

ESL-2600 Slit Lamp

Operation Manual

ESL-2600

Slit Lamp



ELI
EZer

Preface

Thank you for purchasing our ESL-2600 slit lamp. Please read this manual carefully for the sake of your best use.

General Requirements for Safety

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

Precautions

1. Do not use this instrument in the flammable or explosive environment, keep it away from dusty locations or high temperature. Use it indoors and keep it clean and dry.
2. Check that all the wires are correctly and firmly connected before using. Ensure that the instrument is well grounded.
3. Please pay attention to all the rated values of the electrical connecting terminal.
4. Only use fuse according to the specifications and rated values stipulated by our product.
5. Use the power cable supplied with this instrument.
6. Don't touch the surface of the lens and prism with hand or hard objects.
7. Turn off the main power first before replacing the illumination bulb and fuse.
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. Turn off the power and cover the instrument with dust-proof hood when it is not in use.
10. 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.

THE SAFETY MARKS USED IN THIS INSTRUMENT

TYPE B



REFER TO THIS MANUAL

ATTENTION PLEASE



THE PROTECTIVE GROUNDING

TERMINAL OF



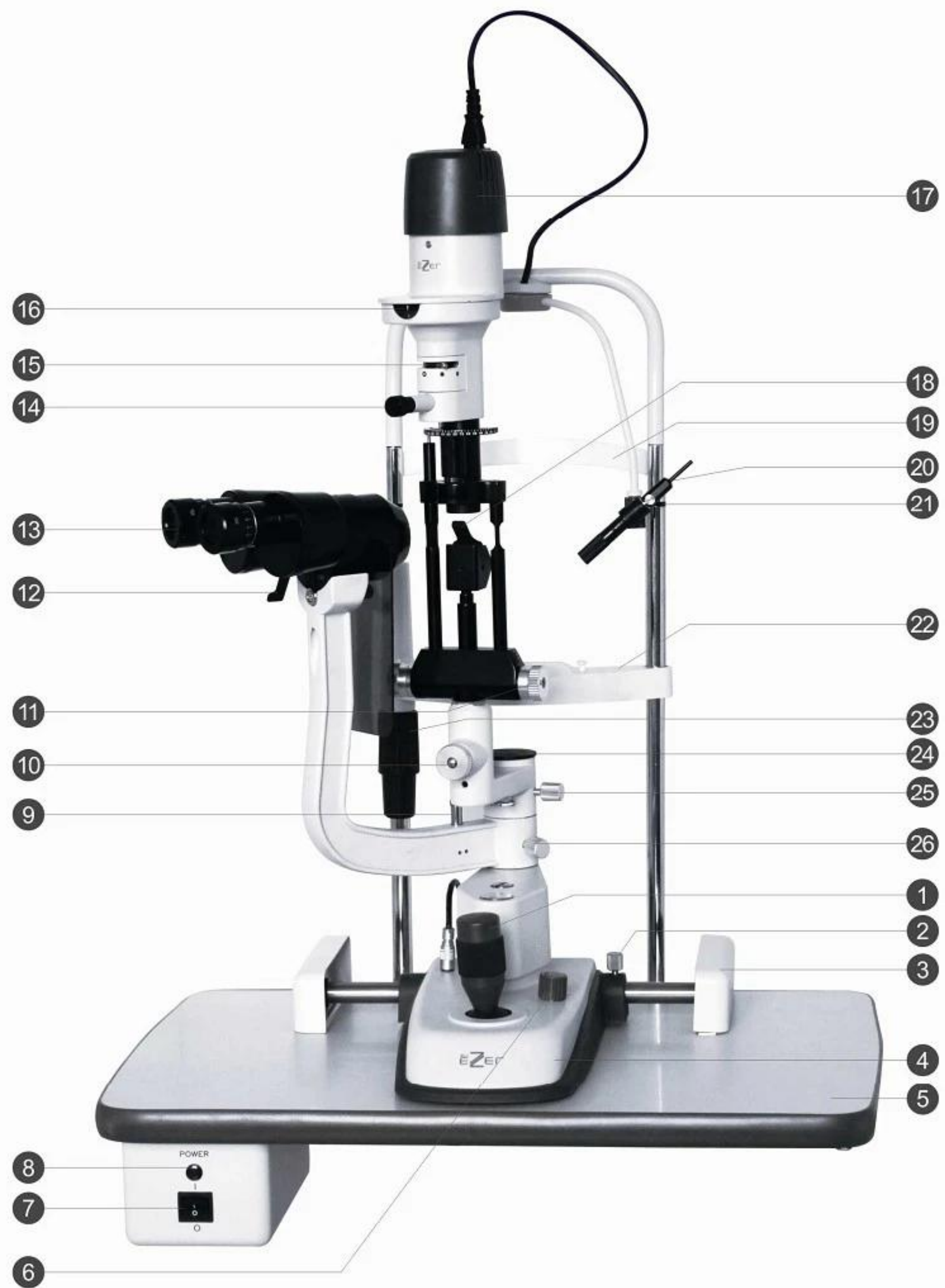


Fig 1

Contents

1. Nomenclature	1
2. Assembly	3
2.1 Components	3
2.2 Assembly procedure	5
2.3 Checking procedure after assembling.....	8
3. Operation procedures	9
3.1 Diopter compensation and Pupil Distance adjustment	9
3.2 Patient position and fixation target	10
3.3 Base operation.....	10
3.4 Illumination parts operation	11
4. Maintenance	12
4.1 Replacing the illumination bulb.....	12
4.2 Replacing the reflecting mirror.....	13
4.3 Replacing the fuse.....	13
4.4 Adjusting the tightness of the slit width knob	13
4.5 Replacing the chin-rest paper	14
4.6 Cleaning	14
4.7 Consumables	14
5. Trouble shooting guide	15
6. Responsibility	15
7. Transportation and storage.....	16
8. Optional accessories (purchase in addition).....	16
8.1 Applanation tonometer	16
9. Specifications	17

1. Nomenclature

1 Joystick

Incline joystick to move the instrument slightly on the horizontal surface and rotate it to adjust the elevation of the microscope.

