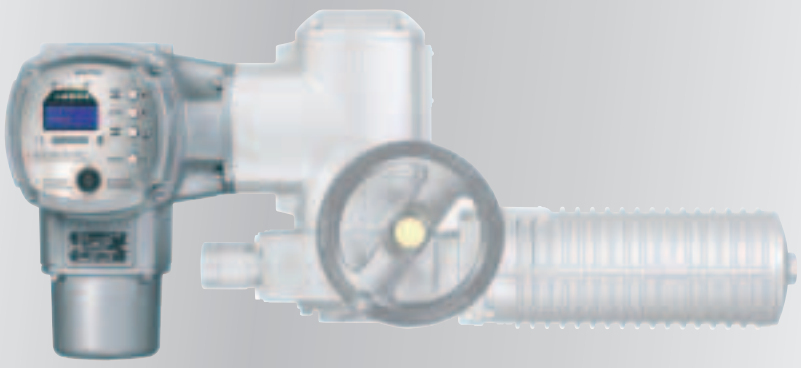
auma®
Solutions for a world in motion

Actuator controls

AUMATIC
AC 01.1
ACExC 01.1



Product description

Applications

Electric actuators are used for the automation of industrial valves. A suitable actuator is available for nearly all valve applications.

Integral controls are the ideal interface between the actuator and the DCS. The actuators are perfectly controlled and the integration of the actuator into the DCS is made much simpler.

Power

: Conventional power plants (coal, gas, oil)
: Hydroelectric power plants
: Geothermal power plants
: Solar thermal power plants
: Biogas power plants

Oil & gas

: Exploration, offshore plants
: Refineries
: Distribution
: Gas tanks
: Tank farms

Water sector

: Sewage treatment plants
: Water treatment plants
: Drinking water distribution
: Seawater desalination
: Steel construction for water resources

Industrial and special solutions:

: Air conditioning
: Food industry
: Chemical/pharmaceutical industry
: Vessel and submarine shipbuilding
: Steel mills
: Paper industry
: Cement works
: Mining

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Solutions for a world in motion

2010-10-06

This brochure will provide both the beginner and the expert with an overview of the functions and applications of AUMA AUMATIC actuator controls. It can be used as the basis to determine whether a device is suitable for the chosen application. Knowledge on the basic functions of electric actuators is a prerequisite for understanding the contents.

For detailed product selection refer to the separate data sheets and price lists. On request, AUMA engineers within field service and within our subsidiaries can help you find the correct device for the application.

In the mid-1970s, the first integral actuator controls were introduced. They replaced the complex actuator controls located in control cabinets and simplified installation, commissioning and connection of the devices to the DCS. The continuously growing market for devices with integral controls proves the success of this concept. 70 % of the actuators delivered by AUMA are equipped with integral controls now.

The latest detailed information on the AUMATIC actuator controls can be found on the Internet under www.auma.com. All documents, including dimensional drawings, wiring diagrams and final inspection records for supplied devices are available on the Internet in digital form.

Subject to change without notice.
The product features and technical data provided do not express or imply any warranty.

Control concepts

Why do I need controls?

An electric actuator in the classical sense, i.e. without integral controls, consists of the following components:

- an electric motor.
- gearing for the reduction of the motor speed to the required output speed and for the transmission of the motor torque into the output torque.
- a handwheel for manual emergency operation.
- limit switching for measuring the travel.
- torque switching for measuring the torque present at the valve.

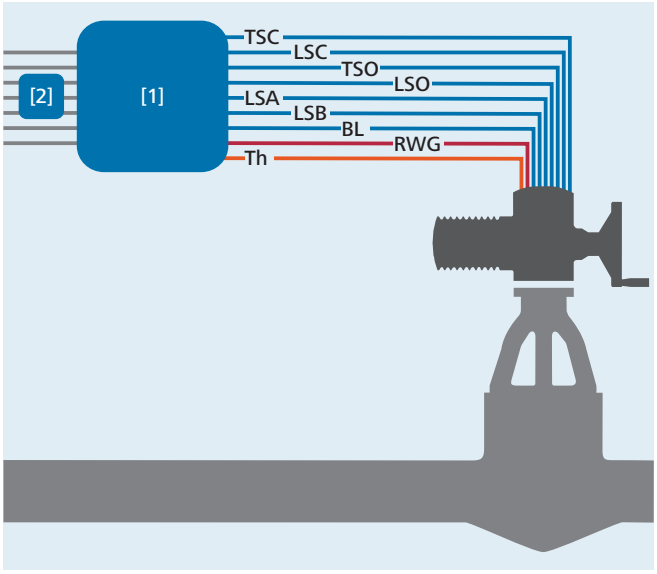
However, there is no switch for switching the device on or off. Nor does this basic actuator have any switchgear for reversing control of the motor as required to operate the actuator in both directions or any logic to process the torque and limit signals.

SA multi-turn actuator and SG part-turn actuator without integral controls

Additional equipment is required, the so-called actuator controls, to be able to control the actuator via the DCS.

Tasks of the actuator controls

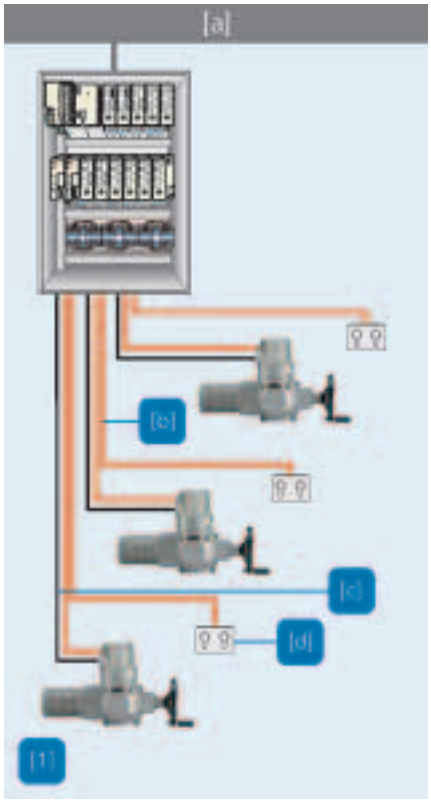
- Processing the operation commands from the DCS and appropriate control of the actuator motor
- Providing the signals for the DCS
- Processing the signals from the actuator and automatic switching
- Providing local operation with indication of the device status for commissioning

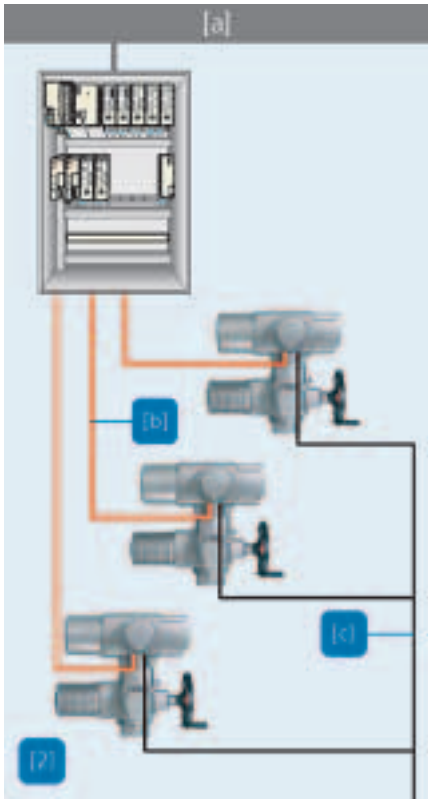


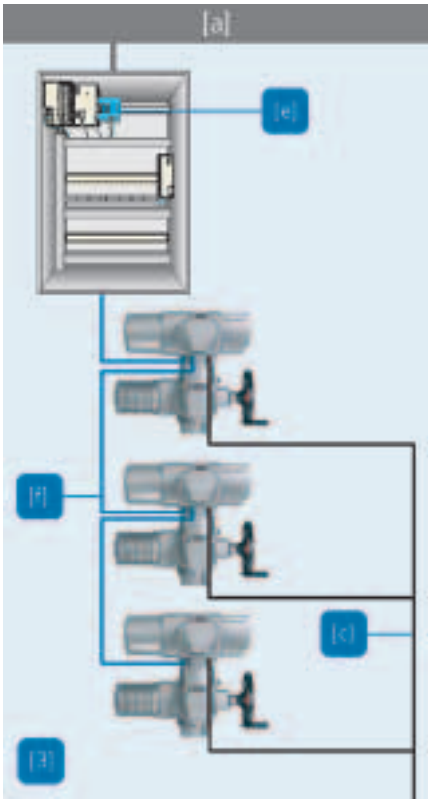
Signals from a fully equipped AUMA actuator
[1] Actuator controls
[2] Control signals from the DCS or feedback signals to the DCS
[TSC] Torque switch signal in direction CLOSE
[LSC] Limit switch signal in end position CLOSED
[TSO] Torque switch signal in direction OPEN
[LSO] Limit switch signal in end position OPEN
[LSA] Intermediate position switch signal in direction CLOSE (option)
[LSB] Intermediate position switch signal in direction OPEN (option)
[BL] Blinker transmitter signal, option for actuators for modulating duty
[RWG] Electronic position transmitter, 0/4 – 20 mA (option)
[Th] Thermoswitch

As explained before, there are several options to implement actuator controls. Depending on the plant configuration, the most favourable solution should be selected. AUMA sales engineers will help you choose the best solution.

Control concepts







[a]: DCS
[b]: Multicore signal cable
[c]: Power supply
[d]: Local controls

[e]: Fieldbus interface
[f]: Fieldbus cable (2-wire cable or fibre optic cable)

[1] External controls

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

- All actuator signals e.g. limit, torque and thermoswitch signals must be passed on to the external controls in the control cabinet. A separate signal channel is required for each signal.
- The control of the actuators via a reversing contactor combination has to be implemented and installed in the control cabinet.
- The local controls have to be implemented and mounted.
- Depending on the valve type, the signals have to be processed differently (torque/limit seating).

External controls require extensive planning and installation. If mistakes are made during installation, commissioning may be hazardous. The documentation of the controls is extensive.

[2] Integral controls

Actuators with integral controls are immediately ready for use. As soon as the power supply has been established, the actuator can be operated via the operating elements on the local controls. The actuator can be set up completely on site; only operation commands and feedback signals are exchanged between the DCS and the actuator. The sensor signals of the actuators are processed internally. Integral protective functions prevent damage during commissioning.

Further advantages

- No extensive wiring in the control cabinet is required
- Reliable and correct processing of the actuator signals.
- Actuator and controls are optimally adapted to each other
- Standard wiring diagrams are available
- Warranty for both actuators and controls

[3] Fieldbus

By using a single data transmission medium for all signals from many devices, the structure of fieldbus systems can be kept very clear and simple. Where the control cabinet of commonly used systems is filled with input and output sub-assemblies, the fieldbus only requires a single interface.
Compared to common installations, the fieldbus systems have expanded functions. This includes setting of the field devices via the DCS.
The integral AUMA actuator controls are available with interfaces to all common fieldbus systems.

