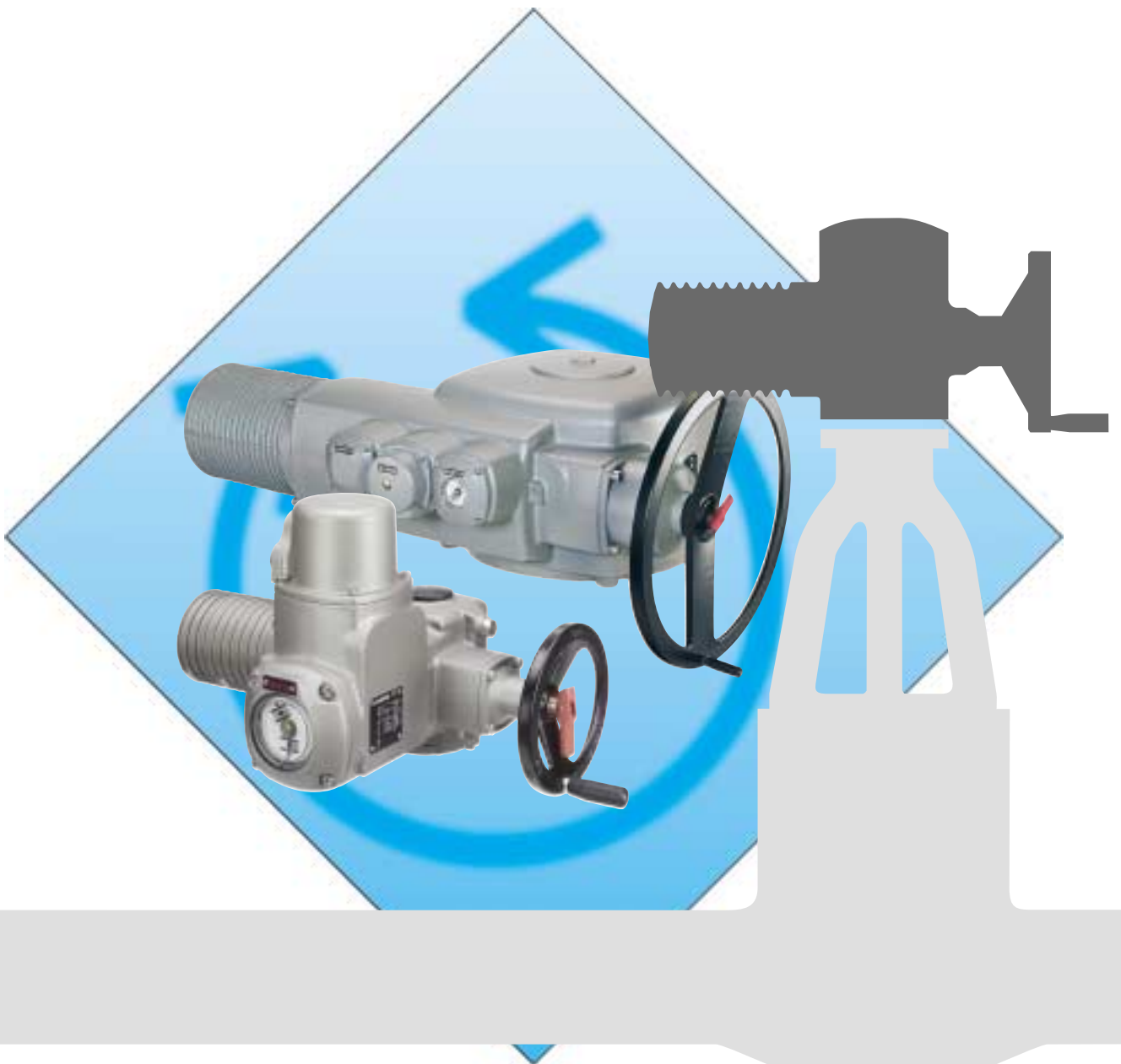


# auma®

## Electric multi-turn actuators

SA 07.1 – SA 48.1  
SAR 07.1 – SAR 30.1



Certificate Registration No.  
12 100 4269

### Product description

# Introduction / Contents

In the course of constantly increasing automation in all sectors of industry, electric actuators for process control and regulation have become more and more important.

For more than 30 years AUMA concentrates on design, development and manufacturing of electric actuators. During this time AUMA has acquired a know-how in this field that can hardly be surpassed. AUMA is one of the world-wide leading electric actuator manufacturers.

Sales support and after sales service are provided by a global network consisting of regional offices, subsidiaries, representatives and service centers. This ensures that experienced sales engineers and qualified service technicians are close to the customers. They are prepared for responding to enquiries, executing orders or providing after-sales service.

With this brochure AUMA offers a complete overview of design, functions and equipment of the multi-turn actuator type range SA. Further information can be found on separate data sheets and price lists.

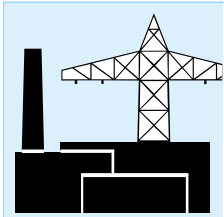
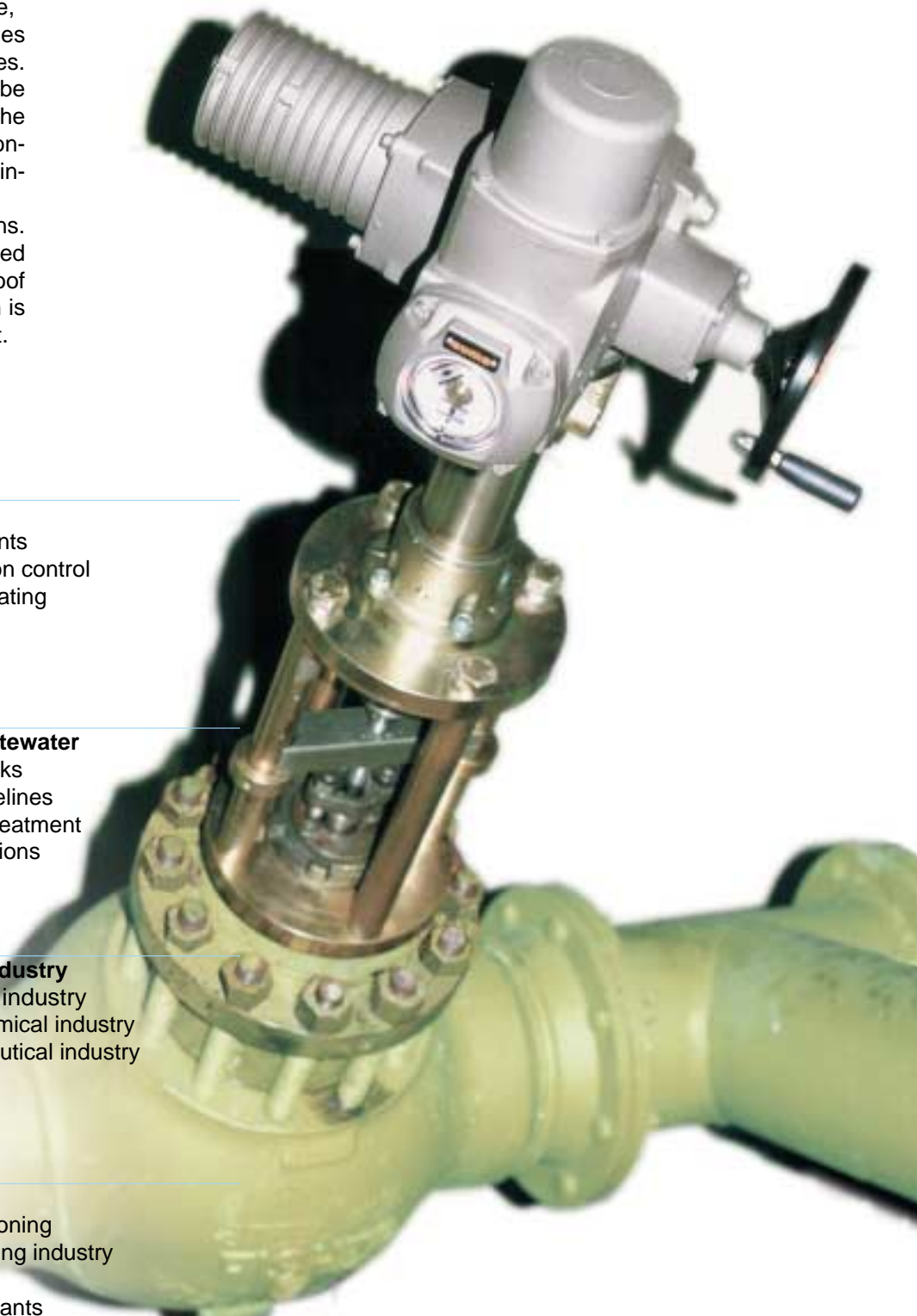
Detailed and up-to-date information on the multi-turn actuators SA can be found in the internet under [www.auma.com](http://www.auma.com). All documents, including dimension drawings, wiring diagrams and final inspection records for supplied multi-turn actuators are available in the internet in digitalized form.

<b>Contents</b>	
<b>Introduction / Contents</b>	<b>2</b>
<b>Applications</b>	<b>3</b>
<b>Multi-turn actuators SA 07.1 – SA 48.1</b>	<b>4</b>
Definition for multi-turn actuators according to DIN EN ISO 5210	4
<b>Multi-turn actuators with integral controls</b>	<b>5</b>
<b>Summary of functions</b>	<b>6</b>
<b>Functions</b>	<b>7</b>
Type designation	7
Open-close duty	7
Modulating duty	8
Comparison short-time and intermittent duty	9
Limit switching	10
Torque switching	10
Setting ranges of tripping torque / Torques for modulating service	11
Analogue torque sensing (option)	11
Running indication	11
<b>Equipment</b>	<b>12</b>
Switches	12
Mechanical position indicator (option)	13
Remote position transmitter (option)	13
<b>Design principle</b>	<b>14</b>
<b>Equipment</b>	<b>16</b>
Motors	16
Motor protection	17
<b>Output speeds</b>	<b>18</b>
<b>Equipment</b>	<b>19</b>
Heater	19
Locking device for manual operation (option)	19
Integral controls (option)	20
Which type of controls?	21
<b>Interfaces</b>	<b>22</b>
Valve attachment	22
Output drive types	22
Electrical connection	23
<b>Service conditions</b>	<b>24</b>
Enclosure protection	24
Corrosion protection / Colour	24
Ambient temperatures	24
Lifetime	24
<b>Service conditions / General</b>	<b>25</b>
Explosion protection	25
General	25
EU-Directives	25
Functional tests	25
<b>Multi-turn actuator / gearbox combinations</b>	<b>26</b>
Combinations with bevel or spur gearboxes	26
Combinations with worm gearboxes	26
Combinations with lever gearboxes	26
<b>Index</b>	<b>27</b>

We reserve the right to alter data according to improvements made. Figures and diagrams are not binding.

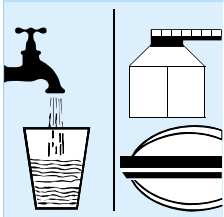
AUMA multi-turn actuators of the type range SA can be used wherever the automation of a valve requires a rotation. The adaption to the requirements of nearly every valve automation task is possible. This is on account of:

- an extremely wide torque range,
- various combination possibilities with AUMA valve gearboxes. Thereby the torque range can be further extended and/ or the multi-turn actuator can be converted into a part-turn, lever or linear actuator
- a large variety of versions. Whether for open loop or closed loop control or explosion-proof applications, a suitable version is available for every requirement.



