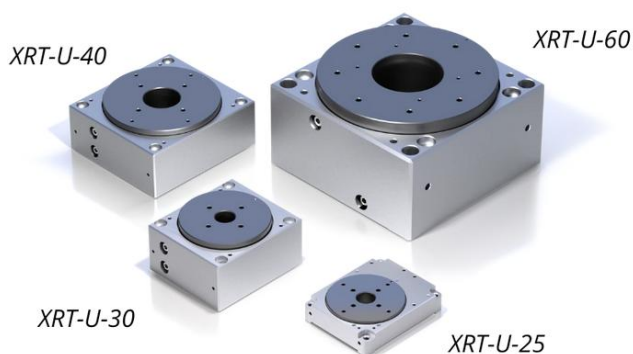




XRT-U series

Compact and precise rotation stage

The XRT-U is a compact high-precision rotation stage driven by an ultrasonic piezo motor. Xeryon's ultrasonic piezo motor ensures you high speeds, long lifetime and noiseless operation. This makes the XRT-U a state-of-the-art rotary stage for a broad range of precision positioning and metrology applications. The precision ball bearings allow you to achieve low error motion values. The XRT-U is available in four sizes and with different options. Stacking onto a Xeryon linear stage is easily done directly on the top plate or with available interface plates.

KEY FEATURES

drive principle	patented Crossfixx™ ultrasonic piezo technology
bearings	precision ball bearings
lifetime	>1000 km / typ. 10 million rev.
control principle	closed-loop position control

MODEL CODE STRUCTURE

BASE SPECIFICATION			OPTIONAL				CONNECTOR/CABLE	
stage type	approx. rotor diameter (mm)	encoder resolution (μrad)	vacuum compatibility	non-magnetic	dual motor	light shield ¹	connector type	cable length
XRT-U	-25	-109 -49 -19 -3	-HV (10-6 mbar) -UHV (10-9 mbar)	not possible	-2M	not possible	see tables below	
	-30			-NM	not possible	-LS		
	-40			not possible		not possible		
	-60			-NM				

¹ light shield around optical encoder to reduce light scattering

CONNECTOR OPTION	stage environment		
	standard	-HV	-UHV
-C0 (OEM) ²	14p Molex Pico-Clasp (501330-1400)	not recommended	
-C1 (scientific)	15p D-sub HD male	15p D-sub LD female	
-C2	12p Fischer (S 103 Z062-130+)		not possible

² only available for XRT-U-25 and XRT-U-30

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

Example: **XRT-U-30-49-HV-C1-L150**

- XRT-U series rotation stage
- Rotor diameter of 30 mm (approx.)
- Encoder feedback with a resolution of 49 μ rad
- Vacuum compatibility (HV)
- 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)	< 1 W (XRT-U-30/40) < 1 W (XRT-U-25 single motor) < 2 W (XRT-U-25 dual motor) < 5 W (XRT-U-60)
mounting surface flatness	< 20 μ m
internal operation voltage	48-60 V

MOTION PERFORMANCE

Specifications dependant on the [encoder resolution](#)

		XRT-U all rotor diameters				unit	tolerance	
resolution		-109	-49	-19	-3			
ENCODER	type	optical, incremental						
	resolution	109	49	19	3	μrad		
		22.5	10.1	3.92	0.62	arcsec		
		6250	2810	1090	170	μ°		
	index	1 per rev.						
STAGE	positioning	resolution	125	50	25	15	μrad	typ.
		= min. step size	25	10	5	3	arcsec	
		= min incremental motion (MIM)	7100	2800	1400	860	μ°	
		unidirectional repeatability	± 125	± 50	± 25	± 15	μrad	typ.
			± 25	± 10	± 5	± 3	arcsec	
			± 7100	± 2800	± 1400	± 860	μ°	
bidirectional repeatability	± 250	± 100	± 50	± 30	μrad	typ.		
	± 50	± 20	± 10	± 6	arcsec			
	± 14200	± 5600	± 2800	± 1720	μ°			

Specifications dependant on the [diameter](#)

			XRT-U-25	XRT-U-30	XRT-U-40	XRT-U-60	unit	tolerance
STAGE	speed	max. speed	1080	720	540	360	°/s	typ.
		min. speed	0.008	0.008	0.006	0.004	°/s	typ.
		stability	1				%	typ.
		point-to-point positioning time ¹	30 150				msec	typ.
		max. acceleration	1620	285	115	63	x10 ³ /s ²	typ.
	error motion (p-p)	radial at 7 mm above top surface	5	1	2	5	μm	max.
		axial in centre	2.5	0.5	1	2.5	μm	max.
		tilt (wobble)	250	50	100	250	μrad	max.
	operation duty cycle (for -HV/-UHV only)		50				%	max.
			120				sec	max.

