OLYMPUS®

Modules described in this manual

SZ2-LGB
SZ2-LGSF
SZ2-LGSI
SZ2-LGDF
SZ2-LGDI
SZ2-LGR

INSTRUCTIONS

LIGHTGUIDE ILLUMINATOR SYSTEM

This instruction manual is for the Olympus Lightguide Illuminator System. To ensure the safety, obtain optimum performance and to familiarize yourself fully with the use of this equipment, ® we recommend that you study this manual thoroughly before operating the system.
Retain this instruction manual in an easily accessible place near the work desk for future reference.

This publication is printed on 100% recycled paper

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CONTENTS

IMPORTANT

⚠ SAFETY PRECAUTIONS

Lightguide Illuminator SZ2-LGB

1. Before replacing the halogen bulb, be always sure to set the light intensity control knob to "O" (OFF), unplug the power cord of the AC adapter from the power outlet and wait until the bulb holder and bulb have cooled down enough to prevent electric shock or burns.

Applicable bulb	**Halogen bulb (with mirror)12V22WHAL (JCR 12V-22WA/3) mfd. by Philips or KLS**

2. Install the system on one of the specified stands or a flat surface in a manner that does not block air intake through the vent opening on the rear panel. Do not place it on a soft surface in which it may sink, as this will block the vent hole and lead to rise in the internal temperature.
3. Leave the spaces for heat radiation around the system.
   (Read: 10 cm or more. Sides: 5 cm or more. Top: Open space.)
4. Always use the AC adapter and power cord provided by Olympus.
   Distribute the AC adapter cord and power cord so that they do not contact hot areas such as the surroundings of the bulb mount.
5. Be sure to supply power from a grounded, 3-conductor power outlet using the proper power cord. If the power outlet is not **grounded** properly, Olympus can no longer warrant the electrical safety performance of the equipment.
6. To shut down the power supply immediately in a case of emergency, set the light intensity control knob to "O" (OFF) or unplug the power cord of the AC adapter.
7. Do not look directly at the light output from the light guide port to prevent damaging your eye. Also do not insert a finger into the light guide port to prevent burns.
8. Do not carry or apply vibrations to the system while the lamp bulb is on. Otherwise, the degradation or damage or the lamp or malfunction of the system may result.
9. The standard service life of the lightguide illuminator is 8 (eight) years of use or 20,000 hours of total power ON period, whichever is the shorter period.
   For details, see Inspection Sheet on page 16.

Light Guide

1. The input end surface of the light guide is very hot immediately after use.
2. To prevent the light guide fibers from being broken (which results in decrease in the light intensity), do not bend the light guide to a radius below 65 mm (in case of a flexible tube, do not bend it to a radius below 45 mm (SZ2-LGR only) or 30 mm).
3. To prevent shortening the life of the light guide, avoid twisting it whenever possible.

★**When the interlock light guide is used, twisting it in the counterclockwise direction cannot adjust its bending angle (but the light guide may be damaged).**

Safety Symbols

The following symbols are found on the equipment. Study the meaning of the symbols, and always use the equipment in the safest possible manner.

Symbol	Explanation
	Indicates that the surface becomes hot, and should not be touched with bare hands.
	Before use, carefully read the instruction manual. Improper use could result in personal injury to the user and/or damage to the equipment.
O	Indicates that the main switch is OFF.

Warnings

Warning indications are placed at parts where special precaution is required when handling and using the equipment. Always heed the warnings.

Warning indication position	Illuminator (SZ2-LGB) (Bulb mount pull-out knob)	 [High temperature warning]

1 Getting Ready

1. This manual pertains only to the operation of the lightguide illuminator system. Also read the instruction manuals of the SZ2 series microscope and associated options to obtain general understanding on the system.
2. The lightguide illuminator system is composed of precision instruments. Handle them with care and avoid subjecting them to sudden or severe impact.
3. Do not use the system where it is subjected to direct sunlight, high temperature and humidity, dust or vibrations. (For the operating environmental conditions, see "SPECIFICATIONS" on page 12.)

2 Maintenance and Storage

1. To clean the lenses and other glass components, simply blow dirty away using a commercially available blower and wipe gently using a piece of cleaning paper (or clean gauze).
   If a lens is stained with fingerprints or oil smudges, wipe it gauze slightly moistened with commercially available absolute alcohol.

⚠ Since the absolute alcohol is highly flammable, it must be handled carefully.
Be sure to keep it away from open flames or potential sources of electrical sparks - for example, electrical equipment that is being switched on or off.
Also remember to always use it only in a well-ventilated room.

2. To clean the system components other than the glass components, wipe with a clean cloth. If a component is contaminated seriously, wipe it using a soft cloth slightly moistened with a diluted neutral detergent.
3. Never attempt to disassemble any part of the system as this could result in malfunction or reduced performance.
4. When the microscope is not in use, be sure to set the main switch to "O" (OFF). After checking that the lamp housing has been cooled down, place the dust-prevention cover on the microscope for storage.

