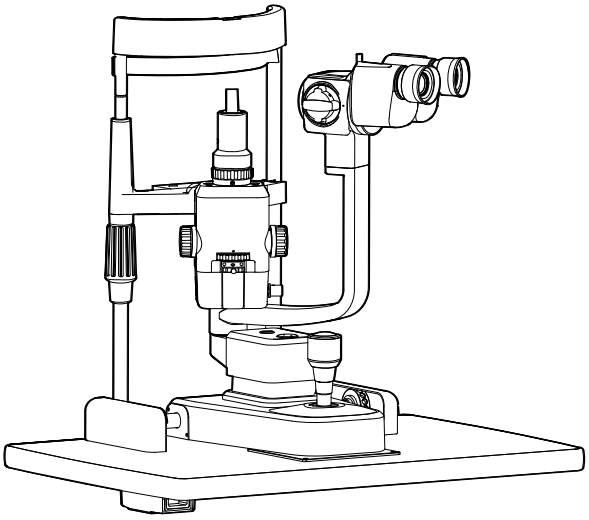
TOPCON



INSTRUCTION MANUAL
SLIT LAMP

SL-2G

INTRODUCTION

Thank you for purchasing the Slit Lamp SL-2G.

INTENDED USE / INDICATIONS FOR USE

The Slit Lamp SL-2G is an AC-powered slitlamp biomicroscope intended for use in eye examination of the anterior eye segment, from the cornea epithelium to the posterior capsule. It is used to aid in the diagnosis of diseases or trauma which affect the structural properties of the anterior eye segment.

This instrument has the following features:

- Smooth operation
- Uses an LED light source with enhanced life span
- Apochromatic optical system to achieve natural color and high resolution
- Robustness and durability

This Instruction Manual covers an overview of the basic operation, troubleshooting, checking, maintenance and cleaning of the TOPCON SL-2G Slit Lamp.

To get the best use from the instrument, read "Displays for Safe Use" and "Safety Cautions". Keep this Instruction Manual with the instrument for future reference.

PRECAUTIONS

- This is a precision instrument, install/store it in a place with the following conditions: temperature (10 to 40°C), humidity (30 to 75%) and atmospheric pressure (700 to 1060hPa). Avoid direct exposure to sunlight.
- To ensure smooth operation, install the instrument on a level surface free of vibrations. Also, do not place any objects on the instrument.
- Before using the instrument, connect all cables correctly.
- Use the specified source voltage.
- When not using, protect the instrument with the dust cover.
- Keep the objective lens free from finger prints and dust.

WARNING
When operating the instrument, be sure not to touch the patient's eye or nose.

CAUTION
This instrument must not be used for the following patients:

- Patients who are hypersensitive to light
- Patients who recently underwent photodynamic therapy (PDT)
- Patients taking medication that causes photosensitivity.

This symbol is applicable for EU member countries only.
To avoid potential negative consequences for the environment and possibly human health, this instrument should be disposed of (i) for EU member countries - in accordance with WEEE (Directive on Waste Electrical and Electronic Equipment), or (ii) for all other countries, in accordance with local disposal and recycling laws.

CAUTION Federal law restricts this device to sale by or on the order of a Physician or Practitioner.

WARNING Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause birth detects or other reproductive harm. Wash hands after handling.

CLASS I

IEC60601-1

CAUTIONS FOR USE

Use this instrument carefully on the following patients:
- Patients who have epidemic corneitis, conjunctivitis or any other infectious disease
- Patients who are taking medications that cause light hypersensitivity.

Be careful not to let the patient touch this instrument. The patient's hand may be pinched by a movable part.

To avoid injury or fire caused by electric shock, turn off the power switch and unplug the power cord when not in use.

To avoid injury caused by electric shock, turn off the power switch when replacing the lamp.

To avoid burns caused by heat, do not replace the lamp with a new one immediately after it burns out.

When operating the base unit, please note the following:
- Beware of catching fingers in the moving parts.
- Avoid hitting the patient's eyes or nose.

DISPOSAL

When disposing the instrument and/or parts, follow the local regulations for disposal and recycling.

STORING PLACE, USAGE PERIOD

1. When storing the instrument, ensure that the following conditions are met:
   (1) The instrument must not be splashed with water.
   (2) Store the instrument where environmental conditions are appropriate.
   (3) Do not store or transport the instrument on a slope or uneven surface or in an area where it is subject to vibrations or instability.
   (4) Do not store the instrument where chemicals are stored or gas is generated.

2. Usage period:
   8 years from delivery providing regular maintenance is performed (according to the self-certification [TOPCON data]).

USER MAINTENANCE

1. Regularly maintain and check the instrument and its parts.
2. When using the instrument after a prolonged period of inactivity, confirm normal and safe operation beforehand.
3. Keep the objective lens, eyepiece and mirror free from finger prints and dust.
4. When not in use, protect the instrument with the dust cover.
5. If the objective lens, eyepiece or mirror is stained, clean it following "Cleaning lenses and mirrors" on pg. 32 of this Instruction Manual.

DISPLAYS FOR SAFE USE

In order to ensure the safe use of the product and to prevent danger to the operator and others, or damage to property, important warnings are placed on the product and inserted in the instruction manual.
It is recommended for all users to take note of the meaning of the following displays and icons before reading the "Safety Cautions" and text.

DISPLAYS

DISPLAY	MEANING
⚠ **WARNING**	Ignoring or disregarding this display may lead to death or serious injury.
⚠ **CAUTION**	Ignoring or disregarding this display may lead to personal injury or physical damage.

- Injury refers to cuts, bruises, sprains, fractures, burns, electric shocks, etc.
- Physical damage refers to damage to buildings, equipment or furniture.

ICONS

ICONS	MEANING
	This indicates Prohibition. Specific content is expressed with words or an icon either inserted in the icon itself or located next to the icon.
	This indicates Mandatory Action. Specific content is expressed with words or an icon either inserted in the icon itself or located next to the icon.
	This icon indicates Hazard Alerting (Warning). Specific content is expressed with words or an icon either inserted in the icon itself or located next to the icon.

SAFETY CAUTIONS

WARNING

Icons	Prevention item	Page
	To avoid fire in the event of an instrument malfunction, immediately turn OFF the power switch and unplug the cable if you see smoke coming from the insturment, etc. Ask your dealer for service.	—

CAUTION

Icons	Prevention item	Page
	To avoid injury to the patient's eye and nose, pay particular attention while operating the instrument body.	15
	To prevent fingers from being caught, beware of the moving parts while operating the main body.	15
	To avoid causing discomfort to the patient and damage to the patient's eye, do not make the illumination too bright.	16
	To prevent electrical shock, do not attempt disassembling, rebuilding or repairing. For repairs, call your dealer.	19
	When replacing the lamp, switch off the power supply and remove the power cable to avoid electric shocks.	30
	To avoid burns, beware of high temperatures when replacing the lamp immediately after switching it off.	30
	Before doing daily maintenance, pull out the power cable (to avoid electric shocks) and wait until the body is cooled (to avoid burns).	32
	To prevent burns, do not touch the parts inside the lamp house cover during operation and immediately after cutting the power supply.	32
	The base contains strong springs. Do not attempt to disassemble this, as these springs could shoot out of the base, causing injury.	33
	To prevent falling during use and movement, secure optional accessories.	34

⚠ CAUTION

Icons	Prevention item	Page
	Connect and organize AC adapter cables according to the assembly procedure. To avoid injury and disconnection, take care not to catch the cables with your feet.	—
	Use only the attached AC adapter. Using any other AC adapter might cause incorrect operation/failure.	**29**
	The light radiated from the instrument is potentially hazardous. The longer the exposure time is, the higher the risk of causing disorder to the eye is. When operating with the maximum intensity, the light radiation reaches values exceeding the safety guideline in about 160sec.	**26**
	This instrument has been tested (with 120V/230V) and found to comply with IEC60601-1-2Ed.3.0: 2007. This instrument radiates radio frequency energy within standard and may affect other devices in the vicinity. If you have discovered that turning on/off the instrument affects other devices, we recommend you change its position, keep a proper distance from other devices, or change the outlet. Please consult the dealer from whom you purchased the equipment for any questions.	—

USAGE AND MAINTENANCE

Usage
- This Slit lamp SL-2G is a precision electrical device for medical use that must be used under the instruction of a doctor.

