Laboratory Fluorescent Biological Microscope

Model Number

BS-7000A

User Manual

This manual is written for laboratory biological microscope BS-7000A. For safety, exerting best performance of the instrument, and making you familiar with the instrument entirely, we strongly recommended that you carefully read this manual before using the microscope.

Content

User Notices

1. Safety note

1. Carefully open the box, avoid the accessories, like lens, dropping to ground and being damaged.
2. Do keep the instrument out of direct sunlight, high temperature or humidity, dusty and easy shaking environment. Make sure the stage is smooth, horizontal and firm enough.
3. When moving the instrument, please use two hands to grip with the two sides of the microscope body.
4. If the bacterium solution or the water splash to the stage, objective or viewing tube, pull out the power cord at once, and wipe up the microscope. Otherwise, the instrument will be damaged.
5. When running, the lamp house and nearby parts will be very hot. Please ensure there is enough cooling room for them.
6. Make sure the instrument is earthed, to avoid lighting strike.
7. For safety, be sure the main switch is in "O"(off) state before replace the halogen lamp or the fuse, then cut off the power, and do the operation after the lamp bulb and the lamp house completely cool.
8. Check the input voltage: be sure the input voltage which signed in the back of the microscope is consistent with the power supply voltage, or it will bring a serious damage to the instrument.
9. Use the factory supplied power cord, please.

2. Maintenance

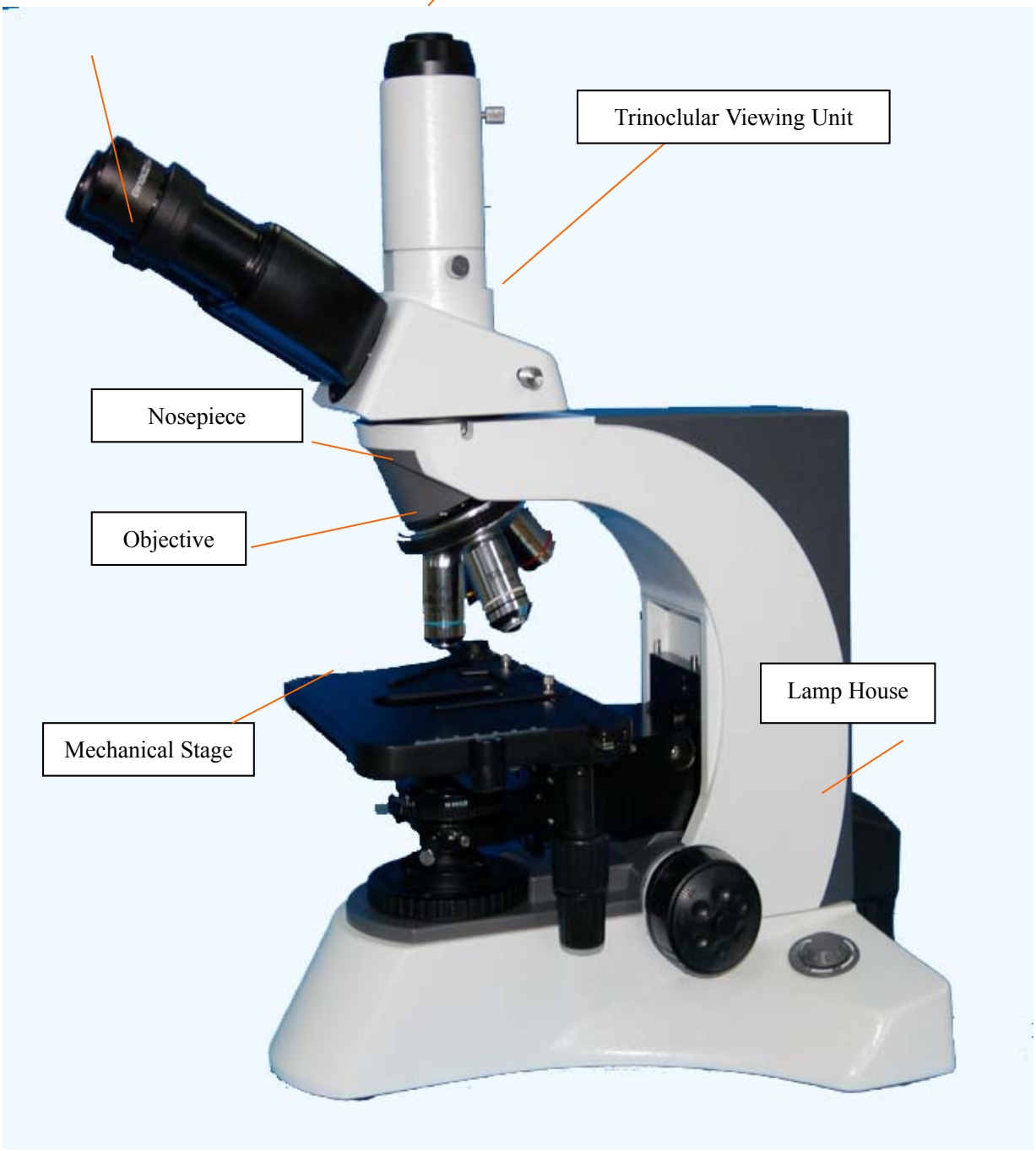
1. All the lenses have been well checked and adjusted. It is forbidden to disassemble them yourself.
2. The nosepiece and coarse/fine focus unit have a compact and precise frame, please don't disassemble them as possible as you can.
3. Keep the instrument clean, wipe dust regularly, and be attention to avoid contaminating the optical elements especially.
4. The contaminations on the prism, as finger mark and oil, could be gently wiped with a piece of soft cloth or tissue paper, gauze which has been immersed in pure alcohol or xylene. **(note that the alcohol and the xylene are all burned easily, do not let them near the fire, and use them in a drafty room as possible as you can.)**
5. Don't use organic solvent to wipe the non-optical elements, when you need to clean, use the soft detergent, please.
6. When using, if the microscope is splash by liquid, cut off the power at once, and wipe up the

moisture.

7. Do not disassemble any parts of the microscope. That will affect the function or decline the performance of the microscope.
8. Place the instrument in a cool, dry position. After using the microscope, remember to cover it with dust helmet. Do wait for the lamp house cooling completely before cover.

Optical Microscope Part

1. Name of Components



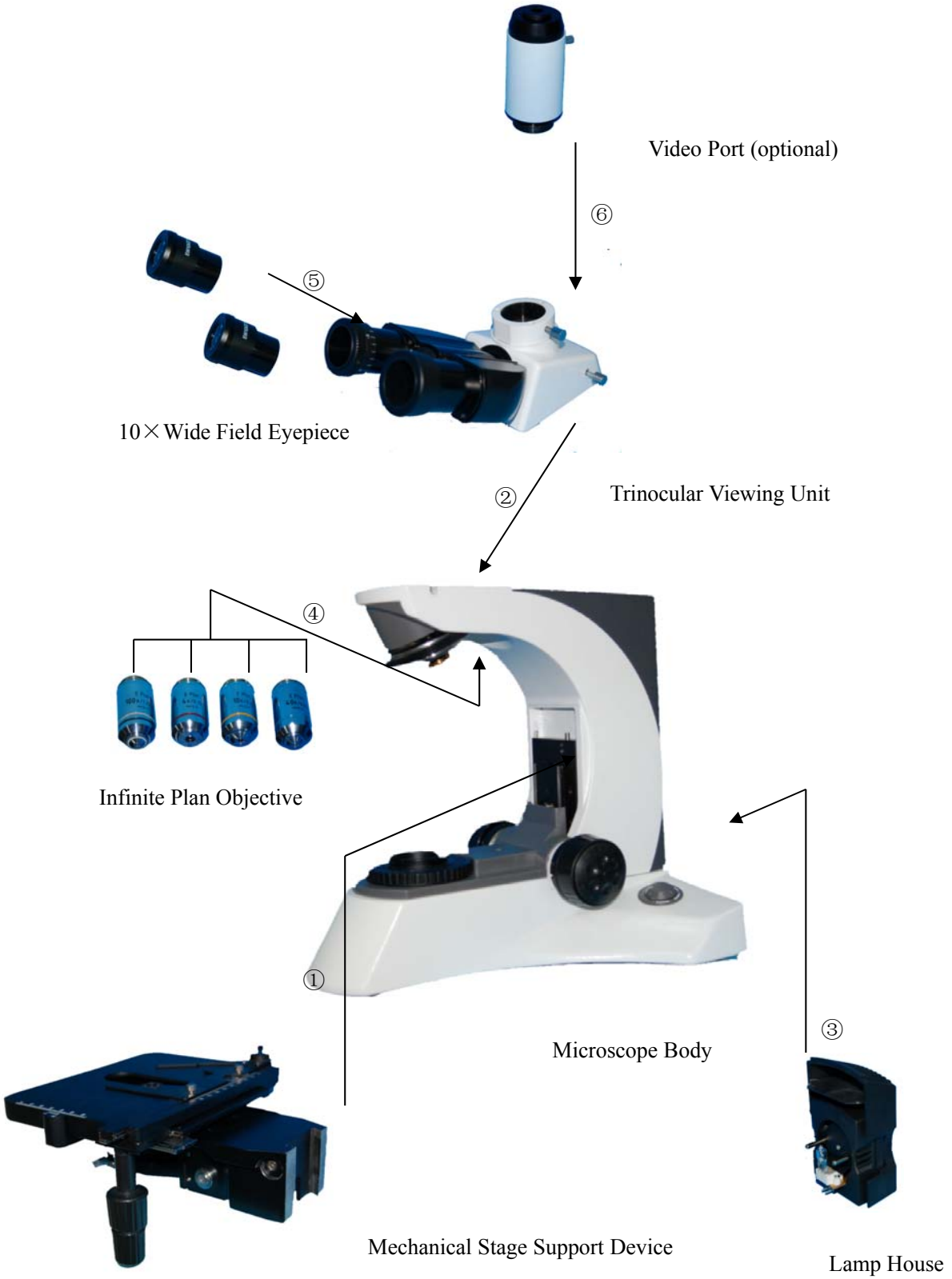
2. Installation

2-1 Installation Diagram

The following figure shows the installation sequence of the components. The number in the figure show 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.**


Video Port (optional)
⑥
⑤
10×Wide Field Eyepiece
②
Trinocular Viewing Unit
④
Infinite Plan Objective
①
Microscope Body
③
Mechanical Stage Support Device
Lamp House

