At the Center of Your Research Discoveries

The Essence of Cutting-edge Microscopy Research

Microscopes are critical tools for cutting-edge research in biology, medical and pharmaceutical sciences. To satisfy the demands of today’s high-end research, Nikon has developed the new Ti series of microscopes. Combined with NIS-Elements imaging software, the Ti supports diverse image acquisition and analysis methods such as multi-dimensional time-lapse imaging to acquire temporal, spatial and spectral information of fast, dynamic live cell processes. Intelligently designed automation and further expansion of Nikon’s powerful modular approach make the Ti ideal for applications such as confocal, FRET, High Content Analysis (HCS), and photobleaching/photo activation to study interaction of fluorescence protein molecules in living cells and tissues.

Nikon’s exclusive Perfect Focus System (PFS) is now incorporated into the nosepiece unit and allows for the simultaneous use of two separate levels for additional illuminators or detectors. The newly developed “full intensity” phase contrast unit enables acquisition of incredible phase contrast images without the use of light-attenuating phase contrast objectives.

Advanced functions of Ti-E dramatically expand research imaging possibilities

Fast and Automated
High-speed motorized components allow fast, coordinated and seamless image acquisition

Screening
Multimode scanning of well plate at an unprecedented speed

Time-lapse Imaging
Built-in Perfect Focus System (PFS) for automatic focus correction

High-quality Phase Contrast Observation
Newly developed “full intensity” optical components enable phase contrast with high NA non-phase-contrast objectives

Multiple Cameras
Image acquisition and analysis with multiple side ports and back port cameras

Motorized Laser TIRF (Total Internal Reflection Fluorescence) Observation
Alternate time-lapse observation between widefield fluorescence and TIRF (NA 1.49) images by fast illumination switching and motorized control of laser incident angle

Photo Activation
The photo activation unit allows cell marking and dynamic analysis using photoactivatable and photoswitchable proteins such as PA-GFP and Kaede

Confocal Imaging
Seamless integration with confocal microscope systems for high-performance spectral confocal imaging

The flagship model that is fully motorized for automated multimode image techniques and acquisition

The universal model that comes standard with four output ports and potential for motorized components

The basic model that can be dedicated to specific tasks, built with two output imaging ports
Ti: Stress-Free Operation

High-speed Motorized Control and Acquisition

The synchronized control of many motorized components such as the nosepiece, fluorescence filters, shutters, condenser turret and stage, allows researchers to use the microscope for a wide range of automated multi-dimensional experiments. Faster device movement and image acquisition decrease overall light exposure and subsequent phototoxicity, leading to more meaningful data.

Enhanced speed of individual motorized components

Operation and/or changeover speed of objectives, filter cubes, XY stage, excitation/barrier filters has been greatly enhanced, realizing stress-free operational environment that enables researchers to focus on observations and image capture routines. The newly developed controller that memorizes and reproduces observation conditions and the joystick that enables stage control at will make the microscope feel like an extension of your eyes and hands.

- High-speed XY stage movement
- High-speed Piezo Z stage movement
- High-speed epi-fl filter changeover

Newly developed digital Controller Hub significantly increases motorized accessory speed by reducing the communication overhead time between components, boosting total operation speed.

PC control and automation of the Ti’s motorized components are optimized to reduce the respective communication time between action commands and movements producing high-speed total control. By adding firmware intelligence to the microscope, total operation time of the motorized components is reduced. For example, the total time for continuous image acquisition in three modes (two-channel fluorescence and phase contrast) with illumination shutter control is greatly reduced enhancing cell viability.

Control process

<table>
<thead>
<tr>
<th>Conventional model</th>
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<td>Signal communicable</td>
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<tr>
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<tr>
<td>Signal communicable</td>
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<tr>
<td>Stage movement</td>
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<tr>
<td>PFS correction</td>
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<tr>
<td>Filter changeover</td>
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<tr>
<td>Image capture</td>
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Remarkably Fast Image Acquisition!

Screening image capture of 96 wells in three modes (two-channel fluorescence and phase contrast) is possible at a speed of more than twice that of conventional models.

