Nikon

Microscope

ECLIPSE 50i
ECLIPSE 55i

Instructions

Introduction

Thank you for purchasing this Nikon product.
This instruction manual, which describes basic microscope operations, is intended for users of the Nikon ECLIPSE 50i and 55i microscopes.
To ensure correct use, please read this manual carefully before operating the instrument.

- This manual may not be reproduced or transmitted in whole or in part without Nikon's express consent.
- The contents of this manual are subject to change without notice.
- Although every effort has been made to ensure the accuracy of this manual, errors or inconsistencies may remain. If you note any points that are unclear or incorrect, please contact your nearest Nikon representative.
- Some of the products described in this manual may not be included in the set you have purchased.
- Make sure you have read the manuals for any other products attached to or to be used with this microscope (super high-pressure mercury lamp power supply, high-intensity light source, etc.).

Warning/Caution symbols used in this manual

Although Nikon products are designed to provide the utmost safety, ignoring safety precautions or improper use may result in personal injury or property damage, as well as voiding the terms of the warranty. To ensure safe use, please read the instruction manual carefully and thoroughly before trying to operate the instrument. Do not discard this manual. Store in a convenient location near the product for ready reference.
In this manual, safety precautions are indicated by the following symbols. For safe, correct use of the microscope, always follow the instructions indicated by these symbols.

Symbol	Meaning
 **WARNING**	Disregarding instructions indicated by this symbol may result in death or serious injury.
 **CAUTION**	Disregarding instructions indicated by this symbol may result in injury or property damage.

Meaning of symbols used on the product

When appearing on the product, the symbols below indicate the need for caution at all times during use.
Consult the instruction manual and read the relevant instructions before attempting to use or adjust any part to which the symbol has been affixed.

	**Caution! Biohazard** This symbol found on the stage indicates the following: • WARNING: Contact between sample and microscope may result in biohazard risks. • Always connect the battery and cables to the appropriate terminals. Failure to do so may result in malfunction. • Decontaminate the contaminated part according to the standard procedure specified for your laboratory.
	**Caution for heat** This symbol found on the lamphouse of the ECLIPSE 50i indicates the following: • The lamp and surrounding areas (including the lamphouse) become very hot during and immediately after a period of illumination. • Risk of burns. Do not touch the lamp or surrounding areas during or immediately after a period of illumination. • Make sure the lamp and surrounding areas have cooled sufficiently before attempting to replace the lamp
	**Caution** This symbol found on the wiring cover of the ECLIPSE 55i indicates the following: • Always connect the battery and cables to the appropriate terminals. Failure to do so may result in malfunction. • **Do not remove the wiring cover.** Do not remove the cover except for when assembling the product or replacing batteries. Using the system without the cover may cause a short, resulting in abnormal heat.

Safety Precautions

Please follow the safety precautions given below.

WARNING

1. Intended use of the product

This product is intended primarily for microscopic observations of cells and tissue set on glass sides using diascopic (transmitted) and episcopic (reflected) illumination.
It is intended for use in experimentation and observation of cells and tissue in the fields of pathology and cytology in hospital and other laboratory settings.

2. Do not disassemble.

Disassembly may result in malfunctions and/or electrical shock and will void the terms of the warranty. Never attempt to disassemble any part other than the parts described in this manual. If you experience problems with the product, contact your nearest Nikon representative.

3. Read the instruction manuals carefully (when using the ECLIPSE 50i).

To ensure safety, carefully read this manual and the manual provided with any other equipment used with this product. Observe all warnings and cautions given at the beginning of each manual.

When the J-FL 50i55i Epi-fluorescence attachment is attached to the microscope
The mercury lamp (or xenon lamp) for Epi-fl microscopy requires special care during handling. Make sure you have read the instruction manual for the light source (super high-pressure mercury lamp power supply or high-intensity source).

4. Power cord for microscope and the power cord for AC adapter

Use one of the power cords specified. Using the wrong power cord may result in fire or other hazards. The product is classified as subject to Class I protection against electrical shock. Make sure it is connected to an appropriate ground terminal.
Refer to Chapter 8 for the power cords specified.
To prevent electric shock, always turn off the main power switch (press it to the "O" position) of the product before attaching or detaching the power cord.

5. Inspect the AC adapter (when using the ECLIPSE 55i) (when using J-CY cytodiagnostic unit).

The ECLIPSE 55I and the J-CY cytodiagnostic unit are powered by an AC adapter. Use only the specified adapter model meeting the requirements. Using any other type of adapter may result in malfunction, overheating, and/or fire.
Refer to Chapter 8 for the adapter specified.

- To prevent malfunctions and/or fire, use the AC adapter in a well-ventilated location. To ensure proper heat radiation and to prevent overheating, never cover or place any object on the adapter.
- To prevent malfunctions, always turn off the power switch (press it to the "O" position) of the product before attaching the AC adapter.

WARNING

6. Heat from the light source (when using the ECLIPSE 50i)

The lamp and surrounding areas (including the lamphouse) will become very hot during and immediately after a period of illumination.

- Risk of burns. Never touch the lamp or surrounding areas during or immediately after a period of illumination
- Always attach the lamphouse cover when using the product.
- Make sure the lamp and surrounding areas have cooled sufficiently before attempting to replace the lamp
- To avoid risk of fire, do not place fabric, paper or highly flammable volatile materials such as gasoline, petroleum benzine, paint thinner or alcohol near the lamphouse while the lamp is lit or during a period of around thirty minutes after the lamp has been turned off.

7. Mercury lamps and xenon lamps (when the J-FL 50i55i Epi-fluorescence attachment is attached)

The mercury lamp (or xenon lamp) for J-FL 50i55i Epi-fluorescence attachment requires special care during handling. For safe and correct use of this system, carefully read the warnings below. Keep in mind all potential hazards. Additionally, carefully read the manual for the super high-pressure mercury lamp power supply (or high-intensity light source) and the manual (if provided) from the lamp manufacturer, then follow the instructions given therein.

Hazards of Mercury Lamps and Xenon Lamps

1) When lit, mercury (and xenon) lamps radiate ultraviolet light that can damage the eyes and skin. Direct viewing of the light may result in blindness.
2) The lamps contain sealed gas under very high pressure, pressure that increases when the lamp is on. If the lamp is scratched, fouled, subjected to high external pressure or physical impact, or used beyond its service life, the sealed gas may escape or the lamp may burst, resulting in gas inhalation, injury from glass, or other injury.
3) When the lamp is lit, the lamp and surroundings will become extremely hot. Touching the lamp with bare hands may result in burns; flammable materials placed near the lamp may ignite.
4) Using the wrong lamp type may result in accidents, including bursting of the lamp.

Safety is a top design priority for Nikon products. The preceding hazards should pose no danger as long as the user observes all of the warnings and cautions given in the manuals, and uses the system only for its intended purpose.
However, failure to heed the warnings and cautions given in the manuals, subjecting the system to shock or impact, or attempting to disassemble the system may result in accidents and injury. Make sure you are familiar with and adhere to all warnings and cautions.

8. Always turn off the lamp when changing filter cubes (when the J-FL 50i55i Epi-fluorescence attachment is attached to the microscope).

When changing filter cubes, always turn off the Epi-fl attachment. Leaving the lamp on may result in ultraviolet exposure.

9. Hazardous Sample

This microscope is intended primarily for microscopic observations of cells and tissue set on glass slides.
Check to determine whether a sample is hazardous before handling.
Handle hazardous samples according to the standard procedure specified by your laboratory.If the sample is potentially infectious, wear rubber gloves and avoid touching samples. If contact occurs between a sample and the microscope, decontaminate the contaminated portion according to the standard procedure specified for your laboratory.

CAUTION

1. **Turn off power during assembly, connection/disconnection of cords, lamp replacement, and maintenance.**

   To prevent electric shock and/or malfunctions, always turn off the power switch(es) of the product (press to the "|" position) and unplug the power cord from the wall outlet before assembly, connecting or disconnecting of cords, lamp replacement, and cleaning of the microscope and the objective.

2. **Lamp replacement precautions (when using the ECLIPSE 50i)**

   To avoid burns, wait at least 30 minutes after the lamp is turned off to give it sufficient time to cool.
   To avoid electric shock or malfunctions, never attempt to replace the lamp without first turning off the power switches for the microscope and the peripheral devices (press them to the "|" position) and unplugging the power cord from the wall outlet.
   Make sure the lamphouse cover is securely fitted to the lamphouse after lamp replacement. Never turn on the lamp while the lamphouse cover is open. Do not break up used lamps; instead, dispose of them as special industrial waste or as specified by local regulations.

3. **Confirming the light source (when using the ECLIPSE 50i)**

   The microscope's built-in power source is used for the halogen lamp that is a light source for the microscope. A halogen lamp up to 6V-30W can be lit. Always use the specified halogen lamp. Using an unspecified lamp may cause malfunctions.

   specified lamp: 6V-30W (PHILIPS 5761)

4. **Avoid contact with water.**

   Never allow water to come into contact with the product, and keep the product away from liquids. Splashing water onto the product may cause a short, resulting in malfunction or abnormal heating. If water is splashed onto the product, immediately turn off the power switch (press to the "|" position) and remove the power cord from the receptacle. Then wipe off moisture with a dry cloth or something similar. If water enters the product, do not use; in this case, contact your distributor.

5. **Do not place any object on top of the product.**

   Do not place any object on top of the product or cover it with a cloth or the like. The system temperature will rise, resulting in malfunctions.

CAUTION

6. Cautions on assembling, installing, and carrying the microscope

- Take care to avoid pinching your fingers or hands during microscope assembly.
- Scratches or fouling such as fingerprints on optical components (such as lens and filters) will degrade microscope images. Be careful to avoid scratches or direct contact with the lens and filters.
- The main unit weighs about 9 kg. Grasp the main unit by the handle on the back of the microscope and the recess at the base on the opposite side from the handle.
- Remove all attachments (if attached) from the microscope before carrying the microscope.
- Do not install the product in a locker or cabinet.

7. Storage conditions for installation and transportation

The microscope must be installed under the following operating conditions: temperature (0°C to 40°C), humidity (85% RH max., no condensation)

Storage conditions for transportation are as follows: temperature (-20°C to +60°C), humidity (9-% RH max., no condensation)

8. Use the microscope with the wiring cover (when using the ECLIPSE 55i)

Do not remove the cover except when assembling the product or replacing batteries. Using the system without the cover may cause a short, resulting in abnormal heat.

9. Remove any covers from the product before switching on.

Do not use the product while covered with a cloth, etc., as this will give result in abnormal heat and fire hazards.

10. Caution concerning long, sustained observations

To relieve fatigue resulting from long observation sessions, limit continuous observations to one hour. Take at least 10- to 15-minute breaks between observation sessions. Adjust the layout of other equipment (such as the display and the mouse) and match to the position of the product and the height of your chair.

11. Disposal of the product

To avoid biohazard risks, dispose of the product as contaminated equipment according to the standard procedure specified for your laboratory.

CAUTION

12. Rechargeable Battery (when using the ECLIPSE 55i)

Use the Nikon EN-EL1 Li-ion rechargeable battery for the ECLIPSE 55i. Do not use any other type of battery. Although the EN-EL1 is designed for use with Nikon digital cameras, it can also be used for the ECLIPSE 55i.

Take the following precautions when handling the battery:

- Do not expose to open flames or excessive heat.
  The battery may become hot, leak, or burst.
- Do not short circuit or disassemble.
  The battery may become hot, leak, or burst.
- Always use the charger supplied (MH-53).
  If a different charger is used, the battery may become hot, leak, or burst.
- The EN-EL1 is designed specifically for Nikon digital cameras and the ECLIPSE 55i. Do not use it for any other equipment.
  The battery may become hot or leak.
- Do not carry or store with metallic objects such as necklaces or hairpins.
  The battery may become hot, leak, or burst.
- Do not expose to direct sunlight, or leave inside a sun-heated car with all windows shut.
  The battery may become hot, leak, or burst.
- Do not drop or expose to strong impact.
  The battery may become hot, leak, or burst.
- Keep out of reach of small children.
  The battery can be swallowed by small children. If swallowed, consult a physician immediately.
- Do not immerse in water or allow to become wet.
  The battery may become hot or leak.
- Do not use if unusual features, such as discoloration or deformation, are present.
  The battery may become hot or leak.
- Do not exceed the charging period, even if battery is not fully charged.
  The battery may become hot or leak.
- Insulate the contacts with tape, etc., when disposing of the battery.
  The battery may become hot, burst, or ignite on contact with other metals.
- Observe local waste disposal regulations upon disposal.
- Please read the instruction manuals supplied with the EN-EL1 and the battery charger.

Notes on handling the product

1. Handle the product gently.

This product is a precision optical instrument and requires gentle handling. Avoid subjecting it to sudden impact and shocks.
Even relatively minor impacts are capable of affecting the precision of the object.

2. Weak electromagnetic waves

The product emits weak electromagnetic waves. Do not install the product near precision electronic devices to avoid degrading their performance. If the TV or radio reception is affected, move the TV or radio farther from the product.

3. Scratches, dirt, and foreign particles on the lens

Scratches or fouling such as fingerprints on optical components (such as lens and filters) will degrade microscope images. If these parts become dirty, clean them as described in chapter "7. Care and maintenance" at the end of this manual.

4. Dirt on the lamps (when using the ECLIPSE 50i)

Never touch the lamp with bare hands. Dirt or fingerprints on the lamp will result in uneven illumination and reduce the service life of the lamp. Always wear gloves when handling lamps.

5. Installation location

This product is a precision instrument. Use or storage in inappropriate environments may result in malfunctions or poor performance. Consider the following factors when selecting an installation location:

- Select a vibration-free location. Install the product on a level surface.
- Install the product at least 10 cm away from walls.
- Choose a location less exposed to hazards in the event of collisions, earthquakes, or other potential disasters. To keep the product from falling, use strong rope or other means if necessary to secure it to the working desk or to another heavy, stable item.
- Avoid locations exposed to direct sunlight, locations immediately under room lights, and other bright locations.
- Avoid locations with excessive dust.
- To avoid splashes, do not use the microscope near water.
- Make sure the ambient temperature is 0 to 40°C and humidity is 85% or less. Installing the COOLSCOPE in hot, humid locations may result in mildew formation or condensation, impairing performance or generating malfunctions.
- Storage conditions for transportation are as follows: temperature (-20°C to +60°C), humidity (90% RH max., no condensation)
- Do not install the product in a locker or cabinet.
- Select a layout that allows easy removal of the power cord from the product's AC inlet in the event of an emergency.
- Room lights just above the microscope may reduce visibility in the objective as extraneous light. If possible, switch off room lights directly above the microscope when making observations.

6. Focusing knobs

- Never turn the focus knobs on the left and right sides of the microscope in opposite directions at the same time. Doing so may damage the microscope.
- Turning the coarse focus knob past its farthest point will damage the microscope. Never use undue force when turning the knob.

7. Protect the ports from dust and extraneous light (when the trinocular eyepiece tube or the C-TE ergonomic binocular tube is attached).

To keep out extraneous light and dust, always attach the supplied cap to any port not currently in use.

8. Handling of filters (when J-FL 50i55i Epi-fluorescence attachment is attached to the microscope)

- Interference filters (especially excitation filters, which are exposed to strong light) degrade over time. Replace them after the appropriate number of hours.
- Filter characteristics may alter if the filter is exposed to high humidity. To prevent changes in or degradation of filter characteristics, avoid using or storing the filters under conditions of high humidity or high temperature. Avoid subjecting filters to rapid temperature changes. When a filter is not in use, store in a desiccator or hermetically sealed container with a drying agent.
- The filters in the nine types of filter cubes listed below offer sharp, high-resolution waveform characteristics superior to normal filters. However, due to their sophisticated coatings, they must be handled with special care. In particular, take care to avoid abrasion from cleaning. (Follow the procedure described in section "1. Filter and lens cleaning" of chapter "7. Care and Maintenance.")
  Single-band filter cubes: DAPI, FITC, TxRed, GFP
  Multi-band filter cubes: F-R, F-T, D-F, D-F-R, D-F-T

Abbreviations Used in This Manual

The product names and abbreviations used in this manual are given below.

