Technical data Multi-turn actuators for open-close and modulating duty

General information

AUMA PF-M multi-turn actuators are equipped with integral controls.

Type	Output speed in rpm[1] (selection of 9 levels)[2]			Torque range[3]	Modulating torque[4]	Valve attachment	Valve shaft			Stem stroke	Stem Ø	Handwheel[5]		Weight[6]
PF-M	V1	V2	V3	Max. [Nm]	Max. [Nm]	Standard ISO 5210	Cylindrical Max. [mm]	Square Max. [mm]	Two-flat Max. [mm]	For rising stem[7] Max. [mm]	For rising stem[7] Max. [mm]	Ø [mm]	Reduction ratio	approx. [kg]
5	2 – 20	4 – 35	–	2 – 5	2.5	F03/F04/F05/F07[8]	15	14	14	–	–	–[9]	8,9 : 1	6
10	–	2 – 18	4 – 35	4 – 10	5.0	F03/F04/F05/F07[8]	15	14	14	–	–	–[9]	8,9 : 1	6
25	–	1 – 6	2 – 14	10 – 25	12.5	F05/F07/F10	20	17	17	40	23	125	20 : 1	8
50	–	0.5 – 3	1 – 6	20 – 50	25	F05/F07/F10	20	17	17	40	23	125	20 : 1	8
100	–	0.5 – 1.5	0.5 – 3	40 – 100	50	F07/F10	38	30	27	50	26	160	17,5 : 1	11

1) The values for output speed refer to an operation at a load of 70% of the maximum torque.
2) Operating times can be selected in 9 levels when placing the order. Otherwise, the fastest speed is selected as default value in the factory. Settable via Bluetooth in steps of 1 % within the range.
3) The tripping torque is adjustable for directions OPEN and CLOSE within the indicated torque range. The “Torque bypass” function (can be activated) allows increasing the pre-set tripping torque to 127 % (unseating torque). This increase only applies during actuator start for an adjustable time period. This allows unseating blocked valves.
4) Maximum permissible torque for modulating duty. The values from the “Torque range” column still apply as tripping torques.
5) Handwheels and reduction ratio of part-turn version. Smaller reduction ratios are planned and consequently fewer handwheel revolutions.
6) Specified weight includes multi-turn actuator, unbored coupling and handwheel.
7) For output drive type A.
8) F04 flange bores shifted by 45°
9) Manual emergency operation possible using additional tools.

Features and functions

Type of duty	Open-close duty:	Classes A and B according to ISO 22153, short-time duty S2 - 15 min
	Modulating duty:	Class C according to ISO 22153, intermittent duty S4 - 50 %, with maximum number of starts up to 1,200 starts/h
	For nominal voltage and +40 °C ambient temperature and at load of 35 % of the maximum torque. The type of duty must not be exceeded.	
Motor	Variable speed, brushless motor Soft start/soft stop. The progress characteristics can be configured as requested.	
Insulation class	F (motor winding)	
Motor protection	Via short-circuit protection and current measurement	
Self-locking	At standstill with spring-applied brake	
Turns/stroke	Up to maximum 400 turns/stroke Solutions for a mechanical position indication are only available for defined stroke ranges and up to maximum 54 turns/stroke.	
Limit switching	Via Hall sensors	
Torque switching	Via electronic current measurement. Tripping torques infinitely adjustable via Bluetooth. 8 levels can be selected when placing the order.	
Mechanical position indication	Standard:	Continuous indication. Versions: 1 – 9 turns/stroke 9 – 14 turns/stroke 14 – 27 turns/stroke 27 – 54 turns/stroke
	Option:	Without mechanical position indication
Manual operation	PF-M5 – PF-M10:	
	Manual emergency operation possible using additional tools: • Hexagon socket spanner AF10 (coupling change-over) • Allen key AF5 (for turning)	
	PF-M25 – PF-M100:	
	Standard:	Manual drive for setting and emergency operation, handwheel does not rotate during electrical operation.
	Option:	Without handwheel, i.e. handwheel and handwheel shaft are obsolete. The end stops are included except for version with swing range 45° – 360°.

