



The Most Accurate Atomic Force Microscope

Park NX-Hivac

The world's most accurate and easy to use
high vacuum AFM for failure analysis

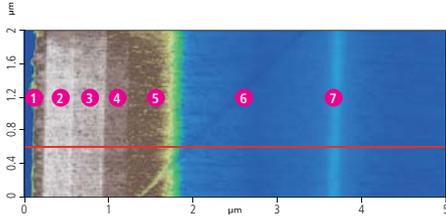
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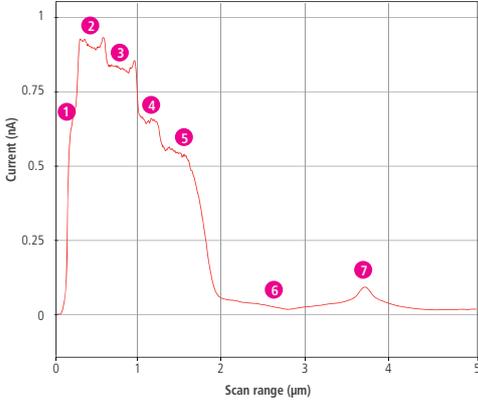
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High vacuum scanning for failure analysis applications

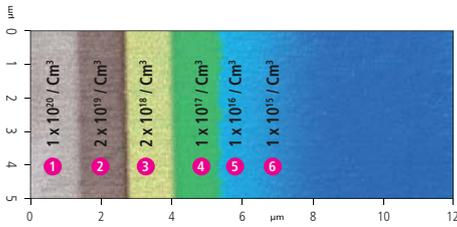




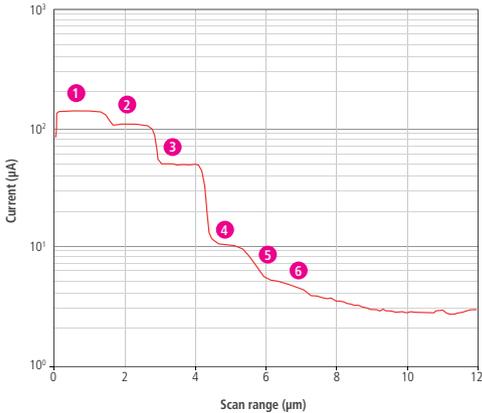
Line profile



SSRM image of calibration stair sample (N type)



