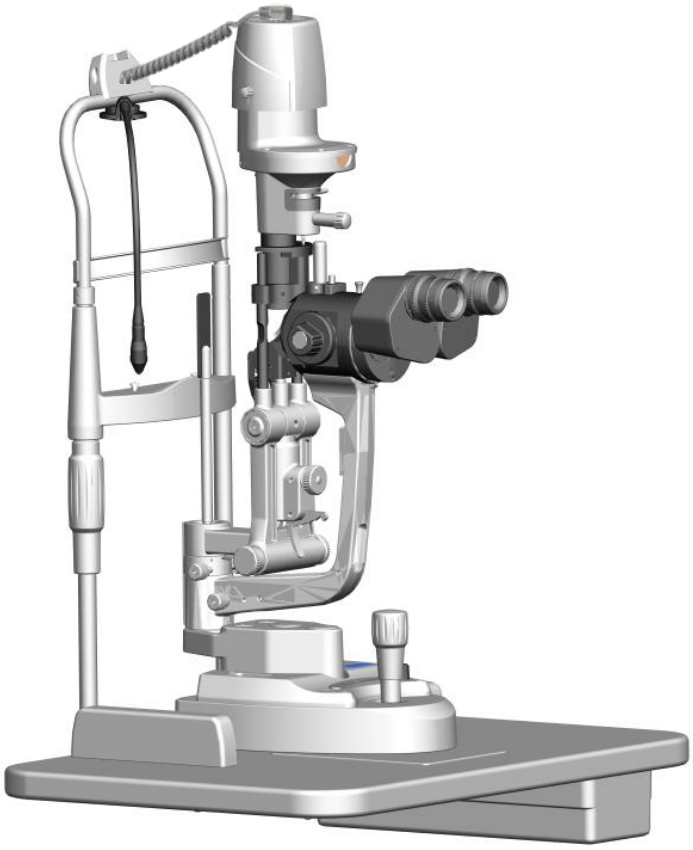
USER MANUAL

Slit Lamp Microscope

Model: S360/S360S/S390L



Content

Preface

Thank you for purchasing MediWorks' product - Slit Lamp Microscope. The following is the description and specification of our product:

General Description

- This operation instruction is an integral part of the Slit Lamp Microscope. Product-related operation instructions and technical instructions are given in this manual. The address for the user inquiry is recorded on the last page of the manual.
- This manual contains operation instruction and technical instruction. The equipment classification of the Slit Lamp Microscope according to the requirements of IEC 60601-1 is also given in this manual.
- The IEC 60601-1 standard stipulates that the applicable marks have been permanently attached to the instrument and are also described in the 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.
- The product consists of a microscope, a slit lamp, an instrument table and an optional camera interface, a digital module, and a slit lamp image management software.

Instruments classification: According to the IEC 60601-1 classification standard of medical electrical equipment, the slit lamp microscope is a general equipment of Class I continuous operation instrument, which cannot be used under two circumstances: a flammable anesthetic gas and air mixture, oxygen or nitrous oxide gas and air mixture.

The specification of this slit lamp microscope.

Microscope type:	Galilean-Type
Magnification change:	S360/S390L : 5 Magnifications S360S: 3 Magnifications
Total magnification Ratio:	S360/S390L : 6.3X, 10X, 16X, 25X, 40X S360S: 10X, 16X, 25X
Eyepieces	12.5X
Angle between eyepieces:	10º
Pupillary distance adjustment:	52mm～80mm
Diopter adjustment:	-8D—+8D
Field of view:	40X (∅5.7mm), 25X (∅8.9mm), 16X (∅14mm), 10X

(∅22.3mm), 6.3X (∅36.2mm)

Slit Illumination

Slit width:	Continuously variable from 0 to 14mm (at 14mm, slit becomes a circle)
Slit length:	Continuously variable from 1mm to 14mm
Lamp:	3V/3W LED module
Slit angle:	0°-180° (Adjustable both vertical and horizontal)
Slit inclination	4 step: 5°, 10°, 15°, 20°
Filters:	Heat-absorbing filter, ND filter, Red-free, Cobalt Blue, Build-in Yellow Filter
Aperture diameters:	∅14mm, ∅10mm, ∅5mm, ∅3mm, ∅2mm, ∅1mm, ∅0.2mm
Luminance:	≥ 150klx
LED color-temperature:	3000-4000k

Base

Longitudinal movement:	115mm
Lateral movement:	110mm
Fine base movement:	15mm
Vertical movement:	30mm

Chin-Rest

Vertical movement	80mm

Power Supply

Input:	~100V-240V, 50/60Hz
Rated current:	1.2A
Output:	Lamp: 3V (LED) Fixation: 15V

Size & Weight

Package size	740mm × 450mm x 530mm
Gross weight:	23Kg
Net weight:	17Kg

Working Environment

Temperature:	+5℃～+40℃
Relative humidity:	≤90%
Air pressure:	860hpa～1060hpa

Storage Environment

Temperature:	-40℃～+55℃
Relative humidity:	≤90%

Air pressure:	860hpa～1060hpa

Transportation Environment

Temperature:	-40℃～+55℃
Relative humidity:	≤90%
Air pressure:	860hpa～1060hpa

Attentions!

Dear customers, we provide one-year free warranty service to receive the "Product Warranty Card" for confirmation. The warranty card is attached with this manual. Please fill in the "Product Warranty Card" attached to this manual in time and return it to the company according to the address on the cover of this manual, so that we can provide you with better follow-up services.

General Requirements for Safety

Dear customers, please read the instruction manual carefully before using our products to avoid accidental mechanical hazards and improper use of the user, resulting in unclear images and diagnostic errors. In particular, carefully read the following safety precautions to prevent the product is damaged, personal injury, and other hazards and accidents that may occur.

1 The product can only be used by qualified medical staff.

2 Do not disassemble or attempt to perform operations that are not described in this instruction manual. If the operation is not performed properly, excessive force may cause damage to the machine or personal injury. If the instrument fails, please read the troubleshooting guide carefully; follow the troubleshooting methods and steps to troubleshoot the problem; if the problems remain unsolved, please contact our Manufacturer and Service Department, and our company will arrange professional maintenance personnel to help you troubleshoot.

3 Do not store and use in a flammable, explosive, high temperature, high humidity and dusty environment; use it in a clean room, keeping the product clean and dry.

4 Other medical instruments and equipment that installed at the same site must comply with the same electromagnetic compatibility principles. Equipment that cannot comply with or is known to have poor electromagnetic compatibility must be installed at least 3 meters away from the equipment and must be powered by a different power cord.

5 Please pay attention to the rating of all electrical connection ports.

6 Before using the instrument, please check all the wires are correctly connected; if the wires are inappropriately connected it may cause the instrument to be short-circuited, which may cause the product is damaged and personal injury.

7 Users should pay attention when using the instrument, and be careful when moving the parts to avoid damage due to the moving of the base and tilting of the projection tube.

8 When replacing fuses and other electrical components, turn off the main power switch. Replace the fuse that meets the specifications specified in this manual.

9 If there is a need to replace power cord, please use the power cord specified in this manual.

10 Don't touch the surface of the lens and prism with hand or hard objects.

11 When the device is not operating, the power should be turned off, and cover the device with dust cover.

12 To prevent the instrument from falling down to floor, it should be placed on the floor where the inclination angle is less than 10°.

13 Please deal with the waste disposal produced by the machine following relevant laws and regulations.

14 Please read the safety signs and other illustrations used on this instrument carefully to use the device safely.

THE SAFETY MARKS, PICTURES USED IN THIS INSTRUMENT

According to the IEC 60601-1 standard, the following figures, symbols and marks are used on the products. For the specific meanings, see Table 1 below:

No.	Mark	Description
1		TYPE B
2		Date of Production
3		"Observe user manual" information label
4	MD	Medical device
5		WEEE mark Please deal with the waste disposal produced by the machine following relevant laws and regulations
6	CE	CE mark

7	REF	Catalogue number / part number
8	SN	Serial Number
9	Output	Located on the base, indicate outlet of the power
10	Input	Located on the base, indicate input of the power
11		Located on the base, use with on and off
12	Rx only (for US)	USA Federal law restricts this device to sale by or on the order of a physician
13		The mark of light dimmer
14		Manufacturer information
15	EC REP	Authorized representative in the European Community
16	CH REP	Authorized representative in Switzerland

EMC precautions:

Below cables information are provided for EMC reference.