2 Base Locking Screw

The base will be locked when fasten this screw.

3 Rail Cover

Protect the rail surface.

4 Base

Support the microscope and the illumination arms with the joystick controlling its movement.

5 Worktable

6 Brightness Control Switch

The brightness can be continuous adjusted. Avoid working continuously at high setting, as the service life of the bulb will be shortened.

7 Main Power Switch

8 Pilot Lamp

9 Location Roller

When it is in the middle, it stands for included angle of 0° between the microscope arm and the illumination arm. And the right or left side stands for the included angle of 10° .

10 Centering Knob

Loosening the knob allows the illumination light to be moved from the center of the vision field for indirect retro-illumination. Fastening the knob brings the illumination light return to the center.

11 Slit Width Control Knob

The slit width is continuously adjustable from 0 to 9mm.

12 Magnification Changer Lever

Push the lever to either side to select the desired magnification of the microscope.

13 Diopter Adjustment Ring

Adjust the eyepieces diopter to obtain a clear image before using the instrument.

14 Aperture and Slit Height Control Knob

Rotate this knob to adjust the spot and the slit height. Swing the knob horizontally to revolve the slit.

15 Filter Selection Lever

There are four filters for selection

16 Slit Height and Aperture Display Window

17 Lamp Cap

18 Reflecting Mirror

The long mirror is provided. The observation pathway may be interfered as the included angle between the microscope arm and the illumination arm is only $3^{\circ}\sim 10^{\circ}$.

19 Forehead Belt

20 Fixation target

An illuminated fixed spot for patient to look at.

21 Horizontal Mark

When the horizontal center of the patient's eye is in line with this mark, the elevation of the microscope controlled by joystick is also in its center position.

22 Chin-rest

23 Chin-rest Elevation Adjustment Knob

Rotate the knob to adjust the elevation of the chin-rest.

24 Protection Cap

Please cover the main shaft hole with the protection cap to prevent dusts and physiological salt solution from dropping into the main shaft pole of the illumination arm during the

operation. Take off the cap when assemble the focusing test rod.

25 Microscope and Illumination Arm Couple Bolt

Fasten this bolt and the illumination arm and the microscope arm could be move in couple state to rotate together. Loosen it and the illumination arm then can rotate separately.

26 Microscope Arm Locking Knob

Lock the rotational movement of the microscope arm.

2. Assembly

This section of the manual describes how to assemble ESL-2600 slit lamp. All parts should be taken out with great care from the packing case before assembling.

2.1 Components-----



Fig.1



Fig.2

	Name	Quantity
A	Illumination Part	1
B	Base Part (with Microscope)	1
C	Head-rest Part	1
D	Breath Shield	1
E	Work Table with Power Box	1
F	Rail Cover	2
G	Input Power Cable	1
H	Chin-rest Paper	1
I	Spare Main Illumination Bulb	1
J	Protection Cap	1
K	Spare Long Reflecting Mirror	1
L	Brush	1
M	Dust Cover	1
N	Focusing Test Rod	1*
O	Cross Screw Driver with Wood Handle	1
P	Hexagonal wrench	1
Q	Watch Screw Driver	1
R	Spanner	1

(*Optionally available in some region.)

2.2 Assembly procedure

Necessary tools are as follows:

Cross screwdriver with wood handle	(O)
Watch screwdriver	(P)
Spanner	(R)

1) Selecting Voltage and Fuse



Fig.3

- ✧ 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 screwdriver (R).

- ✧ Open the fuse holder with screw driver (P) and take out the fuse, check and ensure that its rated value is corresponding to the mains voltage:

110V-----1A

220V-----0.5A

It has been set to 220V, 0.5A before leaving our factory.

⚠ Attention: Set the input voltage and frequency of the instrument according to that of the mains.

2) Assembling the Worktable (E)

- ✧ To attach the worktable on the motorized instrument table, please screw off four M8x20mm bolts with spring washers with the spanner (S).
- ✧ Lift the worktable to aim its screw hole at the assembly hole of the instrument table. Put down the worktable, with the power panel

facing the operator, refasten the bolt securely with the spanner.

