Valve position indicator

WGD 90.1
for part-turn gearboxes
GS 50.3 – GS 250.3
GS 315 – GS 500
and lever gearboxes
GF 50.3 – GF 250.3
with swing angle > 180°
(multi-turn)
Valve position indicator WGD 90.1

Scope of these instructions: These instructions are valid for the valve position indicator WGD 90.1 for mounting to an AUMA part-turn gearbox of type ranges: GS 50.3 – GS 250.3, GS 315 – GS 500, and AUMA lever gearboxes of type range: GF 50.3 – GF 250.3 with swing angle > 180°. It is furthermore possible to mount the unit to purchased gearboxes with swing angle > 180°.

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</table>
1. Safety instructions

1.1. Range of application

AUMA valve position indicators are designed for indicating the position and the final position of AUMA part-turn gearboxes of type ranges GS 50.3 – GS 250.3, GS 315 – GS 500 and AUMA lever gearboxes GF 50.3 – GF 250.3. For other applications, please consult AUMA. The manufacturer is not liable for any possible damage resulting from use in other than the designated applications. Such risk lies entirely with the user. Observance of these operation instructions is considered as part of the gearboxes’ designated use.

1.2. Commissioning (electrical connection)

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

1.3. Maintenance

The maintenance instructions (refer to page 23) must be observed, otherwise a safe operation of the valve position indicator is no longer guaranteed.

1.4. Warnings and notes

Failure to observe the warnings and notes may lead to serious injuries or damage. Qualified personnel must be thoroughly familiar with all warnings and notes in these operation instructions. Correct transport, proper storage, mounting and installation, as well as careful commissioning are essential to ensure a trouble-free and safe operation.

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!**
  The printed circuit boards are equipped with parts which may be damaged or destroyed by electrostatic discharges. If the boards need to be touched during setting, measurement, or for exchange, it must be assured that immediately before a discharge through contact with an earthed metallic surface (e.g. the housing) has taken place.

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

2. Short description

AUMA valve position indicators type WGD 90.1 are designed for continuous, mechanical position indication and electric position feedback. Limit switches are installed for end position detection. Additionally, it is possible to generate two intermediate positions, if desired. A precise position feedback with low backlash is possible by direct mounting on the gearbox.
# 3. Technical data

<table>
<thead>
<tr>
<th>Features and functions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Version</strong></td>
<td>Clockwise closing, counterclockwise closing</td>
</tr>
<tr>
<td><strong>Swing angle</strong></td>
<td>Multi-turn, range up to 125 turns/stroke</td>
</tr>
<tr>
<td><strong>Limit switching</strong></td>
<td>Counter gear mechanism for end positions OPEN and CLOSED for 0.5 to 125 turns per stroke</td>
</tr>
<tr>
<td>Standard:</td>
<td>Single switch for each end position</td>
</tr>
<tr>
<td>Options:</td>
<td>Intermediate position switch (DUO limit switching), adjustable for any intermediate position</td>
</tr>
<tr>
<td><strong>Rating of the switches:</strong></td>
<td>Mechanical life time = 2 x 10⁶ cycles</td>
</tr>
<tr>
<td>Imax.:</td>
<td>AC (resistive load): 5 A (30 - 250 V)</td>
</tr>
<tr>
<td></td>
<td>DC (resistive load): 2 A (30 V); 0.5 A (125 V); 0.25 A (250 V)</td>
</tr>
<tr>
<td>For switches with gold plated contacts: min. 5 V to max. 50 V, min. 4 mA to max. 400 mA</td>
<td></td>
</tr>
</tbody>
</table>

**Position feedback, analogue (options):**
- **Potentiometer:** Conductive film 1 kΩ or 5 kΩ/0.25 W, linearity ± 2.5 %
- **Position transmitter:** Electronic position transmitter RWG: 0/4 – 20 mA in 3- or 4-wire version |
- 4 – 20 mA in 2-wire version |
- For further information on the RWG, refer to page 18

