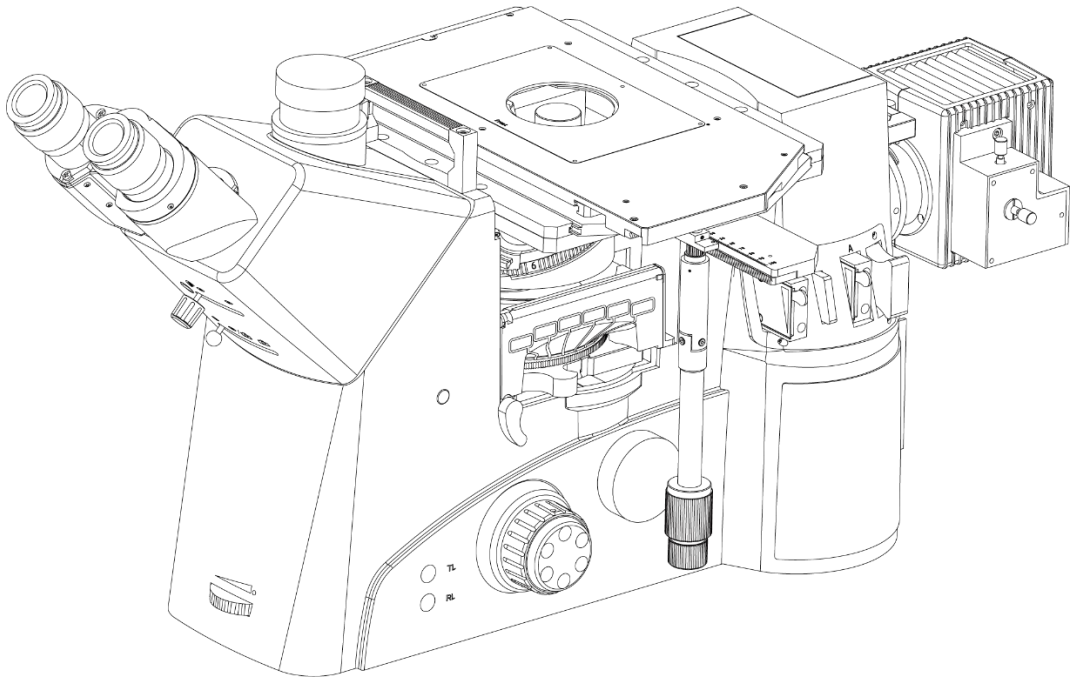
Research Metallographic Microscope

Model Number: BS-6045

Instruction Manual



This instruction manual applies to the BS-6045 research metallographic microscope. In order to ensure safety, maximize the performance of the instrument, and make you fully familiar with the use of this microscope, we recommend that you read this manual thoroughly and carefully before operating the microscope.

Warning and Caution Symbols Used in This Manual

The company provides you with the most safe and reliable instruments, but incorrect use and neglect of the precautions in the manual may cause personal injury and property damage. It is hoped that before you use the product, please read this manual carefully to ensure the correctness of use. In addition, please keep the manual in a place where you can easily read it at any time for real-time query.

In this manual, safety matters will be emphasized with the following symbols, please be sure to follow the instructions with these symbols.

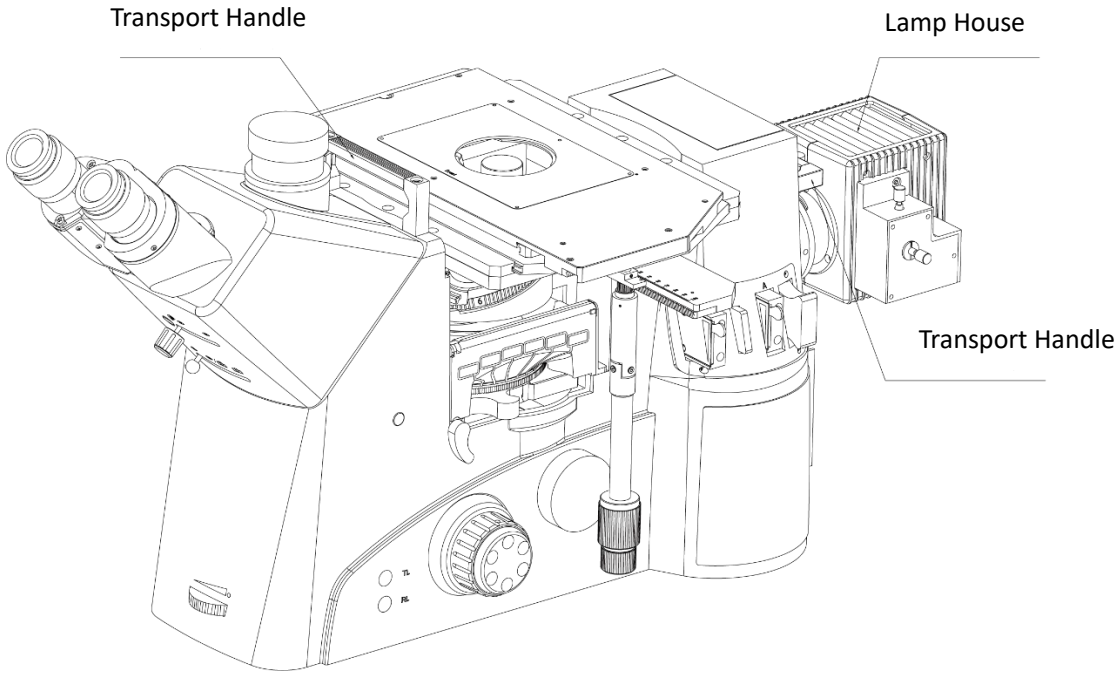
logo	meaning
 Warning	Ignoring this warning could result in serious personal injury or even death
 Notice	Ignoring this notice may result in personal injury or property damage

The meaning of the logo on the product

logo	meaning
	Protective conductor terminal
	careful. scald! You are reminded of the following situations: The lighting room and its surrounding area can become hot when in use. Do not touch the lighting room while it is on or for thirty minutes after it is turned off. Even after the light housing is turned off, the light housing and its surroundings are still very hot, so make sure to allow sufficient cooling time before replacing the bulb
	This symbol appears on the nameplate of the appliance, reminding you to confirm that the input voltage is consistent with the power supply voltage in your area
·	Turn on the power. Turn the brightness knob to adjust the brightness of the field of view
	Turn off the power
	UV radiation
	The instrument needs to be disconnected from the power supply before turning on

Content

Safety Precautions



1. Avoid placing the microscope in places exposed to direct sunlight, high temperature or humidity, dusty, and subject to strong vibrations, and ensure that the worktable is flat, level and strong enough. (Weight: about 29.5 kg for the main unit).

2. If it is necessary to move the microscope, hold the transport handle tightly and keep the microscope and the work surface with a gap before moving the microscope (above).

3. If bacterial solution or water splashes on the stage, objective lens or observation tube, unplug the power cord immediately and wipe off the spilled liquid or water. Otherwise, the instrument may be damaged.

4.

When working, the lamp house will become very hot. Make sure there is enough space for heat dissipation around the lamp house, otherwise heat will accumulate and the instrument will be damaged.

5. Before turning on power to the lamp house, make sure that the correct power source is connected. Before replacing the bulb or fuse, switch off the power supply. Wait for the lamp chamber to cool down completely before proceeding.

★Specified bulb: 12V 100W HAL high brightness halogen bulb (OSRAM)

★Use a fuse that can load the correct fuse current, and must not use a temporary fuse to prevent the power supply from being cut off.

6. Connect the power cord correctly to ensure that the instrument is grounded to avoid lightning strikes.

7. Use the special power cord provided by our company.

8. This product should be stored in a sheltered place without acid gas, alkali, organic solvent and other harmful substances around.

★ For safety, this machine is equipped with a three-pin grounding plug, and the grounding is protected by the three -pin grounding plug. Do not use any adapter plugs that reduce safety.

★ Do not place the device in a position where it is difficult to operate and disconnect the current.

★ If the equipment is used in a manner not specified by the company, the protection provided by the equipment may be impaired.

Ⅰ. Structure and Name

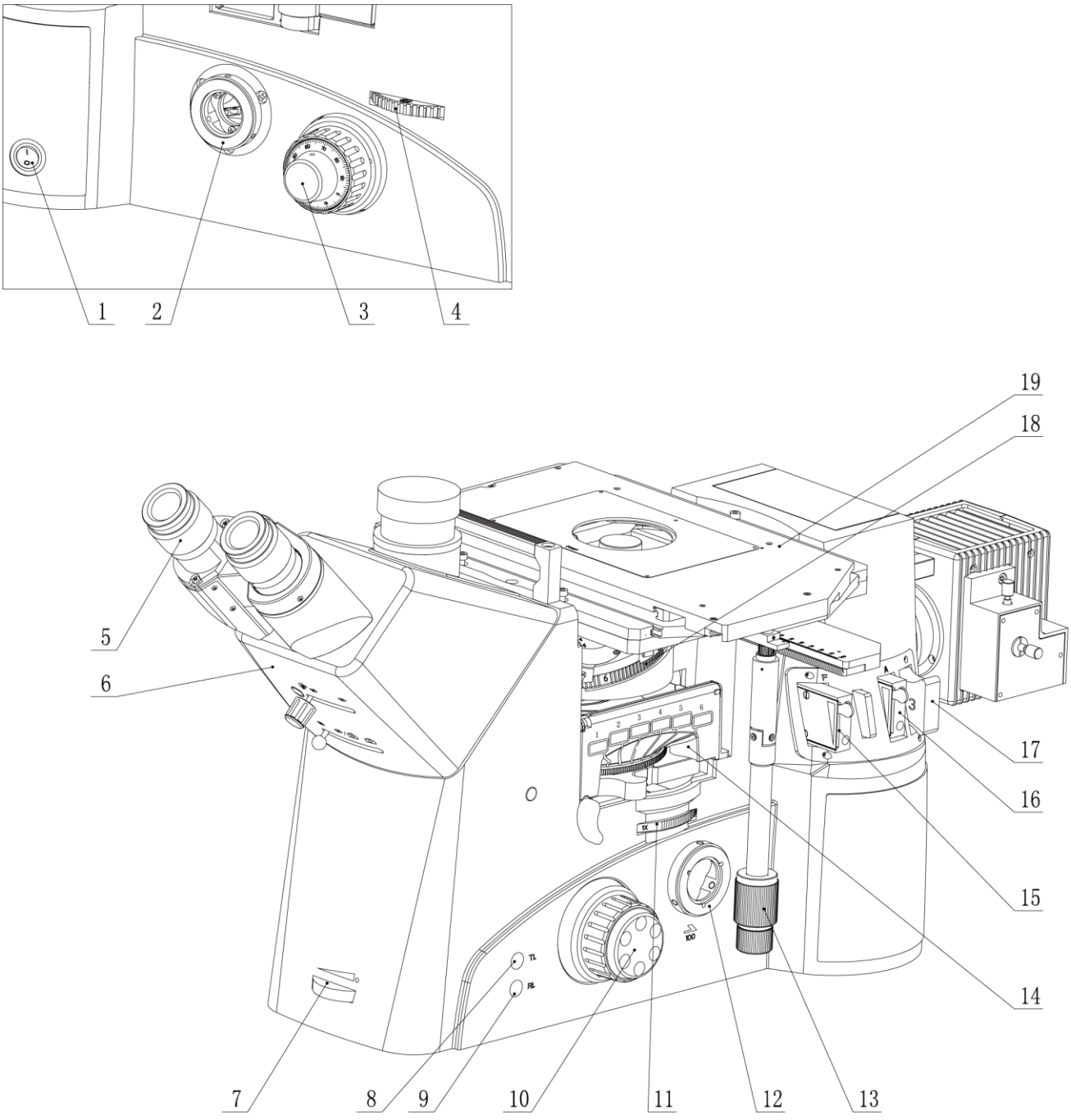


Figure 1

Part name:

1 Power switch

2 Left camera port

3 Left coarse / fine focus handwheel

4 Side port converter (optical path conversion --- left and right port / observation)

5 Eyepieces

6 Trinocular Tube

7 Brightness adjustment knob

8 Lighting Room Switches

9 Lighting shutter switch

10 Right coarse / fine focus handwheel

11 Intermediate magnification rate converters

12 Right camera port

13 Stage X/Y axis handwheel

14 Multifunctional module turntable

15 Field diaphragm

16 Aperture diaphragm

17 Three-hole color filter insert

18 Nosepieces

19 Stage

Ⅱ. Application

The BS-6045 inverted metallographic microscope is mainly used to study the surface of various substances under reflected light.

This machine can be used for observation of bright field, dark field, phase contrast, differential interference contrast, polarized light, etc.

Main applications of this machine: The identification and analysis of the structure of various metals and alloys is a right-hand man in the field of scientific research and teaching.

Ⅲ. Installation

1. Preparations before installing and operating the microscope

Remove the packaging of the main unit and all parts and accessories.

The package includes the main unit, trinocular tube, eyepiece, objective lens, lighting chamber, etc., as well as other accessories and accessories, such as filters, differential interference accessories, dust cover, tools, instructions, etc. Each optional accessory will be packaged separately.

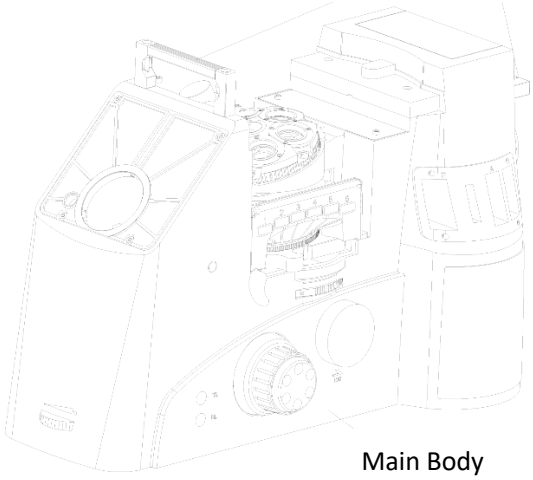
(1) Remove all packaging and check to confirm that it is consistent with the product you purchased.

(2) According to the prompt in Figure 2, remove the transport handle for subsequent microscope operations.

Place the main unit on a horizontal shock-proof workbench, and then use a 4mm hexagon screwdriver to remove the transport handle.

★Please keep the removed handle properly.

Transport Handle



Main Body

Figure 2

2. Installation

(1) Trinocular tube

①Use a 2mm hexagon screwdriver to loosen the mo
Dust cover.

②Align the trinocular tube with the dovetail mount,
Screwdriver fixed.

★Please stabilize the trinocular tube to avoid falling a
performance of the device.

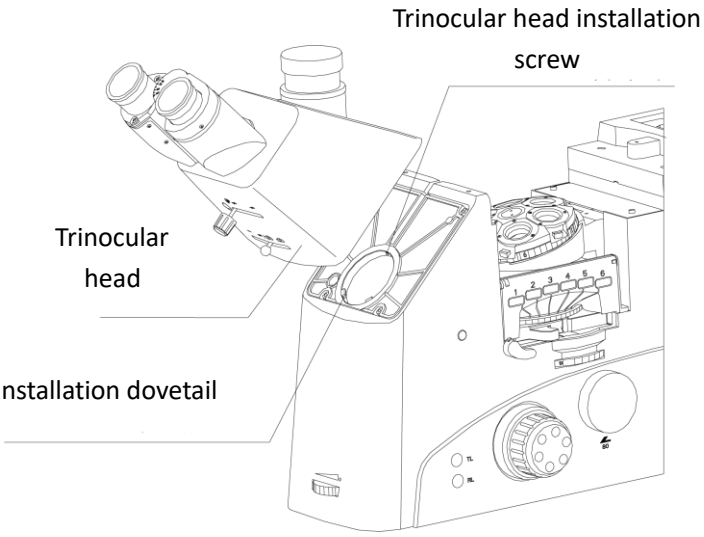


Figure 3

(2) Eyepiece and centering telescope

①Remove the dust cap of the lens barrel, and insert the two eyepieces into the lens barrel (the mounting end face of the eyepiece is in complete contact with the end face of the lens barrel).

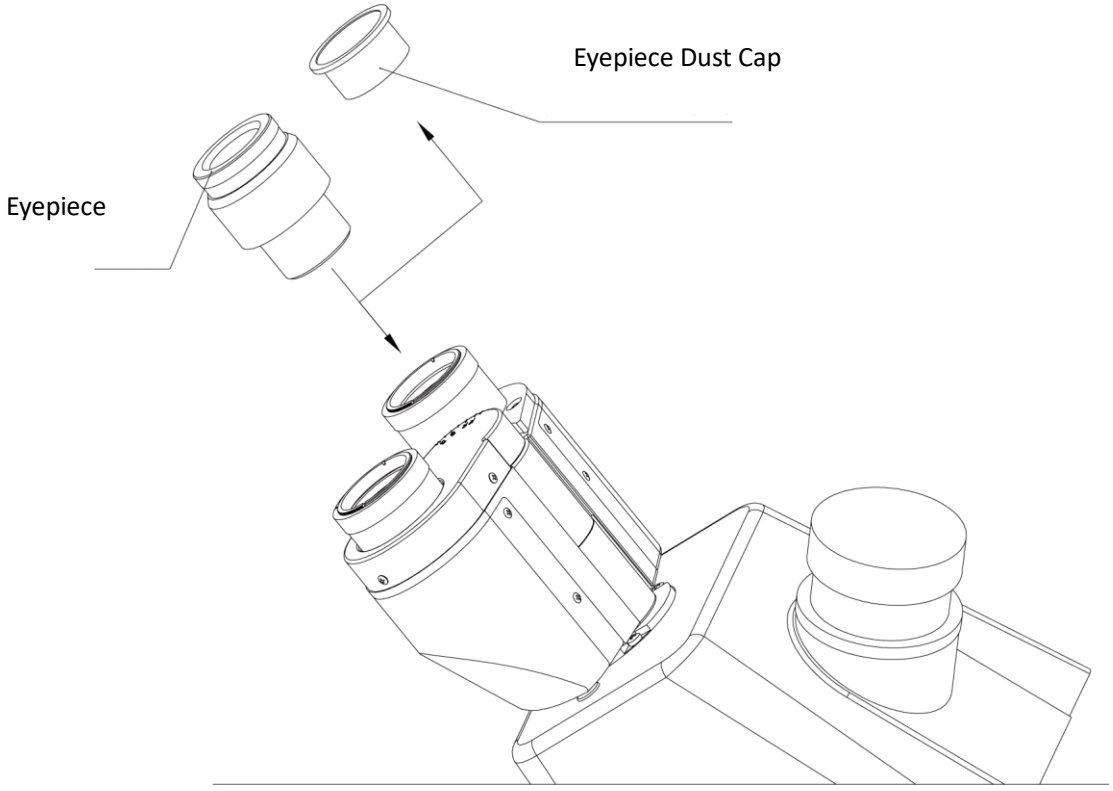


Figure 4

(3) Reticle eyepiece

If the reticle is added to the eyepiece, it may cause slight image shift, The diopter adjustment ring can be rotated to focus the eyepiece reticle.

To replace the reticle, simply unscrew the reticle holder.

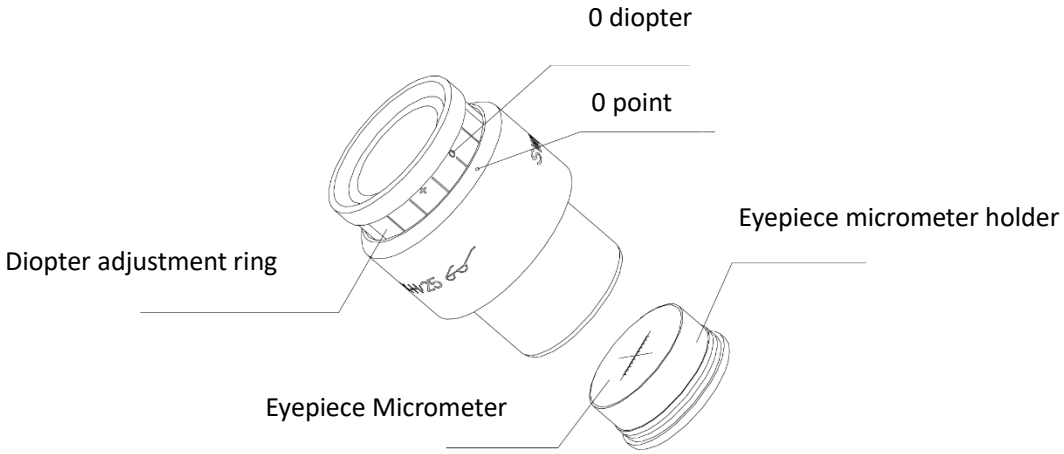


Figure 5

(4) Objective lens

Unscrew the dust cover of the converter, screw the objective lens into the threaded hole of the converter, The end faces are fully fitted.

