

XVS series

Precise vertical piezo stage with high force

The XVS series is a high-precision vertical stage driven by an ultrasonic piezo motor. It offers fast positioning, nanometer precision, and high force output in a compact design. Xeryon's motor technology ensures a long lifetime, silent and vibration-free operation, and position-holding when powered off. Low heat generation makes it ideal for stable nano-positioning. The XVS is used in various industries for tasks like part alignment and sample manipulation. It comes in different lengths and force ratings and can be easily stacked into XZ or XYZ assemblies. For heavier loads, a mass compensation option is available to increase payload capacity.

KEY FEATURES

drive principle	patented Crossfixx™ ultrasonic piezo technology
bearings	precision crossed-roller
lifetime	> 1000 km / typ. 20 million cycles
control principle	closed-loop position control

MODEL CODE STRUCTURE

BASE SPECIFICATION			OPTIONAL				CONNECTOR/CABLE	
stage type	stage length (mm)	encoder resolution (nm)	vacuum compatibility	short cage for increased stroke	mass compensation	light shield ¹	connector type	cable length
XVS-1	-40	-1250	-HV (10 ⁻⁶ mbar) -UHV (10 ⁻⁹ mbar)	-SC	not possible	-LS		see tables below
		-312						
		-78						
		-5						

¹ light shield around optical encoder to reduce light scattering

BASE SPECIFICATION			OPTIONAL				CONNECTOR/CABLE		
stage type	stage length (mm)	encoder resolution (nm)	vacuum compatibility	short cage for increased stroke	mass compensation ²	light shield ¹	connector type	cable length	
XVS-3	-40	-1250	-HV (10 ⁻⁶ mbar) -UHV (10 ⁻⁹ mbar)	-SC		-LS		see tables below	
		-312							
		-78							
		-5							
	-60	same as for XVS-3-40							-MC3
	-80								-MC4

¹ light shield around optical encoder to reduce light scattering

² not all combinations are possible and some options limit the stage stroke/travel range (see tables further below)

CONNECTOR OPTION	stage environment		
	standard	-HV	-UHV
-C0 (OEM)	available as from 10/2025 (XLS-1) 08/2025 (XLS-3)	not recommended	
-C1 (scientific)	15p D-sub HD male	15p D-sub LD female	
-C2	12p Fischer (S 103 Z062-130+)		not possible

CABLE LENGTH OPTION	length
-L25	25 cm
-L50	50 cm
-L150 (standard)	150 cm
-L300	300 cm

Example: XVS-3-40-312-HV-MC1-C1-L150

- XVS-3 series vertical stage
- Stage length of 40 mm
- Encoder feedback with a resolution of 312 nm
- Vacuum compatibility (HV)
- Mass compensation MC1 for payload range of 150-250 g
- D-sub connector option (C1)
- Cable length of 150 cm

ENVIRONMENTAL COMPATIBILITY

temperature range	-30°C to +70°C
humidity range	20% to 90% RH (non-condensing)
heat dissipation (motor only)	< 5 W (48 V) < 6 W (60 V)
mounting surface flatness	< flatness specification of stage
internal operation voltage	48 V (XD-C, XD-M and XD-19 controller) 60 V (XD-OEM controller)

PAYLOAD RANGE

stage type	stage option	payload range (g) ¹		stroke/ travel range (mm)	stage mass (g)	location of mass comp. unit	bracket
		resolution -1250 and -312	resolution -78 and -5				
XVS-1-40		0-35	0-20	25	51	-	L-bracket XYZ S
	-SC			30			

¹ net payload added by user (stage dead load is already taken into account)

stage type	stage option	payload range (g) ¹		stroke/ travel range (mm)	stage mass (g)	location of mass comp. unit ²	bracket
		resolution -1250 and -312	resolution -78 and -5				
XVS-3-40		0-100	0-50	25	97	-	L-bracket XYZ L
	-SC			30			
	-MC1	150-250		17	139	right	
	-MC2	250-350					
XVS-3-60		0-75	0-40	40	143	-	L-bracket XYZ L
	-SC			48			
	-MC3	230-330		40	274	left	custom
	-SC-MC4	250-350		48	224	right	
XVS-3-80		0-50	0-25	50	185	-	L-bracket XYZ L
	-SC			69			
	-MC4	225-325		48	266	right	custom

