XLS-1 series

Compact and precise linear piezo stage

The XLS-1 series are precise linear stages driven by an ultrasonic piezo motor. These stages combine high-speed positioning with nanometre precision. 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-1 is used in a wide variety of industries and applications, e.g. for part alignment or sample manipulation. The XLS-1 series is available in different lengths and are easily stacked into an XY-assembly. All stages can be equipped with a short cage to increase the stroke.

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		
			vacuum compatibility	low- or non-magnetic bearings	short cage for increased stroke
XLS-1	-30	-OPEN	-HV (10^{-6} mbar) -UHV (10^{-9} mbar)	-LM / -NM	-SC
		-1250			
		-312			
		-78			
		-5			
		-1			
	-40	same as for XLS-1-30			
	-50				
	-60				
	-70				
	-80				
	-100				
	-120				

Environmental compatibility

temperature range	-30°C to +70°C
humidity range	20% to 90% RH (non-condensing)
heat dissipation (motor only)	< 1 W
mounting surface flatness	< flatness specification of stage
internal operation voltage	< 48 V

Disclaimer: The product images shown may be for illustration purposes only and may not be an exact representation of the product.

Motion performance

			XLS-1 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	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	40 75		60 100	150 300		msec msec	typ.
		point-to-point positioning time 10 mm 1 mm 100 µm	NA	100 40 30		250 60 50	300 150 90		msec. msec. msec.	typ.
		operation duty cycle (for -HV/-UHV only)	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 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

		XLS-1 -30	XLS-1 -40	XLS-1 -50	XLS-1 -60	XLS-1 -70	XLS-1 -80	XLS-1 -100	XLS-1 -120	unit	tole-rance
dimensions	length	30	40	50	60	70	80	100	120	mm	± 0.1
	width	34									
	height	13									
stroke/ travel range	standard cage	10	25	30	40	45	50	75	100	mm	± 0.1
	short cage (-SC)	25	30	38	48	52	69	85	109		
max. acceleration		60	45	35	30	25	20	15	10	m/s^2	typ.
mass (w/o connector)		40	50	63	76	88	105	126	151	g	± 5%
load capacity (payload limitation)		0.5								kg	max.
load capacity* (bearing force limitation)	vertical	237	396	475	633	712	792	990	1188	N	max.
	lateral	237	396	475	633	712	792	990	1188		
	tilt around pitch axis	1.13	1.50	1.88	2.25	2.63	3.00	3.75	4.50	Nm	
	tilt around yaw axis	1.13	1.50	1.88	2.25	2.63	3.00	3.75	4.50		
	tilt around roll axis	3.02	5.05	6.06	8.07	9.08	10.10	12.62	15.15		
driving force		1								N	min.
holding force		1								N	min.
passive holding stiffness		0.5								N/µm	typ.
stage material	slider/base	aluminium									
	bearings	stainless steel									
cable length**		1.5								m	± 0.1
connector (stage to controller)		1x 15-pin D-sub HD male (standard) 1x 15-pin D-sub female (-HV)									

* valid for stages with standard cage

Error motion

		XLS-1 length 30 to 60	XLS-1 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	± 150 ± 30	± 150 ± 30	µrad arcsec	max.
	yaw	± 250 ± 50	± 250 ± 50	µrad arcsec	max.

These values are valid for stages with standard cage.

