

Technical data Multi-turn actuators for open-close duty with 3-phase AC motor

General information

AUMA TR-M multi-turn actuators with integral controls for valve automation in potentially explosive atmospheres.

Type	Output speed rpm		Torque range ¹⁾			Run torque ²⁾		Number of starts	Valve attachment ³⁾			Handwheel		Weight ⁴⁾
TR-M	50 Hz	60 Hz	Min. [Nm]	S2-15 min Max. [Nm]	S2-30 min Max. [Nm]	S2-15 min Max. [Nm]	S2-30 min Max. [Nm]	Starts Max. [1/h]	Stand- ard EN ISO 5210	Option DIN 3210	Max. Ø rising stem [mm]	Ø [mm]	Reduction ratio	approx. [kg]
30X	4	4.8	10	30	20	11	7	60	F07 F10	– G0	26 34	160	11:1	26
	5.6	6.7											8:1	
	8	9.6											11:1	
	11	13											8:1	
	16	19											11:1	
	22	26											8:1	27
	32	38											11:1	
	45	54											8:1	
	63	75											11:1	
	90	108											8:1	
	125	150											5.5:1	
	180	216		25	18	9	6						4:1	
60X	4	4.8	10	60	40	21	14	60	F07 F10	– G0	26 34	160	11:1	27
	5.6	6.7											8:1	
	8	9.6											11:1	
	11	13											8:1	
	16	19											11:1	
	22	26											8:1	28
	32	38				11:1								
	45	54				8:1								
	63	75				11:1								
	90	108				8:1								
	125	150				5.5:1								
	180	216		50	30	18	11						4:1	
120X	4	4.8	12	120	90	42	21	60	F10	G0	40	200	11:1	30
	5.6	6.7											8:1	
	8	9.6											11:1	
	11	13											8:1	
	16	19											11:1	
	22	26											8:1	32
	32	38				11:1								
	45	54				8:1								
	63	75				11:1								
	90	108				8:1								
	125	150				5.5:1								
	180	216		100	70	35	18						4:1	
250X	4	4.8	25	250	180	100	50	60	F14	G1/2	58	315	11:1	48
	5.6	6.7											8:1	
	8	9.6											11:1	
	11	13											8:1	
	16	19											11:1	
	22	26											8:1	54
	32	38											11:1	
	45	54											8:1	
	63	75											11:1	
	90	108											8:1	
	125	150											5.5:1	
	180	216		200	140	80	40						4:1	

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Type	Output speed rpm		Torque range ¹⁾			Run torque ²⁾		Number of starts	Valve attachment ³⁾			Handwheel		Weight ⁴⁾	
TR-M	50 Hz	60 Hz	Min. [Nm]	S2-15 min Max. [Nm]	S2-30 min Max. [Nm]	S2-15 min Max. [Nm]	S2-30 min Max. [Nm]	Starts Max. [1/h]	Stand- ard EN ISO 5210	Option DIN 3210	Max. Ø rising stem [mm]	Ø [mm]	Reduction ratio	approx. [kg]	
500X	4	4.8	50	500	360	175	90	60	F14	G1/2	58	315	45 : 1	50	
	5.6	6.7											33 : 1		
	8	9.6											45 : 1		
	11	13											33 : 1		
	16	19				150	75						56		
	22	26												33 : 1	
	32	38												45 : 1	
	45	54												33 : 1	
	63	75				120	60							45 : 1	
	90	108												33 : 1	
	125	150												22 : 1	
	180	216												16 : 1	
1000X	4	4.8	100	1,000	710	330	170	60	F16	G3	77	315		45 : 1	66
	5.6	6.7												33 : 1	
	8	9.6												45 : 1	
	11	13												33 : 1	
	16	19				300	150						72		
	22	26												33 : 1	
	32	38												45 : 1	
	45	54												33 : 1	
	63	75				160	80							45 : 1	
	90	108												33 : 1	
	125	150												22 : 1	
	180	216												16 : 1	

1) The tripping torque is adjustable for directions OPEN and CLOSE within the indicated torque range.

2) Maximum permissible torque for 15 min. or 30 min. running time.

3) Indicated flange sizes apply for output drive types A and B1. Refer to separate dimension sheets for further output drive types.

4) Indicated weight includes multi-turn actuator with 3-phase AC motor, electrical connection in standard version, output drive type B1 and handwheel.