¹ for a 1° step and settling within bidirectional repeatability range, communication delay not taken into account

Exact counts per revolution in function of encoder resolution and rotor diameter

		XRT-U-25	XRT-U-30	XRT-U-40	XRT-U-60
resolution (μrad)	109	57600	57600	86400	64800
	49	144000	144000	135000	129600
	19	360000	360000	345600	324000
	3	1843200	1843200	2764800	2073600

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

MECHANICAL PROPERTIES

		XRT-U-25	XRT-U-30	XRT-U-40	XRT-U-60	unit	tolerance
dimensions		37.5 x 30 x 8.9	40 x 35 x 21	50 x 46 x 21	70 x 70 x 38.6	mm	± 0.1
rotor diameter		27	32	43	65	mm	± 0.1
aperture		6.35	7	13.5	25.4	mm	+0/+0.05
rotation range		> 360° (unlimited)					
mass (w/o connector)		24	80	124	489	g	± 5%
load capacity (payload limitation)	inertia	50	300	400	2500	kgmm ²	max.
	mass ¹	0.1	0.5	1	5	kg	
load capacity (bearing force limitation)	axial	10	25	35	100	N	max.
	radial	10	25	35	100	N	
	tilt	0.05	0.15	0.2	1	Nm	
driving torque ²		9.5 (single motor) 19 (dual motor)	15	20	90	mNm	min.
holding torque		9.5 (single motor) 19 (dual motor)	15	20	90	mNm	min.
stage materials	rotor housing bearing fasteners	stainless steel AISI316 blank aluminium stainless steel; full ceramic (-NM) stainless steel grade A4					
cable	length	1.5				m	± 0.1
	type	shielded cable, PFA insulation and PU sheat (standard) shielded cable, PFA insulation w/o sheat (-HV and -UHV)		2x shielded cable, PFA insulation and sheat (standard/-HV) ³ 2x shielded cable, PFA insulation w/o sheat (-UHV) ²			
	diameter	Ø3.1 (standard) Ø2.1 (-HV and -UHV)		Ø1.7 (standard and -HV) Ø1.4 (-UHV)		mm	± 0.2

¹ assuming a solid cylindrical payload of dia. 40 mm

² max. advised unbalanced load in applications with an horizontal rotational axis is 1/3 of the specified driving torque

