XSK600
Industrial Microscope
Operating Manual

This Operation manual is for XSK600 industrial microscope. To ensure safety, get the optimal performance and make you fully familiar with the usage of this microscope, we recommend that you should read this handbook carefully before operation.

Contents

一、The basic parameters and specifications of this microscope

1. Eyepiece:

Category	Magnification	Visual field diameter(mm)
Super wide field plan eyepiece	10X	Φ24

2. Objective（Bright & dark field）:

Category	**Magnification**	**Numerical Aperture（NA）**	**System**	**Working Distance（mm）**
Plan infinity and long working distance	5X	0.1	Dry	29.4
	10X	0.25		16.0
	20X	0.40		10.6
	40X	0.60		5.4

3. The total magnification of microscope:

Objective	**Eyepiece**	**Microscope tube** Coefficient	**Magnification**
5X	10X	1X	50X
10X			100X
20X			200X
40X			400X

4. Mechanical tube length ： ∞

5. Microscope tube lens： Focal length f = 200mm

7. Coarse and fine focusing adjustment range： 25mm

8. The entire fine focusing adjustment division value： 0.002mm

9. Mechanical stage： Move 76 mm horizontal, 50 mm vertical, graduation 0.1 mm

10. Filter（green、blue、neutral）： Insert plate style (Epi-illumination)

11. Software： For option

① Two-dimensional measurement software

② professional metallurgical image analysis software

二、 Before use

1. Safety Note:

1). Microscope placed on the firm and flat desktop or working table.
2). Microscope must not be placed under direct sunlight, keep away from the wall 20cm
3) When connecting microscope with power supply, turn the main switch to "OFF" position, make sure the inlet voltage must be compliance with label marked on the microscope, then plug into the electrical outlet. Please pay attention to make good earth connection. Otherwise, it would influence the electrical safety and instrument performance.
4) When replacing the light bulbs, the main switch must be shut off and pull the power plug out from the electrical socket, never pull power cord directly with hand by force. The bulb in light cabin can be replaced after it is cool.
5) Microscope is precision optical instrument, please operating carefully and to avoid a sudden sharp shock or impact.
6) When moving microscope, you should hold both the arm of main body and base of microscope with 2 hands. Take with microscope viewing head is prohibited.
7) The microscope cannot be moved from the low-temperature environment into high-temperature environment immediately, the optical components would go moldy, that would cause the image cannot be focused sharply and influence the observation.

2. Preparation before use:

1). Sample specimen: Processing the collected sample with professional and technical treatment, and make the prepared specimen for microscope observation.
2). Preparing a number of materials and appliances: such as alcohol, ether reagents, gauze, cotton, tweezers & pliers, rubber air blower, and so on. Desktop should be clean and tidy, don't put things nothing to do with work.

3. Safeguard and maintenance:

1) When cleaning all glass components, the first blowing the dust off the surface, then gently clean with gauze, and please wipe off oil or fingerprints carefully on the lens surface with a few ether (70%) and alcohol (30%) mixed solution. (dip the gauze or absorbent cotton moistened with this organic solvent)

★ As ether and alcohol solvent is flammable liquids, must be used with care, pay attention not to make these chemicals close to the fire and EDM sources, such as switch operation in the electronic equipment. Remember to use these chemicals only in well-ventilated room.

2) To clean the other parts of microscopes. Use a soft hairless cloth, dip a small amount of neutral cleaning agents, then wipe off the dirt.

3) Please don't break down any part of the microscope, which will damage the microscope and lead to low function or performance.

4) Please cover microscope with Dustcover when it is not in use.

5) Operating environment:

Indoor use, the highest elevation 2,000 meters.