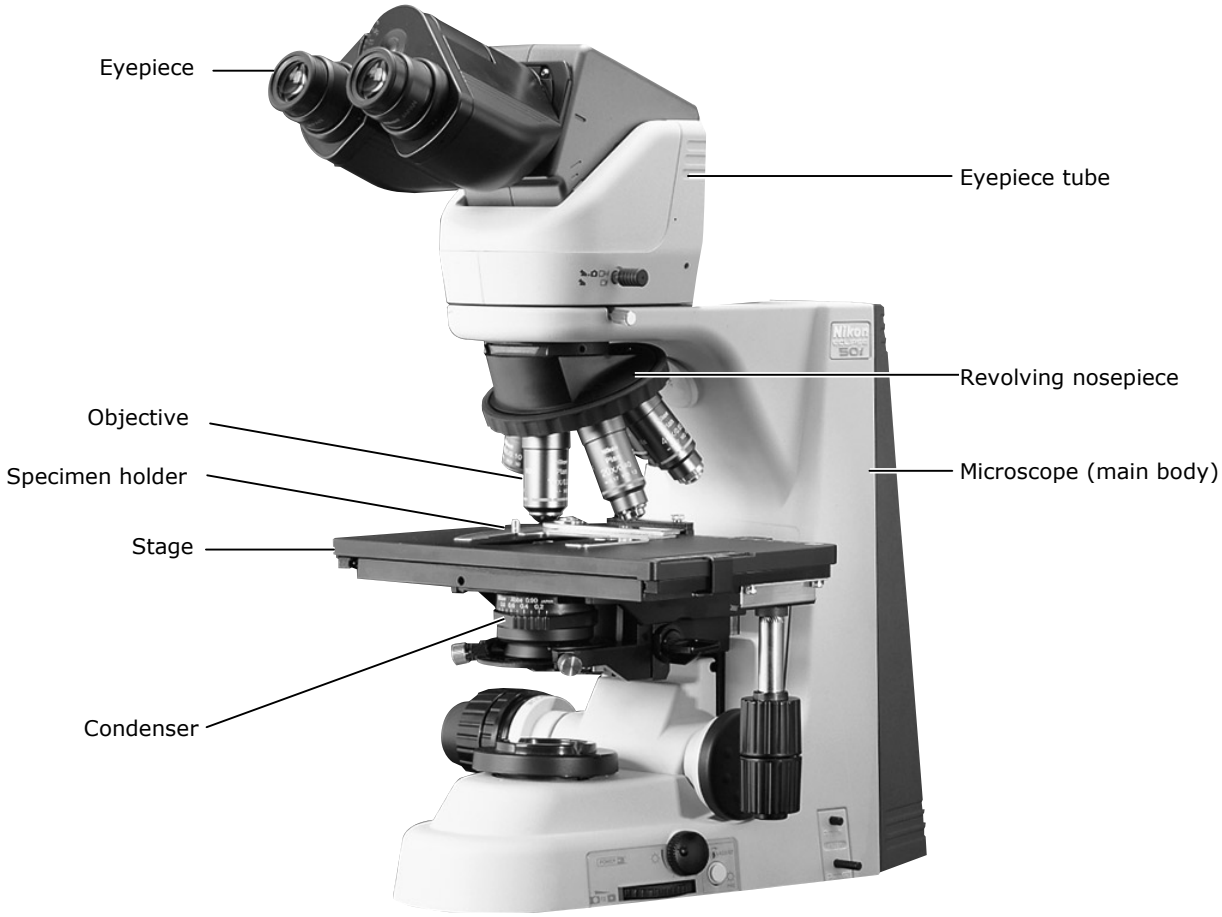
The manual uses the following abbreviations:

Name of device	Abbreviation
Microscope ECLIPSE 50i	50i
Microscope ECLIPSE 55i	55i
C-ER Eye Level Riser	Eye Level Riser
C-TE Ergonomic Binocular Tube	Ergonomic Binocular Tube
C-TEP DSC Port for Ergonomic Binocular Tube	DSC Port
J-FL 50i55i Epi-Fluorescence Attachment	Fluorescence Attachment
J-CY Cytodiagnostic Unit	Cytodiagnostic Unit
C-HS Hand switch	Hand switch
DS DS Camera Head DS-5M	Camera Head
DS Camera Control Unit DS-L1	DS-L1
DS Camera Cable	Camera Cable
Super High Pressure Mercury Light Source	Mercury Light Source
Super High Pressure Mercury Lamphouse	Mercury Lamphouse

Contents

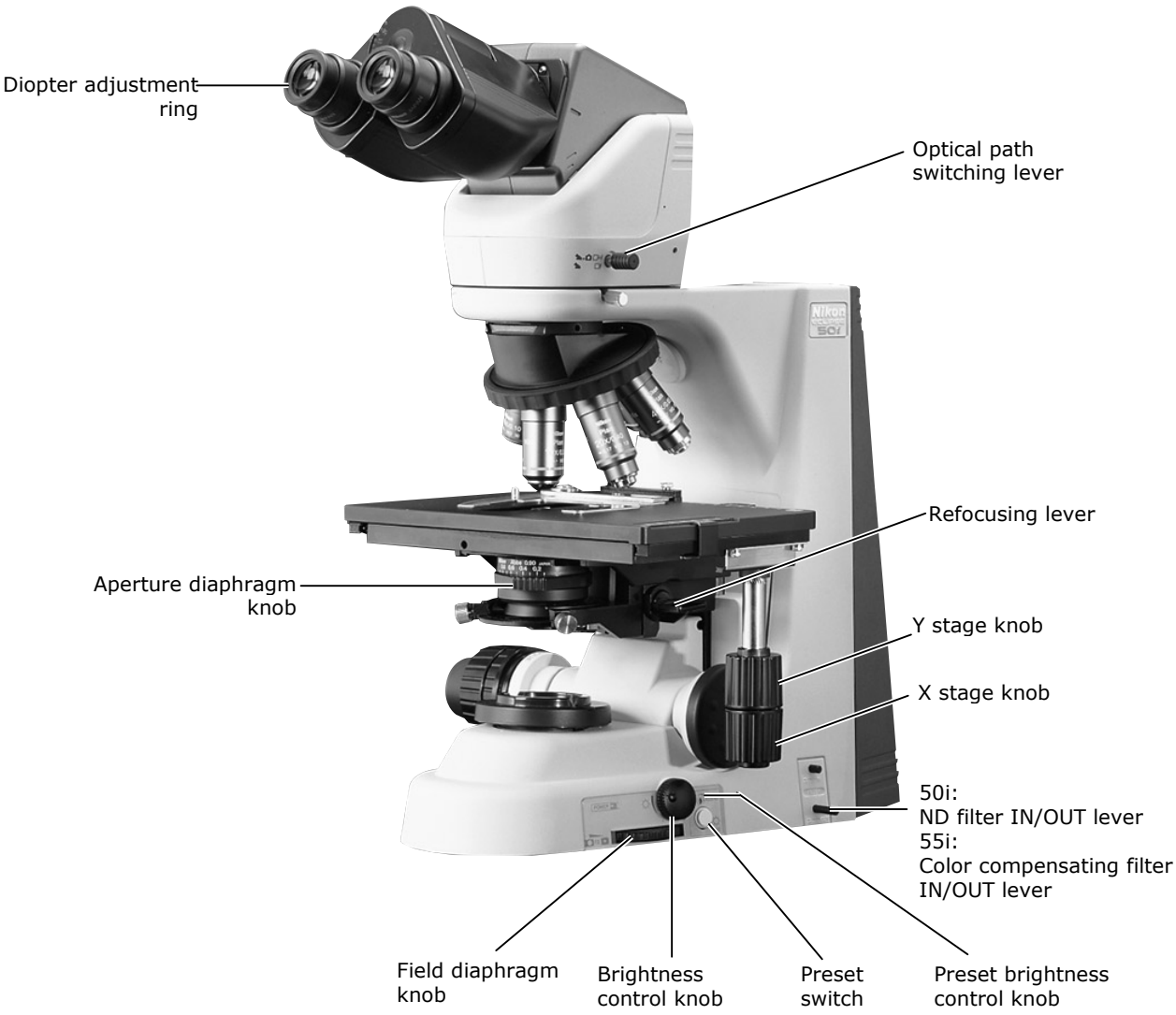
1 Part Names

1.1 Names of Main Components

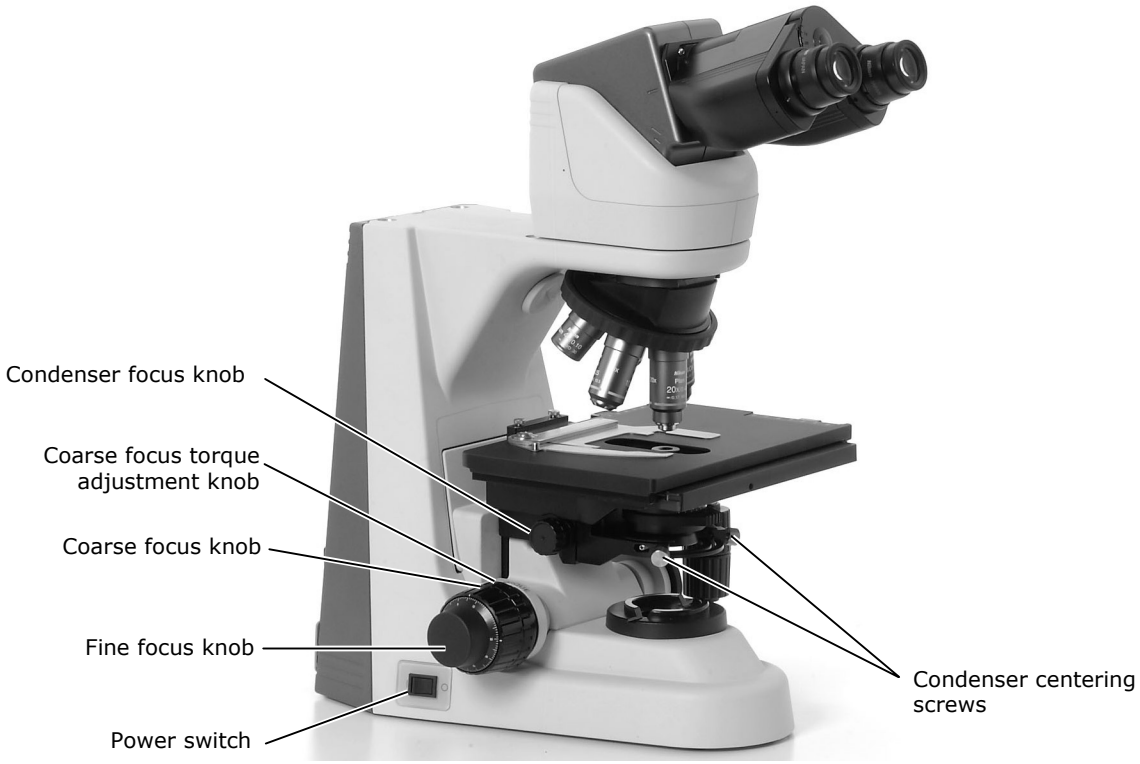


1.2 Names of Parts Used to Make Adjustments

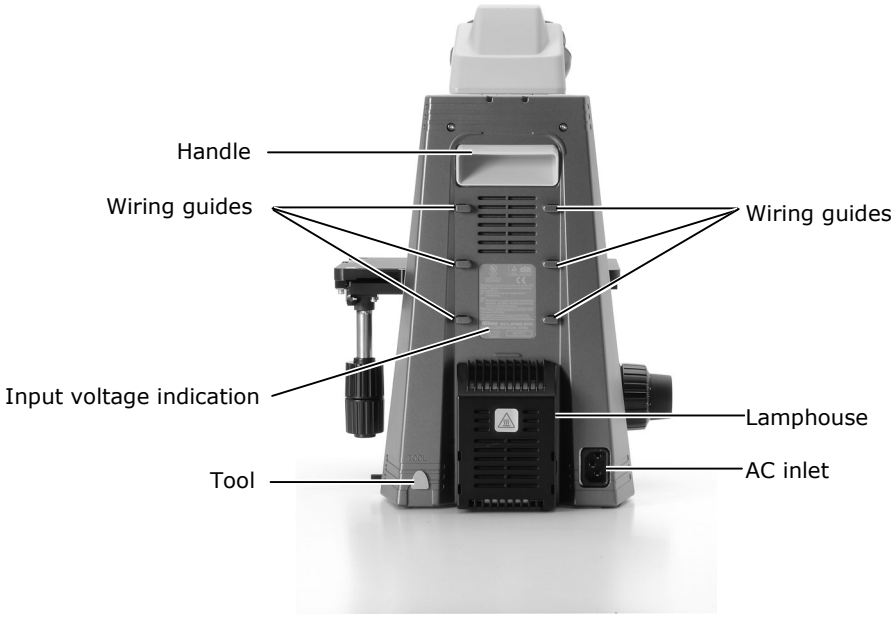
1.2.1 Right view



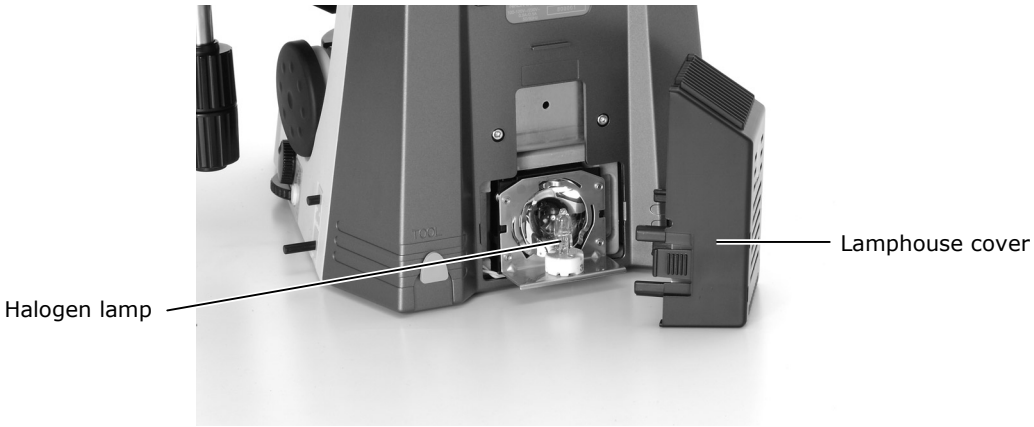
1.2.2 Left view



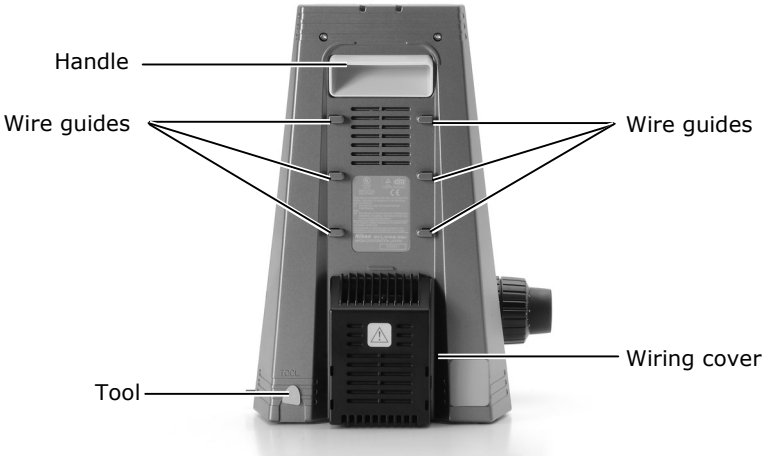
1.2.3 Rear view (50i)



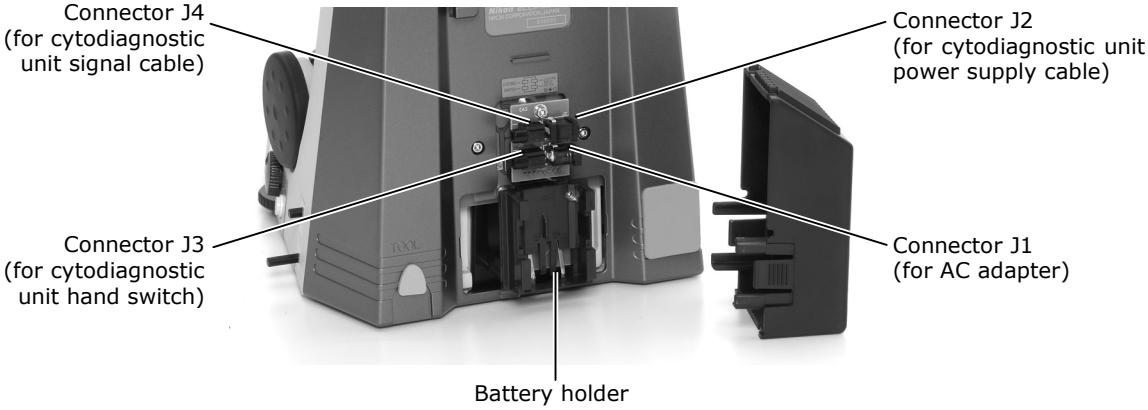
50i with lamphouse cover open



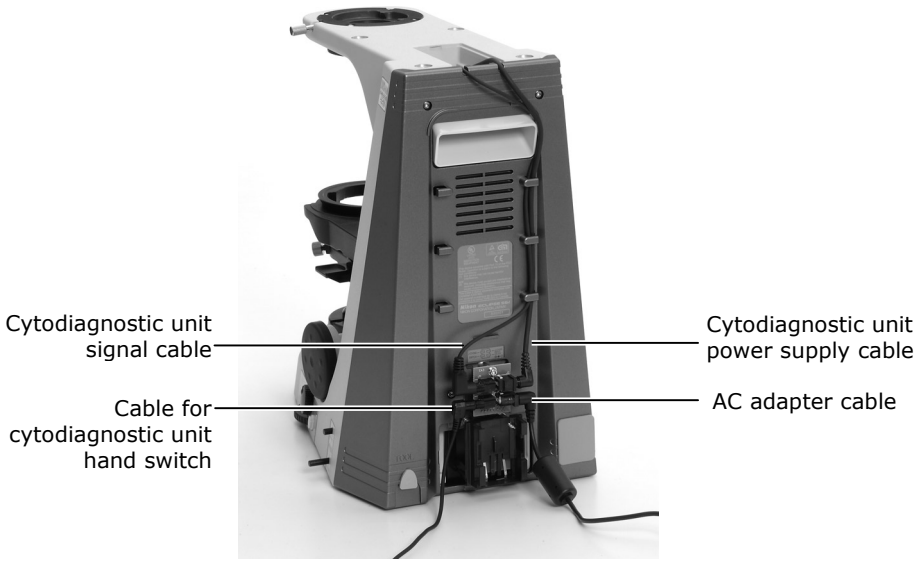
1.2.4 Rear view (55i)



