

*Make your contribution  
to the nanotechnology  
revolution*

- *Ultra-high resolution characterization at high and low voltage in high vacuum: 1.6 nm @ 1 kV*
- *Beam deceleration mode with sub-100 V and high surface sensitivity imaging*
- *Superb low and very low kV backscattered electron imaging for compositional characterization in high and low vacuum*
- *Novel high stability Schottky field emission gun enabling a beam current up to 100 nA for superb analysis*
- *150 x 150 mm high precision and stability piezo stage*
- *World's only true high resolution low vacuum FESEM, with a resolution of 1.8 nm @ 3 kV*
- *The ultimate characterization solution for charging and/or contaminating nano-materials or –devices*
- *Full prototyping solution with on-board 4 k x 4 k digital pattern generator, dedicated patterning software, fast beam blanker and gas chemistries*

## **Nova™ NanoSEM 630**

**The most versatile ultra-high resolution FESEM combining very low kV imaging and analytical capabilities with unique low vacuum performance to meet your most demanding nanoscale characterization requirements**

Three years after the successful introduction of the Nova™ NanoSEM, FEI introduces the Nova NanoSEM 30 series, a family of ultra-high resolution field-emission SEMs which is specifically configured to get the most information out of the largest selection of samples, down to the nanometer level. The Nova NanoSEM 630 dramatically expands the capabilities of its predecessor in the low and very low kV characterization as well as its analytical capabilities: access to sub-100 V imaging with high surface sensitivity, superb low kV BSE and faster analysis are now possible.

Featuring advanced optics that include a 2-mode final lens (immersion and field-free), SE/BSE in-lens detection and beam deceleration technologies, the Nova NanoSEM 630 is a complete solution for ultra-high resolution characterization at high and low voltage in high vacuum. This is efficiently complemented by the Nova NanoSEM 630's unique low vacuum characterization capabilities: thanks to its Helix™ technology, ultra-high resolution is achieved even on non-conductive nano-materials and/or devices. Using low vacuum and Helix, electron-beam induced contamination resulting from previous sample processing steps is efficiently suppressed.

The Nova NanoSEM 630 also offers the most extensive set of tools for nanoprototyping, including an on-board digital pattern generator and dedicated patterning software, a high speed electrostatic beam blanker, gas injection systems for direct electron beam writing of nanostructures and its high stability 150 mm piezo stage.

Spectacular results have been obtained on a variety of challenging nanotechnology materials such as metals, magnetic materials, nano-particles and powders, nano-tubes and -wires, porous materials (e.g. silicon), plastic Electronics, glass substrates, organic materials, diamond films, cross-sections etc.

Add nanoanalysis capabilities such as EDS or STEM, and you will get with Nova NanoSEM 630 a powerful solution for the most demanding characterization needs at the nanoscale.

## Essential specifications

### Electron optics

- High resolution field emission-SEM column, with:
  - monopole magnetic immersion final lens
  - 60 degree objective lens geometry
  - heated objective apertures
  - through-the-lens differential pumping
  - beam deceleration
  - high stability Schottky field emission gun
- Source lifetime 12 months guaranteed
- Resolution @ optimum WD (high vacuum)
  - 1.0 nm at 15 kV (TLD-SE)
  - 1.6 nm at 1 kV (TLD-SE)
  - 0.8 nm at 30 kV (STEM)
- Resolution @ optimum WD (low vacuum)
  - 1.5 nm at 10 kV (Helix detector)
  - 1.8 nm at 3 kV (Helix detector)
- Beam landing energy: 50 V - 30 kV
- Probe current: 0.6 pA - 100 nA continuously adjustable
- Max. horizontal field width: 4.0 mm at 5 mm WD (corresponds to 35 x minimum magnification in quad view)

### Detectors

- In-lens SE detector (TLD-SE)\*
- In-lens BSE detector (TLD-BSE)\*
- Everhardt-Thornley SED\*
- Low vacuum SED (LVD)\*
- IR-CCD\*
- UHR low vacuum SED (Helix detector)
- TV-rate solid-state BSED
- High sensitivity low kV SS-BSED
- TV-rate low vacuum solid-state BSED (GAD)
- STEM detector

\* standard

### Vacuum system

- Complete oil free vacuum system
- 1 x 220 l/s TMP
- 1 x PVP-scroll
- 2 x IGP
- Chamber vacuum (high vacuum) < 1 e - 4 mBar
- Chamber vacuum (low vacuum) < 2 mBar
- Evacuation time (high vacuum) < 3.5 minutes

**Chamber**

- 379 mm left to right
- 5 mm analytical WD
- 21 ports
- EDX take-off angle: 35 deg

**5-axes motorized stage**

- Eucentric goniometer stage
- X = 150 mm
- Y = 150 mm
- Z = 10 mm
- Clearance: max. 55 mm to eucentric point
- T = -10° - + 60°
- R = n x 360°
- Minimum step XY: 100 nm
- Repeatability @ 0° tilt: 1 µm

**• System control**

- 32-bit graphical user interface with Windows® XP, keyboard, optical mouse, multifunctional control panel (optional) and joystick (optional)
  - Image display: 1 x 19-inch LCD (2<sup>nd</sup> optional), SVGA 1280 x 1024

