M352 E 05.4.NF.1

Nikon

LV-UEPI
Universal Epi Illuminator

Instructions

Thank you for purchasing the Nikon products.
This instruction manual has been prepared for the users of Nikon LV-UEPI Universal Epi Illuminator.
To ensure correct usage, read this manual carefully before operating the instrument.

- It is prohibited to reproduce or transmit this manual in part or whole without Nikon's expressed permission.
- The contents of this manual are subject to change without notice.
- Although every effort has been made to ensure the accuracy of this manual, if you note any points that are unclear or incorrect, contact your nearest Nikon representative.
- Some of the products described in this manual may not be included in the set you have purchased.
- Be sure to read the instruction manual for any other products that may be used in combination with the microscope.

Warning/Caution Symbols Used in This Manual

Although Nikon products are designed to provide you with the utmost safety during use, incorrect usage or disregard of the instructions can cause personal injury or property damage. For your safety, read this instruction manual carefully and thoroughly before using the instrument. Do not discard this manual, but keep it near the product for easy reference.
In this manual, safety instructions are indicated with the symbols shown below. Be sure to follow the instructions indicated with these symbols to ensure correct and safe operation.

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

Meaning of Symbols Used on the Equipment

Symbol	Meaning
	**Caution for heat.** This marking on the rear of the lamphouse and near the lamphouse mount of this illuminator calls your attention on the followings. • The lamphouse is very hot during and immediately after illumination. • Risk of burns. Do not touch the lamphouse during and immediately after illumination. • Make sure that the lamphouse has sufficiently cooled before replacing the lamp.

WARNING

1. **Intended product use**
   This illuminator should only be used for microscopic observation. Do not use it for any other purpose.

2. **Do not disassemble.**
   Disassembly may cause malfunction, electrical shock, and/or injury. Any injury or damage due to such an act will not be warranted. Do not disassemble any part other than those described in this manual. If you experience any problem with the illuminator, notify your nearest Nikon representative.

3. **Read the instruction manuals carefully.**
   For your safety, carefully read this manual and the manuals provided with the other products to be used with the system. Be sure to read warnings and cautions at the beginning of each manual in particular.
   When the external light source is used:
   When you use the external light source using a mercury lamp or so on, handle the lamp with extreme caution. Read the manual for the light source carefully and observe handling precautions.

4. **Heat from the light source**
   The lamp and the lamphouse become extremely hot. To avoid burns, do not touch the lamphouse while the lamp is lit or for thirty minutes after it is turned off.
   Furthermore, to avoid the 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 for about thirty minutes after it is turned off.

5. **Air vents**
   Do not block the air vents on the microscope and lamphouse.
   If the air vents are blocked, the temperature of the microscope will raise. And it results in damage or fire.

6. **Reflection**
   Lustrous specimen reflect the illumination. Do not observe the area around the objectives for a long time because the strong reflection may hurt your eyes.

CAUTION

1. Handle the system gently.

Components of this device are precision optical instruments. Handle them carefully, and do not subject them to any shocks.

2. Do not wet this device

If this device gets wet, a short circuit may cause malfunction or abnormal heating of the microscope. If you accidentally spill water on the device, immediately turn off the power. Then, wipe away the moisture using a dry cloth or the like. If water gets inside the device, do not use it; instead, notify your nearest Nikon representative.

3. Installation location

Being a precision optical instrument, the illuminator may get damaged or loose accuracy if it is used or stored under unsuitable conditions. When selecting the installation location, note the following:

- Avoid a brightly lit location, such as exposed to direct sunlight or directly under a room light. The image quality deteriorates if there is excessive ambient light.
- Always install the microscope with a surrounding clear area of 10 cm or more.
- Choose a location that is free from considerable dust or dirt.
- Choose a flat surface with little vibration.
- Choose a sturdy desk or table that is able to bear the weight of the instrument.
- Do not install the illuminator in a hot and humid location.
- For details about the operating environment and storage environment, see “VI. Specifications.”

4. Cautions on assembling

- Be careful not to pinch your fingers or hands during assembly.
- Scratches or fingerprints on the lens surface will adversely affect the microscope image. Be careful not to scratch or touch the lens surfaces.

5. Objective

This illuminator adopts the infinity optical system. Use an objective for infinity optical system. The objective has a marking of “ ” (infinity). If an objective for finity optical system is used, it may hit the specimen because the focus length is different.

6. Light source

Nikon recommends that the light source to be installed onto this device should have been tested by a safety certification organization.
To install this illuminator onto the LV150/LV150A or LV100D, be sure to use the specified lamp and lamphouse. If other parts are installed, it may cause a failure of the system.

● **Lamphouse:**
Nikon LV-LH50PC precentered lamphouse 12V 50W (model LV-LH50PC)

● **Lamp:**
Nikon LV-HL50W 12V 50W LONGLIFE halogen lamp (model LV-HL50W), or non-Nikon 12V 50W SHORTLIFE halogen lamp (model OSRAM HLX 64610, OSRAM HLX 64611, or PHILIPS 7027)

If you wish to buy these lamps, contact your nearest Nikon representative.

