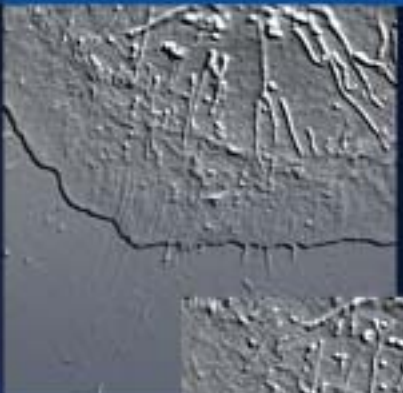
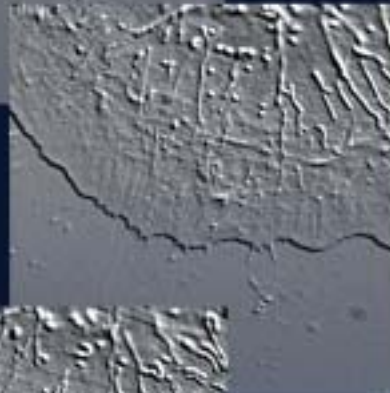




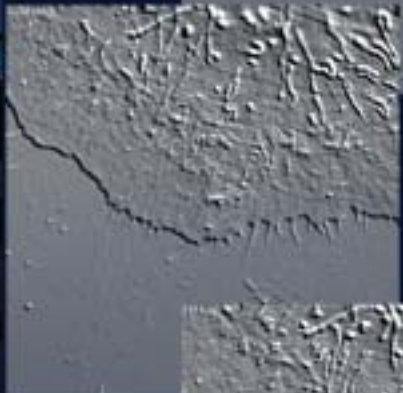
Inverted Research Microscope **ECLIPSE TE2000-PFS**



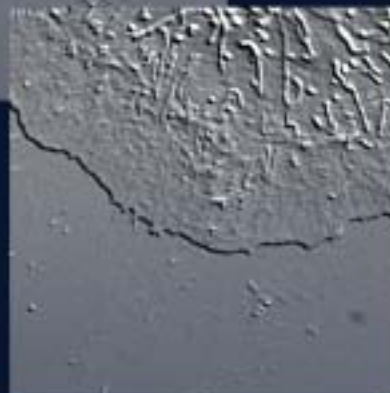
270 sec



615 sec



1380 sec



1515 sec



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ECLIPSE TE2000-PFS

Farewell to focus drift!

A powerful new model with real-time focus correction strengthens the TE2000 series

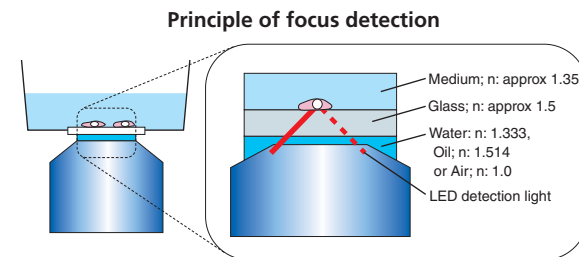
Focus drift is one of the biggest obstacles to acquiring “live cell” time lapse data. Prolonged periods of observation and stage movement as well as a host of other factors can result in focus drift.

The new TE2000-PFS (Perfect Focus System) automatically detects the surface* of the coverslip optically and continually corrects focus to compensate for even the most infinitesimal changes. The benefits of the PFS are obvious:

*Interface of glass and medium in immersion applications or glass and air in dry applications.

- You no longer have to adjust the focus knob every time stage movement occurs or after adding reagents.
- You can continue stable, in-focus observations over an extended period of time—perfect for time-lapse recording.
- You can minimize photobleaching, which keeps cells alive longer in fluorescence observation, because focus adjustment is no longer necessary.
- You can catch the rapid change of cells because PFS instantaneously corrects focus drift resulting from temperature drop when adding reagents.
- While the Perfect Focus system is continually holding focus at the coverslip, you can freely select focus planes throughout the specimen thanks to an Optical Offset feature*.

*Patent pending



The coverslip surface* is detected by the LED light emitted through the objective.
* Top surface in immersion applications.

Always in perfect focus

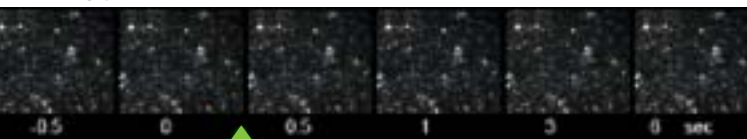
Nikon Original!

