

PRECAUTIONS

IMPORTANT!
(Read this section before use)

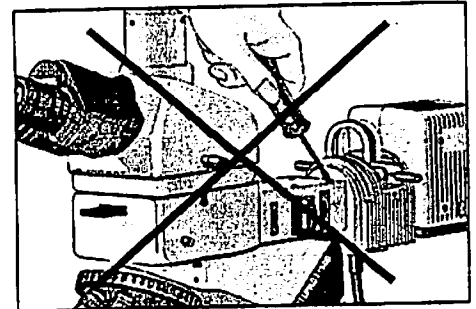
1. Purpose

Use the Epi-illuminator only for the illuminating device of microscopic observation.



2. Never Disassemble

Disassembly may cause electrical shocks and/or severe damage to the instrument. Never disassemble parts unless clear instructions are given in this manual. If you notice any malfunction, contact your nearest Nikon representative.

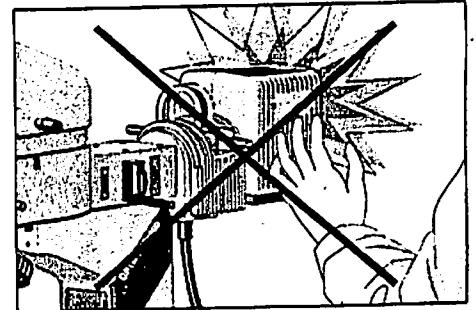


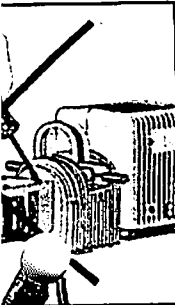
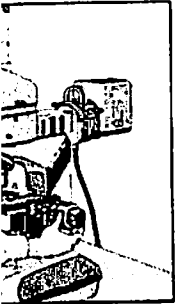
3. Heat at the Light Source

Lamp and lamphouse become very hot during and after the illumination.

Do not touch either of these.

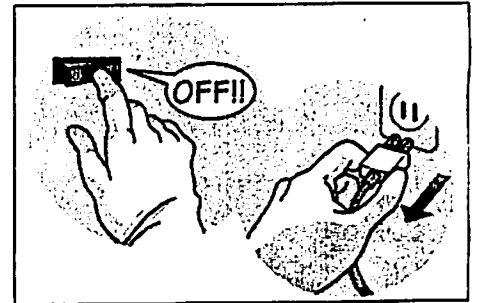
- Do not touch the lamphouse within 30 minutes after switching off the power.
- Never bring inflammable substances (such as gasoline, thinner, alcohol, cloth and paper) near the lamphouse. This may lead to a fire.





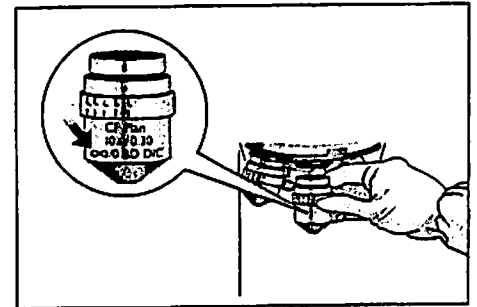
4. Precautions while Replacing Lamp Bulbs

- Use the specified lamphouse and lamp bulb only. (See p.17.) Use of any other lamphouse and lamp bulb will damage the light adjusting circuit of the instrument
- Wait until the lamp and its surroundings cool down before replacing the lamp.
- Before replacing the lamp bulb, turn off the power switch and unplug the power connector to avoid electrical shocks and/or severe damage to the instrument.



5. Objective

Use the infinite system objective with the mark ∞ . Universal Epi-illuminator makes use of the infinite optical system. If a finite system objective is used, there is a possibility that it will hit the sample on the stage when turning the revolving nosepiece, leading to the damage to the objective and the sample.



6. Dirt on the lens

Do not leave dust, dirt, or finger marks on the lens, mirror or bulb surfaces. Dust and dirt can appear as shadows and impair the image quality and contrast, they should be kept clean at all times.

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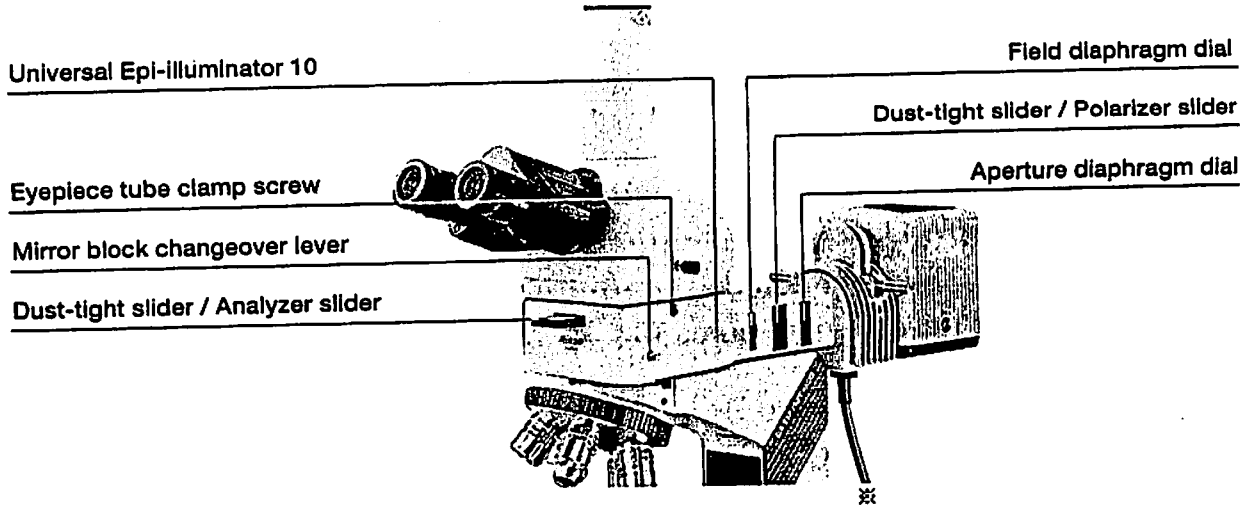
IMPORTANT!

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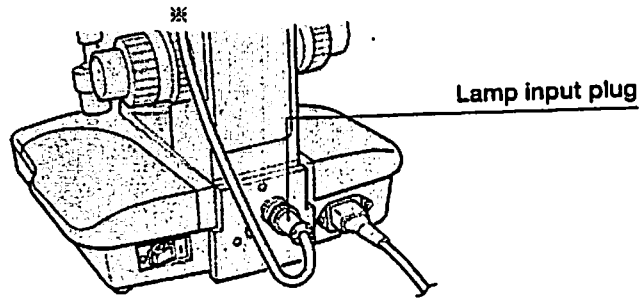
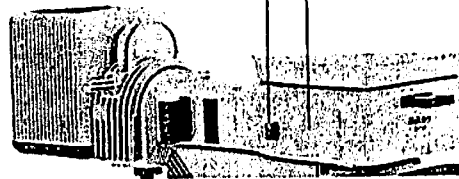
NOMENCLATURE

Universal Epi-illuminator 10 is a precision instrument. Handle it gently. Do not subject it to strong impacts or unnecessary forces. This will severely damage the instrument.



