XDS-3 LED INVERTED MICROSCOPE

Cod. 5901988

Instructions Manual

Thank you for buying our product!

This unit is a precision optical instrument. Our product has been design to provide the highest level of safety, however, improper operation or negligence in following the instructions in this manual may cause personal injuries and property losses. In order to ensure your safety, prolong the life of this unit and maintain it properly, please read this manual carefully before operating this unit.

Caution!

This manual uses the following symbols for safety reminders. Be sure to observe these warnings in order to operate this unit properly and safely.

Negligence in heeding the warning of this symbol may cause personal injury or damage to this unit!

Caution!

Negligence in heeding the caution of this symbol may affect the viewing performance of this unit.

Reminder !

Provide instructions and skills in operating this unit.

Pay attention to environmental protection.

Safety Reminder

1. Be sure to turn off the power switch and remove the power cord before installing this unit, replacing the bulb or fuse, plugging and unplugging the power supply.
To prevent electric shock or fire, be sure to turn off the power switch and remove the power cord before installing this unit, replacing the bulb or fuse, plugging and unplugging the power supply.

2. Do not disassemble

Except the removable parts mentioned herein, no part of this unit shall be removed, otherwise the performance of this unit may be reduced, or may cause an electric shock, injury or damage to this unit. Please contact the supplier if any fault occurs.

3. Input voltage

Check if the input voltage is consistent with your local voltage supply. If not, do not operate this unit and contact the supplier. Improper input voltage may cause a short circuit or fire thereby causes damage to this unit.

4. Use specific bulb, fuse and power cord

Use of an improper bulb, fuse or power cord may cause damage or fire to this unit. Any extended power cord used must be grounded (PE).

5. Protect this unit from high temperatures, dampness and foreign objects

To prevent short circuit or any other fault, do not expose this unit to any high temperatures or dampness environment for a prolonged period of time. A suitable operating environment is designated at a temperature of 5°C-35°C, and relative humidity of 20%-80% (at 25°C). If water splashes on this unit, turn off the power switch and remove the power cord immediately, and then wipe the water off with dry cloth. When any foreign object enters or drips onto this unit, please stop operating the unit and contact the supplier.

6. Coarse/fine focusing knobs

This unit employs a coarse/fine coaxial focusing mechanism. Do not turn the left/right coarse/fine focusing knob in the opposite direction. When the objectives lifting device reaches the limit of motion, do not continue to turn the coarse focusing knob, otherwise the focusing mechanism may be damaged.

7. Storage place

This unit is a precision optical instrument, and improper operation or storage may cause damage or its precision may be adversely affected. Consider the following when selecting a storage place:

※ Avoid placing the unit under direct sunlight, directly under interior lighting or any other bright place.

※ A suitable operating environment is designated at a temperature of 5°C-35°C, and relative humidity of 20%-80% (at 25°C). Do not expose this unit to high temperatures, dampness or dust for a prolonged period of time, otherwise mist or mold may develop or dust may deposit on the lens, thus cause damage to this unit and shortening its life.

Caution!

8.Installation of bulb

Do not touch the glass surface of the bulb directly with bare hands. When mounting the bulb, wear gloves or wrap it with cotton material.

※ Wipe off any dirt on the surface of the bulb with a clean cotton fabric dipped in alcohol. If the dirt is not thoroughly removed, it would etch the surface of the bulb weakening its brightness and shortening its life.

※ Mount the bulb with care to avoid slipping off or injuries to your fingers.

※ When replacing the bulb, make sure its contact is intact. If its contact is damaged, the bulb may be disabled or short-circuited.

Caution!

9. Instrument handling

This precision optical instrument is heavy and should be handled with care. Strong impact and rough handling are strictly prohibited, it may cause damage to this unit.

10. Environmental protection

Please dispose the wastes from the packaging and operation of this unit by category such as cartoon, foam, plastic, bulb and etc. Do not discard the damaged mercury lamp carelessly in order to avoid creating environmental poll

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I. Characteristics and applications of this unit

The XDS-3 LED inverted microscope is multifunctional microscope. It adopts excellent infinity optics system and provides eximious optical function. It is designed with good-looking shape and convenience operation. The long working distance condenser system can be placed into or out of the light path, and is suitable for tissue observation in a high culture dish. The illuminate system to well consider spreading heat and safety. It also accord with man-machine engineering. The phase contrast device can be attached to the light path to perform transmitted phase contrast microscopic observation. This unit is suitable for the microscopic observation of cells, tissues and clear liquid tissues, and the dynamic microscopic observation of tissues cultured in a culture dish, and is applicable to scientific research institutions, colleges and universities, medical and health, inspection and quarantine agencies, agricultural, animal husbandry and dairy industries.

