

LIFE SCIENCE

FLUOVIEW™ FV4000/FV4000MPE

Confocal Laser Scanning Microscope

Multiphoton Laser Scanning Microscope

Technical Documentation

FLUOVIEW System Specifications

Specifications: FV4000/FV4000MPE

Scanner	Scanner type	Galvo scan unit: galvanometer scanner Hybrid scan unit: Galvanometer scanner and resonant scanner	
	Scanning mirror	Silver coated	
	Galvanometer scanner (normal imaging)	Scanning resolution	64 × 64 to 4096 × 4096 pixels
		Scan speed (one way)	Pixel dwell time; 1 μs–1000 μs. 512 × 512 pixels; 0.92 fps 1024 × 1024 pixels; 0.46 fps
		Scan speed (round trip)	Pixel dwell time; 0.25 μs–0.5 μs. 512 × 512 pixels; 4.0 fps 256 × 256 pixels; 15.8 fps With interlace scan 512 × 512 pixels; 15.8 fps, 256 × 256 pixels; 60.2 fps
		Optical zoom	0.9X–50X in 0.01X increments
		Scan rotation	Free rotation (360 degrees) in steps of 0.1 degree
		Scanning mode	PT, XT, XZ, XY, XZT, XYT, XYZ, XYλ, XYZT, XYλT, XYλZ, XYλZT
		ROI scanning	Rectangle clip, ellipse clip, polygon clip, free area clip, line, free line and point, tornado mode only for stimulation
	Resonant scanner (high-speed imaging)	Scanning resolution	512 × 32 to 1024 × 1024 pixels
		Scan speed (one way)	Pixel dwell time; 0.033 μs. 1024 × 1024 pixels; 7.6 fps, 1024 × 512 pixels 15 fps, 1024 × 32 pixels 202 fps
		Scan speed (round trip)	Pixel dwell time; 0.033 μs. 1024 × 1024 pixels; 15 fps, 1024 × 512; 30 fps, 1024 × 32 pixels 438 fps
		Optical zoom	0.9X–8X in 0.01X increments
		Scanning mode	XT, XZ, XY, XZT, XYT, XYZ, XYλ, XYZT, XYλT, XYλZ, XYλZT
		ROI scanning	Rectangle clip, line
	Pin hole	Single motorized pinhole, pinhole diameter ø50–800 μm (1 μm steps)	
	Field number (FN)	20	
	Dichroic mirror turret	Eight positions (high-performance DMs and 10/90 mirror; high reflectance mirror for MPE)	
	Laser port	One port	
	Optional laser port	Maximum two optional ports	
	Laser power monitor	Equipped	
Lasers for SPE confocal	Visible lasers	Main combiner	405 nm: 50 mW, 488 nm: 20 mW, 561 nm: 20 mW, 640 nm: 40 mW. One optional laser port for the sub laser combiner or optional single laser unit. Fiber connected to the scan unit's laser port
		Sub combiner	Maximum three laser units as follows: 445 nm: 75 mW, 514 nm: 40 mW, 594 nm: 20 mW, fiber connected to main laser combiner
		Optional single laser	445 nm: 75 mW, 514 nm: 40 mW, or 594 nm: 20 mW, directly connected to main laser combiner
		Modulation	AOTF (0% – 100%, 0.1% step)
	NIR lasers	NIR combiner	Maximum three laser units as follows 685 nm: 40 mW, 730 nm: 30 mW, 785 nm: 100 mW Fiber connected to the scan unit's optional laser port
		Modulation	Direct modulation (0%, 2% – 100%, 0.1% step)
Spectral detector for SPE confocal	Detector module	Cooled silicon photomultiplier broadband type or red-shift type; two channels. A maximum of three units can be configured (maximum six channels).	
	Spectral method	Motorized volume phase holographic transmission diffraction grating, motorized adjustable slit. Detectable wavelength range: 400 nm – 900 nm, selectable wavelength bandwidth: 1–100 nm, minimum lambda step 1 nm, wavelength resolution: 2 nm	
	Dichromatic mirror turret	Eight positions (high-performance DMs and mirror)	
	Image bit depth	16-bit, HDR photon counting is available (1G cps)	

Specifications: FV4000/FV4000MPE (cont'd)

Fluorescence illumination unit	External LED fluorescence light source, fiber adapter to the scan unit, motorized switching between the LSM light path and fluorescence illumination
Transmitted light detector unit	Multi-alkali PMT one-channel, transmitted light source is coupled, motorized switching between detector and transmittance illumination light source
Analog and digital in/out box	Four-channel analog signal input, six-channel digital TTL trigger input, five-channel digital TTL trigger output; scanner timing output
Control unit	OS: Windows 11 Professional for Workstations 64-bit (English)