Mirror / Filter block attaching port

ND8 anti-glare filter lever



II ASSEMBLY

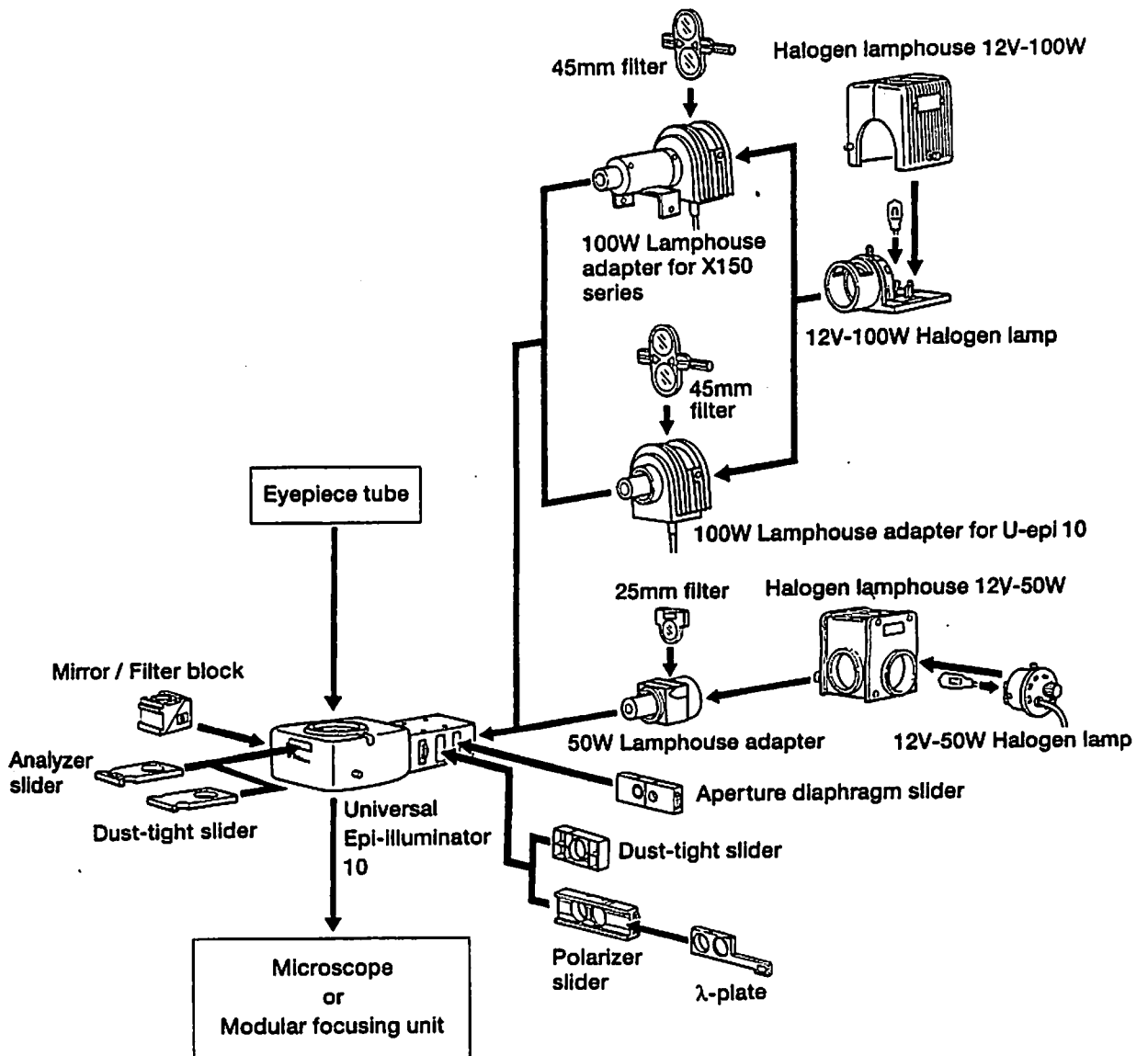
Installation

- Avoid installation at a location where the instrument is exposed to direct sunlight or room light. Illumination of the surrounding environment affects observations through the microscope.
- Install the instrument at a clean and dust-free location.
- Install the instrument on a level floor at a location where vibration is minimum.
- The recommended environmental conditions at the installation location are given below.

Room temperature: 10~35°C

Relative humidity: 35~85%

High temperature and high humidity may lead to formation of mold and dew, and result in damage to the instrument.



1. For 12V-50W Light Source

1) 50W Lamphouse Adapter

Attach the 50W lamphouse adapter to the Universal Epi-illuminator and secure it firmly using three screws supplied with the adapter.

2) Universal Epi-illuminator 10

Install the Universal Epi-illuminator on the microscope or Modular Focusing Unit.

Note:

- When mounting the illuminator on the microscope arm, clamp it in the position so that the mirror block changeover lever of the illuminator comes to the right.
- When mounting the illuminator on the Modular Focusing Unit, clamp it in the position so that the lamphouse adapter attached to the illuminator comes to the right.

3) Analyzer Slider / Dust-tight Slider

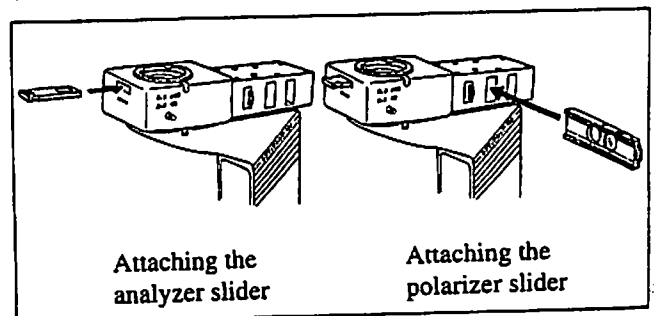
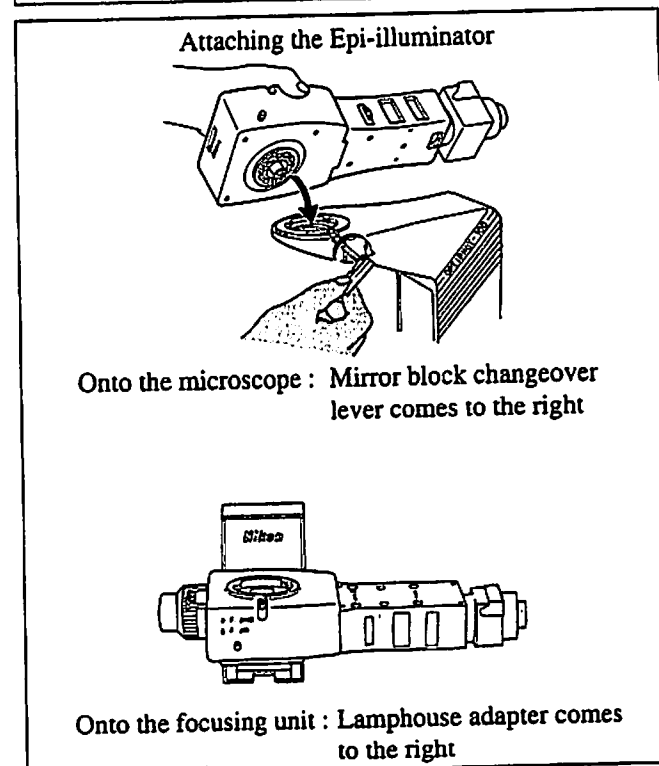
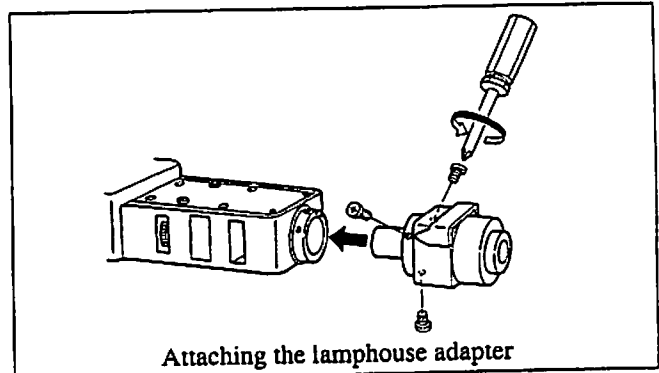
Remove the dust-tight slider on the front side of the Epi-illuminator and insert the analyzer slider in its place.

