



# **BS-6004 SERIES**

## **INVERTED METALLURGICAL**

### **MICROSCOPE INSTRUCTION**



This instruction manual is for the Inverted Metallurgical microscope BS-6004 series. To ensure the safety and obtain optimum performance and to familiarize yourself fully with use of this microscope, we recommend that you study this manual thoroughly before operating the microscope. Retain this instruction manual in an easily accessible place near the work desk for future reference.

The instruction is according to industry standard JB/T10077-1999.

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**Before using***BS-6004 series*

Inverted metallurgical microscope is used to discern and analyze organizational structure from kinds of metal. It is very important in the work of quality research for foundry, smelt, heat treatment and inspection for raw material and analysis for metallurgical structure of material after processing. It is also the important tool of research work for metal physics, which is widely used in enterprise, university and R&D.

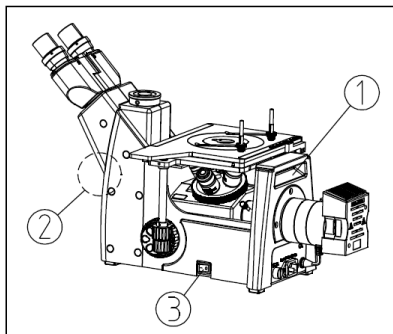
**1. Attention:**

Fig.1

- 1.1 As the microscope is precision instruments, it should be taken carefully and avoid impact during transportation.
- 1.2 Do not expose the microscope in the sun directly, either not in the high temperature, damp, dusty or acute shake place. Make sure the worktable is horizontal. Following environment is required: Indoor temperature: 5°C~40°C, Max relative humidity:80%.
- 1.3 To move the microscope, please hold groove ① behind and tube position ② and lay it carefully. (Fig. 1)

★ It will be damaged by holding the stage, focusing knobs, tube or illuminator.

1.4 The lamp will be very hot during working, please make sure there is enough space around for dissipating.

1.5 Please connect the microscope with ground to avoid lightning strike.

1.6 Please make sure the power switch is "0"(Off)(See the left Fig) and the bulb cool down before replace the bulb or fuse.

★ Bulb: 3W LED bulb (Standard)

12V/30W halogen bulb (Philips 5761) (Optional)

1.7 It adopt widely voltage 90~240V, and do not need any transformer. Please make sure the power supply before using.

1.8 Please use special wires supplier by our company.

**2. Maintenance**

2.1 Clean the lenses gently with a soft lens tissue. Carefully wipe off oil or fingerprints on the lens surfaces with tissue moistened with 3:7 mixture of ethanol and aether or dimethylbenzene.

★ **Ethanol and Aether are both flammable. Please leave them away from fire or fire source, especially during the power switch turn on and turn off.**



2.2 Don't use organic solution to clean the surfaces of the microscope, especially for plastic parts. Please use the neutral detergent if necessary.