The objective lenses correspond to the converter lettering in order of magnification.

The dust cover is screwed into the remaining space of the converter.

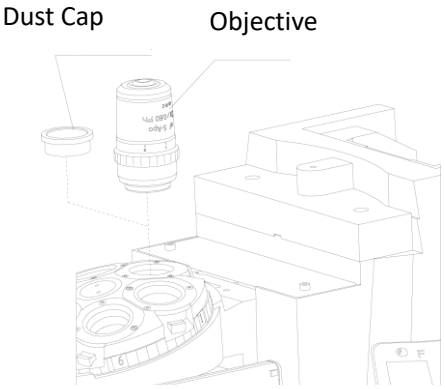


Figure 6

(5) Stage

The stage 135X85 R/L is installed with the host,
Use three pieces of M4X10 screws.

★The stage can be installed on the left or right according to the requirements (that is, the X/Y handwheel can be on the left or right side of the operator).

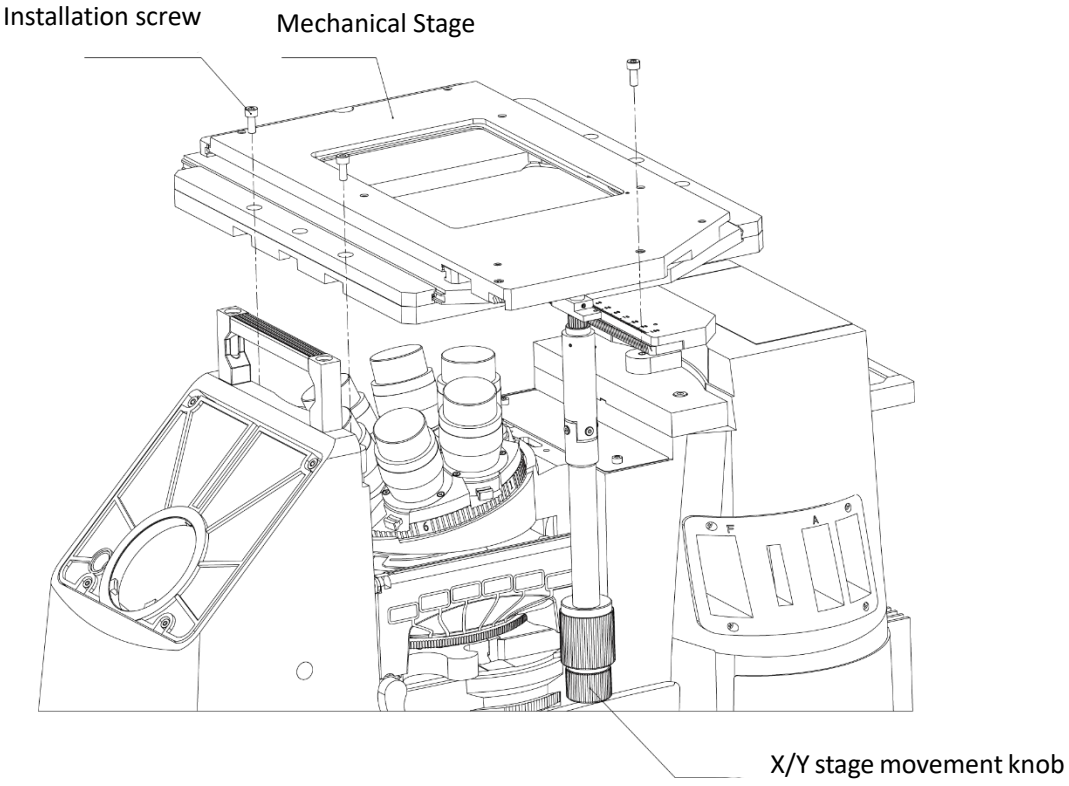


Figure 7

Hold one side of the slice mounting bracket against the spring inside the stage frame, and press the stage part into the frame to lay flat.

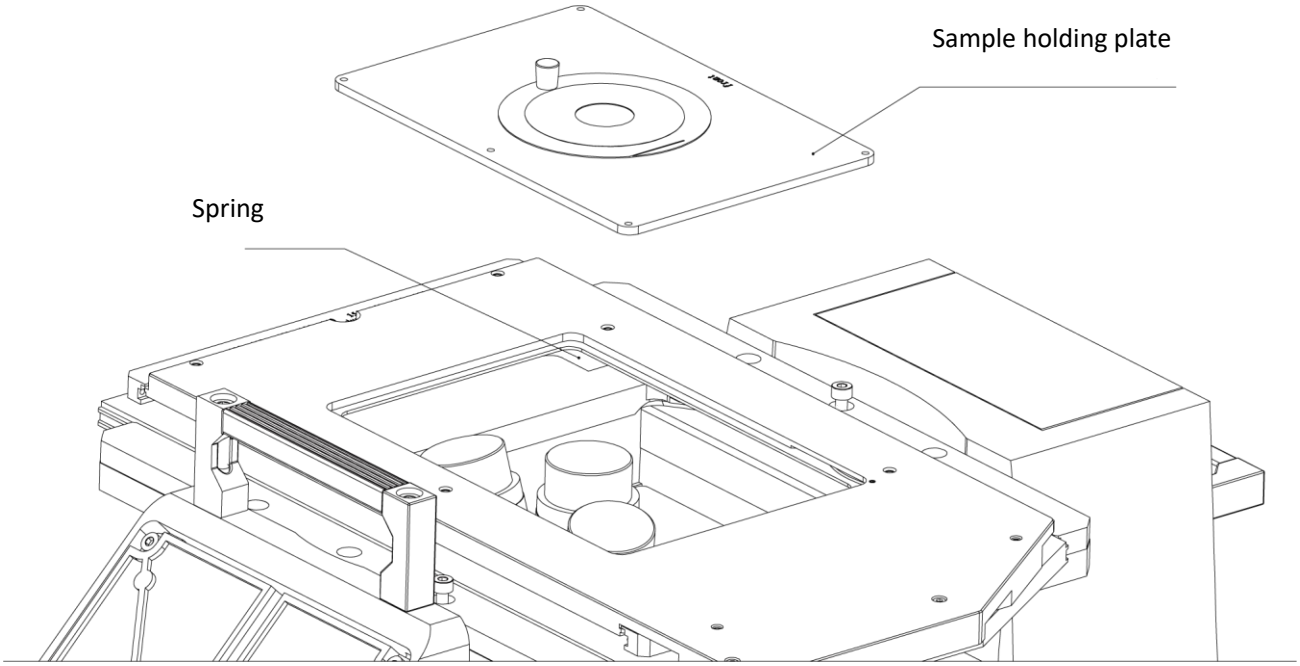


Figure 8

(6) Microscope power interface

Before installing any parts and accessories, please turn off the power of the microscope.

★ TL/ lighting room switch, can control the lighting room on / off when the power switch is not turned off.
★ RL/ lighting shutter switch can block the reflected lighting light when the power switch is not turned off.

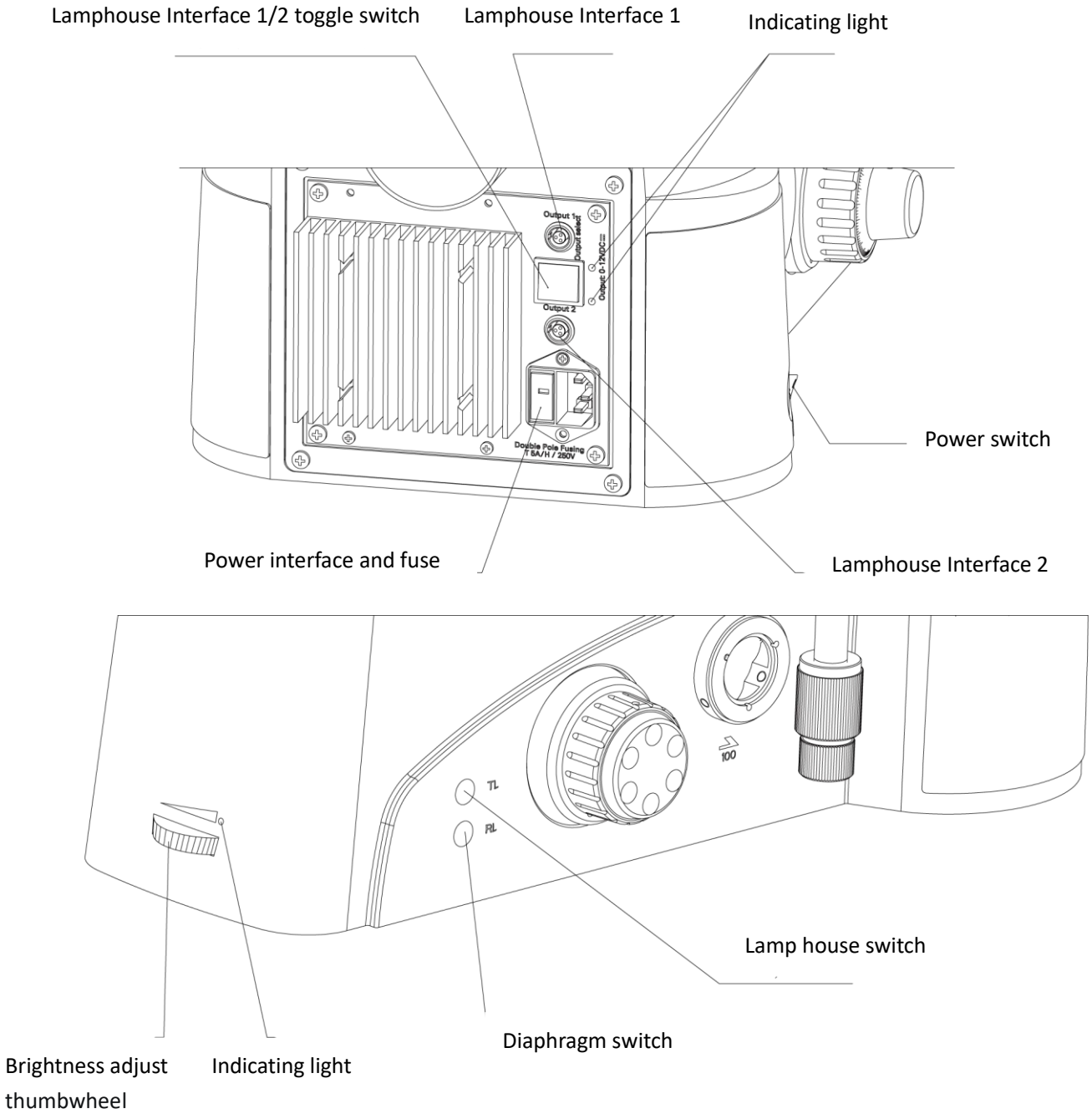


Figure 9

(7) Lighting room (halogen lamp)

Check whether the connection is correct, switch on the power supply, rotate the potentiometer adjustment knob, observe whether brightness changes, switch is corresponding.

