Version No.: V2.0

BestScope

BS-2091 Series Inverted Biological Microscope Instructon Manual

This instruction manual is for the operation guide, troubleshooting and maintenance to BS-2091 series inverted biological microscope. Please study this manual thoroughly before operating, and keep it with the instrument. The manufacturer reserves the rights to the modifications by technology development. On the basis of operation ensured, technical specifications may be subject to changes without notice.

Contents *BS-2091 Series*

Before Use *BS-2091 Series*

1. Operation Notice

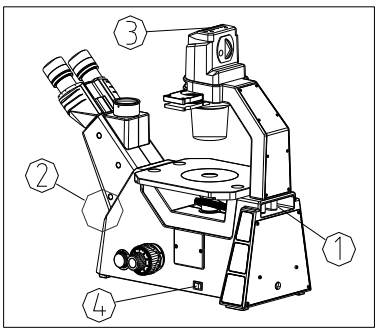


Fig. 1

1. As the microscope is a high precision instrument, always operate it with care, and avoid physical shake during the operation.
2. Do not expose the microscope in the sun directly, either not in the high temperature, damp, dust or acute shake. Make sure the worktable is flat and horizontal.
Following environment is required when operating: Indoor temperature: 5℃～40℃, Max relative humidity: 80%.
3. When moving the microscope, use one hand to hold the gap① of the microscope back and the other hand to hold the low side② of the front observation tube. (See the Fig. 1)
★ It will damage the microscope by holding the stage, focusing knob, head or light source when moving.
4. When working, make sure there is enough room for the heat dissipating around the light source housing③ (especially the above). (See the Fig. 1)
5. Fluorescence microscope should be used under dark environment.
★In order to protect eyes, do not stare at fluorescence light directly.
6. Fluorescence sample will be faded by ultraviolet radiation, so it can not for long time save. Do not expose the sample under fluorescence light for long time, or it will be quenched.
7. For safety, make sure the power switch④ is at "OFF" and power it off, waiting for the bulb fully cooling down before replacing the LED. (See Fig.1)
★Bulb selected only:
Transmitted lighting: Single 5W LED (class 3B);
Reflection LED fluorescence lighting: Single 3W LED/5W LED (class 3B).
8. Connect the microscope to the ground to avoid lightning strike.
9. External power adapter is used. Wide voltage range is supported as 100~240V AC.
10. Use the special wire supplied by our company.

2. Maintenance

1. Wipe the lens gently with a soft lens tissue. Carefully wipe off oil or fingerprints with tissue moistened with a little of 3:7 mixture of alcohol and ether or dimethylbenzene.
★Alcohol and ether is flammable. Don't place these chemicals near to fire or fire source. Please use them in a ventilated place when turning on/off the electric device.
2. Do not use organic solution to wipe the surface of other components. Please use the neutral

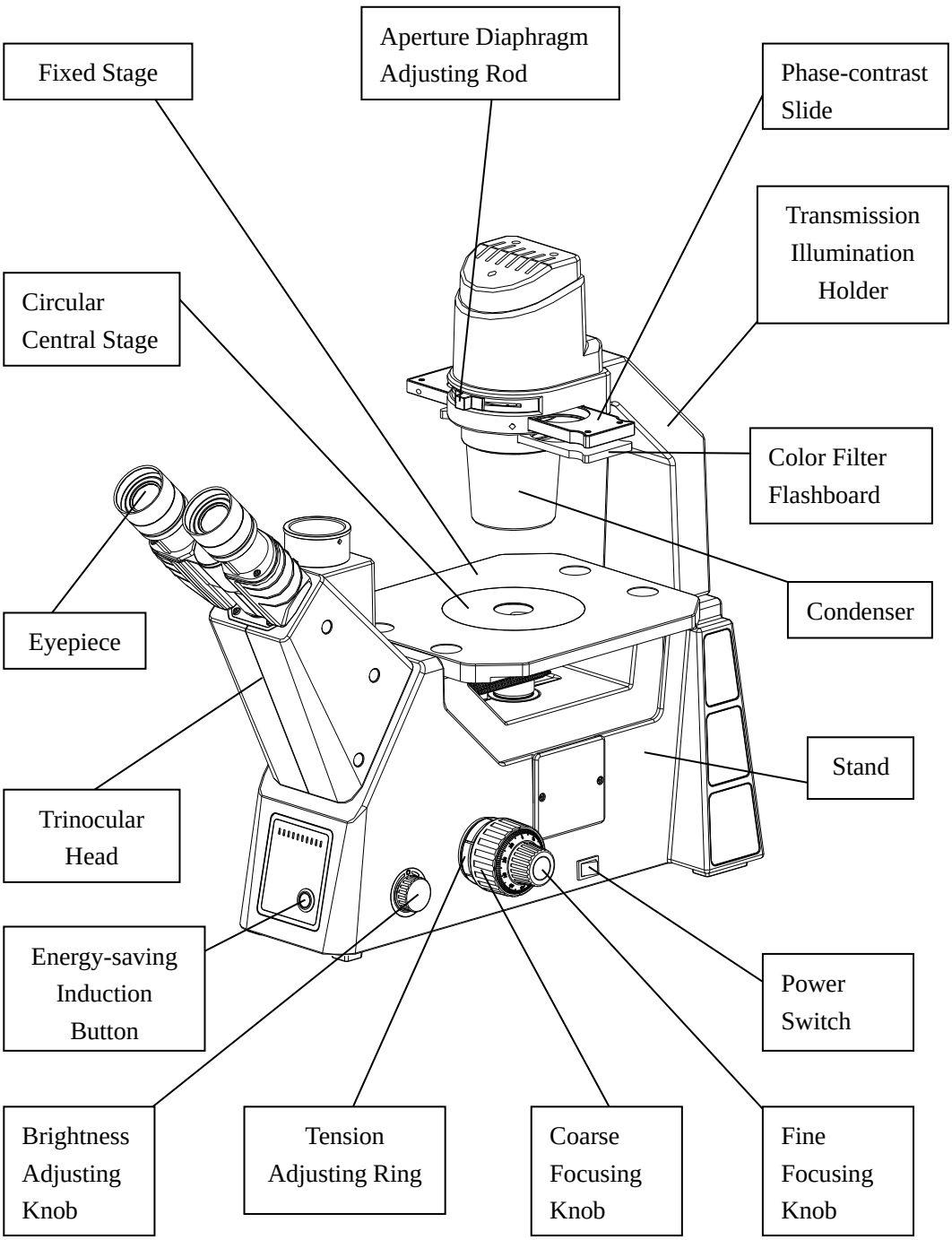
detergent if necessary.
3. If the microscope is damped by the liquid, cut off the power immediately and wipe it dry.
4. Never disassemble the microscope. Otherwise, it will influence its function or damage it.
5. After using, cover the microscope with a dust cover.

