Limit switching

WSHEx 10.2 – WSHEx 16.2

for manually operated valves
Read operation instructions first.

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

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

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1. Safety instructions

1.1. Basic information on safety

Standards/directives

AUMA products are designed and manufactured in compliance with recognised standards and directives. This is certified in an EC Declaration of Conformity.

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

They include among others standards and directives such as IEC 60079 “Electrical apparatus for explosive atmospheres” –

- Part 14: Electrical installations in hazardous areas (other than mines).
- Part 17: Inspection and maintenance of electrical installations in hazardous areas (other than mines).

Safety instructions/warnings

All personnel working with this device must be familiar with the safety and warning instructions in this manual and observe the instructions given. Safety instructions and warning signs on the device must be observed to avoid personal injury or property damage.

Qualification of staff

Assembly, electrical connection, commissioning, operation, and maintenance must be carried out exclusively by suitably qualified personnel having been authorised by the end user or contractor of the plant only.

Prior to working on this product, the staff must have thoroughly read and understood these instructions and, furthermore, know and observe officially recognised rules regarding occupational health and safety.

Work performed in potentially explosive atmospheres is subject to special regulations which have to be observed. The end user or contractor of the plant are responsible for respect and control of these regulations, standards, and laws.

Commissioning

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

Operation

Prerequisites for safe and smooth operation:

- Correct transport, proper storage, mounting and installation, as well as careful commissioning.
- Only operate the device if it is in perfect condition while observing these instructions.
- Immediately report any faults and damage and allow for corrective measures.
- Observe recognised rules for occupational health and safety.
- Observe the national regulations.

Protective measures

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

Maintenance

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

Any device modification requires prior consent of the manufacturer.

1.2. Range of application

AUMA limit switching devices are designed for signalling the actual position and end position of manually operated valves.

The devices described below are provided for use in the potentially explosive atmospheres of zones 1, 2, 21, and 22.

Other applications require explicit (written) confirmation by the manufacturer.
The following applications are not permitted, e.g.:

- Industrial trucks according to EN ISO 3691
- Lifting appliances according to EN 14502
- Passenger lifts according to DIN 15306 and 15309
- Service lifts according to EN 81-1/A1
- Escalators
- Permanent submersion (observe enclosure protection)
- Potentially explosive areas of zones 0 and 20
- Radiation exposed areas in nuclear power plants

No liability can be assumed for inappropriate or unintended use.

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

**Information**

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

### 1.3. Warnings and notes

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

**DANGER**

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

**WARNING**

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

**CAUTION**

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

**NOTICE**

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

**Arrangement and typographic structure of the warnings**

Type of hazard and respective source!

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

→ Measures to avoid the danger
→ Further measure(s)

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

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

### 1.4. References and symbols

The following references and symbols are used in these instructions:

**Information**
The term **Information** preceding the text indicates important notes and information.

Symbol for CLOSED (valve closed)
Symbol for OPEN (valve open)
Safety instructions

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

< > Reference to other sections
Terms in brackets shown above refer to other sections of the document which provide further information on this topic. These terms are either listed in the index, a heading or in the table of contents and may quickly be found.
2. Identification

2.1. Name plate

Each device has a name plate.

Figure 1: Arrangement of name plates

![Name plate diagram]

[1] Name plate
[2] Additional plate, e.g. KKS plate (Power Plant Classification System)
[3] Explosion protection approval plate

**Data for identification**

Figure 2: Limit switching device name plate

![Limit switching device name plate]

[1] Type and size
[2] Order number

Figure 3: Explosion protection approval plate

![Explosion protection approval plate]

[1] Ex Symbol, CE mark, ID no.
[2] EC type examination certificate
[3] Explosion protection classification - electrical explosion protection

**Type and size**

These instructions apply to the following devices:

Limit switching device WSHEx, sizes: 10.2, 14.2, 16.2

**Order number**

The product can be identified using this number and the technical data as well as order-related data pertaining to the device can be compiled.

Please always state this number for any product inquiries.

On the Internet at [http://www.auma.com](http://www.auma.com), we offer a service allowing authorised users to download order-related documents such as wiring diagrams and technical data (both in German and English), inspection certificates and the operation instructions when entering the order number.
2.2. Short description

The AUMA WSH limit switching devices allow valve operation via handwheel; at the same time, reaching the valve end position is indicated via the end position switches. A mechanical position indicator shows the valve position.

As an option, the limit switching device can be equipped with a remote position transmitter to transmit the valve position as 0/4 – 20 mA current signal to the DCS.
3. Transport, storage and packaging

3.1. Transport

⚠️ DANGER ⚠️

Danger in case of inappropriate fixing!

Risk of death or serious injury.

→ Do NOT stand below hovering load.
→ Attach ropes or hooks for the purpose of lifting by hoist only to housing and NOT to handwheel.

3.2. Storage

⚠️ NOTICE ⚠️

Danger of corrosion due to inappropriate storage!

→ Store in a well-ventilated, dry room (maximum humidity 70 %).
→ Protect against floor dampness by storage on a shelf or on a wooden pallet.
→ Cover to protect against dust and dirt.
→ Apply suitable corrosion protection agent to uncoated surfaces.

Long-term storage

If the device must be stored for a long period (more than 6 months) the following points must be observed in addition:

1. Prior to storage:
   Protect uncoated surfaces, in particular the output drive parts and mounting surface, with long-term corrosion protection agent.

2. At an interval of approx. 6 months:
   Check for corrosion. If first signs of corrosion show, apply new corrosion protection.

3.3. Packaging

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

4.1. **Mounting position**

AUMA WSH limit switching devices can be operated without restriction in any mounting position.