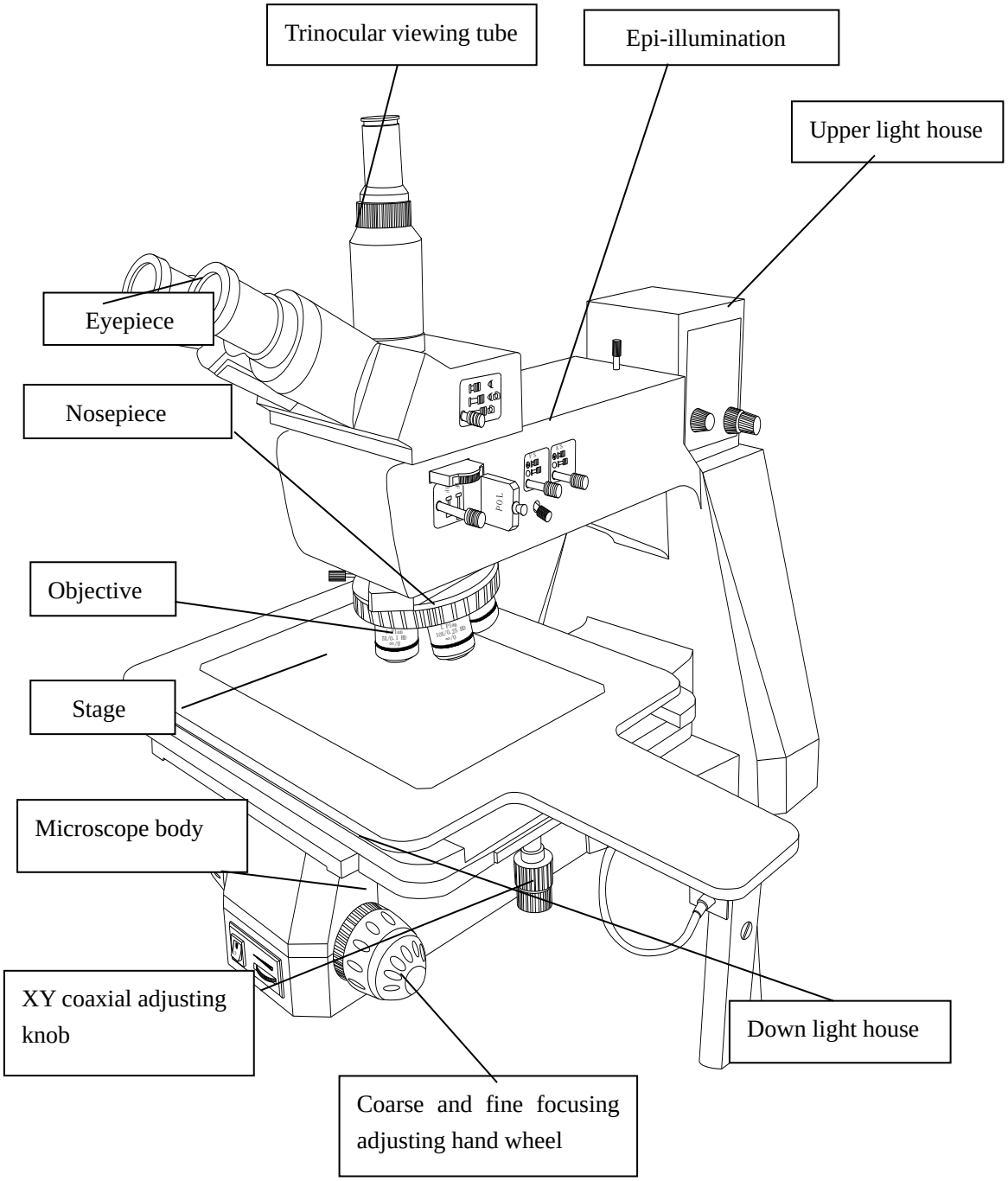
Ambient temperature: 5 ℃ ~ 35 ℃. Relative Humidity: <80%.

4. Warning ： ★

If the microscope is not operated as specified by Operation Manual, it may be hazardous to the safety of the users. In addition, it may damage microscope, please always operate microscope in accordance with this handbook.

