



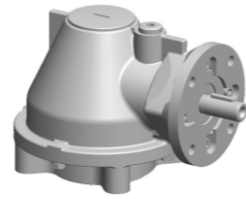
AUMA Norm
SA 3 - SA 100
SAR 3 - SAR 100
Output Torque from
30 Nm to 1000 Nm



AUMA e-pac
SA 3 - SA 100
SAR 3 - SAR 100
Output Torque from
30 Nm to 1000 Nm



AUMA High Torque
SA 25.1 - SA 40.1
SAR 25.1 - SAR 30.1
Output Torque from
2000 Nm to 16000 Nm



AUMA Bevel Gearboxes
ABG 10.2 - ABG 35.2
Output Torque from
375 Nm to 10000 Nm



AUMA Worm Gearboxes
GS 40.2 - GS 125.2
Output Torque from
300 Nm to 5600 Nm



AUMA Worm Gearboxes
GS 160 - GS 500
Output Torque from
8000 Nm to 360000 Nm



AUMA Worm Gearboxes
GF 63 - GF 315
Output Torque from
300 Nm to 90000 Nm



AUMA Bevel Gearboxes
GK 10.1 - GK 40.1
Output Torque from
120 Nm to 16000 Nm



AUMA India Electric Actuators

SA 3 - SA 100
SAR 3 - SAR 100
SA 25.1 - SA 40.1
SAR 25.1 - SAR 30.1

AUMA India Private Limited (CIN No: U74999KA1983PTC005412)

HEAD OFFICE & WORKS

Bangalore

Plot No.: 38-A & 39-B, II Phase,
Peenya Industrial Area,
Bangalore - 560 058
Tel : 080-3041 2222/ 2839 4656
Fax : 080-28392809
Email : info@auma.co.in
Website: www.auma.co.in

BRANCH OFFICES

WEST ZONE

Pune

712, 713, Building No. 1,
"Siddharth Towers", Kothrud,
Pune - 411 038
Tel : 020-25410465
Fax : 020-25443186
Email: NCPatil@aumaindia.com

NORTH ZONE

Noida

1310, Tower A,
Corenthum Complex,
Sector 62, Noida - 201 301
Tel : 0120-3060522
Fax : 0120-3060523
Email: VeereshS@auma.co.in

SOUTH ZONE

Chennai

19/ 49, I Floor,
Srinivasa Reddy Street,
Off South Usman Road
Chennai - 600 017
Ph: 044 - 4552 4447
Email: vramanan@aumaindia.com

RESIDENTIAL REPRESENTATIVES

Kolkata:

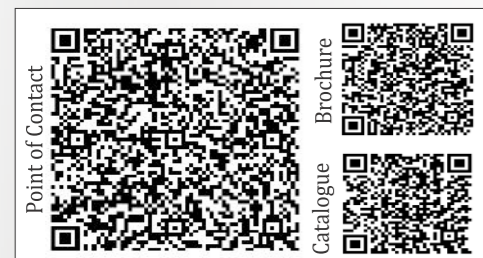
Ph: +91 9937431333
E-mail: vsppatra@aumaindia.com

Hyderabad:

Ph: +91 9342694012
E-mail: MaheshKP@auma.co.in

Vadodara:

Ph: +91 9974645180
E-mail: nishchay@aumaindia.com



We reserve the right to alter the data according to changes made. The product features and technical data provided do not express or imply any warranty.

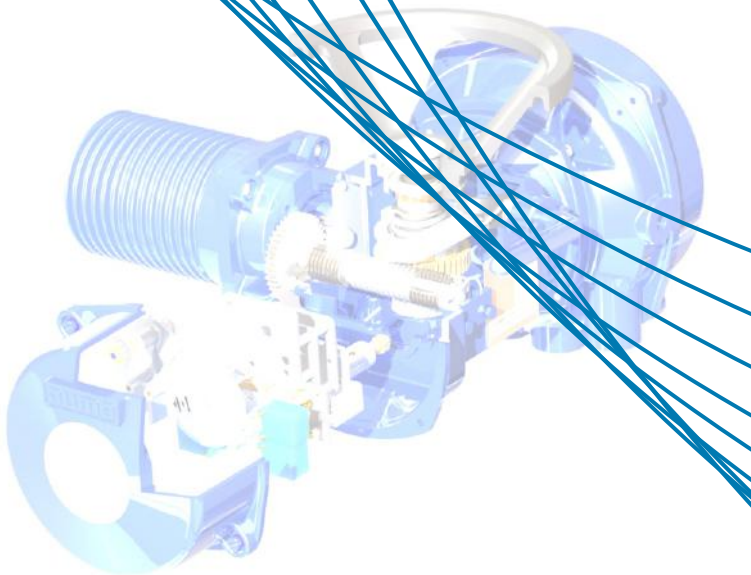
For latest information on AUMA products, please visit www.auma.co.in



Armaturen- Und Maschinen- Antriebe

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Note: There are various features and options that are available other than what is listed in the catalogue. For special needs, please contact AUMA India.



AUMA India Head Office at Bangalore

AUMA is the world's leading manufacturer of electric actuators, actuator controls and valve gearboxes for the automation of industrial valves / gates / dampers. AUMA has more than 50 years of experience in research & development and manufacturing electric actuators.

AUMA India, a subsidiary of AUMA Germany has established itself as the leading brand name in the Indian actuator market, since 1986. AUMA India offers the widest range of solutions for torque requirements from 10 Nm to 16000 Nm with or without integral starter for direct actuation and up to 360000 Nm in combination with gearboxes.

AUMA India has state-of-the-art manufacturing facility at Bangalore. It sells its products through the sales offices in Bangalore, Pune, Noida, Chennai and with its Residential Representatives in Kolkata, Hyderabad, Vadodara, Coimbatore and Mumbai.

AUMA India has a number of service centers and service representatives across India to ensure prompt after-sales service.

This brochure provides an overview of the functions and applications of AUMA India multi-turn actuators and actuator controls, for potential users. It can be used as the basis to determine the suitability of a device for the chosen application. For latest information on AUMA products, visit www.auma.co.in or contact our sales team.

AUMA India multi-turn actuators of SA range can be used wherever automation of valves are required. AUMA India offers customized actuation solutions for diverse applications in various industries to automate flow control devices, on account of:

- Availability of a wide torque range.
- Various combination AUMA actuators and valve gearboxes, thus further extending the torque range and / or converting the multi-turn actuator into part-turn, lever or linear actuator.
- Availability of a large variety of versions, suitable for use in explosion proof applications, nuclear power generation applications.
- Fieldbus applications.



Power Sector

- Conventional power plants (coal, gas, oil)
- Co-generation power plants
- Hydroelectric power plants
- Biogas power plants
- Solar thermal power plants
- Nuclear power plants



Oil & Gas

- Exploration, offshore plants
- Refineries
- Distribution
- Tank farms
- Petrochemical complexes



Water Sector

- Sewage treatment plants
- Water treatment plants
- Drinking water distribution
- Seawater desalination