Specifications: FV4000MPE

MPE laser	Automatic laser introduction optic		Introduction optic with AOM attenuation (0%–100%, 0.1% increments) for each laser line, including fully automated beam expander, XY shifter, and two-axis angle alignment (four-axis quadralign auto alignment optics). Direct coupling to the scanning unit’s laser port.	
	Qualified IR pulsed lasers with negative chirp		Spectra-Physics products: Mai Tai eHP DS -OL: 690–1040 nm InSight X3 -OL: 680–1300 nm InSight X3+ -OL: 680–1300 nm InSight X3 DA -OL: 700–1300 nm+1045 nm fixed line InSight X3+DA-OL: 700–1300 nm+1045 nm fixed line Coherent products: Chameleon Vision S Olympus: 690–1050 nm Chameleon Discovery NX TPC: 660–1320 nm + 1040 nm fixed line	
		One Laser System	Dual Lines System	Twin Lasers System
	Main IR pulsed line	Mai Tai eHP DS -OL InSight X3 -OL InSight X3+ -OL Chameleon Vision S Olympus	InSight X3 DA -OL Main Output InSight X3+ DA -OL Main Output Chameleon Discovery NX TPC OPTICAL OUTPUT A	Mai Tai eHP DS -OL InSight X3 -OL InSight X3+ -OL
	Second IR pulsed laser line	—	InSight X3 DA -OL Dual Output InSight X3+ DA -OL Dual Output Chameleon Discovery NX TPC OPTICAL OUTPUT B	Mai Tai eHP DS -OL
	IR laser combining optic	—	Motorized light path switcher with DM900, DM1000R, and DM1100 to combine two IR wavelengths for imaging	
MPE detector	Detector module	Cooled silicon photomultiplier (broadband type or red-shift type); two channels; a maximum of three units can be configured (maximum six channels total) in the epi-light path. Detectable wavelength: 400 nm–800 nm		
	Filter cube	Large-diameter filter cube to efficiently collect scattered light (Φ45 mm)		
	Image bit depth	16-bit, HDR photon counting is available (1G cps)		
TruResolution objective	FV30-AC10SV	Mag: 10X, NA: 0.6, W.D.: 8 mm; immersion: SCALEVIEW-A2 (water, silicone oil, and normal oil are available)		
	FV30-AC25W	Mag: 25X, NA: 1.05, W.D.: 2 mm; immersion: water		

Microscope Specifications

Specifications: Inverted (IX83) Microscope Frame

Microscope frame	Frame	IX83P2ZF
	Revolving nosepiece	Motorized sextuple revolving nosepiece (DIC slider can be attached), simple waterproof structure
	Focus	Motorized; stroke: 10.5 mm; minimum increment: 0.01 µm; maximum nosepiece movement speed: 3 mm/s
	Light path selection	Motorized 0:100/50:50/100:0 (left side port: BI port) with laser interlock
	Transmitted illumination pillar	Pillar tilt mechanism (30° inclination angle with vibration reducing mechanism) with laser interlock Condenser holder (with 88 mm stroke, refocusing mechanism) Field iris diaphragm adjustable
Transmitted illumination		High color reproducible LED light source
Observation tube		Tilting binocular, 10X eyepieces, field number 22
Stage	Mechanical stage with right handle	Stage stroke: X: 114 mm × Y: 75 mm, stage position locking function
	Motorized stage	3rd-party motorized stage options are available
Condenser	Motorized long working distance universal	W.D. 27 mm, NA 0.55, motorized turret with 7 position slots for optical devices (three positions for ø30 mm and four positions for ø38 mm), motorized aperture and polarizer
	Long working distance universal	W.D. 27 mm, NA 0.55, manual turret with five positions for optical devices (three positions for ø30 mm and two position for ø38 mm)
Fluorescence mirror turret		Motorized turret with eight positions, built-in shutter, simple waterproof structure; position 1: mirror for LSM, position 2: NRDM for MPE
Focus compensator	TruFocus Red	Offset method (focus search, one-shot focus, continuous focus), class 1 laser product. Available wavelength: 400 nm–800 nm

Specifications: Upright (BX63LF) Microscope Frame for Documentation

Microscope frame	Focus	Built-in motorized nosepiece focus Stroke: 20 mm; minimum increment: 0.01 µm; maximum nosepiece movement speed: 3 mm/s
	Transmitted illumination	Built-in Köhler illumination for transmitted light, light intensity LED indicator, built-in motorized field stop
	Transmitted light source	12 V 100 W halogen bulb (pre-centered)
Observation tube		Erect image tilting trinocular, light path exchange; BI: camera 100:0/0:100
Revolving nosepiece	Motorized	Motorized sextuple revolving nosepiece (DIC slider attachable)
	Manual	Manual coded sextuple nosepiece (DIC slider attachable)
Stage	Mechanical stage	Ceramic-coated coaxial stage with left- or right-hand low drive control: with rotating mechanism and torque adjustment mechanism, optional rubber grips, and available stage handle extension adapter
	Motorized stage	3rd-party motorized stage options are available
Condenser	Motorized	Motorized universal condenser (NA 0.9, motorized eight-position turret, aperture stop, polarizing filter in/out mechanism, and top lens swing out mechanism)
	Manual	Universal (NA 0.9), for 1.25X–100X (swing-out: 1.25X–4X)
Fluorescence mirror turret		Motorized turret with eight positions, position one: mirror for LSM with laser interlock

