LVEM 25E

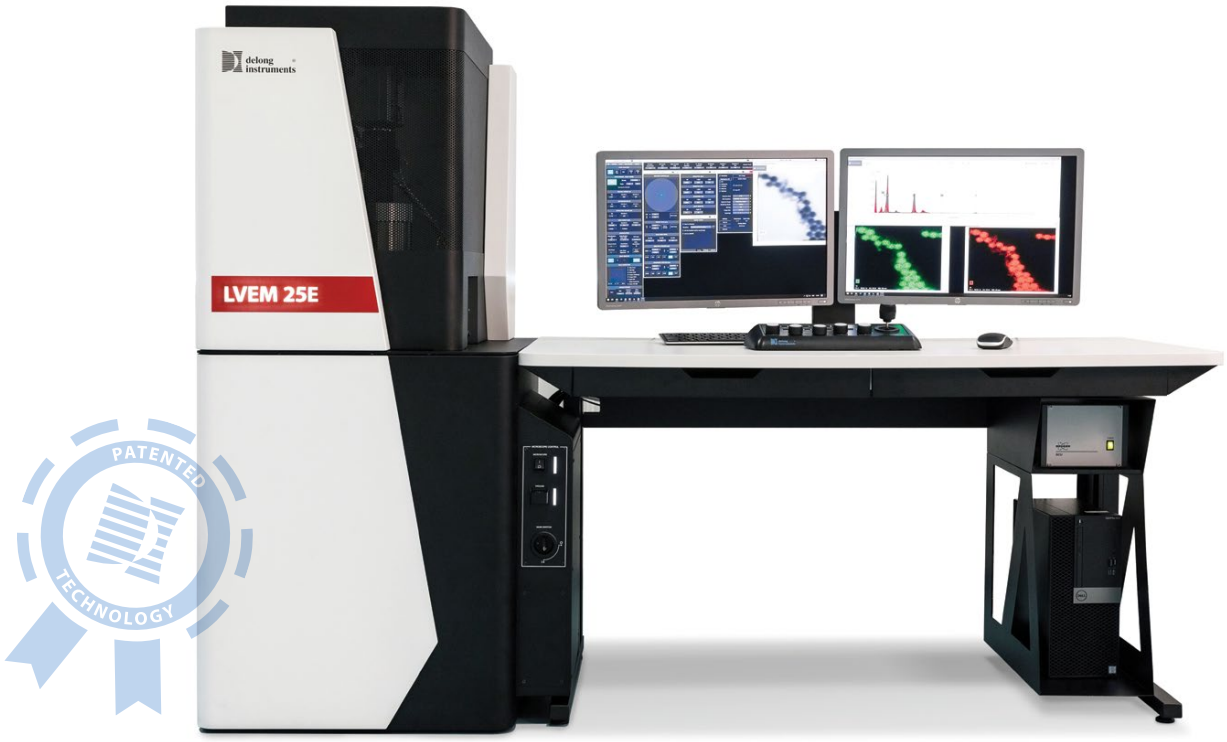
Compact Low Voltage Electron Microscope

All-in-One EM

delong instruments®

... your way to electron microscopy

INTRODUCING THE LVEM 25E



Multiple imaging modes in one instrument

- Equipped with TEM, STEM, SEM, EDS, ED, DF and HAADF modes
- Easily switch between imaging modes via intuitive software
- Bright field and dark field imaging in TEM, with bright field, dark field, and HAADF imaging available in STEM
- SEM mode (BSE) for surface imaging
- Energy Dispersive Spectroscopy (EDS) for elemental analysis
- Electron Diffraction (ED) for understanding crystal structure

Fully integrated and portable design

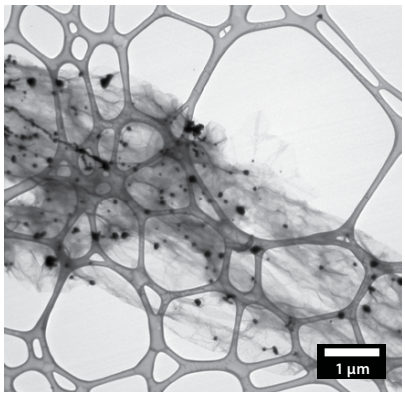
- Extremely compact, space-saving and portable design
- Single-plug installation in nearly any laboratory environment
- No special facility requirements (no cooling, power or anti-vibration isolation needed)