3 Caution

If the system is used in a manner not specified by this manual, the safety of the user may be imperiled. In addition, the equipment may also be damaged. Always use the equipment as outlined in this instruction manual.

The following symbols are used to set off text in this instruction manual.

⚠ : Indicates that failure to follow the instructions in the warning could result in bodily harm to the user and/or damage to equipment (including objects in the vicinity of the equipment).

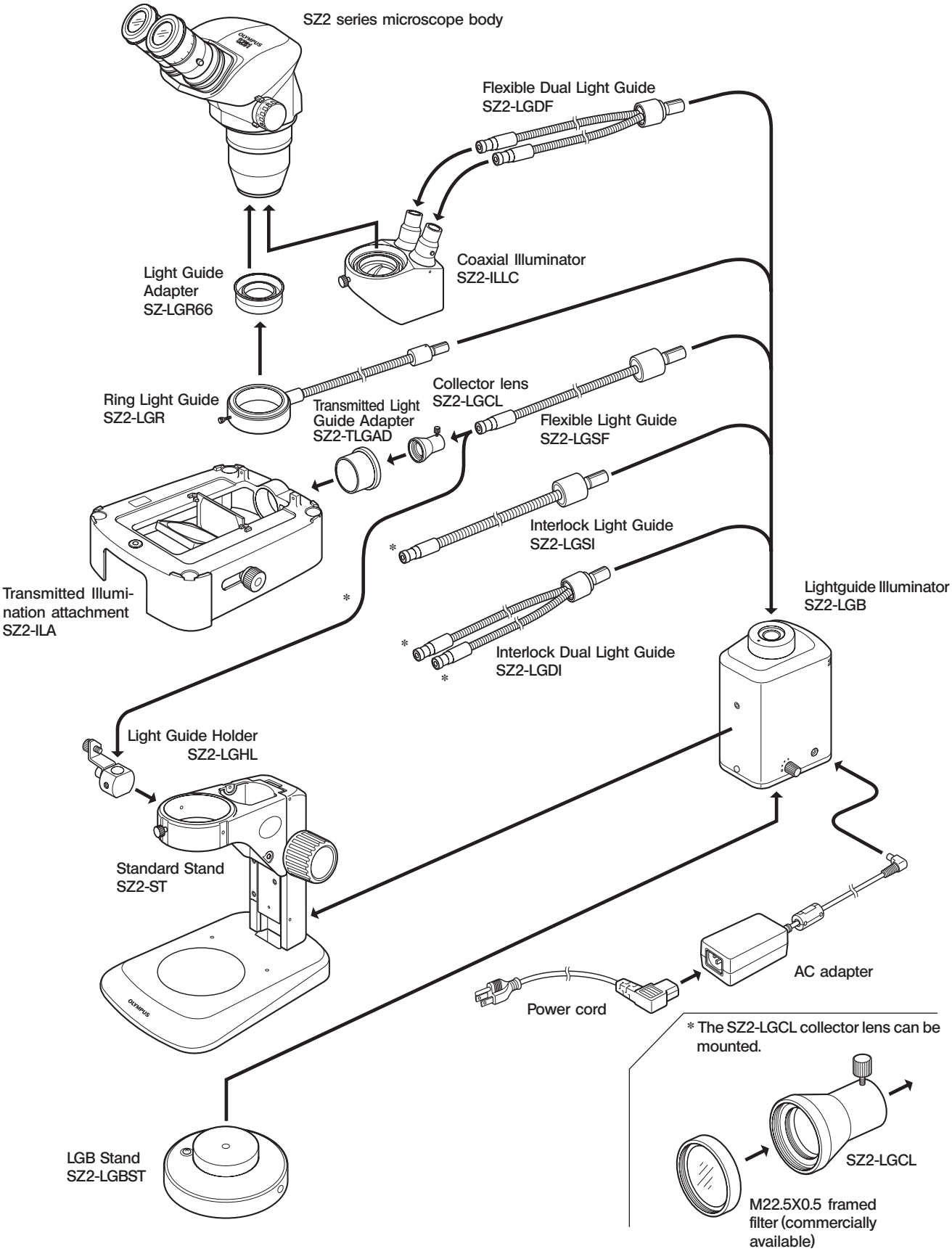
★ : Indicates that failure to follow the instructions could result in damage to equipment.

◎ : Indicates commentary (for ease of operation and maintenance).

