Talos F200C G2 (S)TEM

Versatile, powerful system for 3D visualization and characterization of biomolecules, nanoparticles, and cellular ultrastructure

Industry-leading performance for state-of-the-art results

The Thermo Scientific™ Talos™ F200C G2 (Scanning) Transmission Electron Microscope is a versatile, powerful system for delivering 3D characterization of biological samples, biomaterials and nanoparticles in cell biology, biochemistry, structural biology, and nanotechnology research.

The robust and configurable design and automation functions provide high system stability, application flexibility, and ease of use that enable scientists to quickly obtain better insight and understanding of macromolecular structures, cellular components, cells, and tissues in three dimensions.

The system features a constant-power C-TWIN lens that delivers outstanding optical performance and stability and provides an optimal balance between contrast and resolution for biological and soft matter samples. The industry-leading TEM and STEM detectors then provide high-quality acquired data for competitive scientific results.

Additionally, the Talos F200C G2 (S)TEM platform includes a rugged system enclosure and optional piezo stage for maximum thermal and mechanical stability.

Versatility for multidisciplinary use

Designed for both cryo-EM and room temperature applications, the Talos F200C G2 (S)TEM enables experiments spanning the complete application range in life sciences from TEM and (optional) STEM imaging to low dose and cryo-EM, EDS mapping, and electron diffraction experiments.

The system supports multiple automated imaging applications and workflows, such as 2D imaging and 3D tomography of plastic sections of cells and tissue; 2D imaging and single particle analysis (SPA) of purified nanoparticles; or electron diffraction from submicron-size crystals.

Key Benefits
Configurable and upgradable system suitable for continuous support of competitive research
A wide range of TEM and STEM applications
A high level of automation and ease of use with application software for different user workflows
High stability and repeatability given by the constant-power objective lens, complete enclosure, remote operation, and (optional) piezo stage
Long data-acquisition sessions enabled by the optional long duration dewar, automation of batch data collection and remote monitoring
State-of-the-art TEM and STEM detectors
Tunable electron acceleration within 20-200 kV
Flexibility provided by various side-entry holders

A variety of single-tilt and double-tilt holders can be selected for TEM and STEM applications at ambient and cryo-EM temperatures. High-field-of-view tomography holders enable collection of tilt series up to the range from -80° to +80°. Special holders with beryllium coatings are also available for EDS applications. The retractable automatic cryo-box provides superior protection of cryo-samples and ensures minimal ice growth for data acquisition.

The X-FEG electron source provides high brightness and coherence for high resolution imaging in both TEM and STEM modes. Tunable electron acceleration within the operating range of 20-200 kV enables optimization of electron energy and penetration depth for specific samples and applications.

The default Thermo Scientific Ceta™ 16M Camera displays a large field of view and captures images at a fast rate (up to 40 fps in full resolution with Ceta speed enhancement), while the piezo stage ensures highly sensitive drift-free imaging and precise sample navigation, saving time and allowing users to capture more data from each sample.

The optional Ceta-S and Ceta-F Cameras are further optimized for imaging at low dose rates and provide superior sensitivity and resolution in cryo-EM. Alternatively, the Ceta-D camera is optimized for detection of diffraction peaks and is recommended for the microED use case. The ultimate quality of TEM images can be achieved with the optional, industry-leading Thermo Scientific Falcon™ 4i Direct Electron Detector.

The Thermo Scientific Panther detector with a double segmented sensor facilitates all state-of-the-art STEM imaging techniques (BF/DF/HAADF). The detector is optimized for simultaneous multi-modal STEM imaging using its 16 segments and enables advanced imaging techniques, such as (i)DPC.

Unmatched versatility and upgradability of the system ensure that multiple users from different research areas can easily perform experiments at current standards, as well as address new research problems in the future.

User-friendly, intuitive system

The Talos F200C G2 (S)TEM is an ideal choice for multi-disciplinary environments with multiple users with different backgrounds, making various TEM and STEM workflows accessible to a broader community of scientists with advanced automation, user-friendly digital user interface, and first-class ergonomics.