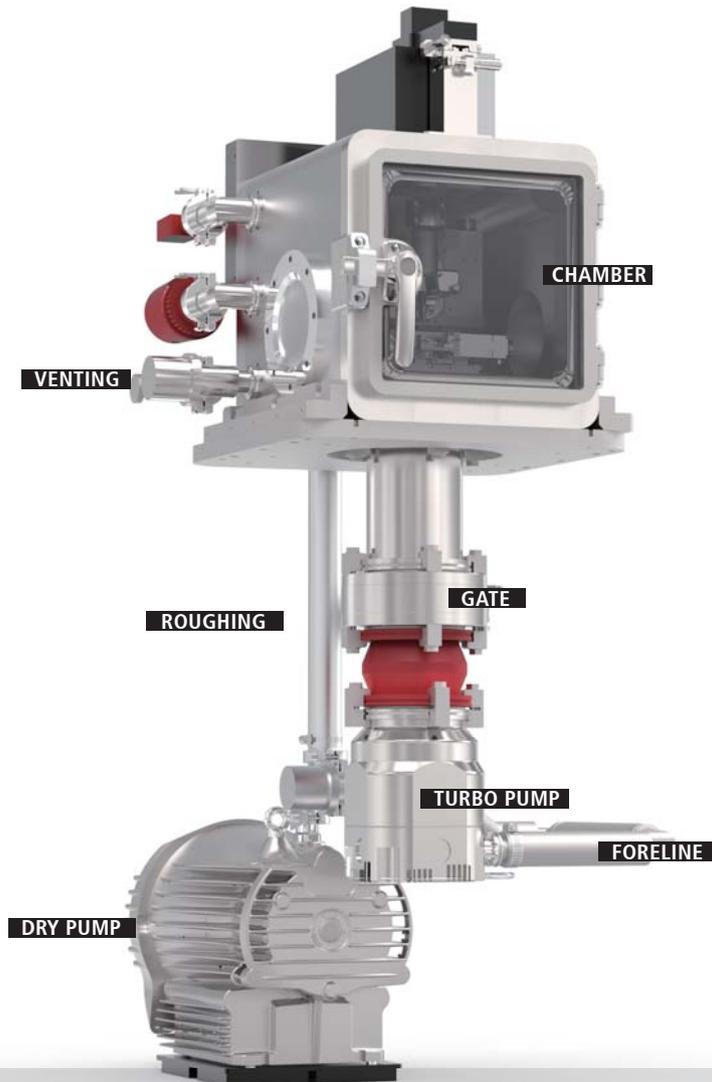
Line profile



SSRM image of calibration stair sample (P type)

Park NX-Hivac allows failure analysis engineers to improve the sensitivity and resolution of their measurements through high vacuum SSRM. Because high vacuum scanning offers greater accuracy, better repeatability, and less tip and sample damage than ambient or dry N_2 conditions, users can measure a wide range of dope concentration and signal response in failure analysis applications.

Performing SSRM measurements under high-vacuum conditions can reduce the required tip-sample interaction force, which can significantly reduce damage to both the sample and the tip. This will extend the life of each tip, making scanning cheaper and more convenient, and can provide more accurate results by improving spatial resolution and signal to noise ratio. This makes high vacuum SSRM measurements conducted with the NX-Hivac an excellent choice for failure analysis engineers looking to increase their throughput, reduce costs, and improve accuracy.



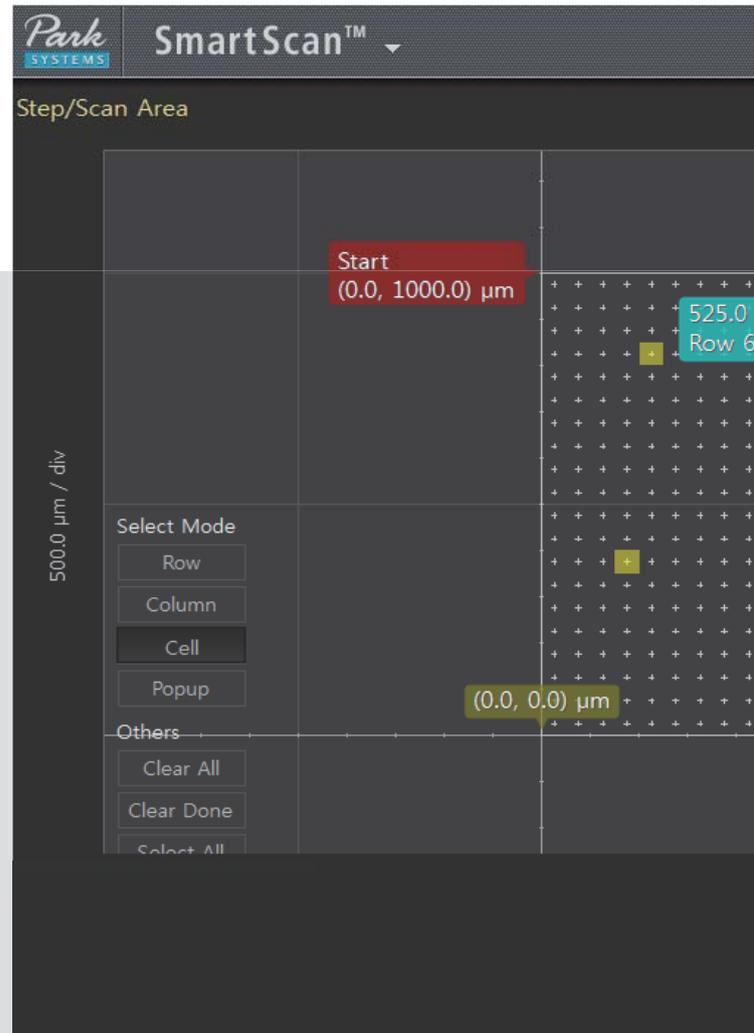
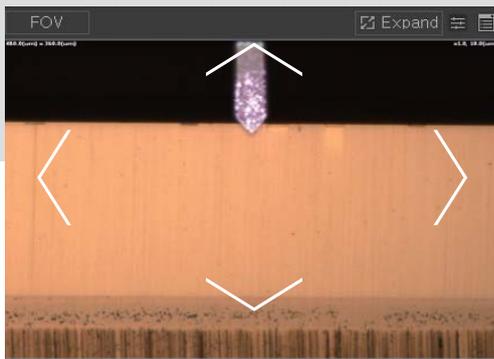
Park NX-Hivac

Advanced automation features

The NX-Hivac features a range of tools that minimize the required input from the user. This means you can scan faster and increase your lab's throughput.