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC WARNING: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

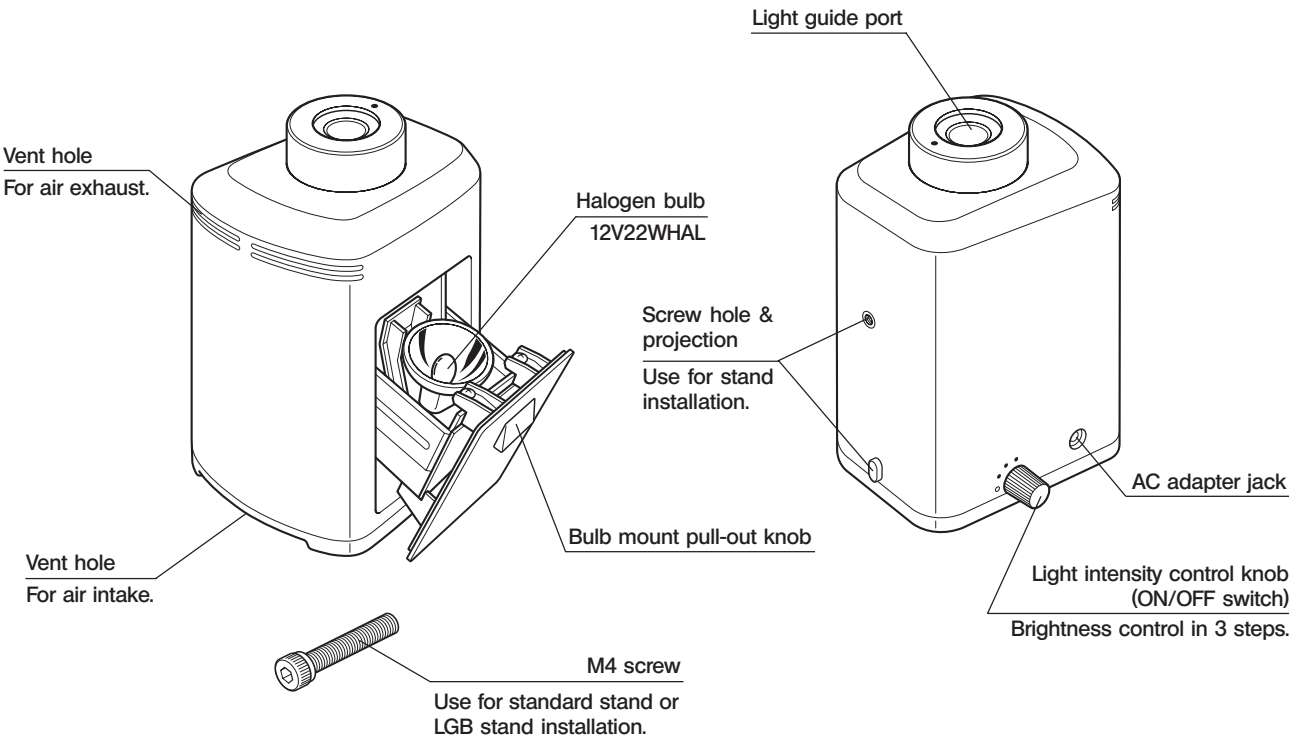
1 SYSTEM DIAGRAM

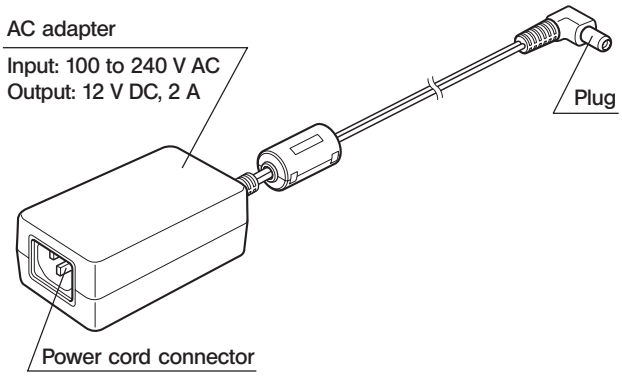


2 NOMENCLATURE

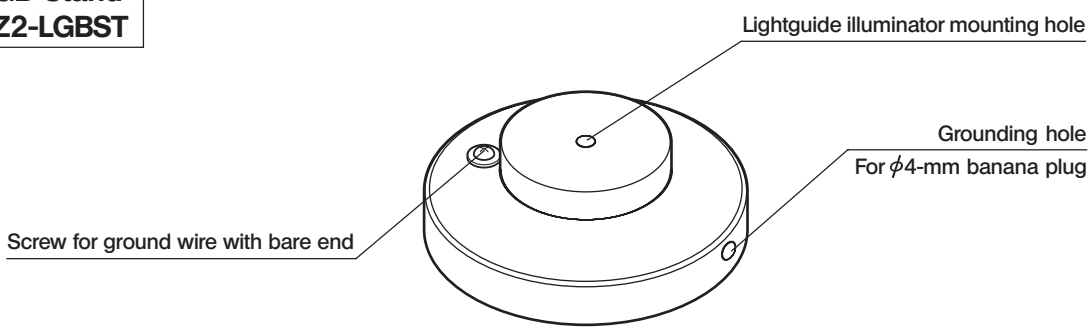
Lightguide Illuminator SZ2-LGB

(Note) The following figure shows the view when the bulb mount is pulled out.