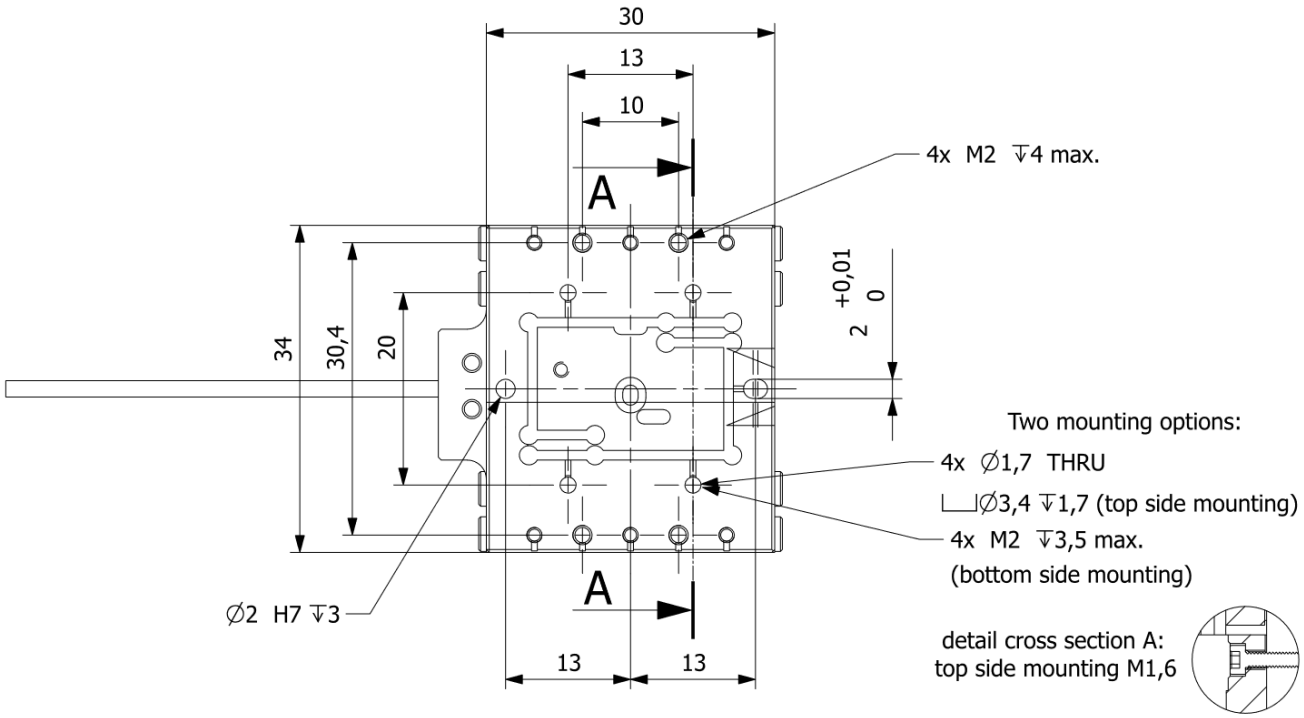
Better straightness and flatness are available upon request.

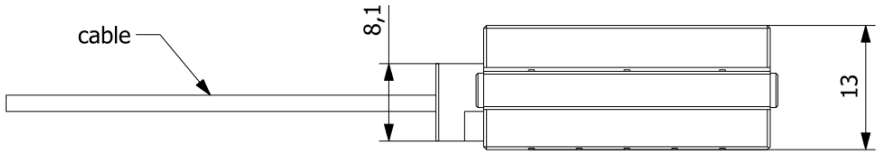
Controller/software

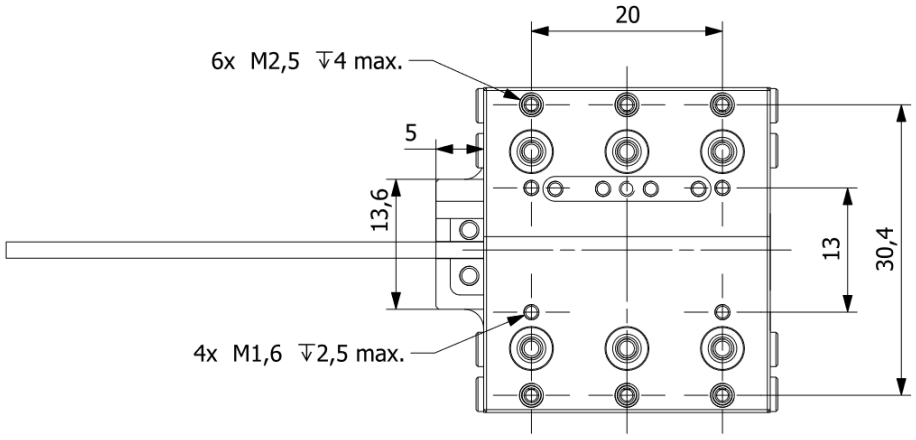
The XLS-1 series linear stages are compatible with all Xeryon controllers. Controlling of the stage is done with:

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

Drawings (STEP-files are available on our website)



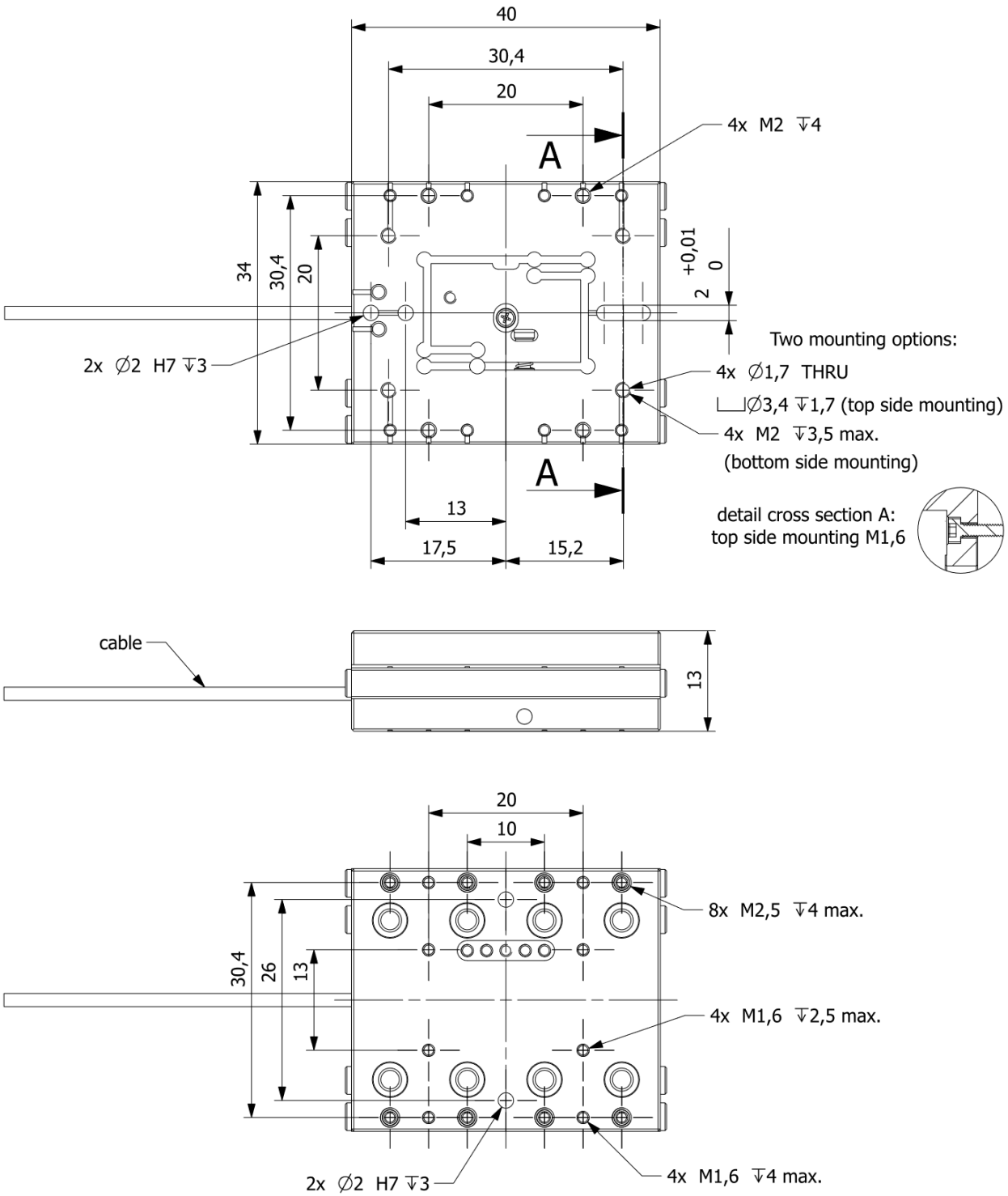




	max. tightening torque
M1,6	16 cNm
M2	34 cNm
M2,5	60 cNm

recommended flatness of
mounting surfaces: 5 µm max.

