



# ECLIPSE FN1

Upright Fixed Stage Microscope for Electrophysiological Research



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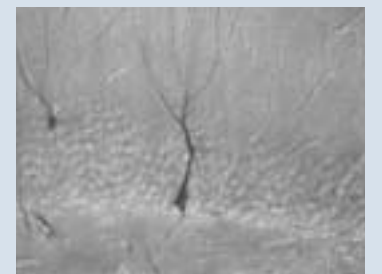
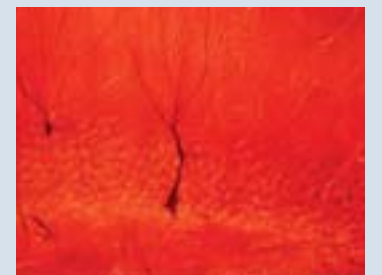
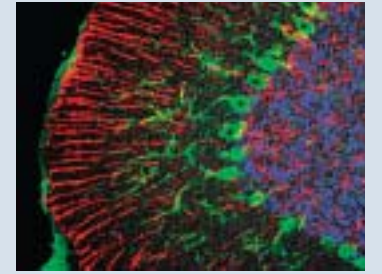
Upright Fixed Stage Microscope for Electrophysiological Research

## State-of-the-art upright research microscope dedicated to electrophysiological experiments

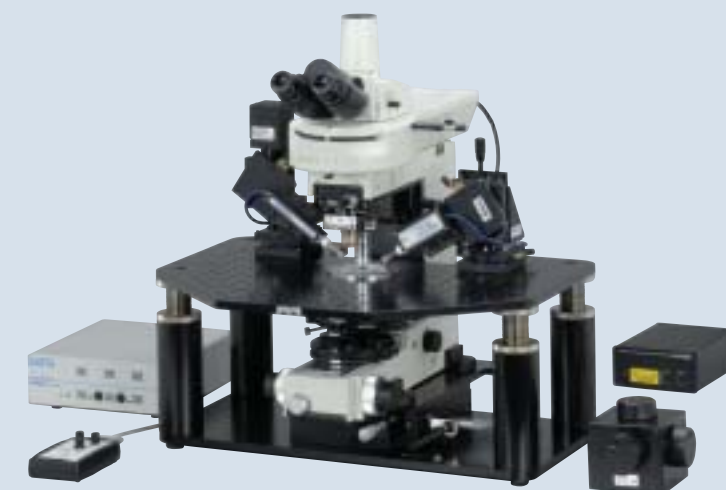
Newly developed from the ground up with electrophysiologists for electrophysiology research; legendary Nikon optics and effortless functionality.



System example: configuration with Narishige equipment



The Eclipse FN1 is the result of Nikon's close work with scientists to re-engineer what was the world's first research microscope for patch-clamp experiments—the Eclipse E600FN. Nikon carefully studied all aspects of the microscope, from the very essence of optical performance, through functionality, and expandability. The results? The FN1 enables visualization of minute details within thick specimens with perfect clarity, while offering streamlined manipulation, and minimal noise. With upgraded performance and powerful innovative features, it meets and exceeds the rigorous demands of challenging electrophysiological experiments, taking your research to new horizons.



System example: configuration with Burleigh equipment



System example: configuration with Nikon stage





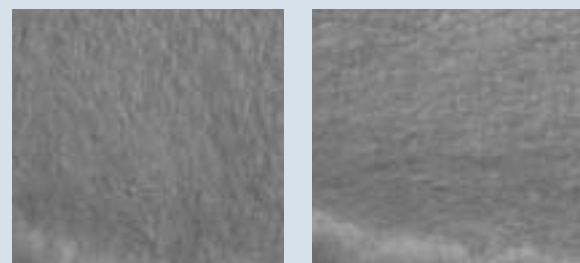
Water dipping objective Plan 100xW

# Objectives completely reengineered—streamlined electrophysiological experiments

## Documentation of deeper areas with pristine clarity

### The world's first water dipping objective with depth-induced aberration correction *New!*

The Plan 100xW 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. With excellent IR transmission, this lens is a terrific choice for Multi-Photon imaging.



Oblique illumination (vertical contrast)

Oblique illumination (horizontal contrast)

### Simple switching between DIC and Oblique Light

Changeover from visible to IR (infrared) light, from DIC to Oblique illumination is done with simple rotation of the completely waterproof turret. This can be very useful when placing stimulation electrodes and local perfusion pipettes.



