

Nikon

Inverted Microscope

**ECLIPSE
TE300**

Instructions



Thank you for purchasing the Nikon products.

This instruction manual is for users of Nikon's ECLIPSE TE300 Inverted Microscope.

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 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.
- When using any of the accessories, read the manual provided for that accessory as well.

Warning/Caution Symbols Used in This Manual

Although Nikon products are designed to provide you with the utmost safety during use, incorrect usage or disregard of the instructions can cause personal injury or property damage. For your safety, read 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	Meaning
.....	
 WARNING	Disregarding indications marked with this symbol may lead to death or serious injury.
 CAUTION	Disregarding indications marked with this symbol may lead to injury or property damage.

Meaning of Symbols Used on the Equipment

Symbol	Meaning
.....	
	Caution for heat. This marking near the lamphouse calls your attention on the following; • Lamphouse becomes very hot during and immediately after the illumination. • Risk of burns. Do not touch the lamphouse during and immediately after the illumination. • Make sure that the lamphouse is sufficiently cool before the lamp replacement.



WARNING

1. Intended product use

The system should only be used for microscopic observation. Do not use the system for any other purpose.

2. Do not disassemble

Disassembling the microscope or the system could result in electrical shock or damage to the equipment. Never disassemble any portion of the equipment unless the procedure is described in this manual. If you have any problems with the equipment, contact your nearest Nikon representative.

3. Check the input voltage

Make sure that the input voltage indicated on the rear panel of the power supply is the same as your regional voltage. If not the same, do not use the power supply, and notify your nearest Nikon representative immediately. Using the wrong input voltage for the power supply could result in a short circuit or fire, and could also damage the power supply and any equipment connected to the power supply.

4. Use only the specified power cord

For connection to the power supply, use only the specified power cord. Using any other cord could result in damage to the equipment, or a fire. Refer to the "Electrical Specifications (p. 50) for the specifications on the power cord.

In order to avoid electrical shock, always turn off the power switch of the power supply (flip it to the "O" side) before connecting the power cord.

5. Heat from the light source

When the lamp is on, the lamp and the lamphouse become extremely hot.

To avoid burns, do not touch the lamphouse while the lamp is on, and for at least 30 minutes after it has been turned off.

Furthermore, in order to avoid the risk of fire, do not place or bring any cloth, paper, or other highly flammable or volatile materials (including gasoline, petroleum benzine, paint thinner, or alcohol) near the lamphouse while the lamp is on, and for at least 30 minutes after it has been turned off.

The bottom of the power supply becomes hot during use. Do not obstruct the air vents on the sides of the power supply.



CAUTION

1. Light source

The specified power supply, illumination pillar and lamp must be used, otherwise, the instruments could be damaged.

Refer to the "Electrical Specifications" for the specifications on the power supply, illumination pillar and lamp.

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

To prevent electrical shock or damage to the instruments, always turn off the power switch of the power supply (flip it to the "○" side) and unplug the power cord before connecting or disconnecting cables or replacing the lamp.

3. When replacing the lamp

To avoid burns, always allow the lamp to cool for at least thirty minutes before replacing the lamp.

Furthermore, always turn off the power switch of the power supply (flip it to the "○" side) and unplug the power cord before replacing the lamp.

After replacing the lamp, make sure to attach the lamphouse cover securely. Never use the lamphouse without its cover.

4. Do not wet the microscope

If the microscope or the power supply becomes wet, a short circuit may result that could damage them or make them extremely hot. If you accidentally spill a liquid on the equipment, immediately turn off the power switch of the power supply (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, notify your nearest Nikon representative.

5. Weak electromagnetic waves

This microscope emits weak electromagnetic waves that may affect the accuracy of any precision electronic equipment positioned near it. If the microscope affects TV or radio reception, move the radio or TV away from the microscope.

6. Installation

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

This microscope is a precision optical instrument. Using or storing it under unsuitable conditions may damage the microscope or may have an adverse effect on its accuracy. See "Installation Location" on page v and use the microscope in a suitable environment.

7. Transporting the microscope

When transporting the microscope, do not carry it by holding the coaxial coarse/fine focusing knob, the eyepiece tube, the stage, etc. This could cause these components to come off and the microscope could be damaged.



Notes on Handling the Microscope

1. Handle the Microscope Carefully

This microscope is a precision optical instrument. Handle it carefully, and do not subject it to strong shocks. (The precision of the objectives in particular can be adversely affected even by weak shocks.)

2. Installation Location

Select a location with limited exposure to dust, vibration, high temperature and humidity (40°C, 80% or more), and direct sunlight. Leave a certain space between the microscope and the nearby wall to allow the user to look at the warning labels on the lamphouse.

3. Focusing Knobs

Never turn the focusing knobs on the left and right sides of the microscope in opposite directions at the same time, as doing so can result in damage to the microscope.

Turning the coarse focusing knob as far as it will go and then attempting to turn it further will result in damage to the microscope. Never use undue force to turn the knob.

4. Dirt on Lens

Do not leave dust, dirt or fingerprints on the lens or lamp. Dirt or stains on the lens or mirror will deteriorate image quality.

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I

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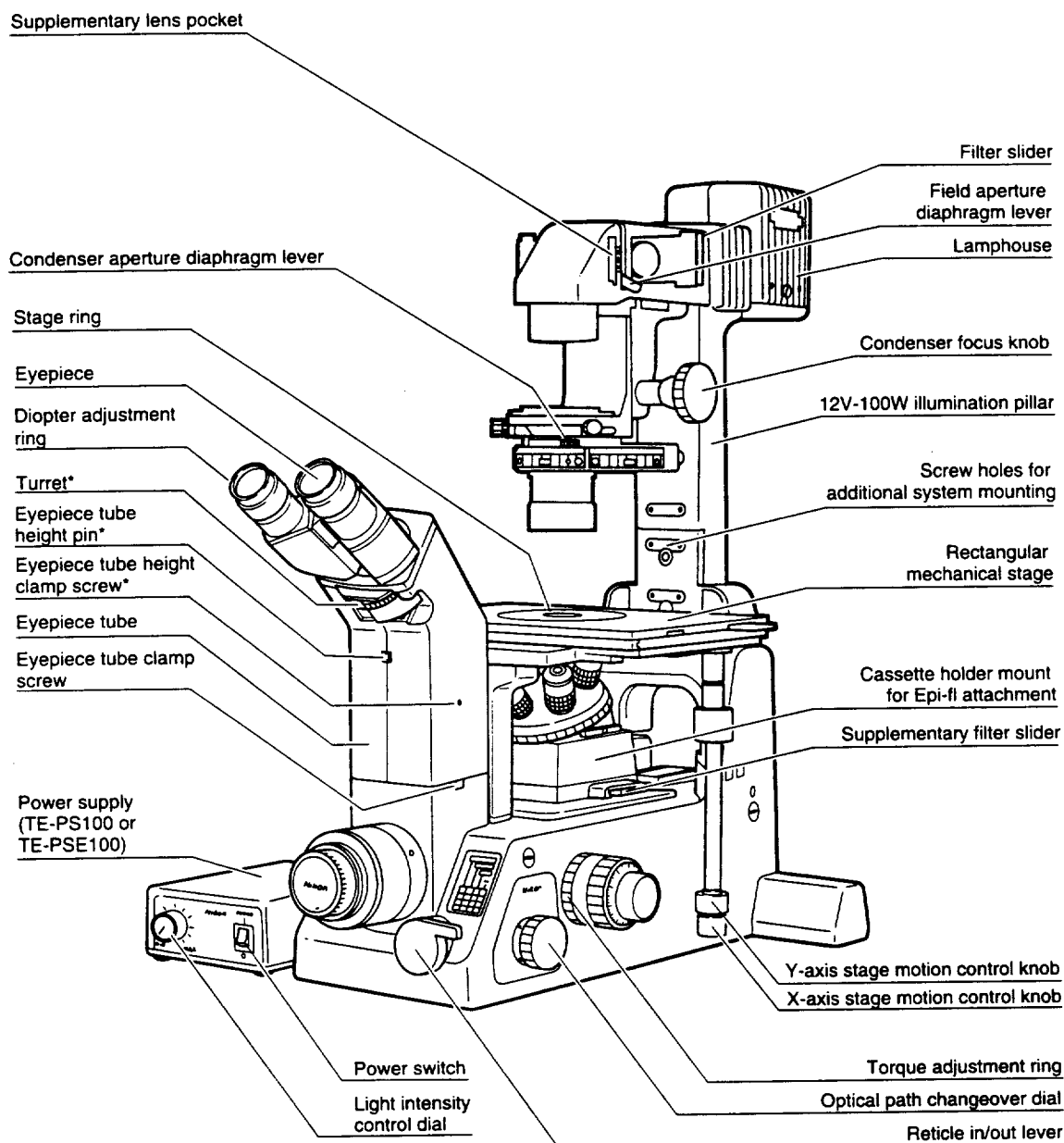
V

VI

VII

I. NOMENCLATURE

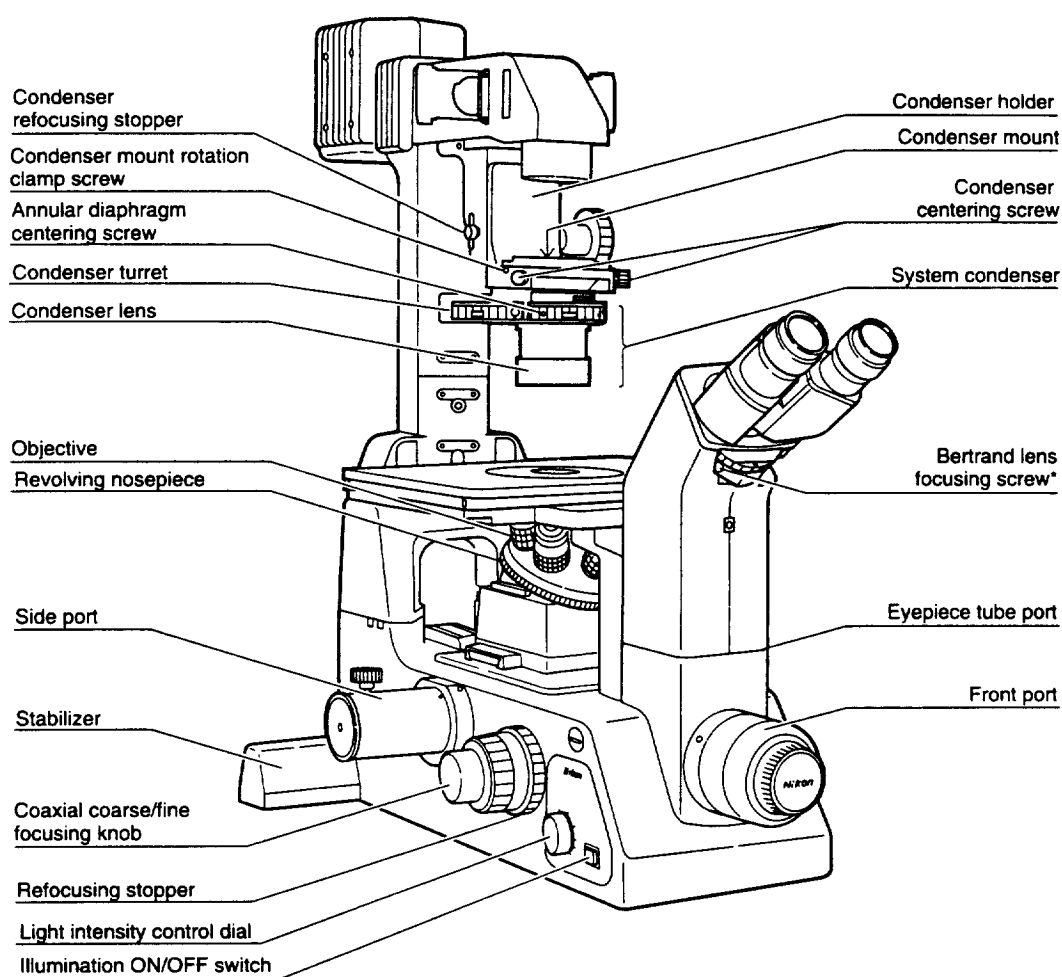
1. System Components (Right-hand)



* For TE-TL eyepiece tube only.

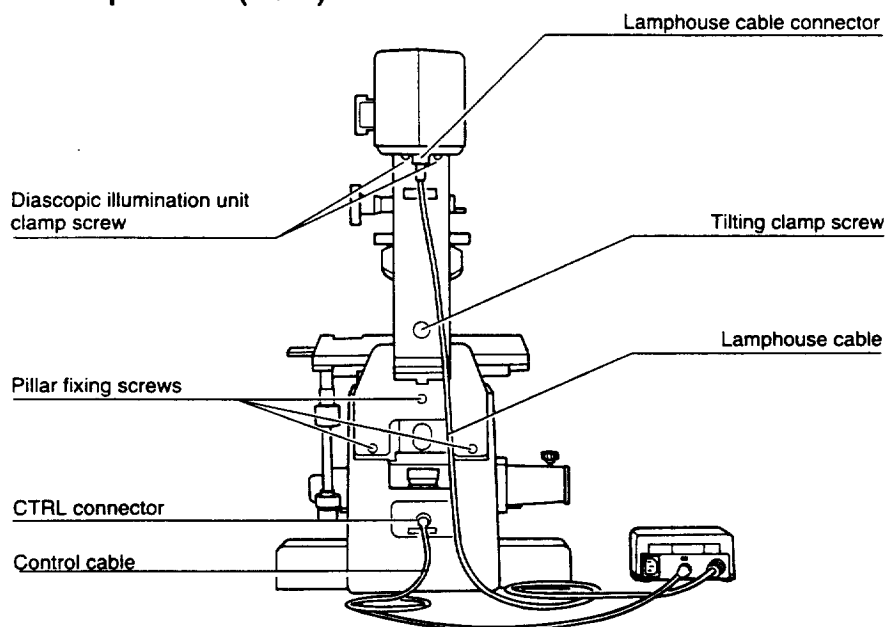
For details on using the TE-PS30 or TE-PSE30 power supply in combination with the 6V-30W illumination pillar, refer to page 48.

2. System Components (Left-hand)



* For TE-TL eyepiece tube only.

3. System Components (Rear)

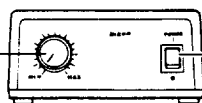


4. TE-PS100/TE-PSE100 Power Supply

Power switch

Before turning on the power, confirm that the input voltage shown on the rear panel matches the voltage that you will be using. If not the same, do not use this power supply.

Flip the switch to the "I" side to turn on the power; the switch lamp should light when the power is on. Flip the switch to the "O" side to turn off the power.



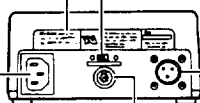
Light intensity control dial
This dial adjusts the lamp brightness when the CTRL switch is off.

AC input connector

Connect the power cord specified in the "Electrical Specifications" (page 50).

Input voltage label

Before turning on the power, confirm that the input voltage shown here matches the voltage that you will be using. If not the same, notify your nearest Nikon representative. (If you use the instrument with the wrong input voltage, it may be damaged.)



Rear panel

CTRL connector

Connect a control cable between this connector and the CTRL connector on the rear of the microscope.

OUTPUT connector

This is the lamp output connector. Connect the lamp cable from the illumination pillar to this connector.

CTRL switch

Turning this switch on disables the light intensity control dial on the power supply. The light intensity control dial on the left side of the microscope can then be used to adjust the brightness and to turn the illumination on and off. Turning this switch off disables the light intensity control dial on the microscope. The light intensity control dial on the power supply can then be used to adjust the brightness.

Connector Pin Assignments

OUTPUT connector



Pin 1 : Output +
Pin 2 : Output -
Pin 3 : Unused

Sanwa Electric
SNS-1603-RSFb

CTRL connector



Pin 1 : Light intensity volume (10kΩ)
Pin 2 : Light intensity volume (10kΩ)
Pin 3 : Unused
Pin 4 : Output ON/OFF switch
(shorted: on/open: off)
Pin 5 : Unused
Pin 6 : Unused
Pin 7 : Output ON/OFF switch
(shorted: on/open: off)
Pin 8 : Unused

Hirose Electric
HR12-10R-8SC

⚠ WARNING: The bottom of the power supply becomes hot while it is in use. Do not obstruct the air vents on the sides of the power supply.

