Enabling Nanoscale Advances

Park NX7

The affordable choice for the first step AFM research with the latest NX components

Park NX7

The most affordable research grade AFM with flexible sample handling

Park NX7 has all the state-of-the-art technology you have come to expect from Park Systems, at a price your lab can afford. Designed with the same attention to detail as our more advanced models, NX7 allows you to do your research on time and within budget.

Accurate XY Scan by Crosstalk Elimination

- Two independent, closed-loop XY and Z flexure scanners
- Flat and orthogonal XY scan with low residual bow
- Accurate height measurements without any need for software processing

The Most Extensible AFM Solution

- The most comprehensive range of SPM modes
- Advanced nanomechanical measurement modes are supported as default enabled by NX electronic controller
- The best option compatibility and upgradeability in the industry

User Experience-Driven Software and Hardware Features

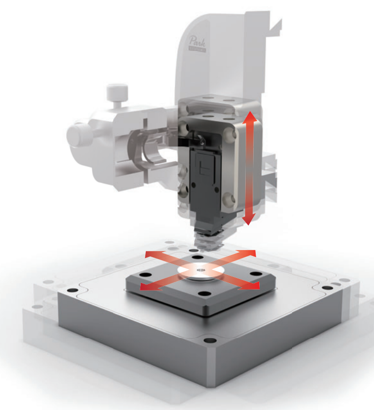
- Open side access for easy sample or tip exchange
- Easy, intuitive laser alignment with pre-aligned tip mount
- Park SmartScan™ - AFM operating software versatile enough to empower both novices and power users alike toward great nanoscale research

Park NX7

AFM Technology

Flat Orthogonal XY Scanning without Scanner Bow

Park's Crosstalk Elimination scanner structure removes scanner bow, allowing flat orthogonal XY scanning regardless of scan location, scan rate, and scan size. It shows no background curvature even on flattest samples, such as an optical flat, and with various scan offsets. This provides you with a very accurate height measurement and precision nanometrology for the most challenging problems in research and engineering.



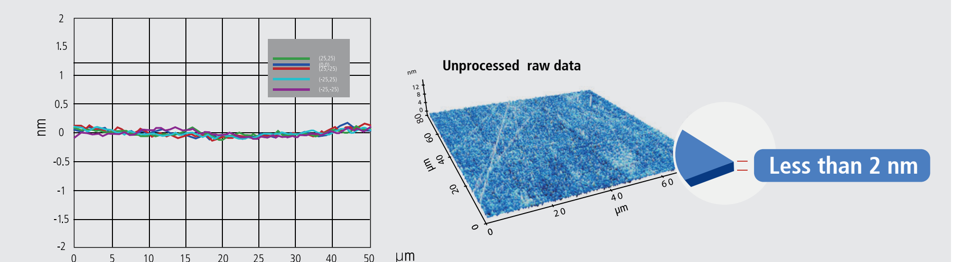
Decoupled XY and Z Scanners

The fundamental difference between Park and its closest competitor is in the scanner architecture. Park's unique flexure based independent XY scanner and Z scanner design allows unmatched data accuracy in nano resolution further improved with NX AFM Head (Z scanner) powered by NX AFM electronic controller.

Accurate Surface Measurement

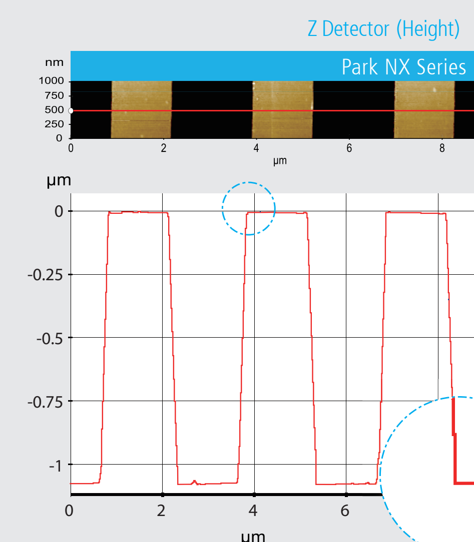
"Flat" sample surface as it is!

