

APPLICATION

The intended use of the probe-station **SMARPROBE** is the positioning of probes to analyze or manipulate samples fixed onto its sample stage. The system can be used for atmospheric probing of large samples up to nano-probing of the latest semi-conductor technologies within an electron microscope. If the intended use is nano-probing it is recommended to choose the **SMARPROBE LX** with an active temperature control for low thermal drift (*L*) and/or with an extended scan range for vibration free fine-positioning (*X*). Typical applications of the **SMARPROBE** are:

- Electrical Characterization of Nano-Materials (i.e. *I-V*, *C-V* analysis)
- Failure Analysis via Electron Beam Induced Characterization Methods (i.e. EBAC and EBIC)
- Mechanical Manipulation of Nano-Materials
- Surface Analysis Experiments (with customized extensions)

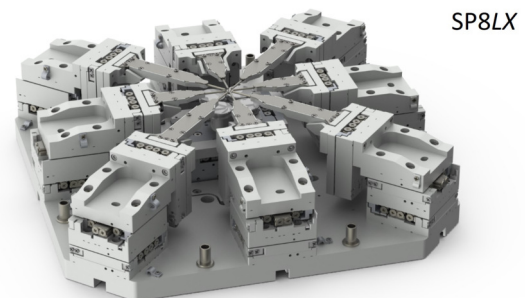
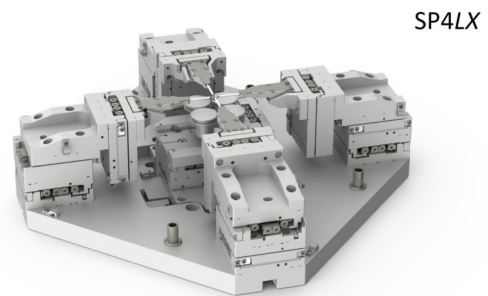
Together with partners we can offer complete nanoprobeing solutions, including SEM, necessary electronics and the **SMARPROBE** system. Please do not hesitate to contact us for further information.

Key Properties
Automation - Closed Loop Positioning
- Automatic Tip Landing
- Python Scripting
EBAC/EBIC: In-situ Current Amplifier
Probing Area: 25 mm x 25 mm
Scan Range: >10 μm
Stability: <1 nm/min Thermal Drift

SPECIFICATIONS

The **SMARPROBE** system is composed of the following elements, manipulators including probe holders, a sample stage, two vacuum feedthroughs, a rack for the control electronics and a graphical user interface (GUI). The **SMARPROBE** come in three different sizes, the SP4 with four, the SP6 with six and the SP8 with eight manipulators. You can choose the *L* and the *X* option for low drift and extended scan range of the manipulators. Further it is possible to change between the standard and the advanced probe holder or to fully customize the system.

All manipulators and control electronics of the **SMARPROBE** are based on the SmarAct GmbH standard products which guarantees highest production standards and continuous support.



General Specifications	
Operating Environment	HV (10 ⁻⁷ mbar), Ambient Conditions
Plasma Cleaning	Compatible
Numbers of Manipulators	Up to 8
Coarse Driving Principle	Piezo Stick-Slip
Fine Driving Principle	Piezo Scanner
Relative Drift between Probe and Sample	> 1, < 1 for L Extension
Max. Probing Area [mm]	25x25
Max. Sample Size ¹ [mm]	52x52
Min. SEM Working Distance [mm]	1 for 12x12 Samples
	2 for larger Samples
Base Materials	Aluminium
Dimensions Nanoprober, W x L x H [mm]	187 x 187 x 56 for 5-8 Manipulators (SP8)
	156 x 156 x 56 for 2-4 Manipulators (SP4)
Dimensions Rack for Electronics, W x L x H [mm]	600 x 1000 x 1400

Manipulator Properties	
Positioner Type ²	CLS-3232, X Extension: DLS-3232
Movement Range [mm]	X=21, Y=13, Z=13
Scan Range [μm]	> 3, X Extension : > 10
Closed-Loop Position Resolution [nm]	1
Max. Lift Force [N]	> 1.5

Sample Stage Properties	
Positioner Type ²	SLC-2430 and SLC-1720
Movement Range [mm]	3 DOF; X=16, Y=16, Z=12
Scan Range [μm]	> 3
Closed-Loop Position Resolution [nm]	1
Sample Mounting	Quick exchange of up to 4 SEM Stubs
Max. Lift Force [N]	> 1.5
Electrical Connection	Coaxial, Triaxial upon request
Heating/Cooling Option ³ [°C]	-20 to +100

Probe Properties	
Probe Mounting	Tip Holder is fully removable
Probe Needle diameter [μm]	250
Conductor Type	Coaxial, Triaxial upon request
Maximum Measurement Frequency [MHz]	100
Leakage Current at 10 V [pA]	< 1
Conductor Resistance [Ω]	1
Maximum Voltage [V]	210
Maximum Current [mA]	105

Vacuum Connector Properties	
Connector for Motion System	1-2x Zero Force Connector
Flange Size [mm]	130 x 150
Connector for Probe Signal Conductor	1 Push-Pull Connectors for each Manipulator
Flange Size [mm]	50 x 50

User Interface Properties	
Software requirements	Windows 10
Hardware Interface	USB or ethernet
Motion Control	Point+Click within SEM picture, CAD Navigation

Accessories	
Advanced Probe Holder	Automatic Tip Landing + Current Amplifier
Sample Surface Cleaning	Quick Removal of Carbons and Oxides
Sample Heating/Cooling	Passively Cooled Peltier Stage
Sample Surface Analysis	vacuum-compatible AFM
Triaxial Option	Reduced Leakage Current
Source Measurement Unit	Keithley 4200 with up to 8 SMUs

¹ Probing Area reduces to 12mm x 12mm when loading a 52mm x 52mm sample.

² For further details see specification sheet, available at SmarAct GmbH, for further information.

³ A passively (vibration-free) cooled peltier stage can be inserted onto the sample stage

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SmarAct Metrology GmbH & Co. KG develops sophisticated equipment to serve high accuracy positioning and metrology applications in research and industry within fields such as optics, semiconductors and life sciences. Our broad product portfolio – from miniaturized interferometers and optical encoders for displacement measurements to powerful electrical nanoprobers for the characterization of smallest semiconductor technology nodes – is completed by turnkey scanning microscopes which can be used in vacuum, cryogenic or other harsh environments.

We maintain the complete production in house for a high level of customization so that we can always provide you the optimal individual or OEM solution. We also offer feasibility studies, measurement services and comprehensive support to accompany you along your projects.

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