

Talos 12 TEM

Multidisciplinary 120 kV transmission electron microscopy built to fit your needs

Proven 120 kV TEM performance

The Thermo Scientific™ Talos™ 12 Transmission Electron Microscope (TEM) is an accessible 120 kV instrument with exceptional performance and user-friendliness, designed for a diverse range of scientific imaging and experimentation needs. The Talos 12 TEM features a reduced footprint (compared to previous generations of Talos TEM) with a robust enclosure and systems to improve accessibility, bringing industry-leading performance and automation to more researchers and laboratories.

The Talos 12 TEM enables high-quality imaging thanks to a constant-power objective lens for high optical stability, along with a 16-megapixel Thermo Scientific Ceta™ CMOS Camera and our latest generation STEM detectors. These integrated and embedded detectors provide significant hardware stability and accelerated automation for an optimized and seamless user experience.

A robust, oil-free vacuum system with a large ion getter pump (IGP) helps to ensure contamination-free operation and enables fast sample exchanges via a standard side-entry mechanism. The instrument's long-duration dewar keeps the system cool for up to 96 hours, facilitating longer data acquisitions without user intervention.

The Talos 12 TEM offers automation for column alignments and data collection. This translates to exceptional ease of use, remote and local operational flexibility, increased productivity, and maximized instrument uptime, all of which are crucial for efficient 2D imaging and 3D tomography experiments.

Versatility for multidisciplinary users and core resource managers

The Talos 12 TEM is a powerful TEM and STEM solution for both 2D and 3D applications, suitable for multidisciplinary research settings. It can be configured as a conventional system for routine TEM imaging of cells and tissues, as an expanded system for sample characterization by different STEM and energy-dispersive X-ray spectroscopy (EDS) detectors, or as an

Key features

Proven and versatile (S)TEM with an adaptable system utilizing a LaB₆ or tungsten thermionic source, the Talos 12 TEM can be configured for TEM and STEM imaging, as well as cryogenic applications.

Highly stable, robust enclosure with improved user accessibility features.

Exceptional imaging quality delivered by an optically stable constant-power objective lens system, combined with integrated high-sensitivity and large-field-of-view detectors with fast electronics.

Excellent ease of use facilitated by auto functions and alignments. Application workflows for users of all skill levels.

Remote operation enabled by digitally controlled hardware components and integrated software applications.

Extended, unattended data collection enabled by automated batch acquisition workflows.



entry-level cryo-electron microscopy (cryo-EM) imaging platform. Its modular design helps meet the diverse needs of research labs and core facilities.

User-friendly software supports multiple user accounts with varying access rights to microscope functions and saved data, managed through standard Microsoft Windows settings. TEM software enables quick switching between TEM and STEM modes, adjustment of optical and detector settings, and tuning of the applied acceleration voltage. The user interface allows these settings to be saved for various operational conditions across different applications, which is crucial for defining image contrast and resolution.

Routine microscope alignments are simplified with user-guiding functions and are automated for convenience, helping to ensure optimized and stable imaging conditions for users of any experience level.

A high level of automation and complete digital control over multiple microscope components (including the electron gun, optical elements, motorized apertures, vacuum system, stage, and detectors) facilitate remote control for even more flexibility and operational convenience.

The SmartCam digital search-and-view camera simplifies interactive sample examination, conveniently displaying the data on a computer screen without the need for low-light conditions. The constant-power objective lens can perform fast magnification changes without hysteresis, allowing users to zoom in on identified regions of interest. Individual TEM or STEM images can be recorded using the intuitive user interface of Thermo Scientific Velox™ Software, providing image rotation and post-processing functions, such as image filtering and drift-corrected frame integration.

Thermo Fisher Scientific continues to develop and maintain application software packages (i.e., Velox, Maps 3, Tomography 5, and EPU Software) to provide the Talos 12 TEM with streamlined workflows for routine 2D imaging, large-area multi-scale imaging, tomography, and single particle analysis, while also facilitating the integration of data from other Thermo Scientific systems. These software packages guide stepwise workflows to set up critical data collection parameters, ensuring fast and successful imaging for all users, regardless of their experience level.