LGB Stand SZ2-LGBST



3 ASSEMBLY

◎Consult the System Diagram and confirm the mounting positions of the modules.

★**Before assembly, remove dirt and dust from the modules and perform operations carefully so as not to damage them.**

3-1 Installing the SZ2-LGB Lightguide Illuminator

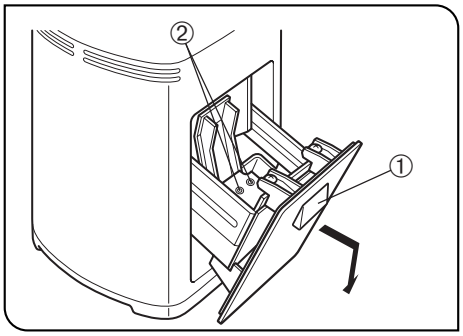


Fig. 1

1 Mounting (Replacing) the Halogen Bulb (Fig. 1)

Applicable bulb	Halogen bulb (with mirror) 12V22WHAL (JCR 12V-22WA/3) mfd. by Philips or KLS (For the average life, see page 11.)

⚠ **Set the light intensity control knob of the illuminator to "O" (OFF) and unplug the power cord of the AC adapter from the power outlet.**

⚠ **The lamp bulb and surroundings are very hot immediately after use. Before replacing the bulb, wait for them to cool down sufficiently.**

1. Hook you finger on the bulb mount pull-out knob ① and pull it toward you till the stop position, and then lower the bulb mount.
2. Align the pins of the halogen bulb with the pinholes on the bulb mount ② and insert firmly.
3. Return the bulb mount to the original position. If this is incomplete, the interlock switch will be activated, making it impossible to turn the lamp on.

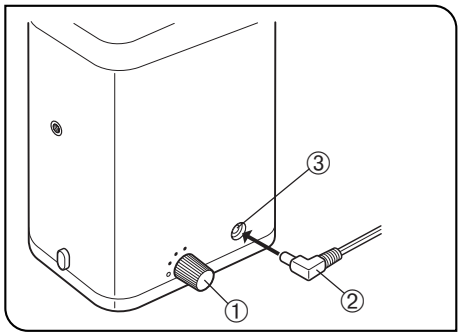


Fig. 2

2 Connecting the AC Adapter (Figs. 2 to 4)

⚠ **The AC adapter cord and power cord are vulnerable to bending and twisting. Do not apply an excessive force to them.**

1. After setting the light intensity control knob ① to "O" (OFF), insert the plug ② of the AC adapter into the AC adapter jack ③ firmly.

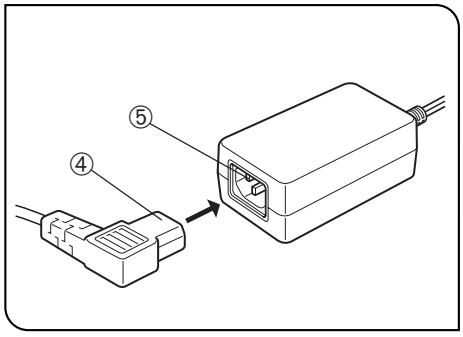


Fig. 3

2. Insert the connector ④ of the power cord into the connector ⑤ on the AC adapter.

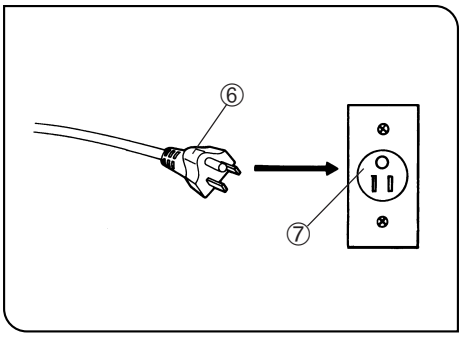


Fig. 4

3. Insert the plug ⑥ of the power cord into the power outlet ⑦.

⚠ Connect the power cord to a grounded, 3-conductor power outlet using the proper power cord. If the power outlet is not grounded properly, Olympus can no longer warrant the electrical safety performance of the equipment.

3-2 Attaching the SZ2-LGB Lightguide Illuminator

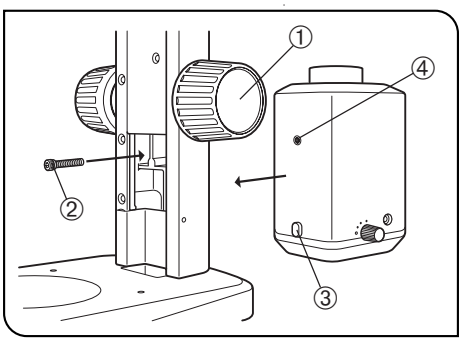


Fig. 5

1 Attaching on the SZ2-ST Standard Stand (Fig. 5)

1. Rotate the focus adjustment knob ① of the SZ2-ST to move the focusing block to the highest limit position.
2. The illuminator-mounting hole is exposed below the focusing block. Insert the provided M4 screw ② into this hole to clamp the illuminator.

