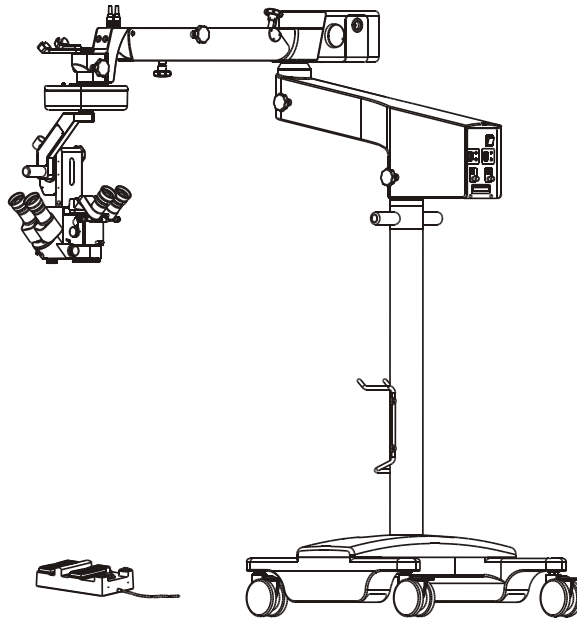


OPERATINGMICROSCOPES.COM

MODEL MS-117
OPERATING MICROSCOPE
INSTRUCTION MANUAL



Preface

Thank you for your purchasing our MS-117 Operating Microscope. Please read this manual carefully for the sake of your best use.

General Requirements for Safety

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

Precautions

1. Do not use this instrument in the environment where is prone to fire and to blast or where there is much dust and high temperature. Use it in the room and simultaneously be careful to keep it clean and dry.
2. Check that all the wires are correctly and firmly connected before use. Ensure that the instrument is well grounded.
3. Please pay attention to all the rating of the electrical connecting terminal.
4. Please only use the fuse according to the specifications and rated 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 main 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 dustproof cover 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 make contact with the authorized distributor or our After-Sales Service Department.

★ THE SAFETY MARKS USED IN THIS INSTRUMENT TERMINAL OF PROTECTIVE GROUNDING



TYPE B



ATTENTION PLEASE
REFER TO THIS
MANUAL



TERMINAL OF THE
PROTECTIVE
GROUNDING



BE CAREFUL OF
BURNS



1 Features and Specifications

1.1 Features

MS-117 Operating Microscope is an Operating Microscope for use by two persons, each using binocular vision. It ensures the same stereo effect that the doctor and the assistant observe. The main microscope has five-step magnifications and the assistant microscope has three-step magnifications. The assistant microscope can be locked at 90° to the left or the right of the main scope.

The system adopts the cold light source which won't do damages to the tissue. The illumination is sufficient and symmetrical. According to the characters of ophthalmic operation, the illumination system is equipped with retina protecting device, red reflex intensifier.

The instrument adjusting functions include magnifying, focusing, horizontally removing, pitching and inclining in which magnifying, focusing and horizontally removing can be controlled by footswitch.

This instrument is available and flexible for ophthalmic operation.

1.2 Specifications

1.2.1 Main microscope and assistant microscope

Focus of objective lens $f=200\text{mm}$

Magnification of eyepiece $12.5\times/18\text{B}$

Magnification and visual field:

Focus of the object lens (mm)	Total magnification (main)	Total magnification (assistant)	Diameter of visual field(mm)	Diameter of light spot(mm)
f200	4×		58	50
	6×	6×	38 (35)	
	10×	10×	23 (23.4)	
	16×	14×	14 (15.5)	
	25×		9	

1.2.2 Practical working distance 190mm

1.2.3 Eyepiece tube

Visual angle of eyepiece tube of main scope 45°

Visual angle of eyepiece tube of assistant lens 45°

The adjustable range of diopter	$\pm 6D$
The adjustable range of pupil distance	50mm~70mm
The height of eyepiece cover	12mm

1.2.4 Illumination

The view-field illumination is conducted by $6^\circ +0^\circ$ cold light source coaxial illumination and 20° oblique illumination. The oblique illumination can be used for slit illumination and the slit width can be adjusted.

Maximum illumination of the coaxial illumination	$\geq 50000LX$
20° oblique illumination field	$\phi 20mm$
Maximum illumination of the oblique illumination	$\geq 50000LX$

1.2.5 Position adjustment

Maximum stretch radius of microscope arm	1240mm
Vertical movement range (from floor to front surface of objective)	850mm~1350mm
Fine focusing distance	50mm
Fine focusing speed	$\leq 2mm/s$
Range of X/Y movement	50mm \times 50mm
Speed of X/Y movement	$\leq 2mm/s$

1.2.6 Electric

Input voltage	AC220V $\pm 10\%$ /50Hz $\pm 1\%$ AC110V $\pm 10\%$ / 50Hz $\pm 1\%$
Input power	330VA
Fuse tube	AC110V T6.3A AC220V 3.15A
Bulb	12V/100W cold-reflex halogen lamp
Electrical safety standard	executive standard IEC601-1, Type B, Class I