USER MAINTENANCE

To maintain the safety and performance of the instrument, unless done by an authorized service engineer, never attempt to do maintenance of items other than those specified here in. For details about maintenance, read the descriptions in this manual.

REPLACING THE ILLUMINATION LAMP

The illumination lamp can be replaced. For specific instructions, see page 30.

DISCLAIMERS

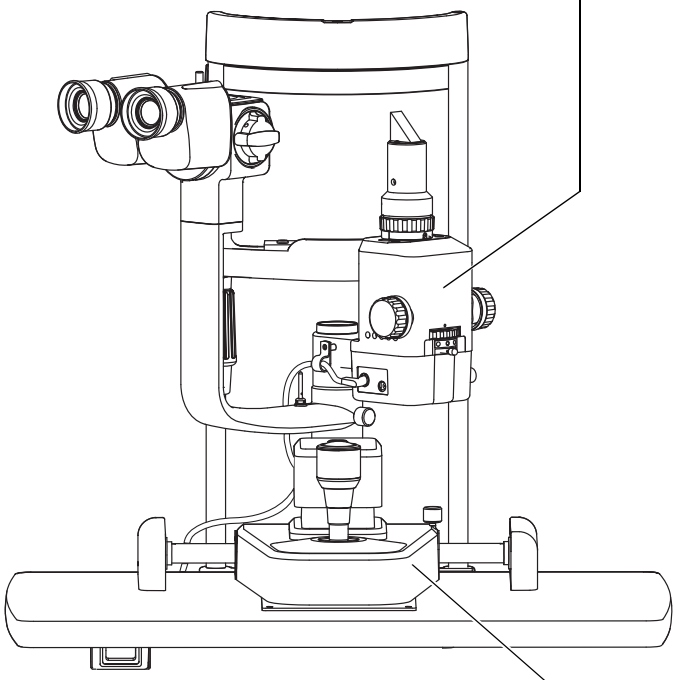
- TOPCON is not responsible for damage due to fire, earthquakes, actions or inactions of third persons or other accidents, or damage due to negligence and misuse by the user and any use under unusual conditions.
- TOPCON is not responsible for damage derived from inability to properly use this equipment, such as loss of business profits and suspension of business.
- TOPCON is not responsible for damage caused by operations other than those described in this Instruction Manual.
- The device does not provide a diagnose of any condition or lack thereof or any recommendations for appropriate treatment. The relevant healthcare provider is fully responsible for all diagnose and treatment decisions and recommendations.

WARNING INDICATIONS AND POSITIONS

To ensure safety, warning labels are provided on the instrument body.
Use the instrument following these warning instructions. If any of the following labels are missing, contact your dealer or TOPCON (see the back cover).

CAUTION

- To prevent electric shocks, switch off the power supply and remove the power cable before replacing the lamp.
  Afin d'éviter tout choc électrique, coupez le contact et débranchez le câble d'alimentation avant de remplacer l'ampoule.
- To avoid burns, beware of high temperatures when replacing the lamp immediately after switching it off.
  Afin d'éviter toute brûlure, prenez garde à la température élevée de l'ampoule lorsque le remplacement de celle-ci se fait immédiatement après avoir coupé l'alimentation électrique.



CAUTION

When operating the base unit, note the following:
Pendant la manipulation de la base de l'instrument, veuillez prendre les précautions suivantes;

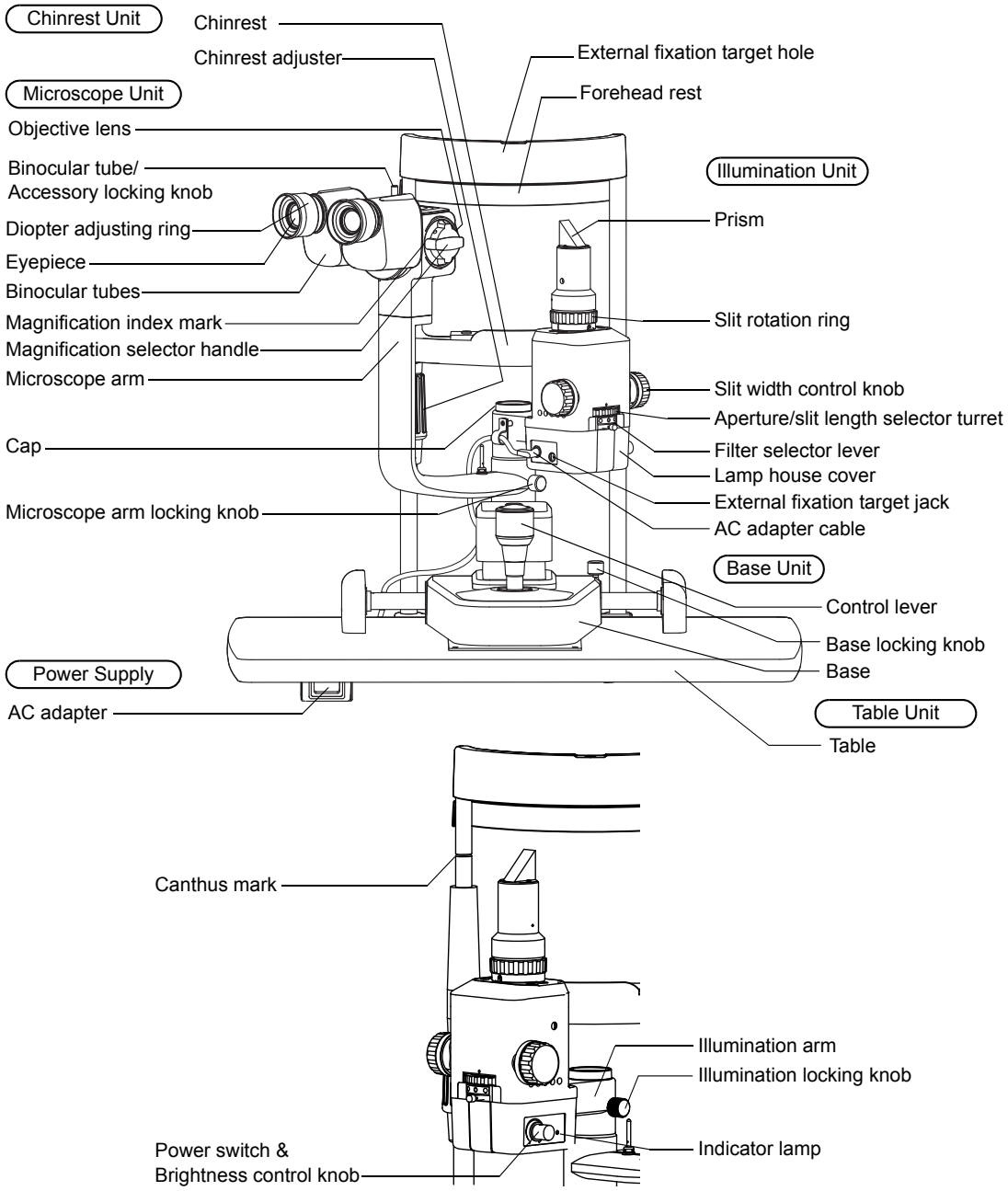
- To prevent fingers from being caught in between, be aware of the moving parts.
  Prenez garde aux pièces mobiles afin d'éviter de coincer les doigts
- Be careful not to hit the patient's eyes or nose.
  Gardez une distance de travail appropriée afin d'éviter le contact avec les yeux et le nez du patient.