- Low residual bow
- No need for software processing
- Accurate results independent of scan location
- Less than 2 nm of out-of-plane motion with the NX electronic controller



Industry Leading Low Noise Z Detector

Park AFMs are equipped with the most effective low noise Z detectors in the field, with a noise of 0.02 nm over large bandwidth. This produces highly accurate sample topography and no edge overshoot. Just one of the many ways Park NX series saves you time and gives you better data.



No creep effect

Accurate Sample Topography Measured by Low Noise Z Detector

- Uses low noise Z detector signal for topography
- Has low Z detector noise of 0.02 nm over large bandwidth
- Has no edge overshoot at the leading and trailing edges
- Needs calibration done only once at the factory

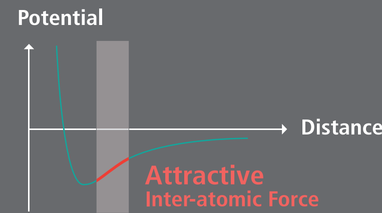
Sample: 1.2 μm Nominal Step Height
(9 μm x 1 μm, 2048 pixels x 128 lines)

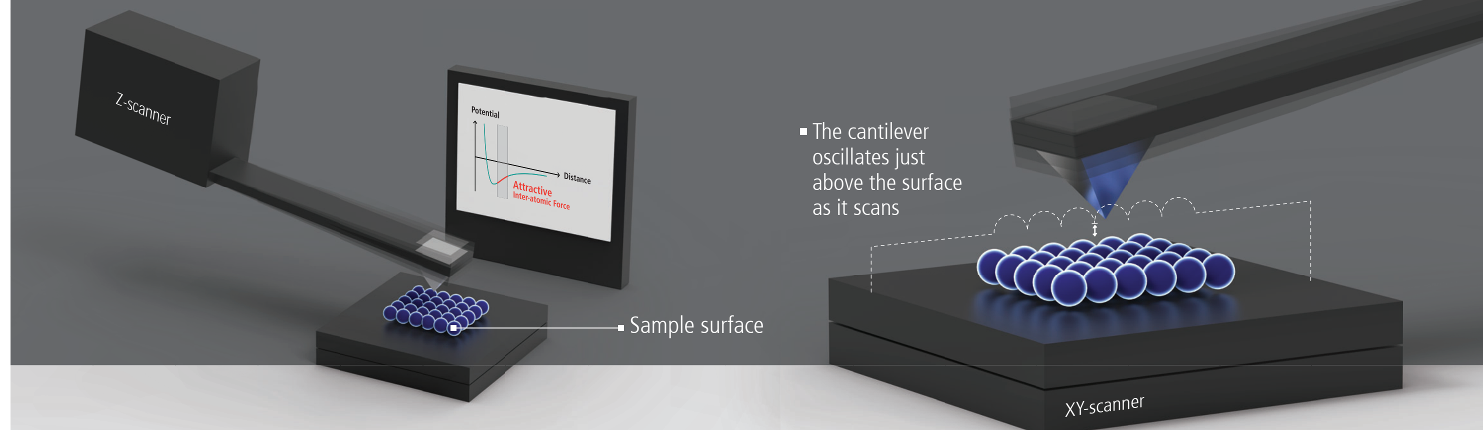
True Non-Contact™ Mode

True Non-Contact™ Mode is a scan mode unique to Park AFM systems that produces high resolution and accurate data by preventing destructive tip-sample interaction during a scan.