Specifications: Upright (BX63LF) Microscope Frame for Electro-Physiology

Microscope frame	Focus	Built-in motorized nosepiece focus Stroke: 20 mm; minimum increment: 0.01 µm; maximum nosepiece movement speed: 3 mm/s
	Transmitted illumination	Built-in Köhler illumination for transmitted light, light intensity LED indicator, built-in motorized field stop
	Polarization filter wheel	Four-position manual filter wheel for polarizer and IR filter for IR-DIC (775 nm)
	Transmitted light source	12 V 100 W halogen bulb (pre-centered)
Observation tube		Erect image tilting trinocular, light path exchange; BI: camera 100:0/0:100
Manual nosepiece	Slide nosepiece	Coded slide nosepiece (DIC prism; WI-DICTHTA2 slide IN/OUT), two positions for 45 mm and 75 mm objectives
	Swing nosepiece	Coded swing nosepiece (DIC prism; WI-DICTHTA2 slide IN/OUT), two positions for LUMPLFLN W series objectives
	Revolving nosepiece	Coded sextuple nosepiece (DIC slider attachable)
Stage	Mechanical stage	Cross movement mechanism, XY axes handle torque adjustable (rack & pinion), movement range: 43 mm (Y) × 50 mm (X)
	Motorized stage	3rd-party motorized bridge stage options are available
Condenser	Universal	Universal condenser, NA: 0.8, W.D.: 5.7 mm, turret: four positions for DIC prisms; built-in quarter wavelength plate
	Manual	DIC condenser, single DIC prism attachable, built-in quarter wavelength plate
Two-deck fluorescence mirror turret		Upper deck; motorized turret with eight positions, position one: mirror for MPE with laser interlock, position two: mirror for LSM with laser interlock Lower deck; motorized slider for NDM, port for NDD

Specifications: Gantry (GF) Microscope Frame

Microscope frame	Focus	Built-in motorized nosepiece focus Stroke: 20 mm; minimum increment: 0.01 µm; maximum nosepiece movement speed: 3 mm/s
	Maximum space for sample (W × H × D)	640 × 355 × 520 mm (25.2 × 14 × 20.5 in.) without stage
Observation tube		Erect image tilting trinocular; light path exchange; BI: camera 100:0/0:100
Manual nosepiece	Slide nosepiece	Coded slide nosepiece (DIC prism; WI-DICTHTA2 slide IN/OUT), two positions for 45 mm and 75 mm objectives
	Swing nosepiece	Coded swing nosepiece (DIC prism; WI-DICTHTA2 slide IN/OUT), two positions for LUMPLFLN W series objectives
Two-deck fluorescence mirror turret		Upper deck; motorized turret with eight positions, position one: mirror for MPE with laser interlock, position two: mirror for LSM with laser interlock Lower deck; motorized slider for NDM, port for NDD
Stage	Manual Z stage	Lab jack type, stroke about 70 mm with adjustable upper limit stopper
	Manual XY stage	Stroke 60 mm for XY with stage stopper
	Motorized stage	3rd-party motorized stage options are available

Software Specifications

		cellSens FV	cellSens Dimension	cellSen FV Desktop	cellSens FV Viewer
Layout	Customize and create layouts of tool windows and the workspace		X		
Basic image acquisition	Scanner, detector, and illumination settings for acquisition		X		
	Simultaneous or sequential multi-channel image acquisition		X		
	Averaging or accumulation scan		X		
	Time-lapse image acquisition by defining the interval and repeat number		X		
	Z-stack image acquisition by changing the microscope's Z position		X		
2D view	Single view/tile view/three sides/projection display		X	X	X
	LUT adjustment/auto contrast		X	X	X
	Photon number display		X	X	X
3D view	3D/4D rendering by MIP/alpha blend/iso surface		X	X	
Laser control	VIS/NIR laser control for SPE		X		
	IR laser control for MPE		FV40S-MPL		
Microscope control	Microscope control to change objectives and light path		X		
	TruFocus: one-shot/continuous Z-drift compensation during time-lapse imaging		X		
	Parfocal and parcentral correction		X		
Advanced image acquisition	Multi-area	Multiposition imaging for multi-area time-lapse/image stitching by controlling the motorized stage.	FV40S-MS		
	Well Navigator	Easily set the acquisition settings for each well.	FV40S-MS FV40S-WELNVG		
	Fast Z-stack image	Fast Z acquisition using piezo Z motor.	FV40S-PIEZO		
	TruSight	Remove noise and restore image resolution by CI deconvolution processing. Automated optimization of image acquisition settings and processing.		CI Deconvolution	
	Super resolution	Obtain super resolution images by optimization of acquisition and OSR processing.	FV40S-OSR		
	TruResolution	Automatic spherical aberration compensation by adjusting a motorized correction collar.	FV40S-ACC		
	Photo stimulation sequence	Sequential image acquisition and photostimulation with precise time accuracy.	X		
	Multipoint/mapping stimulation	Sequential point scan at predefined points or points in a rectangular ROI.	FV40S-MM		
	Sequence manager	Create a protocol of complex imaging sequences and execution at high time precision.	FV40S-SEQM		