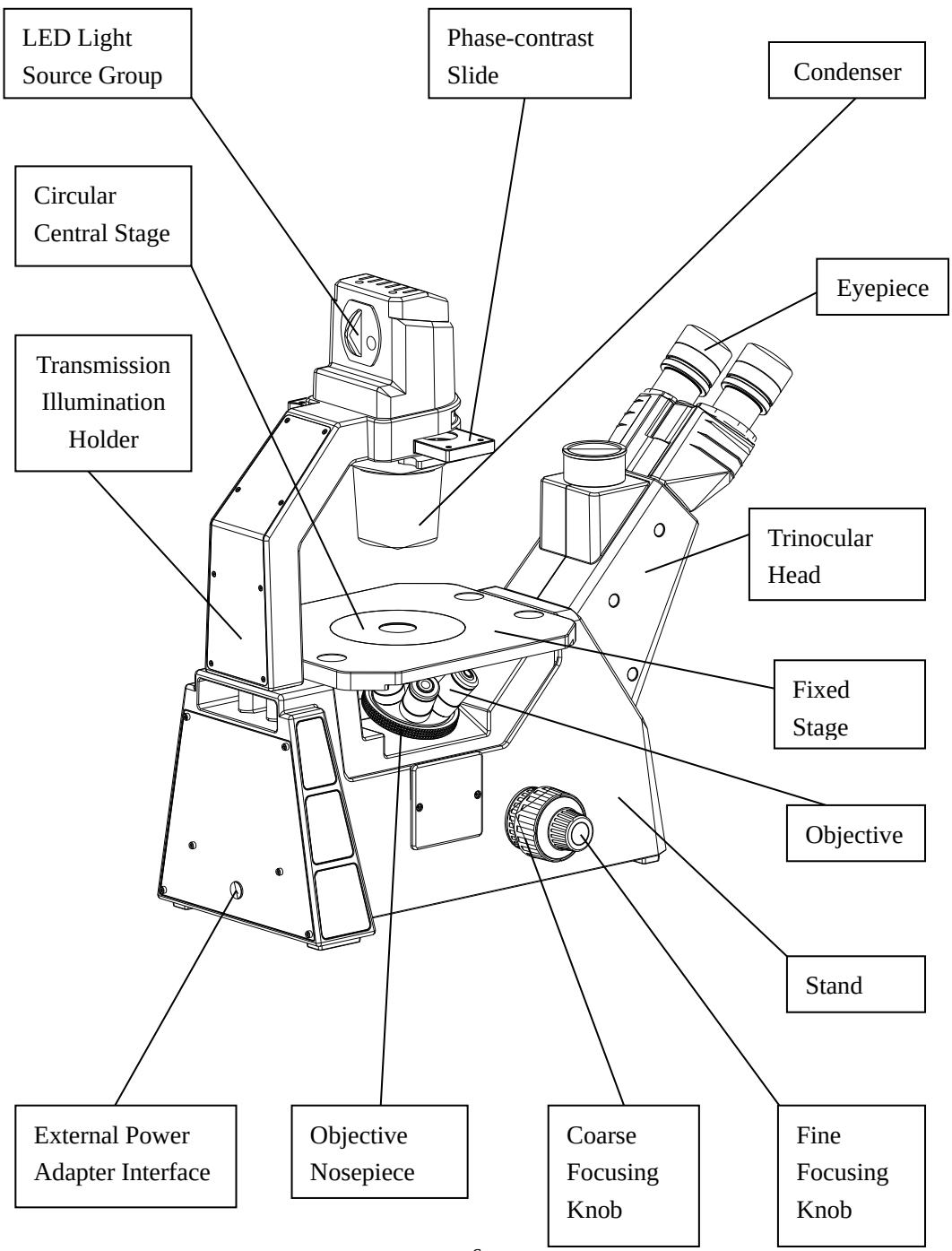
3. Safety Sign

Sign	Signification
	The surface gets hot and don't touch it with bare hand.
	Study the instructions before use. Unsuitable operation would lead to person hurt or instrument faulty.
I	Main switch ON
O	Main switch OFF

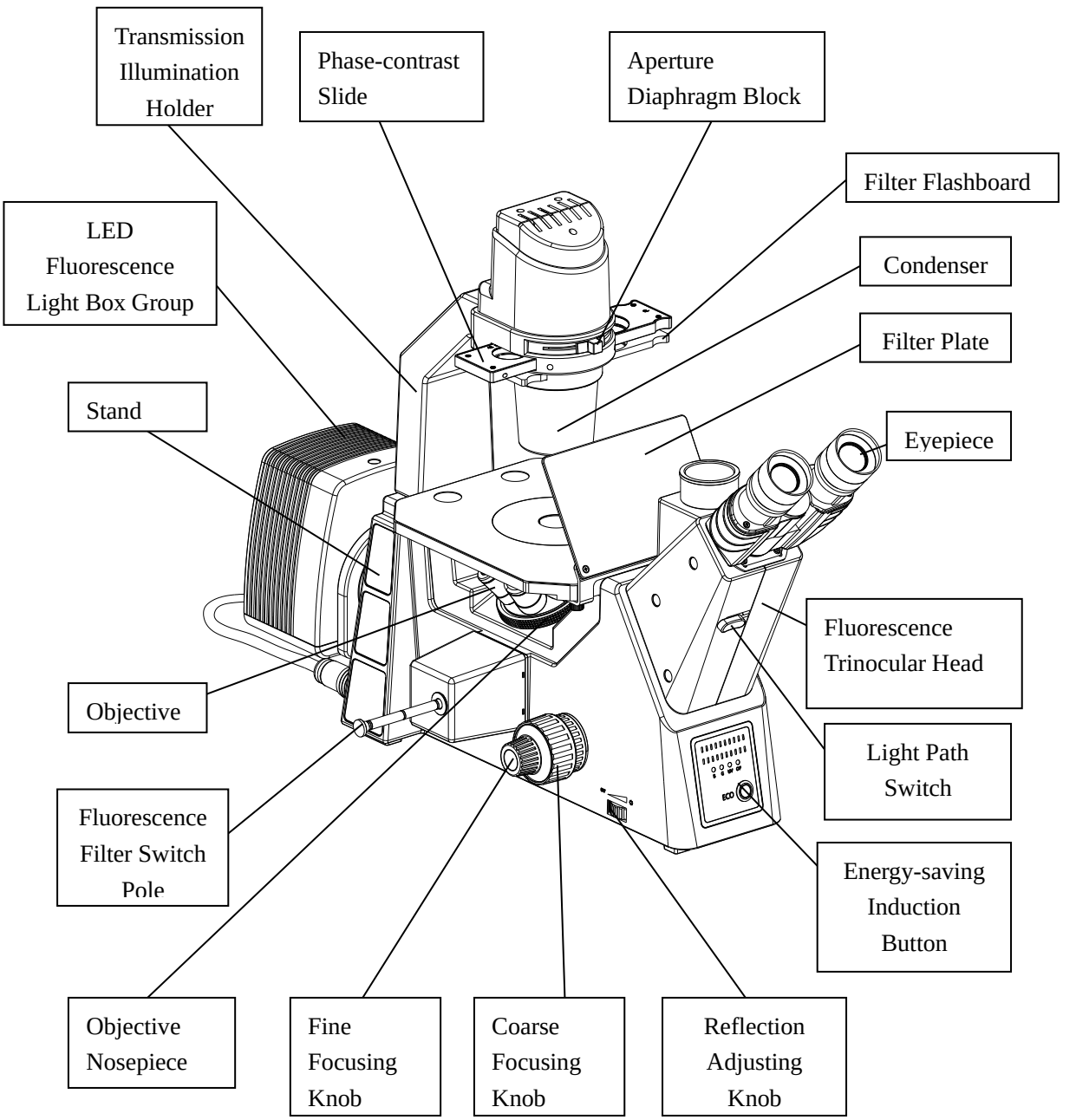
1. Components *BS-2091 Series*

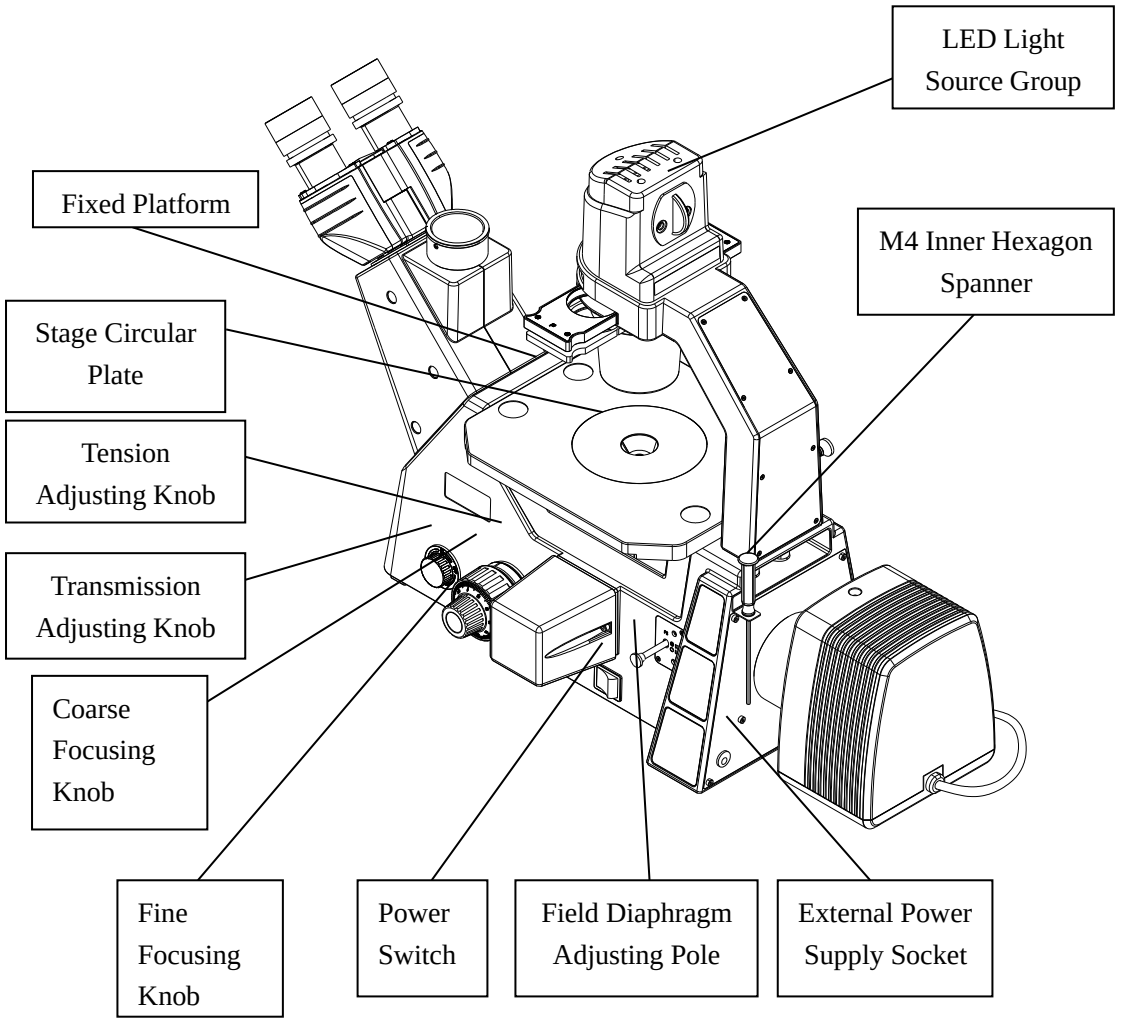
BS-2091 Biological Microscope




LED Light Source Group
Phase-contrast Slide
Condenser
Circular Central Stage
Eyepiece
Transmission Illumination Holder
Trinocular Head
Fixed Stage
Objective
Stand
External Power Adapter Interface
Objective Nosepiece
Coarse Focusing Knob
Fine Focusing Knob

