CoreAFM

The Essence of Atomic Force Microscopy

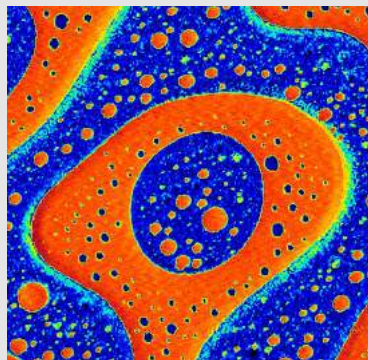| Powerful and versatile	Compact and complete	Value for money

nanosurf

In its closed state (top), the CoreAFM's scanner compartment protects your scans from outside disturbances. It can easily be opened (bottom) to allow access to the scanner and sample stage, for example for placing a new sample.

Topography and phase of a polymer mix

CoreAFM: The Essence of Atomic Force Microscopy

Intelligently combining the core components of AFM to achieve maximum versatility and user-friendliness resulted in the CoreAFM. Because of this fundamental design, the CoreAFM is streamlined to perform AFM at its best.

Key features

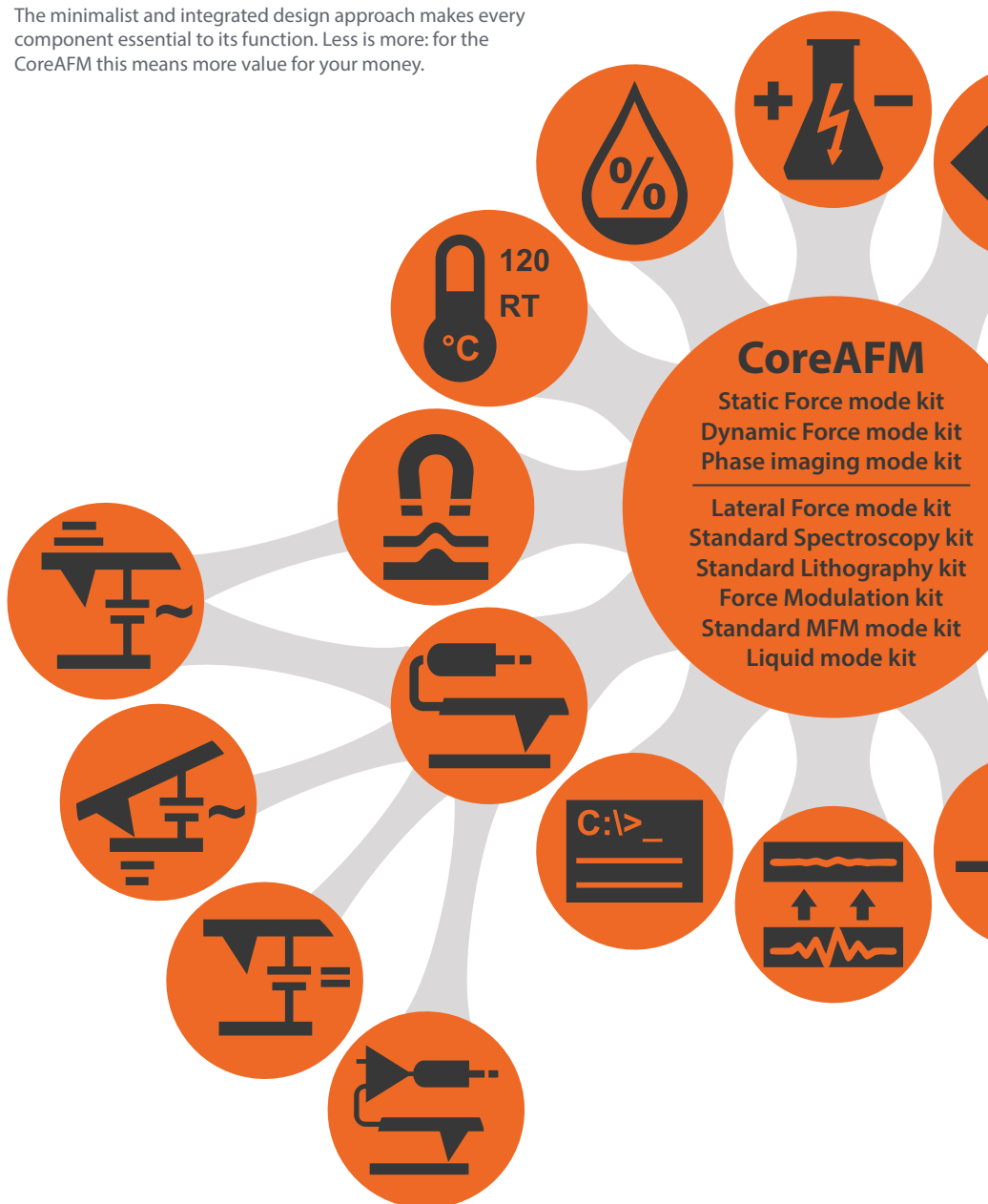- **Compact by design, with a complete and streamlined feature set**

