valid from 2024

UNLIMITED POSSIBILITIES

BIOAFM ACCESSORIES HANDBOOK

Unmatched flexibility & modularity
More than 100 accessories and 30 operating modes

Accessories Handbook 2024 Contents

System Compatibilities 4-10

NanoWizard® V 4
BioScience and NanoScience
NanoWizard 4 XP 5
BioScience and NanoScience
NanoWizard ULTRA Speed 3 6
NanoWizard NanoOptics 7
NanoWizard PURE 8
ForceRobot® 400 9
CellHesion® 300 10

1 Control electronics options 11-12

CellHesion Controller 11
ForceRobot Controller 11
NanoWizard PURE Controller 11
Vortis 2.1 SPM Controller 11
Vortis 2.2 SPM Controller Speed version 12
Advanced version option for the
Vortis 2.1 and 2.2 Controller 12

2 System options 13-14

NanoWizard V 13
NanoWizard 4 XP 13
NanoWizard ULTRA Speed 3 13
NanoWizard NanoOptics 14
NanoWizard PURE 14
ForceRobot 400 14
CellHesion 300 14

3 Software modules 15-16

PeakForce Tapping® software module 15
PeakForce-QI 15
ScanAsyst™/DynAsyst® software modules . . 15
PeakForce QNM® 15
SmartMapping 15
ExperimentPlanner 15
QI Advanced software module 15
Advanced AC modes module 16
DirectOverlay 2 module 16
DirectTiling software module 16
NanoLithography/NanoManipulation module . . 16
CellMech Package 16
Advanced Force Spectroscopy module 16

4 Application modules and modes 17-20

Fast scanning package 17
HyperDrive imaging package 17
OEM micropipettes 17
CoverslipHolder with electrical
sample connection 17
Kelvin Probe Microscopy (KPM) module 17
Kelvin Probe Microscopy (KPM) module –
enclosed volume 18
Conductive AFM module 18
Conductive AFM module – enclosed volume . . 18
Contact Resonance Module 18
Tunneling Current Conductive AFM
(TC-CAFM) module 19
Tunneling Current Conductive AFM
(TC-CAFM) module – enclosed volume 19
Scanning Tunneling Microscopy
(STM) module 19
Tuning Fork module 19
Akiyama Probe module 19
Optical focus tracking 20
High Voltage Piezo Force Microscopy
(with Amplifier) 20
Low Voltage Piezo Force Microscopy 20
Scanning Thermal AFM from Bruker Anasys . . 20
ForceWheel 20

5 Sample Stages 21-23

HybridStage 21
StretchingStage 21
StretchingStage for higher forces 21
Motorized precision stage 21
Sample holder for large samples 22
Manual precision stage 22
Precision mapping stage 22
Stand-alone Stage for NanoWizard AFM 22
Head-up stage 23

Accessories Handbook 2024 Contents

TAO Tip Assisted Optics module 23
CellHesion module 23

6 Cantilever holder options 24

Fixed-spring cantilever holder 24
Cantilever holder with hinge clip 24
TopView cantilever holder 24
Cantilever holder with electrical tip connection – enclosed volume 24
SideView cantilever holder 24

7 Environmental control options 25-27

Universal Temperature Controller 25
BioCell for coverslips with temperature control 25
CoverslipHolder 25
PetriDishHeater 25
PetriDishHeater for BioMAT 25
PetriDishHolder 26
Active humidity control package with PetriDishHeater 26
SmallCell closed liquid cell for harsh solvents . . 26
3-port small volume SmallCell 26
High Temperature Heating Stage (HTHS) 27
Heating Cooling Module (HCM) 27
Heating Cooling Stage (HCS) 27
Cryostage 27

8 Electrochemistry solutions 28

Temperature controlled ECCell 28
Heating Cooling Stage (HCS) with electrochemistry cell 28
Scanning Electrochemical Microscopy (SECM) option 28

9 Vibration and acoustic isolation . . . 29

Acoustic enclosure table top version 29
Active vibration isolation from Accurion 29
Acoustic enclosure, various versions 29
Base for acoustic enclosure 29

10 Optics accessories 30-31

TopViewOptics with granite base 30
TopViewOptics with breadboard 30
TopView optical module 30
BioMaterials Workstation BioMAT 31
Upright Fluorescence Microscope (UFM) kit . . 31
Fiber-coupled detection module 31
Inverted optical microscope configurations . . 31
Raman spectroscopy 31
Data communication kit 31

11 OEM solutions and small parts 32-34

JPK biocompatible glue 32
JPK spare parts 32
AFM probes 32
FluidFM® ADD-ON from Cytosurge 32
QR Code Reader 33
CO_2 Controller 33
OEM syringe pumps 33
CCD, EMCCD and CMOS cameras 33-34
OEM incubators for Live Cell experiments under controlled environments 34
OEM glove box systems for NanoWizard AFMs 34

12 Indentation solutions 35

Bruker BioSoft in-situ indenter 35

NanoWizard V BioScience and NanoScience

System Compatibilities

System options	**CellHesion 300**	**NanoWizard NanoOptics**	**NanoWizard 4 XP**	**NanoWizard ULTRA Speed 3**	**ForceRobot 400**
Optics accessories	**Upright Fluorescence Microscope kit**	**Inverted optical microscopes from all major suppliers** Zeiss, Olympus, Nikon, and Leica	**BioMAT**	**TopViewOptics with granite base**	**TopViewOptics with breadboard**	**TopView optical module**
Control electronics options	**Vortis 2.1 SPM Controller**	**Vortis 2.2 SPM Controller Speed version**	**Advanced version option for the Vortis 2.1 and Vortis 2.2 Controller**
Software modules	Advanced AC modes	Advanced Force Spectroscopy	Direct Overlay 2	Direct Tiling	Experiment Planner	NanoLithography & Nanomanipulation	PeakForce Tapping	QI Advanced	PeakForce QI	ScanAsyst/ DynAsyst software modules	Smart Mapping
Sample stages	Head-up stage	Motorized precision stage	Manual precision stage	Stretching-Stage	Hybrid Stage	Stretching-Stage for higher forces	Stand-alone Stage	CellHesion module	TAO module
Fluid cells & temperature control	BioCell	Coverslip Holder	PetriDish Heater	PetriDish Heater for BioMAT	High Temperature Heating Stage	Heating Cooling Module	Heating Cooling Stage	Cryo Stage	PetriDish Holder	SmallCell	3-port small volume SmallCell	Universal Temperature Controller
Electrochemistry solutions	Heating Cooling Stage with electrochemistry cell	ECCell electrochemistry cell	Scanning Electrochemical Microscopy (SECM) option
Application modules & modes	Scanning Tunneling Microscopy module	High-Voltage Sample Bias Amplifier	Low-Voltage Sample Bias	Conductive AFM module	Conductive AFM module - enclosed volume	Tunneling Current Conductive AFM module	Tunneling Current Conductive AFM module - enclosed volume	Kelvin Probe Microscopy module	Kelvin Probe Microscopy module - enclosed volume
	Tuning Fork module	Akiyama probe module	Coverslip Holder with electrical sample connection	HyperDrive fluid imaging package	Fast scanning package	CellMech Package	Contact Resonance Module	Electrical sample connection module	Scanning Thermal Microscopy module	Sample holder for large samples
Cantilever holders	Fixed-spring cantilever holder	Topview cantilever holder	Cantilever holder with hinge clip	Cantilever holder with electrical tip connection - enclosed volume	Side-view cantilever holder
Extras & OEM	FluidFM ADDON from Cytosurge	Humidifier	Micropipettes	ForceWheel	CO_2 Controller	Incubators	Syringe pumps	Potentiostats
	Fiber coupled detection module	Cameras	Acoustic enclosure	Vibration isolation	Glove Box systems	Indentation solutions	Cantilevers	Small parts and useful tools
Applications	**Life Sciences** (highlighted with blue boxes) ■ High resolution imaging, in air and liquid, of single molecules such as proteins, DNA/RNA, carbohydrates, lipids ■ Live Cell Imaging ■ Bacteria and virus characterization ■ Cellular adhesion and cytomechanics ■ Molecular interactions, receptor-ligand, antibody-antigen ■ Molecular unfolding ■ Molecular recognition ■ Biomaterials, compound and implant characterization ■ Material properties such as adhesion, elasticity, stiffness ■ Drug formulation, encapsulation and aging studies	**Nano Sciences** (highlighted with gray boxes) ■ High resolution imaging in air and liquid of single molecules, thin films, nanoparticles or nanowires ■ Characterization of surface properties such as adhesion, stiffness, friction, conductivity, charges, hardness ■ Polymer science ■ Single molecule force measurements ■ Smart organic materials ■ Surface properties of conjugated polymers ■ Biosensors ■ Degradable materials ■ Electrochemistry ■ Colloidal probe, surface forces and interface phenomena