II

BASIC MICROSCOPY

Normal Microscopy Phase Contrast Microscopy

For normal microscopy, perform steps 1 to 14.

For phase contrast microscopy, perform steps 1 to 18.

-▶ For detailed operations, see Section "IV. OPERATIONS ON COMPONENTS," from page 16.
-▶ If the microscope has not been assembled, first read Section "V. ASSEMBLY," from page 36.

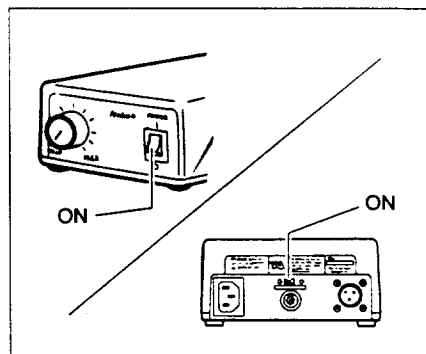
II. BASIC MICROSCOPY

1

Turn on the power.

Turn ON the power switch. Turn ON the CTRL switch (located on the rear of the power supply).

⚠ WARNING Confirm that the voltage that you will be using matches the input voltage indicated on the rear panel of the power supply. If not the same, do not use the power supply, and notify your nearest Nikon representative.



2

Adjust the brightness of the lamp

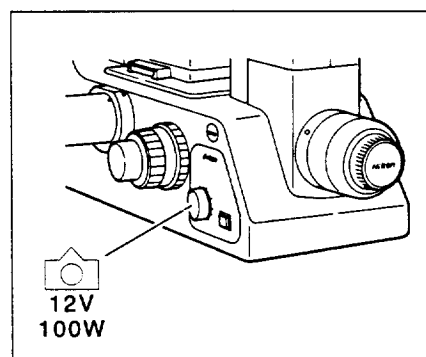
Turn the light intensity control dial on the left side of the base so that it is position at

12V
100W

If the light intensity is too bright or too weak, adjust the light intensity control dial until a satisfactory brightness level is attained.

When using the TE-PS30 or TE-PSE30 power supply in combination with the 6V-30W illumination pillar, set the light intensity control dial to

6V
30W

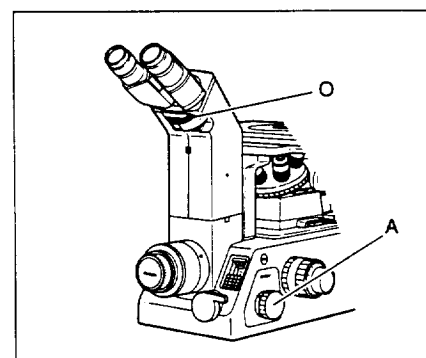


3

Set the optical path for the observation.

Set the eyepiece tube turret to O.
(For TE-TL eyepiece tube only.)

Set the optical path changeover dial on the right side of the base to A.

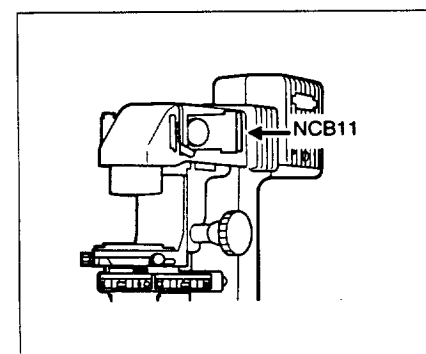


4

Select the NCB11 filter.

Hold the nonslip portion of the filter slider to push in the NCB11 filter. Do not touch the filter. Keep other filters out of the optical path.

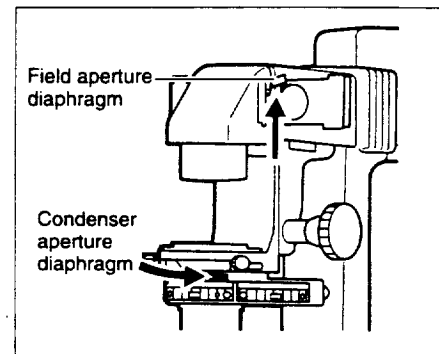
For phase contrast microscopy, set the GIF (green interference filter), instead of the NCB11 filter, in the optical path.



5

Fully open the field aperture and condenser aperture diaphragms.

Raise the field aperture diaphragm lever.
Turn the condenser aperture diaphragm lever to the right.



6

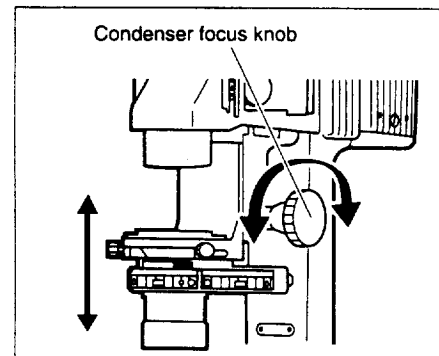
Adjust the condenser position.

Adjust the condenser to an approximately correct position.

System condenser

When using a LWD condenser lens

Rotate the condenser refocusing stopper by half turn to loosen it, and rotate the condenser focus knob to lower the condenser to its limit. Rotate the turret until the module A comes to the front (i.e., it enters the optical path).



When using an ELWD condenser lens

Rotate the condenser focus knob to raise the condenser to the upper limit, then lower the condenser by approx. 1 cm from the limit. Rotate the turret until the module A comes to the front (i.e., it enters the optical path).

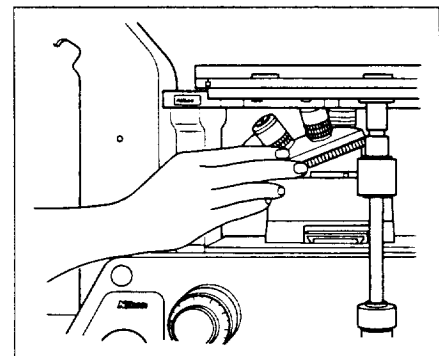
ELWD-S condenser

Rotate the condenser focus knob to raise the condenser to the upper limit, then lower the condenser by approx. 2 cm from the limit.

7

Move the 10x objective into the optical path.

Move the 10x objective into the optical path by rotating the revolving nosepiece securely into the clickstop.

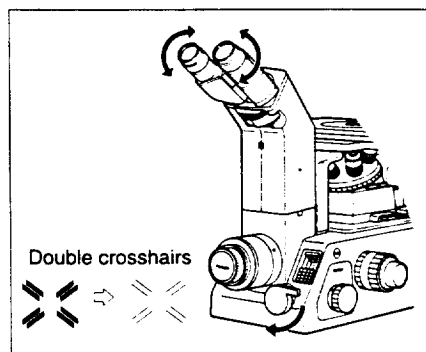


8

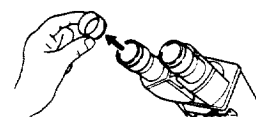
Adjust the eyepiece diopter.

Turn down the reticle in/out lever to the right to bring the photomask into the optical path. Rotate the diopter adjustment ring on each eyepiece to bring the photomask's double crosshairs into sharp focus.

Be sure to perform this step for each eye, as correct focus for each eye is usually different.



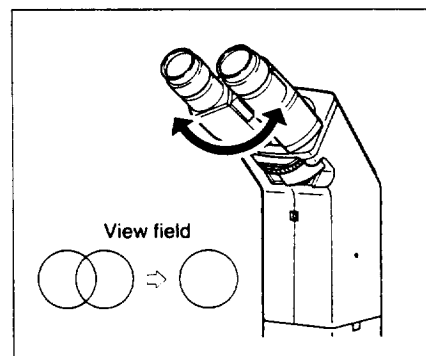
If you wear glasses while observing through the microscope, remove the rubber eye guards.



9

Adjust the interpupillary distance.

Adjust the interpupillary distance until the viewfield is visible as a single image through both eyepieces.

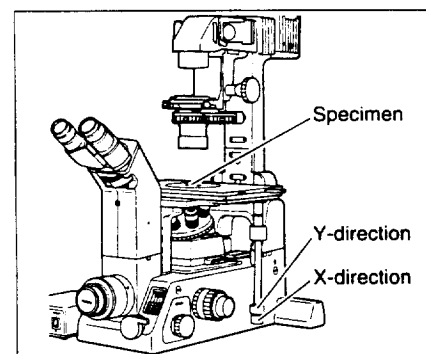


10

Place a specimen on the stage.

Move the stage to position the desired section of the specimen into the viewfield.

If the specimen is on a slide glass, be sure to mount it with its cover glass facing down. (See page 24.)



11

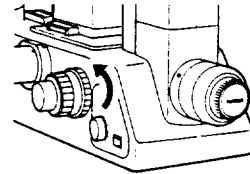
Focus.

Rotate the refocusing stopper on the left-hand focusing knob counter-clockwise to unlock the stopper.

Rotate the coarse/fine focusing knob to focus on the specimen.

Never turn the left-hand and right-hand knobs in the opposite directions at the same time, as damage may result.

Unlock the refocusing stopper

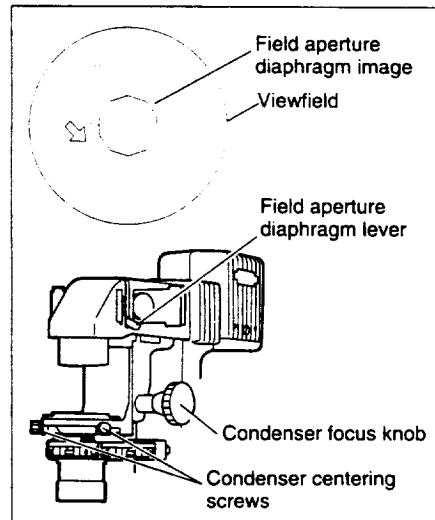


12

Center the condenser.

Narrow down the field aperture diaphragm until the diaphragm edge is viewed through eyepieces. Rotate the condenser focus knob to focus the image of the field aperture diaphragm on the specimen surface.

Adjust the condenser centering screws so that the center of the field aperture diaphragm image matches the center of the viewfield.



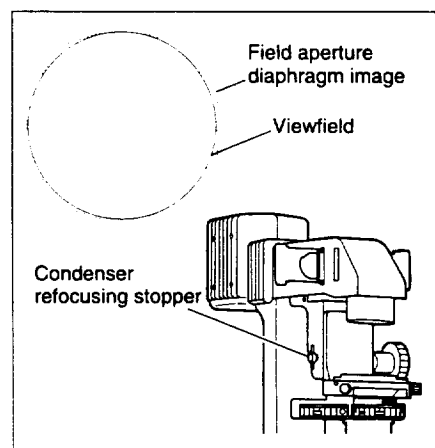
13

Center the condenser with the 40x objective.

Switch to the 40x objective.

Adjust the image of the field aperture diaphragm until it circumscribes the viewfield.

Adjust the condenser centering screws so that the center of the field aperture diaphragm image matches the center of the viewfield.



If using the LWD condenser lens, tighten the condenser refocusing stopper after adjustment and mark the position where the condenser is in focus.

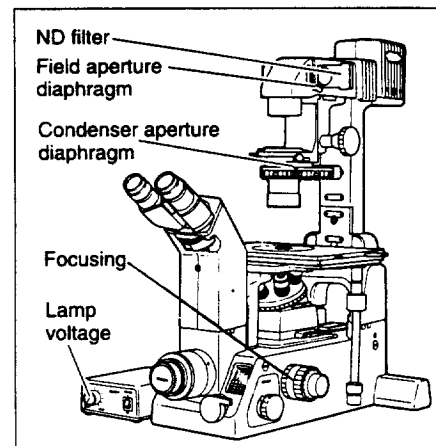
Perform microscopy with a desired objective.

- ◆ Switch to a desired objective.
- ◆ Focus the microscope.
- ◆ Adjust the field aperture diaphragm until it is inscribed or circumscribed with the viewfield.
- ◆ Adjust the brightness with the ND filters or the light intensity control dial on the base. Turn the dial between 6 and 12.

For color photomicrography, adjust it to $\frac{12V}{100W}$ (page 18). (For color photomicrography when using the TE-PS30 or TE-PSE30 power supply in combination with the 6V-30W illumination pillar, set the dial to $\frac{6V}{30W}$.)

- ◆ Stop down the condenser aperture diaphragm to a range of 70 to 80% of the objective's numerical aperture. (Set the eyepiece tube turret to B, or insert the centering telescope instead of an eyepiece and adjust the aperture diaphragm while observing the diaphragm image through the eyepieces.) With some specimens, stopping down the diaphragm or opening the diaphragm will yield a better image (page 21).

When replacing the specimen, you can use the refocusing stopper (page 29), condenser refocusing stopper (page 30), and pillar tilting mechanism (page 31) for enhanced efficiency.



Now, the basic microscopic operation is completed.
For phase contrast microscopy, proceed with the following steps 15 to 18.

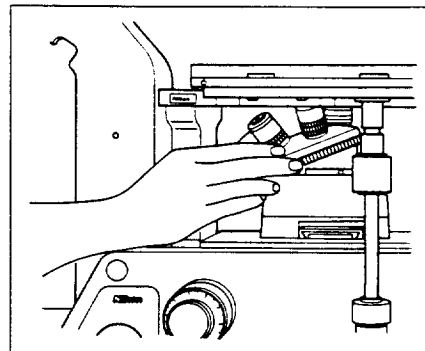
Phase Contrast Microscopy

15

Switch to the phase contrast objective.

Rotate the revolving nosepiece to bring the phase contrast objective of the lowest magnification (ex.: 4x) into the optical path. Focus the microscope with the coaxial coarse/fine focusing knobs.

The phase contrast objective is identified as it is impressed with the Ph code. (See page 23.)

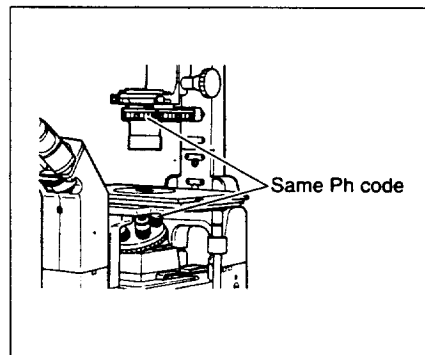


16

Bring the phase annular diaphragm into the optical path.

Identify the annular diaphragm that has the same Ph code as the objective in the optical path, and bring it into the optical path.

If the system condenser turret is used, rotate the turret to bring the module having the same Ph code as the objective into the optical path.



17

Center the annular diaphragm.

Open the field aperture diaphragm to the full.

If the TE-TL eyepiece tube is used

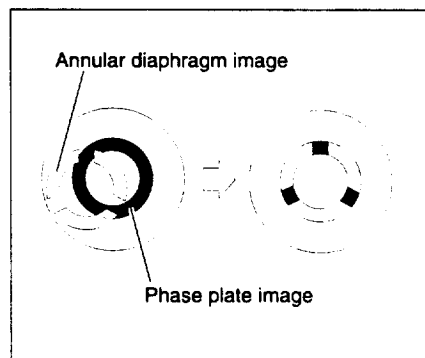
Set the turret to B. While observing through both eyepieces, rotate the Bertrand lens focusing screw to focus on the phase plate image of the objective and the annular diaphragm image of the condenser.

If the TE-TS eyepiece is used

Remove an eyepiece and insert the centering telescope in its place. Holding the flange of the centering telescope, rotate its eyepiece to focus on both the phase plate image of the objective and the annular diaphragm image of the condenser.

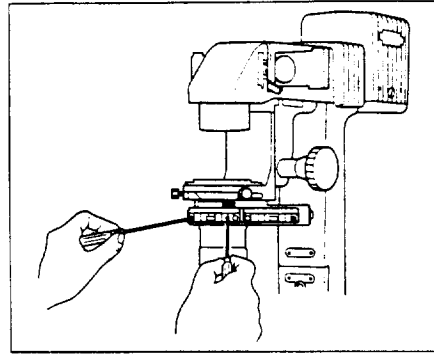
Adjust so that the phase plate image is concentric with the annular diaphragm image.