2.3 If the microscope damped by the liquid during working, please cut off the power immediately and make it dry.

2.4 Do not disassemble or assemble the microscope to avoid damaging the capability.

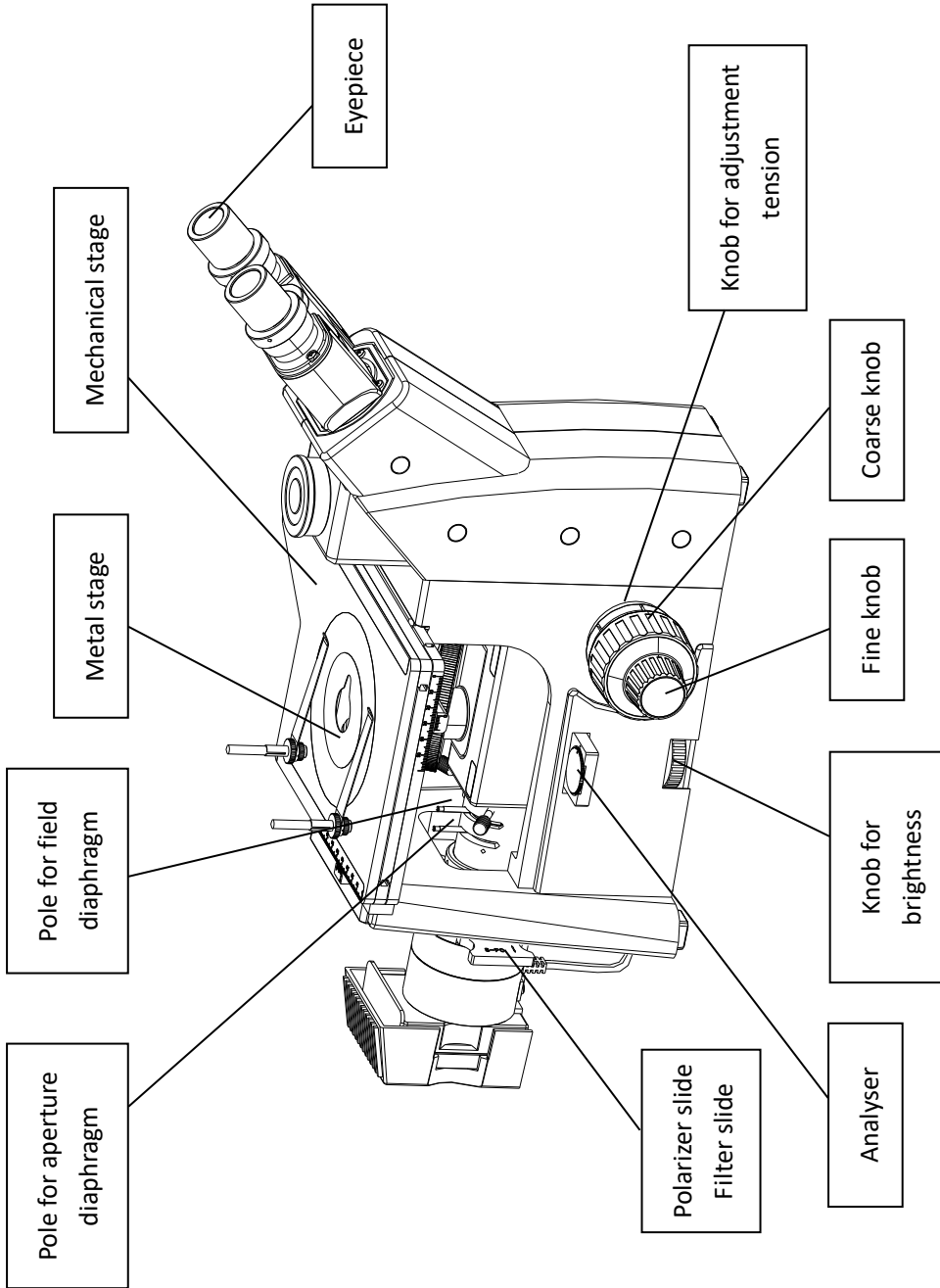
2.5 After using, put on dust cover to protect microscope.