Features and functions		
Coupling	Standard:	Coupling unbored
	Options:	• Coupling unbored extended • Finish machining of coupling (standard or extended) – Bore according to EN ISO 5211 with 1 keyway according to DIN 6885-1 – Square bore according to EN ISO 5211 – Two-flat according to EN ISO 5211
Valve attachment	Standard:	Dimensions according to ISO 5210
	Options:	• With output drive type A • With LE linear thrust unit • With GS worm gearbox

Features and functions		
Power supply	Standard voltages: 1-phase AC current: 100 – 240 V / 50 – 60 Hz Permissible variation of mains voltage ±10 % Permissible variation of mains frequency ±5 % Options: DC current: 24 V DC ±10 % DC current: 180 – 300 V DC ±10 % For current consumption, refer to Electrical data PROFOX	
Overvoltage category	Category III according to IEC 60364-4-44 Category II in compliance with IEC 60364-4-44 (according to cDEKRAus for the North American market)	
Power electronics	With integral motor controller (current consumption in standby mode < 3 W)	
I/O interface control (input signals)	3 digital inputs:	• Via opto-isolator, with one common • Control voltage 24 V DC, current consumption: approx. 15 mA per input • Minimum pulse duration for shortest operation pulse: 100 ms • All digital inputs must be supplied with the same potential • All inputs can be configured as required • Standard assignment (without positioner and without fieldbus interface): CLOSE, OPEN, STOP • Assignment for option with positioner: MODE, OPEN, CLOSE • Assignment for option with fieldbus interface: OPEN, CLOSE, I/O interface I/O interface: Selection of the control source (fieldbus interface or I/O input signals) Factory setting of “I/O Interface” signal: Input signal 0 V = fieldbus interface is active
	Analogue input: (option)	• 0/4 – 20 mA or 0 – 10 V • No galvanic isolation • For option with positioner: Used as input signal for position setpoint or as input signal for motor speed • For option with fieldbus interface: Used as input for the position setpoint (definition via 2 digital inputs which command source is active for the positioning: fieldbus or analogue input) or for a sensor signal which can be further transmitted via fieldbus.
Status signals of I/O interface (output signals)	3 digital outputs:	• Freely configurable semi-conductor output contacts, per contact max. 24 V DC, 100 mA (resistive load) • Outputs can be configured as required • Default assignment: End position CLOSED (high active), end position OPEN (high active), collective fault signal (low active)
	Analogue output:	• Position feedback signal 0/4 – 20 mA (load maximum 500 Ω) or 0 – 10 V • No galvanic isolation

Features and functions		
Additional I/O signals for control and signalling (option)	2 digital inputs:	2 digital inputs (via opto-isolator, galvanically isolated) • Control voltage 115 V DC, current consumption: approx. 15 mA per input • Minimum pulse duration for shortest operation pulse: 100 ms • All inputs can be configured as required; however, a signal may only be assigned to maximum one input (irrespective of the type, 24 V DC or 115 V AC). • Assignment via order e.g.: OPEN, CLOSE, (push-to-run operation) or CLOSE/OPEN, EMERGENCY
	3 digital outputs:	Freely configurable output contacts, max. 240 V AC / 30 V DC, 1 A (resistive load) • 2 x type SPST NO, 1 type SPDT • Outputs can be configured as required • Default assignment: End position CLOSED (high active), end position OPEN (high active), collective fault signal (SPDT)
Voltage output (option)	Auxiliary voltage 24 V DC, max. 80 mA for supply of control inputs, without galvanic isolation.	
Functions (actuators with I/O interface)	Standard:	• Switch-off mode adjustable: Limit or torque seating for end positions OPEN and CLOSED • Torque monitoring across the whole travel • Function for excessive torque in defined situations • Programmable EMERGENCY behaviour: – Digital input low active, – Reaction can be selected: Stop, run to end position CLOSED, run to end position OPEN • Speed control – Ramps – Program operation profiles – Program specific speed for OPEN and CLOSE operations or one digital input
	Option:	• Positioner – Position setpoint via analogue input E1 = 0/4 – 20 mA or 0 – 10 V – Programmable behaviour on loss of signal – Automatic adaptation of dead band (adaptive behaviour selectable) – Selection between open-close duty and modulating duty via digital MODE input
Local controls (external)	Standard:	Without
	Options:	• Push buttons OPEN, STOP (LOCAL - REMOTE), CLOSE • Signalling the operation via the FOX-EYE: – Change between the operation modes: REMOTE (OK), OFF, LOCAL and COMMISSIONING – End positions CLOSED and OPEN – Running CLOSE, running OPEN
Bluetooth communication interface	BT 5.x version Min. range of 3 m in industrial environments. Required accessories: • AUMA CDT (Commissioning and Diagnostic Tool for Windows-based PCs) • AUMA Assistant App (Commissioning and Diagnostic Tool for Android and iOS devices)	
Electrical connection	Cable entry: 3 x M20x1.5 threads for cable glands. Inside rail with spring clamp terminals for wire connection.	
Wiring diagram (basic version)	TPC P00A1A1A100000, standard TPC P00A1B1A100000, version with positioner	