4.2. **Limit switching device: mount to valve/gearbox**

**NOTICE**

Danger of corrosion due to damage to paint finish and condensation!

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

→ After mounting, connect the device immediately to electrical mains to ensure that heater reduces condensation.

4.2.1. **Output drive types B, B1 – B4 and E**

**Application**

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

**Design**

Output drive bore with keyway:

- Type B1 – B4 with bore according to ISO 5210
- Types B and E with bore according to DIN 3210
- Later change from B1 to B3, B4, or E is possible.

Figure 4: Output drives

![Output drives diagram]

[1] Output drive types B1/B2 and B
[2] Hollow shaft with keyway
[4] Output drive sleeve/output drive plug sleeve with bore and keyway

**Information**

Spigot at valve flanges should be loose fit.

4.2.1.1. **Limit switching device (with output drive types B1 – B4 or E): mount to valve/gearbox**

1. Check if mounting flanges fit together.
2. Check whether bore and keyway match the input shaft.
3. Apply a small quantity of grease to the input shaft.
4. Fit WSH limit switching device.
   **Information:** Ensure that the spigot fits uniformly in the recess and that the mounting faces are in complete contact.
5. Fasten WSH limit switching device with screws according to table.
   **Information:** We recommend applying liquid thread sealing material to the screws to avoid contact corrosion.
6. Fasten screws crosswise to a torque according to table.

Table 1: Fastening torques for screws

<table>
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<tr>
<th>Screws</th>
<th>Fastening torque $T_A$ [Nm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threads</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M10</td>
<td>51</td>
</tr>
<tr>
<td>M16</td>
<td>214</td>
</tr>
<tr>
<td>M20</td>
<td>431</td>
</tr>
</tbody>
</table>

4.2.2. Output drive type A

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

4.2.2.1. Stem nut: finish machining

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

Figure 5: Design of output drive type A

3. Remove bearing races [2.1] and bearing rims [2.2] from stem nut [1].
4. Drill and bore stem nut [1] and cut thread.
   **Information:** When fixing in the chuck, make sure stem nut runs true!
5. Clean the machined stem nut [1].
6. Apply sufficient Lithium soap EP multi-purpose grease to bearing rims [2.2] and bearing races [2.1], ensuring that all hollow spaces are filled with grease.
7. Place greased bearing rims [2.2] and bearing races [2.1] onto stem nut [1].
   **Information:** Ensure that dogs or splines are placed correctly in the keyway of the hollow shaft.
9. Screw in spigot ring [3] until it is firm against the shoulder.
4.2.2.2. Multi-turn actuator (with output drive A): mount to valve

Figure 6: Assembly with output drive type A

1. If the output drive type A is already mounted to the limit switching device: Loosen screws [3] and remove output drive type A [2].
2. Check if the flange of output drive type A matches the valve flange [4].
3. Apply a small quantity of grease to the valve stem [1].
4. Place output drive type A on valve stem and fasten until it is flush on the valve flange.
5. Turn output drive type A until alignment of the fastening holes.
6. Screw in fastening screws [5], however do not completely fasten.
7. Fit limit switching device on the valve stem so that the stem nut dogs engage into the the stem nut.
   ➥ The flanges are flush with each other if properly engaged.
8. Adjust limit switching device until alignment of the fastening holes.
9. Fasten limit switching device with screws [3].

Table 2: Fastening torques for screws

<table>
<thead>
<tr>
<th>Screws</th>
<th>Fastening torque $T_A$ [Nm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threads</td>
<td>Strength class 8.8</td>
</tr>
<tr>
<td>M6</td>
<td>11</td>
</tr>
<tr>
<td>M10</td>
<td>51</td>
</tr>
<tr>
<td>M12</td>
<td>87</td>
</tr>
<tr>
<td>M16</td>
<td>214</td>
</tr>
<tr>
<td>M20</td>
<td>431</td>
</tr>
</tbody>
</table>

11. Turn limit switching device with handwheel in direction OPEN until valve flange and output drive A are firmly placed together.
12. Tighten fastening screws [5] between valve and output drive type A crosswise applying a torque according to table.
4.3. Accessories for assembly

4.3.1. Stem protection tube for rising valve stem

— Option —

Figure 7: Assembly of the stem protection tube

1. Seal thread with hemp, Teflon tape, or thread sealing material.
4. Check whether cap for stem protection tube [1] is available and in perfect condition.
5. Electrical connection

5.1. Basic information

**Danger due to incorrect electrical connection**

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

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

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

**Wiring diagram/terminal plan**

The pertaining wiring diagram/terminal plan is attached to the device in a weather-proof bag, together with these operation instructions. It can also be obtained from AUMA (state order no., refer to name plate) or downloaded directly from the Internet (www.auma.com).

**Limit and torque switches**

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

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

5.2. Connection with terminal connection (KR)

5.2.1. Terminal compartment: open

Figure 8: Terminal connection KR

1. Cover
2. Screws for cover
3. O-ring
4. Terminal compartment
5. Frame
Hazardous voltage!

Risk of electric shock.
→ Disconnect device from the mains before opening.

1. Loosen screws [2] and remove cover [1].
   ➔ Terminal compartment [4] is designed for explosion protection Ex e (increased safety).
2. Insert cable glands with Ex e approval and of size suitable for connection cables.
   ➔ The enclosure protection IP… stated on the name plate is only ensured if suitable cable glands are used. Example: Name plate shows enclosure protection IP68.
3. Seal cable entries which are not used with approved plugs suitable for the required protection type.
4. Remove cable sheathing and insert the wires into the cable glands.
5. Fasten cable glands with the specified torque to ensure the required enclosure protection.