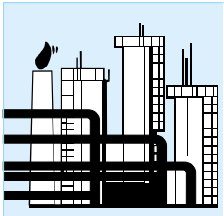
### Energy

- Power plants
- Air pollution control
- District heating
- Pipelines



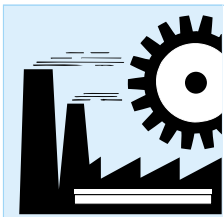
### Water / Wastewater

- Water works
- Water pipelines
- Sewage treatment
- Pump stations
- Locks
- Dams



### Chemical industry

- Chemical industry
- Petro-chemical industry
- Pharmaceutical industry



### Others

- Air conditioning
- Ship building industry
- Steel mills
- Cement plants
- Food industry

## Multi-turn actuators SA 07.1 – SA 48.1



### Multi-turn actuators SA 07.1 – SA 16.1

- Torques from 10 to 1 000 Nm
- Output speeds from 4 to 180 rpm



### Multi-turn actuators SA 25.1 – SA 48.1

- Torques from 630 to 32 000 Nm
- Output speeds from 4 to 90 rpm

### Definition for multi-turn actuators according to DIN EN ISO 5210

A multi-turn actuator is an actuator which transmits to the valve a torque for at least one full revolution. It is capable of withstanding thrust.

## Multi-turn actuators with integral controls



**Multi-turn actuator SA 07.1 with integral controls AUMA MATIC**



**Multi-turn actuator SARV 07.1 with controls VARIOMATIC mounted on a wall bracket**

Controls are required to operate an actuator and to process actuator signals. In general it is possible to install the controls externally in a control cabinet.

An actuator with integral controls is often the better solution. Labour intensive design and installation costs are considerably reduced and an optimum functionality for the application are just a few of the many advantages. AUMA offers nearly all types of actuators with integral controls.

AUMA actuator controls are available with a wide variety of equipment - from the simple OPEN - CLOSE control to the microcontroller version with logging of operating data or a version with a fieldbus interface.

Detailed information on pages 20 and 21.

# Summary of functions

- Standard
- Option

		SA 07.1- 48.1	SAR 07.1 - 30.1	Description on page
<b>Functions</b>	<b>Open-close duty (SA)</b>	<span style="color: green;">●</span>		7,9
	<b>Modulating duty (SAR)</b>		<span style="color: green;">●</span>	8,9
	<b>Limit switching (adjustable)</b>	<span style="color: green;">●</span>	<span style="color: green;">●</span>	9,14
	Four train gear limit switching (adjustable)	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	14
	<b>Torque switching (adjustable)</b>	<span style="color: green;">●</span>	<span style="color: green;">●</span>	10,14
	<b>Analogue torque sensing</b>	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	11
	<b>Running indication</b>	<span style="color: green;">●</span> <sup>1)</sup>	<span style="color: purple;">■</span>	11
<b>Equipment</b>	<b>Switches (microswitches)</b>	<span style="color: green;">●</span>	<span style="color: green;">●</span>	12
	Tandem switches	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	12
	Triple switches	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	12
	Switches with gold plated contacts	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	12
	<b>Mechanical position indicator</b>	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	13
	<b>Remote position transmitter</b>	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	13
	<b>Heater</b>	<span style="color: green;">●</span>	<span style="color: green;">●</span>	19
	<b>Motors</b>			16,17
	3-ph-AC motors	<span style="color: green;">●</span>	<span style="color: green;">●</span>	16
	1-ph AC motors <sup>2)</sup>	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	16
	DC motors <sup>3)</sup>	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	16
	variable speed motors (SARV) <sup>4)</sup>		<span style="color: purple;">■</span>	16
	<b>Motor protection</b>	<span style="color: green;">●</span>	<span style="color: green;">●</span>	17
	Thermoswitches	<span style="color: green;">●</span>	<span style="color: green;">●</span>	17
	PTC-thermistors	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	17
	<b>Manual operation</b>	<span style="color: green;">●</span>	<span style="color: green;">●</span>	15
	Handwheel lockable	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	19
<b>Integral controls<sup>3)5)</sup></b>	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	5,20,21	
<b>Interfaces</b>	<b>Valve attachment accord. to ISO 5210 / DIN 3210</b>	<span style="color: green;">●</span>	<span style="color: green;">●</span>	14,22
	<b>Output drive types</b>			22
	B, B1	<span style="color: green;">●</span>	<span style="color: green;">●</span>	22
	A, B2, B3, B3D, B4, C, D, DD, E	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	22
	Special valve attachments	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	22
	Linear thrust units LE	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	22
	<b>Electrical connection</b>			15,23
	AUMA plug/ socket connector	<span style="color: green;">●</span>	<span style="color: green;">●</span>	23
	Terminals	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	23
	Plug cover in special versions	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	23
<b>Service conditions</b>	Enclosure protection IP67	<span style="color: green;">●</span>	<span style="color: green;">●</span>	24
	Enclosure protection IP68	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	24
	Corrosion protection KN	<span style="color: green;">●</span>	<span style="color: green;">●</span>	24
	Corrosion protection KS, KX	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	24
	High temperature version	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	24
	Low temperature version	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	24
	<b>Explosion protection<sup>6)</sup></b>	<span style="color: purple;">■</span> <sup>7)</sup>	<span style="color: purple;">■</span> <sup>3)</sup>	25
<b>EU-Directives</b>	<span style="color: green;">●</span>	<span style="color: green;">●</span>	25	
<b>Functional tests</b>	<span style="color: green;">●</span>	<span style="color: green;">●</span>	25	
<b>Combinations with AUMA valve gearboxes</b>	<span style="color: purple;">■</span>	<span style="color: purple;">■</span>	26	

1) for SAEx optional

2) up to size 14.5

3) up to size 16.1

4) up to size 10.1, always requires integral controls

5) required for version with variable speed motor (SARV)

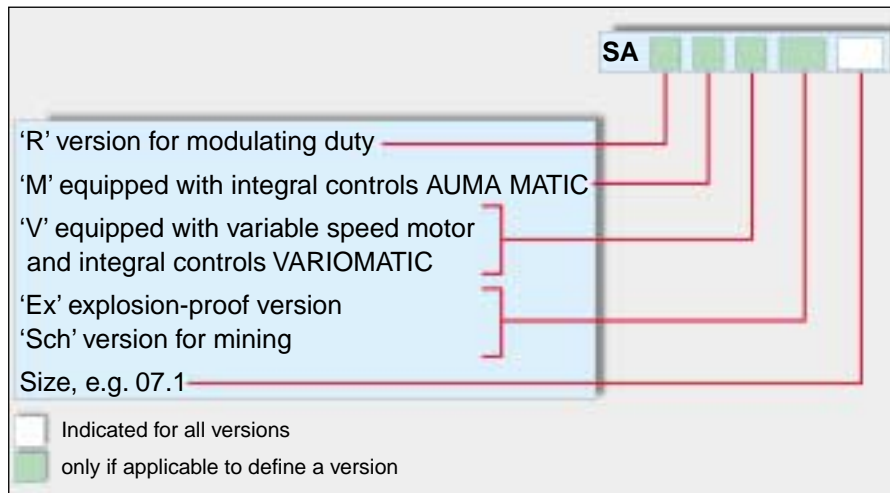
6) not for multi-turn actuators with variable speed motor (SARV)

7) up to size 40.1

## Type designation

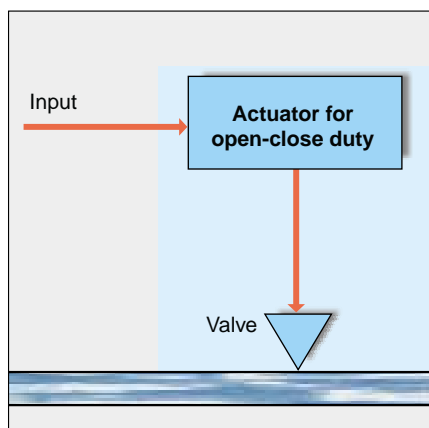
A type code defines the various versions.

It must be noted that not every combination is possible, e.g. an explosion-proof version of SARV is not available.



## Open-close duty

### Open-close duty



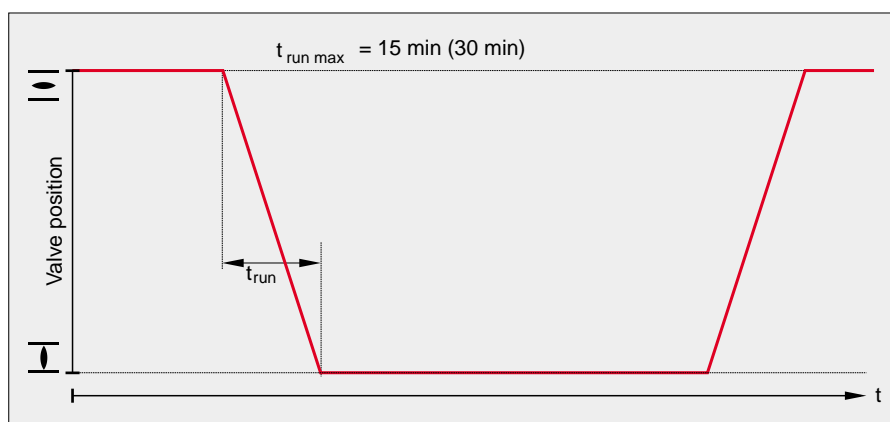
The normal valve positions in open-close duty are the end positions OPEN and CLOSED. After receiving an appropriate command the actuator operates the valve to one of the two end positions or, if necessary, to a pre-defined intermediate position.

The valves are operated relatively seldom, the time intervals can span between a few minutes up to several months.

### Type of duty for multi-turn actuators for open-close service

AUMA multi-turn actuators SA for open-close service are rated for short time duty S2 - 15 min. A special version for S2 - 30 min is also available but necessitates reduced torques.

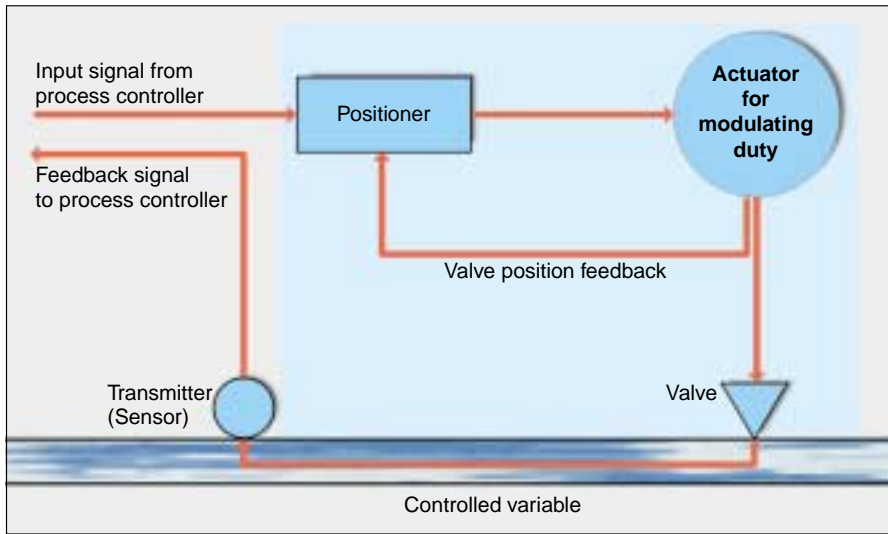
Description of types of duty on page 9.



Typical characteristics for open-close duty

# Functions

## Modulating duty



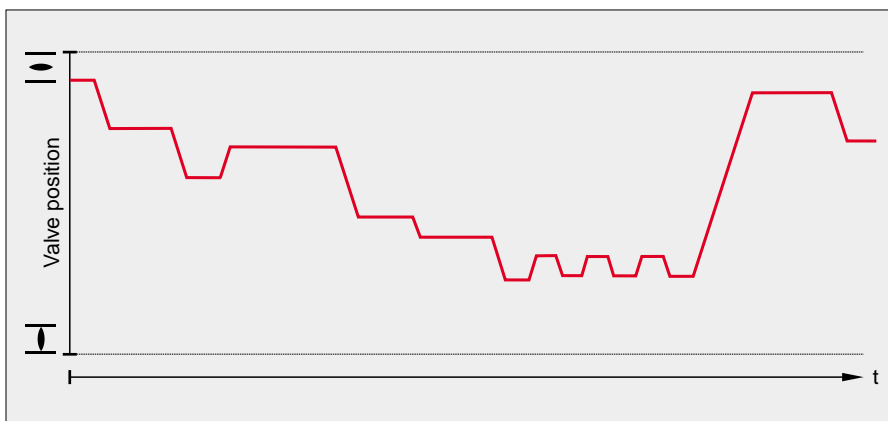
### Type of duty for multi-turn actuators for modulating service

AUMA multi-turn actuators SAR for modulating service are rated for intermittent duty S4 - 25%. Special versions for S4 - 50% and S5 - 25% are also available.

