XLS-5 series

Precise linear piezo stage with high force output

The XLS-5 series are precise linear stages driven by an ultrasonic piezo motor. 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 XLS-5 is used in a wide variety of industries and applications, e.g. for part alignment or sample manipulation. The XLS-5 series is available in different lengths and are easily stacked into an XY- or XYZ-assembly.

Key features

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

Model code structure

stage type	stage length (mm)	encoder resolution (nm)	optional			connector type
			vacuum compatibility	non-magnetic	short cage for increased stroke	
XLS-5	-40	-OPEN	-HV (10^{-6} mbar) -UHV (10^{-9} mbar)	-NM	-SC	see table below
		-1250				
		-312				
		-78				
		-5				
		-1				
	-60	same as for XLS-5-40				
	-80					
	-120					

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)	< 5 W
mounting surface flatness	< flatness specification of stage
Internal operation voltage	< 60 V

Motion performance

			XLS-5 all lengths						unit	tole-rance
		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						
		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)	500	50			50	25	mm/s	typ.
		max. speed	1000	200			150	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 time for a 1 mm step[4] 0 g load 100 g load	NA	25 40		80 120	250 450		msec	typ.
		point-to-point positioning time 10 mm 1 mm 100 µm	NA	130 25 20		170 80 50	500 250 150		msec	typ.
		operation duty cycle (for -HV/-UHV)	50 120						% sec	max. max.

[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 µm 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

		XLS-5 -40	XLS-5 -60	XLS-5 -80	XLS-5 -120	unit	tolerance
dimensions	length	40	60	80	120	mm	± 0.1
	width	47.6					
	height	16.8					
stroke/ travel range	standard cage short cage (-SC)	25 30	40 48	50 69	100 109	mm	± 0.1
max. acceleration		100	60	55	45	m/s^2	typ.
mass (w/o connector)		81	120	161	241	g	± 5%
load capacity (payload limitation)		2				kg	max.
load capacity* (bearing force limitation)	vertical lateral	396 396	633 633	792 792	1188 1188	N	max.
	tilt around pitch axis tilt around yaw axis tilt around roll axis	1.50 1.50 7.74	2.25 2.25 12.38	3.00 3.00 15.48	4.50 4.50 23.23	Nm	
driving force		5				N	min.
holding force		5				N	min.
passive holding stiffness		1				N/µm	typ.
stage material	slider/base bearings	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)					

* valid for stages with standard cage

Error Motion

		XLS-5 length 40 to 60	XLS-5 length 80 to 120	unit	tolerance
error motion*	straightness	± 2	± 5	µm	max.
	flatness	± 2	± 5	µm	max.
	pitch	± 120 ± 25	± 120 ± 25	µrad arcsec	max.
	roll	± 100 ± 20	± 100 ± 20	µrad arcsec	max.
	yaw	± 250 ± 50	± 250 ± 50	µrad arcsec	max.

These values are valid for stages with standard cage.
Better straightness and flatness are available upon request.