Cable	Max. cable length, Shielded/unshielded		Number	Cable classification
AC power cable	1.8m	Nonshielded	1 Set	AC Power
DC Power cable	1.36 m	Nonshielded	1 Set	DC Power
DC Power cable for Slit Lamp Microscope	0.7 m	Nonshielded	1 Set	DC Power
USB cable for Slit Lamp Microscope	0.3 m	shielded	1 Set	DC Power
USB cable for Slit Lamp Microscope	1.9 m	shielded	1 Set	DC Power

Important information regarding Electronic Magnetic Compatibility (EMC)

Slit Lamp Microscope needs special precautions regarding EMC and put into service according to the EMC information provided in the user manual and other documents; Slit Lamp Microscope conforms to

this EN 60601-1-2:2007+AC:2010/IEC 60601-1-2 standard for both immunity and emissions.
Nevertheless, special precautions need to be observed:

● The use of accessories and cable other than those specified, with the exception of accessories and cables sold of Slit Lamp Microscope as replacement parts for internal components, may result in increased EMISSIONS or decreased IMMUNITY or decreased LIFESPAN of the Slit Lamp Microscope.

● Slit Lamp Microscope should not be used adjacent to or stacked with other equipment. In case adjacent or stacked use is necessary, The Slit Lamp Microscope should be observed to verify normal operation in the configuration in which it will be used.

EMC Information

Guidance and manufacturer's declaration - electromagnetic emissions - for all ME EQUIPMENT and ME SYSTEM.

Table 1:Guidance and manufacturer's declaration – electromagnetic emissions		
The Slit Lamp Microscope is intended for use in the electromagnetic environment specified below. The customer or the user of the Slit Lamp Microscope should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The Slit Lamp Microscope 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 A	The Slit Lamp Microscope is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ Flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration - electromagnetic immunity - for all ME EQUIPMENT and ME SYSTEM.

Table 2:Guidance and manufacturer's declaration – electromagnetic immunity			
The Slit Lamp Microscope is intended for use in the electromagnetic environment specified below. The customer or the user of the Slit Lamp Microscope 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 lines to lines ±2 kV lines to earth	±1 kV lines to lines ±2 kV lines	Mains power quality should be that of a typical commercial or hospital environment.

		to earth	
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 cycle 70% U_T (30% dip in U_T) For 25 cycle <5% U_T (>95% dip in U_T) For 5 cycle	<5% U_T (>95% dip in U_T) For 0,5 cycle 40% U_T (60% dip in U_T) For 5 cycle 70% U_T (30% dip in U_T) For 25 cycle <5% U_T (>95% dip in U_T) For 5 cycle	Mains power quality should be that of a typical commercial or hospital environment. If the user of Slit Lamp Microscope requires continued operation during power mains interruptions, it is recommended that the Slit Lamp Microscope be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) magnetic field IEC 61000-4-8	3A/m	3A/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. mains voltage prior to application of the test level.			

Guidance and manufacturer's declaration – electromagnetic immunity for ME EQUIPMENT and ME SYSTEM that are not LIFE-SUPPORTING.

Table 3: Guidance and manufacturer's declaration – electromagnetic immunity

The Slit Lamp Microscope is intended for use in the electromagnetic environment specified below. The customer or the user of the Slit Lamp Microscope should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment-guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the SYSTEM, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80MHz	V_1=3V	Recommended separation distance $d = [\frac{3.5}{V_1}]\sqrt{P}$ 150kHz to 80 MHz
Radiated RF IEC 61000-4-3	3 Vrms 80MHz to 2.5GHz	E_1=3V/m	$d = [\frac{3.5}{E_1}]\sqrt{P}$ 80MHz to 800MHz $d = [\frac{7}{E_1}]\sqrt{P}$ 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, should be less than the compliance level in each frequency range. Interference may occur in the vicinity of equipment marked with the following symbol: 

Recommended separation distances between portable and mobile RF communications equipment and the ME EQUIPMENT and ME SYSTEM – for ME EQUIPMENT and ME SYSTEM that are not LIFE-SUPPORTING.

Recommended separation distances between portable and mobile RF communications equipment and the Slit Lamp Microscope			
The Slit Lamp Microscope is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Slit Lamp Microscope can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Slit Lamp Microscope 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 80 MHz $d = [\frac{3.5}{V_1}]\sqrt{P}$	80MHz to 800MHz $d = [\frac{3.5}{E_1}]\sqrt{P}$	800MHz to 2.5GHz $d = [\frac{7}{E_1}]\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.73
1	1.2	1.2	2.3
10	3.7	3.7	7.3
100	12	12	23

WEEE precautions：

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

1 Technical specifications

1.1 Instrument Mark and Technical Specification

The slit lamp microscope is powered by network power supply. The following marks are required permanently affixed to the instruments according to IEC 60601-1Standard. The following table lists the tips for your reference.

Table two:

No.	Content	Instructions
1	Manufacturer/ supplier	Shanghai MediWorks Precision Instruments Co., Ltd
2	Figure /icon/ mark	Detail in table one
3	Connect to main power	Detail in power specification
4	Power frequency, Hz	Detail in power specification
5	Input power frequency	Detail in power specification
6	Network output power	N/A
7	Classification	Detail in table one item 1
8	Working time	No indication, work continuously
9	Output	Detail in table one item 9
10	Physiological reaction	No indication. N/A
11	AP/AGP type device	No indication. N/A
12	High pressure terminal device	No indication. N/A
13	Cooling condition	No indication. N/A
14	Mechanical stability	No indication. Detail in **General Requirements for Safety** item 12.
15	Protective packing	Transportation marks required by **<EN ISO 780-1997 packing-handling icon marks> are** affixed to the outer packing carton, which includes up, fragile, afraid of the rain, stacking Limit, stacking weight limit and so on.

1.2 Indicator Light

The power switch is designed with indicator light. When the light is blue, it means the power is on and the instrument is working.

1.3 Product Technical Specifications

Please refer to "General Description"

2 Installation of the instrument 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.

2.1 Replacements of consumables

Detail in Chapter 5 of this manual.

3 Component list

3.1 Component list

The following electronic components are used in this instrument.

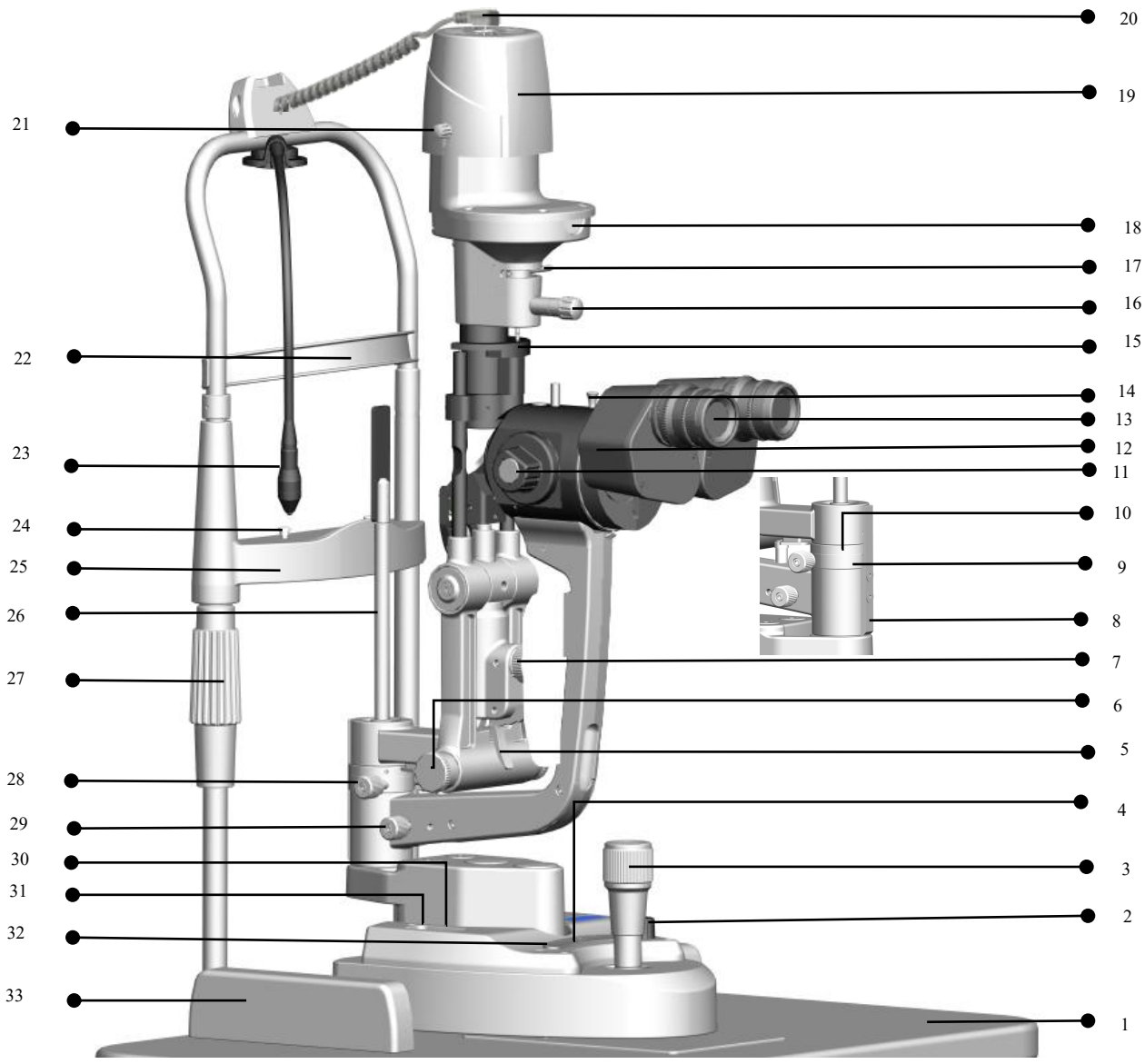
Table three:

