

M608 E 18.5.NF.8 (1/2)



Nikon

Research Stereo Microscope
SMZ25/SMZ18
Instruction Manual

Introduction

Thank you for purchasing a Nikon product.

This instruction manual is written for users of the Nikon research stereo microscopes for SMZ25 Zooming Body/SMZ18 Zooming Body. 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.

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Safety Precautions

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

WARNING and CAUTION Symbols

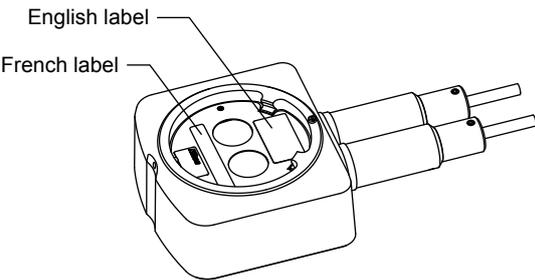
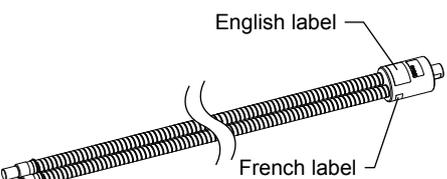
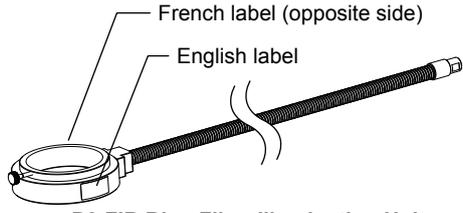
Although this product is designed and manufactured to be completely safe during use, incorrect usage or failure to follow the safety instructions provided may cause personal injury or property damage. To ensure correct usage, read this manual carefully before using this product. Do not discard this manual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

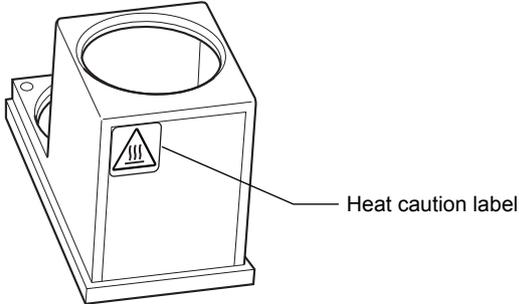
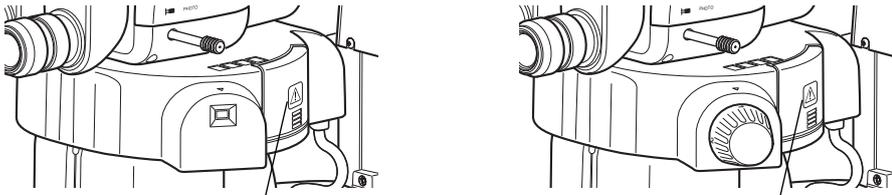
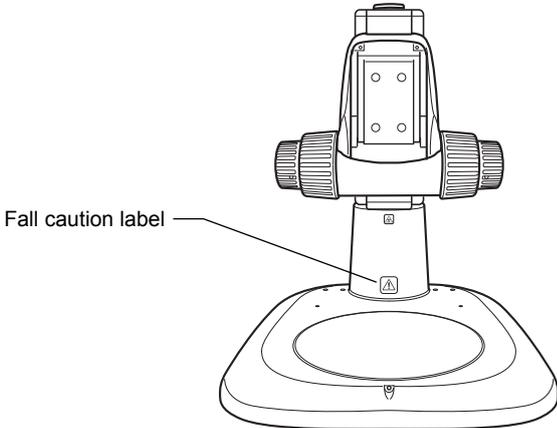
Safety instructions in this manual are marked with the following symbols to indicate their importance. For your safety, always follow the instructions marked with these symbols.

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.

<p>Photobiological safety label</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>IEC62471 RISK GROUP2 CAUTION Possibly hazardous optical radiation emitted from this product. Do not stare at operating lamp. May be harmful to the eyes.</p> </div> <p>English label</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Groupe de risque 2 ATTENTION: possibles émissions de rayonnements optiques de cet appareil. Ne regardez pas la source de lumière, peut endommager vos yeux.</p> </div> <p>French label</p>	<p>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</p> <p style="text-align: center;">Label Position</p> <div style="text-align: center;">  <p>P2-CIA Coaxial Epi Illuminator</p> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;">  <p>C-FDF Flexible Double Arm Fiber Illumination Unit</p> </div> <div style="text-align: center;">  <p>P2-FIR Ring Fiber Illumination Unit</p> </div> </div>
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<p>Heat caution label</p> 	<p>Caution: Heat of the empty cube</p> <p>Immediately after diascope 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 diascope observation.</p> <p>Label Position</p>  <p>Heat caution label</p> <p>Empty cube of the epi fluorescence attachment</p>
<p>Light leakage caution label</p> 	<p>Caution: Light leakage</p> <p>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.</p> <p>Label Position</p>  <p>Light leakage caution label</p> <p>P2-EFLM Motorized Epi Fluorescence Attachment</p> <p>Light leakage caution label</p> <p>P2-EFLI Epi Fluorescence Attachment</p>
<p>Fall caution label</p> 	<p>Caution: P2-FMDN Focus Mount attachment orientation</p> <p>Attach the P2-FMDN Focus Mount to the stand so that the focus mount faces the front of the stand as shown in the figure.</p> <p>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.</p> <p>Label Position</p>  <p>Fall caution label</p> <p>P-PS32 Plain Stand, P-DSL32 LED Diascopic Illumination Stand, P-DSF32 Fiber Diascopic Illumination Stand</p>

Biohazard label

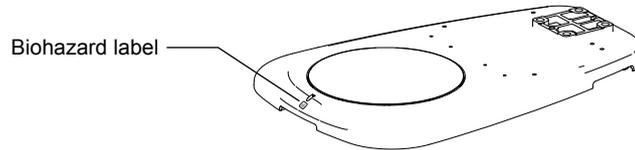


Caution: Biohazard

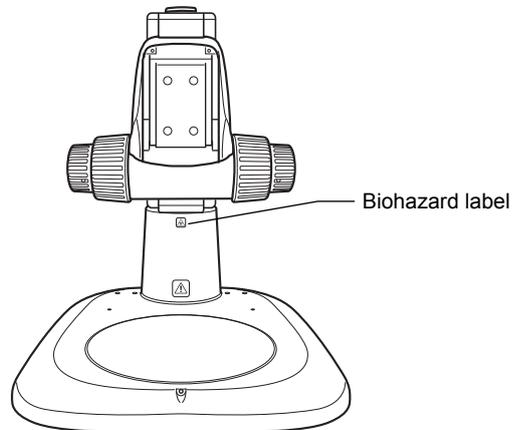
This symbol calls your attention to the following:

- The product may become biohazardous if a sample contacts the product.
- To avoid exposure to biohazard, do not touch contaminated parts with your bare hands.
- Decontaminate the contaminated parts according to the standard procedures for your facility.

Label Position



**P2-PB Plain Base, P2-DBL LED Diascopic Illumination Base,
P2-DBF Fiber Diascopic Illumination Base**



**P-PS32 Plain Stand, P-DSL32 LED Diascopic Illumination Stand,
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 illuminator

During and immediately after a period of illumination, the lamp and the periphery of the lamp (including the lamphouse) are very hot if the light source of the illumination device is a mercury lamp.

- Do not touch the lamp or the periphery of the lamp during or immediately after a period of illumination. There is a risk of burn if you touch the hot area.
- Always attach the lamphouse cover when using this product.
- Make sure the lamp and the periphery of the lamp have cooled sufficiently (which may take approximately 30 minutes) before replacing the lamp.
- Do not place fabric, paper, or highly flammable volatile materials (i.e. gasoline, petroleum benzine, paint thinner, and alcohol) near the lamphouse while the lamp is on or for about thirty minutes after it was turned off. 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 warnings or cautions in the manuals, subjecting the system to shock or impact, or disassembling the system may result in unexpected accidents or 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 the periphery of the lamp 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

<p>1 Power off 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.</p> <p>2 Do not look into the LED light The P2-CIA Coaxial Epi Illuminator, C-FDF Flexible Double Arm Fiber Illumination Unit and P2-FIR Ring Fiber Illumination Unit use LEDs as the light source. A label indicating photobiological safety is attached to these devices in order to bring attention to the following. (For details about the label attachment position, see “Label Attached to the Product” on page v.) “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”</p> <p>3 Be careful of the heat of the empty cube Immediately after diascope 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 diascope observation.</p> <p>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.</p> <p>5 Specification of the light source Be sure to use the specified light source for an illumination device. 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.</p> <p>6 Movement of motorized device The microscope system contains motorized devices. To avoid accidental injury by the movements of the motorized devices, be careful with the following when controlling the movements of motorized device with remote controls or personal computers.</p> <ul style="list-style-type: none"> • Before operation, check the state of the entire microscope system to ensure safety when operating the motorized devices. 	<ul style="list-style-type: none"> • If having touched the zooming body, focus knob, objective, stage, or devices or samples placed on the stage, your hand or fingers may be caught and injured. Keep hands off such devices and parts during operation. <p>7 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.</p> <p>8 Remove any covers from the product before switching on. Do not use a device 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 device with a piece of cloth or similar while in use.</p> <p>9 Notes on laying cables Connect and route the cables in accordance with the specified methods. If the cables are not routed and connected properly, the devices may not function correctly.</p> <p>10 Do not place any object on this product. Do not place any object on top of this product.</p> <p>11 Cautions on assembling and installing the product</p> <ul style="list-style-type: none"> • Take care to avoid pinching your fingers or hands during product assembly and installation. • Scratches or fouling optical components (such as lens and filters) with fingerprints, etc. will degrade microscope images. Be careful to avoid scratches or direct contact with the lens and filters when assembling.
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**CAUTION**

- The total mass of the microscope system is over 20 kg. When moving the system to another location, temporarily separate the removable devices and carry the system while firmly holding the hand holding portions of the base, with multiple persons. Do not lift the system while holding the binocular part of the tube or putting hands under the objective.
- Do not place this product in a locker or cabinet.

12 Cautions on sustained observations

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

13 Cautions on use, transportation, and storage

This product must be operated, transported, or stored in accordance with the following conditions. If you install the product 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.

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

14 Cautions on the disposal of the product

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

To avoid exposure to biohazard, dispose of bases (model: P2-PB, P2-DBL and P2-DBF) or stands (model: P-PS32, P-DSL32 and P-DSF32) as contaminated devices in accordance with the standard procedures of your 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 Electromagnetic environment

Before using this product, Nikon recommends evaluating the electromagnetic environment of the installation site.

Do not use this product close to strong electromagnetic radiation sources (example: unshielded intentional RF sources). They may interfere with the proper operation of this product.

This product emits low-level electromagnetic radiation. Do not install this product near precision electronic devices. Otherwise, the performance of such devices might be degraded. If TV or radio reception is affected, move the TV or radio farther away from this product.

3 Scratches, dirt, and foreign particles on the lens

Scratches or fouling optical components (such as lens and filters) with fingerprints, etc. will degrade microscope images.

If these parts become dirty, clean them as described in Chapter 7, "1.1 Cleaning Lenses."

4 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 nearby 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 just above this product may enter the objective as extraneous light. If possible, switch off the room lights directly above this product when observing samples.
- 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% or less. 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 you install the product 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.

5 Handling a focus knob

- Never turn the focus knobs in opposite directions at the same time. Doing so may damage the product.

6 Protect the ports from dust and extraneous light

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

7 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."

8 Motorized devices

When using motorized devices, do not force the motorized devices to move/stop by hand.

Chapter

1

Components

This stereo microscope system can be composed of the SMZ25 Zooming Body or SMZ18 Zooming Body attached to the motorized or manual focus mount and devices such as bases, objectives, tubes and episcopic illuminators that can be arbitrarily selected.

This chapter introduces the names of the devices and components with the following three types of system configuration as examples.

- 1 Microscopy system with an SMZ18 Zooming Body using episcopic illumination
- 2 Microscopy system with an SMZ25 Zooming Body using diascopic illumination and epi-fluorescence illumination
- 3 Compact system with an SMZ18 Zooming Body

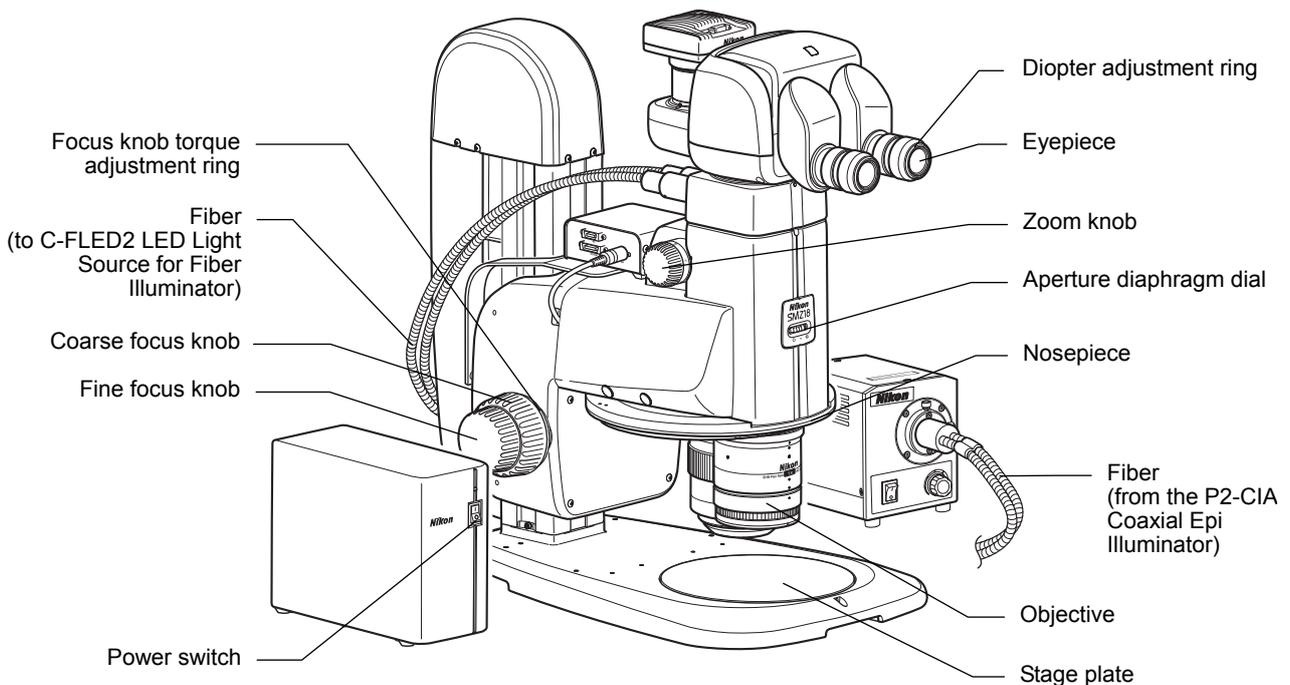
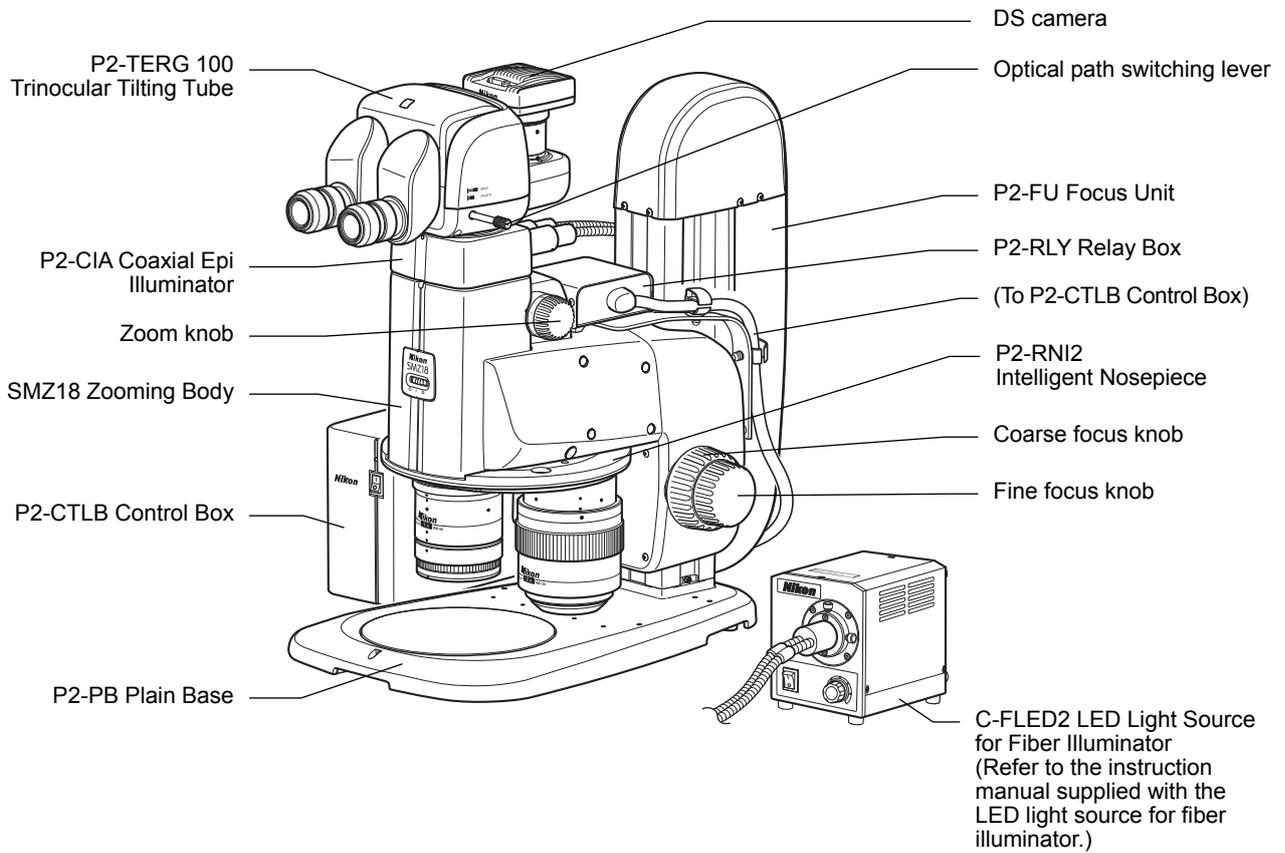
For details about the overall system configuration, see Chapter 5, "1 System Configuration."

1

Microscopy System Using Episcopic Illumination

1.1

Names of the Devices and Operation Sections



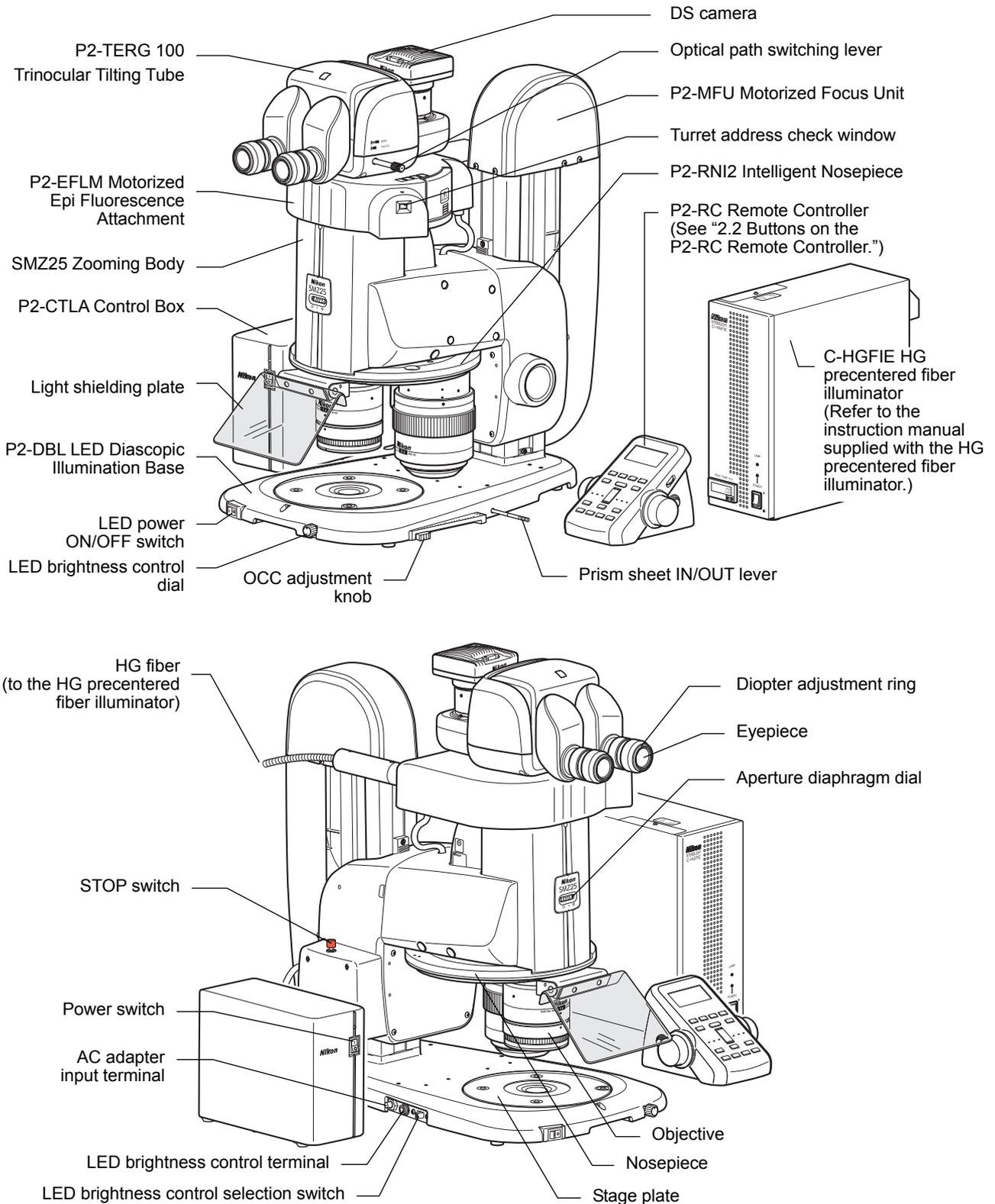
For the names of the components needed for assembly and connections such as the fixing screws and connectors, see Chapter 5, "3 Assembly Procedures."

2

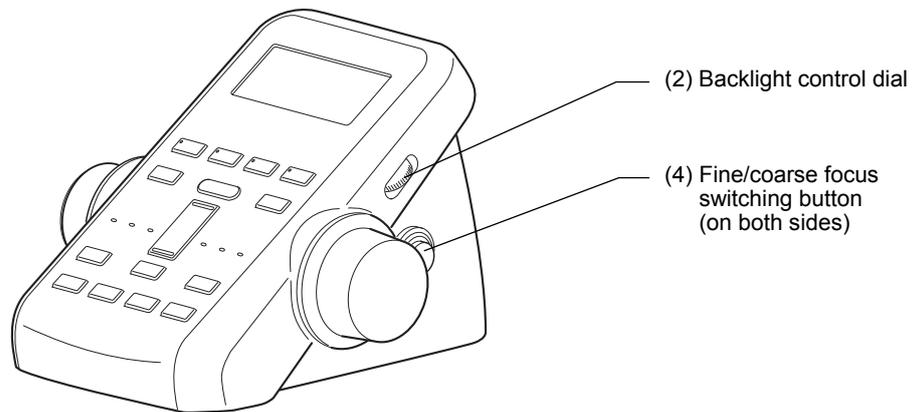
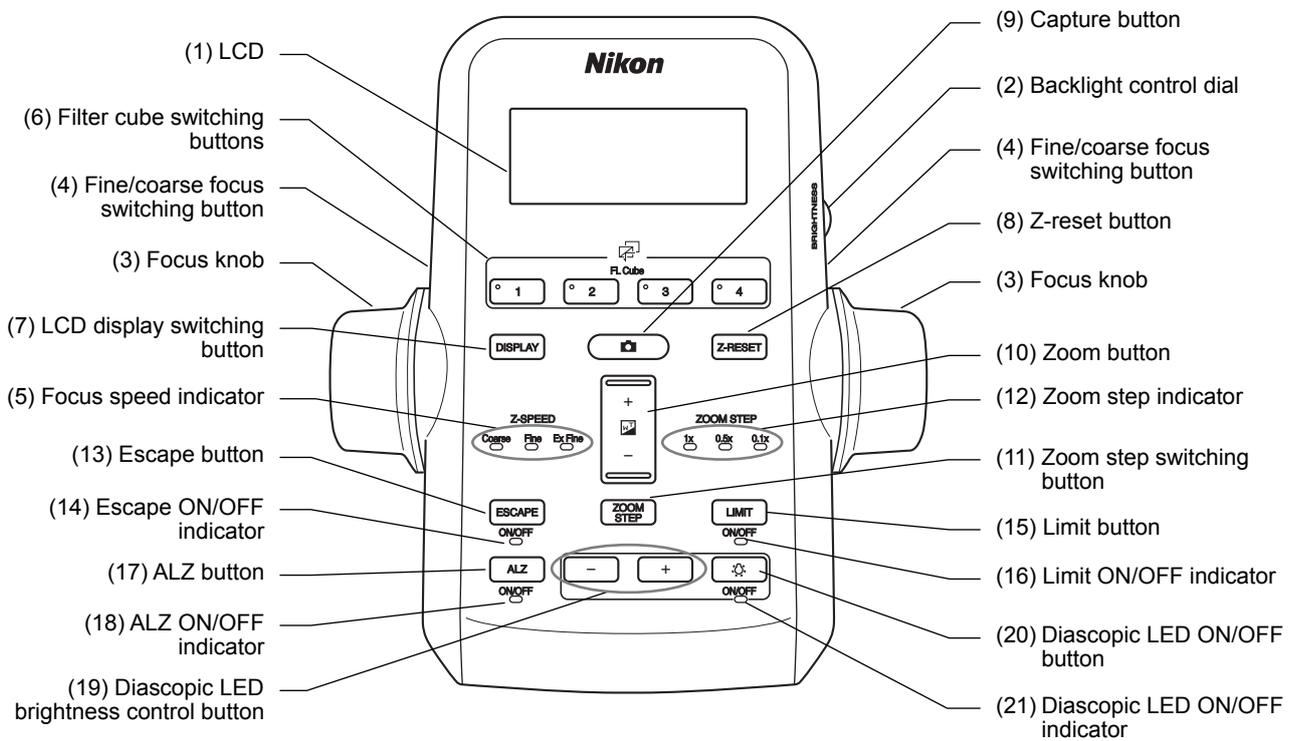
Microscopy System Using Diascopic Illumination and Epi-fluorescence Illumination

2.1

Names of the Devices and Operation Sections



For the names of the components needed for assembly and connections such as the fixing screws and connectors, see Chapter 5, "3 Assembly Procedures."

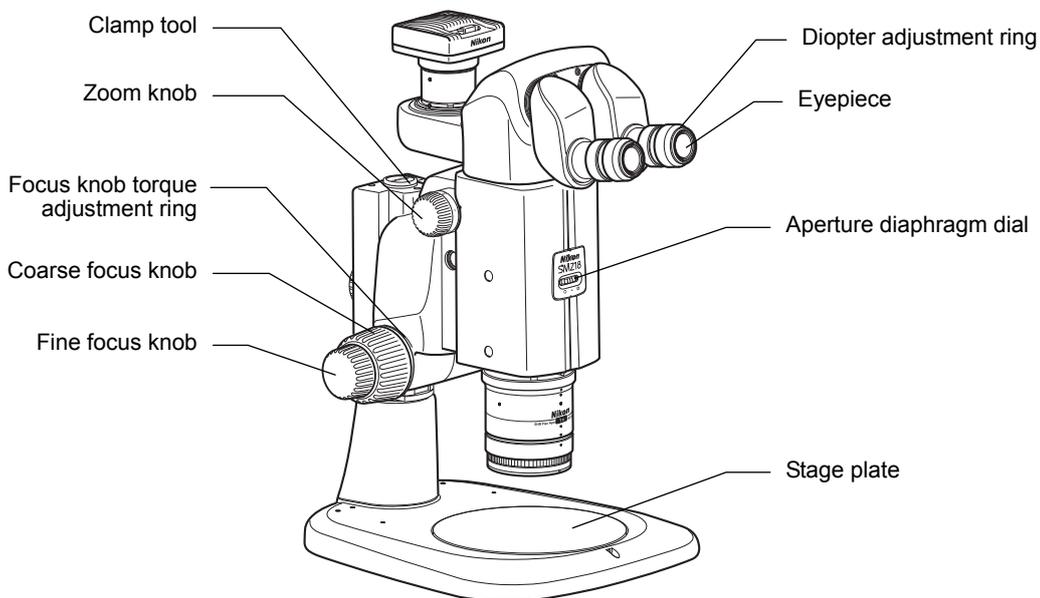
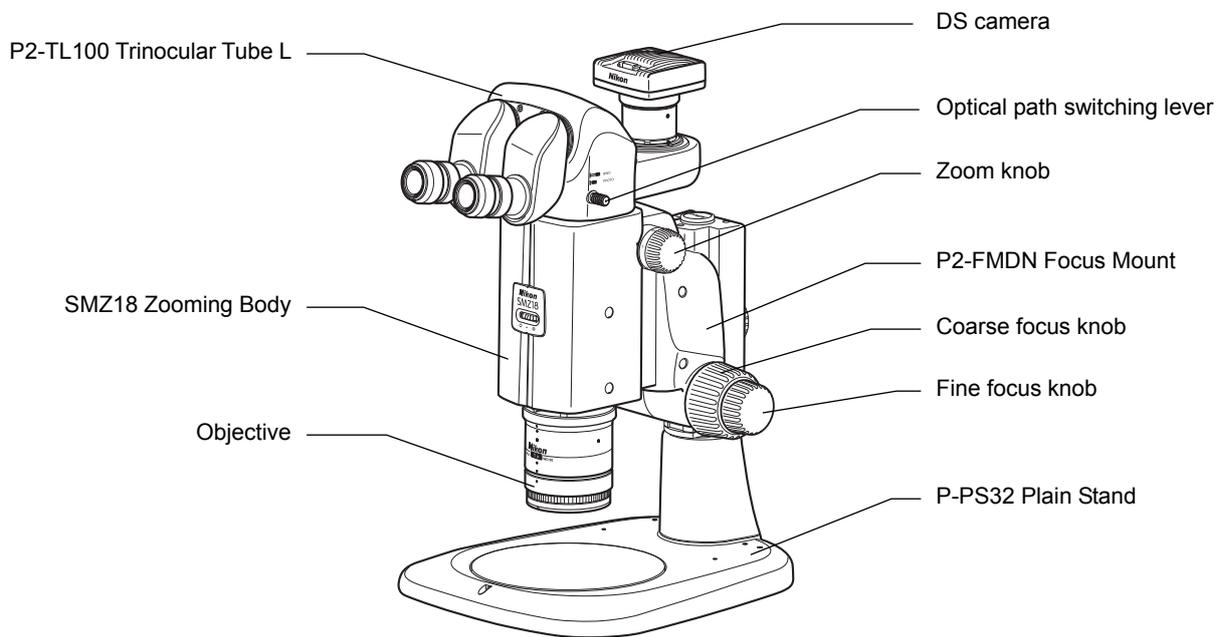


Right Side

For details about the buttons' functions, see "Functions and indications of the operation buttons" in Chapter 4, "10.1 P2-RC Remote Controller."

3 Compact System

3.1 Names of the Devices and Operation Sections



For the names of the components needed for assembly and connections such as the fixing screws and connectors, see Chapter 5, "3 Assembly Procedures."

The above figures show the basic configuration. The compact systems for episcopic, diasopic and epi-fluorescence microscopies can also be configured. (See Chapter 5, "2 Device List.")

☆☆☆

Chapter

2

Microscopy Procedures

This chapter describes the microscopy procedures listed below.

The devices used in the descriptions are based on the configuration examples given in the previous chapter.

Procedure 1: Procedure for microscopy under episcopic illumination

Procedure 2: Procedure for microscopy under diasopic illumination

Procedure 3: Procedure for epi-fluorescence microscopy

It is assumed that all required components are attached to the microscope with all necessary cables properly connected.

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

When using the motorized system or intelligent system for microscopy, see Chapter 3, “16 Internally Saved Information.”

1 Operation Flowchart

Microscopy under episcopic illumination or diascopic illumination

1	Turn on the power.
2	Set a sample.
3	Bring an objective into the optical path.
4	Turn on the illumination and adjust the brightness.
5	Set the optical path to 100% to the binocular part.
6	Adjust the depression angle of the tilting tube.
7	Adjust the diopter.
8	Adjust the interpupillary.
9	Adjust the focus.
10	Change the magnification using the zoom knobs.
11	Turn off the power after completing microscopy.

- * In microscopy under diascopic illumination using an epi-fluorescence attachment, attach an empty cube (supplied with the microscope) to the epi-fluorescence attachment and bring it into the optical path.
- * When using a compact system of an SMZ18 Zooming Body combined with a P-PS32 Plain Stand and P2-FMDN Focus Mount without using an illumination system, perform the steps above in the order of [2], [5], [6], [7], [8], [9], and [10].

Epi-fluorescence microscopy

After locating the target in the sample with microscopy under diascopic illumination, follow the procedure below:

11	Turn off the diascopic LED illumination.
12	Bring the filter cube into the optical path.
13	Adjust the angle of the light shielding plate.
14	Turn on the HG precentered fiber illuminator and adjust the brightness.
15	Adjust the focus.
16	Change the magnification by zooming in and out.
17	Turn off the power after completing microscopy.

2

Procedure for Microscopy under Episcopic Illumination

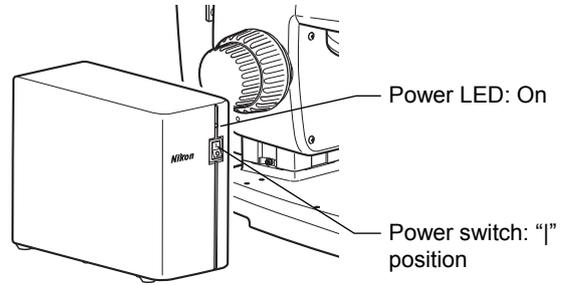
This section describes the procedure for performing microscopy under episcopic illumination using the SMZ18 Zooming Body combined with the P2-CIA Coaxial Epi Illuminator.

1 Turn on the power.

Turn on the P2-CTLB Control Box by pressing the power switch to the “I” position.
Check that the power LED on the control box lights.

✔ Power supply to the DS-L3/DS-L4 camera control unit

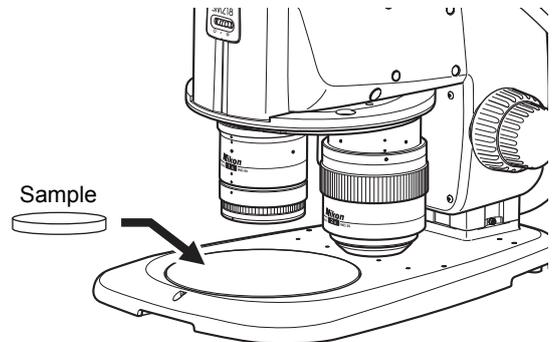
When the DS-L3/DS-L4 camera control unit is connected, turn on the control box and then the DS-L3/DS-L4.



Power on

2 Set a sample.

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



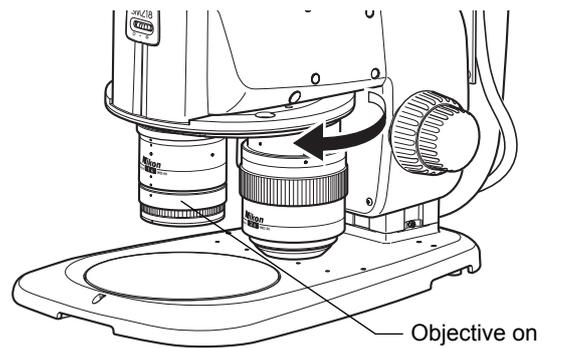
Setting the sample

3 Bring an objective into the optical path.

Turn the nosepiece to bring the objective to be used into the optical path.
Check that the objective falls into the click position when turning the nosepiece.
(See Chapter 3, “8.2 Switching Objectives.”)

✔ P2-CIA Coaxial Epi Illuminator

- The P2-CIA Coaxial Epi Illuminator is supplied with a 1/4 lambda plate (optional). When using the 0.5x or 1x objective, attach the 1/4 lambda plate to the tip of the objective. Turn the 1/4 lambda plate so that the white circle (indicator) is at the front.
- For the P2-CIA Coaxial Epi Illuminator, available objectives and zooming ratios are restricted. For details, see Chapter 4, “7.1 P2-CIA Coaxial Epi Illuminator.”



Rotating the nosepiece

4 Turn on illumination and adjust the brightness.

Refer to the instruction manual for the C-FLED2 LED Light Source for Fiber Illuminator.

✓ Aperture diaphragm

The SMZ18 Zooming Body is equipped with an aperture diaphragm. Turn the aperture diaphragm dial counterclockwise (O side) to fully open the aperture. (For details about using the aperture diaphragm, see Chapter 3, "10 Using the Aperture Diaphragm.")

5 Set the optical path to 100% to the binocular part.

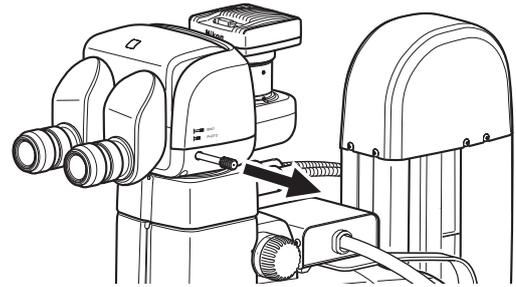
Pull out the optical path switching lever of the tube to set the optical path to 100% to the binocular part.

✓ Moving the optical path switching lever

Pulling out the optical path switching lever: 100% to the binocular part

Pushing in the optical path switching lever: 100% to the vertical tube

The division ratio of the light amount differs depending on the tube types. (See Chapter 3, "3 Switching the Optical Path of the Tube.")

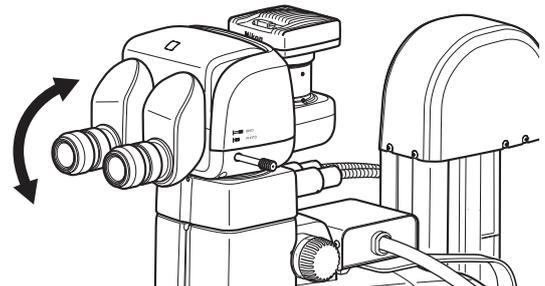


Optical path to the binocular part: 100%

6 Adjust the depression angle of the tilting tube.

When using the P2-TERG 100 or P2-TERG 50 Trinocular Tilting Tube, change and adjust the angle of the binocular part to facilitate microscopy.

(The low eye level P2-TL100 Trinocular Tube L does not have a mechanism for adjusting the angle of depression.)



Adjusting the angle of depression

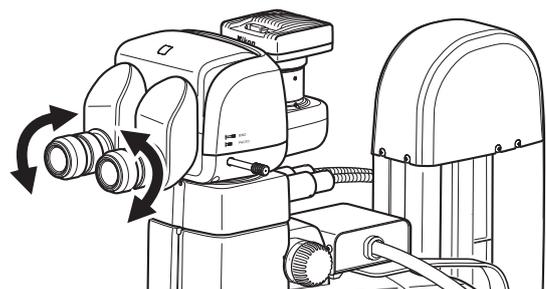
ⓘ Notes on adjusting the angle of depression

- Do not apply excessive force to the binocular part during depression angle adjustment. It 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.

7 Adjust the diopter.

Adjust to match your diopter. For details, see Chapter 3, "5 Adjusting the Diopter."