StepScan Automation with Motorized stage

StepScan gives users the ability to program the device to image multiple regions quickly and easily. The NX-Hivac lets you scan a sample in just five steps: Scan, lift cantilever, move motorized stage to user defined coordinate, approach, and repeat. This boosts productivity enormously and reduces required user input to the absolute minimum.



The screenshot displays a software interface for configuring a measurement routine. On the left, a grid of measurement points is shown with a callout indicating a point at 725.0 μm, Column 11. A green box labeled 'End (1000.0)' is positioned near the grid. The central 'Step/Scan Recipe' panel contains the following table:

Step/Scan Recipe			
Positions / Methods			
	X (μm)	Y (μm)	Method
1	225.000	825.000	method 1
2	875.000	825.000	method 1
3	525.000	725.000	method 2
4	825.000	625.000	method 2
5	175.000	375.000	method 1
6	775.000	225.000	method 2
7	475.000	125.000	method 1

The 'Step/Scan Method' panel on the right shows configuration for 'method 2'. The 'Scan Area' section includes:

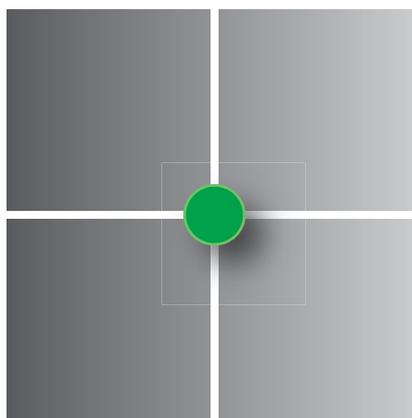
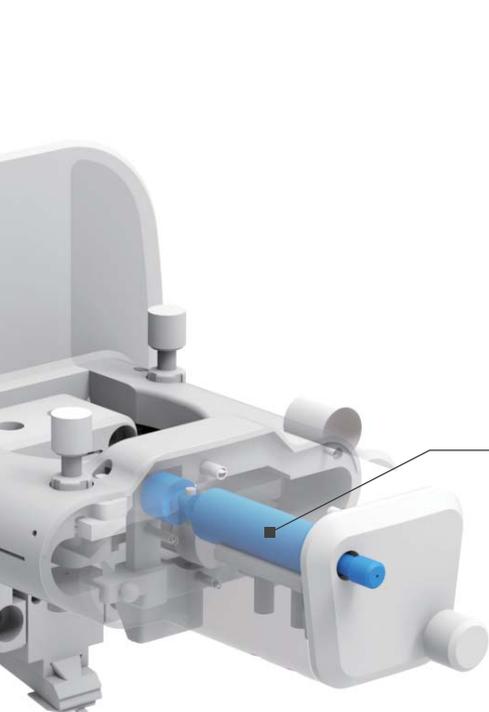
- Pixels: X=2, Y=1
- Size: 0.000 μm
- Offset: 0.0000 μm
- Rotation: 0.00 deg

 The 'Scan Channels' section lists:

- Z Height: μm
- HEM1 In: V
- Current: nA
- Conductance: nS
- Resistance: GΩ

 The 'Scan Options' section includes:

- Sine Scan
- Over Scan: each end 5 %
- Slow Scan Smooth: Only At line end
- Detector Driven Sampling



Motorized laser alignment

Park's motorized laser beam alignment lets the user seamlessly continue automated measurement routines without user input. With our advanced pre-aligned cantilever holder, the laser beam is focused on the cantilever upon tip exchange. The laser spot is then optimized along the X- and Y-axis by motorized positioning knobs.

Dovetail-lock mount

The AFM head can be quickly and easily secured onto the dovetail rail with a positioning repeatability of a few microns.



Multi-sample chuck

The magnetic chuck can hold up to five separate samples. This improves productivity by reducing the need to activate the vacuum pump and vent.