1.2.7 CCD is an optional accessory.

2 Names and Uses of Parts

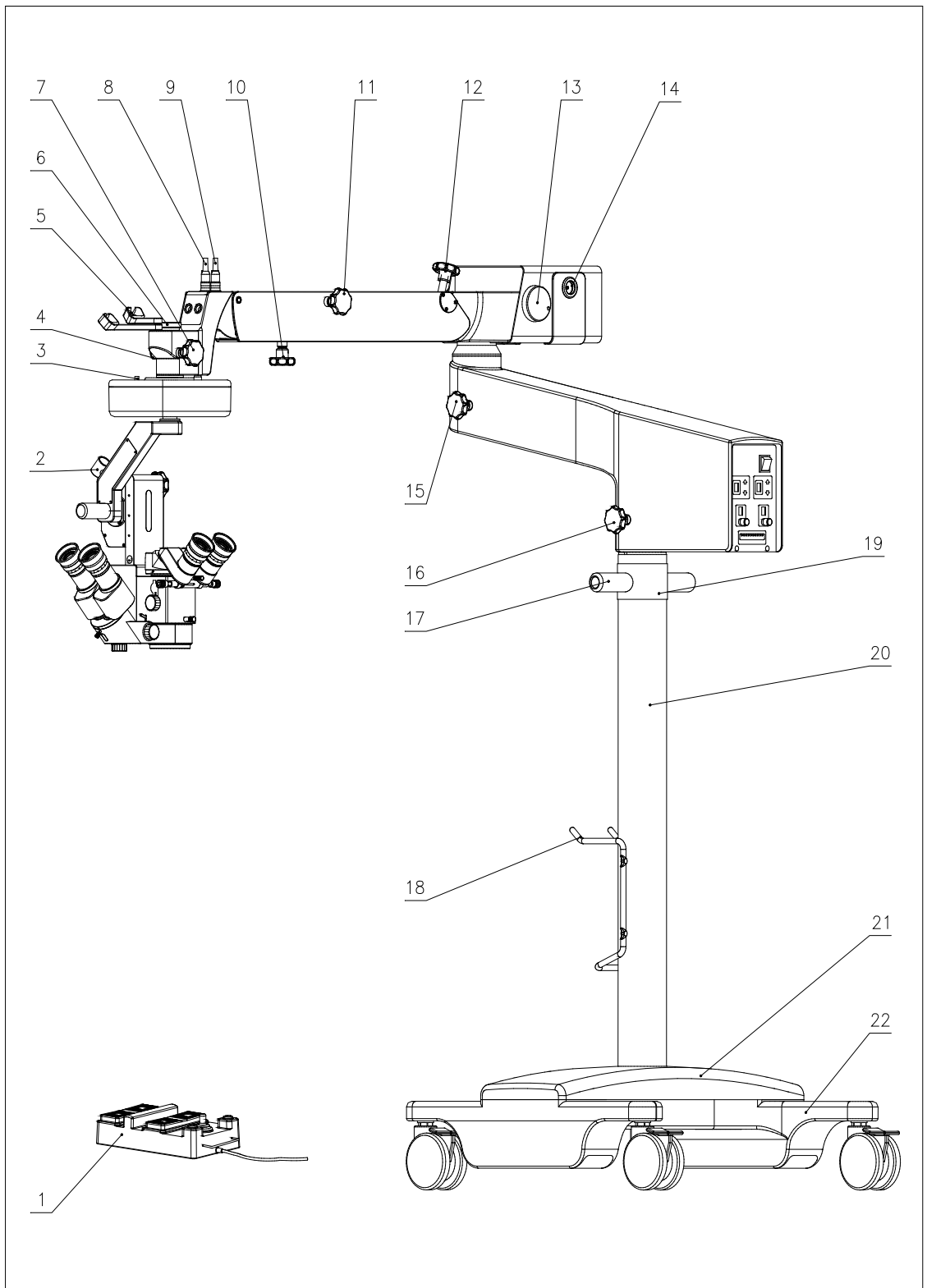


Fig.1- The Entire Fig.1

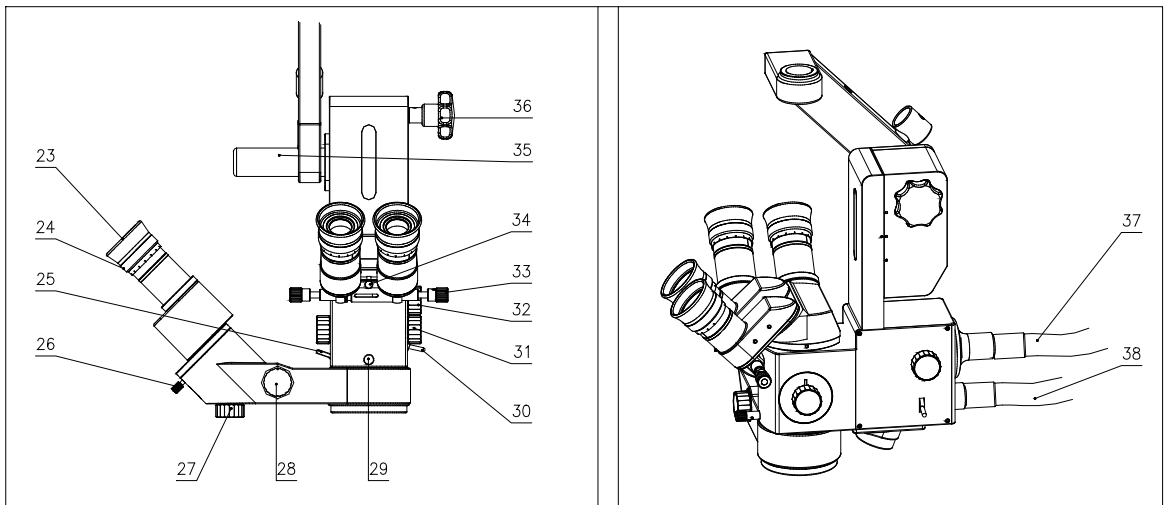


Fig.2- The Entire Fig.2

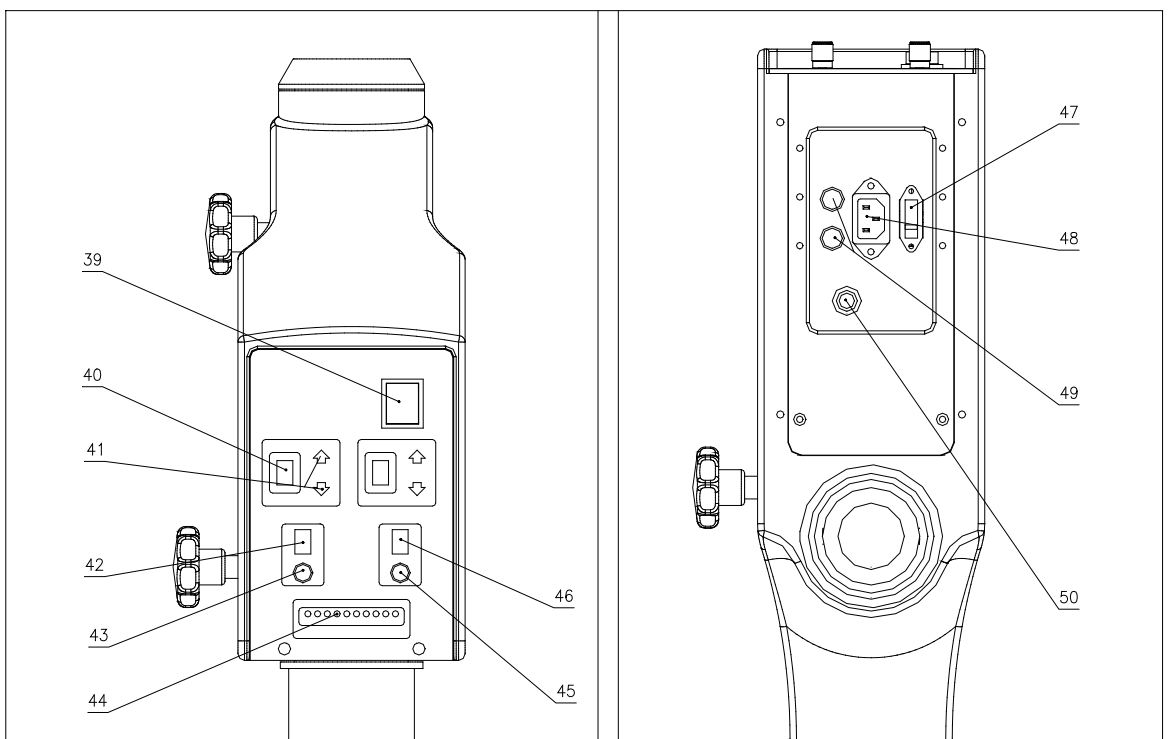


Fig.3- The Entire Fig.3

[1] footswitch

[2] jacket of fiber optics

[3] reposition button

Press the button to make the coordinate moving device return back to the center position.

[4] locking pin

Avoid the microscope falling when assembling and disassembling instrument or when the fixing screw becomes flexible.

[5] rotating connector

Lock the position of fiber optics. The fiber optics is through out of the second arm and pass the rotating connector.

[6] fixing screw

Hang the microscope on the second arm using the screw. The screw must be periodically checked even if there is locking pin[4].

[7] star locking handwheel (sterile cover)

To lock the angle between microscope with coordinate device and the suspension axle.

[8] 8 core socket

The control line connector for focusing and magnification

[9] 7 core socket

The control line connector for the coordinate device

[10] lower limit knob on the second arm

Loosen the knob to adjust the microscope position vertically to the lowest position when the second arm is falling.

[11] star handwheel fixation screw (sterile cover)

Fasten the knob clockwise to fix the second arm so that the microscope will not move vertically.

[12] balance adjusting button

Turn the knob when adding or taking off accessories to re-adjust the vertical moving balance on the second arm.



Attention: Push the second arm to the peak before adjusting the balance knob[16].

At that time the revolving resistance of the balance knob is minimum.

[13] stir handle

Stir it to switch bulb. When the normal bulb has troubles, stir the handle to spare bulb to continue the operation.

[14] side door handle

Pull it to open the side door when replacing of bulb.

[15] star handwheel fixation screw (sterile cover)

Turn the screw clockwise to fix the second arm immobile to the first arm.

[16] star handwheel fixation screw (sterile cover)

Turn the screw clockwise to fix the first arm.

[17] moving handle

Hold the handle with two hands when moving the instrument.

[18] pothook

For hanging the footswitch when moving or storing the instrument.

[19] decorative hoop

[20] column

[21] balance board

[22] base

To support and fix the column.

[23] eyecover

Used to adjust pupil distance.

[24] diopter adjustment hoop

Turn the hoop around to adjust the eyepiece diopter ranging from $-60D$ to $+60D$.

[25] locking pin lever

It is used to make the assistant microscope locked at 90° to the left or the right of the main scope. Push the lever, the assistant scope revolving in vertical at angle of $+90^\circ$. When the assistant scope has return back to the angle of 90° to the main scope, locking pin spring to orient socket and lock the assistant scope.