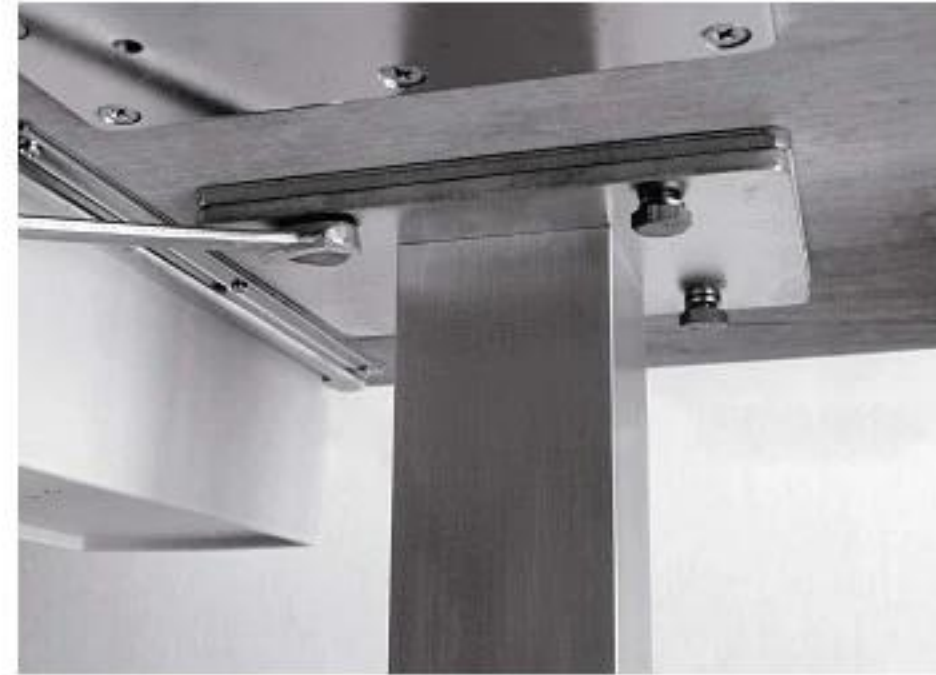
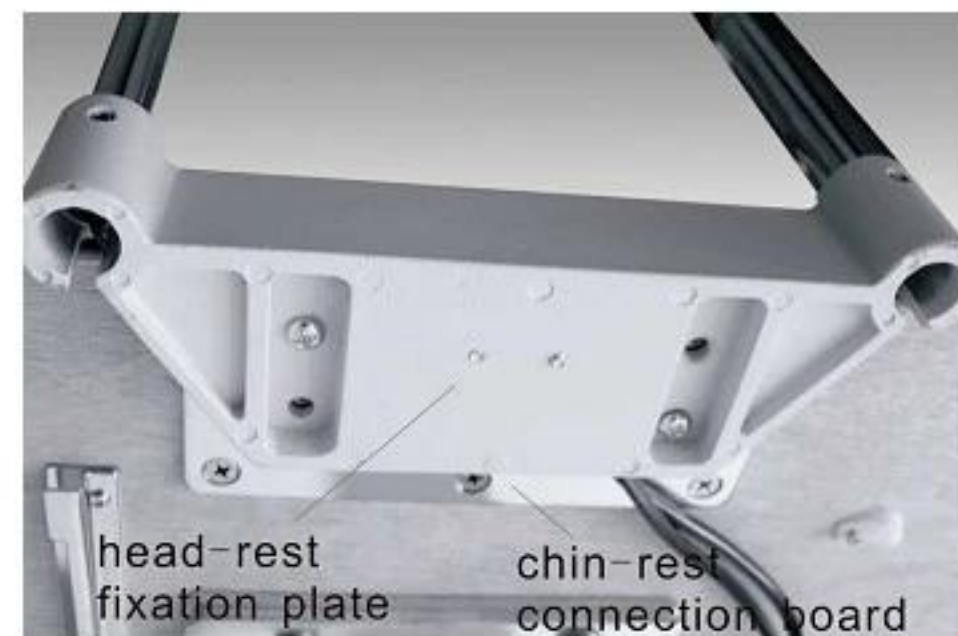


Fig.4

3) Assembling the Head-rest Part (C)



- ✧ Remove the four screws attached to the chin-rest connection board with the screw driver (P).

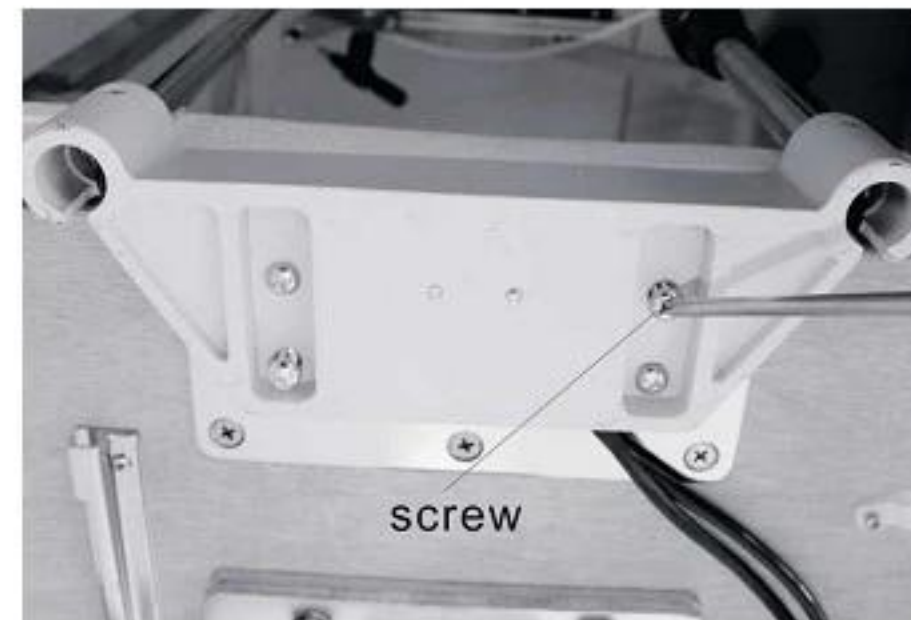


Fig.5

- ✧ Put two cables in the gap between the head-rest fixation plate and the chin-rest connection board. While ensuring they are not clamped, retighten the previously removed screws.

4) Assembling the base part (B) and the rail cover (F)



Fig.6

- ✧ Place the wheels of both sides of the base (B) on the rail on the worktable.
- ✧ Check whether the wheels can be rolled steadily on the rail.
- ✧ Insert the bottom of the rail covers into the gap below the both sides of the rails respectively in the direction of the arrow (Fig.6).

5) Assembling illumination part (A)



Fig.7

- 6) Loosen the illumination arm couple bolt (26).
- 7) Rotate the brass shaft sleeve to make the angle of the red mark and the illumination arm between 30°~90°.
- 8) Loosen the screw in the illumination arm with the screwdriver (R). Aim the assembly hole of the illumination arm at the brass shaft sleeve then put it down with care, let the shaft keeping close to the bottom surface well and the two red marks stretch in one line

simultaneously.

- 9) After the two red marks accurately aligned, re-tighten the screw.

6) Assembling the breath shield (E)



Fig.8

- 10) Remove the breath shield fixation screw from the microscope arm.
- 11) Pass the removed screw through the hole of the breath shield then re-screw it into the arm.

7) Connecting plug



Fig.9

- 12) Insert the plug on the top of the head-rest part (C) into the socket of the lamp cap (18) on the illumination part (A).
- 13) Connect the two plugs below the head-rest part with the corresponding output socket of the power box. .
- 14) Insert the plug of the input power cable (G) into the input socket of the power box. .

- 15) Remove the cable clips from the bottom of the worktable with screwdriver (P) and wrap the output and input cables respectively, then re-attach them to the bottom of the worktable.