Note: When you remove the analyzer slider, make sure you insert the dust-tight slider.

4) Polarizer Slider / Dust-tight Slider

Remove the dust-tight slider on the right side of the Epi-illuminator and insert the polarizer slider in its place.

Note: When you remove the polarizer slider, make sure you insert the dust-tight slider.



5) Aperture Diaphragm Slider

Insert the aperture diaphragm slider into the slot at the far side of the Epi-illuminator.

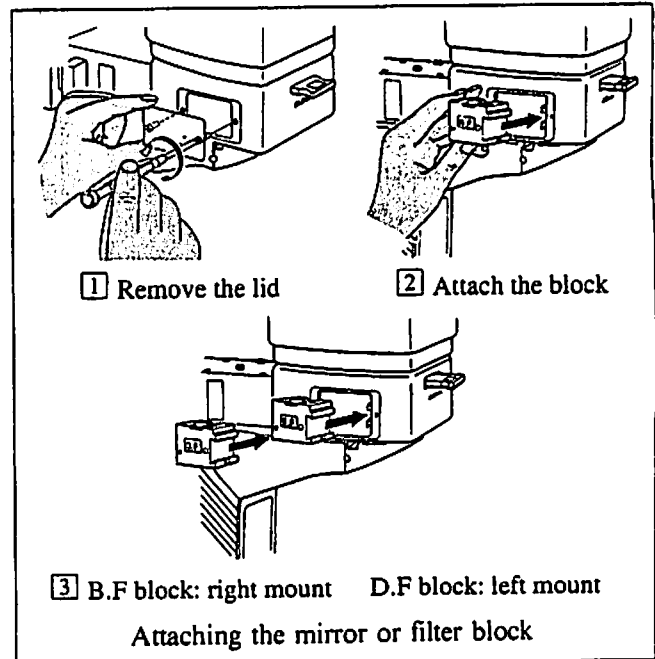
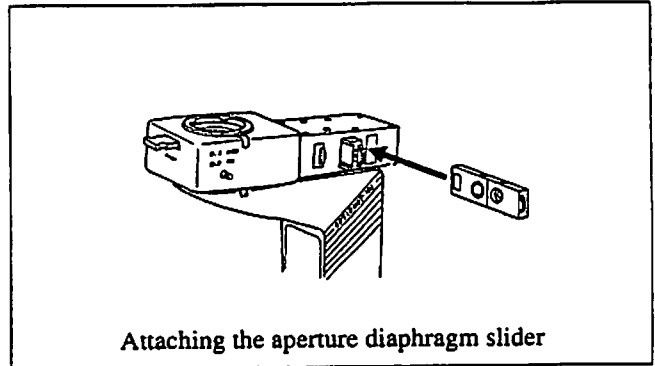
6) Mirror / Filter Block

Remove the lid on the left side of the Epi-illuminator by unscrewing the two screws [1], and insert the mirror or filter block in the dovetail inside. [2] Tighten the block fixing screw which is found at the left side of the dovetail. If you find it difficult to fit the block, take the mirror block changeover lever off the Epi-illuminator, and screw it into the block.

Two blocks can be mounted on the illuminator at the same time. When you mount the brightfield mirror block (indication: B.F) and the darkfield mirror block (indication: D.F) at the same time, be sure to fit the "B.F" block first, that is onto the right mount [3]. In this case, the "B.F" block should be inserted until it settles at the second click-stop position.

Note:

- Be sure to tighten the block fixing screw after attaching the block to the mount. If not, the block will slide off the place when moving the block changeover lever.
- The block fixing screw can't be removed. Do not try to remove it by force.
- Do not overtighten the block fixing screw.
- Release the block fixing screw before removing the block from the dovetail.



7) Lamp and Lamphouse

CAUTION:

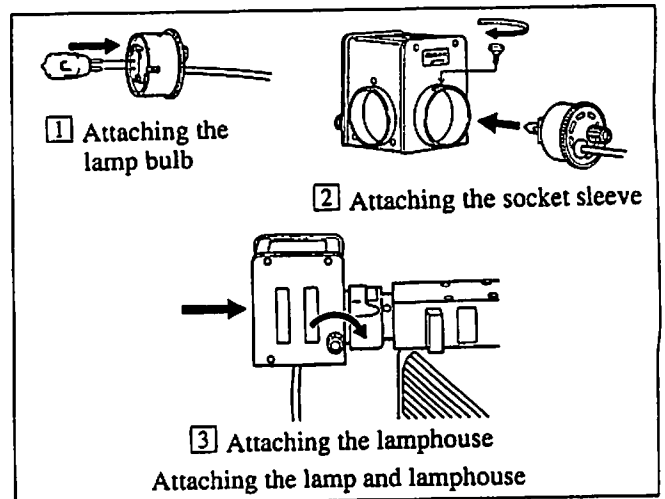
- Use the lamp and lamphouse specified. (See p.17.)
- Wait until the lamp and the lamphouse cool down before replacing the lamp.
- Before replacing lamp bulbs, turn off the power switch and unplug the power connector to avoid danger of electrical shocks and/or severe damage to the instrument.
- Do not touch the glass surface with bare hands. Fingerprints or dirt on the bulb surface will degrade its illuminating capacity. Wipe clean the fingerprints or dirt with a clean piece of cloth.

Connect the lamp leads firmly to the socket holes.

1

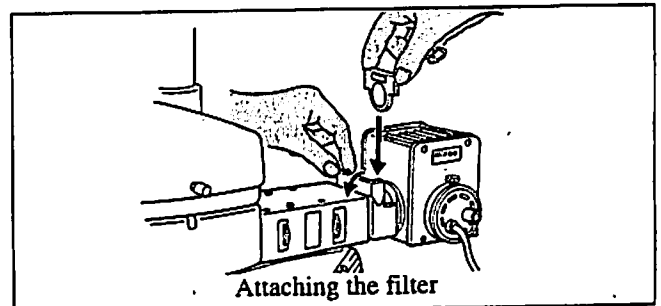
Insert the socket sleeve in the lamphouse and tighten it with the socket sleeve clamp screw. 2

Loosen the lamphouse clamp screw sufficiently. Mount the lamphouse to the lamphouse adapter, and tighten it with the clamp screw. 3



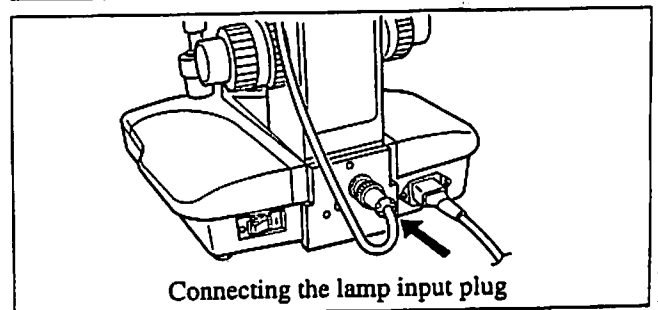
8) Filter

Insert the 25mm filter into the receptacle of the lamphouse adapter, if necessary.