☐ BioScience ☐ NanoScience

NanoWizard 4 XP
BioScience and NanoScience

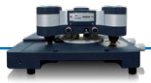
System Compatibilities

System options	**CellHesion 300**	**NanoWizard NanoOptics**	**NanoWizard ULTRA Speed 3**	**ForceRobot 400**
Optics accessories	**Upright Fluorescence Microscope kit**	**Inverted optical microscopes from all major suppliers** Zeiss, Olympus, Nikon, and Leica	**BioMAT**	**TopViewOptics with granite base** / **TopViewOptics with breadboard** / **TopView optical module**
Control electronics options	**Vortis 2.1 SPM Controller**	**Vortis 2.2 SPM Controller Speed version**	**Advanced version option for the Vortis 2.1 and Vortis 2.2 Controller**	
Software modules	Advanced AC modes; Advanced Force Spectroscopy; Direct Overlay 2	DirectTiling; Experiment Planner; NanoLitho-graphy & Nanomani-pulation	PeakForce Tapping; QI Advanced; Smart Mapping	
Sample stages	Head-up stage; Motorized precision stage; Manual precision stage	Stretching-Stage; Hybrid Stage; Stretching-Stage for higher forces	Stand-alone Stage; CellHesion module; TAO module	
Fluid cells & temperature control	BioCell; Coverslip Holder; PetriDish Heater; PetriDish Heater for BioMAT	High Tem-perature Heating Stage; Heating Cooling Module; Heating Cooling Stage; Cryo Stage	PetriDish Holder; SmallCell; 3-port small volume SmallCell; Universal Tempera-ture Controller	
Electrochemistry solutions	Heating Cooling Stage with electrochemistry cell	ECCell electrochemistry cell	Scanning Electrochemical Microscopy (SECM) option	
Application modules & modes	Scanning Tunneling Microscopy module; High-Voltage Sample Bias Amplifier; Low-Voltage Sample Bias	Conductive AFM module; Conductive AFM module - enclosed volume; Tunneling Current Conductive AFM module	Tunneling Current Conductive AFM module - enclosed volume; Kelvin Probe Microscopy module; Kelvin Probe Microscopy module - enclosed volume	
	Tuning Fork module; Akiyama probe module; Coverslip Holder with electrical sample connection; HyperDrive fluid imaging package; Fast scanning package; CellMech Package; 8x Fluidics Module; Contact Resonance Module; Electrical sample connection module; Scanning Thermal Microscopy module; Sample holder for large samples			
Cantilever holders	Fixed-spring cantilever holder; Topview cantilever holder	Cantilever holder with hinge clip; Cantilever holder with electrical tip connection - enclosed volume	Side-view cantilever holder	
Extras & OEM	FluidFM ADDON from Cytosurge; Humidifier; Micropipettes; ForceWheel; CO_2 Controller; Incubators; Syringe pumps; Potentiostats			
	Fiber coupled detection module; Cameras; Acoustic enclosure; Vibration isolation; Glove Box systems; Indentation solutions; Cantilevers; Small parts and useful tools			
Applications	**Life Sciences** (highlighted with blue boxes) ■ High resolution imaging, in air and liquid, of single molecules such as proteins, DNA/RNA, carbohydrates, lipids ■ Live Cell Imaging ■ Bacteria and virus characterization ■ Cellular adhesion and cytomechanics ■ Molecular interactions, receptor-ligand, antibody-antigen ■ Molecular unfolding ■ Molecular recognition ■ Biomaterials, compound and implant characterization ■ Material properties such as adhesion, elasticity, stiffness ■ Drug formulation, encapsulation and aging studies		**Nano Sciences** (highlighted with gray boxes) ■ High resolution imaging in air and liquid of single molecules, thin films, nanoparticles or nanowires ■ Characterization of surface properties such as adhesion, stiffness, friction, conductivity, charges, hardness ■ Polymer science ■ Single molecule force measurements ■ Smart organic materials ■ Surface properties of conjugated polymers ■ Biosensors ■ Degradable materials ■ Electrochemistry ■ Colloidal probe, surface forces and interface phenomena	

☐ BioScience ☐ NanoScience

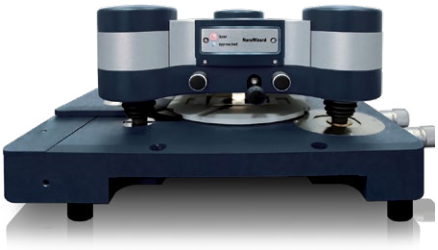
NanoWizard ULTRA Speed 3

System Compatibilities

	Advanced AC modes	Advanced Force Spectro-scopy	Direct Overlay 2	Direct Tiling	Experi-ment Control	Experi-ment Planner	NanoLitho-graphy & Nanomani-pulation	PeakForce Tapping	QI Advanced	PeakForce QI	Scan Asyst	PeakForce
System options	 **CellHesion 300**		 **NanoWizard NanoOptics**		 **NanoWizard V**		 **NanoWizard 4 XP**		 **ForceRobot 400**			
Optics accessories	 **Upright Fluorescence Microscope kit**		**Inverted optical microscopes from all major suppliers** Zeiss, Olympus, Nikon, and Leica		 **BioMAT**		 **TopViewOptics with granite base**		 **TopViewOptics with breadboard**		 **TopView optical module**	
Control electronics options	 **Vortis 2.2 SPM Controller Speed version**						 **Advanced version option for the Vortis 2.1 and Vortis 2.2 Controller**					
Software modules	Advanced AC modes	Advanced Force Spectro-scopy	Direct Overlay 2	Direct Tiling	Experiment Planner	NanoLitho-graphy & Nanomani-pulation	PeakForce Tapping	QI Advanced	PeakForce QI	ScanAsyst/ DynAsyst software modules	Smart Mapping	
Sample stages	Head-up stage	 Motorized precision stage	Manual precision stage	Stretching-Stage	 Hybrid Stage	Stretching-Stage for higher forces	Stand-alone Stage	 CellHesion module	 TAO module			
Fluid cells & temperature control	BioCell	Coverslip Holder	 PetriDish Heater	PetriDish Heater for BioMAT	High Tem-perature Heating Stage	Heating Cooling Module	Heating Cooling Stage	Cryo Stage	PetriDish Holder	SmallCell	3-port small volume SmallCell	Universal Tempera-ture Controller
Electrochemistry solutions	Heating Cooling Stage with electrochemistry cell				ECCell electrochemistry cell				Scanning Electrochemical Microscopy (SECM) option			
Application modules & modes	Scanning Tunneling Microscopy module	High-Voltage Sample Bias Amplifier	Low-Voltage Sample Bias	Conductive AFM module	Conductive AFM module - enclosed volume	Tunneling Current Conductive AFM module	Tunneling Current Conductive AFM module - enclosed volume	Kelvin Probe Microscopy module	Kelvin Probe Microscopy module - enclosed volume			
	Tuning Fork module	Akiyama probe module	Coverslip Holder with elect-rical sample connection	HyperDrive fluid imaging package	CellMech Package	Electrical sample connection module	Scanning Thermal Microscopy module	Sample holder for large samples				
Cantilever holders	 Fixed-spring cantilever holder		Topview cantilever holder		 Cantilever holder with hinge clip		Cantilever holder with electrical tip connection - enclosed volume		Side-view cantilever holder			
Extras & OEM	FluidFM ADDON from Cytosurge	Humidifier	Micropipettes	ForceWheel	CO_2 Controller	Incubators	Syringe pumps	Potentiostats				
	Fiber coupled detection module	Cameras	Acoustic enclosure	Vibration isolation	Glove Box systems	Indentation solutions	Cantilevers	Small parts and useful tools				
Applications	■ High-speed and high resolution imaging, in air and liquid, of cells, tissues, proteins, DNA/RNA, carbohydrates or lipids ■ Single molecule and live cell dynamics ■ Cell kinetics and signaling processes ■ Polymers, phase transitions ■ Real-time, in situ-experiments simultaneously with advanced optical techniques ■ Characterization of surface properties such as adhesion, stiffness, friction, conductivity, charges, hardness											

NanoWizard NanoOptics

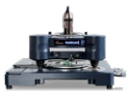
System Compatibilities



System options	**CellHesion 300**	**NanoWizard V**	**NanoWizard 4 XP**	**ForceRobot 400**
Optics accessories	**Upright Fluorescence Microscope kit**	**Inverted optical microscopes from all major suppliers** Zeiss, Olympus, Nikon, and Leica	**BioMAT**	**TopView Optics with breadboard**
	TopView optical module	**TopView Optics with granite base**	**Raman reflector kit**	
Control electronics options	**Vortis 2.2 SPM Controller**	**Vortis 2.1 SPM Controller Speed version**	**Advanced version option for the Vortis 2.1 and Vortis 2.2 Controller**	
Software modules	Advanced AC modes	Advanced Force Spectroscopy	Direct Overlay 2	Direct Tiling
	Experiment Planner	NanoLithography & Nanomanipulation	SmartMapping	
	PeakForce Tapping	QI Advanced	ScanAsyst/DynAsyst software modules	Data communication kit
Sample stages	Head-up stage	Motorized precision stage	Manual precision stage	Hybrid Stage
	Stretching-Stage	Stretching-Stage for higher forces	Stand-alone Stage	CellHesion module
	TAO module			
Fluid cells & temperature control	BioCell	Coverslip Holder	PetriDish Heater	Heating Cooling Module
	Heating Cooling Stage	PetriDish Holder	SmallCell	3-port small volume SmallCell
	Universal Temperature Controller			
Electrochemistry solutions	Heating Cooling Stage with electrochemistry cell	ECCell electrochemistry cell	Scanning Electrochemical Microscopy (SECM) option	
Application modules & modes	Scanning Tunneling Microscopy module	High-Voltage Sample Bias Amplifier	Low-Voltage Sample Bias	Conductive AFM module
	Conductive AFM module - enclosed volume	Tunneling Current Conductive AFM module	Tunneling Current Conductive AFM module - enclosed volume	Kelvin Probe Microscopy module
	Kelvin Probe Microscopy module - enclosed volume	Tuning Fork module		
	Akiyama probe module	Coverslip Holder with electrical sample connection	HyperDrive fluid imaging package	Fast scanning package
	CellMech Package	Contact Resonance Module	Electrical sample connection module	Scanning Thermal Microscopy module
	Sample holder for large samples	Optical focus tracking		
Cantilever holders	Fixed-spring cantilever holder	Topview cantilever holder	Cantilever holder with hinge clip	Cantilever holder with electrical tip connection - enclosed volume
	Side-view cantilever holder			
Extras & OEM	FluidFM ADDON from Cytosurge	Humidifier	Micropipettes	ForceWheel
	CO_2 Controller	Incubators	Syringe pumps	Potentiostats
	Fiber coupled detection module	Cameras	Acoustic enclosure	Vibration isolation
	Glove Box systems	Indentation solutions	Cantilevers	Small parts and useful tools
Applications	■ Aperture fiber SNOM experiments ■ Scattering-type SNOM (sSNOM) experiments ■ Nanomanipulation in optical fields ■ Optical surface properties such as absorption, excitation or nonlinear effects ■ Dyes and markers ■ Quantum dots/rods ■ Quenching or plasmon generation in combination with topography, nanomechanical, electrical and magnetic properties			