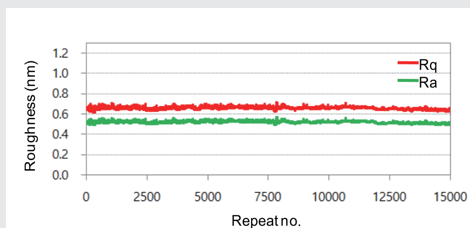
Accurate Feedback by Faster Z-servo enables True Non-Contact AFM

- Less tip wear → Prolonged high-resolution scan
- Non-destructive tip-sample interaction → Minimized sample modification
- Maintains non-contact scan over a wide range of samples and conditions

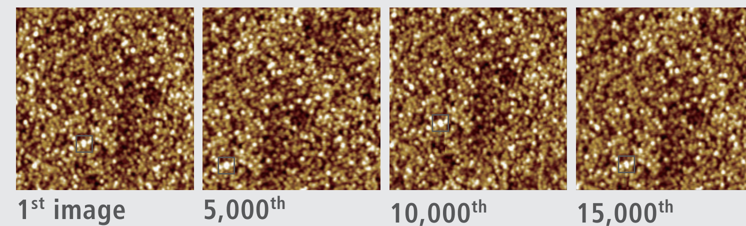




Unlike in contact mode, where the tip contacts the sample continuously during a scan, or in tapping mode, where the tip touches the sample periodically, a tip used in non-contact mode does not touch the sample. Because of this, use of non-contact mode has several key advantages. Scanning at the highest resolution throughout imaging is now possible as the tip's sharpness is maintained. Non-contact mode avoids damaging soft samples as the tip and sample surface avoid direct contact.

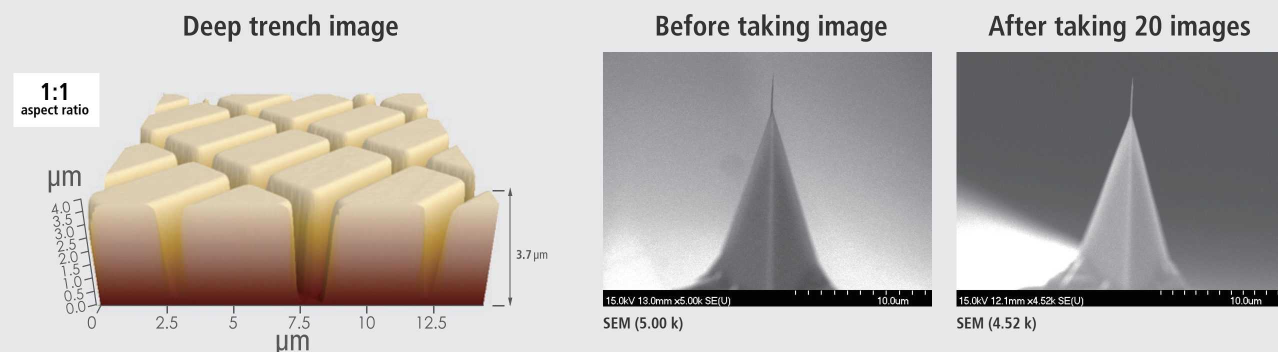


Repeat	1st	…	5000th	…	10000th	…	15000th	Total Avg.	1σ (%)
Rq(nm)	0.669		0.674		0.665		0.642	0.662	0.011 (1.720%)
Ra(nm)	0.527		0.535		0.525		0.508	0.524	0.010 (1.835%)



