



Nikon

AZ-FL

Epi-Fluorescence Attachment

Instructions

Introduction

Thank you for purchasing the Nikon products.

This instruction manual is written for the users of the Nikon AZ-FL Epi-Fluorescence Attachment.

To ensure correct usage, read this manual carefully before operating the product.

- It is prohibited to reproduce or transmit this manual in part or whole without Nikon's expressed permission.
- The contents of this manual are subject to change without notice.
- Although every effort has been made to ensure the accuracy of this manual, if you note any points that are unclear or incorrect, contact your nearest Nikon representative.
- Some of the products described in this manual may not be included in the set you have purchased.
- Also be sure to read the manuals for any other products that you are using with this product.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.



Safety Precautions

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

Warning/Caution Symbols Used in This Manual

Although Nikon products are designed to provide the utmost safety during use, incorrect usage or failure to follow the safety instructions provided may cause personal injury or property damage. Damage or injury that may occur due to mishandling is unwarranted. For your safety, read the instruction manual carefully and thoroughly before using the product. And, do not discard this manual but keep it near the product for easy reference.

In this manual, safety instructions are indicated with the symbols shown below. Be sure to follow the instructions indicated with these symbols.

Symbol	Details
 Warning	Disregarding instructions marked with this symbol may lead to death or serious injury.
 Caution	Disregarding instructions accompanying this symbol may lead to injury or property damage.



Warning

1. Intended application of this product

This product must only be used for microscopic observation. Do not use this product for other purpose.

2. Do not disassemble.

Disassembling this product may result in malfunctions. Malfunctions and damage due to disassembling are unwarranted. Do not disassemble the section that is not indicated in this manual. If you notice any abnormalities, contact your nearest Nikon representative.

3. Read the instruction manual carefully.

To ensure safety, carefully read this manual and the manuals for other equipment used with this product. Especially be sure to follow the warnings and cautions indicated in the first of this manual.

For the operation of the light source

To observe a specimen under the epi-fl illumination, a light source that has a mercury lamp or a xenon lamp must be used with this product. Take great care of the lamp in operating the light source. Read the instruction manual for the light source and follow the instructions and cautions for it.

4. Use the specified light source.

This product can be used with the light sources described below, but cannot be used with the devices other than those light sources.

- **For the Nikon C-HGFI/C-HGFIE Intensilight**

Adapter	AZ-HGFA (not available for UV excitation)
Light source	C-HGFI Intensilight (manual) or C-HGFIE Intensilight (motorized)
Light guide fiber	C-HGFIF15 HG fiber (1.5 m) or C-HGFIF30 HG fiber (3 m)

- **For the mercury lamp house**

Adapter	AZ-HGA HG Lamphouse adapter
Collector lens	C-FC (available for UV excitation) or Epi UV-C (with UV cut filter)
Lamp house	HG Lamp house 3 (type: LH-M100C-1) or HG Lamp house 4 (type: LH-M100CB-1), with a rearview mirror
Socket	HG socket (type; Hg)
Mercury lamp	Super-high pressure mercury lamp 100W (type: USH-102DH, manufactured by Ushio Inc.)
Power supply	C-SHG1 Super-high pressure mercury lamp power supply



Warning

5. Check the input voltage.

To connect a light source, check the input voltage indicated on the nameplate of the light source or of the power supply before turning on the source. If the input voltage indicated on the places differs from the local voltage, do not turn on the product. Contact your nearest Nikon representative. Use of the product under the incorrect voltage may cause over-heating due to over-current, possibly resulting in a fire and damaging the light sources and the power supply.

6. Use the specified lamp and power cord.

Be sure to use the lamp and power cord specified in the instruction manual. Use of other devices may cause malfunctions or fire.

7. Pay attention for heat from the light source.

Lamp and its surrounding areas become very hot during and immediately after illumination. Follow the cautions below to avoid burn injury and to prevent fire.

- Do not touch the lamp or its surroundings while the lamp is lit or for 30 minutes after turning off the power.
- Be sure to use the product with the top cover of the light source closed.
- Allow the lamp and its surrounding areas to cool (for approximately 30 minutes after being turned off) before replacing the lamp.
- Do not allow cloth, paper, or highly flammable volatile materials, such as gasoline, benzine, paint thinner or alcohol, to come near the light source while the lamp is lit or within 30 minutes after turning off the power.
- Do not block the air vents and the opening for the cooling fan of the light source. And, to ensure that it radiates heat properly and does not overheat, never cover or place any object on the light source.

8. Ultraviolet light (UV)

If you use a light source that has a mercury lamp or a xenon lamp, the light source radiates ultraviolet light, which is harmful to the eyes and skin, from the emission port. Direct viewing of light from these lamps may result in snow blindness at a light case or blindness at the worst case. To prevent injury, follow the guidelines below:

- **Use the collector lens with a UV cut filter into the optical path of the microscope unless the UV excitation light is necessary.**
- **When performing the epi-fl microscopy by using the UV excitation light, attach the filter cubes exclusive to the UV excitation light. And then, if you must see the objective or its surroundings, be sure to see through the ultraviolet light shield.**
- **Use the light source with the illuminator.**

Always connect the light source to this product when the light source is ready to light on. Do not turn on the light source if it is not connected to this product, and do not disconnect the light source from this product while the light source is lit. When disconnecting the light source from this product, turn off the power supply of this product and then unplug the power cord from the wall outlet.

9. Use the ultraviolet shield

Lustrous specimens reflect the illumination. Do not observe the area near the objective for a long time because the strong reflection may hurt your eyes. Harmful illumination light including ultraviolet rays could be given out from the objective when UV excitation method or so on is performed. When you see the area around the objective, be sure to see through the ultraviolet light shield.



Caution

1. Turn off the power of the light source before assembly or maintenance.

To prevent electric shocks and fire, be sure to turn off the power of the light source by pressing down the power switch to “O” side and unplug the power cord from the wall outlet when assembling the product, attaching cables and light guide fiber, replacing lamps or filters, or maintenance activities such as cleaning of the objective.

Also, be sure to turn off the light source by pressing down the power switch to the “O” side before plugging or unplugging the power cord.

2. Do not wet the product nor allow foreign matter to be intruded.

Do not wet the product. Water splashed onto any component of this product may result in malfunction. Also, malfunctions may occur if foreign matters intrude. If any liquid or foreign matters intrude, do not use the product, but contact your nearest Nikon representative.

3. Cautions on assembling this product

- Be careful not to pinch your fingers or hands during assembly.
- Scratches or fingerprints on the lenses and filters will adversely affect the image. Assemble the product without scratching those optical parts.

Notes on Handling the System

1. Carefully handle the product.

This product is a precision instrument. Handle it carefully and do not subject it to damage or vibrations.

Cautions on moving the product

- Securely hold the bottom front of the microscope base and the indentations at the bottom back of the stage pullar when carrying the microscope.
- Do not grasp the stand pillar, elevating section, stage, stage height adjustment knob, focus knob, eyepiece tube, zoom body, etc. when carrying the microscope to avoid breakage, adverse effect on its performance, or malfunctions.

2. Installation or storage location

The product is a precision instrument. Using or storing the product under unsuitable conditions may damage it or may have an adverse effect on its performance. The following conditions should be considered when selecting the installation or storage location.

- For installation, select a location with a temperature from 0 to 40°C and a relative humidity of 85 % or less (no condensation).

For storage, select a location with a temperature from -20 to 60°C and a relative humidity of 90 % or less (no condensation).

If the product is installed or stored in a location subject to high temperatures and humidity, mold or condensation may form on the lens, resulting in lowered performance and possible damage to the product.

- Avoid bright locations where the product is exposed to direct sunlight or immediately under room lights.

The image quality deteriorates in bright surroundings because of the ambient light entering the objective.

- Install in a place with little dust and dirt.
- Install in a place with little vibrations.
- Install and store the product on a sturdy desk or table that can bear the weight of the product.
- Install the product in the location of 10 cm or more away from the surrounding walls.
- Do not install in the narrow space such as shelf or locker.
- Do not place anything on the product.
- Cover the product to avoid dust when storing.
- Arrange a layout that allows easy removal of the power cord from the AC inlet of the light source in the event of an emergency.

3. Weak electromagnetic waves

The product emits weak electromagnetic waves. Do not install the product near precision electronic devices to avoid degrading their performance. If a TV or radio reception is affected, move the TV or radio set farther from the product.

4. Notes on handling optical parts

Scratch or dirt such as fingerprints on the optical parts such as lens or filter affects the viewing of the image. Carefully use the optical parts without scratching. If any dirt attaches to the product, clean it according to Chapter 6, "Care and Maintenance".

5. Notes on handling a filter cube

Up to four filter cubes can be attached onto this product. Note the following precautions for handling a filter cube.

- Interference filters (especially excitation light filters, which are exposed to strong light) deteriorate over time. Replace them depending on their total operating hours.
- 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 and avoid subjecting the filters to rapid temperature changes. When a filter is not in use, store it in a desiccator or hermetically sealed container with a drying agent.
- The filters attached in the nine types of filter cubes listed below have sharper wavelength characteristics than standard filters. However, due to their sophisticated coatings, they must be handled with special care. In particular, take care to avoid abrasion from cleaning. (Follow the procedures described in the “Cleaning Lenses and Filters” of Chapter 6, “Care and Maintenance.”)
Single band filter cubes: DAPI, FITC, TxRed, and GFP
Multi band filter cubes: F-R, F-T, D-F, D-F-R, and D-F-T

6. Notes on handling the light guide fiber

Do not forcefully bend, pull or twist the light guide fiber. The inlet and outlet attachments are provided to the both ends of the light guide fiber. Make sure that no dirt or dust remains. If any dirt attaches to the product, clean it according to Chapter 6, “Care and Maintenance”.

Contents

Introduction	1
Safety Precautions	2
Warning/Caution Symbols Used in This Manual.....	2
Notes on Handling the System.....	6
Chapter 1 Part Names	10
Configuration Example 1: For Epi-fl Microscopy (without UV Excitation)	10
Configuration Example 2: For Diascopic DIC Microscopy/Epi-fl Microscopy (without UV Excitation).....	11
Configuration Example 3: For Diascopic DIC Microscopy/Epi-fl Microscopy (with UV Excitation).....	12
Chapter 2 Sequence of Microscopy	13
Procedure of Epi-fl Microscopy	14
Procedure of Bright-field Microscopy under the Diascopic Illumination.....	16
Combination Use of Epi-fl Microscopy and DIC Microscopy under the Diascopic Illumination ..	17
Chapter 3 Operation of Each Part	21
Opening/Closing the Shutter	21
Selecting a Filter Cube.....	21
Operating the Ultraviolet Light Shield	21
Operating Excitation Light.....	22
Operating the ND Filter Slider (for the Mercury Lamp House).....	23
Operation for the Diascopic Illumination (for the Diascopic Stand)	24
Operating the DIC Prisms (for the DIC Microscopy under the Diascopic Illumination).....	25
Filter Cubes	26
Selecting the Excitation Light Filter (EX Filter)	26
Selecting the Barrier Filter (BA Filter)	27
Replacing Excitation Light Filters, Barrier Filters, and Dichroic Mirrors	28
Chapter 4 Assembly	29
Attaching the Single Nosepiece/Triple Nosepiece	30
Attaching the Product to the Stand	31
Attaching the Zoom Body.....	31
Attaching the Eyepiece Tube and Eyepieces	32
Attaching an Objective(s).....	32
Attaching the Ultraviolet Light Shield	32
Attaching Filter Cubes.....	33
Attaching the Light Source	34
Chapter 5 Troubleshooting	35
Troubleshooting on Image Viewing.....	35
Troubleshooting on Operation	36
Troubleshooting on the Light Source	37

