BestScope

Inverted Biological Microscope

Model Number

BS-2092

User Manual

To ensure correct operation, please read this manual thoroughly before using the microscope and keep it near the product for easy reference.

CONTENTS

User notice

1. Application

Inverted Biological microscope is the dedicated microscope for biological and medical areas, applied in the field of microscopic measurement, health agencies, laboratories, research institutes and universities and other units for biology, genetics, immunology, chemistry, environment protection, oceanography, pharmacology, bacterial observation, education and professional studies.

2. Safety Precaution

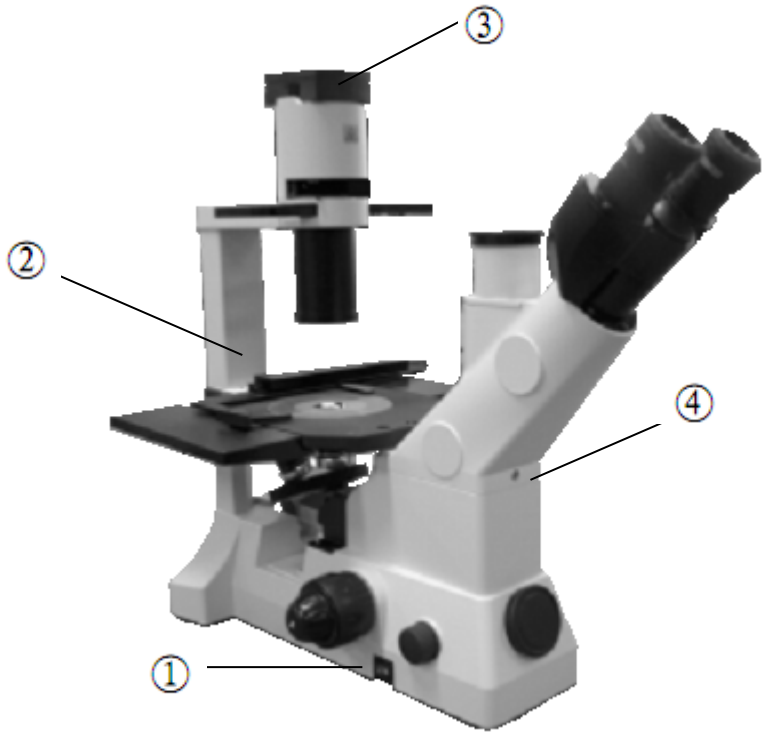

Fig.1

1. Do not keep the instrument in a direct sunlight, high temperature or humidity, dusty and easy shaking environment. Make sure the stage is plane, horizontal and stable enough.(Weight: about 9.5 kg)
2. When moving the microscope, please hold the instrument by the lower side of the observation tube④ and the illumination column②.（Fig.1）
3. If the bacterium solution or the water splash to the stage, objective or viewing tube, set the main switch to off state and unplug the power cord. Then wipe away

any liquid. Otherwise, the instrument will be damaged.

4. When working, the lamp house on the top of the arm③ (Fig.1) will become very hot, be sure there is enough room around the lamp house (especially the top side for cooling).
5. Before replacing the lamp bulb or fuse, turn the main switch① to the “O”(off) position, then cut off the power. If the lamp is on, or soon after it has been turned off, it is hot and will cause serious burns, please do the replacement after it cool down completely.

★ Specified lamp：the halogen lamp 6V30W (PHILIPS5761)

6. Earth this instrument to prevent the lightning strike.
7. Use the specified power cord, please.
8. The product should stored in a shady location and no acidic gases, alkalis, organic solvents and other hazardous materials surrounding; the storage period is usually not more than 6 months.

★ always ensure that the grounding terminal of the microscope and that of the wall outlet are properly connected. If the equipment is not grounded, we can no longer warrant the electrical safety performance of the equipment.

3. 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 source 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 microscope components other than the glass components. To clean them, use a lint-free, soft cloth slightly moistened with a diluted neutral detergent.

3. be careful not to spill any liquid – such as a culture solution –on the unit. if you do spill any thing, immediately set the main switch to off and unplug the power cord. then wipe away any liquid on microscope.

4. Do not disassemble any part of the microscope as this could result in malfunction or reduced performance.

5. If no objectives are mounted, be sure to cover the objective mounting threaded positions on the revolving nosepiece to prevent any dust and spilled culture solution from getting on the lenses inside.

6. When not using the microscope, keep it covered with a dust cover. Make sure the lamp socket is cool before covering the microscope.

4. Safety Symbols

Symbol	Explanation
	Indicate that the surface becomes hot ,and should not be touched with bare hands.
	Before use, carefully read the instruction manual. incorrect use could result in personal injury to the user and/or damage to the equipment.
	Indicate that the main switch is ON.
	Indicate that the main switch in OFF.

I. Nomenclature

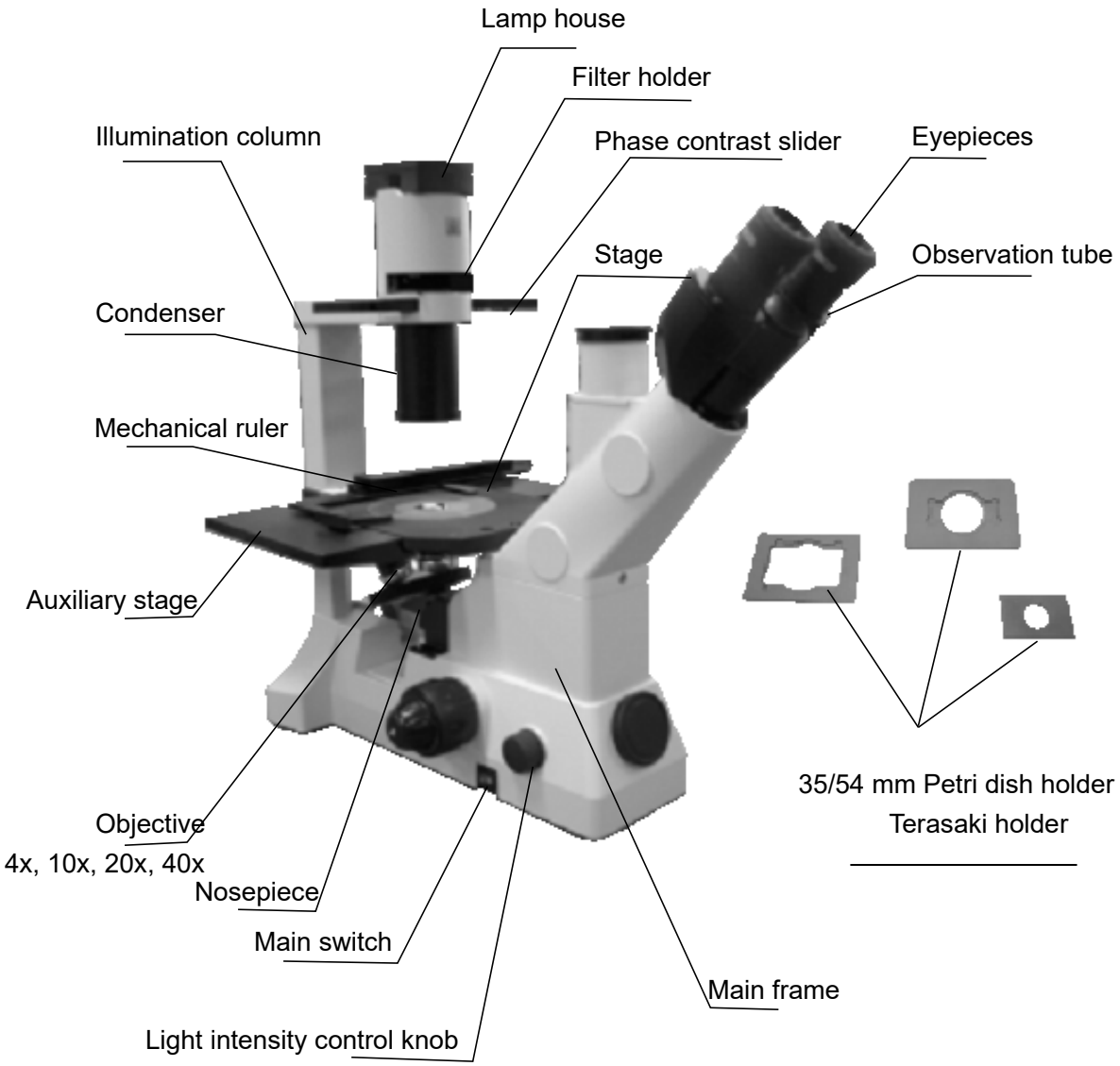

Fig.2

2. Installation

2-1 Installation Diagram

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

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

★ **Keep well with the supplied S1.5 and S2 hexagon wrench. When changing the components, you will need it again.**