Note that since any displacement of the phase plate and annular diaphragm images will cause low contrast to the phase contrast image of the specimen, the exact coincidence of the two images is necessary.



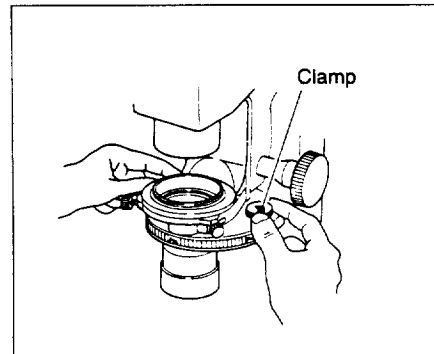
System condenser

Fully open the condenser aperture diaphragm. (The optical path is blocked when the condenser aperture diaphragm is stopped down.) Insert two hexagonal screwdrivers into the annular diaphragm centering screws for the module in the optical path and rotate the screwdrivers to adjust the annular diaphragm.



ELWD-S condenser

Unclamp the right-hand and left-hand turret centering knobs. Rotate the centering knobs for adjustment. Through PhL centering, other annular diaphragms are also centered automatically. (If there is no PhL, use the phase contrast objective of the lowest magnification (for example, 4x).)



18

Perform microscopy with a desired phase contrast objective.

- ◆ Use the annular diaphragm (module) that has the same Ph code as the objective in the optical path. Every time that the annular diaphragm (module) is changed, center the annular diaphragm as described in step 17. (As for the ELWD-S condenser, once centering is complete with PhL, other annular diaphragms are also centered automatically.)
- ◆ Adjust the field aperture diaphragm until it is circumscribed with the viewfield.
- ◆ Adjust the brightness with the ND filters or the light intensity control dial.
- ◆ If the system condenser turret unit is used, always open the condenser aperture diaphragm to the full.
- ◆ For microscopy at the maximum contrast, bring the GIF into the optical path. Keep the NCB11 filter away from the optical path when using GIF.

When replacing the specimen, you can use the refocusing stopper (page 29), condenser refocusing stopper (page 30), and pillar tilting mechanism (page 31) for enhanced efficiency.

When you observe a specimen in a laboratory dish or other containers, we recommend the use of an objective that has a correction ring for compensating the thickness of the dish or container bottom. (See page 23.)

Now, the phase contrast microscopic operation is all completed.

III

PHOTOMICRO- GRAPHIC PROCEDURE

In photomicrography, the following items are particularly important.

Read all of them thoroughly. (page 33)

The specimen must be illuminated properly.

The microscope must be precisely focused.

All external light must be blocked out.

-▶ For details on mounting the camera and the photomicrographic attachment on the microscope, refer to Section "V. ASSEMBLY," on page 36.
-▶ For details on how to operate the various components, refer to Section "IV. OPERATIONS ON COMPONENTS," on page 16.

III. PHOTOMICROGRAPHIC PROCEDURE

Nikon's 35 mm single-lens reflex cameras (such as F-90, option) and photomicrographic equipment (option) may be used for photomicrography with the ECLIPSE TE300.

Using a single-lens reflex camera

Mount an SLR camera directly on the microscope front port. Because intermediate magnification, 2x, is applied, the photomicrography magnification is the "magnification of the objective multiplied by 2."

For photomicrography, set the optical path changeover dial to B. The use of a cable release (option) eliminates the effects of vibration caused by pressing the shutter button.

Note that when using an SLR camera that carries the  Advanced Photo System (APS) logo, the size of the area that is photographed is smaller than that of a normal SLR camera.

Using a photomicrographic equipment

Mount a photomicrographic equipment directly on the side port, or on the eyepiece tube port via the eyepiece tube bracket (option, for infinite optical systems) and the trinocular eyepiece tube for the upright type microscope (option, for infinite optical systems).

Rotate the optical path changeover dial to align the optical path to the port on which the photomicrographic equipment is mounted.

For the photomicrographic procedures using the photomicrographic equipment, refer to its manual.

The following shows the photomicrographic procedures using a 35 mm SLR camera.

Before starting photomicrography, make sure that:

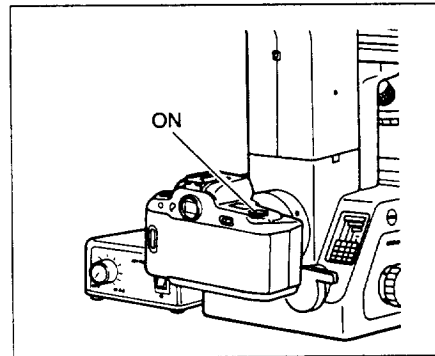
- The microscope is ready for normal microscopy. (See page 4.)
- The camera is loaded with film. (Refer to the instruction manual that comes with your camera.)

1

Turn on the camera.

Turn on the main switch of the camera. Set the camera for the appropriate film sensitivity, exposure mode, and photometry mode.

For details on how to use the camera, refer to the manual that was provided with the camera.



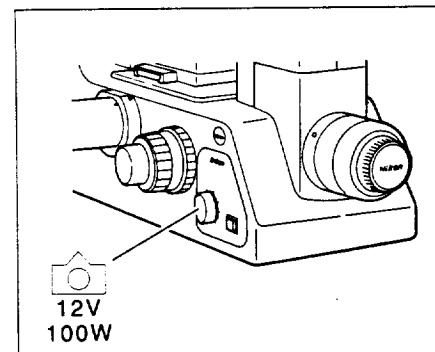
2

Adjust the lamp brightness.

Set the light intensity control dial on the left side of the microscope base to

12V
100W

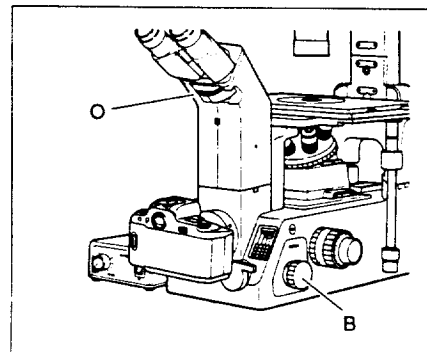
When using the TE-PS30 or TE-PSE30 power supply in combination with the 6V-30W illumination pillar, set the light intensity control dial to  12V 100W.



3

Select the optical path for photomicrography.

Set the turret assembly to O. (For TE-TL eyepiece tube only.)
Set the optical path changeover dial on the right side of the base to B.



4

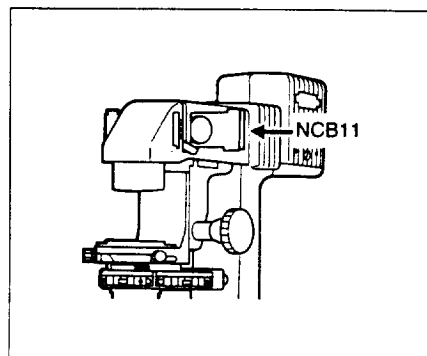
Set the filters.

Daylight type color film

Bring the NCB11 filter into the optical path.

Monochrome film or tungsten type color film

Bring the NCB11 filter out of the optical path.



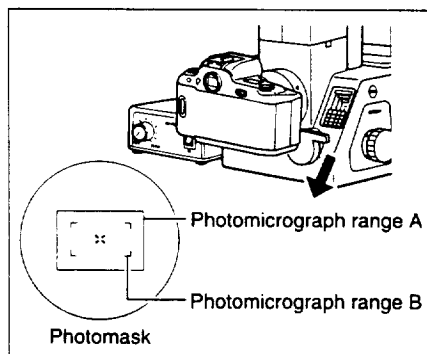
5

Compose the frame.

Turn down the reticle in/out lever to the right to bring the photomask into the optical path.
Move the stage to bring the subject into the frame that indicates the photomicrograph range. (See page 26.)

Photomicrograph range A: The photomicrograph range when a 35mm SLR camera is mounted on the front port

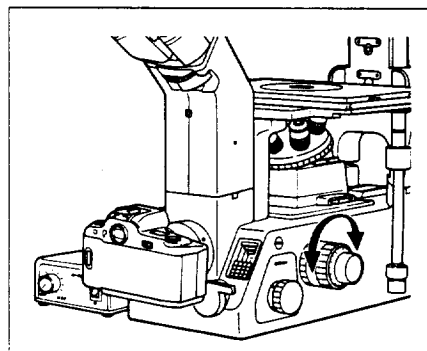
Photomicrograph range B: The photomicrograph range when a PLI 2.5x projection lens and a photomicrographic attachment are mounted on the side port.



6

Adjust the focus.

While observing through the eyepieces, focus on your specimen.

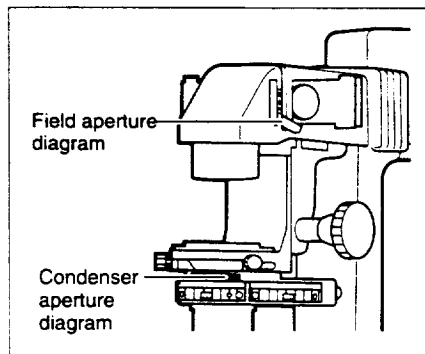


7

Adjust the diaphragm.

Stop down the field aperture diaphragm until it is slightly wider than the photomicrograph frame. (See page 30.)
Adjust contrast, depth of focus and resolution with the condenser aperture diaphragm. (See page 21.)

The aperture diaphragm should normally be set to 70 to 80% of the objective's numerical aperture.



8

Check the exposure time.

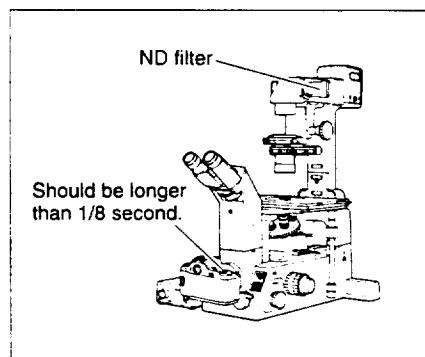
Check the exposure time displayed on the camera. Adjust the brightness so that the exposure time is longer than 1/8 of a second.

Color film

Adjust with the ND filters. (Keep the NCB11 filter in the optical path.)

Monochrome film

Adjust with the ND filters or by adjusting the light intensity control dial.

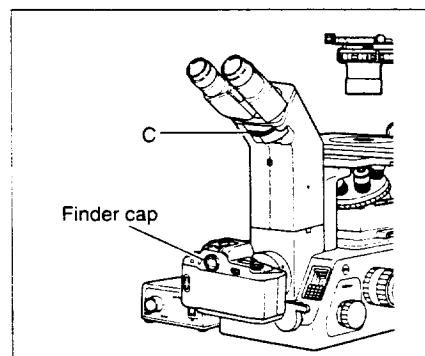


9

Prevent external light from coming in.

Set the turret assembly to C. (For TE-TL eyepiece tube only.) (Especially for long-time exposure.)
Fit the finder cap (option) to the camera finder.

Keep the finder cap on the finder except when the exposure time should be checked through the finder.

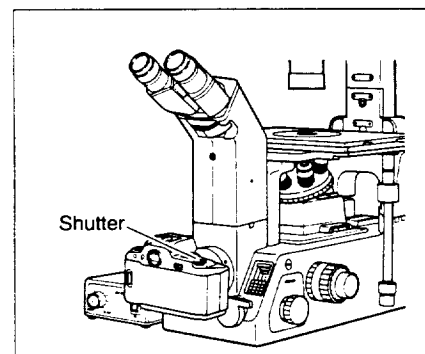


10

Press the shutter.

If using a cable release (option), press the release button.

If not using a cable release, using the camera's timer can eliminate the effects of vibration caused by pressing the shutter.



IV

OPERATIONS ON COMPONENTS



IV. OPERATIONS ON COMPONENTS

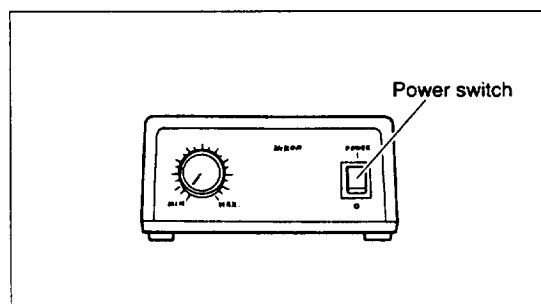
1 ON/OFF switching of power

WARNING

- Confirm that the voltage that you will be using matches the input voltage indicated on the rear panel of the power supply. If not the same, do not use the power supply, and notify your nearest Nikon representative.
- Only use the specified lamp (page 50). Using a larger lamp could damage the light intensity adjustment circuitry.
- Do not touch the lamphouse or place any heat-sensitive object near it, since the lamphouse becomes extremely hot during use. Also use great care not to bring volatile substances (such as gasoline, thinner, alcohol, etc.) close to the lamphouse. Such exposure may result in inflammation or other dangers.
- Be sure to carefully read and observe the  WARNING and  CAUTION sections listed at the beginning of this manual.

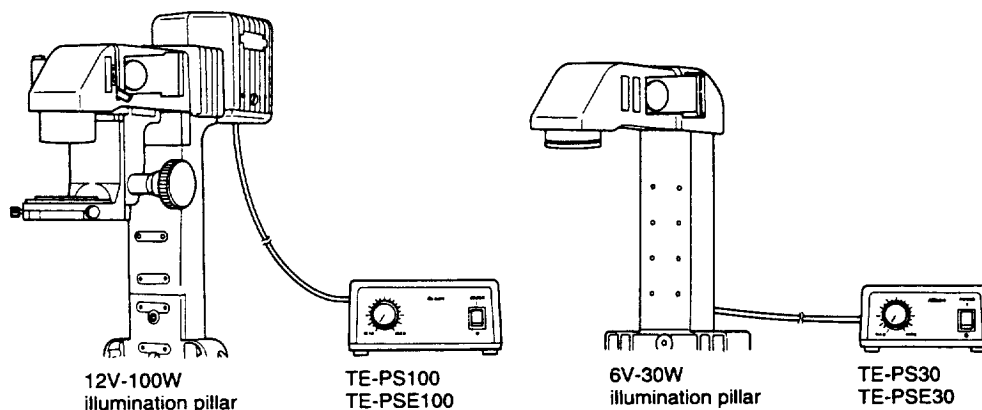
Connect the power supply and the lamphouse with the lamp cable (page 41).

To turn the power on, flip the power switch on the front of the power supply to the “I” side. (The switch lamp lights when the power is on.) To turn the power off, flip the power switch to the “O” side. (The switch lamp also goes out.)



Instead of the TE-PS100/TE-PSE100 power supply and the 12V-100W illumination pillar, it is also possible to use the TE-PS30/TE-PSE30 power supply together with the 6V-30W illumination pillar.

Note that the only the combinations of power supplies and illumination pillars shown below can be used.



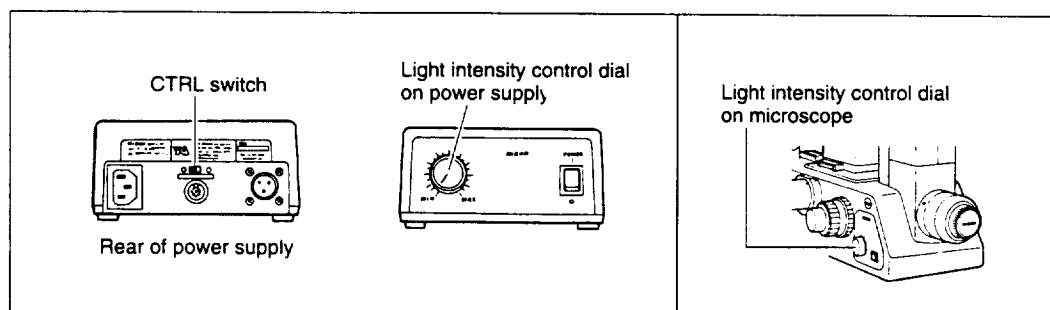
2 Adjusting Brightness

Adjust the lamp brightness through the lamp intensity control dial and the ND filters (dimming filters).

