

Instructions

LG-LSLED

LED light source for light guide

Notes

To ensure the safety, obtain optimum performance and to familiarize yourself fully with the use of this product, we recommend that you study this manual thoroughly before operating this product, and always keep this manual reachable when operating this product.

For details of products included in the configuration of this system, see page 8.

Optical Microscope Accessory

This product is applied with the requirements of standard IEC/EN61326-1 concerning electromagnetic compatibility.

- Immunity Industrial and basic electromagnetic environment

Emissions exceeding the level required by aforementioned standards may occur if this product is electrically connected to other equipment.

NOTE: This product 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 product is operated in a commercial environment. This product 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 product 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 product.

FCC Supplier's Declaration of Conformity

Hereby declares that the product

Product name: Optical Microscope Accessory

Model Number: LG-LSLED

Conforms to the following specifications:

FCC Part 15, Subpart B, Section 15.107 and Section 15.109

Supplementary Information:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Responsible Party Name: Evident Scientific, Inc.

Address: 48 Woerd Ave Waltham, MA 02453, USA

Phone Number: 781-419-3900



In accordance with European Directive on Waste Electrical and Electronic Equipment, this symbol indicates that the product must not be disposed of as unsorted municipal waste, but should be collected separately.

Refer to your local distributor in EU for return and/or collection systems available in your country.

For Korea only

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

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Concept of this instruction manual

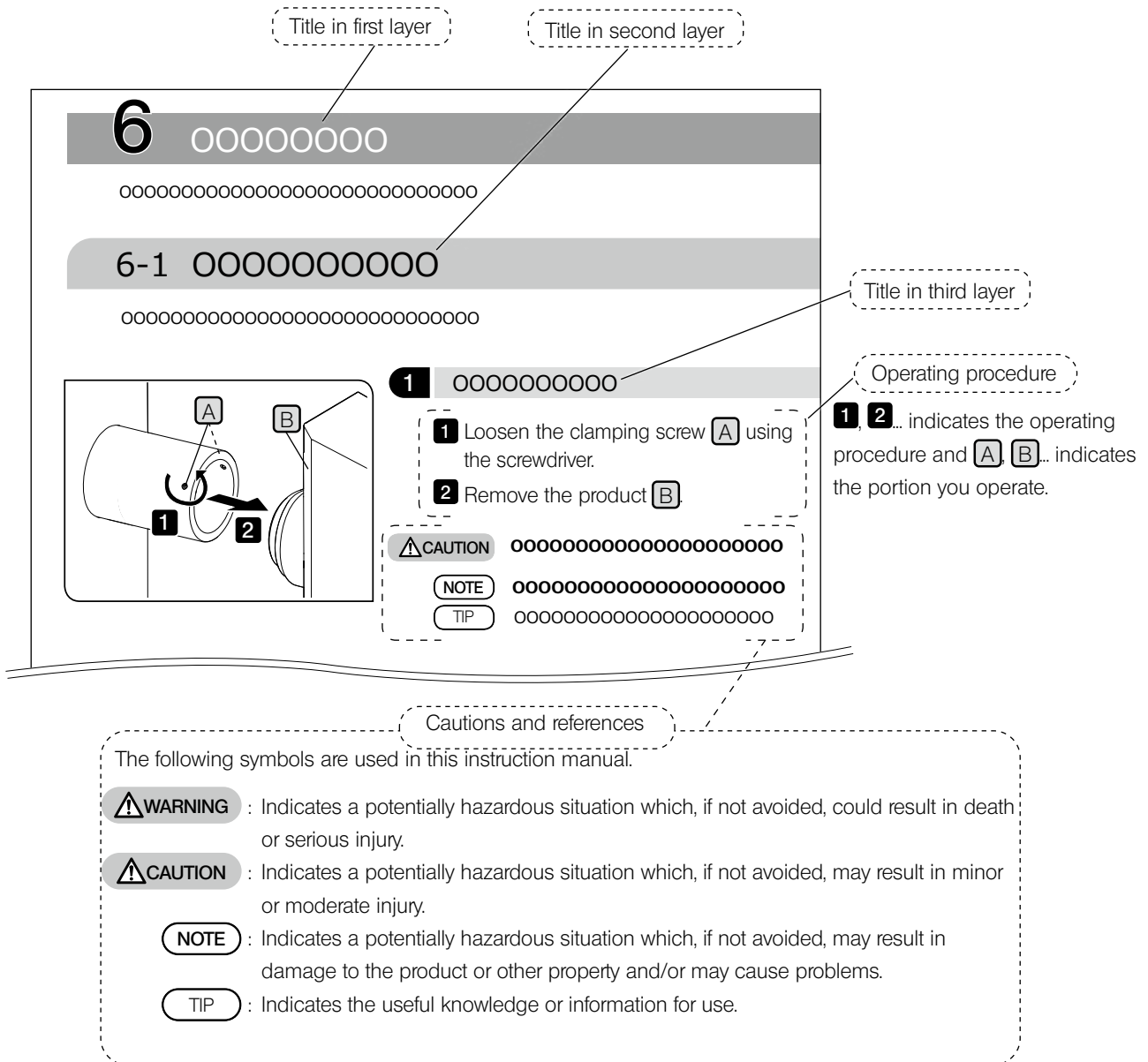
This instruction manual describes only the contents related to LG-LSLED (LED light source for light guide).
 When using this product, read all the instruction manuals supplied with the products (option) you purchased together with this manual.