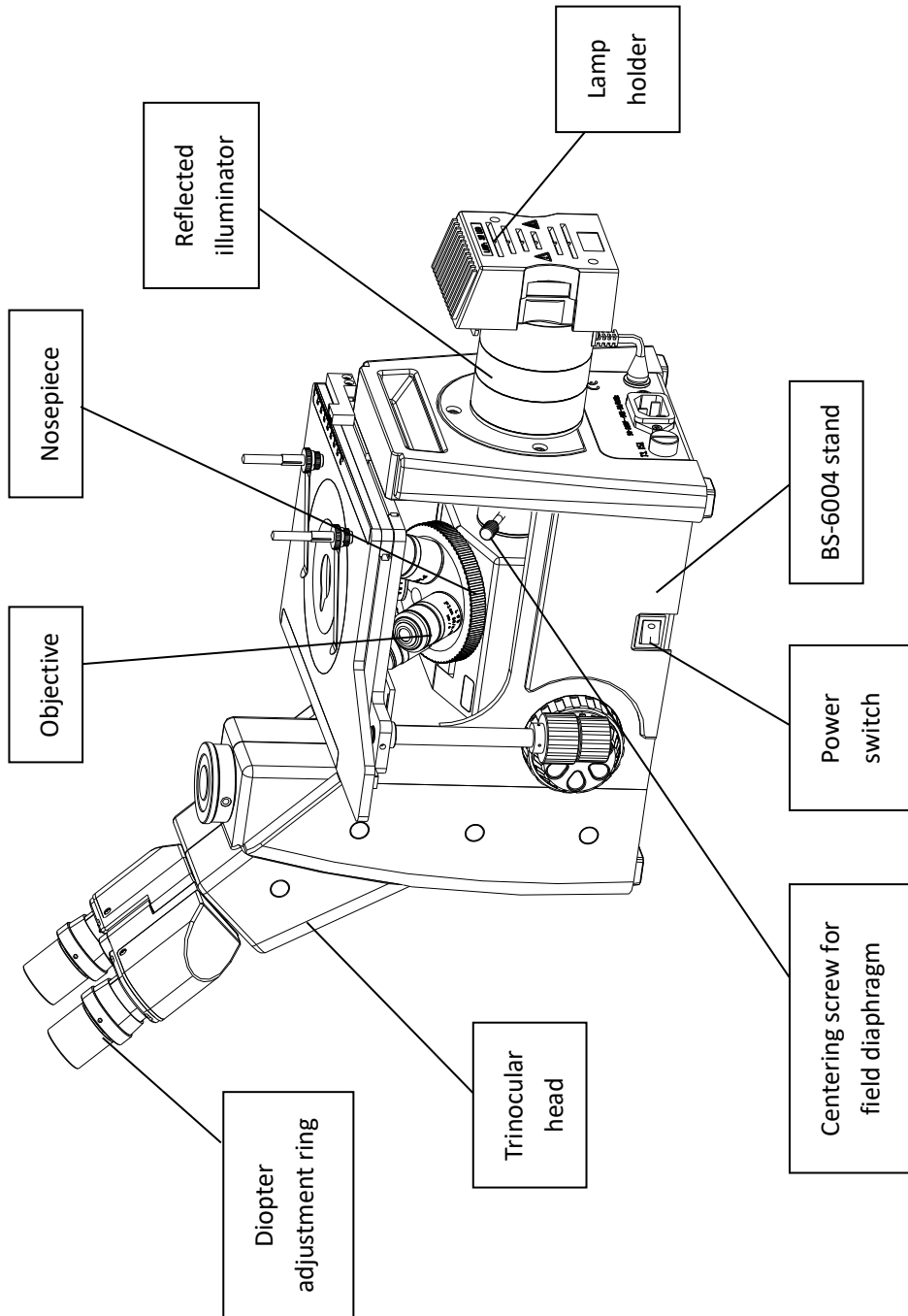
**3. Safety sign**

Sign	Signification
	It shows the surface gets hot and don't touch with bare hand.
	Read the introduction before using. Unsuitable operation would lead person hurt or instrument faulty.
	Power switch ON
○	Power switch OFF