9) Lamp Input Plug

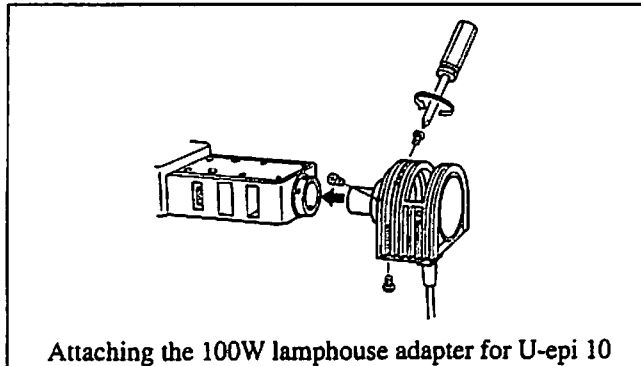
Connect the lamp input plug of the lamp socket to the receptacle on the rear side of the microscope base or transformer.



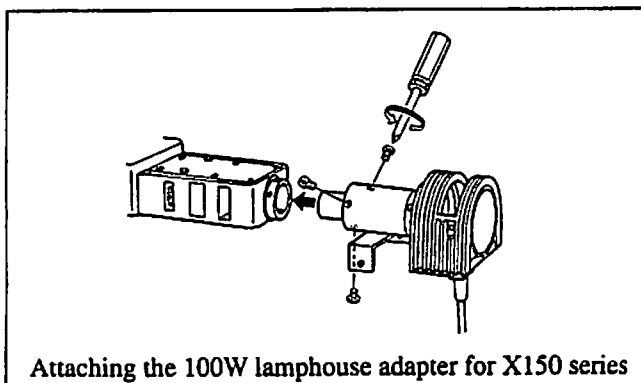
2. For 12V-100W Light Source

1) 100W Lamphouse Adapter

- When mounting the illuminator on the OPTIPHOT-100S or Modular Focusing Unit, attach the 100W lamphouse adapter for U-epi 10 to the Universal Epi-illuminator and secure it firmly using three screws supplied with the adapter.
- When mounting the illuminator on the OPTIPHOT-150/150S, attach the 100W lamphouse adapter for X150series to the Universal Epi-illuminator and secure it firmly using three screws supplied with the adapter.



Attaching the 100W lamphouse adapter for U-epi 10

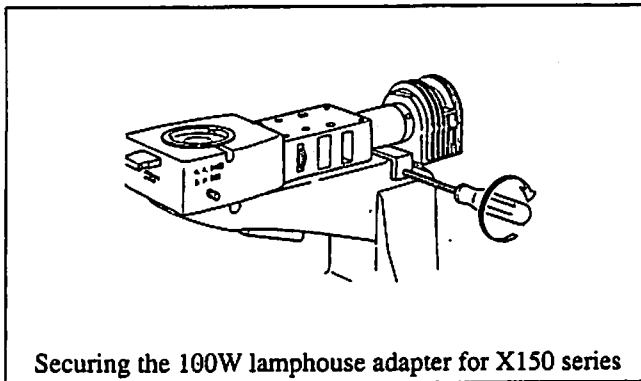


Attaching the 100W lamphouse adapter for X150 series

2) Universal Epi-illuminator 10

Refer to the procedure described in 1.-2).

Note: When mounting the illuminator on the OPTIPHOT-150/150S, tighten the screws on both sides of the lamphouse adapter support to secure the adapter.



Securing the 100W lamphouse adapter for X150 series

3) ~ 6)

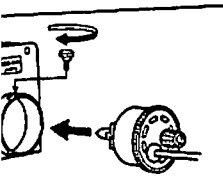
For the assembly procedures from step 3)

"Analyzer Slider / Dust-tight Slider " to step 6)

"Mirror / Filter Block", refer to the descriptions from 3) to 6) in preceding chapter 1.

to avoid danger

ice will degrade its



ing the socket sleeve



phouse
lamphouse



filter



p input plug

7) Lamp and Lamphouse

CAUTION:

- Use the lamp and lamphouse specified. (See p.17.)
- Wait until the lamp and the lamphouse cool down before replacing the lamp.
- Before replacing lamp bulbs, turn off the power switch and unplug the power connector to avoid danger of electrical shocks and/or severe damage to the instrument.
- Do not touch the glass surface with bare hands. Fingerprints or dirt on the bulb surface will degrade its illuminating capacity. Wipe clean the fingerprints or dirt with a clean piece of cloth.
- Fully insert the lamphouse into the lamphouse receptacle of the adapter before tightening the clamp screw.
- To remove the lamphouse, first remove the filter holders, and then detach the lamphouse.

Loosen the clamp screw **1** of the lamphouse lid using a coin and remove the lid **2**.

While pressing down the lamp clamp lever **3**, insert the lamp leads fully into the socket holes **4**. Take care to avoid tilting the lamp when returning the clamp lever to its original position.

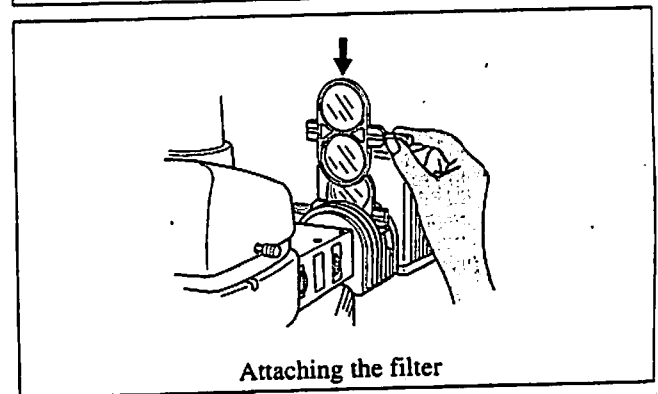
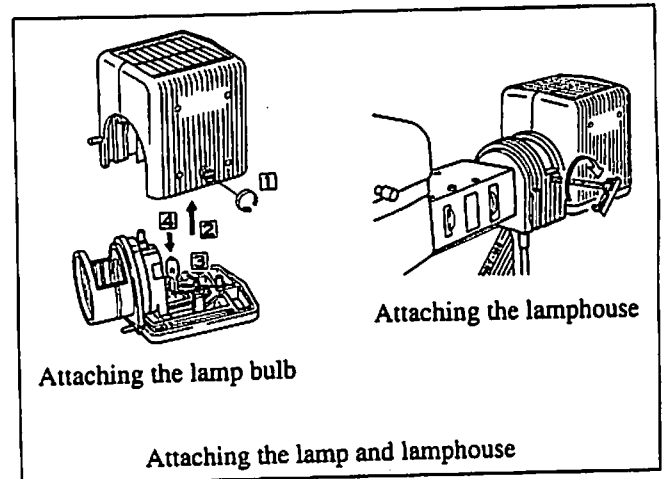
Close the lid and tighten the clamp screw of the lamp house lid. Mount the lamphouse to the lamphouse adapter, and tighten it with the clamp screw.

8) Filter

Insert the 45mm filter into the receptacle of the lamphouse adapter, if necessary.

