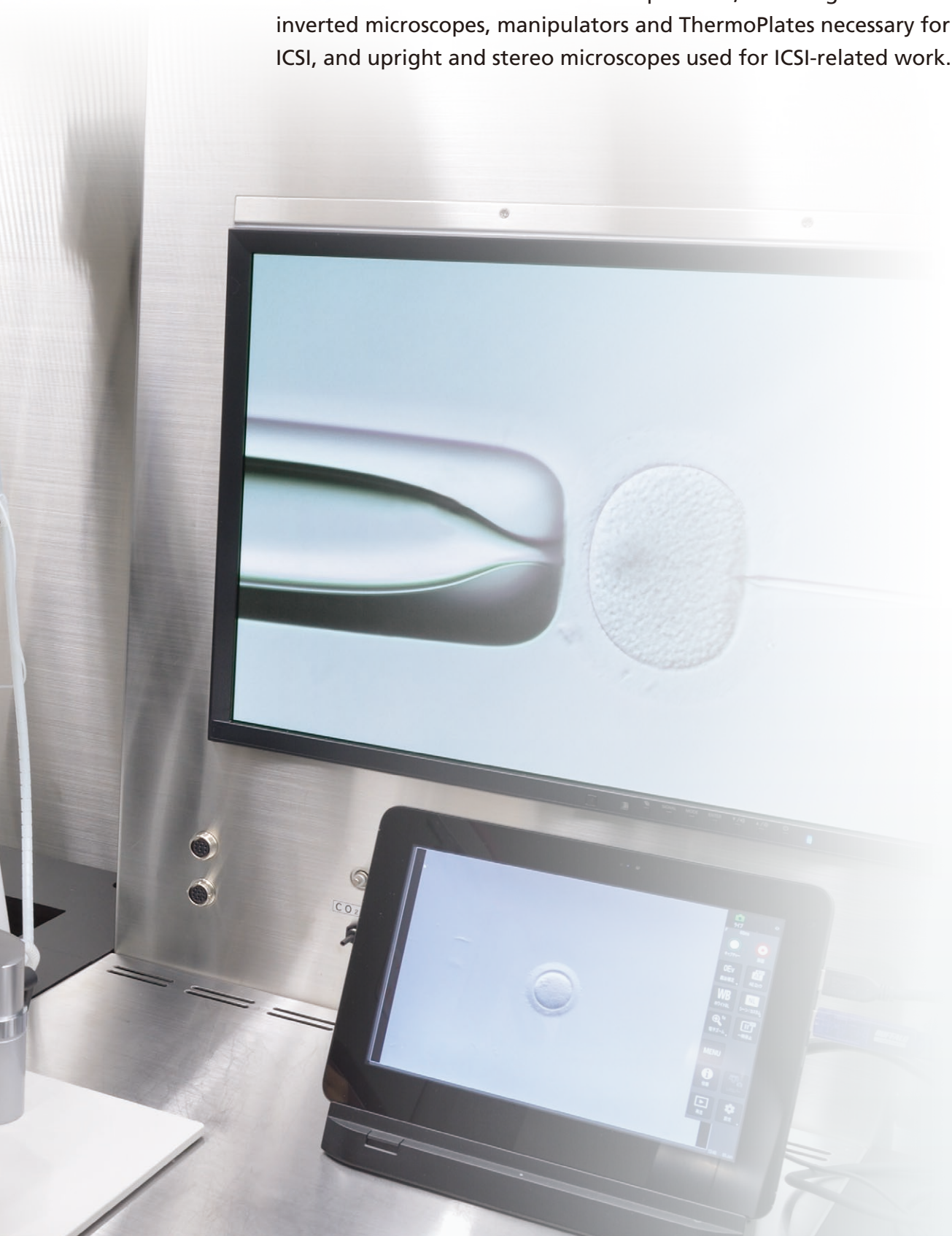
Microscope Systems for ICSI

Shedding New Light
On **MICROSCOPY**

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.
This brochure introduces various ICSI products, including the latest inverted microscopes, manipulators and ThermoPlates necessary for ICSI, and upright and stereo microscopes used for ICSI-related work.



ECLIPSE Ti2 inverted microscope

The Ti2 provides an ultra-stable platform for carrying out precision manipulation procedures such as ICSI. The intermediate magnification switching function (1.5X) allows easy switching of observation magnifications between 200X and 300X without changing objectives. The stage can accommodate handles of various lengths on either the left or the right side. Combined with a variable inclination eyepiece tube, the Ti2 provides an ergonomic interface for precision manipulation. Both halogen and cell-friendly LED light sources are available for diascopic illumination. A motorized microscope model is also available.