[26] fixation screw

For the fixation of the assistant eyepiece tube. At ordinary times, never loosen the screw to avoid the eyepiece tube falling.

[27] focusing knob of assistant eyepiece tube (sterile cover)

[28] magnifying knob of assistant eyepiece tube (sterile cover)

By turning the knob, three magnifications of assistant scope are available: 6X, 10X, 16X.

[29] coaxial illumination knob (sterile cover)

Rotate the knob to switch the 0° illumination.

[30] black dot lever (sterile cover)

There is a black dot in the light spot when pushing the lever upwards in order to protect retina.

[31] focusing knob of main eyepiece tube (sterile cover)

Five magnifications correspond with different magnifications of big object lens with different focuses. Rotating this knob could switch the main lens' magnification.

[32] adjustment knob of the slit width

Rotate this knob to adjust the oblique illumination's slit width.

[33] pupil distance adjustment knob (sterile cover)

To adjust pupil distance which can be adjusted continually from 50mm to 70mm.

[34] fixation screw of main eyepiece tube

For the fixation of the main eyepiece tube. At ordinary times, never loosen the screw to avoid the eyepiece tube falling.

[35] adjustment handle of the microscope (sterile cover)

It is used to adjust the microscope's position roughly.

[36] pitching adjusted handle (sterile cover)

Rotate this handle to make the main light axle of the microscope pitching up and down, then the observation angle will be changed.

[37] oblique illumination fiber optics (connector)

[38] coaxial illumination fiber optics (connector)

[39] power switch

[40] illumination brightness displayer

The brightness is showed by figure1~9. Great the figure is, brighter the illumination is.

[41] illuminate brightness adjustment button

Press the button to increase or decrease brightness.

[42] X-Y moving speed displayer

X-Y moving speed has 5 steps (1-5). Greater the figure is, faster the speed is.

[43] X-Y moving speed adjusting knob

To control the speed of the coordinate device moving up X or Y orient. Turn the knob clockwise, the speed is up, otherwise the speed is down.

[44] working status testing displayer

The testing displayer indicates whether chip system electrical is ok. If there is no problems, the bulb is shining in green, otherwise the bulb is shining in red. There are eight bulbs: “P” 5V power supply, “X” X coordinate of X-Y, “Y” coordinate of X-Y, “F” focus function, “Z” magnification function, “L” light source, “I” X-Y auto reposition, “II” and “III” fan. The “P” bulb is lighted in red showing the trouble in power supply system. After removing the troubles, “I”, “II” and “III” are lighted showing it works.

[45] focusing speed adjusting knob

The knob can control focusing speed.

[46] focusing speed displayer

The system has zoom magnifications with 5 steps (1-5), Each figure indicate a step. The greater the figure is, the faster the speed is.