2-2 Installation Steps

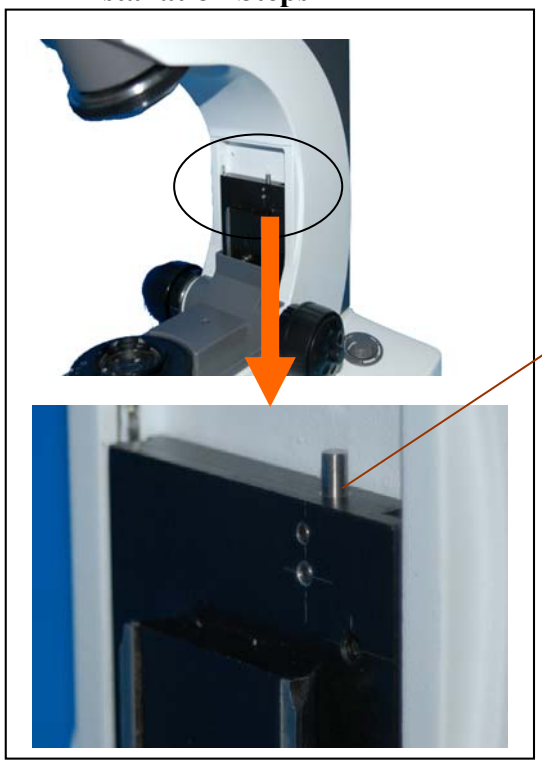


Figure 1

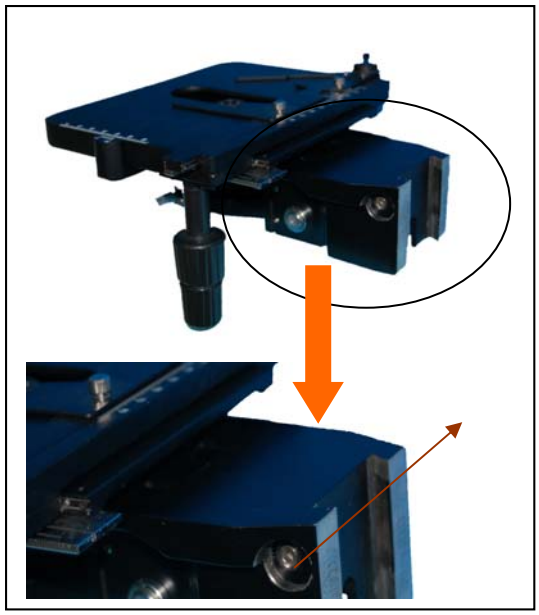


Figure 2

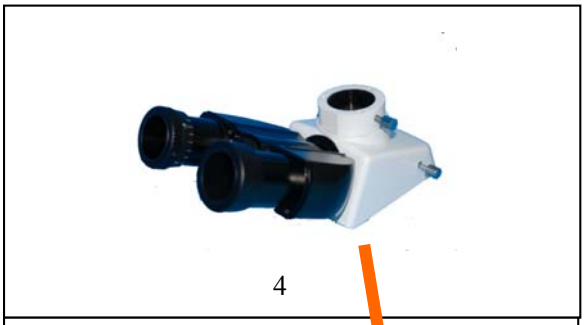
Figure 3

2-2-1 Installing the Mechanical Stage Support Device

★ Before installing the device, be sure to adjust the coarse focus knob. Make the guide board (see figure 1)down to the lowest position, so you can install the mechanical stage support device easily.

✧ Hold on the mechanical stage support device (figure 2), place it from the top of the guide board (figure 1), let the device (figure2) falling free until it reach the limit position. Use the hexagon wrench screw down the locking block, make the stage support device (figure1) and the guide board fixed together.

★ **The mechanical stage have been adjusted horizontally and fixed together before leaving factory. Do not disassembly unless necessary, that may affect the observation precision of the instrument.**



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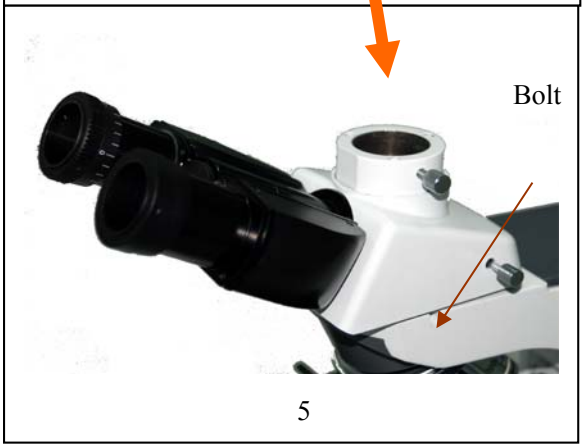

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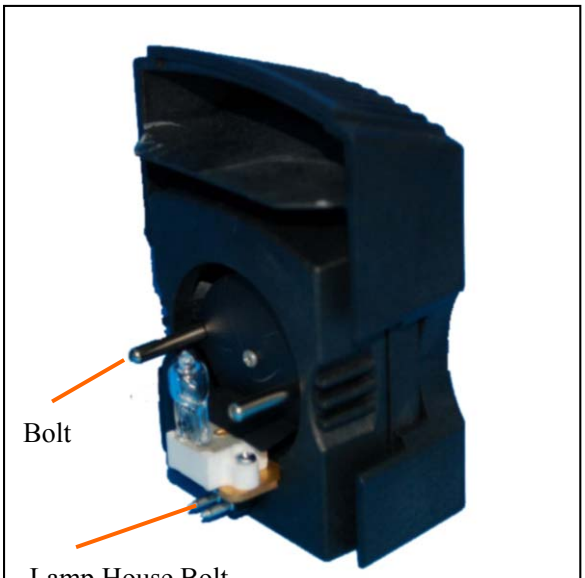

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2-2-2 Installing the Trinocular Viewing Unit

Insert the trinocular viewing unit (figure4) into the microscope head (figure5), turn to a proper position, then use the hexagon wrench screw down the bolt to fix (See figure 5).

2-2-3 Installing and Replacing the Lamp (figure 6)

✧ Please use the specified halogen Lamp 6V30W.

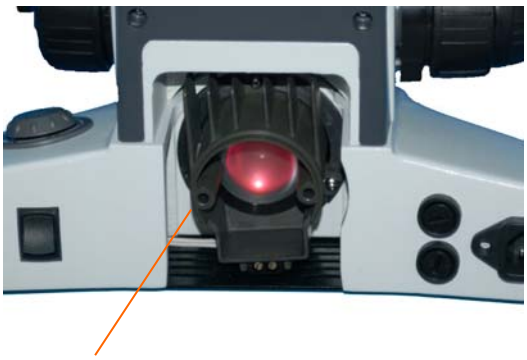
1. Hold to the bulb after you wrap it with gauze or other protection materials, and then deeply insert it into the lamp holder.

2. Replacing Lamp when using or soon after

When using, or soon after it is turned off, the lamp, the lamp house and nearby parts will be very hot and will cause serious burns. Please turn the main switch on “O” (off), pull out power plug, and make sure the bulb, the lamp room and periphery are all cool. Then, you can do your replacing.

★ Please insert the lamp gently, or it will be damaged by excessive extrusion

★ **Do not touch the Halogen bulb with your bare hands. It will shorten the service life or cause it to burst. If you leave finger marks on the surface carelessly, clean it with a dry soft cloth.**



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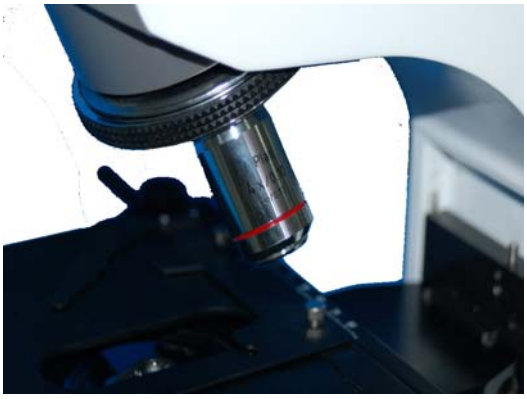

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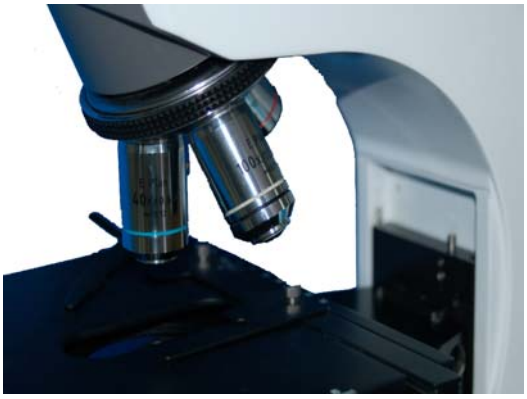

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2-2-4 Installing the Lamp House

✧ Keep the bolt on the lamp house (figure 6) in line with the jack on the back of the microscope (like the show of figure 7), then pushing the lamp holder into the illumination kits gently until they are against each other (figure 8).

2-2-5 Installing the Objective

1. Adjusting the coarse focus knob until the support device of the mechanical stage reach its low limit position.
2. Wresting the lowest magnification objective onto the nosepiece from the left or the right side (figure 9), then push the nosepiece clockwise, then place other objectives by the sequence of low to high magnification (figure 10).

✧ Installing objective this way will make the change of magnification to be easier while in using.

★ Clean the objective regularly, the objective of the inversed microscope is very sensitive to dust.

