

# attoSHPM

## Technical Specifications

General Specifications	
type of instrument	Scanning Hall Probe Microscope with STM tip for tip-sample distance control
sensor head specifics	MBE grown hall cross sensor (GaAs/AlGaAs heterostructure) on a 2-axis tiltable sensor mount
Operation Modes	
imaging modes	constant height
slope compensation	2 axis scan plane correction
z feedback	STM distance tracking (usually only for autoapproach)
Resolution	
size of Hall cross on sensor	400 nm (high resolution), 250 nm (ultra high resolution)
field sensitivity @ 4 K	1500 V/AT
noise-equivalent magnetic field (theoretical)	15 nT/vHz @ 4 K and 40 $\mu$ A Hall current, 80 nT/vHz @ 77 K and 40 $\mu$ A Hall current
typical attainable field detection limit (measured)	15 $\mu$ T typ. (bandwidth 10 Hz @ frequency 277 Hz)
z bit resolution @ 4 K	57 pm at 15 $\mu$ m scan range
Sample Positioning	
total travel range	5 x 5 x 5 mm <sup>3</sup> (open loop)
step size	0.05..3 $\mu$ m @ 300 K, 10..500 nm @ 4 K
fine scan range	50 x 50 x 24 $\mu$ m <sup>3</sup> @ 300 K, 30 x 30 x 15 $\mu$ m <sup>3</sup> @ 4 K
closed loop scanning	optional
sample holder	ASH/QE/4CX quick-exchange sample holder with 8 electrical contacts
Suitable Operating Conditions	
temperature range	1.5 K..300 K (dependent on cryostat); mK compatible setup available on request
magnetic field range	0..15 T+ (dependent on magnet)
operating pressure	designed for He exchange gas (vacuum compatible version down to 1E-6 mbar on request)
Suitable Cooling Systems	
titanium housing diameter	48 mm
bore size requirement	designed for a 2" (50.8 mm) cryostat/magnet bore
compatible cryostats	attoDRY1000/1100/2100, attoLIQUID1000/2000/3000/5000
Compatibility with Electronics	
scan controller and software	ASC500 (for detailed specifications please see attoCONTROL section)
Options and Upgrades	
closed loop scanning & global sample coordinates	interferometric encoders for scan linearization and closed loop sample navigation
ultra-large scan range upgrade	80 x 80 $\mu$ m <sup>2</sup> @ 300 K, 125 x 125 $\mu$ m <sup>2</sup> @ 4 K
in-situ inspection optics	tip/sample monitoring via in-situ LT-LED for illumination, mirrors, lenses and CCD camera (outside of cryostat) field of view approx. 3 mm x 2 mm, resolution approx. 20 $\mu$ m (depending on cryostat)
closed loop upgrade for coarse positioners	resistive encoder, range 5 mm, sensor resolution approx. 200 nm, repeatability 1-2 $\mu$ m

