



Fixed Stage Microscope for Electrophysiological Research

ECLIPSE FN1

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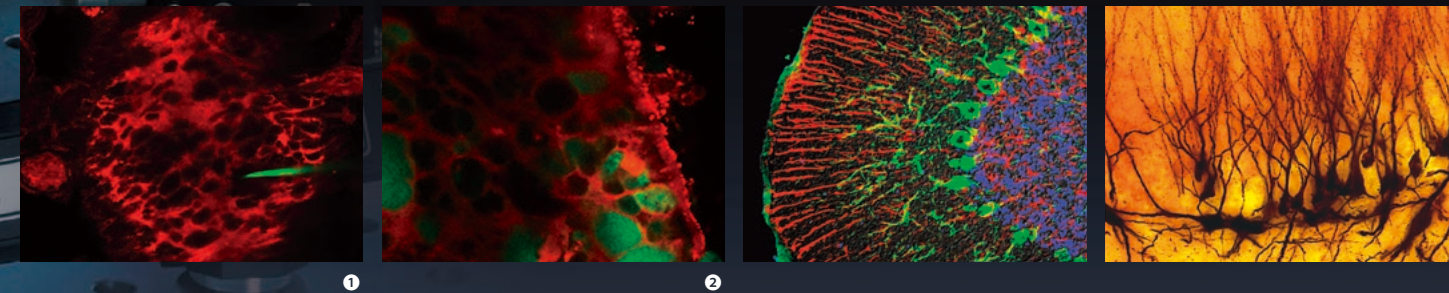
Shedding New Light On **MICROSCOPY**



# ECLIPSE FN1

Fixed Stage Microscope for Electrophysiological Research

## The Research Microscope Optimized for Observation and Analysis of Electrophysiology



The ECLIPSE FN1 is a special purpose upright microscope developed to meet the rigorous demands of electrophysiological research, providing exceptional clarity and contrast for visualization of minute details deep within a specimen. The FN1 has a completely redesigned optical system that includes a unique water dipping objective with depth-induced aberration correction.

Moreover, in combination with the AX/AX R confocal microscope, highly sensitive confocal images can be acquired at high speed.



Configuration with Narishige stage



Configuration with Nikon stage



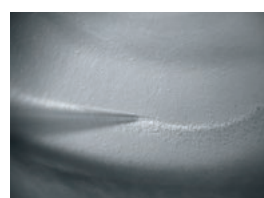


## Objective Lenses Allow Imaging of Deeper Areas with Ultimate Clarity

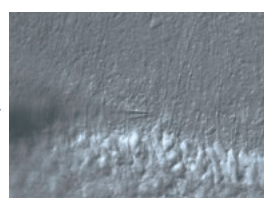
### The true one-lens solution: LWD 16X objective

By using a variable magnification double port (optional), the 16X objective allows you to capture images from a low magnification wide field at 5.6X to a high magnification high resolution at 64X with the rear port CCD camera\*<sup>1</sup> with the same lens. A wide viewfield of up to 2.0mm can be achieved at 0.35X intermediate magnification, enabling the observation of whole specimens and easy electrode placement. Variable magnification double port varies magnification between three levels (0.35X/2X/4X or 0.35X/1X/4X).

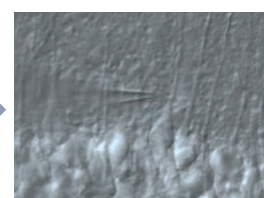
\*Magnification of the front port is not variable.



5.6X (magnification 0.35X)



32X (magnification 2X)



64X (magnification 4X)

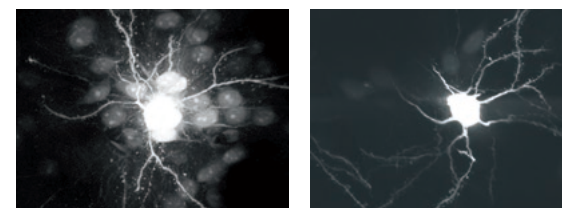
Images courtesy of: Dr. Hiroyoshi Miyakawa, Dr. Shigeo Watanabe, Tokyo University of Pharmacy and Life Science



As the 16X objective has a wide 45° manipulator approach angle and 3.0mm long working distance.