This adjustment is required for each user.

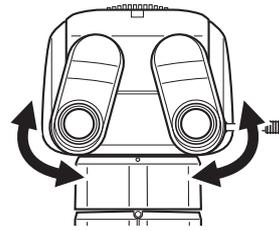


Adjusting the diopter

8 Adjust the interpupillary.

Adjust 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 user.



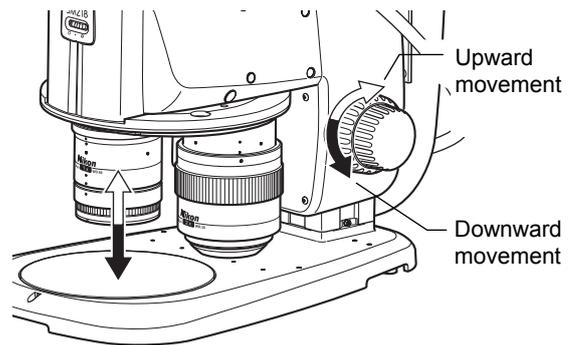
Adjusting the interpupillary distance

9 Adjust the focus.

Turn the focus knobs (coarse/fine control) on the right and left of the focus unit to move the focus mount of the focus unit vertically and focus on the sample. The figure shows the turning directions of a knob and the corresponding vertical movements of the focus mount (zooming body).

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

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



Focusing

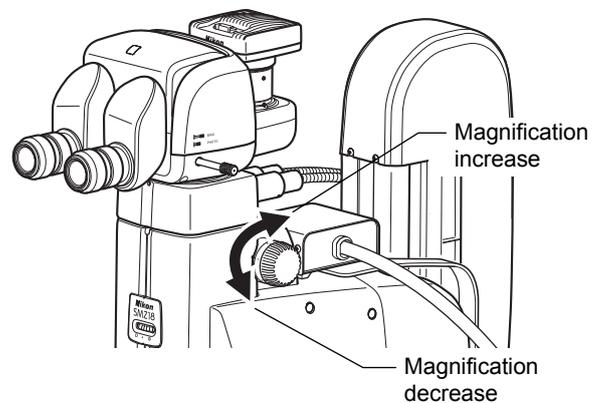
10 Change the magnification using the zoom knobs.

Turn the zoom knobs on the right and left of the SMZ18 Zooming Body to change the magnification. The figure shows the turning directions of a knob and the corresponding changes in magnification.

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

The magnification continuously changes from 0.75x to 13.5x.

Zoom magnification values are marked on the zoom knobs.



Zooming in/out

✔ Click stop during image zooming

It is also possible to cause a click stop to occur at predetermined magnification positions during image zooming.

(See Chapter 4, “1.1 SMZ18 Zooming Body.”)

✔ P2-CIA Coaxial Epi Illuminator

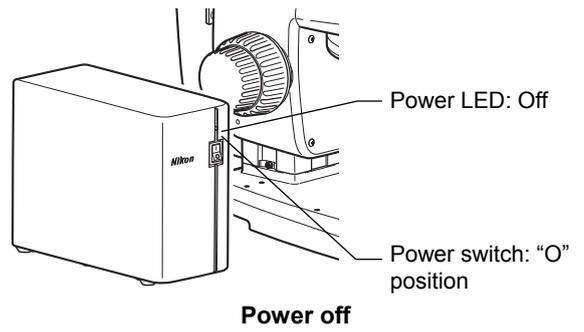
For the P2-CIA Coaxial Epi Illuminator, available objectives and zooming ratios are restricted. For details, see Chapter 4, “7.1 P2-CIA Coaxial Epi Illuminator.”

11 Turn off the power after completing microscopy.

Turn off the P2-CTLB Control Box by pressing the power switch to the “O” position.

Check that the power LED on the control box turns off.

Also turn off the LED light source for fiber illuminator.



3 Procedure for Microscopy under Diascopic Illumination

This section describes the procedure for microscopy under diascopic illumination using the SMZ25 Zooming Body combined with the P2-DBL LED Diascopic Illumination Base.

For the same operations as in “2 Procedure for Microscopy under Episcopic Illumination,” details are omitted.

1 Turn on the power.

Turn on the P2-CTLA Control Box by pressing the power switch to the “I” position.

Check that the power LED on the control box lights.

✔ P2-MFU Motorized Focus Unit

When the power is turned on, the motorized focus unit is initialized as follows:

- (1) The focus mount rises to the upper sensor limit.
- (2) This is followed by downward movement to the position when power was turned on.

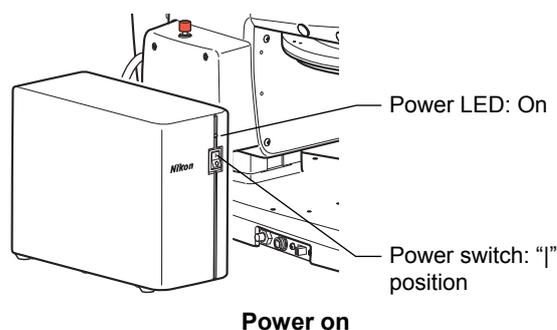
* Other motorized devices also perform internal initialization.

✔ Power supply to the P2-DBL LED Diascopic Illumination Base

For a system configuration where a control box has been connected, the control box supplies power to the P2-DBL LED Diascopic Illumination Base. The P2-DBL therefore need not be connected to a power supply. (See Chapter 4, “8.1 P2-DBL LED Diascopic Illumination Base.”)

✔ Power supply to the DS-L3/DS-L4 camera control unit

When the DS-L3/DS-L4 camera control unit is connected, turn on the control box and then the DS-L3/DS-L4.



2 Set a sample.

→ Step 2 in “2 Procedure for Microscopy Under Episcopic Illumination”

ⓘ Empty cube

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

3 Bring an objective into the optical path.

→ Step 3 in “2 Procedure for Microscopy Under Episcopic Illumination”

4 Turn on the illumination and adjust the brightness.

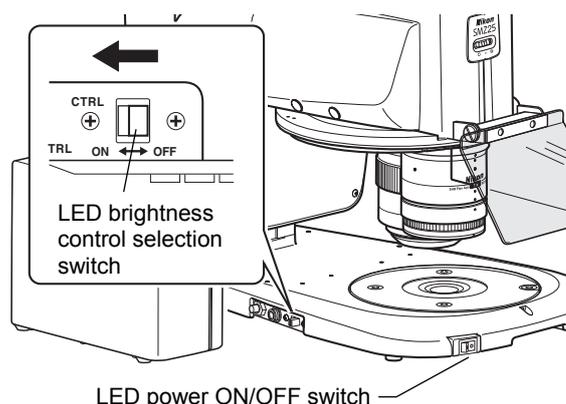
Turn on the LED power ON/OFF switch at the front of the LED diascope illumination base.

Turn on the LED brightness control selection switch on the left of the base to assign control to the control box, and then control the brightness using the remote controller.

(When the LED brightness control selection switch is off, illumination can be controlled from the base using the LED brightness control dial.)

Press the diascope LED ON/OFF button on the remote controller to turn on LED illumination. Check that the LED ON/OFF indicator lights.

Press the diascope LED brightness control buttons to adjust the brightness. Press [+] to increase the brightness and [-] to decrease the brightness.



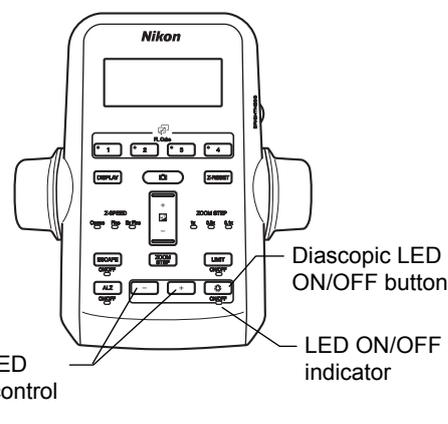
Turning on the LED power ON/OFF switch on the base, and setting the illumination control right to the control box

✔ Illumination control

When the LED brightness control selection switch is turned on, diascope illumination can be turned on or off, brightness can be controlled, and light intensity can be monitored from the control box (a P2-RC Remote Controller, or a PC (software: NIS-Elements)). Note that illumination cannot be controlled from the control box, even if the LED brightness control selection switch is turned on, unless the LED power ON/OFF switch on the base is turned on.

To directly control the brightness using the LED brightness control dial on the base, turn off the LED brightness control selection switch.

For details about using the diascope illumination base, see Chapter 4, “8.1 P2-DBL LED Diascope Illumination Base.”



Remote on/brightness control

✔ Aperture diaphragm

The SMZ25 Zooming Body is equipped with an aperture diaphragm. Turn the aperture diaphragm dial counterclockwise (O side) to fully open the aperture. (For details about using the aperture diaphragm, see Chapter 3, “10 Using the Aperture Diaphragm.”)

5 Set the optical path to 100% to the binocular part.

→ Step 5 in “2 Procedure for Microscopy Under Episcopic Illumination”

6 Adjust the depression angle of the tilting tube.

→ Step 6 in “2 Procedure for Microscopy Under Episcopic Illumination”

7 Adjust the diopter.

→ Step 7 in “2 Procedure for Microscopy Under Episcopic Illumination”

8 Adjust the interpupillary.

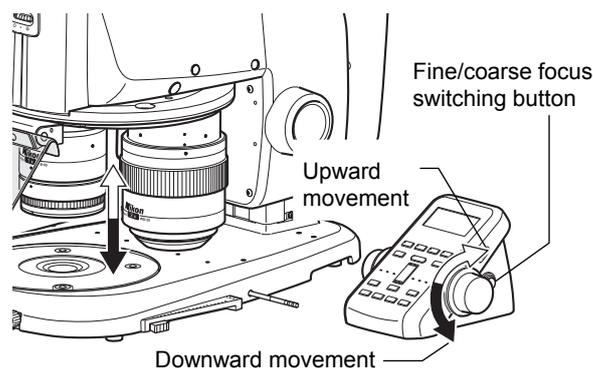
→ Step 8 in “2 Procedure for Microscopy Under Episcopic Illumination”

9 Adjust the focus.

Turn the focus knobs of the remote controller to move the focus mount of the focus unit vertically and focus on the sample. The figure shows the turning directions of a knob and the corresponding vertical movements of the focus mount (zooming body).

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

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



✔ Focus speed switching

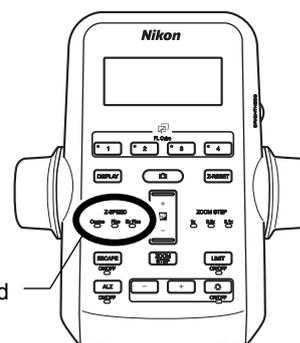
The focus speed can be switched between coarse, fine, and extra fine control.

Use the fine/coarse focus switching button on the remote controller to switch the speed.

Each time the button is pressed, the focus speed is cyclically switched in the order of coarse, fine, and extra fine.

When the focus speed is changed, the corresponding indicator (Coarse/Fine/ExFine) lights.

- Coarse: 2 to 10 mm/second
- Fine: 0.2 to 5 mm/second
- Extra fine: 0.01 to 0.1 mm/second



Focus speed indicator

Focus operation

10 Change the magnification by zooming in and out.

Press the zoom buttons on the remote controller to change the magnification of the zooming body.

- Upper zoom button: Magnification increase
- Lower zoom button: Magnification decrease

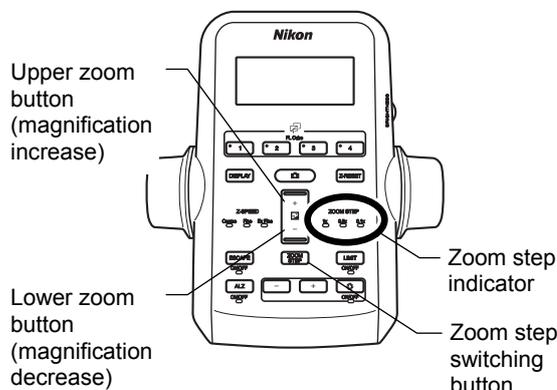
The magnification changes in the range from 0.63x to 15.75x.

Pressing and holding the buttons causes the magnification to change continuously.

✔ Magnification step size

Each time the zoom step switching button is pressed, the step size changes in the following order: 1x, 0.5x then 0.1x. When a step size is selected, the corresponding step LED indicator lights.

(See Chapter 4, “1.2 SMZ25 Zooming Body.”)

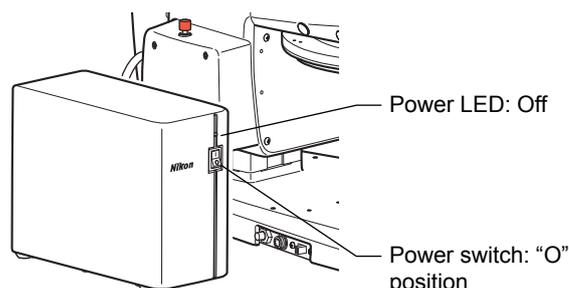


Zooming in/out

11 Turn off the power after completing microscopy.

Turn off the P2-CTLA Control Box by pressing the power switch to the “O” position.

Check that the power LED on the control box turns off.



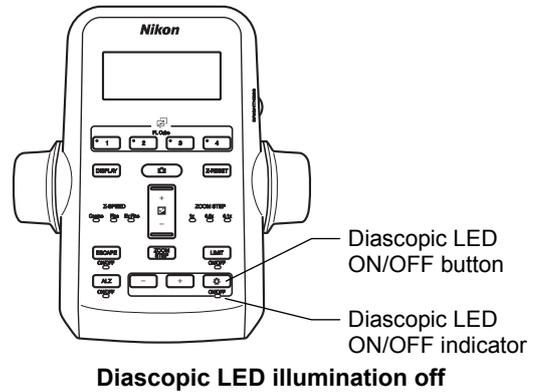
Power off

4 Procedure for Epi-fluorescence Microscopy

After locating a target in a sample in “3 Procedure for Microscopy Under Diascopic Illumination” (steps 1 to 10), follow the procedure below:

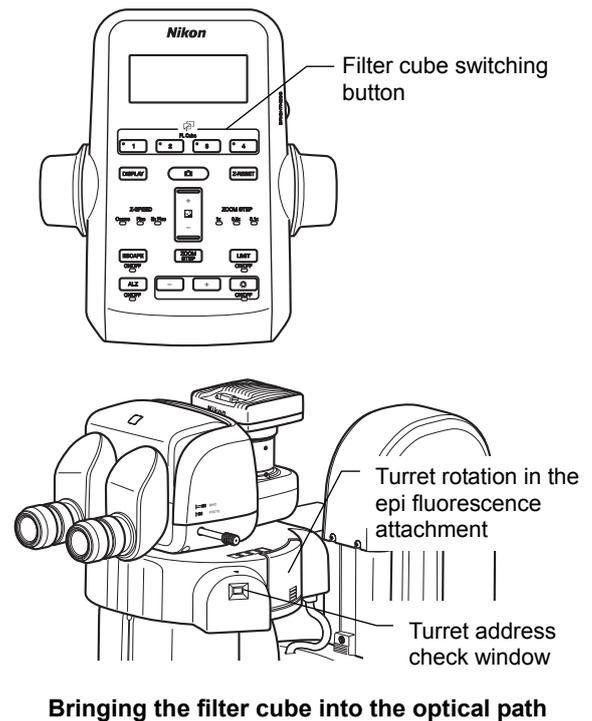
11 Turn off the diascopic LED illumination.

Press the diascopic LED ON/OFF button on the remote controller to turn off LED illumination.
Check that the diascopic LED ON/OFF indicator turns off.



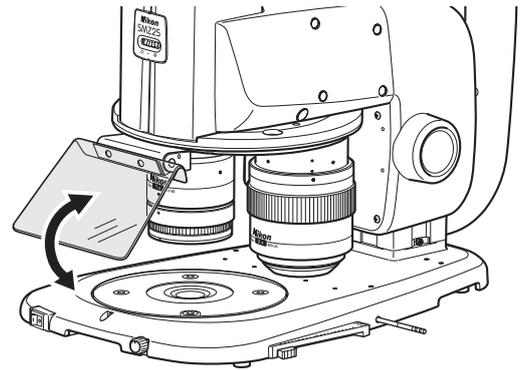
12 Bring the filter cube into the optical path.

Press the filter cube switching buttons (FL1 to FL4) on the remote controller to bring the desired filter cube into the optical path. FL1 to FL4 designate the turret addresses of the epi fluorescence attachment. The LED of the pressed button lights so that the turret address on the optical path can be identified. The address on the optical path can be identified also through the turret address check window of the epi fluorescence attachment.



13 Adjust the angle of the light shielding plate.

Change the angle of the light shielding plate to 45° to prevent light reflected from the objective from entering your eyes.



Adjusting the angle of the light shielding plate

14 Turn on the HG precentered fiber illuminator and adjust the brightness.

Refer to the instruction manual for the fiber light source.

15 Adjust the focus.

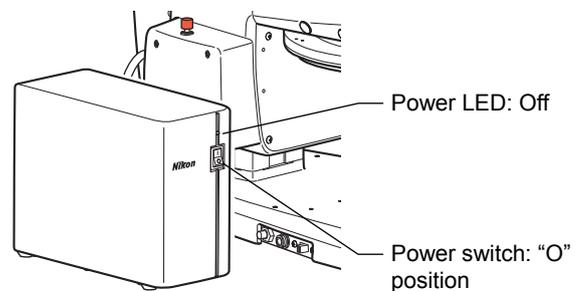
→ Step 9 in “3 Procedure for Microscopy Under Diascopic Illumination”

16 Change the magnification by zooming in and out.

→ Step 10 in “3 Procedure for Microscopy Under Diascopic Illumination”

17 Turn off the power after completing microscopy.

Turn off the HG precentered fiber illuminator and P2-CTLA Control Box by pressing their power switches to the “O” position. Check that their power LEDs go off.



Power off

☆☆☆

Chapter

3

Specific Operations

This chapter describes how to work with this microscope system in order 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.

Connect the device to the relevant power source before turning on the power. 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 the relevant device.

- P2-CTLA Control Box
- P2-CTLB Control Box
- P2-DBL LED Diascopic Illumination Base, P-DSL32 LED Diascopic Illumination Stand

✔ Power supply (control box/12 V AC adapter)

Power to the P2-DBL LED Diascopic Illumination Base and P-DSL32 LED Diascopic Illumination Stand is supplied by connecting a control box or a 12 V AC adapter. (The P-DSL32 can only use the P2-CTLB Control Box.) To provide diascope illumination without using a control box, connect a 12 V AC adapter.

✔ LED power on/off and illumination control

Turn on or off the LED diascope illuminator using the LED power ON/OFF switch on the P2-DBL LED Diascopic Illumination Base or P-DSL32 LED Diascopic Illumination Stand.

Adjust illumination using the LED brightness control dial on the base (stand). To enable adjustment using the LED brightness control dial on the base (stand), the LED brightness control selection switch must be turned off.

When a control box is connected to the base (stand), turn on the LED brightness control selection switch. In this state, diascope illumination can be turned on or off, brightness can be controlled, and light intensity can be monitored from the control box. Note that illumination cannot be controlled from the control box, even if the LED brightness control selection switch is turned on, unless the LED power ON/OFF switch on the base (stand) is turned on.

- P2-DBF Fiber Diascopic Illumination Base, P-DSF32 Fiber Diascopic Illumination Stand (Refer to the instruction manual supplied with the C-FLED2 LED Light source for fiber illuminator.)
- P2-CIA Coaxial Epi Illuminator (Refer to the instruction manual supplied with the C-FLED2 LED Light source for fiber illuminator.)
- P2-EFLI Epi Fluorescence Attachment, P2-EFLM Motorized Epi Fluorescence Attachment (Refer to the instruction manual supplied with the C-HGFI/C-HGFIE HG Precentered Fiber Illuminator.)
- C-FDF Flexible Double Arm Fiber Illumination Unit (Refer to the instruction manual supplied with the C-FLED2 LED Light source for fiber illuminator.)
- C-FID2 Double Arm Fiber Illuminator (Refer to the instruction manual supplied with the C-FLED2 LED Light source for fiber illuminator.)
- P2-FIR Ring Fiber Illumination Unit (Refer to the instruction manual supplied with the C-FLED2 LED Light source for fiber illuminator.)
- P2-FIRL2 LED Ring Illumination Unit 2 (Refer to the instruction manual supplied with the P2-FIRL2 LED Ring Illumination Unit 2.)
- P-DF2 LED Dark Field Unit 2 (Refer to the instruction manual supplied with the P-DF2 LED Dark Field Unit 2.)
- C-LSL2 LED Epi Illuminator 2 (Refer to the instruction manual supplied with the C-LSL2 LED Epi Illuminator 2.)

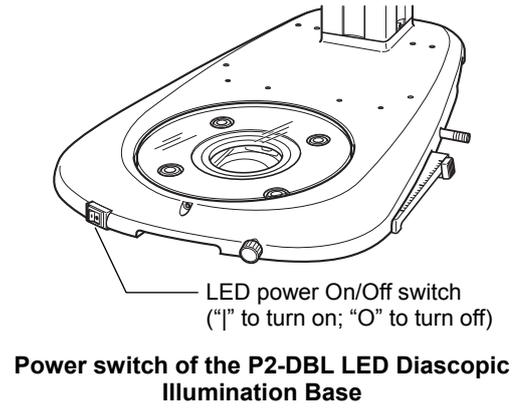
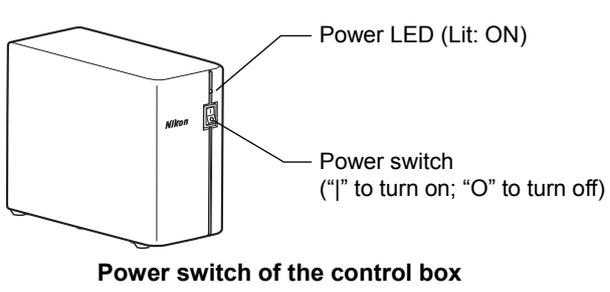
When using an illuminator whose light source is an HG precentered fiber illuminator or fiber illumination LED light source, also turn on the power to the light source. (Refer to the instruction manual supplied with the light source.)

When using multiple power supplies, they need not be turned on in a particular order except for the following cases:

- When using a camera control unit to capture images, power on the camera control unit at the end.
- When controlling a C-HGFIE HG Precentered Fiber Illuminator from NIS-Elements, etc. via a control box, power on the HG precentered fiber illuminator before the control box.

Press the power switch to the “I” position to turn the power on and to the “O” position to turn the power off.

When power is turned on, the power LED lights.



2

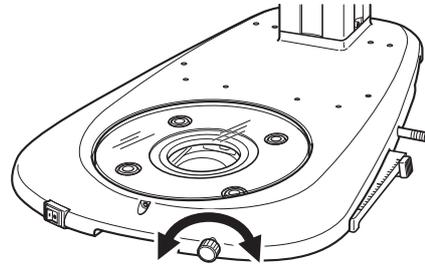
Adjusting the Brightness

The illumination brightness can be adjusted for 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 the sections in Chapter 4 describing how to use the individual devices.

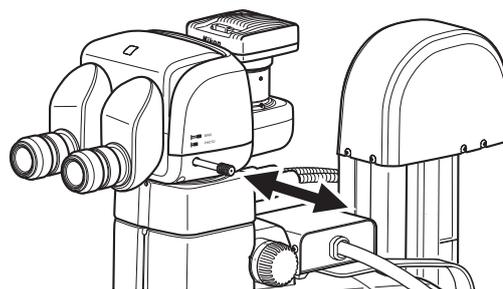
- Adjust the brightness using the LED brightness control dial of the device
 - P2-DBL LED Diascopic Illumination Base
 - P-DSL32 LED Diascopic Illumination Stand
- Adjust the brightness using the C-FLED2 LED Light source for fiber illuminator
(Refer to the instruction manual supplied with the C-FLED2 for details.)
 - P2-CIA Coaxial Epi Illuminator
 - C-FDF Flexible Double Arm Fiber Illumination Unit
 - C-FID2 Double Arm Fiber Illuminator
 - P2-FIR Ring Fiber Illumination Unit
 - P2-DBF Fiber Diascopic Illumination Base
 - 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.)
 - P2-EFLI Epi Fluorescence Attachment
 - P2-EFLM Motorized Epi Fluorescence Attachment
- Adjust the brightness using the power supply section of each unit
(Refer to the instruction manual supplied with the relevant product for details.)
 - P2-FIRL2 LED Ring Illumination Unit 2
 - P-DF2 LED Dark Field Unit 2
 - C-LSL2 LED Epi Illuminator 2



Brightness control on the P2-DBL LED Diascopic Illumination Base

3 Switching the Optical Path of the Tube

For observing a specimen using the eyepiece, switch the optical path to the binocular part. For imaging using the DS camera, switch the optical path to the vertical tube. Use the optical path switching lever of the tube to switch the optical path. Push or pull the lever to make the desired selection. Be sure 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	
P2-TERG 100 Trinocular Tilting Tube	Pulled out	100	100	0
	Pushed in	100	0	100
P2-TERG 50 Trinocular Tilting Tube	Pulled out	100	100	0
	Pushed in	100	50	50
P2-TL100 Trinocular Tube L	Pulled out	100	100	0
	Pushed in	100	0	100

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

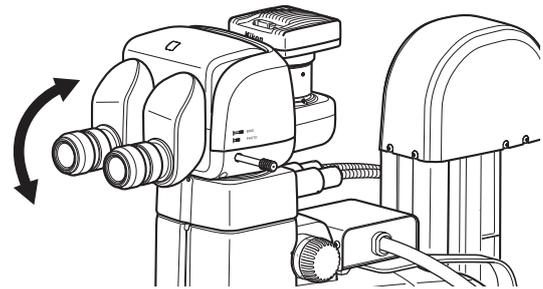
4 Adjusting the Angle of Depression

When the P2-TERG 100 Trinocular Tilting Tube or P2-TERG 50 is used, the angle of the binocular part to facilitate microscopy can be changed and adjusted.

The angle can be continuously 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 low eye level P2-TL100 Trinocular Tube L does not have a mechanism for adjusting the angle of depression.)



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. It 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 to match your diopter. This adjustment is required for each user.

- 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 knob. (See “7 Focusing on the Sample.”)
- 3 Minimize the magnification, and then turn the diopter adjustment rings of the right and left eyepieces to bring them into focus separately.

[Image zooming]

SMZ18 Zooming Body: Zoom knob on the zooming body

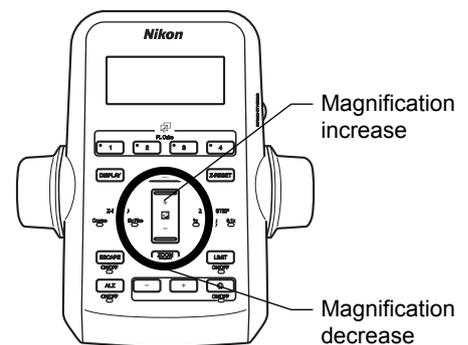
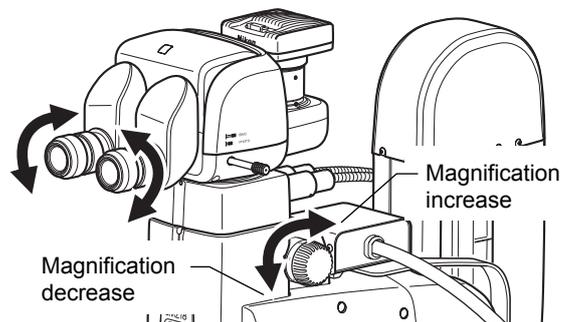
SMZ25 Zooming Body: Zoom buttons on the remote controller or the right pedal of the foot switch

[Zoom magnification]

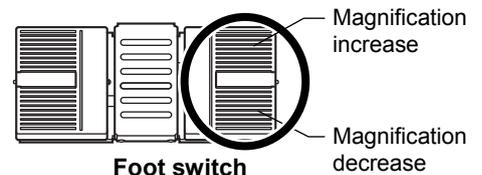
SMZ18 Zooming Body: 0.75x to 13.5x

SMZ25 Zooming Body: 0.63x to 15.75x

- 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.



Remote controller



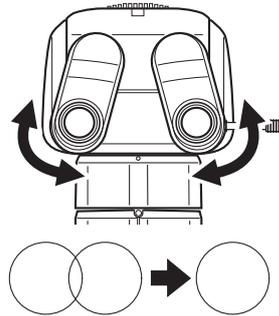
Foot switch

Adjusting the diopter

6 Adjusting the Interpupillary Distance

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

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

7 Focusing on the Sample

Focus adjustment of the sample is performed by the rotation of the focus knobs on the focus unit or focus mount. When the remote controller or foot switch is connected, focusing can be adjusted using the focus knobs of the remote controller or the foot pedals on the left side of the foot switch. To use the foot switch, the P2-RC Remote Controller or the P2-CTLA Control Box must be connected.

[Focus operation]

Focus unit, focus mount, remote controller: Focus knob

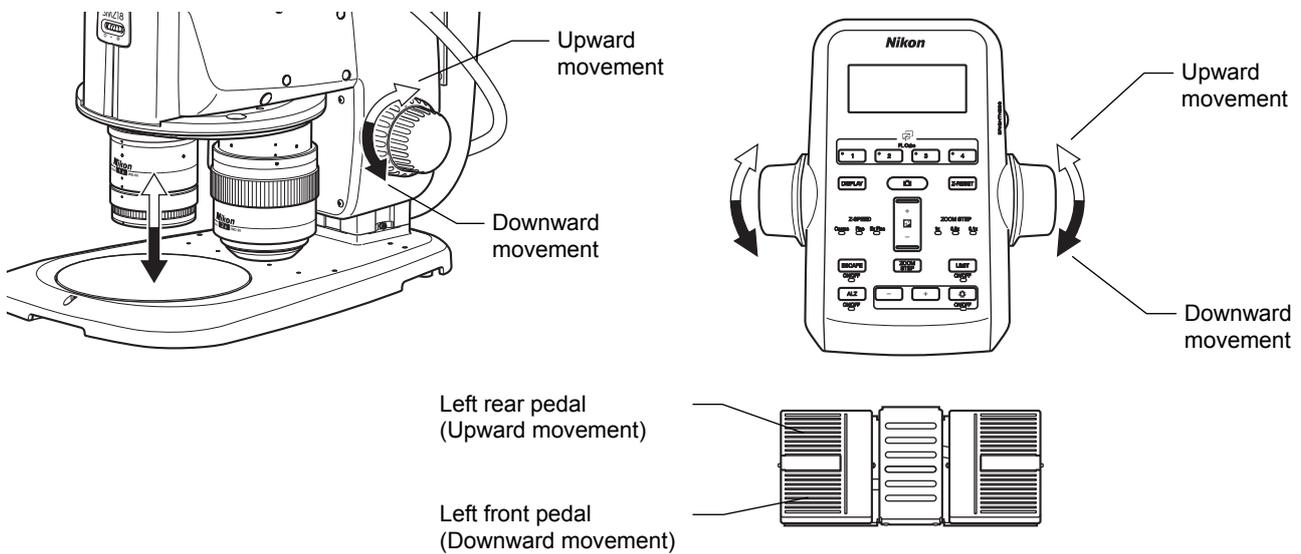
The figure shows the turning directions of the focus knobs and the corresponding vertical movements of the focus mount.

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

Foot switch: Left foot pedal

- **Rear pedal: Upward movement**
- **Front pedal: Downward movement**

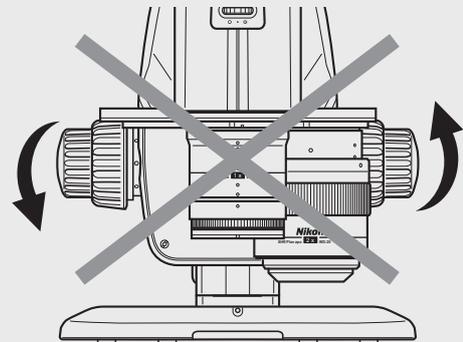
(See Chapter 4, "10.2 AZ-FSW Foot Switch.")



Focus operation

! Notes on turning the focus knobs

- When using the focus knobs of the focus unit, focus mount or the remote controller, do not turn (or twist) the right and left focus knobs in opposite directions at the same time. Doing so may cause malfunction.
- When the focus knobs of the focus unit or focus mount reach their rotational limits for the unit's vertical movement, do not forcibly turn it further. Doing so may cause malfunction.



Do not turn the knobs in the opposite direction!

- 1 Check that the optical path of the tube is 100% to the binocular part.
- 2 Using coarse control, lower the zooming body to a position near the working distance.

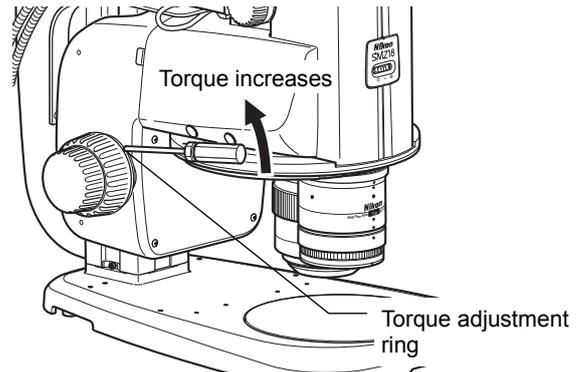
[Working distances of objectives]

- 0.5x : 71 mm
- 1x : 60 mm
- 1.6x : 30 mm
- 2x : 20 mm

- 3 Using fine control, precisely focus on the sample.

■ Torque of the focus knobs

For the P2-FU Focus Unit and P2-FMDN Focus Mount, the torque of the coarse focus knobs can be changed. To do this, turn the torque adjustment ring on the base of the left coarse focus knob using the hex driver (nominal designation, 2: supplied with the focus unit). Adjust the torque to an appropriate level.



Adjusting the torque of the focus knobs

ⓘ Notes on the torque adjustment

When the torque is too low, the zooming body may slide down due to the various loads it carries, such as its own weight or the load of the counterbalance spring inside the focus unit. This may result in injury, such as pinching fingers between the objective and sample, or cause damage to the sample or objective. Be sure to adjust the torque to an appropriate level.

Note that turning the fine focus knob will cause the coarse focus knob to also turn, changing the torque of the fine focus knob.

■ Focusing stroke

- P2-FU Focus Unit

Focusing stroke:	100 mm
Stroke per rotation of the focus knobs	Coarse control, 18.50 mm per rotation Fine control, 3.27 mm per rotation
- P2-MFU Motorized Focus Unit

Focusing stroke:	100 mm
------------------	--------
- P2-FMDN Focus Mount

Focusing stroke:	65 mm
Stroke per rotation of the focus knobs	Coarse control, 18.50 mm per rotation Fine control, 3.27 mm per rotation

✔ Useful functions for focusing

When using the P2-MFU Motorized Focus Unit, the remote control enables the following remote operations: changing the focus speed, setting the limit position, setting retracting, and resetting Z. For details, see Chapter 4, “2.2 P2-MFU Motorized Focus Unit.”

* Also see Chapter 4, “2 Focus Units.”

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 the P2-RNI2 Intelligent Nosepiece and equipped with two objectives having different magnification ratios.

8.1

Image Zooming

The magnification of the zooming body can be changed by zooming in and out.

[Image zooming]

SMZ18: Zoom knobs of the Zooming Body

The figure shows the turning directions of a knob and the corresponding changes in the magnification.

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

SMZ25: Zoom buttons of the remote controller

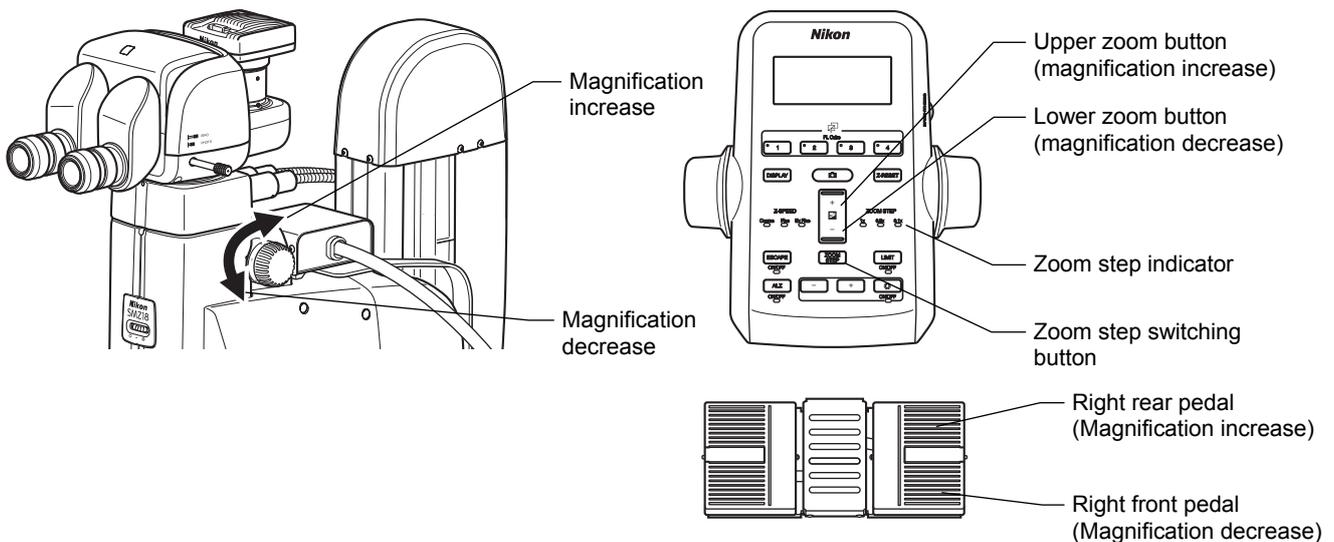
- **Upper button: Magnification increase**
- **Lower button: Magnification decrease**

Pressing and holding the buttons causes the magnification to change continuously.

Right foot pedal of the foot switch

- **Rear-side pedal: Magnification increase**
- **Front-side pedal: Magnification decrease**

(See Chapter 4, "10.2 AZ-FSW Foot Switch.")

**Zooming in/out****■ Magnification and zoom ratio**

SMZ18: 0.75 to 13.5x, 18:1

SMZ25: 0.63 to 15.75x, 25:1

✔ Useful functions for image zooming

When using the SMZ25 Zooming Body, the magnification step size can be switched by pressing the zoom step switching button of the remote controller. The magnification can also be switched automatically so that the field of view before switching is maintained when the objective is switched (ALZ function). For details, see Chapter 4, "1.2 SMZ25 Zooming Body."

✔ **Total magnification**

The total magnification of the microscope is determined from 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.

* Also see Chapter 4, "1 Zooming Bodies."

8.2

Switching Objectives (Using the P2-RNI2 Intelligent Nosepiece)

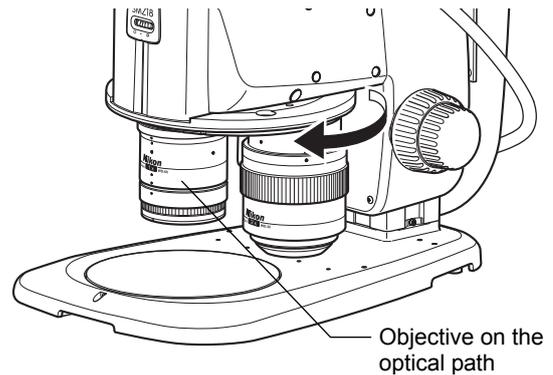
The P2-RNI2 Intelligent Nosepiece can be attached with two of the following objectives: P2-SHR Plan Apo 0.5X, 1X, 1.6X and 2X. The attached objectives can be switched by turning the nosepiece. Check that the objective falls into the click position when turning the nosepiece.

■ **Stereoscopic view and vertical view**

An intelligent nosepiece has two click positions for each objective.

