



Guangzhou Micro-shot Technology Co., Ltd

ML41

**Biological microscope
User manual**



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Biological microscope ML41

Welcome to use ML41 biological microscope!

ML31 series biological microscope is widely used at biology and medical university laboratory, medical treatment and public health, scientific study instrument, etc.

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.

.....

Safety Reminder



Warning!

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.



Warning!

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.



Warning!

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.



Warning!

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).



Warning!

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.



Warning!

6. Heat of light source

The lighting bulb generates high temperatures during operation. Do not touch the collector lens or lamp box when the lamp is illuminated, and do not touch the bulb within 10 minutes after the lamp goes out due to high temperatures arising from operation. When replacing the bulb, make sure it has cooled down

properly (the lamp should be off for at least 10min).

- ★ To prevent burn, do not touch the bulb when the lamp is illuminated or within 10min after it goes out.
- ★ To prevent fire, do not place any fibrous product, paper, flammable or explosive material (e.g., gasoline, petroleum ether, alcohol) near the halogen lamp housing or mercury lamp housing.



Warning!

7. 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.



Caution!

8. 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!

9. 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.
- ※ When replacing the bulb, the feet should be inserted into the holder as deeply as possible. If the feet are not tightly inserted, the bulb may go out or short circuit.



Caution!

10. 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.



11. 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 pollution.

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I . Attention

1. Do not disassemble

Please do not disassemble the detachable parts not mentioned in this manual. If the instrument is found to be faulty, please find an experienced professional to repair it or contact the manufacturer directly.

2. Check the voltage

(1) The rated input voltage is marked on the microscope base. Note that the local power supply voltage must be consistent with it. If the microscope is used under non rated voltage, it will be seriously damaged.

(2) The power supply socket shall be provided with grounding wire.

3. Handling and placement

(1) Turn off the power switch before handling the instrument.

(2) Working environment requirements:

Room temperature: 0 ° C ~ 40 ° C

Maximum relative humidity: 85%

(3) Avoid placing the instrument under direct sunlight or room light. The bright environment will affect the imaging quality of the specimen.

(4) Avoid placing the microscope in a dusty environment. When the microscope is not in use, it should be covered with a dust cover.

(5) The microscope should be placed flat without vibration.

4. Operate with care

(1) Microscope is a kind of precision optical instrument. Strong vibration and hard operation will cause serious damage to the instrument. Pay special attention not to force

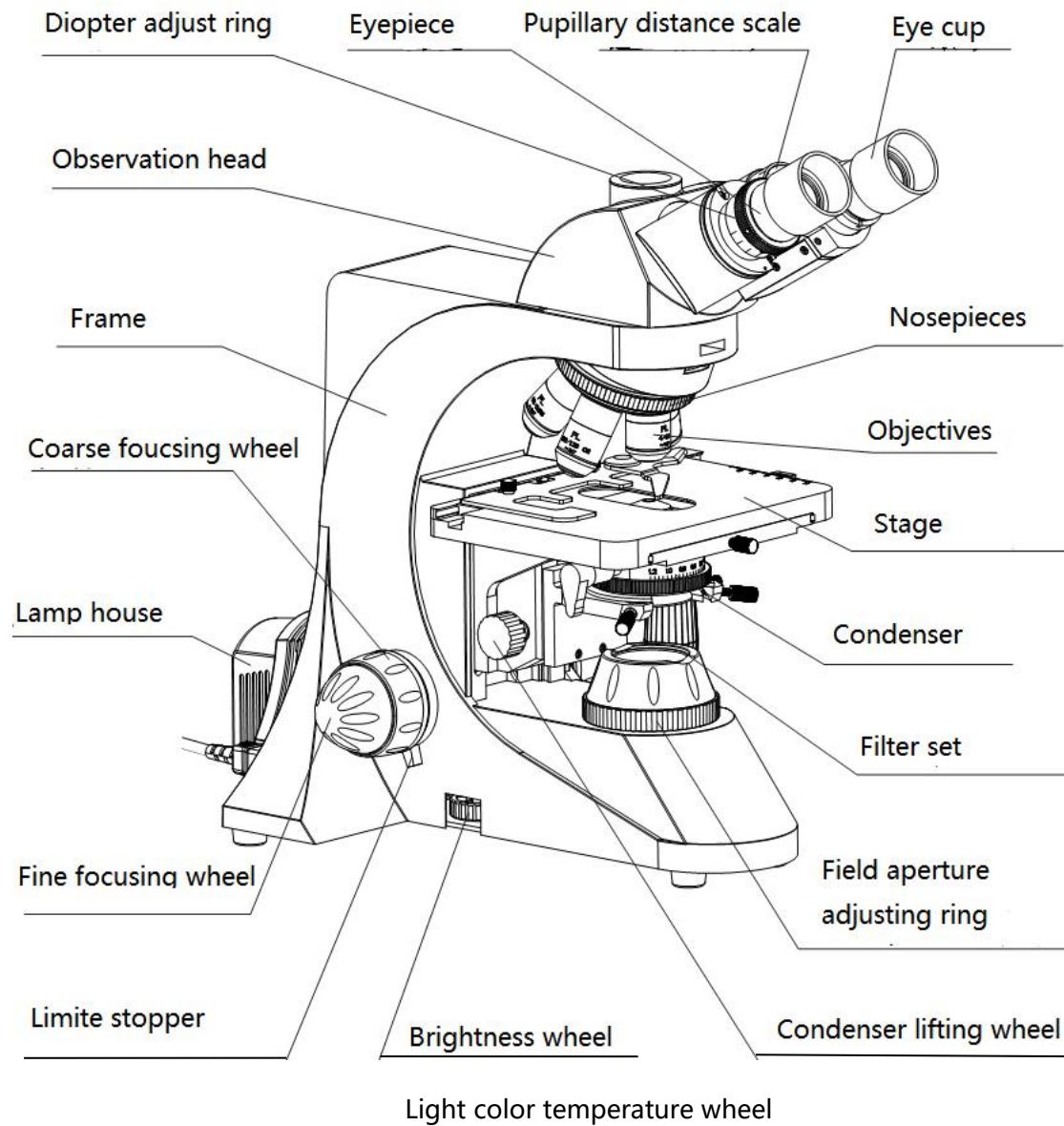
the left and right coarse focusing handwheel to rotate in reverse to each other, otherwise it will cause serious loss of focusing accuracy or even failure.

