Nikon

ECLIPSE Ti2

Inverted Research Microscope

Shedding New Light On **MICROSCOPY**

See More Than Before

Leading platform for advanced imaging

The ECLIPSE Ti2 delivers an unparalleled 25mm field of view (FOV) that revolutionizes the way you see. With this incredible FOV, the Ti2 maximizes the sensor area of large-format CMOS cameras without making compromises, and significantly improves data throughput.
The Ti2's exceptionally stable, drift-free platform is designed to meet the demands of super-resolution imaging while its unique hardware-triggering capabilities enhance even the most challenging, high-speed imaging applications. Furthermore, the Ti2's unique, intelligent functions guide users through imaging workflows by gathering data from internal sensors, eliminating the possibility of user errors. In addition, the status of each sensor is automatically recorded during acquisition, providing quality control for imaging experiments and enhancing data reproducibility.
In combination with Nikon's powerful acquisition and analysis software, NIS-Elements, the Ti2 is a total innovation in imaging.

Contents

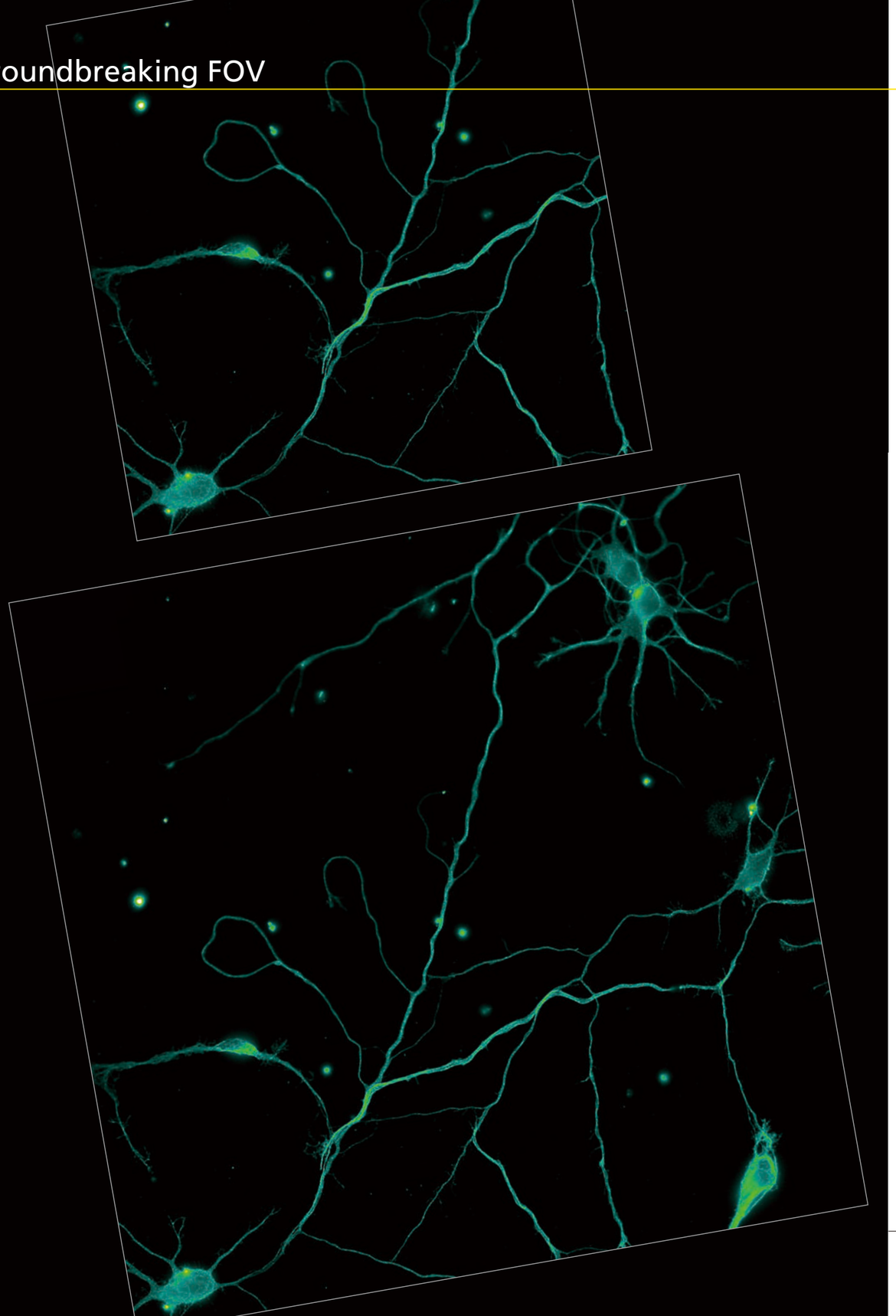
ECLIPSE Ti2-E

Motorized and intelligent model for advanced imaging applications. Compatible with PFS, auto correction collar, and external phase contrast system. The base of choice for live-cell imaging, high-content applications, confocal and super-resolution.

ECLIPSE Ti2-A

Manual model with imaging capability for laser applications. Intelligent features provide interactive guidance through imaging workflows and automatically detect microscope status.

Groundbreaking FOV

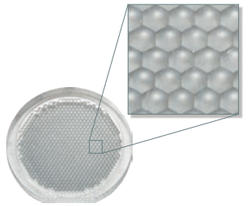


As research trends evolve towards large-scale, systems-level approaches, there is an increasing demand for faster data acquisition and higher throughput capabilities. Development of large-format camera sensors and improvements in the data processing capabilities of PCs have facilitated such research trends. The Ti2, with its unprecedented 25mm field of view, provides the next level of scalability, enabling researchers to truly maximize the utility of large-format detectors and future-proof their core imaging platform as camera technologies continue to develop at a rapid pace.

Bright illumination over a wide area

High-power LEDs deliver bright illumination across the Ti2's large field of view, ensuring clear, consistent results from demanding applications such as high-magnification DIC. Incorporation of a fly-eye lens design provides uniform illumination from edge to edge for quantitative high-speed imaging and seamless tiling of images in stitching applications.

High-power LED illuminator



Built-in fly-eye lens

A compact epi-fluorescence module designed for large FOV imaging provides high transmittance across a broad spectrum, including UV. Large diameter fluorescence filters with hard coatings deliver large FOV images with a high signal-to-noise ratio.

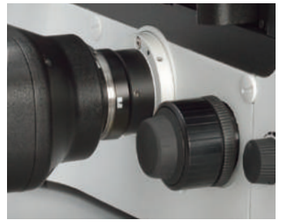
Epi-fluorescence module

Large diameter fluorescence filter cubes

Large diameter observation optics

The diameter of the observation light path has been enlarged in order to achieve a field number of 25 at the imaging port. The resulting large FOV is capable of capturing approximately double the area of conventional optics, enabling users to gain maximum performance from large-format sensors such as CMOS detectors.

Enlarged tube lens



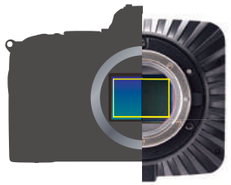
Imaging port with large 25 field number

Objectives for large FOV imaging

Objectives with superior image flatness ensure high quality images from edge to edge. Utilizing the maximum potential of the OFN25 objective significantly accelerates data collection.

Cameras for large-volume data acquisition

Nikon's FX-format F-mount cameras Digital Sight 10 and Digital Sight 50M are equipped with CMOS image sensors optimized for research use, originally developed for professional D-SLR cameras.
This allows high-speed and high-sensitivity live-cell imaging, enabling the best use to be made of the Ti2's large FOV.



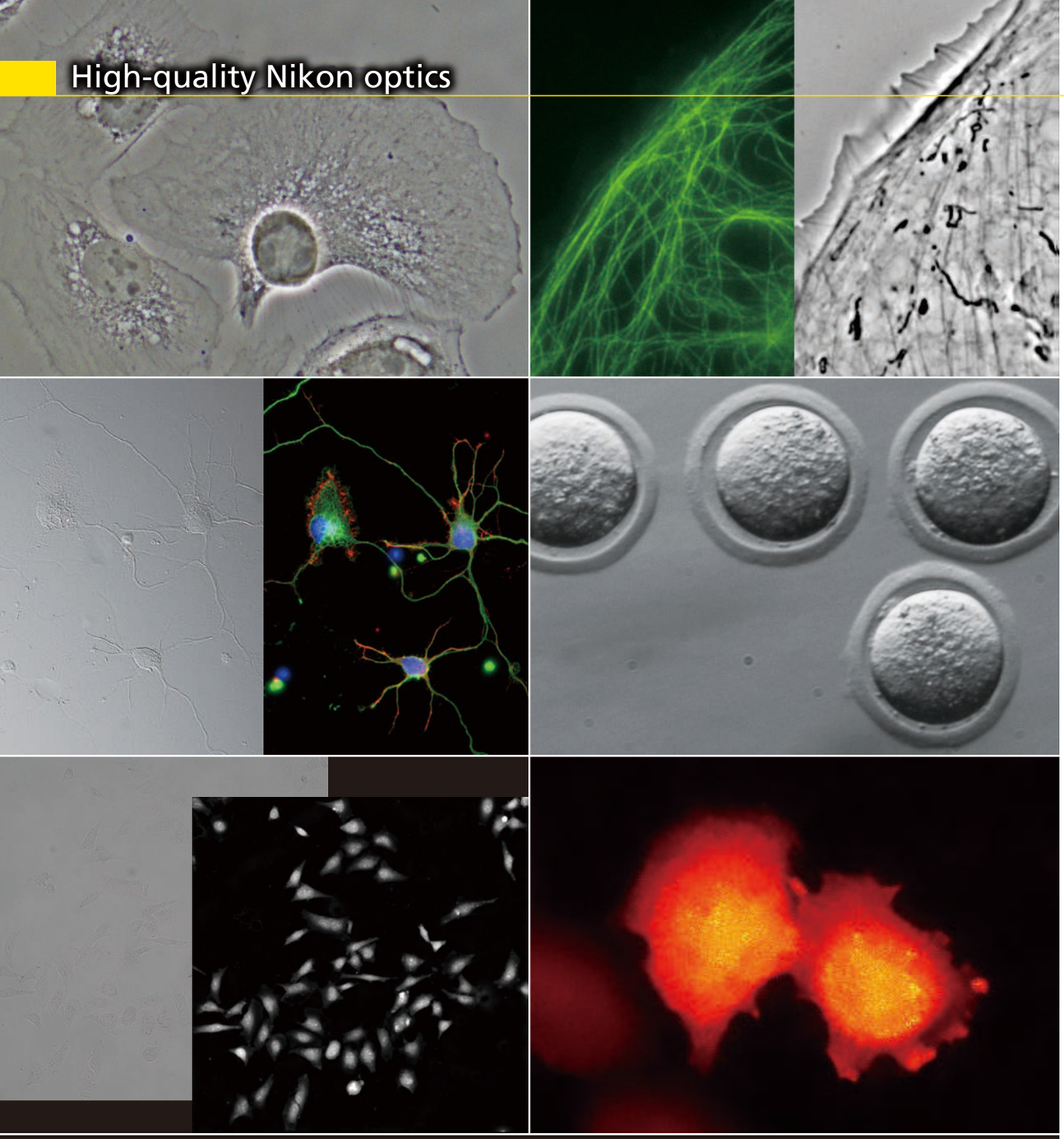
D-SLR camera technology optimized for microscopy

Digital Sight 10

Digital Sight 50M

Image on page 4
Neuron culture stained for microtubules (Alexa Fluor® 488), captured with CFI Plan Apochromat Lambda 60XC objective and DS-Qi2 camera.
Conventional FOV on top and new Ti2 FOV on bottom.
Photo courtesy of Josh Rappoport, Nikon Imaging Center, Northwestern Univ.; Sample courtesy of S. Kemal, B. Wang, and R. Vassar, Northwestern Univ.

High-quality Nikon optics



Apodized phase contrast image:
BSC-1 cells captured with CFI S Plan Fluor ELWD ADM 40XC objective

DIC and epi-fluorescence images:
25mm FOV image of neurons (DAPI, Alexa Fluor® 488, Rhodamine-Phalloidin), captured with CFI Plan Apochromat Lambda 60XC objective and DS-Qi2 camera
Photo courtesy of Josh Rappoport, Nikon Imaging Center, Northwestern Univ.;
Sample courtesy of S. Kemal, B. Wang, and R. Vassar, Northwestern Univ.

Brightfield and Volume Contrast images:
HeLa cells captured with CFI S Plan Fluor ELWD 20XC objective

Epi-fluorescence and external phase contrast images:
PTK-1 cells labeled with GFP-alpha-tubulin captured with CFI Apochromat TIRF 100XC Oil objective
Photo courtesy of Alexey Khodjakov, Ph.D Research Scientist VI / Professor, Wadsworth Center

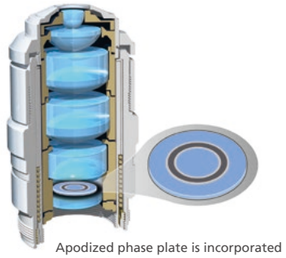
NAMC image:
Mouse embryos, captured with CFI S Plan Fluor ELWD NAMC 20XC objective

Luminescence image:
HeLa cells expressing BRET-based calcium indicator protein, Nano-lantern (Ca^{2+}).
Sample courtesy of Prof. Takeharu Nagai, The Institute of Scientific and Industrial Research, Osaka University

Nikon's high-precision CFI60 infinity optics, designed for use with a variety of sophisticated observation methods, are highly regarded by researchers for their superb optical performance and solid reliability.

Apodized phase contrast

Nikon's unique apodized phase contrast objectives with selective amplitude filters dramatically increase contrast and reduce halo artifacts to provide detailed high-definition images.



Apodized phase plate is incorporated in APC objectives

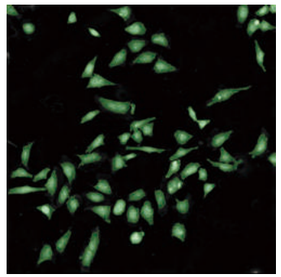
DIC (Differential Interference Contrast)

Nikon's highly-regarded DIC optics provide uniformly clear and detailed images with high resolution and contrast throughout the magnification range. DIC prisms are individually tailored for each objective lens to provide the highest-quality DIC images for every sample.

DIC prisms matched to individual objectives are mounted in the nosepiece

Volume Contrast (Ti2-E)

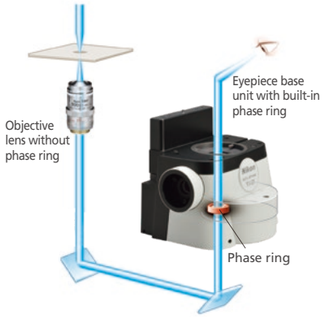
Volume Contrast imaging utilizes label-free, brightfield images captured at various Z-depths to assemble a phase distribution image. Volume Contrast renders cells easily identifiable as objects for automated counting and area analysis. As this method utilizes brightfield imaging, Volume Contrast enables in-line, non-destructive analysis of cells, suitable for various applications.



Binarized image analyzed by Volume Contrast

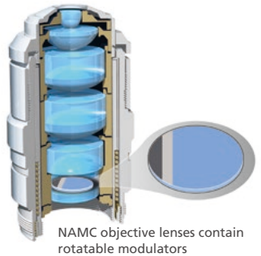
External phase contrast (Ti2-E)

The motorized external phase-contrast system enables users to combine phase contrast with epi-fluorescence imaging without compromising fluorescent light transmission by bypassing the need to use phase-contrast objectives. For example, very high NA, liquid immersion objectives can be used for phase-contrast imaging. Using this external phase contrast system, users can easily combine phase contrast with other imaging modalities, including weak-fluorescence imaging such as TIRF and laser tweezer applications.