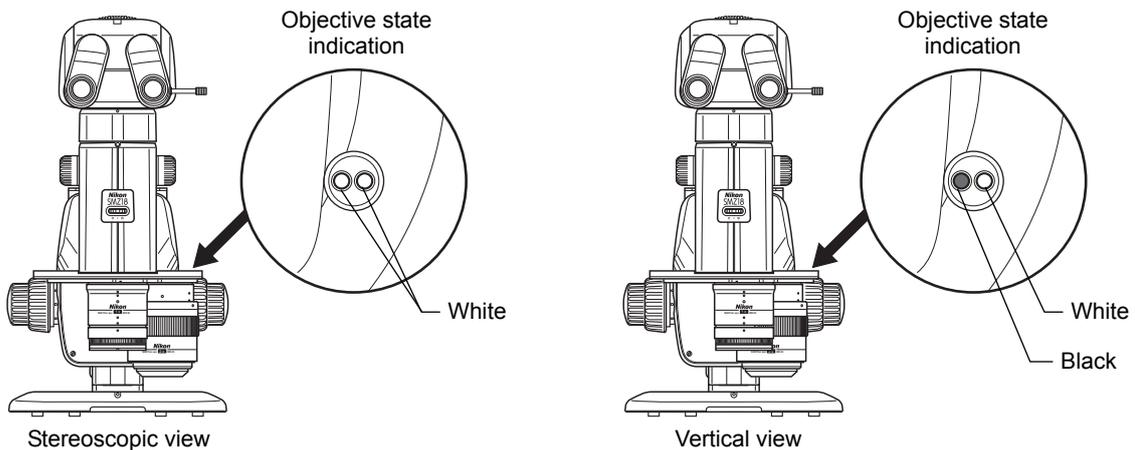
The click position switches between stereoscopic view and vertical view. Microscopy with vertical view is possible when needed, for example when taking a picture.

The click position of the objective can be checked by the position of the objective viewed from the front or the color of the hole on the objective status display area on the intelligent nosepiece.



Switching Objectives

* Also see Chapter 4, "3.1 P2-RNI2 Intelligent Nosepiece."



Objective position state (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

Sliding the Stage Plate

Move the specimen by sliding the stage plate of the base or stand with the sliding mechanism.

The stage plate can be smoothly and finely moved within the approximately 3 mm range by loosening the stage plate fixing screw.

This mechanism is useful for positioning, especially for high-magnification observation.

Securely fix the stage plate in place using the fixing screw when this mechanism does not need to be used.

There are three types of the bases that have the sliding mechanism: P2-PB, P2-DBL and P2-DBF.

The stands P-PS32, P-DSL32 and P-DSF32, which can be used in combination with the SMZ18 Zooming Body, have this mechanism.

9.2

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 instead of the stage plate to shift the sample on the glass plate and change the part to be observed.

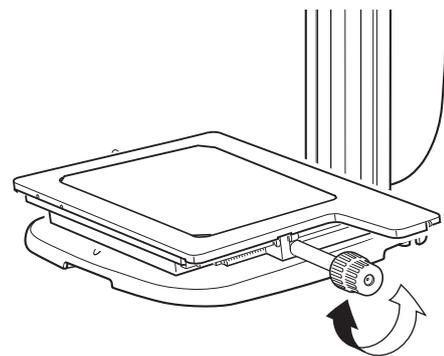
■ **XY stroke of the stage with the X/Y shift knob and stroke per rotation of the knob**

X: 150 mm; 37.5 mm per rotation

Y: 100 mm; 24.1 mm per rotation

ⓘ **Restriction**

If the P-SXY64 XY Stage is mounted on the P-PS32 Plain Stand, the movement of the stroke in the Y direction is restricted.



Shift using the P-SXY64 XY Stage

* Also see Chapter 4, "5.7 P-SXY64 XY Stage."

9.3

Using the Sliding Stage

Remove the stage plate from the base or the stand 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 the Aperture Diaphragm

The SMZ18 and SMZ25 Zooming Bodies contain an aperture diaphragm.

Turn the aperture diaphragm dial to adjust the aperture.

The aperture can be adjusted in the range from fully open to 3 mm dia.

Opening and closing the aperture diaphragm causes the brightness and focus depth to change resulting in a change in resolution.

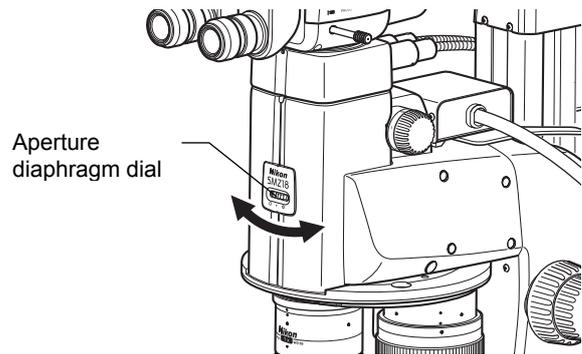


Open ⇔ Close

Brightness Bright Dark

Focus depth Shallow Deep

Resolution High Low



Adjusting the aperture diaphragm

11 Using Episcopic Illumination

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

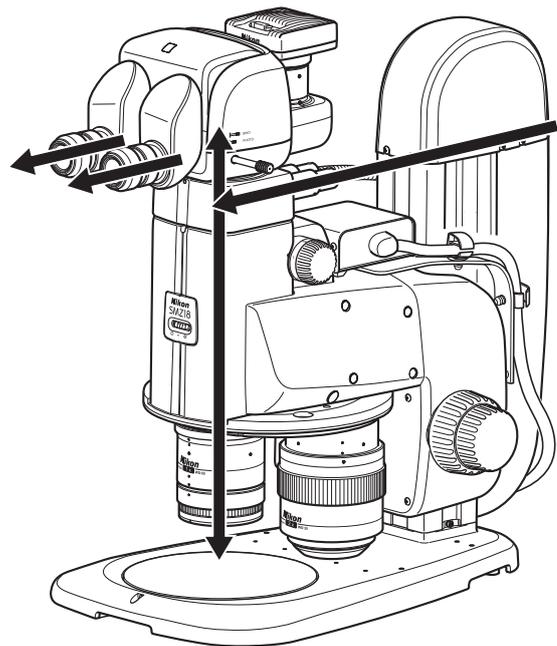
Illumination led from the light source by the fiber is emitted to a sample through an objective or directly so that an image resulting from the light reflected from the sample is observed. Episcopic illumination is used for observing samples which do not transmit light such as metal and mineral sections.

In addition, if the P2-CIA Coaxial Epi Illuminator is attached, illumination along the optical axis for observation can also be emitted, which is effective for observing samples such as metallic mirrors, resins having smooth surfaces, and semiconductor wafers.

See Chapter 4, “7 Episcopic Illuminator” and select the appropriate device based on the objective of microscopy.

- P2-CIA Coaxial Epi Illuminator
- C-FDF Flexible Double Arm Fiber Illumination Unit
- C-FID2 Double Arm Fiber Illumination
- P2-FIR Ring Fiber Illumination Unit
- P2-FIRL2 LED Ring Illumination Unit 2
- C-LSL2 LED Epi Illuminator 2

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



Episcopic illumination with the P2-CIA Coaxial Epi Illuminator

12 Using Diascopic Illumination

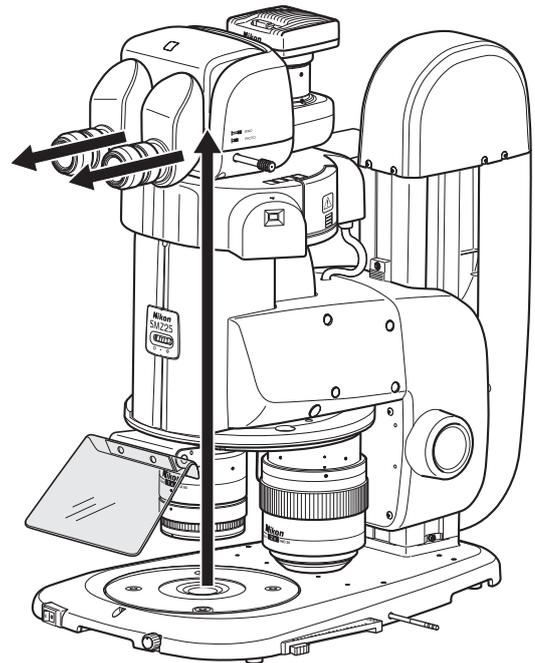
The microscope system enables diascopic illumination when used with a diascopic illumination base or a diascopic illumination stand. All of the devices use LEDs as the light source and provide uniform illumination.

The image to be observed results from diascopic illumination which 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, a P-DF2 LED Dark Field Unit 2 or a P2-POL Simple Polarizing Attachment can be attached to enable dark-field diascopic illumination and diascopic simplified/polarized illumination. This enables observation of samples that are difficult to be observed under ordinary bright-field diascopic illumination such as transparent materials and crystals and tissues and minute organisms in culture solutions.

See Chapter 4 “8 Diascopic Illuminator” and select the appropriate device based on the objective of microscopy.

- P2-DBL LED Diascopic Illumination Base
- P2-DBF Fiber Diascopic Illumination Base
- P-DSL32 LED Diascopic Illumination Stand
- P-DSF32 Fiber Diascopic Illumination Stand
- P-DF2 LED Dark Field Unit 2
- P2-POL Simple Polarizing Attachment



Diascopic illumination with the P2-DBL LED Diascopic Illumination Base

❗ 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 P2-DBL LED Diascopic Illumination Base, the P2-DBF Fiber Diascopic Illumination Base, the P-DSL32 LED Diascopic Illumination Stand and the 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 Using Epi-Fluorescence Illumination

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

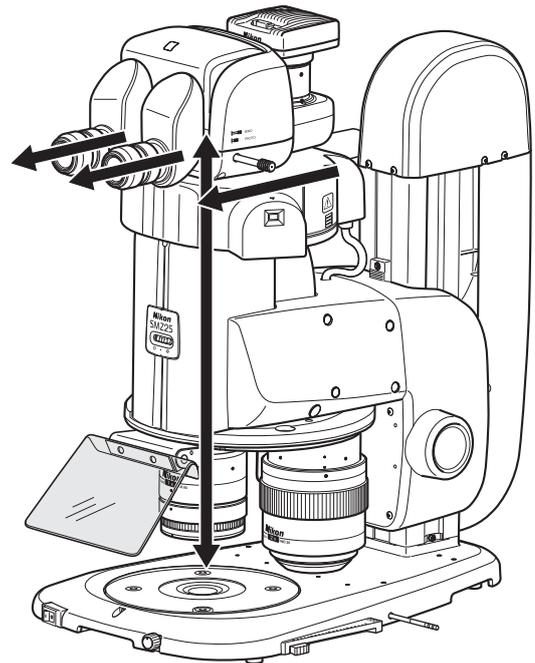
In this microscope system, state detection or motorized-type epi-fluorescence illumination is available. With a filter cube attached to the device, the filter cube is brought into the optical path by the rotation of the turret, resulting in the generation of epi-fluorescence illumination. The light source 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.

See Chapter 4, “9 Epi-Fluorescence Attachment” and select the appropriate device based on the objective of microscopy.

- P2-EFLI Epi Fluorescence Attachment
- P2-EFLM Motorized Epi Fluorescence Attachment

For details on adjusting the 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.

13.1 Switching Filter Cubes

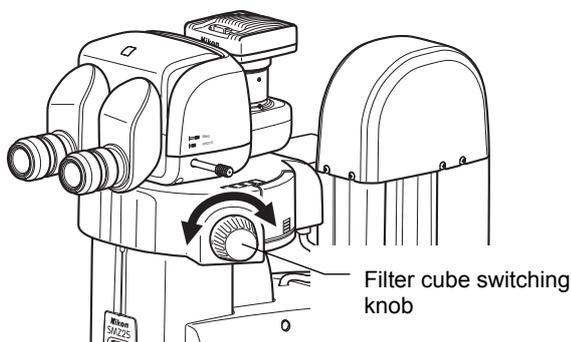
The turret of the epi fluorescence attachment is rotated to switch the four filter cubes attached to the turret.

[Turret rotation operation]

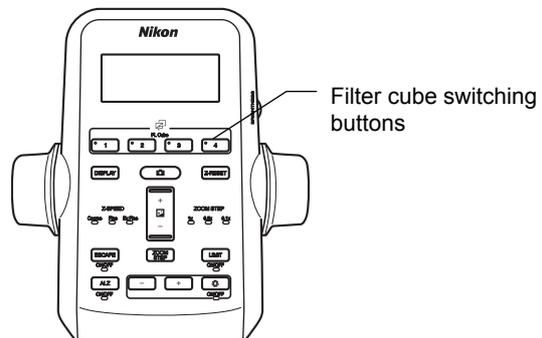
P2-EFLI Epi Fluorescence Attachment:

Filter cube switching knob of the device

P2-EFLM Motorized Epi Fluorescence Attachment: Filter cube switching buttons of the remote controller



Filter cube switching knob



Filter cube switching buttons

Switching filter cubes

On the P2-EFLI Epi Fluorescence Attachment, turn the filter cube switching knob to assign to the indicator the turret address (FL1 to FL4) of the filter cube to be placed into the optical path.

On the remote control, press the filter cube switching buttons (FL1 to FL4) to specify the turret address of the filter cube to be placed into the optical path. The LED of the pressed button lights so that the turret address on the optical path can be identified. The motorized epi fluorescence attachment has a turret address view window on the right front so that the turret address on the optical path can be identified.

13.2 Selecting a Filter Cube

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

- P2-EFL GFP-B, P2-EFL GFP-L, and P2-EFL RFP Filter Cube: Used for fluorescence observation with a given wavelength.
- P2-EFLC Filter Cube: Used for fluorescence observation with an arbitrary wavelength when combined with arbitrary filters, for example.
- P2-EFLBFA Filter Cube (Bright Field): Used for bright-field episcopic observation.
- Empty cubes (three cubes supplied with an epi-fluorescence attachment): Used when performing diascope illumination observation using the epi-fluorescence attachment.

13.3 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.

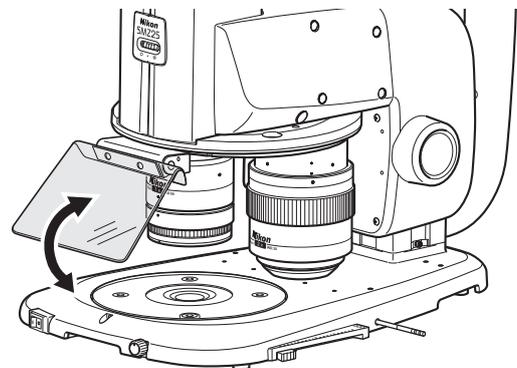
■ Locating a target in the sample

For epi-fluorescence microscopy, Nikon recommend locating a target with bright-field diascope 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 diascope illumination.
- If the sample is not transparent, use the P2-EFLBFA 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 the reflected ultraviolet light, which is originally emitted through the objective, from entering the observer's eyes from the sample.



Using the light shielding plate

14 Remote Operation

The microscope system enables remote control of several functions including focusing and changing magnification. The following remote control devices can be used when connected with the P2-CTLA Control Box:

- P2-RC Remote Controller
- AZ-FSW Foot Switch
- AZ-PCR Photo Release

For details, see Chapter 4 “10 Remote Control Devices.”

Remote control from NIS-Elements is also possible by connecting the USB connector on the control box to a personal computer. For details, refer to the NIS-Elements instruction manual.

15 Capturing Images

The microscope system can capture images of the sample being observed by attaching a camera such as a DS camera to the vertical tube.

15.1 Procedure for Capturing Images

Follow the procedure below to capture images. For the camera settings, refer to the instruction manual supplied with the DS-L3/DS-L4 or DS-U3.

✔ Using the DS-L3/DS-L4

Specify the following items beforehand.

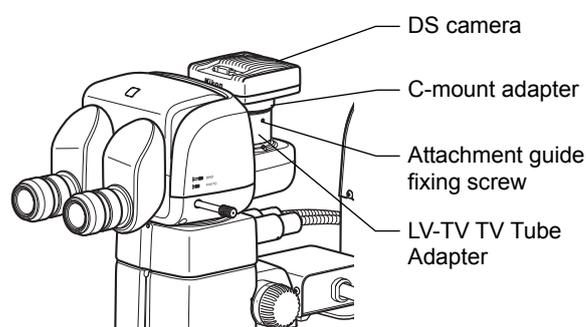
- Folder to save
- Name of the save file (or select Auto.)
- File format and file size of the save file
- Date and destination of the data

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

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

For details about attaching the DS camera, see [5] Attach a DS camera in Chapter 5, “3.3 Assembly of 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 DS camera. After making the appropriate adjustments, tighten the screw.



Adjusting the DS camera orientation

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

(4) Adjust the DS camera's white balance.

When using diascope 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 DS camera exposure compensation function.

(8) Press the [FREEZE] button on the DS-L3/DS-L4 to check the image.

(9) Save the image if acceptable.

To save the image, press the capture button on the remote controller or DS-L3/DS-L4, or step on the pedal of the AZ-PCR Photo Release.

■ **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 the image of the portion that has not been exposed to excitation light can be captured. To obtain the best results, use the diasopic 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 DS camera, the brightness can be changed also by making an adjustment on the DS 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/DS-L4 or DS-U3.

16

Internally Saved Information

In stereo microscopes, the following information saved in the control box is read and used. The escape distance of the motorized focus unit is previously set before the product is shipped. There is no initial value specified for other parts. When using a motorized system or an intelligent (status detection) system for the first time, set the values as required by following the specified procedures. For details, refer to the instruction manual supplied with the relevant product.

P2-CTLA Control Box

Items	Default	Tools
Objective	-	NIS-Elements and setup tools, DS-L3/DS-L4
Eyepiece	-	Setup tools, DS-L3/DS-L4
Epi-fl filter cube	-	NIS-Elements and setup tools, DS-L3/DS-L4
Motorized focus unit escape distance	20 mm	NIS-Elements and setup tools

P2-CTLB Control Box

Items	Default	Tools
Objective	-	NIS-Elements and setup tools, DS-L3/DS-L4
Eyepiece	-	Setup tools, DS-L3/DS-L4
Epi-fl filter cube	-	NIS-Elements and setup tools, DS-L3/DS-L4

☆☆☆

Chapter

4

Functions and Operations of the Devices

This chapter describes the main functions and how to use the devices.

1 Zooming Bodies

There are two types of zooming bodies for parallel optics stereo microscopes: the SMZ18 Zooming Body with a manual zooming mechanism and the SMZ25 Zooming Body with an automatic zooming mechanism.

1.1 SMZ18 Zooming Body

This model, which offers high NA, is designed for manual zoom operations.

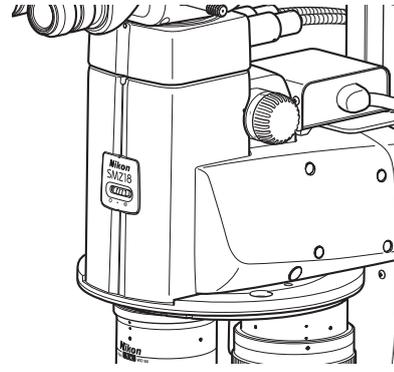
Attach the zooming body to the focus unit through the P2-FM Focus Mount Adapter or the P2-RNI2 Intelligent Nosepiece.

Attach an objective to the objective mount at the bottom of the zooming body. Two switchable objectives with different magnifications can be attached when used in combination with a P2-RNI2 Intelligent Nosepiece.

Attach a relevant tube to the round dovetail of the tube mount at the top of the zooming body. The microscope system can be extended by attaching a coaxial epi illuminator or epi fluorescence attachment to the tube mount round dovetail.

For systems where a control box has been connected, the zoom information is sent to the control box via a motorized focus unit or relay box, and then transmitted to the DS-L3/DS-L4 camera control unit or personal computer.

The SMZ18 Zooming Body in combination with the dedicated P2-FMDN Focus Mount enables system configuration with various types of stands with a 32-dia support pillar. Adding the P2-EFLI Epi Fluorescence Attachment to this system enables epi-fluorescence microscopy. Note that the P2-EFLM Motorized Epi Fluorescence Attachment cannot be used.



SMZ18 Zooming Body

ⓘ Restriction

Tubes, intermediate tubes and objectives of the previous SMZ series cannot be used.

■ Image zooming

Images can be zoomed in and out using the zoom knobs on the right and left sides of the zooming body.

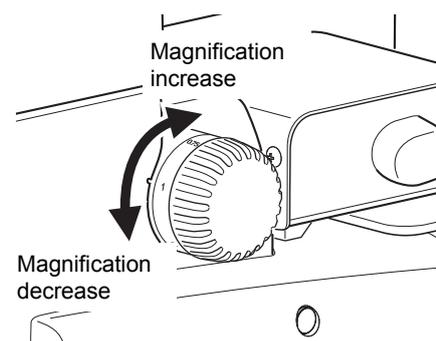
Turning the knob backward: Magnification increase

Turning the knob forward: Magnification decrease

Turning the knob causes the magnification to continuously change in the range from 0.75x to 13.5x (18:1 zoom ratio).

Magnification values are marked on the zoom knobs.

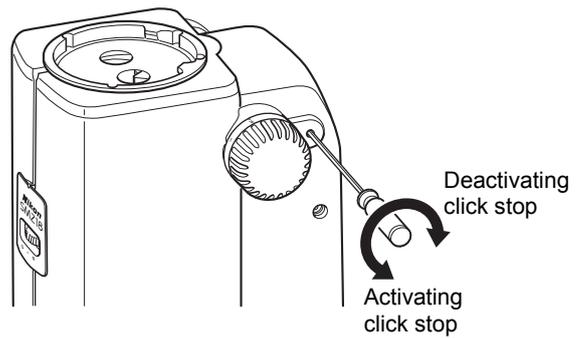
Click stop of the zoom knobs operates at the positions of 0.75x, 1x, 2x, 3x, 4x, 5x, 6x, 8x, 10x, 12x, and 13.5x. It is also possible to deactivate the click stop function.



Zooming in/out

■ **Activating and deactivating click stop of zoom operations**

Insert the hex driver (nominal designation: 2) supplied with the focus unit into the hole on the rear side of the right zoom knob. Turn the internal screw counterclockwise to activate click stop. Turn it clockwise to deactivate click stop.



Activating and deactivating click stop of zoom operations

✓ **Aperture diaphragm**

The zooming body is equipped with an aperture diaphragm dial which enables the diaphragm of the right and left optical paths to be simultaneously adjusted in the range from fully open to 3 mm dia.

For details about using the aperture diaphragm, see Chapter 3, “10 Using the Aperture Diaphragm.”

1.2

SMZ25 Zooming Body

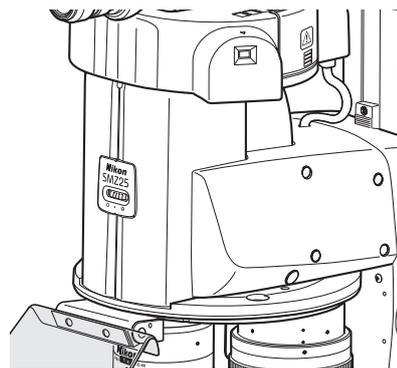
This model, which offers high NA, is designed for motorized zoom operations.

Attach the zooming body to the focus unit through the P2-FM Focus Mount Adapter or the P2-RNI2 Intelligent Nosepiece.

Attach an objective to the objective mount at the bottom of the zooming body. Two switchable objectives with different magnifications can be attached when used in combination with a P2-RNI2 Intelligent Nosepiece.

Attach a relevant tube to the round dovetail of the tube mount at the top of the zooming body. The microscope system can be extended by attaching a coaxial epi illuminator or epi fluorescence attachment to the tube mount round dovetail.

Zoom is controlled by the P2-CTLA Control Box. Control signals are sent to the SMZ25 via a motorized focus unit or relay box. The zoom information is sent to the control box via a motorized focus unit or relay box, and then transmitted to the DS-L3/DS-L4 camera control unit or personal computer.



SMZ25 Zooming Body

⚠ **Restriction**

Tubes, intermediate tubes and objectives of the previous SMZ series cannot be used.

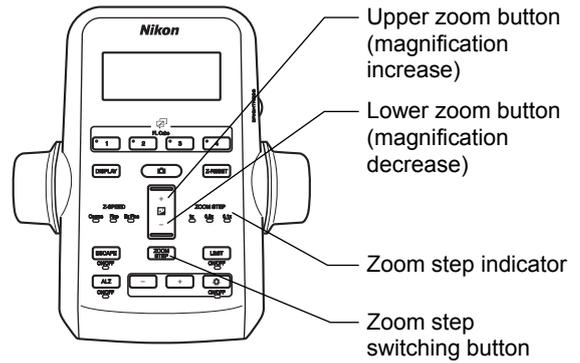
■ **Image zooming**

Images can be zoomed in and out using the zoom buttons on the remote controller.

Upper zoom button: Magnification increase

Lower zoom button: Magnification decrease

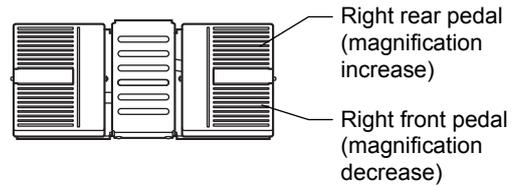
Each time the button is pressed, the magnification changes in the range from 0.63x to 15.75x (25:1 zoom ratio) in steps. The step size depends on the setting of the zoom step switching button. Pressing and holding the button causes the magnification to change continuously.



■ **Magnification step size**

Each time the zoom step switching button on the remote controller is pressed, the step size changes in the following order: 1x, 0.5x then 0.1x.

When a step size is selected, the corresponding step LED indicator lights.



Zooming in/out

The right pedals of the foot switch can also be used to zoom in and out images as well as the zoom buttons on the remote controller.

Right rear pedal: Magnification increase

Right front pedal: Magnification decrease

Each time the pedal is pressed, the magnification changes by one step. The step size depends on the setting of the zoom step switching button on the remote controller. Pushing and holding the pedal causes the magnification to change continuously.

✔ **Aperture diaphragm**

The zooming body is equipped with an aperture diaphragm dial which enables the diaphragm of the right and left optical paths to be simultaneously adjusted in the range from fully open to 3 mm dia.

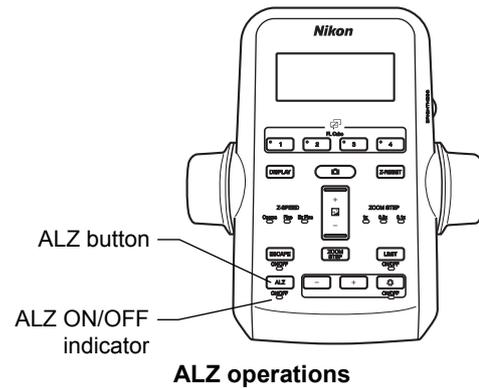
For details about using the aperture diaphragm, see Chapter 3, "10 Using the Aperture Diaphragm."

Useful zoom operation functions (ALZ function)

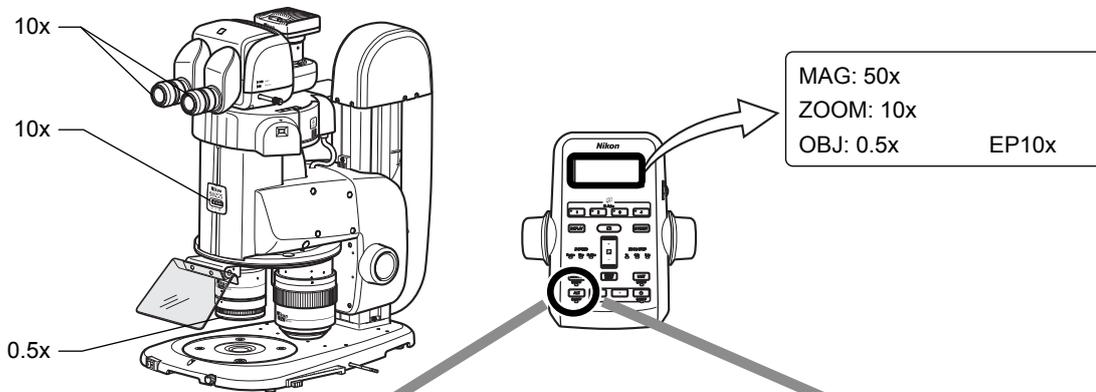
When the objective is switched, the zoom magnification is automatically changed so that the field of view is maintained as it was.

This prevents the target image from moving or disappearing and makes it possible to observe the image while increasing or decreasing the zoom magnification.

To activate the ALZ function, press the ALZ button on the remote controller. The ALZ ON/OFF indicator lights. To deactivate the ALZ function, press the button again.



Example: Starting from an objective magnification of 0.5x, zoom magnification of 10x and eyepiece magnification of 10x equaling a total magnification of 50x, switch the objective as follows;



Deactivate the ALZ function.

Activate the ALZ function.

Switching the objective from 0.5x to 2x

MAG: 200x	EP10x
ZOOM: 10x	
OBJ: 2x	

Total magnification changes from 50x to 200x. The field of view of the observed image changes.

MAG: 50x	EP10x
ZOOM: 2.5x	
OBJ: 2x	

Zoom magnification automatically changes from 10x to 2.5x. Total magnification stays 50x and the field of view is maintained.

Deactivate the ALZ function.

ALZ function stays active.

Switching the objective from 2x to 0.5x

MAG: 12.5x	EP10x
ZOOM: 2.5x	
OBJ: 0.5x	

Total magnification changes from 50x to 12.5x. The field of view of the observed image changes again.

MAG: 50x	EP10x
ZOOM: 10x	
OBJ: 0.5x	

Zoom magnification automatically changes from 2.5x to 10x. Total magnification stays 50x and the field of view is maintained.

Use example of the ALZ function

2 Focus Units, Focus Mount

There are two types of focus units for parallel optics stereo microscopes: the P2-FU Focus Unit with a manual focus knob and P2-MFU Motorized Focus Unit. Attach the focus unit to the base. The P2-FMDN Focus Mount, that can be attached to the support pillar of the stand to focus on the specimen, is also provided.

2.1 P2-FU Focus Unit

The P2-FU Focus Unit consists of a square-type support pillar and a focus mount with the coaxial coarse/fine focusing system. The focus mount is attached with the SMZ18 or SMZ25 Zooming Body through the P2-RNI2 Intelligent Nosepiece or the P2-FM Focus Mount Adapter. The square-type support pillar is attached with the P2-PB Plain Base, P2-DBL LED Diascopic Illumination Base or the P2-DBF Fiber Diascopic Illumination Base. Three types of stands can be configured.

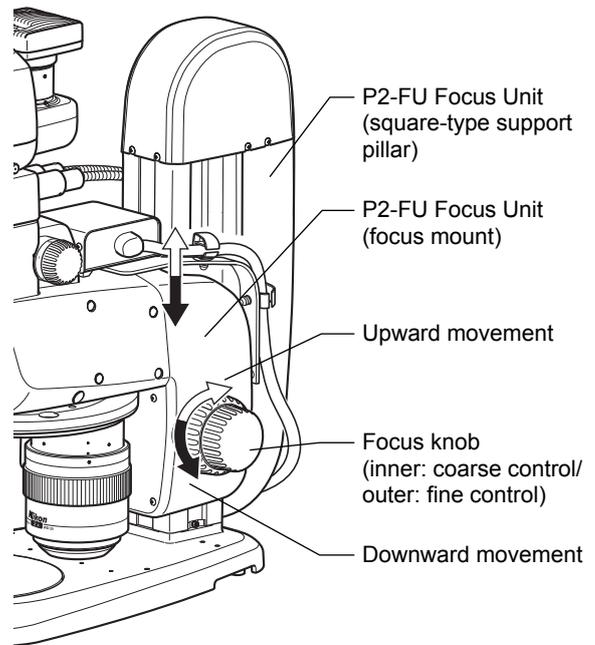
■ Focusing operation

Focus can be adjusted using the coarse/fine focus knobs on the right and left of the focus mount. The figure shows the turning directions of the focus knob and the corresponding vertical movements of the focus mount.

Turning the knob backward: Upward movement

Turning the knob forward: Downward movement

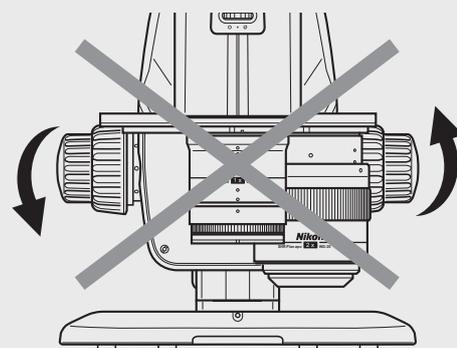
- Focusing stroke: 100 mm
- Stroke per rotation of the focus knob:
 - Coarse control, 18.50 mm/rotation
 - Fine control, 3.27 mm/rotation



P2-FU Focus Unit

⚠ Notes on turning the focus knobs

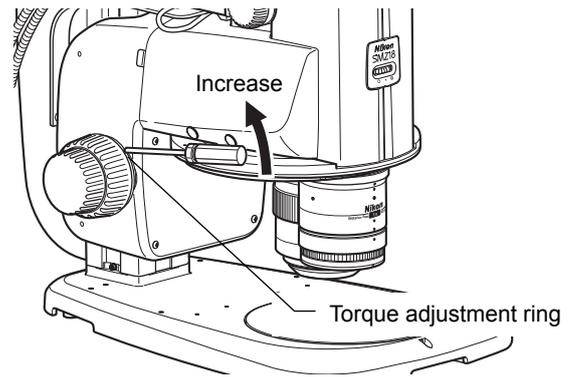
- Do not turn (or twist) the right and left focus knobs in opposite directions at the same time. Doing so may cause malfunction.
- When the focus knobs reach their rotational limits for the unit's vertical movement, do not forcibly turn it further. Doing so may cause malfunction.



Do not turn the knobs in the opposite direction!

■ **Torque of the focus knobs**

The torque of the coarse focus knobs can be changed by turning the torque adjustment ring on the base of the left coarse focus knob using the hex driver (nominal designation, 2: supplied with the focus unit). Adjust the torque to an appropriate level.



Adjusting the torque of the focus knobs

ⓘ **Notes on the torque adjustment**

When the torque is too low, the zooming body may slide down due to the various loads it carries, such as its own weight or the load of the counterbalance spring inside the focus unit. This may result in injury, such as pinching fingers between the objective and sample, or cause damage to the sample or objective. Be sure to adjust the torque to an appropriate level.

Note that turning the fine focus knob will cause the focus control knob to also turn, changing the torque of the fine focus knob.

✔ **Tool storage space**

The focus unit has a storage space for storing three tools on its rear side. The hex driver and wrench supplied with the focus unit and the Intelligent nosepiece can be stored here.

2.2 P2-MFU Motorized Focus Unit

The P2-MFU Motorized Focus Unit consists of a square-type support pillar and a focus mount with the motorized focusing system. The focus mount is attached with the SMZ18 or SMZ25 Zooming Body through the P2-RNI2 Intelligent Nosepiece or the P2-FM Focus Mount Adapter. The square-type support pillar is attached with the P2-PB Plain Base, P2-DBL LED Diascopic Illumination Base or the P2-DBF Fiber Diascopic Illumination Base. Three types of motorized stands can be configured.

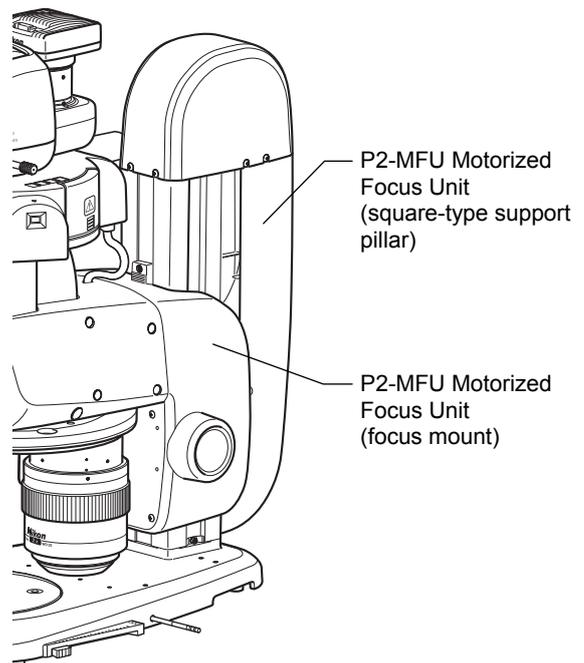
■ **Initialization at power on**

When the microscope system has been assembled and the power of the control box is turned on, the motorized focus unit is initialized as follows:

- 1 The power is turned on.
- 2 The focus mount moves upward to the upper limit.
- 3 The focus mount moves downward to the position before the power was turned on.

■ **Focusing operation**

Focusing movement of the motorized focus unit is conducted using the focus knobs on the remote controller or the foot switch connected to the remote controller. The vertical position (Z coordinate value) is shown on the LCD on the remote controller.



P2-MFU Motorized Focus Unit

✔ **Z coordinate value**

The accuracy of the Z coordinate value (vertical position) shown on the remote controller is not guaranteed. This value is used as a reference and includes a margin error.

Focus knobs on the remote controller

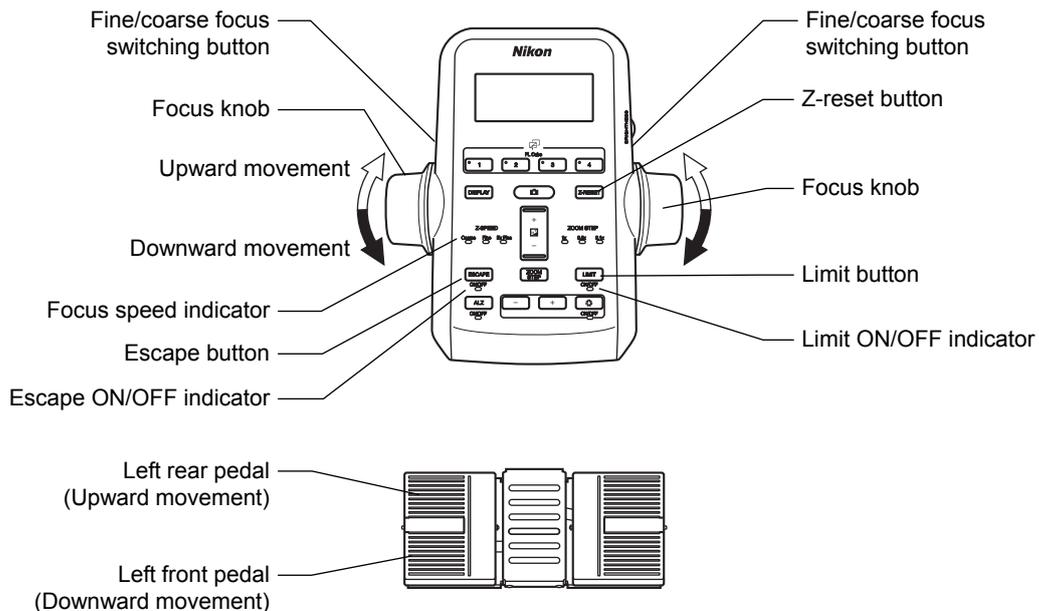
Turning the knob backward: Upward movement of the focus mount
 Turning the knob forward: Downward movement of the focus mount

- Focusing stroke: 100 mm

Pedals of the foot switch

Left rear pedal: Upward movement of the focus mount
 Left front pedal: Downward movement of the focus mount

For details about the pedal operations, see “10.2 AZ-FSW Foot Switch” in this chapter.



Focus operation

■ **Focus speed**

The focus speed can be switched between coarse, fine, and extra fine control.

Use the fine/coarse focus switching button on the remote controller to switch the speed.

Each time the button is pressed, the focus speed is cyclically switched in the order of coarse, fine, and extra fine.

