



# Scientific Research Metallographic Microscope

**Model Number: BS-6024RF/TRF, 6025RF/TRF**

## Instruction Manual



BS-6024RF/TRF



BS-6025RF/TRF

This manual is written for Scientific Research Metallographic Microscope of BS-6024RF/TRF, 6025RF/TRF. To ensure the safety, obtain optimum performance and to familiarize yourself fully with the microscope, it's strongly recommended that you read this manual carefully before operating this microscope.

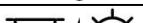
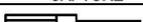
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## User Notice

### I. Safety Symbols

The following signs are on the microscope. Figure out what these symbols meanings and always use the microscope in the safest way.

Symbol	Meaning
	Main power switch is on
	Main power switch is off
	Ground connection
	Upper / Lower lighting
	Button press for upper lighting, button do not press for lower lighting
	Trash bin
 F.S. 	F.S-Diaphragm,  -Aperture diaphragm opening direction,  -Narrow direction
<b>ECO</b>	The switch of Light off while people leave
 CAPTURE	Photograph
	Wrench used here
	Light intensity direction, weaken to the left, strengthen to the right
	CE certification passed

### II. Safety Precautions

1. Be careful when moving the microscope, to avoid the lens glass sticked by fingerprints and sweat stains for the sake of observation, to avoid the lenses dropped or damaged.
2. Do keep the microscope out of direct sunlight, high temperature or humidity, dusty and easy shaking environment. Make sure the stage is smooth, horizontal and firm enough.
3. Hook into the upper slot behind the rack by one hand, and hold the front bottom of the rack by the other hand when moving the microscope.
4. If the carrier, objective or viewing tube is spilled with bacteria or solution, you should immediately pull out the power wire and dry the solution or water to ensure that the microscope is dry. Otherwise, it is possible to damage the instrument.
5. Be sure to keep at least 10cm away from the left, right, top, rear of the microscope from walls and other objects, so as not to plug natural convection air, which is used for cooling.
6. Make sure the instrument is earthed, to avoid lightning strike.
7.  is used to ensure safety, you should make sure the main switch is in "O" (off) state and cut off the power supply before replacing the bulb or the fuse. Check the input voltage: Be sure the input voltage which is signed in the back of the microscope is consistent with the power supply voltage, or it will bring a serious damage to the instrument.
8. Use the special wire provided by our company.

### III. Maintenance

1. All the lenses have been adjusted properly; Please do not dismount them by yourself.
2. The nosepiece, coarse and fine focusing parts are so delicate that it is forbidden to disassemble them carelessly by yourself.
3. Keep the instrument clean, and do not pollute the optical elements when wiping away the dust on the instrument. The objective lenses should be cleaned once every other month by professional.
4. We can clean the contaminations such as fingerprints and oil smudges on the prism by using the Lens paper and solution, which is mixed by ether(70%) and alcohol(30%).

**⚠ Noting that alcohol and ether are highly flammable, do keep them away from the fire or potential sources of electrical sparks, and use them in a drafty room as possible as you can.**

5. Do not attempt to use organic solvents to clean the microscope components other than the glass components. Using neutral detergent to clean them.
6. You should cut off the power immediately and dry it if the microscope is wetted by the liquid when using the microscope.
7. Do not try to disassemble any part so as not to affect functionality or lower the performance of the microscope.
8. The instrument should be kept in a cool, dry place and should be covered with a dust shield when not be used. Cover the microscope after the lamp cooling down.
9. Working environmental requirements:
  - a) Indoor use;
  - b) Temperature range:10°C~35°C;
  - c) Maximum relative humidity: when the temperature reached 31 °C is 80%, linear reduction of temperature to 34°C is 70%, when the temperature reached 37°C is 60%, when the temperature reached 40°C is 50%.
10. Storage and transportation requirements:
  - a) Temperature range: -40°C~+70°C
  - b) relative humidity range: 10%~100%
  - c) Atmospheric pressure range: 500hpa~1060hpa

#### warning:

Please operate the microscope in the manner specified in this manual, Otherwise, not only user's safety will be endangered but also the microscope will be damaged. The microscope shall always be operated in accordance with this instruction.

© This microscope will not cause radiation, electromagnetic interference and other phenomena to the surrounding environment. It meets CE&UL certification standard.

The following symbols are used in this instruction to highlight text:

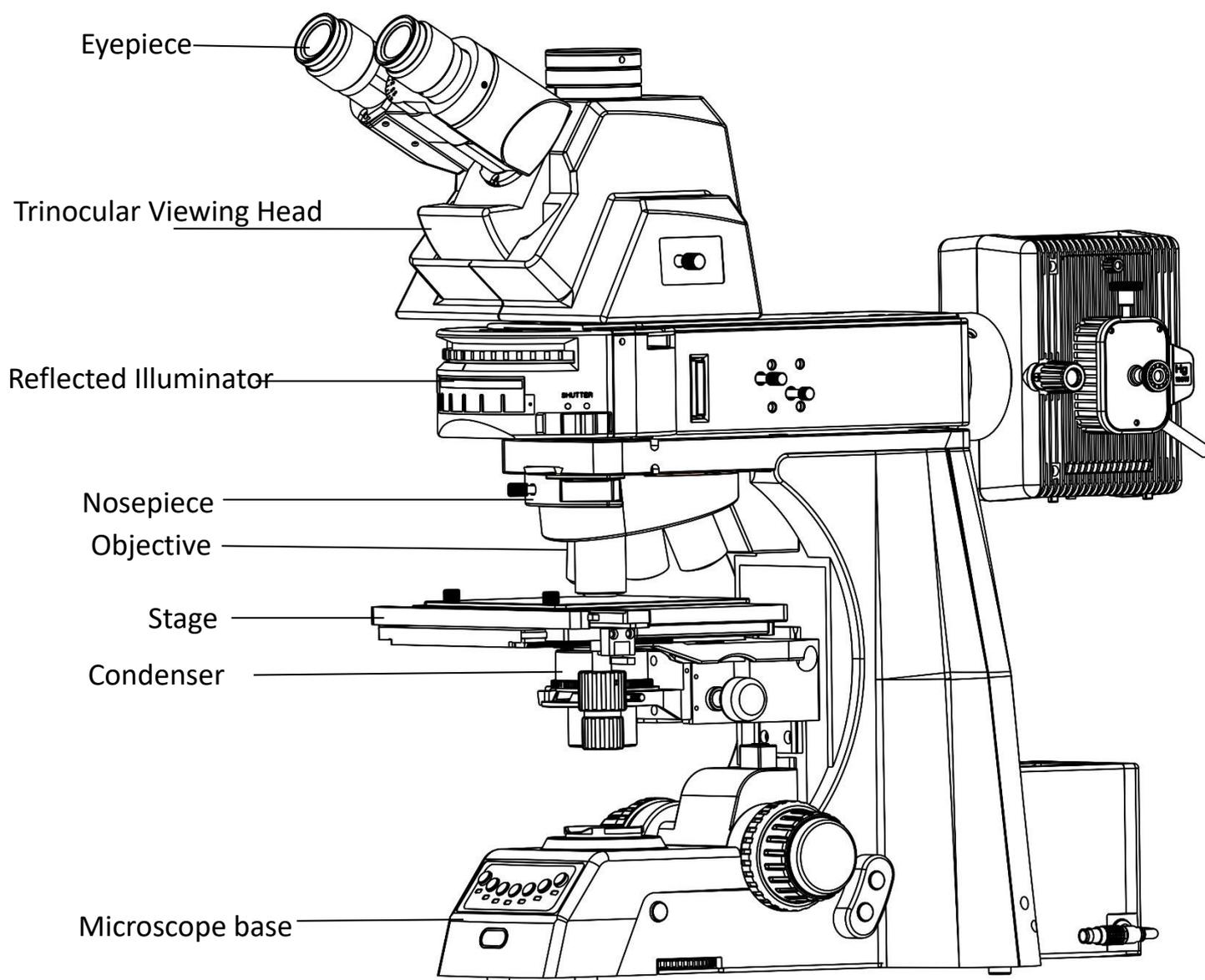
⚠ means failure to observe the warning in this instruction will result in personal injury to the operator and/or damage to the instrument (including objects near the instrument)

★ means failure to follow this instruction will cause instrument damage.

