

XLA-5 series

Precise and compact linear actuator

The XLA-5 combines ultra-compact design, high precision, and powerful performance. Driven by the CrossFixx™ ultrasonic piezo motor, it offers speeds up to 1000 mm/s, submicron resolution, and up to 5 N of force - all in a unit weighing under 35 g. Stroke lengths range from 10 to 150 mm, with options for integrated or external control. Its stackable design is ideal for space-constrained setups.

KEY FEATURES

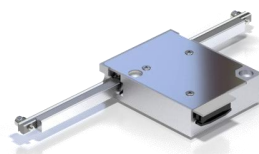
drive principle	patented Crossfixx™ ultrasonic piezo technology	
lifetime	> 1000 km / typ. 20 million cycles	
control principle	closed-loop position control	
controller	XD-OEM (external)	integrated

MODEL CODE STRUCTURE

actuator type	rod length (mm)	encoder resolution (nm)	FFC/FPC cable outlet direction	controller
XLA-5	-45	-1250	-Z1 (straight, standard) -Z2 (angled 90°, custom)	-EXT (<u>external</u> controller)
		-312		
		-78		
	-55	same as for XLA-5-45		
	-65			
	-75			
	-85			
	-95			
	-105			
	-125			
	-145			
	-165			
	-185			

Example: XLA-5-45-312-Z1-EXT

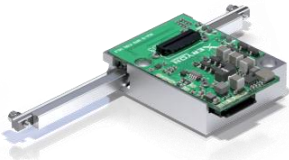
- XLA-5 series linear actuator
- Rod length of 45 mm
- Encoder feedback with a resolution of 312 nm
- Straight, standard cable outlet direction
- External controller



actuator type	rod length (mm)	encoder resolution	controller
XLA-5	45	-10MU (10 μm)	-INTG (<u>integrated</u> controller)
		-1MU (1 μm)	
		-250 NAN (250 nm)	
		-100 NAN (100 nm)	
	-55	same as for XLA-5-45	
	-65		
	-75		
	-85		
	-95		
	-105		
	-125		
	-145		
	-165		
	-185		

Example: **XLA-5-45-1MU-INTG**

- XLA-5 series linear actuator
- Rod length of 45 mm
- Encoder feedback with a resolution of 1 µm
- Controller integrated into actuator



ENVIRONMENTAL COMPATIBILITY

temperature range	-30°C to +70°C
humidity range	20% to 90% RH (non-condensing)
heat dissipation (motor only)	< 6 W
internal operation voltage	60 V

MOTION PERFORMANCE

EXTERNAL CONTROLLER			XLA-5-EXT all rod lengths			unit	tolerance
			-1250	-312	-78		
ENCODER	type		optical, incremental				
	grating period		79.8 318			µm LPI	
	resolution	rounded effective	1250 1248.035	312 312.009	78 78.002	nm	
	index		1 per full stroke				
ACTUATOR	positioning	resolution = min. step size = min. incremental motion (MIM)	1250	350	80	nm	typ.
		unidirectional repeatability	± 1250	± 350	± 80	nm	typ.
		bidirectional repeatability	± 2500	± 700	± 160	nm	typ.
	speed	max. speed	400			mm/s	typ.
		min. speed	2 to 5			µm/s	typ.
		stability (at typical speed of 10 mm/s)	± 1			%	typ.
		point-to-point positioning time ¹	10 mm 1 mm 100 µm	75 30 20	105 65 60		msec

¹ conditions: settling within bidirectional repeatability range, <100 g horizontal payload, communication delay not taken into account

