General information

ACV 01.2 actuator controls for controlling variable speed multi-turn actuators of the SAV/SARV .2 type range with Modbus TCPI/IP interface.

Features and functions

Power supply	Standard voltages AC:							

3-phase AC Voltages/frequencies					**1-phase AC** Voltages/frequencies			
Volt	220 – 240		380 – 480		Volt	110 – 120		220 – 240	
Hz	50	60	50	60	Hz	50	60	50	60

Permissible variation of mains frequency: ±5 %
Permissible variation of mains voltage: ±10 %
−30 % for maximum 10 seconds within a range of 380 V – 480 V with the following restrictions:

- If required, the motor speed will be reduced down to nominal speed depending on the load of the actuators used
- A low mains voltage increases the mains current consumption; a higher mains voltage reduces the mains current consumption
- The torque limits of the actuators used might be decreased for a short time, if applicable

External supply of the electronics (option)	24 V DC: +20 % / −15 % Current consumption: Basic version approx. 250 mA, with options up to 500 mA For external electronics supply, the power supply of integral controls must have an enhanced isolation against mains voltage in compliance with IEC 61010-1 and the output power be limited to 150 VA.
Rated power	Actuator controls are designed for nominal motor power, refer to Electrical data pertaining to the actuator
Control and feedback signals	Via Modbus TCP/IP interface
Additional input signals for Fieldbus interface (option)	• 2 free analogue inputs (0/4 – 20 mA), 4 free digital inputs 　- 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) 　- Control inputs: OPEN, STOP, CLOSE, EMERGENCY 　- I/O interface: Selection of control type (fieldbus 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 or 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/current consumption for control 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 100 – 125 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 Modbus TCP/IP interface	

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Features and functions	
Additional output signals for Fieldbus interface (option, only available in combination with additional input signals)	• 6 programmable output contacts: 　- 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: 　- 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: 　- 6 potential-free change-over contacts without one common, max. 250 V AC, 5 A (resistive load) • 6 programmable output contacts: 　- 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: 　- 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), All binary output signals must be supplied with the same potential. • Analogue output signal for position feedback 　- Galvanically isolated position feedback 0/4 – 20 mA (load max. 500 Ω)
Local controls	**Standard:** • Selector switch: LOCAL - OFF - REMOTE (lockable in all three positions) • Push buttons: OPEN, STOP, CLOSE, RESET 　- Local STOP 　　The actuator can be stopped via push button STOP of local controls if the selector switch is in position REMOTE. • 6 indication lights: 　- 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: • Special colours for the indication lights: 　- 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 SSP Bluetooth profile (Serial Port Profile). Required accessories: • AUMA CDT (Commissioning and Diagnostic Tool for Windows-based PC) • AUMA Assistant App (Commissioning and Diagnostic Tool)

Features and functions		
Application functions	Standard:	• 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
		• Operation profile with any 8 intermediate positions: Position can be set between 0 and 100 %, reaction and signal behaviour programmable
		• Velocity profile with up to 10 ranges, velocity can be individually adjusted for positions OPEN and CLOSED for each range
		• Running indication blinking: can be set
		• Speed/operating time source can be selected (REMOTE, LOCAL)
		• 4 internal nominal speeds or operating times can be programmed (and selected in LOCAL)
		• Nominal speed source can be selected for REMOTE (binary, analogue, fieldbus)
		• Soft start, soft stop with velocity reduction (adjustable)
		• Positioner:
		- Position setpoint via fieldbus interface
		- Programmable behaviour on loss of signal
		- Automatic adaptation of dead band (adaptive behaviour selectable)
		- Change-over between OPEN-CLOSE control and setpoint control via fieldbus
		- Modulating duty with proportional operation (2 % – 20 %)
		- Positioning accuracy <0.2 % (SAV/SARV .2 only)
	Options:	• 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) (SAV/SARV .2 only)
		• Lift Plug Valve: In combination with multiport valve (SAV/SARV. 2 only)
		• 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:	• EMERGENCY operation (programmable behaviour)
		- Via additional input (option, low active) or via fieldbus interface
		- Reaction can be selected: STOP, run to end position (OPEN, CLOSED) or intermediate position at defined speed
		- 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:	• Enabling local controls via Enable LOCAL digital input: Thus, actuator operation can be are or disabled via push buttons on local controls.
		• Interlock for main/by-pass valve: Enabling the operation commands OPEN or CLOSE via two digital inputs
		• 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 function		• Valve overload protection: Adjustable, results in switching off and generates fault signal
		• Motor temperature monitoring (thermal monitoring): Results in switching off and generates fault signal
		• Monitoring the heater within actuator: Generates warning signal
		• Monitoring of permissible on-time and number of starts: Adjustable, generates warning signal
		• Operating time monitoring: Adjustable, generates warning signal
		• Phase failure monitoring: Results in switching off and generates fault signal