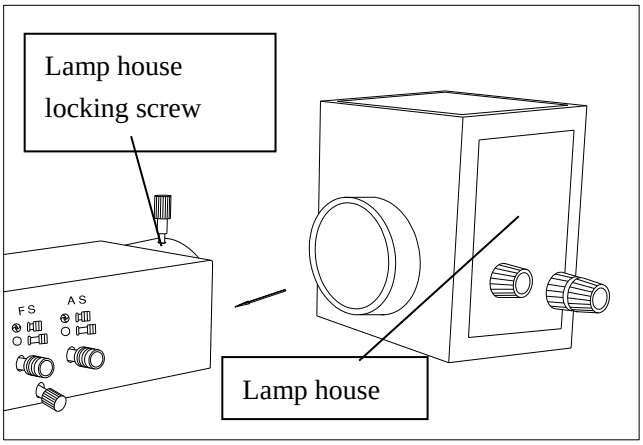
三、The installation and use of microscope

1. The description of each part of microscope



2. Installation:

1). Installation of lamp house

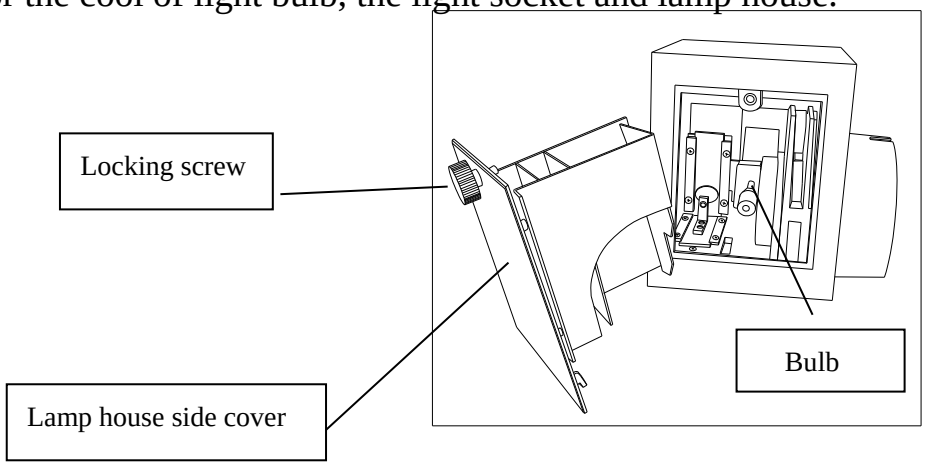


① Release the Lamp house locking screw.
② Insert into lamp house as per the direction of the arrow.
③ Lock and tight the locking screw.

2). Installation of halogen lamps

The light source of this microscope, both upper and down, is 12V/50W bulb.
(12 V/100W for Option)

★ Whenever replacing the bulb, you must firstly turn off the main switch and wait for the cool of light bulb, the light socket and lamp house.



① Release the locking screw.
② Remove Lamp house side cover.
③ Wear gloves or a piece of gauze, then hold bulbs, insert the bulb pins into lamp holders and make sure the pins are inserted completely.
Do not touch bulb with your fingers, if fingerprint left on the light bulb unheedingly, use a soft cloth to clean.
④ Install the side cover of the lamp house.
⑤ Tighten the locking screw.

3). Install Epi-illuminator release the lock screw, equipped with Epi-illuminator, tighten the locking screw.

4) Installation of Microscope head

① Fully release the fixing screw of Microscope head.
② Rotate observation tubes of microscope toward front.
③ Lock the fixing screw to fix the microscope head.

5). Objective Lens installation

Mounting the objective lens from low power to high-power, in clockwise direction, into the nosepiece, make sure that the mounted objective lenses are firmly tightened.

6). Eyepiece installation

Take off dustproof covers from eyepiece, insert eyepieces into the eyepiece tube, the eyepiece must be properly inserted.

7) Connecting the power cable

Winding and bending easily damage power cable, do not pull strongly by force.

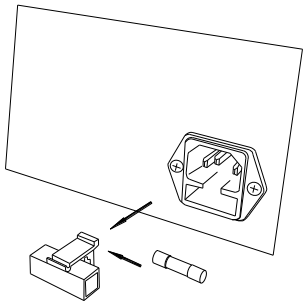
① Convinced that the main switch is off.
② Connecting lamp house and base with specified cable.
③ Insert one plug of power cable into the socket of base.
④ Then insert the other plug of power cable into the power outlet.
Connect the power cable properly and ensure that the earth cable is connected correctly between power supply and instrument.