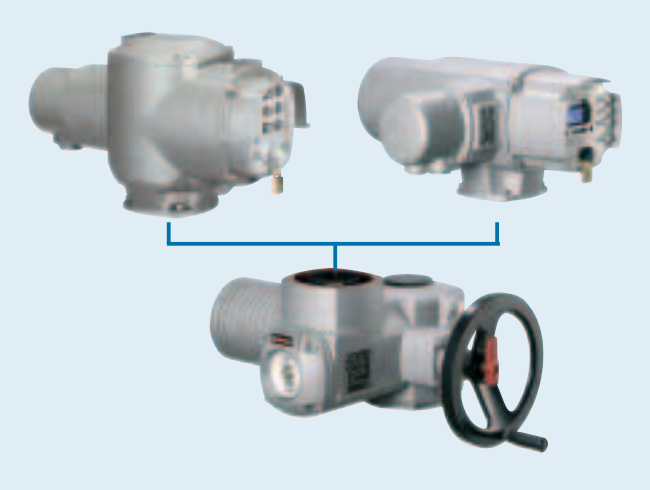
Modular design/versions

Modular design – with suitable controls

Each application has its special requirements. For this reason, AUMA only builds actuators on demand – tailor-made to customer requirements. Due to the modular design of the AUMA product range, different features can be combined. For each actuator type, there are a large number of equipment variants.

One of the central features of AUMA's modular design is the ability to supply or retrofit integral controls onto the basic actuator.

AUMATIC or AUMA MATIC



AUMA SA or SG actuators can be equipped with AUMA MATIC or AUMATIC controls.

In its basic version, the AUMA MATIC is the ideal controller for simple OPEN - CLOSE applications.

The AUMA MATIC provides end position indication, the selector switch position and a collective fault signal, all as feedback signals.

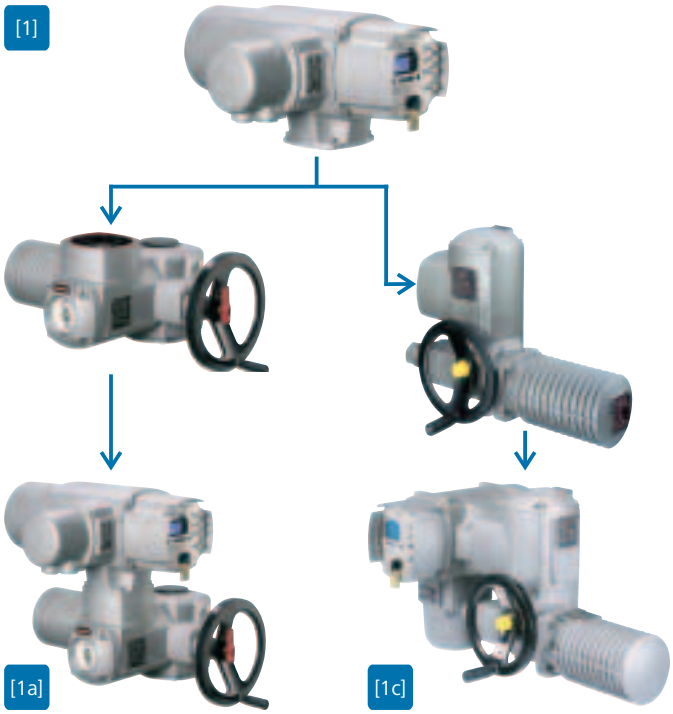
The behaviour of the AUMA MATIC can be adapted to the application via programming switches, e.g. setting the type of seating.

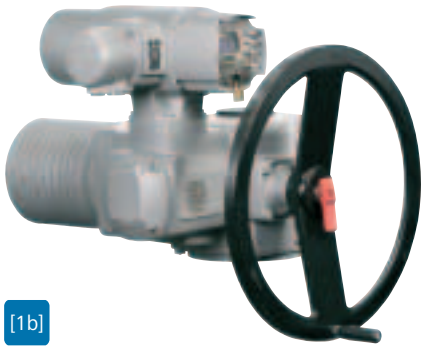
For detailed information on the AUMA MATIC, refer to the brochure, Actuator controls AUMA MATIC.

As well as the AUMA MATIC's functionality, the AUMATIC offers some other advantages, e.g.

- Programmable signal relays
- Non-intrusive setting in combination with the MWG control unit in the actuator (option)
- Adaptive positioner (option)
- Fieldbus interfaces for Profibus DP, Modbus RTU, DeviceNet, Foundation Fieldbus (option)
- Monitoring and diagnostics
- Logging of operating data
- Cable-based or wireless programming interface for connecting a programming device

The AUMATIC functions are described in the following.





[1] **Modular design 1**
Universal control concept

AUMA actuator controls can be combined with the different actuator types. Even with different actuator types within a plant, a universal concept with regards to the connection to the DCS and device operation/setting can be maintained.

The controls are available for the following actuator ranges:

- Multi-turn actuators for open-close duty
  SA 07.1 – SA 16.1
  SAExC 07.1 – SAExC 16.1
- Multi-turn actuators for modulating duty
  SAR 07.1 – SAR 16.1
  SARExC 07.1 – SARExC 16.1
- Part-turn actuators for open-close duty
  SG 05.1 – SG 12.1
  SGExC 05.1 – SGExC 12.1
  SG 03.3 – SG 04.3
- Part-turn actuators for modulating duty
  SGR 05.1 – SGR 12.1
  SGR 03.3 – SGR 04.3

[1a] Multi-turn actuator of size SA 10.1 (max. 120 Nm)
[1b] Multi-turn actuator of size SA 16.1 (max. 1,000 Nm)
[1c] Part-turn actuator of size SG 05.1 (max. 150 Nm)

[2] **Modular design 2**
Plug/socket connections

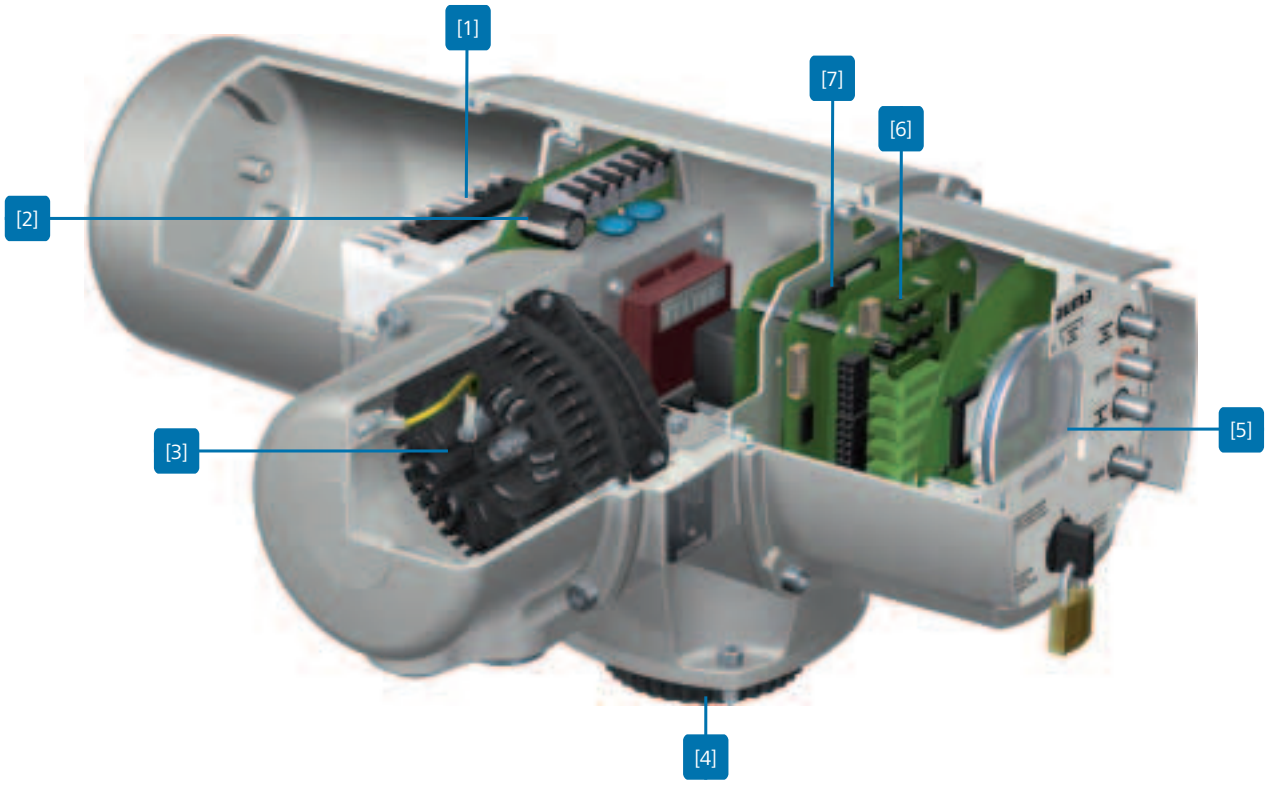
The controls can be mounted on the actuator at 90° intervals, the electrical connection and the local controls can be positioned in the same way. The connections are plug and socket which enables the actuator and controls to be adapted to the installation situation in the plant in no time at all. Further advantages of the plug/socket connection are high ease of service and once electrical connections have been established, they do not have to be separated again.

[3] **Modular design 3**
Wall bracket

The controls can be mounted separately from the actuator on a wall bracket. This is recommended if:

- the actuator is installed in an inaccessible place, e.g. in a shaft.
- high ambient temperatures at the valve may influence the control electronics.
- heavy valve vibration could influence the control electronics.

Design principle



[1] **Switchgear**

In the standard version, reversing contactors with a maximum switching power of 7.5 kW are used for motor power switching. For applications requiring a high number of starts, we recommend the use of thyristor units. Apart from a longer lifetime, they have shorter reaction times. Thyristor units are available up to a maximum power of 5.5 kW.

[2] **Power supply unit**

The power supply for the internal electronics, the heating system and the position transmitters (option) within the actuator.

[3] **Electrical connection**

Different plug/socket connectors are available for the electrical connection. The different versions for standard, fieldbus or explosion-proof devices are described on pages 30 and 31.
For maintenance work, the actuator can be disconnected quickly from the power supply and control cables and can easily be reconnected.

[4] **Plug/socket connector to the actuator**

The electrical connection between the integral controls and the actuator is made by using a plug/socket connector. Four screws are used to attach the controls housing to the actuator. For maintenance purposes the controls can be separated and reconnected to the actuator in no time at all.

[5] **Local controls/display**

The local controls contain all operating elements required to operate and set the actuator locally. A selector switch is used to select Local control or remote control or to disable all operation commands when set to 0.
All actuator states and device parameters can be shown as plain text on the illuminated display. The display text is available in nine different languages. In addition, five indication lights show different actuator states (refer also to the Signals/indication section on pages 26 and 27).
An interface where a laptop or a PDA can be connected is also located on the local controls. As standard, the AUMATIC includes a cable-based connection; as an option the device is also available with a Bluetooth interface for wireless connection.