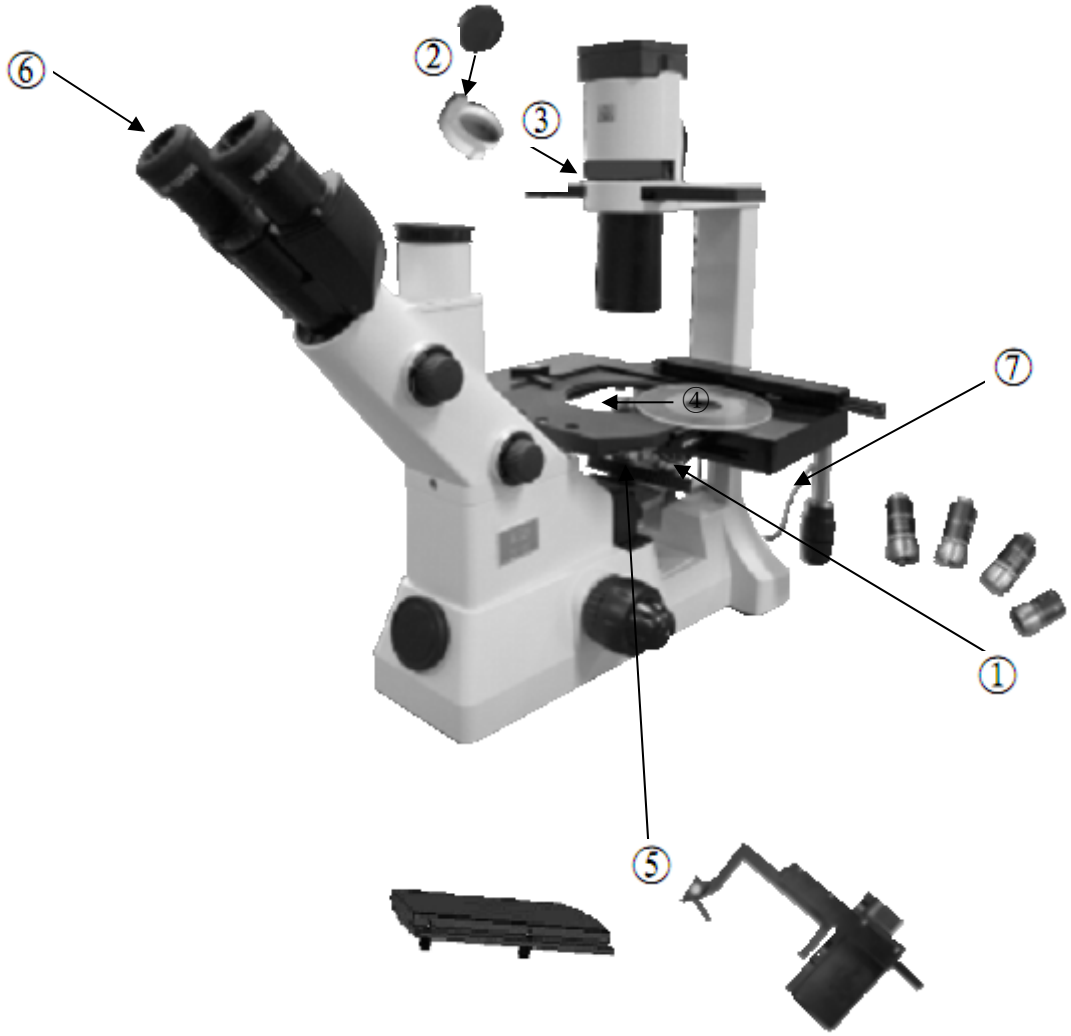

Fig.3

2-2 Installing steps

2-2-1 Installing and replacing the lamp (Fig.4)

✧ Please use the specified halogen Lamp 6V30W.

1. Hold to the bulb ①after you wrap it with gauze or other protection materials, then depress the plugs② into the jack④ on the lamp house, ensure the filament and the bolt③ are in a same level.

2. Replacing the 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 to “O” (off), pull up power plug, and make sure the bulb, the lamp house and periphery are all cool. Then, you can do your replacement.

★ Please insert the bulb 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 fingerprints on the surface carelessly, clean it with a dry soft cloth.

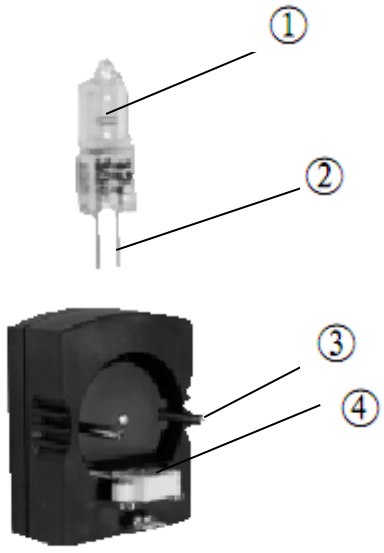

Fig.4

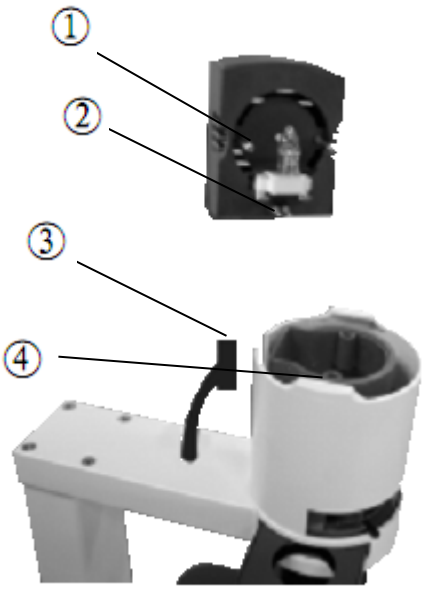

Fig.5

2-2-2 Installing the lamp house (Fig.5)

Keep the BNC connector plugs③ and the lamp house pin② in line, and keep the bolt① and the condenser jack④ in line, too. Then push the lamp house into the illumination unit gently until they are against each other.

2-2-3 Mounting the objectives (Fig.6-7)

1. Turn the coarse adjustment knob① as Fig.6 shows until the revolving nosepiece is set

at its lower limit.

★ For ensuring the safety of the instrument during transportation, the nosepiece is located in the lowest position and the tension adjustment collar② is adjusted to an appropriate tension while leaving the factory.

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

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

◎ It also can install the objective through the stage opening.

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

★ Be sure to cover any unused threaded positions with the objective caps to prevent dirt and dust from getting inside.

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

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

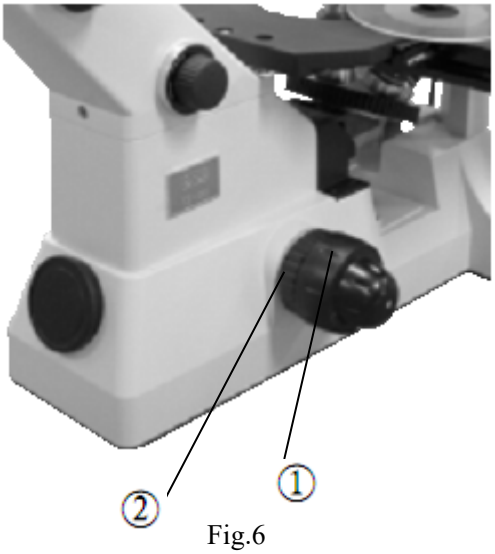

Fig.6

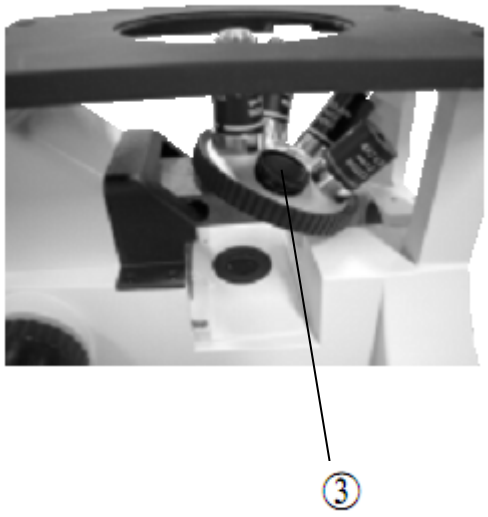

Fig.7

2-2-4 Installing the stage lengthen splint and the mechanical ruler (Fig. 8)

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

◎ Generally, the mechanical ruler will be installed at 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 the bolt until it stay hard.
2. Installing the mechanical ruler
   Please install the ruler in the same way as the stage splint.