**Mechanical position indicator:** Continuous indication, adjustable indicator disc with symbols OPEN and CLOSED

**Heater in switch compartment:** Standard: Self-regulating PTC heater; 5 – 20 W, 110 – 250 V AC/DC |
Option: 24 – 48 V AC/DC

**Electrical connection:** Standard: AUMA plug/socket connector with crimp type connection for flexible conductors |
40 poles, cross section 0.75 – 1.0 mm² |
Option: Cross sections 0.5 mm² or 1.5 mm²

**Threads for cable glands:** Standard: Metric threads |
Options: Pg-threads

**Terminal plan:** APG AP 101 (basic version)

**Mounting position:** Positioning on the gearbox at every 90° possible

## Service conditions

**Enclosure protection according to EN 60 529**
- Standard: IP 68-3, dust and water tight up to max. 3 m head of water
- Options: IP 68-6, dust and water tight up to max. 6 m head of water
- Options: IP 68-6, dust and water tight up to max. 6 m head of water

**Corrosion protection:**
- Standard: KN Suitable for installation in industrial units, in water or power plants with a low pollutant concentration
- Options: KS Suitable for installation in occasionally or permanently aggressive atmosphere with a moderate pollutant concentration (e.g. in wastewater treatment plants, chemical industry)
- KX Suitable for installation in extremely aggressive atmosphere with high humidity and high pollutant concentration

**Finish coating:** Standard: Two-component iron-mica combination

**Colour:**
- Standard: AUMA silver-grey (similar to RAL 7037)
- Options: Other colours are possible on request

**Ambient temperature:**
- Standard: –25 °C to +80 °C
- Options: –25 °C to +70 °C (in combination with position transmitter RWG) |
- –40 °C to +60 °C (low temperature)

**Mounting to gearbox:**
- Standard: AUMA part-turn gearboxes GS/Lever gearboxes GF with AUMA adapter |
- Delivery for mounting to purchased gearbox without adapter or retrofit-kit |
- Subsequent mounting to AUMA part-turn gearboxes GS/Lever gearboxes GF including AUMA retrofit-kit

## Further information

**EU Directives:**
- Machinery Directive: (98/37/EC)

**Reference documents:**
- Product description Worm gearboxes GS 50.3 – GS 250.3/GS 315 – GS 500
- Information Lever gearboxes GF 50.3 – GF 250.3

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1) For version in enclosure protection IP 68, higher corrosion protection KS or KX is strongly recommended.
4. Transport and storage

4.1. Transport
- Transport to place of installation in sturdy packing.
- For products equipped with handwheel, do not attach ropes or hooks to the handwheel for the purpose of lifting by hoist.
- If the valve position indicator and gearbox are mounted on the valve, attach ropes or hooks for the purpose of lifting by hoist to the valve and not to the position indicator/gearbox.

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

In case valve position indicator is to be stored for a long period (more than 6 months), the following points must imperatively and additionally be observed:
- Prior to storage: Protect bright surfaces, in particular the output drive parts and mounting surface, with long-term corrosion protection agent.
- Check for corrosion approximately every 6 months. If first signs of corrosion show, apply new corrosion protection.

After mounting the valve position indicator, connect the unit immediately to electrical mains, so that condensation is reduced by the heater.

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

If the valve position indicator has already been mounted to the gearbox at the time of delivery, the mounting description below may be ignored. For later mounting to AUMA gearboxes, an appropriate retrofit-kit is included within the scope of delivery.

5.1. Removing the protection cover or pointer cover

Part-turn gearboxes and lever gearboxes may be equipped with protection cover or pointer cover.

For the version with protection cover (figures 1 and 2):
- Loosen 4 bolts (17.1) and remove protection cover (17.0).
  (there are 6 bolts for type range GS 315 to GS 500 – not illustrated).
- Insert clamping washer (12) with snap ring (32).
- Place drive disc (3) and fasten with 2 bolts (11.1).