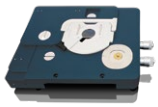
NanoWizard PURE

System Compatibilities

Optics accessories	 **BioMAT**	 **TopView optical module**	 **Upright Fluorescence Microscope kit**	**Inverted optical microscopes from all major suppliers** Zeiss, Olympus, Nikon, and Leica	 **TopViewOptics with granite base**	 **TopViewOptics with breadboard**	
Control electronics options	 **NanoWizard PURE Controller**						
Software modules	Advanced Force Spectroscopy	Direct Overlay 2	Direct Tiling	Experiment Planner	NanoLithography & Nano-manipulation	PeakForce Tapping	Scan Asyst	Smart Mapping
Sample stages	Head-up stage	 Motorized precision stage	Manual precision stage	StretchingStage	StretchingStage for higher forces	Stand-alone Stage	 CellHesion module	
Fluid cells & temperature control	BioCell	Coverslip Holder	 PetriDish Heater	PetriDish Heater for BioMAT	High Tem-perature Heating Stage	Heating Cooling Module	Heating Cooling Stage	Cryo Stage	PetriDish Holder	SmallCell	3-port small volume SmallCell	Universal Tempera-ture Controller
Electrochemistry solutions	Heating Cooling Stage with electrochemistry cell	ECCell electrochemistry cell	Scanning Electrochemical Microscopy (SECM) option					
Application modules & modes	Scanning Tunneling Microscopy module	High-Voltage Sample Bias Amplifier	Low-Voltage Sample Bias	Conductive AFM module	Conductive AFM module - enclosed volume	TC-AFM module	Tunneling Current Con-ductive AFM module - en-closed volume	Kelvin Probe Microscopy module
	Kelvin Probe Microscopy module - enclosed volume	Akiyama probe module	CoverslipHolder with electrical sample connection	CellMech Package	Electrical sample connection module	Scanning Thermal Microscopy module	Sample holder for large samples	
Cantilever holders	 Fixed-spring cantilever holder	Topview cantilever holder	 Cantilever holder with hinge clip	Cantilever holder with electrical tip connection - enclosed volume	Side-view cantilever holder			
Extras & OEM	FluidFM ADDON from Cytosurge	Humidifier	Micropipettes	ForceWheel	CO_2 Controller	Incubators	Syringe pumps	Potentiostats
	Cameras	Acoustic enclosure	Vibration isolation	Glove Box systems	Indentation solutions	Cantilevers	Small parts and useful tools	Fiber coupled detection module
Applications	■ High resolution imaging, in air and liquid, of single molecules, cells, tissues, thin films, nanoparticles or nanowires ■ Material properties such as adhesion, elasticity, friction, conductivity, hardness ■ Single molecule force measurements ■ Bacteria and virus characterization ■ Cellular adhesion and cytomechanics ■ Surface properties of conjugated polymers ■ Degradable materials							

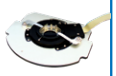
ForceRobot 400

System Compatibilities

Optics accessories	**Inverted optical microscopes from all major suppliers** (Zeiss, Olympus, Nikon, and Leica)				
Control electronics options	 **ForceRobot Controller**	 **Vortis 2.1 SPM Controller**	 **Advanced version option for the Vortis 2.1 and Vortis 2.2 Controller**		
Software modules	Advanced Force Spectroscopy	Direct Overlay 2	Direct Tiling	Experiment Planner	
Sample stages	 Manual precision stage	 Motorized precision stage	 Precision Mapping Stage		
Fluid cells & temperature control	BioCell	Coverslip Holder	 PetriDish Heater	High Temperature Heating Stage	Heating Cooling Stage	PetriDish Holder	SmallCell	3-port small volume SmallCell	Universal Temperature Controller
Application modules & modes	ForceWheel	CellMech Package			
Cantilever holders	 Fixed-spring cantilever holder	Topview cantilever holder			
Extras & OEM	FluidFM ADDON from Cytosurge	Humidifier	Micropipettes	CO_2 Controller	Incubators	Syringe pumps
	Cameras	Acoustic enclosure	Vibration isolation	Glove Box systems	Cantilevers	Small parts and useful tools
Applications	■ Protein (un)folding and receptor-ligand interactions ■ Analysis of adhesion forces of single macromolecules for surface chemistry and polymer science ■ Elastic response or melting of DNA ■ Single molecule mechanical properties, e.g. muscle proteins, synthetic biopolymers, carbohydrates or spider silk protein ■ Localization of binding of small molecules to proteins (e.g. inhibitors on membrane proteins) ■ Quantification of kinetics, affinity and energy landscapes of biological interactions ■ Colloidal probe and Nanoindentation experiments					

CellHesion 300

System Compatibilities

Optics accessories	 **Upright Fluorescence Microscope kit**	 **TopView Optics with granite base**	**Inverted optical microscopes from all major suppliers** (Zeiss, Olympus, Nikon, and Leica)
Control electronics options	 **CellHesion Controller**	 **Vortis 2.1 SPM Controller**	 **Advanced version option for the Vortis 2.1 and Vortis 2.2 Controller**
Software modules	Advanced Force Spectroscopy	Direct Overlay 2	Direct Tiling	Experiment Planner	CellMech Package	SmartMapping
Sample stages	 HybridStage	 Motorized precision stage				
Fluid cells & temperature control	BioCell	Coverslip Holder	 PetriDish Heater	Heating Cooling Stage	PetriDish Holder	SmallCell	3-port small volume SmallCell	Universal Temperature Controller
Cantilever holders	 Fixed-spring cantilever holder	Topview cantilever holder	Side-view cantilever holder					
Extras & OEM	FluidFM ADDON from Cytosurge	Humidifier	Micropipettes	ForceWheel	CO_2 Controller	Incubators	Syringe pumps
	Cameras	Acoustic enclosure	Vibration isolation	Glove Box systems	Cantilevers	Small parts and useful tools	
Applications	■ Stiffness and elasticity mapping on samples ranging from single cells to substrates and tissues ■ Cell-cell and cell-substrate interactions ■ Cell adhesion and tether formation ■ Biomaterial studies, biofouling, biosensors, capsules ■ Implant coatings and cellular biochips ■ Automated mapping of sample properties over a large range for structured substrates, microspheres, cells. etc., together with the HybridStage ■ Testing functionalized surfaces ■ Applications in microbiology and virus research ■ Pharmaceutical studies such as drug delivery mechanisms ■ Applications in food, paper or textile industry on fibers, coatings or powders in air or liquid ■ Binding studies such as receptor/ligand or antibody/antigene						

1 Control electronic options

CellHesion Controller

Compact control electronics for CellHesion systems

Key features

- TTL output for synchronization of external equipment (e.g. CCD cameras)
- Modular hybrid analog/digital design with latest FPGA/PPC technology
- 18 bit ADCs @ 1 MHz sample rate
- 20 bit DACs @ 1 MHz sample rate

ForceRobot Controller

Compact control electronics for the ForceRobot system

Key features

- TTL output for synchronization of external equipment (e.g. CCD cameras)
- Modular hybrid analog/digital design with latest FPGA/PPC technology
- 18 bit ADCs @ 1 MHz sample rate
- 20 bit DACs @ 1 MHz sample rate
- Can control a ForceRobot head and a precision mapping stage

NanoWizard PURE Controller

Fully featured, low-noise, high-performance, digital SPM controller for NanoWizard PURE systems

Key features

- TTL output for synchronization of external equipment (e.g. CCD cameras)
- Modular hybrid analog/digital design with latest FPGA/PPC technology
- 16 bit ADC @ 64 MHz
- 5 × 18 bit ADCs @ 1 MHz
- 14 bit DAC @ 128 MHz
- 4 × 20 bit DAC @ 1 MHz
- 1 × high-speed lock-in amplifier
- 3 × low-noise, capacitive distance sensor interface
- Thermal noise cantilever calibration up to 2 MHz
- Easy connection of accessories at the front panel

Vortis 2.1 SPM Controller

Fully featured, low-noise, high-performance, digital SPM controller

Key features

- High-speed data capture with a maximum data pixel rate of up to 1,000,000 pixels/sec
- Modular hybrid analog/digital design with latest FPGA/PPC technology
- 2 × 16 bit ADC @ 64 MHz
- 7 × 18 bit ADCs @ 1 MHz
- 14 bit DAC @ 128 MHz
- 4 × 20 bit DAC @ 1 MHz
- 1 × high-speed lock-in amplifier
- 4 × low-noise, capacitive distance sensor interface
- Thermal noise cantilever calibration up to 4 MHz
- Low voltage output for electronic modules and pre-amplifiers with +/-15 V and +/-5 V
- 6 × TTL input channels, 10 × TTL output channels
- Easy connection of accessories at the front panel

1 Control electronic options

Vortis 2.2 SPM Controller Speed version

Fully featured, low-noise, high-performance, digital SPM controller for high speed scanning systems

Key features

- High-speed data capture with a maximum data pixel rate of up to 8,000,000 pixels/sec
- Modular hybrid analog/digital design with latest FPGA/PPC technology
- 2 × 16 bit ADC @ 64 MHz
- 8 × 18 bit ADCs @ 1 MHz
- 14 bit DAC @ 128 MHz
- 4 × 20 bit DAC @ 1 MHz
- 1 × high-speed lock-in amplifier
- 4 × low-noise, capacitive distance sensor interface
- Thermal noise cantilever calibration up to 7.5 MHz
- Low voltage output for electronic modules and pre-amplifiers with +/- 15 V and +/- 5 V
- 6 × TTL input channels, 10 × TTL output channels
- Easy connection of accessories at the front panel

Advanced version option for the Vortis 2.1 and Vortis 2.2 Controller

Most advanced and flexible high-performance digital SPM controller

Key features

- Access to external and internal signals for flexible research and easy combining of additional advanced optical instrumentation (e.g. SuperResolution, FLIM)
- 4 × 16 bit ADC @ 64 MHz
- 12 × 18 bit ADCs @ 1 MHz
- 6 × 14 bit DAC @ 128 MHz
- 8 × 20 bit DAC @ 1 MHz
- 2 high-speed (60 MSamples/sec) and 1 mid speed (1 MSamples/sec) lock-in amplifier
- 6 × low-noise, capacitive distance sensor interface
- Two channel, gated photon counting (2+2 inputs, 32 bit TTL counters, up to 20 Mcounts/s, 20 ns min pulse width, 40 ns pulse separation)

2 System options

NanoWizard V

for automated nano-mechanical imaging and fastest scanning of corrugated samples

The NanoWizard V BioAFM combines high spatio-temporal resolution with a large scan area, fast scanning rates of up to 400 lines/sec and enables long-term, self-regulating experiment series. (see NanoWizard V brochures)

Key features

- Tip-scanner technology for safe and easy operation in air, gases, and fluids
- Automated alignment of cantilever deflection detection system
- Head completely sealed against vapor and liquids
- Simultaneous AFM imaging with inverted research microscopes
- Compatible with advanced optical techniques such as confocal or superresolution techniques
- Open hard and software architecture
- Comprehensive set of AFM modes like Bruker's unique PeakForce-QI software mode, PeakForce Tapping, Quantitative (QI) Imaging mode, ScanAsyst and PeakForce QNM, contact mode with lateral force, advanced AC modes like non-contact, phase detection, and accessories for the characterization of electrical and magnetic properties, including state-of-the-art FluidFM cantilevers for cell injection and manipulation