### Unique water dipping objective with depth-induced aberration correction

The CFI Plan 100XC W objective (NA 1.1, W.D. 2.5mm) is the world's first water dipping lens with a correction ring. This ring corrects spherical aberration induced by imaging deep in tissue or by working at physiological temperatures — providing outstanding Z-axis resolution in IR-DIC imaging, as well as a tight point spread function for confocal applications.



Images courtesy of: Hiroyuki Hakozaiki MS, University of California, San Diego

### Objective series ideal for IR-DIC imaging

Axial chromatic aberration in the visible to near-infrared region (up to 850nm) has been corrected in CFI Apochromat NIR 40X W and 60X W objectives. This enables the user to observe/document minute structures of a thick specimen with ample resolution. In addition, transmittance of every objective is exceptionally high, even in the IR region, thanks to wide-range spectrum anti-reflection coatings.



(From left) CFI Plan Fluor 10X W, CFI75 LWD 16X W, CFI Apo NIR 40X W, CFI Apo NIR 60X W, CFI Plan 100XC W

### Easy insertion of microelectrode

The objectives boast a long W.D. of 2.5-3.5mm (2.5mm even at 60X or 100X), taking advantage of the 60mm parfocal distance of the CFI60 optics. Since there is ample space above the specimen, microelectrodes can be easily inserted. The diameters of the objectives are 17% slimmer than previous lenses, and provide broad approach angles up to 45°, facilitating dramatically enhanced access of microelectrodes to the specimen.



45° approach angle, long working distance



Water dipping objective CFI Plan 100XC W  
Water dipping objective CFI75 LWD 16X W

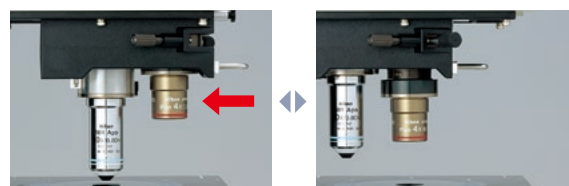




## Streamlined Electrophysiological Experiments and Broad Work Space

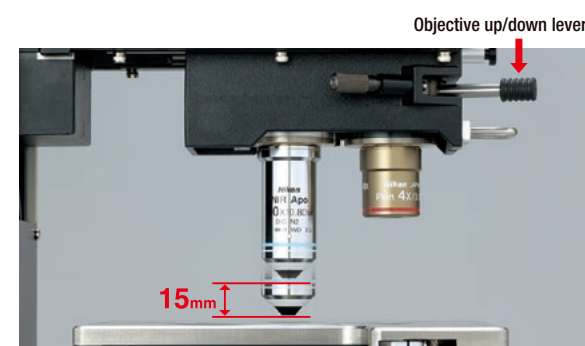
### ■ Smoother objectives changeover

The FN1 comes with a 2-position sliding nosepiece. A high magnification objective can be mounted on either the front or back position.



Front/back sliding objective changeover

The objectives can be raised by the lever to prevent collision with the manipulator or the chamber when they are being changed. The retraction distance is 15mm, so even a thick glass dish is protected.



Objective retraction mechanism

### ■ Parfocal distance correction and centering mechanism

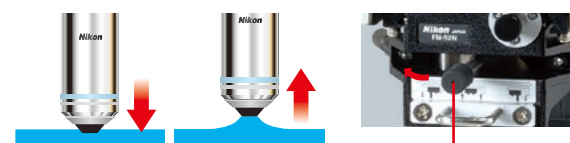
The parfocal distance of both the front and rear objectives can be finely tuned to achieve perfect parfocality. The front objective has a centering mechanism, which ensures perfect parcentricity, making it simple to find your cell when switching to a higher magnification.