[6] **Interface**

The interface forms the link to the process control system. Here, the commands from the process control system are received and signals issued. Depending on the DCS, a parallel or a fieldbus interface or a combination of both interfaces can be used.

[7] **Logic**

The logic processes all external and internal signals. Functions such as adaptive positioning, menu guided setting, logging of operating data as well as monitoring and diagnostic functions are implemented by the integral microcontroller. The entire settings are stored in a non-volatile memory. In the event of a power failure all data is immediately available once power is restored.

Summary of applications, functions, and equipment

Standard ● Option ■	AUMATIC				
	AC		ACExC		
Service conditions	Standard	Fieldbus	Standard	Fieldbus	Page
Enclosure protection IP 67	●	●	●	●	10
Enclosure protection IP 68	■	■	■	■	10
Corrosion protection KN	●	●	●	●	11
Corrosion protection KS, KX	■	■	■	■	11
Low temperature versions	■	■	■	■	10
Explosion protection	–	–	●	●	11
Interface					
Parallel interface	●	■	●	■	12
Fieldbus interfaces	–	●	–	●	13
Operation/setting					
Local operation	●	●	●	●	14
Local setting	●	●	●	●	15
Operation/setting via laptop/PDA	■	■	■	■	15
Functions					
Limit seating	●	●	●	●	17
Torque seating	●	●	●	●	17
Automatic end position adjustment	●	●	●	●	18
Torque by-pass	●	●	●	●	18
OPEN - STOP - CLOSE control/positioning mode	●	●	●	●	19
Setpoint control (positioning)	■	●	■	●	19
Extended operating time by means of stepping mode	●	●	●	●	20
Process control	■	■	■	■	20
Multiport valve function	–	■	–	■	21
Failure functions					
Automatic phase correction	●	●	●	●	22
Overload protection of the valve	●	●	●	●	23
Protection of the motor against overheating	●	●	●	●	23
Phase failure monitoring	●	●	●	●	24
Failure behaviour on loss of signal	■	■	●	●	24
EMERGENCY behaviour	●	●	●	●	25
Protection against unauthorised operation/setting	●	●	●	●	25
Feedback signals/local indication					
Feedback signals for parallel interface	●	●	●	●	26
Feedback signals for fieldbus interface	●	●	●	●	27
Local indication	●	●	●	●	27
Diagnostics					
Identification of fault causes	●	●	●	●	28
Logging of operating data	●	●	●	●	29
Limit monitoring	●	●	●	●	29
Switchgear					
Reversing contactors	●	●	●	●	8
Thyristors	■	■	–	–	8
Electrical connection for non-explosion-proof actuators					
Electrical connection with plug/socket	●	●	–	–	30
Expanded connection compartments	■	■	–	–	30
Double sealed	■	■	–	–	30
Protection cover	■	■	–	–	30
Parking frame	■	■	–	–	30
Electrical connection for explosion-proof actuators					
Plug/socket connector for explosion-proof actuators	–	–	●	●	31
Plug-in terminal connection for explosion-proof actuators	–	–	■	■	31
Double sealed	–	–	●	●	31
Protection cover	–	–	■	■	31
Parking frame	–	–	■	■	31

Service conditions

AUMA devices are used worldwide; in all climate zones, in industrial plants of all kinds under special local ambient conditions. AUMA devices have to operate reliably and for a long time under any conditions without requiring major maintenance work. For this very reason, AUMA has focussed on making AUMA devices resistant to the most unfavourable conditions and have adapted their protective measures to the state-of-the-art technology.

AUMA actuators at work – in Siberia and in the Sahara

Enclosure protection

IP 67

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

IP 68

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

In order to guarantee the enclosure protection IP 68, suitable cable glands must be used. They are not part of the standard supply, but can be provided by AUMA on request.

Ambient temperatures

	Versions	Temperature range
AUMATIC AC	Standard Low temperature Extreme low temperature[1]	–25 °C … +70 °C –40 °C … +70 °C –50 °C … +70 °C
Explosion-proof AUMATIC ACExC	Standard Low temperature Extreme low temperature[1]	–20 °C … +40 °C/60 °C[2]/70 °C[3] –40 °C … +40 °C/60 °C[2] –50 °C … +40 °C/60 °C[2]

Some of the permissible ambient temperature ranges of AUMA actuators differ from those of the AUMATIC. This has to be observed during sizing.

[1] Device includes heating system for connection to external power supply 230 V AC or 115 V AC.
[2] For the temperature range +60 °C, special sizing of the actuator is required for temperature class T4.
[3] +70 °C possible in combination with explosion group IIB and temperature class T3

Corrosion protection/colour

Standard (KN)

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 for installation in occasionally or permanently aggressive atmospheres with a moderate pollutant concentration.

KX

AUMA recommends this corrosion protection class for installation in aggressive atmosphere with high humidity and a high pollutant concentration.

Colour

The standard colour of the finish coating is silver-grey (similar to RAL 7037). Other colours are available on request.

Explosion protection

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

Classification of explosion protection

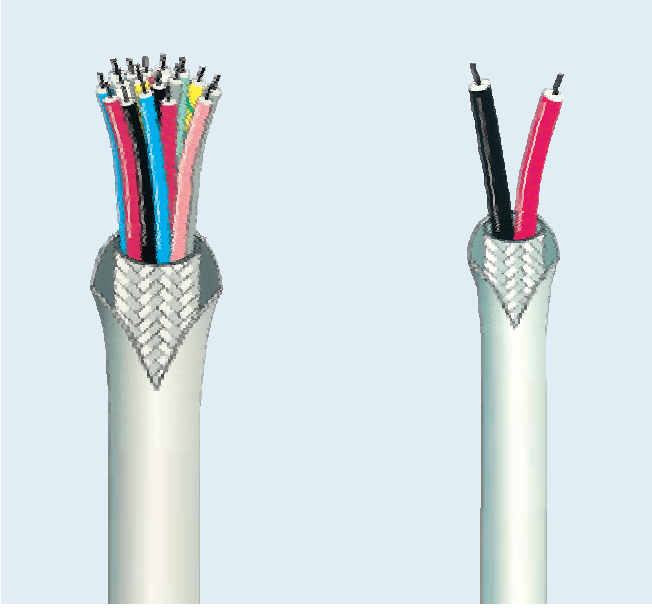
Types	Classification
Multi-turn actuators SAExC 07.1 – SAExC 16.1 SARExC 07.1 – SARExC 16.1 with ACExC	■ II2G EEx de IIC T4 ■ II2G c IIC T4 ■ II2D Ex tD A21 IP6X T130°C
Part-turn actuators SGExC 05.1 – SGExC 12.1 with ACExC	■ II2G EEx de IIC T4 ■ II2G c IIC T4 ■ II2D Ex tD A21 IP6X T130°C

Certificates of Conformity from national test authorities in other countries such as USA, Canada, CIS, Brazil, Japan, etc., are also available.

Interfaces

While the mechanical interface between actuator and valve is defined by a few standards worldwide, there is a large variety of connections from the actuator to the DCS. Selecting the proper connection is not just reduced to deciding between conventional parallel control or fieldbus, it is also a question of redundancy concepts, transmission media, etc.

Whatever the requirements, AUMA keeps track of the latest developments: not only with regards to the devices but also regarding the know-how of our sales engineers or within our quotations department. Here you can find your competent partners who will support you in finding the solution to rather complex questions on the connection to the DCS.

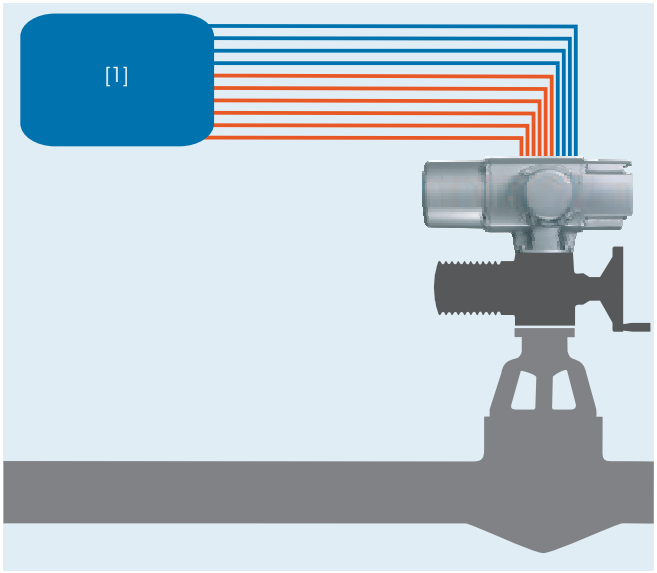


Parallel wiring or fieldbus with 2-wire technology is no longer the only question. Fieldbus enables much more comprehensive data exchange and therefore a more intensive integration of the actuators into the process.

Parallel interface

For systems with parallel signal transmission, discrete signals such as operation commands are transmitted as 24 V DC signals (alternatively 115 V AC). Continuous signals such as nominal or actual position values are exchanged as 4 – 20 mA signals.

Each signal requires a separate signal channel and a separate input or output at the controls.



Even in the basic version, the AUMATIC with parallel interface exchanges up to 10 discrete signals with a PLC [1]:

- Four binary inputs for the OPEN, STOP, CLOSE and EMERGENCY commands.
- Six binary outputs, one reserved for a programmable collective fault signal and five freely programmable signal relays.
- An analogue output for the transmission of the valve position if a positioner is included in the actuator.

Depending on the function of the controls, the AUMATIC has other inputs and outputs. The optional positioner for example requires an additional analogue input for the nominal position value and an additional discrete input for a MODE signal. This signal can be used to change over between setpoint control and OPEN - STOP - CLOSE control.

Fieldbus interface

In the case of fieldbus systems all signals for all devices connected to the bus are transmitted via a common signal channel. In general, this is either a 2-wire or a fibre optic cable. The number of cables connected to the AUMATIC does not depend on the number of functions available for the device.

The AUMATIC actuator controls are available with the following fieldbus interfaces:

- Profibus DP
- Profibus DP-V1
- Modbus RTU
- DeviceNet
- Foundation Fieldbus

Redundancy

By installing a second fieldbus interface, so-called component redundancy can be achieved. This is possible for Profibus DP, Modbus RTU and DeviceNet. Depending on the fieldbus system and/or in combination with the AUMA SIMA master station, different redundancy concepts may be achieved.

In combination with parallel interface

Certain control concepts require that the actuators can be controlled via fieldbus during normal operation, and under particular conditions, via parallel operation commands. The AUMATIC provides two options:

- The fieldbus interface of the AUMATIC is equipped with additional binary and/or analogue inputs for operation commands and setpoints. In this case the feedback signals are exclusively sent via the bus.
- In addition to the fieldbus interface the AUMATIC contains a complete parallel interface. The feedback signals are therefore also available via binary and analogue outputs.

Transmission media

Depending on the bus system, you may have the controls with a connection for conventional bus cables or for the connection of fibre optic cables.

