

## Tecnai™ G<sup>2</sup> F30 Series The ultimate Nano-Analysis System

The Tecnai™ G<sup>2</sup> F30 series are reliable and proven (scanning) transmission electron microscopes, with a unique and unrivalled task-oriented user interface. The accessories that may be fitted to these systems have largely been embedded into this user interface, meaning that operators can utilize the full functionality of the total microscope system through one coherent interface, allowing all the capabilities of the system to be easily controlled by operators of different experience levels.

- *High performance in TEM imaging, STEM imaging and Nano-Analysis*
- *Ultra clean vacuum*
- *High spatial coherence due to an ultra-stable FEI Schottky source*
- *State-of-the-art, superior stability, high-tension circuitry results in an energy spread of less than 0.8 eV*
- *Computerized stage with unique eucentric specification for*
  - *the highest resolution tomography capabilities*
  - *maximized tilts*
  - *maximum stability*

The field emission Tecnai microscopes are a culmination of the best electron optical designs based on resolution performance, stability and specimen movement. Since 300 kV offers a resolution advantage for the same pole piece gap, the 300 kV systems allow more flexibility for most applications. The lens types that are available for the Tecnai G<sup>2</sup> F30 series allow you to choose the optimal combination of tilt/resolution and analytical performance

required for your application (see Table 1).

An unlimited number of user alignments (including field emission gun presets) can be stored on the microscope. This allows for rapid switching and optimization for different users.

For the best results the F30 series allow the high tension to be switched between 300 kV and any other value within 1 minute. This is very important, since depending on the types of damage mechanisms that need to be considered a different kV may be required. Some mechanisms are attenuated at 300 kV (such as radiolysis) however some are amplified (such as knock-on). The system can be operated at a lower kV with excellent performance, and per user the operating conditions are stored. The PC digitally controls all microscope functionality through a Temserver service, which can be remotely accessed and which can be intergrated with special service software for remote diagnosis.

Mode changes of the microscope system are trivial, it is straightforward to go from a high resolution TEM image to a high resolution STEM image in seconds, and vice versa in the same time. The Tecnai series microscopes have, in addition, a very large selection of application software developed by FEI, such as automated focus reconstruction (TrueImage™), automated tomography (Xplore3D™) as well as a Low-Dose package that sets the standard for imaging dose-sensitive samples such as biological or polymeric materials.

300 kV has a resolution advantage, as well as the ability to image thicker samples when compared with lower voltage instruments. An effective increase in brightness, as well as beam current gives better analytical performance by improving signal to noise ratios. If smaller energy spread is required, simply switch to a lower kV value. At 200 kV for example, similar specifications can be obtained as a dedicated 200 kV system, making this an ideal multi-user analytical solution.

## Essential specs

### Electron Source

- Schottky Field emitter with high maximum beam current (> 100 nA)
- High probe current (> 0.6 nA in a 1 nm spot, > 15 nA in a 10 nm spot)
- Small energy spread (0.8 eV or less)
- Spot drift < 1 nm/minute
- High stability and long life

### Imaging

- Patented TWIN, S-TWIN and U-TWIN objective lenses
- Coma-free alignment for high resolution objective-lens centering
- Magnification reproducible within 1.5%
- Embedded CCD/energy filter
- Ranged, rotation-free magnification series
- Unsurpassed information limit with U-TWIN (< 0.10 nm attainable)

### STEM

- Fully digital scan system
- Bright Field and Annular Dark Field mode
- Ultra-high Resolution STEM HAADF detector

### Micro-analysis

- Excellent EDX in-hole performance (<1% hole count)
- Low system background in EDX (<1% spurious peaks)
- Embedding of EDX, PEELS and energy filter
- Spectrum imaging with multiple detectors

Objective lens	TWIN	S-TWIN	U-TWIN
TEM Point Res.	0.24 nm	0.20 nm	0.17 nm
TEM Line Res.	0.144 nm	0.102 nm	0.102 nm
Obj. Lens C <sub>s</sub>	2.0 mm	1.2 mm	0.65 mm
Obj. Lens C <sub>c</sub>	2.2 mm	1.4 mm	1.4 mm
Obj. Lens Focal Length	2.7 mm	2.3 mm	2.6 mm
Information Limit	0.15 nm	0.14 nm	0.10 nm
Extended Resolution (Truelmage)	0.17 nm	0.16 nm	0.12 nm
Minimum Focus step	3 nm	1.8 nm	0.5 nm
Magnification range TEM	58x - 800Kx	60x - 1000Kx	60x - 970Kx
Probe C <sub>s</sub>	2.0 mm	1.2 mm	0.65 mm
Probe C <sub>c</sub>	2.2 mm	1.4 mm	1.4 mm
STEM HAADF Res.	0.24 nm	0.19 nm	0.14 nm
Camera Length (mm)	100 - 5600	80 - 4500	90 - 5000
Diffraction Angle	20°	26°	32°
Magnification range STEM	150x - 230Mx	150x - 230Mx	150x - 230Mx
EDS Solid Angle	0.13 sr	0.13 sr	0.13 sr
Tilt Angle (double-tilt holder)	70°	40°	24°
Tilt angle: tomography holder	70°	70°	n/a

Table 1. Selected Specifications of the F30 Series

### Specimen stage

- Fully computer-controlled, eucentric side-entry, high stability CompuStage
- Choice of a variety of specimen holders
- X, Y movement 2 mm, specimen size 3 mm
- Specimen recall reproducibility ≤ 0.1 μm (x, y) and ≤ 0.1° (α tilt) attainable
- Drift < 0.5 nm/minute with a standard holder

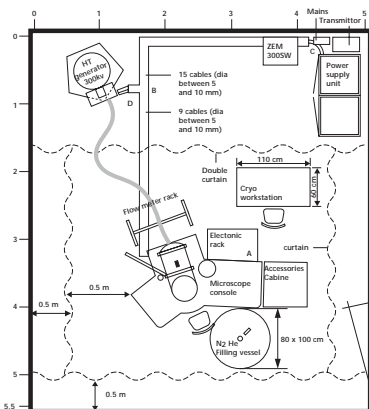
### Vacuum

- Fully interlocked differentially pumped column
- Clean vacuum system with turbo molecular pump, prepumping column, gun and specimen airlock
- 150 l/s Ion Getter Pump on specimen area
- Liner tubes pumped by additional Ion Getter Pump

- Ultra-high vacuum for contamination-free observation
- Vacuum levels: specimen chamber 2.7 x 10<sup>-5</sup> Pa; gun 5 x 10<sup>-7</sup> Pa
- Plate camera exchange without switching off high tension or emitter

### Operation / automation

- Advanced User Interface: constantly updated and improved
- Operating system: industry standard Windows® 2000
- Remote operation available
- Motorized apertures available
- Scripting software (SW) module available
- Advanced filtering SW available
- Ready for LAN networking
- 2<sup>nd</sup> data monitor available



Minimal floorplan

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