CAUTION

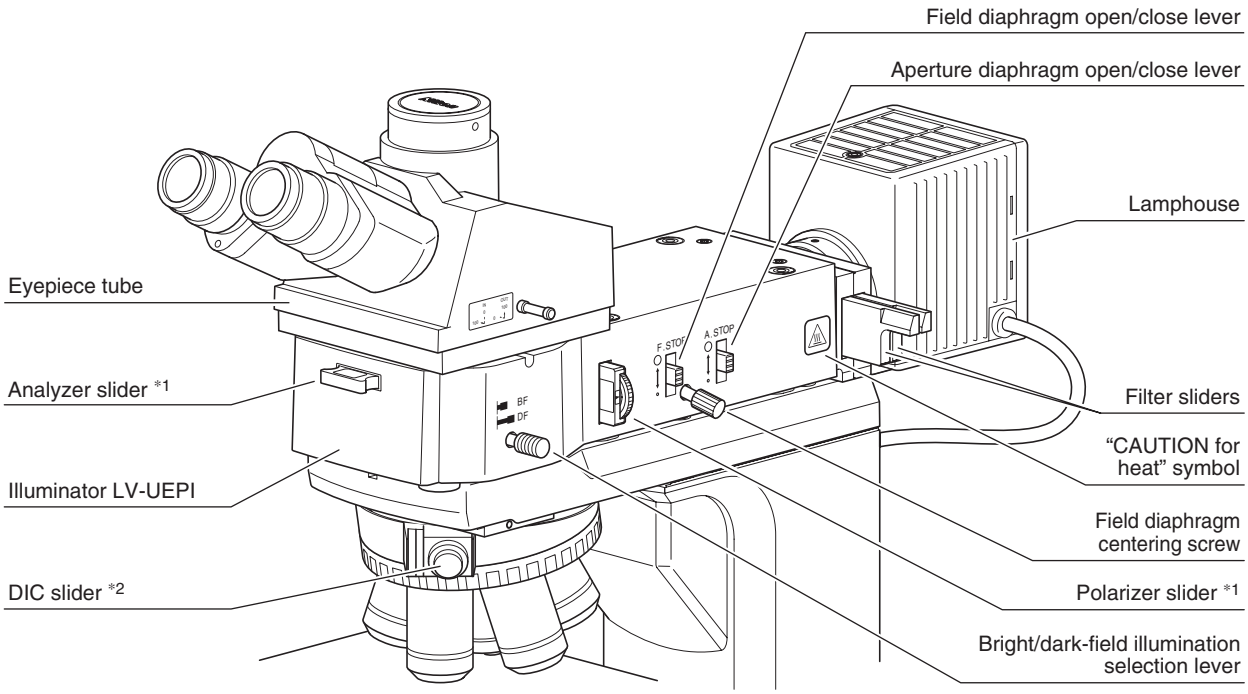
7. Cautions on lamp replacement

- To prevent burn injury, allow the lamp to cool down sufficiently (for at least 30 minutes after the microscope system is turned off) before replacing the lamp.
- To prevent electrical shock and damage to the microscope, always turn off the power switch (flip it to the "○" side) and unplug the power cord from the wall outlet before connecting or disconnecting the lamphouse.
- Do not touch the glass surface of the lamp with bare hands. Fingerprints or grease on the bulb surface will reduce the illumination intensity of the lamp. Wipe out any fingerprints or grease attached to the surface.
- Securely attach the lamphouse cover to the lamphouse after replacing the lamp. Never light the lamp while the lamphouse cover is open.
- When you dispose of the replaced lamp, do not break it up. Instead, dispose of the used lamp as special industrial waste or dispose of it according to the local regulations and rules.

CONTENTS

1 Names of Each Part

The drawing below depicts that the illuminator LV-UEPI, eyepiece tube, lamphouse, and attachments for DIC microscopy are installed on the ECLIPSE LV150A. The microscope is also configured with the DIC slider.



*1: For DIC microscopy or simplified polarization microscopy.
*2: For DIC microscopy.

II Assembly

This chapter describes the way to assemble this device onto the ECLIPSE LV150/LV150A as an example.

Assemble each part of the microscope by referring to the diagram in this chapter.

WARNING

- Before assembling the microscope, be sure to read the ⚠ WARNING and ⚠ CAUTION at the beginning of this instruction manual and follow the instructions written therein.
- To prevent electrical shocks and fire, turn off the power switches of the microscope and illuminator (flip them to the "○" side) and unplug the power cord from the outlet when assembling the microscope.

