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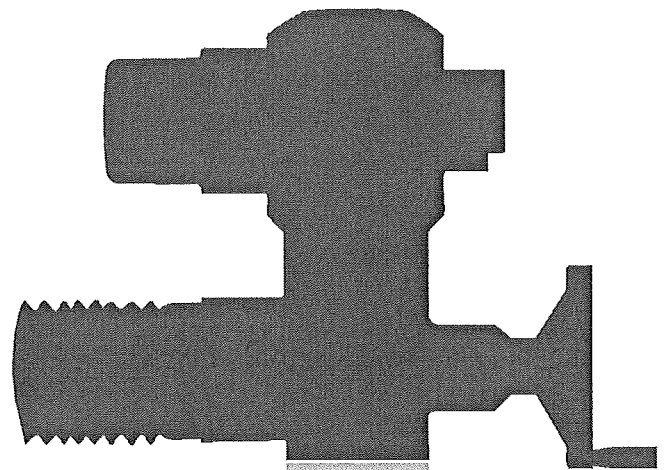
Multi-turn actuators

SA 07.1 - SA 16.1

SAR 07.1 - SAR 16.1

AUMA MATIC

Operation instructions



Certificate Registration No.
12 100 4269

Scope of these instructions:

These instructions are valid for multi-turn actuators SA(R) 07.1 - SA(R) 16.1 with controls AUMA MATIC.
These operation instructions are only valid for "clockwise closing", i.e. driven shaft turns clockwise to close the valve.

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1. Safety instructions

1.1 Range of application

AUMA actuators are designed for the operation of industrial valves, e.g. globe valves, gate valves, butterfly valves and ball valves. For other applications, please consult us. AUMA is not liable for any possible damages 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 Short description

AUMA multi-turn actuators type SA(R) 07.1 - SA(R) 16 have a modular design. Multi-turn actuators are driven by an electric motor and controlled with the electronic controls AUMA MATIC, which are included in the scope of supply. 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 stated by the valve manufacturer.

1.3 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.

1.4 Maintenance

The maintenance instructions (refer to page 30) must be observed, otherwise a safe operation of the actuator is no longer guaranteed.

1.5 Warnings and notes

Non-observance of the warnings and notes may lead to serious injuries or damages. 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. 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.

1.6 Further notes



This pictograph means: Procedure may have been performed by valve manufacturer!

If actuators are delivered mounted to a valve, this step has been done in the valve manufacturer's plant.

Setting must be checked during commissioning!

2. Technical data

2.1 Multi-turn actuator SA(R) 07.1 - SA(R) 16.1

Type of duty: (according to IEC 34-1/ VDE 0530)	SA: SAR:	Standard: Option: Standard:	Short-time duty S2 - 15 min Short-time duty S2 - 30 min Intermittent duty S4 - 25 % ED. Permissible number of starts see Technical data sheet for SAR
Limit switching:		Counter gear mechanism for end positions CLOSED / OPEN	
Torque switching:		Adjustable torque switching for closing and opening direction	
Speeds:		see Technical data sheets for SA and SAR	
Heater in switch compartment:		approx. 5 W, 24 V, internally supplied	
Motors:		3-phase AC motor or 1-phase AC motor	
Motor protection:		Standard: Option:	3 Thermoswitches 3 PTC thermistors + PTC tripping device
Electrical connection:		Standard:	AUMA plug/socket connector 100 with screw cable terminations.
Wiring diagram:		Refer to name plate on AUMA MATIC	
Ambient temperature:	SA: SAR:	-25 °C to + 70 °C -25 °C to + 60 °C	
Enclosure protection: (according to EN 60 529)		Standard: Option:	IP 67 IP 68
Finish coating:		Standard:	two-component iron-mica combination

2.2 Controls AUMA MATIC

Integral controls AUMA MATIC, type AM 01.1 and AM 02.1, for direct fitting to:
Multi-turn actuators AUMA NORM SA(R) 07.1 - SA(R) 16.1

Voltage supply		Refer to name plate
Motor controls	Reversing contactors: Thyristors:	Standard: mechanical, electrical, locked, max. 690V AC, max. 7,5 kW Option: electronically locked, max. 460V AC, max. 1,5 kW
External control voltage		24V DC, galvanically isolated from internal voltage supply
Binary inputs (input signals)	Galvanic isolation: Nominal voltage: Current input:	Standard: OPEN-STOP-CLOSE Option: Switch-over AUTOMATIC-MANUAL ¹⁾ for input signals OPEN-CLOSE Opto-isolators 24 V DC, from internal power supply (max. 50 mA load) or from external source 10 - 15 mA per input
Analogue inputs (option)		see positioner
Relay outputs		– Collective fault signal: Phase failure/ motor protection tripped/ torque fault: Torque switch operated in mid-travel (can be separated, see table 3, page 20) – 4 output relays: End position OPEN / End position CLOSED/ selector switch LOCAL / selector switch REMOTE
Monitor relay (diagnosis LEDs)		– Phase failure, motor protection tripped – Torque fault: Torque switch operated in mid-travel
Analogue output (option)		Position actual value (galvanically isolated) E2 = 0/4 - 20 mA
Positioner (option)		– Input range (position nominal value) E1 = 0/4 - 20 mA Input resistance 250 Ohm – Feedback E2 (position actual value): 0/4 - 20 mA
Emergency operation (EMERGENCY) (option)		Effective in selector switch position LOCAL and REMOTE: – End position OPEN – End position CLOSED
Timer (option)	Parameters:	Stepping time/ pause time independently adjustable (1-30 seconds)
Local controls		Standard: Selector switch LOCAL-OFF-REMOTE, lockable Push-buttons OPEN-STOP-CLOSE Option: Indication lights for end position OPEN, FAULT, end position CLOSED
Enclosure protection		Standard: IP 67 Option: IP 68
Temperature range	SA: SAR:	–25 °C to + 70 °C –25 °C to + 60 °C
Electrical connection		see clause 7, page 10
1) Only in conjunction with the positioner		

3. Additional information to the legend for wiring diagrams

- Information A:** A running indication is possible with blinker transmitter (S5) installed (opening and closing of contacts)
Direction CLOSE: Connections $X_K 6 - X_K 7$
Direction OPEN: Connections $X_K 6 - X_K 8$
The contacts remain closed in the end positions.
When connected to an external PLC the blinking signal can be switched off via the DIP-switches (table 3, page 20).
- Information B:** The type of seating in the end positions is determined by the valve manufacturer through setting the programming switches S1-2 and S3-2 (see subclause 15.2, page 20). The tripping of a torque switch in an intermediate position switches off the actuator and gives a fault signal.
The limit switches serve for signalisation when switching off by torque seating. They need to be set so that the appropriate switch is tripped shortly before reaching the end position. If the torque switch trips before the limit switch, the actuator is switched off and a fault signal is given.
For further programming possibilities, e.g. self-retaining in operation mode REMOTE, see table 3, page 20.
- Information D:** The following faults are registered and can be transmitted to the control room as a potential-free collective fault signal:
- Power failure
- Phase failure
- Motor protection tripped
- Torque switch tripped in mid-travel.
This signal can be switched off in the programming, refer to table 3, page 20.
- Information E:** Input signals according to DIN 19 240.
The nominal current of the inputs $X_K 2$; $X_K 3$ and $X_K 4$ is 10-15 mA. If internal voltage 24 V DC is used for remote control, it must only be connected via potential-free contacts.
- Information F:** In case of wrong phase sequence the rotating field is automatically corrected. In case of a phase failure the actuator stops. This fault is indicated at LED V14 on the interface board. For collective fault signal see information D.
- Information G:** Potential-free contacts are available for signals. The internal control voltage ($X_K 11 / + 24 V$ and $X_K 5 / - 24V$) must not be used for external lamps, relays etc.

4. Transport and storage

- Transport to place of installation in sturdy packing.
- Do not attach ropes or hooks to the handwheel for the purpose of lifting by hoist.
- If multi-turn actuator is mounted on valve, attach ropes or hooks for the purpose of lifting by hoist to valve and not to multi-turn actuator.
- 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 multi-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 bright surfaces, especially of 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 actuator immediately to electrical system, so that condensation is prevented by the heater.

5. Mounting to valve/ gearbox



- Prior to mounting the multi-turn actuator must be checked for damage.
- Damaged parts must be replaced by original spare parts.

Mounting is most easily done with the valve shaft / gearbox shaft pointing vertically upward. But mounting is also possible in any other position.

The multi-turn actuator is delivered ex works in position CLOSED (limit switch CLOSED tripped).

- Check if mounting flange fits the valve/gearbox.

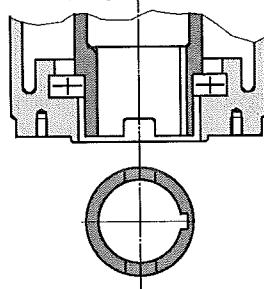


Spigot at flanges should be loose fit!

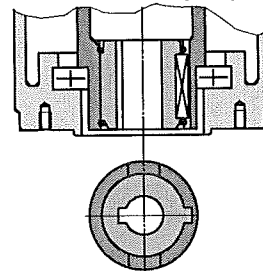
The output drive types B1, B2, B3 or B4 (figure A) are delivered with bore and keyway (usually according to ISO 5210).

Figure A

Output drive type B 1 / B 2
plug sleeve



Output drive type B 3 / B 4
bore with keyway



For output drive type A (figure B), thread must match the thread of the valve stem. If not ordered explicitly with thread, the stem nut is unbored or with pilot bore when delivered. Finish machining of stem nut see below.

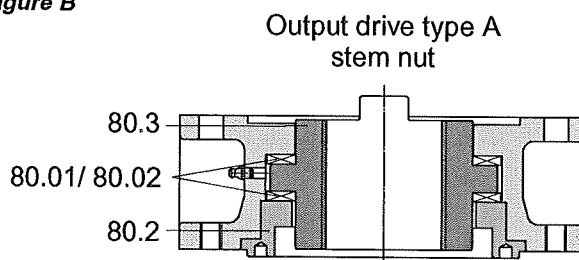
- Check whether bore and keyway match the input shaft of valve/gearbox.
- Thoroughly degrease mounting faces at multi-turn actuator and valve / gearbox.
- Apply a small quantity of grease to input shaft of valve / gearbox.
- Place actuator on valve / gearbox and fasten. Fasten bolts (at least quality 8.8, refer to table 1) evenly crosswise.

Table 1

8.8	T _A (Nm)
M 6	10
M 8	25
M 10	50
M 12	87
M 16	220

Finish machining of stem nut (output drive type A):

Figure B



The output drive flange does not have to be removed from the actuator.

- Remove spigot ring (80.2, figure B) with the help of a wrench or similar tool from the mounting flange.
- Take off stem nut (80.3) together with thrust bearing (80.01) and thrust bearing races (80.02).
- Remove thrust bearing and thrust bearing races from stem nut.
- Drill and bore stem nut and cut thread
When fixing in the chuck, make sure stem nut runs true!
- Clean the machined stem nut.
- Apply ball bearing grease to thrust bearing and races, then place them on stem nut.
- Re-insert stem nut with thrust bearings into the mounting flange. Ensure that dogs are placed correctly in the slots of the hollow shaft.
- Screw in spigot ring until it is firm against the shoulder.
- Press a few squirts of grease into the grease nipple with a grease gun.

Protection tube for rising valve stem

- For protection tubes supplied separately, wire round the thread with hemp or teflon band.
- Screw protection tube into thread and tighten it firmly.
- For corrosion protection KS/ KX, push down the seal to the housing.
- Touch-up possible defects in painting.
- Check whether cap is available and not damaged.

