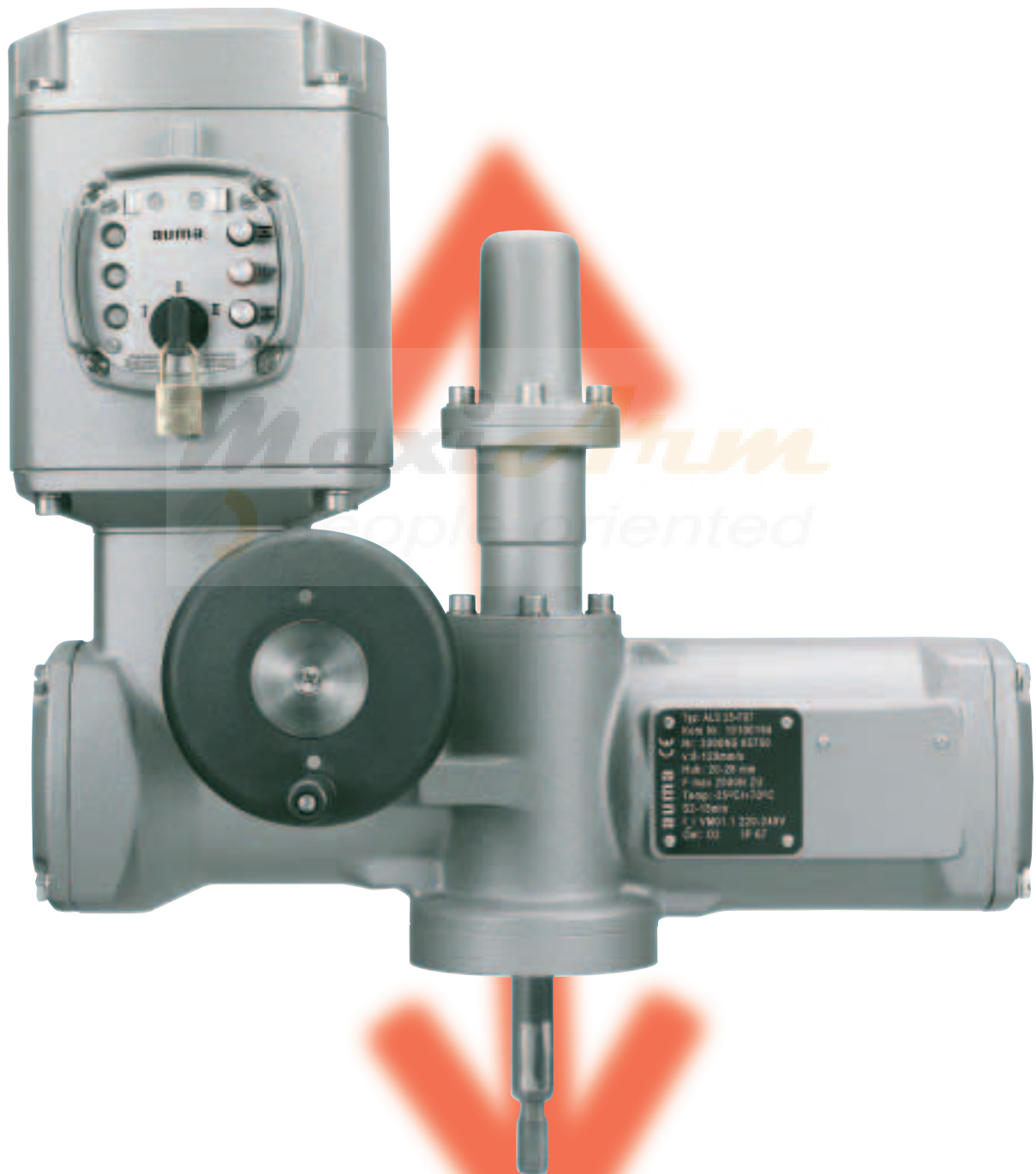


# auma®

## Electric linear actuators

ALS 25.1 – ALS 75.1  
with Fail-Safe function



Certificate Registration No.  
12 100 4269  
12 104 4269

[www.maxiarm.ru](http://www.maxiarm.ru)

Product description

# Solutions for a world in motion.

For safety reasons many industrial applications and the ship-building industry demand a fail-safe function for linear actuators. In the event of a power failure the fail-safe function has to be activated and the valve closed or opened by spring action. Up to now mainly pneumatic and hydraulic actuators fulfilled these requirements.

