

Nikon

Microscope
ECLIPSE E800
Instructions

Thank you for purchasing this Nikon product. This instruction manual is written for users of the Nikon Microscope ECLIPSE E800. To ensure correct usage read this manual carefully before operating the instrument.

- It is prohibited to alter this manual in part or whole without expressed permission.
- The contents of this manual are subject to change without any 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.
- Also be sure to read the instruction manual for the power supply that you are using, either the V-PS100DU-2, or the V-PS100E-2.

Warning/Caution Symbols in This Manual

Though Nikon products are designed to provide you utmost safety during use, incorrect usage or disregard of the instructions can cause personal injury or property damage. For your safety, read the instruction manual carefully and thoroughly before usage. Do not discard this manual but keep it near the product for easy reference.

Inside this instruction manual, safety instructions are indicated with the symbols shown below. Be sure to follow the instructions marked with these symbols for your safety.

Symbol



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.



WARNING

1. Intended product use

This microscope should only be used for microscopic observation. Do not use this microscope for any other purpose.

2. Do not disassemble

Attempting to disassemble this product could result in electric shock or damage. Never attempt to disassemble any portion of the microscope unless the procedure is described in this instruction manual. If you have any problems with the microscope, contact your nearest Nikon representative.

3. Confirm the input voltage

Make sure that the input voltage indicated on the back panel of the power supply is the same as the voltage provided in your region. If the indicated voltage is different, do not use the power supply; instead, contact your nearest Nikon representative immediately. If the power supply is used with the wrong input voltage, a short circuit or fire may result, and the power supply and any connected equipment may be damaged.

If using the power supply V-PS100DU-2, set the voltage switch on the back panel of the unit to the voltage supplied in your region.

4. Use the specified fuse

If the power supply fuse blows, always replace it with the specified fuse. (See the manual supplied with the power supply.) Using the wrong fuse could result in damage or fire.

In order to prevent electric shock, always turn the power switch on the power supply off (flip it to the “○” side) and unplug the power cord before replacing the fuse.

5. Use the specified power cord

Always use a power cord that is rated for the voltage used in your area and that has been approved under local safety standards. Using the wrong power cord could result in damage or fire.

- For 100 - 120 V area

UL listed, detachable cord set, 3-conductor grounding type SVT, No. 18 AWG rated at 125 V, 7 A minimum.

In case of using the extension cord, use only the power supply cord with the PE (protective earth) wire.

- For 220 - 240 V

3-pole power supply cord set, which must be approved according to EU/EN standards.

Class I equipment should be connected to PE (protective earth) terminal.

In case of using the extension cord, use only the power supply cord with the PE (protective earth) wire.

In order to prevent electric shock, always turn the power switch on the power supply off (flip it to the “○” side) before connecting the power cord.

6. Heat from the light source

The lamp and the lamphouse become extremely hot when the lamp is on.

To avoid burns, do not touch the lamphouse while the lamp is lit or for thirty minutes after the lamp is turned off.

Furthermore, in order to avoid the risk of fire, do not place fabric, paper, or highly flammable materials such as gasoline, benzene, paint thinner, or alcohol near the lamphouse while the lamp is lit or for thirty minutes after the lamp is turned off.



CAUTION

1. Check the light source

The power supplies V-PS100DU-2 and V-PS100E-2 provide the power for the halogen lamp that serves as the microscope light source. Although these power supplies can power a halogen lamp of up to 12 V/100 W, the specified lamp and lamphouse must be used. The equipment could be damaged if a non-specified combination of components is used.

Specified lamphouse : Nikon halogen lamphouse Model C-LP HALOGEN 12V100W
Specified lamp : Halogen lamp, 12 V-100 W LONGLIFE
OSRAM HLX 64623 or PHILIPS 7724

2. Turn off the power when connecting or disconnecting cables or when replacing the lamp

In order to prevent electric shock and damage to the equipment, always turn the power switch on the power supply off (flip it to the “○” side) and unplug the power cord before connecting or disconnecting cables or replacing the lamp.

3. Cautions when replacing the lamp

In order to prevent burns, allow the lamp to cool (for at least thirty minutes after turning off the power) before replacing the lamp. Furthermore, in order to prevent electric shock and damage to the equipment, always turn the power switch on the power supply off (flip it to the “○” side) and unplug the power cord before replacing the lamp.

After replacing the lamp, make sure that the lamphouse cover is securely closed.
Never use the lamphouse while its cover is open.

4. Be careful not to get injured in stage operations

The stage rack will stick out as a result of stage operations. Be careful not to strike your hand against the rack when you are turning the focus knobs or the condenser focus knob. It is possible to injure your hand on the edge of the rack.

5. Do not wet

If the microscope or the power supply becomes wet, a short circuit may result and the equipment could be damaged or could become extremely hot. If you accidentally spill a liquid on the equipment, immediately turn the power switch on the power supply off (flip it to the “○” side) and unplug the power cord. Then use a dry cloth to wipe away the moisture. If any liquid gets inside of the equipment, do not attempt to use it; instead, contact your nearest Nikon representative.

6. Weak electromagnetic waves

This microscope emits weak electromagnetic waves. The accuracy of any precision electronic equipment may be adversely affected if positioned near this microscope. If this microscope affects TV or radio reception, move the radio or TV away from the microscope.

7. Cautions concerning installation

Be careful not to pinch your hands or fingers when installing the microscope.

This microscope is a precision optical instrument, and using or storing it under unsuitable conditions may damage it or may have an adverse affect on its precision. See “Installation Location” on P.27, and use this microscope in a suitable environment.

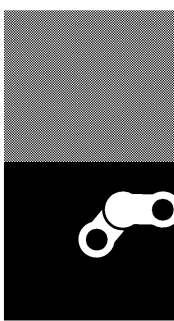
8. Notes on transport

Because this microscope is a precision optical device, handle it carefully and do not subject it to strong physical shocks. (The precision of the objective in particular may be adversely affected by even weak physical shocks.)

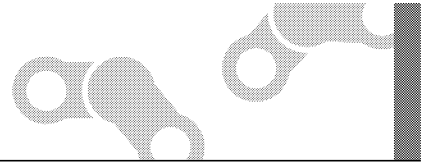
When moving the microscope, first detach the lamphouse. Then have at least two people carry the microscope, at least one on each side, using the carrying handles.

Be sure to screw the carrying handles in as far as they will go and make sure that they are secure. If the carrying handles are not attached securely, they could come out or break while the microscope is being carried, creating a hazardous situation. Screw the carrying handles into the upper holes on the rear of the microscope. If you use the lower holes, your hands will be caught between the handles and the table when you place the microscope down. (P.27)

In addition, do not grasp the coarse focus knob, the fine focus knob, the eyepiece tube, the stage, etc., when carrying the microscope; there is a chance that the part could come off, and the equipment could be damaged.



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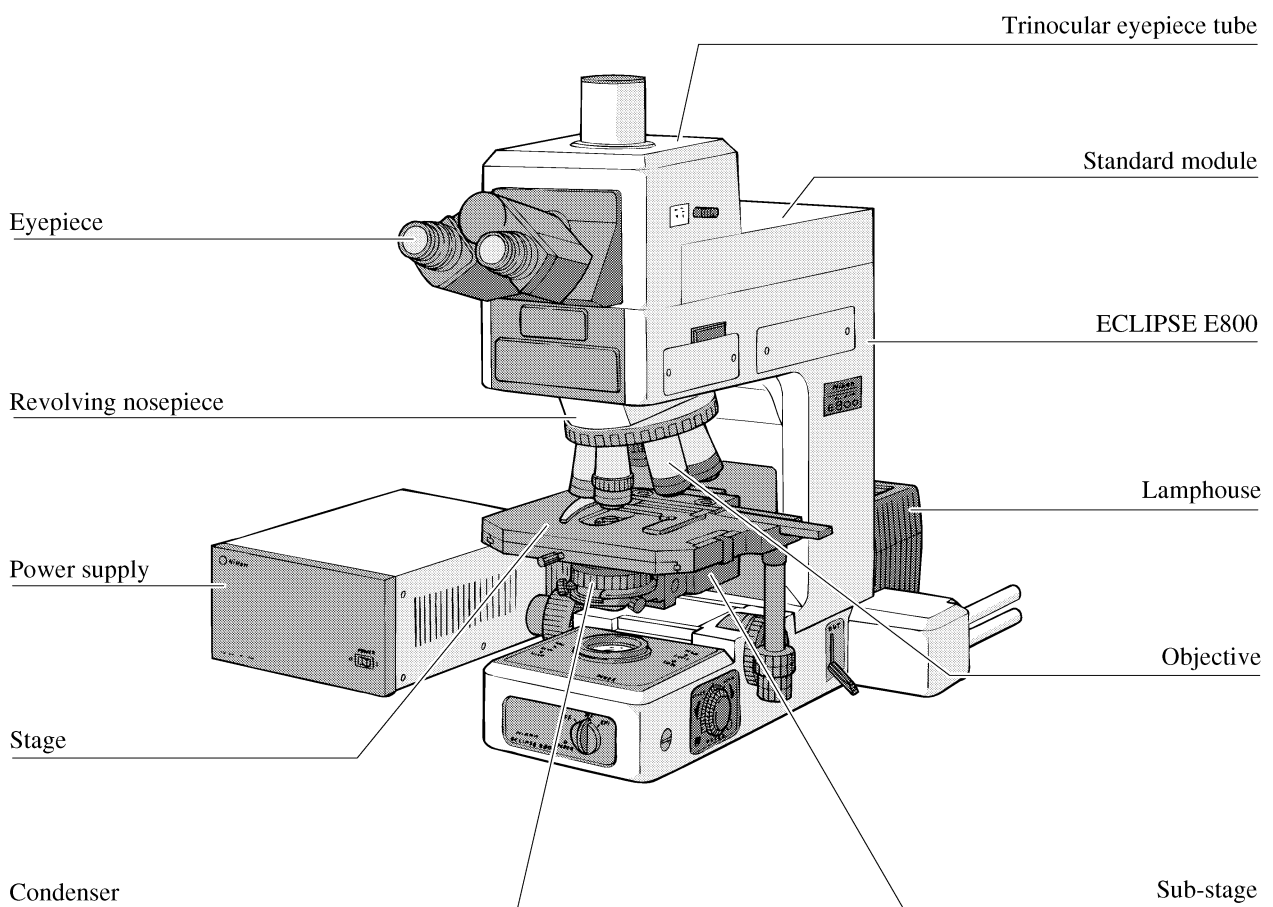
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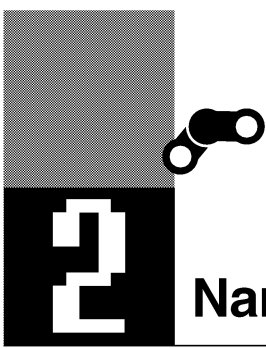
1

Names of Component Parts

See chapter “2. Names of Operational Parts” for the names of the parts that are used to operate the microscope.