When PFS is turned on, the position of the coverslip surface is always detected during observation, and the data is continuously fed back to the focusing mechanism thanks to the Nikon’s propriety COF (Continuous Optical Feedback) technology*.

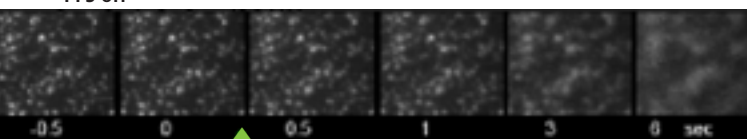
*Patent pending

Correction to focus drift caused by expansion/contraction of the plastic dish when reagents are added

•PFS on



•PFS off



Observation method: Laser TIRF

Perfect focus to the plane of interest

Nikon Original!

Focus is continuously corrected at any plane of interest throughout the specimen by the Optical Offset feature*. Unlike other systems that have to initially focus on the coverslip interface and then shift the focal point to the plane of interest, PFS can continuously keep focusing on the focus plane. Consequently, you will never again miss rapid events in your specimen because of focus drift.

*Patent pending

High-precision focusing

By combining the highly sensitive focus detection system and the extremely accurate Z-axis control system of the TE2000-E, focusing precision of less than 1/3 the focal depth of the objective is achieved.

Long-term focal maintenance

All that is required to keep the specimen in focus is to focus on the desired plane, then turn PFS on. This allows consistent focus to be maintained for observations of days or more.

Focus is maintained during time-lapse recording

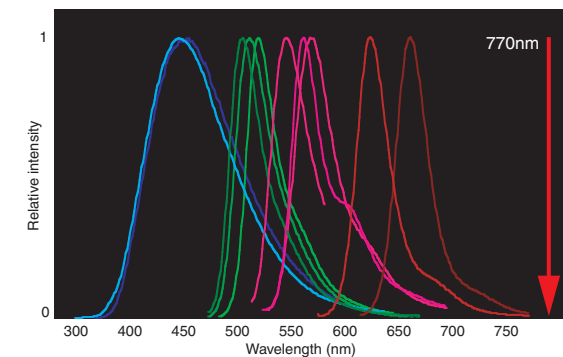


Observation method: DIC

Focus detection with infrared light

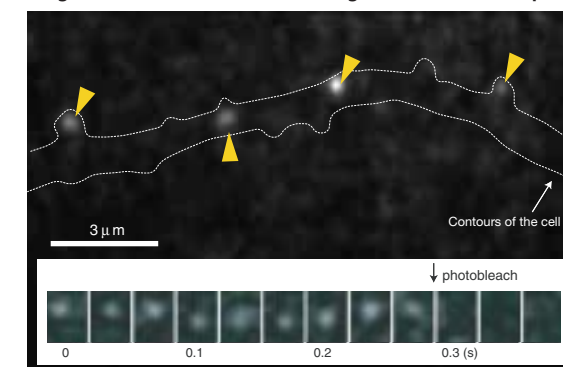
PFS uses an LED in the infrared range and an internal linear CCD detector, to detect the focal point, so it does not intrude on wavelengths used for observation. This means you can carry out observation and focus maintenance at the same time, with no influence at all on captured images.

The 770nm wavelength, which does not affect fluorescence observation, is used for focus detection



Since the wavelength of the LED does not affect the image quality, high-contrast visualization of single fluorescent molecules—normally only possible with high-S/N ratio microscopy—is possible. The example photo shows that, even immediately after stimulation with a neurotransmitter, the receptor’s (YFP fusion protein) dynamic behavior can be continuously tracked at the single molecular level.

Single molecular fluorescence image of YFP label receptor



Cell: dendrite (part) of a primary dispersion culture cell of a hippocampus
Time-lapse image: being photobleached at after 0.3 s
Observation method: TIRF

Supports all methods

PFS is compatible with a wide array of observation methods, from brightfield, fluorescence to DIC, TIRF, phase contrast, and others.