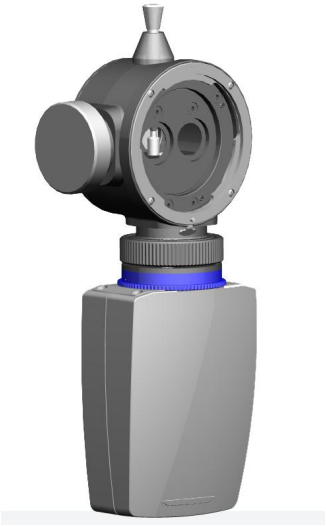
No.	Component name
1	15V/4A DC power adaptor
2	Control circuit board
3	Brightness adjustment potentiometer
4	Power switch with indicator
5	Photo shooting button
6	USB port
7	3 pin input aviation connector
8	4 pin output aviation connector
9	LED bulb as light source
10	Diode (for fixation light)

3.2 Transport and Storage Environmental Conditions

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

1 Graphical description of each part of the slit lamp microscope





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1 Slit Lamp Base
2 Brightness Control knob
The brightness can be adjusted continuously. Avoid working continuously at high setting, as 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 Shutter button
Used for digital slit lamp photography.
5 Illumination Inclination Lever
Four inclination stops are available from 5°up to 20°. The interval between each is 5°.
6 Slit Width Control Knob
Turn the knob to adjust the slit width. The left knob is marked with a slit width indicator.
7 Illumination system reset knob
By loosening the knob, the light can be offset from the center of the field of view of the microscope to provide indirect backlighting. When the knob is tightened, the light can be restored to the center of the microscope field of view.
8 Limit marker
Limit viewing system and illumination system relative angle indicating and limiting illumination arm rotation angle.
9 The indication of relative angle between the microscope and illumination unit.

10 The mark of relative angle between the microscope and illumination unit.

11 Magnification Changer
Five different magnifications are provided.

12 Binocular tubes base
Open it to both sides and adjust to the appropriate distance for easy observation.

13 12.5X Eyepieces

14 Yellow filter rod
Pull up or press to switch the yellow filter.

15 Slit Movement Platform
Moving up and down to makes the slit opening and closing, and the lower scale shows the angle between the slit and the vertical direction.

16 Slit Height Control Knob
Rotate this knob to adjust the spot and the slit height. Swing the knob horizontally to revolve the slit

17 Filter Selection Lever and display mark
The lever can choose different filters

18 Aperture Slit Height and Display Window
It will display the diameter of the slit and the aperture.

19 Lamp Cap
With the function of protecting and insulating, its normal working temperature is around 51℃

20 Power plug
The power of the light source assembly is connected here.

21 The Fixation Knob of Lamp Cap
After fixing the knob, the lamp cap will not move.

22 Headrest Belt
Keep the patient's head in a suitable position.

23 Fixation target
Make the patient stare at it, it is convenient for checking.

24 Chin-rest paper fixing bolt
For fixing the pad paper.

25 Chin-rest
Supporting the patient’s chin.

26 Focusing Testing Rod

27 Chin-rest Elevation Adjustment Knob
Rotate the knob to adjust the elevation of the chin-rest.

28 Illumination arm locking knob
When the knob is tightened, the illumination system and the observation system are in a linked state and can rotate together. When the knob is

loosened, the illumination system can be rotated separately.

29 Microscope arm locking knob
Lock the observation system so that it cannot rotate.

30 Power input
Used to supply power to the power module.

31 Power output
Used to power main lamp and fixation target.

32 Power Switch
Press the power switch button once to turn it on, then press the button again shortly to enter standby mode, and press and hold for 3 seconds to turn off all power.

33 Rail Cover
Protect the rail surface.

34 Digital module
Apply to S390L Mediview Image System.

2 Installation

This section of the manual describes how to assemble the S360/S360S /S390L slit lamp. All parts should be taken out with great care from the packing case before assembling.

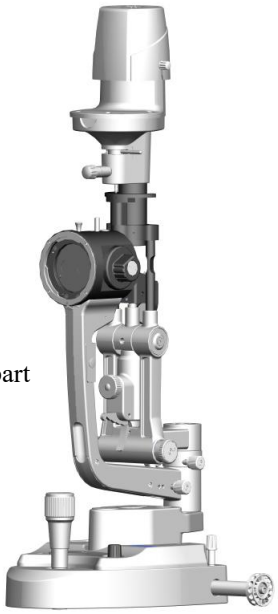
2.1 Check List

No	Name	Qty.	Note
1	Microscope Part	1	
2	Chin-rest	1	
3	Binocular tubes Part	1	
4	Instrument Table	1	Metal plate or Wooden tabletop
5	Rail Cover	1	
6	Gas Shield	1	
7	Power Cable	1	
8	Focusing Test Rod	1	
9	Dust-proof Cover	1	
10	Chin-rest Paper	1	
11	5mm Wrench	1	

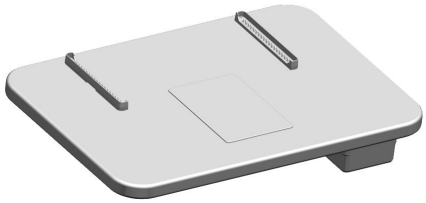
12	2mm Wrench	1	
13	User Manual	1	
14	Packing List	1	
15	Digital Module Set (for S390L)	1	Diagram 34

Table 1

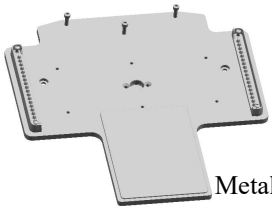
Figures:



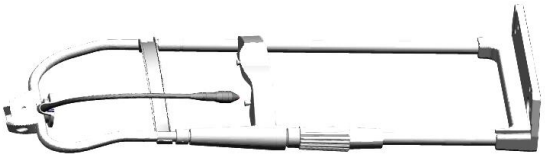
Microscope part



Wooden tabletop



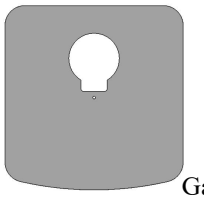
Metal plate



Chin-rest

Rail cover

Binocular tubes part



Gas shield

Focusing test rod

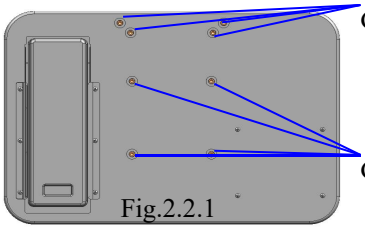
2.2 Slit lamp microscope installation procedure

2.2.1 Instrument table installation

Open the carton, take out the tools like screw driver and spanner.

➢ Wooden tabletop installation procedure

1. Before attaching the wooden tabletop on to the power table, please screw off four M6x20mm bolts with the spanner .（Fig.2.2.1 Group A）.



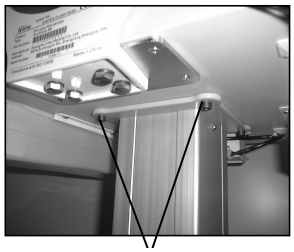
Group B

Group A

Fig.2.2.1

2. Lift the wooden tabletop to aim its screw hole at the assembly hole of the instrument table.（Fig.2.2.2）
3. Put down the wooden tabletop, with the power panel facing the operator, refasten the bolt securely with the spanner (Fig.2.2.2).