6. Manual operation



Manual operation should only be engaged when motor is not running. Switching over while motor is running may lead to damage at multi-turn actuator (figure C)!

- Lift change-over lever in the center of the handwheel up to max. 85°, while slightly turning the handwheel back and forth until manual drive engages (figure D).

Figure C

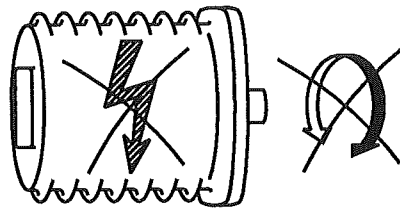
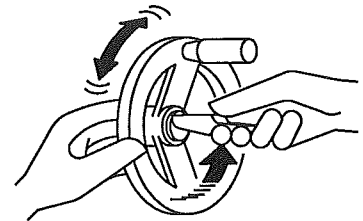


Figure D



Manual force is sufficient for operating the change-over lever. The use of an extension is neither necessary nor permitted. Excessive force may damage the change-over mechanism.

- Release change-over lever (should snap back into initial position by spring action). If change-over lever does not snap back, assist with hand to assure that the lever comes to the initial position (figure E).

Figure E

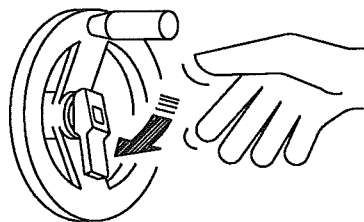
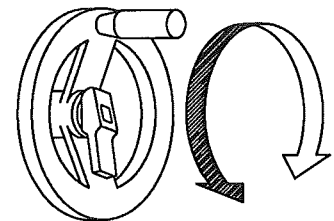


Figure F



- Manual operation remains engaged until motor is started again. Then motor operation is engaged automatically.
- Turn handwheel into desired direction (figure F).



Only operate manually when change-over lever is in its initial position!

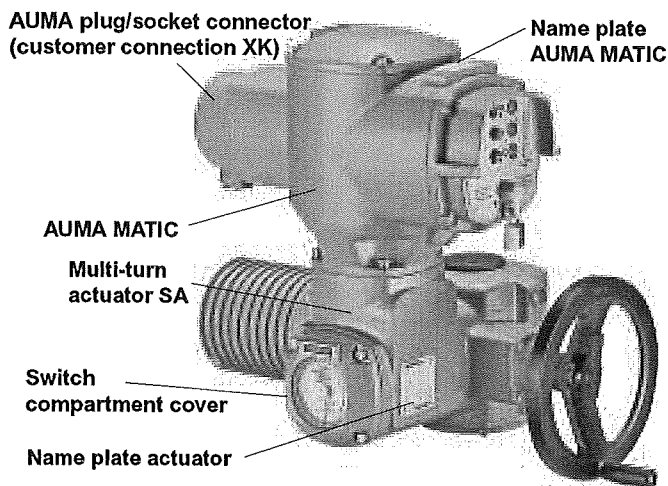
- Manual operation is automatically disengaged when motor is started

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.

Figure G



AUMA actuators SA(R) are operated via the electronic controls AUMA MATIC. The controls may either be mounted directly to the actuator or to a separate wall bracket.

The electrical connection to the power supply is made at a plug / socket connector with screw cable terminations as standard.

When installing the AUMA MATIC on a wall bracket, observe the following points:

- 1) For position feedback an electronic position transmitter (RWG) must be used.
- 2) For the connection of actuator and AUMA MATIC on wall bracket, use additionally suitable flexible and screened connecting cables.

- Check if type of current, supply voltage and frequency correspond to motor data (refer to name plate at motor and AUMA MATIC).
- Remove plug cover (AUMA plug / socket connector) (figure G).
- Loosen screws and remove socket carrier from plug cover.
- Insert cable glands suitable for connecting cables.



- Enclosure protection IP 67 or IP 68 is only ensured if suitable cable glands are used.
- Seal cable entries which are not used with suitable plugs.

7.1 Wiring diagram

- Connect cables according to order related wiring diagram MSP. . . KMS TP The wiring diagram applicable to the actuator is attached to the handwheel in a weather-proof bag, together with the operation instructions. In case the wiring diagram is not available, it can be obtained from AUMA (state commission no., refer to name plate) or downloaded directly from the internet (see page 34).

Additional notes to the references mentioned in the wiring diagram, e.g. >Information A< see clause 3, page 6

cross sections: control cables max. 2,5 mm²,
power cables max. 6 mm².

- Heater for prevention of condensation is internally supplied, unless ordered differently.
- Only the same potential can be switched on the two circuits of the switches. Different potentials require tandem switches. Switches with gold plated contacts (option) may only be loaded with low voltage (< 50 V DC / 400 mA).
- For the connection of position transmitters (potentiometers, RWG) screened cables must be used

7.2 Type of seating



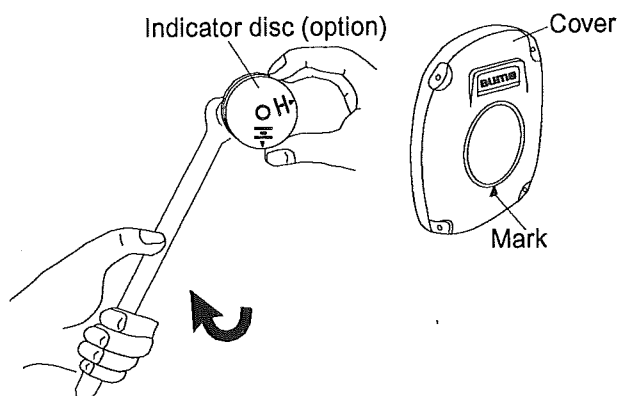
- The valve manufacturer specifies whether switching off in the end positions should be by limit switch (limit seating) or torque switch (torque seating). In case type of seating is to be changed, see programming AUMA MATIC, subclause 15.2, page 20.

- Fit and fasten socket carrier in plug cover.

- Clean sealing faces at plug cover (AUMA plug/socket connector) and check whether O-ring is o.k. Apply a thin film of non-acidic grease (e.g. Vaseline) to the sealing faces.
- Replace cover and fasten 4 bolts evenly crosswise.
- Fasten cable glands firmly to ensure enclosure protection IP 67 or IP 68.

8. Setting of the limit switching

Figure H1



The following instructions are only valid for "clockwise closing", i.e. driven shaft turns clockwise to close the valve.

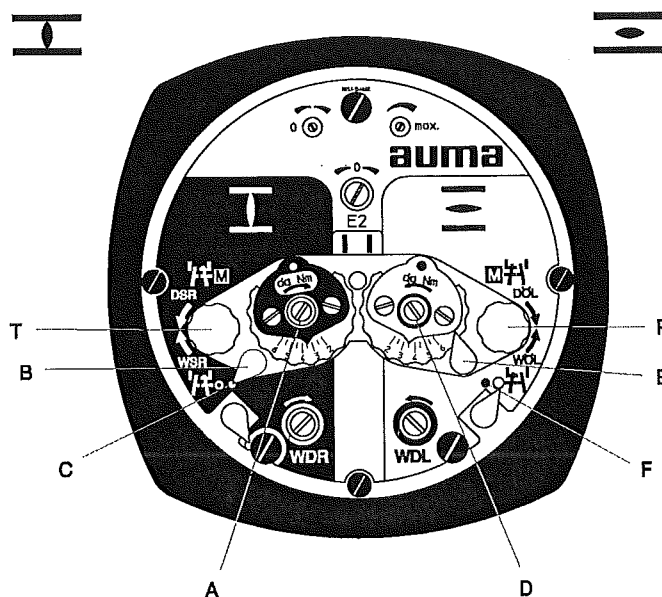
- Engage manual operation as described under clause 6 on page 9.
- Remove switch compartment cover and, if provided, pull off indicator disc (figure H1). Open end spanner (ca. 10 mm) may be used as lever.

8.1 Setting for end position CLOSED (black section)

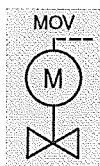


- Turn handwheel clockwise until valve is closed.
- Press down and turn setting spindle A (figure H2) with screw driver (5 mm) in direction of arrow, thereby observe pointer B. While a ratched is felt and heard, the pointer B moves 90° every time. When pointer B is 90° from mark C, continue turning slowly. When pointer B has reached the mark C, stop turning and release setting spindle. In case of having turned too far, continue turning and approach the mark C anew.

Figure H2



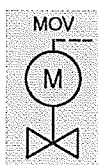
8.2 Setting for end position OPEN (white section)



- Turn handwheel counter-clockwise until valve is open, then turn back approximately 1/2 a turn.
- Press down and turn setting spindle D (figure H3) with screw driver (5 mm) in direction of arrow, thereby observe pointer E. While a ratched 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. In case of having turned too far, continue turning and approach the mark F anew.

Red test buttons T and P (figure H2) serve for operating the microswitches of torque and limit switching.

9. Setting of the DUO-limit switching (Option)



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

Any application can be switched **on** or **off** via the two intermediate position switches. The switch-on / switch-off function is realised through the connection of the appropriate NC and NO contacts.

- Move valve to desired intermediate position.

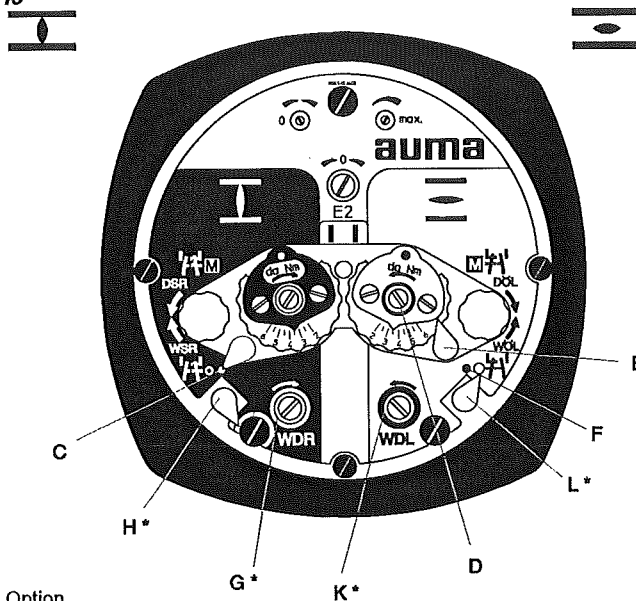
9.1 Setting for direction CLOSE (black section)

- Turn setting spindle G (figure H3) with screw driver (5 mm) in direction of arrow, thereby observe pointer H. While a ratched 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. In case of having turned too far, continue turning and approach the mark C anew.

9.2 Settings for direction OPEN (white section)

- Turn setting spindle K (figure H3) with screw driver (5 mm) in direction of arrow, thereby observe pointer L. While a ratched 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. In case of having turned too far, continue turning and approach the mark F anew.

Figure H3



*) Option

10. Setting of the torque switching

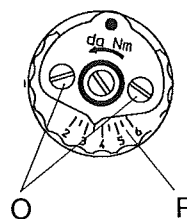
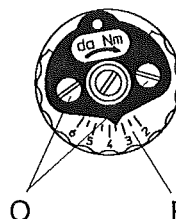


Figure J

- Set torque must suit the valve
- When multi-turn actuator is delivered by a valve manufacturer, setting was made during testing.
- This setting should only be changed with the consent of the valve manufacturer!

Setting CLOSED

Setting OPEN



- Loosen both lock screws O at the torque dial (figure J).
- Turn torque dial P to set it to the required torque (1 da Nm = 10 Nm).