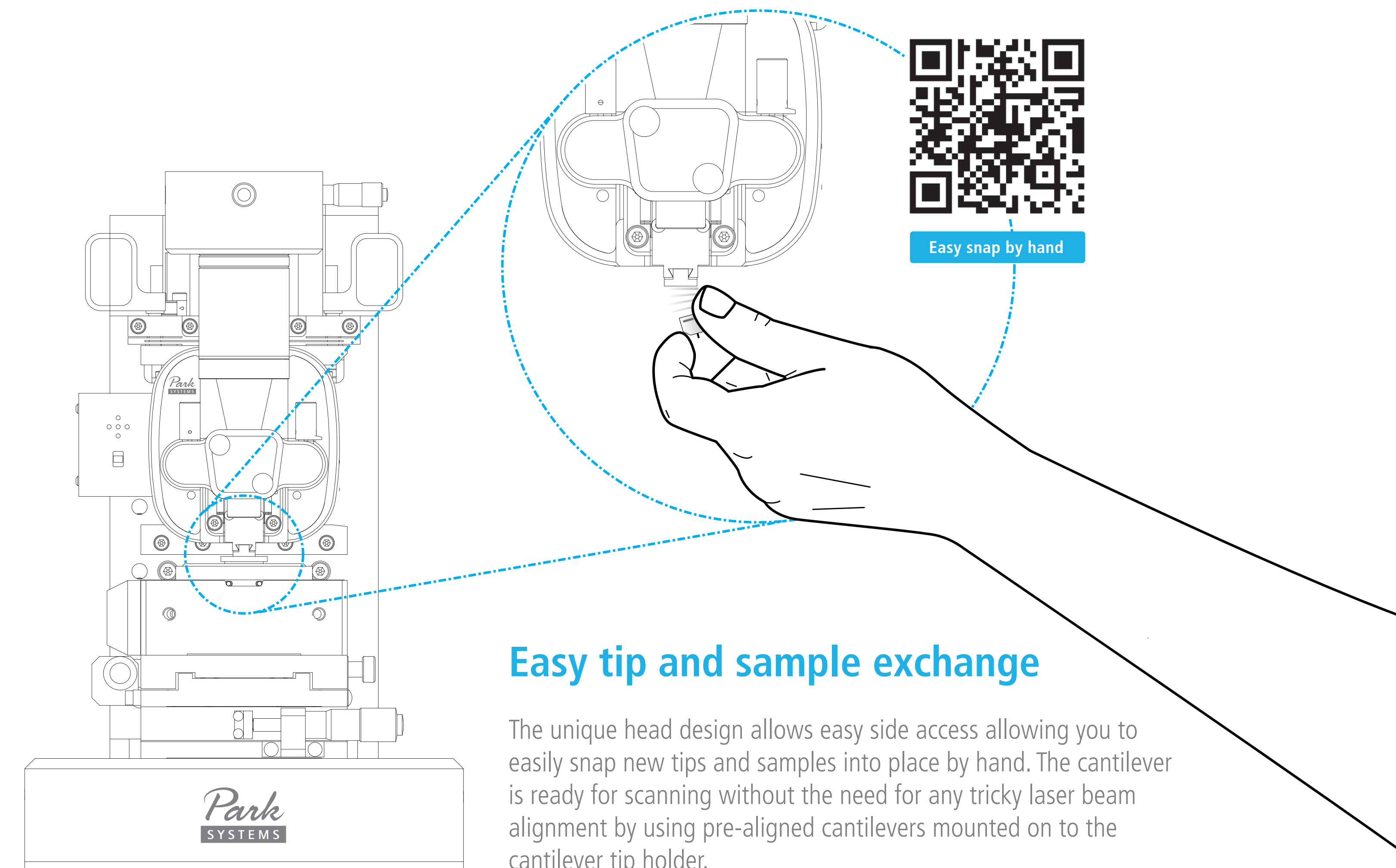
1st image 5,000th 10,000th 15,000th

Furthermore, non-contact mode senses tip-sample interactions occurring all around the tip. Forces occurring laterally to tip approach to the sample are detected. Therefore, tips used in non-contact mode can avoid crashing into tall structures that may suddenly appear on a sample surface. Contact and tapping modes only detect the force coming from below the tip and are vulnerable to such crashes.



