

M518E 09.7.NF.1



M518EN01

Nikon

Stereoscopic Zoom Microscope

SMZ745T

Instructions

Introduction

Thank you for purchasing a Nikon product.

This instruction manual is written for users of Nikon Stereoscopic Zoom Microscope SMZ745T.

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



WARNING

1. Intended use of this product

This product is intended only for microscopy. Do not use it for any other purposes.

2. Do not disassemble.

Disassembling this product may result in electric shock or malfunction. Do not disassemble any part that is not indicated in this manual. If you experience problems with the product, please contact your nearest Nikon representative.

3. Read the instructions thoroughly.

To ensure safety, thoroughly read this manual and the manuals for other equipment to be used with this product. In particular, be sure to follow the warnings and cautions at the beginning of the manuals.

4. Check the input voltage

When using an illuminator, check that the input voltage displayed on the power supply of the illuminator matches the operating voltage. Please contact your nearest Nikon representative if the displayed voltage does not match the operating voltage. Use of an improperly matched illuminator may result in damage to the equipment.

5. Cautions on the power cord

The power supply is necessary for using the halogen illuminators, which are accessories. Follow the cautions below for the power cord.

- To prevent electric shock, turn off the power switch on the power supply before connecting or disconnecting the power cord.
- For the power supply TN-PSE30W A (for regions with 230 V power only), the power code is specified. Be sure to use the specified power cord for the power supply. Use of other power cords may result in malfunction, overheating, or fire.

(Refer to ■ Power Supply TN-PSE30W A (for regions with 230 V power only) on p.22.)



WARNING

6. Cautions on heat from the light source

The lamp and the lamphouse become extremely hot when the lamp is turned on. Follow the cautions below to prevent burns and fire.

- To avoid burns, do not touch the lamp and the lamphouse while the lamp is on or for approximately thirty minutes after it has been turned off.
- To avoid the risk of fire, 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 has been turned off.

7. Cautions on lamp replacement

- When replacing the lamp, wait approximately thirty minutes after turning off the lamp, and make sure that the lamp and the lamphouse have cooled sufficiently.
- To prevent electric shock and product damage, turn off the power switch on the power supply before replacing the lamp.



CAUTION

1. Check the light source

When using an illuminator, be sure to use the specified rating only. Use of other rating may result in damage to the equipment. Refer to the instructions for the lamp rating.

2. Cautions on assembling the product

- Take care to avoid pinching your fingers and hands.
- Scratches and dirt (i.e. fingerprints) on the lenses will degrade the image quality. When assembling the product, be careful not to scratch or directly touch the lenses.

Notes on Handling the Product

1. Handle with care.

This stereoscopic microscope is a precision optical instrument. Handle the product with care and avoid physical shocks. Physical shocks during transportation and operation as well as forcible operations may result in damage to the product.

2. Installation location

Note the following conditions when installing the product.

- Install the product in a location with a temperature of 0 to +40°C and a relative humidity of 85% or less (no condensation). If installed in a hot or humid location, mold may form on the lenses or condensation may occur inside, resulting in poor performance or damage to the product.
- Do not use the product in a location subject to direct sunlight.
- Install the product in a location with little vibration.
- Install the product in a location with little dust and dirt.

3. Cleaning the lenses

Do not allow dust, fingerprints, or any other dirt to get on the lenses. Dirt on the lenses will degrade the image quality. If a lens becomes dirty, clean them as described below.

- Use an air blower to blow dust away. Remove any dust by brushing off with a soft brush or by wiping gently with a gauze, if necessary.
- Only when there are fingerprints or grease on the lens, wipe gently with a soft, clean cotton cloth, lens tissue, or gauze dampened with a small amount of absolute alcohol (ethyl or methyl). Do not use the same part of the cloth more than once.
- Absolute alcohol is highly flammable. Handle with care. Do not use near an open flame.
- When using absolute alcohol, follow the instructions provided by the manufacturer.

4. Cleaning painted or plastic parts

Use of silicon cloth is recommended for cleaning painted parts, plastic parts and printed parts. If such a part becomes excessively dirty, wipe it gently with a gauze dampened in a mild detergent solution. Do not use organic solvents (such as alcohol, ether, or paint thinner). As this may result in deformation of the part or removal of lettering.