INTEGRATED CONTROLLER		XLA-5-INTG all rod lengths				unit	tolerance	
		-10MU	-1MU	-250NAN	-100NAN			
ENCODER	type	optical, incremental						
	grating period	112.9 225				µm LPI		
	resolution rounded effective	10000 9407.4	1000 1007.9	250 249.8	100 100.8	nm		
	index	1 per full stroke						
ACTUATOR	positioning	resolution = min. step size = min. incremental motion (MIM)	10000	1000	250	100	nm	typ.
		unidirectional repeatability	± 10000	± 1000	± 250	±100	nm	typ.
		bidirectional repeatability	± 20000	± 2000	± 500	±200	nm	typ.
	speed	max. speed	400			200	mm/s	typ.
		min. speed	2 to 5				µm/s	typ.
		stability (at typical speed of 10 mm/s)	± 1				%	typ.
		point-to-point positioning time ¹	10 mm 1 mm 100 µm	85 45 15	115 75 45		msec	typ.

¹ conditions: settling within bidirectional repeatability range, <100 g horizontal payload, communication delay not taken into account

Note: a detailed description of the technical terms used in this datasheet can be found on the Terminology page of our website.

MECHANICAL PROPERTIES

		XLA-5										unit	tolerance
rod length		-45	-55	-65	-75	-95	-105	-125	-145	-165	-185	mm	± 0.1
dimensions	ext. controller	38 x 30 x 9.1										mm	± 0.1
	integrated controller	38 x 30 x 11.9											
stroke / travel range		10	20	30	40	60	70	90	110	130	150	mm	± 0.3
mass		34.9	35.7	36.4	37.2	38.7	39.4	40.9	42.4	43.8	45.3	g	± 5%
max. acceleration		950	840	730	650	530	490	420	370	330	300	m/s ²	typ.
holding force		5										N	min.
driving force ¹		5										N	min.
actuator materials	housing	blank aluminum steel rail with ceramic traction surface stainless steel											
	rod cover												
cable type	ext. controller	FFC 305 mm, 12 core, 0.5 mm pitch with opposite side contacts 50 000 bending cycles at radius 10 mm (min.) (Molex 15266-0138)											
	integrated controller	FFC 305 mm, 16 core, 0.5 mm pitch with same side contacts and latching ears 100 000 bending cycles at radius 10 mm (typ.) (Molex 15018-0181)											
bearing type		recirculating ball linear guide with end seal and lubrication storage standard preload (clearance +1 to +0 µm)											

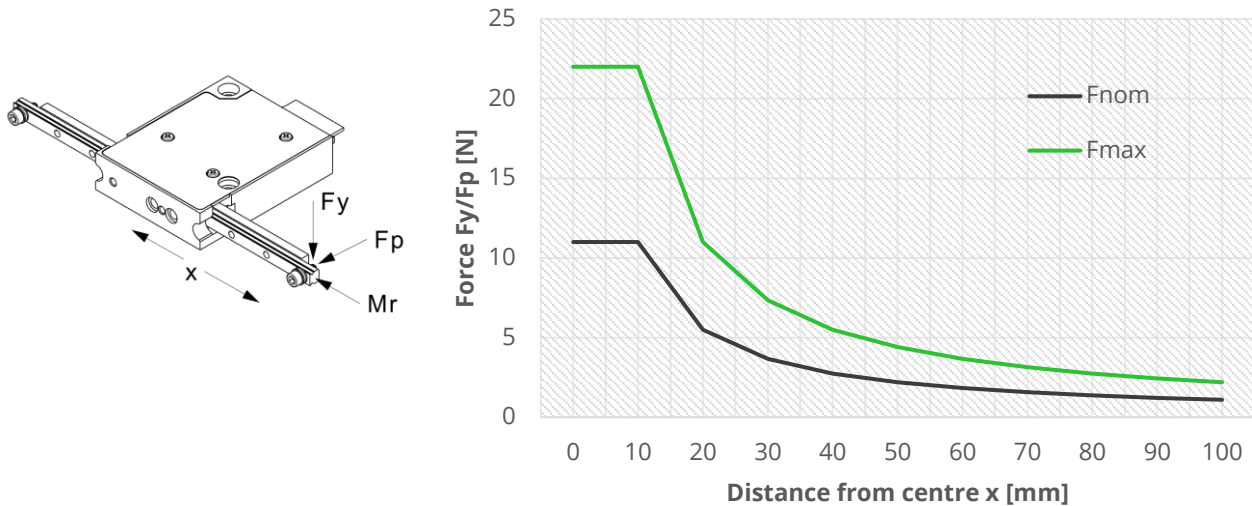
¹ for vertical lifting applications, consider 1/3 of the specified driving force as max. advised payload