[47] 110V/220V switch

[48] socket

[49] fuse

110V T6.3A, 220V T3.15A, for power supply

[50] footswitch socket

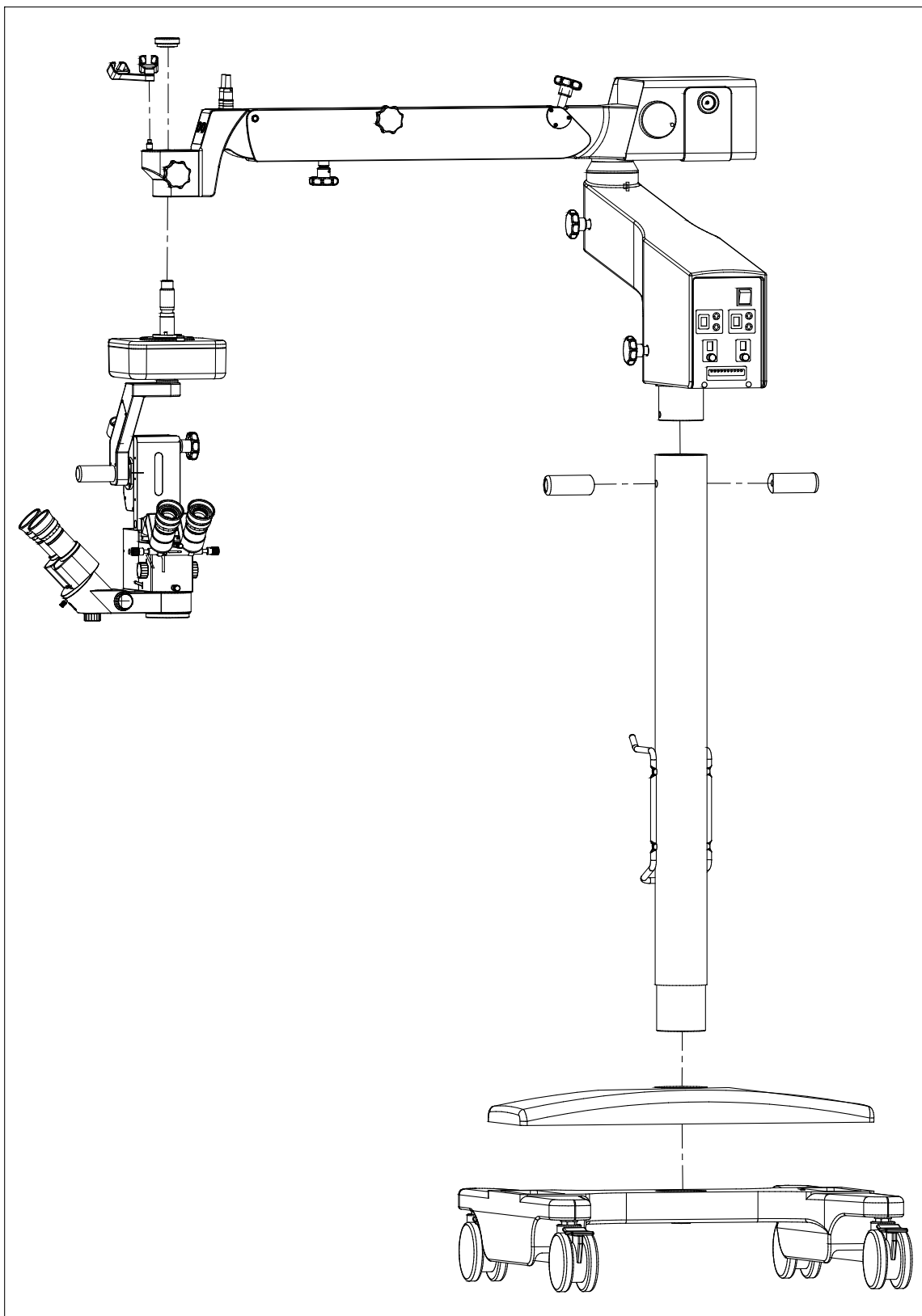


Fig.4- Disperse Fig.

3 Assembly

This equipment may be installed either by user self with reference to the manual or by the service offered by the manufacturer or authorized representatives when real difficulties come.

This equipment is packed in five packages. Please open the package in the direction indicated by the mark on the packages. Take out all the parts and assemble them according to the following procedures:

3.1 Assembly of the Base

3.1.1 Take out the base[22] from the package and lay it on the earth. Take out the balance block[21] and place it gently targeting the two Position Holes.(Attention: Hands hold at less than 35mm to the edge of the balance block.)

3.1.2 Make up the two borders and the foot-support indicated in Fig.5. Screw the hexagon screws into the six fixing holes and tighten them with the hexagon spanner. Restitute the two fixing holes' decorative covers taken off anteriorly.



Attention: At least two persons are required for this job due to the heavy weight of the base. Gentle handling is a must.

3.2 Assembly of the Column to the Base

3.2.1 Take out the column[6] from the packing case, and the contact side with the earth should be a foam pad underneath it, in order to prevent its surface painting from damaged. Remove the decorative hoop[19]. Then remove Hexagon screws from the bottom of the column with a plus spanner supplied in the package. Take off the spring washer and flat washer.

3.2.2 Insert the column into the Balance Block vertically (Notice that there is a orientation groove at the bottom of the column), and then rotate the column to insert the orientation pin into the orientation groove. Then insert the hexagon screw together with the spring washer and the flat washer from the beneath into the column. Note insert the spring washer first, then the flat washer.

3.3 Assembly of the Arm to the Column

Take out the plastic cover, the moving handle[17] and the hexagon screws. Take out the arm from the packing case and assembly it to the column, then screw down the 2 hexagon cone screws with the 4mm hexagon spanner. Assembly the decorative hoop[17], the moving handle, the hexagon screws, and screw down them with the 8mm hexagon spanner, then screw the plastic cover on the top of the column with the moving handle[19](indicated in Fig. 4).



Attention: During this course the starlike fixation wheel[16] must be inspected to see Whether it is loosen or not. Please rotate the wheel clockwise to fasten it in order to avoid the injury risk.

5.4 Assembly of the microscope main body

- 3.4.1 Loosen the starlike fixation wheel[15] counter clockwise, and then rotate the Second Arm according to the First Arm to the needed angle, then fasten the wheel[15] clockwise.
- 3.4.2 Check out whether the Block in the Axial hole on the top of the Second Arm towers is above the hole. If it towers above, just back the starlike fixation wheel[7] for a few steps, then press down the block with the finger, so that it may not tower above any more.
- 3.4.3 Rotate down the fixation screw[6] from the hanging axis of the X-Y coordinator.
- 3.4.4 Pull the plug at one end of the cord through the axis hole from bottom to top. And then pull out the security pin[4] with one hand, and insert the hanging axis of the coordinator into the axial hole with the other hand at the same time. Then release the security pin, so that the pin may spring into the groove. After that, put the fixing screw on the plug, and rotate it firmly.