7) Replacing the fuse

Before replacing fuse, turn off the main switch, unplug the power cables.

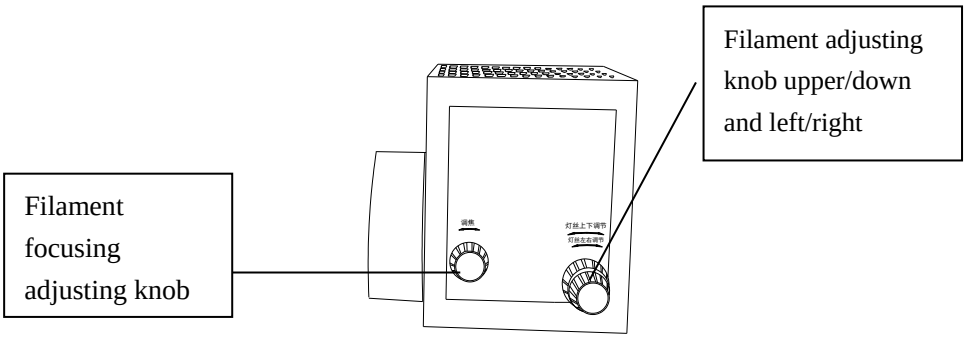
① Pull out the fuse holder, take out the old fuse.
② Insert the new fuse.

Use only specified rated fuse.



4. Epi-illumination observation steps:

1) Switch Transmitted/Reflected illumination rod to reflected illumination position, and Bright and dark field switch rod located at BF position, adjusting brightness by light intensity knob
2) Move all color filters and polarizing plates away from the light path.
3). Rotating nosepiece and make 10X objective lens in the light path.
4) Locate the samples on the stage.
5). Rotating XY coaxial hand wheel, move the sample into the light path.
6) Observing with right eye through the right eyepiece, rotating coarse focusing hand wheel to make the sample in a focused position, then adjusting fine focusing wheel to get a clear and sharp image.
7) Observing with left eye through the left eyepiece, rotating the diopter adjusting ring to make image clear in the left eyepiece. At this time, the image in both eyepieces is in focus and clear.
8) Regulating the eyepiece pupillary distance.
9) Regulating filament Center: removing one eyepiece, through adjusting filament focusing knobs and filament upper/down, left/right adjusting knob till you can see the clear filament image at the back focusing ground of objective lens and in the middle.

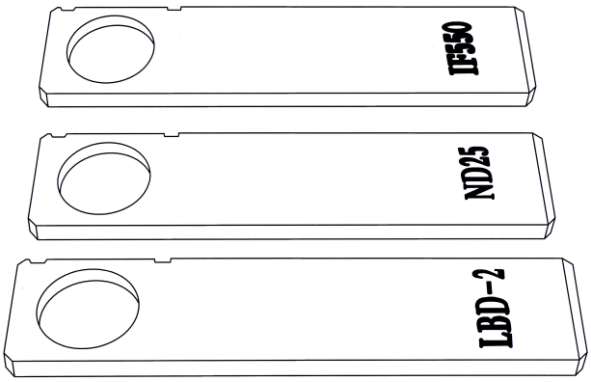


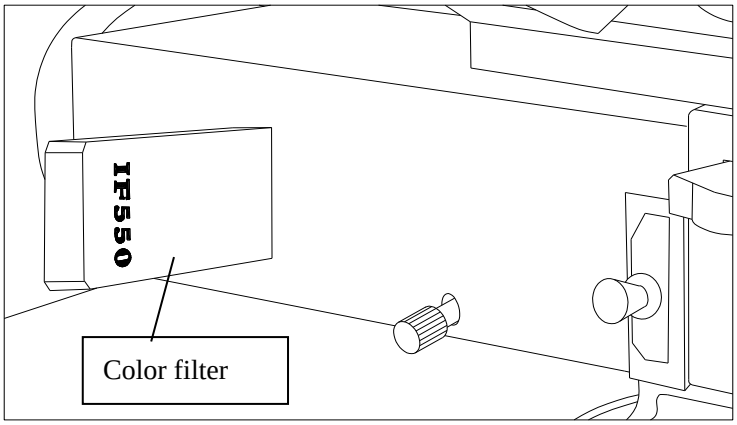
10). Observing from different magnification objective, please regulate the light intensity to the required level. Because the objectives are guaranteed the parfocal accuracy, to get a clear image, you can just adjust the fine focusing wheel.
11) Insert the selected optical color filter
12) Regulating field (stop) diaphragm. [See 5.3]]
13) Aperture (stop) diaphragm. [See 5.4]]
14) For dark field observation, Bright and dark field switch rod located at DF position and regulating field stop & aperture stop to the largest position, also adjusting the light intensity to maximum. Polarizer, Analyzer and Filters should be moved out of light path.