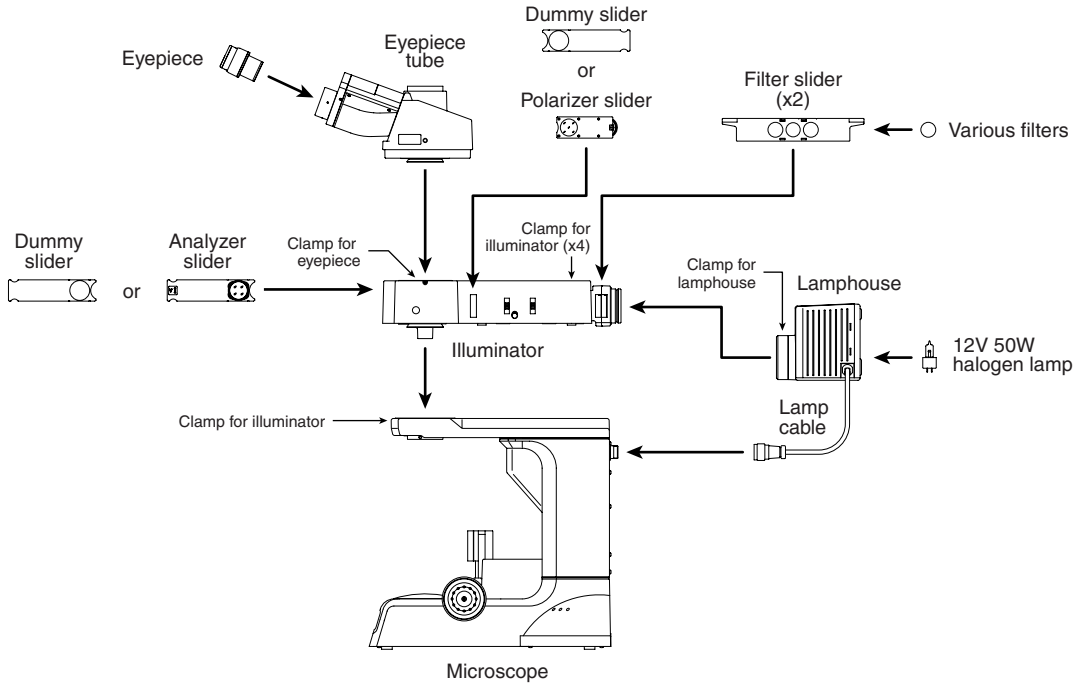
CAUTION

- Be careful not to pinch your fingers or hands during assembly.
- Scratches or fingerprints on the lens surface will adversely affect the microscope image. Be careful not to scratch or touch the lens surfaces. If lenses are contaminated with fingerprint or such, clean them according to the procedure described in "V. Care and Maintenance."
- The microscope system is a precision optical instrument. Handle it carefully and do not subject it to a strong physical shock. (In particular, objectives may loose accuracy when exposed to even a weak physical shock.)

▶ Required tools

- Hexagonal screwdriver 2 mm × 2 (supplied with the microscope)
- Hexagonal wrench 3 mm × 1 (supplied with the microscope)

▶ Assembling the LV-UEPI



1 Attaching the Illuminator

1. Illuminator main unit

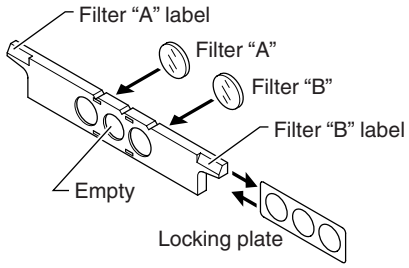
1 Loosen sufficiently the illuminator clamp screw on the front of the microscope arm using the hexagonal screwdriver.
2 Mount the illuminator onto the microscope arm and fix it by tightening the illuminator clamp screw.
3 Secure the illuminator on the microscope arm. Do this by tightening four hex screws supplied with the illuminator using the hexagonal wrench.
4 Cover the screw holes with the protective stickers supplied with the illuminator.

2. Sliders (dummy sliders, analyzer slider, and polarizer slider)

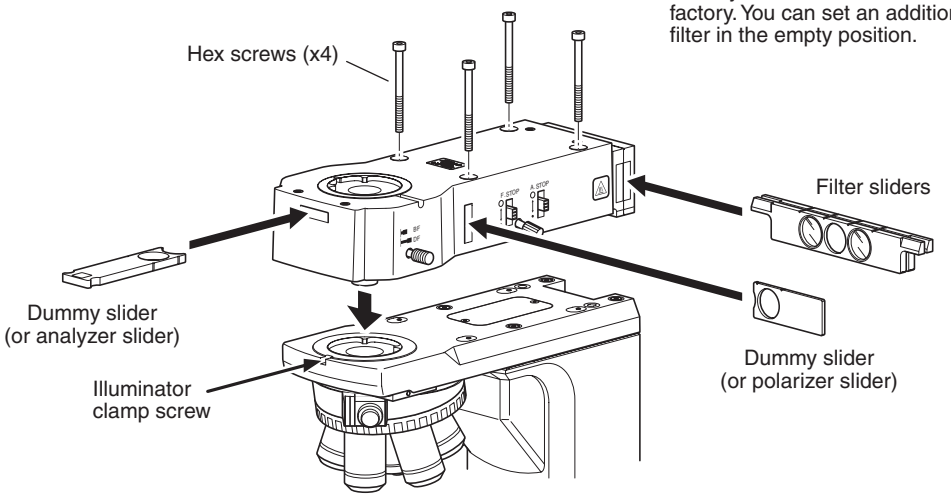
The sliders are to be inserted into the slots on the front and the right side of the illuminator. For dummy sliders, slide them in till the limit (so that the empty hole will be set in the optical path). For the polarizer slider and analyzer slider, see page 14 and 15.

