

# MiniTEM™ data sheet

MiniTEM has been developed specifically for nanoparticle characterization and this has determined the resolution and voltage specifications of the system.

- Resolution of 1 nm
- Accelerating voltage 25kV

The low accelerating voltage compared to traditional transmission electron microscopes (TEM) allows for maximum contrast. Novel technical solutions allow for a compact and vibration tolerant design. The system can be plugged into a standard wall socket (110/230V) and can be placed in a standard laboratory setting.

## Automatically set actions for easy start up

- Illumination
- Focus
- Beam alignment
- Exposure

## Automated imaging and particle analysis

The automation in MiniTEM goes beyond the settings of the microscope and camera. It allows for automatic image acquisition and subsequent particle analysis and data presentation.

Waypoints are easily selected on the grid to be analyzed. Images are automatically acquired at the selected waypoints. The particles in the selected images can automatically be analyzed for morphology, integrity, purity, aggregation or any other characteristic that has been built into the automation workflow by the user. The data can be presented as a list, a histogram, a scatter plot or a box plot.

Pattern recognition and machine learning capabilities enable MiniTEM to perform advanced image analysis resulting in particle characterization, classification and measurements which are statistically relevant. A large portion of this is thanks to the ability to automatically acquire and analyze large subsets of images.



# Specifications

## Hardware

Specimen size	Standard $\varnothing$ 3.05 mm grids
Weight of the microscope	140 kg
Weight of the electronics box	80 kg

## TEM

Nominal accelerating voltage	25kV
Resolving power	1.0 nm
Total magnification*	1,127 - 430,743x
Field of view	100 $\times$ 0.25 $\mu$ m
Focal length	1.34 mm
Cs (spherical aberration coefficient)	1.03 mm
Cc (Chromatic aberration coefficient)	1.05 mm
$\alpha$ theor (theoretical aperture angle)	1.2 $\times$ 10 <sup>-2</sup> rad

\* Nominal (image 3 1/4 x4")

## Electron optics

Condenser lens	Magnetostatic & electrostatic
Condenser aperture	$\varnothing$ 50, 50, 30 $\mu$ m
Objective lens	Magnetostatic
Objective aperture	$\varnothing$ 50, 50, 30 $\mu$ m
Projection lens	Double electrostatic

## Electron gun

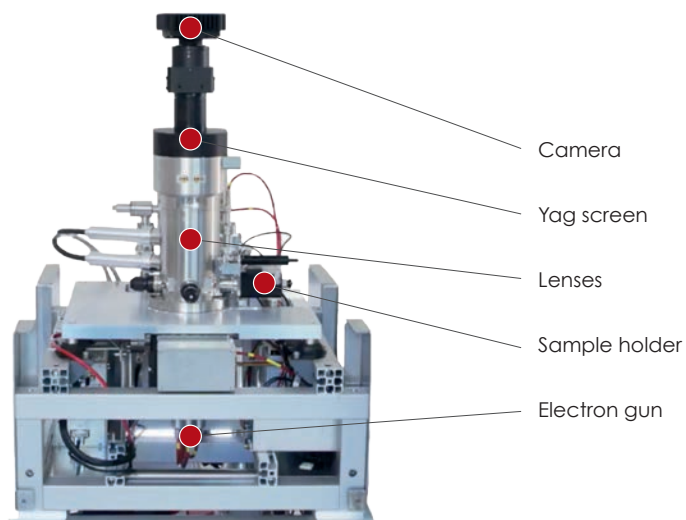
Type	SE Cathode ZrO/W[100]
Current density	0.3 mAsr <sup>-1</sup>
Lifetime	>2,000 hours

## Vacuum

Airlock system: turbomolecular pump	10 <sup>-5</sup> mbar
Sample chamber: ion getter pump	10 <sup>-8</sup> mbar
Gun chamber: ion getter pump	10 <sup>-9</sup> mbar

## Light optics

Objective Olympus M20x	NA*0.75
Objective Olympus M4x	NA*0.13



## ViroCam

CCD sensor	Truesense KAI-04070
Pixel size	7.4 $\times$ 7.4 $\mu$ m
Digitalization	16 bits
Image size, full frame	2048 $\times$ 2048 pixels
Image size, live mode	1024 $\times$ 1024 pixels
Live view frame rate	24 fps
Interface	Gigabit ethernet
Cooling	Passively cooled

## MiniTEM computer

### Hardware

CPU	Intel i7
RAM	16 GB
GPU	Supporting Open CL 1.1
VRAM	16 GB
Data storage	500 GB SSD

### Software

Operating system	Windows 10
Framework	.Net 4.6
Imaging and analysis	MiniTEM
Microscope interface	MicroCS

## Power ratings

Mains input	100–240 V/50–60 Hz
Power	450 VA

\* Numerical aperture

**Disclaimer:** All product, product specifications and data are subject to change without notice to improve reliability, function or design or otherwise.

