

ELECTRIC ACTUATORS

for cylinders in hydraulic steel structures and hydropower



The combination of electric actuators by AUMA and spindle-driven cylinders offers powerful, economic and environmentally friendly actuation solutions fulfilling premium requirements in hydraulic steel structures and hydropower.

HIGHEST PULLING AND THRUST FORCES

Particularly in applications for hydraulic steel structures, high pulling and thrust forces are required to operate mitre gates at locks or heavy radial gates and fish-belly flap gates.

AUMA actuators in combination with cylinders are perfectly suited to generate the required forces. The combinations between electric actuators and cylinders, also called spindle-driven cylinders, generate pulling forces of up to 2,000 kN at electro-mechanical level. They are designed for frequent operations. Strokes of up to 8 metres are possible. Fail safe application opportunities are also available.

Electro-mechanical solutions have numerous advantages: They are long-lasting, easy to install, robust and maintenance-free. Furthermore, this set-up is environmentally friendly and particularly suitable for ecologically sensitive sites. Operation and maintenance costs are extremely reasonable.

ELECTRIC ACTUATORS FOR CYLINDERS



PROVEN SOLUTIONS

Automation solutions with electric actuators and spindle-driven cylinders have proven their reliability during more than 25 years in the most sophisticated hydropower and hydraulic steel structure applications. In Europe alone, several thousands applications are fulfilling their daily tasks.

Countries like Germany, the Netherlands, France, and Belgium rely on electric cylinders in their most frequently used sluices and channels. Sluice gates are often opened and closed which makes it important that the systems are always perfectly operational. Consequently, robust make and reliable operation of electric cylinders are important features.

DEMANDING APPLICATIONS

AUMA actuators for automating spindle-driven cylinders are particularly suited for the following applications:

- > Mitre gates, trap gates, and segmental gates
- > Radial lock gates, interconnection gates, sliding and roller gates, culvert gates
- > Fish-belly flap gates and sluice gates at weirs
- > Barrage gates for flood protection
- > Weight-loaded valves
- > Turbine control
- > Operation and locking of drawbridges like bascule bridges, lifting bridges and swing bridges

ADVANTAGES AT A GLANCE

AUMA actuators for automating spindle-driven cylinders offer numerous advantages:

- > Simple installation and commissioning
- > Long lifetime
- > Continuous travel measurement, position feedback and force monitoring are integrated as standard
- > High enclosure protection IP68 as standard
- > Continuous underwater use down to 60 m head of water is possible as an option
- > Maintenance-free operation for 10 years and more (depending on the operation)
- > Low operating and maintenance costs
- > Environmentally friendly, encapsulated system without pressure and without liquid lubricants
- > Outstanding suitability for low temperatures without additional heating
- > Simple fail safe solutions
- > Easy integration within various control schemes, from parallel signal transmission to fieldbus and HART right through to Industrial Ethernet
- > Intelligent actuator controls
- > Comprehensive diagnostic and analysis functions for predictive maintenance
- > Manual on-site operation
- > Positioning speed can be modified via stroke on request

Thanks to the outstanding technical properties and the multitude of variants and functions, electric actuators with spindle-driven cylinders are perfectly suited for most diverse applications.

LONG-LASTING, ROBUST AND MAINTENANCE-FREE

Combinations of electric actuators by AUMA with spindle-driven cylinders are characterised by long lifetimes. Thanks to their encapsulation and the high enclosure protection, they are particularly robust and resilient. The combination of electric actuators with spindle-driven cylinders offer the high enclosure protection IP68 as standard. Furthermore, they can be deployed at low temperatures without requiring additional heating systems.

According to DIN 19704, electric cylinders are specified for a lifetime of minimum 35 years. Typically, they are maintenance-free for at least ten years. This ensures moderate maintenance costs.

EASY TO INSTALL

Electric cylinders simply require power supply and a signal cable for operation: So, easy installation and commissioning is ensured, at moderate operating costs.

Actuator controls with integral local controls are also included in the standard version. This facilitates both operation on site as well as integration within a superordinate DCS.

UNDERWATER USE

Special sealing schemes allow for continuous underwater use of up to 60 m head of water.