3. Filter sliders and filters

1 Remove each filter slider from the illuminator. (There are two sliders.)
2 Pull out the locking plate from the filter slider.
3 Insert the desired filter. (Two filters can be set on the filter sliders.)
4 Reinstall the locking plate.
5 Affix the label to the appropriate lug of the filter slider.
6 Attach the filter sliders to the illuminator.

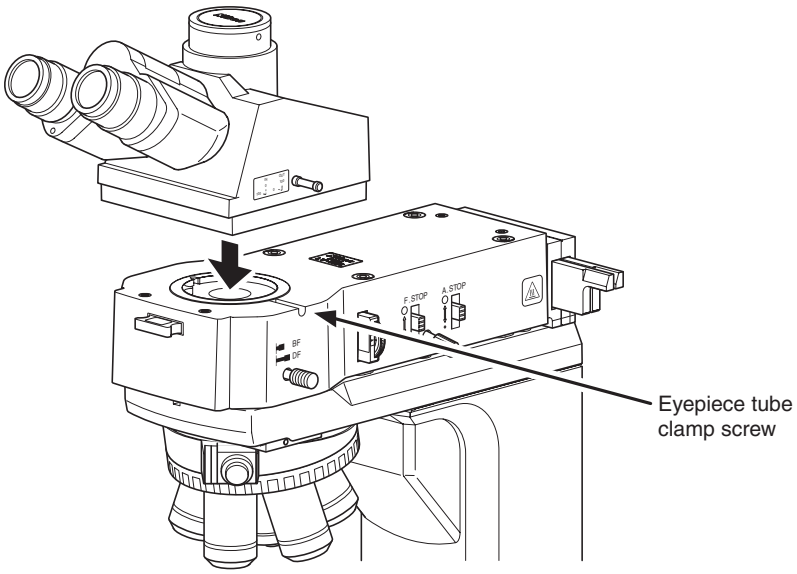


ND4, ND16, and NCB filters are already set on the filter sliders at the factory. You can set an additional filter in the empty position.



2 Attaching the Eyepiece Tube

Fully loosen the eyepiece tube clamp screw with the hexagonal screwdriver. Fit the eyepiece tube onto the mount on the top of the illuminator and tighten the eyepiece tube clamp screw with the hexagonal screwdriver.



▶ Note on removing the eyepiece tube

Take hold of the eyepiece tube when loosening the eyepiece tube clamp screw since the eyepiece tube may come off suddenly.

3 Attaching the Lamphouse and Replacing the Lamp

CAUTION

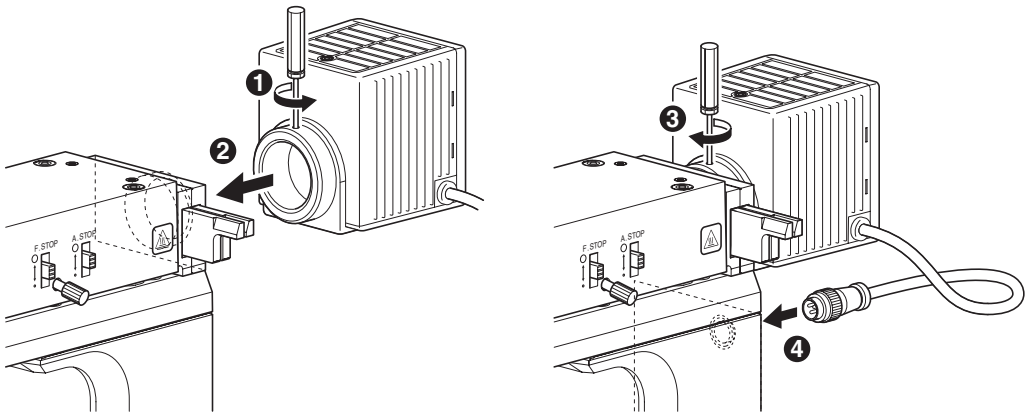
- To prevent electrical shock and damage to this device, always turn off the power switch of the illuminator before connecting or disconnecting the lamphouse.
- To prevent burn injury, allow the lamp and the lamphouse to cool down sufficiently (for at least 30 minutes after the lamp is turned off), before replacing the lamp.
- Nikon recommends that the lamp and the lamphouse to be installed onto this device should have been tested by a safety certification organization. To use the LV150/ LV150A or LV100D, refer to the specified light sources described in “6. light source” in Caution on the page 4.
- Do not touch the glass surface of the lamp with bare hands. Fingerprints or grease on the bulb surface will reduce the illumination intensity of the lamp. Wipe clean any fingerprints or grease attached to the surface.
- Securely attach the lamphouse cover to the lamphouse after replacing the lamp. Never light the lamp with the lamphouse cover removed.
- When you dispose of the replaced lamp, do not break it up. Instead, dispose of the used lamp as special industrial waste or dispose of it according to the local regulations and rules.