Multipoint microscopy of HeLa cells transiently expressing Venus-tubulin and mCherry-intrunin stained with Hoechst33342 and DiD. (All in pseudo-color)

Photos courtesy of Kenta Saito and Takeharu Nagai, Research Institute for Electronic Science, Hokkaido University.
Nikon’s exclusive and integrated Perfect Focus System (PFS) eliminates focus drift

Focus drift is one of the biggest obstacles in time-lapse observation. Nikon’s PFS design corrects focus drift during long-term observation and when reagents are added. Even with high magnification, high NA objectives and techniques like TIRF, your images are always in sharp focus. Additionally, incorporating PFS in the nosepiece unit saves space and does not limit the use of the Ti expanded infinity space stratum structure (see page 9).

Real-time focus correction

The PFS employs high-performance optical offset, making real-time correction in the desired Z-plane possible. The state of the PFS is prominently displayed on the front of the microscope. Moreover, when the PFS is not in use, the optical component of the PFS can be simply retracted from the optical path.

Compatible with diverse fluorescence dyes with improved performance in broader wavelength range

By now employing 870nm wavelength for the coverglass interface detection, near-infrared fluorescence dyes including Cy5.5 can be used. As the optical characteristics from ultraviolet to infrared range are also improved, the number of usable objectives is increased, realizing stable focus in applications requiring a wide range of wavelengths from Ca2+ concentration measurement in the UV to laser tweezers in the IR.

Comprehensive Imaging Software NIS-Elements Provides Secure System Control

Nikon’s original imaging software NIS-Elements provides an integrated control of the microscope, cameras, components and peripherals and allows the programming of automated imaging sequences. The intuitive GUI makes setting of the experiment parameters easy and reproducible. NIS-Elements offers many tools and controls to facilitate flexible and reliable data acquisition, paired with a diverse suite of analysis tools for measurement, documentation and databasing.
Ti: Revolutionary Phase Contrast System

High-quality Phase Contrast Images with High NA Lens, as well as Bright Fluorescence Images

Nikon's world-leading optical designers have developed the unique “full intensity” external phase contrast unit. With this revolutionary system, a phase ring is incorporated in the microscope body instead of the objective lens, allowing the use of specialized objectives without phase rings and acquisition of high-quality images with high NA objectives. Moreover, using the objectives without a phase ring enables capturing of “full intensity” bright fluorescence images.

Phase ring is incorporated in the microscope body

Incorporating a phase ring—that was normally positioned within the phase contrast objective lens—into the external phase contrast unit optically allows use of specified high NA objectives to produce high-resolution phase contrast images. Four types of phase contrast rings are available according to the objectives used. (common for Ti-E/U/S)

Unprecedented high resolution

Nikon’s high-performance objective lenses, including the 60x and 100x TIRF objectives with the world’s highest numerical aperture of 1.49 incorporating spherical aberration correction collars, deliver high-resolution phase contrast images that can not be captured with any standard phase contrast objective.

Bright fluorescence image using same objective

Because there is no light loss due to a phase ring, bright “full intensity” fluorescence, confocal and TIRF images can be captured using the same objective as well as providing phase contrast observation.

Use of laser tweezers without changing lens

Because an objective without a phase ring can be used for phase contrast observation, use of laser tweezers is possible without changing the objective lens.

Phase contrast observation with water immersion objective

It is now possible to use a water immersion objective for phase contrast observation. Clear, high-resolution—refractive index matched—phase contrast images with minimal aberration of deep specimen areas can be captured.

Changing the conventional concept of phase contrast

C. elegans: Touch neurons stained with EGFP

Photos courtesy of: Motomichi Doi and Kaoru Katoh, The National Institute of Advanced Industrial Science and Technology (AIST)

Stratum structure enables flexible extendibility

The Ti employs the stratum structure that takes advantage of infinity optics. In addition, the PFS is incorporated in the nose-piece unit, allowing two optical component levels in addition to the PFS to be attached by using the “stage up position set.” Simultaneous mounting of laser tweezers and photo activation unit as well as multiple stacked epifluorescence filter turrets is possible. Each of the three motorized filter cube turrets can be controlled individually.

Back port enables multiple camera imaging

Use of an optional back port expands the image capture capability. Used in combination with the side port it allows simultaneous image acquisition for two wavelengths with two cameras. For example, when observing interaction between fluorescence proteins with FRET ( Förster Resonance Energy Transfer) and intensity difference between CFP and YFP is great, individual camera sensitivity adjustment allows comparison of high S/N ratio images.

Example: In addition to the PFS, a photo activation module (upper left) and a back port (lower left) are mounted.

