

## Technical Specifications

<b>General Specifications</b>	
type of instrument	tuning-fork based AFM with shear-force or standard detection
sensor head specifics	etched metal wires, etched or pulled optical fiber probes, STM tips, Akiyama probes (also compatible with NaugaNeedles commercial tips)
<b>Modes of Operation</b>	
imaging modes	non-contact mode AFM, EFM, SGM
slope compensation	2 axis scan plane correction
z feedback	PI feedback loop for amplitude modulation (AM), phase modulation (PM) or frequency modulation (FM) using included PLL, constant force
optional upgrades	AFM/STM mode
<b>Resolution</b>	
measured z-noise density	< 16 pm/ $\sqrt{\text{Hz}}$
z bit resolution @ 4 K	7.6 pm at 2 $\mu\text{m}$ scan range
<b>Sample Positioning</b>	
total travel range	5 x 5 x 5 mm <sup>3</sup> (open loop)
step size	0.05..3 $\mu\text{m}$ @ 300 K, 10..500 nm @ 4 K
fine scan range	50 x 50 x 4.2 $\mu\text{m}^3$ @ 300 K, 30 x 30 x 2 $\mu\text{m}^3$ @ 4 K (open loop)
sample holder	ASH/QE/0 quick exchange sample holder and integrated heater with calibrated temperature sensor
<b>Suitable Operating Conditions</b>	
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)
<b>Suitable Cooling Systems</b>	
titanium housing diameter	48 mm
bore size requirement	designed for a 2" (50.8 mm) cryostat/magnet bore
compatible cryostats	attoDRY1000/1100/2100
<b>Compatibility with Electronics</b>	
scan controller and software	ASC500 (for detailed specifications please see attoCONTROL section)
<b>Options and Upgrades</b>	
closed loop scanning & global sample coordinates	interferometric encoders for scan linearization and closed loop sample navigation
ultra-large scan range upgrade	80 x 80 $\mu\text{m}^2$ @ 300 K, 125 x 125 $\mu\text{m}^2$ @ 4 K
in-situ inspection optics	tip/sample monitoring via in-situ LT-LED for illumination, mirrors, lenses and CCD camera (outside), field of view approx. 3 x 2 mm, resolution approx. 20 $\mu\text{m}$ (depending on cryostat)
closed loop upgrade for coarse positioners	resistive encoder, range 5 mm, sensor resolution approx. 200 nm, repeatability 1-2 $\mu\text{m}$
sample holder upgrade	ASH/QE/4CX quick-exchange sample holder (8 electrical contacts, integrated heater & T-sensor)