  The fusion of a modern flexure-guided scanner, XYZ sample stage, camera, active vibration isolation table, and air-flow protection in a single all-in-one unit results in a complete AFM system with an unparalleled compact footprint. All the essential functions of modern AFM are integral components of the CoreAFM system; thus, only connecting the controller, power and USB is all that is needed for a fully operational CoreAFM.

- **A real performer that is both powerful and versatile**

  State of the art electronics with 24-bit ADC and DAC results in high-resolution XYZ driving of the 100×100×12 µm scanner and allows for low-noise force detection limited only by the cantilever. Thirty two standard and optional modes with fully compatible add-ons make the CoreAFM the tool of choice for applications ranging from materials research to life science and electrochemistry. Starting from the basic CoreAFM system its functionality can be seamlessly extended.
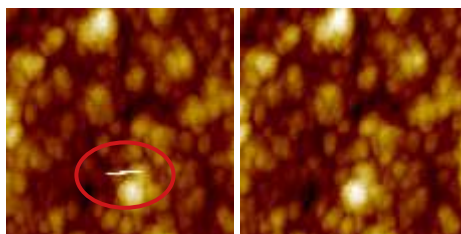
- **Simplicity and functionality that offer top value for money**

  The minimalist and integrated design approach makes every component essential to its function. Less is more: for the CoreAFM this means more value for your money.

CoreAFM

Static Force mode kit
Dynamic Force mode kit
Phase imaging mode kit

Lateral Force mode kit
Standard Spectroscopy kit
Standard Lithography kit
Force Modulation kit
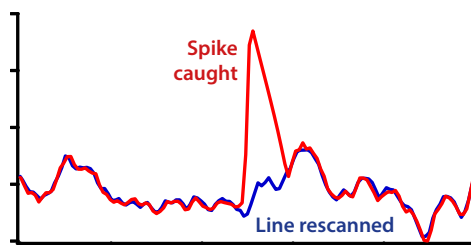Standard MFM mode kit
Liquid mode kit

SpikeGuard

A deeper system integration of the Isostage is reflected in the unique *SpikeGuard* feature, which eliminates glitches during imaging. Although the Isostage is an active vibration isolation system, glitches can still occur when distortions are too severe. *SpikeGuard* detects such anomalies and rescans the line for a distortion-free image.
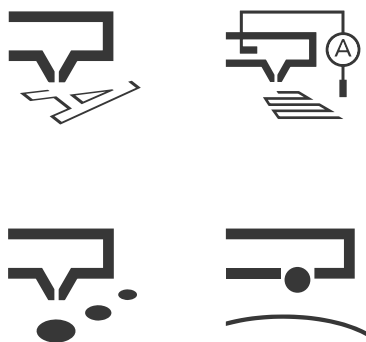
SpikeGuard turned OFF   *SpikeGuard* turned ON

Spike caught

Line rescanned

Kits contain everything to get started with a mode, including sample(s) and cantilevers.

Options provide all hardware, software keys, and accessories needed to enable a new mode.

Standard modes mentioned in the center circle are possible without any additional options.

The kits for the Static, Dynamic, and Phase imaging are always included with the CoreAFM.

FluidFM®

Primary add-on functionality

- Conductive AFM mode
- Advanced MFM mode
- Sample heating option
- Environmental control
- Electrochemistry option
- Signal I/O option
- Petri dish option
- Cantilever holder FluidFM
- Advanced lithography
- Advanced spectroscopy
- Scripting interface
- Isostage 300

Secondary add-on functionality

- Advanced conductive AFM
- EFM mode kit
- PFM mode option
- KPFM mode option
- Scanning thermal
- Nano-thermal analysis
- Petri dish heating option

FluidFM® add-on functionality

- FluidFM SICM option
- FluidFM nanolithography
- FluidFM spotting
- FluidFM colloidal spectr.