Chapter 6 Care and Maintenance	38
Cleaning Lenses and Filters.....	38
Cleaning of the Product.....	38
Decontamination	38
Storage of the Product	38
Regular Inspections (Charged)	38
Chapter 7 Specifications.....	39

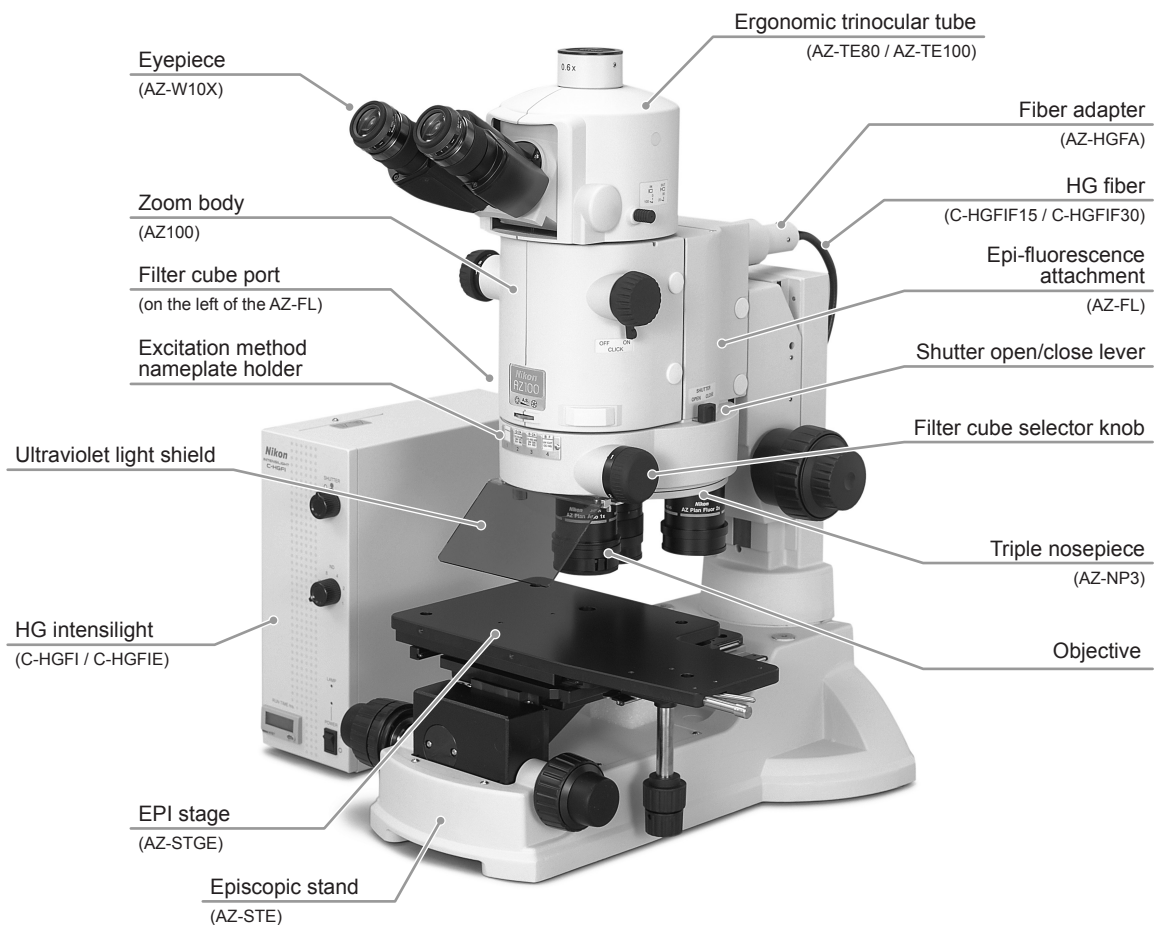
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Part Names

The Nikon AZ-FL Epi-Fluorescence Attachment is an epi-fl attachment exclusive to the AZ series microscope. The epi-fl microscopy is available with the AZ series microscope by connecting the product to a light source using an optional adapter. The product can install up to four filter cubes for fluorescence observation and can switch the excitation method with the knob.

Configuration Example 1: For Epi-fl Microscopy (without UV Excitation)

The figure below shows an example for epi-fl microscopy system.



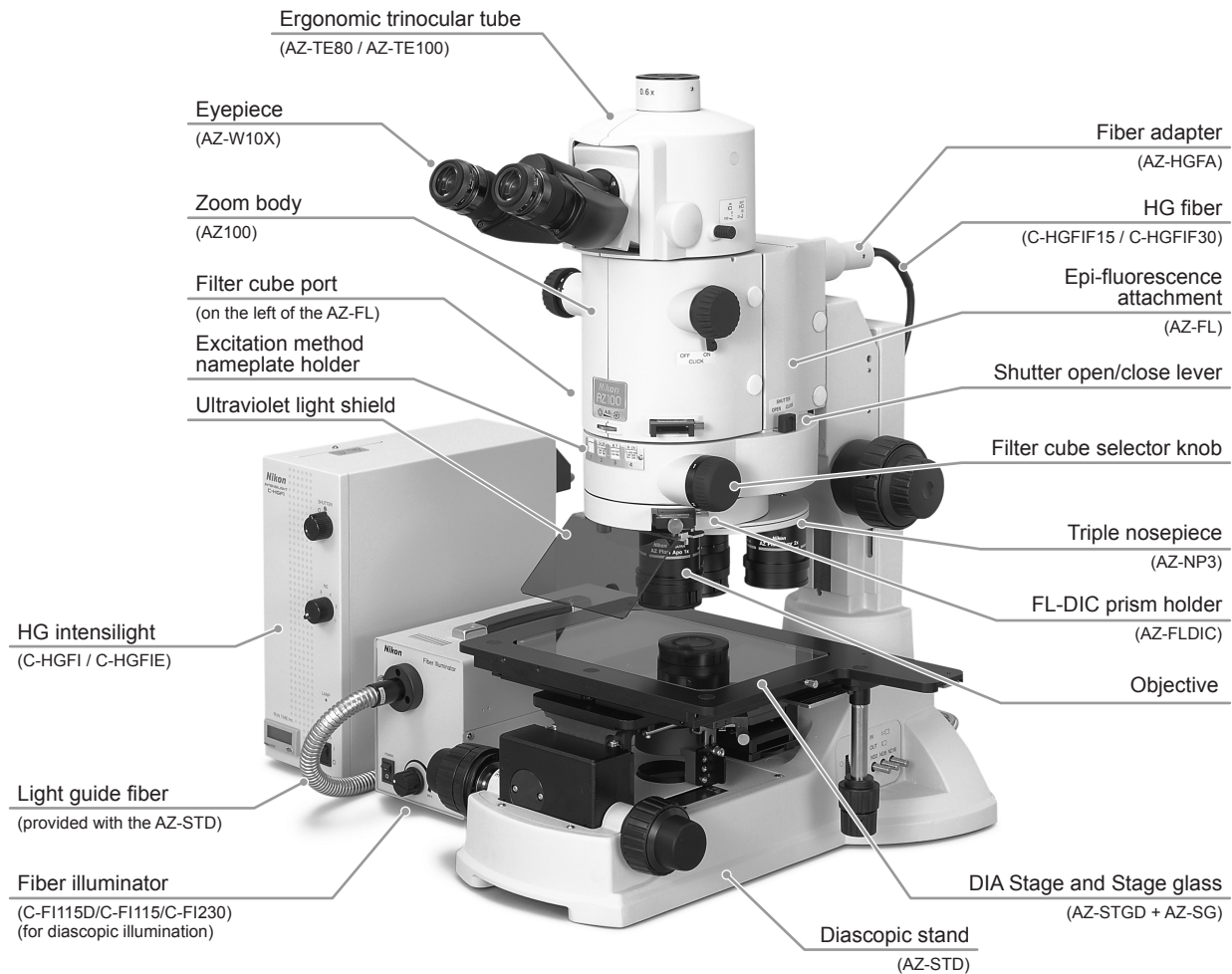
Configuration example 1: For epi-fl microscopy (without UV excitation)

The figure shows the configuration example of the following parts:

AZ-TE80 Ergonomic Trinocular Tube 80, AZ-W10X Eyepiece 10X, AZ100 Zoom Body, AZ-FL Epi-Fluorescence Attachment, AZ-NP3 Triple Nosepiece, objectives, AZ-STE Episcopic Stand, AZ-STGE EPI Stage, AZ-HGFA Fiber Adapter, C-HGFI/C-HGFIE HG Intensilight, and C-HGFIF15/C-HGFIF30 HG fiber (1.5 m/3 m).

Configuration Example 2: For Diascopic DIC Microscopy/Epi-fl Microscopy (without UV Excitation)

The figure below shows the second example. The epi-fluorescence attachment is added onto the microscopy system with the diascopic illumination to enable epi-fl microscopy. Besides, the AZ-FLDIC is added to the system to enable DIC microscopy under the diascopic illumination. The HG Intensilight is used for the epi-fl illumination furnished with a mercury lamp as a light source. (This light source cannot be used for the UV excitation.)



Configuration example 2: For diascopic DIC microscopy/epi-fl microscopy (without UV excitation)

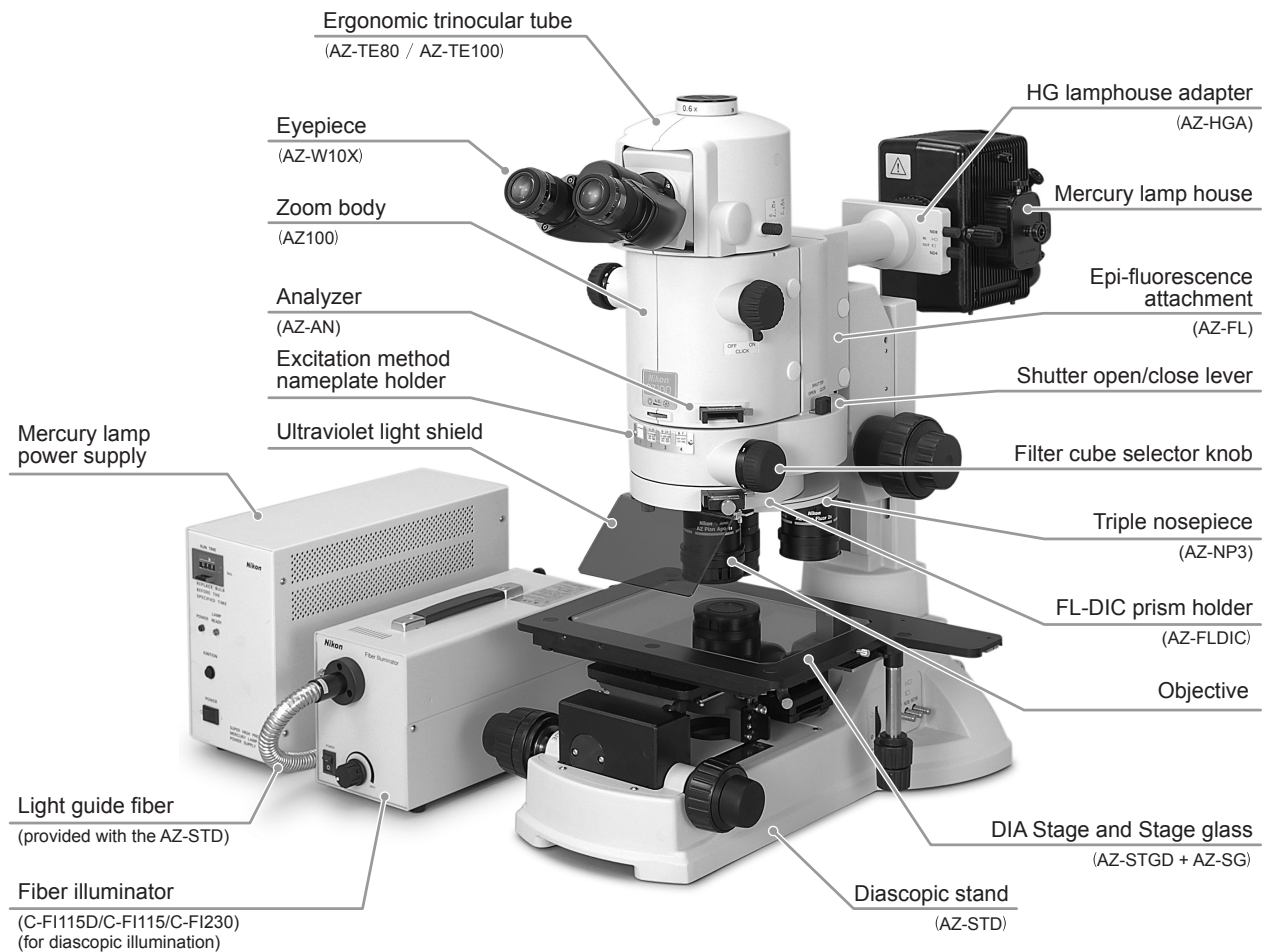
The figure shows the configuration example of the following parts:

AZ-TE80 Ergonomic Trinocular Tube 80, AZ-W10X Eyepiece 10X, AZ100 Zoom Body, AZ-FL Epi- Fluorescence Attachment, AZ-FLDIC Prism Holder, AZ-NP3 Triple Nosepiece, objectives, AZ-STD Diascopic Stand (with a light guide fiber), AZ-STGD DIA Stage, C-FI115D/C-FI115/C-FI230 Fiber Illuminator (for the diascopic illumination), AZ-HGFA Fiber Adapter, C-HGFI/C-HGFIE HG Intensilight, and C-HGFIF15/C-HGFIF30 HG fiber (1.5 m/3 m).

* Besides these parts, filters are attached for the diascopic DIC microscopy.

Configuration Example 3: For Diascopic DIC Microscopy/Epi-fl Microscopy (with UV Excitation)

The figure below shows the third example. The epi-fluorescence attachment is added onto the microscopy system with the diascopic illumination. Besides, the mercury lamp house is added to the system to enable the epi-fl microscopy with UV excitation light. The mercury lamp is connected with the system via a special adapter and a special power supply is used for it.



Configuration example 3: For diascopic DIC microscopy/epi-fl microscopy (with UV excitation)

The figure shows the configuration example of the following parts:

AZ-TE80 Ergonomic Trinocular Tube 80, AZ-W10X Eyepiece 10X, AZ100 Zoom Body, AZ-FL Epi-Fluorescence Attachment, AZ-FLDIC Prism Holder, AZ-NP3 Triple Nosepiece, objectives, AZ-STD Diascopic Stand (with a light guide source), AZ-STGD DIA Stage, C-FI115D/C-FI115/C-FI230 Fiber Illuminator (for the diascopic illumination), AZ-HGA HG Lamphouse Adapter, Mercury Lamp House (with a collector lens), C-SHG1 Mercury Lamp House Power Supply.

* Besides these parts, filters are attached for the diascopic DIC microscopy

2

Sequence of Microscopy

This chapter describes the sequence for each microscopy method with this product.



Warning

Be sure to read the “Warning,” “Caution,” and “Notes on Handling the System” and follow the instructions before using this product.

And read the instruction manuals provided with the microscope, accessories, light source, and other devices used with the product. Especially be sure to follow the warnings and cautions indicated in the first of this manual.

Before observations

- Check the cumulative lit on time of the mercury lamp of the light source. If the time has exceeded the average operation life for lamps of its kind, replace the lamp.
- Use non-fluorescent glass slide.
- To prevent fading of the specimen, make sure to close the shutter for the excitation light when you don't observe the specimen.
- Be sure to see through the ultraviolet light shield when you see the area around the objective. Because harmful light including ultraviolet rays is emitted from the objective to the specimen when the lamp is lit for the fluorescence microscopy with UV excitation light.

Zoom magnification for providing proper illumination

The zoom magnification is restricted as follows for the epi-fl microscopy.

For the HG intensilight

Objective	Zoom magnification
AZ-Plan Apo 0.5x	2x or higher
AZ-Plan Apo 1x	
AZ-Plan Fluor 2x	
AZ-Plan Apo 4x	3x or higher
AZ-Plan Fluor 5x	2x or higher

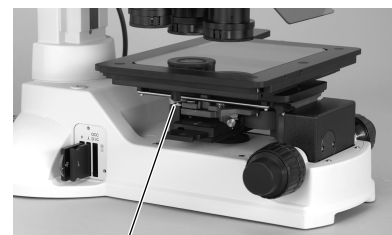
For the mercury lamp house

Objective	Zoom magnification
AZ-Plan Apo 0.5x	3x or higher
AZ-Plan Apo 1x	
AZ-Plan Fluor 2x	
AZ-Plan Apo 4x	
AZ-Plan Fluor 5x	

Blocking the diascope illumination

In the substage of the DIA stand, a shutter is installed to block the diascope illumination. To perform epi-fl microscopy, close the shutter to block the diascope illumination.

To perform observation under the diascope illumination such as bright-field microscopy, simplified polarization microscopy, and DIC microscopy, open the shutter for the diascope illumination.



Shutter open/close knob for the diascope illumination (far side: close the shutter, near side: open the shutter)

For the differential interference contrast (DIC) microscopy under the diascope illumination

To perform the DIC microscopy under the diascope illumination, the AZ-FLDIC FL-DIC Prism Holder must be attached between the epi-fluorescence attachment and the nosepiece (or the single nosepiece).

Insert the DIC prism (DIA prism slider) into a slot on the front of the AZ-FLDIC to perform the DIC microscopy under the diascope illumination. For the operation procedure of the DIC prism, see Chapter 3, “Operation of Each Part.”



Procedure of Epi-fl Microscopy

This section describes the procedure to perform epi-fl microscopy.

Required accessories

- **Filter cube** A filter cube, adequate to your excitation method, must be installed to the epi-fluorescence attachment. For details on installation, see Chapter 4, "Assembly."

- 1 Close the shutter in the epi-fluorescence attachment.**

Move the shutter knob on the right of the epi-fluorescence attachment to the Close position to block the optical path of the illumination.

 - When the DIA stand is used, close the shutter of the diascope illumination too. (Refer to page 13.)
- 2 Turn on the power supply of the light source to light up the lamp.**

For information about operation of the light source, refer to the instruction manual for the light source.

 - Wait a few minutes to stabilize the lamp condition.
- 3 Open the shutter in the epi-fluorescence attachment.**

Move the shutter knob on the right of the epi-fluorescence attachment to the OPEN position to pass the illumination.
- 4 Center the lamp (only for the mercury lamp house)**

For the centering method of the lamp, refer to page 22, "Centering the lamp." For information about operation of the light source, refer to the instruction manual for the light source.

 - For the Intensilight, the centering procedure is not required.
- 5 Set the appropriate filter cube into the optical path.**

Rotate the filter cube selector knob on the right of the epi-fluorescence attachment to set the appropriate filter cube into the optical path.

 - Check the display on the excitation method nameplate on the front of the epi-fluorescence attachment and select the appropriate filter cube number.
- 6 Adjust the brightness of the illumination.**

Adjust the brightness for the fluorescence microscopy.

 - For the Intensilight, adjust the brightness adjust knob on the light source.
 - For the mercury lamp house, operate the ND4/ND8 filter knob on the AZ-HGA HG Lamphouse Adapter.
- 7 Adjust the diopter and the interpupillary distance.**

Note that when the DIA stand is used, the following preparations are useful to reduce fading of the specimen. Before fluorescence microscopy, perform microscopy under the diascope illumination such as bright-field microscopy, DIC microscopy. Bring the target into the field of view. Adjust the diopter and the interpupillary distance. And Focus on the specimen.

8 Locate the appropriate objective into the optical path (for the triple nosepiece) and set a zoom magnification.

Rotate the zoom knob to select the zoom magnification from among 1x to 8x.

- The zoom magnification range of adequate illumination is restricted in the epi-fl microscopy. (Refer to page 13.)

9 Focus on the specimen.

Turn the focus knob on the stand and the stage height adjustment knob to focus on the specimen.

10 Before finishing the observation, close the shutter for the excitation light.

To prevent fading of the specimen, make sure to close the shutter for the excitation light when you don't observe the specimen.

■ Procedure of epi-fl microscopy

7 Adjust the diopter and the interpupillary distance.

8 Adjust the zoom magnification.

2 Turn on the lamp.

4 Center the lamp. (only for the lamp house)

6 Adjust the brightness. (Operate the ND filters on the adapter for the lamp house.)

Close the shutter. **1**

Open the shutter. **3**

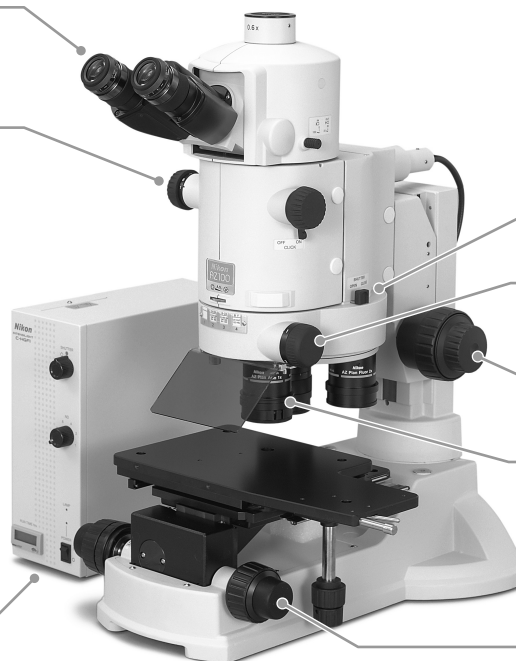
Close the shutter. **10**

Select the filter cube. **5**

Focus on the specimen and start the observation. **9**

Set the objective. **8**

Focus on the specimen and start the observation. **9**



Procedure of Bright-field Microscopy under the Diascopic Illumination

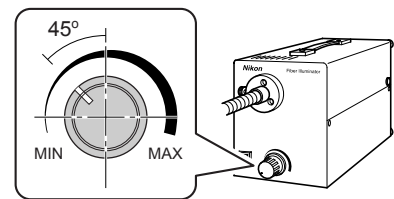
When the AZ-STD Diascopic Stand and the AZ-STGD DIA Stage are used, bright-field microscopy can be performed under the diascopic illumination.

Required accessories

- **DIA cube (accessory)** A DIA cube must be attached in a position of the filter cube turret. For details about the attaching method, refer to Chapter 4, "Assembly."

- 1 Close the shutter in the epi-fluorescence attachment.**
Move the shutter knob on the right of the epi-fluorescence attachment to the Close position to block the optical path of the illumination.
- 2 Place the DIA cube into the optical path.**
Turn the filter cube selector knob on the right of the epi-fluorescence attachment to select the address of the DIA cube.
- 3 Open the shutter for the diascopic illumination.**
Operate the shutter open/close knob for the diascopic illumination on the left of the DIA stage to open the optical path of the diascopic illumination.
- 4 Turn on the power supply of the optical fiber light source for the diascopic illuminator to light up the lamp.**
For information about operation of the light source, refer to the instruction manual for the light source.

- 5 Adjust the brightness of the diascopic illumination.**
Adjust the brightness with the brightness control knob on the light source and the ND filters on the diascopic stand.
 - To illuminate with white light, rotate the brightness control knob on the light source to the position shown in the right figure and then adjust the brightness with the ND filter on the diascopic stand.