Fig.2.2.2



The screw to connect with the table

4. Connect two white connectors under tabletop, Turn on and press Up & Down switch to check whether the instrument table is normal.(Fig.2.2.3).

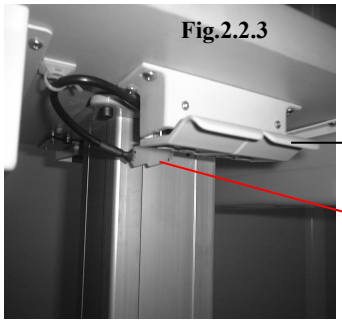


Fig.2.2.3

Up & Down switch

White connectors

5. Remove the four screws of B Team with the screw driver, take out the chin-rest from carton, ensure the four hole on chin-rest aim the screw hole of B team(Fig.2.2.1 Group B), re-tighten the previously removed screw and make chin-rest connect with wooden tabletop .(Fig. 2.2.4)

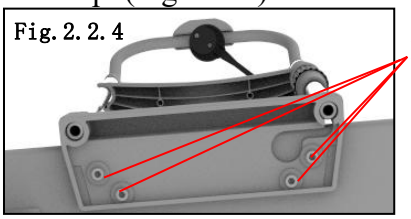


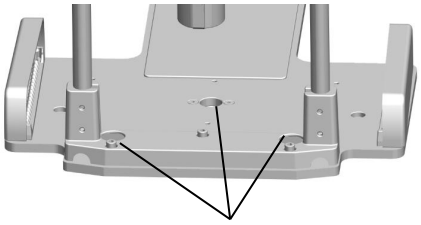
Fig. 2. 2. 4

Four screws

➢ Metal plate installation procedure

Remove the three screws from metal plate use the screwdriver, take out the chin-rest from carton, ensure the three holes on chin-rest aim the screw hole of metal plate, re-tighten the previously removed screw and make chin-rest

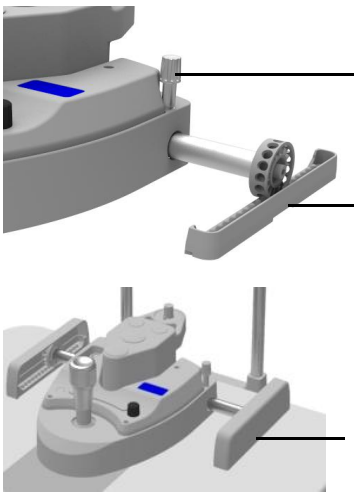
connect with metal plate.



Three screws

2.2.2 Installing other components

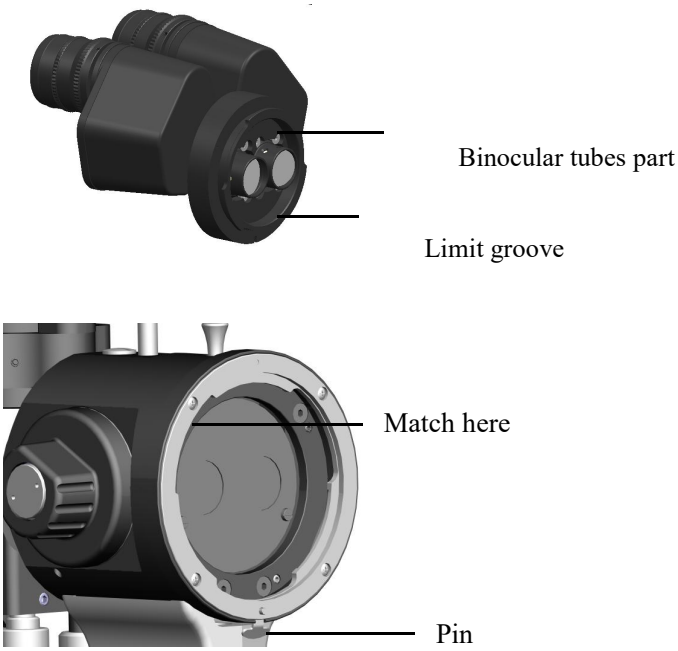
1. Take out the microscope part, put it on the rails of the tabletop, try to keep the two gears in the same position on the two guide rails, and loosen the base locking screw. Put on the rail cover, and then push the gears along the rails to touch one end of the rail cover. Check whether each gear on both sides touches one end of the rail cover. If one of them is at a distance, remove the rail cover. Readjust the position of the gear on the rail until it reaches the same end of the rail cover at the same time. Then gently push the base back and forth to check whether the gears can smoothly roll back and forth on the rails. After confirming that there is no problem with the movement of the base, then tighten the base locking screw to make the base locked.(Fig.2.2.5and 2.2.6)



Lock screw on base

Rail cover

2. Take out the binocular tubes part, put the gas shield on the cylindrical surface of the binocular tubes, and then match the groove on the binocular tubes with the pin on the microscope body. Fasten the fixing screw on the body to the microscope (Fig.2.2.7). ATTENATION：Don't touch the objective lens and eyepiece when assembling.



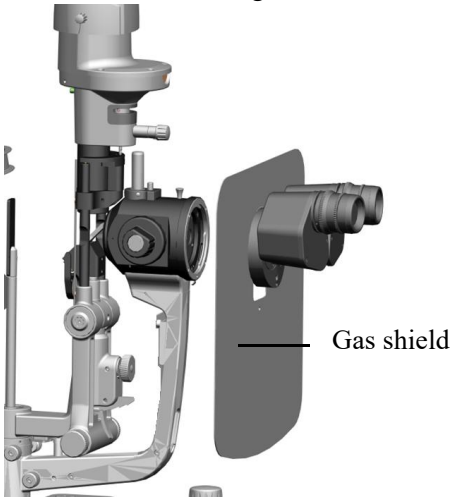
Binocular tubes part

Limit groove

Match here

Pin

Fig.2.2.7

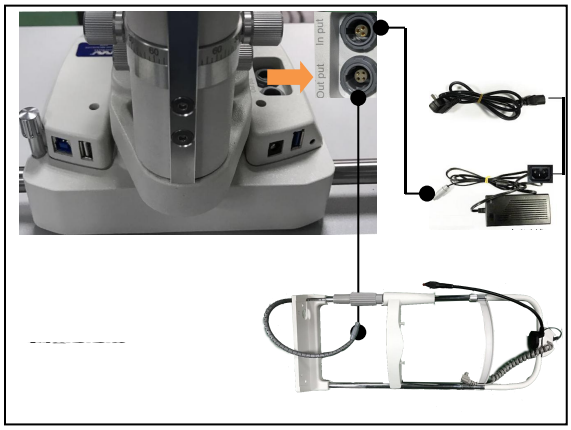


Gas shield

Fig.2.2.8

3. Refer to figure 2.2.9. The 4-pin aviation plug of the chin-rest is connected to the "Output" on the base of the slit lamp

microscope; the power adapter is connected to the “Input” on the base of the slit lamp microscope.



⚠Note: The limited slot on the air socket should be aligned corresponded slot when plugging and unplugging. Do not force the plug.

4. The power supply can work normally from 100V to 240V. The power switch (see Figure 2.2.10) can be turned on with one short-press, short-pressed again to hold, and long press for 3 seconds to turn off all power.

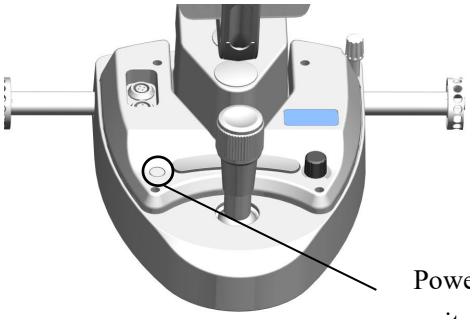


Fig2.2.10

5. Arrange the tools used in the installation and the spare parts in the box and place them in the drawer at the bottom right of the table top.