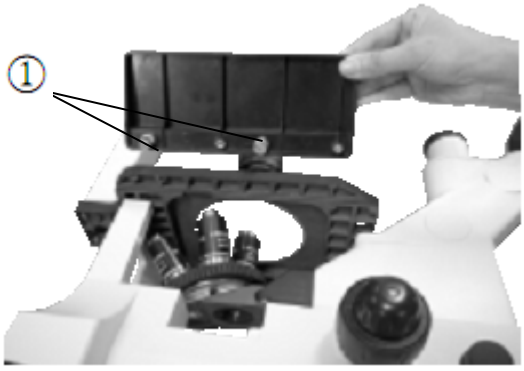

Fig.8

2-2-5 Installing the stage inserted plate (Fig.9)

1. When using the glass stage ①, there is no special requirement, you just need to place it in a plane.

2. Install the stage inserted plate on to the stage opening.

◎ Turn the disk, let the V nick face the user, so the recognition of the objective will become easier.

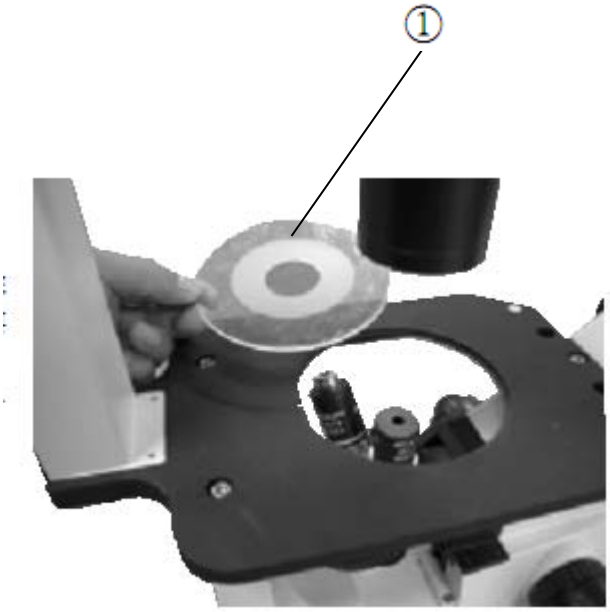

Fig.9

2-2-6 Installing the eyepiece (Fig.10)

1. Remove the cap of the eyepiece tube①.
2. Insert the eyepiece② into its tube③ until they are against each other.
3. screw tightly the bolt③ with provided S1.5 wrench to keep the eyepiece from dropping out.

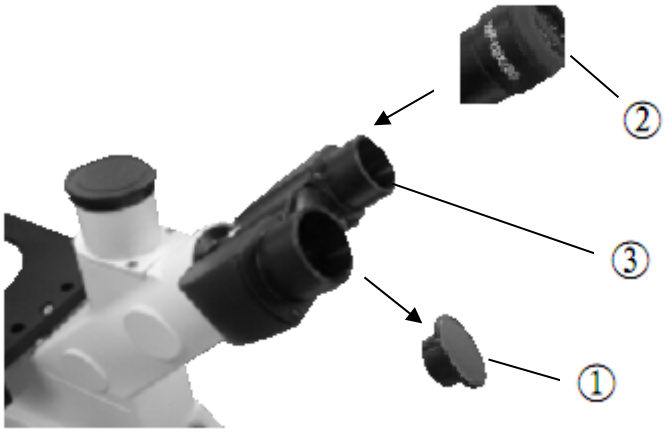

Fig.10

2-2-7 Installing the color filters (Fig.11)

Let the filters cool down sufficiently before replacing them. Take out the filter holder① and insert the required filters②.

Push the filter down to the bottom as shown in Fig.11 ③ so that it does not tilt. If the filter is inclined or is not pushed down to the bottom④, it may fall off the filter holder.

◎More than one filter can be stacked in the filter holder. You can mount as many as you like, as long as the total thickness does not exceed 11mm.

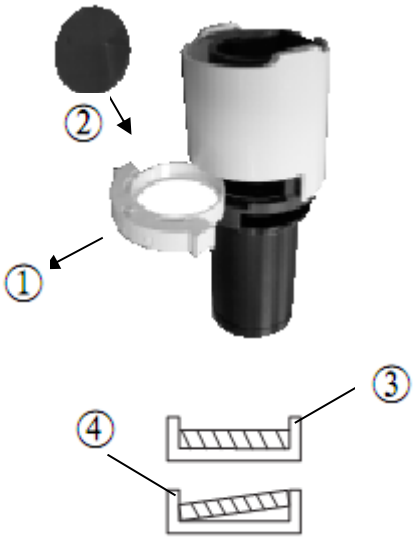

Fig.11

2-2-8 Connecting the power cord (Fig.12,13 &14)

★ Cables and cords are vulnerable when bent or twisted. Never subject them to excessive force.

1.Make sure that the main switch of the power supply is set to “o”(OFF)before connecting cables.(Fig.12)

2.Connect the plug④ of the illumination column firmly to its jack⑤on the rear of the microscope.(Fig.13)

3. Connect one end of the power cord ② into its connector ③ on the rear of the microscope.(Fig.13)

4. Connect the other end of the power cord② to a wall outlet⑥.(Fig.14)

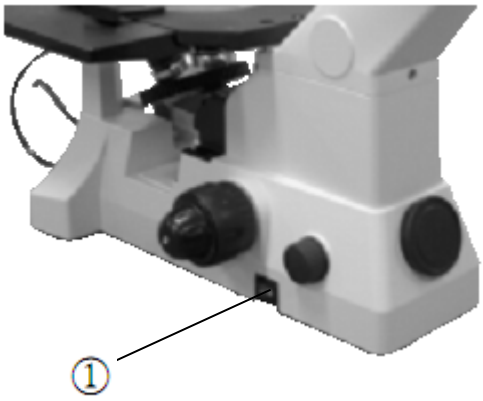

Fig .12

★ Do always use the supplied power cord .If lost or damaged, select the same standard cord, please.

★ Connect the power cord correctly, to ensure the instrument is grounded.

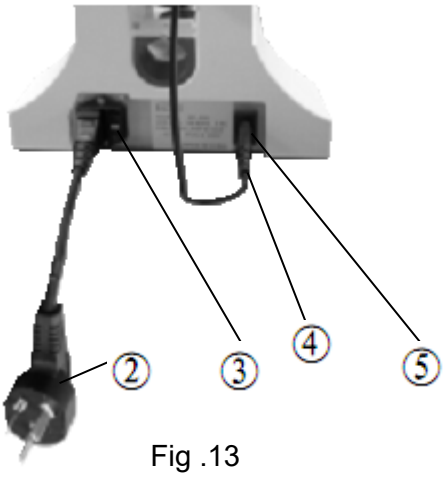

Fig .13

2-2-9 Replacing the fuse (Fig.12-14)

★ Do remember to turn the main switch① to the state of “O” (off) before replacing the fuse, and unplug the power cord②. Rotate the fuse kits out of the holder by the “--”type screwdriver, replace a new fuse, then rotate back to the holder again.

★ Fuse rating: 250V, 1A.