Large Vacuum Chamber

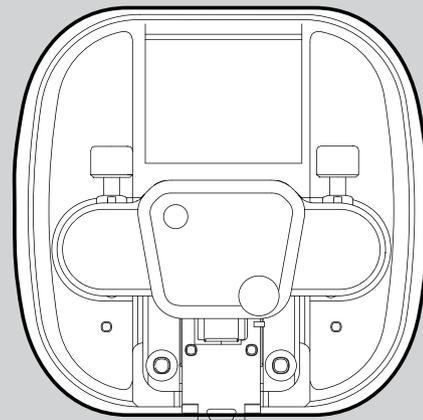
The NX-Hivac features a chamber size of 300 mm X 420 mm X 320 mm, allowing users to scan more samples sizes and put more samples into the unit without breaking the vacuum seal.

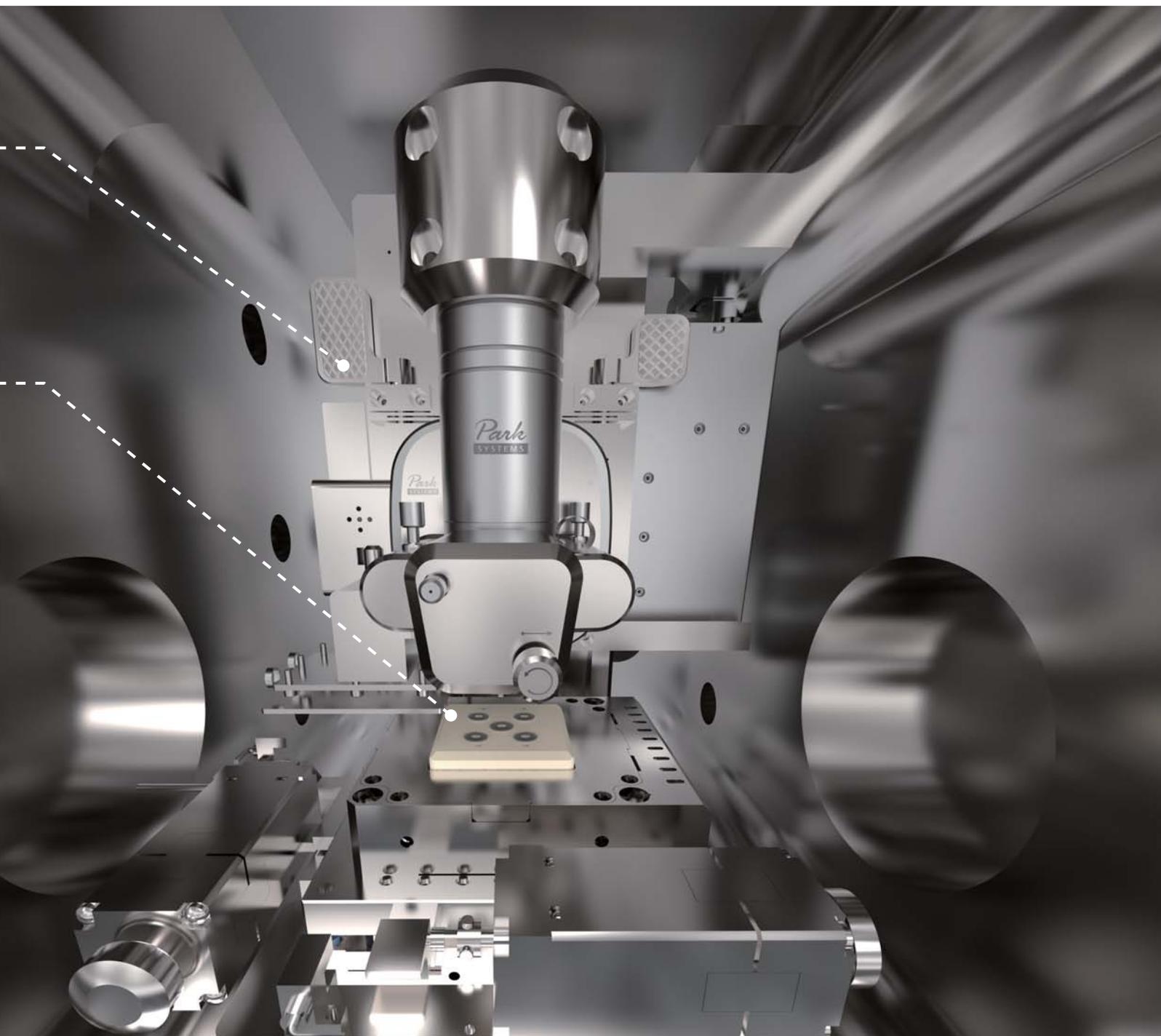
Easy Tip and Sample Exchange

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 Snap by Hand





Park NX-Hivac

Designed for productivity

The NX-Hivac has several usability features that make it more convenient and effective than other leading AFMs.