Knob position for daylight color

- 6 Place an objective into the optical path (for the triple nosepiece) and select the condenser suitable for the objective.**
Two condensers are available in the DIA stand: one for objectives of 0.5x to 1x and one for objectives of 2x to 5x. Select the suitable condenser for the objective in use.
 - For the operation information, refer to the instruction manual for "AZ-STD Diascopic Stand and AZ-STGD DIA Stage."
 - Use the objective of 1x, 4x, or 5x for the DIC microscopy.

- 7 Focus on the specimen.**
Focus on the specimen with the focus knobs and the stage height adjustment knobs.

- 8 Adjust the condenser, the aperture diaphragm, and the field diaphragm.**
For adjusting these parts, refer to the instruction manuals for "AZ-STD Diascopic Stand and AZ-STGD DIA Stage."

- 9 Adjust the zoom magnification. And then start the observation.**

When the bright-field microscopy under the diascopic illumination is performed with the epi-fluorescence attachment installed, the peripheral area of the viewfield becomes dark under a zoom magnification of 2x or less. To get an even brightness, remove the epi-fluorescence attachment.

Combination Use of Epi-fl Microscopy and DIC Microscopy under the Diascopic Illumination

When the diascopic stand and the DIA stage are used in the system and accessories are attached, differential interference contrast (DIC) microscopy can be performed under the diascopic illumination.

DIC microscopy is useful for searching a target because epi-fl microscopy causes fading of the specimen easily. When epi-fl microscopy and DIC microscopy are performed simultaneously, each microscopy method compensates shortcomings of another microscopy method.

Required accessories

- **AZ-FLDIC FL-DIC Prism Holder** (Attach the prism holder between the epi-fluorescence attachment and the triple or single nosepiece.)
- **Filter cube** (Attach the filter cube, that conforms with the excitation method to be performed, to the epi-fluorescence attachment.)
- **DIA cube** (An accessory. Attach the DIA cube to a position of the filter cube turret.)
- **AZ-RP Rotatable Polarizer** (Attach the rotatable polarizer to a slot on the DIA stand.)
- **AZ-AN DIA DIC Prism Holder with Analyzer** (Attach the prism holder with analyzer to a slot on the AZ100 Zoom Body.)
- **AZ-DP1/DP4/DP5 DIA DIC Prism 1x/4x/5x** (Select one according to the magnification of the objective.)
- **AZ-DPS1/DPS5 DIA DIC Prism Slider 1-4x/5x** (Select one according to the magnification of the objective.)

For attaching the AZ-FLDIC, the filter cube, and the DIA cube, refer to Chapter 4, "Assembly" and for attaching other sliders, refer to Chapter 3, "Operation Procedures" and the instruction manual for "AZ-STD Diascopic Stand and AZ-STGD DIA Stage."

To perform the DIC microscopy

- 1 Close the shutter in the epi-fluorescence attachment.**
Move the shutter knob on the right of the epi-fluorescence attachment to the Close position to block the optical path of the illumination.
- 2 Place the DIA cube into the optical path.**
Rotate the filter cube selector knob on the right of the epi-fluorescence attachment to set the DIA cube into the optical path.
- 3 Place the 1x objective and the condenser for low magnification into the optical path.**
- 4 Turn on the light source for the diascopic illumination and adjust the brightness.**
For information about the operation of the light source, refer to the instruction manual for the light source.
- 5 Focus on the specimen.**
Focus on the specimen with the focus knobs and the stage height adjustment knobs.

6 Place the analyzer into the optical path.

Insert the AZ-AN DIA DIC Prism Holder with Analyzer into a slot on the front of the AZ100 Zoom Body and place it into the optical path.

- For operation procedure, refer to the instruction manual for “AZ-STD Diascopic Stand and AZ-STGD DIA Stage.”

7 Place the rotatable polarizer into the optical path.

Push in the AZ-RP Rotatable Polarizer into a slot on the left of the diascopic stand to place the polarizer into the optical path of the diascopic illumination.

- For operation procedure, refer to the instruction manual for “AZ-STD Diascopic Stand and AZ-STGD DIA Stage.”

8 Place an objective into the optical path (for the triple nosepiece) and select the condenser suitable for the objective.

Two condensers are available in the diascopic stand: one for objectives of 0.5x to 1x and one for objectives of 2x to 5x. Select the suitable condenser for the objective in use.

- For the operation information, refer to the instruction manual for “AZ-STD Diascopic Stand and AZ-STGD DIA Stage.”
- Use the objective of 1x, 4x, or 5x for the DIC microscopy.

9 Adjust the focus again.**10 To use the condenser for high magnification, center and focus the condenser.**

The condenser must be adjusted at the start. Normally it does not need the adjustment again.

- For the operation information, refer to the instruction manual for “AZ-STD Diascopic Stand and AZ-STGD DIA Stage.”

11 Adjust the aperture diaphragm and the field diaphragm.

- For the operation information, refer to the instruction manual for “AZ-STD Diascopic Stand and AZ-STGD DIA Stage.”

12 Adjust the orientation of the polarizer to set a crossed Nicols position.

Turn the ring on the polarizer to get the darkest view.

- An index is provided on the polarizer rotation ring. Align the polarizer with the index position to set the orientation of the polarizer horizontally, to a right angle to the orientation of the analyzer (crossed Nicols position). The position of the darkest view is a crossed Nicols position.

13 Place the DIC prism into the optical path.

For the DIC microscopy under the diascopic illumination, insert a DIC prism into the position anterior to the specimen (illumination side) and another DIC prism to the position posterior to the specimen (objective side).

- **Illumination side:** For the 1x objective, insert the DIA DIC prism (AZ-DP1) into the DIC slot on the left of the diascopic stand. For the 4x or the 5x objective, insert the DIA DIC prism 4x (AZ-DP4) or the DIA DIC prism 5x (AZ-DP5) into the slot on the bottom of the high magnification condenser.
- **Objective side:** For the 1x or the 4x objective, insert the DIA Prism Slider 1-4x (AZ-DPS1) into a slot on the front of the AZ-FLDIC. For the 5x objective, insert the DIA Prism Slider 5x (AZ-DPS5) into a slot on the front of the AZ-FLDIC.
- For operation procedure, refer to the instruction manual for “AZ-STD Diascopic Stand and AZ-STGD DIA Stage.”

14 Set an interference color.

Rotate the prism position knob at the end of the DIC prism slider to set an interference color.

15 Adjust the zoom magnification. And then start the observation.

To perform the epi-fl microscopy and DIC microscopy simultaneously

To perform epi-fl microscopy and DIC microscopy under the diascope illumination simultaneously, follow the instructions below.

16 Turn on the light source for the epi-fl microscopy.

Wait a few minutes to stabilize the lamp condition.

17 Center the lamp (only for the mercury lamp house)

For the centering method of the lamp, refer to page 22, "Centering the lamp." For information about operation of the light source, refer to the instruction manual for the light source.

- For the Intensilight, the centering procedure is not required.

18 Set a filter cube into the optical path.

Place a filter cube into the optical path with the filter cube selector knob on the right of the epi-fluorescence attachment.

- Check the display on the excitation method nameplate on the front of the epi-fluorescence attachment and select the appropriate filter cube number.

19 Open the shutter in the epi-fluorescence attachment.

Move the shutter knob on the right of the epi-fluorescence attachment to the OPEN position to open the optical path.

20 Bring the brightnesses of the epi-fl image and the DIC image into balance.

Operate the ND filters for the episcopic illumination and for the diascope illumination and adjust the brightness control knobs for both to bring the brightnesses of the epi-fl image and the DIC image into balance.

- If the brightness of the diascope illumination cannot decrease properly, remove the boost lens from the filter slot in the optical fiber light source and replace it with the AZ-ND128 ND filter provided with the AZ-FLDIC. Attach the AZ-ND128 to the standard filter holder and insert the filter to the slot in the optical fiber light source.
For attaching method of the filter, see "Operating the ND128 filter" and the instruction manual for the optical fiber light source.

21 When the microscopy ends, close the shutter in the epi-fluorescence attachment.

■ Combination use of epi-fl microscopy and DIC microscopy under the diascope illumination

15 Adjust the zoom magnification.

6 Place the analyzer into the optical path.

13 Place the DIC prism on the objective side into the optical path.

14 Select the interference color.

16 Turn on the light source for the epi-fl microscopy.

17 Center the lamp. (only for the lamp house)

20 Adjust the balance of the DIC image and the fluorescent image.

4 Turn on the diascope illumination and adjust the brightness.

Close the shutter. 1

Open the shutter. 19

Close the shutter. 21

Set the DIA cube. 2

Set the filter cube. 18

Focus on the specimen. 5 9

Set a low magnification objective. 3

Set an appropriate objective. 8

Adjust the condenser. 10

Adjust the diaphragm. 11

Adjust the balance of the DIC image and the fluorescent image. 20

Adjust the diaphragm. 11

Switch the condenser. 3 8

Focus on the specimen. 5 9

■ Left view of the diascope stand (for the low magnification objective)

7 Place the polarizer into the optical path.

12 Adjust the orientation of the polarizer.

13 Place the DIC prism on the illumination side into the optical path.

■ Left view of the diascope stand (for the high magnification objective)

7 Place the polarizer into the optical path.

12 Adjust the orientation of the polarizer.

Place the DIC prism on the illumination side into the optical path. 13

3

Operation of Each Part

This chapter describes operations of this product, the devices used with this product, and the filter cube.

Opening/Closing the Shutter

A lever is provided on the right of the epi-fluorescence attachment to open/close the shutter of the optical path of the excitation light.

Move the lever to the far side (indicated CLOSE) to close the shutter and move the lever to the near side (indicated OPEN) to open the shutter.

To prevent fading of the specimen of the fluorescence observation, make sure to close the shutter when you don't observe the specimen.



Opening/closing the shutter

Selecting a Filter Cube

A filter cube selector knob is provided on the right of the epi-fluorescence attachment. Rotate this knob to change the filter cube in the optical path.

The number (1 to 4) on the knob indicates the filter cube address number. To place a filter cube of a certain address, rotate the knob to show the address number. Check the filter cubes and their numbers on the excitation method nameplate.

To perform bright-field microscopy or DIC microscopy under the diascope illumination with the diascope stand and the DIA stage, a DIA cube must be attached in a position of the filter cube turret.

For details about the filter cube, see Page 26, "Filter Cubes."



Selecting a filter cube

Operating the Ultraviolet Light Shield

An ultraviolet light shield is provided to the epi-fluorescence attachment. When you see the area around the objective, be sure to see through the ultraviolet light shield.

The ultraviolet light shield can swing away left for replacing specimens or objectives.



Caution

If the ultraviolet light shield is not used, ultraviolet light reflected from the specimen may enter your eye. (Ultraviolet light is invisible.) When you see the area around the objective, be sure to see through the ultraviolet light shield.



Operating the ultraviolet light shield

Operating Excitation Light

For information about the operation of the HG intensilight, refer to the instruction manual for the light source.

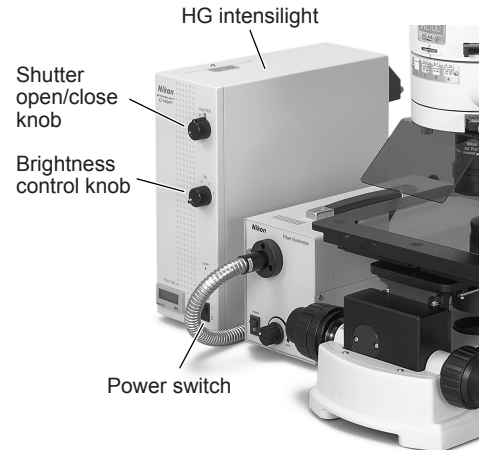
Turning on/off the lamp

To turn on/off the illumination light, turn on/off the power of the light source.