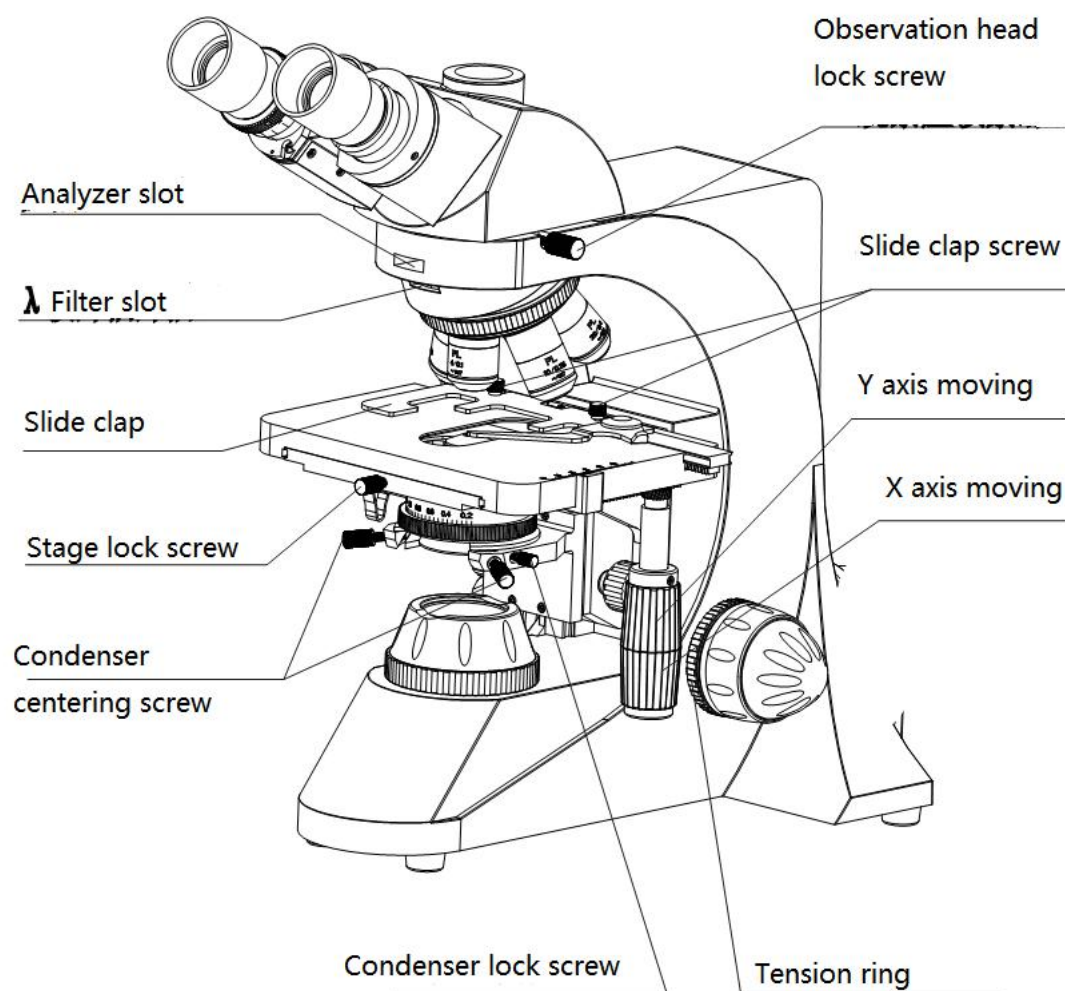
(2) Do not touch the surface of optical parts by hand, otherwise the imaging will be blurred.