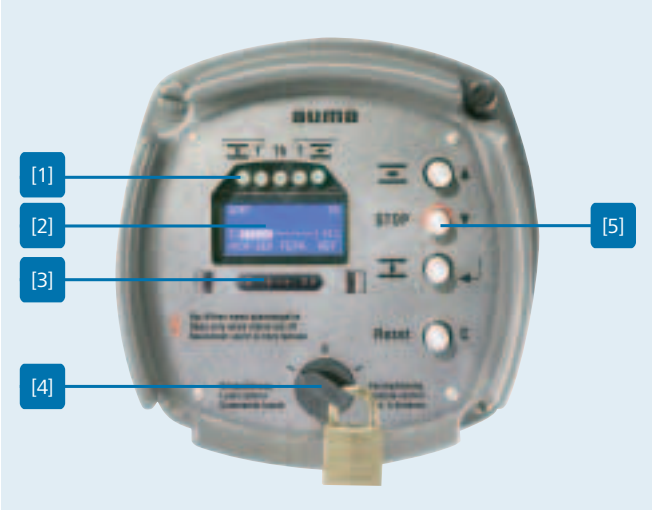
Further literature

For detailed information refer to the brochure ‘Electric actuators with fieldbus interfaces’.

Operation/setting

Operation and setting cannot be separated. When changing parameters, you would like to check without any difficulties, whether the changes have the desired effect. For this reason, the classic operating elements are also setting elements now, and the traditional setting tools include functions to commission the actuator.

Operating and indication elements of the AUMATIC



[1] **Indication lights**
See page 27

[2] **Display with plain text**
See page 27

[3] **Interface for the connection of a laptop or PDA**
In the basic version, the AUMATIC is equipped with an infra-red interface which can be used to connect the laptop to the AUMATIC using a cable. As an option, the AUMATIC is available with a Bluetooth interface for wireless connection. In this case, the settings can also be made using a PDA as an alternative to the laptop.

[4] **Selector switch**
The selector switch is used to activate either REMOTE mode, LOCAL mode or the programming mode. To prevent unauthorised operation, the selector switch can be locked with a padlock.

[5] **Push buttons**
For operation of the actuator as well as navigation within the display menu.

Local operation

If the selector switch is in the local position, the actuator can be operated with the OPEN - STOP - CLOSE push buttons. It can be determined for each direction of operation, whether the actuator is run in push-to-run operation or self-retaining. In push-to-run operation, the actuator stops immediately when releasing the push button. If self-retaining is set, the actuator runs into one of the end positions or until the STOP push button is operated.

Local setting

The parameters can be set locally using the push buttons on the local controls after changing to the programming mode.

This function is password protected to stop unauthorised parameter changes.

All parameters can be viewed on the menu-guided display. They can be set without opening the housing or using a tool, provided that the actuator is equipped with the optional magnetic limit and torque transmitter MWG. This is called non-intrusive setting of the actuator.

Only exception: If the actuator is equipped with a control unit with electromechanic switches, the end positions and the tripping torque have to be set mechanically by means of a screwdriver. The actuator housing has to be opened.

The non-intrusive setting is an asset for explosion-proof devices, since all settings can be made without affecting the explosion protection.

The display can be set to the following languages:

- German
- English
- French
- Spanish
- Turkish
- Hungarian
- Italian
- Polish
- Portuguese

Operation/setting via laptop/PDA

Alternatively to operation/setting via push buttons, the settings can also be made using the COM-AC operation and programming software via a laptop or PDA. Setting the parameters is much more convenient. Pre-prepared parameter records can be uploaded from a database to the AUMATIC.

In this case, the settings are also password protected.

The setting of the end positions has to be made directly via the local controls. This ensures that the user is situated next to the device when changing values which are critical to the operation of the valve.

Cable-based via infra-red interface

A laptop is connected to the AUMATIC via an interface cable. The actuator can then be operated and/or programmed using the laptop.

Wireless via Bluetooth interface (option)

In this case, operation/setting is not only possible via a laptop but also using a hand-held PDA. The PDA or the laptop work in the same way as a remote control of the AUMATIC local controls. This is an advantage where access to the actuator is difficult. The Bluetooth connection is encrypted: Third parties with a Bluetooth-enabled device cannot eavesdrop on the communication.

COM-AC operating and programming software

COM-AC can be downloaded free of charge from the AUMA website (www.auma.com). There are two versions available, one for use on a laptop and one for use with a PDA.

To load data from the AUMATIC onto a laptop or the PDA, a password is required. The device settings are thereby protected against unauthorised changes.

All parameters are listed in a structure and can be easily and precisely entered.

After setting the parameters the data is sent to the AUMATIC with a mouse-click.

COM-AC supports the following languages:

- German
- English
- French
- Spanish
- Italian
- Turkish
- Hungarian
- Polish
- Portuguese

Monitoring and operating function

Using COM-AC you can read all diagnostic data from the AUMATIC. The evaluation of the information is much more convenient than on the display of the AUMATIC. Using the additional operating functions the connected actuator can be operated via a laptop or PDA.

Database

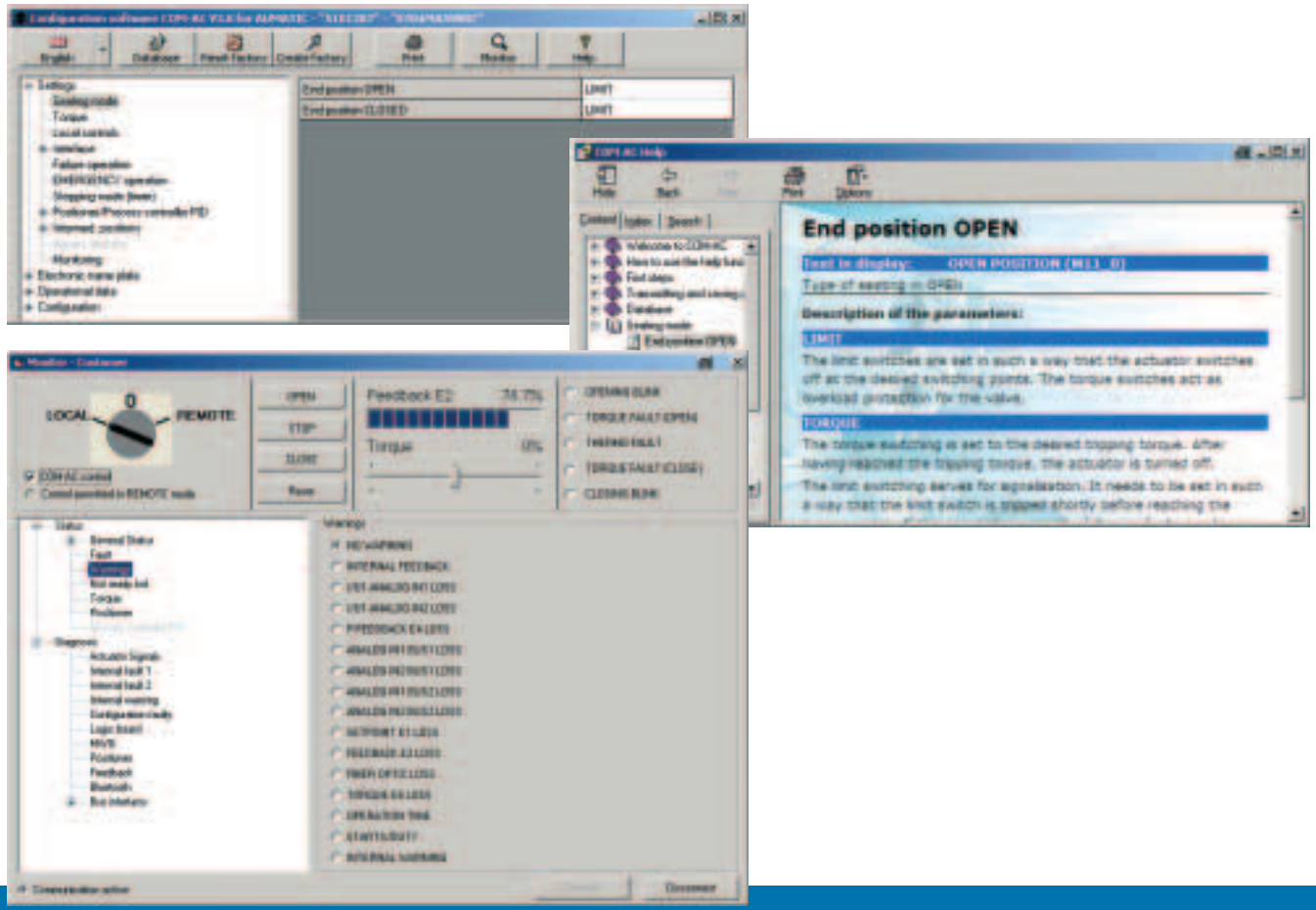
COM-AC has its own database where the data records of the device can be stored.

This has the following advantages:

- The parameters of all devices can be stored easily for documentation purposes.
- A replacement device can be commissioned quickly by transmitting the correct parameters from the database.
- The data records can be processed offline and then transferred to the AUMATIC on site.

Online help

All parameters are explained in detail in the online help. The help function is available in both English and German.



Functions

The AUMATIC offers extensive functions which are available during commissioning and make life easier for the user.

During operation, the AUMATIC evaluates all signals to ensure safe and reliable operation of both actuator and valve. This includes tripping after reaching an end position, but also failure functions such as overload protection.

The AUMATIC has extensive control options. Due to the trend towards decentralisation and the introduction of fieldbus technology, many tasks have been shifted from the DCS to the field devices; the data volume to be exchanged has been considerably reduced. The programming of your DCS can therefore become more straight forward.

Switching off in the end positions

If one of the valve end positions is reached the controls automatically switch off the actuator.

Depending on the valve type, the actuator is switched off according to the following procedure:

- Limit seating, i.e. at one of the set switching positions
- Torque seating, i.e. with a defined torque

AUMA actuators include two independent measuring systems, the limit switching and the torque switching.

The type of seating is determined by the way the controls process the limit and torque signals.

- If the controls are set to limit seating, the controls switch off the actuator as soon as a limit signal is received.
- If the controls are set to torque seating, the controls switch off the actuator as soon as the set torque limit has been exceeded. The torque limit is specified by the valve manufacturer. Due to the additional limit signal the controls recognise that the actuator has regularly been tripped in one of the end positions.

The type of seating can be set independently for either end position.

Explosion-proof AUMA actuators with AUMATIC at a tank farm in Venezuela

Functions

Automatic end position adjustment

Often the actuator is equipped with a position transmitter which provides the valve position either as a current or voltage signal. The position transmitter is required if the DCS requires a feedback signal or if the AUMATIC uses an internal positioner. When setting the end position the position signal of the position transmitter is standardised to the desired range; a reference operation is not required.

The setting is maintained even if the power supply fails. Even if the actuator is operated via the handwheel in this state, the AUMATIC will immediately recognise the current valve position once the power supply has been restored. No battery is required for backup in the event of a power failure.

Torque by-pass

The torque switching protects the valve from overload.