5. The use of regulating devices:

1) The use of color filter

This instrument provides a green (IF550), blue (LBD-2) and neutral color filter (ND25), users can choose according to need. Insert the selected color filter into the optical path.





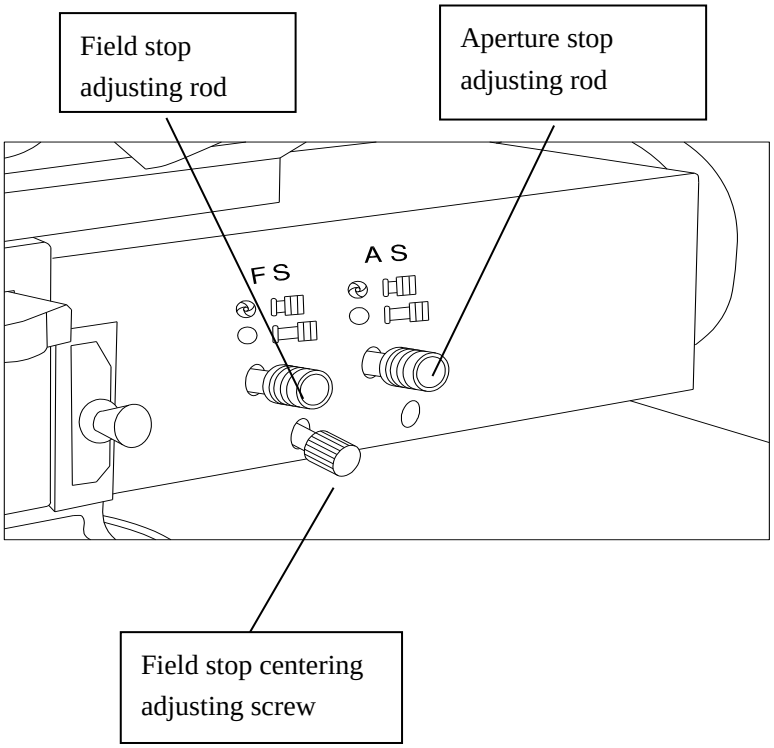
2). Stage

Rotating the coarse and focusing adjusting hand wheel to make the stage down, placing the specimen on. Through rotating XY coaxial adjusting knob to move the stage, you can find the specimen on the stage, and meet with the requirement of observation and measurement.

3) Field Stop (FS)

Field Stop is a diaphragm to limit the imaging space of optical system. Opening too large, the unnecessary lighting parts are illuminated, as a result, because the reflection, diffraction of specimen and glass, and other mess or rambling reflection light, the contrast of imaging declined. Conversely, if the field Stop is opening too small, there's less light around the field of view, and cause reducing the observation field of vision.
In actual use, regulating the image of field stop in the center of field of view through adjusting centering screw, then regulating the size of field stop by Field stop adjusting rod,

and make Field stop a little bit larger than visual field.



