Multi-turn actuators
SARV 07.1 - SARV 10.1
with AUMA VARIOMATIC-MC

Operation instructions
Scope of these instructions: These instructions are valid for multi-turn actuators SARV 07.1 - SARV 10.1 with controls AUMA VARIOMATIC-MC. These operation instructions are 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 SARV 07.1 - SARV 10.1 with integral controls VM MC 01.1 have a modular design. Motor and gearing are mounted in a common housing. The multi-turn actuators are driven by an electric motor and controlled with the electronic controls AUMA VARIOMATIC-MC, which are included in the scope of supply.

The AUMA VARIOMATIC-MC makes it possible to realise all connections and functions of the complete controls via software. The behaviour of the controls is configured via software parameters instead of jumpers and potentiometers. These parameters can be set via a menu or a serial interface. All parameters are stored in a non-volatile memory (EEPROM) and are retained in the event of a power failure.

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 (page 38) must be observed, otherwise a safe operation of the multi-turn 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 (ESD)!

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 already be 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 prior to commissioning!
2. Technical data

2.1 Multi-turn actuator SARV 07.1 - SARV 10.1

<table>
<thead>
<tr>
<th>Type of duty: (according to IEC 34-1/ VDE 0530)</th>
<th>Intermittent duty S5 - 40 % ED - 1500 c/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit switching:</td>
<td>Counter-gear mechanism for end positions CLOSED/OPEN</td>
</tr>
<tr>
<td>Torque switching:</td>
<td>Adjustable torque switching for closing and opening direction</td>
</tr>
<tr>
<td>Speeds:</td>
<td>Output speeds adjustable via controls AUMA VARIOMATIC-MC</td>
</tr>
<tr>
<td>Heater in switch compartment:</td>
<td>5 - 20 W, 110 V - 250 V or 24 V - 40 V, external supply</td>
</tr>
<tr>
<td>Motor:</td>
<td>Electronically commutated special AUMA motor</td>
</tr>
<tr>
<td>Motor protection:</td>
<td>Thermistor + tripping device</td>
</tr>
<tr>
<td>Electrical connection:</td>
<td>Standard: AUMA plug/socket connector 100 with screw cable terminations</td>
</tr>
<tr>
<td>Wiring diagram:</td>
<td>See name plate at AUMA VARIOMATIC-MC</td>
</tr>
<tr>
<td>Ambient temperature:</td>
<td>– 25 °C to + 60 °C</td>
</tr>
<tr>
<td>Enclosure protection:</td>
<td>Standard: IP 67</td>
</tr>
<tr>
<td>Finish coating:</td>
<td>Standard: Two-component iron-mica combination</td>
</tr>
</tbody>
</table>

### Technical data

#### 1-ph AC (standard voltage and frequencies)

<table>
<thead>
<tr>
<th>V</th>
<th>220 - 240</th>
<th>220 - 240</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hz</td>
<td>50</td>
<td>60</td>
</tr>
</tbody>
</table>

#### Torque for modulating

<table>
<thead>
<tr>
<th>Torque for modulating</th>
<th>Tripping torque 1)</th>
<th>Valve mounting flange</th>
<th>Stem-diameter</th>
<th>AUMA modulating actuator type</th>
<th>Number of starts 2)</th>
<th>Minimum duration of impulse 3)</th>
<th>Backlash</th>
<th>Handwheel diameter</th>
<th>Handwheel reduction</th>
<th>Weight 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>max. Nm</td>
<td>min. Nm</td>
<td>max. Nm</td>
<td>Standard ISO 5210 (Special/ DIN 3210)</td>
<td>max. mm</td>
<td>Speed</td>
<td>max. min/max rpm</td>
<td>ms</td>
<td>min. ms</td>
<td>mm</td>
<td>kg (appr.)</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td>30</td>
<td>F 07 F 10 (G 0)</td>
<td>26</td>
<td>SARV 07.1-...3/32</td>
<td>1500</td>
<td>50</td>
<td>75</td>
<td>160</td>
<td>8:1</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
<td>60</td>
<td>F 07 F 10 (G 0)</td>
<td>26</td>
<td>SARV 07.1-...4/45</td>
<td>1500</td>
<td>50</td>
<td>75</td>
<td>160</td>
<td>4:1</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
<td>60</td>
<td>F 10 (G 0)</td>
<td>40</td>
<td>SARV 07.5-...3/32</td>
<td>1500</td>
<td>50</td>
<td>75</td>
<td>200</td>
<td>8:1</td>
</tr>
<tr>
<td>60</td>
<td>60</td>
<td>120</td>
<td>F 10 (G 0)</td>
<td>40</td>
<td>SARV 10.0-...3/32</td>
<td>1500</td>
<td>50</td>
<td>75</td>
<td>200</td>
<td>8:1</td>
</tr>
</tbody>
</table>

#### Electrical data

<table>
<thead>
<tr>
<th>Torque for modulating</th>
<th>Tripping torque 1)</th>
<th>Valve mounting flange</th>
<th>Stem diameter</th>
<th>AUMA modulating actuator type</th>
<th>Motor type</th>
<th>Electr. power consumption at max. torque 5)</th>
<th>Current at max. speed and max. torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>max. Nm</td>
<td>min. Nm</td>
<td>max. Nm</td>
<td>Standard ISO 5210 (Special/ DIN 3210)</td>
<td>max. mm</td>
<td>Speed</td>
<td>min/max rpm</td>
<td>approx. W</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td>30</td>
<td>F 07 F 10 (G 0)</td>
<td>26</td>
<td>SARV 07.1-...3/32</td>
<td>VEC 56-12-32-R</td>
<td>500</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
<td>60</td>
<td>F 07 F 10 (G 0)</td>
<td>26</td>
<td>SARV 07.5-...3/32</td>
<td>VEC 56-12-32-R</td>
<td>700</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
<td>60</td>
<td>F 10 (G 0)</td>
<td>40</td>
<td>SARV 10.0-...4/45</td>
<td>VEC 56-12-32-R</td>
<td>900</td>
</tr>
<tr>
<td>60</td>
<td>60</td>
<td>120</td>
<td>F 10 (G 0)</td>
<td>40</td>
<td>SARV 10.1-...1,5/16</td>
<td>VEC 56-12-32-R</td>
<td>700</td>
</tr>
</tbody>
</table>

1) adjustable
2) with 40% ED, for nominal voltage and 20 °C ambient temperature
3) for identical direction of rotation
4) with motor, output drive B 1 and controls AUMA VARIOMATIC-MC
5) Motor and controls

---

Recommended fuses in mains: 10 A
(SARV 07.1 ... -3/32 = 6 A); curve D according to IEC/EN 60898.
2.2 Controls VARIOMATIC-MC

Integral controls AUMA VARIOMATIC, type VM-MC, for direct fitting to modulating actuators SARV 07.1 - SARV 10.1 or on wall bracket

<table>
<thead>
<tr>
<th>Voltage supply</th>
<th>Single-phase AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor controls</td>
<td>Power electronics with integral motor controller</td>
</tr>
<tr>
<td>External control voltage</td>
<td>24V DC, galvanically isolated from internal voltage supply</td>
</tr>
<tr>
<td>Binary inputs</td>
<td>Standard: OPEN-STOP-CLOSE-EMERGENCY + 24 V DC galvanically isolated</td>
</tr>
<tr>
<td></td>
<td>Switch-over AUTOMATIC/MANUAL (analogue/ binary control)</td>
</tr>
<tr>
<td></td>
<td>Opto-isolators</td>
</tr>
<tr>
<td></td>
<td>24 V DC, from internal power supply (max. load 50 mA) or from external source</td>
</tr>
<tr>
<td></td>
<td>17 mA per input</td>
</tr>
<tr>
<td>Analogue inputs</td>
<td>Nominal operating time or output speed E3 = 0 - 20 mA</td>
</tr>
<tr>
<td></td>
<td>Position set value E1 IN = 0/4 - 20 mA, 20 - 4/0 mA</td>
</tr>
<tr>
<td></td>
<td>Process set value E1 IN = 0/4 - 20 mA, 20 - 4/0 mA</td>
</tr>
<tr>
<td></td>
<td>Process actual value E4 = 0/4 - 20 mA, 20 - 4/0 mA</td>
</tr>
<tr>
<td></td>
<td>Input resistance 250 Ohm</td>
</tr>
<tr>
<td>Relay outputs</td>
<td>Standard: Collective fault signal (all faults)</td>
</tr>
<tr>
<td></td>
<td>5 programmable output relays (NO contacts, max. 24 V/1A)</td>
</tr>
<tr>
<td></td>
<td>Standard connections: End position OPEN/ end position CLOSED/ selector switch REMOTE/ tripping torque reached in mid-travel OPEN/ tripping torque reached in mid-travel CLOSED</td>
</tr>
<tr>
<td></td>
<td>Option: Collective fault signal (all faults) (Relays: change-over contacts, max. 24 V/1A)</td>
</tr>
<tr>
<td></td>
<td>13 programmable output relays</td>
</tr>
<tr>
<td></td>
<td>Signal 1-5 one relay each with NO contact, max. 24 V/1A</td>
</tr>
<tr>
<td></td>
<td>Signal 6-13 one relay each with change-over contact, max. 24 V/1A</td>
</tr>
<tr>
<td></td>
<td>Possible signals: Ready for operation REMOTE/REMOTE BINARY/REMOTE ANALOGUE</td>
</tr>
<tr>
<td></td>
<td>End position CLOSED/ end position OPEN/ operation in direction CLOSE/ operation in direction OPEN/ limit switch CLOSED/ limit switch OPEN/ torque switch CLOSED/ torque switch OPEN/ selector switch LOCAL/ selector switch OFF/ selector switch REMOTE/ intermediate position 1/ 2/ 3/ 4/ stepping mode CLOSE active/ stepping mode OPEN active/ motor protection tripped/ torque fault CLOSED/ torque fault OPEN/ both limit switches operated, both torque switches operated nominal value E1 is below 3.0 mA/ actual value E2 is below 3.0 mA/ permissible running time or max. permissible number of starts/hour has been exceeded</td>
</tr>
<tr>
<td>Analogue output 1) (option)</td>
<td>Position feedback signal (actual value) E2 OUT = 0/4 - 20mA (galvanically isolated)</td>
</tr>
<tr>
<td>Positioner 1) Parameters</td>
<td>Outer dead band XT</td>
</tr>
<tr>
<td></td>
<td>Inner dead band in direction OPEN dXAUF</td>
</tr>
<tr>
<td></td>
<td>Inner dead band direction CLOSE dXZU</td>
</tr>
<tr>
<td></td>
<td>Dead time TT</td>
</tr>
<tr>
<td></td>
<td>Input range E1 IN (position set value): 0/4-20 mA, 20-0/4 mA</td>
</tr>
<tr>
<td></td>
<td>Input range E2 IN (position actual value): 0-5 V, 5-0 V, 0/4-20 mA, 20-0/4 mA</td>
</tr>
<tr>
<td></td>
<td>Tolerance E1 ZU</td>
</tr>
<tr>
<td></td>
<td>Tolerance E1 AUF</td>
</tr>
<tr>
<td></td>
<td>Behaviour on loss of signal (position set value/ position actual value)</td>
</tr>
<tr>
<td>adaptive parameters</td>
<td>Automatic adaptation of the inner dead band (dXAUF, dXZU) to the overrun of the actuator</td>
</tr>
<tr>
<td></td>
<td>Automatic adaptation of the outer dead band (XT) to the number of starts of the actuator</td>
</tr>
<tr>
<td>Process control PID 2) (option) Parameters</td>
<td>P: Proportional amplification Kp</td>
</tr>
<tr>
<td></td>
<td>I: Reset time Tn</td>
</tr>
<tr>
<td></td>
<td>D: Rate time / rate amplification Vv</td>
</tr>
<tr>
<td></td>
<td>Inverse operation</td>
</tr>
<tr>
<td></td>
<td>External/ internal process set value</td>
</tr>
<tr>
<td></td>
<td>Internal process set value in %</td>
</tr>
</tbody>
</table>