© means annotation (for operation and maintenance)

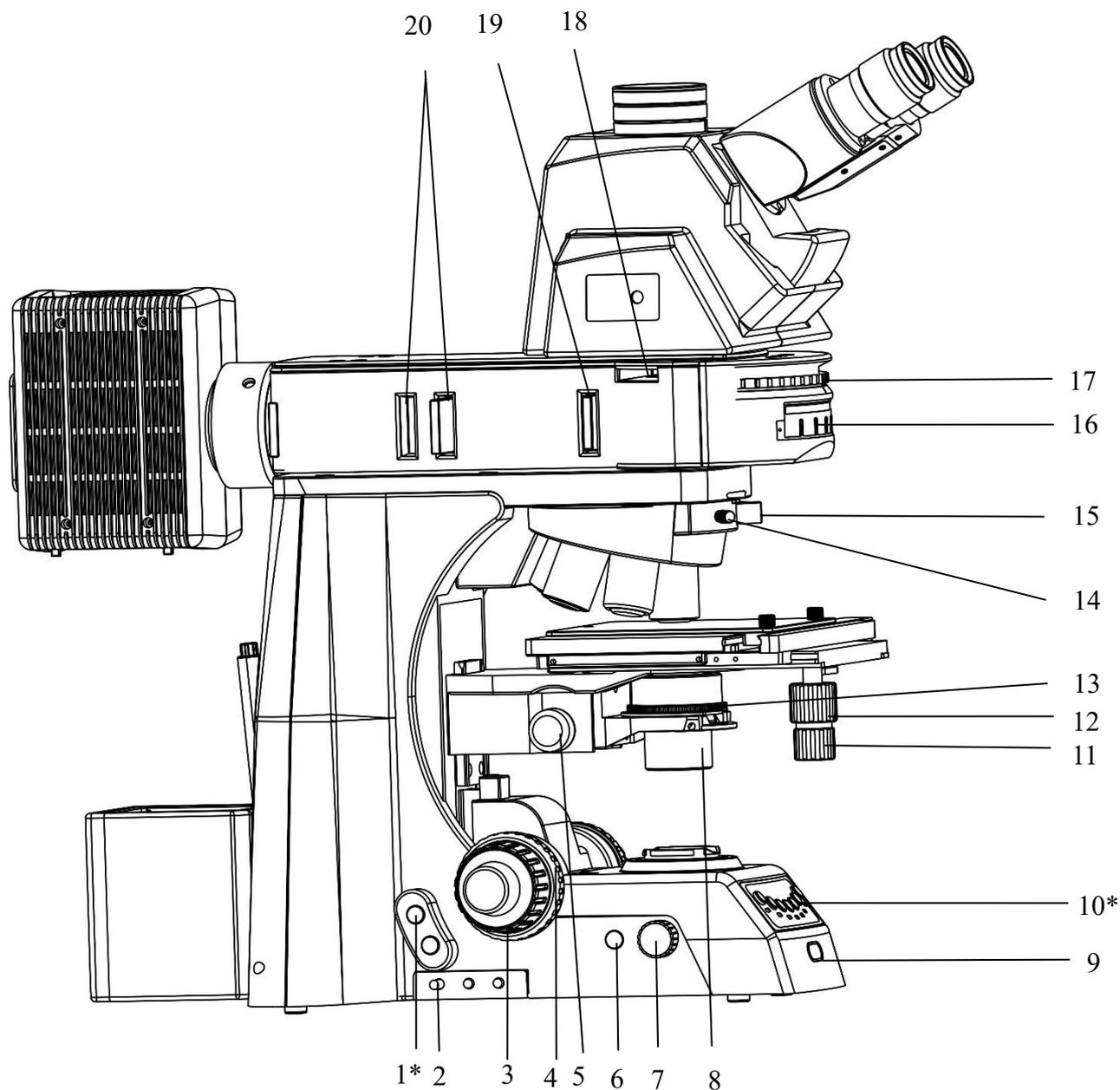
## 1. Components Name

The main difference between BS-6024RF/TRF and BS-6025RF/TRF is that BS-6024RF/TRF is manual microscope, BS-6025RF/TRF has motorized nosepiece. BS-6024RF and BS-6025RF only have reflected illumination, BS-6024TRF and BS-6025TRF have reflected and transmitted illumination, we will mainly introduce the operation of BS-6025TRF, other models can refer to BS-6025TRF.



BS-6025TRF

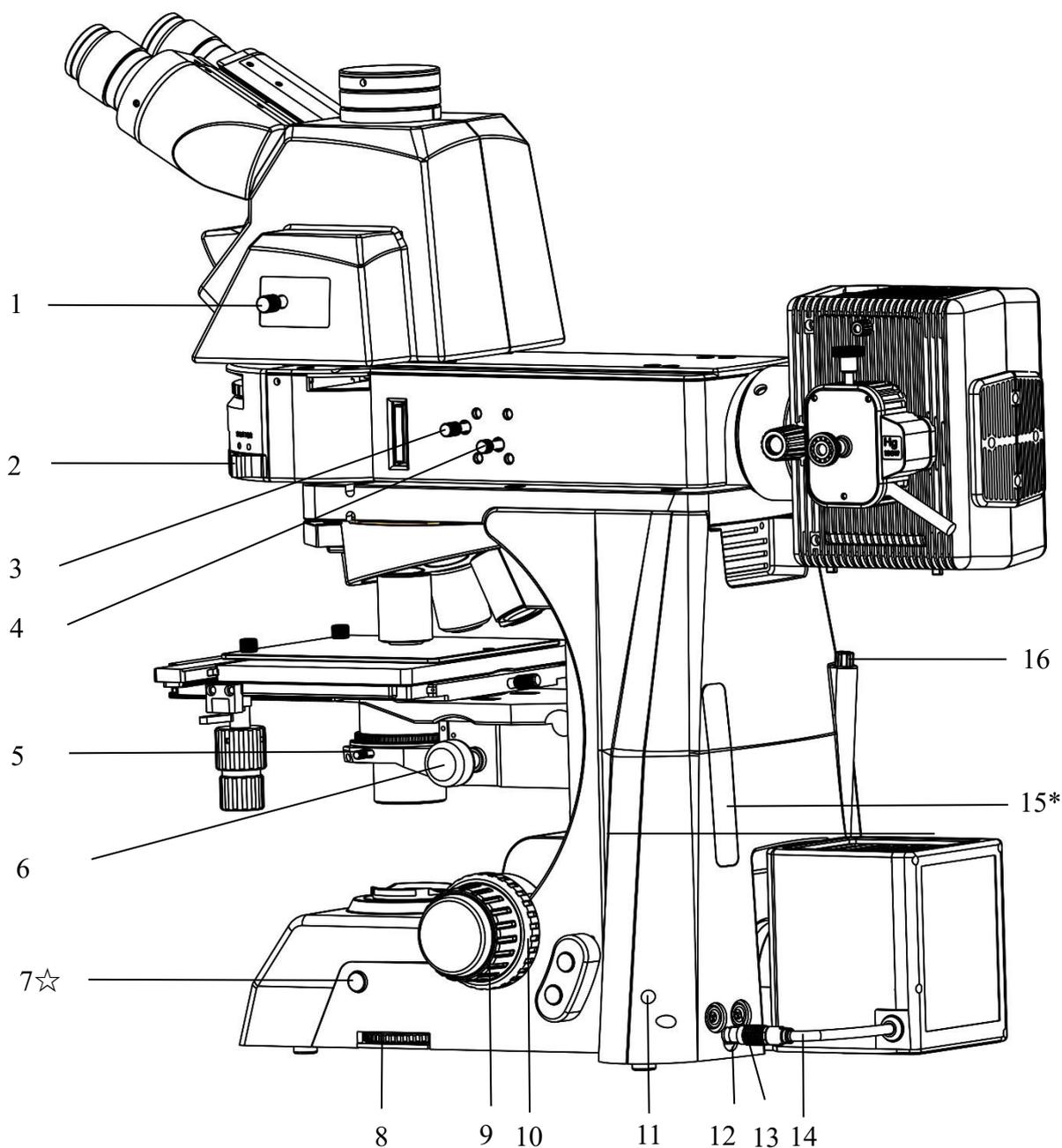
## 2. Structure



BS-6025TRF

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> <li>1. Function shortcut keys</li> <li>2. Filter switch lever</li> <li>3. Coarse and fine lifting hand-wheel</li> <li>4. Focusing upper position locking hand-wheel</li> <li>5. Condenser height adjustment hand-wheel</li> <li>6. Upper and lower lighting switch button</li> <li>7. brightness control button</li> <li>8. Long distance condenser</li> <li>9. "ECO" infrared induction device</li> <li>10. Objective switch key area</li> </ol> | <ol style="list-style-type: none"> <li>11. Stage movement hand wheel for X-direction</li> <li>12. Stage movement hand wheel for Y-direction</li> <li>13. Condenser diaphragm adjusting ring</li> <li>14. Extended function board fastening screw</li> <li>15. Extended function board</li> <li>16. Excitation light label</li> <li>17. Rotating spectroscope assembly room</li> <li>18. Check partial slot</li> <li>19. The partial slot</li> <li>20. ND filter slots</li> </ol> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

\* Manual version does not have this function



BS-6025TRF

- 1. Switching lever for optical path observation
- 2. Aperture switch button
- 3. Viewing diaphragm
- 4. Aperture diaphragm
- 5. Fastening screw for condenser
- 6. Condenser height adjustment hand-wheel
- 7. Photograph button
- 8. Field aperture size adjustment knob

- 9. Fine focusing hand wheel
- 10. Coarse focusing hand wheel
- 11. Lamp room fastening screw
- 12. Earthing screw
- 13. Lamp room socket
- 14. Lamp room plug
- 15. USB interface
- 16. Universal wrench

### 3. Adjustment and Operation

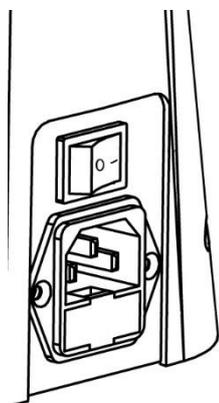


Fig.1

#### 3-1 Turn on the power (Fig.1)

Turn on the power, change the main switch on the back of microscope (as shown by the Fig.1) into "I" (power on) state.