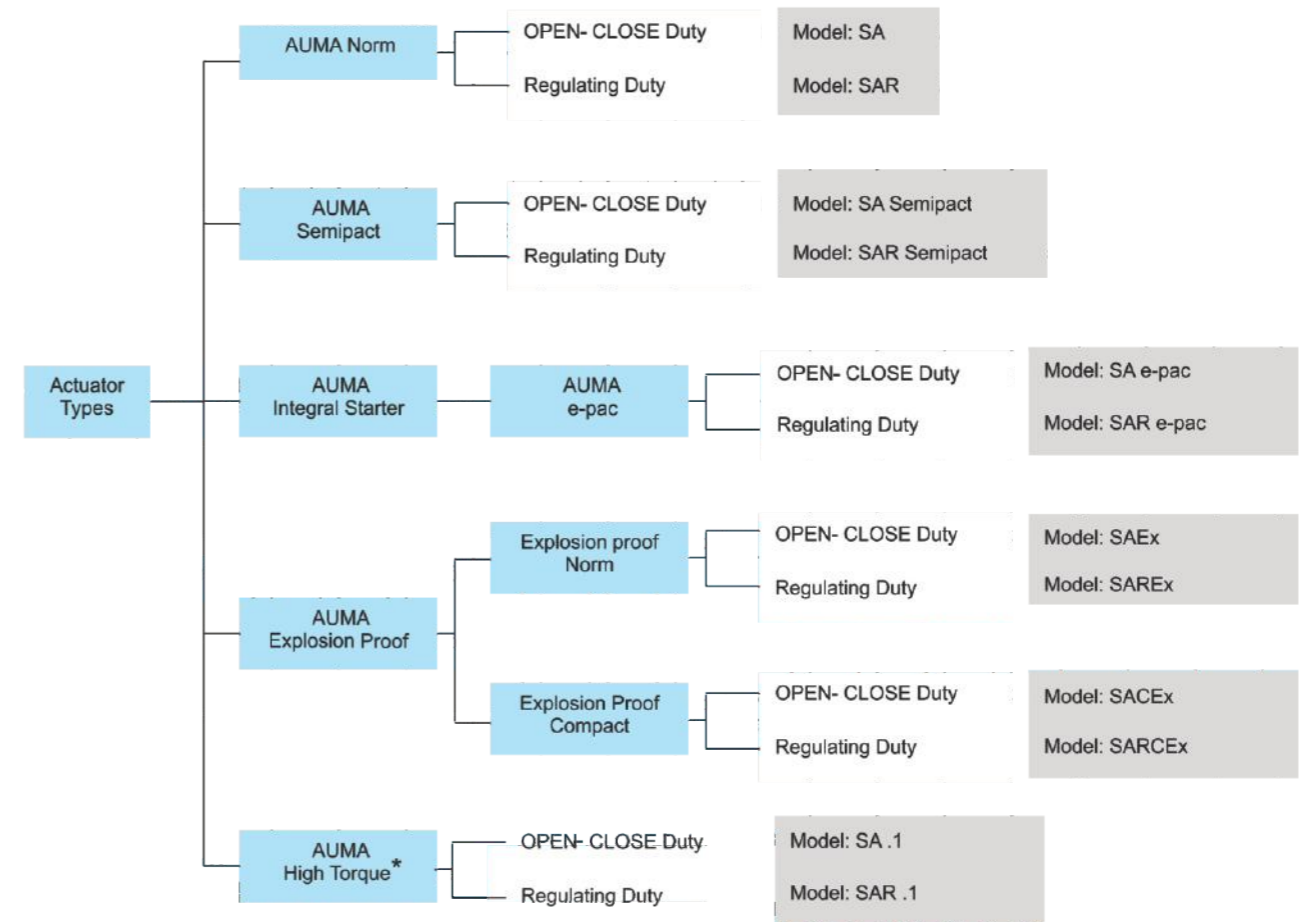


Industry & Marine - Others

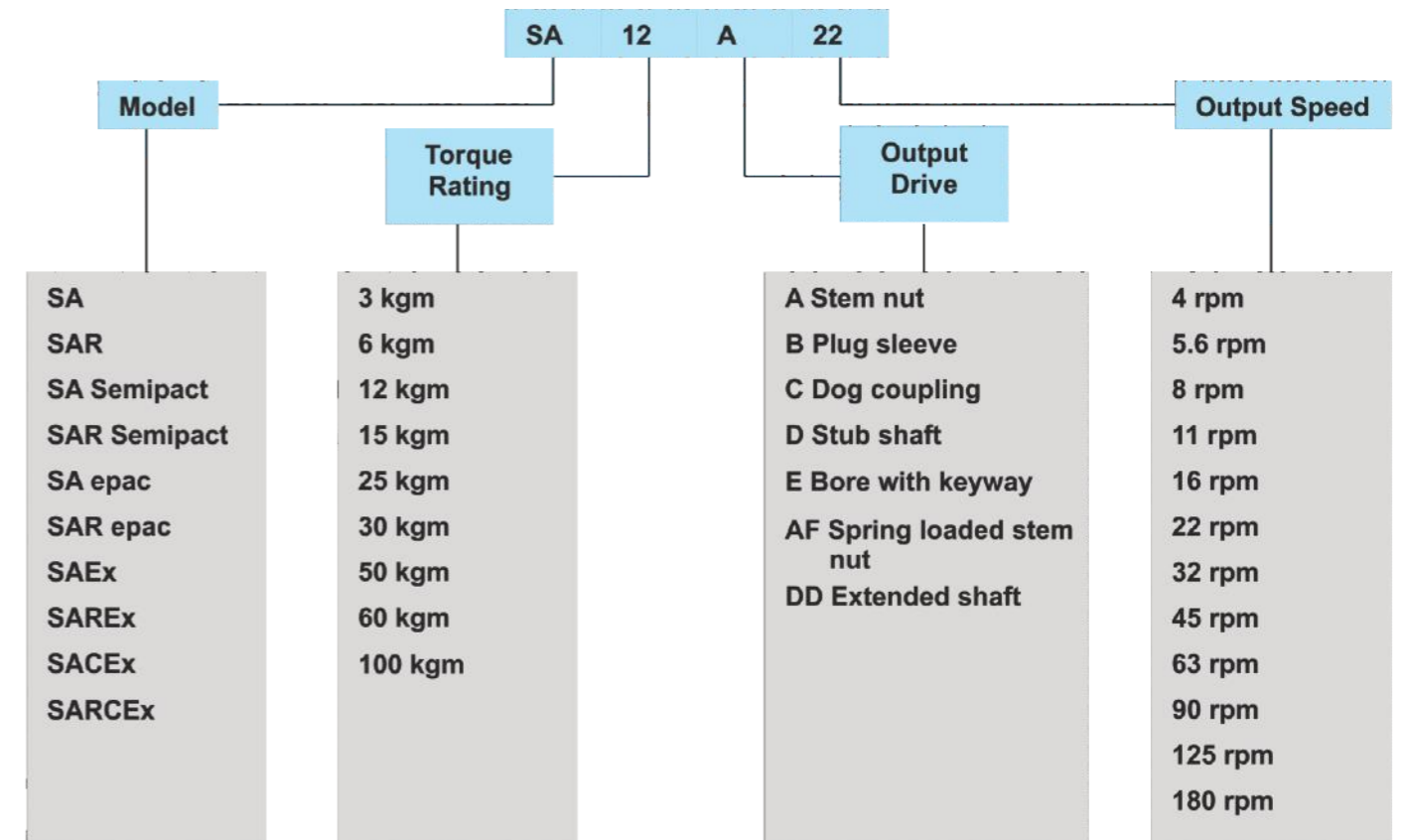
- Cement works, Steel mills
- Air conditioning
- Chemical industry
- Paper & pulp, Food industry
- Pharmaceutical industry
- Shipbuilding industry



Please Note: Explosion proof actuators and actuators for use in nuclear applications are described in separate catalogues.



Type Designation: Example



*For High torque actuator specifications, refer High torque actuator data sheets.



Multi-turn Actuator SA 3 - SA 100
AUMA Norm



Multi-turn Actuator SA 3 - SA 100
with Integral Starter- AUMA e-pac



Multi-turn Actuator SA 3 - SA 100
AUMA Semipact



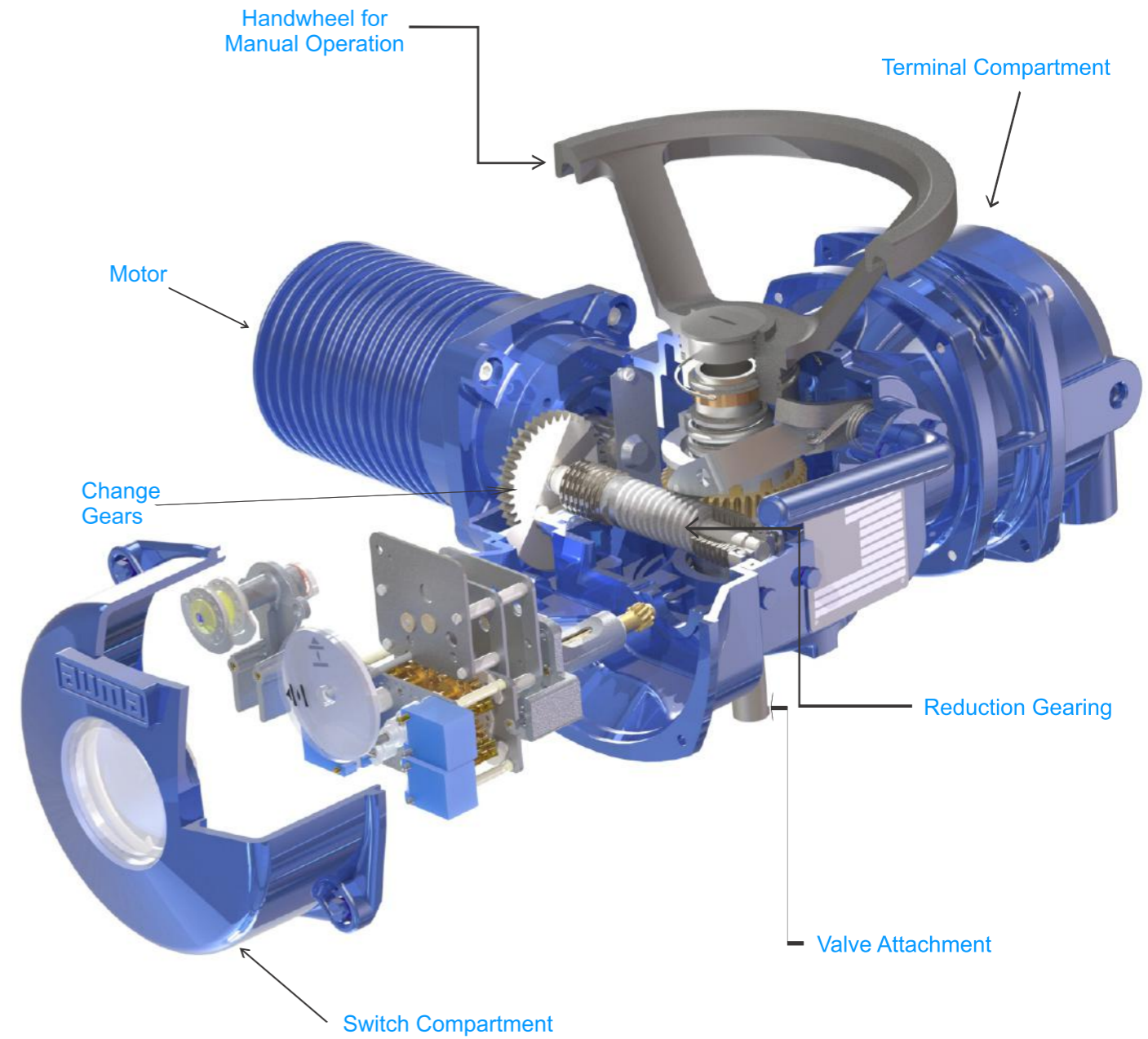
Multi-turn Actuator SA 25.1 - SA 40.1
AUMA High Torque Actuator



Multi-turn Actuator SAEx3 - SAEx100
Explosion Proof - AUMA Norm



Multi-turn Actuator SACEx3 - SACEx100
Explosion Proof - AUMA Compact



Motor

To unseat valves from end positions high starting torque is required, which is provided by the motors developed by AUMA India.