Applicable user of this instruction manual

This instruction manual applies to users who use this product according to "Intended use" and our distributors.

How to read this instruction manual

This instruction manual is created as follows.



Product Concept

Product outline

Using this LG-LSLED (LED light source for light guide) in combination with our microscope via light guide allows you to illuminate the sample.

Intended use

This product is designed as the illumination unit for microscope.

This product is intended to used in combination as a system, refer to the instruction manual for the system product to be combined.

Cautions and confirmation before use

This product includes the following items. If any item is missing or damaged, contact us.

- AC adapter

Safety precautions

If the product is used in a manner not specified by this manual, the safety of the user may be imperiled. In addition, the product may also be damaged. Always use the product according to this instruction manual.

Installation



WARNING • **Do not block the air vents.**

Do not install the product on a table or bench which has soft surface, as the product may sink and the air vents of the bottom surface may be blocked, which creates a fire hazard.

Do not to block the air vents on the back of the product. Secure the space of 10 cm or more around the air vents.



CAUTION • **Install the product on a level table or bench.**

Prevention of electric shock



WARNING • **Never disassemble each part of this product.**

It could cause electric shock or failure of the product.

• **Do not touch the product with wet hands.**

In particular, if you touch the main switch of the power unit or the power cord with wet hands, electric shock, ignition or failure of the product may be caused.

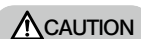
• **Do not bend, pull or tie the power cord/cables in a bundle.**

Otherwise they could be damaged, causing a fire or an electric shock.

• **Never insert any tools or metal fragments in the air vents of the product.**

As this product contains the cooling fan, if you insert metal fragments or similar, the fan may be damaged or fire may be caused.

Electric safety



CAUTION • **Always use the power cord provided by us.**

If the proper AC adapter and the power cord are not used, the electric safety and the EMC (Electromagnetic Compatibility) performance of the product cannot be assured. If no power cord is provided, please select the proper power cord by referring to the section "Proper selection of the power cord" at the end of this instruction manual.

• **Always connect the ground terminal.**

Make sure that the ground terminal of the power cord and that of the power outlet are connected properly. If the product is not grounded, our intended electric safety and EMC performance of the product cannot be assured.

• **Do not use the product in close proximity to the sources of strong electromagnetic radiation.**

Proper operation may be interfered. The electromagnetic environment should be evaluated prior to operation of the product.

• **Disconnect the power cord in case of emergency.**

In case of emergency, disconnect the power cord from the power cord connector on the product or from the power outlet.

Install the product at the location where you can reach the power cord connector or the power outlet at hand to disconnect the power cord quickly.

• **Do not connect or disconnect the power cord, cables and products (optional) while the power is on.**

LED

This product emits high-intensity visible light. Because light-absorbing materials have the physical property of converting incident light into heat, damage can arise to heat-sensitive or flammable light-absorbing materials. To avoid such thermal damage and the potential danger of fire or burns, please obey the following instructions:



WARNING

- Never cover up the light guide socket or light guide exit (danger of fire).
- Never cover up the open light guide socket or light guide exit with your hands or other parts of the body (danger of burns).



CAUTION

Do not look at the LED light directly.

LG-LSLED is classified as Risk Group 2 regulated by IEC62471 "Photobiological Safety of Lamps and Lamp Systems".

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

Light guide



WARNING

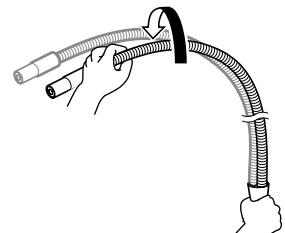
- When turning ON the LED unit, do not cover the hole of the light guide socket of LG-LSLED or the distal end of the light guide. Otherwise, it may cause fire or burns.
- If there is a light guide that is not illuminating the sample when turning ON the LED unit, be sure to secure the space of 10 cm or more between the flammable light-absorbing materials and the distal end of such light guide. Otherwise, it may cause fire or burns.
- When illuminating heat-sensitive or flammable light-absorbing objects, special care must be taken to ensure that an appropriate suitable distance between light guide and object, and a suitable lamp brightness level are selected so that no thermal damage occurs.



CAUTION

- Be careful, the distal end of the incident fiber of light guide and the portions connected with the light guide socket are very hot during use or immediately after use.
- In order to prevent breaking the fiber in the light guide (reduction of light intensity), do not bend the light guide forcibly.
- If you bend the light guide, twist it as little as possible. The lifetime of the light guide may become shorter.
- When using the dual light guide LG-DI or LG-DFI, the twist of the light guide may be loosened and it may be bent spontaneously when determining the illumination position.



You can prevent the light guide from bending spontaneously by twisting the light guide in the arrow direction shown in the picture. However, do not twist the light guide too firmly.



Safety warning symbols




The following symbols are placed on the product.

Study the meaning of the symbols and always use the product in the safest possible manner.