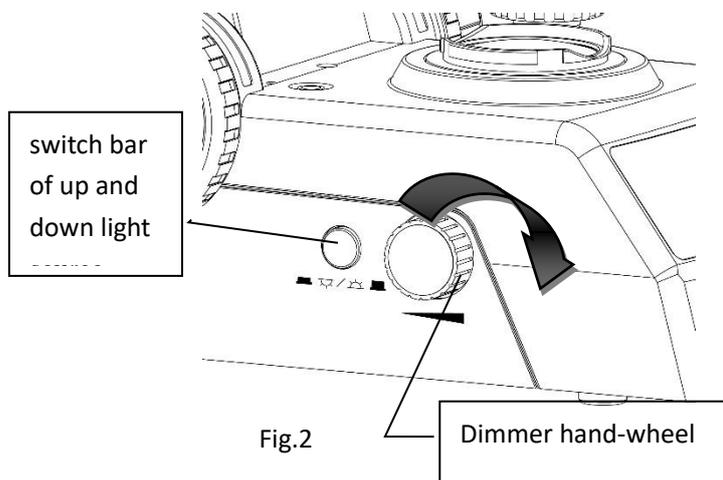


Fig.2

#### 3-2 Light intensity adjustment and upper & lower light source switch (Fig.2)

As shown by the arrow in Fig.2, The light fades as the button rotates. Instead, the light enhances.

As shown in Fig.2, when pushing the switch bar of up and down light source, the upper light source is lighting, the symbol is  ; when pulling out the switch bar of up and down light source, the down light source is lighting, the symbol is  .

#### 3-3 Light source socket (Fig.3)

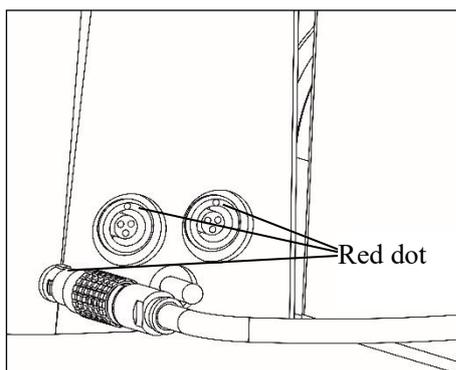


Fig.3

As shown in Fig.3, there are red dots in the socket and plug, the direction should be adjusted before the plug is inserted into the socket, and red dots should be inserted in alignment. When hearing "click", it means ok.

Noting screen prints on the left and right socket corresponds to switch levers of up and down light

source. As shown by the Fig:  means light socket of up light source, which corresponds to the pushed state of switch bar for up and down light source;  means light socket of down light source, which corresponds to the pulled state of switch bar for up and down light source.

★ When changing switch levers of up and down light source, the statement of which is different from the statement shown by the fig, please check the plug and make sure the plug is in the socket.

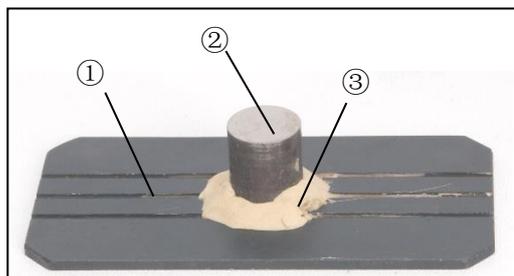


Fig.4

### 3-4 Specimen preparation and placement (Fig.4, Fig5)

1. The specimen (Num② in Fig.4) for observation is fixed on the sample plate (Num① in Fig.4) by use of silly putty (Num③ in Fig.4), and ensure the specimen surface is parallel to the sample plate. You can use the nipping machine to press the sample. (as shown in Fig.5).

2. Place the sample plate of the fixed specimen on the microscope stage.

- ★ Be careful when replacing the objectives, after the specimen was observed with a short-range objective lens, the objective may collide with the specimen when it is need to replace the objective.



Nipping machine

Fig.5

### 3-5 Pupillary distance adjustment (Fig.6)

The distance range between the pupils is 47mm~78mm. When observing, we adjust the distance between the pupils by holding the right and left prism eyepiece tube, rotating around the axis until both left and right field of view combined and feel comfortable.

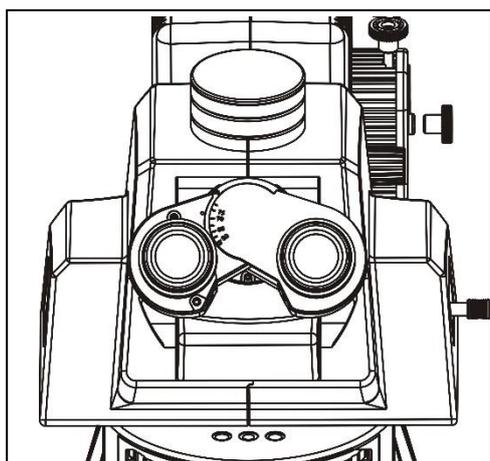


Fig.6

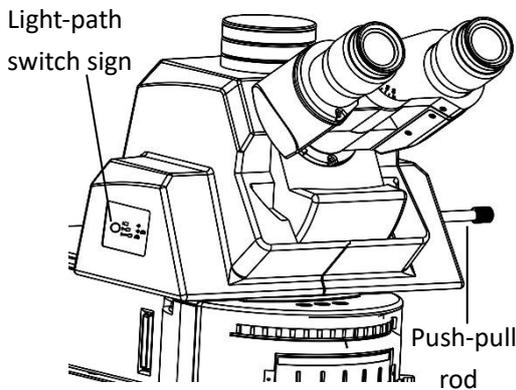


Fig.7

**3-6 Three position light-path switch (Fig.7)**

Select the desired light path and light intensity ratio as shown by Fig.7

Diagram	Push-pull rod Operation	Eye: Camera light ratio
	Completely pushed	100: 0
	Middle	20: 80
	Completely pulled	0: 100

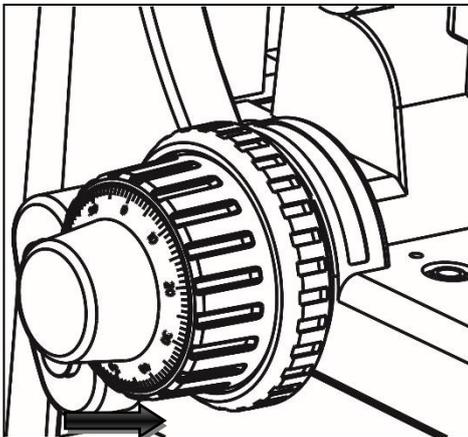


Fig.8

**3-7 Focusing (Fig.8, Fig.9)**

1. When no cameras are used:

Push-pull rod (as shown in Fig.7) is completely pushed. When binocular observing, you can use 10× objective to focus. To prevent the specimen from colliding with the objective lens, The mechanical stage should be raised, which brings the specimen close to the objective, then slowly reverse rotation of the coarse focusing wheel so that the specimen could be down, meanwhile, you can search the image in the 10× eyepiece, finally you can focus to clear with the fine focus hand-wheel. At that time even if you convert to other multiplier objective, the specimen can reach the same focus without any damage.

2. When Photographic devices are used:

Push-pull rod (as shown in Fig. 7) is completely pushed. Making binocular observations, when the image is clear, then pulled it out, then it can be observed by the camera system.

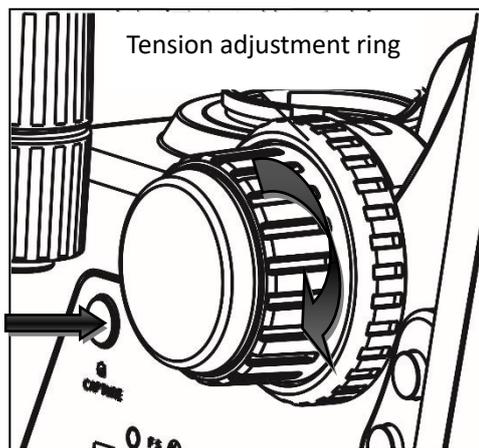


Fig.9

★ The fine focusing hand wheels on both sides are held by magnets for easy removal. All you need is the arrow shown in the Fig.9, Press one end of the hand wheel inward to make the other curl, then gently pull off the end of the cock, so hand-wheel is easily detached. Assembly also needs only hand wheel center alignment put in. This function makes the two fine-tuning hand wheels conveniently inter changeable, to avoid fine-tuning hand-wheel and platform handle collision.

**3-8 Adjust the tightness of the focusing hand-wheel (Fig.9)**

The rotation direction is shown in the Fig.9, the more rotation, the tighter the focusing hand-wheel is. On the contrary, the less rotation, the less tight the focusing hand-wheel is.