Change Gears

AUMA actuators are driven by special combination of gears, which are outside the grease filled housing and require no lubrication. If required, output speed can be easily altered by changing the gear pair and / or motor at site.

Output Speeds

With large range of available output speeds, almost every required time can be achieved with AUMA actuators.

The actuator output speed is determined by the motor speed, change gears and reduction gear ratio of worm / worm wheel.

The output speeds are available from 4 - 180 rpm.

During trial run, if found necessary, the output speed can be easily changed by exchanging the change wheels at site. The grease filled housing need not be opened for this purpose. The torque switch setting & limit switch setting remains the same. For actuators with output drive A (Stem nut), max. permissible stem velocity must be observed:

- For gate valves max. 500 mm / min.
- For globe valves max. 250 mm / min.

For higher velocities, it is recommended to use spring loaded stem nut type AF (special design).

Reduction Gearing

A well proved principle of worm gearing is used to reduce the motor speed to required output speed of actuator. Self locking feature is achieved by worm gearing up to 90 rpm at output. Worm shaft and output shaft with worm wheel run in ample sized bearings. The sliding worm is positioned between two sets of springs on worm shaft. The worm moves axially in relation to thrust, which is the measure for torque. Via lever & gears, the torque measure is transmitted to control unit.

Self Locking

AUMA multi-turn actuators SA / SAR 3 to SA / SAR 100 are self locking (see note) with exception of output speeds 125 & 180 rpm. Actuators with 125 & 180 rpm are having double start worm drive. After torque switch

is tripped, the sliding worm may move back to initial position by the action of torque measuring springs. This allows torque switch to be released. If control system provides continuous signal, this results in hunting of motor. This can be avoided by the use of auxiliary relay.

Note on Self Locking:

Self locking gearing does not ensure safe stopping after an operation. If this is required, separate locking arrangement must be provided.

Switch Compartment

Depending upon type of valve, the actuator must be switched off at the end positions by limit switch or torque switch. For this purpose, independent limit switching or torque switching devices are provided in the switch compartment. The switching devices are easily accessible for any setting at site.

Terminal Compartment

All electrical connections are terminated inside the terminal compartment through multi-pin plug & socket connector as standard. Multi-pin plug & socket connectors are provided for ease of connection and maintenance. Screw type connectors are also provided as an option. For detailed information, refer page 26.

Valve Attachment

The valve mounting flange is according to ISO 5210 / DIN 3210. Various output drives are available for adaption to various types of valves.

Mounting Position

AUMA actuators with or without integral starters can be operated in any desired mounting position.

Manual Operation

Electric actuators have a handwheel to enable operation of the actuator during commissioning or in case of power failure. If the actuator motor is switched on again after manual operation, the handwheel is automatically disengaged from the motor drive.

Motors

As a standard, AUMA Multi-turn actuators are equipped with 3 phase induction motors. AUMA motors are class F insulated and withstand winding temperature up to 140°C.

The motors are used for short time duty (S2-15 min) or intermittent duty (S4-25%) as per IS 12824 and provide approximately three times rated torque for short duration. The size of the motor is smaller compared to continuous duty motor S1 of same output power. This results in reduced inertia of the rotor and therefore less overshoot after switching off the motor, AUMA motors are designed for enclosure protection class IP 55 / IP 67 / IP 68 when mounted on the actuator (See Technical data for motor). All motor cables are brought to terminal compartment cover from inside of the actuator thus avoiding terminal box.

Single Phase AC Motors

AUMA actuators can be supplied with single phase AC motor. The required capacitor is fitted in the terminal compartment cover

DC Motors

AUMA actuators are also available with DC motors. These motors operate on 24 V, 48 V, 110 V, 220 V DC supply.

AC Motors with Other Voltages and Frequency

Three phase induction motors are available in wide range of operating voltages from 220 V to 690 V and operating frequency of 50 or 60 Hz.

Technical Data - Motor				
	3 ph AC Motor		1 ph AC Motor*	DC Motor*
Voltages / Frequency	Std	50 Hz 415 V	50 Hz 220 V - 240 V	220 V, 110 V, 48 V, 24 V
	Optional	50 Hz / 60 Hz 220 V, 380 V, 400 V, 415 V, 440 V, 460 V, 480 V, 500 V, 525V, 550 V, 600V, 660 V, 690 V		
Permissible Variation in Voltage	± 10%		± 10%	± 10%
Motor Standard	IS 325/ EN/ IEC 60034		IS 996/ EN/ IEC 60034	IS 4722/ EN/ IEC 60034
Mounting	C Type Flange, B14, IS 2223/ EN/ IEC 60072			
Enclosure Protection	IP 67 or IP 68 after mounting			IP 55 after mounting
Type of Cooling	Surface Cooled			
Insulation Class IS 1271/ EN/ IEC 60034/ 62114	Std. : F Class Optional : H Class			
Starting	Direct On Line			Direct On Line (Not applicable for above 4.0 kW rating motors)
Type of Duty	S2-15 min. or S4-25% as per IS 12824			
Direction of Rotation	Bi-directional			
Motor Protection	3 Thermoswitches		2 Thermoswitches	2 Thermoswitches

* For detailed information on DC motors, please contact AUMA India

** 1 ph AC motor for given voltages is available for 0.06/ 0.12/ 0.25 kW for 1400 rpm as well as for 0.18/ 0.37 for 2800 rpm.

Motor Protection

Thermoswitch

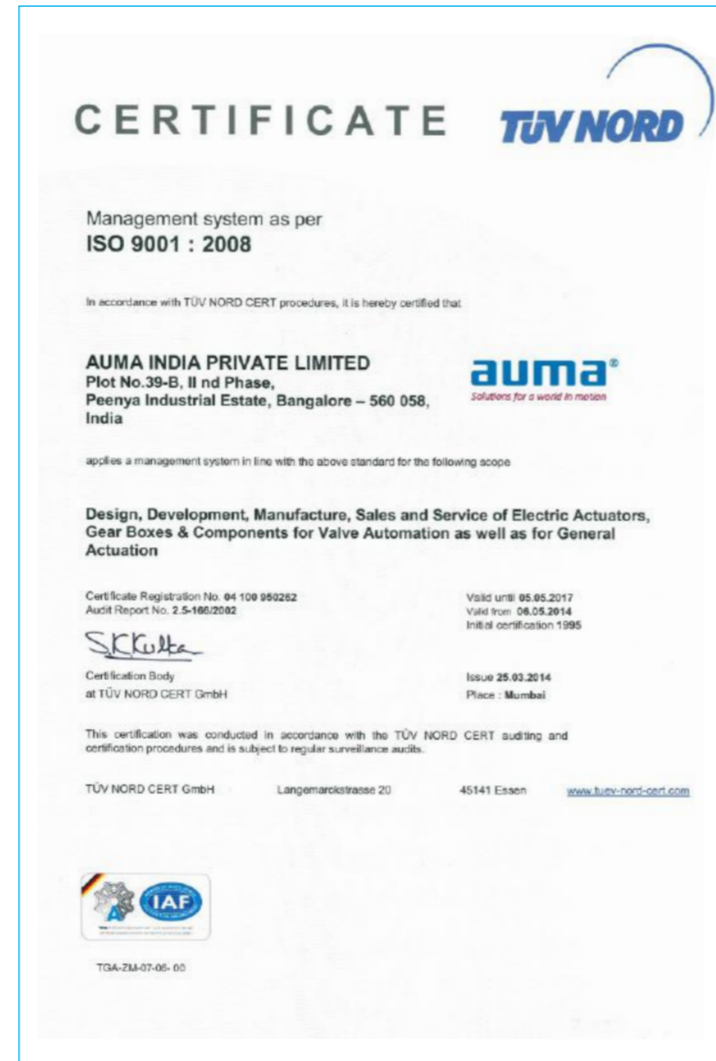
Motor winding may get overheated if the actuator is run beyond rated duty or if the rotor is stalled for considerable longer time or if too high ambient temperature is encountered. In order to protect the motor against overheating, thermoswitches are embedded in the windings of three phase, single phase AC motors and DC motors. When integrated into the control circuits, they will protect the motor against damage due to excessive winding temperature.

The thermoswitches interrupt the control circuit as soon as winding temperature of 140°C is exceeded. After cooling down to a temperature of approximately 110°C, the actuator can be switched on once again.

Technical Data - Thermoswitch

AC Voltage	Switch Rating
250 V AC Cos Ø=1	2.5 A
250 V AC Cos Ø=0.6	1.6 A
Tripping Temp. 140°C	
Reset Temp. 90 - 110°C	

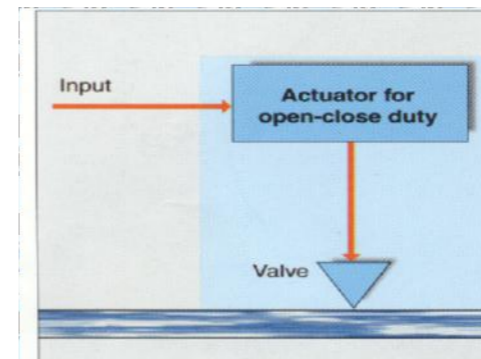
Note: The motor protection device must be integrated into the controls, otherwise warranty for motor becomes null & void.



OPEN-CLOSE Duty

The characteristic feature of this actuator is open loop control. The normal valve positions in OPEN-CLOSE duty are end positions OPEN and CLOSE. After receiving command, the actuator operates the valve to one of the end positions or if necessary to a preset intermediate position. The frequency of operation of valves can span between a few minutes to several months.