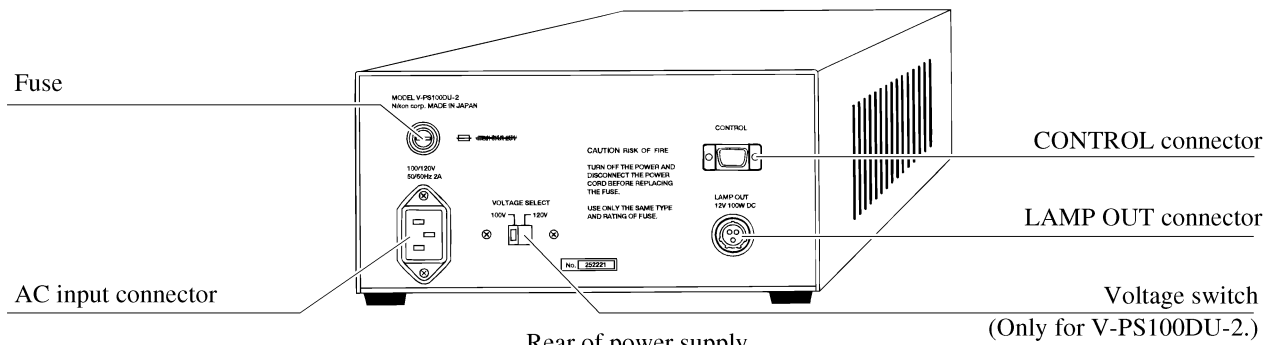
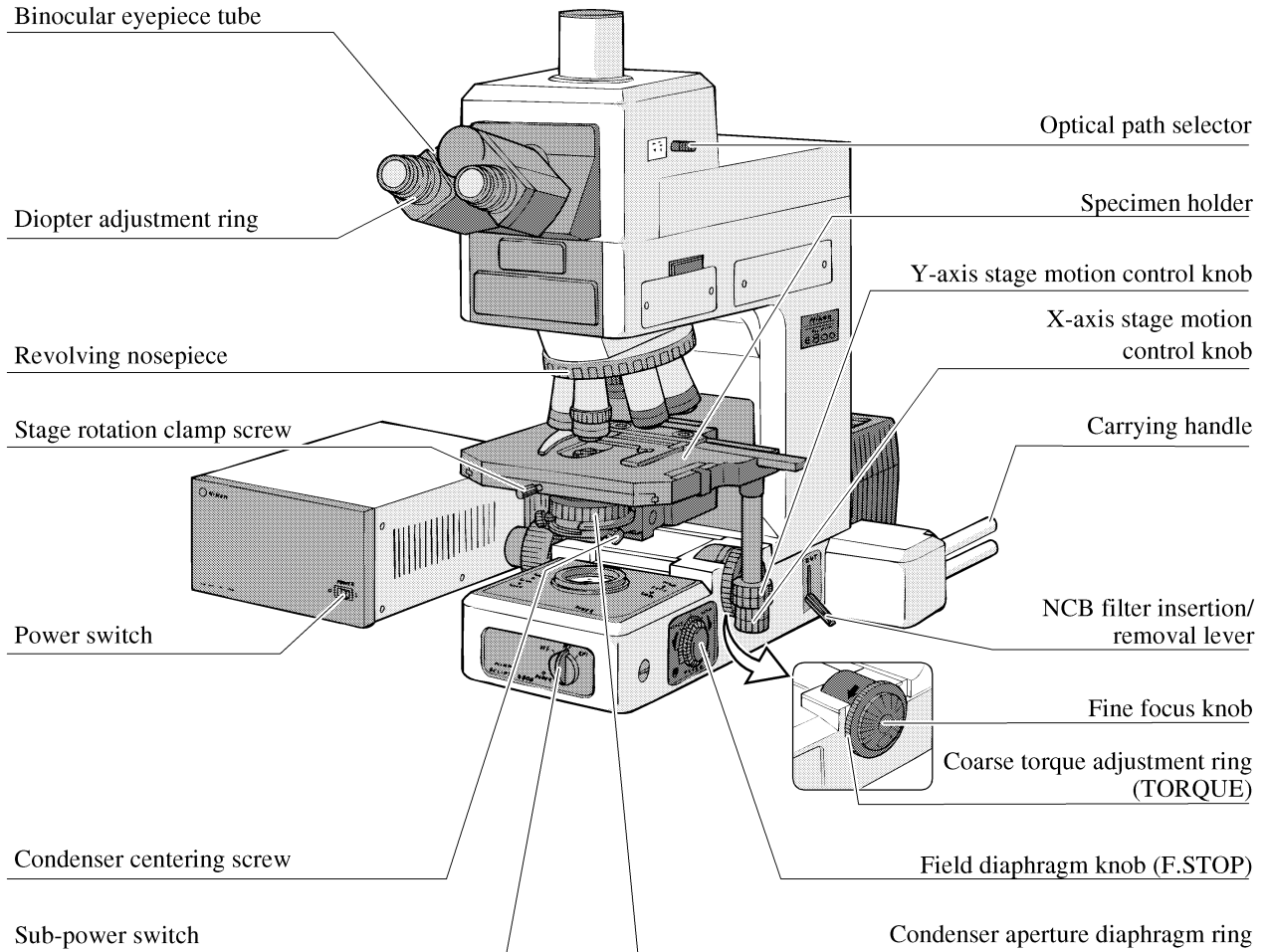
If the microscope is not assembled yet, see chapter “5. Assembly” first.





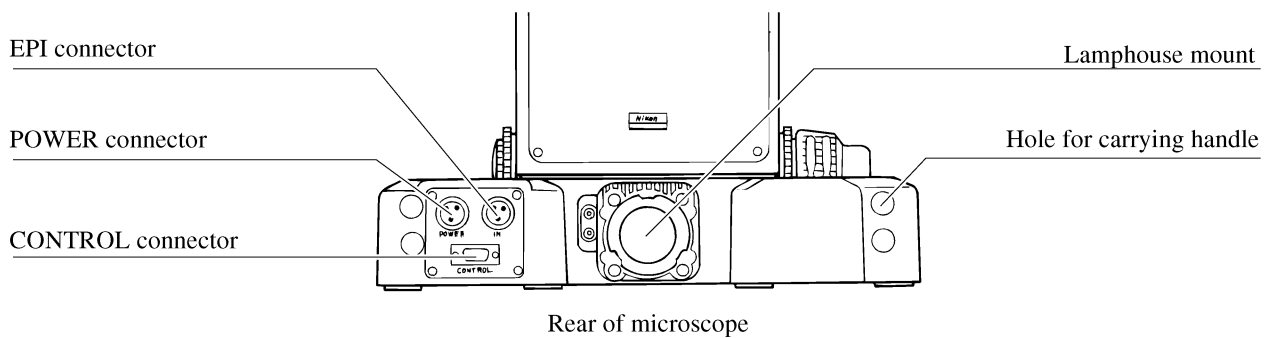
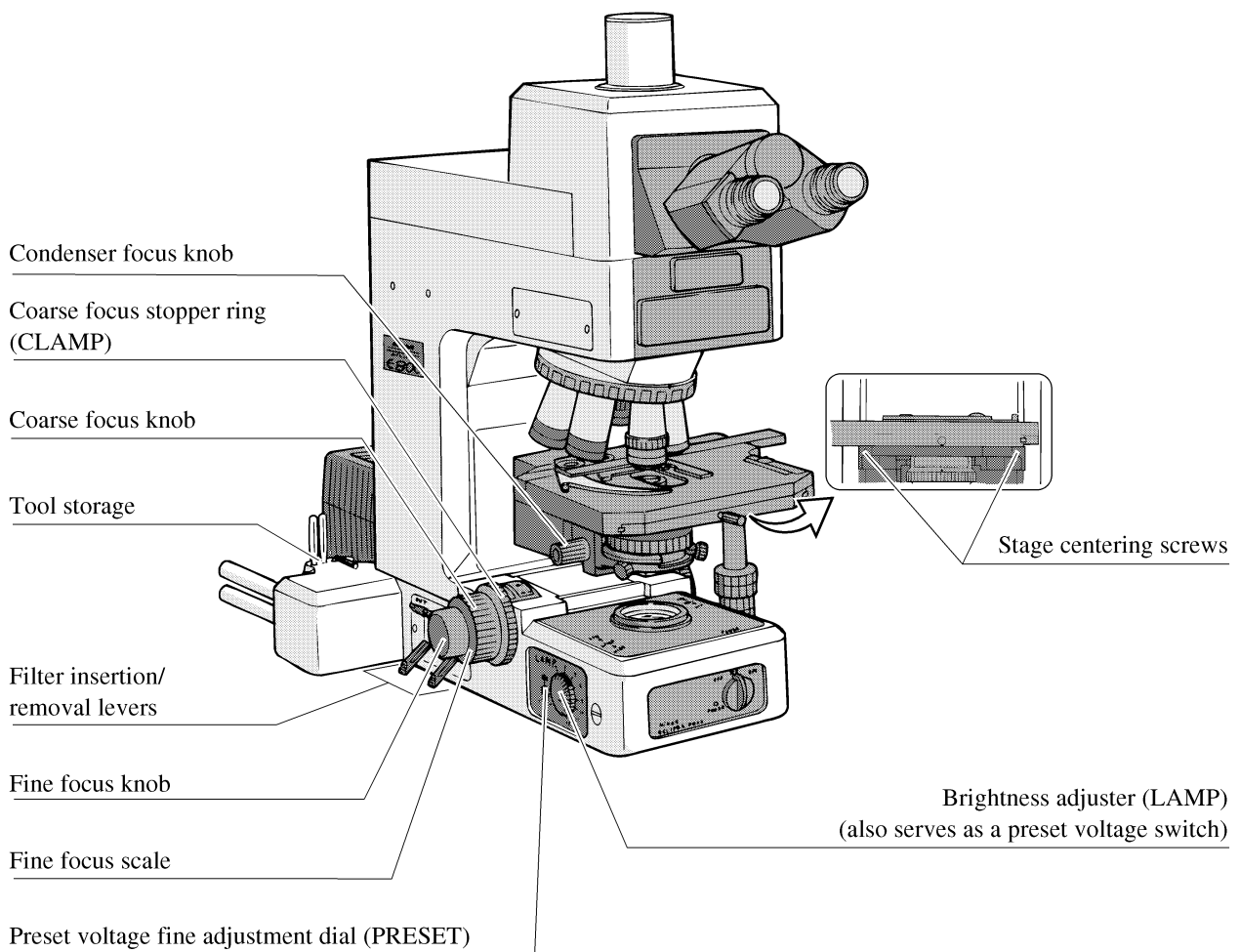
Names of Operational Parts

See chapter “1. Names of Component Parts” for the names of the components of the microscope.
If the microscope is not assembled yet, see chapter “5. Assembly” first.



Rear of power supply
(This illustration shows the rear of the power supply V-PS100DU-2.)

2. Names of Operational Parts





Microscopic Procedure

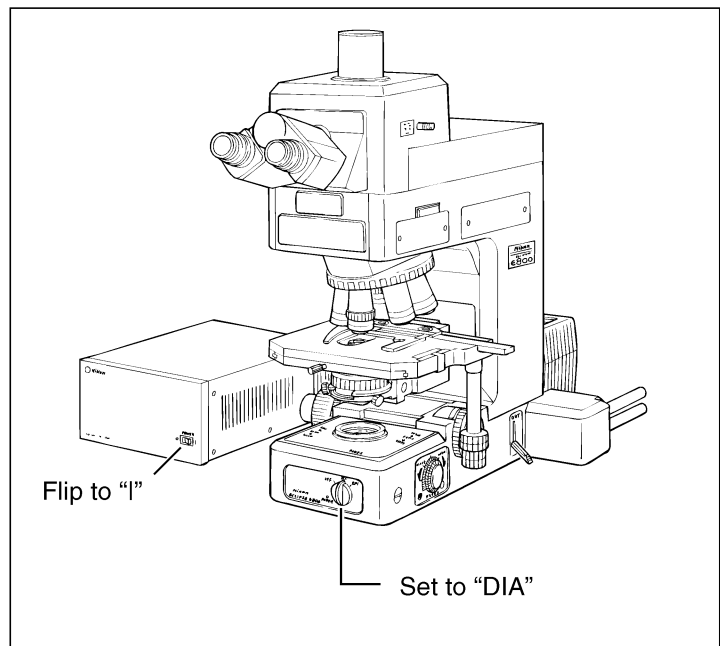
The general procedure for microscopy is described below.