Park NX7

Why the world's most accurate small sample AFM is also the easiest to use

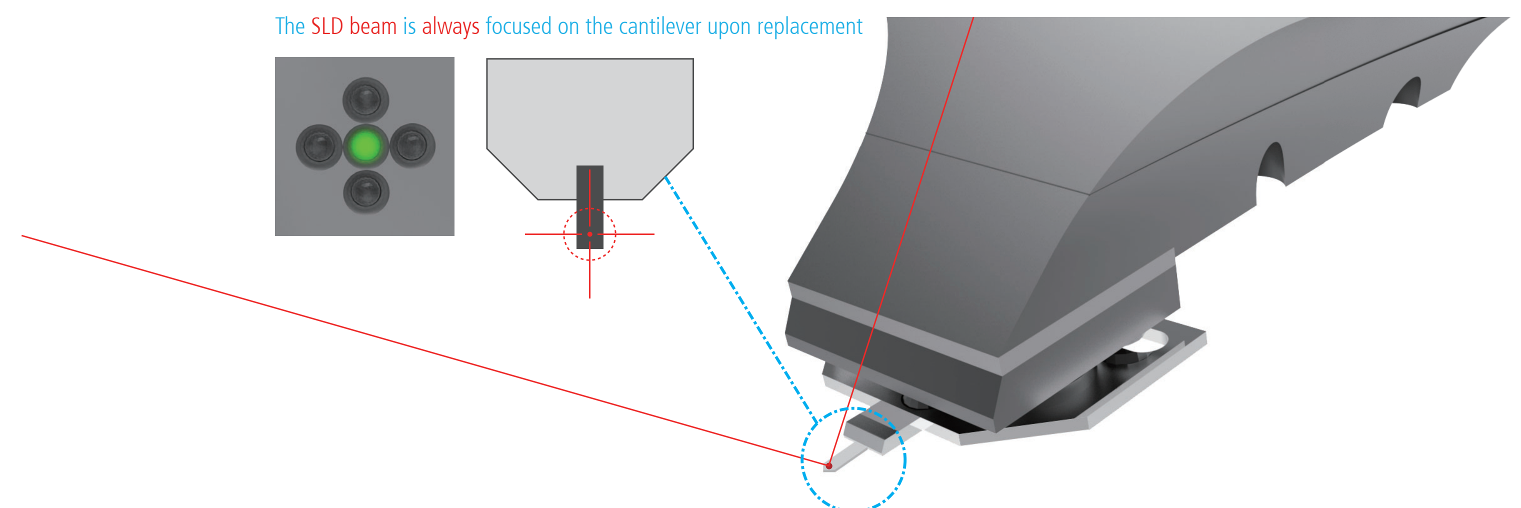


Easy tip and sample exchange

The unique head design allows easy side access allowing you to easily snap new tips and samples into place by hand. The cantilever is ready for scanning without the need for any tricky laser beam alignment by using pre-aligned cantilevers mounted on to the cantilever tip holder.

Easy, intuitive SLD beam alignment

With our advanced pre-aligned cantilever holder, the SLD beam is focused on the cantilever upon placement. Furthermore, the natural on-axis, top-down view allows you to easily find the SLD spot. Since the SLD beam falls vertically onto the cantilever, you can intuitively move the SLD spot along the X- and Y- axis by rotating two positioning knobs. As a result, you can easily find the SLD and position it onto the position-sensitive photodiode using our operation software's beam alignment user interface. From there, all you will need is a minor adjustment to maximize the signal prior to starting data acquisition.



The SLD beam is always focused on the cantilever upon replacement

Park Atomic Force Microscopy Modes

Get the data you need with Park's selection of scanning modes

TOPOGRAPHY IMAGING

- Contact
- Non-Contact
- Tapping

ELECTRICAL / MAGNETIC PROPERTIES

- Conductive AFM
- PinPoint Conductive AFM
- IV Spectroscopy
- Photocurrent Mapping
- Scanning Tunneling Microscopy
- Scanning Spreading Resistance Microscopy
- Scanning Capacitance Microscopy
- Electrostatic Force Microscopy
- Kelvin Probe Force Microscopy
- Piezoresponse Force Microscopy
- Magnetic Force Microscopy
- Tunable Magnetic Field MFM

NANOMECHANICAL PROPERTIES

- Force Distance Spectroscopy
- PinPoint Nanomechanical
- Force Modulation Microscopy
- Lateral Force Microscopy
- Nanoindentation
- Nanolithography
- Nanomanipulation