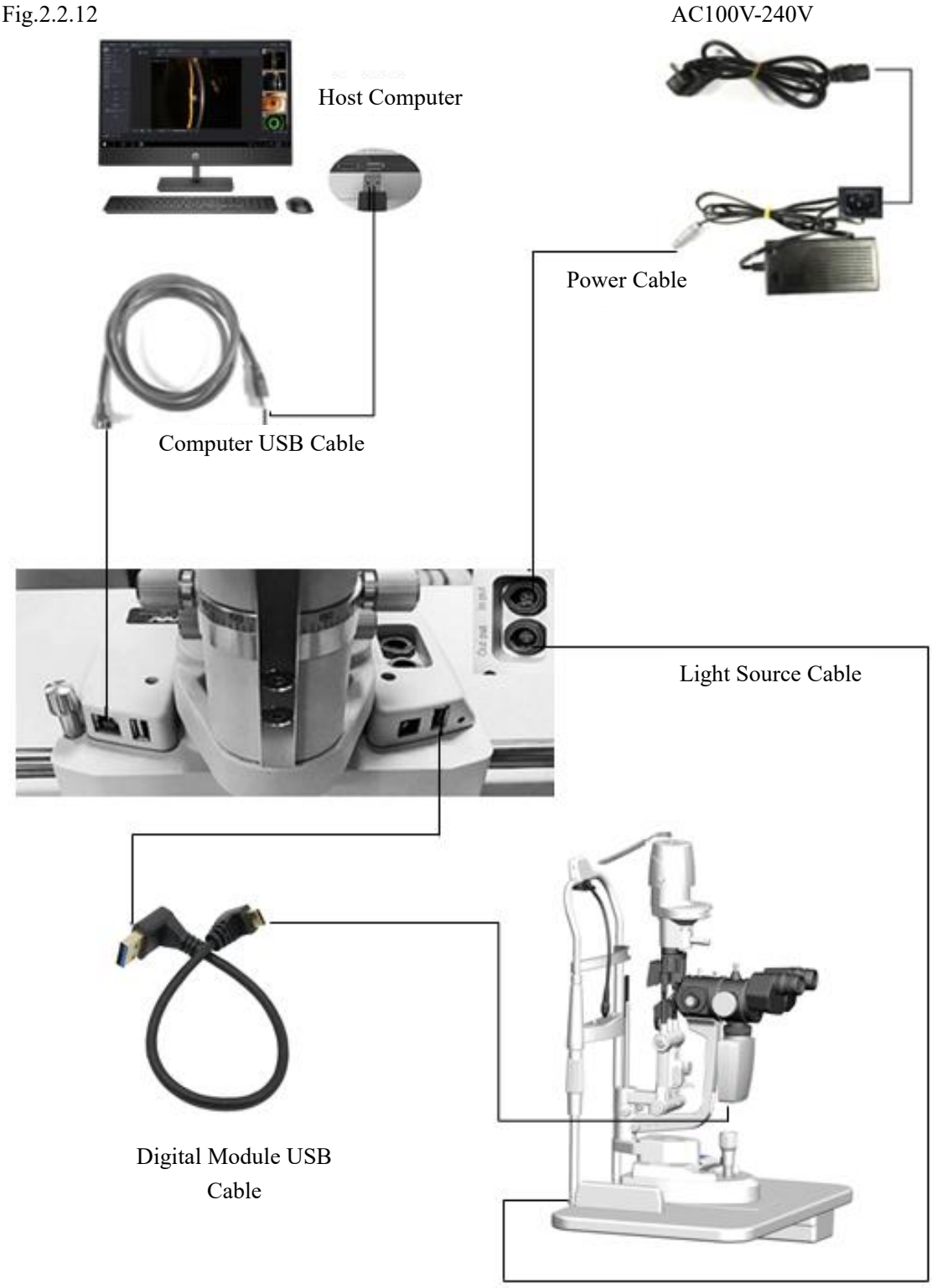
2.3 S390L digital module installation procedure

1.Align the digital module set splitter mount to the slit lamp main body, and rotate the splitter to the right to the position could lock splitter. Then put the gas shield on the cylindrical surface of the binocular tubes, and install the binocular tubes on the splitter in the same way.

2.Power Plug Description

3.Refer to Figure 2.2.12the 4-pin aviation plug of the bracket is connected to the “Output” on the base of the slit lamp; the power adapter is connected to the “Input” on the base of the slit lamp microscope. One end of the digital module data cable is connected to the USB3.0 interface, and the other end is connected to the digital module. One end of the computer data cable is connected to the USB3.0 host interface, and the other end is connected to the computer.
4.This power supply can work normally under the voltage of 100V to 240V. Turn on the power and pull up the beam splitter lever on the digital module. For the installation and use of the image capture management software, please refer to the relevant manual attached with device.
5.Organize the tools used in the installation and the spare parts in the box and place them in the drawer at the bottom right of the table top.
6.Note: The limited slot on the air socket should be aligned corresponded slot when plugging and unplugging. Do not force the plug.

Fig.2.2.12


AC100V-240V
Host Computer
Power Cable
Computer USB Cable
Light Source Cable
Digital Module USB Cable

2.4 Checking Program

1. The power cord of this instrument is a three-core power cord. Please select a suitable power socket to match it.
2. Insert the focusing test rod and turn the slit width control knob (see Figure 2.4.1). The illumination spot should be observed on the black plane of the focusing test rod. The brightness change of the illumination should be observed when rotate the brightness adjustment knob.
3. Check the fixation target to verify that it is properly illuminated.
4. Check whether the moving parts such as the slit and aperture width knob, the aperture adjustment knob, the filter selection lever (see Figure 2.4.2), the zoom knob (see Figure 2.4.3), and the joystick (see Figure 2.4.4) operate normally.

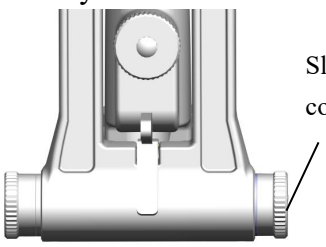


Figure 2.4.1

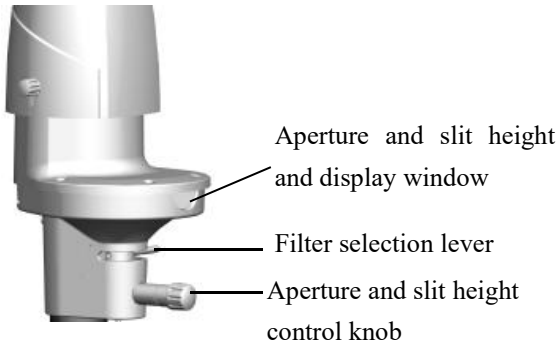


Fig2.4.2

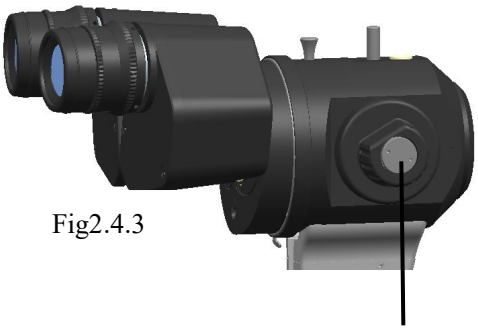


Fig2.4.3

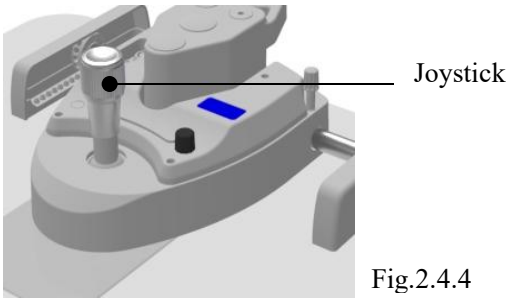


Fig.2.4.4

5. The brightness change of the illumination should be observed when rotate the brightness adjustment knob (see Figure 3.1.2)
6. After the checking is completed, press and hold the key for 3 seconds to turn off the power and cover the dust cover.

3 Operation procedure

3.1 Diopter compensation and Pupillary distance adjustment

1. Use of focusing test rod

The focusing test rod is provided as a standard accessory to determine the correct adjustment of the microscope. Insert the focusing rod into the spindle hole with the black flat surface facing the objective lens of the microscope, ie the operator side (see Figure 3.1.1).

Note: After adjustment, the focusing test rod should be removed.

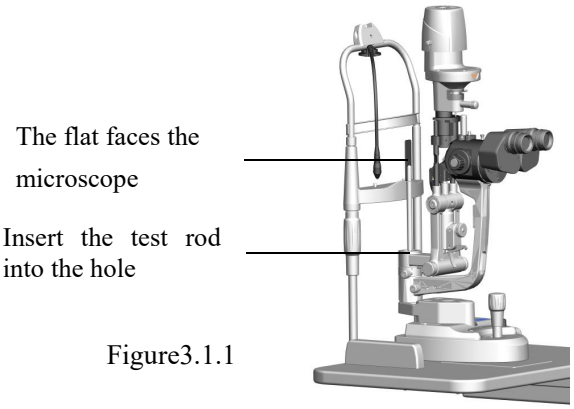


Figure3.1.1

2. Brightness adjustment

Turn on the main power switch and turn the brightness adjustment knob to the middle (see Figure 3.1.2). Adjust the slit width adjustment knob (see Figure 2.4.1) to make the slit width 2 to 3 mm.