For details on each step, refer to the corresponding item in chapter “4. Operation of Each Part.”

If the microscope is not assembled yet, see chapter “5. Assembly” first.

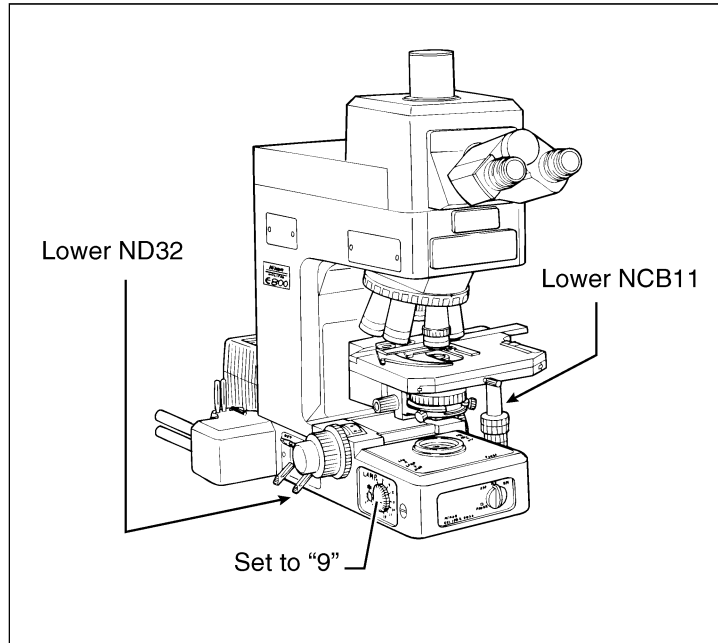
1 Turn on the power switch on the power supply. (Flip the switch to the “I” side.) As soon as the power comes on, the pilot lamp lights.

2 Set the sub-power switch to “DIA”. The lamp lights.



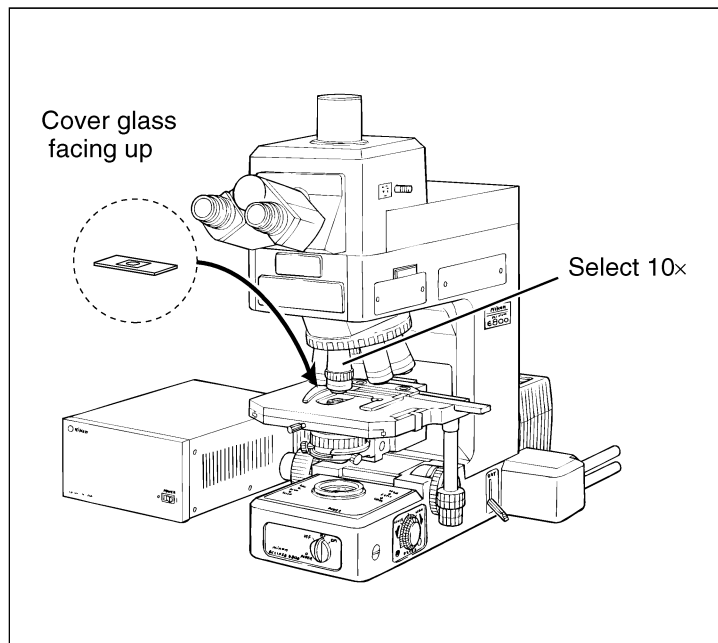
3 Set the brightness adjuster to “9”.
This brightness provides the best color reproduction. (p. 23)

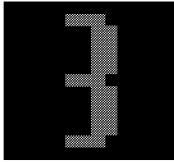
4 Insert filters ND32 and NCB11 into the optical path.
ND32: Reduces glare in the binocular eyepiece.
NCB11: Improves color reproduction. (p. 21)



5 Move the 10× objective into the optical path.
Rotate the revolving nosepiece until the 10× objective clicks into place.

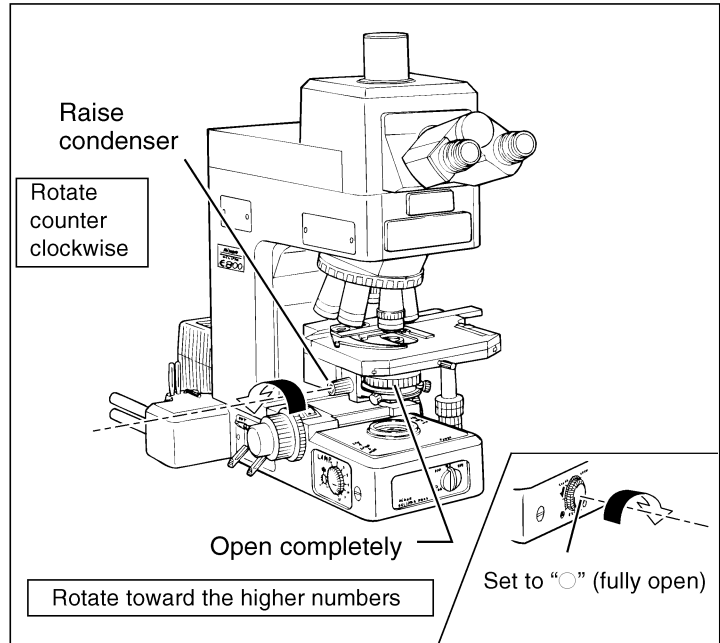
6 Set the specimen in place with the cover glass facing up.





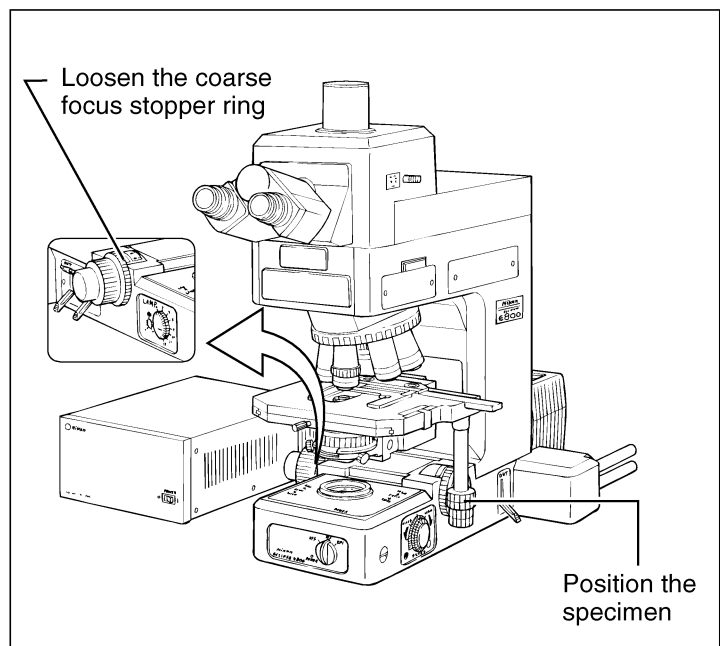
7 Raise the condenser as high as it will go. (p. 18)

8 Open the field and the condenser aperture diaphragm all of the way. (p. 19, 20)



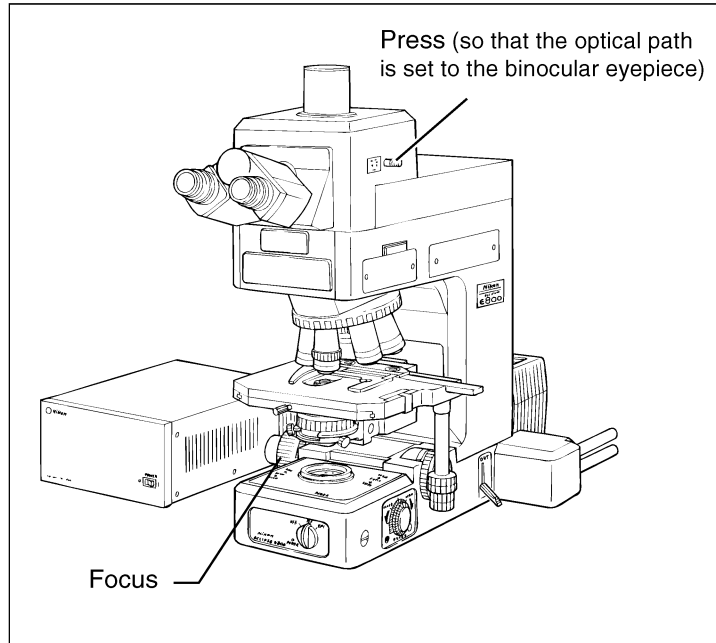
9 Move the specimen until the portion to be viewed is in the optical path. (p. 21)

10 Loosen the coarse focus stopper ring as much as possible. Rotate it in the direction opposite that indicated by the arrow on the base as far as it will go. (p. 15)



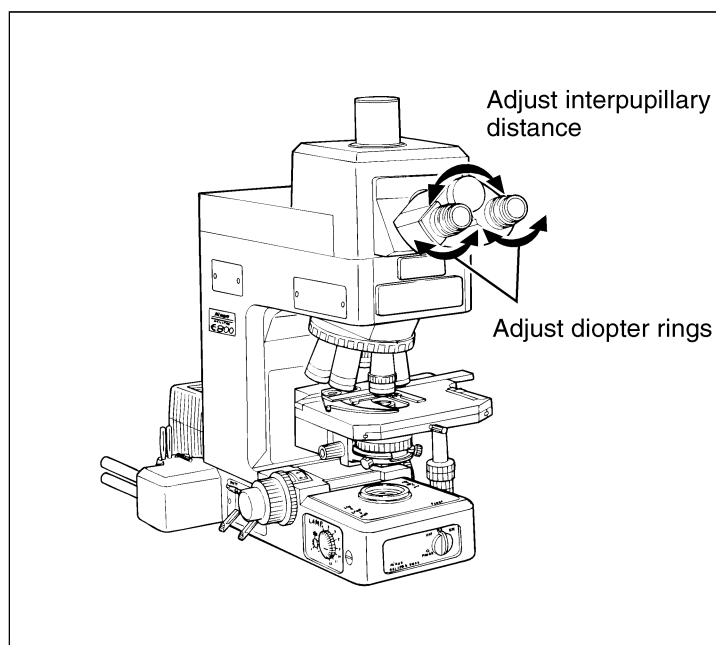
- 11** Set the optical path 100% to the binocular eyepiece. (p. 16)

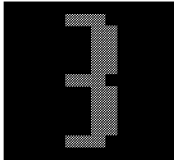
- 12** Focus on the specimen. (p. 14)