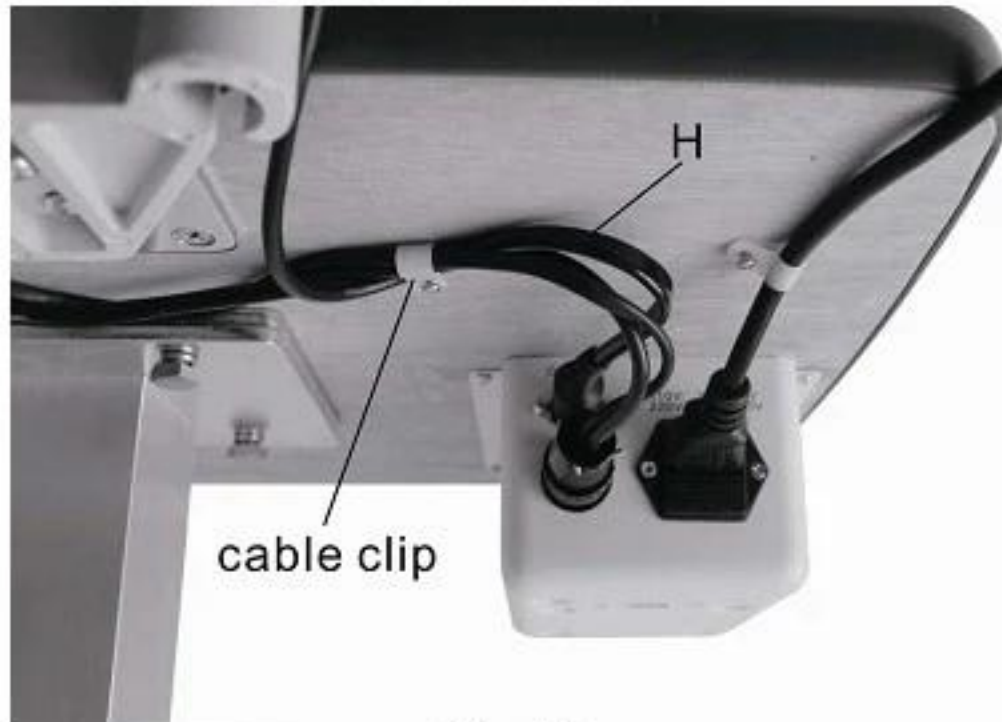


Fig.10

8) Assembling the chin-rest paper (H)

- 16) Pull out the two fixing pins from the chin-rest.
17) Get rid of the paper package and let the pins go through its holes.
18) Insert the fixing pins into the hole again.

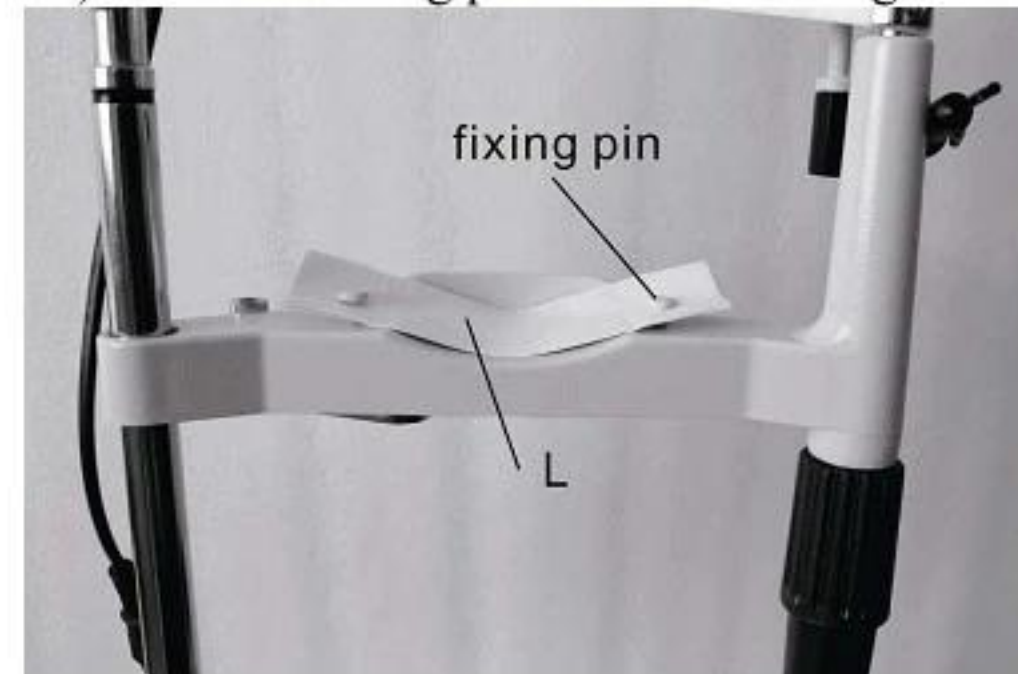


Fig.11

2.3 Checking procedure after assembling -----

1) Power plug

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

 **Attention: Please uses the special cable supplied with this instrument.**

2) The power box and the illumination part

- 21) When the main power switch (8) 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.
- 22) Turn on the main power switch, and the pilot lamp (9) will be lighted. Open the slit width control knob (12) to examine the illumination.
- 23) Press the brightness control switch (7) respectively at two positions and the brightness should be changed accordingly.
- 24) Check the fixation target device to con-firm it is lighting.
- 25) Check if all the moveable parts such as aperture and slit height control knob (15), filter selection lever (16), and magnification changer lever (13) etc. could be operated freely.
- 26) After examining, turn off the main power and cover the instrument with the dust cover (N).