			cellSens FV	cellSens Dimension	cellSen FV Desktop	cellSens FV Viewer
Advanced image acquisition	Trigger	Trigger in to start/stop image acquisition. Trigger out to other equipment.	X			
	Stitching	Stitch images acquired using the multi- area function to create a wide area image.	FV40S- MS		X	
Image processing	Processing	Extract, append, merge	X	X	X	
		Rolling average / accumulation	X		X	
		Maximum intensity projection	X	X	X	X
	Spectral unmixing	Distinguish different fluorochrome images with similar spectra from a lambda stack image. Remove fluorescence cross talk in multichannel images. Live processing is available.	X		X	
	Ratio	Create a ratio image by image modulation display. Live processing is available.	X		X	
	TruAI noise reduction	Denoise a resonant scanner image using a pre-trained neural network. Live processing is available.	FV40S- AINR		FV40S- AINR	
	Map image processing	Create a reaction map from multipoint/ mapping stimulation data.	FV40S- MM		X	
Image analysis	Interactive 2D measurement			X		
	Intensity plot over time/Z			X		
	Line profile			X		
	Object tracking			Tracking Count & Measure		
	Kymograph			X		
	Object analysis and classification			Count & Measure		
	FRAP analysis	Mobile/immobile fraction and $\tau/2$		Life Science Analysis		
	FRET analysis	Ratio/acceptor Photobleaching/ sensitized emission		Life Science Analysis		
	Colocalization analysis	Colocalization measurement		X		
Deep learning	Training of a neural network			Deep Learning		
	Inference using a trained network	Efficient segmentation analysis using deep learning		Deep Learning Count & Measure		
Remote development kit	Remotely control your FLUOVIEW system from custom software that you create		FV40S- RMTDK			

Objectives Specifications

UPLXAPO Series	Mag	NA	WD	IM	CC
UPLXAPO4X	4	0.16	13	Dry	na
UPLXAPO10X	10	0.4	3.1	Dry	na
UPLXAPO20X	20	0.8	0.6	Dry	na
UPLXAPO40X	40	0.95	0.18	Dry	Yes
UPLXAPO40XO	40	1.4	0.13	Oil	na
UPLXAPO60XO	60	1.42	0.15	Oil	na
UPLXAPO100XO	100	1.45	0.13	Oil	na

X Line objectives deliver simultaneously improved numerical aperture (NA) to acquire brighter and higher resolution images, image flatness for smoother image stitching and efficient image analysis, and chromatic aberration correction from 400 nm–1000 nm. X Line objectives enable you to acquire multicolor images with high accuracy and precision.

UPLSAPO Series	Mag	NA	WD	IM	CC
UPLSAPO30XS	30	1.05	0.8	Silicone oil	Yes
UPLSAPO30XSIR	30	1.05	0.8	Silicone oil	Yes
UPLSAPO40XS	40	1.25	0.3	Silicone oil	Yes
UPLSAPO60XW	60	1.2	0.28	Water	Yes
UPLSAPO60XS2	60	1.3	0.3	Silicone oil	Yes
UPLSAPO100XS	100	1.35	0.2	Silicone oil	Yes

These super apochromat objectives provide spherical and chromatic aberration compensation and high transmission from the visible to the near infrared. Using silicone oil or water immersion media, which have refractive indexes closely matching that of live cells, they achieve high-resolution imaging deep in living tissue.

UPLAPO-HR/ APON-TIRF Series	Mag	NA	WD	IM	CC
UPLAPO60XOHR	60	1.5	0.11	Oil	Yes
UPLAPO100XOHR	100	1.5	0.12	Oil	Yes
APON100XHOTIRF	100	1.7	0.08	Special oil	Yes
UAPON150XTIRF	150	1.45	0.08	Oil	Yes

Offering our highest numerical aperture values, these apochromat objectives are optimized for super resolution imaging.

PLAPON Series	Mag	NA	WD	IM	CC
PLAPON1.25X	1.25	0.04	5	Dry	na
PLAPON2X	2	0.08	6.2	Dry	na

For high-performance macro observation, these apochromat objectives provide sharp, clear, flat images without color shift, achieving high transmission up to the near-infrared region of the spectrum. They perform well for fluorescence, and brightfield observations.