As an alternative AUMA offers for safety-relevant applications electric linear actuators with fail-safe function.

Electric actuators provide fundamental advantages when compared to pneumatic or hydraulic actuators:

- electric energy is transported much more easily and economically to an actuator than compressed air or oil.
- electric wiring needs practically no maintenance, which is required for air or oil pipelines.
- electric actuators only require energy if a movement should take place. For pneumatic and hydraulic actuators the working pressure must constantly be maintained.

All in all this results in considerable cost savings. There are technical and economical advantages which speak for the application of electric linear actuators.

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

AUMA linear actuators ALS are applied whenever an automated linear movement driven by an electric motor and a fail-open or fail-close safety operation function independent of the power supply is required, e.g., for the operation of valves in safety relevant applications.



## Energy

- Power plants
- Air pollution control
- District heating



## Chemical industry

- Chemical industry
- Petrochemical industry
- Pharmaceutical industry



## Water/ Waste water

- Water works
- Sewage treatment
- Pump stations
- Sluice-gates
- Dams



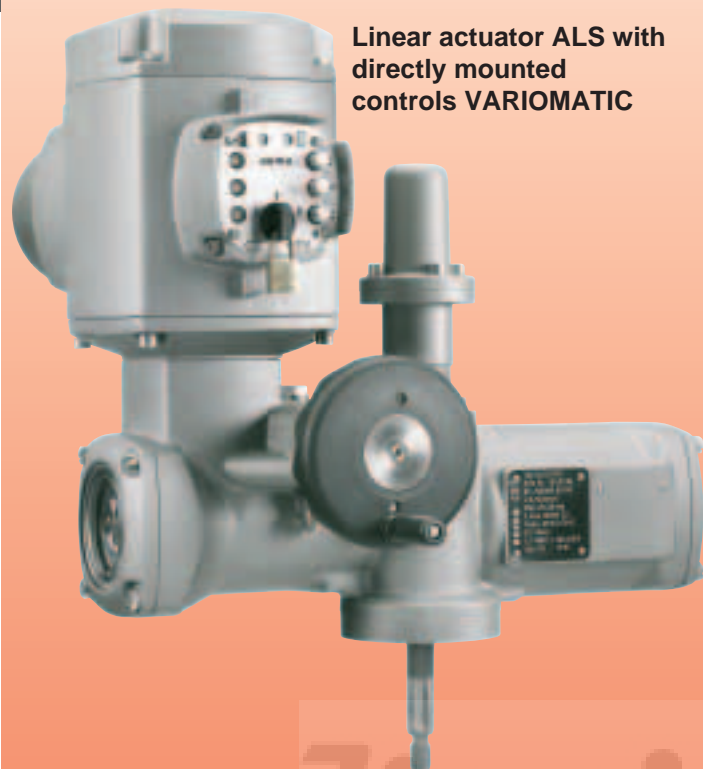
## Pipelines



## Others

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

# Linear actuators ALS



Linear actuator ALS with directly mounted controls VARIOMATIC

## The features

AUMA linear actuators have the following **features**:

































- Manual operation without change-over, even in fail-safe status
- Minimum closing or opening time for fail-safe operation
- Damping for fail-safe operation
- Constant high efficiency
- Self-locking
- Stroke limitation in opening direction by a mechanical end stop
- 1-phase supply voltage
- Integral controls
- After a fail-safe operation the actuator is immediately ready for operation when the power supply is restored
- High availability for long lifetime
- Low operating costs