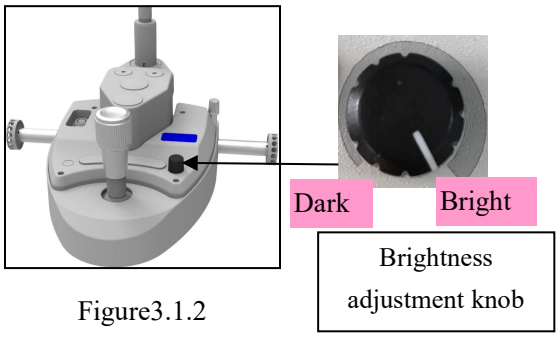


Figure3.1.2

3. Diopter adjustment

The focus of the microscope is adjusted in front of the normal eye (ie, 0 diopter). If the operator has abnormal eye, gently rotate the eyepiece tube diopter adjustment ring to adjust the eyepiece diopter to the appropriate position (see Figure 3.1.3).

It is recommended to correct the diopter in the following order:

1. First, rotate the diopter adjustment ring counterclockwise to the end;
2. Then, turn the diopter adjustment ring clockwise until the clearest slit image appears on the focusing test bar
3. Adjust the other eyepiece in the same way;
3. Record the diopter value on each eyepiece for future reference.

Figure3.1.3

4. Pupillary distance adjustment

Use both hands to tilt the binocular tubes base on both sides, adjust the pupil distance to both eyes and observe the image on the focusing test rod through the eyepiece to obtain a stereoscopic image. When adjusting the pupil distance, ensure that the two eyepieces are at the same height (see Figure 3.1.4).

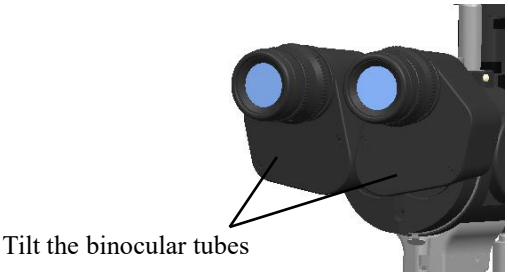


Figure3.1.4

3.2 Patient's head position and use of fixation target

1. Place the patient's chin on the chin-rest, with the forehead resting on the headrest belt and adjusting a handle below the chin-rest bracket until the patient's corner of the eye match with the level of the pole marked in line
2. The use of a fixation target is to fix the patient's vision, so that the patient's non-examined eye is gazing at the fixation target. When changing the fixation

position, turn the fixation rod up and down or left and right to obtain the desired fixation target position (see Figure 3.2.1).

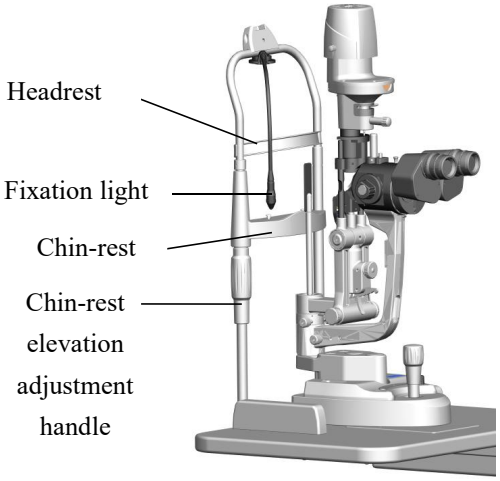


Fig.3.2.1

3.3 How to use moving base

1. Roughly Adjustment in the horizontal direction with the joystick in the upright position (see Figure 3.3.1), move the base back and forth to move the microscope in a horizontal direction to roughly align the target.

2. Adjustment in the vertical direction. Rotate the joystick to adjust the height of the microscope to align it with the target. Rotate clockwise to lower the microscope; counterclockwise to raise the microscope (see Figure 3.3.1).

3. Slightly adjustment in the horizontal direction. Tilt the joystick forward and backward to make the microscope move slightly in the horizontal direction. Observe through the eyepiece to accurately align the target to obtain a clear observation (see Figure 3.3.1).

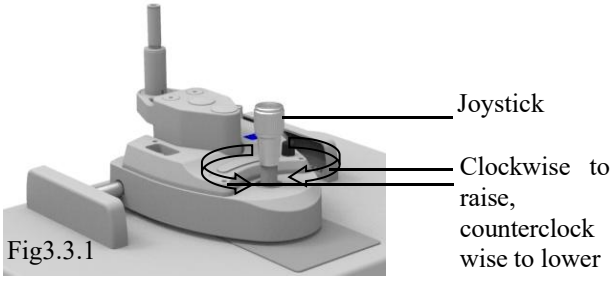


Fig3.3.1

4. Lock the base. After the microscope is adjusted, tighten the base locking screw (see Figure 3.3.2) to fix the base so that it cannot move.

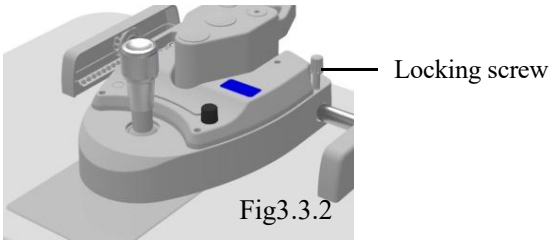


Fig3.3.2

3.4 Operation of illumination system

1. Change the brightness of the slit image: Rotate the slit width control knob (see Figure 2.3.1) to change the slit width from 0mm to 12mm (when the width is adjusted to 14mm, the slit becomes circular), the knob has a scale to indicate roughly the width value (see Figure 3.4.1).

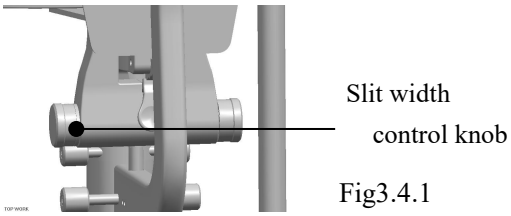


Fig3.4.1

2. Change the aperture diameter and slit height: Rotate the aperture selection knob to get 7 different sizes of circular spot and 1 continuous change aperture. The diameter of the circular spot is 14, 10, 5, 3, 2, 1, 0.2. Continuously changing the aperture can continuously change the length of the slit from 1 to 14 mm. The aperture data is displayed from the pupil

reading window (see Figure 3.4.2).

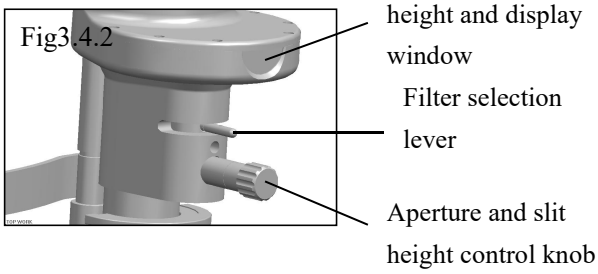


Fig3.4.2

3. Rotating slit image: horizontally move aperture selection knob can rotate the slit image at any angle between vertical and horizontal. The angle of rotation can be displayed by the scale board. Each small grid is 5, and the larger grid is 10. (See Figure 3.4.3).

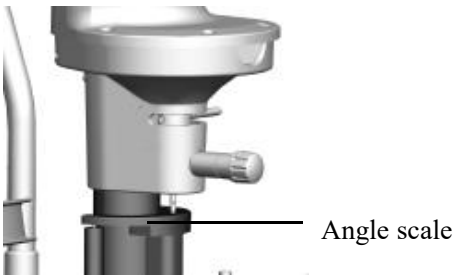


Figure3.4.3

4. Offset illumination. Rotate the centering knob and rotate the slit width adjustment knob in the direction of the arrow to offset the illumination light from the center of the microscope field of view. This is mainly used for indirect inverse illumination methods to check the eyes. Rotate the centering knob and the slit light returns to the center of the field of view (see Figure 3.4.4).