1. Attaching the lamphouse

This section describes the way to assemble the LV-LH50PC onto this device as an example. To install another light source, refer to the instruction manual for each device.

Before performing the following procedures, turn off the power supply for the microscope (press the “○” side) and unplug the power cord from the wall outlet.

1. Loosen the clamp screw on the top side of the lamphouse connector by using the hexagonal screwdriver.
2. Mount the connection port of the lamphouse over the connection port on the rear of the illuminator or microscope and press the lamphouse as far as it goes.
3. Using the hexagonal screwdriver supplied with the microscope, tighten the clamp screw on the top of the connection port of the lamphouse to secure the lamphouse.
4. Plug the cable coming from the lamphouse into the lamp connector on the rear of the microscope and tighten the ring of the connector to secure the connection.



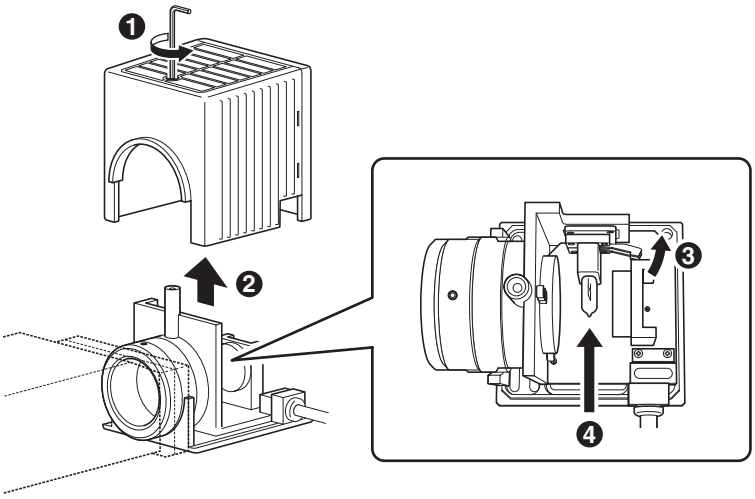
To remove the lamphouse, reverse the above procedure.

2. Replacing the lamp

This section describes the way to replace lamps for the LV-LH50PC as an example. To replace lamps for another light source, refer to the instruction manual for each device.

Before starting the procedure below, verify that the power switch on the microscope is turned off (flip the switch to "○" side), the power cord is unplugged from the outlet. And, wait for more than 30 minutes from turning off the lamp to cool down the lamp and lamphouse.

1 Loosen the lamphouse cover clamp screw using the hexagonal wrench.
2 Remove the lamphouse cover.
3 Push down the lamp clamp lever and remove the old lamp.
4 With the lamp clamp lever held down, insert the electrodes of a new lamp into the pin holes of the socket. Press the lamp as far as it goes, and then release the lamp clamp lever to secure the lamp.
Be careful not to touch the glass surface with bare hands.
When releasing the lamp clamp lever, use care so that the lamp does not tilt.
5 Close the lamphouse cover and secure it by tightening the clamp screw.

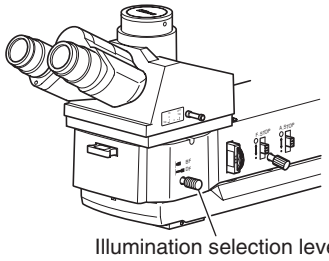


* For the LV-LH50PC, lamps can be replaced without having to detach the lamphouse from the microscope.

III Operation of Each Part

1 Illumination selection lever

The illumination selection lever on the right side can be used to alternate the microscopy illumination between the bright field (BF) and the dark field (DF). Push the lever to select the bright field illumination (BF), or pull it out to select the dark field illumination (DF).



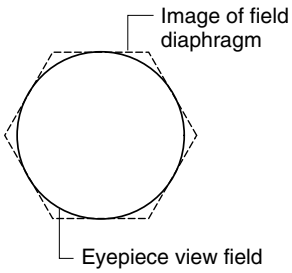
2 Filters

There are two filter sliders in the end of the illuminator. Two filters can be set on each filter slider. The desired filters can be brought into the optical path by sliding the filter sliders in and out.
For attaching the filters, refer to p.8.

Filters	Usage
NCB11 (neutral color balancing filter)	Color balance adjustment and color photomicrography.
ND4 (ND filter)	Brightness adjustment. (tramsmittance: 25%)
ND16 (ND filter)	Brightness adjustment. (tramsmittance: 6%)
GIF (green interference filter)	Contrast adjustment.
IF (interference filter)	For interference.