Features and functions		
Explosion protection	Standard:	II2G Ex db eb h IIC T4 or T3 Gb II2D Ex h tb IIIC T 130°C or T 190°C Db
	Options:	II2G Ex db h IIC T4 or T3 Gb
Product certificates	DEKRA 19 ATEX 0091 X IECEx DEK 19.0055 X	
Type of duty	Standard:	Short-time duty S2 - 15 min, classes A and B according to ISO 22153
	Option:	Short-time duty S2 - 30 min, classes A and B according to ISO 22153
For nominal voltage and +40 °C ambient temperature and at run torque load.		
Motors	3-phase AC asynchronous squirrel-cage motor, type IM B9 according to IEC 60034-7, IC410 cooling procedure according to IEC 60034-6	
Mains voltage, mains frequency	Standard voltages: Refer to table: 3-phase AC standard voltages [► 5] Special voltages: Refer to table: 3-phase AC special voltages [► 5] Further voltages on request Permissible variation of mains voltage: ±10 % Permissible variation of mains frequency: ±5 %	
Overvoltage category	Category III according to IEC 60364-4-44: ≤ 500 V AC Category III according to IEC 60364-4-44: > 500 V AC for actuators with reversing contactor Category II according to IEC 60364-4-44: > 500 V AC for actuators with thyristor unit	
Insulation class	Standard:	F, tropicalized
	Option:	H, tropicalized
Motor protection	PTC thermistors (according to DIN 44082) PTC thermistors additionally require a suitable tripping device in the integral controls.	

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Features and functions		
Self-locking	Self-locking: Output speeds up to 90 rpm (50 Hz), 108 rpm (60 Hz) NOT self-locking: Output speeds from 125 rpm (50 Hz), 150 rpm (60 Hz) Multi-turn actuators are self-locking if the valve position cannot be changed from standstill while torque acts upon the output drive.	
Motor heater (option)	Voltages: 110 – 120 V AC, 220 – 240 V AC or 380 – 480 V AC Power depending on the size 12.5 – 25 W	
Manual operation	Manual drive for setting and emergency operation, handwheel does not rotate during electrical operation. Options: Handwheel lockable Handwheel stem extension Power tool for emergency operation with square 30 mm or 50 mm	
Indication for manual operation (option)	Indication whether manual operation is active/not active via single switch (1 change-over contact)	
Electrical connection	Standard: AUMA Ex plug/socket connector (KT, KM); screw-type motor terminals; control terminals in spring clamp terminal technology Option: AUMA Ex plug/socket connector (KT, KM), with additional support terminals in plug/socket connector	
Threads for cable entries	Standard: Metric threads Option: NPT threads, G threads	
Valve attachment	Standard: B1 in accordance with ISO 5210 Options: A, B2, B3, B4, C, D according to ISO 5210 A, B, D, E according to DIN 3210 C according to DIN 3338 Special valve attachments: AF, AK, AG, B3D, ED, DD, IB1, IB3 A prepared for permanent lubrication of stem	
Position sensing	Absolute encoder, magnetic for position sensing (MWG) Turns per stroke: 2 to 500 (standard) or 20 to 5,000 (option)	
Torque sensing	AUMA torque sensor; resolution ± 2 %, referring to maximum adjustable torque.	
External supply of the electronics (option)	24 V DC: +20 %/–15 % 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	The nominal power is the nominal motor power, refer to Electrical data.	
Switchgear	Standard: Reversing contactors (mechanically and electrically interlocked) for AUMA power classes A1 and A2 Option: Thyristor unit for mains voltage up to 500 V AC for AUMA power classes B1, B2 and B3. For the assignment of AUMA power classes, please refer to Electrical data.	
Digital control input	Standard: 4 digital inputs: OPEN, STOP, CLOSE, EMERGENCY (via opto-coupler with one common). Options: 6 digital inputs, e.g. OPEN, STOP, CLOSE, EMERGENCY, MODE, Enable LOCAL Up to 7 digital inputs e.g. MODE; OPEN, CLOSE, STOP, EMERGENCY, Interlock OPEN, Interlock CLOSE	
Analogue input	Positioner option: Position setpoint via AIN2 (galvanically isolated) as continuous value of 0/4 – 20 mA	
Control voltage/current consumption for digital control inputs	Standard: 24 V DC, current consumption: approx. 10 mA per input Options: 20 – 60 V DC, current consumption: approx. 10 mA per input 100 – 120 V DC, current consumption: approx. 15 mA per input All input signals must be supplied with the same potential.	
Status signals (output signals)	Standard: 6 programmable output contacts: 5 potential-free 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) - Analogue output signal for position feedback - Galvanically isolated position feedback 0/4 – 20 mA (load max. 500 Ω) Options: 6 programmable output contacts: 5 change-over contacts with separate common, max. 250 V AC, 1 A (resistive load), 1 potential-free change-over contact, max. 250 V AC, 5 A (resistive load) 6 change-over contacts with separate common, max. 250 V AC, 5 A 1 further analogue output, e.g. torque output as continuous value from 0/4 – 20 mA Up to 12 relay outputs (1 battery module and 1 standard relay module or 1 standard relay module and 1 option relay module)	