★ **When operating, use 10 × magnification objective to search specimen and focus firstly, then replace with higher magnification objective if necessary.**

★ **When replacing the objective, slowly turning the nosepiece until you hear "clicked", that means the objective enter the required position--the light path center.**

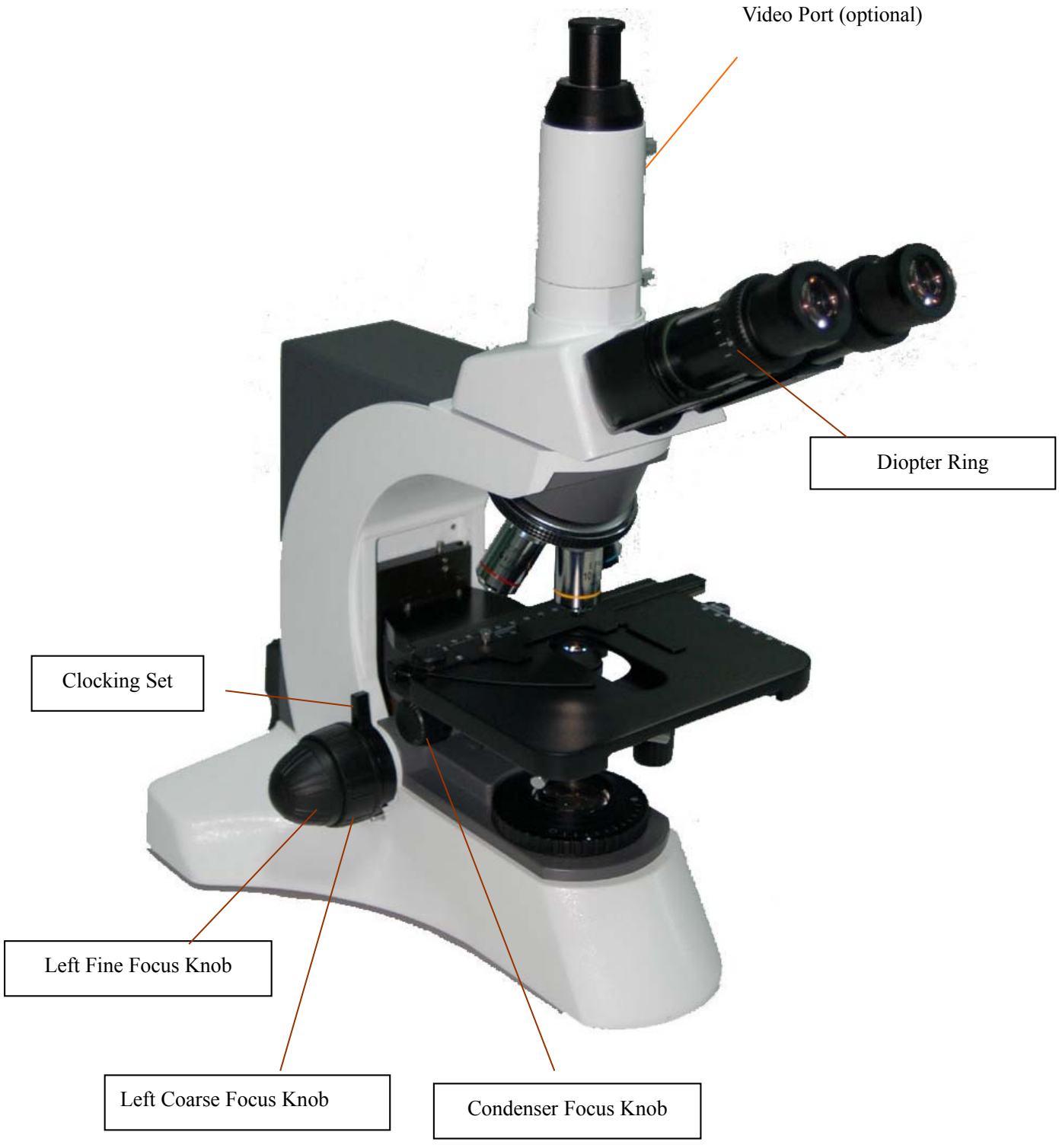
2-2-6 Installing the Eyepiece

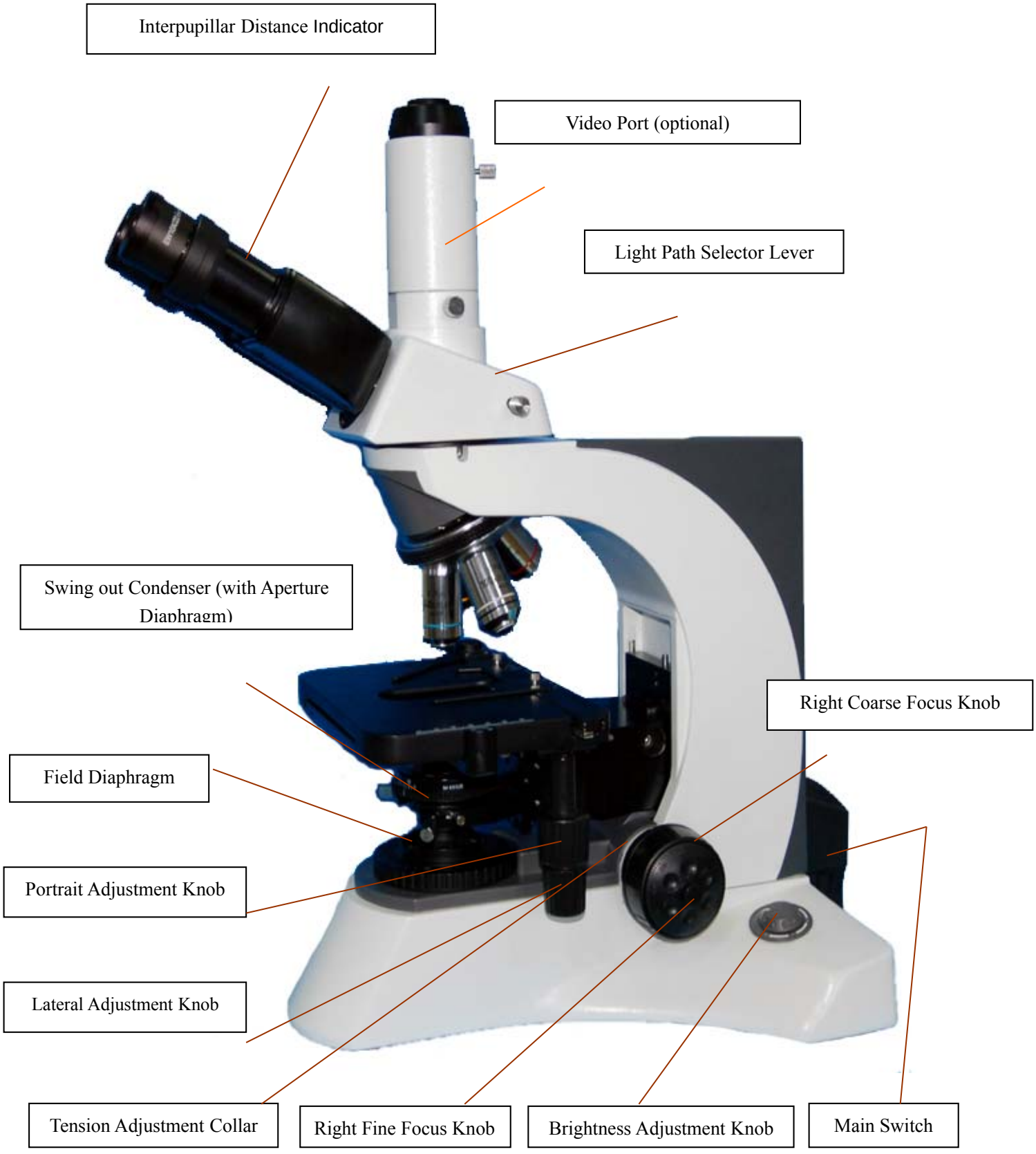
Insert the eyepiece (figure 11) into the eyepiece tube until they are against each other. The result is showing in the figure 14.

2-2-7Installing the Video Port (optional)

Insert the video port (figure 12) into the trinocular unit (figure 13), then screw down the bolt to fix it. The result is showing in figure 14.

3. Adjustment





Note : the video port is optional.

4. Operation

Figure 15

4-1 Turning on the Lamp (Figure 15)

Connect the power, turn on the main switch (figure 15) to "-"(on).

4-2 Adjust Brightness (Figure 16)

Turning the brightness adjustment knob clockwise, the voltage raise, and the brightness strengthen; turning with the anti-direction, the voltage decline, and the brightness weaken.

Figure 16

✧ Using the lamp in a low voltage condition, will prolong the use life.

4-3 Adjust the Tension Adjustment Collar (figure 17)

★ The tightness of the tension adjustment collar has adjusted before leaving factory, if finding it's loosing (the mechanical stage drop itself because of deadweight), please turning the tension adjustment collar until the tightness is in order.

Figure 17

Figure 18

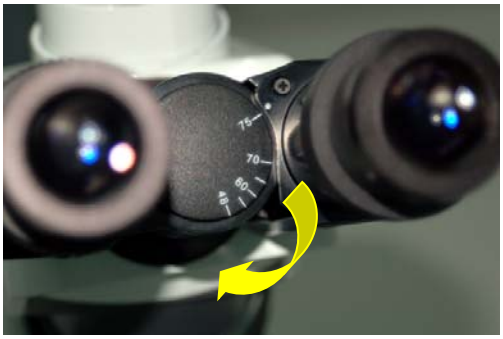


Figure 19

Figure 20

4-4 Placing Specimen(figure 18)

Place the slide on the mechanical stage. Use the stage clips to clamp the slide gently.

Turn the portrait and lateral adjustment knob of the mechanical ruler, move the specimen onto the required position.

★ Be careful when changing the objective. If you finish the observation with the short working distance objective, and want to change another one, be careful of not letting the objective touch the specimen.

4-5 Adjusting the Interpupillar Distance (Figure 19)

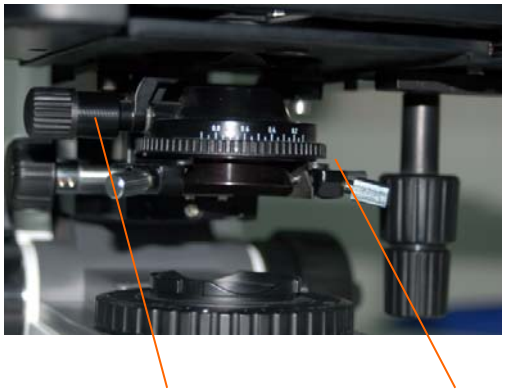
The interpupillar distance range: 48mm～75mm. When observing with two eyes, hold on the left and right prism holder, turn around the axis, adjust the interpupillar distance until the left and right fields of view coincide completely.

4-6 Adjusting the Diopter (Figure 20)

The right ocular tube is fixed. So by turning the left diopter ring after the right ocular focus on the specimen, the operator who's left and right eye has different eyesight can obtain a comfortable focus position with both eyes.

Figure 21

Figure 22



Swing out Condenser

Aperture Diaphragm

Figure 23

4-7 Focus (figure21, figure22)

1. When not using the video set

Push in the light path selector lever (figure 25) completely, then observe with both eyes. Use the 10×objective focus, to avoid the objective touch with the specimen, you should raise the mechanical stage at first, let the specimen close to the objective, then slowly separating them to focus.

