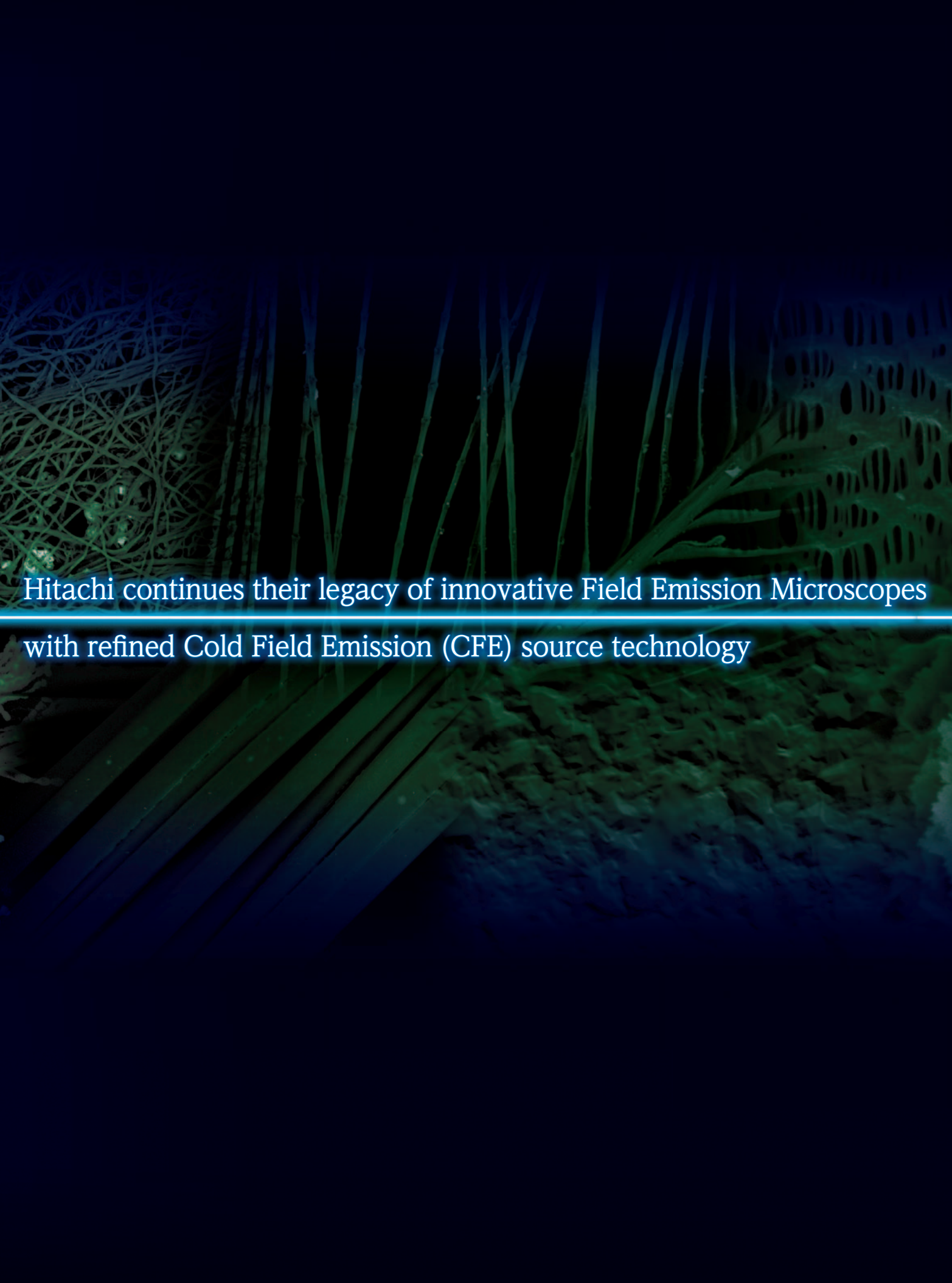
UHR FE-SEM
SU8200 Series

HITACHI
Inspire the Next

Ultra-high Resolution Scanning Electron Microscope

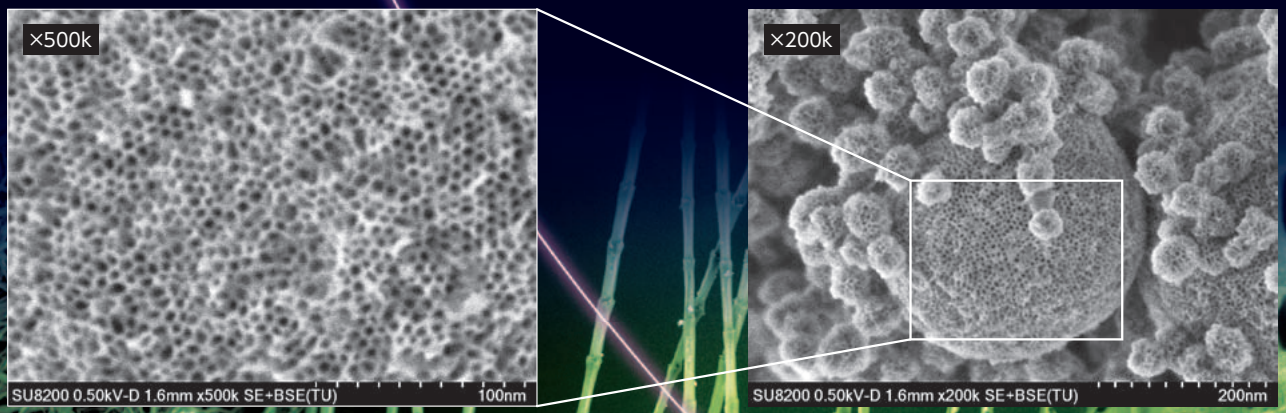
SU8200 Series


Broadening technology
for continued advancement
HITACHI
SU8220


Hitachi continues their legacy of innovative Field Emission Microscopes
with refined Cold Field Emission (CFE) source technology

High Resolution Imaging

The ultimate SEM source for high resolution imaging at low acceleration voltage with unmatched beam brightness and stability.



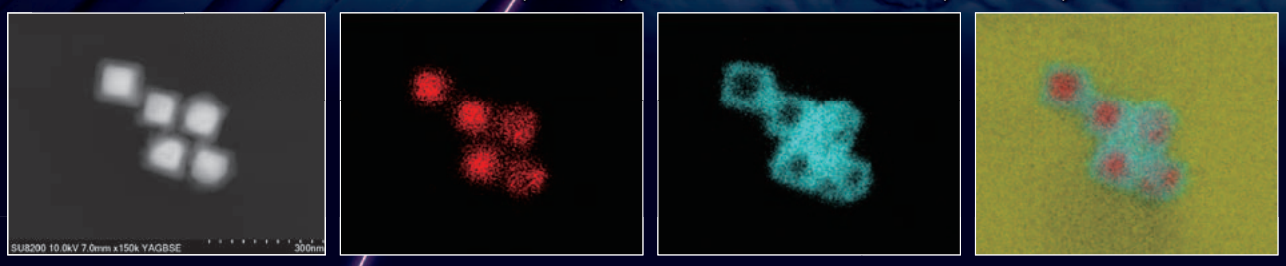
Sample : Mesoporous silica nanospheres Landing Voltage : 500 V Magnification : 500,000× / 200,000×
Sample courtesy of Tokyo Institute of Technology, Dr. Toshiyuki Yokoi

The SU8200 series FE-SEM — The ultimate F

image observation and elemental microanal

Hitachi SEMs have contributed to the advancement of materials science, medical research, a
for over 40 years with the release of the first commercially available CFE-SEM in 1972.
Today, the innovative SU8200 series FE-SEM is the culmination of decades of experience, researc
The result is the ultimate FE-SEM with unmatched beam brightness and stability affording hi
and high quality elemental analysis at low acceleration voltages.