For the version with pointer cover (figures 3 and 4):
- Loosen 2 bolts (11.1) and remove pointer cover (11.0).
  (there are 3 bolts for type range GS 315 to GS 500 – not illustrated)
- Remove upper O-ring (011) from worm wheel.
- Unscrew grub screws (C).
- Place drive disc (3) and fasten with 2 bolts (11.1).
5.2. Part-turn gearboxes GS 50.3 – GS 125.3 and lever gearboxes GF 50.3 – GF 125.3

Remove protection cover or pointer cover (refer to subclause 5.1.)

Mount adapter to valve position indicator (figure 5):
- Place O-ring (012) onto adapter (2).
- Fit adapter (2) to valve position indicator using four bolts M4 (2.1), at a torque according to table 1. The position of the adapter with reference to the valve position indicator may be determined as appropriate.
- Mount coupling from retrofit-kit.

Mount valve position indicator to gearbox (figure 6):
- Position valve position indicator into the same position as gearbox (OPEN or CLOSED) by turning the coupling.
- Insert O-ring (013) into the groove at the adapter.
- Apply sealing compound (e.g. Loctite type 573) to the mounting surface at gearbox housing cover.
- Fit complete valve position indicator using bolts (11.1) and lock washers (04) without major coupling torsion onto gearbox. The position of the valve position indicator with reference to the gearbox may be determined as appropriate.
- Fasten bolts crosswise with a torque according to table 1.

Table 1: Fastening torques for bolts

<table>
<thead>
<tr>
<th>Type</th>
<th>Screws</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS/GF 50.3</td>
<td>M5</td>
</tr>
<tr>
<td>GS/GF 63.3 – 125.3</td>
<td>M6</td>
</tr>
<tr>
<td>GS/GF 160.3</td>
<td>M8</td>
</tr>
<tr>
<td>GS/GF 200.3</td>
<td>M10</td>
</tr>
<tr>
<td>GS/GF 250.3</td>
<td>M12</td>
</tr>
<tr>
<td>GS 315 – 500</td>
<td>M12</td>
</tr>
</tbody>
</table>

- After mounting to gearbox, touch up any possible damage to paint finish.
5.3. Part-turn gearboxes GS 160.3 – GS 250.3/GS 315 – GS 500 and lever gearboxes GF 160.3 – GF 250.3

Remove protection cover or pointer cover (refer to subclause 5.1.)

**Mount small adapter to valve position indicator (figure 7)**
- Place O-ring (012) onto small adapter (2).
- Fit small adapter (2) to valve position indicator using four bolts M4 (2.1), at a torque according to table 1. The position of the adapter with reference to the valve position indicator may be determined as appropriate.

**Mount large adapter to gearbox:**
- Insert O-ring (4.09) into the groove at the large adapter.
- Apply sealing compound (e.g. Loctite type 573) to the mounting surface at gearbox housing cover.
- Secure large adapter with bolts (11.1) and lock washers (04) onto gearbox. The position of the adapter with reference to the gearbox may be determined as appropriate.
- Fasten bolts crosswise with a torque according to table 1.

**Fasten Oldham coupling from retrofit-kit:**
- Mount hub 1 of Oldham coupling (1.4) onto the shaft of the valve position indicator and fasten with screws.
- Mount hub 2 onto the shaft of the indicator disc and fasten with bolts.

**Mount valve position indicator to gearbox:**
- Position valve position indicator into the same position as gearbox (OPEN or CLOSED) by turning the coupling.
- Insert clutch disc in one of the hubs of the Oldham coupling.
- Insert O-ring (013) into the groove on the small adapter (2).
- Apply sealing compound (e.g. Loctite type 573) onto the mounting surface.
- Fasten small adapter (2) using bolts M6 (4.21) and lock washers (04) without major coupling torsion to large adapter (4.2) (for torques, refer to table 1).