CONTENTS

OPTIONAL ACCESSORIES

CONFIGURATION

NAMES OF MAIN BODY COMPONENTS

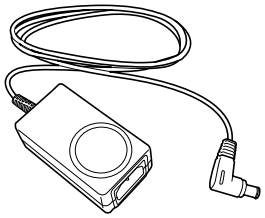
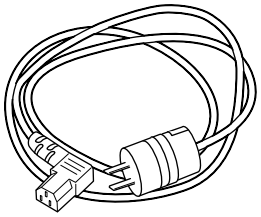
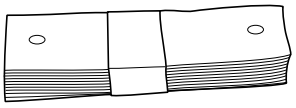
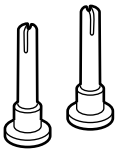
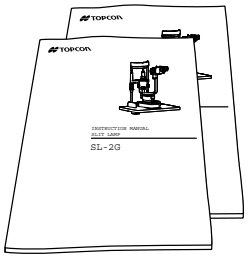


CONFIGURATION OF PARTS THAT COME INTO CONTACT WITH THE PATIENT

Forehead rest: Polyamide resin
Chinrest: Polyamide resin

STANDARD ACCESSORIES

Make sure that all the following standard accessories are included.
Figures in parentheses are the quantities.

AC adapter (1) (Model: JMW110kA15) 	Power cable (1) 
Chinrest paper (1) 	Dustcover (1) 
Spare chinrest tissue pin (2) 	Instruction manual, Assembly Manual (1 each) 

For optional accessories, see “Optional Accessories” on page 34.

PREPARATIONS

POWERING ON

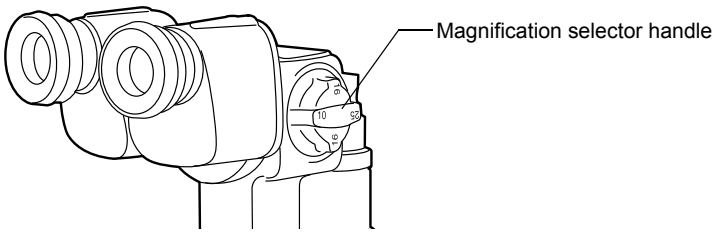
1 Connect the power cable.
When connected, the indicator lamp turns to orange.

2 Turn the Power switch & Brightness control knob clockwise and switch the power ON.
The indicator lamp turns to green.

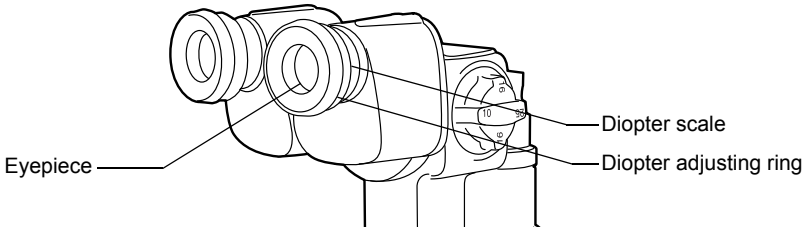
ADJUSTING THE DIOPTER AND PUPILLARY DISTANCE(PD)

NOTE	To ensure sharp observation of slit images, always carry out the diopter and eye width adjustment.

1 Operate the magnification selector handle of the microscope unit and set the magnification index to "25."



2 Turn the right and left diopter adjusting rings counter-clockwise to the end, and move the table unit to a position that allows you to get focus on the object.

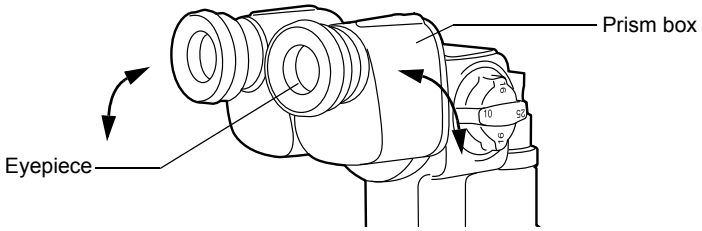


Firmly fix the object on the chinrest, and fix the microscope arm so that the flat part of the object and the microscope are vertical to each other.

3 Operate the magnification selector handle of the microscope and set the magnification index to "10."

4 Look through the eyepiece and, one by one, turn the diopter adjusting ring clockwise. Stop turning at a focus position (where the diopter scale is obtained).
The scale of the diopter adjusting ring shows the diopter scale.

5 Looking through the eyepiece, hold the prism box and adjust the pupillary distance of the eyepiece to enable binocular vision.

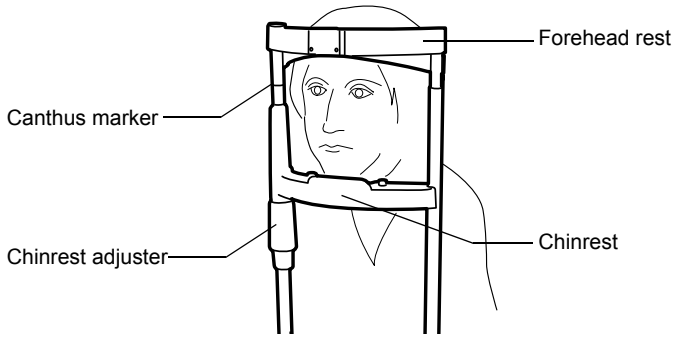


OPERATION PROCEDURES

POSITIONING THE PATIENT

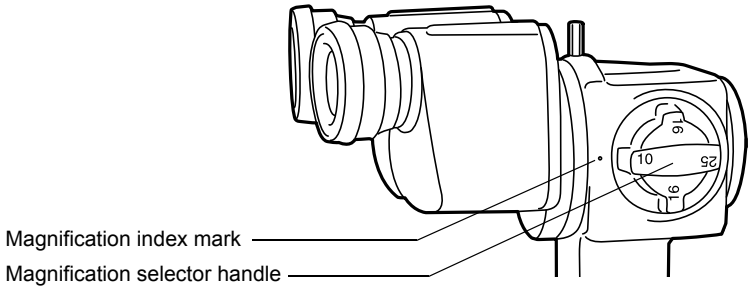
1 Place the patient's chin on the chinrest and instruct them to place their forehead against the forehead rest.

2 By rotating the chinrest adjuster, align the patient's eye with the canthus marker on the chinrest frame.



OPERATING THE MICROSCOPE UNIT

Turn the magnification selector handle to the desired magnification index . Make sure the desired magnification is aligned with the magnification index mark.



For overall magnification in conjunction with the magnification index of the magnification selector handle, see page 20.

OPERATING THE BASE AND FOCUSING

CAUTION	To avoid injury to the patient's eye and nose, pay particular attention while operating the instrument body.

CAUTION	To prevent fingers from being caught in between, beware of the moving parts while operating the main body.

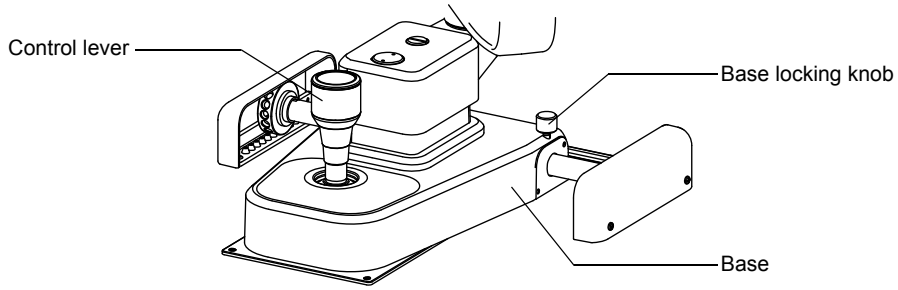
NOTE	To prevent dropping the base locking knob from the base, do not loosen the knob too much.

1 For major horizontal movements, hold the control lever in the upright position and move the entire base.

2 For fine adjustments, move the control lever in the required direction.

3 The base can be raised by turning the control lever clockwise, and lowered by turning the control lever counter-clockwise.