Multi-turn actuators SARV are suitable for type of duty S5 - 40%

The controlled variable in a modulating application is affected by many influences. A change of the reference input signal, pressure fluctuation in the pipeline, and temperature variations influence the process in such a way that a frequent adjustment of the MOV is required. For sensitive modulating applications the starts may be in intervals of a few seconds.

Therefore high requirements apply to the multi-turn actuators for this duty. Mechanical components and the motor must be designed appropriately to withstand a large number of operations without affecting the required modulating accuracy.



Typical characteristics for modulating duty



## Comparison short-time and intermittent duty

Short-time duty	Intermittent duty																																									
S2	S4																																									
<p>The operation time at a constant load is short, so that thermal equilibrium is not reached. The pause is long enough for the machine to cool down to ambient temperature. The duration of short-time duty is limited to 15 min or 30 min.</p>	<p>The duty is a sequence of identical cycles which consist of starting time, operation time with constant load and rest period. The rest period allows the machine to cool down so that thermal equilibrium is not reached. The relative on-time at S4-25% or S4-50% is limited to 25% respectively 50%.</p>																																									
	<p><b>S5</b></p> <p>Similar to S4, but with additional braking time. The braking is carried out electrically, e.g. by reverse current.</p>																																									
	<p style="text-align: center;"><b>Permissible number of starts</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Size</th> <th colspan="3">Number of starts max. [c/h]</th> </tr> <tr> <th>SAR</th> <th>SARV</th> <th>SAREx</th> </tr> </thead> <tbody> <tr> <td>07.1</td> <td>1 200</td> <td>1 500</td> <td>900</td> </tr> <tr> <td>07.5</td> <td>1 200</td> <td>1 500</td> <td>900</td> </tr> <tr> <td>10.1</td> <td>1 200</td> <td>1 500</td> <td>900</td> </tr> <tr> <td>14.1</td> <td>1 200<sup>1)</sup></td> <td>–</td> <td>900<sup>1)</sup></td> </tr> <tr> <td>14.5</td> <td>1 200<sup>1)</sup></td> <td>–</td> <td>900<sup>1)</sup></td> </tr> <tr> <td>16.1</td> <td>900<sup>1)</sup></td> <td>–</td> <td>600<sup>1)</sup></td> </tr> <tr> <td>25.1</td> <td>300</td> <td>–</td> <td>–</td> </tr> <tr> <td>30.1</td> <td>300</td> <td>–</td> <td>–</td> </tr> </tbody> </table>			Size	Number of starts max. [c/h]			SAR	SARV	SAREx	07.1	1 200	1 500	900	07.5	1 200	1 500	900	10.1	1 200	1 500	900	14.1	1 200 <sup>1)</sup>	–	900 <sup>1)</sup>	14.5	1 200 <sup>1)</sup>	–	900 <sup>1)</sup>	16.1	900 <sup>1)</sup>	–	600 <sup>1)</sup>	25.1	300	–	–	30.1	300	–	–
Size	Number of starts max. [c/h]																																									
	SAR	SARV	SAREx																																							
07.1	1 200	1 500	900																																							
07.5	1 200	1 500	900																																							
10.1	1 200	1 500	900																																							
14.1	1 200 <sup>1)</sup>	–	900 <sup>1)</sup>																																							
14.5	1 200 <sup>1)</sup>	–	900 <sup>1)</sup>																																							
16.1	900 <sup>1)</sup>	–	600 <sup>1)</sup>																																							
25.1	300	–	–																																							
30.1	300	–	–																																							
	<p>1) for higher output speeds reduced number of starts, refer to separate data sheet.</p>																																									

# Functions

## Limit switching

The limit switching enables to switch off the actuator when reaching the defined valve position, usually an end position. It is part of the control unit (refer to page 14).



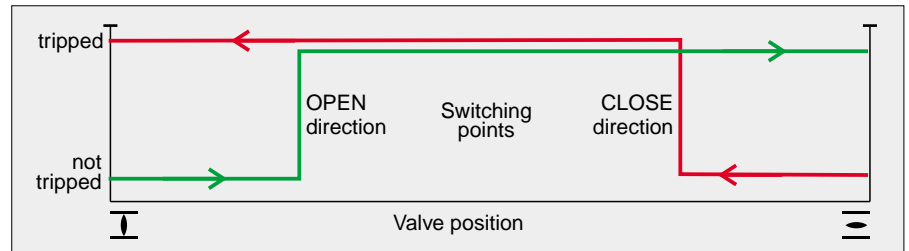
The travel is measured by two mechanical counter gear mechanisms, which when reaching the set switching points operate the electrical limit switch via cams.

The setting accuracy is 1/10 turn and the tripping point repetitive error goes towards zero. Any possible coasting of the motor and gearing is not considered.

Following numbers of turns per stroke are possible:

- 1 - 500
- 1 - 5000 (Option).

### DUO (Four train gear) limit switching



With the DUO limit switching an additional switching point can be set for each direction of rotation (intermediate position switches). The switching can be set to any valve position between the end positions. The switch remains tripped from the adjusted tripping point up to the end position, if not more than 120 rotations of the hollow shaft are between.

The switch signal can be used e.g. to:

- signalize a certain valve position,
- to start an additional actuator which is mounted on a bypass valve,
- to start or switch off any unit, e.g. a pump.

## Torque switching



The torque switching enables to switch off the actuator when reaching a pre-defined torque instead of a definite position. The tripping torque can be set independently for each direction.

The range of tripping torques for the various actuator sizes are listed on page 11.

### Torque seating in the end positions

For tight closing certain valve types must be operated into the end position CLOSED with a defined force. Such valves can be closed reliably by torque seating.

Limit seating is common in the end position OPEN.

### Limit switching at torque seating

When torque seating in the end position the limit switching serves for signalisation. Therefore the actuator controls can differentiate whether the actuator was switched off the normal way in the end position or the torque switching was activated in mid travel position due to excessive torque, which will cause a fault signal in the control room.

### Torque switching as overload protection

The torque switching acts as overload protection over full travel, also when limit seating in the end positions. Sluggishness of the valve or a trapped object in the pipeline may require an excessive, non-justified torque, which may damage the valve. This is prevented by the torque switching.

## Setting ranges of tripping torque / Torques for modulating service

### Multi-turn actuators for open-close duty - minimum and maximum tripping torques

Size	07.1	07.5	10.1	14.1	14.5	16.1	25.1	30.1	35.1	40.1	48.1
min. [Nm]	10	20	40	100	200	400	630	1 250	2 500	5 000	10 000
max. <sup>1)</sup> [Nm]	30	60	120	250	500	1 000	2 000	4 000	8 000	16 000	32 000

### Multi-turn actuators for modulating duty - minimum and maximum tripping torques - Torques for modulating duty

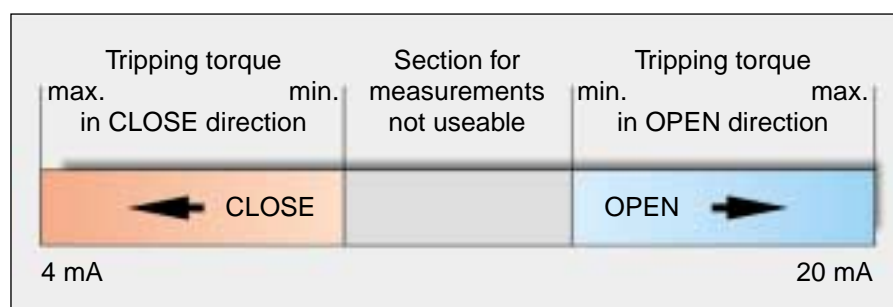
Size	07.1	07.5	10.1	14.1	14.5	16.1	25.1	30.1
min. [Nm]	15	30	60	120	250	500	1 000	2 000
max. [Nm]	30	60	120	250	500	1 000	2 000	4 000
Torque for modulating [Nm]	15	30	60	120	200	400	800	1 600

1) For some higher output speeds reduced torques. Refer to separate data sheets

## Analogue torque sensing (option)

If the actuator is equipped with an analogue torque sensing, the demanded torque can be constantly displayed. The torque signal is available as 4 - 20 mA current signal.

The maximum values 4 mA and 20 mA can only be reached when the torque switching is set to the maximum possible tripping torque.



## Running indication

The blinker switch is part of the standard equipment of the actuator types SA and can be used for running indication. The contacts are wired to the AUMA plug/ socket connector.

For types SAR, SAEx and SAREx the blinker switch is an optional extra.

### Rating of blinker switch

Type of current	Switch rating $I_{max}$		
	30 V	125 V	250 V
AC	5 A	5 A	5 A
DC	2 A	0,5 A	0,4 A

# Equipment

## Switches



With the help of the switches, the mechanically measured values travel (i.e. number of turns) and torque are converted into usable signals for the actuator controls. The switches are integrated into the control unit which contains four switches in the basic version:

- one limit switch each for the end positions OPEN and CLOSED,
- one torque switch each for the directions OPEN and CLOSE.

The limit switches are tripped when an end position is reached and the torque switches are tripped when the set tripping torque is exceeded.

If the actuator is supplied with a DUO-limit switching (refer to page 10) two more limit switches are available.

To meet the high demands regarding reliability, AUMA uses specially developed high quality microswitches with snap action mechanism.

In the basic version the switch contacts are of silver. For voltages between 5 V and 50 V and low current switches with gold plated contacts are recommended.

### Versions

	Application / Description	Type of contacts
Single switches	Standard	one NC and one NO contact
Tandem switches (Option)	For switching two different potentials. The switches have two compartments with galvanically isolated switches in a common sealed housing. The two switches are operated together; one switch is leading, which should be used for signalisation.	two NC and two NO contacts
Triple switches (Option)	For applications where three different potentials are to be switched. This version consists of one single and one tandems switch.	three NC and three NO contacts

### Rating of switches

Type of current	Switch rating $I_{max}$		
	30 V	125 V	250 V
AC (ind. load) $\cos \varphi = 0,8$	5 A	5 A	5 A
DC (res. load)	2 A	0,5 A	0,4 A

with gold contacts

	min. 5 V, max. 50 V
Current	min 4 mA, max 400 mA

### Technical data

Enclosure protection	IP 66
Operating element	lever
Contact elements	two snap action contacts
Contact material	Silver (standard) Gold (option), recommended for controls with low voltages
Mechanical lifetime	min. $2 \times 10^6$ cycles

## Mechanical position indicator (option)



The position of the valve is indicated continuously by the adjustable disk bearing the symbols for OPEN and CLOSED. The disk can be seen through an indicator glass in the switch compartment cover.

The mechanical position indicator requires an additional reduction gearing in the control unit.

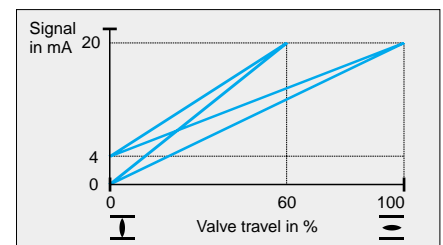
## Remote position transmitter (option)

*RWG and/or potentiometer will be installed in the control unit*



### Electronic position transmitter RWG

The actual position value is transmitted by a potentiometer and transformed by electronics into a current signal. Zero and span of the feedback signal can be easily adjusted by trimmer potentiometers.



Inverse operation of the RWG is possible. This is also valid for the explosion-proof (intrinsically safe) version.