High contrast and resolution for standard samples

- Unmatched contrast of biologic and light material samples
- Meaningful results with reduced staining
- Image resolution as good as 1.0 nm
- Designed for conventionally prepared samples
- Super-fast sample exchange

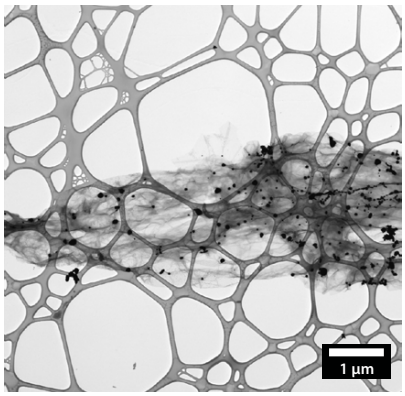
YOUR WAY TO ELECTRON MICROSCOPY

Equipped with TEM, STEM, SEM, EDS and ED modes, the LVEM 25E provides users with a unique option to obtain multiple data results from one sample – you can easily switch between the imaging modes using the intuitive LVEM software.



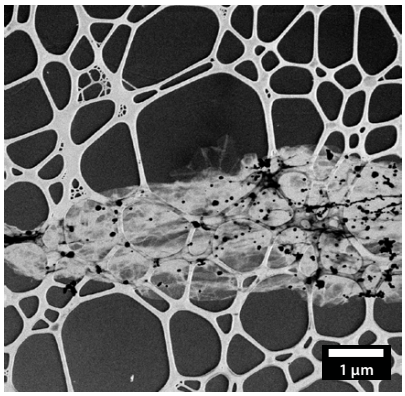
TEM

Imaging in 25 kV TEM mode delivers high-frame-rate live imaging with excellent contrast, enabling precise size, shape, and structural analysis at the nanoscale.



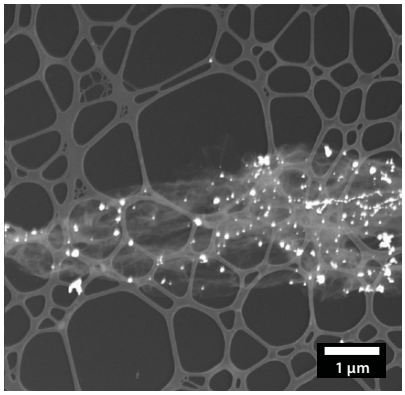
STEM

Imaging at lower accelerating voltages with the 10 kV and 15 kV STEM modes provides even higher contrast levels and allows for analysing thicker samples.



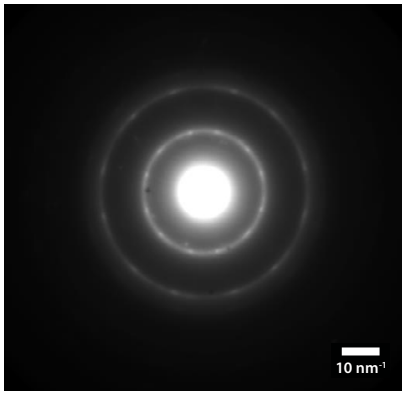
Dark Field

TEM dark-field imaging is selective for a chosen diffraction spot, revealing particular domains or defects. STEM dark-field (DF) and high-angle annular dark-field (HAADF) modes provide enhanced signal for diffraction-sensitive and Z-contrast imaging, respectively.



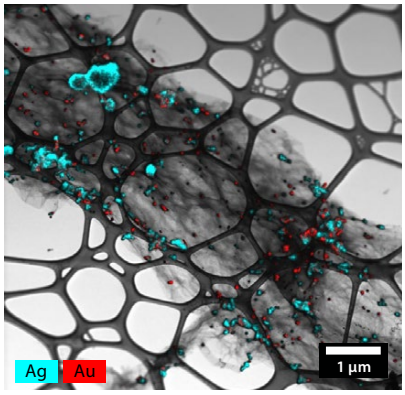
SEM

The SEM mode (BSE) enables detailed surface analysis, providing insight into sample morphology, surface topography, and material contrast.



ED

Electron diffraction enables structural characterization of crystalline materials in TEM mode, allowing identification of crystal structure, phase, and orientation directly from selected areas of the sample.