The operator can converse turn the coarse focus knob to get the specimen down ,and search images in the 10×ocular simultaneously, then use the fine knob to focus. At this moment, you can replace other magnification objectives safely, and focus without the risk of destroying the specimen.

2. When using the video set

Pull out the light path selector lever (see figure25), observe with both eyes, when the image is sharp, you can see the pictures directly on the video screen which connected by the microphotograph system through the video mount.

★ **If you need to fix the stage on a vertical position to make the observation become more convenience, take use of the locking set.**

4-8 Adjusting the Swing out Condenser (Figure 23)

The center of the condenser and the light axes of the objective are coaxial. It has been adjusted before leaving factory, so the user needn't to adjust them by self.

The highest position of the condenser has been adjusted too. It also needn't any user's operation.

Turn the condenser focus knob to shift the condenser. It needs to raise the condenser when using the high magnification objective, and to decline when using the low magnification one.

1. Using the Swing out Condenser
   When using the low magnification objective, turn out the condenser, and let it away from the light path. While using the high magnification objective, turn it into the light path.
2. Adjusting the Aperture Diaphragm

The aperture diaphragm is designed for the adjustment of the numerical aperture , not for the brightness. Generally, reducing the diaphragm opening to 70- 80% of the N.A. value of the respective objective will provide an image of acceptable quality. If you want to observe the image of the aperture diaphragm, remove one eyepiece and look through the tube. You will see a dark circle encroaching on the bottom of the tube.

Figure24

Figure25

4-9 Adjusting the Field Diaphragm (Figure 24)

The control for the field diaphragm is a ring used for adjusting the area of field diaphragm. When using, turn the ring to reduce the field diaphragm, look into the field, if the diaphragm image is faintness, do the follow steps: first, turn the condenser focus knob, shift the condenser holder to the position where the observed image of the field of view is sharp; then open the field diaphragm, let the image full of the field of view , reduce the mixed light, improving the quality of the image.

4-10 Switching the Light Path Selection (Figure 25)

When the light path selector lever on the trinocular viewing set is pushed in, all the light enters the binocular tube, so you can do the binocular observation. While the lever pull out, some part of light enters the binocular tube, the left go up , enter the video tube, so you can observe through the video equipment.

5. Technical Specifications

1. Main specifications

Optical System	Infinite Optical System
Viewing Head	Compensation Free Trinocular Head ,Inclined at 30, Interpupillar distance: 48-75mm
Eyepiece (Ocular)	Exceed wide field ocular EW10X/22, tube Φ30 matched
Nosepiece	Backward Quintuple Nosepiece
Objective	Infinite plan Achromatic: 4×，10×，40×，100×
Focus System	Coaxial Coarse and Fine Focusing System, Sensitivity and Graduation of Fine Focus: 0.001mm
Stage	Double layer mechanical stage, area: 185×142mm, movement range: 75×55mm
Koehler Illumination	Exposed illumination system, Aspheric collector, halogen lamp 6V30W
Condenser	Swing out condenser NA0.9/0.25

2. Configuration Table

Viewing Head	Compensation Free Trinocular Head	●
Eyepiece	Extra Wide Field Eyepiece	●
Objective	Infinite plan objective: 4×，10×，40×，100×	●
	Infinite Plan Objective: 20×	○
Condenser	Swing out Condenser NA0.9/0.25	●
Video Accessories		○
Video Mount	C Mount 1×	○
	C Mount 0.5×	○
Polarization Device		○
Turret Phase Contrast Device		○
Dark Field Device		○
Fluorescent Attachment		○
Temperature Control Device		○

Note: ●Standard outfit，○ Optional

3. Objective Specifications

Magnification	Numerical Value Aperture Diaphragm(N. A）	Working Distance（mm）	Thickness of Cover Slip	Conjugate Distance（mm）	Magnification Sign (Color loop)
4X	0.10	25.42	0.17	∞	Red
10X	0.25	11	0.17	∞	Yellow
40X	0.65	0.75	0.17	∞	Baby Blue
100X	1.25	0.21	0.17	∞	Black and White Circle

6. Trouble shooting

Some problems will happen in the using of the microscope, you could solve them according the following list

PROBLEMS	REASON FOR PROBLEM	SOLUTION
I、 OPTICAL PART:		
1. Illumination is opening, but the field of view is dark.	The poor contact exists in the lamp house and the illumination system.	Ensure the contact pin and the lamp holder pin work well
	The lamp bulb spoils	change a new bulb
	The brightness adjustment knob is set too dark	Adjust the knob in a proper position
	No use the appointed lamp bulb	use the specified halogen Lamp 6V30W
2. The edge of the field of view has shadow or the brightness is asymmetry	The nosepiece is not in the located position	Adjust it into the located position
	The surface of the lamp become black	Change a new lamp bulb
	The surface of the lens is moldy or has contaminant	Clean the lens
3. Find dust and stain in the field of view	There are stains on the specimen	Change the specimen
	There are stains on the eyepiece	Clean the eyepiece
4. The image is defocus\low-resolution	The objective damage	Mend and correct the objective (send to factory for overhauling)
	The lens of the objective and eyepiece is moldy or have contaminant	Do cleaning
	The opening of Aperture diaphragm and field diaphragm is not proper, and too much astigmatism.	Change the opening of the aperture diaphragm and field diaphragm
	Fine focus system is broken	Examine and repair the fine focus system(send to factory for overhauling)
	The objective is not in the center of the light path	Turn the nosepiece to the located position
5. The image focus surface incline(one side is clear and the other	The illumination light incline serious	Adjust the filament position ,let the light distributing of the field of view become symmetrical and bright
	The specimen don’t correctly place	Put the specimen on the right position

side is faint)	The nosepiece is not in the located position	Turn the nosepiece in the required position
The eyes are uncomfortable, the left and right fields of view is not coincided	The interpupillar distance is not correct	Adjust the interpupillar distance correctly
	The diopter is not right	Adjust the diopter according your sight
	Can't adapt to binocular observation	When look into the objective, 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

PROBLEM	REASON FOR PROBLEM	SOLUTION
II、 MECHANICAL PART:		
1. The coarse focus knob is hard to run	The tension adjustment collar is too tight	Loose properly
2. The image can't stay on the focal plane in the process of the observation	The tension adjustment collar is too loose	Tighten properly
III、 ELECTRIC PART:		
1. The lamp can't light	No power supply	Check the power cord, and connect them exactly
	the installation of the bulb is wrong	Install the bulb correctly
	The bulb burn out	Change a new bulb
The bulb burn out in a high frequency	Not use the specified lamp	Use the required lamp
2. The height of the brightness is not enough	Not use a appointed lamp	use a appointed lamp
	The brightness adjustment knob is used wrong	Adjust the brightness adjustment knob in a correct way
3. The light glimpse	The bulb is going to spoil	Change the bulb
	The power cord have a poor contact	Check the power cord, and connect them exactly

FL-800 Epi-fluorescent Attachment Part

User Notices

The FL-800 epi-fluorescent attachment is designed for BS-2080 laboratory microscope.

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 virations.
3. Make certain that the burner is installed correctly and all cords are connected firmly.
4. Do not open the lamp housing while it is turned on or for at least 10 minutes after it has been turned off. Lamp housing parts are extremely hot and cause burns if touched.
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 burner or the fuse, and wait for at least 10 minutes before replacing the burner. (Be sure to use a GCQ-100 mercury burner.)
9. To prevent obstruction of the air flow, it is important to leave enough space around and above the lamp housing.

Safety Symbols

The following symbols are found on the system. Study the meaning of the symbols and always use the equipment in the safest possible manner.

Symbol	Explanation
	Indicates that the surface becomes hot, and should not be touched with bare hands。
	Indicates that high voltage (upper 1KV) inside, improper handling could result in an electric shock to the user.
	Before use, carefully read the user manual. Improper handling could result in personal injury to the user and/or damage to the equipment.
	Indicates that the main switch is ON.
	Indicates that the main switch is OFF.

- This manual is written just for FL-800 epi-fluorescent attachment and before equipping it with laboratory microscope, be sure to learn how to use the microscope.

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 burner 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 burner. High-pressure gas is sealed within the mercury burner. 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

●FL-800 Epi-fluorescent Attachment includes: (Fig.1)

① Main body of the Epi-fluorescent Attachment
② Power supply unit NFP-1
③ Power cord (please use the power cord provided)
④ A GCQ-100 mercury burner
⑤ Fuses (8A)