Linear actuator ALS 25.1 with controls VARIOMATIC on wall bracket

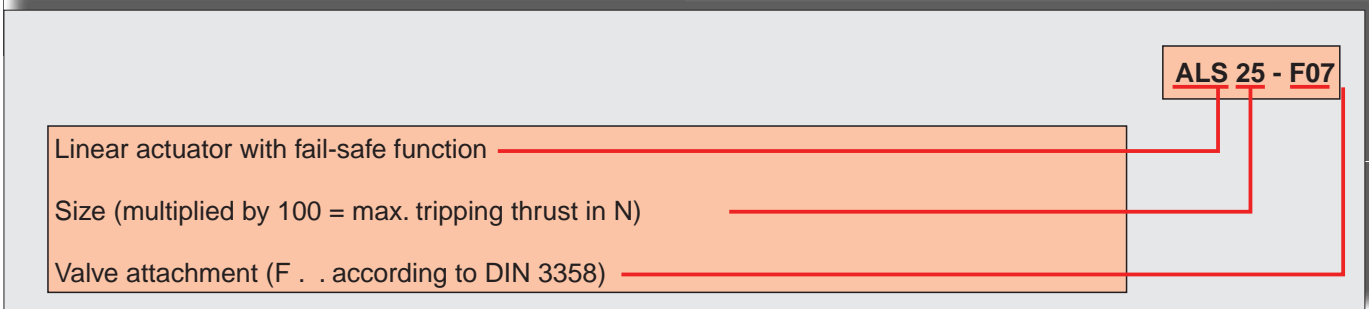


# Summary of functions/ Equipment

		ALS 25 – ALS 75	Description on page
 Standard  Option			
Functions	Open-close duty OPEN-(STOP)-CLOSE control		6
	Fail-safe function		6
	Thrust seating		7
	– Tripping thrust adjustable		7
	– Overload protection		7
	Operating time adjustable		10
	– External nominal operating time		10
	Adjustable stroke		10
	Analogue thrust signal <sup>1)</sup>		10
Equipment	Manual operation		8
	– Lockable handwheel		11
	1-phase supply voltage		11
	– 24 V DC Fail-safe unit		11
	– Power supply Fail-safe unit		11
	Ellipto-centric gearing		9
	Thrust sensor		9
	Electronically commutated motor		8
	Motor protection		11
	Mechanical position indicator		8
	Remote position transmitter		11
	Integral controls <sup>2)</sup>		8, 12
	Interfaces	Valve attachment according to DIN 3358	
– Thrust rod according DIN 3358			9, 13
Electrical connection with AUMA plug/ socket connector			13, 14
Other information	Ambient conditions		14
	– Enclosure protection IP67		14
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	– Corrosion protection KN		14
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	– Temperature range		14
	EU Directives		14
	Functional test		15
1) only possible with actuator controls VARIOMATIC-BUS 2) as a standard the actuator controls VARIOMATIC-MC with integral microcontroller			

# Functions

## Type designation



## Type of duty

### Open-close duty

In open-close duty the end positions OPEN, CLOSED or any intermediate position can be approached.

For linear actuators ALS 25.1 the type of duty according to IEC 34 is: 'Short-time duty S2 - 15 min'.

For movements between the end positions max. 60 starts per hour are permitted. This number depends on the thrust, operating time and ambient temperature.