AUMA multi-turn actuators type SA for OPEN-CLOSE service are rated for short time duty S2-15 min, generally.



Typical Characteristics of OPEN-CLOSE Duty

Short Time and Intermittent Duty as per IS 12824

Short time duty S2

Operation at constant load during a given time, less than that required to reach thermal equilibrium, followed by a rest and de-energized period of sufficient duration to re-establish machine temperatures within 2°C.

The duration of short time is limited to 15 min*.

Intermittent Duty S4

A sequence of identical duty cycles, each cycle including a significant period of starting, a period of operation at constant load and a rest and de-energized period. These periods being too short to attain thermal equilibrium during one duty cycle.

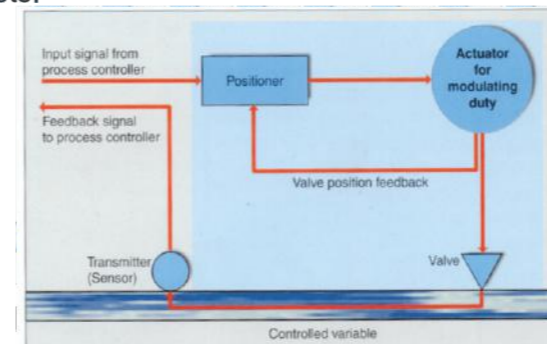
The relative on time at S4-25%* is limited to 25% of the cycle time.

*For any special duty, please contact AUMA India.

Regulating / Modulating Duty

The characteristic feature of this actuator is closed loop control in which input command signal to actuator is directly influenced by the flow through the valve. Regulating / Modulating duty actuator SAR operates between two set bands between OPEN-CLOSE positions depending upon actual valve position and feedback signal. The motors of these actuators are rated for intermittent duty S4-25%. The mechanical components and motors are designed to withstand a large number of operations required for modulating applications.

Permissible number of starts-stops depends upon actuator size & speed. The details are available in data sheets.



Typical Characteristics of Regulating Duty

Description of Regulating Duty

AUMA actuators of type SAR are suitable for Regulating duty / Modulating duty. SAR actuator achieves any position of travel between 0 - 100% of valve stroke depending on the remote set point command given by the customer's DCS / PLC. SAR actuators differ from SA actuators in several respects:

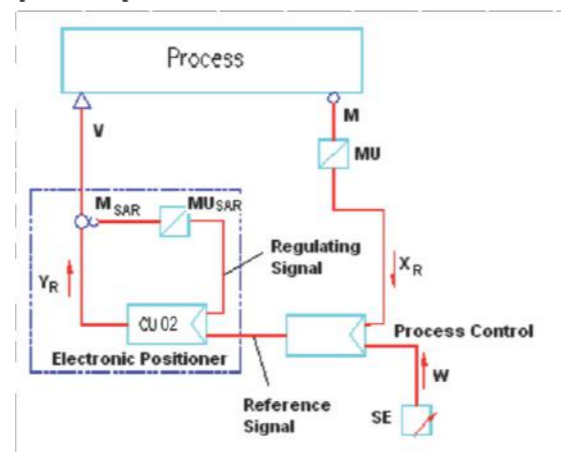
- 4 pole motors are used to reduce overshoot.
- Worm with high quality finish on flanks for better efficiency.
- Disc springs on worm shaft are pre-compressed to reduce dead band when reversing.

While selecting AUMA actuators for regulating duty applications, following points should be noted:

- Max. no. of starts - 1200 cycles / hour with motor power up to 0.55 kW and 600 cycles / hour with motor power above 0.55 kW.
- Output speed of actuator max. 45 rpm.
- Torque for regulating duty should not exceed 50% of max. torque of actuator.
- Max. torque of actuator can be used for seating and unseating of the valve.
- For reversing service, duration of impulse should be minimum of 50 ms.
- Electronic position transmitter or precision potentiometer should be used for remote position indication.
- The motor should be short time duty class S4 - 25%.

The SAR actuator basically consists of control units as explained in following diagram:

Principle of Operation:



SAR: Regulating duty actuator

MSAR: Valve position feedback (potentiometer)

MUSAR: Electronic position transmitter (contact (or) non-contact type)

V : Regulating valve

W : Reference input

CU 02: Electronic positioner

M : Sensor for regulating valve

MU : Signal converter for sensor

SE : Setting nominal value

XR : Input value at controller

YR : Output value at electronic positioner

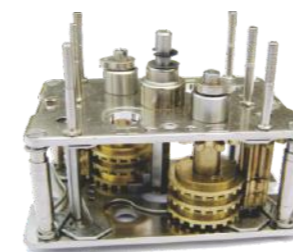
Limit Switching

The limit switching enables actuators to switch off when reaching defined valve position, usually end positions. The valve travel is measured by mechanical counter gear mechanism, which when reaching the set switching points, operate the electrical limit switches by cams. The setting accuracy is 1/10 of a turn of actuator output shaft.

In limit switching, Two train counter gear and Four train counter gear versions are available.

Two Train Counter Gear

For Two train counter gear, two limit switches, one for each direction of travel having 1 NO + 1 NC or 2 NO + 2 NC contacts are provided. The number of spindle turns can be set between 1 and 480 or 1 and 4800.



Two Train Counter Gear

Four Train Counter Gear

If limit switching is required at two end positions only, Two train counter gear is used. However, if two additional intermediate switching positions are desired, Four train counter gear is required. This limit switching has four counter gears and four limit switches. Two counter gears are used to switch off at end positions as in Two train counter gear while the other two are available for setting any desired intermediate positions between end positions. After cam actuation, the switches remain actuated till reaching end of valve travel.

Example of such applications are:

- To stop at intermediate position.
- Sequence control, that is to start another equipment like pump or bypass valve actuator after certain travel of valve.

The accuracy of setting is 1/10 of a turn of actuator output shaft. For four train counter gear, four limit switches of 1 NO + 1 NC or 2 NO + 2 NC contacts are provided.



Four Train Counter Gear

Torque Switching

The torque switching enables to switch off the actuator when pre-determined torque is reached. The torque switching works on principle of sliding worm.

Axial displacement of worm proportional to thrust is transmitted to torque switches. Torque switches operate in closing & opening directions. The required tripping torque can be easily set on the graduated dial and can be read directly in daNm. If limit switch cut off is selected prior to torque switch, then torque switch serves as overload protection.

For tight seating of certain valves, the actuator must be operated to end position CLOSED with defined force. Such operation can be carried out by torque seating. Limit seating is commonly used in the end position OPEN.

When torque seating is used at end position, limit switches can be used for signalization. Therefore, actuator controls can differentiate whether actuator was switched off by torque switch or by limit switch. Micro switches of torque switching are provided with 1 NO + 1 NC or 2 NO + 2 NC contacts for both open and close directions.



Torque Switching

Running Indication

Blinker switch is provided in the actuator and can be used as running indicator.



Blinker Switch

Micro Switches

With the help of micro switches, mechanical parameters such as travel & torque are converted into electrical signals for actuator control. There are four switches in the basic version:

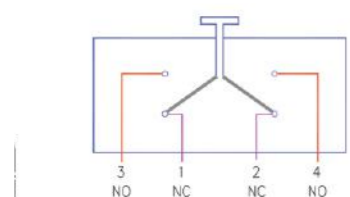
- One limit switch each for the end positions OPEN and CLOSE.
- One torque switch each for the directions OPEN and CLOSE.

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

The micro switches are individually sealed to enclosure protection class IP 66, as per IS 13947. The micro switches have double break change over potential free contacts. The circuit is interrupted simultaneously at two points. The basic versions of the switch contacts are of silver.

Single and Tandem Micro Switches

Limit and torque switches are available in single or tandem versions.

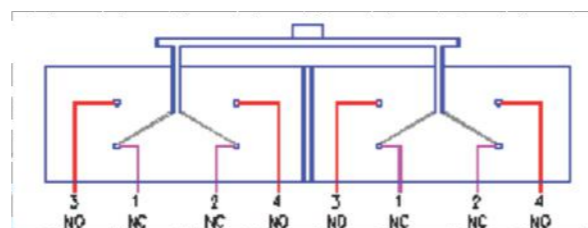


Single Micro Switch

Limit or torque switches in tandem version have additional switching contacts. These contacts can be wired for following applications:

- Switching another circuit also with different voltage and current.
- Safety function, to operate with single switch.
- Multiplying the available contacts, example for signalization.

For such applications, a relay is recommended since there may be small differences in tripping points of tandem switches.

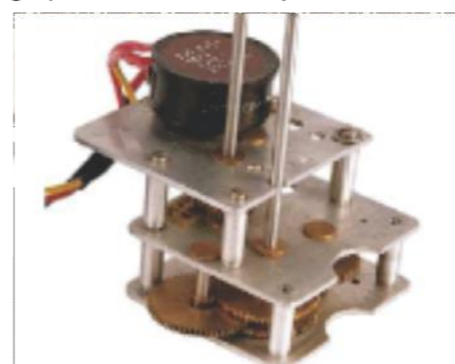


Tandem Micro Switch

Technical Data - Micro Switch Ratings						
Type of Switch	Type of Current	Rating in Amp at				Approximate Electrical Contact Rating
		30 V	75 V	125 V	250 V	
Limit and Torque	AC, cos Ø = 0.8 Inductive	8	7	6	5	50,000 cycles at 250 V AC, 5 A
	DC Inductive	5	1	0.2	0.1	50,000 cycles at 250 V DC, 0.1 A
	DC Resistive	7	1	0.5	0.5	50,000 cycles at 250 V DC, 0.25 A
Blinker	AC, cos Ø = 0.8 Inductive				4	

Reduction Gear Unit

A reduction gear unit (RGU) in the actuator is used for mechanical position indication, remote position indication and for operation of intermediate switches. The output shaft of the actuator drives final output shaft of RGU through a series of reduction gears and final shaft turns by approximately 270° while actuator output shaft performs full number of turns as set on Two train or Four train counter gear unit. The reduction gear ratio needed for each particular case is fitted at works if the ratio is known. For this purpose fixed RGU is supplied. If the ratio needs to be altered at site, variable ratio RGU is available, which allows simple modification at site depending upon number of output shaft for full stroke of valve.