Parfocal distance correction knob



### ■ Safe, accurate dipping operation

After the objective has been lowered, it can be further lowered by approximately 1mm by depressing the lens up/down lever to gently dip the lens top into the bath solution. This eliminates the risk of specimen disturbance due to the lowering of the objective deep into the solution.

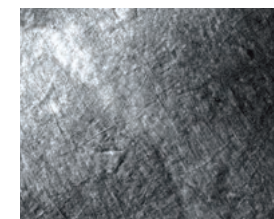


Simple lever operation ensures safe dipping

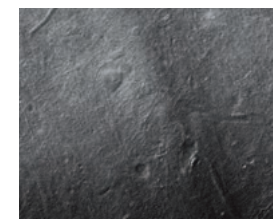
Objective up/down lever

### ■ Simple wavelength/illumination switchover

Alternating wavelength from visible to IR (infrared), or illumination technique from DIC and Oblique Light is carried out simply by rotating the wavelength selection and illumination selection turrets. Oblique illumination provides high contrast with deeper shadows by providing incident illumination at shallow angles.



Observed under oblique illumination



Observed under IR-DIC illumination

Images courtesy of: Dr. Hiroyoshi Miyakawa, Dr. Shigeo Watanabe, Tokyo University of Pharmacy and Life Science



#### Illumination selection turret

The user can choose between DIC illumination and oblique illumination. The oblique illumination direction can be freely adjusted by rotating the incident illumination 360°, making it easy to identify the microelectrode position.

#### Wavelength selection turret

The user can choose from IR-DIC, visible DIC and brightfield. Deeper tissue penetration into a specimen can be clearly visualized by choosing infrared wavelengths between 850 and 950nm.

### ■ Streamlined operation

The focus knob and field diaphragm adjustment are located on the front part of the base to enable efficient focusing. Moreover, there are no cumbersome belts outside the base. The coarse/fine focus knob is located on both the left and right sides, so it can be operated with either hand. In addition, the optional remote handle enables ON/OFF and light intensity adjustment of the fiber illumination from outside the cage.



### ■ Waterproof LWD condenser with increased flexibility

Nikon has developed an LWD condenser that can be easily switched between brightfield, DIC, and Oblique Light illumination techniques by simply rotating the turret. This condenser has a long working distance, providing a wide space between it and the specimen. In addition, the condenser surface is waterproof and comes with a solution reservoir to catch spills. The condenser can be easily removed — even if you are using a fixed stage — and it can be cleaned without causing vibration to the manipulator.



The condenser and polarizer turret can be simply and quickly removed.

### I-shaped slimline body creates more space above and below the stage

The simple and slim I-shaped body has no projection on the body other than the focus knob, so there is more space in the working area for your experiment. This also provides better access around the microscope to position manipulators and other peripherals. With the eye-point of the body 25mm lower than conventional models, you can work in greater comfort.





## Enhanced Noise Reduction and High Responsiveness to a Broad Range of Experimental Needs

### Minimizing electronic noise

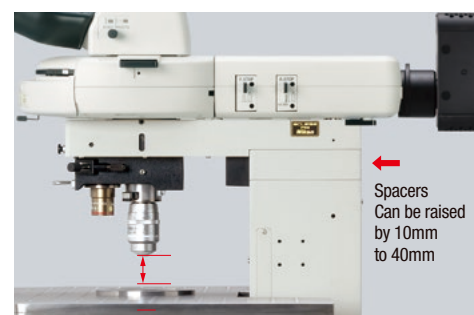
The effects of electrical noise from the light source can be reduced by placing the lamphouses for diascopic and epi-fluorescence illumination outside the cage and connecting them via optical fiber. Noise can be dramatically reduced by connecting ground pins to all main parts of the microscope.

### Ultimate vibration noise reduction

Nikon has achieved both improved rigidity and vibration resistance for the FN1 body by undertaking critical measurement and simulation analysis of its structure. Nikon has succeeded in suppressing the vibration generated when the nosepiece or the magnification module is switched.