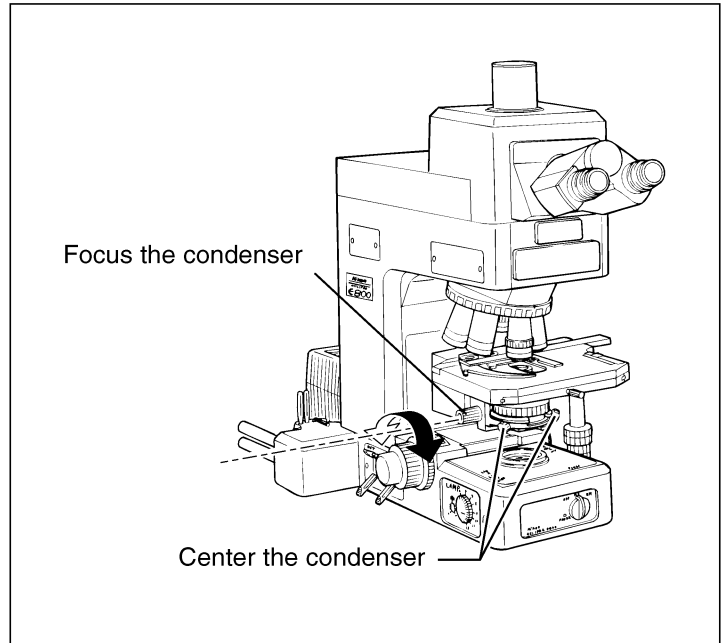
- 13** Adjust the diopter rings for both eyepieces. (p. 16)

- 14** Adjust the interpupillary distance. (p. 17)





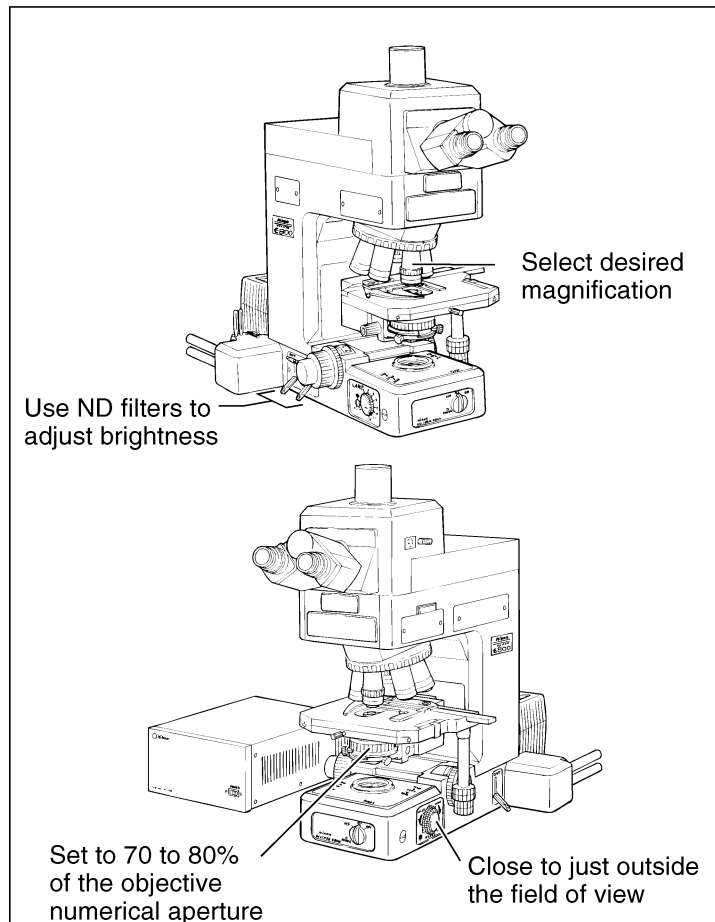
15 Focus and center the condenser. (p. 18)



16

Switch to any desired objective and view the specimen.

- Re-adjust the focus.
- Use ND filters to adjust the brightness.
- Close the field diaphragm so that it is just outside the field of view.
- Close the condenser aperture diaphragm to about 70 to 80% of the objective numerical aperture. (p. 19)



- If a portion of the field of view is dark, try adjusting the condenser centering screws. If that does not resolve the problem, check the following items:
 - Filter insertion/removal (p. 21)
 - Positioning of the revolving nosepiece (p. 35)
 - Condenser focusing (p. 18)
 - Full opening of the field and aperture diaphragms (p. 19, 20)
 - Optical path selection for the eyepiece tube (p. 16)
 - Lamp installation (p. 28)
 - Revolving nosepiece installation (p. 30)
 - Condenser installation (p. 30)
- If it is not possible to focus on the specimen, check the following items.
 - Mounting of the specimen (p. 35, 36)
 - Release of the coarse focus stopper (p. 15)
 - Thickness of the cover glass (0.17 mm is standard) (p. 35)

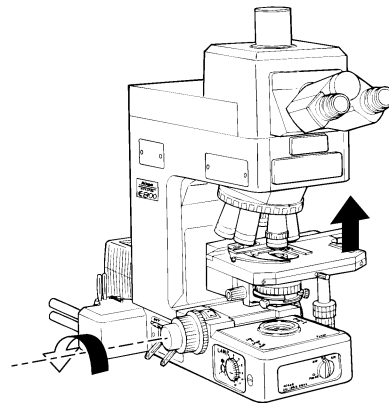


4

Operation of Each Part

1 Coarse focus knob/fine focus knob

Relationship between the rotation of the coarse and fine focus knobs and the vertical movement of the stage



Relationship between the rotation of the coarse and fine focus knobs and the vertical movement of the stage

The relationship between the rotation of the coarse and fine focus knobs and the vertical movement of the stage is as shown in the illustration.

Rotating the fine focus knob one step moves the stage 1 μm .

Rotating the fine focus knob one complete turn moves the stage 0.1 mm.

Rotating the coarse focus knob one complete turn moves the stage 12 mm.

The coarse/fine focus stroke (range of vertical motion) for the stage is 2 mm up and 23 mm down from the reference (focused) position.

Never attempt either of the following actions, since doing so will damage the unit:

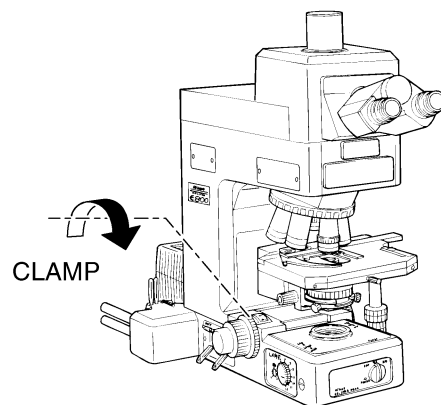
- Rotating the left and right knobs in opposite directions at the same time.
- Continuing to rotate the coarse focus knob after the stage has reached the limit of its motion.

Adjusting the torque of the coarse focus knob

It is possible to adjust the torque of the coarse focus knob.

To increase the torque, turn the torque adjustment ring located behind the right-hand fine focus knob in the direction indicated by the arrow on the base of the microscope (i.e., the counter-clockwise direction). To reduce the torque, turn the ring in the direction opposite to that indicated by the arrow (i.e., the clockwise direction).

2 Coarse focus stopper



The coarse focus stopper marks the stage position at which the specimen is in focus by restricting the movement of the coarse focus knob. (Movement of the stage by the fine focus knob is not restricted.)

Once the coarse focus stopper is clamped in place, the coarse focus knob cannot be used to move the stage any higher. In effect, once the coarse focus knob is clamped in place at the focus position, a rough focus can be attained the next time simply by turning the coarse focus knob as far as it will go. This feature is convenient when viewing similar specimens one after another.

If the coarse focus stopper is not being used, the coarse focus stopper ring should be loosened as far as it will go (by turning it as far as it will go in the direction opposite to that indicated by the arrow on the base of the microscope.)

Using the coarse focus stopper

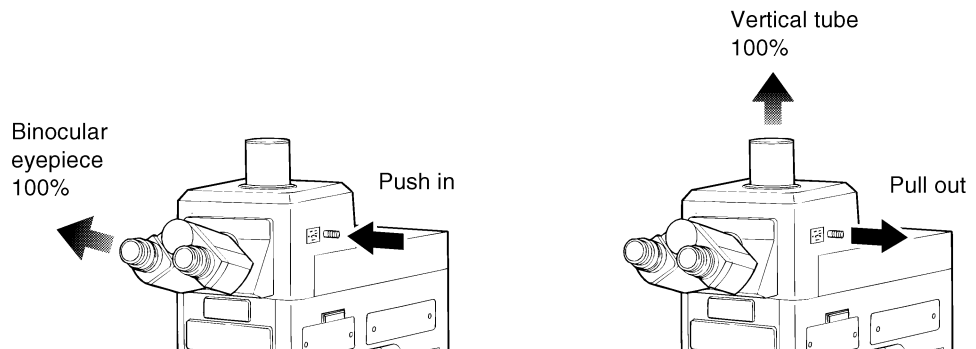
With the specimen in focus, turn the coarse focus stopper ring about 270° in the direction indicated by the arrow on the base of the microscope. The coarse focus stopper is now clamped in place.

When changing the specimen, lower the stage by turning only the coarse focus knob.

After changing the specimen, gently raise the stage by turning only the coarse focus knob as far as it will go.

The specimen should be roughly in focus when the stage has been raised as far as it will go; use the fine focus knob to bring the specimen into perfect focus.

3 Trinocular eyepiece tube optical path selection

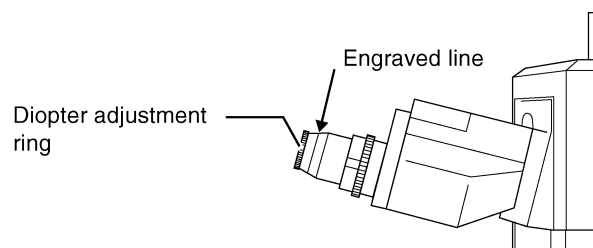


The optical path selector can be used to set the optical path to either 100% to the binocular eyepiece or 100% to the vertical tube.

If you push the optical path selector all of the way in until it clicks into place, 100% of the light goes to the binocular eyepiece.

If you pull the optical path selector all of the way out until it clicks into place, 100% of the light goes to the vertical tube.

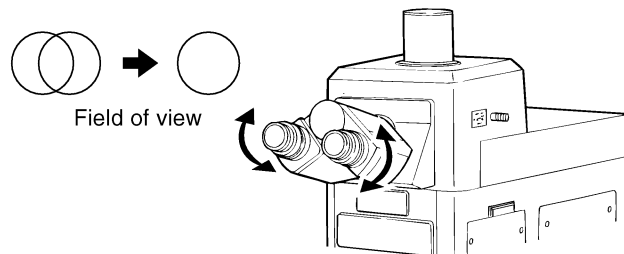
4 Diopter adjustment



Diopter adjustment compensates for differences in the diopter between the left and right eyes. In addition to making observation through both eyes easier, this adjustment also reduces the extent to which focusing is lost when the objective is changed. Perform diopter adjustment for both eyepieces.

Diopter adjustment method

- 1 Perform steps **1** to **12** in chapter “3. Microscopic Procedure,” so that the specimen is focused with the 10× objective.
- 2 Turn the diopter adjustment rings on the eyepieces and align the edges of the diopter adjustment rings with the engraved lines. (This is the diopter adjustment “0” position.)
- 3 Move the 40× objective into the optical path. Turn the coarse and fine focus knobs to focus on the specimen.
- 4 Move the 4× or the 10× objective into the optical path.
- 5 **Turn the diopter adjustment rings on the eyepieces**, not the coarse and fine focus knobs, and focus on the specimen. Do so while peering through the right eyepiece with your right eye and the left eyepiece with your left eye.
- 6 Repeat steps **3** to **5** twice.

