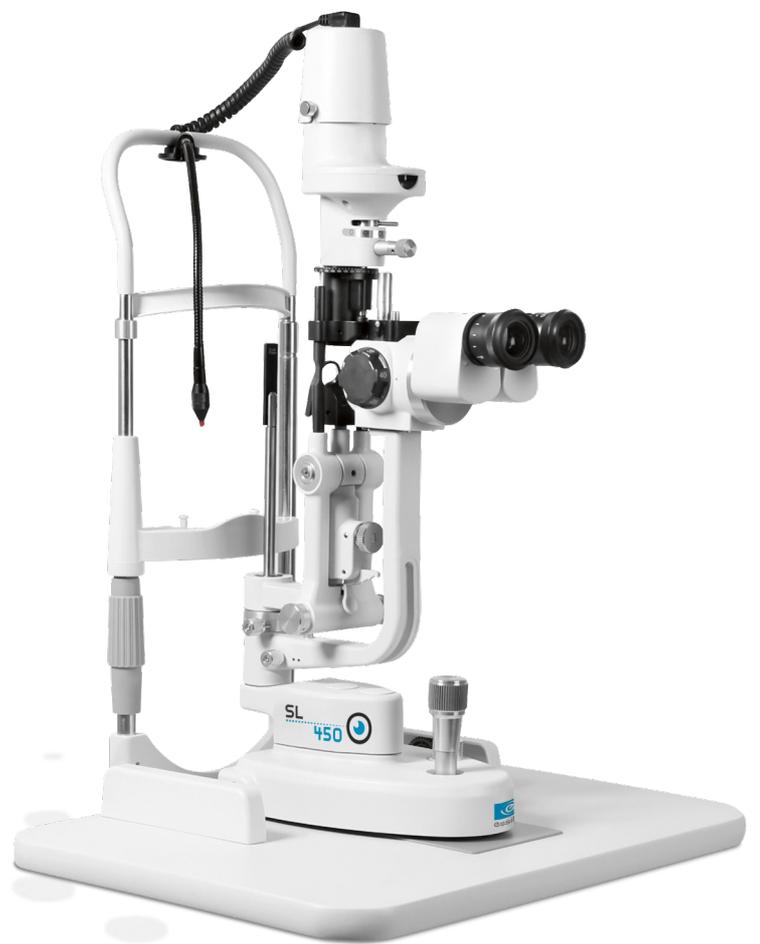


SL 350
SL 450



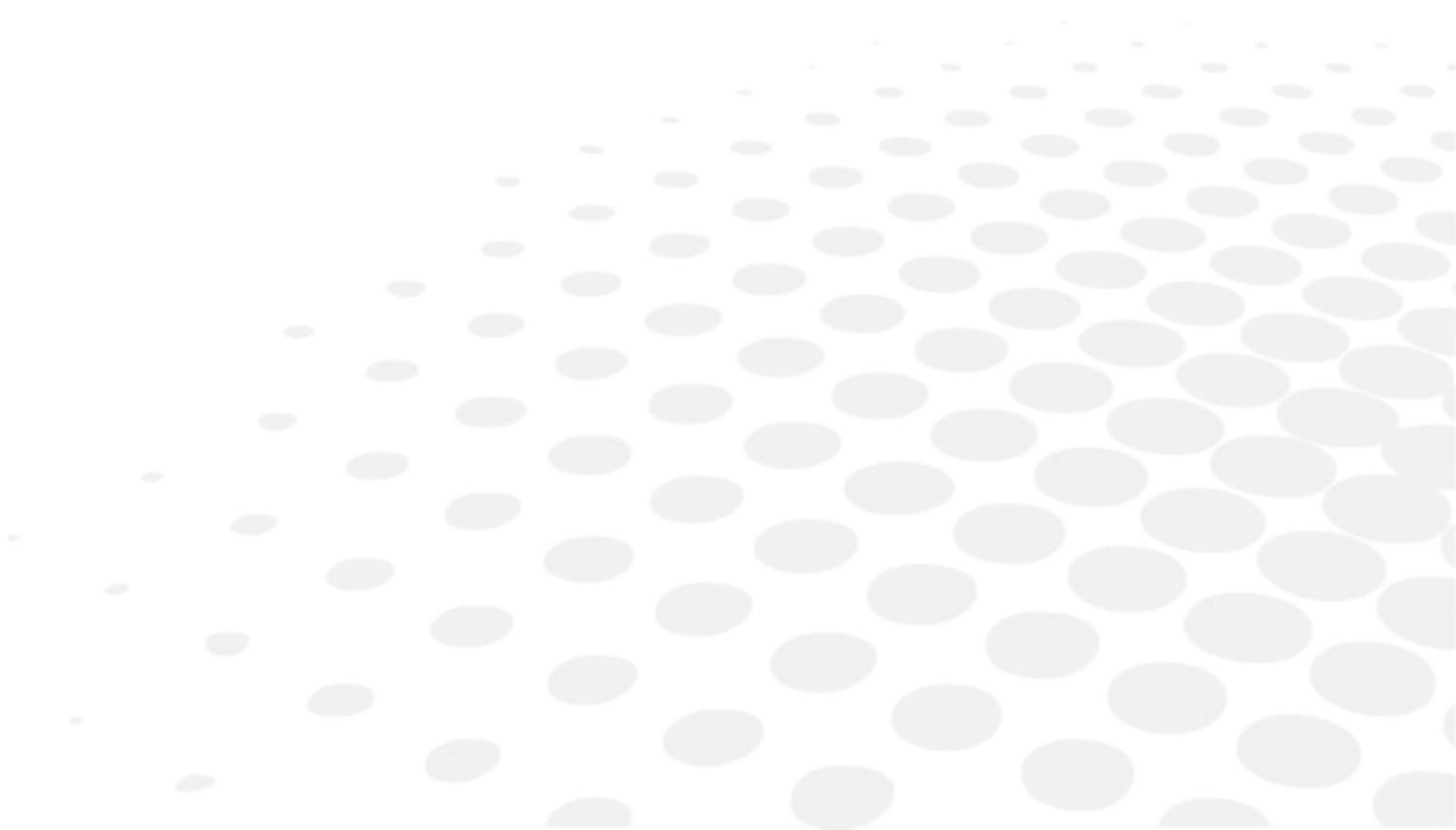
User manual

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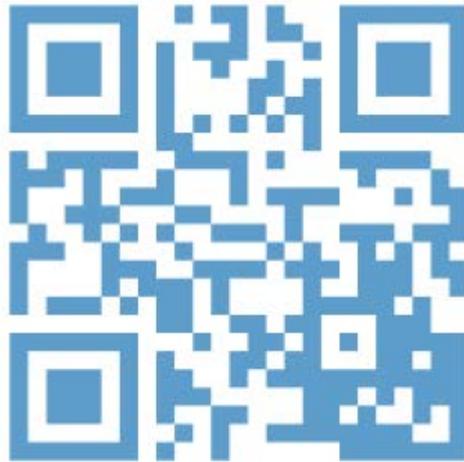
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I. INTRODUCTION



	<p>The complete user manual is available on a web space. To access, please scan the QR code below using a dedicated application.</p>
	<p>Le manuel utilisateur complet est disponible sur un espace web. Pour y accéder veuillez scanner le QR code ci-dessous à l'aide d'une application dédiée.</p>
	<p>O manual do usuário completo está disponível na área web do cliente. Para acessar, scanear o código QR abaixo usando a respectiva aplicação.</p>



1. GENERAL DESCRIPTION

- This user manual is relevant for product SL350H and SL450H. It is based on relevant technical specification and operation of the product.
- The classification of this instrument according to IEC 60601-1 is specified in this manual.
- Labels and marks required by IEC 60601-1 standard is stuck on the instruments and described in this user manual.
- Working principle:
A beam of light attached to the slit lamp projects to the patients' eye, which forms an optical section of the living tissue of the eye, in this way the doctor can finish the observation and examination.
- Slit lamp microscopes are used to observe the disease of the anterior structures and tissue damage of eyes.

2. INSTRUMENT CLASSIFICATION

This instrument is categorized to class I Type B according to IEC 60601-1 standard, which can not be used under two circumstances:

1. A flammable anesthetic gas and air mixture,
2. Oxygen or nitrous oxide gas and air mixture.

3. SPECIFICATIONS

a. Microscope

TECHNICAL DATA	VALUE
Type	Galilean type
Magnification change	SL350H: Three positions revolving drum SL450H: Five positions revolving drum
Eyepieces	12.5X
Angle between eyepieces	13°
Total magnification ratio	SL350H: 10X, 16X, 25X SL450H: 6X, 10X, 16X, 25X, 40X
Pupillary adjustment	52 mm ~ 78 mm
Diopter adjustment	± 6D
Field of view	SL350H: 25X (∅8.5 mm), 16X (∅13.5 mm), 10X (∅22 mm) SL450H: 40X (∅5.5 mm), 25X (∅8.5 mm), 16X (∅13.5 mm), 10X (∅22 mm), 6X (∅34.7 mm)

b. Slit illumination

TECHNICAL DATA	VALUE
Slit width	Continuously variable from 0 to 14 mm (at 14 mm, slit becomes a circle)
Slit length	Continuously variable from 1 mm to 14 mm
Aperture diameters	∅14 mm, ∅10 mm, ∅5 mm, ∅ 3 mm, ∅ 2 mm, ∅1 mm, ∅0.5 mm
Slit angle	0° - 180°
Slit inclination	4 steps: 5°, 10°, 15°, 20°
Filters	Heat-absorbing filter, ND filter, Red-free, Cobalt blue filter
Lamp	6V / 20W Halogen lamp

c. Base

TECHNICAL DATA	VALUE
Longitudinal movement	110 mm
Lateral movement	110 mm
Fine base movement	15 mm
Vertical movement	30 mm

d. Chinrest

TECHNICAL DATA	VALUE
Vertical movement	80 mm
Fixation target	Red LED

e. Power

TECHNICAL DATA	VALUE
Input voltage	220V / 110V ~ ± 10%
Input frequency	50Hz / 60Hz
Power consumption	30VA (max)

f. Output voltage

TECHNICAL DATA	VALUE
Light	6V
Fixation	3V

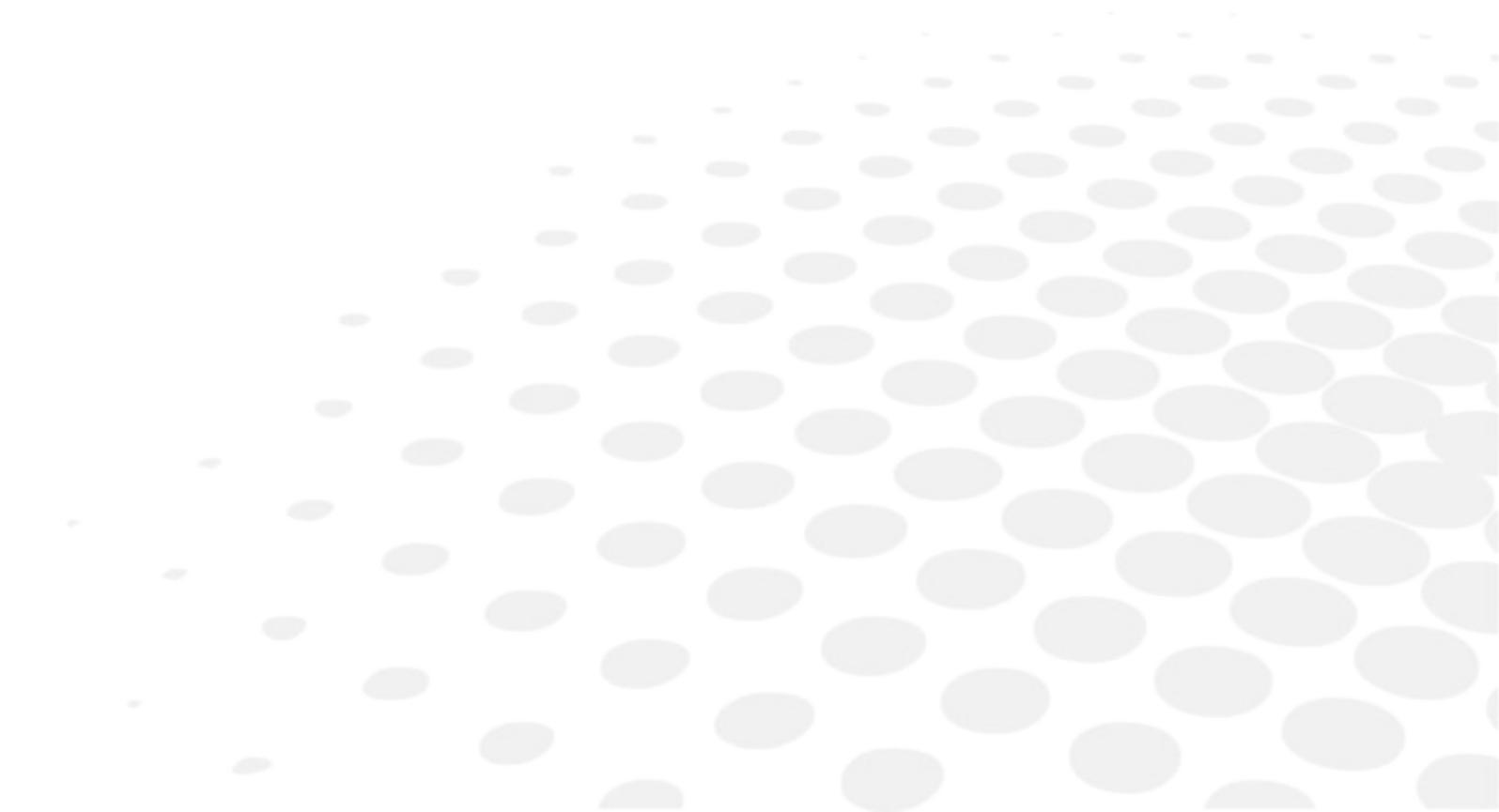
g. Dimension and weight

TECHNICAL DATA	VALUE
Dimension	740 mm x 450 mm x 500 mm
Gross weight	25 Kg
Net weight	24 Kg

h. Environmental conditions

PHASE	TECHNICAL DATA	VALUE
Transport	Temperature	-40°C ~ +55°C
	Atmospheric pressure	700 hPa ~ 1060hpa
	Relative humidity	≤93%
Storage	Temperature	-40°C ~ +55°C
	Atmospheric pressure	700 hPa ~ 1060hpa
	Relative humidity	≤93%
Use	Temperature	+5°C ~ +40°C
	Atmospheric pressure	800 hPa ~ 1060hpa
	Relative humidity	≤80%