### Compatible with large specimens

The FN1 enables the microscope height to be raised by 10mm to 40mm by inserting up to four 10mm-thick spacers between the body and the arm. This is particularly advantageous for applications that require the observation of larger specimens such as intravital preps.



## System Expansion

## Confocal Imaging System

### AX/AX R Confocal Microscope

The AX/AX R has a large field of view of FN 25 and high resolution (up to 8192 x 8192 pixels), enabling acquisition of detailed structural information even when using low-magnification objectives. The resonant scanner of the AX R enables high-speed imaging at up to 720 fps, and can capture morphological changes and responses to stimuli in biological samples such as brain slices. The AX/AX R enables high-speed imaging of the entirety of large specimens such as model organisms, or the reactions of live cells over a wide area in a single high-resolution image.



## Accessories

### LV-TT2 Tilting Trinocular Eyepiece Tube

It delivers erect images as opposed to the inverted images seen through ordinary eyepiece tubes. Its height-adjustable design ensures a comfortable viewing posture even when an intermediate module is mounted.



### FN-MT magnification variable turret

Offers flexibility in changing intermediate magnifications between 1X, 1.25X, 1.5X and 2X without moving the objective lens. Vibration-free zooming can be achieved with every FN1 objective lens.



### IR-DIC attachment

Illumination in the IR range allows the visualization of minute structure deep within thick tissue of up to 300 or 400µm. Extremely high quality IR-DIC images can be obtained using a polarization set and light source compatible with IR wavelengths.



FN-IR/ISA DIC IR analyzer, DIC sliders, FN-PT polarizer turret, polarizer, and DIC module

### Epi-fluorescence illuminators

The NI-FLT6 Epi-Fluorescence Cube Turret accepts 6 filter cubes. Its built-in noise terminator cuts stray light to achieve an exceptionally high signal-to-noise ratio. The CI-FL-2 Epi-Fluorescence Attachment accepts 4 filter cubes. Both devices can be directly attached to the D-LEDI fluorescence LED illumination system, a lamphouse-type light source that ensures sufficient brightness. Alternatively, a commercially available light source with a liquid light guide can be connected to reduce the thermal effect on the microscope.



NI-FLT6 Epi-Fluorescence Cube Turret, NI-FLEI-2 Epi-Fluorescence Attachment and Epi-fluorescence Filter Cubes