1) Adjusting the brightness with the lamp intensity control dial

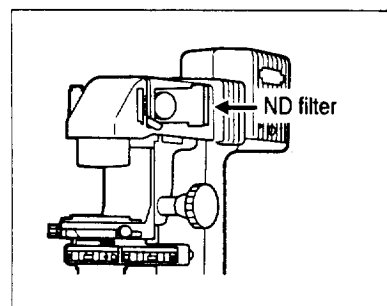
There are two light intensity control dials: one on the front of the power supply, and one on the left side of the microscope base. Either dial can be used to adjust the lamp brightness. If a control cable is connected between the microscope and the power supply and the CTRL switch on the rear of the power supply is turned ON, the brightness can be controlled with the lamp intensity control dial on the microscope. (In this case, the lamp intensity control dial on the power supply is disabled.)

- If the CTRL switch is OFF, the brightness can be adjusted through the lamp intensity control dial on the power supply. (In this case, the lamp intensity control dial on the microscope is disabled.)
- The lamp brightness on the scale for the lamp intensity control dial on the microscope may differ slightly from the lamp brightness for the lamp intensity control dial on the power supply.
- Turning the lamp intensity control dial changes the lamp voltage, and also changes the color temperature. Increasing the number on the lamp intensity control dial, the light becomes bluer. Decreasing the number on the lamp intensity control dial, the light becomes redder. When performing photomicrography with daylight-type color film, set the lamp intensity control dial in the range indicated by . The best color balance can be obtained by inserting an NCB11 filter into the optical path (page 20).
- When performing photomicrography with monochrome film, remove the NCB11 filter from the optical path. Good contrast is obtained by using a GIF.



2) Brightness adjustment with ND filters

Filters that control light quantity are called ND filters. An ND filter with a large number allows less light to pass and therefore produces a darker image. When performing photomicrography with color film, use ND filters to adjust the brightness rather than using the light intensity control dials. If the brightness is controlled with one of the light intensity control dials, the tint (color temperature) of the light source changes, affecting the colors produced in the final image. ND filters are to be attached to the filter slider at the diascopic illumination unit. (See page 38.)

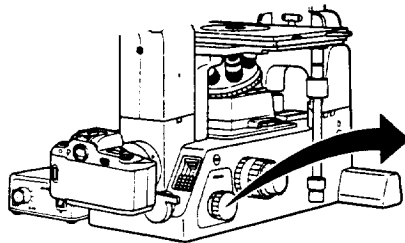


- ND2 : Reduces light quantity to 1/2. (Approx. 50% transmissivity)
 ND16: Reduces light quantity to 1/16. (Approx. 6% transmissivity)

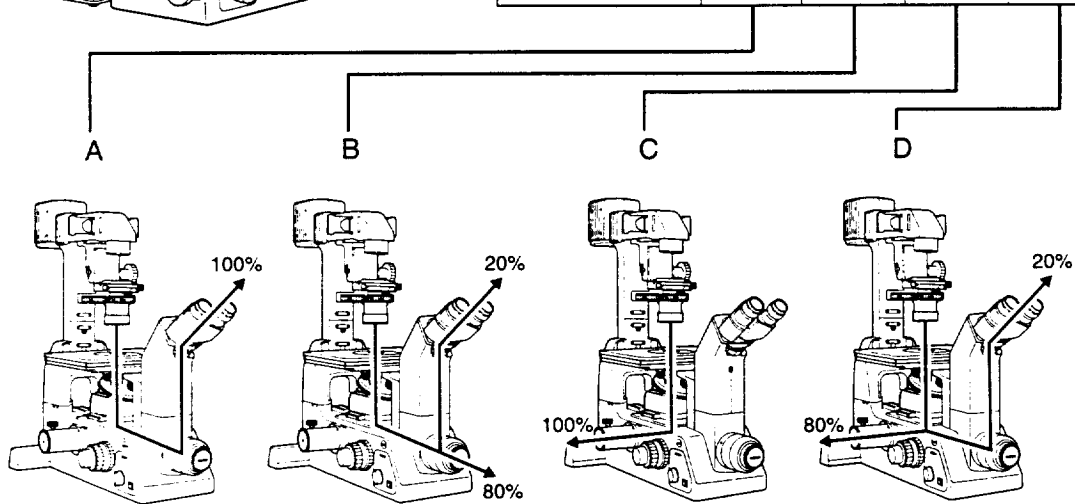
3 Changing Optical Paths

This microscope has three ports; the eyepiece tube port (circular dovetail groove) for mounting the eyepiece tube, the front port (F mount) for mounting a 35 mm SLR camera, and the side port (C mount) for mounting a photomicrographic equipment or any other devices. Use the optical path changeover dial on the right side of the microscope base to switch the optical paths between these ports.

- Only the front port has 2x intermediate magnification.
- The eyepiece tube for the upright type microscope (for infinite optical systems) and any other devices may be mounted on the eyepiece tube port by using the eyepiece tube bracket (option, for infinite optical systems). (For example, a teaching head or drawing tube may be mounted.)
- Various devices may be mounted to the side port. The mounting may be direct, or indirect via the C-mount TV adapter. (For example, a photomicrographic equipment, TV system, or photometry system may be mounted.)



Optical path \ Positions of dial	A	B	C	D
Eyepiece tube port	100%	20%	—	20%
Front port	—	80%	—	—
Side port	—	—	100%	80%



4 Filters

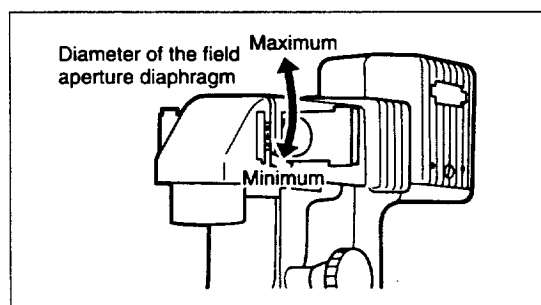
Set the appropriate filters in three filter sliders at the diascope illumination unit. (See page 38.)
The following filters are available.

- ND2 filter : For normal microscopy and for brightness adjustment in photomicrography.
Reduces light quantity to 1/2. (Approx. 50% transmissivity)
- ND16 filter : For normal microscopy and for brightness adjustment in photomicrography.
Reduces light quantity to 1/16. (Approx. 6% transmissivity)
- NCB11 filter : For normal microscopy and for correcting the color temperature in color photomicrography (day light type).
Color reproduction is optimized when an NCB11 filter is inserted into the optical path and the lamp intensity control dial is set to the $\frac{12V}{100W}$ position. (If using the TE-PS30/TE-PSE30 power supply, color reproduction is optimized when the lamp intensity control dial is set to the $\frac{6V}{30W}$ position.) (The colors that are produced may vary slightly, depending on the brand of film.)
The NCB11 filter should be kept away from the optical path when making photomicrography with tungsten type color film or monochrome film.
- GIF : Green interference filter.
For microscopy with monochromatic light and for improving the contrast in monochrome photomicrography.
- Heat insulation filter : For reducing the influences of heat rays in the illumination light on the sample.
Use the heat insulation filter for a sample quite sensitive to heat, though the microscope has a built-in heat insulation filter.

5 Field Aperture Diaphragm

The field aperture diaphragm restricts the illumination on a specimen to an observation area. The diameter of the field aperture diaphragm is maximized by setting the field aperture diaphragm lever to the top position.

For general use, the diaphragm is set slightly larger (or smaller) than the viewfield. Too wide an illuminated area gives off stray light, which causes flares, resulting in reduced image contrast. Therefore, for photomicrography in particular, correctly adjusting the field aperture diaphragm is very important. The best results can be obtained by stopping down the diaphragm so that it is just slightly wider than the area that is imaged on the film, that is, the photomicrograph range. (Note that stopping down the diaphragm too far causes vignetting.)



6 Condenser Aperture Diaphragm

The condenser aperture diaphragm adjusts the numerical aperture (N.A.) of the illumination system. Aperture of this diaphragm determines optical resolution, brightness, contrast, and depth of focus. Narrowing down the condenser aperture diaphragm decreases resolution and brightness, and increases contrast and depth of focus. Because these characteristics are interrelated and cannot be controlled one by one, the aperture must be adjusted for each specimen and application.

Adjustment of the condenser aperture diaphragm is especially important for bright-field microscopy, differential interference contrast microscopy, and photomicrography. Generally, aperture settings of 70 to 80% of the objective N.A. yield good images of appropriate contrast.

Adjust the aperture of the diaphragm while observing the diaphragm image through the eyepieces. Leftward rotation of the condenser aperture diaphragm lever stops down the diaphragm. Rightward rotation opens it.

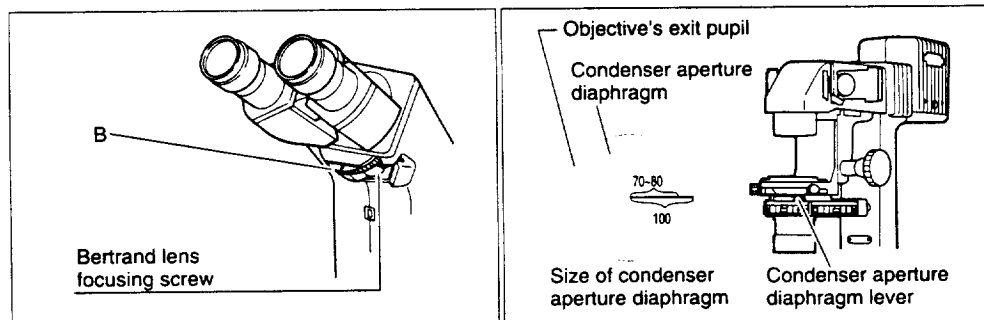
For TE-TL eyepiece tube:

Set the turret assembly to B to bring the Bertrand lens into the optical path, then adjust the focus with the Bertrand lens focusing screw. The images of the objective's exit pupil (bright circle) and the condenser aperture diaphragm become visible. (If the image of the condenser aperture diaphragm is not seen, stop down the condenser aperture diaphragm further.) While observing these images, adjust the condenser aperture diaphragm lever until the aperture of the diaphragm reaches 70 to 80% of the exit pupil of the objective.

For TE-TS eyepiece tube:

Remove one eyepiece, then insert the centering telescope. Hold the flange of the centering telescope with one hand and rotate its eyepiece for focusing. The images of the objective's exit pupil (bright circle) and the condenser aperture diaphragm become visible. (If the image of the condenser aperture diaphragm is not seen, stop down the condenser aperture diaphragm further.) While observing these images, adjust the condenser aperture diaphragm lever until the aperture of the diaphragm reaches 70 to 80% of the exit pupil of the objective.

- Be sure to keep the condenser aperture diaphragm fully opened when the system condenser turret unit is used for phase contrast microscopy. (With the condenser aperture diaphragm stopped down, the optical path is blocked.)
- Since the condenser aperture diaphragm of the ELWD-S condenser is independent from annular diaphragm, its size will not have any effect on the annular diaphragm.



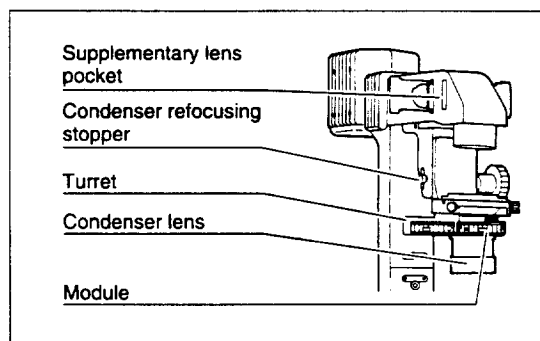
7 System Condenser

A condenser has dual functions. It condenses light, and provides the condensed light with optical elements to enable various types of microscopic applications. Traditional microscopes require condensers to be changed according to microscopic applications; for example, a phase contrast condenser for phase contrast microscopy, and a differential interference contrast condenser for differential interference contrast microscopy.

The system condenser of this microscope features modules that contain the optical elements; up to five modules can be incorporated into the unit. As a result, the user needs only to rotate the turret in order to execute various microscopic applications, without changing condensers.

Modules may be replaced without dismounting the condenser turret unit from the microscope, enabling several microscopic applications to be executed for a short period of time.

- Modules may be arranged freely in the turret unit if they are applicable to the condenser lens in use.
- For phase contrast microscopy, select the module having the same Ph code as marked on the objective. Bring it into the optical path and center the annular diaphragm. (See page 10.)
- Be sure to keep the condenser aperture diaphragm fully opened when the system condenser is used for phase contrast microscopy. (With the condenser aperture diaphragm stopped down, the optical path is blocked.)



- **LWD condenser lens**

This condenser lens features a long working distance (30 mm), with N.A. of 0.52.

It is capable of phase contrast, differential interference contrast, and bright-field microscopy applications.

The condenser lens is used with its supplementary lens installed in the pocket at the diascope illumination unit.

The condenser refocusing clamp can be used. (See page 30.)

The following modules can be used with this condenser:

For phase contrast microscopy: PhL, Ph1, Ph2, Ph3

For differential interference contrast microscopy: DIC0.5 (NL), DIC0.5-1.0 (NM), DIC1.0-1.4 (NH)

For HMC microscopy: MC1, MC2, MC3

For bright-field microscopy: A

Be sure to set the supplementary lens in the pocket at the diascope illumination unit for maximum performance.

- **ELWD condenser lens**

This condenser lens features a very long working distance (75 mm), with N.A. of 0.3.

It is capable of phase contrast, differential interference contrast, and bright-field microscopy applications.

The following modules can be used with this condenser:

For phase contrast microscopy: PhL, Ph1, Ph2

For differential interference contrast microscopy: DIC0.5 (NL)

For bright-field microscopy: A

Check whether supplementary lens of the LWD condenser is not left in the pocket at the diascope illumination unit. If it is left, replace it with a hollow slider.

8 Objective

1) Ph Codes

Each phase contrast objective is labeled with a Ph code: PhL, Ph1, Ph2, or Ph3.

For phase contrast microscopy, be sure to use the annular diaphragm or module that has the same Ph code as the objective, regardless of the magnification of the objective.

2) Objective with correction ring

An inverted microscope is frequently used to observe specimens through the bottom plate (made of glass or plastic) of a laboratory dish or culture bottle. For such applications, the normal objectives (for 0.17 mm thick cover glass) may not provide clear images, disabling the microscope from demonstrating its full performances. In such cases, use an objective with a correction ring to compensate for bottom plate thickness.

The objectives with correction rings are not intended to compensate for wedge-like changes of thickness at edges of a container. We recommend that they should be used for compensation for even thickness.

- Adjusting the correction ring
 - (1) Adjust the scale of the correction ring to the thickness of the bottom plate of the container. This thickness should be a measured value or the value stated by the container manufacturer.
 - (2) Focus on the specimen with the coaxial coarse/fine focusing knob.
 - (3) Rotate the correction ring clockwise or counterclockwise slightly if the image has poor resolution and/or contrast. When the correction ring is rotated, the specimen image becomes slightly out of focus. Adjust the focus again with the fine focusing knob.
 - (4) If the resolution and contrast are improved, rotate the correction ring further in the same direction, then adjust the focus again.

If the resolution and contrast are deteriorated, rotate the correction ring in the reverse direction by the amount about double the previous turn, then adjust the focus.

In this way, rotate the correction ring in the same direction if a better image is obtained, or rotate it in the reverse direction if a poor image is obtained. Repeat this operation to find the best point.

The 0 mm position of the correction ring is used for microscopy of a specimen with no cover glass on an upright type microscope.

We recommend that you take a note of the reading of a well-visible position on the correction ring. Your note should help when you later use containers having different bottom plate thickness.

The glass stage ring (option) is available to improve working efficiency, since it enables the part of operation to be seen from above the stage.