Symbol	Meaning
	Indicates a non-specific general hazard. Follow the description given after this symbol or in the instruction manual.
	Indicates that the surface becomes hot. Be careful, it may cause burns.
I	Indicates that the seesaw type main switch is ON. (Seesaw type is the type of switch where ON or OFF is selected by pressing it to ON or OFF side.)
O	Indicates that the seesaw type main switch is OFF.

Label position and instruction

The labels are attached to the portions which require special cautions during use and operation. Be sure to follow these instructions.

Label position	Label	Instructions in instruction manual	Page
Back of LG-LSLED		Caution for electric safety	3
Front of LG-LSLED		Warning and caution for LED	4
		High temperature	4

When caution labels are dirty or peeled off, contact us for replacement or inquiries.

Handling precautions

General

- NOTE**
- This product is a precision instrument. Handle it with care and avoid subjecting it to a sudden or severe impact.
 - Never disassemble any part of the product. Otherwise, failure could be caused.
 - Do not use the product in areas where it may be subjected to direct sunlight, high temperature and/or humidity, dust or vibrations.
(For conditions of operating environments, see “5 Specifications” (P.13).)
 - For products (option) attachable to this product, see “1 System diagram” (P8).
The use of this product in combination with other separately available items not only creates the risk of abnormal operation, but it also may damage the product.
- TIP**
- The power cord is for exclusive use of this product. Do not use it with other product.
 - Before disposing of this product, be sure to follow the regulations and rules of your local government.

Maintenance and storage

Cleaning of each unit

Do not leave stains or fingerprints on the lenses and filters. If they get dirty, blow away dust with a commercially available blower and gently wipe the lens or filter with a piece of cleaning paper (or clean gauze).

Only when cleaning fingerprints and oil stains, slightly moisten a piece of cleaning paper with commercially available absolute alcohol and wipe them off with it.

⚠ WARNING

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, the electrical equipment that is switched ON and OFF may cause the ignition of a fire. Also, always use absolute alcohol only in a well-ventilated room.

Wipe the portions other than the lens with a dry soft cloth. If the dirt cannot be removed by dry-wiping, moisten a soft cloth with diluted neutral detergent and wipe the dirty surface with it.

NOTE

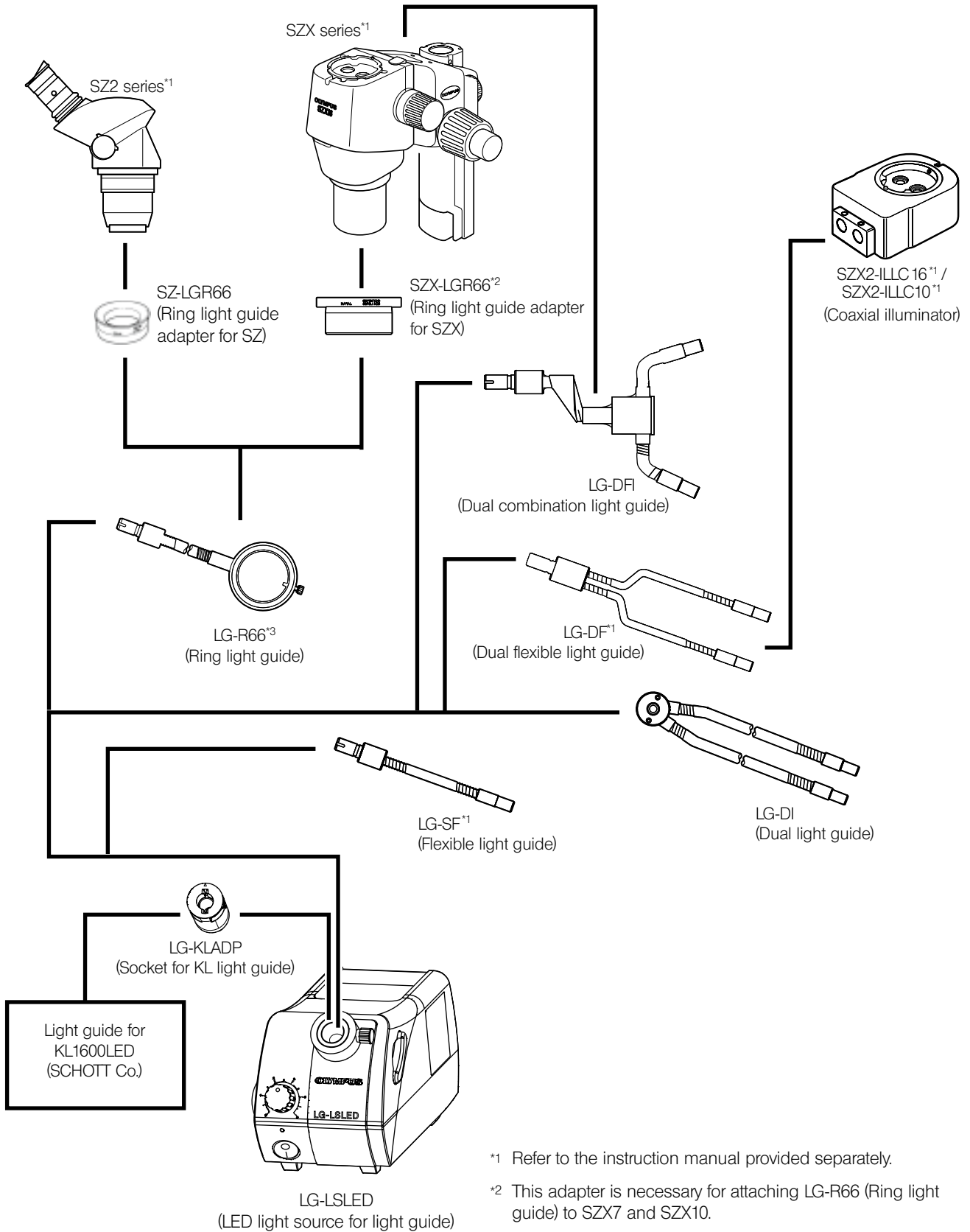
Do not use organic solvents because they may deteriorate the coated surface or plastic parts.

