



ESEM™ Vacuum Mode for Versa 3D™

ESEM vacuum mode extends the range of low vacuum operation in low vacuum-equipped system

ESEM™ mode provides an extended vacuum range for extra challenging samples which include soft materials, highly porous samples and samples that outgas heavily. For these sample types, the high flow rate of water vapor can help mitigate contamination or imaging instability from the liberated volatile components. Additionally, samples that change state in high vacuum can be more easily protected with a less stringent vacuum, especially when combined with temperature control such as cooling. Cooling reduces volatility in combination with low vacuum. The ESEM option enables the possibility to add the FEI dynamic stages for cooling a thin or a bulk sample with the WetSTEM™ or Peltier cooled stage options. For inducing changes, stages supporting heating to 1000°C or 1500°C are also available for small quantities of bulk samples.

ESEM support of water vapor environment and thermal control during electron imaging enables many in situ dynamic experiments, such as wetting; hydration/dehydration cycling; colloidal crystallization; melting/solidification; film formation and generic liquid-liquid, liquid-solid type interactions. Experimental progress can be captured with the integrated recording options for direct AVI and/or user-defined sequential image saving. Subsequent movie creation from an image series is supported with the FEI Movie Creator Software. This software allows selection of displayed image data, frame selection (inclusion/omission) and display frame rate to customize movies for different purposes (e.g. scientific review or explanatory demonstration).

The ESEM vacuum mode extends the versatility of your Versa 3D system for dynamic experimentation and difficult sample handling.

Key Benefits

- Adds an extended vacuum range to support natural state observation of many samples that are not high vacuum compatible
- Supports use of auxiliary gases (other than water vapor) for electron imaging
- Enables addition of optional FEI dynamic stages (hot and cold)
- Includes the gaseous secondary electron detector (GSED) for optimum imaging in low vacuum

Technical highlights

- Integrated vacuum mode switching and vacuum control via the user interface
- Includes differential through-the-lens pumping support for very low vacuum
- Enables *in situ* experimental hardware and software options to be integrated to the Versa 3D

Chamber vacuum

- ESEM-vacuum: 10 to 4000 Pa
- High vacuum and low vacuum modes unchanged
- Auxiliary gas input available for approved gasses

Detectors

- Standard included the 500 µm aperture GSED (gaseous secondary electron detector)
- Optional ESEM GAD can be ordered to support higher temperature imaging with the needle GSED in addition to the beam-protecting functionality provided by the integrated x-ray cone that improves both analysis and low voltage imaging performance in low vacuum
- Support for optional hot stage detector (delivered as part of hot stage option)

Installation requirements

- ESEM upgrade requires the Versa 3D low vacuum base configuration
- High vacuum only versions cannot be upgraded to ESEM
- For FEI dynamic stages the hot-cold control kit is required as is the appropriate feedthrough, chiller unit and selected dynamic stage (all configured and sold separately)
- ESEM and low vacuum modes are for use with the electron beam and will not allow imaging or milling with the ion beam in low vacuum or ESEM vacuum

The ESEM mode allows addition of FEI options such as:

- WetSTEM™
- Peltier cooled stage
- 1000°C or 1500°C hot stage



Optional Peltier Cooling Stage for bulk sample cooling.



Optional WetSTEM™ cooling stage for bulk samples (like the Peltier cooling stage) and thin or electron beam transparent samples.



Optional 1000°C Heating Stage for heating bulk samples.



Optional 1500°C Heating Stage for heating bulk samples.

Learn more at FEI.com

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TÜV Certification for design, manufacture, installation and support of focused ion- and electron-beam microscopes for the Electronics, Life Sciences, Research and Natural Resources markets.

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