3 Adjusting the Field Diaphragm

The field diaphragm open/close lever changes the size of the field diaphragm. Adjust the size of the diaphragm until it circumscribes the viewfield.

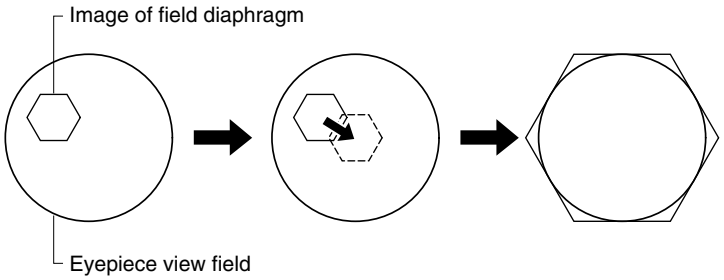


▶ Field diaphragm

- The field diaphragm restricts illumination on the specimen to the area being observed.
- Illuminating an area larger than necessary can let in stray light, creating flaring and reducing the contrast of the optical image.
- Proper operation of the field diaphragm is important for the photomicrography. Generally, the field diaphragm should be set to an area slightly larger than the area to be exposed on film, that is, the photographed area.
- Be sure to adjust the field diaphragm after centering it.

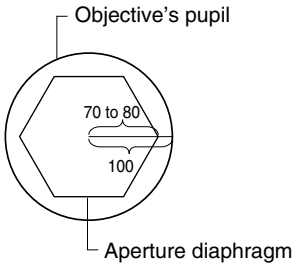
Centering the field diaphragm

1. Turn the illumination selection lever to the BF position.
2. If accessories for DIC (polarizer, analyzer, and DIC slider) are in place, pull them out of the optical path.
3. Select the 10x objective and focus on the specimen.
4. Lower the field diaphragm open/close lever to reduce the field diaphragm opening.
5. Rotate the field diaphragm centering screw on the both sides to move the center of the field diaphragm image to the center of the viewfield.
6. Use the field diaphragm open/close lever and centering screws so that the field diaphragm image is inscribed in the viewfield.
7. When starting observation, raise the field diaphragm open/close lever so that the field diaphragm image is slightly larger the viewfield.



4 Adjusting the Aperture Diaphragm

The aperture diaphragm open/close lever will change the opening of the aperture diaphragm. Remove one of the eyepieces, and then adjust the lever while observing the objective's pupil (the bright area when the aperture diaphragm is full opened) in the eyepiece tube. Generally, the aperture diaphragm should be adjusted to about 70 to 80% of the numerical aperture of the objective.

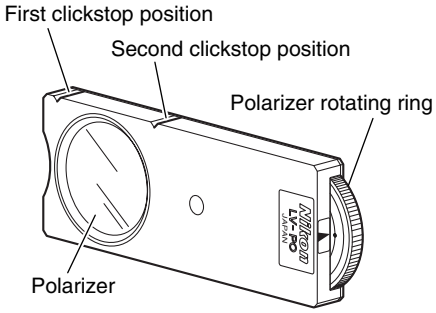


Aperture diaphragm

- Since the aperture diaphragm is for adjusting the numerical aperture of the illumination system, this diaphragm is related to the resolution of the optical image, contrast, and depth of focus.
- The diaphragm image may not appear in the case of a specimen with low reflectivity. In this case, change to a specimen with a near-polished surface.
- The aperture diaphragm centering has been done at the factory and does not need to be adjusted.

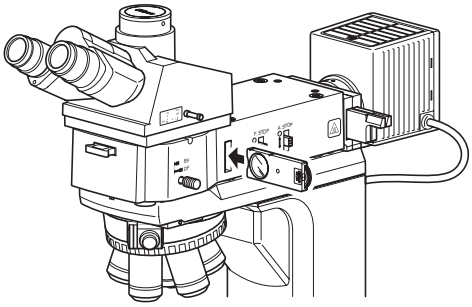
5 Polarizer Slider

The polarizer slider can be used together with the analyzer slider to enable the the simplified polarization microscopy. Likewise, the polarizer slider can be combined with the analyzer slider and DIC slider to perform DIC microscopy.



▶ Placing the polarizer in the optical path

Remove the dummy slider at the right side of the illuminator, and in its place, insert the polarizer slider with its orientation indication facing toward the eyepieces.
Pushing the polarizer slider in to the first clickstop position inserts the empty hole into the optical path. Pushing it further in to the second clickstop position inserts the polarizer into the optical path.
Set the orientation of the polarizer by turning the polarizer rotating ring.