ECLIPSE Ts2R inverted microscope

The Ts2R is smaller than the Ti2, while featuring the same stages, stage handles and eyepiece tubes. The compact design of the Ts2R enables it to fit easily inside clean benches or laminar flow hoods.
The Ts2R features an LED light source for diascopic illumination and the Ts2R-FL includes up to four additional fluorescent LED light sources. Users can quickly switch between diascopic and fluorescent observation by using buttons on the front panel. The Ts2R and Ts2R-FL can be configured for a variety of contrasting methods including Emboss Contrast, NAMC, and spindle observation.

SMZ18/SMZ1270/SMZ800N stereo microscopes

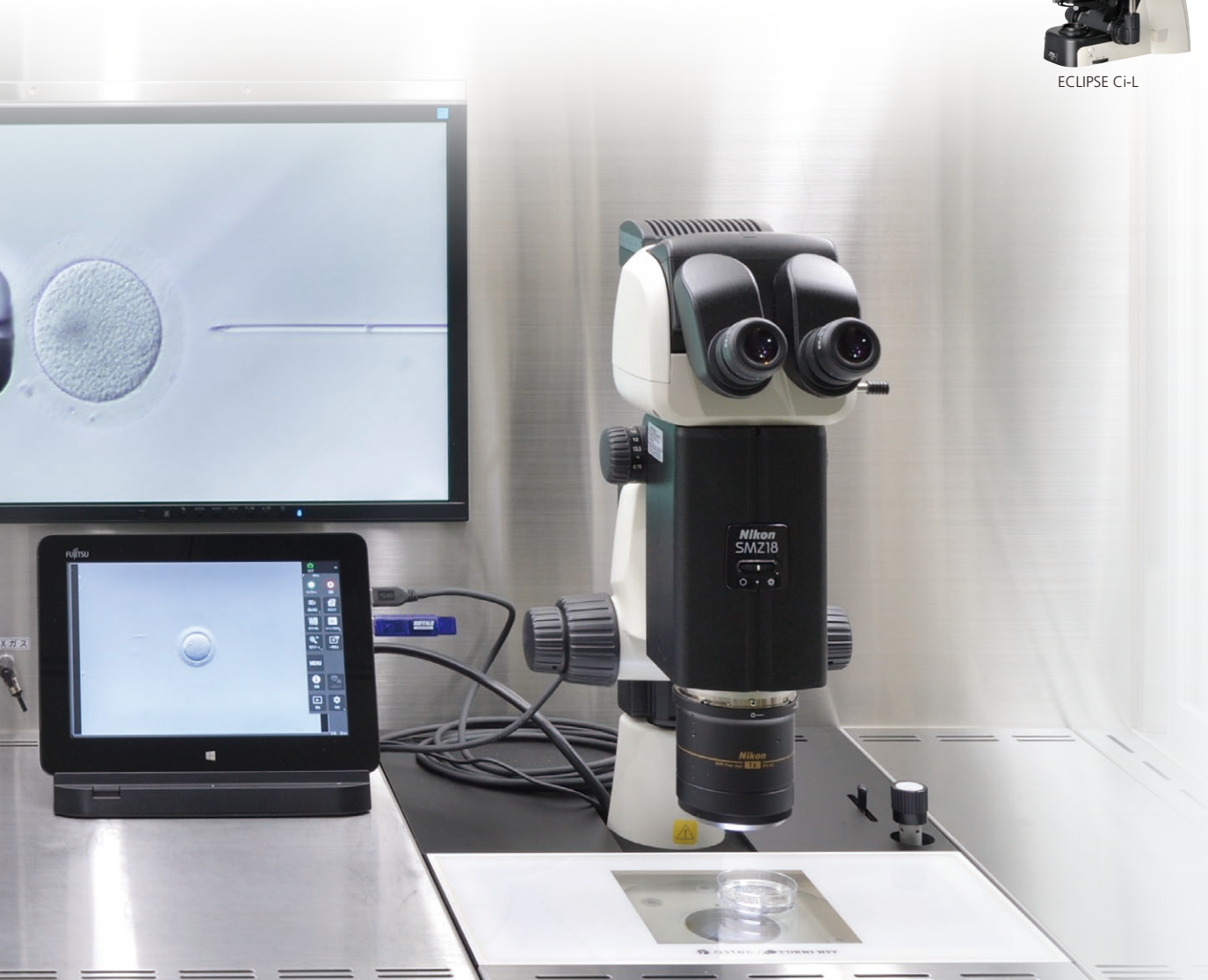
Zoom ratio is 18:1 (zoom range: 0.75X - 13.5X) with SMZ18, 12.7:1 (0.63X - 8X) with SMZ1270 and 8:1 (1X - 8X) with SMZ800N. The Oblique Coherent Contrast (OCC) option enables high-contrast observation of oocytes and embryos.