**1. Nomenclature**

*BS-6004 series*





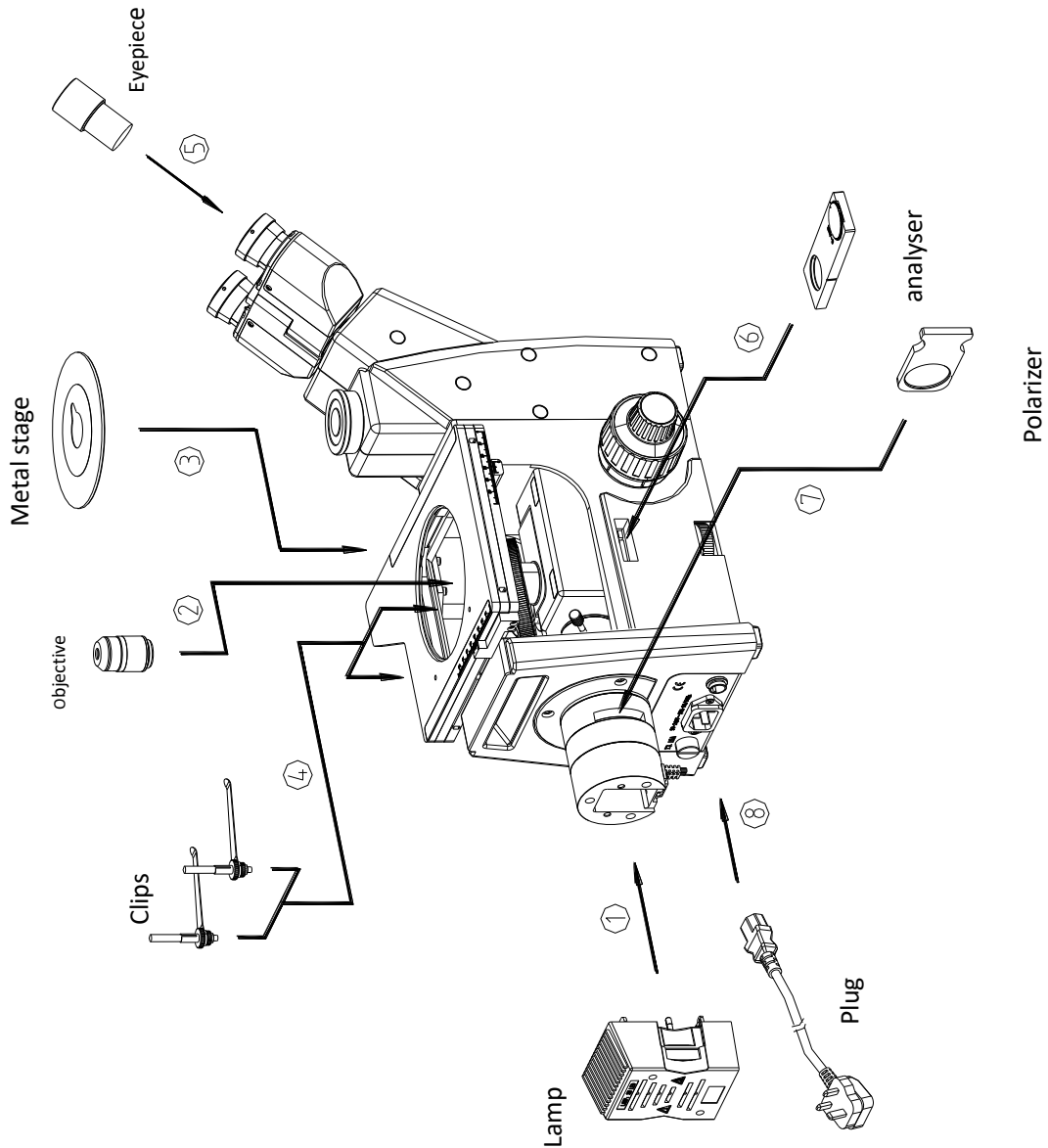
**2. Assemblage**

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**2-1 Assemblage scheme**

The below numbers shows the assemblage order.

- ★ Before assemblage, please make sure all parts are without any dust or dirt..
- ★ Be careful during assemblage and do not scrap or touch the optical lens.



## 2-2 Assemblage step

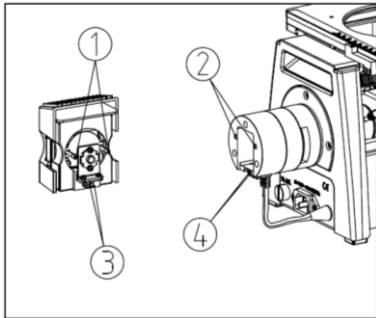


Fig.2

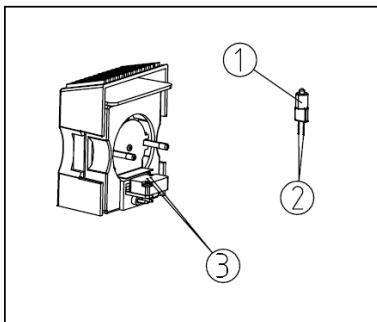


Fig.3

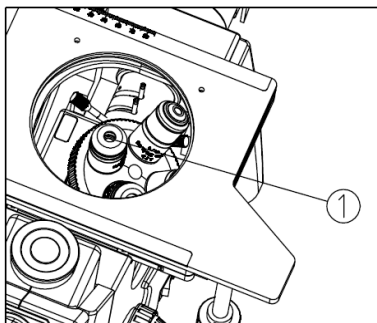


Fig.4

### 2-2-1 Set lamp holder

Make sure the pin ① and ③ facing to the hole ② and ④, then lock. (Fig. 2)

★ LED bulb: 3W

★ Halogen bulb: 6V30W (Philips 5761)

### 2-2-2 Set or replace bulb

Use clean glove or gauze to hold the bulb and make sure the bulb pin ① facing to hole ③ and lock. Please make sure the bulb should be vertical. (Fig. 3)

★ Do not touch the bulb by finger directly.

Clean by gauze if there is finger print on bulb.

★ Whenever replace the bulb, please cut off the power first and wait the illuminator part cool down.

### 2-2-3 Set objectives

Turn the coarse knob to make the nosepiece to lowest. Through the hole on stage to set the objectives ① on nosepiece from low magnification to high magnification with the direction. (Fig. 4)

★ Clean the objectives regularly. It is very sensitive of dust for objective of Inverted microscope.

★ Please use low magnification objective, such as 5X or 10X to find image, then use high one for observation.

★ Make sure to hear click when turning to show the objective on correct position.