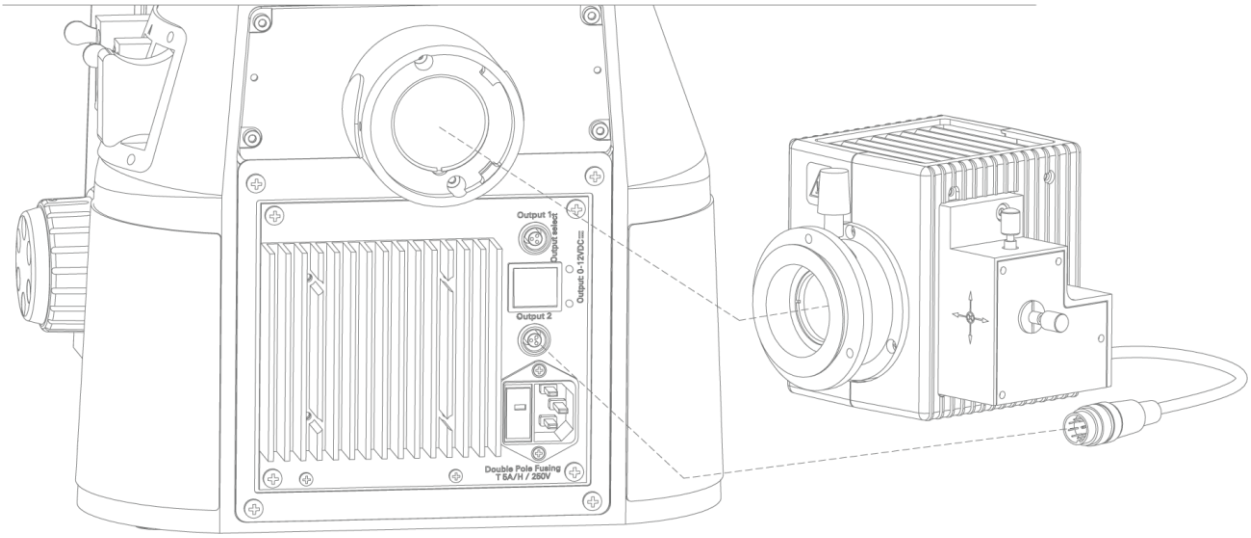


Figure 10

(8) Lamp replacement

Please use 12V100W halogen lamp (OSRAM)

1) Disconnect the power.
2) Using the hexagon wrench S3 , completely loosen the lamp house fixing screw on the lamp house cover.
3) Pull the lamp holder upward while pulling it out, turn the lamp holder side 90 degrees after opening it.
4) Hold the bulb with gloves or a piece of gauze, press down the bulb fixing rod, fully insert the bulb pin into the socket on the lamp socket, put the bulb fixing rod back to the original position, and fix the bulb.

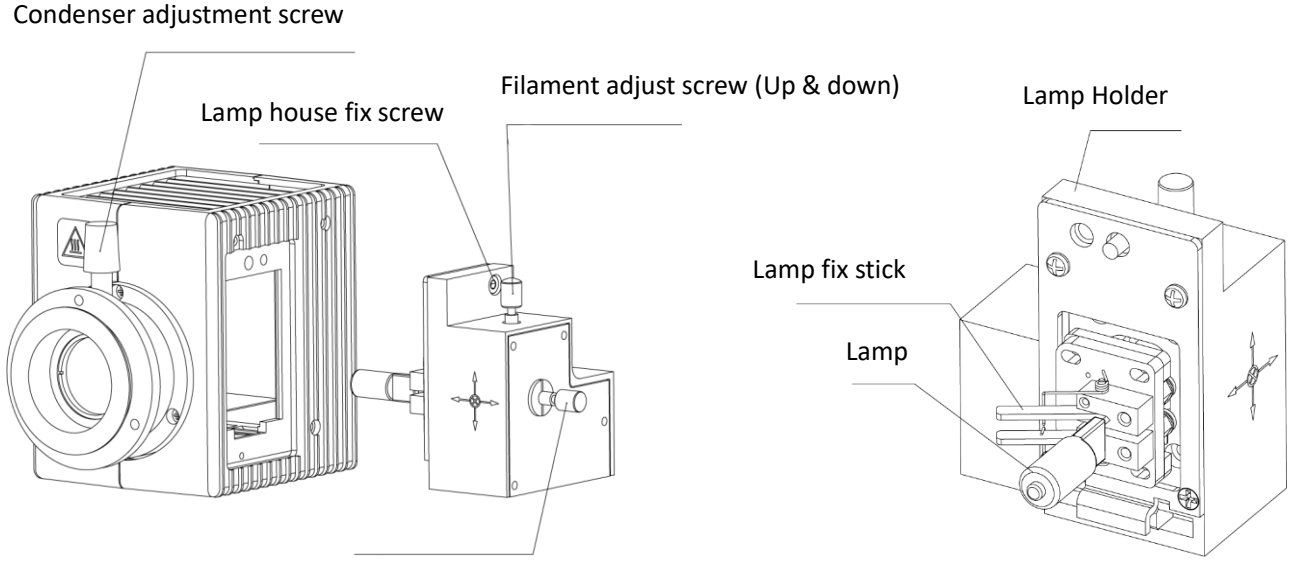


Figure 11

Ⅳ. Use and Adjustment

1. Microscope coarse and fine focus handwheel

Movement range: 10mm

Coarse focus handwheel: 2mm/ circle

Fine focus handwheel: 0.2mm/ circle, 0.002/ div

★Coarse focusing handwheels are installed on both sides of the microscope

The left fine focus handwheel has a scale

Right fine focus handwheel without scale

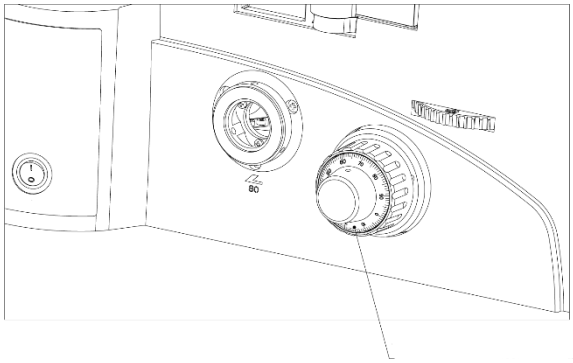


Figure 12 Fine focus handwheel (with scale)

2. Side port converter / optical path conversion

--- left side, right side port, visual observation

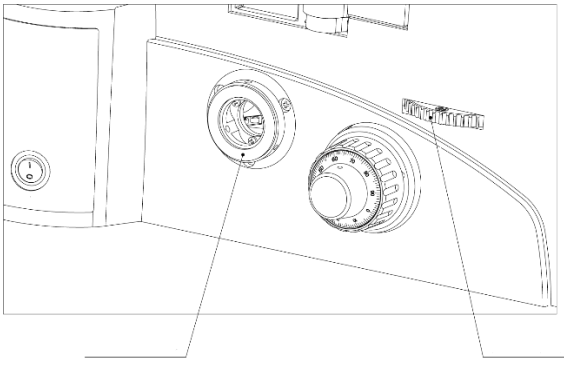
The side port converter has position indications for three different split ratios.

100%vis:0%doc 

20%vis:80%doc right 

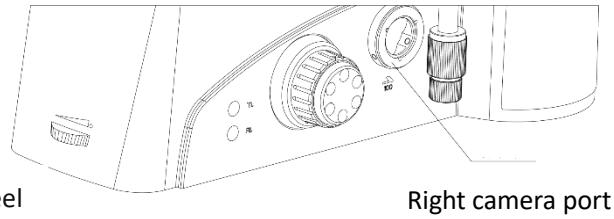
0%vis:100%doc left 

★: vis--- Visual observation
doc--- camera



Left camera port (connect with screw)

Light Distribution thumbwheel



Right camera port (connect with screw)

Figure 13

3. Intermediate rate converter

The intermediate magnification converter has magnification mark: 1X/1.5X switch each other.

During observation, the intermediate magnification can be directly converted to change the observation magnification, which is convenient for the operator to observe.

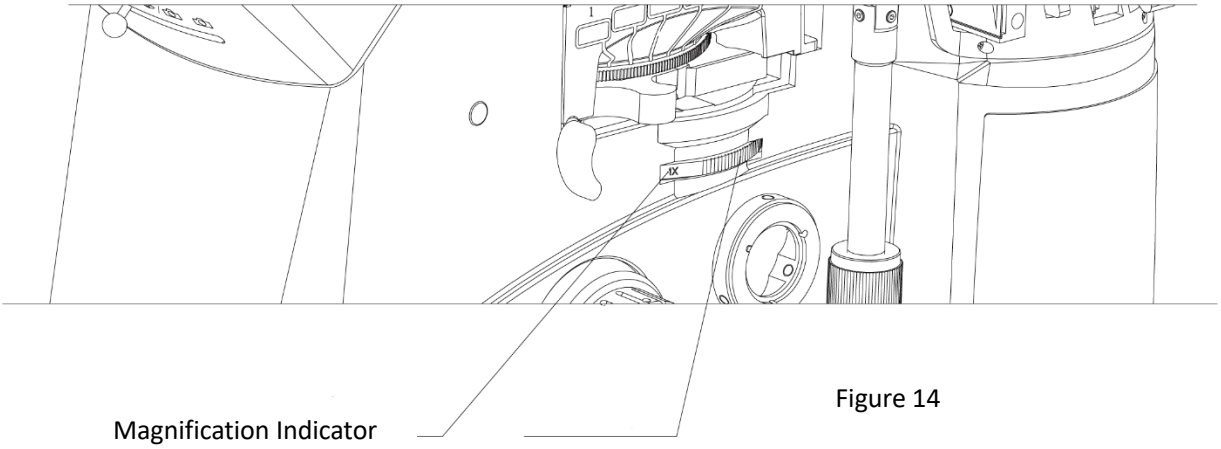


Figure 14

4. Multifunctional module

Six functional modules can be assembled.