Reduction Gear Unit (RGU)

Position Indicators

Continuous Mechanical Position Indicator

Adjustable discs having symbols for OPEN and CLOSE indicate the position of the valve continuously. The discs can be seen through an indicator glass on switch compartment cover. The OPEN-CLOSE discs can be set to coincide with limit switching. The mechanical position indicator requires reduction gear unit for operation.

*As an option digital mechanical position indicator can be provided in place of mechanical position indicator.



Continuous Mechanical Position Indicator

Remote Position Indicator

The position of the valve can be transmitted as a continuous signal for remote indication. A potentiometer mounted on RGU is used for this purpose. A power supply unit provides necessary voltage to the potentiometer. The potentiometer rotates through 270° for one full stroke of valve & output signal from potentiometer is proportional to valve travel. Thus, the actual position of the valve can be read continuously on position meter calibrated & mounted on control panel.



Remote Position Indicator

Technical Data - Remote Position Indicator

Potentiometer	Standard : 220 Ohms, 3W, Linearity ± 3% Optional : 100, 560, 1000 Ohms, 3W, Linearity ± 3% Precision : 200, 500, 1000 Ohms, 5000 Ohms 1W, Linearity ± 0.5%
Power Supply Unit	PS 01, Input 220 V, 50 Hz, Output 24 V DC
Position Meter	0 - 100% in various sizes

Digital Remote Position Indicator

The position display can be provided by digital remote position indicator, which displays open position in percentage.



Digital Remote Position Indicator

Intermediate Switches

With this limit switching, additional switching points can be set for each direction of rotation. The switching can be set between 25% and 75% of valve travel in each direction. The switch sub-assembly consisting of 2 or 4 cam switches is mounted on output shaft of RGU. Each micro switch has 1 NO + 1 NC contact.



*Intermediate positions can be set for indication or interlocking purpose.

Manual Operation

During commissioning or in an emergency or when there is no power supply, actuator can be operated by handwheel. The manual drive is engaged by means of a lever. When motor starts running, the manual drive gets disengaged immediately & handwheel does not rotate during power operation.

In manual operation, hammer blow can be effected with handwheel. The hammer blow makes it possible to open a jammed or rarely operated valve.

Top Bevel Gear Set

Using a side mounted handwheel instead of the standard handwheel can further reduce manual effort on the handwheel. Reduction ratios available are:

- SA 3 / 6 / 12 / 15 2:1
- SA 25 / 30 / 50 / 60 3:1
- SA 100 4:1

Instead of handwheel, a chain wheel can also be provided for actuators mounted in inaccessible zones.



Top Bevel Gear Set

Space Heater

Condensation in the actuator is possible due to wide fluctuation of the ambient temperature. The heater integrated in the control unit prevents the water condensation. The heater is rated for continuous duty.

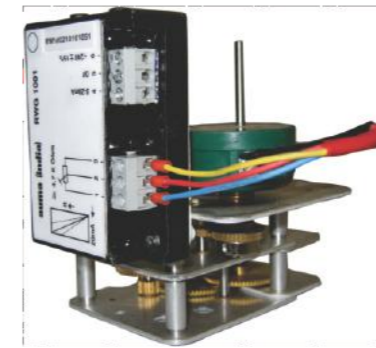
*Self regulating space heater and space heater with thermostat can also be provided on request.

Technical Data - Space Heater					
Volts, AC	230	230	110	110	24
Resistance, Ohms	5 k	2.7 k	1.2 k	0.6 k	120
Rating, Watts	10	20	10	20	5

Electronic Position Transmitter (RWG - Contact Type)

This device is a signal converter for the transformation of resistance value into proportionate current signal. It can also be placed in the actuator where the position determined by the potentiometer is converted into 4 - 20 mA current signal.

As position transmitter, preferably a potentiometer of 4.7 kOhm should be used so that the reference voltage source is not overloaded. This device requires 24 V DC power supply regulated within $\pm 15\%$. AUMA power supply unit PS is recommended for this purpose. RWG Contact Type is a 3 wire system and is having linearity of 0.05%.



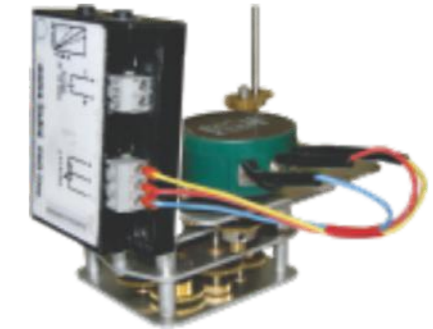
RWG - Contact type

Technical Data - Contact Type EPT

Configuration	3/4 Wire
Supply Voltage	24 V DC Min. 18, Max. 33 V
Output Current	0 / 4 - 20 mA
Input Resistance	150 kOhms
Displacement of zero position, Max.	$\pm 25\%$
Displacement of end position, Max.	from 50 to 100%
Influence of supply voltage variation	Max. 0.2%
Temp. Drift	0.2% 10°C
Linearity not considering potentiometer	0.05%

Electronic Position Transmitter (RWG - Contact type)

This is basically same as RWG Contact Type, however with 2 wire system. The linearity is less than 1%.



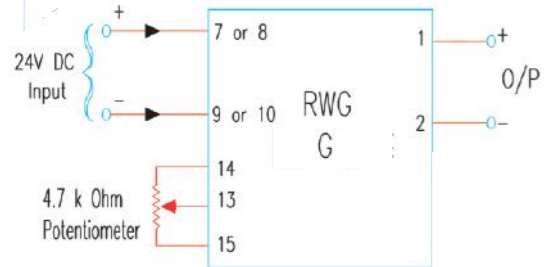
RWG - contact type

Technical Data -Contact Type EPT

Configuration	2 Wire
Supply Voltage	24 V DC Min. 18, Max. 33 V
Output Current	4 - 20 mA
Input Resistance	150 kOhms
Displacement of Zero Position, Max.	$\pm 25\%$
Displacement of End Position, Max.	From 60 to 100%
Influence of supply voltage variation	Max. 0.15%
Linearity not considering potentiometer	< 1%

Electronic Position Transmitters RWG-GI Single O/P

It is a signal converter device for the transformation of resistance value into proportionate galvanically isolated two current outputs. This device requires 24 V DC power supply regulated within $\pm 10\%$. AUMA power supply unit PS is recommended for this purpose.

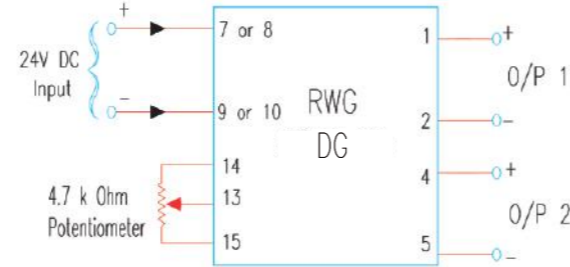


RWG Contact type GI Single O/P

Technical Data - RWG GI Single O/P	
Supply Voltage	24 V DC $\pm 10\%$ regulated
Output 1 (Isolated) Output 2 (Isolated)	0 / 4 - 20 mA 0 / 4 - 20 mA
Current Drawn	100 mA
Adjustability of Span	$\pm 50\%$
Adjustability of Zero	$\pm 25\%$
Change in Output due to Input Supply Variation	$< 0.2\%$
Linearity Error for both Outputs	$< 1\%$

Electronic Position Transmitters RWG-GI Dual O/P

It is a signal converter device for the transformation of resistance value into proportionate galvanically isolated two current outputs. This device requires 24 V DC power supply regulated within $\pm 10\%$. AUMA power supply unit PS is recommended for this purpose.



RWG Contact type GI Dual O/P

Technical Data - RWG GI Dual O/P	
Supply Voltage	24 V DC $\pm 10\%$ regulated
Output 1 (Isolated) Output 2 (Isolated)	0 / 4 - 20 mA 0 / 4 - 20 mA
Current Drawn	100 mA
Adjustability of Span	$\pm 50\%$
Adjustability of Zero	$\pm 25\%$
Change in Output due to Input Supply Variation	$< 0.2\%$
Linearity Error for both Outputs	$< 1\%$

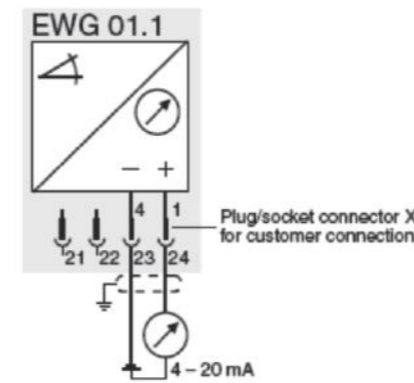
EWG 01.1 - Electronic Position Transmitter: Technical Data

Setting: Refer calibration document no: 4-Epac_EWG-31284.