4) Aperture diaphragm /stop (AS)

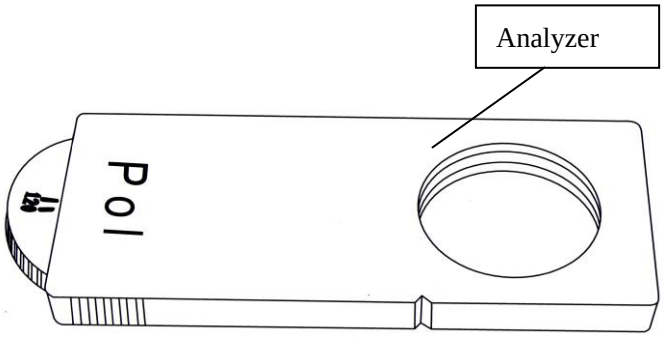
Aperture stop determines the numerical aperture of illumination system. When the numerical aperture of illumination system matches objective lens', it can provide better image resolution and contrast and to increase the depth of field. Incorrectly use Aperture diaphragm would lead image resolution and contrast declined, and it is also the main reason of color distortion.

Take off the Eyepiece, cover a paper mask on the top of eyepiece tube of microscope head, poke a small hole in the center, observe through the hole with eye, we can see the size of aperture diaphragm (Polygon) inside, it is the most appropriate when moving aperture diaphragm adjusting rod to regulate it the in diameter 3 / 4 of aperture size of back focusing ground of objective lens (circular hole). At this time, it does not diminish the resolution of objective lens, but you can increase the contrast. Conversely, if the aperture diaphragm is larger than aperture size of back focusing ground of objective lens, that is, you cannot see aperture diaphragm through small hole, imaging contrast will be significantly decreased. If the aperture diaphragm open is too small, the image depth of field is increased, but the image lines become thick, the resolution dropped, and even color distortion occurred.

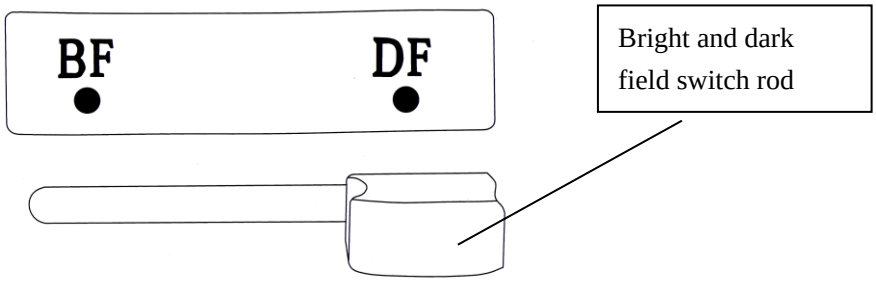
It should be stressed that the aperture diaphragm and field diaphragm, join into the optical system, are to improve the quality of imaging, adjustment should be based on objective resolution and the contrast required, you should not treat it only as devices of imaging brightness adjustment. Adjust the brightness level of imaging, mainly to regulate light intensity.

5) Polarizing devices

① Shift the Polarizer into the light path
② Insert the Analyzer into hole under the microscope head, rotating revolving wheel, When revolving wheel located at “0”, the analyzer is orthogonal with polarizer.
③ The polarizing observation can be proceeded as requested.



④ Dark field observation (under Epi-illumination)
Move the dark/bright field switch rod, you can observe a dark field or bright field observation.



BF（Bright Field）

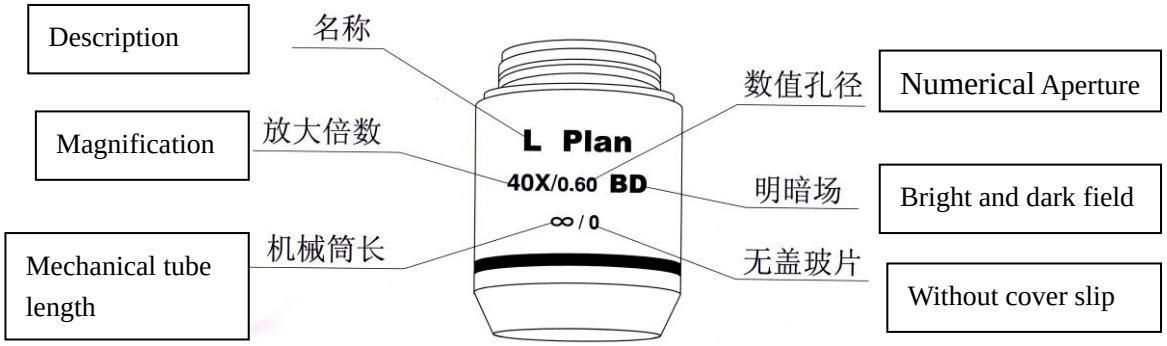
DF（Dark Field）

6). Transmitted illumination observation steps:

1). Switch Transmitted/Reflected illumination rod to transmitted illumination position, and Bright and dark field switch rod located at DF position
2). Pull out the Analyzer
3). Other operation is the same as biological microscope.