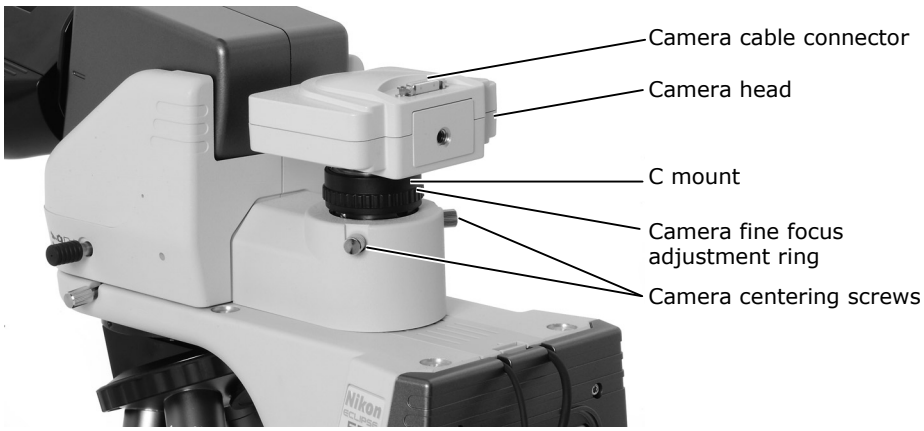
55i with wiring cover open



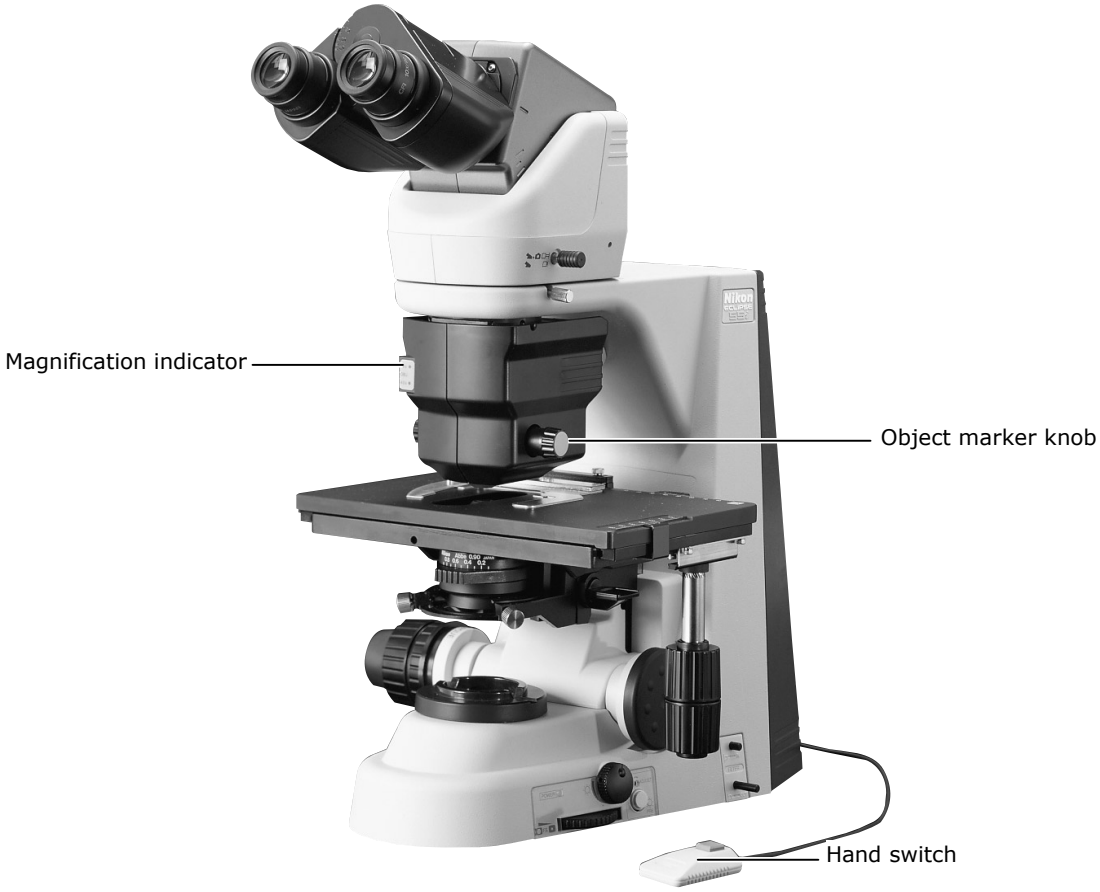
55i with cables connected



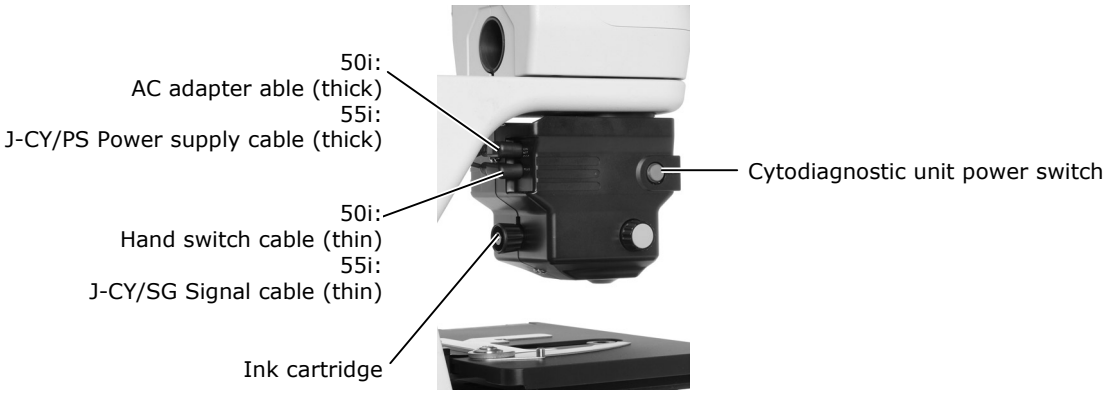
1.2.5 Ergonomic binocular tube with camera attached



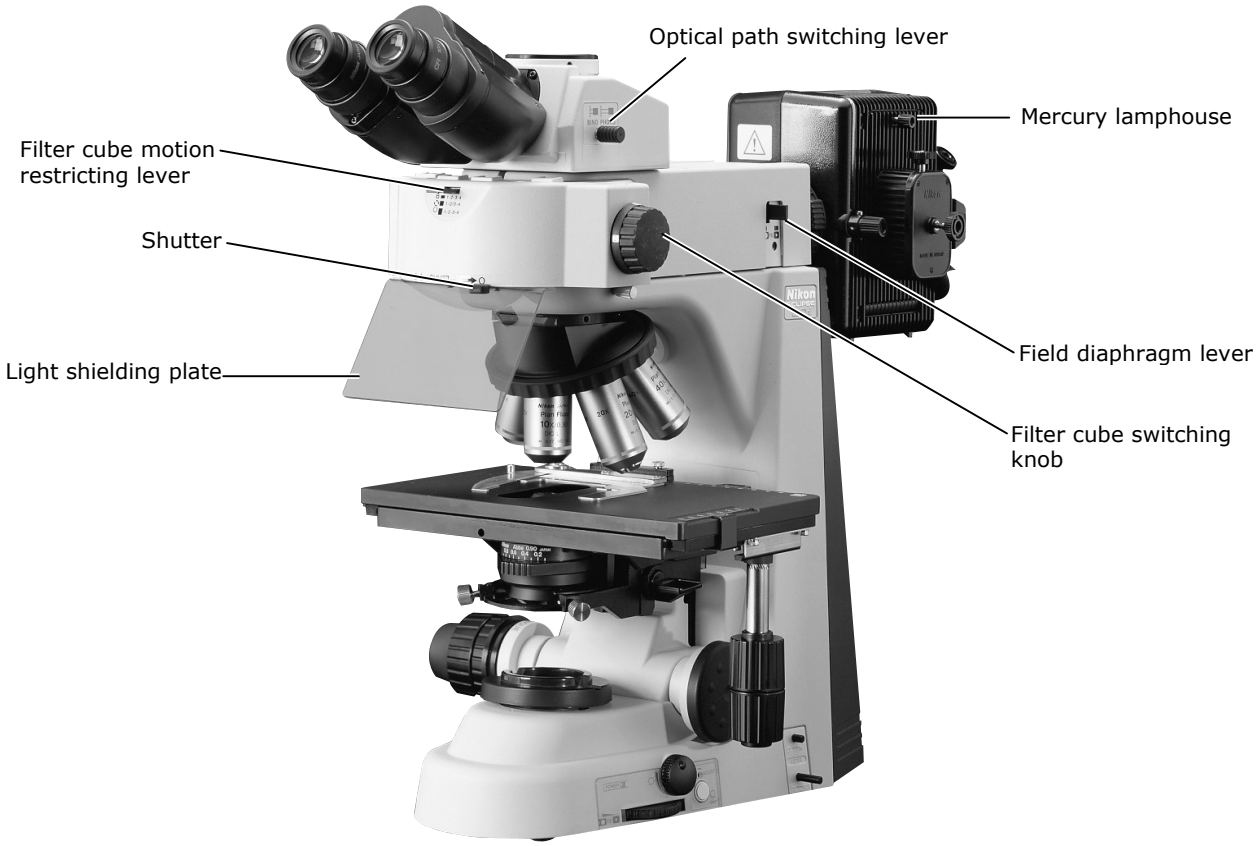
1.2.6 With cytodiagnostic unit attached



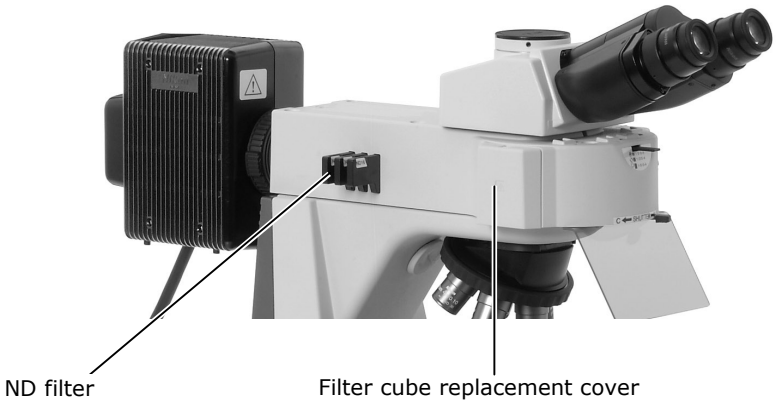
Side and rear views of cytodiagnostic unit



1.2.7 With fluorescence attachment mounted



(Mercury lamps require a separate power source.)



2 Microscopy

2.1 Bright-Field Microscopy

The ECLIPSE 55i with the low magnification objective may result in uneven illumination in the field of view.
(If the cytodiagnostic unit is mounted, refer to the directions in the following section entitled "2. Microscopy with Cytodiagnostic Unit Attached.")

1 Turn on power.

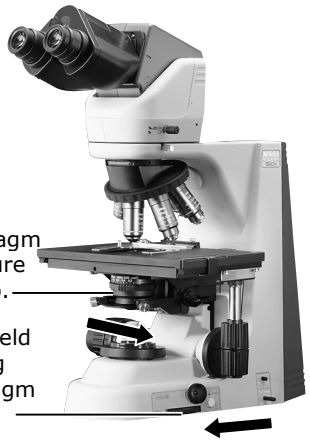
⇒ **P.35**

Press the power switch to the "|" position.

2 Raise the condenser to the uppermost position.

Raise the condenser using the condenser focus knob.

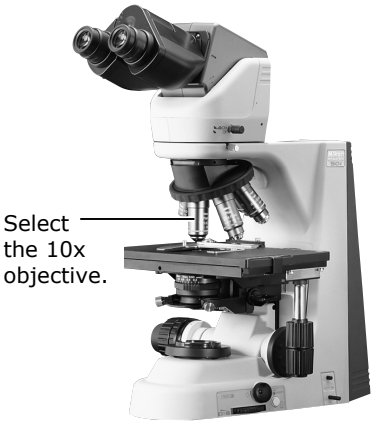
3 Fully open the field diaphragm and aperture diaphragm.



Fully open the aperture diaphragm using the aperture diaphragm knob.

Fully open the field diaphragm using the field diaphragm knob.

4 Set the 10x objective into the optical path.



5 Set a specimen and move the portion to be viewed into the optical path.

⇒ **P.42**

6 Focus on the specimen.

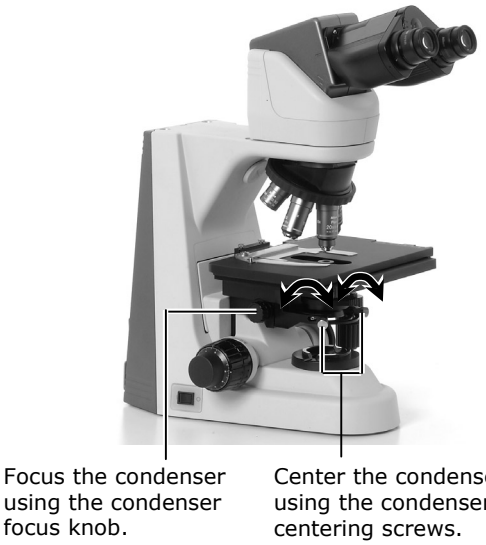
⇒ **P.40**

7 Adjust the diopter and the interpupillary distance.

⇒ **P.43**
⇒ **P.44**

8 Focus and center the condenser.

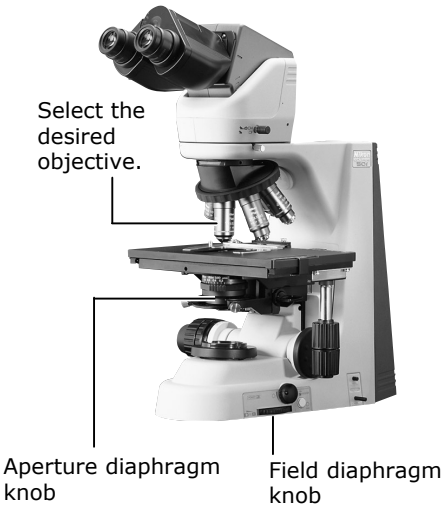
⇒ **P.45**



9 Switch to the desired objective and view the specimen.

Adjust the field diaphragm and aperture diaphragm each time you change objectives.

⇒ **P.46**
⇒ **P.47**



10 Turn off power after completing observation.

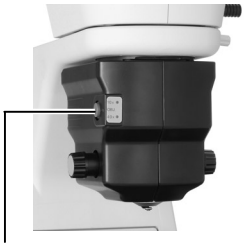
Press the power switch to the "○" position.

2.2 Microscopy with Cytodiagnostic Unit Attached

1 Turn on power.

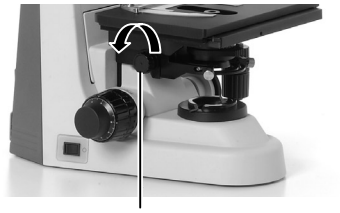
⇒ **P.35**

Press the switch to the "|" position.



Insert the cytodiagnostic unit power switch.

2 Raise the condenser to the uppermost position.



Raise the condenser using the condenser focus knob.

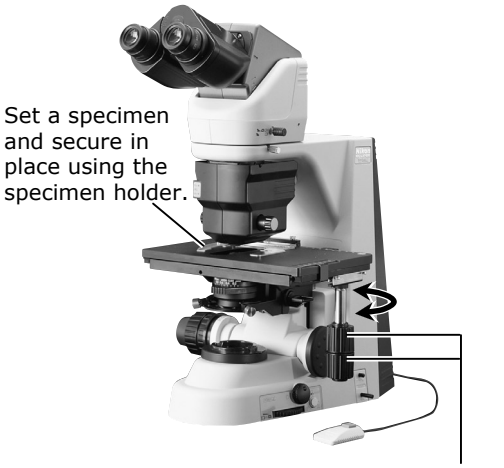
3 Fully open the field diaphragm and aperture diaphragm.

Fully open the aperture diaphragm using the aperture diaphragm knob.

Fully open the field diaphragm using the field diaphragm knob.

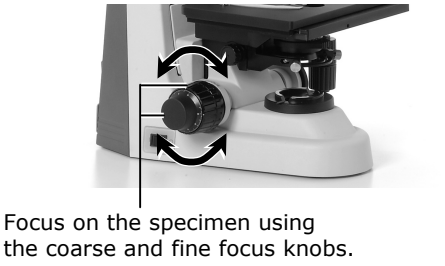
4 Set a specimen and move the portion to be viewed into the optical path.

⇒ **P.42**



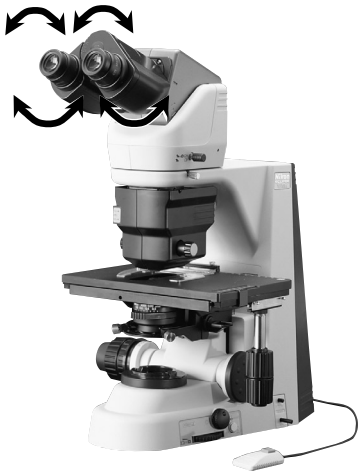
5 Focus on the specimen.

⇒ **P.40**



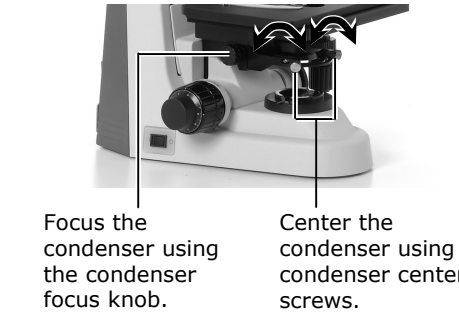
6 Adjust the diopter and interpupillary distance.

⇒ **P.43**
⇒ **P.44**



7 Focus and center the condenser.

⇒ **P.45**

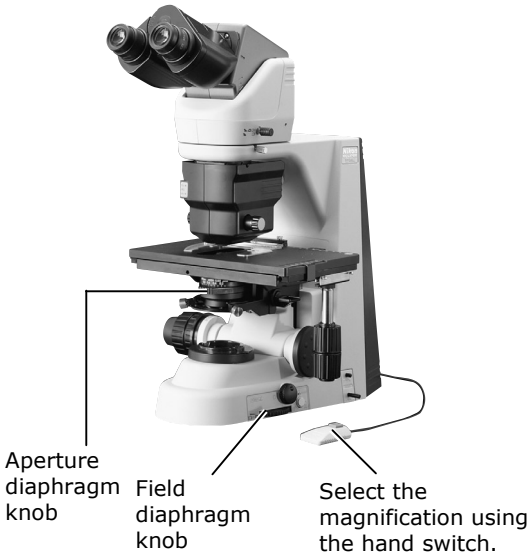


8 Switch magnification using the hand switch.

Adjust the field diaphragm and aperture diaphragm for optimal image quality.

