

Technical data Linear actuators for open-close and modulating duty

General information

AUMA PF-L linear actuators are equipped with integral controls.

Type	Thrust ¹⁾		Modulating force ²⁾	Operating speed in mm/second ³⁾⁴⁾				Valve attachment	Stem stroke	Thread of valve stem	Handwheel		Weight ⁵⁾⁶⁾
PF-L	Min. [kN]	Max. [kN]	Max. [kN]	V1	V2	V3	V4 ⁷⁾	Standard EN ISO 5210 (DIN 3358)	Max. [mm]		Ø [mm]	Turns per stroke of 10 mm	approx. [kg]
2	0.8	2.0	1.0	0.2 – 1.8	0.3 – 2.5	–	–	F05	60	M12 x 1.25	— ⁸⁾	30	8
3	1.4	3.5	1.7	0.2 – 1.2	0.3 – 2.3	–	–	F05	60	M12 x 1.25	— ⁸⁾	30	8
6	2.4	6.0	3.0	–	0.2 – 1.2	0.3 – 2.5	–	F05	60	M12 x 1.25	— ⁸⁾	30	8
10	4.0	10	5.0	–	0.1 – 0.6	0.2 – 1.2	–	F05 ⁹⁾ /F07	80	M16 x 1.5	125	50	10
15	6.0	15	7.5	–	–	0.1 – 1.0	0.2 – 1.7	F05 ⁹⁾ /F07	80	M16 x 1.5	125	50	10
18	7.2	18	9.0	–	–	0.1 – 1.0	0.2 – 1.7	F05 ⁹⁾ /F07	80	M16 x 1.5	125	50	10

- 1) The thrust is adjustable for directions OPEN and CLOSE within the indicated range. Via the “torque bypass” function (can be activated), the set thrust can be increased to 127 % (unseating force). This increase only applies during actuator startup for an adjustable time period. This allows unseating blocked valves.
- 2) Maximum permissible thrust in modulating duty. The values indicated in the “thrust” column are still considered as tripping forces.
- 3) The values for operating speed refer to an operation at a load of 70 % of the maximum thrust.
- 4) Operating speeds can be selected in 13 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.
- 5) Specified weight includes linear actuator and handwheel without coupling.
- 6) Plus 1.0 kg for versions with power level V4 and/or power supply via 3-phase AC.
- 7) Only available for version with 3-phase AC.
- 8) Manual operation possible using additional tools.
- 9) F05 can only be used up to 10 kN according to ISO 5210.

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 with 35 % of the maximum thrust. 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	
Limit switching	Via Hall sensors	
Thrust switching	Via electronic current measurement. Tripping forces are infinitely adjustable via Bluetooth. Can be pre-configured in the order.	
Mechanical position indicator	Standard:	Continuous indication via an indicator moving on an axis. Versions: • PF-L2 – PF-L6: 5 – 27 mm/stroke 28 – 40 mm/stroke 41 – 60 mm/stroke • PF-L10 – PF-L18: 20 – 36 mm/stroke 37 – 56 mm/stroke 57 – 80 mm/stroke
	Option:	Without mechanical position indicator
	Manual operation for setting an emergency operation.	
Manual operation	PF-L2 – PF-L6:	
	Manual operation with hexagon spanner: • Hexagon socket spanner AF10 (coupling change-over) • Allen key AF5 (for turning)	
	PF-L10 – PF-L18:	
	Standard:	With manual drive, does not rotate during electrical operation.
	Option:	Without handwheel, i.e. handwheel and handwheel shaft are obsolete.