◎Attach the illuminator on the rear of the stand by aligning the projection ③. Now the screw hole ④ on the illuminator should be aligned with the illuminator-mounting hole on the stand.

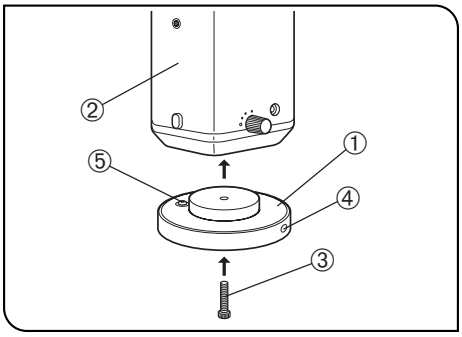


Fig. 6

2 Attaching on the SZ2-LGBST LGB Stand (Fig. 6)

1. Insert the M4 screw ③ provided with the lightguide illuminator ② into the screw hole on the bottom of the LGB stand ①. Then use an Allen wrench to clamp the illuminator.
2. When ESD (electro-static discharge) function is required for the LGB stand, connect a ground wire to ④ if it is with a ϕ4-mm banana plug or to ⑤ if it is with a bare end.

3-3 Attaching the Light Guide and Other Accessories

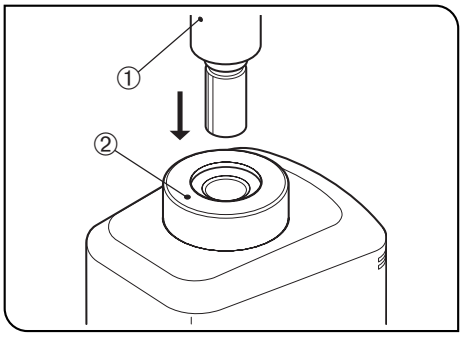


Fig. 7

1 Attaching the Light Guide (Input End) (Fig. 7)

Align marking • ① on the light guide (input end) with marking • ② on the light guide port, and insert the light guide all the way into the port.

2 Attaching the Light Guide (Output End) (Figs. 8 & 9)

SZ2-LGSI/SZ2-LGDI

These light guides need not be attached because the light from the output end is irradiated directly on the specimen surface.

SZ2-LGDF

Insert the output end of this light guide into the SZ2-ILLC coaxial illuminator. (For details, refer to the instruction manual for the SZ2-ILLC.)

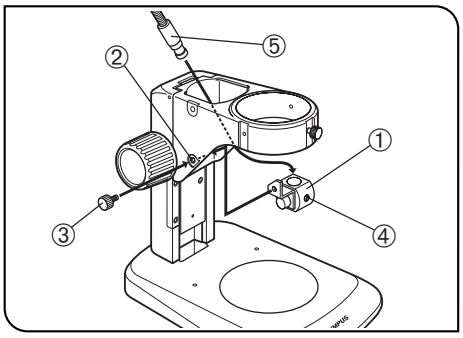


Fig. 8

SZ2-LGSF

1. Attaching using the SZ2-LGHL light guide holder (Fig. 8)

1. Attach the SZ2-LGHL holder ① onto the mounting hole ② and clamp with the mounting screw ③ of the holder.
2. Loosen the light guide clamping screw ④ of the holder slightly using an Allen wrench, insert the output end ⑤ of the light guide into the holder, and tighten the clamping screw.

2. Attaching using the SZ2-TLGAD transmitted light guide adapter (Fig. 9)

1. Attach the SZ2-TLGAD onto the SZ2-ILA transmitted illumination attachment in the same way as attaching the SZ2-LHAD lamp-housing adapter onto it. (For details, refer to the instruction manual for the SZ2-ILA.)
2. Screw the SZ-LGCL collector lens into the SZ2-TLGAD adapter, insert the output end of the light guide into the SZ2-LGCL, and then tighten the clamping screw.

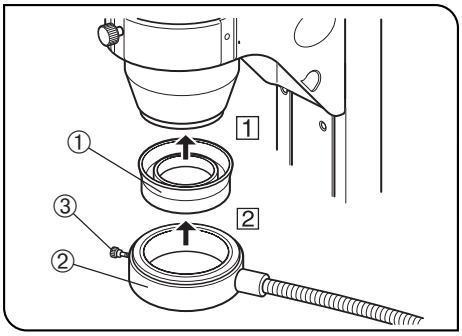


Fig. 9

SZ2-LGR

1. Screw the SZ-LGR66 ring light guide adapter ① into the threaded section of the auxiliary objective mount at the extremity of the SZ2 microscope body.
2. Loosen the clamping knob ③ of the SZ2-LGR ring light guide ②.
3. Fit the SZ2-LGR ② all the way into the SZ-LGR66 ①, and then tighten the clamping knob ③.