#### Illumination selection turret

Oblique illumination provides high contrast with deeper shadows by providing incident illumination at a shallow angle. Moreover, the direction of the contrast can be freely adjusted by rotating the incident illumination 360°, making it easy to identify the microelectrode position.

#### Wavelength selection turret

Deeper tissue penetration into a specimen can be clearly visualized by choosing infrared wavelengths between 850 and 950nm.

## High resolution documentation via IR-DIC

### New 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 APO 40xW NIR and 60xW NIR objectives. This enables the user to observe/document minute structures of a thick specimen with ample resolution. In addition, transmittance is exceptionally high thanks to wide-range anti-reflection coatings.



Dedicated objectives

### A usable one-lens solution for electrophysiology

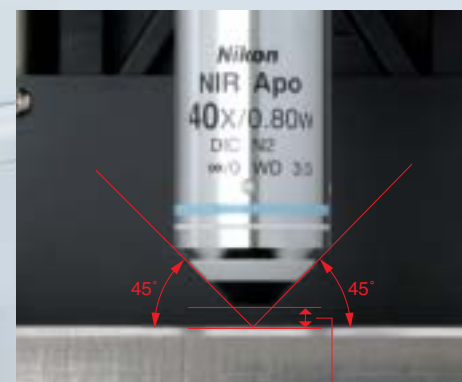
The high NA 16x objective lens allows high magnification observation over a wider field of view (2mm). When combined with a magnification module it provides 4x, 16x, 32x, and 64x magnification with a 45° approach angle and 3.0mm of working distance.



Image courtesy of: Hiroyuki Hakozaki MS, Ellisman Laboratory, University of California, San Diego, Center for Research in Biological Structure, NCMIR (National Center for Microscopy & Imaging Research)

### Easy microelectrode placement

The objectives boast a long W.D. of 2.5-3.5mm (longer than 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. The lens top has been treated to prevent bubbles from becoming attached to it.



45° approach angle, long working distance

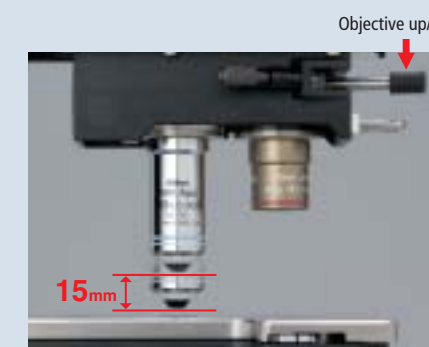
### Smoother objectives changeover

The FN1 comes with a 2-position sliding nosepiece—the nosepiece can be slid back and forth, so that the objective does not collide with the manipulator when changing the magnification.



Front/back sliding objective changeover

When changing the objective, it can be raised at the touch of a lever to prevent it from striking the chamber. The retraction distance is as long as 15mm, so even a thick glass dish is safe.



Objective retraction mechanism

### Parfocal distance correction and centering mechanism

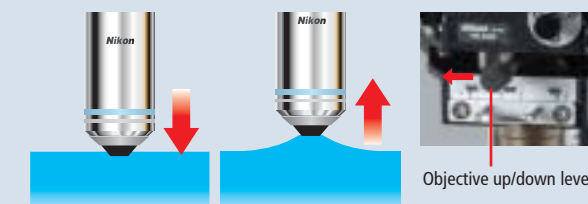
The parfocal distance of both the front and rear objectives can be fine-tuned, to assure perfect parfocality. The front objective has a centering mechanism, assuring perfect parcentricity, making it simple to find your cell when switching to higher magnification.

Parfocal distance correction knob



### Safe, accurate dipping operation

After lowering the objective, if the lens up/down lever is depressed, the objective's lens top dips into the bath solution. This eliminates the risk of specimen damage due to excessive lowering of the objective.



Simple lever operation ensures safe dipping.