SMZ18

ECLIPSE Ci/ECLIPSE E200 upright microscopes

The Ci series offers three different models, all of which are compatible with phase contrast observation. The Ci-E and Ci-L feature an LED light source for diascopic illumination which transmits minimal heat and is therefore ideal for sperm observation. The Ci-S is equipped with a halogen light source. The compact ECLIPSE E200 is available in both halogen and LED models.

ECLIPSE Ci-L

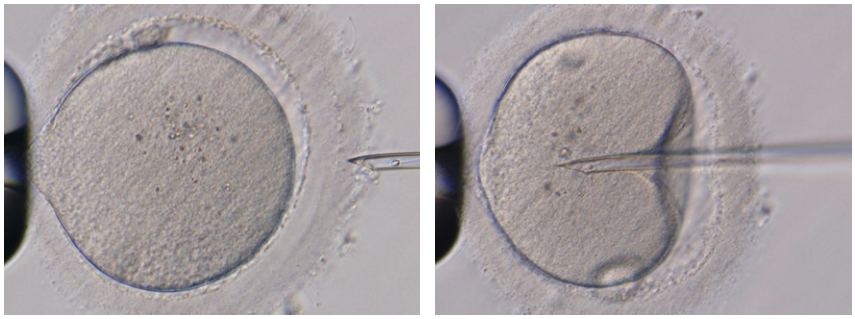


Accessories for Inverted Microscope

Nikon Advanced Modulation Contrast (NAMC) observation

Ti2 Ts2R

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.

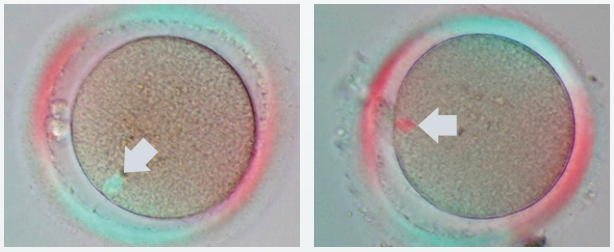
CFI S Plan Fluor ELWD NAMC 20XC (left),
CFI S Plan Fluor ELWD NAMC 40XC (right)

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

Spindle observation

Ts2R

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 or Emboss Contrast is fast and easy as spindle observation only requires two optical modules, one mounted in the condenser turret and an analyzer inserted under the nosepiece.
The following five objectives are compatible with spindle observation: CFI Achromat LWD 40XC, CFI S Plan Fluor ELWD 20XC, CFI S Plan Fluor ELWD 40XC, 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.

TS2R-C-SO Spindle Observation System

Emboss Contrast observation

TS2R

The Emboss Contrast technique provides pseudo-relief contrast of samples on plasticware, similar to NAMC, but with less glare. Emboss Contrast is compatible with standard objectives and therefore easily combined with epi-fluorescence applications.

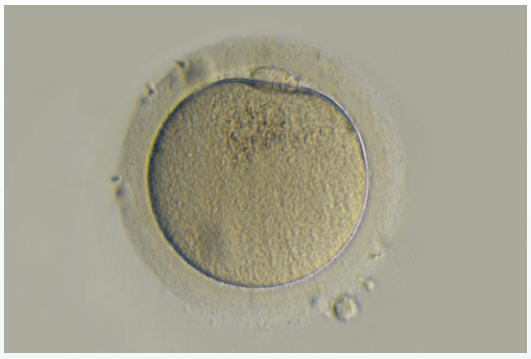
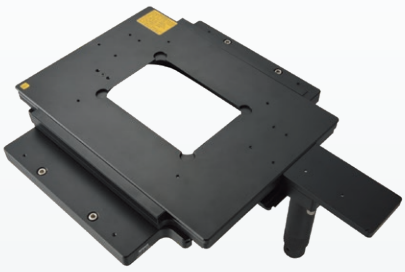


Image courtesy of Hideaki Watanabe, Ph.D. and Hisataka Hasegawa, Ph.D.