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5.4. Foreign gearboxes

The valve position indicator may also mounted to other gearboxes. For further information (e.g. dimensions for adapter's production by customer), please contact AUMA.
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.
- Before connection check whether type of current and voltage fulfil the indications on the wiring diagram.

6.1. Connection with AUMA plug/socket connector in crimp version

![Figure 8: Connection](image)

- Loosen bolts (50.01) (figure 8) and remove plug cover.
- Loosen screws (51.01) and remove socket carrier (51.0) from plug cover (50.0).
- Insert cable glands suitable for connecting cables.
  (The enclosure protection stated on the name plate is only ensured if suitable cable glands are used).
- Seal cable entries which are not used with suitable plugs.
- Connect cables according to order-related wiring diagram.
- The pertaining wiring diagram is attached to the product in a weather-proof bag, together with these operation instructions. In case the terminal plan is not available, it can be obtained from AUMA (state commission no., refer to name plate) or downloaded directly from the Internet (www.auma.com).

Crimp sockets are supplied separately and in sufficient number inside the plug cover.
For crimping, a suitable tool, e.g. the BUCHANAN four indent crimp tool, must be used.

Cross sections:
0.75 – 1 mm², on request 0.5 mm² or 1.5 mm²

<table>
<thead>
<tr>
<th>Table 2: Technical data AUMA plug/socket connector in crimp version</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical data</strong></td>
</tr>
<tr>
<td>Number of contacts max.</td>
</tr>
<tr>
<td>Designation</td>
</tr>
<tr>
<td>Connecting voltage max.</td>
</tr>
<tr>
<td>Nominal current max.</td>
</tr>
<tr>
<td>Type of customer connection</td>
</tr>
<tr>
<td>Cross section max.</td>
</tr>
<tr>
<td>Material: Pin/socket carrier Contacts</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

6.2. Heater

To reduce condensation within the housing, the heater must be connected.
7. Switch compartment

The following sub-assemblies are located within the switch compartment:

- Limit switching (page 12).
- DUO limit switching (option) (page 14)
- Potentiometer (option) (page 17)
- Electronic position transmitter (option) (page 18)
- Mechanical position indicator (page 21)

The switch compartment must be opened to perform the setting of these sub-assemblies.

7.1. Opening the switch compartment

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

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

7.2. Pulling off the indicator disc

- Pulling off the indicator disc (figure 10). Open end wrench may be used as lever.
8. Setting the limit switching

8.1. Clockwise closing

If a gearbox is mounted, the end stops within the gearbox must be set prior to setting the limit switching (refer to operation instructions of gearbox).

The following description is only valid for “clockwise closing”, i.e. driven shaft turns clockwise to close the valve.

Identification within the wiring diagram:
APG-AP... for “clockwise closing”.

Setting end position CLOSED (black section)

- Turn handwheel clockwise until valve is closed.
- Connect continuity tester via limit switch LSC (WSR) to electrical connection (figure 11). As standard version, this connection is made via pins A2 and A4 (refer to terminal plan attached).
- Press down and turn setting spindle A (figure 12) with screw driver in direction of arrow, thereby observe cam B. While a ratchet is felt and heard, the cam B moves 90° every time until the limit switch LSC (WSR) is operated. The connected continuity tester signals the operation of the switch.
- Stop turning and release setting spindle.
- When overriding the tripping point inadvertently (ratchet is heard after the cam has snapped), continue turning the setting spindle in the same direction and repeat setting process.
  Attention: Ensure that setting spindle A is released by spring action after the setting process is completed.