If the valves are not operated for a long period of time, the valve can become stuck in the end positions. Especially if a medium flows through the valve which is prone to crystallization, this effect cannot be avoided. In situations like these it is desirable to be able to use the maximum available torque of the actuator to unseat the valve.

For this reason, the torque by-pass can deactivate the torque switching. For operation from one of the end positions, the torque switching is ignored for a defined period; during this time, the full torque of the actuator is used.

The torque by-pass function is based on the prerequisite that the valve is designed for the increased load up to the stall torque of the actuator. This has to be observed when sizing the actuator. Otherwise, the valve can be damaged.

SA multi-turn actuator with AUMATIC on a gate valve in a peat-fired power plant in Ireland.

OPEN - STOP - CLOSE control/ positioning mode

Shut-off valves are generally either fully opened or closed. For remote operation, the OPEN, STOP and CLOSE operation commands of the AUMATIC are supplied. The OPEN - STOP - CLOSE control is also called self-retaining. If the actuator receives an operation command, the actuator runs until receiving a stop command or a switch-off condition occurs, e.g. the end position is reached.

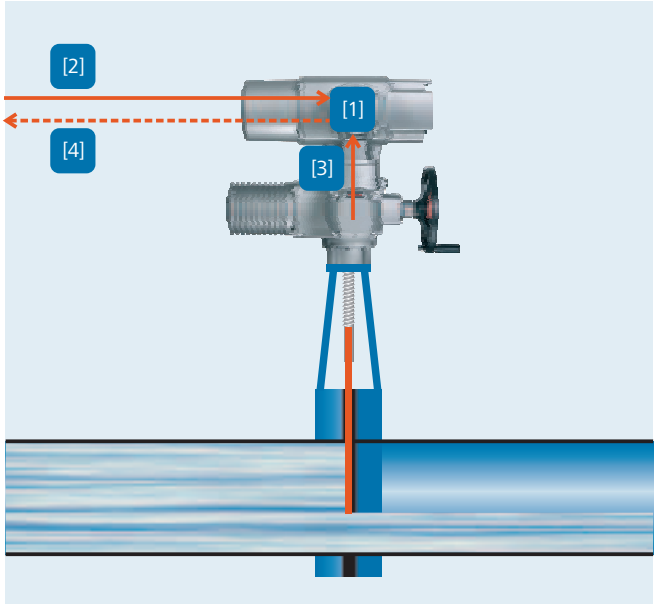
The OPEN - CLOSE duty, the so-called push-to-run operation, is contrary to this. The actuator stops as soon as an operation command is cancelled. This type of control is required if the actuator is controlled by an external positioner.

Self-retaining and push-to-run operation can be programmed with the AUMATIC.

Positioning duty

With the positioning duty, for example, a defined valve position is used to achieve the required constant flow rate through a pipeline. This can either be achieved by supplying a setpoint or, for reoccurring positions, by defining up to eight intermediate positions in the AUMATIC where the actuator stops if set accordingly. However, the actuator has to be equipped with a position transmitter, e.g. a potentiometer.

Setpoint control/positioning (option)



The positioner [1] within the controls positions the valve according to the externally supplied setpoint [2]. Depending on the interface, the setpoint may take the form of a 4 – 20 mA signal or be transmitted as a digital signal via the fieldbus. The positioner requires the current valve position [3] for closed-loop control. The valve position can also be transmitted to the DCS.

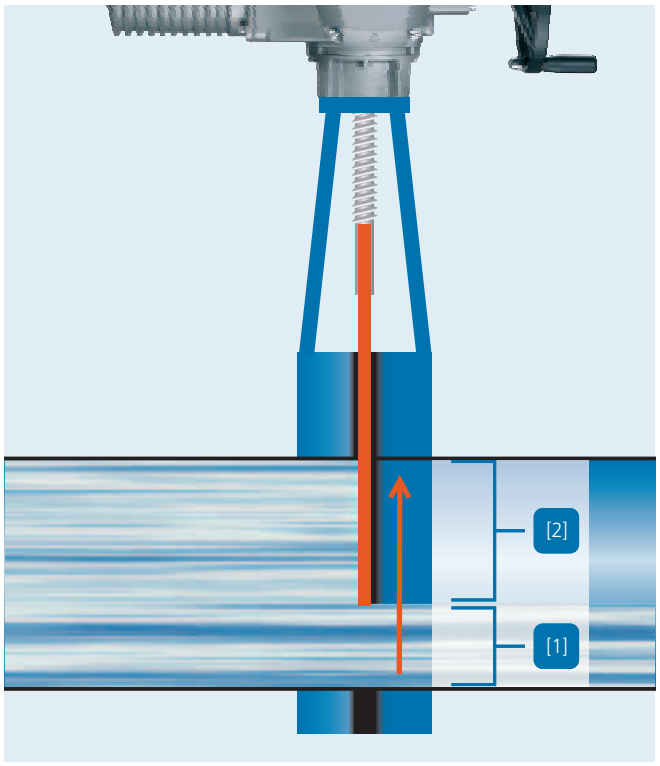
The internal positioner removes the need for an external positioning device. In combination with a modulating actuator mounted on a modulating valve, you obtain an ideally adapted unit, which can be integrated into the DCS.

Adaptive positioning

Due to the inertia of actuator and valve, the valve position changes only slightly after switching off the actuator. The difference is determined by the positioner. During the next operation, the switch-off point is adapted to reduce the difference. After a few operations, the ideal positioner behaviour is achieved. The positioner continuously adjusts to changing conditions within the process.

Extended operating time by means of stepping mode

In some cases, it may be desirable to reduce the operating speed of the actuator. A typical example is to avoid water hammer when opening a valve.



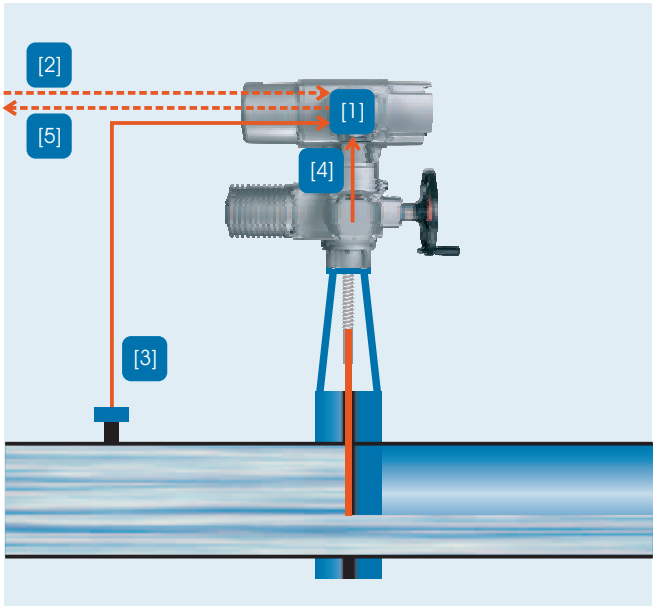
A reduced opening speed within section [1] may prevent water hammer within the pipeline. For the remaining section [2], the valve can be opened at normal speed.

The output torque of actuators with 3-phase AC or 1-phase AC motors depends on the frequency of the supply voltage connected to the motor. Stepping mode is a simple but effective option to reduce the operating speed. The operating speed is set by defining the running time between two pauses and the pause interval between two stepping mode operations.

Stepping mode is switched on or off via the intermediate positions which can be programmed in the AUMATIC. By defining the intermediate positions, the stepping range can be set for any section of travel.

Process control (option)

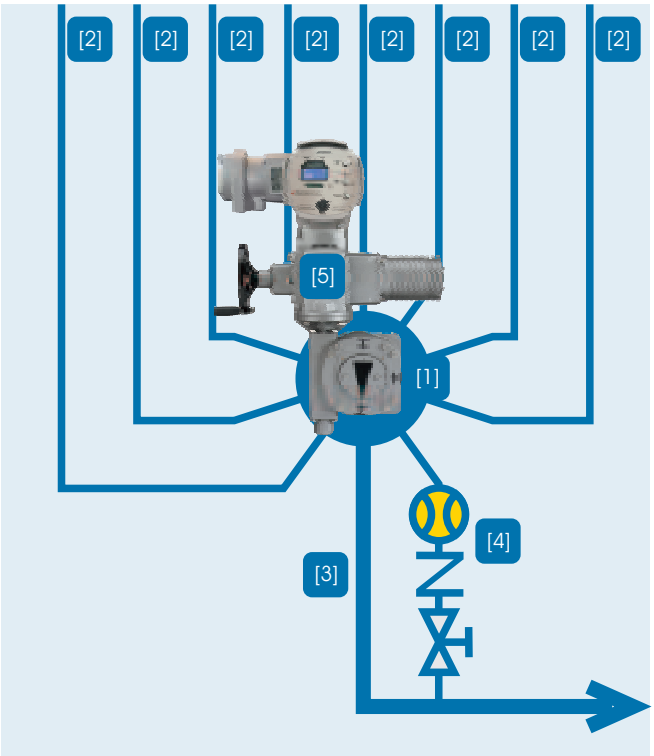
Especially in case of installations in remote areas, a cost-effective process control can be installed, since the PID controller integrated in the AUMATIC assumes the task of an otherwise required higher level control. The control is no longer required.



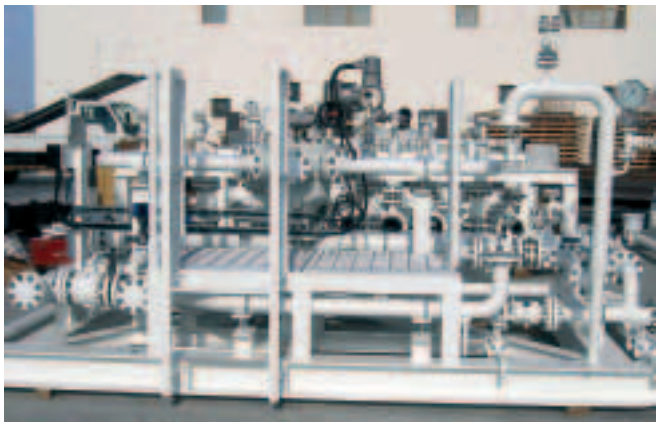
The integral PID controller [1] controls the actual process value [3] via the valve position, in this case the flow rate through a pipeline, according to a nominal process value [2], which is either externally supplied or programmed in the AUMATIC. In addition, the PID controller also requires the current valve position [4]. The current actual process value [5] is redirected to the control room.

Multiport valve function (option)

Multiport valves are specialist valves used in oil production. The multiport valve function has been developed specifically for this application. The user can control the eight inputs of the valve remotely. A fieldbus interface is necessary within the actuator for data communication.



The multiport valve [1] unites up to eight oil wells [2] in a single pipeline [3]. A special tap [4] is used to analyse the oil from a selected oil well. The AUMA actuator positions the so-called multiport selector in the valve installed in the inlet of the selected well. The oil is then led to the analysis tap [4].



Multiport valve with mounted AUMA actuator.