CFI Plan Fluor 10X, CFI S Plan Fluor ELWD 20XC,
CFI S Plan Fluor ELWD 40XC,
CFI S Plan Fluor ELWD 60XC

Stage Ti2 Ts2R

Durable manual stages with smooth motion. Available with left or right handle positions and different handle lengths (“short handle” and “middle handle” for Ts2R and Ti2, and an additional “long handle” option for the Ti2).



Camera port Ts2R

The Ts2R’s optional camera port is compatible with C-mount cameras (in combination with camera adapters). Three types of camera ports with different light split ratios are available for image sharing between the binocular tube and camera.
The TS2R-P-CHL Camera Port 50L is specifically designed for ICSI to ensure easy access to the stage.

Ts2R-FL configured with TS2R-P-CHL Camera Port 50L

NTX Micromanipulator set

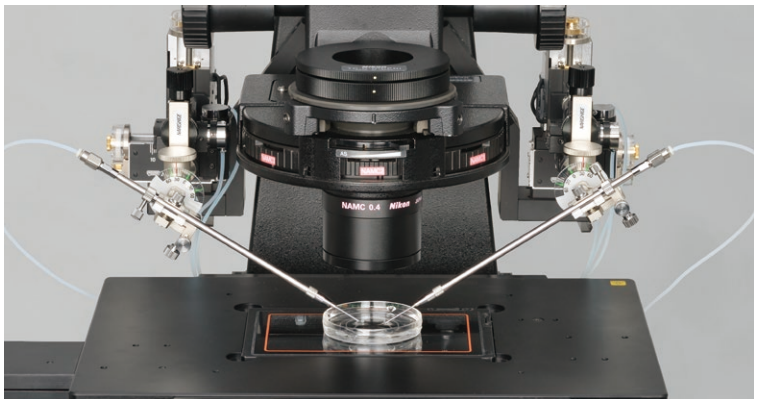
Ti2 Ts2R

The NTX is a micromanipulator set designed especially for the Ti2 and Ts2R inverted microscopes that allows effortless setup and easy adjustment of the pipette holder. Micromanipulator systems produced by a collaboration between Nikon and Narishige have earned high praise worldwide since their development.

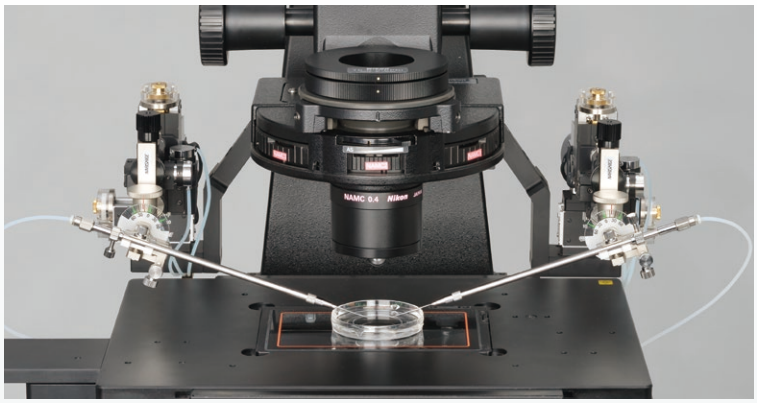
*In the U.S.A. and Europe, use NTXVM for clinical use.

Newly designed dedicated adapter (NTX-N4)

The junction positions of the microscope's support section and the supporting parts of the motor-driven manipulator are set depending on each pipette's angle, and the angle of the pipette holder can be easily adjusted.



With pipette angle set to 35 degrees (high)



With pipette angle set to 20 degrees (low)

Improved stability

The set location of the pipette holder is positioned on the central shaft of the universal joint. It improves the stability of the pipette holder in combination with the novel mechanism.
The enlarged angle indicator and newly added angle index on the universal joint improve the readability of the pipette angle display.
In addition, pipettes can be manually moved up and down using the dial with an arrow displayed.

Improved operability

Operability is improved with reduced rebound risk and enhanced responsiveness.

Movement range

Knob operation	10 mm
Full knob rotation	250 µm
Minimum graduation	2 µm
Joystick operation	Max. 2 mm
Motorized operation	22 mm

NTX-N3 configured with inverted microscope Ts2R-FL

NTX-N4 configured with inverted microscope Ti2-U

The NTX-N3/N4 set does not include a microinjector.