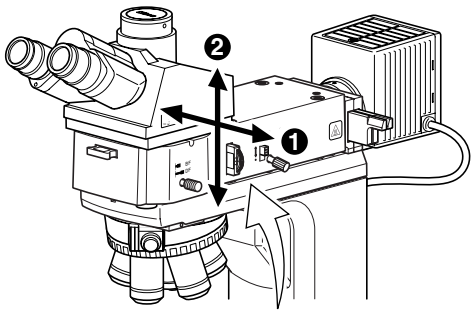


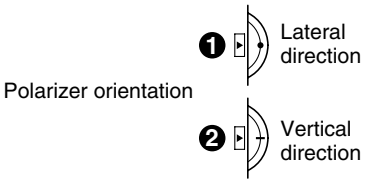
▶ Removing the polarizer out of the optical path

With the polarizer placed in the optical path, pull it out in the right direction to the first clickstop position. The polarizer has been removed out of the optical path (instead, the empty hole is now in the optical path).

▶ Adjusting the orientation of the polarizer

Turning the polarizer rotating ring changes the orientation of the polarizer. Here is how to bring the polarizer and the analyzer into the crossed Nicols position.
Place the polarizer and the analyzer in the optical path. Place a specimen with a flat and plain surface on the stage and set the microscope for simplified polarization microscopy.
Remove one eyepiece from the microscope and look inside the open sleeve. You can see the objective's pupil as a bright circle.
Turn the polarizer rotating ring in either direction until the dark cross appears in the viewfield. This is the crossed Nicols position.
(Matching the marks on the polarizer rotation dial as shown in ❶ on the illustration will bring about the crossed Nicols position as well.)

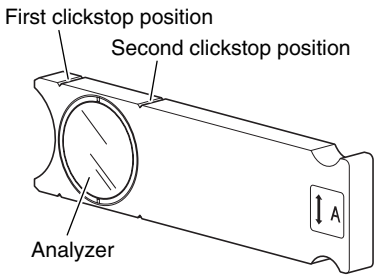




Dark cross

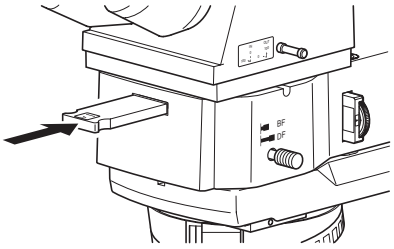
6 Analyzer Slider

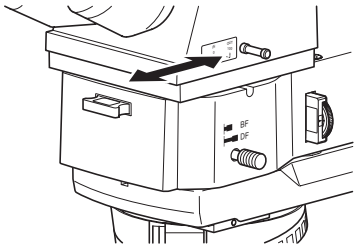
The analyzer slider can be used together with the polarizer slider to enable the simplified polarization microscopy. Likewise, the analyzer slider can be combined with the polarizer slider and DIC slider to perform the DIC microscopy.



▶ Placing the analyzer in the optical path

Remove the dummy slider at the front of the illuminator, and in its place, insert the analyzer slider with its marking facing up.
Pushing the analyzer slider in to the first clickstop position inserts the empty hole into the optical path. Pushing it further in to the second clickstop position inserts the analyzer into the optical path.
The orientation of the analyzer is as indicated by the arrow on the lower right figure.





Analyzer orientation

▶ Removing the analyzer out of the optical path

With the analyzer placed in the optical path, pull it out toward you to the first clickstop position. The analyzer has been removed out of the optical path (instead, the empty hole is now in the optical path).

IV Troubleshooting

Improper use of the microscope may adversely affect its performance even though there is no damage on itself. If any of the problems listed below arises, take the countermeasures indicated.

Problems	Cause	Countermeasures
The viewfield is invisible, vignetted, or uneven in brightness.	The lamp is not installed properly.	Install the lamp securely. (p. 10)
	The field diaphragm is stopped down too far.	Open the diaphragm to a suitable size. (p. 12)
	A filter or filter slider is in an intermediate position.	Move the filter slider to a clickstop position. (p. 12, 14, and 15)
	The bright/dark-field illumination selection lever is in an intermediate position.	Move it to a clickstop position. (p. 12)
Dirt or dust in the viewfield	The aperture diaphragm is stopped down too far.	Open the aperture diaphragm to a suitable size. (p. 13)
	Dirt or dust exists on the lens, eyepiece, filter, or specimen.	Clean it. (p. 19)
The viewing is poor (too much or too little contrast, or poor resolution).	The aperture diaphragm is stopped down too far.	Open the aperture diaphragm to a suitable size. (p. 13)
	Dirt or dust exists on the lens, eyepiece, filter, or specimen.	Clean it. (p. 19)
	The used objective is not suitable for the microscopy.	Use the specified objective.
No interference color is seen on the DIC microscopy.	No analyzer or no polarizer is placed in the optical path.	Put the analyzer and polarizer into the optical path. (p. 14 and 15)
	No DIC prism is placed in the optical path.	Put the DIC prism into the optical path.
Uneven colors or low contrast on the DIC microscopy.	The used objective is not suitable for the microscopy.	Use objectives marked “LU Plan” or “LU Plan Apo.”
	The used objective and the DIC prism do not match for the microscopy.	Match the prism selection according to the objective.