PLAPON-SC Series	Mag	NA	WD	IM	CC
PLAPON60XOSC2	60	1.4	0.12	Oil	na

The high numerical aperture super-corrected 60X objective minimizes chromatic aberration to the utmost limit in the 405–650 nm spectrum. 0.1 µm or less axial chromatic aberration is provided in this range, and every objective is delivered with its measured data sheet.

UMPLFLN-W/ LUMPLFLN-W/ XLUMPLFLN-W/ LUMFLN-W Series	Mag	NA	WD	IM	CC
UMPLFLN10XW	10	0.3	3.5	Water	na
UMPLFLN20XW	20	0.5	3.5	Water	na
XLUMPLFLN20XW	20	1	2	Water	na
LUMPLFLN40XW	40	0.8	3.3	Water	na
LUMPLFLN60XW	60	1	2	Water	na
LUMFLN60XW	60	1.1	1.5	Water	Yes

These semi-apochromat, long-working distance, water-dipping objectives are used for confocal imaging in combination with electrophysiology.

XLPLN MPE Series	Mag	NA	WD	IM	CC
XLPLN10XSVMP	10	0.6	8	SCALEVIEW-A2 (water, silicone oil, and normal oil available)	Yes
XLPLN25XWMP2	25	1.05	2	Water	Yes
XLPLN25XSVMP2	25	1	4	SCALEVIEW-A2 (water and silicone oil available)	Yes
XLPLN25XSVMP2	25	0.95	8	SCALEVIEW-A2 (water and silicone oil available)	Yes
XLPLN25XGMP	25	1	8	80% glycerin in water (silicone oil and normal oil available)	Yes

Optimized for multiphoton excitation imaging, these objectives achieve high-resolution 3D imaging through fluorescence detection at a focal point of a large field of view.