II. SAFETY AND PRECAUTIONS



**General requirements for safety**

Please read carefully about following precautions to avoid unexpected personal injury as well as the product being damaged and other possible dangers.

1. PRECAUTIONS

1. In case there is any trouble, please first refer to the trouble-shooting guide. If it still can't work, please contact with the authorized distributor or our repair department.
2. Do not use this instrument in the environment prone to fire and blast or where there is much dust and with high temperature. Use it in room and simultaneously be careful to keep it clean and dry.
3. Check that all the wires are correctly and firmly connected before using. Ensure that the instrument is well grounded.
4. Please pay attention to all the ratings of the electrical connecting terminal.
5. Turn OFF the main power first before replacing the main bulb, flash lamp and fuse.
6. When replacing the power cable, please use the power cable in accordance with the notes in the instruction manual.
7. Don't touch the surface of the lens and prism with hand or hard objects.
8. To prevent the instrument from falling down to floor, it should be placed on the floor where the inclination angle is less than 10°.
9. Read carefully the safety and other signals on this machine in order to use the product safely.

2. SAFETY MARKS

The safety marks, icons and warning symbols stuck on this instrument.

MARK	DESCRIPTION
	Type B
	Manufacturing date
Class I	The slit lamp is class I medical device
Type B	English form of B type
	WEEE mark: Please deal with the waste disposal produced by the machine following relevant laws and regulations.
	CE marking according to applicable directives Date of first marking 12/2015
PN	Part number
SN	Serial number
I	Power ON
O	Power OFF
Output	At the back of power supply box, indicate outlet of the power
Input	At the back of power supply box, indicate input of the power
Fuse	Rated value and current value (F1AL250V)
Power	At the front of power supply box, switch the power ON and OFF
Voltage selector	Switch the input voltage from 110V to 220V
	The mark of light dimmer

3. EMC PRECAUTIONS

Other medical instruments and equipment which needs to be installed on the same site using with this instrument shall comply with the same electromagnetic compatibility principle. The equipment which is unable to comply with the electromagnetic compatibility or is known with poor electromagnetic compatibility shall be installed 3 meters at least away from this equipment and powered by different power supply.

4. WEE PRECAUTIONS

Please dispose the waste electrical and electronic equipment in accordance with relevant regulations and laws.

5. MARKS ON DEVICE

The marks on power box of slit lamps.

MARK	DESCRIPTION
	Protective earth terminal

6. INDICATOR LAMP

There is indicator lamp on power switch. Green light indicates the power is on, and the instrument is working.

- Model SL350H, when operating at maximum intensity, exceeds the threshold set by the safety guidelines after 168 seconds.
- Model SL450H, when operating at maximum intensity, exceeds the threshold set by the safety guidelines after 168 seconds.

7. INSTALLATION AND WORKING CONDITION

Slit lamps are network powered medical instrument. Please check pert the checking list after opening the carton and install the instrument according to this user manual. Test and ensure the instrument operating well before putting to use.

8. COMPONENT LIST

The following electronic components are used in this instrument.

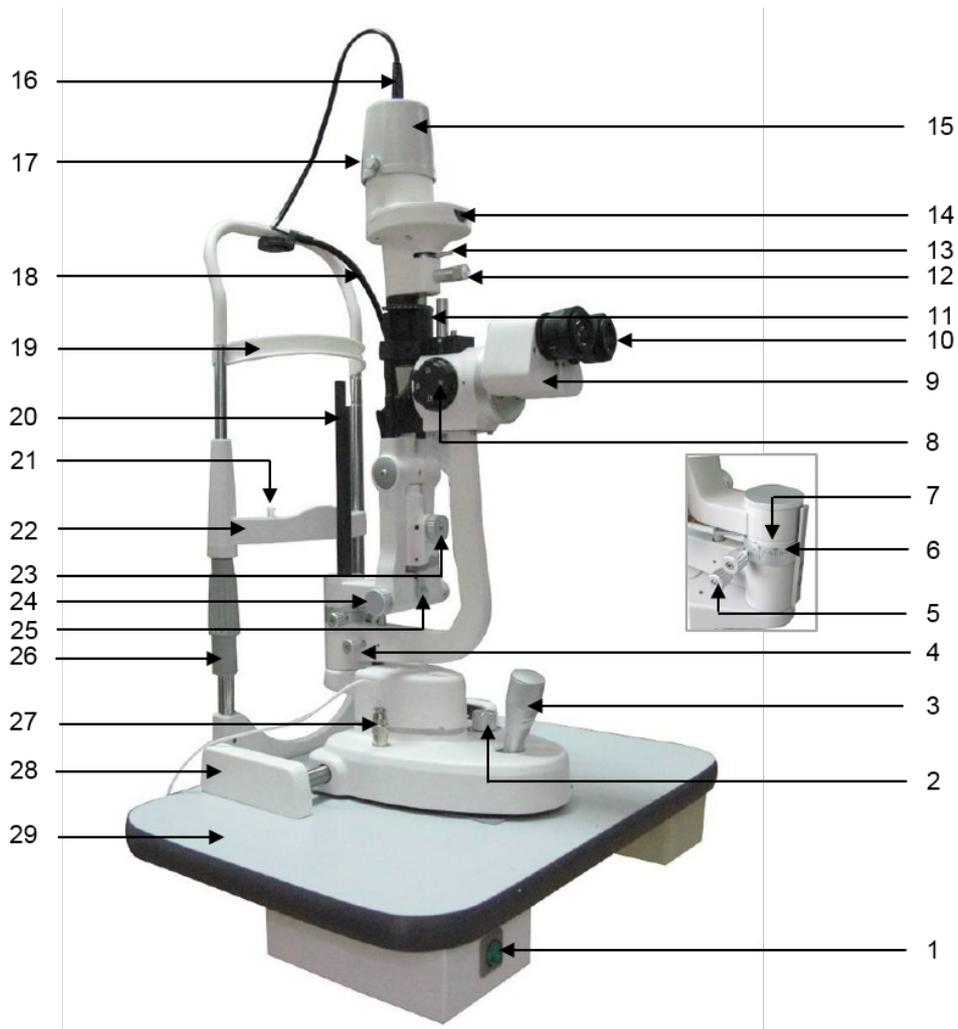
N°	COMPONENT NAME
1	Annulus transformer
2	Light dimmer potentiometer
3	SCR circuit boards
4	Power switch with indicator
5	Metal output socket with four pins
6	220V / 110V input voltage selector
7	Network power input socket
8	Light sauce (halogen/ LED lamp)
9	Fixation point
10	Fuse
11	Protective earth terminal

9. TRANSPORT AND STORAGE

No special requirements besides the content about transportation and storage of IEC 60601-1 standard.

III. NOMENCLATURE



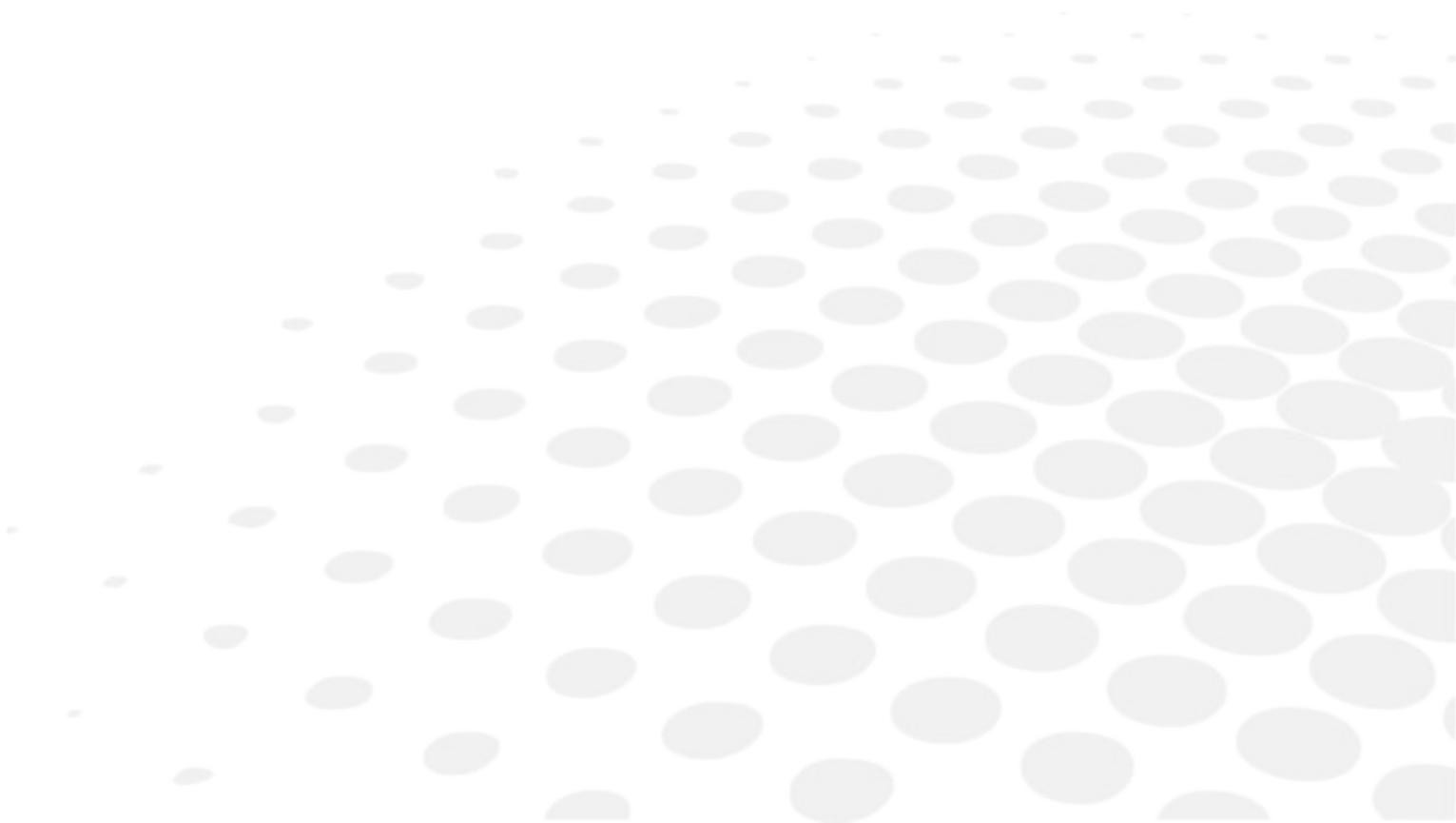


With:

N°	DESCRIPTION
1	Main power switch.
2	Brightness control knob: Avoid working continuously at high brightness or the service life of the bulb will be shortened.
3	Joystick: Incline joystick to move the instrument slightly on the horizontal surface and rotate it to adjust the elevation of the microscope.
4	Microscope arm locking knob: Lock the rotational movement of the microscopes arm.
5	Illumination arm locking knob: Lock the rotational movement of the illumination arm.
6	The indicate of relative angle between the microscope and illumination unit: Mark on the angle mark ring of the illumination arm, which relates to the long mark of the microscope arm, represent the two arms' angle when the "0" on the ring relates to the short mark at one side of the operator the right eyepiece may be blocked, and the side of the patient the left eyepiece.
7	The mark line on the ring of the microscope arm. Together with (7) to indicate the angle between the microscope and illumination unit.

