BestScope

Inverted Fluorescent Microscope

BS-7000B

Instruction Manual

This manual is written for Inverted Fluorescence Microscope BS-7000B. For safety and keeping the best performance, making you familiar with the instrument entirely, it is strongly recommended that you read this manual carefully before using the microscope.

User Notices

Safety Note

1. The epi-fluorescent attachment is a precise instrument. Open the box carefully, and avoid dropping the accessories to ground and causing damage to them.
2. Do keep the instrument out of direct sunlight, high temperature or humidity, dusty and vibrations.
3. Make sure that the lamp(mercury lamp) is installed correctly and all cords are connected firmly.
4. Do not open the lamp housing while it is turned on, lamp housing parts are extremely hot and may cause burns if touched. Users can open the lamp housing at least 10 minutes after it has been turned off.
5. Always be sure to ground (earth) the equipment.
6. Verify that the voltage and the frequency of the AC mains outlet match the setting of the voltage switch and the frequency switch on the rear of the power supply unit.
7. Always use the power cord provided and make sure that the main switch is moved to “O”(OFF) before connecting the power cord plug to the wall outlet.
8. To prevent any hazard, always turn the main switch on the power supply unit to “O” (OFF), unplug the power cord plug from the mains outlet before replacing the lamp or the fuse, and wait for at least 10 minutes before replacing the lamp. (Be sure to use a GCQ-100 mercury lamp.)
9. To prevent obstruction of the air flow, it is important to leave enough space around and above the lamp housing.

Safety Symbol

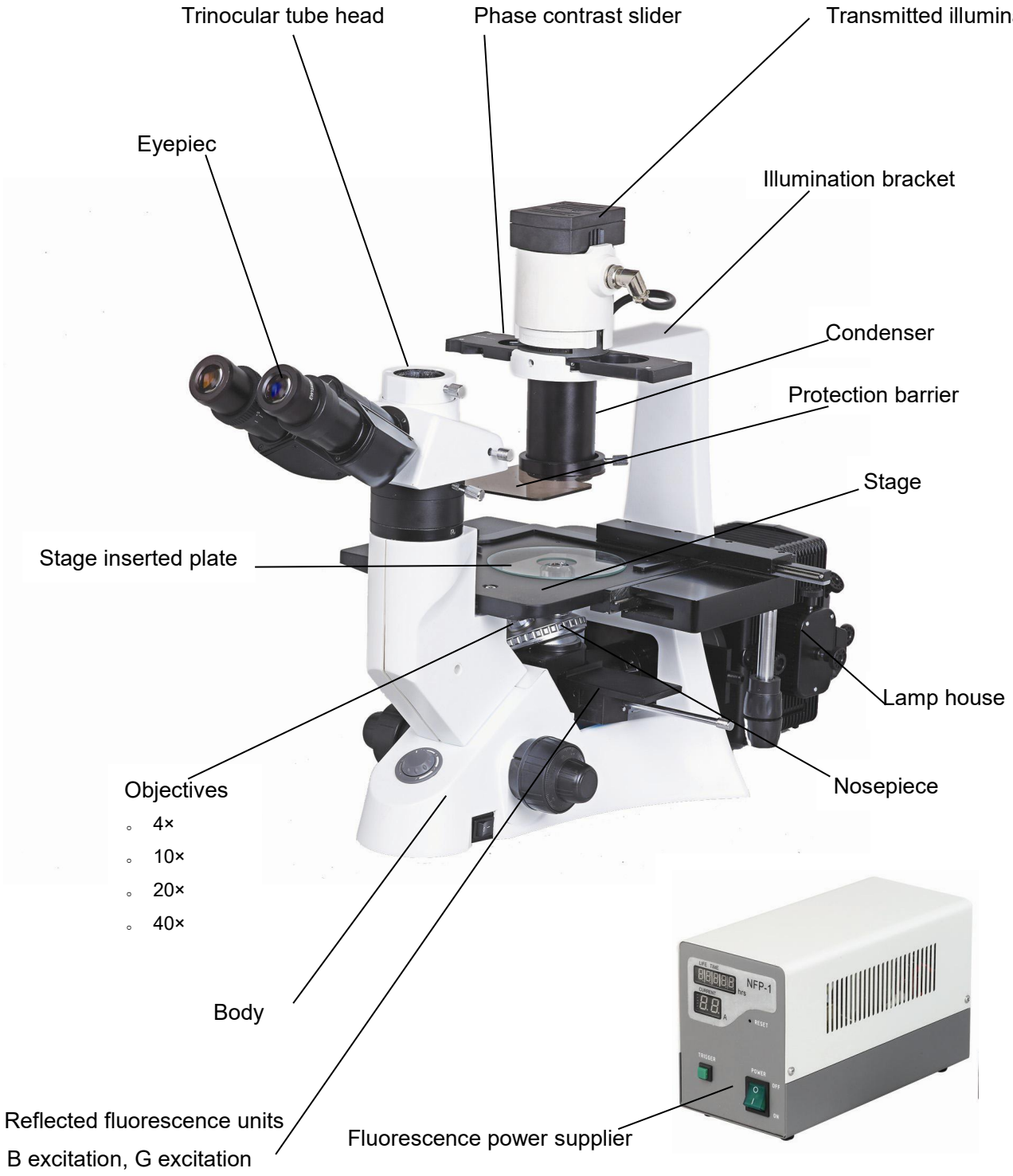
Symbol	Meaning
	The surface is very hot, not touch by your hands
	Before using, please read the instruction carefully, improper operation will result in bodily injure or instruction malfunction.
I	The main switch on
O	The main switch off

Maintenance and Storage

1. Clean all glass components by wiping gently with gauze. To remove fingerprints or oil smudges, wipe with gauze slightly moistened with a mixture of ether (70%) and alcohol (30%).

   ⚠ Since solvents such as ether and alcohol are highly flammable, they must be handled carefully. Be sure to keep these chemicals away from open flames or potential sources of electrical sparks. For example, electrical equipment that is being switched on or off. Also remember to always use these chemicals only in a well-ventilated room.
2. Do not attempt to use organic solvents to clean the non-optical component of the equipment. To clean these, use a lint-free, soft cloth lightly moistened with a diluted neutral detergent.
3. Do not disassemble any part of the power supply unit as malfunction or damage may occur.
4. In order not to impair the safety of the equipment, replace the lamp when the counter of NFP-1 indicates “100.00” hours. To prevent any hazard, always turn the main switch on the power supply unit to “O” (OFF), unplug the power cord plug from the mains outlet, and wait for at least 10 minutes before replacing the lamp. High-pressure gas is sealed within the mercury lamp. Thus, if it is continued to be used after its service life expectancy, the glass tube may deform and may sometimes rupture.