LOAD RATING OF LINEAR GUIDE

In order to guarantee the lifetime specification and to maintain smooth rolling behaviour, the moment load applied to the actuator rod should remain within the following specifications:

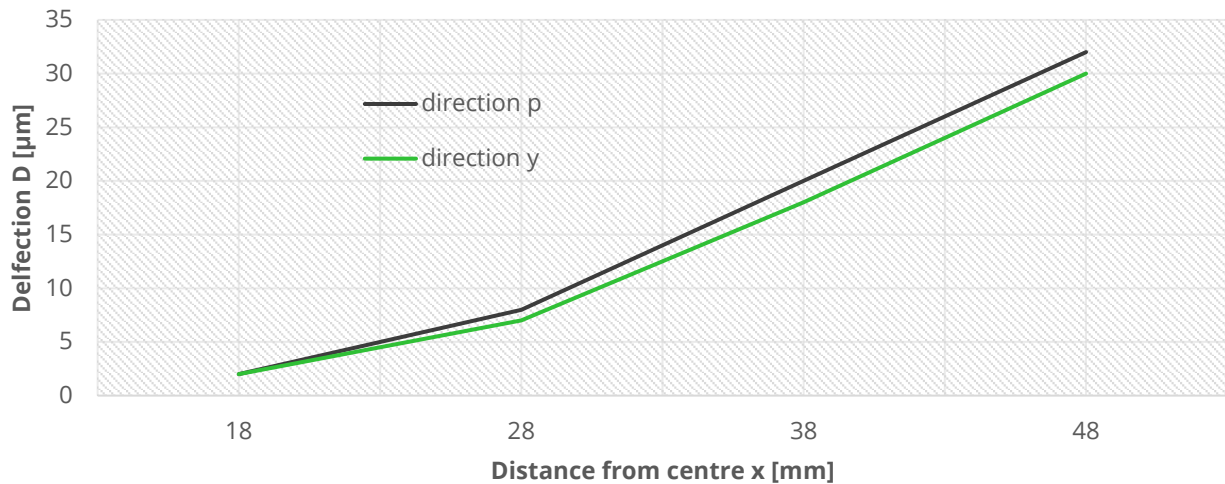
- The tilt moment is limited to 0.11 Nm (nominal) and 0.22 Nm (maximal). When translated into forces F_y and F_p acting on the rod end at a distance x from the actuator centre, the following load curves are obtained.
- The twisting moment M_r applied to the rod is limited to 0.10 Nm (nominal) and 0.20 Nm (maximal).

The actuator body is in these cases fixed while the load is applied to one end of the rod. Long-term operation is allowed at load ratings up to the nominal value, while operating at the maximal value is only advised for short periods of time.



ROD DEFLECTION UNDER LOAD

When applying a load to an actuator, the rod end will deflect. Since the linear guide inside the actuator body has no or minimal play, most of this deflection is caused by elastic bending of the rod. The table below shows measured values of this deflection under a load of 1 N applied in two directions (see above figure).



