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Nikon

Stereo Microscope

SMZ800N/SMZ1270/SMZ1270i

Instruction Manual

Introduction

Thank you for purchasing a Nikon product.

This instruction manual is written for users of the Nikon stereo microscopes SMZ800N/SMZ1270/SMZ1270i. To ensure correct usage, read this manual carefully before operating this product.

- No part of this manual may be reproduced or transmitted in any form without prior written permission from Nikon.
- The contents of this manual are subject to change without notice.
- The equipment described in this manual may differ from the actual product in its appearance.
- Although every effort has been made to ensure the accuracy of this manual, errors or inconsistencies may remain. If you note any points that are unclear or incorrect, please contact your nearest Nikon representative.
- Some of the equipment described in this manual may not be included in the set you have purchased.
- If you intend to use any other equipment with this product, read the manual for that equipment too.
- If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Symbols Used in This Manual

The following symbols are used in this manual.

◆ **Symbols for Safety**

⚠ **WARNING** ⚠ **CAUTION**	Highlights important information that should be noted for safety. Read "Safety Precautions" for details.

◆ **Other Symbols**

	Indicates information you should note or comply with to prevent defects or malfunction of this product.
	Indicates information you should be aware of in using this product, as well as other useful information.

Contents

Safety Precautions

To ensure correct and safe operation, read this manual before using this product.

WARNING and CAUTION Symbols

Although this product is designed and manufactured to be completely safe during use, incorrect usage or failure to follow the safety instructions provided may cause personal injury or property damage. To ensure correct usage, read this manual carefully before using this product. Do not discard this manual and keep it handy for easy reference.

Safety instructions in this manual are marked with the following symbols to indicate their importance. For your safety, always follow the instructions marked with these symbols.

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

Label Attached to the Product

The label attached to the products shown below indicates that attention should be paid to use of these products. Before using a product with the label attached, be sure to carefully read the manual.

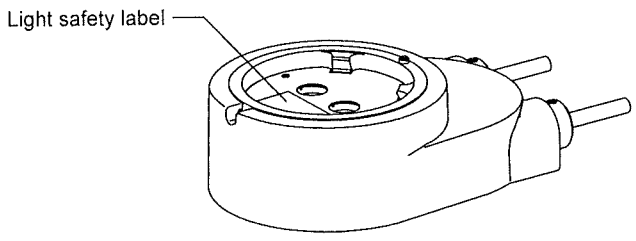
Light safety label

IEC62471 RISK GROUP2
CAUTION
Possibly hazardous optical radiation emitted from this product.
Do not stare at operating lamp.
May be harmful to the eyes.

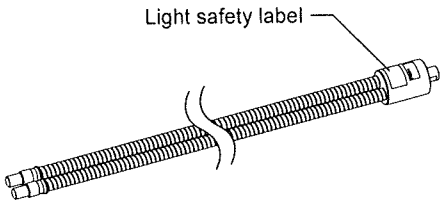
Caution: Do not look into the LED light.

Possibly hazardous optical radiation emitted from this product.
Do not stare at operating lamp.
May be harmful to the eyes.
RISK GROUP 2 IEC62471: 2006

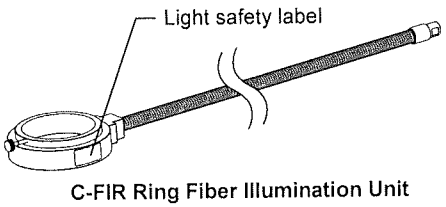
Label Position



P-CI Coaxial Epi Illuminator



C-FDF Flexible Double Arm Fiber Illumination Unit



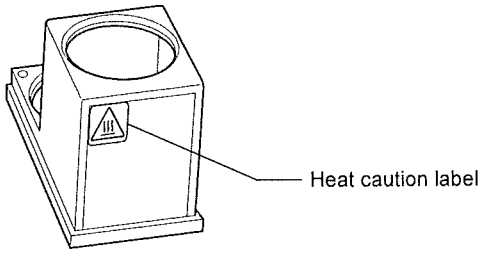
C-FIR Ring Fiber Illumination Unit

Heat caution label

Caution: Heat of the empty cube

Immediately after diascopic observation using an epi-fluorescence attachment, the front face of the empty cube may become hot, resulting in burns. Do not touch the front face of the empty cube. Replace the empty cube several minutes after finishing the diascopic observation.

Label Position



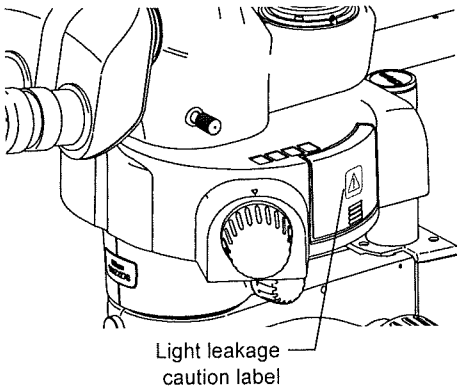
Empty cube for the epi-fluorescence attachment

Light leakage caution label

Caution: Light leakage

Do not use the epi-fluorescence attachment while the filter cube replacement cover is open. Harmful light including ultraviolet light may leak and affect fluorescence observation.

Label Position



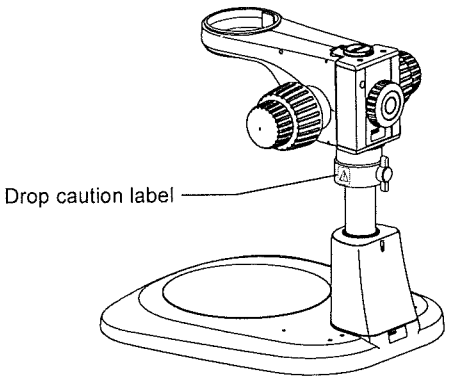
P-EFL Epi Fluorescence Attachment

Drop caution label

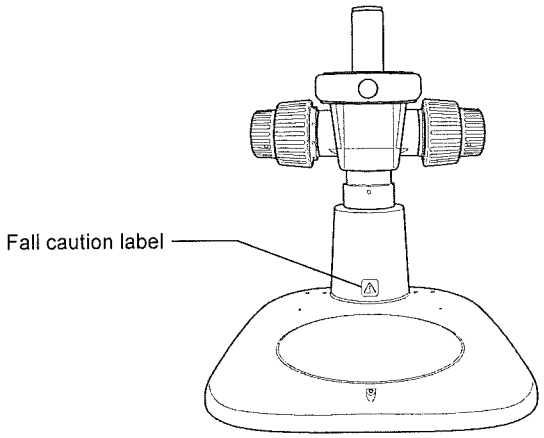
Caution: Use of anti-drop collar

When using a C-FMCN Focus Mount attached in the middle of the support, be sure to use the anti-drop collar. Otherwise the zooming body may slide down when the focus mount fixing screw is loosened. This may result in injury such as pinching fingers between the objective and sample, or damage to the sample on the stage plate by the objective.

Label Position



Anti-drop collar for the C-FMCN Focus Mount

Fall caution label	**Caution: C-FMCN Focus Mount attachment orientation**
	Attach the C-FMCN Focus Mount to the stand so that the focus mount faces the front of the stand as shown in the figure. If the focus mount is attached in the incorrect orientation, the stand may fall over. This may result in damage to the device or unexpected injury. **Label Position**  **P-PS32 Plain Stand, P-DSL32 LED Diascopic Illumination Stand, or P-DSF32 Fiber Diascopic Illumination Stand**

WARNING

1 **Do not disassemble.**

Disassembling this product may result in electric shock or malfunction. Malfunction and damage due to disassembling or modification are unwarranted.

Do not disassemble parts other than those described in this manual. If you experience problems with this product, contact your nearest Nikon representative.

2 **Read the instruction manuals carefully.**

To ensure safety, carefully read this manual and the manuals for other equipment to be used with this product. Particularly, all warnings and cautions given at the beginning of each manual must be observed.

Safety is a top design priority for Nikon products. Safety is ensured as long as the user observes all of the warnings and cautions given in the manuals, and uses the system only for its intended purpose. However, failure to heed the warnings and cautions given in the manuals, subjecting the system to shock or impact, or attempting to disassemble the system may result in unexpected accidents and injury.

Product with an epi-fluorescence attachment:

The light source used for epi-fluorescence microscopy (HG Precentered Fiber Illuminator) requires special care during handling because of its characteristics. Be sure to refer to the manual for the light source being used.

3 **Check the input rating**

For devices that use a power supply, check that the rating of the power supplied to the device matches the power used by the device. If the input rating does not match, do not use the power supply and contact your local representative. Using an incorrect power supply may damage the device.

4 **Notes on the power cord**

Be sure to use the specified power cord. Use of other power cords may result in malfunction or fire. This product is classified as having Class I protection against electric shock. Make sure this product is connected to an appropriate protective earth terminal.

See Chapter 8, "2 Performance Properties" for the specified power cords.

- To prevent electric shock, always turn off the power switch (Press to the "O" position.) for the device before connecting or disconnecting the power cord.

5 **Heat from the light source**

During and immediately after a period of illumination, the lamp and surrounding areas (including the lamp house) are very hot when the light source of the illuminator is a mercury lamp.

- Do not touch the lamp or surrounding areas during or immediately after a period of illumination. There is a risk of burn if you touch the hot area.
- Always attach the lamp house cover when using this product.
- Make sure the lamp and surrounding areas have cooled sufficiently (which may take approximately 30 minutes) before attempting to replace the lamp.
- Do not place fabric, paper, or highly flammable volatile materials (i.e. gasoline, petroleum benzene, paint thinner, and alcohol) near the lamp house during and for about thirty minutes after a period of illumination. Because the lamp is very hot, ignition or fire may be induced.

WARNING

6 **Hazards of mercury lamps (when using the epi-fluorescence attachment)**

The light source used with the epi-fluorescence attachment (HG Precentered Fiber Illuminator) requires special care during handling because of its characteristics. For safe and correct use of this system, carefully read the warnings below. Keep in mind all potential hazards. Additionally, carefully read the manual for the illuminator and the manual from the lamp manufacturer (if provided), then follow the instructions given therein. Failure to heed the warnings and cautions given in the manuals, subjecting the illuminator to shock or impact, or attempting to disassemble the illuminator may result in unexpected accidents and injury.

- **Ultraviolet light**

  When lit, mercury lamps radiate ultraviolet light that can damage the eyes and skin. Do not directly look at the light of the lamp. Doing so may cause your eyesight to be lost.

  When changing filter cubes, always turn off the light source. Leaving the lamp turned on during filter cube replacement may result in ultraviolet exposure.

- **High-pressure gas**

  The lamps contain sealed gas under very high pressure. And the pressure increases when the lamp is on. Crack or dirt of the lamp tube, strong external force or impact, or use beyond the tube's life may cause the encapsulated gas to leak or the lamp to blow up. If this happens, an accident such as gas inhalation or injury with glass may take place.

- **Heat**

  When the lamp is lit, the lamp and surrounding areas will become extremely hot. Do not touch the lamp with bare hands or place flammable materials near the lamp. Failure to comply may result in burns or fire.

- **Designated lamp**

  Be sure to use the designated lamp. Using other types of lamps may result in accidents, including bursting of the lamp.

7 **Hazardous sample handling**

This product can also be used for microscopy and imaging of biological samples (cells/tissues) in a petri dish.

Check to determine whether a sample is hazardous before handling. If the sample is hazardous, handle it in accordance with the standard procedure specified for your laboratory. If the sample is potentially infectious, wear rubber gloves and avoid direct contact with the samples. If such a sample is spilled onto this product, the portion must be decontaminated in a safe manner. Consult your safety supervisor or the safety standards of your facility.

CAUTION

1 **Power shutdown**

To prevent electric shock and/or malfunction, always turn off the power switch(es) for this product and the peripheral devices (press to the "O" position) and unplug the power cord from the wall outlet before assembling this product, connecting or disconnecting cables, replacing lamps, or cleaning the zooming body and the objective.

2 **Do not look into the LED light**

The P-CI Coaxial Epi Illuminator, C-FDF Flexible Double Arm Fiber Illumination Unit and C-FIR Ring Fiber Illumination Unit use LEDs as the light source. A label indicating light safety is attached to these illuminators in order to being attention to the following. (For details about the label attachment position, see "Label Attached to the Product" on page vi.)

"Possibly hazardous optical radiation emitted from this product. Do not stare at operating lamp.
May be harmful to the eyes.
RISK GROUP 2 IEC62471: 2006"

3 **Be careful of the heat of the empty cube**

Immediately after diascopic observation using an epi-fluorescence attachment, the front face of the empty cube may become hot, resulting in burns. Do not touch the front face of the empty cube. Replace the empty cube several minutes after diascopic observation.

4 **Caution on light leakage**

Do not use the epi-fluorescence attachment while the filter cube replacement cover is open. Harmful light including ultraviolet light may leak and affect fluorescence observation.

5 **Anti-drop collar for the C-FMCN Focus Mount**

When using a C-FMCN Focus Mount attached in the middle of the support, be sure to use the anti-drop collar. Otherwise the zooming body may slide down when the focus mount fixing screw is loosened. This may result in injury such as pinching fingers between the objective and sample, or damage to the sample on the stage plate by the objective.

6 **C-FMCN Focus mount attachment orientation**

Attach the C-FMCN focus mount to the stand so that the focus mount faces the front of the stand.

If the focus mount is attached in the incorrect orientation, the stand may fall over. This may result in damage to the device or unexpected injury.

7 **Specification of a light source**

Be sure to use the specified light source for an illuminator. Using a light source not specified can cause malfunction and induce an accident. For the specified light source, see Chapter 8, "2 Performance Properties" or the instruction manual for the light source.

8 **Avoid contact with water or chemical solutions.**

Never expose this product to water or chemical solutions, and avoid using this product in circumstances where there is risk of exposure to water or chemical solutions. Exposure of electric parts (such as the HG Precentered Fiber Illuminator) to liquids may cause a short circuit, resulting in malfunction or abnormal heating. If water or a chemical solution is splashed onto a device, immediately turn off the power switch for the device (press to the "O" position) and remove the power cord from the receptacle. Then wipe off moisture with a piece of dry cloth or something similar. If water or a chemical solution enters this product, stop using the product, and contact your nearest Nikon representative.

9 **Remove any covers from the system before switching on.**

Do not use the system while it is covered with a piece of cloth, etc., Especially for a light source, which is heated, the disturbance of heat release may cause abnormal heat generation, causing ignition or fire. Do not cover the system with a piece of cloth or similar while in use.

10 **Notes on routing cables**

Connect and route the cables in accordance with the specified methods. If the cables are not routed and connected properly, the system may not function correctly.

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

Do not place any object on top of this product.

12 **Cautions on assembling and installing the product**

- Take care to avoid pinching your fingers or hands during system assembly and installation.
- Scratches or fingerprints, etc. on optical components (such as lens and filters) will degrade microscope images. Be careful to avoid scratches or direct contact with the lens and filters during system assembly.

CAUTION

- The total mass of the microscope system can be as high as approx. 17 kg. When moving the system to another location, temporarily remove any removable devices and carry the system by firmly holding the hand holding portions of the base (several people are needed). Do not lift the system by holding the binocular part of the tube or placing hands on the bottom of the objective.
- Do not place this system in a locker or cabinet.

13 Cautions on sustained observation

To relieve fatigue resulting from long observation sessions, limit continuous observations to one hour. Take at least a 10 to 15-minute break between observation sessions. Adjust the layout of other instrument used and the height of your chair.

14 Cautions on use, transportation, and storage

This product must be operated, transported, and stored in accordance with the following conditions. If the product is installed in a location with high temperature and high humidity, mold and/or condensation may form on the lenses. This may result in performance deterioration or malfunction.

- Operating conditions:
  temperature: 0 to +40°C, humidity: 60% RH max. at 40°C (no condensation)
- Transporting/storage conditions:
  temperature: -20 to +60°C, humidity: 90% RH max. (no condensation)

15 Caution on the disposal of the product

When disposing of this product, follow the rules of the facility.

Notes on Handling the Product

1 **Handle the product carefully.**

This product is a precision instrument. Avoid subjecting it to sudden impacts and shocks.

Even relatively minor impacts are capable of affecting the precision of the objective.

2 **Scratches, dirt, and foreign particles on the lens**

Scratches or fingerprints on optical components (such as lens and filters), etc. will degrade microscope images.
If these parts become dirty, clean them as described in Chapter 7, "1.1 Cleaning Lenses."

3 **Installation location**

This product is a precision optical instrument. Usage or storage of this product in an inappropriate environment may result in malfunction or a degradation in precision. Consider the following factors when selecting an installation location:

- Select a location free of vibration. Install this product on a level surface.
- Install this product at least 10 cm away from walls.
- Select a location less exposed to hazards in the event of collisions, earthquakes, or other potential disasters. To keep this product from falling, use a strong rope or other means if necessary to secure it to the working desk or other heavy, stable item.
- Select a layout that allows easy removal of the power cord from the device's AC inlet in the event of an emergency.
- Do not use a desk mat or similar.
- Avoid locations exposed to direct sunlight, locations immediately under room lights, and other bright locations.
- Light from room lights directly above this product may enter the objective as extraneous light. If possible, switch off the room lights directly above this product when making observations.
- Select a location with minimal dust.
- To avoid splashes, do not use this product near water.
- Make sure the ambient temperature is 0 to + 40°C and humidity is 60% RH max. at 40°C (with no condensation). When transporting or storing this product, the ambient temperature must be -20 to +60°C, with the humidity at 90% RH max (with no condensation). If the product is installed in a location with high temperature and high humidity, mold and/or condensation may be generated on the lenses. Furthermore, performance deterioration and malfunction may occur.
- Do not place this product in a locker or cabinet.

4 **Handling a focus knob**

Never turn the focus knobs in opposite directions at the same time. Doing so may damage the product depending on the model. For details on how to use the knobs correctly, see Chapter 4, "Functions and Operations of the Devices."

5 **Protect the ports from dust and extraneous light**

If not using the vertical tube part of the tube, be sure to attach the supplied cap. Otherwise, extraneous light and dust may be trapped inside the product.

6 **Handling of filters (when using the epi-fluorescence attachment)**

- Excitation filters inside a filter cube are exposed to strong light and degrade over time. Replace them after the appropriate number of hours of use.
- Filter characteristics may alter if the filter is exposed to high humidity. To prevent changes or degradation of filter characteristics, avoid using or storing the filters under conditions of high humidity or high temperature. Avoid subjecting filters to rapid temperature changes. When a filter is not in use, store in a desiccator or hermetically sealed container with a drying agent.
- Especially the filters in GFP type filter cubes offer sharp, high-resolution waveform characteristics superior to normal filters. However, due to their sophisticated coatings, they must be handled with special care. Be sure to handle the filters carefully. Take care to avoid abrasion from cleaning. Follow the description in Chapter 7, "1.1 Cleaning Lenses."

Chapter 1

Components

This stereo microscope system can be composed of a combination of the SMZ800N, SMZ1270 or SMZ1270i Zooming Body attached to the focus mount and devices such as stands, objectives, tubes and episcopic illuminators that can be arbitrarily selected.

This chapter introduces the names of the devices and components of the following basic types of system configuration as examples:

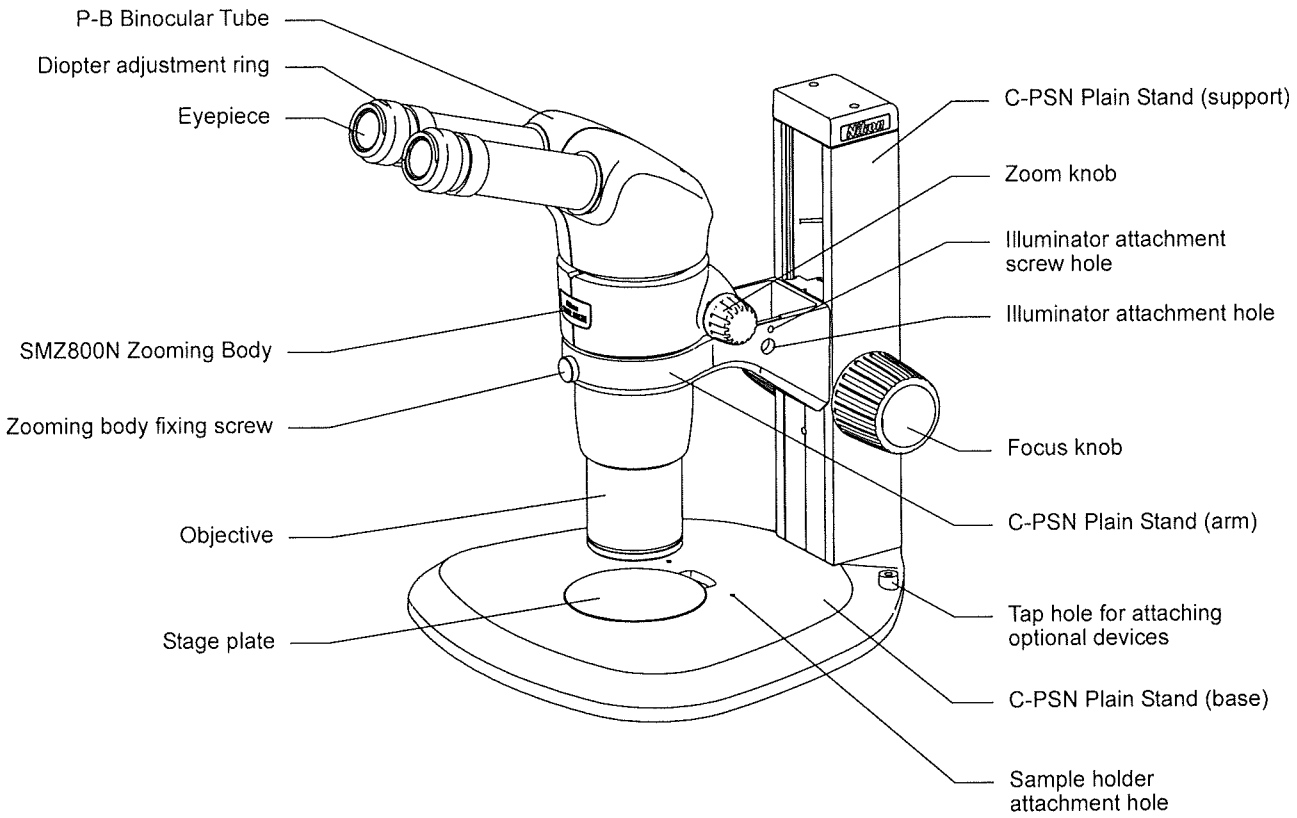
1 System of an SMZ800N Zooming Body with a C-PSN Plain Stand

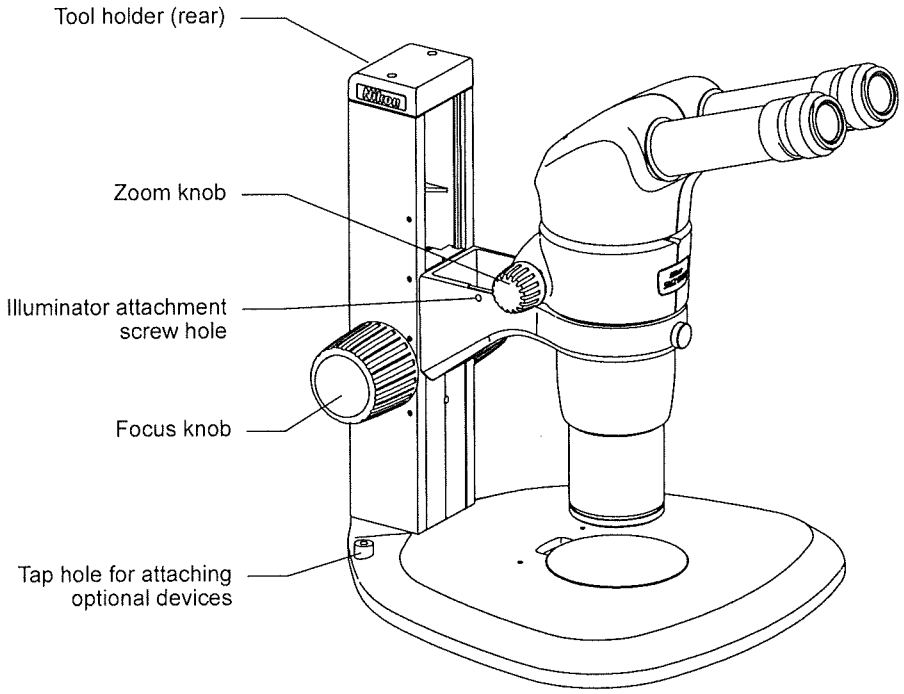
2 System of an SMZ1270 Zooming Body with a P-PS32 Plain Stand

For details on the names of the devices in the system combined with an episcopic illuminator or diascopic illumination stand, see Chapter 3, "Specific Operations" and Chapter 4, "Functions and Operations of the Devices."

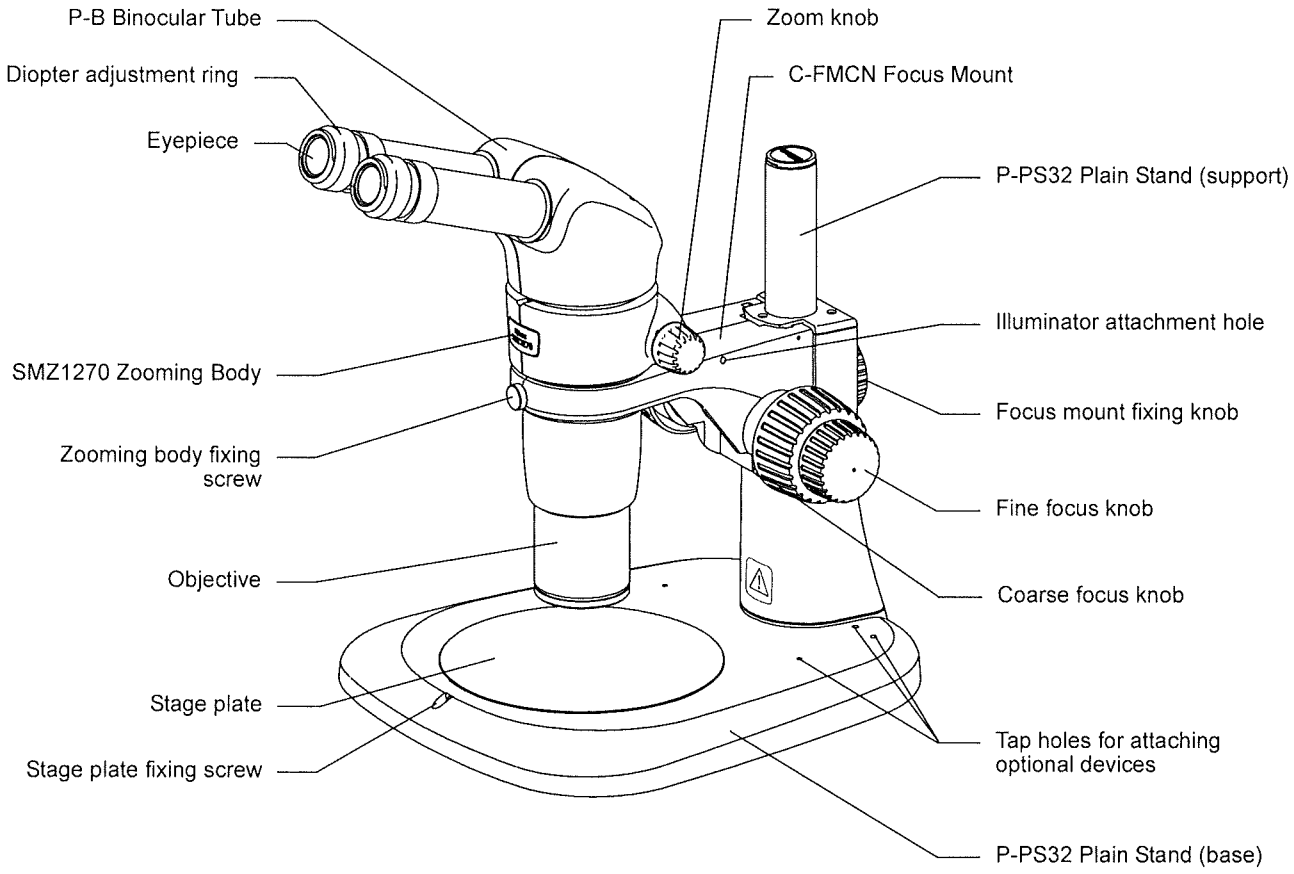
For details on the overall system configuration, see Chapter 5, "1 System Configuration."