CI-FL-2 Epi-Fluorescence Attachment and Epi-fluorescence Filter Cubes

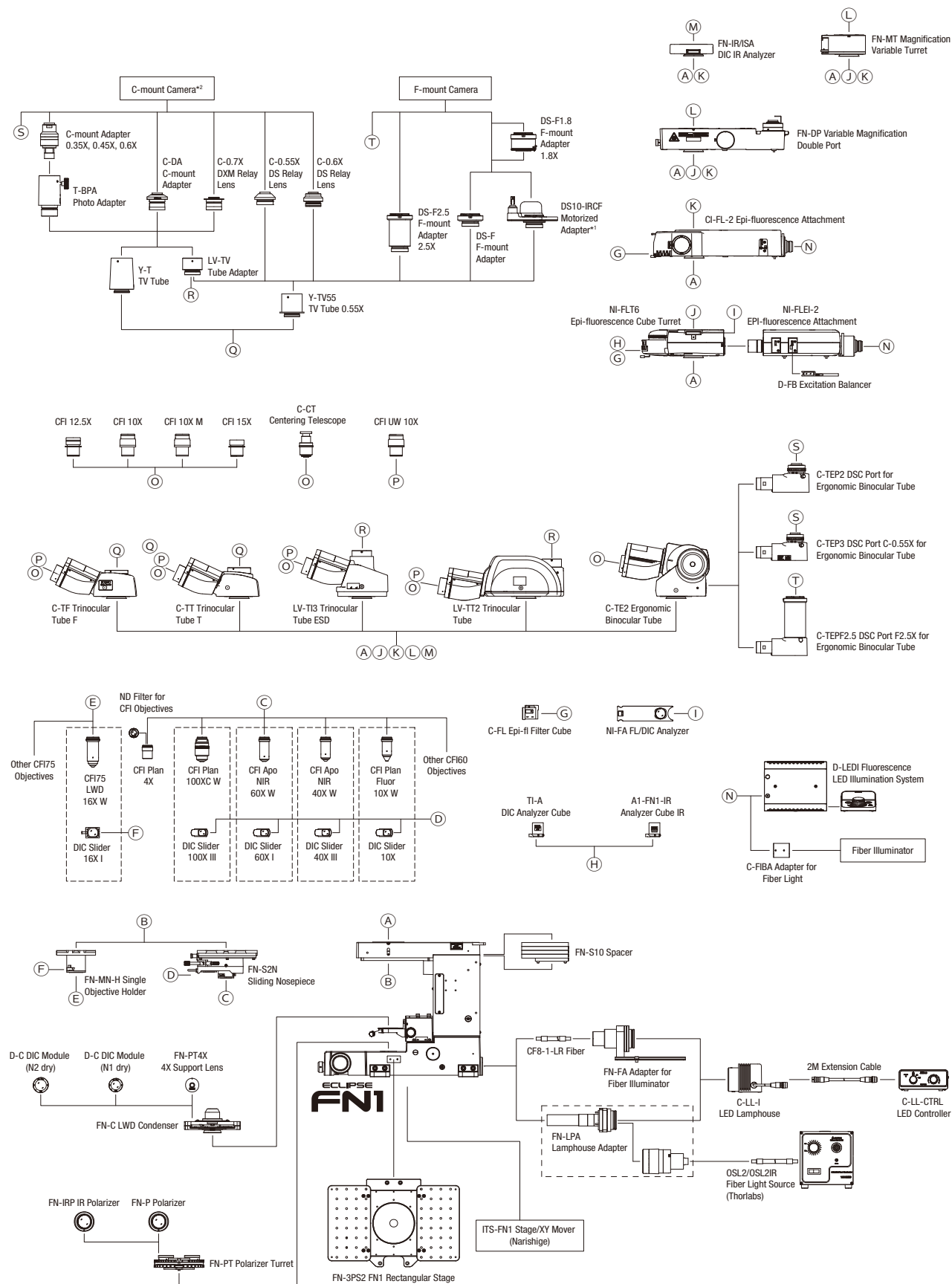
### Epi-fluorescence LED light source

The D-LEDI is a lamphouse-type fluorescent LED illumination system that can be directly connected to an epi-fluorescence attachment. It is high intensity, long life, and alignment-free. Equipped with LEDs of 385 nm, 475 nm, 550 nm, and 621 nm, the D-LEDI can simultaneously turn on LEDs of multiple wavelengths and adjust the intensity ratio between each wavelength.