II.Structural features of this unit

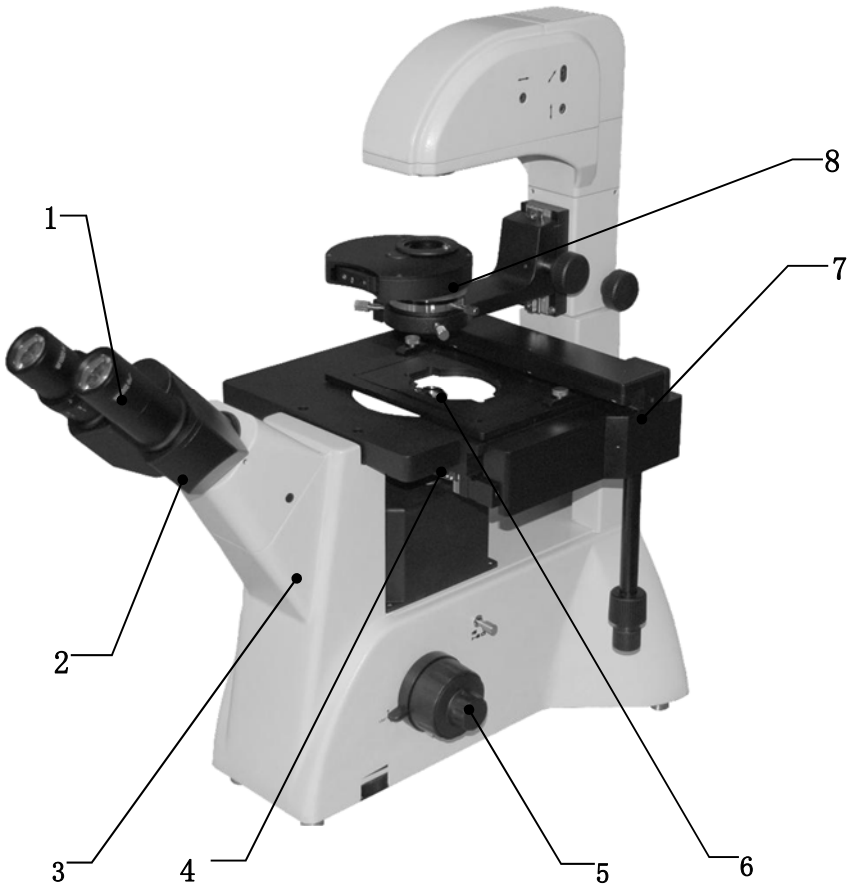


Fig.1

1. Eyepiece 2. Eyepiece tube 3. Main frame 4. Nosepiece 5. Coarse/fine focusing mechanism 6. Objective 7. Stage moving device 8. Puller-type phase contrast condenser

III. Installation of this unit

1. Installation diagram

Caution !	Before installing, be sure every components is clean, no score any parts or glass surface.

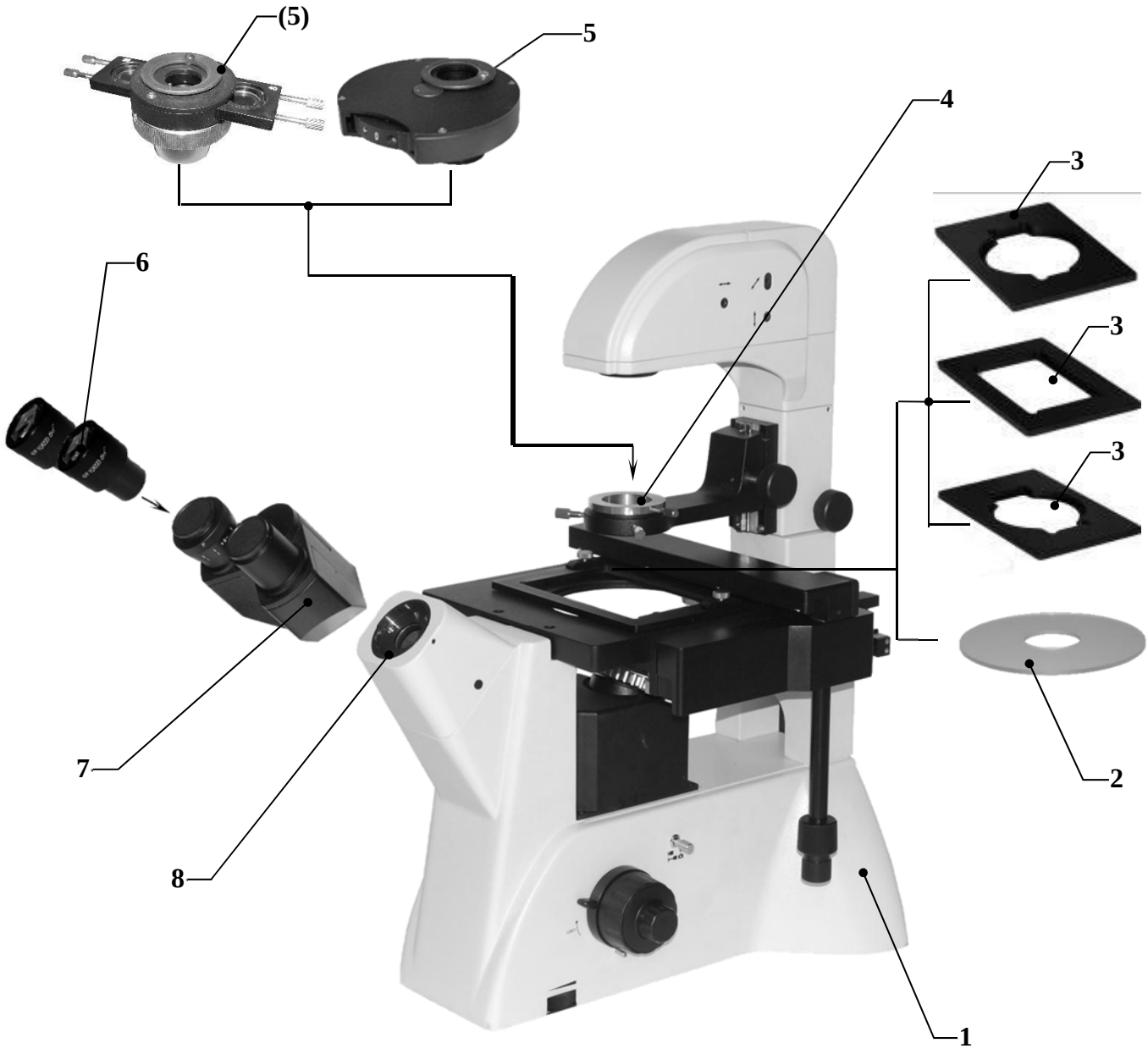


Fig.2

2. Installation steps (As shown in Fig.2)

(1) Unpack this unit, take out the main frame body 1 and place it on a stable work bench, and remove the supporting package and the dust cap (bag).