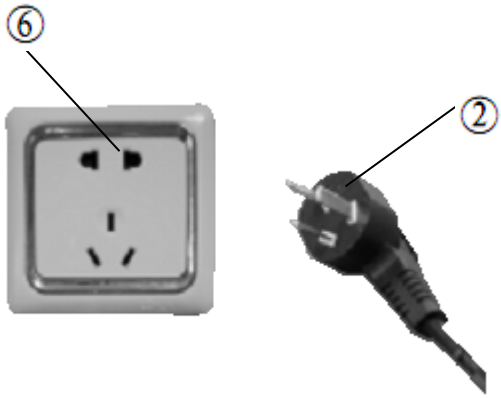

Fig.14

3. Controls

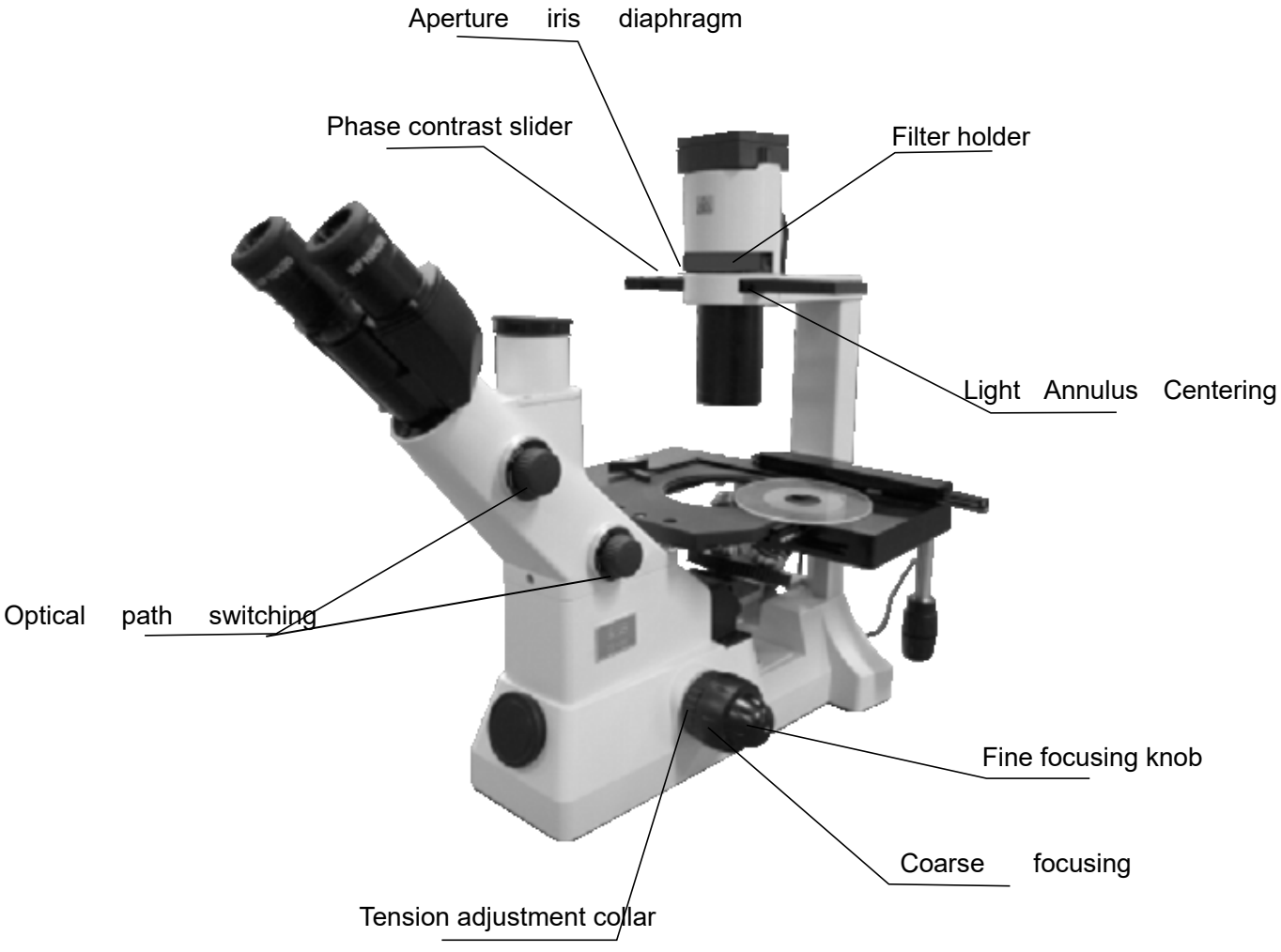

Fig.15

4. Using the controls

4-1 Microscope Frame

4-1-1 Turning on the lamp (Fig.16)

Connect the power supply, turn on the main switch①(shown in Fig.16)which on the bottom side of the base to "—"(on).

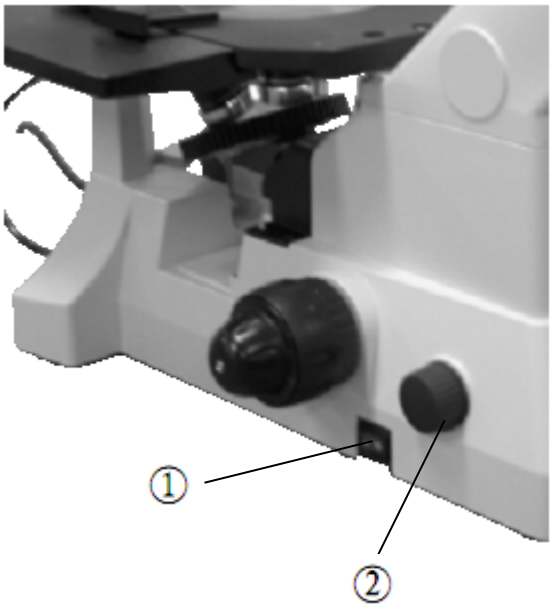

Fig.16

4-1-2 Adjusting the brightness (Fig.16)

Turning the brightness adjustment knob② clockwise, the voltage raise, and the brightness strengthen; Whereas turning at the contra direction, the voltage decline and the brightness weaken.

4-1-3 Adjusting the tension of the coars adjustment knob (Fig.17)

★ Be **sure** to use the tension adjustment ring① to adjust the rotation tension of the coarse adjustment knob.

Adjustment procedure:

◎ How to adjust the tight tension

Turning the tension adjustment ring ① with your finger by counter-clockwise in the figure, the tight tension of the coarse focus knob② is increasing； And if at the contra direction, the tight tension will decline.

If the nosepiece dropped automatically, or the specimen defocused soon even you focus with the fine focus knob③. It means the coarse focus knob is too loose, you should screw it down at the direction shown by the arrowhead in the Fig.18.

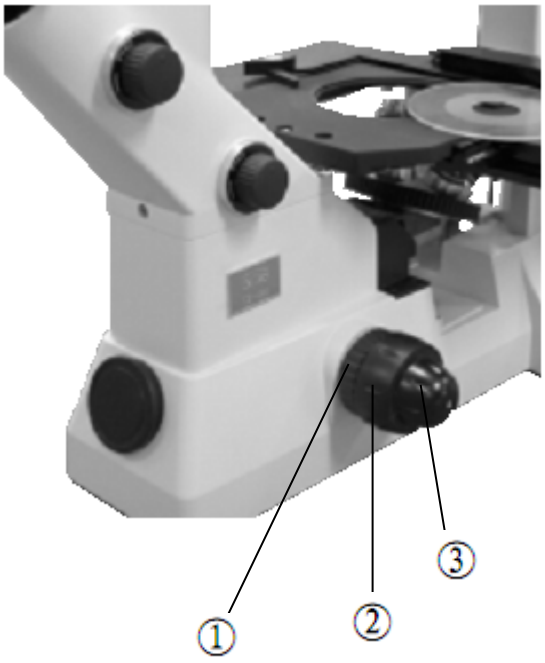

Fig.17

4-2 stage

4-2-1 Placing the specimen (Fig.18& Fig.19)

Put the specimen in the center of the stage.

★ to obtain the best image effect, please select the containers, such as culture dish and culture bottle, with the bottom thickness of 1.2mm, and the same thickness is also required for the specimen slide.

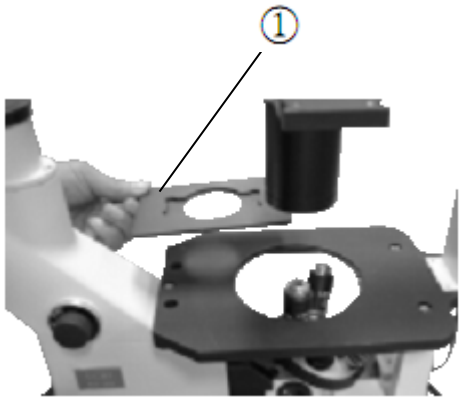

Fig.18

◎Using the Φ35mm culture dish

You can lay a Φ35mm culture dish on the stage directly by using the standard center board① of the stage.

◎ Using the mechanical ruler

1. When using the 96bit or 24bit micro-titration board, please fasten it tightly by the stage clips ②.
2. When fastening other model boards, please use the following supplied brackets with mechanical ruler:

- Terasaki bracket⑦ for Terrasaki board.
- Culture dish bracket⑤for Φ35mm culture dish.
- Slide bracket⑥ for slide and Φ54mm culture dish

Turning the transverse knob③and lengthways knob④, move the specimen to the required position.