Park SmartScan™

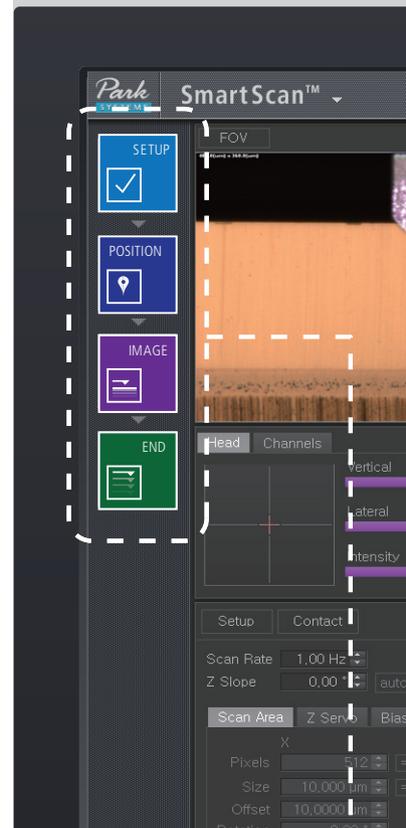
World's easiest to use AFM operating software

Whether your AFM needs are focused on academic research, industrial metrology or failure analysis, NX-Hivac's SmartScan Auto mode offers a streamlined system to generate publishable high quality AFM data. Moreover, SmartScan promises productive session with an AFM even for beginners to obtain quality data as good as an expert's, in much shorter time.

Park Hivac Manager

NX-Hivac auto vacuum control

High vacuum is controlled by Hivac Manager, pumping for the optimized vacuum condition and venting processes are logically and visually controlled by one-button clicking. Each process is visually monitored by color and schematic changes, you would not need to worry about the sequence of vacuum operation after click on a button. Faster and easier vacuum control software brings you ease of use AFM operation and better productivity.



Park Hivac Manager
NX-Hivac auto vacuum control

Status: **Connected**

Controls: **Auto** | Manual

Pumping | Venting

Event Log

when	description
12:02:06	Turn On Dry Pump Fan
12:02:06	Turn On Turbo Pump Fan
12:02:06	Open Roughing Valve
12:02:07	Open Foreline Valve
12:02:09	Start Dry Pump
12:02:10	Waiting for pressure dropped below 0.150...
12:04:23	Start Turbo Pump
12:04:25	Waiting for turbo pump started
12:05:40	Close Roughing Valve
12:05:43	Open Gate Valve