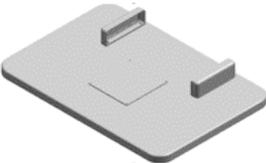
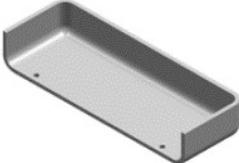
8	Magnification select dial: Five different magnifications are provided.
9	Prism box: Separate the prism box to adjust the interpupillary distance.
10	12.5X eyepieces.
11	Control plat of slit.
12	Slit height control knob.
13	Filter selection lever and display mark: The lever can choose different filters.
14	Aperture slit height and display window: It will display the diameter of the slit and the aperture.
15	Lamp cap: With the function of protecting and insulating, its normal working temperature is around 51°C.
16	Plug of lamp cap: It is connected with the power of the light unit.
17	Fixation knob of lamp cap: After fixing the knob, the lamp cap will not move.
18	Fixation target: Make the patient stare at it, it is convenient for checking Rotate this knob to adjust the spot and the slit height. Swing the knob horizontally to revolve the slit.
19	Forehead belt: Make patient's head in an appropriate position.
20	Focusing test bar.
21	Fixation knob of chinrest paper: It is used to fix the chinrest paper.
22	Chinrest: Supporting the patient's chin.
23	Centering knob of illumination unit: Loosen the knob to allow the illumination light to move from the center of the vision field for indirect retro-illumination. Fastening the knob can bring the illumination light back to the center.
24	Slit width control knob: The slit width is continuously adjustable within the range from 0 to 14 mm. The markson the left knob stands for the approximant value of the width.
25	Illumination onclination lever: Four inclination stops are available from 5°up to 20°. The interval between each is 5°.
26	Chinrest elevation adjustment knob: Rotate the knob to adjust the elevation of the chinrest.
27	Access line and plug of the brightness control.
28	Rail cover.
29	Work tabletop.

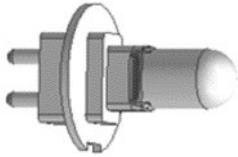
IV. ASSEMBLY



All parts should be taken out with great care from the packing case before assembling.

1. MAIN PARTS CHECK LIST

NAME	QUANTITY	IMAGE
Chinrest part	1	
Microscope part	1	
Illumination part	1	
Tabletop part	1	
Rail cover	1	
Breath shield	1	
Input power cable	1	
Focusing test bar	1	
Protecting cap	1	
Chinrest paper	1	

Screw driver	1	
Spare bulb	1	
User manual	1	
Packing list	1	

2. ASSEMBLY PROCEDURE

1 Open the box, and take out the tools: cross screw driver and spanner.

2 Check the setting on the voltage selector located on the bottom of the power box.



If it doesn't match with the input voltage, slide it to the proper position with watch screw driver.

3 Open the fuse holder with screw driver and take out the fuse, check and ensure that its rated value is corresponding to the mains voltage:

- 110V > 2A
- 220V > 1A

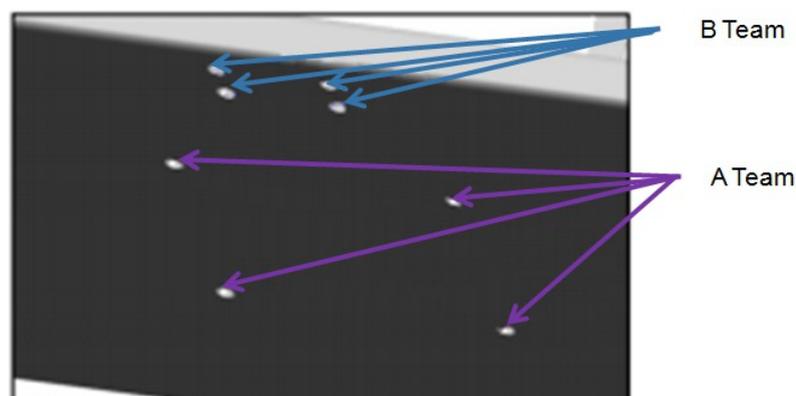


It has been set to 220V, 1A before leaving our factory.

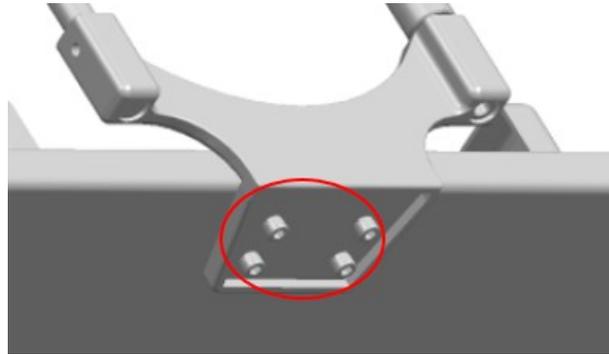


Set the input voltage and frequency of the instrument according to that of the main power supply.

4 Before attaching the tabletop on the power table, please remove "A team" screws (4*M6 x20mm) with the spanner.



- 5 Remove the four screws of "B Team" with screw driver, and fix the chinrest part to the tabletop in the way as below.



- 6 Take out the slit lamp part, put it on the rails of the tabletop, and echeck whether the wheels can be rolled steadily on the rails.

Place the rail cover to the rail, remove four screws attached to the rail with the screw drive, retighten the previously removed screws.

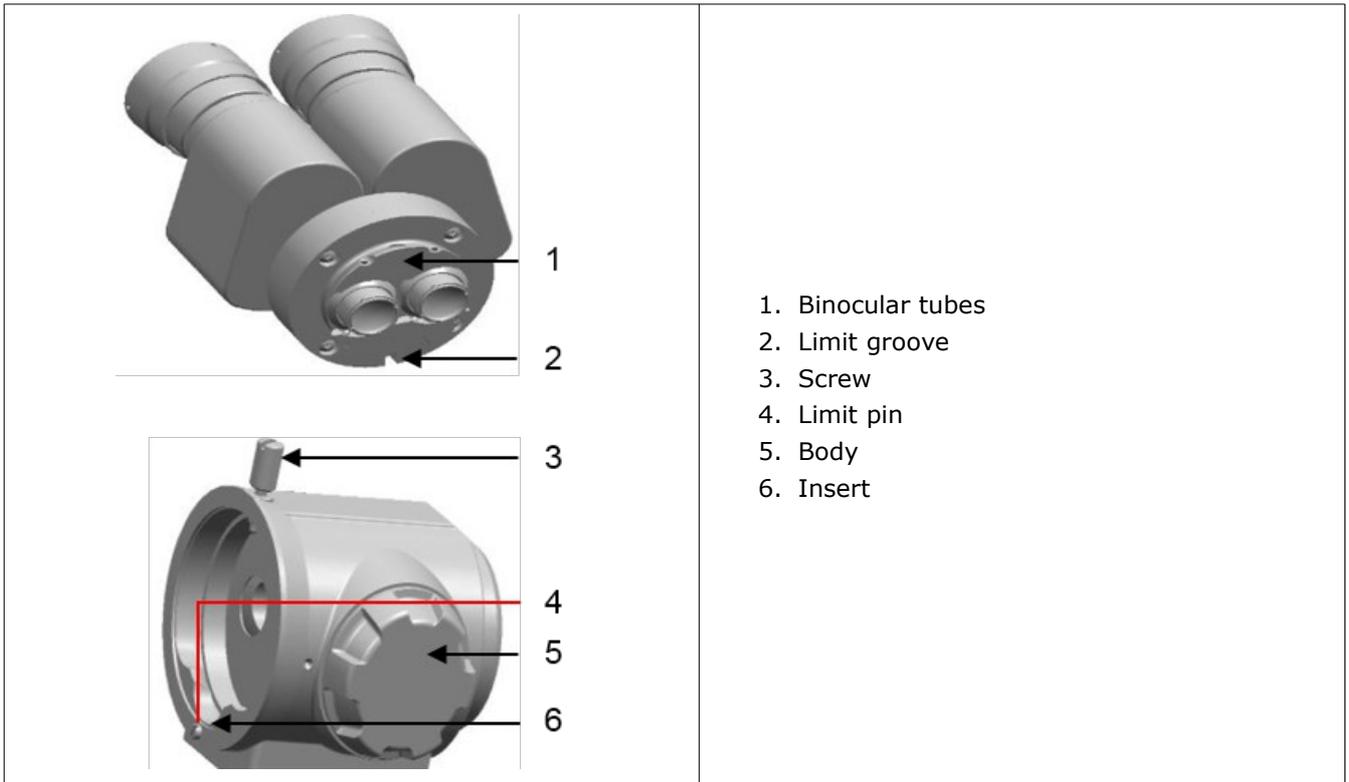
	<p>1 2</p> <p>1. Locking screw on base 2. Rails</p>
	<p>1</p> <p>1. Rail cover</p>

- 7 Take out the binocular tubes of microscope part.

Match the groove on the binocular tubes with the pin on the microscope body. Fasten the fixing screw on the body to the microscope.

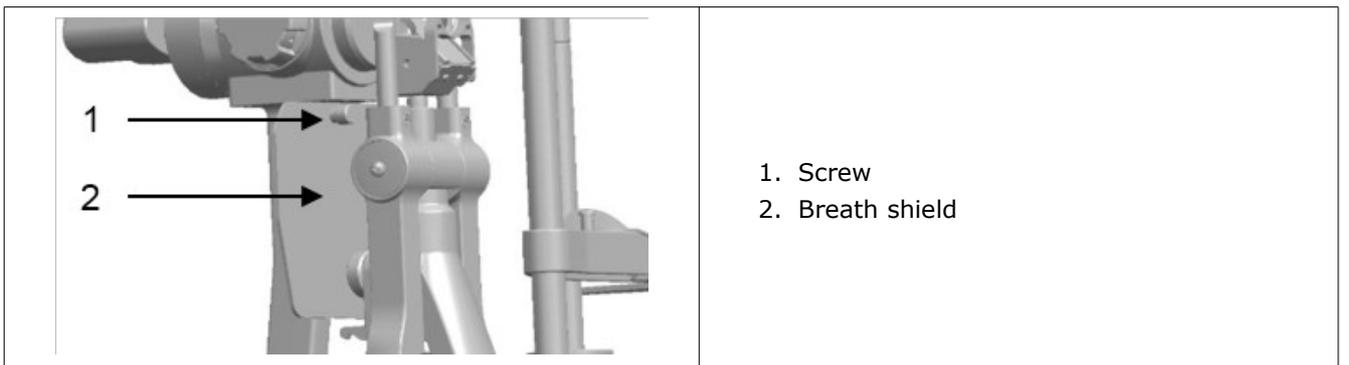


Don't touch the objective lens and eyepieces during assembling.



8 Remove the breathe shield fixation screw from the microscope arm.

Then, pass the removed screw through the hole of the breath shield and then screw it into the arm again.



9 Insert the plug on the top of the chinrest part into the socket of the lamp cap on the illumination part.

10 Connect the plug below the chinrest part with the corresponding output socket of the power box.

11 Collect tools and spare parts and put them into the drawer under the right side of tabletop.

3. CHECKING PROCEDURE



This instrument supplies a 3-wire cable. Please select a proper power socket as matched. Ensure that the instrument is grounded well.

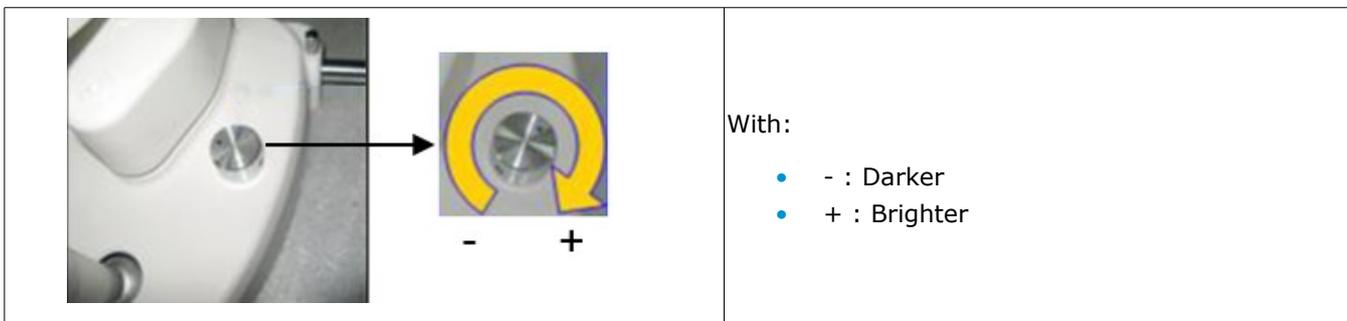
- 1 When the main power switch of the power box is placed at "I", it turns ON, and "O" for turn OFF.