3. Operation procedures

3.1 Diopter compensation and Pupil Distance adjustment

1) Use of the focusing test rod (M)

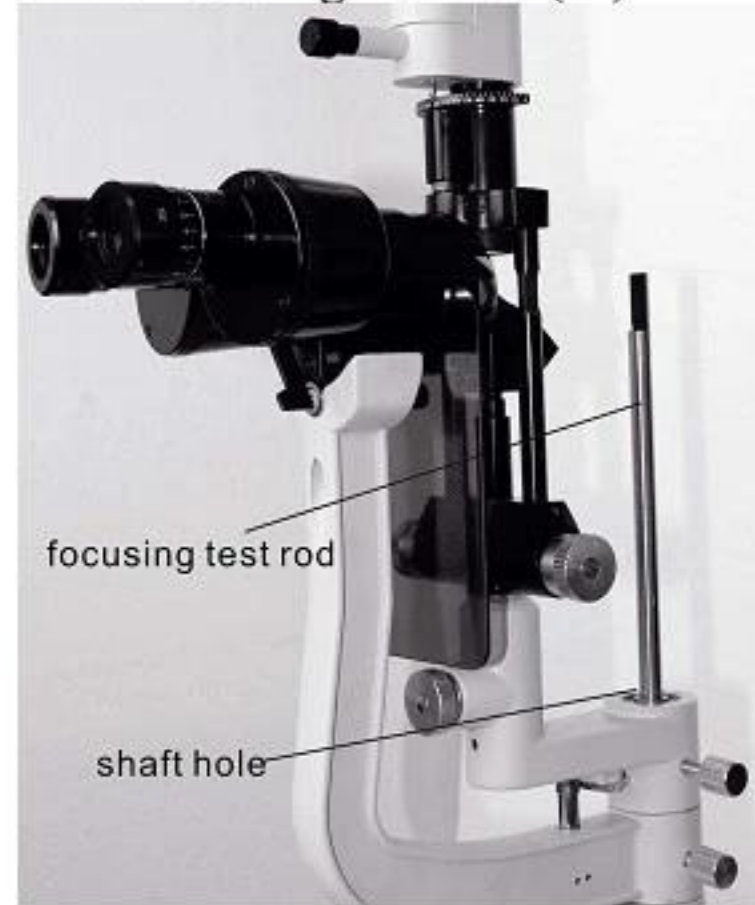


Fig.12

The rod is supplied as one of standard accessories for confirming if the microscope is adjusted correctly. Insert it into the main shaft hole with the flat surface facing the objective lens --- the direction of the operator.

⚠ Attention: After adjusting, remember to take out the rod and insert the protection cap.

2) Brightness adjustment

Switch on the main power switch and set the brightness control switch (7) at 'N' position. Turn the slit width control knob (12) to make the slit width to be 2~3mm.

3) Diopter compensation

The focus of the microscope is calibrated according to the emmetropia. If the operator is an ametropia, he should

adjust the eyepiece diopter.

Suggest adjusting the diopter as following procedures.

- 27) First, rotate the diopter adjustment ring (19) counter clockwise down to the end.
- 28) Second, rotate the ring clockwise until a sharp slit image appears on the focusing test rod.
- 29) Adjust another eyepiece in the same procedure.
- 30) Record the diopter value on each eyepiece for future reference.

4) Pupil distance adjustment

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 rod through the eyepieces, and at the same time a stereo vision will be obtained.

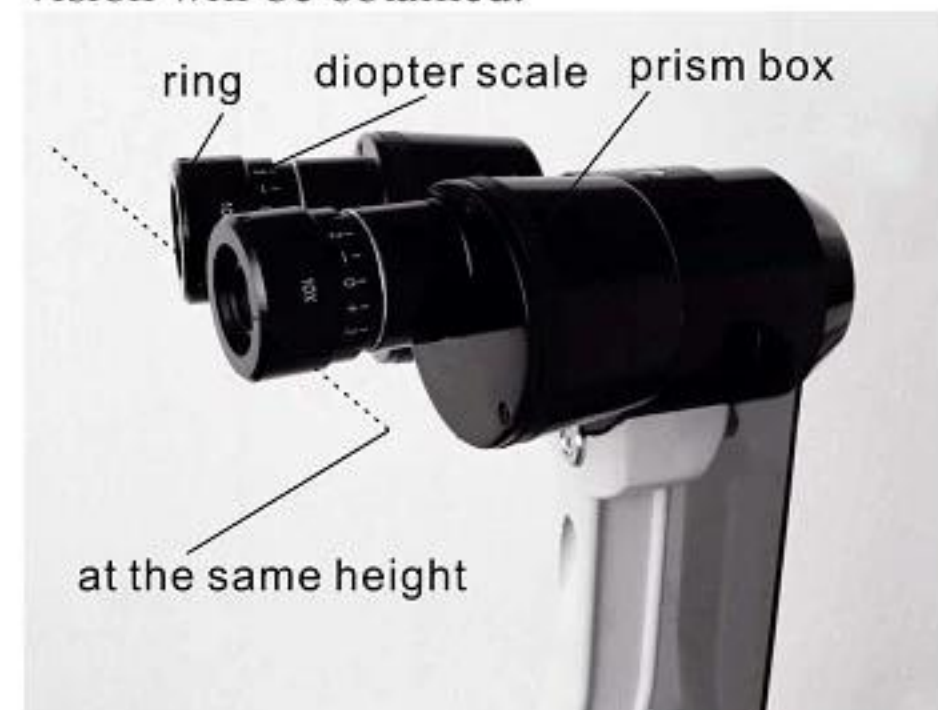


Fig.13

⚠ Attention: While adjusting P. D., ensure that both eyepieces are at the same height.

3.2 Patient position and fixation target-----

1) Positioning the patient's head

Have the patient place his chin on the chin-rest (23) and the forehead against the forehead belt (20). Adjust the chin-rest elevation adjustment knob (24) below the chin-rest until the patient's canthus aligns with the horizontal mark (22).



Fig.14

2) Use of the fixation target

31) For fixing the patient's eyesight, just make him look at the fixation target (21) with the eye not to be examined. To change fixing position, move the lamp bar, as well as move the curved lever around the head-rest.



Fig.15

3.3 Base operation -----

1) Horizontal rough adjustment

Keep the joystick (1) erect and move the base (4) to make the microscope move on the horizontal surface to aim at the object roughly.