Started at 2015/06/23 11:58:47

Automatic vacuum pumping and venting



OPENED

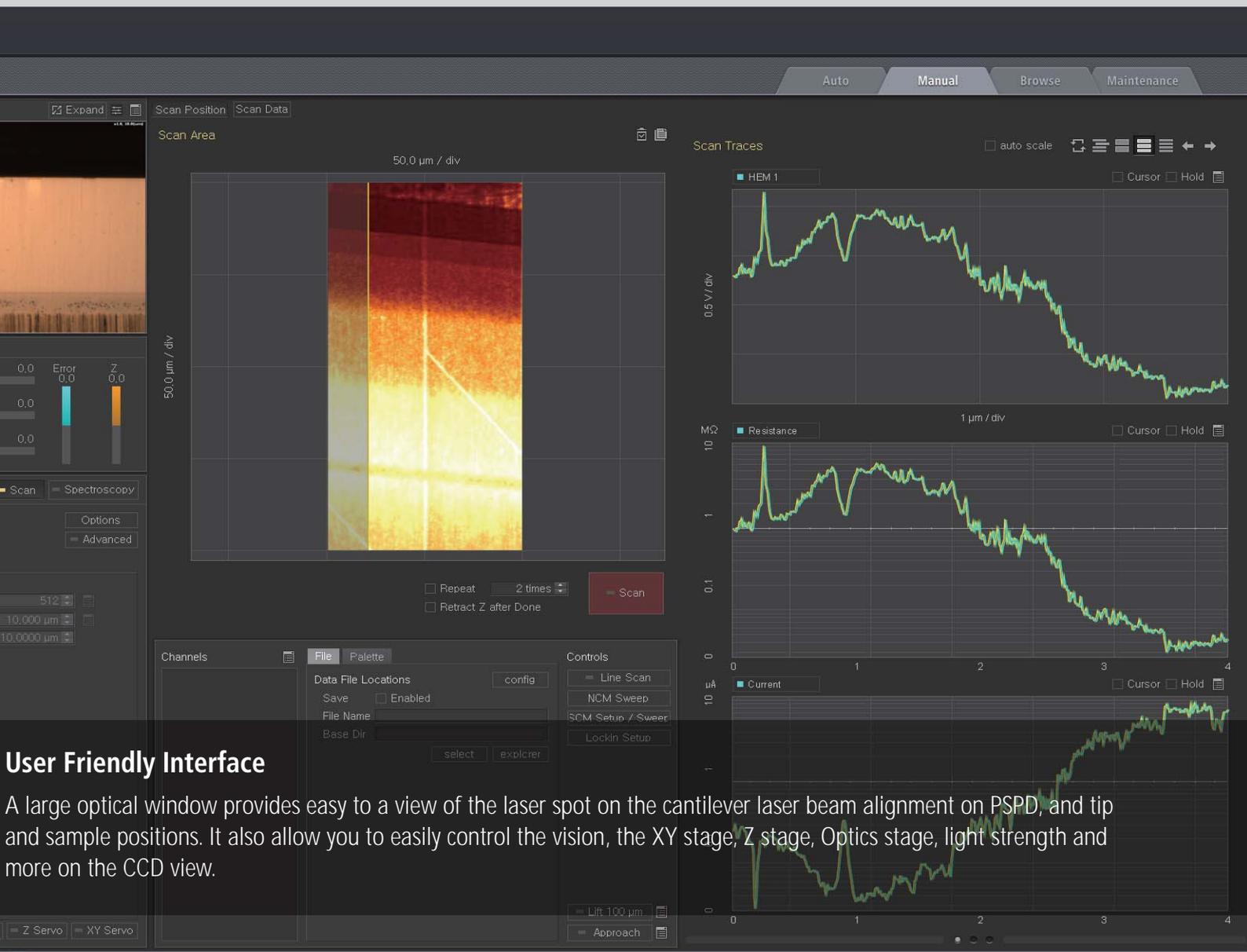


CLOSED



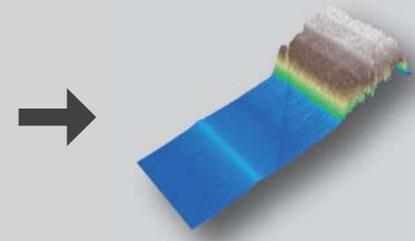
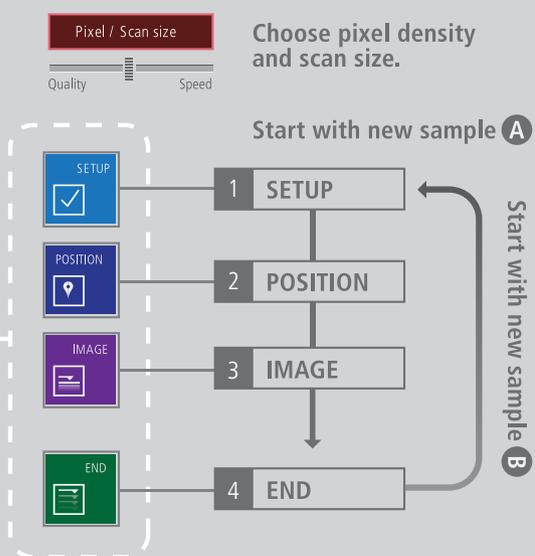
GAUGE SENSOR

The NX-Hivac lets users set up automatic controls for vacuum pumping and venting, further streamlining the scanning process and reducing required human input. The average pumping speed is to about 10^{-5} torr in < 5 min using Turbo and Dry Pump.



