

**General information**

AC 01.2 actuator controls for controlling multi-turn actuators of the SA/SAR .2 type range and part-turn actuators of the SG/SGR type range with Foundation Fieldbus interface.

**Features and functions**

Power supply

Standard voltages:

3-phase AC current voltages/frequencies								1-phase AC current voltages/frequencies			
Volt	380	400	415	440	460	480	500	Volt	110, 115, 120	220, 230, 240	
Hz	50	50	50	60	60	60	50	Hz	60	50	

Special voltages:

3-phase AC current voltages/frequencies					1-phase AC current voltages/frequencies	
Volt	525	575	660	690	Volt	208
Hz	50	50	50	50	Hz	60

Permissible variation of mains voltage: 10 %

Permissible variation of mains voltage: ±30 % (option)

Permissible variation of mains frequency: ±5 %

External supply of the electronics (option)

24 V DC +20 %/–15 %,

Current consumption: Basic version approx. 250 mA, with options up to 500 mA

External power supply must have reinforced insulation against mains voltage in accordance with IEC 61010-1 and may only be supplied by a circuit limited to 150 VA in accordance with IEC 61010-1.

Current consumption

Current consumption of controls depending on mains voltage:

For permissible variation of the mains voltage ±10 %:

- 100 to 120 V AC = max. 740 mA
- 208 to 240 V AC = max. 400 mA
- 380 to 500 V AC = max. 250 mA
- 515 to 690 V AC = max. 200 mA

For permissible variation of the mains voltage ±30 %:

- 100 to 120 V AC = max. 1,200 mA
- 208 to 240 V AC = max. 750 mA
- 380 to 500 V AC = max. 400 mA
- 515 to 690 V AC = max. 400 mA

Overvoltage category

Category III according to IEC 60364-4-443

Rated power

Controls are designed for rated motor power, refer to Electrical Data Multi-turn actuators or Part-turn actuators

Switchgear

Standard: Reversing contactors (mechanically and electrically interlocked) for AUMA power classes A1/A2

Options: Reversing contactors (mechanically and electrically interlocked) for AUMA power class A3

Thyristor unit for mains voltage up to 500 V AC (recommended for modulating actuators) for AUMA power classes B1, B2 and B3

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.

For AUMA power class assignment, refer to Electrical data Multi-turn actuators or Part-turn actuators.

Control and feedback signals

Via Foundation Fieldbus H1 interface

Fieldbus interface with additional input signals (options)

- 2 free analogue inputs (0/4 – 20 mA), 4 free digital inputs
  - Signal transmission is made via fieldbus interface
- MODE, CLOSE, OPEN, STOP, EMERGENCY inputs, I/O interface with 0/4 – 20 mA input for position setpoint
  - Control inputs OPEN, STOP, CLOSE, EMERGENCY
  - I/O interface for selecting the control type (fieldbus or additional input signals)
  - MODE for selecting between open-close duty (OPEN, STOP, CLOSE) and modulating duty (0/4 – 20 mA position setpoint)