1. Components Name



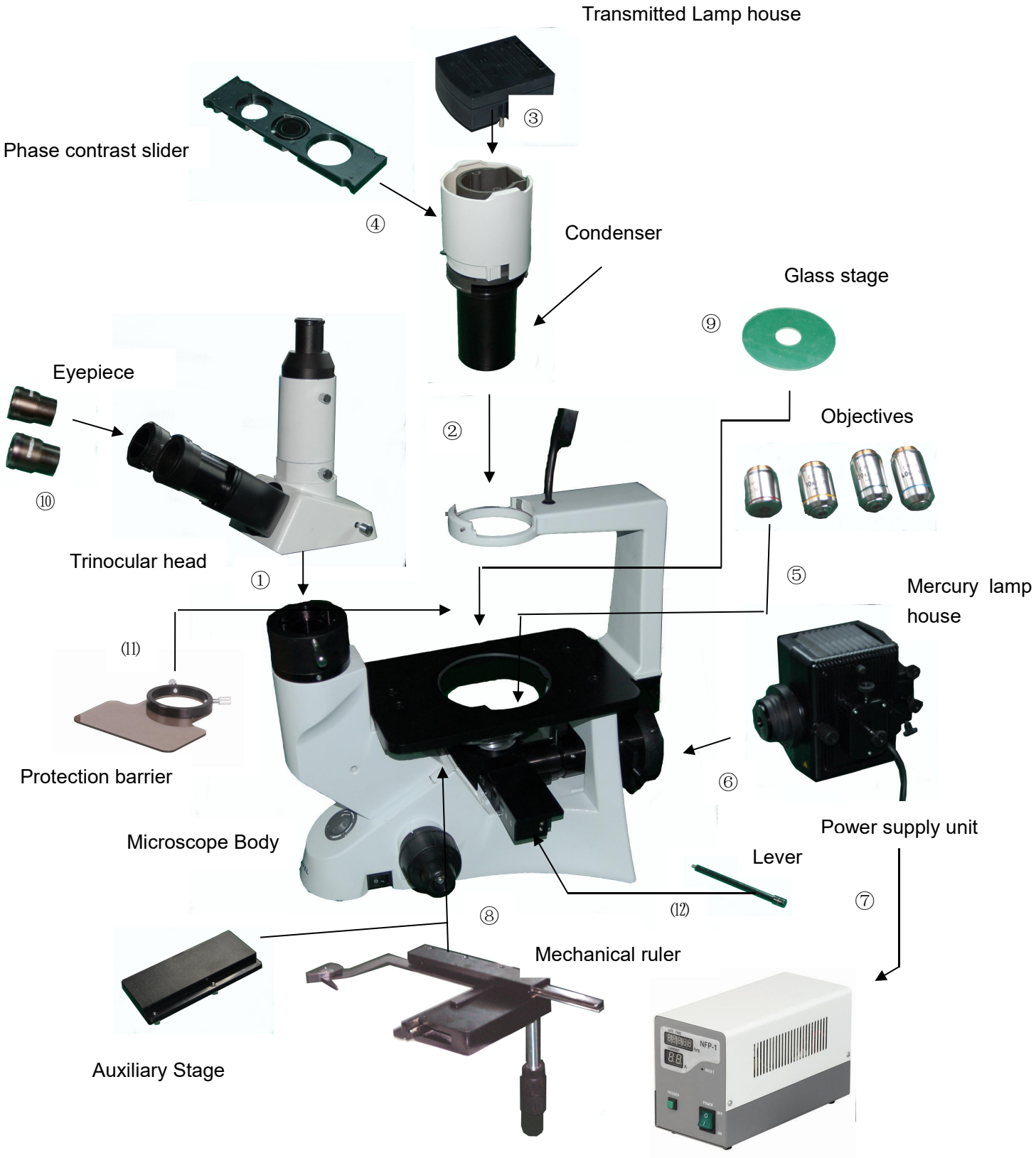
2. Installation

2.1 Installing diagram

The following Figure shows the installation sequence of the components. The number in the Figure shows the installation steps.

***Before installing, be sure every components is clean, do not score any parts or glass surface.**

***Keep well with the supplied hexagon wrench. When changing the components, you will need it again.**



2.2 Installment steps

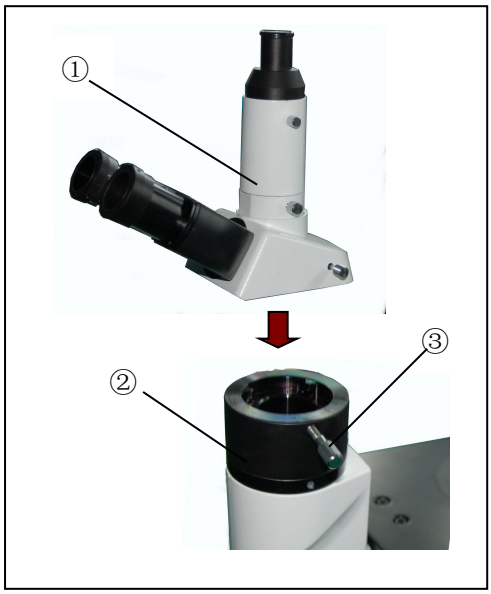


Fig 1

2.2.1 Installing trinocular head(Fig 1)

Loosen the setscrew ③ on the microscope body② and insert the trinocular Viewing Head ① into the body correctly, tight the setscrew ③.

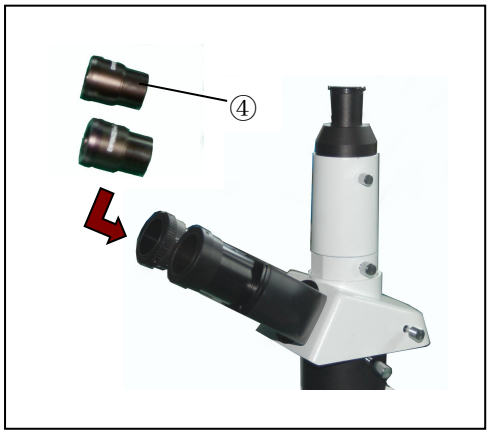


Fig 2

2.2.2 Installing eyepiece(Fig 2)

Insert the eyepiece④ into tube until they are against.

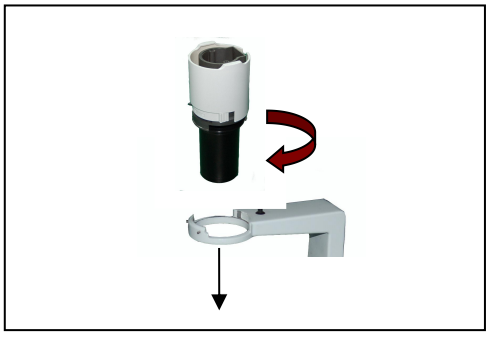


Fig 3

2.2.3 Installing condenser set(Fig3)

Install the condenser into the right direction(Fig3).

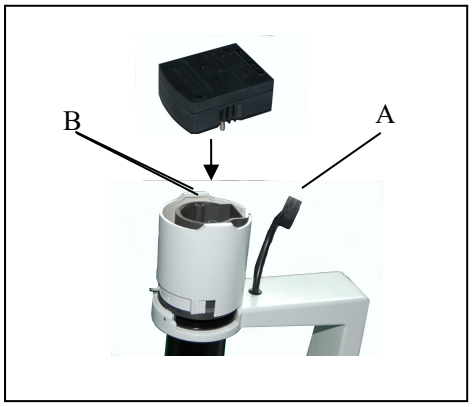


Fig 4

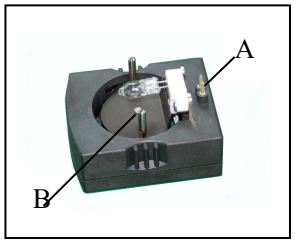


Fig 5

Fig 6

Fig 7

2.2.4 Installing lamp house (Fig4, Fig5)

Insert the plug A on the lamp house into hole A of power cord, then insert the plug B on the lamp house into the B hole of the condenser till there are against. (like Fig 6).