User Friendly Interface

A large optical window provides easy to a view of the laser spot on the cantilever laser beam alignment on PSPD, and tip and sample positions. It also allow you to easily control the vision, the XY stage, Z stage, Optics stage, light strength and more on the CCD view.



Single-Click Imaging with SmartScan™ Auto Mode

All you need to specify for AFM imaging are quality-speed preference, pixel density and scan size. Outside of those factors, you can leave all sophisticated AFM parameters up to the Auto mode of SmartScan. The system will start a measurement with optimized conditions for imaging automatically at the click of a button.

Park NX-Hivac

Increasing accuracy and productivity

Although the NX-Hivac is the world's most accurate high performance AFM, it is also one of the easiest to use and convenient AFMs for failure analysis applications. With Park NX-Hivac, you can increase your productivity and trust that your results are sound.

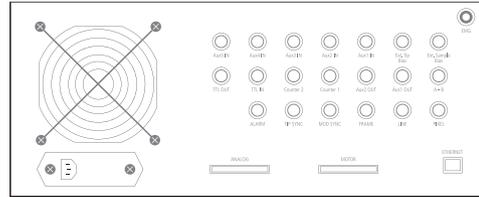
Closed-loop XY and Z Scanners

With two independent closed-loop XY and Z flexure scanners for the sample and probe tip, you can rest assured that your scans will be extremely accurate. The NX-Hivac offers flat and orthogonal XY scanning with low residual bow, offering out of plane motion less than 1 nm over the entire scan range. The NX-Hivac also features a high speeds Z scanner with a 15 μm scan range and Z scanner non-linearity is less than 0.5%. This provides accurate 2D and 3D measurements with no need for software processing.



Low Noise XYZ Position Sensors

The NX-Hivac features Park AFM's industry leading low noise Z detector that can accurately measure sample topography while the low noise XY closed loop scan minimizes the forward and backward scan gap to less than 0.15% of the scan range.



24-bit Digital Electronics

Minimize wasted time and maximize accuracy with the trademark NX-Series electronics controller featured in the NX-Hivac. Our controller is an all digital, 24-bit high speed device which gives the user the ability to perform a wide range of scans including our True Non-Contact mode. With its low noise design and high speed processing unit, the controller is ideal for precise voltage and current measurement as well as nano scale imaging. The embedded electronics also feature digital signal processing, allowing users to easily analyze measurements and imaging.

SPECIFICATION

Scanner

XY scanner: 50 μm \times 50 μm (100 μm \times 100 μm optional)
Z scanner: 15 μm

Optics

Objective lens: 10 x
5M pixel CCD

Sample Stage

XY stage travel: 22 mm \times 22 mm
Sample size: 50 mm \times 50 mm, up to 20 mm thickness

Physical Information

Vacuum chamber (inner): 300 mm \times 420 mm \times 320 mm
Vacuum chamber (outer including granite & pump):
 800 mm \times 950 mm \times 730 mm

Software

SmartScan: Park AFM operating software
XEI: AFM data analysis software
Hivac Manager: Auto vacuum control software

Electronics

ADC: 18 channels
 4 high-speed ADC channels (50 MSPS)
 24-bit ADCs for X, Y, and Z position sensor

High Vacuum

Vacuum level: Typically less than 1×10^{-5} torr
Pumping speed: Reach to 10^{-5} torr within 5 min.

DAC: 12 channels
 2 high-speed DAC channels (50 MSPS)
 20-bit DACs for X, Y, and Z positioning
 3 channels of integrated lock-in amplifier

Park Systems

Dedicated to producing the most accurate and easiest to use AFMs

The global headquarters is located at
Korean Advanced Nanotechnology Center (KANC) in Suwon, Korea.



More than a quarter century ago, the foundations for Park Systems were laid at Stanford University where Dr. Sang-il Park, the founder of Park Systems worked as an integral part of the group that first developed AFM technology. After perfecting the technology, he then went on to create the first commercial AFM and later Park Systems was born.

Park Systems strives everyday to live up to the innovative spirit of its beginnings. Throughout our long history, we have honored our commitment to providing the most accurate and yet very easy to use AFMs, with revolutionary features like True Non-Contact™ mode, and many automated software tools. We are not simply content to rest on our past success. All of our products are designed with same care and creativity that went into our first, allowing you to focus on getting results without worrying about the integrity of your tools.



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