³ XRT-U-40-109 stages have a single cable

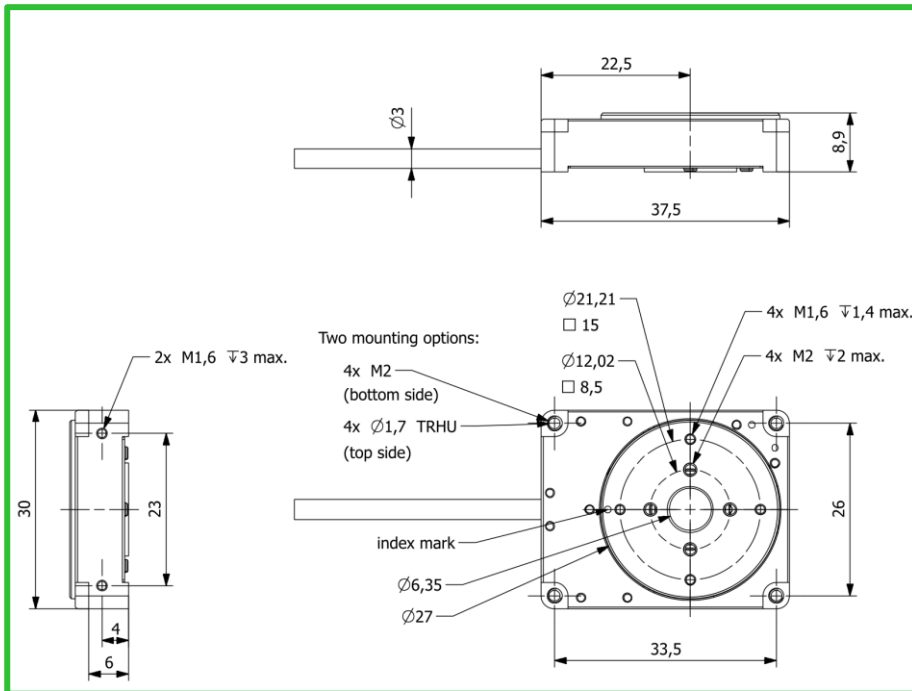
CONTROLLER/SOFTWARE

The XRT-U series rotation stages are compatible with all Xeryon controllers. Controlling of the stage is done with:

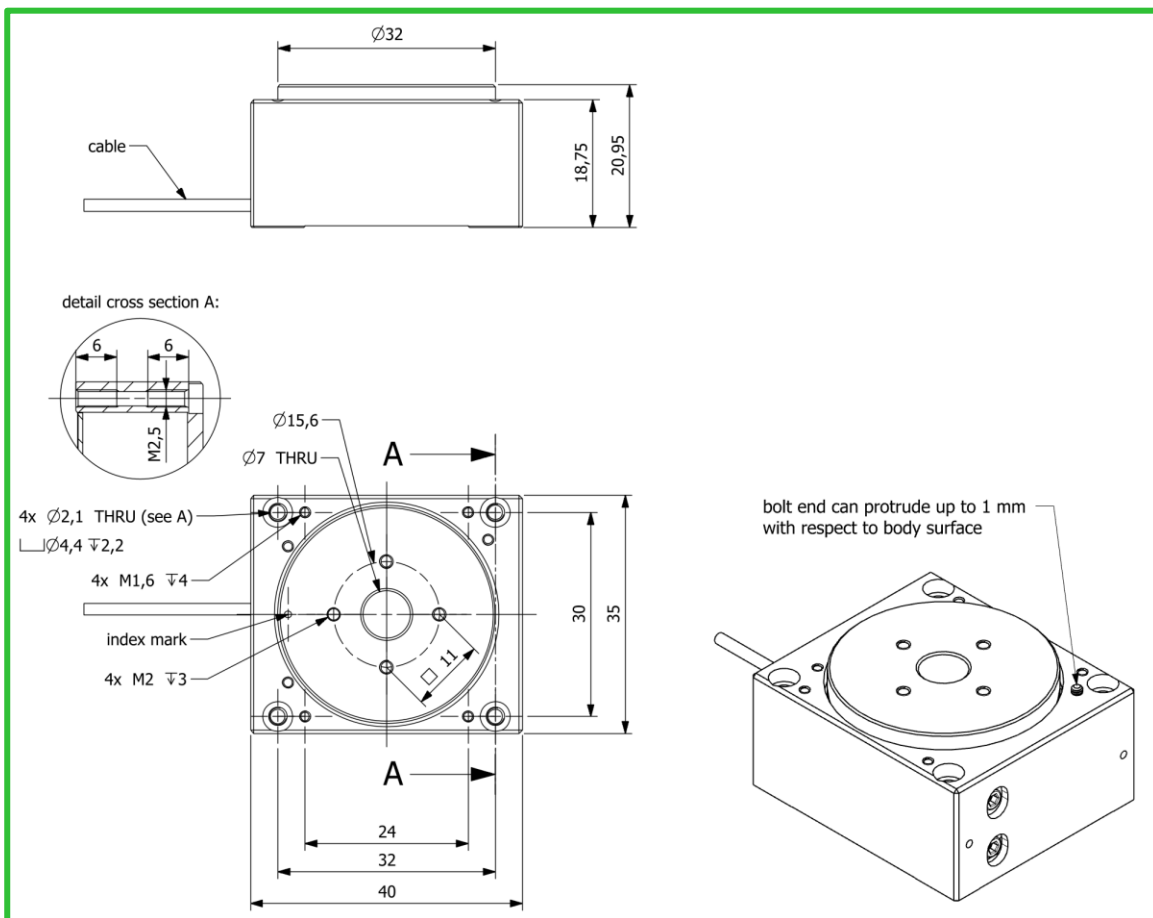
- Easy-to-use Windows interface
- LabVIEW interface program (compiled program or source)
- MATLAB interface script
- C++ and Python libraries