Sample : Au/Cu2O core-shell nanocubes EDX mapping condition : 5 kV, 0.7 nA, 15 min Magnification : 150,000×
Sample courtesy of Institute for Chemical Research, Kyoto University, Dr. Toshiharu Teranishi



YAGBSE Au_M Cu_L Au/Cu Layer map

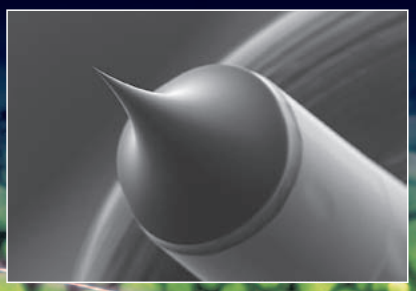
High Spatial Resolution X-ray Microanalysis

The SU8200 series FE-SEM realizes high spatial resolution EDS analysis with higher probe current even at low acceleration voltage conditions.

A novel cold field emission (CFE) gun for improved imaging and analytical performance

The CFE source is ideal for high resolution imaging with a small source size and energy spread. The newly designed Hitachi CFE gun complements the inherent high resolution and brightness of conventional CFE with increased probe current and beam stability. Long-term, continuous operation and elemental analysis are now routine with the new CFE source.

	Cold FE electron source	Schottky FE electron source
Source size (nm)	5	15 - 30
Energy spread (eV)	0.2 - 0.3	0.6 - 0.8
Brightness (A/cm^2 sr)	10^8	10^7



E-SEM providing unsurpassed

ysis at low acceleration voltage conditions

nd industrial manufacturing

ch, and ongoing technology development.
gh resolution imaging

SU8220
Standard stage model

SU8230
Large chamber and stage model

The SU8200 opens a new gateway for SEM analysis

The ultimate SEM electron source now offers high signal to noise (S/N) and uncompromising resolution with high beam current and stability, which is critical for analytical solutions. The robust SU8200 series supports a wide variety of applications within material research & development and industrial quality control environments.

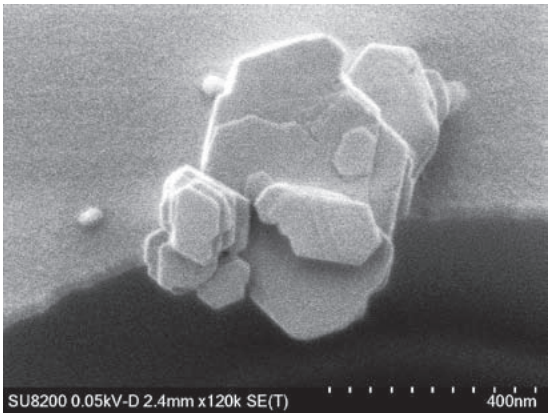
SU8240
Regulus® stage,
High precision stage model

*Regulus stage : REGULated Ultra Stable stage

Image on the FPD (flat panel display) are simulated

Advanced electron optics with extended beam deceleration voltage range

The beam deceleration voltage can be optimized to yield a landing voltage of 10-2000 V enabling the observation of beam sensitive samples, such as organic materials or polymers, in the natural state without beam damage or sample deformation. Additionally, a new selective energy filtering system for the top detector offers fine contrast differentiation even at low accelerating voltages.

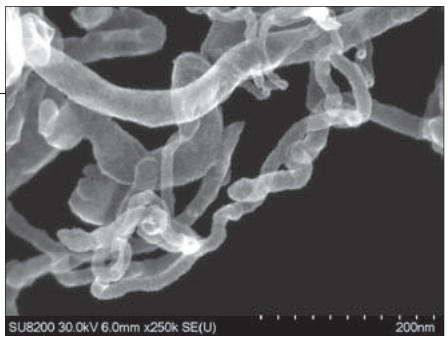


Sample : Kaolin Landing Voltage : 50 V Magnification : 120,000×
"Kaolin" is a coating pigment used for coated papers and is very sensitive to electron beam damage. On the SU8200 series SEM, Kaolin was well observed without sample damage/deformation at acceleration voltage of less than 100 V.