4 To lock the base in place, fasten the base locking knob.



- Coarse focusing is done visually, following the above steps ***1-3***.
- Fine focusing is done through the microscope, following the above steps ***2*** and ***3***.

OPERATING THE ILLUMINATION UNIT

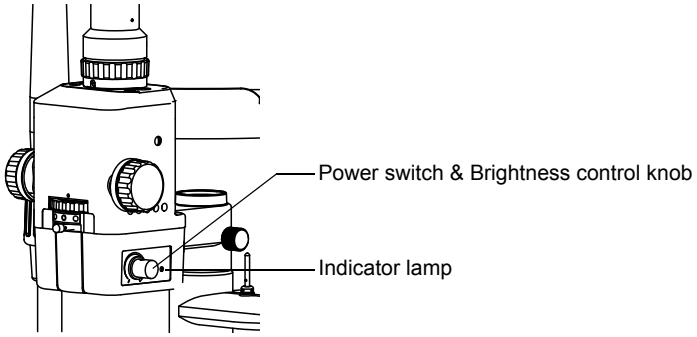
CAUTION	To avoid causing discomfort to the patient and damage to the patient's eye, do not make the illumination too bright.

NOTE	• Adjust the slit width suitably for the purpose of observation. • The slit width scale should be used as a guideline.

ADJUSTING THE BRIGHTNESS

Turn the Power switch & Brightness control knob.

The brightness of the illumination light can be adjusted to the preferred illumination setting.



Turn the Power switch & Brightness control knob counter-clockwise; with a click, the illumination lamp goes off.

The indicator lamp indicates the following conditions:

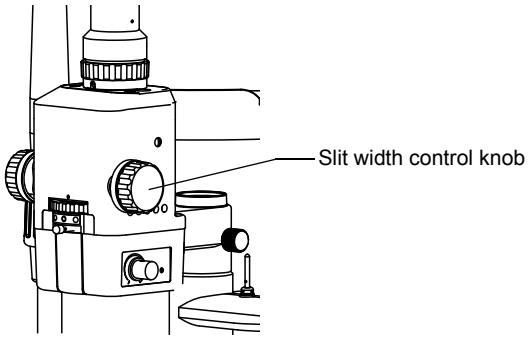
When AC adapter is ON: Turns ON in orange.

When illumination white LED is ON: Turns ON in green.

ADJUSTING THE SLIT WIDTH

Turn the slit width control knob.

The slit width can be changed gradually between 0 and 14mm (14mm=circle).

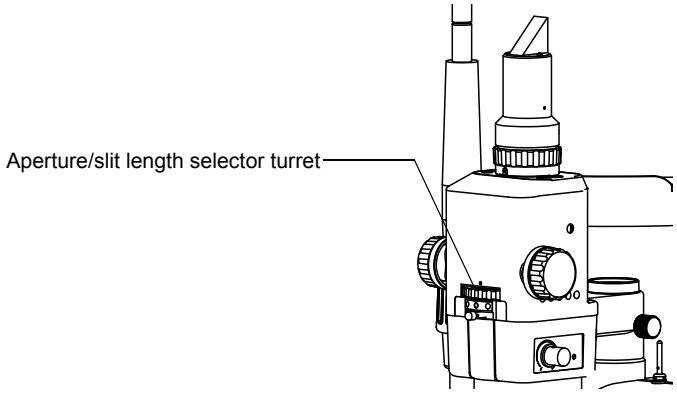


CHANGING THE APERTURE/SLIT LENGTH

Turn the aperture/slit length selector turret.

When the slit is fully opened, 5 types of spot illumination (ϕ14, ϕ10, ϕ5, ϕ1, ϕ0.3mm) are available.

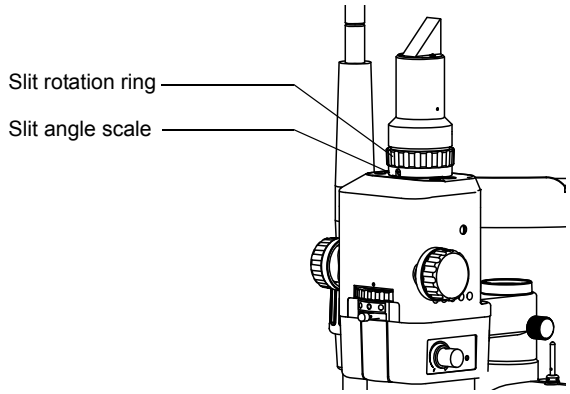
The slit length can be changed gradually between 1mm and 14mm.



TURNING THE SLIT

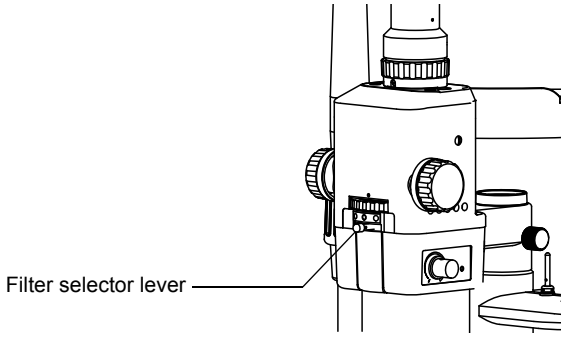
Turn the slit rotation ring.

The slit image can be changed from vertical to horizontal. At this moment, the slit angle can be read from the angle scale.

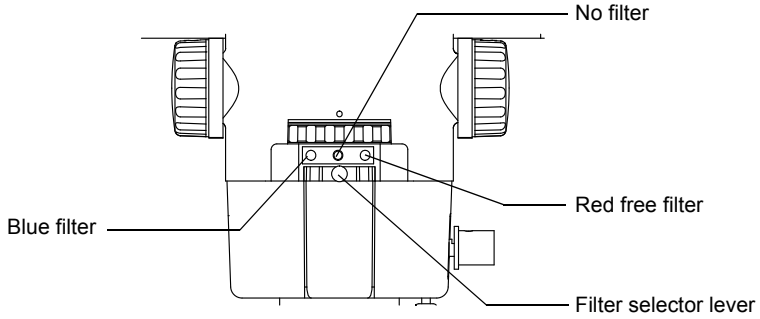


CHANGING FILTERS

Lay the filter selector lever in the direction of the desired filter indication.



The desired filter can be selected from two filter types.



The blue filter is used for fluorescent staining observation.

The red-free filter (colored green) is used to visualize the nerve fiber layer.

ENDING PROCEDURE

Turn OFF the Power switch & the Brightness control knob.

TROUBLESHOOTING

TROUBLESHOOTING GUIDE

CAUTION	To prevent electrical shock, do not attempt disassembling, rebuilding or repairing. For repairs, call your dealer.

When a problem is suspected, check for the condition following the check list below.
If normal operating conditions can not be restored after following the recommended remedies, or if the problem does not fall within any of the conditions in the check list, contact your dealer or TOPCON (see the back cover).

Check List

Problem	Typical condition	Check	Page
Illumination lamp does not work	Cable connection is disconnected.	Connect the cable.	12
	Power switch & Brightness control knob is OFF.	Turn ON Power switch & Brightness control knob.	12
	AC adapter cable is disconnected.	Connect the cable.	12
	Power switch & Brightness control knob is set to minimum position.	Turn up the Power switch & Brightness control knob.	16
	Illumination lamp is broken.	Replace it with a new illumination lamp.	30
Illumination field is not uniform/has shade/is dark	Illumination lamp is not fitted in place.	Fit the illumination lamp into the socket.	30
	Aperture/slit length selector turret is not clicked into place.	Click the aperture/slit length selector turret in place.	17
	Filter selector lever is not clicked into place.	Click the filter selector lever in place.	18
External fixation target (optional) does not work	Illumination unit cable is off.	Insert the cable.	—

SPECIFICATIONS AND PERFORMANCE

PERFORMANCE

Microscope unit	
Type	Galileo type convergent binocular tubes
Magnification	Drum, 3-step magnification
Magnification steps	10, 16, 25
Overall magnification (actual vision field)	10.00 (ϕ22.5mm)/15.98 (ϕ14.1mm)/25.53 (ϕ8.8mm)
Eyepiece lens	Magnification: 12.5x
Binocular tubes	Diopter adjustment range: -5D to +3D
	PD adjustment: 55 - 78mm
Illumination unit	
Illumination field	Slit width: 0-14mm, can be adjusted gradually (14mm=circle) Slit length: 1-14mm, can be adjusted gradually (14mm=circle) Aperture diameter: ϕ0.3, 1, 5, 10, 14mm 1-14mm, can be adjusted gradually
Slit direction	Vertical to horizontal can be adjusted gradually
Filter	Blue filter, red-free filter
Light source	LED
Base unit	
Forward-backward movement	90mm
Right-left movement	100mm
Vertical movement	30mm
Fine movement forward-backward/right-left	12mm
Chinrest unit	
Vertical movement	80mm

- The cornea fluorescent filter is not available.
- The specification and design of the product can be altered for improvements without prior notice.