¹ net payload added by user (stage dead load is already taken into account)

² see technical drawings at the end of this document

MOTION PERFORMANCE

resolution		XVS all lengths				unit	tolerance	
		-1250	-312	-78	-5			
ENCODER	type	optical, incremental						
	grating period	79.8 318		20 1270		µm LPI		
	resolution	rounded effective	1250 1248.035	312 312.009	78 78.125	5 5	nm	
	index	1 per full stroke						
STAGE	positioning	resolution = min. step size = min. incremental motion (MIM)	1250	350	80	50	nm	typ.
		unidirectional repeatability	± 1250	± 350	± 80	± 50	nm	typ.
		bidirectional repeatability	± 2500	± 700	± 160	± 100	nm	typ.
	speed	max. speed (for -HV/-UHV)	50				mm/s	typ.
		max. speed	100			50	mm/s	typ.
		min. speed	5			2	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		300 150 90		msec
		operation duty cycle (for -HV/-UHV)	50 120				% sec	max. max.

¹ conditions: settling within bidirectional repeatability range, vertical payload within specified range, communication delay not taken into account

MECHANICAL PROPERTIES

		XVS-1 40	XVS-3 -40	XVS-3 -60	XVS-3 -80	unit	tolerance
dimensions		see drawings				mm	± 0.1
stroke/travel range		see table on payload range				mm	± 0.1
max. acceleration ¹		17	8.8	8.2	8.2	m/s ²	typ.
stage mass (w/o connector)		see table on payload range				g	± 5%
load capacity ² (bearing force limitation)	vertical	396	396	633	792	N	max.
	lateral	396	396	633	792	N	
	tilt around pitch axis	1.50	1.50	2.25	3.00	Nm	
	tilt around yaw axis	1.50	1.50	2.25	3.00		
	tilt around roll axis	5.05	7.74	12.38	15.48		
driving force		3				N	min.
holding force		3				N	min.
passive holding stiffness		1				N/μm	typ.
stage materials		aluminium coating none (blank) bearings stainless steel 440C fasteners stainless steel grade A4 mass comp. (slider) aluminium and NdFeB magnet mass comp. (stator) Ni-plated unalloyed steel					
length		150 (standard)				cm	± 5
cable	type	2x shielded cable, PFA insulation w/ sheath (standard/-HV) 2x shielded cable, PFA insulation w/o sheath (-UHV)					
	diameter	Ø1.7 (standard and -HV) Ø1.4 (-UHV)				mm	± 0.2