To light up the illumination, press the power switch to the “I” side. To turn off the illumination, press the power switch to the “O” side.

Brightness control (for the HG intensilight)

The brightness of the illumination is adjustable in six levels with the brightness control knob or the remote controller of the light source.



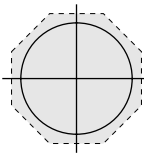
Operating the HG intensilight

Centering the lamp (for the mercury lamp house)

To use the mercury lamp house for the first time or to use the system after exchanging the lamp of the mercury lamp house, center the lamp as described below. If the lamp is not centered, the image may be dark or the illumination may be uneven.

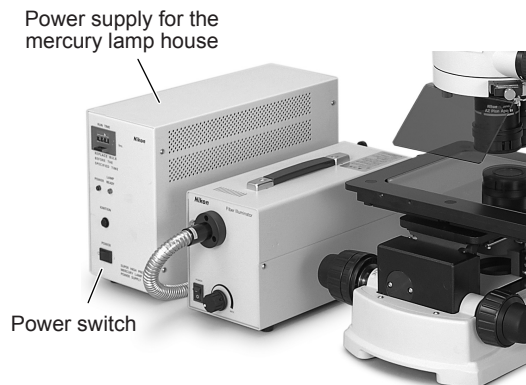
1. Mount the centering plate provided with the AZ-HGA adapter onto the stage. And then, focus on the plate.
2. Detach the objective.
3. Change the zoom magnification of the AZ100 zoom body to 3x.

4. Adjust the collector lens focus knob on the lamp house to get an octagon image of the diaphragm on the centering plate.

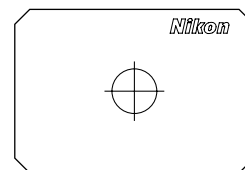


Crosshairs of the centering plate and the diaphragm image

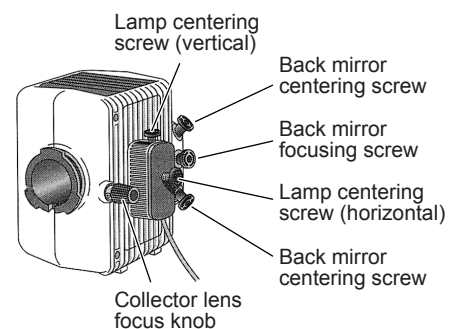
5. Move the intersection point of the crosshairs of the centering plate to the center of the octagon.
6. Adjust the collector lens focus knob on the lamp house to get an arc image of the light source.
7. Rotate the lamp centering screws to shift the arc image slightly apart from the intersection point of the crosshairs of the centering plate.
8. Adjust the back mirror centering screws and the back mirror focusing screw to move the mirror image to the symmetric position of the arc image.
9. Adjust the lamp horizontal centering screw to overlay the arc image and the mirror image.



Operating the power supply for the mercury lamp house



Centering plate



Adjustment screws of the mercury lamp house

10. Adjust the focus of the collector lens of the lamp house.

Perform either adjustment procedure in compliance with the objective to be used.

When only 0.5x objective is used

- (1) Place the 0.5x objective into the optical path.
- (2) Change the zoom magnification of the AZ100 zoom body to 8x and focus on the crosshairs of the centering plate.
- (3) Look into the eyepiece. Move the stage so that the crosshairs move away from the viewfield. Adjust the collector lens focus knob of the lamp house so that the illumination is consistent across the entire viewfield.

When objectives other than 0.5x are used

- (1) Place the lowest magnification objective in the used objectives of 1x to 5x into the optical path.
- (2) Change the zoom magnification of the AZ100 zoom body to 8x and focus on the crosshairs of the centering plate.
- (3) Look into the eyepiece. Move the stage so that the crosshairs move away from the viewfield. Adjust the collector lens focus knob of the lamp house so that the illumination is consistent across the entire viewfield.
- (4) If the 0.5x objective is also used in the observation, place the 0.5x objective into the optical path and repeat the adjustments of Step 1 to 3.
For consistent illumination, the adjustments of Step 1 to 3 are recommended not only for the 0.5x objective but also for all objectives.

Operating the ND Filter Slider (for the Mercury Lamp House)

To use the mercury lamp house, attach the AZ-HGA HG Lamphouse Adapter.

Two ND filters are attached to this adapter: ND4 and ND8. Operate the filter operation knob on the right of the adapter to place the ND4 filter and the ND8 filter into the optical path individually.

Filter type	Intended application
ND4 (ND filter)	For brightness control (transmittance: 25%)
ND8 (ND filter)	For brightness control (transmittance: 12.5%)



Operating the filter slider

Operation for the Diascopic Illumination (for the Diascopic Stand)

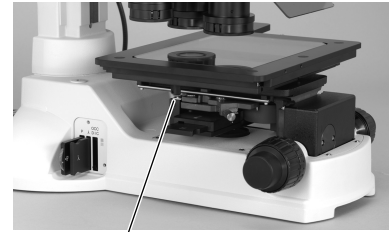
The bright-field microscopy and the DIC microscopy under the diascopic illumination can be performed when the diascopic stand and the DIA stage are attached to this product.

Operating the diascopic illumination shutter

In the substage of the diascopic stand, a shutter is installed to block the diascopic illumination.

To perform epi-fl microscopy, close the shutter to block the diascopic illumination.

To perform epi-fl microscopy and other microscopy under the diascopic illumination simultaneously, open the shutter.



Shutter open/close knob for the diascopic illumination (far side: close the shutter, near side: open the shutter)

Diascopic illumination shutter

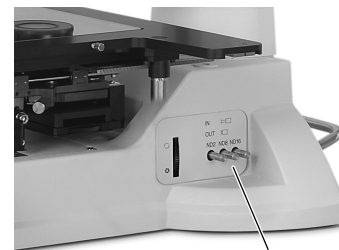
Adjusting the brightness of the diascopic illumination

Three filter selector levers are located on the right rear of the diascopic stand.

To place the filter into the optical path, pull the lever to the IN position.

To remove the filter from the optical path, press the lever fully to the OUT position.

Filter type	Intended application
ND2 (ND filter)	For brightness control (transmittance: 50%)
ND4 (ND filter)	For brightness control (transmittance: 25%)
ND16 (ND filter)	For brightness control (transmittance: 6%)



Filter selector lever

Operating the filter

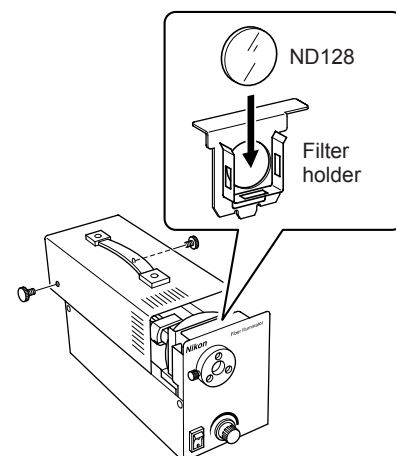
The NCB14 filter is embedded in the diascopic illumination path in the diascopic stand. The filter cannot be removed from the optical path.

Operating the ND128 filter

When the epi-fl microscopy and the DIC microscopy under the diascopic illumination are performed simultaneously, the diascopic illumination may be too bright even all above-described ND filters are used.

In this case, insert the ND128 (ND filter, transmittance: 0.8%) into the standard filter holder for the optical fiber light source and attach the filter holder to the filter slot in the optical fiber light source.

If the boost lens (provided with the diascopic stand) is inserted in the filter slot, remove the boost lens from the filter slot and replace it with the filter holder that has the ND128.



Attaching the ND128 filter

For details on attaching the filter, see the instruction manual for the optical fiber light source.

Operating the DIC Prisms (for the DIC Microscopy under the Diascopic Illumination)

- To perform the microscopy under the diascopic illumination, the diascopic stand and the DIA stage are required. For details on the microscopy under the diascopic illumination, see the instruction manual for “AZ-STD Diascopic Stand and AZ-STGD DIA Stage.”
- The DIC microscopy under the diascopic illumination cannot be performed with the 0.5x or the 2x objective.

Attaching the rotatable polarizer and the analyzer

Insert the rotatable polarizer (AZ-RP) into the slot on the left of the diascopic stand and the analyzer (AZ-AN) into the slot on the front of the AZ100 Zoom Body. For details on attaching method and operation method, see the instruction manual for “AZ-STD Diascopic Stand and AZ-STGD DIA Stage.”

Attaching the DIC prism

To perform the DIC microscopy under the diascopic illumination, two DIC prisms are required. The first prism is inserted to the position at the illumination side below the specimen. The second prism is inserted to the position above the objective.

DIC prism for the illumination side: Attach the DIC prism (DIA DIC prism) for the illumination side to the slot on the left of the diascopic stand. The DIA DIC prism and the slot position depend on the magnification of the objective. Attach the DIC prism to an appropriate position by referring to the following table.

Objective	DIA DIC prism	Slot position
AZ-Plan Apo 1x	AZ-DP1	DIC slot on the left of the diascopic stand
AZ-Plan Apo 4x	AZ-DP4	DIC slot on the bottom of the condenser
AZ-Plan Fluor 5x	AZ-DP5	

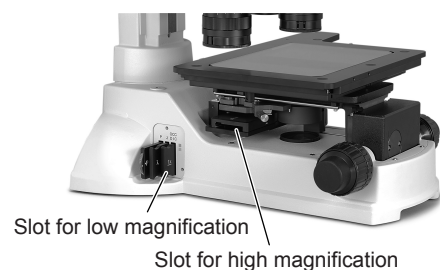
DIC prism for the objective side: Insert the DIC prism (DIA prism slider) for the objective side between the filter cube and the objective. Attach the AZ-FLDIC FL-DIC Prism Holder between the epi-fluorescence attachment and the triple nosepiece (or the single nosepiece) and insert the DIA prism slider into the slot on the front of the AZ-FLDIC. An appropriate DIA DIC prism slider depends on the magnification of the objective.

Objective	DIA prism slider
AZ-Plan Apo 1x	AZ-DPS1
AZ-Plan Apo 4x	
AZ-Plan Fluor 5x	AZ-DPS5

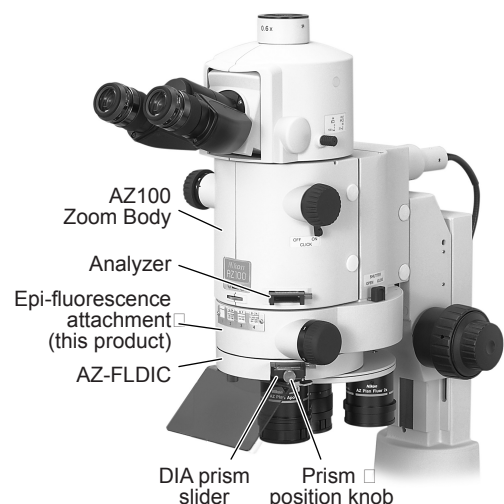
Operating the DIC prism

The DIC prisms are controlled by inserting/extracting the prism or the slider manually. To place the DIC prisms into the optical path, push in the DIA DIC prism and the DIA prism slider as far as they go. To remove the DIC prisms from the optical path, pull out the DIA DIC prism and the DIA prism slider fully.

Rotate the prism position knob at the end of the DIA DIC prism slider to adjust the interference color of the DIC observation.



Slots for the DIC prism for the illumination side (DIA DIC prism)



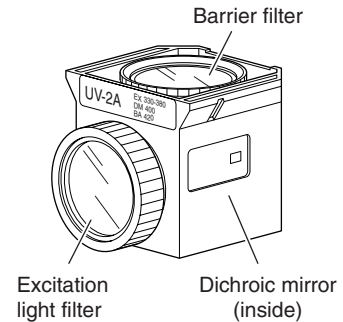
Attaching the DIC prism (DIA prism slider)

Filter Cubes

Up to four filter cubes for the epi-fl microscopy can be attached to this product.