### Power supply unit for multi-turn actuators without integral controls

For the voltage supply of all position transmitters we recommend the AUMA power supply unit PS 01.

**Note:** The unit cannot be used in hazardous areas.

The position of the valve can be transmitted as a continuous signal:

- for remote indication
- as feedback signal to a positioner

For continuous transmission of the valve position a reduction gearing is required in the control unit of the actuator.

A position feedback is provided as an analogue signal by:

- Precision potentiometer
- Precision potentiometer in tandem version
- Precision potentiometer and electronic position transmitter RWG.

### Technical data potentiometer

	Precision potentiometer	Precision potentiometer in tandem version
Linearity:	≤ 1 %	
Power	0,5 W	
Resistance (standard)	0,2 kΩ	0,2/0,2 kΩ
Resistance (option)	0,1 kΩ, 0,5 kΩ, 1,0 kΩ, 5,0 kΩ	0,5/0,5 kΩ, 1,0/1,0 kΩ, 5,0/5,0 kΩ, 0,2/5,0 kΩ

### Technical data RWG

Output signal	4 - 20 mA 0/4 - 20 mA
2-wire system 3- or 4-wire system <sup>1)</sup>	
Voltage supply	24 V DC ± 15%, smoothed
Service life	min. 5 x 10 <sup>6</sup> operations

1) For explosion-proof RWG only 2-wire system possible.

# Design principle

## 2 Control unit

Depending on the type of valve the actuator must be switched-off in the end position by limit or torque switching.

For this purpose two independent measuring systems (limit switching and torque switching) are provided within the control unit. They measure the travel resp. the torque demanded at the output drive.

The switches signalize to the actuator controls that the set tripping points have been reached, which then switches off the motor.

## 1 Motor

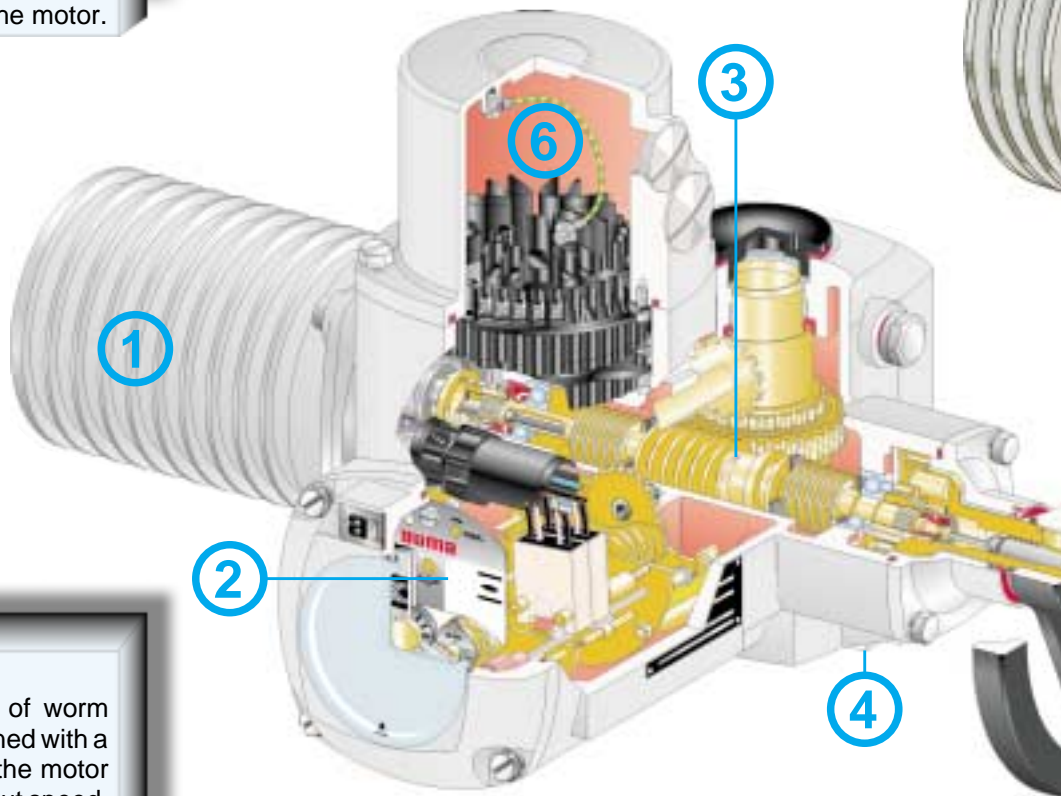
An especially high starting torque is frequently required to unseat valves from the end position. The motors developed by AUMA fulfil this basic requirement.

Besides the commonly used 3-phase AC-motors, 1-phase AC- and DC-motors are available for the actuator sizes up to 14.5 resp. 16.1. The sizes SA 07.1 up to SA 10.1 are available with variable speed motor.

The standard motors are connected via an internal plug/ socket connector (up to 16 A nominal current) to the customer's plug. This enables quick exchange of the motor, e.g. for change of output speed.

Further information on page 16.

SA 07.1 - SA 16.1



## 3 Gearing

The well proved principle of worm gearing, sometimes combined with a planetary gear, is used to reduce the motor speed to the required actuator output speed. Self-locking is achieved by the worm gearing. Worm shaft and output shaft with the worm wheel run in ample sized bearings.

The sliding worm is positioned between two sets of springs on the worm shaft. The worm will be moved in relation to the torque. This axial displacement, as measure for the torque, is transmitted to the control unit via lever and gear wheels.

The gear case is filled with lubricant. This results in maintenance free service for a long period of time.

## 4 Valve attachment

The mounting flange is according to DIN EN ISO 5210 resp. DIN 3210.

Various output drive types are available. Therefore it is possible to adapt to different types of valves.

Further information on page 22.

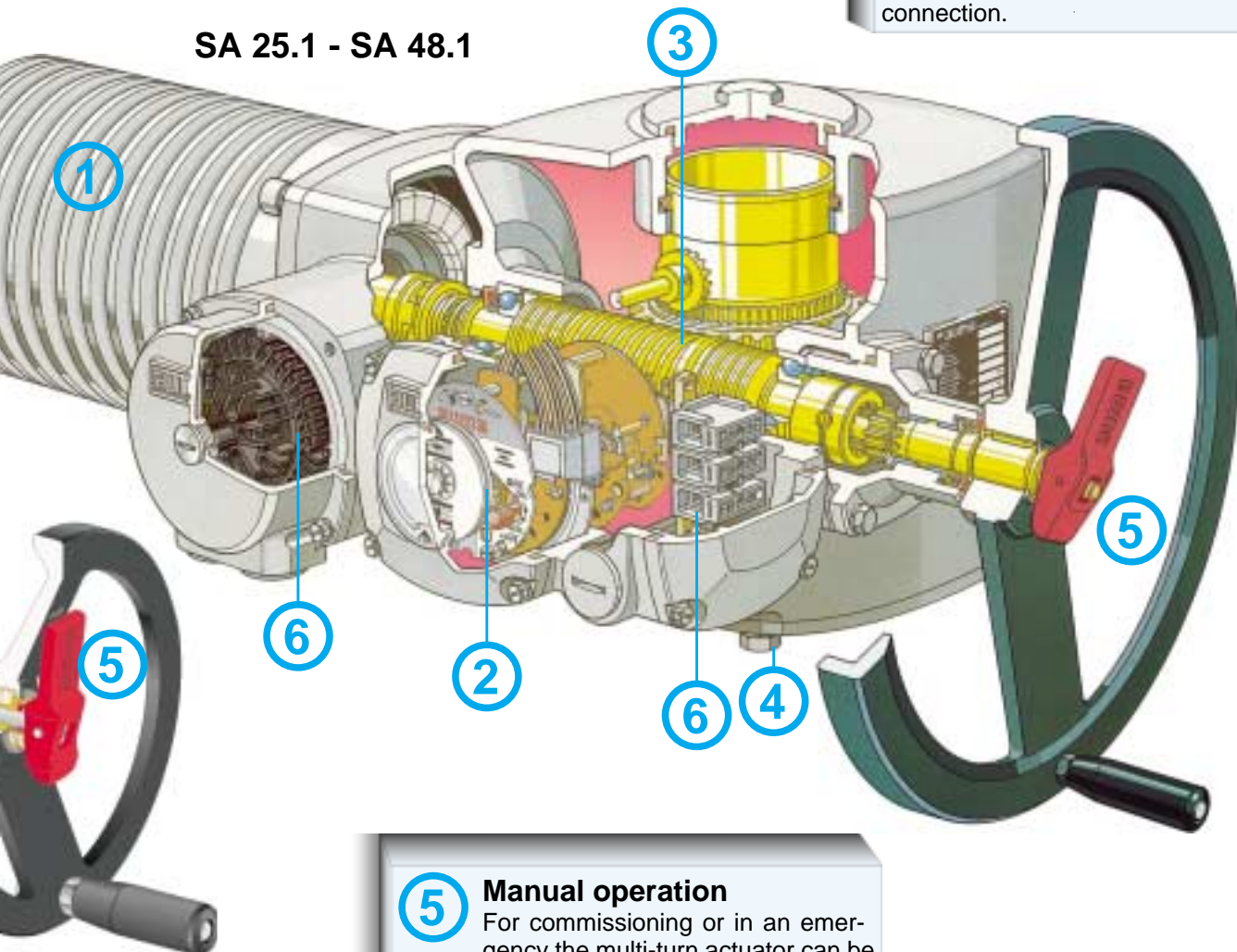
## ⑥ Electrical connection

The connections for motor and controls up to size 16.1 are made on a 50-pole AUMA plug/ socket connector. On larger sizes the motor is connected to terminals in the actuator.

In case the plug/ socket is disconnected for maintenance work, the control wiring remains undisturbed.

For explosion-proof types SAEx and SAREx plug/ socket connectors are not permitted. In this case terminals are used for the electrical connection.

SA 25.1 - SA 48.1



## ⑤ Manual operation

For commissioning or in an emergency the multi-turn actuator can be operated with the handwheel. By operating the red change-over lever the motor drive is disconnected and the manual drive engaged. Since disconnection between motor and drive shaft is made before the self-locking worm/ worm wheel, easy change over to manual drive is possible even if the actuator has been operated at full rated torque.

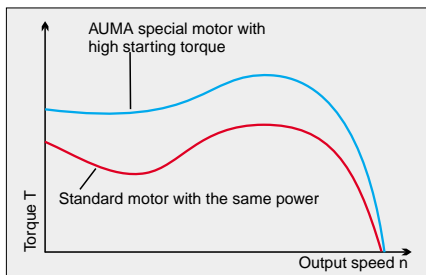
When starting the motor the manual drive is automatically disengaged. During electric operation the handwheel does not rotate.

# Equipment

## Motors

### 3-phase AC motors

As a standard, AUMA multi-turn actuators are equipped with 3-phase AC motors (TENV, pot-type motor without ventilation).



### 1-phase AC motors

AUMA multi-turn actuators SA 07.1 – SA 14.5 can be supplied as an option with 1-phase AC motor. The required capacitor and the sometimes necessary starting switch are fitted in an enlarged plug cover.

**Note:** For available sizes and speeds please refer to separate data sheet.

### DC motors

AUMA multi-turn actuators are also available with DC motors.

**Note:** In some cases starting resistors may be required (refer to separate data sheet). Those are not part of the AUMA supply.

### Variable speed motor

The sizes 07.1 – 10.1 are available with electronically commutated motors (SARV). For actuators with these motors the output speed can be adjusted via the actuator controls VARIOMATIC. Therefore the required operating time can be set at site. Furthermore the actuators have the following advantages:

- Motor braking (S5 - 40 % operation)
- short braking time < 5 ms
- 1-phase supply voltage

### Special motors

On request and if for technical reasons possible, two-speed motors or brake motors can be used.