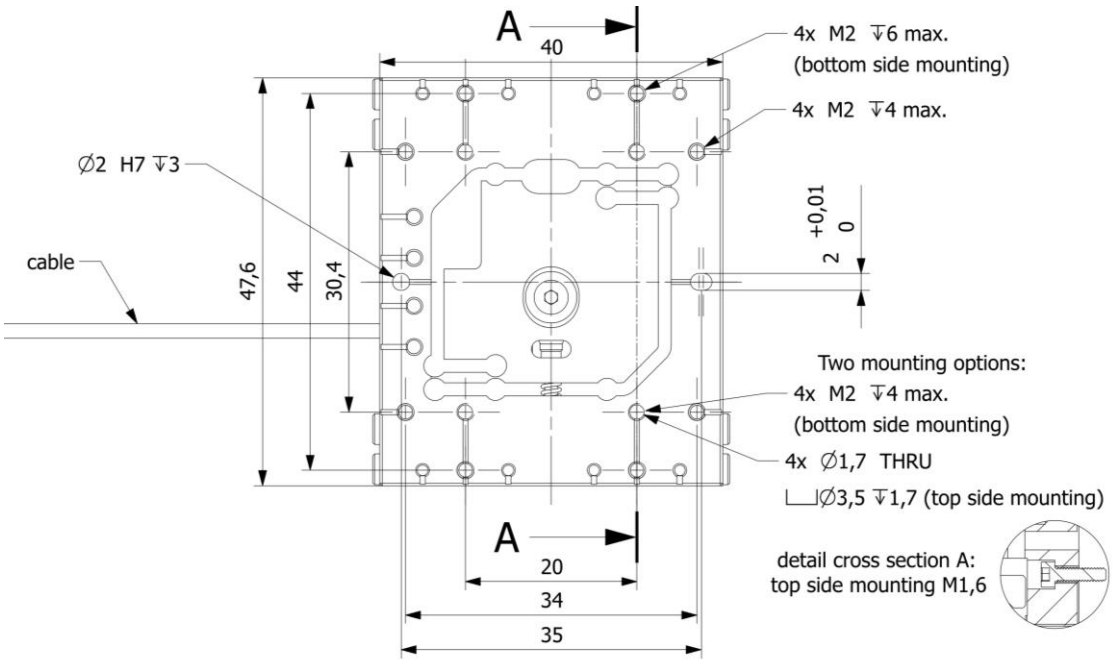
Controller/software

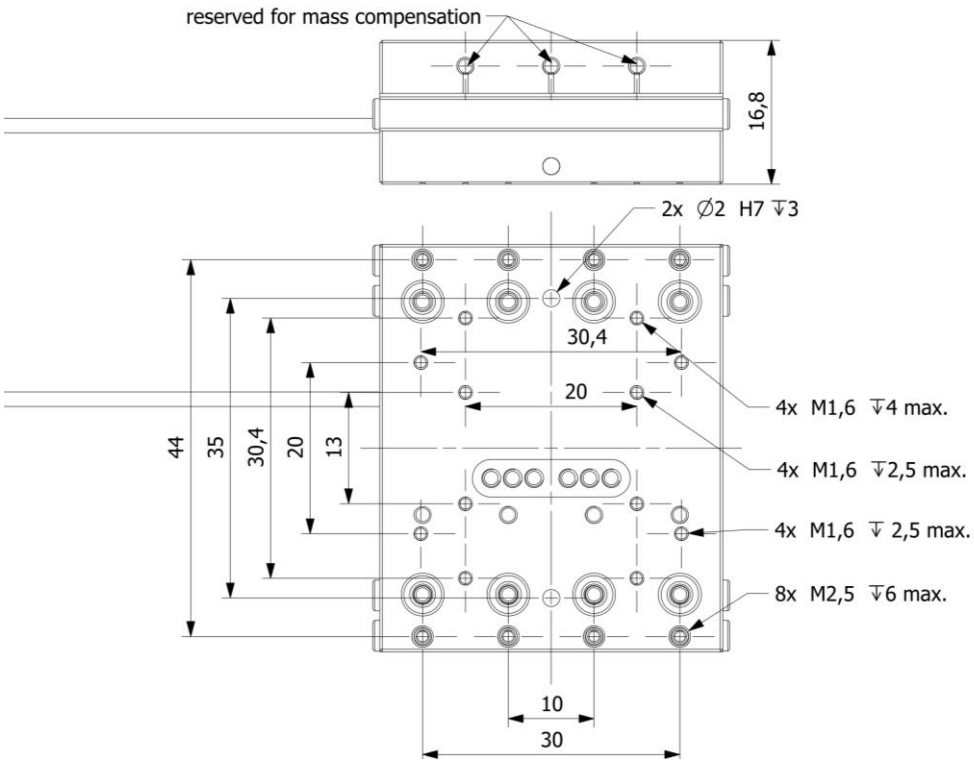
The XLS-5 series linear stages are compatible with all Xeryon controllers. Controlling of the stage is done with:

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

Last updated: 09/08/2024. All specifications are subject to change without prior notice.