3) Cover glass thickness

A specified cover glass thickness is indicated on each objective. ("∞ /0.17" indicates a cover glass thickness of 0.17mm.)

For an objective with a 0.17 mark, place a specimen so that its cover glass (0.17 mm thick) faces the objective. (For an inverted microscope, set a specimen so that its cover glass faces down.) For an objective with a 1.2 mark, place a specimen so that its slide glass faces the objective, because the normal slide glass thickness is 1.2 mm. (For an inverted microscope, set a specimen so that its cover glass faces up.)

When you observe a specimen in a laboratory dish or the like at high magnification through a glass not conforming to the specified thickness, we recommend use of an objective that has a correction ring capable of correcting the glass thickness error.

4) Oil immersion objective

The objective marked with "Oil" is an oil immersion objective.

Before using the oil immersion objective, be sure to immerse the space between the end of the objective and the specimen, with the supplied oil (Nikon immersion oil). When you carry out fluorescent microscopy using the oil immersion objective for fluorescent microscopy, use the non-fluorescent oil (option).

Use care to keep out air bubbles from the oil, since they will deteriorate visibility of images. Air bubbles may be found by observing the exit pupil (bright circle) of the objective. (If the TE-TL eyepiece tube is used, the exit pupil of the objective can be observed by setting the turret to B, bringing the Bertrand lens into the optical path, and adjusting the focus with the Bertrand lens focusing screw. If the TE-TS eyepiece tube is used, the exit pupil can be observed by removing the eyepiece, inserting the centering telescope instead, and rotating the eyepiece into focus while holding the flange in place.)

To remove air bubbles, rotate the revolving nosepiece slightly, and move the oil-immersed objective back and forth once or twice. Or, wipe the oil off, then reapply oil to the objective.

If excessive oil is applied, surplus oil flows out and adheres to the stage or other component. Use a minimum necessary amount of oil (enough to fill the space between the end of the objective and the specimen). Use care not to put oil to any other components.

If oil remains on the oil immersion objective or adheres to the surface of a dry objective, it will greatly reduce image visibility. After use, thoroughly wipe the oil off the objective surface. Also make sure that no oil has spread to the surfaces of other objectives.

To remove oil, moisten a lens tissue or clean cloth with petroleum benzine and lightly wipe the lens surface a few times. Use a fresh part of a lens tissue every time. For best results, wipe last with absolute alcohol (ethyl or methyl alcohol).

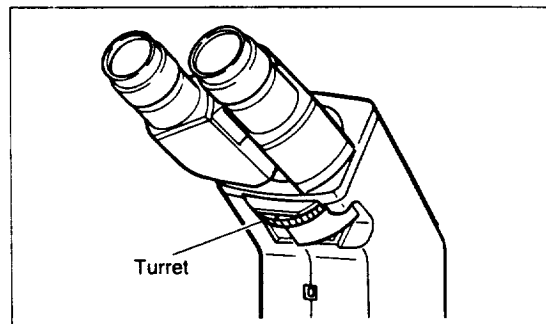
If you cannot obtain petroleum benzine, use methyl alcohol. Because methyl alcohol is a weaker cleaning agent, you will need to wipe the surface repeatedly. (Usually, three or four wipes are adequate to clean the surface.)

Absolute alcohol and petroleum benzine are quite inflammable. Use great care when handling them and when setting the power switch on and off. Be very careful with fire.

9 Turret (For TE-TL eyepiece tube only)

The turret assembly has four positions, O, B, C and M. Use them selectively. Use position O for normal microscopy.

- O: The optical path becomes hollow.
- B: The Bertrand lens enters the optical path, enabling you to observe the exit pupil of the objective. Thus, this position allows centering of the phase contrast annular diaphragm and aperture adjustment of the condenser aperture diaphragm. Use the Bertrand lens focusing screw for focusing. When setting the manipulator, you can observe the edge of manipulator above the objective.
- C: The light blocking plate enters the optical path, shielding the external light from the eyepiece. This position is used for photomicrography.
- M: The magnifier lens enters the optical path, applying the 2.5x intermediate magnification to the observation system. This position is used for observation at slightly higher magnification, or for focusing in photomicrography using the 4x - 20x objective.



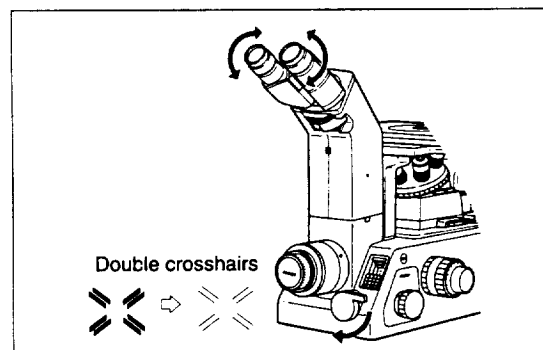
10 Diopter Adjustment

Turn down the reticle in/out lever on the front panel of the microscope to the right to put the photomask into the optical path.

While looking through the right-hand eyepiece with the right eye, rotate the diopter adjustment ring on the eyepiece to bring the double crosshairs of the photomask into sharp focus.

Then, look through the left-hand eyepiece with the left eye and carry on the same adjustment.

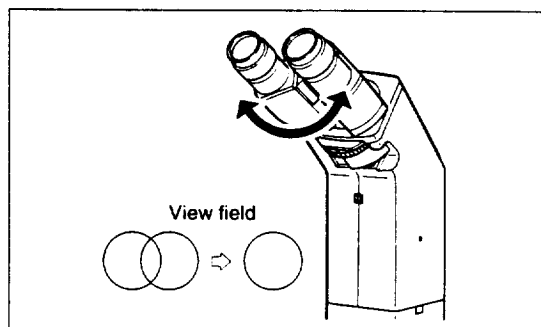
These adjustments correct dioptric difference of the right and left eyes, facilitating observation with both eyes, and reducing the defocusing when changing the objectives.



11 Adjusting Interpupillary Distance

Before adjusting the interpupillary distance, carry out steps 1 to 8 in Section "II. MICROSCOPY" (page 4.) to bring a specimen into focus using the 10x objective.

Adjust the interpupillary distance until the viewfields overlap into one. Once the adjustment is complete, the microscope provides comfortable observation with both eyes.



12 Photomask

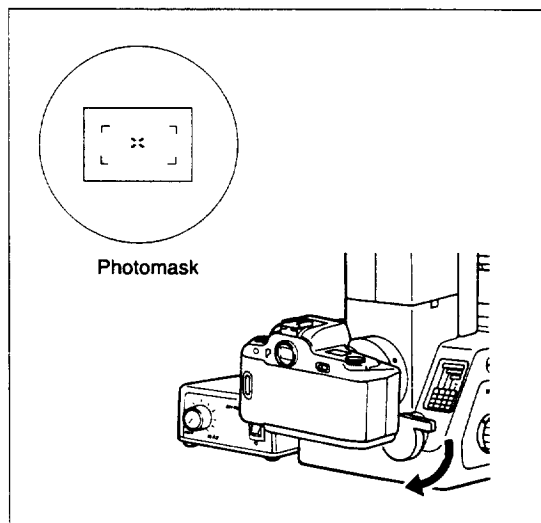
The photomask of the pattern shown in the figure is put into the optical path by turning down the reticle in/out lever on the front panel of the microscope to the right. This photomask is used for trimming and focusing in photomicrography, and diopter adjustment of the eyepieces.

Rectangular frame: The rectangular frame shows the photomicrography range of a 35 mm SLR camera.

Brackets: The brackets show the photomicrograph range when using a PLI 2.5x projection lens and a photomicrographic equipment.

If a projection lens of another magnification is used, determine the photomicrograph range in the finder on the photomicrographic equipment. The photomicrographic equipment can be mounted on the side port or on the eyepiece tube port. To mount the photomicrographic equipment on the eyepiece tube port, mount it via the eyepiece tube bracket and the triocular eyepiece tube for upright type microscopes.

Double crosshairs: The double crosshairs are used for diopter adjustment of the eyepieces.



Note that when using an SLR camera that carries the  Advanced Photo System logo, the size of the photomicrograph range is smaller than that of a normal 35mm SLR camera.

13 Eyepiece Tube

1) Height adjustment (For TE-TL eyepiece tube only.)

When adjusting the height of the eyepieces, be sure to hold the eyepiece tube by hand. The eyepiece tube gets damaged if it is dropped.

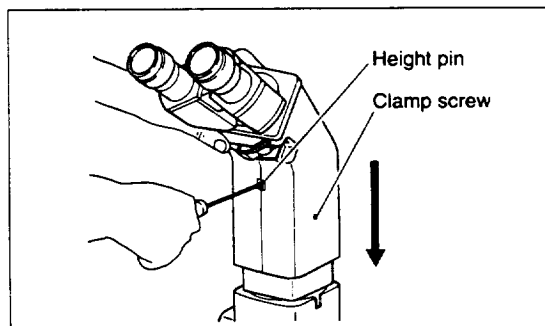
The eyepieces may be adjusted in five heights. (Adjustable range: 30 mm above the reference position)

Loose the clamp screw on the right side of the eyepiece tube, then extend the eyepieces to a desired height.

If the eyepieces are drawn too high, hold the eyepiece tube by hand, and lightly press with a hexagonal screwdriver, the height pin which is located inside the hole of the front of the tube. By doing this, lower the eyepiece tube.

Be sure to hold the eyepiece tube by hand, since otherwise the eyepiece tube may drop and get damaged.

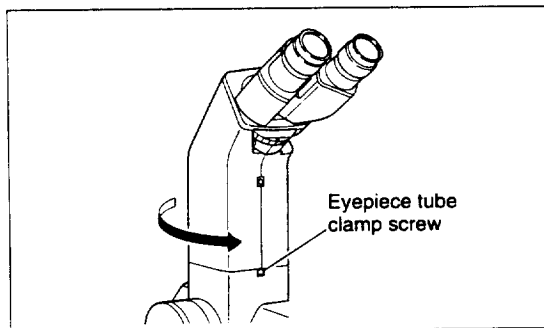
After the adjustment is complete, tighten the clamp screw.



2) Removing and turning the eyepiece tube

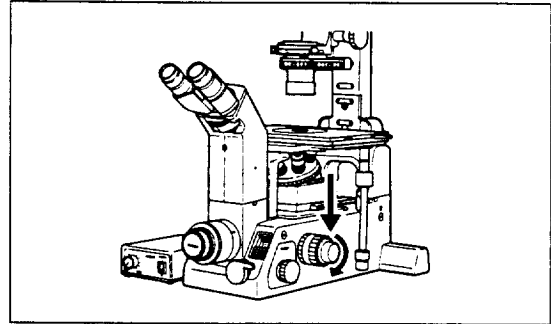
The mounting direction of the eyepiece tube may be changed by loosening the eyepiece tube clamp screw with a hexagonal screwdriver. The eyepiece tube may be fixed at a 90-degree position to use the microscope turned sideways.

If the eyepiece tube is removed and the eyepiece tube bracket (option, for infinite optical systems) is mounted in its place, it becomes possible to mount an upright type microscope eyepiece tube for infinite optical systems, and other devices (such as a teaching head or drawing tube).



14 Focusing Device

The arrows in the figure below show the directions in which you rotate the coaxial coarse/fine focusing knob to move the objectives.



The following shows the relationship between rotation of the knobs and movement of objective:

One scale division on the fine focusing knob gives $1\mu\text{m}$ of objective movement.

One rotation of the fine focusing knob gives 0.1 mm of objective movement.

One rotation of the coarse focusing knob gives 4 mm of objective movement.

The coarse/fine focusing knobs provide a 7-mm upward stroke and 3-mm downward stroke from the reference position.

Counterclockwise rotation of the torque adjustment ring on the right handle increases rotary resistance of the coarse/fine focusing knob.

- Never turn the right and left knobs of the microscope base in the opposite directions at the same time. Failure may result.
- Once the coarse focusing knob has reached its limit, do not force the knob beyond the limit. Failure may result.

15 Refocusing Stopper

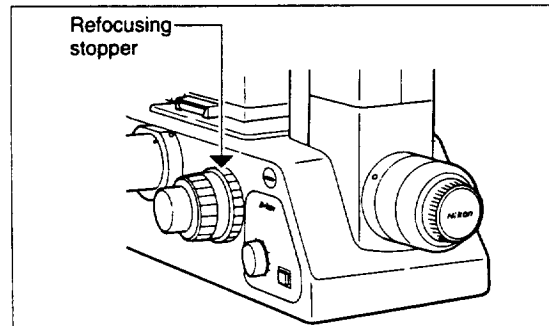
The refocusing stopper on the left-hand coaxial coarse/fine focusing knob is used to mark the position of the coarse focusing knob where a specimen is in focus.

Once the refocusing stopper is clamped at the in-focus position, refocusing is much easier after the objective is shifted for specimen change or other purpose. All you have to do for refocusing is rotate the coarse focusing knob until it reaches the limit.

The refocusing stopper is useful, for example, if the objective is very close to the stage because the container of the specimen has a thick bottom plate, and the magnification can only be changed by lowering the objective.

- (1) At the position where a specimen is in focus, turn the refocusing stopper clamp ring to clamp the stopper. The stopper has been clamped when the black triangle mark on the side of the clamp ring is at the upmost position.
- (2) Lower the focusing mechanism by using the coarse focusing knob only, then change the objective.
- (3) Raise the focusing mechanism slowly, again by using the coarse focusing knob only, until it reaches the limit. Here, the microscope is roughly in focus. Then, rotate the fine focusing knob to give a sharp focus.

When the refocusing stopper is not used, be sure to loosen the clamp until it reaches the limit. If clamped, the focusing mechanism cannot be moved up from the clamped position with the coarse focusing knob. However, stage movement with the fine focusing knob is not affected.



16 Handling Condenser Holder

1) Condenser refocusing stopper (Applicable only when using the LWD condenser lens.)

The condenser refocusing stopper is used to mark the position of the condenser where the image of the field aperture diaphragm is in focus on the specimen surface.

This stopper works in the range 13 mm above and 3 mm below the stage top surface.

The condenser refocusing stopper is very useful since it allows the condenser to be easily returned to the previous position even if it has moved up for specimen replacement. Use this stopper when the incubator (option) is used or when the pillar cannot be tilted.

Usage: Rotate the condenser refocusing stopper in the clockwise direction and clamp it at the position where the image of the field aperture diaphragm is focused on the specimen surface. Then, if the condenser is moved up temporarily for specimen replacement, just lower it to the limit. The condenser is back at the focus position where it was.

2) Rotating the condenser mount

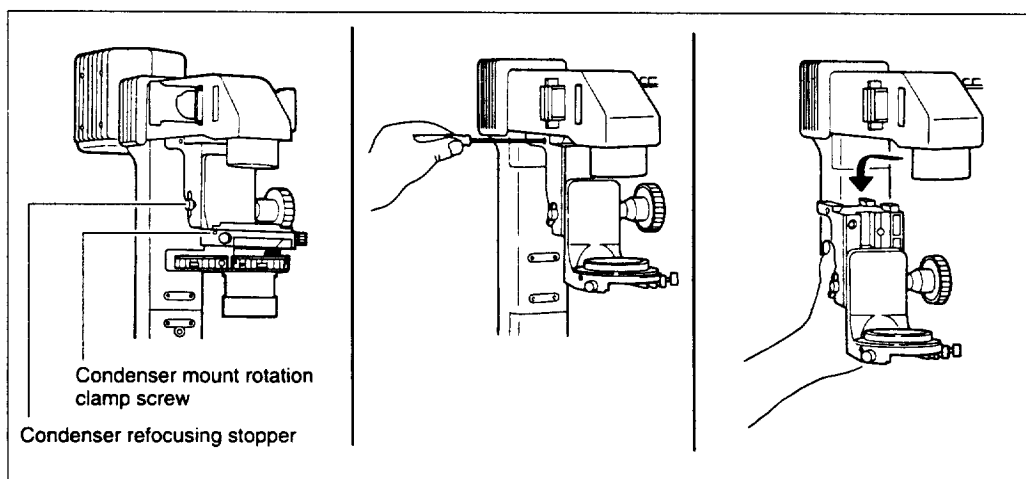
To rotate the condenser mount, loosen the condenser mount rotation clamp screw.