NAMC (Nikon Advanced Modulation Contrast)

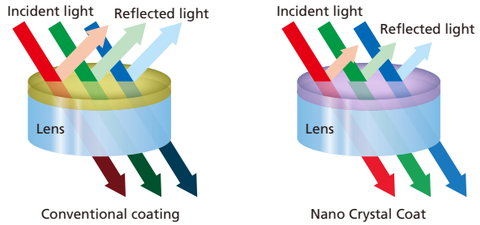
This is a plastic-compatible, high-contrast imaging technique for unstained, transparent samples such as oocytes. NAMC provides pseudo-three-dimensional images with a shadow-cast appearance. The direction of contrast can be easily adjusted for each sample.



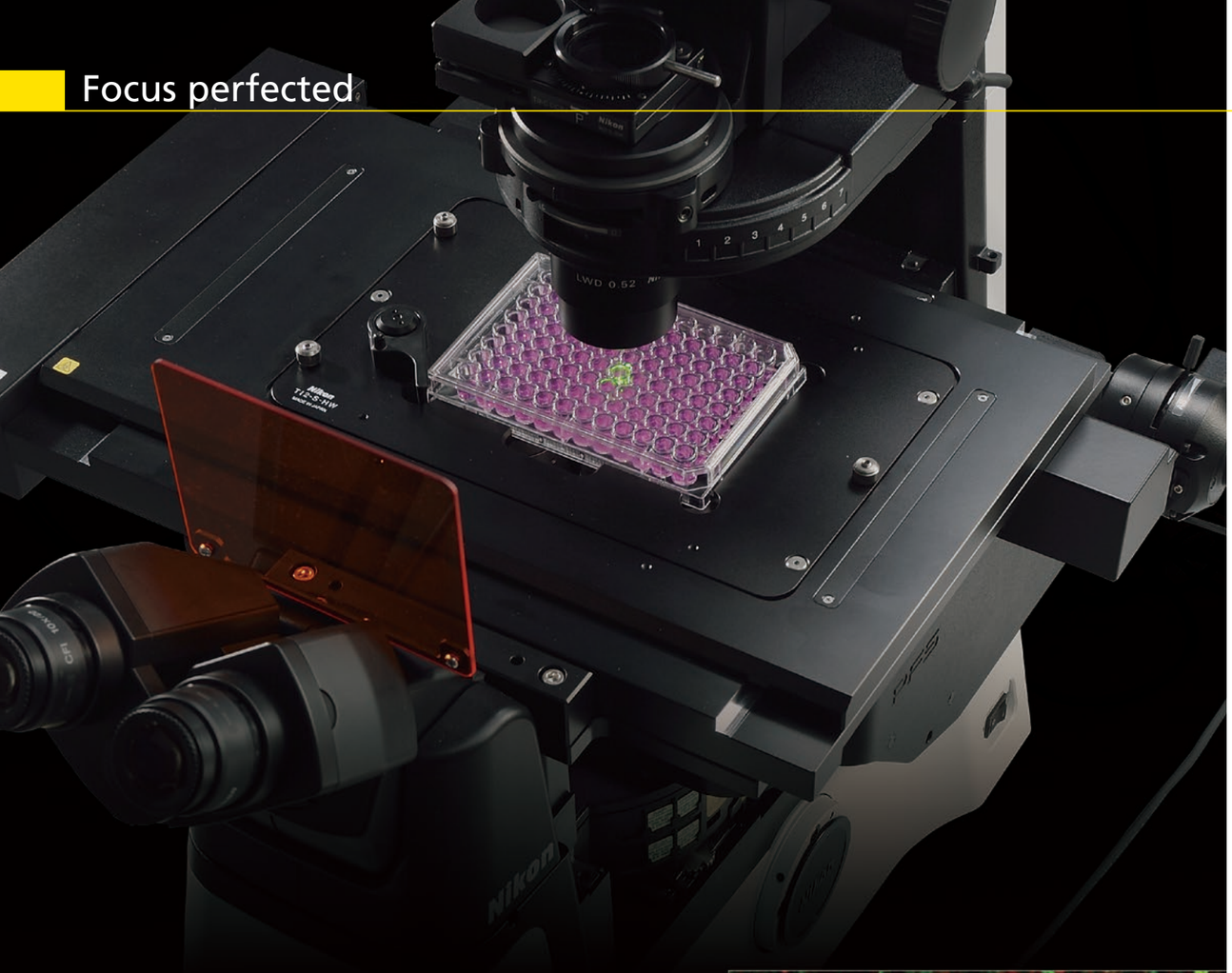
NAMC objective lenses contain rotatable modulators

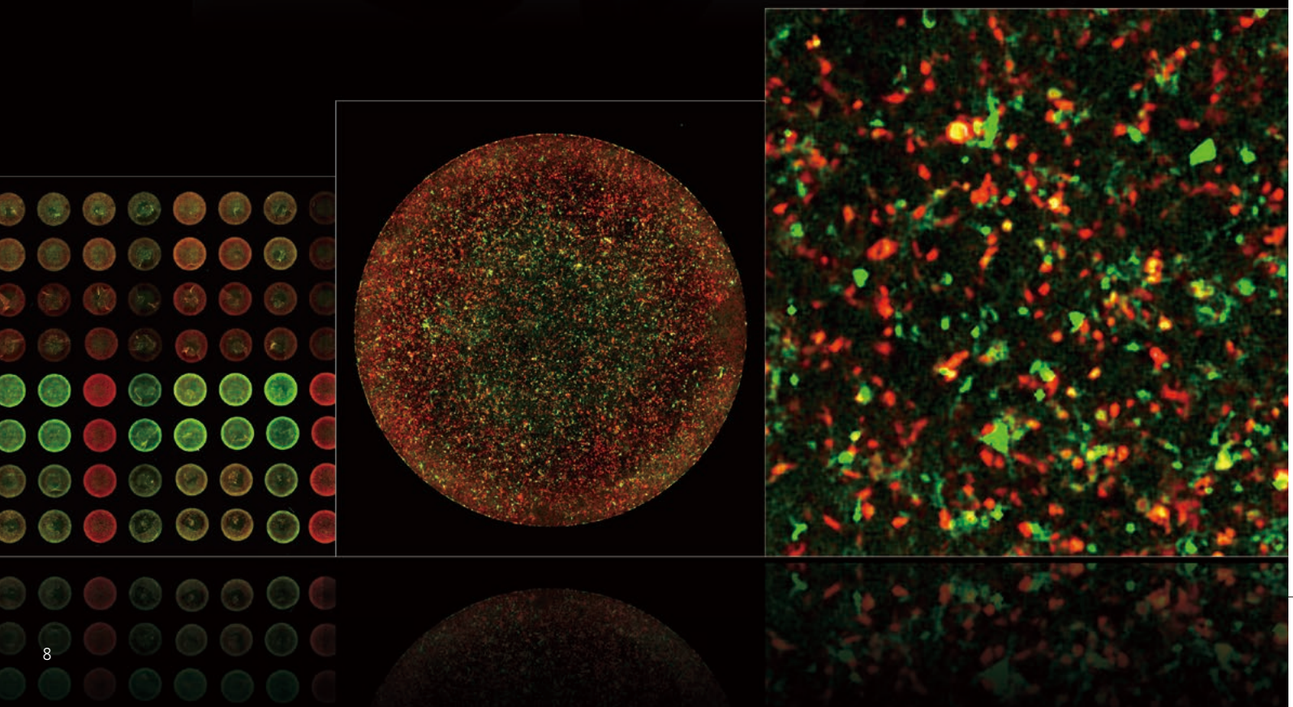
Epi-fluorescence

The Lambda D series objectives, utilizing Nikon's proprietary Nano Crystal Coat technology, are perfect for demanding, low-signal, multi-channel fluorescence imaging that requires high transmission and aberration correction over a wide wavelength range. Combined with new fluorescence filter cubes that offer improved fluorescence detection and stray light countermeasures such as the Noise Terminator, the Lambda D series objectives demonstrate their power in weak signal observations such as single-molecule imaging and even luminescence-based applications.



Focus perfected

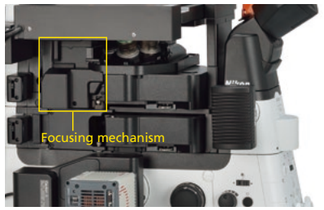




Even the slightest change in temperature and vibrations in the imaging environment can greatly impact focus stability. The Ti2 eliminates focus drift using both static and dynamic measures to enable faithful visualization of the nanoscopic and microscopic world during long time-lapse experiments.

Mechanically redesigned for ultra-high stability (Ti2-E)

In order to improve the focusing stability, both Z-drive and PFS autofocusing mechanisms have been completely re-designed. The new Z-focusing mechanism is smaller and positioned adjacent to the nosepiece to minimize vibrations. It remains adjacent to the nosepiece even in an expanded (staged-up) configuration, ensuring stability for all applications.



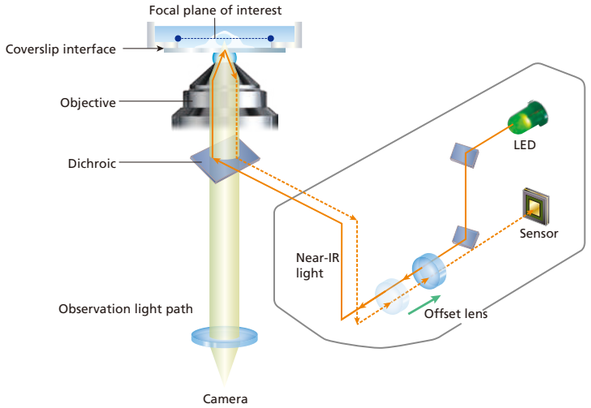
High stability Z-focusing mechanism remains adjacent to the nosepiece even in expanded configurations

The detector portion of the Perfect Focus System (PFS) has been detached from the nosepiece in order to reduce mechanical load on the objective nosepiece. This new design also minimizes heat transfer, which contributes to a more stable imaging environment. Towards this end, the power consumption of the Z-drive motor has also been reduced.
Combined, these mechanical redesigns result in an ultra-stable imaging platform, perfectly suited for single-molecule imaging and super-resolution applications.

Real time focus correction with the PFS: Simply perfect (Ti2-E)

The Perfect Focus System (PFS) automatically corrects focus drift caused by temperature changes and mechanical vibrations, which can be caused by a variety of factors including the addition of reagents to the sample and multi-position imaging.

The PFS maintains focus by detecting and tracking the position of the coverslip surface in real time. Unique optical offset technology allows users to easily maintain focus at a desired position offset from the cover slip surface. The PFS automatically and continuously maintains focus by means of a built-in linear encoder and high speed feedback mechanism, providing highly reliable images even during long-term, complex imaging tasks.



Water Immersion Dispenser (Ti2-E)

The performance of long-term imaging using the PFS together with water immersion objectives can be increased by using the new Water Immersion Dispenser. The Water Immersion Dispenser automatically applies the appropriate amount of pure water to the tip of an objective, preventing the immersion liquid from drying out and overflowing during experiments. It is compatible with all types of water immersion objectives and helps to stably provide high-resolution, high-contrast and aberration-corrected time-lapse images over long periods of time.

Dual micro nozzle geometry automatically keeps the proper amount of water on the tip of water immersion objectives.

Images on page 8
Stitched large image of an entire 96-well plate using PFS and a CFI Plan Apochromat Lambda 4X objective; each well contains neuronal cultures expressing red and green fluorescent proteins.
Sample courtesy of Jeanette Osterloh and Steve Finkbeiner, Gladstone Institutes , UCSF

Assist Guide

It is no longer necessary to memorize complex microscope alignment and operation procedures. The Ti2 integrates data from sensors to guide you through these steps, eliminating user error and enabling researchers to concentrate on their data.

Continuous display of microscope status (Ti2-E/A)

A collection of built-in sensors detects and relays status information for a variety of components in the microscope. All of the status information is recorded in the metadata when you acquire images with a computer, so you can easily recall acquisition conditions and/or check for configuration errors.
In addition, a built-in internal camera allows users to view the back aperture, facilitating confirmation of phase ring alignment and extinction cross in DIC. It also provides a laser-safe method for aligning lasers for applications such as TIRF.

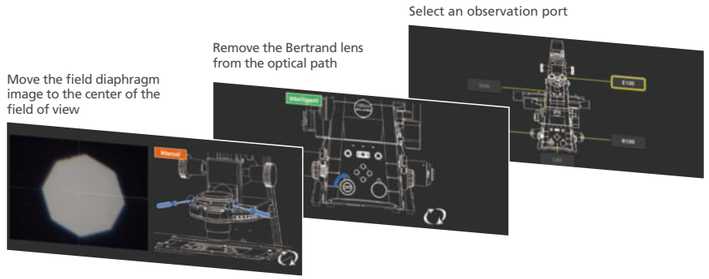
Microscope status can be viewed on a tablet and also determined based on status lights on the front of the microscope, enabling status determination in a dark room.

Status lights


Built-in sensors detect the status of microscope components

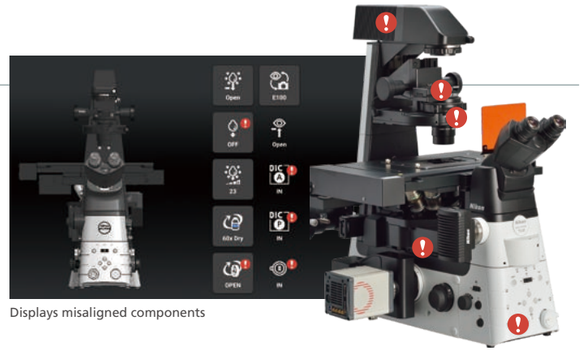
Guidance for operational procedures (Ti2-E/A)

The Ti2's Assist Guide function provides interactive step-by-step guidance for microscope operation. The Assist Guide can be viewed on a tablet or PC, and integrates real time data from built-in sensors and an internal camera. The Assist Guide is designed to help users through alignment procedures for both experiment setup and troubleshooting.



Automatically detect errors (Ti2-E/A)

The Check Mode allows users to easily confirm, on either a tablet or PC that all the correct microscope components are in place for their chosen observation method. This capability eliminates time and effort normally required for troubleshooting when the desired observation method is not achieved. This functionality is particularly advantageous when multiple users are involved, each with the potential to make unexpected changes to the microscope settings. Custom check procedures can also be pre-programmed.

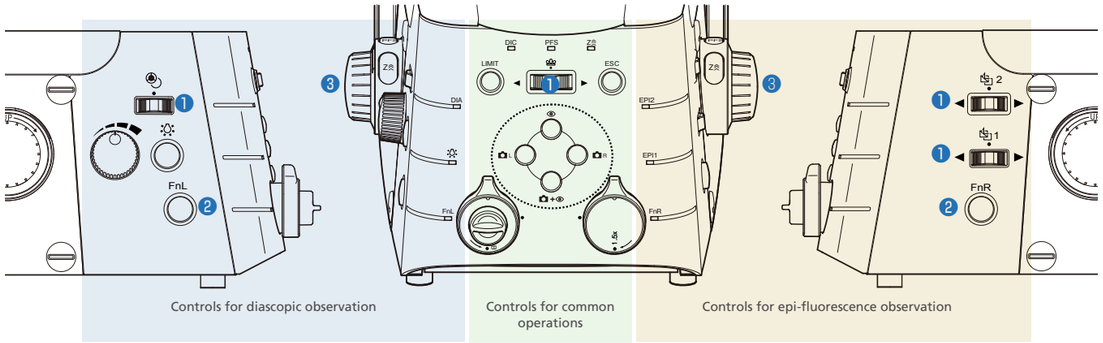

Displays misaligned components

Intuitive operation

The Ti2 has been completely redesigned, from the overall body design to the selection and placement of every button and switch, for the ultimate in user experience. The controls are easy to use even in the dark, where the majority of imaging experiments are conducted. The Ti2 provides an intuitive and effortless user interface so researchers can focus on the data and not on microscope control.