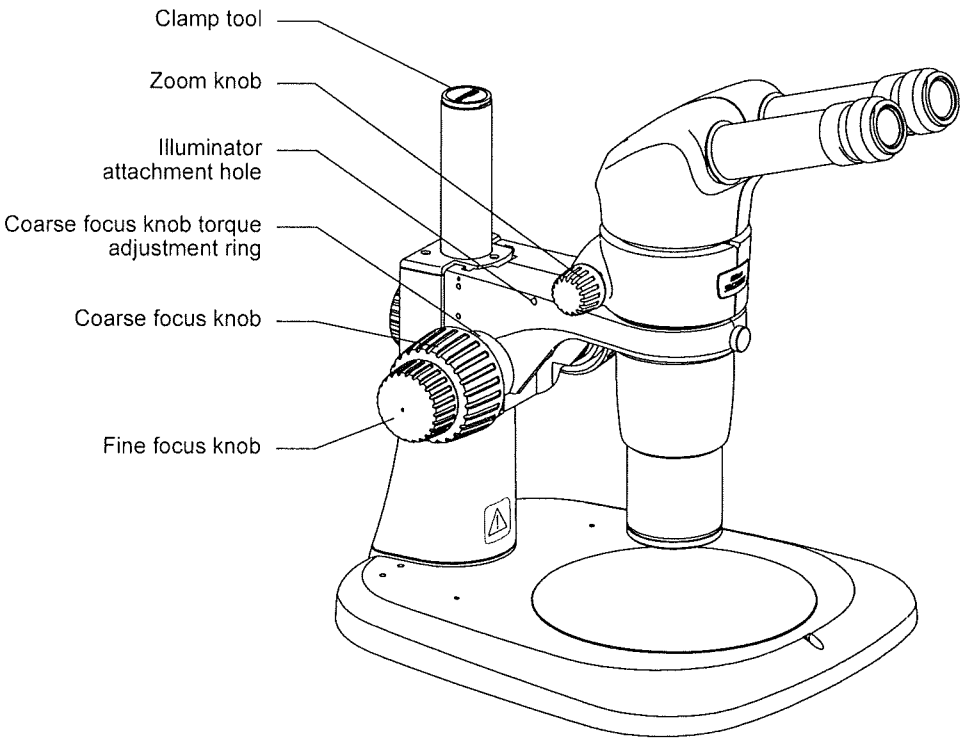
1 SMZ800N Zooming Body Systems





2 SMZ1270 Zooming Body Systems





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Chapter 2

Microscopy Procedures

This chapter describes the basic microscopy procedures for using the SMZ800N Zooming Body system introduced in Chapter 1, "Components."

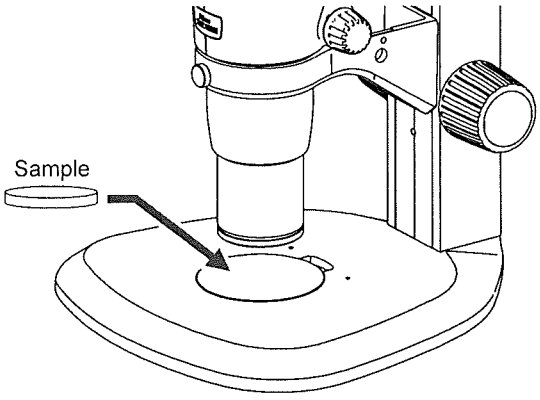
For details on the procedure for using the system combined with other devices, see Chapter 3, "Specific Operations" and Chapter 4 "Functions and Operations of the Devices."

It is assumed that all required devices are attached to the microscope.

If assembly of the microscopy system has not yet been completed, complete assembly as described in Chapter 5, "3 Assembly Procedures."

1 Set a sample.

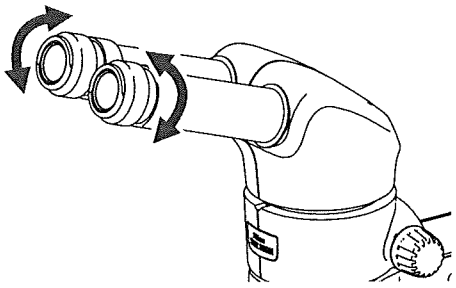
Place a sample on the stage plate immediately under the objective.



Setting a sample

2 Adjust the diopter.

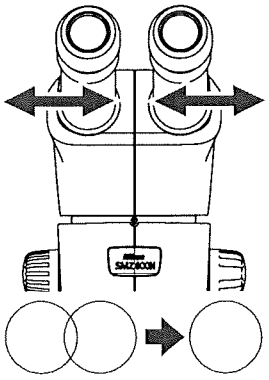
Adjust the diopter to match your eyesight. For details, see Chapter 3, "5 Adjusting the Diopter."
This adjustment is required for each observer.



Adjusting the diopter

3 Adjust the interpupillary.

Adjust the interpupillary to match the distance between your right and left eyes. Look into both eyepieces and move the binocular part of the tube so that the right and left fields of view merge into a single circle.
This adjustment is required for each observer.



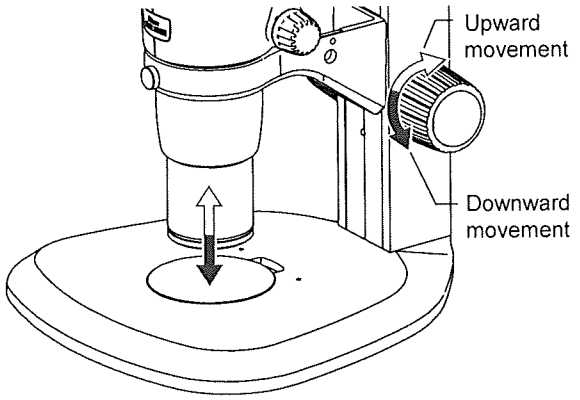
Adjusting the interpupillary distance

4 Focus on the sample.

Turn the focus knob on the right and left of the stand support to move the zooming body vertically and focus on the sample.
The figure shows the knob turning direction and the corresponding vertical movement of the zooming body.

- **Turning the knob backward: Upward movement**
- **Turning the knob forward: Downward movement**

(See Chapter 3, "7 Focusing on the Sample.")



Focusing on the sample

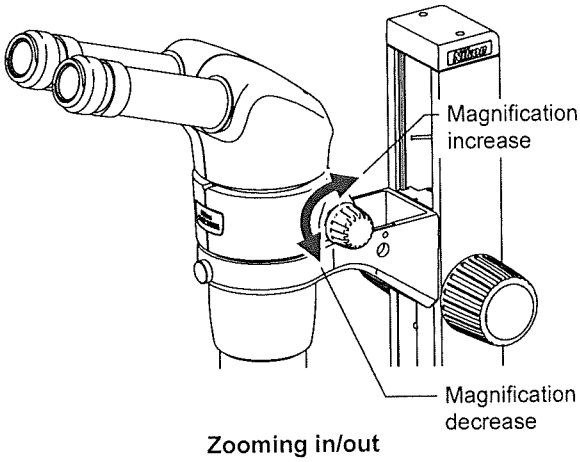
5 Change the magnification using the zoom knobs.

Turn the zoom knobs on the right and left of the SMZ800N Zooming Body to change the magnification. The figure shows the knob turning direction and the corresponding changes in magnification.

- **Turning the knob backward: Magnification increase**
- **Turning the knob forward: Magnification decrease**

The magnification continuously changes from 1x to 8x. Zoom magnification values are indicated on the zoom knobs.

> **Click stop during image zooming**
> It is also possible to use click stops at predetermined magnification positions during image zooming.
> (See Chapter 4, "1.1 SMZ800N Zooming Body.")



Zooming in/out

Notes on microscopy procedures when using other system configurations

- With a system configuration where the illuminator uses the power supply, turn the power on and then adjust the brightness. When microscopy is finished, turn the power off.
- With a system configuration that includes a double-hole nosepiece, bring the objective to be used into the optical path.
- With a system configuration that includes a trinocular tube, set the optical path for the binocular tube to 100%.
- With a system configuration that includes a tilting trinocular tube, adjust the angle of the binocular to one suitable for microscopy.

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Chapter 3

Specific Operations

This chapter describes how to use the microscope system to observe samples.

For details about using the individual devices, see Chapter 4.

1 Turning On the Power

This section lists the devices of the microscope system that require a power supply. Power can be supplied as follows:

- power cord directly connected to the devices
- connection via an AC adapter

or

- connection to the light source (A C-HGFI / C-HGFIE HG Precentered Fiber Illuminator can be used as the external light source.)

For details on the power supply required by each device, see Chapter 4, "Functions and Operations of the Devices" or the instruction manual supplied with each device.

Press the power switch to the "|" position to turn the power on and to the "O" position to turn the power off.

- P-DSL32 LED Diascopic Illumination Stand

> **12 V AC adapter**
>
> The P-DSL32 LED Diascopic Illumination Stand requires a power supply from a 12 V AC adapter. However the 12 V AC adapter is not necessary if a control box is connected to the P-DSL32. In this case, the power is supplied from the control box. Connect a 12 V AC adapter if the control box is not used.

> **LED brightness adjustment control**
>
> When a control box is connected to the P-DSL32 LED Diascopic Illumination Stand, assign the right to turn the power on/off and adjust brightness to the control box. To switch the control right from the P-DSL32 to the control box, turn on the LED brightness control selection switch. This enables you to turn on/off the LED power and adjust the brightness from a PC (software: NIS-Elements) connected to the control box.

- P2-CTLB Control Box
- P-DSF32 Fiber Diascopic Illumination Stand
- C-LEDS Hybrid LED Stand
- C-DS Dia Illumination Stand
- C-DSLU LED Unit for Dia Illumination Stand
- C-LSL LED Epi Illuminator
- P-DF LED Dark Field Unit
- C-FDF Flexible Double Arm Fiber Illumination Unit
- C-FID2 Double Arm Fiber Illuminator
- C-FIR Ring Fiber Illumination Unit
- P-CI Coaxial Epi Illuminator
- P-EFL Epi Fluorescence Attachment

Power does not need to be turned on in any specific order, except when a DS camera control unit is used to capture images. In that case, turn the power to the DS camera control unit on last.

2 Adjusting the Brightness

The illumination brightness can be adjusted on the following devices. Turn the brightness control dial to adjust the brightness to a comfortable level.

Depending on the system configuration, some devices support remote control of the brightness.

For details, see Chapter 4, "Functions and Operations of the Devices."

■ Adjust the brightness using the adjustment dial of the device

- P-DSL32 LED Diascopic Illumination Stand
- C-LEDS Hybrid LED Stand

■ Adjust the brightness using the C-FLED2 LED Light source for fiber illuminator
(Refer to the instruction manual supplied with the C-FLED2 for details.)

- P-CI Coaxial Epi Illuminator
- C-FDF Flexible Double Arm Fiber Illumination Unit
- C-FID2 Double Arm Fiber Illuminator
- C-FIR Ring Fiber Illumination Unit
- P-DSF32 Fiber Diascopic Illumination Stand

■ Adjust the brightness using the C-HGFI/C-HGFIE HG Precentered Fiber Illuminator
(Refer to the instruction manual supplied with the C-HGFI/C-HGFIE for details.)

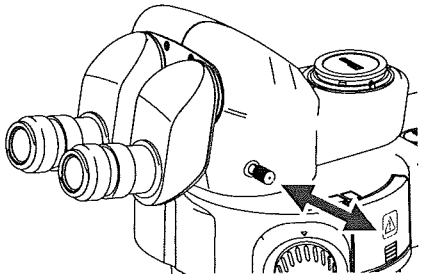
- P-EFL Epi Fluorescence Attachment

■ Adjust the brightness using the power supply section of each unit
(Refer to the instruction manual supplied with the units for details.)

- P-DF LED Dark Field Unit
- C-LSL LED Epi Illuminator
- C-DSLU LED Unit for Dia Illumination Stand

3 Switching the Optical Path of the Tube

The trinocular tubes in this microscope system are equipped with an optical path switching lever. To observe a sample using the eyepiece, switch the optical path to the binocular part. To capture images using a DS camera head, switch the optical path to the vertical tube. Push or pull the lever to make the desired selection. Be sure that the lever is fully pushed in or pulled out. Do not leave the lever stopped partway.



Switching the optical path

Distribution of Light with Optical Path Switching (%)

Tube	Lever position	Binocular part (BINO)		Vertical tube (PHOTO)*
		Left	Right	
P-TERG100 Trinocular Tilting Tube	Pulled out	100	100	0
	Pushed in	100	0	100
P-TERG50 Trinocular Tilting Tube	Pulled out	100	100	0
	Pushed in	100	50	50
P-TL100 Trinocular Tube	Pulled out	100	100	0
	Pushed in	100	0	100

* The light intensity of the left eye is always 100%. The light from the optical path of the right eye is diverted to the vertical tube. (Images of the right eye's optical path are captured.)

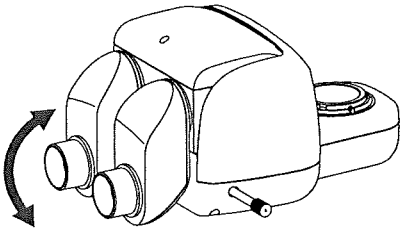
4 Adjusting the Angle of Depression

When a trinocular tilting tube is used, the angle of the binocular part can be changed and adjusted to facilitate microscopy.

The angle can be steplessly changed by moving the binocular part as indicated by the arrow in the figure.

The eye level can also be changed by turning the binocular part 180°.

(The P-B Binocular Tube and P-TL100 Trinocular Tube do not have a mechanism for adjusting the angle of depression or turning the binocular eyepiece tube 180°.)



Adjusting the angle of depression

Notes on adjusting the angle of depression

- Do not apply excessive force to the binocular part during depression angle adjustment. Doing so may cause unexpected failure or malfunction.
- When moving the binocular part, be careful not to catch your fingers in the rotary section at the bottom of the binocular part.

5 Adjusting the Diopter

Adjust the diopter to match your eyesight. This adjustment is required for each observer.

1 Position the diopter adjustment rings of the right and left eyepieces to 0.

2 Maximize the magnification, and then focus on the sample using the focus knobs.
(See "7 Focusing on the Sample.")

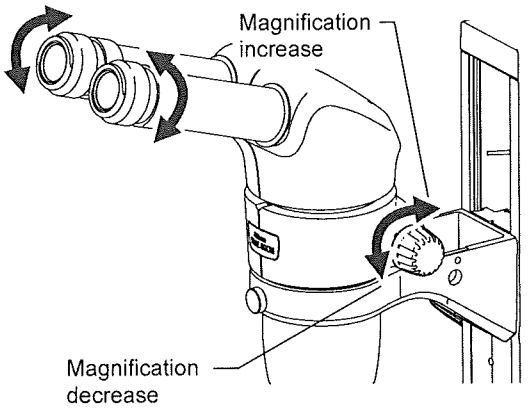
3 Turn the zoom knob to minimize the magnification, and then turn the diopter adjustment rings of the right and left eyepieces to bring them into focus separately.

[Zoom magnification]

SMZ800N Zooming Body: 1x to 8x

SMZ1270/SMZ1270i Zooming Body: 0.63x to 8x

4 Repeat steps 2 and 3 to check the focus, so that changing the magnification does not affect the focus and clear images can be captured.

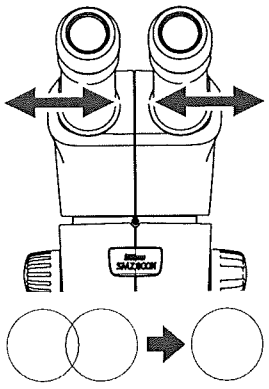


Adjusting the diopter

6 Adjusting the Interpupillary Distance

Adjust the interpupillary distance to match the distance between your right and left eyes. This adjustment is required for each observer.

Look into both eyepieces and move the binocular part of the tube so that the right and left fields of view merge into a single circle.



Adjusting the interpupillary distance

Note on adjusting the interpupillary distance

Do not apply excessive force to the binocular part during interpupillary distance adjustment. Doing so may cause unexpected failure or malfunction.

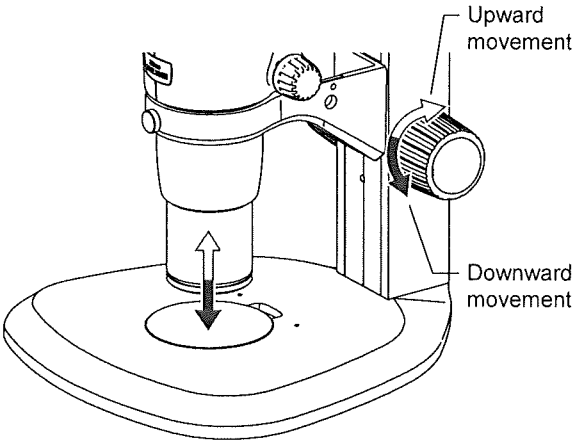
7 Focusing on the Sample

Focus on the sample by turning the focus knobs on the focus mount or stand to move the zoom body (objective) up or down.

The coarse knob and fine knob are on the same axis on the C-FMCN Focus Mount. First, use the coarse knob to move the zooming body downward to a position close to the working distance, and then use the fine knob to bring the sample into focus. (For details on the working distance of objectives, see Chapter 4, "4 Objectives.")

The figure shows the turning direction of the focus knobs and the corresponding vertical movement of the zooming body.

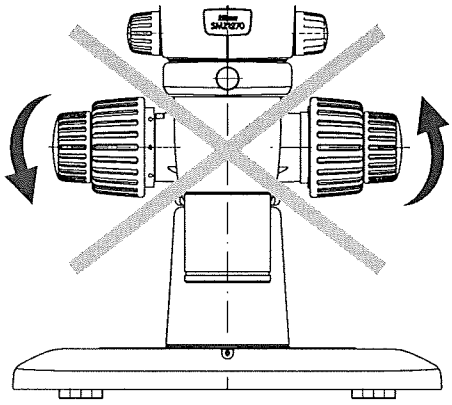
- **Turning the knob backward: Upward movement**
- **Turning the knob forward: Downward movement**



Focusing on the sample

Notes on turning the focus knobs

- When using the focus knobs on the C-FMCN Focus Mount, do not turn (or twist) the right and left focus knobs in opposite directions at the same time. Doing so may cause malfunction.
- When a focus knob on the focus mount or the stand reaches its rotational limit for the unit's vertical movement, do not forcibly turn it further. Doing so may cause malfunction.



Do not turn the C-FMCN's focus knobs in opposite directions!

■ Torque of the focus knobs

The torque of the focus knobs can be adjusted. When the torque is too low, the vertical position of the zooming body may slide due to various loads (such as its own weight or the load of the counterbalance spring inside the focus unit). Adjust the torque to an appropriate level.

[Torque adjustment by turning the right and left focus knobs in opposite directions]

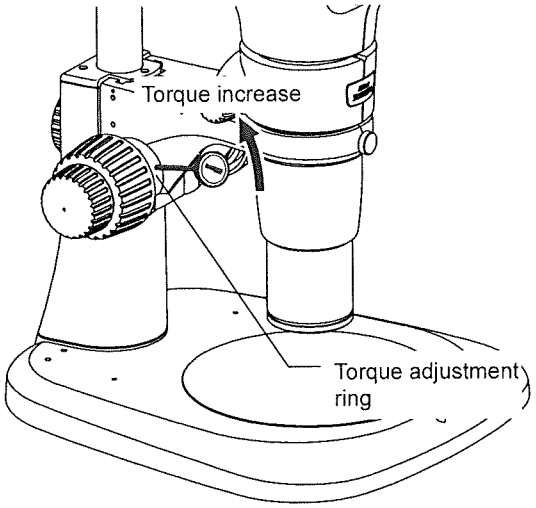
- C-PSN/C-PSCN Plain Stand
- C-DS Dia Illumination Stand
- C-LEDS Hybrid LED Stand
- C-FMAN Focus Mount
- C-FMBN Focus Mount

[Torque adjustment by turning the torque adjustment ring at the base of the left coarse focus knob]

- C-FMCN Focus Mount

Turn the torque adjustment ring using a hex driver (nominal designation: 2). Turn the adjustment ring toward the back to increase the torque. In the C-FMCN, turning the fine control knob will cause the coarse control knob to also turn and change the torque of the fine control knob.

A hex driver is fitted on top of each support of the P-PS32 Plain Stand, the P-DSL32 LED Diascopic Illumination Stand or the P-DSF32 Fiber Diascopic Illumination Stand.



Adjusting the torque of the focus knobs

■ Focusing stroke

- C-FMAN Focus Mount

Focusing stroke:	40 mm
Stroke per focus knob rotation:	18.7 mm

- C-FMBN Focus Mount

Focusing stroke:	50 mm
Stroke per focus knob rotation:	18.7 mm

- C-FMCN Focus Mount

Focusing stroke:	50 mm (35 mm when attached to the stand's support without an anti-drop collar)
Stroke per focus knob rotation:	Coarse control, 18.50 mm Fine control, 3.27 mm

- C-PSN/C-PSCN Plain Stand, C-DS Dia Illumination Stand, C-LEDS Hybrid LED Stand

Focusing stroke:	100 mm
Stroke per focus knob rotation:	21.7 mm

Focusing on a sample by vertically moving the stand's support

The P-DSL32 LED Diascopic Illumination Stand and P-DSF32 Fiber Diascopic Illumination Stand have a focus dial at the base front. Turn the dial to move the stand's support vertically and focus on a sample with height variations.

8 Changing the Magnification

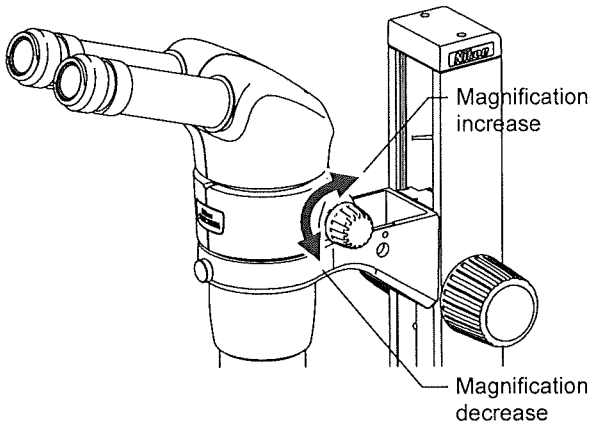
Besides changing the magnification with the zooming body, this microscope system enables the magnification to be changed by switching the objectives when used with a double-hole nosepiece and equipped with two objectives of different magnification ratios.

8.1 Image Zooming

The magnification of the zooming body can be changed by turning the zoom knobs.

The figure shows the knob turning direction and the corresponding changes in magnification.

- **Turning the knob backward: Magnification increase**
- **Turning the knob forward: Magnification decrease**



Zooming in/out

■ **Magnification and zoom ratio**

SMZ800N:	1x to 8x, 8:1
SMZ1270/SMZ1270i:	0.63x to 8x, 12.7:1

Total magnification

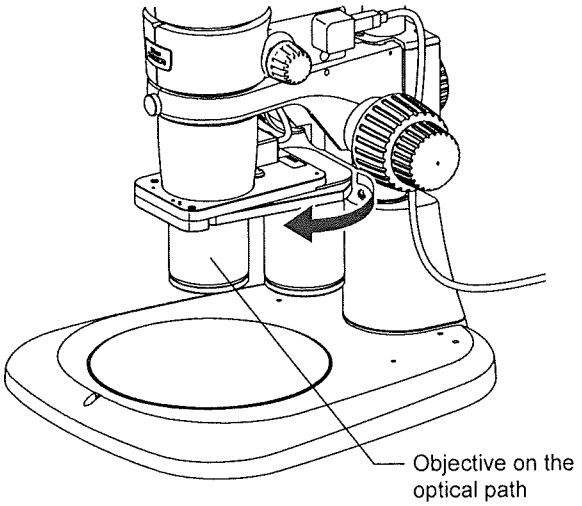
The total magnification of the microscope is determined by the formula below:

Total magnification = zoom magnification x object's magnification x eyepiece's magnification

- When using a vertical tube, replace the eyepiece's magnification with the C mount adapter lens' magnification to calculate the total magnification.

3.2 Switching Objectives (Using a Double-hole Nosepiece)

Turn the nosepiece to switch objectives. Check that the nosepiece stops at a click position when turned. There are two types of nosepieces: a standard type and a type with the status detection function. For details, see Chapter 4, "3 Nosepiece." For details on the attachable objectives, see Chapter 4, "4 Objectives."



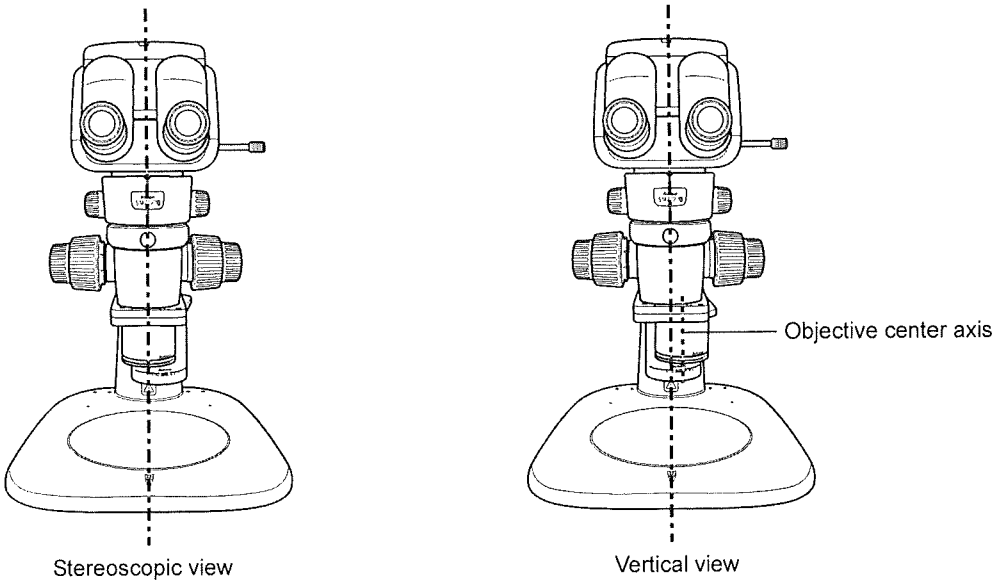
Switching objectives

■ Stereoscopic view and vertical view

A nosepiece has two click positions for each objective.