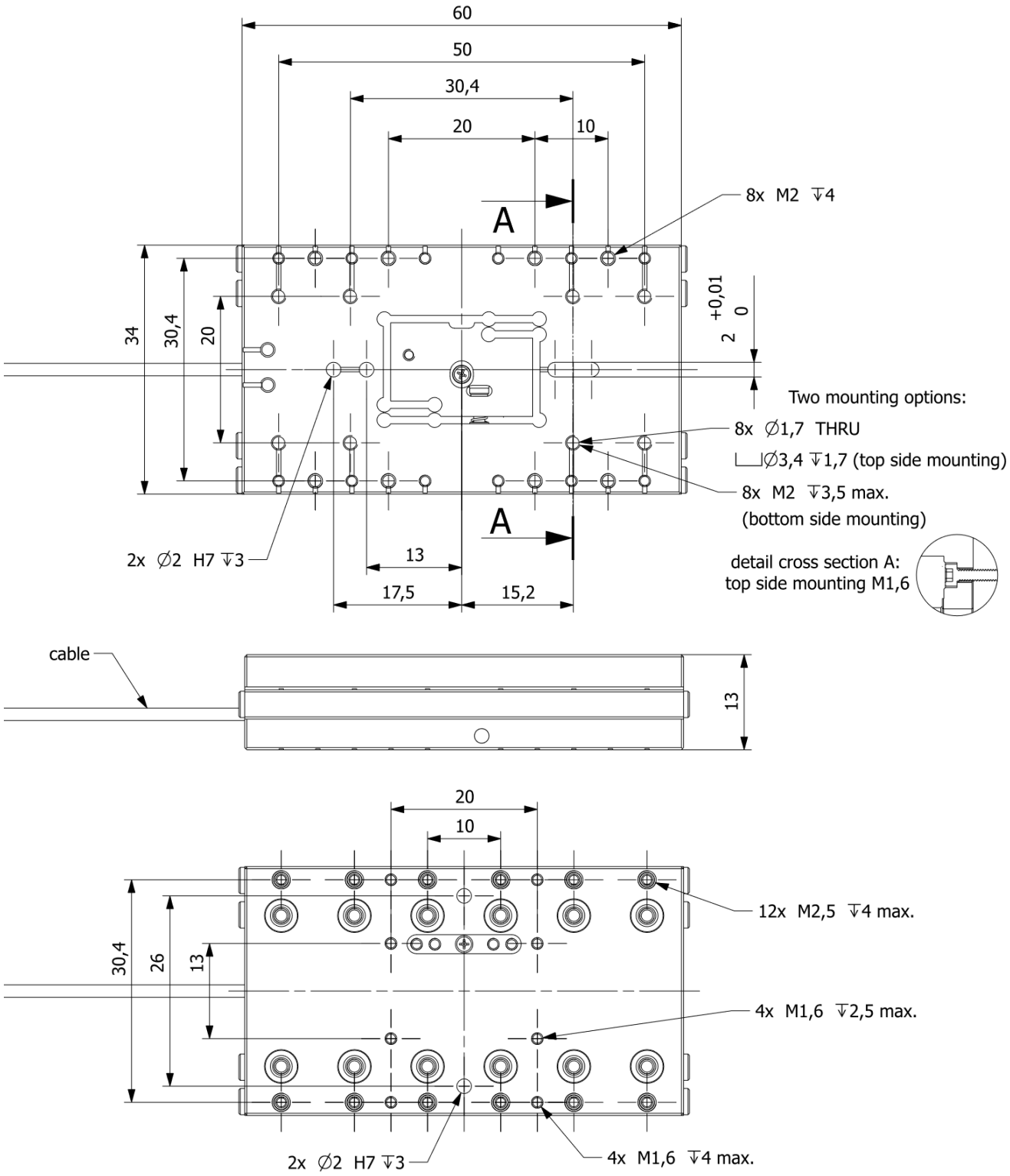
XLS-1-30 assy J6



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

recommended flatness of
mounting surfaces: 5 µm max.