1) Requires potentiometer (or electr. position transmitter RWG when on wall bracket) in the multi-turn actuator.
<table>
<thead>
<tr>
<th>Emergency operation (EMERGENCY-input)</th>
<th>Parameters</th>
<th>Effective in selector switch position LOCAL and REMOTE:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>– End position OPEN, end position CLOSED</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– By-pass of the torque switches</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– By-pass of the motor protection</td>
<td></td>
</tr>
<tr>
<td>Timer (option)</td>
<td>– Start and end of stepping mode in direction OPENF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Start and end of stepping mode in direction CLOSE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Stepping time/stepping pause time (1-30 seconds)</td>
<td></td>
</tr>
<tr>
<td>4 electronic intermediate positions 2)</td>
<td>Each intermediate position can be between 0 and 100%.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Position 1 (0 - 100 %)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Position 2 (0 - 100 %)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Position 3 (0 - 100 %)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Position 4 (0 - 100 %)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Signal: Continual contact NC/NO, impulse</td>
<td></td>
</tr>
<tr>
<td>Torque by-pass</td>
<td>Adjustable within range of 0.2 to 5 seconds. During this time the torque monitoring is not regarded.</td>
<td></td>
</tr>
<tr>
<td>Logging of operating data</td>
<td>– Number of starts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Hours/minutes of operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Number of torque faults in direction OPEN</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Number of torque faults in direction CLOSE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Number of times motor protection has tripped</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Number of power failures</td>
<td></td>
</tr>
<tr>
<td>Electronic name plate</td>
<td>– Product type, version</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Project name</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– AUMA commission number</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– KKS no.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Date of final test</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Wiring diagram number, terminal plan number</td>
<td></td>
</tr>
<tr>
<td>Display elements</td>
<td>Display Diagnosis LEDs</td>
<td>– LC Display, 4 rows with 20 characters each, plain text display</td>
</tr>
<tr>
<td></td>
<td>– Display and programming board: 8 LEDs (end positions, actuator signals)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Interface board: 3 LEDs (internal run commands, faults)</td>
<td></td>
</tr>
<tr>
<td>Setting/programming</td>
<td>– Via menu and the push-buttons of the locals controls/ push-buttons on the display/programming board</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Programming interface RS232</td>
<td></td>
</tr>
<tr>
<td>Local controls</td>
<td>Standard: Selector switch LOCAL-OFF-REMOTE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Push-buttons OPEN-STOP-CLOSE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Indication lights end position OPEN, FAULT, end position CLOSED</td>
<td></td>
</tr>
<tr>
<td>Enclosure protection</td>
<td>Standard: IP67</td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>– 25 °C to + 60 °C</td>
<td></td>
</tr>
<tr>
<td>Electrical connection</td>
<td>Refer to clause 6, page 11</td>
<td></td>
</tr>
</tbody>
</table>

2) Requires potentiometer (or electr. position transmitter RWG when on wall bracket) in the multi-turn actuator.

### 2.3 Software-Versions AUMA VARIOMATIC-MC

<table>
<thead>
<tr>
<th>EEPROM designation</th>
<th>Functions</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z026.332 / 02</td>
<td>with positioner</td>
<td>older version: Z026.581 / 02</td>
</tr>
<tr>
<td>Z026.332 / 03</td>
<td>with process controller / positioner</td>
<td>older version: Z026.581 / 03</td>
</tr>
</tbody>
</table>

The software version (EEPROM designation) can be called up via display, see subclause 15.1.2, page 26, or the serial interface, subclause 15.3, page 30.
3. 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 unfinished 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 unfinished 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 heater immediately, so that condensation is prevented.

4. 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.

The easiest position for mounting is when the valve shaft / gearbox shaft points upright. But mounting can be done in any other position as well.

- Check if valve mounting flange fits to 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 A1

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 A2), thread must match valve stem. If not ordered explicitly with threads, stem nut is unbored or with pilot bore when delivered. Finish machining of stem nut see below.

- Check if bore and keyway match input shaft of valve / gearbox.
- Thoroughly degrease mounting faces of 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>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.8</td>
</tr>
<tr>
<td>M 6</td>
</tr>
<tr>
<td>M 8</td>
</tr>
<tr>
<td>M 10</td>
</tr>
<tr>
<td>M 12</td>
</tr>
<tr>
<td>M 16</td>
</tr>
</tbody>
</table>

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

*Figure A2*

Output drive type A

Stem nut

80.3

80.01/ 80.02

80.2

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

- Remove spigot ring (80.2, figure A2) 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 (1) into thread (figure A2) and tighten it firmly.
- For corrosion protection KS/ KX, push down the seal (2) to the housing.
- Touch-up possible defects in painting.
- Check whether cap (3) is available and not damaged.
5. Manual operation

Manual operation may only be engaged when motor is not running. Switching over while motor is running can 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 until manual operation engages (figure D).

![Figure C](image1)

![Figure D](image2)

Manual force is sufficient for operating the change-over lever. Using an extension is neither necessary nor permitted. If too much force is applied, this may damage the change-over mechanism.

- Release change-over lever (snaps back into initial position by spring action). If change-over lever does not snap back, assist with hand, so that change-over lever is brought back into initial position (figure E).

![Figure E](image3)

![Figure F](image4)

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

![Figure F](image5)

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

- Manual operation is automatically disengaged when motor is started.
6. 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.

AUMA multi-turn actuators SARV MC are operated via the controls AUMA VARIOMATIC-MC. 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 an AUMA plug / socket connector with screw cable terminations as standard.

When connecting the signal wiring (between VARIOMATIC-MC and remote control centre), screened cables, earthed at both ends, must be used.

When installing the AUMA MATIC MC on a wall bracket, observe the following points:
1.) For position feedback via microcontroller board A26 (refer to wiring diagram) an electronic position transmitter (RWG) in 3-wire system must be used.
2.) For the connection of actuator and AUMA VARIOMATIC-MC on wall bracket, use 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 VARIOMATIC-MC).
- Remove plug cover (AUMA plug / socket connector) (figure G).
- Loosen screws and remove socket carrier from plug cover.
- Insert cable glands suitable to 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.

- Connect cables according to order specific wiring diagram MCP...KMS14TP... . The appropriate wiring diagram is attached to the handwheel of the multi-turn actuator in a weather proof bag together with these operation instructions (standard wiring diagram see appendix, page 40). In case the wiring diagram is not available, it can be obtained from AUMA (state commission no., refer to name plate) or downloaded from the internet (see page 50).

  Cross sectional areas: controls cables max. 2,5 mm², power supply max. 6 mm².

- Only the same potential can be switched through the two circuits of the switch. Different potentials require tandem switches.

  Versions with gold-plated microswitches (option) may only be loaded with small voltages (< 50 V DC / 400 mA).

- The valve manufacturer specifies whether switching off in the end positions should be via limit switch (limit seating) or torque switch (torque seating). The set type of seating can be checked via the parameters ‘ELZU’ (close) und ‘ELAUF’ (open) (page 31).

- Electronic position transmitters and potentiometers, which are connected directly to the customer plug XK, from the actuator (refer to wiring diagram), must be connected via screened cables.
• For versions with external control voltage (24 V/50 mA), terminals X10 and X11 (refer to wiring diagram), the control voltage can be used as supply for the remote control (OPEN, STOP, CLOSE).

• For supply of the analogue output signal E2 OUT (option) the auxiliary voltage (24 V /50 mA) can be used through linking the contacts X9 - X10 and X8 - X11 (refer to wiring diagram).

• Insert socket carrier and fasten.

• Clean sealing faces at plug cover, terminal compartment cover 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 securely to ensure enclosure protection IP 67.

7. Setting of the limit switching

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 5 on page 10.

Remove switch compartment cover and, if provided, pull off indicator disc as described in clause 10, page 15.

7.1 Settings for end position CLOSED (black section)

• Turn handwheel clockwise until valve is closed.

• Press down and turn setting spindle A (figure H) 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. In case of having turned too far, continue turning and approach mark C anew.

Figure H
7.2 Settings 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 H) 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 mark F, stop turning and release setting spindle. In case of having turned too far, continue turning and approach mark F anew.

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

8. Setting of torque switching

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

Loosen both lock screws O at the torque dial (figure K).
Turn torque dial P to set it to the required torque (1 da Nm = 10 Nm).
Example:
Figure K shows the following setting: 3,5 dNm = 35 Nm for direction CLOSED 3,5 dNm = 35 Nm for direction OPEN

Tighten lock screws O again.

- The torque switches can also be operated in manual operation. When appropriately controlled electrically, the tripping of the torque switch is stored and thus an electrical start in a specific direction is 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 10, page 15.
- 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.
9. Test run

Check direction of rotation (only required for wall bracket installation):
- The direction of rotation of the indicator disc (figure K1) indicates the direction of rotation of the output drive. If there is no indicator disc provided, the direction of rotation can also be observed on the hollow shaft. To this end, remove screw plug (no.27) (figure K2).
- Engage manual operation as described under clause 5 on page 10.
- Move actuator manually to intermediate position or to sufficient distance from the end position.
- Set selector switch to local operation (I) (figure K3).
- Switch on the mains voltage.
- Operate push-button CLOSE and observe the direction of rotation:

<table>
<thead>
<tr>
<th>Direction of rotation of the indicator disc:</th>
<th>correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction of rotation of the hollow shaft:</td>
<td></td>
</tr>
<tr>
<td>clockwise</td>
<td>correct</td>
</tr>
</tbody>
</table>

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

Check limit switching:
- Set selector switch to position OFF (figure K3).
- Switch on the mains voltage.
- Engage manual operation as described under clause 5 on page 10.
- Move actuator manually into both end positions of the valve.
- Check whether limit switching is set correctly.
When limit switching is set correctly, the appropriate LED at the local controls is illuminated for each end position (figure K3). If both LEDs are illuminated at the same time or if no LED is illuminated when the end position is reached, the limit switching must be set as described in clause 7.

When limit switching is set correctly:
- Perform test run at local controls with selector switch in position LOCAL (I) via push-buttons.

The current input is not interrupted in position OFF.
10. Mechanical position indicator (option)

- Remove the cover on the switch compartment.

**Pull off indicator disc:**
(not required for the setting of the mechanical position indicator)
Pull off indicator disc (figure L1). Open end spanner may be used as lever.

**Setting of the mechanical position indicator:**
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 need to be 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 L2).
- 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.
- Replace cover on switch compartment and fasten bolts evenly crosswise.

11. Setting of the potentiometer (option)

- Move valve to end position CLOSED.
- Remove switch compartment cover.
- If provided, pull off indicator disc as described under clause 10, page 15.
- Turn potentiometer (R2) clockwise to end position.
- Turn potentiometer (R2) back a little.