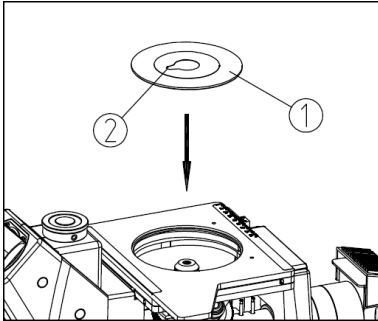


Fig.5

**2-2-4 Set the metal stage**

- (1) Set the metal stage ① on mechanical stage as the direction showed. (Fig. 5)
- (2) Turn the metal stage to make the V hole ② direct to the user.

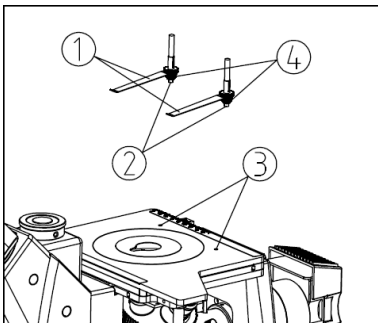


Fig.6

**2-2-5 Set clips**

- (1) Take out clips ① from pole ②. (Fig. 6)
- (2) Screw pole ② into hole ③ on mechanical stage, then lock by screw nut ④.
- (3) Set the clips ① into pole ② and make it direct to center of stage.

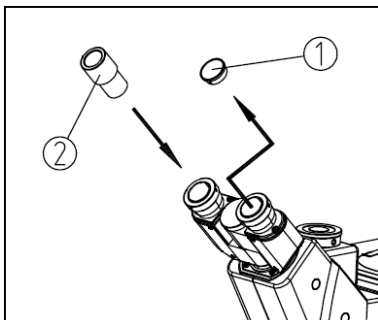


Fig.7

**2-2-6 Set eyepiece**

- (1) Take off eyepiece cap ①. (Fig. 7)
- (2) Insert the eyepiece ② to tube.

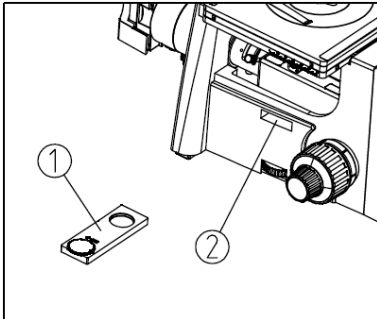


Fig.8

### 2-2-7 Set Analyzer

Insert the analyzer ① into hole ② on microscope stand with its face up to hear click. (Fig.8)

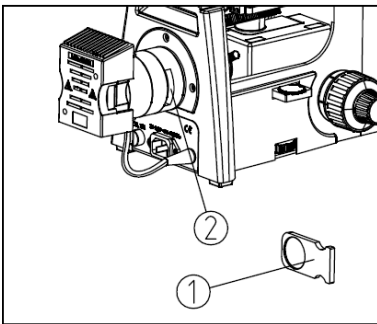


Fig.9

### 2-2-8 Set polarizer and filter

Insert the polarizer or filter ① into hole ② on connector between microscope stand and illuminator with its face up to hear click. (Fig.9)

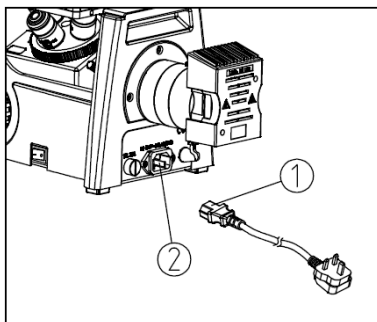


Fig.10

### 2-2-9 Connect power supply

- (1) Make sure the main power switch is at "O" (OFF) position.
- (2) Insert one side of power plug ① into microscope socket ② and the other side connecting to power supply. (Fig. 10)

★ Don't over exert with the wires when it is bendy or voluble.

★ Use the wire supplied by our company only. If it is lost or damaged, choose another suitable one.

★ Connect all wires correctly, make sure the microscope is connected with ground.

3. Operation

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**3-1 Illumination**

- (1) After connect the microscope with power supply, set main switch at “-“ position.
- (2) Turn the knob ① for brightness to suitable. Clockwise turning of the adjusting knob is to bright and counter to dark. (Fig 11)

★ It can protect the bulb if using under low power supply.

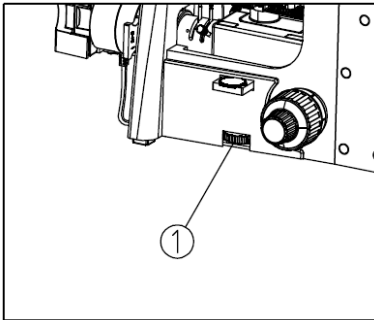


Fig.11

**3-2 Focusing**

- (1)Put the specimen on metal stage and use objective 5X.