Agency Compliance
The SL-2G is designed to comply with the following agency standards:

- IEC 60601-1: 1988+A1:1991+A2:1995
- EN60601-1: 1990 +A1:1993 +A2:1995 +A13:1996
- IEC 60601-1-2 Ed3.0: 2007/EN60601-1-2: 2007
- UL 60601-1: 2003
- ISO 10939:2007
- ISO 15004-1:2006
- ISO 15004-2:2007
- EC Medical Device Directive 93/42/EEC

The following statement is the "Essential performance" provided for by IEC60601-1.
1) The LED light source should not go off.
2) There are no component failures.

ENVIRONMENTAL CONDITIONS

ENVIRONMENTAL CONDITIONS FOR USE

Temperature: 10 to 40°C
Humidity: 30 to 90% (without dew condensation)
Air pressure: 700hPa to 1060hPa

STORAGE CONDITIONS

Environmental conditions (without package)
*Temperature : 10°C to 40°C
Humidity : 10% to 95% (without dew condensation)
Air pressure : 700hPa - 1060hPa

* **THIS INSTRUMENT DOES NOT MEET THE TEMPERATURE REQUIREMENTS OF ISO 15004-1 FOR STORAGE. DO NOT STORE THIS INSTRUMENT IN CONDITIONS WHERE THE TEMPERATURE MAY RISE ABOVE 40°C OR FALL BELOW 10°C.**

ENVIRONMENTAL CONDITIONS FOR PACKAGING IN STORAGE

Temperature : -20°C to +50°C
Humidity : 10% to 95%

ENVIRONMENTAL CONDITIONS FOR PACKAGING IN TRANSPORTATION

Temperature : -40°C to +70°C
Humidity : 10% to 95%

ELECTROMAGNETIC COMPATIBILITY

This product conforms to the EMC Standard (IEC 60601-1-2 Ed.3.0:2007).

a) MEDICAL ELECTRICAL EQUIPMENT needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in the ACCOMPANYING DOCUMENTS.
b) Portable and mobile RF communications equipment can affect MEDICAL ELECTRICAL EQUIPMENT.
c) The use of ACCESSORIES, transducers and cables other than those specified, with the exception of transducers and cables sold by the manufacturer of the EQUIPMENT or SYSTEM as replacement parts for internal components, may result in increased EMISSIONS or decreased IMMUNITY of the EQUIPMENT or SYSTEM.
d) The EQUIPMENT or SYSTEM should not be used adjacent to or stacked with other equipment. IF adjacent or stacked use is necessary, the EQUIPMENT or SYSTEM should be observed to verify normal operation in the configuration in which it will be used.
e) The use of the ACCESSORY, transducer or cable with EQUIPMENT and SYSTEMS other than those specified may result in increased EMISSION or decreased IMMUNITY of the EQUIPMENT or SYSTEM.

Guidance and manufacturer's declaration - electromagnetic emissions		
The SL-2G is intended for use in the electromagnetic environment specified below. The customer or the user of the SL-2G should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment - guidance**
RF emissions CISPR 11	Group 1	The SL-2G uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The SL-2G is suitable for use in commercial and medical establishments connected to the public electric power supply network.
Harmonic emissions IEC61000-3-2	Complies	
Voltage fluctuations/ flicker emissions IEC61000-3-3	Complies	

Guidance and manufacturer's declaration - electromagnetic immunity			
The SL-2G is intended for use in the electromagnetic environment specified below. The customer or the user of the SL-2G should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	-6 kV contact -8 kV air	-6 kV contact -8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	-2 kV for power supply lines -1 kV for input/output lines	-2 kV for power supply lines -1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	-1 kV line(s) to line(s) -2 kV line(s) to earth	-1 kV line(s) to line(s) -2 kV line(s) to earth	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and Voltage variations on power supply input lines IEC 61000-4-11	<5% U_t (>95% dip in U_t) for 0.5 cycle 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 sec.	<5% U_t (>95% dip in U_t) for 0.5 cycle 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 sec.	Mains power quality should be that of a typical commercial or hospital environment. If the user or the SL-2G requires continued operation during power main interruptions, it is recommended that the SL-2G be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE U_t is the a.c. main voltage prior to application of the test level.			

Guidance and manufacturer's declaration - electromagnetic immunity			
The SL-2G is intended for use in the electromagnetic environment specified below. The customer or the user of the SL-2G should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment-guidance**
Conducted RF IEC 61000-4-6 Radiated RF IEC 61000-4-3	3 Vrms 150kHz to 80MHz 3 V/m 80MHz to 2.5GHz	3 V 3 V/m	Portable and mobile RF communications equipment should be used no closer to any part of the SL-2G, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance** $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ 80MHz to 800MHz $d = 2.3\sqrt{P}$ 800MHz to 2.5GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [a] should be less than the compliance level in each frequency range. [b] Interference may occur in the vicinity of equipment marked with the following symbol: 
NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies. NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			
[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the SL-2G is used exceeds the applicable RF compliance level above, the SL-2G should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the SL-2G. [b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.			

Recommended separation distance between portable and mobile RF communications equipment and the SL-2G

The SL-2G is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the SL-2G can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the SL-2G as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	**Separation distance according to frequency of transmitter m**		
	150kHz to 80MHz $d = 1.2\sqrt{P}$	**80MHz to 800MHz** $d = 1.2\sqrt{P}$	**800MHz to 2.5GHz** $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

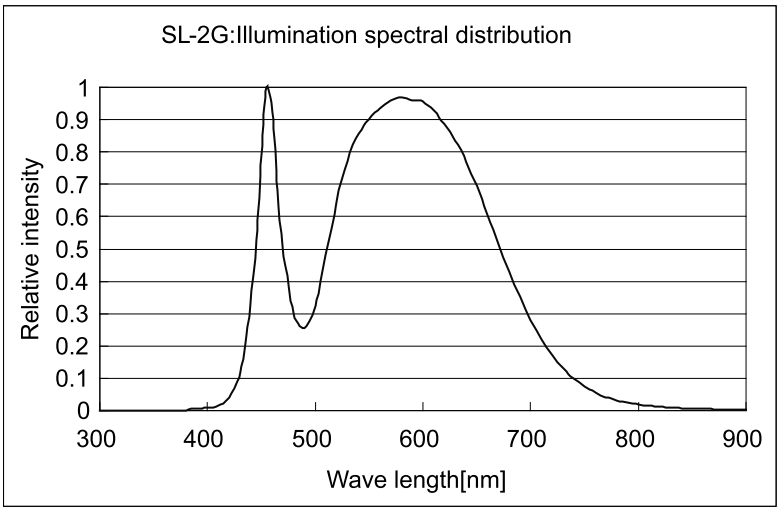
NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

OPTICAL RADIATION HAZARD

CAUTION	The light radiated from the instrument is potentially hazardous. The longer the exposure time is, the higher the risk of causing disorder to the eye is. When operating with the maximum intensity, the light radiation reaches values exceeding the safety guideline in about 160sec.