The view state can be changed between stereoscopic view and vertical view according to the click position. Microscopy can be performed in the vertical position when needed, such as when taking images of the sample.

The click position that an objective is in can be checked by viewing the position of the objective from the front.



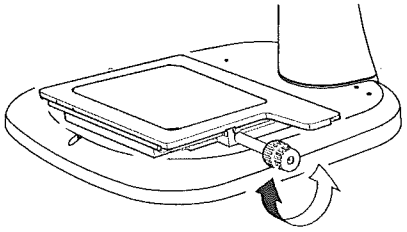
Objective position (stereoscopic view and vertical view)

9 Shifting a Sample

To view another part of a sample during microscopy, use the following procedure to shift the sample.

9.1 Shifting the Stage in the X and Y Directions (P-SXY64 XY Stage)

Turn the XY shift knob of the P-SXY64 XY Stage mounted in place instead of the stage plate to shift the sample on the glass plate and change the part to be observed.



Shift using the P-SXY64 XY Stage

■ **XY stroke of the stage with the X/Y shift knob and stroke per knob rotation**

X: 150 mm; 37.5 mm per rotation
Y: 65 mm (from the optical path, 50 mm towards the front, 15 mm towards the rear); 24.1 mm per rotation

* Also see Chapter 4, "8.1 P-SXY64 XY Stage."

9.2 Using Other Stages

Remove the stage plate from the base and attach the C-SSL DIA Sliding Stage or C-TRS Tilting Stage in place so that the sample can be tilted or moved slightly.

10 Using Episcopic Illumination

The microscope system enables episcopic illumination when used with the devices listed below. All of these devices use LEDs as the light source and provide uniform illumination.

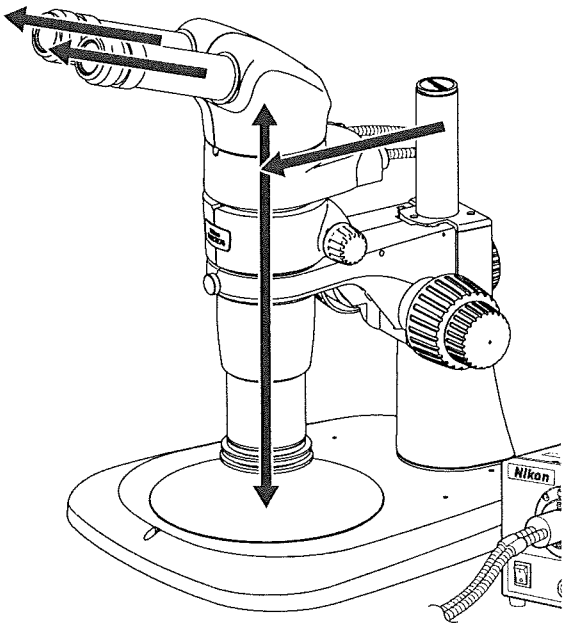
Illumination emitted from the light source is passed through the objective or directly onto the sample by the fiber and the image created by the light reflected by the sample is observed. Episcopic illumination is used for observing samples which do not transmit light such as metal and mineral sections.

In addition, if a P-CI Coaxial Epi Illuminator is attached, illumination can be emitted along the optical axis, and this gives good results when observing samples such as metallic mirrors, resins with smooth surfaces, and semiconductor wafers.

See Chapter 4, "10 Episcopic Illuminator" and select the appropriate device based on the objective of the microscopy to be performed.

- P-CI Coaxial Epi Illuminator
- C-FDF Flexible Double Arm Fiber Illumination Unit
- C-FID2 Double Arm Fiber Illuminator
- C-FIR Ring Fiber Illumination Unit
- C-LSL LED Epi Illuminator
- C-LEDS Hybrid LED Stand

For operations related to light sources such as brightness adjustment, refer to the instruction manual for the light sources.



Episcopic illumination with the P-CI Coaxial Epi Illuminator

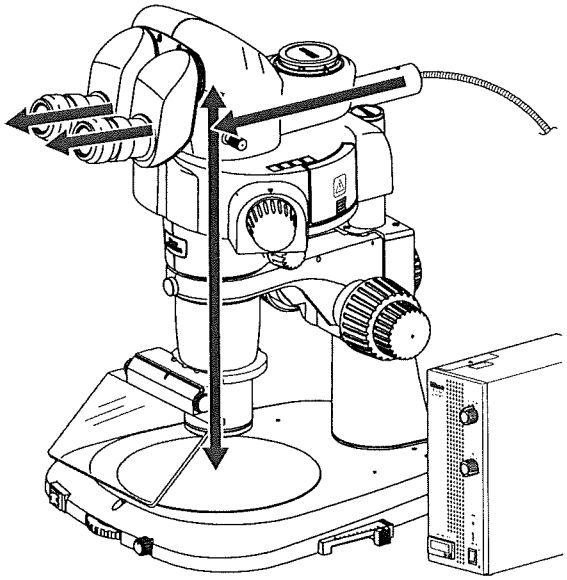
11 Using Epi-Fluorescence Illumination

Epi-fluorescence microscopy used for observing fluorescence images requires an optical element such as a fluorescence filter and a bright light source such as mercury lamp.

With a filter cube attached to the turret inside the device, the filter cube is brought into the optical path by the rotation of the turret, resulting in the generation of epi-fluorescence illumination. The light source is a precentered high-intensity mercury lamp.

Illumination led from the light source to the device by the HG fiber passes through a fluorescence filter and emits excitation light to the sample so that fluorescent images can be observed.

For operations related to light sources such as brightness adjustment, refer to the instruction manuals of the light sources.

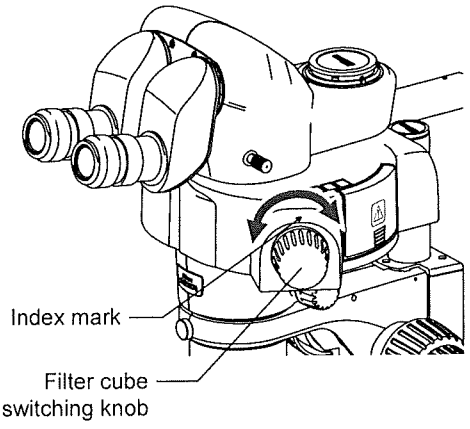


Epi-fluorescence illumination with the epi fluorescence attachment

> ⚠ **WARNING**
>
> The light source used with the epi fluorescence attachment (mercury lamp) requires special care during handling because of its characteristics. Make sure you are familiar with and observe all warnings and cautions described at the beginning of this instruction manual.

11.1 Switching Filter Cubes

Up to four filter cubes can be attached to the turret of the epi fluorescence attachment. Turn the turret using the filter cube switching knob. Select a turret address number (1 to 4) indicated on the knob to bring the filter cube corresponding to the address number into the optical path.



Switching filter cubes

11.2 Selecting a Filter Cube

The epi fluorescence attachment can be equipped with the following filter cubes:

- P-EFL GFP-B Filter Cube and P-EFL GFP-L Filter Cube: Used for fluorescence observation at a given wavelength.
- P-EFLC Filter Cube: Used for fluorescence observation at an arbitrary wavelength when combined with arbitrary filters, for example.
- P-EFLBF Filter Cube (Bright Field): Used for episcopic bright-field observation.
- Empty cubes (three cubes supplied with an epi-fluorescence attachment): Used when performing diascopic illumination observation using the epi-fluorescence attachment.

11.3 Important Notes for Epi-Fluorescence Microscopy

■ Using non-fluorescent slide glass and cover glass

When performing fluorescence observation of samples with a slide glass or cover glass, be sure to use non-fluorescent slide glass or cover glass to obtain a high-contrast image.

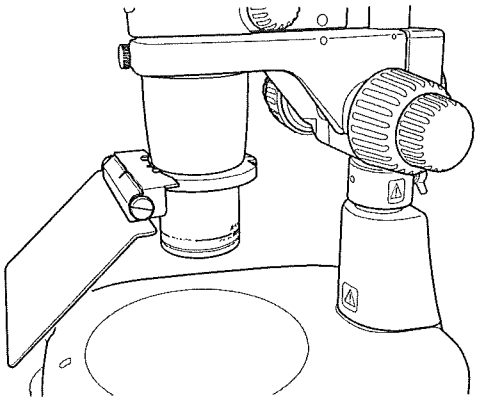
■ Locating a target in the sample

For epi-fluorescence microscopy, Nikon recommends locating a target using bright-field diascopic illumination (OCC illumination) and then switching to epi-fluorescence, rather than emitting strong excitation light to the sample from the beginning. When doing so, follow the operational tips below:

- Start with low magnification under bright-field diascopic illumination.
- If the sample is not transparent, use the P-EFLBF Filter Cube (Bright Field) to obtain the entire image by reflected light.
- Gradually increase the magnification. When the target becomes difficult to locate, switch to epi-fluorescence and use low excitation light.

■ Protection from ultraviolet light (light shielding plate)

The light shielding plate is used to prevent ultraviolet light reflected by the sample, which is originally emitted through the objective, from entering the observer's eyes.



Using the light shielding plate

12 Using Diascopic Illumination

The microscope system enables diascopic illumination when used with the devices listed below. Diascopic illumination stands that use LEDs as the light source provide bright and uniform illumination.

Observe an image visible by diascopic illumination that passes through the sample and enters the objective. Diascopic illumination is used for observing transparent substances such as macromolecular compounds, fibers, and glass and tissue sections and biological specimens in petri dishes.

In addition, optional devices can be attached to enable dark-field diascopic illumination and diascopic simplified/polarized illumination. This enables observation of samples that are difficult to observe using ordinary bright-field diascopic illumination such as transparent materials and crystals and tissues and minute organisms in culture solutions.

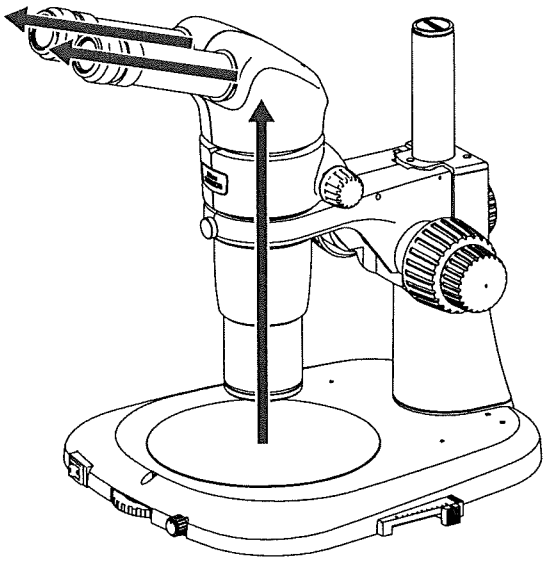
When performing microscopy using diascopic illumination with a C-FMCN Focus Mount attached, match the observation axis with the optical axis of the diascopic illumination stand as follows:

(1) Set the zoom magnification to the smallest.

(2) Loosen the fixing knob of the C-FMCN Focus Mount.

(3) Move the C-FMCN Focus Mount to align the observation axis with the optical axis of the diascopic illumination stand. Be careful not to make the periphery dark.

(4) Tighten the fixing knob of the C-FMCN Focus Mount.



Diascopic illumination with the P-DSL32 LED Diascopic Illumination Stand

Lossen the fixing knob of the C-FMCN Focus Mount before aligning the optical axes.

Do not move the C-FMCN Focus Mount before loosening the fixing knob of the C-FMCN Focus Mount. Doing so may cause failure or malfunction.

See Chapter 4, "12 Diascopic Illuminator" and select the appropriate device based on the objective of microscopy.

- C-DS Dia Illumination Stand
- C-LEDS Hybrid LED Stand
- P-DSL32 LED Diascopic Illumination Stand
- P-DSF32 Fiber Diascopic Illumination Stand
- P-DF LED Dark Field Unit
- C-POL Simple Polarizing Attachment

Empty cube

When an epi-fluorescence attachment is mounted, check that the empty cube of the attachment is in the optical path.

OCC illumination

The P-DSL32 LED Diascopic Illumination Stand and P-DSF32 Fiber Diascopic Illumination Stand support OCC illumination (oblique illumination). OCC illumination, which offers high contrast, is appropriate for microscopy of phase objects.

13 Capturing Images

The microscope system can capture images of the sample being observed when a camera such as a DS camera head is attached to the vertical tube via a TV tube adapter or C-mount adapter.

13.1 Procedure for Capturing Images

Follow the procedure below to capture images. For the camera settings, refer to the instruction manual for the DS-L3 or DS-U3.

Using the DS-L3

Specify the following items beforehand.

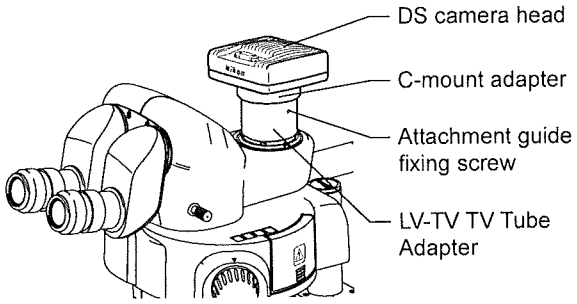
- Folder to save
- Name of the save file (or select Auto.)
- File format and file size of the save file
- Date and destination of the data

(1) Adjust the illumination of the microscope correctly and focus the sample image.

(2) Adjust the mounting orientation of the DS camera head.

For details on attaching a camera head, see [12] Attach a Camera in Chapter 5, "3.3 Assembling Other Devices (Optional)."

Since shifting a sample horizontally causes the image on the monitor to move horizontally, loosen the attachment guide fixing screw and adjust the orientation of the camera. After making the appropriate adjustments, tighten the screw.



Adjusting the camera orientation

(3) Select the camera scene mode suitable for the microscopy type.

(4) Adjust the camera's white balance.

When using diascopic illumination, first capture an image of the top surface of the stage plate. When using episcopic illumination, first capture an image of any white subject. Then, press the WB button to execute white balance adjustment. (For fluorescent photomicrography, Nikon recommends adjusting the white balance under normal bright-field microscopy conditions before capturing images.)

(5) Adjust the position of the sample.

(6) Readjust the focus on the target.

(7) Adjust the image brightness using the camera exposure compensation function.

(8) Press the Pause button on the DS-L3 to check the image.

(9) Save the image if acceptable.

To save the image, press the capture button on the DS-L3.

13.2 Tips on Microscope Settings for Photomicroscopy

■ Confirming the photomicrographic range

The image on the monitor represents the photomicrographic range.

■ Adjusting to eliminate extraneous light

Cover the eyepiece with a piece of cloth or similar item.

■ Protecting fluorescent images from decoloration

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

- **Adjusting the excitation light**

  Excessively bright excitation light will accelerate the decoloration of the sample making it more difficult to obtain suitable fluorescent images. Use the ND filter of the light source to perform adjustment.

- **Sample**

  Photomicrography of the color-fading portion requires a prolonged exposure time resulting in poor color reproduction and low-quality images. Move the sample so that an image of the portion that has not been exposed to excitation light can be captured. To obtain the best results, use the diascopic illumination method to select a specimen section for photomicrography, and then switch to the fluorescent method to capture the image.

- **Using the shutter**

  When not performing observation, close the shutter.

■ Adjusting the brightness of the image on the monitor

When observing images on the monitor via a camera, the brightness can be changed also by making an adjustment on the camera side, for example, by changing the display mode, exposure mode and photometry mode, by compensating the exposure or by adjusting the image level.

For details, refer to the instruction manual for the DS-L3 or DS-U3.

Chapter

4

Functions and Operations of the Devices

This chapter describes the main functions and procedure for using the devices.

1 Zooming Body

There are two types of zoom bodies: the SMZ800N Zooming Body with a zoom magnification of 1x to 8x and the SMZ1270/SMZ1270i Zooming Body with a zoom magnification of 0.63x to 8x. The SMZ1270i zooming body is equipped with a magnification detection function.

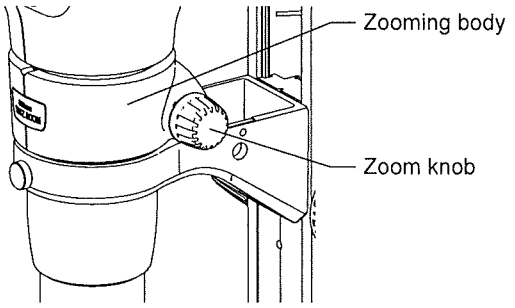
1.1 SMZ800N Zooming Body

The SMZ800N Zooming Body is for parallel-optics stereo microscopes. Attach it to various types of focus mounts or stands with focus knobs.

Attach an objective to the objective mount. Up to two objectives can be attached if a P-RN2 Nosepiece is attached between the zooming body and objectives.

For information on usable objectives, see "4 Objectives."

Attach a tube to the tube mount round dovetail. Microscope system functions can be extended by assembling a device such as a coaxial epi illuminator or an epi fluorescence attachment between the zooming body and the tube.



SMZ800N Zooming Body

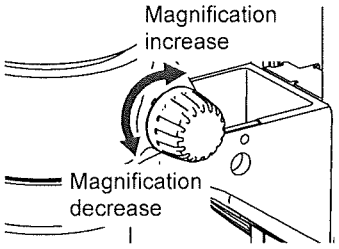
Zoom images in or out using the zoom knobs on the right and left sides of the zooming body.

Turning the knob backward: Magnification increase
Turning the knob forward: Magnification decrease

Turning the knob causes the magnification to continuously change in the range from 1x to 8x (zoom ratio: 8:1).

Magnification values are marked on the zoom knobs.

The zoom knob click stops operate at the 2x, 3x, 4x, 5x, 6x, and 7x positions. It is also possible to deactivate the click stop function.

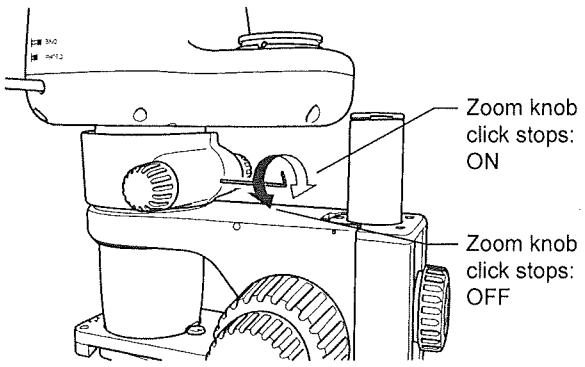


Zooming in/out

■ **Activating and deactivating zoom click stops**

Insert the hex wrench (nominal designation: 2) supplied with the zooming body into the hole on the rear side of the right zoom knob.

Turn the internal screw clockwise to activate click stops. Turn it counterclockwise to deactivate click stops.



Activating and deactivating zoom click stops

1.2 SMZ1270 Zooming Body, SMZ1270i Zooming Body

The SMZ1270 Zooming Body is for parallel-optics stereo microscopes. Attach it to various types of focus mounts or stands with focus knobs.

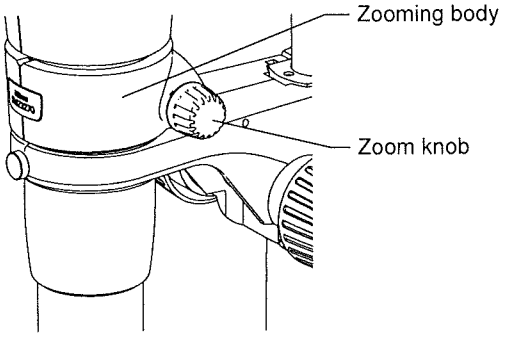
Attach an objective to the objective mount. Up to two objectives can be attached if a nosepiece is attached.

For information on usable objectives, see "4 Objectives."

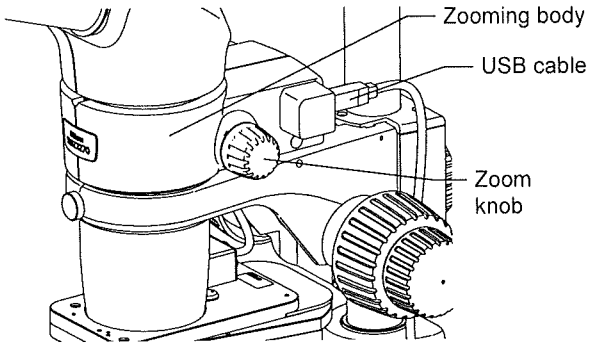
Use a P-RN2 Nosepiece with the SMZ1270 Zooming Body, and a P-RNI2 Intelligent Nosepiece with the SMZ1270i Zooming Body with a built-in magnification detection function.

The status information of the P-RNI2 Intelligent Nosepiece and the magnification information is sent to the SMZ1270i via a nosepiece cable, and output to a DS-L3 Camera Control Unit or a PC (NIS-Elements) via a USB.

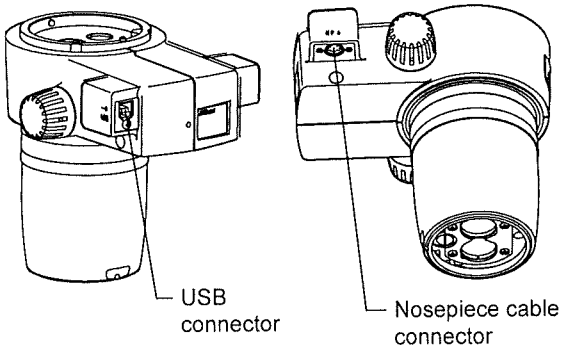
Attach a tube to the tube mount round dovetail. Microscope system functions can be expanded by assembling a device such as a coaxial epi illuminator or an epi fluorescence attachment between the zooming body and the tube.



SMZ1270 Zooming Body



SMZ1270i Zooming Body



SMZ1270i Zooming Body connectors

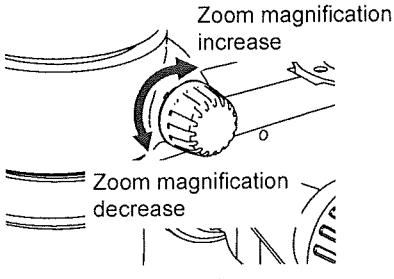
Zoom in or out images using the zoom knobs on the right and left sides of the zooming body.

Turning the knob backward: Magnification increase
Turning the knob forward: Magnification decrease

Turning the knob causes the magnification to continuously change in the range from 0.63x to 8x (zoom ratio: 12.7:1).

Magnification values are marked on the zoom knobs.

The zoom knob click stops operate at the 1x, 2x, 3x, 4x and 6x positions. It is also possible to deactivate the click stop function.



Zooming in/out

■ **Activating and deactivating zoom click stops**

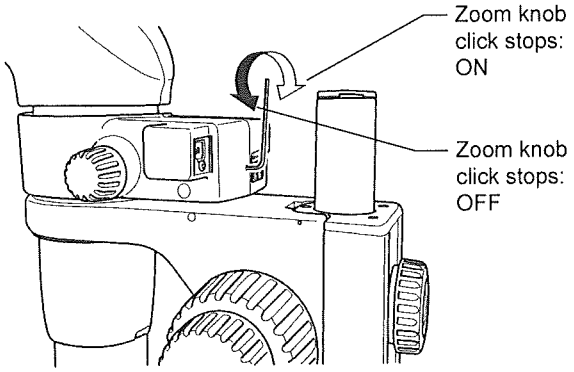
Insert the hex wrench (nominal designation: 2) supplied with the zooming body into the hole on the rear side of the right zoom knob.

Turn the internal screw clockwise to activate click stops. Turn it counterclockwise to deactivate click stops.

> **If a hex wrench cannot be easily turned**
>
> Loosen the zooming body fixing screw on the focus mount, turn the zooming body to the right and left, and then use the hex wrench if it cannot be used easily in the assembled state.

Disconnect the cables connected to the SMZ1270i

Before enabling or disabling the zoom click stops on the SMZ1270i Zooming Body, disconnect the USB cable and nosepiece cable connected to the zooming body. Reconnect the cables after the click stop setting.



Activating and deactivating zoom click stops (The SMZ1270i is used as an example.)

2 Focus Mount

There are three types of focus mounts: the C-FMAN Focus Mount and C-FMBN Focus Mount which attach to various kinds of universal stands, and the C-FMCN Focus Mount which attaches to various kinds of stands with a 32 mm dia. support for stereo microscopes SMZ800N/SMZ1270/SMZ1270i.

2.1 C-FMAN Focus Mount

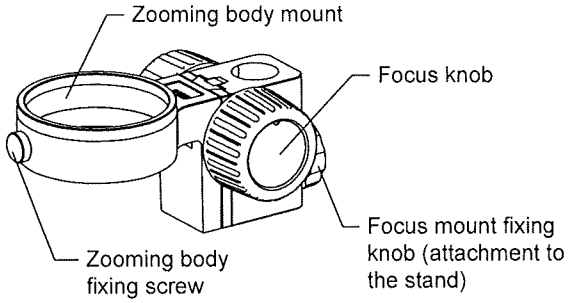
The C-FMAN Focus Mount attaches to a P Universal Stand with a support of 24.5 mm dia. to form a stereo microscope.

Turn the right and left focus knobs to move the zooming body vertically and focus on samples.

Turn the right and left focus knobs in opposite directions to adjust the torque of the focus knob. If the torque is too low, the vertical position of the zooming body may slide easily. Adjust the torque to an appropriate level.

- Turning the focus knob backward: Upward movement
- Turning the focus knob forward: Downward movement
- Focusing stroke: 40 mm
- Stroke per focus knob rotation: 18.7 mm

* A double-hole nosepiece cannot be used together with a zooming body that has a C-FMAN Focus Mount attached.



C-FMAN Focus Mount

2.2 C-FMBN Focus Mount

The C-FMBN Focus Mount attaches to a G-US1 Universal Table Clamp Stand or a G-US2 Universal Table Stand to form a stereo microscope.

Turn the right and left focus knobs to move the zooming body vertically and to focus on samples.

Turn the right and left focus knobs in opposite directions to adjust the rotation torque of the focus knob. If the torque is too low, the vertical position of the zooming body may slide easily. Adjust the torque to an appropriate level.