NanoWizard 4 XP

for high-resolution imaging with extreme performance

The NanoWizard 4 XP BioScience and NanoScience atomic force microscopes combine atomic resolution and fast scanning with rates of up to 300 lines/sec and a large scan range of 100 µm in one system. (see NanoWizard 4 XP brochures)

Key features

- Tip-scanner technology for safe and easy operation in air, gases, and fluids
- Manual alignment of cantilever deflection detection system
- Head completely sealed against vapor and liquids
- Simultaneous AFM imaging with inverted research microscopes
- Compatible with advanced optical techniques such as confocal or superresolution techniques
- Open hard and software architecture
- Comprehensive set of AFM modes like Bruker's unique PeakForce Tapping, Quantitative (QI) Imaging mode, ScanAsyst and PeakForce QNM, contact mode with lateral force, advanced AC modes like non-contact, phase detection, and accessories for the characterization of electrical and magnetic properties, including state-of-the-art FluidFM cantilevers for cell injection and manipulation

NanoWizard ULTRA Speed 3

for high-speed AFM combined with advanced optical microscopy

The NanoWizard ULTRA Speed 3 AFM combines true atomic resolution and fastest scanning with rates of 1,400 lines/sec. (see NanoWizard ULTRA Speed 3 brochure)

Key features

- High-speed imaging at 1,400 lines/sec with excellent resolution for tracking dynamic processes
- Comes with Bruker's exclusive PeakForce Tapping and Bruker's real force curve based QI mode for easy imaging
- DynAsyst for automatic adjustment and optimization of scan parameters in TappingMode™
- NestedScanner feature for fast tracing of high features
- Atomic resolution in closed-loop mode as a result of lowest scanner, position-sensor and detection-system noise level
- Unique integration with optical microscopy as a result of tip-scanning design and DirectOverlay 2 feature for most precise correlative microscopy
- Highest flexibility and upgradeability with a broad range of modes and accessories

2 System options

NanoWizard NanoOptics

1) with fiber port for fiber SNOM experiments
2) UV transparency for top-down illumination

The NanoWizard NanoOptics AFM head is optimized for a broad range of applications ranging from nanoscale optical imaging by aperture and scattering-type SNOM to experiments involving interactions of light with the sample such as absorption, excitation, nonlinear effects and quenching. (see NanoWizard NanoOptics brochure)

Key features

- Comprehensive solutions for AFM and Raman spectroscopy, Tip-Enhanced Raman Spectroscopy (TERS), Aperture SNOM and Scattering-type SNOM (sSNOM), Confocal microscopy, NanoManipulation in optical fields
- Compatible with most commercially available inverted research microscopes (Zeiss Axiovert and Axio Observer lines, Nikon TE and Ti lines, Olympus IX line and Leica DMI/DMi lines)
- Unique integration with optical microscopy thanks to tip and sample scanning design, DirectOverlay 2 mode, smart engineering
- Seamless integration with inverted microscopes, Raman spectrometers, photon counting systems
- 980 nm laser source for detection of cantilever deflection prevents cross talk with other wavelengths
- Wide range of operation modes and accessories such as Tuning Fork, STM, Conductive AFM, Fiber SNOM

NanoWizard PURE

combines functionality and performance in a high-value instrument.

Based on the renowned NanoWizard technology platform, it delivers high-resolution imaging and nanomechanical analysis capabilities that can be seamlessly combined with advanced optical microscopy techniques. (see NanoWizard PURE brochure)

Key features

- Tip-scanner technology for safe and easy operation in air, gases, and fluids
- Bruker's DirectOverlay 2 feature for perfect combination of AFM and optical microscopy
- Supports Bruker's exclusive PeakForce Tapping
- Outstanding flexibility with a broad range of modes and accessories for the characterization of mechanical, electrical, optical, magnetic and chemical sample properties, including state-of-the-art FluidFM cantilevers for cell injection and manipulation
- Can be easily upgraded to a full NanoWizard 4 XP AFM system

ForceRobot 400

The innovative force spectroscope with fully automated workflow. Collects 250,000 force curves per day while varying parameters such as temperature or loading rate.

(see ForceRobot 400 brochure)

Key features

- Fully automated force spectroscope with highest flexibility
- Cutting edge force spectroscopy and force mapping in combination with single molecule fluorescence
- Automated laser and detector alignment
- Automated cantilever drift compensation
- Advanced and dedicated software with ExperimentPlanner, RampDesigner and built-in data batch processing
- Compatible with the Vortis 2.1 and ForceRobot controller

CellHesion 300

The single cell force testing solution for cell adhesion and elasticity studies. Specialized platform for cell adhesion and cell mechanics measurements for samples ranging from single molecules to entire cells. (see CellHesion 300 brochure)

Key features

- Cantilever sensor lifting system with 100 µm +15 µm travel range with closed-loop control thanks to high-speed capacitive sensor feedback
- Integrates with advanced optical imaging (DIC, CLSM, TIRF, FRET...)
- Compatible with the Vortis 2.1 and CellHesion controller

NanoWizard® CellHesion® ForceRobot® NanoTracker

3 Software modules

PeakForce Tapping software module

Enables easy imaging without any expert knowledge

Key features

- Imaging mode with lowest interaction forces for the widest range of samples
- Lowest forces for preserving probe quality
- Easy to Use for brilliant results
- FAST version available with more than 5× faster imaging

PeakForce-QI

Enables force curves with constant loading rate

Key features

- Imaging mode based on PeakForce Tapping with linear Z motion
- For enhanced nanomechanical characterization of soft samples (requires PeakForce QNM)
- Takes advantage of fast scanner cantilever holder with height sensor
- Compatible with ScanAsyst

ScanAsyst/DynAsyst software modules

for automatic adjustment of scanning parameters

Key features

- Enables automatic adjustment and optimization of scan parameters

PeakForce QNM

for capturing force curves from PeakForce Tapping and PeakForce-QI

Key features

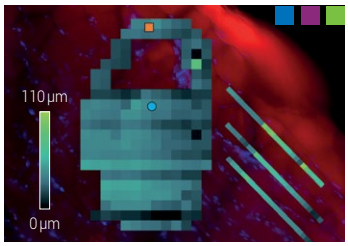
- Data analysis methods to extract nanomechanical properties
- Scripting capabilities for customized fit routines

SmartMapping

For advanced, user-defined freeform-shaped force maps

Key features

- Enables custom free-form map shapes
- The optimal range of force acquisition is evaluated and automatically adjusted by Z-motors
- Automatic subdivision of large regions if combined with motorized stage and HybridStage
- Definition of multiple maps or automated acquisition
- Automatic sensor adjustment if used with supported Heads



ExperimentPlanner

Allows customized experimental procedures, including control of external equipment

Key features

- Full access to imaging and force spectroscopy functions
- Control of fluidics, temperature, position (requires motorized stage), camera image acquisition etc.
- Convenient program editor with extensive online help and loading/saving of plans

QI Advanced software module

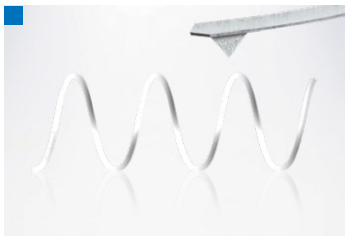
For NanoWizard systems; delivers quantitative mechanical properties

Key features

- Any kind of sample can be imaged: samples with steep edges, loosely attached samples, soft, sticky and brittle samples
- Works under ambient conditions and in fluid
- Quick to learn and easy to operate
- Provides additionally adhesion, stiffness and dissipation data while scanning
- Depending on application, it can also deliver electrical conductivity or molecular recognition in a single scan
- Contact Point Imaging (CPI) mode for extremely soft and inhomogeneous surfaces
- QI Advanced imaging mode for conductive measurements in combination with the JPK CAFM module

NanoWizard® CellHesion® ForceRobot® NanoTracker

3 Software modules



Advanced AC modes module

Software module for NanoWizard systems

Key features

- Comprehensive range of advanced dynamic feedback modes
- Phase Modulation (PM), Frequency Modulation (FM) or self-excitation FM
- Modes can be combined with Amplitude Gain Control (AGC) and Q-Control
- Higher harmonics with extra lock-in amplifier
- Requires cantilever holder with DirectDrive capability

DirectOverlay 2 module

Perfect integration of optical and AFM data; Bruker's proprietary and patented solution for perfect overlay of optical and AFM information

Key features

- Perfect overlay of optical and AFM data with sub-diffraction limit precision
- Direct "in optical image" selection of AFM measurements (imaging and force curves)
- Dramatic reduction of overview image scanning in AFM, giving faster results & lower tip contamination
- Optical image navigation to specific regions of interest, even without AFM scanning. This protects functionalized tips for molecular recognition, avoids tip passivation from image scanning before the force measurements.

DirectTiling software module

Provides a clear visual overview, allowing a fast setup of optically guided experiments.