(2) Take out the dust cap of eyepiece tube , then install the eyepiece tube into the holder of the frame **8**.

(3) Take out the phase contrast condenser **5**. Install the condenser into the condenser holder **4**. If has a turntable phase contrast condenser, turn the turntable so that it faces the main frame body, and then tighten the screw. If has a puller-type phase contrast condenser, the puller shall be horizontal. As shown in Fig. 3.

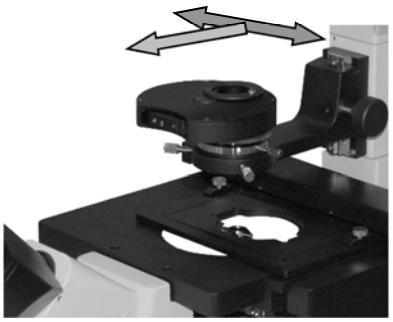


Fig.3

(4) Take out 2 pcs eyepieces 6 and insert them into the eyepiece tube, and turn the eyepieces so that they fits the eyepiece tube well.

(5) If need not use the stage moving device, loosen the screw and take down the stage moving device. Put the circle glass plate **2** in the circle trough of the stage.

(6) If need use the stage moving device, take out the culture dish holder **3** (when the culture dish holder is used to carry a specimen or observe tissue in the culture dish), put the desired specification culture dish holder flatly in the stage moving device rack.

(7) Connect the power cord to the power supply socket of the body.

(8) Check if the above installation is secure and safe.

(9) Inspect and gather the accessories and tools enclosed in the package and keep them in a safe place to avoid mis-placement.

IV. Technical specifications

Main parameters	total magnification		100X-400X (standard)		
	Mechanical tube length		∝		
	Conjugate distance of objective		∝		
Eyepiece	Wide-field eyepiece	WF 10X	field of view number Φ22mm	Eyepiece interface Φ30mm	Parfocal distance 10mm
Trinocular	Hinged binocular tube, with an observation angle of 30°, and a pupil distance of 53-75mm				
	Magnification	N．A．	W．D (mm)	Thickness of cover glass (mm)	Remarks
Objectives	10X	0.25	4.3	1.2	
	20X	0.40	8.0	1.2	
	40X	0.60	3.5	1.2	
Phase-contrast objective	10X	0.25	4.3	1.2	Remark “PHP2”
Nosepiece	Quintuple				
Condenser	Long working distance condenser, working distance: 55mm, and with turnplate phase contrast unit				
Stage	Mechanical Stage, moving range 77mm (longitudinal)X134mm (transverse), detachable stage moving device				
Culture dish holder	Holder 1	86mm (W)X129.5mm (L), optional with a circular culture dish Φ87.5mm			
	Holder 2	34mm (W)X77.5mm (L), optional with a circular culture dish Φ68.5mm			
	Holder 3	57mm (W)X82mm (L)			
Light source	Transmitted lighting	T5W LED, adjustable in brightness			

V. Operation

● **Inverted Microscope Operation.**

Warning!

Before turning on the power switch, check if the input voltage is consistent with local voltage supply. If not, do not operate this unit. If this unit uses an improper input voltage, short circuit or fire may arise, thereby cause damage to this unit!

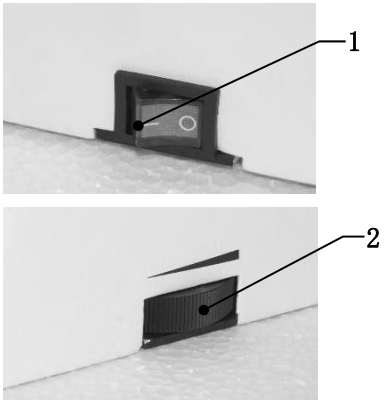


Fig.4

1. Turning on the power switch and brightness adjustment

Turn on the toggle switch 1 on the right of the main body frame (turn it to the "-" position), so that the transmitted LED bulb is illuminated. Turn the brightness control knob 2 to adjust the brightness of LED bulb, and make the brightness of the field of view suitable for visual inspection. As *shown in* Fig. 4.

Caution!

Do not keep the brightness control knob at the brightest position for a prolonged period of time, otherwise the life of the bulb may be shortened! When this unit is not in use, turn the brightness adjusting knob to the low position to maintain the electric functions of this unit.

2. Adjust condenser height

Before this unit is released from the factory, the condenser already bears a calibrated height mark 1, Turn the condenser height control knob 2, to move the condenser into working position until the two lines on the condenser coincide which is optimum position for most applications. *as shown in* Fig. 5.

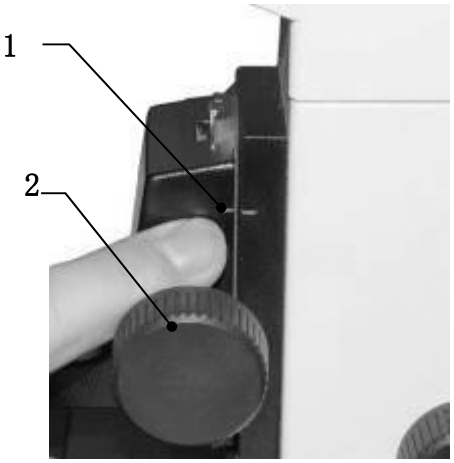


Fig. 5

3. Adjust phase-contrast device

This unit can be fitted with two phase contrast devices: turntable type and puller type, as shown in Fig.6 and Fig.7.

1） If a turntable phase contrast device is provided, turn the turntable 1 in the phase contrast converter to the "0" scale (allowing observation for the transmitted bright), as shown in Fig.6.