## Technical data

	3-ph-AC motor	1-phase AC motor	DC motor	variable speed motor
Standard voltages	50 Hz: 230 V; 380 V; 400 V; 415 V; 500 V 60 Hz: 440 V; 460 V; 480 V	50 Hz: 220 V - 240 V 60 Hz: 110 V - 120 V	220 V; 110 V; 60 V; 48 V; 24 V	50 Hz: 220 V - 240 V
Permissible variations	± 5 % <sup>1)</sup>	± 5 % <sup>1)</sup>	± 10 % <sup>1)</sup>	± 10 %
Motor data	refer to data sheets			
Design / mounting	IM B9 according to IEC 34-7	IM B14 according to IEC 34-7		IM B9 according to IEC 34-7
Type of motor	Squirrel cage	Squirrel cage	DC-rotor	Rotor with permanent magnets
Enclosure protection	IP 67 IP 68 (option)	IP 65 – IP 68	IP 55 IP 67 / 68 (option)	IP 67 IP 68 (option)
Type of cooling	Surface cooling (IC 40 according to IEC 34-6)			
Insulation class	F according to IEC 85, tropicalized			
Electrical connection of motor	up to SA 16.1(4 kW): AUMA plug/ socket connector at multi-turn actuator SA 25.1 and larger: Terminals at multi-turn actuator	AUMA plug/ socket connector at multi-turn actuator	Motor terminal box	AUMA plug/ socket connector at multi-turn actuator
Starting	direct on line			
Type of duty	S2 - 15 min, S2 - 30 min, S4 - 25 %, S4 - 50 % ED or S5,	S2 - 10 min or S4 - 25 % ED	S2 - 15 min	S5 - 40 % ED
Direction of rotation	clockwise and counter-clockwise (reversing)			
Motor protection	3 thermoswitches or 3 thermistors	2 thermoswitches	–	1 thermistor

1) Over voltage may result in excessive temperature rise in the motor windings. In case of under voltage the motor torque (stall torque) decreases with the square of the voltage. Larger voltage variations have therefore to be considered when sizing the actuator.

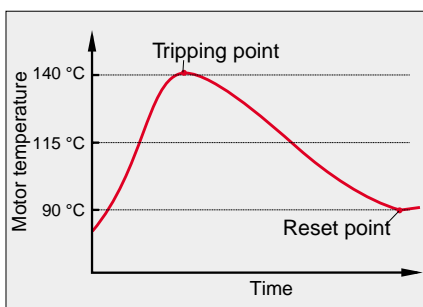


## Motor protection

In order to protect the motor against overheating, thermostats resp. PTC thermistors are embedded in the windings of the 3-phase AC and 1-phase AC motors. When integrated into the control circuit, they will protect the motor against damage due to excessively high winding temperature.

Thermostats resp. PTC thermistors offer a better protection than thermal overload relays, since the temperature rise is directly measured at the motor.

The thermostats will interrupt the control circuit as soon as a winding temperature of 140 °C is exceeded. After cooling down to a temperature between 120 °C to 90 °C the actuator can be switched on again.



**Important!** The motor protection devices (thermostats or thermistors) have to be integrated into the controls, otherwise the warranty for the motor will lapse.

If the multi-turn actuator is equipped with integral controls, the thermostats are always integrated.

Type of actuator	thermostats	PTC-thermistors
SA <sup>1)</sup>	Standard	Option
SAR	Standard	Option
SAEx <sup>2)</sup>	Standard	Option
SAREx	–	Standard
SAMEx <sup>2)</sup>	–	Standard
SARMEx <sup>2)</sup>	–	Standard
SARV	–	Standard

1) also with integral controls AUMA MATIC

2) According to DIN VDE 0165 subclause 6.1.4, explosion-proof actuators must be additionally equipped with a thermal overload relay (e.g. motor protection switch) besides the thermostats.

In the controls AUMA MATIC the thermal overload relay resp. the PTC tripping device is already integrated.

### Rating of the thermostats

AC voltage (250 V AC)	Switch rating I <sub>max</sub>
cos φ = 1	2,5 A
cos φ = 0,6	1,6 A

DC voltage	Switch rating I <sub>max</sub>
60 V	1 A
42 V	1,2 A
24 V	1,5 A

# Output speeds

## Output speeds

With the large range of available output speeds, almost every required operating time can be achieved with AUMA multi-turn actuators.

The actuator output speed is determined by the motor speed and the gear reduction ratios, except for actuators with variable speed motors. Therefore it is necessary to mention the output speed when placing an order.

For multi-turn actuators with output drive type A, stem nut (refer to page 22), the max. permissible stem velocity (output speed) must be observed:

- for gate valves max. 500 mm/min
- for globe valves max. 250 mm/min (max. 45 rpm)

For higher velocities or output speeds it is strongly recommended to use a spring loaded stem nut, output drive type AF (refer to page 22).

### Self-locking

AUMA multi-turn actuators SA 07.1 – SA 16.1 are self-locking<sup>1)</sup> with exception of the output speeds 125 and 180 rpm. Actuators of the sizes SA 35.1 and SA 40.1 with the output speed 32 rpm are not self-locking. This is additionally the case for SA 35.1 with an output speed of 45 rpm. These non self-locking multi-turn actuators have a double start worm / worm wheel. After the torque switch has tripped, the sliding worm will be able to move back to its initial position by action of the torque measuring springs. This allows the

torque switch to be released. If the control system provides continuous signals, this will result in a constant switching on and off of the motor (Pumping effect).

Remedy:

- for SA 07.1 to SA 16.1 using motor controls AUMA MATIC, or
- 'capturing' the off signal with an auxiliary contactor or relay.

1) self-locking under normal operation conditions; a self-locking gearing does not ensure a safe stopping after an operation. If this is required, a brake motor must be used.

### Output speeds for multi-turn actuators for open-close duty

Size SA	max. torque <sup>1)</sup> [Nm]	3-ph-AC motor S2 - 15 min / S2 - 30 min		1-ph AC motor S2 -10 min		DC motor S2 - 15 min [rpm]
		50 Hz [rpm]	60 Hz [rpm]	50 Hz [rpm]	60 Hz [rpm]	
07.1	30	4 - 180	4,8 - 216	4 - 180	4,8 - 216	4 - 180
07.5	60	4 - 180	4,8 - 216	4 - 180	4,8 - 216	4 - 180
10.1	120	4 - 180	4,8 - 216	4 - 180	4,8 - 216	4 - 180
14.1	250	4 - 180	4,8 - 216	8 - 45	9,6 - 54	4 - 180
14.5	500	4 - 180	4,8 - 216	8 - 22	9,6 - 26	4 - 45
16.1	1 000	4 - 180	4,8 - 216	–	–	4 - 22
25.1	2 000	4 - 90	4,8 - 108	–	–	–
30.1	4 000	4 - 90	4,8 - 108	–	–	–
35.1	8 000	4 - 45	4,8 - 54	–	–	–
40.1	16 000	4 - 32	4,8 - 38	–	–	–
48.1	32 000	4 - 16	4,8 - 19	–	–	–

1) Individual sizes have reduced torques at highest speeds

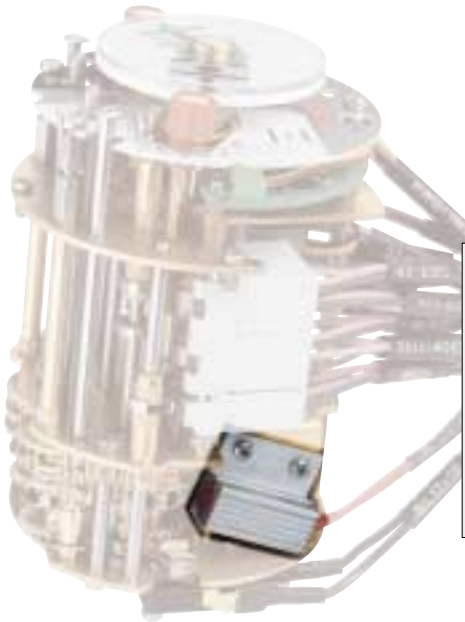
### Output speeds for multi-turn actuators for modulating duty

Size SAR	Torque for modulating [Nm]	3-ph AC motor <sup>2)</sup>		1-ph AC motor <sup>2)</sup>		variable speed motor <sup>3)</sup> [rpm]
		50 Hz [rpm]	60 Hz [rpm]	50 Hz [rpm]	60 Hz [rpm]	
07.1	15	4 - 45	4,8 - 54	4 - 45	4,8 - 54	3 - 45
07.5	30	4 - 45	4,8 - 54	4 - 45	4,8 - 54	3 - 45
10.1	60	4 - 45	4,8 - 54	4 - 45	4,8 - 54	1,5 - 22
14.1	120	4 - 45	4,8 - 54	8 - 45	9,6 - 54	–
14.5	200	4 - 45	4,8 - 54	8 - 22	9,6 - 26	–
16.1	400	4 - 45	4,8 - 54	–	–	–
25.1	800	4 - 11	4,8 - 13	–	–	–
30.1	1 600	4 - 11	4,8 - 13	–	–	–

2) Intermittent duty S4 - 25 % ED

3) Intermittent duty S5 - 40 % ED, output speed can be modified within the designated ranges at site

## Heater



Condensation in the actuator is possible due to wide fluctuation of the ambient temperature. The heater integrated in the control unit prevents this in general.

The heater is rated for continuous duty. Therefore it should always be energized, but at least when the actuator is not operating.

### Technical data

	Heater for actuators without integral controls	Heater for actuators with integral controls
Heating element	self-regulating PTC element	Resistance type heater
Voltage ranges	110 V - 250 V DC/AC 24 V - 48 V DC/AC 380 V - 400 V AC	24 V DC/AC (internal supply)
Power	5 W - 20 W for SA / SAR 3 W - 15 W for SAEx / SAREx	5 W

## Locking device for manual operation (option)

The locking device prevents unauthorized manual operation of the multi-turn actuator.



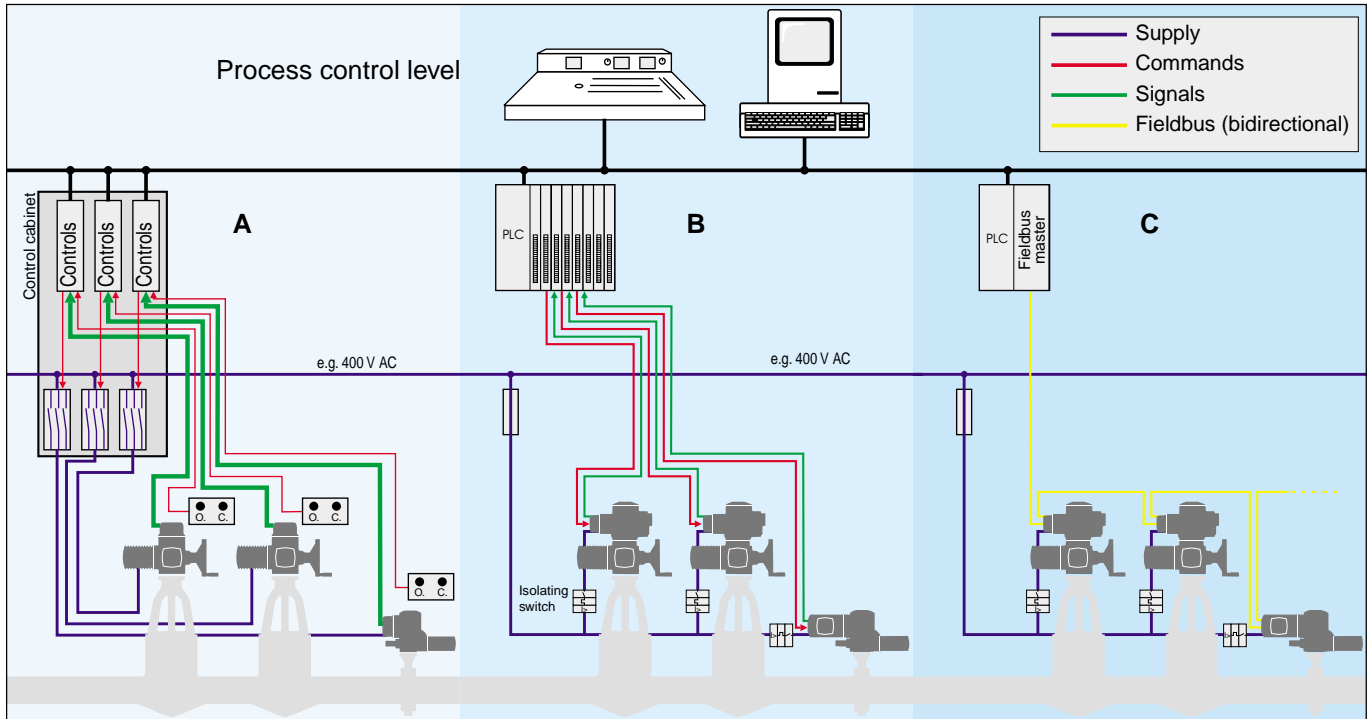
# Equipment

## Integral controls (option)

The aim in developing integral motor controls was to enable the customer

to save the high installation costs for external controls. The diagram

shows this impressively.