Example:

Figure J shows the following setting:

3,5 da Nm = 35 Nm for direction CLOSE

3,5 da Nm = 35 Nm for direction OPEN

- Tighten lock screws O again



- The torque switches can also be operated in manual operation. With appropriate electrical controls, the tripping of a torque switch is stored and thus a re-starting in a specific direction prevented.
- The torque switching acts as overload protection over full travel, also when stopping in the end positions by limit switch.
- If applicable, press indicator disc on shaft and perform setting as described under clause 12, page 14.
- Clean sealing faces at cover and housing; 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 hex. bolts evenly crosswise.

11. Test run

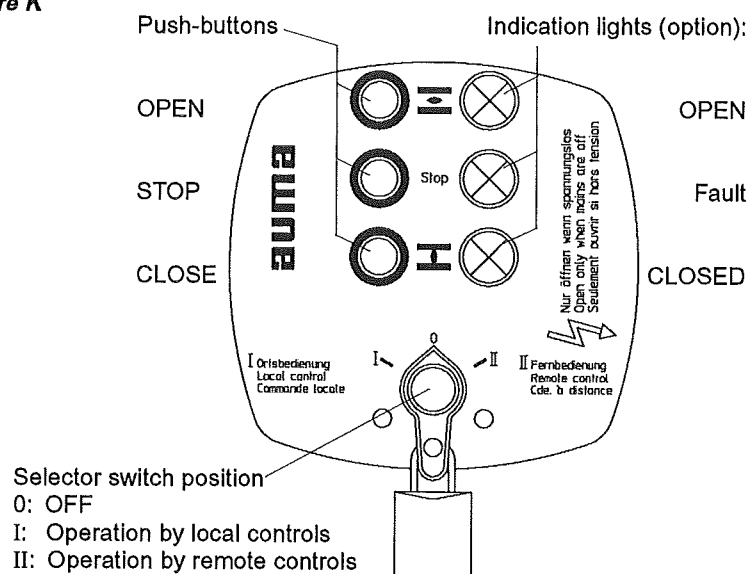
- Set selector switch to position OFF (0) (figure K).
- Switch on supply voltage.
- Engage manual operation as described under clause 6 on page 9.
- Move actuator manually into both end positions of the valve.
- Check whether limit switching is set correctly. Hereby observe that the appropriate switch 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 under clause 8 on page 11.

When limit switching is set correctly:

- Perform test run at local controls with selector switch in position LOCAL (I) via push-buttons (figure K).

Red test buttons T and P (figure M) serve for operating the microswitches of torque and limit switching.

Figure K



12. Setting of mechanical position indicator (option)



Indicator disc rotates approximately 180° at full travel from OPEN to CLOSE or vice versa.

A suitable reduction gearing was installed in our works. If the turns per stroke are changed at a later date, the reduction gearing may have to be exchanged, too.



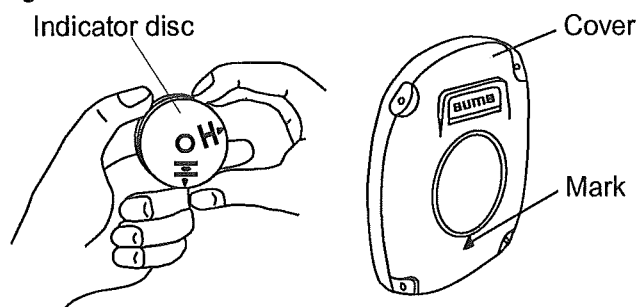
- Move valve to end position CLOSED.
- Turn lower indicator disc until symbol  CLOSED is in alignment with the mark on the cover (figure L).
- Move actuator to end position OPEN.
- Hold lower indicator disc in position and turn upper disc with symbol  OPEN until it is in alignment with the mark on the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

Figure L

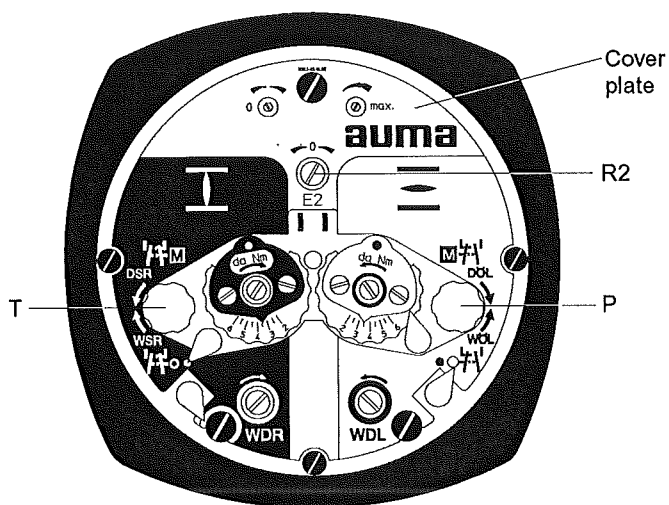
13. Setting of the potentiometer (option)

- Move valve to end position CLOSED.
- Remove switch compartment cover and, if provided, pull off indicator disc as described under clause 8, page 11.
- Turn potentiometer (R2) clockwise to initial position.
End position CLOSED corresponds to 0 %, end position OPEN to 100 %.



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.
- If applicable, press indicator disc on shaft and perform setting as described under clause 12.
- Clean sealing face, check O-Ring, apply a thin film of non-acidic grease to sealing face.
- Fit and fasten switch compartment cover.

Figure M

14. Setting of the electronic position transmitter RWG (option)

– For a remote indication or external control –

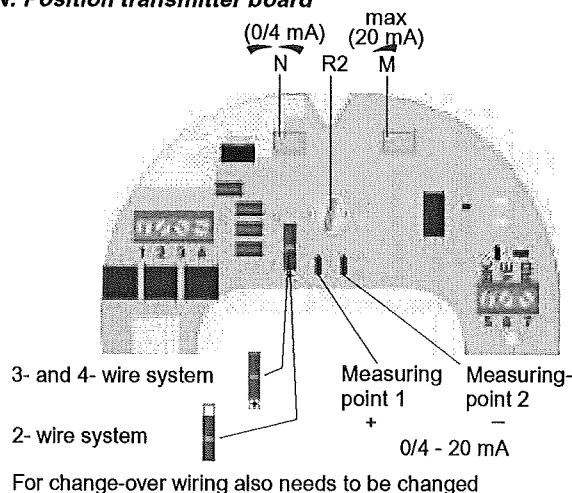
The electronic position transmitter is set in the factory according to the signal range stated in the purchase order. Perform a subsequent adjustment according to subclauses 14.1 or 14.2.

After mounting the actuator to the valve, check setting by measuring the output current at the designated measuring points (see subclause 14.1 or 14.2) and re-adjust, if necessary.

Table 2

Technical data		RWG 4020	
Wiring diagrams		MSP... KMS TP . . 4 / ... (requires 2 external wires) 3-/ 4-wire system	MSP... KMS TP . 4 . / ... MSP... KMS TP . 5 . / ... 2-wire system
Output current	I	0 - 20 mA, 4 - 20 mA	4 - 20 mA
Supply voltage	U _v	internal supply 24 V DC	external supply 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	(U _v - 14 V) / 20 mA

Figure N: Position transmitter board



For inverse operation interchange the connections 7 (red/RD) and 5 (black/BK) at position transmitter board (figure N).

14.1 Setting for 2-wire system 4 - 20 mA and 3- /4-wire system 0 - 20 mA

- Connect voltage to AUMA MATIC.
 - Move valve to end position CLOSED.
 - Remove switch compartment cover and, if provided, pull off indicator disc as described under clause 8, page 11.
 - For actuators with measuring points not accessible, remove cover plate (figure O1).
 - Connect ammeter for 0 - 20 mA to measuring points (figure N, page 16 or figure O1).
- In end position CLOSED of 3- or 4-wire system, the value must be 0 mA, for 2-wire system it must be 4 mA after setting.



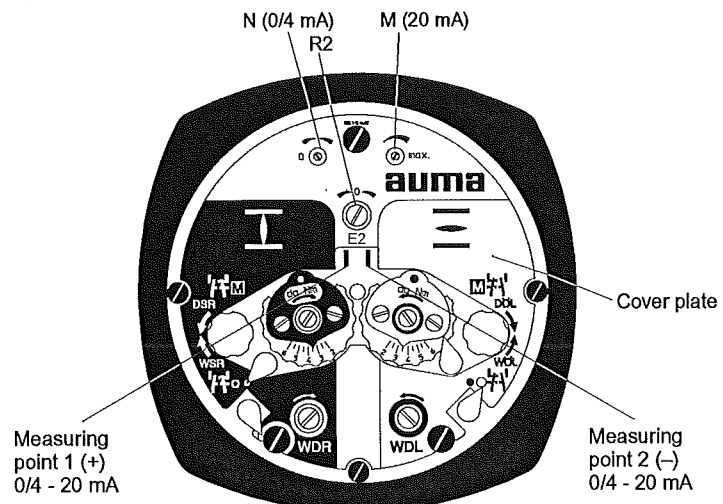
The circuit (external load) must be connected (observe max. ext. resistance R_B), or the appropriate poles at the AUMA plug/socket connector must be linked (refer to wiring diagram MSP...KMS TP...), otherwise it is not possible to measure a value.

- Turn potentiometer (R2) clockwise to initial position.
- Turn potentiometer (R2) whilst decreasing output signal until stop is felt.
- Turn trimmer potentiometer (N) clockwise until output current starts to increase.
- Turn back trimmer potentiometer (N) until a residual current of approx. 0,1 mA (or 4,1 mA in case of 2-wire system) is reached. This ensures that the signal remains above the dead and live zero point.
- Move valve to end position OPEN.
- Set to end value 20 mA with trimmer potentiometer (M).
- Approach end position CLOSED anew and check minimum value (0 mA or 4 mA). If necessary, correct the setting.
- In case cover plate (figure O1) has been removed, fit anew.
- If applicable, press indicator disc on shaft and perform setting as described under clause 12, page 14.
- Clean sealing face, check O-Ring, apply a thin film of non-acidic grease to sealing face.
- Fit and fasten switch compartment cover.



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

Figure O1



14.2 Setting for 3- / 4- wire system 4 - 20 mA



- Connect voltage to AUMA MATIC.
- Move valve to end position CLOSED.
- Remove switch compartment cover and, if provided, pull off indicator disc as described under clause 8, page 11.
- For actuators with measuring points not accessible, remove cover plate (figure O2).
- Connect ammeter for 0 - 20 mA to measuring points (figure N, page 16 or figure O2).



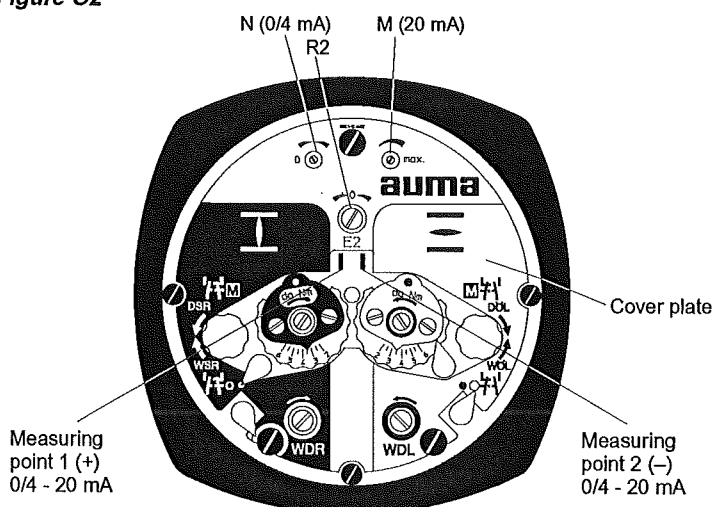
The circuit (external load) must be connected (observe max. ext. resistance R_B), or the appropriate poles at the AUMA plug/socket connector must be linked (refer to wiring diagram MSP...KMS TP...), otherwise it is not possible to measure a value.