5. Storage

- Store the product in a dry location where mold is unlikely to grow.
- Do not store the product in a location subject to direct sunlight or high temperature and humidity.
- Put a dust-proof cover over the product to protect it from dust.

6. Regular inspections (Paid service)

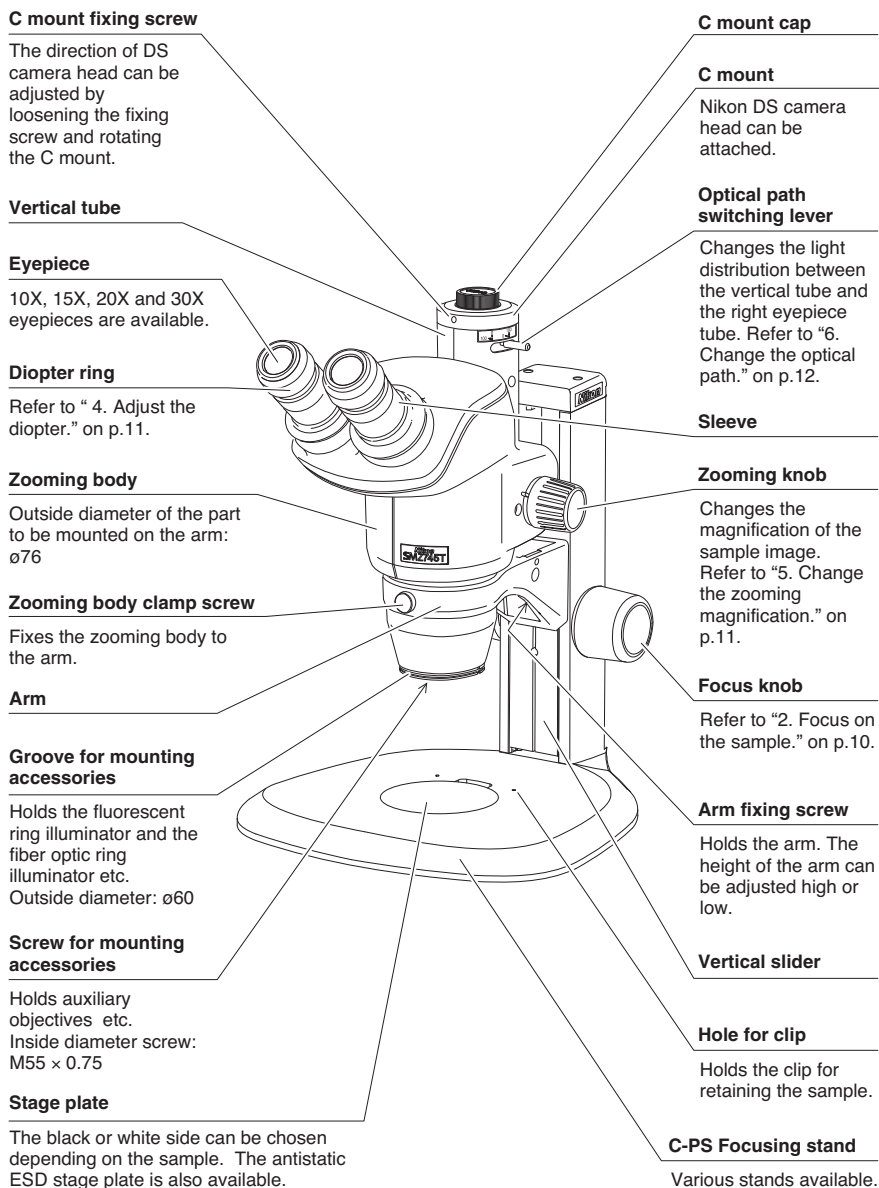
Regular inspections are recommended in order to maintain the peak performance. Please consult your nearest Nikon representative for details about regular inspections.