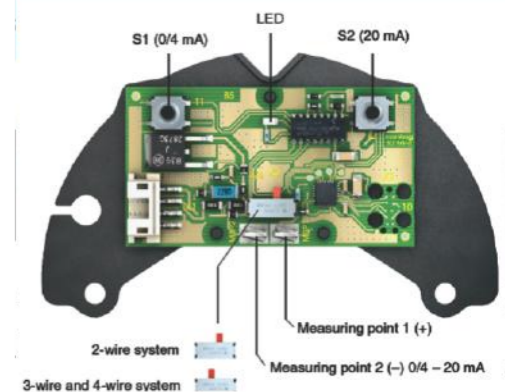
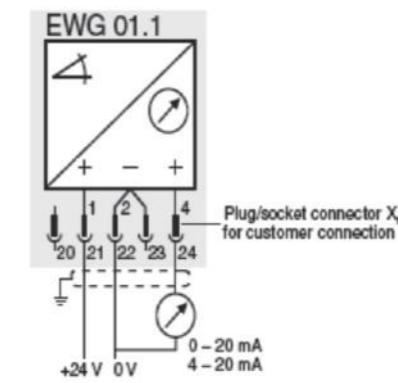
Inverse operation: For inverse operation, exchange terminals red and black on position Transmitter Board

Wiring:

2-wire system

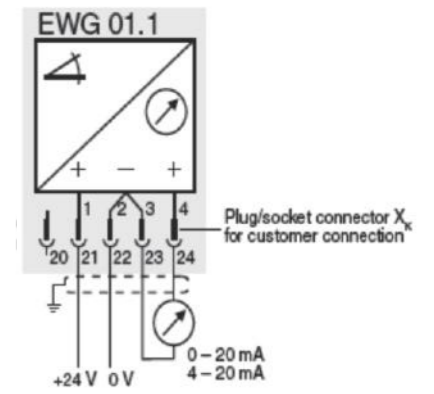


3-wire system



EWG - Non - Contact Type

4-wire system



EWG 01.1:

Contactless and wear-free sensing of the valve position by means of Hall sensors for signaling the valve position.

Data	3-wire or 4-wire system	2-wire system
Output current IA	0 - 20 mA, 4 - 20 mA	4 - 20 mA
Power supply UV 1)	24 V DC (18 - 32 V)	24 V DC (18 - 32 V)
Max. current consumption	LED off = 26 mA, LED on = 27 mA	20 mA
Max. load RB	600 Ω	$(UV - 12 V)/20 \text{ mA}$
Impact of power supply		0.1 %
Load influence		0.1 %
Temperature impact		$< 0.1 \text{ } \%/K$
Angle of rotation	$340^\circ \pm 5^\circ$	$340^\circ \pm 5^\circ$
Ambient temperature		$- 60 \text{ } ^\circ\text{C}$ to $+ 80 \text{ } ^\circ\text{C}/+90 \text{ } ^\circ\text{C}$
Linearity (without RGU ratio)	$< 0.3\%$	$< 0.3\%$

Notes on table

- | | | |
|----|---------------------|---|
| 1. | Power supply | Power supply possible via: EPAC controls or external power supply |
| 2. | Ambient temperature | Depending on temperature range of the actuator: Refer to name plate |

Electronic Positioner - Control Unit Ver. 2 (CU 02)

Control Unit is used to position a valve to a set position by giving the command (4-20mA) and monitoring the valve position feedback (4-20mA/4.7k Pot) from the valve.



General Data - Control Unit Ver. 2 (CU 02)	
Input Supply Voltage	24Vdc +/- 30%
Max Supply Current	100 mA
Ambient Temperature (operation)	-20 ° to +80 °C
Mounting	Snap on type for DIN rail
Enclosure	IP 20
Housing	Polycarbonate, Grey
Weight	Approx 300gms
Dimensions (L X B X H) mm	90X71X63
Wire Size	0.2 to 0.75 sq. mm
Terminal Type	Screw Type

Technical Data - Control Unit Ver. 2 (CU 02)

SIGNAL INPUT	Command Signal (E1)	4 - 20 mA
	Position Feedback Signal (E2)	4 - 20 mA (5KΩ Pot)
CHARACTERISTICS	Dead Band	1.5% - 2.5%
	Fail Safe Setting (Based on the selection)	Stay
		Open
	Close	
Output : Through Mechanical Relay - 250VAC, 10A; 30VDC, 5A		

Potentiometer

A potentiometer is used as sensor for actuator. Single turn wire wound potentiometer with 4.7 kOhm with linearity $\pm 0.5\%$ is available for this purpose. It is available in single or tandem version.

Technical Data - Potentiometer

Resistance	4.7 kOhm $\pm 0.5\%$
Power Rating	2/ 3 Watt at 40°C
Angle of Rotation	275° $\pm 5^\circ$
Linearity	$\pm 0.5\%$

Signal Isolator

AUMA signal isolator is available in various versions: Power supply conditions. Isolation is provided between input and output and also between two outputs.

Technical Data - Signal Isolator

Power Supply	230 V AC $\pm 15\%$ 110 V AC $\pm 15\%$ 24 V DC ± 1 V
Input Signal	4 - 20 mA 1 - 5 V
Output Signal	4 - 20 mA single 4 - 20 mA dual 4 - 20 mA & 1 - 5 V
Accuracy	$\pm 0.1\%$ of output span
Zero & span adjustment	$\pm 2\%$ min. at zero $\pm 10\%$ min. at span



Signal Isolator



Power Supply Unit

Power Supply Unit PS

This unit gives 24 V DC power supply for electronic positioner CU 02 and electronic position transmitter, in case 24 V DC is not available at site. There are two versions available:

Version I : For regulating application with CU 02:

The output voltage U_o & U_c require no trimming potentiometer. The voltage U_c is diverted from voltage

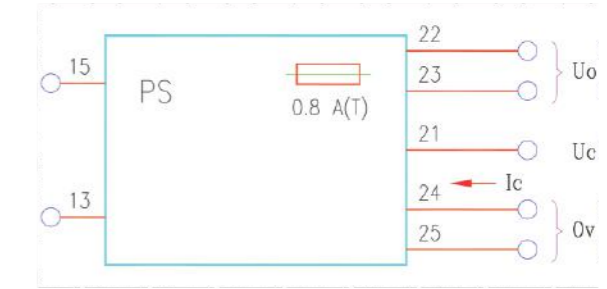
U_o , thus U_c can serve as common reference potential for whole regulating system.

Supply voltage to PS is 220 V or 110 V $\pm 15\%$, 50 Hz

The maximum output voltage is

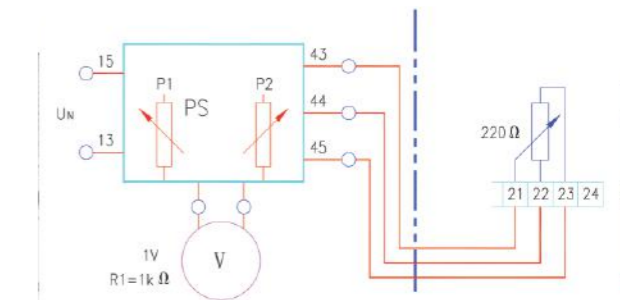
$U_o = 24 \text{ V} \pm 1 \text{ V DC}$

$U_c = 5.5 \text{ V} \pm 0.5 \text{ V DC}$



Version I

Version II : For remote position indication with potentiometer 220 Ohms as position transmitter. In this, two additional potentiometers P1 and P2 are provided for positions zero and maximum. A voltmeter of 1 V, calibrated in % is used for visual indication of valve travel. This voltmeter is connected to the PS (Version II) as shown below:

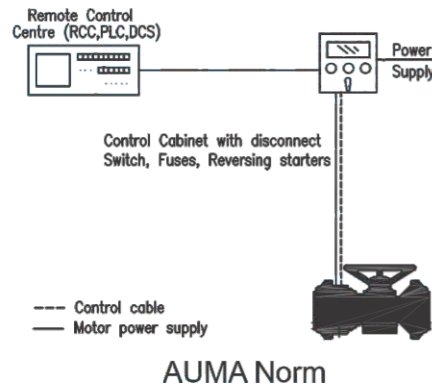


Technical Data - PS 24 V DC

Input supply voltage & Frequency	100 V AC – 240 V AC 50 Hz/ 60 Hz
Power Drawn	9 VA
Output voltage max	24 V DC $\pm 1\%$; 150 mA
Mounting	Snap on type for DIN rail
Ambient Temperature (Operation)	-25 °C to 70 °C
Weight/ Dimension [LXBXH]/ Wire size	0.15 Kg 84 X 22.5 X 90 mm 0.2 sq. mm to 2.5 sq. mm

AUMA Norm Actuator

This actuator offers a complete actuator type SA with electric motor, torque switch for OPEN-CLOSE direction, limit switches for both end positions and blinker transmitter for running indication. The required reversing contactor should be installed separately and wired to the motor. For signalization of the switching and to trip the contactors over micro switches, control wires are required from actuator terminal compartment cover to reversing contactor installed separately.



AUMA Integral Starter Actuator

The purpose of offering integral motor controls for the actuator is to enable the customer to save high installation costs for external controls. Actuators with integral controls include control & switching elements and are supplied ready for use.

All electrical components such as limit, torque, thermostats, all monitoring elements and position transmitters are integrated into modern controls. This results in following simplification:

- No extensive wiring in the external control cabinet.
- Several actuators can be connected to common supply cable using isolation switch for each actuator.
- Actuator signals are processed in the controls, only feedback to process control system is necessary.
- Integral starter housing can be easily replaced due to multi-pin plug & socket connector between actuator & integral starter unit.
- Actuator can be operated from Local or Remote position by means of selector switch on the integral starter unit.

Control Versions of Integral Starter Units

AUMA e-pac

The electronic version of AUMA India integral starter e-pac incorporates sophisticated electronic controls with field programming feature. E-pac is modular in construction and consists of power supply with transformer and programmable control logic card with display.