Attention: For the sake of the safety, two persons are required to do this job.

- 3.4.5 Connect the 7-pin plug with the 7-pin socket[9] of the Second Arm through the control cord of the X-Y coordinator.
- 3.4.6 Connect the 8-pin plug of the holding arm with the 8-pin socket[8] of the Second Arm. Notice that the inner groove of the plug should comply with the direction of the notch of the socket edge during the connection(indicated in Fig. 4).



Attention: After the above assembly, the dynamic balance of the second arm should be adjusted. First hold the bottom of the X-Y coordinator, then loosen the starlike fixation wheel[11]. When the arm is loosened and could move up and down, push the Second Arm to the utmost peak. Now the resistance against the rotation adjustment of the balance adjustment knob[12] is the smallest.

First, rotate the balance adjustment knob[12] counter clockwise (to increase the resistance). Deploy the Second Arm horizontally, and drag the microscope up and down, and then compare the resistance between upwards moving and downwards moving. If the resistance of upwards moving is bigger, continue rotating the balance adjustment knob[12] counter clockwise. If the resistance of downwards moving is bigger, then rotate the balance adjustment knob[12] clockwise. Do this repeatedly till the resistances of upwards moving and downwards moving are almost equivalent. Then the Second Arm may stay steadily in any position of $\pm 20^\circ$ relative to horizontal line.

Attention: every time before adjusting the balance adjustment knob[12], the Second Arm should be pushed to the utmost peak in order to decrease the resistance against the rotation adjustment of the balance adjustment

knob[12].

After finishing the assembly, put through the power and check each operation function of the machine according to the user manual . If the machine cannot work normally, please first overhaul it according to 6.3 Trouble Shooting. If it still cannot work, please contact our after-sales service department.

3.5 Assembly of the fiber optics

- 3.5.1 Insert the rotation connector[5] into the hole above the top of the arm.
- 3.5.2 Insert the fiber optics into the hole of the rotation connector[8], then pull it through the protection tube[5] behind the inclination arm, then plug the fiber optics[37] into the hole[38] of the illuminator(indicated in Fig.4).

3.6 Assembly of the CCD camera (optional accessory)

The CCD camera of this instrument is an optional accessory. If you have ordered this CCD camera device when buying the microscope, you can fix it according to the following procedures.

- 3.6.1 First check the packing case for the CCD device, and it includes the spare parts and tools(indicated in Fig. 9).
- 3.6.2 Loosen the fixation screw[34] of the main eyepiece tube, and take down the main eyepiece tube.
- 3.6.3 Assemble the beam splitter to the microscope main body.
- 3.6.4 Select the right side or the left side of the main scope as the assembly position for the CCD camera just according to the actual requirements. Rotate down the dust-proof cover and place it appropriately.
- 3.6.5 Take out the CCD adapter from the package, and insert it into the beam outlet hole according to the direction displayed in the figure, then rotate the screw flange firmly.
- 3.6.6 Rotate down the original camera lens and screw flange of the CCD camera, and place them appropriately. Insert the connector for the camera head into the assembly position and fasten it.
- 3.6.7 Insert the camera head with the connector into the CCD adapter. Please make sure that the groove of the assembly surface of the connector must target the location pin of the camera head. List the nut and fasten it, then rotate the flange of the camera head.
- 3.6.8 Connect the red wire of the nude end of DC-12V with the positive terminal of the power supply of the CCD camera with a Philips screwdriver, and the black wire with the negative terminal. Connect the cord plug with the defined power supply.(Whether this procedure is needed or not depends on the CCD camera selected.)
- 3.6.9 Rotate the video wire connector around the signal output port of the CCD camera. Plug one end of the 75 Ω video wire into the video wire connector, and the other end into the monitor or the Video Import of a video recorder. Turn the power on

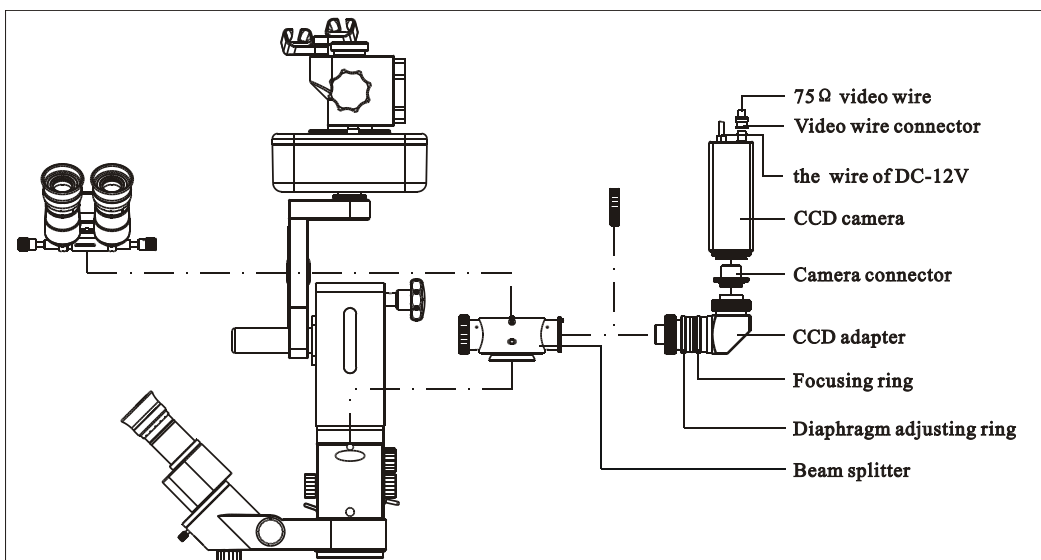


Fig.5

after the entire configuration has been correctly set. Watch the image on the monitor screen and note the direction of the image. If the image is reversed, just dismantle the CCD camera and mount it again after rotating for 180° .

3.6.10

Finally fit the eyepiece to the beam splitter(indicated in Fig. 5).



Attention: The dynamic balance of the Second Arm must be adjusted after the above assemblies.

4 Preparation before Using the Instrument

4.1

Check whether the local power voltage and frequency match the one of this instrument. If not, don't start this instrument.