Rotate the condenser mount for differential interference contrast microscopy or when adjusting the turret orientation.

If the system condenser is used, and the condenser holder is not fitted with a polarizer (in bright-field or phase contrast microscopy), the turret may be turned to the right or left and fixed using this function. The free space created this way may be available for mounting a manipulator, etc. (See page 31.)

3) Removing the condenser holder

The condenser holder may be removed from the diascope illumination unit.



17 Illumination Pillar

1) Tilting the pillar

The illumination pillar may be tilted to provide a wider operation space, which is useful to change large-size specimens.

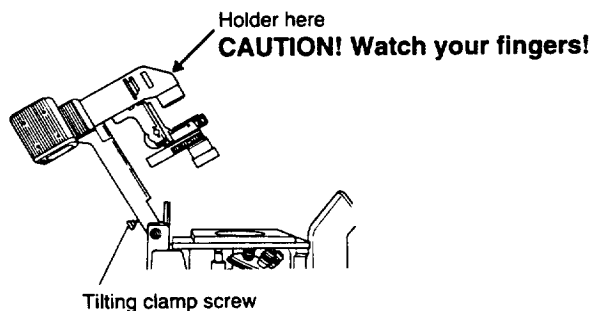
As shown in the figure below, rotate and unlock the clamp screw on the rear of the pillar, hold the front of the diascope illumination unit (shown by arrow in the figure), and gently tilt the pillar toward the back.

Usually, the tilting clamp screw may be left unlocked.

But when relatively heavy attachments is attached to the pillar, the tilting clamp screw should be locked to avoid the pillar from accidentally tilting.

CAUTION

- Be careful not to get your fingers caught by the openings on the pillar when tilting it.
- Be sure to clamp the screws tightly when attaching the relatively heavy attachments such as optional high intensity light source. If not, they may drop when the pillar is tilted.
- When using the optional high intensity light source, be sure to check if the light source and the adapter are clamped tightly before tilting the pillar. (To avoid the drop.)

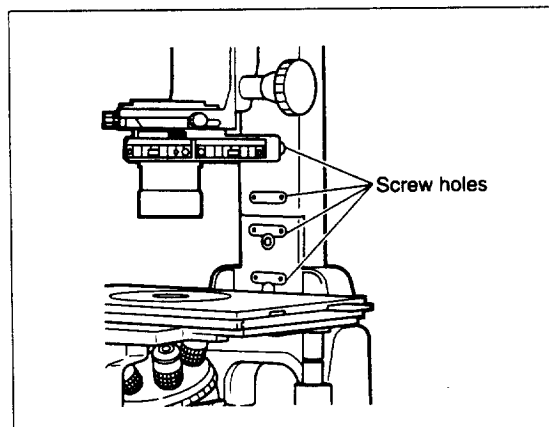


2) Screw holes for mounting various devices

The front surface of the pillar has eight M4 tapped holes for mounting a manipulator or other devices.

The upper four holes are used to mount a device, which should be removed from above the stage when tilting the pillar.

The lower four holes are used to mount a device, which should remain above the stage when tilting the pillar.



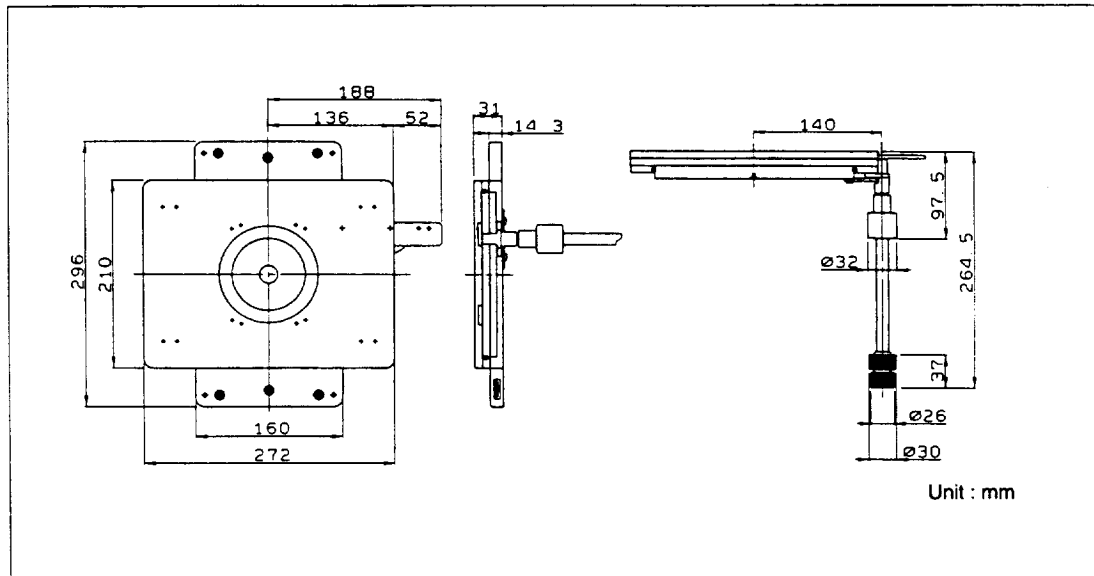
18 Rectangular Mechanical Stage

This stage has a handle with a universal joint, which enables the handle angle to be changed for smooth movement of the hand between the coaxial coarse/line focusing knob and the handle on this stage. Normally, this stage is installed so that its handle is at the rear right. (See page 37.) The stage may also be installed in the diagonally opposite position, with the handle at the front left.

The stage has tapped holes in the top and bottom plates for mounting a manipulator or other experimental devices. The tapped holes in the bottom plate are used to mount a heat incubator. For the positions of these holes, see the figure below.

Two types of stage rings are available: 20 mm dia. and 40 mm dia. Use them selectively according to the sizes of specimen containers.

If the revolving nosepiece is rotated while the stage has been moved significantly out of observation range (when using a 40mm stage ring), the objective may strike the bottom of the stage. In this case, lower the revolving nosepiece as far as it will go before changing objectives.



⚠ CAUTION

The stage rack protrudes during operation. When operating the focusing knobs or the revolving nosepiece, be careful not to graze your hand on the end of the rack.

19 Photomicrography

1) Checking before photomicrography

Before starting photomicrography, ensure the following:

- (1) Eliminate illumination unevenness.

Make sure that:

- The condenser is centered. (See page 8.)
- The condenser annular diaphragm is centered (for phase contrast microscopy). (See page 10.)
- The aperture of the condenser aperture diaphragm is proper. (Normally 70 to 80% of objective's N.A.). (See page 21.) (Fully opened for phase contrast microscopy.)
- The field aperture diaphragm is stopped down to a range slightly larger than the photomicrography frame. (See page 20.)

- (2) Set the lamp brightness (lamp voltage) and filter properly. (See page 18.)

	Lamp voltage	Filter
Daylight type color film		Put NCB11 into optical path.
Tungsten type color film	8	Remove NCB11.
Monochrome film	6 or more	Remove NCB11.

Use color compensation (CC) filters obtainable on the market if necessary.

- (3) Focus the microscope properly. (See page 33.)
- (4) Prevent external light from entering. (See page 15.)

2) Relationship between photomask and photomicrography range

- (1) 35 mm SLR camera (on front port)

The rectangular frame of the photomask shows the range of photomicrography.

The magnification on the film surface is the objective's magnification multiplied by 2.0 (the intermediate magnification of the microscope).

If higher magnification is needed, use the conversion lens CL2x (option). Note that a magnification obtained by using an objective only is better in resolution than the same magnification obtained by combining a conversion lens with an objective.

When using an SLR camera that carries the  Advanced Photo System (APS) logo, the magnification is higher and the size of the photomicrography range is smaller than that of a normal 35mm SLR camera.

- (2) Photomicrographic equipment

The square brackets in the photomask show the photomicrography range when using a PLI 2.5x projection lens. If using a projection lens of a different magnification, or if it is necessary to precisely determine the photomicrography range, determine the photomicrography range by looking through the finder of the photomicrographic equipment. (Refer to the manual of the photomicrographic equipment.)

3) Focusing in photomicrography

On photomicrography, it is especially important to obtain appropriate illumination and focus the microscope properly.

Focusing for photomicrography is carried out through the eyepieces with the photomask built in the microscope. This applies regardless of whether the photomicrography uses a 35 mm SLR camera or a photomicrographic equipment.

- (1) Turn the reticle in/out lever to the right to bring the photomask into the optical path.
- (2) Set the turret assembly to O. (For TE-TL eyepiece tube only) Rotate the diopter adjustment rings of the right and left eyepieces to focus on the double crosshairs in the photomask. (See page 25.)
- (3) Use the optical path changeover dial to direct the optical path to the port on which the camera (or the photomicrographic equipment) is mounted.

Front port: B

Side port: C or D

- (4) Use the coaxial coarse/fine focusing knob to bring the specimen into focus.

- **When using high-powered objectives (40x or more)**

Rotate the fine focusing knob slowly until both the double crosshairs and specimen image are clearly seen.

- **When using low-powered objectives (4x to 20x)**

For TE-TL eyepiece tube:

Use the coarse focusing knob to obtain focus. Set the turret to M (to bring the magnifier (2.5x) into the optical path) to multiply the observing magnification. (The use of the magnifier has no influence on the photomicrography optical path.) Rotate the fine focusing knob until both the double crosshairs and the specimen image are clearly seen. (Once the magnifier is brought into the optical path, do not make any diopter adjustments on the eyepieces.)

For TE-TS eyepiece tube:

Use the finder of the photomicrographic attachment, as the eyepieces are incapable of focusing at low magnification.

Mount the focusing telescope on the finder, and while looking through it, move the focusing telescope back and forth until the double crosshairs are clearly seen. Then, rotate the fine focusing knob to bring the double crosshairs and specimen image into sharp focus.

- (5) If a objective with a correction ring is used, make sure that the correction ring is properly adjusted. (See page 23.)

4) Precautions on photomicrography

(1) 35 mm SLR camera

- Adjust the brightness with the ND filter so that the exposure time (shutter speed) is longer (slower) than 1/8 second. When using monochrome film, the light intensity control dials can also be used to adjust the brightness.
- When taking photomicrograph with 35mm SLR camera attached to the front port, make +1/3 to +2/3 exposure compensation (over exposure) on the camera for the best results.
- To prevent external light from entering, be sure to keep the finder cap (option) on the viewfinder eyepiece of the camera. The finder cap may only be removed when your camera displays exposure time in the viewfinder and you want to check exposure time.
- If the shutter is to be pressed with your eye kept away from the microscope eyepiece, as in the case of long-time exposure, set the turret assembly to C to prevent external light from entering through the eyepiece. (For TE-TL eyepiece tube only.)
- Even if all microscope components are adjusted properly, the view field looked through the camera's eyepiece is vignetted. This has no influences upon photomicrography, however.
- If not using a cable release, using the camera's timer to eliminate the effects of vibration caused by pressing the shutter is recommended.

When using an SLR camera that carries the  Advanced Photo System (APS) logo, note that the size of the photomicrograph range is smaller than that of a normal 35mm SLR camera.

(2) Photomicrographic equipment

- If the shutter is to be pressed with your eye kept away from the microscope eyepiece as in the case of long-time exposure, set the turret assembly to C to prevent external light from entering through the eyepiece. (For TE-TL eyepiece tube only.)
- For details of photomicrographic operations, refer to the instruction manual of the photomicrographic equipment.
- If a photomicrographic equipment with a Polaroid or 35 mm dark box is mounted on the side port, its cover will not open fully. Do not attempt to force the cover full open.

5) When using Nikon F-90

Use Nikon F-90 with the following settings. Please refer to the instruction manual supplied with the camera for the details.

(1) Standard setting

Focusing	M (manual focus)
Exposure mode	A (aperture-priority auto)
Exposure metering system	 (matrix metering)
Film advance mode	S (single-frame shooting)
Film speed	DX-coded films: DX (automatic film speed setting) non-DX-coded films: M (manual speed setting)

(2) To get proper exposure on a certain object

Exposure metering system	 (center-weighted metering) or  (spot metering)
--------------------------	--

Refer to the instruction manual of the F-90 for the area to be metered.

(3) To make long exposure

Exposure mode	M (manual)
Shutter speed	"bulb"

(4) Self-timer operation

While pressing  button, rotate command dial until desired timer duration appears on the LCD panel.



V

ASSEMBLY

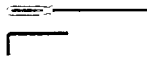


V. ASSEMBLY

Tools required:

Supplied hexagonal screwdriver x2

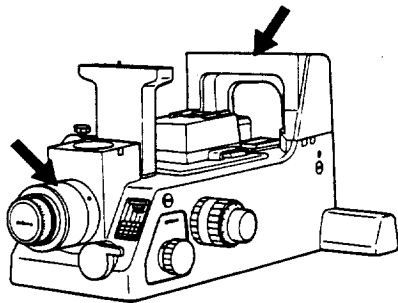
Hexagonal wrench x1



1. Installing the base

Take the base out of the package, and place it on a stable surface. Be sure to firmly hold the portions shown in the figure below because the base is heavy.

- Leave a space of approx. 20 cm between the base and the nearby wall to allow the user to look at the warning labels on the lamphouse.
- Because the illumination pillar can be tilted backwards to permit the switching of large specimens, the microscope should be set up so that it has approximately 40cm of clearance behind it.

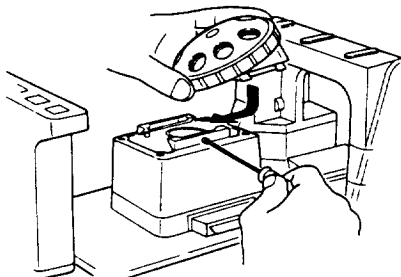


2. Mounting the revolving nosepiece

Install the revolving nosepiece in the dovetail mount of the focusing mechanism in the center of the base.

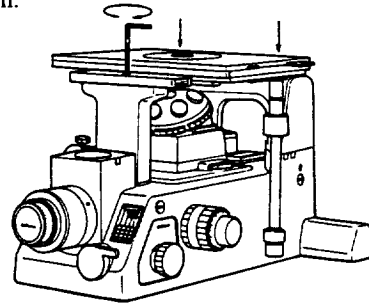
Loosen the revolving nosepiece clamp screw with a hexagonal screwdriver. Align the notches on the revolving nosepiece and the dovetail mount, and slide the revolving nosepiece into place.

Tighten the clamp screw to secure the nosepiece.



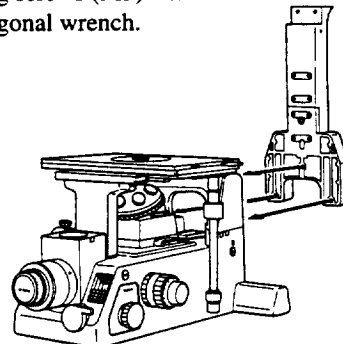
3. Installing the stage

Place the stage onto the pedestal on the base so that the handle is located at the rear right or front left. Secure the stage by tightening the three stage clamp screws (M5 hexagonal socket head screws) with the hexagonal wrench.



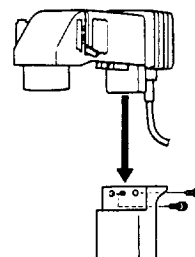
4. Installing the illumination pillar

Mount the illumination pillar on the pedestal at the rear of the base. Then secure the pillar by tightening the three illumination pillar fixing screws (M5) with the hexagonal wrench.



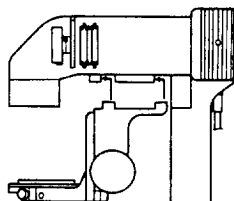
5. Installing the diascopic illumination unit

Place the diascopic illumination unit on top of the illumination pillar. Secure the unit by tightening its two screws (M5) with the hexagonal wrench.