Continually developed and maintained application software packages facilitate streamlined workflows compatible with other (S)TEM and SEM/FIB Thermo Scientific products. The dedicated application packages ensure optimal data collection for users at all experience levels with a high level of ease of use.

The SmartCam digital search-and-view camera simplifies interactive sample examination and allows daylight operation. Automatic software-controlled switching of apertures and of the cryo-box provides fast and easy operation of the microscope and facilitates remote operation for even more flexibility and convenience. Using the optional long duration dewar, unattended automated data collection sessions become possible for up to 96 hours. Liquid nitrogen must still be refiled in cryo-EM holders manually.

Figure 1. A slice through a 3D tomogram of a 200nm plastic section of brain tissue imaged by the Talos F200C G2 (S)TEM with Ceta 16M Camera. ***Sample courtesy of Benjamin H. Cooper from MPI Goettingen, Germany.***

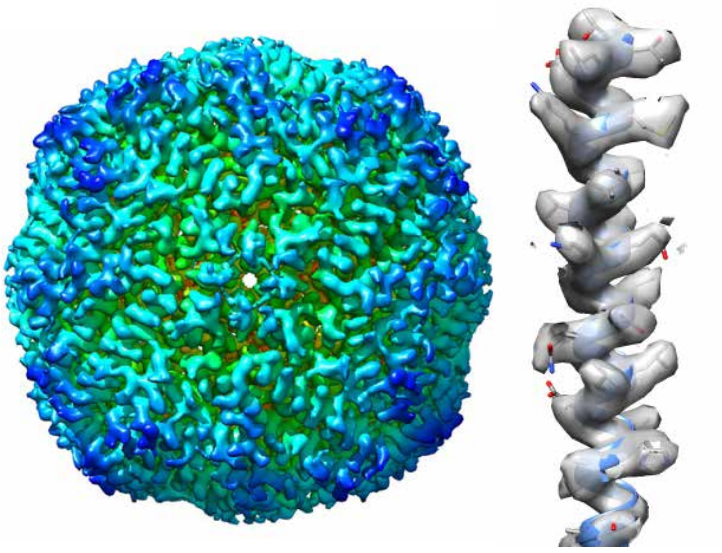

Figure 2. 3D cryo-EM map of apoferritin (left) and an extracted α-helix with a fitted atomic model (right) as determined by SPA at 3.3 Å resolution using the Talos F200C G2 (S)TEM with Falcon 3EC Direct Electron Detector.

Unique features and technical highlights

- High-brightness X-FEG at 200 kV
- Constant-power C-TWIN objective lens providing superior beam stability and fast magnification changes
- Robust system enclosure and optional piezo stage ensuring high system stability and reproducibility
- Digital search-and-view camera for interactive examination of samples in daylight conditions
- Optional automatic cryo-box and motorized apertures for fast and easy switching and remote operation
- Optional long duration dewar enabling long sessions of data acquisition without user intervention
- Ceta Camera family of 16-Mpixel CMOS cameras providing large field of view and high read-out speed
- Optimized Ceta-S and Ceta-F Cameras for low dose applications such as beam-sensitive samples
- Optimized Ceta-D Camera for microED applications
- State-of-the-art Falcon 4i Direct Electron Detector for the best cryo-EM performance and throughput
- Segmented Panther detector with high sensitivity and increased speed for all STEM applications
- Intuitive (S)TEM imaging using the Thermo Scientific Velox™ User Interface with image processing functions including drift-corrected frame integration (DCFI)
- Dedicated software packages for application workflows: 2D imaging mapping (MAPS), single particle analysis (EPU), and tomography (TOMO)

Talos F200C G2 (S)TEM 9C-TWIN) Specifications	
X-FEG brightness @200kV	1.8 × 10^9 A/cm^2 srad
TEM information limit	0.18 nm
TEM point resolution	0.30 nm
STEM HAADF resolution	0.20 nm
TEM magnification range	25–650k × (standard) 35–910k × (enhanced)
Maximum tilt angle (stage)	±90°

Installation requirements

- Environmental temperature: 18–23°C
- Temperature stability: 1°C per 24 hours
- Relative humidity: <80%
- Room dimensions: 4.83 x 3.90 m (15.9 x 12.8 ft)
- Room height: 3.03 m (9.94 ft)

See the preinstallation manual for detailed information and possible room layouts.