Thoughtfully designed layout for microscope control (Ti2-E/A)

The placement of all of the buttons and switches are based on the type of illumination they control. Buttons that control diascopic observation are positioned on the left side of the microscope and those that control epi-fluorescence observation are on the right side. Buttons that control common operations are on the front panel. This use of zoning provides an easy-to-remember layout, a desirable feature when operating the microscope in a dark room.



❶ Shuttle switch (Ti2-E)
Shuttle switches have been incorporated into the design to control devices such as the epi-fluorescence filter cube turret and objective nosepiece. These types of switches emulate the feel of manually rotating these devices, for intuitive control. Additional functionality can be incorporated into these shuttle switches so that a single switch can operate multiple related devices. For example, the shuttle switch for the epi-fluorescence filter cube turret not only rotates the turret but also opens and closes the fluorescence shutter when the user presses the switch. It is also possible to program these switches to operate a barrier filter wheel and the external phase contrast unit.

❷ Programmable Function button (Ti2-E/A)
Conveniently located Function buttons allow customization of the user interface. Users can select from more than 100 functions, including control of motorized devices such as shutters and even signal output to external devices via the I/O port for triggered acquisition. Mode functions, which enable instant changing of observation methods by storing the settings of each motorized device, can also be assigned to these buttons.

❸ Focusing knob (Ti2-E)
A focus acceleration button and a PFS engagement button are provided adjacent to the focusing knobs. The two buttons are easily identified by touch because of their different shapes. Focusing speed is automatically adjusted for the objective in use, enabling stress-free operation by maintaining an ideal focusing speed.

Intuitive control with joystick and tablet (Ti2-E)

The Ti2 joystick not only controls stage movement, but the majority of motorized functions on the microscope, including PFS activity. It can display XYZ coordinates and the status of microscope components, providing an effective means for the user to remotely control the microscope. Motorized functions of the Ti2 can also be controlled from a tablet, connected by wireless LAN to the microscope, providing a versatile graphical interface for microscope control.

System expandability

Stage up kit

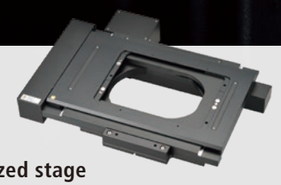
Allows expansion of the infinity space for incorporation of additional devices such as a second epi-fluorescence filter cube turret, barrier filter wheel, back port unit, and LAPP modules.

Epi-fluorescence filter cube turret

Compatible with large FOV. A manual intelligent model and high-speed motorized models with motorized shutter are available.

Motorized barrier filter wheel

Provides high-speed filter switching (50msec. switch time between adjacent positions) and is compatible with large FOV. It can also be mounted in the infinity space, under the epi-fluorescence filter cube turret, when the stage is raised.



Motorized stage

Control methods are optimized for fast stage operation. A stage with a built-in encoder and a piezo stage for Z-stacking are available. Magnetic specimen holders ensure safe operation.

Auto Correction Collar

Changes in sample/coverglass thickness, refractive index distribution and temperature can lead to image deterioration. This unique auto correction collar utilizes a harmonic drive and automatic correction algorithm to achieve precise collar adjustment.

Fluorescence LED light source

An eco-friendly light source optimized for fluorescence observation. It is a light source that can be directly mounted on the epi-fluorescence module.

LAPP system

Various illumination modules, such as TIRF and photostimulation modules, can be flexibly combined to customize your imaging system. Up to five modules can be mounted simultaneously.

Motorized TIRF Module

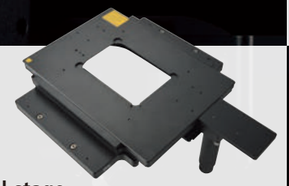
The incident angle of the laser and corresponding penetration depth of the evanescent field can be controlled via NIS-Elements software. When multiple TIRF modules are mounted (see image), the penetration depth can be independently set for each wavelength.

Field stop sliders

Two different rectangular-shaped apertures and one round aperture model are available. The rectangular models prevent excitation outside of the imaging area and unintentional photobleaching of samples. They can be removed for ultra-wide FOV imaging.

Condenser turret

Three types are available: manual, intelligent, and a motorized type that automatically switches between seven positions to accommodate different imaging modes.



Manual stage

A long travel stroke allows observation of the entire area of a well plate. The travel area can be restricted to ensure safe operation. Various specimen holders are available.

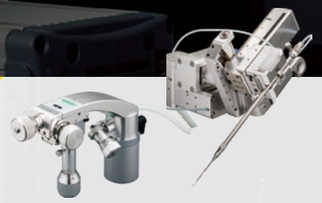
Confocal microscopes

The AX high-resolution/AX R ultrafast high-resolution confocal system. Multiphoton versions A1 MP+/A1R MP+ are also available.

Stage top incubator

The STX series precisely maintains temperature at 37.0°C and humidity at more than 95%, and controls CO_2 to enable culturing of cells for more than 1 week.

Manufactured by Tokai Hit Co., Ltd.



Oil hydraulic micromanipulator

The MTK-1-N4 achieves simple, easy pipette alignment and smooth pipette movement by means of a four-axis hydraulic joystick.

Manufactured by Narishige Lifemed Co., Ltd.

Super Resolution Microscopes

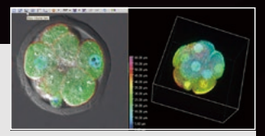
N-SIM S, which achieves live-cell imaging with double the resolution of conventional optical microscopes, and N-STORM, which achieves ten times the resolution of conventional optical microscopes for molecular-level observation, are available.

NIS-Elements

A unified acquisition and analysis software platform

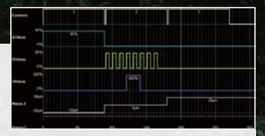
Nikon's unified software platform, NIS-Elements, provides acquisition control for basic to advanced imaging systems as well as powerful analysis tools and stunning display capabilities. NIS-Elements can be streamlined for simple, turnkey use and expanded for fully customized, complex experiments such as conditional workflows. NIS-Elements also offers easy-to-use, graphical programming tools such as JOBS and Illumination Sequence for customizing tasks. In addition to Nikon hardware, NIS-Elements controls devices from a vast array of manufacturers to enable the highest level of customization.

Device Control



Multidimensional Imaging

Optical Configuration (OC) settings memorize custom observation modes and are combined in the ND Acquisition GUI to easily create experiments combining multi-channe, multi-stage position, z-stacking, and timelapse imaging, as well as image stitching. Other functions such as photostimulation and photobleaching can also be flexibly combined.

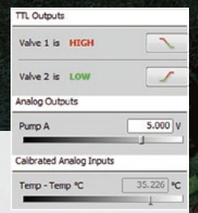


High-speed hardware control

The Ti2's unique hardware triggering capabilities remove software callbacks during acquisition routines to maximize imaging speed. The Illumination Sequence module provides a simple, graphical interface for quickly designing and verifying complex, triggered acquisition experiments.

Graphical programming for custom tasks

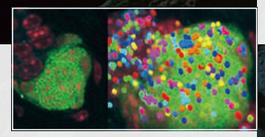
For complex or unique image acquisition needs, the JOBS tool provides an easy-to-use graphical interface for creating custom workflows using drag-and-drop features.



Control of Third Party Products

NIS-Elements can natively control a vast number of devices from a variety of manufacturers including high-sensitivity cameras, piezo-devices, light sources, wheels, and National Instruments DAQ devices. This flexibility in hardware control enables custom configurations tailored to individual research needs.

Display & Processing

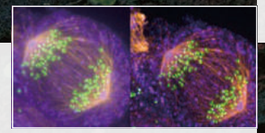


Multi-dimensional Display

Multi-dimensional images that combine multichannel, time-lapse, Z stack, and multi-XY position imaging, as well as image stitching are intuitively displayed in a single window. Powerful volume rendering tools provide unrivalled image quality and interactivity while the Movie-Maker feature enables users to easily create stunning movies.

Advanced Image Processing

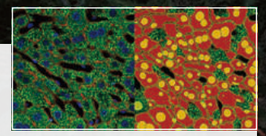
Advanced filters for sharpening, smoothing, and denoising as well as real-time shading correction and image averaging for noise reduction are available. NIS-Elements also offers advanced image arithmetic tools as well as a variety of image projection options such as extended depth of focus (EDF).



Deconvolution

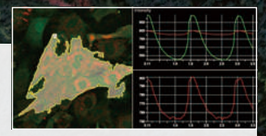
Automatic and manual modes, robust algorithms for noise measurement and removal, and enhanced spherical aberration correction are provided to help actualize theoretical resolutions for even confocal images. Both 3D and 2D deconvolution options are available.

Image Analysis



Automatic measurement

A combination of powerful segmentation tools, morphology functions, classifiers, and an extensive list of measurement tools for 2D, 3D and timelapse datasets enable users to extract quantitative information from their data with ease. Interactive/manual measurement options are also available.

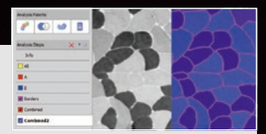


Real-time measurement

Time measurements can be carried out in real time and visualized during acquisition. Real-time analysis results can be especially useful for optimizing experiments that rely on drug treatments or ratiometric imaging like FRET or FRAP.

2D and 3D Object Tracking

NIS-Elements provides powerful tools for identifying and tracking 2D and 3D objects. Measurements include velocity, acceleration, distance, and direction. A variety of innovative display options are available for communicating and presenting tracking analysis results.



Custom Analysis Routines

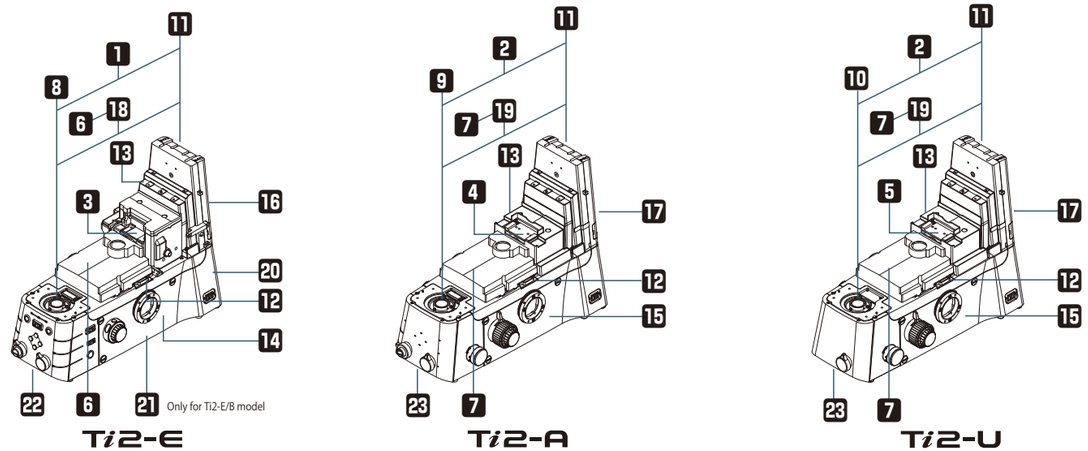
The General Analysis (GA) module provides an easy method for creating custom analysis routines that combine image processing and measurement. Routines created in GA can be saved and recalled and even combined with JOBS to create conditional acquisition workflows that rely on real-time analysis results from the integrated GA routine.

Stitched large image (with no shading correction) of a 19-day-old rat embryo (Alexa Fluor® 488-WGA, Alexa Fluor® 568-Phalloidin, DAPI), captured with CFI Plan Apochromat VC 20X objective

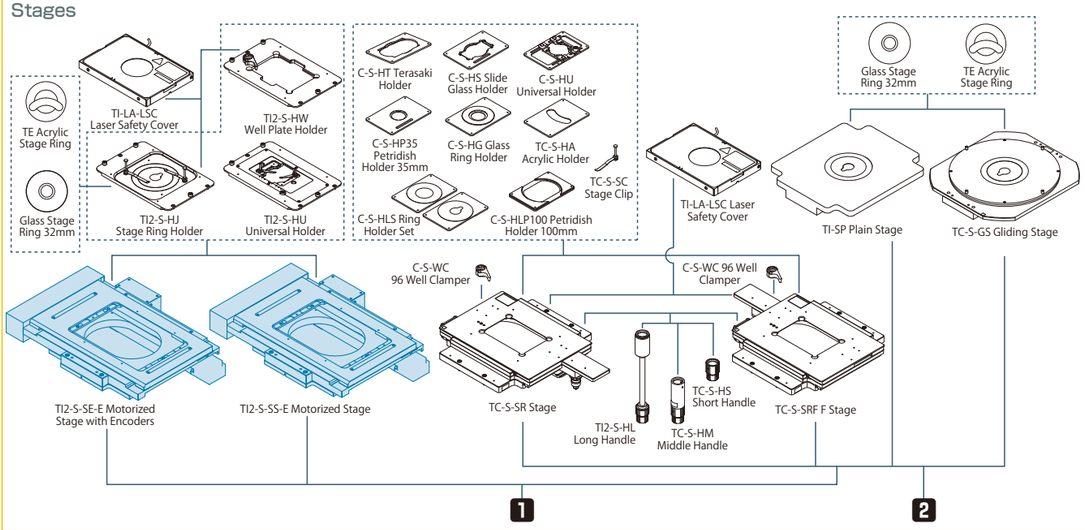
System Diagram

Motorized accessories (with status detection function)

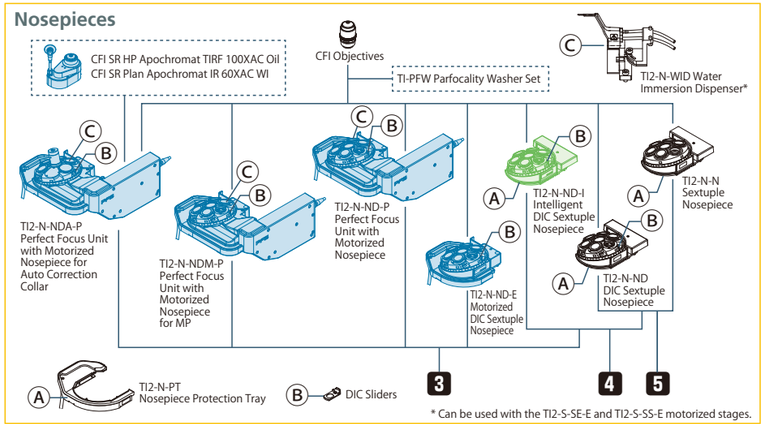
Accessories with status detection function



Stages

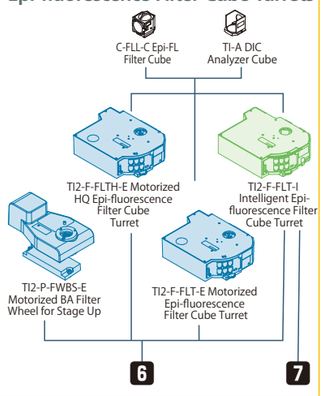


Nosepieces

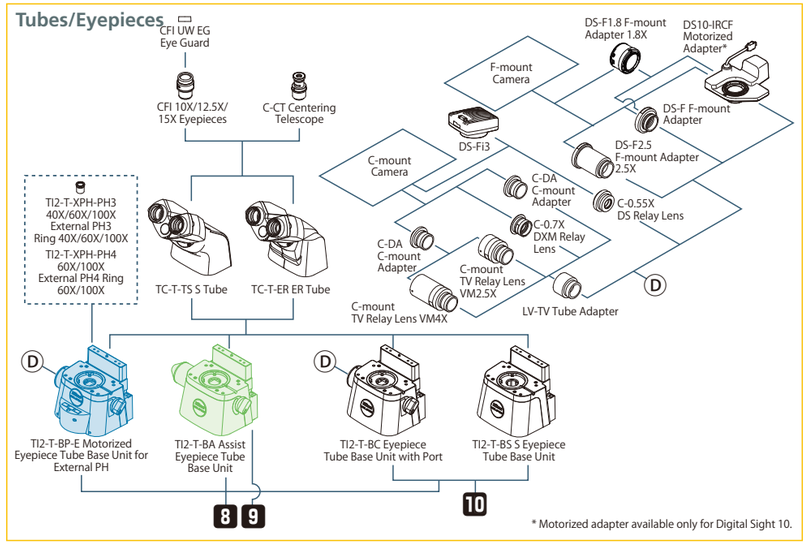


* Can be used with the TI2-S-SE-E and TI2-S-SS-E motorized stages.