- Turn potentiometer (R2) clockwise to initial position.
Turn potentiometer (R2) whilst decreasing output signal until stop is felt.
- Turn trimmer potentiometer (N) clockwise, until output current starts to increase.
- Turn back potentiometer (N), until a rest current of approx. 0,1 mA is reached.
- Move valve to end position OPEN.
- Set to end value 16 mA with trimmer potentiometer (M).
- Move valve to end position CLOSED.
- Set potentiometer (N) 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.
- In case cover plate (figure O2) has been removed, fit anew.
- If applicable, press indicator disc on shaft and perform setting as described under clause 12, page 14.
- Clean sealing face, check O-Ring, apply a thin film of non-acidic grease to sealing face.
- Fit and fasten switch compartment cover.



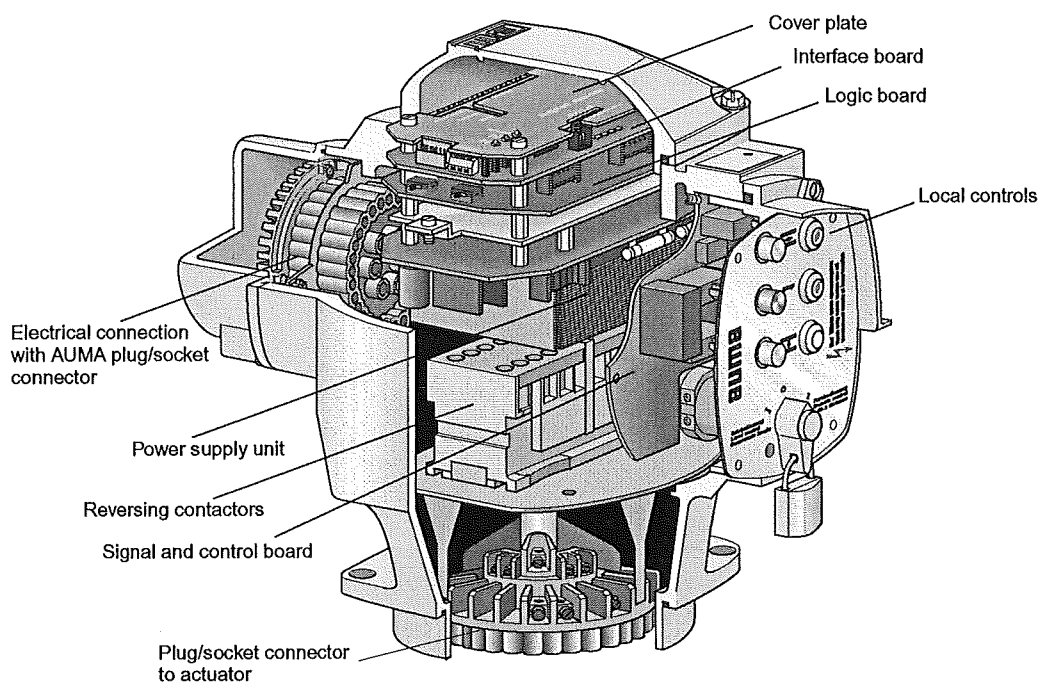
If the maximum value can not be reached, the selection of the reduction gearing must be checked.

Figure O2



15. Programming AUMA MATIC

Figure P: AUMA MATIC standard version

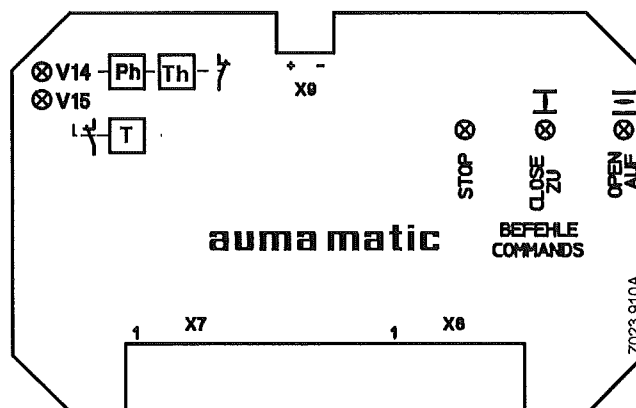


15.1 Functions of the diagnosis LEDs on the interface board (standard version)

V14 is illuminated: Phase failure, motor protection tripped,

V15 is illuminated: Torque fault: torque switch operated in mid-travel

Figure Q1: Cover plate above interface board



LEDs STOP, CLOSE, OPEN

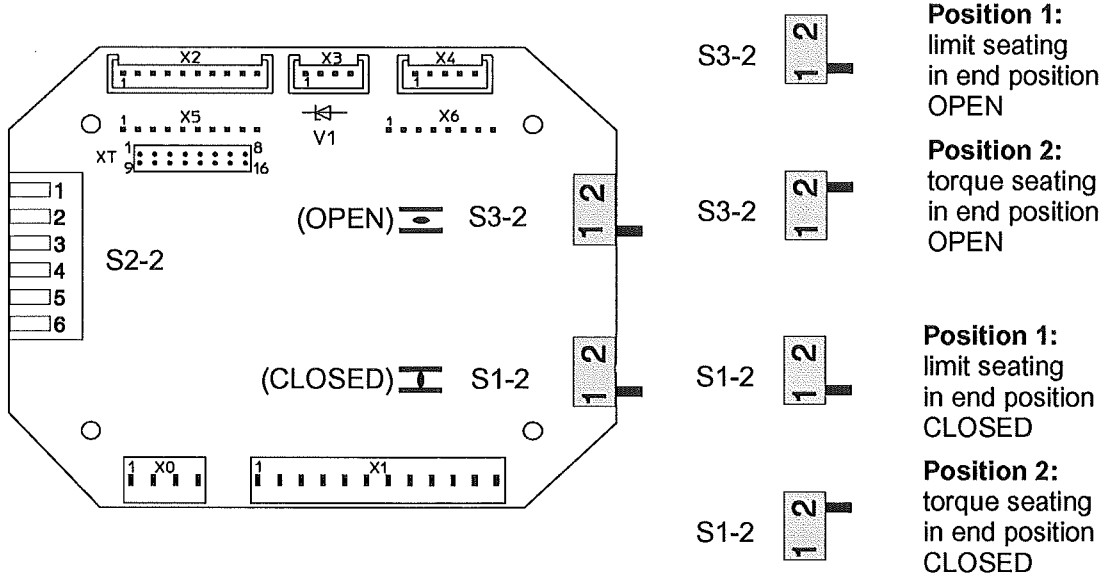
indicate available remote control commands.

15.2 Programming of the logic board



The type of seating - limit or torque seating - (switch S1-2 and switch S3-2, figure Q2) must be determined by the valve manufacturer.

Figure Q2: Logic board A2



- Set desired programming according to table 3 at the switch S2-2.

Tabelle 3

DIP switch S2-2	Programming (ON = pushed down)	
	Direction CLOSE	Direction OPEN
Self-retaining REMOTE	OFF ON	OFF ON
Push-to-run operation REMOTE	OFF ON	OFF ON
Self-retaining LOCAL	OFF ON	OFF ON
Push-to-run operation LOCAL	OFF ON	OFF ON
	activated	deactivated
Blinker transmitter	OFF ON	OFF ON
	included	not included
Torque switch operated in mid-travel within collective fault signal	OFF ON	OFF ON

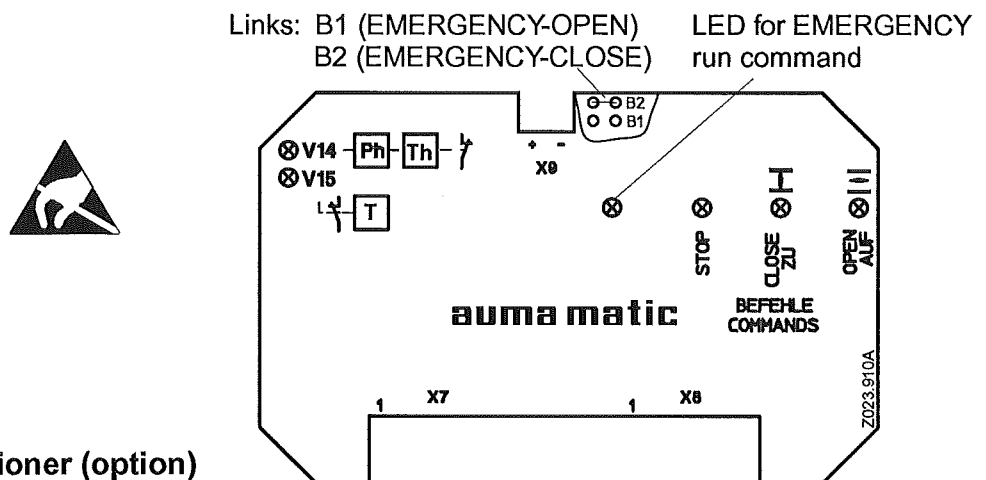
15.3 EMERGENCY-OPEN and EMERGENCY-CLOSE signal (option)

(5. digit in wiring diagram MSP ... C, D or P)

When an EMERGENCY run command is given the actuator operates the valve to the predetermined end position.

- The input at terminal $X_K 1$ (refer to wiring diagram) must be connected to an NC-contact (closed circuit principle) at + 24 V DC.
- If EMERGENCY-OPEN or EMERGENCY-CLOSE signal is generally not desired:
Disconnect links B1 (for EMERGENCY-CLOSE) and B2 (for EMERGENCY-OPEN).

Figure R: Cover plate for option EMERGENCY-OPEN or EMERGENCY-CLOSE

**16. Electronic positioner (option)****16.1 Technical data**

Command signal (input signal E1, nom. value)	0/4 - 20 mA (option 0 - 5 V)
Feedback (input signal E2, actual value)	0/4 - 20 mA (option 0 - 5 V)
Sensitivity (dead band) ΔE (P9)	0,5 % - 2,5 %
Fine adjustment sensitivity "Sens" (P7) (only useful for output speeds <16 1/min)	min 0,25 %
Time delay " t_{off} " (P10)	0,5 - 10 s
Input resistance	250 Ohm
Operation in stepping mode:	
Running time " t_{on} " (P8) effective until error variable ≤ 25 %; then set value automatically reduces by factor 3.	0,5 - 15 s

16.2 Setting

The positioner in the AUMA MATIC is programmed according to the order details and is set together with the actuator prior to delivery. Due to peculiarities of the regulating system not known beforehand, a readjustment may become necessary. Before adjusting the positioner, the programming of the positioner should be checked.

- Remove 4 screws at cover AUMA MATIC (figure P, page 19) and take off cover.
- Check programming of the logic board according to subclause 15.2.



Self-retaining REMOTE must be switched off with positioner.

- Take off cover plate (figure S2) and carry out required programming at positioner board (figure S1) according to table 4. For values of command signal E1 and feedback E2, see sticker on cover plate (figure S2). The behaviour of the actuator in case of loss of the command signal E1 and / or the feedback signal E2 can be set on the positioner board by DIP-switches. The complete range of choices, however, is only available with signals 4 - 20 mA.



Prior setting it must be ensured that the circuit for the position feedback E2 (see wiring diagram MSP... KMS TP...) is closed (measuring device or link). In case of missing signal E2 the LED V10 "E1/E2 < 4 mA" (figure S2) is on and the positioner does not respond.