¹ taking into account the max. allowable payload

² valid for stages with standard cage

CONTROLLER/SOFTWARE

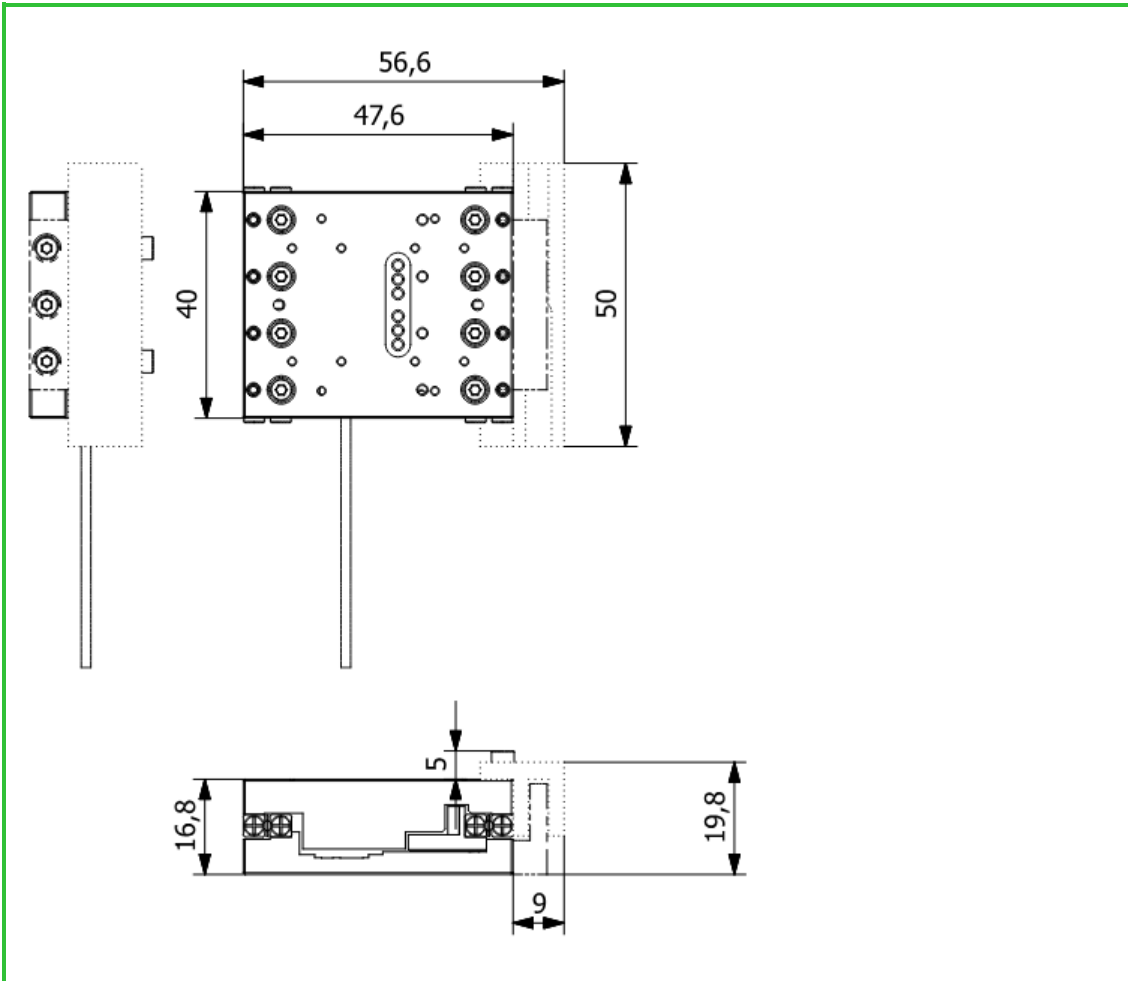
The XVS series linear stages are compatible with the XD-C, XD-M, XD-19 and XD-OEM controller. Stages with resolution -5 need to be connected to an XD-M controller. Controlling of the stage is done with:

- 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)