The main power switch should be set at the "O" position before connecting the input cable with the power socket.

- 2 Turn ON the main power switch, and the pilot lamp will be lighted.

Open the light control knob to examine the brightness.

> The power supply signal will turn bright when power is connected.



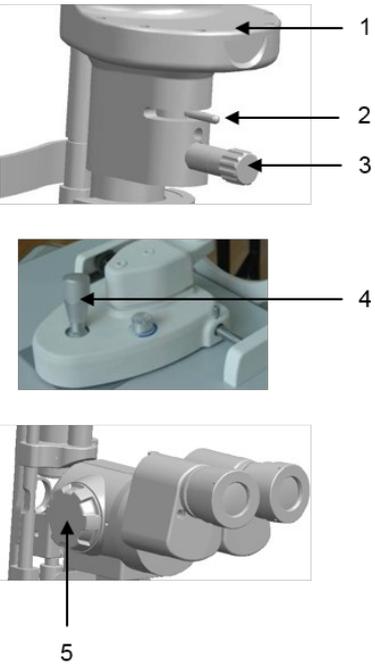
- 3 Insert the focus test bar to right position.

Adjust the slit width control knob and there should be facula on the black flat surface of focus test bar, and the brightness should change.

- 4 Check the fixation target device to confirm it is lighted.

Ensure it can be normally lighted.

5 Check the following part works flexibly:

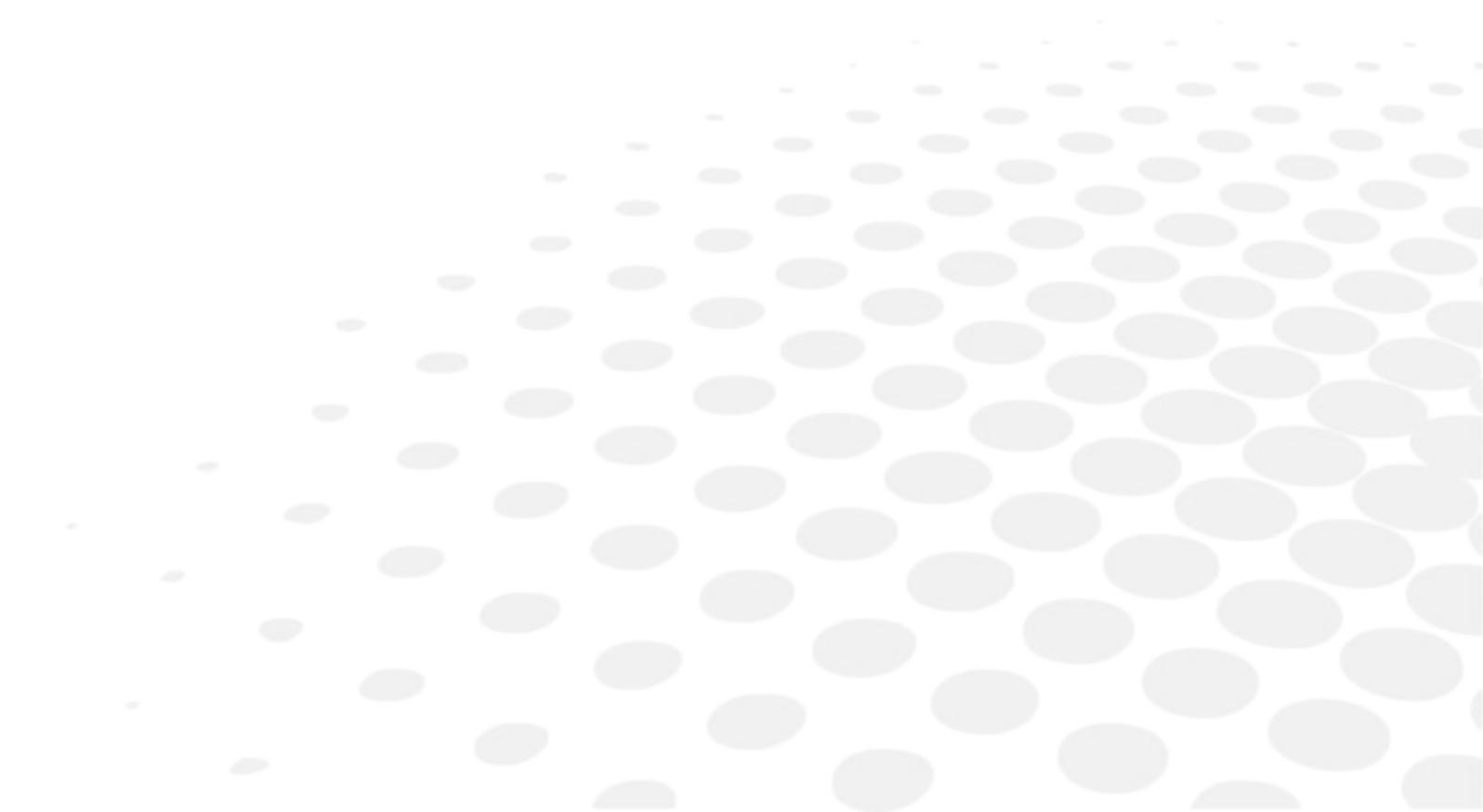
	<ol style="list-style-type: none"> 1. Display window 2. Filter handle 3. Aperture knob 4. Joystick 5. Magnification drum
---	---

6 Turn ON the light knob.

> The light should be from dark to bright.

7 Turn OFF the main power and cover the instrument with the dust-proof cover after testing.

V. OPERATION PROCEDURES



1. PREPARATION FOR DIOPTER COMPENSATION AND IPD ADJUSTMENT

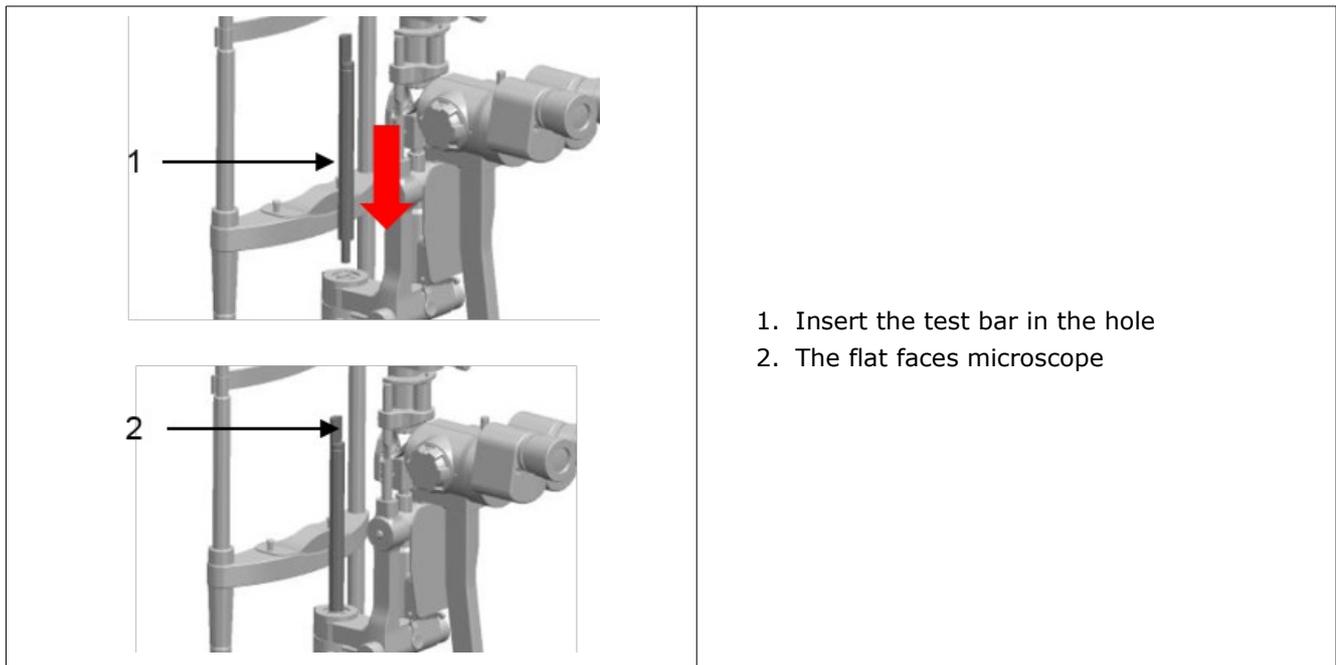
Use the focusing test bar

- 1 The bar is a standard accessory for accurate adjustment of the microscope.

Insert it into the main shaft hole with the black flat surface facing the objective lens i.e. the direction of the operator.

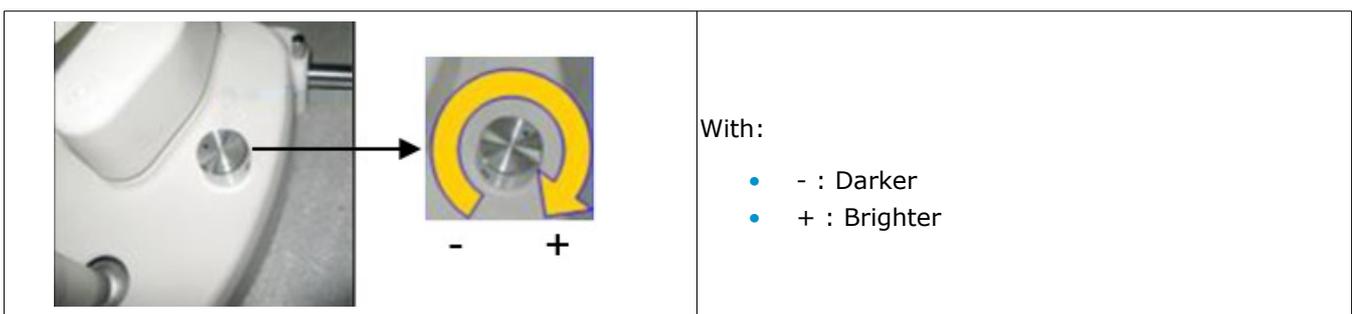


Remove the bar after testing.



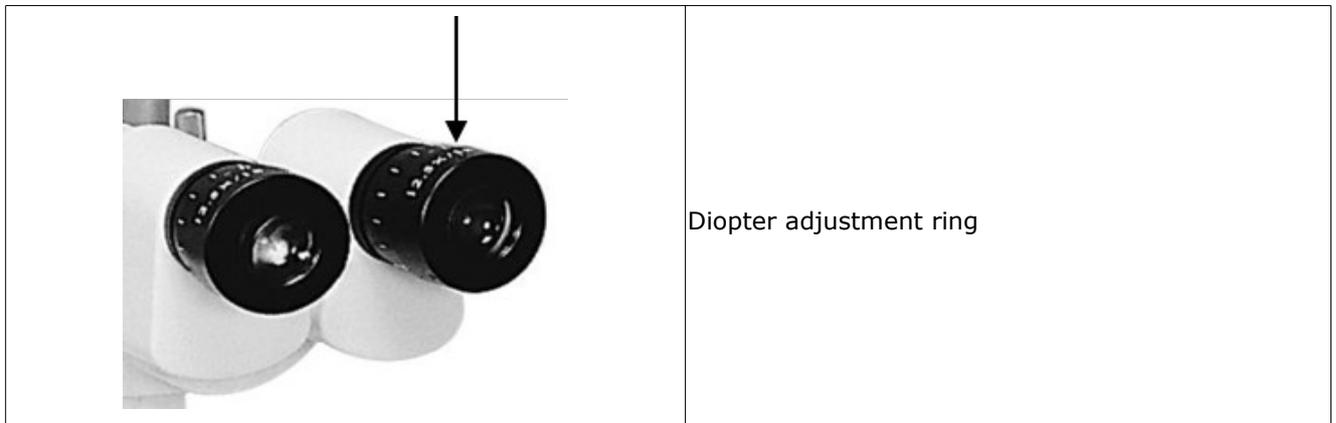
Brightness adjustment

- 1 Switch ON the main power.
- 2 Rotate the light dimmer to the central position.
- 3 Set the slit width at 2~3 mm.



Adjustment of diopter compensation

- 1 The focus of microscope is calibrated according to the emmetropia. If the operator is ametropia, he should adjust the eyepiece diopter (see picture below) according to the following procedures:



- 2 Rotate the diopter adjustment ring counter-clockwise to the end.
- 3 Rotate the ring clockwise until a fine slit image appears on the focusing text bar.

At this time, it is also the clearest observation of the reticule in the eyepiece.

Adjust the other eyepiece in the same way.

- 4 If necessary, record the diopter value on each eyepiece for future reference.

Interpupillary distance adjustment

- 1 Separate the prism box of the microscope with both hands to adjust the P.D. until both eyes could see the same image on the focusing test bar through the eyepieces, and at the same time a stereo vision will be obtained.