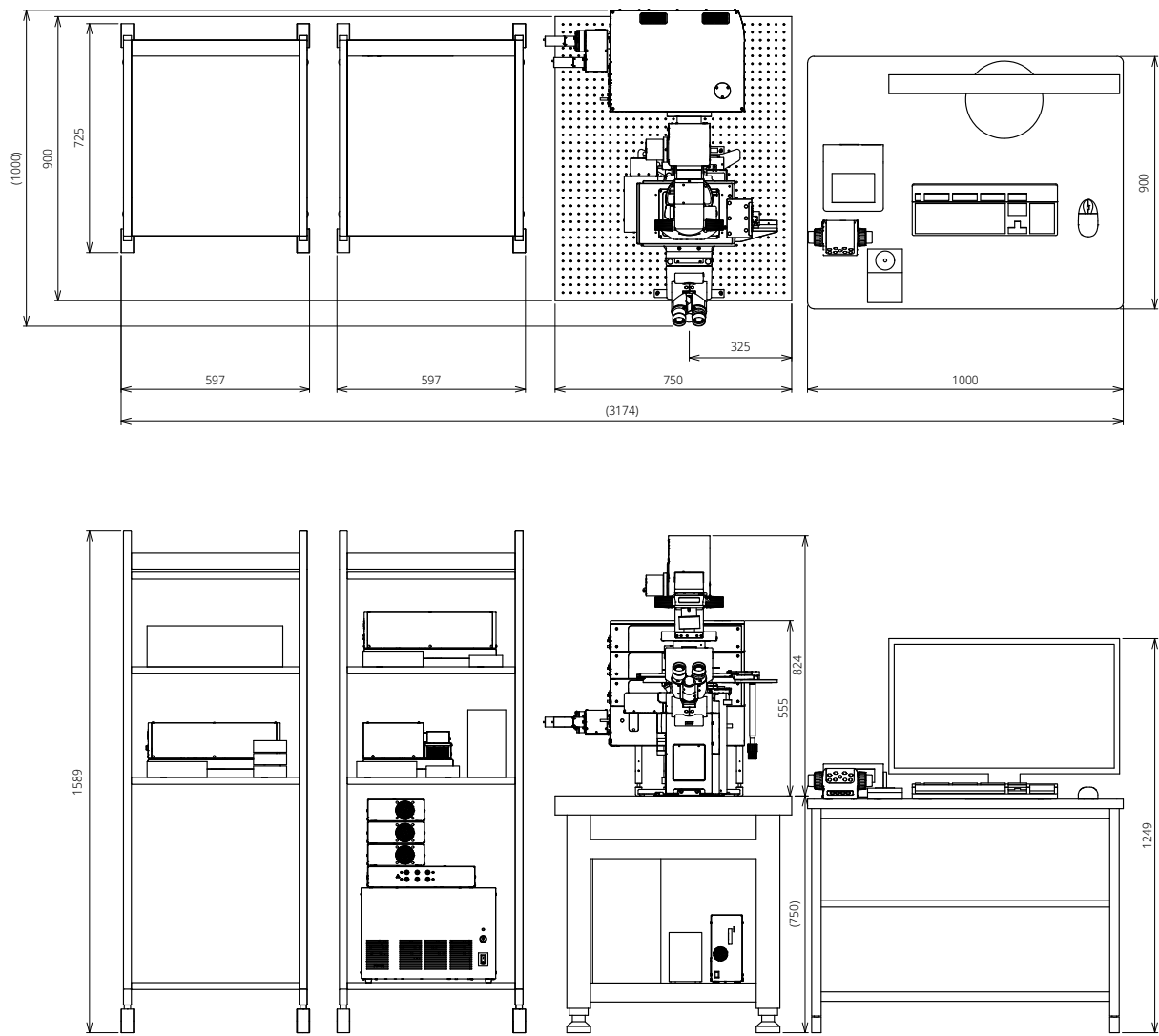
System Layout

Operation Environment

FV4000	Indoor use altitude	Max. 2,000 m (6562 ft)
	Ambient temperature	18 to 28 °C (64.4 to 82.4 °F); fluctuation range: ±2.5 °C (4.5 °F)
	Relative humidity	30 to 75%
	Supply voltage fluctuation	±10%
	Pollution degree	2 (in accordance with IEC60664-1)
	Installation (overvoltage) category	II (in accordance with IEC60664-1)
FV4000MPE	Indoor use altitude	Max. 2,000 m (6562 ft)
	Ambient temperature	20 to 25 °C (68 to 77 °F); fluctuation range : ±1 °C (1.8 °F)
	Relative humidity	30 to 75%
	Supply voltage fluctuation	±10%
	Pollution degree	2 (in accordance with IEC60664-1)
	Installation (overvoltage) category	II (in accordance with IEC60664-1)