As the cooling fan is used with this product, the dust may pile up when using the product for a long time. Clean the product on a regular basis.

Lifetime

The lifetime of this product is approximately 8 years after purchase if the product is used properly according to this instruction manual. (except consumables)

1 System diagram



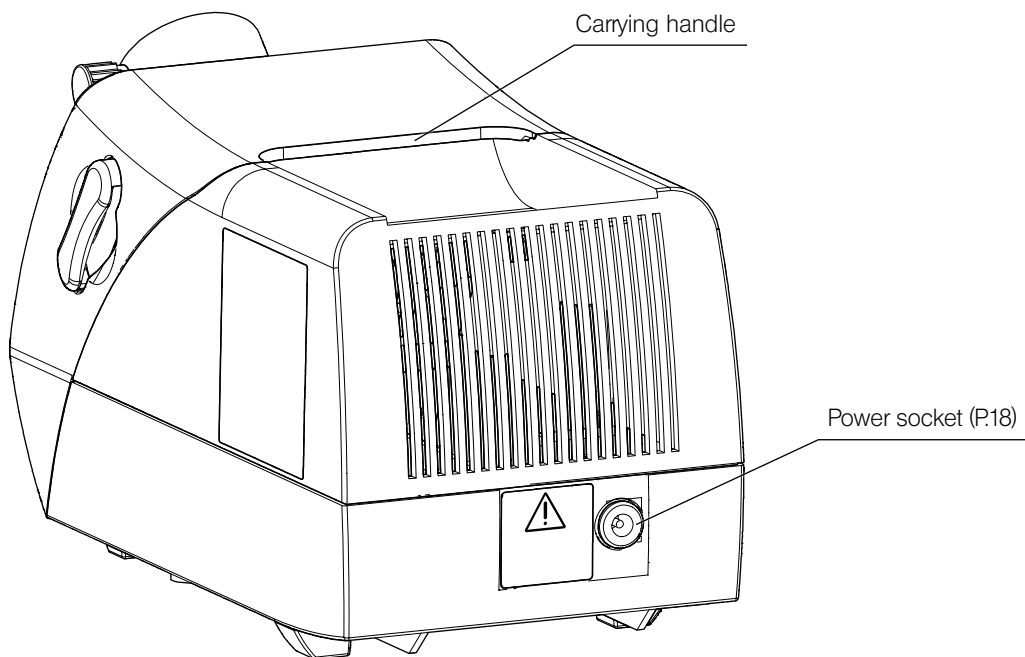
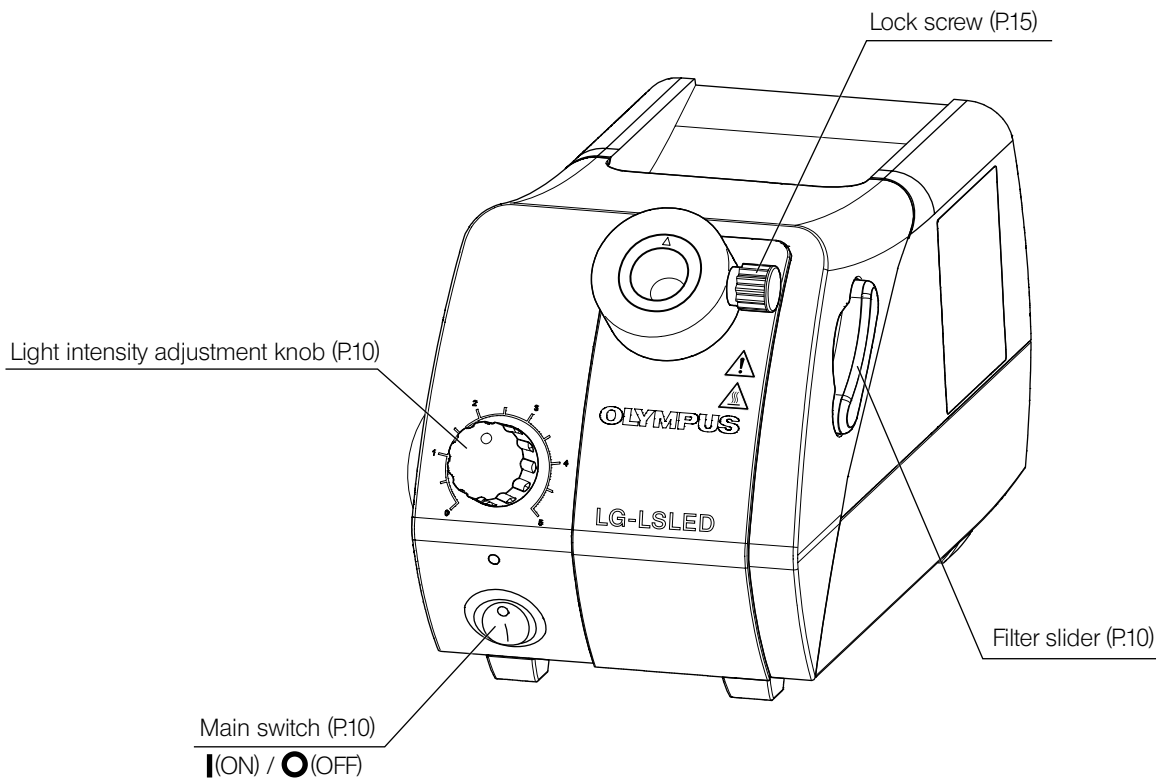
*1 Refer to the instruction manual provided separately.