ENVIRONMENTALLY FRIENDLY

Another asset: This electro-mechanical solution does not present any risk of water contamination by leaking oil. Both the electric actuators as well as the spindle-driven cylinder are lubricated without pressure. Consequently, electric cylinders are an environmentally friendly alternative to hydraulic actuation technology.

FEATURES AND FUNCTIONS



WITH OR WITHOUT SELF-LOCKING

The combination of actuator and cylinder is generally self-locking. This means that the system remains in the current position in case of power failure. If required, these applications can be designed in a non self-locking variant. In this instance, fail safe solutions are feasible, making use of gravity.

ADJUSTABLE MOTOR SPEED

Since large weights must be moved, variable speed actuators are the perfect choice. They allow the operating speed to be adapted across the travel. This further allows soft starts as well as gentle approaching of end positions. Modulating duty in turn allows for highest positioning accuracy, for example for turbine control, making fast emergency operations with speeds of more than 120 mm/s possible.

SYNCHRONISATION

When synchronising the actuators, large fish-belly flap gate or radial gates can be synchronised to operate at the at the highest level of precision, using two electric cylinders.

SIMPLE FAIL SAFE SOLUTIONS

AUMA actuators in non-self-locking variant offer simple solutions for emergency closing operations in case of power failure. For example, weightloads can be deployed for mechanical energy storage. As long as voltage is applied, the actuator maintains the closing element at the desired position thanks to the weightload. In case of voltage drops or if an emergency signal is issued, the closing element autonomously closes due to the gravity of the weightload at a defined speed.

In the same way, fish-belly flap gates can automatically open because of the water pressure or radial gates be lowered by their own weight.

A brake unit integrated within the actuator ensures that the positioning process is also performed at a defined operating speed while in gravity mode, thus preventing pressure surges for example.



The combination of AUMA actuators and spindle-driven cylinders is a completely encapsulated electro-mechanical drive unit, converting the rotary movement of the actuator into a linear movement.

1 Electric SA multi-turn actuator

AUMA SA multi-turn actuators provide sufficient force to operate spindle-driven cylinders. The actuators are available in many sizes and versions and can be tailored to the individual requirements of the application. Depending on the variant, a handwheel is available for emergency operation.

2 Control unit

The control unit as an integral part of the actuator provides continuous travel measurement and torque monitoring.

3 Brake unit (option)

The brake unit is deployed for fail safe actuator solutions without self-locking. In standard operation, the unit maintains the cylinder in the desired position. In case of power failure, the brake unit controls the closing speed.

4 Spring assembly

Integral spring assembly protects the electric actuator with spindle-driven cylinder against axial impact loads.