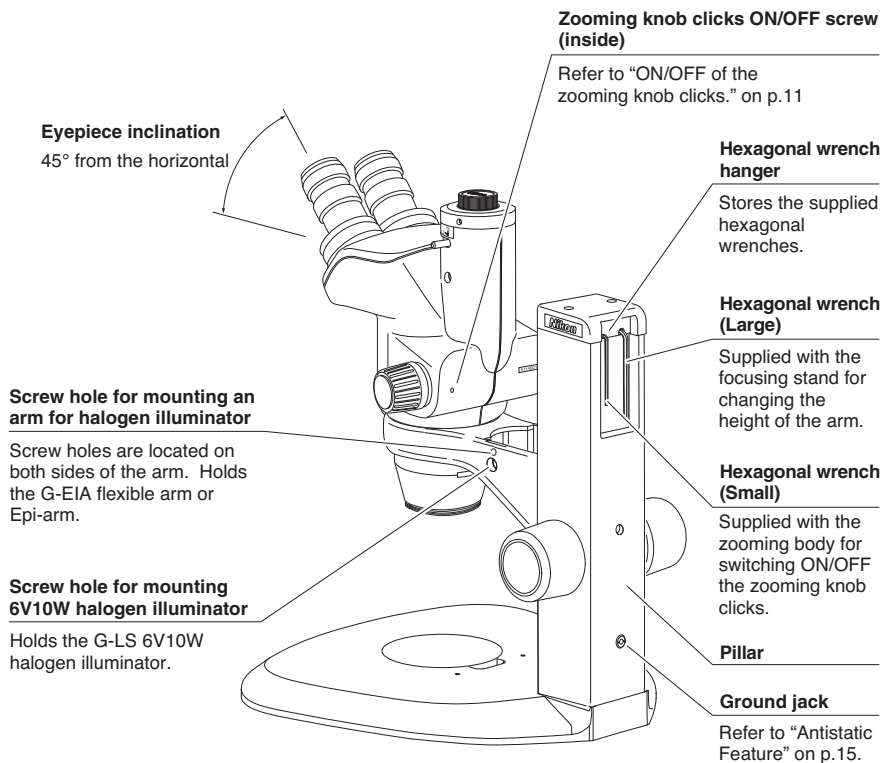
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I Nomenclature

The illustration shows the combination of SMZ745T zooming body, C-W10X eyepieces and C-PS plain focusing stand.





II Microscopy Procedures

- If the microscope has not been assembled, first refer to Chapter III, “Assembly.”

1 Place the sample.

Place the sample in the optical path on the stage plate of the stand. The black or white side can be chosen depending on the sample. Use the stage clips to hold the sample, if necessary.

2 Focus on the sample.

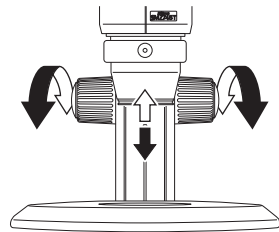
Turning the left and right focus knobs to the same direction will raise or lower the arm (on which the zooming body is mounted) and focus on the sample.

■ Working distance

The distance between the focus plane and the bottom surface of the zooming body is called “the working distance”. Since the working distance of the SMZ745T is 115 mm, the focusing will become easier if you set the zooming body at the position where its bottom surface is 115 mm apart from the sample surface. Refer to Table 1 (p.23) for changing the working distance when the auxiliary objectives are attached.

■ The torque of the focus knob

If the torque of the focus knob is too light, the zooming body falls down by its own weight. Adjust the torque to an appropriate weight. (Refer to “7. Adjust the torque of the focus knob.” on p.14.)



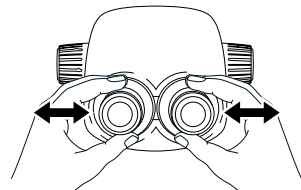
The arm moves down by turning the focus knob towards the observer.

3 Adjust the interpupillary distance.

This adjustment is for adjusting the distance between both eyes of the observer.

Adjust the interpupillary distance so that the fields of view for each eye are merged into one. Move while holding each sleeve with both hands.

This adjustment is required for each observer since individual interpupillary distance vary.



4 Adjust the diopter.

This adjustment is for adjusting the eyesight of the observer.

- 1 Turn the diopter rings on both eyepieces to set them at the 0 position (match the 0 line with the index line).
- 2 Turn the zooming knob to 5X. Focus on the sample using the focus knob. (Refer to “2. Focus on the sample.” on p.10.)
- 3 Turn the zooming knob to 0.67X. Look into the left eyepiece with the left eye, and focus on the sample using the diopter ring on the left eyepiece. Then, look into the right eyepiece with your right eye and focus on the sample using the diopter ring on the right eyepiece.
- 4 Repeat steps 2 and 3 until the image is kept focused even though the zooming magnification is changed. This adjustment ensures the sharp image throughout the zooming range.