BS-2091 Biological Microscope (LED Fluorescence Model)




LED Light Source Group
Fixed Platform
M4 Inner Hexagon Spanner
Stage Circular Plate
Tension Adjusting Knob
Transmission Adjusting Knob
Coarse Focusing Knob
Fine Focusing Knob
Power Switch
Field Diaphragm Adjusting Pole
External Power Supply Socket

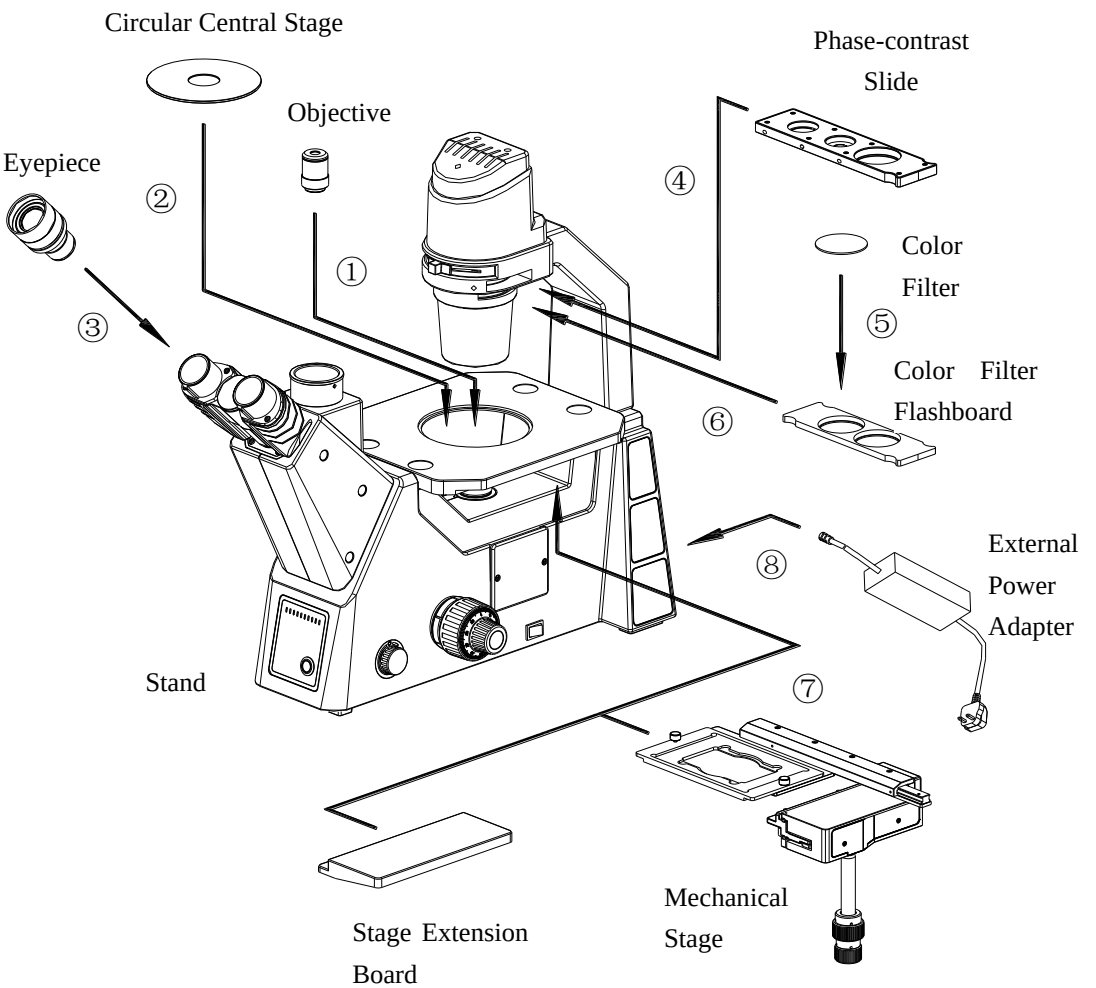
2. Assembling *BS-2091 Series*

2-1 *Assembling Scheme*

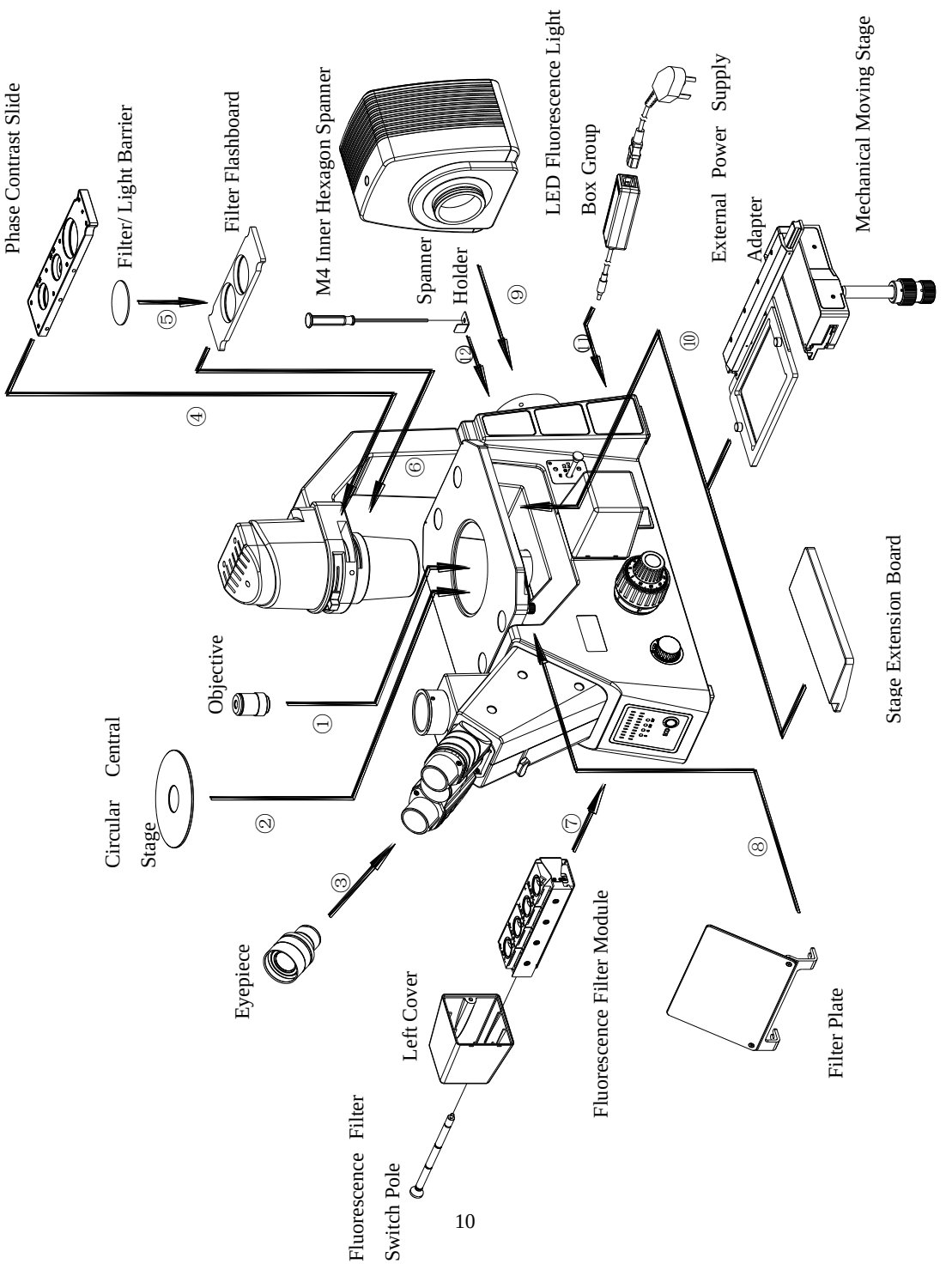
Following is the Assembling Scheme to describe how to assemble the components, and the numbers denote the assembling order.