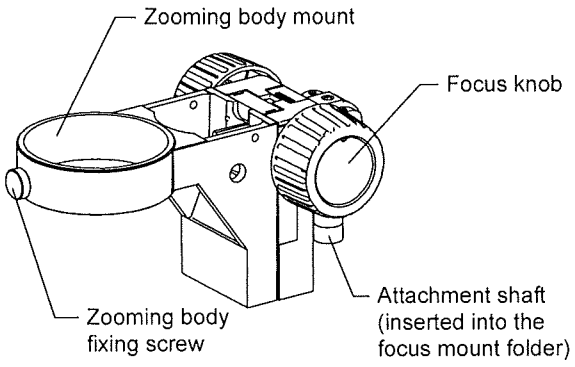
In addition, the zooming body can be inclined by loosening a set screw on the support. This is useful when observing an inclined sample or using the focus mount on other devices such as a wire bonder.

- Turning the focus knob backward: Upward movement
- Turning the focus knob forward: Downward movement
- Focusing stroke: 50 mm
- Stroke per focus knob rotation: 18.7 mm
- Angle of inclination at the mount: 180°

* A C-LSL LED Epi Illuminator can be attached to the C-FMBN Focus Mount directly or via an SMZ-U Epi Arm or a G-EIA Flexible Arm.

* A double-hole nosepiece cannot be used together with a zooming body that has a FMBN Focus Mount attached.

* The C-FMBN Focus Mount has an antistatic function.



C-FMBN Focus Mount

2.3 C-FMCN Focus Mount

The C-FMCN Focus Mount is a focus mount for stereo microscopes SMZ800N/SMZ1270/SMZ1270i and is attachable to the various stands with a support of 32 mm dia.

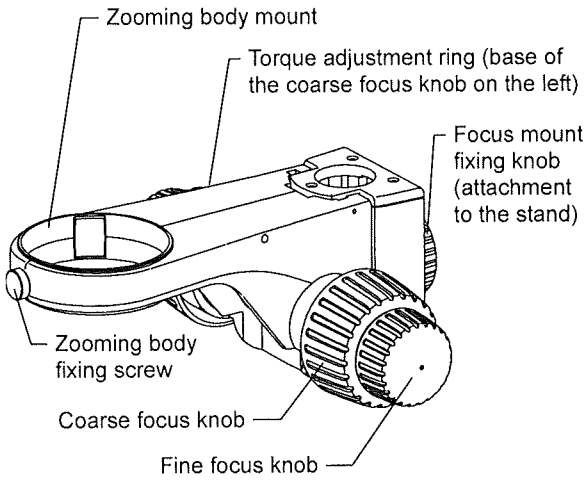
Turn the single-axis coarse and fine knobs on both sides to move the zooming body vertically and focus on samples.

Adjust the focus knob torque using the torque adjustment ring at the base of the coarse focus knob on the left.

- Turning the focus knob backward: Upward movement
- Turning the focus knob forward: Downward movement
- Focusing stroke: 50 mm (35 mm when attached to the stand's support without an anti-drop collar)
- Stroke per coarse focus knob rotation: 18.7 mm
- Stroke per fine focus knob rotation: 3.27 mm

* A C-LSL LED Epi Illuminator can be attached to the C-FMCN Focus Mount via an SMZ-U Epi Arm or a G-EIA Flexible Arm.

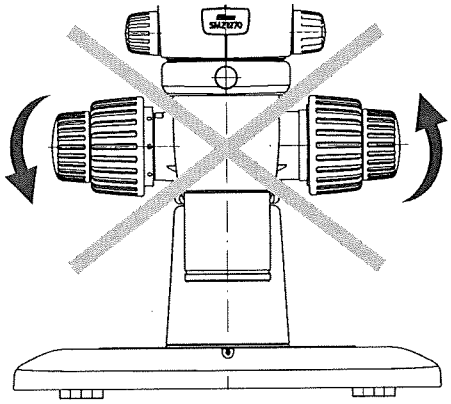
* A double-hole nosepiece can be used together with a zooming body that has a C-FMCN Focus Mount attached.



C-FMCN Focus Mount

Notes on turning the focus knobs

- Do not turn (or twist) the right and left focus knobs in opposite directions at the same time. Doing so may cause malfunction.
- When a focus knob reaches its rotational limit for the unit's vertical movement, do not forcibly turn it further. Doing so may cause malfunction.



Do not turn the knobs in opposite directions!

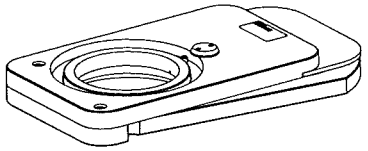
3 Nosepiece

There are two types of double-hole nosepiece: The standard P-RN2 Nosepiece and the P-RNI2 Intelligent Nosepiece equipped with the status detection function.

3.1 P-RN2 Nosepiece

Attach the P-RN2 Nosepiece to the objective mount of the SMZ800N Zooming Body or the SMZ1270 Zooming Body.

Two objectives attached to the nosepiece can be switched by turning the nosepiece. Vertical observation with a single-side optical path is also possible.



P-RN2 Nosepiece

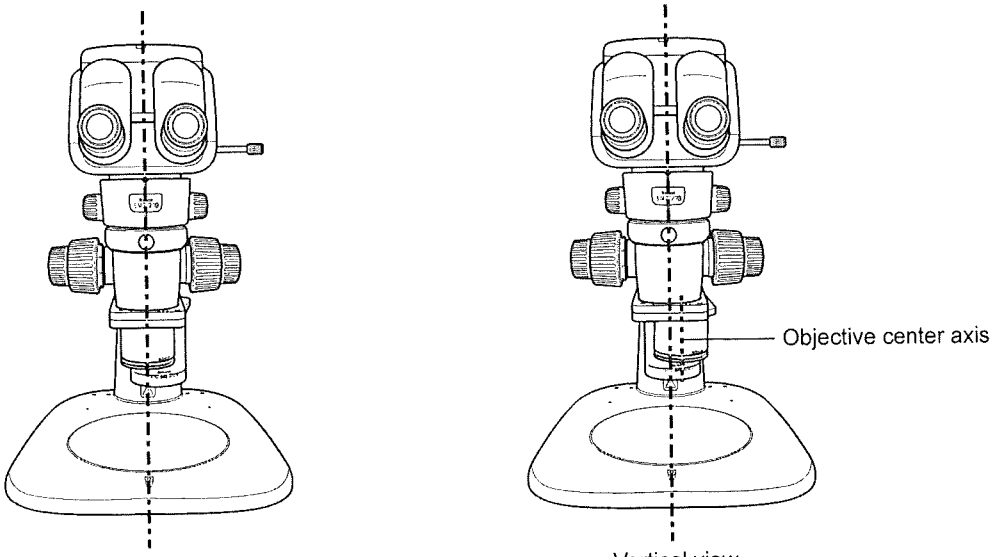
■ **Stereoscopic view and vertical view**

The nosepiece has two click positions for each objective.

The view state can be changed between stereoscopic view and vertical view according to the click position.

Microscopy can be performed in the vertical position when needed, such as when taking images of the sample.

The click position that an objective is in can be checked by viewing the position of the objective from the front.



Objective position (stereoscopic view and vertical view)

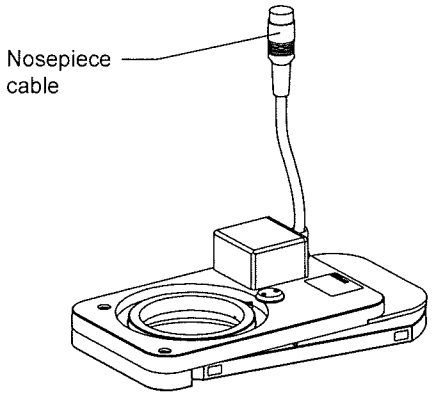
3.2 P-RNI2 Intelligent Nosepiece

This nosepiece has a function for detecting the address of an objective. Attach it to the objective mount on the SMZ1270i Zooming Body.

The two objectives attached to the nosepiece can be switched by turning the nosepiece. Vertical observation with a single-side optical path is also possible.

For details on vertical observation, see the previous section 3.1, "P-RN2 Nosepiece - ■ Stereoscopic view and vertical view."

Objective address, stereoscopic/vertical view information is sent to the SMZ1270i Zooming Body via a nosepiece cable, and then output to a DS-L3 Camera Control Unit or a PC (NIS-Elements).



P-RNI2 Intelligent Nosepiece

4 Objectives

The microscope system supports the objectives in the following table.

Attach objectives to the zooming body or nosepiece.

Model	Magnification	NA (max.)	Working distance	Objective mount
P-Achro 0.5X *	0.5x	0.053	189 mm	M58 x 1.25
P-ED Plan 0.75X	0.75x	0.079	117 mm	
P-Plan 1X *	1x	0.105	78 mm	
P-ED Plan 1.5X/WF	1.5x	0.158	44 mm	
P-ED Plan 2X/WF	2x	0.21	35 mm	
P-Plan Apo 0.5X/WF	0.5x	0.053	82.5 mm	
P-Plan Apo 0.75X/WF	0.75x	0.079	107 mm	
P-Plan Apo 1X/WF	1x	0.105	70 mm	

Restriction

- P-Achro 0.5X, P-ED Plan 0.75X and P-Plan 1X cannot be used with SMZ1270/SMZ1270i.

Total magnification

The total magnification of the microscope is determined from the formula below:

Total magnification = zoom magnification x objective's magnification x eyepiece's magnification

- When using a vertical tube, replace the eyepiece's magnification with the C mount adapter lens' magnification to calculate the total magnification.

5 Stands (with Focus Knobs)

The stand is composed of a base, support and arm.
To focus on the sample, vertically move the zooming body attached to the arm using a focus knob on the support.

5.1 C-PSN/C-PSCN Plain Stand

These models do not have a diascopic illuminator installed in the base.

There are two types of stands: the C-PSN type with a standard size base and the space saving C-PSCN type with a small base. (The C-PSCN is not suitable for a top-heavy system such as when a camera is attached to the tube.)

Attach a zooming body to the zooming body mount on the arm.

The arm can also be attached 55 mm lower than the current height. (See Chapter 5, "3.1 Assembly of the Basic System - [1] Install a stand. - ■ C-PSN/C-PSCN Plain Stand's arm position change.")

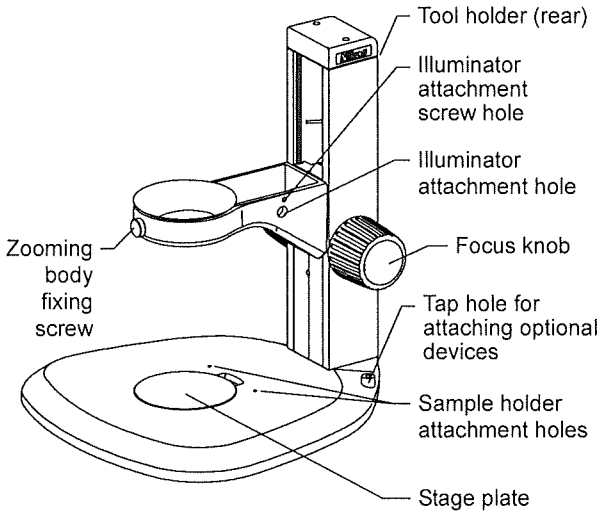
Turn the focus knobs on the support to move the zooming body vertically and focus on samples.

Turn the right and left focus knobs in opposite directions to adjust the focus knob torque. If the torque is too low, the vertical position of the zooming body may slide easily. Adjust the torque to an appropriate level.

- Focusing stroke: 100 mm
- Stroke per focus knob rotation: 21.7 mm

This stand is equipped with a stage base (90 mm dia.) that has a black and a milky white surface. Select the surface appropriate for the sample. This stage plate is attached to the base using a leaf spring and it can be swapped for the stage plate for ESD.

A stage clip (sample holder) can be attached to the base using the two stage clip attachment holes.



C-PSN Plain Stand

■ **Optional devices attachable to the stand**

- Stage clip
- C-LSL LED Epi Illuminator (attached directly or via a G-EIA Flexible Arm or an SMZ-U Epi Arm)
- C-FID2 Double Arm Fiber Illuminator
- Type-2 Sliding Stage
- C-TRS Tilting Stage

* A double-hole nosepiece can be used in combination with the zooming body with a C-PSN Plain Stand attached.

5.2 C-DS Dia Illumination Stand

This stand is equipped with a diascopic illumination function that uses a 6V20W halogen lamp or a C-DSLU LED Unit for Dia Illumination Stand as the light source.

For details, refer to the instruction manual supplied with the stand.

5.3 C-LEDS Hybrid LED Stand

This stand is equipped with a diascopic and episcopic illumination functions that use a white LED as the light source.

For details, refer to the instruction manual supplied with the stand.

6 Stand (Universal Model)

These stands are equipped with an arm that can be moved horizontally and vertically. Attach a focus mount to the arm when using a stand.

6.1 G-US1 Universal Table Clamp Stand

Clamp this stand to a table, etc. Attach a C-FMBN Focus Mount to the arm that can be moved horizontally and vertically. For details, refer to the instruction manual supplied with the stand.

6.2 G-US2 Universal Table Stand

This stand is equipped with a base. Attach a C-FMBN Focus Mount to the arm that can be moved horizontally and vertically. For details, refer to the instruction manual supplied with the stand.

6.3 P Universal Stand

This stand is equipped with a base. Attach a C-FMAN Focus Mount to the arm that can be moved horizontally and vertically. For details, refer to the instruction manual supplied with the stand.

7 Stands (Exclusive Model)

This stand series is exclusive to the stereo microscope system.

The stands are composed of a base and support with a large stage plate.

Attach a C-FMCN Focus Mount to the support.

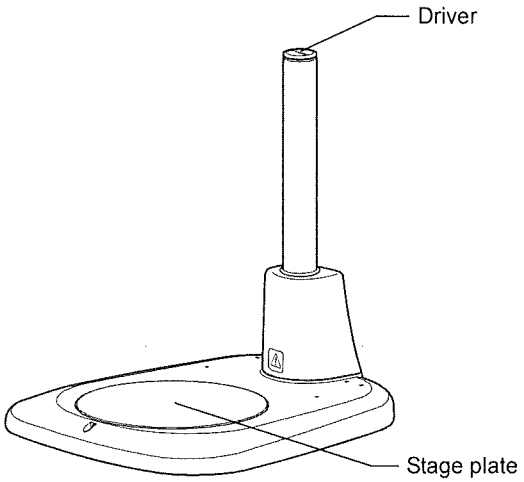
7-1 P-PS32 Plain Stand

This stand is equipped with a base without diascopic illuminator.

It is used with a C-FMCN Focus Mount attached to the support.

It is equipped with a stage plate (180 mm dia.) with black and milky white surfaces. Select the surface appropriate for the sample.

A dedicated hex driver is located at the top of the support.



P-PS32 Plain Stand

■ Attachable optional devices

The following devices can be attached optionally to this stand:

- P-SXY64 XY Stage
- Type-2 Sliding Stage
- C-SSL DIA Sliding Stage
- P-DF LED Dark Field Unit
- C-TRS Tilting Stage
- C-LSL LED Epi Illuminator (via an SMZ-U Epi Arm)
- C-FDF Flexible Double Arm Fiber Illumination Unit (via a C-FIDH Fiber Holder)
- C-FID2 Double Arm Fiber Illuminator

Tap holes for attaching optional devices

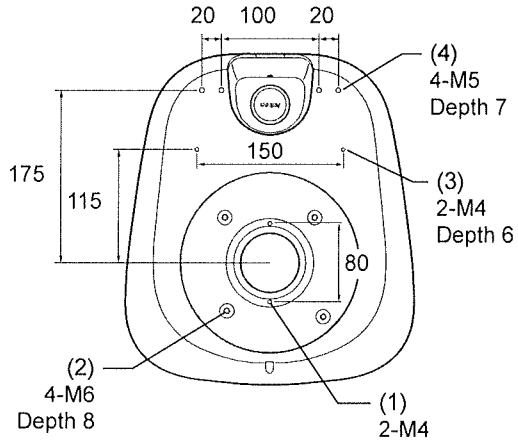
The base's top board has tap holes for attaching various devices. The tap holes do not go right the way through to prevent liquid penetrating into the base.

(1) 2-M4: Positioned under the stage plate attachment part of the base. Used for multiple purposes. Used for attaching a Type-2 Sliding Stage or a C-TRS Tilting Stage.

(2) 4-M6: Positioned under the stage plate attachment part of the base. Used for attaching a P-SXY64 XY Stage.

(3) 2-M4: Positioned at the center on the top surface of the base. Used for multiple purposes.

(4) 4-M5: Positioned at the rear on the top surface of the base. Used for attaching a C-FDF Flexible Double Arm Fiber Illumination Unit (via a C-FIDH Fiber Holder).



Tap holes for attaching optional devices

Exchange for a C-EP support

The support length is 100 mm longer than standard when the original support for this stand is exchanged for a C-EP support. This is useful for attaching the focus mount to a high position.

7.2 P-DSL32 LED Diascopic Illumination Stand

See "12.1 P-DSL32 LED Diascopic Illumination Stand."

7.3 P-DSF32 Fiber Diascopic Illumination Stand

See "12.2 P-DSF32 Fiber Diascopic Illumination Stand."

8 Stages

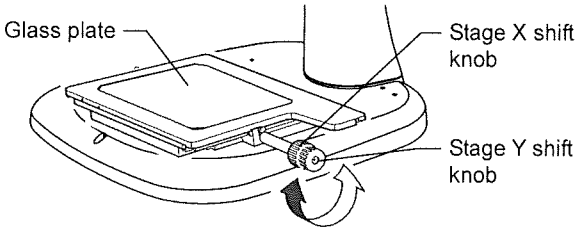
8.1 P-SXY64 XY Stage

This stage shifts the glass plate in the X and Y directions when the X/Y shift knobs are turned. Attach this stage instead of the stand base.

The height of the stage is 36.7 mm.

The glass plate measures 215 mm x 154 mm x 5 mm and is detachable.

Stage adapters for AZ are usable with the stage and a 45-mm dia. filter can be slotted into the optical-path hole on the lower board of the stage.



P-SXY64 XY Stage

[Usable stands]

- P-PS32 Plain Stand
- P-DSL32 LED Diascopic Illumination Stand
- P-DSF32 Fiber Diascopic Illumination Stand

■ **XY stroke of the stage with the X/Y shift knob and stroke per knob rotation**

X: 150 mm; 37.5 mm per rotation
Y: 65 mm (from the optical path, 50 mm towards the front, 15 mm towards the rear); 24.1 mm per rotation

■ **Load weight**

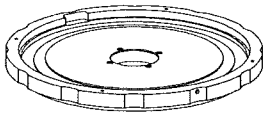
5 kg or less

8.2 C-SSL DIA Sliding Stage

This stage is movable in the range of ±19 mm in the radial direction by pressing the stage's side.

The height of the stage is 11.5 mm.

Attach the stage to the position where the stage plate was removed from the stand base. Attach the removed stage plate on the sliding stage.



C-SSL DIA Sliding Stage

[Usable stands]

- P-PS32 Plain Stand
- P-DSL32 LED Diascopic Illumination Stand
- P-DSF32 Fiber Diascopic Illumination Stand
- C-DS Dia Illumination Stand

8.3 Type-2 Sliding Stage

This stage is movable in the range of ±20 mm in the radial direction.

The height of the stage is 17.7 mm.

Attach the stage to the position where the stage plate was removed from the stand base. Attach the removed stage plate on the sliding stage.

When this stage is used with a P-PS32 Plain Stand, a 90-dia. SM Acrylic Plate (optional) is required separately. In this case, the height of the stage is 16.7 mm. The stage is securely attached to the P-PS32 using bolts. For details, see Chapter 5, "3.2 Assembly of Other Devices (Optional) - [8] Attach a type-2 sliding stage."

Type-2 Sliding Stage

[Usable stands]

- C-PSN/C-PSCN Plain Stand
- P-PS32 Plain Stand

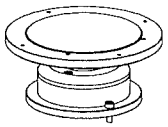
8.4 C-TRS Tilting Stage

This stage can be tilted within ±30° of the tilt range to observe samples. The rotation center of the tilt is positioned in the center on the upper plane of the stage.

Attach the stage to the position where the stage plate was removed from the stand base. Attach the removed stage plate or a 90-dia. SM Acrylic Plate (optional) on the sliding stage.

The height of the stage is 48 mm. (when horizontal)

For details, refer to the instruction manual for the C-TRS Tilting Stage.



C-TRS Tilting Stage

[Usable stands]

- P-PS32 Plain Stand
- P-DSL32 LED Diascopic Illumination Stand
- P-DSF32 Fiber Diascopic Illumination Stand
- C-PSN/C-PSCN Plain Stand
- C-DS Dia Illumination Stand
- C-LEDS Hybrid LED Stand

9 Tubes

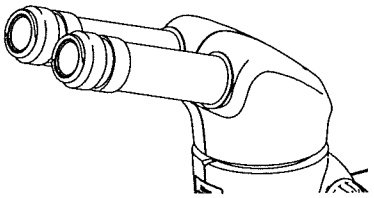
This microscope system can be used with the following tubes.

9.1 P-B Binocular Tube

This tube is the standard type for this microscope system. Attach two eyepieces of the same magnification (10x, 15x, 20x or 30x) to the binocular eyepiece sleeve in order to observe erected images.

The depression angle of the binocular eyepiece tube is 20°.

- Eye-point height (when used with 10x eyepieces): Approx. 121 mm from the mount joint (interpupillary of 58 mm)
- Field of view number: 22



P-B Binocular Tube

Note on adjusting the interpupillary distance
Do not apply excessive force to the binocular part during interpupillary distance adjustment. Doing so may cause unexpected failure or malfunction.

Combination with the P-IBSS2 Beam Splitter
When a P-B Binocular Tube is used in combination with a P-IBSS2 Beam Splitter2, the periphery may become dark in the low zoom magnification range.

9.2 Trinocular Tubes

There are three types of trinocular tubes as follows:

- Ergonomic eyepiece tube: P-TERG100 Trinocular Tilting Tube
  P-TERG50 Trinocular Tilting Tube
- Low-eyelevel eyepiece tube: P-TL100 Trinocular Tube

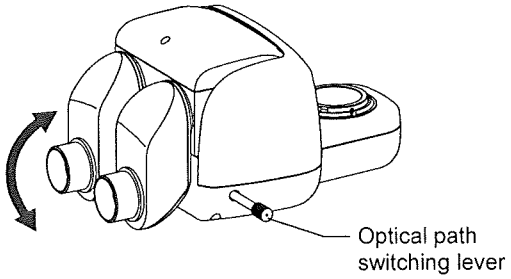
Attach two eyepieces of the same magnification (10x, 15x, 20x or 30x) to the binocular eyepiece sleeve in order to observe erected images.

Attach a camera such as a DS camera to the vertical tube via an adapter.

Using the optical path switching lever on the trinocular tube, switch the optical path between sample observation using the eyepieces and image capturing using a DS camera. The distribution of light (%) varies depending on the tube type. (See the table on the next page.)

On the ergonomic eyepiece tubes, moving the binocular eyepiece tube in the direction shown in the figure changes the angle of depression continuously between 0° to 30°. Select the optimal angle for microscopy. The depression angle for low-eyelevel eyepiece tube is 10° and cannot be changed.

- Eye point variation (ergonomic eyepiece tube with 10x eyepieces attached):
  Approx. 90 mm (25 to 115 mm from the mount joint)
- Eye-point height (Low-eyelevel eyepiece tube with 10x eyepieces attached):
  Approx. 48 mm from the mount joint
- Field of view number
  (Binocular eyepiece tube): 22
  (Vertical tube): 18



Adjusting the angle of depression

Notes on adjusting the depression angle and interpupillary distance

- Do not apply excessive force to the binocular part during depression angle or interpupillary distance adjustment. Doing so may cause unexpected failure or malfunction.
- When moving the binocular part, be careful not to catch your fingers in the rotary section at the bottom of the binocular part.

Distribution of light with optical path switching (%)

Tube	Lever position	Binocular part (BINO)		Vertical tube (PHOTO)*
		Left	Right	
P-TERG100 Trinocular Tilting Tube	Pulled out	100	100	0
	Pushed in	100	0	100
P-TERG50 Trinocular Tilting Tube	Pulled out	100	100	0
	Pushed in	100	50	50
P-TL100 Trinocular Tube	Pulled out	100	100	0
	Pushed in	100	0	100

* The light intensity of the left eye is always 100%. The light from the optical path of the right eye is diverted to the vertical tube. (The image in the right eye's optical path is captured.)

10 Episcopic Illuminators

The episcopic illuminators which can be used with this microscope system are a coaxial episcopic illuminator, which is attached between the zooming body and tube, a ring fiber illuminator, which is attached to the tip of the objective, and an illuminator that has a flexible fiber for adjusting the illumination direction.

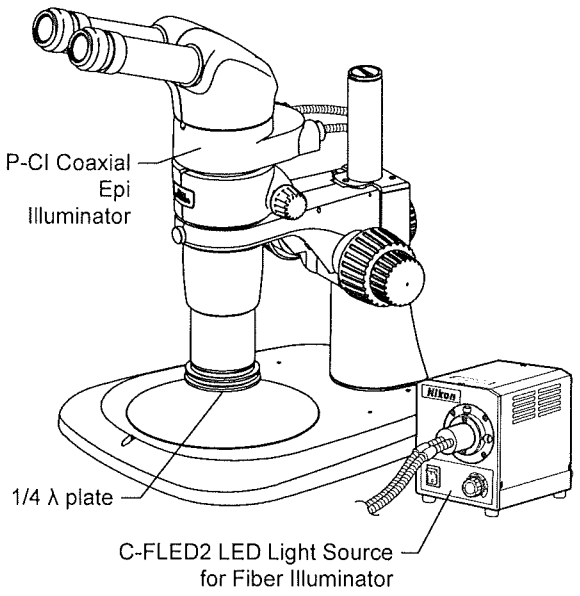
10.1 P-CI Coaxial Epi Illuminator

Attach this episcopic illuminator of 1.5x magnification to the position between the zooming body and the tube. The C-FLED2 LED Light Source for Fiber Illuminator is used as its light source. The light from the light source is led into the device by the two-branch fiber and episcopic illumination is generated along the optical axis. This illuminator is suitable for observing mirror-like samples.

A 1/4 λ plate (optional) is supplied to prevent flare in the imaging system due to light reflected into the optical system.

There are two types of 1/4 λ plates: a 1/4 λ plate for 1x or lower objective, and a 1/4 λ plate for 1.5x objective. Screw the plate in the tip of the corresponding objective.

The brightest illumination is generated when the yellow indication is at the front. Select the position that has the optimum brightness and contrast for observation.

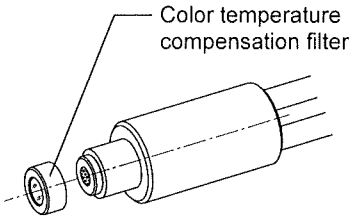


P-CI Coaxial Epi Illuminator

Color temperature compensation filter

If the image looks yellowish during coaxial episcopic observation, color shade can be adjusted by screwing a color temperature compensation filter into the tip of the fiber on the light source side.

Note that the brightness will be reduced approx. 50% when a color temperature compensation filter is used.



Fiber tip on the light source side

Restriction

See the following table for the types of objectives usable with the coaxial epi illuminator and the recommended zoom magnifications.

