M700 E 16.9.NF.3 (1/2)
M700EN03

Nikon

Inverted Microscope

ECLIPSE Ts2-FL

ECLIPSE Ts2

Instructions

Introduction

Thank you for purchasing a Nikon product.

This instruction manual is intended for users of the Nikon Inverted Microscope ECLIPSE Ts2-FL/Ts2.

To ensure correct usage, read this manual carefully before operating this product.

- No part of this manual may be reproduced or transmitted in any form without prior written permission from Nikon.
- The contents of this manual are subject to change without notice.
- The equipment described in this manual might differ from the actual product in its appearance.
- Although every effort has been made to ensure the accuracy of this manual, errors or inconsistencies might remain. If you notice any points that are unclear or incorrect, please contact your local Nikon representative.
- Some of the equipment described in this manual may not be included in the set you have purchased.
- If you intend to use any other equipment with this product, read the manual for that equipment too.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment might be impaired.

Symbols Used in This Manual

This manual uses the following symbols:

◆Safety symbols

⚠ **WARNING** ⚠ **CAUTION**	These symbols indicate safety items that require particular attention. For details, see "Safety Precautions."

◆Other symbols

❗	This symbol indicates items that require attention or must be observed in order to prevent malfunction or failure of this product.
✔	This symbol indicates useful hints or necessary information about using this product.

Contents

Safety Precautions

To ensure correct and safe operation, read this manual before using the product.

WARNING and CAUTION Symbols

Although this product is designed and manufactured to be completely safe during use, incorrect usage or failure to follow the safety instructions provided may cause personal injury or property damage. To ensure correct usage, read this manual carefully before using the product. Do not discard this manual and keep it handy for easy reference.

Safety instructions in this manual are marked with the following symbols to highlight their importance. For your safety, always follow the instructions marked with these symbols.

Symbol	Description
 **WARNING**	Disregarding instructions marked with this symbol may lead to serious injury or death.
 **CAUTION**	Disregarding instructions marked with this symbol may lead to injury or property damage.

Meaning of Symbols Used on the Product

The symbol appearing on the product indicates the need for caution at all times during use. Always refer to the instruction manual and read the relevant instructions before manipulating any part to which the symbol has been affixed.

Symbol	Description
	**Biohazard** This symbol label attached on the stages reminds you of the following: • Spillage of a sample from a vessel onto the microscope, presents a biohazard risk. • To avoid biohazard contamination, do not touch the contaminated portion with your bare hands. • Decontaminate the contaminated portion according to the standard procedure of your laboratory.
	**Warning (for the Ts2-FL), Caution (for the Ts2)** This symbol label can be found on the diascopic illuminator, and cautions the following: • Risk group category of photobiological safety of diascopic illumination and episcopic illumination. • Do not look directly into the light of diascopic illumination or episcopic illumination. See "WARNING: 7 Photobiological safety" and "WARNING: 8 Do not look directly into the illuminator" to follow what is described there.
	**Caution: Mount the cover over the filter cube mounting port (for the Ts2-FL only)** This symbol label can be found on the cover of the filter cube mounting port. This label gives the following cautions: • Do not turn on the fluorescence LED while the cover of the fluorescence filter cube mounting port is open. See "CAUTION: 2 Mount the cover over the filter cube mounting port (for the Ts2-FL only)" to follow what is described there.
	**Information on how to mount or replace the fluorescence LED unit (for the Ts2-FL only)** This symbol can be found on the cover of fluorescence LED unit replacement port. reminds you of the following note about a procedure of mounting or replacing the LED unit. For details, see step 2 "Mounting the fluorescence LED unit" in Section "4.6.1 Basic Assembly for Episcopic Illumination Microscopy."

⚠ WARNING

1 Do not disassemble.

Disassembly may cause malfunction and/or electrical shock, and will lead to the forfeiture of all claims against warranty. Do not disassemble any part other than those described in this manual. If you experience any problem with the microscope, contact your local Nikon representative.

2 Read this manual thoroughly.

To ensure safety, thoroughly read this manual for other equipment to be used with this product. In particular, be sure to follow the warnings and cautions at the beginning of the manuals.

By reading this manual thoroughly, you can use this product without the need for any further specialized training. Contact your nearest Nikon representative if you have any questions, or notice any errors.

Nikon products are designed with the utmost safety in mind, provided that you use them for their designed purpose, and heed all warnings and cautions in the respective manuals. Failure to heed warnings or cautions in the manuals, subjecting the equipment to shock or impact, or attempting to disassemble the equipment might result in accident or injury.

3 Input voltage

This product can be used with 100 to 240 VAC at 50/60 Hz, and is compatible with AC wall outlets worldwide. In normal circumstances, power voltage is not a concern. However, note that you should avoid using this product with an unstable supply voltage.

4 Power cord

Be sure to use the provided (or specified) power cord. Use of other power cords might result in failure or fire.

- For details on the specified power cord, see the Section "7.2 Performance Properties."
- To prevent electric shock, always turn off the power switch of the microscope (set it to "○") before plugging in or unplugging the power cord.
- This product complies with JIS Class I electric shock protection, and must therefore be connected to a protective grounding terminal.

5 Notes on handling flammable solvents

The following flammable solvents are used with this product:

- Immersion oil (Nikon immersion oil for oil immersion objectives)
- Absolute alcohol (ethyl alcohol or methyl alcohol for cleaning optical parts)
- Petroleum benzene (for removing immersion oil)
- Medical alcohol (for disinfecting the microscope)

WARNING

Keep these solvents away from fire. Before using a solvent, carefully read the instructions provided by the manufacturer of the solvent, and handle it correctly and safely. Note the following precautions when using solvents with this product.

- Keep solvents away from any parts that might become hot.
- Keep solvents away from this product and its surroundings when turning on or off the power switch, or plugging in or unplugging the power cord.
- Be careful not to spill solvents.

6 Handling of dangerous samples

This microscope is designed primarily for microscopic observation of living cells and tissue cultures in Petri dishes and other vessels.

Before handling a sample, check to see if it is hazardous. If the sample is hazardous, follow the standard procedure of your laboratory. If the sample is of an infectious nature, wear rubber gloves to avoid infection, and do not touch the sample directly. Be careful not to spill the sample. If a sample is spilled over this product, or otherwise comes into contact with it, decontaminate the affected area, following the standard procedure of your laboratory.

7 Photobiological safety

This product is manufactured in accordance with the IEC62471 standard "Photobiological Safety of Lamps and Lamp Systems", established by the International Electrotechnical Commission (IEC).

Ts2 and Ts2-FL

The photobiological safety of the light emitted from the diascopic illuminator (the condensers or an aperture of the condenser holder) of this product is classified into the following risk group according to the above standards. If the distance from the diascopic illuminator to the retina is larger than the following hazard distance, the photobiological safety of this product is classified into the Exempt Group, which does not invoke a photobiological hazard.

	Classification	Hazard Distance
Retinal blue-light hazard	Risk Group 2	4 m

Ts2-FL

The photobiological safety of the light emitted from the episcopic illuminator (the objectives or the lens mount holes of nosepiece) of this product is classified into the following risk group according to the above standards. If the distance from the episcopic illuminator to the retina is larger than the following hazard distance, the photobiological safety of this product is classified into the Exempt Group, which does not invoke a photobiological hazard.

	Classification	Hazard Distance
UV radiation hazard	Risk Group 3	2 m
Retinal blue-light hazard	Risk Group 2	7 m
Retinal blue-light or thermal hazard	Risk Group 3	4 m

⚠ WARNING

8 Do not look directly into the illuminator

Ts2

The following caution label indicating photobiological safety is affixed on the diascopic illuminator. This label gives the caution as below. (As for the position of the label, see Chapter 1, "Components".)

CAUTION
Possibly hazardous optical radiation emitted from the diascopic illuminator (the condensers or an aperture of the condenser holder). Do not look directly into the light of diascopic illumination. May be harmful to the eyes.

Ts2-FL

The following warning label indicating photobiological safety is affixed on the diascopic illuminator. This label gives the caution and warnings as below. (As for the position of the label, see Chapter 1, "Components".)

WARNING
UV emitted from the episcopic illuminator (the objectives or the lens mount holes of nosepiece). Avoid eye and skin exposure to the emission. Use the ultraviolet light shielding plate.

WARNING
Possibly hazardous optical radiation emitted from the episcopic illuminator (the objectives or the lens mount holes of nosepiece). Do not look directly into the light of episcopic illumination. Eye injury may result.

CAUTION
Possibly hazardous optical radiation emitted from the diascopic illuminator (the condensers or an aperture of the condenser holder). Do not look directly into the light of diascopic illumination. May be harmful to the eyes.

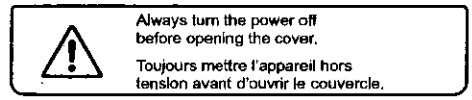
⚠ CAUTION

1 Turn the power off

To prevent electrical shock or failure, always turn off the power switch of the microscope (set it to "○") before plugging in or unplugging the power cord. Always turn off the power switch of the microscope (set it to "○") and unplug the power cord before assembling the microscope, replacing fluorescence filter cubes or fluorescence LED units for use with the Ts2-FL, or cleaning the microscope.

2 Mount the cover over the filter cube mounting port (for the Ts2-FL only)

The following label is affixed to the cover of the filter cube mounting port. This label gives notes as below.



- Turn the power off before opening the cover of the filter cube mounting port.
- If the cover is not mounted on the port, the leaked light from the port may be a background noise for the episcopic illumination microscopy. Also, the leaked light may be harmful to the eyes.

3 Mount the cover over the fluorescence LED unit replacement port (for the Ts2-FL only)

The fluorescence LED is activated by an internal safety switch when the cover is mounted on the LED unit replacement port.

If the power switch is turned on (set to "|") with the cover removed, the internal safety switch prevents the LED unit from turning on.

Before turning on the power of the fluorescence LED unit, make sure that the cover is mounted on the LED unit replacement port and the cover fixing screws are fastened firmly.

If the fluorescence LED unit lights when the cover is open, this product is in failure. Immediately stop using this product, and contact your local Nikon representative.

4 Do not get the microscope wet or allow foreign matter to get inside it

If the microscope becomes wet, a short circuit might occur, causing the microscope to malfunction or overheat. Similarly, a short circuit might occur if foreign matter gets inside the microscope. Also make sure that water does not get on the AC inlet on the rear side.

Should you accidentally spill liquid on the microscope, immediately turn off the power switch of the microscope (set it to "○") and unplug the power cord. (Do not touch the power cord with wet hands.) Then, wipe off any moisture with a dry cloth or similar material.

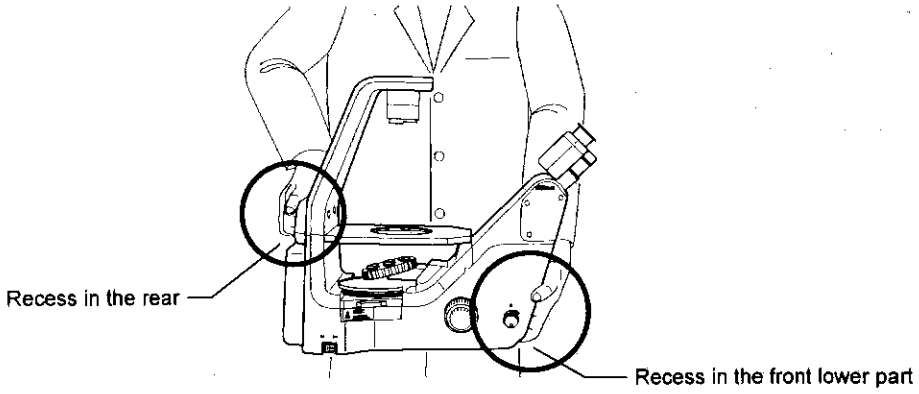
The entire lower side of the nosepiece is shielded by a drip-proof protective cover, thereby preventing water from getting inside the microscope. Be sure to mount caps over unused holes in the nosepiece.

If any liquid or foreign matter gets inside the microscope, do not use the microscope, and contact your local Nikon representative.

⚠ CAUTION

5 Cautions on carrying the microscope

- When carrying this product, firmly hold it by gripping the recess in the front lower part of the main body and the recess in the rear of the main body.



- Do not hold any other parts (such as the upper part of the illumination pillar, the focus knobs, the eyepiece tube, or the stage) when carrying the microscope. Doing so might result in dropping or failure of this product.

6 Cautions on assembly and replacement

- Take care not to pinch your fingers or hands.
- Scratches and dirt (such as fingerprints) on optical components such as lenses and filters, and fluorescence filter cubes and LED units for use with the Ts2-FL will degrade the microscope image. Take care not to scratch these optical components or touch them directly during your work.

7 Do not place anything on this product

Do not place anything on the top of this product. In particular, never place a heavy object. Doing so might cause deformation, damage, or malfunction of this product. Moreover, an object dropping from the top of the microscope might result in injury.

8 Do not turn on the power when this product is covered

Do not turn on the power when this product is covered by anything. Doing so might block ventilation of the microscope and cause it to overheat, possibly resulting in fire. Do not cover this product with a cloth or similar material while using it. Doing so will increase the temperature inside the microscope, which might result in failure.

9 Cautions on continuous microscopy work

To alleviate fatigue, avoid continued use of this product for periods of more than one hour, and take short breaks of 10 to 15 minutes between each work session. Appropriately arrange the other equipment to be used, and adjust the seat height of your chair.

10 Disposal of this product

To avoid biohazards, dispose of this product as contaminated material, according to the standard procedure of your laboratory.

Notes on Handling This Product

1 Handle with care

This product is a precision optical instrument. Handle this product carefully to avoid exposure to shocks and vibrations.

In particular, the precision of objectives, and fluorescence filter cubes and LED units for use with the Ts2-FL might be affected by even mild shocks.

Any scratches and dirt (such as fingerprints) on optical components such as lenses and filters will degrade the microscope image.

Take care not to scratch or stain optical components. If they become dirty, clean them according to the procedure in Chapter 6, "Maintenance and Storage."

2 Electromagnetic environment

The electromagnetic environment should be evaluated prior to operation of the device.

Do not use this device in close proximity to sources of strong electromagnetic radiation (e.g. unshielded intentional RF sources), as these can interfere with the proper operation.

This product emits low-level electromagnetic radiation. Do not install this product near precision electronic devices. If you do, the performance of such devices might be degraded. If TV or radio reception is affected, move the TV or radio farther away from this product.

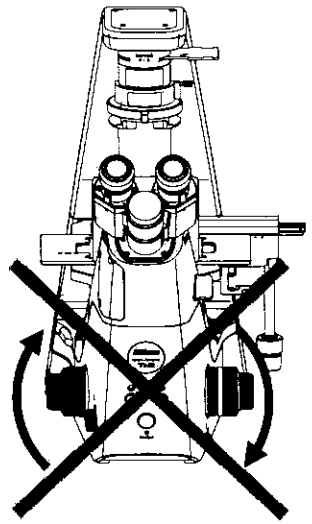
3 Installation location and storage location

This product is a precision optical instrument. Use or storage of this product under inappropriate conditions might result in malfunction or loss of precision. The following conditions must be considered for the installation location and storage location.

- Install this product indoors at a temperature of 0 to +40°C, and a relative humidity of 60% or less (at +40°C, no condensation).
  Store or transport this product in a location with a temperature of -20 to +60°C and a relative humidity of 90% or less (no condensation). Installing or storing this product in a hot or humid location might result in mold or condensation on the lenses, loss of precision, or other malfunction.
- Install and store this product in a splash-, dust-, and vibration-free location.
  Place a cover over this product when storing it, so as to protect it from dust.
- Install and store this product on a level and suitably sturdy desk or table.
  Install this product in a location with minimal exposure to hazards in the event of an earthquake or other potential disaster. If necessary, secure this product to the working desk (or other heavy and stable object) by a strong cord or similar means, so as to prevent this product from tipping over or falling off the desk.
- Install this product in a location where the power cord can be unplugged immediately from the AC inlet of the microscope in case of an emergency.
- Avoid placing this product in direct sunlight or immediately under room lights.
  In a bright environment, extraneous light entering the objective will degrade image quality. Extraneous light from a room light immediately above the microscope might also enter the objective. In this case, we recommend turning off the room light immediately above the microscope before use.
- Install this product at least 10 cm away from nearby walls.
- Do not use this product on a desk mat or similar item.
- Do not install this product in a closed space such as a locker or cabinet.

4 Focus knobs

Do not rotate the right and left focus knobs in opposite directions at the same time. Similarly, do not continue to rotate the coarse focus knob after the stage has reached the upper or lower limit of its motion. These actions will damage the microscope.



5 Objectives

When observing suspended cells in a container, it is necessary to set the objective closer to the container than usual in order to achieve proper focus. If the objective is switched while set this close, the tip of the objective might collide with the container. In this case, lower the objective before rotating the nosepiece.

Likewise, before placing a large container on the stage, make sure that the tip of the objective does not protrude from the stage surface.

6 35 mm-diameter Petri dishes

When using a 35 mm-diameter Petri dish, always attach the supplied round-holed annular ring to the stage. Using the long-holed ring instead might result in the dish falling through the opening.

7 Oil-immersion observation

Use only a minimum quantity of immersion oil. If too much oil is applied, the excess might flow onto the stage and its surroundings, thereby affecting the microscopy work.

When using petroleum benzene or absolute alcohol to wipe off immersion oil or to clean the lenses, follow the instructions provided by the manufacturer of the petroleum benzene or alcohol to be used. Keep these flammable liquids away from fire or sparks.

See "5. Notes on handling flammable solvents" under ⚠WARNING.

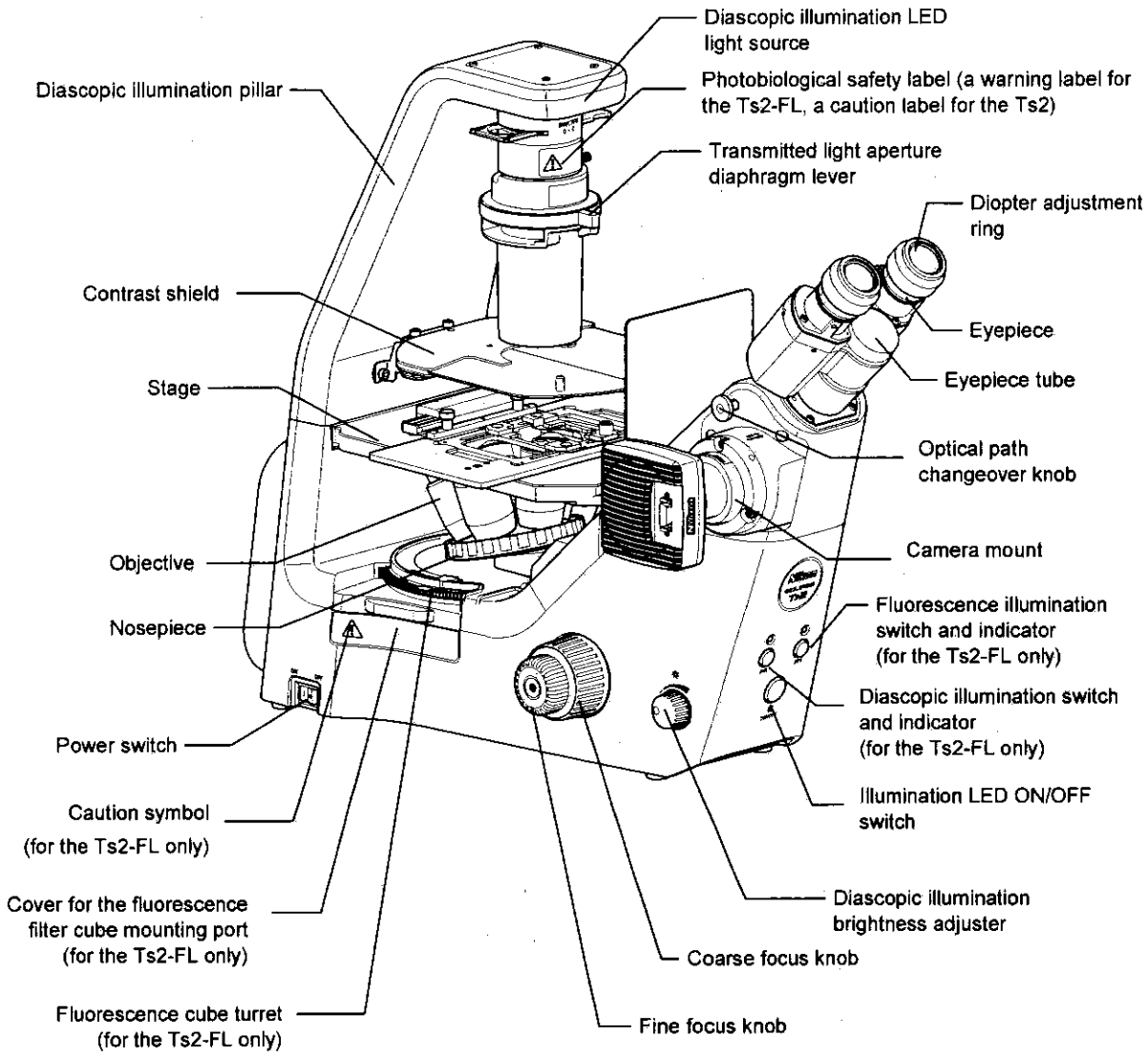
8 Fluorescence filter cube (for the Ts2-FL only)