★ Before assembling, make sure there is no dust, dirt or other materials which will disturb it. Assemble carefully and do not scrap any part or touch the glass surface.

★ Preserve the hexagon spanner, and it will be used when changing the parts.



1. Assembling Scheme of BS-2091 Biological Microscope (LED Fluorescence Model)



2-2 *Assembling Steps*

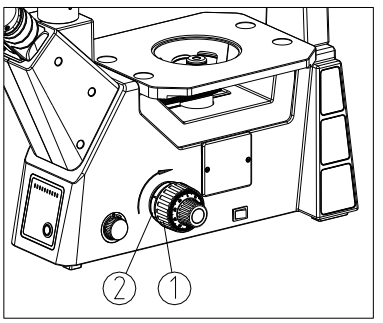


Fig. 2

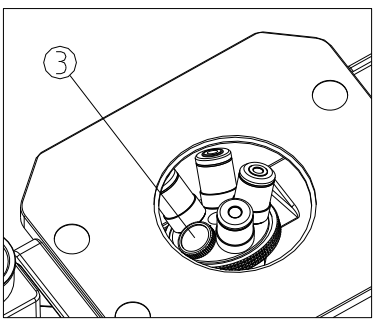


Fig. 3

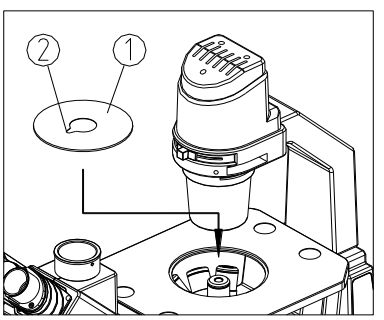


Fig. 4

2-2-1 *Assemble the Objective*

(1) Rotate the coarse focusing knob① as the direction shown in the figure, until the nosepiece is in the low-limit location (See Fig.2).

★ The nosepiece is set to the lowest location when leaving factory, to ensure the instrument to be safe in transportation. Please turn the coarse adjustment ring② to the proper tension.

(2) Install the objective into the microscope nosepiece from the lowest magnification to the highest in a clockwise direction from the left side.

★ It is easy for changing magnification in this way.

★ It can also be assembled through the aperture of the stage.

★ Clean the objectives periodically, since the inverted microscope objective is very sensitive.

★ Cover all the holes with the dust cap③ to avoid the dust and dirt entering. (See Fig.3)

★ Search and focus the sample by low magnification objective(4X or 10X) when operating. Then get change to the high magnification ones according to the observation requirements.

★ When replacing the objective, rotate the nosepiece until it sounds "ka-da", to make sure the objective is in the center of the light path.

2-2-2 *Assemble the Circular Central Stage*

(1) Assemble the metal stage① on the stage aperture. (See Fig.4)

(2) Turn the metal stage to face the V groove② to the user, so that it is easy to check the objective.

(3) When using the glass stage, just lay it down flat. There is no special requirement for direction.

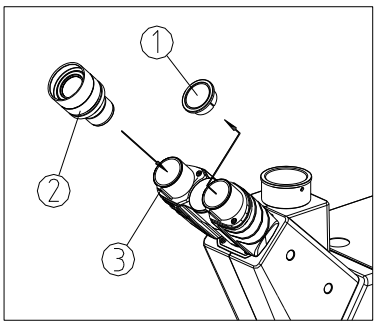


Fig. 5

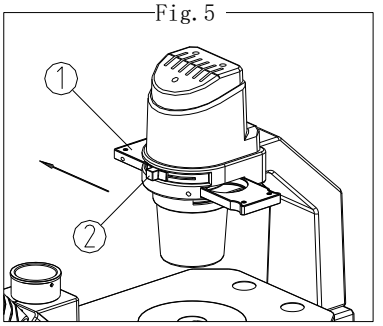


Fig. 6

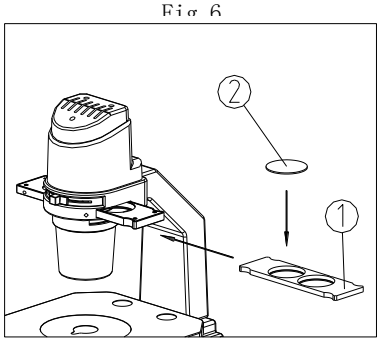


Fig. 7

2-2-3 ***Assemble the Eyepiece***

(1) Take down the eyepiece tube cover①. (See Fig.5)

(2) Insert the eyepiece② into the eyepiece tube, until it touches the surface.

(3) When using the adjustable eyepiece to adjust the diopter, lock the eyepiece② by the inner hexagon lock-screw③ to avoid its rotating.

2-2-4 ***Assemble the Phase-contrast Slide***

(1) Place the phase-contrast slide① upward (with letters upward), insert it into the illumination holder from right to left. (See Fig.6)

(2) Each diaphragm has its corresponding fixed position. Enter the diaphragm into optical way by shifting the phase-contrast until a sound of "kada" is heard.

(3) Keep the aperture diaphragm adjusting rod② in position "o"(max) when doing the phase-contrast observation.

2-2-5 ***Assemble the Color Filter (For Transmission Illumination)***

Pull out the install hole of the color filter flashboard① when assembling the color filter.

Or pull out the whole color filter flashboard, and put the color filter② into the install hole of the color filter flashboard① as shown in the figure, making it be horizontal in the bottom with no decline. Then insert the color filter flashboard into the color filter slot of the illumination holder. (See Fig.7)

The color filters can be overlapped on the flashboard. Multi-filters can be installed according to the requirement, as long as the total thickness does not exceed 4.5mm.

★ For reflex observation of LED fluorescence model, replace the filter② with the light barrier, in order to keep out the stray light.

2-2-6 ***Assemble the Stage Extension Board/ Attachable Mechanical Stage***

Stage extension board can be assembled on either left or right side to extend the work stage. But the stage extension board and the attachable mechanical stage can't be used at the same side.

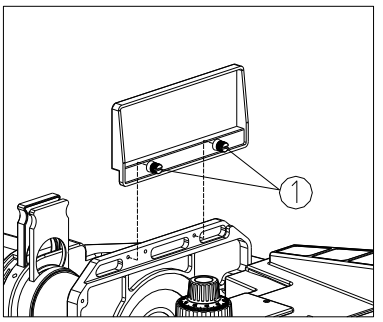


Fig. 8

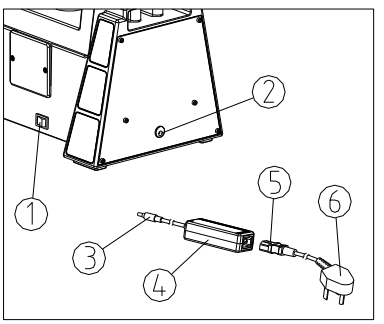


Fig. 9

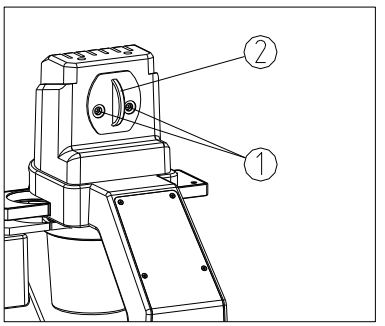


Fig. 10

The attachable mechanical stage is usually assembled on the right side, where is more comfortable for adjusting.

(1) Assemble the stage extension board

Screw down the lock-screw① on the stage extension board, then screw it on the horizontal stage from the right or left bottom, and use small tools like coins to screw it down until the board is fixed firmly.(See Fig.8)

(2) Assemble the attachable mechanical stage

Follow the guide of *Assemble the stage extension board*.

2-2-7 *Connect Power Cord*

(1) Make sure the main power switch① is at "O" (OFF) before connect the power cord. (See Fig.9)

(2) Insert the plug③ of external power supply④ into power supply socket②, and make sure it is connected well.

(3) Insert the plug⑤ of the power cord into power supply socket of external power supply④, and make sure it is connected well.

(4) Insert the plug⑥ of the power cord into power supply socket, and make sure it is connected well.

★ Don't use strong force when the power cord is bended or twisted, otherwise it will be damaged.

★ Use the special wire supplied by our company. If it's lost or damaged, choose one with the same specifications.