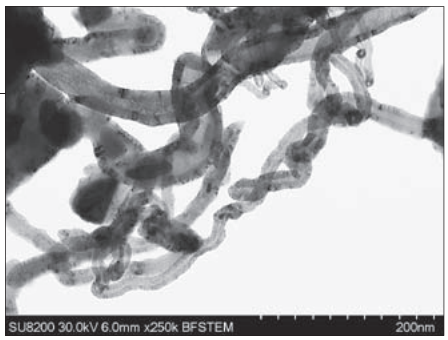
STEM Image Observation Function (Option)

A Scanning Transmission Electron Microscope (STEM) image, providing internal specimen information, can be obtained simultaneously with the secondary electron image. The optional Bright Field STEM Aperture Unit is often utilized to generate enhanced contrast differentiation on materials of similar density.

SE image
Surface information



BF-STEM image
Internal information

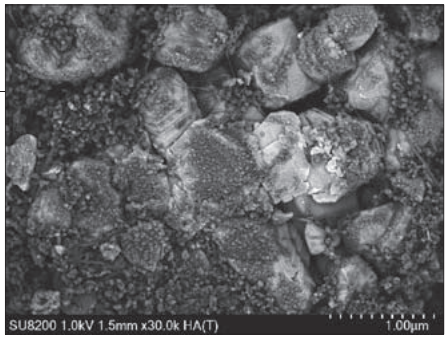


Sample : Carbon nanotubes Acceleration Voltage : 30 kV Magnification : 250,000×

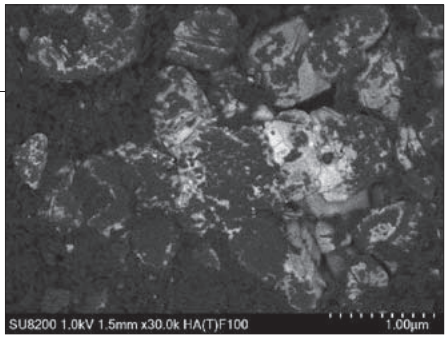
Top Detector Filtering System (Option)

Top detector filtering system provides enhanced electron detection specificity. Fine contrast differentiation is achieved by selectivity filtering inelastic scattering electrons and directly detecting specific energy back scattered electrons.

Top filter
OFF



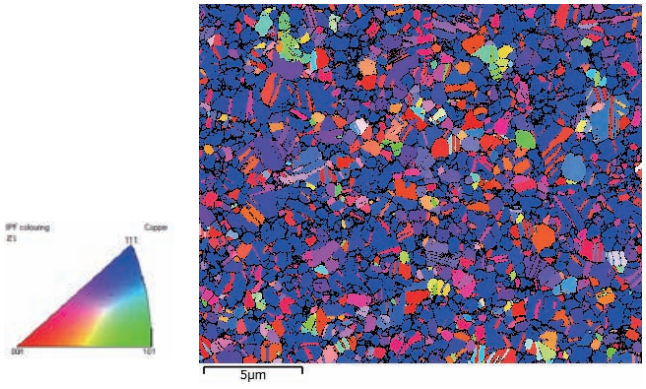
Top filter
ON



Sample : Lithium-ion Battery Positive Electrode (the Same FOV)
Acceleration Voltage : 1 kV Magnification : 30,000×

Electron Back Scattered Diffraction (EBSD) Analysis System (Option)

Optional EBSD systems for the SU8230 and SU8240 are available from various vendors.



Sample : Cu line (100 μm) Acceleration Voltage : 25 kV Specimen current : 3 nA
FOV : 22.5 × 18.3 μm Pixel step : 0.05 μm Time : 40 min