Key features

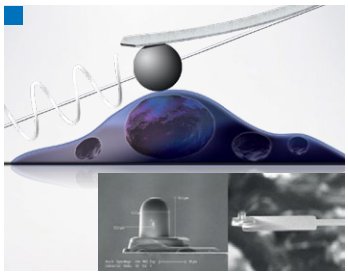
- Improved user-friendly workflow
- Large range tiling of optical images
- Allows easy navigation of extended scan-ranges
- Automated mapping of large sample areas
- Requires the DirectOverlay 2 software module
- Only compatible with Motorized Precision Stage or HybridStage

NanoLithography/NanoManipulation module

Software module for NanoWizard systems

Key features

- Moving objects or scratching the surface with controlled force
- Free hand, vector-based patterns possible
- Pattern creation by electrical current such as anodic oxidation

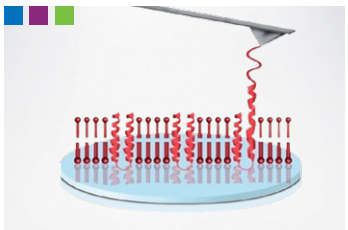


CellMech Package

For viscoelastic property measurements of gels, cells, and tissues

Key features

- Sine modulation measurements at defined frequencies can be freely combined with customized force curves or force mapping
- MicrorheologyAssistant for setting up modulation experiments with defined frequencies over large ranges (0.5-500 Hz)
- One-click calibration of sensitivity and spring constant for all kinds of cantilever
- Specifically designed probes with defined radii and pre-calibrated spring constant



Advanced Force Spectroscopy module

For advanced force measurement experiments ranging from single protein unfolding, and DNA stretching to probing of cells and tissue

Key features

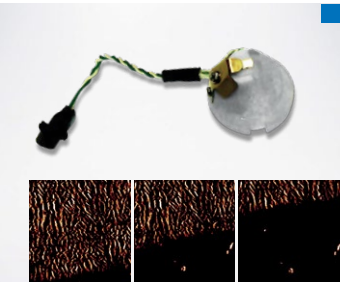
- Integrated RampDesigner for user-defined segmentation of force curves
- Advanced force clamp
- Tuneable frequency sweep from 0.1 to 10 kHz
- Setting of user-defined patterns for rheology applications

NanoWizard® CellHesion® ForceRobot® NanoTracker

4 Application modules and modes

Fast scanning package

Fast scanning option for NanoWizard V and NanoWizard 4 XP



Key features

- Scan speed up to 400 lines/second (NW V) and 300 lines/second (NW 4 XP)
- Includes PeakForce Tapping – FAST version
- Ultra stable JPK DirectDrive cantilever excitation for dynamic modes
- > 70 kHz z-scanner resonance frequency
- Software upgrade for fast scanning modes
- Fast data acquisition
- Includes NestedScanner feature for fast tracing of high features

HyperDrive imaging package

For highest resolution imaging of soft samples in air and liquid

Key features

- Designated cantilever holder with built-in oscillation excitation
- Works with standard intermittent-contact mode cantilevers
- Low dynamic forces (< 50 pN). Small oscillation amplitudes in water (< 1 nm) enable sub-nm resolution.
- HyperDrive operating software module
- HyperDrive starter kit includes 5 cantilevers
- Supports FM-AFM and self-excitation FM-AFM
- For aqueous solutions and temperatures up to 60 °C

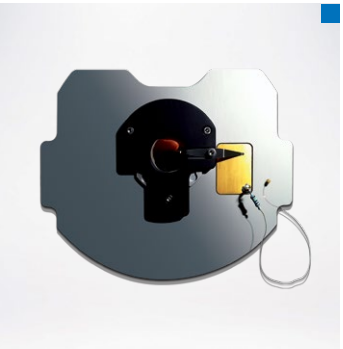
OEM micropipettes*

Bruker offers a micropipette system, e.g. CellTram® models from Eppendorf, together with NanoWizard or CellHesion systems.

*Optical microscope and NanoWizard head are not included

CoverslipHolder with electrical sample connection

For electrical measurements such as Conductive AFM or STM on a coverslip in combination with high NA optics



Key features

- For Life Science stage
- Compatible with Bruker modules like CAFM (also enclosed volume), STM, KPM, and PFM
- Bottom access for high numerical aperture optical imaging
- Sample size up to 25 × 25 mm and 0-1 mm thickness
- Includes two sample mounting frames:
  - Bolt-down frame with silicone seal for dry operation or aqueous solutions
  - Low profile frame for dry operation with improved optical accessibility and three contact clamps
- Electrical connection from sample topside

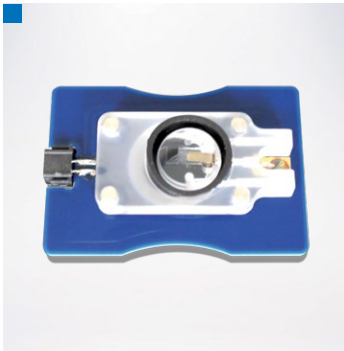
Kelvin Probe Microscopy (KPM) module

Option for nanoscale mapping of surface potential distribution

Key features

- Surface Potential Mapping
- Cantilever Holder with electrical tip connection included
- One-pass and two-pass operation possible
- Software interface

4 Application modules and modes



Kelvin Probe Microscopy (KPM) module – enclosed volume

For nanoscale mapping of surface potential distribution under controlled environmental conditions

Key features

- Surface Potential Mapping
- Cantilever Holder with electrical tip connection included
- One-pass and two-pass operation possible
- Software interface

Conductive AFM module

For high-performance conductivity experiments

Key features

- Tip-bias cantilever holder with integrated current amplifier circuit and automatic sample grounding
- Sample holder for conductive samples (optional transparent sample holder)
- Bias Voltage +/- 10 V
- Current Range: +/- 100 nA
- Gain: 100 V/µA
- Optimized cantilever exchange tool
- Software interface
- 10× Bruker SCM-PIT-V2 cantilever
- Compatible with all stages except Cryo- and StretchingStage

Conductive AFM module – enclosed volume

For high-performance conductivity experiments under controlled environmental conditions

Key features

- Tip-bias cantilever holder with integrated current amplifier circuit
- SmallCell-based, closed volume cell with < 140 µl volume and connections for perfusion/gas flow
- Bias Voltage +/- 10 V
- Current Range: +/- 100 nA
- Gain: 100 V/µA
- Sample holder for conductive samples (optional transparent sample holder)
- Optimized cantilever exchange tool
- Software interface
- Compatible with all stages except Cryo- and StretchingStage

Contact Resonance Module

Enables quantitative characterization of nanomechanical properties up to 300 GPa based on contact resonance imaging.

Key features

- Seamless integration with all life science stages
- Enables PLL-based imaging and resonance sweep-based force mapping
- Tailored software package for easy, step-by-step data acquisition and analysis
- Sample size up to 15 mm in diameter and 10 mm thick
- Includes:
  - Sample holder with integrated ultrasonic transducer
  - Test and reference samples
  - A set of probes with diamond-like carbon coating

4 Application modules and modes

Tunneling Current Conductive AFM (TC-CAFM) module

For low-conducting samples

Key features

- Tip-bias cantilever holder with integrated current amplifier circuit and automatic sample grounding
- Sample holder for conductive samples (optional transparent sample holder)
- Optimized cantilever exchange tool
- Bias Voltage +/-10V
- Current Range: +/-10nA
- Gain: 1000V/µA
- Noise limit 100fA RMS
- Software interface
- Compatible with all stages except Cryo- and StretchingStage

Tunneling Current Conductive AFM (TC-CAFM) module – enclosed volume

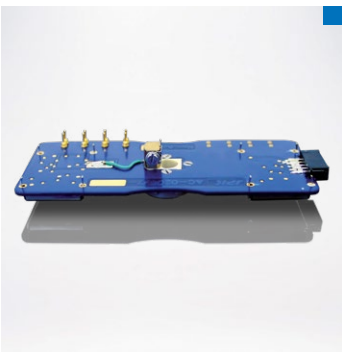
For low-conducting sample experiments under controlled environmental conditions

Key features

- Tip-bias cantilever holder with integrated current amplifier circuit
- SmallCell-based, based closed volume cell with <140µl volume and connections for perfusion/gas flow
- Sample holder for conductive samples (optional transparent sample holder)
- Optimized cantilever exchange tool
- Software interface
- Bias Voltage +/-10V
- Current Range: +/-10nA
- Gain: 1000V/µA
- Noise limit 100fA RMS
- Compatible with all stages except Cryo- and StretchingStage

Scanning Tunneling Microscopy (STM) module

Tip-bias wire holder with integrated current amplifier circuit and automatic sample grounding

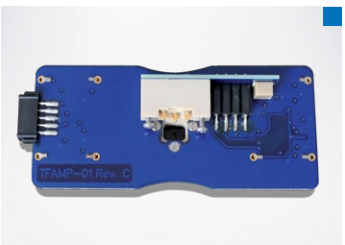


Key features

- Tip holder for 0.25mm or 0.5mm wire probes
- Sample holder for conductive samples (optional transparent sample holder)
- Optimized cantilever exchange tool
- Bias Voltage +/-10V
- Current Range: +/-100nA, +/-10nA
- Gain: 100V/µA
- Software interface
- Compatible with all stages except Cryo- and StretchingStage

Tuning Fork module

For tuning fork-based feedback modes e.g. fiber-SNOM or TERS

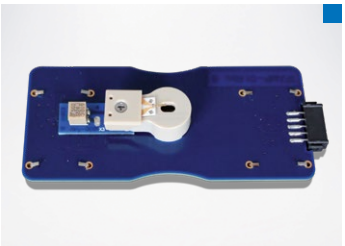


Key features

- Works with self-excitation or external mechanical dither
- Allows vertical (shear force) or horizontal mounting of tuning forks
- Includes two holder boards and two 40kHz tuning forks for customer self-assembly
- Software interface
- Improved mounting mechanism for holder boards

Akiyama Probe module

For TAO module, CellHesion module and HybridStage



Key features

- Software interface
- Designed to work with Akiyama-Probes
- Includes 2 Akiyama probes
- Requires Vortis 2 SPM Controller
- Allows imaging without AFM laser for light sensitive samples
- No alignment necessary, probes can be easily mounted

4 Application modules and modes

Optical focus tracking

For TAO module, CellHesion module and HybridStage

Key features

- Moves the microscope objective
- Synchronous or asynchronous focus tracking
- Spacers for rising stage and condenser
- Piezo range 100 µm (PIFOC® from Physik Instrumente (PI) GmbH & Co. KG) or 150 µm (SFS SlimFocus from nanoFaktur GmbH)

High Voltage Piezo Force Microscopy (with Amplifier)

For biasing a sample, e.g., in electro-optical experiments or in Piezoresponse Force Microscopy (PFM) and piezo hysteresis mapping

Key features

- Measurement of amplitude & phase of the response
- Voltage range +/-70 V, Bandwidth up to 100 kHz
- Max. current 75 mA
- Incl. Cantilever Holder with electrical tip connection
- Software interface, includes PFM mode

Low Voltage Piezo Force Microscopy

For biasing a sample to low voltages, e.g., in electro-optical experiments or in Piezoresponse Force Microscopy (PFM) and piezo hysteresis mapping

Key features

- Measurement of amplitude & phase of the response
- Voltage range +/-10 V, Bandwidth up to 100 kHz
- Max. current 2 mA
- Incl. Cantilever Holder with electrical tip connection
- Software interface, includes PFM mode

Scanning Thermal AFM from Bruker Anasys

For thermal conductivity experiments

Key features

- System includes software, power supply, controller, CAL box, bridge cable and five SThM probes
- Probes come pre-mounted for easy exchange and allow high resolution thermal imaging (<0.1 °C) and heating up to 160 °C