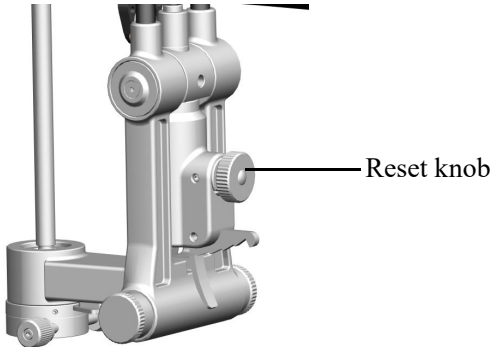


Figure3.4.4

5. Tilt the illumination light. When using a contact lens and using a slit section view or fundus examination, oblique illumination is required. By pressing down on the tilting lever, the lighting components can be tilted from 5 to 20 (every 5th gear) (see Figure 3.4.5). **Since this method may touch the patient's head, be careful.**

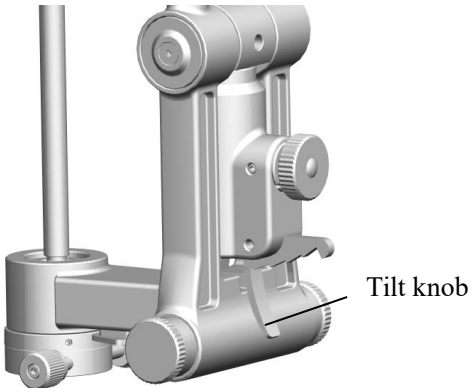


Figure 3.4.5

6. Select the color filter. Rotate the filter selector lever in the horizontal direction to switch four different color filters into the light path. Heat-absorbing filters are often used to make the patient feel more comfortable. Other filters should be placed in the position of the heat-absorbing filter after use. (See Figure 3.4.6).

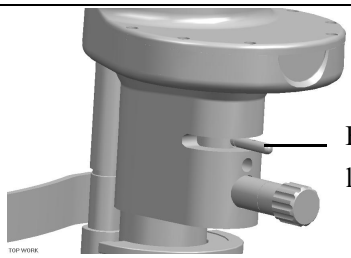


Figure3.4.6

7. From left to right: white filter, heat absorbing filter, light reduction filter, red-free filter, cobalt blue filter. The white film is only used when the factory is calibrated, and the operator does not have to use it.

3.5 Digital module set operation (S390L)

1. Capture button (see Figure 3.5.1), press the capture button in the camera mode to take a photo; press the capture button in the video mode to start recording, press the capture button in the recording state to end the current recording.

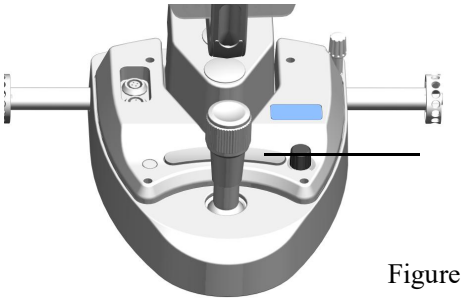


Figure 3.5.1

2. When capturing images, make sure that the beam splitter lever is in the pulled up position. At this point, the microscope image can be captured, and the light pass through eyepiece will decrease and the field of view brightness will decrease (see Figure 3.5.2).

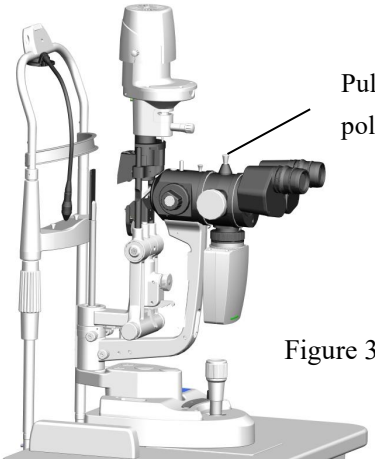


Figure 3.5.2

3.The number above the apertures: F14, F16, F18, F21, F25, F30 indicate the aperture size. The larger the number, the smaller the aperture. When the light is insufficient, a large aperture is required to ensure the brightness of the picture, apply to the condition such as observing the cornea with slit light. Use a small aperture for greater depth of field when there is plenty of light, apply to the condition such as use a large spot to observe the eye (see Figure 3.5.4).

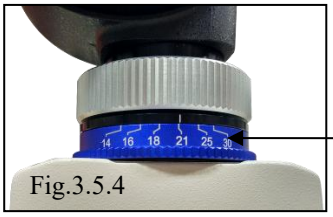


Fig.3.5.4

4.The background light source module provides additional illumination for observing, improving the quality of digital photography. The background light source has two kinds of LED light source and infrared light source.

3.6 Operation notes

1. During the operation, the operator should first understand the contents of the instruction manual and master the structure and function of the slit lamp microscope. It is necessary for proper

operation and diagnosis.

2. During the use of the operator, the different scales and different indication marks corresponding to the various knobs at different positions should be observed clearly, to prevent unnecessary misjudgments during observations.

3. The operator should adjust the pupil distance and the vision before observing the microscope during the operation. If the distance and vision are incorrect, there may be a feeling of dizziness.

4. The operator may have a feeling of dizziness if using microscope for a long time during the operation. Please adjust the observation time according to your personal situation.

5. When the patient is diagnosed with a slit lamp microscope, a beam of slit light is applied to the eye. If the slit light is too dark, it will affect the observation. If the slit light is too strong, and the observation last too long, it may affect the patient's vision. If the patient feels uncomfortable, please inform the operator or actively seek medical attention. Try to avoid illuminating the patient's eyes for a long time under strong light.

4 Cleaning

4.1 Cleaning method

1. Cleaning the lens and mirror: If dust adheres to the lens or mirror, gently wipe it off with soft cotton dampened with absolute alcohol (see Figure 4.1.1).

Attention: Don’t wipe with hands or hard object or any corrosive detergent lest that the surface should be damaged.

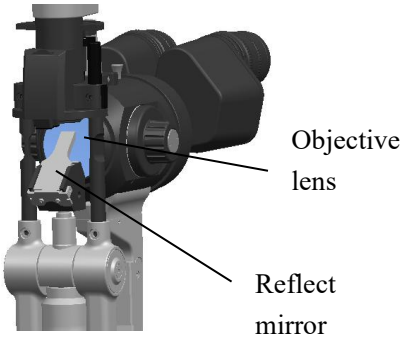


Figure. 4.1.1

2. Cleaning the pad, rails, and shaft: If the pad, rails, and shaft are not clean, the horizontal and vertical movements will not be smooth. Wipe clean with a clean soft cloth (see Figure 4.1.2).

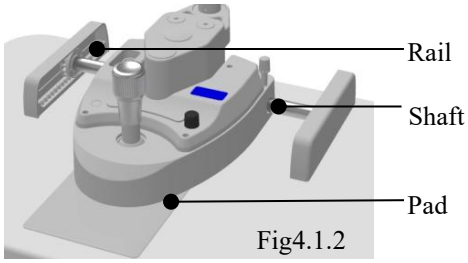


Fig4.1.2

3. Cleaning and disinfecting plastic parts: Clean plastic parts such as chin-rest, headrest belt, etc. Use a soft cloth dampened with a soluble detergent or water to clean the dirt, then wipe it with medical alcohol. **Note: Do not wipe with any abrasive cleaner to avoid damaging the surface.**

4. Replace the chin-rest paper: When the chin-rest paper is used up, pull out the two fixing bolts on the bracket and put on the new paper, then install the fixing bolt (see Figure 4.1.3).

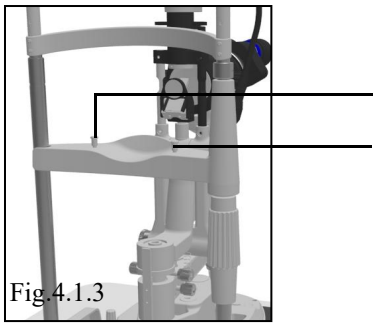


Fig.4.1.3

4.2 Cleaning cycle

The slit lamp microscope should be used in a relatively clean environment, and the main parts that need to be cleaned are as specified in the instruction manual 4.1. In order to ensure the normal use and observation of the slit lamp, the cleaning should be carried out regularly. The cleaning cycle is recommended as follows:

1. For the eyepiece area, lens and mirror parts:

   Cycle: It is recommended to do it every 2 months.
   Since the surface of the lens and the mirror is coated with an anti-reflection film and a reflective film, although the coating is sufficiently strong, frequent wiping tends to cause damage to the film, thereby affecting the optical effect of observation. This cycle is only a suggestion. If there is a lot of dust adhering to the lens that has affected the quality of the observation, it is recommended to clean it immediately according to the prescribed method.
2. For the rails, shaft and the pad:

   Cycle: It is recommended to do it once every month.
   The use of slit lamps in a relatively clean environment in a hospital does not cause the sliding pad, rails and shafts. They will not need to clean in a short period of time (within 1 year), nor does it affect the horizontal and vertical movement of the moving base. However, we recommend that you clean the above parts with a clean soft cloth every 6 months for better positioning and positioning.
3. For chin-rest, plastic parts such as headrest straps:

   Cycle: It is recommended to do it once a day.
   These two parts are the parts that are in frequent contact with the inspected person. They should be cleaned and disinfected in time. The cleaning and disinfection cycle is only our recommendation. A new chin-rest paper should be replaced when inspecting each of the inspectors. The headrest strap area should also be cleaned. Both parts should be cleaned and disinfected daily before the first use.
4. For the whole device

   Cycle: It is recommended to do it every 2 months.
5. Product Lifecycle

   The slit lamp has a life cycle of 8 years.