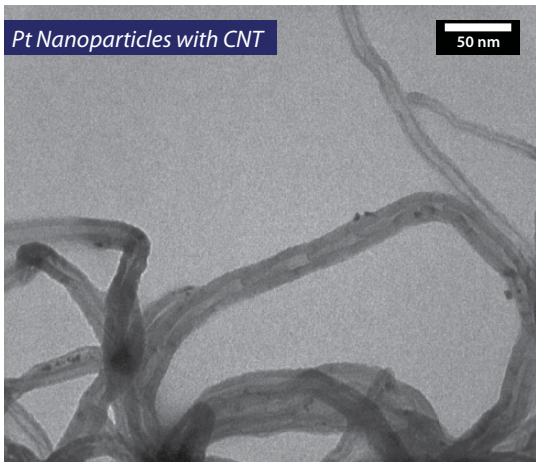
EDS

The EDS mode enables elemental analysis in TEM, STEM, and SEM modes. In STEM and SEM, it also supports elemental mapping and line scans, with results that can be directly overlaid on structural images for combined structural and compositional evaluation.

Sample: Reduced graphene oxide with Au and Ag nanoparticles, Bytesnikova Z., MENDELU

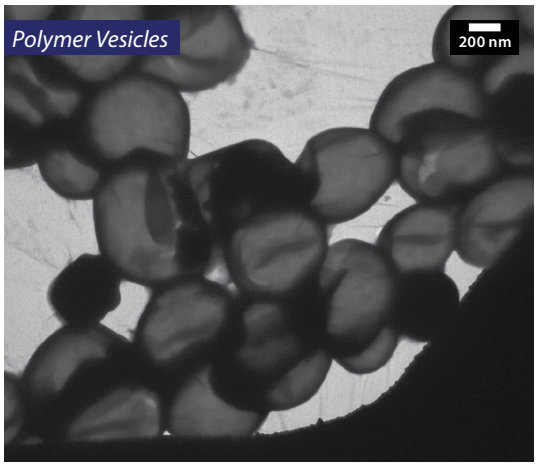
MATERIAL SCIENCE APPLICATIONS

The all-in-one LVEM 25E provides its users with a never-before-seen level of imaging versatility. For users in materials science, this device provides the possibility to not only measure internal and external structures, but also to analyse the chemical composition of the sample, all in a single device. The advanced software assists the user by automatically setting column alignments and aperture positions. A super-fast sample exchange further enhances imaging throughput.



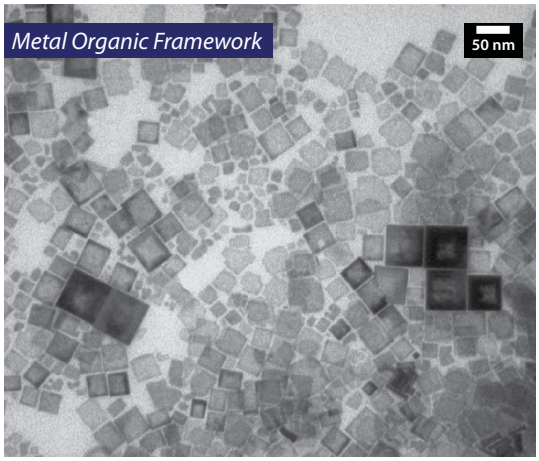
Nanomaterials

Capture shape, structure and size distributions of nanoparticles through high contrast TEM and SEM measurements to reveal detailed nanoscale features.



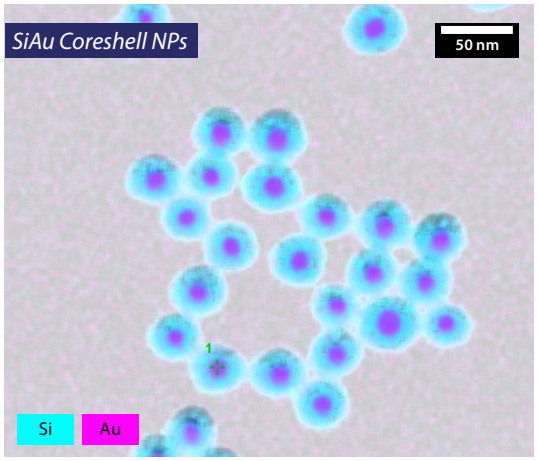
Polymers

Understand sample morphology and detect imperfections in the crystalline structure of polymeric materials using high contrast TEM measurements and detailed ED data.



Chemistry

Quickly understand the quality and purity of your samples, or the effectiveness of a new synthesis protocol, using high-contrast TEM and SEM images and EDS data.