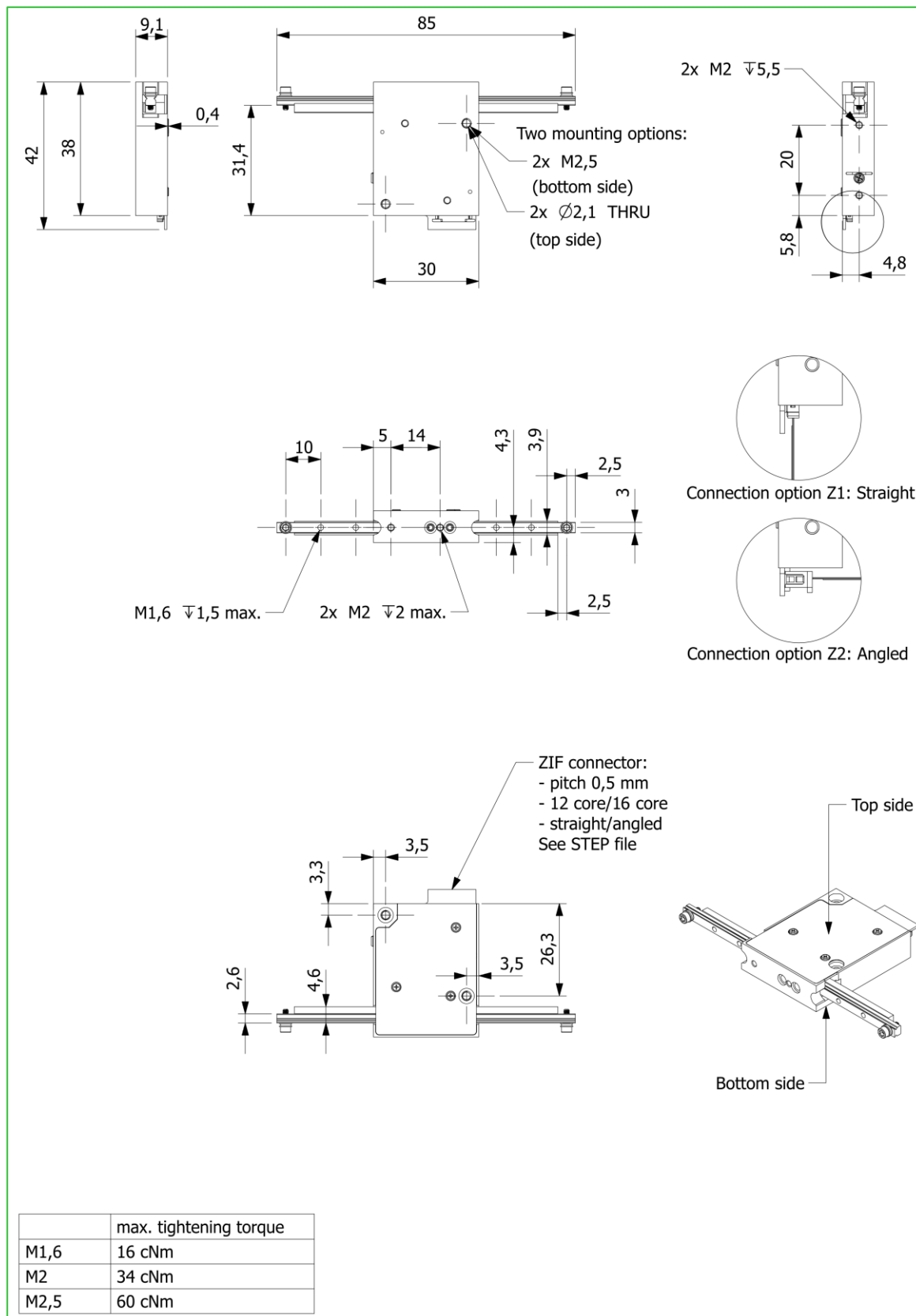
CONTROLLER/SOFTWARE

The XLA-5-EXT actuators are compatible with the XD-OEM controller. The XLA-5-INTG actuators have an integrated controller. Controlling of the stage is done with:

- easy-to-use Windows interface
- LabVIEW interface program (compiled program or source)
- MATLAB interface script
- C++ and Python libraries

DRAWINGS (STEP-FILES ARE AVAILABLE ON OUR WEBSITE)

XLA-5-85-EXT assy F3 for use with external controller



XLA-5-85-INTG assy F6 with integrated controller