## Open design facilitates simple placement of multiple electrodes

### One objective covers a wide range of magnifications

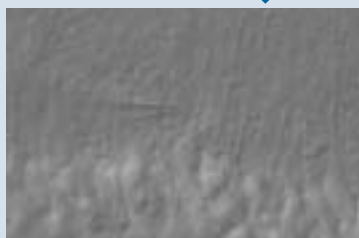
With a variable magnification double port (optional), which allows you to vary magnifications between 0.35x, 2x, and 4x, it is possible to observe from a low magnification wide field to a high magnification high resolution field with the 16x objective alone. Vibrations caused by switching objectives are no longer a problem. This feature provides the flexibility to image large structures, such as the hippocampus, as well as small structures, such as axons and dendrites, with the same lens. 0.35x intermediate magnification allows a 2.0mm viewfield, enabling easy electrode handling under macro observation. Moreover, as the 16x objective has a wide 45° approach angle and 3.0mm long working distance, it is possible to patch what you see.



At 0.35x



At 2x



At 4x

### I-shaped body leaves 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.



### Streamlined operation

The focus knob and field diaphragm ring are located on the front part of the base to enable focusing with ease. 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 control of the fiber illumination and light volume adjustment.



### Waterproof LWD condenser with increased usability

Nikon has developed a new LWD condenser that can be used for brightfield, DIC, and Oblique Light illumination techniques. Illumination can be instantly changed 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 can be cleaned with a wet cloth without vibrating the manipulator.



The condenser and polarizer turret can be simply and quickly removed for easy cleaning, or to facilitate whole small animal experiments.



## Meticulous noise reduction

### Minimizing electronic noise

Nikon has succeeded in significantly reducing electronic noise by utilizing fiber illumination to bring light into the system from outside the Faraday cage. Moreover, Nikon has taken additional measures to minimize electronic noise. Ground pins connected to all main parts of the microscope, for example, can be used to drastically reduce noise further.

### Utmost vibration noise reduction

Nikon achieved both improved rigidity and vibration resistance for the FN1 body by critical measurement and simulation analysis of its structure. In addition, Nikon succeeded in suppressing vibration noise by reducing the tremor that is generated when the slider nosepiece or magnification adjustment mechanism is switched.



## Responding to a broad range of experimental needs

### Compatible with large specimens

The FN1 enables the microscope height to be raised 10-30mm by inserting a spacer\* between the body and the arm. This is particularly advantageous for applications that require the observation of larger specimens, such as intravital preps or whole animal experiments.

\*Under development

### Responds to various illuminators

The condenser, substage and turret can be removed entirely from the FN1 body to allow for more free space, depending on the purpose of the experiment. In addition, the height of the fixed stage can be easily and quickly changed by the operator.



### Stage

When Nikon and Narishige jointly developed the exclusive stage for the FN1, they placed priority on ease of use. Therefore, changing the height of the stage and its legs is a simple process that can easily be done by the operator. Flat-level accuracy can be achieved with ease. The stage can be directly attached to an antivibration table, making it extremely stable for demanding experiments. It is possible to switch between a double magnet pillar and a fixed pillar to suit each particular experiment.

Manufactured by Narishige Co., Ltd.



### XY mover

The mover comes with two handles (coarse and fine) so it is possible to easily and precisely move to the region of interest by translating the microscope body in the X or Y axis direction. The attached scale enables confirmation of the mover position within the stroke.

Manufactured by Narishige Co., Ltd.



### Micromanipulator

The NT-88-V3 Narishige micromanipulator facilitates precise electrode placement, and its compact units can be freely configured to suit your application.

Manufactured by Narishige Co., Ltd.



### Patch-clamp amplifier

Incorporating Capacitor-Feedback technology, the Axopatch 200B is the very latest patch-clamp amplifier—making it perfect for single-channel and whole-cell patch clamping.

\*For more details, please contact your local distributor.

Manufactured by Axon Instruments.

### Fiber-optics illuminators

Two types with fiber light-guides are available. It is free from electric noise and heat since the power unit is placed outside the cage.



### Sumita LS-DWL

It accepts a 12V-100W halogen lamp. Light intensity can be fine-tuned using an adjustment dial. Adjustment can be made via the external controller, which can also turn the lamp on/off.

Manufactured by SUMITA Optical Glass, Inc.



### Exfo X-Cite 120 system

Suited for fluorescence applications, its powerful 120W lamp requires no alignment and provides rich spectrum with high excitation intensity. It has a typical life of 1500 hours. A motorized model with RS-232 interface and software that enables control of the iris, lamp, and built-in shutter via the computer is also available.

Manufactured by Hamamatsu Photonics K. K.

**Episcopic illuminators**

The D-FL Universal Epi-illuminator is a 6-filter type compatible with brightfield, darkfield, DIC and fluorescence applications. Its built-in noise terminator cuts stray light to achieve an exceptionally high S/N ratio. The J-FL Epi-illuminator is a 4-filter type for epi-fluorescence microscopy.