Failure functions

During all stages of the actuator's life, from installation and commissioning right through to operation, external conditions may disturb normal operation. The conditions may be caused due to mistakes during commissioning but also due to foreign matter within the valve.

AUMA actuator controls therefore include a variety of failure functions which either eliminate the faults or switch off the actuator before any damage can be incurred.

Your great advantage: There is no need for worst case assessments and the respective programming within your controls to account for these events.

And if such an event occurs, the integral diagnostic functions will indicate the cause of the fault.

Automatic phase correction

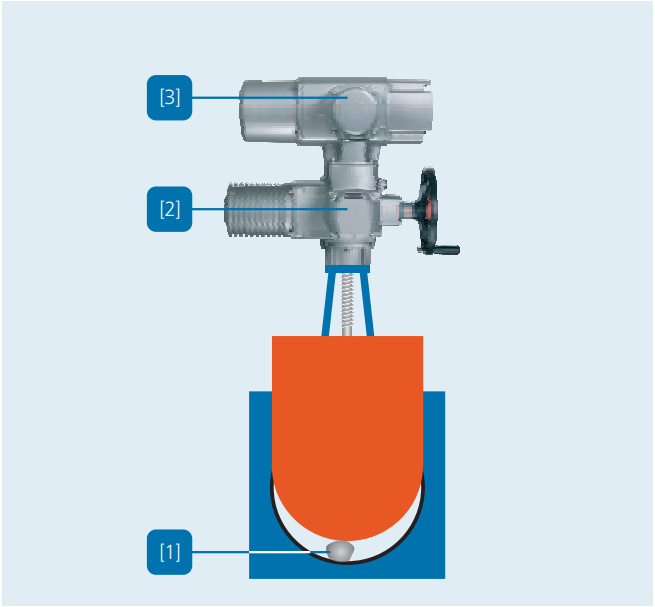
Most actuators are driven by three-phase asynchronous motors. The three phases of the power supply have to be connected in the correct sequence to make sure these robust motors run in the right direction. Otherwise, the actuator would run in direction CLOSE for an OPEN command and vice versa. In this case, the switch-off features would not take effect and the valve may be damaged or even be destroyed.

The automatic phase correction prevents this. The control of the motor is automatically adapted to the 3-phase rotating field. Even if the phases were crossed over during installation the actuator will still run in the direction CLOSE for a CLOSE command.

Applications under extreme conditions. SG part-turn actuator with AUMATIC in the Arabian desert in Qatar.

Overload protection of the valve

Excessive torque puts an extreme load on the valve; this may cause damage and can, in the worst case, destroy the valve. The torque switching integrated in the actuator is therefore not only used for regular torque seating in one of the end positions: the actuator controls also monitor the torque switching over the whole travel. If the set torque limit is exceeded, the controls immediately trip the actuator and signal a torque fault.

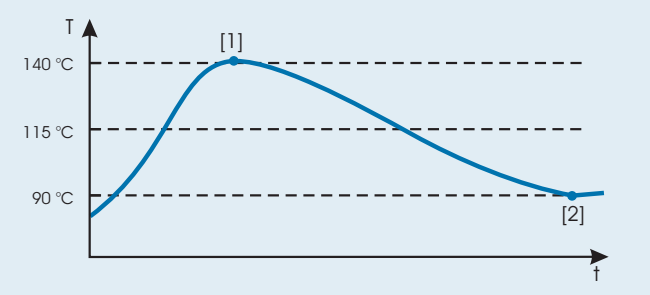


Foreign matter [1] may cause excessive torque. If there was no overload protection available, the actuator would act with its maximum torque upon the foreign matter and therefore upon the valve, only restricted by the maximum stall torque of the motor. This is prevented by the tripping of the torque switching in the actuator [2] and the switching off via the controls [3].

Protection of the motor against overheating

The windings of the 3-phase AC and 1-phase AC motors contain thermoswitches or PTC thermistors which trip as soon as the temperature within the motor exceeds 140 °C.

Thermoswitches or PTC thermistors offer far better protection than thermal overload relays, since the temperature rise is directly measured at the motor winding.



Motor temperature curve against time
When reaching the tripping temperature [1], the AUMATIC automatically trips the actuator and prevents the motor from being damaged due to overheating. Depending on the setting of the AUMATIC, it automatically switches to the ready state or the fault has to be acknowledged once the motor has cooled down to restart temperature [2].

Failure functions

Phase failure monitoring

Actuators are generally driven by 3-phase AC motors. A 3-phase AC supply is required to power these actuators.

The electronics within the AUMATIC is supplied using two of the three phases. If one of the two phases fails, the actuator can no longer be operated.

If the remaining phase fails, the controls remain fully operable. The two motor windings which are still supplied would try to compensate for the torque loss caused by the failure of the third winding and would therefore overheat. As another consequence, the motor protection would be tripped (see page 23) and the actuator be switched off.

To prevent this chain reaction and to quickly identify the cause of the fault, the AUMATIC monitors this third phase. The controls stop the actuator in case of a loss of phase and send the loss of phase fault signal.

Failure behaviour on loss of signal

Some signals must be supplied continuously to the AUMATIC for correct functionality. For example a positioner always requires an actual and nominal position value or an AUMATIC with fieldbus interface continuously monitors the bus signal.

If one of these signals fails, e.g. due to a loss of the master or if a cable is cut through, the process can no longer be reliably monitored.

In these cases, the AUMATIC triggers a defined failure behaviour. During commissioning, you have to determine the most favourable valve position in case of a fault.

The AUMATIC can be set to:

- fail as is
  The actuator remains in the current position.
- fail open
  Actuator moves the valve to end position OPEN.
- fail close
  Actuator moves the valve to end position CLOSED.
- fail to position
  Actuator moves the valve to a predefined position.

AUMATIC “collection” point within a water treatment plant. The controls are mounted separately from the respective actuators on wall brackets.

EMERGENCY behaviour

In emergency situations, a single EMERGENCY signal has to be sufficient to place a process plant in a safe state. The actors involved, including the actuators have to perform a predefined action. Just as for the failure behaviour on loss of signal, the following actions may be programmed:

- fail as is
- fail open
- fail close
- fail to position

Once the EMERGENCY command has been initiated, the AUMATIC ignores all incoming commands. For these EMERGENCY situations, the individual or even all protective equipment may be disabled, e.g. overload or motor protection. The actuator will then perform the required action while ignoring these signals. In emergency situations damage to an actuator or valve may be considered acceptable when compared with the potential damage to the overall plant.

Protection against unauthorised operation/setting

All settings of the AUMATIC are password protected. If the password is handled carefully, the device setting cannot be changed by unauthorised persons.

The selector switch for selecting the control mode via the local controls can be protected against unauthorised operation in any of the three positions by means of a padlock.

Lockable protection cover (option)

The lockable protection cover offers increased protection, even against damage to the local controls.

Remote release of the local controls (option)

Remote release ensures optimum protection against unauthorised operation. The operating elements on the local controls are activated via a signal from the control room. The local controls can only be operated after a release signal from the higher level controls.

Signals/indication

Signals are the foundation for controlling a process flow. For this reason, actuators provide a number of signals which indicate the operational status of the actuator and the valve.

Many applications require that the actuator or the valve status can be provided locally. Depending on the equipment, the actuator offers various possibilities.

The AUMATIC evaluates the signals from the sensors within the actuator. This includes the discrete signals of the limit and torque switching, if required continuous valve position and torque signals, as well as the motor protection. Due to the monitoring of the device components, more signals are added.

Based on these signals, the AUMATIC creates a large number of signals which can both be transmitted to the control room or indicated on site.

Selection:

- End position OPEN reached
- End position CLOSED reached
- Motor protection tripped
- Torque fault in direction OPEN
- Torque fault in direction CLOSE
- Intermediate position x reached
- Valve position
- Selector switch position
- Warning oper.time
- .....

For the complete parameter list refer to the Operation and setting Actuator controls AUMATIC manual.

Each of these signals can be requested via the display on the local controls and be transmitted to the control room. The feedback signals can be individually adapted to the process requirements.

Feedback signals for parallel interface

Discrete signals

Discrete signals include end position signals, intermediate position signals, fault signals and all signals which can be transmitted directly via a binary output to the control room.

The AUMATIC has six programmable signal relays. One of them is reserved for a configurable fault signal, the other five can be freely set according to your requirements.

Unless ordered otherwise, the six relays are configured as follows in the factory:

- OPEN position
- CLOSED position
- Remote sw. position
- Torque fault in direction CLOSE
- Torque fault in direction OPEN
- Fault 3 (torque fault, thermal fault, loss of phase and/or internal fault)

The configuration can be changed at a later date.

Continuous signals

If you require remote position indication, the actuator is equipped with a position transmitter. The position transmitter provides the valve position as a continuous signal. If the actuator contains a control unit with MWG, a continuous torque signal is also included. Both values can be transmitted as 4 – 20 mA via analogue outputs to the control room.

Feedback signals for fieldbus interface

Both discrete and analogue signals are digitised in order to transfer them via the bus. By configuring the fieldbus telegrams you can define which of the signals is transferred to the control room. A lot more signals can be transferred than for devices with a parallel interface. For the most extensive process representation of AUMATIC Profibus DP, 86 discrete and four continuous signals are transmitted.

If the bus protocol supports the respective services, the operating data of the device can also be requested via bus.

As a rule, the number of signals transferred should be reduced to the absolute minimum required for the process. Otherwise, the data flow slows down the bus communication and extends the reaction times.

Local indication

Indication lights

The five indication lights located above the display on the local controls can be freely set. Any discrete signal can be assigned. If you would like to use a setting which is different from the default setting, we recommend to order the AUMATIC with an operation plate where the symbols used for standard configuration are missing.

Standard configuration from left to right

- End position OPEN reached
- End position CLOSED reached
- Fault
- Selector switch in REMOTE position
- Actuator moving

Display

The basic indication shows the selector switch position in the first line, the nominal position value in the second line, the actual valve value in the third line, if available, and the operation status of the device in the last line.

All signals, device parameters and operating data can be indicated as plain text in the display, using the push buttons. The display indication is available in nine languages.

Diagnostics

Diagnostic functions are used for quick fault recognition and troubleshooting in order to reduce downtimes to a minimum.

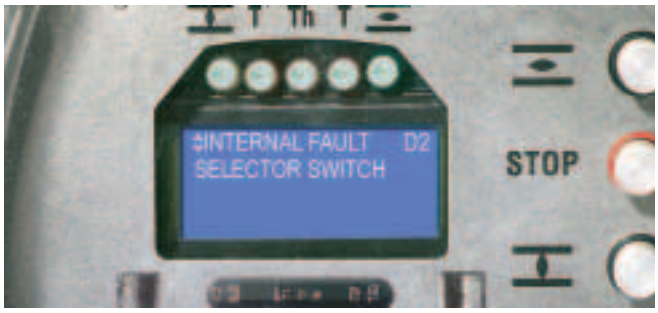
However, diagnostics can be more than that. Modern service concepts forsee preventive maintenance so that faults due to incorrect operation and wear can be excluded right from the beginning. The AUMATIC provides extensive data for this purpose.