Setting end position OPEN (white section)

- Turn handwheel counterclockwise until valve is open.
- Connect continuity tester via limit switch LSO (WÖL) to electrical connection (figure 11). As standard version, this connection is made via pins B2 and B4 (refer to terminal plan attached).
- Press down and turn setting spindle C (figure 12) with screw driver in direction of arrow, thereby observe cam D. While a ratchet is felt and heard, the cam D moves 90° every time until the limit switch LSO (WÖL) is operated. The connected continuity tester signals the operation of the switch.
- Stop turning and release setting spindle.
- When overriding the tripping point inadvertently (ratchet is heard after the cam has snapped), continue turning the setting spindle in the same direction and repeat setting process.
  Attention: Ensure that setting spindle C is released by spring action after the setting process is completed.
8.2. Counterclockwise closing

The following description is only valid for “counterclockwise closing”, i.e. driven shaft turns counterclockwise to close the valve.
Identification within the wiring diagram:
APG-1AP... for “counterclockwise closing”.

Setting end position CLOSED (black section)
- Turn handwheel counterclockwise until valve is closed.
- Connect continuity tester via limit switch LSC (WSL) to electrical connection (figure 13). Pins A2 and A4 (please refer to terminal plan attached).
- Press down and turn setting spindle C (figure 14) with screwdriver in direction of arrow, thereby observe cam D.
  While a ratchet is felt and heard, the cam D moves 90° every time until the limit switch LSC (WSL) is operated. The connected continuity tester signals the operation of the switch.
  Stop turning and release setting spindle.
When overriding the tripping point inadvertently (ratchet is heard after the cam has snapped), continue turning the setting spindle in the same direction and repeat setting process.
Attention: Ensure that setting spindle C is released by spring action after the setting process is completed.

Setting end position OPEN (red section)
- Turn handwheel clockwise until valve is open.
- Connect continuity tester via limit switch LSO (WÖR) to electrical connection (figure 13). Pins B2 and B4 (please refer to terminal plan attached).
- Press down and turn setting spindle A (figure 14) with screwdriver in direction of arrow, thereby observe cam B.
  While a ratchet is felt and heard, the cam B moves 90° every time until the limit switch LSO (WÖR) is operated. The connected continuity tester signals the operation of the switch.
  Stop turning and release setting spindle.
When overriding the tripping point inadvertently (ratchet is heard after the cam has snapped), continue turning the setting spindle in the same direction and repeat setting process.
Attention: Ensure that setting spindle A is released by spring action after the setting process is completed.
9. Setting the DUO limit switching (option)

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

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

9.1. Clockwise closing

The following description is only valid for “clockwise closing”, i.e. driven shaft turns clockwise to close the valve.

Identification within the wiring diagram:
APG-AP..for “clockwise closing”.

Setting direction CLOSE (black section)

- Move valve to desired intermediate position.
- Connect continuity tester via limit switch LSA (WDR) to electrical connection (figure 15). As standard version, this connection is made via pins C2 and C4 (refer to terminal plan attached).
- **Press down** and turn setting spindle E (figure 16) with screw driver in direction of arrow, thereby observe cam F.
  While a ratchet is felt and heard, the cam F moves 90° every time until the limit switch LSA (WDR) is operated. The connected continuity tester signals the operation of the switch.
  Stop turning and release setting spindle.
  When overriding the tripping point inadvertently (ratchet is heard after the cam has snapped), continue turning the setting spindle in the same direction and repeat setting process.
  **Attention:** Ensure that setting spindle E is released by spring action after the setting process is completed.

Setting direction OPEN (white section)

- Move valve to desired intermediate position.
- Connect continuity tester via limit switch LSB (WDL) to electrical connection (figure 15). As standard version, this connection is made via pins D2 and D4 (refer to terminal plan attached).
- **Press down** and turn setting spindle G (figure 16) with screw driver in direction of arrow, thereby observe cam H.
  While a ratchet is felt and heard, the cam H moves 90° every time until the limit switch LSB (WDL) is operated. The connected continuity tester signals the operation of the switch.
  Stop turning and release setting spindle.
  When overriding the tripping point inadvertently (ratchet is heard after the cam has snapped), continue turning the setting spindle in the same direction and repeat setting process.
  **Attention:** Ensure that setting spindle G is released by spring action after the setting process is completed.
9.2. Counterclockwise closing

The following description is only valid for “counterclockwise closing”, i.e. driven shaft turns counterclockwise to close the valve.