Replace lamp

1. Turn the switch to off position when need to replace the lamp. Pull out the lamp house and then the lamp after it is cool down completely.
2. Insert the new lamp softly to prevent damage.
3. Please do not touch the lamp by bare hands, in order not to reduce lamp working life or cause explosion. Clean the fingerprint by wiping slightly with soft cloth which is moistened with ethyl alcohol.

2.2.5 Installing phase contrast plate (Fig6, Fig7)

1. Keep the slider face(the surface which has number 10-20) up towards. Each light ring or hole has its own located position, so you need to move them until you hear the “clicked” to ensure the ring or the hole reach the center of the light path(show as Fig 7).
2. Turn the aperture diaphragm lever ① to adjust aperture. Turn the diaphragm to a Max. aperture when do phase contrast observation.

- The phase contrast ring has been centered beforehand, so it needn’t to be adjusted when in the use. If the ring is not in the center, you could adjust by the centering bolt.
- The 10X/20X phase contrast ring is worked with the 10X, 20X phase contrast objective, while the opening hole is used for bright field objective.

Notices

Environment Requirement:

1. Temperature: 0℃～40℃, max humidity: 85%.
2. High temperature and moisture will damage instrument and affect performance.
3. Keep the instrument away from the dust environment, and take the dust cover when no using.
4. Put the instrument on table without vibration.

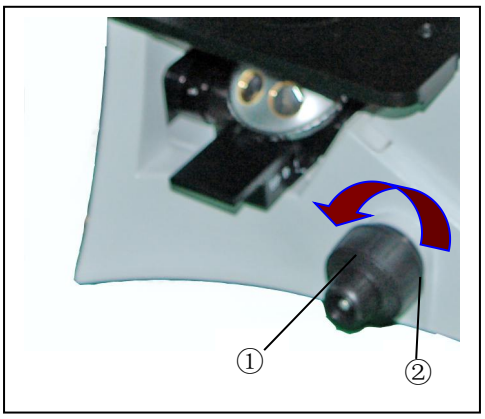


Fig 8

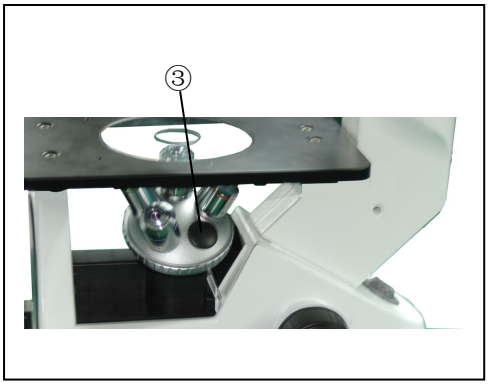


Fig 9

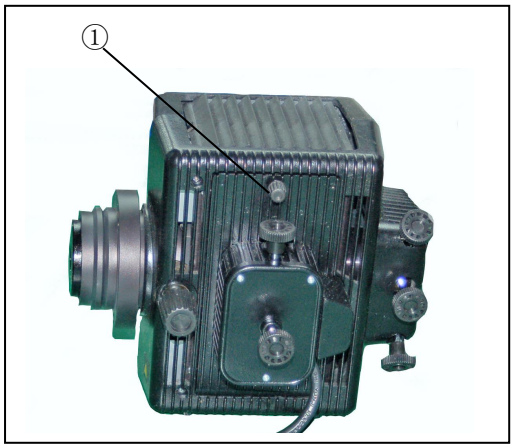


Fig 10

2.2.6 Installing the objective (Fig8, Fig9)

1. Turning the coarse focusing knob① like the figure shows till the nosepiece get to its lowest position.

★For ensuring the safety of the instrument during transportation, the nosepiece has been adjusted to the lowest position and the tension adjustment collar② has been adjusted to a appropriate tight tension while leaving the factory.

2. Screw the lowest magnification objective on to the nosepiece, then turn the nosepiece clockwise, mount other objectives according the magnification sequence from low to high.

◎ Mount objective like this way will make the change of magnification to be very easy in using.

◎ The objectives also can be installed through the stage opening.

★ Clean the objective regularly, the objective used in the inverted microscope is very sensitive to dust.

★ Do cover all the unused holes on nosepiece with dust caps③, to prevent the dust and contamination entering inside.

★ When operating, use the low magnification objective (4X or 10X) to search and focus the specimen at first, then use the higher magnification objectives if necessary.

★ When change the objective, slowly turning the nosepiece until you hear “clicked”, that means the objective enter into the right position—center of the light path.

2.2.7 Mounting the Mercury lamp (Fig10, Fig 11)

1. Loosen the lamp socket clamping screw ①, and remove the lamp socket. (Fig.10)
2. After removing the foam backstop②, securely insert the + pole (the thick head) of the mercury lamp③ to the lower terminal first and then the – pole(the thin head) to the upper terminal, then tighten the two clamping screws④.
3. Close the lamp socket with lamp into the original position and tighten the socket clamping screw①.

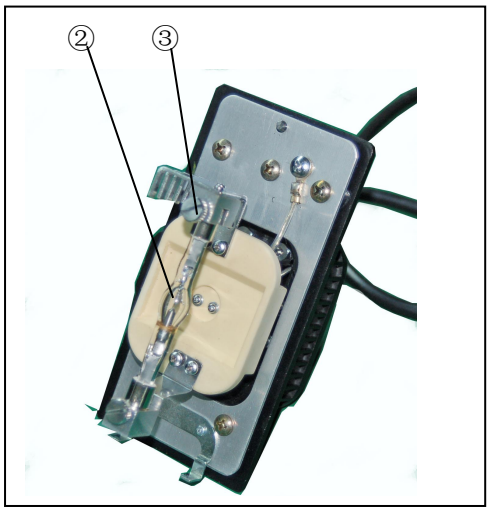


Fig 11

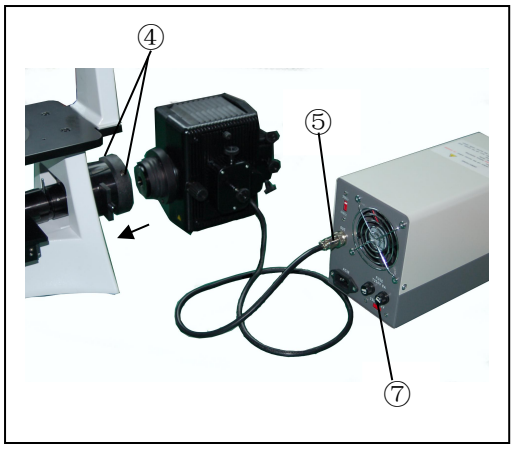


Fig 12

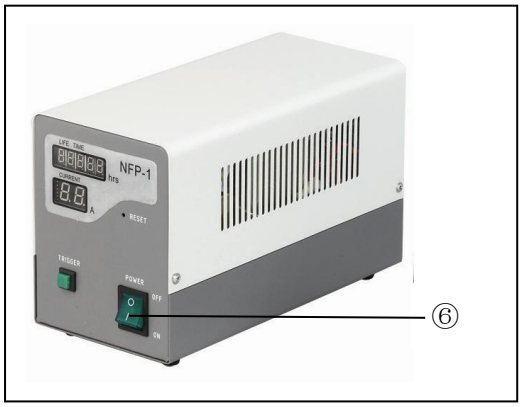


Fig 13

● Be sure to use a 100W HBO ultrahigh pressure spherical mercury lamp.
● Be sure to mount positive pole(the wide head) before the other , or the damage to the lamp may occur.
● Never subject the lamp to excessive force when mounting the Mercury lamp.
● Be careful and avoid leaving fingerprints or dirt on the mercury lamp. Attached stain may cause distortion in glass which could result in a ruptured lamp. If stained, wipe it a way gently with clean gauze.
★ To prevent any hazard, always turn the main switch on the power supply unit to “O” (OFF), unplug the power cord from the mains outlet, and wait for at least 10 minutes before replacing the lamp.