This adjustment should be performed each time the observer is changed since individual eyesights vary.

5 Change the zooming magnification.

The magnification of the sample image will change by turning the left and right zooming knobs of the zooming body. Choose the desired magnification.

■ Total magnification

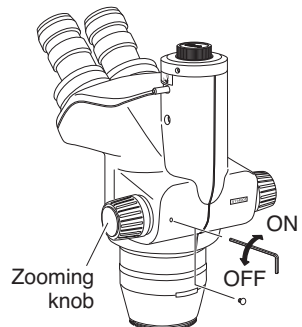
The right zooming knob from the viewing side has the indication of the zooming magnification. Total magnification can be calculated by multiplying the eyepiece magnification by the zooming magnification.

Note) When the auxiliary objective is attached, multiply its magnification as well.

■ ON/OFF of the zooming knob clicks

The clicks on the ON/OFF of the zooming knob are available.

- 1 Remove the small rubber cap from the rear of the zooming body.
- 2 Insert the supplied hexagonal wrench (small) into the screw hole on the rear of the zooming body.

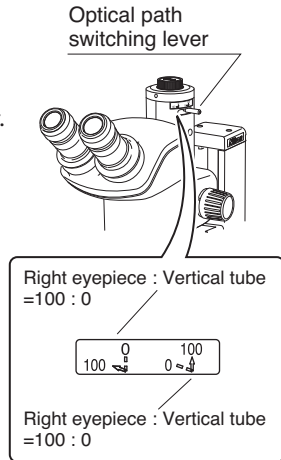


- 3** ON/OFF of the zooming knob clicks are adjustable by turning the inside screw.
- 4** Return the small rubber cap to its original position.

6 Change the optical path.

The light distribution between the vertical tube and the right eyepiece tube can be switched with the optical path switching lever. For binocular observation, move the lever forward. When Nikon DS camera head is mounted to the C mount of the zooming body for taking microphotographs, move the lever backward.

Please refer to the instruction of the camera head for the details of the Nikon DS Camera Head operation.



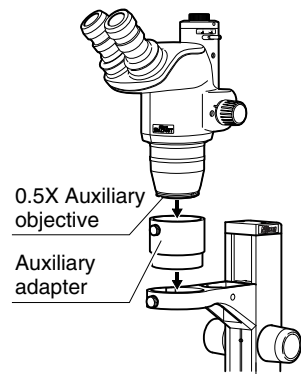
- ☞ • Refer to Table 2 (p.24) for Total Magnification and Real Field of Vertical Tube.

7 Image cannot be focused even with the zooming body at the highest position.

For using the 0.5X auxiliary objective or for observing a tall sample, you may not be able to focus on the sample even if turning the focus knob to raise the zooming body to its highest position.

In this case, use an optional C-ER auxiliary adapter.

Note) Attach the auxiliary objective first to the zooming body, then mount the zooming body on the auxiliary adapter.



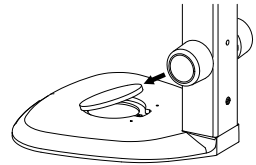
- ☞ • Refer to Table 3 (p.24) for Observable Sample Heights.

III Assembly

- 1 Place the stand on the level surface.**

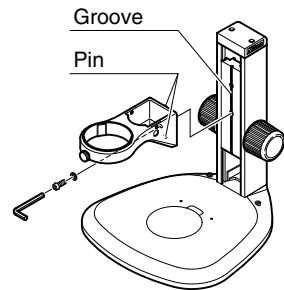
- 2 Mount the stage plate.**

Press the stage plate into the stand base while pushing it against the rim in the direction shown by the arrow in the illustration.



- 3 The stand arm can be lowered. (For not lowering the arm, jump to step 4.)**

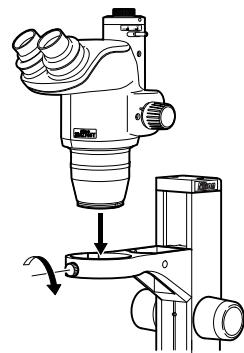
Use the hexagonal wrench (large, supplied with the focusing stand) to loosen the arm fixing screw. Reattach the arm using the screw hole at the lower side of the vertical slider. The arm will become 55 mm lower than its original position. Before tightening the screw, make sure that the two pins on the arm are inserted into the grooves in the vertical slider.