II. Product characteristic

1.Name of each part

Name of each component of ML41 series laboratory biological microscope:

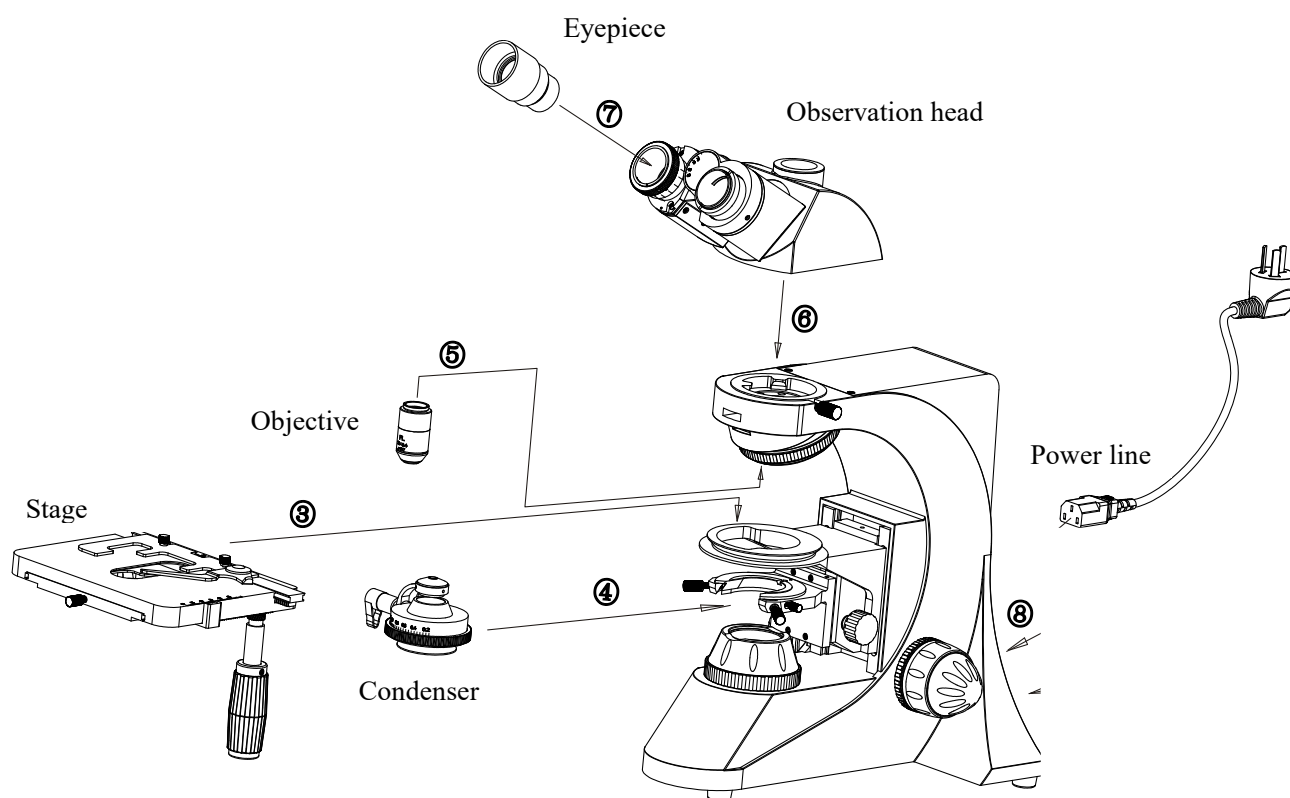




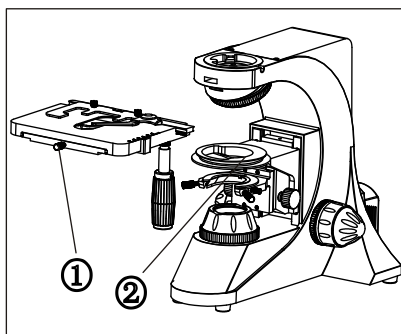
2. Installation of complete machine

2.1 installation step diagram: the following step diagram shows how to install each component, and the number indicates the sequence of installation.

☆ before installation, please make sure that all parts of the microscope are free of dust, dirt and other foreign matters affecting the installation. During installation, be careful not to scratch or scratch any part or touch the glass surface.



