

XVP series

Precise vertical piezo stage with high force output



The XVP series are precise linear stages driven by two ultrasonic piezo motors. It's specifically design to handle large payloads in the vertical direction. These stages combine high-speed positioning with nanometre precision and generate a high force output within a small volume. Xeryon's ultrasonic piezo motor ensures you a long lifetime, noiseless and vibration-free operation. In addition, the self-locking piezo motor holds the position of the stage when powered off. The reduced heat dissipation leads to a very stable nano-positioning system. The XVP is used in metrology applications, e.g. for part alignment or sample manipulation. The XVP can be easily stacked into an XZ- or XYZ-assembly.

Key features

drive principle	patented Crossfixx™ ultrasonic piezo technology (2x)
bearings	precision crossed-roller
lifetime distance	> 1000 km (horizontal movement) / typ. 20 million cycles
control principle	closed-loop or open-loop position control
operating voltage	48 V

Model code structure

stage type	encoder resolution (nm)	optional		connector type
		vacuum compatibility	non-magnetic	
XVP	-OPEN	-HV (10 ⁻⁶ mbar) -UHV (10 ⁻⁹ mbar)	-NM	see table below
	-1250			
	-312			
	-78			
	-5			
	-1			

connector option	standard	-HV	-UHV
-C0	flying leads (12x + shield)		
-C1 (default)	1x 15p D-sub HD male	1x 15p D-sub female	
-C2	1x 12p Fischer (S 103 Z062-130+)		not possible

Environmental compatibility

temperature range	-30°C to +70°C
humidity range	20% to 90% RH (non-condensing)
heat dissipation (motor only)	< 2 x 5 W
mounting surface flatness	< 20 µm
internal operation voltage	< 48 V

Motion performance

		XVP all lengths						unit	tolerance	
resolution		-OPEN	-1250	-312	-78	-5	-1			
ENCODER	type	NA ¹	optical, incremental							
	grating period	NA ¹	79.8		20			µm		
	resolution	NA ¹	1250	312	78	5	1	nm		
	index	NA ¹	1 per full stroke							
	scale accuracy	NA ¹	± 10	± 5	± 1			µm	typ.	
STAGE	positioning	resolution = min. step size = min. incremental motion (MIM)	50000 ²	1250	350	80	50		nm	typ.
		unidirectional repeatability	± 50000 ²	± 1250	± 350	± 80	± 50		nm	typ.
		bidirectional repeatability	± 50000 ²	± 2500	± 700	± 160	± 100		nm	typ.
	speed	max. speed (for -HV/-UHV)	100	10			10	10	mm/s	typ.
		max. speed	200	50			50	25	mm/s	typ.
		min. speed	5000 ³	5			2	1	µm/s	typ.
		stability (at typical speed of 10 mm/s)	± 10	± 1					%	typ.
		point-to-point positioning 0 g load time for a 1 mm step ⁴ 300 g load	NA	600 1000			1000 1300		msec msec	typ.
		operation duty cycle (for -HV/-UHV)	50 120							% sec

¹ a closed-loop control can be achieved by connecting an external position encoder to the controller

² when using stage in burst mode (50 µs bursts)

³ lower average speeds can be achieved when using burst mode

⁴ settling within bidirectional repeatability range

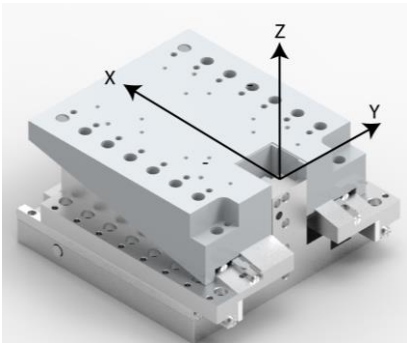
Note: a detailed description of the technical terms used in this datasheet can be found on the Terminology page of our website.

Mechanical properties

		XVP-80	unit	tolerance
dimensions	length	80 (+/- 25 horizontal travel)	mm	± 0.1
	width	80		
	height	41.7 (+/- 5 vertical travel)		
stroke/ travel range		10	mm	± 0.1
max. acceleration		5	m/s ²	typ.
mass (w/o connector)		800	g	± 5%
payload limitation		1.5	kg	max.
holding force		30	N	min.
driving force		30	N	min.
stage material	slider/base bearings	anodised aluminium stainless steel		
cable	length	1.5	m	± 0.1
	type	shielded cable, PFA insulation and sheat (standard/-HV) shielded cable, PFA insulation w/o sheat (-UHV)		