Micromanipulator TAKANOME™

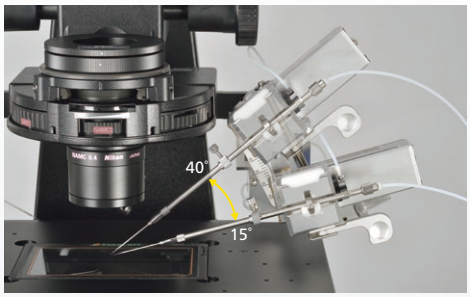
MTK-1 Micromanipulator set

Ti2 Ts2R

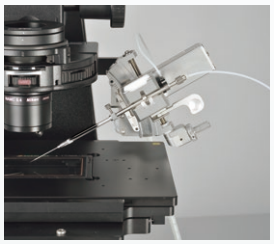
The MTK-1 features smooth and accurate response from the joystick, improved rigidity of the manipulator and increased stability of the pipette position. It is a new type of micromanipulator for ICSI, with various features including instant change of pipette position and easy adjustment of pipette angle. It allows anyone to perform easy and secure pipette setting.

*In the U.S.A. and Europe, use MTK-1VM for clinical use.

- The pipette tip stays in the same position in the field of view, even when the pipette angle is changed.

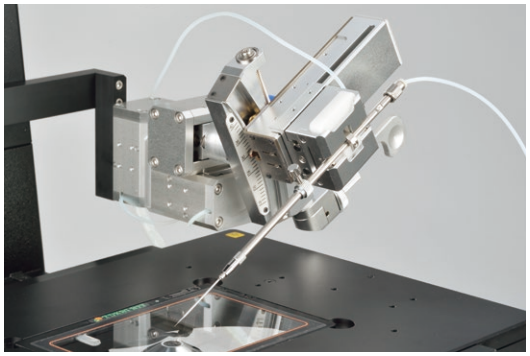


- Simple switching of the pipette setting between HOME and WORKING positions using a lever enables the fast and secure exchange of pipettes and dishes, preventing the breaking of pipettes.



WORKING position

HOME position

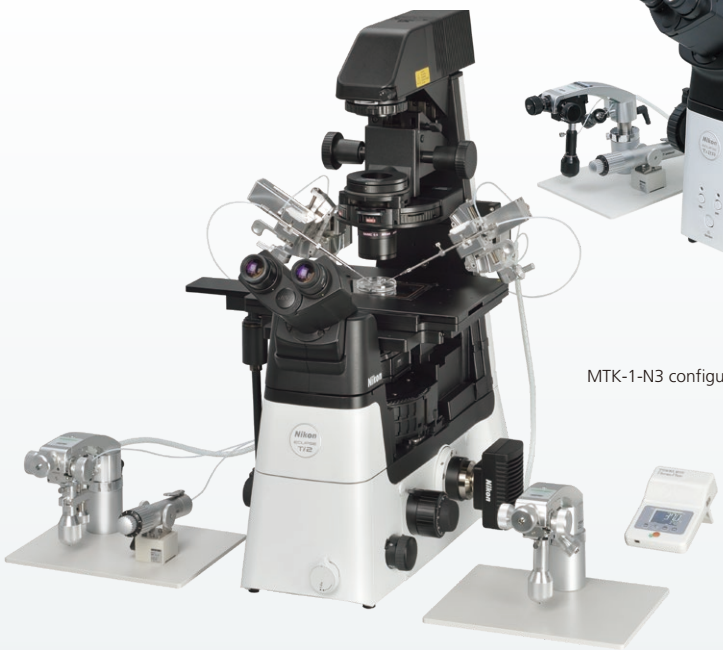


- Improved rigidity of the manipulator body for stable installation. It allows easy mounting on a microscope, and position adjustment.

- Oil hydraulic manipulator provides smooth and accurate response.

Movement range	Knob operation	10 mm (X, Y, Z and T axes)
	Full knob rotation	250 µm (X, Y and Z axes), 1,000 µm (T axis)
	Lever movement	50 mm (T axis)
Inclination angle of T axis		15° - 40°

MTK-1-N3 configured with inverted microscope Ts2R-FL



MTK-1-N4 configured with inverted microscope Ti2-U

The MTK-1-N3/N4 set does not include a microinjector.