The potentiometer must not be at stop, since in this case a fault signal would be transmitted.

- If applicable, press indicator disc on shaft and perform setting as described under clause 10.
- Clean sealing face, check O-Ring, apply a thin film of non-acidic grease to sealing face.
- Fit and fasten switch compartment cover.
12. Setting of the electronic position transmitter RWG (option)

— For a remote indication or external control —
— For a VARIOMATIC-MC on wall bracket —

⚠️ When mounting the VARIOMATIC-MC to the actuator at a later date, the wiring diagram of the controls (MCP...KMS 14TP...) must correspond to the terminal plan of the actuator (KMS 14TP ...).

The position actual value E2 OUT (see wiring diagram and Technical data page 6) can also be generated by potentiometer (clause 11) via the microcontroller board, without electronic position transmitter RWG. An RWG may be required for VARIOMATIC-MC on wall bracket.

After mounting the actuator to the valve, check setting by measuring the output current at the designated measuring points (see subclause 12.1) and re-adjust, if necessary.

Table 3

<table>
<thead>
<tr>
<th>Technical data</th>
<th>RWG 4020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wiring diagrams</td>
<td>MCP...KMS14TP ... 4/ ... (requires 2 external wires)</td>
</tr>
<tr>
<td></td>
<td>3/- 4-wire system</td>
</tr>
<tr>
<td>Output current I</td>
<td>0 - 20 mA, 4 - 20 mA</td>
</tr>
<tr>
<td>Supply voltage U_v</td>
<td>internal supply</td>
</tr>
<tr>
<td></td>
<td>24 V DC, ±15% smoothed</td>
</tr>
<tr>
<td>max. current drawn I</td>
<td>24 mA at 20 mA output current</td>
</tr>
<tr>
<td>max. load R_B</td>
<td>600 Ω</td>
</tr>
</tbody>
</table>

Figure N: Positioner board

Inverse operation is done via parameter E2OUT (page 34).
12.1 Setting for 3- / 4- wire system 4 - 20 mA

- Connect voltage to VARIOMATIC-MC.
- Move valve to end position CLOSED.
- Remove switch compartment cover.
- If provided, pull off indicator disc as described under clause 10, page 15.
- For actuators with measuring points not accessible, remove cover plate (figure O).
- Connect ammeter for 0 - 20 mA to measuring points (figure N or figure O) or read value E2 in the display (see page 26, status indication).

The circuit (external load) must be connected (observe max. external load R_B), or the appropriate poles at the AUMA plug/socket connector must be linked (refer to wiring diagram MCP...KMS 14TP...), 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 residual 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 O) has been removed, fit anew.
- If applicable, press indicator disc on shaft and perform setting as described under clause 10, page 15.
- 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 O
13. Design AUMA VARIOMATIC-MC

The AUMA VARIOMATIC-MC consists of the following components:

- Power supply unit (AUMA VARIOMATIC power supply unit)
- Motor controls (thyristor unit, reversing contactor)
- Interface board
- Microcontroller board
- Display board
- Local controls, selector switch

Figure P1: Design VARIOMATIC-MC
14. Operation modes

The AUMA VARIOMATIC-MC has the following types/modes of operation:

1. Operation mode **OFF**
2. Operation mode **LOCAL**, control via local controls
3. Operation mode **REMOTE BINARY**, control by remote control centre or process control system
4. Operation mode **REMOTE ANALOGUE**, control via set point
5. Operation mode **EMERGENCY OPERATION**, emergency operation in predetermined direction

### 14.1 Operation mode OFF

The selector switch (figure P2) on the local controls is in position **OFF**.
- The input signal analogue/binary (see wiring diagram MCP ... KMS14TP ...) has no effect.
- No open-close or modulating operation is possible.
- The input signal **EMERGENCY** (subclause 14.5, page 23) is ignored, i.e. the emergency operation is **not** performed.

### 14.2 Operation mode LOCAL

**OPEN / CLOSE duty:**

With selector switch (figure P2) to position ‘LOCAL’:
- The input signal analogue/binary (see wiring diagram MCP ... KMS 14TP ...) has no effect.
- The actuator can be controlled via the the push-buttons OPEN, STOP, CLOSE (figure P2).
- With the software parameter SHO ‘Self-retaining LOCAL’ (page 31) a choice between push-to-run and continuous operation can be made.
- Faults (page 36) without automatic Reset must be confirmed with the push-button STOP.
- If the AUMA VARIOMATIC-MC is equipped with a display and programming board, the push-buttons OPEN or CLOSE can also be used for menu control, when the selector switch is in position **OFF** (see subclause 15.2, page 30). The main menu can be called up by pushing down the STOP button for an extended time (approx. 2 seconds).

### 14.3 Operation mode REMOTE BINARY

**14.3.1 OPEN / CLOSE operation**

Control from the control station is only possible when the selector switch is in position **REMOTE** (figure P2).

The activation of this operation mode depends on the EPROM and the parameter PID ‘Version’ (page 34 or 35) and is described in more detail in subclause a) and b).

#### a) OPEN-CLOSE actuators

(Software version Z026.332/01, refer to subclause 15.1.2, page 26).

For these actuators the signal analogue/binary + 24 V (see wiring diagram MCP ... KMS14TP ...) has no effect on the behaviour.
The actuator is controlled by external REMOTE commands OPEN, STOP, CLOSE.

With the software parameter SHF ‘Self-retaining REMOTE’ (page 31) a choice between push-to-run and continuous operation can be made (programming see clause 15, page 25).

Some faults (see page 36) can be confirmed with the push-button STOP.

b) Modulating actuators or actuators with process controller

(Software version Z026.332/02 or /03, see clause 15.1.2, page 26).

As a change-over from modulating duty to open-close duty is possible with these actuators, the parameter PID (page 34 or 35) is of primary importance. If this parameter is set to OPEN-CLOSE actuator, the actuator behaves like an OPEN-CLOSE actuator, i.e. the signal Analogue/Binary has no effect on the operation mode.

If the actuator is configured as a modulating actuator (or with process controller), the signal Analogue/Binary must be at + 24V (refer to wiring diagram MCP ... KMS14TP ...), in order to enable a control via the commands OPEN and STOP.

14.3.2 Stepping mode (option)

(Software version Z026.332/02 or /03, see clause 15.1.2, page 26).

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

- Stepping mode can be activated for each direction (OPEN or CLOSE) (parameters TKZU or TKAUF, page 34).
- For both directions the stepping range (start and end of stepping mode) can be set separately (parameters TAZU, TEZU, or TAAUF, TEAUF, page 34).
- The stepping times and stepping pause times apply to both directions. They can be set, independently of each other, within a range of 1 s to 30 s (parameters TEIN and TAUS, page 35).

Programming is done either on the display and programming board (option) by entering the code 0300, via the serial interface, see clause 15, page 25.

14.4 Operation mode REMOTE ANALOGUE

14.4.1 Modulating operation via a positioner (three position controller)

(Software version Z026.332/02 or /03 (see clause 15.1.2, page 26)

The positioner integrated in the controls VARIOMATIC-MC provides the position signal for controlling the motor depending on the nominal and actual value of the position. The feedback signal (actual value of actuator position) is given internally within the actuator.

A positioning via the external nominal value E1 (refer to wiring diagram MCP ... KMS14TP ...) is only possible when the selector switch (figure P2) is in position REMOTE and the input signal Analogue/Binary is not present.

Programming of the parameters (page 31) is done either on the display and programming board (option) by entering the code 0300, via the serial interface, see clause 15, page 25.
Command signal

- The following set values can be used in programming as command signal (E1) (positioner parameter E1IN, page 33):
  - 0 - 20 mA
  - 20 - 0 mA
  - 4 - 20 mA
  - 20 - 4 mA

Signal failure

- With the input ranges 4 - 20 mA or 20 - 4 mA cable break (signal failure) monitoring of command signal E1 or feedback E2 is performed. The following behaviour for signal failure can be programmed (parameter FAIL):
  - FAIL AS IS the actuator remains in current position
  - FAIL CLOSE the actuator runs to end position CLOSED
  - FAIL OPEN the actuator runs to end position OPEN

Overrun (inner dead band)

The inner dead band determines the switching-off point of the actuator. The tripping point in both directions can be set via the parameters ‘Dead band dXZU’ for direction CLOSE and ‘Dead band dXAUF’ for direction OPEN (page 33), so that the actuator stops at the nominal value if possible.

Max. error (outer dead band)

The outer dead band determines the starting point of the actuator. If the error or a change in nominal value is higher than the max. error set with parameter XT (page 33), the motor is started (see figure P4).

- The parameter XT must be set sufficiently high to ensure a stable function of the positioner. If the value is set too small, this results in an excessive number of starts, which can lead to a reduction of life time of the actuator and the valve.

Dead time

The dead time prevents the operation to a new nominal position within the determined time. The dead time (parameter TBL, page 33) can be set between 0 and 25 seconds.

- It must be ensured via the controls that the max. permissible number of starts of the actuator is not exceeded. This can be achieved by setting the dead time to a sufficiently high value.
Tolerance nominal value E1

- With a set point of $E_1 = 0/4\text{mA (0 \%)}$ or 20 mA (100 \%) the actuator runs to the appropriate end positions.
- If the nominal values 0 or 20 mA are not reached, a tolerance for the nominal value within the end position range can be programmed. (Parameter E1ZU, or E1AUF, page 33)
- When the value is below the tolerance E1ZU, the actuator runs until it reaches the end position CLOSED, when the value exceeds the tolerance E1AUF, the actuator runs until it reaches the end position OPEN.

14.4.2 Modulating operation via the adaptive positioner (self-adaptation)

Parameter AUTO (page 34) must be switched on. The actuator behaves as in the operation mode REMOTE ANALOGUE, but with the following additional features:

- The overrun (page 21) is determined and permanently adapted automatically.
- The outer deadband (Parameter XT) is adapted to the inner deadband automatically, if $d_{XAU}$ or $d_{XU}$ > XT.

14.4.3 Modulating operation via integral process controller (PID controller)

(Software-Version Z026.332/03, see clause 15.1.2, page 26)

*Figure P5: Modulating duty via process controller*

In this operation mode the VARIOMATIC-MC operates as a process controller (PID controller) with subordinate positioner (adaptive positioner), i.e. the process controller sets an internal nominal value.

The implemented process controller has a cycle time of about 100 ms.

Internal / external process nominal value

The actuator can be operated with external or internal process nominal value. This setting is done via the parameter PID (page 35).
- With the parameter E1IN (page 35) a section of the analogue input signal E1 can be selected, if an external process nominal value is set.
- The internal process nominal value is set with the parameter PSOLL (page 35).

Process controller inverse operation

Usually (e.g. flow control, water feed level control) the parameter PIDIN is in position “OFF” (page 35). In this case the actuator opens if the process actual value is smaller than the process nominal value.

In inverse operation (e.g. level control in discharge) the actuator must close if the process actual value is smaller than the process nominal value.

Actual process value (process feedback)

The analogue input E4 is used for measuring the process actual value. The desired section can be selected via the parameter E4IN (page 35).
The actual actuator position is required for the process control, since the process controller sets a nominal position at the subordinate positioner. The input range is determined with the parameter E2IN (page 35). Hereby it needs to be observed that on the microcontroller board (see order related wiring diagram MCP...KMS14TP...) potentiometer (voltages) are connected to plug X11 and electronic position transmitters (current inputs) at plug X12.