⇒ **P.50**
⇒ **P.46**
⇒ **P.47**

Contrast may be reduced when viewing certain specimens at 40× magnification. If this happens, reduce magnification to 10× and stop down the field diaphragm as far as possible. This will minimize contrast loss.



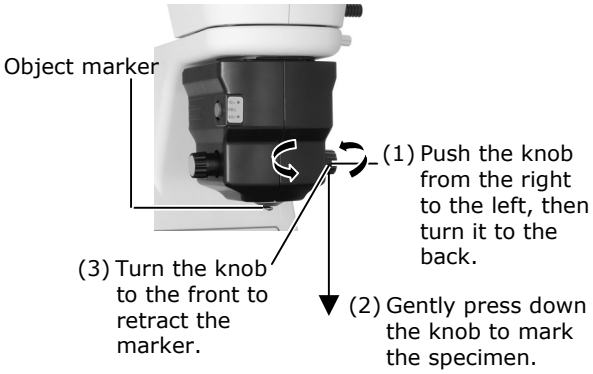
9 To mark the specimen, follow the procedure given below:

(1) Holding the object marker knob with both hands, push it from the right toward the left, then turn it toward the back to extend the marker.

(2) Gently press down the entire object marker knob to apply a mark.

(3) Turn the object marker knob toward the front to retract the marker.
⇒ P.50

(4) Release both hands from the object marker knob.



10 Turn off all power switches after completing observations.

2.3 Microscopy with Fluorescence Attachment Mounted

Before microscopy

- **Check the cumulative operating hours of the mercury lamp. Replace the lamp if its cumulative operating hours exceed the average service life.**
- **Use non-fluorescent slide glass.**
- **Use non-fluorescent immersion oil.**
- **To keep the specimen color from fading, keep the shutter closed when not performing microscopy.**

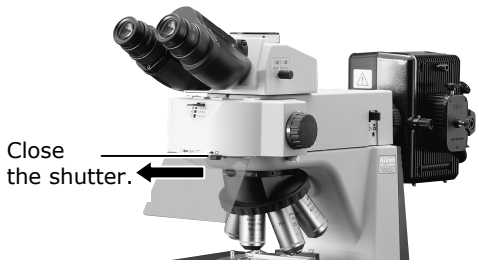
1 Perform steps 1 through 10 in "1 Bright-Field Microscopy."

2 Turn off the microscope power switch.

Press the power switch to the "○" position.

3 Close the shutter and block the light emitted by the mercury lamp.

⇒ **P.51**



4 Insert the excitation filter cube to be viewed into the optical path.

⇒ **P.52**

Select a cube using the filter cube switching knob.

5 **Fully open the field diaphragm of the fluorescence attachment.**

⇒ **P.51**

Fully open the field diaphragm.

6 **Turn on the mercury lamp, then open the shutter and center the lamp. (Refer to the operating manual for the light source.)**

7 **Set the 10x objective into the optical path.**

Select the 10x objective.

8 **Set a specimen and move the portion to be viewed into the optical path.**

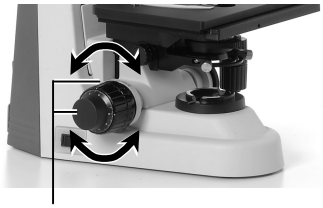
⇒ **P.42**

Set a specimen and secure in place using the specimen holder.

Move the portion to be viewed into the optical path using the XY stage knobs.

9 **Focus on the specimen.**

⇒ **P.40**

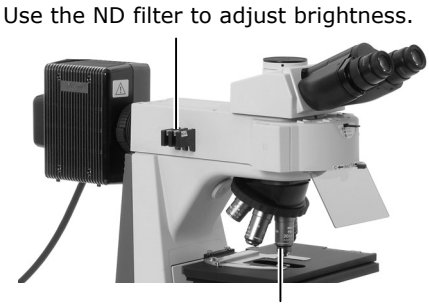


Focus on the specimen using the coarse and fine focus knobs.

10 Switch to the desired objective and view the specimen.

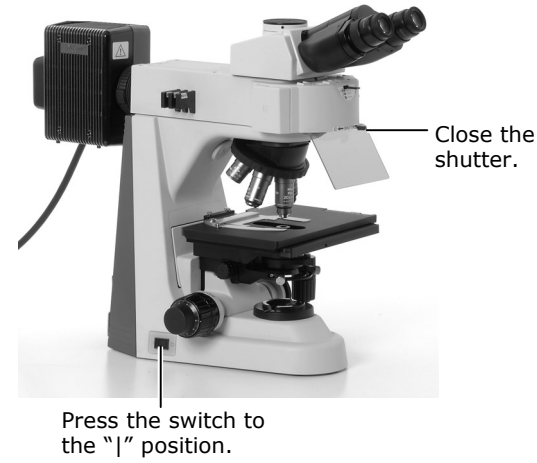
- Refocus.
- Use the ND filter for the fluorescence attachment to adjust brightness.
- Adjust the field diaphragm so that it extends slightly beyond the field of view.
- When using an oil immersion type objective, apply immersion oil between the specimen and the objective.

⇒ **P.51**
⇒ **P.48**



11 To return to bright-field microscopy.

- Close the shutter of the fluorescence attachment and block the light emitted by the mercury lamp.
- Turn on the microscope power switch to turn on the diascopic light source.
- Turn the fluorescent cube switching knob and move the position without a fluorescent cube into the optical path.



12 Turn off all power switches after completing observations.

2.4 Photomicroscopy

For detailed discussions of the camera, photomicroscopic software, and PC, refer to the operating manuals provided with the respective products. The following instructions assume a DS-5M digital camera and DS-L1 camera control unit.

1 Adjust the microscope for proper image observation.

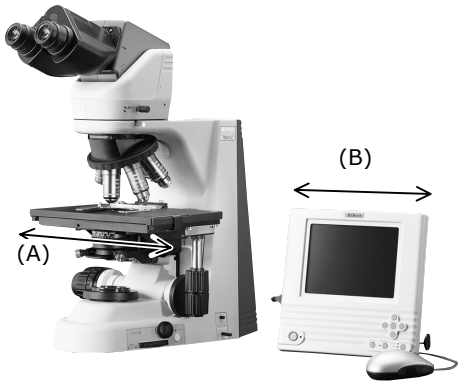
See the directions given in sections from "1. Bright-Field Microscopy" to "3. Epi-fluorescence Microscopy."

2 Adjust the camera head mounting position until the image is displayed properly.

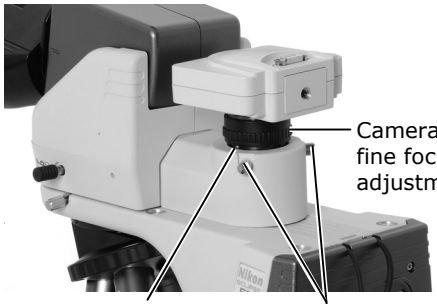
(1) Adjustment based on stage motion direction
Loosen the C mount installation direction locking screw and adjust the camera position so that moving the stage forward-backward or right-left moves the image on the monitor in opposite directions. After making the appropriate adjustments, tighten the screw to secure the C mount into place.

(2) Focus adjustment
If the image viewed through the eyepiece appears to be in focus but the image on the monitor is out of focus, turn the camera fine focus adjustment ring on the C mount until the image on the monitor is in focus.
Note that such out of focus situations can also indicate incorrect diopter adjustment. Make sure you have made diopter adjustments. (P.43)

(3) Centering the camera
Turn the right and left camera centering screws to align the image seen through the eyepiece with the image on the monitor.



Adjusting (A) and (B)



3 Make camera settings.

For detailed discussion, refer to the operating manual provided with the camera.
When using the DS-L1, you must choose and enter at least the following information:

- Folder for data storage.
- Name of file to be saved. (You can select "Auto.")
- File format and file size.
- Date and destination of data

4 Select the camera scene mode suitable for the microscopy method.

5 Set the camera white balance.

To adjust white balance, press the WB button while capturing an image of a clear section of a specimen slide. (For fluorescent photomicrography, adjust white balance under normal lighting conditions before shooting.)

6 Capture and save images.

Focus on the specimen.
Refocus.
Adjust image brightness using the camera exposure compensation function.
Check the image using the Freeze button.
If the image is acceptable, press the CAPT. button to save the image.

(The operating procedure differs if DF/FL scene mode is selected. For detailed discussion, refer to the operating manual provided with the camera.)

3 Individual Operations

Item	Title	Operating sections
3.1	Power ON/OFF	Power switch, battery, AC adapter
3.2	Brightness Adjustment	Brightness control knob, preset switch, ND filter, color compensating filter
3.3	Optical Path Switching	Optical path switching knob
3.4	Vertical Stage Motions	Coarse/fine adjustment knobs, coarse torque adjustment ring, refocusing lever
3.5	Lateral Stage Motions	X knob, Y knob, XY knob torque adjustment screws
3.6	Diopter Adjustment	Diopter adjustment rings
3.7	Interpupillary Adjustment	Eyepiece sleeve
3.8	Adjusting Observation Position	Ergonomic binocular tube
3.9	Adjusting Condenser Position	Condenser focus knob, condenser centering screws
3.10	Aperture Diaphragm Adjustment	Condenser aperture diaphragm, objective
3.11	Selection of Condenser	Condenser
3.12	Field Diaphragm Adjustment	Field diaphragm knob
3.13	Oil Immersion Operation	Oil immersion objectives, oil immersion condensers
3.14	Water Immersion Operation	Water immersion objectives, water immersion condensers
3.15	Operation of Cytodiagnostic Unit	Cytodiagnostic unit, hand switch
3.16	Fluorescence observation	Fluorescence attachment
3.17	Fluorescent Filter Selection	Filter cube
3.18	Image Capture	Camera

3.1 Power ON/OFF

3.1.1 Turning on the microscope

To turn on the microscope, press the power switch to the "|" position.

To turn off the microscope, press the power switch to the "○" position.

3.1.2 Turning on the cytodiagnostic unit

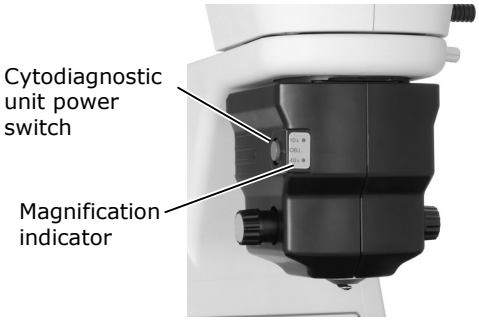
Depress the power switch to turn on the cytodiagnostic unit.

Turning on the unit starts initialization and sets the magnification of the cytodiagnostic unit to the 10x setting.

The "10x" magnification indicator lights.

Press the power switch. The switch pops out, and the cytodiagnostic unit is switched off.

The magnification indicator turns off.



3.1.2 Turning on the fluorescence attachment light source (mercury lamp)

Refer to the operating manual provided with the super high-pressure mercury lamp power supply unit.

Always observe all warnings and precautions described in the manual.

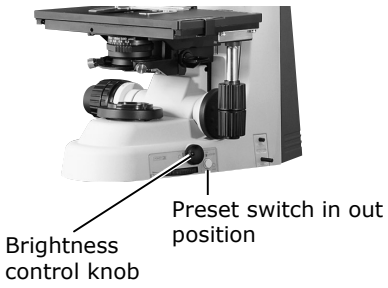
3.2 Brightness Adjustment

Image brightness can be adjusted by the following methods:

	Method	Operating controls	Explanation
Transmitted image	Adjusting lamp voltage (The 50i is subject to shifts in color temperature.)	Brightness control knob	3.2.1
		Preset switch Preset brightness control knob	3.2.2
	ND filter attachment/detachment (for 50i only)	ND filter IN/OUT lever	3.2.3
	(for 55i when a cytodiagnostic unit is mounted) Automatic adjustment after magnification change	Hand switch (Do not set the brightness control knob to the maximum position. Make sure the preset switch is not depressed.)	3.2.4
Epi-fl image	ND filter	Attaching/removing ND filter for fluorescence attachment	3.2.5
	Erasure of transmitted image	Microscope power switch	3.2.6
(Monitor image)	Camera adjustment	Application software for camera control: Display mode, exposure mode, exposure compensation, camera gain adjustment, etc.	3.2.7

3.2.1 Adjustment using the brightness control knob

With the preset switch in the out position, rotate the brightness control knob. (The brightness control knob is disabled if the preset switch is depressed.)



Brightness control knob	Image brightness
Clockwise rotation	Becomes brighter
Counterclockwise rotation	Becomes darker

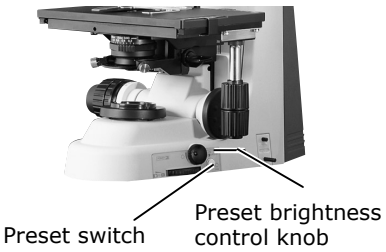
For 50i

Adjusting brightness with the brightness control knob will affect the lamp color temperature and alter the color balance of the image. If accurate color reproduction is critical, set the brightness control knob to a midpoint setting and use the ND filter to make brightness adjustments.

3.2.2 Adjustment using the preset switch

Push in the preset switch to enable the brightness level (lamp voltage) previously set with the preset brightness control knob.

Toggle the preset switch – i.e., return it to the out position – to enable the brightness level (lamp voltage) previously set with the preset brightness control knob.



How to use the preset brightness control knob

Push in the preset switch to set it to the depressed position.
While viewing the actual image, turn the knob with a precision screwdriver until the desired brightness is achieved.
Setting the preset switch to the depressed position enables the brightness level set with the preset brightness control knob.

For 55i when a cytodiagnostic unit is mounted

To adjust brightness automatically after switching magnification, make sure the preset switch is in the out position.

3.2.3 Adjustment with the ND filter IN/OUT lever (for 50i)

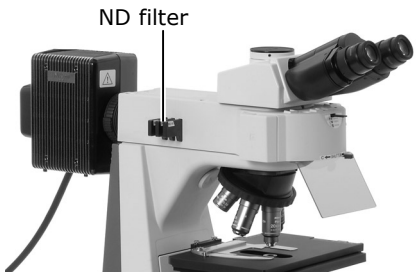
Pushing in the ND filter IN/OUT lever moves the ND filter (light intensity adjustment filter) into the optical path and reduces brightness. The color balance of the image remains unaffected.

3.2.4 Automatic adjustment after magnification change (only for a 55i when a cytodiagnostic unit is mounted)

If the cytodiagnostic unit is mounted to a 55i, pressing the hand switch to change magnification will also activate brightness adjustment.
However, the brightness control knob must not be at the maximum setting, and the preset switch must not be in the depressed position for this automatic adjustment function to activate.

3.2.5 Adjustment with the ND filter for the fluorescence attachment

Pushing in the ND filter attach/detach lever moves the ND filter into the optical path and darkens the fluorescent image.
ND filters are used to adjust light intensity. Higher filter numbers correspond to lower transmission rates (i.e., darker images). ND filters do not affect color balance. (The table on P.53 shows the brightness levels achieved by different combinations of the three filters.)



ND2: Reduces light intensity by 1/2.

ND4: Reduces light intensity to 1/8 previous levels.

ND16: Reduces light intensity to 1/16 previous levels.

3.2.6 Transmitted image in fluorescence observation

For fluorescence observations, turn off the microscope power switch to cancel the transmitted image.
Bright ambient lights will make it more difficult to view the image. We recommend keeping the room dark during fluorescence observations.

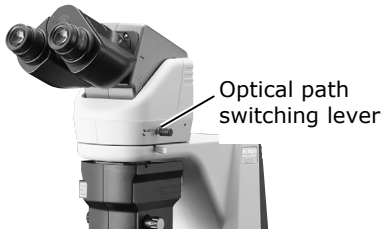
3.2.7 Camera adjustment (adjusting the brightness of the image on the monitor)

When observing images captured by the camera and displayed on the monitor, you can adjust brightness by varying camera adjustment parameters, such as display mode, exposure mode, metering mode, exposure compensation, and image level adjustment.
For detailed discussion, refer to the operating manual provided with the camera or camera control software.

3.3 Optical Path Switching

3.3.1 Optical path distribution

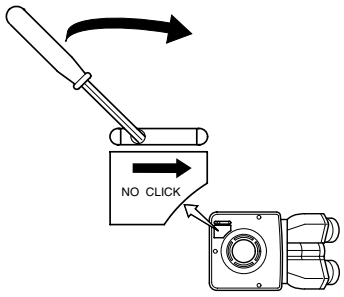
With the ergonomic binocular tube or trinocular eyepiece tube, the optical path switching lever allows distribution of light to the binocular section and camera port.



	Position of optical path switching lever	Optical path distribution (%)	
		Binocular section	Camera port
Ergonomic binocular tube	Pushed in	100	0
	Extended	50	50
Trinocular eyepiece tube T	Pushed in	100	0
	Extended by one notch	20	80
	Extended by two notches	0	100
Trinocular eyepiece tube F	Pushed in	100	0
	Extended	0	100

3.3.2 Disabling the clicking of the optical path switching lever

The trinocular eyepiece tubes T and F have a "NO CLICK" switch on their tube mounting surfaces. Slide this switch in the direction of the arrow with the tip of a pointed tool to disable clicking for the optical path switching lever. Set the switch to this position if you need to eliminate the slight vibrations resulting from the clicking action.