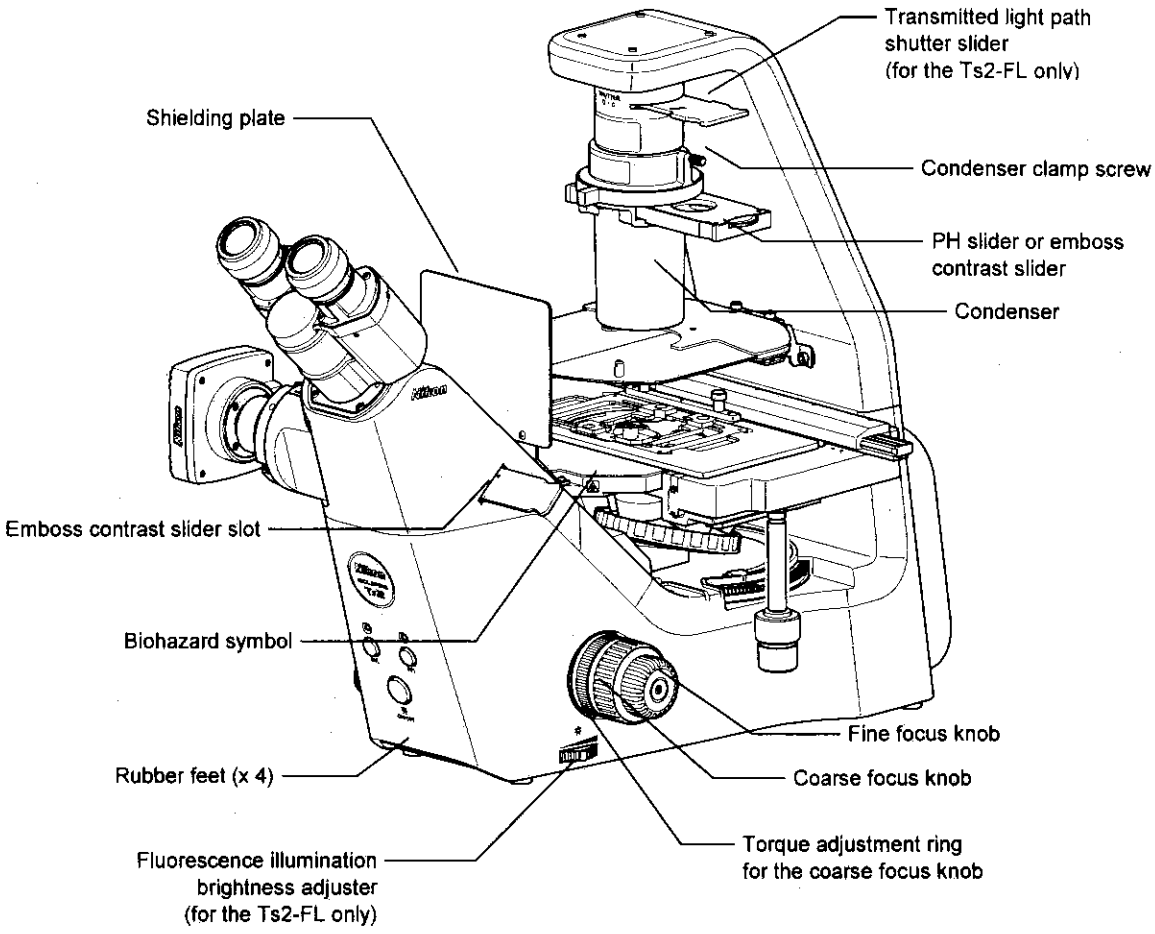
- The excitation filter inside the fluorescence filter cube is subject to very strong light beams, and consequently degrades over time. Replace the filter at intervals based on the total number of operating hours.
- The characteristics of the filter might change under high humidity. Avoid using and storing fluorescence filter cubes in conditions subject to high temperature, high humidity, or extreme temperature changes, to avoid affecting the characteristics and quality of the filters. When the fluorescence filter cubes are not to be used, we recommend that they be stored in a desiccator or sealed container that contains a desiccant.

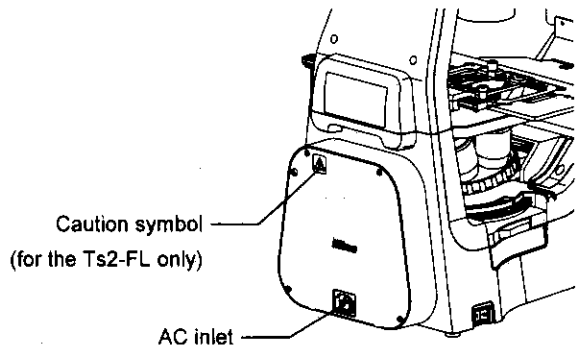
1 Components

This chapter illustrates each component of the Ts2-FL model, which supports fluorescence microscopy.

There are some components that do not apply to the Ts2 model, which does not support fluorescence microscopy, and such components are accompanied with a brief explanation to that effect.




Transmitted light path
shutter slider
(for the Ts2-FL only)
Shielding plate
Condenser clamp screw
PH slider or emboss
contrast slider
Condenser
Emboss contrast slider slot
Biohazard symbol
Fine focus knob
Rubber feet (x 4)
Coarse focus knob
Torque adjustment ring
for the coarse focus knob
Fluorescence illumination
brightness adjuster
(for the Ts2-FL only)


Caution symbol
(for the Ts2-FL only)
AC inlet

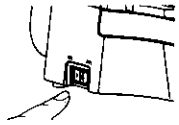
2 Operations for Each Microscopy Method

This chapter assumes that all necessary devices have been installed. For information on assembly, see Chapter 4, "Assembly."

2.1 Bright-field Microscopy Procedure

1 Turn on the power switch. (The diascopic illumination LED turns on.)

Set the power switch to "|" to turn on the power to the microscope.



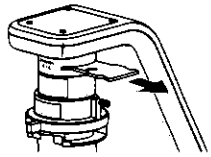
Ts2-FL: The indicator on the diascopic illumination switch turns on.
Ts2: The indicator on the front of the microscope turns on.

2 Turn on the illumination.

If the illumination LED is unlit, press the illumination LED ON/OFF switch to turn on the LED.

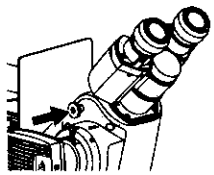
3 Open the transmitted light path shutter. (For the Ts2-FL only.)

Use the transmitted light path shutter slider to open the shutter.



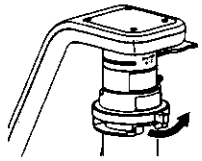
4 Set the optical path to 100% for the binocular part.
(Only if a camera port is mounted)

Use the optical path changeover knob to set the illumination light path to 100% for the binocular part.



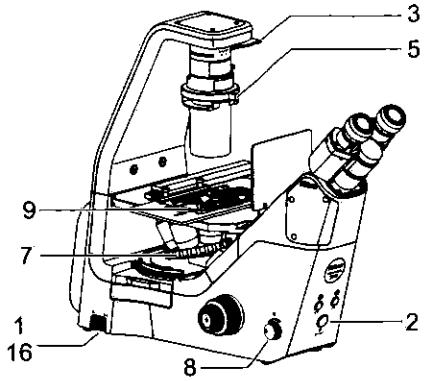
5 Fully open the aperture diaphragm

Rotate the aperture diaphragm lever fully counterclockwise to fully open the aperture.



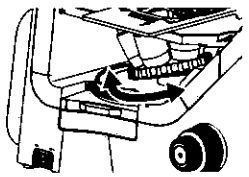
6 Set each slider to the bright-field position.

If a PH slider or emboss contrast slider is mounted, set the slider to the hollow position.



7 Place a 10x objective into the optical path.

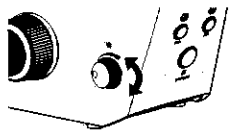
Turn the nosepiece to place the 10x objective into the optical path.



✔ Turn the nosepiece until it clicks in place.

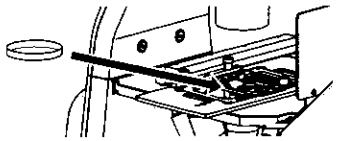
8 Adjust the brightness.

Rotate the diascopic illumination brightness adjuster to adjust the brightness of the view field.

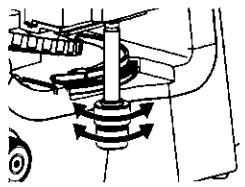


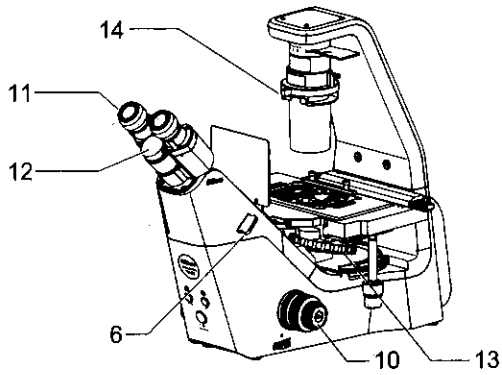
9 Set a specimen and place the observed portion into the optical path.

(1) Set a specimen on the stage. (For details, see Section 3.4.)



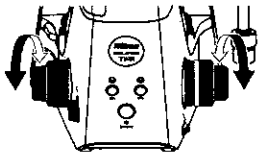
(2) If a mechanical stage is used, rotate the stage knob to place the observed portion of the specimen into the optical path. If the specimen is in a container, adjust its position so that the center of the container (that has an even thickness) comes under the optical path.

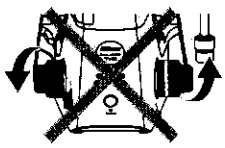




Focus on the specimen. (For details, see Section 3.5.)

(1) Look into the eyepieces, and rotate the coarse focus knob towards you to move the objective as close to the specimen as possible. Then, lower the nosepiece until the image of the specimen is in focus.
(2) After the focus has been roughly adjusted with the coarse focus knob, rotate the fine focus knob to accurately adjust the focus.





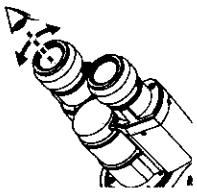
Notes on handling the focus knobs

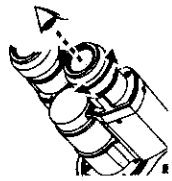
Do not attempt the following operations, as they might result in malfunction or failure:

- Rotating the right and left focus knobs in the opposite directions
- Rotating the coarse focus knob past its limit

Perform diopter adjustment. (For details, see Section 3.7.)

(1) Rotate the diopter adjustment rings on both eyepieces to set them to the reference position.
(2) Use the 40x objective to focus on the specimen.
(3) Place the 10x objective into the optical path.
(4) Look into the right and left eyepieces with both eyes, and focus on the specimen by rotating the diopter adjustment ring on each eyepiece. At this time, do not use the focus knobs.
When rotating the diopter adjustment ring, hold the eyepiece barrel with the fingers so that the entire eyepiece does not rotate.

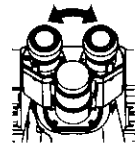




(5) Repeat steps (2) to (4) to check that the specimen is in focus.

Adjust the interpupillary distance.

By rotating the binocular part while looking through the eyepieces, adjust the distance between the eyepieces so that the right and left view fields overlap to form a single image.



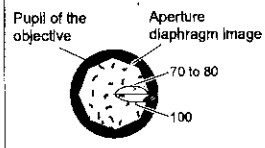
It is easier to adjust the interpupillary distance if you try to gaze into the distance while looking into the eyepieces.

Switch to a desired objective.

Turn the nosepiece to place a desired objective into the optical path.

Adjust the aperture. (For details, see Section 3.6.)

Attach an optional centering telescope to the binocular part.
Rotate the aperture diaphragm open/close lever for the condenser so that the aperture diaphragm size is 70% to 80% of the pupil of the objective to be used.
When adjustment is complete, remove the centering telescope and attach an eyepiece instead.



Appropriate aperture size

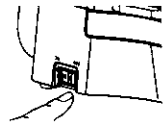
Adjust the aperture diaphragm every time you switch the objective.

Observe the specimen.

(1) Rotate the diascopic illumination brightness adjuster to adjust the brightness of the view field.
(2) Set the sample so that the observed portion is in the center of the view field.
(3) If the observed portion of the specimen is out of focus, rotate the fine focus knob to focus on the specimen.
(4) When replacing and observing the specimen, check the focus and the brightness, and adjust them as necessary.

Turn off the power switch.

Set the power switch to "○" to turn off the power to the microscope.



2.2 Phase Contrast Microscopy Procedure

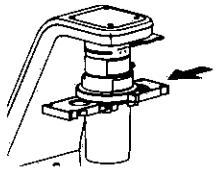
1 Focus on the specimen under bright-field microscopy conditions.

Perform step 1 through to step 12 in Section 2.1, "Bright-field Microscopy Procedure."

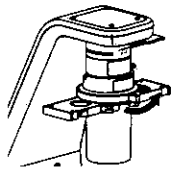
2 Place a phase contrast (Ph) objective into the optical path.

3 Place the Ph annular diaphragm (of the same code as the Ph code of the objective) into the optical path.

Operate the PH slider to place the Ph annular diaphragm module into the optical path. (For details, see Section 3.12.)



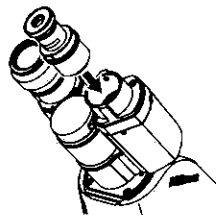
4 Check that the aperture diaphragm of the condenser is fully opened.



✔ Aperture diaphragm for phase contrast microscopy
If the aperture diaphragm is closed, it obstructs the annular diaphragm and phase contrast effects cannot be obtained.

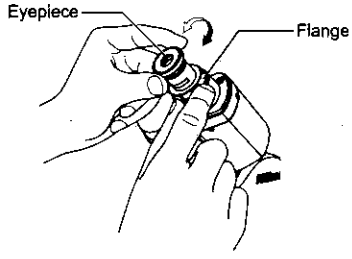
5 Remove one eyepiece from the eyepiece tube, and insert a centering telescope instead.

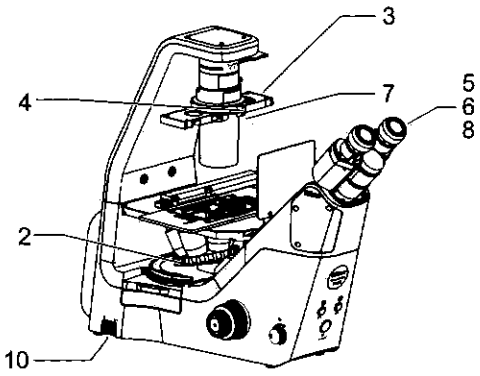
(If a non-centerable PH slider is used, centering is not required. In this case, proceed to step 9.)



6 Adjust the centering telescope to your vision.

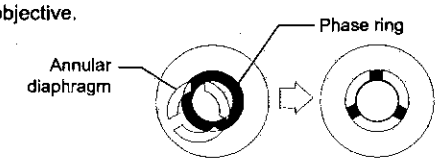
While holding down the flange of the centering telescope, turn the eyepiece of the centering telescope to focus on the phase ring in the objective.





7 Center the annular diaphragm.
(For details, see Section 3.12.2.)

Use the hexagonal screwdriver (provided with the microscope) to turn the two centering screws on the centerable PH slider to merge the annular diaphragm image with the phase ring image in the objective.



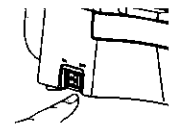
8 Remove the centering telescope and attach the eyepiece.

9 Observe the specimen.

(1) Rotate the diascopic illumination brightness adjuster to adjust the brightness of the view field.
(2) Set the sample so that the observed portion is in the center of the view field.
(3) If the observed portion of the specimen is out of focus, rotate the fine focus knob to focus on the specimen.
(4) When replacing and observing the specimen, check the focus and the brightness, and adjust them as necessary.

10 Turn off the power switch.

Set the power switch to "○" to turn off the power to the microscope.



2.3 Emboss Contrast Microscopy Procedure

1 Focus on the specimen under bright-field microscopy conditions.

Perform step 1 through to step 12 in Section 2.1, "Bright-field Microscopy Procedure."

2 Place the sector diaphragm of the condenser-side emboss contrast slider into the optical path. **(For details, see Section 3.13.1.)**

Push the condenser-side emboss contrast slider.

3 Place the diaphragm of the eyepiece-tube-side emboss contrast slider into the optical path.
(For details, see Section 3.13.2.)

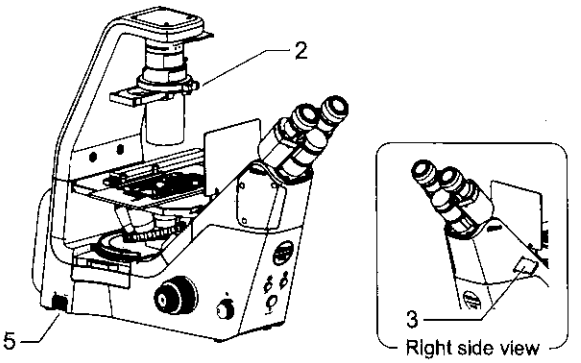
Place the eyepiece-tube-side emboss contrast slider in a position that matches the magnification of the objective.

4 Observe the specimen.

(1) Rotate the diascopic illumination brightness adjuster to adjust the brightness of the view field.
(2) Set the sample so that the observed portion is in the center of the view field.
(3) If the observed portion of the specimen is out of focus, rotate the fine focus knob to focus on the specimen.

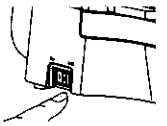
✔ You can adjust the degree of contrast by rotating the condenser-side emboss contrast slider adjuster to turn the sector diaphragm.

(4) When replacing and observing the specimen, check the focus and the brightness, and adjust them as necessary.



5 Turn off the power switch.

Set the power switch to "○" to turn off the power to the microscope.



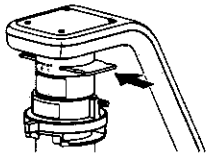
2.4 Episcopic Illumination Microscopy Procedure (for the Ts2-FL Only)

1 Focus on the specimen under bright-field microscopy conditions.

Perform step 1 through to step 12 in Section 2.1, "Bright-field Microscopy Procedure."

2 Close the transmitted light path shutter.

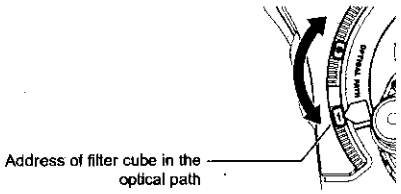
Use the transmitted light path shutter slider to close the shutter.



- The transmitted light path shutter blocks out excitation light from the fluorescence illuminator to prevent the diascopic illumination LED from emitting light.

3 Place the fluorescence filter cube into the optical path.(For details, see Section 3.14.4.)

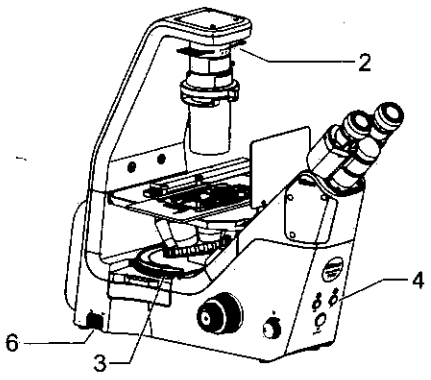
Turn the fluorescence cube turret to place a desired fluorescence filter cube into the optical path.



- Fluorescence cube turret
  Fluorescent positions (1 to 3) and bright-field positions (☼) are alternately allocated. The turret clicks each time a filter cube is brought to a fluorescent or a bright-field position. When switching turret positions, check that the turret clicks and the address indications match the intended filter cube position, seen from the front of the microscope.

4 Turn on the fluorescence illumination.

Press the fluorescence illumination switch to light the LED unit corresponding to the fluorescence filter cube in the optical path.



5 Observe the specimen.

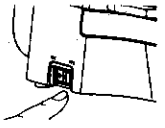
(1) Rotate the fluorescence illumination brightness adjuster to adjust the brightness of the view field.

(2) Set the sample so that the observed portion is in the center of the view field.
(3) If the observed portion of the specimen is out of focus, rotate the fine focus knob to focus on the specimen.
(4) When replacing and observing the specimen, check the focus and the brightness, and adjust them as necessary.

- Blocking out ambient light
  If a contrast shield is mounted, closing the contrast shield produces an image with good contrast even in a bright room.
- Oil immersion objectives
  If you use oil immersion objectives, fill the space between the specimen and the objective with a (Nikon-specified) non-fluorescent immersion oil.

6 Turn off the power switch.

Set the power switch to "○" to turn off the power to the microscope.



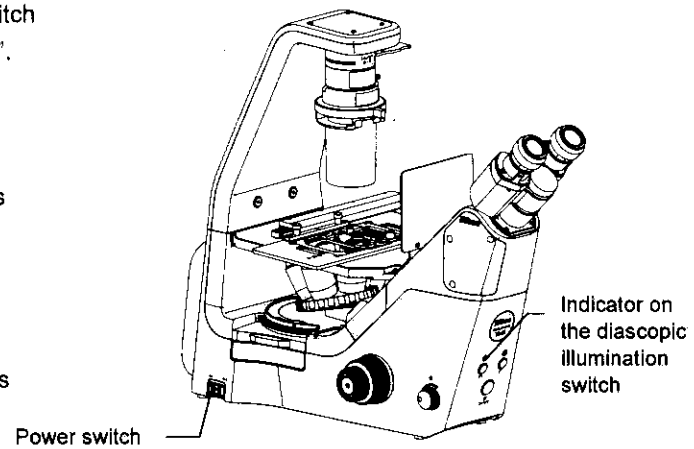
3 Operations for Each Purpose

3.1 Turning the Power On or Off

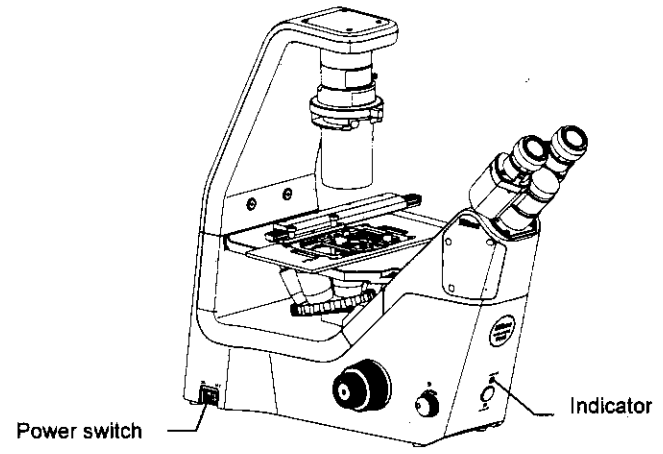
To turn on the power of this product, set the power switch to "|". To turn off the power, set the power switch to "○".