- 4 Mount the zooming body.**

Lightly tighten the zooming body clamp screw to hold the zooming body on the arm.

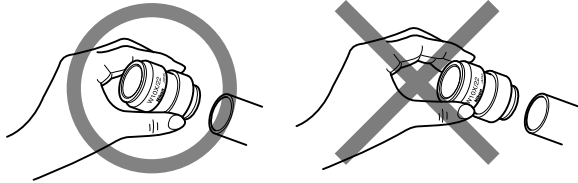
Note) Do not overly tighten the zooming body clamp screw since it may cause damage to the product.



5 Insert the eyepieces into the eyepiece sleeves.

Be sure that it is inserted all the way to the end of the sleeve.

Note) When inserting the 10X eyepiece, assure that it reaches the end of the sleeve, because the rubber cover of the 10X eyepiece will obstruct the view of the sleeve end. When inserting, hold the rubber cover instead of the diopter ring. If not, it may result in the damage to the product.

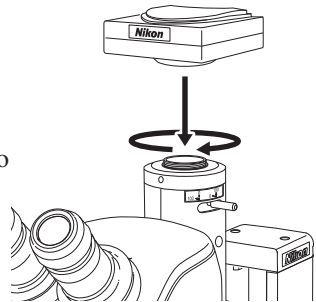


6 Attach the camera head (optional).

Remove the C mount cap from the zooming body.

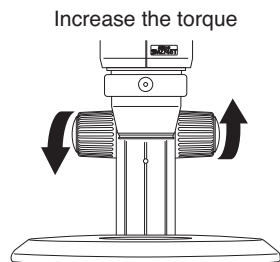
Mount the C mount adapter to DS camera head first. Then, attach the DS camera head to the C mount of the zooming body.

The direction of DS camera head can be adjusted by loosening the fixing screw and rotating the C mount.



7 Adjust the torque of the focus knob.

Adjust the torque of the focus knob so as not to fall down the zooming body by its own weight.



(To reduce the torque, turn the knob in the direction opposite to the arrow.)

8 Storing the tools

The hexagonal wrenches can be stored at the rear of the focusing stand. Refer to the figure on p.9.

Antistatic Feature

The SMZ745T, the C-PS/C-PSC plain focusing stand and the C-W10X eyepieces are antistatic. You can enjoy this feature when observing the sample that cannot stand much static. When using the microscope on this purpose, change the stage plate to antistatic ESD stage plate and ground the microscope through the ground jack at the rear of the plain focusing stand. The ϕ 4 mm grounding terminal can be inserted into the ground jack.

The following accessories are also antistatic.

- C-FPS Fluorescence Attachment
- Auxiliary Objectives (all types)
- C-FMB Focusing Mount B
- G-US1 and G-US2 Universal Table Stands

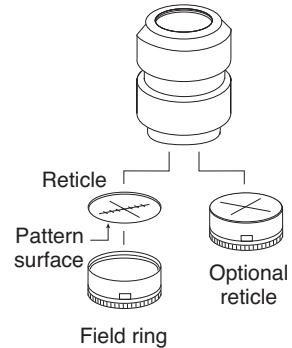
IV Using Accessories

1 Reticles

Your reticles can be attached to the eyepiece. Remove the field ring (or lens room of the 20X and 30X) from the eyepiece, then attach the reticle with its pattern surface facing down to the eyepiece, and reattach the field ring (or lens room).

- ☞ Refer to Table 1 (p.23) for the size of the reticle which can be attached.

Note) The 20X and 30X eyepieces adopt the internal focusing system, and the primary image has the magnification. Use the reticle with 1.3X pattern for 20X eyepiece, and with 1.4X pattern for 30X eyepiece. An optional reticle with cross hairs or scaled cross hairs is available for 10X eyepiece.