Relative Spectral Distribution of Illumination Light



Because prolonged intense light exposure can damage the retina, the use of the device for ocular examination should not be unnecessarily prolonged, and the brightness setting should not exceed what is needed to provide clear visualization of the target structures.

The retinal exposure dose for a photochemical hazard is a product of the radiance and the exposure time. If the value of radiance were reduced in half, twice the time would be needed to reach the maximum exposure limit.

While no acute optical radiation hazards have been identified for SL-2G, it is recommended that the intensity of light directed into the patient's eye be limited to the minimum level which is necessary for diagnosis. Infants, aphakes and persons with diseased eyes will be at greater risk. The risk may also be increased if the person being examined has had any exposure with the same instrument or any other ophthalmic instrument using a visible light source during the previous 24 hours. This will apply particularly if the eye has been exposed to retinal photography.

ELECTRIC RATING AC

AC ADAPTER RATING

Source voltage: AC 100-240V
Frequency: 50-60Hz
Power input: 40VA

SAFETY DESIGNATIONS PER IEC 60601-1 STANDARD

- Classification of applied part by grade of protection against electric shocks: B type applied part
  B type applied part provides a certain grade of protection against electric shocks, particularly with regard to leak current, measuring current for patient, and reliability of connection to protective facility (Class I equipment).
- Type of protection against electric shocks: Class I equipment
  Class I equipment does not depend on basic insulation only for electric shocks; it also provides means for connecting the equipment to a protective grounding system so that the accessible metal parts do not become conductive in case of failure in the basic insulation.
- Grade of protection against a hazardous ingress of water: IPxO
  This product does not provide protection against ingress of water.
  (Grade of protection against a hazardous ingress of water stated by IEC 60529: IPxO)
- Classification by the method of sterilization/disinfection: None
  This product has no part requiring sterilization/disinfection.
- Classification of safety of use in an environment containing air/combustible gas, oxygen or nitrogen monoxide/combustible anesthetic gas: Equipment not suited for use in an environment containing air/combustible gas, oxygen or nitrogen monoxide/combustible anesthetic gas
  Use this product in an environment not containing combustible anesthetic gas and combustible gas.
- Classification by mode of operation: Continuous operation equipment
  Continuous operation refers to an operation under normal load conditions without exceeding specified temperatures, without a limit of time.

DIMENSIONS, WEIGHT

Dimensions	550mm(W)x399mm(D)x520mm(H) (Standard Type) 440mm(W)x379mm(D)x558mm(H) (Unit Type) 329mm(W)x293mm(D)x414-444mm(H) (w/o Table and Chinrest)
Weight	15.2kg (Standard Type) 14.8kg (Unit Type) 8.0kg (w/o Table and Chinrest)

OPERATION PRINCIPLES

Illuminates the observed part with the illumination light emitted from the illumination optical system and allows magnified observation with the binocular stereoscopic microscope.

REFERENCES

SHAPE OF PLUG

Country	Voltage/frequency	Shape of plug
Mexico	110V/50Hz	Type C&E
Argentina	220V/60Hz	Type A
Peru	220V/60Hz	Type A
Venezuela	110V/50Hz	Type C&E
Bolivia & Paraguay	220V/60Hz	Type A (Most common) Type H (Infrequently)
Chile	220V/60Hz	Type A
Colombia	110V/50Hz	Type C
Brazil	220V/60Hz 127V/60Hz	Type A Type C
Ecuador	110V/50Hz	Type C&E
USA	120V/60Hz	Type A (Hospital Grade)
Canada	120V/60Hz	Type A (Hospital Grade)

SYMBOL

Symbol	IEC Publication	Description	Description (French)
	60417-5032	Alternate Current	Courant alternatif
	60878-02-02	Type B applied part	Partie appliquée du Type B

MAINTENANCE AND CHECKUPS

PERIODIC MAINTENANCE

Before using, confirm the following:

- Following the "ADJUSTING THE DIOPTER AND PUPILLARY DISTANCE(PD)" on page 12, the diopter and eye width adjustment is carried out, and the focus is acquired.
- Move the base forward-backward and right-left: The base moves smoothly.
- Component parts, including the eyepiece unit, are fitted in place.
- The chinrest base is firmly fitted to the table.
- Cables and plugs are attached connected.
- The illumination lamp light is bright enough.

DAILY CARE

CAUTION	Use only the attached AC adapter. Using any other AC adapter might cause incorrect operation/ failure.

- This instrument may be affected adversely by dust. Apply the dust cover when not in use.

PLACING AN ORDER FOR CONSUMABLES

- When ordering consumable items, contact your dealer or TOPCON (see the back cover) and specify the article name, product code and quantity.

Article name	Product code
Illumination lamp unit	44628 2020

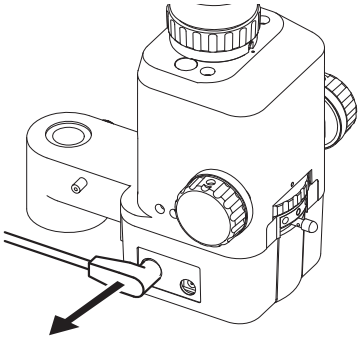
The illumination lamp unit will gradually lower its light volume in about 4 years, depending on the operating time.
When it becomes too dim, replace the lamp with a new one.

REPLACING ILLUMINATION LAMPS

CAUTION	When replacing the lamp, switch off the power supply and remove the power cable to avoid electric shocks.
CAUTION	To avoid burns, beware of high temperatures when replacing the lamp immediately after switching it off.
NOTE	To ensure perfect illumination, make sure that the socket flange and notch are firmly fitted.

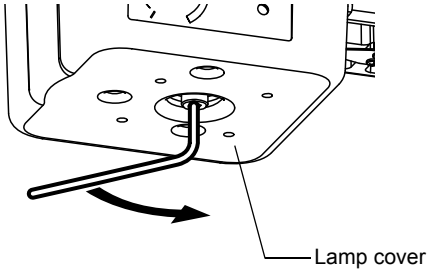
1 Turn the Power switch & Brightness control knob to OFF.

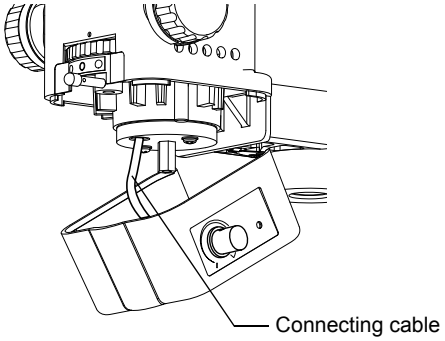
2 Remove the power cable from the illumination unit.



When the external fixation target (optional) is attached, remove the connector from the external fixation target.

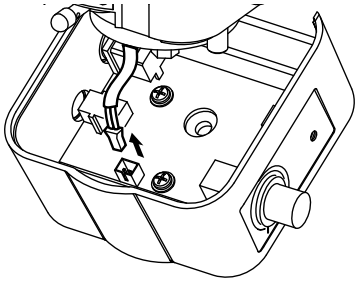
3 Remove the screws attaching the lamp cover with a hexagon wrench, and remove the lamp cover by pulling it downward.



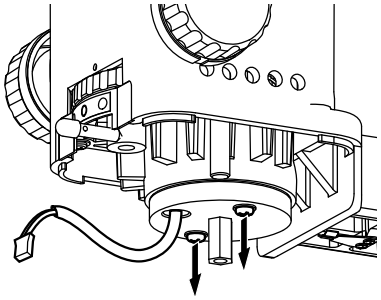


When removing the lamp cover, be careful of the connecting cable.