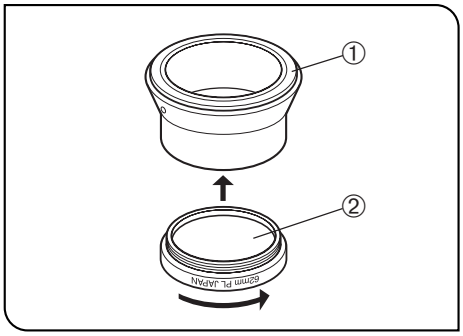


Fig. 10

Attaching the LG-R66PL Analyzer/Polarizer (Figs. 10 & 11)

◎Remove the SZ2-LGR ring light guide temporarily and attach the analyzer before the polarizer.

Attaching the LG-R66PL (62S-PL) Analyzer

★Attach the analyzer so that its indication "62 mm PL JAPAN" is upside down.

Screw the 62S-PL analyzer ② into the bottom of the SZ-LGR66 ring light guide adapter ①.

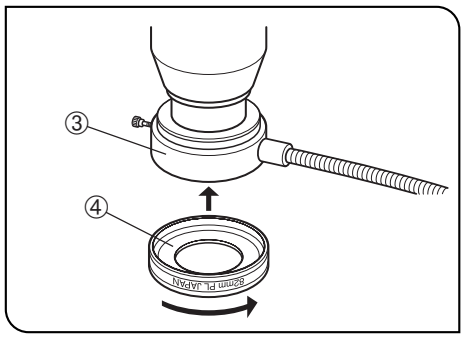


Fig. 11

Attaching the LG-R66PL (82S-PL) Polalizer

★Attach the polarizer so that its indication "82 mm PL JAPAN" is upside down.

Screw the 82S-PL polarizer ④ all the way into the bottom of the SZ2-LGR ring light guide ③.

4 OPERATION

4-1 Adjusting the Light Guide Angle (Interlock Light Guide Only)

◎ Angle adjustment is not necessary for the flexible light guide provided that it is attached to the normal position.

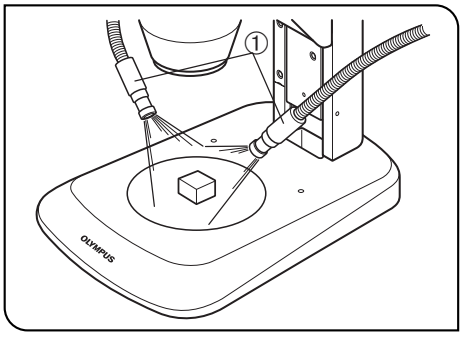


Fig. 12

In the position that does not hinder observation, hold the output end section ① of the light guide with a hand and irradiate the light on the specimen. Do not twist the light guide at this time.

★**Twisting the interlock light guide in the counterclockwise direction cannot adjust its bending strength. Do not twist it to prevent it from being damaged.**

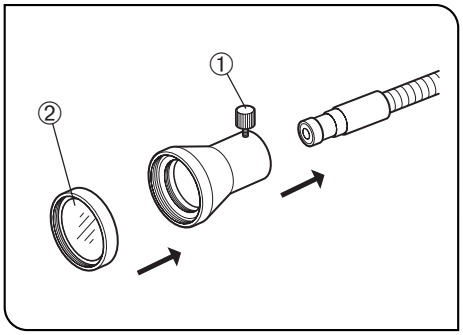


Fig. 13

Using the SZ2-LGCL Collector Lens (Fig. 13)

Loosen the clamping knob ① on the collector lens, fit it into the output end of the light guide (SZ2-LGSI/LGSF/LGDI) and tighten the clamping knob.

Attaching the framed filter

Screw in a commercially available framed filter (M 22.5 mm, pitch 0.5 mm) ② into the extremity of the collector lens.

The type of the filter may include:

- green filter; • yellow filter; • color temperature filter:
- ND filter (for light intensity adjustment).

4-2 Adjusting the Light Guide Brightness

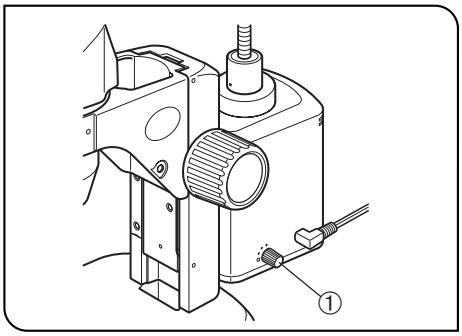


Fig. 14

◎The light intensity control knob ① is also used as the main switch.

1. Turn the light intensity control knob ① clockwise until it clicks. This turns the illuminator on at the minimum light intensity.
2. Turn the light intensity control knob further clockwise to set the light intensity to the medium and maximum positions.

⚠ To turn the light off, set the light intensity control knob to "○" (OFF). The interior of the illuminator remains hot even after the light has been turned off, so leave it until it is completely cooled down.

■ Light intensity control knob position and average bulb life

◎The service life of the lamp bulb is 50 hours when it is used under the rated voltage. However, this system is designed to extend the service life by using lower rated voltages.