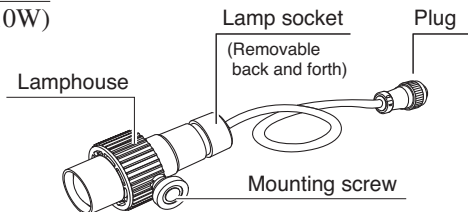


2 Halogen Illuminators

There are two illuminators available: the G-LS of 6V10W and the C-DSLS of 6V20W.

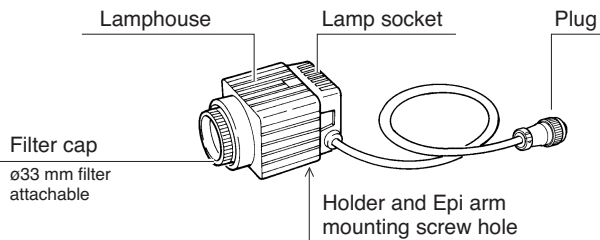
■ G-LS

Lamp Socket A (6V10W)



■ C-DSLS

Illuminator A (6V20W)



1 Lamp

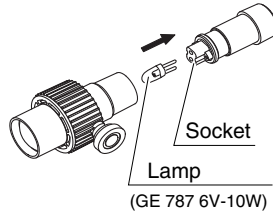


WARNING

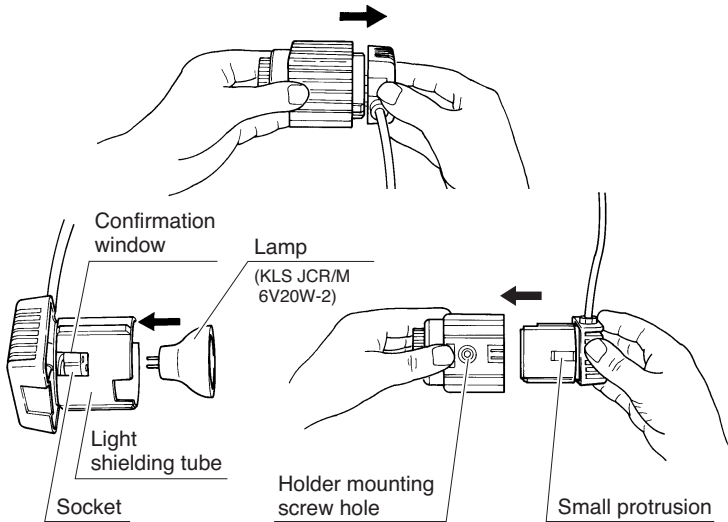
- When replacing the lamp, wait approximately thirty minutes after turning off the lamp, and make sure that the lamp and the lamphouse have cooled sufficiently.
- To prevent electric shock and product damage, turn off the power switch on the power supply before replacing the lamp.

Pull the lamp socket from the lamphouse and insert the lamp straight into the socket to the end. Use halogen lamps of the specified rating only. Then, attach the lamp socket to the lamphouse.

■ G-LS



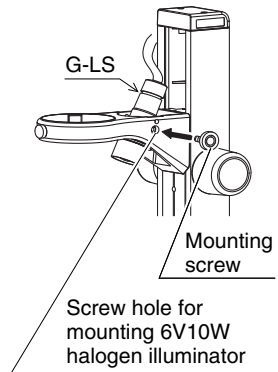
■ C-DSLS



Note) Do not touch the glass part of the lamp with bare hands as it may burn and stick to your skin, possibly reducing its level of light output or causing damage to the lamp. When replacing a lamp, handle it with a cloth or through its packaging until the replacement is completed. If you get fingerprints on the lamp, wipe gently with a clean cloth dampened with alcohol.

2 Attaching to the stand (for G-LS only)

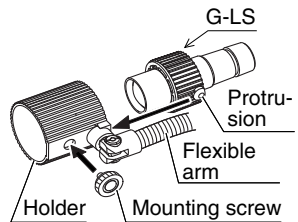
Align the protrusion on the lamphouse with the inside of the screw hole on the arm of the stand (screw hole for mounting 6V10W halogen illuminator), then insert the mounting screw from the outside of the arm and secure it.

**3 Attaching to the stand with arm for halogen illuminator**

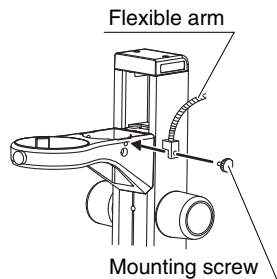
Special arms are provided to be attached to the stand. By using these arms, the direction of illumination can be controlled easily.