Micromanipulator-dedicated microinjector

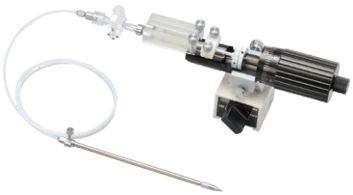
Pneumatic Microinjector IM-11-2

The IM-11-2 allows suction and injection of a microsample with precision and operability comparable to oil hydraulic injectors. It is suitable for both injecting and holding during ICSI. Air bubbles do not enter the micropipette when the pneumatic microinjector is fitted.

- Movement range: 40mm

* In the U.S.A. and Europe, use IM-11-2VM for clinical use.

Oil-type Microinjector IM-9B



The IM-9B is suitable for injection and provides smoother and more stable maneuverability by employing a mechanism that minimizes backlash. Also, its 53mm working distance, large-volume syringe and just-the-right-size control knob with graduated scales all contribute to easy control of the injection.

- Movement range: 53mm (Full rotation of knob: 500µm)
- Control value: approx. 10µl with full rotation of knob (Glass type syringe: 1,060 µl)

* In the U.S.A. and Europe, use IM-9BVM for clinical use

Pipette Holder Clamper HIK-5N

The HIK-5N is used to keep the pipette holder in the desired position, thereby simplifying pipette exchange. The magnetic clamper can be attached to a bench or iron plate.

Micropipette Puller PC-100

The PC-100 is used to pull the glass capillary vertically, utilizing the gravitational force of its own weight. It has two modes: a single pull, pulling capillary at one stretch, and a double pull in which the setting is changed in mid-process.

Manufacturer: NARISHIGE SCIENTIFIC INSTRUMENT LAB.

Microforge MF-900

The MF-900 is designed to produce injection and holding pipettes. In addition to the temperature and illumination, the position of the heating element can be adjusted.

Manufacturer: NARISHIGE SCIENTIFIC INSTRUMENT LAB.

Pipette Grinder EG-401

The grinder with minimized irregular movements of the grinding plane and the microscope are combined. Precise grinding while confirming needle contact with grinding plane is facilitated.

Glass Capillaries G-100, G-1, GD-1/1.2/1.5

G-100 is a thin-walled glass capillary ideal for ICSI, while G-1 is for general purpose.
The GD series is commonly known as double tubing. These glass capillaries contain an internal glass fiber (approx. 100 µm).
The glass capillaries have been prewashed in an ultrasonic washing machine.

Manufacturer: NARISHIGE SCIENTIFIC INSTRUMENT LAB.

ThermoPlate® TPi series

TPi-TCSX for inverted microscope

Automatic thermocontrol system with a glass heating plate keeps the specimen at a set temperature. Temperature is adjustable from room temperature to 60°C in 0.1°C increments.

TPiE-SP/SPE

The TPiE-SP/SPE allows thermal control of standby samples beside a microscope. A large SP type and small SPE type are available.

TPiD-SMZ25DX for stereo microscope

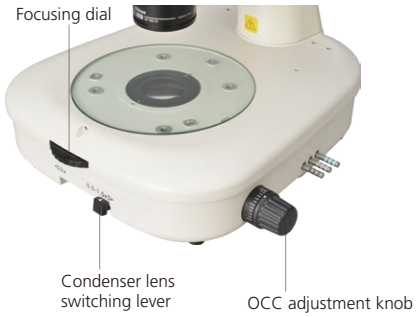
The TPiD-SMZ25DX enables thermal control of standby samples as well as samples under observation. This is useful when dealing with multiple samples.

TPi-UNIX for stereo microscope

The TPi-UNIX can be used for all stereo microscope stands. The entire area of the glass heater is heated to control the temperature of multiple dishes.

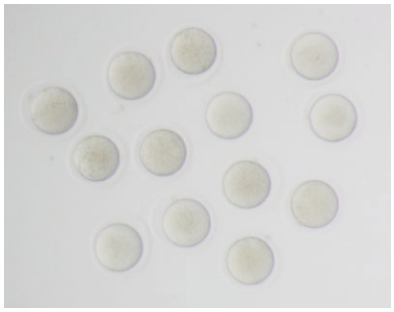
Diascopic Illumination Stands with built-in OCC illuminator

Nikon's unique OCC oblique contrast technique applies coherent light to samples in a diagonal direction, by partially shading the optical path. This method provides relief-like contrast to colorless and transparent sample structures such as oocytes.
Two types of stand are available: the P-DSF32 Fiber Diascopic Illumination Stand that allows high-contrast illumination, and the compact, slim-type P-DSL32 LED Diascopic Illumination Stand that generates minimal heat.