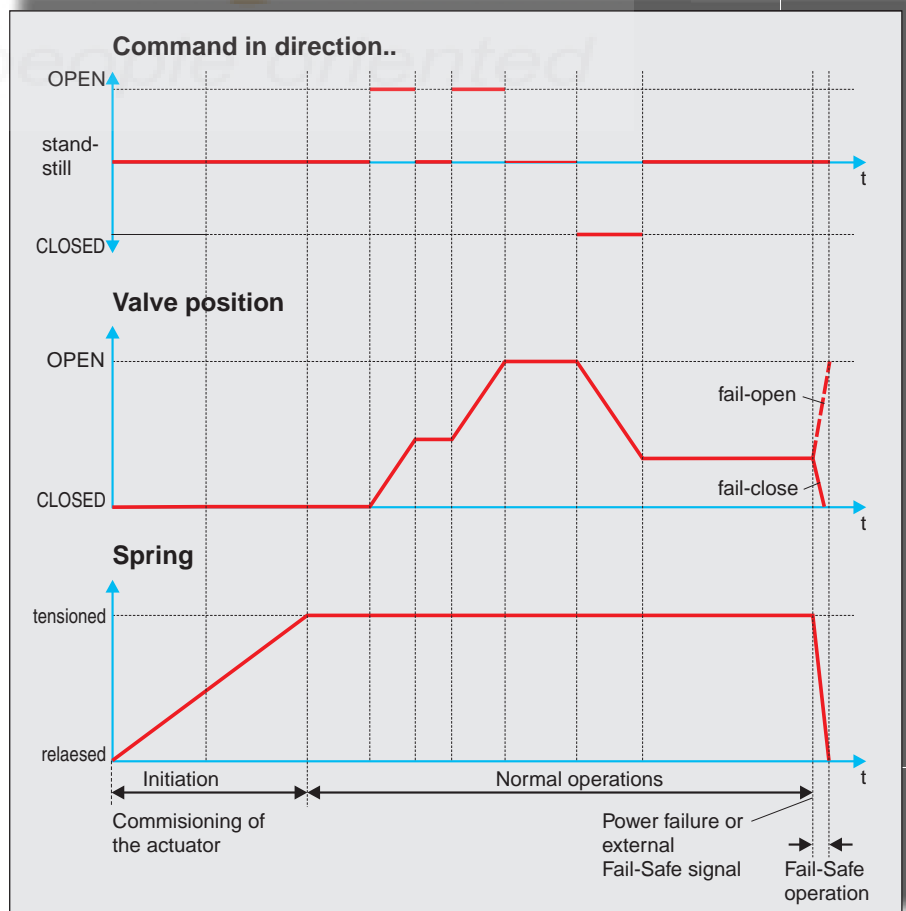
## Fail-safe function

The fail-safe function enables the actuator to close (fail-close) or open (fail-open) a valve instantly (< 1 s) in case of an emergency situation. A fail-safe operation is either initiated by loss of the power supply or by a command from the control station. A spring in the fail-safe unit of the actuator serves as the energy source.

When commissioning and after each fail-safe operation the spring is automatically wound up in an initiation phase. A reference operation for determination of the end positions is not required. The sequence of commissioning up to the first fail-safe operation is shown in the flow chart.

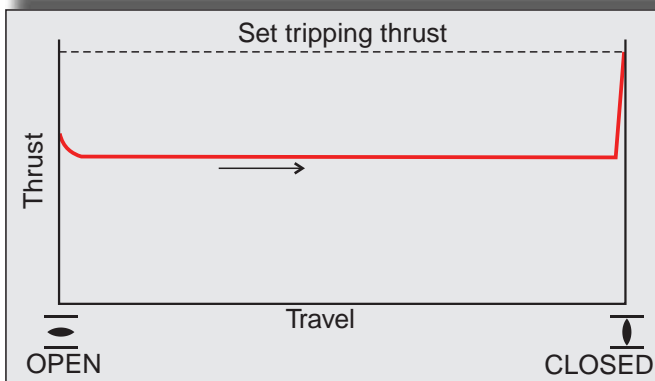
For the valve it must be noted that during a fail-safe operation the maximum thrust will be effective. The thrust and travel cannot be limited by switching off at a set value. The high dynamic forces present during fail-safe operation are reduced by an integrated damper to protect the valve and actuator.

### Flow chart from commissioning to the first fail-safe operation



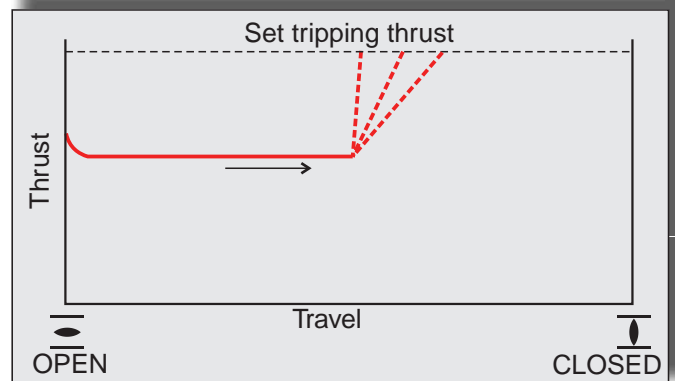
## Thrust seating

### Automatic switching off in the end positions



The actuator is automatically switched off when the defined thrust is built up in the valve seat or at the internal end stop OPEN. The hall sensors signal that the end position has been reached. The thrust sensor is described on page 9.

### Thrust switching as overload protection



The thrust sensor acts as overload protection for the whole travel. The actuator is switched off, if the valve requires excessive thrust in an intermediate position, e.g. due to a trapped object. Since the signalisation of the end positions is missing in this case, one can distinguish between a normal thrust switching in one of the end positions and tripping in an intermediate position caused by an overload.



### Setting range for thrust seating

	Stage									
	0	1	2	3	4	5	6	7	8	9
<b>ALS 25</b>	1.00 kN	1.15 kN	1.30 kN	1.45 kN	1.65 kN	1.80 kN	2.00 kN	2.20 kN	2.35 kN	2.50 kN
<b>ALS 75</b>	3.00 kN	3.50 kN	4.00 kN	4.50 kN	5.00 kN	5.50 kN	6.00 kN	6.50 kN	7.00 kN	7.50 kN

## Design principle

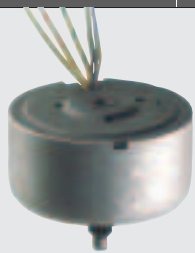
**1 Actuator controls VARIOMATIC**  
The controls with microcontroller VARIOMATIC-MC and VARIOMATIC PROFIBUS-DP are available as controls and interface between the higher order process controls and the actuator. After switching on the voltage supply the actuator is immediately ready for operation and can be operated via the local controls.