Multiport and Stratum Structure Support Advanced Research

Multiple image port design with left, right, and bottom* ports for optical output enables a camera or detector to be attached to each port. Furthermore, the expanded space stratum structure enables addition of an optional back port. These features allow simultaneous image capture with multiple cameras using two-tier dichroic fluorescence filter turrets.

*Available with Ti-E/B and Ti-U/B models with bottom port

ECFP image from YC3.60

Confocal YFP image from YC3.60

Photos courtesy of: Kenta Saito and Takeharu Nagai, Research Institute for Electronic Science, Hokkaido University

NG108 cell: Growth cone stained with EGFP-fascin

Photos courtesy of: Satoe Ebihara, Kaoru Katoh, The National Institute of Advanced Industrial Science and Technology (AIST)

Bright fluorescence image using same objective

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Advanced Fluorescence Illumination Functions Respond to Leading Bio-imaging from Live Cell to Single Molecule

The Ti series provides a diverse choice of fluorescence illuminators to support cutting-edge research of cell biology, molecular biology and biophysics using the new imaging and photo activation technologies.

Motorized laser TIRF for observation of cell membrane dynamics and single molecule

- **TIRF (Total Internal Reflection Fluorescence)**
  When a specimen is exposed to laser illumination at an incident angle greater than a critical angle, total internal reflection occurs. Under these conditions an evanescent wave is only generated within a couple of hundred nm from the coverslip-specimen interface. By using this light to excite coverslip-specimen interface, fluorescence images with an extremely high S/N ratio can be acquired. This is the principle of TIRF. Nikon’s objective lenses for TIRF observation feature high NA of 1.49, at nearly the theoretical limit for standard oil immersion, and the high S/N technique can capture even single molecule fluorescence images.

- **Photo activation for PA-GFP observation**
  When fluorescence proteins such as Kaede and PA-GFP are exposed to 405nm illumination, fluorescence characteristics change. For example, Kaede changes fluorescence colors from green to red, and PA-GFP increases fluorescence intensity 100 times. Kaede and PA-GFP are used, respectively, for selectively highlighting cells and proteins of interest within live specimens and studying their dynamics. The Ti series features a specialized photo activation illuminator that allows fluorescent time-lapse observation of dynamic events following photo activation or photo conversion.

- **FRET for analysis of intracellular Ca$^{2+}$ concentration**
  Using FRET (Förster Resonance Energy Transfer) technique, intermolecular interactions between molecules within close proximity of one another can be detected and measured. Using the optional back port, each FRET channel can be separated by wavelength and sent to separate cameras. This enables the capture of high-resolution images in the entire frame for each wavelength. Even when intensity difference between wavelengths is large, a high-quality FRET image can be captured by adjusting camera sensitivity for each wavelength.

- **Time-lapse imaging by switching TIRF and epi-fluorescence observation**
  This enables alternate time-lapse recording between fluorescence and multi-wavelength TIRF images.

- **White light TIRF utilizing mercury or arc lamp illumination**
  Mercury arc lamp illumination can be used for TIRF observation. The specialized epi-fl illuminator unit with white light TIRF allows multi-spectral TIRF to be accomplished without multiple lasers. The wide wavelength band of mercury illumination makes multiple wavelength TIRF observation possible by simply changing filter cubes.

- **NG108 cell: Growth cone stained with EGFP-fascin**
  Photos courtesy of: Satoe Ebihara, Kaoru Katoh, The National Institute of Advanced Industrial Science and Technology (AIST)

- **Photo activation of PA-GFP in a living mammalian cell by 405nm laser irradiation**
  Photos courtesy of: Tomoki Matsuda and Takeharu Nagai, Research Institute for Electronic Science, Hokkaido University

- **Imaging histamine-evoked Ca$^{2+}$ release in mammalian cells reported by a FRET-based Ca$^{2+}$ indicator, YC3.60**
  Photos courtesy of: Kenta Saito and Takeharu Nagai, Research Institute for Electronic Science, Hokkaido University

- **CFI Apochromat TIRF 60x Oil, NA 1.49 (left)**

- **CFI Apochromat TIRF 100x Oil, NA 1.49 (right)**

- **Remote controller**

- **Motorized TIRF attachment**
  Newly developed motorized laser TIRF illumination unit allows laser incident angle adjustment, shutter control and switching to epi-fluorescence excitation with the control pad or NIS-Elements software. The laser incident angle can be stored with a single touch of the control pad button. Storing laser incident angles can be easily reproduced. This enables alternate time-lapse recording between fluorescence and multi-wavelength TIRF images.