5.2.2. Cable connection

Table 3: Terminal cross sections and tightening torques

<table>
<thead>
<tr>
<th>Type</th>
<th>Terminal cross sections</th>
<th>Tightening torques</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power terminals (U, V, W)</td>
<td>max. 10 mm² (flexible or solid)</td>
<td>1.5 – 1.8 Nm</td>
</tr>
<tr>
<td>PE connection</td>
<td>max. 10 mm² (flexible or solid)</td>
<td>3.0 – 4.0 Nm</td>
</tr>
<tr>
<td>Control contacts (1 to 50)</td>
<td>2.5 mm² (flexible or solid)</td>
<td>0.6 – 0.8 Nm</td>
</tr>
</tbody>
</table>

Danger of corrosion: Damage due to condensation!
→ After mounting, commission the device immediately to ensure that heater minimises condensation.

1. Strip wires.
2. For flexible cables: Use end sleeves according to DIN 46228.
3. Connect cables according to order-related wiring diagram.
**WARNING**

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

*Risk of electric shock.*

→ Connect all protective earth conductors.
→ Connect PE connection to external protective earth conductor of connection cables.
→ Start running the device only after having connected the protective earth conductor.

4. Tighten protective earth firmly to PE connection

Figure 9: PE connection

![Figure 9: PE connection](image)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[1]</td>
<td>Terminal blocks</td>
</tr>
<tr>
<td>[2]</td>
<td>Terminal frame</td>
</tr>
<tr>
<td>[3]</td>
<td>PE connection, symbol: ☀</td>
</tr>
</tbody>
</table>

5.2.3. Terminal compartment: close

Figure 10: Terminal connection KR

![Figure 10: Terminal connection KR](image)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[1]</td>
<td>Cover</td>
</tr>
<tr>
<td>[2]</td>
<td>Screws for cover</td>
</tr>
<tr>
<td>[3]</td>
<td>O-ring</td>
</tr>
<tr>
<td>[5]</td>
<td>Frame</td>
</tr>
</tbody>
</table>

2. Check whether O-ring [3] is in good condition, replace if damaged.
3. Apply a thin film of non-acidic grease (e.g. petroleum jelly) to the O-ring and insert it correctly.
5.3. Accessories for electrical connection

5.3.1. External earth connection

**Application**  
External earth connection (terminal clamp) for connection to equipotential compensation.

Figure 11: Earth connection
6. Operation

Figure 12: Limit switching device directly mounted on valve

Turning the handwheel opens or closes the valve.
7. **Indication (at device)**

For visual valve position indication, a position indicator is available.

**Mechanical position indicator:**

- local indication of valve position
  
  (For complete travel from OPEN to CLOSED or vice versa, the indicator disc [2] rotates approximately 180° to 230°.)

- indicates that the end positions (via indication mark [3]) have been reached

**Figure 13: Mechanical position indicator**

1. Cover
2. Indicator disc
3. Indicator mark
4. Symbol for OPEN position
5. Symbol for CLOSED position
8. Signals

Limit switches signal that the valve has reached the end position.

As an option, the limit switching device can be equipped with a remote position transmitter to transmit the valve position.

<table>
<thead>
<tr>
<th>Feedback signal</th>
<th>Type and designation in terminal plan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>End position OPEN/CLOSED reached</strong></td>
<td>Setting via limit switching</td>
</tr>
<tr>
<td></td>
<td>Switches: 1 NC and 1 NO (standard)</td>
</tr>
<tr>
<td>LSC</td>
<td>Limit switch, closing, clockwise rotation</td>
</tr>
<tr>
<td>LSO</td>
<td>Limit switch, opening, counterclockwise rotation</td>
</tr>
<tr>
<td><strong>Intermediate position reached</strong></td>
<td>Setting via DUO limit switching</td>
</tr>
<tr>
<td></td>
<td>Switches: 1 NC and 1 NO (standard)</td>
</tr>
<tr>
<td>LSA</td>
<td>DUO limit switch, clockwise rotation</td>
</tr>
<tr>
<td>LSB</td>
<td>DUO limit switch, counterclockwise rotation</td>
</tr>
<tr>
<td><strong>Valve position (option)</strong></td>
<td>Electronic position transmitter RWG</td>
</tr>
<tr>
<td>B3/B4, RWG</td>
<td>2-wire system 4 – 20 mA</td>
</tr>
</tbody>
</table>

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

9.1. Switch compartment: open

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


[Image of switch compartment]

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

[Image of wrench and indicator disc]

9.2. Limit switching: set

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

[Image of limit switch]
9.2.1. End position CLOSED (black section): set

1. Engage manual operation.
2. Turn handwheel clockwise until valve is closed.
3. Press down and turn setting spindle [1] with screw driver in direction of the arrow and observe the pointer [2]: While a ratchet is felt and heard, the pointer [2] moves 90° every time.
4. If the pointer [2] is 90° from mark [3]: Continue turning slowly.
5. If the pointer [2] moves to mark [3]: Stop turning and release setting spindle.
   ➤ The end position CLOSED setting is complete.
6. If you override the tripping point inadvertently (ratchet is heard after the pointer has snapped): Continue turning the setting spindle in the same direction and repeat setting process.