Attention: Please make sure that the input voltage/frequency of this instrument comply with the local power voltage/frequency.

4.2

Check the grounding and make sure that the instrument is earthed well.

4.3

This instrument is equipped with a 3-pin power cable, and please select a suitable socket to match it.



Attention: Please use the special cable, or that complies with IEC227 standard to ensure the instrument's well grounding.

4.4

The power switch[39] on the plate has two states. 'ON' means the power is put through, and 'OFF' means the power is cut out. Before connecting the instrument's electrical wire to the electrical socket, it should be 'OFF'.

4.5

Insert the plug of the instrument into the local socket. (The electrical socket should be earthed well.) The other port should be inserted into the socket[48] below the panel.

4.6

Turn on the power switch, and the switch may give out green light. Watch the illumination light of the instrument to confirm that the instrument illuminates normally.

- 4.7 The switch on the blue plate should be turned off after the above check. Extract the plug and cover the instrument with the dust-proof shroud.

5 Use of the Instrument

5.5 Use of the Foot

Control Switch

Foot control switch indicated in Fig. 6

- 5.1.1 Connect the cable plug of the foot control switch to the socket[50] at the bottom of the column panel indicated in Fig.4). The notch of the plug should comply with the protuberant

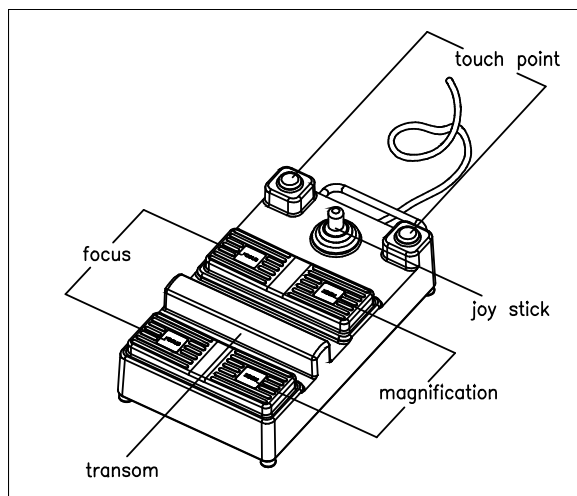


Fig.6 Foot Control Switch

- direction inside the socket. Put through the power and turn on the switch[39], then the instrument could be normally used.
- 5.1.2 When fine focusing, put the foot on the left side of the foot switch's crossbeam. Step down with the forward sole, and the microscope may move upwards; step down with the backward heel, and the microscope may move downwards.
- 5.1.3 When changing magnification of the microscope, put the foot on the right side of the foot switch's crossbeam. Step down with the forward sole, and the magnification may decrease; step down with the backward heel, and the magnification may increase. Five magnification will be changed circularly if the switch is stepped down time and again.
- 5.1.4 During the operation, if it needs to change the operation position so that it could be seen through the microscope, just adjust the X-Y coordinator's horizontal position. Manipulate the Direction stick on the foot switch with the foot, and the microscope's vision field may move relatively according to the Stick's forward, backward, right, left forward, right forward, left backward, right backward movements. The directions of vision field movement and Stick's movement are the same.
- 5.1.5 The antennas on the two sides of the front of the foot switch are used to control the coaxial illumination and the oblique illumination. The left antenna is used to control the coaxial illumination, step once the antenna and the coaxial illumination may be shut off, step again and the coaxial illumination may be restarted. The right antenna is used to control the oblique illumination, and the control methods are the same as the left one.

5.2 Setting and Adjustment before Using

5.2.1 Adjusting the balance of the 2nd arm. Unscrew the star handwheel fixation screw[12] on the arm. If the Arm may rebound upwards, then rotate the balance adjustment knob[13] clockwise to increase the upward resistance. If the Arm descends, then rotate the balance adjustment knob[13] counter clockwise to increase the downwards to resistance until the upwards resistance and downwards on are almost equivalent. After finishing the balance adjustment of the Second Arm, the microscope could stay steadily at any rough focusing position within $\pm 20^\circ$ relating to the horizontal line.

5.2.2 According to the height of the operation surface and the operation needs, the lowest position of the microscope's vertical movement could be adjusted to prevent the microscope from unexpected falling and causing medical accident. When adjusting, just loosen the lower-limit fixation wheel[10] of the Second Arm, and rotate the wheel counter clockwise, then adjust the microscope to the needed position, and finally fasten the wheel clockwise.

5.2.3 Put through the power, and check whether the bulb has been burned bad.



Attention: The invalid bulb must be replaced before operation to ensure the later operation may go on smoothly.

5.2.4 All the sterile cover must be sterilized before use.

5.2.5 Set the position of the assistant scope . The assistant scope can be placed either at the left side or right side of the main microscope(indicated in Fig.7). If you want to change the position of the assistant scope , first press the locking pin lever [25] downwards, then rotate the assistant scope. Release the locking pin lever after the assistant scope moves a small angle and continue to rotate the assistant scope until the locking pin clicks into the locating.

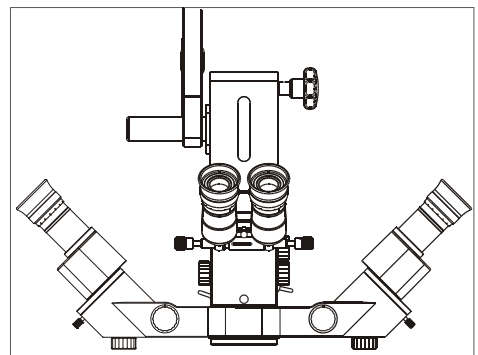


Fig.7 adjustment of the assistant lens

5.3 Adjustment during Using

5.3.1 Move the instrument to a proper place. Stamp the two brakes to avoid possible slipping.

5.3.2 Move the foot control switch[1] to a proper place. Connect the cable plug of the foot control switch to the socket at the bottom of the column panel.