Identification of failure causes

You can imagine the scenario: A device is defective so you call out the manufacturer who comes immediately. Unfortunately, they do not have the appropriate spare parts with them which leads to a loss of production and increased cost.

If a fault occurs the AUMATIC will indicate the defective part via the display in plain text. When contacting AUMA service, detailed fault information can be provided. The service technician will then arrive on site well prepared.

The diagnostic information can also be read via the COM-AC programming software (see page 16)



Clear fault indication. The operation instructions provide information on eliminating the faults.

Fireproof version of an AUMA SA multi-turn actuator with AUMATIC – Devices with this coating remain fully operable for at least 30 min. if exposed to temperatures up to 1,100 °C in case of a fire.

Logging of operating data

Better than fault finding at a later date is to eliminate their causes before the fault actually occurs. To achieve this, you have to know how the actuator is operated. Only then is it possible to optimise operation and to extend the lifetime of both the actuator and the valve e.g. by changing parameters.

Therefore, the AUMATIC is equipped with a comprehensive operating data logging function which counts the frequency of certain events.

- Motor run time
- Number of starts
- How often has contact been made with one of the end positions?
- How often has the torque switching been tripped?
- How often has the motor protection been tripped?

For the complete parameter list refer to the Operation and setting Actuator controls AUMATIC manual.

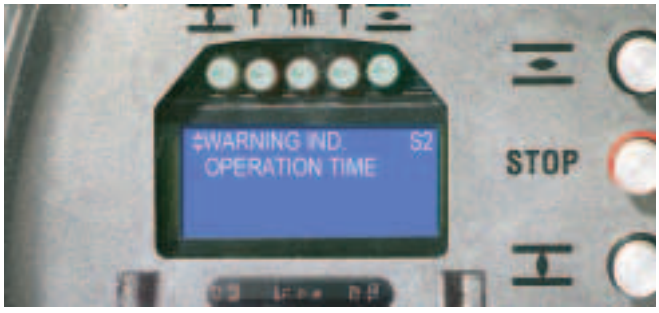
Each value is counted as an absolute and as a resettable value. The resettable counter can be reset to zero, e.g. after inspection and revision work.

Limit monitoring

When operating actuators several limits have to be observed. SAR multi-turn actuators for modulating duty, for example, have a maximum permissible number of starts of 1,200 starts per hour, or the maximum running time without interruptions for multi-turn actuators for open-close duty is 15 min.

The limit monitoring monitors these and other limits and issues a warning once these limits have been exceeded. The actuator does not stop but it is a clear indication that the cause of why the limit has been exceeded has to be detected and eliminated. If these limits are regularly exceeded, premature wear of both actuator and valve will occur. For this reason, the logging of operating data also includes the logging of the number of times the limits have been exceeded.

The default indication shows that there is warning (WRN) available. The actuator continues its operation.



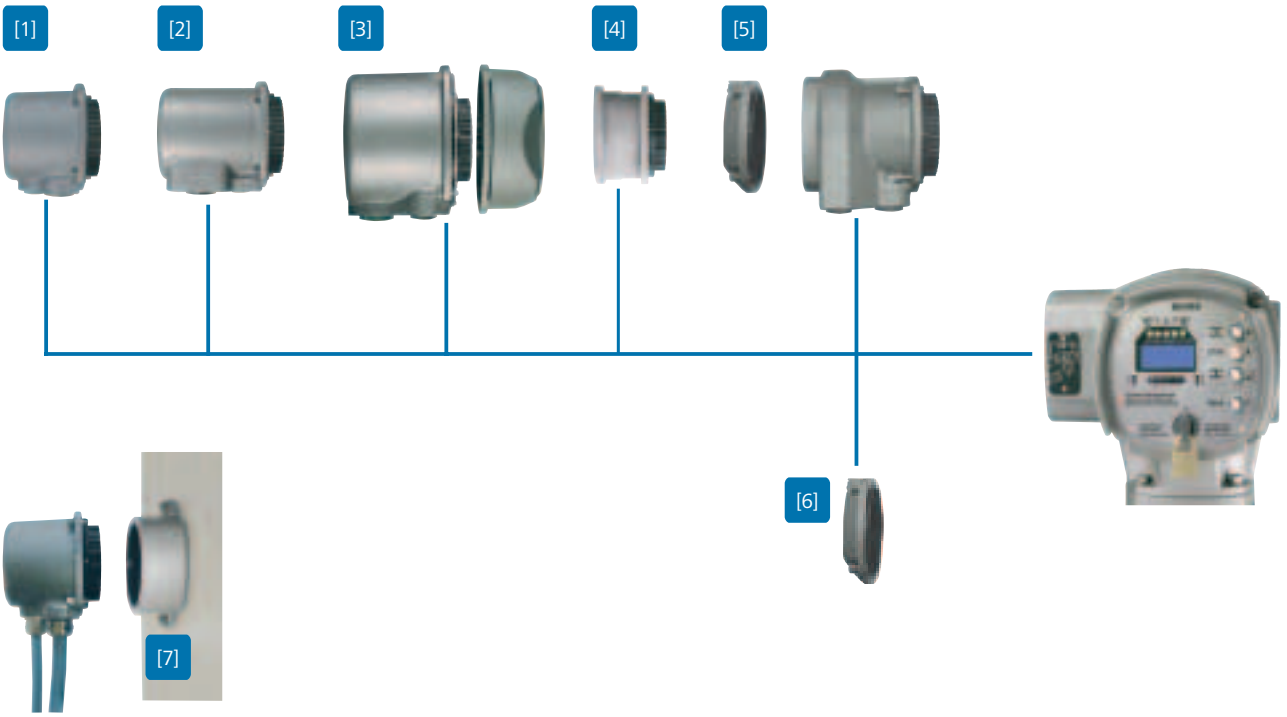
The respective status indication shows the reason for the warning.

Electrical connection for non-explosion-proof actuators

AUMA non-explosion-proof actuators use a “plug-in” type electrical connection. This applies to both power supply and signal cables. The wiring made during installation remains undisturbed, even if the actuator has to be disconnected from the mains or the DCS, e.g. for maintenance purposes. The actuator can be quickly reconnected, wiring errors are avoided.

The electrical connection is available in different sizes. The number of cable entries may vary. The cable entries usually have metric threads, Pg- or NPT-threads are also available.

The electrical connections can be used for actuators with or without controls.



All electric connections are based on the AUMA plug/socket connector with 50 screw-type terminals for connecting the signal cables and three screw-type connections for connecting the supply voltage.

[1] **Standard S**
with three cable entries. The diameter is 100 mm.

[2] **Enlarged terminal compartment SH (option)**
with up to six cable entries

[3] **Enlarged terminal compartment SE (option)**
with three cable entries. The diameter is 135 mm. An intermediate frame is required for adapting to the actuator housing.

[4] **Double sealed intermediate frame (option)**
When removing the plug cover or due to leaky cable glands, ingress of dust and water into the housing is possible. This is prevented by inserting the double sealed intermediate frame between the electrical connection and actuator housing. The enclosure protection, IP 67 or IP 68, will not be affected, even if the electrical connection is removed. The double sealed intermediate frame can be combined with any of the illustrated electrical connections.

[5] **Fieldbus connection SD**
If the actuator is equipped with actuator controls with a fieldbus interface, a special electrical connection is required. The connection of the power supply does not differ from the other electrical connections, a connection board for connecting the fieldbus cables is integrated into the plug.

[6] **Protection cover**
for protecting the plug compartment when plug is removed.

[7] **Parking frame**
for safe mounting of a disconnected plug.

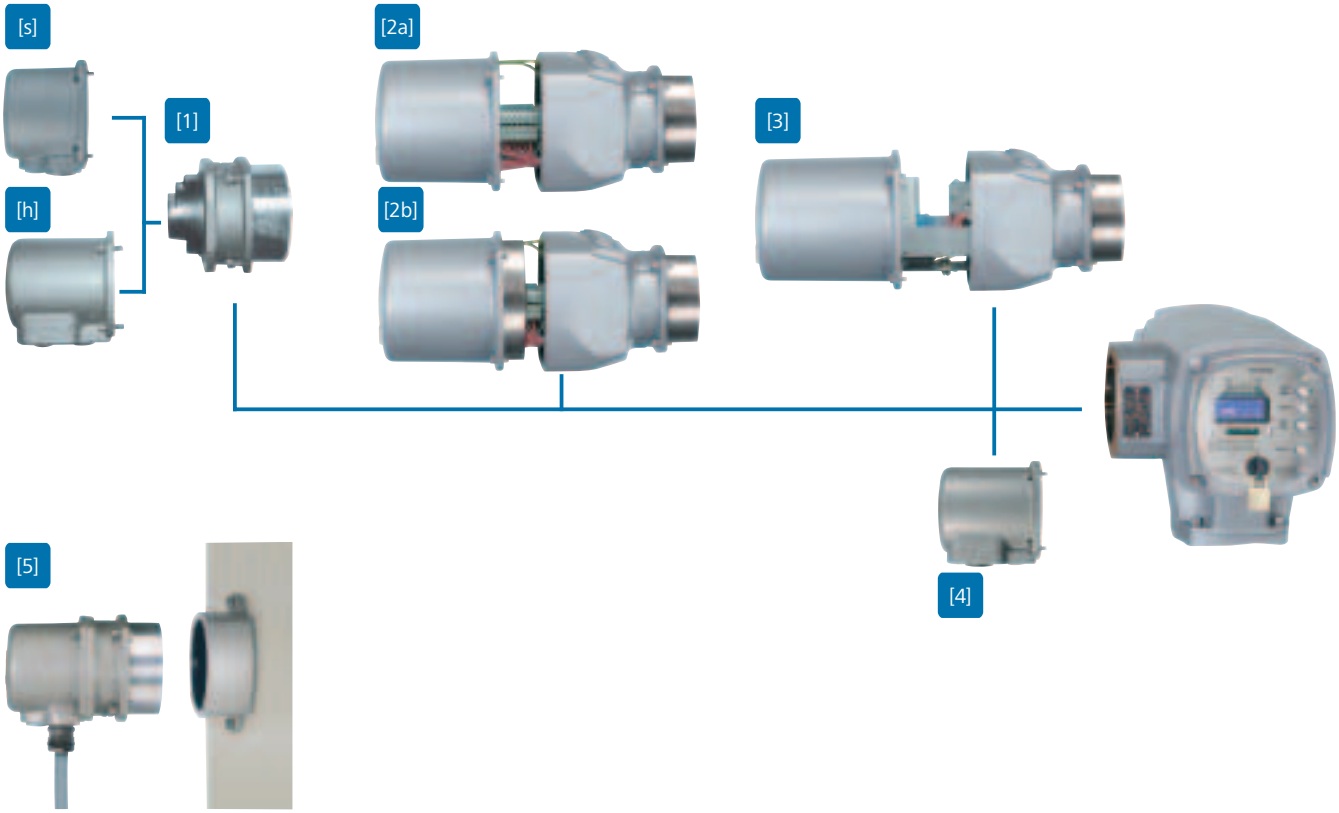
Electrical connection for explosion-proof actuators

AUMA explosion-proof actuators use a “plug-in” type electrical connection. This applies to both power supply and signal cables. The wiring made during installation remains undisturbed, even if the actuator has to be disconnected from the mains or the DCS, e.g. for maintenance purposes. The actuator can be quickly reconnected and wiring errors are avoided.