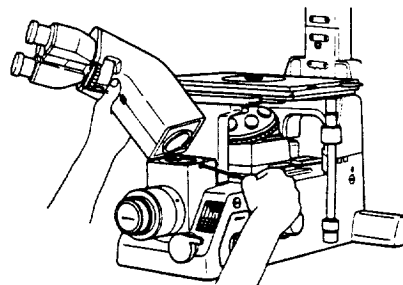
6. Mounting the condenser holder

Align the dovetail groove on the condenser holder with the notched portion of the dovetail groove on the diascope illumination unit, and then slide the condenser holder forward. Tighten the clamp screw to secure the condenser holder.



8. Mounting the eyepiece tube

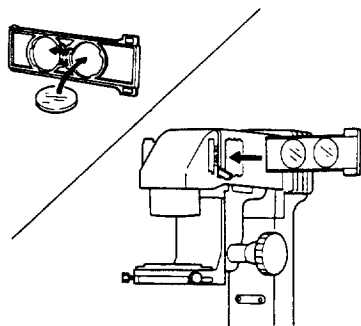
Loosen the eyepiece tube clamp screw of the eyepiece port (dovetail mount) at the front of the base, using the hexagonal screwdriver. Tilt the eyepiece tube slightly and attach it to the dovetail mount, and tighten the clamp screw to secure the eyepiece tube.



7. Setting the 33 mm filter (GIF, NCB11, ND2, ND16 or heat insulation filter)

Remove the filter slider from the diascope illumination unit. As shown in the figure below, push aside the claw and set the 33 mm filter in the filter slider.

When setting or removing the filter from the filter slider, wear gloves or use gauze to avoid the direct touch by your fingers.

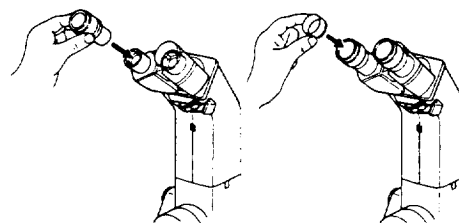


9. Mounting the eyepieces

The right and left eyepieces must be of the same magnification.

Remove the dust caps from the eyepiece sleeves. Insert the eyepieces into the eyepiece sleeves by fitting their three grooves with the three projections on each sleeve.

If the rubber eye guards (option) are to be used, fit them over the eyepieces.

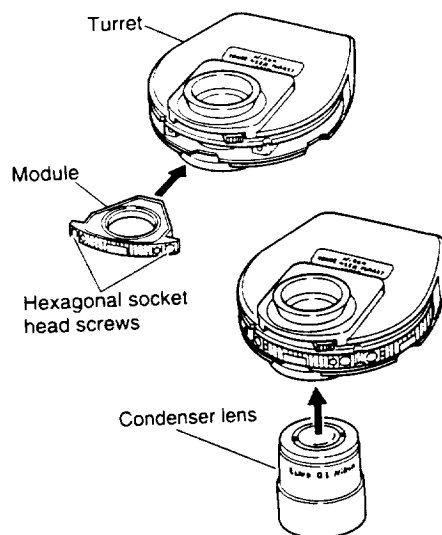


10. Mounting the condenser

Mounting the system condenser

First assemble the system condenser:

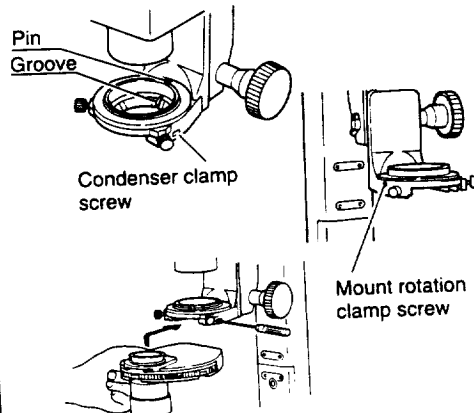
- When using an ELWD condenser lens
Leave the hollow module (with mark "A") in the turret as is. Set the modules PhL to Ph2 (annular diaphragm modules marked in red), into the remaining module ports so that when looked from above, their numbers increase with clockwise rotation of the turret. Fix each module with two hexagonal socket head screws. Screw the ELWD condenser lens (marked in red) into the turret unit.
- When using an LWD condenser lens
Set the supplementary lens into the pocket of the diascopic illumination unit. (See page 1.)
Remove the hollow module (with mark "A") from the turret by loosening the two hexagonal socket head screws. (The removed module A is used for bright-field microscopy.)
Set the modules PhL to Ph3 (annular diaphragm modules marked in black), into the module ports so that their numbers increase with clockwise rotation of the turret. Fix each module with two hexagonal socket head screws.
Screw the LWD condenser lens (marked in white) into the turret unit.



Then install the system condenser to the microscope:

Using the hexagonal screwdriver, loosen the condenser clamp screw located deep in the right-hand hole of the condenser holder. (If the clamp screw is hidden and the screwdriver cannot be inserted, loosen the condenser mount rotation clamp screw on the left of the condenser holder, rotate the mount center by hand until the pin at the top of the mount aligns with the groove in the mount center, and tighten the mount rotation clamp screw to secure.)

Mount the system condenser turret unit so that the marks on the module on the optical path face the front side, and tighten the clamp screw with the hexagonal screwdriver to secure the turret unit.

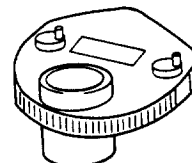


Mounting the ELWD-S condenser

Mounting procedures are the same as above system condenser turret unit.

Using the hexagonal screwdriver, loosen the condenser clamp screw located deep in the right-hand hole of the condenser holder. (If the clamp screw is hidden and the screwdriver cannot be inserted, loosen the condenser mount rotation clamp screw on the left of the condenser holder, rotate the mount center by hand until the pin at the top of the mount aligns with the groove in the mount center, and tighten the mount rotation clamp screw to secure. See above figure.)

Mount the condenser so that the mark on the turret faces the front side, and tighten the clamp screw with the hexagonal screwdriver to secure the condenser. (See above figure.)



11. Installing objectives

Remove the stage ring from the stage. Install objectives in such places that magnification increases with clockwise rotation of the revolving nosepiece. Refit the removed stage ring.

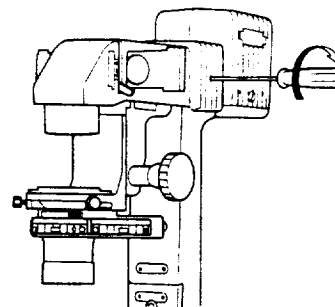
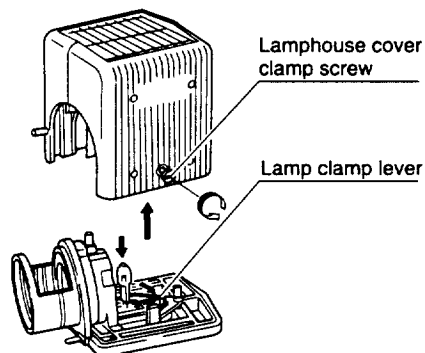
12. Installing the lamp and lamphouse

⚠ CAUTION:

- Use the specified lamp.
- Be sure to turn OFF the power switch and plug out the power cord before installation.
- Do not touch the lamp bulb with bare hands. Keep it in the cover or wear gloves. If dirt or fingerprints are put on the bulb, thoroughly wipe them off. Be sure to remove the lamp cover after the lamp bulb is mounted.

- (1) Loosen the lamphouse cover clamp screw with a coin or the like.
- (2) Remove the cover.
- (3) Press down the lamp clamp lever, and while doing this;
- (4) Insert the lamp into the socket pin hole as far as it touches the stopper.
- (5) Set the lamp clamp lever to the previous position. Be careful so the lamp is mounted upright. If it is tilted, retry.
- (6) Close the cover.
- (7) Tighten the lamphouse cover clamp screw.

Align the anti-rotation pin on the lamphouse mount to the groove in the cylindrical part of the lamphouse, insert the lamphouse into the lamphouse mount, then secure the lamphouse by tightening its clamp screw.



Removing the lamphouse

⚠ CAUTION:

Lamphouse is very hot immediately after lamp is turned off. Make sure that it is sufficiently cool before replacement.

For safety, tighten the tilting clamp screw of the illumination pillar.

Set the power switch off (or make sure that it is set off).

Loosen the lamphouse clamp screw, then draw the lamphouse out.

13. Connecting the power supply

Plug the lamp cable connector into the OUTPUT connector on the power supply. Secure the connector by turning the lock ring as far as it will go.

Plug the power cord into the AC input connector on the power supply.

Plug in the other end of the power cord to an AC line receptacles with the ground conductor (each conductor).

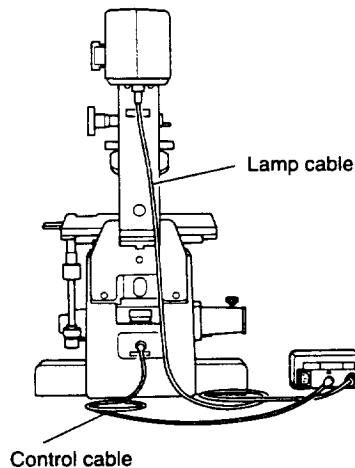
Use only the specified power cord. Refer to the "Electrical Specifications" for the specification on the power cord.

14. Connecting the control cable

(The control cable is used only when using the light intensity control dial on the microscope to control the lamp brightness.)

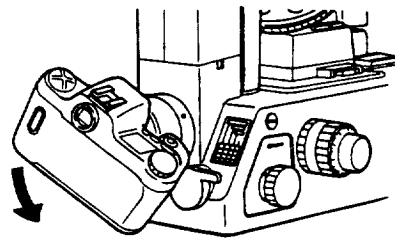
Plug the control cable connector into the CTRL connector on the rear of the microscope.

Plug the other control cable connector into the CTRL connector on the rear of the power supply.



15. Installing a 35 mm SLR camera

Remove the F mount cap from the front port. Align the lens in/out index on the camera to that on the front port, mount the camera, then rotate the camera in the direction of the arrow until it stops with a click. (See the figure below.) Install the cable release (option) by screwing its threaded end over the cable release screw on the camera.



To dismount the camera, press the lens dismounting button on the camera, and hold the button depressed while rotating the camera in the opposite direction of the arrow until it stops. Then, gently dismount the camera. Note that the F mount may be damaged if you attempt to rotate the camera in the direction of the arrow.

For film loading, photomicrographic mode selection, etc., refer to the instruction manual of the 35 mm SLR camera.

16. Installing the photomicrographic equipment (option)

Refer to the instruction manual of the photomicrographic equipment for detailed information about its assembly, film loading, photomicrographic mode selection, and photomicrographic procedures.

- To install the photomicrographic equipment on the side port:
Assemble the photomicrographic equipment with reference to its manual. Remove the cap from the side port. Insert the PLI projection lens into the side port until its thrusting surface contacts the sleeve. Install the photomicrographic equipment to the side port sleeve so that its finder faces the front. Insert the connection ring into the sleeve until the abutting point firmly seats, then fix the ring securely with the clamp screw. In photomicrography, adjust the optical path changeover dial on the right of the base to D when focusing through the eyepieces. When taking a photograph, adjust the dial to C.
- To install the photomicrographic equipment on the eyepiece tube port:
Assemble the photomicrographic equipment with reference to its manual. Loosen the eyepiece tube clamp screw with the hexagonal screwdriver, and then remove the eyepiece tube. Install the optional eyepiece tube bracket for infinite optical systems by tilting it slightly towards the dovetail groove, and then secure the bracket by tightening the clamp screw. Install the trinocular eyepiece tube for upright type microscopes (optional trinocular eyepiece tube F or T for infinite optical systems) by fitting it over the dovetail mount on the eyepiece tube bracket, and tightening the clamp screw. Insert the PLI projection lens into the vertical tube of the eyepiece tube until its thrusting end contacts the vertical tube. Mount the photomicrographic equipment onto the vertical tube so that the finder faces the front.

In photomicrography, set the optical path changeover dial on the right of the base to A. Direct the optical path to the vertical tube by operating the optical path changeover lever on the eyepiece tube, etc.

Now the assembly is completed.



VI. TROUBLESHOOTING

If the microscope does not function properly, take appropriate action as described below.

1. Optical

Symptoms	Causes	Countermeasures
Viewfield vignetting, uneven brightness, or viewfield only partially visible	Optical path changeover dial not in clickstop position.	Rotate to clickstop position.
	Revolving nosepiece not correctly mounted on focusing mechanism.	Mount securely.
	Revolving nosepiece not in clickstop position (Objective not in optical path).	Set to clickstop position.
	Supplementary filter slider at the bottom of the focusing mechanism not in clickstop position.	Set to clickstop position.
	Incorrect condenser mounting.	Mount correctly.
	Incorrect condenser turret positioning.	Correctly set to the position that matches the objective.
	Incorrect eyepiece tube turret assembly positioning (For TE-TL eyepiece tube only).	Set turret to [O] position.
	Photomask in intermediate position.	Turn reticle in/out lever until it clicks at stopper.
	Stage ring in optical path.	Change specimen position and move stage.
	Field aperture diaphragm image not in focus on specimen surface.	Rotate condenser focus knob to bring field aperture diaphragm image into focus on specimen surface. (When using an LWD condenser with supplementary lens, loosen refocusing stopper before performing this operation.) (P. 30)
	Field aperture diaphragm stopped down excessively.	Open diaphragm properly.
Dirt or dust in viewfield	Dirt or dust on lens (field lens, condenser, eyepiece) or culture container.	Clean lens or culture container.
	Field aperture diaphragm image not in focus on specimen surface.	Rotate condenser focus knob to bring field aperture diaphragm image into focus on specimen surface. (When using an LWD condenser with supplementary lens, loosen refocusing stopper before performing this operation.) (P. 30)

Symptoms	Causes	Countermeasures
Poor image quality (No effect of phase contrast; or poor contrast or resolution)	Bright-field objective is used.	Use phase contrast objective.
	Condenser annular diaphragm not put in optical path.	Select annular diaphragm (module) that matches Ph code of the objective. Put it into optical path.
	Phase rings different between condenser annular diaphragm and objective.	Select annular diaphragm (module) that matches Ph code of the objective. Put it into optical path.
	Condenser annular diaphragm poorly centered.	Center annular diaphragm.
	Dirt or dust on lens (field lens, condenser, eyepiece) or culture container.	Clean lens or culture container.
	Objective's correction ring not set to glass (or plastic) thickness of culture container.	Make correction.
	Thickness of culture container glass (or plastic) is outside the glass thickness compensation range of objective.	Use container with glass (or plastic) of thickness that is within compensation range.
	Field aperture diaphragm image not in focus on specimen surface.	Rotate condenser focus knob to bring field aperture diaphragm image into focus on specimen surface.
Uneven focus	Nosepiece incorrectly mounted.	Rotate to clickstop position.
	Nosepiece not in clickstop position.	Mount properly.
Image flows	Specimen tilted on stage surface.	Correctly reposition specimen on stage.
	Nosepiece not in clickstop position.	Rotate to clickstop position.
	Nosepiece incorrectly mounted.	Mount properly.
	Condenser annular diaphragm off-centered.	Recenter condenser annular diaphragm.
	Condenser incorrectly mounted.	Mount properly.
	Illumination pillar stopped halfway.	Gently bring pillar into contact with stopper.
Yellowish image	No NCB11 filter in optical path.	Insert NCB11 filter into optical path.
	Lamp voltage too low.	Set to  on scale for light intensity control dial (when using light intensity control dial on microscope).

Symptoms	Causes	Countermeasures
Viewfield too bright	No ND filter in optical path.	Insert ND filter(s) into optical path.
	Too high voltage setting with light intensity control dial.	Set to lower voltage with light intensity control dial.
Viewfield too dark	Condenser aperture diaphragm stopped down excessively.	Open diaphragm properly.
	Field aperture diaphragm image not in focus on specimen surface.	Rotate condenser focus knob to bring field aperture diaphragm image into focus on specimen surface.
	Optical path changeover dial set to B or D.	Set optical path changeover dial to A.