### External controls (A)

For connecting actuators to external controls, the following must be considered:

- Space in a control cabinet must be provided.
- For each actuator a power switching device, e.g. reversing contactors, must be installed.
- A supply cable must be connected from each switching device to the appropriate actuator.
- Controls must be provided to process the actuator signals and operate the switching device accordingly.
- Extensive wiring diagrams must be prepared
- All actuator signals, e.g. the torque and limit switch signals, must be passed on to the controls. For this purpose a multi-core control cable is necessary.
- If local controls are required, they must be installed and need additional separate wiring.

### Integral controls (B)

Actuators with integral controls include control and switching elements and are supplied ready for use.

All electrical components, e.g. limit, torque and thermo switches, as well as monitoring elements and position transmitter (option) are integrated into the modern controls. This results in the following simplifications:

- No extensive wiring in the external control cabinet is required.
- Several actuators can be connected to a common supply cable, using an isolating switch for each actuator.
- the motor protection is integrated into the controls.
- The actuator signals are processed in the controls, only feedback to the process control system is necessary.

### Integral controls / fieldbus (C)

If the actuator controls are integrated in a fieldbus system, the installation costs are further reduced. The commands and signals of all actuators are transmitted to and from the master station via a two-wire cable or a fibre-optical cable (option).

The space consuming input/output boards, as well as their associate control cabinet sections, are no longer required.

## Which type of controls?

Multi-turn actuators **SA, SAR, SAEx and SAREx** up to size 16.1 can be equipped with the integral controls **AUMA MATIC**. The versions SA and SAR can be retrofitted without any problems. For explosion-proof actuators retrofitting is not possible.

3-phase or single phase AC motor

Single phase AC motor with variable output speed

The **VARIOMATIC** provides the power electronics to control the electronically commutated motors. Therefore the **VARIOMATIC** is always required to operate the **SARV** actuators with variable output speed.

- AUMA MATIC
- AUMA MATIC MC
- AUMA MATIC PLC
- AUMA MATIC PROFIBUS-DP
- AUMA MATIC PROFIBUS-FMS
- AUMA MATIC INTERBUS-S
- AUMA MATIC MODBUS-RTU
- VARIOMATIC
- VARIOMATIC MC
- VARIOMATIC PROFIBUS-DP
- VARIOMATIC PROFIBUS-FMS
- VARIOMATIC INTERBUS-S
- VARIOMATIC MODBUS-RTU

Version controls	Short description
Standard	For OPEN - STOP - CLOSE control. Can be equipped with a positioner.
MC	Microcontroller version. Various programming possibilities. Is equipped with internal PID-control and logging of operating data.
PLC	Only available for AUMA MATIC. A mini-PLC is integrated in the controls. Can be operated via fieldbus.
PROFIBUS-DP	Integrated PROFIBUS-DP interface. The bus can be connected via fibre optical cable. High functionality, can be supplied with logging of operating data.
PROFIBUS-FMS	Integrated PROFIBUS-FMS interface. The bus can be connected via fibre optical cable.
INTERBUS-S	Integrated INTERBUS-S interface.
MODBUS-RTU	Integrated MODBUS-RTU interface. The bus can be connected via fibre optical cable.

### Further literature

Detailed information can be found in the following brochures:

- **Product description**  
Actuator controls AUMA MATIC / VARIOMATIC,
- **Technical information**  
Actuator controls with PROFIBUS-DP interface,
- **Technical information**  
PROFIBUS-FMS actuators,
- **Information**  
INTERBUS-S actuators.

### Wall bracket

Besides the above mentioned possibility, to fit the controls directly to the actuator, they can be mounted separately from the actuator on a wall bracket. This is recommended when:

- limited space restricts the access to directly mounted controls

- high ambient temperatures in the surroundings of the actuator could affect the electronics
- heavy vibrations of the valve could influence the controls.

# Interfaces

## Valve attachment

The valve attachment is according to DIN EN ISO 5210 or DIN 3210.

### Flange sizes

Size		07.1	07.5	10.1	14.1	14.5	16.1	25.1	30.1	35.1	40.1	48.1
max. torque [Nm]		30	60	120	250	500	1 000	2 000	4 000	8 000	16 000	32 000
ISO 5210	Standard	F07	F07	F10	F14	F14	F16	F25	F30	F35	F40	F48
	Option	F10	F10	–	–	–	–	–	–	–	–	–
DIN 3210	Option	G0	G0	G0	G1/2	G1/2	G3	G4	G5	G6	–	–

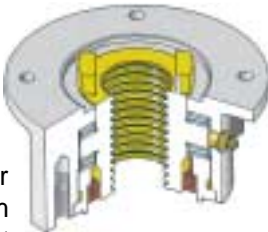
## Output drive types

Various output drive types according to EN ISO 5210 or DIN 3210 are available in order to adapt the multi-turn actuators to the different types of valves. On request it is possible to supply output drives according to DIN 3338.

### Output drive type A (ISO 5210 / DIN 3210)

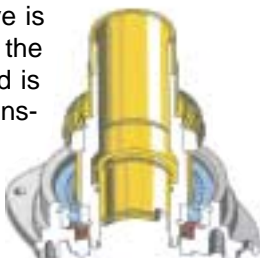
Stem nut for rising and non-rotating valve stem.

The mounting flange together with the stem nut and thrust bearings form one assembly, which is suitable for accepting thrust.



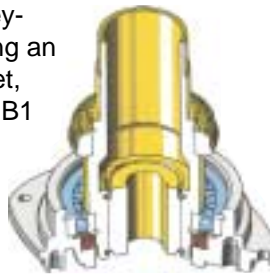
### Output drive types B1, B2 (ISO 5210) or B (DIN 3210)

This output drive is integrated into the hollow shaft and is designed for transmission of torque. Low radial loads can be accepted.



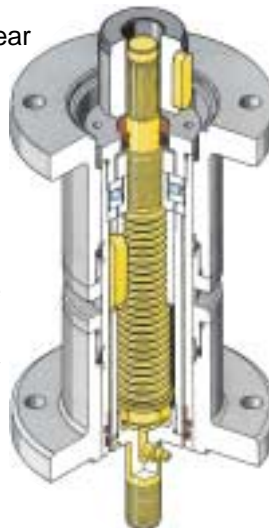
### Output drive types B3 or B4 (ISO 5210) or E (DIN 3210)

Bore with key-way. By using an output socket, output drive B1 can be converted into type B3 or B4 or E.



### Linear thrust unit LE

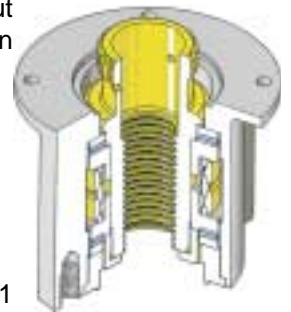
With the linear thrust unit the rotary movement of the actuator output shaft is converted into an axial movement. The multi-turn actuator becomes a linear actuator. Different stroke lengths can be supplied.



### Special output drive types

Further output drive types are available besides the above described:

- Spring loaded stem nut AF
- Pendulum stem nut AK
- Stem nut with plain bearings AG
- Hexagon in hollow shaft
- Insulated output drives IB1 and IB3



Detailed information on special output drive types can be found on separate data sheets and price list.

## Electrical connection

### AUMA plug/ socket connector

Multi-turn actuators up to size SA 16.1 are equipped with AUMA plug/ socket connector for motor and controls.

For size SA 25.1 and larger the motor is connected to screw type terminals in the terminal compartment. The controls are still wired to the AUMA plug/ socket connector.



### Terminals

For explosion-proof multi-turn actuators type SAEx screw type terminals are used for the electrical connection as a standard.



On request, those terminals can also be used for non-explosion-proof actuators.

### Special connections

For special customer requests plug/ socket connectors of specified brands can be used.

The plug cover of the standard version can be replaced by the following variants:

Plug cover with

- removable lid
- enlarged terminal compartment (sizes SA 07.1 – SA 10.1 and AUMA MATIC)
- enlarged terminal compartment and removable lid (up to size SA 10.1 and for AUMA MATIC)

### Parking frame, protection cover

These parts offer the facility to place the plug connector, while taken off the actuator, in a proper place on a wall. The open terminal compartment at the actuator can be closed with the protection cover. This prevents dust and water from entering the compartment while the plug connector is taken off.

### AUMA plug/ socket connector

Technical data	Motor power connections <sup>1)</sup>	Protective earth	Controls
No. of contacts max.	6 (3 are used)	1 (leading contact)	50 pins / sockets
Marking	U1, V1, W1, U2, V2, W2	according to VDE	1 to 50
Voltage max.	750 V	–	250 V
Current max.	25 A	–	16 A
Type of connection (for customer connections)	Screws	Screw for ring lug	Screws Crimping (option)
Cross section max.	6 mm <sup>2</sup>	6 mm <sup>2</sup>	2,5 mm <sup>2</sup>
Material: Pin/socket carrier contacts	Polyamide Brass	Polyamide Brass	Polyamide Brass, tin plated gold plated (option)

### Terminals for connection

Technical data	Motor power connections <sup>1)</sup>	Protective earth	Controls
Terminals max.	3	1	48
Marking	U1, V1, W1	according to VDE	1 to 48
Voltage max.	750 V	–	250 V
Type of connection	Screws	Screws	Cage clamp <sup>2)</sup>
Cross section max.	10 mm <sup>2</sup> up to SA 16	10 mm <sup>2</sup>	2,5 mm <sup>2</sup> flexible 4 mm <sup>2</sup> solid wire

### Threads for conduit entries<sup>3)</sup>

Type	AUMA NORM <sup>4)</sup>	AUMA MATIC <sup>4)</sup>
SA/SAEx 07.1 – 10.1	2xPg 21, 1xPg 13,5	1xPg 29; 1xPg 21, 1xPg13,5
SA/SAEx 14.1 – 16.1	1xPg 29, 1xPg 21, 1xPg 13,5	1xPg 29; 1xPg 21, 1xPg13,5
SA 25.1	1xPg 29, 1xPg 29, 1xPg 21, 1xPg 13,5	–
SAEx 25.1	1xPg 29, 1xPg 29, 1xPg 21	–
SA 30.1	1xPg 36, 1xPg 29, 1xPg 21, 1xPg 13,5	–
SAEx 30.1	1xPg 36, 1xPg 29, 1xPg 21	–
SA 35.1 – 48.1	1xPg 42, 1xPg 29, 1xPg 21, 1xPg 13,5	–
SAEx 35.1 – 40.1	1xPg 42, 1xPg 29, 1xPg 21	–

1) suitable for copper wires; for aluminium wires contact AUMA

2) as an option with screw connection

3) at supply sealed with plugs; for other thread types and/or sizes contact AUMA; on request cable glands are available.

4) the thread size mentioned first is provided for motor power supply.