Usable objectives and recommended zoom magnifications

Objective	Zoom magnification	
	SMZ800N Zooming Body	SMZ1270/1270i Zooming Body
0.5X	3x -	4x -
0.75X	2x	2x
1X	1.5x -	1.5x -
1.5X	3x -	3x -
2X	Unusable	Unusable

* Shading or vignetting may occur in the low zoom magnification range.

For details on using the light source, refer to the instruction manual for the light source.

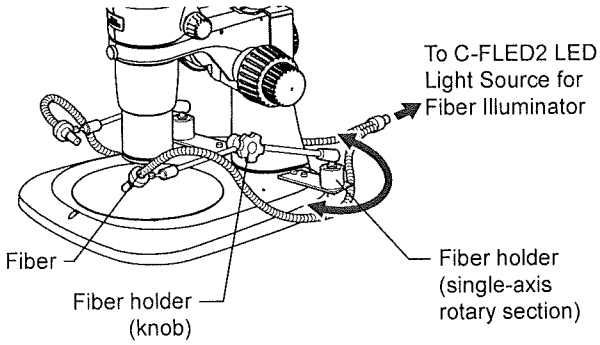
10.2 C-FDF Flexible Double Arm Fiber Illumination Unit

This illuminator for illuminating samples is a fiber connected to the C-FLED2 LED Light Source for Fiber Illuminator.

Two fibers are held by the C-FIDH Fiber Holder. The orientation of the holder's arm can be adjusted so that the tips of the fibers face the samples for illumination. For details on using the fiber holder, see "■ C-FIDH Fiber Holder."

> **Important note on handling fibers**
>
> Do not excessively bend or apply excess force to the fibers. Doing so may damage the fibers.

For details on the procedure for using a light source, refer to the instruction manual for the light source.



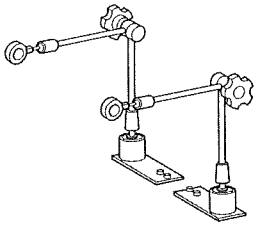
C-FDF Flexible Double Arm Fiber illumination Unit

■ C-FIDH Fiber Holder

This holds the tip of the flexible double-arm fiber. Mount the base of the holder to the base (stand) of the microscope system. The holder holds the tips of the fibers with the two arms extending from its base. The arms can be freely positioned in any direction. The positions of the arms can be firmly locked by tightening the knobs at the joints of the arms. The arms are connected with a mechanism that enables the arms to be freely swung centered around a single axis (Z axis). This allows the arms to be pushed aside without having to unlock the arm joints. If the arm position is returned by rotating it on the same axis, the arm will stop at the first lock position.

The C-FIDH Fiber Holder can be attached to the following stands:

- P-PS32 Plain Stand
- P-DSL32 LED Diascopic Illumination Stand
- P-DSF32 Fiber Diascopic Illumination Stand



C-FIDH Fiber Holder

10.3 C-FID2 Double Arm Fiber Illuminator

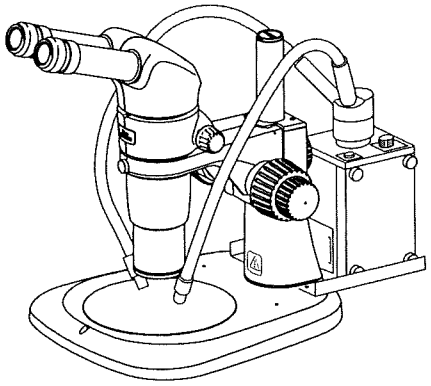
This illuminator for illuminating samples is a light guide connected to the C-FLED2 LED Light source for fiber illuminator.
The fiber is bifurcated at the mount to the light source. An interlock type covering mechanism enables adjustment of illumination position and orientation.

> **Important note on handling fibers**
>
> Do not excessively bend or apply excess force to the fibers. Doing so may damage the fibers.

The C-FID2 Double Arm Fiber Illuminator can be attached to the following stands:

- P-PS32 Plain Stand
- P-DSL32 LED Diascopic Illumination Stand
- P-DSF32 Fiber Diascopic Illumination Stand
- C-PSN/C-PSCN Plain Stand

For details on the procedure for using a light source, refer to the instruction manual supplied with the light source.



C-FID2 Double Arm Fiber Illuminator

10.4 C-FIR Ring Fiber Illumination Unit

The C-FIR Ring Fiber Illumination Unit is a ring shaped fiber illuminator that attaches to the external tip of the objective and connects to the C-FLED2 LED Light Source for Fiber Illuminator.

The edge face of the sample can be illuminated evenly using this ring-shaped fiber.

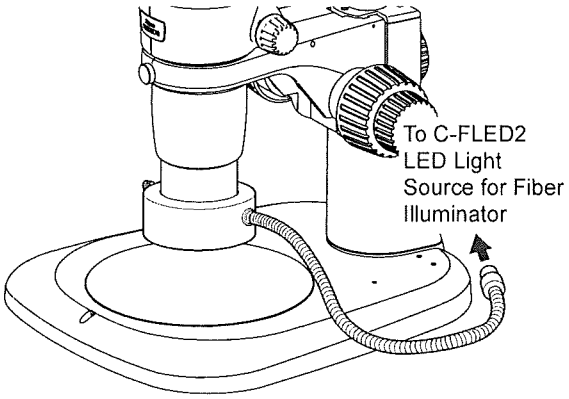
Restriction

The C-FIR Ring Fiber Illumination Unit cannot be used with the P-ED Plan 2X/WF.

Important notes on handling the fiber

Do not excessively bend or apply excess force to the fibers. Doing so may damage the fiber.

For details on the procedure for using a light source, refer to the instruction manual supplied with the light source.



C-FIR Ring Fiber Illumination Unit

10.5 Other Episcopic Illuminators

In addition to the illuminators with the episcopic illumination function described in Section 10.1 to Section 10.4, the C-LSL LED Epi Illuminator and C-LEDS Hybrid LED Stand can also be used.

The C-LEDS Hybrid LED Stand also has the diascopic illumination function. For details, refer to the instruction manual supplied with the illuminators.

11 Epi-Fluorescence Attachment

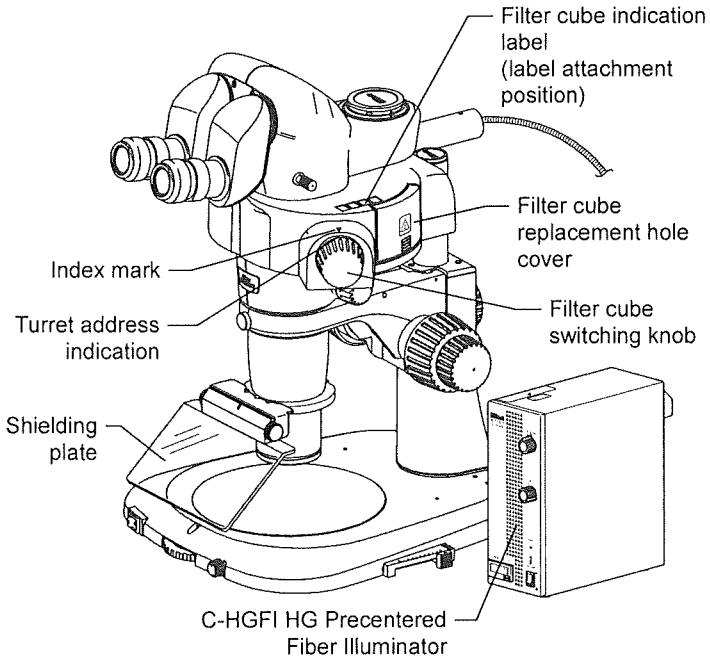
This microscope system can be used with the P-EFL Epi Fluorescence Attachment to perform epi-fluorescence microscopy.

11.1 P-EFL Epi Fluorescence Attachment

This epi-fluorescence attachment is used with filter cubes attached to the turret inside the attachment. Bring the desired filter cube into the optical path when performing epi-fluorescence microscopy. Install this attachment between the zooming body and the tube.

An HG precentered fiber illuminator is used as the light source. The light from the light source is introduced inside the attachment and led through the filter cubes attached to the turret for epi-fluorescence illumination.

Up to four cubes can be attached to the turret of the epi-fluorescence attachment. Turn the turret using the filter cube switching knob. Align a turret address number (1 to 4) displayed on the knob with the indicator to bring the filter cube of the selected address into the optical path.



P-EFL Epi Fluorescence Attachment

⚠ CAUTION

- Do not use the epi-fluorescence attachment while the filter cube replacement cover is open. Harmful light including ultraviolet light may leak and affect fluorescence observation.
- Immediately after diascopic observation using an epi-fluorescence attachment, the front face of the empty cube may become hot, resulting in burns. Do not touch the front face of the empty cube. Replace the empty cube several minutes after finishing the diascopic observation.

Be sure to attach four cubes to the turret.

Attach an empty cube at positions where no filter cube is required.

■ **Filter cube**

- P-GFP-B Filter Cube and P-GFP-L Filter Cube: Used for fluorescence observation at a given wavelength.
- P-EFLC Filter Cube: Used for fluorescence observation at an arbitrary wavelength when combined with arbitrary filters, for example.

  The sizes of the attachable filters and mirror are listed below:

  Excitation filter (EX): External diameter 18 mm, Thickness 8 mm or less
  Dichroic mirror (DM): Dimensions 18 mm x 26 mm, Thickness 1 mm or less
  Barrier filter (BA): External diameter 18 mm, Thickness 3.8 mm or less

  For details, refer to Chapter 5, "3.2 Assembly of Other Devices (Optional) - [3] Attach a P-EFL Epi Fluorescence Attachment."
- P2-EFLBF Filter Cube (Bright Field): Used for episcopic bright-field observation.
- Empty cube (Three cubes are supplied with an epi-fluorescence attachment): Used when performing diascopic illumination observation using the epi-fluorescence attachment.

Light shielding plate

The device is equipped with a light shielding plate for preventing the reflection of ultraviolet light. Use the light shielding plate when performing fluorescence microscopy. When in use, the light shielding plate can be pushed aside to positions up to 45° horizontally to the rear. When not in use, the plate can be pushed aside to positions up to 170°.

Episcopic bright-field observation

This is useful for viewing the entire opaque specimen during fluorescence observation.

Even though the P-EFLBF Filter Cube has a built-in UV-cut filter, adjust the light intensity to the appropriate level with the light source illuminator so that illumination is not too bright. In addition, two types of 1/4 λ plates are provided in order to prevent flares at the imaging system caused by the light reflected inside the optical system: the 1/4 λ plate for 1x or lower power objectives, and the 1/4 λ plate for 1x objectives. Attach a corresponding 1/4 λ plate to the tip of each objective.

Note the following points when using a P-EFLBF Filter Cube:

- Brightness differs between the right and left optical path when reflected light from mirror plane type specimens is observed.
- Double image may occur due to the built-in half mirror.
- The periphery of the image may not be clearly visible in the low zoom magnification range.
- The periphery of the image may become dark when an intermediate tube such as a beam splitter is used together.

OCC light shielding plate

When using an epi-fluorescence attachment in combination with a P-DSL32 LED Diascopic Illumination Stand, Nikon recommends closing the OCC light shielding plate on the dia-illumination completely. This can decrease background noise caused by intrinsic fluorescence in the diascopic illuminator.

For details on the procedure for using a light source, refer to the instruction manual for the light source.

12 Diascopic Illuminators

The primary diascopic illuminator for this microscope system consists of a stand equipped with an illuminating optical system. A dark-field illuminator and polarizing illuminator are also available.

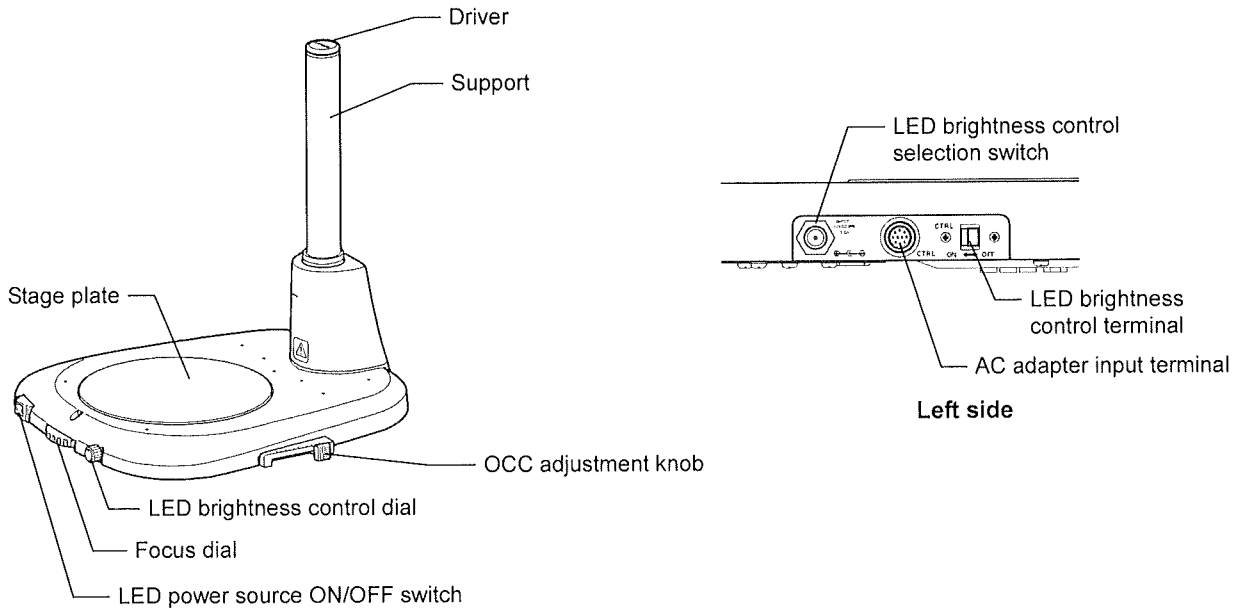
12.1 P-DSL32 LED Diascopic Illumination Stand

The P-DSL32 is a stand equipped with LED diascopic illumination systems and the focus mechanism of the support vertical movement type.

Attach a C-FMCN Focus Mount to the support.

The base with a large glass plate (180 mm dia.) enables observation of samples in a container such as a petri dish.

A dedicated hex driver is located at the top of the support.



P-DSL32 LED Diascopic Illumination Stand

■ Illumination control

Connect a 12 V AC adapter or a P2-CTLB Control Box to the power supply for illumination control.

[When a 12 V AC adapter is used as the power supply]

Check that the LED brightness control selection switch is turned off. In this state, the LED brightness control dial on the base is enabled. Move the LED power ON/OFF switch to the "|" (ON) position to turn on illumination. Turn the LED brightness control dial clockwise to increase the brightness.

[When the power is supplied from a control box]

To control illumination with a control box connected, the control rights must be assigned to the control box. Turn on the LED brightness control selection switch. In this state, the LED can be turned on or off, brightness can be adjusted and light intensity can be monitored from the control box.

For details, see "13 P2-CTLB Control Box."

- Brightness control selection switch Off: Assigns the control right to the base.
- Brightness control selection switch On: Assigns the control right to the control box.

■ OCC (oblique coherent contrast) illumination

This stand supports OCC illumination so that a transparent sample can be observed at high contrast using diascopic illumination with a white LED. OCC illumination is an oblique illumination method suitable for observing the phase objects, where a sample is obliquely illuminated with a coherent illuminating light by shielding a part of the optical path using a shading plate. With this illumination method, a colorless transparent sample can be observed with relief and contrast.

To adjust the OCC contrast, slide the OCC adjustment knob at the right front of the base back and forth. Adjust until the optimum observation state is obtained in combination with the selected magnification and phase amount of the sample. For ordinary bright-field microscopy under diascopic illumination, set the OCC adjustment control to the farthest position. Sliding the control gradually forward from that position will cause the OCC effect to increase. Sliding the control by 46 mm will result in a completely shielded state.

In addition, the control position can be reproduced using the OCC adjustment knob with a scale.

Usable objectives and recommended zoom magnifications

Objective	Zoom magnification	
	Bright-field diascopic illumination	OCC illumination
0.5X	1.5x - 8x	Contrast in the field of view is not uniform.
0.75X	1x - 8x	Contrast in the field of view is not uniform.
1X	Min. - 8x	5x - 8x
1.5X	Min. - 8x	3x - 8x
2X	2.5x - 8x	1.5x - 8x

* Shading may occur in the low zoom magnification range.

> **Increasing contrast of the OCC observation image**
>
> For observations of the OCC observation image with higher contrast, remove the filter dropping ring (attached to the base optical path immediately under the glass plate). The contrast can be increased by removing the filter dropping ring that contains a diffuser plate to control excess contrast for OCC.

■ Focusing mechanism

The support moves vertically using the focus dial at the front of the base so that samples with height variations can easily be in focus.

- Focusing stroke: 6.2 mm
- Stroke per focus dial rotation: 3.24 mm

■ Attachable optional devices

The following devices can be attached optionally to this stand:

- P-SXY64 XY Stage
- C-SSL DIA Sliding Stage
- P-DF LED Dark Field Unit
- C-TRS Tilting Stage
- C-LSL LED Epi Illuminator (via an SMZ-U Epi Arm)
- C-FDF Flexible Double Arm Fiber Illumination Unit (via a C-FIDH Fiber Holder)
- C-FID2 Double Arm Fiber Illuminator
- C-POL Simple Polarizing Attachment

> **45-mm dia. filter**
>
> A 45-mm dia. filter (no thicker than 5 mm) can be dropped onto the filter dropping ring (attached to the base optical path immediately under the glass plate).

Tap holes for attaching optional devices

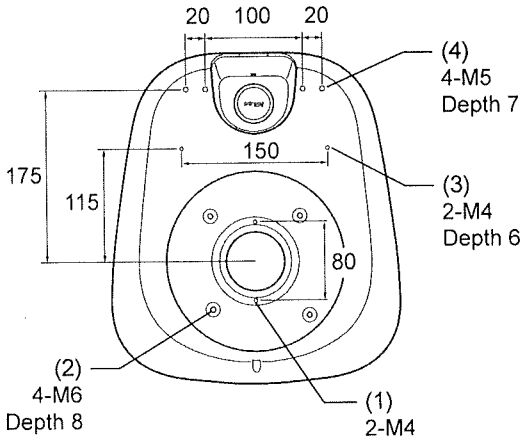
The base's top board has tap holes for attaching various devices. The tap holes do not go right the way through to prevent liquid penetrating into the base.

(1) 2-M4: Positioned under the stage plate attachment part of the base. Used for multiple purposes. Used for attaching a C-TRS Tilting Stage.

(2) 4-M6: Positioned under the stage plate attachment part of the base. Used for attaching the P-SXY64 XY Stage.

(3) 2-M4: Positioned at the center on the top surface of the base. Used for multiple purposes.

(4) 4-M5: Positioned at the rear on the top surface of the base. Used for attaching a C-FDF Flexible Double Arm Fiber Illumination Unit (via a C-FIDH Fiber Holder).



Tap holes for attaching optional devices

Exchange for a C-EP support

The support length is 145 mm longer than standard when the original support for this stand is exchanged for a C-EP support. This is useful for attaching the focus mount to a high position.

12.2 P-DSF32 Fiber Diascopic Illumination Stand

The P-DSF32 is a stand equipped with fiber diascopic illumination optical systems and a focus mechanism of the support vertical movement type.

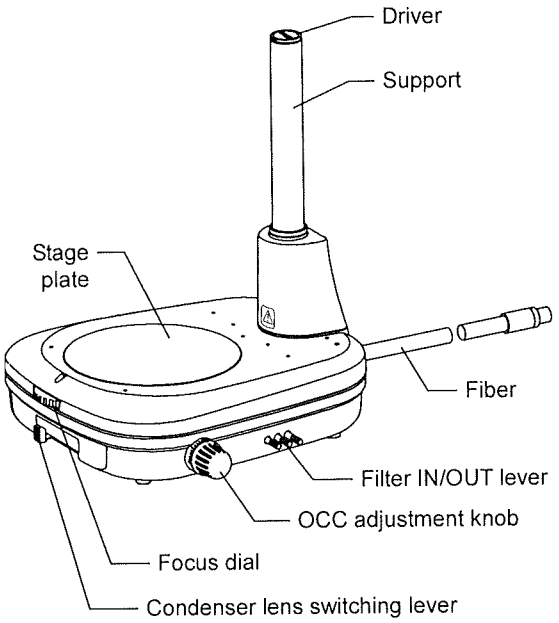
Attach a C-FMCN Focus Mount to the support.

The base with a large glass plate (180 mm dia.) enables observation of samples in a container such as a petri dish. The base has indents at the right and left planes and the rear plane (three in total) for holding the base.

A dedicated hex driver is located at the top of the support.

■ Illumination ON/OFF, brightness control

Attach the C-FLED2 LED Light source for fiber illuminator as the light source to the rear side of the base using a fiber. Turn the illumination on/off and adjust the brightness using the C-FLED2. For details, refer to the instruction manual for the light source.



P-DSF32 Fiber Diascopic Illumination Stand

■ OCC (oblique coherent contrast) illumination

This stand supports OCC illumination so that a transparent sample can be observed at high contrast using diascopic illumination with a white LED. OCC illumination is an oblique illumination method suitable for observing the phase objects, where a sample is obliquely illuminated with a coherent illuminating light by shielding a part of the optical path using a shading plate. With this illumination method, a colorless, transparent sample can be observed with relief and contrast.

To adjust the OCC contrast, turn the OCC adjustment knob. Adjust until the optimum observation state is obtained in combination with the selected magnification and phase amount of the sample. In addition, since the OCC adjustment knob has a scale, the position of the knob can be reproduced.

■ Condenser lens

The base contains condenser lenses for low/high-magnification microscopy. Switch the condenser lens based on the objective being used to ensure uniform diascopic illumination. A wide range of observation magnifications are supported. To switch the condenser lens, slide the condenser lens switching lever to the right or left.

Slide the lens switching lever to the right: For low magnification; objective lens 0.5x to 1.5x
Slide the lens switching lever to the left: For high magnification; objective lens 2x

Compatible objectives and recommended zoom magnification

Objective	Zoom magnification	
	Bright-field diascopic illumination	OCC illumination
0.5X + condenser lens for low magnification	1.5x - 8x	Unusable
0.75X + condenser lens for low magnification	1x - 8x	Unusable
1X + condenser lens for low magnification	Min. - 8x	3x - 8x
1.5X + condenser lens for low magnification	Min. - 8x	3x - 8x
2X + condenser lens for height magnification	Min. - 8x	2x - 8x

* Shading may occur in the low zoom magnification range.

■ Filter

The base has three different filters: NCB11, ND4, and ND16. The individual filters can be inserted into and removed from the optical path separately. To insert a filter into the optical path, push in the filter IN/OUT lever.

■ Focusing mechanism

The support moves vertically using the focus dial at the front of the base so that samples with height variations can easily be in focus.

- Focusing stroke: 6.2 mm
- Stroke per focus dial rotation: 3.24 mm

■ Attachable optional devices

The following devices can be attached optionally to this stand:

- P-SXY64 XY Stage
- C-SSL DIA Sliding Stage
- P-DF LED Dark Field Unit
- C-TRS Tilting Stage
- C-LSL LED Epi Illuminator (via an SMZ-U Epi Arm)
- C-FDF Flexible Double Arm Fiber Illumination Unit (via a C-FIDH Fiber Holder)
- C-FID2 Double Arm Fiber Illuminator
- C-POL Simple Polarizing Attachment

> **45-mm dia. filter**
> A 45-mm dia. filter (no thicker than 2 mm) can be dropped onto the filter dropping ring (attached to the base optical path immediately under the glass plate).

Tap holes for attaching optional devices

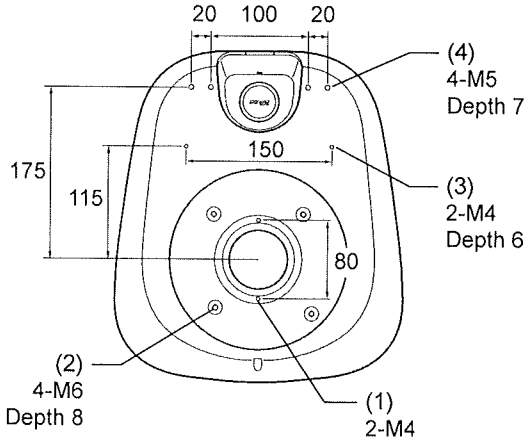
The base's top board has tap holes for attaching various devices. The tap holes do not go right the way through to prevent liquid penetrating into the base.

(1) 2-M4: Positioned under the stage plate attachment part of the base. Used for multiple purposes. Used for attaching a C-TRS Tilting Stage.

(2) 4-M6: Positioned under the stage plate attachment part of the base. Used for attaching the P-SXY64 XY Stage.

(3) 2-M4: Positioned at the center on the top surface of the base. Used for multiple purposes.

(4) 4-M5: Positioned at the rear on the top surface of the base. Used for attaching a C-FDF Flexible Double Arm Fiber Illumination Unit (via a C-FIDH Fiber Holder).



Tap holes for attaching optional devices

Exchange for a C-EP support

The support length is 145 mm longer than standard when the original support for this stand is exchanged for a C-EP support. This is useful for attaching the focus mount to a high position.

12.3 P-DF LED Dark Field Unit

This dark-field illumination unit has LEDs that are tilted and positioned like a ring. The unit is attached to the base of the microscope. For details, refer to the instruction manual for the P-DF LED Dark Field Unit.

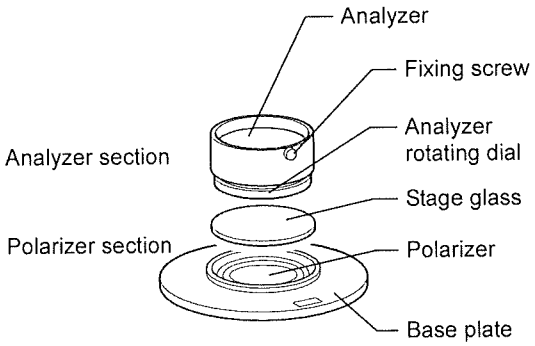
12.4 C-POL Simple Polarizing Attachment

This is a simple polarizing device that consists of a polarizer section and analyzer section.

First remove the stage plate from the base of the diascopic illumination stand and attach the base plate. Orient the polarizer as required, and then set the stage glass (90 mm dia.) supplied with the attachment. The stage glass can be rotated.

Attach the analyzer to the tip of the objective and tighten the fixing screw to stabilize it. To turn the analyzer, turn the knurled ring at the tip of the objective.

The polarizer and analyzer have indicators which show the orientation of the polarizing plate. Use a screw head at the bottom plane of the analyzer rotating dial as the analyzer's indicator.



C-POL Simple Polarizing Attachment

Directly placing the polarizer

When a polarizing attachment is used, the periphery becomes dark in the low zoom magnification range. To reduce vignetting, remove the stage glass and directly place the polarizer.

The polarizer can be directly placed on the P-DSL32 LED Diascopic Illumination Stand only.

Drop the polarizer removed from the polarizer section into the position where the diffuser was removed from the base of the stand. Use the original stage plate supplied with the base.