*2 This adapter is necessary for attaching LG-R66 (Ring light guide) to SZX7 and SZX10.

*3 LG-R66 (Ring light guide) can be attached to SZX16 directly.

2 Nomenclature of main operating portions

This section describes the nomenclature of main operating portions of the product.

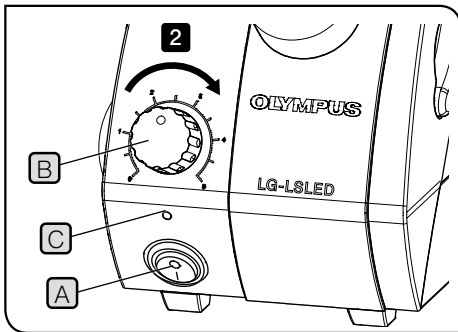


3 Operating procedures

This section describes the basic operating procedures of each portion.

1 Turning ON the main switch and adjusting the brightness

⚠ WARNING Remove the cap that covers the distal end of the light guide before turning ON the main switch. As the cap absorbs the light, heat damage, fire or burns may be caused.



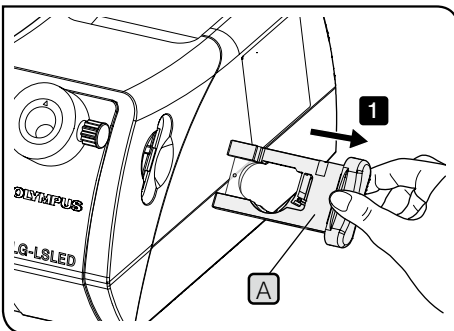
- 1 Set the main switch **A** to **I** (ON).
- 2 Rotate the light intensity adjustment knob **B** toward the scale 5 (arrow direction) to increase the brightness or rotate it toward the scale 0 to decrease the brightness.

NOTE If you set the light intensity level to scale 0, the light is not emitted, but the power of the LG-LSLED is ON (The indicator **C** is ON). To turn OFF the power, set the main switch **A** to **O** (OFF).

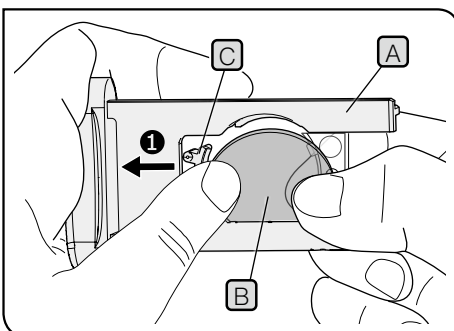
2 Attaching the filter (Optional)

⚠ CAUTION Before replacing the filter with another filter, set the power to **O** (OFF) and make sure that the filter slider is fully cooled down in order to prevent looking at LED light directly.

- TIP**
- The filter is not provided.
 - The filter with a diameter of 28 mm and a thickness of 2 mm can be attached.
 - Use the optional 28LBA15 (LBA filter) if you want to change to the light bulb color.

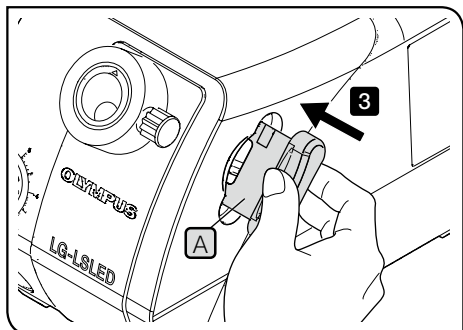


- 1 Remove the filter slider **A** from LG-LSLED.



- 2 Attach the LBA filter **B** to the filter slider **A** in the following procedure.
 - 1 Push the filter slider **C** of the filter slider in arrow direction.
 - 2 Insert the bottom of the filter **B** into the filter slider as follows.
 - 3 Fit in the top of the filter **B**.

NOTE When cleaning fingerprints and oil stains attached to the filter, slightly moisten a piece of cleaning paper with commercially available absolute alcohol and wipe them off with it.