2） If a puller-type phase contrast device is provided, set the phase contrast puller 2 to the central light hole, as shown in Fig.7.

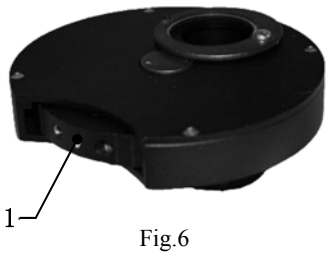


Fig.6

4. Reset diopter adjustment ring

Turn the diopter adjustment ring 1 on the left eyepiece tube, so that the "0" diopter position is aligned with the side scale (remark white line), as shown in Fig. 8.

Fig. 7

5. Adjust interpupillary distance

Parallax can be eliminated by adjusting the interpupillary distance so that the distance of the eyepiece tube is identical with interpupillary distance and enable to observe more comfortably and clearly. When observe through two eyepieces, if the field of view consists of two overlapping circles, as shown Fig.8-a, can alter the exit pupil center distance of the eyepiece tubes by turning the left or right frame body 2 until the field of view becomes a fully overlapped circle, as shown in Fig. 8-b.

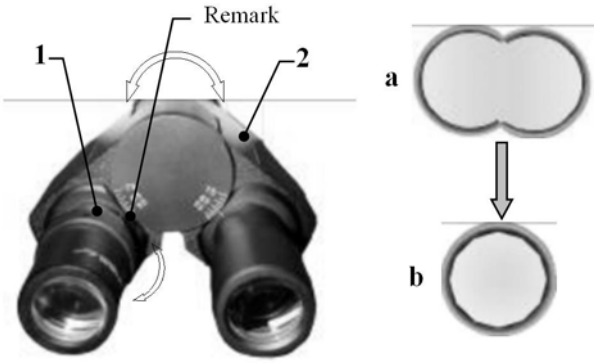


Fig.8

6. Inspect transmitted lighting path

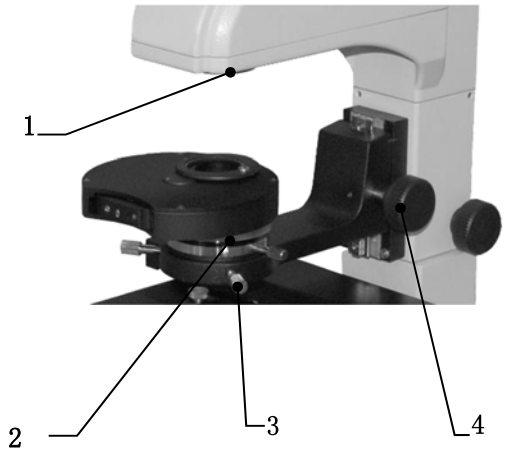
The optical system of this unit has been calibrated before factory release. But the center of the lighting bulb or condenser system may deviate from the center of the optical system due to any possible violent vibration or inclination during transport. After the above installation and adjustment, the light path of the optical system should be checked.

（1） Inspect the center of field diaphragm

a) Turn the 10X plan objective into optical path, open the aperture diaphragm 2, and close the field diaphragm 1, when a light spot as shown in Fig.9-a can be seen in the field of view. If the edge of the light spot is unclear, it can be made clear by adjusting the condenser height control knob 3.

b) If the light spot deviates from the center of the field of view, as shown in Fig. 9-a, the condenser center (center of aperture diaphragm) must be adjusted. The center of the light spot can coincide with that of the field of view by adjusting two the centering screws 3 of the condenser holder, as shown in Fig. 9-b.

c) Open field diaphragm, so that the observed specimen image fills the visual field, as shown in Fig.9-c.



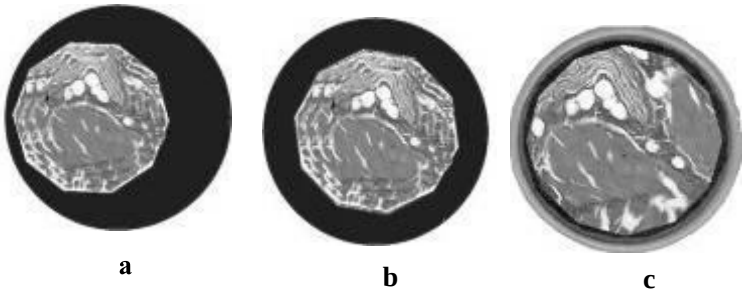


Fig.9

7. Place specimen slice or culture dish

1) To observe a slide specimen, the slide can be placed directly on the culture dish holder 1. To observe tissues in a culture dish, determine the culture dish holder to be used based on the external dimensions of the culture dish (refer to the technical specification table for the allowable culture dish dimensions), as shown in Fig. 11.

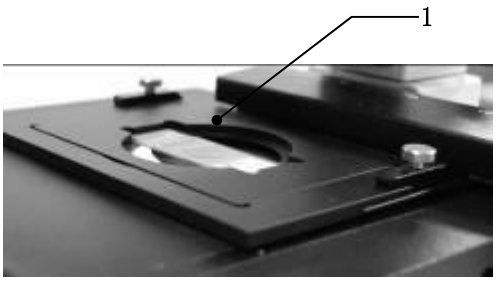


Fig.11

（2）Adjust the stage moving device control knob 1 and 2 so that the observed area is right above the objective for easy observation and adjustment, as shown in Fig. 12.