- **Overview of TIRF**

- **405nm laser light**

- **White light TIRF utilizing mercury or arc lamp illumination**
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Use of Optimal Optical Technology for Each Observation Method Allows Uncompromised Image Capture

Nikon’s uncompromising optical technologies provide diverse multi-modal visual information of a specimen using any observation method, delivering the full range of cellular details to researchers.

- Nomarski DIC
- The perfect balance of high contrast and high resolution is imperative for the observation of smaller structures. Nikon’s unique DIC system is designed to achieve uniform high-resolution images even at low magnifications. The new DIC sliders (dry types) include high-resolution and high-contrast choices.

- Motorized analyzer cube
- A filter cube style DIC analyzer can be mounted on the motorized filter turret to minimize switching time between DIC observation and fluorescence observation.

- Phase contrast
- For critical phase contrast observation, the CFI Plan Fluor ADH 100x (Oil) objective is available. This objective reduces halos and doubles the contrast of minute cell detail compared to conventional phase contrast objectives. It enables phase contrast observation of specimens with low-contrast minute structures within the cell.

- Fast and comfortable operation with motorized components
- Operation buttons on both sides of microscope body
  Fluorescence filter changeover, objective changeover, objective retraction, Z-axis coarse/fine changeover, PFS on/off control and offset storage, diascopic illumination on/off control can be operated quickly with easy-to-identify buttons on the microscope body.

- Hoffman Modulation Contrast®
- The combination of dedicated HMC objectives and HMC condenser components creates high contrast 3D-like images without halos, of living transparent specimens grown in plastic dishes.

- Objectives simultaneously developed with Nikon Ti series
  - CFI Plan Fluor ELWD/ELWD phase contrast objective
    - Newly developed broadband multilayer coating realizes high-transmittance from near-ultraviolet (Ca2+) to near-infrared wavelengths, with improved chromatic correction. The correction collar ring allows these objectives to be used with a diverse range of culture vessels and specimen thicknesses. High-quality images with no aberrations can be obtained under a broad range of illumination techniques.

- Filter cube style DIC analyzer
- High-quality single-microscope DNA bending assay using darkfield microscope. Each high green spot is a single plasmid DNA molecule. By viewing a pair of darkfield microscope, the position and orientation of DNA bending can be measured by following the intensity and color of the plasma arcs. For more information see Workman et al. (PNAS, 2013).

- Bovine ovum
- Viewed with an ADH objective

- Darkfield
- Use of high NA condenser allows darkfield observation. Long-term observation of nanoparticles without photobleaching is possible.

- Uncompromised Image Capture
- Uncompromising optical technologies provide diverse multi-modal visual information.

- Comfortable Observation
- Users can concentrate on their research without being hindered by microscope operations.

- Enhanced Operability Enables Comfortable Observation
- All buttons and control switches for motorized operation are designed considering ease of operation, visibility and understandability. Users can concentrate on their research without being hindered by microscope operations.

- Sophisticated original slant design
- By inclining the front part of the microscope’s body slightly backward the distance between the operator’s eye point and the specimen has been reduced by about 40mm, improving visibility and ergonomic design.

- Remote controller touch panel and preset buttons
- The microscope can be operated and microscope status is confirmed with icons. Also, observation conditions can be memorized with preset buttons. This enables switching observations from phase contrast to fluorescence with a single touch of a button, allowing the user to concentrate on observation without stress or avert attention from the task.
Motorized Elements for Comfortable Observation

Fast, automatic operation by integrated control with NIS-Elements software

Microscopes have evolved from merely observation devices to software-controlled data acquisition devices. Nikon’s Ti series not only features fast and comfortable motorized operation, but it also realizes acquisition of reliable data by controlling all motorized components for automatic imaging with the NIS-Elements imaging software.

- Nikon motorized XY stage
- Piezo Z stage
- Motorized nosepiece
- Motorized filter rotating turret
- Motorized condenser turret
- Motorized barrier filter wheel
- Remote controller
- Joystick unit
- PFS offset dial
- Ergonomic controller

Ti-E can be fully motorized with the HUB-A

Communication speed is dramatically increased through proprietary motorization algorithms, innovatively accelerating the sequence of operation. The Ti-E assures more reliable and efficient data acquisition in the research field.