2) Vertical adjustment

Rotate the joystick to adjust the microscope's height until it aligns with the target.

Turn the joystick clockwise to raise the microscope and counter-clockwise to lower it.

3) Horizontal fine adjustment

Tilt the joystick to make the microscope move slightly on the horizontal surface. While watching through the eyepieces,

tilt the joystick to aim accurately at the object for a sharp image.

4) Locking the base

When finishing the adjustment, fasten the base locking screw (2) to lock the base (4) and prevent it from sliding.



Fig.16

3.4 Illumination parts operation-----

1) Changing the slit width

Turn the slit width control knob (12) and the slit width will be changed from 0mm to 9mm. The slit becomes a circle at the 9mm size.



Fig.17

2) Changing the aperture and slit height

Turn the aperture and slit height control knob (15) and 6 different circular beams of light are available at full aperture: 9, 8, 5, 3, 1, 0.2 diameter respectively. With a slit image, the slit height can be changed continuously from 1 to 9mm, which is indicated through the display window (17).



Fig.18

3) Rotating the slit image

Swing the aperture and slit height control knob (15) horizontally to revolve the slit image at any angle from vertical to horizontal. The rotation angle scale indicates the angle of image rotation with small division for 5° and big division for 10° .



Fig.19

4) Deflecting the illumination light

Loosen the centering knob (11) and swing the slit width control knob (12) by the arrow, 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. Fasten the centering knob and the slit light will return to the center of the microscope vision field.



Fig.20

5) Filter selection

Turn the filter selection lever (16) in the horizontal surface to add four different kinds of filters respectively into the illumination pathway. Usually the heat absorption filter is used so that the patient may feel more comfortable in long period of examination.

1 ND 2 heat absorption 3 grey
4 red-free 5 blue

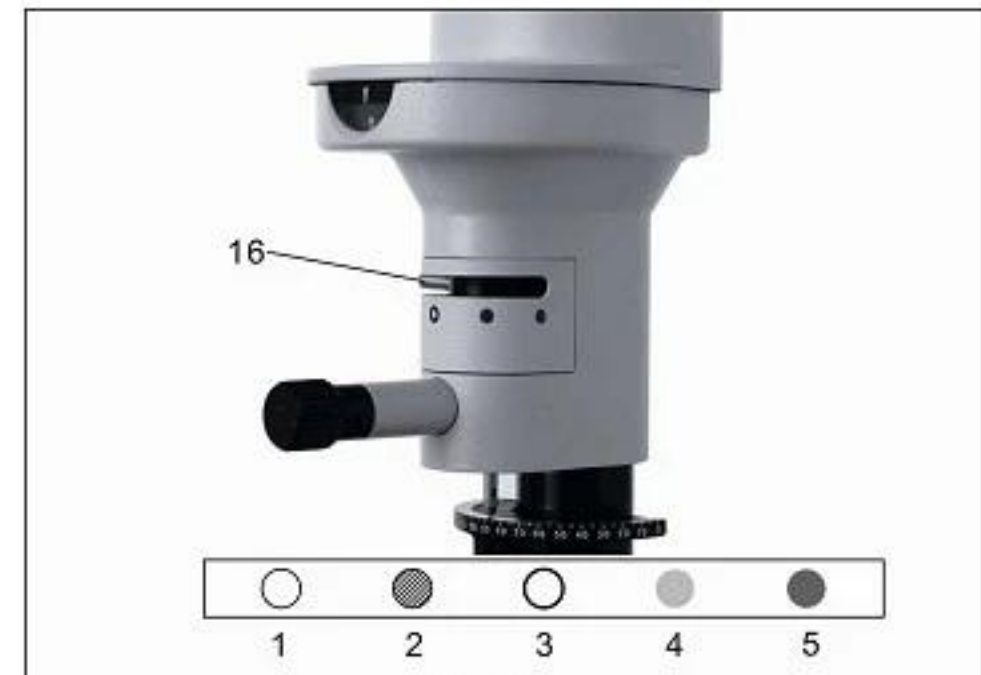


Fig.21

4. Maintenance

⚠ Attention: The replaced waste materials should be treated as industrial rubbish.

4.1 Replacing the illumination bulb

- ✧ Turn the main power switch (8) off.
- ✧ Pull out the plug connected to the lamp house, unscrew the fastening screw and then pull the lamp cover (26) until it is pulled out from the illumination part(A) (Fig22).



Fig.22

- ✧ Turn the compression spring upward and then pull out the plug and take out the old bulb and replace it with a new one. Turn the compressing spring downward. The groove in the bulb fixation disc

should be aimed at the flange of the lamp base; otherwise the illumination may be uneven.

⚠ Attention: The bulb is hot

- ✧ The mark point on the lamp cover aligns the mark point on the illumination part. Tighten mounting screw and insert the connecting plugs.
- ✧ Turn on the main power switch and check whether the new bulb works or not.