Ts2-FL:
The indicator on the diascopic illumination switch turns on.

Ts2:
The indicator on the front of the microscope body turns on.



Ts2-FL



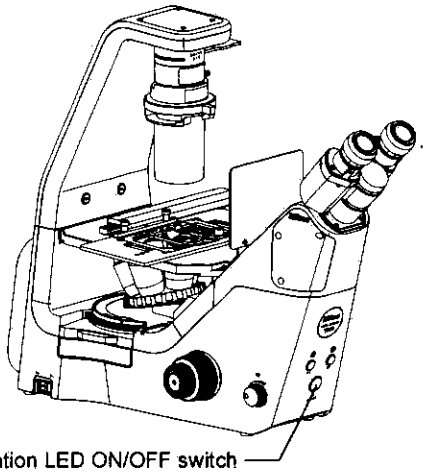
Ts2

3.2 Turning On or Off the Illumination

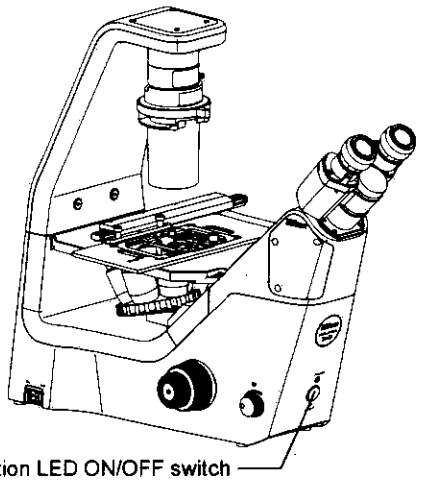
To turn on or off the illumination, press the illumination LED ON/OFF switch.

If the illumination LED ON/OFF switch is in the off state, illumination will not turn on even if the power switch is turned on.

Ts2-FL:
To change the illumination method, press the diascopic illumination (DIA) switch or episcopic illumination (EPI) switch. The diascopic illumination LED and fluorescence LED unit for episcopic illumination cannot be lit at the same time.



Ts2-FL

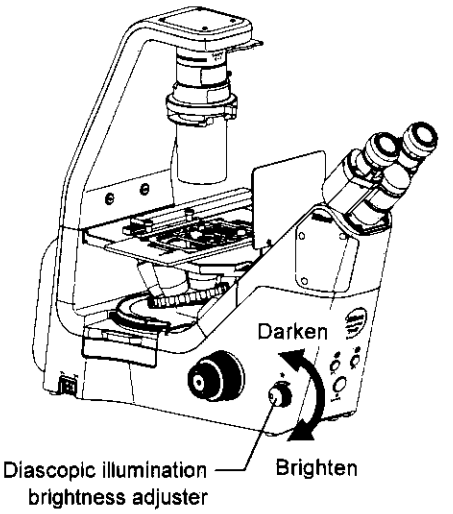


Ts2

3.3 Adjusting the Illumination Brightness

3.3.1 Diascopic Illumination Brightness Adjuster

To adjust the brightness of diascopic illumination, turn the diascopic illumination brightness adjuster.



3.3.2 Fluorescence Illumination Brightness Adjuster (for the Ts2-FL only)

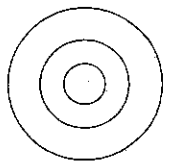
To adjust the brightness of episcopic illumination, turn the fluorescence illumination brightness adjuster. For details, see Section "3.14.2 Episcopic Illumination Brightness."

3.4 Setting the Specimen on the Stage

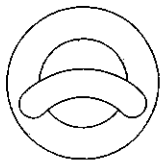
The stage is secured on the microscope. Set the specimen to be observed on the annular ring (on the optical path) in the center of the stage.

3.4.1 Annular Ring

The microscope main body is provided with two types of annular rings. To use an annular ring, attach it at the center of the stage.



Circular bore acrylic annular ring



Crescent-shaped bore acrylic annular ring

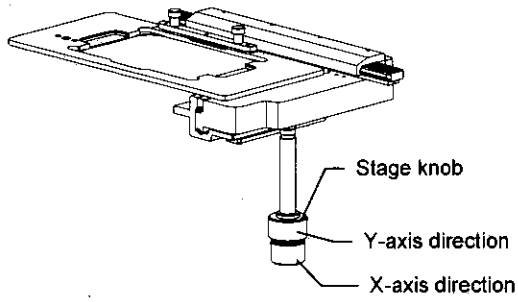
⚠ CAUTION

The annular ring has an aperture whose very sharp edge might cause injury if touched accidentally. Be very careful when handling the annular ring.

3.4.2 TS2-S-SM Mechanical Stage

The mechanical stage is mounted and used on the plain stage. The specimen can be moved in the X-axis and Y-axis directions by operating the stage knobs.

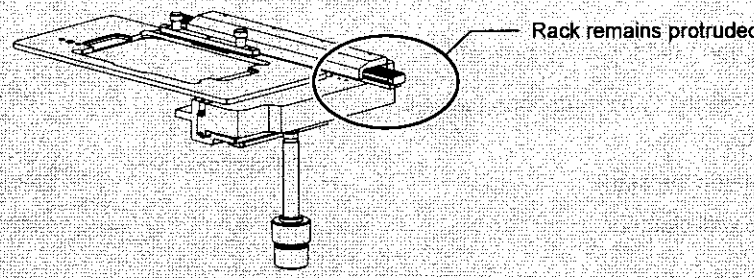
A 128 × 86 mm microplate can be placed on the mechanical stage. Attaching the following specimen holders enables you to observe various types of specimens.



Description	Model
Glass ring holder	C-S-HG
Ring holder set	C-S-HLS
Terasaki plate holder	C-S-HT
Glass slide holder	C-S-HS
Universal holder	C-S-HU
Petri dish holder 35 mm	C-S-HP35
Petri dish holder 100 mm	C-S-HLP100

⚠ CAUTION

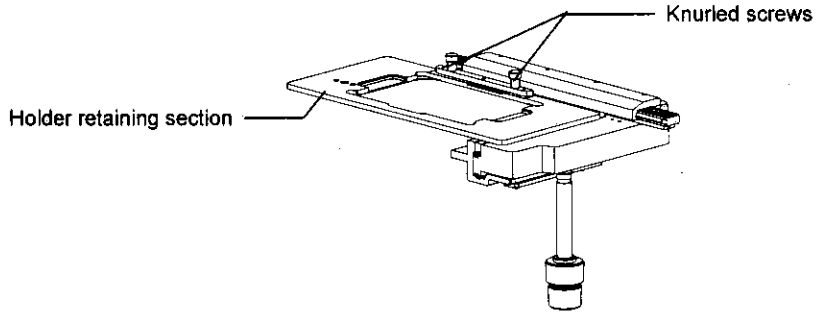
The stage rack will protrude when the stage is operated. When operating the focus knobs or the nosepiece, take care not to strike your hands against the rack. Contact with the edges of the rack might result in injury.



When placing a large container on the stage

Removing the holder retaining section (that moves in the X- and Y-axis directions) enables you to place a large container (such as a cell culture flask) on the stage.

You can remove the holder retaining section by loosening the two knurled screws.



Cautions on switching the objective

When observing suspended cells in the container, it is necessary to set the objective closer to the container than usual in order to achieve proper focus.

If the objective is switched while set this close, the tip of the objective might collide with the container. In this case, lower the objective to be switched before rotating the nosepiece.

TC-S-SC Stage Clip

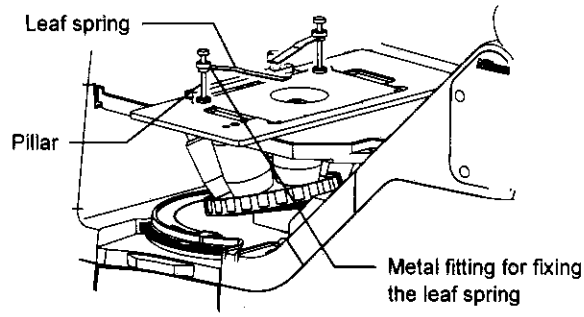
Attaching a stage clip to the specimen holder enables you to fix a specimen in place.

The leaf spring can be moved up and down. To fix a specimen, perform the following procedure:

(1) Raise the leaf spring.

(2) Lower the leaf spring until it comes into contact with the specimen.

(3) Gently push down the metal fitting for fixing the leaf spring.



C-S-WC 96 Well Clamper

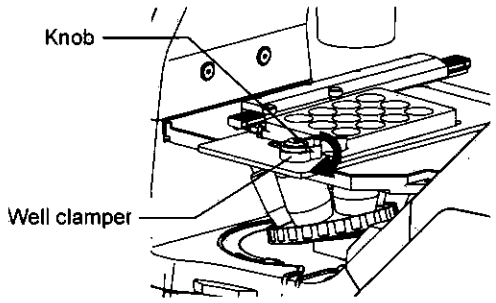
Attaching a 96 well clamper to the stage enables you to fix a well plate in place.

To fix a well plate, perform the following procedure:

(1) Hook your finger on the knob, and open the well clamper outward.

(2) Place a well plate on the stage.

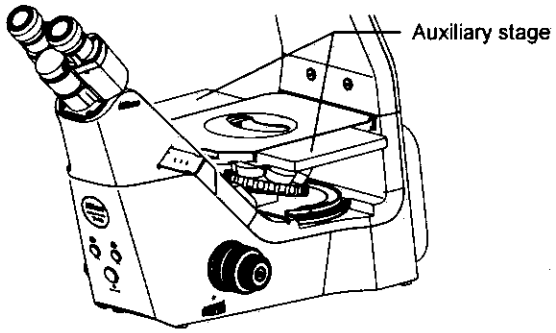
(3) Gently close the well clamper.



3.4.3 TS2-S-SA Auxiliary Stage

The TS2-S-SA auxiliary stage is added to right and left of the plain stage to broaden the workspace on the stage.

Overall stage width becomes 300 mm with the auxiliary stage attached.



3.5 Focusing on the Specimen

To adjust the focus, rotate the focus knobs on the right and left sides of the microscope to move the objective up and down.

3.5.1 Focus Knobs

There are two focus knobs: the "coarse focus knob" for moving the objective a large distance with a single turn, and the "fine focus knob" for moving the objective a short distance with a single turn.

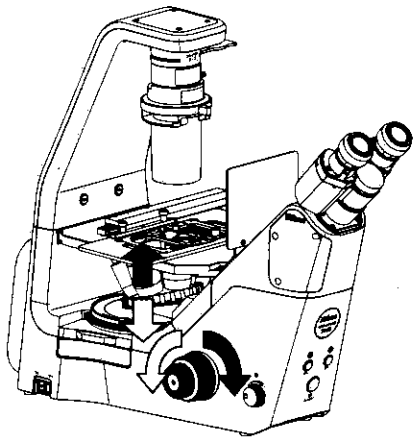
⚠ CAUTION

Never attempt the following operations, as they might result in product malfunction:

- **Rotating the left and right focus knobs in opposite directions.**
- **Rotating the coarse and fine focus knobs past their limit**

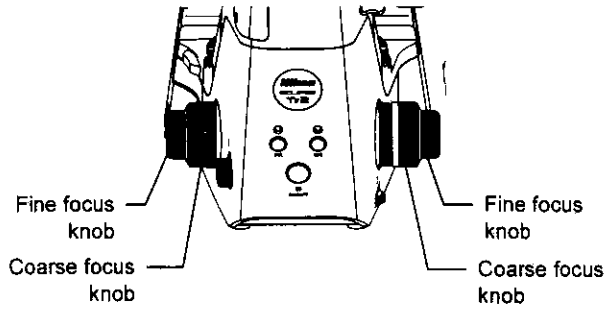
The figure to the right illustrates the relationship between the rotational direction of the focus knobs and the vertical motion of the objective.

The focus adjustment stroke is 8.5 mm.



The traveling distance of the objective for each knob is as follows:

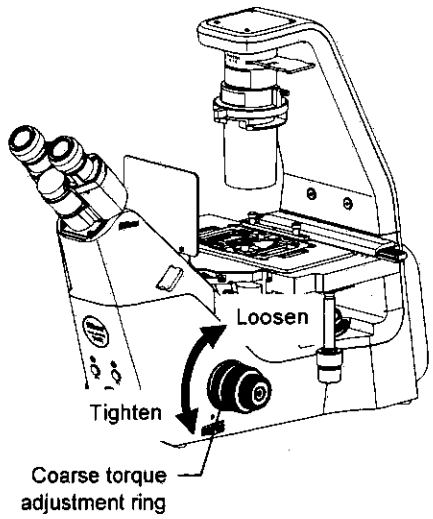
Rotation of knob	Distance traveled by objective
Fine focus knob: 1 rotation	0.2 mm
Coarse focus knob: 1 rotation	37.7 mm



3.5.2 Coarse Torque Adjustment Ring

The focus knob on the right side of the microscope is equipped with a coarse torque adjustment ring for adjusting the tightness of the coarse focus knob.

To tighten the coarse focus knob, rotate the torque adjustment ring counterclockwise. To loosen the knob, rotate the ring clockwise.



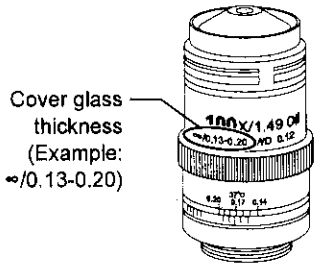
⚠ CAUTION

- **Excessively loosening the coarse torque adjustment ring might cause the nosepiece to lower under its own weight, resulting in a loss of focus during observation. Adjust the torque appropriately.**
- **Attempting to rotate the coarse torque adjustment ring beyond its limit point might damage the torque adjustment mechanism. When adjusting torque, be careful not to excessively rotate the coarse torque adjustment ring**

3.5.3 Cover Glass Thickness

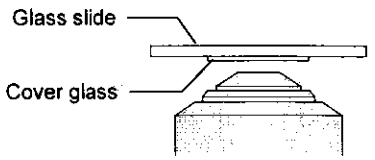
Objectives are labeled with the supported cover glass thickness. For example, "∞/0.17" indicates a cover glass thickness of 0.17 mm.

When you observe a specimen in a Petri dish (or similar) at high magnification through a glass not conforming to the specified thickness, we recommend using an objective that has a correction ring capable of adjusting the optical system according to the glass thickness.



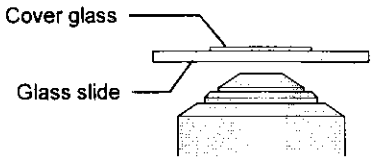
Glass Thickness of 0.17 mm

When using the objective labeled "0.17", use a cover glass with a thickness of 0.17 mm. In this case, face the cover glass downward, and set the specimen so that the cover glass faces the objective.



Glass Thickness of 1.2 mm

When using the objective labeled "1.2", use a normal cover glass with a thickness of 1.2 mm. In this case, face the cover glass upward, and set the specimen so that the glass slide faces the objective.

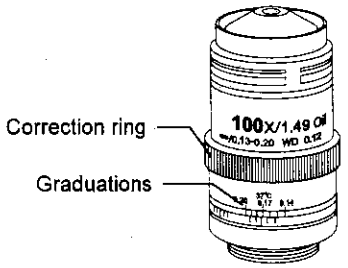


3.5.4 Objective with Correction Ring

Inverted microscopes are sometimes used to observe through the bottom plate (glass or plastic) of a Petri dish or a culture vessel. In such a case, the microscope might not perform optimally with standard objectives (for cover glasses with a thickness of 0.17 mm), as the thickness of the bottom plate varies from container to container.

By using an objective with a correction ring, you will be able to compensate for the thickness of the bottom plate.

Note, however, that correction is not possible where there is a change in the thickness of the bottom plate (for example, around the periphery of the container). Use the correction function where the thickness of the bottom plate is uniform.



Adjusting the correction ring

1 Adjust the objective correction ring to match the graduation to the thickness of the bottom plate of the container.

Measure the thickness of the bottom plate, or refer to the value stated by the container manufacturer.

The "0 mm" position on the correction ring corresponds to the position for observing a specimen without a cover glass on an upright microscope.

An acrylic annular ring is useful as it will allow you to view the manipulated parts from above the stage as you work.

2 Focus on the specimen by rotating the focus knobs.

3 If the resolution and contrast of the image are poor, slightly rotate the correction ring on the objective in either direction.

This will shift the focus slightly. Readjust the focus by turning the fine focus knob.

4 If resolution and contrast are improved, rotate the correction ring slightly in the same direction, and readjust the focus.

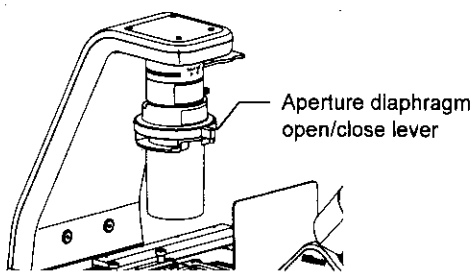
If resolution and contrast are lost, rotate the correction ring in the opposite direction by approximately twice the amount rotated in the previous step. Readjust the focus.

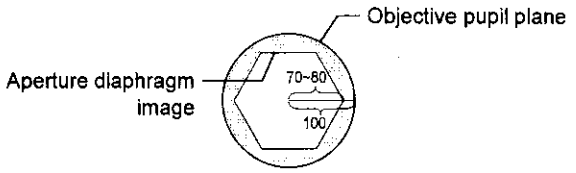
5 Rotate the correction ring in the same direction if the image becomes clearer, or rotate it in the reverse direction if the image becomes less clear. Repeat this operation to obtain the optimal image.

We recommend that you take a note of the optimal correction ring settings for different thicknesses of containers for future reference.

3.6 Adjusting the Transmitted Light Aperture Diaphragm

The aperture diaphragm adjusts the numerical aperture of the illumination system. By adjusting the aperture diaphragm, you can adjust the resolution, brightness, contrast, and focal depth of the microscope image. Closing the aperture diaphragm will reduce the resolution and brightness, and increase the contrast and focal depth. These properties are interrelated, and cannot be adjusted independently. Adjust the aperture diaphragm according to the specimen and purpose.





Aperture diaphragm adjustment is particularly important for bright-field microscopy and photomicroscopy.

Typically, adjusting the aperture diaphragm to 70% to 80% of the pupil of the objective will result in an appropriate contrast and a favorable image.

Adjust the aperture of the diaphragm while observing the actual diaphragm image through the eyepiece tube. Remove one of the eyepieces. Using the adapter, attach an optional centering telescope instead. Rotate the eyepiece of the centering telescope to adjust the focus. This will allow you to view the objective pupil plane (a bright circle) and the aperture diaphragm image.

Rotate the aperture diaphragm open/close lever counterclockwise to close the aperture, or clockwise to open the aperture. Adjust the aperture diaphragm so that the size of the diaphragm image is 70-80% of the size of the objective pupil plane.

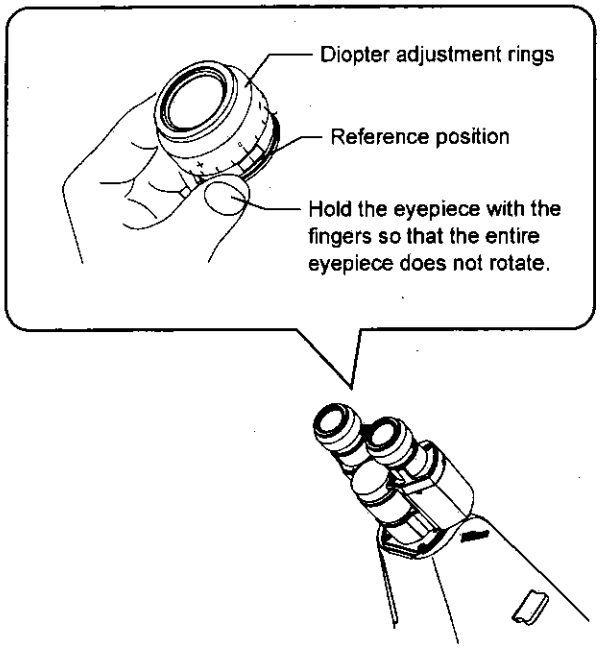
Notes on the condenser and aperture diaphragm

- Be sure to fully open the aperture diaphragm when performing phase contrast microscopy. If the aperture diaphragm is closed, it will obstruct the annular diaphragm and the phase contrast effects cannot be obtained.
- Be sure to fully open the aperture diaphragm when performing emboss contrast microscopy. If the aperture diaphragm is closed, it will obstruct the sector diaphragm and a proper image cannot be obtained.

3.7 Adjusting the Diopter

Diopter adjustment corrects the difference in eyesight between the left and right eyes of the user, making binocular observation easier. The eyepiece tube length will be maintained correctly, allowing the objective to perform optimally with minimal focus loss upon objective change.

To perform diopter adjustment, follow the procedure below.