Figure S1: Positioner board A7

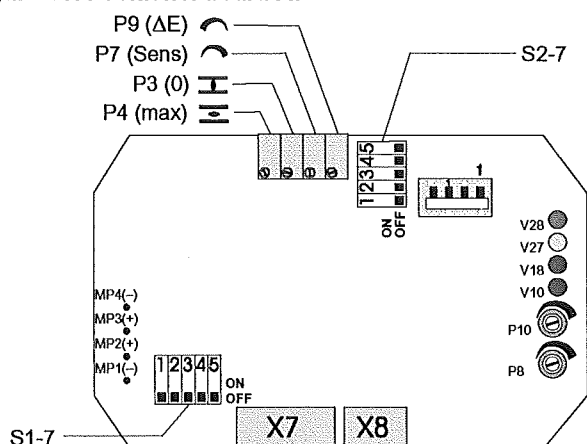


Figure S2: Cover plate positioner

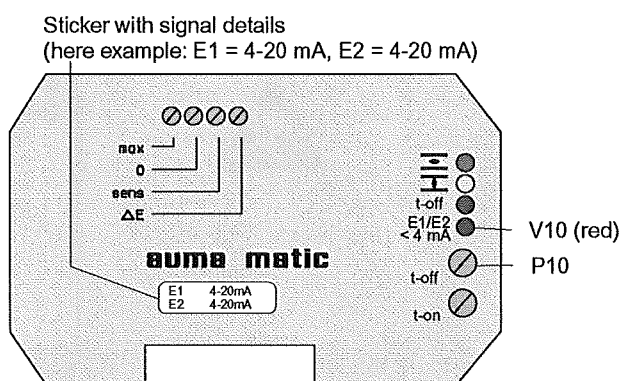


Table 4: Recommended settings

Actuator behaviour on loss of signal E1 and/ or E2	Condition		Programming (Figure S1)	
	Command signal nominal value E 1	Feedback signal Actual value E 2 ¹⁾	S1-7 (type of signal)	S2-7 (behaviour)
fail as is , i.e. actuator stops immediately and remains in this position	4 - 20 mA ^{3) 4)}	4 - 20 mA ^{3) 4)}		
fail close , i.e. actuator moves the valve to the end position CLOSED	4 - 20 mA ⁴⁾	4 - 20 mA ⁴⁾		
fail open , i.e. actuator moves the valve to the end position OPEN	4 - 20 mA ⁴⁾	4 - 20 mA ⁴⁾		
Stepping mode	other programming see above			
Split Range version (option)	other programming see above			

1) 3) 4) refer to table 5

Table 5: Further possible settings

Different actuator behaviour on loss of signal		Condition		Programming (Figure S1)	
E1	E2	Command signal nominal value E 1	Feedback signal Actual value E 2 ¹⁾	S1-7 (type of signal)	S2-7 (behaviour)
fail as is	fail open	4 - 20 mA ⁴⁾	0 - 5 V ^{2) 4)}		
fail close	fail as is	0 - 20 mA	4 - 20 mA ⁴⁾		
		0 - 10 V	4 - 20 mA ⁴⁾		
	fail open	0 - 20 mA	0 - 20 mA		
		0 - 20 mA	4 - 20 mA ⁴⁾		
		0 - 20 mA	0 - 5 V ²⁾		
		4 - 20 mA ⁴⁾	0 - 5 V ²⁾		
		0 - 5 V ²⁾	0 - 5 V ²⁾		
		0 - 10 V	0 - 5 V ²⁾		
		0 - 20 mA	4 - 20 mA ⁴⁾		
		0 - 5 V ²⁾	4 - 20 mA ⁴⁾		
fail open		4 - 20 mA	0 - 20 mA		
		4 - 20 mA ⁴⁾	0 - 5 V ²⁾		

1) Internal feedback signals: 0/4 - 20 mA from electronic position transmitter or 0 - 5 V from precision potentiometer 5 k Ω

2) On loss of E 1 or E 2 there may be a misinterpretation, since E 1 or E 2 can also be functional (without fault) with signal < 4 mA (end position CLOSED = 0 V or 0 mA).

3) For version with external change-over analogue/binary (option): additional emergency operation command for both directions possible (see page 21, subclause 15.3)


4) Only with Life-Zero signal (e.g. 4 - 20 mA)

Values are not valid for inverse operation or for feedback of E2.

16.3 Positioner adjustment end position CLOSED (standard version)










Prior to the positioner setting it has to be ensured that the limit and torque switching of the actuator (clauses 8-10, pages 11-13) as well as the position feedback (clauses 13-14, pages 15-18) have been set.

- Set selector switch (local controls) to position LOCAL.
- Run multi-turn actuator by pressing push-button  to end position CLOSED.
- Supply nominal value E1 of 0 or 4 mA (see wiring diagram).
- Turn potentiometer P10 (t_{off}) counter-clockwise to the stop (figure S2).











Missing signals E1/E2 or wrong polarity are indicated by LED V10 "E1/E2 < 4 mA" (figure S2)

- Connect Voltmeter to measuring points MP3 and MP4 (figure S3) for measuring the nominal value (0 - 5 V) .
For a nominal value E1 of 0 mA the Voltmeter shows 0 V.
For a nominal value E1 of 4 mA the Voltmeter shows 1 V.
In case nominal value (0 V or 1 V) is not correct:
Correct nominal value signal in control room.
- Connect Voltmeter to measuring points MP2 and MP1 for measuring the actual value signal. For an actual value E2 of 0 mA the Voltmeter shows 0 V. For an actual value E2 of 4 mA the Voltmeter shows 1 V.
If measured value is not correct:
Adjust position feedback signal according to clauses 13 and 14.

If	Possible LED indication: (refer to figures S3 and S4)	Then	Required setting in end position CLOSED (refer to figures S3 and S4)
	LEDs are not illuminated		Turn potentiometer "0" (P3) slightly clockwise until LED  (V27 yellow) lights up.
	LED  (V28 green) is illuminated		Turn potentiometer "0" (P3) slightly clockwise until LED  (V28 green) goes out and LED  (V27 yellow) lights up.
	LED  (V27 yellow) is illuminated		Turn potentiometer "0" (P3) counter-clockwise until LED  (V27 yellow) goes out. Then turn potentiometer "0" (P3) slightly clockwise until LED  (V27 yellow) lights up again.

16.4 Positioner adjustment end position OPEN (standard version)

- Run multi-turn actuator by pressing push-button  (local controls) to end position OPEN.
- Connect Voltmeter to measuring points MP2 and MP1 for measuring of the actual value E2. When position feedback is set correctly the Voltmeter shows 5 V.
If measured value is not correct:
Adjust position feedback signal according to clauses 13 and 14 and continue with page 23, subclause 16.3.
- Connect max. command signal (nominal value E1) = 20 mA.
- Connect Voltmeter to measuring points MP3 and MP4 for measuring the nominal value E1. For a nominal value of 20 mA the Voltmeter shows 5 V.
If measured value is not 5 V:
Check the externally supplied command signal E1.

If	LED indication: (refer to figures S3 and S4)	Then	Required setting in end position OPEN: (refer to figures S3 and S4)
	LEDs are not illuminated		Turn potentiometer "max" (P4) slightly counter-clockwise until LED  (V28 green) lights up.
	LED  (V28 green) is illuminated		Turn potentiometer "max" (P4) clockwise until LED  (V28 green) goes out. Then turn potentiometer "max" (P4) slightly counter-clockwise until LED  (V28 green) lights up again.
	LED  (V27 yellow) is illuminated		Turn potentiometer "max" (P4) slightly counter-clockwise until LED  (V27) goes out and LED  (V28 green) lights up.

16.5 Setting of the sensitivity

- Set selector switch at local controls (figure P, page 19) to position REMOTE.
- Set command signal E1 according to sticker on cover plate (see figure S4). The sensitivity (ΔE / dead band) is set to maximum value (2,5 %) in the factory.
- The sensitivity can be improved or the dead band reduced by turning potentiometer ΔE (P9) counter-clockwise. For a precise setting of the sensitivity, a set point device with accuracy in the 0,1 mA range is required.
- For actuators with $n < 16 \text{ min}^{-1}$ a better sensitivity ($\Delta E_{\min} = 0,25 \%$) can be achieved by turning the potentiometer P7 (sens) clockwise.



When setting ΔE the following must be observed:
If the number of starts is too high, this will lead to unnecessary wear at the valve and actuator. Therefore the maximum possible dead band acceptable for the process must be set.

- To prevent exceeding the max. permissible number of starts (refer to Technical data sheet SAR) in extreme cases, a time delay between 0,5 s (left stop) and 10s (right stop) may be set with potentiometer t-off (P10).

Figure S3: Positioner board A7

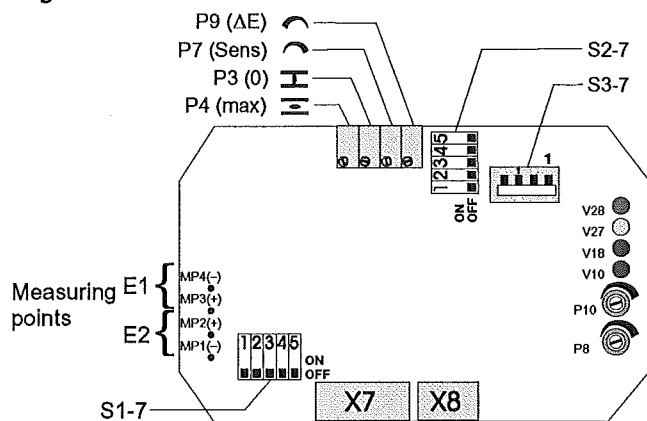
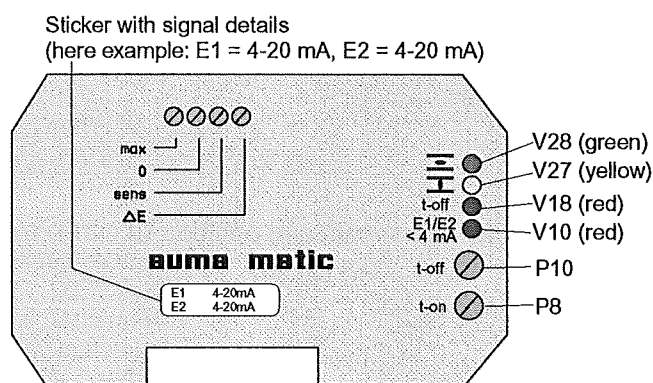


Figure S4: Cover plate positioner




16.6 Positioner adjustment end position OPEN (inverse operation)

In standard version the maximum input signal ($E1 = 20 \text{ mA}$) results in operation to end position OPEN.

- By switching the code switch S3-7 (figure S3) to position "1" an inversion of this signal definition (inverse operation) can be achieved.
- Additionally, the connections 7 (red/RD) and 5 (black/BK) at the position transmitter board (internal position feedback) in the actuator (figure N, page 16) must be interchanged.



Prior to the positioner setting it has to be ensured that the limit and torque switching of the actuator (clauses 8-10, pages 11-13) as well as the position feedback (clauses 13-14, pages 15-18) have been set.








- Set selector switch (local controls) to position LOCAL.
- Run actuator with push-button  to end position OPEN.
- Supply nominal value E1 of 0 or 4 mA (see wiring diagram).

- Turn potentiometer P10 (t_{off}) counter-clockwise up to the stop (figure S4).











Missing signals E1/ E2 or wrong polarity are indicated by LED V10 "E1/E2 < 4 mA" (figure S4)

- Connect Voltmeter to measuring points MP3 and MP4 (figure S3) for measuring the nominal value (0 - 5 V).
For a nominal value E1 of 0 mA the Voltmeter shows 0 V.
For a nominal value E1 of 4 mA the Voltmeter shows 1 V.
In case nominal value (0 V or 1 V) is not correct:
Correct nominal value signal in control room.
- Connect Voltmeter to measuring points MP2 and MP1 for measuring the actual value signal.
For an actual value E2 of 0 mA the Voltmeter shows 0 V.
For an actual value E2 of 4 mA the Voltmeter shows 1 V.
If measured value is not correct: Adjust position feedback according to clauses 13 and 14.