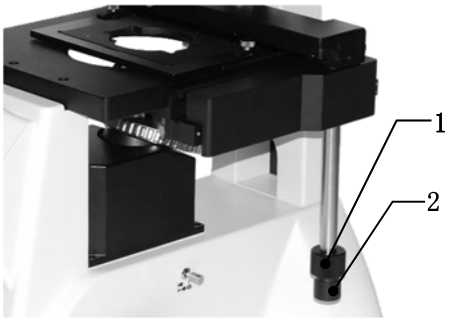


Fig. 12

8. Operate coarse and fine focusing control knob

(1) Focus with the 10X objective

Turn the nosepiece 1 to make 10X objective into optical path (when it turns in place, the objective will snap automatically), as shown in Fig. 13.

(2) Turn the coarse focusing control knob 3 to lift the objective to the highest point, then observe and turn the coarse focusing control knob slowly to lower the objective, when a specimen image appears in the field of view, stop turning the coarse focusing control knob.

(3) Turn the fine focusing control knob 2 for fine focusing to make the specimen image clear.

(4) Lock the objective lifting limit hand wheel 4 as indicated by the arrow in the figure.

Reminder!

When use a high magnification objective, first use 10X objective to focus and set the limit hand wheel, then exchange the high magnification objective, raise the objective to the limit height with a coarse focusing control knob directly, and then focus finely with the fine focusing control knob.

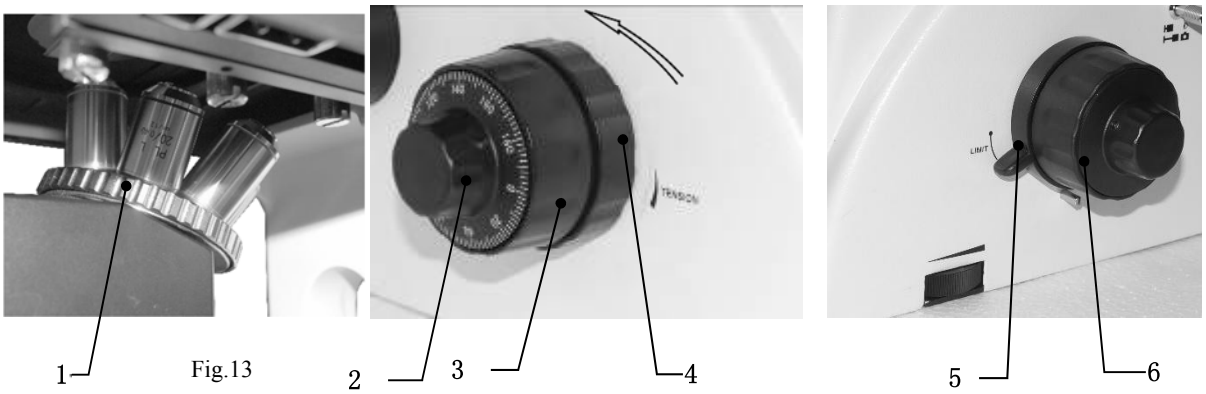


Fig.13

(5）Focus Tension Adjustment

The tension of the coarse focus control knob is adjustable and preset at the factory for ease of use. If wish to adjust the coarse focus tension, adjust the knob 5 of tension adjustment. Turning the wheel clockwise decrease the tension, and anticlockwise increases it.

Caution!

Too high tension may be affected operation and physical discomfort.

9. Adjust, assemble and remove the moving device of stage

(1) The longitudinal (Y) and transverse (X) movement of the stage moving device 1 is realized by the longitudinal adjusting knob 2 and the transverse adjusting knob 3 that are coaxial, as shown in Fig. 14.

Caution!

The stage moving device is driven by gear and rack. In case of longitudinal or transverse movement to the fixed position (maximum), do not continue to turn the adjusting knob as this is likely to damage the movement adjusting mechanism. When the stage moving device protrudes from the fixed stage, the rack will extend outward. Be careful not to let the rack hit your hand or any other part of your body.

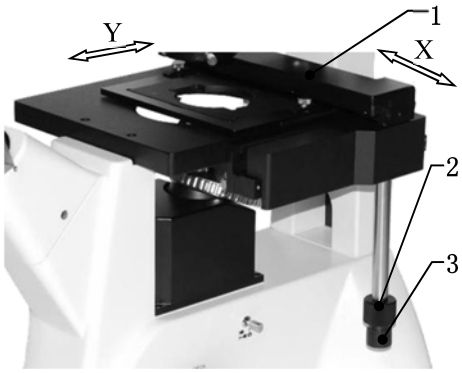


Fig. 14

（2）If observing tissues in a big culture dish, the stage moving scale 1 on the fixed stage must be removed. During removal, keep the condenser system 4 out of the light path, remove the culture dish holder, and lower the objective (turn the coarse focusing control knob so that the objective lifting mechanism is lowered). Use a screwdriver to loosen the 3 mounting screws 5 at the bottom of the stage moving device, remove the stage moving device 6, and lay it flatly on the worktable upside down. Do not lay it laterally or overhead, otherwise it may drop or be deformed, affecting the precision of this device. *See Fig.15* for the operating process.

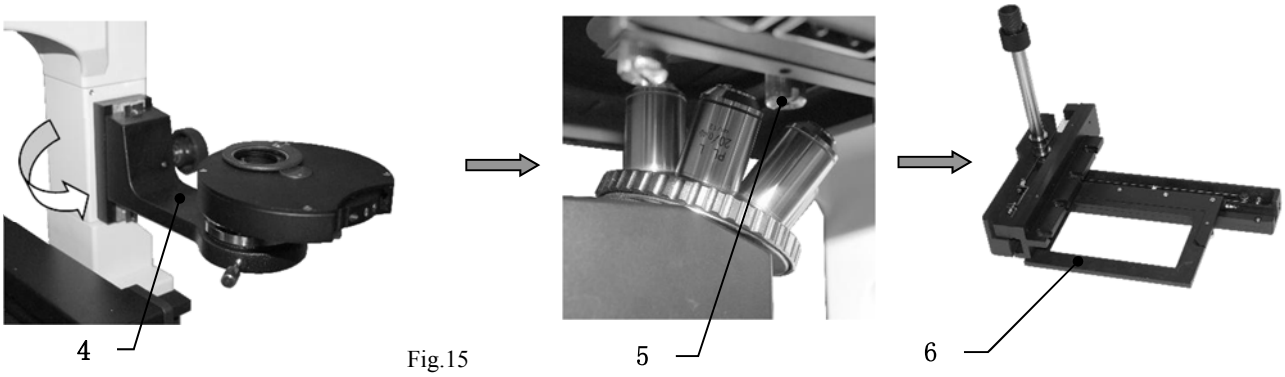


Fig.15

Caution!