1 Adjust the focus of the 10x objective onto the specimen under the bright-field microscopy settings.

2 Rotate the diopter adjustment rings on both eyepieces to set them to the reference position.

3 Place the 40x objective into the optical path.

4 Look into the left eyepiece with your left eye and focus on the specimen by rotating the focus knob on the microscope body.

5 Place the 10x objective into the optical path.

6 Look into the left eyepiece with your left eye and focus on the specimen by rotating the diopter adjustment ring on the left eyepiece.

Do not touch the focus knobs on the microscope body in this step. When rotating the diopter adjustment ring, hold the eyepiece barrel with the fingers so that the entire eyepiece does not rotate.

7 Perform steps 3 to 6 twice.

8 Adjust the right eyepiece in the same way as above.

Perform steps 3 to 7 for the right eyepiece.

3.8 Adjusting the Eyepieces

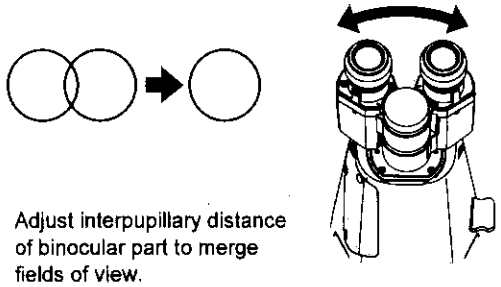
To make binocular observation easier, the interpupillary distance needs to be adjusted appropriately for the user.

Adjusting the interpupillary distance

Interpupillary distance adjustment adjusts the distance between the eyepieces to better suit the user. This will make binocular observation easier.

When diopter adjustment is complete, place the 10x objective into the optical path, and adjust the focus onto the specimen. Look into the eyepieces with both eyes, and adjust the interpupillary distance of the binocular part so that the two fields of view merge.

The binocular part has an interpupillary distance scale. We recommend that you remember your own interpupillary distance for easier adjustment in the future.



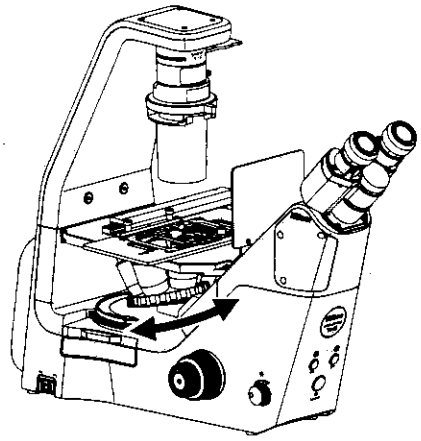
Adjust interpupillary distance of binocular part to merge fields of view.

3.9 Switching the Objective

To switch the objective, rotate the nosepiece until it clicks in place.

Before rotating the nosepiece, check the height of the objective to prevent it from colliding with the sample or stage.

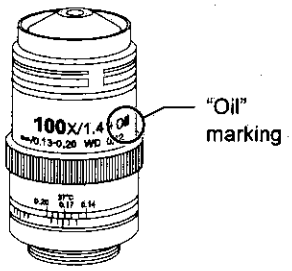
Normally, attach the objectives so that magnification is increased sequentially by rotating the nosepiece clockwise (as viewed from above).



3.10 Using Oil Immersion Objectives

Objectives marked with the word "Oil" are oil immersion objectives.

When using an oil immersion objective, fill the space between the tip of the objective and the specimen with oil (Nikon Immersion Oil). When performing fluorescence microscopy with an oil immersion objective for fluorescence microscopy, use non-fluorescent immersion oil.

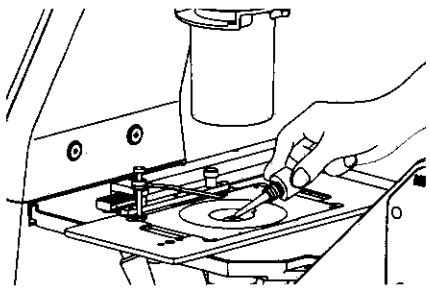


Oil-immersion observation procedure

1 Lower the objective by rotating the focus knobs.

2 Taking care not to let bubbles form, apply the bare minimum amount of oil onto the tip of the objective.

If too much oil is applied, excess oil might overflow onto the stage and other parts. Use as little oil as possible (just enough to fill the space between the tip of the objective and the specimen), and take care not to allow the oil to get on other parts.



3 Place the specimen on the stage.

4 Slowly raise the objective by rotating the focus knobs, allowing the oil on the tip of the objective to touch the bottom surface of the specimen.

5 Check that no air bubbles have formed in the oil.

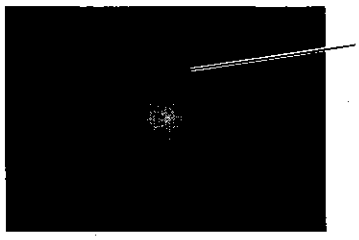
Bubbles in the oil will adversely affect the image. Refer to the following section and check for air bubbles.

Checking for air bubbles

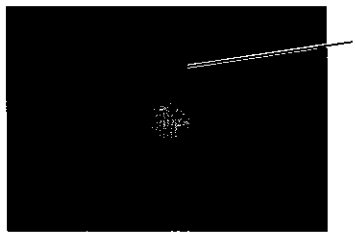
To check for air bubbles, observe the objective pupil plane. Remove the eyepieces, attach the centering telescope, and rotate the eyepiece of the centering telescope to adjust the focus. This will allow you to view the objective pupil plane.

If you detect air bubbles in the oil, try removing them by rotating the nosepiece slightly to move the oil-immersed objective back and forth once or twice. If the air bubbles cannot be removed, wipe off the oil, and then reapply new oil.

Objective pupil plane observed with centering telescope:



Field of view with focus of centering telescope shifted from the above state:



Removing oil

After using an oil immersion objective, wipe off the oil from its tip.

To remove the oil, gently wipe the objective two or three times with a lens tissue or clean cloth dampened with petroleum benzene. Lenses can be cleaned more effectively by making sure not to wipe with the same part of the tissue more than once. After wiping with petroleum benzene, wipe with absolute alcohol (ethyl or methyl alcohol) for a better finish.

If petroleum benzene is unavailable, use methyl alcohol instead. Note that methyl alcohol is not as effective as petroleum benzene, and will require a few more wipes.

When wiping oil off the specimen, take care not to damage the specimen.

⚠ CAUTION

- **Any oil remaining on an oil-immersion type of objective or staining on the tip of a dry type of objective will adversely affect the viewed image. After use, thoroughly wipe off all oil, and make sure that no oil adheres to the tips of other objectives.**
- **Absolute alcohol and petroleum benzene are highly flammable. Handle them with due care. Do not use them near an open flame, or operate a power switch in the vicinity.**

Reapplying oil

A 25 mm diameter or acrylic annular ring is useful as it will allow you to apply oil via its oiling notch, without the need to remove the specimen (such as a Petri dish). Set the annular ring so that its notch matches the rotational direction of the nosepiece, hold the nosepiece so that the objective is aligned with the notch, and apply the oil.

3.11 Using the Condenser

Diascopic illumination microscopy requires the pre-centered ELWD condenser lens (provided).

The specifications of the pre-centered ELWD condenser lens are shown in the following table.

	Pre-centered ELWD condenser lens
NA	0.3
Working distance	75 mm
Available microscopy method	Bright-field microscopy, phase contrast microscopy, embossed contrast microscopy

3.12 Operating the Components for Phase Contrast Microscopy

Phase contrast microscopy is suitable for observation of clear and colorless specimens, unstained or lightly colored specimens, decolored specimens, and ultra-thin slices for electron microscopes. The phase contrast method is not suitable for graded or hard-stained specimens.

Phase contrast microscopy requires phase contrast (Ph) objectives (phase rings) and PH sliders.

3.12.1 Phase Contrast (Ph) Objectives (Phase Rings)

Ph objectives are divided into "achromatic", "plan achromatic," "plan flour," and "plan apochromatic" objectives, depending on how much the chroma aberration and image plane curvature are adjusted. These lenses also are further subdivided into several types, depending on the properties of the internal phase ring. For favorable microscopy results, the phase contrast amount of the specimen must match the properties of the phase ring. See the table below for the use properties of Ph objectives.

When using a dark contrast Ph objective, make sure that the phase contrast of the specimen does not exceed the allowed phase contrast amount (latitude) of the objective. If the phase contrast amount of the specimen is greater than the allowed phase contrast amount, observation is not possible as the image will be illuminated brighter than the background.

When preparing a phase contrast specimen, you can adjust the phase contrast according to the thickness of the specimen, the mounting agent, the refractive index of culture solution.

A specimen with weak contrast under a DLL objective might yield better results under a DM objective.

The center of the Ph annular diaphragm will be misaligned if you observe a specimen that causes scattered light or generates a lens or prism effect. In particular, care is required when observing live and thick specimens, oversized specimens, or specimens using a microplate, because the center will be misaligned due to the lens or prism effect, making the specimen difficult to observe.

Use properties of Ph contrast objectives

<table>
<tr><th colspan="2">Ph contrast objective</th><th>Appearance</th><th colspan="2">Contrast</th><th>Latitude</th><th>Usage example</th></tr>
<tr><td rowspan="2">Dark contrast</td><td>DLL
DL</td><td rowspan="2">Generally, an object with larger phase contrast appears darker. Therefore, the image is shown in black in a relatively brighter field of view, similar to the one observed with bright-field microscopy.</td><td rowspan="2">Suitable for detailed observation mainly using micro contrast.</td><td>Intermediate (with broader usage)</td><td>Phase contrast and absorbing object (labeled object) in low and intermediate latitude</td><td>Bacterial spore, general live cell, slightly thick specimen, bacteria, stained specimen, insect egg, fat globule, crystalline, etc.</td></tr>
<tr><td>DM</td><td>High (with relatively narrower usage)</td><td>Transparent object in low latitude</td><td>Bacteria and protozoal flagellum, fibrin minute fiber, fine granule, mounting-agent-selectiv e slice, ultra-thin slice, etc.</td></tr>
<tr><td>Bright contrast</td><td>BM</td><td>Generally, an object with larger phase contrast appears brighter. Therefore, the image is shown brighter in a relatively darker field of view, similar to the one observed with dark-field microscopy.</td><td colspan="2">Suitable for morphology, detection, and calculation of fine fiber and granule mainly using macro contrast.</td><td>Almost all areas</td><td>Bacteria and protozoal flagellum, fibrin minute fiber, fine granule, blood cell calculation, etc.</td></tr>
</table>

There is a Ph objective used in Apodized Phase Contrast (APC) observation in which haloing is decreased and minute structure contrast is increased compared to the above phase contrast observation. See the table below for usage properties of Ph objectives for APC observation.

Usage properties of Ph objectives for APC observation

Ph contrast objective		Appearance	Contrast		Latitude	Usage example
Dark contrast	ADL	Generally, an object with larger phase contrast appears darker. Therefore, the image is shown in black in a relatively brighter field of view, similar to the one observed with bright-field microscopy.	Suitable for detailed observation mainly using micro contrast.	Intermediate (with broader usage)	Phase contrast and absorbing object (labeled object) in low and intermediate latitude	Bacterial spore, general live cell, slightly thick specimen, bacteria, stained specimen, insect egg, fat globule, crystalline, etc.
	ADH			High (with relatively narrower usage)	Transparent object in low latitude	Bacteria and protozoal flagellum, fibrin minute fiber, fine granule, mounting-agent-selective slice, ultra-thin slice, etc.

Plan fluor Ph objectives

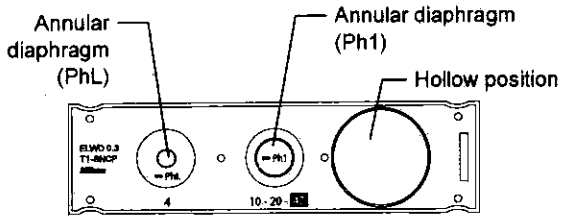
Plan fluor Ph and plan apochromat Ph objectives can also be used for bright-field and episcopic fluorescence microscopies. Plan apochromat Ph objectives can also be used for bright-field and episcopic fluorescence microscopies. Since both types of objectives are equipped with an internal phase ring (phase plate), they might present images that differ somewhat from those presented by method-specific objectives. Use method-specific objectives for strict observations.

3.12.2 Ph Annular Diaphragm

The Ph annular diaphragm is a ring-shaped diaphragm that is mounted on the optical path for diascopic illumination. For this microscope, use the Ph annular diaphragm attached to the T1-SNCP Precentered PH Slider or T1-SCP Centering PH Slider.

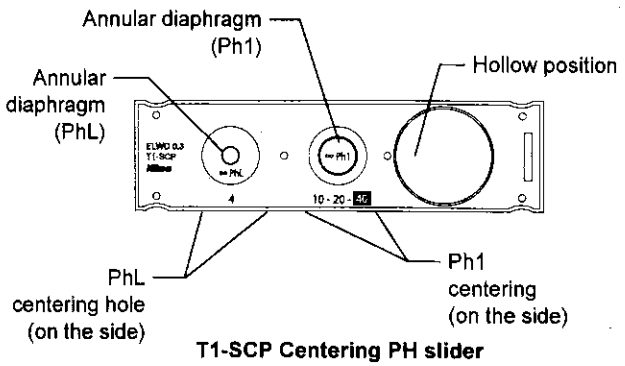
The T1-SNCP Precentered PH Slider and T1-SCP Centering PH Slider are equipped with PhL and Ph1 annular diaphragms. They can be attached to a condenser slider slot.

Use the hollow position when performing bright-field microscopy. To use a Ph2 annular diaphragm, attach a T1-SPH2 PH2 Slit to the hollow position.



T1-SNCP Precentered PH Slider

The T1-SCP Centering PH Slider can center the PhL and Ph1 annular diaphragms.



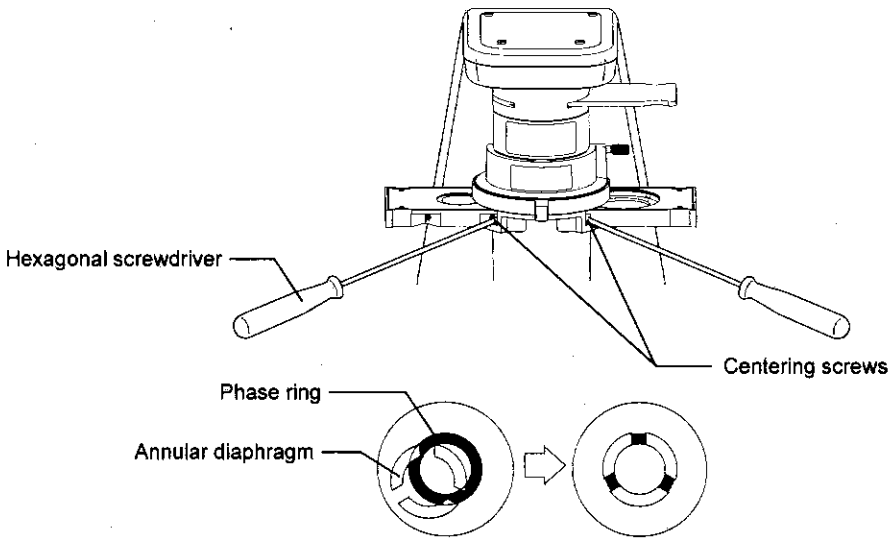
T1-SCP Centering PH slider

Ph codes

Ph codes are identification codes for phase rings of Ph objectives and PH annular diaphragm of condensers.

Each Ph objective is marked with one of the Ph codes (Ph1, Ph2, or Ph3), depending on the size of the phase ring. (Ph codes have no bearing on objective magnification.) For phase contrast microscopy, an objective and PH annular diaphragm that have the same Ph code must be placed into the optical path. Note that combining an objective and PH annular diaphragm that have different Ph codes does not yield phase contrast effects.

If a T1-SCP Centering PH Slider is used, it is possible to center the annular diaphragm. Turn the centering screw of the PH slider to merge the annular diaphragm image with the phase ring image in the objective.



Decentering the phase ring and the Ph annular diaphragm

Basically, the phase ring and the Ph annular diaphragm should be adjusted so that they are concentric. However, slightly decentering them will produce a shadowing effect, resulting in a three-dimensional image.

3.13 Operating the Components for Emboss Contrast Microscopy

Emboss contrast microscopy allows observation of specimens through a plastic bottom plate. Use an objective specified for the microscopy method (CFI 10x, CFI LWD 20x, or CFI LWD 40xC).

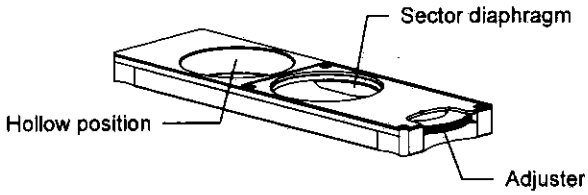
To perform emboss contrast microscopy, a condenser-side emboss contrast slider and eyepiece-tube-side emboss contrast slider must be mounted on the microscope.

3.13.1 Condenser-side Emboss Contrast Slider

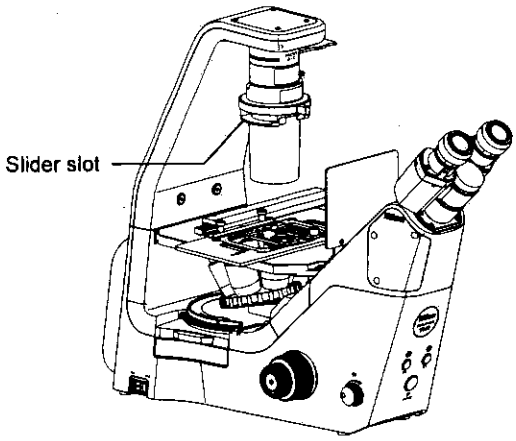
Insert the condenser-side emboss contrast slider into the condenser slider slot.

The condenser-side emboss contrast slider is equipped with a sector diaphragm. Attaching a centering telescope to the eyepiece tube enables you to view a sector diaphragm image.

You can change the direction of image contrast by rotating the condenser-side emboss contrast slider adjuster to turn the sector diaphragm.

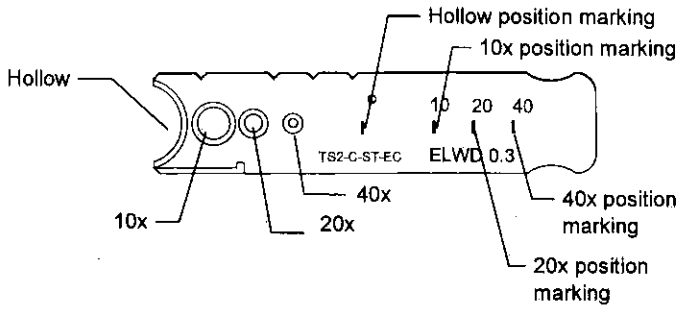


TS2-C-S-EC Emboss Contrast Slider



3.13.2 Eyepiece-tube-side Emboss Contrast Slider

The eyepiece-tube-side emboss contrast slider has position markings. For emboss contrast microscopy, insert the slider into the microscope until it reaches the position of the same number as the magnification of the objective. To switch back to bright-field microscopy, pull out the slider up to the hollow position.



TS2-C-ST-EC Emboss Contrast Slider

3.14 Operating the Components for Episcopic Illumination Microscopy (for the Ts2-FL Only)

The Ts2-FL incorporates a fluorescence cube turret and can be used for episcopic fluorescence microscopy.

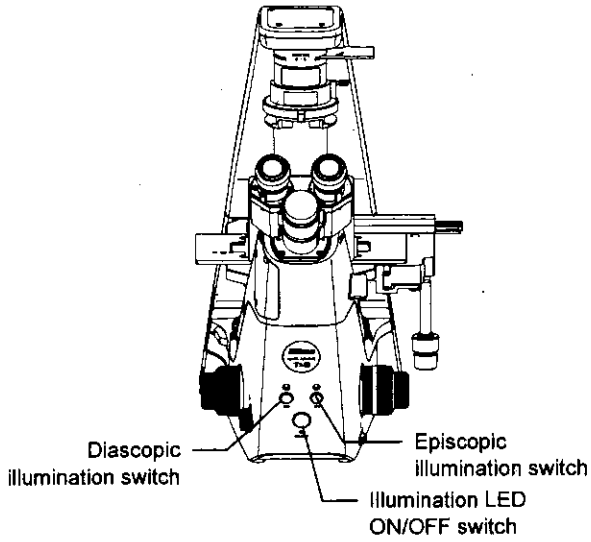
For the light source for episcopic fluorescence microscopy, use an appropriate fluorescence LED unit for each excitation wavelength.

3.14.1 Episcopic Illumination Switch

To switch the illumination from diascopic illumination (DIA) to episcopic illumination (EPI), press the episcopic illumination switch. To switch back to diascopic illumination, press the diascopic illumination switch.

To turn on or off the illumination, use the illumination LED ON/OFF switch in the same way as for diascopic illumination.

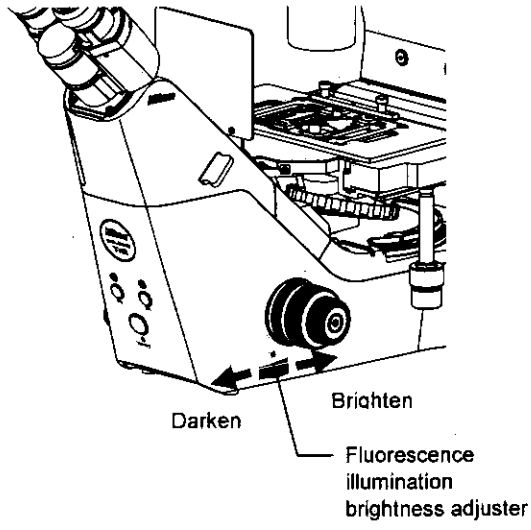
Both the diascopic illumination LED and the fluorescence LED unit for episcopic illumination cannot be lit at the same time.