Setting of the process controller

The setting of the process controller parameters is heavily dependent on the field of use for the controller. For most uses a PI controller is sufficient.

As initial position for the setting the proportional amplification \( K_p \) should be set very low (between 0 and 1), the reset time \( T_n \) should be set very high (1000). The D-portion should be deactivated through setting the rate time \( T_v \) to 0 and the rate amplification \( V_v \) to 1.

If a small regulation deviation already requires a major position change, the proportional amplification \( K_p \) must be increased.

Example:

In a large water basin the valve can be opened completely for a small deviation, as the change in water level is very small.

The I-portion is determined with the reset time \( T_n \). The more inert a system is, the higher the reset time \( T_n \) should be set.

14.5 Operation mode emergency operation

In case an emergency operation has been set via the parameter EMERGENCY (NOT) (page 31), the actuator drives to the programmed end position when the signal EMERGENCY (refer to wiring diagram MCP ... KMS14TP ...) is removed.

As the signal EMERGENCY works low-active, 24 V must be connected at contact X, Pin 1 in normal state. No emergency operation is performed when signal is open.

- During the emergency operation the thermosignal NOTTH (page 32) can be ignored.
- The torque switches can also be bypassed between the limit switches (parameter NOTDR, page 32).
- No emergency operation is performed when the selector switch is in position OFF (figure U, page 30).

14.6 Nominal output speed

14.6.1 In OPEN-CLOSE operation

The output speed can be pre-determined in the operation mode LOCAL and REMOTE BINARY via the parameter ‘Manual speed’ NHAND (page 32). When the parameter NFERN (page 32) is in position ON, the setting of the output speed via the analogue input E3 (0 to 20 mA) in the operation mode REMOTE BINARY is possible.

14.6.2 In modulating operation

The minimum or maximum output speed in modulating operation is determined via the parameters ‘Min. speed’ and ‘Max. speed’ NMIN and NMAX (page 34). To this end the speed is decreased according to the graph to the left prior to reaching the nominal position. The ramp is determined via the proportional range PARAMETER PROPB (page 34).

14.6.3 Emergency operation

The output speed for the emergency operation can be preset via the parameter ‘Speed emergency operation’ NNOT (page 32).
### 14.7 Intermediate positions

4 intermediate positions can be programmed in the AUMA VARIOMATIC-MC (parameters POS1 - POS4, pages 32, 33). Each intermediate position can be set to a value between 0 and 100% of the travel. It is also possible to program the way in which the reaching of the intermediate position is indicated (parameters POS1D - POS4D).

#### Figure P6: Functions of the intermediate positions Pos. 0-2 (see table below)

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Type of interm. position</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>CLOSED 0 POS 1 OPEN</td>
<td>Active from intermediate position to end position OPEN (see figure P6)</td>
</tr>
<tr>
<td>1</td>
<td>CLOSED 1 POS 0 OPEN</td>
<td>Active from end position CLOSED to intermediate position (see figure P6)</td>
</tr>
<tr>
<td>2</td>
<td>POS + XT</td>
<td>Impulse (see figure P6)</td>
</tr>
<tr>
<td>3</td>
<td>Stop CLOSE and OPEN</td>
<td>Actuator stops upon having reached the intermediate position. Actuator only runs after a new run command is issued.</td>
</tr>
<tr>
<td>4</td>
<td>Stop CLOSE</td>
<td>Actuator stops during operation in direction CLOSE upon having reached the intermediate position. Actuator only runs after a new run command is issued.</td>
</tr>
<tr>
<td>5</td>
<td>Stop OPEN</td>
<td>Actuator stops during operation in direction OPEN upon having reached the intermediate position. Actuator only runs after a new run command is issued.</td>
</tr>
<tr>
<td>6</td>
<td>End position CLOSED</td>
<td>The intermediate position limits the travel in direction CLOSE, i.e. the actuator stops when having reached the set position in direction CLOSE. A continuation of the operation in direction CLOSE is not possible. The signal end position CLOSED is activated.</td>
</tr>
<tr>
<td>7</td>
<td>End position OPEN</td>
<td>The intermediate position limits the travel in direction OPEN, i.e. the actuator stops when having reached the set position in direction OPEN. A continuation of the operation in direction OPEN is not possible. The signal end position OPEN is activated.</td>
</tr>
</tbody>
</table>

- Pos. 3 to 5 are only effective in the operation modes LOCAL and REMOTE BINARY.
- Pos. 6 and 7 can only be assigned to intermediate positions 1 and 2 (parameter POS1 and POS2).
15. Display, operation and programming of the AUMA VARIOMATIC-MC

The programming of the AUMA VARIOMATIC-MC can be done via (figure Q):

a) the display and programming board (subclause 15.1)
b) the local controls (subclause 15.2)
c) the serial interface (subclause 15.3)

On the final inspection the AUMA VARIOMATIC-MC is programmed according to the customer’s requirements via the serial interface and its details (comm. no., date of final test....) are stored in the EEPROM (non-volatile memory). A subsequent programming is possible at any time via the programming buttons S-27 - S3-27 (figure R) or the serial interface. During programming of the AUMA VARIOMATIC-MC no run commands are executed (and no emergency operation).

15.1 Display and programming board

8 LEDs on display and programming board A 27 (option):
- Display functions see figure R.
- Diagnosis LEDs on interface board A2:
  - V3-2: Run command CLOSE (yellow)
  - V2-2: Ready for operation (red, blinking)
  - Fault (red, continuously illuminated)
  - V1-2: Run command OPEN (green)

15.1.1 Display elements

- LC-Display 4x20 characters:
  Indication of operation mode (LOCAL-OFF-REMOTE), operating data, order details, state and functions of the output relays, settings of the parameters either in German or English (as desired).
- 8 LEDs on display and programming board A 27 (option):
  Display functions see figure R.
- 3 diagnosis LEDs on the interface board A2
  Display functions see figure R.
15.1.2 Inquiry for software version

After connecting the supply voltage, the product name and software version are indicated for approx. 5 seconds on the display. See also subclause 2.3, page 7.

When the supply voltage is already connected the software version can be called up via the menu ‘order information’ (figure S1).

15.1.3 Programming via the programming buttons S1-27 to S3-27

The programming and operation of the AUMA VARIOMATIC can be done via the programming buttons S1-27 and S3-27 (figure R) on the display and programming board in the VARIOMATIC-MC. The display simplifies the operation and the setting of the AUMA VARIOMATIC-MC. The readout on the LC-display depends on the current state of the AUMA VARIOMATIC-MC. The structure of the menu is shown in the graph below (figure S1).

**Figure S1: menu structure**

By pressing the buttons S1-27 or S3-27 it is possible to change between the following displays:

**Figure S2: Status indications**

*change-over in % or absolute by briefly pressing S2-27*
Figure T1 shows three examples for status display in operation modes OFF, LOCAL and REMOTE ANALOGUE are shown.
- The first line always states the current operation mode.
- Line two and three indicate the current status.
- The fourth line shows the current function of the buttons S1-27 to S3-27.

**Figure T1: Example displays**

![Figure T1: Example displays](image)

**Main menu**

Push the button S2-27 (figure T1) for approx. 2 seconds to enter the main menu (figure T2).

**Figure T2**

![Figure T2](image)

- Button S1-27: Change to programming menu (figure T3).
- Button S2-27: Change to information menu (figure T9, page 29).
- Button S3-27: Return to main menu (figure T2).

If no input is received over a longer period of time (approx. 5 min) the AUMA VARIOMATIC-MC reverts back to status indication (page 26).

**Programming**

![Figure T3](image)

- Button S1-27: Indication of all parameters (see figure T4 display parameters).
- Button S2-27: Altering (programming) the parameters (see code input, page 28).
- Button S3-27: Return to main menu (figure T2).

**Display parameters**

![Figure T4: Example for display parameter E1](image)

- By pushing the buttons S1-27 or S2-27 it is possible to change between all available parameters (see subclause 15.4, page 31):
- Button S3-27: Return to programming menu (figure T3).
**Code input**

- Via menu Programming, choose “Configuration” using button S2-27 (figure T3, page 27). To change the parameter, a code must first be entered (figure T5). Depending on the entered code access to one of the following parameter groups is possible (see also subclause 15.4, page 31):

<table>
<thead>
<tr>
<th>Code</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>0100</td>
<td>Standard parameters (type of seating, self-retaining)</td>
</tr>
<tr>
<td>0200</td>
<td>Expanded parameters (emergency operation, output relays, intermediate positions)</td>
</tr>
<tr>
<td>0300</td>
<td>Positioner parameters</td>
</tr>
<tr>
<td>0400</td>
<td>Process controller parameters</td>
</tr>
</tbody>
</table>

- Button S1-27 “+” (figure T5) increments the current number by one every time the button is depressed (9 changes to 0).
- Push button S2-27 “>” to go to the next number.
- Confirm the code with button S3-27 “ESC” or, in case of an incorrect entry, cancel the process with the same button.

**Figure T5: Code input**

```
* PROGRAM MODE *
Code  2000
+ > ESC
```

Programming:

**Standard parameters**

**Expanded parameters,**

**Positioner parameters**

**Process controller parameters**

Alterting (programming) of the parameters (refer to subclause 15.4) is done via the menu. The procedure is the same for all three menus. Figures T6, T7 show an example with the positioner parameter dead band Xₜ.

**Figure T6**

```
* PROGRAM MODE *
Dead zone: 0.6 %
> EDIT ESC
```

- Push button S1-27 “>” (figure T6) until desired parameter is indicated in the display.
- Push button S2-27 “EDIT” to change the value.
- If necessary, push button S3-27 “ESC” to cancel the process and to go back to code input.
- Change value (figure T7):
  - Button S1-27 “-”: Reduce value by one step.
  - Button S2-27 “+”: Increase value by one step.
- End process with button S3-27 “ESC”.

**Figure T7**

```
* PROGRAM MODE *
Dead zone: 0.7 %
- + ESC
```

28
• Button S1-27 "Yes" (figure T8):
  Store and return to parameter programming menu (figure T6).
• Button S3-27 "No" (figure T8):
  Do not store and return to parameter programming menu (figure T6).

**Figure T8**

---

**Info-menu**

The info-menu can be called up from the main menu (page 27) with the button S2-27.

**Bild T9**

- Button S1-27: Display of order details (menu order info)
- Button S2-27: Display of state and function of the output relays.
- Button S3-27: Return to main menu (page 27).

**Order info**

The order data contain the details:
- Product designation (can not be changed)
- Version (article no. of the EPROM; can not be changed)
- Comm. no.
- Project name
- Lable
- Valve
- Date of final test
- Wiring diagram no.
- Terminal plan
- Service-Text 1 + 2

The order data are stored in the EEPROM during the final test. Later alterations of these data are only possible via the serial interface (page 30).

**Output relays**

This menu (figure T10) shows the state and current configuration of the output relays.

**Figure T10**

- Button S1-27: Change-over between state and function of the output relay.
- Button S2-27: Changes to next output relay.
- Button S3-27: Return to info-menu
15.2 Local controls

The push-buttons OPEN-STOP-CLOSE are used for programming via the local controls (figure U). The push-buttons have the same function as the buttons S1-27 to S3-27 of the display and programming board (except operation mode LOCAL).

- Set selector switch to position OFF.
- Perform programming as described under subclause 15.1.3, page 26. For the function of the push-buttons see figure U.