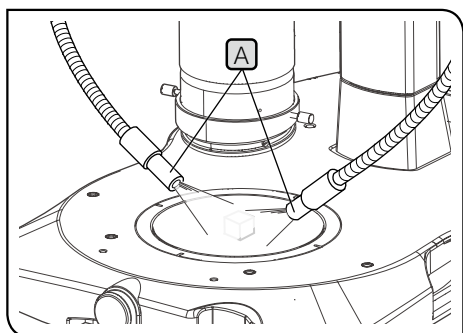


3 Insert the filter slider **A** into LG-LSLED completely to the end.

NOTE During operation, keep the filter slider inserted completely or pulled out to the click position.

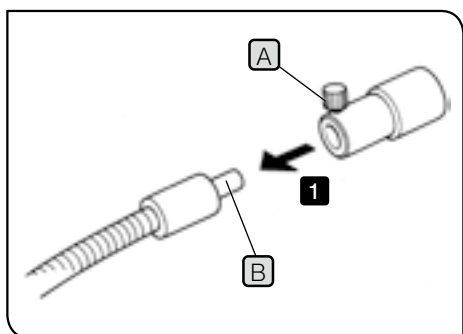
If you operate LG-LSLED with the filter slider placed at the position other than two positions described above, the cooling in LG-LSLED may be impacted adversely or the filter slider may be damaged.

3 Adjusting LG-DI/LG-DFI (Dual light guide/Dual light guide)



1 Illuminate the light to the sample from the position where the distal ends **A** of the light guide do not interfere with operation.

TIP For procedures to prevent the light guide from bending spontaneously, see page 4.



Using HLL301 (Spot lens)

1 Loosen the clamping screw **A** of HLL301 (Spot lens), insert HLL301 into the distal end **B** of LG-DI or DFI, and tighten the clamping screw **A**.

4 Troubleshooting

This section describes the possible problems of this product and their remedies.

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 us for assistance.

Problem	Cause	Remedy	Page
A light is not emitted.	The AC adapter is not connected.	Connect the outlet plug to the AC adapter properly.	18
		Make sure that the outlet plug is connected to the commercial power supply and the DC power jack is connected to the LG-LSLED properly.	18
	The power is not supplied to the AC adapter.	Check the commercial power supply.	-
	The power is not ON.	Turn ON the main switch.	10
	The light guide is disconnected.	Connect the light guide to the LG-LSLED (LED light source for light guide) and the microscope properly.	15
The light intensity is reduced.	The light source unit is overheated.	Make sure that the cooling fan is working properly.	-
		Make sure that air vents or exhaust ports are not covered by obstacles.	-
	The light guide is about to be disconnected.	Connect the light guide to the LG-LSLED (LED light source for light guide) and the microscope properly.	15
	The filter is engaged in the light path.	Pull out the filter slider to the click position.	10
	The filter slider is not inserted completely to the end.	Make sure that the filter slider is inserted completely to the end.	10
	The distal end of light guide or the top surface of filter is dirty.	Remove the dust/dirt.	7

Repair request

If you cannot solve the problems even though taking actions described in Troubleshooting, please contact us for assistance. At that time, please tell them the following information as well.

- Product name and abbreviation (Example: LED light source for light guide LG-LSLED)
- Product number
- Problem

5 Specifications

This section describes detail specifications, such as shape, functions and performances, etc. of this product.

■ LG-LSLED

Item	Specifications
Power supply	Use AC adapter. Input voltage range: AC 100-240 V 50-60 Hz Input current: Max: 1.4 A Output voltage: DC 24 V Output current: 2.71 A Power consumption: 65 W Dimension: 115 (L) x 53 (W) x 38(H) mm Weight: 310 g (reference value)
Rating	Rated input voltage: DC 24 V 1.5A Power consumption: Max: 37 W
Illumination light source	Lifetime of LED Color: White Design value: Approx. 60,000 hours (Value derived by calculating the LED element alone based on LM80/TM21)
Light intensity adjustment	Continuous variable knob Scale: 0 (turned OFF) to 5)
Light guide	Mounting diameter: Ø15 mm Maximum valid fiber diameter: Ø9 mm (Total luminous flux when LG-SF is combined: 360 lm or more)
Filter slider	Attachable filtersize Ø28 mm / Thickness: 2 mm
Dimension	114 (W) x 231 (D) x 137 (H) mm
Weight	Approx. 2.45 kg
Operating environment	<ul style="list-style-type: none"> • Indoor use • Altitude: Max. 2000 meters • Ambient temperature: 5 to 40 °C (41 to 104 °F) • Relative humidity: Max 80% (31 °C (88 °F) or less) (without condensation) In case of over 31 °C (88 °F), the relative humidity in operating environment is decreased linearly through 70% at 34 °C (93 °F), 60% at 37 °C (99 °F), and to 50% at 40 °C (104 °F). • Supply voltage fluctuation: ±10 % • Pollution degree 2 (in accordance with IEC60664-1) • Installation/Overvoltage category: II (in accordance with IEC60664-1)
Cooling method	Air cooling (low noise)

■ 28LBA15 (LBA filter) [Optional]

Item	Specifications
Filter type	Color temperature conversion filter
Color temperature conversion capability	15 decamired
Dimension	Ø28 mm / Thickness: 2 mm
Weight	Approx. 4 g

■ LG-KLADP (Socket for KL light guide) [Optional]

Item	Specifications
Attachable light guide	SCHOTT light guide for KL1600LED
Dimension	Ø23 mm / Length: 39.3 mm
Weight	Approx. 15 g