3.4 Vertical Stage Motion

3.4.1 Prohibited actions

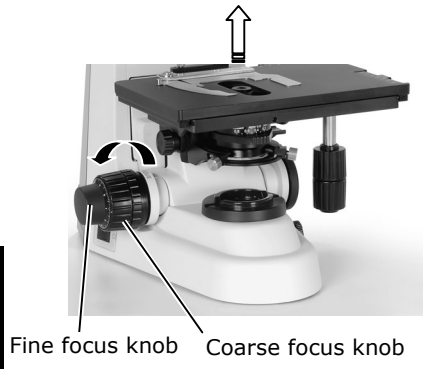
Avoid the following actions, which can cause equipment malfunctions.

- **Rotating the right and left coarse/fine focus knobs in opposite directions.**
- **Rotating the coarse focus knob past the stopper.**

3.4.2 Knob rotation direction and stage motion direction

Turn the coarse or fine focus knob to raise or lower the stage and to adjust image focus.
The coarse focus knob is located on either the right side or the left side. A fine focus knob is provided on both sides.

To lower the stage	Turn the knob toward the front.
To raise the stage	Turn the knob toward the back.



3.4.3 Number of knob turns and distance of stage travel

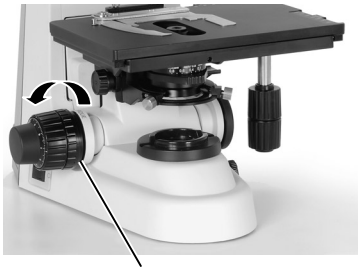
No. of knob turns	Distance of stage travel (vertical direction)
Coarse focus knob 1 turn	Approx. 13.8 mm
Fine focus knob 1 turn	Approx. 0.1 mm
Fine focus knob 1 graduation on scale	1 μm

The vertical motion range (coarse/fine focus stroke) of the stage is from 2 mm above the focal point (reference position) to approximately 28 mm below the focal point.

3.4.4 Adjusting the rotating torque of the coarse focus knob

Adjust the rotation torque of the coarse focus knob (rotation resistance) by turning the torque adjustment ring (TORQUE) located at the base of the coarse focus knob. If the torque is too low, the stage may descend under its own weight.

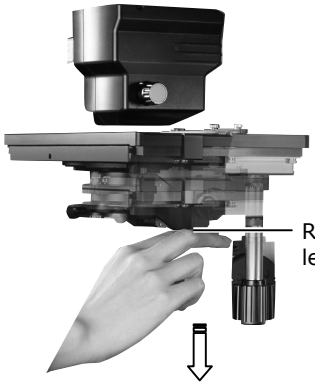
When turned in the direction of arrow	Makes knob harder to turn.
When turned in the direction opposite to arrow	Makes knob easier to turn.



Coarse focus torque adjustment knob

3.4.5 How to refocus

The entire stage can be lowered by setting a finger on the refocusing lever or top surface of the stage and pushing down. When the finger is released, the stage slowly returns to its original position.
If the stage is lowered to the lowest position, it will be locked in that position.
Push down once again to disengage the lock, allowing the stage to return to the original position.
This function is useful when replacing specimens.
Be sure to lower the stage slowly.



Refocusing lever

3.5 Lateral Stage Motion

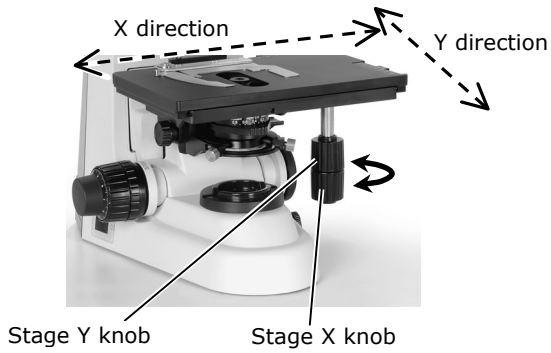
3.5.1 Prohibited action

Avoid the following actions, which can cause equipment malfunctions.

- **Moving the stage to the left and right by holding the top surface of the stage directly.**

3.5.2 Knob rotation direction and stage motion direction

To move the stage in the X or Y direction, rotate the stage X knob or stage Y knob.



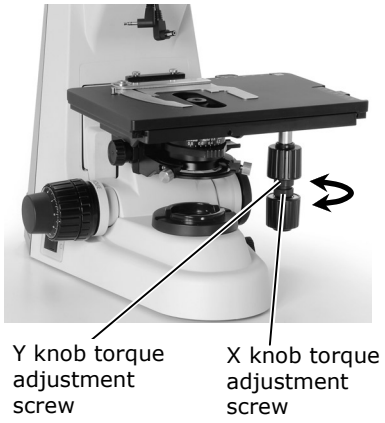
3.5.3 Adjusting the knob heights

The heights (positions) of the X knob and Y knob can be changed. Hold the knob and move it along its vertical axis to the desired height.

3.5.4 Adjusting the knob rotation torque

When the X knob and Y knob are moved to the top and bottom positions, the torque adjustment screws can be found between the knobs.

Turning the torque adjustment screw to move them closer towards the respective knobs increases rotational torque.
(To increase rotational torque, turn the adjustment screw counterclockwise and clockwise, as viewed from above, for the Y knob and X knob, respectively.)
Avoid loosening these screws excessively. If they are too loose, the top surface of the stage may move, even at a very light touch.



3.6 Diopter Adjustment

Diopter adjustment compensates for differences in visual acuity between the right and left eyes, improving binocular observation. It also minimizes focal deviations when switching objectives. Adjust diopter settings for both eyepiece lenses.

(1) Turn the diopter adjustment ring of each eyepiece lens and align the end face of the diopter adjustment ring with the line. (This is the diopter adjustment reference position.)

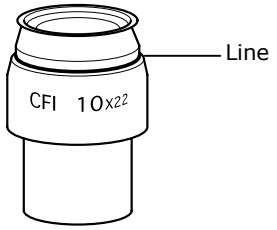
(2) Perform steps 1) to 10) in "2-1. Bright-Field Microscopy" to focus on the specimen with the 10x objective.

(3) Set the 40x objective in the optical path. Using the coarse/fine focus knobs, focus on the specimen.

(4) Set the 4x or 10x objective in the optical path.

(5) Focus on the specimen using the diopter adjustment rings instead of the coarse/fine focus knobs. When making focus adjustments, be sure to look through the right eyepiece with your right eye and the left eyepiece with your left eye.

(6) Perform steps (3) through (5) twice.

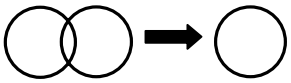


Reference position for diopter adjustment

3.7 Interpupillary Adjustment

Interpupillary adjustment improves the ease of binocular observation.

Perform steps 1) to 10) in "2-1. Bright-Field Microscopy" and focus on the specimen using the 10x objective. Then, move the eyepiece sleeve until the fields of view for the right and left eyes coincide.

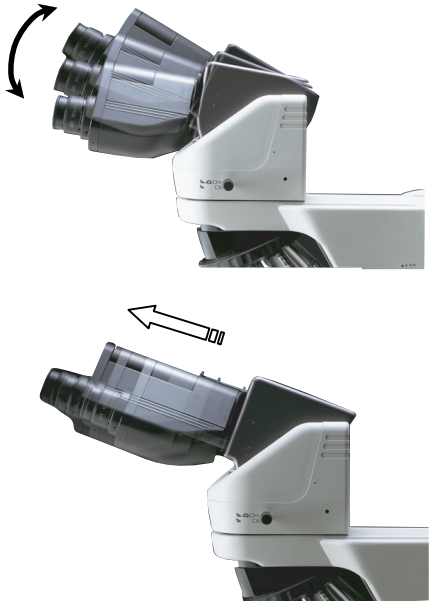


Field of view

The right and left fields of view converge until they coincide.

3.8 Adjusting the Observation Position

The ergonomic binocular tube makes it possible to extend and tilt the binocular section. Adjust the position of the binocular section for the most comfortable viewing.



3.9 Adjusting the Condenser Position

Adjust the condenser (focusing and centering) so that the light passing through the condenser forms an image at the correct location (center of the optical path) on the specimen surface.

(1) Perform steps 1) to 10) in "2-1. Bright-Field Microscopy" to focus on the specimen using the 10x objective.

(2) Stop down the field diaphragm to the minimum setting.

(3) Turn the condenser focus knob to form the field diaphragm image on the specimen surface.

(4) Turn the condenser centering screws so that the field diaphragm image is positioned in the center of the field of view.

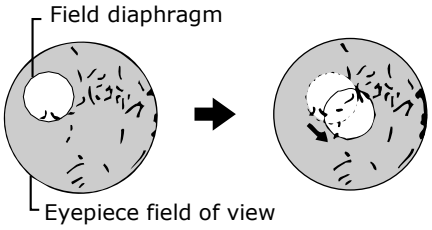
(5) Set the 40x objective in the optical path. Turn the coarse/fine focus knobs and focus on the specimen.

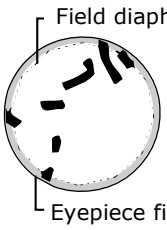
(6) Turn the condenser focus knob to form the field diaphragm image on the specimen surface.

(7) Adjust the condenser centering screws until the field diaphragm is at the center of the eyepiece field of view. This is easiest if you set the field diaphragm aperture to slightly smaller than the eyepiece field of view.

Turn the field diaphragm knob and stop down the field diaphragm to its minimum setting.

Condenser focus knob Condenser centering screws





3.10 Adjusting the Aperture Diaphragm

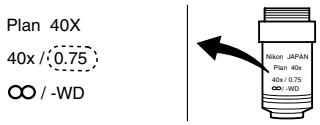
The setting of the aperture diaphragm affects optical image resolution, contrast, depth of field, and brightness. Turning the condenser aperture diaphragm ring (or aperture diaphragm knob) changes the size of the aperture diaphragm.

A small aperture diaphragm opening reduces resolution and brightness but increases contrast and depth of field. A large aperture diaphragm size increases resolution and brightness but reduces contrast and depth of field. These characteristics involve inherent tradeoffs and cannot be optimized independently. Generally, aperture settings that are 70 to 80% of the maximum aperture of the objective will provide satisfactory images with suitable contrast.

Since an excessively small aperture diaphragm opening will degrade image resolution, we do not recommend setting the aperture diaphragm to less than 60% of the objective's maximum aperture.

Aperture diaphragm knob

The maximum numerical aperture is indicated on the side of the objective.



0.75X0.7～0.8=0.525～0.6

3.10.1 Adjusting the aperture diaphragm opening using the condenser scale

Since the condenser scale indicates the numerical aperture set, adjust the aperture diaphragm ring according to the scale.
(Normally, the index on the aperture diaphragm ring should align with a scale line that corresponds to 70 to 80% of the maximum aperture of the objective.)

3.10.2 Adjusting the aperture diaphragm opening using the centering telescope (optional)

Remove one eyepiece lens and mount the centering telescope in place using the optional adapter. Turn the aperture diaphragm ring to stop down to the minimum aperture. While holding down the flange of the centering telescope, turn the eyepiece of the centering telescope and focus on the aperture diaphragm.

Turn the diaphragm ring to adjust the aperture. (Normally, the aperture diaphragm should be adjusted to around 70 to 80% of the size of the field of view.)

After the adjustment, remove the centering telescope and adapter and reinstall the eyepiece.

3.11 Selecting a Condenser

Objective magnification	Condenser (◉: Optimum, ○: Suitable, x: Not suitable)					
	Achromatic/aplanat condenser	Swing-out condenser	Achromat condenser	Abbe condenser	Low-magnification condenser	1-100x condenser
1x	x	x	x	x	◉Note 2	◉
2x	x	○Note 3	x	x		
4x	x		○Note 2	○Note 1		
10x to 100x	◉	○	○	○	x	

Note 1: The entire field of view may not be covered if a UW eyepiece is attached.
Note 2: Indoor lighting and light from other sources reflected from the surface of the condenser lens may enter the field of view. If this happens, dim the indoor lighting or find some way to keep strong extraneous light from striking the stage.
Note 3: Swing out the top lens before use.

Depending on the type of objective, the indicated numerical aperture of the objective may not be achieved.

For example, when an objective with an N.A. of 1.4 is used, the maximum aperture of the swing-out condenser or the Abbe condenser will be only about 65% of the objective's N.A., even when the condenser aperture diaphragm is wide open.

Refer to the condenser operating manual for more information on phase contrast condenser.

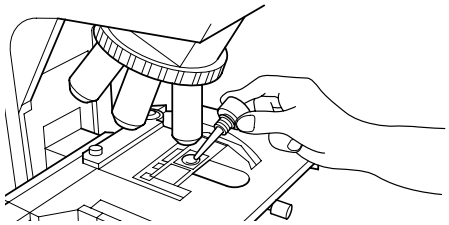
3.12 Adjusting the Field Diaphragm

The field diaphragm controls the amount of illumination falling on the area of the specimen being viewed. Turning the field diaphragm knob changes the size of the field diaphragm. For normal observations, the size of the diaphragm should be slightly wider than the boundary of the field of view. Illuminating a broader area than necessary will result in stray light entering the field of view, generating flare and reducing image contrast. Appropriate field diaphragm settings are particularly important for photomicrography. In general, good results will be obtained by stopping down the field diaphragm to settings slightly wider than the area to be reproduced within the photo frame or monitor display.

Field diaphragm knob

3.13 Oil Immersion Operation

Objectives marked "Oil" are oil-immersion objectives. Objectives of this type are used with immersion oil applied between the specimen and the tip of the objective.



For maximum performance, oil-immersion objectives with numerical apertures of 1.0 or higher should be combined with oil-immersion chromatic/aplanat condensers. Oil-immersion condensers are used by applying oil between the specimen and the condenser.

Any bubbles in the immersion oil will degrade image quality. Be careful to prevent bubbles from forming. To check for air bubbles, fully open the field diaphragm and aperture diaphragm, remove the eyepiece, and examine the exit pupil (bright round section) of the objective inside the eyepiece tube. If it is difficult to ascertain the presence of bubbles, mount a centering telescope (optional) with the adapter (optional), then look for air bubbles while turning the eyepiece section of the centering telescope to adjust focus. If you detect bubbles, remove them by one of the following methods:

- Turn the revolving nosepiece slightly to move the oil-immersed objective back and forth once or twice. (In the case of the condenser, gently turn the condenser focus knob to move the condenser up and down slightly.)
- Add oil.
- Remove the oil and apply new oil.

Use as little oil as possible (just enough to fill the space between the tip of the objective and the specimen, or between the tip of the condenser and the specimen). Too much oil will result in excess oil flowing onto the stage and around the condenser.

Any oil remaining on the oil-immersion objective or adhering to the dry-type objective will noticeably degrade image quality. After use, thoroughly wipe off all oil, and make sure that no oil remains on the tips of other objectives. Additionally, carefully wipe off oil from the condenser.

Use petroleum benzine to wipe off immersion oil. For optimum results, we recommend following up petroleum benzine with absolute alcohol (ethyl or methyl alcohol).

If petroleum benzine is unavailable, use methyl alcohol alone. When using just methyl alcohol, note that surfaces will need to be wiped repeatedly to ensure complete removal of immersion oil. Usually, three or four times should be sufficient to clean the lens.

CAUTION

When using petroleum benzine or absolute alcohol, always follow the instructions provided by the manufacturer. These liquids are highly flammable and must be kept away from flames and sparks.

3.14 Water Immersion

Objectives marked "WI" or "W" are water-immersion objectives. These objectives are used with immersion water (distilled water or physiological saline) applied between the specimen and the tip of the objective. Microscopy procedures are the same as for oil-immersion objectives.

Since water evaporates readily, monitor the immersion water during observation. Avoid using too much water, since excess water will flow onto the stage and around the condenser, promoting corrosion.

After use, wipe off water from the tip of the objective and condenser, then follow up by wiping with absolute alcohol.

If you observe water stains, apply a small amount of neutral detergent and wipe gently, then follow up with absolute alcohol.

3.15 Using the Cytodiagnostic Unit

Installing a cytodiagnostic unit on the microscope allows users to switch magnification using the hand switch and to mark the specimen.

3.15.1 Magnification switching

Pressing the hand switch toggles magnification between 10x and 40x.

When a cytodiagnostic unit is mounted on the 55i, light intensity will vary with changes in magnification. (But note that light intensity does not vary if the brightness control knob is set to the maximum setting, or if the preset switch is in the depressed position.)

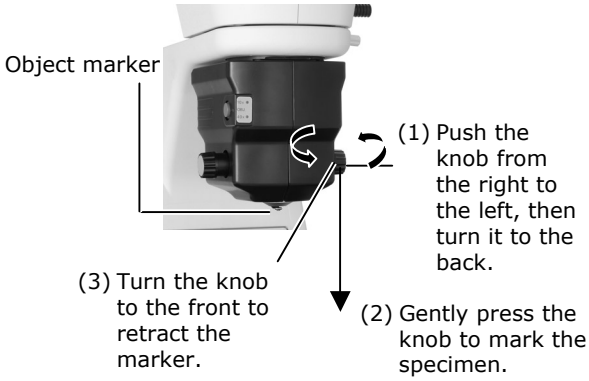
3.15.2 Marking specimens

Holding the object marker knob with both hands, push it from the right toward the left, then turn it toward the back to extend the marker.

Gently press down the entire object marker knob to apply a circular mark.

Turn the object marker knob toward the front to retract the marker.

Add ink if ink markings are thin.
(Refer to P.72.)



3.16 Fluorescence Observation

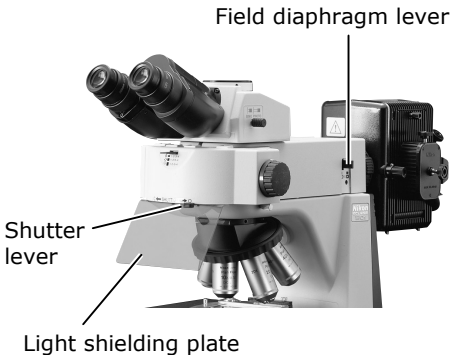
3.16.1 Warning

The mercury lamp (or xenon lamp) used with the fluorescence attachment requires careful handling. Be sure to read the warnings described in the beginning of this manual and in the operating manual provided by the manufacturers of the super high-pressure mercury light source (or high-intensity light source) and lamp. Observe all the warnings and precautions described in those documents.