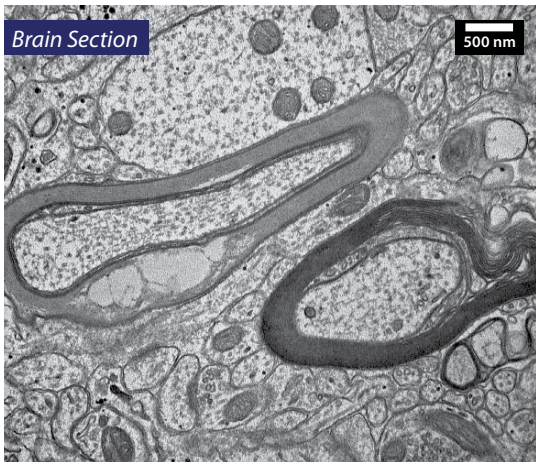
Combined Materials

Characterize mixtures of materials for mixture ratio, sample purity, presence of contaminants and other aspects of your samples.

For more information, see LVEM 25E application brochure.

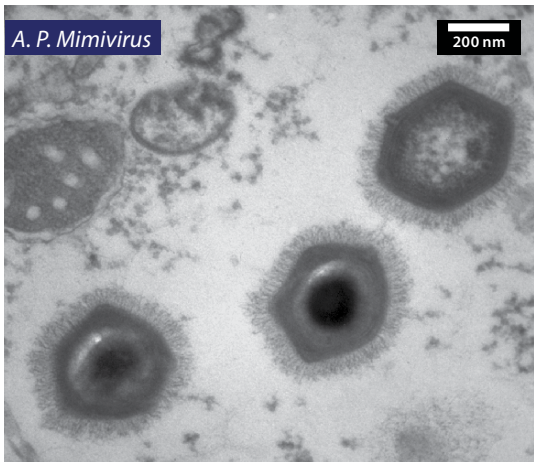
LIFE SCIENCE APPLICATIONS

The LVEM 25E is the ideal imaging device for applications in life sciences. Equipped with five imaging and analysis modes, it can push research to the next level. Super-fast sample exchange and enhanced automation make the LVEM 25E a practical and easy-to-use tool for routine imaging applications. The LVEM 25E provides well-contrasted and highly detailed images from samples prepared with standard preparation protocols and provides the option to obtain the same level of detail with reduced staining.



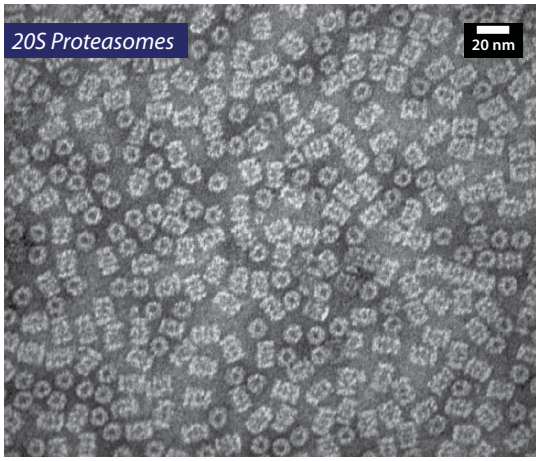
Pathology

Capture high-throughput images of thin sections prepared using standard protocols or analyse structures typically hidden with stain using reduced staining protocols. Combine TEM with SEM measurements to check basic surface characteristics and sample quality.



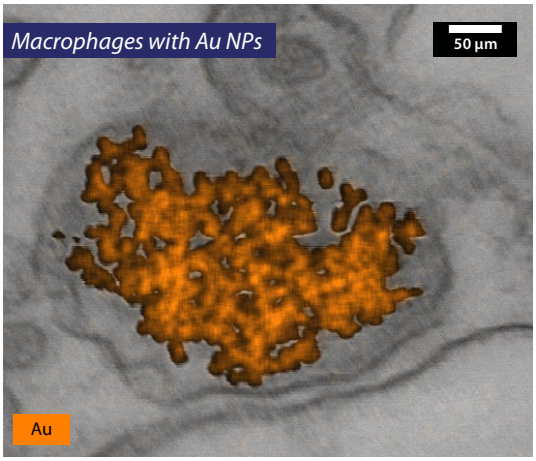
Virology

Quickly and reliably measure critical details about the quantity, size, shape, and capsid structures of even the smallest of viruses. Use the STEM mode to analyse the internal structures of larger viruses.