Power Supply with Transformer

- 24 V DC, 150 mA source.
- Mechanically interlocked.
- 3-phase Transformer

Programmable Control Logic Card with Display

- Monitor relay for collective fault signals with potential free contacts.
- Local status annunciation and fault annunciation by LED or Text Display on LCD
- Inching and non-inching for both local and remote mode through programming/dip switches.
- Limit switch seating or torque seating through programming/ dip switches.

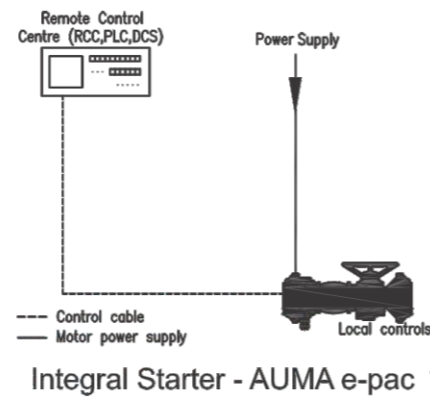
Unique Features of AUMA e-pac

- Modularity between actuator and customer connection provides ease of commissioning , service and spare inventory of actuators at site.
- In-built diagnostic port : simple to diagnose & service actuator locally without using any additional hardware.
- In-built local push button station
- Emergency shutdown (ESD) in all actuators.
- Easy programming facility, which enables customers to program the actuator at site to suit plant requirements.



AUMA e-pac

- Different versions of e-pac and optional features make the actuator controls adaptable to any field situations. Various options available are:
 - Wall mountable controls
 - Actuator with DC input supply
 - Non – intrusive functionality



AUMA Semipact Actuator

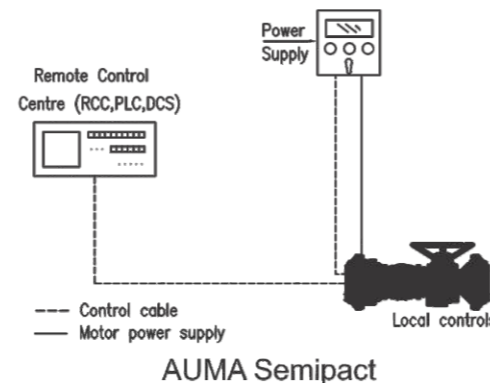
AUMA's semipact actuator is a basic actuator with additional features of selector switch and push button station. Motor controls and switchgear are external to the actuator and are in customer's scope. Auma India semipact actuator is available for both isolation and regulating duty services.

The mode of operation depending on the selector switch position could be:

- Local: actuator can be operated in the Local mode by using the push button station in the OPEN-STOP-CLOSE position. The running direction can be indicated by the LEDs on the actuator.
- Remote: actuator can be operated in the Remote mode by supplying controls through the external motor control center. LEDs on the actuator would indicate the running direction of the actuator in the remote mode as well.
- Stop: actuator can not be operated in either mode. There is a provision to lock the selector switch in any position using a padlock.

Following additional (optional) accessories can be incorporated:

- Power Supply Unit PS for 24 V DC output.
- Electronic Positioner CU 02.
- Electronic Position Transmitter (Contact type) / (Non - contact type).



AUMA Semipact

Specification	
Torque Range	Selectable - 40% to 100% of rated Torque
Limit Range	1 to 4000
End Limit Indication	Latching relay (Latching relay will hold previous state during the Power fail condition)
Programmable Relays	Four – Relays : Each can be Programmed individually
Events Stored with Real Time Clock	All data are stored with Real Time Stamp (e.g. Torque, Number of Starts per hour, Fault indication)
Remote Controls	Four –wire Two – wire- MODBUS Two – wire - Regulating duty (4-20mA)

- Solid state controls in place of electrical – mechanical contactors.
- Event logging for actuator information
- Thermal over load relay
- Remote annunciation relays.
- Single phase protection and automatic phase correction.
- Electronic positioned for regulating duty with or without isolator.

Fieldbus Interface (Optional)

AUMA India integral starter actuators are available with 2 wire control. The actuators follow open industrial protocol conforming to MODBUS RTU standards (other protocols could be provided on request).

MODBUS is an application layer messaging protocol, which provides Master / Slave communication between various digital automation devices that are interconnected on RS-485 twisted pair cable.

Salient features

- MODBUS RTU protocol over RS – 485 twisted pair cable.
- AUMA actuators support baud rates up to 38.4 kbits.
- Protection : Parity check for each byte and CRC check for each message.
- Maximum of 247 slaves can be connected on one bus, with repeaters after every 32 slaves and without repeaters maximum of 32 slaves.

Types of Actuator Controls

AUMA e-pac with Wall Mountable Feature

AUMA actuators with integral starter can also be provided with the unique feature of wall bracket mounting, where e-pac controls are mounted on a wall bracket separately.

Advantages of wall mountable e-pac actuators

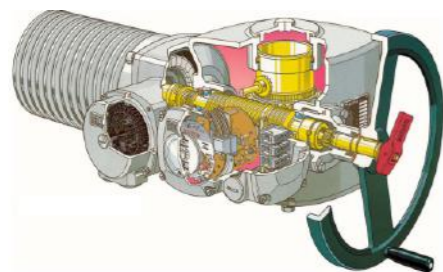
- Protects actuator electronics from severe environmental conditions.
- Easy accessibility of the e-pac controls for the operators in difficult to reach positions i.e., when valves with actuators is in pit head or elevation etc.
- Protection against induced vibration in valves and actuator controls in case of severe vibrations in pipeline.
- Prevents exposure of actuator controls against high temperature.
- Normally, maximum distance between actuator and wall mountable e-pac unit is 100 m*.



AUMA e-pac with Wall Mountable Feature

AUMA High Torque Actuator

AUMA offers a range of multi-turn high torque actuators SA 25.1 - SA 40.1 and SAR 25.1 - SAR 30.1 for applications demanding high torque with low operating time. The maximum output torque ranges from 2000 Nm to 16000 Nm for OPEN-CLOSE duty and 2000 Nm to 4000 Nm for regulating duty applications. For detailed information, refer Technical, Electrical data sheets and dimension sheets of high torque actuator.



High Torque Actuator

Note : Please contact AUMA for additional information on high torque actuator for regulating duty application

AUMA India Master Station (AIMS)

AUMA India has introduced a Master Station solution known as AIMS, which is used to integrate actuators into an automation environment. AIMS is an interface between field actuator and host system. It can also act as Standalone Master. It has a modular design suitable for open Fieldbus protocols such as MODBUS RTU. It has GUI based interface and can be adapted to most conditions while using an identical interface. AIMS master station is a significant part of a commissioning support system, network manager, data concentrator or diagnostic tool and can be integrated to any DCS using open industrial protocols.



AUMA India Master Station

Note : Please contact Auma for additional information on high torque actuator for regulating duty application.

Technical Data - AIMS	
Redundancy/Topology	Processor, Power Supply, Network, HMI; Loop, Line, redundant Line
Input Supply	230 V AC
HMI	Touch screen - 10" display
Protocol	Modbus – RTU between actuator & AIMS (RS -485); Modbus – TCP between AIMS & DCS
Total Network	3 concurrent loop / line
Total no. of Actuators	80 actuators in each loop. Total 240 actuators can be connected.
Dimension/ Repeater	485 x 330 x 500 mm/ In-built
Mounting/ Color	Rack mountable/ Grey
Ambient Temperature	-20 degree C to +50 degree C

Mechanical Interface

Output Drives

Various output drive types according to ISO 5210 / DIN 3210 are available in order to adapt the actuators to different types of valves. Special sizes can be supplied on request.

Output Drive Type - A (Stem nut)

The output drive has stem nut for rising or non-rotating valve stem. The mounting flange together with stem nut and thrust bearing form one assembly, which is suitable for accepting thrust loads.

Output Drive Type - B (Plug sleeve)

Plug sleeve has bore and keyway and is designed for transmission of torque.

Output Drive Type - C (Dog coupling)

This is similar to type B, however with dog coupling for torque transmission.

Output Drive Type - D (Stub shaft)

The shaft with key engages with bore and keyway of mating part.

Output Drive Type - E (Bore with keyway)

This type is mainly used for connecting to a gearbox, example Auma gearbox type GS (worm / worm wheel) or GK (bevel gearbox).

Linear Thrust Unit (LTU)

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

Technical Data			
Linear Thrust Unit	Tr. Thread	Max. Thrust kN	Stroke Length mm
LTU 6	24 x 5	20	50 & 100
LTU 12	32 x 6	35	60 & 120
LTU 25	40 x 7	63	80 & 160
LTU 50	50 x 8	100	80 & 160
LTU 100	60 x 9	175	130

Output Drive Type - AF (Spring-loaded stem nut)

Spring-loaded stem nut for rising and non-rotating valve stems. The springs compensate for dynamic thrust for high speeds or even for thermal expansion of valve stem.

Valve Attachment

Valve attachment is according to ISO 5210 or DIN 3210.

Flange Sizes			
Actuators size SA / SAR	Max. Torque Nm	ISO 5210	DIN 3210
3	30	F10	G0
6	60	F10	G0
12	120	F10	G0
15	150	F10	G0
25	250	F14	G1/2
30	300	F14	G1/2
50	500	F14	G1/2
60	600	F14	G1/2
100	1000	F16	G3

Stem Protection Tube

To protect rising valve stem, optionally a protection tube can be fitted to the handwheel hub. Internal threads are provided in the handwheel hub as a standard. If protection tube is not required, the bore of the handwheel hub is closed with lid.