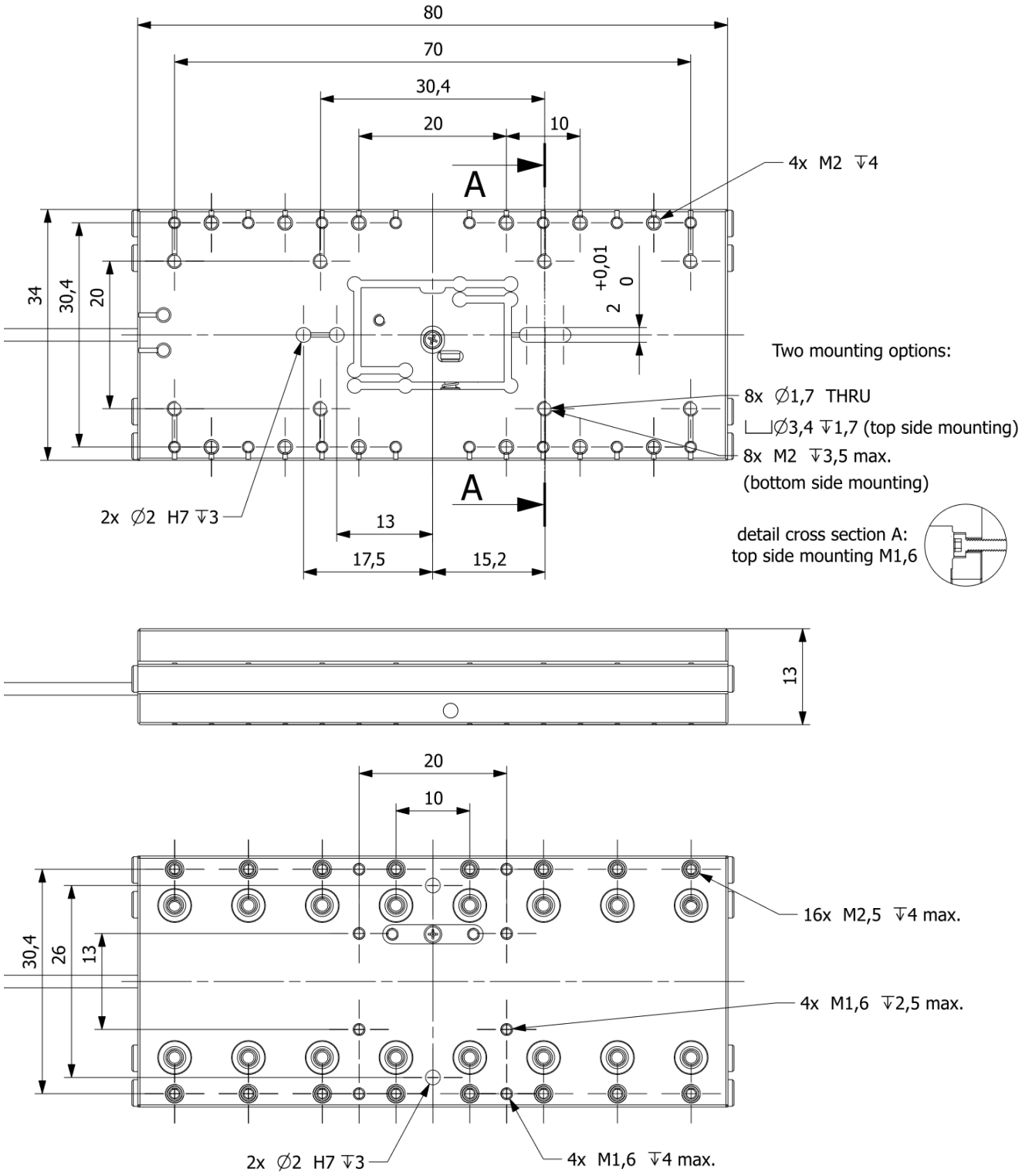
XLS-1-40 assy J6



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

recommended flatness of
mounting surfaces: 5 µm max.

XLS-1-60 assy J6



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

recommended flatness of
mounting surfaces: 5 µm max.

XLS-1-80 assy J6