2.2.8 Assembly of the Fluorescent Attachment , Cable and Cord Connections (Fig 12, 13)

1. Mount the lamp housing into the other end of the fluorescent attachment and fix it with two screws④.
2. Plug the connector ⑤ from the lamp housing securely into the connector on the power supply unit and make sure the cord is correctly connected. (Make sure that the main switch⑥ of the power supply is set to “O” (OFF) before connecting cables)
3. Connect the power cord which along with the microscope into connector on the power supply unit and connect the other end of the cord to the mains jack.

● Verify the voltage and the frequency of the AC mains outlet match the microscope pre-set voltage and frequency, which is marked on the rear of the power supply units. Improper input voltage and frequency may degrade lamp performance, or in the worst case (although very rare), cause the lamp to explode.
● It is better to use the power cord provided by us and the same type power cord should be used if you lose or damage the old one.

2.2.9 Fuse Replacement (Fig 12, 13)

1. Set the main switch to “O” (OFF) and unplug the power cord before replacing fuses.
2. Using a flat-blade screwdriver, remove each of the fuses holders⑦by tuning it anti-clockwise and pulling out.
3 Replace both fuses with new ones.

● Always use the designated fuses (2pcs 8A). Make sure the voltage of the fuse match the voltage of the AC mains outlet.

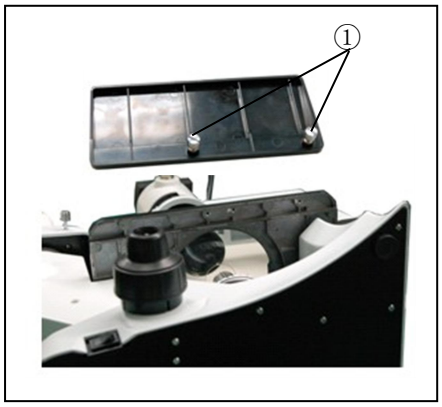


Fig 14

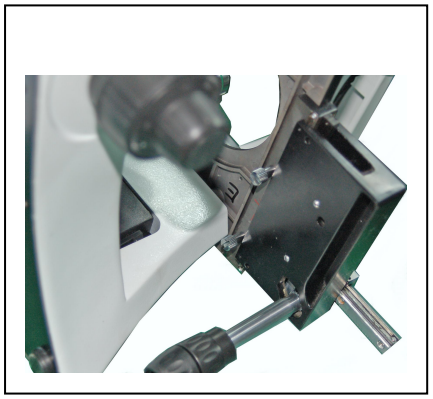


Fig 15

2.2.10 Installing the stage lengthen splint and the mechanical ruler (Fig 14, 15)

◎ Stage lengthen splint(auxiliary stage) can be installed in either side of the stage to enlarge the work surface. But you can't install the mechanical ruler together at same side.

◎ Generally, the mechanical ruler will be installed in the right side for comfortable adjustment.

1. Installing the stage lengthen splint
   First, Screw the fixed bolt① on to the splint, then mount it on to the stage from right or left below, screwing down it until it stay firm.
2. Installing the mechanical ruler
   Please install the ruler like the way of the stage splint.

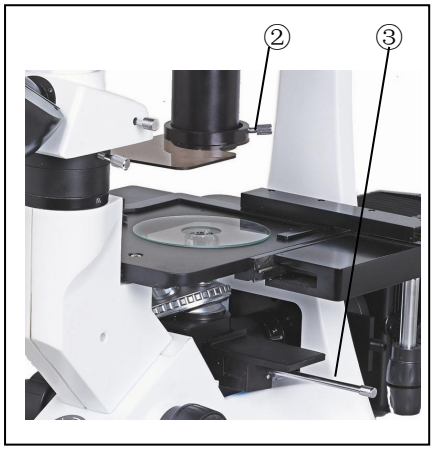


Fig 16

2.2.11 Installing protection barrier, glass plate, lever (Fig 16)

1. Install the protection barrier on the condenser by tightening the screw②.
2. Placing the glass plate to the right position.
3. Screw the lever③ to the filter blocks box under the nosepiece.

3. Adjustment and operation

3.1 Lamp adjustment for fluorescence observation

3.1.1 Connecting power

Set the main switch of the power supply unit to “I” (ON). It will stabilize in 5 to 10 minutes after ignition.

- Some mercury lamps may not ignite the first time the power is turned on due to variance in production. If this occurs, set the main switch to “1” (ON), then press the TRIGGER button on the front panel of the power supply no more than 4 seconds, repeat as necessary if the mercury lamp still not on.
- To avoid shortening the lamp life, do not turn the lamp off within 15 minutes after ignition.
- The lamp cannot be re-ignited in 10mimutes after turning off, that is, until the mercury vapor inside it has cooled down and become to liquid.

● Ensure that the hour counter is reset to “000.00” after replacement of the lamp. And you can insert a thin object such as a mechanical pencil tip into the reset hole on the front panel of the power supply unit to press the internal switch.

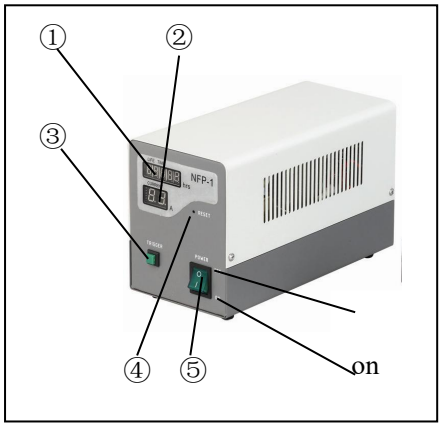


Fig 1

3.1.2 Function of button (Fig 1)

① Hour counter
② Ammeter
③ Excitation button(TRIGGER)
④ Reset button
⑤ Power switch

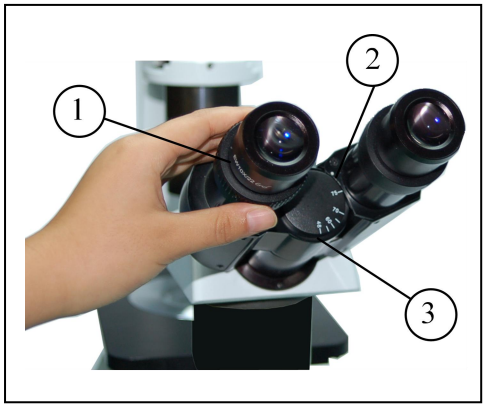


Fig 2

3.1.3 Adjusting the diopter (Fig 2)

1. Look into the right ocular by your right eye, then revolving the coarse focus knob to focus on the specimen.
2. Then use your left eye to look into the left ocular. If the image is not sharp, just use the diopter adjustment ring① to adjust please.