XVS-3-40-MC1 assy H7

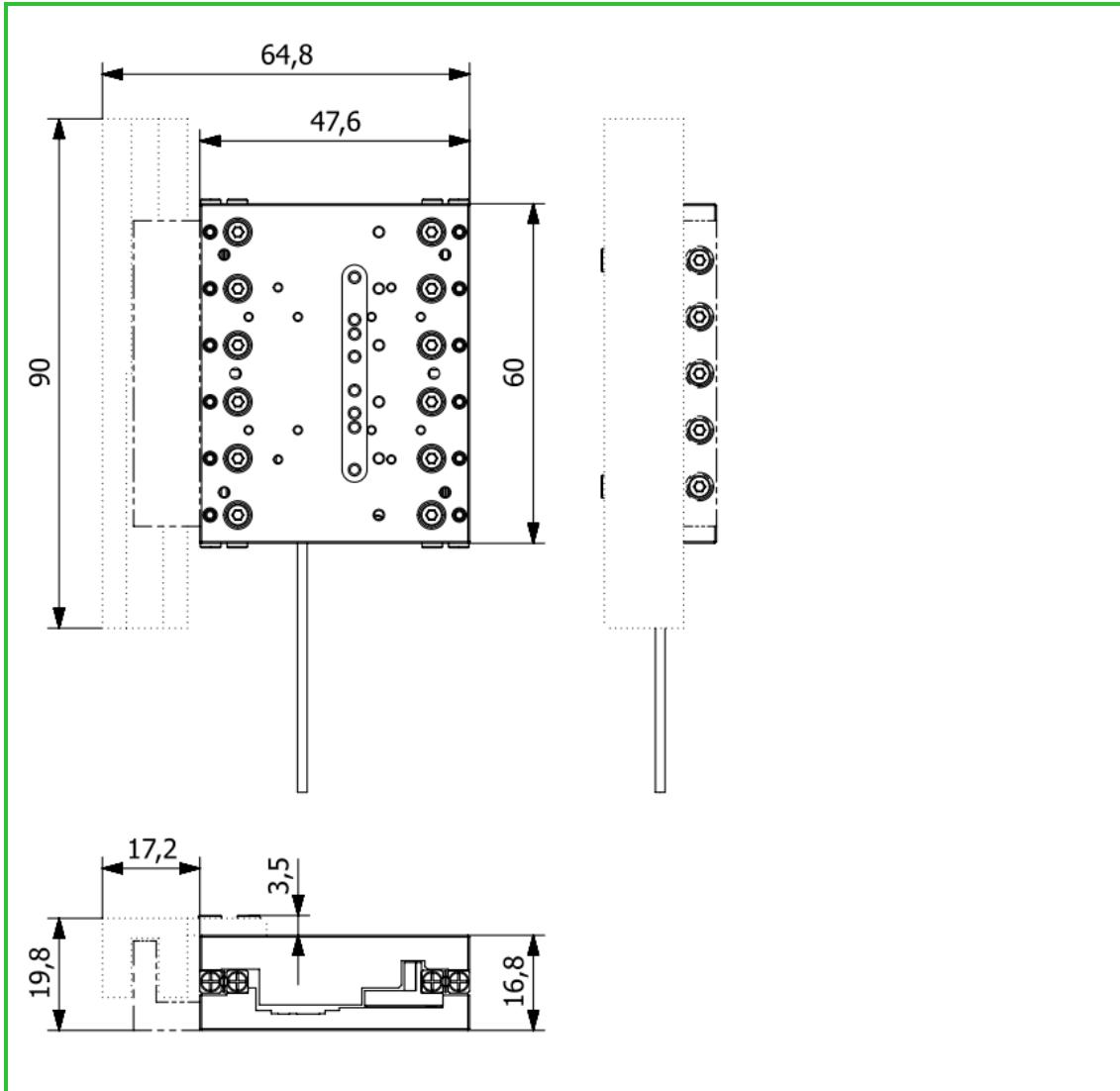
XVS-3-40-MC2 assy H7



Notes:

- XVS stages without mass compensation unit, are XLS stages with the direction of motion oriented vertically.
- Details on mounting interfaces can be found in the specification sheets of the XLS-1 and XLS-3 series.