Accelerated imaging workflows

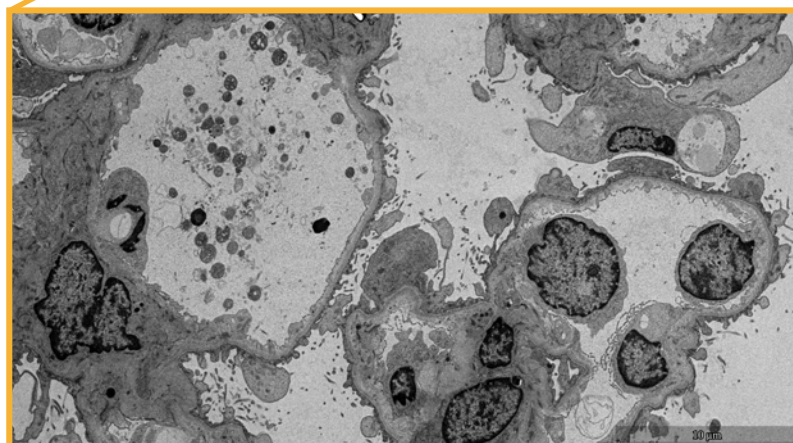
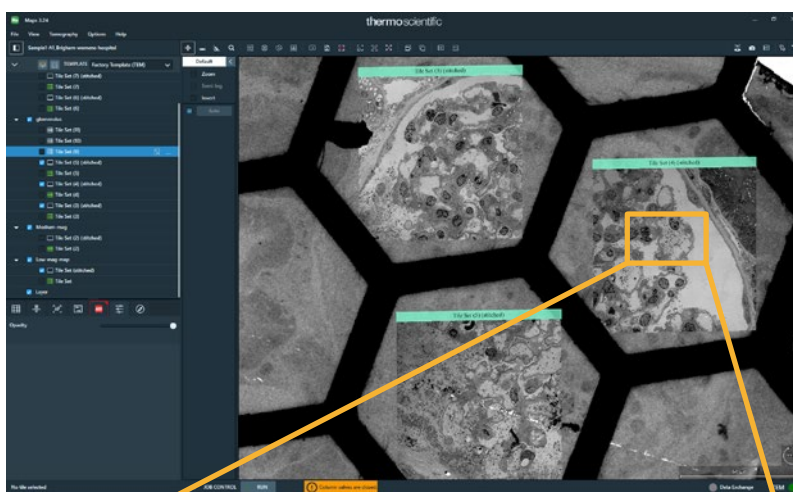
Large-area cell and tissue imaging for the life sciences and pathology with streamlined workflows for large-area multi-scale imaging of multiple ROIs, integrated with data annotation and storage for offline viewing and remote collaboration.

Enabling structural biology research, from negative stain imaging for structural analysis to biochemical optimization and data collection for cryo-EM single particle analysis.

Cryo-EM imaging with minimal ice growth and transmission loss thanks to a unique automatic cryo-box. Access to long data collection sessions for single particle analysis or tomography greatly shorten the overall time to structure.

Accelerated nanoparticle characterization of drug delivery vectors, optimized by high-throughput cryogenic acquisition strategies and AI-powered segmentation and critical quality attribute (CQA) analysis with Thermo Scientific Amira™ Software.