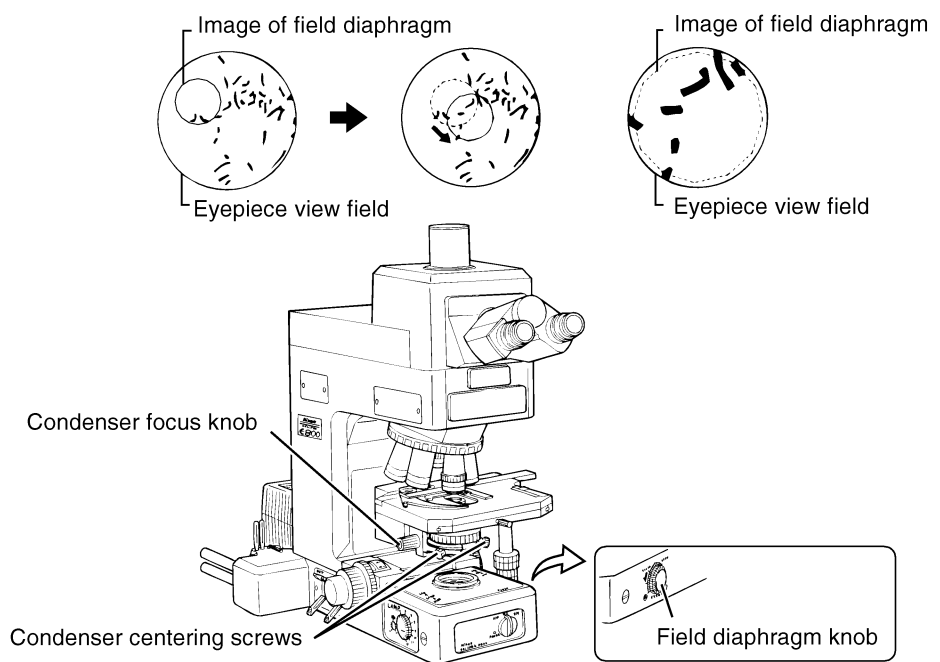
5 Interpupillary distance adjustment

Before adjusting the interpupillary distance, perform steps **1** to **13** in chapter “3. Microscopic Procedure” so that the specimen is focused with the 10× objective.

Adjust the interpupillary distance so that the field of view for each eye is aligned on one position. Doing so will make observation through the binocular eyepiece with both eyes easier.

6 Condenser

Focusing and centering

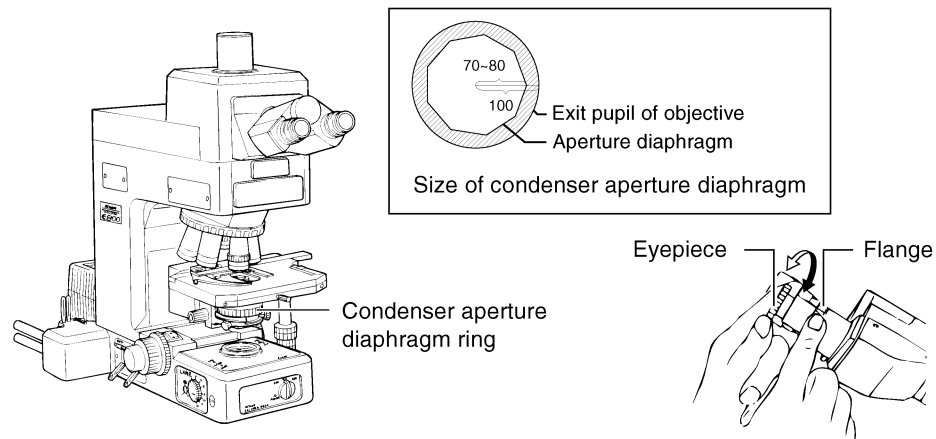


Focus and center the condenser so that the light passing through the condenser forms the image at the proper position on the specimen (i.e., at the center of the optical path).

Before focusing and centering the condenser, perform steps **1** to **14** in chapter “3. Microscopic Procedure,” so that the specimen is focused with the 10× objective.

- 1** Close the field diaphragm to its minimum setting.
- 2** Turn the condenser focus knob so that the image of the field diaphragm forms on the specimen.
- 3** Make rough adjustments with the condenser centering screws so that the image of the field diaphragm appears at the center of the eyepiece view field.
- 4** Move the 40× objective into the optical path. Turn the fine focus knob to focus on the specimen.
- 5** Turn the condenser focus knob so that the image of the field diaphragm forms on the specimen.
- 6** Adjust the condenser centering screws so that the image of the field diaphragm appears at the center of the eyepiece view field. This adjustment is easier to make if you adjust the size of the field diaphragm so that it is just slightly smaller than the eyepiece view field.

Condenser aperture diaphragm



The aperture diaphragm is important because it is related to the resolution, contrast, depth of focus, and brightness of the optical image. Turning the condenser aperture diaphragm ring changes the size of the aperture diaphragm.

As the aperture diaphragm is stopped down, resolution and brightness are reduced while contrast and depth of focus are increased. Conversely, as the aperture diaphragm is opened, resolution and brightness are increased while contrast and depth of focus are reduced. It is not possible to adjust one pair of characteristics without affecting the other. Generally, a satisfactory image with appropriate contrast can be obtained with an aperture setting that is 70% to 80% of the objective numerical aperture.

If the aperture diaphragm is stopped down too far, the resolution is reduced; therefore, except when viewing a nearly transparent specimen, we do not recommend stopping down the aperture to less than 60% of the numerical aperture of the objective.

Adjusting the size of the aperture diaphragm according to the condenser scale

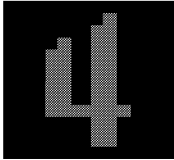
Because the condenser scale indicates the numerical aperture, adjust the aperture diaphragm ring according to the scale. Normally, the index on the aperture diaphragm ring should be aligned with the scale line corresponding to 70% to 80% of the numerical aperture of the objective.)

Adjusting the size of the aperture diaphragm by using a centering telescope (sold separately)

Remove one of the eyepieces and, using a special adapter (sold separately), mount a centering telescope in its place. Turn the aperture diaphragm ring to stop down the aperture diaphragm as far as possible. While holding down the flange of the telescope, turn the eyepiece of the centering telescope and focus on the aperture diaphragm.

Turn the aperture diaphragm ring to adjust the size of the aperture diaphragm. (Normally, the aperture diaphragm should be adjusted so that it is about 70% to 80% of the size of the view field.)

Remove the centering telescope and the adapter, and then re-install the eyepiece.



Objective and condenser combinations

Objective magnification \ Condenser	Universal condenser		Achromatic aplanat condenser	Swing-out condenser
	Dry	Oil		
2×	Swing-out the top lens. (Note 1)	/	/	Swing-out the top lens. (Note 1)
4×				
10× to 100×	Can be used. (Note 2)	Can be used.	Can be used.	Can be used. (Note 2)

- **(Note 1)** For photomicrography using a 2× objective, use a PL projection lens of at least 2.5×. If a 2× projection lens is used, the periphery of the image will be dark.
- **(Note 2)** Depending on the type of objective, the numerical aperture of the objective may not be satisfied. For example, when an objective with an N.A. of 1.4 is used, the aperture size will only be about 65% of the view field even when it is opened to its limit.

7 Field diaphragm

The field diaphragm limits illumination to the area of the specimen that is being viewed. Turning the field diaphragm knob changes the size of the field diaphragm. For normal observation, the size of the diaphragm should be such that it is just inside or outside the edge of the view field. If a broader area than necessary is illuminated, stray light from outside sources will also enter the optical system, creating flaring and reducing the contrast of the optical image. The operation of the field diaphragm is especially important in photomicrography; generally, good results are obtained by stopping down the field diaphragm to just slightly larger than the area that will be reproduced on the film, i.e., the size of the photo frame.

8 Filters

In this microscope, the filters indicated below are housed in both sides of the base of the microscope. A filter is inserted into the optical path by pressing its filter insertion/removal lever down. When a lever is lifted, the filter is removed from the optical path.

NCB11 (color balancing filter)	For general microscopy and color photomicrography	Right side of microscope
ND2 (transmission rate: 50%)	For brightness adjustment in general microscopy and photomicrography	Filter cassette on left side of microscope
ND8 (transmission rate: 12.5%)		
ND32 (transmission rate: 3%)		
GIF (Green interference filter)	For phase contrast, differential interference contrast, and contrast adjustment	
D (lemon skin)	Always insert in optical path	

The filters in the filter cassette can be replaced with $\phi 33$ filters. For details on how to replace the filters, refer to page 32.

9 Stage

Adjustment of torque of the stage motion control knobs

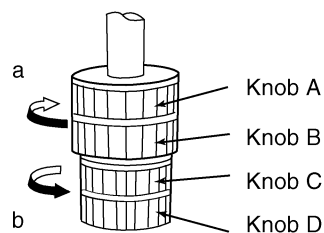
The torque of the X-axis and Y-axis stage motion control knobs can each be adjusted.

For Y-axis motion

To tighten the tension in the Y-axis, turn Knob B in the direction of arrow "a" while holding Knob A; to reduce the tension, turn Knob B in the opposite direction.

For X-axis motion

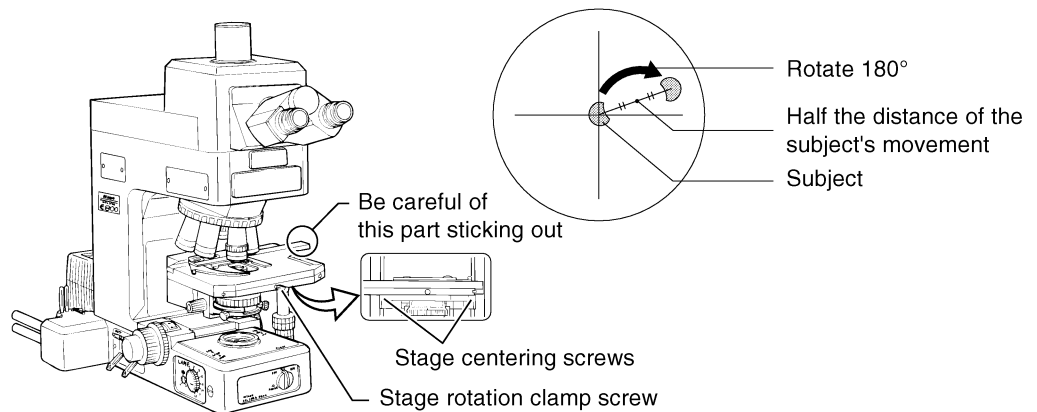
To tighten the tension in the X-axis, turn Knob C in the direction of arrow "b" while holding Knob D; to reduce the tension, turn Knob C in the opposite direction.



Stage rotation

Loosen the stage rotation clamp screw in order to rotate the stage. Rotating the stage is useful for cropping images during photomicrography.

Stage centering



CAUTION The stage rack will stick out as a result of stage operations. Be careful not to strike your hand against the rack when you are turning the focus knobs or the condenser focus knob. It is possible to injure your hand on the edge of the rack.

If necessary, center the stage according to the following procedure.

- 1** Move the 10× objective into the optical path and focus on the specimen. Designate a prominent feature of the specimen as the subject and use the stage motion control knobs to move the subject into the center of the view field.
- 2** Loosen the stage rotation clamp screw and rotate the stage approximately 180°.
- 3** If the subject is no longer in the center of the view field, use a hexagonal screwdriver to turn the two stage centering screws so that the subject moves half way back towards the center of the view field.
- 4** Using the stage motion control knobs, move the subject back to the center of the field of view.
- 5** Next, move the 40× objective into the optical path and repeat steps **2** through **4**.