2-2-8 *Replacing the Bulb*

(1) Screw out the screw① with hexagon spanner and pull out the light source group② from the microscope, replace the LED or the whole light source group②. (See Fig.10)

★ Replacing the bulb when using or after using: When using or just after using, the bulb, bulb holder surface and all around will be very hot. Turn the main switch to "OFF", and pull out the power cord from the outlet. Before replacing, wait until the LED, LED holder and all around cools down.

★ Bulb selected only: Single 5W LED (class 3B).

3. Adjustment Device

3-1 *Set Illumination（for Transmission Illumination）*

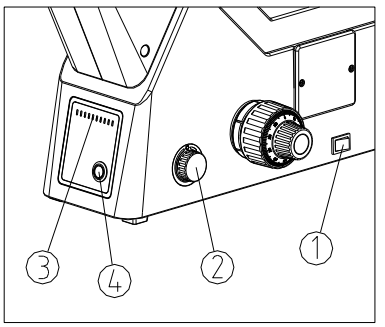


Fig. 11

(1) Put through the power and turn on the main power switch to"ON" (See Fig. 11).

(2) Adjust the light adjustment knob② until the illumination is comfortable for observation. Rotate the light adjustment knob② clockwise to raise the brightness, and the number of bright cells on the brightness indicator③ will increase. Rotate the light adjustment knob② counterclockwise to lower the brightness, and the number of bright cells on the brightness indicator③ will decrease.

★ Use the bulbs in the low-voltage state can extend the bulb life.

(3) Press down the energy-saving induction button④ to turn on the energy-saving induction function. After the user leaves the microscope, the microscope light source will automatically turn off 30mins later. When the user return to the microscope, the light source will automatically turn on. Press up the energy-saving induction button④ can turn off the energy-saving induction function.

★ The default of time-delay is set to 30mins when leaving the factory.

3-2 *Place the Specimen*

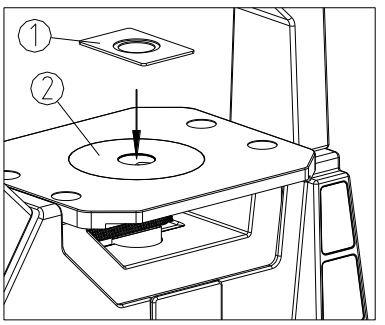


Fig. 12

Place the sample in the center of the stage.

★ Please select the container with the thickness of 1.2mm as Petri dish, culture flask etc, to get the best observation effects. Select specimen slide with the thickness of 1.2mm when the sample is placed on it.

(1) Place theϕ35mm Petri dish holder① (attached) on the circular central stage②, and put the ϕ35mm Petri dish in its center. (See Fig.12)

(2) Slip the whole holder to move the Petri dish.

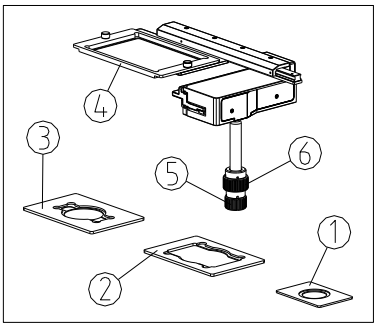


Fig. 13

◎ Use the attachable mechanical stage

(1) Place the microtitration plate on the mechanical stage holder④ when using 96 # or 24 # microtitration plate. (See Fig.13)

(2) In order to clip all the types of board tightly, please use the matched holder and attachable mechanical stage as follows:

● Use the Terasaki holder② to place Terasaki board.

● Use the ϕ35mm petri dish holder① to place ϕ35mm petri dish.

● Use the specimen slide holder③ to place theϕ54 petri dish and specimen slide.

(3) Rotate the horizontal moving ring⑤ and vertical moving ring⑥ to shift the specimen to the proper position. (Work distance X*Y=120×80mm)

★ Carefully change the objective. The objective may collide with the circular central stage or the Petri dish holder when it is changed after observing in short distance.

★ Make sure to take off the circular board of the stage when use the mechanical moving stage.

3-3 *Adjust Focusing*

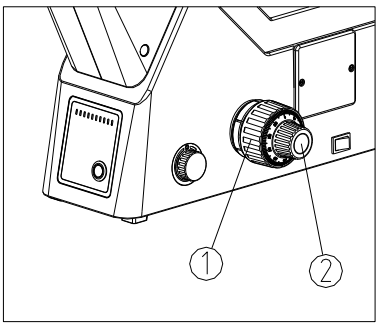


Fig. 14

(1) Put the speciman on the circular central stage, then shift the 4X or 10X objective into the light path.

(2) Align the scale “0” of the diopter ring on the diopter adjustable eyepiece with the scale of the eyepiece sliding base (see 3-5 Adjust the Diopter). Observe the eyepiece, and rotate the coarse focusing knob① until the image outline appears in the view field.(See Fig.14)

(3) Rotate the fine focusing knob② for clear details.

3-4 *Adjust the Focusing Tension*

If the handle is very heavy when coarse focusing, or the specimen leaves the focus plane soon after focusing, or the stage declines itself, these problems can be solved by adjusting the tension adjustment ring①.(See Fig.15)

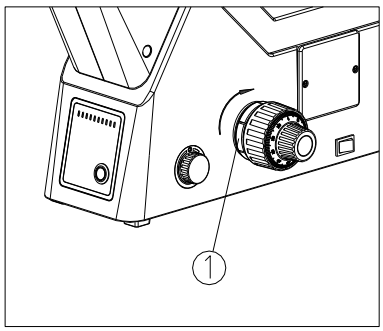


Fig. 15

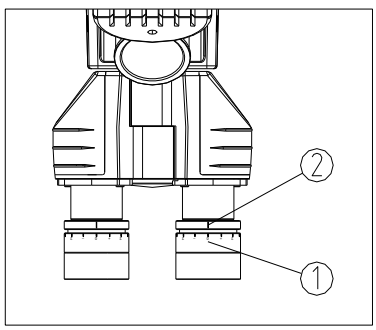


Fig. 16

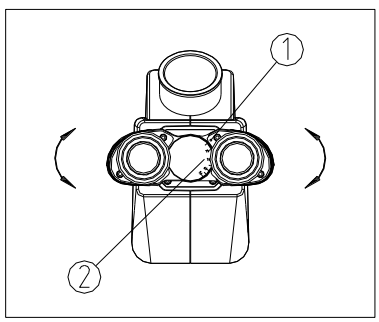


Fig. 17

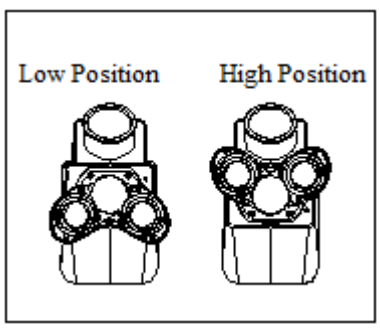


Fig. 18

Rotate the tension adjustment ring① according to the arrow direction in the figure, to tighten the focusing system; rotate the tension adjustment ring① in the opposite direction, to loosen the focusing system.

3-5 *Adjust the Diopter*

Align the scale "0" of the diopter ring① on the diopter adjustable eyepiece with the scale② of the eyepiece sliding base, and make the image clear by focusing. Then observe the other side eyepiece, if the image is not clear enough, rotate the diopter ring until the image is clear. (See Fig.16)

★There are ±5 diopters on the diopter adjustment ring①, and the value aligned with the scale② of eyepiece sliding base is your eye's diopter.

★Remember your eye's diopter, so that you can use it next time.

3-6 *Adjust the Interpupillary Distance*

When using two eyes to observe, hold the base of two prism bases and rotate them around the axis until there is only one field of view.

The dot "。"① on the eyepiece base points to the interpupillary distance indicator scale②. The number is the interpupillary distance. (See Fig.17)

Adjustable range: 50～75mm

★ Remember your interpupillary distance, so that you could use it next time.

★ This hinge type of eyepiece tube can be rotated in 360º, so users can choose suitable eyespot height according to personal height. For example, when the interpupillary distance is 65mm, rotate upward for 180° through the front eyepiece tube, then the eyespot height can be raised for 34mm. (See Fig.18)

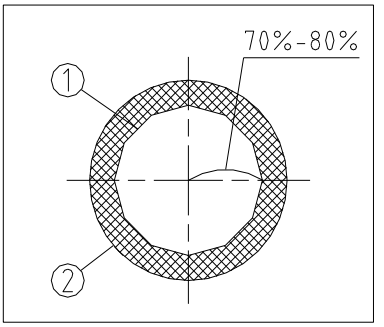


Fig. 19

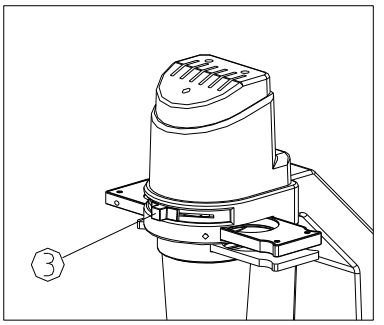


Fig. 20

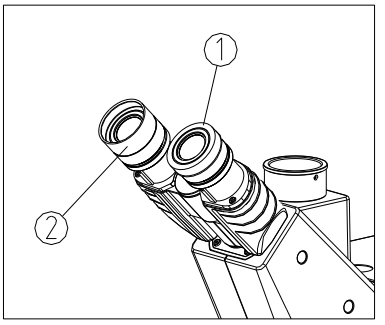


Fig. 21

3-7 *Adjust Aperture Diaphragm*

The aperture diaphragm decides the numerical aperture of the illumination in bright-field observation. If the N.A. of illumination matches with the N.A. of the objective; it can obtain better resolution and contrast, and increase the depth of field.