Epi-fluorescence Filter Cube Turrets

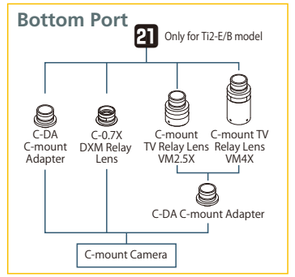


Tubes/Eyepieces

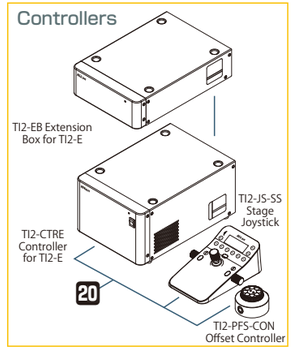


* Motorized adapter available only for Digital Sight 10.

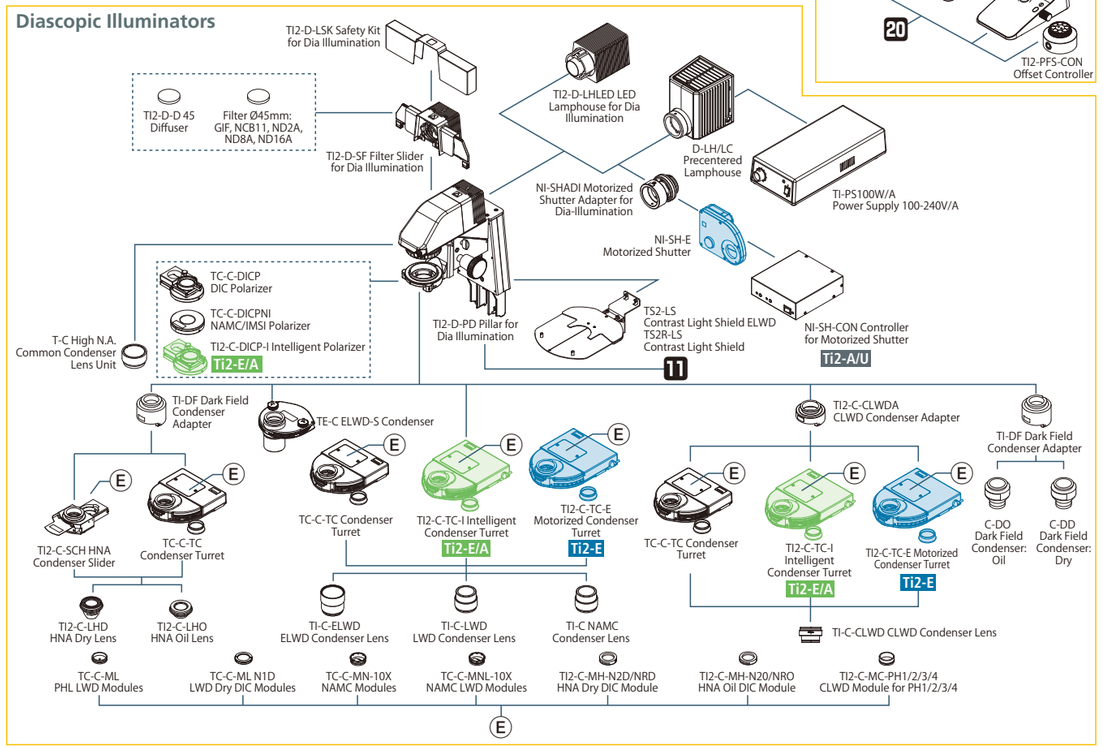
Bottom Port



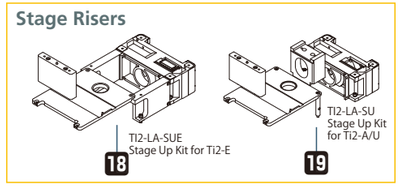
Controllers



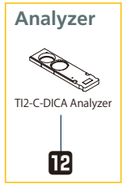
Diascopic Illuminators



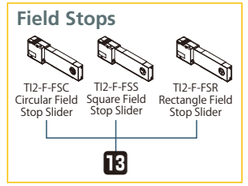
Stage Risers

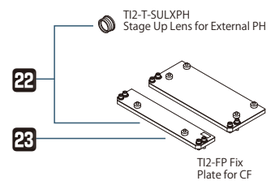


Analyzer



Field Stops



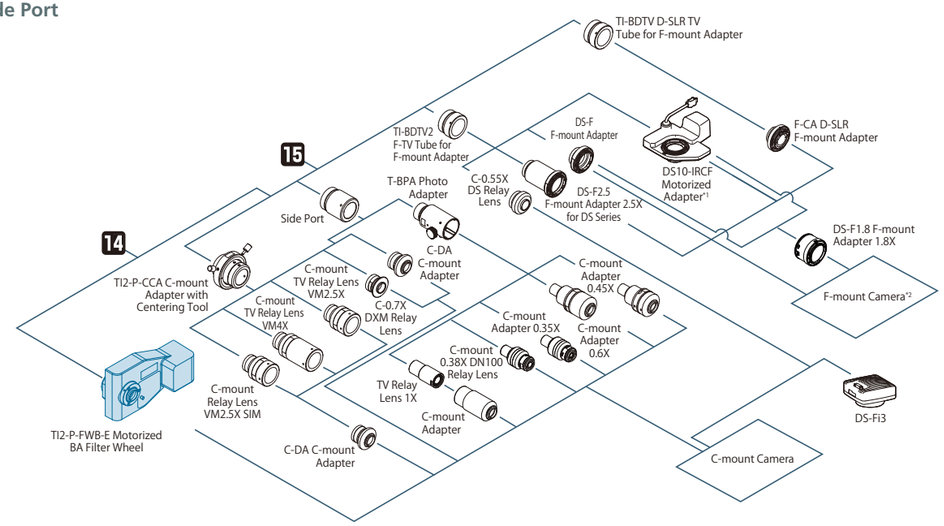


System Diagram

Motorized accessories (with status detection function)

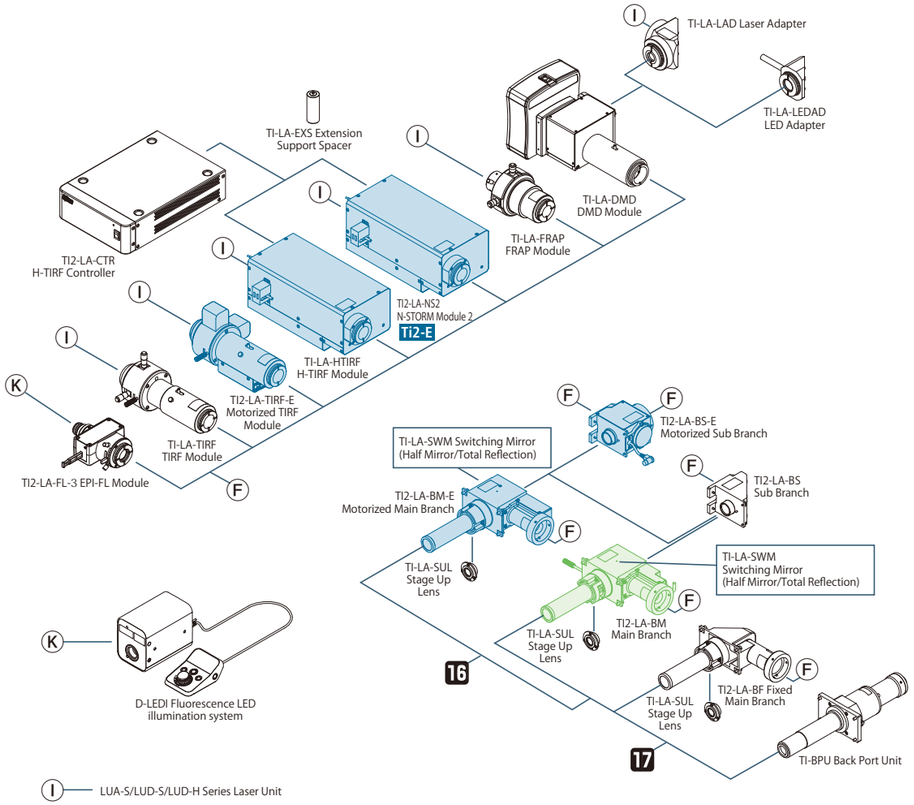
Accessories with status detection function

Side Port



*1 Motorized adapter available only for Digital Sight 10.
*2 There are restrictions on some camera combinations. For more information, please consult Nikon.

Fluorescence Illuminators



Objectives

Type	Model		Immersion	NA	W.D. (mm)	Cover glass thickness	Correction ring	Spring loaded	DIC	Phase contrast	Fluorescence			PFS
											UV	Visible light	NIR	
Plan Fluor	CFI Plan Fluor	4X		0.13	17.20	—					◎	◎		
		10X		0.30	16.00	0.17			○		◎	◎		✓
		20X		0.50	2.10	0.17			○		◎	◎		
		20XC MI	Oil Glycerin Water	0.75	0.51-0.35 0.51-0.34 0.49-0.33	0-0.17	✓	✓	○		◎	◎		
		40X		0.75	0.66	0.17		✓	○		◎	◎		✓
		40X Oil	Oil	1.30	0.24	0.17		✓w/stopper	○	EXT PH3-40x	◎	◎		✓
		60XC		0.85	0.40-0.31	0.11-0.23	✓	✓	○		◎	◎		
		60XS Oil	Oil	0.50-1.25	0.22	0.17		✓	○	EXT PH3-60x	◎	◎		
		100X Oil	Oil	1.30	0.16	0.17		✓w/stopper	○		◎	◎		✓
		100XS Oil	Oil	0.50-1.30	0.16	0.17		✓	○		◎	◎		
		DL 4XF		0.13	16.50	1.20				PHL	○	○		
		DLL 10X		0.30	16.00	0.17				PH1	○	○		✓
		DL 10XF		0.30	15.20	1.20				PH1	○	○		✓
		DLL 20X		0.50	2.10	0.17				PH1	○	○		✓
		DLL 40X		0.75	0.66	0.17		✓		PH2	○	○		✓
		DLL 100X Oil	Oil	1.30	0.16	0.17		✓w/stopper		PH3	○	○		✓
		ADH 100X Oil	Oil	1.30	0.16	0.17		✓w/stopper		PH3	○	○		✓
S Plan Fluor	CFI S Plan Fluor	LWD 20XC		0.70	2.30-1.30	0-1.80	✓		○		◎	◎		✓
		ELWD 20XC		0.45	8.20-6.90	0-2.00	✓		○		◎	◎		✓
		ELWD 40XC		0.60	3.60-2.80	0-2.00	✓		○		◎	◎		✓
		ELWD 60XC		0.70	2.60-1.80	0.10-1.30	✓		○		◎	◎		
		LWD ADM 20XC		0.70	2.30-1.30	0-1.80	✓			PH2	○	○		✓
		ELWD ADM 20XC		0.45	8.20-6.90	0-2.00	✓			PH1	○	○		✓
		ELWD ADM 40XC		0.60	3.60-2.80	0-2.00	✓			PH2	○	○		✓
		ELWD ADL 60XC		0.70	2.60-1.80	0.10-1.30	✓			PH2	○	○		
		ELWD NAMC 20XC		0.45	8.20-6.90	0-2.00	✓				○	○		
		ELWD NAMC 40XC		0.60	3.60-2.80	0-2.00	✓				○	○		
Super Fluor	CFI Super Fluor	4X		0.20	15.50	—					◎ 340	◎		✓
		10X		0.50	1.10	0.17		✓	○		◎ 340	◎		✓
		20X		0.75	1.00	0.17		✓	○		◎ 340	◎		✓
		40XC		0.90	0.34-0.26	0.11-0.23	✓	✓	○		◎ 340	◎		
		40X Oil	Oil	1.30	0.19	0.17		✓w/stopper	○		◎ 340	◎		✓
		100XS Oil	Oil	0.50-1.30	0.20	0.17		✓			◎ 340	◎		
Plan Apochromat	CFI Plan Apochromat	Lambda D 2X		0.10	8.50	0-0.17					◎ CF	◎	◎	
		Lambda D 4X		0.20	20.00	0-0.17					◎	◎	◎	✓
		Lambda D 10X		0.45	4.00	0.17			◎		◎	◎	◎	✓
		Lambda D 20X		0.80	0.80	0.17		✓	◎		◎	◎	◎	✓
		Lambda D 40XC		0.95	0.21	0.11-0.23	✓	✓	◎		◎ CF	◎	◎	✓
		Lambda D 60X Oil	Oil	1.42	0.15	0.17		✓	◎	EXT PH3-60x	◎	◎	◎	✓
		Lambda D 100X Oil	Oil	1.45	0.13	0.17		✓	◎	EXT PH3-100x	◎	◎	◎	✓
		Lambda S 10X		0.45	4.00	0.17			○		●	◎	◎	✓
		Lambda S 25XC Sil	Silicone Oil	1.05	0.55	0.11-0.23	✓		○		●	◎		✓
		Lambda S 40XC Sil	Silicone Oil	1.25	0.30	0.13-0.21 (23°C) 0.15-0.23 (37°C)	✓		○		●	◎		✓
		VC 60XC WI**	Water	1.20	0.31-0.28	0.15-0.18	✓	✓	○	EXT PH3-60x	◎	◎		✓
		IR 60XC WI**	Water	1.27	0.18-0.16	0.15-0.19	✓	✓	○	EXT PH3-60x	●	○	◎	✓
		10XC Glyc	Oil Glycerin Water	0.50	2.00***	0-0.17	✓					◎	◎	
	CFI HP Plan Apochromat	VC 100X Oil	Oil	1.40	0.13	0.17		✓	○	EXT PH3-100x	●	◎		✓
	CFI SR Plan Apochromat	IR 60XC WI**	Water	1.27	0.18-0.16	0.15-0.19	✓		○	EXT PH3-60x	●	○	◎	✓
		IR 60XAC WI*,**	Water	1.27	0.18-0.16	0.15-0.19	✓		○	EXT PH3-60x	●	○	◎	✓
	CFI SR HP Plan Apochromat	Lambda S 100XC Sil	Silicone Oil	1.35	0.31-0.29 (23°C) 0.30-0.28 (37°C)	0.15-0.19	✓		○		◎	◎		✓
Apochromat	CFI Apochromat	LWD Lambda S 20XC WI**	Water	0.95	0.99-0.90	0.11-0.23	✓		○			○	○	✓
		LWD Lambda S 40XC WI**	Water	1.15	0.61-0.59	0.15-0.19	✓		○	EXT PH3-40x	○	◎		✓
		Lambda S 40XC WI**	Water	1.25	0.20-0.16	0.15-0.19	✓	✓	○	EXT PH3-40x	◎	◎		✓
		TIRF 60XC Oil	Oil	1.49	0.16-0.10 (23°C) 0.13-0.07 (37°C)	0.13-0.19 (23°C) 0.15-0.21 (37°C)	✓		○	EXT PH4-60x	●	◎		✓
		TIRF 100XC Oil	Oil	1.49	0.16-0.10 (23°C) 0.15-0.09 (37°C)	0.13-0.19 (23°C) 0.14-0.20 (37°C)	✓		○	EXT PH4-100x	●	◎		✓
	CFI SR HP Apochromat	TIRF 100XC Oil	Oil	1.49	0.16-0.10 (23°C) 0.15-0.09 (37°C)	0.13-0.19 (23°C) 0.14-0.20 (37°C)	✓		○	EXT PH4-100x	●	◎		✓
		TIRF 100XAC Oil*	Oil	1.49	0.16-0.10 (23°C) 0.15-0.09 (37°C)	0.13-0.19 (23°C) 0.14-0.20 (37°C)	✓		○	EXT PH4-100x	●	◎		✓