The stage moving device is the key part for carrying the specimen and the culture dish. Do not lay it laterally or overhead after removal, otherwise it is likely to drop, affecting its precision. It should be laid flatly on the worktable upside down.

（3）Adjust the tension of longitudinal and transverse adjusting knob

The tension of longitudinal and transverse adjusting knob of stage moving device are adjustable and preset at the factory. When used the device, no need for adjusting the tenson, but have a long time to use the device, it

may be need to adjust the tension, can accord the following method to adjust the device.

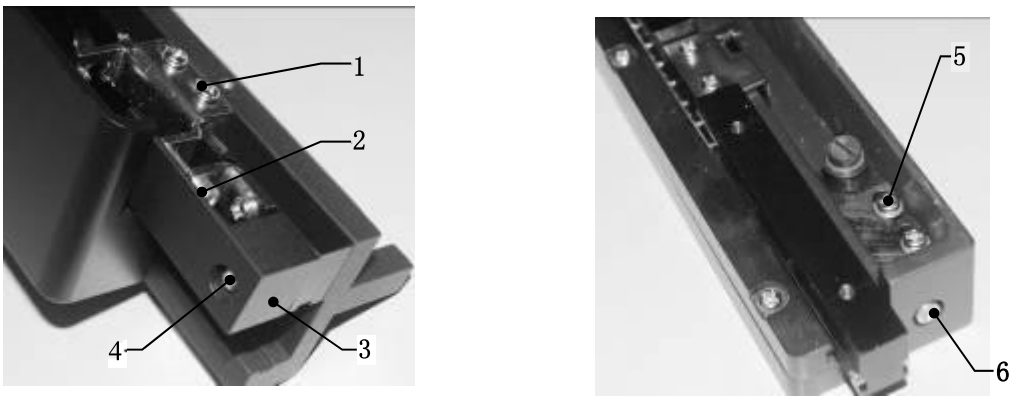
Removal of stage moving device and invert it on the table.

a）Adjust the tension of longitudinal adjusting knob

Screw out the cross recess head screw 4 and remove the baffle 3，then loosen the cross recess head screws 1 (loosen slightly)，adjust the hexagonal screw 2 with a hexagonal socket wrench to adjust the tension of longitudinal knob. See Fig.16-a.

b) Adjust the tension of transverse adjusting knob

Loosen the cross recess head screws 5 (loosen slightly)， adjust the hexagonal screw 6 with a hexagonal socket wrench to adjust the tension of transverse knob. See Fig.16-b.



a b

Fig.16

10. Adjust diopter

Adjust the diopter adjusting ring 1 on the left eyepiece tube to calibrate diopter, which is difference between both eyes of different user.

(1) Turn 40X objective into optical path, observe micro-image in right eyepiece which the eyepiece tube has no diopter adjusting ring, and focus to make micro-image clear

(2) Observe micro-image in left eyepiece only. If the image unclear, it is necessary to adjust the diopter adjusting ring 1 to make image clear. The diopter adjusting range is N=±5 diopters, as shown in Fig.17.

Fig. 17

● Phase Contrast Microscopic Observation

1. Adjust the phase contrast device

Turn the 10X phase contrast objective into the light path, and turn the phase contrast turntable or phase contrast puller to the “10” scale. Turn condenser height control knob, so that the phase contrast condenser rises to the position of scale, see fig.5 .

Reminder!

In the phase contrast observation mode, the phase contrast objective must correspond to the phase contrast ring plate in the phase contrast condenser, i.e., the magnification of the objective corresponds to the scale of the puller or insert plate, otherwise the imaging effect of phase contrast observation would be affected.

2. Place specimen

Lay the phase contrast specimen flatly on the culture dish holder or directly on the fixed stage (remove stage moving device). Focus to make the specimen image clear.

3. Center phase contrast device

(1) Remove one eyepiece from eyepiece tube, and insert centering eyepiece 2, as shown in Fig. 18-a.

(2) A dark ring 5 and a bright ring 6 will be observed in the field of view, as shown in Fig. 18-c.

(3) If the edge of the dark ring or bright ring is unclear in the field of view, adjust the adjusting ring 7 of the centering eyepiece to make the edge clear.

(4) In the phase contrast observation mode, the center of the dark ring should coincide with that of the bright ring. If their centers do not coincide, as shown in Fig. 16-c, it is necessary to center the phase contrast turntable or phase contrast puller. Use the hexagon spanner to adjust two screw 3 of the phase contrast turntable to make coincide; adjust the centering screws and 4 of the phase contrast puller to make coincide, as shown in Fig. 18-d.

(5) After the phase contrast device is centered, the centering eyepiece can be removed, insert working eyepiece .

Caution!

In case of changeover to a phase-contrast objective of a different magnification, the phase-contrast device must be centered again, otherwise the effect of observation phase-contrast would be affected.