Turn up the scale cover, move the locking handle down, and the turntable can be pulled out or inserted from the right side. After the polarizer insert can be pulled out, the adjustable analyzer insert can be inserted in its position.

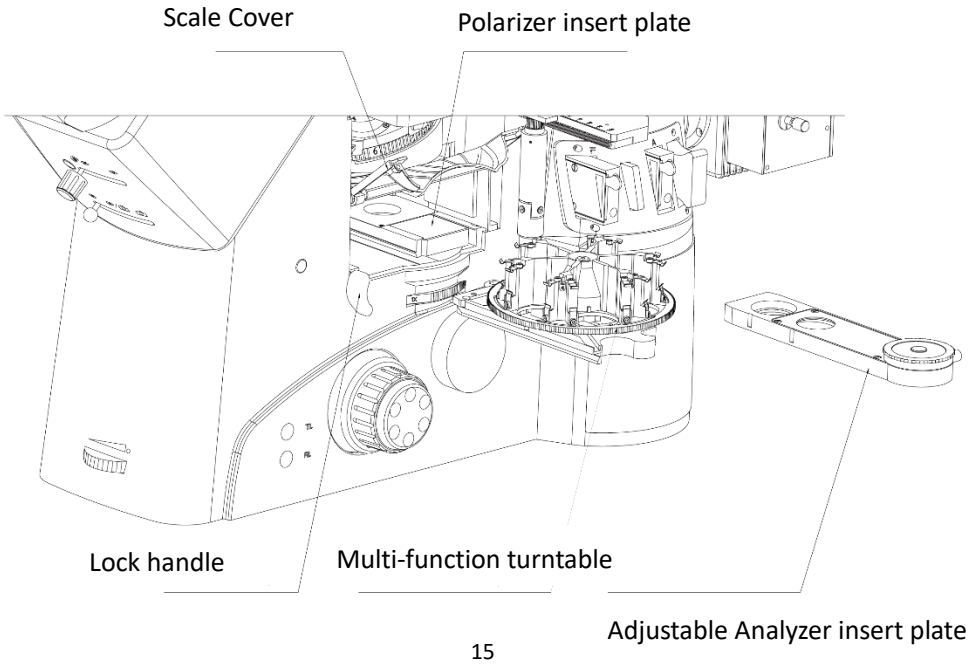


Figure 15

5. Install the function module

When inserting the module, the two sides of the module should be inserted into the turntable along the lower spring sheet, the end faces should be close to each other, and the upper spring sheet should press the top of the module firmly.

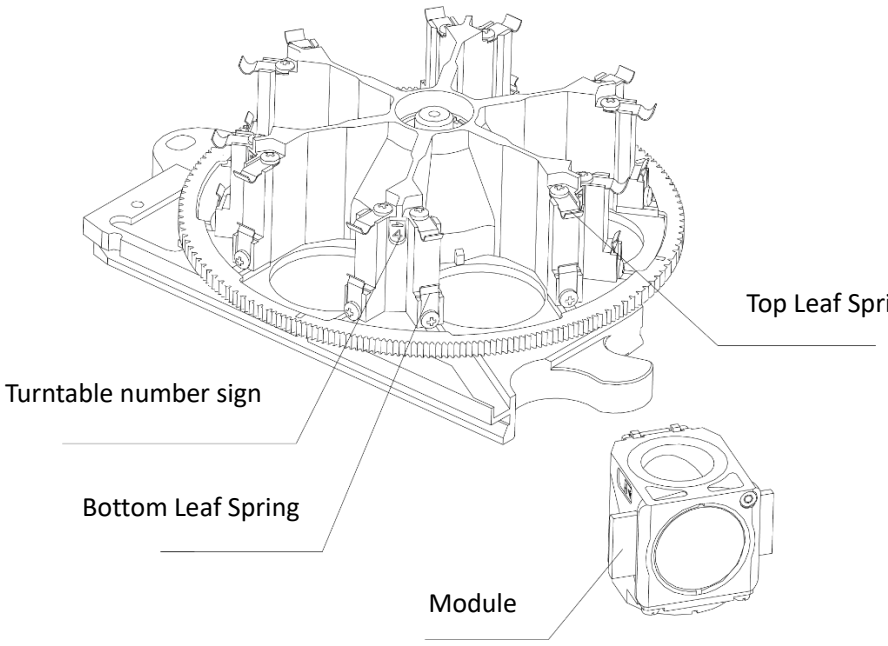


Figure 16

★ Note that the module logo corresponds to the turntable digital logo.

6. The aperture / field diaphragm lever can be moved up and down to adjust the diaphragm size.

Use a 3mm Allen key to adjust the center of the diaphragm so that it is in the center of the optical path.

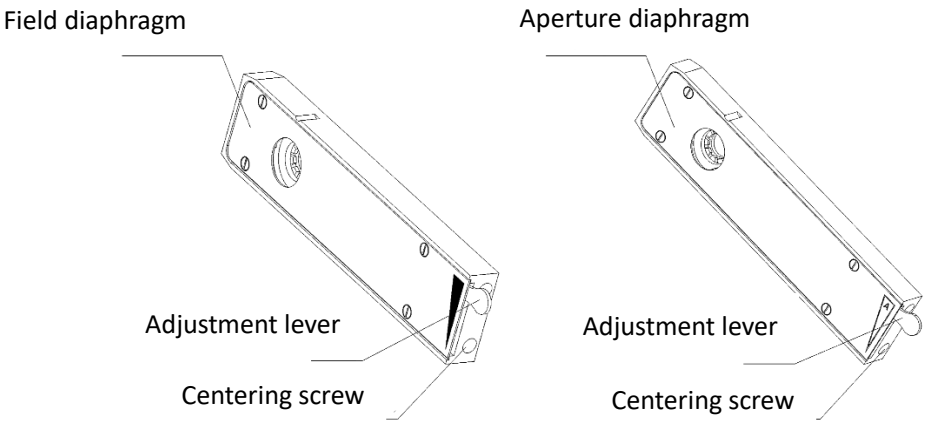


Figure 17

7. Trinocular tube

Trinocular Tube: 45° Trinocular tube with vis(vision)/doc(documentation) sliding prism, Bertrand lens and manual vis switch.

Down lever---move the knob/slider

0%vis:100%doc

50%vis:50%doc

100%vis:0%doc

Up lever---rotate the knob/slider (at the Bertrand lens position) to focus the Bertrand lens.

100%vis

0

Bertrand lens

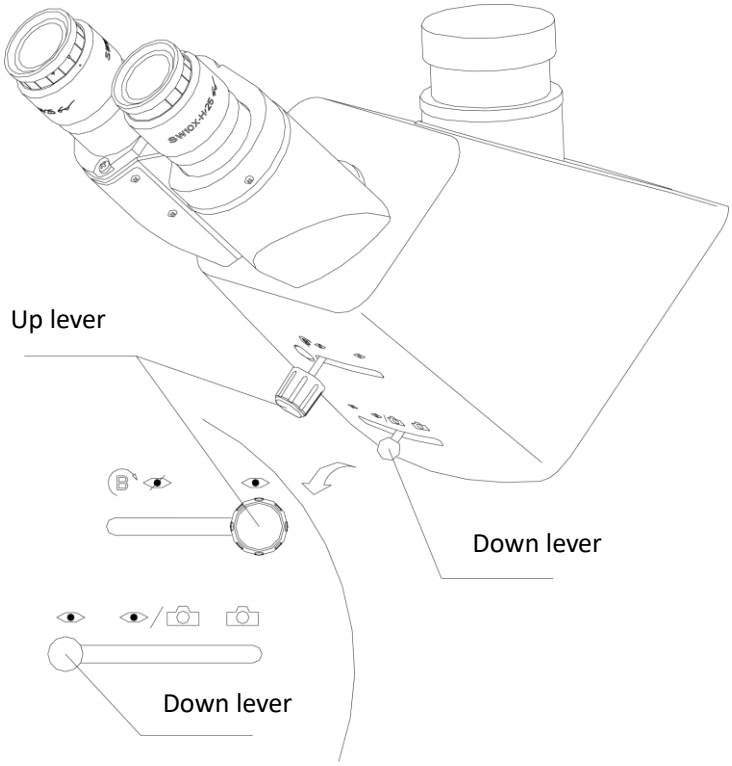


Figure 18

Ⅴ. Microscope observation

1. Objective lens

1. When the objective lens changer is rotated to change the objective lens, turn to positioning and hear a "click" sound to ensure that the required objective lens enters the center of the optical path.
2. During operation, first use a low-magnification objective lens (4X or 10X) to search and focus the sample, and then switch to a high-magnification objective lens for observation as needed.
3. If the objective lens is replaced, it can also be installed through the opening on the stage.

   Note that the magnification of the objective lens is consistent with the scale on the converter. Generally, turn the objective lens converter clockwise, and the order of magnification is from low to high.

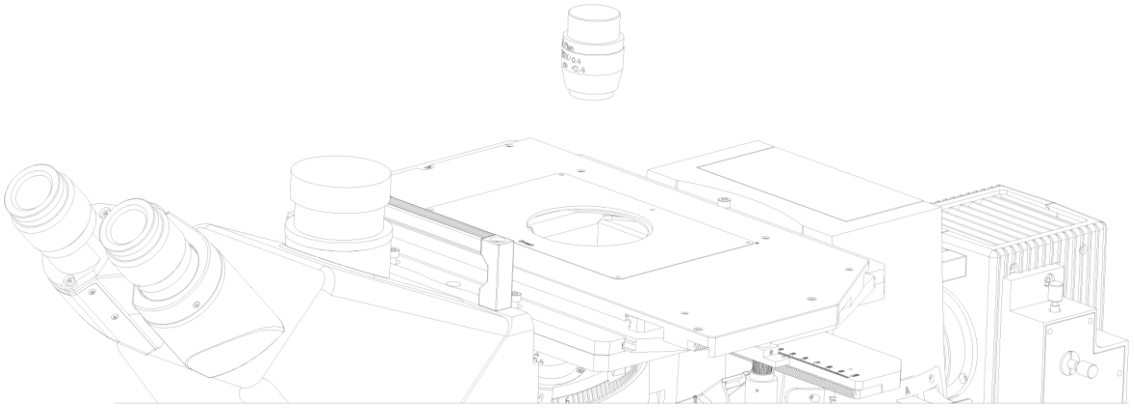


Figure 19

2. Trinocular tube

(1) Adjust the viewing angle

First observe one side eyepiece with one eye and rotate the coarse focus handwheel and the fine focus handwheel to focus the sample. Then look with the other eye. Check the other side of the eyepiece, if the image is not clear, you can use the eyepiece diopter adjustment ring to focus on the sample so that both eyes can see the specimen clearly at the same time.