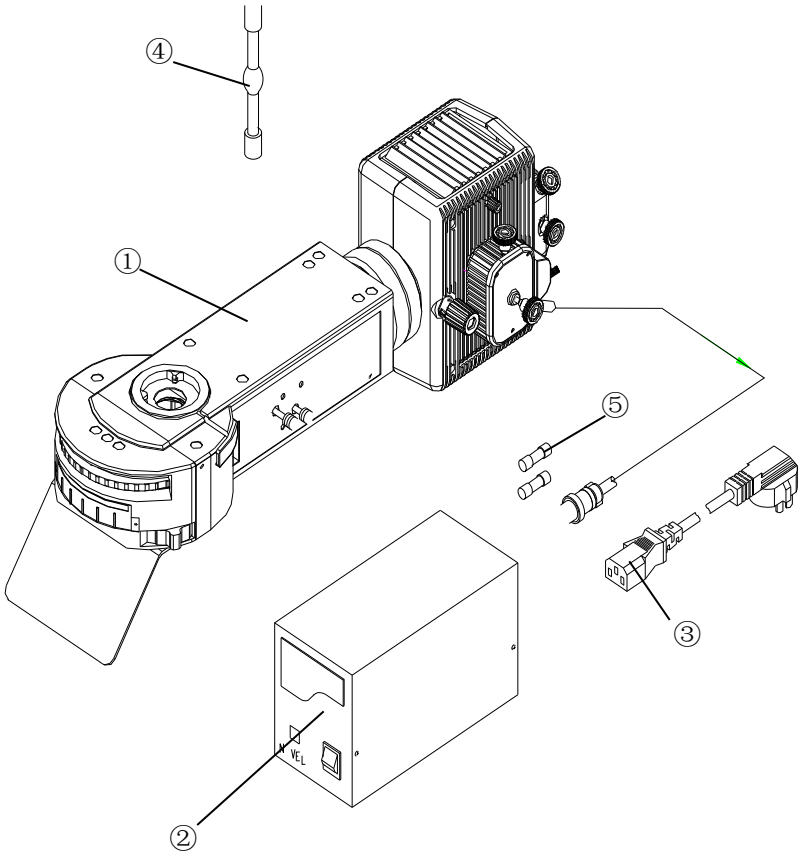
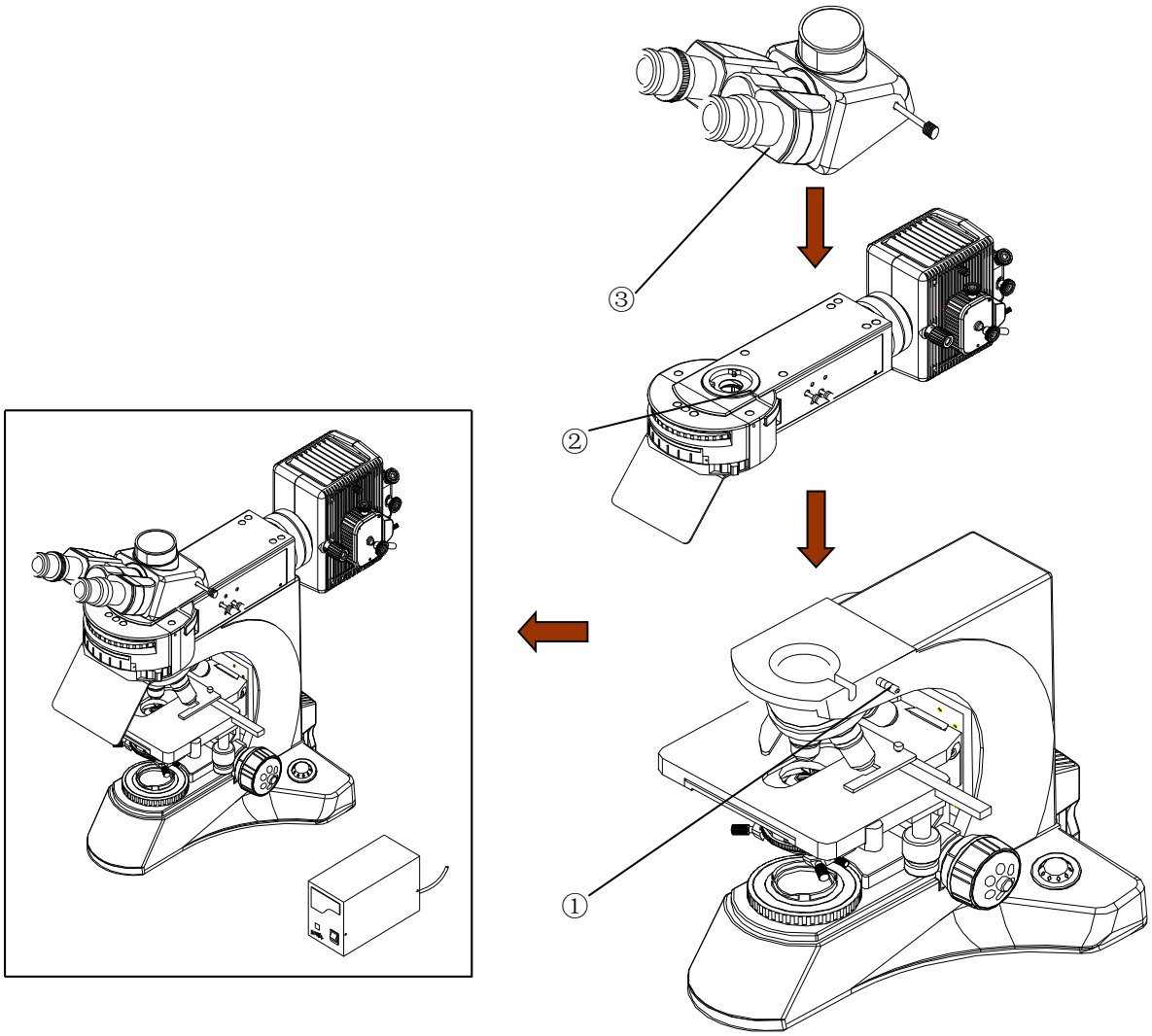


Fig.1

2. Assembly

● **BS-7000A Laboratory Fluorescent Microscope= (BS-2080)+（FL-800）**



Assembly of BS-7000A Laboratory Fluorescent Microscope：

1. Loosen the setscrew① and take the trinocular Viewing Head ③ from the body of BS-2080 laboratory microscope.
2. Insert the epi-fluorescent attachment into the laboratory microscope correctly and tighten the setscrew① until it is installed firmly.
3. Insert the trinocular Viewing Head ③ into the epi-fluorescent attachment correctly and tighten the setscrew② until it is installed firmly.

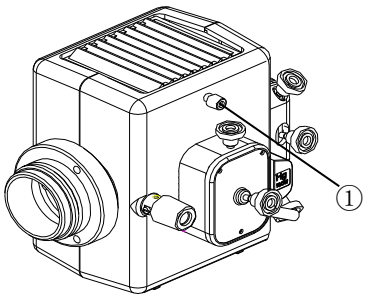


Fig.1

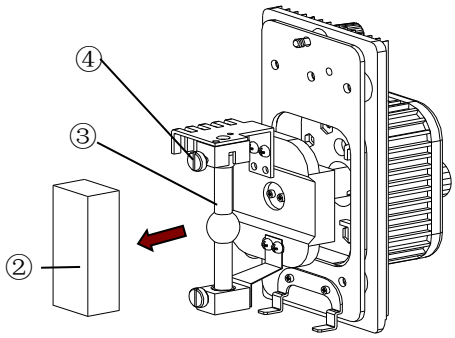


Fig.2

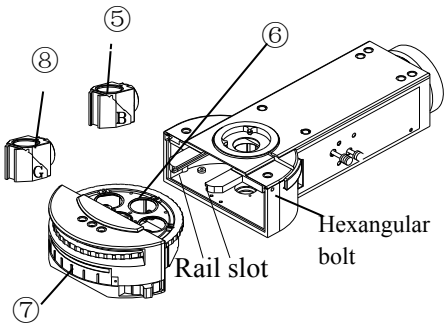


Fig.3

2.1 Preparation

Open the box carefully, remove all packing material and take the attachment out.

2.2 Mounting the Mercury Burner (Fig.1 and Fig.2)

1. Loosen the burner socket clamping screw ①, and remove the burner socket.（fig.1）
2. After removing the foam backstop ②, securely insert the + pole (the wide head) of the specified mercury burner ③ to the lower teminal first and then the – pole(the thin head) to the upper terminal, then tighten the two socket clamping screws④.
3. Close the burner socket with burner into the original position and tighten the socket clamping screw①.

- Be sure to use a GCQ-100 mercury burner.
- Be sure to mount positive pole(the wide head) before the other , or the damage to the burner may occur.
- Never subject the burner to excessive force when mounting the Mercury Burner.
- Be careful and avoid leaving fingerprints or dirt on the mercury burner. Attached stain may cause distortion in glass which could result in a ruptured burner. 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 plug from the mains outlet, and wait for at least 10 minutes before replacing the burner.

2.3 Mounting filter blocks (Fig.3 and Fig.4)

1. Screw down the hexangular bolt with the attached hexangular wrench and take out the filterblock turret⑥.

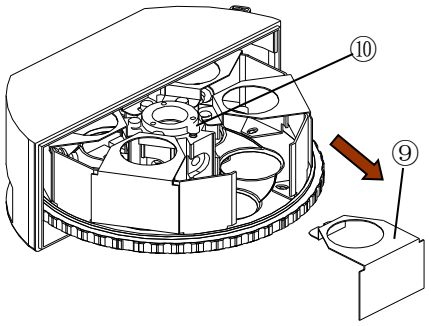


Fig.4

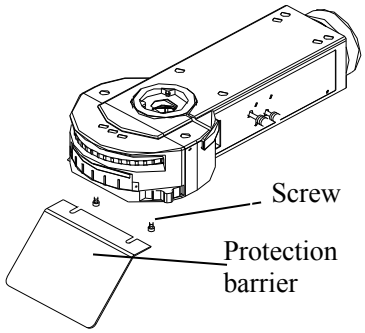


Fig.5

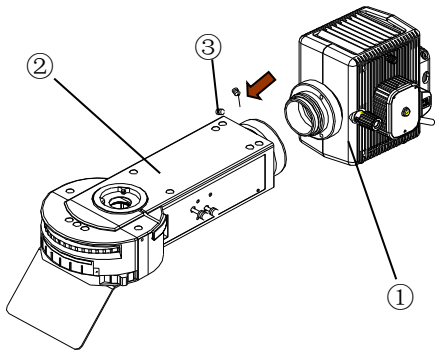


Fig.6

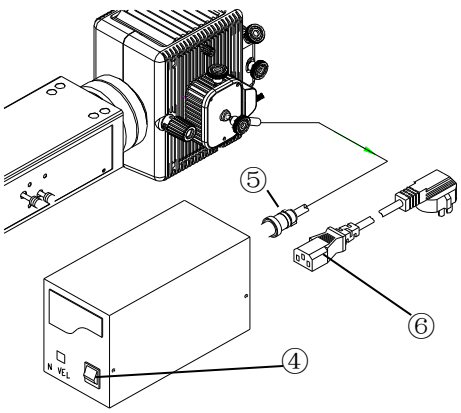


Fig. 7

2. Invert the filterblock turret ⑥ ,several model blocks ⑨ can be found .Loosen the bolt ⑩ to take one of the blocks out.

3.Mount the G –excitation mirror block⑧ into the hollow and tighten the bolt⑩.Beside the bolt, you can see a number on the turret indicating G-excitation. It will help you remember it if you insert a label below the same number on the front side of the turret. Mount other filter blocks in the same way.

4. Push the filterblock turret back into the rail slot and tighten the hexangular bolt.

2.4 Mounting Protection Barrier (Fig.5)

Install the protection barrier on the attachment by tightening the screw.

2.5 Assembly of the Fluorescent Attachment (Fig.6)

Mount the lamp housing ① into the other end of the attachment② and fix it with two screws③.

2.6 Cable and Cord Connections (Fig.7 and Fig. 8)

1． Make sure that the main switch④ of the power supply is set to “O”（OFF） before connecting cables.

2． Plug the connector ⑤ from the burner socket securely into the connector on the power supply unit and make sure the cord is correctly connected.