Drawings (STEP-files are available on our website)

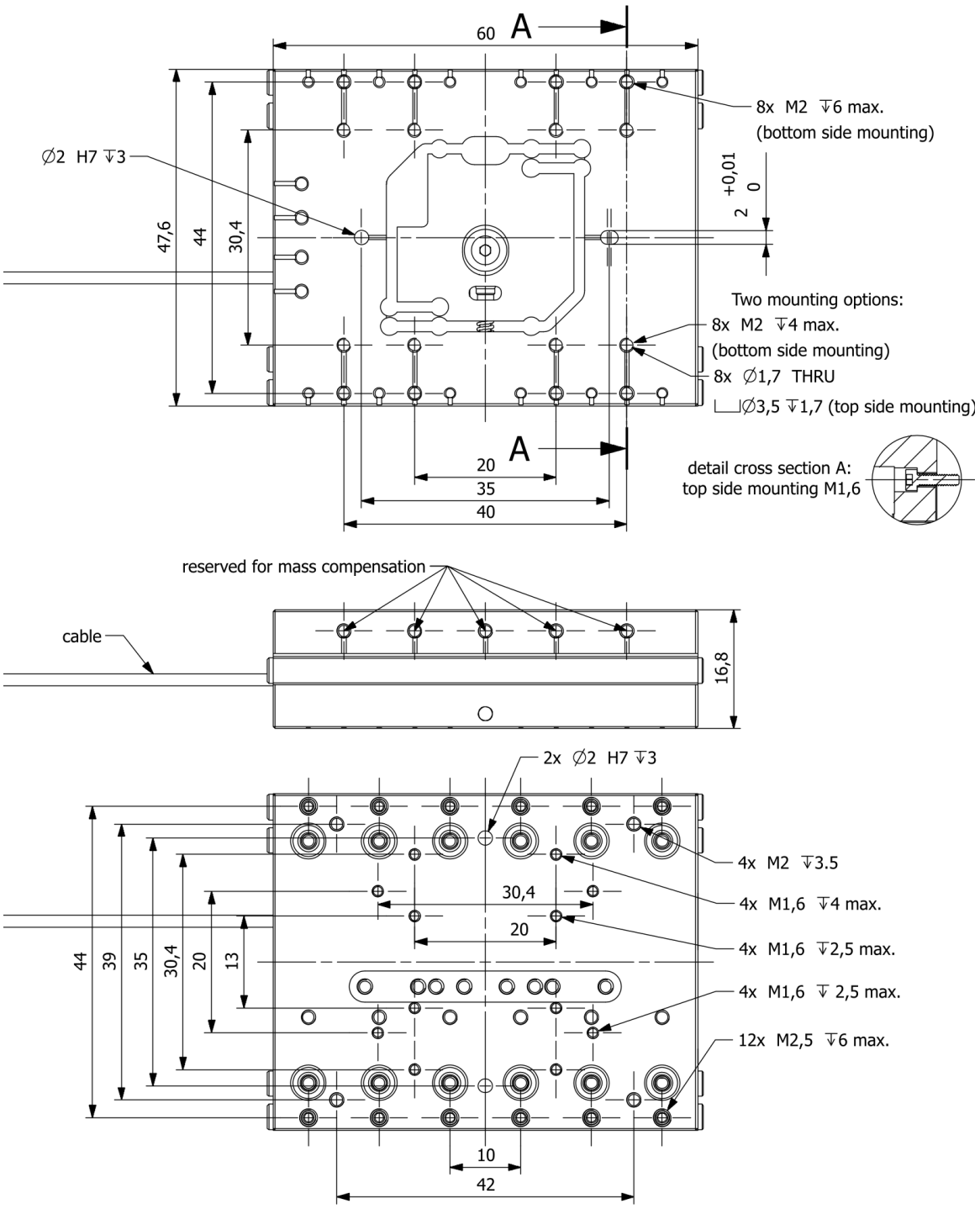




	max. tightening torque
M1,6	16 cNm
M2	34 cNm
M2,5	60 cNm

recommended flatness of
mounting surfaces: 5 µm max.