9) Lamp Input Plug

Connect the lamp input plug of the lamphouse adapter to the receptacle on the rear side of the microscope base or transformer. (Refer to Figure of 1.-9.)

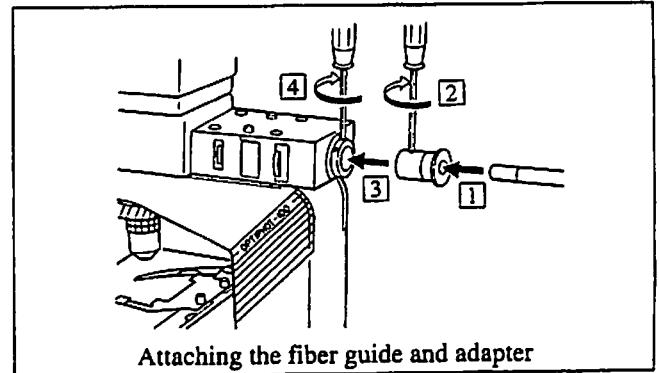


★ For Metal Halide Light Source

Fully insert the fiber guide in the fiber guide adapter for U-epi 10 **1** and clamp it with the screw of the adapter. **2**

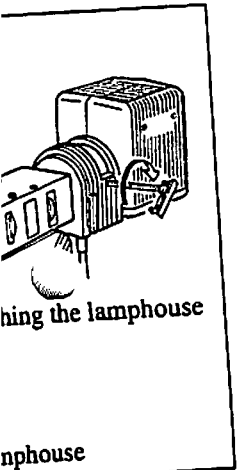
Note: Do not apply excessive force to the clamp screw when tightening.

Attach the fiber guide adapter to the Universal Epi- illuminator **3** and clamp it with the screw of the illuminator. **4**



Attaching the fiber guide and adapter

Refer also to the instruction manual of Metal Halide Light Source.



Attaching the lamphouse

Lamphouse



Filter



PREPARATION

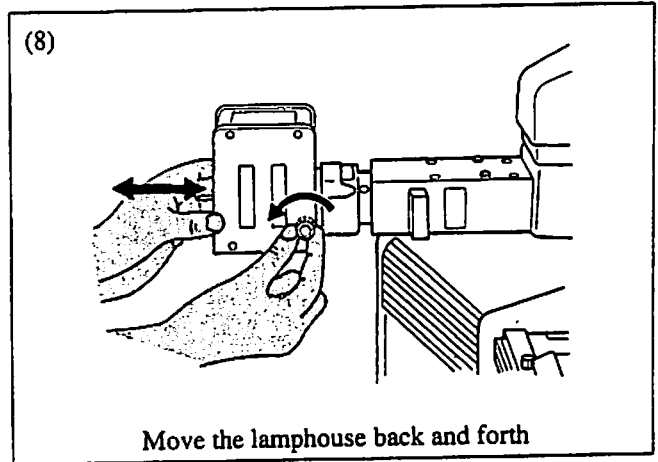
1. Lamp Centering — ONLY for 12V-50W light source —

- (1) Push in the mirror block changeover lever of the Universal Epi-illuminator to position the brightfield mirror block (indication: "B.F.") in the optical path.

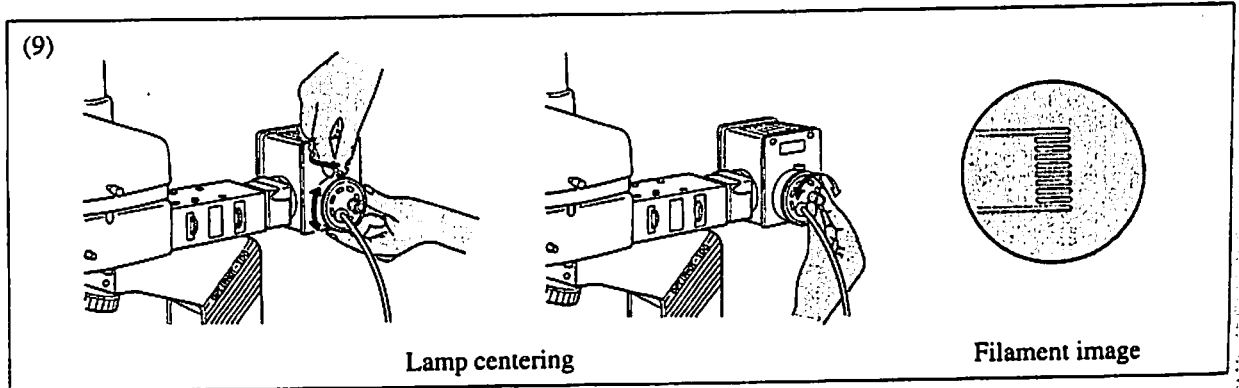
Note: Make sure the brightfield mirror block is fitted to the right mount.

- (2) Turn on the power switch of the microscope or transformer to light the lamp. Adjust the brightness about to "6V".
- (3) Remove the Nomarski prism, analyzer, polarizer, and λ -plate sliders from the optical path.
- (4) Insert the aperture diaphragm into the optical path, and fully open the aperture.
- (5) Place the sample with high reflectance on the stage, and move the objective 10X into the optical path.
- (6) Focus on the sample. Stopping down the field diaphragm will facilitate focusing.
- (7) Remove one of the two eyepieces and look through the eyepiece sleeve, where the objective's pupil can be observed as a bright circle, and the built-in diffuser surface in the illuminator can be also seen together with the filament image.

- (8) Release the lamphouse clamp screw, and move the lamphouse back and forth until the filament image is focused on the diffuser and exit pupil. Tighten the lamphouse clamp screw in this position.



- (9) Thereafter, release the socket sleeve clamp screw, turn the lamp vertical centering ring and the lamp lateral centering screw until the filament image is centered to the exit pupil. Tighten the socket sleeve clamp screw in this position.



2. Field Diaphragm Centering

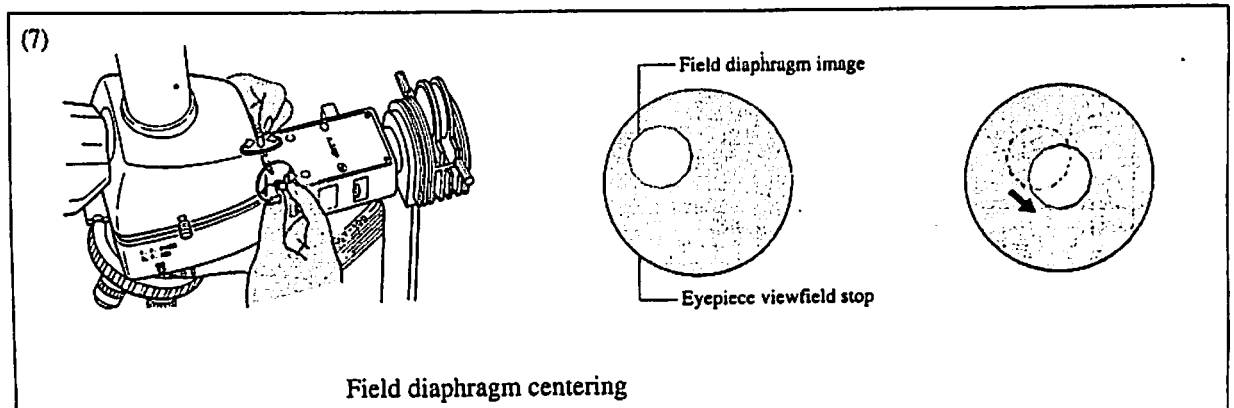
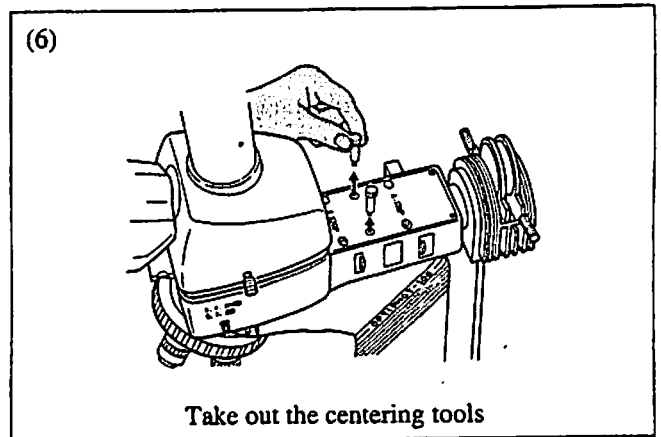
- (1) Push the mirror block changeover lever to position the brightfield mirror block (indication: "B.F.") in the optical path.