3. Connect the power cord connector ⑥ into connector on the power supply unit and make sure the cord is correctly connected.

- 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 units and improper setting may degrade burner performance , or in the worst case(although very rare), cause the burner to explode.
- It is better to use the power cord provided by BestScope and the same type power cord should be used if you lose or damage the old one.

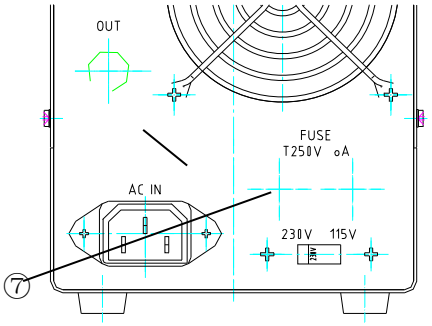


Fig.8

2.7 Fuse Replacement (Fig.7 and Fig. 8)

1 Set the main switch ④ to "O" （OFF） and unplug the power cord before replacing fuses.

2 Using a flat-blade screwdriver, remove each of the fuses holders ⑦ by tuning it counter-clockwise。
and pulling out.

3 Replace both fuses with new ones.

● Always use the designated fuses (8A). And make sure the voltage of the fuse match the voltage of the AC mains outlet.

3. Adjustment & Operation

3.1 Name of Components(Fig.9-13)

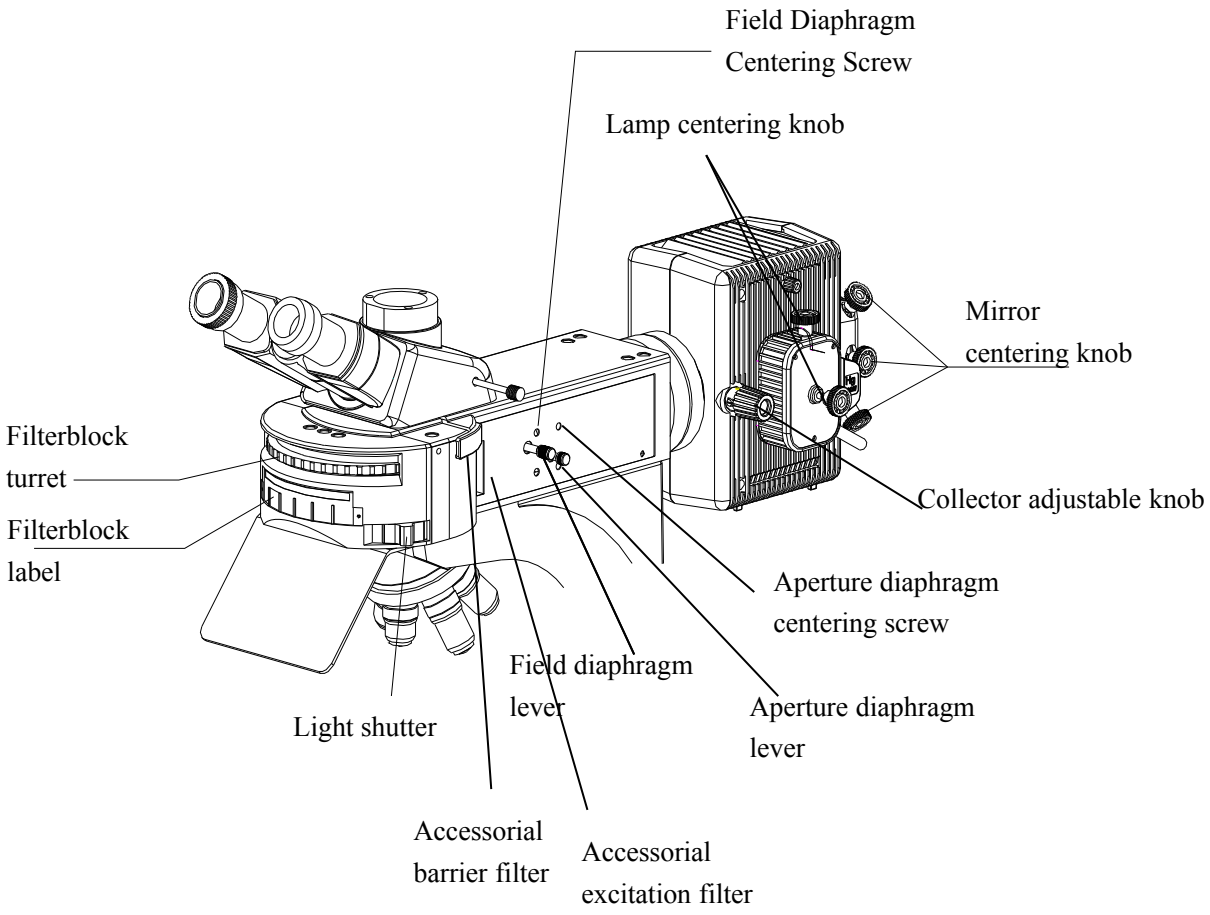


Fig.9

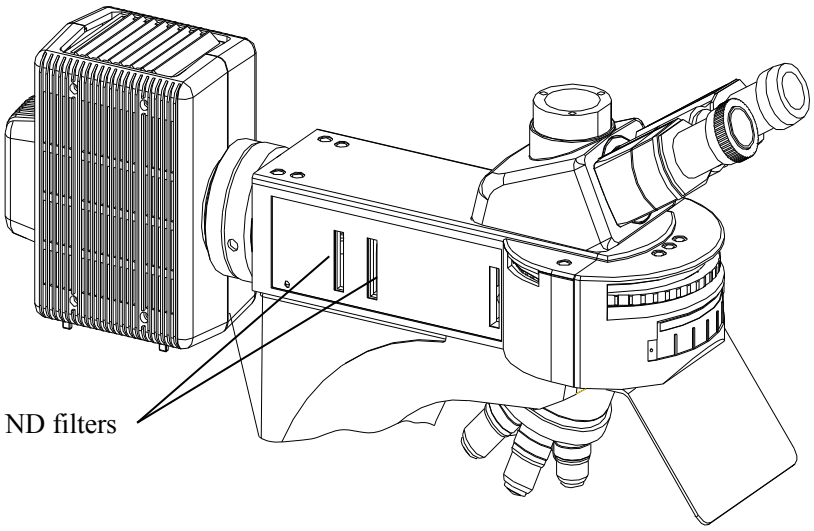


Fig.10

Fluorescent mirror block (filter block)

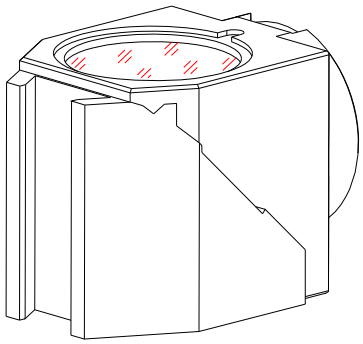


Fig.11

◎ There are 6 fluorescent mirror blocks (filter block) mounted in the filterblock turret at the most.(fig.11)

● a mirror block includes a diachronic mirror, a barrier filter, an excitation filter.(There are kinds of excitation filters).Don't take apart the filer block.

◎ This epi-fluorescent attachment has two kinds of excitation filterblocks attached.(B-excitation and G-excitation).if you need other kinds of filterblock, you have to purchase it separately.

Power Supply Unit (for 100w mercury lamp)

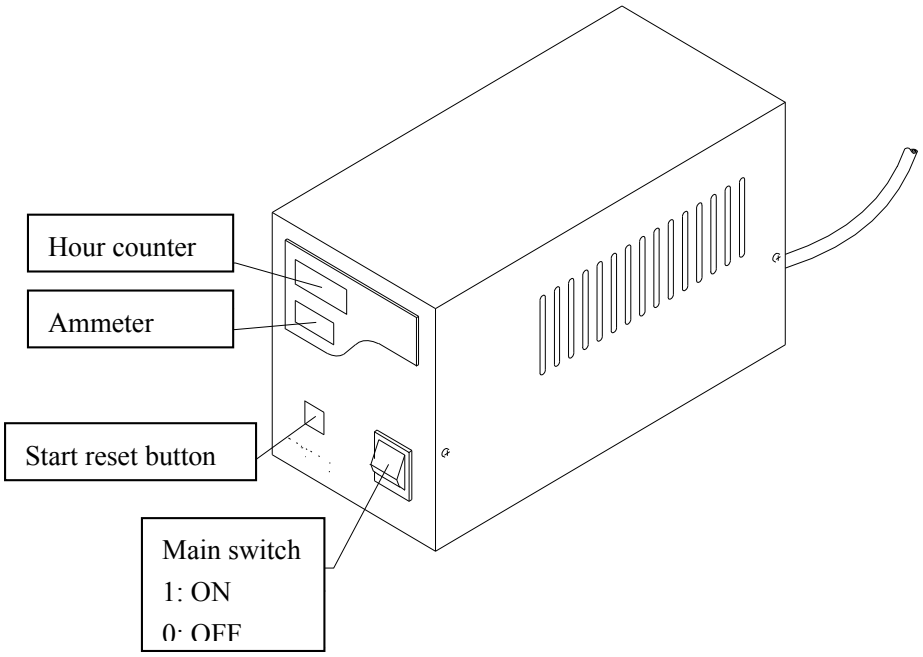


Fig.12

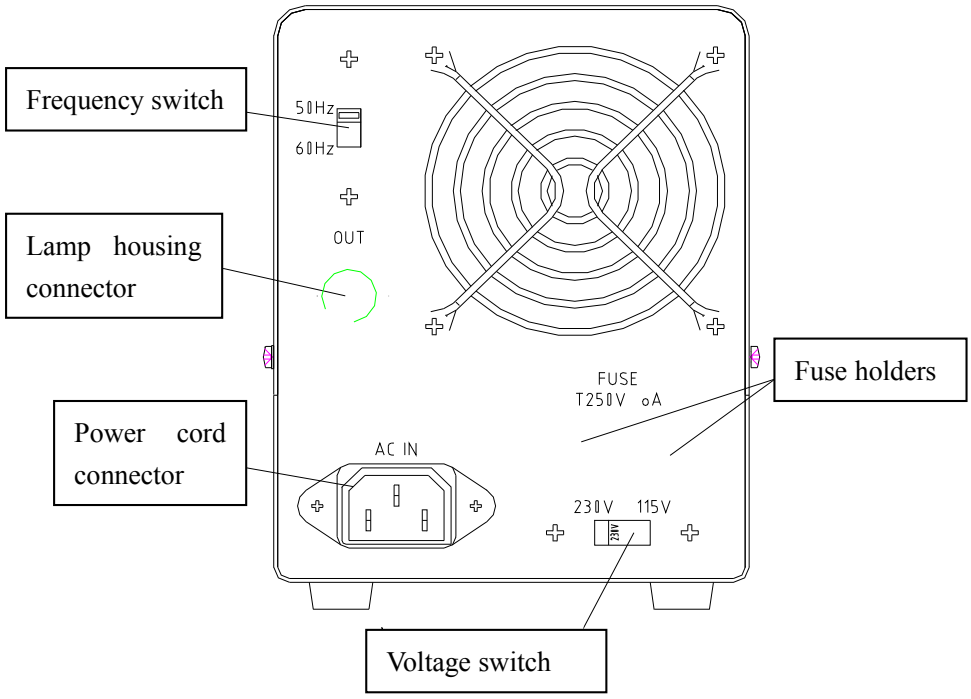


Fig.13

3.2 Operation

3.2.1 Preparation

1. 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 units.
2. Make sure the cord is connected firmly.
3. When transmitted light observation is required, pull out the filter system and make the hole in the light path.
4. Adjust the field diaphragm to match the field edge. If it not centered, use the hexangular wrench to adjust the screw.
5. Be sure to use immersion oil when using fluorescent free objectives.
6. When it is required to interrupt observation for a short period, use the shield in the accessorial excitation filter part. (Repeated on-off of the mercury lamp will shorten its service life considerably)
7. Precautions on the specimen color fading:

   The system employs high-intensity excitation light to enable bight observation of dark fluorescent specimens. As a result, if high-power objectives are used frequently, color fading of the specimen occurs early, degrading the view (contrast) of fluorescent images. So it is effective to use the shutter frequently to avoid illuminating the specimen for a longer period than required.

   ND filter and small aperture diaphragm can help weaken the intensity of the excitation light. Also, it is useful to use light shutter to reduce the specimen color fading.

   Color fading of the specimen can also be delayed using commercially available color fading preventing agent (DABCO, etc). The use of color fading preventing agent is recommended when you perform high-magnification observation frequently.

   ★ **Note that color fading preventing agent cannot be used with certain specimens**

3.2.2 Select Fluorescent Filter Combination

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

3.2.3 Objectives for Various Observations

OBJECTIVES	EXCIATION	
	B, G	U, V, B, G
4×/0.13 Fluorescent Objective	○	○
10×/0.30 Fluorescent Objective	○	○
40×/0.75 Fluorescent Objective	○	○
100×/1.30 Fluorescent Objective	○	○
20×/0.50 Fluorescent Objective	○	○
4×Infinite Plan Objective	●	○
10×Infinite Plan Objective	●	○
40×Infinite Plan Objective	●	○
100×Infinite Plan Objective	●	○

●: Standard outfit for BS-2080 laboratory microscope ○: Optional

3.2.4 Switch on Electrical Source

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

- Some mercury burners may not ignite the first time the power is turned on due to variance in production, and the safety mechanism in the starter in such a case. If this occurs, set the main switch to "1"（ON）, then press the starter reset switch on the front panel of the power supply and between 1 to 4 seconds are required for igniting the burner. Repeat as necessary.
- To avoid shortening the burner life, do not turn the burner off within 15 minutes after ignition.
- The burner cannot be re-ignited for about 10mimutes, that is, until the mercury vapor inside it has cooled down and condenser to liquid.
- Ensure that the hour counter is reset to "000.00" after replacement of the burner. 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.

3.2.5 Centering the Field Iris Diaphragm(Fig.1)

1. Switch the light shutter ① to "●"position.
2. Revolve filter block turret to engage the B-excitation mirror in the light path.

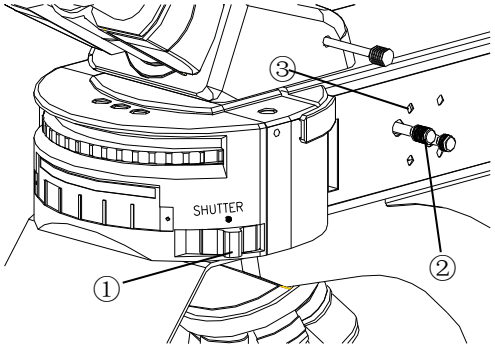


Fig.1

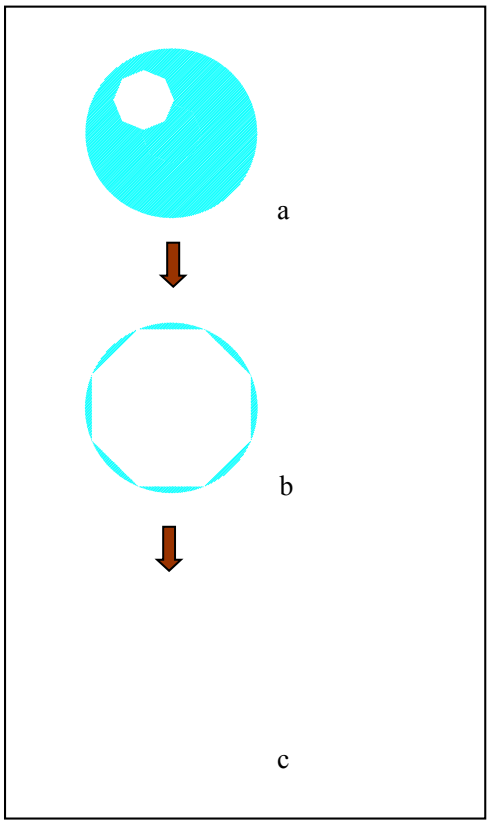


Fig.2

Adjusting the field iris diaphragm (Fig.2)

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.

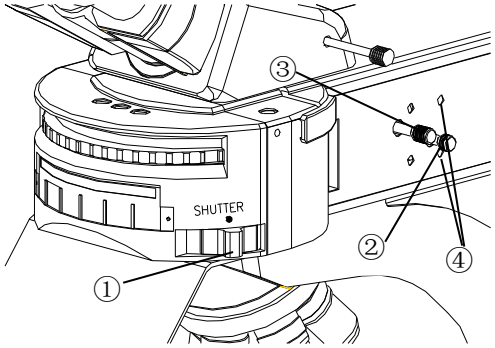


Fig.3

3.2.6 Centering the Aperture Iris Diaphragm (Fig.3)

1. Switch the light shutter① to "●"position to shut off the light path.
2. Revolve the filter block turret to engage the G-excitation mirror block or another into the light path.
3. Switch the light shutter① to"O" position to open the light path.
4. Engage the 10×objective in the light path, and place the centering plate (a white plate with a cross) on the stage and bring into approximate focus.
5. Move the cross of the centering plate to the center of the field of view.
6. Remove any of objectives from the light path.
7. Pull out the aperture diaphragm lever② to adjust the aperture iris diaphragm to the smallest diameter.
8. Pull out the field iris diaphragm lever③ to adjust the field iris diaphragm to the smallest diameter. The image of aperture iris diaphragm can be found on the centering plate.
9. Adjust the aperture iris diaphragm centering screws④ with attached wrench to superpose the image of aperture iris diaphragm on the cross of centering plate.

Adjusting the aperture iris diaphragm (Fig.3)

The aperture iris diaphragm adjusts image resolution and contrast.
For fluorescent observation, push in the aperture iris diaphragm lever③.
Both ND filter and small aperture diaphragm can help weaken the intensity of the excitation light to delay color fading of the specimen
According to the objective in use, adjust the diaphragm image using the field iris diaphragm lever③ so that the field of view is circumscribed by the field iris diaphragm to exclude stray light.

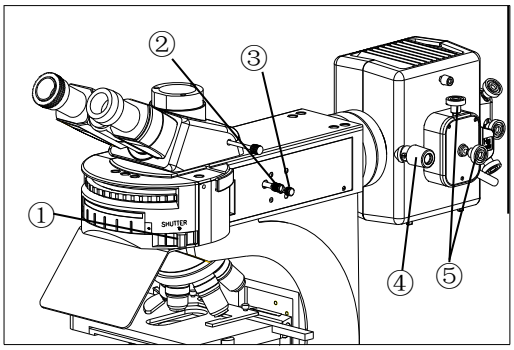


Fig.4

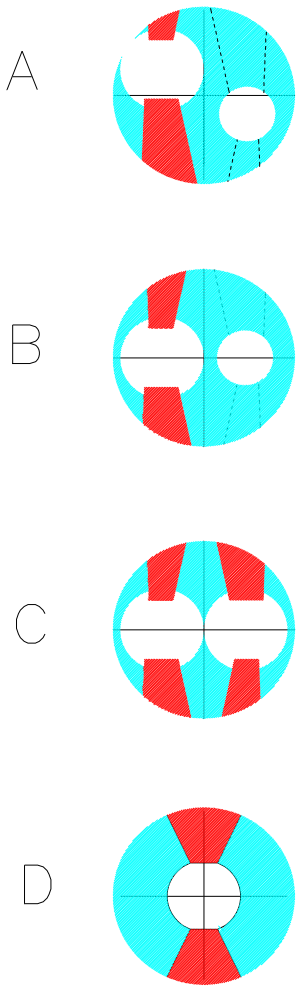


Fig.5

3.2.7 Centering the mercury burner (Fig.4-6)

◎Before proceeding to center the burner, wait for the arc image to stabilize to protect against glare during arc image centering, it should be viewed across the excitation light protective shield.

1. Switch the light shutter ① to"●" position to shut off the light path.
2. Revolve the filter block turret to engage the green or blue excitation filter block into the light path. If U/V excitation filter block used, be sure to use the protective shield.
3. Revolve the nosepiece to engage 10× objective into the light path. Place the centering plate on stage, through transmission observation;, adjust the stage until the cross is in the centre of the field of view.
4. Remove the objective from the revolving nosepiece position and engage this position in the light path.
5. Pull out the field iris diaphragm lever② to close the iris diaphragm and push in the aperture iris diaphragm lever③ to open the iris diaphragm to the large limit.
6. Switch the light shutter① to "O" position to open the light path.
7. Turn the collector adjusting knob④ to project the arc image on the centering plate and sharpen it.(A)
8. Revolve the burner adjusting knob⑤ to move the arc image and the mirror reflected arc image in the symmetrical position。(B)
9. Adjust the mirror focusing knob⑥(Fig.6) to sharpen the mirror reflected arc image. (C)
10. Turn the burner adjusting knob⑤ to overlap the arc image with the mirror reflected arc image.(D)

◎ Turn the collector adjusting knob④ to make the field of view as bright as regular as possible..