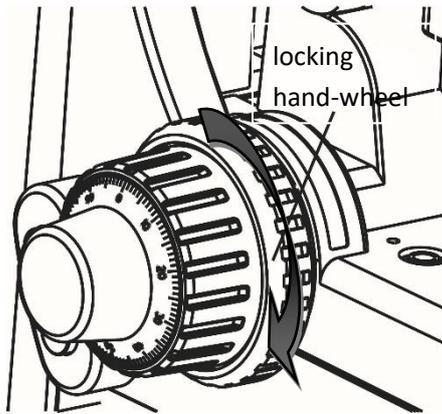


Fig.10

### 3-9 Focusing upper limit (Fig.10)

- Actually, if you want to restrict locking of stage height (The upper limit of focus) as appropriate, just turn the locking hand-wheel in the direction of the arrow (as shown in Fig.10) at the corresponding upper limit position.

### 3-10 Electric condenser adjustment (Fig.11, 12)

- The center of the condenser should be coaxial with the optical axis of the objective lens, the product has been adjusted before delivery, there is no need to adjust the center again.
- The top position of the condenser, the product has been adjusted before delivery, users don't need to adjust it by themselves.
- Turn the focusing hand-wheel of the condenser ①, the condenser moves up and down, make the aperture image of the field clear at each magnification.

#### Focus the lens in the middle position:

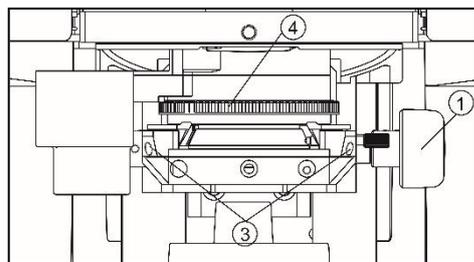


Fig.11

1. Turn the focusing hand wheel of the condenser ①, Raise the condenser to the highest position.
2. Focus the sample with 10x objective lens.
3. Rotate aperture ring ②, narrow the field stop image to make it visible in the field of view.
4. Turn the focusing hand wheel of the condenser ①, focus the image of the field aperture.
5. Move the field diaphragm to the center of the field with the universal adjusting wrench turning the center of the field with the center screws ③ to the center of the condenser.
6. Gradually open the field aperture, if the image of the field diaphragm is in the center and in the field of view, which means the condenser has been correctly aligned.

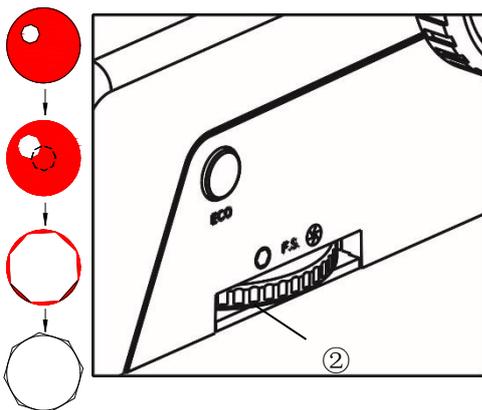


Fig.12

7. In practical application, slightly increase the aperture of the field of view to make its image just cut out of the field of view.
8. Aperture diaphragm ④ adjustment. Aperture diaphragm is designed for the adjustment of numerical aperture, not for brightness control. Usually, When the aperture diaphragm is opened to 70 to 80% of the exit pupil of the objective lens, good image with enough contrast can be obtained, adjust the aperture diaphragm with the scale mark on the condenser lens in accordance to objective lens magnification.
9. Adjustment of aperture size in field of view. During operation, rotate the aperture of the field diaphragm ②, narrow the field diaphragm and observe the field of view, if the aperture looks blurry, you can turn the focusing hand wheel of condenser, lift condenser holder to make the image clear, then turn the field diaphragm, make it just adjust to fill the eyepiece field of view to reduce the noise of light and improve image quality.

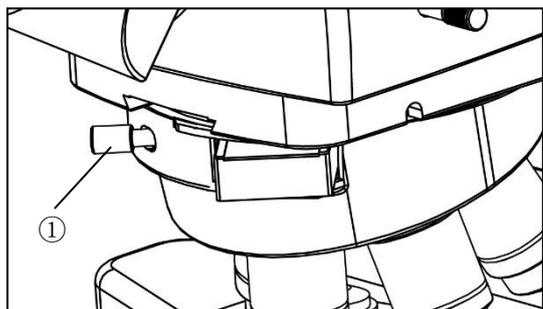


Fig.13

### 3-11 Use of extended feature boards (Fig.13)

As shown in Fig.13, a slot equipped with extended function board is reserved on the nosepiece. When the microscope lens is delivered, it is inserted into the slot with ordinary light and dark field board. If you want to use other extension function board, you just need to unscrew the serial number ① and loosen it, pull out the standard light and shade field board, and then insert the extension function board into the slot and tighten the screw of serial number ①.

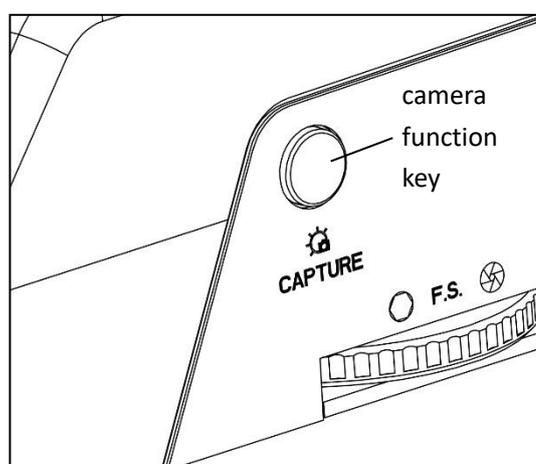


Fig.14

### 3-12 Computer control signal interface and camera function key (Fig.14, 15)

When the external digital camera and microscope computer control signal output interface (as shown in Fig.15) supported by our company are all connected to the computer, NOVA Basic software is running on the computer at the same time. After capturing the real-time shooting image of the camera, press the camera function button in Fig.14 to take photos and record the images captured by the current camera immediately (If you want to know the detailed computer operation, please refer to related software operation instructions)

Computer control signal interface

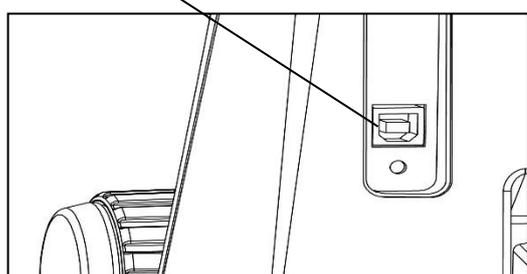


Fig.15

**Note:** The camera function key is changed to ECO in the manual version. ECO function: Power will be cut off automatically after 15 minutes without operator's presence.

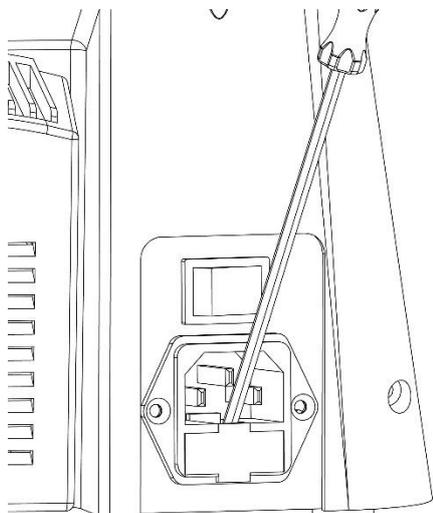


Fig.16

**3-13 Fuse replacement (Fig.16, 17)**

As shown in Fig.16, firstly, open the drawer of the fuse box with a universal adjustment wrench, then use a universal wrench to gently push the fuse through the square hole under the fuse drawer.

★ **The glass in the middle of the fuse is thin. When you open the fuse box drawer and push out the fuse, please handle it carefully and gently.**

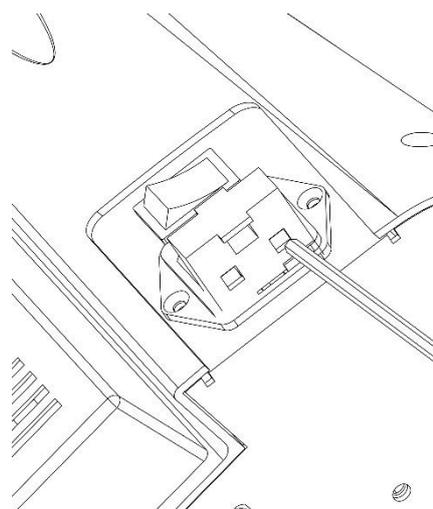


Fig.17

**3-14 Key areas (manual version does not have this function) (Fig.18)**

As shown in Fig.18, the conversion process of objective lens only requires the corresponding keys to enable the microscope to perform the objective transformation automatically. By default, the order from left to right is 5x, 10x, 20x, 50x, 100x, or the order of multiplier needs to be confirmed by itself, which can be marked with the multiplier tag attached randomly.

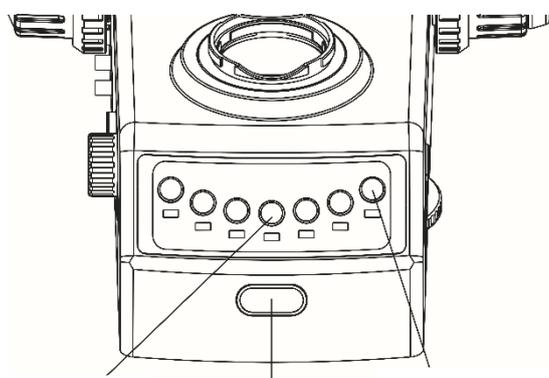
There are two modes of switching: free and directional.