10 Preset voltage switch (for photomicrography)

The color temperature of the lamp varies according to the voltage. If the voltage is high, the color temperature of the lamp increases and the light becomes bluer; if the voltage is low, the color temperature of the lamp decreases and the light becomes redder. Therefore, in order to obtain the best color reproduction in color photomicrography, it is necessary for the lamp voltage to be kept constant. When using daylight-type color film, the standard setup is to use the color balancing filter (NCB11) and set the lamp voltage to 9 V.

The preset voltage switch is used to automatically set the standard lamp voltage (9 V). Because the brightness adjuster also serves as the preset voltage switch, setting the brightness adjuster to the “PRESET” position automatically sets the lamp voltage to 9 V.

Fine adjustment of the preset voltage

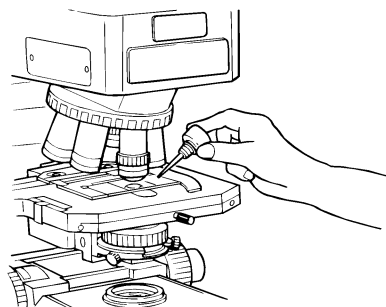
If the final images on color film shot with the brightness adjuster set to the “PRESET” position are reddish or bluish, adjust the preset voltage. Fine adjustments of up to ± 1 V can be made to the 9 V setting by using a minus (–) screwdriver to turn the rotary switch (the preset voltage fine adjustment dial) on the left side of the microscope base.

When images are reddish: Increase the voltage. (Doing so will increase the lamp color temperature, giving the light a bluish tint.)

When images are bluish: Decrease the voltage. (Doing so will decrease the lamp color temperature, giving the light a reddish tint.)

If this adjustment is not enough to resolve the problem, also use color compensation filters (CC filters), available on the market.

11 Oil-immersion operation (using an oil-immersion type objective and condenser)



Objectives marked “Oil” are oil-immersion type objectives. These objectives are used with the provided immersion oil applied between the specimen and the tip of the objective.

In order to get maximum performance from oil-immersion type objectives with a numerical aperture of 1.0 or greater, an oil-immersion type achromatic aplanat condenser must also be used. Oil-immersion type condensers are used with oil applied between the specimen and the condenser lens.

Bubbles in the oil will adversely affect the viewing of the image. Be careful to prevent the formation of air bubbles. To check for air bubbles, remove the eyepieces, open the field diaphragm and the aperture diaphragm as far as possible, and look at the exit pupil of the objective within the eyepiece tube. (The exit pupil will appear as a bright circle.) If it is difficult to see if there are any bubbles, mount a centering telescope (sold separately) on an eyepiece sleeve by using an adapter (sold separately). Then, while turning the eyepiece on the centering telescope to change the focus, look through the centering telescope for bubbles. If there are bubbles in the oil, remove them by one of the following methods:

- Turn the revolving nosepiece slightly, moving the objective with the air bubbles back and forth one or two times. (In the case of the condenser, gently turn the condenser focus knob to move the condenser up and down slightly.)
- Add more oil.
- Remove the oil and replace it with 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). If too much oil is applied, the excess will flow onto the stage and around the condenser.

Any oil remaining on oil-immersion type objectives or on the tip of dry-type objectives has a negative effect on viewing. After using oil, wipe all of it away and make sure that there is no oil on the tips of the other objectives. The oil on the condenser lens should also be carefully wiped away after use.

Use petroleum benzine to wipe away immersion oil. Wiping with absolute alcohol (ethyl alcohol or methyl alcohol) after the oil has been cleaned up finishes the clean up process.

If you cannot obtain petroleum benzine, use methyl alcohol. However, because methyl alcohol does not clean as well as petroleum benzine, it will be necessary to wipe the surfaces repeatedly. (Usually, three or four times is sufficient to clean the lenses.)

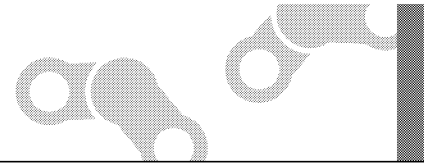


CAUTION When using petroleum benzine or absolute alcohol, please follow the instructions provided by the manufacturer. Keep these flammable liquids away from fire or sparks.



5

Assembly



WARNING In order to prevent electric shock and fire, turn the power switch on the power supply off (flip to the “○” side) during assembly. Also turn the microscope’s sub-power switch off.



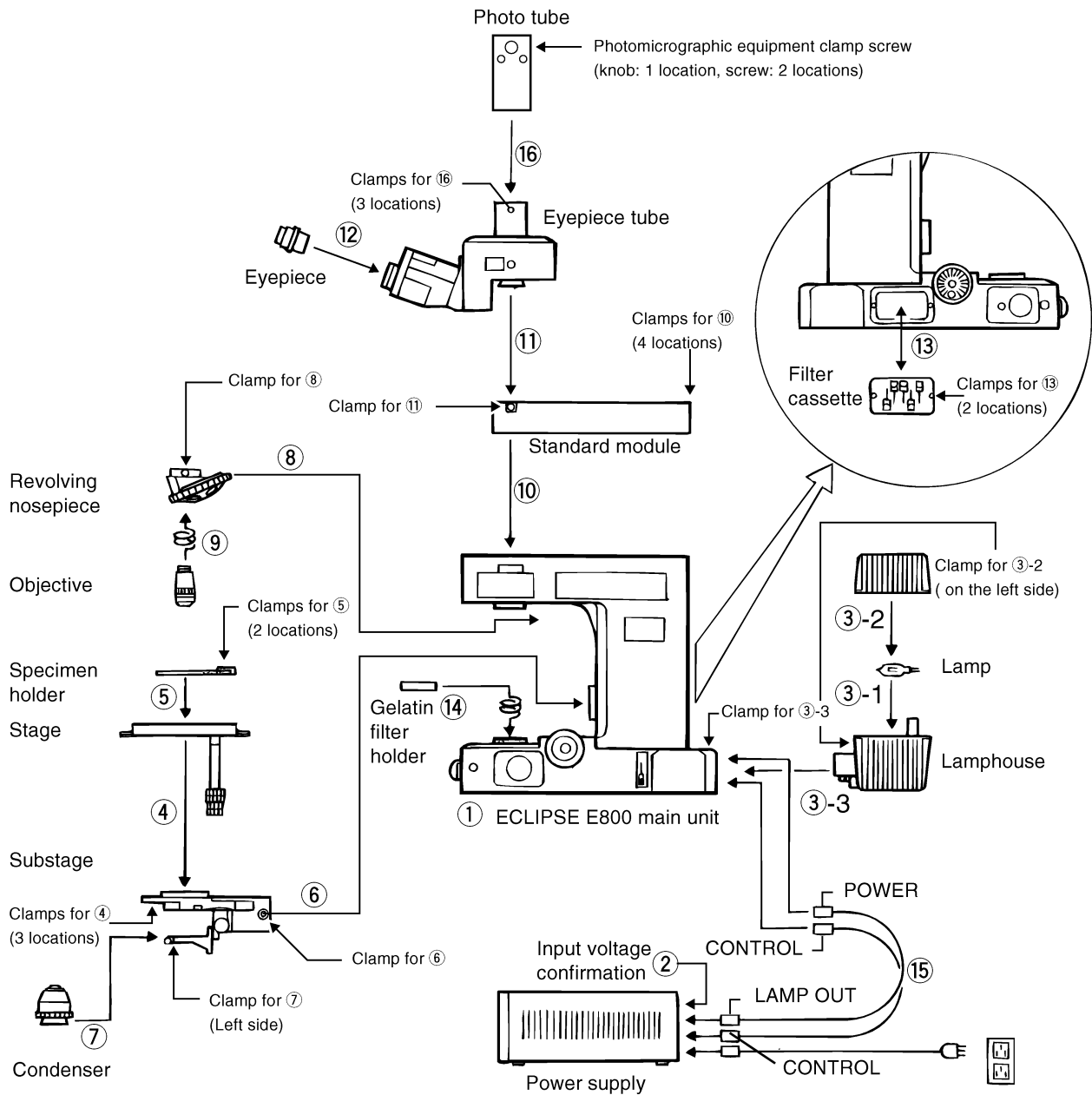
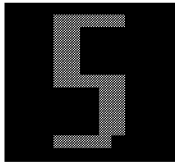
- CAUTION** • When moving the microscope, first detach the lamphouse. Then have at least two people carry the microscope, at least one on each side, using the carrying handles.
- Be sure to screw the carrying handles in as far as they will go and make sure that they are secure. If the carrying handles are not attached securely, they could come out or break while the microscope is being carried, creating a hazardous situation. Screw the carrying handles into the upper holes on the rear of the microscope. If you use the lower holes, your hands will be caught between the handles and the table when you set the microscope down.
 - Do not grasp the coarse focus knob, the fine focus stage, etc., when carrying the microscope; there is a chance that the part could come off, and the equipment could be damaged.
 - Be careful not to pinch your hands or fingers when setting up the microscope.

Tools needed

- Two hexagonal screwdrivers (provided)
- One hexagonal wrench (provided)
- Four carrying handles (provided)
- One coin (or a minus (-) screwdriver)

Assemble each part in sequence as numbered in the diagram. (For details, refer to pages 27 to 33.) Viewing will be adversely affected if any of the lenses are scratched or if they have any fingerprints on them. Handle the lenses carefully during assembly.

Because this microscope is a precision optical device, handle it carefully and do not subject it to strong physical shocks. (The precision of the objectives in particular may be adversely affected by even weak physical shocks.)



(Some components may not be included in the set that you purchased.)

1. Setting Up the Microscope



- CAUTION**
- When moving the microscope, have at least two people carry the microscope, at least one on each side, using the carrying handles.
 - Be sure to screw the carrying handles in as far as they will go and make sure that they are secure. If the carrying handles are not attached securely, they could come out or break while the microscope is being carried, creating a hazardous situation. Screw the carrying handles into the upper holes on the rear of the microscope. If you use the lower holes, your hands will be caught between the handles and the table when you set the microscope down.
 - In addition, when transporting the assembled microscope, do not grasp the coarse focus knob, the fine focus knob, the eyepiece tube, the stage, etc., when carrying the microscope; there is a chance that the part could come off, and the equipment could be damaged.
 - Be careful not to pinch your hands or fingers when installing the microscope.

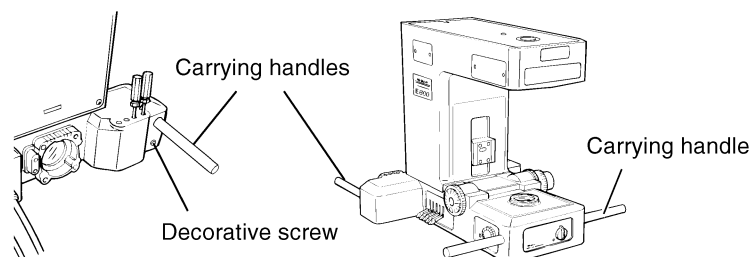
Installation location

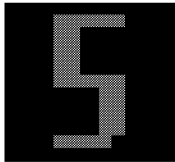
This product is a precision optical instrument, and using or storing it under unsuitable conditions may damage it or may have an adverse effect on its precision. The following conditions should be kept in mind when selecting the installation location:

- Avoid installing the microscope in a bright location, such as in a room that receives direct sunlight, or directly under room lights. The quality of the view through the microscope deteriorates if there is a lot of ambient light.
- Install the microscope in a location that is free from dust or dirt.
- Install the microscope on a flat surface with little vibration.
- Install the microscope on a sturdy desk or table that is able to bear the weight of the microscope.
- Install the microscope in a location where the temperature will range from 0 to 40°C and where the humidity is less than 85%. If the microscope is installed in a warm, humid location, condensation or mold may form on the lenses, degrading performance or damage the equipment.