Note: Make sure the brightfield mirror block is fitted to the right mount.

- (2) Turn on the power switch of the microscope or transformer to light the lamp. Adjust the brightness about to 6V.
- (3) Remove the Nomarski prism, analyzer, polarizer, and λ -plate sliders from the optical path.
- (4) Place the sample with high reflectance on the stage, and move the 10X objective into the optical path.
- (5) Focus on the sample. Stopping down the field diaphragm will facilitate focusing.
- (6) Take out the centering tools and insert them into the field diaphragm centering holes.

- (7) Stop down the field diaphragm to its smallest size. If the diameter of field diaphragm image and the viewfield of eyepiece are eccentric, perform the centering adjustment by rotating the centering tools. In this case, adjust the size of the field diaphragm slightly smaller than the eyepiece viewfield, and the centering operation will become easy.

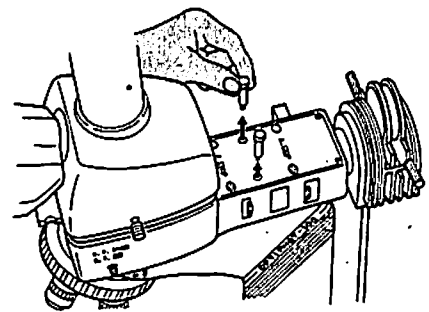
- (8) Replace the centering tools after completing the centering adjustment.



3. Aperture Diaphragm Centering

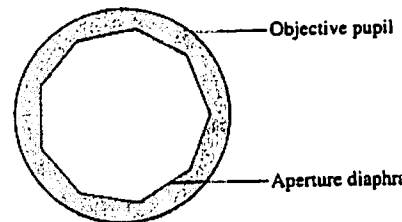
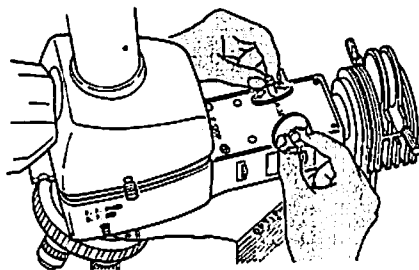
- (1) Push the mirror block changeover lever to position the brightfield mirror block (indication: "B.F.") in the optical path.
- (2) Turn on the power switch of the microscope or transformer to light the lamp. Adjust the brightness about to "6V".
- (3) Remove the Nomarski prism, analyzer, polarizer, and λ -plate sliders from the optical path.
- (4) Insert the aperture diaphragm in the optical path and fully open the aperture.
- (5) Place the sample with high reflectance on the stage, and move the 10X objective into the optical path.
- (6) Focus on the sample. Stopping down the field diaphragm will facilitate focusing.
- (7) Switch from the 10X to the 50X objective and re-focus on the sample.
- (8) Take out the centering tools and insert them into the aperture diaphragm centering holes.
- (9) Remove one of the two eyepieces and look through the eyepiece sleeve, where the objective's pupil can be observed as a bright circle, and the built-in diffuser surface in the illuminator can be also seen together with the filament image.
- (10) Stop down the aperture diaphragm to its smallest size, and the diaphragm image will appear on the exit pupil.
- (11) If the diameter of aperture diaphragm image and the exit pupil are eccentric, perform the centering adjustment by rotating the centering tools.
- (12) Replace the centering tools after completing the centering adjustment.

(8)



Take out the centering tools

(11)



Aperture diaphragm centering



OPERATION OF EACH PART

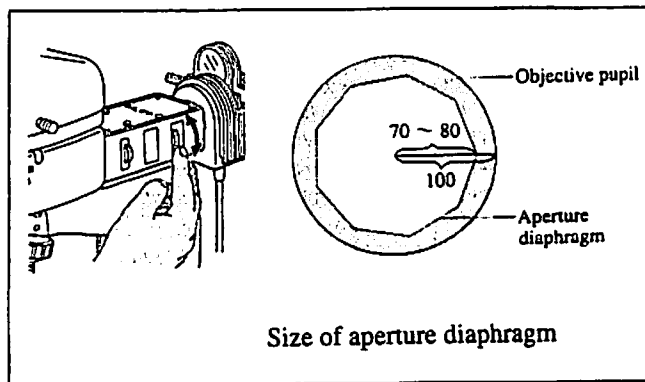
1. Aperture diaphragm

Stop down the aperture diaphragm to 70 ~ 80% of the objective's numerical aperture.

To adjust the diaphragm, remove any one of the two eyepieces and look into the eyepiece sleeve. While observing the diaphragm image on the objective's exit pupil, adjust the size of the aperture by rotating the aperture diaphragm dial.

※ Be sure to fully open the diaphragm in darkfield microscopy.

※ The aperture diaphragm is used to adjust the illumination system's numerical aperture (N.A.), and plays an important part in determining image resolution and contrast. Generally, a good image of appropriate contrast can be obtained when the aperture is stopped down to 70~80% of the objective's exit pupil. Image resolution may be adversely affected by stopping down the aperture diaphragm excessively. Therefore, the aperture should not be smaller than 60% of the objective's N.A., except when observing special samples.

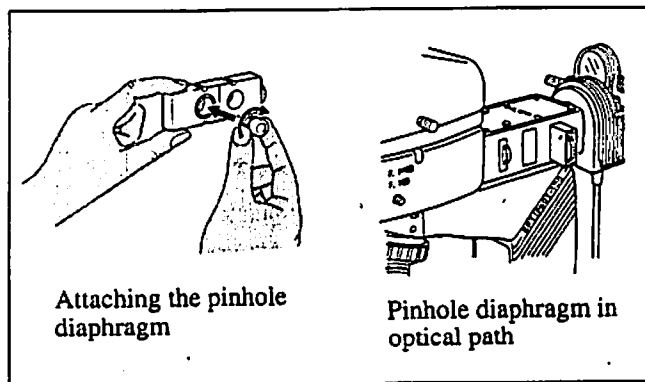


Note: Diaphragm image may not appear when observing the sample with low reflectance.

2. Pinhole Diaphragm

Used for obtaining the deep depth of focus when using the high magnification objective. It is effective for observation of contact holes.