Restrictions

The C-POL Simple Polarizing Attachment cannot be used with the P-ED Plan 2X/WF.

The 0.5x objective supports a 1x or larger zoom area more and other objectives cover the entire zoom area.

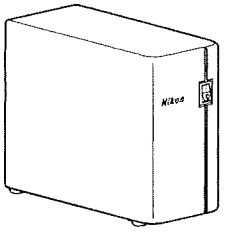
12.5 Other Diascopic Illuminators

In addition to the devices equipped with the diascopic illumination function listed above (12.1 to 12.4), the C-DS Dia Illumination Stand and C-LEDS Hybrid LED Stand also have the diascopic illumination function. The C-LEDS Hybrid LED Stand also has the episcopic illumination function. For details, refer to the instruction manual supplied with the stands.

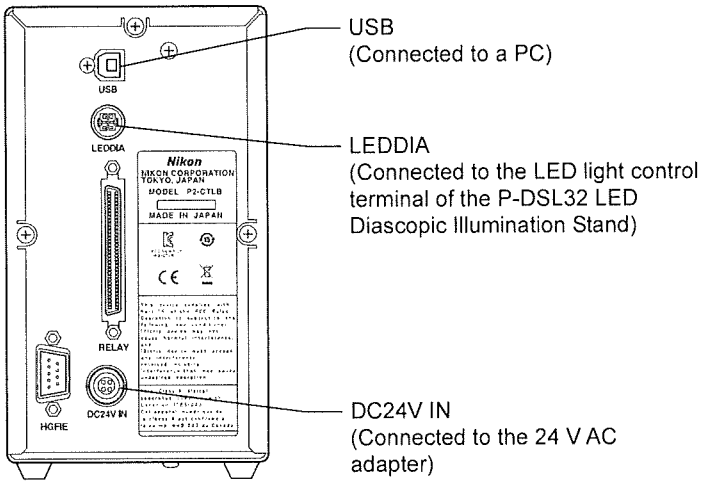
13 P2-CTLB Control Box

The P2-CTLB Control Box supplies illumination power to the P-DSL32 LED Diascopic Illumination Stand, turns on or off the LED power source, adjusts brightness and monitors the light intensity.

Connect a PC (software: NIS-Elements) to the control box in order to control illumination. For details on the procedure for controlling illumination, refer to the instruction manual for NIS-Elements.



P2-CTLB Control Box



Rear of the P2-CTLB

Use the power cable specified in Chapter 8, "2 Performance Properties" to connect to the AC adapter.

14 Other Devices

In addition to the devices described in the earlier sections, the following optional devices can be used with this microscope system:

- P-THSS Teaching Head
- P-IDT Drawing Tube
- SMZ10A Aperture Unit
- P-IBSS2 Beam Splitter
- P-IER Eyelevel Riser

☆☆☆

Chapter 5

Assembly

This chapter contains the system configuration diagrams and lists of the system components, and explains how to assemble the systems.

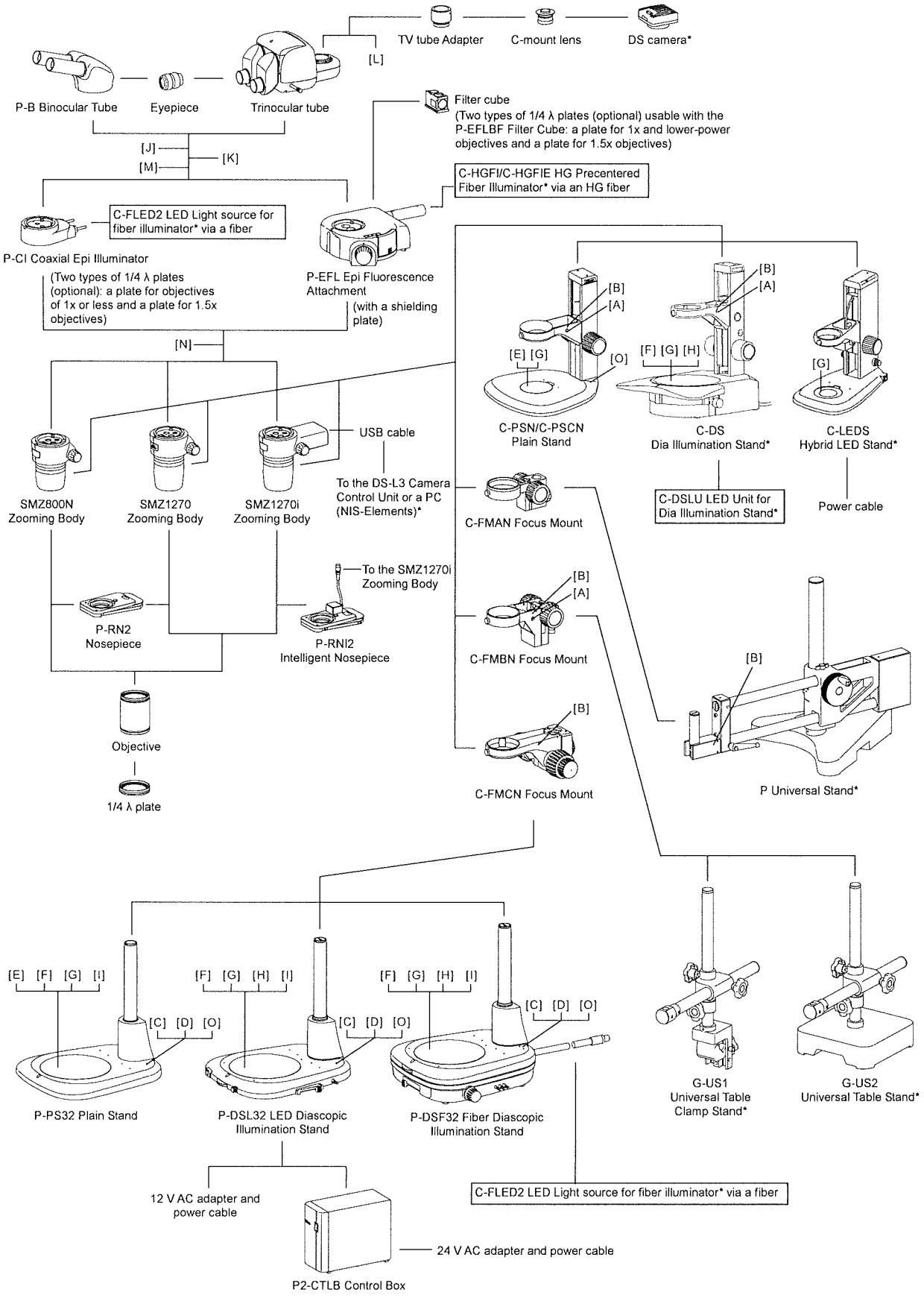
Before starting assembling, read the appropriate notes such as ⚠CAUTION "10 Cautions on assembling and installing the product" at the beginning of this instruction manual and "3 Installation location" in "Notes on Handling the Product" in this instruction manual.

> ⚠ **CAUTION When moving or carrying the system**
>
> The total mass of the microscope system may become approx. 17 kg.
>
> When moving the assembled microscopy system, work with at least two people. Put hands in the depression at the front of the base and the rear of both sides to lift up the system. Be very careful not to let fingers be caught when putting it down.

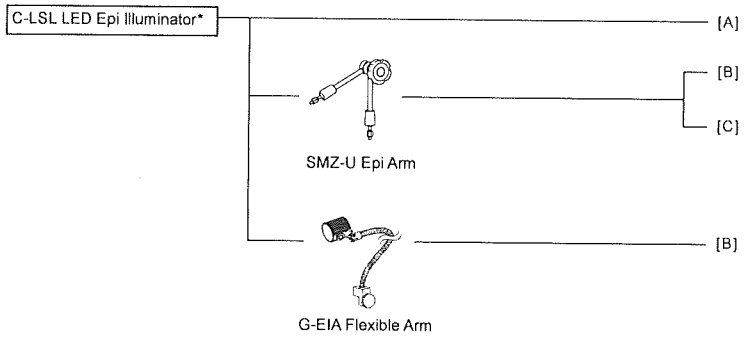
■ Tools necessary for assembly

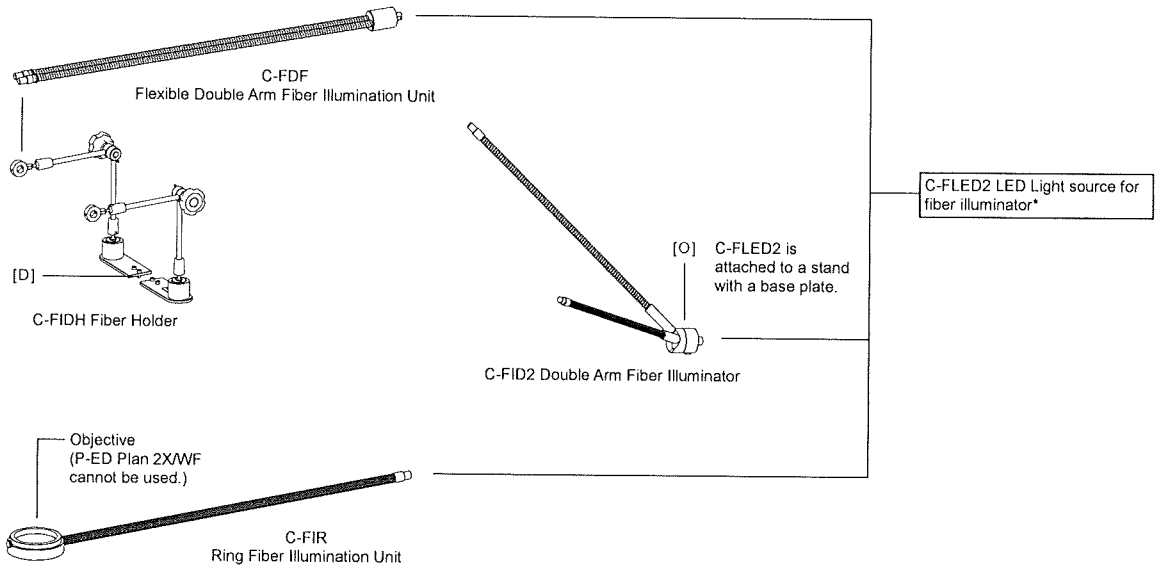
Tools	Devices that supply tools
Hex wrench (nominal designation: 2)	SMZ800N, SMZ1270, SMZ1270i Zooming Body
Hex wrench (nominal designation: 2.5)	P-SXY64 XY Stage
Hex wrench (nominal designation: 3)	P-SXY64 XY Stage
Hex wrench (nominal designation: 4)	C-FIDH Fiber Holder
Hex wrench (nominal designation: 5)	P-SXY64 XY Stage
Hex driver (nominal designation: 2)	P-DSF32 Fiber Diascopic Illumination Stand
Hex driver (nominal designation: 2) (support fit-in type)	P-PS32 Plain Stand, P-DSL32 LED Diascopic Illumination Stand, P-DSF32 Fiber Diascopic Illumination Stand
Spanner wrench (nominal designation: 10)	C-FIDH Fiber Holder

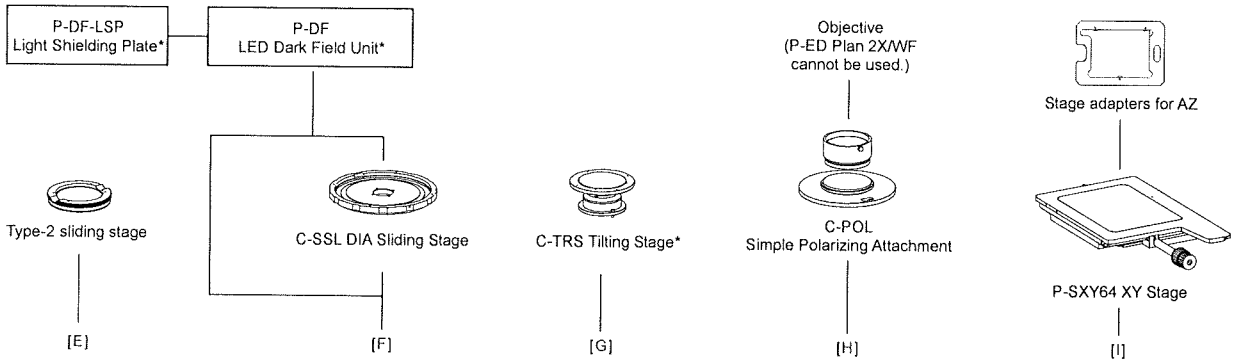
1 System Configuration

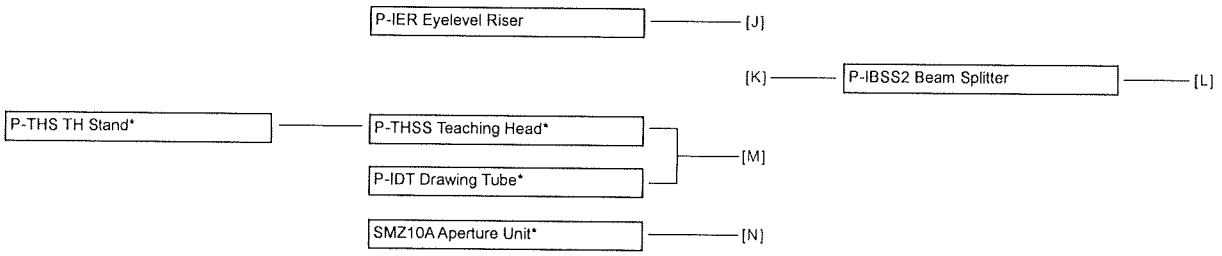


The instruction manual is supplied with the products marked with an asterisk.









The instruction manual is supplied with the products marked with an asterisk.

2 Device List

Select one device from each group marked with "√" and configure the basic microscopy system.

Device	Name	Model	Basic System Configuration	Remarks
Main Body	Zooming Body	SMZ800N	√	
	Zooming Body	SMZ1270		
	Zooming Body	SMZ1270i		
Focus Mount	Focus Mount	C-FMAN	√	Unusable with the nosepiece
	Focus Mount	C-FMBN		Unusable with the nosepiece
	Focus Mount	C-FMCN		
Nosepiece	Intelligent Nosepiece	P-RNI2	Optional	
	Nosepiece	P-RN2		
Objective	Objective	P-Achro 0.5X	√	Unusable with the SMZ1270/1270i
	Objective	P-ED Plan 0.75X		Unusable with the SMZ1270/1270i
	Objective	P-Plan 1X		Unusable with the SMZ1270/1270i
	Objective	P-ED Plan 1.5X/WF		
	Objective	P-ED Plan 2X/WF		
	Objective	P-Plan Apo 0.5X/WF		
	Objective	P-Plan Apo 0.75X/WF		
	Objective	P-Plan Apo 1X/WF		
Stand, Stage (including a product that contains the diascopic illumination function)	Plain Stand	P-PS32	√	
	LED Diascopic Illumination Stand	P-DSL32		
	Fiber Diascopic Illumination Stand	P-DSF32		
	Plain Stand	C-PSN		
	Compact Plain Stand	C-PSCN		
	Dia Illumination Stand	C-DS		
	Hybrid LED Stand	C-LEDS		
	Universal Table Clamp Stand	G-US1		
	Universal Table Stand	G-US2		
	Universal Stand	P		
	XY Stage	P-SXY64	Optional	Stage adapters for AZ (optional)
	DIA Sliding Stage	C-SSL	Optional	
	Sliding Stage	Type-2	Optional	
	Tilting Stage	C-TRS	Optional	
	LED Dark Field Unit	P-DF	Optional	P-DF-LSP Light Shielding Plate (optional)
	Simple Polarizing Attachment	C-POL	Optional	Not attachable to the P-ED Plan 2X/WF
Tube	Binocular Tube	P-B	√	
	Trinocular Tilting Tube	P-TERG100		
	Trinocular Tilting Tube	P-TERG50		
	Trinocular Tube	P-TL 100		
Eyepiece	Eyepiece	C-W 10XB	√	
	Eyepiece	C-W 15X		
	Eyepiece	C-W 20X		
	Eyepiece	C-W 30X		
Episcopic Illuminator	Coaxial Epi Illuminator	P-CI	Optional	1/4 λ plate (optional, two types: a plate for objectives of 1x or less and a plate for 1.5x objectives)
	Flexible Double Arm Fiber Illumination Unit	C-FDF	Optional	C-FIDH Fiber Holder (optional)
	Double Arm Fiber Illuminator	C-FID2	Optional	
	LED Epi Illuminator	C-LSL	Optional	SMZ-U Epi Arm (optional), G-EIA Flexible Arm (optional)
	Ring Fiber Illumination Unit	C-FIR	Optional	Not attachable to the P-ED Plan 2X/WF

Device	Name	Model	Basic System Configuration	Remarks
Epi Fluorescence Attachment	Epi Fluorescence Attachment	P-EFL	Optional	With shielding plate P-GFP-B/P-GFP-L/P-EFLC Filter Cubes (all optional)
Light Source	HG Precentered Fiber Illuminator	C-HGFI	Optional	Light source for P-EFL
	HG Precentered Fiber Illuminator	C-GHFIE	Optional	Light source for P-EFL
	LED Light source for fiber illuminator	C-FLED2	Optional	Light source for P-CI, P-DSF32, C-FDF, C-FID2 and C-FIR
	LED Unit for Dia Illumination Stand	C-DSLU	Optional	Light source for C-DS
Control Box	Control Box	P2-CTLB	Optional	Power supply when not connecting an AC adapter to P-DSL32
Others	Teaching Head	P-THSS	Optional	
	TH Stand	P-THS	Optional	
	Drawing Tube	P-IDT	Optional	
	SMZ10A Aperture Unit		Optional	
	Beam Splitter	P-IBSS2	Optional	
	Eyelevel Riser	P-IER	Optional	
	DS cameras		Optional	

3 Assembly Procedures

The stereo microscopes SMZ800N/SMZ1270/SMZ1270i Zooming Bodies are the system microscopes that can be used in various device configurations.

This chapter describes the basic device assembly procedures. See figures in Chapter 1, "Components" for basic configuration examples. This chapter also describes the assembly procedures for various optional devices such as illuminators that can be added to the basic configuration.

Before starting assembling, see 2, "Device List" and check the devices to be used.

3.1 Assembly of the Basic System

1 Install a stand.

Install a stand on a flat and stable table or a working table in the position that has no influence from vibration.

See the instruction manual supplied with the following stands:

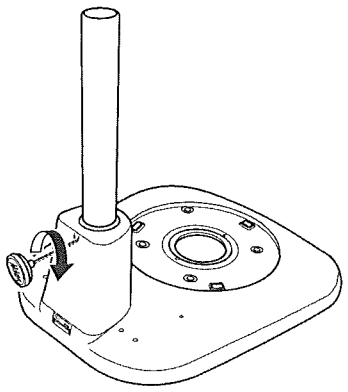
- C-DS Dia Illumination Stand
- C-LEDS Hybrid LED Stand
- G-US1 Universal Table Clamp Stand
- G-US2 Universal Table Stand
- P Universal Stand

■ **Support attachment to the stand**

[P-PS32 Plain Stand,
P-DSL32 LED Diascopic Illumination Stand,
P-DSF32 Fiber Diascopic Illumination Stand]

Attach a support supplied with the stand to the stand. The procedure for attaching the support is the same for all stand types.

Insert the support to the stand and tighten the clamp screw on the rear side using a hex driver supplied with the support (The hex driver is located at the top of the support).



Securely attaching the support

> **C-EP Support**
> When attaching not the supplied support, but a long-type C-EP Support, do it in the same way as instructed above.

■ **Stage plate attachment**

A transparent glass stage plate or acrylic stage plate is supplied with the stand in accordance with the types of stands.

The acrylic stage plate has black and milky white surfaces. Attach the stage plate with the surface appropriate for the sample up.

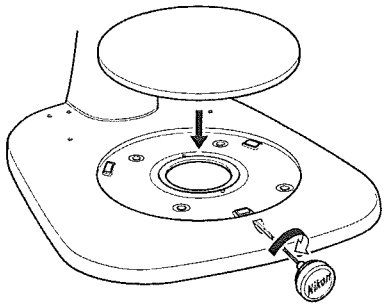
> **Glass stage plate handling precautions**
> Be very careful when handling the glass stage plate. Attach all other components before attaching the glass stage plate in order to avoid the risk of breaking the glass during assembly.

**[P-PS32 Plain Stand,
P-DSL32 LED Diascopic Illumination Stand,
P-DSF32 Fiber Diascopic Illumination Stand]**

Attach the stage plate supplied with the stand to the base. The procedure for attaching the stage plate is the same for all stand types.

(1) First loosen the M4 set screw for the stage plate located at the middle front of the stand base using a hex driver (nominal designation: 2).

(2) Tilt the stage plate and attach it so that it fits the base, and then tighten the fixing screw.



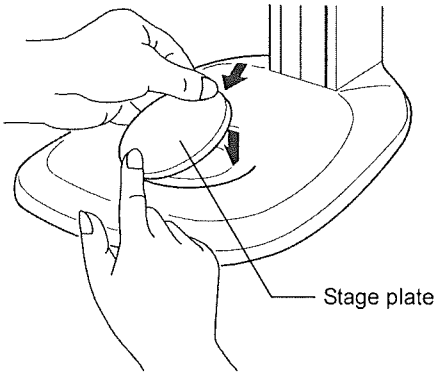
Securely attaching the stage plate

[C-PSN/C-PSCN Plain Stand]

Attach the stage plate supplied with the stand to the base.

Insert the stage plate tilted toward the front, and push in the rear side while holding the front side.

The stage plate is securely attached by the spring.



Attaching the stage plate

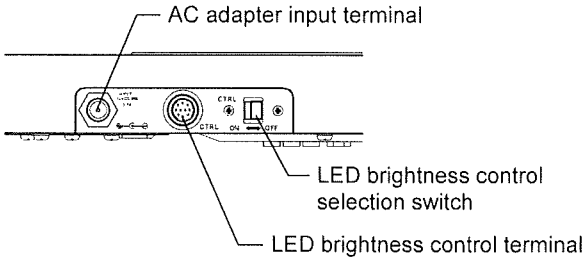
■ **P-DSL32 LED Diascopic Illumination Stand cable connection (Connection of the power supply to diascopic illumination)**

- **When not using a control box:**

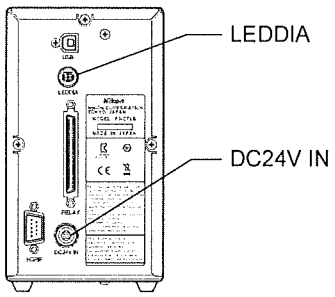
  Connect a 12 V AC adapter to the AC adapter input terminal on the left side of the stand base, and then connect the power cord.

- **When using a control box:**

  Connect the LED brightness control terminal "CTRL" on the left side of the stand base to the connector "LEDDIA" on the rear side of the control box. Use the CTRL cable supplied with the control box. Connect the 24 V AC adapter to DC24V IN of the control box, and then connect the power cord.



Left side of the base



Rear side of the P2-CTLB

Beware of overhang of cables

When these cables are connected, the connectors (cables) overhang to the left of the base. Be careful so that they do not interfere with other devices such as a control box or they are not accidentally touched and disconnected while attaching devices or performing observation.

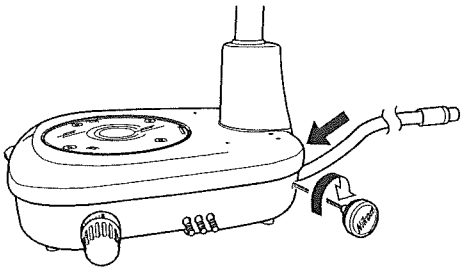
Use the power cord specified in Chapter 8, "2 Performance Properties."

> ⚠ **WARNING**
>
> **Before connecting the power cord**
>
> To prevent electric shock, be sure to turn off the power switch (press it to the "O" position) at the front of the base before connecting the power cord to the adapter.

■ Fiber attachment to the P-DSF32 Fiber Diascopic Illumination Stand

Insert a hex driver (nominal designation: 2) in the fiber fixing screw hole at the right rear side of the base and loosen the internal fixing screw (M4 set screw). Insert the fiber to the rear side of the base until it reaches the limit and tighten the fixing screw.

Firmly insert the other end of the fiber into the fiber attachment hole of the C-FLED2 LED Light Source for Fiber Illuminator. See the instruction manual for the light source for details.

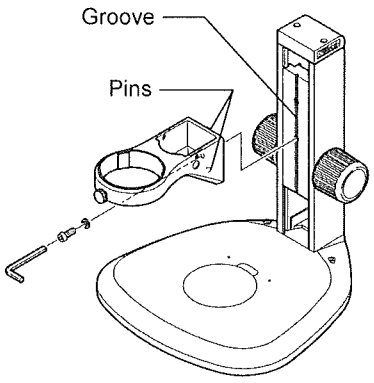


Securely attaching the fiber

■ C-PSN/C-PSCN Plain Stand's arm position change

The arm of the C-PSN/C-PSCN Plain Stand can be attached to a lower position.

Loosen the arm attachment screw and attach the arm to the lower screw hole position on the vertical slider using the hex wrench (nominal designation: 2) supplied with the stand. The arm can be attached to the position 55 mm lower than the standard. Check that two pins of the arm are fitted in the groove of the vertical slider before tightening the fixing screw.



Arm position change

2 Attach a focus mount.

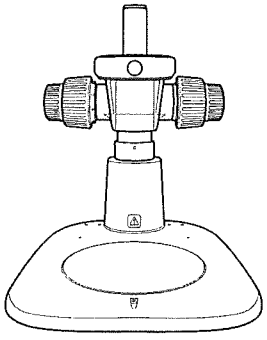
■ C-FMCN Focus Mount attachment

The C-FMCN Focus Mount can be attached to the following stands:

- P-PS32 Plain Stand
- P-DSL32 LED Diascopic Illumination Stand
- P-DSF32 Fiber Diascopic Illumination Stand

[Focus mount orientation]

Attach the focus mount to the stand so that the focus mount faces the front of the stand as shown in the figure.

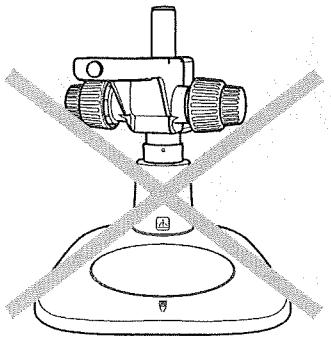


Correct orientation of the focus mount

⚠ CAUTION

Incorrect orientation of the focus mount

If the focus mount is attached in the incorrect orientation, the stand may fall over. This may result in damage to the device or unexpected injury. Be sure not to attach the focus mount if the focus mount does not face the front of the stand as shown in the figure.