3.14.2 Episcopic Illumination Brightness

Use the fluorescence illumination brightness adjuster to adjust the brightness of the fluorescence LED unit attached to the microscope.

The brightness of the fluorescence LED unit is memorized for each address on the fluorescence filter cube switching turret. For this reason, even if the brightness is changed by switching to another filter cube, the same brightness can be restored when the filter cube is switched back to the original cube. (However, the memorized brightness will be cleared when the power is turned off.)



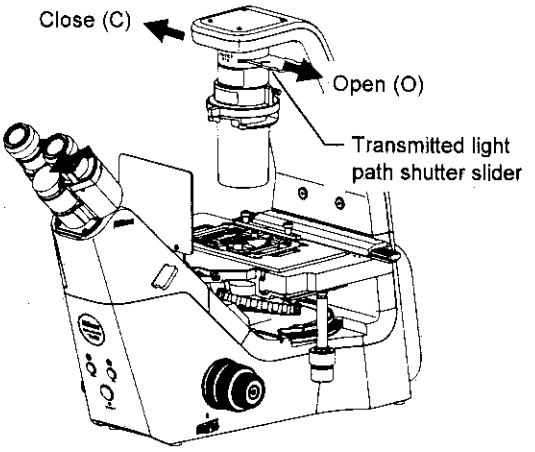
Blinking indicator

When the indicator on the fluorescence illumination switch is blinking, episcopic illumination brightness is at maximum or an LED unit is not connected to the currently selected position.

3.14.3 Transmitted Light Path Shutter Slider

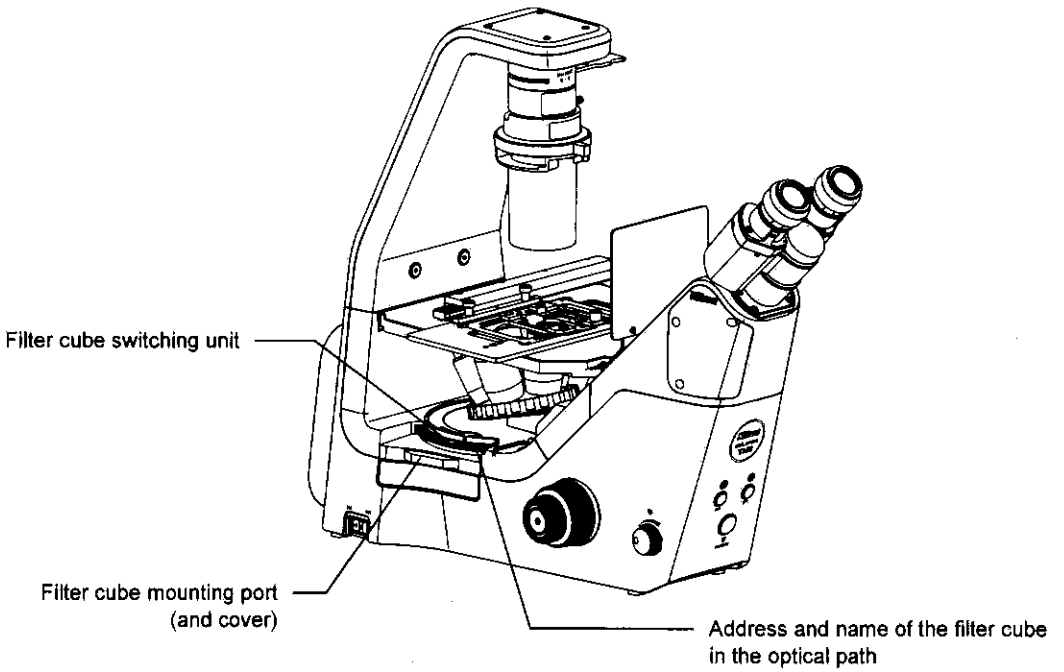
There is a shutter in the transmitted light path. When performing fluorescence microscopy, use the transmitted light path shutter slider to close the shutter.

This will cause the excitation light from the fluorescence illuminator to collide with the shutter, thereby preventing the diascopic illumination LED from emitting light.



3.14.4 Fluorescence Cube Turret

The fluorescence cube turret reflects the illumination light from the fluorescence LED unit into the objective. This turret allows you to attach up to three filter cubes (each with a built-in dichroic mirror) and switch the filter cube by rotating the filter cube switching unit.



Filter cube mounting port and cover

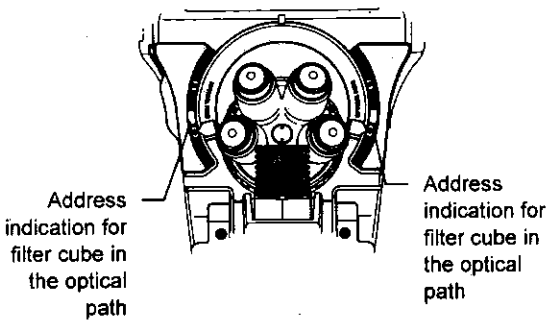
When replacing the filter cube, remove this cover.

Filter cube switching unit

Rotating the filter cube switching unit switches the filter cube. When the filter cube is switched, the fluorescence LED unit is switched automatically.

Fluorescent positions (1 to 3) and a bright-field position (☼) are alternately allocated to the turret. The turret clicks each time a filter cube is brought to a fluorescent or a bright-field position.

Address of the filter cube that is in the optical path is indicated on the right and left of the filter cube switching unit. When switching the filter cube, check that the turret clicks and the address indications match the intended filter cube position, seen from the front of the microscope. If you select the bright-field position, the filter cube is removed from the optical path. The three bright-field positions have the same function.

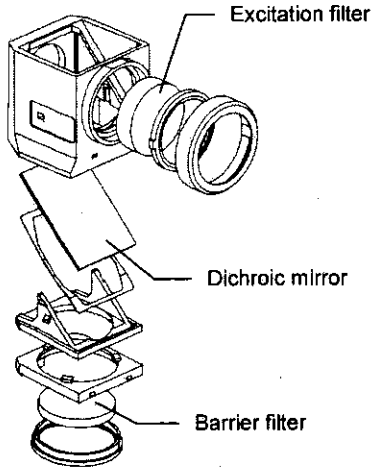


3.14.5 Fluorescence Filter Cube

A filter cube consists of three types of optical components: an excitation filter (EX filter), a barrier filter (BA filter), and a dichroic mirror (DM).

Referring to the following items as a guide, select a desired combination of filter cubes according to the characteristics of the specimen and fluorophore.

- We recommend using dedicated filter cubes. For details, see Section "3.14.6 Properties of Filter Cubes for Fluorescent LED Illumination."
- You can select a combination of an excitation filter and a barrier filter even if you are using the same excitation method.
- Excitation filters, barrier filters, and dichroic mirrors can be purchased separately.
- Excitation filters are exposed to strong light during operation and will deteriorate over time. Replace the filter as appropriate.

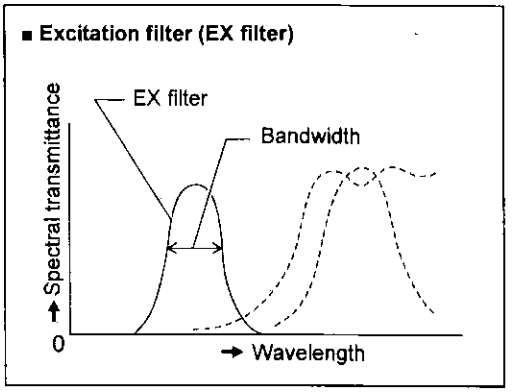


Selecting the excitation filter (EX filter)

Excitation filters allow selective transmission of light (excitation light) in the wavelength range required for fluorescent light emissions from the specimen, blocking light of all other wavelengths.

The wavelength range of light allowed to pass through a filter is referred to as the bandwidth.

The bandwidth range of an excitation filter determines the brightness of the fluorescent image, the generation of autofluorescence (fluorescence resulting from substances other than the fluorophores), and degree of fading. The broader the bandwidth, the greater the amount of excitation light irradiated onto the specimen, thereby increasing the brightness of the image. However, this also increases the amount of autofluorescence and causes faster color fading. Conversely, narrow bandwidth reduces the amount of excitation light striking the specimen and causes the image to appear darker, but reduces autofluorescence and fading.



For specimens with pronounced autofluorescence, use excitation filters with a narrow bandwidth. (Note that this will make the fluorescent image darker.) Excitation filters are exposed to strong light during operation and will deteriorate over time. Replace the filter at intervals based on the total number of operating hours.

	EX filter bandwidth	
	Narrow	**Wide**
Brightness of fluorescent image	Dark	Bright
Generation of autofluorescence	Low	High
Degree of color fading	Low	High

Selecting the barrier filter (BA filter)

Barrier filters allow only fluorescent light emitted by the specimen to pass through, blocking excitation light.

This allows the fluorescent image to be viewed without extra illumination (on a dark background).

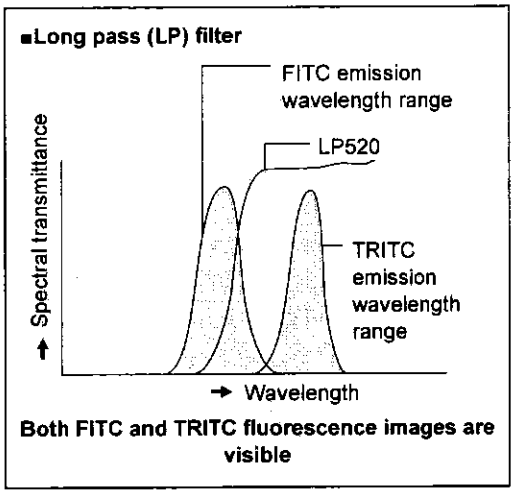
There are two types of barrier filters: long pass filters (LP filters) that block all light below a certain wavelength but pass all light of longer wavelengths, and bandpass (BP filters) that pass light of a certain wavelength range and block all other light. Use the filter type appropriate for your intended purpose.

Long pass (LP) filter

LP filters block all light below a certain wavelength but pass all light of longer wavelengths. The border wavelength is called the cut-on wavelength.

For specimens labeled with a fluorophore in which the fluorescent wavelength range and excitation wavelength range (light that the specimen absorbs in order to emit fluorescent light) are very close, selecting a barrier filter with the shortest cut-on wavelength permitted by the performance requirements will generally result in the most efficient microscopy of fluorescent images.

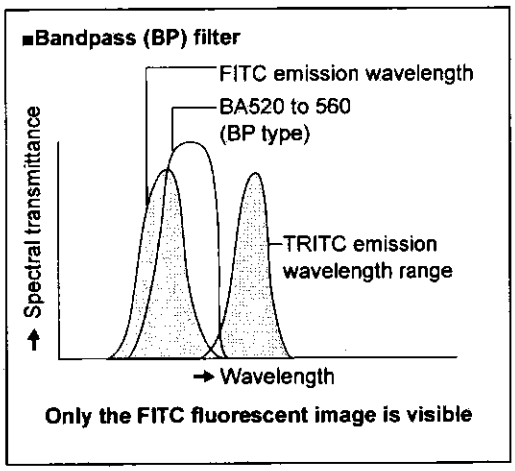
If the cut-on wavelength is long, excitation light and fluorescent light will be entirely distinct, tending to darken the background of fluorescent images. However, recent developments in filter performance have resulted in increased use of filters of short cut-on wavelengths.



Bandpass (BP) filter

BP filters pass only light of a certain wavelength range, blocking all other light. BP filters are used for microscopy of fluorescent images involving a specific fluorophore in multiple-labeled specimens. (For example, in a double-labeled specimen of FITC and TRITC, the BA520-560 filter enables microscopy of just the FITC fluorescent image.)

However, BP filters will not separate autofluorescence, because the fluorescent image in the above combination is green only). LP filters are better suited for fine separation of autofluorescence, based on slight color differences.



Replacing the excitation filter and barrier filter

Both excitation and barrier filters can be removed from the filter cube and replaced with other filters. (Both filters are a threaded type.)

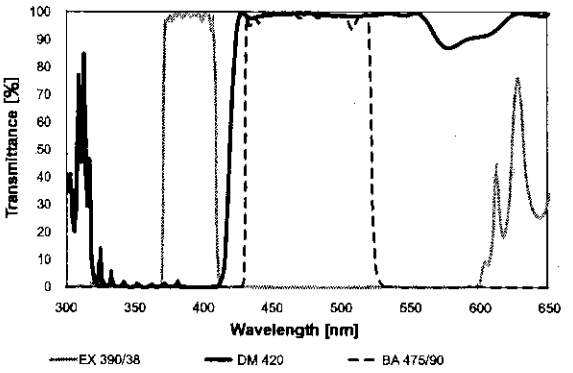
When replacing or mounting these filters, make sure that they are oriented correctly.

3.14.6 Properties of Filter Cubes for Fluorescent LED Illumination

The models and properties of the recommended filter cubes for fluorescent LED illumination are as follows:

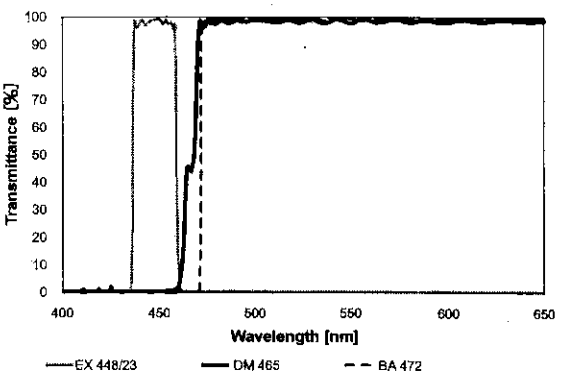
C-LED385

Compatible with the C-LEDFL385 LED unit



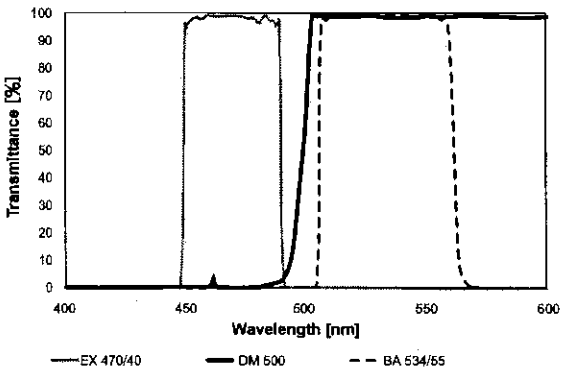
C-LED455

Compatible with the C-LEDFL455 LED unit



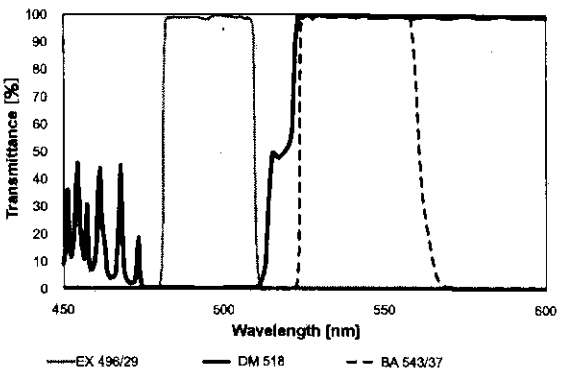
C-LED470

Compatible with the C-LEDFL470 LED unit



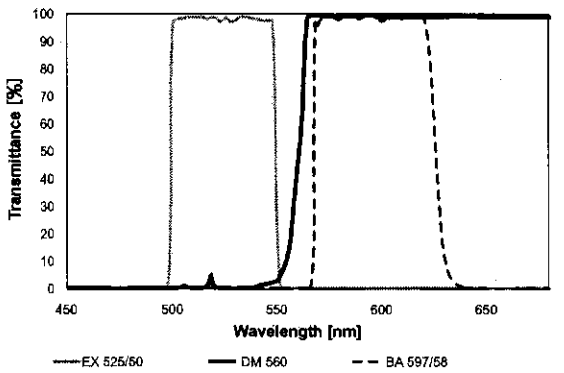
C-LED505

Compatible with the C-LEDFL505 LED unit



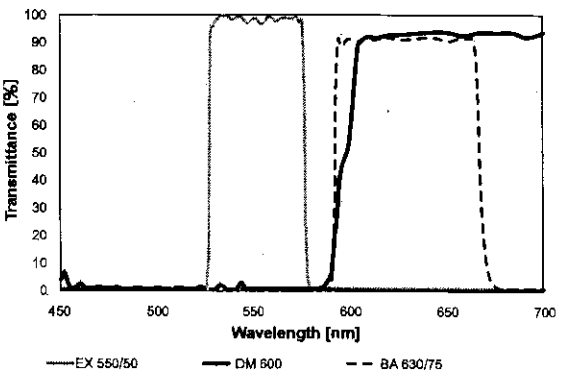
C-LED525

Compatible with the C-LEDFL525 LED unit



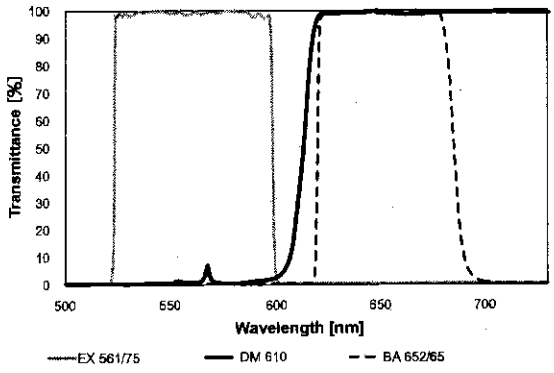
C-LED560

Compatible with the C-LEDFL560 LED unit



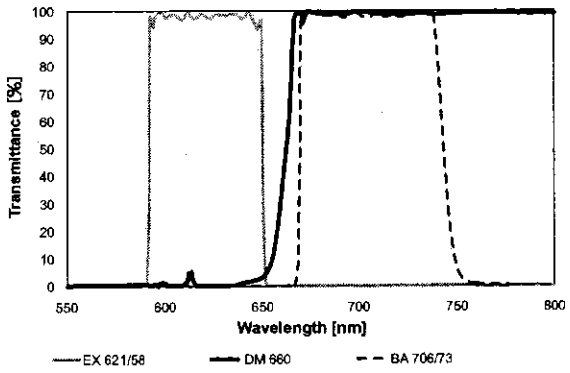
C-LED590

Compatible with the C-LEDFL590 LED unit



C-LED625

Compatible with the C-LEDFL625 LED unit

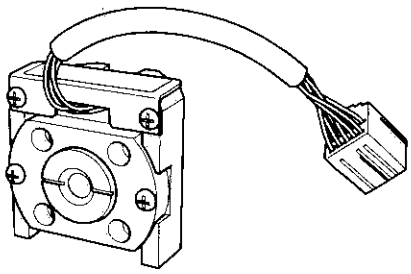


3.14.7 Fluorescence LED Unit

The Ts2-FL allows you to mount up to three different fluorescence LED units as the light source for episcopic fluorescence microscopy.

When the fluorescence cube turret is rotated, the fluorescence LED unit is switched automatically. Therefore, mount the fluorescence LED unit at the same address as the filter cube to be used.

For information about fluorescence LED units that can be used, see Section "4.2 List of Components."

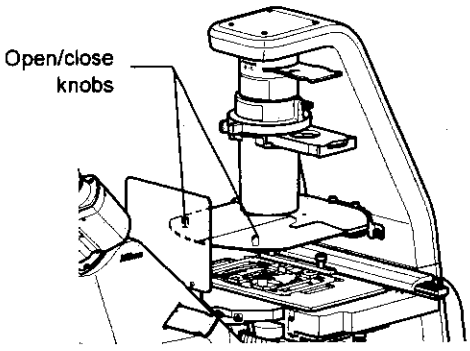


3.14.8 Contrast Shield

The contrast shield blocks out ambient light to enable episcopic fluorescence microscopy with good contrast even in a bright room. You can open and close the contrast shield with the open/close knobs. When performing episcopic fluorescence microscopy, close the contrast shield.

The contrast shield can be mounted at two different positions (30 mm and 60 mm above the surface of the stage).

Attach the contrast shield at the position 30 mm above the stage surface to increase shielding performance, or 60 mm above the stage to secure easier access to the stage.



3.15 Capturing Images

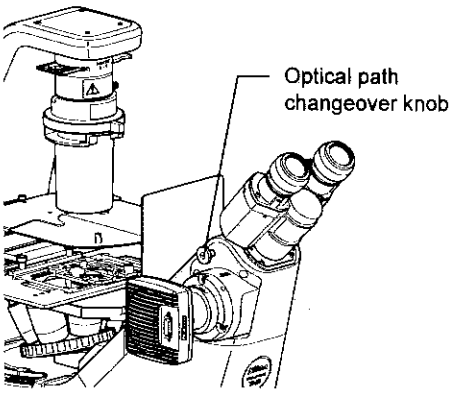
To capture microscope images, use the DS camera head mounted in the camera port.

3.15.1 Camera Port

Use the optical path changeover knob to switch the optical path. The following tables show the light intensity distribution ratios.

TS2-P-CF Camera Port100

Knob state	Binocular part	Camera port
Pushed	100%	0%
Pulled	0%	100%



3.15.2 Image Capturing Procedure

1 Correctly adjust the illumination and other settings of the microscope and focus on the image of the specimen.

2 Adjust the position for mounting the DS camera head.

Loosen the clamp screw for adjusting the mounting direction of the camera mount, and adjust the camera position so that the image on the monitor moves in the opposite direction to that of the specimen. After adjusting the camera position correctly, tighten the clamp screw to secure the camera in place.

