

## Specifications:

### ■ Performance:

Configuration	HC (high contrast) configuration	AB (analytical) configuration
Resolution:		
Point:	0.36nm	0.4nm
Lattice:	0.2nm	0.2nm
Accelerating voltage:	40,60,80,100,120 KV	40,60,80,100,120 KV
Minimum voltage change:	50V	50V
Power stability:		
Accelerating voltage	$2 \times 10^{-6}/\text{min}$	$2 \times 10^{-6}/\text{min}$
Objective lens current	$1 \times 10^{-6}/\text{min}$	$1 \times 10^{-6}/\text{min}$
Condenser lens:	Two-stage (single gap)	Three-stage (double gap)
Spot size:	Variable in 5 steps	Variable in 5 steps
Minimum probe diameter:	0.2um	40nm*1
Objective pole piece:	HBP12 High contrast pole piece	ABP12 Analytical pole piece
Goniometer:		
Specimen holder capacity:	One Specimen	One Specimen
Specimen tilt angle:	$\pm 30^\circ$	$\pm 45^\circ$
Specimen shift:	2.0 mm(X/Y), $\pm 0.5$ mm(Z)	2.0mm (X/Y), $\pm 0.5$ mm(Z)
Magnification range:		
MAG mode	1,000 to 600,00 times	1,000 to 600,00 times
Low MAG mode	50 to 1,000 times	50 to 1,000 times
Camera length:		
SA DIFF mode	15 to 350 cm	20 to 350 cm
HD DIFF mode	4 to 80 m	4 to 80 m
HR DIFF*2 mode	337mm	337mm
Image Orientation (IOS)	$\pm 90^\circ$ (2,500 to 30,000 times)	$\pm 90^\circ$ (2,500 to 30,000 times)

\*1When a LaB6 filament (SM-LKS, optional attachment) is used.

\*2When the EM-AD10 (optional attachment) is used.

The EDS mounting Kit (optional attachment) is required for TEM analytical microscopy in the AB configuration.

### ■ Construction:

- A. **Electron Gun (cool beam type):** (1) Accelerating voltage: Range - 40 to 120KV, Variable step - 50V minimum; (2) Bias: Self-bias; (3) Filament: pre-centered W hairpin type, Pre-centered single crystal LaB6 type (optional); (4) Filament heating: Direct current heating; (5) Airlock and gun lift: Automatic; (6) Axis alignment: Shift and tilt with electromagnetic balanced double deflector. Alignment wobbler built-in.
- B. **Condenser Lens:** (1) Lens system: 2-stage lens (HC configuration), 3-stage lens (AB configuration); (2) Variable apertures: Metal bellows type aperture selector, Click stop selection, 100-200-300 um dia. apertures; (3) Axis alignment: Shift and tilt, Electromagnetic balanced double deflector; (4) Stigmator: Electromagnetic with centering, Adjusted for each spot size from among 5 spot sizes; (5) Beam tilt:  $\pm 2^\circ$  (x/y) for bright field Image,  $\pm 4^\circ$  (x/y) for dark field image, Bright /dark field image changeover can be made by single touch operation (instant changeover); (6) Beam displacement correction: Provided.