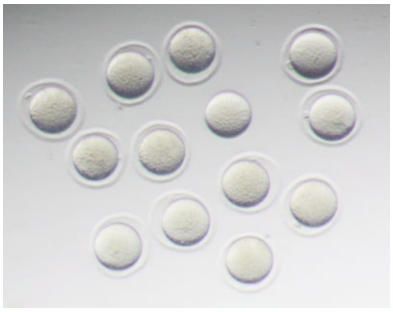


Contrast can be optimized for a sample using the OCC adjustment knob on the P-DSF32 Fiber Diascopic Illumination Stand.

The slide lever with scales on the P-DSL32 LED Diascopic Illumination Stand allows the desired levels of OCC illumination to be saved and reproduced.



Normal diascopic illumination



OCC illumination

Fertilized mouse egg
Captured by SMZ800N stereo microscope with P-DSF32 stand and Plan Apo 1X/WF objective at 8X zoom
Images courtesy of: Teruhiko Wakayama, Ph.D. Advanced Biotechnology Center, University of Yamanashi

SMZ18 configured with P-DSF32 DIA Stand

SMZ1270 configured with P-DSF32 DIA Stand

SMZ800N configured with P-DSL32 DIA Stand

* Microscope cameras can be mounted via P-IBSS2 beam splitter S2


Nikon
SMZ18

Phase contrast accessories for ECLIPSE Ci

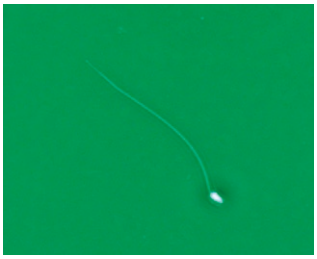
As it enhances the contrast of samples, phase contrast observation is effective for the measurement of sperm count or sperm motility using the Computer-Assisted Sperm Analysis (CASA) system. Dedicated objectives and a dedicated condenser are required for phase contrast technique.

① CFI Plan Fluor DLL 10X, 20X, 40X, 100X Oil phase contrast objectives
② C-CT Centering Telescope
③ C-PH Phase Contrast Turret Condenser
④ CI-F-CH Filter Cassette Holder

Ci-L configured with phase contrast accessories

Phase Contrast Objectives for Sperm Observation

CFI Plan Fluor BM 40X and CFI BM 10X objectives provide bright, negative phase contrast images, ideal for sperm observation. The parts of samples that have large phase differences are visualized as bright objects against a dark background, similar to darkfield microscopy. It is particularly useful for observing terminal filaments of sperm flagella.



Sperm of echinus
Images courtesy of: Dr. Sumio Ishijima, Tokyo Institute of Technology

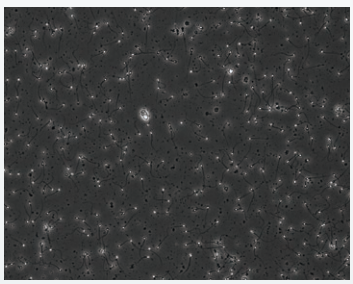
CFI Plan Fluor BM 40X

Phase contrast accessories for ECLIPSE E200

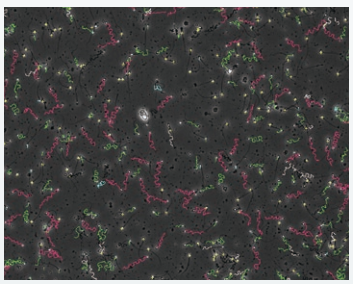
①GIF Filter, ②Centering Telescope, ③E2 Phase Contrast Condenser, ④Phase Contrast Slider 10X-40X, ⑤Phase Contrast Slider 100X

CFI Achromat DL 10X, 20X, 40X, 100X Oil phase contrast objectives

ECLIPSE E200-F
(model with field diaphragm)



Phase contrast image of sperm



Sperm tracing image, color-coded according to sperm velocity.