★ Please make sure the specimen should be vertical with the objective. If not, please fix the specimen by plasticine

- (2) Adjust the diopter of right tube to “0” (See 3-4 Adjust diopter). Observe through right eyepiece and turn the coarse knob ① to find the image (Fig 12)
- (3) Turn the fine knob ② to make the image clear.

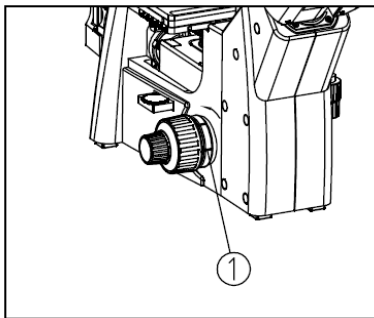
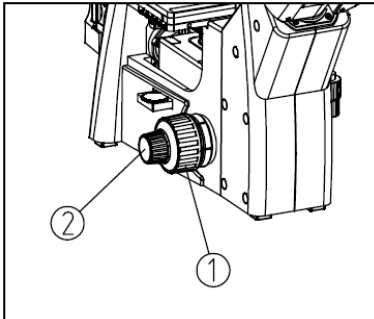


Fig.13

**3-3 Adjust tension of focus**

If the tension is too tight or image is out of focus plane or the stage slips down during focusing, please adjust the tension knob ① of focus. (Fig. 13)

★ The knob ① direction indicated is for loose and opposite direction for tight.

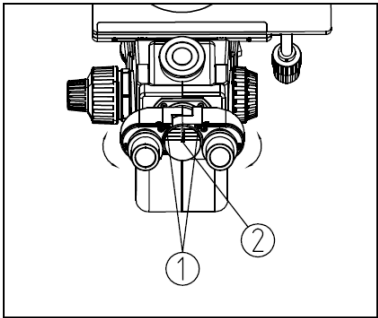
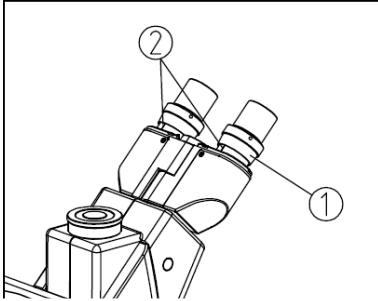


Fig.15

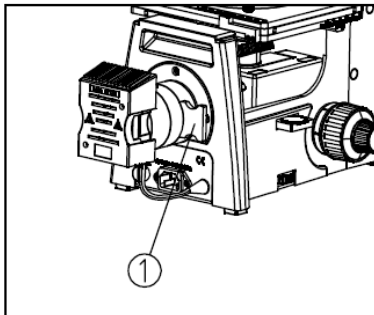


Fig.16

**3-4 Adjust diopter**

Diopter is  $\pm 5$  and it is point to the line on tube. After getting the clear image through right eyepiece, Please observe through left eyepiece with left eye. If the image is not clear, please adjust the left diopter adjusting ring ①. (Fig 14)

★ When both eyepieces have diopter, select one for standard and adjust another. Please make sure the diopter of standard one should be at “0” position before focusing.

**3-5 Adjust inter-pupillary distance**

When two eyes observe, please turn the two prism house with the direction indicate to adjust the inter-pupillary till suitable. (Fig. 15)

The mark “.” on left tube indicates the inter-pupillary.

The inter-pupillary range: 50~76mm

★Please remember your inter-pupillary for next observe.

**3-6 Use filter**

It can make the background of image softly and improve the image more clearly through using filters. (Fig. 16)

Filter: Green, blue, red

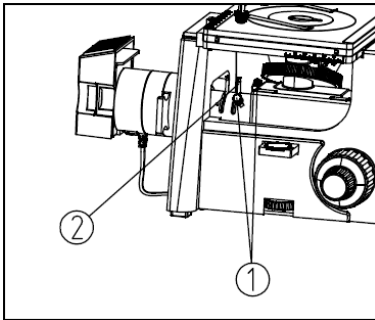


Fig.17

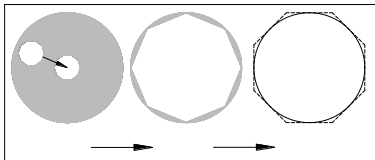


Fig.18

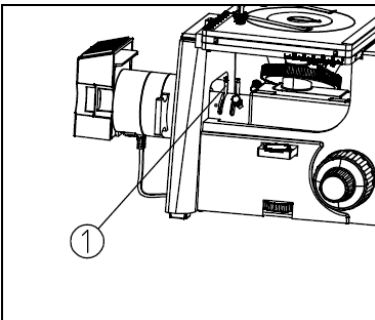


Fig.19

### 3-7 Adjust field diaphragm

Field diaphragm can strength the image contrast by preventing the diameter of bean of light into condenser and in order to strength the image contrast. When the image is in the edge of field, the objective can bring out the supper image.