Identification within the wiring diagram:
APG-1AP... for “counterclockwise closing”.

Setting direction CLOSE (black section)
- Move valve to desired intermediate position.
- Connect continuity tester via limit switch LSA (WDL) to electrical connection (figure 17). Pins C2 and C4 (please refer to terminal plan attached).
- **Press down** and turn Setting spindle G (figure 18) with screw driver in direction of arrow, thereby observe cam H.
  While a ratchet is felt and heard, the cam H moves 90° every time until the limit switch LSA (WDL) is operated. The connected continuity tester signals the operation of the switch.
  Stop turning and release setting spindle.
  When overriding the tripping point inadvertently (ratchet is heard after the cam has snapped), continue turning the setting spindle in the same direction and repeat setting process.
  **Attention:** Ensure that setting spindle G is released by spring action after the setting process is completed.

Setting direction OPEN (red section)
- Move valve to desired intermediate position.
- Connect continuity tester via limit switch LSB (WDR) to electrical connection (figure 17). Pins D2 and D4 (please refer to terminal plan attached).
- **Press down** and turn setting spindle E (figure 18) with screw driver in direction of arrow, thereby observe cam F.
  While a ratchet is felt and heard, the cam F moves 90° every time until the limit switch LSB (WDR) is operated. The connected continuity tester signals the operation of the switch.
  Stop turning and release setting spindle.
  When overriding the tripping point inadvertently (ratchet is heard after the cam has snapped), continue turning the setting spindle in the same direction and repeat setting process.
  **Attention:** Ensure that setting spindle E is released by spring action after the setting process is completed.
10. Testing/setting the reduction gearing

To ensure correct mechanical position indication, the reduction gearing must be adapted to the turns per stroke of the valve position indicator.

The reduction gearing is designed for up to 125 turns per stroke.

- Check whether turns/stroke of the valve position indicator correspond to the stage setting of the reduction gearing, using table 3.
  If the setting is not correct:
  Set stage by offsetting the locking screw (03).

<table>
<thead>
<tr>
<th>Table 3: Reduction gearing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn/stroke above – to</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>0.5 – 1.0</td>
</tr>
<tr>
<td>1.0 – 2.0</td>
</tr>
<tr>
<td>2 – 4</td>
</tr>
<tr>
<td>4 – 8</td>
</tr>
</tbody>
</table>

To make best use of the electrical rotation angle of the potentiometer for versions equipped with potentiometer (page 17) or RWG (page 18), the reduction gearing (stages 01 to 6) is additionally divided by a further gearwheel set (A, B, C) (not illustrated). If the stage pre-set in the factory is to be modified for these versions, we recommend to contact AUMA.
11. Setting the potentiometer (option)

The potentiometer records the valve position.

If an electronic position transmitter (RWG) is installed, the potentiometer setting is performed with the RWG setting (please refer to pages 18 et seqq.).

Prior to potentiometer setting, make sure to correctly set the reduction gearing (refer to page 16).

- Move valve to end position CLOSED.

```
Figure 20: Control unit
```

- Turn potentiometer (figure 20) to the stop in compliance with table 4. End position CLOSED corresponds to 0 %, end position OPEN to 100 %.

```
<table>
<thead>
<tr>
<th>Reduction stage is set to</th>
<th>Version for clockwise closing (standard)</th>
<th>Version for counter-clockwise closing</th>
</tr>
</thead>
<tbody>
<tr>
<td>01, 1, 3, 5</td>
<td>01, 1, 3, 5</td>
<td>0, 2, 4, 6</td>
</tr>
<tr>
<td>02, 4, 6</td>
<td>02, 4, 6</td>
<td>0, 2, 4, 6</td>
</tr>
</tbody>
</table>
```

- Turn potentiometer slightly back from the stop.
### 12. Setting the electronic position transmitter RWG (option)

The electronic position transmitter records the valve position and generates a current signal between 0/4 and 20 mA, using the actual position value measured by the potentiometer.