When adjusting, be sure that the eyepieces are at the same level

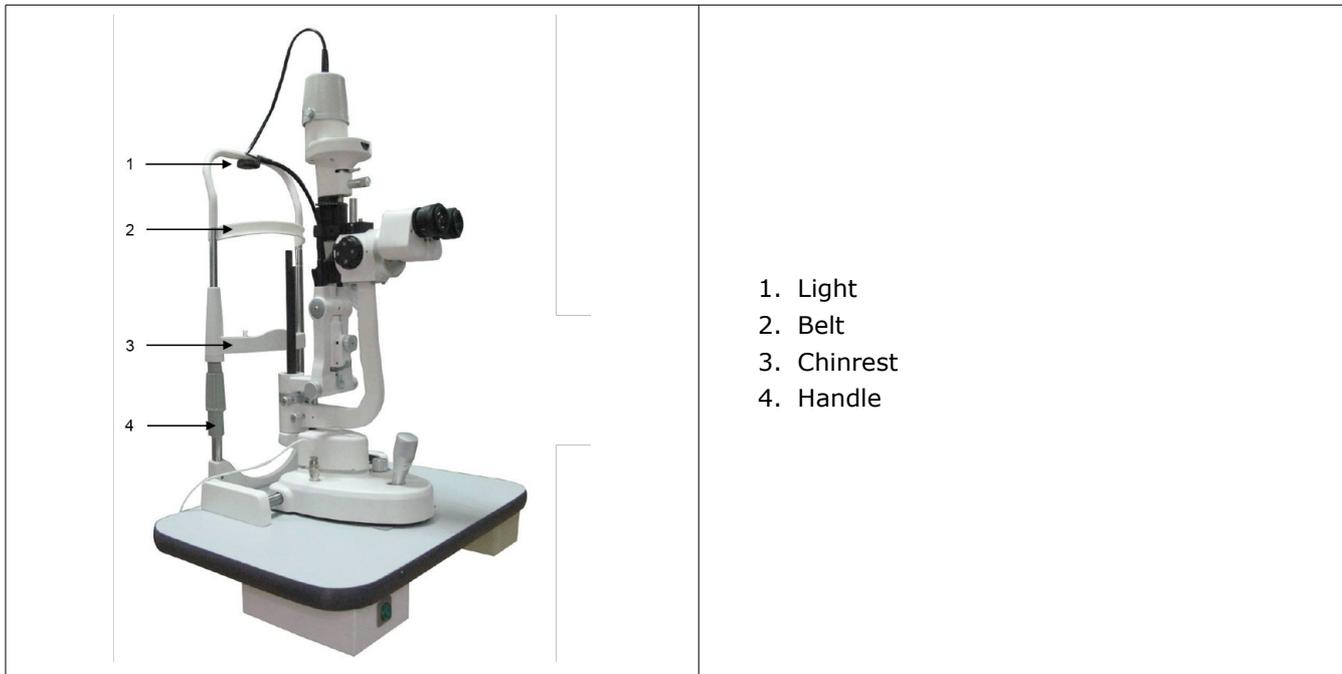


2. PATIENT POSITION AND USE OF THE FIXATION POINT

The patient should put chin on the chinrest and push forehead against the forehead belt.

Position of the patient head

- 1 Adjust the chinrest elevation adjustment knob below the chinrest until the patient's can thus align with the horizontal mark.



Use of the fixation target

- 1 For fixing the patient's sight, just make him look at the fixation target with the eye not to be examined.

Move the lamp bar to change fixing position, so as to achieve the correct lamp position

3. BASE OPERATION

Horizontal rough adjustment

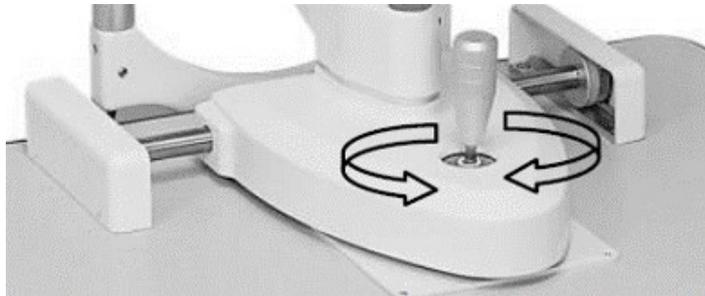
- 1 Keep the joystick erect and move the base to make the microscope move on the horizontal surface to aim at the object appropriately.

Vertical adjustment

- 1 Rotate the joystick to adjust the microscope's height until it aligns with the target.
- 2 Rotate the joystick clockwise to raise the microscope and counter-clockwise to lower it.

Horizontal fine adjustment

- 1 Tilt the joystick to move the microscope slightly on the horizontal surface and watch through the eyepieces until a clear and sharp image appear on the field.



Locking the base

- 1 When finishing the adjustment, fasten the base locking screw to lock the base and prevent it from sliding.



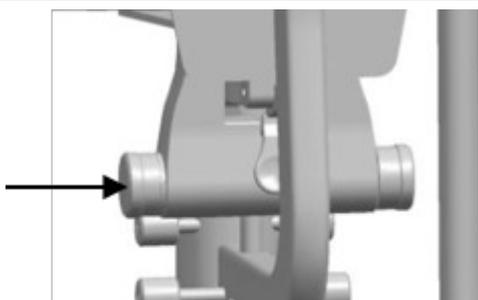
Locking screw

4. OPERATION OF ILLUMINATION SYSTEM

Changing the slit width

- 1 Turn the slit width control knob and the slit width will be changed from 0 mm to 14 mm.
 - > The slit becomes a circle at the 14 mm size.

The width value is indicated approximately by the scale on the knob.

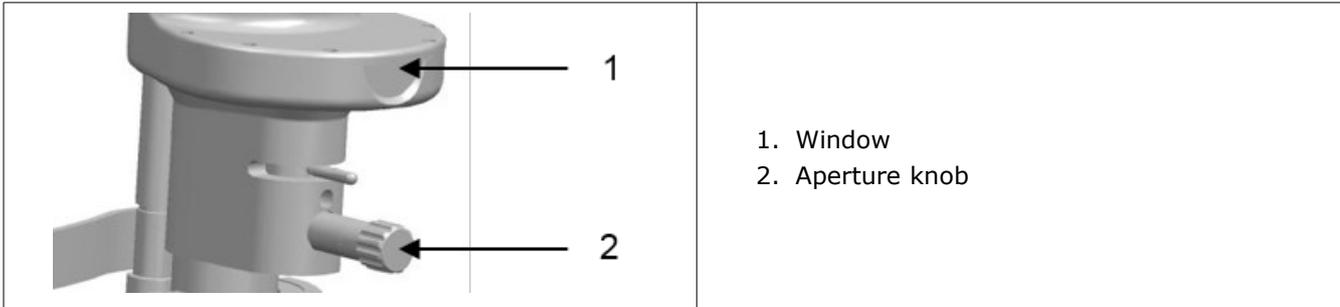


Show slit width

Changing the aperture and slit height

- 1 Turn the aperture and slit height control knob and 7 different circular beams of light are available at full aperture: 14, 10, 5, 3, 2, 1 and 0.5 Dia.

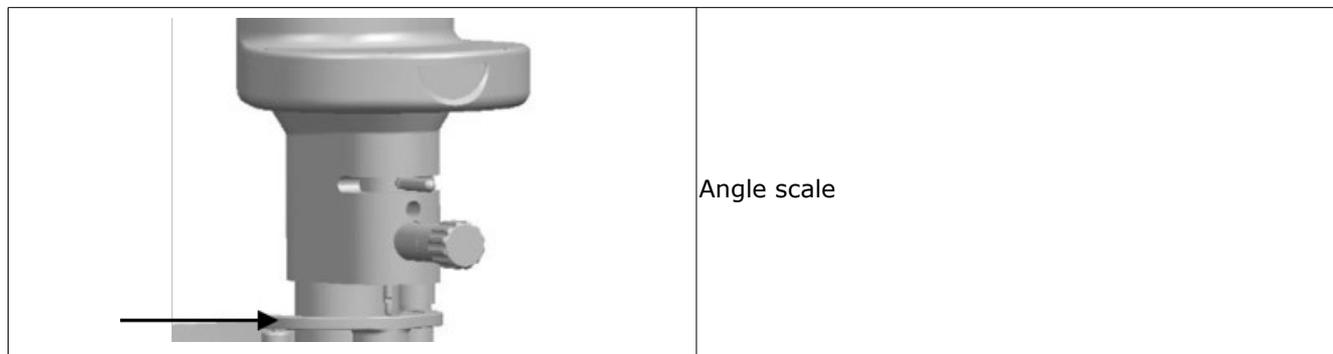
Respectively and one continuously changing aperture with a slit image, the slit height can be changed continuously from 1 to 14 mm, which is indicated through the display window.



Rotating the slit image

- 1 Swing the aperture and slit height control; knob horizontally to revolve the slit image at any angle in the vertical or horizontal direction.

The angle of image rotation is indicated by the rotation angle scale with small division for 5° and big division for 10°.

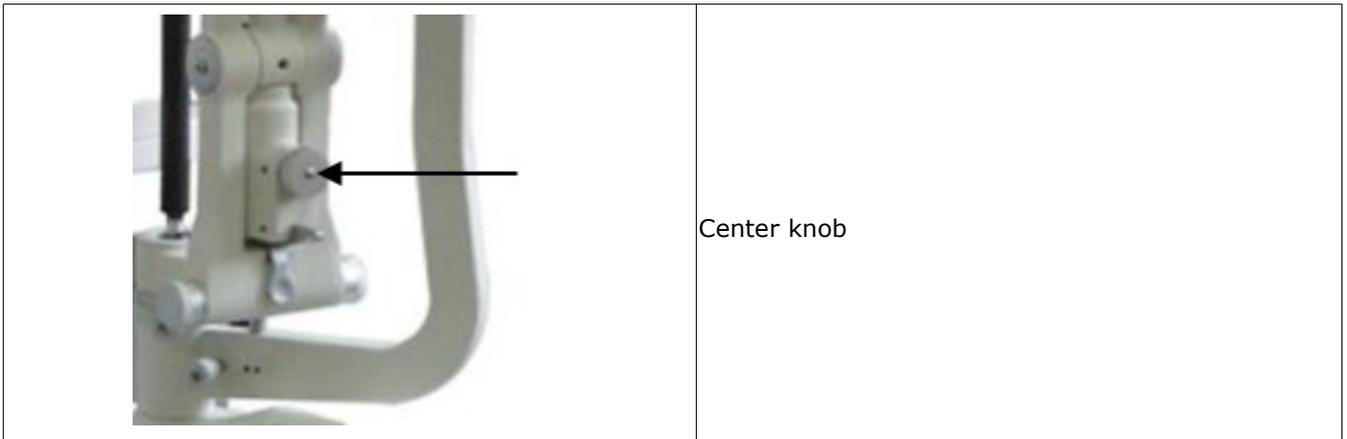


Decentering the illumination light

- 1 Loosen the centering knob and swing the slit width control knob back and forth so the light spot moves away from the center of the microscope vision field.

It is mainly used to examine the eyes by indirect retro-illumination.

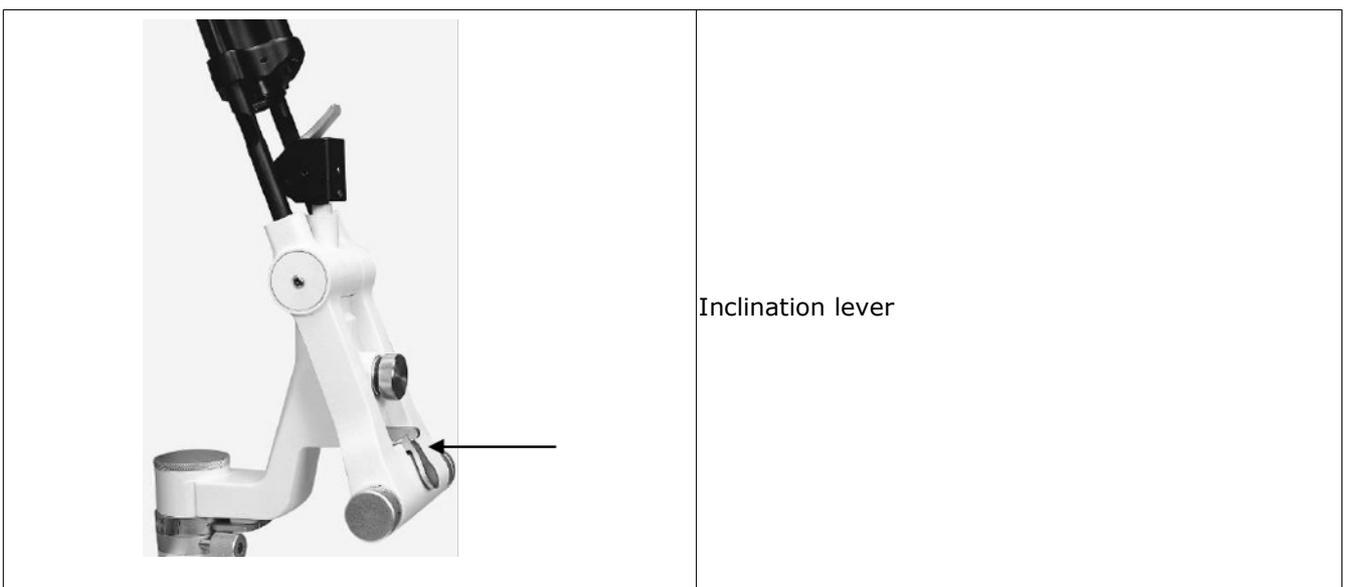
- 2 Fasten the centering knob and the slit light will return to the center of the microscope vision field.