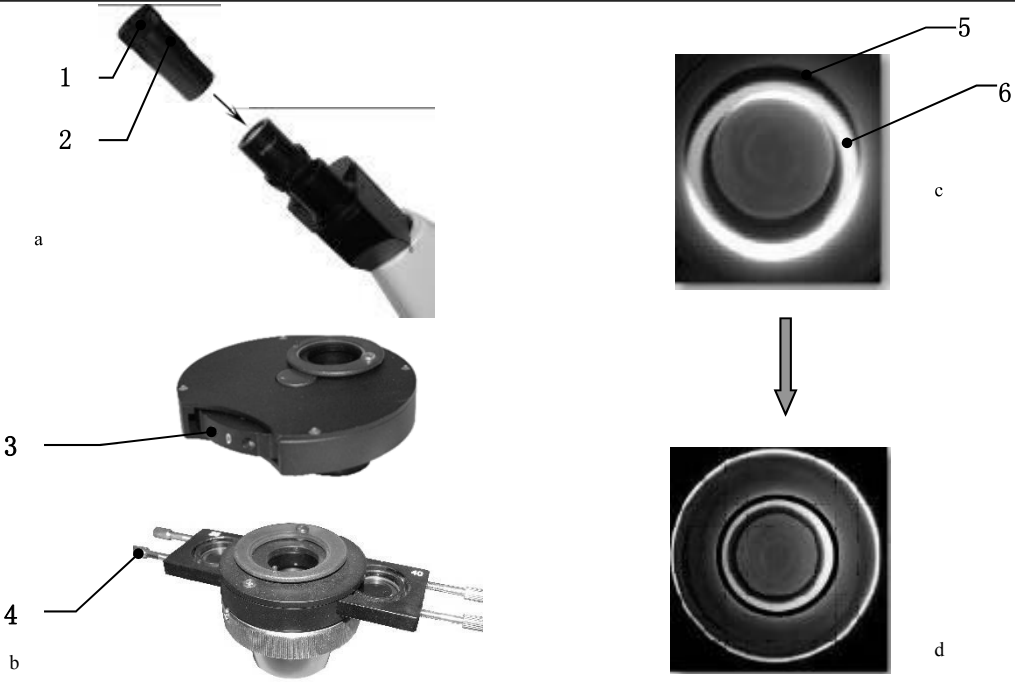
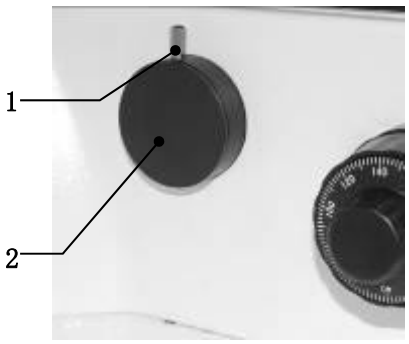


Fig.18

● Operate Trinocular Device

This unit performs eyepiece and photographic observation, switch by push-pull rod 3, located at the right side of main frame body. The photography output 1 is located at the left side and covered by a dust-proof cap 2. The following is operation steps.



（1）Loosen the fastening screws of the photography output terminal, and remove the dust-proof cap.

(2) Mount the photography device on the output terminal, then tighten the fastening screws again.

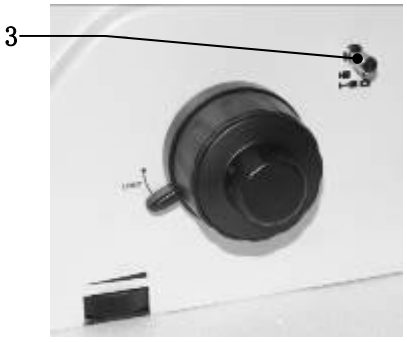


Fig.19

(3) Turn the 10X objective into the light path.

(4) Push the push-pull rod 3 in and focus to make micro-image clear.

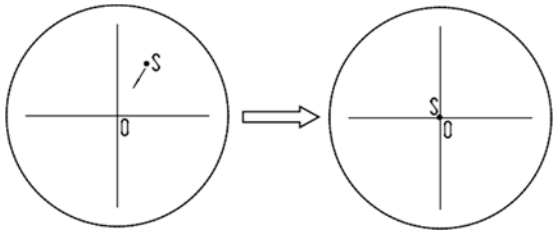
(5) Push the push-pull rod 3 out to see whether the image with photography clear. If unclear, adjust the fine focusing control knob to make the image clear.

(6) If there is strict synchronization requirement for eyepieces and photographic images (consistency between the center and direction of the image), a synchronization adjustment will be necessary as follows:

a. Push in push-pull rod, observe with eyepieces. Find a feature point in the field of view (a readily identifiable target, such as *S* point in Fig. 20-a), move it to the center of the field of view. If there is a division eyepiece, move the target to the reticle intersection of the division eyepiece, as shown in Fig. 20-b.

b. Push the push-pull rod, view the image in monitor or display screen, and see if the identified target image is at the center of the displayed window. If it deviates from the center of displayed window, Adjust the 3 screws on the output terminal to move the identified target to center.

c. Move the specimen and see if the image in the monitor or display screen moves in the same direction as the specimen. If move in different direction, it is necessary to adjust the direction of the photographic device. Loosen the fastening screws , turn the photographic device to make the displayed direction of the image inline with the direction of stage motion, then fasten the screws.



a Fig.20 **b**

d. Push push-pull rod in, observe the specimen image with both eyes, and focus to make the specimen image clear.

e. Push the push-pull rod out to see if the image in the monitor or display screen is clear. If not, adjust the fine focusing control knob to make the image clear.

VI. Replace fuse

Warning! To replace the bulb and the fuse, turn off the power switch and unplug the power cord, otherwise fire, personal injury or damage to this unit may occur due to electric short circuit.

● **Replace Fuse**

The fuse of the main unit is a circuit system used for LED unit, and is integrated into the power input socket 3 of the main unit.