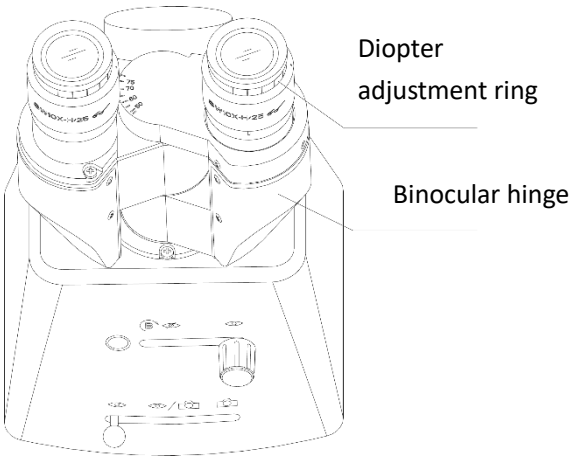


Figure 20

★There are ± 5 diopters on the eyepiece diopter adjustment ring, which is the same as that on the eyepiece tube. The value of the dot alignment is the diopter value of the eye.

(2) Adjust the interpupillary distance

The binocular hinges are rotated toward or away from each other to adjust the interpupillary distance of the eyepiece, and the left and right visual fields are two as one. The height of the exit pupil can also be adjusted.

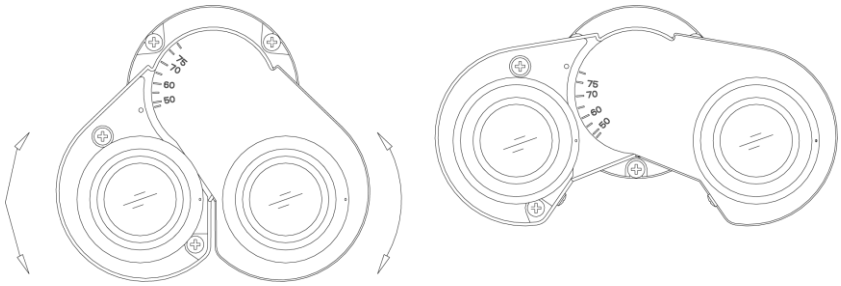


Figure 21

Interpupillary distance adjustment range: 55 ~ 75mm

The indication point "·" on the eyepiece seat corresponds to the scale on the interpupillary distance indicator, and the size of the interpupillary distance at this time can be read.

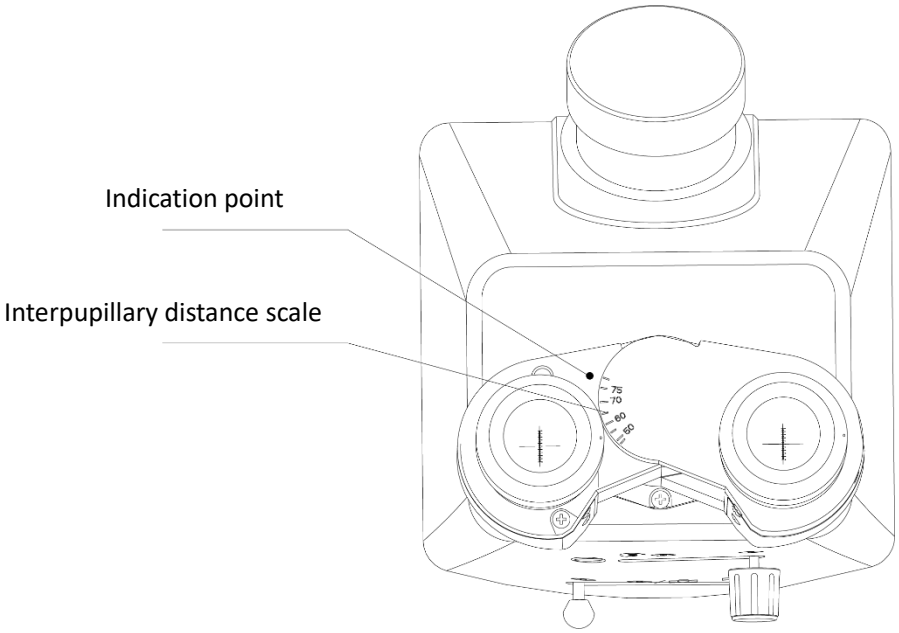


Figure 22

3. Lighting device

1. Filament adjustment, aperture diaphragm adjustment.

(1) Pull out the aperture diaphragm from the optical path, and dial the upper lever of the trinocular tube to B`, adjust the filament image observed from the eyepiece to the center of the field of view through the filament adjusting screw.

(2) Insert the aperture diaphragm into the optical path, open it to the proper size and adjust the aperture diaphragm to the center of the field by the centering screw.

(3) Turn any objective lens into the system, place the sample on the stage, and adjust the upper lever of the trinocular tube from B` to the , adjust the condenser adjusting screw, observe in the eyepiece, and tighten the condenser adjusting screw until the brightness of the whole field of view is uniform.

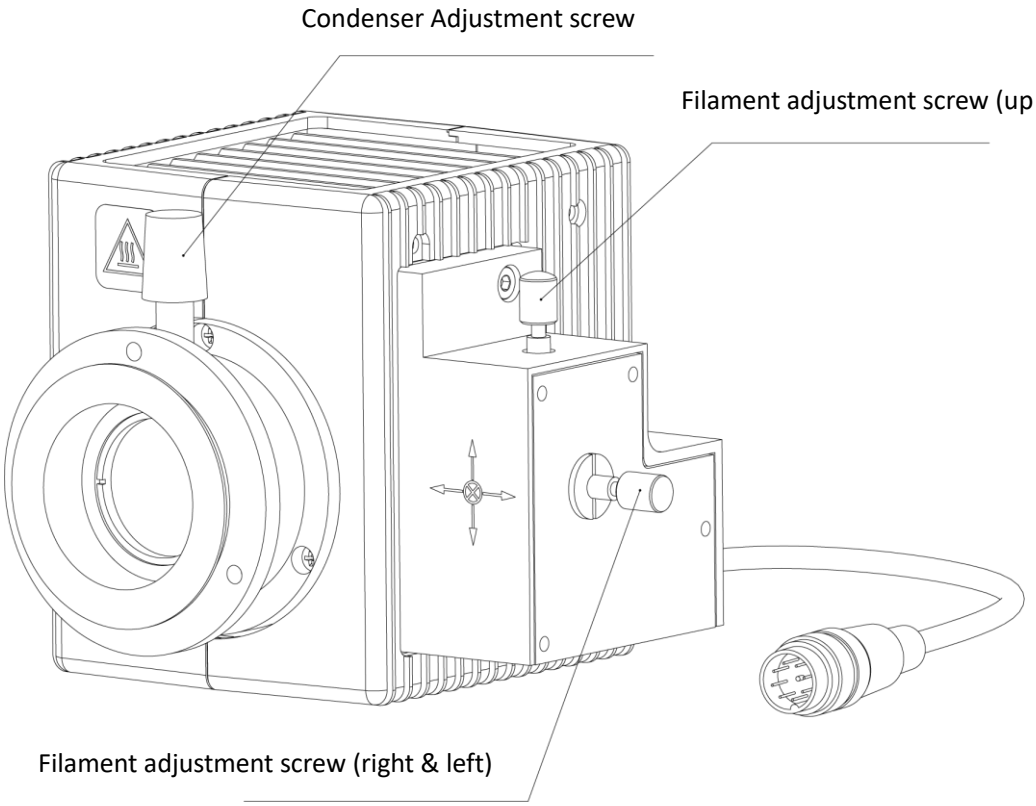


Figure 23

2. The filter

The three-hole filter insert plate is in the slot, and the middle hole is through hole. Insert the color filters into the optical path as required.

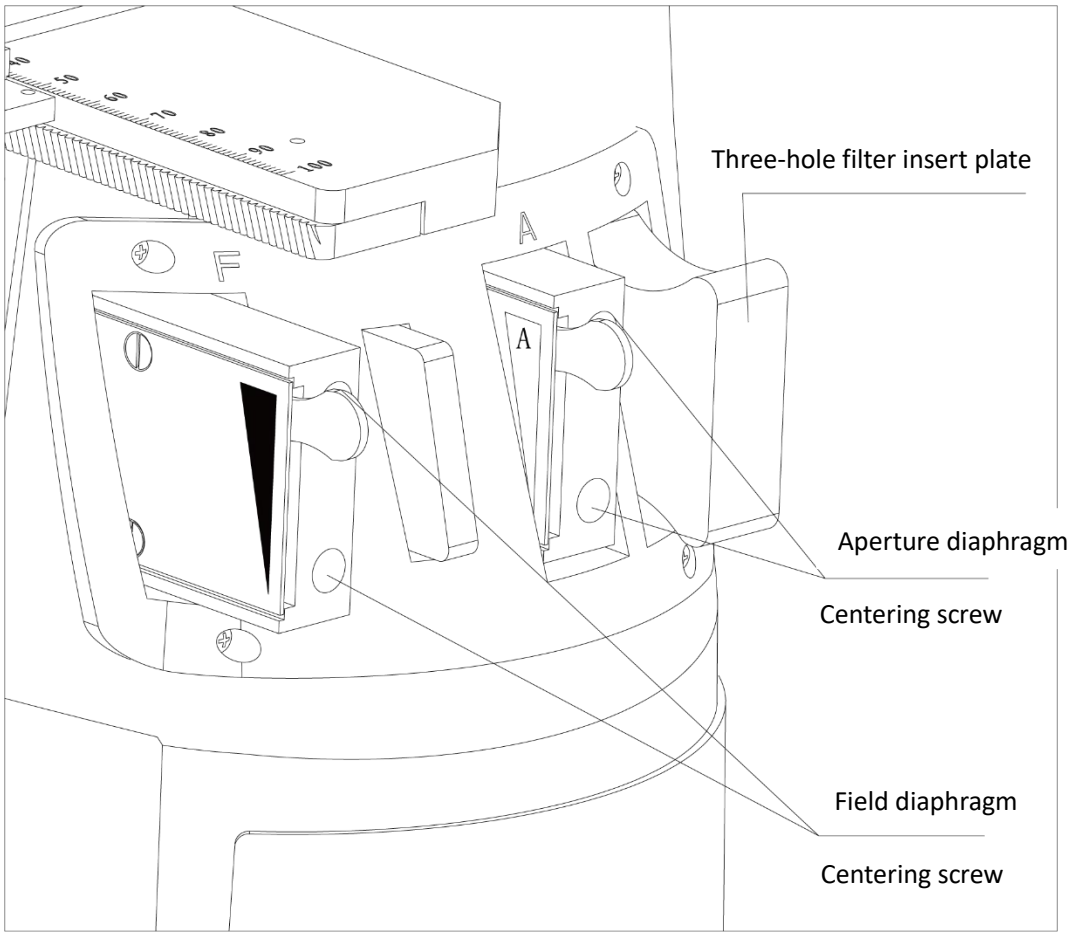


Figure 24

3. Adjust the field diaphragm.

Insert the field diaphragm into the optical path, open the field diaphragm to an appropriate size, and adjust the centering screw to adjust the field diaphragm to the center through binocular observation.