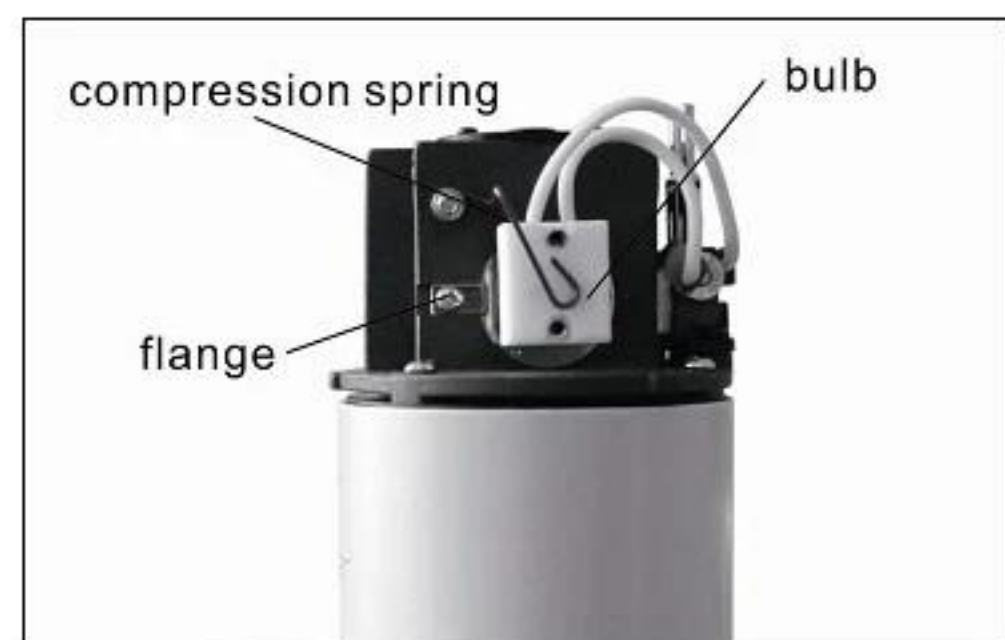


Fig.23

4.2 Replacing the reflecting mirror -----

- ✧ Set the angle between the microscope and the illumination arm to exceed 30° .
- ✧ Remove the long mirror by holding the extended surface.
- ✧ Insert new long reflecting mirror.

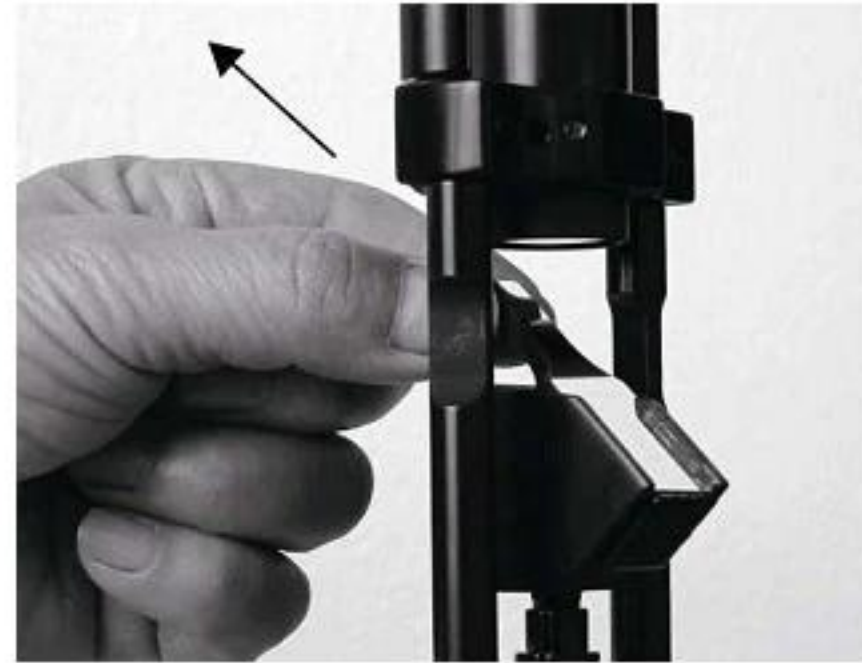


Fig.24

4.3 Replacing the fuse -----

- ✧ Turn off the main power switch (8) and pull out the input cable from the power socket.
- ✧ Screw off the fuse holder cover with the screw driver (P).
- ✧ Replace it with a new fuse, then fasten the cover.
- ✧ The fuse specifications are as follows:

110V	1A, 125V
220V	0.5A, 250V



Fig.25

⚠ Attention: Please select the fuse of the same type, specification and rating.

4.4 Adjusting the tightness of the slit width knob -----

If the slit width control knob is too loose, the slit width may be out of control. Loosen the screw on the right knob with the screw driver (O), and then hold the left knob firmly with one hand, while the other hand rotates the right knob clockwise to adjust its tightness. When it is appropriate, fasten the screw of the right knob firmly again.



Fig.26

4.5 Replacing the chin-rest paper -----

When the paper is exhausted, pull up-wards two fixing pins of the chin-rest and place a new package of paper, then fix the fixing pins again.

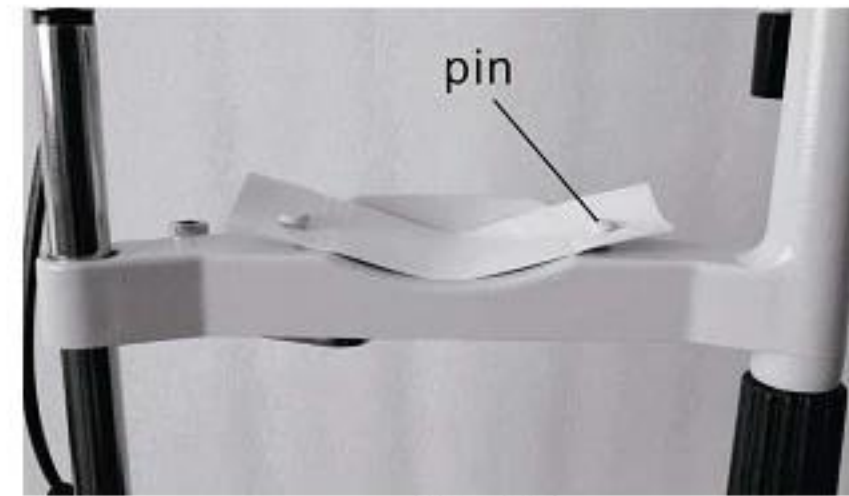


Fig.27

4.6 Cleaning -----

1) Cleaning the lenses and mirrors

If any dust stick on the lenses or reflecting mirrors, brush them with the brush (M) supplied in the standard accessories. In case any dust still remains, wipe it off with soft cotton dipped with absolute alcohol.

⚠ Attention: Never scratch with fingers or any other hard materials.

2) Cleaning the slide plate, rail and shaft

If the slide plate, rail and shaft are dirty, the vertical and horizontal movement will be unsteady. Wipe them with clean soft cloth.