★ **There are ±5 diopter in the adjustment ring. The number which the reticle on the eyepiece holder pointed is your eye’s diopter graduation.**

Fig 3

3.1.4 Adjusting the interpupillar distance (Fig3, 4)

When observing with two eyes, hold on the left and right prism holder, turn around the axis, adjusting the interpupillary distance until the left and right fields of view coincide completely.

★ **The reticle on the interpupillary distance indicator③, pointed by the spot "." ②on the eyepiece tube, shows the scale of the interpupillary distance.** (Fig.2)

The range of the interpupillary distance: 48～75mm.

Fig 4

3.1.5 Switching the light path (Fig 4)

◎ Pulling out the light path selector lever④ by your finger, select the light path you needed.

◎ when in the binocular observation, pushing in the lever until you heard a "clicked". While in video or photography, pulling out the lever until it reached the "clicked" position.

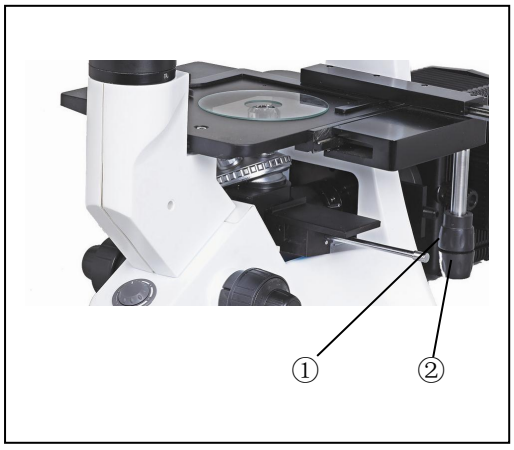


Fig 5

3.1.6 Mounting Auxiliary Stage (Fig 5)

1. When using mechanical ruler. Position the specimen by moving the X,Y knob(120mmx78mm)
2. Use the standard specimen cover(1.2mm)for best observation.

● Carefully replacing objectives. Or else the objective may touch the inserted glass plate.

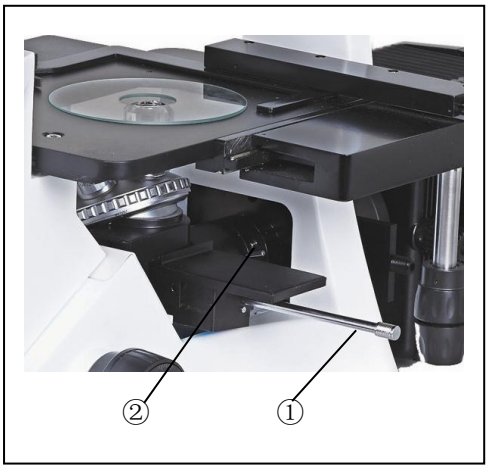


Fig 6

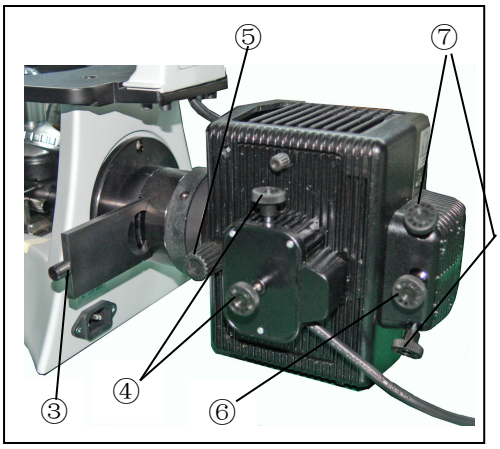


Fig 7

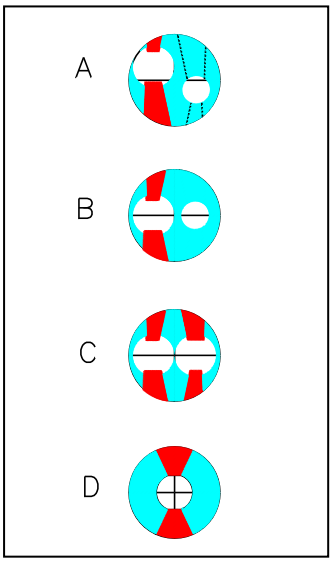


Fig 8

3.1.7 Centering the mercury lamp (Fig.6-8)

◎Before proceeding to center the mercury lamp, turn on the power supplier, wait for the brightness of the lamp to stabilize. When centering the mercury lamp, to protect users' eyes, please use the excitation light protective shield (protection barrier).

1. Move the opening hole of nosepiece in to the light path. Or remove one objective and turn the opening hole to the light path.
2. Move the lever ① on the fluorescent unit, make the green or blue excitation filter unit into the light path. If U/V excitation filter unit is used, be sure to use the protective shield.
3. Clockwise rotate the field diaphragm adjustment knob ② to open the diaphragm.
4. Place a piece of white paper on the stage and push the filter slide ③ into the light path, make the mercury lamp filament projected on white paper.
5. If the mercury lamp filament is not projected onto white paper, turn the condenser knob ⑤, make the mercury lamp filament projected on the white paper. If the lamp is not centered, adjust the filament knob④. (A)
6. Turn the lamp filament centering knob ④, adjust the left and right halves of the filament to the center. (B)
7. Use the rear focus knob ⑥, adjust the mirror at rear of the lamp housing, adjust the left and right to same focus. (C)
8. Turn the filament centering knob ④ to make the filament image and mirror image overlap. (D)

◎ Turn the collector adjusting knob⑤ to make the field of view as best as possible.

◎ Maintain this condition until the next time the lamp is replaced.

Note:

- When the hour counter indicates “100.0”, set the main switch to “o” (OFF) for safety, wait for more than 10 minutes, then replace the mercury lamp after making sure that the lamp housing has cooled down. A mercury lamp seals high-pressure gas inside. If the lamp is used beyond its service life, stress may accumulate inside the lamp, and in the worst (but very rare) case, the lamp could explode.
- After replacing with a new lamp, reset the hour counter, be sure to press the reset switch until “000.00” is displayed.

Centering the mirror reflected image (Fig.7)

★ The mirror reflected image has been centered before leaving the factory. Please do not adjust the knob⑦ if not necessary. Only when the lamp has been centered precisely, can the knob⑦ be adjusted.

Note: once the knob is adjusted, the reflected mirror cannot be reconverted to the status when leaving the factory.

Knob control: (Fig.7):

1. The middle knob⑥ is the mirror reflected image focusing knob which can sharpen the reflected image, it can adjust the mirror front and back.
2. The knobs at both sides⑦ can adjust the up/down or left/right position of the mirror reflected image.