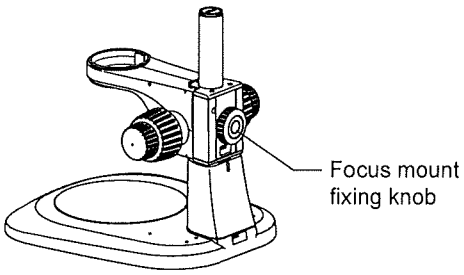


Incorrect focus mount orientation

[Focus mount attachment position]

(1) Standard position

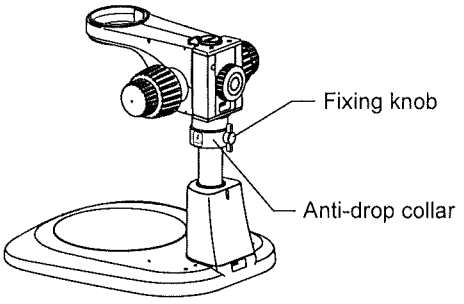
Insert the focus mount until it reaches the lower limit of the support, and tighten the focus mount fixing knob on the rear side.



Securely attaching the focus mount

2) Position higher than the standard

Attach the supplied anti-drop collar so that it fits the support with the convex side up as shown in the figure, and tighten the fixing knob on the rear side at the required position. Then, insert the focus mount until it reaches the anti-drop collar, and tighten the fixing knob on the rear side of the focus mount.



Securely attaching the anti-drop collar

⚠ CAUTION

Use of the anti-drop collar

When using a C-FMCN Focus Mount attached in the middle of the support, be sure to use the anti-drop collar. Otherwise the zooming body may slide down when the focus mount fixing screw is loosened. This may result in injury such as pinching fingers between the objective and sample, or damage to the sample on the stage plate by the objective.

■ C-FMBN/C-FMAN Focus Mount Attachment

The C-FMBN Focus Mount can be attached to the following stands:

- G-US1 Universal Table Clamp Stand
- G-US2 Universal Table Stand

C-FMAN Focus Mount can be attached to the following stands:

- P Universal Stand

Refer to the instruction manual supplied with the stand for how to attach the focus mount.

Stand with a vertically movable arm

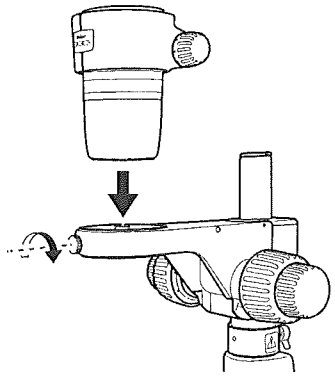
The C-PSN/C-PSCN Plain Stand, C-DS Dia Illumination Stand and C-LEDS Hybrid LED Stand is equipped with a vertically movable arm.

The focus mount is not required to be attached.

3 Attach a zooming body.

Attach a zooming body to the focus mount or to the vertically movable arm of the stand. The procedure for attaching a zooming body is the same for all types.

Loosen the zooming body fixing screw of the focus mount or vertically movable arm, and then insert the zooming body into the abutting joint. Place the zooming body so that its name plate faces the front, and then gently tighten the zooming body fixing screw to attach the zooming body.

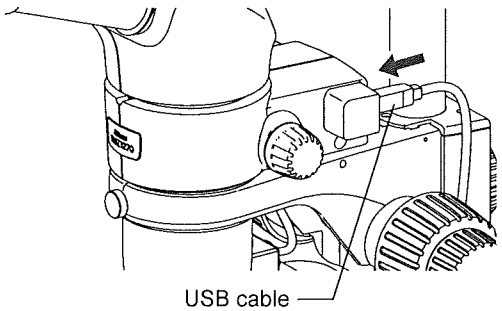


Securely attaching the zooming body

> **Caution when attaching the zooming body**
>
> Do not forcibly tighten the zooming body fixing screw. This may cause malfunction.

■ USB cable connection to SMZ1270i

When an SMZ1270 Zooming Body is attached, connect a DS-L3 Camera Control Unit or a PC (NIS-Elements) to the connector on the rear right side of the SMZ1270i using a USB cable.



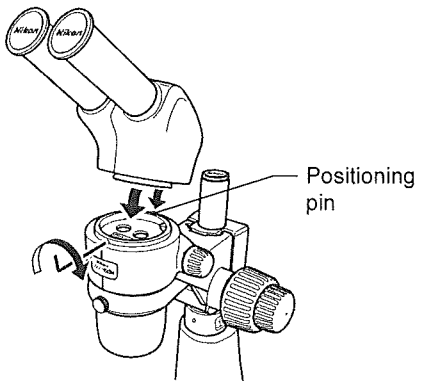
Connecting the USB cable

4 Attach a tube.

Attach a tube to the zooming body. The procedure for attaching a tube is the same for all types.

(1) Completely loosen the M4 set screw for the tube at the upper front of the zooming body using a hex driver (nominal designation: 2).

(2) Align the positioning groove on the rear of the round dovetail at the bottom of the tube with the positioning pin on the rear of the round dovetail groove at the zooming body upper plane so that they fit, and then tighten the fixing screw.

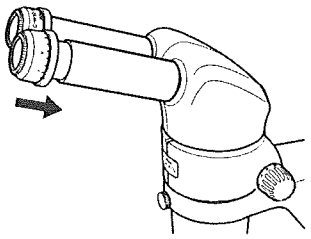


Securely attaching the tube

5 Attach eyepieces.

Attach eyepieces to the tube.

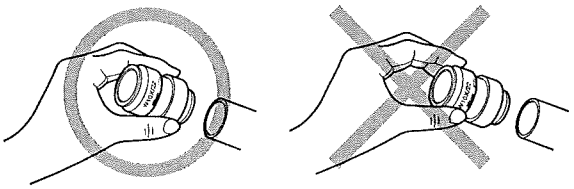
Use two eyepieces of the same magnification. Completely insert them into the tube until they touch the edge plane of the tube sleeve.



Attaching the eyepieces

Caution when attaching the eyepieces

Pay attention when inserting a 10x eyepiece because a rubber cover is attached to the 10x eyepiece so the eyepiece end is not visible. To prevent malfunction, hold the rubber cap when inserting the 10x eyepiece. Do not hold the diopter adjustment ring when inserting it.

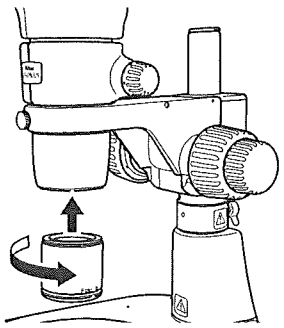


6 Attach an objective.

Attach the objective to be used to the zooming body. The procedure for attaching an objective is the same for all types.

Screw the objective in the objective attachment screw hole at the lower plane of the zooming body.

Insert it straight from the bottom and securely screw it until it touches the abutting joint.



Attaching the objective

Restriction

P-Achro 0.5X, P-ED Plan 0.75X and P-Plan 1X cannot be used with the SMZ1270/SMZ1270i.

The basic system assembly is complete.

3.2 Assembly of Other Devices (Optional)

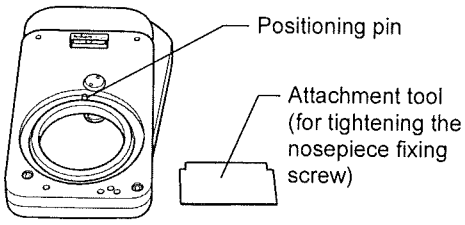
1 Attach a nosepiece.

To use two objectives, attach a nosepiece to the zooming body.

Attach a nosepiece before performing 3.1, step 6 "Install an objective."

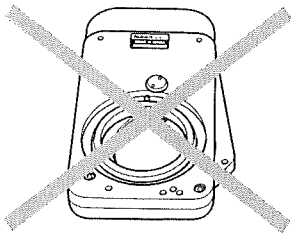
The P-RN2 Nosepiece is intended for the SMZ800N Zooming Body or the SMZ1270 Zooming Body, and the P-RNI2 Intelligent Nosepiece is intended for the SMZ1270i Zooming Body. The procedure for attaching a nosepiece is the same for both types.

(1) First check that the nosepiece is in the stereoscopic view state as shown in the figure.



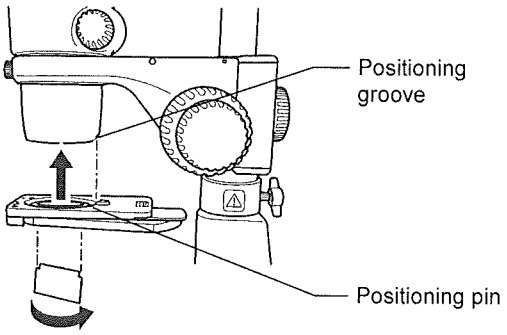
Nosepiece in the stereoscopic view state (The P-RN2 is used as an example.)

Note that the nosepiece in the vertical view state as shown in the figure cannot be attached.



Nosepiece in the vertical view state (Attachment not possible in this state)

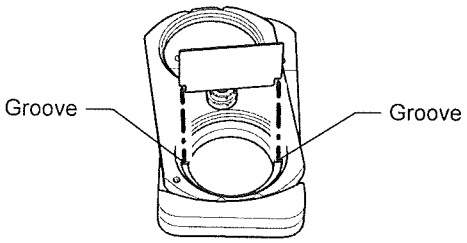
(2) Align the positioning pin for attaching the nosepiece with the positioning groove at the bottom rear of the zooming body so that the nosepiece fixing screw fits the objective fixing screw at the bottom of the zooming body. Insert the attachment tool along the two grooves from the bottom of the nosepiece and tighten the nosepiece fixing screw to securely attach the nosepiece by turning the attachment tool.



Securely attaching the nosepiece

Attachment tool

Be sure to insert the attachment tool straight along the two grooves of the nosepiece. Check the groove positions by referring to the figure "Nosepiece viewed from the bottom." If the tool is inserted at an angle, the convex part of the tool contacts the objective, resulting in scratches or damage to the objective.



Nosepiece viewed from the bottom

■ **Cable connection to P-RNI2**

When a P-RNI2 Intelligent Nosepiece is attached, connect the P-RNI2 connector to the connector on the rear left side of the SMZ1270i Zooming Body.

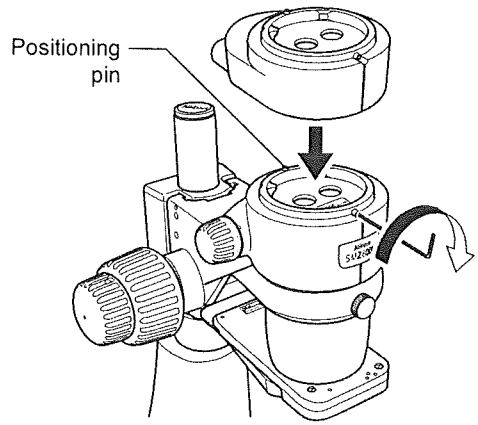
After attaching the nosepiece, attach objectives by following 3.1, step 6 "Attach an objective."

2 Attach a P-CI Coaxial Epi Illuminator.

Attach a coaxial epi illuminator after performing 3.1, step 3 "Attach a zooming body."

(1) First completely loosen the M4 set screw for the illuminator at the upper front of the zooming body using a hex driver (nominal designation: 2).

(2) Align the positioning groove on the rear of the round dovetail at the bottom of the coaxial epi illuminator with the positioning pin on the rear of the round dovetail groove at the zooming body upper plane so that they fit, and then tighten the fixing screw.



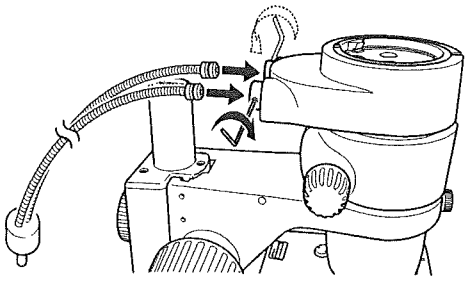
Securing attaching the coaxial epi illuminator

■ **Fiber attachment**

First loosen the M4 set screws for the fiber on the side plane of the two fiber attachment holes on the rear side of the coaxial epi illuminator using a hex driver (nominal designation: 2). Insert the fiber to the attachment hole until it reaches the limit and then tighten the fixing screw.

Insert the other end of the fiber into the fiber attachment holes of the C-FLED2 LED Light source for fiber illuminator.

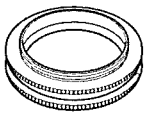
Refer to the instruction manual for the light source for details.



Securely attaching the LED fiber

■ **1/4 λ plate attachment (optional)**

There are two types of 1/4 λ plates: a 1/4 λ plate for objectives of 1x or less, and a 1/4 λ plate for 1.5x objectives. Both types of 1/4 λ plates are screwed in the tip of the objective when used.



1/4 λ plate

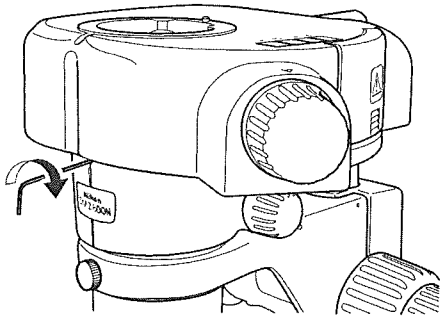
After attaching the coaxial epi illuminator, continue assembly by following from 3.1, step 4 "Attach a Tube."

3 Attach a P-EFL Epi Fluorescence Attachment.

Attach an epi fluorescence attachment after performing 3.1, step 3 "Attach a zooming body."

(1) Completely loosen the M4 set screw for the illuminator at the upper front of the zooming body using a hex driver (nominal designation: 2).

(2) Align the positioning groove on the rear of the round dovetail at the bottom of the epi fluorescence attachment with the positioning pin on the rear of the round dovetail groove at the zooming body upper plane so that they fit, and then tighten the fixing screw.



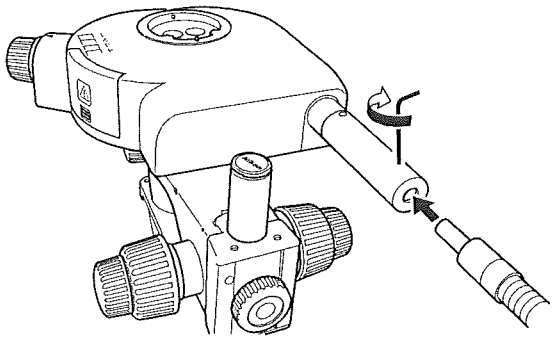
Securely attaching the epi fluorescence attachment

■ HG fiber attachment

Loosen the M4 set screw for the HG fiber on the top of the HG fiber attachment hole on the rear side of the epi fluorescence attachment using a hex driver (nominal designation: 2).

Insert the emission side tip of the HG fiber to the attachment hole until it reaches the limit and tighten the fixing screw.

Firmly insert the source side connector to the HG fiber attachment hole of the C-HGFI or C-HGFIE HG Precentered Fiber Illuminator. See the instruction manual for the light source for details.



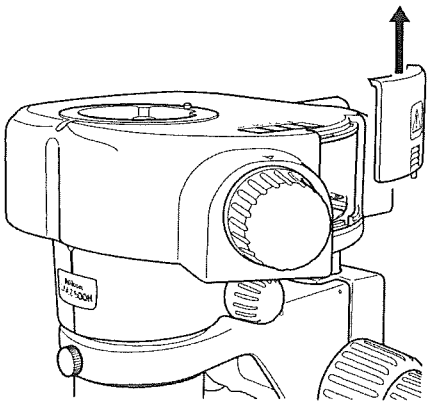
Securely attaching the HG fiber

■ Filter cube attachment

Attach a filter cube to the turret inside the epi fluorescence attachment. Up to four filters can be attached.

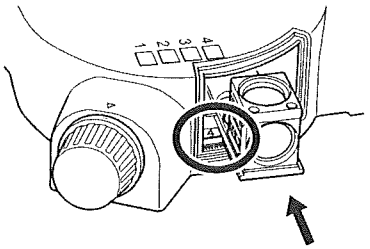
> **Do not touch the surface of the filter with bare hands**
> Scratches or fingerprints on the filter surface will degrade microscope images. Handle the filter cube carefully.

(1) Remove the filter cube replacement hole cover on the right side of the epi fluorescence attachment (as viewed from the front). Push it upward to remove.



Removing the filter cube replacement cover

(2) Align the dovetail groove of the filter cube with the internal dovetail and insert the filter cube until it reaches the limit. The installation positions are numbered from [1] to [4] and are shown on the left inside of the filter cube attachment hole.



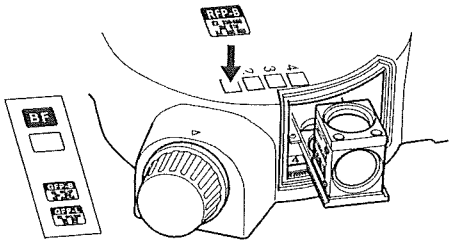
Attaching the filter cube

Be sure to attach four cubes to the turret.
Attach an empty cube to the position to which no filter cube is attached.

(3) Affix the filter cube indication label.

Labels indicating the type of filter cube are supplied with the epi fluorescence attachment. It is useful to identify the type with the labels. Affix a label indicating the type of attached filter cube to the label attachment position at the top of the filter cube attachment hole. Numbers 1 through 4 are indicated next to the label indents. Affix a label for the attached filter cube to the indent corresponding to the filter cube address.

* Label "PFP"
The supplied filter cube labels used in common with other devices include a label "PFP" that is not used for the P-EFL Epi Fluorescence Attachment. Do not use the label "PFP."



Affixing a label indicating the type of the filter cube

(4) Return the cover of the filter cube replacing hole to the original position.

■ 1/4 λ plate attachment (optional)

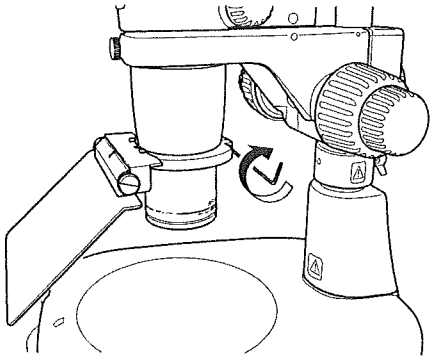
When using a P-EFLBF Filter Cube, screw the optional 1/4 λ plate in the tip of the objective.

■ Shielding plate attachment

Attach the shielding plate to the objective or the nosepiece.

- Attachment to the objective

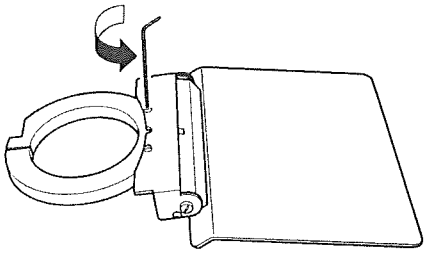
Align the ring of the shielding plate with outer periphery of the objective, and tighten the M2.5 hexagon socket head bolt on the rear side of the ring using a hex driver (nominal designation: 2) to secure the shielding plate.



Securely attaching the shielding plate

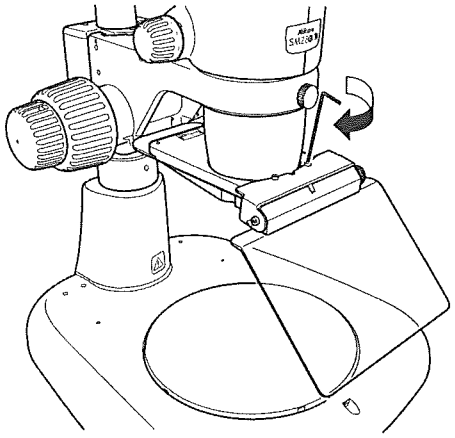
- Attachment to the nosepiece

(1) Separate the ring attached to the light shielding plate. The ring is attached to the light shielding plate with the two M2.5 hexagon socket head bolts. Remove them using a hex driver (nominal designation: 2).



Removing the ring from the light shielding plate.

(2) Align two screw holes on the upper plane of the nosepiece with the screw holes on the shielding plate, and securely attach the shielding plate using the two M2.5 hexagon socket head bolts used for attaching the ring.



Securely attaching the shielding plate

■ Filter and mirror attachment to the P-EFLC Filter Cube

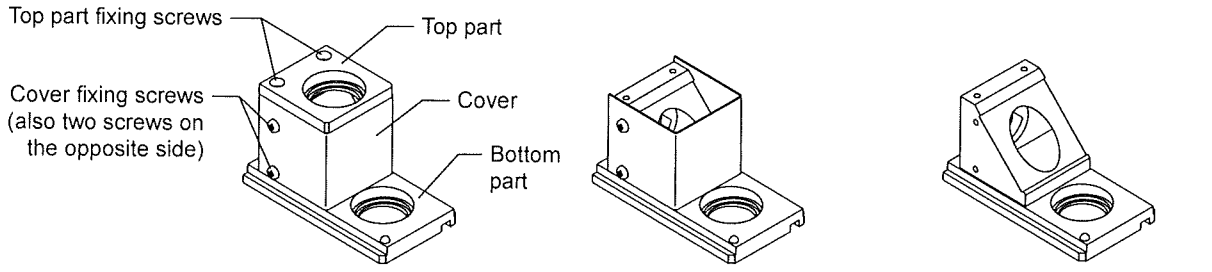
The filters and mirror of the following sizes can be attached to the P-EFLC Filter Cube:

Excitation filter (EX): External diameter 18 mm, Thickness 8 mm or less
Dichroic mirror (DM): Dimensions 18 mm x 26 mm, Thickness 1 mm or less
Barrier filter (BA): External diameter 18 mm, Thickness 3.8 mm or less

(1) Remove the top part and cover from the P-EFLC.

1) Loosen and remove the two top part fixing screws from the top surface of the filter cube to take off the top part.

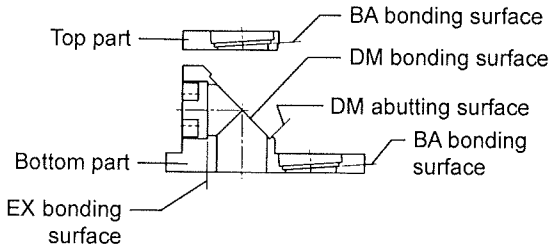
2) Loosen and remove the four cover fixing screws from the right and left sides of the filter cube to take off the cover.



Entire P-EFLC **Top part removed** **Cover removed (bottom part)**

P-EFLC disassembly

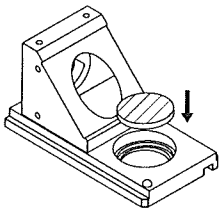
* See the section view on the right for the reference plane of each part.



Reference plane

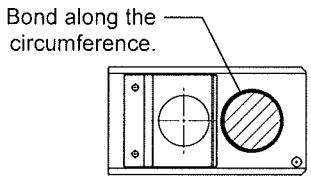
(2) Bond to attach the barrier filter to the bottom part.

1) Push the barrier filter into the position shown in the figure of the bottom part until it hits the bonding surface. Observe the manufacturer's instructions for the orientation of the barrier filter.



Barrier filter setting - 1

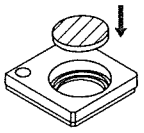
2) Fill in the gap between the bottom part and the barrier filter with adhesive.



Barrier filter bonding - 1

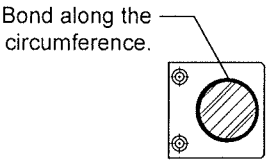
(3) Bond to attach the barrier filter to the top part.

1) Push the barrier filter into the position shown in the figure of the top part until it hits the bonding surface. Observe the manufacturer's instructions for the orientation of the barrier filter.



Barrier filter setting - 2

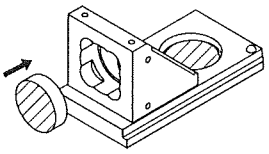
2) Fill in the gap between the top part and the barrier filter with adhesive.



Barrier filter bonding - 2

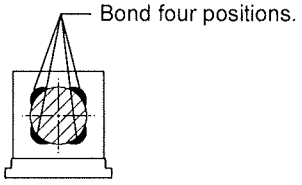
(4) Bond to attach the excitation filter.

1) Push th eexcitation filter into the position shown in the figure of the bottom part until it hits the bonding surface. Observe the manufacturer's instructions for the orientation of the excitation filter.



Excitation filter setting

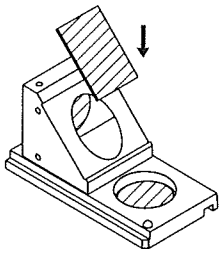
2) Fill in the four bonding posiions of the bottom part with adhesive to bond the excitation filter to the bottom part.



Excitation filter setting

(5) Bond to attach the dichroic mirror.

1) Place the dichroic mirror so that its evaporated surface contacts the bonding surface and the side touches the abutting surface.

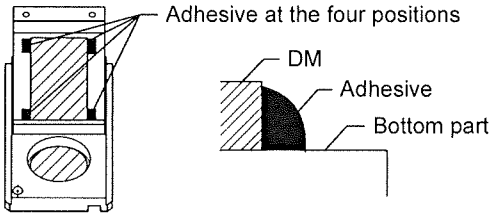


Dichroic mirror setting

2) Place the dichroic mirror at the center of the bonding surface and place adhesive at the four bonding positions shown in the figure.

Adhesive application

- Make sure that the adhesive does not seep in between the dichroic mirror and the bonding surface.
- Adhesive must not leak from the bottom part.

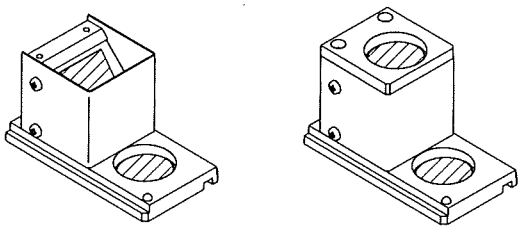


Dichroic mirror bonding

(6) Assembling each part of the P-EFLC.

1) Securely attach the cover to the bottom part by tightening the four screws on the sides.

2) Securely attach the top part by tightening the two screws on the top.



Cover attached | Top part attached (complete)

P-EFLC assembly

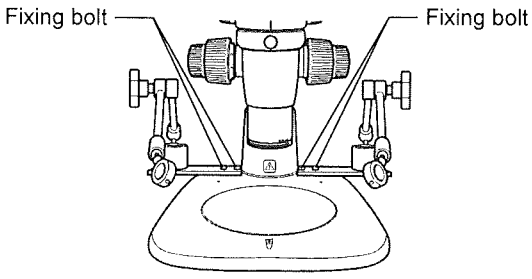
After attaching the epi fluorescence attachment, continue the assembly by following the procedure from 3.1, step 4 "Attach a tube."

4 Attach a C-FDF Flexible Double Arm Fiber Illumination Unit.

Attach a flexible double arm fiber illumination unit to a P-PS32 Plain Stand, P-DSL32 LED Diascopic Illumination Stand or P-DSF32 Fiber Diascopic Illumination Stand.

Attach fiber holders using the tool holes on the base to hold the fiber. The procedure for attaching holders is the same for all stand types.

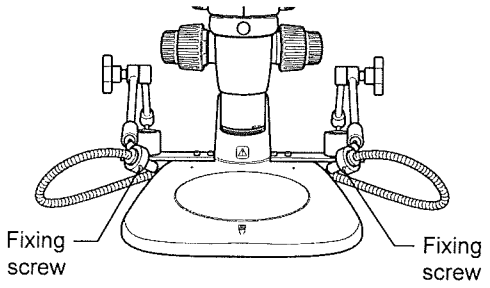
(1) Attach a holder of the C-FIDH Fiber Holder to the right and left rear sides of the base. Two bolt holes are located on each side. Tighten four M5 hexagon socket head bolts using a hex wrench (nominal designation: 4).