3 Adjust the focus of the monitor image.

4 Select the scene mode of the camera according to the microscopy method.

5 Set the white balance for the camera.

After a transparent section of a specimen is photographed, pressing the WB button executes white balance adjustment. (For photographing during fluorescence microscopy, we recommend that white balance be adjusted under bright-field microscopy conditions before photographing.)

6 Use the exposure compensation function of the camera to adjust the brightness of the image.

7 Press the [FREEZE] button on the camera control unit (or the camera control screen on the PC) to check the image.

8 Press the [CAPTURE] button on the camera control unit (or the camera control screen on the PC) to save the image.

3.15.3 Notes on Microscope Settings for Photographing

Checking the photographing range

The photographing range is the range displayed on the monitor.

Reducing extraneous light

Covering the eyepieces with a cloth (or similar material) can reduce extraneous light.

Preventing fading of fluorescence images

In the case of fluorescent sample, fluorescence might fade during exposure. To avoid this problem, take the following measures:

- **Adjusting excitation light**
  Too strong excitation light will accelerate fading of the sample and prevent the fluorescence image from being photographed clearly. Adjust the brightness of excitation light properly.
- **Sample**
  Photographing a faded portion of a sample requires a longer exposure time, resulting in poor color reproduction and thus preventing a clear image from being captured. To avoid this problem, move the sample, and then photograph another portion that has not been exposed to excitation light. We recommend that you first use phase contrast microscopy to select a portion to be photographed, and then switch to episcopic fluorescence microscopy when taking the photograph.

Adjusting the brightness of the image on the monitor

When the image is observed on the monitor through the camera, the brightness is also changed by making adjustments on the camera. For example, the brightness can be changed by making adjustments such as exposure mode change, photometry mode change, or exposure correction.

For details, see the instruction manual for the camera control unit.

4 Assembly

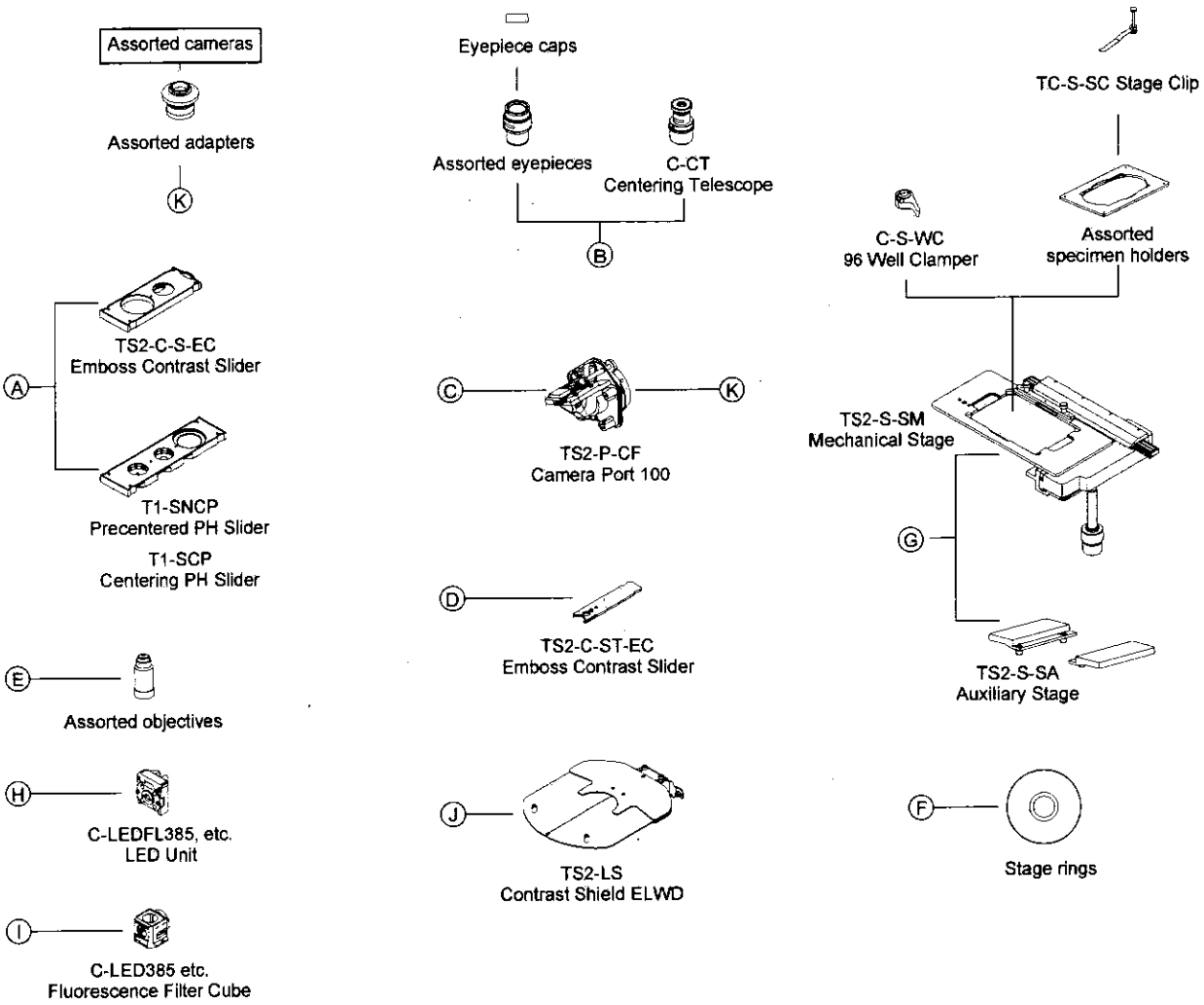
⚠ WARNING

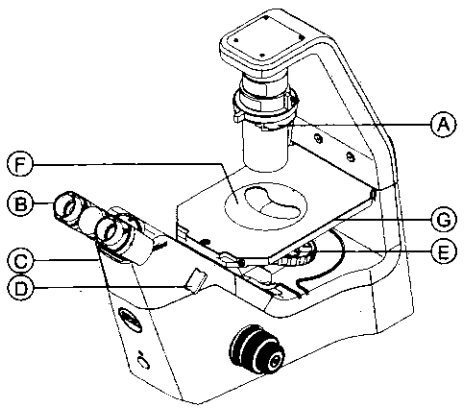
- **Before assembling or connecting devices, thoroughly read "Safety Precautions" at the beginning of this manual, and heed all warnings and cautions written therein.**
- **To prevent electric shock, fire, and product damage, be sure to turn off the power switches on all devices, and unplug the power cords beforehand.**

⚠ CAUTION

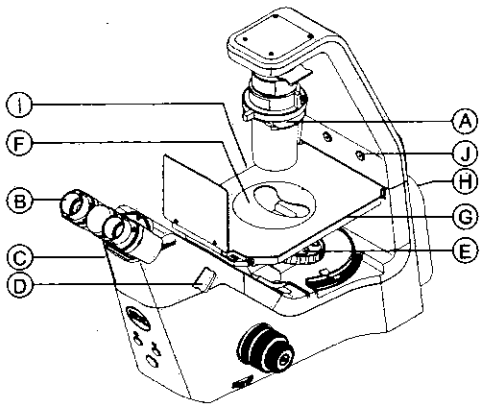
- **Take care not to pinch your fingers or hands.**
- **Scratches and dirt on optical components (such as lenses and filters) will degrade the microscope image. Keep them free of scratches, dust, fingerprints, and other dirt.**
- **This product is a precision optical instrument. Handle this product with due care, and avoid subjecting it to physical shocks. In particular, the accuracy of objectives might be lost by even mild physical shocks.**

4.1 Ts2-FL/Ts2 Equipment Configuration





ECLIPSE Ts2 Main Body



ECLIPSE Ts2-FL Main Body

Assembly tools provided with the microscope

- 3 mm hexagonal wrench: 1 pc.
- 2 mm hexagonal screwdriver: 2 pcs.

4.2 List of Components

The following table shows the components of the ECLIPSE Ts2-FL and Ts2 models. Some components may be unavailable, depending on when you purchase this product. For details, contact your local Nikon representative.

Device	Description	Model	Remarks
Main body	ECLIPSE Ts2-FL main body	ECLIPSE Ts2-FL	
	ECLIPSE Ts2 main body	ECLIPSE Ts2	
Eyepiece	Eyepiece	TS2-W10x, C-W15X, C-W20X	
	Centering telescope	C-CT	
Objective	CFI objective	CFI series	
Camera port	Camera Port 100	TS2-P-CF	
Stage	Mechanical stage	TS2-S-SM	
	Auxiliary stage	TS2-S-SA	
Specimen holder	Glass ring holder	C-S-HG	
	Ring holder set	C-S-HLS	
	Terasaki holder	C-S-HT	
	Glass slide holder	C-S-HS	
	Universal holder	C-S-HU	
	Petri dish holder 35 mm	C-S-HP35	
	Petri dish holder 100 mm	C-S-HLP100	
	96-well plate clamper	C-S-WC	
	Stage clip	TC-S-SC	
Annular ring	Glass annular ring 32		
	TE acrylic annular ring		
Condenser-side emboss contrast slider	Emboss contrast slider	TS2-C-S-EC	
Eyepiece-tube-side emboss contrast slider	Emboss contrast slider	TS2-C-ST-EC	
PH slider	Non-centerable PH slider	T1-SNCP	
	Centerable PH slider	T1-SCP	
Additional PH module for PH sliders	PH2 slit	T1-SPH2	PH2

Device	Description	Model	Remarks
LED unit	LED unit	C-LEDFL385	Peak wavelength: 385 nm
	LED unit	C-LEDFL455	Peak wavelength: 455 nm
	LED unit	C-LEDFL470	Peak wavelength: 470 nm
	LED unit	C-LEDFL505	Peak wavelength: 505 nm
	LED unit	C-LEDFL525	Peak wavelength: 525 nm
	LED unit	C-LEDFL560	Peak wavelength: 560 nm
	LED unit	C-LEDFL590	Peak wavelength: 590 nm
	LED unit	C-LEDFL625	Peak wavelength: 625 nm
Fluorescence filter cube	Fluorescence filter cube	C-LED385	Compatible with the C-LEDFL385 LED unit
	Fluorescence filter cube	C-LED455	Compatible with the C-LEDFL455 LED unit
	Fluorescence filter cube	C-LED470	Compatible with the C-LEDFL470 LED unit
	Fluorescence filter cube	C-LED505	Compatible with the C-LEDFL505 LED unit
	Fluorescence filter cube	C-LED525	Compatible with the C-LEDFL525 LED unit
	Fluorescence filter cube	C-LED560	Compatible with the C-LEDFL560 LED unit
	Fluorescence filter cube	C-LED590	Compatible with the C-LEDFL590 LED unit
	Fluorescence filter cube	C-LED625	Compatible with the C-LEDFL625 LED unit
Contrast shield	Contrast shield ELWD	TS2-LS	

4.3 Assembling the Basic Set

Before assembling the microscope, be sure to read and follow all the instructions given in "Safety Precautions" and "Notes on Handling This Product" at the beginning of this manual. Also before assembly, in order to prevent electrical shock, be sure to set the power switch to "○" to turn the power off.

1 Installing the main body of the microscope

⚠ CAUTION
When lifting this product, firmly hold it by gripping the recess in the front bottom part of the body and the recess in the rear part of the body.

(1) Select the installation location.

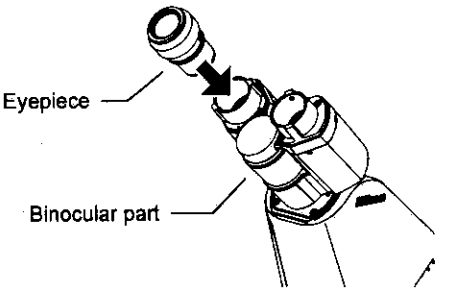
For information about installation locations, see "Installation location and storage location" under "Notes on Handling This Product" at the beginning of this manual.

(2) Remove the main body of the microscope from the packing box, and install it in a stable location.

2 Attaching the eyepieces

Attach right and left eyepieces that have the same magnification rate.

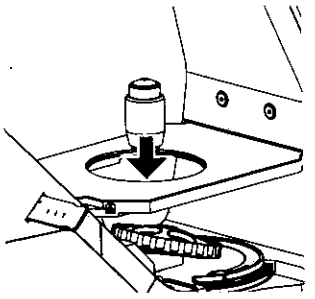
To use rubber eye guards, attach them to the eyepieces.



3 Attaching the objectives

(1) Remove the annular ring and specimen holder from the stage.

(2) Screw the objective into the nosepiece from above the stage. Attach objectives so that the magnification increases as the nosepiece is turned clockwise (as viewed from above).

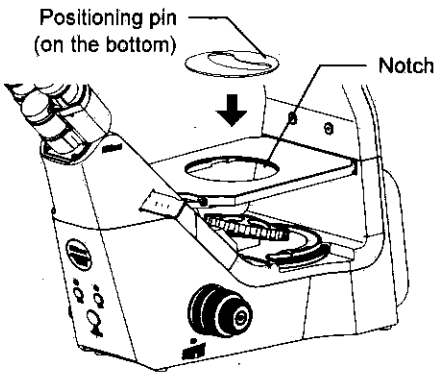


4 Attaching components to the stage as necessary

Attaching an annular ring (when a mechanical stage is not used)

Insert an annular ring into the center of the stage.

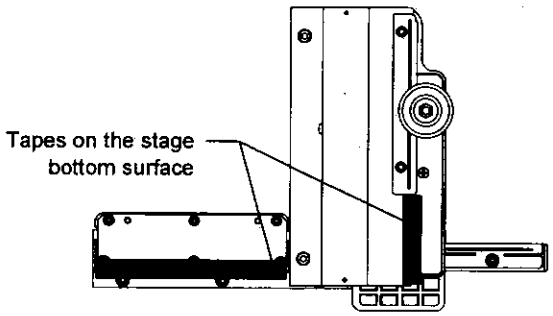
To attach and use an acrylic annular ring of a crescent-shaped bore on the microscope main body, fit the positioning pin of the annular ring in the notch on the stage.



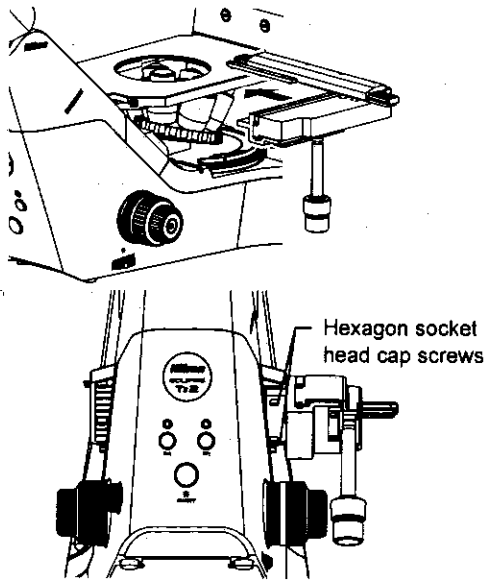
Attaching a mechanical stage

(1) Remove the annular ring if it is mounted on the stage.

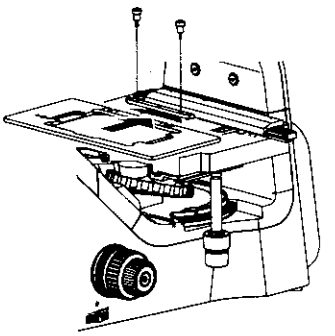
(2) Peel off the two tapes for securing the mechanical stage during transport.



(3) Place the mechanical stage on the stage of the microscope, and use two hexagon socket head cap screws to secure the mechanical stage from underneath the stage. (Tool: 3 mm hexagonal wrench)



(4) Place the holder retaining section on the stage, and secure it with the two knurled screws attached to the mechanical stage. (No tools required)

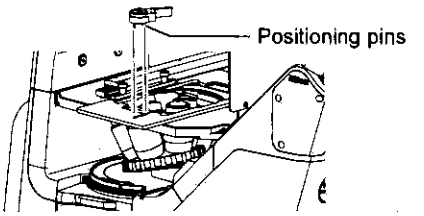


(5) Set the specimen holder on the mechanical stage.

Attaching a 96 well clamper

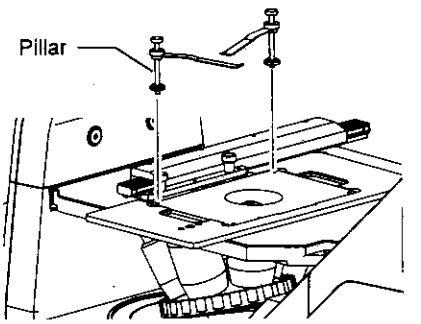
Align the two positioning pins on the well clamper with the holes in the stage, and then insert these pins.

The well clamper is secured on the stage by the magnet on the bottom of the clamper.



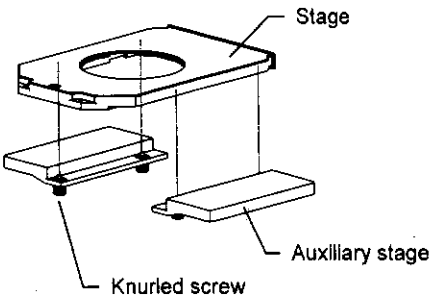
Attaching a stage clip

Screw the stage clip pillar into two of the four threads in the specimen holder.



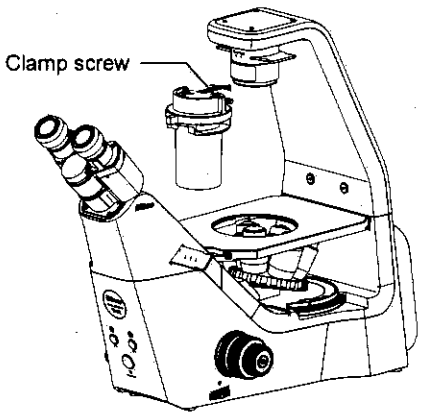
Attaching an auxiliary stage

Attach the auxiliary stage to the right and left of stage if the microscope and secure them together with knurled screws.



5 Attaching the condenser

Mount the condenser on the condenser holder on the illumination pillar, and then tighten the clamp screws.



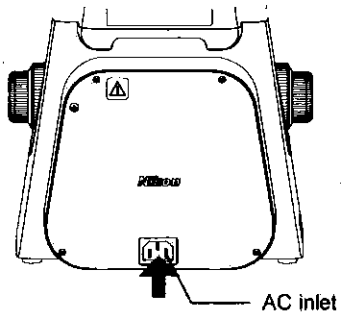
6 Connecting the power cord

Be sure to use the provided or specified power cord which matches the power supply voltage in your local area. Use of other power cords might result in failure or fire.

(1) Make sure that the power switch on the main body of the microscope is off (set to "○")

(2) Insert the power cord into the AC inlet on the main body of the microscope.

(3) Plug the other end of the power cord into a wall outlet.

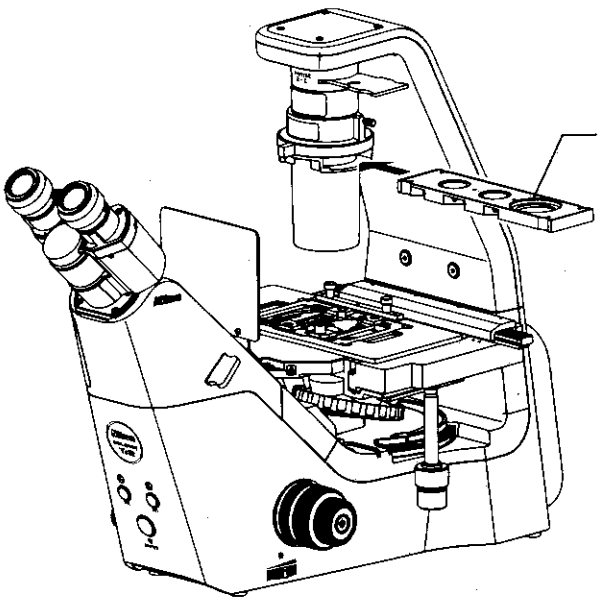


4.4 Installing the Components for Phase Contrast Microscopy

Phase contrast microscopy requires phase contrast (Ph) objectives (phase rings) and Ph annular diaphragms (incorporated in PH sliders).

Attach objectives as described in Section "4.3 Assembling the Basic Set."

Insert a T1-SNCP Precentered PH Slider or T1-SCP Centering PH slider into the condenser slider slot.

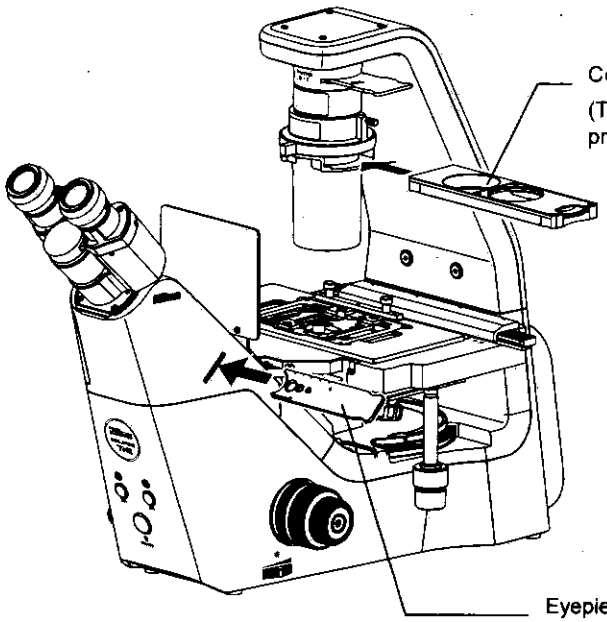


4.5 Installing the Components for Emboss Contrast Microscopy

To perform emboss contrast microscopy, an eyepiece-tube-side emboss contrast slider and condenser-side emboss contrast slider must be mounted on the microscope.