The controls can be mounted directly to the actuator (possible to re-position every 90°) or separately from the actuator on a wall bracket. Further information on page 812.

**2 Mechanical position indicator**  
The position of the actuator is indicated continuously and can be seen through an indicator glass in the switch compartment cover. The indicator disc bears the symbols for OPEN and CLOSED.

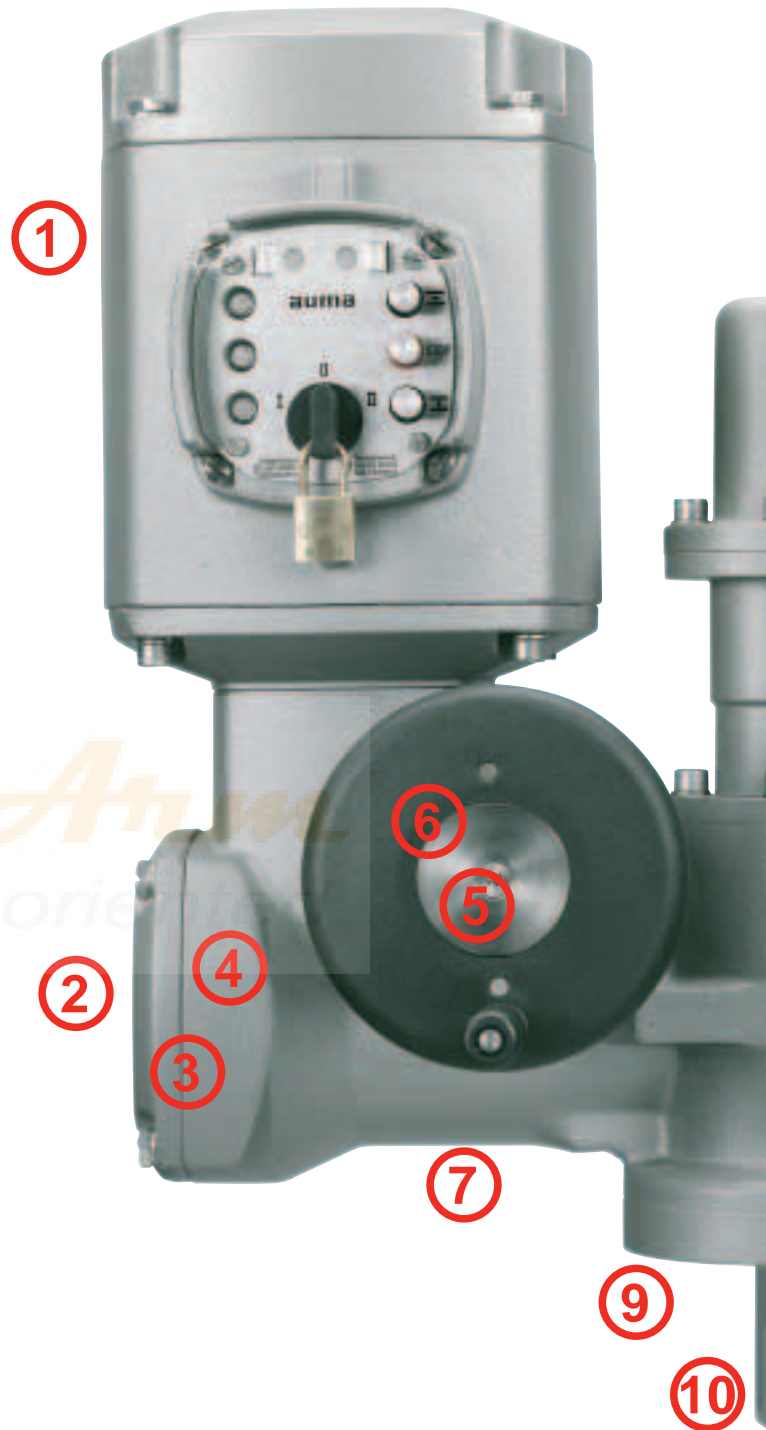
**3 Limit sensors**  
Contactless limit switches (Hall sensors) signal to the actuator controls that an end position OPEN or CLOSED has been reached.

**4 Motor**  
High torque for small size is the essential feature of the variable speed motors. The compact design enables a coaxial arrangement of motor, gearing and output drive, the prerequisite for a favourable ratio of size to torque.