3.16.2 Fluorescence attachment shutter

The shutter blocks illumination. When suspending microscopy, close the shutter to prevent fading of specimen colors. (Set the shutter lever to the C position to move the shutter into the optical path and block light.) To protect important specimens, make it a habit to use the shutter whenever appropriate.

When pausing Epi-fluorescent microscopy to perform microscopy diascopic light, move the shutter into the optical path to block the Epi-fluorescent light.



3.16.3 Light shielding plate of the fluorescence attachment

The light shielding plate protects the observer's eyes from ultraviolet light reflected from the specimen. To remove the plate, loosen the clamp screw and pull it forward.

3.16.4 Field diaphragm of the fluorescence attachment

The field diaphragm controls the illumination on the area of the specimen being viewed. Operating the field diaphragm lever changes the size of the field diaphragm. For normal observations, stop down the diaphragm so that the aperture boundaries are just outside (or inside) the field of view. Illuminating an area broader than necessary will result in stray light entering the field of view, generating flare, reducing image contrast, and expanding the area of the specimen subject to fading.

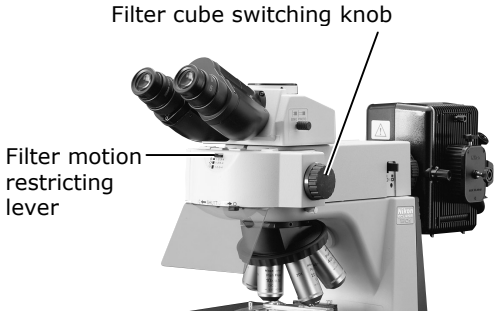
Appropriate field diaphragm settings are particularly important for photomicrography. In general, good results will be obtained by stopping down the field diaphragm to slightly wider than the area to be reproduced within the photo frame or monitor display.

3.16.5 Switching excitation methods

Four filter cubes can be mounted on the fluorescence attachment. Move the desired cube into the optical path by turning the filter cube switching knob on the right side of the device.

For bright-light observations, leave one cube position empty, and move this empty position into the optical path.

Use the fluorescent motion restricting lever located at the upper front section to limit cube switching operations.



Lever position	Filter cube switching
Pulled all the way to the front	Free (switching possible)
Pushed in one increment (notch)	Switching between positions 1 and 2, or between positions 3 and 4. (The position at which the lever is pulled determines whether switching is for positions 1 and 2 or positions 3 and 4.)
Pushed in two increments (notches)	Lock (filter cubes cannot be switched)

3.16.6 Installing and removing the filter cubes

WARNING

Always turn off the mercury lamp before installing or removing the filter cubes.

(1) Remove the cover on the left-hand side of the fluorescence attachment.

(2) Insert the filter cubes.

(3) Replace the cover.

(Refer to P.67.)

3.16.7 ND filters for fluorescence attachment

Push in the ND filter attach/detach lever to move ND filters into the optical path and darken the fluorescent image.

ND filter attach/detach lever

ND filters are used to adjust light intensity. Higher filter numbers correspond to lower transmission rates (i.e., darker images). ND filters do not affect color balance.

ND2: Reduces light intensity by 1/2.

ND4: Reduces light intensity to 1/8 previous levels.

ND16: Reduces light intensity to 1/16 previous levels.

As shown below, you can combine these three filters to achieve various levels of brightness.

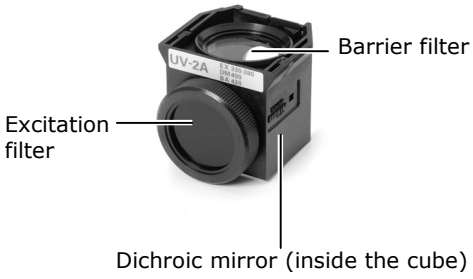
Brightness	ND4	ND8	ND16
1	-	-	-
1/4	○	-	-
1/8	-	○	-
1/16	-	-	○
1/32	○	○	-
1/64	○	-	○
1/128	-	○	○
1/512	○	○	○

(-: Outside optical path, ○: In optical path)

3.17 Selecting Fluorescent Filters

A filter cube is comprised of the following three optical components: an excitation filter (EX filter), a barrier filter (BA filter), and a dichroic mirror (DM). Select a combination of filter cubes appropriate for the specimen characteristics, fluorescent pigment, and the purpose intended. Keep in mind the following:

- Different combinations of excitation and barrier filters may be selected for the same excitation method.
- Other types of excitation filters, barrier filters, and dichroic mirrors can be purchased separately.
- Excitation filters are exposed to strong light during operations and tend to age rapidly. Replace the excitation filter at frequent intervals.

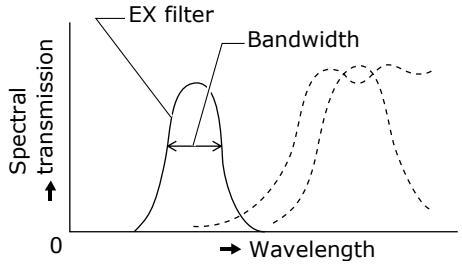


CAUTION

When using the UV2A or UV2B, be sure to remove the screw from the excitation filter frame and the spacer from inside the excitation filter. These filters cannot be used until the spacer ring has been removed.
(Refer to 3.7.4.)

3.17.1 Selecting excitation filters (EX filters)

Excitation filters allow selective transmission of light (excitation light) in the waveband required for fluorescent light emissions from the specimen, blocking light of all other wavelengths. The range of wavelengths allowed to pass through a filter is referred to as bandwidth.



The range of the bandwidth of the excitation filter determines the brightness of the fluorescent image, the generation of self-fluorescence (fluorescence resulting from substances other than fluorescent pigments), and degree of fading. The broader the bandwidth, the greater the amount of excitation light irradiated onto the specimen, increasing brightness. However, this also increases the amount of self-fluorescence and causes faster color fading. Narrow bandwidth reduces the amount of excitation light striking the specimen and causes the image to appear darker, but reduces self-fluorescence and fading. For specimens with pronounced self-fluorescence, use excitation filters that pass a narrow bandwidth (note that this will make the fluorescent image darker).

Excitation filters are exposed to strong light during operations and tend to age rapidly. Replace the filter at intervals determined by usage.

	Narrow	**EX filter bandwidth**	**Wide**
Brightness of fluorescent image	Dark		Light
Generation of self-fluorescence	Low		High
Degree of color fading	Low		High

3.17.2 Selection of barrier filter (BA filter)

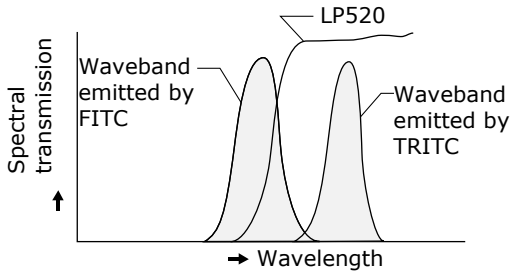
The barrier filter allows only fluorescent light emitted by the specimen to pass, blocking excitation light. This allows viewing of a fluorescent image without excess illumination (dark background).
There are two types of barrier filters: LP filters block all light below a certain wavelength but pass all light of longer wavelengths. BP filters pass only light of a certain waveband, blocking all other light. Use the filter type appropriate for your intended purpose.

LP filter (long-pass filter)

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

(1) For specimens dyed with a fluorescent pigment in which the fluorescent waveband and excitation waveband (light that the specimen absorbs in order to emit fluorescent light) are very close, select a barrier filter with the shortest cut-on wavelength permitted by performance requirements for efficient fluorescent microscopy. 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 advances in filter performance have resulted in increased use of filters of short cut-on wavelengths.

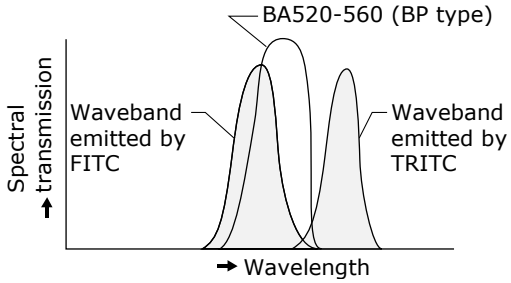
(2) For multiple-dye specimens, use an LP filter for microscopy of fluorescent images of all dyes. Note that a combination involving an ordinary dichroic mirror, an excitation filter, and an LP-filter-type barrier filter will be incapable of exciting dyes that emit long-wavelength fluorescent light – for example, TRITC in the case of FITC and TRITC. This will result in very dark TRITC fluorescent images. For such cases, we recommend using multiband filters.



Both the FITC and TRITC images are visible.

BP filter (bandpass filter)

The bandpass filter passes only light of a certain wavelength, blocking all other wavelengths.
BP filters are used for microscopy of fluorescent images involving a specific dye in multiple-dye specimens. (For example, in a double-dye specimen of FITC and TRITC, the BA520-560 filter enables microscopy of just the FITC fluorescent image.)
However, BP filters will not indicate self-fluorescence, if any (because the fluorescent image in the above combination is green only). LP filters are better suited for making fine distinctions in self-fluorescence based on slight color differences.



Only the FITC fluorescent image is visible.

3.17.3 Replacing excitation and barrier filters

Excitation and barrier filters can be removed from the fluorescent cube and replaced. (Dichroic mirrors cannot be dismounted from the fluorescent cube.) Excitation filters are screw-in filters.

Barrier filters are slide-in filters. Align the projection on the barrier filter with the groove on the fluorescent cube and turn clockwise approximately 30 degrees to secure in place.

3.17.4 Filter cube internal spacers

The filter cubes listed below cannot be inserted directly into the fluorescence attachment. Instead, as described below, an internal spacer must first be removed or reversed.

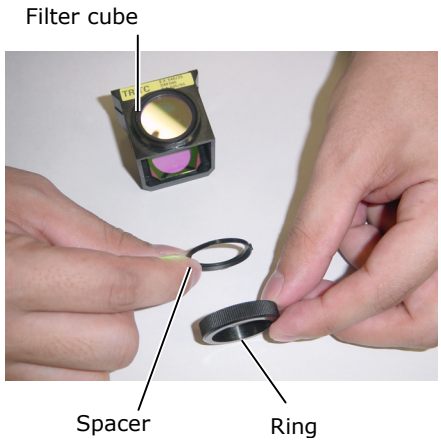
(1) Place the filter cube on the work surface with the excitation filter facing up.

(2) Unscrew the ring retaining the excitation filter.
(Be careful to avoid dropping the filter.)

(3) Remove the spacer inside the ring.

(4) Remove or reverse the spacer as appropriate for the particular filter cube type. The actions suitable for various filter cubes are given below.

(5) Reattach the ring.



- Filter cubes requiring spacer removal
  - UV-2A
  - UV-2B
- Filter cubes requiring spacer reversal
  - DAPI
  - FITC
  - GFP-L
  - GFP-B
  - TRITC
  - Tx-Red

3.18 Image Capture

Images can be captured by mounting a camera head to the ergonomic binocular tube or trinocular eyepiece tube.

For more detailed discussion of this topic, refer to the operating manual provided with the camera head or camera control software.

Proper adjustment of light intensity and focus on the microscope side are important for obtaining clear images. Listed below are key considerations in capturing clear images.

3.18.1 Adjusting light intensity

Lamp voltage: When the 50i is used in applications for which accurate color reproduction is critical, set the brightness control knob at a midpoint and use ND filters to make brightness adjustments.

Filter: Place a commercially available color compensation filter on the filter holder at the microscope base, as necessary.

3.18.2 Adjusting the condenser

- Always focus and center the condenser.
- Center the annular diaphragm for phase contrast microscopy.
- For normal operations, set the diaphragm aperture to 70 to 80% of the N.A. of the objective.

3.18.3 Confirming the photomicrographic range

The image on the monitor represents the photomicrographic range.

3.18.4 Confirming focus

Check focus by viewing through the eyepiece and viewing the monitor. If the focal positions for the two images differ, adjust the focal position adjustment screw at the camera port.

3.18.5 Making adjustments to keep out extraneous light

Field diaphragm: Stop down the diaphragm to a setting just slightly wider than the area shown on the monitor.

Eyepiece: Cover the eyepiece with a cloth.

3.18.6 Anti-vibration measures

If the exposure is less than 1/8 of a second, reduce light intensity with ND filters to make exposures longer than 1/8 of a second. (If accurate color reproduction is not important, you can use the brightness control knob to reduce light intensity.)

3.18.7 Fluorescence photomicrography

The fluorescence of fluorescent specimens may fade during exposure. To prevent this, do the following:

(1) Select a brighter optical combination.
Even if the overall magnification is the same on the monitor, the combination of objective and camera zoom can result in significant variations in exposure time. We recommend increasing the magnification with the objective rather than the zoom. (Generally, the aperture of the objective increases with magnification. The larger the numerical aperture, the brighter the resulting image.)

(2) Adjusting the excitation light
Excessively bright excitation light will accelerate specimen fading while making it more difficult to acquire suitable fluorescent images. Use ND filters to adjust brightness.

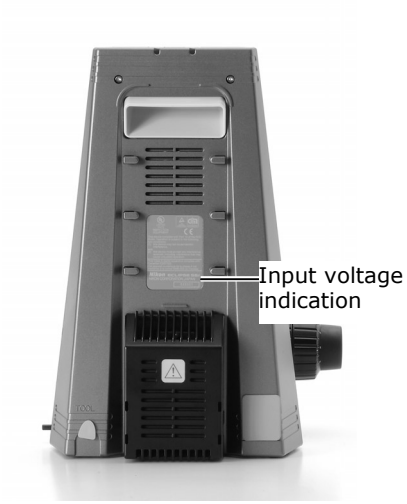
(3) Specimen
Photomicrography of faded specimen sections requires prolonged exposure times and results in poor color reproduction and low-quality images. Move the specimen to obtain images from a fresh section of the specimen previously unexposed to excitation light. Use the differential interference contrast or phase contrast methods to select a specimen section for photomicrography. For best results, switch to the fluorescent method to capture images.

(4) Supersensitive TV camera (except for DS-5M)
Under certain conditions, it may help to place an IR (infrared ray) blocking filter in front of the supersensitive TV camera sensor. Experiment with the IR blocking filter to determine its characteristics.

4 Assembly

1 Checking the Input Voltage

Check the input voltage indicated on the back of the microscope. Use the microscope only if this indication matches the power supply voltage for the area in which the microscope will be used.



CAUTION

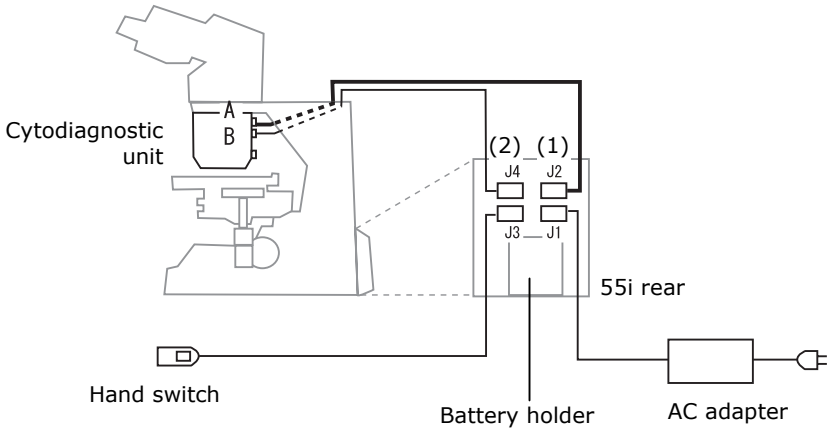
If the voltage indication and supply voltage differ, do not attempt to use the microscope. Contact your nearest Nikon representative to seek advice.

2 Wiring at the Rear and Installing the Battery (for the 55i)

(1) Confirm that the microscope is turned off.

(2) Remove the rear wiring cover.

(3) Connect the appropriate cables.



55i rear

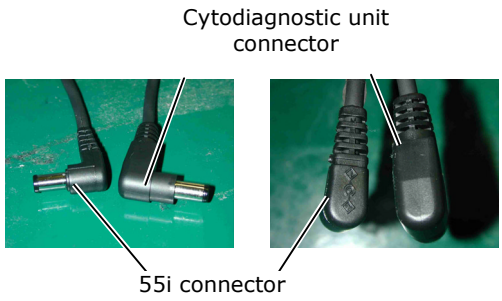
Connector J1: 12V DC input (+ -C / - –)
Connector J2: J-CY/PS
Connector J3: Switch } (when using cytodiagnostic unit)
Connector J4: J-CY/SG

Cytodiagnostic unit rear

Connector A: 12V DC input (+ -C / - –)
Connector B: Switch

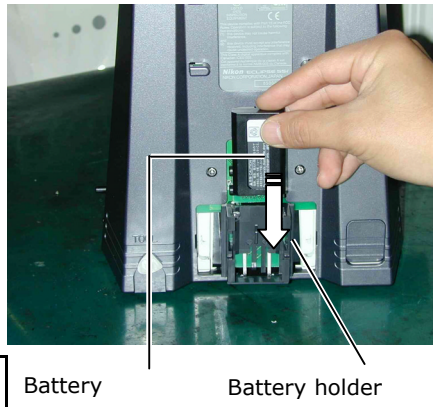
Cables provided with the cytodiagnostic unit

(1) J-CY/PS cable



(2) J-CY/SG cable (both ends are identical)

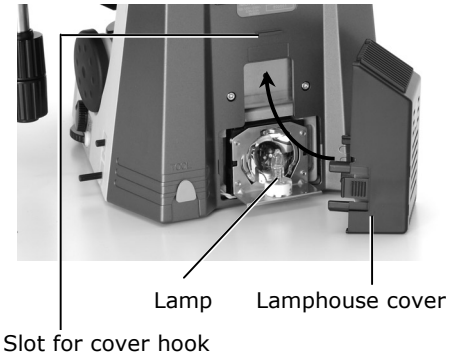
(4) Install a fully recharged battery (when using the 55i on battery power).
Insert the battery into the battery holder.
If the 55i is running on battery power, there is no need to connect the AC adapter to the J1 connector (12V DC input) at the rear of the 55i.