Securely attaching the fiber holder

(2) Insert the flexible double arm fiber tip into the ring at the arm end, and tighten the M4 set screw for the fiber using a hex driver (nominal designation: 2).

(3) Firmly insert the fiber source side connectors into the fiber attachment holes on the C-FLED2 LED Light Source.
See the instruction manual for the light source for details.



Securely attaching the flexible arm fiber

5 Attach a C-FID2 Double Arm Fiber Illuminator.

Attach a double arm fiber illuminator to a P-PS32 Plain Stand, P-DSL32 LED Diascopic Illumination Stand, P-DSF32 Fiber Diascopic Illumination Stand, C-PSN Plain Stand or C-PSCN Compact Plain Stand.

See the instruction manual for the C-FLED2 LED Light source for fiber illuminator for details on how to attach the illuminator.

6 Attach a C-FIR Ring Fiber Illumination Unit.

Attach a ring fiber illumination unit to a P-Achro 0.5X, P-ED Plan 0.75X, P-Plan 1X, P-ED Plan 1.5X/WF, P-Plan Apo 0.5X/WF, P-Plan Apo 0.75X/WF or P-Plan Apo 1X/WF.

See the instruction manual for the C-FLED2 LED Light source for fiber illuminator for details on how to attach the unit.

7 Attach a C-SSL DIA Sliding Stage

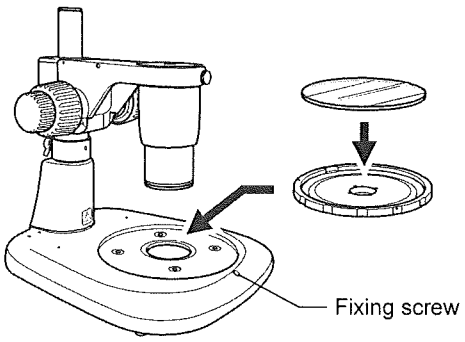
Attach a DIA sliding stage to a P-PS32 Plain Stand, P-DSL32 LED Diascopic Illumination Stand or P-DSF32 Fiber Diascopic Illumination Stand.

(1) Loosen the M4 set screw for the stage plate on the base using a hex driver (nominal designation: 2) to remove the stage plate.

(2) Attach the sliding stage to the base so that it fits, and tighten the stage plate fixing screw.

(3) Place the stage plate removed in Step (1) on the sliding stage.

(4) Tighten the stage plate fixing screw for the sliding stage.



Securely attaching the DIA sliding stage

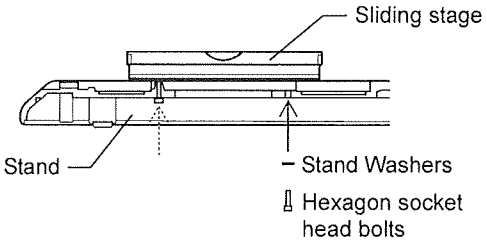
8 Attach a type-2 sliding stage.

Attach a type-2 sliding stage to a P-PS32 Plain Stand, C-PSN Plain Stand or C-PSCN Compact Plain Stand.

(1) Remove the stage plate from the stand.

(2) Alternatively, place a type-2 sliding stage so that it fits the stand, and then securely attach it by tightening two M2.5 hexagon socket head bolts and washers from the base surface of the stand using a hex wrench (nominal designation: 2) or a hex driver (nominal designation: 2).

(3) Attach the removed stage plate to the type-2 sliding stage. When using a P-PS32 Plain Stand, use a 90-dia. stage plate separately.



Securely attaching the type-2 sliding stage

Type-2 sliding stage attachment

The type-2 sliding stage can be attached by fitting it into the base of the C-PSN/C-PSCN. Nikon recommends securely attaching the stage by tightening bolts.

9 Attach a C-POL Simple Polarizing Attachment.

Attach a simple polarizing attachment to a P-DSL32 LED Diascopic Illumination Stand or P-DSF32 Fiber Diascopic Illumination Stand.

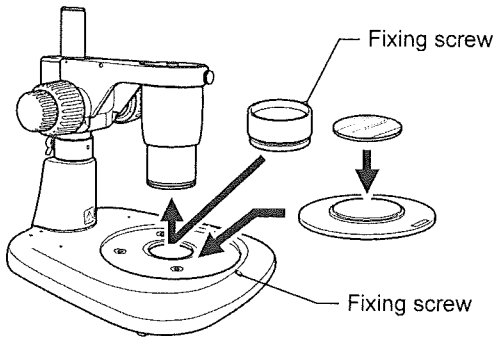
This simple polarizing attachment cannot be used with a P-ED Plan 2X/WF.

(1) Loosen the M4 set screw for the stage plate of the base using a hex driver (nominal designation: 2) to remove the stage plate, and alternatively place the base plate of the polarizer so that it fits the base.

(2) Determine the orientation of the polarizer and tighten the stage plate fixing screw.

(3) Place the stage glass (90 mm dia.) supplied with the polarizer attachment on the polarizer.

(4) Loosen the fixing screw of the analyzer. Insert the analyzer into the objective end until it reaches the limit, and tighten the fixing screw.



Securely attach a simple polarizing attachment

Directly placing the polarizer

The polarizer can be removed from the polarizer attachment and can be individually attached. Place the polarizer under the stage plate of the diascopic illumination base. The stage plate can be used as is.

10 Attach a P-SXY64 XY Stage.

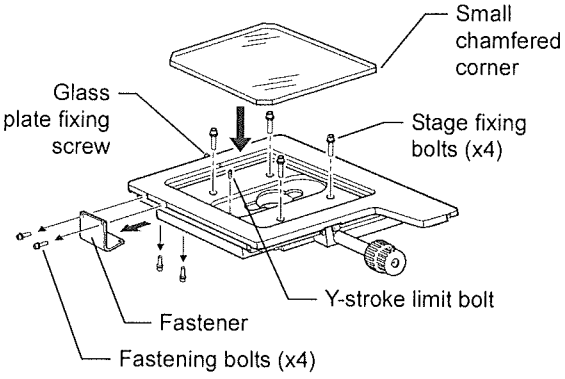
Attach an XY stage to a P-PS32 Plain Stand, P-DSL32 LED Diascopic Illumination Stand or P-DSF32 Fiber Diascopic Illumination Stand.

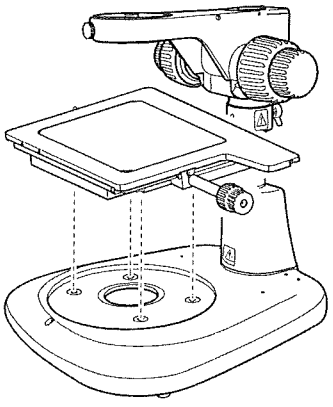
(1) Remove the fastener for the stage. Loosen the four M4 hexagon socket head bolts for the stage using a hex wrench (nominal designation: 3).

(2) Loosen the M4 set screw for the stage plate on the base using a hex driver (nominal designation: 2) to remove the stage plate.

(3) Screw the Y-stroke limit bolt supplied with the P-SXY64 in the stage. Use a hex wrench (nominal designation: 2.5) when tightening the M3 hexagon socket head bolt.

(4) Attach the P-SXY64 Stage using the four tap holes that are located under the stage plate attachment position.
Move the upper plate of the P-SXY64 to align the installation holes on the lower plate with the tap holes, insert the four M6 hexagon socket head bolts and firmly tighten them using a hex wrench (nominal designation: 5).





Securely attaching the P-SXY64

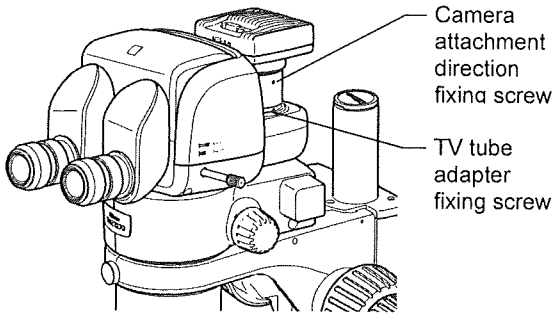
(5) Attach the glass plate supplied with the P-SXY64 XY Stage so that it fits the upper plate of the stage. The glass plate has chamfered corners including one small chamfered corner. Align the small chamfered corner with the right rear side of the stage (as viewed from the front) to fit the glass plate on the stage, and tighten the glass plate fixing screw.

11 Attach a camera.

(1) Screw the C-mount lens in the DS camera, attach the DS camera head to the LV-TV TV Tube Adapter, and then tighten the camera attachment direction fixing screw on the TV tube adapter.

(2) Loosen the TV tube adapter fixing screw located on the tube side mount, attach the TV tube adapter, determine the DS camera head orientation, and then tighten the TV tube adapter fixing screw.

(3) Connect the camera cable connector of the DS camera head to the connector "CAMERA" of the DS-L3/DS-U3 DS camera control unit using a dedicated camera cable.



Securely attaching the camera

12 Attach other devices.

In addition to the above devices from 1 to 11, the following devices can be used.

- C-TRS Tilting Stage
- C-LSL LED Epi Illuminator
- P-DF LED Dark Field Unit
- P-IER Eyelevel Rizer
- P-THSS Teaching Head
- P-IDT Drawing Tube
- SMZ10A Aperture Unit
- P-IBSS2 Beam Splitter

☆☆☆

Chapter 6

Troubleshooting

Misuse of the microscope can adversely affect performance even if the microscope is functioning properly. If any of the problems described in this chapter occur, be sure to check the table for possible causes before requesting service.

If problems that are not listed in the table are detected or the problem still persists even after the indicated measures are taken, turn off the device and contact your nearest Nikon representative.

1 Image Viewing

Problem	Cause	Measure
Part of the field of view is missing. The field of view is invisible. The brightness of the field of view is not uniform. Images are dark.	Devices are not attached correctly.	Attach the devices correctly.
	The optical path switching lever of the tube is positioned partway.	Position the lever correctly.
	The nosepiece is not turned to the click position or is placed in the vertical view state.	Firmly turn the nosepiece to the click position for stereoscopic view to bring the objective into the optical path.
	The objective and/or sample is contaminated with dirt or dust.	Clean as needed.
	The light intensity of illumination is too low.	Adjust the light intensity to an appropriate level.
	The turret of the epi-fluorescence attachment is not at the correct position.	Set the turret at the correct position by turning the filter cube switching knob.
Dirty or dusty field of view	The objective is contaminated with dirt or dust.	Clean as needed.
	The sample is contaminated with dirt or dust.	Clean as needed.
One side of the image is blurred or images are distorted.	The stage is not attached horizontally.	Attach the stage correctly.
	A sample is tilted relative to the stage surface.	Correctly reposition the sample on the stage.

2 Operation

Problem	Cause	Measure
Even when looking with both eyes, an image does not appear as a single image.	The interpupillary distance has not been adjusted.	Adjust the interpupillary distance.
	The diopter has not been adjusted.	Adjust the diopter distance.
Eyes become fatigued.	The interpupillary distance has not been adjusted.	Adjust the interpupillary distance.
	The diopter has not been adjusted.	Adjust the diopter distance.
	Brightness is inadequate.	Adjust the brightness of the illumination.
Changing magnification results in large focal deviation.	The diopter has not been adjusted.	Adjust the diopter distance.
The focal deviation is large when objectives are switched.	The diopter has not been adjusted.	Adjust the diopter distance.
The torque of the focus knob is heavy.	The torque of the focus knob is too tight.	On devices with a torque adjustment ring, loosen the torque adjustment ring to some extent. On devices with a focus knob on both sides, turn the focus knobs in the direction for loosening the torque.
The focus becomes less sharp over time. The vertical position of the zooming body may slide due to various loads (such as its own weight or the load of the counterbalance spring inside the focus unit).	The torque of the focus knob is too loose.	On devices with a torque adjustment ring, tighten the torque adjustment ring to adjust the torque to an appropriate level. On devices with a focus knob on both sides, turn the focus knobs in the direction for tightening the torque.

Chapter 7

Maintenance and Storage

This chapter describes how to maintain and store the product.

1 Cleaning

Clean and disinfect the microscope and lenses as described in the procedures below.

■ **Tools used for cleaning**

- Blower
- Soft brush
- Soft cotton cloth, lens tissue, gauze, etc.
- Pure alcohol (ethyl or methyl alcohol), medical alcohol

> ⚠ **CAUTION**
>
> - Pure alcohol used for cleaning is highly flammable. Be careful when handling these materials particularly around open flames or when turning the power switch on or off.
> - Follow the instructions provided by the manufacturer when using pure alcohol.
> - When cleaning the product, do not use organic solvents (alcohol, ether, thinner, etc.) on the coated, plastic, or printed areas. Doing so will result in discoloration or peeling of the printed characters.

1.1 Cleaning Lenses

Keep the lens free of dust and fingerprints. Any contamination on the lenses or filters will lower the image quality. If the lenses have become dirty, clean them as follows:

■ **Cleaning light dirt (dust)**

(1) Use an air blower to blow off any dust.

(2) If any dust remains, brush the dust off using a soft brush or gently wipe the dust off using a piece of gauze.

■ **Cleaning tough dirt (fingerprints or grease)**

Use a soft, clean cotton cloth, lens tissue, or gauze lightly dampened with pure alcohol (ethyl or methyl alcohol) to wipe the dirt off.

> **Tips on wiping**
>
> Do not reuse cotton cloth, lens tissue, or gauze that has already been used.

1.2 Cleaning Parts Other than the Lens

■ **Cleaning light dirt (dust)**

Use a silicon cloth to clean the part.

■ **Cleaning tough dirt (fingerprints or grease)**

Lightly dampen a piece of gauze with a neutral detergent and gently wipe the dirt off.

1.3 Disinfecting the Product

For routine disinfection of this product, Nikon recommends using 70% medical alcohol.

Using organic solvents on plastic parts can cause discoloration.

Cautions on disposal

If a sample contacts this product, check whether the sample is hazardous. If the sample is hazardous, follow the standard procedures established for your facility.

2 Storage

- Store this product in a dry location free of mold or mildew.
  The storage conditions are as follows: temperature (-20°C to +60°C), humidity (90% RH max., no condensation).
- Place a cover over this product to protect it from dust.
- Switch off the device (press the switch to the "O" position). If the device is warm, wait for it to cool before covering it with a cover.

3 Periodic Inspection (Charged)

To maintain the performance of this product, Nikon recommends periodic inspection (chargeable service). Contact your nearest Nikon representative for details.

☆☆☆

Chapter

8

Specifications

1 Microscopy (Principles)

The microscope's objectives and optical zoom system enable the magnification of minute substances of samples placed on the stage such as metal, mineral, and cells, so that microscopy and image capturing are performed with the focus adjusted using the focus device.

■ Intended use of this product

This microscope is intended primarily for microscopic observations, experimentation and image capturing of samples (metal, mineral, cells, etc.) placed on the stage, using diascopic and reflected illumination. Therefore, accuracy of the numeric information (such as magnifications or Z-position information) is not guaranteed. These values are used as reference and include a margin of error.

2 Performance Properties

■ Stereo microscope

Name	Zooming body	Zooming body
Model	SMZ800N	SMZ1270/1270i
Zoom ratio	8:1	12.7:1
Magnification	1x to 8x	0.63x to 8x
Distance between optical axes	22 mm	22 mm
Max. NA	0.105 (with a 1x objective (f=100) at 8x zoom)	0.105 (with a 1x objective (f=100) at 8x zoom)
Focus mount	76 mm dia. mount	76 mm dia. mount
Tube mount	54 dia. round dovetail	54 dia. round dovetail
Objective mount	M58 x 1.25	M58 x 1.25
Zooming	Right/left single-axis knob Click stop: 2x, 3x, 4x, 5x, 6x, 7x; cancelable	Right/left single-axis knob Click stop: 1x, 2x, 3x, 4x, 6x, cancelable
Magnification detection	Not available	SMZ1270: Not available SMZ1270i: Available Magnification output by USB Display magnification range 0.1x (zoom range: 0.63x to 3x) 0.2x (zoom range: 3x to 6x) 0.5x (zoom range: 6x to 8x)

■ **Focus mount**

Name	Focus Mount	Focus Mount	Focus Mount
Model	C-FMAN	C-FMBN	C-FMCN
Vertical movement method	Through rotation of the right/left single-axis focus knob Knob torque adjustable	Through rotation of the right/left single-axis focus knob Knob torque adjustable	Through rotation of the right/left single-axis coarse/fine knob Coarse focus knob torque adjustable
Focusing stroke	40 mm	50 mm	50 mm (35 mm when attached to the stand's support without an anti-drop collar)
Stroke per focus knob rotation	18.7 mm/rev	18.7 mm/rev	Coarse: 18.7 mm/rev Fine: 3.27 mm/rev
Mount inclination	Not possible	Possible (Angle of inclination: 180°)	Not possible
Supported stand	P Universal Stand	• G-US1 Universal Table Clamp Stand • G-US2 Universal Table Stand	• P-PS32 Plain Stand • P-DSL32 LED Diascopic Illumination Stand • P-DSF32 Fiber Diascopic Illumination Stand
Others	---	---	Anti-drop collar supplied

■ **Stand**

Name	Plain Stand
Model	C-PSN/C-PSCN
Focusing mechanism	With single-axis focus knobs on the support Focusing stroke: 100 mm Stroke per focus knob rotation: 21.7 mm/rev Knob torque adjustable
Stage clip attachment hole	Two clips on the base
Stage plate	Black plane and milky white plane, acrylic, 90 mm dia. Attached to the base using a leaf spring Exchangeable for an ESD stage plate.
Arm position	55 mm movable (downward)
Attachable devices	• Stage clip • C-LSL LED Epi Illuminator (attached directly or via a G-EIA Flexible Arm or SMZ-U Epi Arm) • C-FID2 Double Arm Fiber Illuminator • Type-2 Sliding Stage • C-TRS Tilting Stage
Others	The C-PSCN is a space-saving model with a small base.

* For details on the specification for the C-DS Dia Illumination Stand and C-LEDS Hybrid LED Stand, refer to the instruction manual supplied with the stands.

* For details on the specification for the P Universal Stand, G-US1 Universal Table Clamp Stand and G-US2 Universal Table Stand, refer to the instruction manual supplied with the stands.

Name	Plain Stand	LED Diascopic Illumination Base	Fiber Diascopic Illumination Base
Model	P-PS32	P-DSL32	P-DSF32
Tap hole	With tap holes for optional devices	With tap holes for optional device	With tap holes for optional device
Stage plate	Black plane and milky white plane, acrylic plate, 180 mm dia. Attached to the base using a fixing screw	Transparent glass plate, 180 mm dia. Attached to the base using a fixing screw	Transparent glass plate, 180 mm dia. Attached to the base using a fixing screw
Illumination optical systems	None	• Diascopic illumination using an LED light source (bright field, OCC) • With the LED power ON/OFF switch and brightness control dial, LED brightness control selectable • AC adapter input terminal • LED brightness control terminal • Power supply: Supplied from the 12 V AC adapter or P2-CTLB Control Box	• Diascopic illumination through an external LED light source and fiber (bright field, OCC) • High/low magnification condenser lens: Switching type • Filter (NCB11, ND4, ND16): Removable • Light source: C-FLED2 LED Light Source for Fiber Illuminator (Refer to the instruction manual for the light source.)
Focusing mechanism	None	Support vertical movement system using the focus dial on the base Focusing stroke: 6.2 mm Stroke per focus dial rotation: 3.24 mm	Support vertical movement system using the focus dial on the base Focusing stroke: 6.2 mm Stroke per focus dial rotation: 3.24 mm
Attachable devices	• P-SXY64 XY Stage • Type-2 sliding stage (P-PS32 only) • C-SSL DIA Sliding Stage • P-DF LED Dark Field Unit • C-TRS Tilting Stage • C-LSL LED Epi Illuminator (via an SMZ-U Epi Arm) • C-FDF Flexible Double Arm Fiber Illumination Unit (via a C-FIDH Fiber Holder) • C-FID2 Double Arm Fiber Illuminator • C-POL Simple Polarizing Attachment (P-DSL32 and P-DSF32 only)		
Others	• Dedicated hex driver located at the top of the support • Support exchangeable for a C-EP support (P-PS32: Approx. extra 100 mm, P-DSL32 and P-DSF32: Approx. extra 145 mm)		

■ Tube

Name	Binocular Tube	Trinocular Tilting Tube	Trinocular Tube
Model	P-B	P-TERG100 P-TERG50	P-TL100
Angle of depression	20°	0 to 30° (continuously changeable)	10°
Binocular/tube optical-path switching	None	Lever push-in/pull-out	Lever push-in/pull-out
Eye point	Height: Approx. 121 mm from the mount joint (when the interpupillary distance is 58 mm)	Variation: Approx. 90 mm (25 mm to 115 mm from the mount joint)	Height: Approx. 48 mm from the mount joint
Field of view number	22	Binocular eyepiece tube: 22 Vertical tube: 18	Binocular eyepiece tube: 22 Vertical tube: 18

■ Objective

Name	Objective	Objective	Objective	Objective
Model	P-Achro 0.5X	P-ED Plan 0.75X	P-Plan 1X	P-ED Plan 1.5X/WF
Magnification	0.5x	0.75x	1x	1.5x
Numerical aperture (max.)	0.053	0.079	0.105	0.158
Working distance	189 mm	117 mm	78 mm	44 mm
Objective mount	M58 x 1.25	M58 x 1.25	M58 x 1.25	M58 x 1.25

Name	Objective	Objective	Objective	Objective
Model	P-ED Plan 2X/WF	P-Plan Apo 0.5X/WF	P-Plan Apo 0.75X/WF	P-Plan Apo 1X/WF
Magnification	2x	0.5x	0.75x	1x
Numerical aperture (max.)	0.21	0.053	0.079	0.105
Working distance	35 mm	82.5 mm	107 mm	70 mm
Objective mount	M58 x 1.25	M58 x 1.25	M58 x 1.25	M58 x 1.25

■ Eyepiece

Name	Eyepiece	Eyepiece	Eyepiece	Eyepiece
Model	C-W10XB	C-W15X	C-W20X	C-W30X
Magnification	10x	15x	20x	30x
Field number	22	16	12.5	7

■ Episcopic illuminator

Name	Coaxial Epi Illuminator	Flexible Double Arm Fiber Illumination Unit	Ring Fiber Illumination Unit	Double Arm Fiber Illuminator
Model	P-CI	C-FDF	C-FIR	C-FID2
Magnification	1.5x	–	–	–
Episcopic illumination	• Episcopic illumination through a two-branch fiber • Light source: C-FLED2 LED Light Source for Fiber Illuminator (Refer to the instruction manual for the light source.)	• Episcopic illumination through fiber branched into two • Light source: C-FLED2 LED Light Source for Fiber Illuminator (Refer to the instruction manual for the light source.) • Used together with a C-FIDH Fiber Holder	• Episcopic illumination through fiber positioned like a ring • Light source: C-FLED2 LED Light Source for Fiber Illuminator (Refer to the instruction manual for the light source.)	• Episcopic illumination through fiber branched into two • Light source: C-FLED2 LED Light Source for Fiber Illuminator (Refer to the instruction manual for the light source.)
Installation and related devices	Installed between the zooming body and the tube	• P-PS32 Plain Stand • P-DSL32 LED Diascopic Illumination Stand • P-DSF32 Fiber Diascopic Illumination Stand	Screwed into the tip of the objective • Achro 0.5X • P-ED Plan 0.75X/WF • Plan 1X • P-Plan Apo 0.5X/WF • P-Plan Apo 0.75X/WF • P-Plan Apo 1X/WF	• P-PS32 Plain Stand • P-DSL32 LED Diascopic Illumination Stand • P-DSF32 Fiber Diascopic Illumination Stand

■ Epi fluorescence attachment

Name	Epi Fluorescence Attachment
Model	P-EFL
Magnification	1x
Epi-fl illumination	• Attachment of filter cubes to the internal turret • Up to four filter cubes can be attached. • Turret switching: Knob rotation method • Light source: HG Precentered Fiber Illuminator C-HGFI/C-HGFIE (Refer to the instruction manual for the light source.)

■ Control box

Name	Control Box
Model	P2-CTLB
AC adapter	24 V AC adapter
Function in this system	Power supply to the P-DSL32 LED Diascopic Illumination Stand, Illumination control from a PC (NIS-Elements) connected using a USB cable.

■ AC Adapter

Name	12 V AC Adapter	24 V AC Adapter
Model	EA1050E-120	PW-120A-1Y24GPB
Manufacturer	EDAC POWER Electronics Co., Ltd.	Power-Win Technology
Input rating	100-240 VAC±10%, 50-60 Hz, 1.8 A	100-240 VAC±10%, 50-60 Hz, 2.0 A
Output rating	12 VDC, 3.5 A Max.	24 VDC, 5.0 A Max.
External dimensions (W x H x L)	60 x 35 x 120 mm	64.8 x 38.5 x 170 mm
Weight	253 g (excluding power cable)	650 g (excluding power cable)
Safety standards	UL Listed, GS certified, CE declaration of conformity, PSE certified	UL Listed, GS certified, CE declaration of conformity, PSE certified

■ Power cable

Relevant device	P2-CTLB Control Box P-DSL32 LED Diascopic Illumination Stand EA1050E-120 12 V AC adapter PW-120A-1Y24GPB 24 V AC adapter
When used in 100-120 V regions outside Japan	UL listed detachable power cable set, 3 conductor grounding (3 conductor grounding Type SVT, No.18 AWG, 3 m long maximum, rated at 125 VAC minimum)
When used in 220-240 V regions	Detachable power cable set approved in accordance with EU/EN standards, 3 conductor grounding (3 conductor grounding Type H05VV-F, 3 m long maximum, rated at 250 VAC minimum)
When used inside Japan	PSE approved detachable power cable set, 3 conductor grounding (3 conductor grounding Type VCTF 3 x 0.75 mm^2, 3 m long maximum, rated at 125 VAC minimum)

3 Physical Properties

Stereo microscopes SMZ800N/SMZ1270/SMZ1270i

Operating conditions	Temperature: 0°C to +40°C Humidity: 60% RH max. at 40°C (no condensation) Altitude: 2,000 m max. Pollution level: Degree 2 Overvoltage Category: Category II Electrical shock protection class (AC Adapter): Class I Indoor use only
Transport/storage conditions	Temperature: -20°C to +60°C Humidity: 90% RH max. (no condensation)
External dimensions (W x H x L) and mass	Dimensions and mass vary depending on the composition described in Chapter 1, "Components." SMZ800N Zooming Body system: 292 mm x 376 mm x 387 mm, 5.5 kg SMZ1270 Zooming Body system: 300 mm x 402 mm x 420 mm, 6.5 kg
Safety Standards	• C-UL-US Listed • FCC Part 15 Subpart B Class A Note: 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. • CAN ICES-003(A) / NMB-003(A) • Australian EMI (AS/NZS CISPR11) CE Marking • Low Voltage Directive • EMC Directive