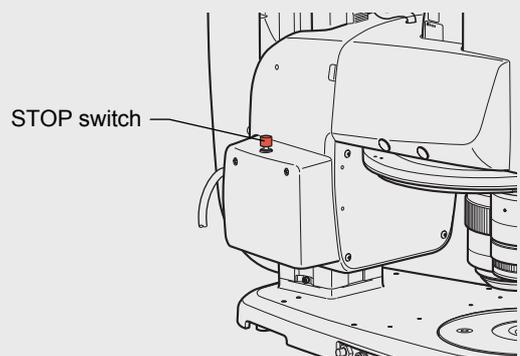
When the focus speed is changed, the corresponding indicator (Coarse/Fine/ExFine) lights.

- Coarse: 2 to 10 mm/second
- Fine: 0.2 to 5 mm/second
- Extra fine: 0.01 to 0.1 mm/second

! Forced stop of motorized movement

The motorized focus unit is equipped with the STOP switch on the left side. Pressing the switch causes motorized movement to be forcibly stopped. To resume the motorized movement, perform the following steps:

1. Press the STOP switch again.
2. Turn off the power by pressing the power switch of the P2-CTLB Control Box to the “O” position.
3. Turn on the power by pressing the power switch to the “I” position. (After the power on, initialization at power on is automatically performed.)



❗ Focus knob of the P2-MFU Motorized Focus Unit

The focus knob of the P2-MFU Motorized Focus Unit attached with a cover cannot be used. This knob is to be used by Nikon during maintenance.

Useful focus operation functions

The P2-MFU Motorized Focus Unit enables operations such as setting the limit position, setting retracting, and resetting Z using the remote controller.

■ Limit position setting

When the limit button is pressed, the current position is set as the limit position so that the vertical movement part does not move down passing the limit point.

Pressing the limit button again cancels the limit position setting. When a limit position is set, the limit ON/OFF indicator below the button lights. Note that a limit position cannot be set in the range from the upper limit to 10 mm below that position. The default value of the limit position setting is 0 mm. The setting value can be changed using the NIS-Elements of remote controller.

■ Escape setting

Pressing the Escape button causes the vertical movement part to move upward by the preset distance so that it stays in position. The vertical movement is not possible in this escape status. Pressing the Escape button again causes the vertical movement part to return to the previous position. Pressing and holding the Escape button causes the vertical movement part to exit escape status. When in escape status, the Escape ON/OFF indicator below the button lights.

The default value of the escape setting is 20 mm. The setting value can be changed using the setup tool or NIS-Elements.

■ Z resetting

Pressing the Z-reset button displays 0 as the Z position (focus position) on the LCD of the remote controller. Pressing the button at another position sets that position as 0.

Also see “10.1 P2-RC Remote Controller” in this chapter.

✔ Tool storage space

The focus unit has a storage space for storing three tools on its rear side. The hex driver and wrench supplied with the focus unit and the Intelligent nosepiece can be stored here.

2.3

P2-FMDN Focus Mount

The P2-FMDN Focus Mount used exclusively for the SMZ18 can be attached to various types of stands with a 32-dia support pillar.

❗ Restriction

Microscope systems including the P2-FMDN Focus Mount cannot be combined and used with the P2-EFLM Motorized Epi Fluorescence Attachment.

■ Focusing operation

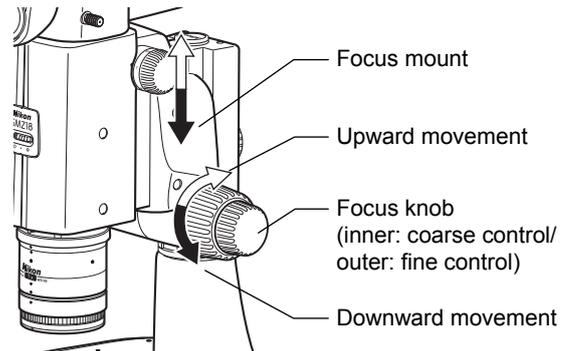
Turn the right/left single-axis focus knob in the same direction to focus on the specimen.

The figure shows the turning directions of the focus knob and the corresponding vertical movements of the focus mount.

Turning the knob backward: Upward movement

Turning the knob forward: Downward movement

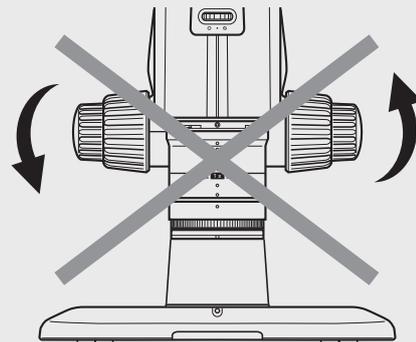
- Focusing stroke: 65 mm
- Stroke per rotation of the focus knob:
 - Coarse control, 18.50 mm/rotation
 - Fine control, 3.27 mm/rotation



P2-FMDN 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 the focus knobs reach their rotational limits for the unit's vertical movement, do not forcibly turn it further. Doing so may cause malfunction.



Do not turn the knobs in the opposite direction!

■ Torque of the focus knobs

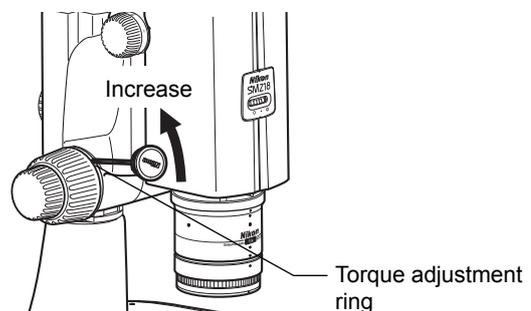
The torque of the coarse focus knobs can be changed by turning the torque adjustment ring on the base of the left coarse focus knob using the tool supplied with the stand.

Adjust the torque to an appropriate level.

❗ Notes on the torque adjustment

When the torque is too low, the zooming body may slide down due to the various loads it carries, such as its own weight or the load of the counterbalance spring inside the focus unit. This may result in injury, such as pinching fingers between the objective and sample, or cause damage to the sample or objective. Be sure to adjust the torque to an appropriate level.

Note that turning the fine focus knob will cause the coarse focus knob to also turn, changing the torque of the fine focus knob.



Adjusting the torque of the focus knobs

■ Cable clamps

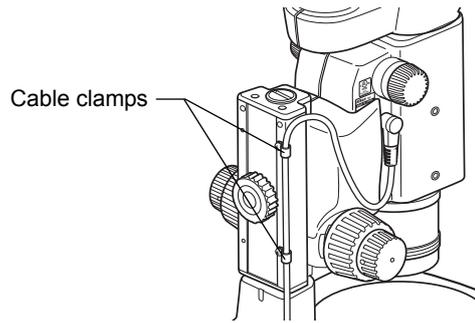
Four cable clamps and four fixing screws (pan-head M4-8 mm) are supplied with the P2-FMDN Focus Mount.

The cable clamps are used for clamping the P2-RLYC Relay Cable or the fibers of the P2-CIA Coaxial Epi Illuminator to the rear side of the focus mount.

The cable clamps are not attached by default. Attach them as required.

Use cable clamp fixing screws for fixing the relay box metal fitting to the focus mount when using the P2-RLY Relay Box for epi-fluorescence microscopy, as well as for fixing the cable clamps.

(See Chapter 5, “3.2 Compact System Assembly – 2 Attach a focus mount. - ■ Clamp cable attachment.”)



Clamping the P2-RLYC Relay Cable

3 Nosepiece, Focus Mount Adapter

3.1 P2-RNI2 Intelligent Nosepiece

The P2-RNI2 Intelligent Nosepiece is a nosepiece that connects the zooming body and the focus unit. Two objectives can be attached. The attached objectives can be switched by turning the nosepiece.

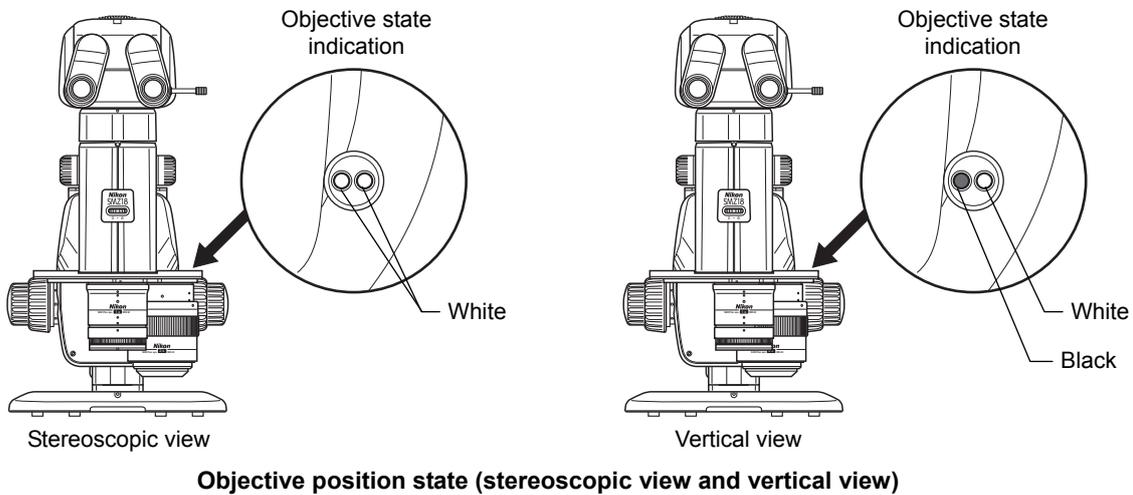
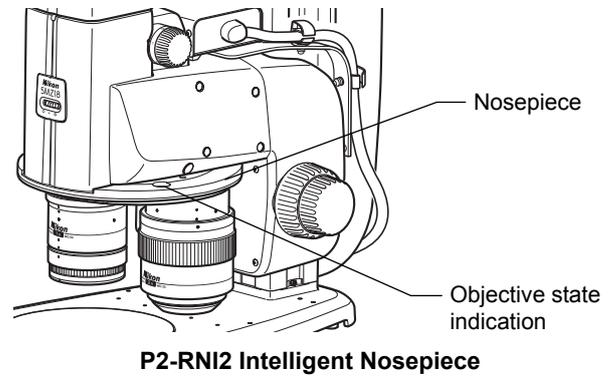
■ **Stereoscopic view and vertical view**

An intelligent nosepiece has two click positions for each objective.

The click position switches between stereoscopic view and vertical view. Microscopy with vertical view is possible when needed, for example when taking a picture.

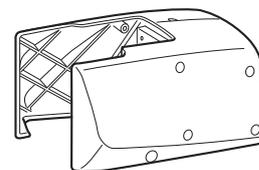
The click position of the objective can be checked by the position of the objective viewed from the front or the color of the hole on the objective status display area on the intelligent nosepiece.

For systems where a control box has been connected, the objective attachment position addresses and vertical-view state are sent to the control box via a motorized focus unit or relay box, and then transmitted to the DS-L3/DS-L4 camera control unit and personal computer.



3.2 P2-FM Focus Mount Adapter

The P2-FM Focus Mount Adapter is an adapter that connects the zooming body and the focus unit. When not using an intelligent nosepiece, connect the zooming body to the focus unit via the P2-FM Focus Mount Adapter.



4 Objectives

The microscope system supports the following objectives.

Attach the objectives to the zooming body or intelligent nosepiece.

Model name	P2-SHR Plan Apo 0.5X	P2-SHR Plan Apo 1X	P2-SHR Plan Apo 1.6X	P2-SHR Plan Apo 2X
Magnification	0.5x	1x	1.6x	2x
Numerical aperture (maximum)	0.078	0.156	0.25	0.312
Working distance	71 mm	60 mm	30 mm	20 mm
Parfocal distance:	150 mm	150 mm	150 mm	150 mm
Objective mount	Exclusively-shaped bayonet	Exclusively-shaped bayonet	Exclusively-shaped bayonet	Exclusively-shaped bayonet
Others	With a protection ring	With a correction glass		With a correction ring

- The 2x objective is equipped with the correction ring for water 0 to 3 mm in depth. The correction ring compensates an aberration caused by water in the dish. With this objective, select 2x magnification or higher. If magnification less than 2x is selected, shading will occur or part of the field of view will be missing.
- Attach the 1/4 lambda plate for the coaxial epi illuminator to the position from which the protection ring supplied with the 0.5x objective or the correction glass supplied with the 1x objective has been removed.

! Restriction

- When the episcopic illuminator is used, use of the objectives and magnification are subject to some restrictions. (See "7 Episcopic Illuminator" in this chapter.)
- When the diascope illuminator is used, use of the objectives and magnification are subject to some restrictions. (See "8 Diascopic Illuminator" in this chapter.)

✔ 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 Bases, Stands, and Stages

Bases are used in combination with the P2-FU Focus Unit or the P2-MFU Motorized Focus Unit. There are three types of bases: Two with the illumination function and one without the illumination function.

Each stand consists of a base and a support pillar. Attach a P2-FMDN Focus Mount to the support pillar of the stand. There are three types of stands: Two with the illumination function and one without the illumination function.

In all bases and stands, a large stage plate (180 mm dia.) is used to allow for more efficient work and easier observation of samples in containers such as petri dishes.

The base's function can be expanded by replacing the stage plate removed from the base or the stage plate's base with a stage having an X/Y shift knob, or a sliding stage, or by combining with a P2-POL Simple Polarizing Attachment consisting of a polarizer and an analyzer.

The base's function and the stand's function can be expanded by replacing the stage plate removed from the base or the stand's base with a stage having an X/Y shift knob or a sliding stage, or by combining with a diascope polarizing attachment.

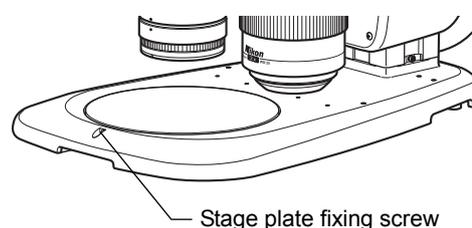
5.1 P2-PB Plain Base

The P2-PB is a standard model base without illumination systems.

Combine this base with the P2-MFU Motorized Focus Unit or the P2-FU Focus Unit to form a motorized plain stand or a plain stand.

It is equipped with a stage plate with black and milky white surfaces. Select the surface appropriate for the sample.

The plain base has three indents for holding the base: Front of the base's top board and on the right and left rear.



P2-PB Plain Base

✔ Sliding mechanism of the stage plate

The sliding parts are mounted on the base part for mounting the stage plate, which can be slid by loosening the stage plate fixing screw. There is a clearance gap of approximately 3 mm around the stage plate when the stage is securely set. The stage plate can be smoothly and finely moved within the clearance gap by loosening the stage plate fixing screw.

This mechanism is useful for positioning, especially for high-magnification observation.

Securely fix the stage plate in place using the fixing screw when this mechanism does not need to be used.

■ Attachable optional devices

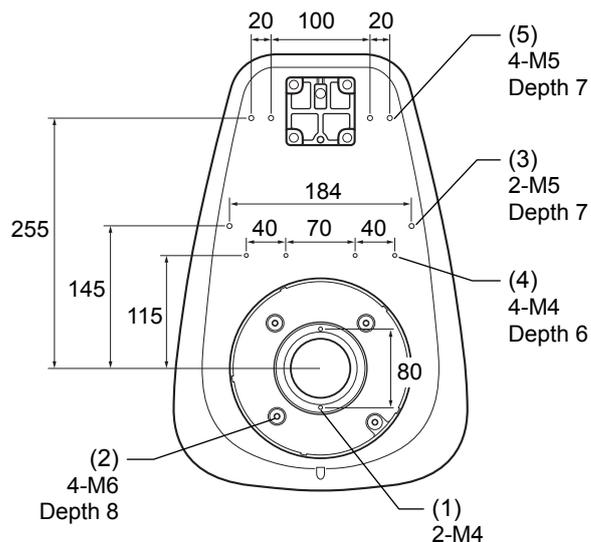
The following devices can be attached to this base:

- P-SXY64 XY Stage
- C-SSL DIA Sliding Stage
- P-DF2 LED Dark Field Unit 2
- C-TRS Tilting Stage
- C-LSL2 LED Epi Illuminator 2 (via an SMZ-U Epi Arm)
- C-FDF Flexible Double Arm Fiber Illumination Unit (via a C-FIDH Fiber Holder)

✔ **Screw holes for attaching optional devices**

The base's top board has screw holes for attaching various types of devices. Screw holes (2) to (5) are not penetrating to prevent ingress of solution into the base.

- (1) 2-M4: Positioned under the stage plate attachment section of the base. Usable for multiple purposes.
- (2) 4-M6: Positioned under the stage plate attachment section of the base, Used for attaching the P-SXY64 XY Stage.
- (3) 2-M5: Positioned at the center on the top surface of the base. Usable for multiple purposes.
- (4) 4-M4: Positioned at the center on the top surface of the base. Usable for multiple purposes.
- (5) 4-M5: Positioned at the rear on the top surface of the base. Used for attaching a device such as the C-FDF Flexible Double Arm Fiber Illumination Unit.



Screw holes for attaching optional devices

5.2 P2-DBL LED Diascopic Illumination Base

See "8.1 P2-DBL LED Diascopic Illumination Base" in this chapter.

5.3 P2-DBF Fiber Diascopic Illumination Base

See "8.2 P2-DBF Fiber Diascopic Illumination Base" in this chapter.

5.4

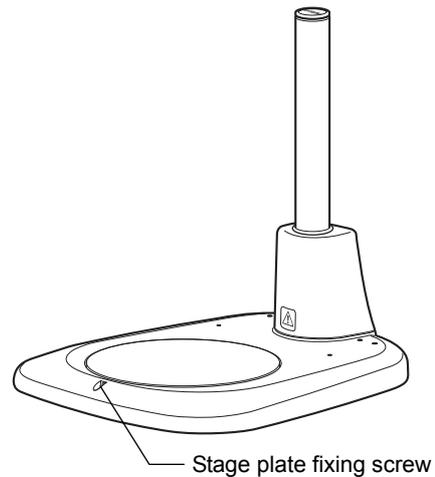
P-PS32 Plain Stand

The P-PS32 is a standard model stand without illumination systems.

Combine this stand with an SMZ18 via a P2-FMDN Focus Mount. This stand cannot be used in combination with an SMZ25.

This stand is equipped with a stage plate with black and milky white surfaces. Select the surface appropriate for the sample.

The support pillar of the stand can be replaced with a long support pillar. A dedicated screwdriver is stored in the upper part of the support pillar.



P-PS32 Plain Stand

✔ Sliding mechanism of the stage plate

The sliding parts are mounted on the base part for mounting the stage plate, which can be slid by loosening the stage plate fixing screw. There is a clearance gap of approximately 3 mm around the stage plate when the stage is securely set. The stage plate can be smoothly and finely moved within the clearance gap by loosening the stage plate fixing screw.

This mechanism is useful for positioning, especially for high-magnification observation.

Securely fix the stage plate in place using the fixing screw when this mechanism does not need to be used.

■ Attachable optional devices

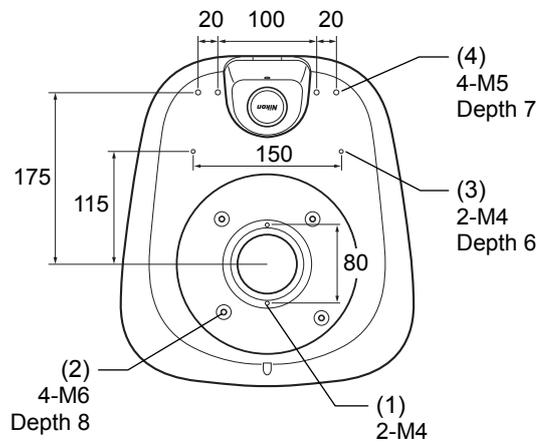
The following devices can be attached to this stand:

- P-SXY64 XY Stage
- Circular Floating Stage 2
- C-SSL DIA Sliding Stage
- P-DF2 LED Dark Field Unit 2
- C-TRS Tilting Stage
- C-LSL2 LED Epi Illuminator 2 (via an SMZ-U Epi Arm)
- C-FDF Flexible Double Arm Fiber Illumination Unit (via a C-FIDH Fiber Holder)

✔ Screw holes for attaching optional devices

The base's top board has screw holes for attaching various types of devices. Screw holes (2) to (4) are not penetrating to prevent ingress of solution into the base.

- (1) 2-M4: Positioned under the stage plate attachment part of the base. Usable for multiple purposes.
- (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. Usable for multiple purposes.
- (4) 4-M5: Positioned at the rear on the top surface of the base. Used for attaching a device such as the C-FDF Flexible Double Arm Fiber Illumination Unit.



Screw holes for attaching optional devices

5.5 P-DSL32 LED Diascopic Illumination Stand

See “8.3 P-DSL32 LED Diascopic Illumination Stand” in this chapter.

5.6 P-DSF32 Fiber Diascopic Illumination Stand

See “8.4 P-DSF32 Fiber Diascopic Illumination Stand” in this chapter.

5.7 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 base or the stage plate on the stand. The glass plate measures 215 mm x 154 mm x 5 mm and is detachable.

A 45-mm dia. filter can be slotted into the optical-path hole on the lower board of the stage.

[Compatible bases and stands]

- P2-PB Plain Base
- P2-DBL LED Diascopic Illumination Base
- P2-DBF Fiber Diascopic Illumination Base
- P-PS32 Plain Stand
(The movement of the stroke in the Y direction is restricted.)
- P-DSL32 LED Diascopic Illumination Stand
(The movement of the stroke in the Y direction is restricted.)
- P-DSF32 Fiber Diascopic Illumination Stand
(The movement of the stroke in the Y direction is restricted.)

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

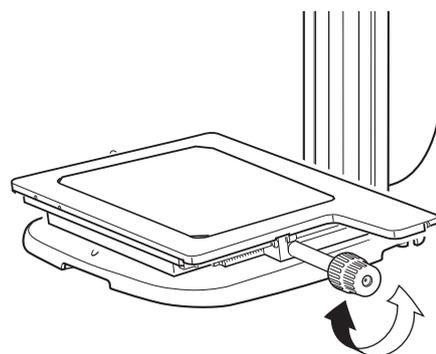
X: 150 mm; 37.5 mm per rotation
Y: 100 mm; 24.1 mm per rotation

■ **Load weight**

5 kg or less

■ **Applicable range of diascope illumination (bright field/ OCC)**

150 x 100 mm travel range (Shading may occur in diascope illumination or OCC illumination in the low zoom magnification range.)



Shift using the P-SXY64 XY Stage

5.8

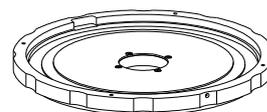
C-SSL DIA Sliding Stage

This stage enables fine movement of a sample when its side is pushed.

Place the C-SSL DIA Sliding Stage on the base or the stand from which the stage plate was moved, and then mount the removed stage plate on the C-SSL DIA Sliding Stage..

[Compatible bases and stands]

- P2-PB Plain Base
- P2-DBL LED Diascopic Illumination Base
- P2-DBF Fiber Diascopic Illumination Base
- P-PS32 Plain Stand
- P-DSL32 LED Diascopic Illumination Stand
- P-DSF32 Fiber Diascopic Illumination Stand



C-SSL DIA Sliding Stage

5.9

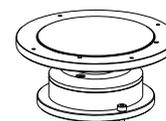
C-TRS Tilting Stage

This stage enables tilt observation of samples. Attach the stage to the base or stand.

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

[Compatible bases and stands]

- P2-PB Plain Base
- P2-DBL LED Diascopic Illumination Base
- P2-DBF Fiber Diascopic Illumination Base
- P-PS32 Plain Stand
- P-DSL32 LED Diascopic Illumination Stand
- P-DSF32 Fiber Diascopic Illumination Stand



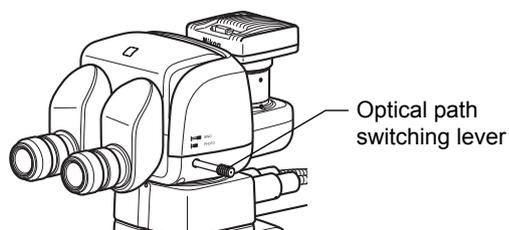
C-TRS Tilting Stage

6 Tubes

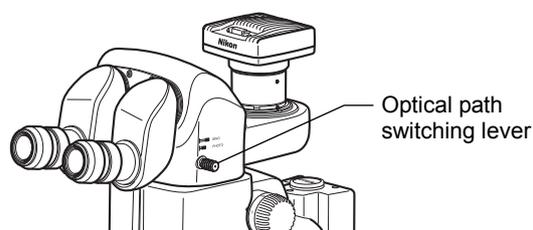
This microscope system can be used with the tubes listed in the table below.

Attach the 10x, 15x, 20x, or 30x eyepiece to the binocular sleeve. Then, attach a camera such as a DS camera to the vertical tube using an adapter.

The tube is equipped with the optical path switching lever. This allows the optical path to be switched during observation using the eyepiece and capture images using the DS camera. The distribution ratio of the light amount depends on the tube type.



P2-TERG 100/ P2-TERG 50 Trinocular Tilting Tube



P2-TL100 Trinocular Tube L

Distribution of light with optical path switching (%)

Tube	Lever position	Binocular part (BINO)		Vertical tube (PHOTO)*
		Left	Right	
P2-TERG 100 Trinocular Tilting Tube	Pulled out	100	100	0
	Pushed in	100	0	100
P2-TERG 50 Trinocular Tilting Tube	Pulled out	100	100	0
	Pushed in	100	50	50
P2-TL100 Trinocular Tube L	Pulled out	100	100	0
	Pushed in	100	0	100

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

6.1 P2-TERG 100/ P2-TERG 50 Trinocular Tilting Tube

The P2-TERG 100/ P2-TERG 50 is an ergonomic tube that enables the angle of depression to be adjusted.

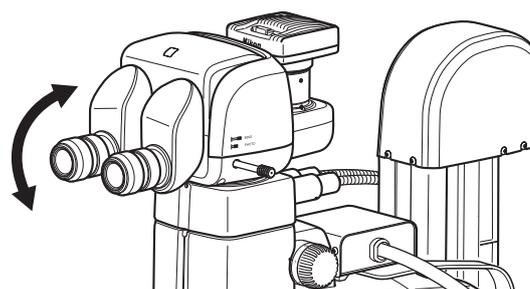
The angle can be continuously changed by moving the binocular part as indicated by the arrow in the figure.

Adjust the angle to facilitate microscopy.

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

Angle of depression: 0 to 30° (continuously variable)

For the division of the light amount with the optical path switching lever, see the table above.



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. It 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.

6.2 P2-TL100 Trinocular Tube L

Angle of depression: 10°

For the distribution ratio of the light amount with the optical path switching lever, see the table above.

7 Episcopic Illuminator

The illuminators which can be used for this microscope system include 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.

7.1 P2-CIA Coaxial Epi Illuminator

Attach this illuminator 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.

■ 1/4 λ plate

When using coaxial epi illuminator with a 0.5x or 1x objective, an optional 1/4 λ plate must be attached to the tip of the objective.

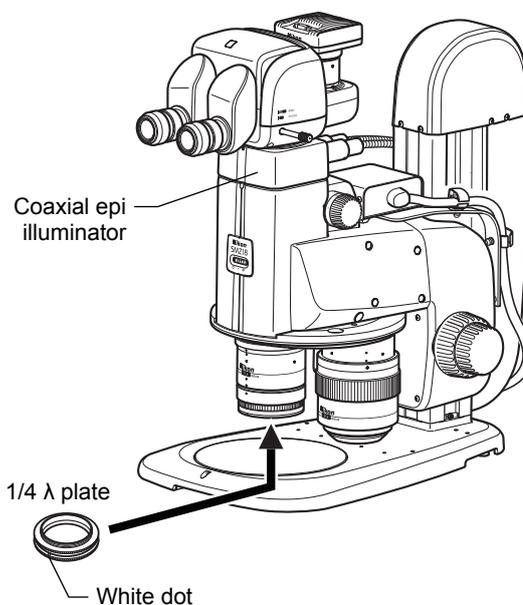
1/4 λ plates are supplied to prevent flare in the imaging system due to light reflected into the optical system.

There are the following two types of 1/4 λ plates.

- P2-CIA QL0.5X 1/4 λ plate 0.5x for coaxial epi illuminator:
Intended for 0.5x objectives
- P2-CIA QL1X 1/4 λ plate 1x for coaxial epi illuminator:
Intended for 1x objectives

When using a 0.5x objective, remove the protection ring from the tip of the objective, and then screw the 1/4 λ plate. When using a 1x objective, remove the correction glass from the tip of the objective, and then screw the 1/4 λ plate.

The brightest illumination is generated when the white dot on the 1/4 λ plate is at the front. Select a position that has the optimum brightness and contrast for observation.



P2-CIA Coaxial Epi Illuminator

⚠ Restriction

The type of objectives used for the coaxial epi illuminator and the recommended zoom magnification are shown below.

Usable objectives and recommended zoom magnifications

Objective	Zoom magnification	
	SMZ18 Zooming Body	SMZ25 Zooming Body
P2-SHR Plan Apo 0.5X	From 3.8x	From 2.5x
P2-SHR Plan Apo 1X	From 4.0x	From 4.0x
P2-SHR Plan Apo 1.6X	Unusable	Unusable
P2-SHR Plan Apo 2X	Unusable	Unusable

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

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

7.2 C-FDF Flexible Double Arm Fiber Illumination Unit

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

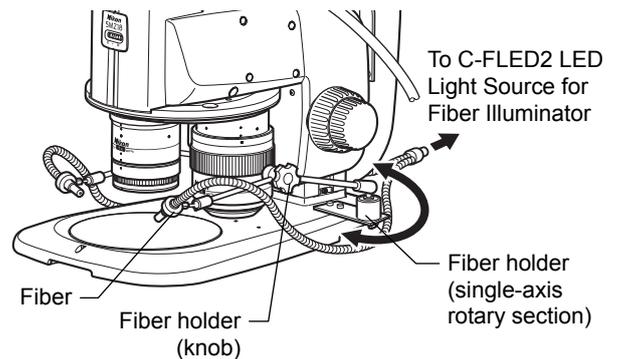
Two fibers are held by the C-FIDH Fiber Holder. The orientation of the holder's arm can be adjusted so that the tips of the fibers face the samples for illumination. For details about using the fiber holder, see the "■ C-FIDH Fiber Holder".

⚠ Important notes on handling the fibers
Do not excessively bend the fibers or apply excess force to the fibers. Doing so may damage the fibers.

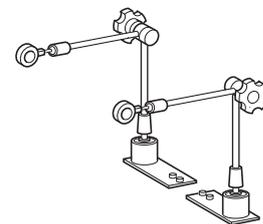
For details about using the light source, refer to the instruction manual for the light source.

■ C-FIDH Fiber Holder

It holds the tip of the flexible double-arm fiber. Mount the base of the holder to the base (stand) of the microscope system. It holds the tips of the fibers with the two arms coming from the holder's 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. After that, if the arm position is returned by the rotation of the single axis, the arm will stop at the position that was locked first.



C-FDF Flexible Double Arm Fiber illumination Unit



C-FIDH Fiber Holder

7.3 P2-FIR Ring Fiber Illumination Unit

The P2-FIR is illuminator is connected to the C-FLED2 LED Light Source for Fiber Illuminator. Attach the ring-shaped fiber illumination to the outer periphery of the objective in order to illuminate samples.

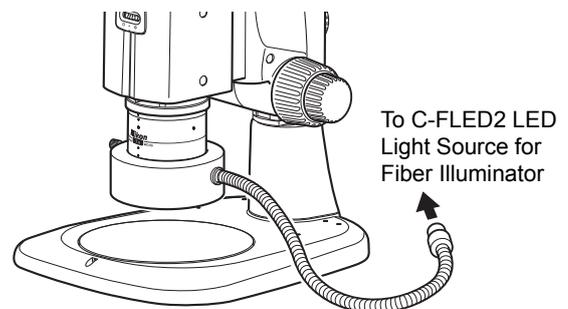
The edge face of the sample can be illuminated evenly using this ring-shaped fiber.

⚠ Restriction
The following two objectives can be used with the P2-FIR Ring Fiber Illumination Unit:

- P2-SHR Plan Apo 0.5X
- P2-SHR Plan Apo 1X

⚠ Important notes on handling the fibers
Do not excessively bend the fibers or apply excess force to the fibers. Doing so may damage the fibers.

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



P2-FIR Ring Fiber Illumination Unit

7.4 P2-FIRL2 LED Ring Illumination Unit 2

The ring illumination part is attached to the outer periphery in order to illuminate samples.

For details, refer to the instruction manual for the P2-FIRL2 LED Ring Illumination Unit 2.

8

Diascopic Illuminator

As the primary diascopic illuminator for this microscope system, there are two types of bases and two types of stands equipped with the illumination optical system. A dark-field illuminator and a polarizing illuminator are also usable.

8.1

P2-DBL LED Diascopic Illumination Base

The P2-DBL is an illumination base equipped with diascopic illumination optical systems.

Attach a P2-FU Focus Unit or P2-MFU Motorized Focus Unit to the base.

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

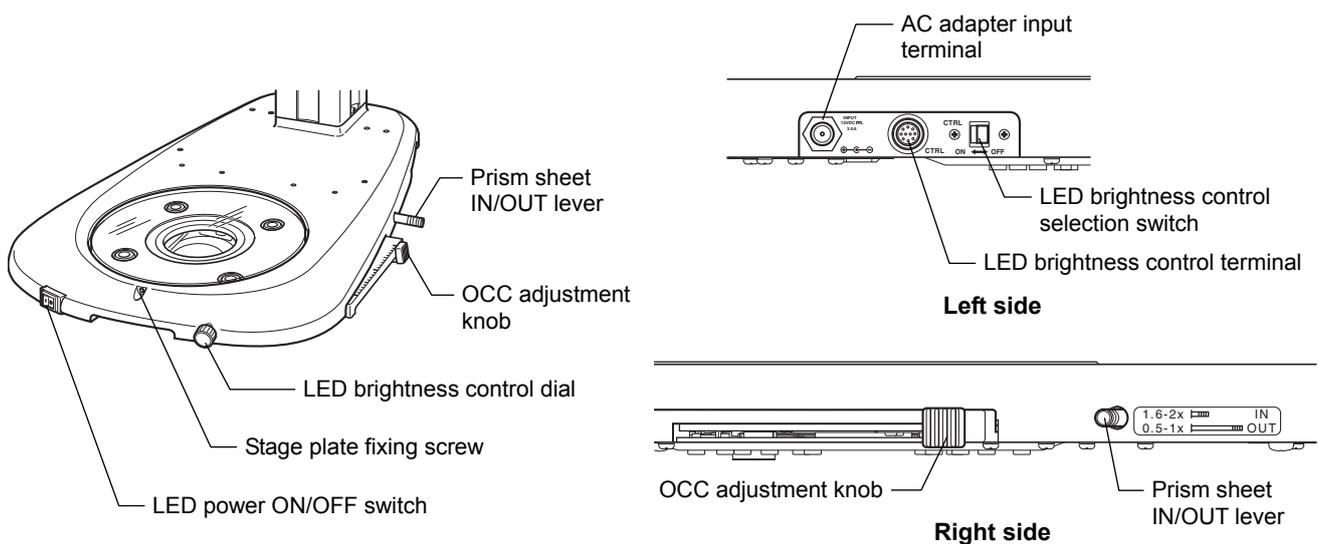
The base has three indents for holding the base.

✔ Sliding mechanism of the stage plate

The sliding parts are mounted on the base part for mounting the stage plate, which can be slid by loosening the stage plate fixing screw. There is a clearance gap of approximately 3 mm around the stage plate when the stage is securely set. The stage plate can be smoothly and finely moved within the clearance gap by loosening the stage plate fixing screw.

This mechanism is useful for positioning, especially for high-magnification observation.

Securely fix the stage plate in place using the fixing screw when this mechanism does not need to be used.



P2-DBL LED Diascopic Illumination Base

■ Power supply and illumination control

Power to the P2-DBL LED Diascopic Illumination Base is supplied by connecting a control box or a 12 V AC adapter. To provide diascopic illumination without using a control box, connect a 12 V AC adapter.

Turn on or off the LED diascopic illumination using the LED power ON/OFF switch at the front of the base.

Adjust illumination using the LED brightness control dial on the base. To enable adjustment using the LED brightness control dial on the base, the LED brightness control selection switch must be turned off.

[Controlling illumination from the control box]

When a control box is connected to the base, turn on the LED brightness control selection switch. In this state, diascopic illumination can be turned on or off, brightness can be controlled, and light intensity can be monitored from the control box.

Actual control is carried out by the P2-RC Remote Controller or the PC (software: NIS-Elements) connected to the control box.

Note that illumination cannot be controlled from the control box, even if the LED brightness control selection switch is turned on, unless the LED power ON/OFF switch on the base (stand) is turned on. Be sure to turn on the LED power ON/OFF switch.

- LED brightness control selection switch, on: Assigns the control right to the control box.
- LED brightness control selection switch, off: Assigns the control right to the base.

For details about the control box, see “11.1, P2-CTLB Control Box” and “11.2, P2-CTLA Control Box.”

■ **OCC (oblique coherent contrast) illumination**

This device supports OCC illumination so that a transparent sample can be observed at high contrast using diascope 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 using diascope illumination, set the OCC adjustment control to either the farthest or closest position. Sliding the control gradually forward or backward from that position will cause the OCC effect to increase. Sliding the control by 46 mm will result in completely shielded status. Since adjustment in two directions is thus possible, the direction of the OCC contrast can be reversed.

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

■ **Prism sheet**

The LED diascope illumination base contains a prism sheet to reduce shading. When using the 1.6x or 2x objective, push in the prism sheet IN/OUT lever. When using the 0.5x or 1x objective, pull out the lever.

Usable objectives and recommended zoom magnifications

Objective	Zoom magnification	
	Bright-field diascope illumination	OCC illumination
P2-SHR Plan Apo 0.5X	From 1.3x	Contrast in the field of view is not uniform.
P2-SHR Plan Apo 1X	Entire area	From 5.0x
P2-SHR Plan Apo 1.6X	Entire area	From 4.0x
P2-SHR Plan Apo 2X	From 2.0x	From 3.0x

* Shading may occur in the low zoom magnification range.

■ **Attachable optional devices**

The following devices can be attached to this base:

- P-SXY64 XY Stage
- C-SSL DIA Sliding Stage
- P-DF2 LED Dark Field Unit 2
- C-TRS Tilting Stage
- C-LSL2 LED Epi Illuminator 2 (via an SMZ-U Epi Arm)
- C-FDF Flexible Double Arm Fiber Illumination Unit (via a C-FIDH Fiber Holder)
- P2-POL Simple Polarizing Attachment

✔ **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 grass plate). The contrast can be increased by removing the filter dropping ring that contains a diffuser plate to control excess contrast for OCC.

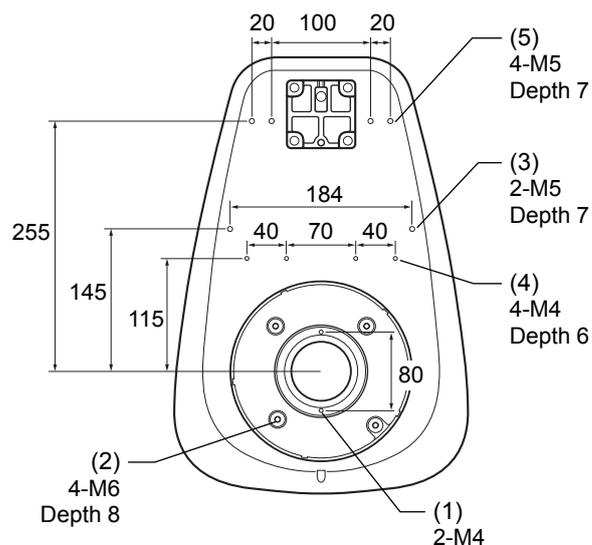
✔ **45-mm dia. filter**

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 grass plate).