9.2.2. End position OPEN (white section): set

1. Engage manual operation.
2. Turn handwheel counterclockwise until valve is open.
3. Press down and turn setting spindle [4] with screw driver in direction of the arrow and observe the pointer [5]: While a ratchet is felt and heard, the pointer [5] moves 90° every time.
4. If the pointer [5] is 90° from mark [6]: Continue turning slowly.
5. If the pointer [5] moves to mark [6]: Stop turning and release setting spindle.
   ➤ The end position OPEN setting is complete.
6. If you override the tripping point inadvertently (ratchet is heard after the pointer has snapped): Continue turning the setting spindle in the same direction and repeat setting process.

9.3. Intermediate positions: set

— Option —
Limit switching devices equipped with DUO limit switching contain two intermediate position switches. One intermediate position may be set for each running direction.

Figure 15: Setting elements for limit switching

**Black section:**
- [1] Setting spindle: Running direction CLOSE
- [2] Pointer: Running direction CLOSE

**White section:**
- [4] Setting spindle: Running direction OPEN

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

### 9.3.1. Running direction CLOSE (black section): set

1. Move valve in direction CLOSE to desired intermediate position.
2. If you override the tripping point inadvertently: Turn valve into the opposite direction and approach intermediate position again in direction CLOSE.
   
   **Information:** Always approach the intermediate position in the same direction as in later electrical operation.

3. **Press down** and turn setting spindle [1] with screw driver in direction of the arrow and observe the pointer [2]: While a ratchet click is felt and heard, the pointer [2] moves 90° every time.
4. If the pointer [2] is 90° from mark [3]: Continue turning slowly.
5. If the pointer [2] moves to mark [3]: Stop turning and release setting spindle.
   
   ➤ The intermediate position setting in running direction CLOSE is complete.
6. If you override the tripping point inadvertently (ratchet click is heard after the pointer has snapped): Continue turning the setting spindle in the same direction and repeat setting process.

### 9.3.2. Running direction OPEN (white section): set

1. Move valve in direction OPEN to desired intermediate position.
2. If you override the tripping point inadvertently: Move valve in opposite direction and approach intermediate position again in direction OPEN (always approach the intermediate position in the same direction as in later electrical operation).
3. **Press down** and turn setting spindle [4] with screw driver in direction of the arrow and observe the pointer [5]: While a ratchet click is felt and heard, the pointer [5] moves 90° every time.
4. If the pointer [5] is 90° from mark [6]: Continue turning slowly.
5. If the pointer [5] moves to mark [6]: Stop turning and release setting spindle. The intermediate position setting in running direction OPEN is complete.

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

9.4. Potentiometer

— Option —

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

Setting elements

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

Setting is made via potentiometer [1].

Figure 16: View on control unit

9.4.1. Potentiometer setting

Information

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

1. Move valve to end position CLOSED.
   ➢ End position CLOSED corresponds to 0 %
   ➢ End position OPEN corresponds to 100 %
4. Perform fine-tuning of the zero point at external setting potentiometer (for remote indication).

9.5. Electronic position transmitter RWG: set

— Option —

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

Information

The electronic position transmitter RWG 5020 Ex is designed as an intrinsically safe electric circuit Ex ib according to IEC 60079-11.

⚠️ WARNING

Intrinsically safe electric circuit, risk of explosion!

Risk of death or serious injury.

➢ Observe the applicable installation regulations regarding explosion protection when connecting.
Table 4: Technical data RWG 5020

<table>
<thead>
<tr>
<th>2-wire system</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EC type examination certificate</td>
<td>PTB 03 ATEX 2176</td>
</tr>
<tr>
<td>Explosion protection</td>
<td>II2G Ex ib IIC T4</td>
</tr>
<tr>
<td>Terminal plans</td>
<td>KMS</td>
</tr>
<tr>
<td>Output current</td>
<td>IA</td>
</tr>
<tr>
<td>Power supply</td>
<td>UV</td>
</tr>
<tr>
<td>Max. current consumption</td>
<td>I</td>
</tr>
<tr>
<td>Max. load</td>
<td>RB</td>
</tr>
<tr>
<td>Signal and power supply circuits</td>
<td>UA</td>
</tr>
<tr>
<td></td>
<td>IL</td>
</tr>
<tr>
<td></td>
<td>PL</td>
</tr>
<tr>
<td></td>
<td>CI</td>
</tr>
<tr>
<td></td>
<td>LI</td>
</tr>
</tbody>
</table>

Figure 17: View of control unit

[1] Potentiometer (travel sensor)
[2] Potentiometer min. (4 mA)
[3] Potentiometer max. (20 mA)
[4] Measuring points 4 – 20 mA

1. Connect voltage to electronic position transmitter.
2. Move valve to end position CLOSED.
7. Turn back potentiometer [2] until a value of approx. 4.1 mA is reached.
   ➤ This ensures that the signal remains above the dead and live zero point.
8. Move valve to end position OPEN.
9. Set potentiometer [3] to end value 20 mA.
10. Approach end position CLOSED anew and check minimum value (4.1 mA). If necessary, correct the setting.

Information

If the maximum value cannot be reached, the selection of the reduction gearing must be checked. (The max. possible turns/stroke are indicated on the order-related technical data sheet for the actuator.)

9.6. Mechanical position indicator: set

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

4. Move valve to end position OPEN.

5. Hold lower indicator disc CLOSE in position and turn upper disc with symbol (OPEN) until it is in alignment with the mark on the cover.

6. Move valve to end position CLOSED again.

7. Check settings:
   If the symbol (CLOSED) is no longer in alignment with mark on the cover:
   7.1 Repeat setting procedure.
   7.2 Check whether the appropriate reduction gearing has been selected, if required.