Voltage and current values of the optional additional inputs	Standard:	24 V DC, current consumption: approx. 10 mA per input
Voltage and current values of the optional additional inputs	Options:	48 V DC, current consumption: approx. 7 mA per input 60 V DC, current consumption: approx. 9 mA per input 115 V DC, current consumption: approx. 15 mA per input 115 V AC, current consumption: approx. 15 mA per input
		All input signals must be supplied with the same potential.
Status signals		Via Foundation Fieldbus H1 interface
Fieldbus interface with additional output signals (options)		Additional output signals (only available in combination with additional input signals) Binary output signals <ul style="list-style-type: none"> <li>• 6 programmable output contacts <ul style="list-style-type: none"> <li>- 5 potential-free NO contacts with one common, max. 250 V AC, 1 A (resistive load), default configuration: End position CLOSED, end position OPEN, selector switch REMOTE, torque fault CLOSE, torque fault OPEN</li> <li>- 1 potential-free change-over contact, max. 250 V AC, 5 A (resistive load), default configuration: Collective fault signal (torque fault, phase failure, motor protection tripped)</li> </ul> </li> <li>• 6 programmable output contacts <ul style="list-style-type: none"> <li>- 5 potential-free change-over contacts with one common, max. 250 V AC, 1 A (resistive load)</li> <li>- 1 potential-free change-over contact (max. 250 V AC, 5 A)</li> </ul> </li> <li>• 6 programmable output contacts <ul style="list-style-type: none"> <li>- 6 potential-free change-over contacts without one common, max. 250 V AC, 5 A (resistive load)</li> </ul> </li> </ul> Analogue output signal for position feedback <ul style="list-style-type: none"> <li>• Galvanically isolated position feedback 0/4 – 20 mA (load max. 500 Ω)</li> </ul>
Voltage output	Standard:	Auxiliary voltage 24 V DC, max. 100 mA for supply of control inputs, galvanically isolated from internal voltage supply
	Option:	Auxiliary voltage 115 V AC, max. 30 mA for supply of control inputs, galvanically isolated from internal voltage supply Not possible in combination with PTC tripping device
Redundancy (option)		Redundant FF H1 interface in accordance with AUMA redundancy I
Local controls	Standard:	<ul style="list-style-type: none"> <li>• Selector switch LOCAL - OFF - REMOTE (lockable in all three positions)</li> <li>• Push buttons OPEN, STOP, CLOSE, RESET <ul style="list-style-type: none"> <li>- Local Stop The actuator can be stopped via push button Stop of local controls if the selector switch is in position REMOTE. Not activated when leaving the factory.</li> </ul> </li> <li>• 6 indication lights: <ul style="list-style-type: none"> <li>- End positions and running indication CLOSED (yellow), torque fault CLOSE (red), motor protection tripped (red), torque fault OPEN (red), end position and running indication OPEN (green), Bluetooth (blue)</li> </ul> </li> <li>• Graphic LC display, illuminated</li> </ul>
	Option:	<ul style="list-style-type: none"> <li>• Special colours for the 5 indication lights: <ul style="list-style-type: none"> <li>- End position CLOSED (green), torque fault CLOSE (blue), torque fault OPEN (yellow), motor protection tripped (violet), end position OPEN (red)</li> </ul> </li> </ul>
Bluetooth communication interface		Bluetooth class II chip, version 2.0 with a range up to 10 m in industrial environments. Supports the SPP Bluetooth profile (Serial Port Profile). Programming software: AUMA ToolSuite, commissioning and diagnostic tool for Windows-based PCs, PDAs and smartphones
Application functions		<ul style="list-style-type: none"> <li>• Switch-off mode adjustable <ul style="list-style-type: none"> <li>- Limit or torque seating for end position OPEN and end position CLOSED</li> </ul> </li> <li>• Torque by-pass, adjustable up to 5 seconds (no torque monitoring during start-up time)</li> <li>• Start and end of stepping mode as well as ON and OFF times (1 to 1,800 seconds) can be set individually for directions OPEN and CLOSE.</li> <li>• Any 8 intermediate positions between 0 and 100 %, reaction and signal behaviour programmable</li> <li>• Positioner: <ul style="list-style-type: none"> <li>- Position setpoint via fieldbus interface</li> <li>- Automatic adaptation of the dead band (adaptive behaviour selectable)</li> <li>- Selection between open-close duty and modulating duty via Foundation Fieldbus function blocks.</li> </ul> </li> </ul>