(Movement Range: 120 (width) × 78 (Length) mm)

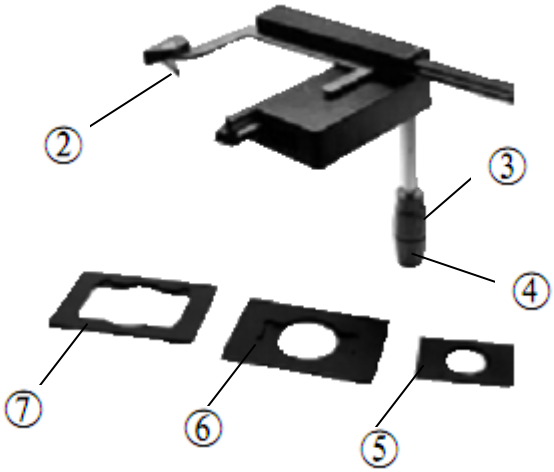

Fig.19

4-2-2 Moving the specimen

Turn the X-axis and Y-axis knobs of the mechanical stage or move the specimen directly by hand.

★ **Be careful when changing objectives. When objectives are switched after observing the specimen with an objective with short working distance, the newly selected objective may interfere with the stage center plate or Petri dish holder. Turn the coarse focusing knob slightly to lower the objective properly for that.**

4-3 The viewing tube

4-3-1Adjusting the diopter (Fig.20)

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.**

1. While looking through the left eyepiece with your left eye, turn the coarse and fine focus adjustment knobs to bring the specimen into focus. While looking through the right eyepiece with your right eye, turn only the diopter adjustment ring ①to focus on the specimen.

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

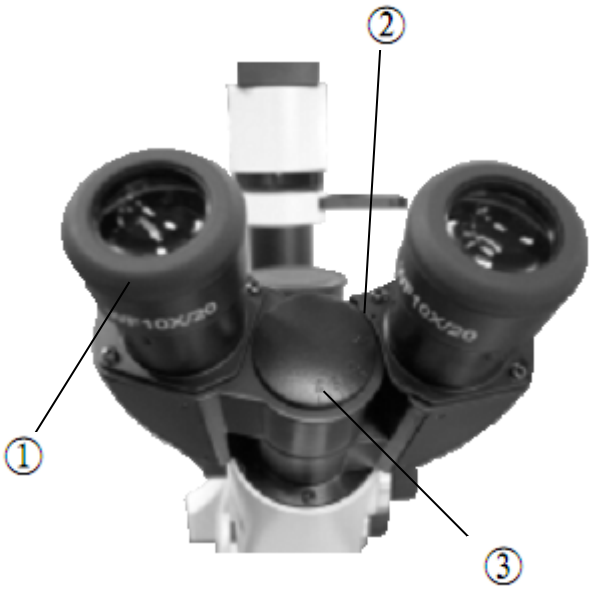

Fig .20

4-3-2 Adjusting the interpupillary distance

(Fig.20-21)

While looking through the eyepieces, move both eyepieces until the left and right fields of view coincide completely.

★ **The reticle on the interpupillar distance indicator③, pointed by the spot "." ②on the eyepiece holder, shows the scale of the interpupillar distance.**（Fig.20）

The range of the interpupillary distance：55～75mm。

Fig.21

4-3-3 Selecting the light path

◎Used for digital photography, CCD and 135 camera.

◎ Revolve two knobs in fig.22 respectively to select the light path you need.

◎ when in the binocular observation, turn the knob to the gap position until you heard a "clicked" .while using video or photography with upper or lower port, turn the upper or lower knob until it reached the "clicked" position.

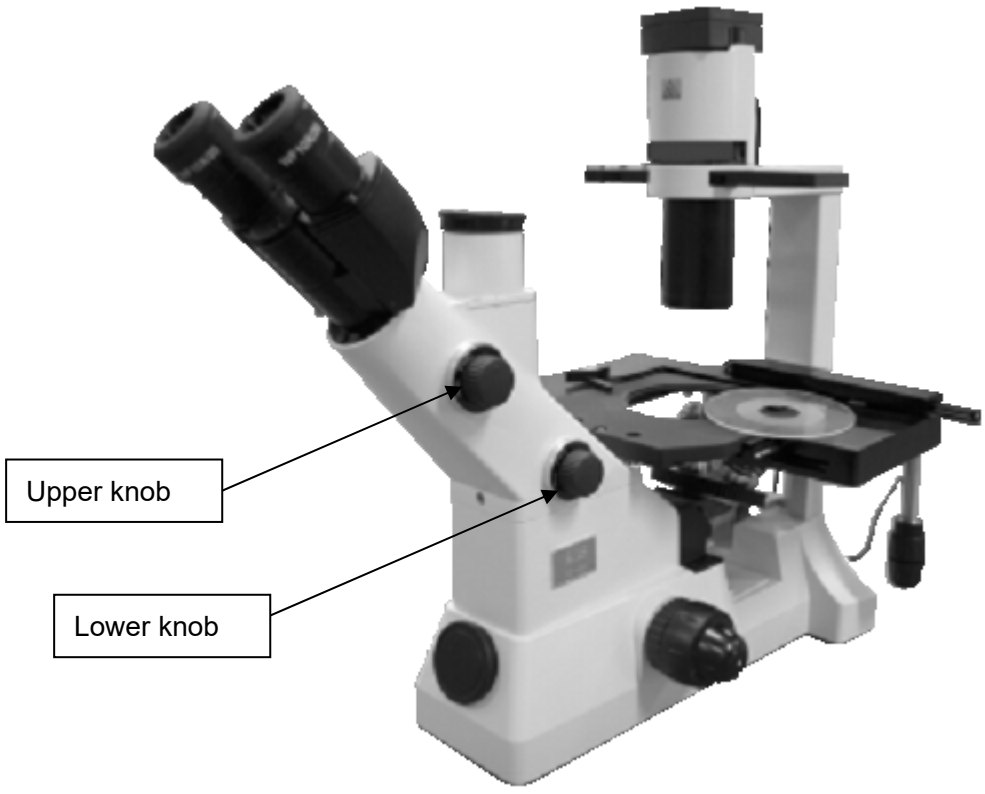

Fig.22

Light path switching knob	Light Intensity ratio	Application
Both the upper and lower knob is set to gap position	100% for binocular observation	Dark specimen observation
The upper knob is set to“PHO”position	80% for binocular eyepieces，20% for TV/photography	Observation of bright specimens, photography, TV observation
The lower knob is set to“PHO”position	100% for TV/photography	Photography, TV observation

4-4 Illumination

4-4-1 Using color filters (Fig.23)

◎ using appropriate filters according to the purposes allows you to observe and photograph specimens more effectively. Particularly, the use of the LED filter is recommended in observation and photomicrography because it renders more neutral colors.

◎ More than one filter can be stacked in the filter holder (filter diameter: 45mm maximum; thickness of stacked filters: 11mm)

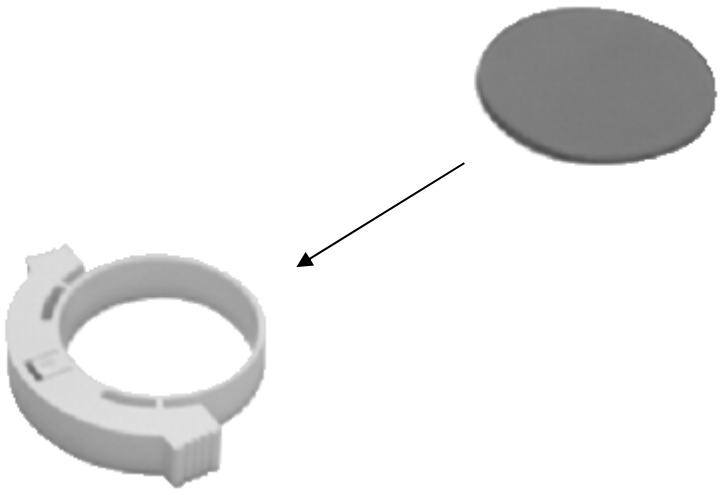

Fig.23

Filter	Application
IF550	Monochrome contrast filter (green)
LBD	Color temperature conversion filter (for observation and photomicrography)
SIF800	Exposure time compensation in photomicrography