Operation and display		
At the actuator	Status indication:	FOX-EYE (indication LED) Display of operation modes and states: • REMOTE: System OK or not ready REMOTE LOCAL COMMISSIONING (only in combination with outside local controls) • End positions • Faults • Bluetooth connection active
	Set end positions:	4 buttons and 1 LED are located below the hood, as well as 3 external buttons for local controls (option) and signalling via FOX-EYE: Run actuator in directions OPEN and CLOSE. Set end position once mounted to the valve.
Via Bluetooth using AUMA Assistant App or AUMA CDT software	Set end positions:	Operate the actuator in directions OPEN and CLOSE. Set end position once mounted to the valve.
	Configuration:	Basic settings for operation: • Rotation speed • Type of seating for end positions, torque switching • Assignment of signal inputs and signal outputs • Fieldbus parameters (if fieldbus option has been selected)
		Further functions: For applications, safety and service, e.g.: • Positioner • EMERGENCY behaviour • Torque bypass • Failure behaviour • Signal configuration
	Diagnostics:	Monitoring key indicators and measured values for preventive maintenance and consequently increasing process safety. Limit values can be set. Deviations generate warning signals which can be transmitted to the DCS via digital outputs or fieldbus.
		Actuator: Temperature value within actuator Key indicators regarding lifetime of electronics, brake, gearbox and seals.
		Actuator and valve: Method for identifying changes in torque requirement: Perform reference operation and save torque as reference profile. Define tolerance range. Perform comparative operations if required. Values outside tolerance initiate a signal which is communicated as described above.
		Further key indicators: Furthermore, the actuator monitors and records further indicators and conditions. The generated fault and warning signals are saved within the event log. These signals can be configured as requested. An overview in the AUMA Assistant App or the CDT software shows all available fault/warning signals with option to enter the details.

With output drive type A for valve shaft with thread (option)			
	Stem stroke[1)] Max. [mm]	Trapezoidal thread Ø Max.	Valve attachment
M25 with A07.2-F07	40	TR22	F07 (option F10)
M50 with A07.2-F07	40	TR22	F07 (option F10)
M100 with A07.2-F07	65	TR26	F07 (option F10)
M100 with A07.2-F10	50	TR26	F10

1) The stem stroke can be increased by using spacer elements as special solution; available on request.

Service conditions	
Mounting position	Any position
Installation altitude	≤ 2,000 m above sea level > 2,000 m above sea level on request
Ambient temperature	–30 °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:	IP67
	Option:	IP68 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 • 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	2 g, for 10 to 200 Hz Resistant to vibration during start-up or for plant failures. However, a fatigue strength may not be derived from this. Not valid in combination with gearboxes.	
Seismic resistance according to IEC 60068-3-3	Test proof for application class 3	
Electrical approval according to North American standards (option)	Approval according to cDEKRAus (CAN/CSA C22.2 No. 61010-1:2012 and UL 61010-1:2012) Restrictions for the following characteristics: • Power supply: 100 – 240 V AC / 50 – 60 Hz • Temperature range: –30 °C to +65 °C (without RTC function within the event log) • Without local controls • Not applicable for PF-M5 – PF-M10	
Corrosion protection	Standard:	KS Suitable for use in areas with high salinity, almost permanent condensation, and high pollution.
	Option:	KX (upon request) 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
Driving load	During operation, accelerating loads up to 15 % of the max. torque may occur.	
Lifetime	Open-close duty:	10,000 operating cycles OPEN - CLOSE - OPEN One operation cycle consists of 25 turns in both directions (OPEN - CLOSE - OPEN)
	Modulating duty:	1.8 million modulating steps
	The lifetime depends on the load and the number of starts. A high starting frequency will rarely improve the modulating accuracy. To reach the longest possible maintenance and fault-free operating time, the number of starts per hour chosen should be as low as permissible for the process.	
Sound pressure level	< 70 dB (A)	
Further information		
EU Directives	Machinery Directive 2006/42/EC Low Voltage Directive 2014/35/EU EMC Directive 2014/30/EU RoHS Directive 2011/65/EU	
Reference documents	Dimensions PF-M5 – PF-M100 Electrical data PF-M5 – PF-M100	