D-LEDI Fluorescence LED Illumination System

System Diagram



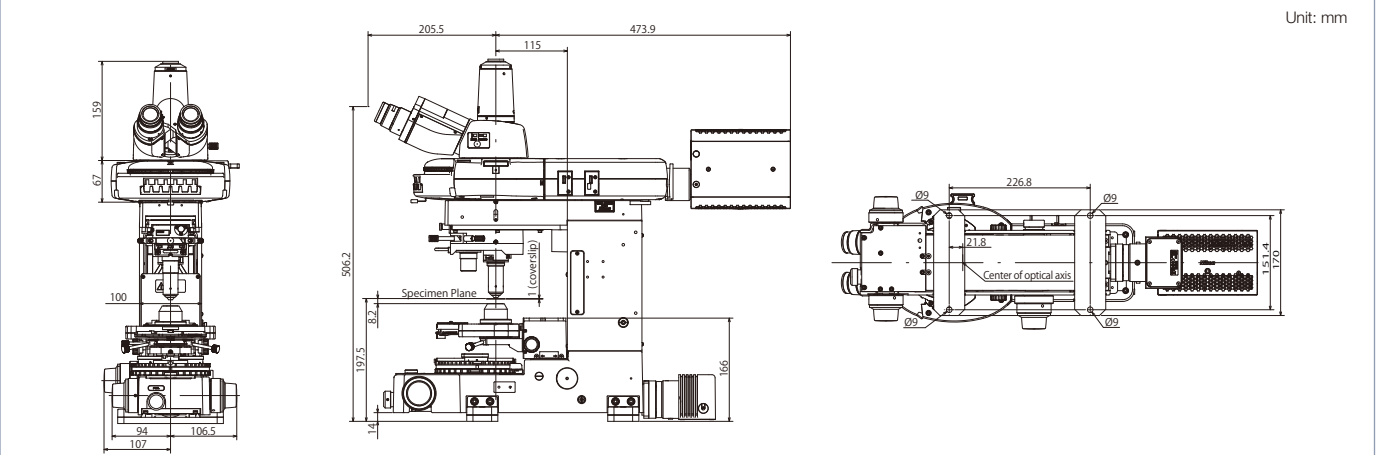
\*1 Exclusively for Digital Sight 10  
\*2 C-0.6X DS relay lens is recommended for Digital Sight 100

Specifications

Optical system	CFI60 and CFI75 infinity optical system
Main body	I-shaped, external power supply
Focusing	Via nosepiece up/down movement Manual coaxial coarse/fine focus knobs (on both sides)
Nosepiece	FN-S2N Sliding Nosepiece (for CFI60 objectives) Front/back 2-position; DIC prism attachable FN-MN-H Single Objective Holder (for CFI75 objective) 1-position; DIC prism attachable
Objectives	CFI Plan 4X NA: 0.10, W.D.: 30.00* CFI Plan Fluor 10X W NA: 0.30, W.D.: 3.50 CFI Apochromat NIR 40X W NA: 0.80, W.D.: 3.50 CFI Apochromat NIR 60X W NA: 1.00, W.D.: 2.80 CFI Plan 100XC W NA: 1.10, W.D.: 2.50 CFI75 LWD 16X W NA: 0.80, W.D.: 3.00 Other CFI60/CFI75 objectives can be used
LWD condenser	Universal turret type NA: 0.78, W.D.: 7.20mm DIC and Oblique Light observations possible
Eyepiece	10X/12.5X/15X (FN 22), UW10X (FN 25)
Eyepiece tubes	C-TE2 Ergonomic Binocular Tube (Bino 100%, Bino : DSC port = 50 : 50) (DSC port cannot be used with variable magnification double port) C-TF Trinocular Tube F (Bino : Photo = 100 : 0, 0 : 100) C-TT Trinocular Tube T (Bino : Photo = 100 : 0, 20 : 80, 0 : 100) LV-TI3 Trinocular Tube ESD (Bino : Photo = 100 : 0, 0 : 100) LV-TT2 Tilting Trinocular Tube (Bino : Photo = 100 : 0, 20 : 80, 0 : 100)
Stage	FN-3PS2 FN1 Rectangular Stage (3-plate mechanical stage) Stroke: 30mm (X, Y)
Light source	For epi-fluorescence illumination D-LEDI Fluorescence LED Illumination System Commercially available light source with a liquid light guide For diascope illumination C-LL-I High Color Rendering LED Lamphouse OSL2/OSL2IR High-Intensity Fiber-Coupled Illuminator (Thorlabs)
Operating conditions	Temperature: +10°C to +40°C Humidity: 85%RH max. (no condensation)
Weight (main body)	Approx. 12kg

\* FN-PT4X 4X Support Lens is required.

Dimensional Diagram



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#### WARNING

TO ENSURE CORRECT USAGE, READ THE CORRESPONDING MANUALS CAREFULLY BEFORE USING YOUR EQUIPMENT.



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