- C. **Specimen Chamber:** (1) Specimen stage: Side entry type micro-active goniometer stage; (2) Stage control: with trackball, switches and mouse; (3) Specimen exchange: Auto airlock and auto rough pumping; (4) Anti-contamination device: Option; (5) Specimen position indicator: Graphic display and X-Y coordinate digital display on display (Y, Y, Tilt-X, Tilt-Y). Up to 20 positions can be Saved and loaded. The positions can also be saved on floppy disk; (6) Basic specimen holder: Common specimen holder base; (7) Cartridge: Quick change specimen cartridge; (8) Tip-on system: Applicable; (9) Specimen holders (option): Various types of holders are available; (10) Image fine shifter: Electromagnetic deflector,  $\pm 2$   $\mu\text{m}$  max. in X and Y directions.
- D. **Objective Lens:** (1) Lens system: 2-stage (objective lens and objective mini lens); (2) Polepiece: HBP12 (for high-contrast configuration) or ABP12 (for Analytical configuration); (3) Current axis alignment: Wobbler for axis alignment built-in; (4) Variable apertures: Metal bellows type aperture selector. Click stop selection 20-50-80  $\mu\text{m}$  dia. apertures. (5) Stigmator: Electromagnetic with centering, adjusted for each lens mode, five independent set conditions can be saved and loaded; (6) Focusing: Digital COARSE and FINE controls, Focus point pre-settable, Focus zoom, Image wobbler (X/Y-control) built-in (5-step changeover in both frequency and amplitude), Optimum under focus (OUF, 3 settings), Automatic through focus system built-in; (7) MDS (minimum dose system): Build-in.
- E. **Intermediate lens and Projector lens:** (1) Lens system: 4-stage (triple I.L. and single P.L.); (2) imaging: Distortion-free, Rotation-free; (3) Field limiting apertures: Metal bellows type aperture selector. Click stop selection. 20-100-300  $\mu\text{m}$  dia. Apertures; (4) Axis alignment: Mechanical and electromagnetic are used in parallel; (5) Stigmator: Electromagnetic with centering; (6) IOS (image orientation system): Built-in.
- F. **Viewing Chamber:** (1) Viewing windows: Front window - 270 $\times$ 170 mm, Sides windows - Two, 90 $\times$ 80 mm (option), Fluorescent screens: 160 mm dia. For observation, 20 mm dia. For focusing; (2) Binocular:  $\times 10$ ; (3) Beam stopper: Option;
- G. **Photographing System:** (1) Camera: Sheet film magazine type; (2) Film size (optionally selectable): For U.S.A.: 4 $\times$ 3 $\frac{1}{4}$  inches, For Europe: 90 $\times$ 65mm, Special size: 118 $\times$ 82mm; (3) Number of films: 50/load; (4) Film feeding: Automatic (single film feeding/ successive feeding selectable). Double-exposure proof; (5) Exposure meter: Electron beam detection, Mean or spot measurement selectable (fluorescent screen linked), Preset exposure time is linked to film sensitivity and Acc.V; (6) Current density: Digital display; (7) Detection range: 5 $\times$ 10<sup>-13</sup> to 5 $\times$ 10<sup>-10</sup> A/cm<sup>2</sup>; (8) Exposure control: Automatic/manual selectable; (9) Shutter speed: 0.1 to 180 s, Bulb; (10) Multi exposure: Possible; (11) Unexposed –film counter: Digital display on CRT; (12) Data recording on film: Film number (4 digits) and operator code (2 alphanumeric characters), Magnification or camera length (4 digits) and micron bar (w/unit) Accelerating voltage (5 digits) Comment (18 alphanumeric characters); (13) Photographing data memory function: Date of photographing, Film number, Film text, EOS condition for photographing, Exposure condition, Specimen position; (14) Data saving on floppy disk: The above data of “Data recording on film” and “Photographing data memory function” can be stored on floppy disk; (15) Photography condition setting: Settable from personal files on floppy disks; (16) Film exchange: Automatic airlock and light proof magazines used; (17) Film desiccator: Separately constructed (option).
- H. **Vacuum System:** (1) Evacuation system: Perfectly differential pumping and radial

evacuation; (2) Evacuation control: Fully automatic (evacuation system diagram is displayed on CRT), ON/OFF can be controlled by timer; (3) High vacuum pumps: Two 420 L/s DPs (oil diffusion pumps); (4) Liquid nitrogen trap for DP: Option; (5) Roughing Pump: One 100 L/min RP (oil rotary pump); (6) Vacuum gauges: Five Pirani gauges; (7) Note: A Penning gauge (option); (8) Pressure: 10<sup>-5</sup> Pa order (at specimen chamber); (9) Bakeout function: Automatic control (timer control); (10) Air compressor: Option, Separately constructed for pneumatic valve drive, If the TEM room has no compressed air supply, this compressor is necessary.

- I. **Computer Control System:** (1) Operation: By using a function box and a mouse on operation screens; (2) Display: TFT color display; (3) Operation screen: Concentrated display for each purpose; (4) Personal file function: For personal information management; (5) Personal file contents: TEM setup condition, EOS data, Photographing data, Specimen position data; (6) Filing media: Hard disk and floppy disk; (7) Self diagnosis function: Works when JEM-1220 is shut down by the following causes: Pneumatic pressure abnormality, Rotary pump belt break, DP heater burnout, Cooling water abnormality, Pirani gauge filament burnout, Reservoir tank pressure abnormality; (8) External control: Possible when an external computer system (option) is connected (Ethernet,RSX232C), RS-232C is used as an interface.

#### 1. JEM-1230 附: TVIPS CCD 相机三维重构软件

##### ■ Features :

- A. Automatic acquisition of tomographic titl series under low dose conditions;
- B. Compensation of titl-induced specimen displacement and drift using image and beam shift;
- C. Sophisticated low dose features defining up to 5 imaging areas on the specimen with independent and automatically stored settings of magnification, spot size, exposure time, defocus, image and beam shift, and camera parameters (size and binning factor);
- D. Image area / resolution can be increased by tiling;
- E. Turn key solutions are available for FEI/Philips, HITACHI, JEOL, and LEO microscopes;
- F. Typical execution time for one tilt step, including displacement and focus correction (depending on TEM type) 25-120 Sec.