OTHER PROPERTIES

- Scanning Thermal Microscopy
- Scanning Ion Conductance Microscopy

● NOT AVAILABLE FOR THIS PRODUCT

ITO coated Quarts chip

Height — 1 µm

Zoom-in height — 0.4 µm

Scanning conditions

Scan Mode: Non-Contact
Scan Size: 5 µm x 5 µm, 2 µm x 2 µm
Cantilever: AC160TS (k= 26 N/m, f= 300 kHz)

Sample courtesy: Kee-Hyun Paik, Multerra Bio, Inc., US

$F_{14}H_{20}$ on Si; Work function

Height — 250 nm

AM KPFM work function — 250 nm

Sideband KPFM work function — 250 nm

Scanning conditions

Scan Mode: KPFM
Scan Size: 1 µm x 1 µm
Cantilever: PPP-EFM (k= 2.8 N/m, f= 75 kHz)

The same image color scale was used for work function image comparison.
Sideband KPFM shows the better image quality and quantiative results compared to AM KPFM

Margarines

Phase change of Margarine surface by temperature control

Room temperature: Height — 1 µm; Phase — 1 µm

Cooling to 5°C: Height — 1 µm; Phase — 1 µm

Scanning conditions

Scan Mode: Tapping Mode
Scan Size: 5 µm x 5 µm
Cantilever: AC160TS (k= 26 N/m, f= 300 kHz)

Scanner	Z Scanner	XY Scanner
	Flexure guided high-force scanner Scan range: 15 µm (optional 30 µm)	Single module flexure XY-scanner with closed-loop control Scan range: 50 µm × 50 µm (optional 10 µm × 10 µm or 100 µm × 100 µm)

Stage	Z Stage	XY Stage
	Z stage range: 26 mm	XY stage range: 13 mm x 13 mm

Vision	On-axis Optic with Vision Camera
	Objective lens: 10x magnification Field-of-view: 480 µm x 360 µm (with default 1.2 M pixel vision camera) 840 µm x 630 µm (with optional 5 M pixel vision camera)

Sample Mount	Sample Dimension
	Sample size: Up to 50 mm Thickness: Up to 20 mm

Electronics	Signal Processing	Integrated Functions
	ADC: 24-bit ADCs for X, Y, and Z scanner position sensor DAC: 20-bit DACs for X, Y, and Z scanner positioning	4 channels of flexible digital lock-in amplifier Spring constant calibration (Thermal method) Digital Q control

Options/Modes

Topography Imaging

- Non-Contact
- Contact
- Tapping

Magnetic Properties

- Magnetic Force Microscopy (MFM)
- Tunable Magnetic Field MFM

Dielectric/Piezoelectric Properties

- Piezoresponse Force Microscopy (PFM)
- PFM with High Voltage
- Piezoresponse Spectroscopy

Chemical Properties

- Chemical Force Microscopy with Functionalized Tip
- Electrochemical Microscopy (EC-AFM)

Electrical Properties

- Conductive AFM (C-AFM)
- I/V Spectroscopy
- Kelvin Probe Force Microscopy (KPFM)
- KPFM with High Voltage
- Scanning Capacitance Microscopy (SCM)
- Scanning Spreading-Resistance Microscopy (SSRM)
- Scanning Tunneling Microscopy (STM)
- Photo Current Mapping (PCM)
- Electrostatic Force Microscopy (EFM)

Mechanical Properties

- PinPoint Nanomechanical Mode
- Force Modulation Microscopy (FMM)
- Nanoindentation
- Nanolithography
- Nanolithography with High Voltage
- Nanomanipulation
- Lateral Force Microscopy (LFM)
- Force Distance (F/d) Spectroscopy
- Force Volume Imaging