✔ **Screw holes for attaching optional devices**

The base's top board has screw holes for attaching various types of devices. Screw holes (2) to (5) are not penetrating to prevent ingress of solution into the base.

- (1) 2-M4: Positioned under the stage plate attachment section of the base. Usable for multiple purposes.
- (2) 4-M6: Positioned under the stage plate attachment section of the base. Used for attaching the P-DF2 LED Dark Field Unit 2.
- (3) 2-M5: Positioned at the center on the top surface of the base. Usable for multiple purposes.
- (4) 4-M4: Positioned at the center on the top surface of the base. Usable for multiple purposes.
- (5) 4-M5: Positioned at the rear on the top surface of the base. Used for attaching a device such as the C-DFD Flexible Double Arm Fiber Illumination Unit.



Screw holes for attaching optional devices

8.2 P2-DBF Fiber Diascopic Illumination Base

The P2-DBF is an illumination base equipped with diascopic illumination optical systems.

Attach a P2-FU Focus Unit or P2-MFU Motorized Focus Unit to the base.

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

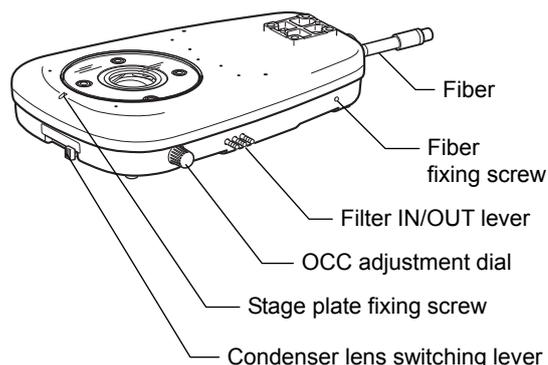
The base has three indents for holding the base: front of the base's top board and on the right and left rear.

✔ **Sliding mechanism of the stage plate**

The sliding parts are mounted on the base part for mounting the stage plate, which can be slid by loosening the stage plate fixing screw. There is a clearance gap of approximately 3 mm around the stage plate when the stage is securely set. The stage plate can be smoothly and finely moved within the clearance gap by loosening the stage plate fixing screw.

This mechanism is useful for positioning, especially for high-magnification observation.

Securely fix the stage plate in place using the fixing screw when this mechanism does not need to be used.



P2-DBF Fiber Diascopic Illumination Base

■ **Illumination on/off, brightness adjustment**

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 supplied with the light source.

■ **OCC (oblique coherent contrast) illumination**

This device supports OCC illumination so that a transparent sample can be observed at high contrast using diascope 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 dial. Adjust until the optimum observation state is obtained in combination with the selected magnification and phase amount of the sample. In addition, the control position (dial position) can be reproduced using the adjustment knob with a scale.

■ **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 diascope 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 1x

Slide the lens switching lever to the left: For high magnification; objective lens 1.6x to 2x

When the condenser lens is switched, the built-in prism sheet is automatically switched and the shading adjusted.

Usable objectives and recommended zoom magnifications

Objective	Zoom magnification	
	Bright-field diascope illumination	OCC illumination
P2-SHR Plan Apo 0.5X and condenser lens for low magnification	From 1.5x	From 4.5x
P2-SHR Plan Apo 01X and condenser lens for low magnification	Entire area	From 4.0x
P2-SHR Plan Apo 1.6X and condenser lens for high magnification	Entire area	From 4.0x
P2-SHR Plan Apo 2X and condenser lens for high magnification	From 2.0x	From 6.0x

* 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.

■ **Attachable optional devices**

The following devices can be attached to this base:

- P-SXY64 XY Stage
- C-SSL DIA Sliding Stage
- P-DF2 LED Dark Field Unit 2
- C-TRS Tilting Stage
- C-LSL2 LED Epi Illuminator 2 (via an SMZ-U Epi Arm)
- C-FDF Flexible Double Arm Fiber Illumination Unit (via a C-FIDH Fiber Holder)
- P2-POL Simple Polarizing Attachment

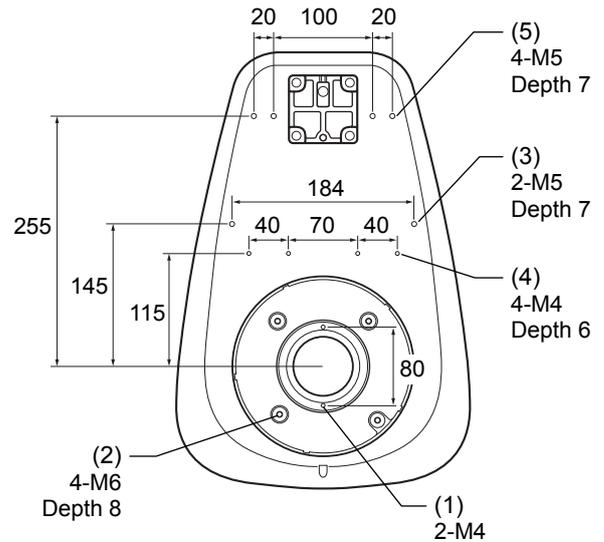
✔ **45-mm dia. filter**

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).

✔ **Screw holes for attaching optional devices**

The base's top board has screw holes for attaching various types of devices. Screw holes (2) to (5) are not penetrating to prevent ingress of solution into the base.

- (1) 2-M4: Positioned under the stage plate attachment section of the base. Usable for multiple purposes.
- (2) 4-M6: Positioned under the stage plate attachment section of the base. Used for attaching the P-SXY64 XY Stage.
- (3) 2-M5: Positioned at the center on the top surface of the base. Usable for multiple purposes.
- (4) 4-M4: Positioned at the center on the top surface of the base. Usable for multiple purposes.
- (5) 4-M5: Positioned at the rear on the top surface of the base. Used for attaching a device such as the C-FDF Flexible Double Arm Fiber Illumination Unit.



Screw holes for attaching optional devices

8.3 P-DSL32 LED Diascopic Illumination Stand

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

Combine this stand with an SMZ18 via a P2-FMDN Focus Mount. This stand cannot be used in combination with an SMZ25.

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

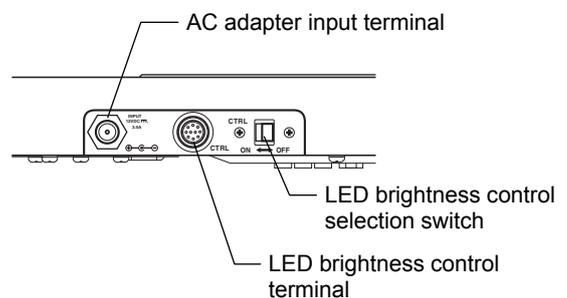
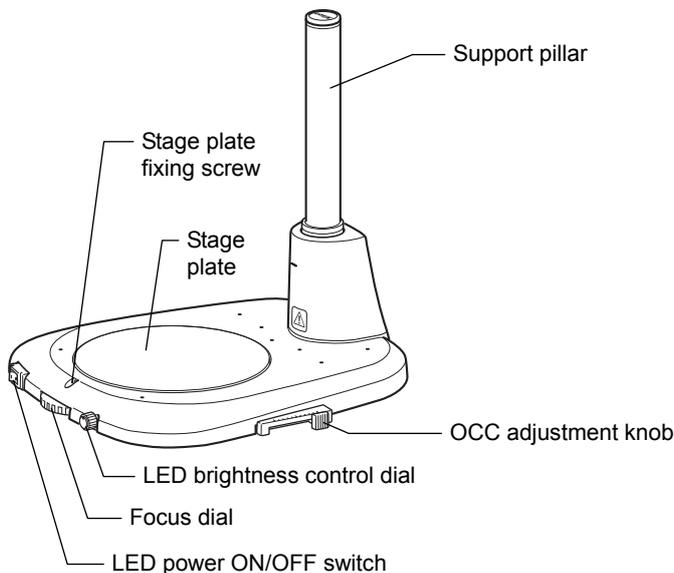
A dedicated hex driver is located at the top of the support pillar.

✔ **Sliding mechanism of the stage plate**

The sliding parts are mounted on the base part for mounting the stage plate, which can be slid by loosening the stage plate fixing screw. There is a clearance gap of approximately 3 mm around the stage plate when the stage is securely set. The stage plate can be smoothly and finely moved within the clearance gap by loosening the stage plate fixing screw.

This mechanism is useful for positioning, especially for high-magnification observation.

Securely fix the stage plate in place using the fixing screw when this mechanism does not need to be used.



Left side of the base

P-DSL32 LED Diascopic Illumination Stand

■ **Power supply and illumination control**

Power to the P-DSL32 LED Diascopic Illumination Stand is supplied by connecting a P2-CTLB Control Box or a 12 V AC adapter. To provide diascopic illumination without using a control box, connect a 12 V AC adapter.

Turn on or off the LED diascopic illuminator using the LED power ON/OFF switch at the front of the base.

Adjust illumination using the LED brightness control dial on the base. To enable adjustment using the LED brightness control dial on the base, the LED brightness control selection switch must be turned off.

[Controlling illumination from the P2-CTLB Control Box]

When the P2-CTLB Control Box is connected to the base, turn on the LED brightness control selection switch. In this state, diascopic illumination can be turned on or off, brightness can be controlled, and light intensity can be monitored from the control box.

Actual control is carried out by the PC (software: NIS-Elements) connected to the control box.

Note that illumination cannot be controlled from the control box, even if the LED brightness control selection switch is turned on, unless the LED power ON/OFF switch on the base is turned on. Be sure to turn on the LED power ON/OFF switch.

- LED brightness control selection switch on: Assigns the control right to the control box.
- LED brightness control selection switch off: Assigns the control right to the base.

For details, see “11.1 P2-CTLB 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 either the farthest or closest 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 (knob 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	From 1.3x	Contrast in the field of view is not uniform.
1X	Entire area	From 5.0x
1.6X	From 5.0x	From 5.0x
2X	From 7.0x	From 7.0x

* 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 to this stand:

- P-SXY64 XY Stage
- C-SSL DIA Sliding Stage
- P-DF2 LED Dark Field Unit 2
- C-TRS Tilting Stage
- C-LSL2 LED Epi Illuminator 2 (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
- P2-POL Simple Polarizing Attachment

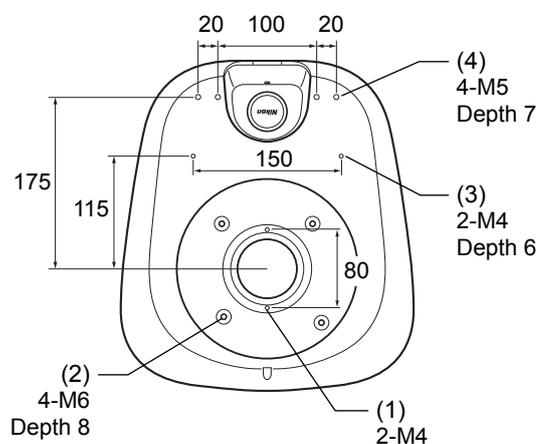
✔ **45-mm dia. filter**

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).

✔ **Screw holes for attaching optional devices**

The base's top board has screw holes for attaching various devices. Screw holes (2) to (4) 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. Usable 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. Usable 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).



Screw holes for attaching optional devices

✔ **Exchange for a C-EP support**

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

The P-DSF32 is a stand equipped with diascope illumination optical systems and the focusing mechanism of the support pillar vertical movement type.

Combine this stand with an SMZ18 via a P2-FMDN Focus Mount. This stand cannot be used in combination with an SMZ25.

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

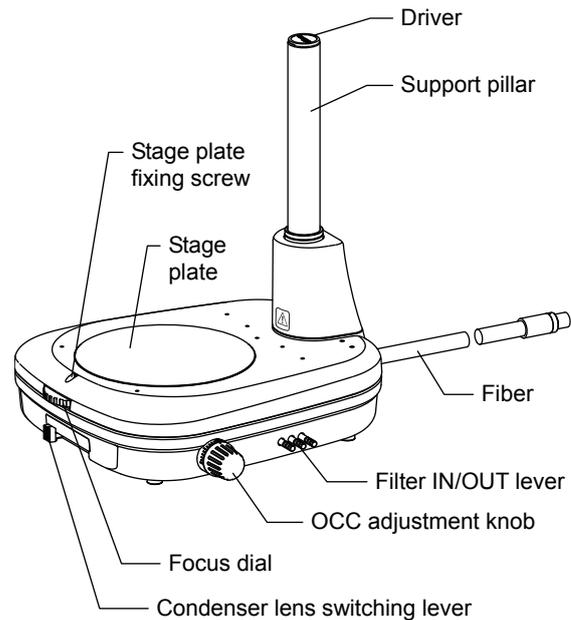
A dedicated hex driver is located at the top of the support pillar.

✓ Sliding mechanism of the stage plate

The sliding parts are mounted on the base part for mounting the stage plate, which can be slid by loosening the stage plate fixing screw. There is a clearance gap of approximately 3 mm around the stage plate when the stage is securely set. The stage plate can be smoothly and finely moved within the clearance gap by loosening the stage plate fixing screw.

This mechanism is useful for positioning, especially for high-magnification observation.

Securely fix the stage plate in place using the fixing screw when this mechanism does not need to be used.



P-DSF32 Fiber Diascopic Illumination Stand

■ Illumination on/off, brightness adjustment

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 supplied with the light source.

■ OCC (oblique coherent contrast) illumination

This stand supports OCC illumination so that a transparent sample can be observed at high contrast using diascope 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, the control position (knob position) can be reproduced using the adjustment knob with a scale.

■ 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 diascope 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 1.6x

Slide the lens switching lever to the left:

For high magnification; objective lens 2x

Usable objectives and recommended zoom magnifications

Objective	Zoom magnification	
	Bright-field diascope illumination	OCC illumination
0.5X and condenser lens for low magnification	From 1.5x	Contrast in the field of view is not uniform.
1X and condenser lens for low magnification	Entire area	From 3.0x
1.6X and condenser lens for low magnification	From 8.0x	From 8.0x
2X and condenser lens for high magnification	From 6.0x	From 6.0x

* 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 pillar 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 to this stand:

- P-SXY64 XY Stage
- C-SSL DIA Sliding Stage
- P-DF2 LED Dark Field Unit 2
- C-TRS Tilting Stage
- C-LSL2 LED Epi Illuminator 2 (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
- P2-POL Simple Polarizing Attachment

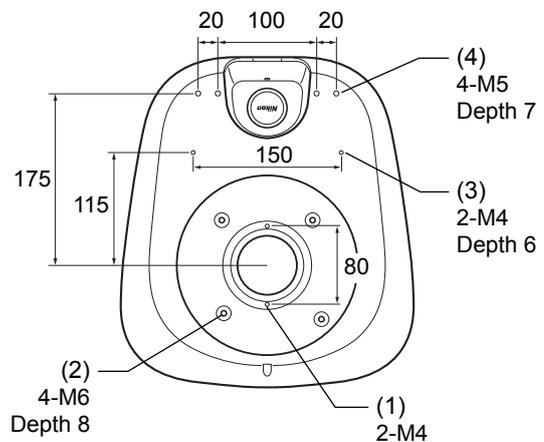
✔ **45-mm dia. filter**

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).

✔ **Screw holes for attaching optional devices**

The base's top board has screw holes for attaching various devices. Screw holes (2) to (4) 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. Usable for multiple purposes. Used for attaching a C-TRS Tilting Stage.
- (2) 4-M6: Positioned under the stage plate attachment part of the base. Usable 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).



Screw 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.

8.5 P-DF2 LED Dark Field Unit 2

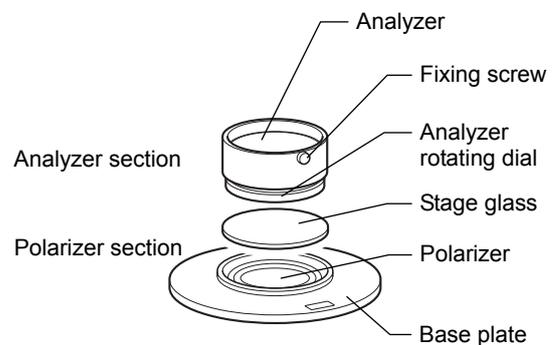
This dark-field illumination unit has LEDs that are tilted and positioned like a ring. The unit is attached to the base or the base of the stand. For details, refer to the instruction manual for the P-DF2 LED Dark Field Unit 2.

8.6 P2-POL Simple Polarizing Attachment

The P2-POL is a simple polarizing device that consists of the polarizer section and the analyzer section.

Polarization microscopy is enabled by changing the orientation of the polarizer built into the base or the stand and the orientation of the analyzer attached to the objective tip.

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



P2-POL Simple Polarizing Attachment

✔ **Directly placing the polarizer**

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

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

The polarizer cannot be placed directly on the P2-DBF Fiber Diascopic Illumination Base.

⚠ **Restrictions**

The P2-POL Simple Polarizing Attachment cannot be used with the P2-SHR Plan Apo 1.6X or 2X objective.

The P2-SHR Plan Apo 1X objective supports the entire zoom area and P2-SHR Plan Apo 0.5X objective supports 1x and larger zoom area.

9

Epi-Fluorescence Attachment

The microscope system can be used with the status detection model P2-EFLI Epi Fluorescence Attachment and Motorized P2-EFLM Epi Fluorescence Attachment.

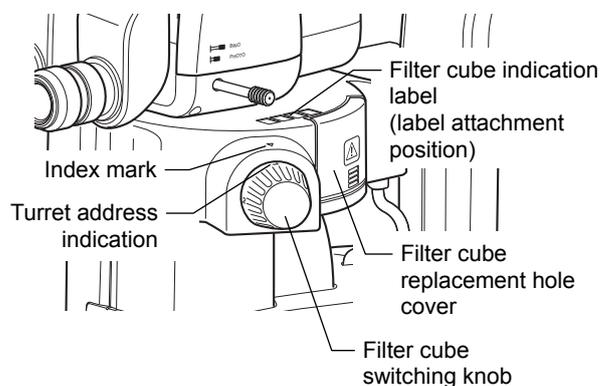
9.1

P2-EFLI Epi Fluorescence Attachment

This illuminator is attached between the zooming body and the tube. A HG precentered fiber illuminator is used as the light source. The light coming from the light source is led into the device by the HG fiber and then passed through the filter cube attached to the internal turret for epi-fl illumination.

The turret can be attached with up to four filter cubes; the addresses of the attachment positions are FL1 to FL4. For the attachable filter cube types, those for fluorescence, bright-field, and empty are available. Turn the filter cube switching knob to assign to the indicator the turret address (FL1 to FL4) of the filter cube to be placed into the optical path.

For systems where a control box has been connected, the information about the turret address on the optical path is sent to the control box via a motorized focus unit or relay box, and then transmitted to the DS-L3/DS-L4 camera control unit and personal computer.



P2-EFLI 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 diascope 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 diascope observation.

ⓘ Be sure to attach four cubes to the turret.

Attach an empty cube to the position to which no filter cube is attached.

■ Filter cube

- P2-EFL GFP-B, P2-EFL GFP-L, and P2-EFL RFP Filter Cubes: Used for fluorescence observation with a given wavelength.
- P2-EFLC Filter Cube: Used for fluorescence observation with an arbitrary wavelength when combined with arbitrary filters, for example.
- P2-EFLBFA Filter Cube (Bright Field): Used for bright-field episcopic observation.
- Empty cube (Three cubes are supplied with an epi-fluorescence attachment): Used when performing diascope 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°.

✔ **Bright-field episcopic observation**

This is useful for observing the entire image of an opaque specimen during fluorescence observation. Although the P2-EFLBFA Filter Cube (Bright Field) contains a UV blocking filter, adjust the brightness of the illuminator so that illumination is not too bright. A $1/4 \lambda$ plate is supplied as an option for the P2-EFLBFA to prevent flare in the imaging system due to light reflected into the optical system. Attach the $1/4 \lambda$ plate to a 0.5x or 1x objective.

When observing light reflected from a specimen with a mirror-like surface, the brightness on the right optical path differs from that on the left optical path. Also, duplicated images may be produced by the internal half mirror.

✔ **OCC light shielding plate**

When using an epi-fluorescence attachment with a diascope illumination base, Nikon recommends closing the OCC light shielding plate on the dia-illumination completely. This can decrease background noise caused by intrinsic fluorescence in the diascope illuminator.

■ **$1/4 \lambda$ plate**

When using a P2-EFLBFA Filter Cube (Bright Field) with a 0.5x or 1x objective, an optional $1/4 \lambda$ plate must be attached to the tip of the objective.

$1/4 \lambda$ plates are supplied to prevent flare in the imaging system due to light reflected into the optical system.

There are the following two types of $1/4 \lambda$ plates.

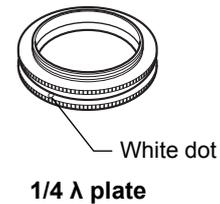
- P2-CIA QL0.5X $1/4\lambda$ plate 0.5x for coaxial epi illuminator:
Intended for 0.5x objectives
- P2-CIA QL1X $1/4\lambda$ plate 1x for coaxial epi illuminator:
Intended for 1x objectives

When using a 0.5x objective, remove the protection ring from the tip of the objective, and then screw in the $1/4 \lambda$ plate.

When using a 1x objective, remove the correction glass from the tip of the objective, and then screw in the $1/4 \lambda$ plate.

The brightest illumination is generated when the white dot on the $1/4 \lambda$ plate is at the front.

Select a position that has the optimum brightness and contrast for observation.



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

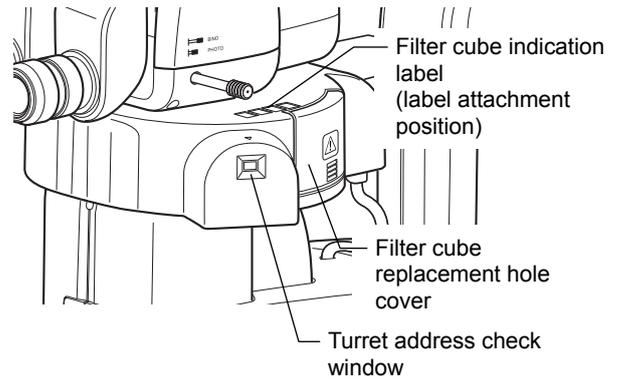
9.2

P2-EFLM Motorized Epi Fluorescence Attachment

The motorized epi-fluorescence illuminator is attached between the zooming body and tube. A HG precentered fiber illuminator is used as the light source. The light coming from the light source is led into the device by the HG fiber and then passed through the filter cube attached to the internal turret for epi-fl illumination.

The turret can be attached with up to four filter cubes; the addresses of the attachment positions are FL1 to FL4. For the attachable filter cube types, those for fluorescence, bright-field, and empty are available. On the remote control, press the filter cube switching buttons (FL1 to FL4) to specify the turret address of the filter cube to be placed into the optical path. The LED of the pressed button lights so that the turret address on the optical path can be identified. The attachment has a turret address check window on the right front so that the turret address on the optical path can be identified.

For systems where a control box has been connected, the information about the turret address on the optical path is sent to the control box via a motorized focus unit or relay box, and then transmitted to the DS-L3/DS-L4 camera control unit and personal computer.



P2-EFLM Motorized 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 diascope 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 diascope observation.

ⓘ Be sure to attach four cubes to the turret.

Attach an empty cube to the position to which no filter cube is attached.

■ **Filter cube**

- P2-EFL GFP-B, P2-EFL GFP-L, and P2-EFL RFP Filter Cubes: Used for fluorescence observation with a given wavelength.
- P2-EFLC Filter Cube: Used for fluorescence observation with an arbitrary wavelength when combined with arbitrary filters, for example.
- P2-EFLBFA Filter Cube (Bright Field): Used for bright-field episcopic observation.
- Empty cube (Three cubes are supplied with an epi-fluorescence attachment): Used when performing diascope 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°.

✔ **Bright-field episcopic observation**

This is useful for observing the entire image of an opaque specimen during fluorescence observation. Although the P2-EFLBFA Filter Cube (Bright Field) contains a UV blocking filter, adjust the brightness of the illuminator so that illumination is not too bright. A $1/4 \lambda$ plate is supplied as an option for the P2-EFLBFA to prevent in the imaging system due to light reflected into the optical system. Attach the $1/4 \lambda$ plate to a 0.5x or 1x objective. When observing light reflected from a specimen with a mirror-like surface, the brightness on the right optical path differs from that on the left optical path. Also, duplicated images may be produced by the internal half mirror.

✔ **OCC light shielding plate**

When using an epi-fluorescence attachment with a diascope illumination base, Nikon recommends closing the OCC light shielding plate on the dia-illumination completely. This can decrease background noise caused by intrinsic fluorescence in the diascope illuminator.

■ **$1/4 \lambda$ plate**

When using a P2-EFLBFA Filter Cube (Bright Field) with a 0.5x or 1x objective, an optional $1/4 \lambda$ plate must be attached to the tip of the objective.

$1/4 \lambda$ plates are supplied to prevent flare in the imaging system due to light reflected into the optical system.

There are the following two types of $1/4 \lambda$ plates.

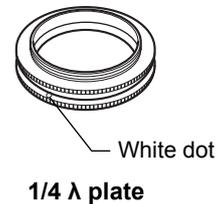
- P2-CIA QL0.5X $1/4 \lambda$ plate 0.5x for coaxial epi illuminator:
Intended for 0.5x objectives
- P2-CIA QL1X $1/4 \lambda$ plate 1x for coaxial epi illuminator:
Intended for 1x objectives

When using a 0.5x objective, remove the protection ring from the tip of the objective, and then screw in the $1/4 \lambda$ plate.

When using a 1x objective, remove the correction glass from the tip of the objective, and then screw in the $1/4 \lambda$ plate.

The brightest illumination is generated when the white dot on the $1/4 \lambda$ plate is at the front.

Select a position that has the optimum brightness and contrast for observation.



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

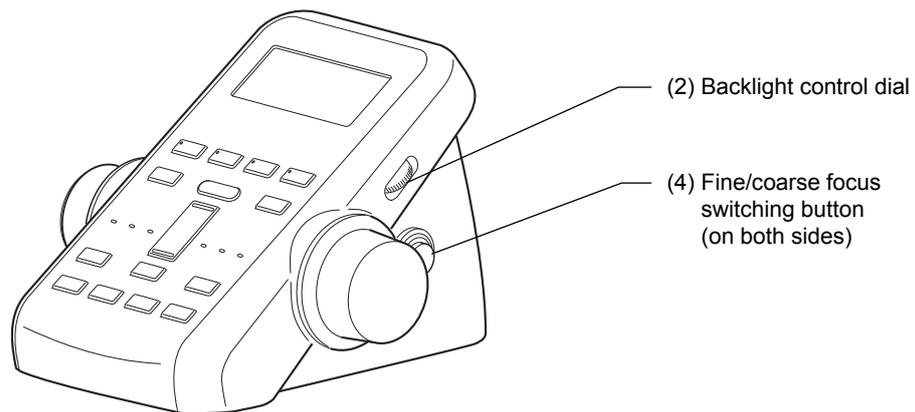
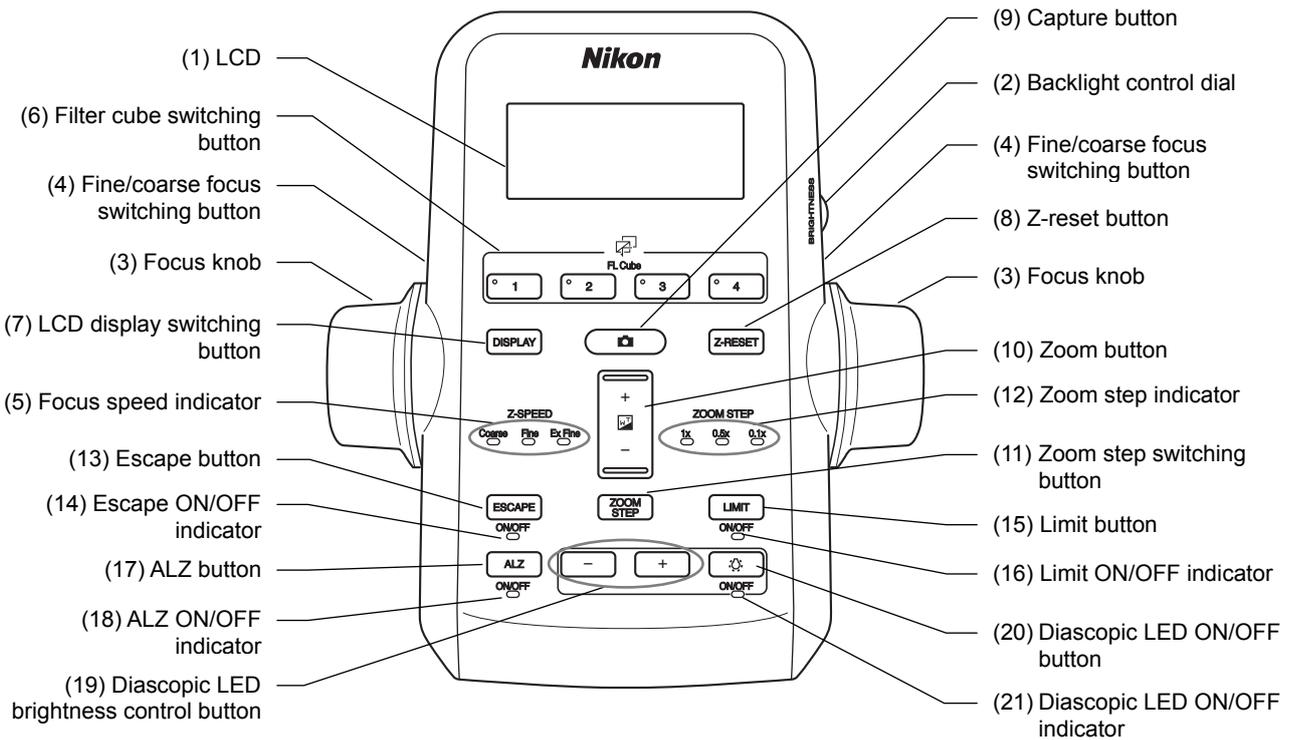
10 Remote Control Devices

A remote controller, foot switch, and photo release are available as remote control devices of the microscope system.

10.1 P2-RC Remote Controller

The P2-RC Remote Controller is used mainly for focus and zoom operations.

The remote controller is attached to the REMOTE connector of the P2-CTLA Control Box.



Front Right Side

P2-RC Remote Controller

■ Functions and indications of the operation buttons

No.	Button/Indication	Function/Description
(1)	LCD	This 4 x 16 LCD displays magnification, filter cube names, and other information. (See “■ LCD indications.”)
(2)	Backlight control dial	Adjusts the backlight of the LCD. When turned fully clockwise, the LCD's backlight and the LED's are turned off.
(3)	Focus knob	Vertically moves the focus mount of the P2-MFU Motorized Focus Unit. Turn backward to move upward. Turn forward to move downward.
(4)	Fine/coarse focus switching button	Switches the focus speed. Each time the button is pressed, the speed is cyclically switched in order of coarse, fine, and extra fine.
(5)	Focus speed indicator	When the focus speed is changed, the corresponding indicator (Coarse/Fine/ExFine) lights.
(6)	Filter cube switching button	Turns the turret of the motorized epi fluorescence attachment. The filter cube of the address of the pressed button is brought into the optical path and the LED of the corresponding button (address on the optical path) lights.
(7)	LCD display switching button	Switches the display on the LCD. Two pages can be switched for display. (See “■ LCD indications.”)
(8)	Z-reset button	Resets the indication of the Z position (focus position) on the LCD to 0. Pressing at another position sets that position as 0.
(9)	Capture button	Captures images using a DS camera.
(10)	Zoom button	Changes the magnification of the zooming body. Pressing the upper button causes the magnification to increase. Pressing the lower button causes the magnification to decrease. Pressing and holding the button causes the magnification to change continuously.
(11)	Zoom step switching button	Switches the zoom step size in order of 1x, 0.5x, and 0.1x.
(12)	Zoom step indicator	When the zoom step size is changed, the corresponding LED (1x, 0.5x, and 0.1x) lights.
(13)	Escape button	Moves the vertical movement part upward by the preset distance so that it stays in position. The vertical movement is not possible in this escape status. Pressing the Escape button again causes the vertical movement part to return to the previous position. Pressing and holding the Escape button causes the vertical movement part to exit escape. The travel distance can be newly set or changed using the setup tool or NIS-Elements.
(14)	Escape ON/OFF indicator	The LED lights when in escape status.
(15)	Limit button	When the limit button is pressed, the current position is set as the limit position so that the vertical movement part does not move down passing the limit point. Pressing the limit button again cancels the limit position setting.
(16)	Limit ON/OFF indicator	The LED lights when the limit position has been set.
(17)	ALZ button	Activates the ALZ function. To deactivate the ALZ function, press the button again. For the ALZ function, see “■ Useful zoom operation functions (ALZ function)” in “1.2 SMZ25 Zooming Body” in this chapter.
(18)	ALZ ON/OFF indicator	The LED lights when the ALZ function is activated.
(19)	Diascopic LED brightness control button	Changes the brightness of diascopic LED illumination. Press [+] to increase the brightness and [-] to decrease the brightness.
(20)	Diascopic LED ON/OFF button	Turns diascopic LED illumination on and off.
(21)	Diascopic LED ON/OFF indicator	The LED lights when diascopic LED illumination is turned on.

No.	Operation Section	Function																																																			
(1)	Left foot pedal	<p>Left rear foot pedal (motorized focus unit Z-coordinate DOWN switch)</p> <ul style="list-style-type: none"> • Drives the motorized focus unit downward. • When pressed, lowers the unit by 1.6 μm. Press and hold to move the unit continuously. • The speed changes based on the magnification and nosepiece address. (See the table below.) • If a nosepiece address has not been set, the unit moves at the maximum speed. <p>Left front of the foot pedal (motorized focus unit Z-coordinate UP switch)</p> <ul style="list-style-type: none"> • Drives the motorized focus unit upward. • When pressed, raises the unit by 1.6 μm. Press and hold to move the unit continuously. • The speed changes based on the magnification and nosepiece address. (See the table below.) • If a nosepiece address has not been set, the unit moves at the maximum speed. <p style="text-align: center;">Coarse</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td rowspan="2">Magnification</td> <td>SMZ25</td> <td>0.63 to 5.0</td> <td>5.1 to 10.0</td> <td>10.1 to 15.75</td> </tr> <tr> <td>SMZ18</td> <td>0.75 to 4.0</td> <td>4.1 to 8.0</td> <td>8.1 to 13.5</td> </tr> <tr> <td rowspan="2">Nosepiece address</td> <td>1</td> <td colspan="3" rowspan="2" style="text-align: center;">10 (mm/second)</td> </tr> <tr> <td>2</td> </tr> </table> <p style="text-align: center;">Fine</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td rowspan="2">Magnification</td> <td>SMZ25</td> <td>0.63 to 5.0</td> <td>5.1 to 10.0</td> <td>10.1 to 15.75</td> </tr> <tr> <td>SMZ18</td> <td>0.75 to 4.0</td> <td>4.1 to 8.0</td> <td>8.1 to 13.5</td> </tr> <tr> <td rowspan="2">Nosepiece address</td> <td>1</td> <td>5 (mm/second)</td> <td>4 (mm/second)</td> <td>2 (mm/second)</td> </tr> <tr> <td>2</td> <td>2 (mm/second)</td> <td>1 (mm/second)</td> <td>0.5 (mm/second)</td> </tr> </table> <p style="text-align: center;">Extra fine</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td rowspan="2">Magnification</td> <td>SMZ25</td> <td>0.63 to 5.0</td> <td>5.1 to 10.0</td> <td>10.1 to 15.75</td> </tr> <tr> <td>SMZ18</td> <td>0.75 to 4.0</td> <td>4.1 to 8.0</td> <td>8.1 to 13.5</td> </tr> <tr> <td rowspan="2">Nosepiece address</td> <td>1</td> <td>0.5 (mm/second)</td> <td>0.4 (mm/second)</td> <td>0.2 (mm/second)</td> </tr> <tr> <td>2</td> <td>0.2 (mm/second)</td> <td>0.1 (mm/second)</td> <td>0.05 (mm/second)</td> </tr> </table>	Magnification	SMZ25	0.63 to 5.0	5.1 to 10.0	10.1 to 15.75	SMZ18	0.75 to 4.0	4.1 to 8.0	8.1 to 13.5	Nosepiece address	1	10 (mm/second)			2	Magnification	SMZ25	0.63 to 5.0	5.1 to 10.0	10.1 to 15.75	SMZ18	0.75 to 4.0	4.1 to 8.0	8.1 to 13.5	Nosepiece address	1	5 (mm/second)	4 (mm/second)	2 (mm/second)	2	2 (mm/second)	1 (mm/second)	0.5 (mm/second)	Magnification	SMZ25	0.63 to 5.0	5.1 to 10.0	10.1 to 15.75	SMZ18	0.75 to 4.0	4.1 to 8.0	8.1 to 13.5	Nosepiece address	1	0.5 (mm/second)	0.4 (mm/second)	0.2 (mm/second)	2	0.2 (mm/second)	0.1 (mm/second)	0.05 (mm/second)
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	2	2 (mm/second)	1 (mm/second)	0.5 (mm/second)																																																	
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	2	0.2 (mm/second)	0.1 (mm/second)	0.05 (mm/second)																																																	
(2)	Right foot pedal	<p>Right rear of the foot pedal (motorized magnification UP switch)</p> <ul style="list-style-type: none"> • Increases the magnification by one step. The step size depends on the zoom step size setting. • Press and hold to increase the magnification continuously. • The zoom step size depends on the setting of the zoom step switching button on the remote controller. <p>Right front of the foot pedal (motorized magnification DOWN switch)</p> <ul style="list-style-type: none"> • Decreases the magnification by one step. The step size depends on the zoom step size setting. • Press and hold to decrease the magnification continuously. • The zoom step size depends on the setting of the zoom step switching button on the remote controller. 																																																			
(3)	Foot rest	Used as a foot rest.																																																			
(4)	CTRL connector	Attach to the FOOT connector of the P2-CTLA Control Box using the supplied cable.																																																			
(5)	PHOTO connector	Connect the AZ-PCR Photo Release. (See "10.3 AZ-PCR Photo Release" in this chapter.)																																																			

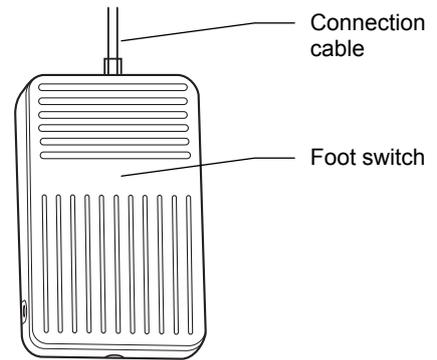
10.3

AZ-PCR Photo Release

The AZ-PCR Photo Release is a foot switch for capturing images using the DS camera connected to the microscope.

The photo release is connected to the PHOTO connector of the AZ-FSW Foot Switch.

For operations using a camera control unit such as the DS-L3/DS-L4 after a DS camera is attached to the microscope, connect the camera control unit to the P2-CTLA Control Box (USB connection). Next, connect the photo release to the AZ-FSW Foot Switch connected to the control box. The DS camera can then capture images simply by stepping on the pedal of the photo release.