■ Other light guides

Item		Specifications					
Product name		LG-R66	LG-DI	LG-DFI		LG-DF	LG-SF
Corrugated tube	Type	Flexible tube	Interlock tube	Flexible tube	Interlock tube	Flexible tube	Flexible tube
	Length	1000 mm	500 mm	1000 mm	500 mm	1000 mm	1000 mm
Fiber	Type	Multicomponent glass: Ø50 µm					
Bundle diameter	Light-incident side	Ø8 mm	Ø8 mm	Ø8 mm		Ø6 mm	Ø6 mm
	Light-emitting side	Ø70 x 0.22 mm	Ø5.66 mm	Ø5.66 mm		Ø4.24 mm	Ø6 mm
Minimum bending radius		33 mm	60 mm	33 mm	60 mm	33 mm	33 mm
Light intensity balance between two light guides of dual light guide		-	90% or more	90% or more		90% or more	-

6 Assembly

6-1 Attaching the light guide

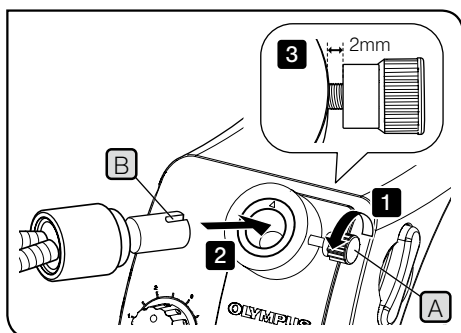
TIP For procedures to attach LG-DF or LG-SF, refer to the respective instruction manual.

1 Attaching the light guide to LG-LSLED (LED light source for light guide)

CAUTION When the light guide is not attached yet, set the power to **○(OFF)** in order to prevent looking at the LED light directly.

NOTE Do not use light guides other than the exclusive light guides.

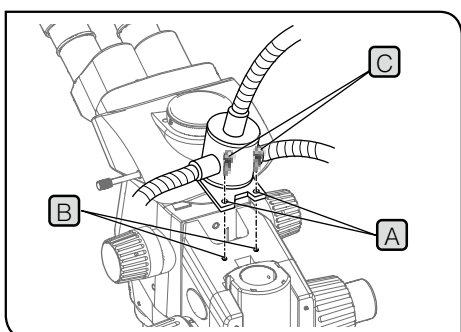
TIP For details of the exclusive light guides, see page 8.



- 1** Loosen the lock screw **A** at the light guide socket hole by rotating it in counterclockwise direction (arrow direction).
- 2** Insert the light guide completely to the end with its groove **B** facing up.
- 3** Tighten the lock screw **A** in clockwise direction. (There is a space of approx. 2 mm.)

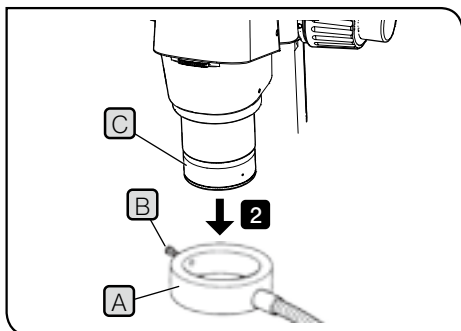
2 Attaching LG-DFI (Dual combination light guide)

TIP This light guide must be attached to SZX-FO (SZX coarse focusing unit) or SZX-FOF (SZX coarse/fine focusing unit) as well when attaching to LG-LSLED (LED light source for light guide).



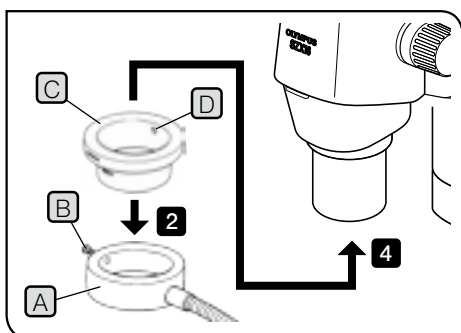
- 1** Align the mount holes **A** at the center of the light guide with the screw holes **B** of SZX-FOF, and attach them with the provided clamping screws **C** (2 pcs.) using the Allen screwdriver provided with the microscope frame.

3 Attaching LG-R66 (Ring light guide)



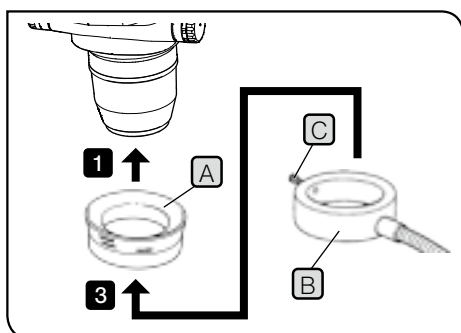
SZX16

- 1 Loosen the clamping knob (B) of LG-R66 (Ring light guide) (A).
- 2 Insert LG-R66 (A) upward until it contacts the objective bottom surface (C), and tighten the clamping knob (B).