A filter cube consists of three types of optical components: an excitation light filter (EX filter), a barrier filter (BA filter), and a dichroic mirror (DM). Taking the following as a guideline, select a combination of filters that is suitable for your purpose and for the characteristics of the specimen and the fluorophore.

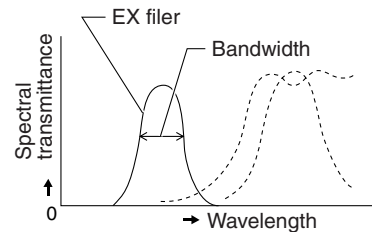
- Even in the same excitation method, a variety of combination of the excitation light filter and the barrier filter can be selected.
- Each excitation light filter (EX filter), barrier filter (BA filter), and dichroic mirror (DM) can be purchased separately.
- The excitation light filter is exposed to strong light. Therefore it may deteriorate under use. It is recommended to replace it at a proper interval.
- See the instruction of Chapter 4 “Assembly” for attachment method of the filter cubes.



Selecting the Excitation Light Filter (EX Filter)

An excitation light filter transmits light selectively and blocks other light. The transmitted light are called excitation light. It is used to excite the fluorophore in the specimen and fluorescence is emitted from the specimen. The wavelength range of light that can pass through the filter is called the bandwidth.

The bandwidth of the excitation light filter determines the brightness of the fluorescent image, the occurrence of autofluorescence (fluorescence resulting from substances other than the fluorophores), and degree of fading. When the filter has a wide bandwidth, a large amount of excitation light will be irradiated on the specimen. In this case, the image becomes bright but the amount of autofluorescence becomes large and fading of the specimen occurs soon. On the contrary, when the filter has a narrow bandwidth, a small amount of excitation light will be irradiated on the specimen. In this case, the image becomes dark but the amount of autofluorescence becomes small and fading of the specimen occurs late. For specimens with pronounced autofluorescence, use an excitation light filter with a narrow bandwidth. (The resulting fluorescent image will be darker, however.)



The excitation light filter is exposed to strong light. Therefore it may deteriorate under use. Please replace it at a proper interval based on the hours used.

	Bandwidth of excitation light filter	
	Narrow	Wide
Brightness of the fluorescent image	Dark	Bright
Occurrence of autofluorescence	Less	High
Degree of fading	Small	Large

Selecting the Barrier Filter (BA Filter)

A barrier filter transmits only fluorescence emitted by the specimen but blocks the excitation light. This filter makes it possible to observe the fluorescent image without unnecessary light (that is, on a dark background). There are two types of barrier filters: LP filters (long-pass filters), which block all light that are shorter than a certain boundary wavelength and allow all light to pass that are longer than the boundary wavelength, and BP filters (band-pass filters), which allow only light in a certain bandwidth to pass. Please use a proper filter depending on the purpose.

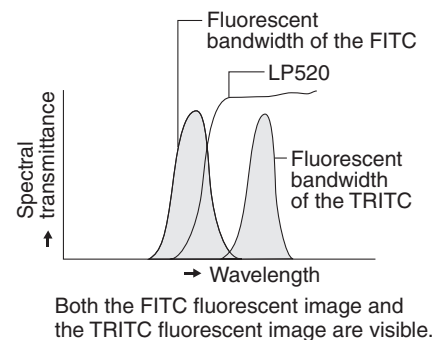
LP filters (long-pass filters)

A long pass filter transmits light that have longer wavelength than a certain wavelength but blocks light that have shorter wavelength. The boundary wavelength is called the cut-on wavelength.

- (1) An excitation light is a light that is irradiated to the specimen. The fluorophore in the specimen absorbs the excitation light energy. As a result, fluorescence is emitted from the fluorophore instead. When a specimen is labeled with a fluorophore that emits fluorescence of very close wavelengths to the excitation light, select a barrier filter with the shortest cut-on wavelength permitted by performance requirements for efficient fluorescent microscopy.

A longer cut-on wavelength tends to result in a more complete separation between an excitation light and fluorescence, rendering a darker background of the fluorescent image. With the recent advancement in filter performance, however, filters with shorter cut-on wavelengths can be used for this purpose and they are used more often than before.

- (2) An LP filter is used for a specimen labeled with multiple wavelengths where fluorescent images for all the wavelengths are desired. However, the usual combination of a dichroic mirror, an excitation light filter, and a barrier filter of LP filter type, may not be sufficient to excite a fluorophore that emits fluorescence of longer wavelength (for example, the TRITC when the specimen is labeled with the FITC and the TRITC), making the fluorescent image for the TRITC very dark. In a case like this, a multi-band filter is recommended.



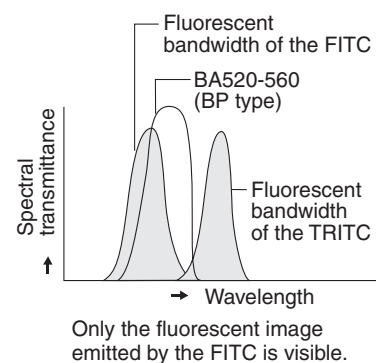
BP filters (band-pass filters)

A BP filter transmits light of a certain bandwidth.

This type of filter is used to observe a fluorescent image only emitted by a certain fluorophore when the specimen is labeled with multiple fluorophore. (For example, when a specimen is labeled with the FITC and the TRITC and you wish to observe a fluorescent image only emitted by the FITC, use a filter of BA520-560.)

However, you cannot distinguish the autofluorescence from the other fluorescence in the image transmitted through the BP filter because the image will only be of one color (green, in the above example).

When you wish to distinguish the autofluorescence by a subtle difference of hue, an LP filter is more useful.



Replacing Excitation Light Filters, Barrier Filters, and Dichroic Mirrors

The excitation light filter, the barrier filter, and the dichroic mirror in the filter cube can be replaced with other elements. When handling these elements, put on gloves and do not touch the surface of filters and mirrors with bare hands. And be careful not to let dust or fingerprints get on them.

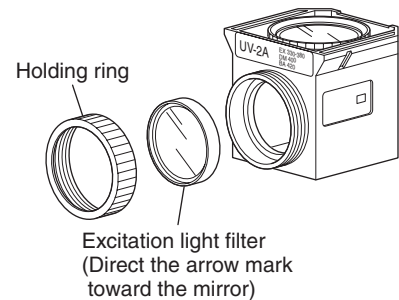
Replacing excitation light filters

The excitation light filter is secured by a screwed type holding ring to the filter cube.

1. **Rotate the holding ring in counterclockwise direction to remove it.**
2. **Replace the excitation light filter with a new one and secure it with the holding ring.**

When attaching the excitation light filter, make sure to place the filter with its arrow mark on the rim facing to the dichroic mirror side.

If a filter made by other manufacturer is used, check and see the filter orientation with the indication on the rim of the filter before securing it.



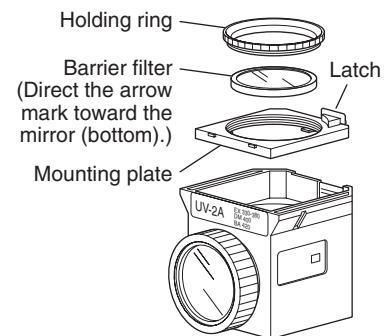
Replacing barrier filters

The barrier filter is secured by a screw type holding ring to the mounting plate at the top of the filter cube.

1. **Press the latch to inside and detach the mounting plate with the barrier filter.**
2. **Rotate the holding ring to remove it from the mounting plate.**
3. **Replace the barrier filter with a new one and secure it in the reverse order.**

When attaching the barrier filter, make sure to place the filter with its arrow mark on the rim facing down (to the dichroic mirror side).

If a filter made by other manufacturer is used, check and see the filter orientation with the indication on the rim of the filter before securing it.



Replacing dichroic mirrors

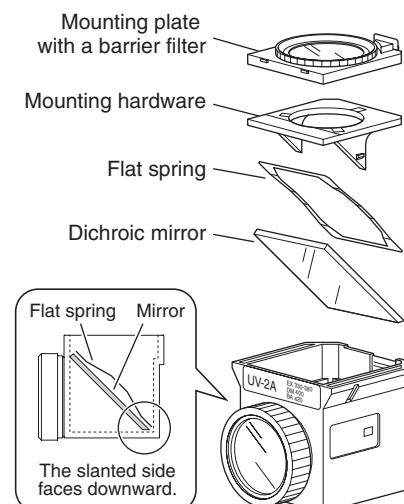
A dichroic mirror is fixed with a flat spring and a mounting hardware inside the filter cube.

1. **Detach the mounting plate with the barrier filter.**
2. **Pull the mounting hardware upward to remove it. (It is clamped with latches on both sides.)**
3. **Remove the flat spring and the dichroic mirror.**
4. **Set a new dichroic mirror and attach the flat spring and the dichroic mirror in their original positions.**

The edge of the dichroic mirror is slanted on one side to distinguish the reflection surface. The slanted edge must be placed in a downward direction to fit the bottom of the filter cube.

And, the flat spring must be placed to hold the both sides of the dichroic mirror.

5. **Put the mounting hardware and the barrier filter back to their original positions.**



4

Assembly

This chapter indicates the procedure for installing this product to the AZ100.



Caution

Be sure to read the “Safety Precautions” and follow the all instructions given there before assembling the product.

* For the procedure of assembling the AZ100 Zoom Body, the AZ-STE Episcopic Stand, and the AZ-STGE EPI Stage, refer to the instruction manual for the AZ100. And, for the installation procedure of the AZ-STD Diascopic Stand and the AZ-STGD DIA Stage, refer to their instruction manuals.

Necessary tools

The following tool is required to assembly the product.

Tool	Appearance	Remark
Hexagonal driver (size: 2 mm)		Provided with the AZ100 Zoom Body
Hexagonal wrench (size: 2.5 mm)		Provided with the AZ100 Zoom Body
Hexagonal wrench (size: 4 mm)		Provided with the AZ100 Zoom Body

Attaching the Single Nosepiece/Triple Nosepiece

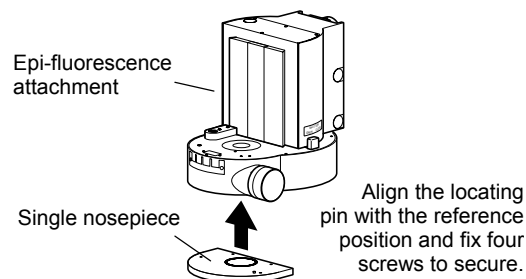
Attach a nosepiece to the lower side of the epi-fluorescence attachment and then attach the attachment to the stand.

Attaching the single nosepiece

To use the objective without switching, attach the single nosepiece to the lower surface of the epi-fluorescence attachment.

Attach the single nosepiece to the lower surface of the epi-fluorescence attachment with the locating pin aligned with the reference position and secure it by fixing the four screws with the 2.5 mm hexagonal wrench provided with the zoom body from the lower surface of the nosepiece.

* To use the AZ-FLDIC FL-DIC Prism Holder, attach the single nosepiece and the AZ-FLDIC to the epi-fluorescence attachment at a time with the screws provided with the AL-FLDIC.



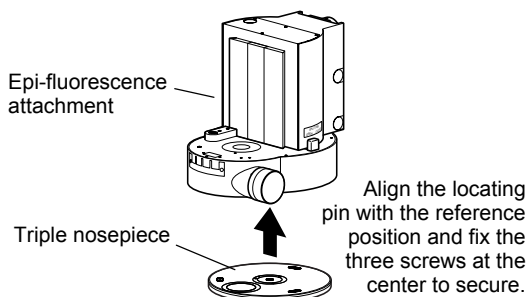
Attaching the single nosepiece

Attaching the triple nosepiece

To switch the objective, attach the triple nosepiece to the lower surface of the epi-fluorescence attachment.