- (1) Turn the pole ② for field diaphragm adjusting to the most left with counter clockwise to make the field smallest. (Fig 17)
- (2) Through the eyepieces, here you can find the image of field diaphragm.
- (3) Adjust the both centering screws ① of field diaphragm to make the diaphragm image to the center.
- (4) Open the field diaphragm slowly, if the field inscribed with its image, it indicates the diaphragm centered. (Fig 18)
- (5) Please increase the diaphragm a little during operation to make the field as circumcircle with its image.

### 3-8 Adjust aperture diaphragm

Aperture diaphragm controls the aperture of illumination. The aperture of illumination should be suitable with objective's, then it can provide the best image and increase depth of field.

The adjustment of aperture diaphragm is the same as field diaphragm. Please use knob ①. Please adjust aperture diaphragm to suitable through the contrast of image. (Fig. 19)

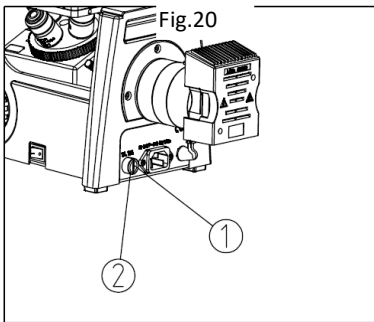
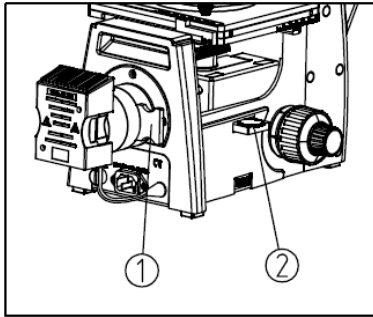


Fig.21

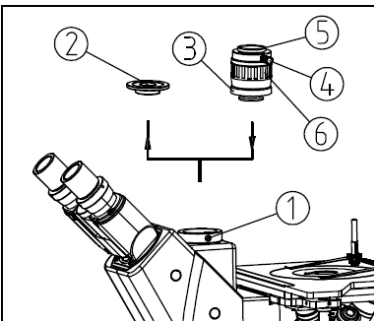


Fig.22

### 3-9 Use simple polarizing kit

Simple polarizing kits includes polarizer and analyzer. (Fig. 20)

- (1) Set analyzer and polarizer as 2-2-7 and 2-2-8. (Please take off filter slide when using polarizer slide)
- (2) It can change position of polarizing light to rotate analyzer.
- (3) When analyzer is at zero position, the analyzer and polarizer are crossed.

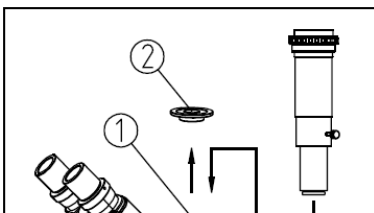
### 3-10 Replace fuse

Before replace fuse, please make sure the power switch is at "0" (Off) and cut off the power supply. Use screwdriver to take off the fuse ① from fuse holder ② and replace a new one. (Fig 21)

★ The rating for fuse: 250V, 8A.

### 3-11 Mount and use TV device

- (1) Loose the lock-screw ① on tri-tube and take off the tri-cap ②. (Fig 22)
- (2) Take off the caps of TV adapter ③ and settle on tri-tube and lock by screw ①.
- (3) Loose the lock-screw ④ on TV adapter and take off C-mount ⑤. Then set the C-mount to CCD or camera and connect to TV adapter again, lock on.
- (4) Adjust the image clear through binocular then observe through CCD. If it is not clear, you can adjust the adjusting ring ⑥ till clear



### 3-12 Mount and use photo device

- (1) Loose the lock-screw ① on tri-tube and take off the tri-cap ②. (Fig 23)
- (2) Mount the photo device as the direction indicated into tri-tube, then lock on screw ①.
- (3) Loose the lock-screw ③ on photo adapter and take off photo tube ④. (Fig. 24)
- (4) Insert 3.2X photo eyepiece ⑤ into tube ⑥. Then mount photo tube ④ and lock on screw ③.
- (5) Adjust the image clear through binocular then use camera as its manual.