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Battery module (option)	6 programmable output contacts: 3 potential-free change-over contacts (NO/NC) and 2 potential-free bistable NO contacts with one common (max. 250 V AC, 1 A), 1 potential-free change-over contact (NO/NC, max. 250 V AC, 5 A) - Indication of the valve position without mains supply - End position setting without mains supply - Battery monitoring - Option 1: 9 V lithium block (not rechargeable): Temperature range –20 °C to +60 °C - Option 2: 9 V AUMA battery pack (not rechargeable): Temperature range –40 °C to +70 °C
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
Local controls	Standard: - Combi-Switch consisting of: - Selector switch: Positions: LOCAL-OFF-REMOTE, functions: ESC, ENTER, (RE-SET); lockable in all three positions - Shuttle dial: OPEN, CLOSE, (STOP) 6 indication lights: - End position and running indication OPEN (green), torque fault OPEN (red), motor protection tripped (red), torque fault CLOSE (red) end position and running indication CLOSE (yellow), Bluetooth communication (blue) - Graphic LC display: illuminated For display of all essential actuator data like travel position, torque, type of seating, etc.
	Option: Colours and functions of indication lights to be selected via the menu according to operation instructions
Bluetooth module (programmable)	Permanently active/inactive, deactivation/activation from REMOTE or selector switch.
Application functions	Standard: - Type of seating: limit or torque seating respectively for end positions OPEN and CLOSED - Torque bypass (OPEN and CLOSE separately, max. 3 ranges within travel, parameterisable) - Stepping mode - Any 8 intermediate positions: can be set between 0 and 100 %, reaction and signal behaviour programmable - Running indication blinking: adjustable
	Options: - Positioner: - Position setpoint via analogue input 0/4 – 20 mA - Programmable behaviour on loss of signal - Automatic adaptation of dead band (adaptive behaviour selectable) - Split range operation - MODE input for selecting between OPEN-CLOSE and setpoint control
Safety functions	Standard: - EMERGENCY operation: - Tripping: Digital input low active (programmable) - Reaction: STOP, OPEN, CLOSE, EMERGENCY position (programmable) - Torque monitoring can be bypassed during EMERGENCY operation
	Options: - Enabling local controls via "Enable LOCAL" digital input: Thus, actuator operation can be enabled or disabled via push buttons on local controls. - Interlock function: Enabling the operation commands OPEN or CLOSE from Remote via two digital inputs - PVST (Partial Valve Stroke Test): programmable to check the function of the actuator
Monitoring function	- Valve overload protection: Torque limit value adjustable, results in switching off and generates fault signal - Motor temperature monitoring: results in switching off and generates fault signal - Monitoring the heater within actuator (if available): generates warning signal - Monitoring of permissible operation mode: adjustable, generates warning signal - Operation time monitoring: adjustable, generates warning signal - Phase failure monitoring: results in switching off and generates fault signal - Rotary direction monitoring: results in switching off and generates fault signal

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Features and functions	
Diagnostic function	- Electronic device ID with order and product data - Logging of operating data: A resettable counter and a lifetime counter each for: - e.g. 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 profile: - Various reference operations can be performed (e.g. during commissioning) - Torque values can be stored as reference profile - Comparative operations can be performed at any time (e.g. for control within the plant) - Tolerance values can be flexibly defined for travel - Values outside the permissible range generate configurable signals to the DCS
Wiring diagram (basic version)	TPC X-0T1AAB11-000

Table 1: 3-phase AC standard voltages

Voltages/frequencies										
Volt [3~]	380	380	400	400	415	440	440	460	480	500
Hz	50	60	50	60	50	50	60	60	60	50

Table 2: 3-phase AC special voltages

Voltages/frequencies										
Volt [3~]	200	200	220	220	230	525	575	600	660	690
Hz	50	60	50	60	50	50	60	60	50	50

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 +60 °C Options: –30 °C to +70 °C –40 °C to +60 °C –50 °C to +60 °C –63 °C to +60 °C For ambient temperatures ≤ –40 °C including heating system
Humidity	Up to 100 % relative humidity across the entire permissible temperature range
Enclosure protection in accordance with IEC 60529	IP68 with AUMA 3-phase AC motor Terminal compartment additionally sealed against interior of actuator (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: maximum 96 hours - Up to 10 operations 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	2 g, for 5 to 200 Hz Resistant up to maximum 2 g to vibration during startup or for failures of the plant. Resistance against frequent or continuously occurring vibration cannot be derived from this. Not valid in combination with gear-boxes. Detailed information can be provided 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
Colour	Standard: AUMA silver-grey (similar to RAL 7037) Option: Available colours on request
Lifetime	AUMA multi-turn actuators meet or exceed the lifetime requirements of ISO 22153. Detailed information can be provided on request.
Sound pressure level	< 72 dB (A)

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Accessories

Separately mounted controls (wall bracket version)	Displaced controls including local controls separately mounted from actuator, connecting cables on request. Recommended for difficult access, or heavy operational vibration occurring on site. Cable length between actuator and deported local controls amounts to max. 100 m.
Software tool (via Bluetooth connection)	AUMA CDT (Commissioning and Diagnostic Tool for Windows-based PCs/notebooks) AUMA Assistant App (Commissioning and Diagnostic Tool for Android and iOS devices)

Further information

Reference documents	Dimensions Multi-turn actuators TR-M30X – TR-M1000X / TR-MR30X – TR-MR1000X Electrical data Multi-turn actuators TR-M30X – TR-M1000X / TR-MR30X – TR-MR1000X
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