# Service conditions

## Enclosure protection

### IP 67

AUMA actuators conform to enclosure protection IP 67 according to EN 60 529. IP 67 means protection against immersion up to 1 m head of water for max. 30 minutes.

### IP 68

AUMA actuators are available with improved enclosure protection IP 68 according to EN 60 529. IP 68 means protection against submersion up to 6 m head of water for max. 72 hours. During submersion up to 10 operations are permissible.

In order to guarantee enclosure IP 68, pressure tight cable glands have to be used. They are not part of the standard supply, but can be provided by AUMA, if ordered.

## Corrosion protection / Colour

### Standard (KN)

The standard AUMA corrosion protection KN is a high quality coating, suitable for outdoor installations even in a moderately aggressive atmosphere.

After thoroughly de-greasing, sand-blasting and cleaning the housings, a high-covering synthetic resin based primer is applied.

Aluminium parts, e.g. covers, are electro-dip coated.

The entire actuator is coated with a two-component paint based on polyurethane with micaceous iron oxide.

The standard colour of the finish coating is silver-grey (DB 701, similar to RAL 9007). The total film thickness for KN is at least 80 µm.

The outside bolts are corrosion protected or of stainless steel.

### KS

AUMA recommends this corrosion protection class for installing units in aggressive atmospheres, e.g. maritime climate or aggressive chemical substances (e.g. sewage works, chemical plants).

In addition to the KN corrosion protection measures, all cast iron parts receive a metallic surface protection or a high quality zinc primer coat. Before finish coating an intermediate coat is applied. The total film thickness is at least 140 µm.

### KX

AUMA recommends this corrosion protection class for installing units in extremely aggressive atmospheres e.g. in cooling towers.

For KX all cast iron parts are provided with a metallic surface protection. Before finish coating the actuator, two intermediate coatings are applied. The total film thickness is at least 225 µm.

## Ambient temperatures

Types	Actuator types	Versions	Temperature range
SA	Multi-turn actuators	Standard	- 25 °C.....+ 80 °C <sup>1)</sup>
		IP 68, submersible <sup>2)</sup>	- 25 °C.....+ 80 °C <sup>1)</sup>
		Low temperature	- 40 °C.....+ 60 °C
		Extreme low temperature	- 60 °C.....+ 60 °C
		High temperature	- 0 °C.....+ 120 °C <sup>1)</sup>
SAEx	Explosion-proof multi-turn actuators	Standard <sup>3)</sup>	- 20 °C.....+ 40 °C <sup>4)</sup>
		IP 68, submersible <sup>2) 3)</sup>	- 20 °C.....+ 40 °C <sup>4)</sup>
		Low temperature <sup>3)</sup>	- 40 °C.....+ 40 °C
		Extreme low temperature <sup>3)</sup>	- 60 °C.....+ 40 °C
SAR	Multi-turn actuators for modulating duty	Standard	- 25 °C.....+ 60 °C
		Low temperature	- 40 °C.....+ 60 °C
SAREx	Explosion-proof multi-turn actuators for modulating duty	Standard <sup>3)</sup>	- 20 °C.....+ 40 °C <sup>4)</sup>
		Low temperature <sup>3)</sup>	- 40 °C.....+ 40 °C

- 1) Valid for version AUMA NORM without electronic position transmitter RWG, with RWG or in version AUMA MATIC max. + 70 °C
- 2) Submersible up to 72 hours, max. 6 m head of water, up to 10 operations during the submersion.
- 3) The PTB (Physikalisch Technische Bundesanstalt, the German national test authority) certificate of conformity is valid for the temperature range from - 20 °C up to + 40 °C (max. +60 °C). The actuators are designed and manufactured to assure proper function even at ambient temperatures below - 20 °C.
- 4) Under certain conditions up to +60 °C possible; requires consultations with AUMA.

## Lifetime

AUMA multi-turn actuators meet the requirements for operating cycles according to draft VDE/VDI (CLOSE - OPEN - CLOSE at 30 turns/stroke).

Type	Cycles
SA 07.1 – SA 10.1	20 000
SA 14.1 – SA 16.1	15 000
SA 25.1 – SA 30.1	10 000
SA 35.1 – SA 48.1	5 000



## Explosion protection

For the installation of actuators in potentially hazardous or explosive areas, special protective measures are required. These are specified in the European Standards EN 50 014, 50 018, 50 019 and 50 020. The PTB (Physikalisch Technische Bundesanstalt, the German national test authority) and the DMT/BVS (German Montan Technology/ Mining Test Facility) as European test authorities certified the conformity of the equipment with the mentioned standards.

The explosion-proof versions of the AUMA actuators SAEx and SAREx correspond to the classes of protection as mentioned in the table.

Certificates of conformity from national test authorities in other countries, e.g. USA (FM), Canada (CSA), Switzerland, Czech Republic, Hungary, CIS, Poland are also available.

All certificates are available online in the internet at: [www.auma.com](http://www.auma.com) (download section).

## General

### Mounting position

AUMA actuators, also those with integral controls, can be operated without restriction in any mounting position.

### Noise level

The noise level caused by the multi-turn actuators does not exceed 72 dB (A).

### Vibration resistance

The function of multi-turn actuators AUMA NORM is not affected by vibrations up to 0,75 g in a frequency range of 5 Hz to 200 Hz.

### Multi-turn actuators without integral controls

	Explosion-proof type	Certificate of conformity
SAEx 07.1 – SAEx 10.1 SAR Ex 07.1 – SAR Ex 10.1	EEx ed IIC T4 <sup>1)</sup>	PTB No. Ex 92.C.1038
SASch 07.1 – SASch 10.1	EEx ed I	BVS99.D.1064 X
SAEx 14.1 – SAEx 16.1	EEx ed IIB + H2 T4	PTB No. Ex-98.E.1019
SAEx 14.1 – SAEx 25.1 SAREx 14.1 – SAREx 16.1	EEx ed IIB T4 <sup>1)</sup>	PTB No. Ex 92.C.1039
SAEx 30.1 – SAEx 40.1	EEx ed II B T4 <sup>1)</sup>	PTB No. Ex 94.C.1007

1) With electronic position transmitter RWG 5020 Ex the type of protection is EEx ed ib IIC T4 resp. EEx ed ib IIB T4 (intrinsically safe).

### Multi-turn actuators with integral controls AUMA MATIC

Types AUMA MATIC	Explosion-proof type	Certificate of conformity
SAMEx 07.1 . – SAMEx 16.1 SARMEx 07.1 – SARMEx 16.1	EEx de IIB T4	PTB No. Ex 91.C.1027

## EU-Directives

### Machinery Directive

According to this directive, actuators are no complete machines. This means that a Declaration of Conformity is not possible. However, AUMA confirms with the Declaration of Incorporation (available online in the internet at: [www.auma.com](http://www.auma.com) (download section)) that during the design stage the standards mentioned in the Machinery Directive were applied.

By mounting the actuator to other components (valves, pipelines etc.) a 'machine' in the meaning of the Directive is formed. Before commissioning this machine a Certificate of Conformity must be issued.

### Low Voltage and Electromagnetic Compatibility (EMC) Directives

AUMA actuators fulfil the requirements, which was proved in extensive tests. Therefore AUMA issued a Certificate of Conformity (available online in the internet at: [www.auma.com](http://www.auma.com) (download section)) according to these Directives.

### CE-Mark



Since AUMA actuators fulfil the requirements of the Low Voltage and EMC Directives, the actuators are marked with the CE-mark in accordance with the directives.

## Functional tests

After assembly all actuators are thoroughly tested and the torque switching calibrated according to AUMA's inspection specification.

A final inspection record can be provided. This inspection records are also available in the internet at: [www.auma.com](http://www.auma.com) (services section).

# Multi-turn actuator / gearbox combinations

## Combinations with bevel or spur gearboxes

By combining multi-turn actuators SA with spur gearboxes GST 10.1 – GST 40.1 or with bevel gearboxes GK 10.2 – GK 40.2 the torque / speed ranges are considerably extended. All gearbox sizes are available with several reduction ratios.

Detailed information can be found on the corresponding technical data sheets.



*Multi-turn actuators SA can be combined with a spur gearbox or a bevel gearbox. Torques up to 16 000 Nm are possible.*

## Combinations with worm gearboxes

In combination with a worm gearbox of the type range GS 40 – GS 500 a multi-turn actuator SA is converted into a part-turn actuator, usually for a 90° movement. Ideal solutions are herewith available especially for large part-turn valves with high torque requirements.

Multi-turn actuators up to the size 40.1 can be combined with GS gearboxes. The torque range goes up to 250 000 Nm.

The worm gearboxes are available in different versions. Counter-clockwise closing versions can also be supplied.

Detailed information can be found on the corresponding technical data sheets.



## Combinations with lever gearboxes

Valves which are operated via lever arrangements require a lever gearbox. Commonly a swivel movement up to 90° is performed. For such applications the SA multi-turn actuators can be combined with a lever gearbox of the type range GF 50 – GF 250. The design of the gearboxes is based on the GS worm gearboxes.

Multi-turn actuators up to the size 25.1 can be combined with GF gearboxes. The torque range goes up to 32 000 Nm.

As for the worm gearboxes, various versions are available, e.g. for counter-clockwise closing.

Detailed information can be found on the corresponding technical data sheets.



Ambient temperatures	24		
high temperature	24		
low temperature	24		
Analogue torque sensing	11		
Applications	3		
<b>B</b>			
Bevel gearboxes	26		
Blinker transmitter	11		
switch rating	11		
<b>C</b>			
CE-Mark	25		
Colour	24		
Combinations with gearboxes	26		
Conduit entries	23		
Control cabinet	20		
Control unit	10,14		
Corrosion protection			
KN, KS, KX	24		
<b>D</b>			
Definition for multi-turn actuators	4		
Design principle	14		
DUO limit switching	10		
<b>E</b>			
Electrical connection	15,23		
AUMA plug/ socket			
connector	15,23		
conduit entries	23		
parking frame	23		
protection cover	23		
special connections	23		
terminals	15,23		
Enclosure protection IP 67, IP 68	24		
EU-Directives	25		
CE-Mark	25		
EMC-directive	25		
Low Voltage Directive	25		
Machinery Directive	25		
Explosion protection	25		
External controls	20		
<b>F</b>			
Fieldbus	20		
Flange sizes	22		
Four train gear limit switching	10		
Functional test	25		
Functions (summary)	6		
<b>G</b>			
Gearbox combinations	26		
Gearing	14		
<b>H</b>			
Heater	19		
<b>I</b>			
Integral controls	5,20 - 21		
Intermediate position switches	10		
Intermittent duty	8		
<b>L</b>			
Lever gearboxes	26		
Lifetime	24		
Limit switching	10,14		
DUO	10		
setting accuracy	10		
turns per stroke	10		
Linear thrust unit	22		
Locking device			
manual operation	19		
Lubrication	14		
<b>M</b>			
Manual operation	15		
locking device	19		
Mechanical position indicator	13		
Modulating duty	8 - 9,18		
permissible number of starts	9		
Motor protection	17		
PTC thermistors	17		
thermoswitches	17		
Motors	14,16		
1-phase AC	14,16		
3-phase AC	14,16		
DC	14,16		
motor protection	17		
variable speed	14,16		
Mounting position	25		
<b>N</b>			
Noise level	25		
<b>O</b>			
Open-close duty	7,9,18		
Output drive types	14,22		
bore with keyway	22		
hollow shaft	22		
linear thrust unit	22		
stem nut	22		
Output speeds	18		
<b>P</b>			
Parking frame	23		
Plug/ socket connector	14,23		
Position indication			
mechanical	13		
reduction gearing	13		
Potentiometer	13		
Power supply unit	13		
Protection cover	23		
<b>R</b>			
Reduction gearing	13		
Remote position transmission	13		
precision potentiometer	13		
reduction gearing	13		
RWG	13		
supply	13		
Running indication	11		
blinker switch	11		
<b>S</b>			
Self-locking	18		
Short time duty	7		
Spur gearboxes	26		
Standards			
DIN 3210	14,22		
DIN 3338	22		
DIN EN ISO 5210	4,14,22		
EN 50 014, 18, 19, 20	25		
IEC 34-1	9		
IEC 34-7	16		
IEC 85	16		
Stem nut	22		
Switches	12		
gold contacts	12		
rating	12		
single	12		
tandem	12		
triple	12		
Switching elements	20		
<b>T</b>			
Terminals	23		
Thermistors	17		
Thermoswitches	17		
Threads for conduit entries	23		
Torque sensing			
analogue	11		
Torque switching	10,14		
overload protection	10		
Torques for modulating duty	11		
Tripping torques	11		
setting range	11		
Type designation	7		
Type of duty	7 - 9		
intermittent duty	8		
short time duty	7		
<b>V</b>			
Valve attachment	14,22		
flange sizes	22		
Vibration resistance	25		
<b>W</b>			
Wall bracket	5,21		
Worm gearboxes	26		