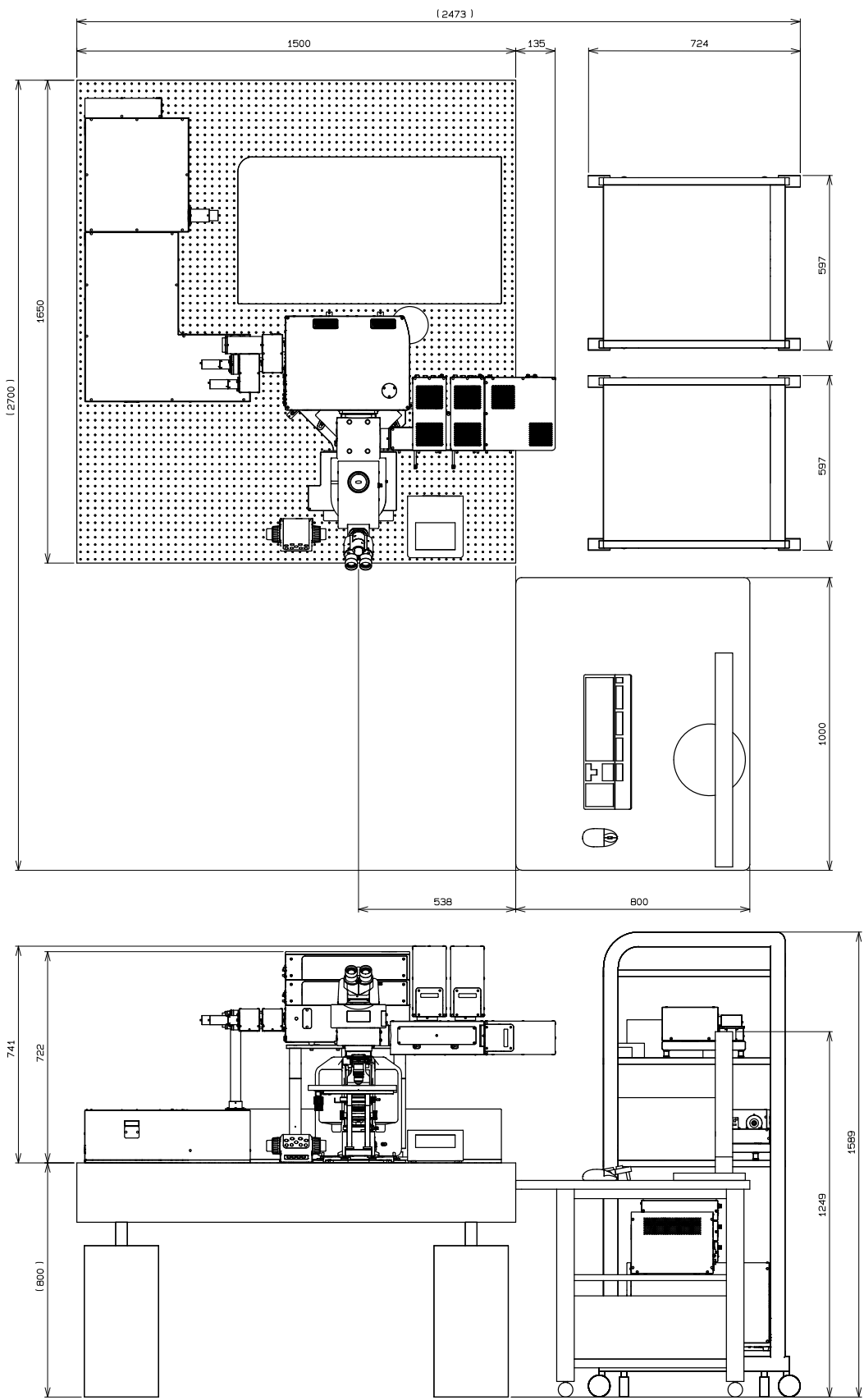
System Layout: FV4000

(unit: mm)