**Figure U: Local controls**

<table>
<thead>
<tr>
<th>Push-buttons</th>
<th>Buttons on indication and programming board</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPEN</td>
<td>S1-27</td>
</tr>
<tr>
<td>STOP</td>
<td>S2-27</td>
</tr>
<tr>
<td>CLOSE</td>
<td>S3-27</td>
</tr>
</tbody>
</table>

15.3 Serial interface

RS 232C
Serial interface for programming and for reading of parameters and information (order data, actuator data). For operation via the serial interface the following is necessary:

- The programming software WIN-MC (option) for the MATIC MC (subclause 15.3.1)

**Figure V: Serial interface**
15.3.1 Programming software WIN-MC (option)

Article no. for software "WIN-MC" only: Z029.294.
Article no. for cable only: Z026.401
Article no. for software "WIN-MC" + cable: Z030.457

System requirements:
- Windows 95/98 or Windows NT 4.0
- PC with 386, 486 or Pentium
- 16 MB main memory
- CD ROM drive

- Install programming software on PC.
- Make connection via serial interface (figure V, page 30).

To establish the communication the selector switch on the local controls (figure U) must be in position OFF.

- Start the programming software in the group programs of the start menu.
- Choose the language in the start window of the programming software.
- The interface must be set as follows:
  - Baudrate: 9600
  - Daten bits: 8
  - Parity: N (keine)
  - Stopbits: 1
  - Protokoll: XON/XOFF
- Prior to a transmission between MATIC MC and the PC the interface must be opened.

For further information regarding the programming software see the online help.

15.4 Software parameters

15.4.1 Standard parameters (type of seating, self-retaining)

These parameters are accessible after entering Code 0100.

<table>
<thead>
<tr>
<th>Note</th>
<th>Standard value</th>
<th>Parameter name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seating in end position CLOSED: Seating in end position CLOSED (limit or torque seating)</td>
<td>limit seating</td>
<td>ELZU</td>
</tr>
<tr>
<td>Seating in end position OPEN: Seating in end position OPEN (limit or torque seating)</td>
<td>limit seating</td>
<td>ELAUF</td>
</tr>
<tr>
<td>Self-retaining LOCAL: Change-over push-to-run operation (OFF) or continuous operation (ON)</td>
<td>ON</td>
<td>SHO</td>
</tr>
<tr>
<td>Self-retaining REMOTE: Change-over push-to-run operation (OFF) or continuous operation (ON)</td>
<td>OFF</td>
<td>SHF</td>
</tr>
<tr>
<td>Language: German, English</td>
<td>German</td>
<td>SPRCH</td>
</tr>
<tr>
<td>Display: Display of analogue input signals in percent or as absolute value</td>
<td>Percent</td>
<td>ABS</td>
</tr>
</tbody>
</table>

15.4.2 Expanded parameters, (emergency operation, output relays, intermediate positions)

These parameters are accessible after entering Code 0200.

<table>
<thead>
<tr>
<th>Note</th>
<th>Standard value</th>
<th>Parameter name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency operation (reaction to EMERGENCY-input): no emerg. operation, emerg. operation in end position OPEN or CLOSED (see also page 23)</td>
<td>no emerg. operation</td>
<td>NOT</td>
</tr>
</tbody>
</table>
### Multi-turn actuators SARV 07.1 - SARV 10.1
### AUMA VARIOMATIC-MC
### Operation instructions

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>Standard value</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency operation thermo:</td>
<td></td>
<td>ON: Thermo signal is regarded</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF: Thermosignal is ignored during an emergency operation</td>
</tr>
<tr>
<td>Emergency operation torque</td>
<td></td>
<td>ON: Torque switches are regarded</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF: Torque switches are ignored during an emergency operation</td>
</tr>
<tr>
<td>Torque by-pass:</td>
<td>OFF</td>
<td>Time span in which torque switches are by-passed after start:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF, 0.2 s, 0.5 s, 1.0 s, 2.0 s or 5.0 s</td>
</tr>
<tr>
<td>Autoreset PowerFail:</td>
<td>ON</td>
<td>ON: After supply voltage is connected the fault is automatically reset.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF: After the supply voltage is connected the fault must be confirmed</td>
</tr>
<tr>
<td>Autoreset Thermo:</td>
<td>ON</td>
<td>ON: After the motor has cooled down the fault is automatically reset.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF: After the motor has cooled down the fault must be confirmed</td>
</tr>
<tr>
<td>S4-25% monitoring:</td>
<td>OFF</td>
<td>ON: Monitoring of starts (1200/h) or running time (max. 15 min)</td>
</tr>
<tr>
<td>Signal 1:</td>
<td>End position OPEN</td>
<td>Function of output relay 1 (see output relays, page 35)</td>
</tr>
<tr>
<td>Signal 2:</td>
<td>End position CLOSED</td>
<td>Function of output relay 2 (see output relays, page 35)</td>
</tr>
<tr>
<td>Signal 3:</td>
<td>REMOTE</td>
<td>Function of output relay 3 (see output relays, page 35)</td>
</tr>
<tr>
<td>Signal 4:</td>
<td>Torque CLOSED</td>
<td>Function of output relay 4 (see output relays, page 35)</td>
</tr>
<tr>
<td>Signal 5:</td>
<td>Torque OPEN</td>
<td>Function of output relay 5 (see output relays, page 35)</td>
</tr>
<tr>
<td>Signal 6 (only in combination with separate relay board):</td>
<td>-</td>
<td>Function of output relay 6 (see output relays, page 35)</td>
</tr>
<tr>
<td>Signal 13 (only in combination with separate relay board):</td>
<td>-</td>
<td>Function of output relay 13 (see output relays, page 35)</td>
</tr>
<tr>
<td>Manual speed (only in combination with SARV or AS)</td>
<td>100 %</td>
<td>Speed in open-close duty in the operation modes LOCAL or REMOTE BINARY, value in percent (see also page 23)</td>
</tr>
<tr>
<td>Speed REMOTE ANALOGUE</td>
<td>OFF</td>
<td>Nominal output speed in operation mode REMOTE BINARY via analogue value 0/4 - 20 mA</td>
</tr>
<tr>
<td>Emergency operation speed (only in combination with SARV or AS)</td>
<td>100 %</td>
<td>Speed for emergency operation, value in percent</td>
</tr>
<tr>
<td>Intermediate position 1:</td>
<td>50,0 %</td>
<td>Value in percent</td>
</tr>
<tr>
<td>Type of intermediate position 1:</td>
<td>active betw. CLOSED and POS1</td>
<td>&quot;CLOSED 1 POS 0 OPEN&quot; means that the signal is active between end position CLOSED and the intermediate position 1.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>See description of intermediate positions, subclause 14.7, page 24</td>
</tr>
</tbody>
</table>
### 15.4.3 Positioner parameters

These parameters are accessible after entering Code 0300.

<table>
<thead>
<tr>
<th>Note</th>
<th>Standard value</th>
<th>Parameter name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate position 2:</td>
<td>50.0 %</td>
<td>POS2</td>
</tr>
<tr>
<td>Value in percent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of intermediate position 2:</td>
<td>active betw. CLOSED and POS2</td>
<td>POS2D</td>
</tr>
<tr>
<td>See description of intermediate positions, subclause 14.7, page 24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate position 3:</td>
<td>50.0 %</td>
<td>POS3</td>
</tr>
<tr>
<td>Value in percent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of intermediate position 3:</td>
<td>active betw. OPEN and POS3</td>
<td>POS3D</td>
</tr>
<tr>
<td>See description of intermediate positions, subclause 14.7, page 24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate position 4:</td>
<td>50.0 %</td>
<td>POS4</td>
</tr>
<tr>
<td>Value in percent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of intermediate position 4:</td>
<td>active betw. OPEN and POS4</td>
<td>POS4D</td>
</tr>
<tr>
<td>See description of intermediate positions, subclause 14.7, page 24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blinking of the corresponding indication light on the local controls indicates whether the actuator is closing or opening the valve.</td>
<td>no blinker</td>
<td>BLINKER</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Note</th>
<th>Standard value</th>
<th>Parameter name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dead band XT (outer dead band):</td>
<td>0.8 %</td>
<td>XT</td>
</tr>
<tr>
<td>In case of error &gt; XT a run command is given in the operation mode REMOTE ANALOGUE. Setting range: 0.2 % - 10.0 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dead band dXCLOSE (inner dead band direction CLOSE):</td>
<td>0.5 %</td>
<td>XZU</td>
</tr>
<tr>
<td>In case of a regulation deviation &lt; dXCLOSE the running actuator is stopped. Setting range: 0.0 % - 9.0 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dead band dXOPEN (inner dead band direction OPEN):</td>
<td>0.5 %</td>
<td>XAUF</td>
</tr>
<tr>
<td>In case of a regulation deviation &lt; dXOPEN the running actuator is stopped. Setting range: 0.0 % - 9.0 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dead time TT:</td>
<td>0.5 s</td>
<td>TBL</td>
</tr>
<tr>
<td>After a modulating run there is no new run for the duration of the dead time TT. Setting range: 0.2 s - 25.0 s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input range E1 (nominal value):</td>
<td>0 - 20 mA</td>
<td>E1IN</td>
</tr>
<tr>
<td>If nominal value is within tolerance of end position CLOSED, a run command for direction CLOSE is given until limit switch is reached. The setting range is between 0 % and 5%.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tolerance E1 CLOSE:</td>
<td>0 %</td>
<td>E1ZU</td>
</tr>
<tr>
<td>If nominal value is within tolerance of end position OPEN, a run command for direction OPEN is given until limit switch is reached. The setting range is between 95 % and 100%.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tolerance E1 OPEN:</td>
<td>100.0 %</td>
<td>E1AUF</td>
</tr>
<tr>
<td>Input range E2:</td>
<td>0 - 5 V</td>
<td>E2IN</td>
</tr>
<tr>
<td>If nominal value E1, actual value E2 or the process actual value E4 must have an input range of more than 4 mA.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAIL-reaction:</td>
<td>FAIL AS IS</td>
<td>FAIL</td>
</tr>
</tbody>
</table>

Note: Standard value and parameter name columns.
Output range E2:
Position feedback, 0/4 - 20 mA.
The output signal E2 OUT and the indication in the display are standardised when the end positions are reached, i.e. the maximum values 0, 4 mA or 20 mA are supplied in the end positions.
When an electronic position transmitter (RWG) is used as input signal for the microcontroller board A26, terminal X12 (e.g. VARIOMATIC-MC on wall bracket), there is no standardization of the output signal E2 OUT.
In this case an adjustment of the electronic position transmitter (RWG) is necessary, see clause 12, page 16.

Self-adaptation:
Switches on self-adaptation in operation mode REMOTE ANALOGUE ON or OFF. The inner dead zone is hereby adjusted according to the overrun of the actuator. The outer dead zone is adjusted according to the number of starts in the predetermined dead band XA and 5.0 %.

Proportional range (5 % - 20 %); (only in combination with SARV or AS)
In case of an error within the proportional range the speed is reduced from maximum speed to minimum speed.