Attach the pinhole diaphragm by screwing it into the hole on the aperture diaphragm slider so that the position of the pinhole will be at far side. After attaching the pinhole diaphragm, insert the aperture diaphragm slider into the Epi-illuminator, and put either diaphragm into the optical path according to the observation purpose.



Note: Make sure of the positive screwing-in to the limit.

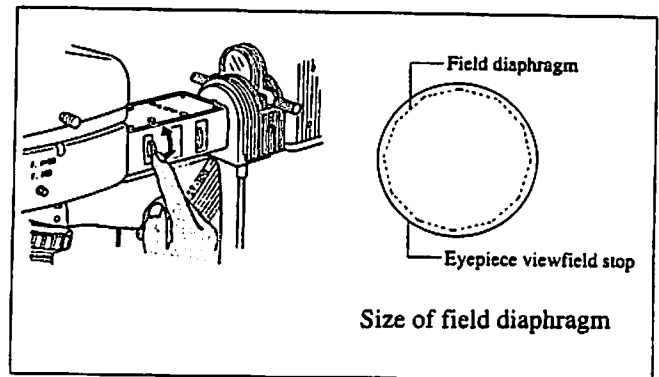
※ The position of the pinhole diaphragm has been adjusted to be concentric with the aperture diaphragm when changing to the pinhole diaphragm. But in high magnification observation, only a slight eccentricity may affect the accuracy because of the small diameter of the high magnification objective's exit pupil. Make sure the pinhole diaphragm is centered to the objective's pupil. If not centered, perform the centering adjustment following the same procedures as the aperture diaphragm centering adjustment (refer to p.11).

Note: Diaphragm image may not appear when observing the sample with low reflectance.

3. Field Diaphragm

Adjust the aperture size with the field diaphragm dial, so that it is slightly larger or smaller than the viewfield.

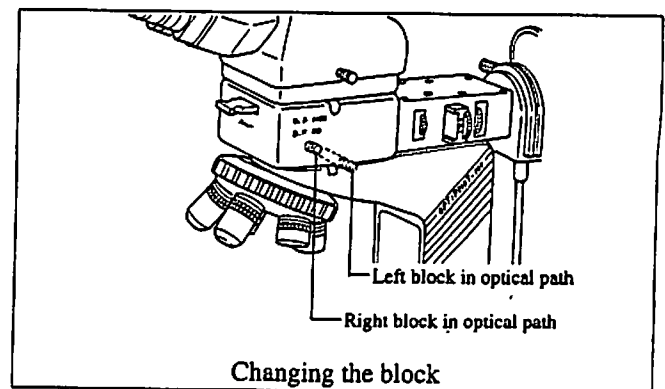
- ※ Be sure to fully open the diaphragm in darkfield microscopy.
- ※ The field diaphragm determines the size of the sample's illuminated area relative to the eyepiece viewfield. If it is opened too wide, stray light will enter the viewfield and generate a flare, lowering the image contrast. Therefore, correct adjustment of the field diaphragm is extremely important, especially in photomicrography.
Generally, good photomicrographic results can be achieved by stopping down the illuminated area so that it becomes slightly smaller than the diagonal dimensions of the film format.



4. Mirror / Filter Block

Brightfield mirror block (indication: B.F), darkfield mirror block (indication: D.F) and epi-fl filter blocks (indication: B, G, V etc.) are available. Two blocks can be mounted at the same time.

- Push in the mirror block changeover lever to the maximum limit to place the block in the right mount in the optical path. You can pull out the lever to the maximum limit to place the block in the left mount in the optical path.
- Be sure to install the brightfield mirror block in the right mount, and the darkfield one in the left mount.
- Insert the darkfield mirror block in the optical path in diascope illumination microscopy using the microscope built in the diascope illuminator.
- Insert the brightfield mirror block in the optical path in simultaneous episcopic and diascope



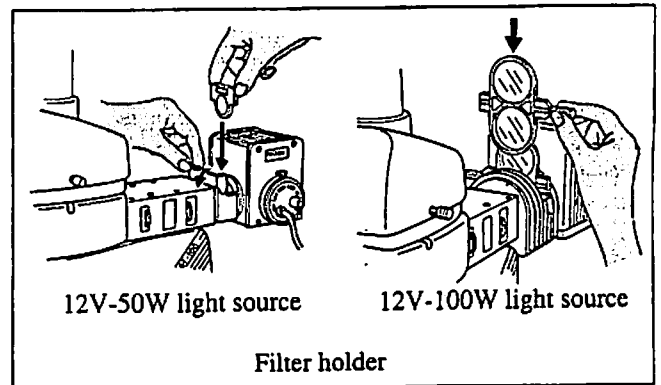
5. Filter

Type	Marking	Usage	Location
Color conversion	NCB11	General microscopy & Color photomicrography	Filter holder
Light reduction	ND2 (1/2 reduction) ND4 (1/4 reduction) ND8 (1/8 reduction)	Brightness control for general microscopy & photomicrography	Filter holder
Anti-glare	ND8	Anti-glare for episcopic brightfield microscopy (ND8 for brightfield and the transparent glass for darkfield)	Built into the Epi-illuminator (ND8 anti-glare filter lever)
Green interference	GIF	Monochrome microscopy & Contrast adjustment	Filter holders

Filter holder

Insert the filter holder into the receptacle of the lamphouse adapter.

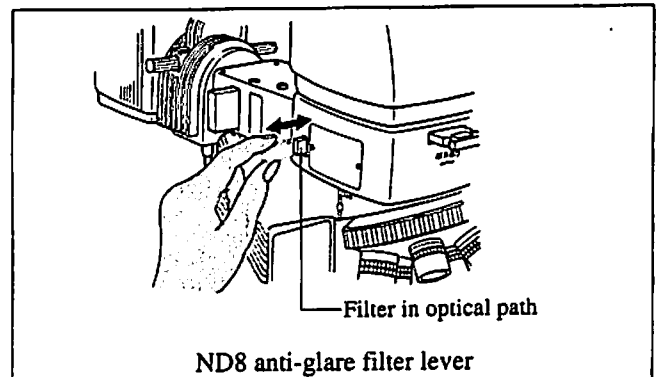
Note: Shape of the filter holder is different depending on the lamphouse adapter being used. Use the filter holder corresponding to the lamphouse adapter.



ND8 anti-glare filter lever

Push in the lever fully to the maximum limit, to place the ND8 filter in the optical path. Pull out the lever fully when the filter is not necessary.

Note: Always move the lever to its maximum limit.