9.7. **Switch compartment: close**

**Danger of corrosion due to damage to paint finish!**

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

9.7. **Switch compartment: close**

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

5. Place cover [1] on switch compartment.

10. Corrective action

10.1. Faults during commissioning

Table 5: Faults during commissioning

<table>
<thead>
<tr>
<th>Fault description</th>
<th>Possible causes</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical position indicator cannot be set.</td>
<td>Reduction gearing is not suitable for turns/stroke of the valve.</td>
<td>Exchange reduction gearing.</td>
</tr>
<tr>
<td>Position transmitter RWG</td>
<td>No value can be measured at measuring points.</td>
<td>Connect terminals 23/24 to XK across RWG.</td>
</tr>
<tr>
<td>Position transmitter RWG</td>
<td>Current loop via RWG is open. (Position feedback 0/4 – 20 mA only functions if the current loop is closed across the RWG.)</td>
<td>Connect external load to XK, e.g. remote indication.</td>
</tr>
<tr>
<td>Position transmitter RWG</td>
<td>Reduction gearing is not suitable for turns/stroke of the valve.</td>
<td>Exchange reduction gearing.</td>
</tr>
<tr>
<td>Limit switches do not operate.</td>
<td>Switch is defective or switch setting is incorrect.</td>
<td>Check setting, if required, reset end positions.</td>
</tr>
</tbody>
</table>

→ Check switches and replace them, if required.

**Switch check**

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

11. Servicing and maintenance

**Damage caused by inappropriate maintenance!**

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

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

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

11.1. Preventive measures for servicing and safe operation

The following measures are required to ensure safe device operation:

**Every 6 months after commissioning and then once a year**

- Carry out visual inspection:
  Cable entries, cable glands, blanking plugs, etc. have to be checked for correct tightness and sealing.
  Respect torques according to manufacturer's details.
- Check fastening screws between limit switching device and gearbox/valve for tightness. If required, fasten screws while applying the tightening torques as indicated in chapter <Assembly>.
- When rarely operated: Perform test run.
- For devices with output drive A: Press in Lithium soap EP multi-purpose grease on mineral oil base at the grease nipple with a grease gun.
- Lubrication of the valve stem must be done separately.

Figure 18: Output drive type A

![Figure 18: Output drive type A](image)

[1] Output drive type A

Table 6: Grease quantities for bearing of output drive A

<table>
<thead>
<tr>
<th>Output drive type</th>
<th>A 10.2</th>
<th>A 14.2</th>
<th>A 16.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity [g]</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

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

For enclosure protection IP68 (option)

After continuous immersion:

- Checking the limit switching.
- In case of ingress of water, locate leaks and repair. Dry device correctly and check for proper function.

11.2. Maintenance

**Maintenance intervals**

After 3 years at the latest for Ex certified products.
Lubrication

The product has adhesive lubrication for travel transmission. We recommend re-lubrication every 8 – 10 years. We recommend exchanging the seals when changing the grease.

11.3. Disposal and recycling

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

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

The following generally applies:

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

Information

The following technical data includes standard and optional features. For detailed information on the customer-specific version, refer to the order-related data sheet. The technical data sheet can be downloaded from the Internet at [www.auma.com](http://www.auma.com) in both German and English (please state the order number).

12.1. Limit switching device WSHEx 10.2 – WSHEx 16.2

<table>
<thead>
<tr>
<th>Type</th>
<th>Output torque Max. [Nm]</th>
<th>Thrust permissible at Output drive type A [kN]</th>
<th>Valve attachment Valves DIN 3210 Option</th>
<th>Max. Ø rising Stem [mm]</th>
<th>Handwheel Ø mm</th>
<th>Weight [kg] Reduction ratio approx.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSHEx 10.2</td>
<td>170</td>
<td>70</td>
<td>F10 G0</td>
<td>40</td>
<td>400</td>
<td>1 : 1</td>
</tr>
<tr>
<td>WSHEx 14.2</td>
<td>400</td>
<td>160</td>
<td>F14 G1/2</td>
<td>57</td>
<td>400/500</td>
<td>1 : 1</td>
</tr>
<tr>
<td>WSHEx 16.2</td>
<td>800</td>
<td>250</td>
<td>F16 G3</td>
<td>75</td>
<td>630</td>
<td>1 : 1</td>
</tr>
</tbody>
</table>

1) Indicated flange sizes apply for output drive types A and B1. Refer to dimension sheets for further output drive types.

2) Indicated weight includes limit switching device with standard electrical connection, output drive type B1 and handwheel.

Features and functions

Explosion protection
- Standard: II 2G Ex e IIC T4 Gb
- II 2G Ex e ib IIC T4 Gb
- II 2D Ex tb IIIIC T130°C

EC type examination certificate
- TÜV 12 ATEX 7187 X

Overvoltage category
- Category III according to IEC 60364-4-443

Electrical connection
- Terminal connection with terminal blocks

Threads for cable entries
- Standard: Metric threads
- Options: Pg-threads, NPT-threads, G-threads

Terminal plan
- Terminal plan according to order number as part of the scope of delivery

Valve attachment
- Standard: B1 according to EN ISO 5210
- Options: A, B2, B3, B4 according to EN ISO 5210
- A, B, D, E according to DIN 3210

Electromechanical control unit

Limit switching
- Counter gear mechanism for end positions OPEN and CLOSED
- Turns per stroke: 2 to 500 (standard)
- Standard: Single switches (1 NC and 1 NO) for each end position, not galvanically isolated
- Options: Tandem switches (2 NC and 2 NO) for each end position, switches galvanically isolated
- Triple switches (3 NC and 3 NO) for each end position, switches galvanically isolated
- Intermediate position switch (DUO limit switching), adjustable for any position

Position feedback signal, analogue (option)
- Potentiometer or 0/4 – 20 mA (RWGEx 5020, Ex ib version)