ForceWheel

For most sensitive experiment control, e.g. force fishing experiments

Key features

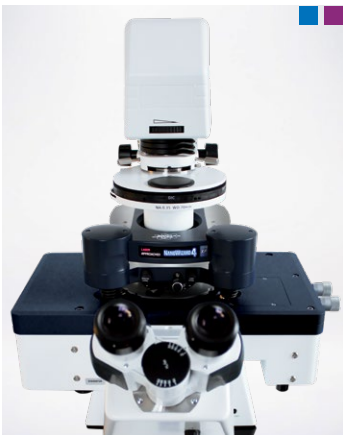
- Manual force curve acquisition
- Continuous setting of gains and setpoints
- Easy, controlled attachment of cells or beads to cantilever tip

Illustration similar

5 Sample stages

HybridStage*

Automated mapping of sample properties over a large range. For samples such as structured substrates, microspheres and cells



Key features

- Combined piezo and motorized stages for automated mapping or scanning of large areas
- Maps large objects such as cell scaffolds, printed 3D structures, micro-spheres or capsules and micro/nano structured surfaces over millimeter distances
- Cell/cell or cell/substrate adhesion in 3D with a large pulling range of up to 300 × 300 × 300 µm³
- Mechanical properties of plant cells, cell layers, cartilage, parasites, scaffolds, bones or tissue, typically with rough surfaces over a mm range
- Optional XY or XYZ piezo flexure scanners with a large travel range (depending on the application) can be implemented
- Automated and streamlined workflow with the motorized HybridStage

*Optical microscope and NanoWizard head are not included

StretchingStage*

For in-situ mechanical testing

Key features

- Stand-alone stage with integrated sample
- Stretching and compression capabilities
- Enables fine motion control for precise positioning of the AFM tip relative to the sample
- Sample size/distance between jaws 10-20 mm or 25-35 mm (standard stage)
- Maximum travel range: 10 mm
- Force range: exchangeable load-cells, range 2 N and 200 N, accuracy readout +/- 1 %
- Velocity: 0.1 mm/min to 1.5 mm/min
- Encoder: resolution 300 nm, linearity 0.1 % of full travel
- Flexible design for different samples
- Comprehensive software control
- Real-time display of force, extension and time, live graphical display of stress/strain curve
- Not compatible with inverted microscopes

*NanoWizard head is not included

StretchingStage for higher forces*

For in-situ mechanical testing with higher forces

Key features

- Stand alone stage with integrated sample stretching and compression capabilities
- Force range: 10 N and 5000 N (10000 N avail.) exchangeable load cells
- Velocity: 0.006 to 3 mm/min
- Maximum travel range: 40 mm for samples of 5 mm length between jaws (resolution 100nm)
- Not compatible with inverted microscopes
- Motor power: 20 W

*NanoWizard head is not included

Motorized precision stage

Offers automatic motion control for precise positioning of the sample relative to optical axis and AFM probe

Key features

- Transmission illumination capability for inverted optical microscopes like Olympus IX line, Zeiss Axio Observer/Axiovert 100/135/200, Nikon TE 2000 or Ti series, Leica DMI/DMi lines. Please specify model upon order.
- Travel range of the sample 20 × 20 mm²
- Step size (Resolution): ≤ 1 µm
- Repeatability (uni-directional): ≤ 2 µm
- Maximum velocity: 1 mm/s
- With joystick or software control
- For automated tiling or mapping applications
- Manual precision positioning of the AFM tip
- Stand alone use or for inverted optical microscopes
- Compatible with all Bruker add-ons, glass slides, Petri dishes etc.
- Compatible with NanoWizard, ForceRobot and CellHesion heads

5 Sample stages

Sample holder for large samples

Fits directly on to the manual or motorized precision stage

Key features

- The holder can accommodate larger samples such as microchips or wafers and is equipped with spring clips which can be varied

Manual precision stage

Offers sub-micron resolution & fine motion control for precise positioning of the AFM tip relative to optical axis and the sample

Key features

- Transmission illumination capability for inverted optical microscopes like Olympus IX line, Zeiss Axio Observer/Axiovert 100/135/200, Nikon TE 2000 or Ti series, Leica DMI/DMi lines. Please specify model upon order
- Travel range of the sample 20 × 20 mm²
- Precise positioning of the sample holder with thermally decoupled, magnetic fixation
- Flexible design for fluid cells, temperature control options, and customized sample holders
- Detachable from optical microscope for stand alone operation
- Drift compensated design
- Compatible with NanoWizard, ForceRobot and CellHesion heads

Precision mapping stage

For ForceRobot devices

Key features

- 20 × 20 mm² xy manual sample travel range
- 100 × 100 mm² xy piezo range for fast point-to-point movement
- Capacitive position sensors for highest accuracy
- Can be mounted on inverted optical microscopes for brightfield and epi fluorescence measurements

Stand-alone Stage for NanoWizard AFM

Offers fine motion control for precise positioning of the AFM tip relative to the sample

Key features

- Travel range of the AFM head (tip positioning) 10 × 10 mm²
- Stand alone use in combination with JPK TopViewOptics
- Magnetic sample holder
- Flexible design for fluid cells and different sample holders
- Rigid, chemical resistant surface
- Maximum flexibility for customized sample mounting

5 Sample stages

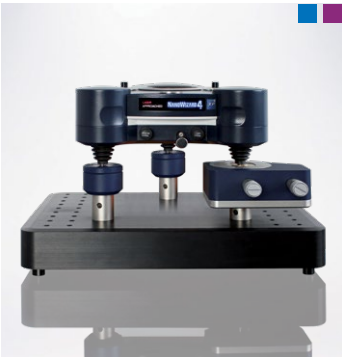
Head-up stage*

For accommodating tall samples and for additional free space around the sample

Key features

- For tall samples from 68 mm up to 140 mm in height (other sample heights on request)
- Flexible design for customized sample holder setups
- 6 mm holes in metric raster with 25 mm distance to mount accessories
- Rigid, chemical resistant surface
- Enables fine motion control for precise positioning of the AFM tip relative to optical axis and the sample
- Not compatible with inverted microscopes

*NanoWizard head is not included



TAO Tip Assisted Optics module

Specialized sample stage for advanced experiments combining AFM and optical spectroscopy based on proven NanoWizard technology. 2 axis and 3 axis version available.
(see TAO module product note)

Key features

- Ultimate platform for co-localized Raman, TERS, scatter type SNOM, and single molecule imaging/spectroscopy experiments
- NanoOptical studies such as quenching, field enhancement or bleaching
- Integrated, sample scanning, confocal imaging
- Integrates with conventional and advanced optical imaging (DIC, Phase contrast, CLSM, TIRF, FRET...)
- Flexible software system solution for experimental freedom and remote operation
- Ultimate flexibility as a result of simultaneous control of up to 6 scan axes with closed loop precision (linearized with capacitive sensors):
- Sample scanner:
  $100 \times 100 \times 10\,\mu m^3 / 100 \times 100\,\mu m^2$
- Compatible with the Vortis 2.1 Advanced controller

CellHesion module

As an add-on to the NanoWizard, the CellHesion module combines the capabilities of the BioAFM with precise adhesion force measurements and all optical microscopy features simultaneously.
(see CellHesion module product note)

Key features

- 100µm additional z-travel
- Perfect hardware linearization as a result of capacitive sensors
- Simultaneous focus tracking option
- Integrates with advanced optical imaging (DIC, Confocal microscopy, FRET...)

6 Cantilever holder options

Contact us for further specialized solutions.

Fixed-spring cantilever holder

Standard holder for all-round applications

Key features

- For air or aqueous solutions
- Compatible with JPK BioCell, CoverslipHolder or PetriDishHeater for easier navigation
- Robust design using glass and medical steel
- For measurements in fluid droplets or in fluid baths like Petri dishes or home made fluid cells
- Immersible to 8 mm fluid depth
- Easy to clean
- Easy handling even with gloves
- Included in starter kit
- Also available with electral tip connection: Electrical connection from AFM controller to cantilever

Cantilever holder with hinge clip

For easy probe mounting

Key features

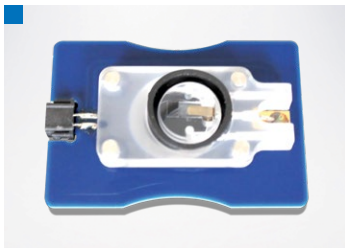
- Compatible with deep sample holders such as PetriDishHeater, BioCell and ECCell
- Compatible with biosamples and multi-compartment sample holders
- No capillary effect
- Autoclavable

TopView cantilever holder

For all-round applications with a large optical field of view

Key features

- Chemically inert cantilever holder
- Optimized for use with top-view optics
- Robust design using glass and medical steel spring only
- Immersible to 6 mm fluid depth
- Easy to clean with detergents, in an ultrasonic bath or by autoclaving
- Easy handling, even with gloves
- Measurements in droplets or in fluid baths like Petri dishes or home made fluid cells
- Works in air and liquid, including aggressive media



Cantilever holder with electrical tip connection – enclosed volume

For use under controlled environmental conditions with a s-shaped spring and an electrical tip connection

Key features

- SmallCell-based, closed volume cell with < 140 µl volume
- Connections for perfusion/gas flow
- Sample holder for conductive samples (optional transparent sample holder)
- Heating up to 70 °C only

SideView cantilever holder

For use in combination with inverted optical microscopes to observe the cantilever region from the side

Key features

- Super cut, fixed spring, length: 15.5 mm
- Cantilever holder with precise mounted mirror
- Allows both view from below and front of cantilever
- Visual observation of tip-sample region, e.g., for cell pick-up
- Compatible with aqueous solutions and epi-illumination
- Available numerical aperture: 0.3

Objectives with minimum 4 mm working distance required (20× recommended)

7 Environmental control options – fluid cells and temperature controls

Universal Temperature Controller

For operating temperature controlled add-ons

Key features

- Required for BioAFM heating and cooling addons
- Can be controlled via SPM software including scripting
- Compatible with all heating add-ons
- Adjustable temperature resolution 0.1 K

BioCell for coverslips with temperature control

For living cell and single molecule experiments with AFM and high-end optics

Key features

- Compatible with transmission illumination
- Cover slip bottom for high NA objectives (1 "/25 mm circular cover slips, 0.17 mm thickness)
- Easy sample exchange via quick lock mechanism
- Optimized stability for single molecule imaging and force measurements
- Connections for perfusion and gas supply
- 15 °C to 60 °C thermoelectric heating/cooling
- Soft sealing by silicone membrane
- Works in air or fluids for all AFM modes
- Full featured temperature controller
- Temperature stability 0.1 K