The objective could be moved if needed when affirming the aperture diaphragm. (The centering telescope can be inserted) Observing through the eye tube, and adjust the aperture diaphragm adjusting rod③ until see the field of view as Fig.19. (See Fig.19 and Fig.20. In Fig.19, ① is Image of aperture diaphragm, ② is Objective outline)

Usually, adjust the N.A. to its 70%~80% when observing the dyed specimen. Adjust the aperture diaphragm to " ⊗ " when observing the bacteria specimen.

3-8 *Use the Eye-cap*

(1) If the user wears glasses, turn over the eye-cap①. It can prevent the glasses touching the eyepiece and avoid damaging the glasses and the eyepiece. (See Fig.21)

(2) If the user doesn't wear glasses, open the eye-cap②. It can prevent stray light disturbing the observation.

3-9 *Use the Color Filter*

Use color filter to increase the accuracy of the observation and photomicrography. It is suggested to use the LBD color filter to get more neutral color when observing bright-field and photomicrograph.

★ Place the color filter according to 2-2-5.

Color filter	Purpose
IF550	Monochromatic contrast color filter (green) (used in phase-contrast observation)
LBD	Color temperature transition color filter (used in bright-field observation and photomicrograph)

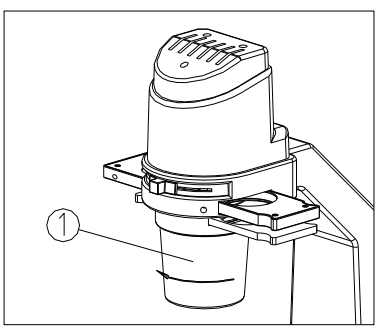


Fig. 22

3-10 ***Shift away the Condenser Lens***

Rotate lower part① of the condenser in clockwise (looking down) and remove it to get larger operation space. It could get the height of 150mm. (See Fig.22)

★ Remember it would not get good illumination effect when operating as so. Only use the big Petri dish when shifting away the condenser.

4.Install and Use the LED Fluorescence Model BS-2091 Series

The method of install and use the LED fluorescence model is coincident with the common biological models except following steps.

4-1 *Assembling Steps*

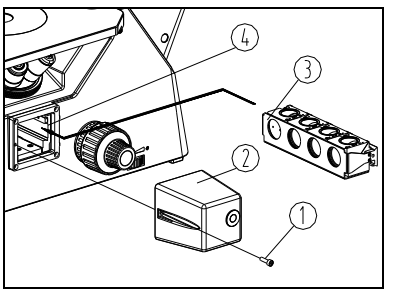


Fig. 23

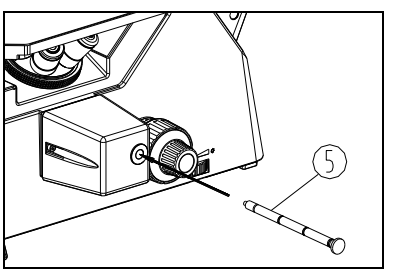


Fig. 24

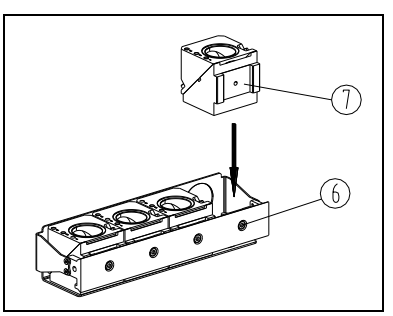


Fig. 25

★For safety, before installing the fluorescence accessory, firstly put the power supply of microscope to "OFF", then pull out the main power supply cable.

4-1-1 *Assemble the Fluorescence Filter Base Set*

(1) Screw up the lock screw① by a M4 inner hexagon spanner, and move out the left cover②.

(2) Align the dovetail interface of fluorescence filter blocks module③ with the dovetail groove of guide base set④, then gently push it into the guide base set④, until a ticking is heard, it indicates the fluorescence filter blocks module is pushed to the right side operating position. It will sound a ticking everytime the operating position is reached. (See Fig. 23)

(3) Put on the left cover②, and tighten the lock screw① by a inner hexagon spanner.

(4) Insert the fluorescence filter switch pole⑤ into the hole of the left cover②, aligning with the screw hole on the side face of the fluorescence filter module, then tighten it.(See Fig. 24)

★BS-2091 LED fluorescence microscope can match up to 4 sets of fluorescence filter module. The standard configuration is 3 sets of fluorescence filter module with one bright field block, if the user need 4 sets of fluorescence filter module, the bright field block can be replaced with the fluorescence filter module, at the meantime replace the LED fluorescence lamp source to be a matched one.

★Replace the fluorescence filter module. See Fig. 25, firstly loosen the lock screw⑥, take off the original fluorescence filter module, then put on the fluorescence filter module⑦ to be installed, insert it into the fluorescence filter base set to the bottom, then tighten the lock screw⑥.

★ When installing the fluorescence filter group, the ID on fluorescence filter group should correspond with the ID on fluorescence filter block module.

★ The LED fluorescence lamp source should match with the fluorescence filter group.

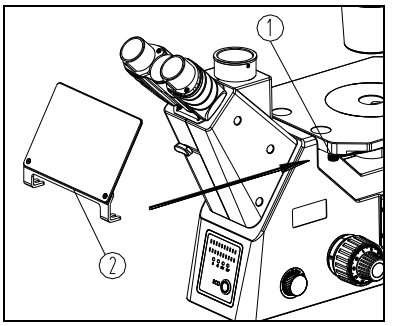


Fig. 26

4-1-2 ***Install the Filter Plate***

(1) Loosen the two lock screw① of the stage. (See Fig. 26)

(2) Align the groove of filter plate② with the lock screw①, and push it according to the direction shown in the figure, then tighten the lock screw①.

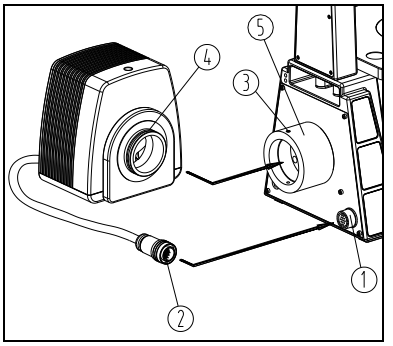


Fig. 27

4-1-3 ***Install the LED Fluorescence Light Box Group***

(1) Insert the aviation plug② into the aviation socket①, according to the direction shown in the figure.(See Fig. 27)

(2) Loosen the lock screw③ completely by the M4 inner hexagon spanner.

(3) Gently push the LED fluorescence light box group④ into the light source connector⑤ to the bottom, then rotate the LED fluorescence light box group, to make the lower plane of the LED fluorescence light box group to be horizontal and lock the screw③.

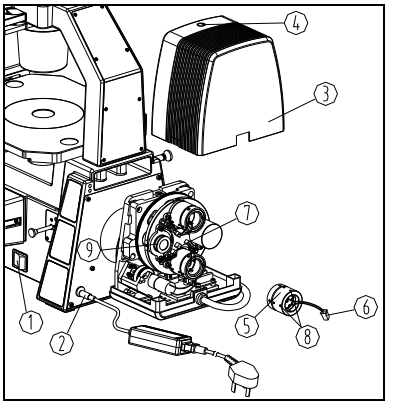


Fig. 28

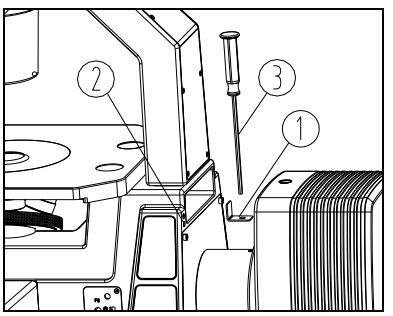


Fig. 29

4-1-4 ***Replace the LED Fluorescence Light Source Group***

After the new LED fluorescence microscope is received, it is not necessary to install and adjust the LED fluorescence light source. After a long period of time in operating, if the LED fluorescence light source is not bright enough or damaged, then replace it as following steps.