Biochemistry

Capture high-contrast negatively stained images of various biomaterials – such as proteins – with reduced stain to study size, shape, and structure. Or eliminate the stain completely to learn about these materials in a completely new way.



Immunology and Oncology

Facilitate the study of thin-sectioned immunolabeled biological samples with the flexibility of imaging unstained, but tagged, thin sections using TEM and STEM imaging modes combined with EDS data.

For more information, see LVEM 25E application brochure.

KEY TECHNICAL FEATURES

Integrated Design

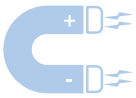
Compact and portable

The completely self-contained design maximizes the choice of installation locations, and for the first time, enables a truly effortless relocation of the electron microscope.

No Special Facilities

Worry-free installation

The LVEM 25E can be readily installed in most spaces without the need for special electrical or plumbing considerations. Simply plug it into a standard electrical outlet and put it into operation in just a few hours.



Permanent Magnet Lenses

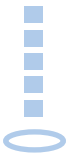
No cooling required

The unique LVEM platform employs permanent magnet lenses and makes the device compact, robust and easy to use while eliminating the need for any cooling.

Fast and Easy Vacuum Recovery

Automated soft bake and gun conditioning

The LVEM 25E reduces downtime should there be a loss of vacuum. With the automatic soft bake and gun conditioning functions, recovering the vacuum is fast and does not require a service visit.



Direct Beam Measurement

Low dose quantification

This LVEM 25E function enables the users to measure sample irradiation.

Automated Features

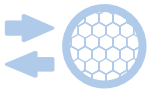
Optimal imaging conditions

Automated correction and control of beam alignment, coarse focus, objective lens astigmatism and aperture position, minimizes the need for the operator to manually correct them. This means the LVEM 25E is always ready to image with optimal performance.

Two-stage magnification

Robust & Powerful

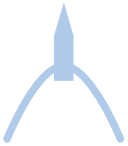
In a unique LVEM design, light optics provide further magnification of the electron beam image, providing the users with stable and reliable performance.



Rapid sample exchange

High-throughput imaging

A redesigned vacuum system, employing an integrated and maintenance free turbomolecular pump, combined with vibration free ion getter pumps, allows for a super-fast sample exchange time and produces an ultra-high vacuum imaging environment, free from contamination.



Field Emission Gun

Highest contrast

A 25 kV Schottky type FEG with very high brightness and spatial coherency allows for strong interactions between the emitted electrons and the sample. This is what provides the LVEM 25E with uniquely high contrast.

Assisted sample exchange

Safety for less experienced users

An optional sample exchange wizard guides users through the sample insertion and removal sequence step by step, making the LVEM 25E operation safe even for new or occasional users.