Oblique illumination

- 1 Oblique illumination is used for sectional or fundus examination by use of a contact lens.
- 2 Press down the inclination lever so that the illumination part may incline to 20°, (5° of each division).

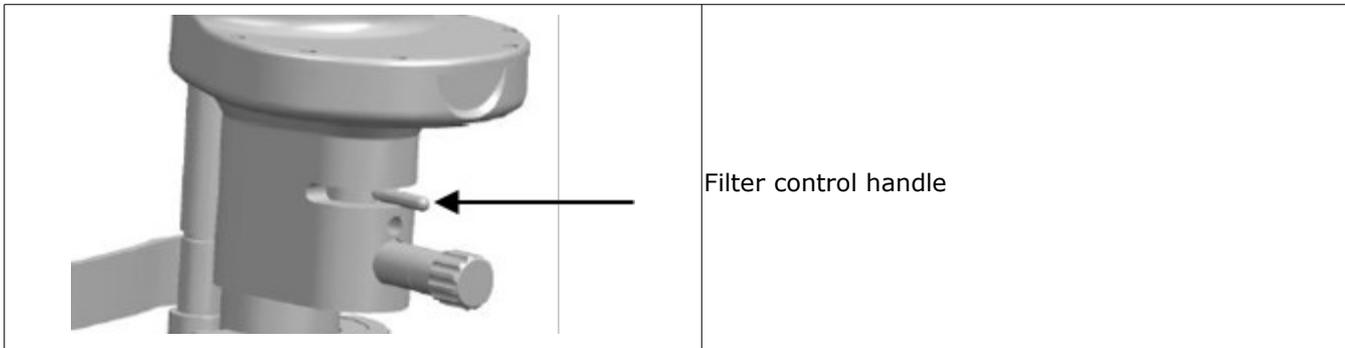
Since the illumination part may touch the patient's head, operate carefully



Filter selection

1 By shifting the selection lever four different filters can be inserted into the illumination pathway.

Usually the thermal safety filter can make the patients feel comfortable. After using the other filters, we should turn back to the thermal safety.



From the left to the right:

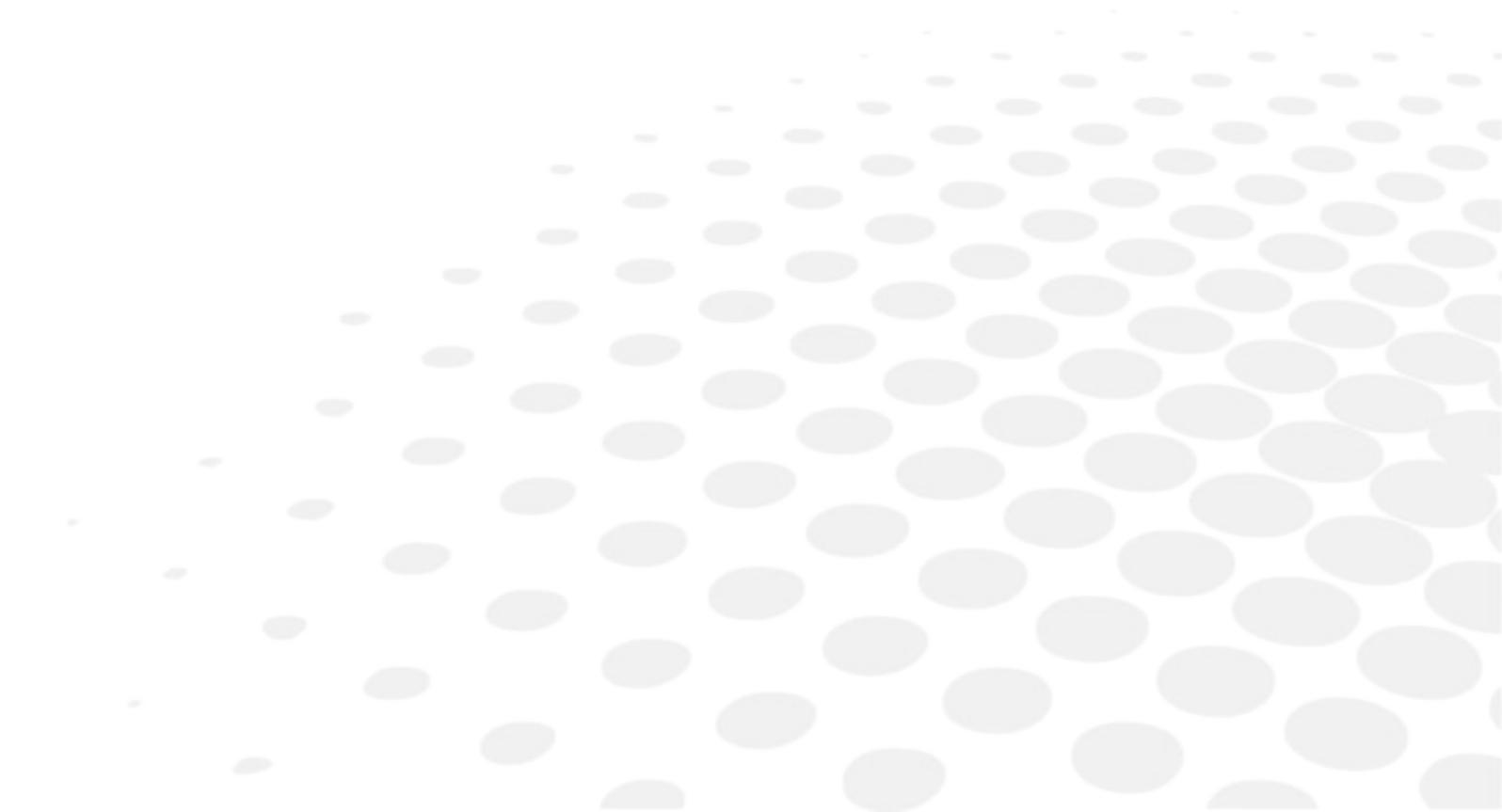
- No filter
- Heat-absorbing filter
- ND filter
- Red-free
- Cobalt blue

5. TIPS OF OPERATION PROCESS



- In the course of the operation the operator should learn more about the contents of the user menu, to master the structure and function of slit lamp microscope so as to carry out the right operation and diagnosis.
- In order to prevent unnecessary observations arising from the misuse of the judge, operators should observe clearly the different locations in the knob corresponding to a different scale and different directional marks in the process of using the SLM.
- Operator should adjust the interpupillary distance and diopter correctly in the operating or which may lead a feeling of dizziness.
- Operator may have a feeling of dizziness in long time observing, so please adjust observing time according to personal habit.
- There will be a branch of crack-ray irradiation in patients' eyes, when they receiving SLM diagnosis. So if the light is too dark, it will affect the observing effect. Conversely, if the light is too bright, in a long time exposure patients' vision might be affected. If patients feel uncomfortable, please tell the operator or take medical treatment. Therefore, please try to avoid prolonged exposure of patients' eyes in the bright light.

VI. CLEANING



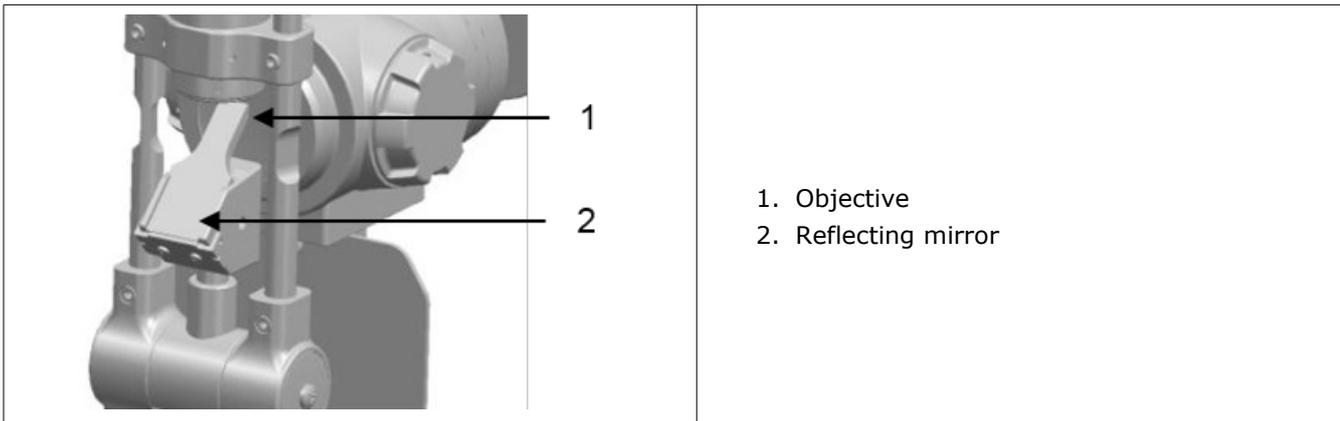


The replaced waste materials should be treated as industrial, rubbish.

1. METHOD

Cleaning the lens and reflecting mirror

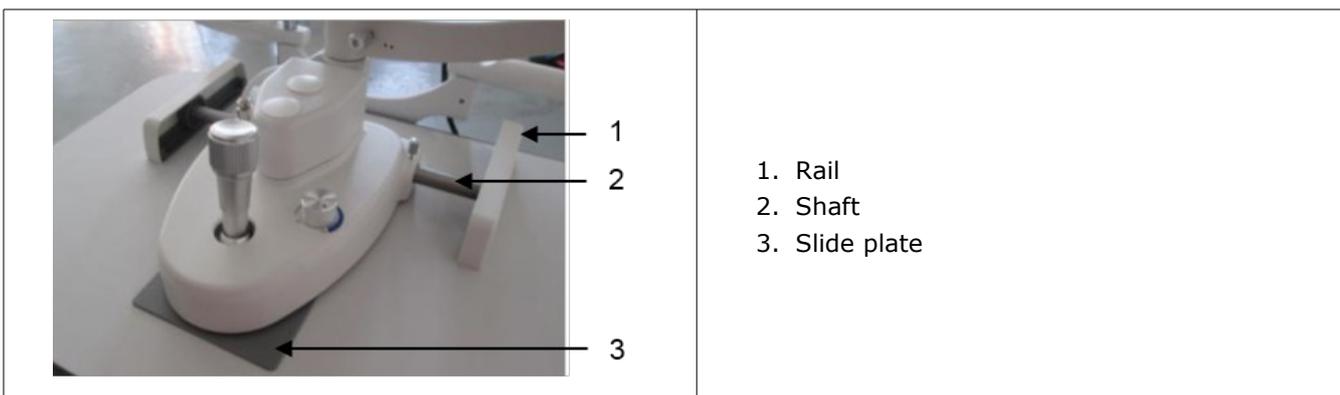
- 1 If there is any dust on the lenses or reflecting mirror, wipe it off with soft cotton dipped in absolute alcohol.



Don't wipe with hands or hard project or any corrosive detergent lest that the surface should be damaged.

Cleaning the sliding pad, rails and shaft

- 1 Clean these parts with clean soft cloth regularly to ensure the stable movement of slit lamp.



Cleaning and disinfecting the plastic parts

- 1 Clean the plastic parts such as chinrest bracket, forehead rest belt with soft cloth dipped in soluble detergent or water, and then disinfect these parts with medicinal alcohol.



Don't wipe these parts with any corrosive detergent in case any surface damage caused.

2. CLEANING CYCLE

It required that the slit lamp should be stored and used in a clean environment. For prolong the service life of the instrument please clean it regularly per as suggestions below.

1. Clean the eyepieces, objective lens and reflecting mirror:

Cycle: suggested once per two months.

The lenses and mirror are coated with antireflection coating and the reflective film. Although the coating is strong enough, frequent wipe will lead to damage to the film, and thus affect the observed optical effect.

Two months is a recommendation: if there is a lot of dust on the lens, please wipe it immediately.

2. Cleaning the slide pad, rails and shaft:

Cycle: suggested once per month.

Usually, these parts won't get dirty in normal use. We suggest cleaning these parts once per 6 months for getting smoother movement experience.