◎ : recommended for best results
○ : suitable
● : possible with visible light that has a longer wavelength than excitation light used for DAPI

EXT : external phase contrast modules
340 : high transmittance with an ultraviolet wavelength range of up to 340nm
CF: confocal imaging is possible at 488 nm and above

* Compatible with Auto Correction Collar
** Compatible with Water Immersion Dispenser
*** 5.50 for upright microscopes

Specifications

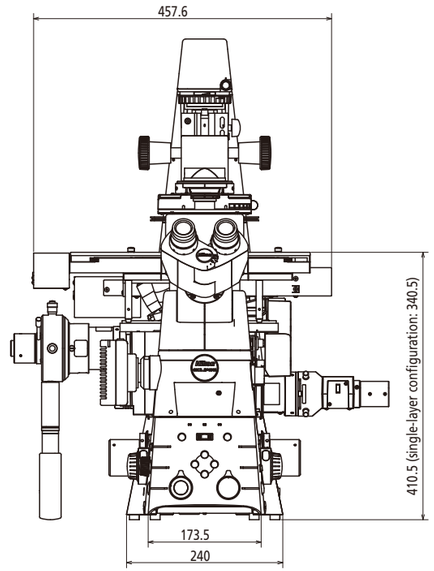
		ECLIPSE Ti2-E, Ti2-E/B*1	ECLIPSE Ti2-A	ECLIPSE Ti2-U
Main body	Optical system	Infinity-corrected CFI60		
	Field number*2	22 with C-mount, 25 with F-mount		
	Intermediate Magnification switching	Manual switching of 1.0x/1.5x (exchangeable from 1.5x to 2.0x)		
		Status detection		—
	Bertrand lens	Manual in/out, and manual focus, Status detection		—
	Output port	4 Motorized positions Eyepiece 100%, left 100%, right 100%, eyepiece 20%/left 80% (Ti2-E/B: bottom 100%)	4 Manual positions Eyepiece 100%, left 100%, right 100%, option (to eyepiece 20%/left 80% or eyepiece 20%/right 80%)	
		Can add ports by use of back port unit and/or choice of tube base unit*3		
	Focusing unit	Motorized drive, Coarse/fine focus changeover, 10mm stroke, Minimum increments: 0.01μm, 0.02μm (with encoder control)	Manual drive, Coarse/fine focusing knob, 10mm stroke	
	Stage up	Available*4		
Tube body	Binocular tube	Binocular S tube TC-T-TS (field number 22), Ergonomic ER tube TC-T-ER (field number 22)		
	Motorized eyepiece tube base unit for external PH (TI2-T-BP-E)	Camera port (field number 16), Motorized PH turret with 4 motorized positions	—	
	Assist eyepiece tube base unit (TI2-T-BA)	Assist camera (field number 22), Status detection		—
	Eyepiece tube base unit with port (TI2-T-BC)	Camera port (field number 16)	—	Camera port (field number 16)
Transmitted illumination	Pillar for transmitted illumination (TI2-D-PD)	Condenser vertical stroke: 66mm, Backward tilting up to 25 degrees, With field diagram and refocusing mechanism 2 filter slot positions (4 filter position option is also available with Filter Slider for transmitted illumination (TI2-D-SF))		
	LED Lamphouse for dia illumination (TI2-D-LHLED)	High power LED		
	Precentered Lamphouse (D-LH/LC)	100W halogen bulb (pre-centered)		
Condenser	Motorized condenser turret (TI2-C-TC-E)	7 motorized positions (Ø37mm x4, Ø39mm x3), LWD/ELWD/CLWD/NAMC condenser lenses are supported	—	
	Intelligent condenser turret (TI2-C-TC-I)	7 manual positions (Ø37mm x4, Ø39mm x3), Status detection, LWD/ELWD/CLWD/NAMC condenser lenses are supported		—
	Condenser turret (TC-C-TC)	7 manual positions (Ø37mm x4, Ø39mm x3), LWD/ELWD/CLWD/NAMC condenser lenses are supported		
	ELWD-S condenser turret (TE-C)	4 manual positions, With ELWD condenser lens (O.D.=65mm, NA=0.3)		
	HNA condenser slider (TI2-C-SCH)	2 manual positions (Ø37mm x1, Ø39mm x1), HNA dry lens/HNA oil lens are supported		
	Condenser lens	LWD (O.D.=30mm, NA=0.52), ELWD (O.D.=75mm, NA=0.29), CLWD (O.D.=13mm, NA=0.72), HNA dry (O.D.=5mm, NA=0.85), HNA oil (O.D.=2mm, NA=1.4), NAMC (O.D.=44mm, NA=0.4)		
Stage	Motorized stage (TI2-S-SE-E, TI2-S-SS-E)	Stroke X: ±57mm, Stroke Y: ±36.5mm, Max drive speed: approx. 25mm/sec, Magnetic sample holder	—	
	Stage (TC-S-SR, TC-S-SRF)	Stroke X: ±57mm, Stroke Y: ±36.5mm, Adjustable stroke range (3 levels) with adjusting pin, Long/middle/short handle options available		
	Gliding stage (TC-S-GS)	Stroke Ø20mm		
Nosepiece	Perfect Focus Unit with motorized nosepiece for Auto Correction Collar (TI2-N-NDA-P)	5 motorized positions, Simple waterproof structure	—	
	Motorized DIC sextuple nosepiece (TI2-N-ND-E) Perfect Focus Unit with motorized nosepiece (TI2-N-ND-P) Perfect Focus Unit with motorized nosepiece for MP (TI2-N-NDM-P)	6 motorized positions, Simple waterproof structure	—	
	Intelligent DIC sextuple nosepiece (TI2-N-ND-I)	6 manual positions, Status detection, Simple waterproof structure		—
	Sextuple nosepiece (TI2-N-N), DIC sextuple nosepiece (TI2-N-ND)	6 manual positions, Simple waterproof structure		
Epi-fluorescence filter cube turret	Motorized epi-fluorescence filter cube turret (TI2-F-FLTH-E, TI2-F-FLT-E)	6 motorized positions, Motorized shutter	—	
	Intelligent epi-fluorescence filter cube turret (TI2-F-FLT-I)	6 manual positions, Manual shutter, Status detection*5		
Filter wheel/shutter	Motorized BA filter wheel (TI2-P-FWB-E)	7 motorized positions, High speed mode: 50ms, Low vibration mode: 100ms (movement time between adjacent positions)	—	
	Motorized shutter (NI-SH-E)*6	12ms to open/close		
Epi-fluorescence attachment	EPI-FL module (TI2-LA-FL-3)	Supports D-LEDI Fluorescence LED; includes 2-position filter slider and aperture diaphragm In combination with the C-FIBA Adapter for fiber light, fiber illumination can be used		
	Field stop slider	Circular (TI2-F-FSC), rectangular (TI2-F-FSR), square (TI2-F-FSS) aperture options		
Control unit	Controller, display device	Stage joystick (TI2-JS-SS), Tablet	Tablet	—
	Controller for TI2-E (TI2-CTRE)	USB/LAN interface, I/O function	—	
Operating environmental		Temperature: 0˚C+40˚C, Humidity: 60% RH max. (at +40˚C, no condensation), Indoor use only		

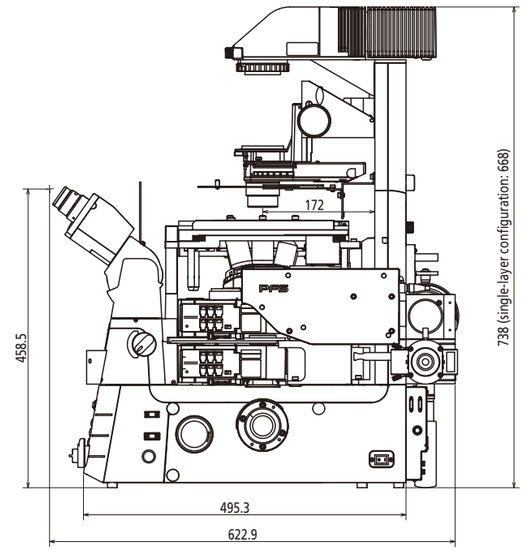
Motorized accessories have a status detection function
*1 Motorized model with a bottom port
*2 Limitations apply based on objective and filter cube choice, stage-up configuration, and illumination module, etc.
*3 Tube base units with a port cannot be used with Ti2-A
*4 Stage up kit is required. Please contact Nikon.
*5 Status detection cannot be used when attached to the Ti2-U
*6 NI-SH-CON Controller for Motorized Shutter is required for use with the Ti2-A/Ti2-U

Dimensional Diagram

Ti2-E

Double layer configuration with an Epi-FL module and a FRAP module

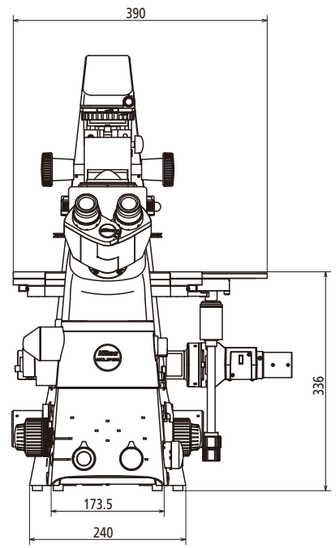




Unit: mm

Ti2-A/U

Single layer configuration with an Epi-FL module



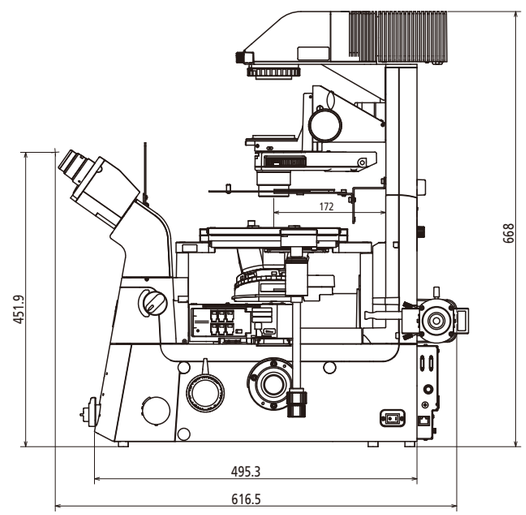


Illustration is of Ti2-A

Unit: mm

ECLIPSE Ti2-U
Inverted Microscope for ICSI

Shedding New Light
On **MICROSCOPY**

Specifications

Model name		ECLIPSE Ti2-U IVF EU	ECLIPSE Ti2-U IVF US
Main Body	Optical System	Infinity-corrected CFI60	
	Field Number	22 with C-mount, 25 with F-mount	
	Intermediate Magnification Switching	Manual switching of 1.0x/1.5x	
	Output Port	4 Manual positions Eyepiece 100%, left 100%, right 100%, eyepiece 20%/left 80%	
	Focusing Unit	Manual drive, Coarse/Fine focusing knob, Focusing stroke: 10 mm	
Tube		• TC-T-TS Binocular S tube (Field number 22)	
Eyepiece Tube Base		• TI2-T-BS S Eyepiece Tube Base Unit	
Eyepiece		• CFI 10X Eyepiece (Field number 22)	
Transmitted Illumination	Pillar for transmitted illumination	• TI2-D-PDI Pillar I for Dia Illumination Condenser vertical stroke: 66 mm, Backward tilting up to 25 degrees, with field diagram and refocusing mechanism	
	LED Lamphouse for Dia Illumination	• TI2-D-LHLED LED Lamp House for Dia Illumination: High power LED	
Condenser	Condenser Turret	• TC-C-TC Condenser Turret: 7 manual positions	
	Condenser Lens	• TI-C NAMC Condenser Lens (O.D.=44 mm, NA=0.4)	
	Modules for Condenser Turret	• TC-C-MN-10X NAMC 10X Module • TC-C-MN-20X NAMC 20X Module • TC-C-MN-40X NAMC 40X Module	
	Polarizer for NAMC Observation	• TC-C-DICPNI NAMC/IMSI Polarizer	
Stage		• TC-S-SRI Stage IVF Stroke X: ±57 mm, Stroke Y: ±36.5 mm • TI2-S-HL Long Handle	• TC-S-SR Stage Stroke X: ±57 mm, Stroke Y: ±36.5 mm • TI2-S-HL Long Handle
Nosepiece		• TI2-N-ND DIC Sextuple Nosepiece: 6 manual positions, Simple waterproof structure • TI2-N-N Sextuple Nosepiece: 6 manual positions, Simple waterproof structure	
Spindle Observation System		• TI2-C-SO Spindle Observation System	
Adjustment Tool		• C-T Centering Telescope	
Objectives (NA/W.D.) W.D.=mm		• CFI Achromat 4X (0.10/30.0) • CFI Achromat NAMC 10XF (0.25/6.20) • CFI Achromat LWD NAMC 20XF (0.40/3.10) • CFI Achromat LWD NAMC 40XC (0.55/2.70-1.70)	• CFI Plan Fluor 4X (0.13/17.20) • CFI S Plan Fluor ELWD NAMC 20XC (0.45/8.20-6.90) • CFI S Plan Fluor ELWD NAMC 40XC (0.60/3.60-2.80)
Power Cord and AC Adapter		• Power Cord Type BE,220-240V • I-AC AC Adapter I	• Power Cord Type BU,100-120V • 4-AC AC Adapter
Operating Environment		Temperature: 0˚C+40˚C, Humidity: 60% RH max. (at +40˚C, no condensation), Indoor use only	

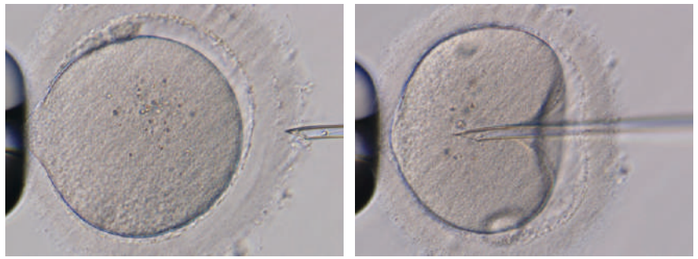
Superior optical performance and precision for ICSI

Nikon microscopes have played a significant role from the early days of Intracytoplasmic Sperm Injection (ICSI) and continue to contribute to the advancement of this field through superior optical performance and precision.
The ECLIPSE Ti2-U IVF EU/US provides an ultra-stable platform for performing precision manipulation procedures such as ICSI. The intermediate magnification switching function (1.5X) allows easy switching of observation magnification without changing objectives.

Photographed at, and with the cooperation of,
Reproduction Clinic Tokyo
Product image for illustration purposes only.
Actual product may vary.