5.3.3 Insert the power supply wire plug on the panel of column into the power socket, then turn on the power switch[39].

- 5.3.4 Press the reposition button [3] on the coordinate device to make the adjustment be original position.
- 5.3.5 Loosen the star fixation screws [7], [15], [16] and star locking handwheel [11], then hold the adjustment handle of the microscope[35] and pitching adjusted handle[36] to control microscope to make the operation position be in the center of the light spot. Adjust the illuminate brightness increasing button[41] to get the suited brightness. The image will be clear with 10 magnification.
- 5.3.6 Adjust the eye-cover [23] height. It can reduce the outside light's interferer to the observation. Limit the height 18mm. If the doctor operates with his glasses, convolve the eye-covers[23] and set them on the lens.
- 5.3.7 Adjust the diopter. The eyepiece diopter must be adjusted so that the image is clear both through the main and assistant microscope. The unit of the diopter adjustment hoop[24] is "1D" and the adjustable scope is $\pm 6D$. When adjusting, turn the diopter adjustment hoop to the white mark agreeing with the doctor's diopter. If the doctor does the operation with glasses, he could adjust the diopter to the mark "0" because the glasses have calibrated his diopter. After the diopter having been adjusted, fasten the roller fixation screw to avoid possible change. If the assistance still feels the image not clear, continue to adjust the diopter of assistant lens. You can adjust the focusing knob of assistant eyepiece tube (sterile cover)[27] until it is clear.
- 5.3.8 Adjust the pupil distance. While adjusting the pupil distance of main microscope, turn the pupil distance adjustment knob[33] until you can observe correctly and posses the stereoscopic vision. While adjusting the pupil distance of assistant microscope, hold the assistant eyepiece tube and pull it. If the figure of doctor's pupil distance has been know, adjust the pupil distance to the figure directly.



Attention: All above should be done before sterilization.

- 5.3.9 Equip the sterile covers at the following parts:
- | | |
|--|--|
| focusing knob of assistant eyepiece tube[27] | magnifying knob of assistant eyepiece tube[28] |
| coaxial illumination knob[29] | black dot lever[30] |
| focusing knob of main eyepiece tube[31] | adjustment knob of the slit width[32] |
| pupil distance adjustment knob[33] | adjustment handle of the microscope[35] |
| pitching adjusted handle[36] | star locking handwheel[7], [11], [15], [16] |



Attention: Cover the microscope lens with one-off covers according to the doctor's request. Then tow the microscope to make the operation position be at the center of light spot.

- 5.3.10 Adjustment of the microscope illumination and the observation direction
- During operation, push the black dot lever [30] down in order to protect retina from being burned by strong light. At that time, a black dot appears in the center of light spot to keep from parts of light coming into pupil. Pull the lever up, the

black dot moves away at once.

- 5.3.11 To change the observation direction during the operation, rotate the pitching adjusted handle[36] to make an angle of the microscope's light-axis prone or supine. Rotating it clockwise is prone(the visual field is close to your body), and rotating it withershins is supine(the visual field is removed).
- 5.3.12 Adjust the focusing. Hold the adjustment handwheel of the microscope[35], the pitching adjusted handle[36]. Draw the microscope to focus roughly. Then focus fine with the foot control switch. Indicated in 5.1.2.
- 5.3.13 Assemble the CCD according to the above-mentioned process if it is needed. The CCD device is indicated in Fig.5.

The image in the monitor is not clear maybe, so rotate the focusing loop of the CCD tie-in. If the image is too bright or dark, adjust the aperture adjustment loop of the CCD tie-in. Adjust the focusing loop and the aperture adjustment loop time and again till the best image.



Attention: In case of one of the bulbs are burned off in operation, adjust the side door handle[14] to change the fibers optic to spare bulbs, so that assure the continua of operation.

5.4 Removing and storing after using

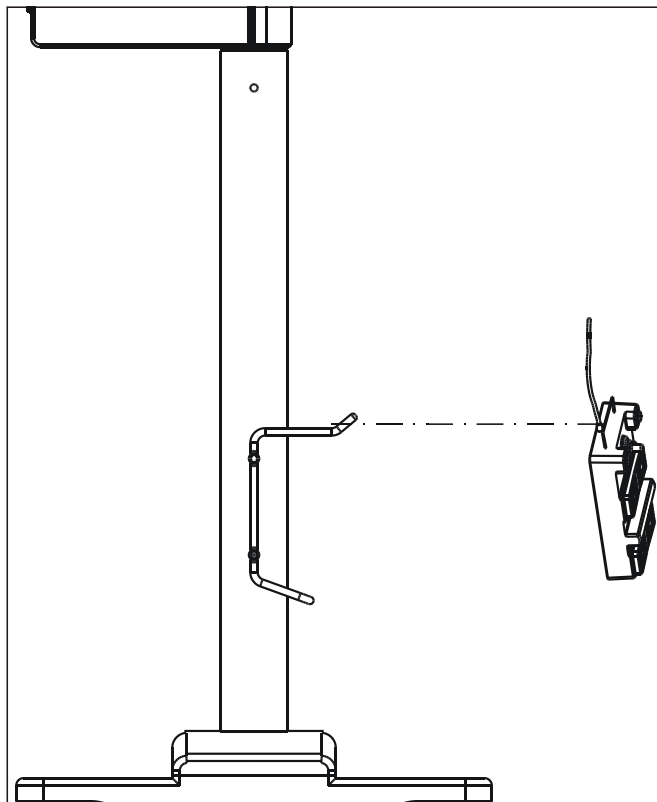


Fig.8- Storing of the Foot Control Switch and the Power Supply Wires

- 5.4.1 Put the microscope in the nearest place from column. Fasten every star fixation screw to make stretch arm and microscope fixed.
- 5.4.2 Pull out the power plug and wind the power supply wire round the pothook[18].
- 5.4.3 Hang the foot control switch[1] on the foot control hitching nail[18].
- 5.4.4 Before moving, release the brake to make the four wheels be rotated.
- 5.4.5 While moving the instrument, hold the movement handles[8] and make the instrument move slowly and carefully to avoid falling and bumping.
- 5.4.6 Take off all sterile covers and handles to be sterilized for next operation.
- 5.4.7 Replace the burned bulb for next operation(indicated in 6.1.1).

6 Maintenance

6.1 Replacement of Brittle



Attention: The waste products are dealt as general dust.