1. Turn off the power switch 1, and unplug the power cord 2, as shown in Fig. 21.

2. Remove the fuse holder 2 with a flat screwdriver 1 or any other tool as shown in the figure, remove the damaged fuse, and replace a new one. Replace the fuse holder into the power input socket of the main unit, as shown in Fig. 22.

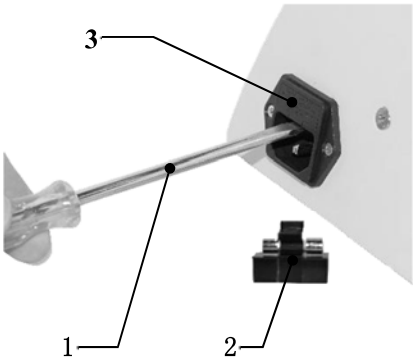


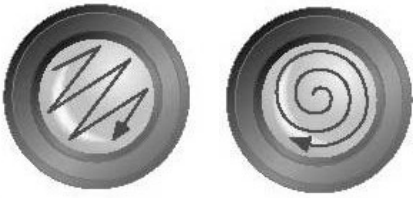
Fig.22

VII. Maintenance

1. The power switch of the main unit is the power control. When finish using this unit, press the switch to "O" to cut off the power supply, unless the electric components in this unit is still operating. When this unit is not to be used for a long time, remove the power plug from the supply socket and keep all cables properly.
2. This unit should be kept clean. Remove any oil on the lens and clean the body with clean gauze (or silk fabric or absorbent cotton) dipped with a little alcohol. Put on the dust shield until this unit is completely cool and dry.
3. Cleaning the lens

   Blow off or wipe off any dust on the lens with a blower ball or a soft brush; heavy dirt and fingerprints can be removed with lens tissue or soft cloth dipped with a little mixture of alcohol and ethyl ether gently (the mix ratio is: alcohol 20-30% and ethyl ether 70-80%).

Reminder! It is easier to clean the lens by wiping them from inside out as shown in the figure.


Wrong Right

4. Cleaning the surface of this unit: Wipe it with clean soft cloth; heavy dirt may be wiped off with a neutral detergent.
5. Keeping: When this unit is not to be used for a long time, turn off the power supply of this unit, allow the bulb to cool down sufficiently, put on the dust shield, store this unit at a dry, ventilated and clean place free from any acid, alkali or steam, otherwise mold may develop on the lens.
6. Periodic inspection: This unit should be inspected and maintained periodically to maintain its performance.

Caution!

Do not wipe this unit with any organic solvent (e.g., alcohol, ethyl ether or its dilute solution), otherwise the surface paint of this unit may come off. It is suggested that a layer of non-corrosive lubricant is applied on the moving parts of this unit before the dust shield is put on, and place the eyepiece and the objectives in a container with desiccant.

VIII. Troubleshooting

Fault	Cause	Solution
Electric system		
No light shown in the field of view using LED unit	The power switch is not turned on.	Turn on the power switch.
	The LED unit is damaged.	Replace the LED unit.
	The fuse is damaged.	Replace the fuse.
	The connector of the electric chassis is in bad	Check and have professional repair it.
	The LED unit mounted is nonconforming.	Use a conforming LED unit.
Optical system and imaging		
There is a black shadow on the edge of the field of view or unevenly illuminated, making it impossible to observe the whole field of view.	The nosepiece has not been turned to the fixed position.	Turn the nosepiece to the fixed position.
	The filament image deviates from the center of the collector.	Reposition the lighting bulb.
	The illuminating light beam is kept out optical path what with the condenser system offset	Turn the condenser device to locate it on the position.
	There is dirt or oil on the surface of the objective, eyepiece or condenser	Wipe the lens surface or replace the lens.
Oil or dust is found in the field of view.	There is oil or dust on the eyepiece lens.	Wipe the eyepiece.
	There is oil or any foreign object on the edge of the field of view diaphragm.	Wipe the diaphragm edge.
Defocusing or low resolution	The objective is damaged.	Repair the objective (by a professional).
	There is oil or dust on the surface of the lens of the objective or eyepiece.	Wipe the objective or the eyepiece.
	The aperture of the aperture diaphragm is too small.	Adjust the aperture of the aperture diaphragm based on the objective magnification (or numerical aperture)

	The objective deviates from the light path.	Turn the nosepiece to the fixed position.
	The specimen cover glass is too thick or thin.	Load a cover glass as necessary for the
	The upper and lower sides of the specimen are inverted.	Place the upper and lower sides of the specimen positively.
The effect of phase-contrast observation is bad.	The phase-contrast objective does not match the ring plate of the phase-contrast condenser lens.	Align the phase-contrast objective with the mark on the turntable of the phase-contrast
	The center of the ring plate of the phase contrast condenser lens deviates from that of the phase plate of the phase contrast objective.	Center the phase-contrast condenser lens, so that the ring plate coincides with the phase plate.
	The specimen used is not suitable for phase-contrast observation.	Replace it with one suitable for phase-contrast observation.
Mechanical system		
The image cannot remain clear during observation.	The focusing mechanism flows (slides down) automatically.	Adjust the coarse adjusting hand wheel.
	The fine focusing mechanism fails	Check and have professional repair it.
	The stage loosens or is inclined.	Check and have professional repair it.
When the condenser lifting device swings in or out, the fixed position cannot be located precisely or is insecure.	The lock screws loosen, making positioning difficult.	Recalibrate the lock screws.
	The locking mechanism is seriously worn, and has insufficient clamping force.	Check and have professional repair it.
Stage moving device	The knob of longitudinal moving is too light.	Adjust the longitudinal steel wire tightness.
	The knob of transverse moving is too light.	Adjust the transverse steel wire tightness.
	The steel wire is rupture	Replacing a new steel wire (professional repairing)