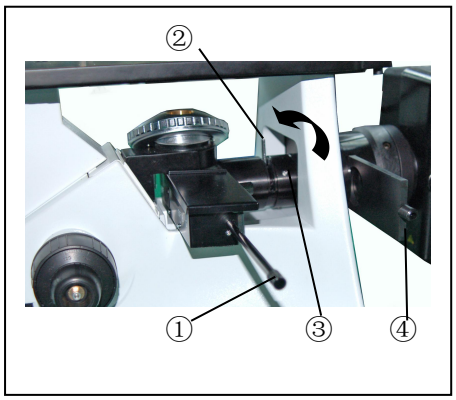


Fig 9

3.1.8 Centering the Field Iris Diaphragm (Fig 9, 10)

1. Move the 10× objective in the light path, and place the specimen on the stage and focus the microscope to get a approximate image.
2. Adjust the the field iris diaphragm lever② anti-clockwise until the diaphragm comes into the smallest.
3. Use the hexangular wrench to adjust the two field iris diaphragm centering screws③ alternately to move the image of the diaphragm to the center. (a of Fig.10 shows the adjustment of diaphragm)
4. After adjusting the aperture, clockwise rotate the field diaphragm adjustment lever ②, open to biggest aperture, can more clearly determine whether the aperture is centered (b of Fig.10).
5. Enlarge the diaphragm until it just circumscribes the field of view (c of Fig.10).

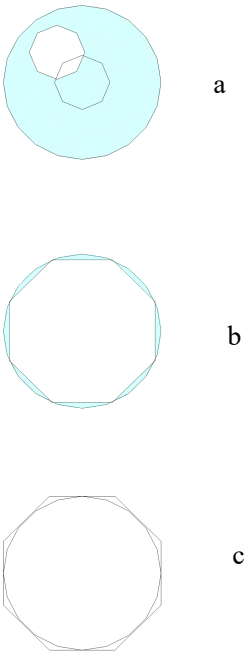


Fig 10

Adjusting the field iris diaphragm

The field diaphragm adjusts the diameter of the illuminating beam to obtain good image contrast.

Keeping the field diaphragm stopped down to the smallest required area for each observation makes it possible to prevent color fading of areas outside the observation target region.

According to the objective in use, adjust the diaphragm image using the field diaphragm lever so that the field of view is circumscribed by the field diaphragm to exclude stray light.

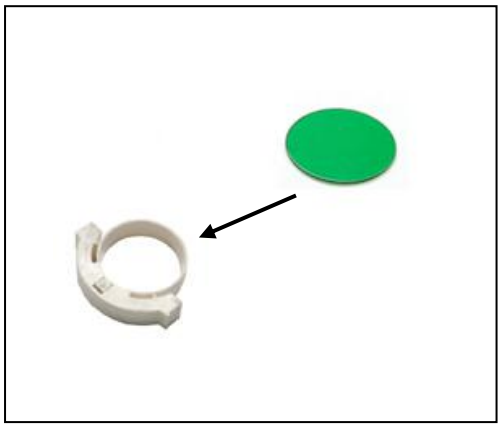


Fig 11

3.1.9 Using color filters (Fig. 11)

◎ Select the appropriate color filters according your need, it became more effective to observe or photography the specimen. Especially, we suggest using the LBD color filter, which can compensate more neutral colors.

◎ You could pile up a group of color filters to the filter holder, if you ensure they are level and the whole thickness is less than 11mm.

Color filter	Meaning
IF550	Single contrast color filter (green) (used for the phase contrast microscopy)
LBD	Color temperature transit color filter (blue) (used for bright field observation and micro photography)

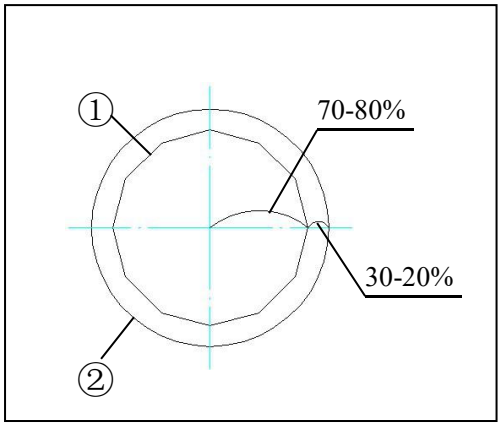


Fig 12

3.1.10 Using the aperture diaphragm (Fig 12)

◎ When in the bright field observation, the aperture diaphragm control the numerical aperture of the illumination system. Only when the numerical aperture of the objective and the illumination system are matching, you can obtain the higher image resolution and contrast, and the increased depth of field, too.

● To recognize the aperture diaphragm, you could remove the eyepiece if necessary (You also could insert in the center telescope), then looked into the viewing tube, you might see a field of view like the Fig. 12 shows. The proportion could be changed by dialing the aperture adjustment lever according your need. (①is the image of the aperture diaphragm, ② is the edge of the objective)

● Generally, when observing the colored specimen, you need to set the size of the condenser aperture diaphragm at 70%～80% of the numerical aperture which marked in the objective, but if observing the bacterium specimen which not colored, you could turn the aperture diaphragm lever at the direction of "↻"(clockwise).

3.2 Transmitted illumination adjustment

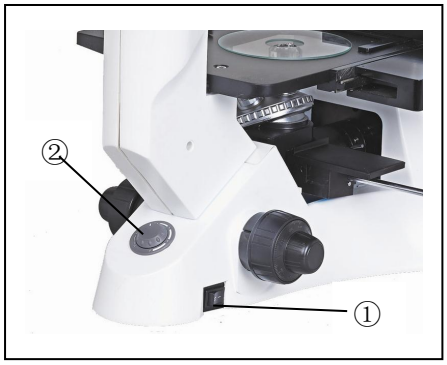


Fig 13

3.2.1 Turn on power, adjusting brightness(Fig 13)

Connect the power, turn on the main switch① (shown on the Fig.13) which on the bottom side of the base to " — "(on). Turning the brightness adjustment knob clockwise②, the voltage raise, and the brightness strengthen; whereas turning at the contrary direction, the voltage decline, and the brightness weaken.

◎Using the lamp in a low voltage condition, will prolong the service life.

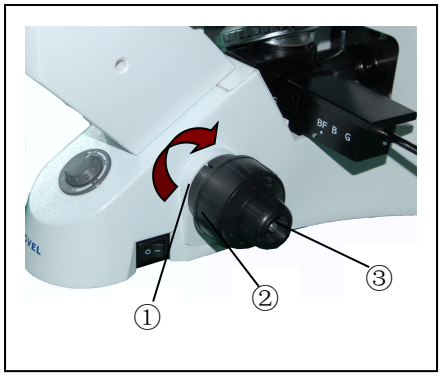


Fig 14

3.2.2 Adjusting the Tension Adjustment Collar (Fig14)

The tension of the coarse focusing knob② has already been adjusted properly before leaving factory.

◎How to adjust tension of the coarse focusing knob?

Turn the tension adjustment collar ① with the plastic spanner. While revolving at the direction of the arrow in the Fig. 14, the tension of the coarse focusing knob② is increasing, and if at the contrary direction, the tension will decline.

spanner

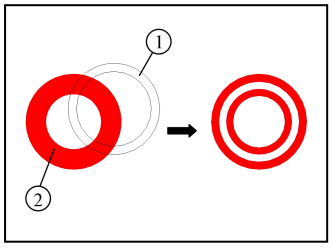


Fig 15

3.2.3 The centering ring (Fig 15, 16)

★ Usually you do not need the operation of centering.