**Free mode:** All the keys of the objective lens are valid, and the key corresponding to the objective lens currently observed is in a green light state.

**Directional mode:** You can only switch between the two selected objective lenses, and the buttons of the other objective lenses are invalid. The key corresponding to the currently observed objective lens will be green light, while the key corresponding to the to-be-switched objective lens will be yellow light.

**Preset method of two objective lenses in directional switching mode:**

Press the "function switch" button to keep it from loosening. At this time, the indicator light of the objective lens switch button is completely off. Then press the conversion button corresponding to the two objective lenses you need to direct, and the indicator light of the two objective keys you press lights up. Finally, release the function switch.



Objective Change key

ECO function

Function switch key

Fig.18

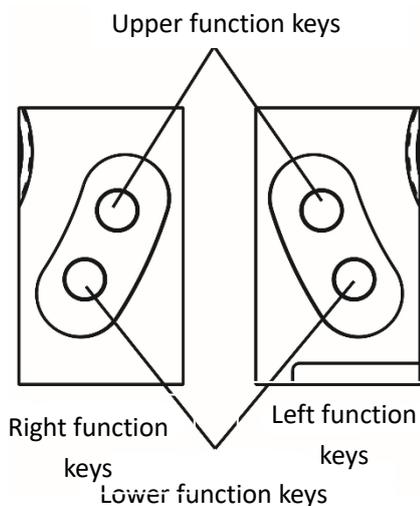


Fig.19

**3-15 Additional function keys (manual version does not have this function) (Fig. 19)**

Figure 19 shows two function keys on each side of the microscope, the functions corresponding to the function keys can be customized on the computer through software. By default, the upper function key is switched clockwise and the lower function key is switched counterclockwise.

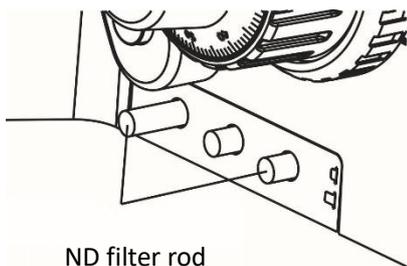


Fig.20

**3-16 Use the ND filter rod (Fig.20)**

As shown in figure 20, when the rod is pushed in, the filter is in use state. When the rod is pushed out, the filter is in empty state. LBD is a color temperature filter. ND25 is a color filter with a light transmittance of 25%, and ND6 is a color filter with a light transmittance of 6%.

**3-17 Color filter use (Fig.21)**

- ⊙ Insert the filter rack most suitable for observation purposes into the filter slot (Num ①, Fig.21), and be sure to insert it from the left.
- ⊙ The first sound "click" means the empty position, and the second, the filter enters the light path.

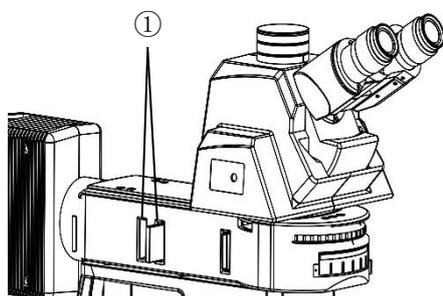


Fig.21

Color filter	Applications
Color temperature	Convert lighting to sunlight for general observation and color photography
Green filter	Increase contrast for black-and-white photography
Yellow filter	Increase contrast when semi-conductor wafer is observed
Frosted sheet	Uniform light, but reduced light intensity
ND6	Adjust light intensity (transmittance: 6%)
ND25	Adjust light intensity (transmittance: 25%)

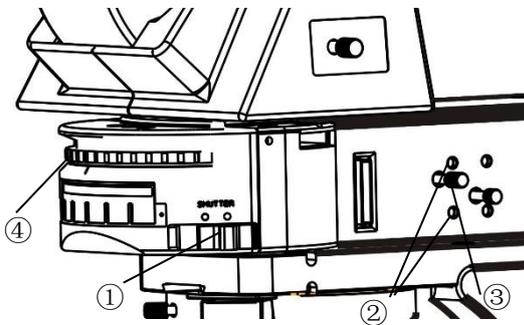


Fig.22

### 3-18 Reflective optical path choice (Fig.22)

Rotate the splitter chamber (Num.④, Fig.22) to the spectroscopy assembly room according to the requirements of the required observation path.

BF1: Reflection field observations (transmittance: 6%)

BF2: Reflection light field observations

DF: Reflection light dark field observations

When rotating the spectroscopy assembly, it must be complete.

**\* It is recommended to use "DF" for dark field observation. For light field observation, please switch to "BF2", in case the light is too bright to damage the eyes.**

### 3-19 Diaphragm against mid-field view (Fig.23, 24)

1. Put the light brake lever on the "●" position.
2. Rotate the spectroscopy assembly chamber (turntable) to the BF position.
3. Put the light brake lever on the "O" position and let the light go.
4. Rotate the objective to transfer the 10x objective into the light path, The sample is then placed on the stage and the image is roughly focused.
5. Pull the lever ③ out of the field diaphragm on the lighting device until the aperture diaphragm is at its minimum diameter.
6. Use a hexagonal wrench to insert the two field diaphragm into the center screw ②, adjust the image to the aperture to be located in the center of the field of view (Fig.23 shows the adjustment process).
7. Push the pull rod ③ along the aperture of the field and open the aperture until the image of the aperture and the perimeter of the field of view are inscribed. If the image is not correctly aligned, re-align until it is centered.
8. Open the wide field of view diaphragm so that the image is exactly connected to the field of view (c in Fig. 23).

#### ● In the light field of reflected light

The field stop adjusts the lighting area to produce high-contrast images. According to the objective lens used, Adjust the aperture knob of the field (Num③, Fig22) of view of the reflecting illuminator until the aperture image is outside the field of view, to screen out unnecessary light.

#### ● In the light-dark field of reflected light

The diaphragm knob must be pushed forward to fully open the diaphragm.

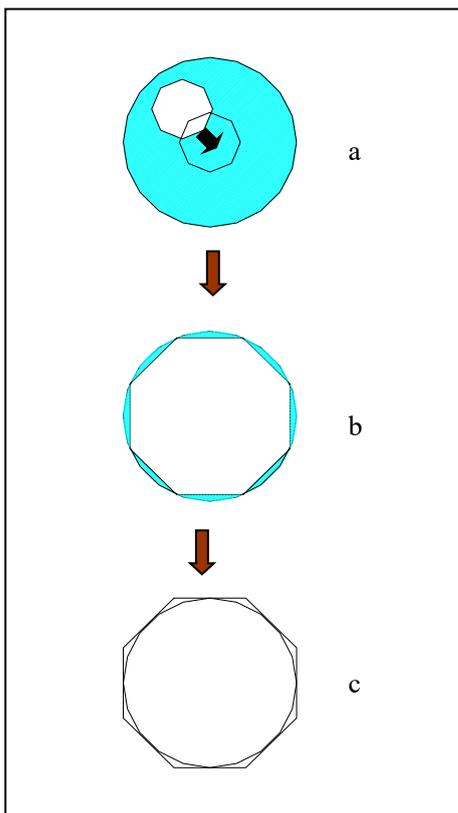


Fig.23

**3-20 Aperture diaphragm use (Fig.24, 25)**

1. Move the light brake lever to the "●" position and close the light path.
2. Rotate the spectroscope assembly chamber (turntable) to the BF position.
3. Move the light brake lever to the "O" position and let the light go.
4. Turn the objective lens nosepiece so that the 10x objective lens enters the light path, and then place the sample on the stage to roughly focus the image.
5. Move the white board with the "cross" line until the "cross" is in the middle of the field of view.
6. Turn the objective to transfer the empty position into the light path.
7. Push the aperture diaphragm out of the pull rod ③ until the aperture diaphragm is at its minimum diameter.
8. Push the pull rod ② through the field diaphragm until it reaches the minimum diameter of the field diaphragm. Meanwhile, the aperture diaphragm image can be seen on the opposite central plate.
9. Insert the hex wrench into two aperture diaphragm alignment screws ④, the aperture image adjusted to aperture matches the "cross" image.

● **In the light field of reflected light**

The aperture size is set between 70% and 80% of the numerical aperture of the objective lens (As shown in Fig.25), this position is generally the best viewing position.

● **In the light-dark field of reflected light**

You must push the aperture diaphragm lever (Num ③ in Fig. 24) to open the aperture diaphragm.

- ⊙ For some samples, close the aperture diaphragm slightly, sometimes to get both high contrast and low glare images. Therefore, it is recommended that close the aperture diaphragm slightly.

**3-21 Use the polarizer and analyzer (Fig.26)**

1. The polarizer (Fig.27) with a screen print face forward, insert it into the polarizer slot (Num.② Fig.26), and then move the polarizer into the light path.
2. After the dust cover is removed, the analyzer (Fig.27) is pushed into the slot (Num.① Fig.26).
3. Turn the polarizer rotor (Num.③ Fig.26) to find the darkest position in the field of view.