Four components of Ti-U/S can be motorized with the HUB-B

By attaching HUB-B unit to the Ti-U/S, two optional motorized components, such as fluorescence filter turret and condenser turret, in addition to the stage and nosepiece, can be motorized, greatly enhancing flexibility.

- Motorized laser TIRF illumination unit
- Motorized shutter “Smart shutter”
- Motorized excitation filter wheel
- Motorized HG precentered fiber illuminator “Intensilight”

HUB-A

HUB-B

Motorized control of laser incident angle and repositioning by memory settings are possible.


Motorized HG precentered fiber illuminator “Intensilight”

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HUB-A

HUB-B

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Motorized HG precentered fiber illuminator “Intensilight”

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Compact, High-Performance CCD Cameras

Digital Sight series digital cameras for microscopes

These camera systems allow for smooth integration with a microscope and other products. Different combinations of camera head and control unit meet the requirements for any microscopic image acquisition.

Camera heads

- **DS-Qi1**
  - Definitive camera for fluorescence time-lapse imaging featuring high sensitivity, low noise, superior quantitative linear response and quantum efficiency, wide dynamic range and high frame-rate.

- **DS-5Mc**
  - High-definition 5.0-megapixel cooled color camera head. Cooling mechanism retains CCD at room temperature minus 20°C and realizes low-noise.

- **DS-Qi1**
  - Definitive camera for fluorescence time-lapse imaging featuring high sensitivity, low noise, superior quantitative linear response and quantum efficiency, wide dynamic range and high frame-rate.

- **DS-2Mv**
  - High-speed 2.0-megapixel color camera head displays smooth, high-quality live images.

- **DS-2MBW**
  - High-sensitivity, high-speed 2.0-megapixel monochrome camera head.

- **DS-Fi1**
  - High-definition 5.0-megapixel color camera head features high frame rate, high red sensitivity, high resolution and accurate color reproduction.

- **DS-2MBWc**
  - High-sensitivity, high-speed 2.0-megapixel cooled monochrome camera head. Cooling mechanism retains CCD at room temperature minus 20°C and realizes low-noise images.

- **DS-U2**
  - USB2.0 PC-use control unit is suitable for operations from advanced image capture to image processing and analysis by integrating control of camera, peripherals and microscope with NIS-Elements imaging software.

- **DS-L2**
  - Standalone control unit with high-resolution large 8.4-in. LCD monitor allows image capture without a PC. Pre-programmed imaging modes realize optimized imaging settings by choosing icons of the illumination method. Annotation, calibration and measurement tools are provided. Various digital interface and networking function enable images to be shared. Various USB 2.0 media storage, HUB and host control are provided.

Control units

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  - High-definition 5.0-megapixel cooled color camera head.

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Comprehensive Imaging & Analysis Software

Imaging software NIS-Elements

NIS-Elements has been developed by Nikon, a leader in microscope and camera technology. It allows automated operations from advanced image acquisition to analysis and measurement by integrating control of microscope, camera and peripherals. It is Nikon’s modular imaging software ideally integrated for all microscopy applications.

- **6D/4D packages selectable depending on purpose**
  - Ar (advanced research) package that allows image acquisition up to 6D (X, Y, Z, time, Lambda (wavelength), multipoint) and analysis and Br (basic research) package that allows to 4D image acquisition are available depending on research purposes and specimens. Upgrades are also possible by adding diverse optional modules.

NSS-Elements D, designed for easy image acquisition yet powerful and economical, is also available.

Cutting-Edge Fluorescent Imaging Illuminators

Diverse illumination options support advanced fluorescence observation

A broad range of illuminators using laser or mercury light sources are available depending on research requirements. These illuminators have excitation lights of various wavelengths and can deliver high NA, high-contrast fluorescence images during observation of single molecules or whole cells, medication experiments and photo activations.

- **Motorized/Manual laser TIRF illuminator unit**
  - This unit allows total internal reflection fluorescence observation of specimens such as cell focal adhesions or single molecules in-vitro using laser illumination. When used with a high-sensitivity camera, images with extraordinarily high S/N ratios that allow observation of single molecule can be captured. The motorized illuminator enables control and storage of laser incident angles as well as automated control of the TIRF/widefield reflector.

- **Epi-fl illuminator unit with white light TIRF**
  - This unit allows high-performance yet cost-effective total internal reflection fluorescence microscopy as well as oblique and standard widefield fluorescent techniques using mercury illumination. By changing fluorescence filters, wavelength of excitation light can be freely selected.