Whenever high brightness is not required, it is recommended to use the system at the minimum intensity.

Setting of marking • on the light intensity control knob	Average life
Left (Minimum intensity)	2,500 hours
Center (Medium intensity)	500 hours
Right (Maximum intensity)	100 hours

4-3 Using the LG-R66PL Analyzer/Polarizer

1 Non-reflection Observation

★ Ensure that the analyzer (62S-PL) and polarizer (82S-PL) of the LG-R66PL are mounted.

◎Turn the rotary ring at the tip of the polarizer for non-reflection observation, with which the specimen can be observed clearly by eliminating direct reflection light from the specimen.

2 Simplified Polarized Light Observation

◎Reflecting polarized light of a mineral or similar specimen can be observed in a simplified manner by manipulating the analyzer and polarizer.

1. With no specimen set, turn the rotary ring at the tip of the polarizer so that the field of view is dark (crossed Nicol).
2. Place the specimen on the stage and rotate the specimen for polarized light observation. When the specimen includes a polarizing substance, its position becomes dark or bright as the specimen is rotated.

5 SPECIFICATIONS

■ Light Guides

Item		Specifications				
Model		SZ2-LGR	SZ2-LGDI	SZ2-LGDF	SZ2-LGSI	SZ2-LGSF
Tube	Type,	Flexible tube,	Interlocked tube,	Flexible tube,	Interlocked tube,	Flexible tube,
	Length	800 mm	500 mm	400 mm	500 mm	400 mm
Fiber	Type	Multi-componentLB56N equivalent, ϕ 50 mm				
	Aperture number	0.56				
Bundle diameter	Input End	ϕ 8 mm	ϕ 5.65 mm	ϕ 5.65 mm	ϕ 4 mm	ϕ 4 mm
	Output End	ϕ 70 X 0.22t mm	ϕ 4 mm	ϕ 4 mm	ϕ 4 mm	ϕ 4 mm
Converging section		Random				
Minimum bending radius		30 mm	65 mm	30 mm	65 mm	30 mm
Light balance between branches		—	90% or more	90% or more	—	—

■ Lightguide Illuminator SZ2-LGB

Item	Specification
Rated voltage	AC adapter Input: 100-240 V AC, 50/60 Hz. Output: 12 V DC, 2 A
Lamp bulb	Halogen bulb (with dichroic mirror)
Bulb model	12V22WHAL (JCR 12V22WA/3)
Bulb life	100 hours (maximum intensity), 500 hours (medium intensity), 2500 hours (minimum intensity)
Light intensity adjustment	Voltage adjustment (3 steps)
Color temperature (reference value)	3290K (maximum intensity), 2960K (medium intensity), 2840K (minimum intensity)
Cooling method	Natural convection
Dimensions	90(W) x 153(H) x 100(D) mm
Weight	Approx. 600g (AC adapter: 200 g)
Operating environment	• Indoor use • Altitude : Max. 2,000 m • Ambient temperature: 5°C to 40°C (41°F to 104°F) • Maximum relative humidity: 80% for temperatures up to 31°C (88°F), decreasing linearly through 70% at 34°C (93°F), 60% at 37°C (99°F), to 50% relative humidity at 40°C (104°F) • Supply voltage fluctuations: ±10% • Pollution degree: 2 (in accordance with IEC664) • Installation/Overvoltage category: II (in accordance with IEC664)

6 TROUBLESHOOTING

Under certain conditions, performance of the system may be adversely affected by factors other than defects. If problems occur, please review the following list and take remedial action as needed.
If you cannot solve the problem after checking the entire list, please contact Olympus.

Irregularity description	Possible cause	Solution	Page
a) The bulb does not light.	Cords and cables are connected improperly.	Connect them securely.	6,7
	The bulb life has expired.	Replace the bulb.	6
	The bulb mount is not pushed in. (The interlock mechanism is activated.)	Push it in completely.	6
	The bulb is not mounted.	Mount a bulb correctly.	6
b) The bulb lights but .lighting is unstable	The bulb life has expired.	Replace the bulb.	6
c) The bulb lights but the field of view is dark.	The bulb life has expired.	Replace the bulb.	6
	An optical component (bulb or light guide ends) is dirty	Clean it.	2
d) The bulb turns off in the middle of use.	The bulb life has expired.	Replace the bulb.	6
e) The field of view is not evenly illuminated.	The bulb is mounted improperly.	Mount a bulb correctly.	6

PROPER SELECTION OF THE POWER SUPPLY CORD

If no power supply cord is provided, please select the proper power supply cord for the equipment by referring to " Specifications " and " Certified Cord " below:

CAUTION: In case you use a non-approved power supply cord for Olympus products, Olympus can no longer warrant the electrical safety of the equipment.

Specifications

Voltage Rating	125V AC (for 100-120V AC area) or, 250V AC (for 220-240V AC area)
Current Rating	6A minimum
Temperature Rating	60°C minimum
Length	3.05 m maximum
Fittings Configuration	Grounding type attachment plug cap. Opposite terminates in molded-on IEC configuration appliance coupling.