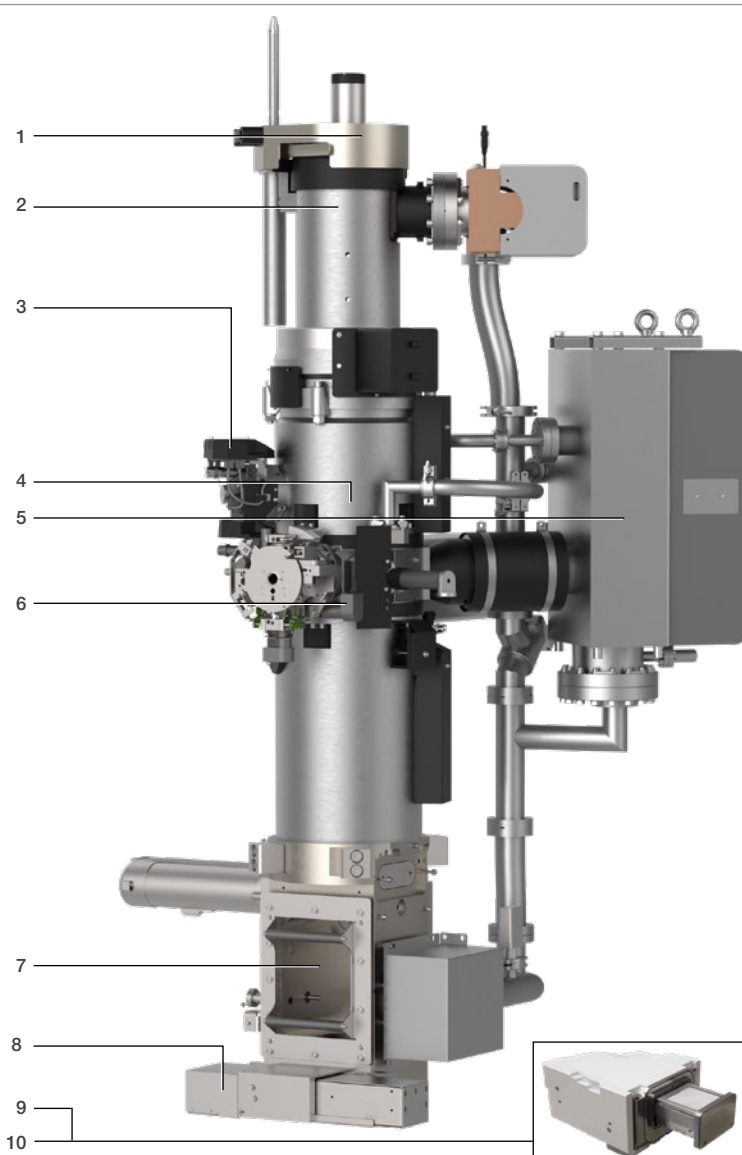
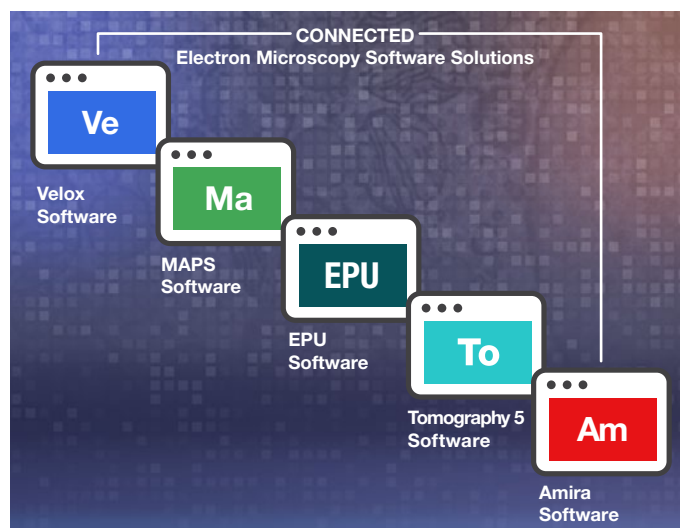
Automated imaging for advanced applications with tomography, correlative light and electron microscopy (CLEM), and elemental analysis/mapping using optional EDS.