- **Photo activation illuminator unit**
  - This unit realizes photo activation of an arbitrary determined spot in the experiment using fluorescence protein such as Kaede and PA-GFP.

- **Fluorescence illuminator unit**
  - Chromatic aberration in broad wavelength range is corrected to provide sharper and brighter fluorescence images.
Advanced Confocal Laser Scanning Microscopes

Advanced confocal laser microscopes optimally match the Ti-E

Confocal laser scanning microscope C1 series

The basic C1plus can capture high-quality images in three fluorescence channels and DIC observation. The C1si allows capture of a wide 320nm band of wavelength spectra at 10nm resolution with a single high-sensitivity scan for advanced spectral analysis. The compact, personal confocal laser microscope C1 series responds well to diverse and high-performance confocal observation requirements.

- **Ti-E with C1plus**

- **Ti-E with C1si**

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**Accessories**

- **T-88-V3 micromanipulator system**
  A packaged set of compact instrumentation—about half the size of a conventional model—for cellular micromanipulation, the NT-88-V3 is ideal for IVF (in-vitro fertilization), ICSI (intracytoplasmic sperm injection), electrophysiology, or ichthyayan/biotechnology applications. Hinged joystick design provides superior ergonomics and operability. Remote oil hydraulic operation minimizes pipette vibration. An index at the coarse manipulator enables easy position adjustment of the pipette.

  Manufactured by Narishige Co., Ltd.

- **Stage incubation system INU series**
  It sustains the internal temperature at 37ºC with humidity of 90% and CO₂ of 5% to keep the specimen in a stable and precise condition for about three days. A special technique is employed to minimize focus drift caused by thermal expansion of a stage. The glass heater on top of the chamber prevents condensation and enables clear images.

  Manufactured by Tokai Hit Co., Ltd.

- **Incubator**
  With an acrylic plastic enclosure providing easy access to the specimen area, this accessory utilizes warm air circulation and maintains the temperature of the interior at 37ºC. The temperature is also adjustable from room temperature to 40ºC.

  Manufactured by Tosai Hit Co., Ltd.

- **Thermal plate warmer ThermoPlate MATS series**
  A temperature controllable stage ring with a glass heating plate keeps the specimen at a set temperature. Temperature is adjustable from room temperature to 50ºC in 0.1ºC increments.

  Manufactured by Tosai Hit Co., Ltd.
Ergonomic Eyepiece Tube
Eyepiece inclination is adjustable from 15° to 45°.
Includes darkslide shutter and Bertrand lens.

Binocular Eyepiece Tube D
Observation of conoscopic image with incorporated Bertrand lens
Phase contrast is possible and darkslide shutter is provided.

Binocular Eyepiece Tube S
Standard model

Plain Eyepiece Tube Base Unit

Stage Base
Stage base for configuration without diascopic illumination

Back Port Unit
Combined use with stage up/riser allows a camera to be mounted on a back port.

HMC Condenser
For Hoffman Modulation Contrast® observation

CLWD Condenser
For high NA long working distance objectives

Epi-fluorescence Attachments
Light source and illumination optics for high S/N images

Stage Ring
Acrylic ring (left) features superior objective lens visibility and the glass ring (right) features less thermal expansion—ideal for time-lapse observation.

CLWD Condenser
For high NA long working distance objectives

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Light source and illumination optics for high S/N images

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Accessories

Specifications

Main body

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<tr>
<th>Port</th>
<th>Ti-E: eyepiece 100%, left 100%, right 100%, eyepiece 20%/left 80%</th>
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</thead>
<tbody>
<tr>
<td>Manual port switching</td>
<td>Motorized port switching Manual port switching*Changeable to right as option.</td>
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<tr>
<td>Two ports (tube base unit with side port, back port) can be added optionally.</td>
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Focusing

| Stroke (manual): up 8mm, down 3mm |
| Motorized escape and refocus mechanism (coarse) |
| Coarse/fine switchable |

Intermediate magnification

| 1.5x |

Officer

Light intensity control, light on/off switch, — VPD on front of body, Operation with controller

Eyespec tube

| Ti-TD Binocular Tube D, Ti-TS Binocular Tube S, Ti-TERG Ergonomic Tube |

Eyespec tube base

| Ti-E/B Eyepiece Tube Base Unit, Ti-E/BR Eyepiece Tube Base Unit for PM, Ti-E-BS Eyepiece Tube Base Unit with Side Port |