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Coupling (option)	The following internal threads for connecting the valve shaft are available: • Unbored • M8 x 1.25 • M10 x 1.50 • M12 x 1.75 • M16 x 2.00 • M20 x 2.50	
Valve attachment	Standard:	Dimensions according to ISO 5210
	Option:	Prepared for fixing up to 4 pillars via an attachment frame. For bores, refer to table: Valve attachment (option) [► 2]

Table 1: Valve attachment (option)

Pitch circle [mm]	Bores
90	4 x M12
100	4 x M12
100	4 x M16
110	4 x M16
120	4 x M16

Features and functions		
Power supply	Standard voltages: 1-phase AC current: 100 – 240 V / 50 – 60 Hz Permissible variation of mains voltage $\pm 10\%$ Permissible variation of mains frequency $\pm 5\%$ Options: • DC current: 24 V DC $\pm 10\%$ • DC current: 180 – 300 V DC $\pm 10\%$ • 3-phase AC current: 380 – 480 V AC / 50 – 60 Hz Permissible variation of mains voltage $\pm 10\%$ Permissible variation of mains frequency $\pm 5\%$ 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 $< 3\text{ W}$) For versions with power level V4 and/or power supply via 3-phase AC: Current consumption in standby up to 6 W	
I/O interface	The standard version can be combined with one further I/O additional board (I/O-1 – IO-4). Refer to table: Details and variants of the I/O interface [► 3]	
I/O interface control (input signals)	Digital inputs:	• Minimum pulse duration for shortest operation pulse: 100 ms • All inputs can be configured as required. On delivery, they have a standard configuration which can be changed via the customer order. • 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 • Possible assignment of the optional, additional 2 inputs: CLOSE, OPEN (push-to-run operation) or CLOSE/OPEN, EMERGENCY
	Analogue input:	• In standard only usable for speed specification (motor speed) or for reading a sensor value (which can be further transmitted via fieldbus). On delivery, the input in standard version is deactivated. • For option with positioner: Use as input signal for the position setpoint For simultaneous use with fieldbus interface: Control can be made via two digital inputs which operation source is active for the positioning: Fieldbus or analogue input.

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Features and functions		
Status signals of I/O interface (output signals)	Digital outputs:	- The outputs can be configured as required. On delivery, they have a standard configuration which can be changed via the customer order. - Default configuration: End position CLOSED (high active), end position OPEN (high active), collective fault signal (low active) - Standard assignment of the optional, additional 3 inputs: End position CLOSED (high active), end position OPEN (high active), collective fault signal (change-over contact)
	Analogue output:	Default settings: Feedback signal of actual position Other output values can be configured, such as torque/thrust or speed (motor speed)
Voltage output (option)	Auxiliary voltage for supply of control inputs with 24 V DC: 1. Max. 80 mA, without galvanic isolation Standard for 3-phase AC and/or power level V4. Option for other versions. 2. Max. 80 mA, galvanically isolated Standard for the optional additional boards I/O-2 and I/O-3. Note: When connecting both voltage outputs at the same time, the galvanic isolation is removed.	
Functions	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 the dead band (adaptive behaviour can be selected) - 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
Heating element against moisture (option)	The heating element within the electronic compartment provides additional protection against condensation and is switched on for low temperatures. Can generally be set to active or inactive.	
Bluetooth communication interface	Permanently active/inactive, deactivation/activation from REMOTE. Required accessories: - AUMA Assistant App (Commissioning and Diagnostic Tool for Android and iOS devices) - AUMA RSTX 100 remote control - AUMA CDT (Commissioning and Diagnostic Tool for Windows-based PCs)	
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	