CAUTION

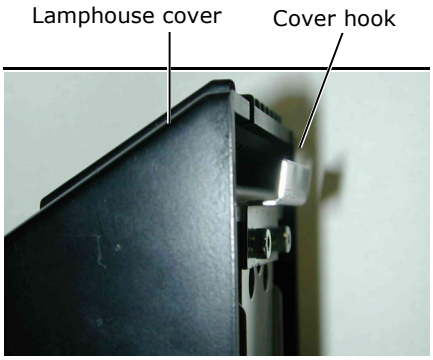
Always use the specified battery type (EN-EL1).

(5) Replace the rear wiring cover.
Engage the cover hook in the slot on the rear of the unit in the direction indicated by the arrow in the diagram.



CAUTION

The rear wiring cover should always be in position, to protect the LED light source and battery holder from impact, etc.



3 Wiring of the Cytodiagnostic Unit

This procedure is required for the 55i.

This procedure is optional for the 50i (performed when the two cables connecting to the cytodiagnostic unit need to be led out from the back of the microscope).

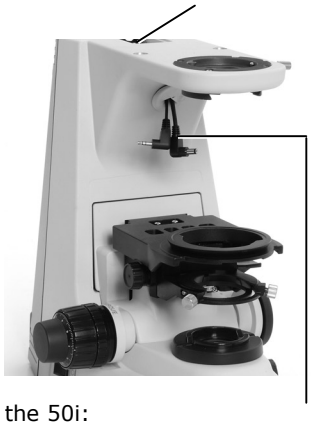
(1) Remove the cover at the top of the microscope arm.

(2) For the 55i, insert the two cables for the cytodiagnostic unit from the top of the arm and lead them out through the opening at the bottom of the arm.
For the 50i, insert the AC adapter cable and the hand switch cable from the top of the arm and lead them out through the opening at the bottom of the arm.

(3) Secure the two cables in place using the guide at the back of the microscope as shown to the right.

(4) Replace the cover

Insert the cables into to the space exposed by the removed cover



For the 50i:
AC adapter and hand switch cable
For the 55i:
Signal cable (thin) (J-CY/SG) and power cable (thick) (J-CY/PS)

Wiring for the 55i

4 Installing a Stage

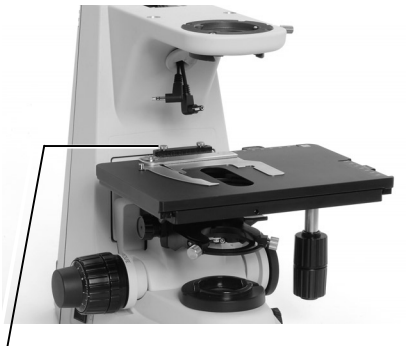
(1) Turn the coarse focus handle to remove the cushioning material from the substage section.

(2) Turn the coarse focus handle until the elevating section is brought to the lowermost position.

(3) Place the stage on the substage and fix into place with the tool stored in the back of the microscope.

(4) Place a specimen holder on the stage and secure with screws.

Stage fixing screw



Specified holder screw

5 Installing a Condenser

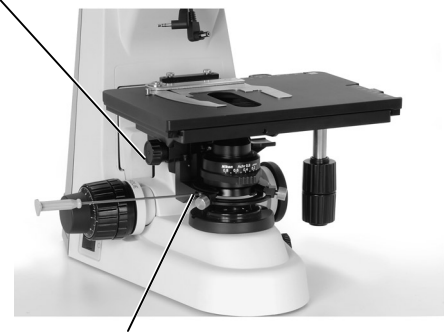
(1) Turn the coarse focus handle until the elevating section is raised to the uppermost position.

(2) Turn the condenser focus knob until the substage is brought to the lowermost position.

(3) Insert a condenser and adjust so that it faces toward the front. Secure in place with the tool stored in the back of the microscope.

(4) Turn the condenser focus knob until the substage is raised to the uppermost position.

Condenser focus knob



Condenser fixing screw

6 Installing a Fluorescent Attachment (when using a fluorescent attachment)

(1) Place a fluorescent attachment on the microscope arm.

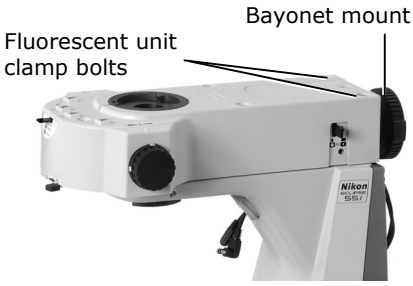
(2) Secure in place with a clamp screw.

(3) Fix the fluorescent attachment clamp bolt using the hex wrench provided with the unit.

(4) Attach a mercury lamphouse to the bayonet mount on the back. (For more information, refer to the instruction manual provided with the superhigh pressure mercury lamp power supply.)

1) Attach a collector lens to the lamphouse.
2) Turn the bayonet mount clockwise as far as it will go.
3) Insert the lamphouse into position.
4) Turn the bayonet mount back to its original position to lock the lamphouse.
5) Attach a mercury lamp.
6) Connect the mercury lamphouse to the mercury lamp power supply.

Clamp screws used to fix the fluorescent unit



Fluorescent unit mounted in place

Mercury lamp house fitted in place

7 Installing an Eyepiece Tube

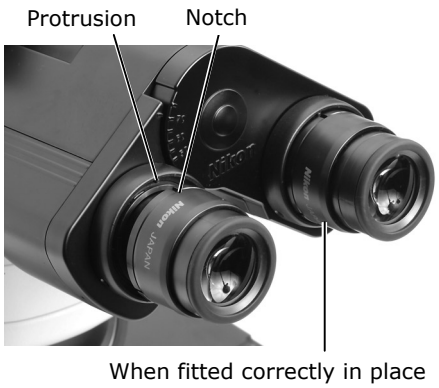
(1) Place an eyepiece tube on the microscope arm (or fluorescent unit).

(2) Secure in place with a clamp screw. (For the fluorescent unit, secure in place with a fixing screw using the tool stored in the back of the microscope.)

Trinocular eyepiece tube mounted on the fluorescent unit

8 Installing an Eyepiece

Make sure the notch on the eyepiece side and the protrusion of the eyepiece sleeve are aligned. Insert the eyepiece.

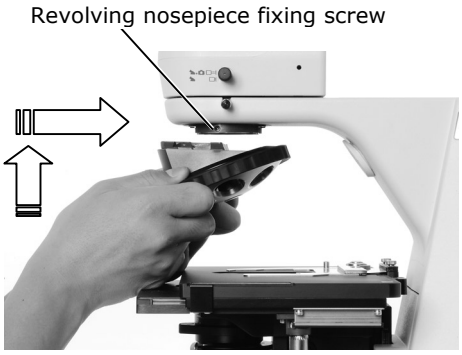


9 Installing a Revolving Nosepiece (or Cytodiagnostic Unit)

9-1 Installing a Revolving Nosepiece

(1) Lift the revolving nosepiece from a position just forward of the point directly below the fitting part and slide toward the back to attach. (Continue sliding the revolving nosepiece until its front position is aligned with that of the fitting part.)

(2) Secure in place with the tool stored in the back of the microscope.

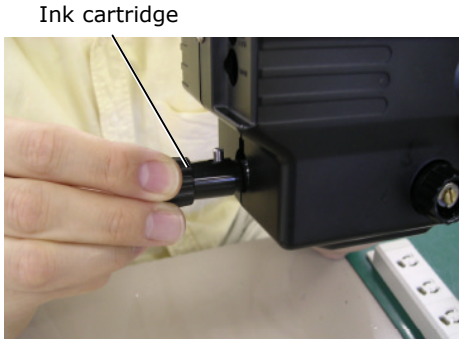


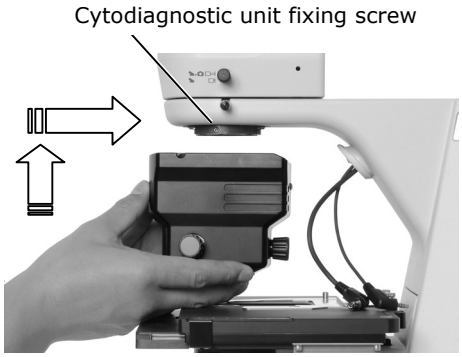
9-2 Installing a Cytodiagnostic Unit

(1) Insert the separately packed ink cartridge to the hole at the rear of the cytodiagnostic unit.

(2) Lift the cytodiagnostic unit from slightly forward of the point directly below the fitting part and slide toward the back to attach. (Continue sliding the cytodiagnostic unit until its front position is aligned with that of the fitting part.)

(3) Secure in place with the tool stored in the back of the microscope.





(4) Check to confirm that the cytodiagnostic unit power switch is off.

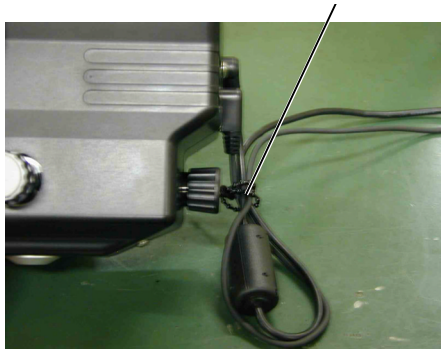
(5) Firmly insert two cables leading out from the bottom of the arm into the connectors on the back of the cytodiagnostic unit.

For the 50i: AC adapter cable (thick)
For the 55i: Power cable (thick)

For the 50i: Hand switch cable (thin)
For the 55i: Signal cable (thin)

(6) If the cables are slack and prone to obstruct operations, secure them with a wire-binding band provided with the cytodiagnostic unit.

Binding band



10 Installing Objectives (when a revolving nosepiece is installed)

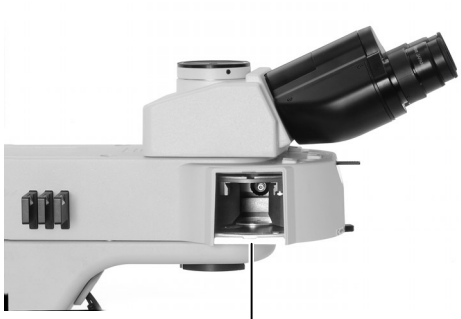
Screw objectives into the revolving nosepiece. When installing the objective in this way, make sure that the magnification of the objective increases when the revolving nosepiece is turned clockwise (clockwise when viewed from above the eyepiece).

11 Installing Filter Cubes and Light Shield (with the fluorescence attachment installed)

(1) Remove the cover on the front left of the fluorescence attachment.

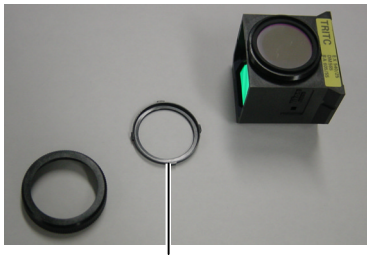
(2) Insert the filter cube.
The filter cubes listed below cannot be installed directly into the fluorescence attachment filter bay. The internal spacer must be removed or reversed, as described on P. 57.

- UV-2A
- UV-2B
- DAPI
- FITC
- GFP-L
- GFP-B
- TRITC
- Tx-Red



Filter cube bay

Filter cube

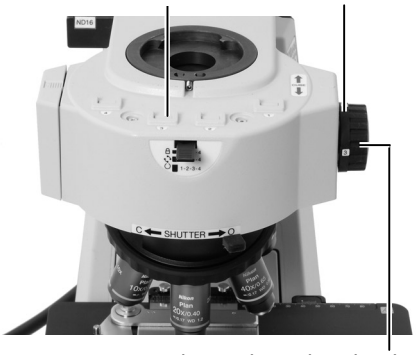


Spacer

(3) Insert a nameplate into the position with the same address as the one indicated on the filter cube select knob on the right side of the microscope.

(4) Turn the filter cube select knob and insert a filter cube into the remaining open bay.

(5) Replace the cover.



Filter cube select knob

For clarity, the eyepiece tube is not shown here.

(6) Attach a light shield to the front bottom of the fluorescent attachment with the tool stored in the back of the microscope.

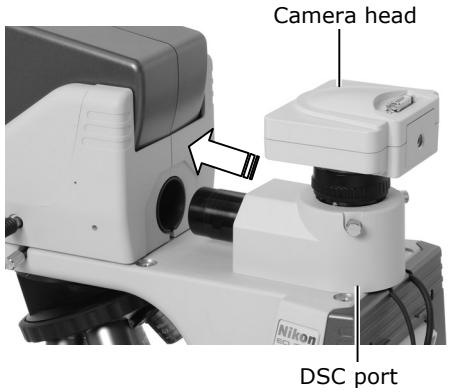
Light shield fitted in place

12 Installing a Camera (when using a camera)

12-1 When attaching to the ergonomic binocular tube:

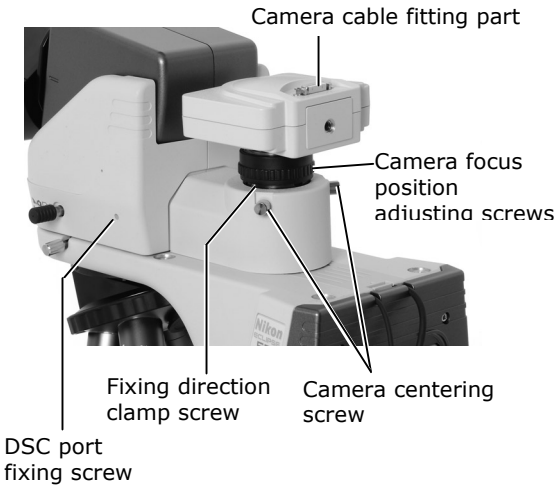
(1) To attach a camera head, screw it into the C mount on the DSC port.

(2) Remove the rear cover of the ergonomic binocular tube and insert the DSC port.



(3) Secure the DSC port into place with the tool stored in the back of the microscope.

(4) Attach the camera cable to the camera head. (Adjust the fitted position before using the camera. Refer to 2.4 Photomicroscopy.)



12-2 When attaching to the trinocular eyepiece tube

(1) Attach the camera head to the trinocular eyepiece tube using the DSC adapter.

(2) Attach the camera cable to the camera head.
(Adjust the fitted position before using the camera.)

13 Installing the Power Cord

13-1 For the 50i:

(1) Check to confirm that the microscope power switch is off.

(2) Insert one end of the power cord into the AC inlet at the back of the microscope.

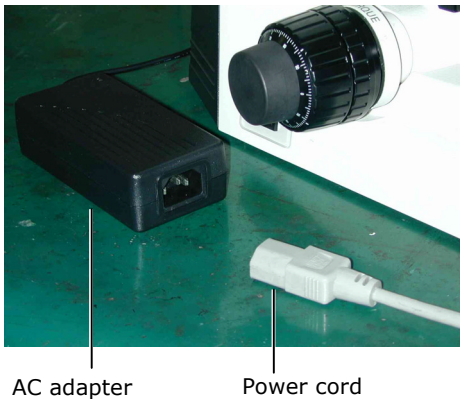
(3) Insert the other end of the power cord into a wall outlet.

13-2 When using the cytodiagnostic unit with the 50i

(1) Check to confirm that the cytodiagnostic unit power switch is off.

(2) Connect one end of the power cord to the AC adapter connecting to the cytodiagnostic unit. Use only the specified AC adapter and power cord.

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



13-3 When not using the battery with the 55i:

(1) Check to confirm that the microscope power switch is off.

(2) Connect one end of the power cord to the AC adapter leading out from the wiring section on the back of the microscope.
Use only the specified AC adapter and power cord.

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

Microscope assembly is now complete.

5 Replacing Consumables

5.1 Replacing the lamp (for the 50i)

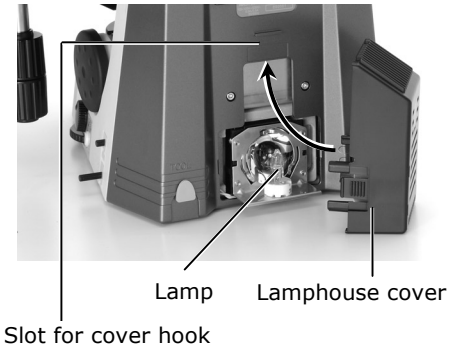
CAUTION

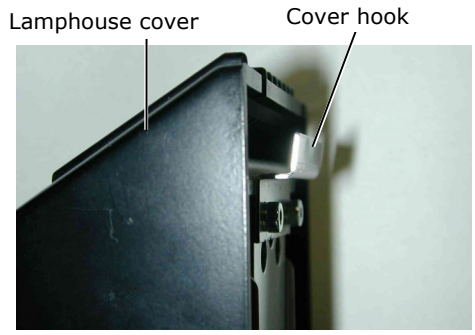
- **Be careful to avoid burns:**
  Wait until the lamp and nearby parts have cooled before attempting to replace the lamp.
- **Be careful to avoid electrical shock:**
  Turn off the power switch and unplug the power cord from the outlet.
- **Be careful to avoid abnormal heat generation:**
  Use only the lamp specified.
- **Be careful to avoid actions that might reduce lamp service life:**
  Avoid touching the bare lamp bulb with bare hands. Soiling will reduce the service life of the lamp.

(1) Remove the lamphouse cover on the back of the microscope. Remove the old lamp.

(2) Replace with a new lamp.
Avoid touching the bare lamp bulb with your bare hands.
Use only the lamp specified (PHILIPS 5761).

(3) Replace the cover.
Engage the cover hook in the slot on the rear of the unit in the direction indicated by the arrow in the diagram.