3. Cleaning the plastic parts:

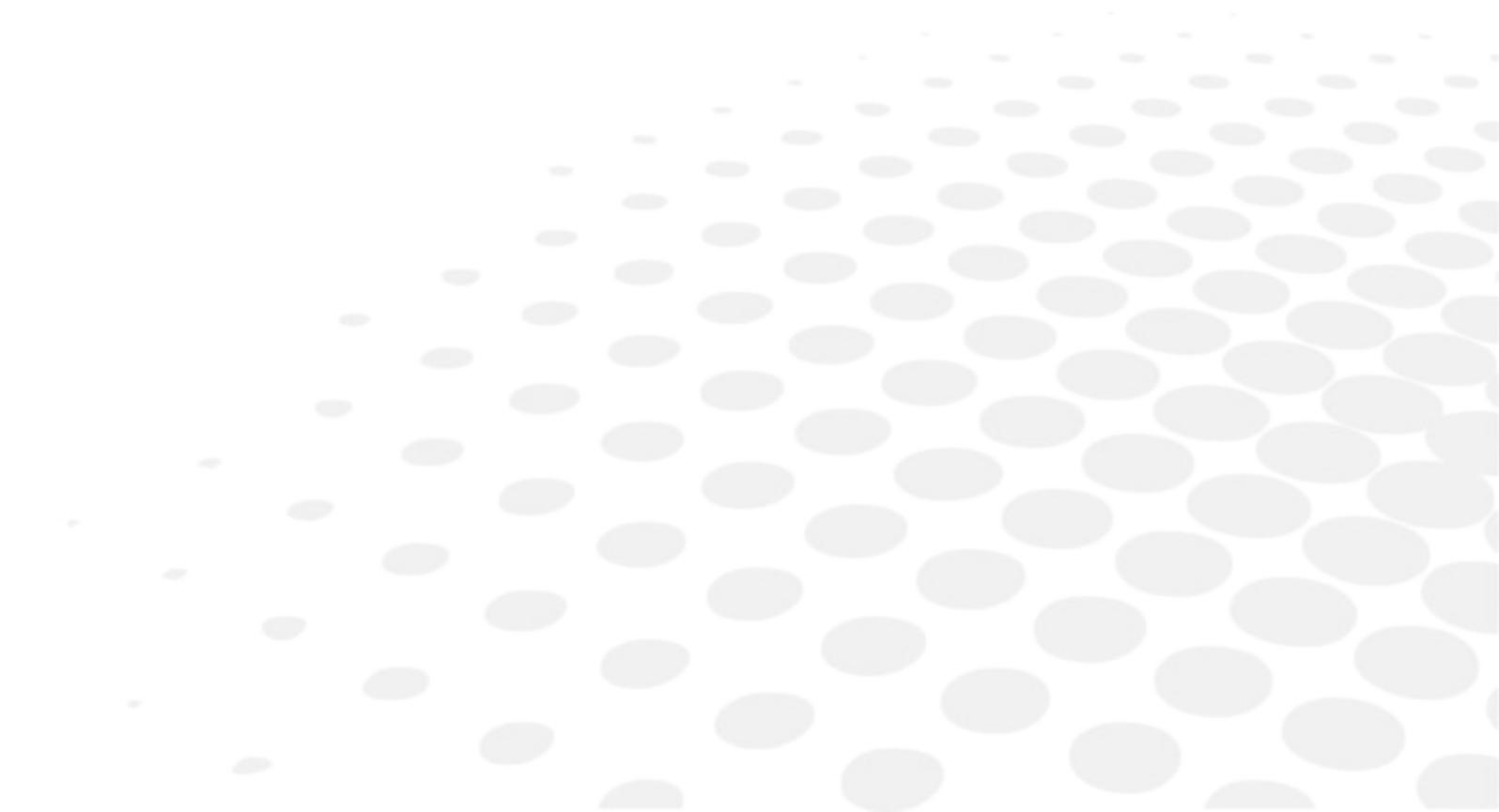
Cycle: suggested once per day

These two parts contact with the patients directly, so please clean and disinfect these two parts timely. Replace a piece of new and clean chinrest paper for each patient.

4. Cleaning the whole machine:

Cycle: suggested once per two months.

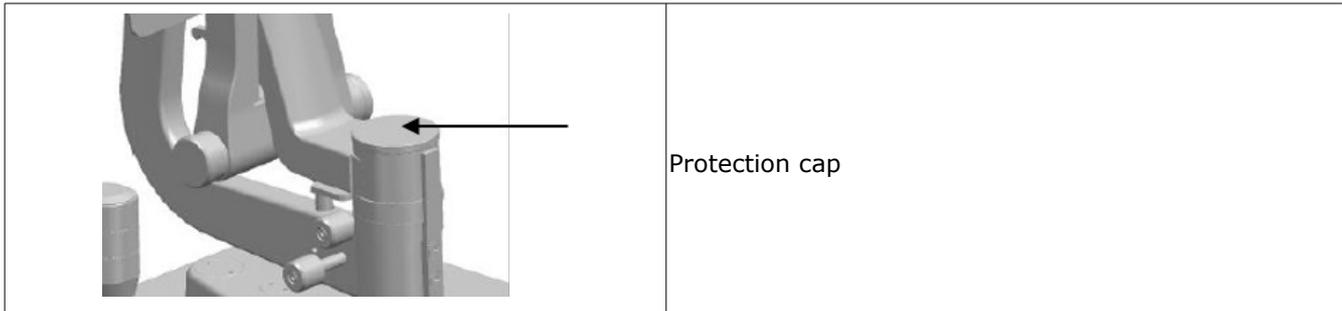
VII. MAINTENANCE



Correct and periodical protection and maintenance will prolong the service life of the slit lamp. The suggested maintaining cycle is once per two months.

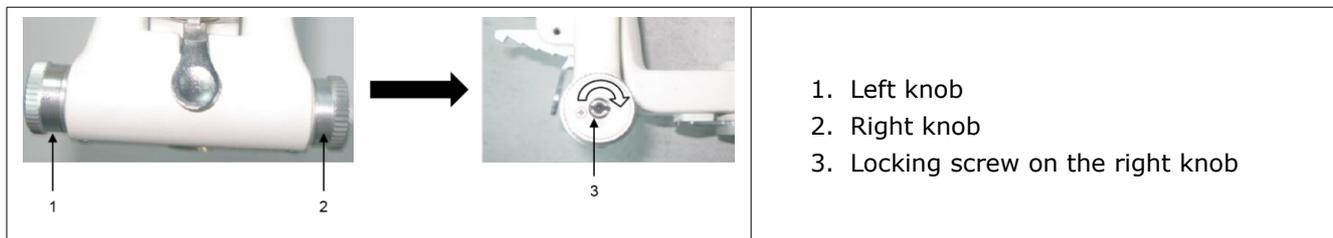
1. PROTECTION

There are always dusts and physiological salt solution dropping into the main shaft hole of the illumination ram during the operation. Please cover the main shaft hole with the protection cap lest the instrument would be damaged. Take off the cap when the focus test bar needs to be assembled.



2. HOW TO ADJUST THE SLIT WIDTH OF THE CONTROL KNOB

1 If the slit width control knob is too loose, the slit width may be out of control. Fasten the locking screw on right side clockwise with a hexagon type screw driver.



2 Rotate the locking screw with a hexagon type screw driver.

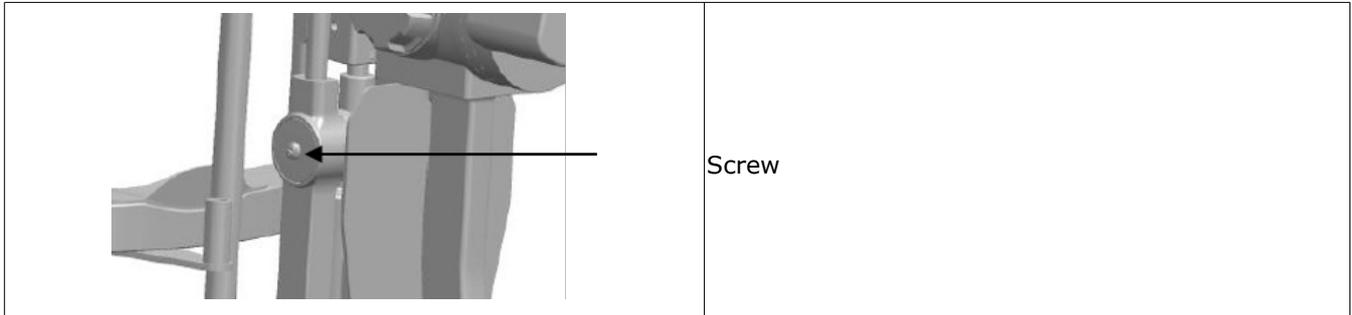


If:

- The knob is too loose, adjust the screw clockwise.
- The knob is too tight, rotate the screw anticlockwise till the knob is comfortable to use.

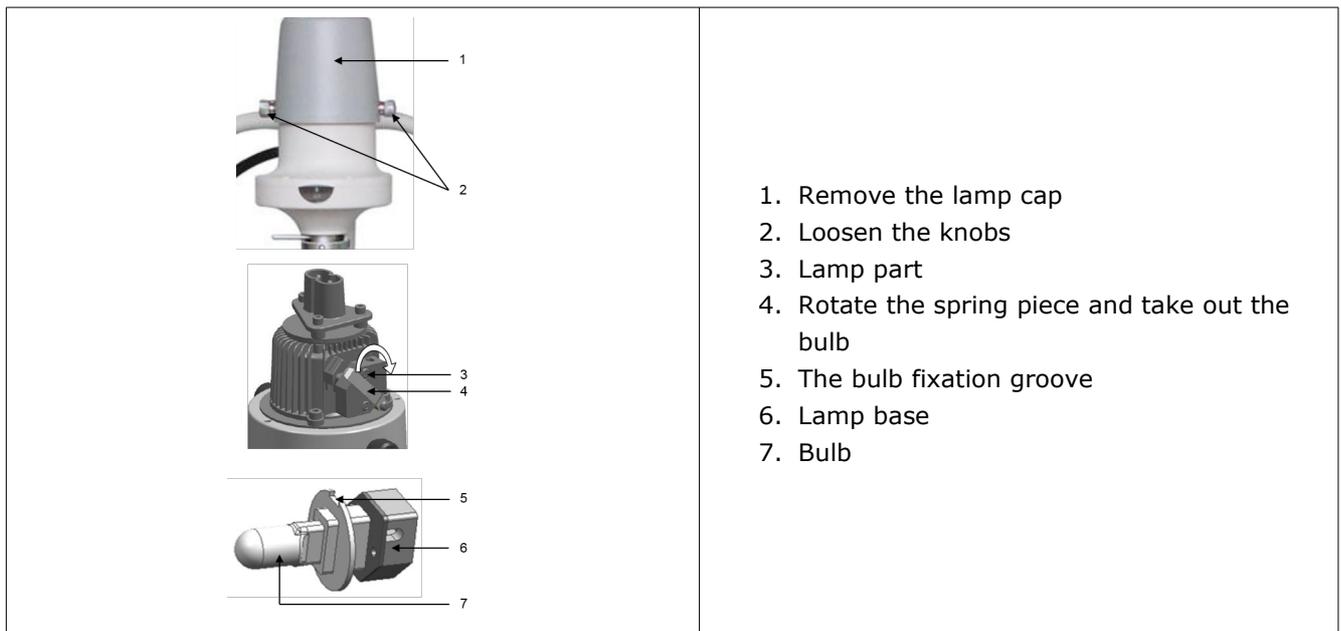
3. HOW TO ADJUST THE INCLINATION OF THE ILLUMINATION PART

- 1 If the inclination mechanism of the illumination part is too loose, fasten the screw on both sides of the pivot point with the screw driver.



4. HOW TO REPLACE THE ILLUMINATION BULB

- 1 Switch OFF the main power.
- 2 Remove out the fixation knob. Pull up the lamp cap from the illumination unit.



- 3 Take out the old lamp part, replace it with a new one.

The groove in the bulb fixation disc should be aligned with the flange of the lamp base; otherwise the illumination may be uneven.

Fix the lamp part with three knobs.

- 4 Place the lamp cap in the original position and fix the lamp cap with the knob.

Then, insert the connecting plug.

- 5 Switch ON the power and check whether the new bulb is illuminating, and if the spot is in good shape without false light.

5. HOW TO REPLACE THE FUSE

- 1 Switch OFF the main power and remove the power cable from socket.
- 2 The fuse is inserted in the fuse box which has fuse mark.

Please rotate the fuse part out by pressing the fuse box with a screw or a coin.

One fuse is in use, the other is in spare. Please check them, if the one in use is burnt, please replace it with the spare one and then place both the two fuse parts into original place.



Fuse specification: F1AL250V



Please select fuse of the same type, specification and rate value.