1 G-EIA flexible arm (for G-LS only)

Align the protrusion on the lamphouse with the inside of the holder of the flexible arm, then insert the mounting screw from the outside of the holder and secure it.

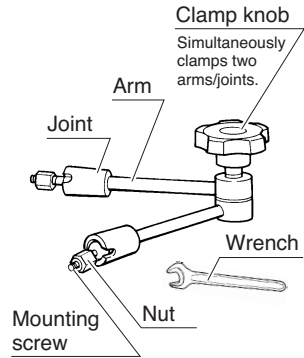


Secure the other end of flexible arm to the left or right screw hole (for mounting an arm for halogen illuminator) on the arm of the stand by the mounting screw supplied with the flexible arm.

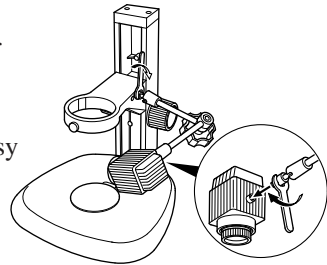


2 Epi arm

Slightly loosen the clamp knob on the arm. Screw in the mounting screw at the end of the Epi arm into the left or right screw hole (for mounting an arm for halogen illuminator) on the arm of the stand while turning the joint. Then, securely tighten the nut using the supplied wrench.



Screw the mounting screw at the other end of the Epi arm into the screw hole on the lamphouse as described above. Set the lamphouse in a position for easy viewing, and tighten the clamp knob.

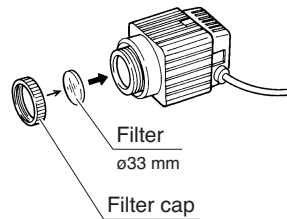


4 Lighting area adjustment (for G-LS only)

You can adjust the lighting area by moving the lamp socket back and forth. Adjust the lighting area to allow easy viewing.

5 Attaching filters (for C-DSLS only)

Rotate and remove the filter cap at the end of the lamphouse and insert a filter. Use filters that have a diameter of 33 mm and a width of 1.5 to 2 mm.



6 Power supplies

Use the Power Supply XN A for regions using 100 to 120 V power, and the Power Supply TN-PSE30W A for regions using 230 V power. Insert the plug of the halogen illuminator into the output connector located on the rear of the power supply.

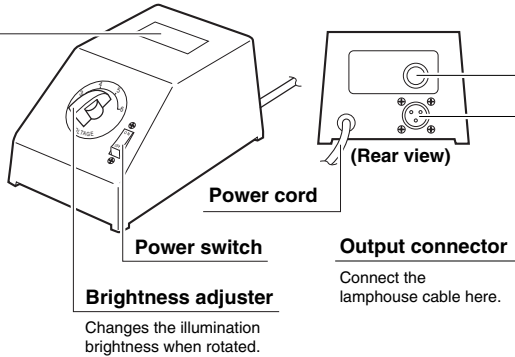
■ Power Supply XN A (for regions with 100 to 120 V power only)

Input voltage display

Check that the voltage displayed matches the voltage used in your area. If the voltages do not match, do not use the power supply and contact your nearest Nikon representative.

Fuse

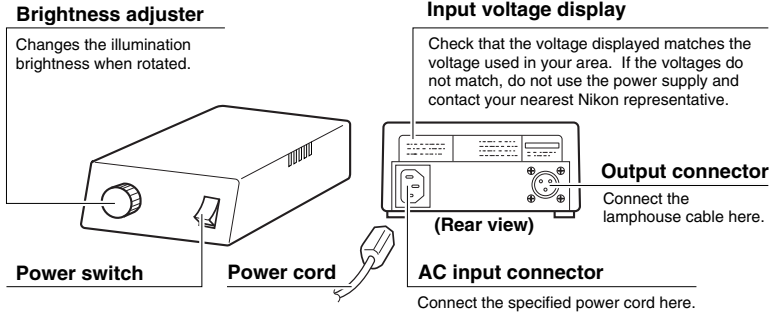
Always use the specified fuse (250 V, 1 A).



Changes the illumination brightness when rotated.