If	Possible LED indications: (refer to figures S3 and S4)	Then	Required setting in end position OPEN: (refer to figures S3 and S4)
	LEDs are not illuminated		Turn potentiometer "0" (P3) slightly clockwise until LED  (V28 green) lights up
	LED  (V27 yellow) is illuminated		Turn potentiometer "0" (P3) slightly clockwise until LED  (V27 yellow) goes out and LED  (V28 green) lights up.
	LED  (V28 green) is illuminated		Turn potentiometer "0" (P3) counter-clockwise until LED  (V28 green) goes out. Then turn potentiometer "0" (P3) slightly clockwise until LED  (V28 green) lights up again.

16.7 Positioner adjustment end position CLOSED (inverse operation)

- Run actuator with push-button  (local controls) to end position **CLOSED**.
- Connect Voltmeter to measuring points MP2 and MP1 for measuring of the actual value E2. When position feedback is set correctly the Voltmeter shows 5 V.
If measured value is not correct:
Adjust position feedback signal according to clauses 13 and 14.
- Connect max. command signal (nominal value E1) = 20 mA.
- Connect Voltmeter to measuring points MP3 and MP4 for measuring the nominal value E1. For a nominal value of 20 mA the Voltmeter shows 5 V.
If measured value is not 5 V:
Check the externally supplied command signal E1.

If	LED indication: (refer to figures S3 and S4)	Then	Required setting in end position OPEN: (refer to figures S3 and S4)
	LEDs are not illuminated		Turn potentiometer "max" (P4) slightly counter-clockwise until LED  (V27 yellow) lights up.
	LED  (V27 yellow) is illuminated		Turn potentiometer "max" (P4) clockwise until LED  (V27 yellow) goes out. Then turn potentiometer "max" (P4) slightly counter-clockwise until LED  (V27 yellow) lights up again.
	LED  (V28 green) is illuminated		Turn potentiometer "max" (P4) slightly counter-clockwise until LED  (V28 green) goes out and LED  (V27 yellow) lights up.

16.8 Positioner in Split Range version (option)

For Split Range a modified version of the positioner is used. The standard version is not suitable for Split Range operation.

16.8.1 Split Range: description of functions

Split Range allows the adaptation of the positioner to nominal value ranges which are for example necessary to individually control several actuators (up to 4 actuators) with the same nominal value signal. Typical values for 2 actuators are 0 - 10 mA and 10 - 20 mA or 4 - 12 mA and 12 - 20 mA. But all other values between 0/4 - 20 mA can also be set and adjusted.

16.8.2 Programming

Programming of the positioner at the code switches S1-7, S2-7, S3-7 can, with one exception, be performed in the same manner as for normal operation.



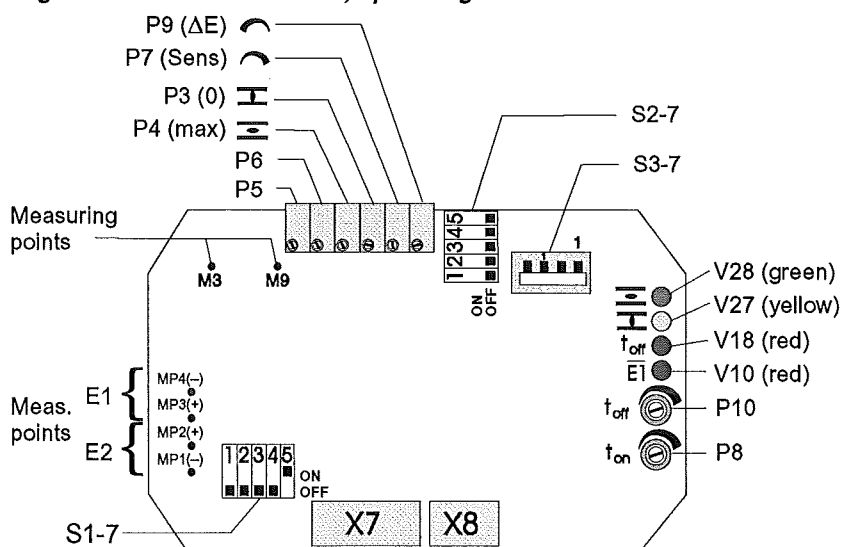
Switch S1-7 DIP 5 at code switch S1-7 must always be in position ON for Split Range version.

16.8.3 Positioner adjustment for Split Range

(See also example on page 28)

- Supply the specified minimum input signal (nominal value E1) for the positioner and check by measuring with Voltmeter at the measuring points MP3 and MP4 (figure T).
- Connect voltmeter to measuring points M3 and MP1.
Calculate setting value:
Initial value = $E \cdot 1_{\min}$ [in Ampere] x 250 Ohm
Set initial value with potentiometer P5.
- Supply specified maximum command signal (nominal value E1) and check by measuring at the measuring points MP3 and MP4.
- Connect voltmeter between measuring point M9 and measuring point MP1. Set 5 V with potentiometer P6.
- Supply input signal E1 from minimum to maximum value and check the set range 0 - 5 V at measuring point M9. If necessary, readjust with P5 or P6.
- Apply the same procedure to the second actuator's positioner and set according to the specified nominal value E1.
- After setting for Split Range operation, perform further readjustment as described in subclause 16.3, page 23.

Figure T: Positioner board A7, Split Range version



Example:

Two actuators are to be operated in Split Range version. Actuator 1 must be in position CLOSED with a nominal value signal E1 of 0 mA, and in position OPEN with a signal of 10 mA.

Actuator 2 must be in position CLOSED with a nominal value signal of 10 mA, and in position OPEN with a signal of 20 mA.

- Positioner actuator 1:
Supply E1 = 0 mA, set with P5 = 0 V at M3, supply E1 = 10 mA, set with P6 = 5V at M9.
- Positioner actuator 2:
Supply E1 = 10 mA, set with P5 = 2,5 V at M3, supply E1 = 20 mA, set with P6 = 5V at M9.
- Perform adjustments and settings for E2 etc. Afterwards the nominal value E1 can be transmitted through both actuators (can be connected in series). When operating within range E1 = 0 - 10 mA the actuator 1 moves, actuator 2 remains in end position CLOSED. When operating within range E1 = 10 - 20 mA the actuator 2 moves, actuator 1 remains in end position OPEN.

17. Timer (option)

With the timer board the operating time can be increased for the entire or any portion of the valve travel.

Example:

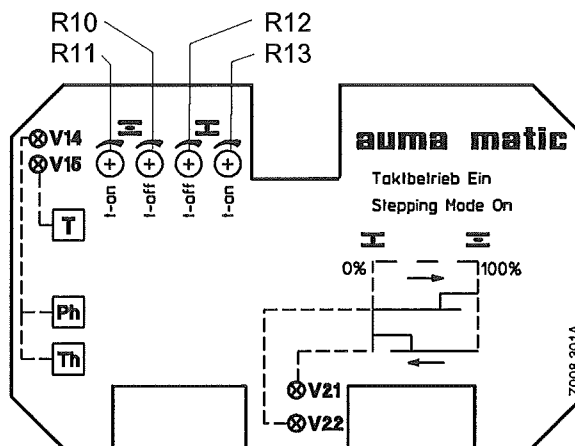
In order to avoid water hammer in long pipelines, stepping mode can be chosen for each part of the travel.

- The timer is installed in the AUMA MATIC instead of the interface board (figure P, page 19).
- Electronic timer is not possible in combination with positioner.

17.1 Function of the diagnosis LEDs (timer)

V14 is illuminated:	Phase failure and/ or motor protection tripped,
V15 is illuminated:	Torque fault: Torque switch operated in mid-travel
V21 is illuminated:	Stepping mode in direction CLOSE switched on
V22 is illuminated:	Stepping mode in direction OPEN switched on

Figure U: Cover plate timer A1.6



17.2 Setting of the timer

Start and end of stepping mode can be set via:

- Intermediate position switches of the DUO limit switching, (clause 9, page 12)
- or external switch (use potential-free contacts)

ON and OFF times can be set independently of each other between 1 - 30 seconds at the 4 potentiometers R10 to R13.

Clockwise rotation:	Time extension
Counter-clockwise rotation:	Time reduction

R10 (t-off)		:	OFF time in direction OPEN
R11 (t-on)		:	Running time in direction OPEN
R12 (t-off)		:	OFF time in direction CLOSE
R13 (t-on)		:	Running time in direction CLOSE

18. Fuses

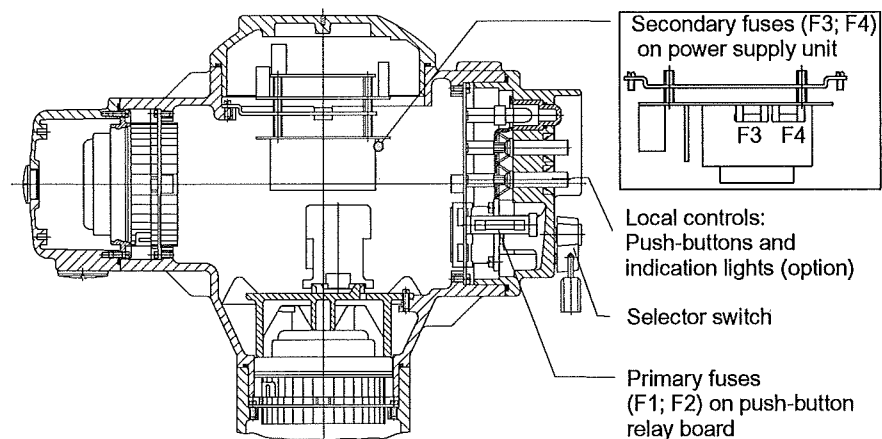


Disconnect actuator from the mains before changing the fuses.



Fuses (figure V) are accessible after removal of the local control cover.

Figure V



Fuses: (figure V)	F 1 / F 2	F 3	F 4
Size	6,3 x 32 mm	5 x 20 mm	5 x 20 mm
with reversing contactors	1 A T; 250 V	500 mA T	1,6 A T
with thyristors	16 A FF; 250 V	500 mA T	1,6 A T

19. Maintenance

After commissioning, check for damages on paint of multi-turn actuator. Do a thorough touch-up to prevent corrosion. Original paint in small quantities can be supplied by AUMA.

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

Seals made of elastomers are subject to aging and must therefore regularly be checked and, if necessary, 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:

- If operated seldom, 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 actuator and valve/gearbox for tightness. If required, re-tighten applying the torques given in table 1, page 8.
- For multi-turn actuators with output drive type A: at intervals of approx. 6 months press in several squirts of ball bearing grease at the lubrication nipple with grease gun.



We recommend to use original AUMA lubricants

The gear housing is filled with lubricant in the factory.
A grease change is recommended after the following operation time:

- If operated seldom after 10 - 12 years
- If operated frequently after 6 - 8 years



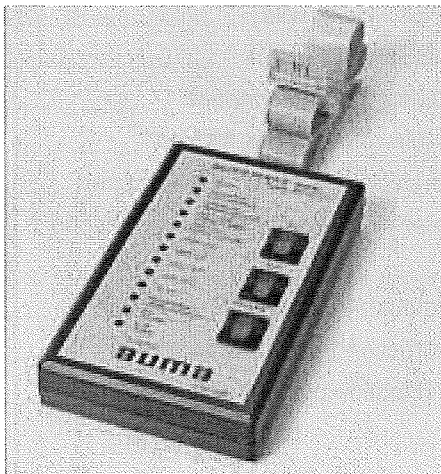
Lubrication of the valve stem must be done separately.