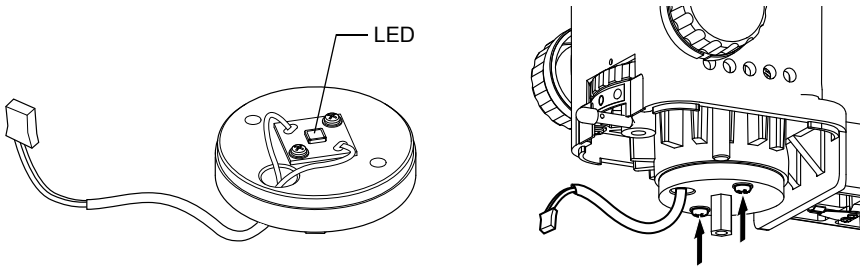
4 Remove the connector from the lamp cover.



5 Remove the screws with a cross slot screwdriver, and remove the lamp unit.



6 Replace the lamp unit with a new one, and set it in reverse order.



When touching the lamp unit, take care not to damage the LED.

RESTOCKING CHINREST TISSUE

When the chinrest tissue supply is depleted, pull out the chinrest tissue pins and replace the tissue.

MAINTENANCE PROCEDURE

⚠ **CAUTION**	Before doing daily maintenance, pull out the power cable (to avoid electric shocks) and wait until the body is cooled (to avoid burns).

⚠ **CAUTION**	To prevent burns, do not touch the parts inside the lamp house cover during operation and immediately after cutting the power supply.

NOTE	To prevent the chinrest, forehead rest and other plastic parts from discoloration and deterioration, do not use volatile solvents for cleaning, including benzine, thinner, ether, gasoline, etc. Wipe parts with a cloth moistened with a tepid solution of neutral detergent for kitchenware.

CLEANING THE PARTS COMING INTO CONTACT WITH THE PATIENT

When the forehead rest and chinrest are stained, mix neutral detergent (dish liquid) with water, wet and squeeze a soft cloth, and wipe them lightly.

CLEANING LENSES AND PRISMS

NOTE	To prevent damaging lens surfaces, do not use gauze held by tweezers and the like.

1 Prepare a solution of ethyl alcohol 20% and ether 80%.

2 Remove dust from lens and prism surfaces.

3 Using clean gauze, lightly draw a circle from the lens/prism center outward.

4 If the stains remain, repeat this ***2*** to ***3*** times.

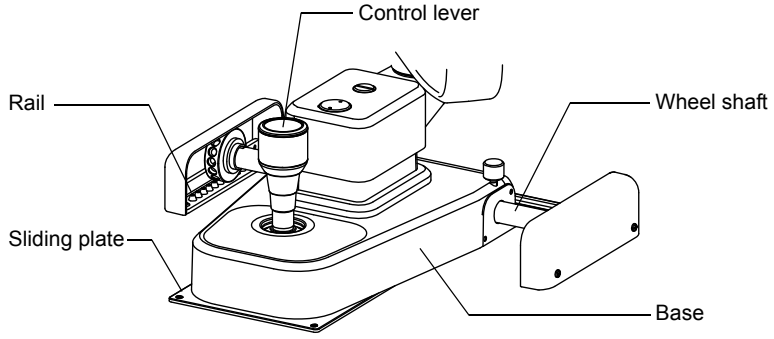
5 If stains are persistent, call your dealer or TOPCON (see the back cover).

CLEANING THE SLIDING PLATE, RAIL AND WHEEL SHAFT

NOTE	When stained, the movement of the sliding plate and the rail of the table top and the wheel shaft of the base becomes less smooth. Clean them with a dry cloth.

1 Wipe the wheel shaft clean by moving the base right and left.

2 Raise the control lever and wipe the sliding plate clean.



DISPOSING THE PRODUCT

For disposal of the instrument and consumables, comply with the regulations on disposal and recycling in your area.

⚠ CAUTION	The base contains strong springs. Do not attempt to disassemble this, as these springs could shoot out of the base, causing injury.

OPTIONAL ACCESSORIES

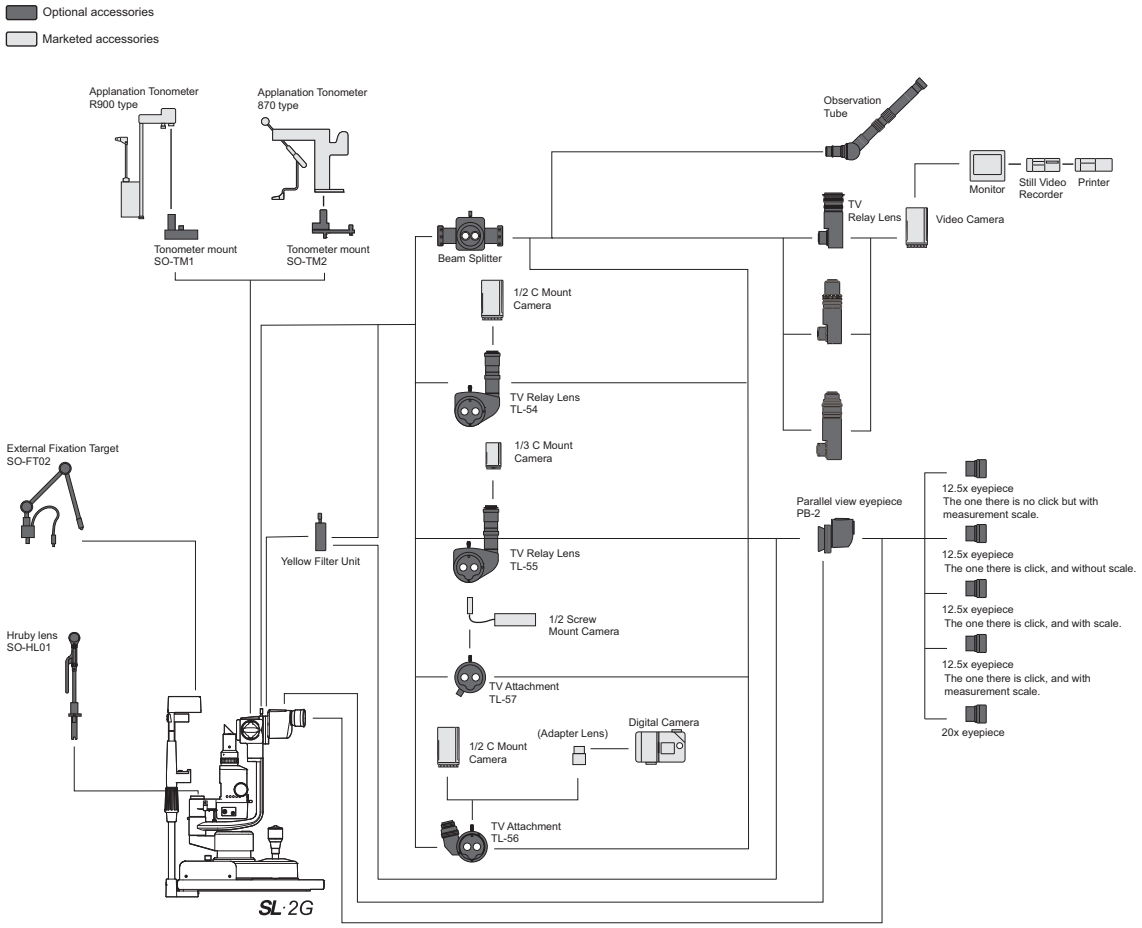
The TOPCON SL-2G Slit Lamp provides the following optional accessories.
For inquiries, please call your dealer or TOPCON (see the back cover).

CAUTION	To prevent falling during use and movement, secure optional accessories.

- For details, please refer to the instruction manuals of each product.

SYSTEM CONFIGURATION

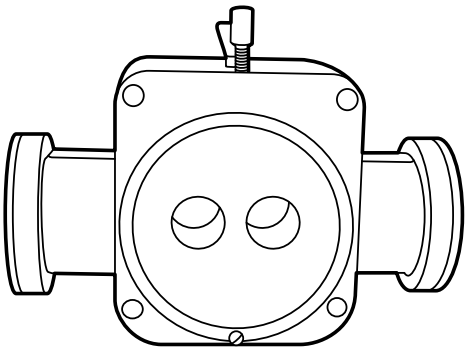
SL-2G SYSTEM CHART



BEAM SPLITTER

FEATURES

- Used to attach the TV relay lens and observation tube.
- The TV relay lens and observation tube can be attached to either side.
- The beam splitter division ratio is TV 50%: patient 50%.