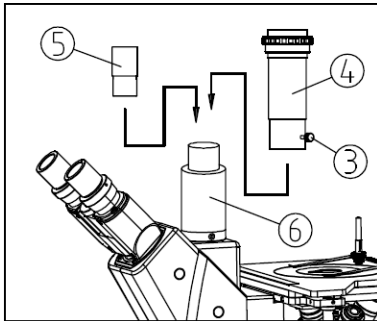


Fig.24

## 4. Technical Parameter

BS-6004 seris

Technical Parameter for BS-6004 Inverted metallurgical microscope.

eyepiece	PL10X/18mm plan eyepiece
Objective	195mm normal metallurgical objective (5X, 10X, 20X, 40X) 195mm LWD professional plan metallurgical objective (5X, 10X, 20X, 50X, 100X)
Head	Gemel trinocular head, 45 degrees inclined, with 8:2 prismatic Inter-pupillary distance: 55-75mm
Nosepiece	Build-in quadruple nosepiece (Build-in quintuple nosepiece)
Focus	Fine and coarse coaxial, moving range: 33mm, fine precision: 0.001mm
Stage	Size: 180*155mm, moving range: 75*40mm φ12 metal stage (φ25metal stage for selection)
Illumination	Reflected Kohler illuminator with iris aperture diaphragm and centering field diaphragm. 100-240VAC power supply with 3W LED bulb (6V30W halogen bulb is optional). Adjustment for brightness.
Polarizing set	Analyzer can be rotatable and both polarizer and analyzer can be moved into light path.
Filter	Blue, green, yellow
Operation Environment	<ul style="list-style-type: none"> <li>● Indoor</li> <li>● Altitude: 2000m Max.</li> <li>● Temperature: 5°C—40°C (41°F—104°F)</li> <li>● Humidity: 80% for 31°C (88°F) 70% for 34°C (93°F) 60% for 37°C (99°F) 50% for 40°C (104°F)</li> <li>● Pollution: 2 (Refer to IEC664)</li> </ul>

## 5. Troubleshooting

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The performance of the microscope can't be made fully because of unfamiliar using, this table will give some advices.



Trouble	Cause	Remedy
<b>1. Optical parts</b>		
(1) bulb works, but the light is not enough	Field diaphragm is not enough large	Turn it larger
	The knob for brightness is too low	Adjust to suitable
	The polarizer and analyzer is pulled inside	Take them off
(2) the edge of field dark or not equal	Nosepiece is not fixed	Fix the nosepiece
	Dirt on lens or eyepiece or objective	Clean them
	Filter, polarizer or analyzer are not at right position	Pull the slides in or pull in the light path selection pole
(3) dirt inside of field	Dirt on specimen	Clean specimen
	Dirt on lenses	Clean lenses
(4) image blur	Slide cover on sample	Take the cover away
	Sample is not upright to objective	Adjust the sample
	Nosepiece is not fixed	Fix the nosepiece
	Aperture diaphragm opened too large	Adjust it
	Dirt on lens of eyepiece	Clean it
(5) image blur somewhere or image moving during focusing	Sample is not set correctly	Set it again
	Nosepiece is not fixed	Fix the nosepiece
(6) eye tired easily or double image	Interpupillary is not correct	Adjust interpupillary
	Diopter is not correct	Adjust diopter
	Not the same magnification for both eyepiece	Use same eyepiece

Trouble	Cause	Remedy
<b>2. Mechanics</b>		
(1) too tight of coarse knob	Tension knot is too tight	Loose it to suitable
(2) stage slips down during observe	Tension knot is too loose	Tight it to suitable
<b>3. Electrical parts</b>		
(1)bulb does not work	There is not power supply	Connect the power supply
	The wires do not connect right	Connect it correctly
	Faulty setting of bulb	Set the bulb correctly
	Bulb burn out	Replace bulb
(2) Not enough brightness	Faulty adjusting of brightness	Re-adjust the brightness
	Bulb is not standard	Use standard bulb
(3) bulb always burns out	Bulb is not standard	Use standard bulb
(4) light flickered	Bulb is going to burn out	Replace the bulb
	The wires do not connect right	Connect it correctly