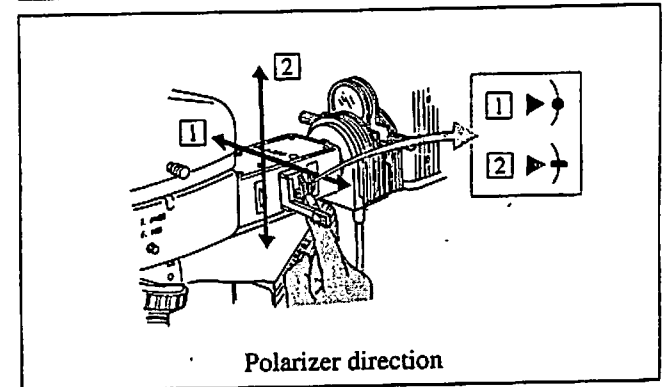
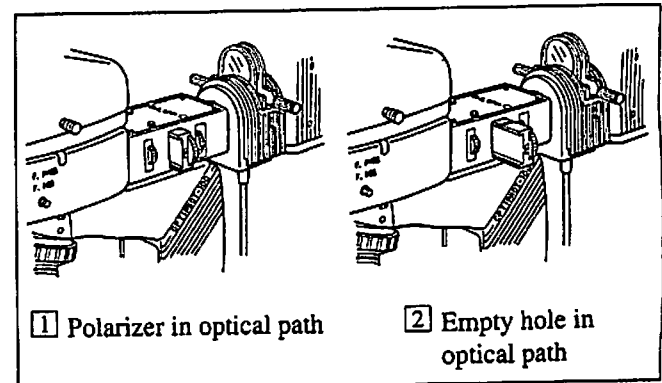
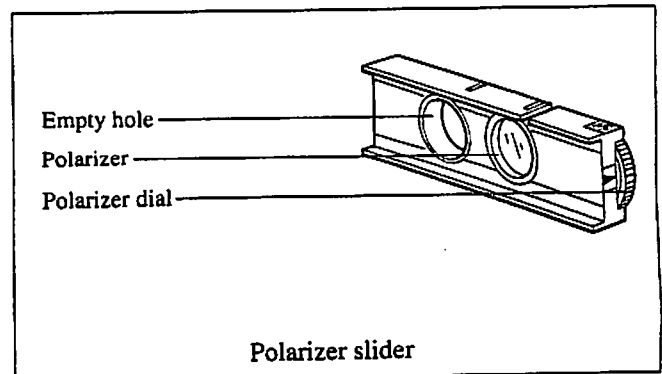
6. Slider

1) Polarizer

Used in combination with the analyzer and the λ -plate in differential interference microscopy and simplified episcopic polarization microscopy.

- Push in the polarizer slider to the second click-stop position, and the polarizer is inserted in the optical path. [1]
- Pull out the slider to the first click-stop position for switching over to brightfield or darkfield microscopy. [2]
- For directional settings of the polarizer, turn the polarizer rotation dial while observing the indication.

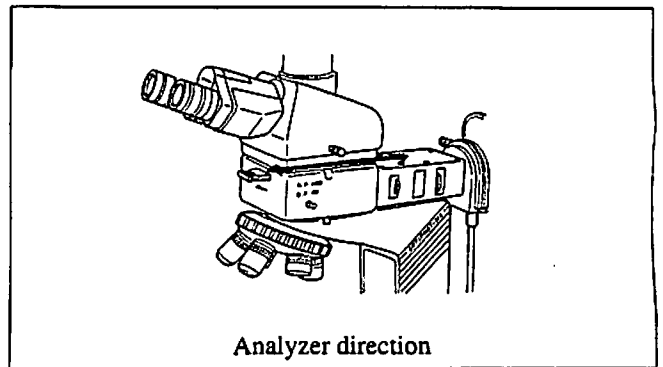
※ Remove the polarizer out of the optical path when not in use. If the polarizer is inserted in the optical path for a long time, there is a fear of changing color. But this does not affect the characteristics of the polarizer.



2) Analyzer

Used in combination with the polarizer and (the Nomarski prism) in simplified polarization microscopy, sensitive polarization microscopy and differential interference microscopy.

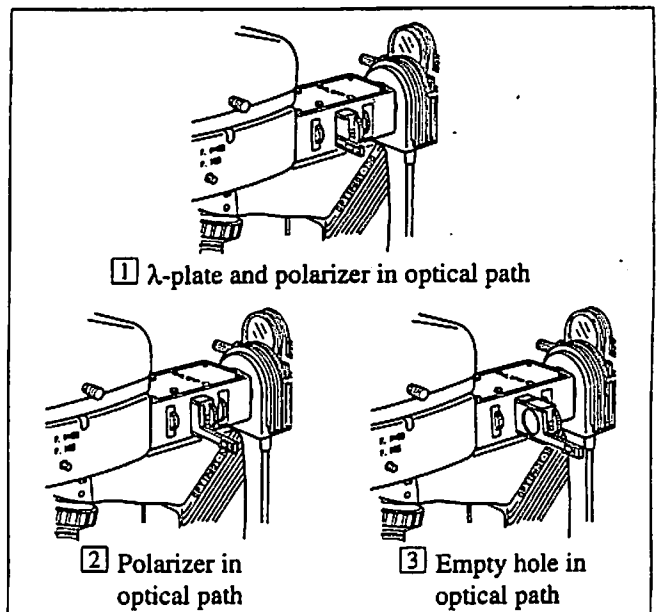
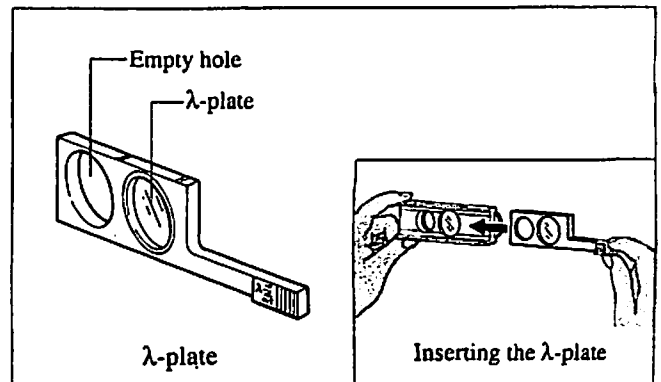
- Insert the analyzer slider to the second click-stop position to place the analyzer in the optical path.
- Pull out the slider to the first click-stop position for switching over to brightfield or darkfield microscopy.
- Direction of the analyzer is shown right.



3) λ -plate

Used by inserting it in the polarizer slider in sensitive polarization microscopy and differential interference microscopy.

- Push in the λ -plate slider together with the polarizer slider fully to the limit to place the λ -plate in the optical path in sensitive polarization microscopy and differential interference microscopy. ①
- Pull out only the λ -plate slider to the first click-stop position to place the empty hole in the optical path for changing the compensation range in the differential interference microscopy or switching over to simplified polarization microscopy. ②
- Pull out the λ -plate together with the polarizer slider to the first click-stop position for switching over to brightfield or darkfield microscopy. ③





CARE AND MAINTENANCE

1. Lens Cleaning

To clean the lens surface, first remove any light dust with a soft brush or gauze. Use a soft cotton cloth, lens tissue, or gauze lightly moistened with absolute alcohol (ethyl or methyl alcohol) to remove fingerprints or grease.

As alcohol is highly flammable substance, sufficient care must be taken in the handling, switching ON/OFF the power and naked flames.

2. Instrument Cleaning

Avoid the use of organic solvents (such as thinner, ether, alcohol, etc.) to clean plastic, painted or printed surfaces, as this may result in damage to the surfaces. We recommend you use a silicon cloth.

3. Storage

When the instrument is not being used, store it in a location free from exposure to moisture and fungus.

4. Periodic Inspections

To maintain optimal performance, we recommend that this instrument be periodically inspected by qualified Nikon service personnel. (Contact your Nikon representative for details).

Please note that any defects or damage caused directly or indirectly by the use of unauthorized replacement of parts and/or service performed by unauthorized personnel will render the warranty void.

Specification of Lamp and Lamphouse

Lamp:	12V-50W Halogen lamp LONGLIFE PHILIPS 5762 or LIFE bulb JC 12V50WL	12V-100W Halogen lamp LONGLIFE OSRAM HLX 64623 or PHILIPS 7724
Lamphouse:	Nikon Hologen Lamphouse 12V-50W	Nikon Halogen Lamphouse 12V-100W