DRAWINGS

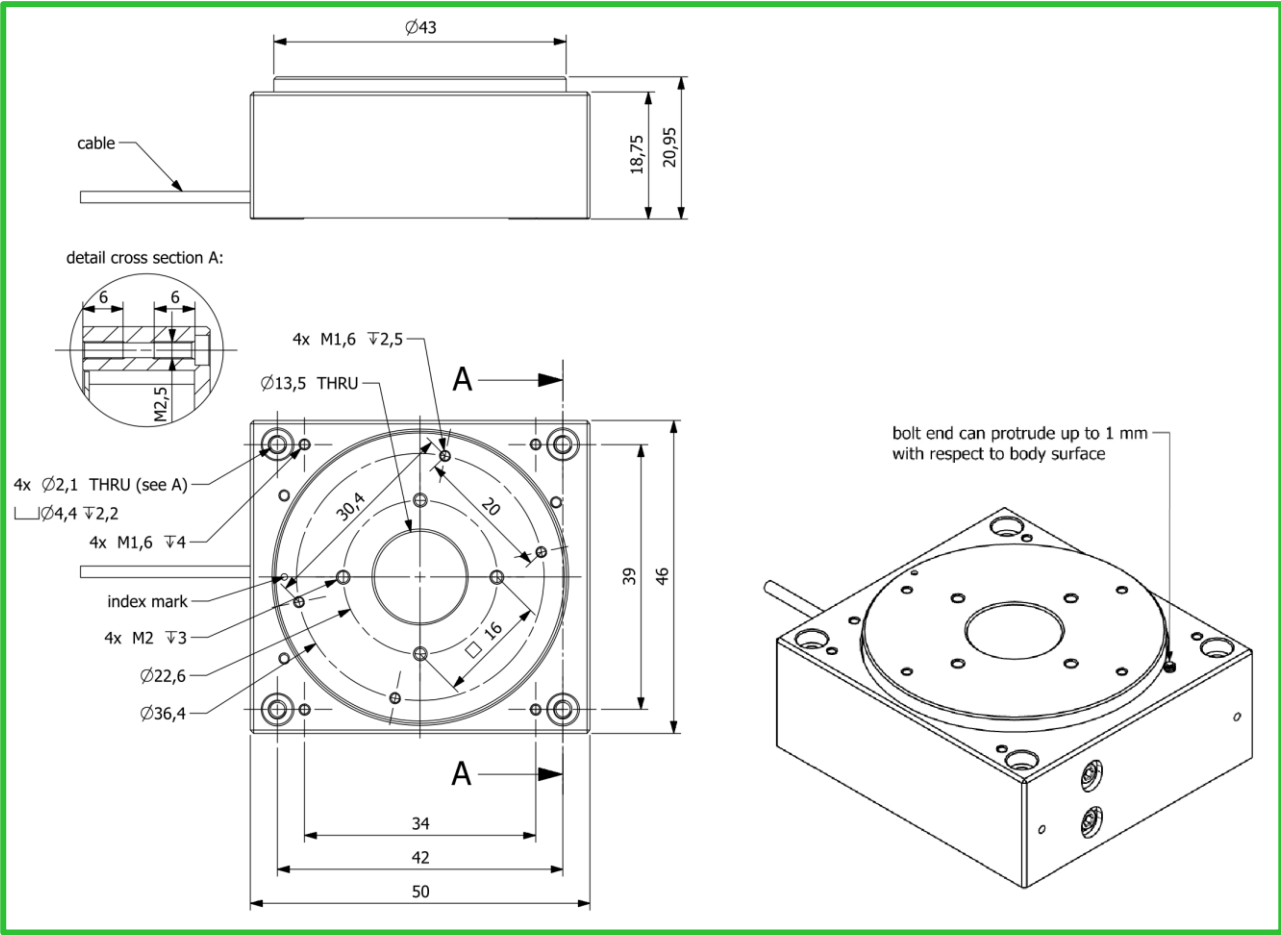
XRT-U-25-assy A2



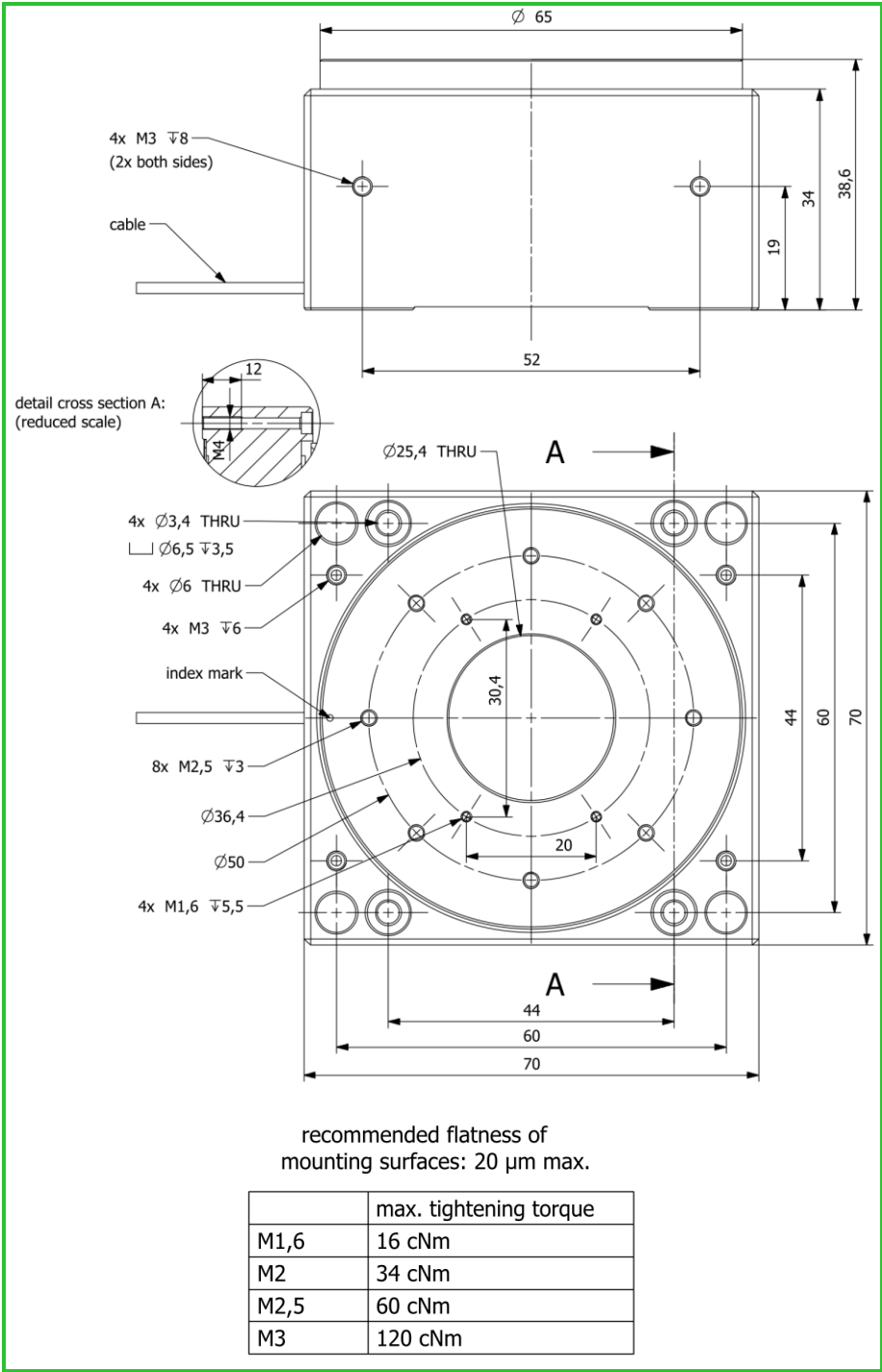
XRT-U-30-assy O1



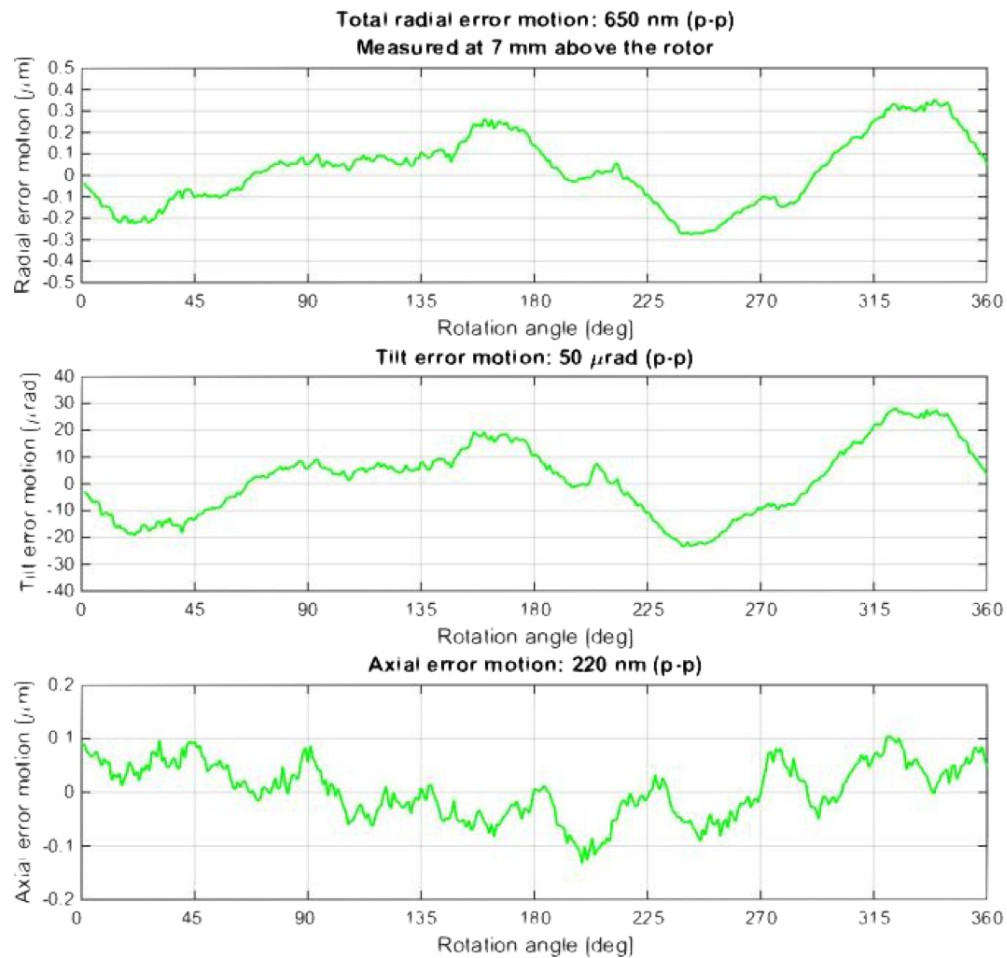
XRT-U-40-assy M1



XRT-U-60-assy F7