Safety functions	<ul style="list-style-type: none"> <li>EMERGENCY operation, behaviour programmable <ul style="list-style-type: none"> <li>Digital input low active (option), or via fieldbus interface</li> <li>Reaction can be selected: Stop, run to end position CLOSED, run to end position OPEN, run to intermediate position</li> <li>Torque monitoring can be by-passed during EMERGENCY operation.</li> <li>Thermal protection can be by-passed during EMERGENCY operation (only in combination with thermoswitch within actuator, not with PTC thermistor).</li> </ul> </li> <li>Release of local controls via fieldbus interface. Thus, actuator operation can be enabled or disabled via push buttons on the local controls.</li> <li>Local Stop <ul style="list-style-type: none"> <li>The actuator can be stopped via push button Stop of local controls if the selector switch is in position REMOTE. Not activated when leaving the factory.</li> </ul> </li> <li>EMERGENCY Stop push button (latching) interrupts electrical operation, irrespective of the selector switch position</li> <li>Interlock, enabling the operation commands OPEN or CLOSE via fieldbus interface</li> </ul>	
Monitoring functions	<ul style="list-style-type: none"> <li>Valve overload protection (adjustable), results in switching off and generates fault signal</li> <li>Motor temperature monitoring (thermal monitoring), results in switching off and generates fault indication</li> <li>Monitoring the heater within actuator, generates warning signal</li> <li>Monitoring of permissible on-time and number of starts (adjustable), generates warning signal</li> <li>Operation time monitoring (adjustable), generates warning signal</li> <li>Phase failure monitoring, results in switching off and generates fault signal</li> <li>Automatic correction of rotation direction upon wrong phase sequence (3-ph AC current)</li> </ul>	
Diagnostic functions	<ul style="list-style-type: none"> <li>Electronic device ID with order and product data</li> <li>Logging of operating data: A resettable counter and a lifetime counter each for: <ul style="list-style-type: none"> <li>Motor running time, number of starts, torque switch trippings in end position CLOSED, limit switch trippings in end position CLOSED, torque switch trippings in end position OPEN, limit switch trippings in end position OPEN, torque faults CLOSE, torque faults OPEN, motor protection trippings</li> </ul> </li> <li>Time-stamped event report with history for setting, operation and faults: <ul style="list-style-type: none"> <li>Status signals according to NAMUR recommendation NE 107: "Failure", "Function check", "Out of specification", "Maintenance required"</li> </ul> </li> <li>Torque characteristics <ul style="list-style-type: none"> <li>3 torque characteristics (torque-travel characteristic) for opening and closing directions, can be saved separately. Torque characteristics stored can be shown on the display.</li> </ul> </li> </ul>	
Motor protection evaluation	Standard:	<ul style="list-style-type: none"> <li>Monitoring the motor temperature in combination with thermoswitches within actuator motor</li> </ul>
	Options:	<ul style="list-style-type: none"> <li>Thermal overload relay in controls combined with thermoswitches within actuator</li> <li>PTC tripping device in combination with PTC thermistors within actuator motor</li> </ul>
Overvoltage protection (option)	Protection of the actuator and control electronics against overvoltages on the fieldbus cables of up to 4 kV	
Electrical connection	Standard:	AUMA plug/socket connector with screw-type connection
	Options:	<ul style="list-style-type: none"> <li>Terminals or crimp connection</li> <li>Gold-plated control plug (sockets and plugs)</li> </ul>
Threads for cable entries	Standard:	Metric threads
	Options:	Pg-threads, NPT-threads, G-threads
Wiring diagram (basic version)	TPCAF000-1A1-A000 TPA00R1AA-0A1-000	

**Further options for version with MWG in actuator**

Setting of limit and torque switching via local controls

Torque feedback signal	Via Foundation Fieldbus Galvanically isolated analogue output 0/4 – 20 mA (load max. 500 Ω), option, only possible in combination with output contact.
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**Settings/programming the Foundation Fieldbus interface**

Setting the Foundation Fieldbus address	The address is set via Foundation Fieldbus while using the provided system management services and a configuration software for Foundation Fieldbus (e.g. NI-FBUS).
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Configurable feedback signals	The feedback signals of the Analog Input (AI) and Discrete Input (DI) function blocks may be configured according to the requirements using channels and the appropriate transducer blocks. Configuration is made via Foundation Fieldbus while using the device description and a configuration software for Foundation Fieldbus (e.g. NI-FBUS).
Programming of AUMATIC user functions	AUMATIC user functions (e.g. stepping mode, intermediate positions, ...) may either be programmed via AUMATIC display or via Foundation Fieldbus using the AUMATIC device description and a configuration software for Foundation Fieldbus (e.g. NI-FBUS).