After mounting to the gearbox, the setting must be checked (refer to clauses 12.1. or 12.2.).

**Table 5: Technical data RWG**

<table>
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<tr>
<th>Wiring diagrams</th>
<th>APG 2 /</th>
<th>APG1AP 2 / 3- or 4- wire system</th>
<th>APG 3 /</th>
<th>APG1AP 3 / for 2-wire system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output current</td>
<td>I_a</td>
<td>0 – 20 mA, 4 – 20 mA</td>
<td>I_a</td>
<td>4 – 20 mA</td>
</tr>
<tr>
<td>Power supply</td>
<td>U_v</td>
<td>24 V DC</td>
<td>U_v</td>
<td>14 V DC + (I x R_b), max. 30 V</td>
</tr>
<tr>
<td>max. current input</td>
<td>I</td>
<td>24 mA at 20 mA output current</td>
<td>I</td>
<td>20 mA</td>
</tr>
<tr>
<td>Max. load</td>
<td>R_b</td>
<td>600 Ω</td>
<td>R_b</td>
<td>(U_v - 14 V)/20 mA</td>
</tr>
</tbody>
</table>

**Table 6: Jumper position**

<table>
<thead>
<tr>
<th>Jumper arrangement to the right</th>
<th>Jumper arrangement to the left</th>
<th>Jumper arrangement to the left</th>
<th>Jumper arrangement to the right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction stage is set to 01, 1, 3, 5</td>
<td>Reduction stage is set to 01, 2, 4, 6</td>
<td>Reduction stage is set to 01, 1, 3, 5</td>
<td>Reduction stage is set to 0, 2, 4, 6</td>
</tr>
</tbody>
</table>

**2-wire or 3-/4-wire-system**
The 2-wire or 3-/4-wire version are set at slide switch S1 in the factory in compliance with the purchase order.

- Dot visible: 3-/4-wire system 0/4 – 20 mA
- Dot not visible: 2-wire system 4 – 20 mA

**Jumper position**
The lock screw (figure 21) shows the pre-set reduction stage (refer also to page 16)

![Figure 21: Control unit with RWG](image)
12.1. Setting 2-wire system 4 – 20 mA or 3-/4-wire system 0 – 20 mA

Prior to RWG setting, make sure to correctly set the reduction gearing (refer to page 16).

- Connect voltage to electronic position transmitter.
- Move valve to end position CLOSED.
- Connect ammeter for 0 – 20 mA to measuring points (figure 22).

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

- Set potentiometer (refer to page 17).

![Figure 22: Control unit with RWG](image)

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

Prior to RWG setting, make sure to correctly set the reduction gearing (refer to page 16).

- Connect voltage to electronic position transmitter.
- Move valve to end position CLOSED.
- Connect ammeter for 0 – 20 mA to measuring points (figure 23).

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

- Set potentiometer (refer to page 17).

```
Figure 23: Control unit with RWG
```

- Turn potentiometer “Rmin” clockwise until output current starts to increase.
- Turn back potentiometer “Rmin,” until a residual current of approx. 0.1 mA is reached.
- Move valve to end position OPEN.
- Set potentiometer “Rmax,” to end value 16 mA.
- Move valve to end position CLOSED.
- Set potentiometer “Rmin,” 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 travel range is now 4 – 20 mA.
- Approach both end positions again and check setting. If necessary, correct the setting.
13. Setting the mechanical position indicator

When changing the mounting position the mechanical position indicator may have to be set again.