Minimum speed (0.5 % - 100 %) (only in combination with SARV or AS)
Minimum speed (in percent) in operation mode REMOTE ANALOGUE

Maximum speed (only in combination with SARV or AS)
Maximum speed (in percent) in operation mode REMOTE ANALOGUE

Input range E3:
Input range nominal output speed (only in combination with SARV or AS)

<table>
<thead>
<tr>
<th>Note</th>
<th>Standard value</th>
<th>Parameter name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output range E2: Position feedback, 0/4 - 20 mA. The output signal E2 OUT and the indication in the display are standardised when the end positions are reached, i.e. the maximum values 0, 4 mA or 20 mA are supplied in the end positions. When an electronic position transmitter (RWG) is used as input signal for the microcontroller board A26, terminal X12 (e.g. VARIOMATIC-MC on wall bracket), there is no standardization of the output signal E2 OUT. In this case an adjustment of the electronic position transmitter (RWG) is necessary, see clause 12, page 16.</td>
<td>no output</td>
<td>E2OUT</td>
</tr>
<tr>
<td>Self-adaptation: Switches on self-adaptation in operation mode REMOTE ANALOGUE ON or OFF. The inner dead zone is hereby adjusted according to the overrun of the actuator. The outer dead zone is adjusted according to the number of starts in the predetermined dead band XA and 5.0 %.</td>
<td>OFF</td>
<td>AUTO</td>
</tr>
<tr>
<td>Proportional range (5 % - 20 %); (only in combination with SARV or AS) In case of an error within the proportional range the speed is reduced from maximum speed to minimum speed.</td>
<td>10.0%</td>
<td>PROPB</td>
</tr>
<tr>
<td>Minimum speed (0.5 % - 100 %) (only in combination with SARV or AS) Minimum speed (in percent) in operation mode REMOTE ANALOGUE</td>
<td>20.0%</td>
<td>NMIN</td>
</tr>
<tr>
<td>Maximum speed (only in combination with SARV or AS) Maximum speed (in percent) in operation mode REMOTE ANALOGUE</td>
<td>100.0%</td>
<td>NMAX</td>
</tr>
<tr>
<td>Input range E3: Input range nominal output speed (only in combination with SARV or AS)</td>
<td>0 - 20 mA</td>
<td>E3IN</td>
</tr>
</tbody>
</table>

15.4.4 Timer parameters
These parameters are accessible after entering 0300.

<table>
<thead>
<tr>
<th>Note</th>
<th>Standard value</th>
<th>Parameter name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version (determines the behaviour of the multi-turn actuator): - OPEN-CLOSE actuator: binary control via the signals OPEN, STOP, CLOSE from REMOTE - Modulating actuator: Setting of a nominal position via analogue input E1, change-over to open-close actuator via input analogue/binary possible - Process controller E1 (external nominal value): The positioner is subordinate to a process controller. The process nominal value is connected to analogue input E1, the process actual value to analogue input E4 - Process controller internal nominal value: as process controller E1, however the process nominal value is fixed</td>
<td>Modulating actuator</td>
<td>PID</td>
</tr>
<tr>
<td>Stepping mode in CLOSE ON: Stepping mode in direction CLOSE between start of stepping mode CLOSE and end of stepping mode CLOSE</td>
<td>OFF</td>
<td>TKZU</td>
</tr>
<tr>
<td>Start of stepping mode CLOSE Start of stepping mode in direction CLOSE</td>
<td>10.0 %</td>
<td>TAZU</td>
</tr>
<tr>
<td>End of stepping mode CLOSE End of stepping mode in direction CLOSE</td>
<td>0.0 %</td>
<td>TEZU</td>
</tr>
<tr>
<td>Stepping mode in OPEN ON: Stepping mode in direction OPEN between start of stepping mode OPEN and end of stepping mode OPEN</td>
<td>OFF</td>
<td>TKAUF</td>
</tr>
<tr>
<td>Start of stepping mode OPEN: Start of stepping mode in direction OPEN</td>
<td>90.0 %</td>
<td>TAAUF</td>
</tr>
<tr>
<td>End of stepping mode OPEN: End of stepping mode in direction OPEN</td>
<td>100.0 %</td>
<td>TEAUF</td>
</tr>
</tbody>
</table>
15.4.5 **Process controller parameters**

These parameters are accessible after entering Code 0400.

(Only for software version Z026.332/03; see page 7)

<table>
<thead>
<tr>
<th>Note</th>
<th>Standard value</th>
<th>Parameter name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Running time: Time which actuator runs in stepping mode</td>
<td>5 s</td>
<td>TEIN</td>
</tr>
<tr>
<td>Pause time: Actuator pause time in stepping mode</td>
<td>5 s</td>
<td>TAUS</td>
</tr>
</tbody>
</table>

### Note

<table>
<thead>
<tr>
<th>Version:</th>
<th>Standard value</th>
<th>Parameter name</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Open-close actuator: binary control via the signals OPEN, STOP, CLOSE from REMOTE</td>
<td></td>
<td>Modulating actuator</td>
</tr>
<tr>
<td>- Modulating actuator: Setting of a nominal position via analogue input E1, change-over to open-close actuator via input analogue/binary possible</td>
<td></td>
<td>PID</td>
</tr>
<tr>
<td>- Process controller E1: The positioner is subordinate to a process controller. The process nominal value is connected to analogue input E1, the process actual value to analogue input E4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Internal process controller: as above, however the process nominal value is fixed in the setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportional amplification Kp P-portion adjustable between 0.1 and 100</td>
<td>1</td>
<td>PIDKP</td>
</tr>
<tr>
<td>Reset time Tn: I-portion between 1 and 1000 s</td>
<td>1000s</td>
<td>PIDTN</td>
</tr>
<tr>
<td>Rate time Tv: D-portion between 0 and 100 s</td>
<td>0</td>
<td>PIDTV</td>
</tr>
<tr>
<td>Rate amplification Vv: Dampening during subsiding of D-portion, adjustable between 1 and 100</td>
<td>0</td>
<td>PIDVV</td>
</tr>
<tr>
<td>Process nominal value when internally pre-determined</td>
<td>0.0%</td>
<td>PSOLL</td>
</tr>
<tr>
<td>Input range E1: Input range of the external process nominal value, 0/4 - 20 mA or 20 - 4/0 mA</td>
<td></td>
<td>E1IN</td>
</tr>
<tr>
<td>Input range E2: Input range of the position feedback</td>
<td></td>
<td>E2IN</td>
</tr>
<tr>
<td>Input range E4: Input range of the process actual value, 0/4 - 20 mA or 20 - 4/0 mA</td>
<td>0 - 20 mA</td>
<td>E4IN</td>
</tr>
<tr>
<td>Process controller inverse operation: Direction of positioner effect on deviation of process nominal value from process actual value</td>
<td>OFF</td>
<td>PIDIN</td>
</tr>
</tbody>
</table>

15.4.6 **Output relays**

For signals to the control room 5 output relays are available on the interface board. A further 8 output relays are available on the relay board as an option. One of the following signals / signal combinations can be allocated to each output relay:

<table>
<thead>
<tr>
<th>Signal</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>No function</td>
<td></td>
</tr>
<tr>
<td>End position CLOSED</td>
<td>For limit seating limit switches only, for torque seating limit and torque switches</td>
</tr>
<tr>
<td>End position OPEN</td>
<td>For limit seating limit switches only, for torque seating limit and torque switches</td>
</tr>
</tbody>
</table>
15.4.7 Faults

The AUMA VARIOMATIC-MC recognizes a variety of faults. In case of some faults, the actuator is switched off immediately. The following list states the faults (errors) and effects.

A fault is indicated / signalised:
- On the local controls by the red indication light FAULT.
- Fault relay on the interface board.
- Diagnosis LED on interface board is blinking red (figure R, page 25).

### Signal | Note
---|---
Run in direction CLOSE |  
Run in direction OPEN |  
Limit switches for CLOSED (WSR) |  
Limit switches for OPEN (WOEL) |  
Torque switches for CLOSED (DSR) | Torque switch tripped  
Torque switches for OPEN (DOEL) | Torque switch tripped  
PTC thermistor PTC1 | PTC thermistor tripped  
Torque fault CLOSED | Torque switch DSR operated in mid travel  
Torque fault OPEN | Torque switch DOEL operated in mid travel  
WSR and WOEL | Both limit switches tripped  
DSR and DOEL | Both torque switches tripped  
E1<3.0 mA | Nominal value E1 is below 3.0 mA.  
E2<3.0 mA | Actual value E2 is below 3.0 mA.  
ED> S4-25 %, 15 min | The max permissible running time (15 min) or the max. permissible number of starts/hour (1,200) has been exceeded.  
LOCAL | Selector switch in position LOCAL  
OFF | Selector switch in position OFF  
REMOTE | Selector switch in position REMOTE  
REMOTE BINARY | Selector switch in position REMOTE, open-close duty  
REMOTE ANALOGUE | Selector switch in position REMOTE, modulating duty via set point  
Intermediate position 1 |  
Intermediate position 2 |  
Intermediate position 3 |  
Intermediate position 4 |  
Stepping range CLOSE | Actuator is in stepping range in direction CLOSE  
Stepping range OPEN | Actuator is in stepping range in direction OPEN  
Ready for operation REMOTE | Selector switch in position REMOTE and no faults

### Table: Fault (error) Indication in display | Cause | Actuator behaviour
---|---|---
Fault end position CLOSED or OPEN | The feedback signal does not correspond to the limit switch signal. | No standardization (see parameter E2OUT, page 34). The fault is reset automatically after correction of the setting (potentiometer must not be at stop in the end positions, i.e. the potentiometer value in the end positions must be smaller 5 V or larger 0 V). Confirmation via push-button STOP on local controls is possible (see subclause 15.2, page 30).
### Fault (error) Indication in display

<table>
<thead>
<tr>
<th>Fault (error)</th>
<th>Cause</th>
<th>Actuator behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Therm</td>
<td>Thermal protection in motor windings tripped.</td>
<td>- Switching off because thermal protection is connected. Operation resumed after cooling down. Dependent on the parameter ‘Autoreset Thermo’ a thermo fault is saved until it is confirmed via the command STOP or is reset automatically. - In operation mode EMERGENCY OPERATION the emergency operation can be continued when a thermo fault has occurred. For this the parameter ‘Emerg. op. Thermo’ must be set to OFF. In this case no fault signal is issued.</td>
</tr>
<tr>
<td>Torque CLOSE: DSR or torque OPEN: DOEL</td>
<td>The torque switch has been operated within the limit settings -&gt; torque fault</td>
<td>- Actuator is switched off and fault signal occurs (saved) - Reset through run command in opposite direction - In operation mode EMERGENCY OPERATION the torque switches can be by-passed between the limit settings. For this the parameter ‘Emerg. Op. thermo’ must be set to OFF. In this case no fault signal is issued.</td>
</tr>
<tr>
<td>E1 &lt; 3.0 mA (for input ranges 4 - 20 mA)</td>
<td>Behaviour according to the software parameter FAIL (‘fail as is’, ‘fail close’, ‘fail open’)</td>
<td>- Automatic reset as soon as E1 exceeds 4.0 mA again</td>
</tr>
<tr>
<td>E2 &lt; 3.0 mA (for input ranges 4 - 20mA)</td>
<td>Behaviour according to the software parameter FAIL (‘fail as is’, ‘fail close’, ‘fail open’)</td>
<td>- Automatic reset as soon as E2 exceeds 4.0 mA again</td>
</tr>
<tr>
<td>S4 &gt; 25%, 15 min</td>
<td>more than 1200 starts/h or running time &gt; 15 min within the last hour</td>
<td>- Signal only when software parameter ‘S4-25 % monitoring’ set to ON - Automatic reset after sufficient pause</td>
</tr>
<tr>
<td>dXCLOSE &gt; XA or dXOPEN</td>
<td>The inner dead zone in direction CLOSE or OPEN is larger than the outer dead zone</td>
<td>- The inner dead zone is set to XA-0.2 % - Reset after correction of inner and outer dead zone</td>
</tr>
<tr>
<td>DSR and DOEL</td>
<td>The supply of the torque switches has been interrupted or there is a mechanical fault in the torque switches.</td>
<td>- Actuator is switched off and fault signal occurs (saved) - Check wiring - Check version no. on interface board: Z024.428/01 - Reset after confirmation via push-button STOP on the local controls and run command in direction OPEN and CLOSE</td>
</tr>
<tr>
<td>WSR and WOEL</td>
<td>The supply of the limit switches has been interrupted or there is a mechanical fault in the limit switches.</td>
<td>- Actuator is switched off and fault signal occurs (saved) - Check wiring - Check version no. on interface board: Z024.428/01 - Reset after confirmation via push-button STOP on local controls</td>
</tr>
<tr>
<td>Phase fault</td>
<td>A phase of the supply voltage is missing</td>
<td>- Actuator is switched off and fault signal occurs - Automatic reset after fault is eliminated</td>
</tr>
<tr>
<td>RESET POWER FAIL</td>
<td>The supply voltage has been interrupted.</td>
<td>- Signal only when parameter ‘Autoreset power’ is switched off. - Reset via push-button STOP on local controls</td>
</tr>
<tr>
<td>Control voltage &lt; 18 V</td>
<td>The control voltage has dropped below 18 V.</td>
<td>- Actuator is switched off and fault signal occurs - Reset via push-button STOP on local controls</td>
</tr>
</tbody>
</table>
16. Relay board (option)