Right: Large area imaging of resin-embedded kidney tissue sample. Maps 3 software enables batch acquisition of multiple tiles for multi-scale imaging. Zoom in to identify regions of interest—such as glomerular basement membrane (GBM)—for further analysis. Sample courtesy of Department of Renal Pathology, Brigham and Women's Hospital, USA

Thermo Scientific Connected Electron Microscopy Software Solutions

- Velox Software: intuitive TEM and STEM imaging with image processing functions
- Dedicated software packages for streamlined application workflows:
 - Maps 3 Software for unattended, batch acquisition of multiple tile sets
 - EPU Software for cryo-EM single particle analysis automated data acquisition
 - Tomography 5 Software for 3D acquisition and visualization of structures at nanometer resolution
 - Amira Software featuring AI-based segmentation and analysis for 3D tomography and 2D nanoparticle characterization
- Operates via a Microsoft Windows 11 workstation

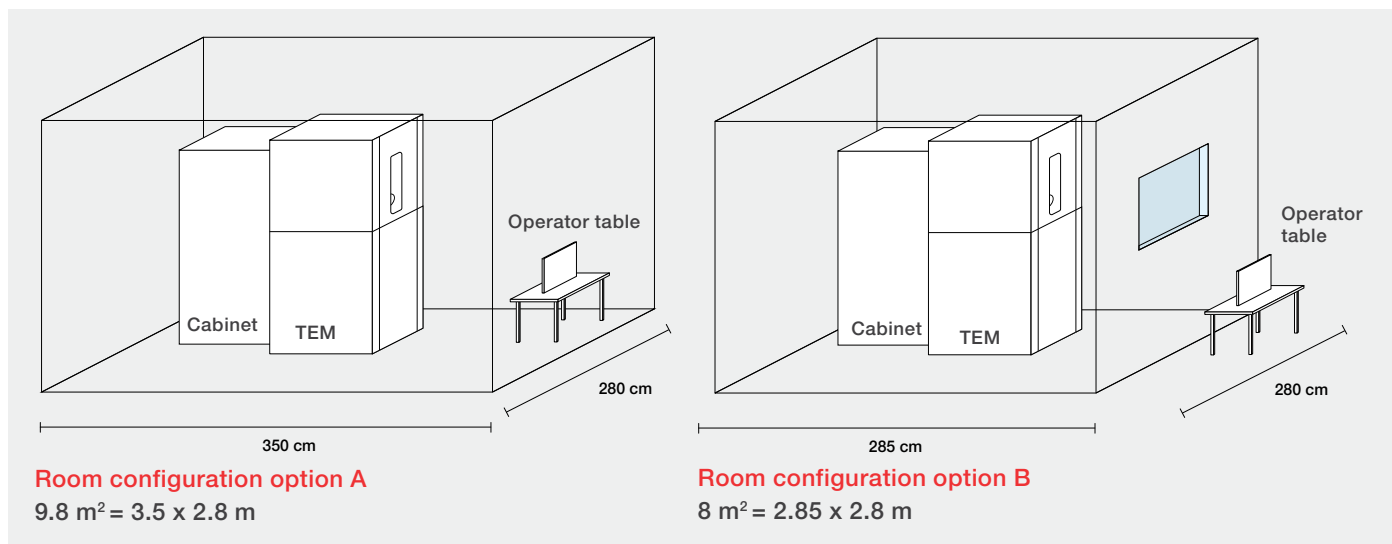


1 LaB₆ or tungsten electron source: High brightness and stability **2 Tunable electron accelerator:** Precise control over energy levels **3 Motorized apertures:** Fast switching, digital control for remote operation **4 Constant power objective lens:** Stable optical conditions **5 Large ion getter pump:** Robust vacuum and fast sample exchanges **6 Auto-retractable cryo-box:** Minimal ice growth and transmission loss **7 SmartCam Camera:** Simple sample navigation and remote control **8 BF/DF STEM detectors:** High-quality brightfield and darkfield imaging **9 Ceta CMOS Cameras:** Large field of view, fast readout speeds **10 Falcon C Direct Electron Detector:** For 100 kV cryo-EM