CAUTION

The lamphouse cover must be attached. Failure to replace the lamphouse cover may result in burns or fire from the heat generated by the lamp.

5.2 Recharging the battery (for the 55i)

CAUTION

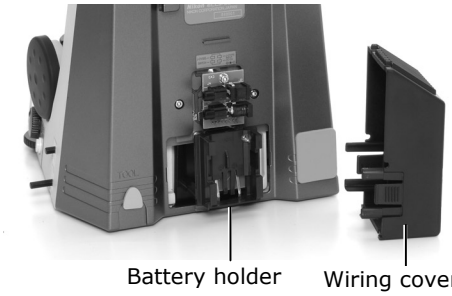
- **When storing or carrying the battery removed from the microscope, be sure to attach the electrode cover (included with the battery). Shorting the battery terminals may result in various problems, including liquid leakage, heat generation, or explosion.**
- **Use only the battery charger specified for use with the EN-EL1.**
- **Before storing the battery for extended periods, fully recharge, then fully discharge the battery. (This should be done at least onece a year.)**
- **Remove the battery from the microscope or battery charger when not in use. If the battery remains attached, it may overdischarge and become unusable, since a trace current flows even when power is turned off.**
- **Store the battery in a cool place when not in use.**
  - **Ideally, store in locations with ambient temperatures around 15°C to 25°C and low humidity.**
  - **Recharge the battery at room temperature (5°C to 35°C).**
- **Recharge the battery at room temperature (5°C to 35°C).**
- **To avoid degrading battery performance, do not recharge the battery until it has been in use for some time and is at least partially discharged.**
- **Battery temperature may increase somewhat immediately after recharging. This does not indicate a problem, and battery performance will not be affected.**
- **If battery life declines significantly, even after a full recharge, the battery needs to be replaced. Please purchase a new rechargeable battery (EN-EL1).**
- **If the battery terminals are soiled, wipe them clean with a dry cloth.**

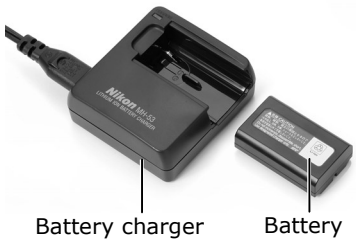
(1) Remove the wiring cover on the back of the microscope, then remove the battery from the battery holder.

(2) Connect the battery to the designated battery charger and plug the power cord of the battery charger into a wall outlet.

(3) Reinstall the charged battery in the battery holder.

(4) Replace the wiring cover.





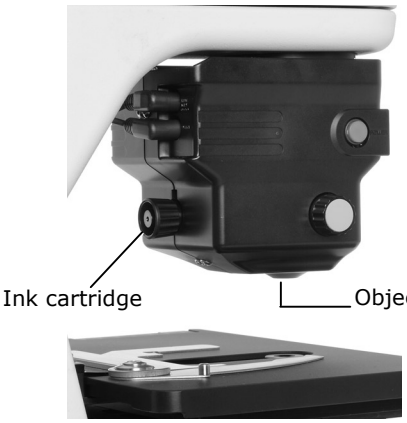
CAUTION

The wiring cover must be attached to protect the LED light source and the battery mount from impact shock.

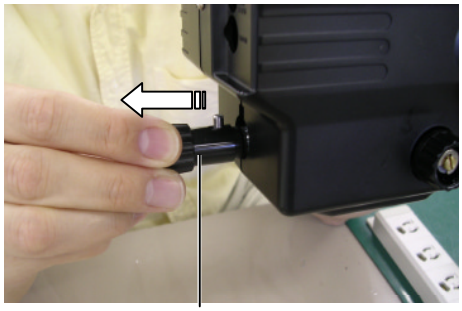
5.3 Refilling Cytodiagnostic Unit Ink

CAUTION

- **Use only the specified refill ink (J-CY refill ink).**
- **Never attempt to disassemble the ink cartridge.**
- **Avoid touching the exposed object marker while the ink cartridge is removed.**



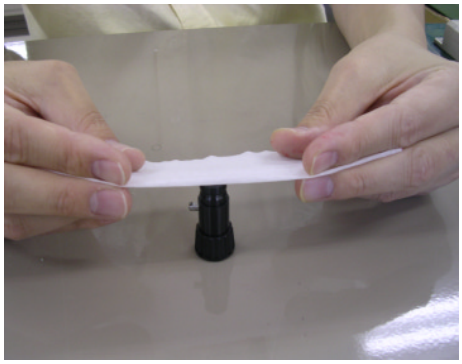
(1) Remove the ink cartridge from the rear of the cytodiagnostic unit.



(2) Apply a few drops of ink to the red portion at the tip. (Overfilling may result in ink leakage.)

(3) Once the ink is fully absorbed, place a piece of paper over the tip to absorb any excess ink.

(4) Replace the ink cartridge.



6 Troubleshooting

If the microscope does not function property, take appropriate action as described below. If the problem is still not resolved after referring to "Troubleshooting," please contact your nearest Nikon representative

6.1 Optical

Problem	Possible causes	Remedy
Field of view vignetting Uneven illumination across the field of view Field of view not visible	Parts installed incorrectly	Install the Parts (nosepiece, condenser, etc.) correctly.
	Movable parts not switched correctly	Rotate the parts (e.g., optical path switchover dial, nosepiece , filter cube switchover dial) until you feel resistance.
	Field diaphragm image not focused on the specimen surface	Focus and center the condenser.
	Field diaphragm stopped down too far	Open the field diaphragm slightly wider than the field of view.
	Dirt or dust on lens and container	Clean. Use a clean container.
Dirt or dust in the field of view	Dirt or dust on lens and container	Clean. Use a clean container.
	Field diaphragm image not focused on the specimen surface	Focus and center the condenser.
Poor image quality Poor contrast Poor resolution	Dirt or dust on lens and container	Clean. Use a clean container.
	Objective's correction ring not matched to the thickness of the bottom plate container.	Adjust the ring correctly.
	Field diaphragm image not focused on the specimen surface	Focus and center the condenser.
Uneven focus	Revolving nosepiece not installed correctly, or not rotated to the click stop position	Install correctly and rotate to the click stop position.
Image is in motion.	Specimen tilted relative to stage surface.	Correctly reposition specimen on stage.
	Revolving nosepiece not installed correctly, or not rotated to the click stop position	Install correctly and rotate to the click stop position.
Yellow-tinged	Lamp voltage too low (for 50i)	Adjust the brightness adjustment dial to match the lamp ratings.
Field of view too bright	No ND filter in optical path	Place filter in optical path.
	Lamp voltage too high (for 50i)	Reduce the voltage with the brightness adjustment dial.
Field of view too dark	Condenser aperture diaphragm stopped down too far	Should normally be set to 70 to 80% of the objective N.A.
	Field diaphragm image not focused on the specimen surface	Focus and center the condenser.
	Optical path switchover dial not set to 100% eyepiece	Switch to 100% eyepiece.

6.2 Operational

Problem	Possible causes	Remedy
Image not in focus, although the objective is raised to the highest position	Stage mounted incorrectly	Mount correctly.
Images in the left and right eyepieces not coincident	Interpupillary adjustment not performed	Make adjustment.
Eye fatigue	Diopter adjustment not performed	Make adjustment.
	Inadequate brightness	Adjust with the brightness adjustment dial or ND filters.

6.3 Electrical

Problem	Possible causes	Remedy
Power does not turn on even though the power switch is set to on.	Power cord not connected or connected improperly	Connect properly.
Lamp does not light.	Lamp burned out	Replace with specified lamp.
Lamp burns out quickly.	Lamp used is unspecified/incompatible	Replace with specified lamp.
(When using cytodiagnostic unit) Power does not turn on, even though cytodiagnostic power switch is set to on.	Cables not connected or connected improperly	Connect the cables properly and push in as far as they will go. (Refer to P.60.)
	The 55i's power switch is not set to on (when using the 55i).	Turn on the 55i's power switch (press it to the "|" position).
(When using cytodiagnostic unit) The magnification of the cytodiagnostic unit does not change, even though the hand switch is pressed.	Hand switch cable or (when using the 55i) signal cable not connected or connected improperly	Connect the cable properly. Push in as far as it will go. (Refer to P.60.)
(When attaching the cytodiagnostic unit to the 55i) The brightness of illumination does not change even when magnification is changed.	Signal cable not connected or connected improperly	Connect the signal cable properly. Push in as far as it will go. (Refer to P.60.)
	The brightness control knob is set to the maximum brightness level.	Set the brightness control knob to a level other than maximum.
	The preset switch is pressed.	Pull out the preset switch.

7 Cleaning and Maintenance

7.1 Lens cleaning

Keep the lens free of dust, fingerprints, etc. Dirt on the lenses or filters will affect image quality. If any of the lenses become dirty, clean them by the procedure given below.

- Brush away dust with a soft brush or wipe away gently with gauze.
- If fingerprints or grease gets on a lens, moisten a piece of soft, clean cotton cloth, lens tissue, or gauze with absolute alcohol (ethyl or methyl alcohol) and wipe.
- Use petroleum benzine only to remove immersion oil from the objective. For optimum results, we recommend following up petroleum benzine with absolute alcohol (ethyl or methyl alcohol). If petroleum benzine is unavailable, use methyl alcohol alone. When using just methyl alcohol, note that surfaces will need to be wiped repeatedly to ensure complete removal of immersion oil. Usually, three or four times should be sufficient to clean the lens.
- Never use petroleum benzine to clean the entrance lens at the bottom of the eyepiece tube or prism surface of the eyepiece tube.
- Absolute alcohol and petroleum benzine are highly flammable. Be careful when handling these materials, particularly around open flames or when turning the power switch on or off.
- Follow the instructions provided by the manufacturer when using absolute alcohol.

7.2 Cleaning the product

- We recommend using a silicon cloth to clean the microscope.
- For stubborn dirt, dampen a piece of gauze with neutral detergent and wipe gently.
- Use of organic solvents on plastic parts may result in discoloration.

7.3 Disinfecting the product

- For routine disinfection of the microscope, we recommend using 70% medical alcohol.
- If contact occurs between a sample and the microscope, determine whether the sample is hazardous. If the sample is hazardous, follow the standard procedures for your laboratory.
- Use of organic solvents on plastic parts may result in discoloration.

7.4 Storage

- Store the microscope in a dry location where mold is unlikely to form.
- Store the objectives and eyepieces in a dry box or similar container with a drying agent.
- Place the vinyl cover over the microscope to protect it from dust.
- Switch off the microscope (press the switch to the "O" position) and wait for the lamphouse to cool before covering the microscope with the vinyl cover.

7.5 Periodic Inspections (fee charged)

To maintain the peak performance of the microscope, we recommend periodic inspections. Contact your nearest Nikon representative for more information. (Parts and service charges apply for this service.)

8 Specifications and Standards

8.1 Specifications

Nikon Microscope ECLIPSE 50i

Model	ECLIPSE 50i
Optical system	Infinity-corrected CF optical system Objective: CF160 Objectives: Field number 22 (with ergonomic tube/binocular tube/cytodiagnostic unit), 25 (with trinocular eyepiece tube T/F) Nosepiece: Sextuple
Focus up/down motion	Drive system: Manual coarse/fine motion (calibration markings for fine motion: 1 µm/marking) Stroke: 2 mm upward, 28 mm downward With one-touch refocusing mechanism
Lamp ratings	6V/30W halogen lamp
Lamp type	Halogen lamp (PHILIPS 5761)
Average lamp life	100 hours
Input ratings	100-240V AC; 230V (10%, 50/60Hz, 0.9A; 0.5A)
Power cord	• 100-120V areas: UL-approved detachable power cord set (3 conductor grounding Type SVT, AWG 18, 3 m long maximum, rated at 125V AC minimum) • 220-240V areas: EU/EN-approved 3-conductor power cord set (3 conductor grounding Type H05VV-F, 3 m long maximum, rated at 250V AC minimum)
Operating conditions	Temperature: 0 to 40°C Humidity: 85% RH max. (no condensation) Altitude: 2000 m max. Degree of pollution: Degree 2 Installation: Category II Electric shock protection class: Class I Indoor use only
Transport/storage conditions	Temperature: -20 to 60°C Humidity: 90% RH max. (no condensation)
External dimensions and weight (main unit)	External dimensions: 184 (W) x 358 (H) x 383 (D) mm (excluding projections) Weight: Approx. 9 kg

8.1 Specifications

Product safety	• UL-listed product (UL61010A-1) • Meets FCC 15B Class A requirements. 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. • This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada. • Complies with Australian EMI (AS/NZS2064 Group1 Class B). CE Marking • Meets EU IVDD (In vitro diagnostic medical device Directive) requirements. (GM-approved: in vitro diagnostic medical device) • Meets EU EMC Directive (EN61326) requirements. CE • UL-listed and GS-approved certification were obtained for the following combination: 50i, cytodiagnostic unit, hand switch, and specified adapter.

Nikon Microscope ECLIPSE 55i

Model	ECLIPSE 55i
Optical system	Infinity-corrected CF optical system Objective: CF160 Objectives: Field number 22 (with ergonomic tube/binocular tube/cytodiagnostic unit), 25 (with trinocular eyepiece tube T/F) Nosepiece: Sextuple
Focus up/down motion	Drive system: Manual coarse/fine motion (calibration markings for fine motion: 1 (m/marking) Stroke: 2 mm upward, 28 mm downward With one-touch refocusing mechanism
Light source for transmitted illumination	White LED
Input voltage	12V DC (provided from the AC adapter)
Power supply	AC adapter
Specified AC adapter	Manufacturer: ILAN ELECTRONICS LTD. Model: F1650K Rated input voltage: 100-240V AC, 1.2A max. (when inputting 115V AC), 50/60Hz Rated output voltage: 12V DC, 3.5A max. Other: UL-listed product, GS-approved, CE-certified
AC adapter power cord	• 100-120V areas: UL-listed detachable power cord set (3 conductor grounding Type SVT, 18 AWG, 3 m long maximum, rated at 125V AC minimum) • 220-240V areas: EU/EN-approved 3-conductor power cord set (3 conductor grounding Type H05VV-F, 3 m long maximum, rated at 250V AC minimum)
Specified battery (Li-ion rechargeable battery)	Manufacturer: Nikon Code: EN-EL1 Rating: 7.4V DC Specified battery charger: MH-53 or similar
Operating conditions	Temperature: 0 to 40°C Humidity: 85% RH max. (no condensation) Altitude: 2000 m max. Degree of pollution: Degree 2 Installation: Category II Electric shock protection class: Class I Indoor use only

8.1 Specifications

Transport/storage conditions	Temperature: -20 to 60°C Humidity: 90% RH max. (no condensation)
External dimensions and weight (main unit)	External dimensions: 184 (W) x 358 (H) x 383 (D) mm (excluding projections) Weight: Approx. 8.5 kg
Product safety	• UL-listed product (UL61010A-1) • Meets FCC 15B Class A requirements. 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. • This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada. • Complies with Australian EMI (AS/NZS2064 Group1 Class B). CE Marking • Meets EU IVDD (In vitro diagnostic medical device Directive) requirements. (GM-approved: in vitro diagnostic medical device) • Meets EU EMC Directive (EN61326) requirements. CE • UL-listed and GS-approved certification were obtained for the following combination: 55i, cytodiagnostic unit, hand switch, specified adapter, and specified battery.

Nikon Microscopes J-FL 50i55i Epi-fluorescence Attachment

Model	J-FL 50i55i Epi-fluorescence Attachment
Optical system	Infinity-corrected CF optical system Variable intermediate magnification: 1X
Fluorescent turret	Manual quadruple turret
Field diaphragm	Manual (ϕ1 to 20 mm)
ND filter	Manual, 3 filters (curved type filters ND4, ND8, ND16)
Shutter	Manual (front-operated)
Compatible lamp housing	Hg, Xe, centered halogen (incompatible with precentered type)
Operating conditions	Temperature: 0 to 40°C Humidity: 85% RH max. (no condensation) Altitude: 2000 m max. Degree of pollution: Degree 2 Installation: Category II Electric shock protection class: Class I Indoor use only
Transport/storage conditions	Temperature: -20 to 60°C Humidity: 90% RH max. (no condensation)
Weight	Approx. 2 kg

J-CY Cytodiagnostic Unit for Nikon Microscopes

Model	J-CY Cytodiagnostic Unit
Optical system	Infinity-corrected CF optical system Objective: 20X Variable magnification lens: 2X, 0.5X
Magnification adjustment system	Quick magnification adjustment by rotary solenoid Operated by C-HS hand switch
Marker section	Quick stamp system (Ink: 7-CY refill ink)
Input voltage	12V DC, 2.5A
Power supply	AC adapter (Power may be supplied directly from the ECLIPSE 55i [through the cytodiagnostic-unit power supply connector] using the cable set for the 55i & cytodiagnostic unit when attaching the adapter to ECLIPSE 55i.)
Specified AC adapter	Manufacturer: ILAN ELECTRONICS LTD. Model: F1650K Rated input voltage: 100-240V AC, 1.2A max. (when inputting 115V AC), 50/60Hz Rated output voltage: 12V DC, 3.5A max. Other: UL-listed product, GS-approved, CE-certified
AC adapter power cord	• 100-120V areas: UL-listed detachable power cord set (3 conductor grounding Type SVT, 18 AWG, 3 m long maximum, rated at 125V AC minimum) • 220-240V areas: EU/EN-approved 3-conductor power cord set (3 conductor grounding Type H05VV-F, 3 m long maximum, rated at 250V AC minimum)
Operating conditions	Temperature: 0 to 40°C Humidity: 85% RH max. (no condensation) Altitude: 2000 m max. Degree of pollution: Degree 2 Installation: Category II Indoor use only
Transport/storage conditions	Temperature: -20 to 60°C Humidity: 90% RH max. (no condensation)
Weight	Approx. 1 kg