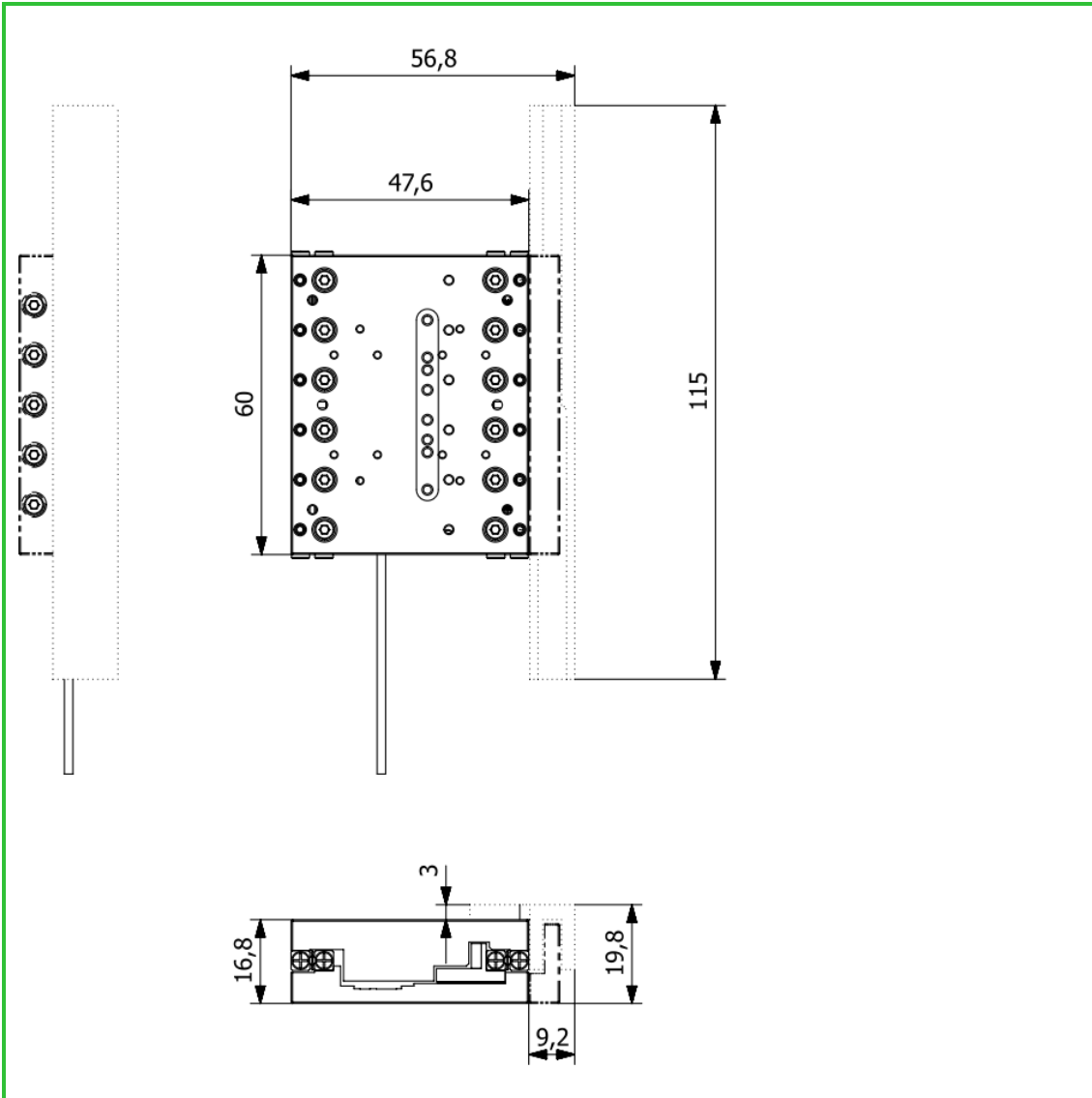
XVS-3-60-MC3 assy H7



Notes:

- XVS stages without mass compensation unit, are XLS stages with the direction of motion oriented vertically.
- Details on mounting interfaces can be found in the specification sheets of the XLS-1 and XLS-3 series.