CoverslipHolder

Same design as the BioCell but without temperature control; ultimate high resolution liquid cell with coverslip bottom

Key features

- Fluid cell for Life Science stage
- Perfusion connection
- Cover slip bottom for high numerical aperture fluorescence imaging
- Rigid clamping for single molecule AFM resolution
- For 1 " circular cover slips

PetriDishHeater

For temperature controlled, living cell experiments with AFM and high-end optics

Key features

- Insert for Life Science stage
- Temperature range: Room temperature up to 60 °C
- Compatible with 35 × 10 mm Petri dishes from WPI and TPP (plastic or plastic with glass bottom)
- Adaptors for other suppliers such as Matek, Willco, IWAKI, Ibidi, and BC upon request
- Ports for perfusion tubes and gas supply (only available for certain types of Petri dishes)
- Silicone anti-evaporation seal
- Software control
- Temperature stability 0.1 K

PetriDishHeater for BioMAT

Shuttle stage with integrated Petri dish heater for BioMaterials workstation

Key features

- Temperature range: Room temperature up to 60 °C
- Compatible with 35 × 10 mm Petri dishes from WPI and TPP – plastic or plastic with glass bottom
- Dipping lenses need to be compatible with type of Petri dish
- Temperature stability 0.1 K
- Software control

7 Environmental control options – fluid cells and temperature controls

PetriDishHolder

Designed like the PetriDishHeater, but without temperature control; ultimate liquid cell for high resolution experiments in a Petri dish

Key features

- Insert for Life Science stage
- Compatible with 35 × 10 mm Petri dishes from WPI and TPP (plastic or plastic with glass bottom)
- Adaptors for other suppliers such as Matek, Willco, IWAKI, Ibidi, and BC upon request
- Ports for perfusion tubes and gas supply (only available for certain types of Petri dishes)
- Openings for immersion medium applications Silicone anti-evaporation seal

Active humidity control package with PetriDishHeater

Bruker offers an external OEM humidifier and sensor package together with the PetriDishHeater.

Key features

- Up to 75 % relative humidity (RH) at ambient temperature (lower RH required separate dry air support), column and tube heating allow RH up to 95 %
- External humidifier column with microfilter candle and heating rod
- Humidification controller incl. dry and wet air mixing device to control air and humidity sensor
- Humidification pre-chamber for PetriDishHeater and sets of tubings and adapters
- Sensor package (I2C) for measurement of temperature and humidity directly within the chamber

SmallCell closed liquid cell for harsh solvents

For smallest volume experiments in a hermetically sealed environment

Key features

- Compatible with transmission illumination
- Small volume (<140µl)
- Hermetically sealed
- BK7 glass and steel spring clip
- Perfusion possibility with inlet and outlet ports
- Easy to clean with solvents and ultrasonic bath
- Two springs and O-rings for aqueous solutions, acids, bases, and harsh solvents
- Independent Cantilever Holder

3-port small volume SmallCell

For smallest volume experiments in a hermetically sealed environment with aqueous solution exchange

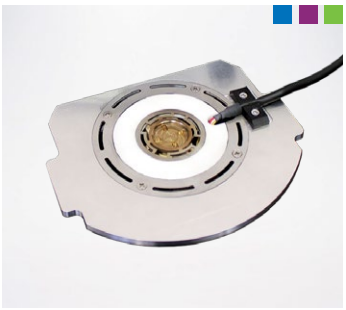
Key features

- Set of two cells
- For aqueous solutions
- Compatible with transmission illumination
- Ultra-small volume of <60µl
- Polycarbonate with silicone seal
- Perfusion possibility
- 2 Luer ports for buffer exchange
- 1 inlet port with septum for small amounts of substances or drugs
- Easy to clean in ultrasonic bath or with ethanol
- Cantilever fixation with designated glue
- Starter kit with tubing, syringe, syringe adaptors, and 2 seals

7 Environmental control options – fluid cells and temperature controls

High Temperature Heating Stage (HTHS)

High performance heating stage is designed for demanding polymer applications and for stable, long time temperature studies of single molecules or nanoparticles

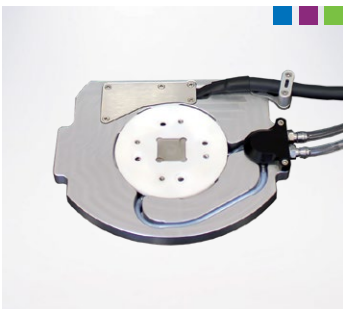


Key features

- Insert for Life Science stage
- Opaque samples
- Resistive heating ambient to 300°C
- 15mm diameter area size
- Full featured temperature controller
- Works in air and fluids for all AFM modes controlled by software (fluids up to 80°C)
- Fast settling time
- Temperature stability 0.1K

Heating Cooling Module (HCM)

Designed for heating and cooling experiments in gas or liquids with minimized drift in all dimensions



Key features

- Insert for life science stages
- Temperature control from -30 to 120°C
- Soft sealed cell with gas flow connection for dry or inert gas
- 15×15mm sample size, magnetic fixation
- Thermoelectric cooling/heating
- Closed circuit liquid cooling – a chilled reservoir is required for lowest temperatures (not supplied)
- Complete set of tubes and connectors including flow indicator

Heating Cooling Stage (HCS)

Designed for AFM experiments in air or liquids, from 0°C up to 100°C, with minimized drift in all dimensions

Key features

- 0°C to 100°C temperature range
- Stand-alone stage for opaque samples
- Thermo-electric temperature control
- Includes JPK SmallCell fluid cell
- 20mm×20mm maximum sample size
- Full featured temperature controller
- Works in air or fluids and all AFM modes
- Fast settling time
- Temperature stability 0.1K

Cryostage*

From -120°C to 220°C for low temperature applications

Key features

- Temperature range from -120°C up to 220°C, temperature stability +/-0.2°C
- Minimized vibration for high-resolution imaging of samples
- Sealed volume with gas flow connection for dry or inert gas over the complete temperature range
- Rapid cooling rate with liquid nitrogen (>10°C/min) and nitrogen environment to prevent ice formation while cooling
- Fine motion control for precise positioning of the AFM tip relative to the sample of 10×5mm
- Integrated Linkam Scientific Instruments technology
- Ergonomic LCD touch screen control
- Sample size: Up to 22mm×22mm
- For opaque samples, no transmission illumination
- Can be combined with electrical, magnetic, nanomechanical measurement modes

*NanoWizard head is not included

8 Electrochemistry solutions

Temperature controlled ECCell

For electrochemistry with temperature control and transmission optics such as phase contrast, DIC or fluorescence together with AFM; ideal for combined studies of temperature and potential-sensitive biomolecules

Key features

- Works with transparent or non-transparent substrates
- Accommodates standard coverslips, metal or silicon chips or other substrates
- Temperature range from ambient to 60 °C
- Max. 1350 µl liquid volume with perfusion capability
- Sealed design for inert gas filling
- Wire electrodes and miniature reference electrode. Suitable for conductive films or substrates (e.g., ITO coated glass)
- Compatible with common potentiostats
- Allows the use of high numerical aperture lenses for optimum fluorescence performance
- Unrestricted high resolution AFM imaging

Heating Cooling Stage (HCS) with electrochemistry cell

Designed for electrochemistry AFM experiments with controlled heating and cooling of the sample

Key features

- For opaque samples
- Temperature range from 0 °C to 100 °C
- Temperature resolution 0.1 °C
- Twin stage thermoelectric element
- Drift minimized in all directions for full temperature ramps simultaneous to AFM imaging
- Heat-pipe design – no water cooling or fan required
- Top-view optical access for easy navigation
- Max. 1350 µl liquid volume with perfusion capability
- Sealed design for inert gas filling
- Wire electrodes and miniature reference electrode

Scanning Electrochemical Microscopy (SECM) option

For scanning electrochemistry

Key features

- Previously unobtainable electrochemical information with < 100 nm spatial resolution
- Simultaneous electrochemical, electrical, and mechanical mapping in liquid
- Reliable, easy-to-use commercially available probes specifically designed for SECM
- Highest resolution SECM and atomic force microscopy performance with a NanoWizard AFM

9 Vibration and acoustic isolation

Acoustic enclosure table top version*

Approved for high performance applications:
Space saving acoustic hood for utmost stability and isolation

Key features

- 76 × 75 × 100 cm³ external dimensions
- Houses NanoWizard AFM with TopViewOptics
- Acoustic insulation for common laboratory noise conditions
- Provides space for active vibration isolation platforms like Accurion i4 or TS150
- Requires a solid table or base frame for setup suitable for AFM operation

*TopViewOptics, tablet and NanoWizard head are not included

Active vibration isolation from Accurion

Key features

- i4 Series – compact table-top vibration isolation unit
- Active Workstation 780 and 900 – active vibration isolation workstations

Acoustic enclosure, various versions

Approved for high performance applications:
Acoustic hood for utmost stability and isolation

Key features

- Standard: 1060 × 1060 × 1160 mm³ ext. dimensions
- Large: 1560 × 1065 × 1160 mm³ ext. dimension
- Extra-large: 1860 × 1060 × 1160 mm³ ext. dimensions
- Houses inverted optical microscope with NanoWizard AFM
- Foam acoustic insulation for common laboratory noise conditions (can also be obtained without foam at no extra charge. Suitable e.g. for washing down in a Biosafety environment)
- Provides space for active vibration isolation platforms like Accurion i4 or TS150
- Front section detachable for easier transport
- Standard and large versions also available with heating system

Base for acoustic enclosure

Approved for high performance applications:
Base frame with flat top surface designed for carrying Bruker's acoustic hoods

Key features

- Free standing support table
- Robust, welded steel construction
- Stable sandwich top-plate:
  - Standard: 113 cm × 113 cm
  - Large: 162 cm × 112 cm
  - Extra-large: 190 cm × 112 cm
- Stable base for Acoustic Enclosure
- Can accommodate active vibration isolation systems from Accurion or Table Stable

10 Optics accessories

TopViewOptics with granite base*

For stand-alone AFM configuration

Key features

- For opaque samples
- Long working distance zoom lens from Navitar™
- 2 mm-400 µm field of view
- Köhler illumination, fiber light illumination
- Color CCD camera
- Easy positioning and focus adjustment

*NanoWizard head and stage are not included

TopViewOptics with breadboard

For use with inverted optical microscopes or BioMAT

Key features

- For opaque samples
- Long working distance zoom lens from Navitar™
- 2 mm-400 µm field of view
- Köhler illumination, fiber light illumination
- Color CCD camera
- Easy positioning and focus adjustment

*Optical microscope, NanoWizard head and stage are not included

TopView optical module*

Optical system for viewing tip and sample during experiments on opaque samples

Key features

- Integrated camera with images captured directly into the AFM software
- Can be mounted on the AFM head while the head is mounted on the inverted fluorescence microscope as well as standalone
- Top-down view perpendicular to sample plane
- Magn. 10×
- Up to 5 MP, frame rate max 9 FPS
- Camera connection type USB 2.0

*NanoWizard head is not included

10 Optics accessories

BioMaterials Workstation BioMAT*

The specialist for investigations of opaque samples in life and material sciences.