**Standard utilities**

- Support computer
- Scripting interface for automation purposes

**Digital image / patterning processor**

- Dwell: 50 ns - 1 ms
- 11 presets + photo + snapshot
- Up to 3584 x 3094 pixel resolution-imaging
- Up to 4000 x 4000 pixel resolution-patterning
- File type: TIFF (8 or 16 bit), BMP or JPEG
- Single frame or 4-quadrant image display
- 4 quadrants live
- 256 frame average or integration

**Documentation**

- Operating instructions handbook
- On-line help

**System options**

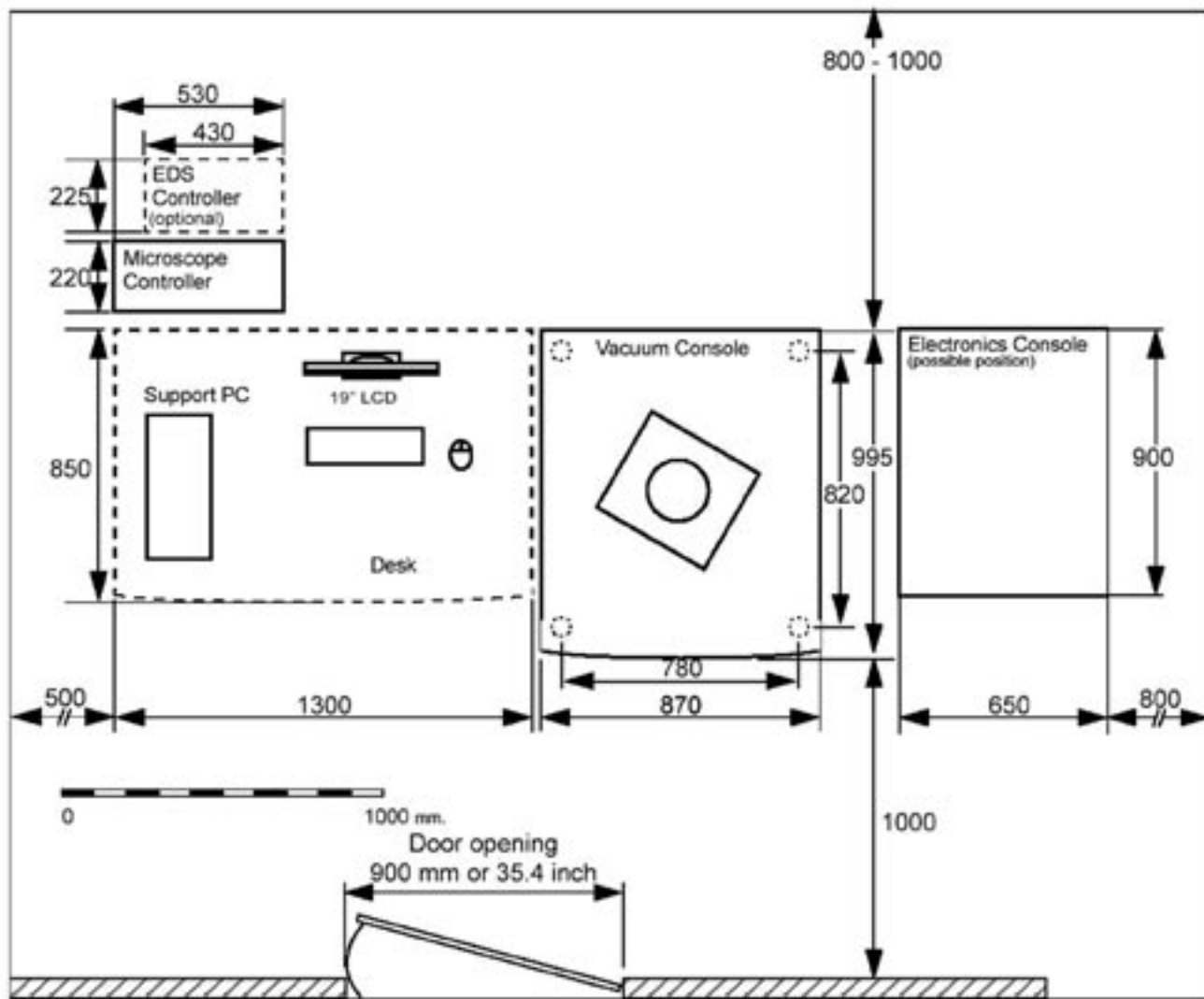
- High speed electrostatic beam blanker (50 Mhz)
- Gas chemistries + injectors
- Patterning generation software
- Specimen holder kit

**Common 3<sup>rd</sup> party accessories**

- EDS
- Nanomanipulators
- Lithography systems
- CAD navigation
- Electrical probing

**Installation requirements**

- Power: voltage 230 V (-6%, +10%), frequency: 50 or 60 Hz (+/- 1%), consumption: < 3.0 kVA for basic microscope
- Environment: temperature 20 °C ± 3 °C, relative humidity below 80% RH, stray AC magnetic fields < 100 nT a-synchronous, < 300 nT synchronous
- Door width: 90 cm
- Weight: column console 540 kg
- Compressed air 4 - 6 bar - clean, dry and oil-free
- System chiller
- Acoustics: < 60 dBC



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TÜV Certification for design, manufacture, installation and support of focused ion- and electron-beam microscopes for the NanoElectronics, NanoBiology, NanoResearch and Industry markets.