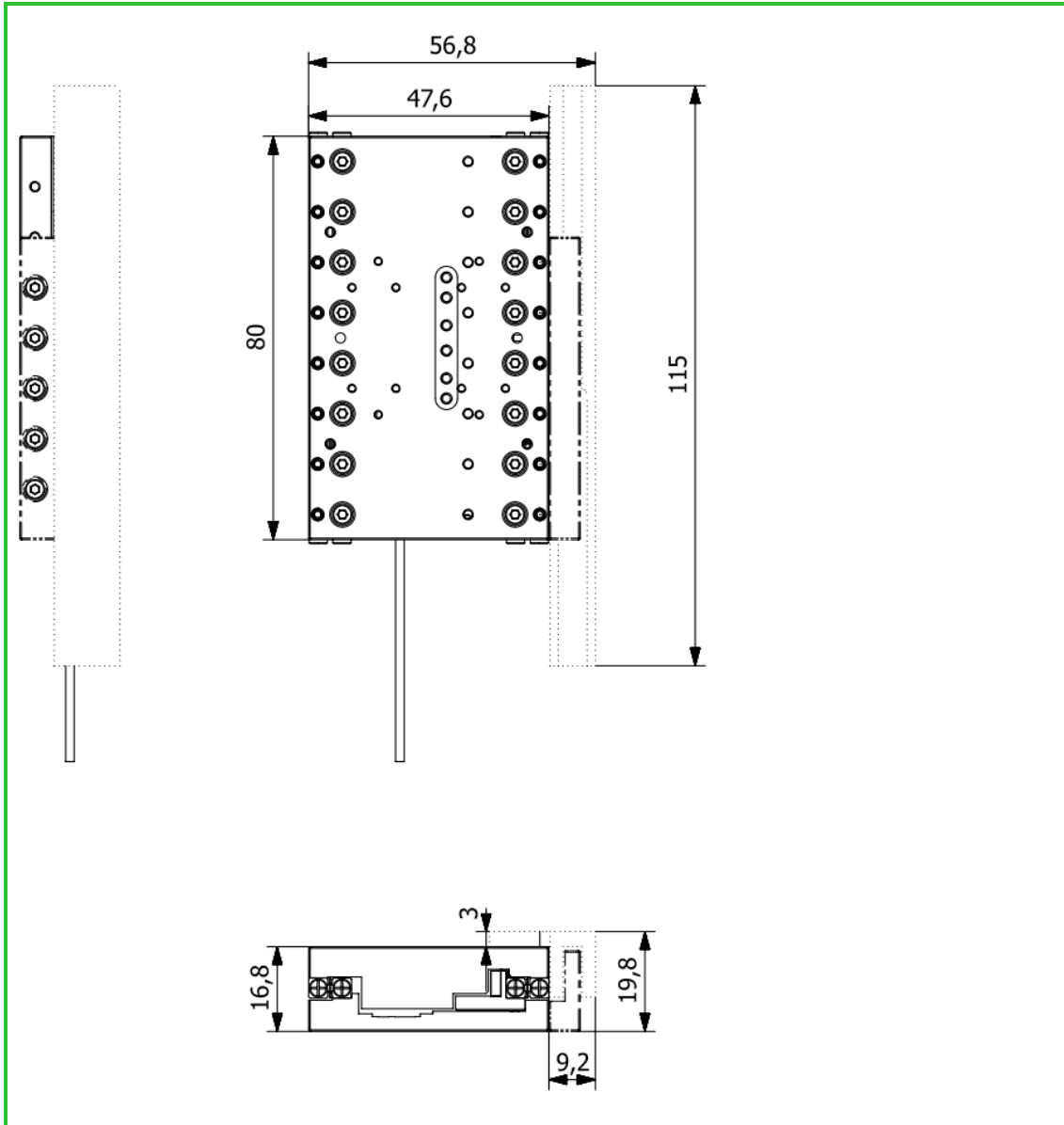
XVS-3-60-SC-MC4 assy H7



Notes:

- XVS stages without mass compensation unit, are XLS stages with the direction of motion oriented vertically.
- Details on mounting interfaces can be found in the specification sheets of the XLS-1 and XLS-3 series.

XVS-3-80-MC4 assy H7



Notes:

- XVS stages without mass compensation unit, are XLS stages with the direction of motion oriented vertically.
- Details on mounting interfaces can be found in the specification sheets of the XLS-1 and XLS-3 series.