

AC 01.2 Profibus DP Technical data Actuator controls

General information

AC 01.2 actuator controls for controlling multi-turn actuators of the SA/SAR .1, SA/SAR .2 type range and part-turn actuators of the SQ/SQR type range with Profibus DP interface.

Features and functions

Power supply	<p>Standard voltages AC:</p> <table border="1" data-bbox="467 629 1070 770"> <thead> <tr> <th colspan="12">3-phase AC</th> </tr> <tr> <th colspan="12">Voltages/frequencies</th> </tr> </thead> <tbody> <tr> <td>Volt</td> <td>220</td> <td>230</td> <td>380</td> <td>380</td> <td>400</td> <td>400</td> <td>415</td> <td>440</td> <td>460</td> <td>480</td> <td>500</td> </tr> <tr> <td>Hz</td> <td>60</td> <td>50</td> <td>50</td> <td>60</td> <td>50</td> <td>60</td> <td>50</td> <td>60</td> <td>60</td> <td>60</td> <td>50</td> </tr> </tbody> </table> <table border="1" data-bbox="467 804 975 945"> <thead> <tr> <th colspan="5">1-phase AC</th> </tr> <tr> <th colspan="5">Voltages/frequencies</th> </tr> </thead> <tbody> <tr> <td>Volt</td> <td>110 – 120</td> <td>110 – 120</td> <td>220 – 240</td> <td>220 – 240</td> </tr> <tr> <td>Hz</td> <td>50</td> <td>60</td> <td>50</td> <td>60</td> </tr> </tbody> </table> <p>Special voltages: Voltage >500 V AC are only permissible with external control box.</p> <table border="1" data-bbox="467 1039 1139 1180"> <thead> <tr> <th colspan="9">3-phase AC</th> <th colspan="2">1-phase AC</th> </tr> <tr> <th colspan="9">Voltages/frequencies</th> <th colspan="2">Voltages/frequencies</th> </tr> </thead> <tbody> <tr> <td>Volt</td> <td>220</td> <td>240</td> <td>525</td> <td>575</td> <td>575</td> <td>600</td> <td>660</td> <td>690</td> <td>Volt</td> <td>208</td> </tr> <tr> <td>Hz</td> <td>50</td> <td>50</td> <td>50</td> <td>50</td> <td>60</td> <td>60</td> <td>50</td> <td>50</td> <td>Hz</td> <td>60</td> </tr> </tbody> </table> <p>Permissible variation of mains voltage: $\pm 10\%$ Permissible variation of mains voltage: $\pm 30\%$ (option) Permissible variation of mains frequency: $\pm 5\%$ Special voltages DC: (on request)</p> <table border="1" data-bbox="467 1332 796 1429"> <thead> <tr> <th colspan="7">DC current</th> </tr> <tr> <th colspan="7">Voltages</th> </tr> </thead> <tbody> <tr> <td>Volt</td> <td>24</td> <td>48</td> <td>60</td> <td>110</td> <td>125</td> <td>220</td> </tr> </tbody> </table> <p>Permissible voltage deviation: (on request)</p>	3-phase AC												Voltages/frequencies												Volt	220	230	380	380	400	400	415	440	460	480	500	Hz	60	50	50	60	50	60	50	60	60	60	50	1-phase AC					Voltages/frequencies					Volt	110 – 120	110 – 120	220 – 240	220 – 240	Hz	50	60	50	60	3-phase AC									1-phase AC		Voltages/frequencies									Voltages/frequencies		Volt	220	240	525	575	575	600	660	690	Volt	208	Hz	50	50	50	50	60	60	50	50	Hz	60	DC current							Voltages							Volt	24	48	60	110	125	220
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External supply of the electronics (option)	<p>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.</p>																																																																																																																																					
Current consumption	<p>Current consumption of the actuator controls depending on mains voltage: For permissible variation of mains voltage of $\pm 10\%$:</p> <ul style="list-style-type: none"> • 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 <p>For permissible variation of mains voltage of $\pm 30\%$:</p> <ul style="list-style-type: none"> • 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	Actuator controls are designed for nominal motor power, refer to Electrical data pertaining to the actuator																																																																																																																																					

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Technical data Actuator controls