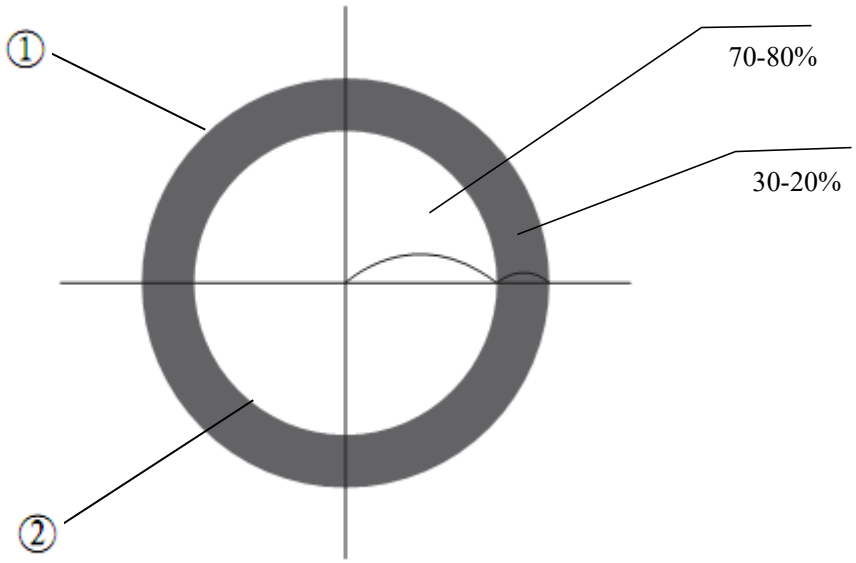

Fig.24

4-4-2 Using the aperture diaphragm (Fig.24)

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

● Checking the aperture iris diaphragm

Remove the eyepiece when necessary (and inset the centering telescope if you have one), then look into the eyepiece sleeve; you will see the field of view as shown in Fig.24.now adjust the aperture iris diaphragm lever as required.

● Generally, when observing a dyed specimen, set the aperture iris diaphragm② to 70% to 80% of the N.A. of the objective① in use.However, when observing a culture specimen, which is not dyed, set the aperture iris diaphragm lever toward“◎” .

4-4-3 Removing the condenser lens (Fig.25)

To provide more working distance, turn the condenser's lower section ① and remove it. The height of Petri dish can be up to 150mm.

★ When you do this, however, keep in mind that proper illumination cannot be achieved. Remove the condenser lens only when using a large culture vessel.

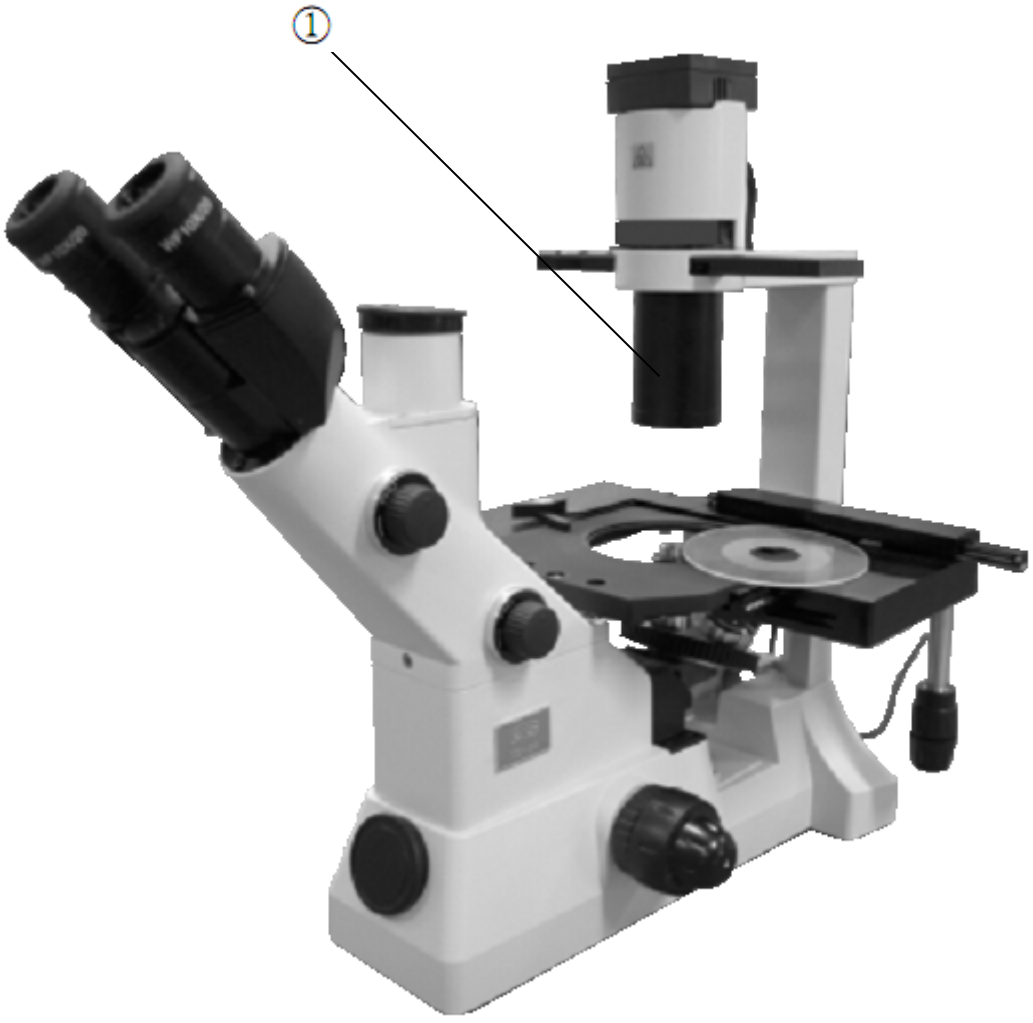

Fig.25

5. Phase Contrast Observation

5.1name of components

5-1-1 Phase contrast objective (Fig.26)

◎phase contrast objective 10x, 20x, 40 x;
◎installation type: refer to 2-2-4: replace the normal objective with phase contrast objective on nosepiece

Fig.26

5-1-2 Phase contrast slider（Fig.27）

◎ Center adjustable phase contrast slider

- The light ring was centered beforehand, so it needn't adjust in the using process. If the ring is not in the center, you could adjust it by the centering bolt with S2 wrench.
- Match 10-20-40 light annulus with phase contrast objective 10X-20X-40X.

Fig.27

5-2 Installation and usage

5-2-1 Installing the phase contrast slider (Fig.28)

1. Hold the phase slider ① face up (engraving side up) with the finger hold on the right, and insert it into the illumination column slot.
2. Every light ring or opening has its own located position, so you need to move them until you heard the "clicked" to ensure the ring or the opening reach the center of the light path.
3. When in the phase contrast observation, do keep the aperture iris diaphragm adjustment lever② to "O" (wide opening).

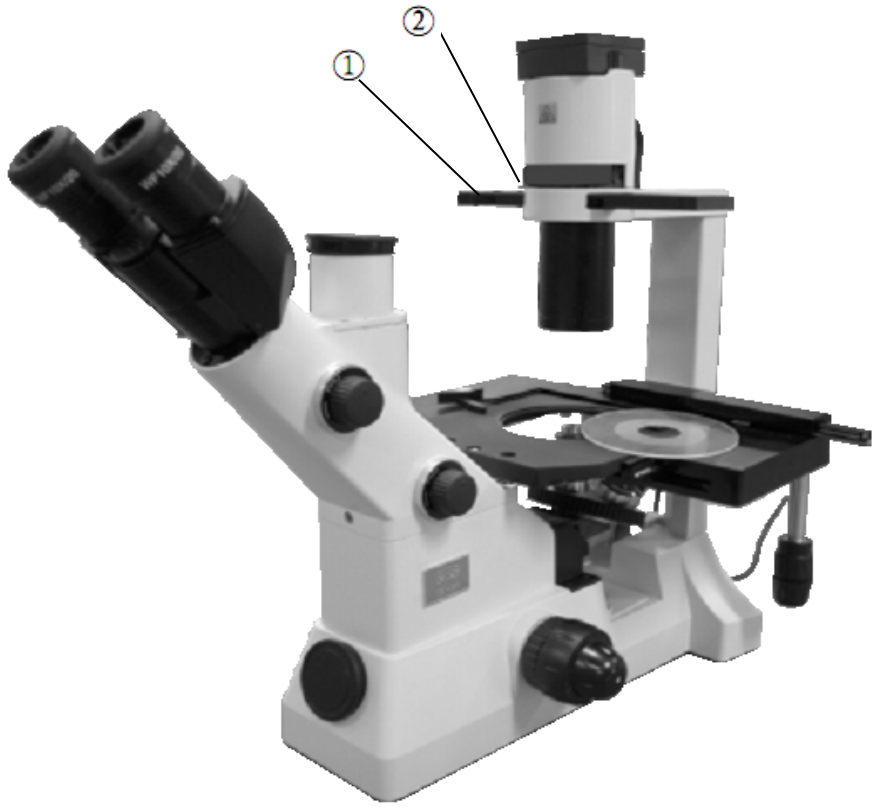

Fig.28

5-2-2 Centering the light annulus (Fig.29-30)