- Place indicator disc on shaft.
- Move valve to **end position CLOSED**.
- Turn lower indicator disc (figure 24) until symbol \(\text{๒} \text{CLOSED}\) is in alignment with the mark on the cover (figure 25).
- Move valve to end position OPEN.
- Hold lower indicator disc CLOSED in position and turn upper disc with symbol \(\text{๒} \text{OPEN}\) until it is in alignment with the mark on the cover.

Indicator disc rotates by approximately 140° to 280° at full travel from OPEN to CLOSED or vice versa (depending on the reduction ratio). For this purpose, a suitable reduction gearing was installed in our works.

If the turns per stroke are changed at a later date, the gear stage of the reduction gearing might have to be adapted (refer to page 16).

13.1. Closing the switch compartment

After having worked at the switch compartment:

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

If damage to paint-finish has occurred after mounting, it has to be touched up to avoid corrosion.
14. **Enclosure protection IP 68**

**Definition**
According to EN 60 529, the conditions for meeting the requirements of enclosure protection IP 68 are to be agreed between manufacturer and user.

AUMA devices in enclosure protection IP 68 fulfil the following requirements in compliance with AUMA definitions:

- Duration of submersion in water max. 72 hours
- IP 68-3, submersible in water up to 3 m head of water
- IP 68-6, submersible in water up to 6 m head of water
- Up to 10 operations during submersion

If submersed in other media, additional measures for corrosion protection may be necessary; please consult AUMA. Submersion in aggressive media, e.g. acids or alkaline solutions, is not permitted.

**Cable glands**
- For devices with electrical components, appropriate cable glands in enclosure protection IP 67 must be used for the entries of electrical cables. The size of the cable glands must be suitable for the outside diameter of the cables, refer to recommendations of the cable gland manufacturers.
- Instruments are usually supplied without cable glands. For delivery, the threads are sealed with plugs in the factory.
- When ordered, cable glands can also be supplied by AUMA at an additional charge. For this, it is necessary to state the outside diameter of the cables.
- The cable glands must be sealed against the housing at the thread with an O-ring.
- It is recommended to additionally apply a liquid sealing material (Loctite or similar).

**Notes**
- The enclosure protection IP 68 refers to the interior compartment.
- If the limit switching WSH is likely to be repeatedly submersed, a higher corrosion protection KS or KX is required.

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

**After ingress of water**
- Check: In case of ingress of water, dry instrument correctly and check for proper function.
15. **Maintenance**

After commissioning, check device for damage to paint finish. Do a thorough touch-up to prevent corrosion. Original paint in small quantities can be supplied by AUMA.

AUMA products require only very little maintenance. Precondition for reliable service is correct commissioning.

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

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

**We recommend additionally:**

- If rarely operated, perform a test run about every 6 months. This ensures that the device is always ready to operate.
- Approximately six months after commissioning and then every year check bolts between limit switching WSH and gearbox for tightness. If required, tighten applying the torques given in table 1, page 8.

16. **Lubrication**

AUMA products are lubricated for life. Subsequent lubrication is not required.

17. **Disposal and recycling**

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

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

The following generally applies:

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

18. **Service**

AUMA offers extensive services such as maintenance and inspection for actuators. Addresses of AUMA offices and representatives can be found on page 26 and on the Internet (www.auma.com).
19. Declaration of conformity and Declaration of Incorporation


AUMA valve position indicators and limit switchings of the type ranges

Valve position indicators

Limit switchings for manually operated valves

WSG 90.1

WSH 10.1 - WSH 16.1

WSH 19.1

Limit switchings for multi-turn gearboxes

WDG 90.1

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Millheim, December 20th, 2004

The declaration does not include any guarantees for certain characteristics.

The above-mentioned AUMA valve position indicators and limit switchings are declared in conformity with the provisions of the Directive.
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**Notes:**
- The index is a guide to the main sections and topics covered in the document. Each section is numbered, indicating where specific instructions or information can be found.
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