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

Running indication (option)
- Blinker transmitter
- Standard: Self-regulating PTC heater, 5 – 20 W, 110 – 250 V AC/DC
- Option: 24 – 48 V DC/DC

Heater in switch compartment
- Resistance type heater, 6 W, 220 – 240 V AC

Service conditions

Use
- Indoor and outdoor use permissible

Mounting position
- Any position

Ambient temperature
- Standard: –50 °C to +60 °C
- Option: –50 °C to +80 °C, on request

Enclosure protection according to EN 60529
- IP68
- According to AUMA definition, enclosure protection IP68 meets the following requirements:
  - Depth of water: maximum 8 m head of water
  - Duration of continuous immersion in water: Max. 96 hours
### Service conditions

<table>
<thead>
<tr>
<th>Pollution degree</th>
<th>Pollution degree 4 (when closed) according to EN 50178</th>
</tr>
</thead>
</table>
| Corrosion protection | **Standard:** KS: Suitable for use in areas with high salinity, almost permanent condensation, and high pollution.  
**Options:** KX: Suitable for use in areas with extremely high salinity, permanent condensation, and high pollution.  
KG: Same as KX, however aluminium-free version (outer parts) |
| Finish coating | Two-component iron-mica combination |
| Colour | **Standard:** AUMA silver-grey (similar to RAL 7037)  
**Option:** Available colours on request |

### Further information

**EU Directives**

- ATEX Directive: (94/9/EC)
- Low Voltage Directive: (2006/95/EC)
13. Spare parts

13.1. Limit switching devices WSHEx 10.2 – WSHEx 16.2
**Information:** Please state type and order no. of the device (see name plate) when ordering spare parts. Only original AUMA spare parts should be used. Failure to use original spare parts voids the warranty and exempts AUMA from any liability. Delivered spare parts may slightly vary from the representation.

<table>
<thead>
<tr>
<th>Ref.No.</th>
<th>Designation</th>
<th>Type</th>
<th>Ref.No.</th>
<th>Designation</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>002.0</td>
<td>Bearing flange</td>
<td>Sub-assembly</td>
<td>549.1</td>
<td>Output drive sleeve B3/B4</td>
<td></td>
</tr>
<tr>
<td>003.0</td>
<td>Hollow shaft</td>
<td>Sub-assembly</td>
<td>551.1</td>
<td>Parallel key</td>
<td></td>
</tr>
<tr>
<td>019.0</td>
<td>Crown wheel</td>
<td>Sub-assembly</td>
<td>553.0</td>
<td>Mechanical position indicator</td>
<td>Sub-assembly</td>
</tr>
<tr>
<td>023.0</td>
<td>Output drive wheel for limit switching</td>
<td>Sub-assembly</td>
<td>556.0</td>
<td>Potentiometer as position transmitter</td>
<td>Sub-assembly</td>
</tr>
<tr>
<td>024.0</td>
<td>Intermediate wheel for limit switching</td>
<td>Sub-assembly</td>
<td>556.1</td>
<td>Potentiometer without slip clutch</td>
<td>Sub-assembly</td>
</tr>
<tr>
<td>025.0</td>
<td>Locking plate</td>
<td>Sub-assembly</td>
<td>557.0</td>
<td>Heater</td>
<td>Sub-assembly</td>
</tr>
<tr>
<td>058.0</td>
<td>Wire for protective earth</td>
<td>Sub-assembly</td>
<td>558.0</td>
<td>Blinker transmitter including end sleeves (without impulse disc and insulation plate)</td>
<td>Sub-assembly</td>
</tr>
<tr>
<td>155.0</td>
<td>Reduction gearing</td>
<td>Sub-assembly</td>
<td>559.0</td>
<td>Control unit</td>
<td>Sub-assembly</td>
</tr>
<tr>
<td>500.0</td>
<td>Cover</td>
<td>Sub-assembly</td>
<td>560.0</td>
<td>Position transmitter RWG</td>
<td>Sub-assembly</td>
</tr>
<tr>
<td>507.1</td>
<td>Frame for electrical connection</td>
<td>Sub-assembly</td>
<td>566.0</td>
<td>Potentiometer for RWG without slip clutch</td>
<td>Sub-assembly</td>
</tr>
<tr>
<td>511.0</td>
<td>Threaded plug</td>
<td>Sub-assembly</td>
<td>566.1</td>
<td>Position transmitter board for RWG</td>
<td>Sub-assembly</td>
</tr>
<tr>
<td>514.0</td>
<td>Output drive form A (without stem nut)</td>
<td>Sub-assembly</td>
<td>566.2</td>
<td>Position transmitter board for RWG</td>
<td>Sub-assembly</td>
</tr>
<tr>
<td>514.1</td>
<td>Axial needle roller bearing</td>
<td>Sub-assembly</td>
<td>566.3</td>
<td>Wire harness for RWG</td>
<td>Sub-assembly</td>
</tr>
<tr>
<td>516.0</td>
<td>Output drive D</td>
<td>Sub-assembly</td>
<td>567.1</td>
<td>Slip clutch for potentiometer</td>
<td>Sub-assembly</td>
</tr>
<tr>
<td>516.1</td>
<td>Output drive shaft D</td>
<td>Sub-assembly</td>
<td>575.1</td>
<td>Stem nut type A</td>
<td>Sub-assembly</td>
</tr>
<tr>
<td>528.0</td>
<td>Terminal frame (without terminals)</td>
<td>Sub-assembly</td>
<td>579.0</td>
<td>Switch for limit/torque</td>
<td>Sub-assembly</td>
</tr>
<tr>
<td>529.0</td>
<td>End clamp</td>
<td></td>
<td>580.1</td>
<td>Spacer</td>
<td></td>
</tr>
<tr>
<td>533.0</td>
<td>Terminals for motor/controls</td>
<td></td>
<td>581.0</td>
<td>Stud bolt for switches</td>
<td></td>
</tr>
<tr>
<td>535.1</td>
<td>Snap ring</td>
<td></td>
<td>607.0</td>
<td>Cover</td>
<td></td>
</tr>
<tr>
<td>542.0</td>
<td>Handwheel with ball handle</td>
<td>Sub-assembly</td>
<td>S1</td>
<td>Seal kit, small</td>
<td>Set</td>
</tr>
<tr>
<td>549.0</td>
<td>Output drive B3/B4</td>
<td>Sub-assembly</td>
<td>S2</td>
<td>Seal kit, large</td>
<td>Set</td>
</tr>
</tbody>
</table>
14. Certificates