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Features and functions		

Diagnostic functions	• Electronic device ID with order and product data
	 • Operating data logging: A resettable counter and a lifetime counter each for:
	  - 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):
	  - 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
	Option:	PTC tripping device (TMS module) in combination with PTC thermistors within actuator motor
Electrical connection	Standard:	AUMA plug/socket connector with screw-type connection
	Options:	• Terminals or crimp connection • Gold-plated control contacts (pins and sockets)
Threads for cable entries	Standard:	Metric threads
	Options:	Pg-threads, NPT-threads, G-threads

For version with MWG within actuator	
Setting of limit and torque switching via local controls	
Torque feedback signal	Via fieldbus interface Galvanically isolated analogue output 0/4 – 20 mA (load max. 500 Ω).
Wiring diagram (basic version)	TPCHC0AI-1AF-A5E0 TPA00R100-0I1-000, 3-phase AC current, 380 V – 480 V TPCHC0AI-1AE-A5E0 TPA00R100-0I1-000, 1-phase AC current, 220 V – 240 V

Settings/programming the Modbus TCP/IP interface	
Setting the fieldbus address	Baud rate, parity and Modbus address are set via the display of actuator controls
Setting the Modbus gateway	Settings are made via web server Default settings of the IP interface:

IP Address Selection	
Address Type	Static IP
Static IP Address	192.168.255.1
Subnet Mask	255.255.0.0
Default Gateway	192.168.0.1

General Modbus TCP/IP data	
Communication protocol	Modbus TCP/IP according to IEC 61158 and IEC 61784
Network topology	Star topology/ point-to-point topology
Transmission medium	IEC IEEE 802.3, cable recommendation: Cat. 6_A
Transmission rate/cable length	• Baud rate of 10/100 Mbits/s • Maximum cable length: 100 m
Supported Modbus functions (services)	01 Read Coil Status 02 Read Input Status 03 Read Holding Registers 04 Read Input Registers 05 Force Single Coil 15 (0FHex) Force Multiple Coils 06 Preset Single Register 16 (10Hex) Preset Multiple Registers 17 (11Hex) Report Slave ID 08 Diagnostics: • 00 00 Loopback • 00 10 (0AHex) Clear Counters and Diagnostic Register • 00 11 (0BHex) Return Bus Message Count • 00 12 (0CHex) Return Bus Communication Error Count • 00 13 (0DHex) Return Bus Exception Error Count • 00 14 (0EHex) Return Slave Message Count • 00 15 (0FHex) Return Slave No Response Count • 00 16 (10Hex) Return Slave NAK Count • 00 17 (11Hex) Return Slave Busy Count • 00 18 (12Hex) Return Character Overrun Count

Commands and signals of the Modbus TCP/IP interface	
Process representation output (command signals)	OPEN, STOP, CLOSE, position setpoint, RESET, EMERGENCY operation command, enable LOCAL, Interlock OPEN/CLOSE
Process representation input (feedback signals)	• End positions OPEN, CLOSED • Actual position value • Actual torque value, requires magnetic limit and torque transmitter (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)	• Motor protection tripped • Torque switch tripped in mid-travel • One phase missing • Failure of analogue customer inputs
Behaviour on loss of communication	The behaviour of the actuator is programmable: • 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: –25 °C to +70 °C
Humidity	Up to 100 % relative humidity across the entire permissible temperature range

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Service conditions

Enclosure protection in accordance with IEC 60529	Standard:	IP68
	Option:	DS terminal compartment additionally sealed against interior of actuator controls (double sealed)
	According to AUMA definition, enclosure protection IP68 meets the following requirements: • Depth of water: maximum 8 m head of water • Continuous immersion in water: maximal 96 hours • Up to 10 operations during immersion • Modulating duty is not possible during 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	Resistance against vibration can be given on request	
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

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 in case of heavy vibration during service. Cable length between actuator and actuator controls is max. 16 m.
Programming software	AUMA CDT (Commissioning and Diagnostic Tool for Windows-based PC) AUMA Assistant App (Commissioning and Diagnostic Tool)
Torque measurement flange DMF (SAV/SARV .2 only)	Accessory for torque measurement

Further information

Weight	Approx. 7 kg (with AUMA plug/socket connector)
EU Directives	Machinery Directive 2006/42/EC Low Voltage Directive 2014/35/EU EMC Directive 2014/30/EU RoHS Directive 2011/65/EU RED Directive 2014/53/EU
Reference documents	Electrical data SAV 07.2 – SAV 16.2/SARV 07.2 – SARV 16.2 Electrical data SQV 05.2 – SQV 14.2/SQRV 05.2 – SQRV 14.2