CoreAFM

Scanner

Maximum scan range	100 µm	< 5 nm flatness
Maximum Z-range	12 µm	closed loop
Detector noise (RMS)	typ. 60 pm	max. 100 pm
Sensor noise (Z, RMS)	typ. 180 pm	max. 250 pm
Dynamic noise (Z, RMS)	typ. 40 pm	max. 70 pm
Static noise (Z, RMS)	typ. 100 pm	max. 200 pm

Controller

Scan control and inputs	24-bit ADC/DAC	200 kHz
Digital lock-in (2×)	16-bit ADC/DAC	20 MHz
User in/out, Excitation in	24-bit ADC/DAC	5 MHz, 10 V
Digital sync	2-bit line/frame sync out	5 V, TTL
Thermal tuning	10 Hz – 2 MHz	
FPGA, 32-bit CPU, 256 MB RAM	programmable	USB 2.0

Primary add-on functionality

Conductive AFM mode option	Provides a conductive cantilever holder and current measurements from 10 nA to 100 µA to enable electrical AFM modes
Advanced MFM mode option	Adds a dual pass contour-following mode to improve MFM/EFM imaging quality
Sample heating option	Contains a sample holder and temperature controller to heat samples from room temperature up to 120°C
Environmental control option	A flexible enclosure between scanner and sample holder, and a sealing ring with feedthroughs for tubes and wires, together allow control of the sample environment
Electrochemistry option	A sample holder with a specially designed cell and electrode pads allows EC-AFM experiments
Signal I/O option	Extension for user-defined experiments (24-bit ADC/DAC, digital sync output, excitation input, deflection/friction signal outputs, Z-feedback on user input)
Petri dish option	Sample holder for liquid or bio applications that use Petri dishes
Cantilever holder FluidFM	FluidFM®-compatible cantilever holder to allow the use of FluidFM® probes from Cytosurge
Advanced lithography option	Adds the nano-printing mode and the possibility to read CAD vector data for lithography
Advanced spectroscopy option	Adds the possibility for large spec maps, real-time spec curve analysis, spec curve process, and stop-by-value. Adds cantilever spring constant and deflection sensitivity calibration. Includes one license for the SPIP post-processing software.
Scripting interface option	Enables AFM control via scripts, LabView, and other programming languages that support Microsoft COM automation
Isostage 300	Active vibration isolation table with unique *SpikeGuard* feature

CoreAFM features

General design	Compact design with tip scanner, sample stage, and scan protection in a single housing. Flexure XY-scanner with piezo Z-scanner.
Sample observation	Integrated camera for top or side view in air and liquid. 5 MP color CCD, switchable, adj. focus
Sample illumination	White LEDs (brightness 0–100%) for top and side view, with axial illumination for top view
Sample approach	Automated, parallel approach through integrated, motorized sample Z-stage (range: 5 mm)
Sample stage	Integrated XY-Sample stage (range: 20 × 20 mm)
Sample size	standard <50 mm (extended <100 mm)
Sample height	standard <5 mm (ext. <10mm / max. <40 mm)
Weight / Dimensions (WDH)	16 kg / 330 × 340 × 230 mm
Power	100–240 VAC, 50/60 Hz, 50 W

Standard CoreAFM operating modes

Static force, Dynamic force, Lateral force, Phase imaging, Liquid imaging, Force modulation, Standard MFM, Standard spectroscopy, Standard lithography

Kits for Static force, Dynamic force, and Phase imaging included with each system

Secondary add-on functionality

Petri dish heating option	Adds heating electronics to the petri dish option to allow heating of liquids (up to 45°C)
Advanced conductive AFM mode option	Sample holder with built-in current pre-amplifier for low current measurement (down to pA range)
EFM mode kit	Provides a sample for EFM and KPFM imaging
PFM mode option	Enables a secondary lock-in to measure piezo forces while imaging
KPFM mode option	Enables a secondary lock-in and tip voltage feedback controller to measure kelvin forces while imaging
Scanning thermal option	Provides the cantilevers, cantilever holder, and electronics to perform SThM
Nano-thermal analysis option	Provides the cantilevers, cantilever holder, and electronics to perform local heat dissipation measurements

FluidFM add-on functionality

FluidFM SICM	Adds a low-current, low-noise pre-amplifier and accessories that allow scanning ion current imaging to enhance resolution on soft materials in liquid
FluidFM nanolithography	Allows you to perform nanolithography by dispensing liquids to create µm-sized structures
FluidFM spotting	Allows you to perform spotting by dispensing liquids in the sub-femtoliter range
FluidFM colloidal spectroscopy	Allows you to perform colloidal spectroscopy in large measurement series via rapidly exchangeable spheres

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