(see BioMAT product note)

Key features

- For studies on non-transparent substrates or samples with AFM and optics
- Outstanding reproducibility of the focussed position (ROI) with both systems
- Unique capability to investigate the ROI precisely with optics and AFM
- Also perfect during operation in liquids
- Wide range of applications: Biochips, cell chips or patterned substrates for cell adhesion, plant cell applications, microbiology, tissue engineering, ...
- Flexible concept with shuttle stage
- Both techniques can even be operated in different laboratory rooms

*Optical microscope and NanoWizard head are not included

Upright Fluorescence Microscope (UFM) kit*

Enables the combined use of AFM and upright fluorescence zoom microscopy for co-localization experiments on opaque substrates

*Optical microscope, NanoWizard head and stage are not included

Fiber-coupled detection module

Allows the precise capture of light emitted by the SPM tip region into a fiber-coupled detector; suitable for home-built SNOM or other light emitting tip experiments

Key features

- Fiber coupler for 50µm core multi-mode optical fiber (FC connector)
- Fits to c-mount equipped inverted optical microscopes
- Precise manual xy positioning of the fiber end
- Built-in CCD-camera system for the alignment of emission spot to fiber center
- Three way optical switch for viewing sample, fiber end, and semi-transparent overlay

Inverted optical microscope configurations

Research lines of inverted optical microscopes from Zeiss, Olympus, Nikon, and Leica; ask the Bruker JPK BioAFM applications team for more information

Raman spectroscopy

Raman spectrometers from Princeton Instruments and Renishaw

Data communication kit

Allows communication and integration of advanced optical systems such as FLIM, Confocal, Superresolution, Raman

11 OEM solutions and small parts

JPK biocompatible glue

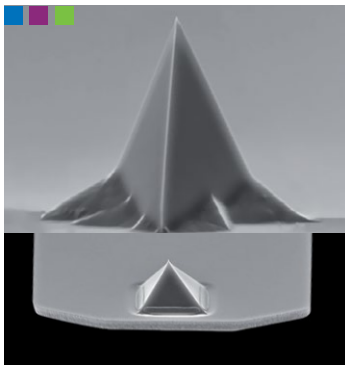
For cantilever or sample fixation, easily removable and biocompatible

- Included in starter kit

JPK spare parts

Available on request

- Springs for different cantilever holders
- Fluid cell seals
- Adapters
- Coverslips
- Tubing for fluid cells

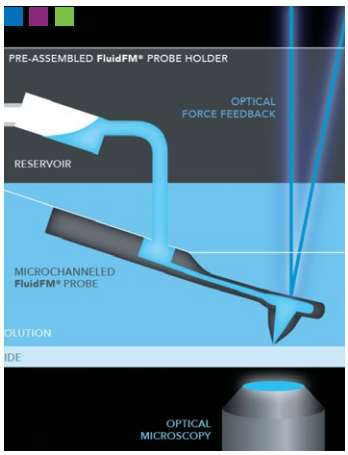


AFM probes

For all kind of applications and experimental needs

- Probes for standard applications (e.g., contact mode, AC mode)
- Super sharp probes for high resolution applications
- Probes for living cell/soft matter imaging
- Probes for force spectroscopy
- Probes for specialized applications (SECM, conductive, high aspect ratio, and many more)

Please visit our online store at brukerafmprobes.com for an overview.



FluidFM ADD-ON from Cytosurge

For advanced single cell, spectroscopy and nanomanipulation experiments

The FluidFM technology enables easy handling of liquid volumes at the femtoliter scale by providing a range of hollow cantilever designs. It enhances the capabilities of your system and opens up new fields of application such as:

- Single cell adhesion measurements with forces > 50 nN
- Single cell injection of targeted drugs or gene vectors
- Colloidal spectroscopy to directly measure interaction forces between colloidal particles and surfaces
- Enhanced nanomanipulation capabilities, and more
- All NanoWizard, CellHesion and ForceRobot platforms are compatible with the FluidFM ADD-ON from Cytosurge.
- It is available as
  - separate add-on (FluidFM ADD-ON Silver) or
  - fully integrated solution (FluidFM ADD-ON Gold and Platinum)

11 OEM solutions and small parts

QR Code Reader

Scans QR codes on cantilever packages

- Easy read-out of cantilever parameters.

CO_2 Controller

For living cell applications

Key features

- CO_2 control device for the generation of a defined CO_2 concentration
- CO_2 setpoint value from 0.0 Vol-% up to 20.0 Vol-%
- Resolution of the CO_2 display: 0.1 Vol-%
- Resolution of the internal CO_2 loop control: 0.01 Vol-%
- Humidification bottle (500 ml) is included, to compensate the strong drying effect
- Tubing and adapters are included
- External CO_2 support needed (CO_2 from e.g. gas cylinder is added to the ambient air)

OEM syringe pumps

Bruker offers offers syringe pumps from World Precision Instruments (WPI):

Aladdin AL-1000

- Accepts syringe sizes: 1-60mL
- Programmable, economical, versatile
- Single pump
- Up to 100 pumps can be daisy-chained together via RS232 network

Aladdin AL-4000

- Accepts two syringes: syringe sizes: 0.5 µL- 60 mL
- Programmable, economical, versatile
- Infuses and withdraws
- Pumping rates: 1.459mL/hr-127.2mL/min

CCD, EMCCD and CMOS cameras

The DirectOverlay 2 optical integration can be used with any camera.
The following cameras are preferred and can be offered directly:

Andor™ Technology

- iXon+ EMCCD
- Zyla sCMOS

Jenoptik cameras

- Gryphax USB 3.0 CMOS back-illuminated cameras, such as Arktur, Rigel, Kapella, Polaris

The Imaging Source

- USB 3.1 CMOS cameras DFK/DMK/DBK/ 37BU family

IDS Imaging Development Systems

- Compact USB CCD 1 and CMOS cameras of type µEye® and UI

1) Communication via Bruker data communication kit

11 OEM solutions and small parts

Photometrics
- Evolve™ EMCCD[1)]

Hamamatsu Photonics K.K.
- ORCA CMOS[1)]

PCO
- Panda family, sCMOS
- Edge family, sCMOS

Ximea
- CMOS USB 3.0 camera (MC031, MC023)

OEM incubators for Live Cell experiments under controlled environments
Bruker offers different incubator models for LIVE CELL applications together with NanoWizard or CellHesion systems.

OEM glove box systems for NanoWizard AFMs
The AFM system can be used in a glove box under controlled atmospheres.

1) Communication via Bruker data communication kit

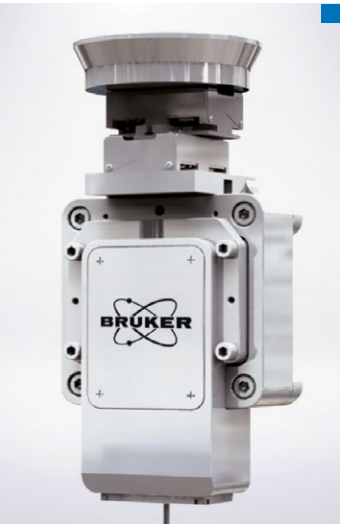
12 Indentation solutions

Bruker BioSoft in-situ indenter

For soft biomaterials mechanical characterization

- Seamless integration with inverted microscopes for maximum test flexibility
- Characterization of specimens ranging from sub-cellular to tissue levels
- In-situ observation during mechanical testing
- Access to physiological pressures from Pa to kPa
- Customizable probes
- Maximum Force: 10 mN
- Load Noise Floor: < 750 nN
- Normal Force Bit Resolution: 1 nN
- Maximum Displacement: 150 µm
- Displacement Noise Floor: < 1 nm
- Normal Displacement Bit Resolution: 0.006 nm
- Thermal Drift of Sensor: ≤ 0.05 nm/sec

*Optical microscope and NanoWizard head are not included



Bruker Online Probes Store

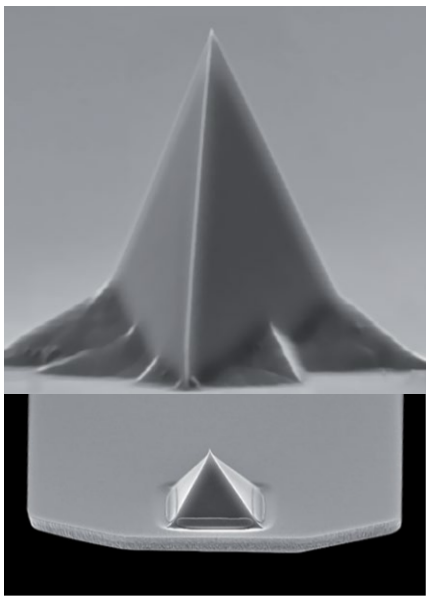
For all your application needs

No matter what your sample, application or environment, Bruker has the right probe for you.

Bruker is the only major AFM/SPM equipment manufacturer that also owns and operates an AFM Probes Nanofabrication Center. Find an extensive line of industry-standard and specialized probes:

- Probes for living cell/soft matter imaging and mechanobiology applications
- Performance probes for highest resolution imaging and materials property mapping
- Only supplier of Bruker's unique PeakForce Tapping probes
- Probes for specialized applications (SECM, conductive, high aspect ratio, and many more)
- Probes for standard applications (e.g., contact mode, AC mode)
- Value Line probes for budget-conscious AFM research

This handbook reflects a large variety of options and will continue to grow in the future with the latest developments. If you cannot find an accessory or operating mode in this handbook, please ask us directly. Bruker is able to deliver customized solutions even for advanced applications.



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