Essential features are:

- Electronically commutated motor with permanent magnets
- constant torque even with voltage fluctuation
- constant speed independent of load

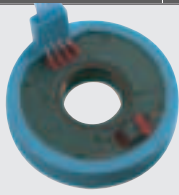


**5 Manual operation**  
The actuator can be operated manually without change-over. Manual operation remaining functional in fail-safe status. For the maximum stroke in normal service conditions, 26.5 turns of the handwheel are required for size ALS 25 and 38 turns for size ALS 75; if the spring is released (fail-safe status), twice the number of turns is required.



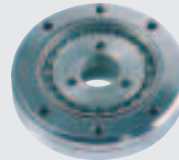
## 6 Thrust sensor

The forces of the thrust rod are transmitted to the sensor. It is possible to measure the actual force continuously. AUMA has patented this unique method of thrust measuring in actuators.



## 7 Gearing

Principal item is the patented ellipto-centric gearing, which enables, whilst possessing a high efficiency, a reduction ratio of 80:1 in one stage. This contributes considerably to the exceptionally small size of the AUMA linear actuators. The extremely small backlash enables operation with almost no noise.



## 8 Output drive unit

In the output drive unit the rotation movement is transformed to a linear movement. A damper is integrated into the cover to reduce the very high forces occurring during fail-safe operation. A safety end stop for the end position OPEN is also integrated into the cover.

## 9 Valve attachment

The valve attachment is according to DIN 3358. Further information on page 13.

## 10 Thrust rod

For connection to the valve a thread according to DIN 3358 is provided. Further information on page 13.

## 11 Fail-safe unit

The fail-safe unit stores the required energy to close (fail-close) or to open (fail-open) the valve instantly in case of a fail-safe incident (power failure or emergency stop). It consists of the following basic elements:

- Spring to store energy. Depending on the position of the spring it is either a fail-close or a fail-open actuator.
- Magnet coupling to lock the spring in tension. It is released by power failure or by an external emergency signal. The coupling is supplied with 24 V DC from external source.



# Functions

## Adjustable operating time

The variable speed motor allows the operating time to be adjusted at any time. The setting is performed via a parameter in the actuator controls. The operating time can be influenced during the operation by means of an external signal from the control station.

### Setting range

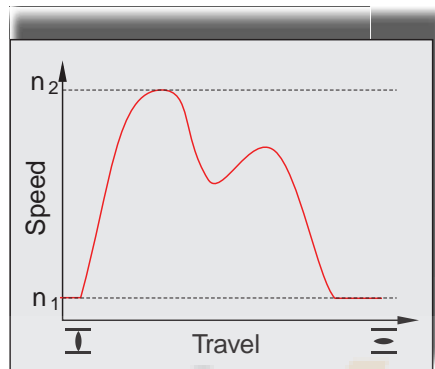
Size	Operating time for max. stroke [s]
ALS	
25	8 - 120
75	15 - 120

### External speed control

The motor output speed and therefore the running speed can be adjusted within its limits from the overriding controls. This can be performed manually or automatically via predefined profiles in the overriding controls. One application is the linearization of changing flow rate during the valve travel.

### Soft start

After receiving a run command the actuator does not start with the set maximum speed but begins to increase speed within a ramp function. Thereby the mechanical parts in the valve and actuator benefit from a reduction of stress. The lifetime of both is prolonged considerably.



## Setting range for stroke

The stroke may be adjusted within the following limits.

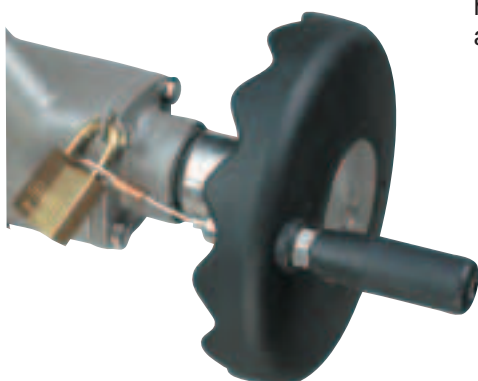
	Stroke	
	min	max
ALS 25	10 mm	40 mm
ALS 75	10 mm	100 mm

## Analogue thrust signal (option)

The thrust sensor (refer to page 9) continuously supplies a signal proportional to the existing torque. In conjunction with the controls VARIO-

MATIC-BUS this signal can be transmitted to the overriding level/ control station.