Attach the triple nosepiece to the lower surface of the epi-fluorescence attachment with the locating pin aligned with the reference position and secure it by fixing the three screws with the 2.5 mm hexagonal wrench provided with the zoom body from the lower surface of the nosepiece.

* The clamp screws do not drop off from the triple nosepiece.



Attaching the triple nosepiece

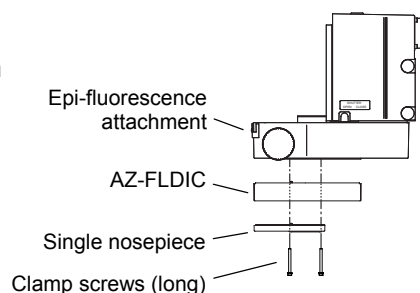
Attaching the AZ-FLDIC FL-DIC Prism Holder

To perform the DIC microscopy under the diascope illumination with the diascope stand, attach the AZ-FLDIC FL-DIC Prism Holder between the epi-fluorescence attachment and the nosepiece (or the single nosepiece). Two types of screws that differs in length and washers are provided with the AZ-FLDIC.

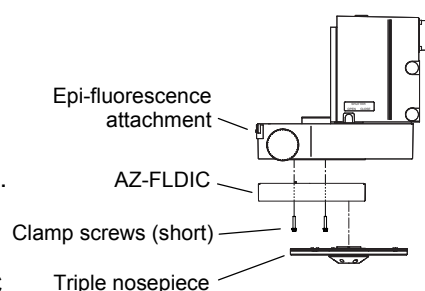
Attaching method for the single nosepiece: Connect the AZ-FLDIC FL-DIC Prism Holder and the single nosepiece securely with four long screws and washers provided with the AZ-FLDIC. (Refer to the right figure.) The screws provided with the single nosepiece are not used.

Attaching method for the triple nosepiece: Fit the locating pin of the AZ-FLDIC into the hole of the bottom of the epi-fluorescence attachment. Fix the AZ-FLDIC with four short clamp screws and washers provided with the product. And then, attach the triple nosepiece to the bottom of the AZ-FLDIC.

Attaching the DIC prism: Attach the DIC prism on the objective side (DIA prism slider) to the DIC prism slot on the AZ-FLDIC. For details on operation, refer to "Operating the DIC Prism (For the DIC Microscopy under the Diascopic Illumination)" on page 25.



Attaching method for the single nosepiece

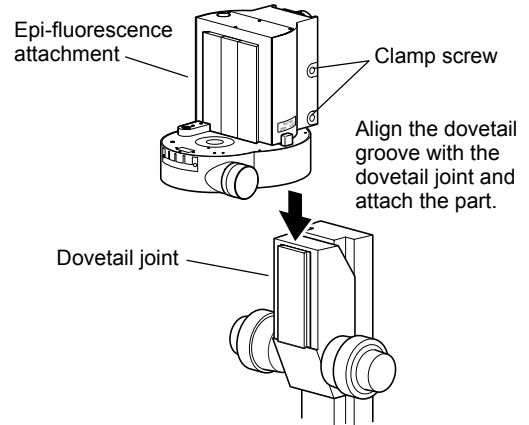


Attaching method for the triple nosepiece

Attaching the Product to the Stand

Attach the epi-fluorescence attachment to the elevating section of the AZ-STE Episcopic Stand or the AZ-STD Diascopic Stand.

1. **Remove the two clamp screw covers on the right of the epi-fluorescence attachment and sufficiently loosen the two clamp screws with the 4 mm hexagonal wrench provided with the zoom body.**
2. **Align the dovetail groove of the epi-fluorescence attachment with the dovetail joint of the stand elevating part and slide down the attachment to be attached.**
Be sure to slide down the epi-fluorescence attachment as far as it goes.
3. **Tighten the two clamp screws to secure the epi-fluorescence attachment and cover the screws.**

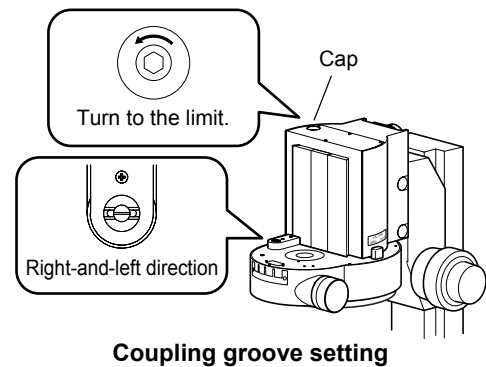


Attaching the epi-fluorescence attachment

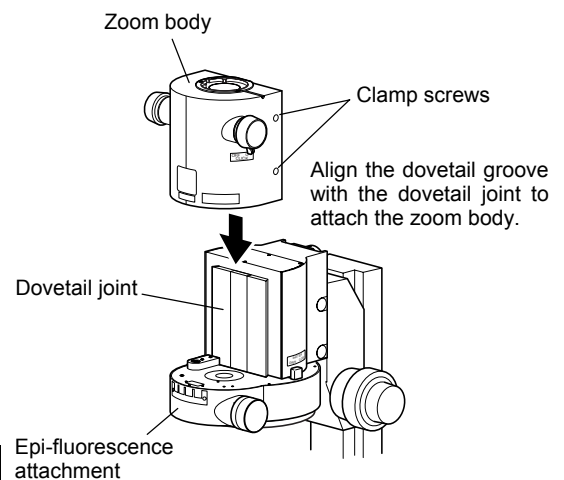
Attaching the Zoom Body

Attach the AZ100 Zoom Body to the epi-fluorescence attachment.

1. **Detach the cap on the top upper surface of the epi-fluorescence attachment and turn the screw inside to the limit position in the counterclockwise with the hexagonal driver.**
Check that the coupling groove of the epi-fluorescence attachment is turned in the right-and-left direction.
2. **Reattach the cap to its original position.**
3. **Rotate the zoom knob on the zoom body to change the magnification to 1x.**
4. **Remove the two clamp screw covers on the right of the zoom body and sufficiently loosen the two clamp screws with the 4 mm hexagonal wrench provided with the zoom body.**
5. **Align the dovetail groove of the zoom body with the dovetail joint of the epi-fluorescence attachment and slide down the zoom body to be attached.**
Be sure to slide down the zoom body as far as it goes.
6. **Tighten the two clamp screws to secure the zoom body and cover the screws.**



Coupling groove setting



Attaching the zoom body

After attaching the zoom body, check that the zoom magnification is controllable between 1x and 8x by rotating the zoom knob on the zoom body.

Attaching the Eyepiece Tube and Eyepieces

Either of the AZ-TE80 trinocular eyepiece tube 80, AZ-TE100 trinocular eyepiece tube 100, or AZ-TP photo adapter can be attached to the zoom body. Attach the eyepieces to the binocular part when the trinocular eyepiece tube is used.

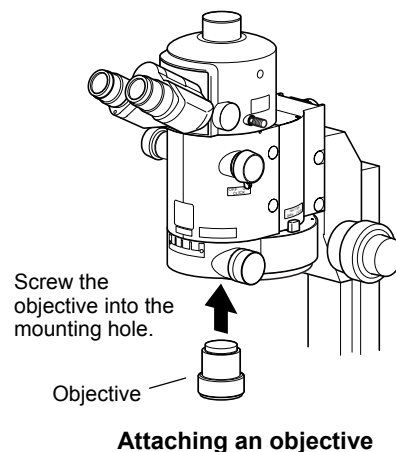
Refer to the instruction manual of the AZ100 for details on attaching the eyepieces.

Attaching an Objective(s)

Attach an objective(s) to the single or triple nosepiece. Raise the elevating section of the stand and lower the stage so that the objective can be screwed into the mounting hole of the single or triple nosepiece and screw the objective.

The following objectives are applicable to the AZ series microscope. For the epi-fl microscopy with UV excitation, place the objective marked with "Plan Fluor" in the optical path.

Objective	Magnification	UV excitation
AZ-PLAN Plan Apo 0.5x	0.5x	Not applicable
AZ-PLAN Plan Apo 1x	1x	Not applicable
AZ-PLAN Plan Fluor 2x	2x	Applicable
AZ-PLAN Plan Apo 4x	4x	Not applicable
AZ-PLAN Plan Fluor 5x	5x	Applicable



Attaching the Ultraviolet Light Shield

Attach the provided ultraviolet light shield to the lower surface of the epi-fluorescence attachment. And tighten the knob on the lower side of the shield to secure.

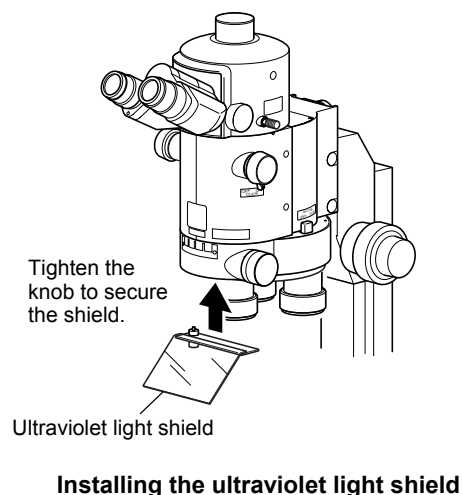
When the AZ-FLDIC is attached, attach the ultraviolet light shield to the bottom of the AZ-FLDIC. When the single nosepiece is attached, attach the ultraviolet light shield to the bottom of the single nosepiece.

The ultraviolet light shield can be rotated clockwise around the mounting screw position when not needed.



Caution

Attach the ultraviolet light shield to prevent the ultraviolet light reflected from the specimen from entering the observer's eyes. (The ultraviolet light is invisible.) Be sure to attach the ultraviolet light shield.



Attaching Filter Cubes

A turret for filter cubes is provided inside the epi-fluorescence attachment. Up to four cubes can be attached to the turret. To switch the filter cubes, rotate the turret by rotating the filter cube selector knob.

1. **When the light source is attached, turn off the power switch of the light source and unplug the power cord from the wall outlet.**
2. **Loosen the two knurled screws on the left of the epi-fluorescence attachment and remove the cover from the filter cube port.**

A dovetail joint for a filter cube appears under the cover. Check that the location number of the filter cube is indicated on the dovetail.

3. **Rotate the filter cube selector knob so that the desired location number is shown on the dovetail in the opening.**

The location position must be checked at the dovetail for the filter cube not at the filter cube selection knob.

4. **If a DIA cube is attached in the position, remove it.**

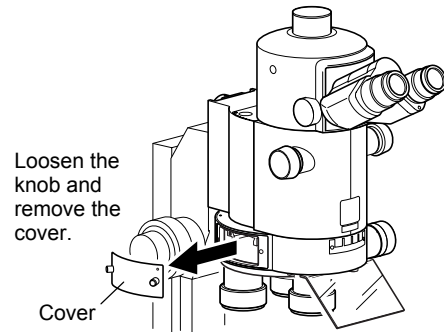
To perform the microscopy under the diasopic illumination, a DIA cube must be attached in the turret.

5. **Insert the filter cube into the dovetail for the filter cube as far as it goes.**

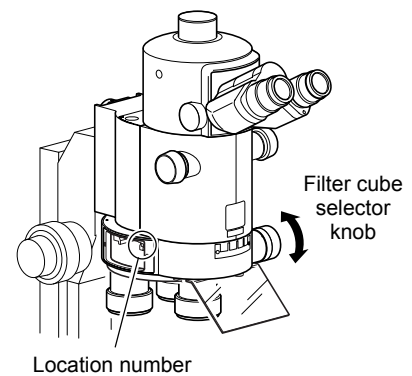
Insert the filter cube with the barrier filter facing upward and the excitation filter facing inside.