Problems	Cause	Countermeasures
Yellowish image	The NCB11 filter is not used.	Place the NCB11 filter into the optical path. (p. 12)
	The lamp voltage is too low.	Rotate the brightness control knob to increase the intensity of the light source and adjust the brightness with ND filters. (p. 12)
Too bright image	The lamp voltage is too high.	Adjust the brightness with the brightness control knob or ND filters. (p. 12)
Dark image	A ND filter is placed in the optical path.	Remove the ND filter out of the optical path. (p. 12)
	The aperture diaphragm is stopped down too far.	Open the aperture diaphragm to a suitable size. (p. 13)
	A polarizer or an analyzer exists in the optical path for the bright-field microscopy.	Remove the polarizer and the analyzer out of the optical path. (p. 14 and 15)
	A halogen illumination is used for a dark specimen.	Replace the light source to more bright one. (p. 10)
	The used objective is not suitable for the microscopy.	Use the specified objective.
	The ambient light is too bright (for the dark-field or epi-fl microscopy).	Darken the ambient light.

V Care and Maintenance

Nikon recommends daily care and maintenance for maintaining the performance as long as possible.
Do not let dust, fingerprints, and the like, get on the lenses. Dirt on the lenses, filters, and the like will adversely affect the optical performance of the microscope.
If lenses are contaminated, clean them according to the procedure described in “1. Cleaning the lenses and Filters.” When cleaning, be sure to turn off the power switches for the microscope and illuminator (flip the switches to “○” side) to avoid malfunction.

▶ Daily care and maintenance

Clean the parts frequently manipulated by hands, such as eyepieces and glass plate according to the procedure described in “1. Cleaning Lenses and Filters” without removing them from the microscope. Nikon recommends cleaning them frequently.
Clean the bottom ends of objectives, filters, and the like to maintain the optical performance. When cleaning the objectives, remove them from the microscope. Clean them whenever they are contaminated.
Microscopes and stages are contaminated with use. When you find the microscope is contaminated, clean them according to the description in “2. Cleaning the Painted, Plastic, and Printed Parts.”

▶ Cleaning tool and supplies (consumables)

- **Cleaning tool**
  Brush (with soft tip) (Use a cleanroom wiper in a cleanroom.)
- **Cleaning supplies (consumables)**
  Ethyl or methyl alcohol
  Lens tissue (Use a cleanroom wiper in a cleanroom.)

1 Cleaning Lenses and Filters

Do not let dust, fingerprints, etc., get on lenses and filers. Dirt on lenses, filters, etc., will adversely affect the view of the image. If any lens gets dirty, clean it as described below.

- Either brush away dust with a soft brush, or wipe it away gently with a piece of gauze.
- Only in cases of fingerprints or grease, dampen a piece of soft, clean cotton cloth, lens tissue, or gauze with absolute alcohol (ethyl or methyl alcohol) and wipe.
- Absolute alcohol requires care in handling as it is highly flammable. Be careful when using fire or turning on/off the power switch nearby.
- Follow the instructions provided by the manufacturer when using absolute alcohol.

2 Cleaning the Painted, Plastic, and Printed Parts

Do not use organic solvents (alcohol, ether, and paint thinner, etc.) on painted, plastic, or printed parts. Doing so could result in discoloration or in the peeling of printed characters. If the dirt is hard to remove, wipe it gently using a piece of gauze dampened with a neutral detergent solvent.

3 Storage

- Store the microscope in a dry place where mold is not likely to form.
- Store the objectives and eyepieces with a drying agent in a desiccator or similar container.
- Put a plastic cover over the microscope to protect it from dust.
- Before putting on the plastic cover, turn off the power switch of the microscope (flip it to the "○" side) and wait until the lamphouse is cool.

4 Regular Inspections

Regular inspections of this microscope are recommended in order to maintain peak performance. Contact your nearest Nikon representative for details about regular inspections.

VI Specifications

Model name	LV-UEPI
Optical system	CFI60 optical system (infinity-corrected CF optical system)
Light source connection	1 (rear)
Illumination	Bright-field, dark-field, DIC*, simplified polarization (* needs options) Illumination switching: bright/dark-field illumination selection lever
Field number	25
Field diaphragm	Manual opening range: ø 1.0 mm to ø 7.8 mm (bright-field) Projected magnification: 3.2x (on the eyepiece image surface) Full open diameter (for dark-field): ø 9.2 mm
Aperture diaphragm	Manual opening range: ø 1.0 mm to ø 8.0 mm (bright-field) Projected magnification: 1.64x (on the objective image surface) Full open diameter (for dark-field): ø 9.2 mm
Operating environment	Temperature: 0°C to +40°C Relative humidity: 85% RH max. (no condensation) Altitude: 2000 m max. Indoor use only
Storage environment	Temperature: -20°C to +60°C Relative humidity: 90% RH max. (no condensation)