Nikon Advanced Modulation Contrast (NAMC) observation

The Nikon Advanced Modulation Contrast (NAMC) technique enables high-contrast observation of colorless and transparent samples through plasticware. NAMC produces a pseudo-relief shading effect, ideal for ICSI. The direction of shading can be adjusted through 360 degrees by turning the modulator in an NAMC objective. CFI S Plan Fluor ELWD NAMC objectives are equipped with a modulator ring clamping mechanism to prevent accidental rotation of the modulator ring while rotating the correction collar.



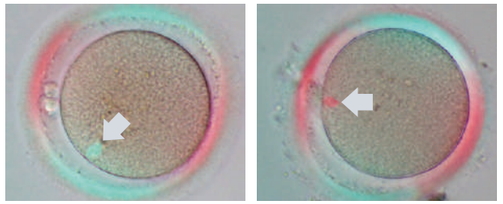
A sperm cell can be clearly observed in the injection pipette
Images courtesy of: Derek Keating, B.A. and Gianpiero D. Palermo, MD, PhD., Andrology and Assisted Fertilization: Weill Cornell Medicine Ronald O. Perelman and Claudia Cohen Center for Reproductive Medicine.

CFI S Plan Fluor ELWD NAMC 20XC (left),
CFI S Plan Fluor ELWD NAMC 40XC (right)

CFI Achromat NAMC 10XF (left) ,
CFI Achromat LWD NAMC 20XF (middle),
CFI Achromat LWD NAMC 40XC (right)

Spindle observation

This polarized light technique enables finely detailed observation of spindle bodies for oocyte assessment and the elimination of spindle damage during sperm injection.
Switching between spindle observation and NAMC is fast and easy.
The following objectives are compatible with spindle observation: CFI S Plan Fluor ELWD NAMC 20XC and CFI S Plan Fluor ELWD NAMC 40XC.



Spindle bodies (indicated by arrows) observed in different colors depending on their orientation. The color can be changed from blue to red by rotating the condenser module 90 degrees.

TI2-C-SO Spindle observation system

ECLIPSE Ts2

Inverted Routine Microscope

Shedding New Light On **MICROSCOPY**

Ts2 / Ts2-FL Specifications

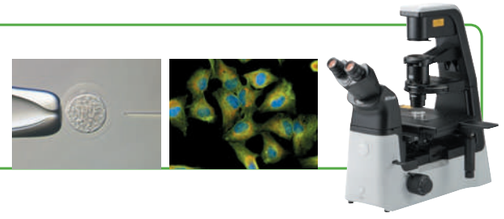
		Ts2	Ts2-FL
Optical System		CFI60 Infinity Optical System	
Observation method		Brightfield, Apodized Phase Contrast*1, Phase Contrast, Emboss Contrast*2	Brightfield, Apodized Phase Contrast*1, Phase Contrast, Emboss Contrast*2, Epi-Fluorescence
Illumination	Diascopic illumination	High luminescent white LED illuminator (Eco-illumination), Built-in Fly eye lens	
	Episcopic illumination	—	LED illuminator, built-in Fly eye lens, Can be configured with up to 3 different fluorescence LED units; available wavelengths: 385, 455, 470, 505, 525, 560, 590, 625 nm
Tube		Inclination: 45 degree, Pupillary distance: 50 - 75 mm, Siedentopf type, Attachable camera port, Eyepiece/Port: 100/0:0/100	
Eyepiece (F.O.V.)		10X (22), 15X (16), 20X (12.5)	
Focusing		Via nosepiece up/down movement, Stroke (manual): Up 7 mm down 1.5 mm Coarse stroke: 37.7 mm per rotation, Fine stroke: 0.2 mm per rotation, Coarse motion torque adjustable	
Nosepiece		Quintuple nosepiece	
Condenser		ELWD Condenser (NA 0.3, W.D. 75 mm)	
Slider		• Precentered or Centering PH Slider, 10X, 20X, 40X Objectives available for phase contrast • Emboss Contrast sliders (both condenser-side slider and eyepiece-tube-side slider must be mounted), 10X, 20X, 40X objectives available for Emboss Contrast	
Stage		• Plain Stage, stage size: 170(X)×247(Y) mm, With 2 Acrylic Types of Stage Ring • Mechanical stage (optional), stroke:126(X)×78(Y) mm, Accepts 5 types of micro-testplate, well clamper and stage clip	
Holder		• C-S-HP35 Petridish Holder 35 mm • C-S-HT Terasaki Holder for Terasaki holder and ø65 dish • C-S-HU Universal Holder for Terasaki plate holder, glass slide, ø35-65 dish and hemocytometer • C-S-HG Glass Ring Holder	• C-S-HLP100 Petridish Holder 100 mm • C-S-HS Slide Glass Holder for glass slides, ø54 dish and hemocytometer • C-S-HLS Ring Holder Set
Epi Fluorescence attachment		—	Epi-fluorescence filter turret (with main body), Filter cubes with noise terminator mechanism Configure with up to 3 Epi-fluorescence filter cubes, Additional positions for bright-field observation, Attachable Contrast Shield (optional)
Dimensions		236(W)×548(D)×471(H) mm	236(W)×564(D)×471(H) mm
Weight (approx.)		13kg	14.5kg
Rated Voltage/Electric Current		100 V-240 VAC±10 %, 50/60 Hz, 0.35 A	
Power Consumption		15 W	

*1 APC (Apodized Phase Contrast) is a type of phase contrast observation with reduced halo, thanks to Nikon's unique lens coating.
*2 Emboss contrast is Nikon's unique contrast observation method. It provides pseudo-three-dimensional images using focal illumination, which gives high contrast to samples.

Related Products

ECLIPSE Ts2R / Ts2R-FL

A compact inverted microscope for your basic research needs.
Ts2R/Ts2R-FL provides a wide range of observation methods and applications in a compact body that can easily fit in limited laboratory spaces while providing streamlined operation.



Do more than before

Fits in every Laboratory — Simple to Use & Compact

Easy to work with

Efficient and comfortable observation

LED light sources and built-in Diascopic/Epi-fluorescence illumination systems reduce setup time and allow users to concentrate on their research.

New streamlined operation

Control buttons on the Ts2 microscope are intuitively located for a streamlined workflow. Commonly used controls such as the on/off and diascopic/epi-fluorescence switching buttons are located at the front panel for easy reach. Buttons pertaining to either diascopic or epi-fluorescence control are zoned to the left and right sides of the microscope body, respectively, to eliminate confusion and improve workflow efficiency.

Faster, brighter images with LED illumination

LED light source is alignment-free resulting in faster setup and consistent results. LEDs also eliminate frequent bulb replacements, saving the user time and money. Moreover, The new Contrast Shield (optional) provides high signal-to-noise fluorescence observation even in brightly lit culture rooms.

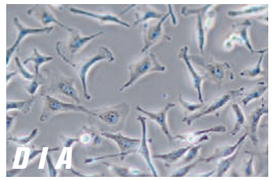
Easy-to-use Mechanical Stage

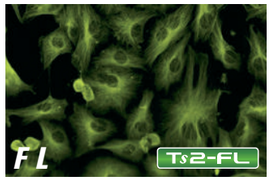
The high performance mechanical stage (optional) can accommodate a wide range of flasks and cell culture chambers. The new stage design also directly accommodates micro plates. In addition, the sample holder is easily removed to accommodate large flasks.

Compact, streamlined body for efficient observation

LED-based high-quality diascopic and epi-fluorescence observation

Two models are available to meet your needs: a diascopic illumination model, the Ts2, and an epi-fluorescence illumination model, the Ts2-FL. High-intensity LED sources are employed for both diascopic and epi-fluorescence illumination.
The built-in fly-eye lens ensures uniform brightness across the entire field of view. A wide range of wavelengths is available to choose from for Epi-fluorescence LED illumination.





Compact and highly stable body

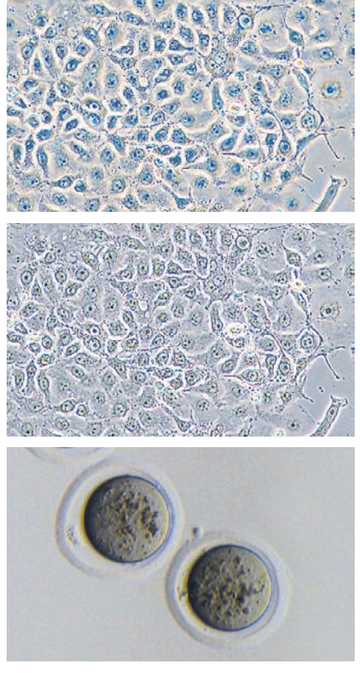
Illumination modules including the epi-fluorescence light source have been seamlessly incorporated into the microscope main body, resulting in a compact and simple design form that's also durable. The compact structure is also vibration-resistant to provide highly stable sample observations.
The camera port is located on the side of the microscope to provide unimpeded viewing of the stage even when placed inside a culture hood.

Ts2

Diascopic illumination model

Ts2-FL

Diascopic and epi-fluorescence illumination model



Do more than before —— DIA

Ts2 Ts2-FL

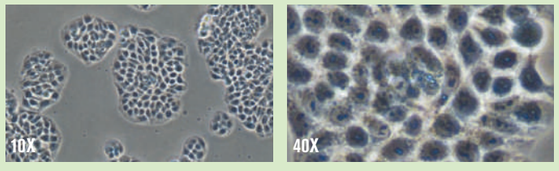
Highly optical performance with diascopic observation

Diascopic observation with high-intensity LED (Eco-illumination)

Eco-illumination provides high-intensity light suitable for phase contrast observation. With the built-in fly-eye lens, uniform brightness is provided across the entire field of view. LEDs are an environmentally friendly, low-power-consumption light source. Eco-illumination provides a long lifetime of 60,000 hours and reduces the frequency of lamp replacement.

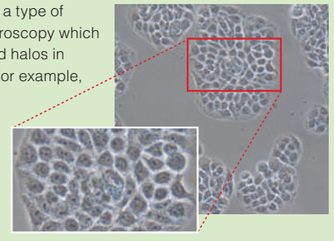
Phase contrast observation

Phase contrast is an optical contrasting technique that typically utilizes a phase contrast objective lens and condenser annulus. The use of a high-intensity LED light source results in clear images even at high magnifications.



Apodized Phase Contrast (APC) observation

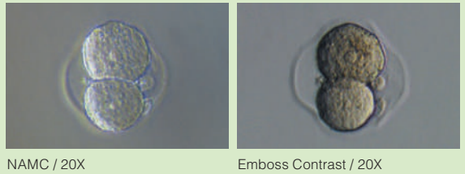
APC observation is a type of phase contrast microscopy which minimizes unwanted halos in thick specimens. For example, APC technique provides clearer details of thick samples such as dividing cells.



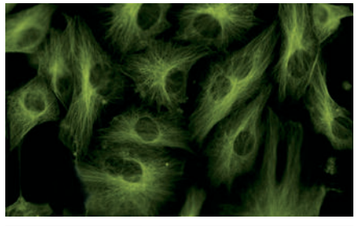
New contrasting technique, "Emboss Contrast"

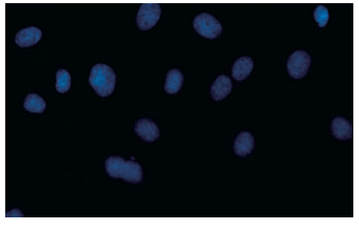
Emboss Contrast is a cost-effective optical technique which does not require costly optics. Utilizing just a bright-field objective lens and two contrast sliders, Emboss Contrast provides pseudo-three dimensional and glare-free images for thick specimens such as iPS cells which would normally suffer from halos with conventional phase contrast methods. Additionally, Emboss Contrast is compatible with both glass and plastic culture chambers, making it a very versatile observation technique.

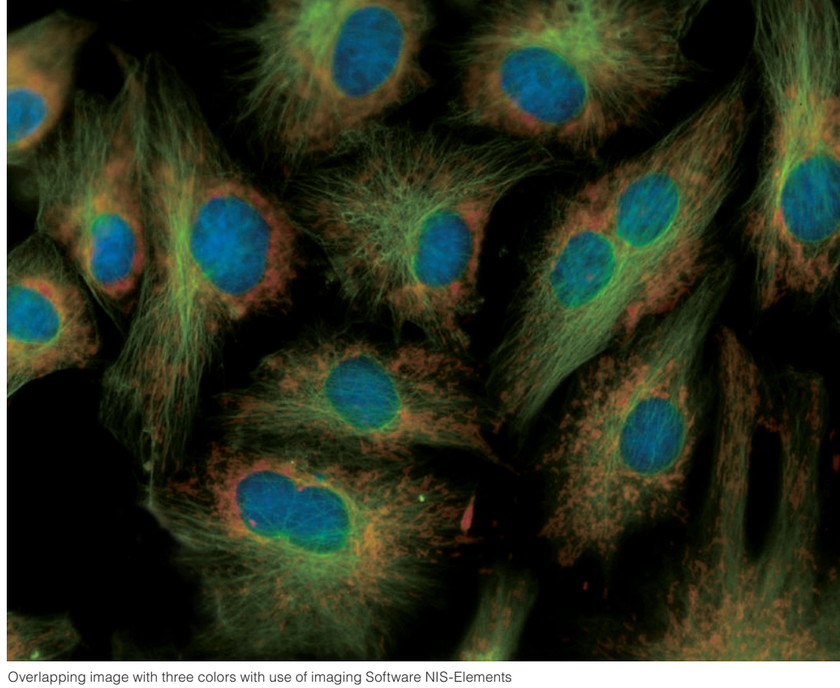
Comparison of new Emboss Contrast and Nikon Advanced Modulation Contrast



NAMC / 20X Emboss Contrast / 20X







Overlapping image with three colors with use of imaging Software NIS-Elements

Do more than before —— FL

Ts2-FL

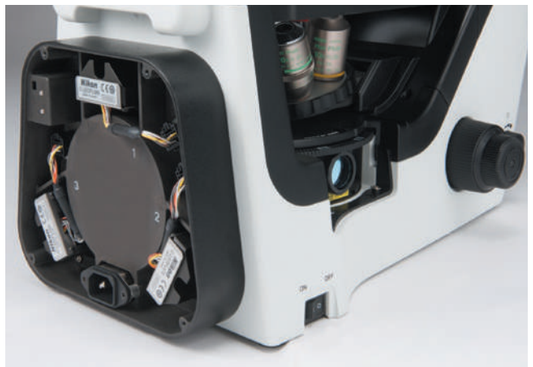
Epi-fluorescence observation made easy with LED

Fly-eye lens for uniform illumination

With a built-in fly-eye lens, uniform brightness is provided across the entire field of view.

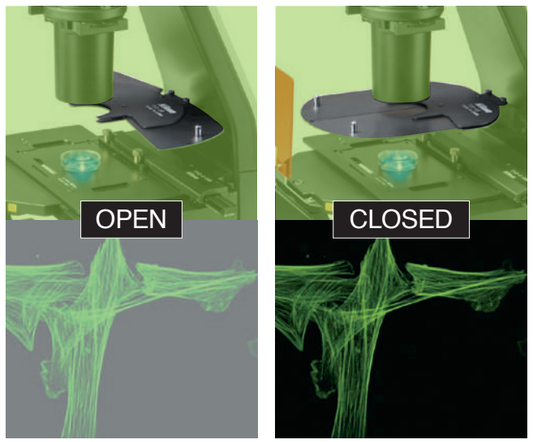
Accurately reproduce illumination power every time

The Ts2 can be configured with up to three fluorescent filter cubes. The illumination power previously defined by the user is replicated when the same wavelength is used again, thus eliminating the need for manual adjustment of light intensity when switching between wavelengths. The Ts2 also incorporates a noise terminator mechanism which allows high signal-to-noise fluorescent images to be captured.