## Lockable handwheel (option)



The locking device prevents unauthorized manual operation of the actuator.

## Supply voltage

Controls and actuator must be supplied with 230 V or alternatively with 115 V 1-phase AC.

### Power supply of the fail-safe unit

For the supply of the magnet coupling in the fail-safe unit, 24 VDC is additionally required in the standard version. As an option the unit can also be supplied with 230 V or 115 V 1-phase AC.

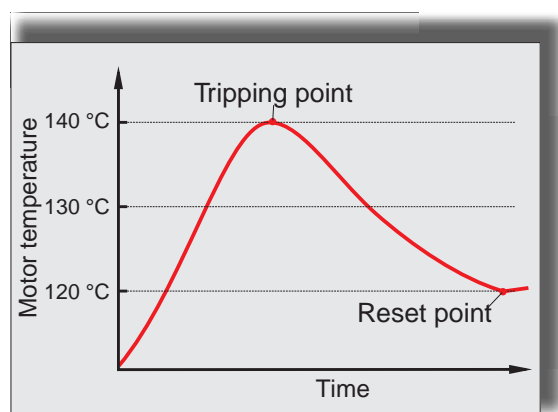
## Motor protection

In order to protect the motor against overheating PTC thermistors are embedded in the motor windings. They provide optimum protection against excessively high temperature.

PTC thermistors in conjunction with the tripping electronics, integrated in the controls VARIOMATIC, offer a better motor protection than overload relays, since the temperature is

directly measured in the motor winding.

The actuator is switched off as soon as the winding temperature exceeds 140 °C. After cooling down to a temperature of approx. 120 °C the actuator can be switched on again.



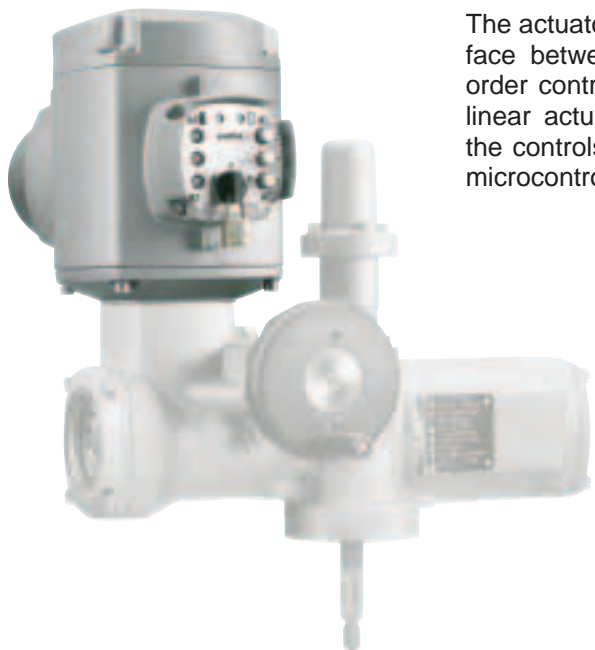
## Remote position indication (option)

If an indication of the valve position is required in the control room, this can be realised with a remote position transmitter integrated in the actuator. From the actuator controls a

4 - 20 mA signal proportional to the valve position, or in case of fieldbus connection, a corresponding digital signal, is provided.

# Equipment

## Integral controls



The actuator controls form the interface between actuator and higher order controls. In the basic version linear actuators are equipped with the controls VARIOMATIC-MC with microcontroller.

Furthermore, there is a version with PROFIBUS-DP interface available.

The controls fulfil the following tasks:

- Load independent speed control of the motor.
- Processing of the commands OPEN, STOP, CLOSE or of a set point.
- Processing of actuator signals, e.g. thrust sensor, end positions, motor protection tripped.
- Providing feedback signals to the higher order control system.
- Easy operation on site.

Actuator and controls are optimally adapted to each other. Therefore quick response to control signals and external commands is guaranteed.