14.1. Konformitätserklärung

EC Declaration of Conformity

for the AUMA limit switching devices of the type ranges WSHEx 10.2 – WSHEx 16.2.

AUMA limit switching devices are designed to be installed on industrial valves and valve gearboxes.

AUMA Räster GmbH & Co. KG as manufacturer declares herewith, that the limit switching devices comply with the requirements of the following directives and the respective approximation of national laws as well as the respective harmonised standards as listed below:

Authorised person for documentation: Peter Malus, Aumastrasse 1, D-79379 Muelheim

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

(2) Low Voltage Directive (2006/95/EC)
EN 50178: 1997

(3) Equipment and protective systems intended for use in potentially explosive atmospheres (94/9/EC)
EN 1127-1: 2011
EN 13463-3: 2009
EN 60079-11: 2007
EN 13463-5: 2011
EN 60079-31: 2009
EN 60079-0: 2009

The EC type examination certificate TÜV 12 ATEX 7187 X issued by the TÜV Rheinland is available for the limit switching devices mentioned above.

Muelheim, 2012-09-01

H. Nowcria, General Management

This declaration does not contain any guarantees. The safety instructions in product documentation supplied with the devices must be observed. Non-concerted modification of the devices voids this declaration.
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AUMA Riester GmbH & Co. KG
Plant Müllheim
DE 79373 Müllheim
Tel +49 7631 809 - 0
riester@auma.com
www.auma.com

Plant Ostfildern-Nellingen
DE 73747 Ostfildern
Tel +49 711 34803 - 0
riester@wof.auma.com

Service-Center Bayern
DE 85386 Eching
Tel +49 81 65 9017- 0
Riester@scb.auma.com

Service-Center Köln
DE 50858 Köln
Tel +49 2234 2037 - 900
Service@sck.auma.com

Service-Center Magdeburg
DE 39167 Niederndodeleben
Tel +49 39204 759 - 0
Service@scm.auma.com

AUMA-Armaturenantriebe Ges.m.b.H.
AT 2512 Tribuswinkel
Tel +43 2252 82540
office@auma.at
www.auma.at

AUMA BENELUX B.V. B. A.
BE 8800 Roeselare
Tel +32 51 24 24 80
office@auma.be
www.auma.nl

AUMA (Schweiz) AG
CH 8965 Berikon
Tel +41 566 400945
Rettich.P@ch.auma.com
www.auma.ch

AUMA Servophony spol. s.r.o.
CZ 250 01 Brandýs n.L.-St.Boleslav
Tel +420 326 396 993
auma-s@auma.cz
www.auma.cz

PROBRECHET & SÖNNER A/S
DK 2450 Kopenhagen SV
Tel +45 33 26 63 00
GS@g-s.dk
www.g-s.dk

IBEROPLAN S.A.
ES 28027 Madrid
Tel +34 91 3717130
iberoplan@iberoplan.com

AUMA Polska Sp. z o.o.
PL 41-219 Sosnowiec
Tel +48 32 783 52 00
biuro@auma.com.pl
www.auma.com.pl

AUMA-LUSA Representative Office, Lda.
PT 2730-033 Barcarena
Tel +351 211 307 100
geral@aumalusa.pt

SAUTECH
RO 011783 Bucuresti
Tel +40 372 303982
office@sauotech.ro

OOO PRIWODY AUMA
RU 141102 Khimki, Moscow region
Tel +7 495 221 64 28
aumarussia@auma.ru
www.auma.ru

OOO PRIWODY AUMA
RU 125362 Moscow
Tel +7 495 787 78 21
aumarussia@auma.ru
www.auma.ru

ERICHS ARMATUR AB
SE 20039 Malmö
Tel +46 40 311550
info@erichsarmatur.se
www.erichsarmatur.se

ELSE-b, s.r.o.
SK 94901 Nitra
Tel +421 905/336-926
elsob@stonline.sk
www.elsob.sk

Auma Endüstri Kontrol Sistemleri Limited
Sirketi
TR 06810 Ankara
Tel +90 312 217 32 88
info@auma.com.tr

AUMA Technology Automations Ltd
UA 02099 Kiev
Tel +38 044 586-53-03
auma-tech@aumatech.com.ua

Africa

Solution Technique Contrôle Commande
DZ Bir Mourad Rais, Algiers
Tel +213 21 56 42 09/18
stcco@wissal.dz

A.T.E.C.
EG Cairo
Tel +20 2 23599680 - 23590861
contactus@atec-eg.com

SAMIREG
MA 20300 Casablanca
Tel +212 5 22 40 09 65
samireg@menara.ma

MANZ INCORPORATED LTD.
NG Port Harcourt
Tel +234-84-462741
mail@manzincorporated.com
www.manzincorporated.com
AUMA South Africa (Pty) Ltd.
ZA 1560 Springs
Tel +27 11 3632880
aumasa@mweb.co.za

