

Technical Specifications

General Specifications	
type of instrument	combined confocal (CFM) and atomic force microscope (AFM) with microwave excitation for scanning optically detected magnetic resonance (ODMR)
scanning protocols	NV scanning mode (cw-ODMR), quench mode, iso-B mode, AFM in contact and fixed height
pulsed protocols	Rabi, Ramsey, Spin-Echo, CPMG, XY4, XY8
Modes of Operation	
imaging modes	optically detected magnetic resonance (ODMR), AFM, CFM, widefield, MOKE
slope compensation	2 axis scan plane correction
z feedback	AFM: PI feedback loop for amplitude setpoint (AM) or frequency modulation (FM) using included PLL
RMS z-noise (BW = 200 Hz)	< 0.4 nm @ RT, < 2.5 nm @ LT
Resolution	
z bit resolution @ 4 K	25 pm at 2.4 μ m scan range
Confocal Unit	
configuration	compact and modular design, two optical channels: one excitation and one detection channel
key benefits	motorised steering mirror for combined beams. long-term stability: drift of < 100 nm//24h within $\Delta T=2$ K
compatible LT-objective	LT-APO/Raman532
inspection unit	sample imaging with large field of view: $\sim 55 \mu$ m
Illumination	
excitation wavelength range	default 515 nm (others on request)
Detection	
detection mode	e.g. optically detected magnetic resonance (ODMR), fluorescence
ODMR contrast at base temperature	> 8 %
Sample Positioning	
total travel range	independent degrees of freedom for tip and sample of 2 mm x 3 mm x 2.5 mm (closed loop)
step size	0.05 .. 3 μ m @ 300 K, 10 .. 500 nm @ 4 K
fine scan range	30 x 30 x 4.3 μ m ³ @ 300 K, 18 x 18 x 2 μ m ³ @ 4 K (open loop)
sample holder	Ti plate with integrated heater and calibrated temperature sensor
Suitable Operating Conditions	
temperature range	< 1.8 .. 300 K in quench mode (AFM scan with optical readout, MW off), < 4 .. 300 K in cw-ODMR
magnetic field range	9/1/1 or 1/1/1 Tesla
operating pressure	designed for He exchange gas
Suitable Cooling Systems	
titanium housing diameter	48 mm
bore size requirement	designed for a 2" (50.8 mm) cryostat/magnet bore
compatible cryostats	attoDRY2200
Options and Upgrades	
closed loop upgrade for coarse positioners	resistive encoder, range 3 mm, sensor resolution approx. 200 nm, repeatability 10 μ m