If necessary, please follow the following steps:

1. Place the specimen on the stage and focus it.
2. Take out the eyepiece, replace it with the CT (the centering telescope), and inserted it into the viewing tube without diopter adjustment.
3. Make sure the matched phase contrast objective and phase light ring (in the phase contrast slider) have been in the center of the light path.

Fig 16

4. Using the CT to look the light ring's image① and the phase contrast ring's image②, if the light ring's image is not sharp, please shifting the CT's ocular until you can see a clear image of the light ring②.
5. Adjusting the bolts of the two centering holes③ in the phase contrast slider by the screwdriver ③until the light ring center and the phase contrast center are coincided.
6. The 10X and the 20X phase contrast objective use the same light ring on the phase contrast slider. So you need to check the coincidence of the light ring center and the phase contrast center when changing the objective. If having departure, you ought to center again.

★ If the light ring is centering incorrectly, you will fail to obtain the best viewing effect of the microscopy.

★ After removing or replacing a thick specimen, the light ring and the phase contrast ring are likely to deviate each other, which will result in a decline of the image contrast. So if happened, please repeat the steps as above.

★ If the container or the cover flip which used to place the specimen is not flat, it maybe need to repeat the centering steps for obtaining a more contrast effect. Please center the light ring by the phase contrast objective, according to the sequence of low to high magnification.

4. Microscope photography and video

4.1 Microscope video

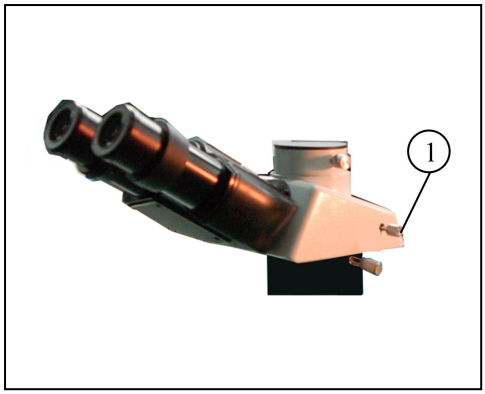


Fig 1

4.1.1 Selecting the light path (Fig.1)

★ just used in the trinocular observation

1. Pulling out the light path selector lever, until you heard the “clicked”.

★ In the dark specimen observation, you can make the focus by both eyes at first, then change the light path.

4.1.2 Installing the video set (Fig.2)

1. Loosen the locking bolt① on the trinocular viewing tube, and take out the dust cap②.
2. Remove the dust cover on the both ends of the video accessories③, and revolve the screw head end into the CCD/CMOS port.
3. Install the accessories into the tri-through port, and screw down the bolt①.

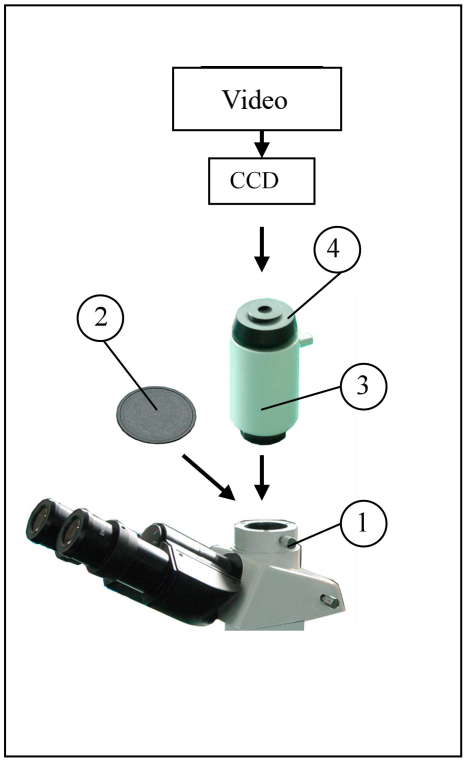


Fig 2

4.1.3 Focus (Fig.2)

Doing a binocular observation at 20% brightness, look the image on the video or the computer which connected with the microscope video system when the image is sharp. If it is not in focus, please turning the revolving video connected tube④ until the image is sharp enough.

4.2 Microscope photography

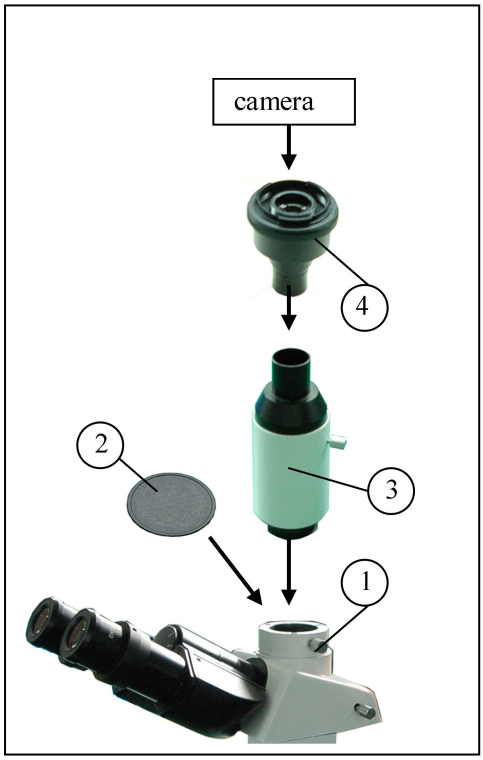


Fig 3

4.2.1 Selecting the light path

★ just used in the trinocular observation

The operation diagram is shown in the details reference is in **4.1.1**.

4.2.2 Installing the photography set (Fig.3)

1. Loosen the locking bolt① on the trinocular viewing tube, and take out the dust cap②.
2. Install the photography accessories③ into the tri-through port, and screw down the locking bolts①.
3. Inserted the camera gate which on the digital photography connected head④ into the correspond position of the camera set port, and screw it down clockwise.
5. Plug the digital photo connected head into the photo tube, then screw down the locking bolts①.

● Before connecting the camera and adapter, remove the camera lens first, then connect the lens port with the adapter. Pay attention to the gate type, please.

● To avoid the disturbing from the ocular in the observation, please place the viewer finder on the two sides of the microscope when installing the camera set.

● The camera magnification = objective magnification ×camera lens magnification

★ When shooting the micrograph, the lens close will bring an impact in some camera. In order to weaken the impact, and obtain a clear image, you could select a longer time of exposure or decrease the brightness to have some compensation.

★ This explanation is used for NiKon Single-lens reflex digital camera.