3) Cleaning and sterilizing the plastic parts

Clean the plastic parts such as chin-rest

bracket, forehead belt with soft cloth dipped with soluble detergent or water, sterilize with medicinal alcohol.

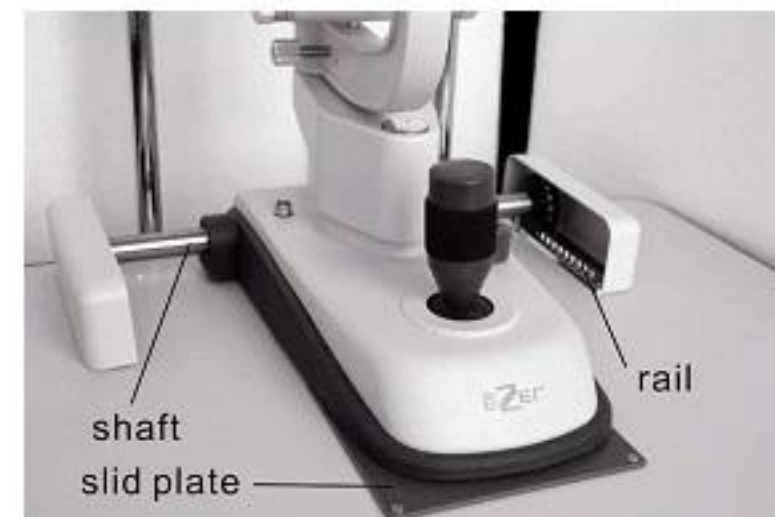


Fig.28

⚠ Attention: Don't wipe with any corrosive detergent lest that the surface should be damaged.

4.7 Consumables -----

Please specify names and quantities when ordering following consumables.

ESL-2600 Slit Lamp	Part name	Outlook
	Illumination bulb	
	Long reflecting mirror	
	Chin-rest paper	
	Fuse 1A(110V) 0.5A(220V)	

5. Trouble shooting guide

In case there is any trouble, please check according to the following table for reference. If it still cannot work, please contact our Repair Department or an authorized distributor.

Trouble	Possible cause	Remedy	Refer to
No illumination	The cable isn't connected correctly with the power socket	Connect the power cable correctly	P7
	The main power switch is on 'O' position	Place the switch on 'I' position	P8
	The plug on the power box is loose	Insert the plug firmly	P7
	The plug on the lamp cap is loose	Insert the plug firmly	P7
	The bulb has burnt out	Change the bulb	P12
	The fuse has blown	Change the fuse	P13
Slit is too dark	The bulb is not assembled properly	Assemble the bulb properly	P12
	The filter lever is in the middle position or in the position of gray filter.	Set the filter lever to the correct position	P13
	Voltage selector is wrongly set	Set the voltage selector correctly	P5
	The coat of the reflecting mirror is oxidized	Change the reflecting mirror	P13
	Too much dust on the reflecting surface	Clean the surface with the brush	P14
Fuse has blown	Voltage selector is wrongly set	Set the voltage selector properly	P5
	The fuse doesn't comply with the specification	Replace it with a suitable fuse	P13
Slit closes automatically	The slit width control knob is too loose	Adjust the tightness of the control knob	P13
Fixation target is off	The output plug is loose	Insert the output plug firmly	P7

6. Responsibility

We will supply the circuit diagram of the instrument, electric component list, drawing annotation and calibration details according to the customer's need for repair.

If there is any need for enquiry of relative information and relative service or some questions, please contact with us directly or authorized distributors.

7. Transportation and storage

During the transportation, be careful to protect it from wetness, upside down and violent vibration. The relative humidity should be 10% to 90%, and environment temperature -25°C to 40°C .

This instrument should be stored in a well ventilated room without corrosive gas where the relative humidity should be 10% to 80% and environment temperature -10°C to 40°C .

If the assembled instrument should be moved or transported in short distance; please lock all the movable parts. Move this instrument carefully with hands pushing or carrying its table. If for long distance transportation, please repack it with original package.

8. Optional accessories (purchase in addition)

8.1 Applanation tonometer

This ESL-2600 slit lamp could be equipped with TN-150, Haag-Streit AG Model R-900 or Model T-900 applanation tonometer for measuring the intraocular pressure.



TN-150、Model R-900
Fig.29

9. Specifications

Microscope -----				
Type	Cross-angle stereovision			
Model of magnifying	Change the objective for 2-grade magnification			
Eyepiece	10x			
Total magnification rate	Objective x Eyepiece = magnification rate / vision field			
	1x	10x	10x	Ø18mm
	1.6x	10x	16x	Ø 14.5mm
Range of P. D. adjustment	10x eyepiece	55mm to 82mm		
Diopter adjustment	10x eyepiece	±5D		
Illumination -----				
Slit projection magnification	2/3x			
Slit width	continuous from 0mm to 9mm (at 9mm , slit becomes a circle)			
Slit height	continuous from 1mm to 8mm			
Aperture diameter	Ø9mm, Ø8mm, Ø5mm, Ø3mm, Ø2mm, Ø1mm, Ø0.2mm			
Slit angle	0° to 180° continuously adjustable from vertical to horizontal			
Filter piece	heat-absorption, grey, red-free, and blue			
Illumination bulb	6V20W halogen bulb			
Movement base -----				
Fore and back movement	90mm			
Left and right movement	100mm			
Fine movement	15mm			
Vertical movement	30mm			
Chin-rest parts -----				
Vertical movement	80mm			
Fixation target	Red LED			
Power source -----				
Input voltage	100/220V ~±10%			
Input frequency	50/60 Hz±1Hz			
Input power	30VA			
Output voltage	Illumination bulb	0V~6V		
	Fixation target	6V		
Electric safe standard	Conform to Standard IEC601-1, Class I Type B			
Dimension and weight -----				
Packing box	670mm x 570mm x 510mm			
Total weight	23 Kg			
Net weight	20 Kg			

✧ Subject to change in design or specifications without advance notice.

ESL-2600 Slit Lamp



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