Error motion

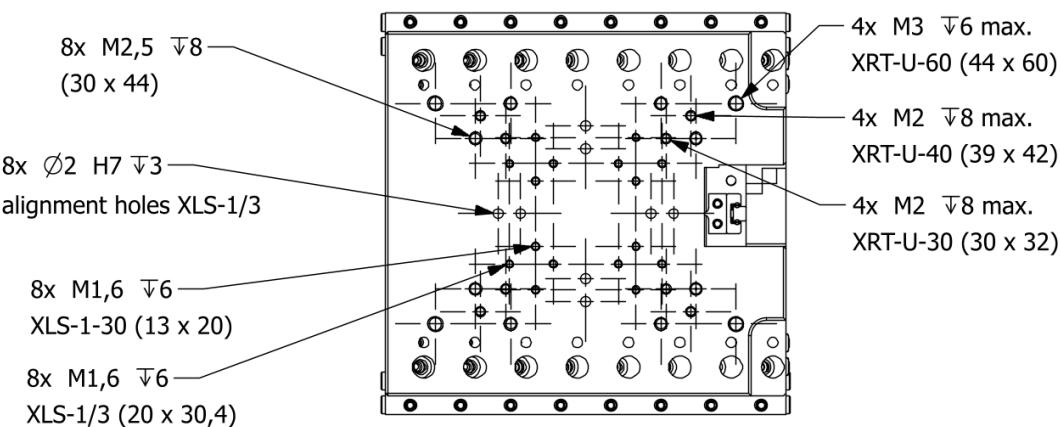
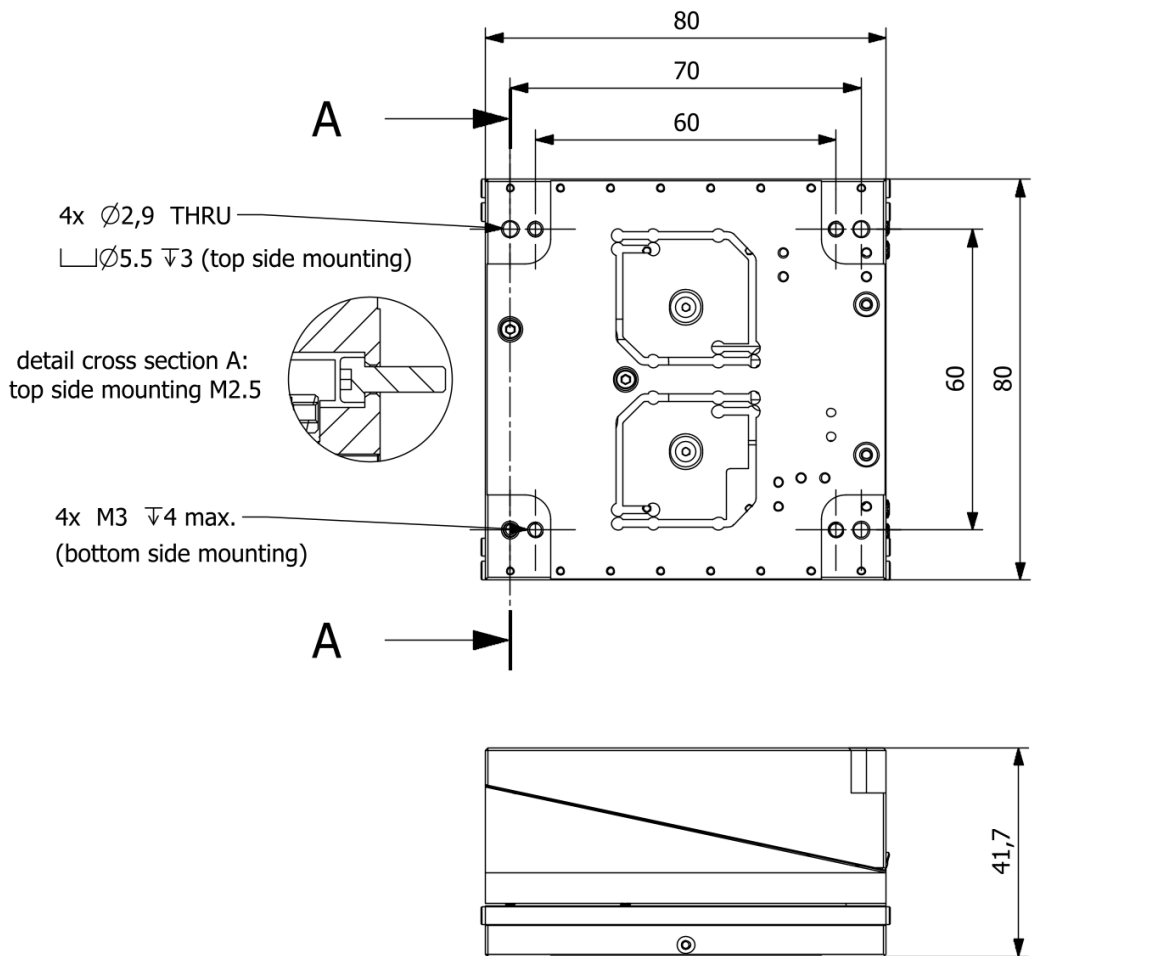
		XVP	unit	tolerance
error motion	x-straightness	± 2	µm	max.
	y-straightness	± 2	µm	max.
	pitch (θy)	140	µrad	max.
		29	arcsec	
	roll (θz)	35	µrad	max.
		7	arcsec	
	yaw (θx)	60	µrad	max.
		12	arcsec	



Controller/software

The XVP series linear stages are compatible with all Xeryon controllers. 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



XVP assy B

recommended flatness of
mounting surface: 20 µm max.

	max. tightening torque
M1.6	16 cNm
M2	34 cNm
M2.5	60 cNm
M3	120 cNm