Explosion-proof connections are always double sealed: The flameproof enclosure inside the actuator remains intact even after removing the plug cover.

The electrical connection is either designed in the protection type “Increased safety” or “Flameproof enclosure”.

The electrical connections can be used for actuators with or without controls.



[1] **Plug/socket connector with screw-type terminals KP**

with 38 screw-type connections for the signal cables. This connection type is the standard connection for explosion-proof actuators, even for those with a fieldbus interface. The connection can be supplied with a standard plug cover (s) with three cable entries or with a high (h) plug cover with up to six cable entries.
The connection with the high (h) cover is also used for devices with integral controls and fieldbus interface.

[2] **Plug/socket connector with spring cage terminals KES**

with up to 50 spring cage terminals for connecting signal cables. Used with operating voltages exceeding 525 V and/or if a large number of terminals are required. The electrical connection has up to 6 cable entries.
The connection is available in protection type “Increased safety” [2a] or “Flameproof enclosure’”[2b].

[3] **Plug/socket connector with FO coupler KES**

This connection type is used for actuators with AUMATIC integral controls with a fieldbus interface and signal transmission via fibre optics. The design basically corresponds to the plug/socket connector with spring cage terminals with the addition of an FO coupler.

[4] **Protection cover**

for protecting the plug compartment when the plug is removed.

[5] **Parking frame**

for safe mounting of a disconnected plug. The parking frame with mounted plug is protected against the ingress of both dust and water.

Technical data

For detailed information refer to the separate data sheets.

	AC 01.1	AC 01.1 Bus	ACExC 01.1	ACExC 01.1 Bus
Voltage supply	3-phase AC 50 Hz: 220 V; 230 V; 240 V; 380 V; 400 V; 415 V; 500 V			
	3-phase AC 60 Hz: 440 V; 460 V; 480 V			
	1-phase AC[1] 50 Hz: 220 V; 230 V; 240 V 1-phase AC[1] 60 Hz: 110 V; 115 V; 120 V			
External supply of the electronics (option)	24 V DC +20 %/–15 % Current consumption: Basic version approx. 200 mA, with options up to 500 mA			
Switchgear (standard)	Reversing contactors[2] (mechanically and electrically interlocked) for motor power up to 1.5 kW			
Switchgear (options)	Reversing contactors[2] (mechanically and electrically interlocked) for motor power up to 7.5 kW			
	Reversing contactors[2] (mechanically and electrically interlocked) for actuators with DC motor (24 V, 48 V, 60 V, 110 V, 220 V); requires external supply of the electronics with 24 V DC and thermal overload relay		–	–
	Thyristor unit (recommended for modulating actuators)		–	–
	for motor power up to 1.5 kW, 500 V AC, with internal fuses		–	–
	for motor power up to 3,0 kW, 500 V AC, with internal fuses		–	–
	for motor power up to 5.5 kW, 500 V AC, external fuses required		–	–
Control	Standard Control inputs 24 V DC, OPEN - STOP - CLOSE - EMERGENCY (via opto-isolator, one common), current consumption: observe approx. 10 mA minimum pulse duration per input for modulating actuators	via bus	Standard Control inputs 24 V DC, OPEN - STOP - CLOSE - EMERGENCY (via opto-isolator, one common), current consumption: observe approx. 10 mA minimum pulse duration per input for modulating actuators	via bus
	Option Same as standard with 115 V AC, current consumption: approx. 15 mA per input		Option Same as standard with 115 V AC, current consumption: approx. 15 mA per input	
Feedback signals	Standard 5 NO contacts with one common, max. 250 V AC, 1 A (resistive load) 1 potential-free change-over contact, max. 250 V AC, 5 A (resistive load)	via bus	Standard 5 NO contacts with one common, max. 250 V AC, 1 A (resistive load) 1 potential-free change-over contact, max. 250 V AC, 5 A (resistive load)	via bus
	Option 5 potential-free NO/NC contacts without one common, per relay max. 250 V AC, 5 A (resistive load)		Option 5 potential-free NO/NC contacts without one common, per relay max. 250 V AC, 5 A (resistive load)	
Position feedback signal (option)	Galvanically isolated analogue output E2 = 0/4 – 20 mA (load max. 500 Ohm)	via bus	Galvanically isolated analogue output E2 = 0/4 – 20 mA (load max. 500 Ohm)	via bus
Voltage output	Standard Auxiliary voltage 24 V DC, max. 100 mA for supply of the control inputs, galvanically isolated from internal voltage supply			
	Option Auxiliary voltage 115 V AC, max. 30 mA for supply of the control inputs, galvanically isolated from internal voltage supply			

[1] The explosion-proof versions ACExC with 1-phase AC supply can only be used in combination with the SGExC part-turn actuators.

[2] The reversing contactors are designed for a lifetime of 2 million starts. For applications requiring a high number of starts, we recommend the use of thyristor units.

Certificates

EU Directives

Declaration of Incorporation in compliance with the Machinery Directive and Declaration of Conformity according to the ATEX, Low Voltage and EMC Directives

According to the Machinery Directive, AUMA actuators and actuator controls are considered as partly completed machinery. This means that a Declaration of Conformity in accordance with this Directive will not be issued by AUMA. AUMA's Declaration of Incorporation confirms that during the design stage of the devices, the fundamental safety requirements stipulated in the Machinery Directive were applied.

AUMA actuators fulfil the requirements of the ATEX, Low Voltage and EMC Directives. This has been proved in extensive tests. Therefore, AUMA issues a Declaration of Conformity.

The declarations of incorporation and conformity form a joint certificate, also integrated within the operation instructions.

According to the Low Voltage and EMC Directives, the devices are labelled with the CE mark.

CE

Final inspection record

After assembly, all actuators are thoroughly tested according to AUMA's inspection specification and the torque switches are calibrated. The procedure is recorded on the final inspection record.

Certificates

To prove the suitability of the devices for special applications, notified bodies perform type tests on the devices. One example are the tests to which explosion-proof devices are subjected. If a device has passed the test, this is recorded in a certificate. For all explosion-proof devices mentioned in this brochure, the relevant certificates can be provided.

Where can I get the certificates?

All certificates and records are provided by AUMA on request either as a hard or digital copy.

The documents can be downloaded from the AUMA website around the clock; some of them are password protected.

- www.auma.com

SIL Functional safety

AUMA has performed a risk analysis and a risk assessment in compliance with EN 61508. Upon request, the results can be supplied.

Quality is not just a matter of trust

Actuators must be reliable and dependable. They determine the cycle of accurately defined work processes.

But reliability does not begin during commissioning. It begins with a well thought out design and careful selection of materials. This continues with conscientious production using ultra-modern machinery in clearly controlled and supervised steps, while keeping in mind the environment.

At AUMA, quality management is monitored on a daily basis. Numerous customer and independent audits, backed by ISO 9001 and ISO 14001 certification confirm these high standards.

The actuator specialist

At AUMA, everything revolves around the electric actuator. In a world where industrial processes have become increasingly complex, concentration is an asset – while still being able to see the bigger picture.

AUMA has to cope with a multitude of requirements from the most different applications and from every corner of the world - this is our daily business. We rise to this challenge by pursuing a clear but flexible product policy – supplying the ideal actuator to every customer.

For this purpose, you have to know your markets. Thinking globally means acting regionally. A comprehensive worldwide sales and service network ensures that there is a competent local contact for every customer.

Since 1964, AUMA has established an excellent brand name in the world of actuators. Reliability and innovation are concepts which are closely linked with AUMA. This is above all to be credited to AUMA's dedicated employees who work devotedly on the future of the actuator.

Literature

Further literature

Brochures

- Information
  Electric actuators and valve gearboxes according to ATEX directive 94/9/EC for the use in potentially explosive atmospheres
- Information
  AUMA actuators with fieldbus interfaces
- Product description
  Actuator controls AUMA MATIC
- Product description
  Electric multi-turn actuators SA 07.1 – SA 48.1
- Product description
  Electric part-turn actuators SG 05.1 – SG 12.1

Technical data

- Actuator controls AUMATIC AC 01.1
- Actuator controls AUMATIC ACExC 01.1
- Actuator controls AUMATIC AC 01.1 Profibus DP
- Actuator controls AUMATIC ACExC 01.1 Profibus DP
- Actuator controls AUMATIC AC 01.1 Modbus
- Actuator controls AUMATIC ACExC 01.1 Modbus
- Actuator controls AUMATIC AC 01.1 DeviceNet
- Actuator controls AUMATIC ACExC 01.1 DeviceNet
- Actuator controls AUMATIC AC 01.1 Foundation Fieldbus

In addition, there are dimension sheets and wiring diagrams available.

The latest issues of all documentation can be downloaded as PDF files from www.auma.com.

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auma®

Solutions for a world in motion

[1] Multi-turn actuators
SA 07.2 – SA 16.2/SA 25.1 – SA 48.1
Torques from 10 to 32,000 Nm
Output speeds from 4 to 180 rpm

[2] Multi-turn actuators SA/SAR
with controls AUMATIC
Torques from 10 to 1,000 Nm
Output speeds from 4 to 180 rpm

[3] Linear actuators SA/LE
Combination of multi-turn actuator SA
with linear thrust unit LE
Thrusts from
4 kN to 217 kN
Strokes up to 500 mm
Linear speeds
from 20 to 360 mm/min

[4] Part-turn actuators
SG 05.1 – SG 12.1
Torques from 100 to 1,200 Nm
Operating times for 90° from 4 to 180 s

[5] Part-turn actuators SA/GS
Combination of multi-turn actuator SA with
part-turn gearbox GS
Torques up to 675,000 Nm

[6] Bevel gearboxes
GK 10.2 – GK 40.2
Torques up to 16,000 Nm

[7] Spur gearboxes
GST 10.1 – GST 40.1
Torques up to 16,000 Nm

[8] Worm gearboxes with base and lever
GF 50.3 – GF 250.3
Torques up to 32,000 Nm

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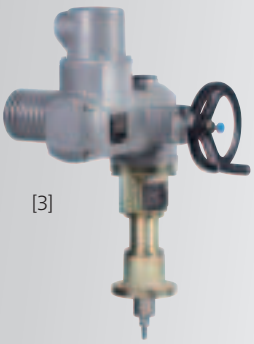
[1]

[2]



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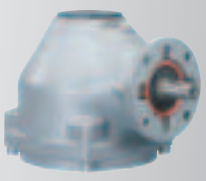

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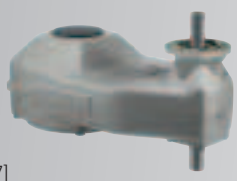

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[8]

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