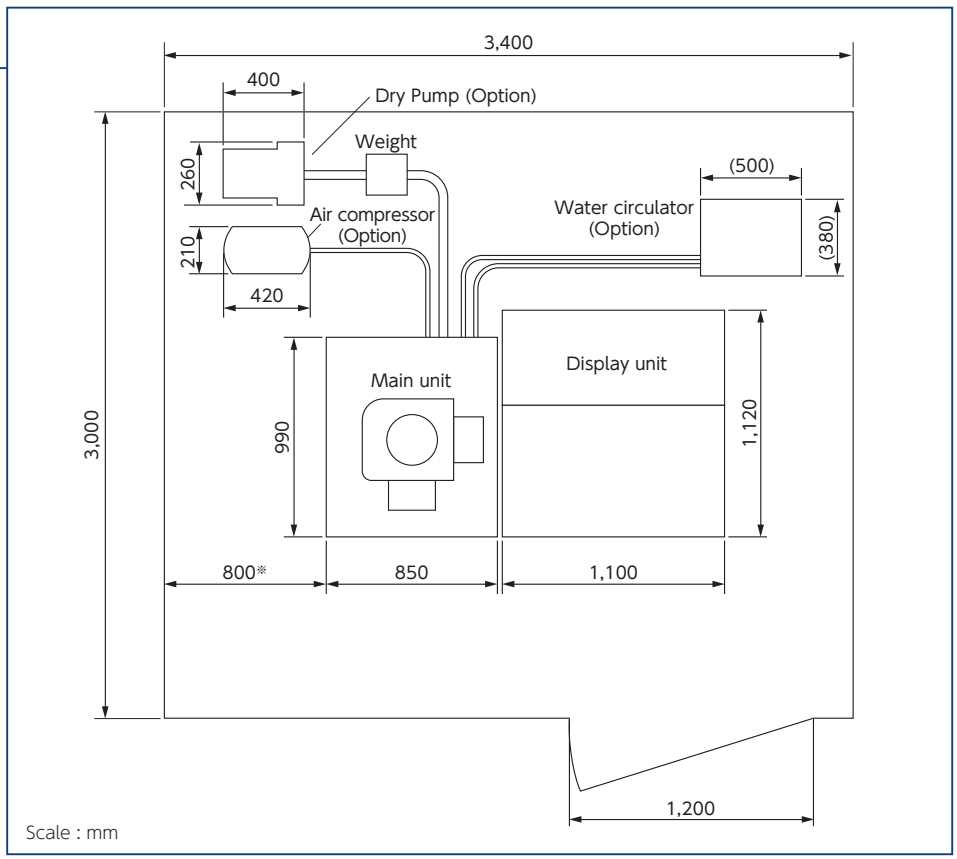
Main specifications

			SU8220	SU8230	SU8240
Secondary Electron Image Resolution			0.8 nm (Vacc 15 kV, WD=4 mm, Magnification 270,000×)※1	1.1 nm(Landing voltage 1 kV, WD=1.5 mm, Magnification 200,000×)※1	
Mag.	Low mag mode		20 - 2,000× (Magnification on Photo)※2		
	High mag mode		100 - 1,000,000× (Magnification on Photo)※2		
Electron Optics	Electron gun		Cold cathode field emission source, Anode heating system, Mild flashing system		
	Accelerating voltage		0.5 - 30 kV (Normal optics)		
	Landing voltage		0.01 - 2 kV (Decelerating optics)		
	Lens system		3-Stage electromagnetic lens		
	Objective lens aperture		Variable type (4 openings selectable and finely adjustable from outside the vacuum)		
	Stigmator coil		Octopole electromagnetic system		
	Scanning coil		2-stage electromagnetic deflection		
Specimen stage	Stage control		5-axis motor drive		5-axis motor drive Regulus® stage
	Movable range	X	0 - 50 mm	0 - 110 mm	0 - 110 mm
		Y	0 - 50 mm	0 - 110 mm	0 - 80 mm
		R	360°		
		T	−5 - 70°		
		Z	1.5 - 30 mm	1.5 - 40 mm	1.5 - 40 mm
	Stage repeatability		–	–	less than ±0.5 µm
Electrical Image Shift			±12 µm (WD=8 mm)		
Detector	Secondary electron detector		Top / Upper / Lower, SE/BSE Signal mixing function (Upper), Top filter function (Top)※3		
	Backscattered electron detector		YAG BSED※3, Semiconductor type BSED※3		
	Transmission Electron detector		STEM detector (for BF-STEM)※3, BF-STEM aperture※3, DF-STEM holder※3		
	Others		Energy Dispersive X-ray spectrometer (EDX)※3, Electron Back Scattered Diffraction (EBSD)※3 (for SU8230, SU8240)		
Evacuation system	Auto evacuation		Pneumatic valve system		
	Specimen exchange chamber		Vacuum level control system		
	Vacuum pumps		Ion pump ×3, Turbo molecular pump ×1, Scroll Dry pump (DRP) ×1※3		
	Vacuum gauges		Full range gauge ×1, Pirani gauge ×2		
	Anti-contamination		Anti-contamination trap		
Display unit	PC/OS		PC/AT compatible, OS : Windows※4		
	External device connection port		USB interface, Network interface (Ethernet)		
	Monitor		LCD (Display screen image:1,920×1,200 pixels), Chamberscope※3		
	Image display modes		Full screen display (1,280×960 pixels), Single screen display (800×600 pixels), Dual screen display (800×600 pixels, ×2) Quad screen display (640×480 pixels), Reduced display		
	Auto alignment function		Auto Brightness and Contrast (ABCC), Auto Focus (AFC)		
	Image data saving		640×480 pixels, 800×600 pixels, 1,280×960 pixels, 2,560×1,920 pixels, 5,120×3,840 pixels		
	Image format		BMP, TIFF, JPEG		
	Image data printing		Free layout print function provided		
	Data manager		SEM Data Manager		

