



EM-Tec ST1 STEM imaging holder

Products #12-000280 and #12-000380



Description

The EM-Tec ST1 STEM imaging holder enables STEM imaging of thin samples on TEM grids with Scanning Electron Microscopes (SEM) for a fraction of the cost of a dedicated STEM detector. This STEM imaging holder uses the standard chamber mounted Everhart-Thornley SE detector to display the STEM images. The EM-Tec ST1 STEM imaging holder incorporates a TEM grid holder assembly, adjustable electron conversion Au plate, electron projection aperture and electron absorption sleeve. Image resolution depends on the type of SEM, kV and sample thickness). Since the maximum high tension is likely to be 25-30kV, use thin TEM sections. Attainable resolution should be close to the electron beam diameter at focus point.

List of components for the EM-Tec ST1 STEM imaging holder:

- 1 – STEM imaging holder body
- 2 – Conversion plate support
- 3 – Conversion plate angle adjustment disc
- 4 – Gold plated electron conversion plate
- 5 – Electron projection aperture
- 6 – TEM grid holder support base
- 7 – TEM grid holder top clamping disc
- 8 – Electron absorption sleeve
- 9 – Allen key 0.9mm for TEM grid holder assembly and electron absorption sleeve

Notes:

1. Before using the EM-Tec ST1 STEM imaging holder, determine if this holder will fit into the chamber and can be moved around without damaging any parts present in the SEM chamber.
2. The SE and BSE scattering from the surface of the sample are blocked by the electron absorption sleeve. The electron absorption sleeve is made from conductive polyethylene.
3. The transmitted electrons hitting the Au plated electron conversion plate are converted into secondary electron to form the STEM image (Au has a very high electron coefficient and does not degrade or tarnish).
4. The angle of the conversion plate can be adjusted between 45°-75° (90° = vertical) to improve the SE signal. If the SE detector is mounted lower in the SEM specimen chamber, choose a steeper angle



Operation

Consider wearing gloves to avoid contamination.

- Retract BSE and EDX detectors in a safe position
- Lower the SEM specimen stage so far that the ST1 STEM imaging including the electron absorption sleeve easily fits into the chamber
- Check if the projection slot aperture is aligned parallel with the electron conversion plate
- Load the sample (TEM grid) on the TEM grid holder support base, place the top clamping disc on the grid and tighten the set screw with the 0.9mm allen key to firmly hold the TEM grid in the grid holding assembly
- Place the electron absorption sleeve on the holder and secure with the set screw using the 0.9mm allen key
- Mount the EM-Tec ST1 STEM imaging holder on the SEM specimen stage
- Rotate the SEM specimen stage to face the electron conversion plate towards the Everhart-Thornly SE detector in the SEM chamber
- Position the ST1 STEM imaging holder in the centre of the specimen stage
- Close the SEM specimen chamber door and pump down
- Move SEM stage upwards to reduce the gap between electron absorption sleeve and polepiece
- Select imaging conditions for 25-30kV and use SE signal to display image
- Start at low magnification to show TEM grid bars and increase magnification/imaging conditions as needed
- Use the SEM stage to move to the desired sample area
- When finished, lower the sample stage to create a larger gap between the electron absorption sleeve and the polepiece
- Vent the chamber, remove STEM imaging holder or load another TEM sample

Specifications

TEM grid capacity:	22mm
Dimensions w/o sleeve (w/o pin):	19 x 16 x 30mm
Dimensions with sleeve (w/o pin):	19 x 16 x 38mm
Attainable resolution – SEM:	2-3nm
- FESEM:	1nm
SEM stage compatibility - standard pin:	#12-000280
- EM-Tec stage adapters M4:	#12-000380
- Hitachi M4	#12-000380
Material for electron conversion plate:	Au plating 3um
Material for holder and conversion plate body:	Vacuum grade aluminium
Material for TEM grid holder assembly:	Brass
Material for electron absorption sleeve:	Conductive polyethylene

Maintenance

The EM-Tec ST1 STEM imaging only requires maintenance when the image quality deteriorates.

- The Au electron conversion plate can get contaminated under long-term electron exposure; this is visible as darkening in the central area. The contamination can be removed by gentle plasma cleaning. Polishing is not recommended.
- If charging becomes evident after long-term use it is advisable to clean or replace the electron projection aperture. This is an 0.42 x 2mm slot aperture (EM-Tec #21-1S0420) which is held in place with a conductive adhesive.

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