SZX10, SZX7

- 1 Loosen the clamping knob (B) of LG-R66 (Ring light guide) (A).
- 2 Insert SZX-LGR66 (Ring light guide adapter for SZX) (C) into LG-R66 (A) completely to the end and tighten the clamping knob (B).
- 3 Loosen the clamping screw (D) of SZX-LGR66 (C) sufficiently using the Allen screwdriver provided with the microscope frame.
- 4 Insert SZX-LGR66 (C) into the objective of SZX, align the surface of objective with the bottom surface of LG-R66, and tighten the clamping screw (D) using the Allen screwdriver.



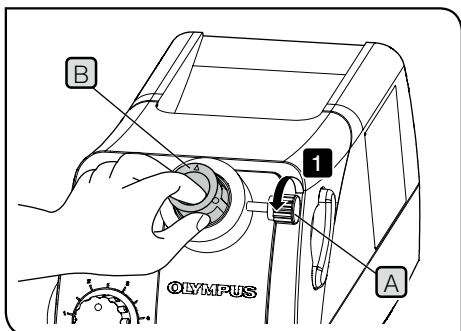
SZ61, SZ51

- 1 Screw in SZ-LGR66 (Ring light guide adapter for SZ) (A) completely to the thread of the auxiliary objective of the SZ2 microscope.
- 2 Loosen the clamping knob (C) of LG-R66 (Ring light guide) (B).
- 3 Insert LG-R66 (B) into SZ-LGR66 (A) completely to the end and tighten the clamping screw (C).

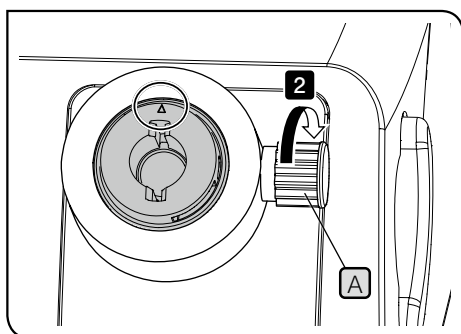
4 Replacing the light guide socket to LG-KLADP (Socket for KL light guide) [Optional]

To use the light guide for KL1600LED (SCHOTT Co.), you must replace the light guide socket with optional LG-KLADP (Socket for KL light guide).

CAUTION Before replacing the light guide socket, be sure to set the power to **○(OFF)** and wait until the light guide is sufficiently cooled down.



1 Remove the lock screw **A** and pull out the light guide socket **B**.



2 Insert LG-KLADP (Socket for KL light guide) with the \triangle mark facing up, attach the lock screw **A**.

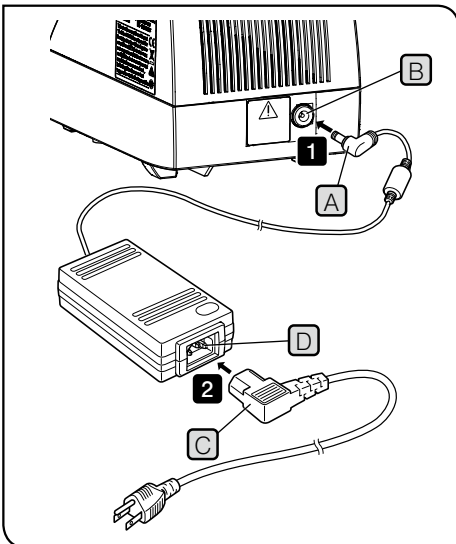
6-2 Connecting the AC adapter and the power cord

⚠ CAUTION

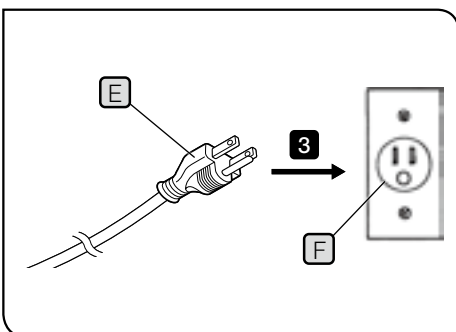
- Always use the AC adapter and the power cord provided by us. If the proper AC adapter and the power cord are not used, the electric safety and the EMC (Electromagnetic Compatibility) performance of the product cannot be assured. If no power cord is provided, please select the proper power cord by referring to the section “Proper selection of the power cord” at the end of this instruction manual.
- If you use the power plug, it into 3-core outlets with grounds. If the outlet is not grounded, the electric safety performance intended by us cannot be assured.

NOTE

- Do not apply excess force to the power cord or the AC adapter cord.
- Before connecting the power cord to the AC adapter, be sure to set the main switch to **○**(OFF).



- 1** Connect the provided AC adapter connector **A** to the power socket **B** of LG-LSLED.
- 2** Connect the specified power cord connector **C** to the AC adapter connector **D**.



- 3** Connect the power cord plug **E** to the power outlet **F**.

■ 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 our products, we can no longer warrant the electrical safety of the equipment.

Specifications

Voltage rating	125 V AC (for 100-120 V AC area) or, 250 V AC (for 220-240 V AC area)
Current rating	6 A 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 the agencies listed in Table 1. In case you are unable to buy locally 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	
Austria	OVE		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		USA	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 Materielkontroll (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)
Canadian Standards Association (CSA)

SV, SVT, SJ or SJT, 3 X 18AWG
SV, SVT, SJ or SJT, 3 X 18AWG

MEMO

MEMO

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