		SU8220	SU8230	SU8240
Software※3		CD measurement function, CD measurement for external PC, Hi-Mouse, TCP/IP communication interface DBC interface		
Others		Microscale (standard sample for calibration)※3, Joystick※3		
Utility requirements	Temperature	15 - 25℃		
	Humidity	60%(RH) or less (non-condensing)		
	Power (Main unit)	AC100 V - 240 V ±10%, 4 kVA (Crimp contact for M6)		
	Grounding	Class D independent grounding (100 Ω or less)		
	Cooling water	Flow 1.0 - 1.5 L/min, Pressure 50 - 100 kPa, Temperature 10 - 20℃ (allowable fluctuations 0.5℃/10 min or less, difference from room temperature must be within 7℃) Supply faucet Rc3/8 tapered female thread ×1, Drain port 20 mm dia. or more ×1 (natural drain type located on floor)		
	Air compressor※5	600 - 800 kPa (RC1/4 tapered female thread)※3 ※5		
	Options	N2 Gas leak port※3, Autotransformer※3		
Dimensions & Weight※6	Main unit	850(W) × 990(D) × 1,710(H) mm, 665 kg	850(W) × 990(D) × 1,745(H) mm, 740 kg	850(W) × 990(D) × 1,745(H) mm, 745 kg
	Display unit	1,100(W) × 1,120(D) × 730(H) mm(Not including monitor height), 275 kg		
	Dry pump※3	260(W) × 400(D) × 340(H) mm, 25 kg		
	Weight	200(W) × 180(D) × 160(H) mm, 40 kg		
	Air compressor※3	420(W) × 210(D) × 520(H) mm, 16 kg		
	Water circulator※3	Option		

※1 Base on the gap (point to point) method by using Hitachi standard sample for resolution measurement
※2 At 127 mm × 95 mm (4" × 5" picture size)
※3 Option
※4 Windows® is a resisted trademark of U.S. Microsoft Corp. in U.S.A. and other countries
※5 In case of connection from the installation site facilities
※6 Weight does not include options
*For disposal of this product, please contact your nearest sales representative

Suggested layout



※Note : Please separate from wall by at least 800mm for maintenance purposes.

Hitachi's successful achievement of practical Field Emission (FE) source technology development was recognized by the IEEE, the world's largest professional association of electrical and electronic engineers.

Hitachi initiated research and development of the FE source in 1969. The distinguished IEEE award in 2012 recognizes and validates our contributions to FE technology and the advancement of materials science, medical research, and industrial manufacturing.

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