America
AUMA Argentina Rep.Office
AR Buenos Aires
Tel +54 11 4737 9026
contacto@aumaargentina.com.ar

AUMA Automação do Brazil Ltda.
BR Sao Paulo
Tel +55 11 4612-3477
contato@auma-br.com

TROY -ONTOR Inc.
CA L4N 8X1 Barrie, Ontario
Tel +1 705 721-8246
troy-ontor@troy-ontor.ca

Asia
AUMA Actuators UAE Support Office
AE 287 Abu Dhabi
Tel +971 26338688
Nagaraj.Shetty@auma.com

AUMA Actuators Middle East
BH 152 68 Salimabad
Tel +973 3 17896585
salesme@auma.com

Mikuni (B) Sdn. Bhd.
BN KA1189 Kuala Belait
Tel + 673 3331269 / 3331272
mikuni@brunet.bn

AUMA Actuators (China) Co., Ltd
CN 215499 Taicang
Tel +86 512 3302 6900
mailbox@auma-china.com
www.auma-china.com

PERFECT CONTROLS Ltd.
HK Tsuen Wan, Kwilooon
Tel +852 2493 7726
joepi@perfectcontrols.com.hk

PT. Carakamas Inti Alam
ID 11460 Jakarta
Tel +62 80 2839 4656
info@aumaco.in
www.aumaco.in

ITG - Iranians Torque Generator
IR 13998-34411 Teheran
Tel +98 2144545654
info@itg-co.ir

Trans-Jordan Electro Mechanical Supplies
JO 11133 Amman
Tel +962 6 5332020
Info@transjordan.net

AUMA JAPAN Co., Ltd.
JP 211-0016 Kawasaki-shi, Kanagawa
Tel +81-(0)44-863-8371
mailbox@auma.co.jp
www.auma.co.jp

Control Technologies Limited
TT Marabella, Trinidad, W.I.
Tel +1 868 658 1744/5011
www.clttech.com

AUMA ACTUATORS INC.
US PA 15317 Canonsburg
Tel +1 724-743-AUMA (2862)
mailbox@auma-usa.com
www.auma-usa.com

Al-Arfaj Engineering Co WLL
KW 22004 Salmiyah
Tel +965 2 2624 3400
import@actuatorbank.com
www.actuatorbank.com

TOO “Armaturen Center”
KZ 060005 Atyrau
Tel +7 7 1122 454 602
armacentre@bk.ru

Network Engineering
LB 4501 7401 JBEIL, Beirut
Tel +961 9 944080
nabil.ibrahim@networkenglb.com
www.networkenglb.com

AUMA Malaysia Office
MY 70300 Seremban, Negeri Sembilan
Tel +606 633 1988
sales@auma.com.my

AUMA Actuators Industry Co LLC
OM Ruwi
Tel +968 24 636036
r-negi@mustafasultan.com

FLOWWORK TECHNOLOGIES CORPORATION
PH 1550 Mandaluyong City
Tel +63 2 532 4058
flowwork@pltdsl.net

Mustafa Sultan Science & Industry Co LLC

M & C Group of Companies
PK 54000 Cavalry Ground, Lahore Cantt
Tel +92 42 3668 0118
sales@mcss.com.pk
www.mcss.com.pk

Petrogulf W.L.L
QA Doha
Tel +974 44350151
pgulf@qatar.net.qa

AUMA Saudi Arabia Support Office
SA 31952 Al Khobar
Tel +966 5 5359 6025
Vinod.Fernandes@auma.com

PERFECT CONTROLS Ltd.
HK Tsuen Wan, Kwilooon
Tel +852 2493 7726
joepi@perfectcontrols.com.hk

Network Engineering
SY Homs
Tel +963 31 231 571
eyad3@scs-net.org

NETWORK ENGINEERING
SY Homs
Tel +963 31 231 571
eyad3@scs-net.org

Sunny Valves and Intertrade Corp. Ltd.
TH 10120 Yannawa, Bangkok
Tel +66 2 2400656
mainbox@sunnyvalves.co.th
www.sunnyvalves.co.th

Top Advance Enterprises Ltd.
TW 10120 Yannawa, Bangkok
Tel +66 2 2400656
mainbox@sunnyvalves.co.th
www.sunnyvalves.co.th

AUMA ACTUATORS (Singapore) Pte Ltd.
SG 569551 Singapore
Tel +65 6 4818750
sales@auma.com.sg
www.auma.com.sg

NETWORK ENGINEERING
SY Homs
Tel +963 31 231 571
eyad3@scs-net.org

AUMA Vietnam Hanoi RO
VN Hanoi
Tel +84 4 37822115
chiennguyen@auma.com.vn

Australia
BARRON GJM Pty. Ltd.
AU 1570 Artarmon
Tel +61 2 8437 4300
info@barron.com.au
www.barron.com.au

AUMA Actuators UAE Support Office
AE 287 Abu Dhabi
Tel +971 26338688
Nagaraj.Shetty@auma.com

AUMA Actuators Middle East
BH 152 68 Salimabad
Tel +973 3 17896585
salesme@auma.com
AUMA Riester GmbH & Co. KG
P.O.Box 1362
DE 79373 Muelheim
Tel +49 7631 809 - 0
Fax +49 7631 809 - 1250
riester@auma.com
www.auma.com

For detailed information on AUMA products, refer to the Internet: www.auma.com