2. Operational

Symptoms	Causes	Countermeasures
Focusing impossible with objective raised to highest position	Stage mounted incorrectly.	Mount correctly
	Refocusing stopper clamped.	Loosen refocusing stopper as far as it comes to the limit.
Focusing impossible with 20x or 40x objective	Thickness of culture container glass (or plastic) is outside the glass thickness compensation range of objective.	Use container with glass (or plastic) of thickness that is within compensation range.
Binocular images not coincident	Incorrect interpupillary adjustment.	Adjust interpupillary distance.
Eye fatigue experienced during observation	Incorrect diopter adjustment.	Correct diopter adjustment.
	Inadequate illumination brightness.	Correct lamp voltage. Or, adjust with ND filter.

3. Electrical

Symptoms	Causes	Countermeasures
Pilot lamp does not light when main power switch is turned ON	Power cord not connected properly.	Disconnect power cord from power outlet and power supply, and then reconnect cord properly.
Lamp does not light	Lamp burnt.	Replace with specified lamp.
Lamp burnt too early	Non-conforming lamp.	Replace with specified lamp.
Adjusting light impossible with the light intensity control dial on microscope	CTRL switch on rear of power supply is OFF.	Turn CTRL switch ON.
	CTRL cable not connected properly.	Reconnect CTRL cable between microscope and power supply.
Turning lamp ON/OFF impossible with the illumination ON/OFF switch on microscope	CTRL cable not connected properly.	Reconnect CTRL cable between microscope and power supply.
	Lamp burnt out.	Replace lamp.
Adjusting light impossible with the light intensity control dial on power supply	CTRL switch on rear of power supply is ON.	Turn CTRL switch OFF.

VII. Care and Maintenance

1. Lens Cleaning

Dust is best removed with a soft brush or gauze. More persistent dirt, such as fingerprints, grease and oil, may be removed with soft cotton, lens tissue, or gauze lightly moistened with absolute alcohol (methyl alcohol or ethyl alcohol).

Use only petroleum benzine to wipe immersion oil off of oil immersion objectives. Wiping with absolute alcohol (ethyl alcohol or methyl alcohol) after the oil has been removed 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 lenses or filters.)

Do not use petroleum benzine to clean the entrance lens at the bottom of the eyepiece tube or prism surface of the eyepiece tube.

Absolute alcohol and petroleum benzine are quite inflammable. Use great care when handling them and when setting the power switch on and off. Be very careful with fire.

2. Cleaning Painted Surfaces

Do not use organic solvents such as alcohol, ether, or paint thinner on painted or plastic components. Doing so could cause fading or discoloration. For persistent dirt, dampen a piece of gauze with neutral detergent and wipe lightly.

3. When Not In Use

When the microscope is not in use, cover it with the vinyl cover, and store it in a dry place not subject to mold.

We especially recommend that the objectives and eyepieces be kept in a container (such as a desiccator) with desiccant in it.

4. Periodical Inspection

To maintain the performance of the microscope, we recommend you to check the microscope periodically. (For details of inspection, contact your dealer or nearest Nikon representative.)

APPENDIX Using the TE-PS30 or TE-PSE30 Power Supply in Combination with the 6V-30W Illumination Pillar

It is possible to use the TE-PS30 (or TE-PSE30) power supply together with the 6V-30W illumination pillar, instead of the TE-PS100 (or TE-PSE100) power supply together with the 12V-100W illumination pillar.

1. TE-PS30/TE-PSE30 Power Supply

Input voltage label

Before turning on the power, confirm that the input voltage shown here matches the voltage that you will be using. If not the same, notify your nearest Nikon representative. (If you use the instrument with the wrong input voltage, it may be damaged.)

CTRL switch

Turning this switch on disables the light intensity control dial on the power supply. The light intensity control dial on the left side of the microscope can then be used to adjust the brightness and to turn the illumination on and off. Turning this switch off disables the light intensity control dial on the microscope. The light intensity adjustment dial on the power supply can control be used to adjust the brightness.

OUTPUT connector

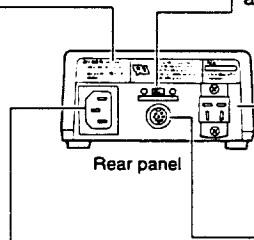
This is the lamp output connector. Connect the lamp cable from the illumination pillar to this connector.

CTRL connector

Connect a control cable between this connector and the CTRL connector on the rear of the microscope.

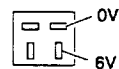
AC input connector

Connect the power cord specified below.



Connector Pin Assignments

OUTPUT connector



Sato Parts
CN3520J

CTRL connector



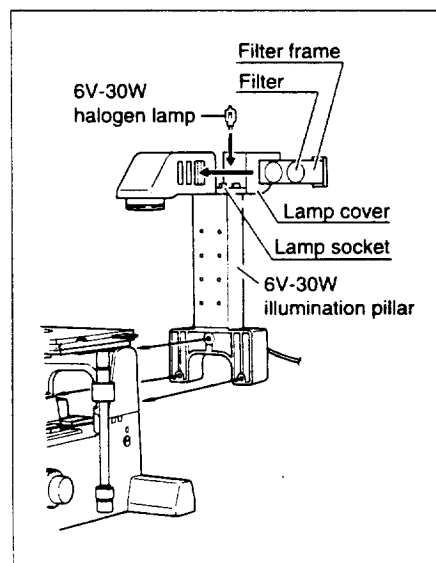
Hirose Electric
HR12-10R-8SC

- Pin 1 : Light intensity volume (10k Ω)
- Pin 2 : Light intensity volume (10k Ω)
- Pin 3 : Unused
- Pin 4 : Output ON/OFF switch (shorted: on/open: off)
- Pin 5 : Unused
- Pin 6 : Unused
- Pin 7 : Output ON/OFF switch (shorted: on/open: off)
- Pin 8 : Unused

WARNING: The bottom of the power supply becomes hot while it is in use. Do not obstruct the air vents on the sides of the power supply.

2. Mounting the 6V-30W Illumination Pillar

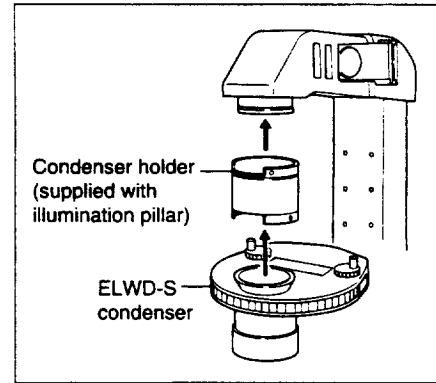
- Attach the pillar to the microscope with three M5 bolts and washers.
- Open the lamphouse cover and insert a 6V-30W halogen lamp into the socket.
- Insert each filter into its corresponding frame, and insert them into the filter openings.
- Connect the lamp cable to the OUTPUT connector on the rear of the power supply. (Be sure to use either the TE-PS30 power supply or the TE-PSE30 power supply.)



3. Mounting the Condenser

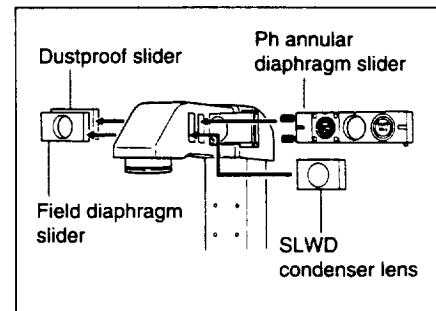
When using an ELWD-S condenser

- Fix the condenser holder on the diascope illumination unit cylinder.
- Mount the ELWD-S condenser on the circular dovetail mount on the condenser holder.
- Illumination system adjustment
Change over to a 4x objective, set the turret at the PhL position, and center the annular diaphragm. If you do not have a 4x objective, use the objective with the weakest magnification as a reference for making this adjustment.



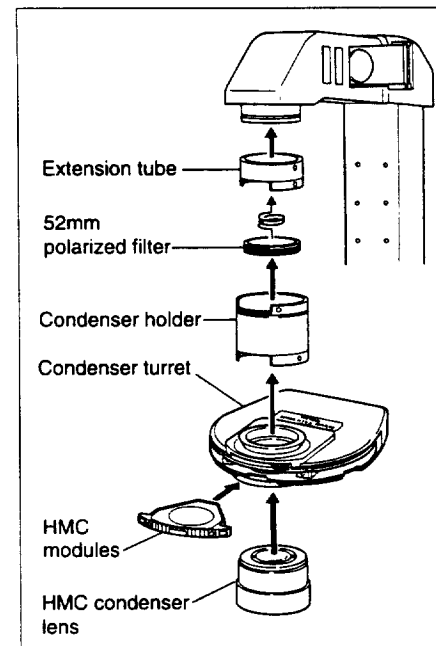
When using an SLWD condenser

- Remove the Field diaphragm slider from the diascope unit and replace it with the SLWD condenser lens.
- Remove the dustproof slider from the diascope unit and replace it with the Ph annular diaphragm slider.
- Illumination system adjustment
Match the PhL and Ph1 annular diaphragms with the phase plate image of their corresponding objectives.



When using an HMC condenser

- Mount a 52 mm polarized filter in the threaded portion inside the extension tube provided with the HMC condenser and fix the extension tube on the diascope illumination unit cylinder.
- Insert the condenser holder inside the extension tube, and secure it in place with the set screw.
- Insert HMC modules into the condenser turret and secure each in place with two bolts with hexagonal sockets.
- Screw the HMC condenser lens into the turret.
- Secure the completed system condenser to the circular dovetail on the condenser holder with the clamp screws.



ELECTRICAL SPECIFICATIONS .

EXTERNAL VIEW

■ When the microscope (model TE300) is used together with the 12V 100W illumination pillar (model TE-DH 100W)

Power supply	For 100 – 120V area : Power supply TE-PS100 For 220 – 240V area : Power supply TE-PSE100
Input rating	DC 12V 100W
Lamp rating	12V 100W halogen lamp
Lamp type	Halogen lamp (OSRAM HLX 64623 or PHILIPS 7724)
Operating environmental conditions	Altitude: 2000m max. Temperature: 0° to 40°C (indoor use only) Relative humidity: 85% max., noncondensing Pollution degree: Degree 2
Protection class	Class II

■ When the microscope (model TE300) is used together with the 6V 30W illumination pillar (model TE-DS 30W)

Power supply	For 100 – 120V area : Power supply TE-PS30 For 220 – 240V area : Power supply TE-PSE30
Input rating	DC 6V 30W
Lamp rating	6V 30W halogen lamp
Lamp type	Halogen lamp (PHILIPS)
Operating environmental conditions	Altitude: 2000m max. Temperature: 0° to 40°C (indoor use only) Relative humidity: 85% max., noncondensing Pollution degree: Degree 2
Protection class	Class III

■ **Power supply TE-PS100/TE-PSE100**
(Power supply for the 12V 100W illumination pillar)

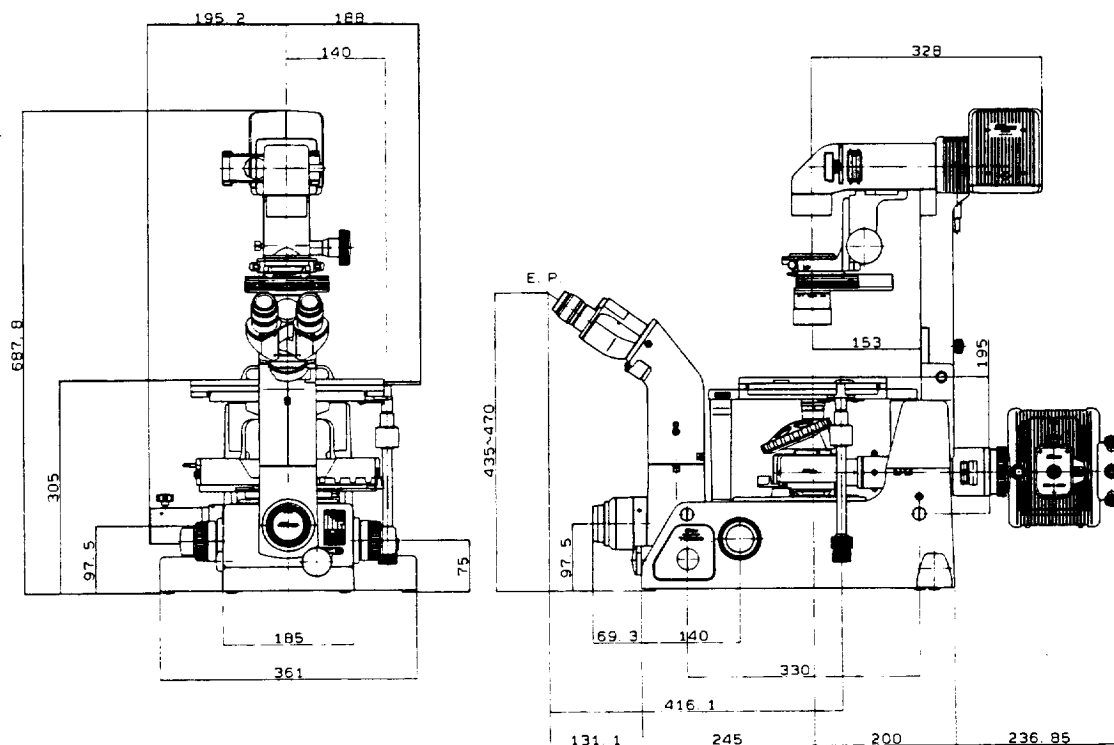
Illumination pillar	Use only with the 12V 100W illumination pillar (model TE-DH 100W). Do not connect the power supply to other equipment.
Input rating	Power supply TE-PS100: 100 – 120V AC, 50/60 Hz, 2.5A Power supply TE-PSE100: 230V AC, 50/60 Hz, 1.5A
Voltage fluctuations	±10%
Output rating	DC 12V 8.4A
Internal fuse rating	Power supply TE-PS100: 125V 5A Power supply TE-PSE100: 250V T3.15A
Operating environmental conditions	Altitude: 2000m max. Temperature: 0° to 40°C (indoor use only) Relative humidity: 85% max., noncondensing Pollution degree: Degree 2
Protection class	Class I
Installation category	Category II
Power cord	Use only the power cord described below. For 100 – 120V area: • Use only UL listed, detachable cord set, 3-conductor grounding type SVT, No. 18 AWG rated at 125V, 7A minimum. • In case of using the extension cord, use only the power supply cord with the PE (protective earth) wire. For 220 – 230V area: • Use only the 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.

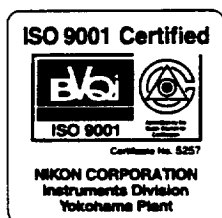
■ **Power supply TE-PS30/TE-PSE30**
(Power supply for the 6V 30W illumination pillar)

Illumination pillar	Use only with the 6V 30W illumination pillar (model TE-DS 30W) Do not connect the power supply to other equipment.
Input rating	Power supply TE-PS30: 100 – 120V AC, 50/60 Hz, 0.6A Power supply TE-PSE30: 230V AC, 50/60 Hz, 0.4A
Voltage fluctuations	±10%
Output rating	DC 6V 30W
Internal fuse rating	250V F2AH
Operating environmental conditions	Altitude: 2000m max. Temperature: 0° to 40°C (indoor use only) Relative humidity: 85% max., noncondensing Pollution degree: Degree 2
Protection class	Class I
Installation category	Category II
Power cord	Use only the power cord described below. For 100 – 120V area: • Use only UL listed, detachable cord set, 3-conductor grounding type SVT, No. 18 AWG rated at 125V, 7A minimum. • In case of using the extension cord, use only the power supply cord with the PE (protective earth) wire. For 220 – 230V area: • Use only the 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.

■ Conforming standards

TE300	UL Listed Product for use with model TE-PS100 and TE-PS30 power supply.
TE-PS100	UL Recognized Component.
TE-PS30	UL Recognized Component.
TE300, TE-PS100, TE-PS30	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 protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. This class A digital apparatus 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.
TE300, TE-PSE100, TE-PSE30	GS Approved. EU Low Voltage Directive satisfied. EU EMC Directive satisfied.





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