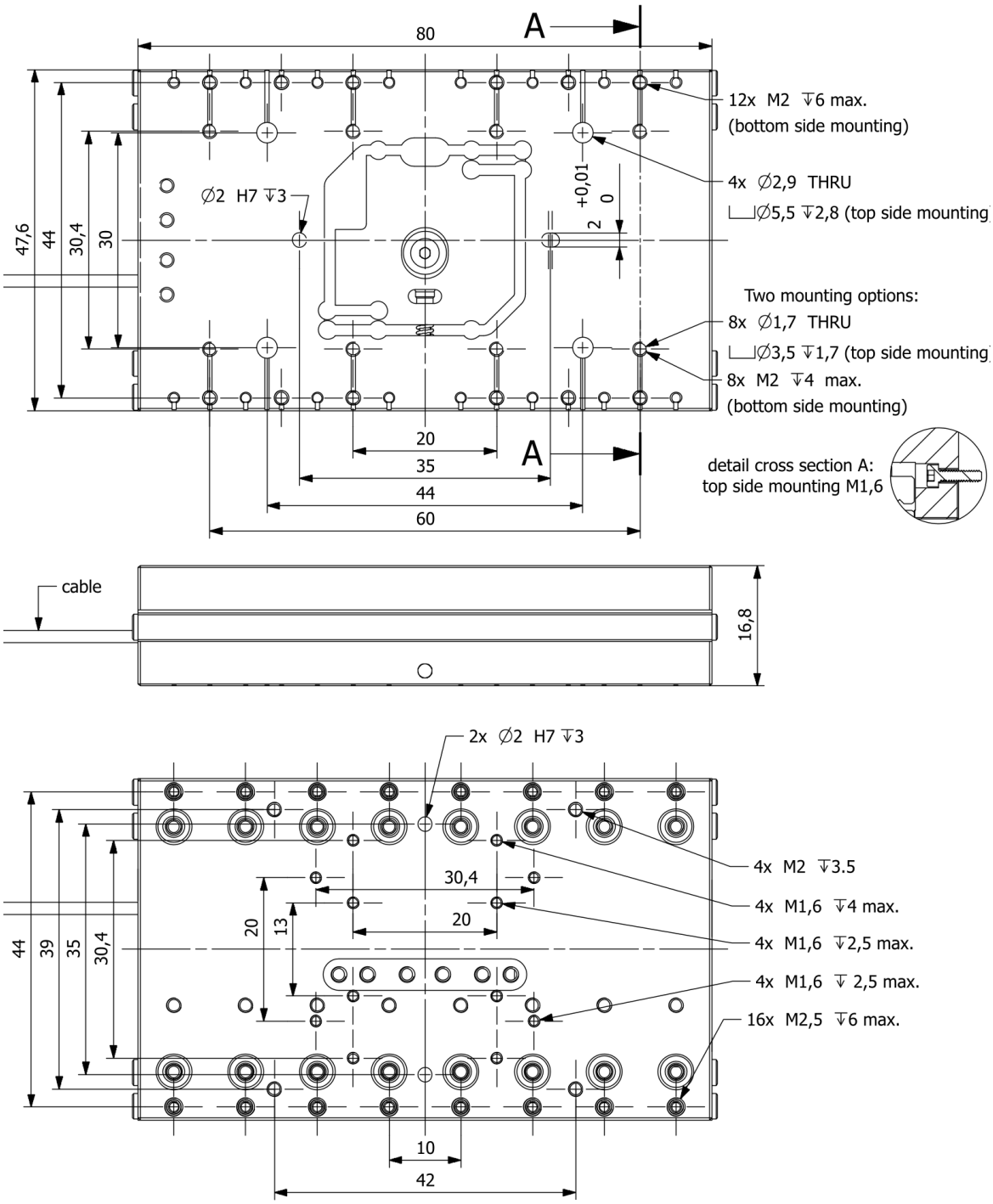
XLS-5-40 assy H7



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

recommended flatness of
mounting surfaces: 5 µm max.