Objective: CFI Achromat DL 10X
Images courtesy of: DITECT corporation
(Sperm Motility Analysis System: SMAS)

Imaging system for ICSI

Microscope Camera DS-Fi3

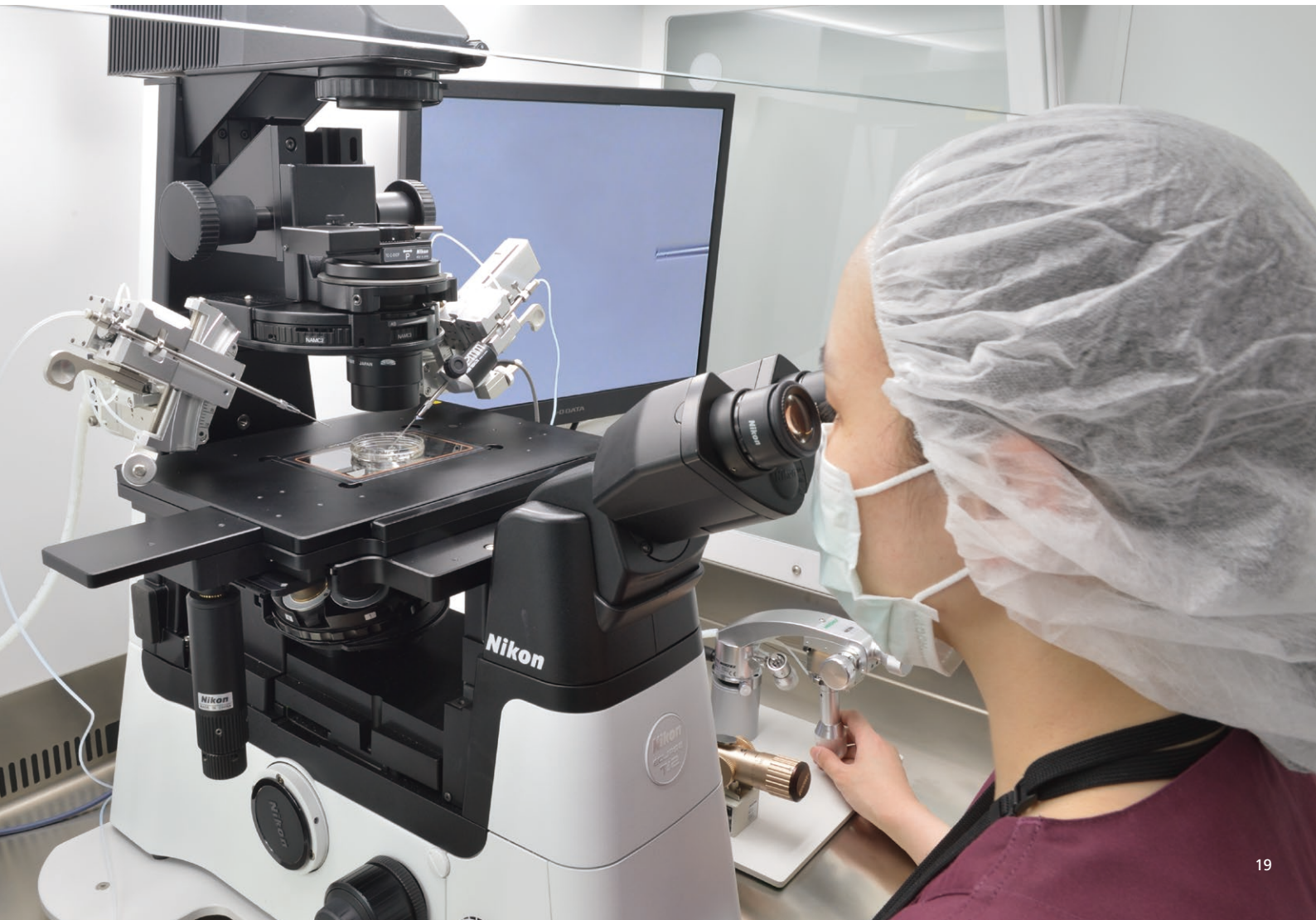
The DS-Fi3 is a high-definition color camera equipped with a 5.9 megapixel CMOS image sensor. With its high-speed data readout and superior color reproduction, the DS-Fi3 is an ideal camera for a variety of observation techniques.

• Max recordable pixels: 2880 × 2048

Imaging software NIS-Elements L

The simple and user-friendly GUI allows intuitive image capturing with the DS-Fi3 camera and a tablet PC. Functions for easy camera setting, a split-screen display, and simple measurement of length, diameter, area and angles are also available.

* For information about other cameras for ICSI and compatible tablet PCs, contact Nikon or Nikon dealers.



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NARISHIGE

NARISHIGE LIFEMED CO., LTD.

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Specifications and equipment are subject to change without any notice or obligation on the part of the manufacturer. October 2019

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

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Nikon

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