**General Foundation Fieldbus interface data**

Communication protocol	Foundation Fieldbus H1 (31.25 kbit/s) in accordance with IEC 61158 and IEC 61784-1
Physical Layer	Separate supply, standard data transmission
Network topology	Line, star and tree structures (trunks combined with spurs) are supported. Internal spur line length within AC 01.2 amounts to 0.27 m.
Transmission medium	Two-wire copper cable with data transmission and voltage supply on the same wire pair in accordance with: <ul style="list-style-type: none"> <li>ISA S50.02-1992 ISA Physical Layer Standard or</li> <li>IEC 61158-2:2000 (ed. 2.0), Fieldbus standard for use in industrial control systems, Part 2: Physical Layer specification and service definition</li> <li>Recommendation: Use cable type A (screened and twisted)</li> </ul>
Foundation Fieldbus current consumption	Approx. 13 mA at +24 V DC
Foundation Fieldbus transmission rate	31.25 kbit/s
Cable length	Max. 1,900 m (only when using the recommended A type cable); with repeaters (4 units max.) expandable up to a max. of 9.5 km
Number of devices	<ul style="list-style-type: none"> <li>Max. 32 devices per segment; all in all max. 240 devices can be addressed</li> <li>Typical number of devices: approx. 6 – 15 devices per segment</li> </ul>
Communication services	<ul style="list-style-type: none"> <li>Publisher/subscriber communication for the transmission of process data</li> <li>Client/server communication for programming and configuration</li> <li>Report distribution for transmission of alarm signals</li> </ul>
Supported Foundation Fieldbus functions	AC 01.2 is a Link Master device. Link Master devices can take over the Link Active Scheduler (LAS) function for bus communication co-ordination.
Permissive connection	AC 01.2 controls offer an automatic polarity detection and polarity correction of the Foundation Fieldbus cable.

**Function blocks of the AUMATIC Foundation Fieldbus interface**

Function blocks of the output signals	<ul style="list-style-type: none"> <li>8 Discrete Output (DO) function blocks for discrete output signals, e.g.: <ul style="list-style-type: none"> <li>OPEN, STOP, CLOSE</li> <li>RESET</li> <li>EMERGENCY</li> <li>Interlock OPEN/CLOSE</li> <li>Enable Local</li> <li>Intermediate positions</li> <li>Digital customer outputs</li> </ul> </li> <li>2 Analog Output (AO) function blocks for analogue output signals, e.g.: <ul style="list-style-type: none"> <li>Setpoint position</li> <li>Analogue customer outputs</li> </ul> </li> </ul>
Function blocks for input signals	<ul style="list-style-type: none"> <li>10 Discrete Input (DI) function blocks for discrete feedback signals, e.g.: <ul style="list-style-type: none"> <li>End position OPEN/CLOSED</li> <li>Selector switch in position LOCAL/REMOTE</li> <li>Running indication (directional)</li> <li>Torque switches OPEN, CLOSED</li> <li>Limit switches OPEN, CLOSED</li> <li>Manual operation by handwheel or via local controls</li> <li>Intermediate positions</li> <li>Digital customer inputs</li> </ul> </li> <li>4 Analog Input (AI) function blocks for analogue feedback signals, e.g.: <ul style="list-style-type: none"> <li>Actual position</li> <li>Torque</li> <li>Analogue 0 – 20 mA customer inputs</li> </ul> </li> </ul>

We reserve the right to alter data according to improvements made. Previous documents become invalid with the issue of this document.

Further function blocks	<ul style="list-style-type: none"> <li>• 1 Signal Characterizer function block (SC) for conversion of analogue signals</li> <li>• 1 Input Selector (IS) function block for selection of analogue input signals</li> <li>• 1 Process controller (PID) block as function block for modulating applications</li> <li>• Resource Block (RB) for defining characteristic Foundation Fieldbus device data</li> <li>• 4 Transducer Blocks (AOTB, DOTB, AITB, DITB) as connection blocks for discrete and analogue input and output signals</li> <li>• 1 Transducer Block (PTB) as connection block for control</li> <li>• 1 Transducer Block (AUMACTB) for configuration and programming</li> <li>• 1 Transducer Block (AUMADTB) for monitoring and diagnostics</li> </ul>
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#### Special features of the AUMATIC Foundation Fieldbus interface

Manufacturer ID	0A01FF
Device type	0x0001
Device revision	0x01
Device ID	0A01FF0001-(works number of AC.2-x)-(series number FF module)
Baud rate	31.25 kbit/s
Polarity	No polarity (automatic polarity detection and correction)