# auma automates valves

## Germany

### WERNER RIESTER GmbH & Co. KG

Factory Müllheim  
P.O.Box 1362  
**D-79373 Müllheim**  
Tel +49 (0) 7631 809-0  
Fax +49 (0) 7631 13218  
e-mail riester@auma.com

Factory Ostfildern-Nellingen  
P.O.Box 1151

**D-73747 Ostfildern**  
Tel +49 (0) 711 / 3 48 03-0  
Fax +49 (0) 711 / 3 48 03-34  
e-mail riester@wof.auma.com

Service-Centre Cologne  
Mathias-Brüggen-Str.164

**D-50829 Köln**  
Tel +49 (0) 221 / 5 97 72-0  
Fax +49 (0) 221 / 5 97 72-19  
e-mail riester@sck.auma.com

Service-Centre Magdeburg  
Am Stadberg 1

**D-39167 Niederndodeleben**  
Tel +49 (0) 39 204 / 7 59 0  
Fax +49 (0) 39 204 / 7 59 19  
e-mail riester@scm.auma.com

Service-Center Bavaria  
Robert-Bosch-Strasse 14

**D-85748 Garching-Hochbrück**  
Tel +49 (0) 89 329885-0  
Fax +49 (0) 89 329885-18  
e-mail riester@scb.auma.com

North Office  
Ship building sector

**D-21079 Hamburg**  
Tel +49 (0) 40 / 79 14 02 85  
Fax +49 (0) 40 / 79 14 02 86  
e-mail DierksS@auma.com

North Office

**D-29664 Walsrode**  
Tel +49 (0) 51 67 / 5 04  
Fax +49 (0) 51 67 / 5 65  
e-mail HandwerkerE@auma.com

West Office

**D-45549 Sprockhövel**  
Tel +49 (0) 2339 / 92120  
Fax +49 (0) 2339 / 921215  
e-mail SpoedeK@auma.com

South-West Office

**D-69488 Birkenau**  
Tel +49 (0) 6201 / 373149  
Fax +49 (0) 6201 / 373150  
e-mail WagnerD@auma.com

Baden Office

**D-79373 Müllheim**  
Tel +49 (0) 7631 / 809193  
Fax +49 (0) 7631 / 809294  
e-mail Hensel R@auma.com

Württemberg Office

**D-73747 Ostfildern**  
Tel +49 (0) 711 / 3480380  
Fax +49 (0) 711 / 3480381  
e-mail KoeglerS@auma.com

Bavaria Office

**D-93356 Teugn/Niederbayern**  
Tel +49 (0) 94 05 / 94 10 24  
Fax +49 (0) 94 05 / 94 10 25  
e-mail JochumM@auma.com

East Office

**D-39167 Niederndodeleben**  
Tel +49 (0) 39204 / 75980  
Fax +49 (0) 39204 / 75989  
e-mail ZanderC@auma.com

## Europe

AUMA Armaturentriebe  
Gesellschaft m.b.H

**A-Tribuswinkel**  
Tel +43 2252 / 82540  
Fax +43 2252 / 8254050  
e-mail office@auma.at

AUMA (Schweiz) AG

**CH-Berikon / AG**  
Tel +41 566 400945  
Fax +41 566 400948  
e-mail Rettich.P.ch@auma.com

AUMA Servopohony

**CZ-Praha**  
Tel +42 0272 7000 56  
Fax +42 0272 7041 25  
e-mail auma-s@auma.cz

AUMA France

**F-Taverny Cedex**  
Tel +33 1 39327272  
Fax +33 1 39321755  
e-mail servocom@auma.fr

OY AUMATOR AB

**FIN-Espoo**  
Tel +35 895 84022  
Fax +35 895 8402300  
e-mail aumator@aumator.inet.fi

AUMA ACTUATORS Ltd

**GB-Clevedon**  
Tel +44 1275 871141  
Fax +44 1275 875492  
e-mail auma@auma.co.uk

AUMA ITALIANA s.r.l.

**I-Lainate / Milano**  
Tel +39 02 9317911  
Fax +39 02 9374387  
e-mail info@auma.it

AUMA BENELUX B.V.

**NL-Leiden**  
Tel +31 7158 14040  
Fax +31 7158 14049  
e-mail office@benelux.auma.com

AUMA Polska SP. z o.o.

**PL-Katowice**  
Tel +48 32 2505412  
Fax +48 32 2509518  
e-mail R.Ludzien@auma.com.pl

AUMA Moscow Representative Office

**RUS-Moscow**  
Tel +7 095 973 29 43  
Fax +7 095 973 35 28  
e-mail georgeip@aha.ru

GRØNBECH & SØNNER

**DK-København**  
Tel +45 3326 6300  
Fax +45 3326 6301  
e-mail gs@groenbech-sons.dk

IBEROPLAN S.A.

**E-Madrid**  
Tel +34 91 3717130  
Fax +34 91 7427126  
e-mail iberoplan@iberoplan.com

D. G. Bellas & Co. O.E.

**GR-Athens**  
Tel +30 1 5223848  
Fax +30 1 5232246  
e-mail dgb@eexi.gr

SIGURD SØRUM A.S.

**N-Sandvika**  
Tel +47 6757 2600  
Fax +47 6757 2610  
e-mail tom.grostad@sigurd-sorum.no

INDUSTRA Lda.

**P-Sintra**  
Tel +351 2 19 10 95 00  
Fax +351 2 19 10 95 95  
e-mail industria@mail.telepac.pt

ERICH'S ARMATUR AB

**S-Malmö**  
Tel +46 40 311550  
Fax +46 40 945515  
e-mail info@erichsarmatur.se

MEGA ENDÜSTRI KONTROL

**TR-Ankara**  
Tel +90 312 4780813  
Fax +90 312 4780831  
e-mail megaltd@turk.net

## Africa

AUMA South Africa (Pty) Ltd.

**ZA-Springs**  
Tel +271 1363 2880  
Fax +271 1818 5248  
e-mail auma-sa@cis.co.za

A.T.E.C.

**ET-Cairo**  
Tel +20 2 3599680  
Fax +20 2 3590861  
e-mail ATEC@INTOUCH.com

## Asia

AUMA (INDIA) Ltd.

**IND-Bangalore**  
Tel +91 808 394655  
Fax +91 808 392809  
e-mail aumabng@bgl.vsnl.net.in

AUMA Japan Co., Ltd.

**J-Chiba**  
Tel +81 47 302 95 51  
Fax +81 47 302 95 55  
e-mail auma.jp@oregano.ocn.ne.jp

AUMA Beijing Representative Office

**PRC-Beijing**  
Tel +86 10 62022491  
Fax +86 10 62022496  
e-mail aumabs@ihw.com.cn

AUMA ACTUATORS (SINGAPORE) Pte. Ltd.

**SGP-Singapore**  
Tel +65 4 818750  
Fax +65 4 818269  
e-mail aumasing@mbox5.singnet.com.sg

AUMA Middle East Representative Office

**UAE-Abu Dhabi**  
Tel +971 26 44 92 43  
Fax +971 26 44 85 61  
e-mail auma@emirates.net.ae

PERFECT CONTROLS Ltd.

**HK-Tsuen Wan, Kowloon, Hongkong**  
Tel +852 24 937726  
Fax +852 24 163763  
e-mail pctld@netvigat.com

AL-ARFAJ Eng. Company W.L.L.

**KWT-Salmiyah**  
Tel +965 4817448  
Fax +965 4817442  
e-mail arfa@ncc.moc.kw

BEHZAD Trading

**Q-Doha**  
Tel +974 433236  
Fax +974 433237  
e-mail behzad@qatar.net.qa

Top Advance Enterprises Ltd.

**ROC-Taipei, Taiwan**  
Tel +886 2273 33530  
Fax +886 2273 65526  
e-mail kycl3530@ms61.hinet.net

DONG WOO Valve Control Co. Ltd.

**RK-Seoul, Korea**  
Tel +82 2761 6233  
Fax +82 2761 1278  
e-mail dw7994@users.unitel.co.kr

Sunny Valves and Intertrade Corp. Ltd.

**THA-Yannawa - Bangkok**  
Tel +66 22 40 06 56  
Fax +66 22 40 10 95  
e-mail swvong@mozart.inet.co.th

## Australia

BARRON GJM Pty. Ltd.

**AUS-Artarmon NSW**  
Tel +612 94 36 10 88  
Fax +612 94 39 34 13  
e-mail info@barron.com.au

## North- and South America

AUMA ACTUATORS INC.

**USA-Pittsburgh**  
Tel +1 412 7871340  
Fax +1 412 7871223  
e-mail mailbox@auma-usa.com

ASVOTEC Termointerindustrial Ltda.

**BR-São Paulo SP**  
Tel +55 11 5505 0404  
Fax +55 11 5505 2577  
e-mail adm@asvotec.com.br

TROY-ONTOR Inc.

**CDN-Etobicoke, Ontario**  
Tel +1 705 721-5851  
Fax +1 705 721 5851  
e-mail troy-ontor@troy-ontor.ca

Ferrostaal de Colombia Ltda.

**DC-Santafé de Bogotá**  
Tel +57 14 01 13 29  
Fax +57 14131806  
e-mail dorian\_hernandez@ferrostaal.com

ATAGESA S.A.

**EC-Guayaquil**  
Tel +59 34884046  
Fax +59 34884048  
e-mail atagesa@yahoo.de

IESS de Mexico S.A.

**MEX-Mexico City**  
Tel +52 55 561701  
Fax +52 5563337  
e-mail iessmex@cmic.org

Galcor del Norte SA de CV

**MEX-Monterrey**  
Tel +52 83 48 01 02  
Fax +52 83 33 28 85  
e-mail angel.galvan@galcor.com

Multi-Valve Latin America S.A.

**PE-San Isidro**  
Tel +51 12 22 13 13  
Fax +51 12 22 18 80  
e-mail multivalve@tsi.com.pe

PASSCO Inc.

**PR-San Juan**  
Tel +18 09 78 77 20 87 85  
Fax +18 09 78 77 31 72 77  
e-mail passco@prtc.net

LOOP S.A.

**RA-Buenos Aires**  
Tel +54 11 43 31 32 06  
Fax +54 11 43 31 32 06  
e-mail loop@datamarkets.com.ar

DIN INSTRUMENTO Ind. Ltda.

**RCH-Santiago de Chile**  
Tel +562 2050100  
Fax +562 2258139  
e-mail valvulas@dininstrumentos.cl

Suplibarca

**YZ-Maraçaiço, Zulia**  
Tel +58 61 55 56 67  
Fax +58 61 53 22 59  
e-mail suplibarca@iamnet.com

# auma®

WERNER RIESTER GmbH & Co. KG  
Armaturen- und Maschinenantriebe  
P.O.Box 1362 • D - 79373 Müllheim  
Tel +49 7631/809-0 • Fax +49 7631/13218  
e-mail riester@auma.com  
www.auma.com



Certificate Registration No.  
12 100 4269