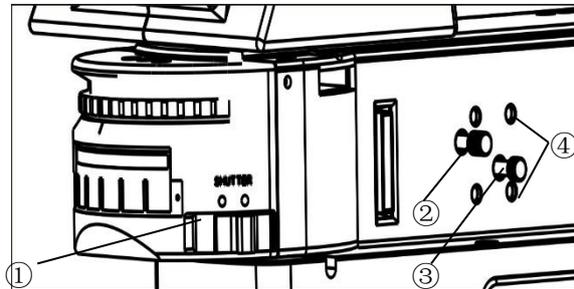


Fig.24

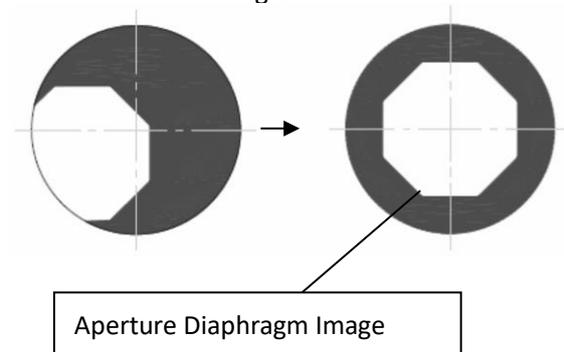


Fig.25

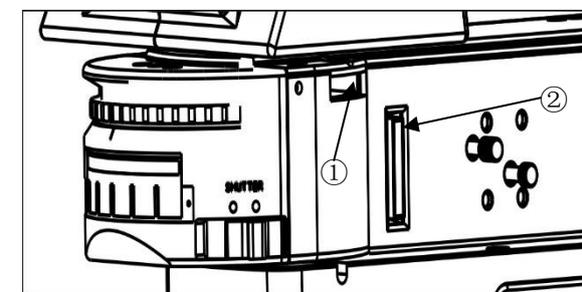


Fig.26



Analyzer



Polarizer

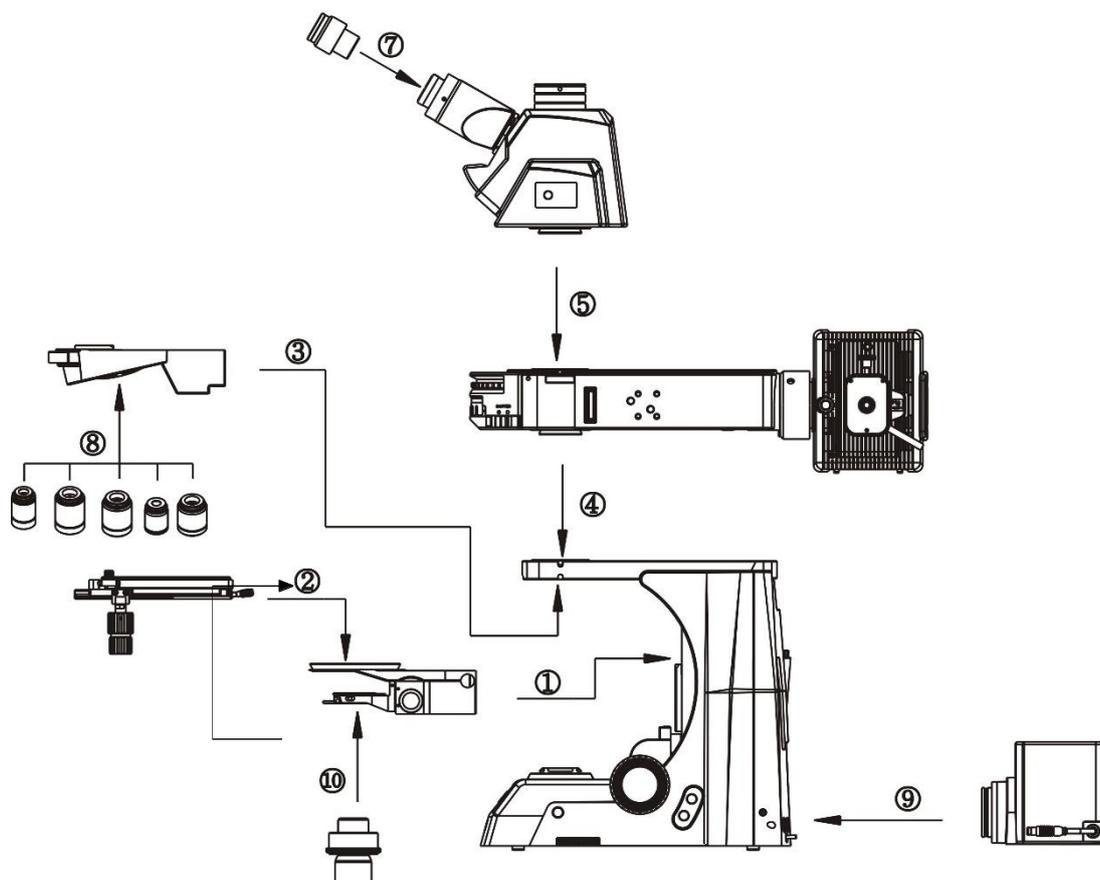
Fig.27

## 4. Installation

### 4-1 Installation diagram

The following figure shows the installation sequence of each component, and the figure shows the installation steps.

- ★ Before installing, make sure all parts are free of dust and dirt. Do not scratch any part or glass surface.
- ★ Keep the Allen wrench provided. You will also need it when changing parts.



## 4-2 Installation Steps

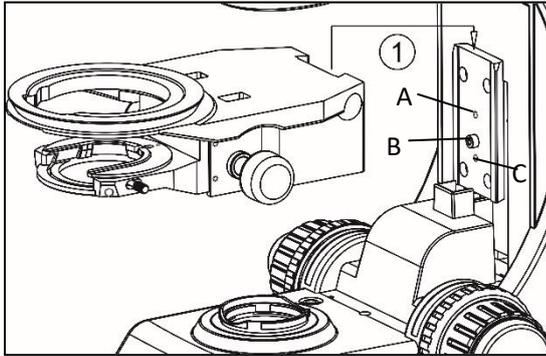


Fig.1

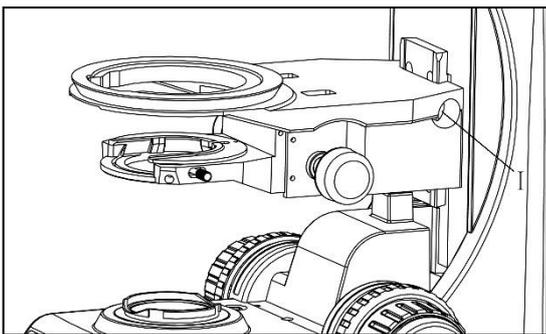


Fig.2

### 4-2-1 Mechanical carrier stage bracket installation (Fig.1, 2)

- ★ Rotate the coarse focusing wheel so that the dovetail of the frame rises until the limit screw exposure end face as shown in the figure, then install the stage bracket according to the path of serial number "C" in Fig.1. Align the dovetail groove of the stage bracket with the dovetail bulge of the rack in Fig.1, slide down naturally until lower level screw is limited. Then the screw of num1 in Fig.2 is screwed inward with a wrench.

The position adjustment of mechanical carrier stage bracket can be adjusted by adjusting the position of limit screw (As shown in the figure, the limit screw is installed at B. When using the metallographic objective lens, the limit screw can be installed at A).

### 4-2-2 Mechanical carrier stage equipment installation (Fig.3)

- ★ The mechanical carrier stage is installed along the path of ramp in Fig.3. Firstly, the hole center of the stage is roughly aligned with the center of the support circle, and then the stage is placed on the positioning ring of the support.
- ◇ After the stage is placed stable, tighten the screw of II with universal wrench in Fig.3, so that the stage can't rotate and shake.

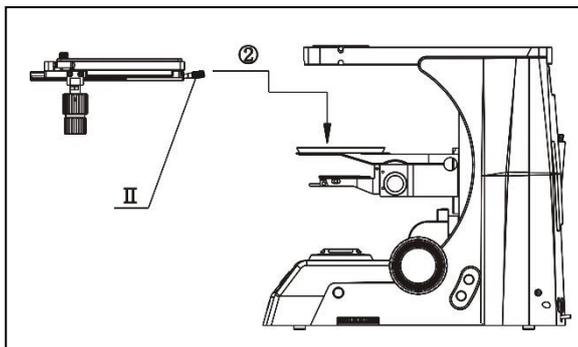


Fig.3

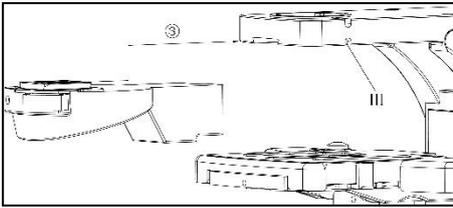


Fig.4

**4-2-3 Nosepiece installation (Fig.4)**

Insert the slit into the dovetail groove of the microscope as shown by Num③ in figure 5 and push it to the bottom, then tighten the screw of III with universal wrench to fasten.