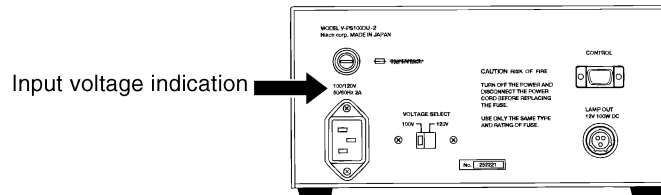
Screw the carrying handles into the holes on both sides of the front and rear (use the upper holes) of the microscope. Be sure to screw all of the handles in as far as they will go.

Have at least two people, with at least one on both sides, carry the microscope to the location where it is to be installed. After placing the microscope in the desired position, use a coin (or minus (–) screwdriver) to remove the decorative screws on the rear of the microscope (in the lower holes). Remove the front pair of carrying handles from the microscope and screw them into the lower holes on the rear of the microscope. Screw the decorative screws into the open holes on the front of the microscope.





2. Confirming the Input Voltage



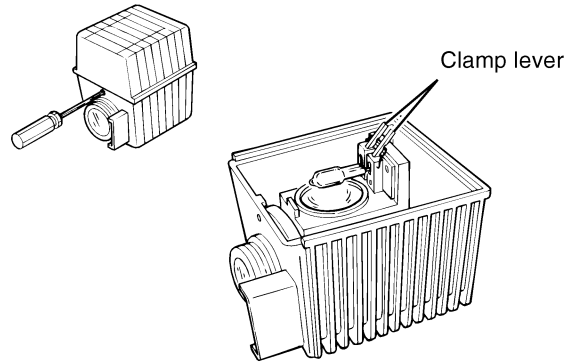
WARNING Make sure that the input voltage indicated on the back panel of the power supply is the same as the voltage provided in your region. If the indicated voltage is different, do not use the power supply; instead, contact your nearest Nikon representative immediately. If the power supply is used with the wrong input voltage, a short circuit, electric shock or fire may result, and the power supply and any connected equipment may be damaged.

If using the power supply V-PS100DU-2, set the voltage switch on the back panel of the unit to the voltage supplied in your region.

3. Lamp and Lamphouse Installation and Removal (Lamp Replacement)



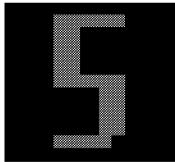
- CAUTION** • In order to prevent electric shock and damage to the equipment, always turn the power switch on the power supply off (flip it to the “○” side) and unplug the power cord before replacing the lamp.
- In order to prevent burns, allow the lamp and the lamphouse to cool before replacing the lamp.
 - Use the Nikon halogen lamphouse C-LP HALOGEN 12V100W for the lamphouse.
 - Use a 12 V - 100 W LONGLIFE halogen lamp (the OSRAM HLX 64623 or the PHILIPS 7724).
 - Do not touch the glass portions of the lamp with your bare hands. Doing so will cause fingerprints, grease, etc., to burn onto the lamp surface, reducing the illumination provided by the lamp. If you do get any fingerprints or dirt on the lamp, wipe it clean.
 - After replacing the lamp, make sure that the lamphouse cover is closed securely. Never use the lamphouse while its cover is open.



- 1 Confirm that the power supply power switch is off (i.e., that it is flipped to the “○” side). Also confirm that the sub-power switch on the microscope is in the OFF position.
- 2 If the lamphouse is mounted on the microscope, use a hexagonal screwdriver to loosen the lamphouse clamp screw (The screw is on the top of the lamphouse mount) and then remove the lamphouse from the microscope.
- 3 Use a hexagonal screwdriver to loosen the clamp screw on the front of the lamphouse and remove the cover.
- 4 While pressing the lamp clamp levers, push the lamp into the socket pin holes as far as it will go. (Do not touch the glass portion of the lamp with your bare hands.)
- 5 Return the clamp levers to its original position. Make sure that the lamp is not tilted.
- 6 Close the cover securely and tighten the clamp screw. Make sure that the cover is fixed in place and will not come off even when shook by hand.
- 7 Plug the lamphouse into the microscope so that the lamphouse plug fits into the lamphouse socket. Tighten the lamphouse clamp screw to secure the lamphouse in place.

4. Stage Installation

Place the stage with the bottom facing up. Place the substage on top of the stage. Align the three mounting holes on the stage and the substage, and then use a hexagonal screwdriver to tighten the three mounting bolts so that the stage is securely attached to the substage.



5. Specimen Holder Installation

Attach the specimen holder, using the two mounting holes on the top of the stage.

6. Substage Installation

Use a hexagonal wrench to loosen the substage clamp screw.

Fit the left side of the substage to the substage mount on the microscope.

Aligning the notch on the substage mount with the pin on the substage, fit the right side of the substage to the substage mount. Use a hexagonal wrench to tighten the substage clamp screw and secure the substage in place.

7. Condenser Installation

Turn the condenser focus knob to lower the bottom part of the substage as far as it will go. Insert the condenser in the bottom part of the substage. Tighten the clamp screw on the left side with the name on the condenser facing to the front.

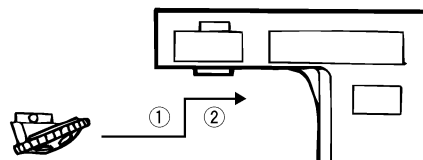
Turn the condenser focus knob to raise the condenser as far as it will go.

8. Revolving Nosepiece Installation

Use a hexagonal screwdriver to loosen the revolving nosepiece clamp screw. Fit the revolving nosepiece into the revolving nosepiece mount on the microscope from the bottom and slide it toward the rear of the microscope as far as it will go. Tighten the revolving nosepiece clamp screw to secure the revolving nosepiece.

Note on removing the revolving nosepiece

First remove all of the objectives. Lower the stage completely, and hold the revolving nosepiece in your hand so that it does not fall when you remove it.



9. Objective Installation

Lower the stage completely.

Screw the objectives into the revolving nosepiece so that the magnification increases when the revolving nosepiece is rotated in the clockwise direction, when looking down on the revolving nosepiece from above.

Note on removing objectives

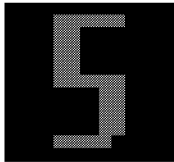
If there is a specimen on the stage, remove it first. Lower the stage completely, and hold each objective in both hands so that it does not fall when you remove it.

10. Standard Module Installation

Install the standard module by aligning the two pins on the standard module with the holes on the microscope, and then use the hexagonal wrench to tighten the four bolts with hexagonal holes so that the standard module is secured in place.

11. Trinocular Eyepiece Tube Installation

Use a hexagonal screwdriver to loosen the eyepiece tube clamp screw. Tilt and insert the round dovetail on the trinocular eyepiece tube to the round dovetail mount on the standard module. Then tighten the eyepiece tube clamp screw so that the trinocular eyepiece tube is secured in place.



12. Eyepiece Installation

Install the left and right eyepieces, both with the same magnification.

Align the three notches on each of the eyepieces with the three protrusions on each sleeve of the eyepiece tube and slide the eyepieces on. Slide the rubber eyeguard (sold separately) into the groove around each of the eyepieces.

Note on removing the eyepieces

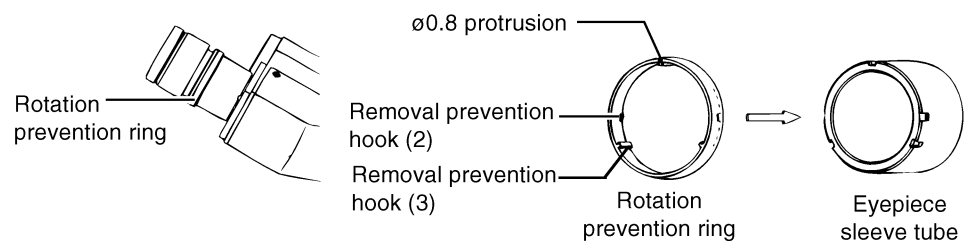
Each eyepiece sleeve on the eyepiece tubes has a ring designed to prevent the eyepiece from rotating. When removing the eyepiece, be careful not to accidentally grasp the rotation prevention ring and forcibly pull it out together with the eyepiece. To re-install a rotation prevention ring, turn the rotation prevention ring so that the surface with the $\varnothing 0.8$ protrusion on it is visible (on the front side), then insert the ring.

To the right eyepiece sleeve:

To install the rotation prevention ring to the right sleeve, position the $\varnothing 0.8$ protrusion of the ring to the top so that the three rotation prevention hooks are engaged with the corresponding notches in the sleeve.

To the left eyepiece sleeve:

Insert the ring so that its three rotation prevention hooks and two removal prevention hooks are engaged with the corresponding notches in the sleeve.



13. Replacing the Filters in the Filter Cassette

Press all of the filter insertion/removal levers down.

Using the hexagonal screwdriver, loosen the two fixing screws, and remove the filter cassette from the microscope. Using gloves or gauze, push up the filters in the filter cassette in the direction of the hooks in order to remove them. Push up the filter hooks, and then insert the $\varnothing 33$ filters that are to be used.

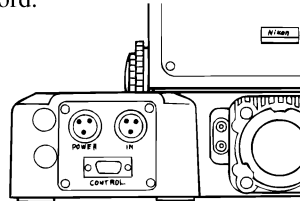
Install the filter cassette back in the microscope as it was, tighten the screws and secure the cassette in place.

14. Gelatin Filter Holder Installation

When using the Nikon AF-1 gelatin filter holder (sold separately), screw it into the field lens section on the microscope base.

15. Power Supply Connection

There are three types of cables that need to be connected: the lamp output cable, the lamp voltage control cable, and the power cord.



Lamp output cable:

Plug one end into the POWER connector on the rear of the microscope, and the other end into the LAMP OUT connector on the rear of the power supply, and then screw on the locking rings so that each connection is secure.

Lamp voltage control cable:

Plug one end into the CONTROL connector on the rear of the microscope, and the other end into the CONTROL connector on the rear of the power supply.

Power cord:

Use only the specified power supply cord set. (Refer to p.2.) Using the wrong power cord could result in damage or fire.

Plug the socket onto the AC input connector on the rear of the power supply, and insert the plug into an AC outlet.

16. Installation of Photomicrographic Equipment (Sold Separately)

For details on how to assemble the photomicrographic equipment and on how to take photomicrographs, refer to the instruction manual provided with the photomicrographic equipment.

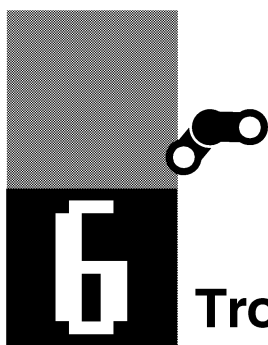
Remove the cap from the vertical tube on the trinocular eyepiece tube, and attach a photo tube. Drop a PL projection lens inside the photo tube (sold separately). Confirm that the projection lens is in as far as it will go.