Unique features and technical highlights

- Thermionic electron source (LaB₆ or tungsten filament)
- Continuously adjustable acceleration voltage within 20–120 kV
- Constant-power objective C-Twin lens for superior beam stability and rapid magnification changes
- Robust system enclosure for high system stability
 - Reduced system footprint
 - LED lighting for operational guidance
 - Transfer deck to support holders and tools
- Digital search-and-view camera for interactive examination of samples in ambient lighting
- Full integration of a 16-megapixel Ceta CMOS Camera for seamless and enhanced automation, providing a large field of view and high read-out speed. Camera options include:
 - Ceta-S or Ceta-F Camera, optimized for low-dose applications, such as the analysis of beam-sensitive samples
 - Ceta-D Camera, a scintillator-based camera optimized for low-dose diffraction data collection
 - Thermo Scientific Falcon C Direct Electron Detector, a dedicated detector for cryo-EM
- Motorized, automatically retractable cryo-box for minimum transmission loss
- Motorized apertures for fast and easy switching and remote operation
- Optional long-duration dewar for long data-acquisition sessions without user intervention
- Optional STEM detectors with high sensitivity and increased speed
- Optional side-entry and retractable EDS detector for chemical analysis
- ACT Ecolabel: documentation of the instrument's environmental footprint, as assessed by My Green Lab, an independent non-profit organization





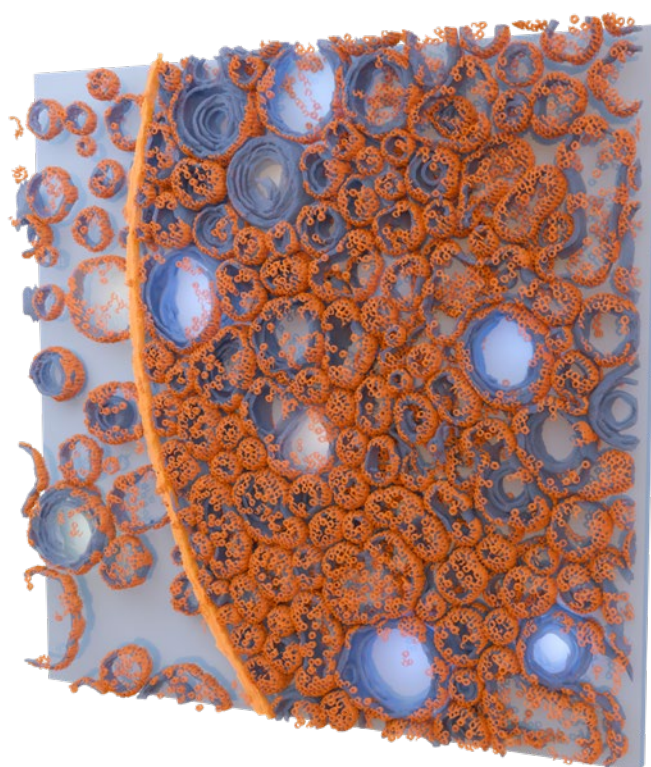
Installation requirements

- Environmental temperature: 18–23°C
- Temperature stability: 1°C per 24 hours
- Relative humidity: <80%
- Room dimensions (see illustration above):
 - Room configuration option A: 3.5 x 2.8 m (11.48 x 9.2 ft)
 - Room configuration option B: 2.85 x 2.8 m (9.35 x 9.2 ft)
 - Room height: 2.6 m (8.53 ft)

See the pre-installation manual for detailed information and possible room layouts.

Talos 12 TEM specifications

- TEM line resolution: 0.204 nm
- TEM point resolution: <0.37 nm
- STEM HAADF resolution: <1.0 nm (with LaB₆)
- TEM magnification range
 - 25–650kx (standard)
 - 35–910kx (enhanced)
- STEM magnification range: 205x to 140Mx
- Maximum tilt angle (stage): ±90°



AI-powered segmentation with Amira Software reveals fine details of proteoliposome architecture. Sample courtesy of Dr. Sara García-Linares and Dr. Alvaro Martínez-del-Pozo, Complutense University of Madrid, Spain, and Dr. Jaime Martín-Benito Romero, CNB-CSIC, Spain.

Learn more at thermofisher.com/talos12

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