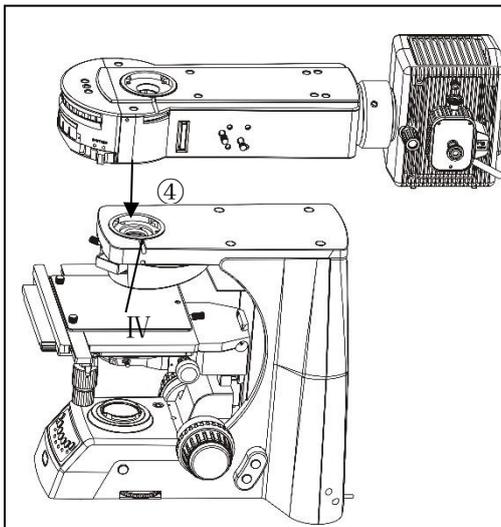


Fig.5

**4-2-4 Metallographic device installation (Fig.5)**

The metallographic device shall be inserted into the head of the microscope body in accordance with the serial number in figure 5 and transferred to the appropriate position, then tighten the screw with hexagon wrench to fasten.

**4-2-5 Install observation head and C-mount of photographic accessories 0.5X/1X (Fig.6)**

**1. Install the trinocular observation head.**

The observation head is loaded into the circular dovetail of the microscope according to the path (Num⑤) shown in ordinal shape in figure 6, then tighten the screw of V with universal wrench to fasten observation head.

**2. Install the interface of photo accessories 0.5x / 1x C-mount (optional).**

The interface of photographic attachment 0.5x / 1x C-mount is loaded into the interface of the three-item attachment of observation header according to the path specified in the serial number ⑥ in figure 6, then tighten the screw of VI with universal wrench to fasten photo attachments.

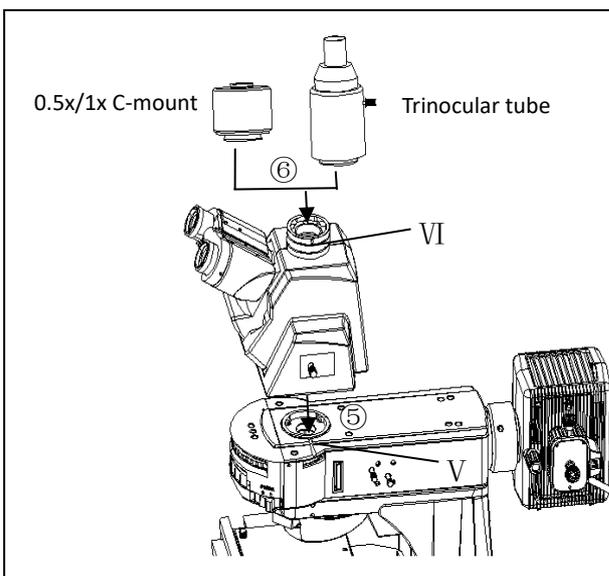


Fig.6

★ During the installation of the observation head, always hold the observation head with one hand to prevent it from falling and breaking.

★ When the observation head is not in use and the photographic accessories are not installed, please cover the interface of the camera lens and the interface of the accessory of the trinocular tube with the corresponding dust cover to prevent dust intake.

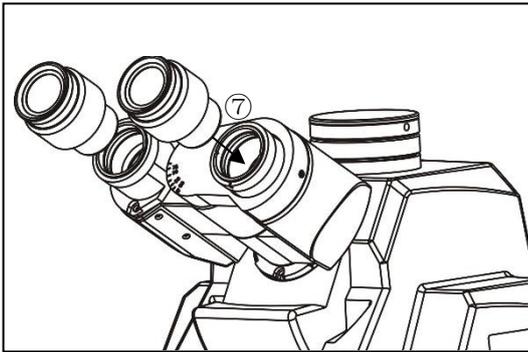


Fig.7

#### 4-2-6 Eyepiece installation (Fig.7)

Insert the eyepiece into the viewing eyepiece tube to the side according to the path of Num ⑦ as shown by Fig.7.

#### 4-2-7 Objective lenses installation (Fig.8)

1. Adjust the coarse focusing hand-wheel until the mechanical carrier stage bracket is lowered to its lower limit.

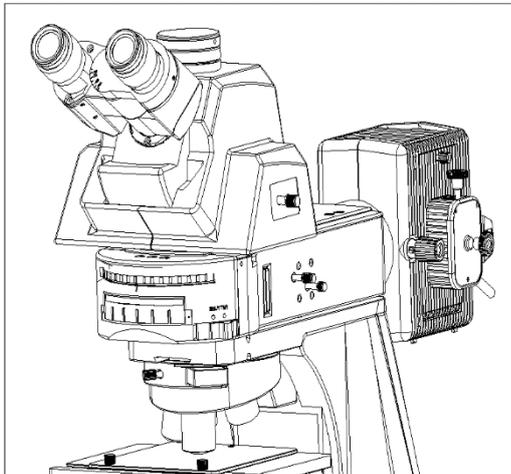
2. The objective lens with the lowest magnification rate is twisted to the nosepiece from the left or right side, then Push the nosepiece clockwise, Install other objective lenses in order from low to high magnification (as shown in Fig.8).

✧ It becomes easy to change the magnification rate during use by this objective installation method.

★ Clean the objective glasses regularly, the objective lens is very sensitive to dust.

★ When operating, the samples were first searched and focused using a 5x objective lens, then the objective lens with other magnification was changed to observe according to the needs.

★ When rotating the objective lens, we can't ensure that the required lens enters the optical center until we hear the "Clicking" voice.



#### 4-2-8 Long distance condenser installation (Fig.9)

Adjust the small bracket to the lowest position, then screw out the lower part of the condenser. The upper part is inserted into the small bracket according to the path shown in Figure 9, until the screw of serial number VIII is placed in the slot, the upper part is pushed to the button, then screw the lower and upper portion of the condenser, Finally the bolt of Num VII is screwed according to the direction as shown in Fig.9 to tighten the long-range condenser.

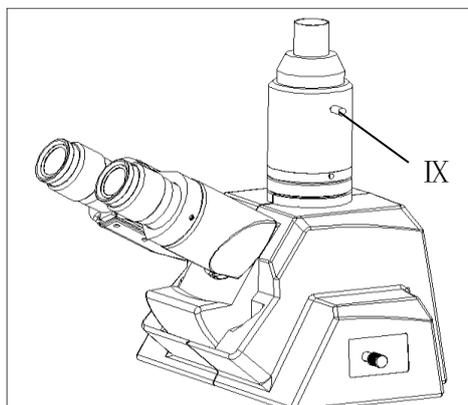


Fig.10

**4-2-9 Change the camera interface (figure 10 and 11 are optional)**

As shown by Fig.10, spin out the serial number IX screw a distance, to make it no longer top tighten the camera interface, then unplug the camera interface.

As shown by Fig.10, screw the camera interface into the three - eye socket to the appropriate location according to the path of Num⑨, screw into position used to tighten camera interface as shown by IX.

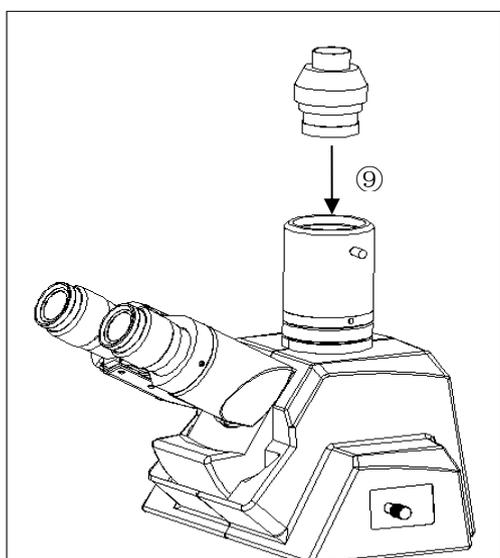


Fig.11

- ★ Determine the most suitable location of the camera interface, the specimen can be viewed with an eyepiece and adjusted to a clear position, then, the camera is installed to observe the image, meanwhile, adjust the position of camera interface accordingly, tighten the serial number IX screws when the clearest image can be get.

**4-2-10 Lamp room installation (Fig.12)**

Firstly, insert the light box into the back of the frame base by referring to the path of Num ⑩ marked in Figure.12.

Secondly, tighten the bolt in the serial number X hole by use of an allen wrench until the light box can not be loose.