(1) Firstly turn the microscope power supply switch① to "OFF", and pull out the external power supply adaptor plug②.

(2) Loosen the screw④ on the cover③ of light source, then take off the light source cover③.(See Fig. 28)

(3) Pull out the connector plug⑥ of the LED fluorescence light source group⑤ from the PCB socket⑦.

(4) Loosen the two inner hexagon lock screws⑧ of the LED fluorescence light source group⑤, and take off the LED fluorescence light source group⑤ from the light source illuminator group⑨.

(5) After the new LED fluorescence light source group is installed, fix the new LED fluorescence light source group on the light source illuminator group⑨, with the two inner hexagon lock screws⑧, and insert the connector plug⑥ of the LED fluorescence light source group into the PCB socket⑦.

(6) Install the light source cover③ back to the original position, and lock the screw④ on the cover③.

★Since the wave length of LED fluorescence lamp and fluorescence filter is corresponding, choose the LED fluorescence lamp which is with same wave length as the original light source to replace it.

4-1-5 ***Fix the M4 Inner Hexagon Spanner***

(1) Adsorb the spanner fixed mount onto the magnet② of microscope body. (See Fig. 29)

(2) Insert the M4 inner hexagon spanner③ into the hole of spanner fixed mount①.

4-2 ***Usage Method***

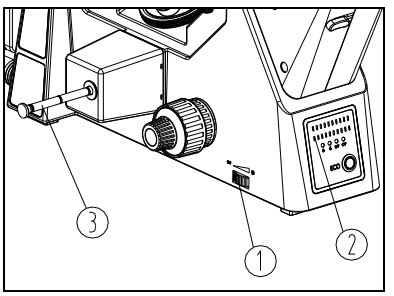


Fig. 30

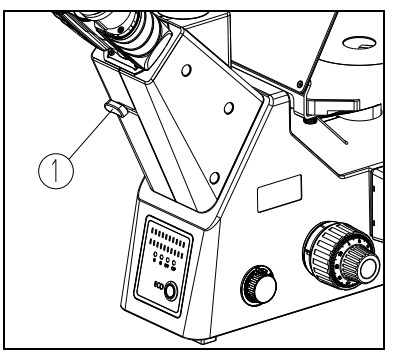


Fig. 31

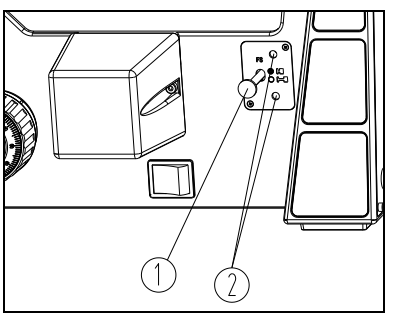


Fig. 32

4-2-1 ***Illumination (For Reflected Illumination)***

(1) Put through the power and turn on the main power switch to"ON".

(2) Adjust the reflected light adjustment knob① until the illumination is comfortable for observation. Rotate the reflected light adjustment knob① counterclockwise to raise the brightness, and the number of bright cells on the brightness indicator② will increase. Rotate the reflected light adjustment knob① clockwise to lower the brightness, and the number of bright cells on the brightness indicator② will decrease. (See Fig. 30)

★ For more details about the transmission illumination and energy saving button, see "3-1 Set Illuminations".

★ When the fluorescence filter switch pole③ is switched to the bright field position, it is in the transmission observation, and need to turn on the transmission light adjusting knob.

4-2-2 ***Select the Light Path***

Push the light path switch① with the thumb, to select the light path.

When the light path switch is at the leftmost position, the light intensity proportion of binocular and trinocular is 0:100, which is used for photography.When the light path switch is at the rightmost position, all the light comes into the binocular head, for visual observation. (See Fig. 31)

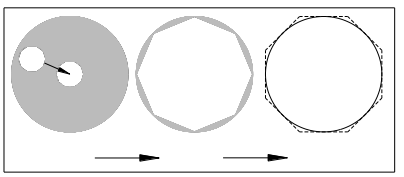


Fig. 33

4-2-3 ***Center the Field Diaphragm***

By limiting the diameter of light entering the condenser, the field diaphragm can prevent other light and strengthen the image contrast. When the image is on the center of the view field, the objective can perform best and obtain the clearest image.

(1) Push the field diaphragm adjusting pole ① to the innermost to adjust field diaphragm to the smallest.

(2) Observe from eyepiece to find image of field diaphragm.

(3) Adjust two field diaphragm centering screws ②, to move the image to the center of view field. (See Fig. 32)

(4) Open the field diaphragm gradually. If the image of field diaphragm is just inscribed to the view field, it means the field diaphragm had been centered correctly. (See Fig. 33)

(5) In actual use, enlarge the field diaphragm a little, to make its image circumscribed to the field of view.

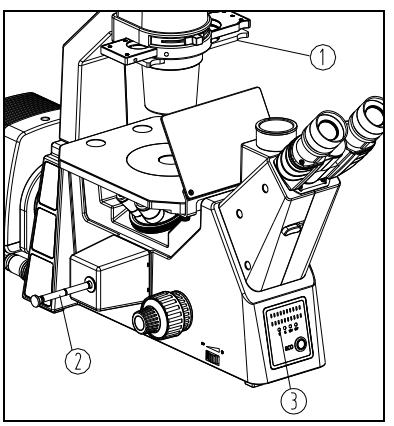


Fig. 34

4-2-4 ***Select fluorescence filter block***

Standard filter block: B1, G1, and UV1.

(1) Pull the filter flashboard① to the position of light barrier, to keep out the stray light. (See Fig. 34)

(2) Push/pull the fluorescence filter group switch pole②, to the wavelength position for fluorescence observation, until a ticking is heard, which indicates the fluorescence filter group and LED fluorescence lamp source are in to light path. The LED is lighten up, and the corresponding fluorescence wave band indicator③ of the front pannel is lighten up.

★When pull the fluorescence filter group switch pole to the outermost, it is in bright field transmission observation.

★In order to protect eyes, do not stare at the excitation light source directly.

5. *Assemble and Use the Accessories* *BS-2091 Series*

5-1 *Assemble and Use the Phase-contrast*

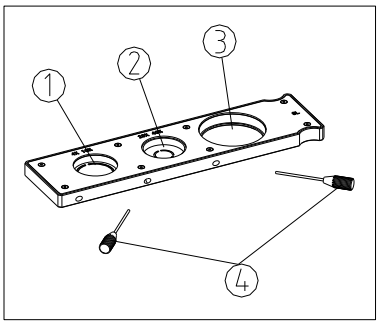


Fig. 35

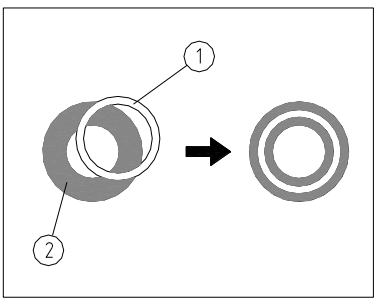


Fig. 36

5-1-1 *Phase-contrast Objective*

(1)Magnification of Phase-contrast Objective: 4X, 10X, 20X, 40X.

(2)Replace the objective of nosepiece with the phase-contrast objective, and assemble it as 2-2-1.

5-1-2 *Phase-contrast Slide*

Phase center adjustable slide

(1) Since the light loop center is not preset, use the phase center adjusting rod④ to adjust center. (See Fig. 35)

(2) Light loop ① and ② are be used with the same magnification phase contrast objective (e.g. 10X phase contrast objective matches to 10X light loop) , hole③ is to be used as a color filter stand for Φ45mm color filter.

(3) Assemble way refer to 2-2-4.

★ Apply to higher requirement of phase-contrast observation.

5-1-3 *Center the Light Loop*

(1) Place specimen on the stage, and focus it.

(2) Remove the eyepiece, and replace it with CT (centering telescope), insert it into the tube without diopter adjustment.

(3) Make sure the matched phase loop (in the phase-contrast objective) and the light loop (in the phase-contrast slide) is shifted into the light path.

(4) Loosen the lock screw of the centering telescope, and observe into the centering telescope when pulling the upper part of it to focus the phase loop② of the focusing objective. Screw down the lock screw until the focusing is clear (See Fig. 36)

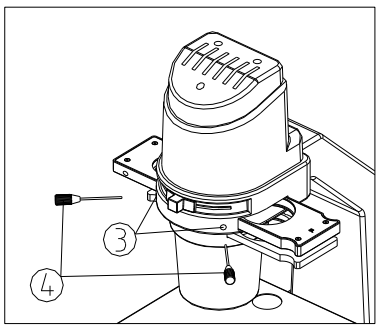


Fig. 37

(5) Insert the phase center adjusting rod④ into two holes③ on the phase-contrast slide, then adjust them until the light loop① center overlay with the phase loop② center. (See Fig.36 & Fig.37)

(6) Shift the other phase loop (in the phase-contrast objective) and the matched light loop (in the phase-contrast slide) into the light path to see if the light loop① is away from the phase loop②. Repeat the centering steps if it is away.