Usually you needn't the operation of centering. If necessary, please accord to the following steps:

1. Place a specimen on the stage and bring it into focus.
2. Replace the eyepiece in the sleeve with the centering telescope.
3. Make sure the magnification of the objective in the light path matches that of the light annulus on the phase slider.
4. While looking into the centering telescope, adjust its position to focus on the phase annulus② of the objective corresponding to the light annulus①.
5. Insert S2 wrench into the two centering screw holes on the phase slider. Tighten and loosen the centering screws until the light annulus is superimposed on the phase annulus of the objective.
6. Repeat the above steps to adjust centering with other objectives. the 10x , 20x and 40x objectives use the same light annulus. To ensure the use with other objectives, put other objectives that has not been used for centering into the light path and make absolutely sure the light annulus① is not deviating from the phase annulus②. If there is any deviation, perform the centering procedure with the other objectives again.

★ Optimum performance cannot be achieved if the light annulus is not properly centered.

★ Ghost images of the light annulus may sometimes emerge. If this happens, superimposed the brightest light annulus image with the phase annulus.

★ When a thick specimen is moved or replaced, the light annulus and the phase annulus may deviate. This can reduce image contrast. If this happens, repeat steps 1 to 5 for readjustment.

★ The centering procedure may have to be repeated in order to get the best possible contrast if a specimen slide or the bottom surface of a culture vessel is not flat. Center the light annulus using objectives in the order of lower to higher magnifications.

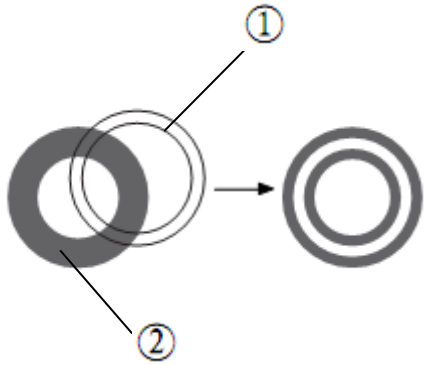

Fig.29

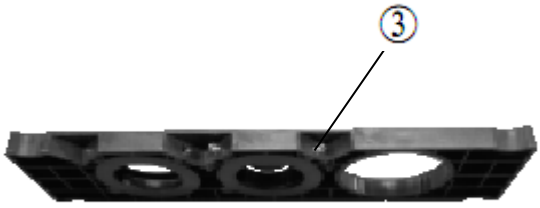

Fig.30

6. Microscope photography and video

6-1 Microscope video

6-1-1 Selecting the light path (Fig.31)

★ Just used in the trinocular observation.

1. when using the upper trinouclar port: turn the upper knob① to “PHO” position and the lower knob② to gap position. When using the lower port: turn the lower knob② to “PHO” position.

2. Make sure you heard the “clicked” for your setting.

★ For the dark specimen observation, you can make the focus by binocular at first, then switching the light path.

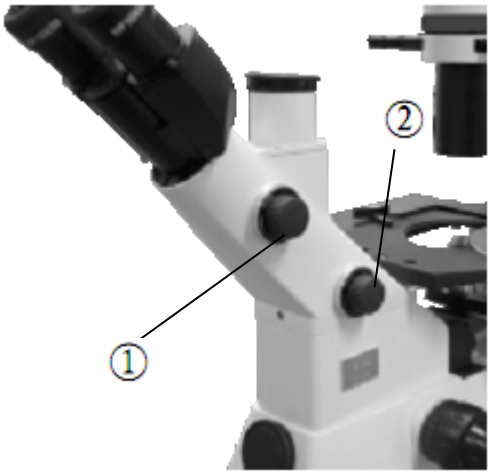

Fig.31

6-1-2 Installing the video set (Fig.32)

1. Take away the dust cap① on trinocular tube.
2. Inset the video accessory② into trinocular tube and screw the pressing ring③ tightly.
3. Screw the mount adapter with CCD camera into the video accessory port② in the direction as shown in Fig.32.

6-1-3 Focus (Fig.32)

Doing binocular observation and focus the specimen at 80% brightness, check that whether the image on the video or the computer which connected with the microscope video system is sharp.

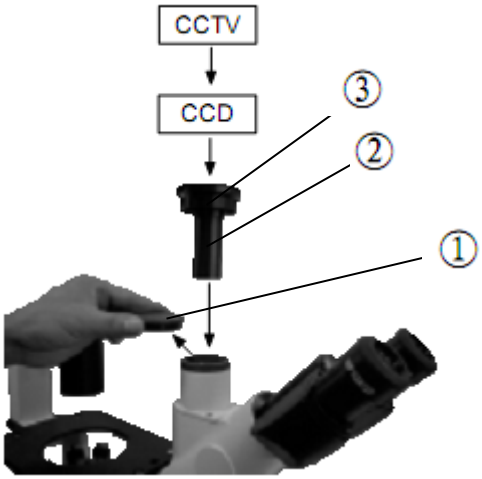

Fig.32

6-2 Microscope photography

6-2-1 selecting the light path

★ Just used in the trinocular observation

Refer to section 6-1-1 for operation information. More details about light path selection can be obtained in section 4-3-4.

6-2-2 Installing the photography set (Fig.33)

1. Take away the dust cap① on trinocular tube.
2. Aligning the port of 135 camera with the latch notch on the photography accessory ② , revolve it clockwise tightly.
3. Inset the photography accessory② into trinocular tube and screw the pressing ring③ tightly.

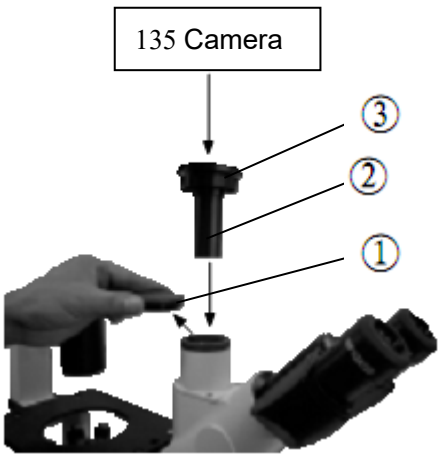

Fig.33

● Before connecting the camera and the latch notch on the photography accessory, remove the camera lens firstly, then connect the lens port with the accessory. Pay attention to the notch type, please.

● Magnification of micrograph= 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.**

6-2-3 Focus

Do binocular observation at 80% brightness, and focus the specimen primarily. When in microscope photography, do use the camera viewfinder to focus the specimen. Please refer to the user manual of the camera set to obtain the details.

6-2-4 Adjusting the color temperature

◎ When shooting the chromophotograph, please use the sunlight film.

1. Mount the LBD temperature changed color filter on to the color filter bracket.
2. Turn the brightness adjustment knob to the maximal position, so you can obtain a sunlight illumination.

6-3 Digital photography

6-3-1 Selecting the light path

★ Just used in the trinocular observation

Refer to section 6-1-1 for operation information. More details about light path selection can be obtained in section 4-3-4.