5 Protection and Maintenance

Correct and regular protection and maintenance will help to extend the lifecycle of the slit lamp. The service period of the slit lamp is 2 months. Maintenance should be carried out every 2 months.

5.1 Protection

During the use of the slit lamp, dust and dirt are easily trapped in the spindle hole of the arm. To protect the instrument from damage, cover the spindle hole with a protective cover. When the focusing test bar needs to be

installed, the protective cover can be removed (see Figure 5.1.1).

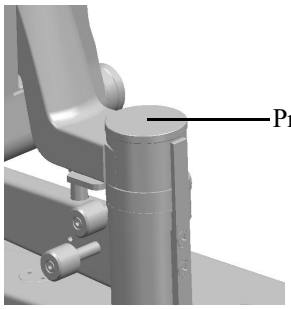


Figure5.1.1

5.2 Maintenance

5.2.1 Slit width control knob tightness adjustment

Slit width adjustment knob: 1.If the slit width control knob is adjusted too loose, the slit width may be out of control. Use a hex driver to adjust the set screw on the right knob clockwise to achieve the proper tightness.

2. Adjust the tightness as follows:

a) Use a hex driver to tight the set screw on the right knob

b) If the width adjustment knob is too loose, the set screw will rotate clockwise (as shown in Figure 5.2.1). If the width adjustment knob is too tight, rotate it in the opposite direction. Attempt several times to reach the proper tightness.

5.2.2 Illumination system tilt adjustment

If the parts of illumination system are too loose, use a hex driver to tighten the screws on both sides (see 5.2.2).

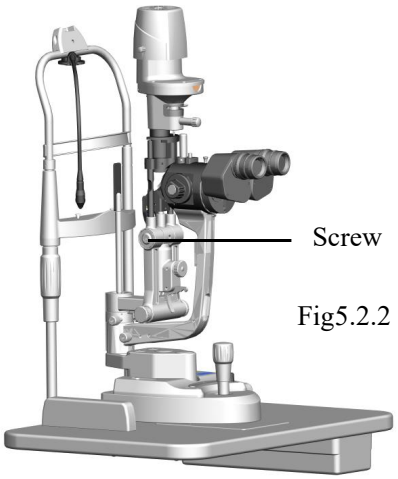
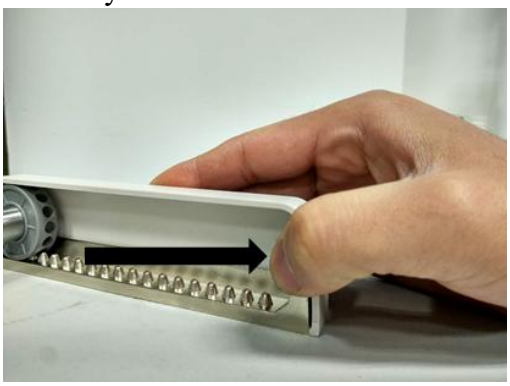


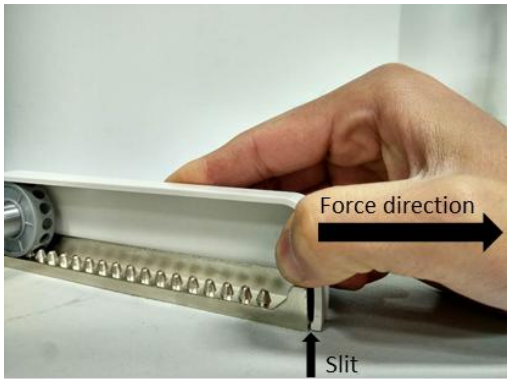
Fig5.2.2

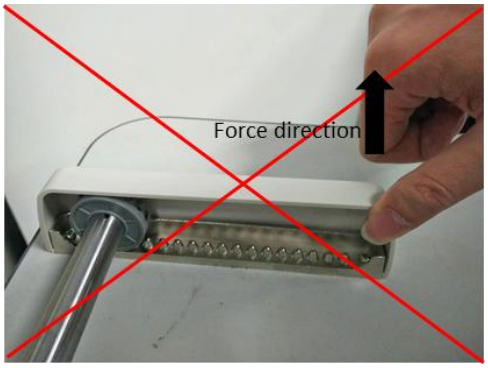
5.2.3 Rail cover removal instructions

1 Place your hand on the rail cover

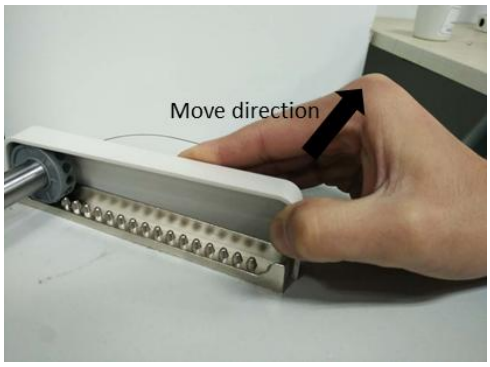


2 Pull the rail cover outwards to see an obvious gap.

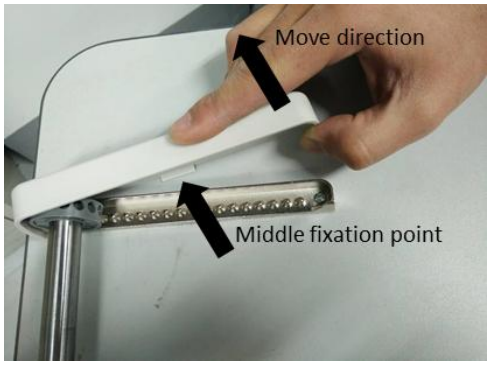




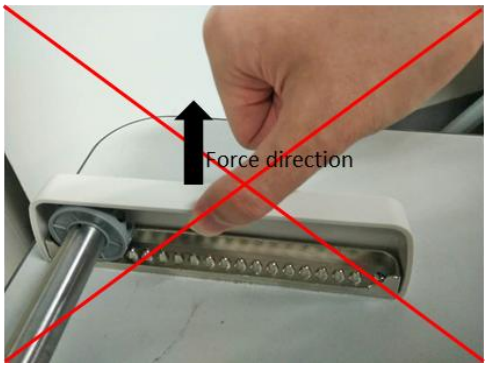
3 Move the rail cover in the direction of the arrow shown



4 If the mid cover area is detached , the disassembly is successful.



5 The false example one



6 The false example one

6 Trouble shooting

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

Error	Possible Cause	Solution
Illumination does not light	The power cord is not properly connected to the power outlet.	Connect the power cord correctly.
	The main power switch is not turned on.	Short press the switch key, the power indicator light is on.
	Loose plug on the power adapter	Tight plug on the power adapter
	The lamp cover is not aligned	Tighten the knob
	Burnt out the bulb	Switch the bulb
	Power adapter is damaged	Replace the power adapter
	The brightness adjustment knob is in the Min	Adjustment brightness adjustment knob
The slit is too dark	The reflect mirror coating is oxidized	Replace the reflect mirror
	Excessive dust on the mirror surface	Clean the surface with soft cotton
	The brightness adjustment knob position is not adjusted to the maximum.	Adjust the brightness adjustment knob.
	The filter rod is located in the first or middle position of the dimmer.	Correctly set the filter selector lever position.
The slit is automatically closed.	The slit width control button is too loose.	Adjust the tightness of the knob.
The fixation lamp does not work..	The fixation lamp plug is loose.	Tight fixed light plug.

Service Life：8 years 1

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