Insert the main body of the photomicrographic equipment on to the photo tube as far as it will go. With the finder mount facing the front, secure the main body in place with the photomicrographic equipment clamp screws. (If the attaching sleeve on the photomicrographic equipment has a groove around its circumference, secure the equipment in place with two small clamp screws. If there is no groove around the circumference of the attaching sleeve, secure it in place with one clamp screw.) Refer to the instruction manual provided with the photomicrographic equipment for details on how to mount a finder, camera box, etc.

17. Storing the Tools

When you finish using the hexagonal screwdriver and the hexagonal wrench, insert them into the tool storage compartment on the base of the microscope.

Assembly is now complete.



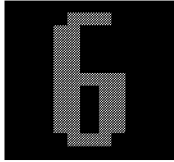
Troubleshooting Tables

Improper use of the microscope may adversely affect performance even if the microscope does not suffer damage. If any of the problems listed in the table below arise, take the countermeasures indicated.

1 Viewing and control systems

Problem	Cause	Countermeasures
Vignetting or uneven brightness in the view field; the entire view field cannot be seen.	The optical path selector on the trinocular eyepiece tube is in an intermediate position.	Set the optical path selector 100% to the binocular eyepiece. (p. 16)
	The optical path selector on the trinocular eyepiece tube is not set 100% to the binocular eyepiece.	
	The revolving nosepiece has not been installed properly.	Install the revolving nosepiece properly. (p. 30)
	The revolving nosepiece has not been rotated until it has clicked into place. (The objective is not in the optical path.)	Turn the revolving nosepiece until it clicks into place. (Place objective in the optical path.) (p. 9)
	The condenser is too low.	Position the condenser so that the image of the field diaphragm forms properly on the specimen. (p. 18)
	The condenser is not centered.	Center the condenser. (p. 18)
	The condenser is not installed properly.	Install the condenser correctly. (p. 30)
	The filters are not switched fully into position.	Switch the filters correctly. (p. 21)
	The field diaphragm is stopped down too far.	Open the diaphragm to a suitable size. (p. 20)
	An unsuitable objective and condenser combination is being used.	Use a suitable combination. (p. 20)
	The lamp is not installed properly.	Install the lamp properly. (p. 29)
Dirt or dust in the view field	The condenser is too low.	Position the condenser so that the image of the field diaphragm forms properly on the specimen. (p. 18)
	The aperture diaphragm is stopped down too far.	Open the diaphragm to a suitable size. (p. 19)
	There is dirt or dust on the lens, condenser, eyepiece, filter or specimen.	Clean the components. (p. 38)
Viewing is poor (too much or too little contrast, poor resolution)	The aperture diaphragm is stopped down too far.	Open the diaphragm to a suitable size. (p. 19)
	The condenser is too low.	Position the condenser so that the image of the field diaphragm forms properly on the specimen. (p. 18)

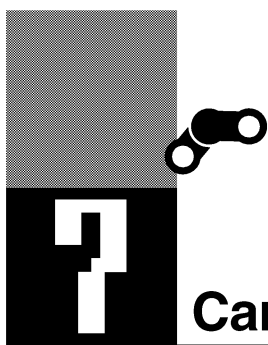
Problem	Cause	Countermeasures
Viewing is poor (too much or too little contrast, poor resolution) (The details cannot be viewed clearly)	The cover glass is too thick.	Use the specified type of cover glass (thickness: 0.17 mm).
	There is no cover glass.	
	There is no oil on the tip of an oil-immersion type objective.	Apply Nikon immersion oil. (p. 23)
	The specified immersion oil is not being used.	
	There are bubbles in the immersion oil.	Remove the bubbles. (p. 24)
	There is immersion oil on the tip of a dry-type objective. (Especially in the case of a 40x objective)	Clean the objective. (p. 24)
	The compensation ring on an objective with a compensation ring has not been adjusted.	Adjust the compensation ring according to the cover glass.
Uneven focus	There is dirt or dust on the lens, condenser, objective or specimen.	Clean the components. (p. 38)
	The revolving nosepiece has not been installed properly.	Install the revolving nosepiece properly. (p. 30)
	The revolving nosepiece has not been rotated until it has clicked into place.	Turn the revolving nosepiece until it clicks into place. (p. 9)
	The specimen is not secured in place on the stage.	Install the specimen properly on the specimen holder on the stage.
Image flows	The stage has been installed on a slant.	Install the stage correctly. (p. 29)
	The revolving nosepiece has not been installed properly.	Install the revolving nosepiece properly. (p. 30)
	The revolving nosepiece has not been rotated until it has clicked into place.	Turn the revolving nosepiece until it clicks into place. (p. 9)
	The specimen is not secured in place on the stage.	Install the specimen properly on the specimen holder on the stage.
	The condenser is not centered.	Center the condenser. (p. 18)
Image is yellowish	The stage has been installed on a slant.	Install the stage correctly. (p. 29)
	An NCB11 filter is not being used.	Use the NCB11 filter. (p. 21)
	The lamp voltage is too low.	Set the brightness adjuster to "PRESET" or to position "9", and then adjust the brightness through the ND filter combination. (p. 23)



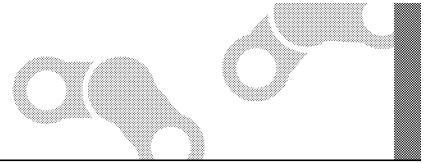
Problem	Cause	Countermeasures
Image is too bright	The lamp voltage is too high.	Set the brightness adjuster to "PRESET" or to position "9", and then adjust the brightness through the ND filter combination. (p. 23)
Inadequate illumination (also check the electrical system problems and countermeasures)	The lamp voltage is too low.	Set the brightness adjuster to "PRESET" or to position "9", and then adjust the brightness through the ND filter combination. (p. 23)
	The aperture diaphragm is stopped down too far.	Open the diaphragm to a suitable size. (p. 19)
	The condenser is too low.	Position the condenser so that the image of the field diaphragm forms properly on the specimen. (p. 18)
Focusing is not possible with high-power objectives	The specimen is placed upside-down.	Affix the specimen on the stage with the cover glass facing up.
	The cover glass is too thick.	Use the specified type of cover glass (thickness: 0.17 mm).
The objective strikes the specimen when switching from a low power objective to a high power objective	The specimen is placed upside-down.	Affix the specimen on the stage with the cover glass facing up.
	The cover glass is too thick.	Use the specified type of cover glass (thickness: 0.17 mm).
	The diopter adjustment has not been made.	Perform the diopter adjustment. (p. 16)
The difference in focus when the objective is switched is large	The diopter adjustment has not been made.	Perform the diopter adjustment. (p. 16)
The specimen does not move smoothly	The specimen holder is not fixed securely in place on the stage.	Secure the specimen holder in place. (p. 30)
When viewing through the binocular eyepiece, the image does not resolve into a single image	The interpupillary distance adjustment has not been made.	Perform the interpupillary distance adjustment. (p. 17)
	The diopter adjustment has not been made.	Perform the diopter adjustment. (p. 16)
Eye strain develops while viewing	The interpupillary distance adjustment has not been made.	Perform the interpupillary distance adjustment. (p. 17)
	The diopter adjustment has not been made.	Perform the diopter adjustment. (p. 16)
	The brightness level is not suitable.	Adjust the brightness through the ND filter combination. (p. 23)

2 Electrical system

Problem	Cause	Countermeasure
The lamp does not light when the power is turned on	The power supply is not plugged in.	Plug the power cord into an outlet. (p. 32)
	The cables between the microscope and the power supply are not connected.	Connect the cables. (p. 32)
	The sub-power switch is set to "EPI."	Set the switch to "DIA." (p. 8)
	The lamp has not been installed.	Install the lamp. (p. 29)
	The lamp is burned out.	Replace the lamp. (p. 29)
The lamp blows immediately	The specified lamp is not being used.	Use the specified lamp. (Refer to the electrical standards on P.39.) (p. 28)
Inadequate brightness	The specified lamp is not being used.	Use the specified lamp. (Refer to the electrical standards on P.39.) (p. 28)
The brightness adjuster has no effect.	The lamp voltage control cable has not been connected.	Connect the cable. (p. 33)
The lamp flickers; the brightness is unstable	The lamp is near the end of its life.	Replace the lamp. (p. 29)
	The connectors are not connected securely.	Secure the connections. (p. 33)
	The lamp is not plugged into its socket securely.	Insert the lamp securely into its socket. (p. 29)



Care and Maintenance



1 Lens cleaning

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

- Either brush away dust with a soft brush, or else wipe it away gently with gauze.
- Only if there are fingerprints or grease on a lens, dampen a piece of soft, clean cotton cloth, lens tissue, or gauze with absolute alcohol (ethyl alcohol or methyl alcohol) and wipe.
- Use petroleum benzine to clean off immersion oil. (p. 24)
- Do not wipe the entrance lens on the eyepiece tube with petroleum benzine.
- Absolute alcohol and petroleum benzine are both highly flammable. Be careful when handling them, when around open flames, when turning the power switch on/off, etc.
- Follow the instructions provided by the manufacturer when using absolute alcohol and petroleum benzine.

2 Cleaning of painted components

Do not use organic solvents (such as alcohol, ether, or paint thinner) on painted components, plastic components, or printed components. Doing so could result in discoloration or in the peeling of printed characters. Use of a silicon cloth is recommended.

3 Storage

Store the microscope in a dry place where mold is not likely to form.

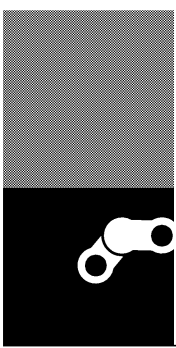
Store the objectives and eyepieces in a desiccator or similar container with a drying agent.

Put the vinyl cover over the microscope to protect it from dust.

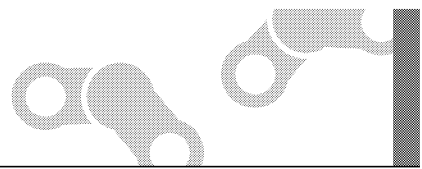
Before putting on the vinyl cover, turn off the sub-power switch on the microscope and the power switch on the power supply (flip the switch to the "O" position), and wait until the lamphouse is cool.

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.



Electrical Specifications



■ ECLIPSE E800 (Main body of the microscope)

Power source:	For 100/120 V area: Power supply V-PS100DU-2 For 230 V area: Power supply V-PS100E-2
Input voltage:	12 V DC
Light source:	Lamp rating: 12 V DC, 100 W Lamp type: Halogen lamp (OSRAM HLX 64623 or PHILIPS 7724)
Protection class:	Class I
Operating environmental conditions:	Temperature: 0 to +40° C Humidity: 85% Rh max., noncondensing Altitude: 2000 m max. Pollution: Degree 2 Installation: Category II
Storing environmental conditions:	Temperature: -20 to +60° C Humidity: 90% Rh max., noncondensing
Conforming standards (for 100/120V area):	<ul style="list-style-type: none"> • UL Listed product • FCC 15B class A satisfied

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 protections 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 the user will be required to correct the interference at his own expense.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la Classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Conforming standards (for 230 V area):

- GS approved product
- EU Low Voltage Directive satisfied
- EU EMC Directive satisfied



■ V-PS100DU-2 (Power supply for 100/120 V area)

■ V-PS100E-2 (Power supply for 230 V area)

Refer to the instruction manual provided with the "Power Supply V-PS100DU-2, V-PS100E-2".

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