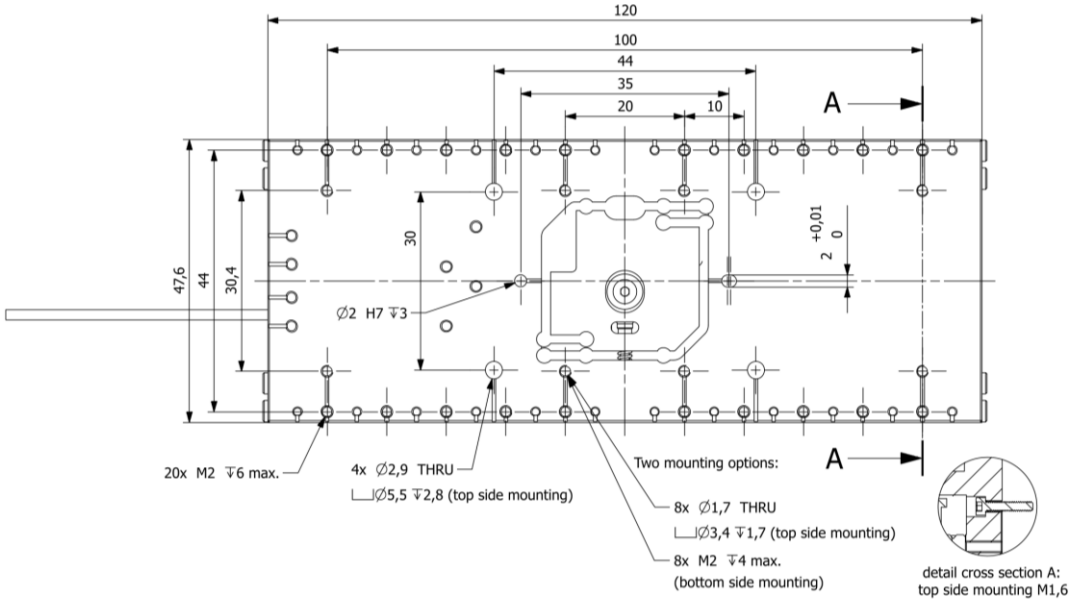
XLS-5-60 assy H7

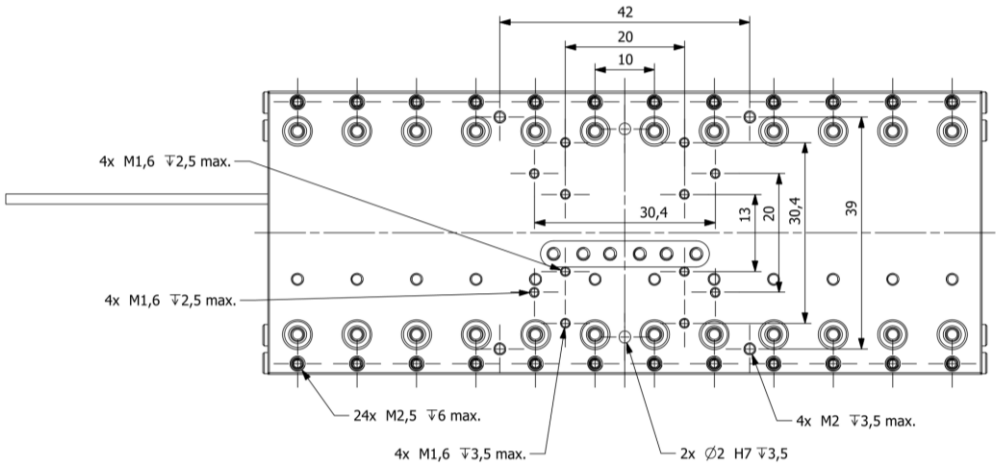


	max. tightening torque
M1,6	16 cNm
M2	34 cNm
M2,5	60 cNm

recommended flatness of
mounting surfaces: 5 µm max.

XLS-5-80 assy H7



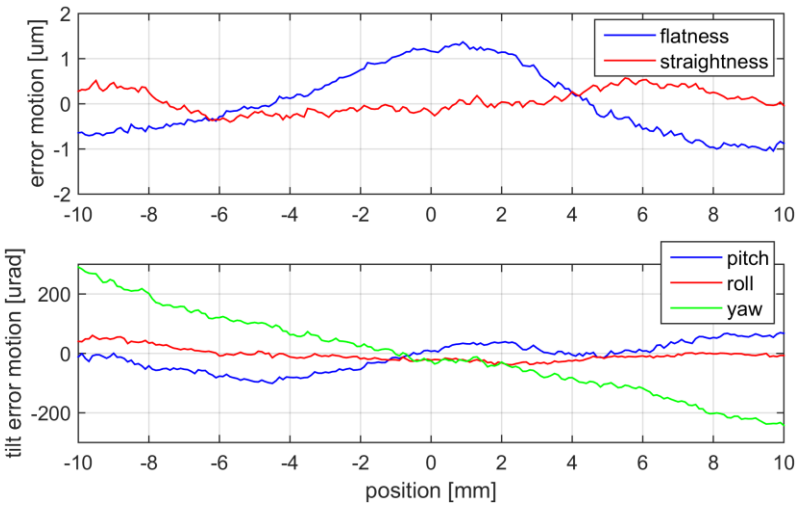


	max. tightening torque
M1,6	16 cNm
M2	34 cNm
M2,5	60 cNm

recommended flatness of
mounting surfaces: 5 µm max.

XLS-5-120 assy H7

Measurement data



Typical error motion values measured on an XLS-5-40 stage.