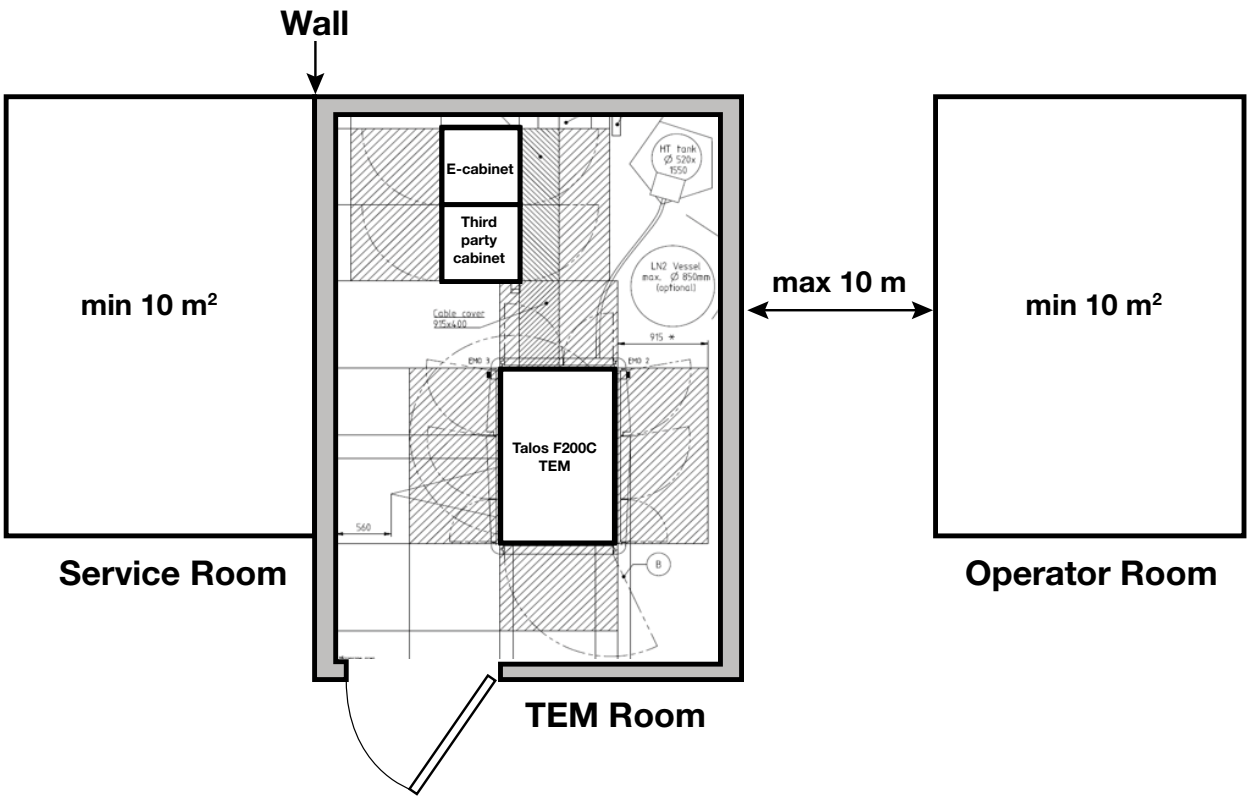

Figure 3. Recommended room layout for Talos F200C TEM. The third party cabinet is needed only for an optional energy filter or other special configurations. The required room dimensions are then extended to 5.77 m x 3.90 m (18.9 x 12.8 ft).

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Notes

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