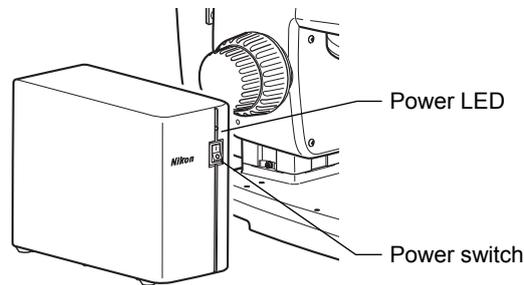
AZ-PCR Photo Release

11

Control/Communication Devices and Relay Devices

11.1

P2-CTLB Control Box



P2-CTLB Control Box

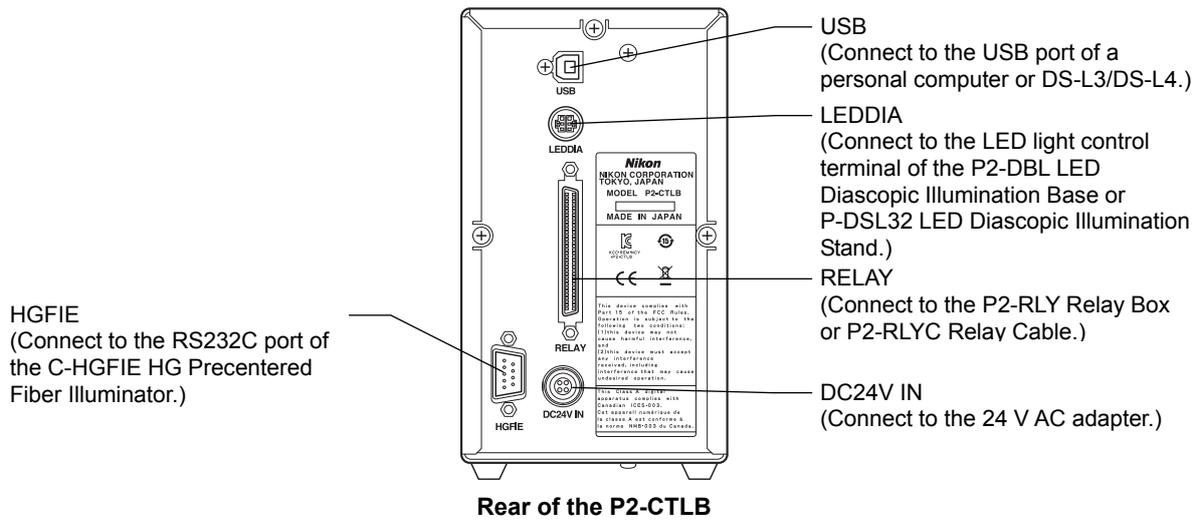
When electrically connected to the following devices, the P2-CTLB Control Box can detect the device states and handle communications:

No.	Device	Operation
(1)	SMZ18 Zooming Body	Detects the magnification.
(2)	P2-DBL LED Diascopic Illumination Base, P-DSL32 LED Diascopic Illumination Stand	Turns On/Off LED illumination, controls illumination, and monitors the light intensity.
(3)	P2-RLY Relay Box	Relays communications.
(4)	P2-EFLI Epi Fluorescence Attachment	Detects the turret address on the optical path.
(5)	P2-RNI2 Intelligent Nosepiece	Detects the nosepiece address on the optical path.
(6)	C-HGFIE HG Precentered Fiber Illuminator	Switches the ND filter and opens/closes the shutter.
(7)	C-HGFIE HG Precentered Fiber Illuminator	Communications
(8-1)	DS-L3/DS-L4 camera control unit plus DS camera	Communications
(8-2)	Personal computer plus DS-U3 camera control unit plus DS camera	Communications
(9)	AC adapter	24 V power input

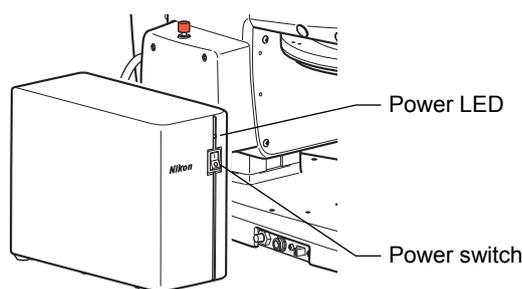
- The power supply for control provides power for the board in the control box and devices (1) to (5).
- Devices (1), (4), and (5) are connected through device (3).
- One type-B USB connector is equipped so that device (8-1) or (8-2) can be connected. Note that both devices cannot be connected at the same time.
- To operate using a personal computer after connecting device (8-1), connect the USB cable from the personal computer to device (8-1).
- Communications with device (7) are handled through a RS232C connection. Communications with device (8-1) or (8-2) are handled through a USB connection.

■ Connector names and connection destinations

The figure below shows the connectors on the rear of the control box and the connection destinations:



For the power cable connected to the AC adapter, use the one specified in Chapter 8, “2 Performance Properties.”



P2-CTLA Control Box

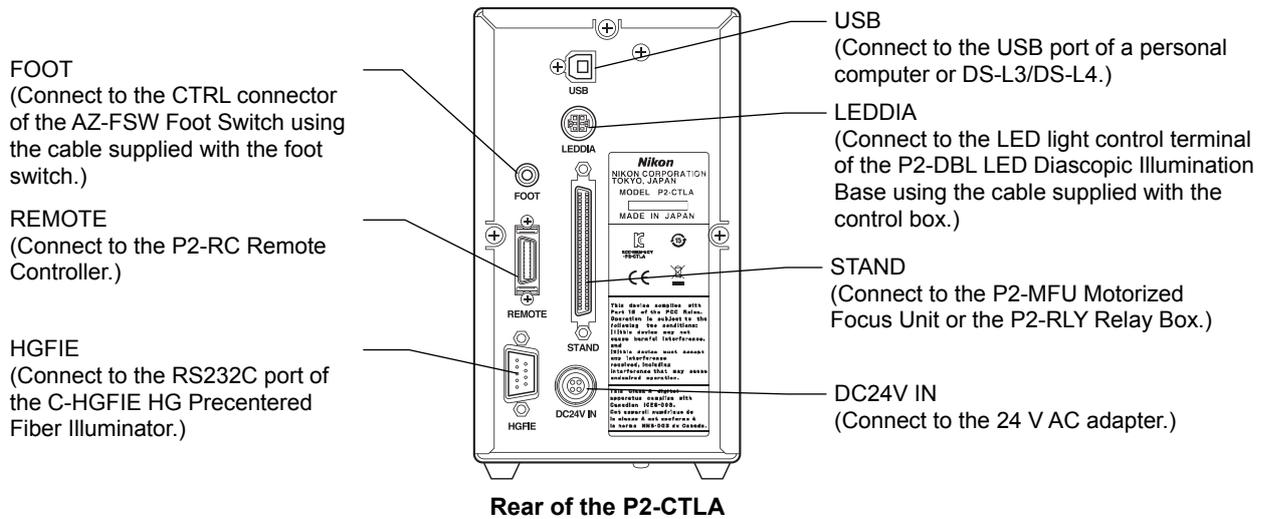
When electrically connected to the following devices, the P2-CTLA Control Box can perform motorized control of the devices, detect the device states, and handle communications:

No.	Device	Operation
(1)	SMZ25 Zooming body	Motorized control of magnification
(2)	SMZ18 Zooming body	Detects the magnification.
(3)	P2-MFU Motorized Focus Unit	Motorized control of focus
(4)	P2-DBL LED Diascopic Illumination Base	Turns On/Off LED illumination, controls illumination, and monitors the light intensity.
(5)	P2-RLY Relay Box	Relays communications.
(6)	P2-EFLM Motorized Epi Fluorescence Attachment	Motorized control of turret rotation
(7)	P2-EFLI Epi Fluorescence Attachment	Detects the turret address on the optical path.
(8)	P2-RNI2 Intelligent Nosepiece	Detects the nosepiece address on the optical path.
(9)	P2-RC Remote Controller	Communications
(10)	AZ-FSW Foot Switch	Detects the switch states, moves the P2-MFU Motorized Focus Unit vertically, and adjust the magnification of the SMZ25 Zooming Body.
(11)	AZ-PCR Photo Release	Detects the switch states and captures images.
(12)	C-HGFIE HG Precentered Fiber Illuminator	Switches the ND filter and opens/closes the shutter.
(13)	C-HGFIE HG Precentered Fiber Illuminator	Communications
(14-1)	DS-L3/DS-L4 camera control unit plus DS camera	Communications
(14-2)	Personal computer plus DS-U3 camera control unit plus DS camera	Communications
(15)	AC adapter	24 V power input

- The power supply for control provides power for the board in the control box and devices (1) to (11).
- Devices (1), (2), (6), (7), and (8) are connected through device (3) or (5).
- One type-B USB connector is equipped so that device (14-1) or (14-2) can be connected. Note that both devices cannot be connected at the same time.
- To operate using a personal computer after connecting device (14-1), connect the USB cable from the personal computer to device (14-1).
- Communications with device (9) are handled through serial communications, communications with device (13) are handled through a RS232C connection, and communications with device (14-1) or (14-2) are handled through a USB connection.

■ Connector names and connection destinations

The figure below shows the connectors on the rear of the control box and the connection destinations:



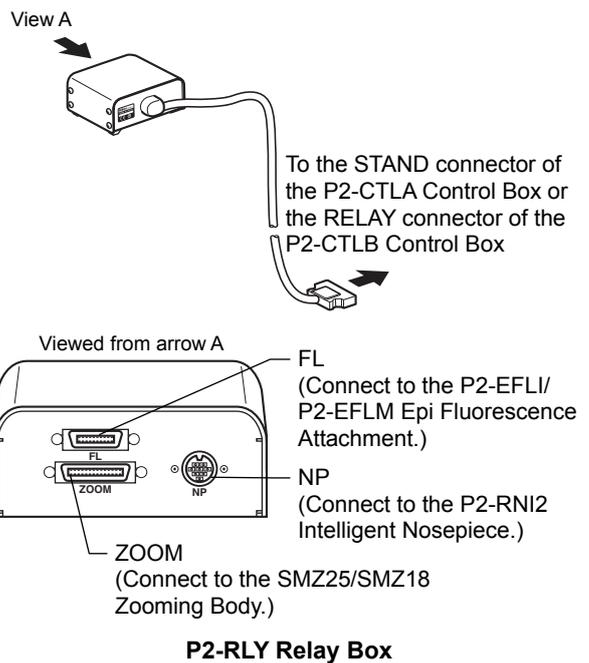
Use the power cable specified in Chapter 8, "2 Performance Properties."

11.3 P2-RLY Relay Box

When electrically connected to the following devices, the P2-RLY Relay Box can relay signals for motorized control of the devices and detect the device states:

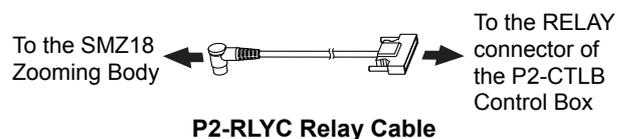
- (1) P2-CTLA Control Box
 - (2) P2-CTLB Control Box
 - (3) SMZ25 Zooming Body
 - (4) SMZ18 Zooming Body
 - (5) P2-EFLM Motorized Epi Fluorescence Attachment
 - (6) P2-EFLI Epi Fluorescence Attachment
 - (7) P2-RNI2 Intelligent Nosepiece
- The drive signals of devices (3) and (5) are relayed through device (1) or (2). For devices (4), (6), and (7), address information signals are relayed.

Attach the relay box to the P2-FU Focus Unit or the P2-FMDN Focus Mount. (See Chapter 5, "3.1 Assembling the EPI System and DIA + EPI-FL System", step 5 "Attach a relay box." (P2-FU Focus Unit system only) and Chapter 5, "3.2 Compact System Assembly", step 4 "Attach a coaxial epi illuminator (in the compact/epi-fl system))



11.4 P2-RLYC Relay Cable

For systems where the P2-RLY Relay Box has not been connected, the P2-RLYC Relay Cable is used to connect the SMZ18 Zooming Body to the RELAY connector of the P2-CTLB Control Box. This enables the status detection signals to be relayed.



Chapter

5

Assembling

This chapter contains the SMZ18/SMZ25 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 “11 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

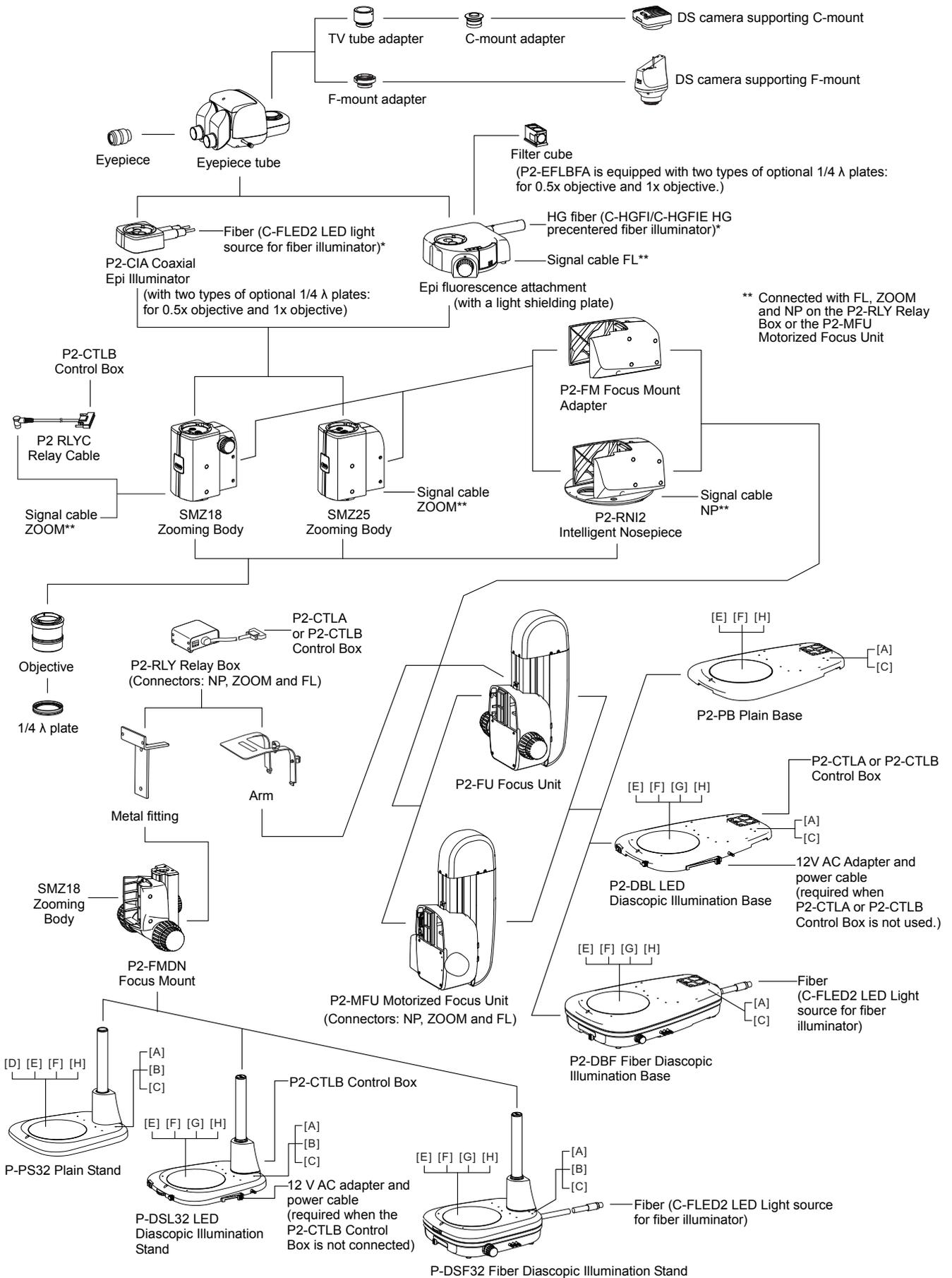
The SMZ18/SMZ25 system weighs over 20 kg in total.

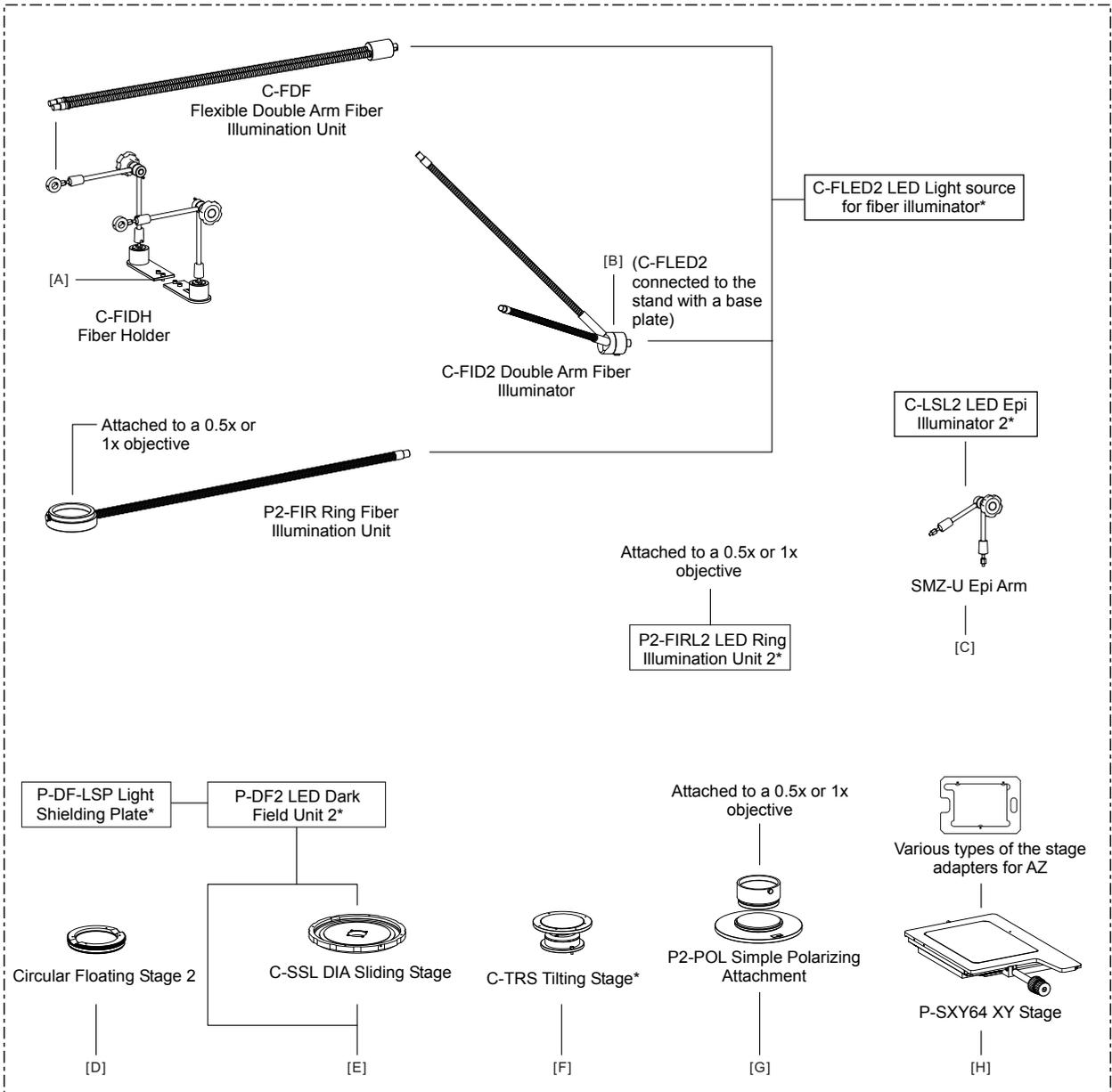
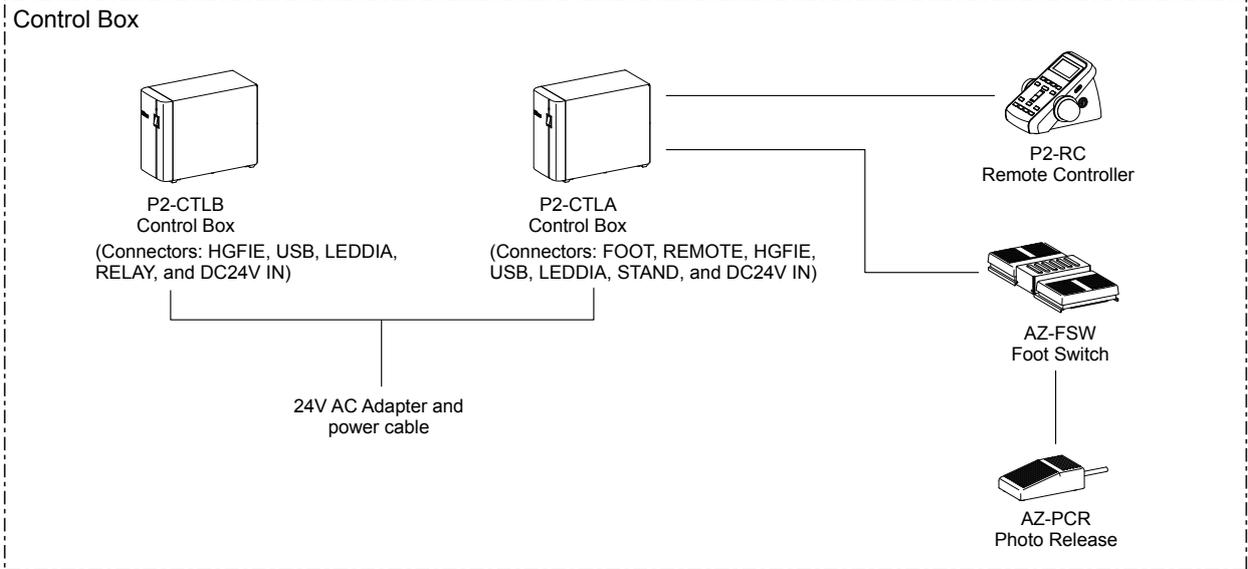
When moving the assembled microscopy system, work with at least two people. Put hands in the depression at the front of the base and the rear of both sides to lift up the system. Be very careful not to let fingers be caught when putting it down.

■ Tools necessary for assembly

Tools	Devices that supply tools
Hex wrench (nominal designation: 2.5)	Intelligent nosepiece, P-SXY64 XY Stage
Hex wrench (nominal designation: 3)	P-SXY64 XY Stage
Hex wrench (nominal designation: 4)	Fiber holder
Hex wrench (nominal designation: 5)	P-SXY64 XY Stage
Hex wrench (nominal designation: 6)	Focus unit
Hex driver (nominal designation: 2)	Focus unit, P-PS32 Plain Stand (fit-in type to the top of the support pillar)
Hex driver (nominal designation: 4)	Intelligent nosepiece, Focus mount adapter, Focus mount
Spanner wrench (nominal designation: 10)	Fiber holder

1 System Configuration





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

2

Device List

Microscopy system is configured by devices that are marked with “√.” For details about the restrictions regarding the configurations, see Chapter 4, “Functions and Operations of the Devices.”

Check the table below (“√” and “-”) for availability.

Device	Model name	Device name	EPI system	DIA + EPI-FL system	Compact system/EPI system	Compact system/DIA + EPI-FL system	Remarks				
Main Body	SMZ18	Zooming Body	√	√	√	√					
	SMZ25	Zooming Body			-	-					
Focus Unit or Focus Mount	P2-MFU	Motorized Focus Unit	√	√	-	-					
	P2-FU	Focus Unit			-	-					
	P2-FMDN	Focus Mount	-	-	√	√					
Focus Mount Adapter or Nosepiece	P2-FM	Focus Mount Adapter	√	√	-	-					
	P2-RNI2	Intelligent Nosepiece			-	-					
Objective	P2-SHR Plan Apo 0.5X	Objective	√	√	√	√					
	P2-SHR Plan Apo 1X	Objective									
	P2-SHR Plan Apo 1.6X	Objective									
	P2-SHR Plan Apo 2X	Objective									
Base, Stand, Stage (including products that contain the diascope illumination function)	P2-PB	Plain Base	√	-	-	-	With an acrylic stage plate				
	P2-DBL	LED Diascopic Illumination Base		√			-	-	With a transparent glass stage plate		
	P2-DBF	Fiber Diascopic Illumination Base		-			-	-			
	P-PS32	Plain Stand	-	-	√	√	With an acrylic stage plate				
	P-DSL32	LED Diascopic Illumination Stand					-	-	-	With a transparent glass stage plate	
	P-DSF32	Fiber Diascopic Illumination Stand					-	-	-		
	P-SXY64	XY Stage					-	-	-		
	Various types	Stage adapters for AZ	Optional	Optional	Optional	Optional					
	C-SSL	DIA Sliding Stage	-	-							
	2	Circular Floating Stage	-	-							
	C-TRS	Tilting Stage	-	-							
	Tube	P2-DF2	LED Dark Field Unit 2	Optional	Optional	Optional	Optional				
		P2-POL	Simple Polarizing Attachment								
		P2-TERG 100	Trinocular Tilting Tube						√	√	√
P2-TERG 50		Trinocular Tilting Tube									
P2-TL100		Trinocular Tube L									
Eyepiece		C-W 10XB	Eyepiece						√	√	√
	C-W 15X	Eyepiece									
	C-W 20X	Eyepiece									
	C-W 30X	Eyepiece									
Episcopic Illuminator	P2-CIA	Coaxial Epi Illuminator	√	-	√	-					
	C-FDF	Flexible Double Arm Fiber Illumination Unit	Optional	Optional	Optional	Optional					
	C-FIDH	Fiber Holder	-	-							
	C-FID2	Double Arm Fiber Illuminator	-	-							
	C-LSL2	LED Epi Illuminator 2	Optional	Optional	Optional	Optional					
		SMZ-U Epi Arm									
	P2-FIRL2	LED Ring Illumination Unit 2									
P2-FIR	Ring Fiber Illumination Unit										

Chapter 5 Assembling

Device	Model name	Device name	EPI system	DIA + EPI-FL system	Compact system/EPI system	Compact system/DIA + EPI-FL system	Remarks
Epi Fluorescence Attachment	P2-EFLM	Motorized Epi Fluorescence Attachment	-	√	-	-	With 3 empty cubes and a light shielding plate
	P2-EFLI	Epi Fluorescence Attachment				√	
	P2-EFL GFP-B	Filter Cube				√	
	P2-EFL GFP-L					√	
	P2-EFL RFP					√	
	P2-EFLC					√	
P2-EFLBFA	√						
Light Source	C-HGFI	HG Precentered Fiber Illuminator	-	√	-	√	
	C-GHFIE	HG Precentered Fiber Illuminator	-	√	-	√	
	C-FLED2	LED Light source for fiber illuminator	√	Optional	√	Optional	
Control/Relay Device	P2-CTLA	Control Box	√	√	-	-	
	P2-CTLB	Control Box			Optional		
	P2-RLY	Relay Box			-	Optional	
	P2-RLYC	Relay Cable			Optional	Optional	
Remote Control Device	P2-RC	Remote Controller	√	√	-	-	
	AZ-FSW	Foot Switch	Optional	Optional			
	AZ-PCR	Photo Release					
Others	P2-CIA QL0.5X	1/4 λ plate 0.5x for coaxial epi illuminator	Optional	Optional	Optional	Optional	
	P2-CIA QL1X	1/4 λ plate 1x for coaxial epi illuminator					
	Various types	DS camera supporting C-mount or F-mount, C-mount adapter and TV tube adapter or F-mount adapter					

3 Assembly Procedures

The SMZ18 and SMZ25 stereo microscopes are system microscopes that can be used in various device configurations. This chapter describes how to assemble the following four systems.

- Microscope system using episcopic illumination (referred to as the "EPI System" in this chapter)
- Microscope system using diascopic and epi-fluorescence illumination (referred to as the "DIA + EPI-FL system" in this chapter)
- Compact system/microscope system using episcopic illumination (referred to as the "compact/EPI system" in this chapter)
- Compact system/microscope system using diascopic and epi-fluorescence illumination (referred to as the "compact/DIA + EPI-FL system" in this chapter)

This chapter also describes how to assemble the devices that can be added to the basic configuration of each system. Refer to the preceding section "5.2 Device List" and check the devices to be used before assembling.

3.1 Assembling the EPI System or DIA + EPI-FL System

1 Attach a base.

Attach the base to be used to the P2-FU Focus Unit or P2-MFU Motorized Focus Unit.

The attachment procedure is the same for all base types.

When configuring the DIA + EPI-FL system, select the dia-illumination base.

The following figure shows an example of attaching the P2-DBL LED Diascopic Illumination Base to the P2-FU Focus Unit.

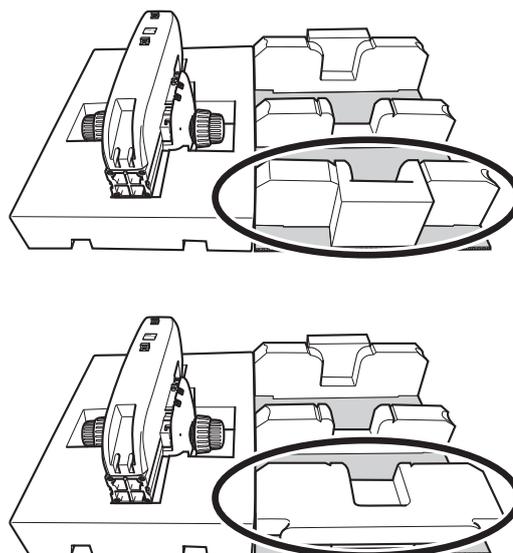
CAUTION Heavy Object

The base and focus unit are heavy. The focus unit is especially heavy so be very careful not to drop it when unpacking or installing. Working with two or more people is recommended.

- P2-FU Focus Unit: Approx. 11 kg
- P2-MFU Motorized Focus Unit: Approx. 12 kg

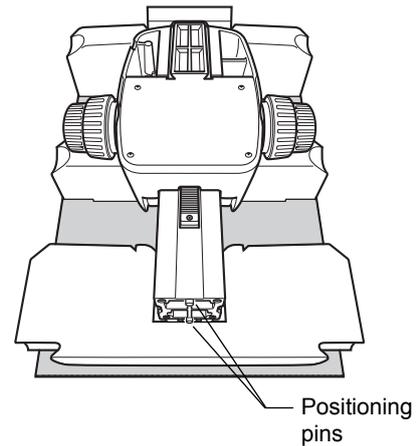
- (1) Remove the inner cover (cardboard) holding the focus unit from the packing box. This inner cover is used when connecting the focus unit and base.

Turn the inner cover over and place it on the desk where the microscope is to be installed. Select a desk and location free from vibration. Remove one of the white polystyrene pieces holding the product at either side, change its orientation as shown in the figure and place it again.



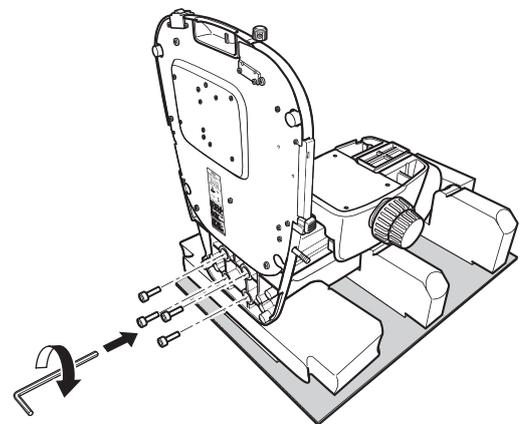
Changing the orientation of the polystyrene piece

- (2) Place the focus unit in the recession of the polystyrene piece as show in the figure.



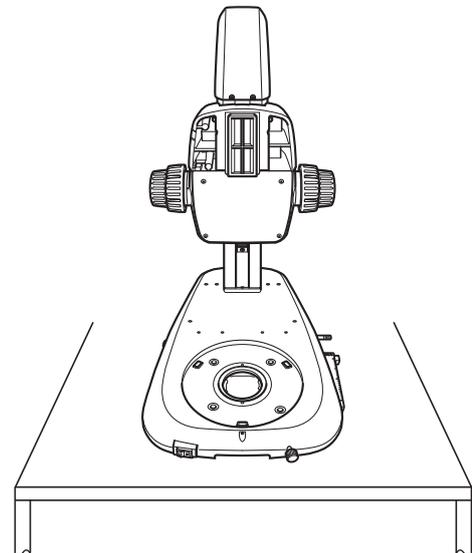
Fitting the focus unit

- (3) Hold the base with the two base side positioning holes aligned with the two positioning pins on the focus unit, screw the four M8 hexagon socket head bolts (supplied with the focus mount) from the bottom of the base and tighten firmly using the hex wrench (nominal designation: 6).



Attaching the base by tightening the bolts

- (4) Install the attached device on the desk.



Installing the base

■ **Attaching the stage plate**

Attach the stage plate.

Depending on the type of the base, either a transparent glass stage plate or an acrylic stage plate is supplied.

The acrylic plate is black on one side and milky white on the other side. Attach the stage plate with the appropriate side facing up according to the sample to be viewed.

! Glass stage plate handling precautions

Be very careful when handling the glass stage plate. Before attaching the glass stage plate, attach all other components in order to avoid the risk of breaking the glass during assembly.

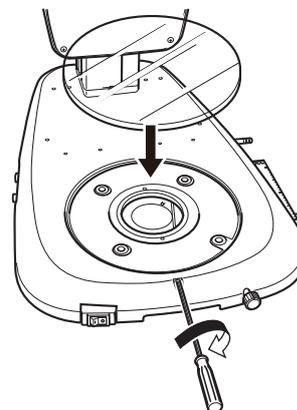
- (1) Loosen the M4 set screw for the stage plate in the front center of the base using the hex driver (nominal designation: 2).
- (2) Tilt the stage plate, fit it into the base, and then tighten the fixing screw.

! Note on fixing a glass stage plate in place

Do not tighten the fixing screw too much to fix the glass stage plate in place to prevent the glass from being damaged or broken.

✓ Sliding mechanism

There is a clearance gap of approximately 3 mm for the sliding mechanism, around the stage plate when the stage is securely set.



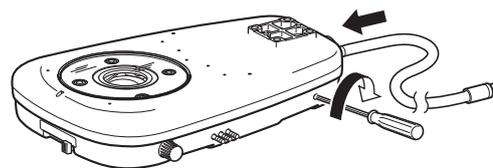
Attaching the stage plate by tightening the screw

■ Attaching a fiber to the P2-DBF Fiber Diascopic Illumination Base

When using the P2-DBF Fiber Diascopic Illumination Base, connect the fiber to the base.

Insert the 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. Refer to the instruction manual supplied with the light source for details.



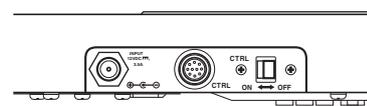
Attaching the fiber by tightening the screw

■ Connecting a cable to the P2-DBL LED Diascopic Illumination Base

Connect the cable to the connector on the left.

Connect the LED brightness control terminal “CTRL” with the connector “LEDDIA” on the control box using the CTRL cable supplied with the control box.

Connect the 12 V AC adapter to the AC adapter input terminal that is used for the dia-illumination power supply for the system without a control box connected.



Connecting the LED dia-illumination base using a cable

! 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.

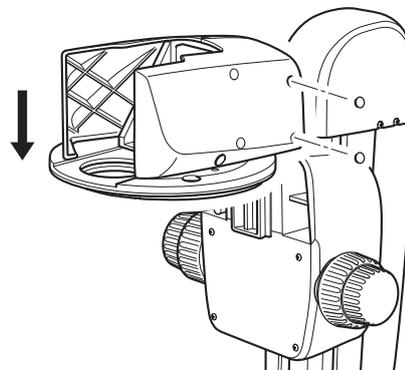
2 Attach an intelligent nosepiece or focus mount adapter.

Attach the intelligent nosepiece or focus mount adapter to the focus unit.

The attachment procedure is the same for both the intelligent nosepiece and focus mount adapter.

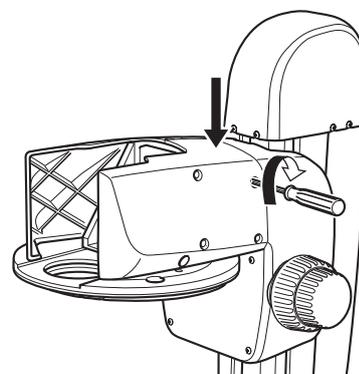
The following figure shows an example of attaching the intelligent nosepiece to the P2-FU Focus Unit.

- (1) Remove the two rubber caps from the fixing bolt holes at the right rear of the intelligent nosepiece (as viewed from the front). Insert the hex driver (nominal designation: 4) and completely loosen the two internal M5 hexagon socket head bolts.
- (2) Drop and fit the dovetail groove on the rear side of the intelligent nosepiece onto the dovetail of the focus unit mount from the top.



Attaching the intelligent nosepiece

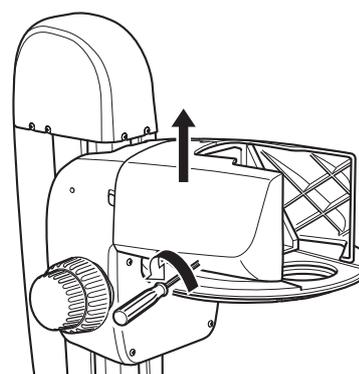
- (3) Firmly tighten the two fixing bolts using the hex driver (nominal designation: 4). After tightening the bolts, put the rubber caps back onto the bolt holes.



Firmly tightening the bolts

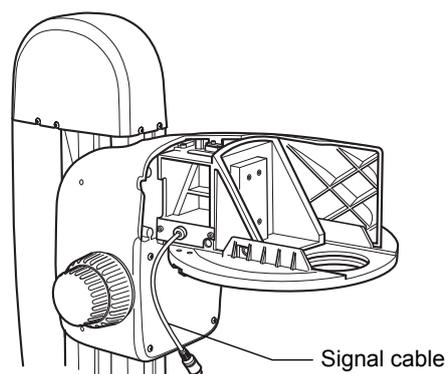
- (4) The cover on the left side (as viewed from the front) of the intelligent nosepiece is a sliding cover. Removing this cover at this point will facilitate the cable connection and routing in “[4] Connect signal cables.”

Remove the rubber caps from the two fixing bolt holes at the bottom of the cover, loosen and remove the two internal M5 hexagon socket head bolts using the hex driver (nominal designation: 4), and pull the cover up to remove it.



■ **Connecting signal cables**

Connect the signal cable of the intelligent nosepiece to the connector “NP” on the motorized focus unit or the relay box. (See “[4] Connect signal cables.”)

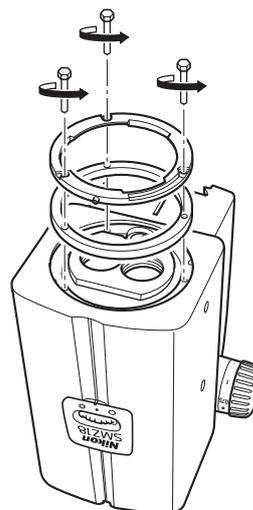


3 Attach a zooming body.

Attach the SMZ18 or SMZ25 Zooming Body to the intelligent nosepiece or focus mount adapter. The attachment procedure is the same for all zooming body types. The following figure shows an example of attaching the SMZ18 Zooming Body to the intelligent nosepiece.

⚠ When attaching to the focus mount adapter
 Step (1) is not necessary when attaching the zooming body to the focus mount adapter. Proceed to step (2).

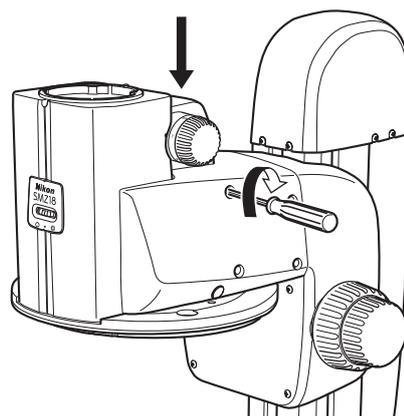
- (1) Detach the objective attachment adapter (dovetail and ring) attached under the zooming body. Loosen the three M3 hexagon socket head bolts using the hex wrench (nominal designation: 2.5).