4. Microscope Imaging

1. Bright field observation.

The upper lever of the trinocular eyepiece tube is dialed in  , the lower lever is dialed in 

The intermediate multiplier converter is converted to 1X/ 1.5x

Multi-function turntable is adjusted to bright field module (Identification number is 1)

The side port light distributing converter goes to  .

2. Dark field observation.

The upper lever of the three eyepiece tube is dialed in  , he lower lever is dialed in 

The intermediate multiplier converter is converted to 1X/ 1.5x

Multi-function turntable is adjusted to dark field module (Identification number is 2)

The side port converter goes to  .

★ Objective lens of this instrument can be used in both bright field and dark field, so there is no need to replace objective lens when observing dark field.

Under dark field lighting, the flat luster part of the sample should be dark, while the small concave and convex area of the sample with diffuse light is bright. Therefore, the image of the field of view under dark field lighting is opposite to that under bright field lighting.

3. Polarized light, cone light observation.

The upper lever of the trinocular eyepiece tube is dialed in  , the lower lever is dialed in 

The intermediate multiplier converter is converted to 1X/ 1.5x

Multi-function turntable to polarizing module (Identification number 4 is single polarizing, 5 is polarizing, 6 is circular polarizing)

(1) Label 4 is single polarized light.

The analyzer plate needs to be inserted into the optical path to obtain orthogonal polarizing light (all black state observed in binocular eyepiece)

(2) Label 5 is polarized light.

This function module comes with orthogonal polarizing light (observe the black state in the binocular eyepiece, and no need to insert the analyzer again)

The side port converter goes to 

4. DIC observation.

The upper lever of the trinocular eyepiece tube is dialed in , the lower lever is dialed in .

Remove the dustproof cover of the nosepiece and install the differential interference accessories into the slot on nosepiece.

Adjust the multi-function turntable to polarizing module (identification number 4 is single polarizing). The adjustable analyzer plate is inserted into the optical path, and adjust the analyzer plate to observe the sample.

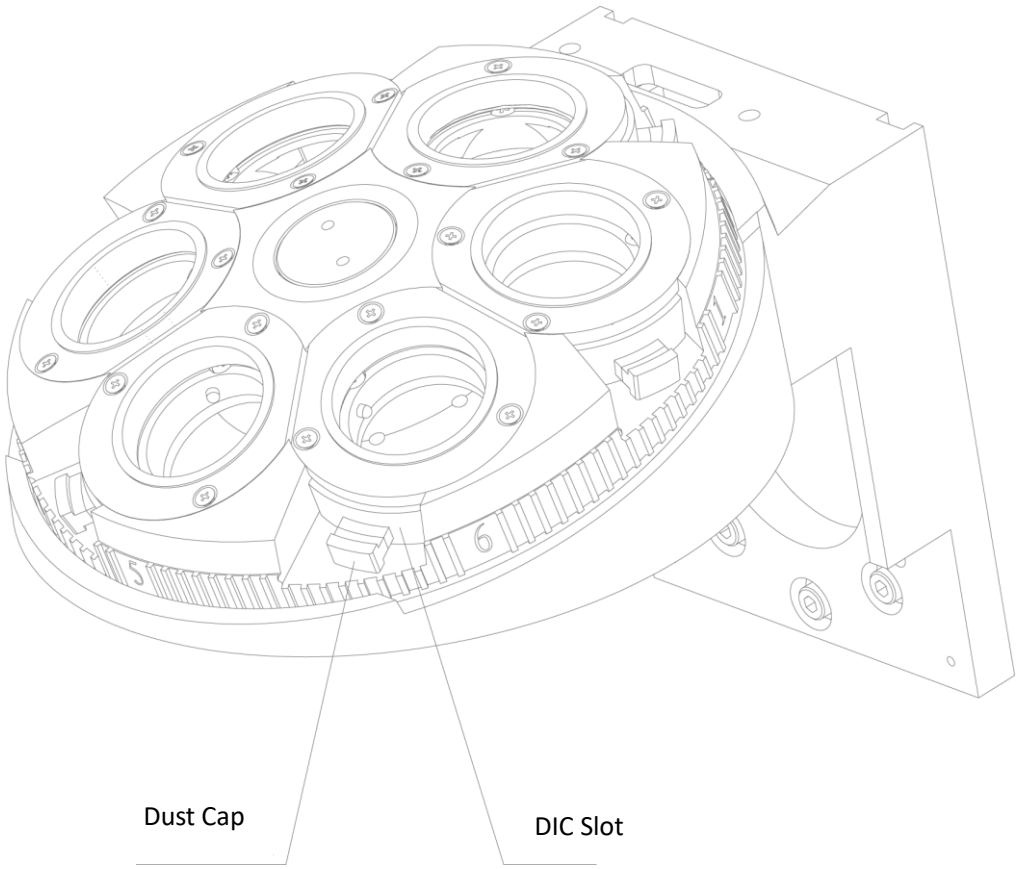
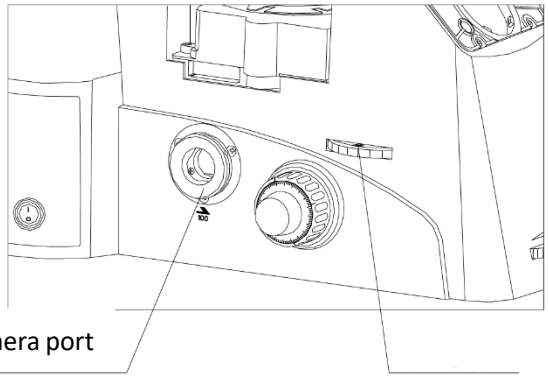


Figure 25

VI. Microphotography

1. Side port microscopic camera.



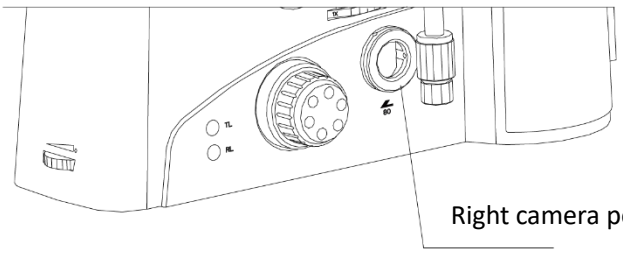


Figure 26

20%vis:80%doc right 

0%vis:100%doc left 

2. Trinocular tube microscope camera.

Up lever position:

100%vis 

Down lever position:

50%vis:50%doc 

100%vis:0%doc 

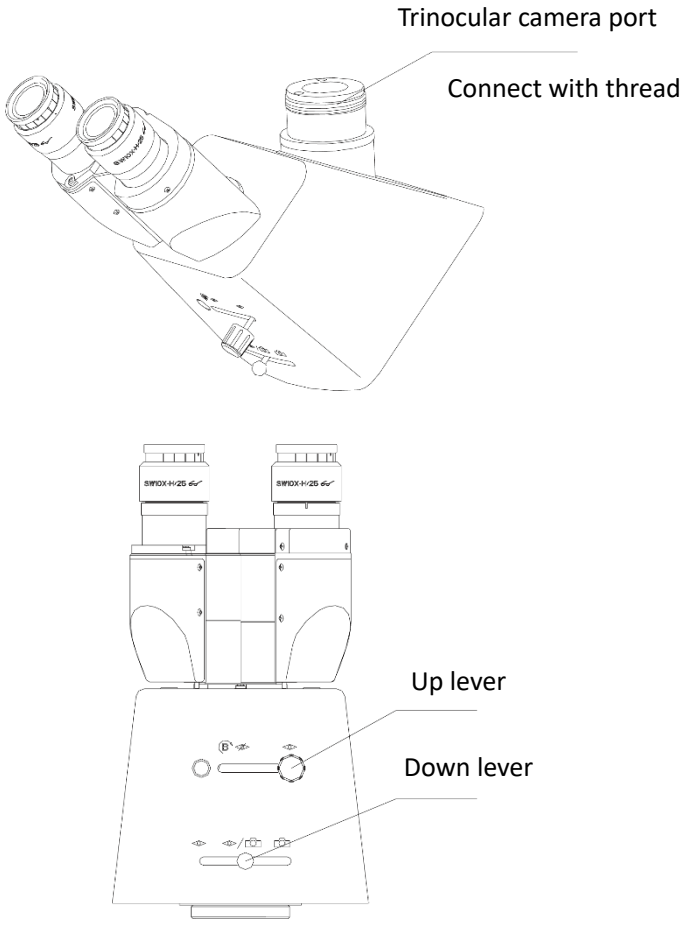


Figure 27

VII. Technical Specifications

1. Main technical specifications

Optical System	Infinity system
Observation Tube	Seidentopf binocular tube, 45 ° inclined
Eyepiece	10X large field eyepiece, view field Φ 25mm
Nosepiece	Sextuple nosepiece
objective lens	Infinity semi-apochromatic objective (bright and dark fields): 5X, 10X, 20X, Infinity apochromatic objective (bright and dark fields) 50X, 100X
Focusing mechanism	Coarse and fine coaxial focusing Coarse adjustment 2mm/ circle, Fine adjustment 0.2mm/ circle Travel (from the focal point of the stage surface): up 2mm, down 7mm
Stage	Movement range: 135 (L) X 80 (W) mm
Illumination	12V 100W halogen tungsten lamp, center adjustable, brightness continuously adjustable
Operating environment	● Altitude: up to 2000 meters ● Ambient temperature: 5 ℃ ~ 40 ℃ (41 ℉ ~ 109 ℉) ● Maximum relative humidity: 80% relative humidity at 31 °C (88 °F) , then decrease linearly 70% relative humidity at 34 ° C (93 °F) 60% relative humidity at 37 ° C (99 °F) 50% relative humidity at 40 ° C (104 °F) ● Pollution degree: Class 2 ● Power supply: ~ 220V ± 10% 50/60HZ ● Power consumption: 100W ● T5A/250V Φ 5X20mm ● Atmospheric pressure: 80kPa ~ 106kPa ● Overvoltage category: Class II

