Robots for Microscopes

imina technologies

Nanoprobing SEM Solution Package

Intuitive *in situ* low current electrical measurements.
Characterize your nanoscale samples in the vacuum chamber of an electron microscope, at the time of their observation.

The Imina Technologies package PN15-4B-V is a unique solution for nanomanipulation and characterization of electrical devices and advanced materials at the nanometer scale.

The solution embeds four miBot™ —our famously easy-to-use and versatile piezoactuated micro robots— allowing you to independently position the probes over millimeter scale samples with a resolution down to the nanometer.

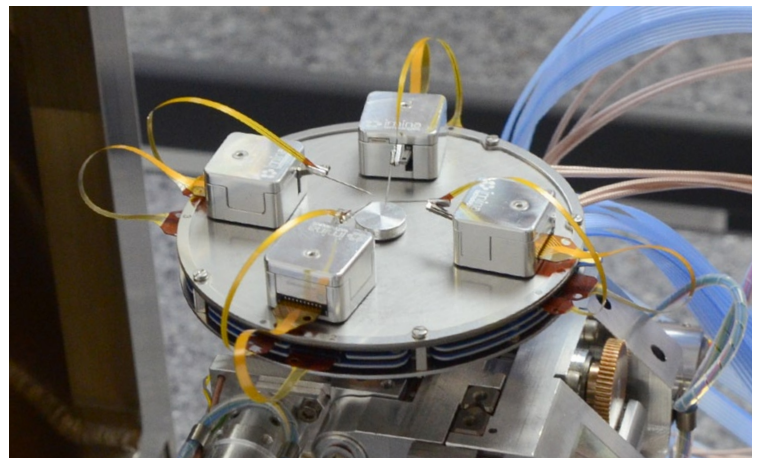
Specifically designed for low current measurements, leakage currents can be as low as 100 fA/V. Electrical characterization of nanostructures can be carried out with third party signal analyzers through the shielded cabling, featuring an excellent signal-to-noise ratio.

A set of adapters is provided with the package and enables to retrofit virtually any SEM, even those with a small chamber. In fact, with a diameter of 10 cm and a flat design, the circular robot platform gets directly mounted on the SEM sample translation stage. Installation and removal only take a few minutes and don't require to permanently modify the chamber of your microscope.

An aperture centered on the robot platform fits various types of SEM stubs, letting you observe the specimen just like you are used to.

- Four Point Probing
- I-V / C-V Measurements
- EBIC & EBAC Characterization
- Sample Preparation
- Nanohandling

- Transistors
- Via Chains
- Die or Open Packages
- MEMS / NEMS
- 2D Materials Devices
- Nanowires & CNT



Benefits

- **Faster experiments.** Observe, prepare and characterize your samples at once.
- **Versatile and precise instruments.** Electrical measurements and mechanical manipulation at the nanometer scale.
- **Hassle-free probe positioning.** Instantly adjust the orientation to any sample geometries.
- **High mechanical stability.** Move without vibration and maintain steady electrical contacts.
- **Extend the capabilities of your SEM.** Retrofit even small chambers without permanent modifications.

swiss design and engineering

Technical Specifications

Nanoprobing SEM Solution	
Number of probes	4 (PN15-4B-V) or 2 (PN15-2B-V)
Dimensions & weight	Height: 37.1 mm * Width (without cables): 100 mm (4”) Weight: 260 g * *For a nanoprobing stage and 4 probers with coaxial cabling.* ** Dimension and geometry of interface parts may vary depending of the SEM configuration*
Sample size and holder	Optimized for a sample with a surface area of approx. 80 mm² (e.g. circular shape with Ø 25.4 mm (1”)). Compatible with various SEM stubs (e.g. Ø 18 mm with pin Ø 3.2 mm and length 6 mm)
Compatible SEMs	Majority of EM chambers from Zeiss, FEI, Hitachi, JEOL, Tescan, ...
User interface	Computer software application (Microsoft® Windows) and control pad

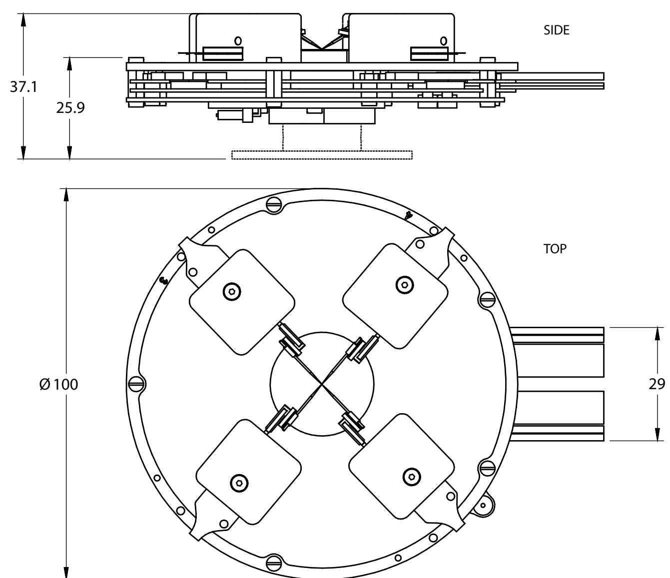
Probers (miBot™ BT-14-VP)	
Degrees of freedom	4 independently driven (X,Y,R,Z) per probe
Motion range	*Stepping (XY,R,Z):* 20 x 20 mm², ± 180°, 42° *Scanning (X,Y,Z):* 440 x 250 x 780 nm³
Max. positioning resolution	*Stepping:* 50 nm (X, Y), 120 nm (Z) *Scanning:* 1.5 nm (X, Y), 3.5 nm (Z)
Connection type	4 coaxial (CAMAC) or triaxial* (BNC) connectors on the SEM flange ** with triaxial cabling option*
Probe tips	Compatible with a wide range of probes tips with 0.51 mm (0.020”) shank diameter and various tip radii (5 nm - 10 um), materials, and lengths.

All technical specifications are approximate values.

Electrical Probing	
Voltage range	± 100 V
Current range	100 fA* – 100 mA ** with triaxial cabling option*
Bandwidth	25 MHz
Resistance	approx. 3.5 Ω *From probe tip to flange connectors*

Operating conditions	
Lowest Pressure	10^{-7} mbar
Temperature Range	273 K to 353 K

Options	
Cabling and connectors	Triaxial



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