Detaching the objective attachment adapter

- (2) Completely loosen the two M5 hexagon socket head bolts for fixing the zooming body on the right side of the zooming body (as viewed from the front) using the hex driver (nominal designation: 4).
- (3) Drop and fit the dovetail groove on the rear side of the zooming body onto the dovetail of the intelligent nosepiece mount.

- (4) Remove the two rubber caps from the fixing bolt holes on the right front side of the intelligent nosepiece (as viewed from the front). Insert the hex driver (nominal designation: 4) into the holes and firmly tighten the two zooming body fixing bolts. After tightening the bolts, put the rubber caps back onto the bolt holes.



Attaching the zooming body by tightening the bolts

■ **Connecting signal cables**

The signal cable for the SMZ25 comes from the left side of the zooming body. In case of the SMZ18, connect the signal cable supplied with the SMZ18 to the round connector on the left side of the zooming body.

Connect the other end of the cable to the connector “ZOOM” on the motorized focus unit or relay box. (See “[4] Connect signal cables.”)

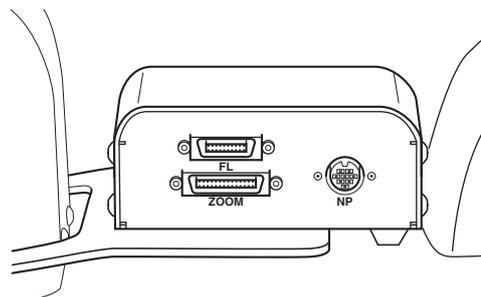
4 Connect signal cables.

Connect the cables required for detecting the device status or to drive the motorized devices.

- (1) Connect the signal cables.

The relay box has connectors “NP”, “ZOOM”, and “FL.”

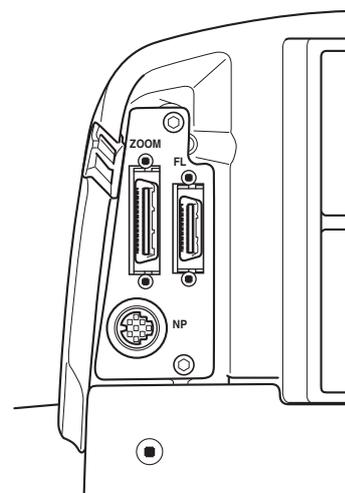
The P2-MFU Motorized Focus Unit has connectors “NP”, “ZOOM” and “FL” on the left side of the unit mount (as viewed from the front).



Connectors on the relay box

The following cables are connected to each connector.

- NP: Connect the signal cable coming from the intelligent nosepiece (there is no connection to the NP connector if the focus mount adapter is attached).
- ZOOM: In case of the SMZ18 Zooming Body, connect to the round connector on the left side of the zooming body using the signal cable supplied with the SMZ18. In case of the SMZ25, connect the signal cable coming from the left side of the zooming body.
- FL: Connect the signal cable coming from the P2-EFLM Motorized Epi Fluorescence Attachment or the P2-EFLI Epi Fluorescence Attachment.



Connectors on the motorized focus unit

✔ **Cable routing**

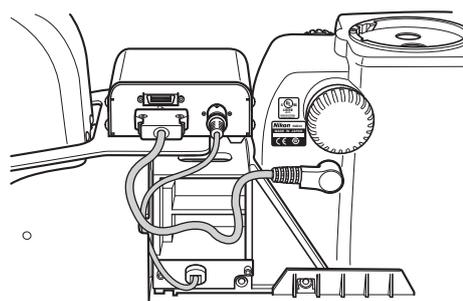
Route the cables before attaching the cover.

(In the figure, even though the relay box is already attached for explanatory reasons, the attachment of the relay box is explained in step [5])

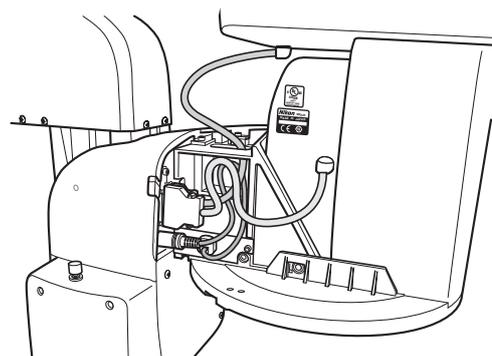
Bring out the cable from the SMZ zooming body along the notch on the focus unit cover and connect to the connector "ZOOM." Pass the cable from the intelligent nosepiece through the oval hole on top of the mount, bring it out along the notch on the top of the left side cover, and then connect to the connector "NP."

When the cable was connected to the motorized focus unit, route the cable as shown in the figure.

Pass the cable from the motorized epi fluorescence attachment through the oval hole at the top of the mount, drop it down, and then connect to the connector "FL."

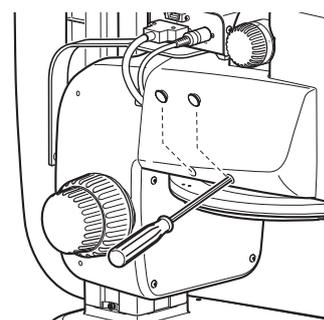


Cable connection to the relay box



Cable connection to the motorized focus unit

- (2) Attach the left cover of the intelligent nosepiece. Route the cable and replace the intelligent nosepiece left side cover removed in step [2]-(4). Align and fit the two protrusions on the left side cover to the two notches in the top center of the intelligent nosepiece, insert the two M5 hexagon socket head fixing bolts in the fixing bolt holes at the bottom of the cover and firmly tighten them using the hex driver (nominal designation: 4). After the attachment, cover the bolt holes using the rubber caps.

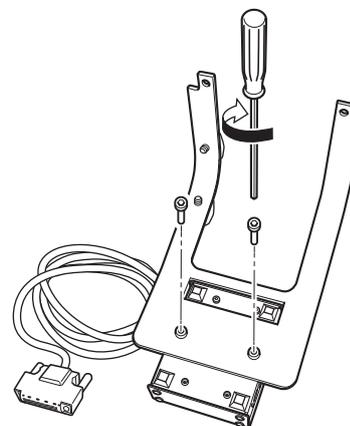


5 Attach a relay box. (P2-FU Focus Unit system only)

Attach the relay box to the P2-FU Focus Unit.

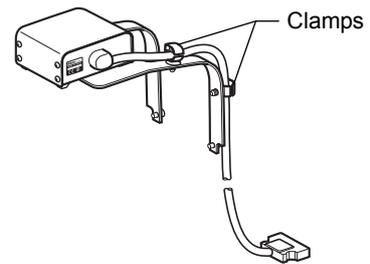
The arm for attaching to the P2-FU Focus Unit and the metal fitting for attaching to the P2-FMDN Focus Mount are supplied with the relay box. Use the arm to attach the relay box to the focus unit.

- (1) The orientation of the joint of the relay box and the arm is such that the signal cables come out from the right side (as viewed from the front) with the relay box attached to the focus unit. Align the box with the two attachment arm screw holes and attach it by tightening the M5 hexagon socket head bolts supplied with the relay box using the hex driver (nominal designation: 4).



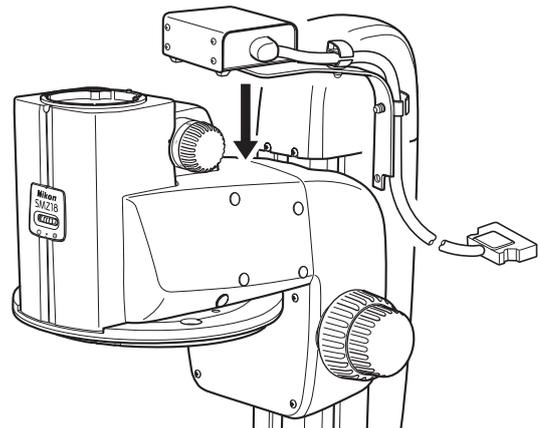
Assembling the relay box

- (2) Clamp the relay box cable using the arm clamps.



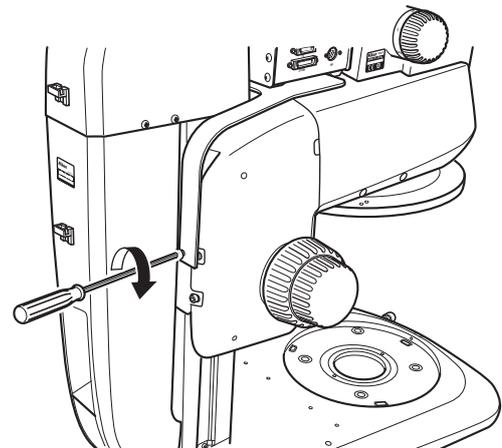
Clamping a cable

- (3) Place the relay box arms over the focus unit as shown in the figure, align the screw holes of the arm with the two screw holes at the back of the focus unit, and attach it by tightening the M5 hexagon socket head bolts supplied with the relay box using the hex driver (nominal designation: 4).



Attaching the relay box

- (4) Connect the cable of the relay box main body to STAND of the P2-CTLA Control Box or RELAY of the P2-CTLB Control Box.

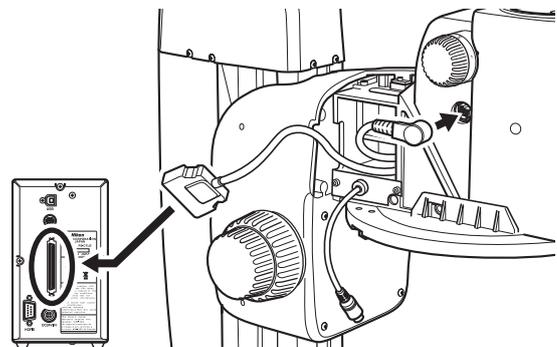


Tightening the bolts for the relay box

■ **Connecting the relay cable (when not using a relay box)**

Use the P2-RLYC Relay Cable to output the zoom magnification information of the SMZ18 to the P2-CTLB Control Box without using a relay box.

Connect the relay cable to the round connector on the left side of the SMZ18, route the wire along the notch of the focus unit cover and connect to the RELAY connector of the P2-CTLB Control Box.

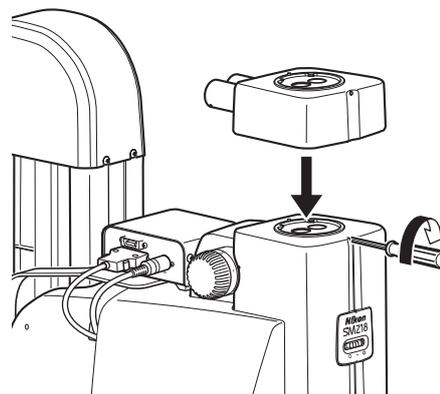


Connecting the relay cable

6 Attach a coaxial epi illuminator. (for the EPI system)

Attach the coaxial epi illuminator to the zooming body.

- (1) Completely loosen the M4 set screw for the illuminator at the top front of the zooming body using the hex driver (nominal designation: 2).
- (2) Align and fit the round dovetail at the bottom of the coaxial epi illuminator with the round dovetail of the zooming body and tighten the fixing screw.

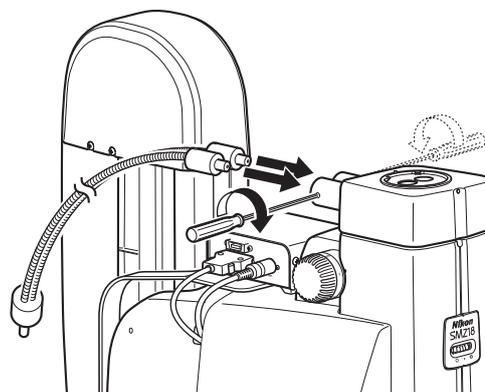


Attaching the coaxial epi illuminator by tightening the screw

■ Attaching the fiber

Loosen the M4 set screws for the fiber on the side of the two fiber attachment holes on the rear side of the coaxial epi illuminator using the hex driver (nominal designation: 2). Insert the fiber to the attachment hole 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. Refer to the instruction manual supplied with the light source for details.

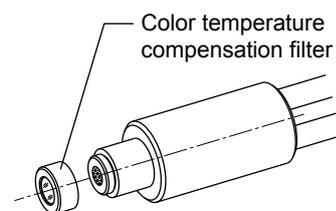


Attaching the LED fiber by tightening the screw

✓ Color temperature compensation filter

If the image appears 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.



Attaching the color temperature compensation filter

■ Attaching the 1/4 λ plate (optional)

When using a 0.5x or 1x objective for coaxial epi illumination, attach an optional 1/4 λ plate to the tip of the objective.

When using a 0.5x objective, remove the protection ring from the tip of the objective, and then screw the 1/4 λ plate. When using a 1x objective, remove the correction glass from the tip of the objective, and then screw the 1/4 λ plate.



1/4 λ plate

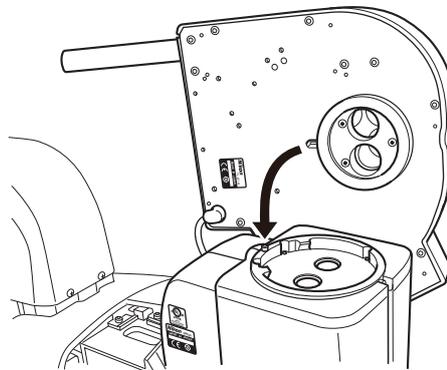
7

Attach an epi fluorescence attachment. (for the DIA + EPI-FL system)

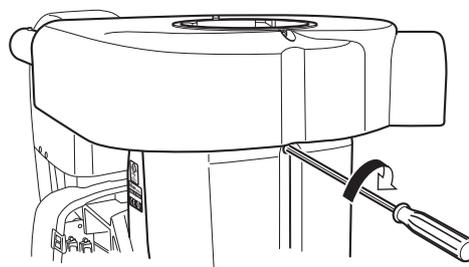
Attach the P2-EFLM Motorized Epi Fluorescence Attachment or the P2-EFLI Epi Fluorescence Attachment to the zooming body.

The attachment procedure is the same for all epi-fluorescence attachment types.

- (1) Completely loosen the M4 set screw for the illuminator at the top front of the zooming body using the hex driver (nominal designation: 2).
- (2) Align and fit the positioning groove at the far end of the round dovetail at the bottom of the epi fluorescence attachment with the positioning pin at the far end of the round dovetail groove on top of the zooming body, and then tighten the fixing screw.



Attaching the epi fluorescence attachment



Tightening the screw for epi fluorescence attachment

■ **Connecting signal cables**

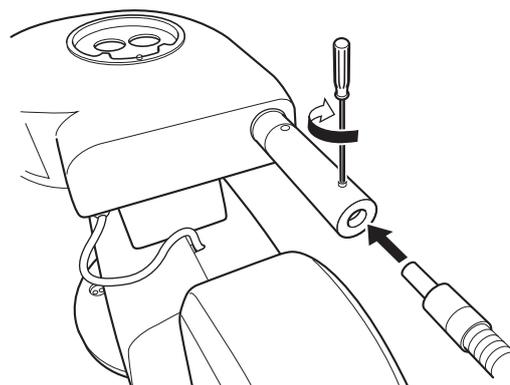
Connect the signal cable that comes from the bottom of the epi fluorescence attachment to the connector “FL” on the motorized focus unit or relay box. In case of the motorized unit, connect it inside the left cover of the intelligent nosepiece. (See “[4] Connect signal cables.”)

■ **Attaching the HG fiber**

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



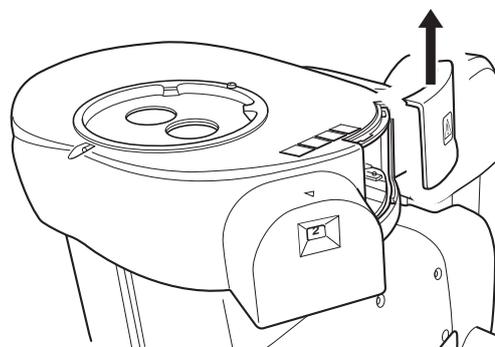
Attaching the HG fiber by tightening the screw

■ **Attaching a filter cube**

Attach the filter cube to the turret in the epi fluorescence attachment. Up to four filter cubes can be attached.

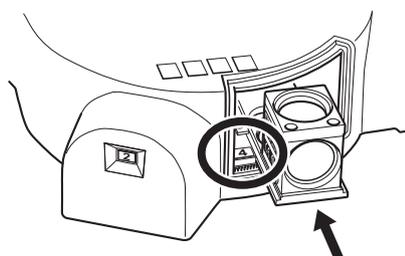
⚠ Do not touch the surface of the filter with bare hands
Scratches or fingerprints on the filter surface will degrade microscope images. Handle the filter cube carefully.

- (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 hole cover

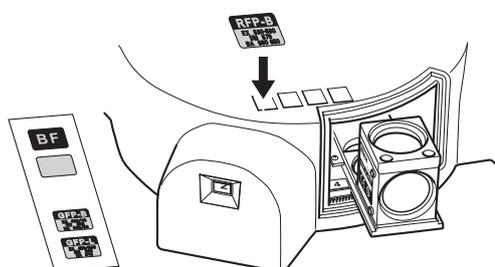
- (2) Align and insert the dovetail groove of the filter cube to the internal dovetail until it reaches the limit. The installation positions are numbered from [1] to [4] and are shown on the left inside of the filter cube attachment hole.



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.



Affixing a label indicating the type of the filter cube

- (4) Replace the cover of the filter cube replacement hole.

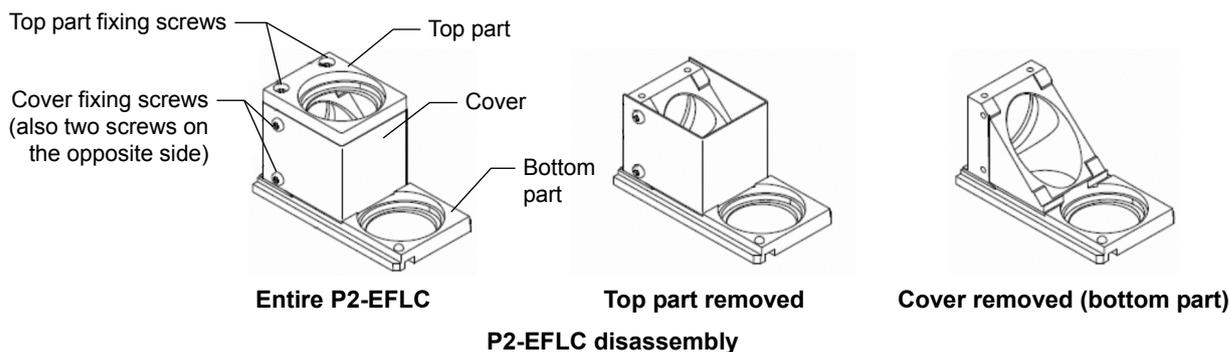
■ **Filter and mirror attachment to the P2-EFLC Filter Cube**

Filters of the following sizes and a mirror of the following size can be attached to the P2-EFLC Filter Cube:

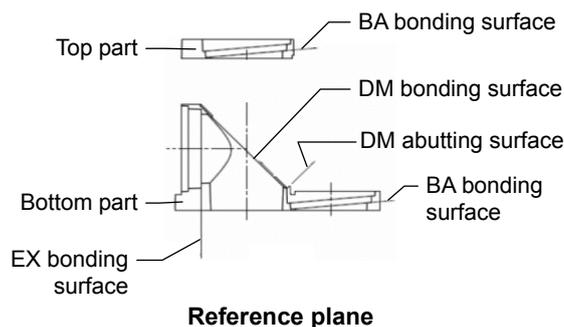
- Excitation filter (EX): External diameter 25 mm, Thickness 6 mm or less
- Dichroic mirror (DM): Dimensions 36 mm x 25.5 mm, Thickness 1 mm or less
- Barrier filter (BA): External diameter 25 mm, Thickness 4 mm or less

(1) Remove the top part and cover from the P2-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.

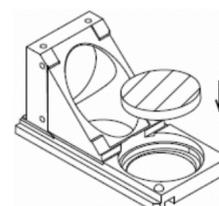


* See the section view on the right for the reference plane of each part.



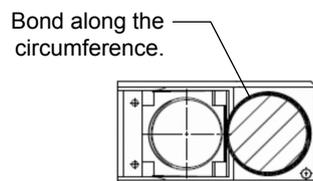
(2) Bond to attach the barrier filter to the bottom part.

- 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

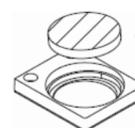
- 2) Fill in the gap between the bottom part and the barrier filter with adhesive.



Barrier filter bonding - 1

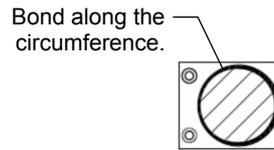
(3) Bond to attach the barrier filter to the top part.

- 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.



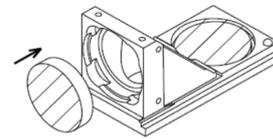
Barrier filter setting - 2

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

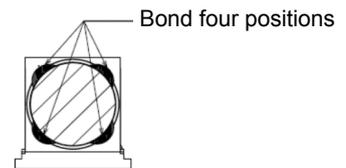


Barrier filter bonding - 2

- (4) Bond to attach the excitation filter.
 - 1) Push the excitation 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.
 - 2) Fill in the four bonding positions of the bottom part with adhesive to bond the excitation filter to the bottom part.

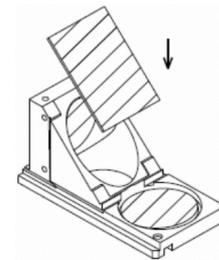


Excitation filter setting



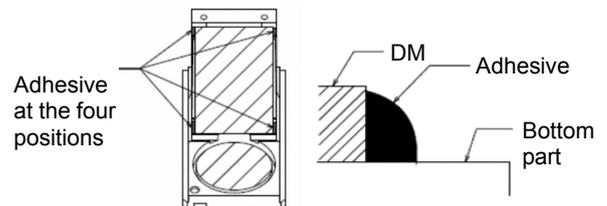
Excitation filter setting

- (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.

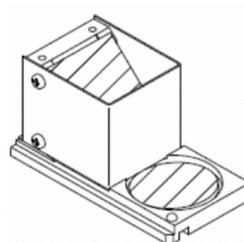


Dichroic mirror bonding

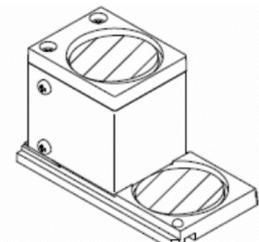
Adhesive application

- 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.

- (6) Assembling each part of the P2-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)

P2-EFLC assembly

■ **Attaching a 1/4 λ plate**

When using a 0.5x or 1x objective with a P2-EFLBFA Filter Cube (Bright Field), attach an optional 1/4 λ plate to the tip of the objective.

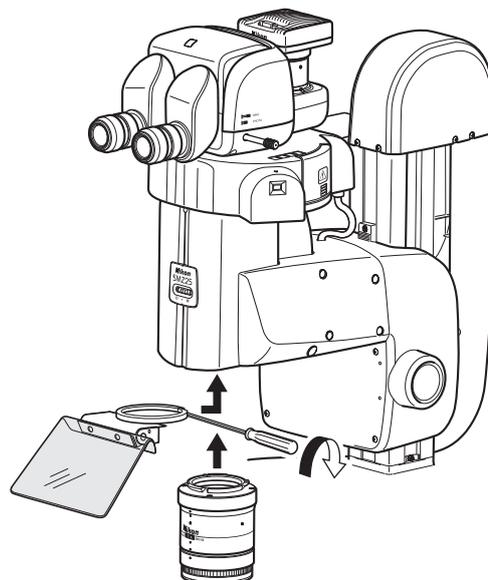
When using a 0.5x objective, remove the protection ring from the tip of the objective, and then screw the 1/4 λ plate. When using a 1x objective, remove the correction glass from the tip of the objective, and then screw the 1/4 λ plate.

■ **Attaching a light shielding plate**

When using a focus mount, attach the light shielding plate to the zooming body, and when using an intelligent nosepiece, attach it to the bottom of the intelligent nosepiece.

• **Attachment to the zooming body**

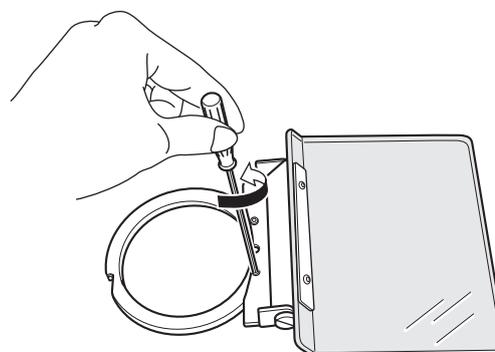
Fit the ring of the light shielding plate to the periphery of the dovetail attachment adapter attached to the lower part of the zooming body, and firmly tighten the M2.5 hexagon socket head bolt on the rear side of the ring using the hex driver (nominal designation: 2).



Attaching the shielding plate by tightening the screw

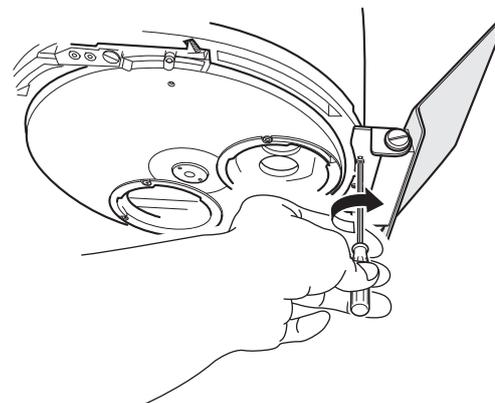
• **Attaching to the intelligent nosepiece**

- (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 the hex driver (nominal designation: 2).



Removing the ring from the light shielding plate

- (2) Align the screw holes of the light shielding plate with the two screw holes at the bottom front of the intelligent nosepiece and firmly attach the light shielding plate using the two M2.5 hexagon socket head bolts that were used to affix the ring.

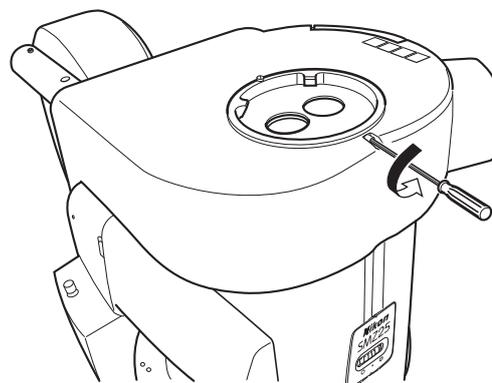


Attaching the shielding plate by tightening the screws

8 Attach a tube.

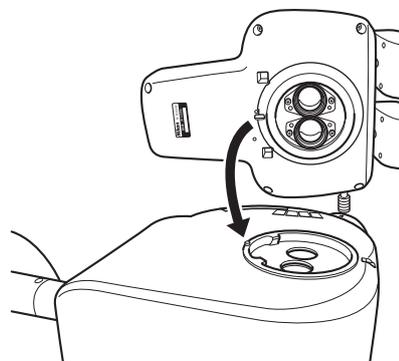
Attach the tube to be used to the epi illuminator or epi fluorescence attachment.
The attachment procedure is the same for all tube types.

- (1) Completely loosen the M4 set screw for the tube at the top front of the illuminator using the hex driver (nominal designation: 2).



Loosening the tube fixing screw

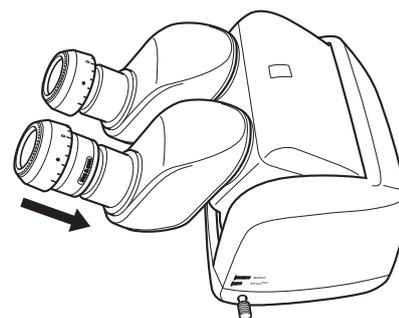
- (2) Align and fit the round dovetail at the bottom of the tube to the round dovetail of the illuminator and tighten the fixing screw.



Attaching the tube

9 Attach eyepieces.

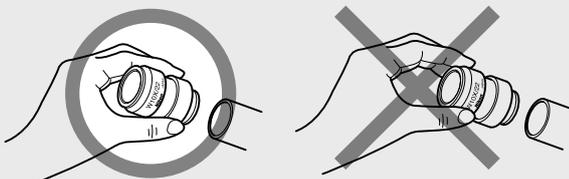
Attach the eyepieces to the tube.
Two eyepieces with the same magnification are used.
Firmly insert the eyepiece until it contacts the end of the tube sleeve.



Attaching the eyepiece

⚠ Caution when attaching eyepieces

Pay attention when inserting a 10x eyepiece because a rubber cover is attached and 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.



10 Attach an objective.

Attach the objective to be used to the zooming body or intelligent nosepiece. Up to two intelligent nosepieces can be attached.

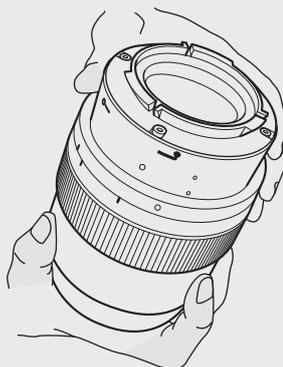
The attachment procedure is the same for all objective types.

The following figures show an example of attaching a 2x objective to the intelligent nosepiece.

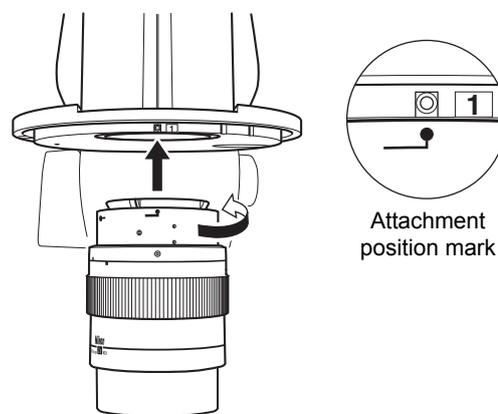
ⓘ Handling the objective

Be sure to hold the objective of the microscope system with both hands because it is very heavy.

Hold the objective by hand when tightening or loosening the fixing screw. In addition, scratches or fingerprints on the lens at the end will degrade the microscope images. Handle the objective carefully.

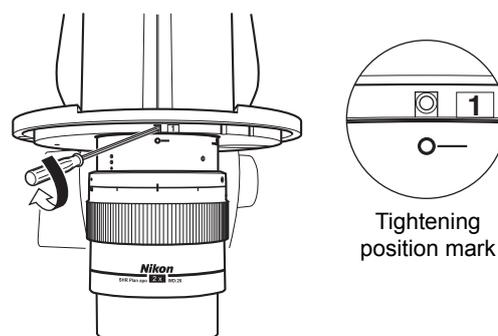


- (1) Completely loosen the M4 set screw for the objective at the top front of the zooming body using the hex driver (nominal designation: 2).
- (2) Align and fit the mark (white dot) on top of the objective to the objective fixing screw position and rotate the objective counterclockwise (as viewed from the top).



Attaching the objective

- (3) Rotate the objective until the mark (white ring) on top of the objective aligns exactly with the objective fixing screw position. After confirming that the dovetail is mated properly, tighten the objective fixing screw.



Tightening the screw for objective

■ Detaching the objective

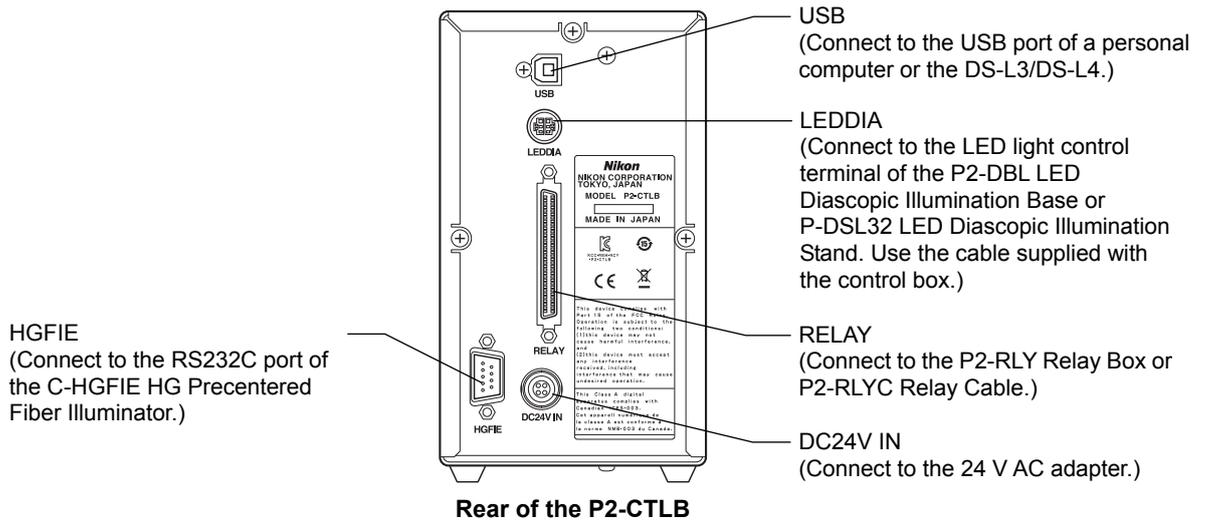
Loosen the objective fixing screw. Hold and rotate the objective clockwise (as viewed from the top) and align the mark (white dot) on top of the objective with the objective fixing screw position. Mating of the dovetail can be released at this position. Loosen the objective fixing screw and pull the objective down to detach it. The objective can be easily detached by pushing it up while rotating.

11

Connect a control box.

■ Connecting to the P2-CTLB Control Box

The figure below shows the connectors on the rear side of the control box and the connection destinations:

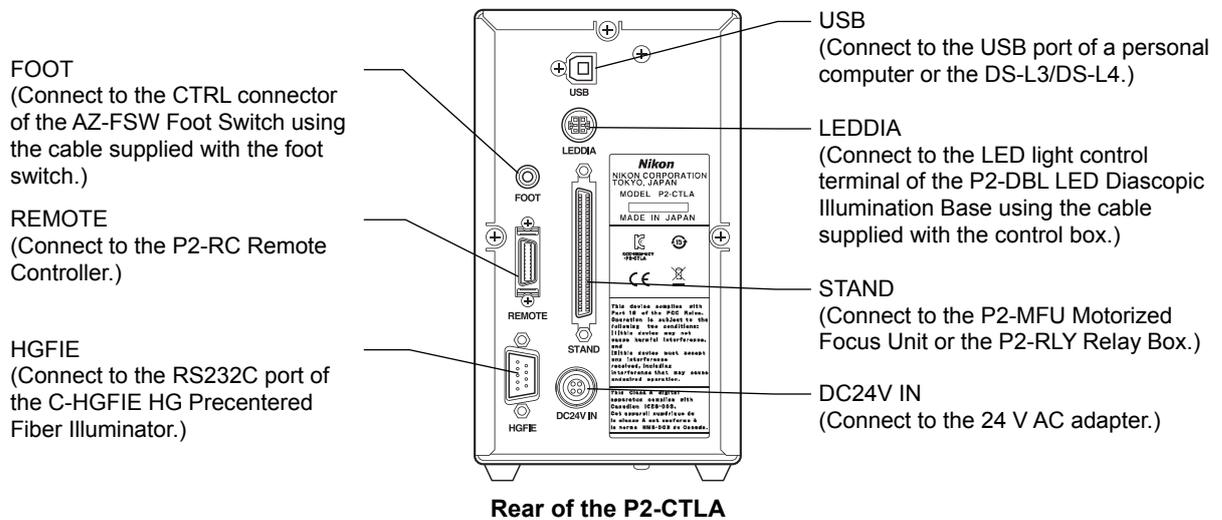


Use a power cord specified in Chapter 8, “2 Performance Properties” to connect to the 24 V AC adapter.

⚠ 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 control box before connecting the power cord to the adapter.

■ Connecting to the P2-CTLA Control Box

The figure below shows the connectors on the rear side of the control box and the connection destinations:



Use a power cord specified in Chapter 8, “2 Performance Properties” to connect to the 24 V AC adapter.

! WARNING Before connecting the power cord

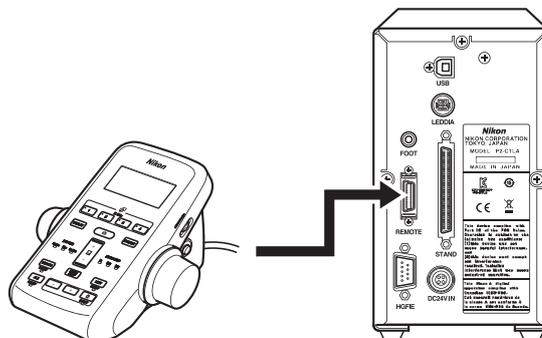
To prevent electric shock, be sure to turn off the power switch (press it to the “○” position) at the front of the control box before connecting the power cord to the adapter.

12 Connect remote control devices. (P2-CTLA Control Box only)

Attach the following remote control devices to the P2-CTLA Control Box.

- (1) Connect the P2-RC Remote Controller.

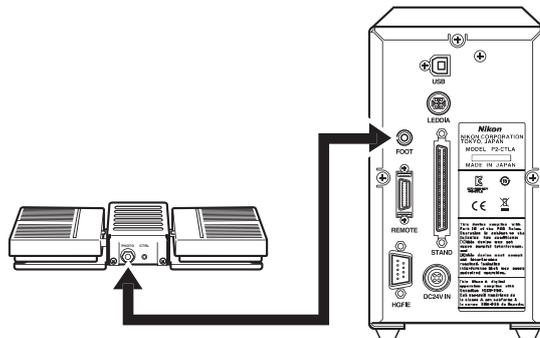
Connect the P2-RC Remote Controller to the connector “REMOTE” of the P2-CTLA Control Box.



Connecting the control box

- (2) Connect the AZ-FSW Foot Switch (optional).

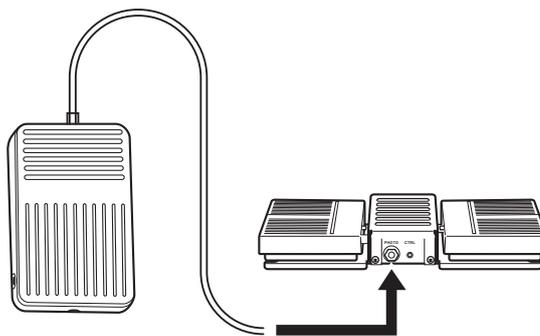
Connect the AZ-FSW Foot Switch to the connector “FOOT” of the P2-CTLA Control Box.



Connecting the foot switch

- (3) Connect the AZ-PCR Photo Release (optional).

Connect the AZ-PCR Photo Release to the connector “PHOTO” of the AZ-FSW Foot Switch.



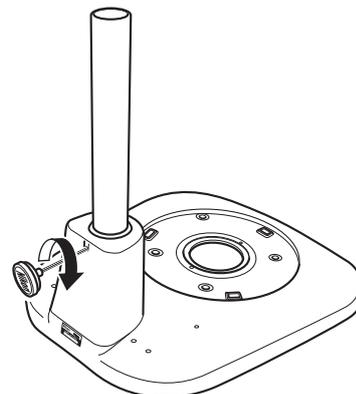
Connecting the photo release

1 Install a stand.

Select a location free of vibration. Install a stand on a level surface.
Select a diascopic illumination stand for diascopic microscopy.

■ Attaching a support pillar to the stand

Fit the support pillar to the stand and tighten the clamp screw on the rear side using the hex driver supplied with the support pillar (The hex driver is inserted on the top of the support pillar).



Attaching the support pillar by tightening the screw

■ Attaching the stage plate

According to the stand type, a transparent glass stage plate or an acrylic stage plate with black and milky white surfaces is supplied with the stand. Attach the stage plate with the appropriate side facing up according to the sample to be viewed.