5. Outfit

5.1 Specification

Optical system	Infinite optical system				BS-7000B
Reflected light source	Excitation units	Excitation	Dichroic mirror	Barrier filter	
	Blue Excitation	BP460～490	DM500	BA520	●
	Green Excitation	BP510～550	DM570	BA590	●
	Ultraviolet Excitation	BP330～385	DM400	BA420	○
	Violet Excitation	BP400～410	DM455	BA455	○
Viewing Tube	Trinocular head, 30°incline; interpupilary range: 48-75mm				●
Eyepiece	High point, extra-wide field eyepiece EW10×/22mm				●
Centering	Centering (φ30mm)				○
Nosepiece	Backward Quintuple Nosepiece				●
Objectives	In finite plan long working distance objective 4×				●
	In finite plan long working distance objective 10×				○
	In finite plan long working distance objective 20×				○
	In finite plan long working distance objective 40×				●
	In finite plan phase contrast objective PH10×				●
	In finite plan phase contrast objective PH20×				●
	In finite plan phase contrast objective PH40×				○
Phase contrast slider	10×-20×, 40× phase annulus plate (Fixed)				●
	10×-20×, 40× phase annulus plate (Adjustable)				○
Mechanical stage	Stage: 160×250mm, inserted plate, Stage strengthen plate:70×180mm.				●
Mechanical ruler	Movement: 120×78mm				●
Reflected illumination	6V30W Halogen lamp, brightness adjustable				●
Reflected Illumination	100WHBO ultra Hi-voltage spherical mercury lamp				●
Protection barrier	Barrier to resist the ultraviolet light				●
Photo Attachment	Adapter for Nikon or Canon DSLR digital camera				○
Video Attachment	1X or 0.5X C-mount				○
Power	Power supplier NFP-1, 220V/110V interchangeable, digital display				●
Condenser	Ultra-long working distance condenser, aperture number 0.3, WD: 72mm				●
Filter	45mm blue, green and ground glass				●
Focusing	Coaxial coarse and fine adjustment, vertical objectives movement. Coarse stroke: 37.7mm per rotation. Fine stroke: 0.2mm per rotation				
Operation condition	● Use indoor ● Altitude: Maximum 2000 m ● Temperature: 5℃~40℃ (41°F~109°F) ● Maximum Relative Humidity: 80% at 31℃(88°F), then Fall Linear. ● 70% at 34℃ (93°F), 60% at 37℃ (104°F), 50% at 40℃ (104°F). ● Pollution Degree:2 (refer to IEC60664)				

Note: ●standard outfit, ○ optional

5.2 Objective Specifications

Type	MAGNIFICATION	NUMERICAL APERTURE (N.A)	WORKING DISTANCE (mm)	CONJUGATE DISTANCE (mm)	FOCUS DISTANCE (mm)	COVER SLIP THICKNESS
Infinite Long Working Distance Plan Achromatic Objective	4X	0.1	25.2	∞	45	—
	40X	0.6	3.2	∞	45	1.2mm
Infinite Long Working Distance Plan Phase Contrast Objective	10X	0.25	11	∞	45	0.17
	20X	0.4	6	∞	45	0.17

5.3 Application

Select fluorescent filters combination according to the fluorescent dye you use.

Excitation	Diachronic Mirror	Excitation Filter	Barrier Filter	Application
U	DM400	BP330-385	BA420	·Auto-fluorescence observation ·DAPI: DNA ·Hoechest 332528, 33342: Chromosome
V	DM455	BP400-410	BA455	·Catecholamines ·5-hydroxy tryptamine ·Tetracycline: Skeleton, Teeth
B	DM500	BP460-490	BA520	·FITC: Fluorescent antibody method ·Acidine orange: DNA, RNA ·Auramine: Tubercle bacillus ·EGFP, S65T, RSGFP
G	DM570	BP510-550	BA590	·Rhodamine, TRITC: Fluorescent antibody method ·Propidium iodide: DNA ·RFP

6. Troubleshooting

Under certain condition, some no-fault factors will bring a reversible influence to the instrument's performance. If the problem is happened, please take proper measures according to the follow table. If you can't solve the trouble by the supplied methods, please contact with the sales department of our company.

PROBLEM	REASON	SOLUTION	PAGE
I. Optical Part:			
1. The illumination is opening, but the field of view is dark.	The plug of the lamp holder is not connected into the illumination set	Connect them well	3
	The bulb burnt out	Change a new lamp	3
	The brightness is too low	Adjust to a proper position	8
	The color filter is piled too much	Minimize the number of the filters	11
	No use the appointed lamp bulb	Use the specified halogen Lamp 6V30W	3
2. The edge of the field of view has shadow or the brightness is asymmetry	The nosepiece is not in the located position	Turn the nosepiece into the position where you can hear "clicked"	4
	the color filter is stopped midway	Insert deeply	5
	The phase contrast slider is not located in the proper position	Turn the slider into the "clicked" position	13
3. Find dust and stain in the field of view	There are stains on the specimen	Change a clean specimen	
	There are stains and dust on the eyepiece	Clean the eyepiece	
4. Appear double image	the size of the aperture diaphragm is too small	Open up the aperture diaphragm	11
5. Resolution problems: ● Image is not sharp; ● The contrast is not high; ● The detail is not clear; ● Don't obtain the phase contrast effect	The nosepiece is not in the center of the light path	Ensure the nosepiece is turned into the "clicked" position	4
	the aperture diaphragm in the view of field is opened too large or too small	Adjust the aperture diaphragm correctly	11
	The lens (condenser, objective, ocular or culture dish) become dirty	Clean all	
	In the phase contrast observation, the bottom thickness of the culture dish is more than 1.2mm.	Use a the culture dish whose bottom thickness is less than 1.2mm	9
	Use a bright field objective	Change to the phase contrast objective	12
	The condenser ring is not coincident with the objective phase ring	Adjust the condenser ring to match the objective phase ring	12
	The light ring and the phase contrast kits is not centered	Adjust the bolts to center them	12

	The objective used is not fit to the phase contrast observation	Please use the compatible objective	12
	When looking at the edge of the culture dish, the phase contrast ring and the light ring is deviated each other	Moving the culture dish until you obtain phase contrast effect. You also can demount the slider, dail the field diaphragm with the direction of “  ”	13
6. One side of the image is unfocused	The nosepiece is not in the center of the light path	Insure the nosepiece is in the “clicked” position	4
	The specimen don’t place properly	Place the specimen on the stage correctly.	9
	The optical performance of the culture dish bottom is poor (such as erose Figure and soon)	Please use a regular culture dish	

PROBLEM	REASON	SOLUTION	PAGE
II. Mechanical Part:			
1. The coarse focus knob is hard to run	The tension adjustment collar is too tight	Loose properly	8
2. The image can't stay on the focal when observation	The tension adjustment collar is too loose	Tighten properly	8
III. Electric Part:			
1. The lamp can't light	No power supply	Check the power cord, and connect them exactly	6
	the installation of the bulb is wrong	Install the bulb correctly	3
	The bulb burn out	Change a new bulb	3
2. The bulb burns out in a high frequency	Not use the specified lamp	Use the required lamp	3
3. The height of the brightness is not enough	Not use a appointed lamp	Use an appointed lamp	3
	The brightness adjustment knob is used wrong	Adjust the brightness adjustment knob in a correct way	8
4. The light glimpse	The bulb is going to spoil	Change the bulb	3
	The power cord have a poor contact	Check the power cord, and connect them exactly	6
Ⅳ. Viewing tube			
The two eyes' field of view is different	The interpupillary distance is not correct	Adjust the interpupillary distance	10
	The diopter is not right	Adjust the diopter	10
	Not adapte to the microscope observation	When oberving, do not stare at the specimen but at the whole field of view, or move the eyes away to see other things, then back into the objective	
Ⅴ. Microscope video			
1. The image is unfocused	Focus incorrectly	Adjusting the focus system, make the double reticle and the specimen distinctly to see	10
There is faintness around the image	It is a inherent character of the achromatic objective	The problem is unavoidable if you used an achromatic objective	
3.The indoor window or the fluorescence lamp develop	The extra light entered into the eyepiece and viewfinder is reflected	Cover up the eyepiece and the viewfinder of the microscope illumination system	