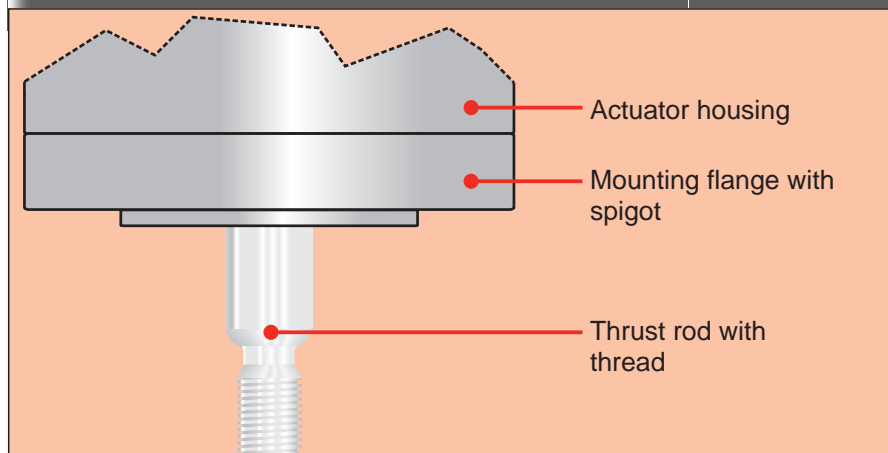
The controls can be mounted directly on the actuator or separately on a wall bracket (refer to page 4). This is recommended, for example, if the actuator is installed in places with limited space.

## Valve attachment

The valve attachment consists of the mounting flange for connecting the actuator to the valve flange and the thrust rod which transmits the thrust to the obturator. Flange and thrust rod are according to DIN 3358.

### Flange sizes

	Standard	Option
ALS 25	F05	F07
ALS 75	F10	–



## Electrical connection

### AUMA plug/ socket connector



As a standard, the actuators are equipped with an AUMA plug/ socket connector for motor and control cables. This applies whether the actuator is equipped with integral controls or not.

#### The significant advantage of this type of connection:

Once connected, the wiring remains undisturbed, even if the actuator has to be removed from the valve, e.g. for maintenance purposes.

### Double sealed (option)



The double sealed connection is a sealed plug and socket which is fitted between the device housing and the plug/ socket connector. Even after removing the plug cover or if the cable glands do not seal properly the device will be protected against the ingress of dust or humidity.

## Technical data

Technical data	Motor power connections <sup>1)</sup>	Protective earth	Control pins
No. of contacts max.	6	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 customer connection	Screws	Screw for ring lug	Screws or 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	Polyamide	Polyamide	Polyamide
Contacts	Brass	Brass	Brass, tin plated or gold plated (option)

### Threads for conduit entries

2 x M 25 x 1.5; 1 x M 20 x 1.5

For delivery, the conduit entries are sealed with plugs; other thread sizes and thread types e.g. Pg or NPT threads are possible on request. Cable glands can be supplied on request.

# Electrical connection / Ambient conditions

## Electrical connection

### 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
- enlarged terminal compartment and removable lid

### Parking frame, protection cover

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

## Enclosure protection

### Enclosure protection IP 67

Controls and actuator in the basic version have enclosure protection IP 67 according to EN 60 529. IP 67 means protection against immersion in water up to max. 1 m head of water for max. 30 minutes.

### Enclosure protection IP 68 (option)

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

The controls are in enclosure protection IP 67 and must be mounted separately on a wall bracket.

## Corrosion protection / Colour

### KN (standard)

The standard AUMA corrosion protection KN is a high quality coating. This is suitable for outdoor installation and for slightly aggressive atmospheres with a low level of pollution.

### KS

AUMA recommends this corrosion protection class when installing devices in occasionally or permanently aggressive atmospheres with a moderate pollutant concentration (e.g. in sewage treatment plants, chemical industry).

### KX

AUMA recommends this corrosion protection class when installing devices in extremely aggressive atmospheres with high humidity and high pollutant concentration.

### Colour

The standard colour of the finish coating is silver-grey (DB 701, similar to RAL 9007). Other colour are possible on request.

## Ambient temperature

-10 °C to +70 °C

## EU Directives

### Machinery Directive

According to this directive, actuators with integral controls are not complete machines. This means that a Certificate of Conformity is not possible. However, AUMA confirms with the Declaration of Incorporation (on the Internet under [www.auma.com](http://www.auma.com)) 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' within the meaning of the

directive is formed. Before commissioning this machine a Certificate of Conformity must be issued.

### Low Voltage and Electromagnetic Compatibility Directive

AUMA actuators and controls fulfil the requirements, which has been proved in extensive tests. Therefore AUMA issued a Certificate of Conformity according to these directives (on the Internet under [www.auma.com](http://www.auma.com)).

### CE Mark



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

### Functional test

After assembly all actuators and actuator controls are thoroughly tested according to AUMA's inspection specification.

A final inspection record can be provided. The inspection records can be retrieved online via the Internet ([www.auma.com](http://www.auma.com)).

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