Remove the dummy slider, and then insert the eyepiece-tube-side emboss contrast slider into the slider slot.

Insert the condenser-side emboss contrast slider into the condenser slider slot.



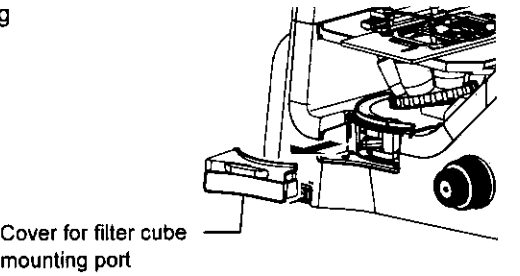
4.6 Assembly for Episcopic Illumination Microscopy (for the Ts2-FL Only)

For the light source for episcopic fluorescence microscopy, use an appropriate fluorescence LED unit for each excitation wavelength.

4.6.1 Basic Assembly for Episcopic Illumination Microscopy

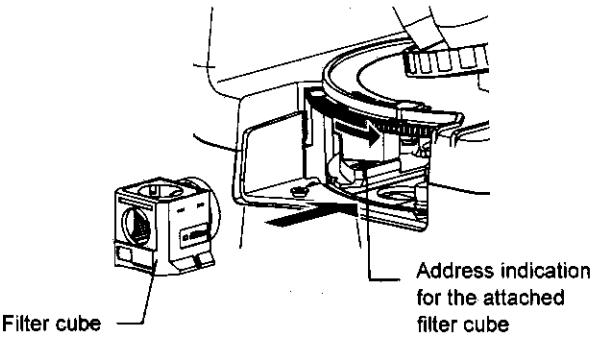
1 Attaching the filter cube

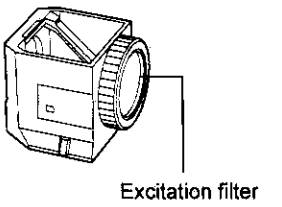
(1) Remove the cover from the filter cube mounting port.



(2) Turn the turret to a position where a filter cube can be mounted easily.

(3) Check the address on the turret, and align the filter cube with the guide groove before inserting it.

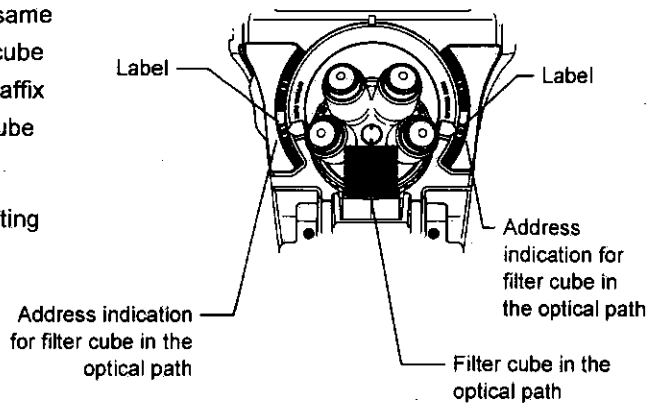




Insert the filter cube so that the excitation filter faces inward. (Do not insert in the opposite direction.)

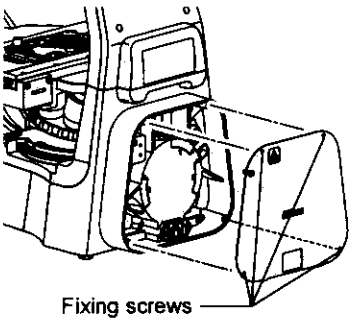
(4) Rotate the filter cube switching unit until the same number as the address of the inserted filter cube appears on the right and left of the unit, and affix the label corresponding to the type of filter cube at the recess on the side of the number.

(5) Remount the cover over the filter cube mounting port.

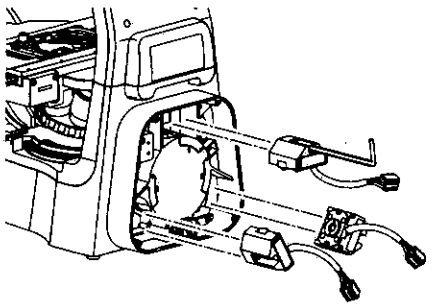


2 Mounting the fluorescence LED unit

(1) Loosen the screw fixing the cover of the fluorescence LED unit replacement port on the back of the microscope, and remove the cover. (Tool: 2 mm hexagonal screwdriver)

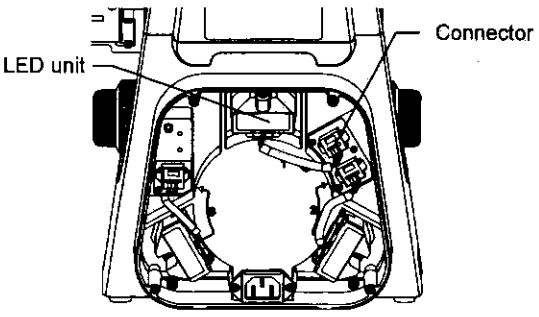


(2) Mount the LED unit (corresponding to the desired wavelength) at the position that matches the address of the filter cube. Align the positioning pin hole on the LED unit with the mating positioning pin to mount the LED unit to the microscope, and fasten the screws to secure the LED unit in place. (Tool: 3 mm hexagonal wrench)



(3) Insert the connector.

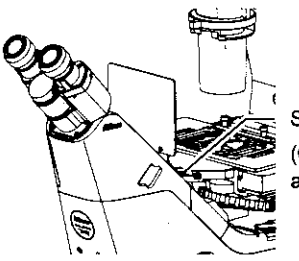
Mount any other LED units in the same way.



(4) Remount the cover in the original position and secure it with the screw. (Tool: 3 mm hexagonal wrench)

3 Mounting the ultraviolet light shielding plate

Mount the ultraviolet light shielding plate on the stage, and secure it with screws. (Tool: 2 mm hexagonal screwdriver)

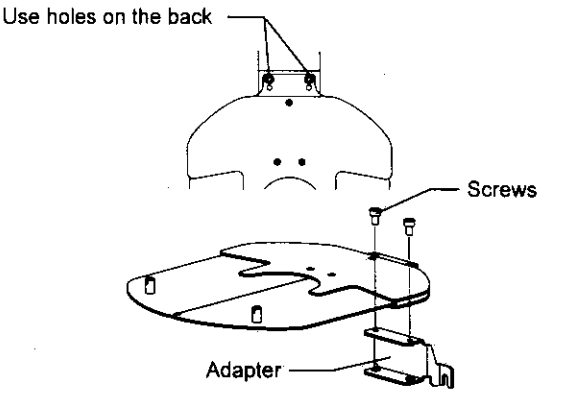


4 Mounting the contrast shield

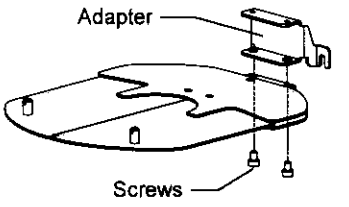
(1) Remove the condenser.

(2) Mount a contrast shield on the adapter, and secure it with a screw, as shown in the figure to the right. (Tool: 3 mm hexagonal wrench)

The contrast shield can be mounted at two different positions (30 mm and 60 mm above the surface of the stage). Attach the contrast shield at the position 30 mm above the stage surface to increase shielding performance, or 60 mm above the stage to secure easier access to the stage.

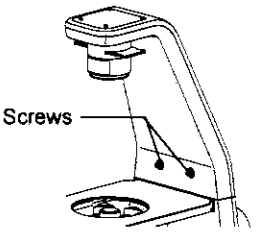


Mounting contrast shield 60-mm above the stage



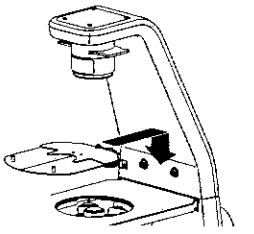
Mounting contrast shield 30-mm above the stage

(3) Insert the screws to the illumination pillar. Do not completely tighten the screws here. (Tool: 3 mm hexagonal wrench)



(4) Mount the contrast shield (to which the adapter is attached) on the illumination pillar. Tighten the screw to secure them. (Tool: 3 mm hexagonal wrench)

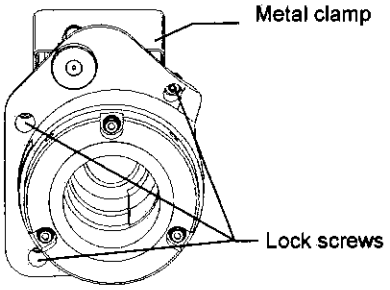
(5) Remount the condenser in the original position.

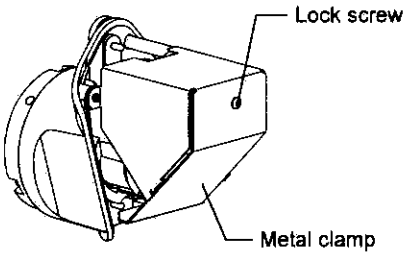


4.7 Mounting the Camera Port and Camera

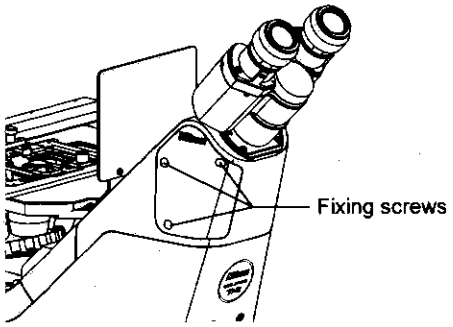
1 Mounting the camera port

(1) Remove the four lock screws and remove the metal clamp. (Tool: 2 mm hexagonal screwdriver)



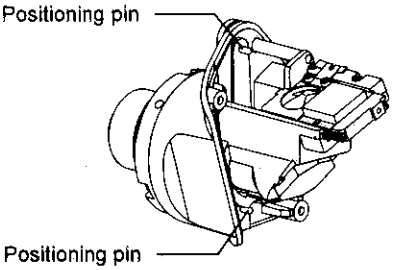


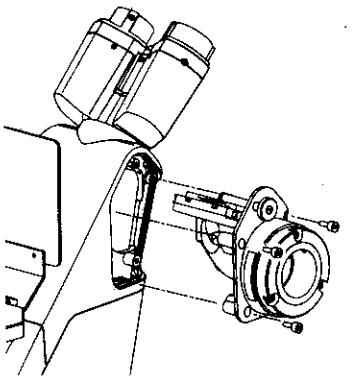
(2) Remove the three screws and remove the cover from the camera port mount on the microscope. (Tool: 2 mm hexagonal screwdriver)



(3) Insert the camera port into the main body of the microscope while adjusting its position with the positioning pins.

(4) Secure the camera port with the three screws removed in step (2) above. (Tool: 2 mm hexagonal screwdriver)



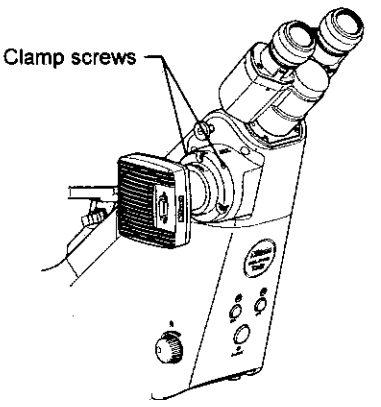


2 Mounting the camera adapter on the camera

Screw the camera adapter into the camera.

3 Mounting the camera

Insert the camera attached to the adapter into the camera port. Orientate the camera properly, and then tighten two clamp screws. (Tool: 2 mm hexagonal screwdriver)



5 Troubleshooting

Misuse of this product might adversely affect performance, even if this product is properly functional. If any of the following problems occurs, see the following tables to check for possible causes before requesting repair service.

If your problem is not listed in the tables, or the problem still persists after measures are taken, turn off the equipment and contact your local Nikon representative.

5.1 Vision and Operation

5.1.1 Problems Common to All Microscopies

Problem	Cause	Action
A portion of the view field is missing. **The view field is invisible.** **Brightness in the view field is not uniform.** **The image is dark.**	Components are not mounted properly.	Mount the components correctly.
	Movable components are not switched correctly.	The following components should exhibit a click when set properly: • Nosepiece • All sliders • Optical path changeover knob (only if a camera port is mounted) • Fluorescence cube turret (for the Ts2-FL only)
	The annular ring on the stage blocks the optical path.	Change the position of the specimen.
Dust or dirt is noticeable in the view field when viewed from the eyepieces.	If dirt or dust rotates when the eyepiece is turned: The eyepieces are dirty.	Clean the eyepieces.
	If dirt or dust moves when the specimen is moved: The specimen is dirty.	Clean the specimen.
	If dirt or dust disappears when the objective is switched: The objective is dirty.	Clean the objective.
Vision is poor. **Contrast or resolution is poor.**	The objective correction ring does not match the thickness of the bottom plate of the container.	Adjust the correction ring properly. (→ 3.5.4 Objective with Correction Ring)
	The thickness of the bottom plate of the container is outside the glass thickness correctable range for the objective.	Use a container whose bottom plate thickness is within the glass thickness correctable range. (→ 3.5.4 Objective with Correction Ring)
	Immersion oil adheres to the dry objective.	Wipe off the oil.
	No immersion oil is applied to the tip of an oil immersion objective.	Use Nikon DF immersion oil. (→ 3.10 Using Oil Immersion Objectives)
	If oil immersion objectives are used: The specified immersion oil is not used.	Use Nikon DF immersion oil. (→ 3.10 Using Oil Immersion Objectives)
	If oil immersion objectives are used: There are air bubbles in the immersion oil applied to the lens.	Wipe off the oil from the lens, and then apply oil again.

Problem	Cause	Action
One side of the view field (up, down, right, or left) is out of focus. Image shifts during focus (asymmetrically out of focus when the focal point is moved).	The nosepiece has not reached the click stop position.	Rotate the nosepiece until it clicks.
	The specimen is inclined to the surface of the stage.	Place the specimen on the stage correctly.
The view field is not sufficiently bright.	If a camera port is mounted: The optical path is set to the camera port side.	Switch the optical path to the binocular part side.
Cannot focus even by moving the objective to the upper limit.	The stage is not mounted properly.	Mount the stage correctly. (→ 4.3 Assembling the Basic Set)
Binocular images are not integrated as a single image.	Interpupillary adjustment has not been performed.	Perform interpupillary adjustment. (→ 3.8 Adjusting the Eyepieces)
Eyes are tired during observation.	Diopter adjustment has not been performed.	Perform diopter adjustment. (→ 3.7 Adjusting the Diopter)
	The brightness is not appropriate.	Adjust the brightness of the illumination with the illumination brightness adjuster.

5.1.2 Problems with Bright-field Microscopy

Problem	Cause	Action
The view field is not sufficiently bright.	The aperture diaphragm is closed more than it should be.	Adjust the aperture to 70% to 80% of the numerical aperture of the objective. (→ 3.6 Adjusting the Transmitted Light Aperture Diaphragm)

5.1.3 Problems with Phase Contrast Microscopy

Problem	Cause	Action
Poor or dull contrast	Objectives for bright-field microscopy are used.	Use objectives for phase contrast microscopy instead. (→ 3.12.1 Phase Contrast (Ph) Objectives (Phase Rings))
	The Ph code of the objective and the Ph code of the annular diaphragm do not match.	Make sure that the Ph code of the annular diaphragm that is placed in the optical path is the same as the Ph code of the objective for phase contrast microscopy. (→ 3.12.2 Ph Annular Diaphragm)
	The annular diaphragm image does not overlap with the phase ring (when a centerable PH slider is used).	Center the annular diaphragm. (→ 3.12.2 Ph Annular Diaphragm)
	The aperture diaphragm of the condenser is not fully open.	Fully open the aperture diaphragm.

5.1.4 Problems with Emboss Contrast Microscopy

Problem	Cause	Action
Poor or dull contrast	The objective is not aligned with the eyepiece-tube-side emboss contrast slider.	Use the correct combination. (→ 3.13 Operating the Components for Emboss Contrast Microscopy)
	The sector diaphragm of the condenser-side emboss contrast slider is out of the optical path.	Place the sector diaphragm into the optical path. (→ 3.13 Operating the Components for Emboss Contrast Microscopy)
	The aperture diaphragm of the condenser is not fully open.	Fully open the aperture diaphragm.
	The current objective is for phase contrast microscopy.	Use normal objectives instead.

5.1.5 Problems with Episcopic Illumination Microscopy (for the Ts2-FL Only)

Problem	Cause	Action
Lamp is lit, but image is invisible or unclear.	The wrong filter cube has been selected.	Select the filter cube appropriate for the specimen. (→ 3.14.5 Fluorescence Filter Cube)
	The combination of excitation filter, barrier filter, and dichroic mirror is incorrect. Or, one of them is missing.	Use the correct combination of filter cubes. (→ 3.14.5 Fluorescence Filter Cube)
	The combination of excitation filter, barrier filter, and dichroic mirror does not match the specimen.	Use the correct combination of filter cubes that matches the specimen. (→ 3.14.5 Fluorescence Filter Cube)
Illumination is leaked.	The filter cube mounted position is shifted from the specified position.	Insert the filter cube all the way into the turret (→ 4.6.1 Basic Assembly for Episcopic Illumination Microscopy)
Poor contrast.	The immersion oil is fluorescent.	Use non-fluorescent oil (Nikon DF immersion oil).
	The glass slide is fluorescent.	Use a non-fluorescent glass slide.
	The diascopic illumination LED is fluorescent.	Close the transmitted light path shutter.
	The room is too bright.	Darken the room. Alternatively, close the contrast shield (if a contrast shield is mounted).

5.2 Electrical Problems

Problem	Cause	Action
Power does not turn on even though the power switch is turned on.	The power cord is not connected or not connected properly.	Turn the power switch off, and then connect the power cord correctly.
Illumination does not turn on even though the power switch is turned on.	The illumination LED ON/OFF switch is turned off.	Turn on the illumination LED ON/OFF switch.
The fluorescence LED unit does not turn on even though the illumination LED ON/OFF switch is turned on and the fluorescence illumination switch is turned on.	Because the cover is not mounted on the fluorescence LED unit replacement port, the interlock mechanism is currently active.	Mount the cover correctly. (→ 4.6.1 Basic Assembly for Episcopic Illumination Microscopy)
	The connector on the LED unit is not connected to the main body of the microscope.	Connect the connector on the LED unit to the main body of the microscope. (→ 4.6.1 Basic Assembly for Episcopic Illumination Microscopy)

6 Maintenance and Storage

6.1 Cleaning

Clean or disinfect the lenses and other components according to the following instructions.

Cleaning tools

- Blower
- Soft brush
- Soft cotton cloth, lens cleaning tissue, gauze, etc.
- Absolute alcohol (ethyl alcohol or methyl alcohol), medical alcohol
- Petroleum benzene (only for wiping off immersion oil)

⚠ CAUTION

- Petroleum benzene and absolute alcohol used for cleaning are highly flammable. Handle them with due care, and keep them away from fire or sparks and when turning the power switch on and off.
- When handling petroleum benzene or absolute alcohol, always follow the instructions provided by the manufacturer.
- Do not use organic solvents (such as alcohol, ether, and thinner) when cleaning painted, plastic, or printed parts of this product. Using organic solvents might result in discoloration or cause printed text to fade.
- Use petroleum benzene only when wiping off immersion oil from objectives. Do not use petroleum benzene to wipe the prism surface of the eyepiece tube or filters.

6.1.1 Cleaning the Lenses

Keep the lenses free of dust, fingerprints, and other dirt. Any dirt on lenses and filters will degrade the image. If the lenses become dirty, clean them according to the following procedure.

Cleaning off minor dirt (such as dust)

(1) Use a blower or similar tool to blow off dust.

(2) If the above method does not work, dust off using a soft brush, or gently wipe off with a gauze.

Cleaning off heavy dirt (such as fingerprints or oil stains)

Wipe off dirt using a soft clean cotton cloth, lens cleaning tissue, or gauze moistened with a small amount of absolute alcohol (ethyl alcohol or methyl alcohol).

Tips for wiping

Do not wipe the lens surface using the same portion of a cloth or tissue more than once.

6.1.2 Cleaning Parts other than Lenses

Cleaning off minor dirt (such as dust)

Wipe off using a silicone cloth.

Cleaning off heavy dirt (such as fingerprints or oil stains)

Gently wipe off using a gauze moistened with a small amount of a diluted neutral detergent solution.

6.1.3 Cleaning Off Immersion Oil

(1) Wipe off using petroleum benzene.

(2) Then, wipe off using absolute alcohol (ethyl alcohol or methyl alcohol) for a better finish.

If petroleum benzene is unavailable

If petroleum benzene is unavailable, use methyl alcohol. Note that methyl alcohol is less effective, and requires more wipes.

6.1.4 Decontaminating this Product

We recommend that you use 70% medical alcohol for normal disinfection of the microscope.

Using organic solvents might result in discoloration of the plastic parts.

Caution on disposal

If a sample comes into contact with this product, check whether the sample is hazardous. If the sample is hazardous, follow the standard procedure of your laboratory.

6.2 Storage

- Store this product in a place that is low in humidity, and therefore less prone to mold.
  Store this product in a temperature range of -20 to +60°C and a relative humidity of up to 90% (no condensation).
- Store objectives and eyepieces in a desiccator or other vessel that contains a desiccant.
- Put a dust cover over this product to protect it from dust.
- Do not cover this product unless the power switch on the main body of the microscope has been turned off (set to "○"), and the lamp house allowed to sufficiently cool. (Cooling takes approximately 30 minutes.)