D-FL Universal Epi-Illuminator



J-FL Epi-Fluorescence Attachment

**Magnification variable turret**

The FN-MT Mag Variable Turret (Optional) allows flexibility of changing intermediate magnification between 1x, 1.5x, 2x and 1.25x. Zooming without vibration can be done for every objective lens.



**IR-DIC attachment**

IR-DIC allows the observation of specimens as thick as 300-400mm. Manufactured by Hamamatsu Photonics K. K..



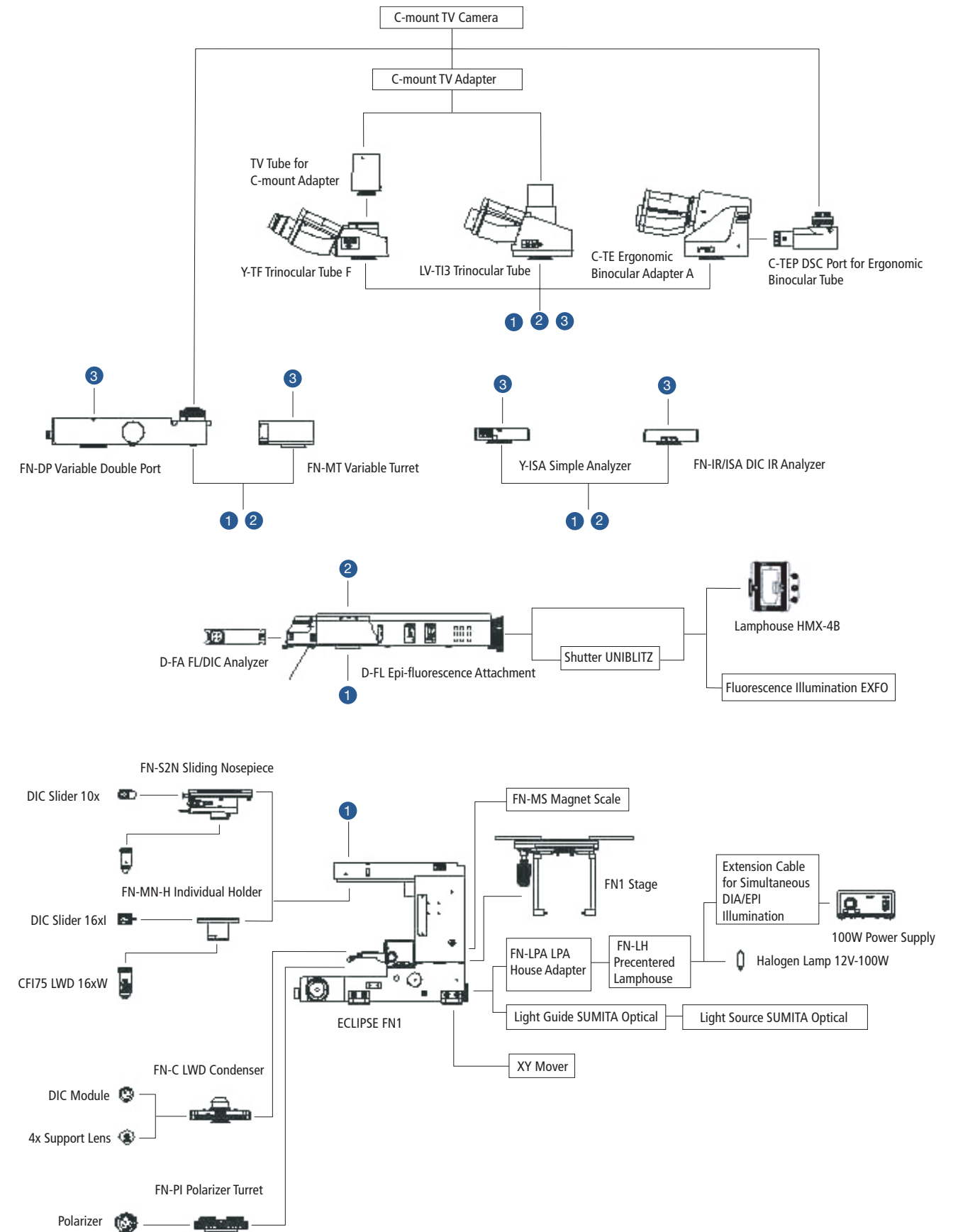
**Digital cameras for microscopes— Digital Sight series**

The camera head and controller can be freely selected according to use. The camera head is available in 2- and 5-megapixel types, with or without a cooling mechanism. The controller is available in a PC-use (via USB) type and a standalone type with a large LCD monitor.