20. Tester for AUMA MATIC

The tester MT 01.1 (article no.: Z008.748) can be used for commissioning and for trouble-shooting.

The tester is not included in the scope of supply of the AUMA MATIC.

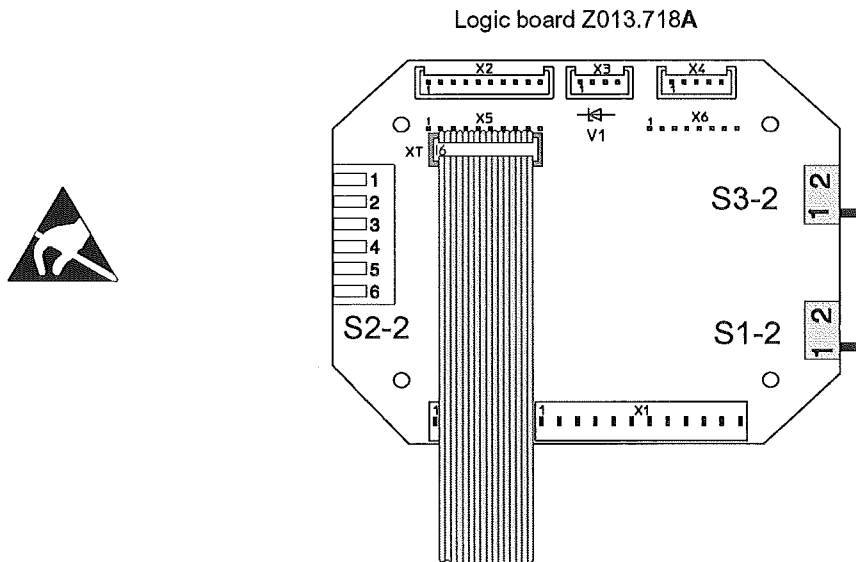
Figure W: Tester MT 01.1



- Switch off supply voltage.
- Remove cover of AUMA MATIC.
- Completely remove interface board and/or position transmitter or positioner board with cover plate (figure P, page 19).

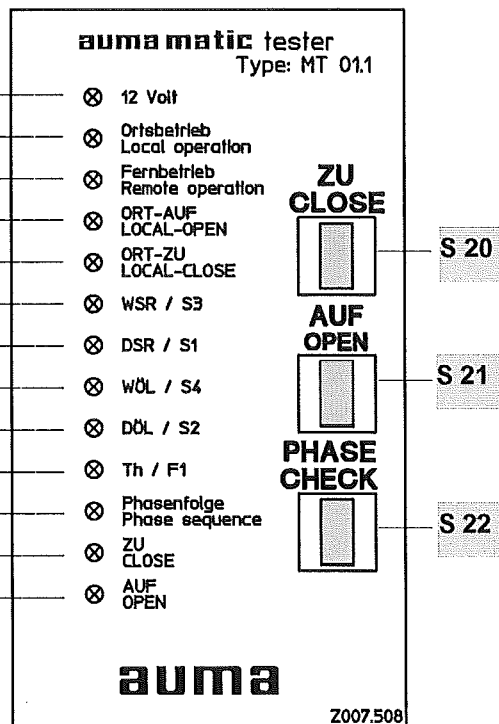
- Plug tester plug into socket X5 on logic board (figure X).
- Switch on supply voltage.

Figure X: Connection tester MT 01.1 on logic board



Diodes are illuminated if:

- Internal voltage 12V is available ¹⁾ _____
- Selector switch is in position LOCAL _____
- Selector switch is in position REMOTE _____
- LOCAL control command OPEN is available _____
- LOCAL control command CLOSE is available _____
- Limit switch closing (clockwise rotation) has tripped _____
- Torque switch closing (clockwise rotation) has tripped ²⁾ _____
- Limit switch opening (counter-clockwise rotation) has tripped _____
- Torque switch opening (counter-clockwise rotation) has tripped ²⁾ _____
- Thermoswitch has tripped _____
- All phases are connected and push-button S 22 is pushed ³⁾ _____
- Actuator is driven in closing direction by push-button S 20 _____
- Actuator is driven in opening direction by push-button S 21 _____



1) If internal voltage 12 V is missing, check fuses in AUMA MATIC, refer to clause 18, page 30.

2) If LEDs "DSR" and "DÖL" are illuminated, check the setting of the torque switching according to clause 10, page 13.

3) For old logic board (delivery before March 2000): phase sequence correct

21. Declaration of Conformity and Declaration of Incorporation

auma®**Declaration of Incorporation
according to EC - Machinery Directive 89/392/EEC
article 4 paragraph 2 (Annex II B)**

AUMA multi-turn actuators of the type ranges

SA 07.1 - SA 48.1
SAR 07.1 - SAR 30.1
SA Ex 07.1 - SA Ex 40.1
SAR Ex 07.1 - SAR Ex 16.1
in versions AUMA NORM,
AUMA SEMIPACT, AUMA MATIC,
or AUMA MATIC PROFIBUS

are designed and produced, as electrical actuating devices, to be installed on industrial valves. WERNER RIESTER GmbH & Co. KG (manufacturer) declares herewith, that when designing the above mentioned electric AUMA multi-turn actuators the following standards were applied:

EN 292 -1
EN 292 -2
EN 50 014
EN 50 018
EN 50 019
EN 50 020
EN 60 204 -1

AUMA multi-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.

auma®
WERNER RIESTER GmbH & Co. KG
Armaturen- und Maschinenbau
P.O. Box 13 62 • 73373 Mühlheim / Germany
Tel 07831 / 809-0 • Fax 07831 / 13218

Mühlheim, December 19, 1996

W. Rieger
Werner Rieger, Managing Director

auma®**EU - 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 multi-turn actuators of the type range

SA 07.1 - SA 48.1
SAR 07.1 - SAR 30.1
SA Ex 07.1 - SA Ex 40.1
SAR Ex 07.1 - SAR Ex 16.1
in versions AUMA NORM,
AUMA SEMIPACT, AUMA MATIC

are designed and produced to be installed on industrial valves.

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

- Directive on Electromagnetic Compatibility (EMC) (89/336/EEU)
- Low-Voltage Equipment Directive (73/23/EEU)

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

a) concerning the Directive on Electromagnetic Compatibility
Emissions: EN 50081-2: 1983
Immunity: EN 50082-2: 1986
From 08.97: EN 51800-3

b) concerning the Low-Voltage Equipment Directive
EN 60204-1
EN 60334-1
VDE 0100 Part 410

auma®
WERNER RIESTER GmbH & Co. KG
Armaturen- und Maschinenbau
P.O. Box 13 62 • 73373 Mühlheim / Baden
Tel 07831 / 809-0 • Fax 07831 / 13218

Mühlheim, February 02, 1998

W. Rieger
W. Rieger, Managing Director

This declaration does not include any guarantee for market compliance.
The liability for compliance is the manufacturer's responsibility under the applicable laws.

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Information also available in the internet:

Wiring diagram, 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).
Our homepage: <http://www.auma.com>

Operation instructions

Deutschland / Germany

D WERNER RIESTER GmbH & Co. KG
Industriegebiet West
Postfach 13 62
79373 Mühlheim/Baden
Tel +49 76 31 809-0
Fax +49 76 31 13 218
e-mail: Riester@auma.com

D WERNER RIESTER GmbH & Co. KG
Postfach 11 51
73747 Ostfildern
Tel +49 71 13 48 03-0
Fax +49 71 13 48 03 34
e-mail: Riester@wof.auma.com

D WERNER RIESTER GmbH & Co. KG
Service-Center Köln
Mathias-Brüggen-Str. 164
50829 Köln
Tel +49 22 15 97 72-0
Fax +49 22 15 97 72-19
e-mail: Service@scm.auma.com

D WERNER RIESTER GmbH & Co. KG
Service-Center Magdeburg
Am Stadtberg 1
39167 Niedermodeleben
Tel +49 39 20 47 59-0
Fax +49 39 20 47 59-19
e-mail: Service@scm.auma.com

D WERNER RIESTER GmbH & Co. KG
Service-Center Bayern
Robert-Bosch-Strasse 14
85748 Garching-Hochbrück
Tel 0 89 / 32 98 85-17
Fax 0 89 / 32 98 85-18
e-mail: Riester@scb.auma.com

D WERNER RIESTER GmbH & Co. KG
Büro Nord
Krelingen 150
29664 Walsrode
Tel +49 51 67 504
Fax +49 51 67 565
e-mail: HandwerkerE@auma.com

D WERNER RIESTER GmbH & Co. KG
Büro Nord
Bereich Schiffbau
Tempowerkring 1
21079 Hamburg
Tel +49 40 79 14 02 85
Fax +49 40 79 14 02 86
e-mail: DierksS@auma.com

D WERNER RIESTER GmbH & Co. KG
Büro West
Rathausplatz 7
45549 Sprockhövel
Tel +49 23 39 92 12-0
Fax +49 23 39 92 12 15
e-mail: KettnerM@auma.com
SuchhardtP@auma.com

D WERNER RIESTER GmbH & Co. KG
Büro Süd-West
Mozartsstr. 4
69488 Birkenau
Tel +49 62 01 37 31 49
Fax +49 62 01 37 31 50
e-mail: WagnerD@auma.com

D WERNER RIESTER GmbH & Co. KG
Büro Baden
Postfach 13 62
79373 Mühlheim/Baden
Tel +49 76 31 80 91 93
Fax +49 76 31 80 92 94
e-mail: HenselR@auma.com

D WERNER RIESTER GmbH & Co. KG
Büro Württemberg
Postfach 11 51
73747 Ostfildern
Tel +49 71 13 48 03 80
Fax +49 71 13 48 03 81
e-mail: KoeplersS@wof.auma.com

D WERNER RIESTER GmbH & Co. KG
Büro Bayern
Kagerberg 12
93356 Teugn/Niederbayern
Tel +49 94 05 94 10 24
Fax +49 94 05 94 10 25
e-mail: JochumM@auma.com

D WERNER RIESTER GmbH & Co. KG
Büro Ost
Am Stadlberg 1
39167 Niedermodeleben
Tel +49 39 20 47 59 80
Fax +49 39 20 47 59 89
e-mail: ZanderC@scm.auma.com

Europa / Europe

A AUMA Armaturentriebe
Gesellschaft m.b.H.
Betriebsgebiet Traiskirchen Süd
Handelsstr. 14
2512 Tribuswinkel
Tel +43 22 52 82 540
Fax +43 22 52 82 54 050
e-mail: office@auma.at

CH AUMA (Schweiz) AG
Chörrenmattstr. 43
8965 Berikon
Tel +41 56 64 00 945
Fax +41 56 64 00 948
e-mail: RettichP.ch@auma.com

CZ AUMA Servopohony spol. s.r.o.
Kazanská 121
10200 Praha 10
Tel +420 2 72 70 00 56
Fax +420 2 72 70 41 25
e-mail: auma-s@auma.cz

F AUMA France
10 - 16 Rue Constantin Pecqueur
Z.A.C. Les Châtaigniers III
95157 Taverny Cédex
Tel +33 1 33 93 27 272
Fax +33 1 33 93 21 755
e-mail: servocom@auma.fr

FIN OY AUMATOR AB
Pi 21 / Hyijekuja 5
02271 Espoo 27
Tel +358 95 84 022
Fax +358 95 84 02 300
e-mail: auma@aumator.fi