Table 1 Certified Cord

A power supply cord should be certified by one of the agencies listed in Table 1 , or comprised of cordage marked with an agency marking per Table 1 or marked per Table 2. The fittings are to be marked with at least one of agencies listed in Table 1. In case you are unable to buy locally in your country the power supply cord which is approved by one of the agencies mentioned in Table 1, please use replacements approved by any other equivalent and authorized agencies in your country.

Country	Agency	Certification Mark	Country	Agency	Certification Mark
Argentina	IRAM		Italy	IMQ	
Australia	SAA		Japan	JET, JQA, TÜV, UL-APEX / MITI	
Austria	ÖVE		Netherlands	KEMA	
Belgium	CEBEC		Norway	NEMKO	
Canada	CSA		Spain	AEE	
Denmark	DEMKO		Sweden	SEMKO	
Finland	FEI		Switzerland	SEV	
France	UTE		United Kingdom	ASTA BSI	
Germany	VDE		U.S.A.	UL	
Ireland	NSAI				

Table 2 HAR Flexible Cord

APPROVAL ORGANIZATIONS AND CORDAGE HARMONIZATION MARKING METHODS

Approval Organization	Printed or Embossed Harmonization Marking (May be located on jacket or insulation of internal wiring)		Alternative Marking Utilizing Black-Red-Yellow Thread (Length of color section in mm)		
			Black	Red	Yellow
Comite Electrotechnique Belge (CEBEC)	CEBEC	‹HAR›	10	30	10
Verband Deutscher Elektrotechniker (VDE) e.V. Prüfstelle	‹VDE›	‹HAR›	30	10	10
Union Technique de l´Electricite´ (UTE)	USE	‹HAR›	30	10	30
Instituto Italiano del Marchio di Qualita´ (IMQ)	IEMMEQU	‹HAR›	10	30	50
British Approvals Service for Electric Cables (BASEC)	BASEC	‹HAR›	10	10	30
N.V. KEMA	KEMA-KEUR	‹HAR›	10	30	30
SEMKO AB Svenska Elektriska Materielkontrollanstalter	SEMKO	‹HAR›	10	10	50
Österreichischer Verband für Elektrotechnik (ÖVE)	‹ÖVE›	‹HAR›	30	10	50
Danmarks Elektriske Materialkontroll (DEMKO)	‹DEMKO›	‹HAR›	30	10	30
National Standards Authority of Ireland (NSAI)	‹NSAI›	‹HAR›	30	30	50
Norges Elektriske Materiellkontroll (NEMKO)	NEMKO	‹HAR›	10	10	70
Asociacion Electrotecnica Y Electronica Espanola (AEE)	‹UNED›	‹HAR›	30	10	70
Hellenic Organization for Standardization (ELOT)	ELOT	‹HAR›	30	30	70
Instituto Portages da Qualidade (IPQ)	np	‹HAR›	10	10	90
Schweizerischer Elektro Technischer Verein (SEV)	SEV	‹HAR›	10	30	90
Elektriska Inspektoratet	SETI	‹HAR›	10	30	90

Underwriters Laboratories Inc. (UL)	SV, SVT, SJ or SJT, 3 X 18AWG
Canadian Standards Association (CSA)	SV, SVT, SJ or SJT, 3 X 18AWG

7 LIGHTGUIDE ILLUMINATOR INSPECTION SHEET

- Study the instruction manual for the lightguide illuminator before inspection.
- For safe use of the lightguide illuminator, we recommend performing the following inspection periodically (every time you replace the lamp bulb and at least every 6 months).
- The table below identified the check items to be observed. Put (X) if not applicable or (✓) if applcable.
- If there is any (X) mark noted, immediately stop use of the product, and consult Olympus for detailed inspections or replace the lightguide illuminator.
- If you detect an abnormality other than that listed below or with other Olympus product, also stop the use of the product and contact Olympus for detailed inspections.
- Note that the service, replacement and detailed inspections are charged after expiration of the warranty period.

If you have any questions, please contact Olympus.

	Check results (Date)			
Check items	/	/	/	/
1. More than 8 years have passed since original purchase or the total power ON time has exceeded 20,000 hours.				
2. Lamp does not light sometimes even though the main switch is set to on.				
3. Illumination flickers when you move the lightguide illuminator.				
4. Scorching or burning odor is produced during use.				
5. Illumination still flickers after replacement with a new lamp bulb.				
6. Extreme discoloration of the lamp socket. Uneveb discoloration of the left and right sections of these parts.				
7. Discoloration, deformation or cracking of the lightguide illuminator.				
8. Melting, crack, deformation or solidification of the wiring part.				
9. Increased frequency of servicing compared to similar devices put into use at the same time as the lightguide illuminator.				

* When the Check Result columns become insufficient, copy this sheet.

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