PFS strongly supports live cell applications

- Compatible with various fluorescence imaging platforms
- Laser TIRF system—with laser light source and ultrahigh S/N ratio
 - White-light TIRF Multi-fluorescence Imaging System
 - Fluorescence system with high S/N capability



Following in the footsteps of the TE2000-E

Just like the TE2000-E, the PFS model comes standard with motorized-focus and motorized 5-way light port changeover—best suited for advanced research.

Streamlined operation from a PC

The microscope can be operated from a PC using third-party application software.

Greater Z-axis precision

The PFS model features a minimum Z-axis linear encoded readout of 0.05μm when operated from the connected PC. Perfect accuracy and focus repeatability is ensured.

Objective anti-collision mechanism

When changing the objective magnification, the nosepiece automatically drops, rotates, and returns to the original height, preventing it from hitting the stage—particularly handy for culture live cell observations.

Auto switching between 5 ports

Five output ports, including a bottom port, are standard and can be easily switched via motorized control.

Acclaimed CF160 objectives

Nikon’s CF160 infinity objectives series provide high N.A.’s and long working distances. As tube-lens focal length is as long as 200mm, there will be no aberration even when various optical components are introduced into the optical path.

Main Specifications

Compatible specimen	Specimens in aqueous solutions (cultured specimens, in-vitro assays, etc.)
Compatible dish	Glass-bottom dishes (glass thickness: 150-180mm, No. 1S recommended)
Detect boundary	Immersion lens: between glass and medium; between dry lens: glass and air
Offset distance	Adjustable with the controller dial
Memory function	Offset distance, Store/recall of nosepiece up/down distance (up to 6 points per nosepiece)
Main body Focusing	Via motorized/manual nosepiece up/down movement
	Stroke—manual: up 7mm, down 3mm; motorized: up 6mm, down 2.5mm Coarse stroke: 4.9mm/rotation (motorized); Fine stroke: 0.1mm/rotation (motorized) Minimum fine reading: 0.05µm by optical linear encoder External fine focusing unit
Intermediate magnification	1.5x
Eyepiece tube	(1) T-TD Binocular Tube D (2) T-TS Binocular Tube S (3) T-TERG Binocular Ergonomic Tube D (4) T-TI Intermediate Tube
Eyepiece lens (F.O.V.)	CFI 10x (22mm), CFI 12.5x (16mm), CFI 15x (14.5mm)
Illumination	T-DH 100W Illumination Pillar
Condenser	ELWD condenser for phase contrast, System condenser LWD, Hoffman Modulation condenser® (HMC), High N.A. condensers, Motorized system condenser LWD
Nosepiece	T-ND6-E Motorized Sextuple DIC Nosepiece
PFS-compatible objectives	Plan Fluor 40x/40xH, Plan Fluor ELWD 20xC/40xC, Plan Fluor ELWD DM 20xC, Plan Fluor ELWD ADL 20xC/40xC, Plan Apo VC 60xH/100xH/60xWI, Plan Apo 60xHA/100xH/60xWI/20x, Plan Apo DM 60xH/100xH, Plan Apo TIRF 60x
Stage	T-SR Rectangular Stage, T-SSR Short Rectangular Stage, T-SP Plain Stage, T-SAM Attachable Mechanical Stage (must be used with T-SP Plain Stage)
Motorized functions	Fine focusing (minimum reading: 0.05µm), Motorized 5-port switching (eyepiece, front, right, left, bottom ports), Motorized coarse focusing (option) DIC nosepiece, Analyzer, Epi-fl filter rotating turret, Epi-fl shutter, Excitation filter wheel, Barrier filter wheel, System condenser turret
Operating environment	Temperature: +20-30°C Humidity: 60% or less (no condensation)
Weight (approx.)	Phase contrast set: 45kg; Epi-fl set: 50kg
Power consumption (max.)	100-240V, 1.2A max. 50-60 Hz

Images courtesy of:

- 1 Prof. Akihiro Kusumi and Dr. Chieko Nakada, Kusumi Office, Institute for Frontier Medical Sciences, Kyoto University
 - 2 Dr. Chieko Nakada, Kusumi Office, Institute for Frontier Medical Sciences, Kyoto University
Co-researcher: Professor Shigeo Okabe, Tokyo Medical and Dental University
- Images on the front cover courtesy of Dr. Alexey Khodjakov, Laboratory of Cell Regulation, Wadsworth Center



The spectral data of the fluorescence labels included in this brochure was created by Molecular Probes Corporation and provided courtesy of Invitrogen Corporation.

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