In standard version 5 output relays are available. A relay board with 8 additional output relays can be installed as an option. It is located directly under the display and programming board.

17. Fuses

⚠️ Before exchanging fuses disconnect actuator from the mains.

⚠️ Fuses (figure W) are accessible after removal of the local controls.

---

**Figure W**

![Fuses (F1; F2) on power supply board](image)

Local controls: Push-buttons and indication lights

<table>
<thead>
<tr>
<th>Fuses: (Figure W)</th>
<th>F1</th>
<th>F2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>5 x 20 mm</td>
<td>5 x 20 mm</td>
</tr>
<tr>
<td>Value</td>
<td>10 A T; 250 V</td>
<td>1 A T; 250 V</td>
</tr>
</tbody>
</table>

---

Recommended fuses in mains: **16 A**

18. 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 assures 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 9.
• At intervals of approx. 6 months press in several strokes of ball bearing grease at the lubrication nipple with grease gun.

  • Lubrication of the valve stem must be done separately.
  • We recommend to use original AUMA lubricants only.

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

19. Fault finding
19.1 Optical signals during operation

**LED V3-2 run command CLOSE (yellow)**
This LED indicates a run command in direction CLOSE.

Is continuously illuminated: Run command in direction CLOSE is being executed.
is not illuminated: No run command in direction CLOSE active.

**LED V1-2 run command OPEN (green)**
This LED indicates a run command in direction OPEN.

Is continuously illuminated: Run command in direction OPEN is being executed.
Is not illuminated: No run command in direction OPEN active.

**LED V2-2 ready for operation/fault (red)**
This LED indicates local faults occurring in the actuator.

Is blinking: Controls o.k.
Is illuminated: Fault

**LEDs on display and programming board**
See subclause 15.1, page 25.

19.2 LED run command CLOSE (yellow) / OPEN (green) is illuminated, but actuator does not run

Check fuses (clause 17, page 38).
19.3 Operation mode REMOTE does not function

Operation mode REMOTE - BINARY (OPEN/CLOSE operation) does not function

Red LED V2-2 on interface board (option) ?

not blinking:

Fault is indicated in LC display (option), 3rd line
→ Remove cause of fault (see table subclause 15.4.7)

blinking:

Indication LC display (option), 1st line ?

Indication: OFF
Set selector switch on local controls to position REMOTE

Yes

Indication: LOCAL

No

Indication: REMOTE-ANALOGUE

a) Used only as OPEN-CLOSE actuator
b) Used as OPEN-CLOSE or modulating actuator
Change-over via signal Analogue/Binary

Change parameter ‘PID’ (subclause 15.4.4 or 15.4.5) in OPEN-CLOSE actuator

Connect +24 V to signal Analogue/Binary to allow control via OPEN and CLOSE.

Check the external run commands:
1.) Press right programming button S1-27 (figure R, page 25) on display and programming board A26 (option) until LC display (2nd line) shows ‘Run command REMOTE’.
2.) Connect remote command CLOSE:
LC display, 3rd line, shows ‘CLOSE’.
3.) Connect remote command STOP:
LC display, 3rd line, shows ‘STOP’.
4.) Connect remote command OPEN:
LC display, 3rd line, shows ‘OPEN’.
If a signal is not shown in LC display:
→ Check wiring.
Multi-turn actuators SARV 07.1 - SARV 10.1

Operation instructions

AUMA VARIOMATIC-MC

---

**Operation mode REMOTE ANALOGUE (modulating duty) does not function**

Red LED V2-2 on interface board (option)?

- **Blinking:**
  - Indication: LC display (option), 1st line?
    - Yes: Change parameter 'PID' (subclause 15.4.5) on modulating actuator (or process controller).
    - No: Connect + 0 V to signal Analogue/Binary to allow control via nominal value E1.

- **Not blinking:**
  - Fault is indicated in LC display (option), 3rd line
    - Remove cause of fault (see table subclause 15.4.7)

---

**Actuator continuously in stepping mode?**

- **With self-adaptation:**
  - Input signal E1 (nominal position) and/or E2 (actual position) are not constant
    - After switching on of operation mode the optimal values must first be determined

- **Without self-adaptation:**
  - Increase dead band XT (subclause 15.4.3)
    - After several starts actuator moves to the exact position

---

**Check input signal E1:**

- Set parameter 'E1 IN' (subclause 15.4.3 or 15.4.5) according to input range
- Check polarity at plug X8 on microcontroller board A26 (X8 Pin 1 in+, X8 Pin 2 out-)
- Indication on display: Press push-buttons S1-27 on display and programming board (figure R, page 26) until display shows 'Nominal position: / Actual position:'. Change-over absolute value / percent value via parameter ABS (display) (subclause 15.4.1), alternatively with middle push-button S2-27.

---

**Check input signal E2:**

- See subclause 19.5, position feedback/indication, page 43

---

**See diagram for flowchart**
19.4 Operation mode LOCAL does not function

Operation mode LOCAL does not function

Red LED V2-2 on interface board (option)?

not blinking:
Fault is indicated in LC display (option), 3rd line
→ Remove cause of fault (see table subclause 15.4.7)

blinking:

Indication LC display (option), 1st line?

Indication: OFF
Set selector switch on local controls to position LOCAL

Indication: REMOTE-BINARY

Indication: REMOTE ANALOGUE

Indication: LOCAL

Check the push-buttons on the local controls (option):
1.) Press right programming button S1-27 (figure R, page 25) on display and programming board (option) until LC display (2nd line) shows ‘Run commands LOCAL’.
2.) Operate push-button CLOSE on local controls:
   LC display, 3rd line, shows ‘CLOSE’.
3.) Operate push-button STOP on local controls:
   LC display, 3rd line, shows ‘STOP’.
4.) Operate push-button OPEN on local controls:
   LC display, 3rd line, shows ‘OPEN’.
If a signal is not shown in LC display:
→ Check wiring.
19.5 Position feedback / indication (from actuator)

19.5.1 No indication in display

Check input signal E2 IN from actuator (potentiometer or RWG):

- Set parameter E2IN (page 33 or 35) according to input range.

Potentiometer is connected to plug X11 on the microcontroller board A26 (refer to wiring diagram), RWG is connected to plug X12.

- Indication in LC display (option):
  Push programming button S1-27 on display and programming board (figure R, page 25) until LC display shows 'Actuator position'. Change-over absolute value / percentage value via parameter ABS (page 31), alternatively with middle programming button S2-27.
  - Fault signal 'Fault end position OPEN', or 'Fault end position CLOSED': Refer to table Faults, page 36.

19.5.2 No position feedback E2 OUT at customer's plug

- Check supply voltage at X7 on microcontroller board A26 (refer to wiring diagram) (X7 Pin 1 = 24 V, X7 Pin 2 = 0V).
- Set parameter E2 OUT (page 34) to '0 - 20 mA' or '4 - 20 mA'.
  Check current signal at plug X7 Pin 3 (out+) and X7 Pin 4 (in–) (do not remove supply at X7 Pin 1 and X7 Pin 2) with measuring device.

19.5.3 Position feedback does not change evenly

- Check setting for limit switching and selection of reduction gearing.
- Check connection of potentiometer (wiper at X7 pin 2).

After setting of limit switching or a change in the input range, a test run, see clause 9, page 14, is necessary.

19.5.4 Position feedback changes with delay or nominal position is reached with considerable deviation

Actuator switches off via torque seating in an end position.

Switching point of limit and torque switch are too far apart from each other.
- Move actuator to end position via torque seating.
- Move actuator manually slightly away from end position and set limit switching anew.

19.6 Actuator is not switched off by limit seating in direction CLOSE or OPEN

The actuator is set to torque seating.
Set actuator to limit seating:
- Set standard parameter ‘ELZU’ (page 31) to ‘limit seating’.
- Set standard parameter ‘ELAUF’ (page 31) to ‘limit seating’.
20. Exploded view and spare parts list multi-turn actuators SA(R)
### Multi-turn actuators SARV 07.1 - SARV 10.1

#### Operation instructions AUMA VARIOMATIC-MC

#### Note:

Please state type and commission no. of the actuator (see actuator name plate) when ordering spare parts.