#### Segment information

Standard	FF H1
Link master (LAS) function	Yes
Current consumption	13 mA
FF connection current	< 20 mA
Device voltage min/max	9 – 32 V DC
FF capacity	< 5 nF
FF inductivity	< 10 µH
Jitter tolerance range	< ±8 µs
Min. transmission level (Vp-t-p)	> 0,75 V
Available server VCRs	23
Available source VCRs	23
Available publisher VCRs	23
Available subscriber VCRs	23
DD revision	0x01
CFF revision	010101
ITK revision	6.0.1

#### Available channels

Analog Output (AO) function blocks	0, 1, 3, 20, 21
Discrete Output (DO) function blocks	0, 2, 4 – 19
Analog Input (AI) function blocks	3, 4, 5, 6
Discrete Input (DI) function blocks	0, 22 – 66, 71

#### Number of function blocks with the respective execution times [ms]

8 Discrete Output (DO) function blocks	30
2 Analog Output (AO) function blocks	30
10 Discrete Input (DI) function blocks	20
4 Analog Input (AI) function blocks	30
1 Signal Characterizer (SC) function block	40
1 Input Selector (IS) function block	30
1 Proportional/Integral/Differential (PID) function block	40

<b>Service conditions</b>	
Use	Indoor and outdoor use permissible
Mounting position	Any position
Installation altitude	Standard: ≤ 2,000 m above sea level
	Option: > 2,000 m above sea level, please contact AUMA
Ambient temperature	Standard: -25 °C to +70 °C
	Options: -60 °C to +60 °C, extreme low temperature version incl. heating system
	Low temperature versions incl. heating system for connection to external power supply 230 V AC or 115 V AC.
Humidity	Up to 100 % relative humidity across the entire permissible temperature range
Enclosure protection according to EN 60529	Standard: IP 68 with AUMA 3-phase AC motor/1-phase AC motor For special motors differing enclosure protection: refer to name plate
	Option: Terminal compartment additionally sealed against interior (double sealed)
	According to AUMA definition, enclosure protection IP 68 meets the following requirements: <ul style="list-style-type: none"> <li>• Depth of water: maximum 8 m head of water</li> <li>• Duration of continuous immersion in water: Max. 96 hours</li> <li>• Up to 10 operations during continuous immersion</li> </ul> Modulating duty is not possible during continuous immersion.
Pollution degree	Pollution degree 4 (when closed)
Vibration resistance according to IEC 60068-2-6	1 g, from 10 Hz to 200 Hz Resistant to vibration during start-up or for failures of the plant. However, a fatigue strength may not be derived from this. Not valid in combination with gearboxes.
Corrosion protection	Standard: KS Suitable for installation in industrial units, in water or power plants with a low pollutant concentration as well as for installation in occasionally or permanently aggressive atmosphere with a moderate pollutant concentration (e.g. wastewater treatments plants, chemical industry)
	Option: KX Suitable for installation in extremely aggressive atmospheres with high humidity and high pollutant concentration
Finish coating	Powder paint Two-component iron-mica combination
Colour	Standard: AUMA silver-grey (similar to RAL 7037)
	Option: Other colours are possible on request.

<b>Accessories</b>	
Wall bracket	AC 01.2 mounted separately from the actuator, including plug/socket connector. Connecting cable on request.  Recommended for high ambient temperatures, difficult access, or in case of heavy vibration during service. Cable length between actuator and AC 01.2 max. 100 m. Not suitable for version with potentiometer in the actuator. Instead of the potentiometer, the actuator has to be provided with RWG. Cable length for Non-intrusive version with MWG in the actuator max. 100 m. Requires separate data cable for MWG.
Programming software for PC	AUMA ToolSuite

<b>Further information</b>	
Weight	Approx. 7 kg (with AUMA plug/socket connector)
EU Directives	Electromagnetic Compatibility (EMC): (2004/108/EC) Low Voltage Directive: (2006/95/EC) Machinery Directive: (2006/42/EC)
Reference documents	Product description Electric multi-turn actuators with integral controls SA 07.2 – SA 16.2/SA 25.1 – SA 48.1 with AM 01.1/2.1 and AC 01.2 Product description Electric part-turn actuators with integral controls SG 05.1 – SG12.1 with AM 01.1 – AM 02.1 and AC 01.2 Dimensions Multi-turn actuators with integral controls AUMATIC Dimensions Part-turn actuators with integral controls AUMATIC