⚠ Glass stage plate handling precautions

Be very careful when handling the glass stage plate. Before attaching the glass stage plate, attach all other components in order to avoid the risk of breaking the glass during assembly.

Loosen the M4 set screw for the stage plate in the front center of the base using the hex driver (nominal designation: 2).

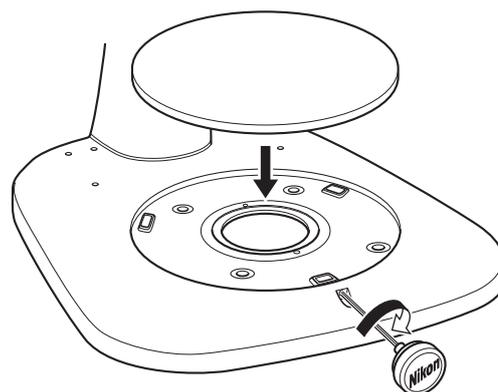
Tilt the stage plate, fit it into the base, and then tighten the fixing screw.

⚠ Note on fixing a glass stage plate in place

Do not tighten the fixing screw too much to fix the glass stage plate in place to prevent the glass from being damaged or broken.

✓ Sliding mechanism

There is a clearance gap of approximately 3 mm for the sliding mechanism, around the stage plate when the stage is securely set.



Attaching the stage plate by tightening the screw

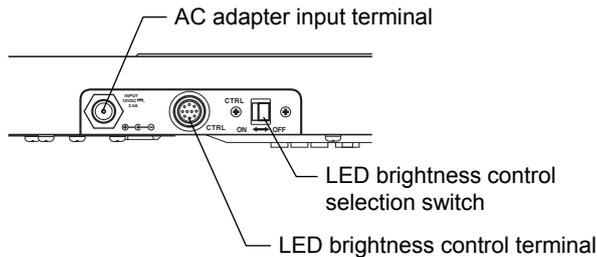
■ **P-DSL32 LED Diascopic Illumination Stand cable connection (Connection of the power supply to diascopic illumination)**

• **When not using a control box:**

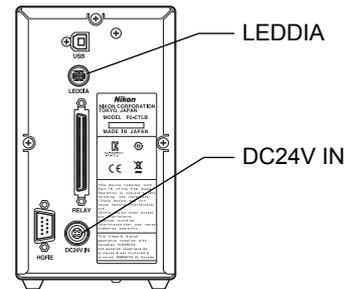
Connect a 12 V AC adapter to the AC adapter input terminal on the left side of the stand's base, and then connect the power cord.

• **When using a control box:**

Connect the LED brightness control terminal "CTRL" on the left side of the stand's 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**

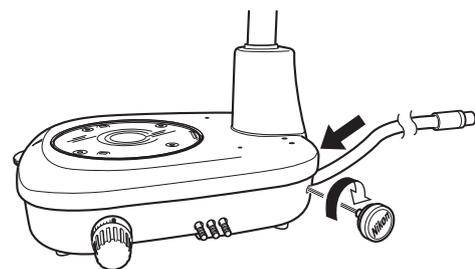
Before connecting the power cord

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.

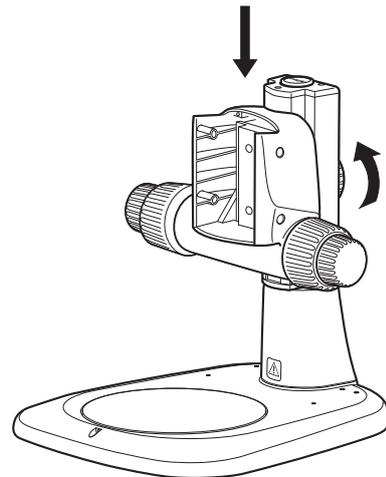


Securely attaching the fiber

2 Attach a focus mount.

Attach the P2-FMDN Focus Mount to the stand.

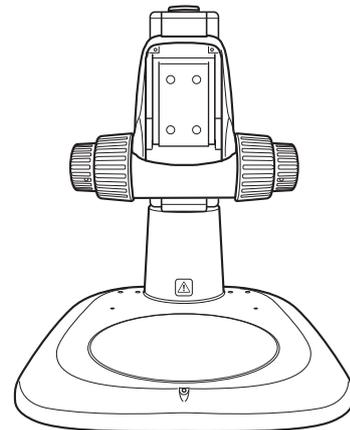
Insert the focus mount to the support pillar from the top until it reaches the limit, and tighten the fixing knob on the rear side.



Attaching the focus mount by tightening the knob

■ Focus mount orientation

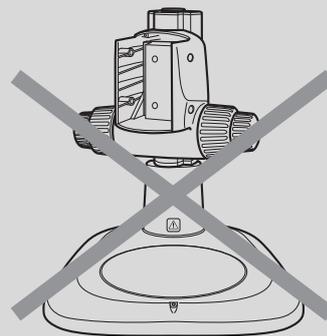
Attach the focus mount so that it faces the front of the stand as shown in the figure.



Correct orientation of the focus mount

⚠ CAUTION

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. Do not 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

■ **Cable clamp attachment**

Four cable clamps and four fixing screws (pan-head M4-8 mm) are supplied with the P2-FMDN Focus Mount. The cable clamps and the fixing screws are used for securely clamping the P2-RLYC Relay Cable or the fibers of the P2-CIA Coaxial Epi Illuminator to the rear side of the P2-FMDN Focus Mount.

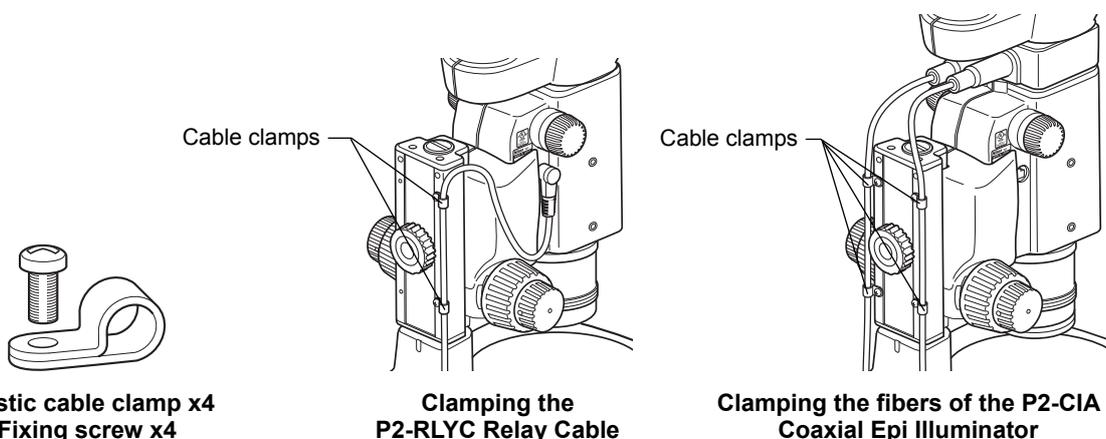
Put the cable or the fibers through cable clamps, and then install the cable clamps to the screw holes using fixing screws. There are two screw holes on each rear right and rear left side of the P2-FMDN Focus Mount. Use two out of the four holes or the four holes as shown in the figures depending on the product in use.

For the P2-RLYC Relay Cable: Use two cable clamps.

For the P2-CIA Coaxial Epi Illuminator: Use the four cable clamps.

✔ **Screw holes for fixing the cable clamps**

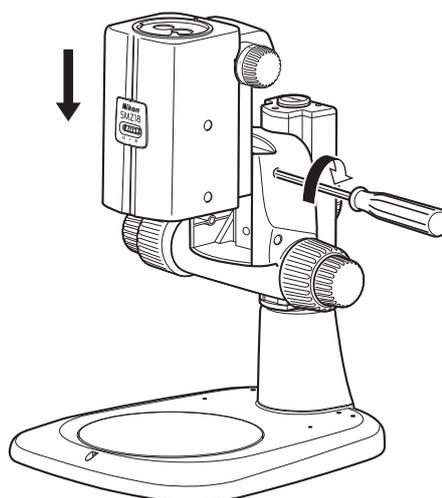
The lower two out of the four screw holes on the rear side of the focus mount are also used for attaching the P2-RLY Relay Box to the focus mount. (See [6].) If the relay box is planned to be used, do not put the cable clamps.



3 Attach a zooming body

Attach the SMZ18 Zooming Body to the focus mount.

- (1) Completely loosen the two M5 hexagon socket head bolts for the zooming body on the right side of the zooming body (as viewed from the front) using the hex driver (nominal designation: 4).
- (2) Drop and fit the dovetail groove of the zooming body onto the dovetail of the focus mount from the top.
- (3) Remove the two rubber caps for the fixing bolt holes on the right side of the focus mount (as viewed from the front). Insert the hex driver (nominal designation: 4) into a hole and firmly tighten the two zooming body fixing bolts. After tightening the bolts, put the rubber caps back onto the bolt holes.



Attaching the zooming body by tightening the bolts

4 Attach a coaxial epi illuminator. (for the compact/EPI system)

Attach the coaxial epi illuminator to the zooming body.

See "3.1 [6] Attach a coaxial epi illuminator. (for the EPI system)"

5 Attach an epi fluorescence attachment (for the compact/DIA + EPI-FL system)

Attach the P2-EFLI Epi Fluorescence Attachment to the zooming body.

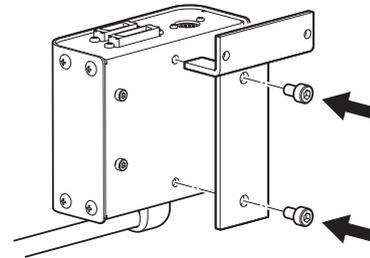
See "3.1 [7] Attach an epi fluorescence attachment. (for the DIA + EPI-FL system)

6 Attach a relay box.

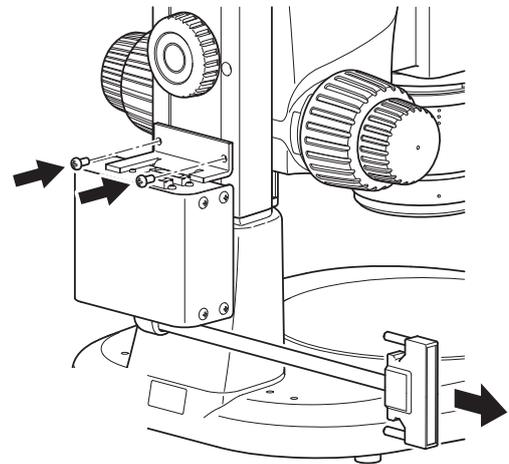
Attach the relay box to the P2-FMDN Focus Mount.

The arm for attaching to the P2-FU Focus Unit and the metal fitting for attaching to the P2-FMDN Focus Mount are supplied with the relay box. Use the metal fitting to attach the relay box to the focus mount.

- (1) Align the relay box main body with the two screw holes on the metal fitting as shown in the figure, and attach it by tightening the M5 hexagon socket head bolts supplied with the relay box using the hex driver (nominal designation: 4).
- (2) If cable clamps are installed in the focus mount, remove them by loosening the fixing screws using a Phillips driver. These screw holes are used for attaching the relay box.
Align the two screw holes on the metal fitting attached to the relay box with the screw holes on the focus mount as shown in the figure. Attach it by tightening the M4 8-mm pan head screws for cable clamps using a Phillips driver.
- (3) Connect the cable of the relay box main body to RELAY of the P2-CTLB Control Box.



Attaching the metal fitting to the relay box



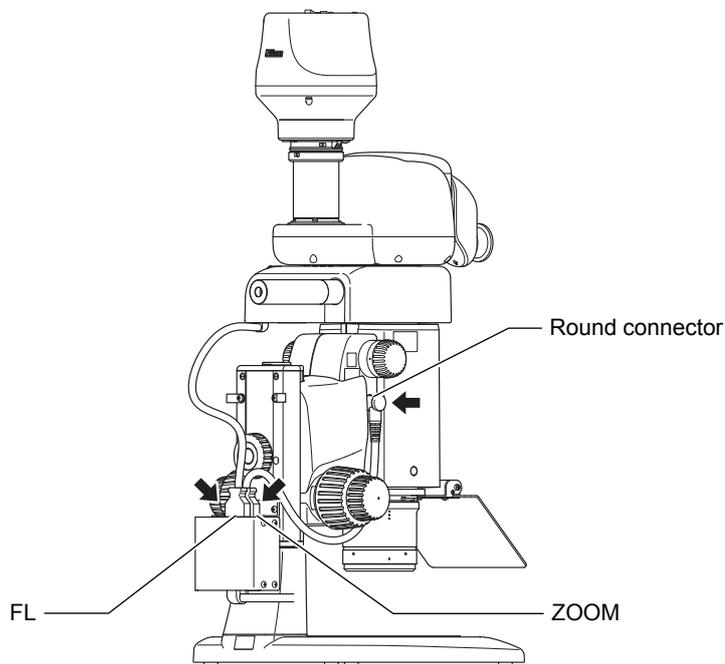
Attaching the relay box to the focus unit

7 Connect signal cables.

Connect the cables required for detecting the device status.

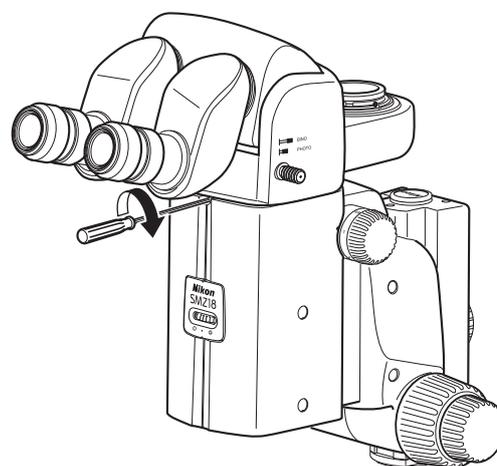
Connect the round connector on the left side of the zooming body with the "ZOOM" connector on the relay box using the signal cable supplied with the SMZ18 Zooming Body.

Connect the signal cable from the P2-EFLI Epi Fluorescence Attachment with the "FL" connector on the relay box.

**8 Attach a tube.**

Attach the tube to be used to the zooming body.

The procedure is the same as the procedure for attaching a tube to the fluorescence attachment or the epi-fluorescence attachment. See "3.1, step 8 Attach a tube."



Attaching the tube by tightening the screw

9 Attach eyepieces.

Attach the eyepieces to the tube.

For details, see "3.1, step 9 Attach eyepieces."

10 Attach an objective.

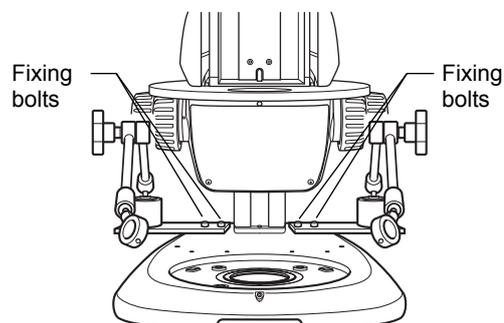
Attach the objective to the zooming body.

The procedure for attaching/removing the objective to/from the zooming body is the same as for attaching/removing it to/from the intelligent nosepiece. See "3.1, step 10 Attach an objective."

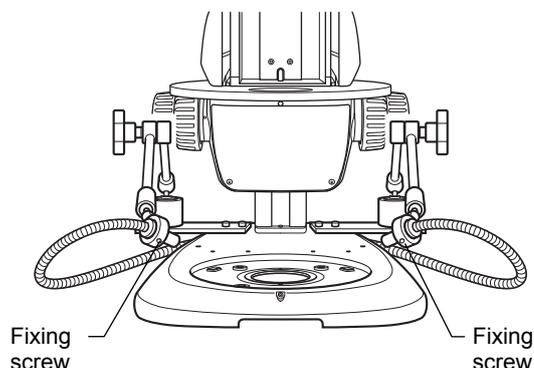
1 Attach a C-FDF Flexible Double Arm Fiber Illumination Unit.

The C-FDF can be attached to any types of bases and stands.

- (1) Attach a base of the C-FIDH Fiber Holder to the right and left rear sides of the base. Two bolt holes are located on each side.
- (2) Fit the flexible double arm fiber tip to the ring at the arm end and tighten the M4 set screw for the fiber using the hex driver (nominal designation: 2).
- (3) Firmly insert the fiber source side connectors into the C-FLED2 LED Light Source attachment holes. Refer to the instruction manual supplied with the light source for details.



Attaching the fiber holder by tightening the bolts



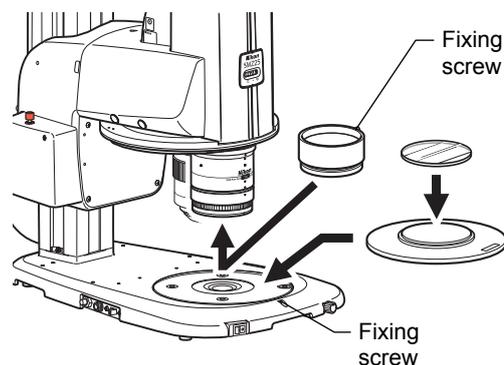
Attaching the flexible double arm fiber by tightening the screws

2 Attach a P2-POL Simple Polarizing Attachment.

The P2-POL can be attached to two kinds of bases (P2-DBL and P2-DBF) and two kinds of stands (P-DSL32 and P-DSF32).

Attach a P2-SHR Plan Apo 0.5X or 1X objective.

- (1) Loosen the M4 set screw for the stage plate on the base or the stand using the hex driver (nominal designation: 2) to detach the stage plate, and fit the base plate of the polarizer into the diascopic illumination 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. Fit the analyzer into the objective end until it reaches the limit, and tighten the fixing screw.



Attaching the simple polarizing attachment by tightening the screws

✔ Directly placing the polarizer

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

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

The polarizer cannot be placed directly on the P2-DBF Fiber Diascopic Illumination Base.

3 Attach a P-SXY64 XY Stage.

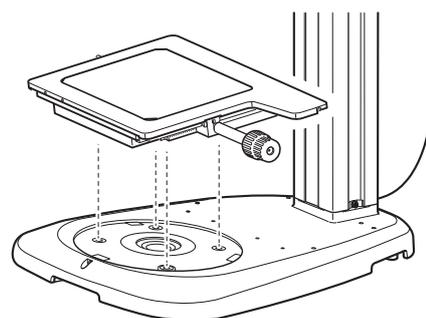
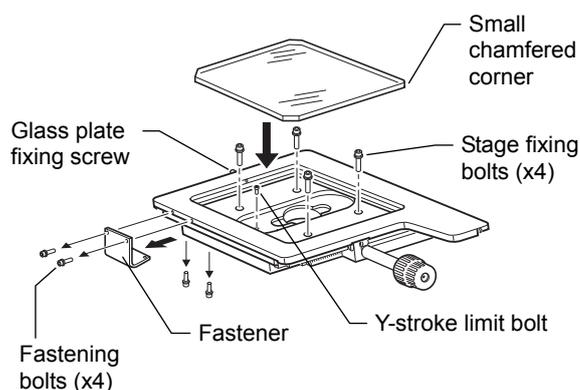
The P-SXY64 can be attached to any types of bases and stands.

- (1) Remove the fastener for the stage. Loosen the four M4 hexagon socket head bolts for the stage using the hex wrench (nominal designation: 3).
- (2) Loosen the M4 set screw for the stage plate on the base or the stand using the hex driver (nominal designation: 2) to detach the stage plate.

⚠ Y-stroke limit bolt

When attaching the stand, screw the Y-stroke limit bolt supplied with the P-SXY64 into the stage. Use the hex wrench (nominal designation: 2.5) when tightening the M3 hexagon socket head bolt.

- (3) Attach the P-SXY64 Stage using the four screw 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 screw holes, insert the four M6 hexagon socket head bolts and firmly tighten them using the hex wrench (nominal designation: 5).
- (4) Insert the glass plate supplied with the P-SXY64 XY Stage into 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.

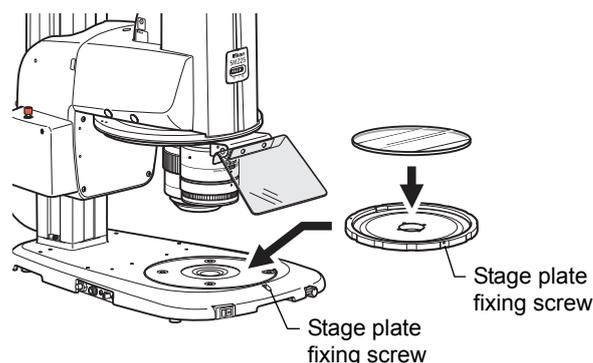


Attaching the P-SXY64 Stage by tightening the bolts

4 Attach a C-SSL DIA Sliding Stage.

The C-SSL can be attached to any types of bases and stands.

- (1) Loosen the M4 set screw for the stage plate on the base or the stand using the hex driver (nominal designation: 2) to detach the stage plate.
- (2) Insert the C-SSL DIA Sliding Stage into the base or the stand, and tighten the stage plate fixing screw.
- (3) Attach the stage plate removed in step (1) to the C-SSL DIA Sliding Stage
- (4) Tighten the stage plate fixing screw of the C-SSL DIA Sliding Stage.

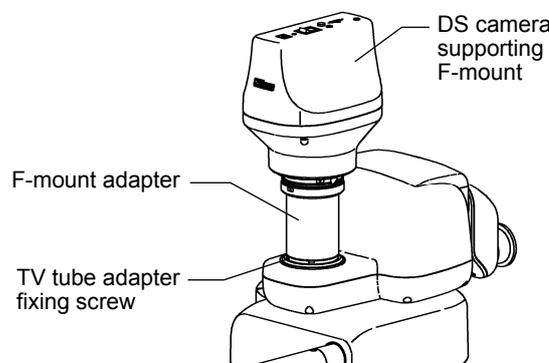
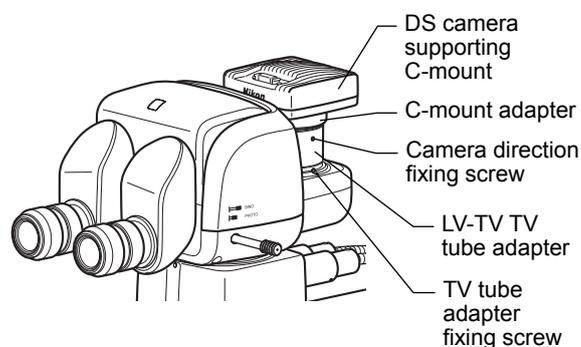


Attaching the C-SSL DIA Sliding Stage by tightening the screw

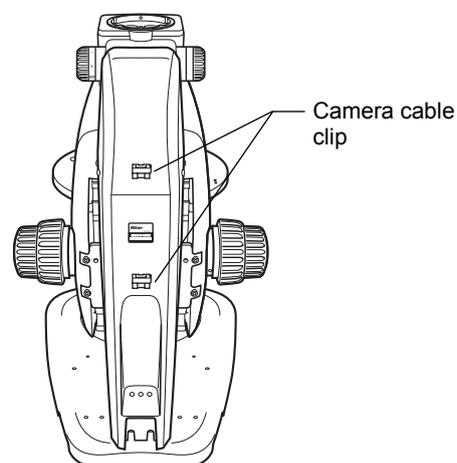
5 Attach a DS camera.

- (1) Attach a suitable adapter to the DS camera. In the case of the DS camera supporting C-mount, firmly screw the C-mount adapter in the DS camera until it reaches the limit. Next, attach the LV-TV TV Tube Adapter to the C-mount adapter, and then tighten the camera direction fixing screw on the TV tube adapter. In the case of the DS camera supporting F-mount, align the index marks on the F-mount adapter and the DS camera, and turn the DS camera counterclockwise, when viewed from the top, until it clicks.
- (2) Loosen the TV tube adapter fixing screw located on the mount on the tube side, attach the TV tube adapter or the F-mount adapter, and determine the DS camera orientation, and then tighten the TV tube adapter fixing screw.
- (3) Connect the camera cable connector of the DS camera to the connector "CAMERA" of the DS-L3/DS-L4/DS-U3 camera control unit using a dedicated camera cable.

Use two camera cable clips that are located on the rear side of the focus unit.



Attaching the DS camera by tightening the screws



Camera cable clip

6 Attach other devices.

Devices such as those listed below can also be attached.

For details on assembly, refer to the instruction manual supplied with the relevant device.

- C-TRS Tilting Stage: Attached to the base or stand
- P-DF2 LED Dark Field Unit 2: Attached to the base, stand or C-SSL DIA Sliding Stage
- P2-FIRL2 LED Ring Illumination Unit 2: Attached to the outer cylinder of the objective

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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 you detect problems that are not listed in the table 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 vertical view status.	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.
	An aperture diaphragm is stopped down too far.	Open it to the proper size.
	The light intensity of illumination is too low.	Adjust the light intensity to an appropriate level.
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 images 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 illumination.
Changing magnification results in large focal deviation.	The diopter has not been adjusted.	Adjust the diopter distance.
The focal deviation is large when switching objectives.	The diopter has not been adjusted.	Adjust the diopter distance.
The torque of the coarse focus knob is heavy.	The torque adjustment ring has been tightened too much.	Loosen the torque adjustment ring to some extent.
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 adjustment ring is loosened too much.	Tighten the torque adjustment ring to adjust the torque to an appropriate level.

3

Motorized Devices

Problem	Cause	Measure
The product cannot be turned on.	The power cable is not connected.	Connect the power cable properly.
Operating the remote controller does not cause a motorized device to operate.	The power of the P2-CTLA Control Box is not turned on or the AC adapter is not connected.	Check the connections between the AC adapter and the P2-CTLA Control Box, and then move the power switch to the "I" position to turn on the power.
	The devices are not connected or the connections are not made correctly.	Connect the devices correctly.
The motorized focus unit does not operate.	The unit is placed in escape status.	Exit the escape status.
	The STOP switch has been pressed.	Press the STOP switch again to cancel the function.
The motorized focus unit does not move down completely.	Limit setting has been made.	Cancel the limit setting.
The motorized zoom function works unexpectedly.	The ALZ function is enabled.	Disable the ALZ function.
The LCD of the remote controller is invisible.	The backlight is turned off.	Turn the backlight control dial.
The LED of the remote controller is off.	The backlight control dial is set to the minimum level.	Turn the backlight control dial.
The light of the LED diascopic illumination base cannot be adjusted.	The LED power ON/OFF switch is set to OFF.	Set the LED power ON/OFF switch to ON.
	The control right has not been matched.	Match the control right.

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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.
- Absolute alcohol (ethyl or methyl alcohol), medical alcohol

CAUTION

- Absolute 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 absolute 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 reduce 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 absolute 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.

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Chapter

8

Specifications

1

Microscopy (Principles)

The microscope's objectives and optical zoom system enable the magnification of minute substances of such samples placed on the stage 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 (For medical care)**

This product is designed to be used for microscopic observation and photography of living cells, tissues and organisms. This product is intended primarily for observation of and experimentation on living cells and tissues by those in fields such as departments of obstetric, gynecology and dermatology, in hospitals. It is also used for observation of and experimentation on living cells, tissues and organisms (nematode, drosophila, etc.) in research facilities. This product can also be used for microscopic observation and photography of metals, minerals, electronic parts, etc. using reflected illumination. Note that the accuracy of the numeric information (such as magnifications or Z-position information) is not guaranteed. These values are used as a reference and include a margin of error. The product is classified as an in-vitro diagnostic medical device. **IVD**

■ **Intended user**

It is intended for researchers, medical professional and those who work on experiments in the field of pathology and cytology.

2

Performance Properties

■ **Stereo microscope**

Name	Zooming body	Zooming body
Model	SMZ18	SMZ25
Zoom ratio	18:1	25:1
Magnification	0.75 to 13.5x	0.63 to 15.75x
NA	0.15 (For 1x objective and 13.5x zoom)	0.156 (For 1x objective and 15.75x zoom)
Objective mount	Round dovetail with the anti-drop mechanism	Round dovetail with the anti-drop mechanism
Zooming	Right/left single-axis knob Click stop: 0.75x, 1x, 2x, 3x, 4x, 5x, 6x, 8x, 10x, 12x, 13.5x; cancelable	Motorized (No zoom knob)
Aperture diaphragm	Variable in the range from fully open to 3 mm dia.	Variable in the range from fully open to 3 mm dia.

Focus unit, focus mount

Name	Focus Unit	Motorized Focus Unit	Focus Mount
Model	P2-FU	P2-MFU	P2-FMDN
Vertical movement method	<ul style="list-style-type: none"> Through rotation of the right/left single-axis coarse/fine focus knob Adjustable coarse focus knob torque 	<ul style="list-style-type: none"> Motorized Focusing travel speed: coarse/fine/extra fine movement switching method (The focus speed changes based on the rotation angle of the remote controller's knob.) <ul style="list-style-type: none"> Coarse: 2 to 100 mm/sec. Fine: 0.2 to 5 mm/sec. Extra fine: 0.01 to 0.1 mm/sec. 	<ul style="list-style-type: none"> Through rotation of the right/left single-axis coarse/fine focus knob Adjustable coarse focus knob torque
Focusing stroke	100 mm	100 mm	65 mm
Stroke per rotation of the focus knob	Coarse: 18.50 mm/rev Fine: 3.27 mm/rev	—	Coarse: 18.50 mm/rev Fine: 3.27 mm/rev
Others	—	—	<ul style="list-style-type: none"> With four plastic cable clamps and four fixing screws

Base

Name	Plain Base	LED Diascopic Illumination Base	Fiber Diascopic Illumination Base
Model	P2-PB	P2-DBL	P2-DBF
Stage plate	Black surface and milky white surface, 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
Diascopic illumination	None	<ul style="list-style-type: none"> Diascopic illumination through an LED light source (bright field, OCC) Prism sheet for shading reduction: Removable LED illumination ON/OFF switch; with a brightness control dial; switchable LED brightness control AC adapter input terminal LED brightness control terminal Power supply: Supply from the control box or a 12 V AC adapter 	<ul style="list-style-type: none"> Diascopic illumination through an external LED light source and fiber (bright field, OCC) High/low magnification condenser lens: Switching method Filter (NCB11, ND4, ND16): Removable Light source: C-FLED2 LED Light Source for Fiber Illuminator (Refer to the instruction manual for the light source.)
Attachable devices	<ul style="list-style-type: none"> P-SXY64 XY Stage C-SSL DIA Sliding Stage C-TRS Tilting Stage P-DF2 LED Dark Field Unit 2 C-FDF Flexible Double Arm Fiber Illumination Unit (via a C-FIDH Fiber Holder) P2-POL Simple Polarizing Attachment (P2-DBL and P2-DBF only) 		
Others	<ul style="list-style-type: none"> With the sliding mechanism With the screw holes for optional devices 		

■ Stand

Name	Plain Stand	LED Diascopic Illumination Stand	Fiber Diascopic Illumination Stand
Model	P-PS32	P-DSL32	P-DSF32
Stage plate	Black surface and milky white surface, 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
Diascopic illumination	None	<ul style="list-style-type: none"> • Diascopic illumination using an LED light source (bright field, OCC) • With the LED power ON/OFF switch and brightness control dial, switchable LED brightness control • AC adapter input terminal • LED brightness control terminal • Power supply: Supplied from the 12 V AC adapter or P2-CTLB Control Box 	<ul style="list-style-type: none"> • Diascopic illumination through an external LED light source and fiber (bright field, OCC) • High/low magnification condenser lens: Switching method • 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 pillar vertical movement system using the focus dial on the base Focusing stroke: 6.2 mm Stroke per focus dial rotation: 3.24 mm	Support pillar 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	<ul style="list-style-type: none"> • P-SXY64 XY Stage • Circular Floating Stage 2 (P-PS32 only) • C-SSL DIA Sliding Stage • P-DF2 LED Dark Field Unit 2 • C-TRS Tilting Stage • C-LSL2 LED Epi Illuminator 2 (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 • P2-POL Simple Polarizing Attachment (P-DSL32 and P-DSF32 only) 		
Others	<ul style="list-style-type: none"> • With the sliding mechanism • With the screw holes for optional devices • Dedicated hex driver located at the top of the support pillar • Support pillar exchangeable for a C-EP support (P-PS32: Approx. extra 100 mm, P-DSL32 and P-DSF32: Approx. extra 145 mm) 		

■ Tube

Name	Trinocular Tilting Tube	Trinocular Tilting Tube	Trinocular Tube L
Model	P2-TERG 100	P2-TERG 50	P2-TL100
Angle of depression	0 to 30° (continuously variable)	0 to 30° (continuously variable)	10°
Eyepiece mount/tube mount optical-path switching	By the optical path switching lever	By the optical path switching lever	By the optical path switching lever

■ Nosepiece, Focus mount adapter

Name	Intelligent Nosepiece	Focus Mount Adapter
Model	P2-RNI2	P2-FM
Function	<ul style="list-style-type: none"> • A double-hole nosepiece that can hold two objectives so that the objectives are switched during observation. It can be used as an adapter to connect the zooming body and the focus unit. • The stereoscopic view and vertical view can be generated by shifting the objective position. • Hold the SMZ18/25 Zooming Body using its front dovetail. • Attached to the focus unit or motorized focus unit using the rear dovetail 	<ul style="list-style-type: none"> • Adapter to connect the zooming body and the focus unit • Hold the SMZ18/25 Zooming Body using its front dovetail. • Attached to the focus unit or motorized focus unit using the rear dovetail.
Objective mount	Dovetail with the objective anti-fall mechanism	—
Status detection	Detect the objective mount address and the vertical view state. Detected information is sent to the control box via signal cable.	—

■ Objective

Name	Objective	Objective	Objective	Objective
Model	P2-SHR Plan Apo 0.5X	P2-SHR Plan Apo 1X	P2-SHR Plan Apo 1.6X	P2-SHR Plan Apo 2X
Magnification	0.5x	1x	1.6x	2x
Numerical aperture (maximum)	0.078	0.156	0.25	0.312
Working distance	71 mm	60 mm	30 mm	20 mm
Parfocal distance	150 mm	150 mm	150 mm	150 mm
Objective mount	Exclusively-shaped bayonet	Exclusively-shaped bayonet	Exclusively-shaped bayonet	Exclusively-shaped bayonet
Others	Protection ring provided	Correction glass provided		With a correction ring

■ **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	LED Ring Illumination Unit 2
Model	P2-CIA	C-FDF	P2-FIR	P2-FIRL2
Magnification	1x	—	—	—
Episcopic illumination	<ul style="list-style-type: none"> • 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.) 	<ul style="list-style-type: none"> • 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 C-FIDH Fiber Holder 	<ul style="list-style-type: none"> • 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.) 	<ul style="list-style-type: none"> • Episcopic illumination through an LED ring (Refer to the instruction manual for the P2-FIRL2 LED Ring Illumination Unit 2.)

■ **Epi fluorescence attachment**

Name	Epi Fluorescence Attachment	Motorized Epi Fluorescence Attachment
Model	P2-EFLI	P2-EFLM
Magnification	1x	1x
Epi-fl illumination	<ul style="list-style-type: none"> • 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.) 	<ul style="list-style-type: none"> • Attachment of filter cubes to the internal turret • Up to four filter cubes can be attached. • Turret switching: Motorized • Light source: HG Precentered Fiber Illuminator C-HGFI/C-HGFIE (Refer to the instruction manual for the light source.)

■ **Remote control device**

Name	Remote Controller	Foot Switch	Photo Release
Model	P2-RC	AZ-FSW	AZ-PCR
Function, etc.	<ul style="list-style-type: none"> • Focus operation, zoom operation, etc. • Connected to the P2-CTLA Control Box • For details, see Chapter 4, “10.1 P2-RC Remote Controller.” 	<ul style="list-style-type: none"> • Focus operation, zoom operation • Connected to the P2-CTLA Control Box 	<ul style="list-style-type: none"> • Image capture using a DS camera • Connected to the AZ-FSW Foot Switch

■ **Relay device**

Name	Relay Box	Relay Cable
Model	P2-RLY	P2-RLYC
Function, etc.	<ul style="list-style-type: none"> • Relay of signals for motorized control of a device or detection of the device status • For details, see Chapter 4, “11.3 P2-RLY Relay Box.” 	<ul style="list-style-type: none"> • Relay of status detection signals with the SMZ18 Zooming Body and RELAY of the P2-CTLB Control Box connected

■ Control box

Name	Control Box	Control Box
Model	P2-CTLB	P2-CTLA
AC adapter	24 V AC adapter	24 V AC adapter
Function, etc.	<ul style="list-style-type: none"> • Combined with a status detection device for status detection or communications through electrical connections • For details, see Chapter 4, “11.1 P2-CTLB Control Box.” 	<ul style="list-style-type: none"> • Combined with a motorized device or status detection device for motorized control, status detection, or communications through electrical connections • For details, see Chapter 4, “11.2 P2-CTLA Control Box.”

■ AC Adapter

Model	3-AC AC Adapter (Model name by the manufacturer: FSP040-RHAN2)	C-AC AC Adapter (Model name by the manufacturer: PW-120A2-1Y240G)
Manufacturer	FSP Group Inc.	POWER-WIN TECHNOLOGY CORP.
Input rating	100-240 VAC±10%, 1.5 A, 50-60 Hz	100-240 VAC±10%, 2-1 A, 50-60 Hz
Output rating	12 VDC, 3.33 A Max.	24 VDC, 5.0 A Max.

■ Power cable

Relevant device	P2-CTLA Control Box P2-CTLB Control Box P2-DBL LED Diascopic Illumination Base 12 V AC adapter 3-AC (Model name by the manufacturer: FSP040-RHAN2) 24 V AC adapter C-AC (Model name by the manufacturer: PW-120A2-1Y240G)
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 region	EU/EN standard approved detachable power cord set, 3 conductor grounding (3 conductor grounding Type H05VV-F 1 mm ² , 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

■ Research stereo microscope SMZ25/SMZ18

Operating conditions	Temperature: 0°C to +40°C Humidity: 60% RH max. (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 (reference)	310 x 550 x 573 mm, approx. 25 kg (The system shown in Chapter 1, "2 Microscopy System under Diascopic Illumination and Epi-fluorescence Illumination" excluding the remote controller, control box and HG precentered fiber illuminator is taken as an example.)
Safety Standards	<ul style="list-style-type: none"> • CE Marking <ul style="list-style-type: none"> • IVD Directive This equipment complies with the emission and immunity requirements of IEC/EN 61326-2-6. • Low Voltage Directive • EMC Directive • C-UL-US Listed • FCC Part 15 Subpart B Class A <p>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.</p> <p>These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.</p> <p>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.</p> <p>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.</p> <ul style="list-style-type: none"> • CAN ICES-003(A) / NMB-003(A) • Australian EMI (AS/NZS CISPR11)



■ AC Adapter

Model name	3-AC AC Adapter(Model name by the manufacturer: FSP040-RHAN2)	C-AC AC Adapter (Model name by the manufacturer: PW-120A2-1Y240G)
Operating environment	Temperature: 0°C to +40°C Humidity: 10 to 90% RH (no condensation) Altitude: 5,000 m max. Pollution level: Degree 2 Overvoltage Category: Category II Electrical shock protection class: Class I Indoor use only	Temperature: 0°C to +40°C Humidity: 10 to 90% RH (no condensation) Altitude: 5,000 m max. Pollution level: Degree 2 Overvoltage Category: Category II Electrical shock protection class: Class I Indoor use only
Storage environment	Temperature: -20°C to +75°C Humidity: 5 to 95% RH (no condensation)	Temperature: -20°C to +85°C Humidity: 10 to 90% RH (no condensation)
External dimensions	110 (L) x 50 (W) x 32 (H) mm	170 (L) x 64.8 (W) x 38.5 (H) mm
Mass (reference)	Approx. 210 g (without the power cord)	Approx. 650 g (without the power cord)
Safety standards	CE marking, GS mark, C-UL-US Listed, PSE mark	CE marking, GS mark, C-UL-US Listed, PSE mark