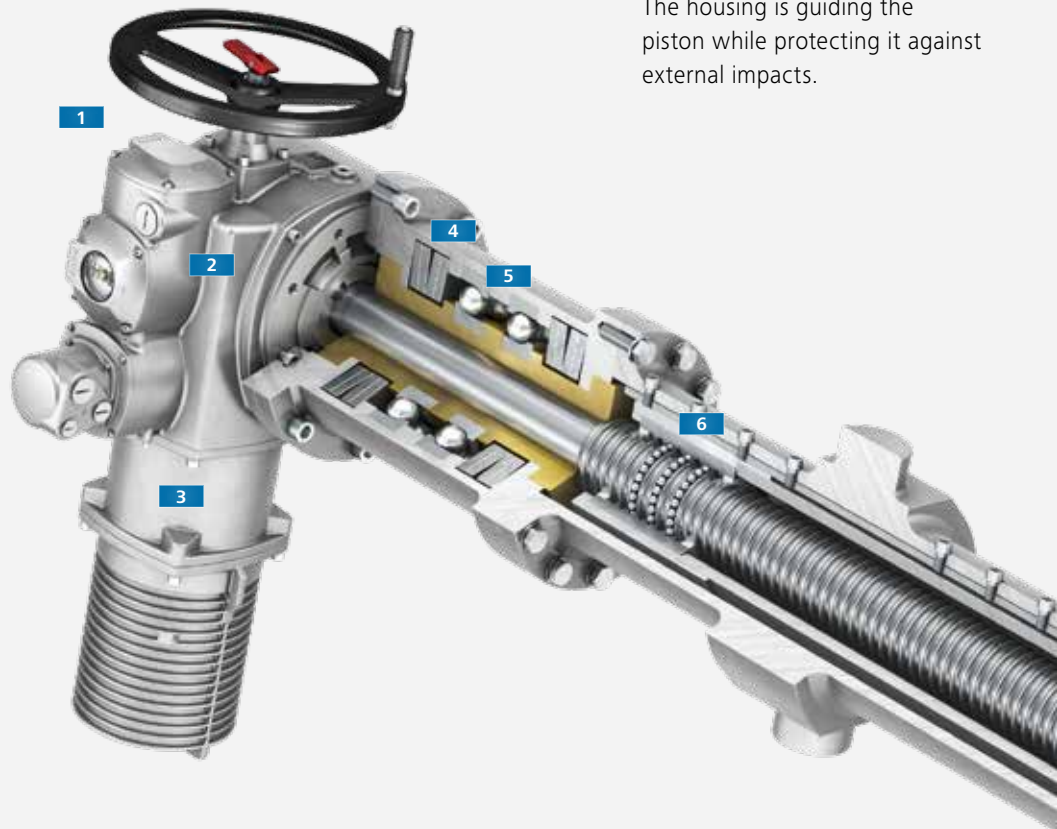
5 Bearing

6 Spindle arrangement

The spindle arrangement converts the rotary movement generated by the actuator into the actual linear movement. The spindle arrangement is composed of spindle nut and piston.

7 Housing

The housing is guiding the piston while protecting it against external impacts.



Intelligent AC actuator controls

The intelligent AC 01.2 actuator controls simplify communication between DCS and actuator. A large variety of interfaces are available. This allows simple integration in virtually any DCS environment:

- > Parallel signal transmission
 - > Conventional fieldbus like Profibus DP, Modbus RTU and Foundation Fieldbus
 - > Industrial Ethernet like Profinet, EtherNet/IP and Modbus TCP
 - > HART and WirelessHART
- Actuator controls may be directly mounted to the actuator or installed at a distance of

up to 100 m. This is particularly useful if the actuator is installed in confined spaces with difficult access.

The integral local controls allow for electric operation of the cylinder, directly on site if required.

A multitude of programmable functions cater for optimum process control. Comprehensive diagnostic and analysis functions are the perfect aid to anticipate high loads and to ensure long-term plant reliability.

The following technical data is for reference only.
For detailed data, please contact AUMA.

Combinations with electric actuators	Multi-turn actuators SA 07.2 – SA 16.2 Multi-turn actuators SA 25.1 – SA 40.1
	Multi-turn actuators SAR 07.2 – SAR 16.2 Multi-turn actuators SAR 25.1 – SAR 30.1 for modulating duty
	Variable speed multi-turn actuators SAV 07.2 – SAV 16.2 Variable speed multi-turn actuators SAV 25.1 – SAV 40.1
	Variable speed multi-turn actuators SAV 07.2 – SAV 16.2 Variable speed multi-turn actuators SARV 25.1 – SARV 30.1 for modulating duty
	Multi-turn actuators SA 07.2-UW – SA 16.2-UW, SA 25.1-UW – SA 30.1-UW, SAR 07.2-UW – SAR 16.2-UW SAR 25.1-UW – SAR 30.1-UW SAV 07.2-UW – SAV 16.2-UW for continuous underwater use
Force	Up to 2,000 kN
Length of stroke	Up to 8,000 mm
Speed	Up to 7,200 mm/min, higher speeds on request
Output speed	4 rpm – 240 rpm at 50 Hz
Mains voltage for 3-phase AC	50 Hz: 230 V, 380 V, 400 V, 415 V, 500 V 60 Hz: 220 V, 380 V, 400 V, 440 V, 460 V, 480 V Permissible variation of mains voltage: $\pm 10\%$ Permissible variation of mains frequency: $\pm 5\%$ Further mains voltages on request
Cable length	Max. 100 m between actuator and AC 01.2 actuator controls
Ambient temperature	Weatherproof: $-30\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$ Lower temperatures on request
Enclosure protection	Standard: IP68 Option: Continuous underwater use down to 60 m head of water

8 Piston rod

The piston rod is pulled or pushed by means of the spindle arrangement.

9 Guiding of piston rod

The task is to guide the piston rod and, at the same time, act as a sealing element and protection against dirt and aggressive substances.

10 Swivel head

The active force is introduced to the part to be moved through the screwed in swivel head. The version can be individually adapted to the application.



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