四、Optical performance and characteristics:

Structural features and performance parameters marked on the objective lens, see below.



The following table listed in the eyepiece and the objective lens combination of optical characteristics.

Optical characteristics		**5X**	**10X**	**20X**	**40X**	**50X**	**60X**	**100X**	**Remark**
NA		0.1	0.25	0.40	0.60	0.55	0.65	0.80	
Mechanical tube length		∞	∞	∞	∞	∞	∞	∞	
Thickness of cover slip		—	—	0	0	0	0	0	mm
Color circle mark		red	yellow	green	blue	blue	Dark blue	white	
System		dry	dry	dry	dry	dry	dry	dry	
Working distance		29.4	16.0	10.6	5.4	5.1	7.01	3.0	mm
Viewing field diameter		Φ4.8	Φ2.4	Φ1.2	Φ0.60	Φ0.48	Φ0.40	Φ0.24	mm
Resolution		3.4	1.34	0.84	0.56	0.61	0.52	0.42	micron
10X Eyepiece	viewing field diameter	Φ22	Φ22	Φ22	Φ22	Φ22	Φ22	Φ22	mm
	Total magnification	50	100	200	400	500	600	1000	times
15X Eyepiece	viewing field diameter	Φ17	Φ17	Φ17	Φ17	Φ17	Φ17	Φ17	mm
	Total magnification	75	150	300	600	750	900	1500	times

* Objective 50X、60X、100X and Eyepiece 15X are optional accessories.

五、Troubleshooting guide：

According to different operation method, though it is not a fault, but will not give full performance of the microscope. After the issue is occurred, please find out the reason further.

Phenomenon	Causation	Disposal
No illumination	Bulb burn out	Change bulb
	Fuse burn out	Change fuse
	power cable not connected	Check the power connector
There's Light, but viewing field is dark	Brightness is not adjusted	Adjust light intensity knob
	Aperture diaphragm shrink too small	Enlarge the aperture diaphragm
	Viewing field diaphragm shrink too small	Enlarge the viewing field diaphragm
See dirt or dust in the viewing field	Some dirt and dust on the eyepieces and specimen	Clean all
Poor visibility : Image is not obvious The contrast is bad Details are unclear	Incorrect objective position in the optical path	To ensure the objective position is correct
	Aperture diaphragm shrink too small	Enlarge the aperture diaphragm
	Group of objective dirty	Clean objectives
	Dirt and dust on the specimen	Clean it
Part of image illegible	Sample didn't level up	Level up the sample
	Incorrect objective position in the optical path	To sure the objective position correct
	Light source center deflected	Adjust center of light source
Light intensity turns to high level, brightness field of view little changed, uneven lighting	Light source center deflected	Adjust center of light source
Sometimes bulb lighting sometimes dark	Light bulb about to burn out	Change bulb
	Pins of bulb not connected	Check connecting
Light bulb burned immediately	Use wrong bulb	Use specified bulb
Stage automatically decline or after fine adjusting, rapidly defocus	Coarse focusing adjusting tension is not enough	Adjusting tension hand wheel
Images not focused to sharp position and when coarse focusing, the stage can not be adjusted upward	Coarse focusing stop is inaccurate	Coarse focusing stop position regulating
Field of view is observed differently under left and right eye	Pupillary distance adjusting incorrectly	Adjust the pupillary distance
	Diopter adjusting incorrectly	Adjust diopter
	Eyepiece of left and right side is in different magnification	Use the same rate eyepiece
	You have not accommodated to the microscope's observation yet	Observation from the eyepiece, look at the entire field of view prior to concentrated in specimen area. Before observe, looking upward or beyond would also be useful.