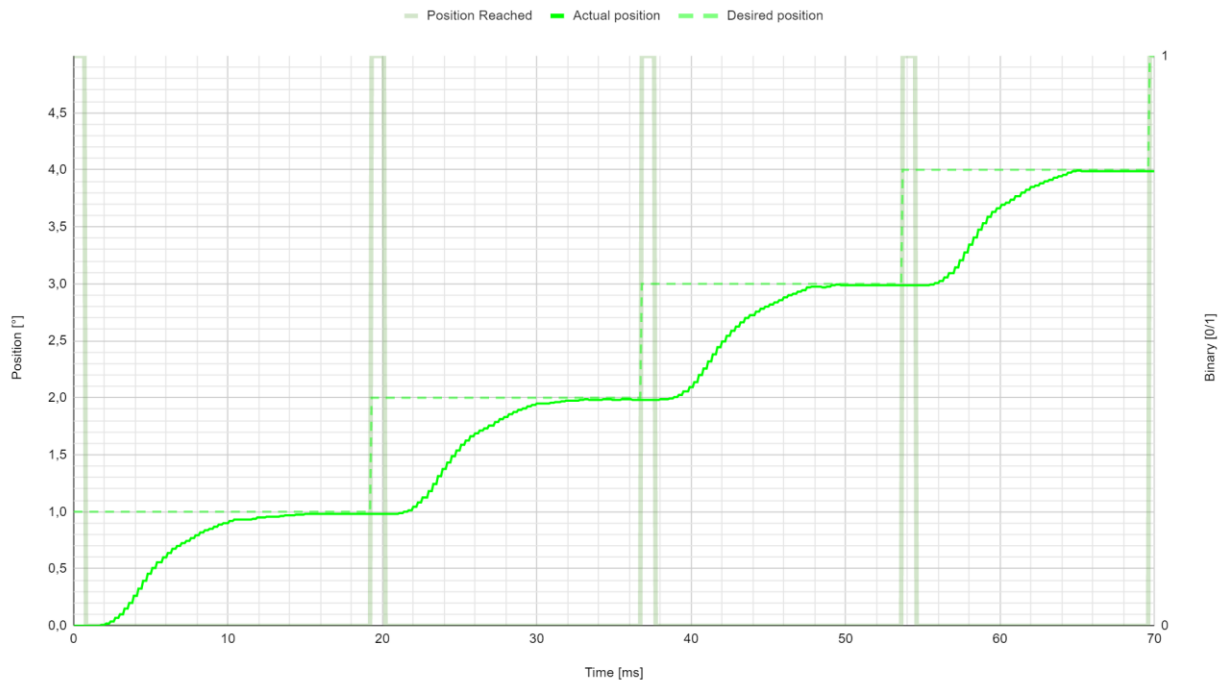
MEASUREMENT DATA



Typical measurement of the error motion of an XRT-U-30 rotation stage.

4 steps of 1° on a XRT-U-30-109 (no load).

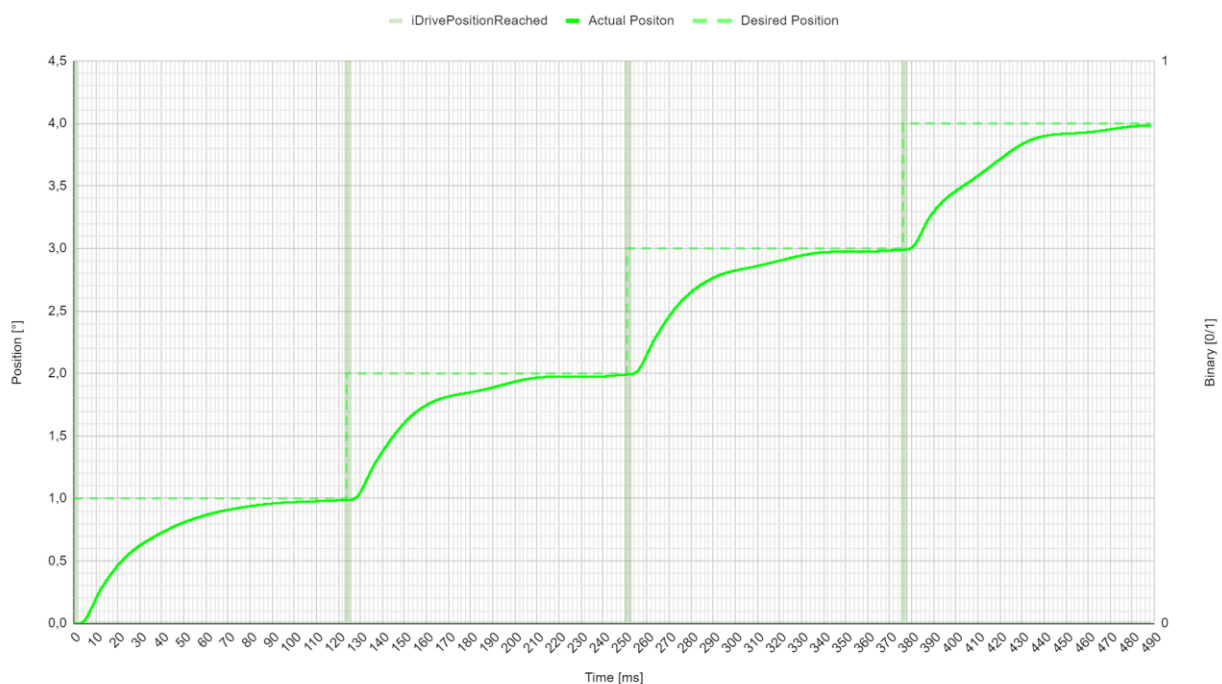
DLAY=5 ms



Example of an XRT-U-30-109 rotation stage without load taking steps of 1°.
A delay of 5 ms is added between reaching the target position and taking the next step.

4 steps of 1° on a XRT-U-30-109 (load: inertia 65 kgmm², mass 240 g)

DLAY=5 ms



Example of an XRT-U-30-109 rotation stage with a load taking steps of 1°.
A delay of 5 ms is added between reaching the target position and taking the next step.