Nosepiece


Objectives

| TI-60iF objectives |

Stage

| TI-SAM Attachable Mechanical Stage—Cross travel: X126 x Y84mm when used with Ti-S Plain Stage |

Motorized functions

| Focusing, Port switching, Coarse focusing |

Epi-fluorescence attachment

| Spectral fluorescence filter cube rotating turret, filter cubes with null-terminator mechanism, Field diaphragm compartment, 33mm ND4/ND8 filters, 25mm heat absorbing filter |

Nomarski DIC system

| Contrast control: Senarmont method (by rotating polarizer) Objectives side prisms, for individual objectives (inserted in nosepiece) |

Weight (approx.)

| Phase contrast set: 41.5kg |

Power consumption (max.)

| Full set with HUB-A and peripherals: approx. 95W | Full set with HUB-B and peripherals: approx. 40W |
Nikon’s Inverted Microscope Legacy and the History of Discovery

2007
- Eclipse Ti-E, the next generation of discoveries begins today
- PFS (perfect focus system)
- Laser TIRF
- Simplified DNA sequencing on the TE2000

2000
- Eclipse TE2000
- IR laser trapping
- Special inverted model used in space
- Cumulina the mouse cloned on the TE300

1996
- Eclipse TE300
- Breakthroughs: CFI 60 optics expanded infinity space
- Dolly the sheep cloned on the Diaphot 300
- First intracytoplasmic sperm injection (ICSI) on the Diaphot

1990
- Diaphot 300
- High NA DIC
- Rectified DIC
- Extra long working distance optics
- The brightest fluorescence
- World’s first IVF baby on the Diaphot TMD

1980
- Diaphot TMD, a revolutionary market leader for inverted microscopy
- Beginning of FURA/CA+ 340nm imaging

1976
- First CF optics
- First Hoffman Modulation Contrast®

1966
- Model MSD, the first affordable tissue culture microscope

1964
- Model M, the legacy begins
- Pioneering 16mm time-lapse live cells

- Landmark achievements for Nikon
- Nikon’s unique technical innovations in inverted microscopy
- Key scientific breakthroughs and Nikon’s participation in some of these
**System Diagram**

### A Eyepieces/Tube Base Units

- CFI UW Eyepiece Guard
- Eyepieces CFI 10x, 12.5x, 15x
- C-CT Centering Scope
- Binocular Tube D
- Binocular Tube S
- Ergonomic Tube
- TI-BTH Eyepiece Tube Base Unit for PH*2
- TI-TB Eyepiece Tube Base Unit with Side Port
- C-Mount Camera

### B Stages

- C-HU Universal Holder
- C-HF Tissue Holder
- C-HSG Slide Glass Holder
- 35mm Petri Dish Holder
- Glass Stage Ring 35mm
- TE Acrylic Stage Ring
- Ti-SR Rectangular Stage
- Ti-SP Short-handle Rectangular Stage
- Ti-SP Plain Stage
- T-SHR Stage Handle Knob

### D Illumination Pillars

- TI-DIC Lampada Plate
- TI-T2 DIC Polarizer
- TI-F2 Filter Set 45mm
- TI-CH Dicapsic Illumination Filter 100W
- TI-C High NA Condenser Lens Unit
- MC/TM2 High NA Condenser Holder
- TI-C High NA Lens (Dry)
- TI-C High NA Lens (Oil)
- TI-T-BPH Eyepiece Tube Base Unit for PH*2
- TI-T-B Eyepiece Tube Base Unit
- TI-T-BPH Phase Ring for PH Unit 60x/PH3, 60x/PH4, 100x/PH3, 100x/PH4

### J Analyzer

- TI-E/B Analyzer
- TI-E/B main body with bottom port only

### I Stage Riser

- TI-S-E Motorized Stage with Encoders*1
- TI-S-GR Motorized Stage with Encoders*1
- TI-S-CON Motorized Stage Controller*1

- TI-SH-U Universal Holder
- TI-SH-W Well Plate Holder
- TI-SH-J Stage Ring Holder

### Notes:

1. Requires a Communication Hub Controller
2. Cannot be used with stage riser
3. Combination with C-HGF/HGFIE Fiber Illuminator “Intensilight” is not recommended
4. Cannot be attached to Ti-S
5. Necessary for incorporating an illuminator unit in lower tier of the stratum structure
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