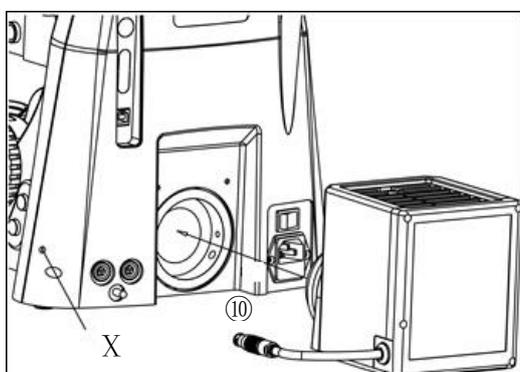


Fig.12

## 5. Technical specifications

### BS-6024TRF, 6024RF Specification

Model		BS-6024TRF	BS-6024RF
Optical system	NIS60 Infinite optical system	●	●
Eyepiece	Extra wide field eyepiece EW10X /25mm, Φ 30mm tube	●	●
Objective	NIS45 5x, 10x, 20x, 50x, 100x bright field and dark field objective	●	●
	NIS60 5x, 10x, 20x, 50x, 100x bright field objective	○	○
Viewing head	Tilting angle trinocular viewing head, 0-35 degree tilt, Pupil Distance 47-78mm, Eyepiece interface Φ30, Fixed visual Angle	●	●
Reflected light	BF1 ( Prevent the switch from being too bright), BF2, DF Three modules	●	●
	Standard Kohler lighting, 12V100W Halogen lamp	●	●
	Polarizer, analyzer	○	○
	Synchronous connection plate	○	○
	Blue, green, yellow filter and ground glass	●	●
Transmitted lighting system	With extended 12V100W power output interface (can be used as falling light source)	●	
	Standard Kohler lighting, 12V100W Halogen lamp	●	
	ND25, ND6 filter	●	○
Condenser	Long range condenser: NA0.65, WD 10.2mm, Adjustable central mechanism, Dual condenser lifting handle	●	
Focusing system	Coaxial focusing, Exchange mechanism of left and right hand wheel; Left hand has height limit function; The right hand has coarse movement and elastic adjustment function; Fine focusing 0.001mm/ grid, 0.1mm/ rotation; Coarse focusing 37.7mm/ rotation; Lifting range 35mm; The sample space is 56mm (change the stage bracket to the lowest gear)	●	●
Nosepiece	Six-hole nosepiece (Expansion slot), Dovetail joint, W26×0.706	●	●
Stage	1. Movement range 4"X4" (102X102mm); 2. Use hard oxide surface to prevent wear; 3. Y can be locked; 4. Size: 210 (X) x170 (Y) mm	●	●
Nipping machine	Used to press the specimens	○	○
Photo adapters	Adapters for Nikon or Canon DSLR digital cameras	○	○
Camera adapters	Standard C-mount adapters 1 x, 0.5 x, 0.7 x	○	○

Software	NOVA Basic image software	●	●
ECO function	No operator turns off the light automatically after 15 minutes	●	●

Note: ●-standard configuration, ○-optional accessories

**BS-6025TRF, 6025RF Specification**

Model		BS-6025TRF	BS-6025RF
Optical system	NIS60 Infinite optical system	●	●
Eyepiece	Extra wide field eyepiece EW10X /25mm, Φ 30mm tube	●	●
Objective	NIS45 5x, 10x, 20x, 50x, 100x bright field and dark field objective	●	●
	NIS60 5x, 10x, 20x, 50x, 100x bright field objective	○	○
Viewing head	Tilting angle trinocular viewing head, 0-35 degree tilt, Pupil Distance 47-78mm, Eyepiece interface Φ30, Fixed visual Angle	●	●
Reflected light	BF1 (Prevent the switch from being too bright), BF2, DF Three modules	●	●
	Standard Kohler lighting, 12V100W Halogen lamp	●	●
	Polarizer, analyzer	○	○
	Synchronous connection plate	○	○
	Blue, green, yellow filter and ground glass	●	●
Transmitted lighting system	With extended 12V100W power output interface (can be used as falling light source)	●	
	Standard Kohler lighting, 12V100W Halogen lamp	●	
	ND25, ND6 filter	●	○
Condenser	Long range condenser: NA0.65, WD 10.2mm, Adjustable central mechanism, Dual condenser lifting handle	●	
Focusing system	Coaxial focusing, Exchange mechanism of left and right hand wheel; Left hand has height limit function; The right hand has coarse movement and elastic adjustment function; Fine focusing 0.001mm/ grid, 0.1mm/ rotation; Coarse focusing 37.7mm/ rotation; Lifting range 35mm; The sample space is 56mm (change the stage bracket to the lowest gear)	●	●
Nosepiece	Motorized Six-hole nosepiece (Expansion slot), Dovetail joint, W26×0.706	●	●
Stage	1. Movement range 4"X4" (102X102mm); 2. Use hard oxide surface to prevent wear; 3. Y can be locked; 4. Size: 210 (X) x170 (Y) mm	●	●
Nipping machine	Used to press the specimens	○	○

Photo adapters	Adapters for Nikon or Canon DSLR digital cameras	○	○
Camera adapters	Standard C-mount adapters 1 x, 0.5 x, 0.7 x	○	○
Software	NOVA Basic image software	●	●
ECO function	No operator turns off the light automatically after 15 minutes	●	●
Additional features	Brightness memory function	●	●
	Built-in objective lens switch button on the front part of the base; TG key (switch between any two objective lenses)	●	●
	4 built-in shortcuts (default is to switch objective)	●	●
	One-click camera function	●	●

Note: ●-standard configuration, ○-optional accessories

## 6. Trouble Shooting

### 6.1 Optical system

For transmitted illumination		
Trouble	Cause	Solution
Edge dark or uneven field of view	The nosepiece is not located (The objective is not in the center of the light path)	The nosepiece is switched to the location (Turn the objective lens so that it properly enters the light path)
	The condenser is not centered	Make condenser be centered
	There is dirt on the lens (Condenser, objective, eyepiece, collector).	Clean the lens
There's dirt in the field of view	There is dirt on the lens (Condenser, objective, eyepiece, collector) or specimen.	Clean the lenses
	The condenser position is too low	Adjust the height of the condenser
Poor image quality (poor contrast, low resolution)	The aperture diaphragm is too wide	Appropriate down
	There is dirt on the incident lens of the binocular tube	Clean the lens
	The aperture diaphragm is too narrow	Adjust the aperture diaphragm bigger
	The condenser position is too low	Adjust the height of the condenser
One side of the image is dark	The condenser is not in the center of the field of view or tilted	Reinstall the lens and adjust the center screw carefully
	The nosepiece is not located	Rotate and locate the nosepiece
	The specimen is not placed in parallel	Adjust or replace it
Image movement during focusing	The specimen floats on the surface of the stage	It should be placed firmly
	The nosepiece is not located	Rotate and locate the nosepiece
Insufficient illumination	Brightness is not adjusted accurately	Adjust the brightness control knob
	The condenser position is too low	Correct its position
	The condenser is not centered	Transfer it to the middle
	The push-pull rod of trinocular tube is in positioned halfway.	Set it to correct position according to the purpose
	The size of field stop is too small.	Open the field stop until the image of the field stop inscribed with the field of viewing

<b>For epi-illumination</b>		
<b>Trouble</b>	<b>Cause</b>	<b>Solution</b>
For bright field observation, the image is too bright	The rotating spectroscopy assembly room is set to BF2	Switch to BF1
The image is uneven	The size of aperture diaphragm is too small	Adjust diaphragm
Field of view is obscured or evenly not illuminated	The rotating spectroscopy assembly room is in an intermediate position.	Adjust it correctly.
	Field stop is not centered.	Center the field stop correctly and open it sufficiently.
	The filter is not in correct position.	Set it in a click position.
	Lamp bulb is not installed correctly.	Push halogen bulb terminals all the way into stop position.
	Analyzer and polarizer not installed correctly	Engage analyzer and polarizer in light path.
Bulb lights on but the field of view is dark.	The aperture diaphragm or field stop is closed.	Open the aperture diaphragms and field stop
	Analyzer and polarizer are engaged in light path.	Remove them from light path.
	The push-pull rod knob of trinocular tube is positioned halfway.	Fully pull out the push-pull rod
	The rotating spectroscopy assembly room is in an intermediate position	Adjust it correctly.
No dark field observation	The rotating spectroscopy assembly room is not at the position of DF	Set the rotating spectroscopy assembly room to DF correctly

## 6.2 Mechanical parts

Trouble	Cause	Solution
The coarse focus knob is hard to run	The tension adjustment collar is too tight	Loose properly
	The locking hand-wheel fixes the stage	Release the locking hand-wheel
Stage descends by itself or defocus during observation.	The tension adjustment collar is too loose	Tighten properly
Specimen cannot be brought into focus	The height of stage is too low	Raise the height of stage
Image moves obviously when you touch the stage	Stage is not properly mounted.	Clamp stage.
The binocular images do not coincide	Pupil distance is not properly adjusted	Readjustment
Eye strain	There is no visual adjustment	Adjust visual acuity correctly
	Improper lighting intensity	Adjust the dimmer knob

## 6.3 Electrical parts

Trouble	Cause	Solution
The bulb does not light when the switch is on	There is no power supply	Check the connection of the wire
	Lamp source plug not inserted correctly	Insert correctly
	The light bulb is broken	Replacement
	The fuse burn out	Check the fuse
Insufficient illumination	The voltage is too low	Increase the voltage
The bulb flickers or is unstable in brightness	The light bulb is going to wear out	Replacement
Leave the setting time without turning off the light	There is something else in front of the device within 1 meter	Move anything within 1 meter of the device
Can't take pictures	Check if the driver is installed correctly	Install the corresponding driver according to the camera model
	The line connection is not normal	Check that the connection between the microscope, computer and camera is normal and reconnected

**After-sales service commitment:**

Within 36 months from the date of delivery, on the condition that the instrument cannot work due to Non-human factor quality problem, our company guarantee the repair and replace the parts.

Our company provide Lifelong maintenance service for the products, in addition, beyond warranty, we supply spare parts in the long run, which has a concessional price.