High S/N epi-florescence observation in bright rooms

The new Contrast Shield accessory (optional) blocks room light, providing an easy and cost-effective method for achieving high signal-to-noise fluorescence observation in a brightly lit culture room.



Accessories

Camera Port

Optional camera port is available for image capturing. Digital Cameras utilizing C- or F-mounts can be attached.

Emboss Contrast Slider

Both condenser-side slider and eyepiece-tube-side slider are available. Contrast modules for 10X, 20X, 40X objective lenses are arranged on the same slider so switching between magnifications is easily achieved by simply sliding the contrast slider.

ThermoPlate® TPi-TS2X (for the Mechanical Stage)

ThermoPlate® TPi-TS2X provides accurate and stable temperature control for the specimen from room temperature to 50 degrees Celsius. Proprietary treatment methods ensure that the glass surface of the Termo Plate is breakage-free.

Manufacturer: TOKAI HIT Co.,Ltd.

Cameras for microscopes

All cameras of the digital sight series can be directly connected to a PC via a fast USB3.0 interface.

*The optional camera port is required to attach the digital camera to the microscope.

Configuration of Ts2 +DS-Fi3 ▶

C-mount CMOS Camera

Microscope camera
Digital Sight 1000

2.0 megapixel
Color
Full HD

Equipped with a 2 megapixel CMOS image sensor, the Digital Sight 1000 can display, capture and save full HD, 1920x1080 pixel images at 30 fps without using a PC.

Microscope camera
DS-Fi3

5.9 megapixel
Color
High-resolution

A high-definition 5.9-megapixel color CMOS image sensor captures fine-textured images in faithful color. For image acquisition, NIS-Elements imaging software is required.

F-mount CMOS Camera

Microscope camera
Digital Sight 10

23.9 megapixel
Color/Monochrome
High-resolution

Achieves color / monochrome switching shooting with a single camera. You can quickly shoot 6K high-definition images in one shot.

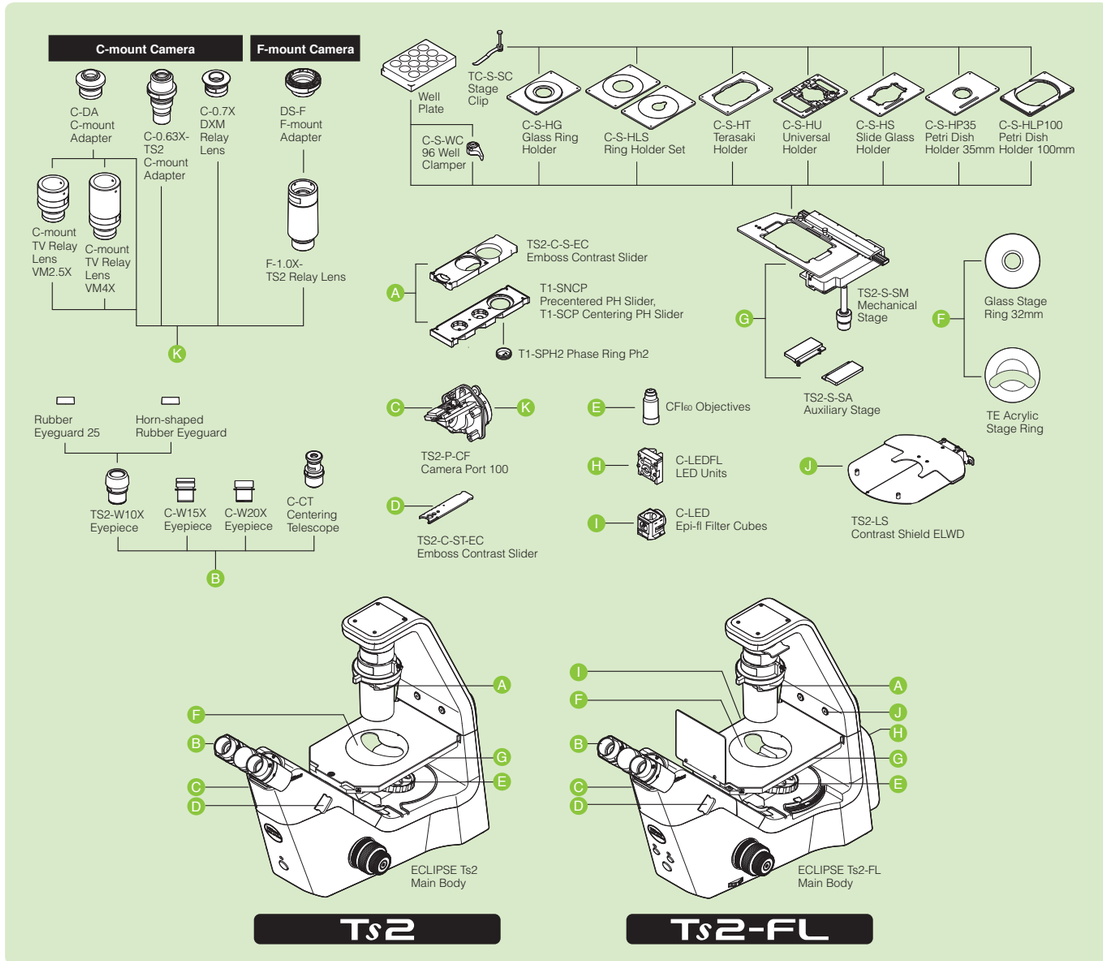
Frame rate	30 fps (1920×1080)	15 fps (2880 × 2048), 30 fps (1440 × 1024)	9 fps (6000 × 3984), 66 fps (1920 × 1080)
Max recordable pixels	1920×1080	2880 × 2048	6000 × 3984

NIS-Elements Imaging software
Advanced Solutions for your Imaging World
for a tablet PC L

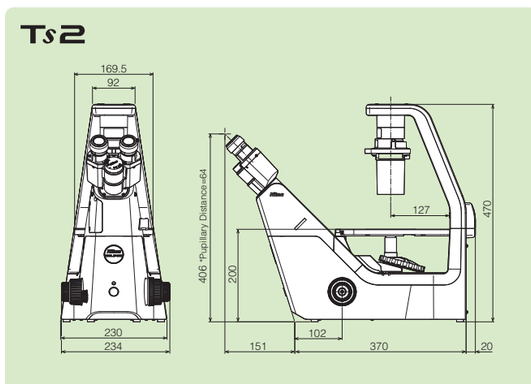
Simply installing NIS-Elements L on a tablet PC enables setting and control of Digital Sight 1000/DS-Fi3/Digital Sight 10 microscope cameras, live image display, and image acquisition.

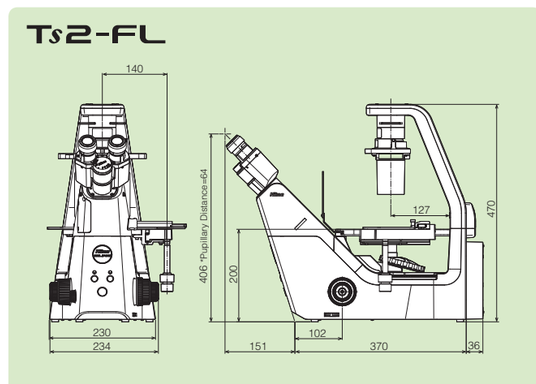
*For information about compatible tablet PCs, contact Nikon.

System diagram



Dimensions (Unit: mm)





ECLIPSE Ts2R

Inverted Research Microscope

Shedding New Light
On **MICROSCOPY**

ECLIPSE Ts2R Inverted Research Microscope

Ts2R / Ts2R-FL Specifications

		Ts2R	Ts2R-FL
Optical System		CFI60 Infinity Optical System	
Observation method		Brightfield, Apodized Phase Contrast*1, Phase Contrast, Nikon Advanced Modulation Contrast*2, DIC, Emboss Contrast*3, Spindle Observation	Brightfield, Apodized Phase Contrast*1, Phase Contrast, Nikon Advanced Modulation Contrast*2, DIC, Emboss Contrast*3, Epi-Fluorescence, Spindle Observation
Illumination	Diascopic illumination	High luminescent white LED illuminator (Eco-illumination), Built-in Fly eye lens	
	Episcopic illumination	—	LED illuminator, built-in Fly eye lens, Can be configured with up to 4 different fluorescence LED units; available wavelengths: 385, 455, 470, 505, 525, 560, 590, 625 nm
Tube		• Binocular tube: Inclination: 35 degree • Ergonomic tube: Inclination:15-45 degree, Siedentopf type, Pupillary distance: 50-75 mm, Attachable camera port	
Eyepiece(F.O.V.)		10X (22), 12.5X (16), 15X (14.5)	
Camera port (Eyepiece: Port)		• TS2R-P-CF 100:0 / 0:100 • TS2R-P-CH 100:0 / 20:80 • TS2R-P-CHL 100:0 / 50:50	
Focusing		Via nosepiece up/down movement, Stroke (manual): Up 8 mm, down 3 mm Coarse stroke: 5.0 mm per rotation, Fine stroke: 0.1 mm per rotation, Coarse motion torque adjustable, Refocusing mechanism mounted	
Nosepiece		Sextuple nosepiece, With DIC prism slots	
Condenser		Condenser turret, mount up to 7 modules: Phase Contrast, DIC, NAMC, IMSI, Emboss Contrast and ND for Bright Field Use with any one of ELWD condenser lens, LWD condenser lens and NAMC condenser lens	
Slider		• Precentered or Centering PH Slider, 10X, 20X, 40X Objectives available for phase contrast • Emboss Contrast sliders (eyepiece-tube-side slider must be mounted), 10X, 20X, 40X, 60X objectives available for Emboss Contrast	
Stage		• Plain Stage, Stage Size 260(X)×300(Y) mm with 2 types of Stage Ring • Rectangular Mechanical Stage Stroke: 114(X)×73(Y) mm, Adjustable XY stroke limit, Accepts 8 types of micro-testplate, well clamper and stage clip	
Holder		• C-S-HP35 Petridish Holder 35 mm • C-S-HLP100 Petridish Holder 100 mm • C-S-HT Terasaki Holder for Terasaki holder and ø65 dish • C-S-HS Slide Glass Holder for glass slides, ø54 dish and hemocytometer • C-S-HU Universal Holder for Terasaki plate holder, glass slide, ø35-65 dish and hemocytometer • C-S-HG Glass Ring Holder • C-S-HLS Ring Holder Set • TC-S-HA Acrylic Holder	
Epi Fluorescence attachment		—	Epi-fluorescence filter turret (with main body), Filter cubes with noise terminator mechanism Configure with up to 4 Epi-fluorescence filter cubes, one position is used during bright-field observation, Attachable Contrast Shield (optional; LWD,ELWD) In combination with the dedicated adapter, D-LEDI Fluorescence LED Illumination system can be used.
Dimensions		286(W)×466(D)×542(H) mm	286(W)×466(D)×542(H) mm
Weight (approx.)		17 kg	18 kg
Rated Voltage/Electric Current		100V–240 V, Less than 0.65 A	
Power Consumption		30W	

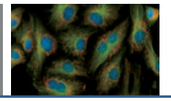
*1 APC (Apodized Phase Contrast) is a type of phase contrast observation with reduced halo, thanks to Nikon's unique lens coating.
*2 NAMC (Nikon Advanced Modulation Contrast) is Nikon's unique modulation contrast observation method which provides stereoscopic images similar to DIC observation, even with samples on plastic dishes.
*3 Emboss contrast is Nikon's unique contrast observation method. It provides pseudo-three-dimensional images using focal illumination, which gives high contrast to samples.

Related Products

ECLIPSE Ts2/Ts2-FL

Fits in Every Laboratory — Simple to Use & Compact

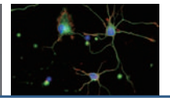
The new Inverted Routine Microscope ECLIPSE Ts2 offers brilliantly clear images, enabling more efficient cell culture observation.



ECLIPSE Ti2-U

Inverted Research Microscope with an excellent manual model

ECLIPSE Ti2-U provides an excellent base platform for accommodating a variety of research applications.



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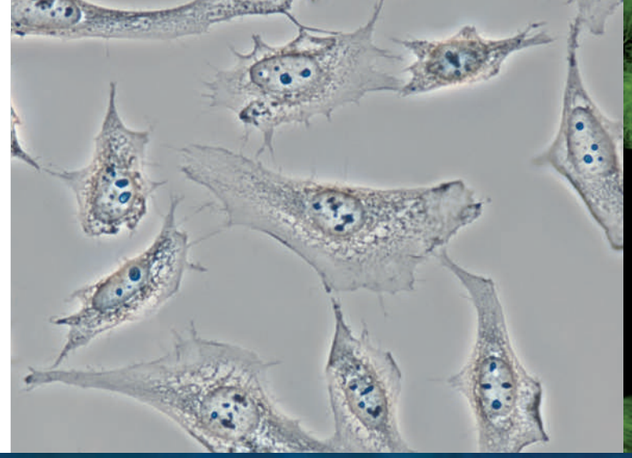
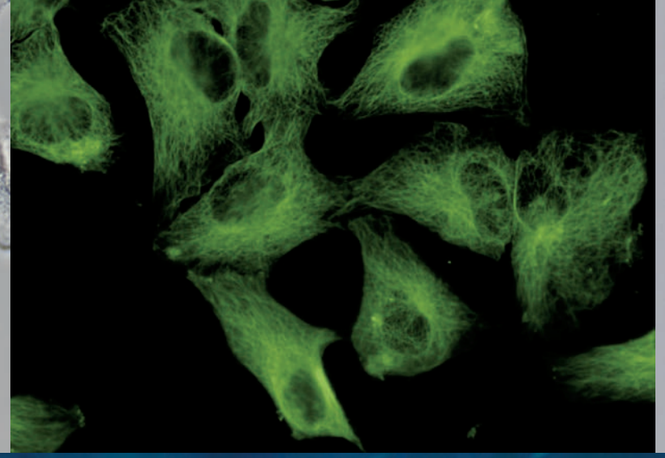
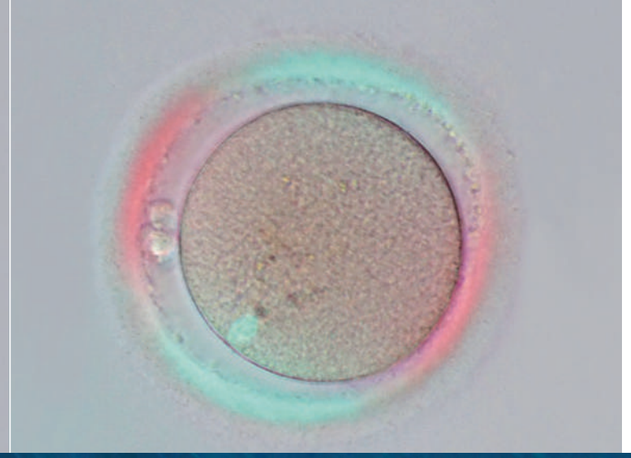





Do more than before

A compact inverted microscope for your basic research needs

Easy to work with

Simple operations

Control buttons on the Ts2R microscope are intuitively located for a streamlined workflow. The on/off and diascopic/epi-fluorescence switching controls are located on the front panel while buttons pertaining to either diascopic or epi-fluorescence control are zoned to the left and right sides of the microscope body, respectively.

Mechanical stage

The Ts2R can be configured with the high-grade rectangular mechanical stage. This stage provides a long travel stroke, enabling users to observe an entire well plate from end-to-end. You can also set limits to the travel stroke (three-way) to match frequently used samples or vessels. The stage handle is offered in two lengths, long or short, to further accommodate the user's needs.