Software

Park SmartScan™

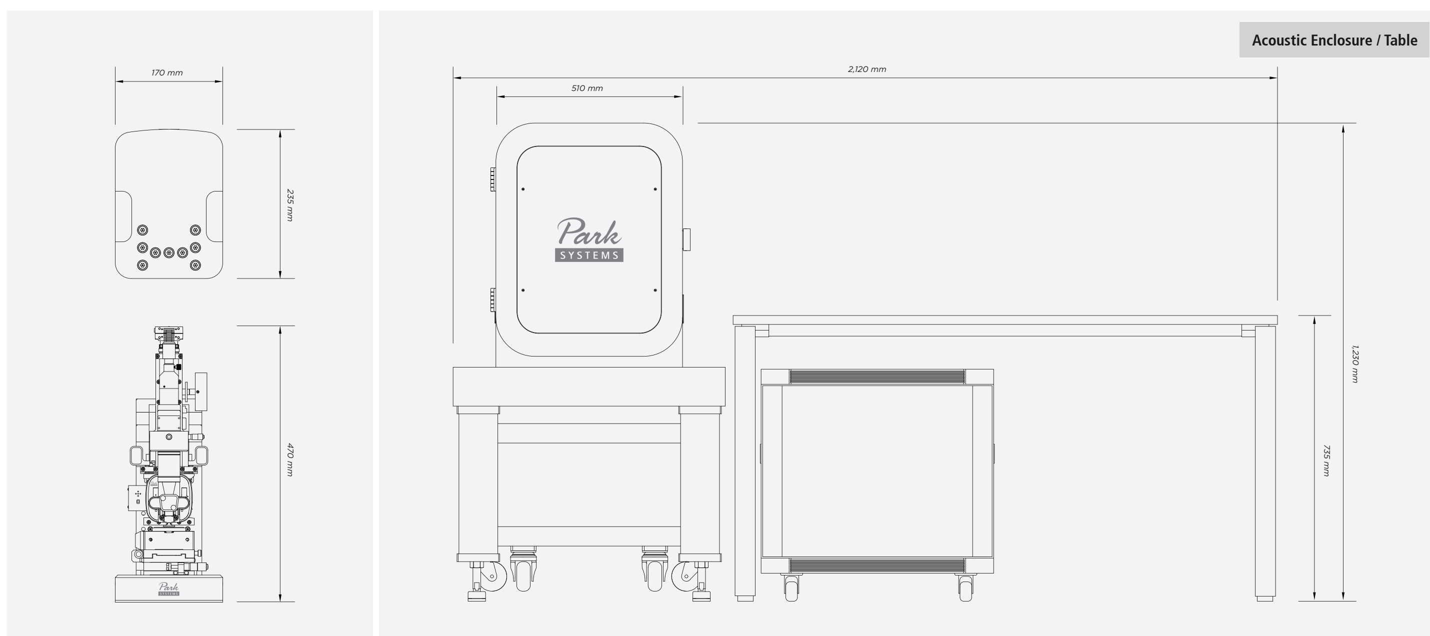
- AFM system control and data acquisition software
- Auto mode for quick setup and easy imaging
- Manual mode for advanced use and finer scan control

Park SmartAnalysis™

- AFM data analysis software
- Stand-alone design—can install and analyze data away from AFM
- Capable of producing 3D renders of acquired data

Accessories

Electrochemistry Cell
Universal Liquid Cell with Temperature Control
Temperature Controlled Stages



ⓘ **Note: All specifications are subject to change without notice. Please visit our website for the most up-to-date specifications.**

Committed to contributing to impactful science and technology

More than 25 years ago, the foundation of Park Systems was laid at Stanford University, where its founder Sang-il Park worked in Prof. Calvin Quate's group—the group that invented the atomic force microscopy. After years of development, Dr. Park introduced the first commercial AFM to the world, paving the path to a successful start of Park Systems. With good foresight, superior products and keen business acumen, Park Systems has positioned itself as the dominant industry leader in AFM nanoscale metrology.

Park Systems continuously strives to live up to the innovative spirit of its origin. Throughout its long journey, the company has provided advanced, accurate and reliable AFM instruments, with revolutionary features including True Non-Contact™ and PinPoint™ nanomechanical AFM. Furthermore, cutting-edge AFM automation features in SmartScan™ make Park AFM systems extremely easy to use and obtain results faster at higher data quality.

Park Systems

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