GB AUMA ACTUATORS Ltd.
Britannia Way
Clevedon
North Somerset BS21 6QH
Tel +44 12 75 87 11 41
Fax +44 12 75 87 54 92
e-mail: auma@auma.co.uk

I AUMA ITALIANA S.r.l.
Via Don Luigi Sturzo, 29
20020 Lainate/Milano
Tel +39 02 93 17 911
Fax +39 02 93 74 387
e-mail: info@auma.it

NL AUMA BENELUX B.V.
Le Pooleweg 9
2314 XT Leiden
Tel +31 71 58 14 040
Fax +31 71 58 14 049
e-mail: office@benelux.auma.com

PL AUMA Polska Sp. z o.o.
Ul. Pukowca 15
40-816 Katowice
Tel +48 32 25 05 412
Fax +48 32 25 05 412
e-mail: R.Ludzien@auma.com.pl

RUS AUMA Moscow
Representative Office
8/9, 1-y Tverskoy-Yamskoy pereulok,
Moscow, 125047, Post Box 220
Tel: +7 095 973 29 43
Fax: +7 095 973 35 28
e-mail: georgiep@aha.ru

DK GROENBECH & SOENNER A/S
Scandiagade 25
2450 Copenhagen SV
Tel +45 33 26 63 00
Fax +45 33 26 63 01
e-mail: GS@groenbech-sons.dk

E IBEROPLAN S.A.
Marques de Hoyos, 10
28027 Madrid
Tel +34 91 37 17 130
Fax +34 91 74 27 126
e-mail: iberoplan@mad.servicom.es

GR D.G. Bellos & Co O.E.
64, Maisonos str.
10438 Athens
Tel +30 15 22 38 48
Fax +30 15 23 22 46
e-mail: dgb@eexl.gr

N SIGURD SOERUM A.S.
Jongsasveien 3
Postboks 85
1301 Sandvika
Tel +47 67 57 26 00
Fax +47 67 57 26 10
e-mail: post@sigurd-sorum.no

INDUSTRA Comércio de
Equipamentos Industriais, Lda.
Estrada de Albarraque 5ª
Centro Empresarial Sintra-Estorial
Bloco A3-Linh 2710-297 Sintra
Tel +351 2 19 10 95 00
Fax +351 2 19 10 95 95
e-mail: Industra@mail.telepac.pt

S ERICHS ARMATUR AB
Travbanegatan 8
Box 91 44
20039 Malmö
Tel +46 40 31 15 50
Fax +46 40 94 55 15
e-mail: Ulf.Elowsson@erichs.se

TR MEGA Endüstri Kontrol Sistemleri
Tic. Ltd. Sti.
Cetin Emec Bulvarı 6.CAD
78.SK. 17/18
06460 Öveçler - Ankara
Tel +90 31 24 78 08 13
Fax +90 31 24 78 08 31
e-mail: megalid@escortnet.com

Asien / Asia

IND AUMA (INDIA) Ltd.
Plot No. 39-B, II Phase
Peenya Industrial Area
Bangalore 560 058
Tel +91 80 83 94 655
Tlx 08 45 50 63 auma in
Fax +91 80 83 92 809

J AUMA JAPAN Co., Ltd.
596-4 Futago-Cho
273-0034 Funabashi-Shi
Chiba
Tel +81 47 30 29 551
Fax +81 47 30 29 555
e-mail: auma.jp@oregano.ocn.ne.jp

PRC AUMA Beijing Representative Office
Room 602, Yuanchenxin Building
12 Yumin Road, Madian
Chaoyang District
100029 Beijing
Tel +86 10 62 02 24 91
Fax +86 10 62 02 24 97
e-mail: AUMABS@ihw.com.cn

UAE AUMA Middle East
Representative Office
Sponsorship: Euro Mechanical
P.O. Box 46153
Tourist Club Street
Abu Dhabi
Tel +971 26 44 92 43
Fax +971 26 44 85 61
e-mail: auma@emirates.net.ae

SGP AUMA ACTUATORS
(Singapore) Pte Ltd.
32, Ang Mo Kio Industrial Park 2
#01 - 02, Sing Industrial Complex
Singapore 569510
Tel +65 48 18 750
Fax +65 48 18 269
e-mail: aumasg@mbox5singnet.com.sg

HK PERFECT CONTROLS Ltd.
Suite 202, Block 1,
Hofai Commercial Centre
218 Sai Lau Kok Road
Tsuen Wan, Kowloon, Hongkong
Tel +852 24 93 77 26
Fax +852 24 93 37 63
e-mail: pcld@netvigator.com

KWT AL-ARFAJ Eng. Company W.L.L.
P.O. Box 391
Salmiyah 22004
Tel +965 48 17 448
Fax +965 48 17 442
e-mail: arfaj@qualitynet.net

Q BEHZAD Trading
P.O. Box 11 23
Rayyan Road
Doha, Qatar
Tel +974 43 32 36
Fax +974 43 32 37

RC Top Advance Enterprises Ltd.
2nd Fl., No.32, Lane 308, Section 3,
Ho-Ping East Road
Taipei, Taiwan, R.O.C.
Tel +886 2 2733 3530
Fax +886 2 2736 5526
e-mail: kycl3530@msb.hinet.net

ROK DONG WOO Valve Control Co.,
Ltd.
Youi do
P.O. Box 293
Seoul, Korea
Tel +82 27 61 62 33
Fax +82 27 61 12 78
e-mail: dw7994@users.unilte.co.kr

T Sunny Valves and Intertrade
Corp. Ltd.
232/13 Yen-A-Kart Soi 2
Yannawa, Bangkok 10120
Tel +66 22 40 06 56
Fax +66 22 40 10 95
e-mail: swvong@mozart.inet.co.th

Nord- und Südamerika / North and South America

USA AUMA ACTUATORS INC.
4 Zesta Drive
Pittsburgh, PA 15 205
Tel +1 41 27 87 13 40
Fax +1 41 27 87 12 23
e-mail: mailbox@auma-usa.com

CDN TROY-ONTOR Inc.
230 Bayview Drive Unit 1A
Pines, Ontario L4N 5E9
Tel +1 41 66 14 12 10
Fax +1 41 70 57 21 58 51

BR Asvotec Termoindustrial Ltda.
Rod. Cônego Cyriaco Scaranello
Pires, Km 01
Monte Mor-Sp, CEP 13190-000
Tel: +55 19 3879-87 35
Fax: +55 19 3879 87 38
e-mail: adm@asvotec.com.br

RCH DIN INSTRUMENTO Ind. Ltda.
Avda. Holanda 2023
C.P.6651631 Casilla 335
Santiago de Chile
Tel: +562 20 50 100
Fax +562 222 58 139
e-mail: valvulas@dininstrumentos.cl

Australien / Australia

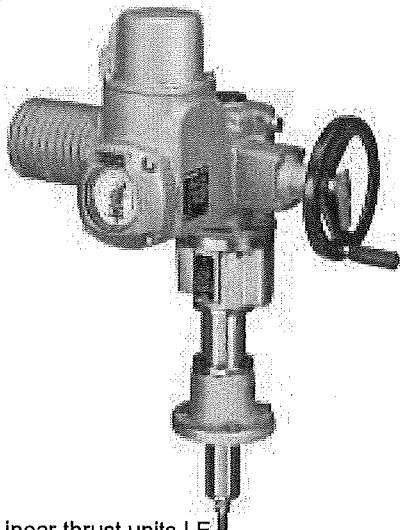
AUS BARRON GJM Pty.Ltd.
P.O.Box 792
Artarmon - NSW 1570
Tel +61 29 43 61 088
Fax +61 29 43 93 413
e-mail: info@barron.com.au

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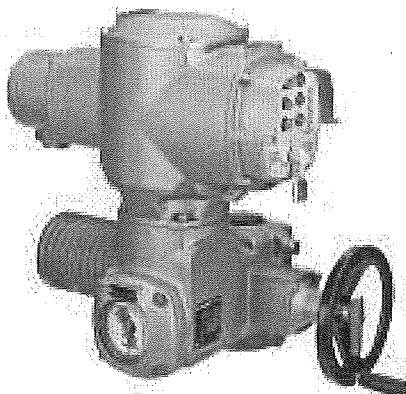
ZA AUMA South Africa (Pty) Ltd.
P.O.Box 12 83
Springs 1560
Tel +27 11 36 32 880
Fax +27 11 81 85 248
e-mail: auma-sa@cls.co.za

ET A.T.E.C.
5, Road No. 101 Maadi
Cairo - Egypt
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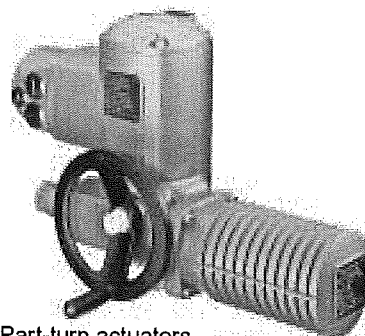
Linear thrust units LE
with multi-turn actuators SA
Thrusts from 4 kN to 217 kN
Strokes up to 500 mm
Linear speeds
from 20 to 360 mm/min



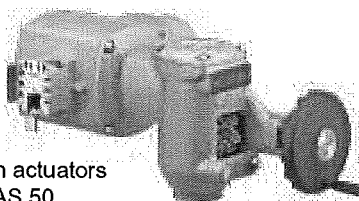
Controls AUMA MATIC
with multi-turn actuators SA/ SAR
Torques from 10 to 1 000 Nm
Speeds from 4 to 180 min⁻¹



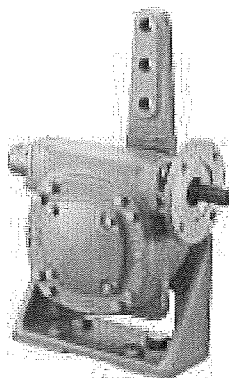
Multi-turn actuators
SA 07.1 - SA 16.1 / SA 25.1 - SA 48.1
Torques from 10 to 32 000 Nm
Output speeds from 4 to 180 min⁻¹



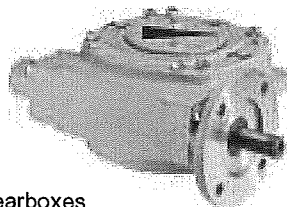
Part-turn actuators
SG 05.1 - SG 12.1
Torques from 100 to 1 200 Nm
Operating times for 90° from 4 to 180 s



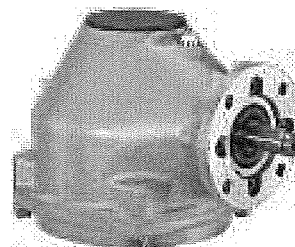
Part-turn actuators
AS 6 - AS 50
Torques from 25 to 500 Nm
Operating times for 90° from 4 to 90 s



Worm gearboxes with base and lever
GF 50.3 - GF 125.3
GF 160 - GF 250
Torques up to 32 000 Nm



Worm gearboxes
GS 40.3 - GS 125.3
GS 160 - GS 500
Torques up to 360 000 Nm



Bevel gearboxes
GK 10.2 - GK 40.2
Torques up to 16 000 Nm



Spur gearboxes
GST 10.1 - GST 40.1
Torques up to 16 000 Nm

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WERNER RIESTER GmbH & Co. KG
Armaturen- und Maschinenantriebe
P.O.Box 1362 • D - 79373 Müllheim
Tel 07631/809-0 • Fax 07631/13218
e-mail riester@auma.com
<http://www.auma.com>

auma®

WERNER RIESTER GmbH & Co. KG
Armaturen- und Maschinenantriebe
P.O. Box 1151 • D - 73747 Ostfildern
Tel 0711/34803-0 • Fax 0711/34803-34
e-mail riester@wof.auma.com



Certificate Registration No.
12 100 4269