Table 2: Details and variants of the I/O interface

	Standard	Option I/O-1	Option I/O-2	Option I/O-3	Option I/O-4
I/O controls					

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		Standard	Option I/O-1		Option I/O-2	Option I/O-3	Option I/O-4
Digital inputs	Quantity	3 x 24 V DC ¹⁾	2 x 115 V AC ²⁾		2 x 24 V DC ¹⁾	2 x 24 V DC ¹⁾	2 x 24 V DC ¹⁾
	Current consumption	approx. 15 mA	approx. 15 mA		approx. 15 mA	approx. 15 mA	approx. 15 mA
	Common	Common GND	Separate GND		Common GND	Common GND	Common GND
	Design	Opto-isolator	Opto-isolator		Opto-isolator	Opto-isolator	Opto-isolator
Analogue inputs	Quantity	1 x AIN 1	–		–	1 x AIN 2	–
	Signal	0/4 – 20 mA or 0 – 10 V	–		–	0/4 – 20 mA	–
	Common	No galvanic isolation	–		–	galvanically isolated	–
I/O status signals							
Digital outputs	Number and type	3 x NO	2 x NO	1 x change-over contact	3 x NO	3 x NO	3 x NO
	Control voltage	24 V DC	230 V AC/ 60 V DC	230 V AC/ 30 V DC	24 V AC/DC	24 V AC/DC	24 V AC/DC
	Resistive load	Max. 80 mA	Max. 1 A	Max. 1 A	Max. 1 A altogether	Max. 1 A altogether	Max. 1 A altogether
	Common	Common COM	Separate COM	Own COM	Common COM	Common COM	Common COM
	Design	Semiconductor relay	Output contact	Output contact	Output contact	Output contact	Bistable relay
Analogue outputs	Quantity	1 x AOUT1	–		–	1 x AOUT2	–
	Signal	0/4 – 20 mA or 0 – 10 V	–		–	0/4 – 20 mA	–
	Load for mA signal	Max. 500 Ω	–		–	Max. 500 Ω	–
Voltage output	Auxiliary voltage	–	–		24 V DC, max. 100 mA	24 V DC, max. 100 mA	–
	Common	–	–		potential-free	potential-free	–
External supply of the integral controls	Voltage	–	–		–	–	24 V DC +20 %/–30 %
	Current consumption	–	–		–	–	up to 1 A under continuous load, for a short time, max. 2 A

1) ON = 11 V – 30 V / OFF = 0 V – 5 V

2) ON = 90 V – 140 V / OFF = 0 V – 50 V

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 • Fault • 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.

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Operation and display		
Via Bluetooth using AUMA Assistant App or AUMA CDT software	Set end positions:	Run actuator in directions OPEN and CLOSE. Set end position once mounted to the valve.
	Configuration:	Basic settings for operation: • Operating speed • Type of seating for end positions, thrust switching • Assignment of signal inputs and signal outputs • Fieldbus parameters (if fieldbus option has been selected) Additional 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 thrust requirement: Perform reference operation and save thrust 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 figures: 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.
Service conditions		
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
	Option:	-40 °C to +60 °C
Humidity	Up to 100 % relative humidity across the entire permissible temperature range	
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	1 g, for 10 to 200 Hz Refers to the fastening of the actuator to the valve (via flange F05 or F07). Resistant to vibration during startup or for plant failures. However, a fatigue strength may not be derived from this.	
Electrical approval according to North American standard (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 – 24 V DC • Temperature range: -30 °C to +60 °C (without RTC function within the event log)	

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Service conditions		
Corrosion protection	Standard:	KS Suitable for use in areas with high salinity, almost permanent condensation, and high pollution.
		Thrust rod: Material made of stainless steel, 1.4305
		Coupling (option): Steel material with ZnNi coating
	Options:	KX Suitable for use in areas with extremely high salinity, permanent condensation, and high pollution.
		Thrust rod: Material made of stainless steel, 1.4404
		Coupling (option): Material made of stainless steel, 1.4404
	Attachment frames (option):	Aluminium material with double layer powder coating Uncoated thread
Coating	Double layer powder coating	
Colour	Standard:	AUMA silver-grey (similar to RAL 7037)
	Option:	Available colours on request
Lifetime	Open-close duty:	10,000 operating cycles OPEN - CLOSE - OPEN One operating cycle consists of one stroke of 40 mm 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		
Reference documents	Dimensions PF-L2 – PF-L18	
	Electrical data PF-L2 – PF-L18	