Stem Protection Tube

Electrical Connection

Terminals

Plug & Socket Connector

The actuators are equipped with plug & socket connectors in three versions as a standard.

Version I:

50 pin circular connector for control
6 + 1 = 7 pins for power



50 Pin Circular Plug & Socket Connector

Technical Data			
	Power	Earth	Controls
50 Pin Plug & Socket Connector, Circular			
No. of Contacts	6 (3 Used)	1	50
Voltage Max.	690 V	-	250 V
Current Max.	25 A	-	16 A
Type of connections for customer use	Screws	Screws	Screws
Cross sec. max. (sq. mm.)	6	6	2.5

Version II:

Circular Connector with Double Sealing feature

AUMA India actuators are optionally offered with double sealing 64 pin circular connector to avoid water entry inside the actuator, in case customer has left the terminal cover loose unintentionally during installation and commissioning.

50 pin circular connector for control
6 + 1 = 7 pins for power



64 Pin Circular Plug & Socket Connector

Technical Data			
	Power	Earth	Controls
64 Pin Plug & Socket Connector, Circular			
No. of Contacts	3+3 (optional)	1	64
Voltage Max.	690 V	-	250 V
Current Max.	25 A	-	16 A
Type of connections for customer use	Stud	Stud	Screws
Cross sec. max. (sq. mm.)	6	6	2.5

Version III:

32 x 2 = 64 pins for control
3 + 1 = 4 pins for power



64 Pin Plug & Socket Connector

Technical Data			
	Power	Earth	Controls
64 Pin Plug & Socket Connector, 32 x 2 & 3 + 1			
No. of Contacts	3	1	64
Voltage Max.	750 V	-	500 V
Current Max.	25 A	-	16 A
Type of connections for customer use	Stud	Screws	Screws
Cross sec. max. (sq. mm.)	6	6	2.5

Version IV:

24X3=72 pins for control
3 + 1 = 4 pins for power



72 Pin Plug & Socket Connector

Technical Data			
	Power	Earth	Controls
72 Pin Plug & Socket Connector, 24x 3 & 3 + 1			
No. of Contacts	3	1	72
Voltage Max.	750 V	-	250 V
Current Max.	25 A	-	16 A
Type of connections for customer use	Stud	Screws	Screws
Cross sec. max. (sq. mm.)	6	6	2.5

Electrical Connection

Terminals (Optional)

Screw Type Connector

Screw type connectors are also used for electrical connection as optional. Stud type terminals can be provided for power connections. Terminals are DIN rail mountable and are available as single or double decker versions also.



Screw Type Connector

Technical Data			
	Power	Earth	Controls
Screw Type Connector			
No. of Contacts	3	1	64
Voltage Max.	750 V	-	500 V
Current Max.	34 A	-	25 A
Type of connections for customer use	Screws / Stud	Screws / Stud	Screws
Cross sec. max. (sq. mm.)	4	4	2.5

Electrical Connection for Integral Starter Versions

Between Actuator and e-pac:

Depending on number of terminals required, 50 pin circular connector or 64 pin connector can be provided between Actuator and e-pac. This simplifies troubleshooting at site.



From e-pac to customer connections:

50 pin circular connector or 64 pin connector can be provided at the customer end connection depending on number of terminals required.

Optional: As an option screw type connectors can also be provided on case to case basis.



Threads for Cable Glands

As a standard, AUMA actuators are supplied with 3 cable glands with Metric threads having 2 glands of size M32x1.5, and 1 gland of size M25x1.5. The cable glands are directly tightened on the threads provided in cable entry cover. The cable gland holes are plugged with metallic plugs and o-rings to prevent ingress of dust and water during transportation and storage. The plugs can be retained in unused openings during usage.

Additional cable gland of size M20x1.5 and M16x1.5 can also be provided as per the requirement. For additional protection under extreme conditions for weather proof and water proof applications, double compression cable glands in various sizes can be supplied.

Optional

BSC and NPT threads can also be provided on request. Maximum numbers of cable glands that can be provided in the KLK (screw type) cover are 6 and in Terminal (plug & socket type) cover are 5.

Note: Please note other cable gland options such as different number of cable glands and sizes can be provided on request.

Actuator - Gearbox Combinations

Combination with Worm Gearboxes

In combination with worm gearboxes of type GS 63.2 to GS 500, a multi-turn actuator is converted into part-turn actuator usually for 90° movements. This is an ideal solution for large part-turn valves with high torque requirements. The torque range goes up to 360000 Nm.



Actuator with GS Gearbox

Combination with Foot Mounted Worm Gearboxes

Louvers, dampers or valves, which are operated via lever arrangement require foot mounted worm gearboxes. For such applications, multi-turn actuator is combined with foot mounted worm gearbox type GF 63 to GF 315. The torque range goes up to 90000 Nm.



Actuator with GF Gearbox

Combination with Bevel Gearboxes

By combining multi-turn actuators with bevel gearboxes GK 10.1 to GK 40.1, the torque speed ranges are considerably extended. Output torques up to 16000 Nm and thrust load up to 1375 kN are possible.



Actuator with GK Gearbox

For additional details, refer to AUMA India Gearbox catalogue

Trunion Mounted Linear Actuators

AUMA also offers customized actuation solution for dampers, chutes, gates, diverters or flap applications, based on thrust and stroke length requirement. Auma trunion mounted actuators provide linear travel. An attachment to the actuator converts output torque of multi-turn actuator into an axial thrust.



Actuator with Trunion Mounting

By combining multi-turn actuators with bevel gearboxes ABG10.2 to ABG 35.2, the torque speed ranges are considerably extended with better torque to weight ratios than ABG 0.1 series. Output torques up to 10000 Nm and thrust load up to 1020 kN are possible.



Actuator with ABG 0.2 Gearbox

Enclosure Protection

AUMA actuators conform to degree of protection IP 68 as per IS/ IEC 60529. The definition of IP 67 & IP 68 as per standard is as follows :

IP : Ingress Protection

First Numeral 6 : Dust tight, prevents ingress of dust.

Second Numeral 7 : Protected against the effects of immersion. Test is made by completely immersing the equipment in water so that:

- Surface of water is at least 150 mm above highest point of equipment.
- The lowest point of equipment is at least 1 m below the surface of water.
- Duration of test is 30 min.

Under above conditions, ingress of water in harmful quantity shall not be possible.

Second Numeral 8 : Test conditions as above, however no ingress of water is permitted.

Ambient Temperature

Type	Actuator Type	Temperature Range
SA	Standard Multi-turn actuator	-20 to +80°C
SAR	Multi-turn actuator for Regulating duty	-20 to +60°C
SAEx SAREx SACEx SARCEx	Explosion Proof actuators, standard, compact and regulating duty	-20 to +60°C

Explosion Proof/ Flame Proof Actuators

For installation of actuators in potentially hazardous or explosive area, special protective measures are required. These are specified in Indian Standard IS 2148-2004 "Specifications for Flame Proof Enclosures of Electrical Apparatus". AUMA India actuators developed for this purpose are suitable for group II gases and in application other than coal mines. The enclosures of explosion proof / flame proof actuators are designed in consideration of clauses specified in IS 2148-2004 and the actuators have been tested and certified by CIFMR, Dhanbad.

Actuator Models	
Actuator Type	Model
Explosion Proof Norm (OPEN-CLOSE Duty)	SAEx 3 / 6 / 12 / 15 SAEx 25 / 30 / 50 / 60 SAEx 100
Explosion Proof Norm (Regulating Duty)	SAREx 6 / 12 / 15 SAREx 25 / 30 / 50 / 60 SAREx 100
Explosion Proof Compact (OPEN-CLOSE Duty)	SACEx 3 / 6 / 12 / 15 SACEx 25 / 30 / 50 / 60 SACEx 100
Explosion Proof Compact (Regulating Duty)	SARCEx 6 / 12 / 15 SARCEx 25 / 30 / 50 / 60 SARCEx 100

Necessary approvals from statutory authorities have been obtained.

For details, refer to separate Flame Proof/ Explosion Proof Catalogue

CE - CE Marking

AUMA has certified its weather proof actuators and valve gearboxes as CE marked to indicate conformity with the essential health and safety requirements at the place of use.

Painting

The standard paint for AUMA India products is Smoke Grey 692

AUMA offer corrosives categories to C3 and C4 of ISO – 12944 – 2 and 2 pack epoxy paint for nuclear painting option.

C3 - EN ISO 12944-2

Type of Paint	Epoxy/ Polyurethane
Standard Color	Smoke Grey 692
Zinc Phosphate Epoxy Primer Thickness	50 microns
Epoxy Thickness (Finish)	60 microns

C4 - EN ISO 12944-2

Type of Paint	Epoxy
Standard Color	Smoke Grey 692
Zinc Phosphate Epoxy Primer Thickness	100 microns
Intermediate Epoxy Paint Thickness	75 microns
Polyurethane Paint Thickness (Finish)	60 microns

Other paints & color can be provided based on mutually agreed customer requirement.

Functional Test

After assembly, all actuators are thoroughly tested and torque switches are calibrated. Final inspection record is provided to the customer.

Type Test Certificates

AUMA actuators and critical components of actuators have been tested and guaranteed for performance. Some of the type test certificates available are listed:

- Endurance Test as per IS / EN / AWWA / GDCD standards.
- Damp Heat Cycle Test as per IS 9000.
- Vibration Test as per IS 12075.
- Noise Test as per IS 12065.
- Degree of Protection as per IS/ IEC 60529
- Tests on Micro Switches.
- Motor Performance Tests.

Legend:

- Head Office & Works
- Sales Branch Office
- Sales Resident Representative
- Service Representative