Input rating	Power supply for 100 V regions only: 100 VAC, 50/60 Hz, 30 W Power supply for 120 V regions only: 120 VAC, 50/60 Hz, 30 W
Output rating	3 to 6 VAC, 3.3 A
Fuse rating	250 V, 1 A

■ **Power Supply TN-PSE30W A (for regions with 230 V power only)**



Input rating	230 VAC, 50/60Hz, 0.3 A
Voltage fluctuation	±10%
Output rating	6 VAC, 5 A
Internal fuse	Fast acting type, F1A/250 V, 5.2 × 20 mm
Operating environment	Altitude: 2000 m max. Temperature: 0 to +40°C (indoor use only) Relative humidity: 85% RH max. (no condensation) Pollution level: Degree 2 Installation: Category II
Storage environment	Temperature: -20 to +60°C Relative humidity: 90% RH max. (no condensation)
Protection class	Class I
Power cord	Use only the following power supply cord. Using the wrong power cord could result in danger or fire. The protection Class I equipment should be connected to PE (protective earth) terminal. <ul style="list-style-type: none"> • For 220 to 240 VAC area Approved according to EU/EN standards, 3 conductor grounding Type H05VV-F, 3 m long maximum, rated at 250 VAC minimum.

Table 1: Total Magnification and Real Field of Binocular Tube

Auxiliary objective	Working distance [mm]	Eyepieces											
		10 X			15 X			20 X			30 X		
		Total magnification	Real field [mm]	Field number 22 Reticle diameter ø25	Total magnification	Real field [mm]	Field number 16 Reticle diameter ø19	Total magnification	Real field [mm]	Field number 12.5 Reticle diameter ø19 Magnification 1.3X	Total magnification	Real field [mm]	Field number 7 Reticle diameter ø12 Magnification 1.4X
None	115	6.7 to 50 X	32.8 to 4.4	10 to 75 X	23.9 to 3.2	13.4 to 100 X	18.7 to 2.5	20.1 to 150 X	10.4 to 1.4				
AL0.29 X	311	1.9 to 14.5 X	113.2 to 15.2	3 to 21.8 X	82.3 to 11.0	3.886 to 29 X	64.3 to 8.6	5.8 to 43.5 X	36.0 to 4.8				
AL0.5 X	211	3.4 to 25 X	65.7 to 8.8	5 to 37.5 X	47.8 to 6.4	6.7 to 50 X	37.3 to 5.0	10.1 to 75 X	20.9 to 2.8				
AL0.7 X	150	4.7 to 35 X	46.9 to 6.3	7 to 52.5 X	34.1 to 4.6	9.38 to 70 X	26.7 to 3.6	14.1 to 105 X	14.9 to 2.0				
AL1.5 X	61	10.1 to 75 X	21.9 to 2.9	15 to 112.5 X	15.9 to 2.1	20.1 to 150 X	12.4 to 1.7	30.2 to 225 X	7.0 to 0.9				
AL2 X	43.5	13.4 to 100 X	16.4 to 2.2	20 to 150 X	11.9 to 1.6	26.8 to 200 X	9.3 to 1.3	40.2 to 300 X	5.2 to 0.7				

Table 2: Total Magnification and Real Field of Vertical Tube

Auxiliary objective	Working distance [mm]	Vertical tube	
		0.55 X Field number 11	
		Total magnification	Real field [mm]
None	115	0.37 to 2.75	29.9 to 4.0
AL0.29 X	311	0.11 to 0.80	102.9 to 13.8
AL0.5 X	211	0.18 to 1.38	59.7 to 8.0
AL0.7 X	150	0.26 to 1.93	42.6 to 5.7
AL1.5 X	61	0.55 to 4.13	19.9 to 2.7
AL2 X	43.5	0.74 to 5.50	14.9 to 2.0

Table 3: Observable Sample Heights

(C-PS/C-PSC plain focusing stand + C-DS diascopic stand) [mm]

Auxiliary objective	Arm normal position	Arm lower position	When using auxiliary adapter
None	0 to 91	0 to 36	42 to 147
AL0.29 X	–	–	–
AL0.5 X	–	–	0 to 36
AL0.7 X	0 to 42	–	0 to 98
AL1.5 X	25 to 129	0 to 74	81 to 185
AL2 X	43 to 147	0 to 92	99 to 203