2. Objective lens parameters

Objective Type	Magnification	Numerical aperture (NA)	working distance (mm)	Conjugate distance (mm)	Parfocal distance (mm)	Cover glass thickness (mm)
Infinity Plan Semi-Apochromatic Objective (BF&DF)	5X	0.15	20	∞	45	0
	10X	0.3	11			
	20X	0.45	3.1			
Infinity Plan Apochromatic Objective (BF&DF)	50X	0.80	1			
	100X	0.9	1			

VIII. BS-6045 Inverted Metallurgical Microscope Configuration Diagram

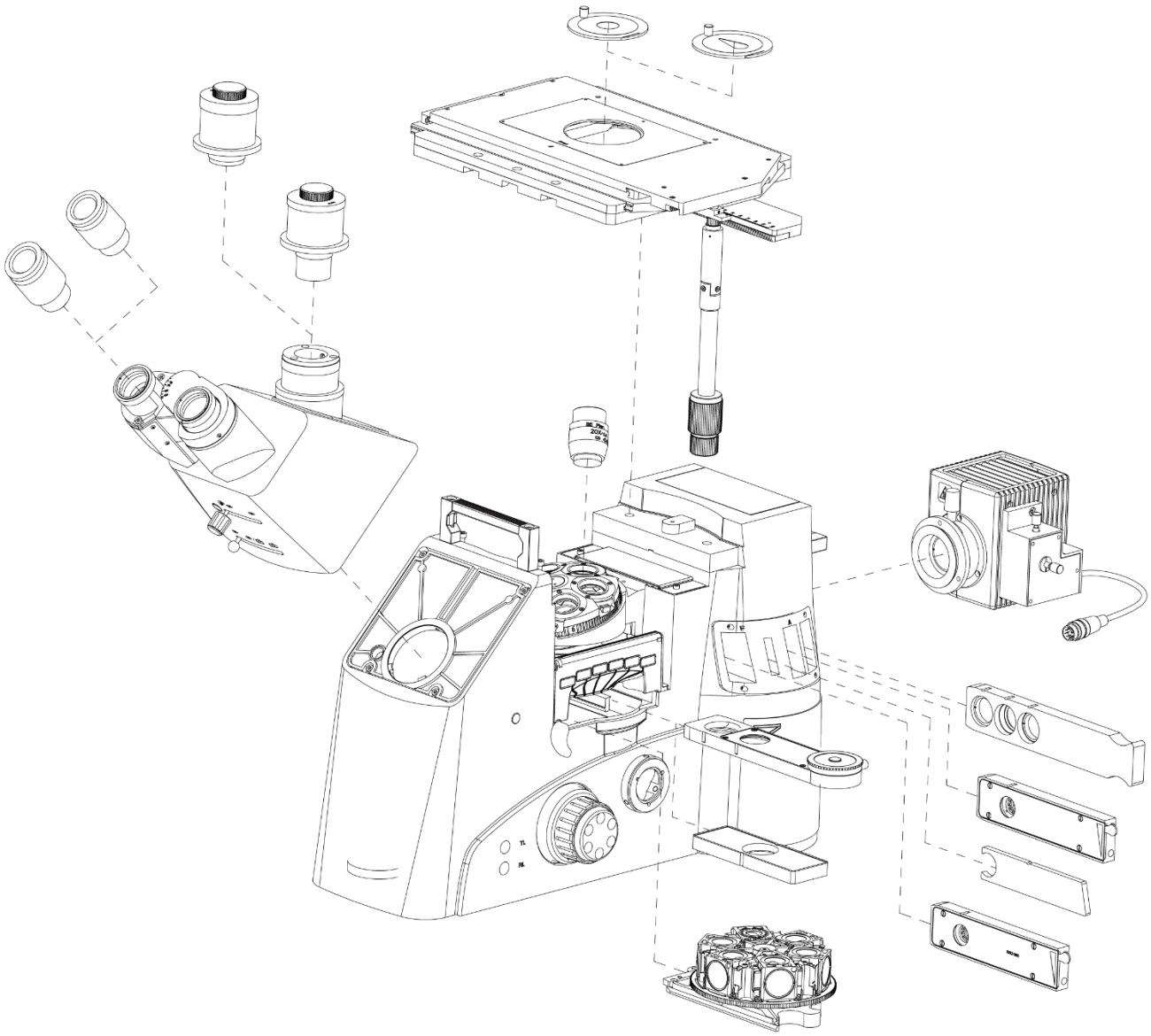


Figure 28

IX. Troubleshooting List

Under certain conditions, the performance of the device can be reversibly affected by non-defect factors. If a problem occurs, check the table below and take the appropriate action. If the problem cannot be solved after checking the whole table, please contact our sales department.

Problem	Cause	Solutions
1. Optical part		
a. Although the lighting is turned on, the field of view is still dark	The socket pins are not connected to the lighting device	Connect correctly
	light bulb burned out	Put on a new light bulb
	Light intensity adjusted too low	Adjust to suitable position
	Too many color filters	Reduce color filters to the minimum required
	The bulb is not the specified bulb	Please use 12V 100W halogen bulb
b. The edge of the field of view is blurred, or the illumination is uneven	The nosepiece is not in place	Be sure to turn the nosepiece to the positioning position
	Color filter stopped halfway	fully pushed in
	Phase contrast skateboard not properly seated	Push the phase contrast slide to the positioning position
c. Seeing dirt or dust in the field of view	Dirt / dust on sample	Please use a clean sample instead
	Dirt / dust on eyepiece	wipe eyepiece
d. the image has ghosting	Aperture diaphragm opened too small	Open the aperture diaphragm
e. resolution problem ● image is not obvious; ● poor contrast; ● details are unclear; ● relief effect is obtained.	The nosepiece is not properly turned into the optical path	Make sure the nosepiece is turned to the correct position
	Aperture diaphragm too wide or too small for brightfield observation	Correctly adjust the aperture diaphragm
	The lens (condenser, objective, eyepiece or petri dish) is dirty	wipe all
	The thickness of the bottom of the petri dish exceeds 1.2mm	Use a petri dish with a bottom thickness of no more than 1.2mm
	Differential interference components are not added to the optical path	Insert the differential interference component into the objective lens mounting slot and move it completely into the optical path
	The multi-function turntable does not turn to the single polarization module	Turn the multi-function dial to the single-polarization module
	The analyzer is not added to the optical path	Add an analyzer to the light path
f. the image is blurred on one side	The nosepiece is not turned correctly	Make sure the nosepiece is turned to the home position
	The sample is not placed correctly on the	Correctly place the sample on the stage

	stage	
	Poor optical performance (irregular contours, etc.) at the bottom of the petri dish	Please use petri dishes with good contour rules

2. Electrical part

a. the bulb does not light up	no power Incorrect bulb installation light bulb burned out	Check the power cord and connect it correctly Install the bulb correctly replace bulb
b. The light bulb burns out frequently	Not using specified bulbs	Use specified light bulbs
c. Lighting brightness	A non-specified light bulb was used	Use specified light bulbs
	Incorrect use of the light intensity adjustment knob	use correctly
d. The lights flicker	The light bulb is about to burn out	replace bulb
	Poor wire connection	Connect correctly

3. Observation tube

The field of view of one eye is not the same as the field of view of the other eye	Incorrect interpupillary distance	Adjust interpupillary distance
	Incorrect diopter adjustment	Adjust the diopter
	Not yet accustomed to microscope observation	When viewing from the eyepiece, the eyepiece looks at the entire field of view before focusing on the sample area. It is also beneficial to look up or into the distance for a while before looking at the microscope

4. Microscopic imaging

a. the image is out of focus	Incorrect focus	Adjust the focus so that both the double reticle and the sample are clearly visible
b. The periphery of the image is blurred	If an achromatic objective is used, this objective cannot focus on the edges	blur is inevitable
c. Development of indoor windows or fluorescent lamps	Extraneous light entering the eyepiece or viewfinder is reflected	Cover the eyepieces and microscope illumination system viewfinder

X. Maintenance and Maintenance

1. Gently wipe the glass parts with gauze. If you want to remove fingerprints and oil stains, wipe with a very small amount (3 : 7 ratio) of ethanol-ether mixture or xylene display gauze.

★Ether and alcohol are extremely flammable, be careful not to put these chemicals near open flames and possible sources of sparks, such as when switching electronic equipment. Try to use these chemicals in a well-ventilated room.

2. Do not use organic solvents to wipe the non-optical parts of the microscope. To clean these parts, use a soft, lint-free cloth with a small amount of mild detergent.

3. When using, if the microscope is wet with liquid, cut off the power immediately and wipe it dry.

4. Do not disassemble any part of the microscope. This affects the functionality of the microscope or reduces the performance of the microscope.

5. If the objective lens is not installed, be sure to cover the objective lens dust cover to prevent dust and splashed tissue culture fluid from entering the system.

6. When the microscope is not in use, it should be covered with a dust cover. Be sure to wait for the lamp socket to cool down sufficiently before putting on the dust cover.

7. The inspection of this product and the replacement of parts and components must be carried out and provided by the company and its designated agency.

After-sales service commitment:

If the instrument cannot work normally due to product quality problems within 18 months from the date of delivery, our company provides free warranty and replacement parts.

The company provides life-long maintenance of the product, and provides spare parts with preferential prices for a long time outside the warranty period.

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