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

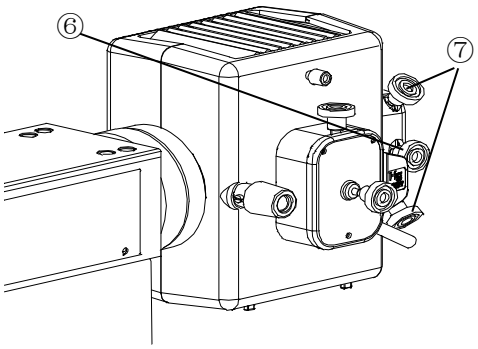


Fig.6

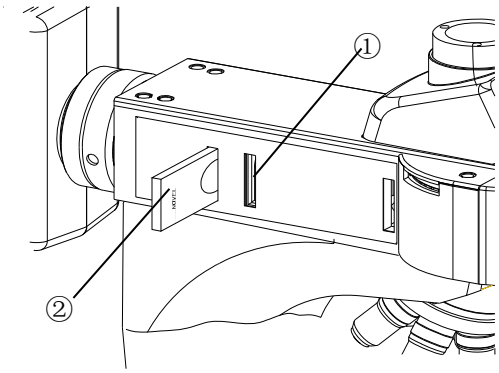


Fig.7

Centering the mirror reflected image (Fig.6)

★ The mirror reflected image has been centered before leaving the factory. Do not adjust the knob⑦ please if not necessary. Only when the burner 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.6）:

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

3.2.8 Mounting ND filter (Fig.7)

1. The ND filter can reduce the excitation light intensity to delay color fading of the specimen. Use the ND filter as far as this does not hinder observation.

2.There are two kinds of ND filters for option:ND6 and ND25 for position ① and ② respectively (Fig.7). To prevent the ND filter from being cracked, insert the filter with the indication surface facing the observation side.

3. When the filter is inserted, there are two clicks heard. the filter is in the light path on the second click.

☆ Note

When the mercury burner is lit for a long period while an ND filter is inserted, the filter and its metallic frame would become very hot. Take care not to burn yourself. When replacing the ND filter, be sure to wait until the ND filter cools down.

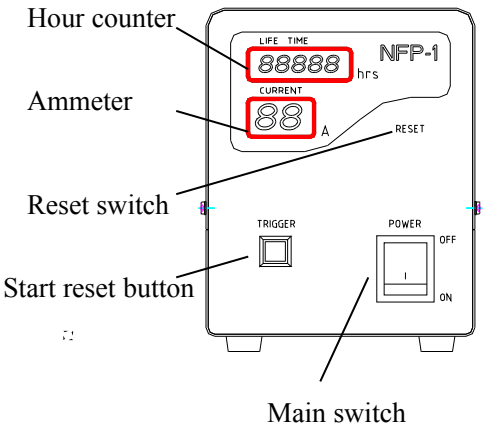


Fig.8

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 lamp burner after making sure that the lamp housing has cooled down..
  A mercury burner seals high-pressure gas inside. If the burner is used beyond its service life, stress may accumulate inside the burner, and in the worst (but very rare) case, the burner could explode.
- After replacing with a new burner, reset the hour counter, be sure to press the reset switch until “000.00” is displayed. (Fig.8)
  Some problems will happen in the using of the attachment, you could solve them according to the following list.

4. Troubleshooting Guide

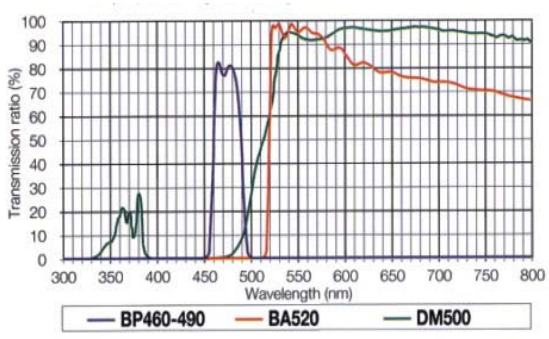
Under certain conditions, performance of the attachment may be adversely affected by factors other than defects. If problems occur, please review the following list and take remedial action as needed.

PROBLEMS	CAUSE	SOLUTION
I. **Optical Part**		
1. Although the mercury burner illumination is on, the field of view is invisible or dark.	The light shutter closes the light path	Switch the light shutter to “〇”position
	The ND filter is engaged in the light path.	Pull out ND filter to open the position
	The fluorescent mirror block is improperly engaged in the light path	Engage it properly
	The aperture iris diaphragm and field iris diaphragm are not open enough	Open the aperture iris diaphragm fully; adjust the field iris diaphragm to circumscribes the field of view
2. Visibility is poor. Image is not sharp. Contrast is poor.	The objective or filter is dirty	Clean them thoroughly
	The aperture iris diaphragm and field iris diaphragm are adjusted improperly	Open these iris diaphragms fully
	The fluorescent mirror block is not proper for the specimen	Use proper mirror block

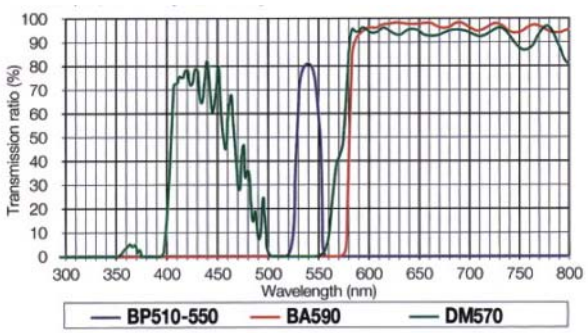
3. The edge of the field of view is obscured or not evenly illuminated	The objective is improperly engaged in the light path	Make sure the nosepiece clicks properly into place
	The fluorescent mirror block is improperly engaged in the light path	Engage it properly in the light path
	The field of view doesn't open fully	Open it fully
	ND filter is stopped in halfway in the light path	Pull in the filter slider until it clicks into place
	The mercury burner is not centered.	Center it
	The collector focus position is not correct	Adjust it to an optimum position
4. Shadow exists in the field of view	The burner or collector is dusty or stained	Clean them thoroughly
Ⅱ.Electrical System		
a) The main switch cannot supply power to the system	The power cord is connected improperly	Connect it properly
	A fuse is blown	Replace the fuses
b)The main switch can be set to ON but the burner doesn't ignite	The lamp housing connecting cord is connected improperly	Connect it properly to the connectors
	The mercury burner is not mounted	Attach a mercury burner
	The auto ignition system is malfunctioning	Set the main switch of the power supply unit to OFF then on again. (Repeated ON-OFF is possible in this case)
c)The mercury burner flickers or the brightness is low	The phenomenon is observed in a short period after ignition	Wait for 10 minutes or more after ignition
	The burner life has expired	Replace the mercury burner

5. Characteristics of Mirror Block's wavelength

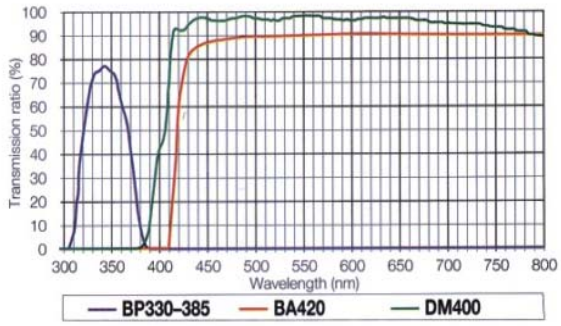
Blue excitation



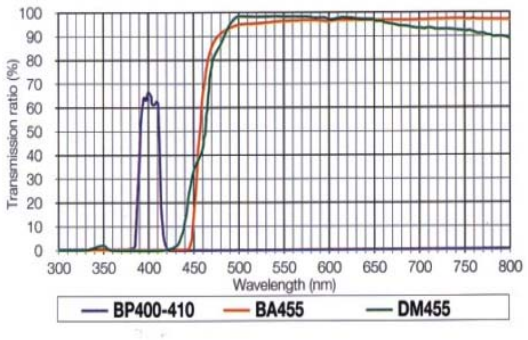
Green excitation



Ultraviolet excitation



Violet excitation



6. Technical Specifications

Epi-Fluorescent Illumination	Fluorescent Filter block	Excitation	Dichroic mirror	Barrier Filter	
	B Excitation	BP460~490	DM500	BA520	●
	G Excitation	BP510~550	DM570	BA590	●
	U Excitation	BP330~385	DM400	BA420	○
	V Excitation	BP400~410	DM455	BA455	○
Lamp	100W GCQ Ultra Hi-voltage Spherical Mercury Lamp				●
Protection Barrier	Barrier to Resist the Ultraviolet Light				●
Power Supplier	Power supplier NFP-1, AC Input 220V/110V(Interchangeable), Digital Display and Timer				●
Objective	Infinite Plan Fluorescence Free Objective 4X/0.13				○
	Infinite Plan Fluorescence Free Objective 10X/0.30				○
	Infinite Plan Fluorescence Free Objective 20X/0.50				○
	Infinite Plan Fluorescence Free Objective 40X/0.75				○
	Infinite Plan Fluorescence Free Objective 100X/1.30				○
Immersion Oil	Fluorescence Free Oil				●
ND filter	Neutral ND6/ND25 filter				○
Centering Plate					●
Vertical Illumination	Infinite optics system Filterblock system (six block admitted) Aperture iris diaphragm and field iris diaphragm Light shutter				● B and G Excitation ● ●
	Observation Methods ① Fluorescence ② Transmitted Light				 ● ●
Mercury Lamp Housing	●Mercury lamp housing 100w ●Mercury Burner GCQ100				● ●
Operating Environment	●Indoor Use ●Altitude: Max. 2000m ●Ambient Temperature: 5℃to40℃(41℉to104℉) ●Maximum Relative Humidity :80% for Temperature Up to 31℃(88℉) Decreasing linearly through 70% at 34℃ (93℉),60 %at 37℃(99℉) to 50% relative humidity at 40℃(104℉) ●Main supply voltage fluctuations not to exceed ±10% of the nominal voltage ●Pollution Degree 2(in accordance with IEC 664) ●Installation/ Over voltage Category Ⅱ(in accordance with IEC 664)				

Note：● Outfit; ○ Option