Ergonomic stage design for improved workflow

The Ts2R's stage height has been lowered by approximately 30% compared to the standard research microscope*, thereby ensuring a comfortable hand position during repetitive operation and sample exchange. Moreover by lowering the support columns and positioning the camera port on the side of the tube, sample visibility is improved.

*Comparison with Nikon's Inverted Research Microscope ECLIPSE Ti2.

Versatile applications with LED illuminators

The high-intensity LED light source enables you to perform a wide variety of observation methods similar to the full-size, inverted research microscope ECLIPSE Ti2. The Ts2R-FL model, which offers epi-fluorescence observation, provides four fluorescence channels and 8 different wavelengths to choose from.

	Ts2R	Ts2R-FL
DIA	• Brightfield • DIC • APC (Apodized Phase Contrast) • Spindle Observation	• Emboss Contrast • Phase Contrast • NAMC (Nikon Advanced Modulation Contrast)
FL	—	• Epi-fluorescence

Compact body

Compact body for streamlined workflow

Illumination modules including the epi-fluorescence light source have been seamlessly incorporated into the microscope main body, resulting in a compact and simple design form that's also durable. The compact structure is also vibration-resistant to provide highly stable sample observations.

Easily fits inside laminar flow hoods

The low stage and side-port camera position reduce user fatigue from repetitive stage manipulation and provides clear visibility of the stage and sample even with the hood sash lowered. Additionally, by rotating the eyepiece tube 180° and fastening it in position, it is possible to have the microscope completely within the hood.

High precision and quality

Advanced-optical performance

The Ts2R is compatible with Nikon's acclaimed CFI60 objective lenses which provide high numerical apertures and long working distances to deliver stunningly clear images.

High performance and quality optical accessories

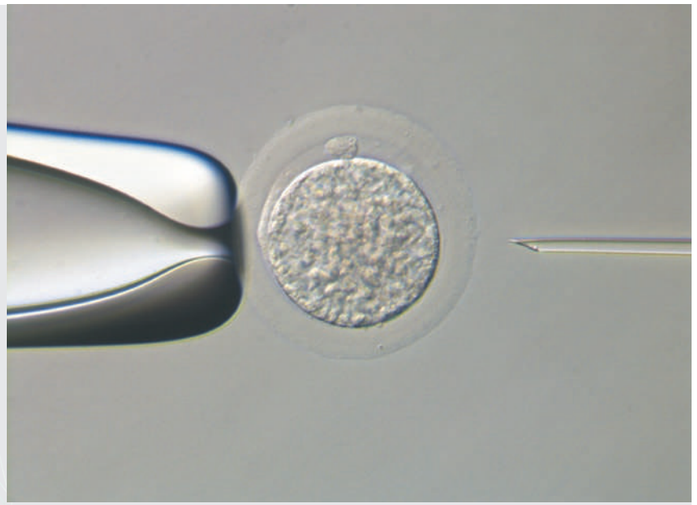
Optical accessories achieve the same performance level as Nikon's inverted research microscope ECLIPSE Ti, providing exceptionally clear, sharp images.

Emboss contrast image (Top left): Two-cell stages derived from mesophyll protoplasts from *Nicotiana benthamiana* after 7 days of culture in liquid medium. (Objective: CFI S Plan Fluor ELWD 20XC)

Photo courtesy of: Dr. Jutta Schulze, Institute of Plant Biology, Braunschweig University of Technology

Ts2R — Diascopic illumination model

Ts2R-FL — Diascopic and epi-fluorescence illumination model



Do more than before —— DIA

Ts2R Ts2R-FL

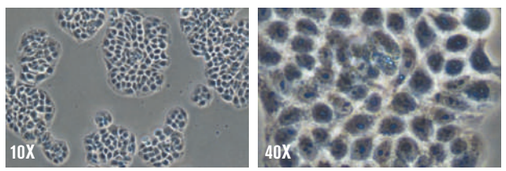
Diascopic observations with enhanced quality

High-intensity LED Eco-illumination

Nikon's LED Eco-illumination is environmentally friendly with its low power consumption and yet provides extremely bright illumination, suitable for phase contrast and DIC imaging. The built-in fly-eye lens ensures uniform brightness across the entire field of view. Furthermore, LED excitation has no unwanted UV component, thereby eliminating UV-mediated cell damage and improving cell survival rates during long-term imaging.

Phase contrast observation

Phase contrast is an optical contrasting technique that typically utilizes a phase contrast objective lens and condenser annulus. The use of a high-intensity LED light source results in clear images even at high magnifications.

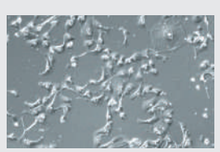


Apodized Phase Contrast (APC) observation

APC observation is a type of phase contrast microscopy which minimizes unwanted halos in thick specimens. For example, APC technique provides clearer details of thick samples such as dividing cells.

Nikon Advanced Modulation Contrast (NAMC)

NAMC provides high relief, DIC-like images of samples on plated on plastic dishes, which is not possible with DIC observation. Ts2R provides high-quality NAMC images like Nikon's inverted research microscope, ECLIPSE Ti2.



Application

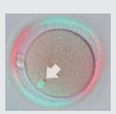
New contrasting technique, "Emboss Contrast"

Nikon's new contrasting technique is compatible with both plastic and glass culture dishes. Unlike phase contrast or NAMC, Emboss Contrast does not require special objective lenses and therefore has minimal effect on epi-fluorescence observation. Emboss Contrast allows thick samples such as embryos to be easily observed in pseudo-three-dimensional image with great clarity.

Image courtesy of Hideaki Watanabe, Ph.D. and Hisataka Hasegawa, Ph.D.

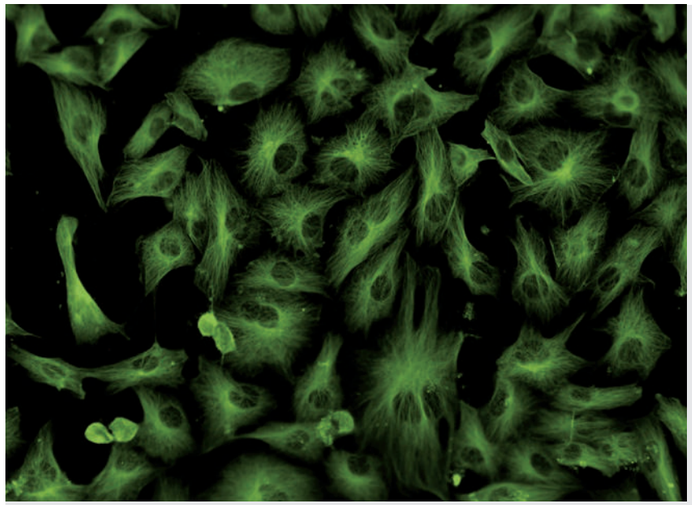
Spindle observation

Accurate observation of spindle bodies is easily attained with the Ts2R. The system offers finely detailed work without damaging the spindle body.



Differential Interference Contrast (DIC) observation

DIC provides high-resolution pseudo-three dimensional images that have a shadow-cast appearance. New high-intensity LED illumination results in vivid DIC images even at high magnifications.

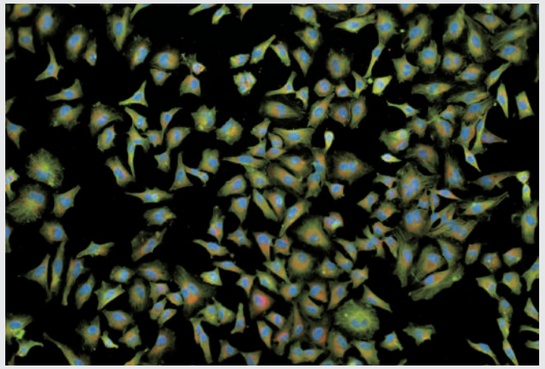


Do more than before —— FL

Ts2R-FL

Fluorescence images with uniform bright illumination

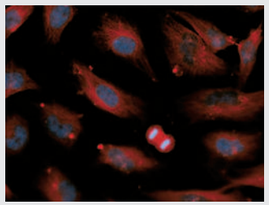
Application



Overlapping image with three colors with use of Imaging Software NIS-Elements

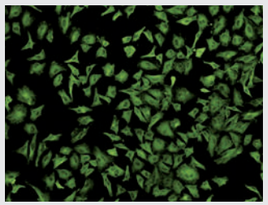
Multicolor fluorescence observation

Using four different LEDs, multicolor fluorescence observation can be easily and efficiently achieved.



High signal-to-noise fluorescence imaging

Noise Terminator helps to capture vivid images.



Clear, vivid observation across the entire field of view

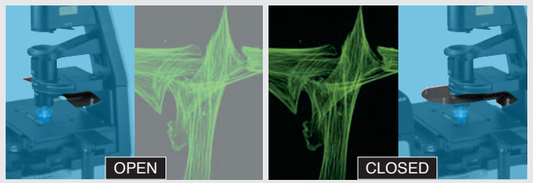
The fly-eye lens delivers uniform brightness to the entire field of view.

Accurately reproduce illumination power every time

The illumination power previously defined by the user is replicated when the same wavelength is used again, thus eliminating the need for manual adjustment of light intensity when switching between wavelengths.

High S/N epi-florescence observation in bright rooms

The new Contrast Shield accessory (optional) blocks room light, providing an easy and cost-effective method for achieving high signal-to-noise fluorescence observation in a brightly lit laboratory.



Fluorescent LED light source

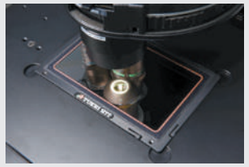
The D-LEDI Fluorescence LED Illumination system can be attached for simultaneous fluorescent and phase contrast observation or fluorescent and differential interference contrast observation.

Accessories

ThermoPlate® TPi-TCSX

ThermoPlate® TPi-TCSX provides accurate and stable temperature control for the specimen from room temperature to 50 degrees Celsius. Proprietary treatment methods ensure that the glass surface of the Termo Plate is breakage-free.

Manufacturer: TOKAI HIT Co.,Ltd.



Stage-top incubator

A stage-top incubation chamber can be utilized to accurately control temperature, humidity and CO_2 levels to maintain optimal cell health during long-term observation.

Manufacturer: TOKAI HIT Co.,Ltd.

Hydraulic micro manipulator system

This compact manipulation system features a suspension-type, soft-touch joy-stick. The hydraulic remote controls enable smooth, movement-free manipulation, minimizing needle deflection. Users can seamlessly switch between coarse and fine motion. Additionally, indicators on the coarse control mechanisms aid needle adjustments.

Manufacturer: NARISHIGE LIFEMED CO., LTD.

Cameras for microscopes

All cameras of the digital sight series can be directly connected to a PC via a fast USB3.0 interface.

*The optional camera port is required to attach the digital camera to the microscope.

F-mount CMOS Camera

Microscope camera

Digital Sight 10

23.9 megapixel | Color/Monochrome | High-resolution

Achieves color / monochrome switching shooting with a single camera. You can quickly shoot 6K high-definition images in one shot.

Monochrome Microscope camera

Digital Sight 50M

NEW

60.0 megapixel | Monochrome | Cooled

Providing strong cost performance, the Digital Sight 50M is a cooled, monochrome model that combines 9K image quality, FOV25 wide field of view, and a maximum frame rate of 225.9 fps.

C-mount CMOS Camera

Microscope camera

DS-Fi3

5.9 megapixel | Color | High-resolution

A high-definition 5.9-megapixel color CMOS image sensor captures fine-textured images in faithful color. For image acquisition, NIS-Elements imaging software is required.

	Digital Sight 10	Digital Sight 50M	DS-Fi3
Frame rate	9 fps (6000 × 3984), 66 fps (1920 × 1080)	6 fps (9552 × 6336), 225.9 fps (640 × 480)	15 fps (2880 × 2048), 30 fps (1440 × 1024)
Max recordable pixels	6000 × 3984	9552 × 6336	2880 × 2048

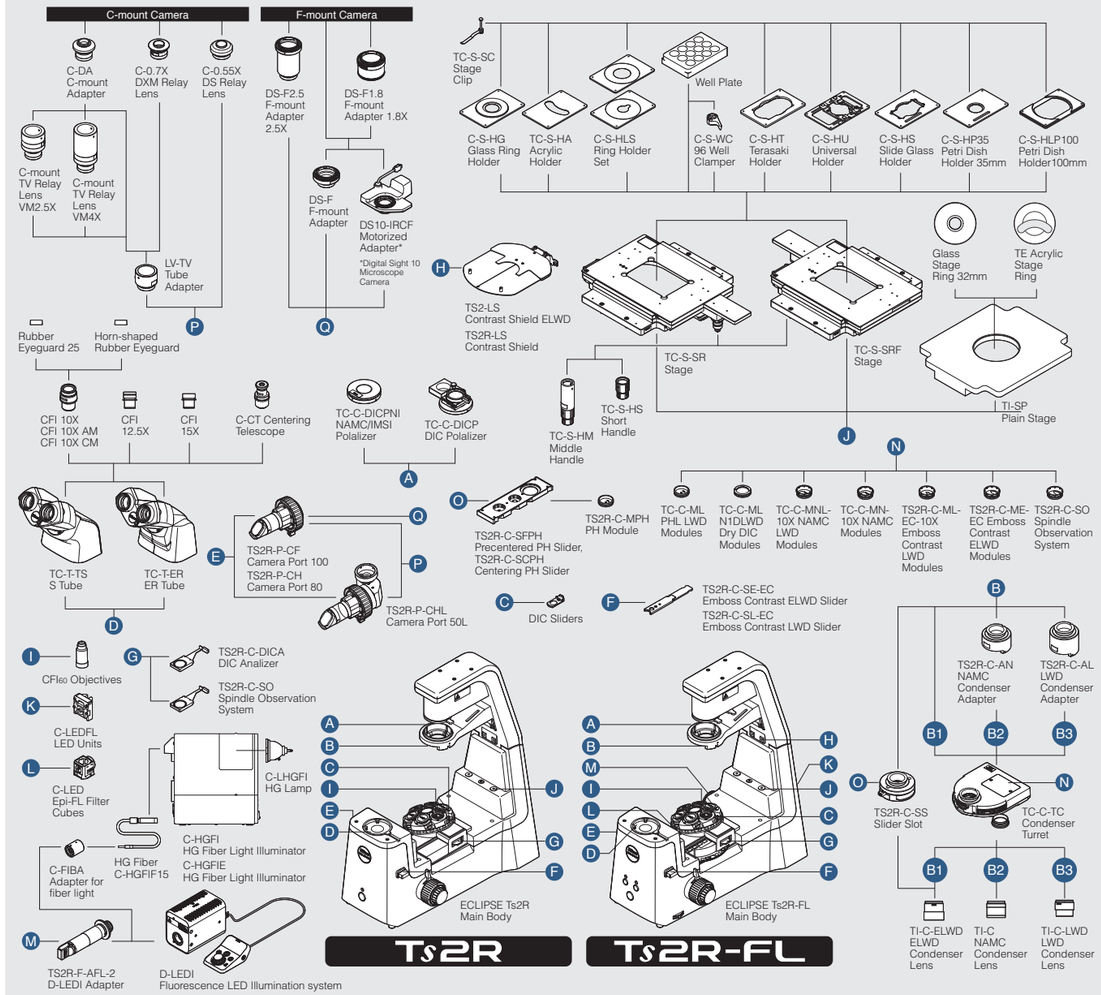
Imaging software NIS-Elements Advanced Solutions for your Imaging World

for a tablet PC L

Simply installing NIS-Elements L on a tablet PC enables setting and control of DS-Fi3/Digital Sight 10 microscope cameras, live image display, and image acquisition.

*For information about compatible tablet PCs, contact Nikon.

System diagram



Dimensions (Unit: mm)