Features and functions	
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 the assignment of AUMA power classes, please refer to Electrical data on actuator
Control and feedback signals	Via Profibus DP interface
Fieldbus interface with additional input signals (option)	<ul style="list-style-type: none"> 2 free analogue inputs (0/4 – 20 mA), 4 free digital inputs <ul style="list-style-type: none"> Signal transmission is made via fieldbus interface Inputs OPEN, STOP, CLOSE, EMERGENCY, I/O interface, MODE (via opto-isolator thereof OPEN, STOP, CLOSE, MODE with one common and EMERGENCY, I/O interface respectively without common) <ul style="list-style-type: none"> OPEN, STOP, CLOSE, EMERGENCY control inputs I/O interface: Selection of control type (fieldbus interface or additional input signals) MODE: Selection between open-close duty (OPEN, STOP, CLOSE) or modulating duty (0/4 – 20 mA position setpoint) Additionally 1 analogue input (0/4 – 20 mA) for position setpoint Inputs OPEN, STOP, CLOSE, EMERGENCY, I/O interface, MODE (via opto-isolator thereof OPEN, STOP, CLOSE, MODE with one common and EMERGENCY, I/O interface respectively without common) <ul style="list-style-type: none"> OPEN, STOP, CLOSE, EMERGENCY control inputs I/O interface: Selection of control type (fieldbus interface or additional input signals) MODE: Selection between open-close duty (OPEN, STOP, CLOSE) or modulating duty (0/4 – 20 mA position setpoint) Additionally 1 analogue input (0/4 – 20 mA) for setpoint position and 1 analogue input (0/4 – 20 mA) for actual process value
Control voltage and current consumption of optional, digital additional inputs	Standard 24 V DC, current consumption: approx. 10 mA per input
	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 100 – 120 V AC, current consumption : approx. 15 mA per input
	All input signals must be supplied with the same potential.
Status signals	Via Profibus DP interface
Fieldbus interface with additional output signals (option)	<p>Additional, binary output signals (only available in combination with additional input signals (option))</p> <ul style="list-style-type: none"> 6 programmable output contacts: <ul style="list-style-type: none"> 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 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) 6 programmable output contacts: <ul style="list-style-type: none"> 5 potential-free change-over 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) 6 programmable output contacts: <ul style="list-style-type: none"> 6 potential-free change-over contacts without one common, max. 250 V AC, 5 A (resistive load) 6 programmable output contacts: <ul style="list-style-type: none"> 4 mains failure proof potential-free NO contacts with one common, max. 250 V AC, 1 A (resistive load), 1 potential-free NO contact, max. 250 V AC, 1 A (resistive load), 1 potential-free change-over contact, max. 250 V AC, 5 A (resistive load) 6 programmable output contacts: <ul style="list-style-type: none"> 4 mains failure proof potential-free NO contacts, max. 250 V AC, 5 A (resistive load), 2 potential-free change-over contacts, max. 250 V AC, 5 A (resistive load), <p>All binary output signals must be supplied with the same potential.</p> <ul style="list-style-type: none"> Analogue output signal for position feedback <ul style="list-style-type: none"> Galvanically isolated position feedback 0/4 – 20 mA (load max. 500 Ω)

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Features and functions	
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)
Profibus DP-V1 (option)	Access to parameters, the electronic name plate and the operating and diagnostic data with acyclic write/read services
Profibus DP-V2 (option)	Redundancy behaviour according to Profibus DP-V2 specification no. 2.212 (Primary and Backup with RedCom) Synchronisation of time between actuator controls and Profibus master with subsequent time stamp of the most important events such as malfunctions, end position and torque signals from actuator controls
Redundancy (option)	Requires Profibus DP-V2 (option) Redundant line topology with universal redundancy behaviour according to AUMA redundancy I or II Redundant line topology and redundancy behaviour according to Profibus DP-V2 specification no. 2.212 (Primary and Backup with RedCom)
FO cable connection (option)	<ul style="list-style-type: none"> • Connector types: ST or SC connector • FO cables <ul style="list-style-type: none"> - Multi-mode: 62,5(50)/125 µm, range approx. 2.5 km (max. 2.0 dB/km) - Single-mode: 9/125 µm, range approx. 15 km (max. 0.4 dB/km) • Topologies: Line, star and redundant loop (with single-channel Profibus DP interface) • Baud rate: up to 1.5 Mbit/s • Optical budget: <ul style="list-style-type: none"> - Multi-mode: 13 dB - Single-mode: 17 dB • Wave length: 1,310 nm • FO coupler by EKS required at DCS, reference addresses: AUMA or www.eks-engel.com
Local controls	Standard: <ul style="list-style-type: none"> • Selector switch: LOCAL - OFF - REMOTE (lockable in all three positions) • Push buttons OPEN, STOP, CLOSE, RESET <ul style="list-style-type: none"> - 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.) • 6 indication lights: <ul style="list-style-type: none"> - End position 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) • Graphic LC display: illuminated
	Option: <ul style="list-style-type: none"> • Special colours for the indication lights: <ul style="list-style-type: none"> - End position CLOSED (green), torque fault CLOSE (blue), torque fault OPEN (yellow), motor protection tripped (violet), end position OPEN (red)
Bluetooth Communication interface	Bluetooth class II chip, version 2.1: With a range up to 10 m in industrial environments, supports the SPP Bluetooth profile (Serial Port Profile). Required accessories: <ul style="list-style-type: none"> • AUMA CDT (Commissioning and Diagnostic Tool for Windows-based PC) • AUMA Assistant App (Commissioning and Diagnostic Tool for Android devices)