★ If the light loop is not centered, the user will not get the best effect of phase-contrast observation.

★ Overlay the phase loop onto the most bright image when seeing double light loop.

★ Light loop will deviate away from phase loop after moving or replacing a piece of thick specimen, which will decrease the image contrast. Repeat step 1-5 if it happens.

★ Repeat the centering steps to increase the contrast if the bacteria hold or specimen slide is uneven. Center the light loop by using phase-contrast objective in low to high magnification.

5-2 *Assemble and Use the TV Device*

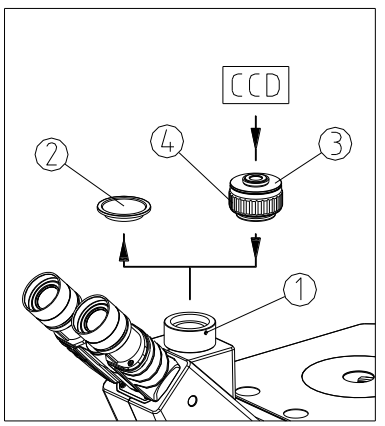


Fig. 38

5-2-1 *Assemble TV Device*

(1) Loosen the lock-screw① on the trinocular head and get down the dust-cover②. (See Fig.38)

(2) Get down the dust-cover caps of the TV adapter③ and the CCD. Insert the screw thread end of TV adapter③ into the CCD, then install the TV device which with CCD into the trinocular tube. Screw down the lock-screw① tightly.

5-2-2 ***Focus***

Do binocular observation, and observe the image on CCTV that connects the TV device by CCD after it is clear. If the image is unclear, rotate the adjustment tube④ until it is clear.

5-3 ***Install and Use the Mobile Phone Connector***

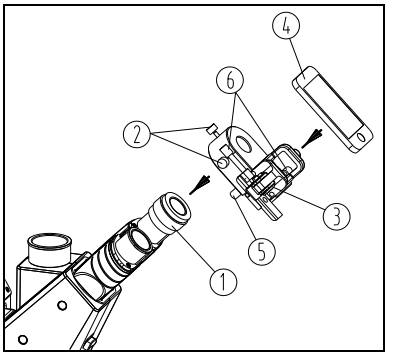


Fig. 39

a) For Binocular Photograph

(1) Loosen the three lock screws② of the mobile phone connector③, and insert the mobile phone connector③ onto the eyepiece①, as the direction shown in Fig. 39, and screw down the lock screw②.(See Fig.39)

(2) Align the camera of mobile phone④ with the hole of the mobile phone connector③, and insert into the the mobile phone connector③.

(3) Observe whether the image of mobile phone④ is clear and in center. If the image is unclear, adjust the up-down adjustment screw⑤, if the image is not in center, adjust the vertically-horizontally adjustment screw⑥, until the image is clear and in center.

★When install the mobile phone connector, take off the eye-cap of eyepiece.

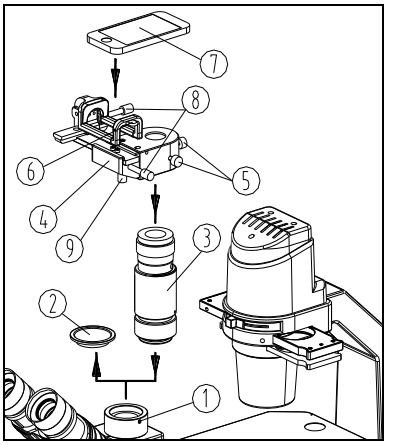


Fig. 40

b) For Trinocular Photograph

(1) Loosen the lock screw① of trinocular head, and take out the three way dust-cover②.(See Fig. 40)

(2) Install the trinocular interface group③ into the trinocular tube, and tighten the lock screw①.

(3) Loosen the three lock screws⑤ of the mobile phone connector④, and insert the mobile phone connector④ onto the trinocular interface group, as the direction shown in Fig. 40, and screw down the lock screw⑤.

(4) Align the camera of mobile phone⑦ with the hole of the mobile phone connector④, and insert into the the mobile phone connector④.

(5) For binocular observation, after the image is clear, observe whether the image of mobile phone⑦ is clear and in center. If the image is unclear, adjust the up-down adjustment screw⑨, if the image is not in center, adjust the vertically-horizontally adjustment screw⑧, until the image is clear and in center.

6. Troubleshooting *BS-2091 Series*

As the performance of microscope can't play fully due to unfamiliar operations, the table below can provide some solutions.

Problem	Cause	Solution	Reference Page
1. Optical System			
1. The LED light is bright, but it's dark in the field of view.	The LED is burn out	Replace it with new one	9
	The light adjusting knob is too low.	Adjust it correctly.	10
	A wrong bulb is used.	Replace it with a correct one.	9
2. The side of the field of the view is dark or not even.	The nosepiece is not in the right position	Turn the nosepiece into the right position until hearing a click	7
	The color filter and the flashboard placed incorrectly	Shift the flashboard until hearing a click.	8
	The phase-contrast slide placed incorrectly	Shift the slide until hearing a click.	8
3. Stain or dust is observed in the field of view.	Stains have accumulated on the specimen	Change the specimen	-
	Stains have accumulated on the eyepieces	Clean the eyepieces	-
4. About the resolution • Unclear image • phase-contrast is out of work • Unclear image of fine structure	Objectives is not placed in the light path correctly	Turn the nosepiece into the right position until hearing a click	7
	The aperture diaphragm opened incorrectly	Adjust the aperture diaphragm	12
	Stain or dust has accumulated on the condenser, objective, eyepieces, or specimen vessel	Clean it	-
	The thickness of specimen slide or Petri dish is not 1.2mm	Use the one with thickness of 1.2mm	10
	Use bright-field objective	Change it with phase-contrast objective	18
	The light loop of phase-contrast slide is unmatched with the phase ring	Use the light loop matched with phase ring	18
	The light loop and the phase ring are not centered	Center them correctly	18
	The light loop and the phase ring are deviate when observing the edge of the Petri dish	Move the Petri dish to get the best phase-contrast effect	-

Problem	Cause	Solution	Reference Page
5. Some parts of image is not in the focal plane	Objectives is not place in the light path	Turn the nosepiece into the right position until hearing a click	7
	The specimen placed on the stage incorrectly	Place the specimen correctly	10
	The optical effect of the Petri dish is not good (ex: bottom smooth)	Use the dish with smooth surface	-
6. The eyes feel tired easily. The right field of view doesn't overlay with the left.	Interpupillary distance is wrong	Adjust the interpupillary distance	12
	Diopter adjustment is wrong	Adjust the diopter	11
	Eyes not accustomed to binocular observation	Do not goggle at the specimen when observing. Observe the entire field of view or look something else before observing.	-
2. Mechanical System			
1. Coarse focusing knob can't move easily	Coarse tension adjust ring is too tight	Loosen a little	11
2. The image is not in the focal plane when observing	Coarse tension adjust ring is too loose	Tighten a little	11
3. Electrical System			
1. The bulb does not work	No power supply	Check the connection of the power cord	9
	The bulb is burnt out	Replace it	9
2. The bulb burns out usually.	A wrong bulb is used.	Replace it with a correct one.	9
3. The field of view is not bright enough.	A wrong bulb is used.	Replace it with a correct one.	9
	The use of light adjusting knob is wrong.	Adjust it correctly.	10
4. The bulb flickers or the brightness is not stable	The bulb is burn out soon	Replace it with a new one	9
	The wire doesn't connect well	Connect it correctly	9

Problem	Cause	Solution	Reference Page
4. LED Fluorescence Part			
1. The LED fluorescence lamp of light box group is not bright	The reflection light adjusting knob switch is not turned on.	Turn on the reflection light adjusting knob switch and rotate to bright enough, and turn the fluorescence filter switch pole to the correct position.	16
	The fluorescence filter switch pole is in the bright field positon.	Turn the fluorescence filter switch pole to the fluorescence observation position.	17
	Without power supply	Check the connection of the power supply cable.	9
	The connection cable is broken.	Replace the connection cable.	9
2. The LED fluorescence lamp is bright but the view field is dark.	The reflection light adjusting knob is not open enough.	Turn the reflection light adjusting knob to be bright enough.	16
3. For transmission bright field observation, the background is yellowgreen.	The fluorescence filter switch pole is turned to the fluorescence observation position.	Turn the fluorescence filter switch pole to the bright field observation position.	17