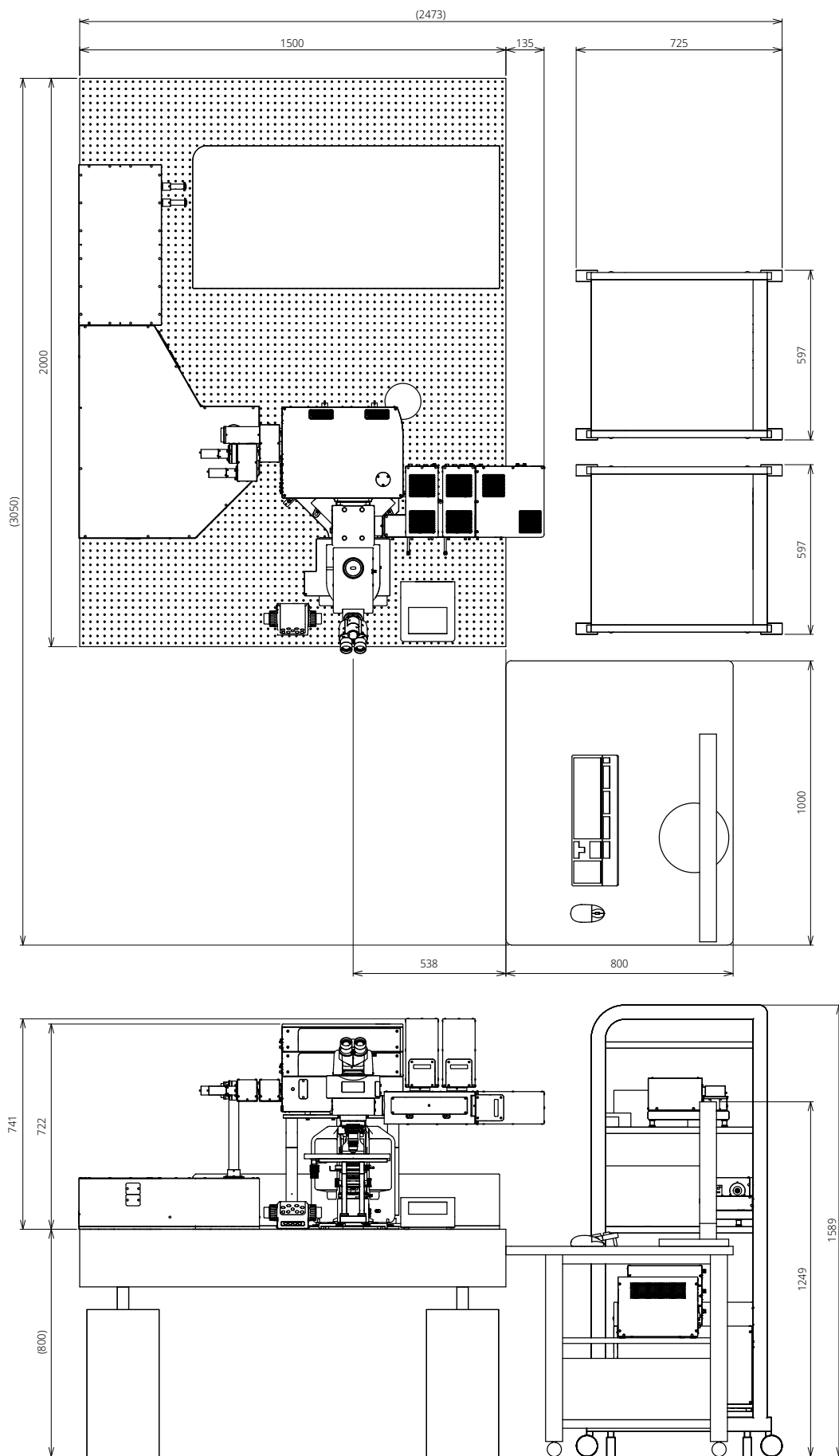


System Layout: FV4000MPE

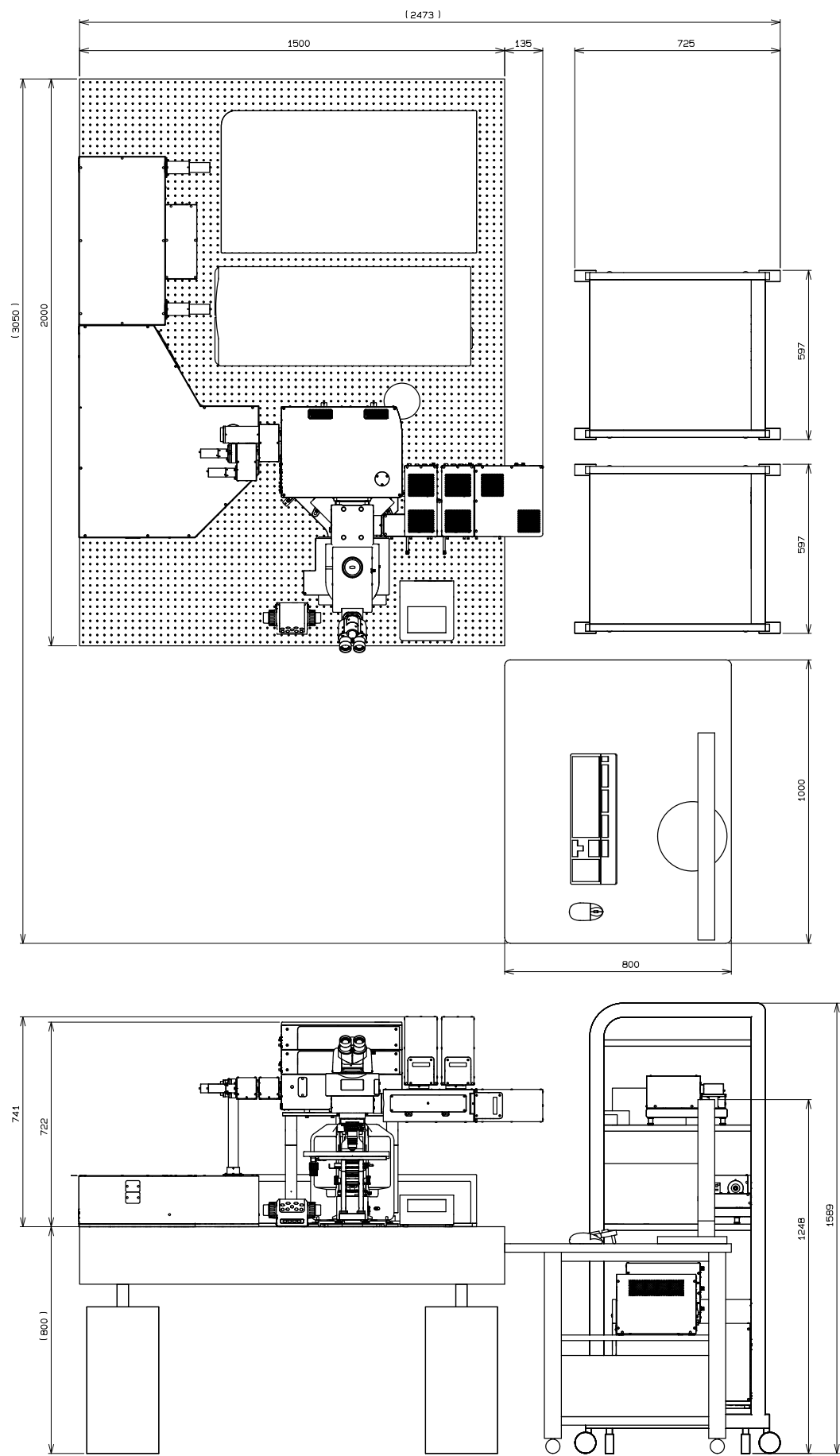
(unit: mm)



System Layout: FV4000MPE



System Layout: FV4000MPE





VISIBLE AND INVISIBLE
LASER RADIATION
AVOID EYE OR SKIN
EXPOSURE TO DIRECT OR
SCATTERED RADIATION
CLASS 4 LASER PRODUCT
OUTPUT: 12W MAX
PULSE DURATION: 40fs-CW
WAVELENGTH: 680-1300nm
OUTPUT: 500mW MAX CW
WAVELENGTH: 400-800nm
IEC 60825-1:2014
EN 60825-1:2014/A11:2021



WARNING - VISIBLE AND
INVISIBLE LASER RADIATION
AVOID EXPOSURE TO BEAM
CLASS 3B LASER PRODUCT
500mW MAX CW 400-800nm
IEC 60825-1:2014
EN 60825-1:2014/A11:2021

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- Illumination devices for microscope have suggested lifetimes. Periodic inspections are required. Please visit our website for details.

This product is designed for use in industrial environments for the EMC performance. Using it in a residential environment may affect other equipment in the environment.

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