SPECIFICATIONS

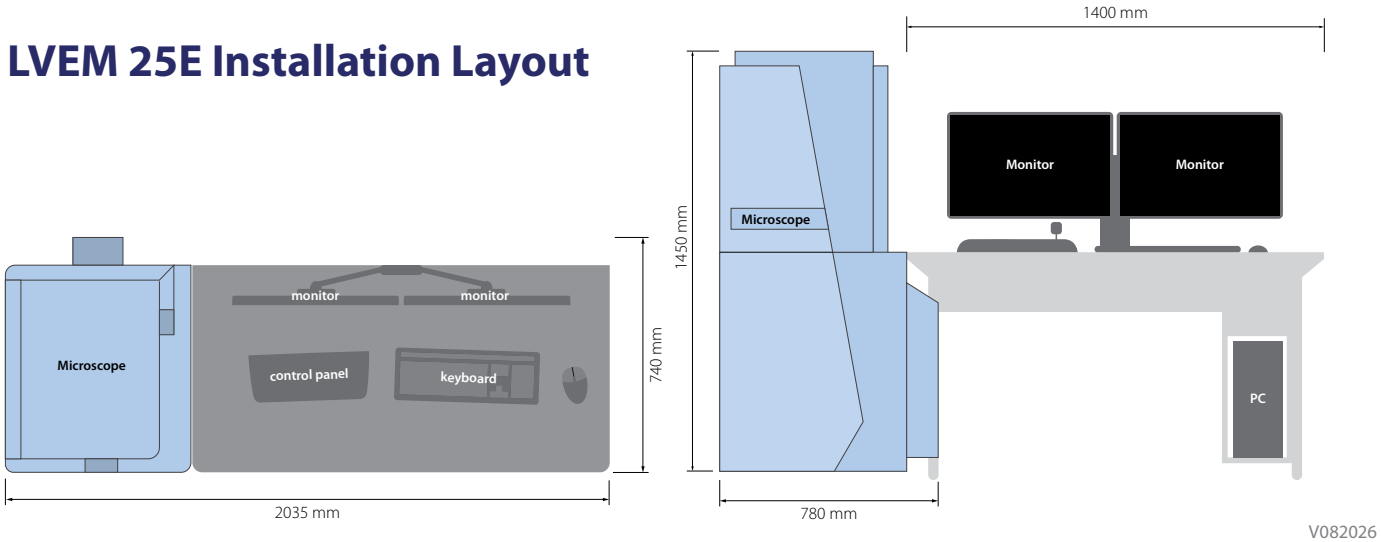
OPERATION			
Electron gun		Schottky field emission gun	
Specimen size		Standard Ø 3.05 mm TEM grids	
Objective lens		Magnetostatic	
Projective lens		Electrostatic	
Specimen movement		x, y: ± 1 mm	z: ± 0.5 mm
Tilt holder		± 20°	
IMAGING MODES			
TEM			
Nominal accelerating voltage		25 kV	
Resolution		1.0 nm	
TOTAL MAGNIFICATION			
On display	3,800–3,000,000×	At camera sensor	160 – 64,000×
MAGNIFICATION IN LOW MAG REGIME			
On display*	1,300×	At camera sensor	54×
FIELD OF VIEW			
Field of view		100 – 0.25 µm	
Field of view in Low mag regime		225 µm	
TEM IMAGE CAPTURE			
Camera		sCMOS	
Sensor size		2,048 × 2,048 pixels	
Digitalization		16-bits	
ELECTRON DIFFRACTION			
Probe size		500 – 8,000 nm	
Camera length (binning 2x2)		2,000 – 5,000 pixels	
Camera constant (binning 2x2)		17 – 40 nm pixels	
STEM		STEM 10	STEM 15
Nominal accelerating voltage		10 kV	15 kV
Resolution		1.0 nm	1.0 nm
Magnification		1150–3,600,000×	1300–4,600,000×
Maximum field of view		81 µm	56 µm
STEM IMAGE CAPTURE			
up to 2,048 × 2,048 pxls/8 bits			
SEM (BSE DETECTOR)			SEM 15
Nominal accelerating voltage			15 kV
Resolution			2.0 nm
Magnification			1300–4,600,000×
Maximum field of view			105 µm

SEM IMAGE CAPTURE	
Up to 2,048 × 2,048 pxls/8 bits	
EDS	
Detector type	Silicon Drift Detector (SDD)
Detector active area	30 mm^2
X-Ray Window	Windowless
Energy Resolution	Mn Kα ≤ 129 eV
Maximum throughput	130 000 cps
Hardware integration	Fully embedded
Software	Esprit
VACUUM	
AIRLOCK SYSTEM	
Diaphragm and turbomolecular pump	10^{-5} mbar
OBJECT SPACE	
Ion getter pump	10^{-8} mbar
ELECTRON GUN	
Ion getter pump	10^{-9} mbar
MAINS CONNECTION & POWER CONSUMPTION	
Standby / Operation / Maximum	60 VA / 410 VA / 600 VA
Voltage / Frequency	100 – 240 V / 50 – 60 Hz
DIMENSIONS AND WEIGHT	
MICROSCOPE	
Weight	220 kg
Dimensions (w × d × h)	780 × 740 × 1450 mm
DIAPHRAGM PUMP	
Weight	3 kg
Dimensions (w × d × h)	300 × 160 × 200 mm
TABLE	
Weight	50 kg
Dimensions (w × d × h)	1400 × 700 × 760 mm
MAINS CONNECTION	
Voltage / Frequency	100 – 240 V / 50 – 60 Hz
INSTALLATION BENEFITS	
No cooling water needed	
Only one single phase plug needed	
Portable design	

**valid for image on display at binning 2×2*

Patent protected in Europe (EP 4364179), Japan (JP 7705968) and South Korea (KR 10-2921035)

LVEM 25E Installation Layout



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LVEMs are supported globally by sales and service offices in local markets. Please contact us directly for any questions you have or to be referred to your local distributor.

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