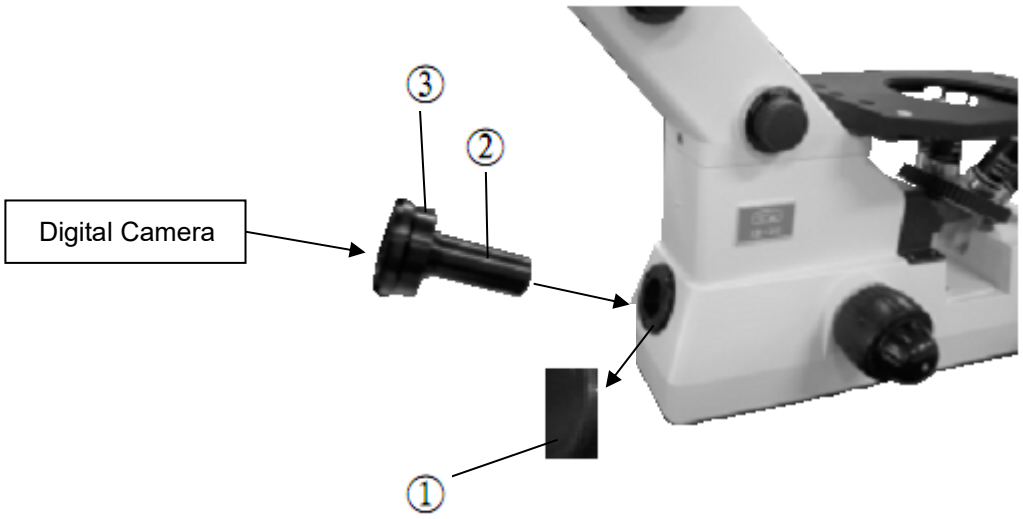

Fig.34

6-3-2 installing the photography set (Fig.34)

1. Take away the dust cap① on trinocular tube.
2. Insert the digital photography accessory ② into the lower tri-through port and screw the pressing ring tightly, then connect digital camera “Cannon A640”.
   (The camera interface of other digital cameras may be different, so the accessory may need customization)

7. Specifications

7-1 Main specifications

Optical system	Infinite Optical System
Viewing Tube	Seidentopf binocular viewing head Inclined at 45°; Division ratio: 80% of Binocular Viewing and 20% of Video Viewing & Micrography
Eyepiece	Wide Field Eyepiece 10X, Linear Field of View : Φ20 mm
Nosepiece	Quintuple Nosepiece
Objective	Infinite Long Working Distance Plan Achromatic objective: 4X Infinite Long Working Distance Plan Phase Contrast objective: 10X,20X,40X
Focusing System	Coaxial Coarse and Fine Focusing System Sensitivity and Graduation of Fine Focus: 0.002mm Movement Range(from the surface focus of stage plate): up 4.5mm, down 4.5mm
Stage	Area: 170(width) ×230 (Length)mm
Mechanical ruler	Movement Range: 120 (width) ×78 (Length)mm
Illumination	Halogen Lamp 6V30W, Preset Center, Intensity Continuously Adjustable
Condenser	Long working Distance Condenser, Numerical Aperture 0.3, Working Distance 72mm After removing condenser, the height of culture dish can be up to 150 mm
Operation environment	● Use indoor ● Altitude: Maximum 2000 m ● Temperature: 5℃~40℃ (41°F~109°F) ● Maximum Relative Humidity: 80% at 31℃(88°F), then Fall Linearly.70% at 34℃ (93°F), 60% at 37℃ (104°F), 50% at 40℃(104°F) ● Pollution Degree:2 (refer to IEC60664) ● Power inputing:~220V 50/60 HZ ● Atmospheric pressure: 80kPa~106kPa ● Overvoltage category:II

7-2 Objective Specifications

Category	magnification	numerical aperture (N.A)	working distance (mm)	Conjugate distance (mm)	Parfocal distance (mm)	Coverslip thickness
Infinite Long Working Distance Plan Achromatic Objective	4X	0.10	22	∞	60	1.2 mm
Infinite Long Working Distance Plan Phase Contrast Objective	10X	0.25	6	∞	60	1.2mm
	20X	0.4	3.1	∞	60	1.2mm
	40X	0.55	2.2	∞	60	1.2mm

8. Configuration table for inverted microscope BS-2092

ITEM	SPECIFICATION	QUANTITY
Main Body	Main frame of inverted microscope BS-2092	1
Objective （Infinite system）	4X (plan)	1
	10X (plan phase contrast)	1
	20X (plan phase contrast)	1
	40X (plan phase contrast)	1
Eyepiece	10X	2
Filter	Red, green, blue	1 ea.
Petri dish holder	Φ35mm,Φ54mm,Terasaki holder	1 ea.
Centering telescope		1
Mechanical ruler		1
Inserted stage plate		1
Auxiliary stage		1
Stage		1
Digital photography accessory		Optional
CCD transfer lens		Optional
135 camera accessory		Optional
Fluorescent	B,G,U,V	Optional

attachment		
Specified Power Cord		1
Spare lamp	6V30W	1
Hexagon wrench	S1.5,S2	1.ea.
Dust cover		1
User manual		1
Certificate of inspection		1

9. Troubleshooting

Under certain condition, some no-fault factors will bring a reversible influence to the instrument's performance. If the problem occurs, 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	CAUSE	SOLUTION	PAGE
I. Optical Part:			
1.The illumination is on, but the field of view is dark.	The socket pin is not connected to the illumination column	Connect it securely	7
	The bulb is burnt out.	Replace it with a new one	7
	The brightness is set too low	Set it to the appropriate position	14
	Two many filters are stacked	Reduce them to the minimum required number	18
	The mounted bulb is not the one designated.	use the designated halogen Lamp 6V30W	7
2. The edge of the field of view is obscured or not evenly illuminated.	The nosepiece is not in the located position	Turn the nosepiece into the position where you can hear "clicked"	20
	the color filter is stopped halfway	Push it in all the way	21
	The phase contrast slider is not located in the proper position	Move the slider until it clicks into place	21
3. Dirt or dust is visible in the field of view	Dirt/dust on the specimen	Replace with a clean specimen	-
	Dirt/dust on the eyepiece	Clean the eyepieces	-
4. The image glares	The aperture iris diaphragm is stopped	Open up the aperture diaphragm	19

	down too far.		
5. Visibility is poor ● Image is not sharp; ● Contrast is poor; ● Details are indistinct; ● Phase contrast effect cannot be obtained.	The objective is not correctly engaged in the light path	Turn the nosepiece into the “clicked” position	20
	the aperture diaphragm is opened or stopped down too far in bright field observation	adjust the aperture diaphragm properly	19
	The lens (condenser, objective, ocular or culture dish) become dirty	Clean it thoroughly	
	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	
	Use a bright field objective	Change to the phase contrast objective	20
	The light annulus of the condenser does not match the phase annulus of the objective.	Adjust the light annulus so that it matches the phase annulus of the objectives	22
	The light annulus and the phase annulus are not centered	Adjust the bolts to center it	22
	The objective used is not compatible with phase contrast observation	Please use the compatible objective	22
	When looking at the edge of the culture dish, the phase contrast ring and the light ring is deviated from each other	Moving the culture dish until you obtain the phase contrast effect. You also could demount the slider, and set the field diaphragm lever to “◎”	-
6.one side of the image is blurred	The objective is not in the center of the light path	Insure the nosepiece is in the “clicked” position	20
	The specimen is not correctly mounted on the stage.	Place the specimen on the stage correctly.	15
	The optical performance of the culture vessel bottom plate is poor (profile irregularity, etc.)	Use a vessel with a good profile irregularity characteristic.	

II. Mechanical Part:			
1.The coarse adjustment knob is too difficult to rotate	The tension adjustment ring is tightened too much	Loosen it appropriately	14
2. the image goes out of focus during observation	The tension adjustment collar is too loosened too much	Tighten it appropriately	14
III. Electrical system:			
1. The lamp can't light	No power supply	Check the power cord, and connect them exactly	7
	the installation of the bulb is wrong	Install the bulb correctly	7
	The bulb burn out	Change a new bulb	7
2. The bulb burns out in a high frequency	Not use the specified lamp	Use the required lamp	7
3. The light intensity is not enough	Not use an designated lamp	use an designated lamp	7
	The brightness adjustment knob is used wrong	Adjust the brightness adjustment knob in a correct way	14
4.The light glimpse	The bulb is going to spoil	Change the bulb	7
	The power cord have a poor contact	Check the power cord, and connect them exactly	12
Ⅳ. Viewing tube			
The field of view of one eye does not match that of the other	The interpupillar distance is not correct	Adjust the interpupillar distance	16
	The diopter is not right	Adjust the diopter	16
	Your view is not accustomed to the microscope observation	Upon looking into eyepieces, try looking at the overall field before concentrating on the specimen range. You may also find it helpful to look up and into distance for a moment before looking into the microscope again.	-
Ⅴ.Photomicrography			
1.The image is	Poor focusing	Adjusting focusing so that	-

out of focus		the double cross lines and the specimen look clearly defined.	
2. The image periphery is blurred uniformly.	If you are using an achromatic objective, this type of objective cannot bring edges into sharp focus.	The problem is unavoidable if you used an achromatic objective	-
3. The indoor window or the fluorescence lamp is photographed.	The stray light entered through the eyepieces or viewfinder is reflected	Cap both the eyepieces and photomicroscope system's viewfinder	-