6.3 Regular Inspection (Charged)

We recommend that your microscope receive regular inspections (at a fee) in order to maintain its full performance over a long period. For details, contact your local Nikon representative.

7 Specifications

7.1 Principles of Operation

Intended use of this product (for medical care)

This product is intended for use in experiments of living cells and tissues and their examinations at hospitals and other medical facilities in the field of genetics, immunology, physiology, pharmacology, neurology, cellular biology and molecular biology.

The bright-field, phase contrast, or epi-fl microscopy is used to observe a sample (cell and tissue) in a culture vessel such as a Petri dish or fixed on a slide as the specimen.

The product is classified as an in-vitro diagnostic medical device.
This product is not intended for use for measurement.
The scale on the focus handle and stage is an indicator to reproduce the position and does not guarantee the value of the thickness or length of a sample measured using this scale.

Intended user

This product is intended for researchers and the medical professional and those who work on experimentations in the field of genetics, immunology, physiology, pharmacology, neurology, cellular biology and molecular biology.

7.2 Performance Properties

Model name	ECLIPSE Ts2-FL/Ts2	
Optical system	Infinity-corrected CFI60 optical system	
	Objective:	CFI60
	Eyepiece:	10x (Number of fields of view: 22)
		15x (Number of fields of view: 16)
		20x (Number of fields of view: 12.5)
	Nosepiece:	Secured on the main body and cannot be replaced, equipped with five holes, and four caps for holes in the nosepiece
Focusing unit	Focusing method:	Objective elevation system
	Drive method:	With the manual coarse and fine focus knobs
		Coarse focus knob: 37.7 mm per revolution
		Fine focus knob: 0.2 mm per revolution
	Vertical stroke:	7 mm above and 1.5 mm below the reference position (the focus position on the top surface of the stage)
	With a coarse torque adjustment mechanism	
Diascopic illuminator	Diascopic illumination pillar:	Secured on the main body and cannot be removed
	Diascopic illuminator:	White LED The diascopic illuminator and fluorescence illuminator cannot be lit at the same time.
	Transmitted light path shutter:	Equipped for the Ts2-FL only

Fluorescence cube turret and fluorescence illuminator (for the Ts2-FL only)	Built in the main body of the Ts2-FL and cannot be removed. Fluorescence cube turret: Up to three fluorescence filter cubes can be mounted, and the turret can be turned manually. The turret indicates the position of the filter cube placed in the optical path. There are position markings at each filter cube mount. Fluorescence illuminator: Up to three fluorescence LED units can be mounted. The changeover of fluorescence LED units is interlocked with the changeover of fluorescence filter cubes.
Illumination power supply	Power supply for both diascopic and fluorescence illumination is incorporated.
Input ratings	100-240 VAC ±10%, 50/60 Hz, 0.35 A
Power consumption (nominal value)	15 W
Power cord	• When used in a 100-120 VAC region, outside Japan UL listed detachable power cord set, 3 conductor grounding (3-conductor grounding Type SVT, NO.18 AWG, maximum length 3 m, rated at 125 VAC minimum) • When used in a 220-240 VAC region EU/EN-listed detachable power cord set, 3-conductor grounding (3-conductor grounding Type H05VV-F 1 mm^2, maximum length 3 m, rated at 250 VAC minimum) • When used in Japan PSE-approved detachable power cord set, 3-conductor grounding (3-conductor grounding Type VCTF 3 x 0.75 mm^2, maximum length 3 m, rated at 125 VAC minimum)

7.3 Physical Properties

Model name	ECLIPSE Ts2-FL/Ts2	
Operating environmental conditions	Temperature:	0°C to +40°C
	Humidity:	60% RH max. (at +40°C, no condensation)
	Altitude:	2,000 m max.
	Pollution:	Degree 2
	Overvoltage category:	Category II
	Electrical shock protection class:	Class I
	Indoor use only	
Storage and transport environmental conditions	Temperature:	-20°C to +60°C
	Humidity:	90% RH max. (no condensation)
External dimensions and mass (for the main body of the microscope only)	TS2-FL	
	External dimensions:	230 mm (W) x 470 mm (H) x 540 mm (D), excluding protrusions
	Mass (reference):	Approx. 14.5 kg
	TS2	
	External dimensions:	230 mm (W) x 470 mm H) x 524 mm (D), excluding protrusions
	Mass (reference):	Approx. 13 kg
Safety standard compliance	• CE marking - IVD Directive This equipment complies with the emission and immunity requirements of IEC/EN 61326-2-6. • C-UL-US Listed • FCC Part 15 Subpart B Class A Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. • CAN ICES-003(A) / NMB-003(A) • Australian EMI (AS/NZS CISPR11)	

ECLIPSE Ts2-FL/Ts2

Règles de sécurité

Afin d'assurer un fonctionnement correct et sécurisé, lisez ce manuel avant d'utiliser le produit.

Symboles AVERTISSEMENT et ATTENTION

Bien que ce produit soit conçu et fabriqué pour assurer une sécurité optimale pendant l'utilisation, une utilisation incorrecte ou le non respect des consignes de sécurité fournies peuvent provoquer des blessures corporelles ou des dommages matériels. Afin d'assurer une utilisation correcte, lisez attentivement ce manuel avant d'utiliser le produit. Ne jetez pas ce mode d'emploi ; conservez-le toujours à proximité pour pouvoir vous y référer en cas de besoin.

Les consignes de sécurité dans ce manuel sont marquées avec les symboles suivants pour souligner leur importance. Pour votre sécurité, veuillez toujours respecter les instructions portant ces symboles.

Symbole	Signification
⚠ AVERTISSEMENT	La négligence des instructions marquées de ce symbole peut entraîner le décès ou des blessures graves.
⚠ ATTENTION	La négligence des instructions marquées de ce symbole peut entraîner des blessures ou des dégâts matériels.

Signification des symboles utilisés pour ce produit

Le symbole apparaissant sur le produit indique que des précautions sont nécessaires à tout moment pendant l'utilisation. Consultez toujours le mode d'emploi et lisez les instructions pertinentes avant de manipuler une pièce sur laquelle le symbole a été apposé.

Symbole	Signification
	**Risque biologique** Cette étiquette de symbole apposée sur les plateaux vous rappelle ce qui suit : • Le déversement d'un échantillon provenant d'un récipient sur le microscope, présente un risque biologique. • Pour éviter la contamination biologique, ne touchez pas la partie contaminée à mains nues. • Décontaminez la partie contaminée selon la procédure standard de votre laboratoire.
	**Avertissement (pour la Ts2-FL), Mise en garde (pour le Ts2)** Cette étiquette de symbole peut être trouvée sur l'illuminateur diascopique et met en garde ce qui suit : • Catégorie du groupe de risque de la sécurité photobiologique de l'éclairage diascopique et de l'éclairage épiscopique. • Ne regardez pas directement la lumière de l'éclairage diascopique ou de l'éclairage épiscopique. Voir «AVERTISSEMENT : 7 Sécurité photobiologique» et «AVERTISSEMENT : 8 Ne pas regarder directement l'illuminateur» pour suivre ce qui est décrit là.
	**Attention : Montez le couvercle sur le port de montage du cube filtre (pour la Ts2-FL uniquement)** Cette étiquette de symbole peut être trouvée sur le couvercle du port de montage du cube filtre. Cette étiquette fournit les mises en garde suivantes : • N'allumez pas la DEL fluorescence si le couvercle du port de montage du filtre cube de fluorescence est ouvert. Voir «ATTENTION : 2 Montez le couvercle sur le port de montage du cube filtre (pour la Ts2-FL uniquement)» pour suivre ce qui est décrit là.
	**Information sur la façon de monter ou de remplacer l'unité de DEL de fluorescence (pour la Ts2-FL uniquement)** Ce symbole peut être trouvé sur le couvercle du port de remplacement de l'unité DEL de fluorescence. Il vous rappelle la remarque suivante sur une procédure de montage ou de remplacement de l'unité DEL. Pour plus de détails, voir l'étape 2 «Montage de l'unité DEL de fluorescence» dans la section «4.6.1 Montage de base pour la microscopie d'éclairage épiscopique.»

⚠ AVERTISSEMENT

1 Ne démontez pas.

Le démontage risque de causer un dysfonctionnement et/ou un choc électrique, et peut empêcher toute réclamation vis-à-vis de la garantie. Ne démontez aucune pièce autre que celles décrites dans ce manuel. Si vous rencontrez des problèmes avec le microscope, contactez votre représentant Nikon local.

2 Veuillez lire attentivement ce manuel.

Par mesure de sécurité, lisez attentivement ce manuel pour d'autres équipements à utiliser avec ce produit. En particulier, assurez-vous de respecter les avertissements et les précautions indiqués au début des manuels.

En lisant ce manuel, vous pouvez utiliser ce produit sans la nécessité de formation spécialisée supplémentaire. Contactez votre représentant Nikon le plus proche si vous avez des questions, ou si vous remarquez toute erreur.

Les produits Nikon sont conçus avec la plus grande sécurité à l'esprit, à condition que vous les utilisiez pour leur effet conçu et teniez compte de tous les avertissements et mises en garde dans les manuels respectifs. En cas de non-respect des avertissements et mises en garde figurant dans ces manuels, la soumission de l'équipement à des chocs ou impacts, ou toute tentative de désassemblage de l'équipement pourrait provoquer des accidents ou des blessures.

3 Tension d'entrée

Ce produit peut être utilisé de 100 à 240 V CA à 50/60 Hz et il est compatible avec des prises de courant secteur dans le monde entier. Dans des circonstances normales, la tension d'alimentation n'est pas une préoccupation. Toutefois, notez que vous devriez éviter d'utiliser ce produit avec une tension d'alimentation instable.

4 Cordon d'alimentation

Veillez à utiliser le cordon d'alimentation fourni (ou spécifié). L'utilisation d'autres cordons d'alimentation peut entraîner une défaillance ou un incendie.

- Pour plus de détails sur le cordon d'alimentation spécifié, voir la section «7.2 Propriétés de performance.»
- Pour éviter toute électrocution, coupez toujours l'interrupteur d'alimentation du microscope (réglez-le sur «○») avant de brancher ou de débrancher le cordon d'alimentation.
- Ce produit est conforme à la norme JIS Classe I de protection contre les chocs électriques et doit donc être connecté à une borne de mise à la terre de protection.

5 Remarques sur la manipulation des solvants inflammables

Les solvants inflammables suivants sont utilisés avec ce produit :

- L'huile d'immersion (huile d'immersion Nikon pour les objectifs à immersion d'huile)
- Alcool pur (alcool éthylique ou méthylique pour le nettoyage des pièces optiques)
- Benzène de pétrole (pour enlever l'huile d'immersion)
- Alcool médical (pour la désinfection du microscope)

⚠ AVERTISSEMENT

Gardez ces solvants loin du feu. Avant l'utilisation d'un solvant, lisez attentivement les instructions fournies par le fabricant du solvant et manipulez-le correctement et en toute sécurité. Veuillez noter les précautions suivantes lors de l'utilisation de solvants avec ce produit.

- Gardez les solvants loin de toutes les pièces susceptibles de chauffer.
- Tenir les solvants à l'écart de ce produit et de ses alentours lors de la mise sous tension ou hors tension de l'interrupteur d'alimentation, ou lorsque vous branchez ou débranchez le cordon d'alimentation.
- Faites attention à ne pas renverser les solvants.

6 Manipulation des échantillons dangereux

Ce microscope est conçu principalement pour l'observation microscopique des cellules et des cultures de tissus vivant dans des boîtes de Pétri et d'autres récipients.

Avant de manipuler un échantillon, vérifiez s'il est dangereux. Si l'échantillon est dangereux, suivez la procédure standard de votre laboratoire. Si l'échantillon est de nature infectieuse, portez des gants en caoutchouc pour éviter l'infection et ne touchez pas directement l'échantillon. Faites attention à ne pas renverser l'échantillon. Si un échantillon est renversé sur ce produit ou entre en contact avec, décontaminez la zone touchée en suivant la procédure standard de votre laboratoire.

7 Sécurité photobiologique

Ce produit est fabriqué en conformité avec la norme CEI 62471 «Sécurité photobiologique des lampes et des appareils utilisant des lampes», établie par la Commission Électrotechnique Internationale (CEI).

Ts2 et Ts2-FL

La sécurité photobiologique de la lumière émise par l'illuminateur diascopique (les condenseurs ou une ouverture du porte-condenseur) de ce produit est classée dans le groupe de risque suivant selon les normes ci-dessus. Si la distance entre l'illuminateur diascopique et la rétine est plus grande que la distance de danger suivante, la sécurité photobiologique de ce produit est classée dans le groupe exonéré qui n'invoque pas un risque photobiologique.

	Classification	Distance de danger
Danger de lumière bleue pour la rétine	Groupe de risque 2	4 m

Ts2-FL

La sécurité photobiologique de la lumière émise par l'illuminateur épiscopique (les objectifs ou les orifices de montage des objectifs de l'embout) de ce produit est classée dans le groupe de risque suivant selon les normes ci-dessus. Si la distance entre l'illuminateur épiscopique et la rétine est plus grande que la distance de danger suivante, la sécurité photobiologique de ce produit est classée dans le groupe exonéré qui n'invoque pas un risque photobiologique.

	Classification	Distance de danger
Danger de rayonnement UV	Groupe de risque 3	2 m
Danger de lumière bleue pour la rétine	Groupe de risque 2	7 m
Danger thermique ou de lumière bleue pour la rétine	Groupe de risque 3	4 m

⚠ AVERTISSEMENT

8 Ne regardez pas directement l'illuminateur

Ts2

L'étiquette suivante indiquant la sécurité photobiologique est apposée sur l'illuminateur diascopique. Cette étiquette fournit la mise en garde ci-dessous. (Quant à la position de l'étiquette, voir chapitre 1, «Composants».)

ATTENTION
Rayonnement optique émis par l'illuminateur diascopique (les condenseurs ou une ouverture du porte-condenseur) possiblement dangereux. Ne regardez pas directement la lumière de l'éclairage diascopique. Cela peut être dangereux pour les yeux.

Ts2-FL

L'étiquette d'avertissement suivante indiquant la sécurité photobiologique est apposée sur l'illuminateur diascopique. Cette étiquette fournit la mise en garde et les avertissements ci-dessous. (Quant à la position de l'étiquette, voir chapitre 1, «Composants».)

AVERTISSEMENT
UV émis par l'illuminateur épiscopique (les objectifs ou les orifices de montage des objectifs d'embout). Évitez d'exposer les yeux et la peau à l'émission. Utilisez la plaque de blindage de lumière ultraviolette.

AVERTISSEMENT
Rayonnement optique émis par l'illuminateur épiscopique (les objectifs ou les orifices de montages des objectifs d'embout) possiblement dangereux. Ne regardez pas directement la lumière de l'éclairage épiscopique. Cela peut entraîner des blessures aux yeux.

ATTENTION
Rayonnement optique émis par l'illuminateur diascopique (les condenseurs ou une ouverture du porte-condenseur) possiblement dangereux. Ne regardez pas directement la lumière de l'éclairage diascopique. Cela peut être dangereux pour les yeux.

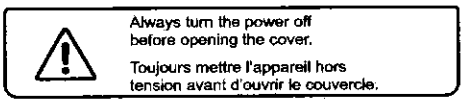
⚠ ATTENTION

1 Coupez l'alimentation

Pour éviter toute électrocution ou panne, coupez toujours l'interrupteur d'alimentation du microscope (réglez-le sur «○») avant de brancher ou de débrancher le cordon d'alimentation. Toujours mettre l'interrupteur d'alimentation du microscope hors tension (position à «○») et débranchez le cordon d'alimentation avant d'assembler le microscope, de remplacer les cubes filtres de fluorescence ou les unités DEL de fluorescence pour une utilisation avec la Ts2-FL, ou de nettoyer le microscope.

2 Montez le couvercle sur le port de montage du cube filtre (pour la Ts2-FL uniquement)

L'étiquette suivante est apposée sur le couvercle du port de montage du cube filtre. Cette étiquette fournit les remarques ci-dessous.



- Coupez l'alimentation avant d'ouvrir le couvercle du port de montage du cube filtre.
- Si le couvercle n'est pas monté sur le port, la fuite de lumière du port peut être un bruit de fond pour la microscopie d'éclairage épiscopique. En outre, la lumière de fuite peut être nocive pour les yeux.

3 Montez le couvercle sur le port de remplacement de l'unité DEL de fluorescence (pour la Ts2-FL uniquement)

La DEL de fluorescence est activée par un interrupteur de sécurité interne lorsque le couvercle est monté sur le port de remplacement de l'unité DEL.

Si l'interrupteur d'alimentation est mis sous tension (réglé sur «|») avec le couvercle enlevé, l'interrupteur de sécurité interne empêche l'unité DEL de s'allumer.

Avant la mise sous tension de l'unité DEL de fluorescence, assurez-vous que le couvercle est monté sur le port de remplacement de l'unité DEL et que les vis de fixation du couvercle sont serrées fermement.

Si l'unité DEL de fluorescence s'allume lorsque le couvercle est ouvert, ce produit est en échec. Arrêtez immédiatement d'utiliser ce produit et contactez votre représentant Nikon local.

4 Ne mouillez pas le microscope ou ne laissez pas des corps étrangers entrer à l'intérieur

Si le microscope devient humide, un court-circuit peut se produire, entraînant des dysfonctionnements ou une surchauffe du microscope. De même, un court-circuit peut se produire si un corps étranger pénètre dans le microscope. Par ailleurs, veillez à ce que l'eau ne pénètre pas dans la prise secteur située à l'arrière.

Si vous renversez accidentellement de l'eau sur le microscope, coupez immédiatement l'interrupteur d'alimentation du microscope (réglez-le sur «○») et débranchez le cordon d'alimentation. (Ne touchez pas le cordon d'alimentation avec les mains mouillées.) Puis essuyez l'humidité avec un chiffon sec ou un matériel similaire.

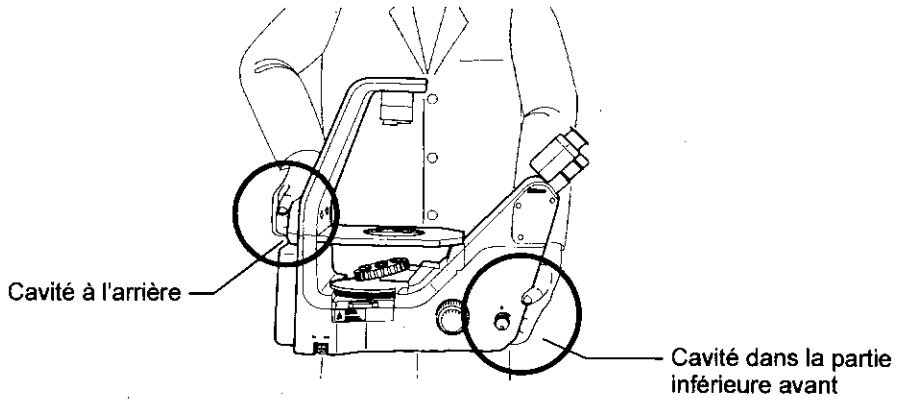
Toute la face inférieure de l'embout est protégée par un couvercle de protection étanche au ruissellement, ce qui empêche l'eau de pénétrer à l'intérieur du microscope. Assurez-vous de poser des bouchons sur les orifices non utilisés dans l'embout.

Si un liquide ou un corps étranger pénètre dans le microscope, ne l'utilisez pas et contactez votre représentant Nikon local.

⚠ ATTENTION

5 Précautions pour le transport du microscope

- Lors du transport de ce produit, tenez-le fermement en saisissant la cavité dans la partie avant inférieure du corps principal et la cavité à l'arrière du corps principal.



- Ne pas tenir toutes les autres parties (comme la partie supérieure de la colonne d'éclairage, les boutons de mise au point, le tube oculaire, ou le plateau) lors du transport du microscope. Cela pourrait se traduire par la chute ou la panne de ce produit.

6 Précautions sur l'assemblage et le remplacement

- Prenez garde à ne pas vous pincer les doigts ou les mains.
- Les rayures et la saleté (comme les empreintes) sur les composants optiques tels que des lentilles, les filtres et les cubes filtres de fluorescence ainsi que les unités DEL pour une utilisation avec le Ts2-FL dégradent l'image du microscope. Prenez soin de ne pas égratigner ces composants optiques ou de les toucher directement lors de votre travail.

7 Ne placez rien sur ce produit

Ne placez aucun objet sur ce produit. En particulier, ne placez jamais un objet lourd. Ne pas respecter cette consigne peut provoquer une déformation, un endommagement ou un dysfonctionnement de l'appareil. Par ailleurs, un objet tombant de la partie supérieure du microscope peut entraîner des blessures.

8 N'allumez pas l'appareil lorsque ce produit est couvert

N'allumez pas l'appareil lorsque ce produit est couvert par quoi que ce soit. Cela pourrait bloquer la ventilation du microscope et provoquer une surchauffe, pouvant entraîner un incendie. Ne couvrez pas ce produit avec un chiffon ou un matériau similaire tout en l'utilisant. Cela va augmenter la température à l'intérieur du microscope, ce qui pourrait entraîner une défaillance.

9 Précautions sur le travail continu de microscopie

Pour soulager la fatigue, évitez l'utilisation continue de ce produit pour des périodes de plus d'une heure et prenez de courtes pauses de 10 à 15 minutes entre chaque séance de travail. Organisez de manière appropriée les autres équipements à utiliser et ajustez la hauteur du siège de votre chaise.

10 Mise au rebut de ce produit

Pour éviter les risques biologiques, disposez de ce produit comme matière contaminée, conformément à la procédure standard de votre laboratoire.