**Tilting Trinocular Eyepiece Tube LV-TT2**

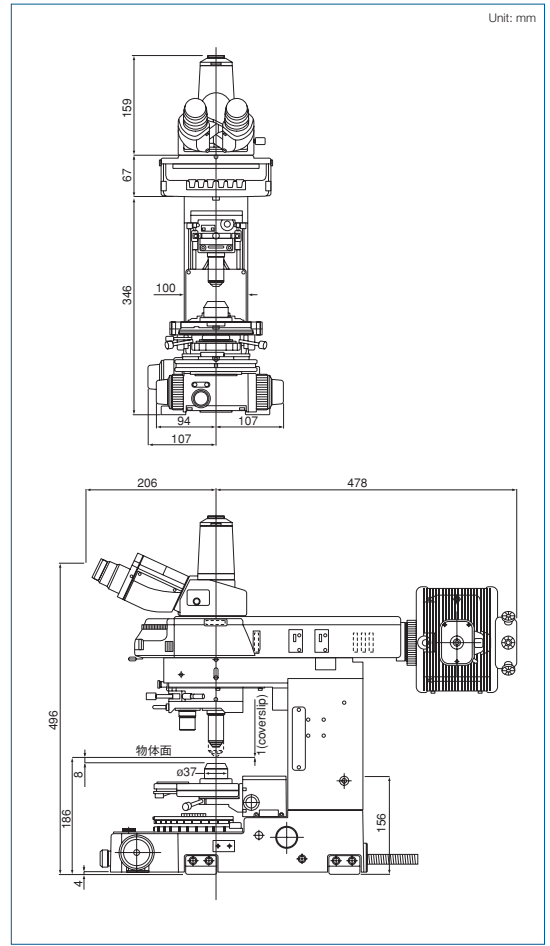
It delivers erect images as opposed to the inverted images seen through ordinary tubes. Its height-adjustable design ensures a comfortable viewing posture even when an intermediate module is mounted.



## Specifications

Optical system	CFI60 and CFI75 system (CF infinity optics)
Main body	I-shaped, external power supply configuration
Focusing	Via nosepiece up/down movement Manual coaxial coarse/fine focus knobs (on both sides)
Nosepiece	Front/back sliding type (for CFI60 objectives) 2-position; DIC prism attachable Single objective holder (for CFI75 objectives) 1-position; DIC prism attachable
Long W.D. condenser	Universal turret type NA: 0.78 W.D.: 8.2mm DIC and Oblique Light observations possible
Eyepiece	10x, F.N.: 22, 25
Eyepiece tubes	Binocular tube (Bino 100%) Ergo tube (Bino 100%, Bino : DSC port = 50 : 50) (DSC port cannot be used with variable magnification double port) Trinocular tube FUW (Bion : Photo = 100 : 0, 0 : 100) Trinocular tube TUW (Bino : Photo = 100 : 0, 20 : 80, 0 : 100)
Stage	3-plate mechanical stage Stroke: 30 (X) to 27.5 (Y) mm
Light source	Lamphouse type (12V-100W long life halogen lamp); pre-centered (Designated lamphouse: FN-LH Pre-centered Lamphouse) (Designated lamphouse: Philips 7724 or Osram HLX64623) Optical fiber type (12V-100W halogen lamp) (Sumita Optical Glass halogen light source, LS-DWL-N Optical Fiber Illuminator)
Operating conditions	Temperature: +10°C to +40°C Humidity: 85%RH max. (no condensation) Altitude: 2000m max. Pollution level: Degree 2 Installation: Category II Electric shock protection Class I Indoor use only
Transport/storage conditions	Temperature: -20°C to +60°C Humidity: 90%RH max. (no condensation)
Dimensions and weight (Main body)	214 (W) x 346 (H) x 422 (D)mm, approx. 12kg

## System Diagram



Specifications and equipment are subject to change without any notice or obligation on the part of the manufacturer. November 2005 ©2005 NIKON CORPORATION



\* Monitor images are simulated.  
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