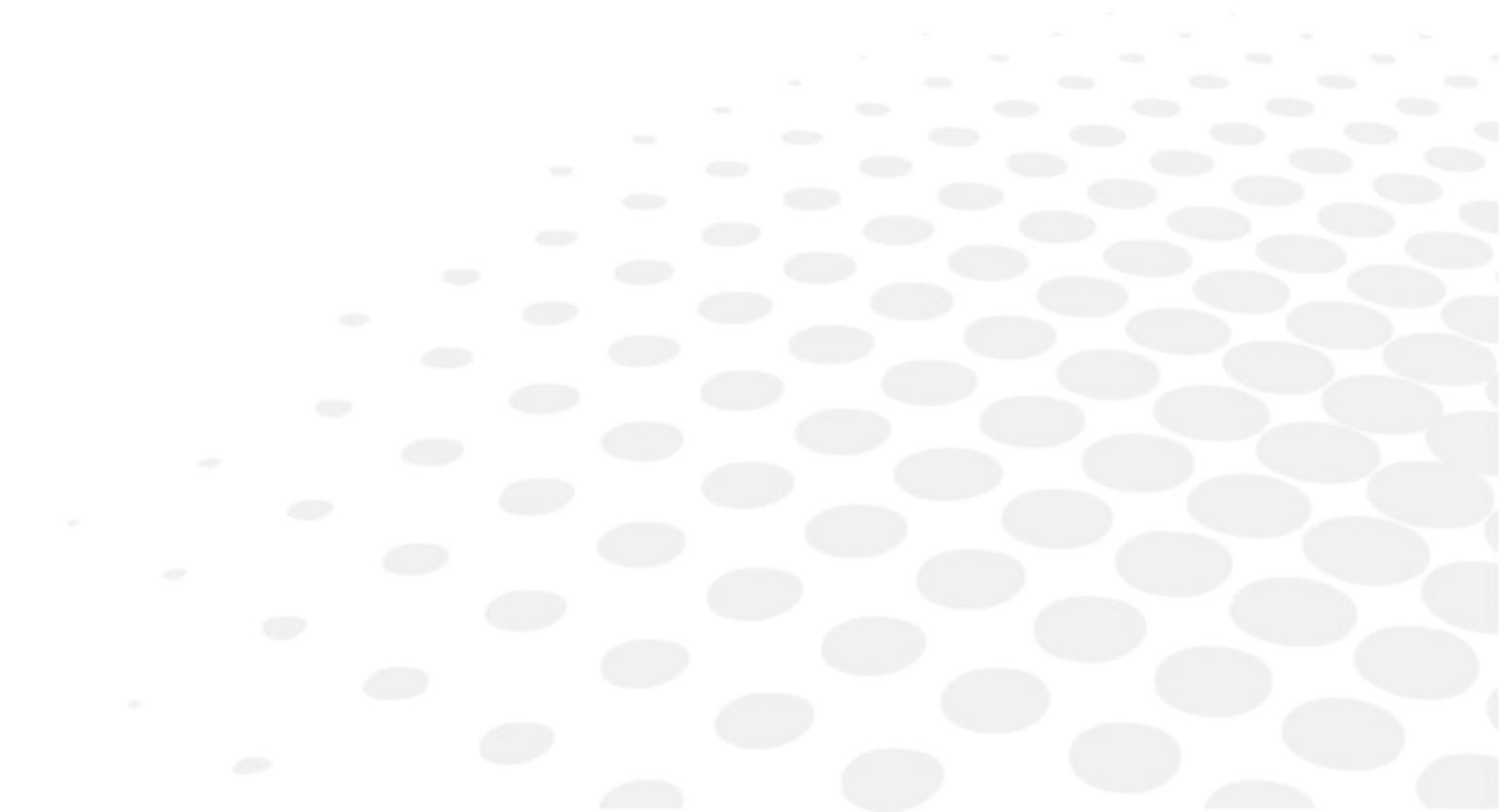
6. CONSUMABLES

1. Fuse: F1AL250
2. Bulb: 6V20W halogen bulb



The service life of the halogen bulb is 480 hours. However, it can still work beyond the time limit, while the brightness of the bulb might be lower.

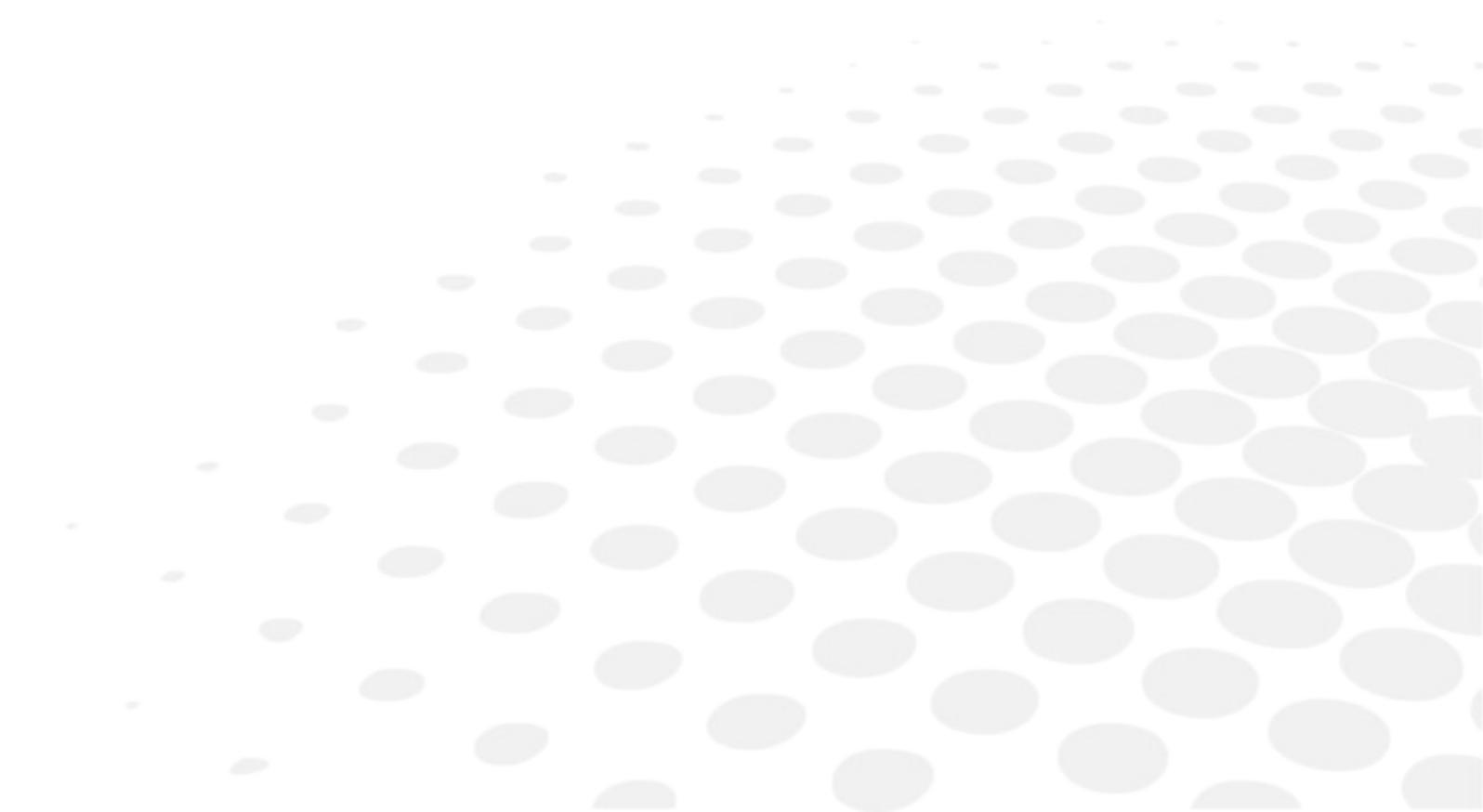
VIII. TROUBLESHOOTING GUIDE



In case there is any trouble, please check according to the following table for reference. If it still cannot work, please contact the repair department of an authorized distributor.

TROUBLE	POSSIBLE CAUSE	REMEDY
No illumination	The cable isn't connected correctly with the power socket	Connect the power cable correctly
	The main power switch is on "O" position	Place the switch on "I" position
	The plug on the power box is loosen	Insert the plug firmly
	The plug on the lamp cap is loosen	
	The bulb has burnt out	Change the bulb
	The fuse has blown	Change the fuse
	The bulb is not assembled properly	Assemble the bulb properly
	The filter lever is in the middle position or in the position of gray filter	Set the filter lever to the correct position
	The brightness adjustment knob is at minimum	Set the brightness adjustment knob
Slit is too dark	Voltage selector is wrongly set	Set the voltage selector correctly
	The coat of the reflecting mirror is oxidized	Change the reflecting mirror
	Too much dust on the reflecting surface	Clean the surface with the brush
Fuse has blown	Voltage selector is wrongly set	Set the voltage selector properly
	The fuse doesn't comply with the specification	Replace it with a suitable fuse
Slit width closes automatically	The slit width control knob is too loose	Adjust the tightness of the control knob
Fixation bulb is off	The output plug is loose	Insert the output plug firmly

IX. APPENDIX



Electrical circle drawing

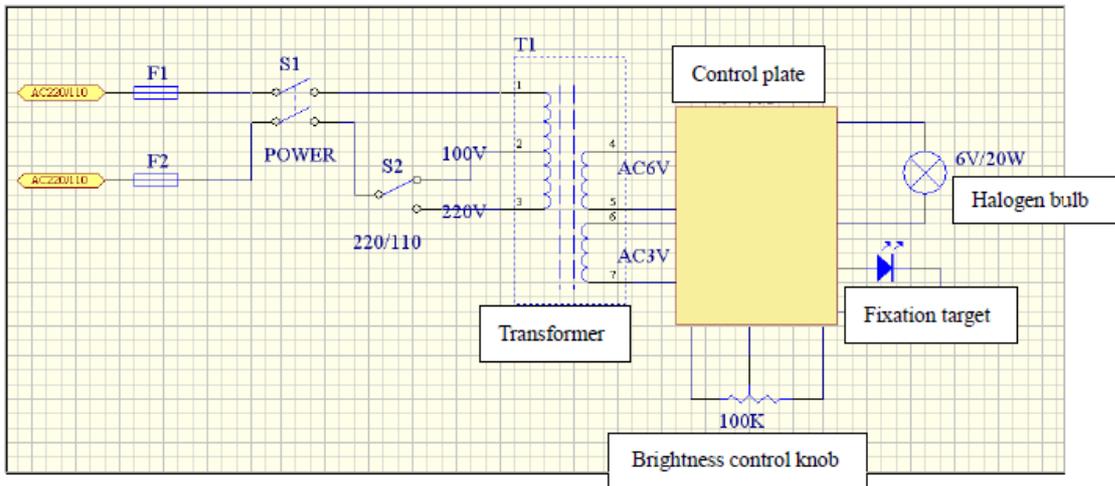
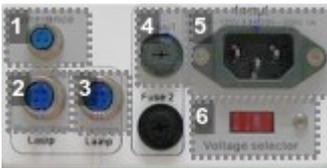
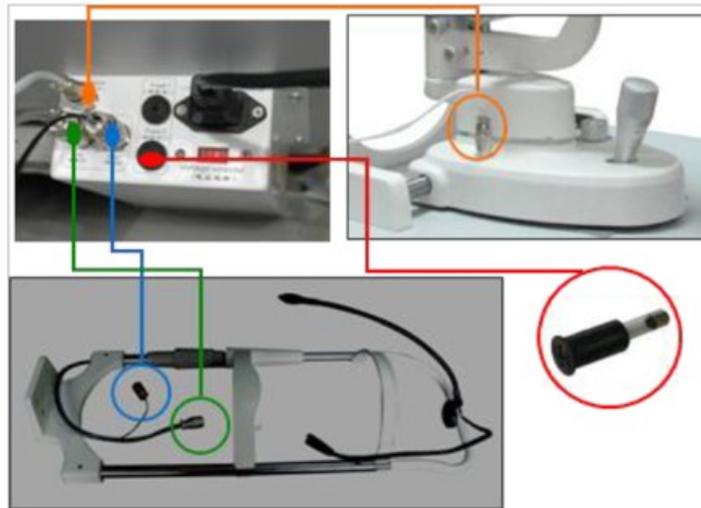


Illustration of the board of power box

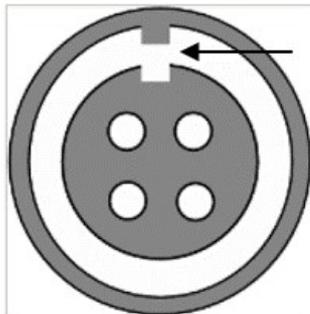


1. Brightness control knob socket
2. Illumination lamp socket
3. Fixation lamp socket
4. Fuse box
5. Power socket
6. 110V / 220V voltage selector

Assembly of power supply



There is a limit groove on the socket. Please align the plug with the groove.



Power box socket



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