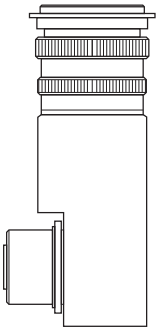


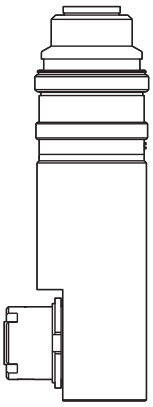
TV RELAY LENS

- Three types of TV relay lenses are prepared for different TV camera types to be used (C mount 1/2 type, C mount 1/3 type and bayonet mount 1/2 type).

FEATURES

- Used with the beam splitter.
- Can connect a TV camera to carry out monitor observation and photographing of still images.





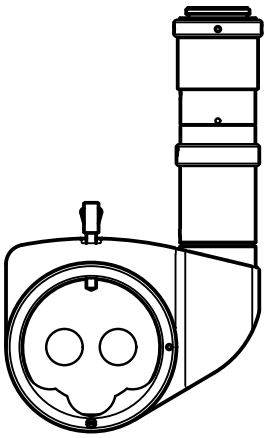
TV RELAY LENS TL-54

TV RELAY LENS TL-55

- Two types of TV relay lenses differ according to the type of TV camera to be used.
  For C mount 1/2 type TV camera: TL-54
  For C mount 1/3 type TV camera: TL-55

FEATURES

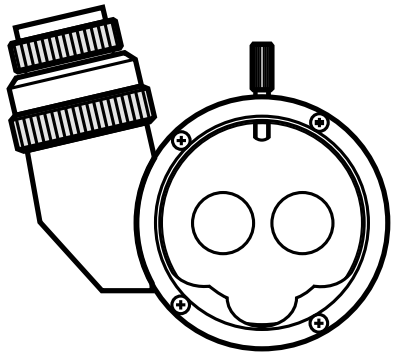
- Incorporated with the beam splitter
- Can connect a TV camera to carry out monitor observation and photographing of still images.
- The beam splitter IN/OUT can be selected.
- The beam splitter division ratio is TV 50%: patient 50%.



TV ATTACHMENT TL-56

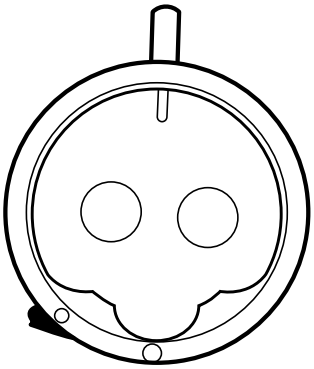
FEATURES

- Used to connect a digital camera.
- Combined with beam splitter.
- The beam splitter division ratio is TV 50%: patient 50%.



TV RELAY LENS TL-57

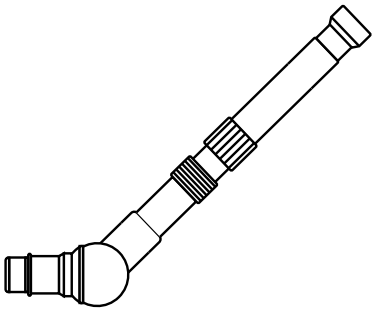
- Used to connect a digital camera.
- Combined with beam splitter.
- The beam splitter division ratio is TV 50%: patient 50%.



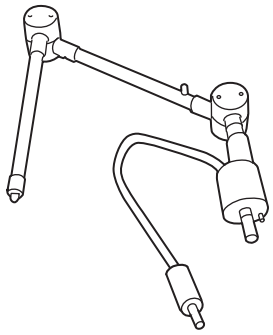
OBSERVATION TUBE

FEATURES

- Used in combination with a beam splitter.
- Used for observation together with the operator.
- Can be inclined to facilitate observation.



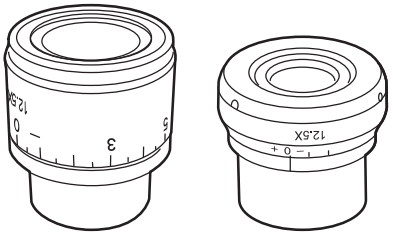
EXTERNAL FIXATION TARGET SO-FT02



FEATURES

- Attached to the upper part of the chinrest to easily guide and fixate the patient's visual line.

12.5X EYEPIECE

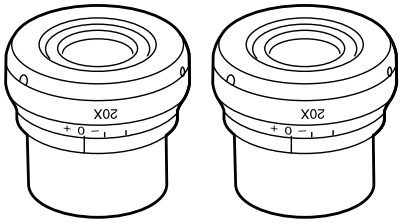


FEATURES

There are four types as below:

- One with internal measurement scale and no click stops.
- One without internal scale and click stops on each adjustment step.
- One with internal scale and click stops on each adjustment step.
- One with internal measurement scale and click stops on each adjustment step.

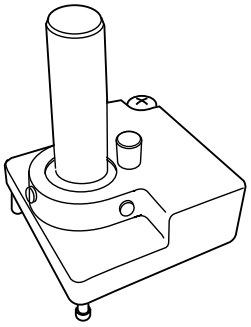
20X EYEPIECE



FEATURES

- Replaces the normal eyepiece for high magnification observation.

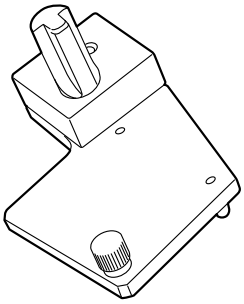
TONOMETER MOUNT SO-TM1



FEATURES

- This is a mount used for attaching the Applanation Tonometer 900.4 (for Slit Lamp 900 (Medical Device Approval No. 15200BZY00166000)) to the SL-2G.

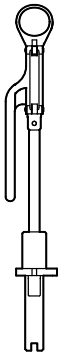
TONOMETER MOUNT SO-TM2



FEATURES

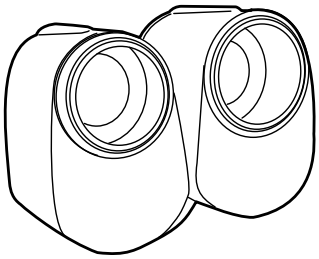
- This is a mount used for attaching the Applanation Tonometer 900.4.3 (Model 870Z) (for Slit Lamp 900 (Medical Device Approval No. 15200BZY00166000)) to the SL-2G.

HRUBY LENS SO-HL01



Normally, observation is possible only up to the anterior vitreous body due to the refractive power of the cornea and lens. With the Hruby lens, the posterior vitreous body and the retina can be observed.

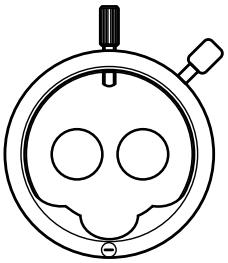
PARALLEL VISION BINOCULAR TUBE PB-2



FEATURES

- Allows observation in a parallel pattern instead of a converging one.
- The handling method is the same as that for the converging binocular tubes.

YELLOW FILTER UNIT



FEATURES

- Combines with the blue filter prepared in the main body for a high-contrast fluorescence observation.
- The filter can be inserted and removed easily via a lever located on the mount.

When calling please give us the following information about your unit:

- Instrument type: SL-2G
- Serial number (Shown on the rating plate on the back of the instrument)
- Period of Usage (Please give us the date of purchase).
- Description of Problem (as detailed as possible).

SLIT LAMP SL-2G

INSTRUCTION MANUAL
Version of 2011 (2011.2-100LW1)
Date of issue: 18, Feb, 2011

Published by TOPCON CORPORATION

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SLIT LAMP

SL-2G

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44628 90991
Printed in Japan 2011.02-100LW1