Features and functions		
Application functions	Standard:	<ul style="list-style-type: none"> Selectable type of seating, limit or torque seating for end position OPEN and end position CLOSED Torque by-pass: Adjustable duration (with adjustable peak torque during start-up time) Start and end of stepping mode as well as ON and OFF times can be set individually for directions OPEN and CLOSE, 1 to 1,800 seconds Any 8 intermediate positions: can be set between 0 and 100 %, reaction and signal behaviour programmable Running indication blinking: can be set Positioner <ul style="list-style-type: none"> Position setpoint via Profibus DP interface Automatic adaptation of dead band (adaptive behaviour selectable) Change-over between OPEN-CLOSE control and setpoint control possible via fieldbus interface Profibus DP interface
	Options:	<ul style="list-style-type: none"> PID process controller: with adaptive positioner, via 0/4 – 20 mA analogue inputs for process setpoint and actual process value Multiport valve: Up to 16 positions, signals (pulse or edge) Automatic deblocking: Up to 5 operation trials, travel time in opposite direction can be set Static and dynamic torque recording for both rotation directions with torque measurement flange as additional accessory
Safety functions	Standard:	<ul style="list-style-type: none"> EMERGENCY operation (programmable behaviour) <ul style="list-style-type: none"> Via additional input (option, low active) or via fieldbus interface Reaction can be selected: Stop, run to end position CLOSED, run to end position OPEN, run to intermediate position Torque monitoring can be by-passed during EMERGENCY operation Thermal protection can be by-passed during EMERGENCY operation (only in combination with thermoswitch within actuator, not with PTC thermistor).
	Options:	<ul style="list-style-type: none"> Release of local controls via fieldbus interface. Thus, actuator operation can be enabled or disabled via push buttons on local controls. Local STOP <ul style="list-style-type: none"> 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.) Interlock for main/by-pass valve: Enabling the operation commands OPEN or CLOSE via fieldbus interface EMERGENCY Stop push button (latching): interrupts electrical operation, irrespective of the selector switch position. PVST (Partial Valve Stroke Test): programmable to check the function of both actuator and actuator controls: Direction, stroke, operation time, reversing time
Monitoring functions		<ul style="list-style-type: none"> Valve overload protection: adjustable, results in switching off and generates fault signal Motor temperature monitoring (thermal monitoring): results in switching off and generates fault indication Monitoring the heater within actuator: generates warning signal Monitoring of permissible on-time and number of starts: adjustable, generates warning signal Operation time monitoring: adjustable, generates warning signal Phase failure monitoring: results in switching off and generates fault signal Automatic correction of rotation direction upon wrong phase sequence (3-ph AC current)
Diagnostic functions		<ul style="list-style-type: none"> Electronic device ID with order and product data Logging of operating data: A resettable counter and a lifetime counter each for: <ul style="list-style-type: none"> 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 Time-stamped event report with history for setting, operation and faults Status signals according to NAMUR recommendation NE 107: "Failure", "Function check", "Out of specification", "Maintenance required" Torque characteristics (for version with MWG in actuator): <ul style="list-style-type: none"> 3 torque characteristics (torque-travel characteristic) for opening and closing directions can be saved separately. Torque characteristics stored can be shown on the display.
Motor protection evaluation	Standard:	Monitoring the motor temperature in combination with thermoswitches within actuator motor
	Options:	<ul style="list-style-type: none"> Thermal overload relay in controls combined with thermoswitches within actuator PTC tripping device in combination with PTC thermistors within actuator motor

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Features and functions	
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
	Option: Gold-plated control plug (sockets and plugs)
Threads for cable entries	Standard: Metric threads
	Options: Pg-threads, NPT-threads, G-threads
Wiring diagram (basic version)	TPCAA000-1A1-A000 TPA00R1AA-0A1-000

Further options for Non-intrusive version with MWG in the actuator

Setting of limit and torque switching via local controls	
Torque feedback signal	Via Profibus DP interface Galvanically isolated analogue output 0/4 – 20 mA (load max. 500 Ω). Option, only possible in combination with output contacts.
Wiring diagram (basic version)	TPCAA000-1A1-A000 TPA00R100-0I1-000

Settings/programming the Profibus DP interface

Baud rate setting	Automatic baud rate recognition
Setting the fieldbus address	The Profibus DP address is set via the actuator controls display.
Configurable process representation via GSD file	For optimum adaptation to the process control system, the process representation input (feedback) can be freely configured.