If a filter cube is attached in a wrong orientation, the filter cube will not be placed in the optical path for your safety.

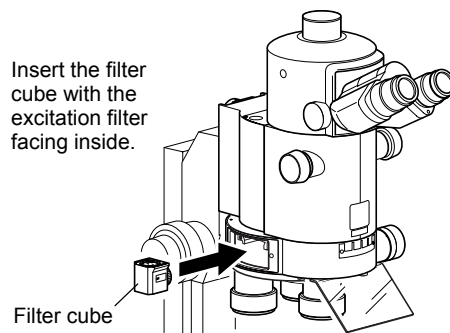
6. **Insert the excitation method nameplate of the inserted filter cube into the holder on the front of the epi-fluorescence attachment.**
7. **Repeat the procedures 3 to 6 to insert all of the desired filter cubes.**
8. **Reattach the cover to the original location with the protrusion on the cover facing the upper ring and secure it by tightening the knob.**



Removing the cover



Location number on the dovetail for the filter cube



Attaching the filter cubes



Caution

Be sure to insert four filter cubes. If no filter cube is placed in a position, strong light including ultraviolet light may enter the optical path and cause an eye injury.

When the number of filter cubes required for microscopy is less than four, insert the provided DIA cube.

In the DIA cube installation, the two openings of the DIA cube must be facing inward and upward.

Attaching the Light Source



Caution

Attach the light source and connect the power supply after assembling the whole microscope. To avoid electric shock or leakage of illumination, be sure to connect the light source after attaching all other devices.

Be sure to read the instruction manual provided with the light source for the attachment and operation procedures. Misuse of the product may result in an accident such as a burst, leakage of gas, electric shock, or blindness due to the reflected ultraviolet light.

Attaching the optical fiber light source

For the optical fiber light source, use the Nikon C-HGFI/ C-HGFIE HG Intensilight.

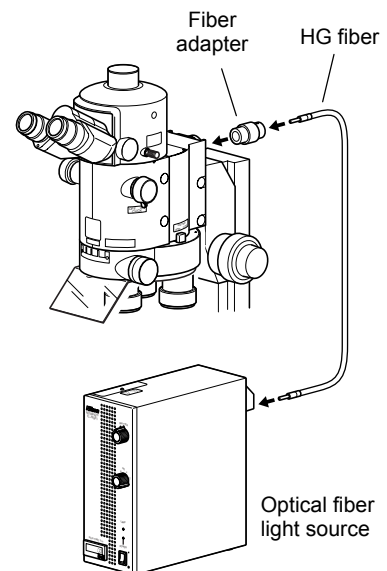
Attach the AZ-HGFA Fiber Adapter to the port on the back of the epi-fluorescence attachment with the locating pin aligned with the groove on the adapter and secure it by fixing the clamp screw. And then, connect the fiber adapter and the light source with the HG fiber [C-HGFIF15/C-HGFIF30 (1.5 m/3 m)].

All connection ports have clamp screws. (Two clamp screws are provided on the AZ-HGFA Fiber Adapter.) Be sure to tighten the screws completely. And insert the light guide fiber as far as it goes and secure it.



Caution

Do not forcefully bend, pull, or twist the light guide fiber. Additionally, do not expose the light guide fiber to high temperature near devices such as the light sources.



Connecting the optical fiber light source

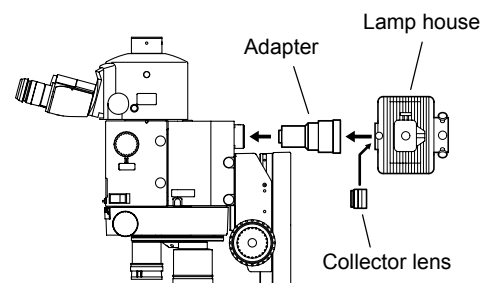
Attaching the mercury lamp house

Attach the AZ-HGA adapter to the port on the back of the product. Be sure to attach the adapter with the locating pin aligned with the groove of the adapter and secure it by fixing the clamp screw.

After that, attach the collector lens to the lamp house and then attach the lamp house to the bayonet-mount of the adapter.

An optional power supply must be used with the mercury lamp house. Connect the lamp cable routing from the mercury lamp house to the power supply.

Refer to the instruction manual of the mercury lamp power supply for attaching or connecting the collector lens, socket, lamp, or power supply.



Attaching the mercury lamp house

5

Troubleshooting

Misuse of the product, although it does not cause a malfunction, may adversely affect performance. If any of the following troubles come, be sure to check the following table for possible causes before requesting service.

Contact your nearest Nikon representative if the troubles cannot be resolved by taking the following measures.

Troubleshooting on Image Viewing

Trouble	Cause	Countermeasure
The viewfield is invisible, vignetted, or uneven in brightness.	The product is not assembled correctly.	Attach the lamps or filters correctly. (p.29 to 34)
	The light source is not connected correctly.	Connect the light source correctly. (p.34)
	The lamp or filter is not attached to the light source correctly.	Attach the lamp or filter correctly. (See the instruction manual for the light source.)
	A slider is at an intermediate position.	Insert the sliders as far as it goes or to the clickstop position.
	No objective is placed into the optical path correctly in the triple nosepiece configuration.	Rotate the triple nosepiece to the clickstop position to place the objective into the optical path.
	Dirt or dust is attached to the lenses (objective and eyepiece), filters, or the specimen.	Clean the components. (p.38)
Dirt or dust is seen in the viewfield.	The opening size of the aperture diaphragm is too small.	Increase the opening size appropriately.
	Dirt or dust is attached to the lenses (objective and eyepiece), filters, or the specimen.	Clean the components. (p.38)
Even though the lamp is on, the image is not visible.	The shutter is closed.	Open the shutter. (p.21)
	The filter cube turret is at an intermediate position.	Rotate the turret by rotating the filter cube selector knob to the click-stop position. (p.21)
	No filter cube is attached in place. Or, the filter cube is attached in a wrong position.	Attach the filter cubes or DIA cubes to all the positions correctly. (p.33)
	The filter cube selection is incorrect.	Place the proper filter cube in the optical path. (p.21)
	No objective is placed into the optical path correctly in the triple nosepiece configuration.	Rotate the triple nosepiece to the clickstop position to place the objective into the optical path.
The viewing is poor (too much or too little contrast, or poor resolution).	The opening size of the aperture diaphragm is too small.	Increase the opening size appropriately.
	Dirt or dust is attached to the lenses (objective and eyepiece), filters, or the specimen.	Clean the components. (p.38)

Troubleshooting on Image Viewing (continued)

Trouble	Cause	Countermeasure
Even though the lamp is on, the image is too dark.	The light source is not centered completely. (when using the super-high pressure mercury lamp house)	Center the lamp.
	The lamp voltage is too low.	Adjust the brightness with the brightness control knob of the light source. (p.22)
	Unnecessary filters are in the optical path.	Place only necessary filters into the optical path.
	The opening size of the aperture diaphragm is too small.	Increase the opening size appropriately.
	The filter cube selection is incorrect.	Place the proper filter cube in the optical path. (p.21)
	The objective is not suitable to the microscopy.	Use the specified objective.
	The room is too bright. (for the epi-fl microscopy)	Darken the room.
The image is too bright.	The lamp voltage is too high.	Adjust the brightness with the brightness control knob of the light source. Or, place the ND filter into the optical path. (p.22)

Troubleshooting on Operation

Trouble	Cause	Countermeasure
The filter cube selector knob does not rotate.	A filter cube is attached in a wrong orientation.	Attach the filter cube in a correct orientation. (p.33)
The range of the zoom magnification is less than the standard range of 1x to 8x even when the zoom knob on the AZ100 is operated.	The zoom body is not installed properly.	Install the zoom body correctly. (p.31)

Troubleshooting on the Light Source

* Refer to the instruction manual of the light source for details of the following countermeasures.

Trouble	Cause	Countermeasure
The lamp does not turn on even though the power switch is turned on.	The power cord is not connected, or is not connected securely.	Plug the power cord to the AC inlet and to the wall outlet.
	No lamp is attached. The lamp is not attached to the socket correctly.	Attach the specified lamp correctly.
	The lamp house connector is not connected to the power supply.	Connect the lamp connector to the power supply.
	The lamp is blown.	Replace the lamp with a new one.
	A wrong lamp is used.	Use the specified lamp.
The lamp flickers, or the brightness is unstable.	The lamp is about to blow.	Replace the lamp with a brand-new.
	The power cord is not connected securely.	Connect the power cord correctly.
	The lamp is not attached to the socket correctly.	Connect the lamp correctly.
	The light guide fiber is not connected correctly.	Connect the light guide fiber correctly. (p.34)
Lamp burns out immediately.	A wrong lamp is used.	Use the specified lamp.
	The input voltage of the power supply is wrong.	Connect the product to the power supply whose voltage is suitable to the product.

6

Care and Maintenance

Cleaning Lenses and Filters

Do not let dust, fingerprint, etc. get on the lenses and filters. The dirt adversely affects the viewing of the image. If any of the lenses or filters gets dirty, clean them as described below.

- Remove dust particles with a soft brush or lightly wipe off with a gauze.
- Only when fingerprints or oily substances are attached, use soft clean lens tissue, cotton cloth or gauze with a little absolute alcohol (ethyl alcohol or methyl alcohol) moistened to remove the dirt.
- Do not use any solvents other than absolute alcohol as they may damage the adhesion surfaces of the lenses or filters. Especially, do not use petroleum benzene for the lens or filter.
- Absolute alcohol is extremely flammable. Keep this flammable solvents away from fire or sparks emitted when turning on/off the power switch of the light source.
- Use absolute alcohol according to the instructions provided by the manufacturer.

Cleaning of the Product

- We recommend that you use a silicon cloth to clean the product.
- For persistent dirt, dampen a piece of gauze with neutral detergent and wipe lightly.
- Use of organic solvent could result in discoloration of the plastic parts.

Decontamination

- We recommend that you use 70 % medical alcohol for decontamination of the product.
- When a specimen is dropped onto the microscope, check that the specimen is hazardous or not. If the specimen is hazardous, follow your standard facility procedures.
- Use of organic solvent could result in discoloration of the plastic parts.

Storage of the Product

- Store this product in a dry place where mold is not likely to form.
- Put the dust-proof cover over this product to protect it from dust.
- Before putting on the dust-proof cover, turn off the power switch of the power source (press it down to the "O" side) and wait until the lamp house gets cool sufficiently.
- Store the lenses and filters in a desiccator or similar container with a drying agent.

Regular Inspections (Charged)

Regular inspection (charged) is recommended to maintain the performance of the product. Contact your nearest Nikon representative for details.

7

Specifications

Model name	AZ-FL Epi-Fluorescence Attachment
Magnification	1x
Filter cube for the epi-fl microscopy	Filter cube: ø25 series Number of attachable filter cubes: 4 Switching type: Inside turret rotation method
Specified light source	C-HGFI/C-HGFIE Intensilight (for the AZ-HGFA) High intensity mercury illuminator (for the AZ-HGA)
Wavelength	For the optical fiber light source: 430 to 700 nm For the high intensity mercury illuminator: 360 to 700 nm
Accessory	Ultraviolet light shield Three DIA cubes Excitation method nameplate
External dimensions	173 mm (width) x 237.5 mm (depth) x 194 mm (height) (excluding protrusions)
Weight	Approximately 3.55 kg
Operating conditions	Temperature: 0 to +40°C Humidity: 85% RH Max (no condensation) Altitude: 2000 m Max Pollution degree: Degree 2 Installation: Category II Indoor use only
Storage environment	Temperature: -20 to +60°C Humidity: 90% RH Max (no condensation)