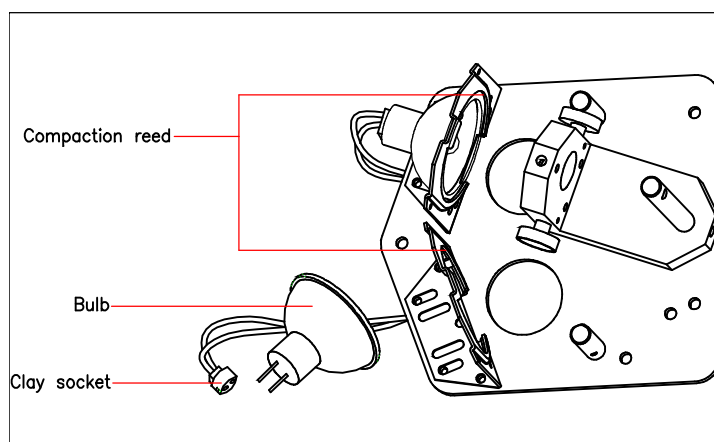


Fig.9- Replacement of the Bulb

- 6.1.1 Replacement of spare bulb.
The disabled bulb should be replaced in time.
- 6.1.1.1 Stir the stir handle[13], and switch to spare bulb and make sure the continua of operation.
- 6.1.1.2 Open the side door by the side door handle[14]. Take out of the bulb with clay socket from two compaction reeds, and pull out clay socket. Then replace the new bulb by the contrary steps.



Attention: Use the special bulbs for this instrument.

- 6.1.2 Replacement of fuse tube



Attention: Please use the fuses which have the same type, specification and rating. For the sake of safety, turn off the power switch and pull out the power input line before replacing fuses.

6.2 Cleaning and Antisepsis

After the instrument had been examined and up to standard, the instrument must be maintained carefully. Unskilled or unqualified users who are not familiar with the structure and function of the instrument can not disassemble it, otherwise the instrument may be damaged and the quality will not be assured. We suggest the cleaning-period be once three months or according to requirements.

- 6.2.1 After the instrument had been examined and up to standard, the instrument must be maintained carefully. Unskilled or unqualified users who are not familiar with the structure and function of the instrument should not disassemble it. Otherwise the instrument may be damaged and the quality will not be assured.
- 6.2.2 The instrument should not be placed in a dusty, moist or corrosive environment.
- 6.2.3 Every lens should not be disassembled. If there are dusts stained on the lens, blow them with a globe or wipe off them with a dust pen. Creasy or water stains can be cleaned with lens cleaning-paper or liquid solvent (1:1 mixture of alcohol and ether). Be careful to prevent the solvent from infiltrating the edges of lens.
- 6.2.4 The surface can be cleaned by the waterish cloth. Wipe off the hangover with the 50% ethanol and 50% distilled water mixed liquid. Do not use the caustic cleanser.
- 6.2.5 The eyecover can be taken off and cleaned with water. Set it back when it is dry.
- 6.2.6 All the sterile covers must be disinfected in the autoclave. The commendatory temperature and time: 120°C, 20minutes 134°C, 5minutes
- 6.2.7 The temporarily needless accessories should be disassembled and put in a closet box packed with moisture-absorber.

6.3 General Guide of Removing Trouble

Phenomena of faults	Probable reason	Guide of removing
The bulb doesn't take effect.	The connection between power lines is not good.	Re-connect the power lines.
	Don't adjust the illumination adjustment knob after turning on the power switch.	Adjust the illumination adjustment knob.
	The plug and the socket of bulb are not well connected.	Take off the bulb. Shave the oxide layer and reassemble the bulb.
	The bulb has been turned off (input voltage exceeds 220V). The fuse tube has been melted.	Replacement of the bulb (input voltage level off to 220V). Replacement of the fuse tube.

Light spot is too dim or not even.	The round lamp base was not turned to its limit.	Turn the base to its limit
	Fiber optics was not inserted to the root.	Insert the fiber optics to its root.
The main microscope and the assistant's have not the same focus.	The diopter was not adjusted.	Adjust the diopter of the main microscope and the assistant's.
The footswitch doesn't take effect.	The plug on footswitch and the socket on column are not good connected or the two groups of connecting parts on the second arm are not good connected.	Re-connect them.
The second arm is obstructed when making movement downwards.	Limited by limiting slide board	Re-adjust the low limit handle.
The macula is not in the center of visual field.	The macula patch rotating knob[30] is not turned to its limit.	Rotate the macula patch rotating knob[30] clockwise downright.

6.4 Ordering the Brittle

MS-117 Operating Microscope	Name	Specification	Recommended type and producer
	Cold Reflexion Halogen lamp	AC12V/100W	HLX64627 (OSRAM)
	Fuse tube	AC110V T6.3A AC220V T3.15A	51S-063H 51S-032H (HOLLYLAND CO.,LTD.)

7 Responsibility

According to users' requirements for service, we can provide the circuit diagram and the list of the electric element, etc..

If you need some correlative datum, respective service or you have questions, please contact with us or the dealer authorized.

8 Transport and Storing

During transportation, the relative humidity varies from 10% to 90%, surrounding temperature varies from -10°C to +40°C and atmospheric pressure varies from 500hPa to 1060hPa, dampproof, no conversion, no great shakings.

This instrument should be reserved in the room where relative humidity varies from 10% to 90%, surrounding temperature varies from -10°C to +40°C and atmospheric pressure various from 500hPa to 1060hPa, no caustic gas and drafty.

Fasten all moveable parts during shot-distance moving and the instrument cannot be

inclined exceeding 10°(indicated in 5.4). If long-distance movement is needed, please move it after re-packing.

If the reservation duration has been over 5 years, please contact with us or the dealer authorized.

Rejection of the instrument should be dealt with according to environments protecting law. Please don't pollute environments.

9 Spare Accessories and Tools

1	cold reflexation halogen bulbs(12V100W)	2pcs
2	sterile covers for fixation handwheel	5pcs
3	sterile covers for pupil distance adjustment knob	2pcs
4	sterile covers for magnification knob of main microscope	2pcs
5	sterile covers for magnification knob of assistant microscope	2pcs
6	sterile covers for focusing knob of assistant eyepiece tube	1pc
7	sterile covers for adjustment knob of the slit width	1pc
8	sterile covers for coaxial illumination knob	1pc
9	sterile covers for black dot lever	1pc
10	sterile covers for adjustment handle of the microscope	1pc
11	dust pen	1pc
12	fuse tubes 110V T6. 3A	4pcs
	fuse tubes 220V T3. 15A	4pcs
13	M4 inner hexagram screw driver	1pc
14	M8 inner hexagram screw driver	1pc
15	M20 hexagram screw driver	1pc
16	P54M bulb socket	2pcs

The camera package includes the following components:

17	CCD	1pc
18	CCD adapter	1pc
19	connector for the camera	1pc
20	wire of DC-12V	1pc
21	beam splitter	1pc
22	75 ohm video frequency line	1pc
23	video frequency line adapter	1pc
24	cross-groove screw tool	1pc