General Profibus DP interface data

Communication protocol	Profibus DP according to IEC 61158 and IEC 61784		
Network topology	Line (fieldbus) structure. When using repeaters, tree structures can also be implemented. Coupling and uncoupling of devices during operation without affecting other devices is possible.		
Transmission medium	Twisted, screened copper cable according to IEC 61158		
Profibus DP interface	EIA-485 (RS-485)		
Transmission rate/cable length	Baud rate (kbit/s)	Max. cable length (segment length) without repeater	Possible cable length with repeater (total network cable length):
	9.6 – 93.75	1,200 m	approx. 10 km
	187.5	1,000 m	approx. 10 km
	500	400 m	approx. 4 km
	1,500	200 m	approx. 2 km
Device types	DP master class 1, e.g. central controllers such as PLC, PC, ... DP master class 2, e.g. programming/configuration tools DP slave, e.g. devices with digital and/or analogue inputs/outputs such as actuators, sensors		
Number of devices	32 devices without repeater, with repeater expandable to 126		
Fieldbus access	Token-passing between masters and polling for slaves. Mono-master or multi-master systems are possible.		
Supported Profibus DP functions	Cyclic data exchange, sync mode, freeze mode, fail safe mode		
Profibus DP ident no.	0x0C4F:	Standard applications with Profibus DP-V0 and DP-V1	
	0x0CBD:	Applications with Profibus DP-V2	

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Commands and signals of the Profibus DP interface	
Process representation output (command signals)	OPEN, STOP, CLOSE, position setpoint, RESET, EMERGENCY operation command, enable local controls, Interlock OPEN/CLOSE
Process representation input (feedback signals)	<ul style="list-style-type: none"> • End positions OPEN, CLOSED • Actual position value • Actual torque value, requires MWG in actuator • Selector switch in position LOCAL/REMOTE • Running indication (directional) • Torque switches OPEN, CLOSED • Limit switches OPEN, CLOSED • Manual operation by handwheel or via local controls • Analogue (2) and digital (4) customer inputs
Process representation input (fault signals)	<ul style="list-style-type: none"> • Motor protection tripped • Torque switch tripped in mid-travel • Failure of analogue customer inputs • One phase missing
Behaviour on loss of communication	The behaviour of the actuator is programmable: <ul style="list-style-type: none"> • Stop in current position • Travel to end position OPEN or CLOSED • Travel to any intermediate position • Execute last received operation command

Service conditions	
Use	Indoor and outdoor use permissible
Mounting position	Any position
Installation altitude	≤ 2,000 m above sea level > 2,000 m above sea level, on request
Ambient temperature	Standard: -30 °C to +70 °C Options: -60 °C to +60 °C, extreme low temperature version Low temperature versions incl. heating system for connection to external power supply 230 V AC or 115 V AC, or internal version 400 V AC.
Humidity	Up to 100 % relative humidity across the entire permissible temperature range
Enclosure protection according to EN 60529	Standard: IP68 Option: Terminal compartment additionally sealed against interior of actuator controls (double sealed) According to AUMA definition, enclosure protection IP68 meets the following requirements: <ul style="list-style-type: none"> • Depth of water: Maximum 8 m head of water • Duration of continuous immersion in water: Maximum 96 hours • Up to 10 operations during continuous immersion • Modulating duty is not possible during continuous immersion.
Pollution degree according to IEC 60664-1	Pollution degree 4 (when closed), pollution degree 2 (internal)
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 use in areas with high salinity, almost permanent condensation, and high pollution. Option: KX: Suitable for use in areas with extremely high salinity, permanent condensation, and high pollution.
Coating	Double layer powder coating Two-component iron-mica combination
Colour	Standard: AUMA silver-grey (similar to RAL 7037) Option: Available colours on request

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Accessories	
Wall bracket	For actuator controls mounted separately from the actuator, including plug/socket connector. Connecting cable on request. Recommended for high ambient temperatures, difficult access, or heavy vibration during service. Cable length between actuator and actuator controls is max. 100 m (Not suitable for version with potentiometer in the actuator). Instead of the potentiometer, the actuator has to be equipped with an electronic position transmitter. (MWG requires a separate data cable.)
Programming software	AUMA CDT (Commissioning and Diagnostic Tool for Windows-based PC) AUMA Assistant App (Commissioning and Diagnostic Tool for Android devices)
Torque measurement flange DMF	Accessory for torque measurement for SA/SAR 07.2 – SA/SAR 16.2
Further information	
Weight	Approx. 7 kg (with AUMA plug/socket connector)
EU Directives	Electromagnetic Compatibility (EMC): (2014/30/EU) Low Voltage Directive: (2014/35/EU) Machinery Directive: (2006/42/EC)
Reference documents	Brochure Electric actuators for industrial valve automation Dimensions Multi-turn actuators with AUMATIC integral controls Dimensions Part-turn actuators with AUMATIC integral controls