<table>
<thead>
<tr>
<th>No.</th>
<th>Type</th>
<th>Designation</th>
<th>No.</th>
<th>Type</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>012</td>
<td>E</td>
<td>Notched pin</td>
<td>58.0</td>
<td>B</td>
<td>Wire for protective earth</td>
</tr>
<tr>
<td>019</td>
<td>E</td>
<td>Cheese head screw</td>
<td>59.0</td>
<td>B</td>
<td>Pin for motor and thermoswitch in motor plug</td>
</tr>
<tr>
<td>020</td>
<td>E</td>
<td>Clamping washer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>053</td>
<td>E</td>
<td>Countersunk screw</td>
<td>60.0</td>
<td>B</td>
<td>Control unit assy. (but without torque head, without switches)</td>
</tr>
<tr>
<td>1.0</td>
<td>B</td>
<td>Housing assy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>B</td>
<td>Flange, bottom assy.</td>
<td>61.0</td>
<td>B</td>
<td>Torque switching head</td>
</tr>
<tr>
<td>3.0</td>
<td>B</td>
<td>Hollow shaft assy. (without worm wheel)</td>
<td>70.0</td>
<td>B</td>
<td>Motor</td>
</tr>
<tr>
<td>5.0</td>
<td>B</td>
<td>Worm shaft assy.</td>
<td>70.1</td>
<td>B</td>
<td>Motor pin carrier (without pins)</td>
</tr>
<tr>
<td>5.7</td>
<td>E</td>
<td>Motor coupling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.8</td>
<td>B</td>
<td>Manual drive coupling assy.</td>
<td>79.0</td>
<td>B</td>
<td>Planetary gearing for motor drive assy.</td>
</tr>
<tr>
<td>5.12</td>
<td>E</td>
<td>Grub screw</td>
<td>80.0</td>
<td>B</td>
<td>Output drive form A assy. (without thread in stem nut)</td>
</tr>
<tr>
<td>5.32</td>
<td>E</td>
<td>Coupling pin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.37</td>
<td>B</td>
<td>Pull rod assy.</td>
<td>80.001</td>
<td>E</td>
<td>Thrust bearing set</td>
</tr>
<tr>
<td>6</td>
<td>E</td>
<td>Worm wheel</td>
<td>80.3</td>
<td>B</td>
<td>Stem nut (without thread)</td>
</tr>
<tr>
<td>9.0</td>
<td>B</td>
<td>Planetary gear for manual drive assy.</td>
<td>85.0</td>
<td>B</td>
<td>Output drive B3</td>
</tr>
<tr>
<td>10.0</td>
<td>B</td>
<td>Retaining flange assy.</td>
<td>85.001</td>
<td>E</td>
<td>Snap ring</td>
</tr>
<tr>
<td>14</td>
<td>E</td>
<td>Change-over lever</td>
<td>90.0</td>
<td>B</td>
<td>Output drive D</td>
</tr>
<tr>
<td>15.0</td>
<td>B</td>
<td>Cover for switch compartment assy.</td>
<td>90.001</td>
<td>E</td>
<td>Snap ring</td>
</tr>
<tr>
<td>17.0</td>
<td>B</td>
<td>Torque lever assy.</td>
<td>100</td>
<td>B</td>
<td>Switch for limit / torque switching (including pins at wires)</td>
</tr>
<tr>
<td>18</td>
<td>E</td>
<td>Gear segment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.0</td>
<td>B</td>
<td>Crown wheel assy.</td>
<td>105.0</td>
<td>B</td>
<td>Blinker transmitter including pins at wires (without impulse disc and insulation plate)</td>
</tr>
<tr>
<td>20.0</td>
<td>B</td>
<td>Swing lever assy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.0</td>
<td>B</td>
<td>Drive pinion II for torque switch assy.</td>
<td>106.0</td>
<td>B</td>
<td>Stud bolt for switches</td>
</tr>
<tr>
<td>23.0</td>
<td>B</td>
<td>Drive wheel for limit switching assy.</td>
<td>107</td>
<td>E</td>
<td>Spacer</td>
</tr>
<tr>
<td>24</td>
<td>E</td>
<td>Drive wheel for limit switching</td>
<td>151.0</td>
<td>B</td>
<td>Space heater</td>
</tr>
<tr>
<td>24.0</td>
<td>B</td>
<td>Intermediate wheel for limit switching assy.</td>
<td>152.1</td>
<td>B</td>
<td>Potentiometer (without slip clutch)</td>
</tr>
<tr>
<td>25.0</td>
<td>E</td>
<td>Locking plate</td>
<td>152.2</td>
<td>B</td>
<td>Slip clutch for potentiometer</td>
</tr>
<tr>
<td>27</td>
<td>E</td>
<td>Screw plug</td>
<td>153.0</td>
<td>B</td>
<td>RWG assy.</td>
</tr>
<tr>
<td>30.0</td>
<td>B</td>
<td>Handwheel with ball handle assy.</td>
<td>153.1</td>
<td>B</td>
<td>Potentiometer for RWG (without slip clutch)</td>
</tr>
<tr>
<td>39</td>
<td>E</td>
<td>Screw plug</td>
<td>153.1</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>49.0</td>
<td>B</td>
<td>Motor plug, socket assy.</td>
<td>153.2</td>
<td>B</td>
<td>Slip clutch for RWG</td>
</tr>
<tr>
<td>50.0</td>
<td>B</td>
<td>Plug cover assy.</td>
<td>153.3</td>
<td>B</td>
<td>Electronic board RWG</td>
</tr>
<tr>
<td>51.0</td>
<td>B</td>
<td>Socket carrier assy. (with sockets)</td>
<td>153.5</td>
<td>B</td>
<td>Wires for RWG</td>
</tr>
<tr>
<td>52.0</td>
<td>B</td>
<td>Pin carrier (without pins)</td>
<td>155.0</td>
<td>B</td>
<td>Reduction gearing</td>
</tr>
<tr>
<td>53.0</td>
<td>B</td>
<td>Socket for control</td>
<td>156.0</td>
<td>B</td>
<td>Mechanical position indicator</td>
</tr>
<tr>
<td>54.0</td>
<td>B</td>
<td>Socket for motor</td>
<td>160.1</td>
<td>B</td>
<td>Protection tube (without cap)</td>
</tr>
<tr>
<td>55.0</td>
<td>B</td>
<td>Socket for protective earth</td>
<td>160.2</td>
<td>E</td>
<td>Cap for stem protection tube</td>
</tr>
<tr>
<td>56.0</td>
<td>B</td>
<td>Pin for control</td>
<td>S1</td>
<td>S</td>
<td>Seal kit (small)</td>
</tr>
<tr>
<td>57.0</td>
<td>B</td>
<td>Pin for motor</td>
<td>S2</td>
<td>S</td>
<td>Seal kit (large)</td>
</tr>
</tbody>
</table>

1) SA 16.1 with output speeds 32 to 180 rpm without motor plug/socket, motor directly wired to pin carrier (52.0).
2) only required for some output speeds
3) not included in basic equipment

type B = sub-assembly  type E = component  type S = set assy. = assembly
21. Exploded view and spare parts list controls VM 01.1
Note:
Exploded view and spare parts list show the standard version of the controls AUMA VARIOMATIC. Deviations from the version with microcontroller are possible.
When placing your order for spare parts, please mention the type of the controls and our commission number (refer to name plate).

<table>
<thead>
<tr>
<th>No.</th>
<th>Type</th>
<th>Designation</th>
<th>No.</th>
<th>Type</th>
<th>Designation</th>
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<tbody>
<tr>
<td>1.1</td>
<td>E</td>
<td>Housing</td>
<td>3.6.0</td>
<td>B</td>
<td>Electronic positioner</td>
</tr>
<tr>
<td>1.2</td>
<td>B</td>
<td>Intermediate flange</td>
<td>3.6.1</td>
<td>B</td>
<td>Electronic positioner board</td>
</tr>
<tr>
<td>2.0</td>
<td>B</td>
<td>Cover local controls assly.</td>
<td>3.6.2</td>
<td>E</td>
<td>Cover plate for electronic positioner board</td>
</tr>
<tr>
<td>2.0012</td>
<td>E</td>
<td>Pad lock</td>
<td>4.1</td>
<td>B</td>
<td>Cover assy</td>
</tr>
<tr>
<td>2.1</td>
<td>B</td>
<td>Cover local controls</td>
<td>5.1</td>
<td>B</td>
<td>Pin carrier (without pins)</td>
</tr>
<tr>
<td>2.8</td>
<td>E</td>
<td>Face-plate for local controls</td>
<td>5.2</td>
<td>B</td>
<td>Adapter plate</td>
</tr>
<tr>
<td>2.9</td>
<td>B</td>
<td>Push-button board</td>
<td>5.3</td>
<td>B</td>
<td>Protective earth</td>
</tr>
<tr>
<td>3.0</td>
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<td>5.4</td>
<td>B</td>
<td>Pin for control</td>
</tr>
<tr>
<td>3.1.1</td>
<td>B</td>
<td>Mounting plate for motor power board</td>
<td>5.5</td>
<td>B</td>
<td>Pin for motor</td>
</tr>
<tr>
<td>3.1.2</td>
<td>B</td>
<td>Motor power board</td>
<td>6.0</td>
<td>B</td>
<td>Plug (assly.)</td>
</tr>
<tr>
<td>3.1.5</td>
<td>B</td>
<td>Socket carrier</td>
<td>6.1</td>
<td>B</td>
<td>Plug cover (assly.)</td>
</tr>
<tr>
<td>3.2.1</td>
<td>B</td>
<td>Motor controller board</td>
<td>6.2</td>
<td>E</td>
<td>Socket carrier assly.</td>
</tr>
<tr>
<td>3.3.1</td>
<td>B</td>
<td>Power supply</td>
<td>6.3</td>
<td>B</td>
<td>Socket for protective earth</td>
</tr>
<tr>
<td>3.3.3</td>
<td>E</td>
<td>Insulation foil</td>
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<td>B</td>
<td>Socket for control</td>
</tr>
<tr>
<td>3.4.1</td>
<td>B</td>
<td>Interface board</td>
<td>6.5</td>
<td>B</td>
<td>Socket for motor</td>
</tr>
<tr>
<td>3.4.2</td>
<td>E</td>
<td>Cover plate for interface board</td>
<td>S</td>
<td>S</td>
<td>Seal kit</td>
</tr>
<tr>
<td>3.5.0</td>
<td>B</td>
<td>Signal board assly.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5.1</td>
<td>B</td>
<td>Signal board</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5.2</td>
<td>E</td>
<td>Cover plate for signal board</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Art B = Sub-assembly  Art E = component  Art S = Set  assly. = assembly

22. Service

AUMA offers extensive services as e.g. maintenance and revision for actuators. Addresses of our service centres (Cologne, Magdeburg, Bavaria) can be found on page 51 or in the internet (page 50).
23. Declaration of Conformity and Declaration of Incorporation


AUMA multi-turn actuators of the type range

SARV 07.1 - SARV 10.1 in version AUMA VARIOMATIC

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/EU)
- Low-Voltage Equipment Directive (73/23/EU)

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

a) concerning the Directive on Electromagnetic Compatibility

Emissions: EN 50081-2: 1993
Immunity: EN 50082-2: 1995
From 08.97: EN 61800-3

b) concerning the Low-Voltage Equipment Directive

EN 60204-1
EN 60034-1
VDE 0100 Part 410

Mülheim, April 14, 1998

W. Riester, 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.
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 range

SARV 07.1 - SARV 10.1
in version AUMA VARIOMATIC

are designed and produced, as electrical actuating devices, to be installed on industrial valves.
Messrs. 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  

DIN VDE 0100  
DIN VDE 0530  
DIN ISO 5210

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.

Mülheim, April 14, 1998

[Signature]

WERNER RIESTER GmbH & Co. KG
Armaturen- und Maschinenantriebe
P.O. Box 13 82 • 79373 Mülheim / Germany
Tel 07631 / 809-0 • Fax 07631 / 13218

This declaration does not include any guarantee for certain characteristics.
The safety instructions in the product documentation supplied with the actuators must be observed.
Worm gearboxes
GS 40.3 – GS 250.3
Torques up to 360,000 Nm

GS 315 – GS 500
Torques up to 32,000 Nm

Part-turn actuators
GF 50.3 – GF 125.3
Torques from 25 to 500 Nm
Operating times for 90° from 4 to 90 s

GF 160 – GF 250
Torques up to 32,000 Nm

Linear thrust units LE
with multi-turn actuators SA/ SAR
Thruts from 4 kN to 217 kN
Strokes up to 500 mm
Linear speeds from 20 to 360 mm/min

Multi-turn actuators SA/ SAR
with controls AUMATIC
Torques from 10 to 1,000 Nm
Speeds from 4 to 180 rpm

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

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

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 rpm

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

Worm gearboxes
GS 40.3 – GS 250.3
Torques up to 360,000 Nm

GS 315 – GS 500
Torques up to 360,000 Nm

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