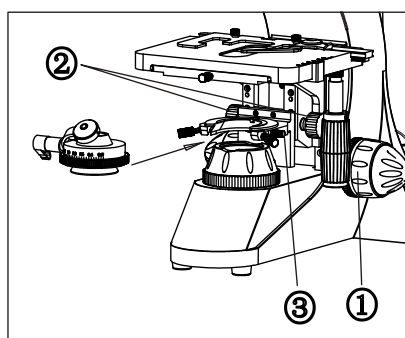
2.2 Installation steps:



picture 3

2.2.1 Install the stage

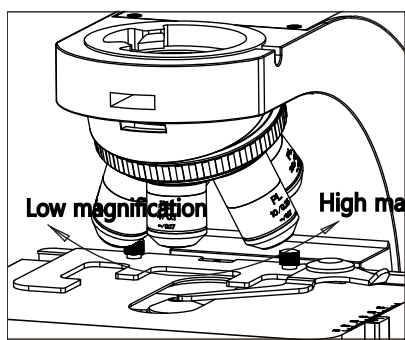
- (1) Completely loosen the fixing screws① on the stage.
- (2) Carefully place the two V-shaped buckles on the bottom of the stage away from the center of the bracket circular hole, and fit them into the V-shaped circular grooves② on the bracket, and then tighten the fixing screws①. (Picture 3)



picture 4

2.2.2 Install the condenser

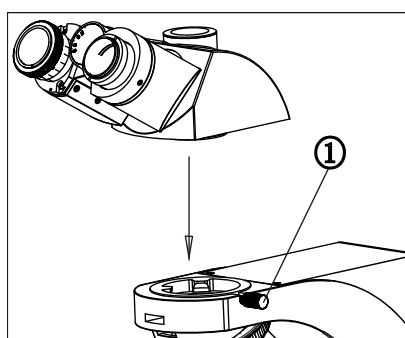
- (1) Turn coarse hand wheel① to raise the stage to the highest position.
- (2) Turn condenser lift hand wheel② to lower the condenser bracket to the lowest position.
- (3) Completely loosen the condenser fixing screws③.
- (4) Roll out the front lens group of the condenser, with the numerical scale facing forward, and align the set screw on the back of the condenser with the slot on the condenser holder, and push the condenser into the innermost part of the condenser holder. (Picture 4)
- (5) Tighten the condenser fixing screw ③, then turn the condenser lifting hand wheel② to raise the condenser to the highest position.



picture 5

2.2.3 Install the objectives

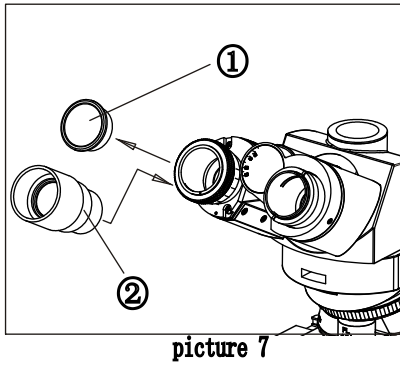
Turn the coarse hand wheel to lower the stage, and then install the objectives on the nosepiece in a counterclockwise direction from low to high magnification. (Picture 5)



picture 6

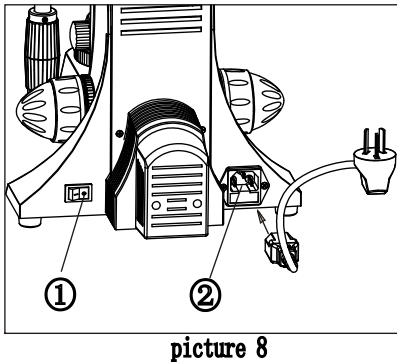
2.2.4 Install binocular head

- (1) Completely loosen the observation base locking screw①.
- (2) Move the dovetail interface at the bottom of the observation base to the right from the center of the round hole on the main frame, tilt it slightly to the left, insert the circular hole along the hole, make the double cylinder of the observation base face forward, and tighten the locking screw①. (Picture 6)



2.2.5 Install the eyepiece

- (1) Remove the dust cover① of the eyepiece tube.
- (2) Insert eyepiece② into the bottom of the eyepiece tube. (Picture 7)



2.2.6 Connect the power cord

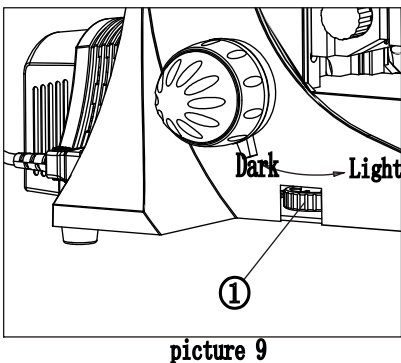
- (1) Make sure that the switch① is set to "O" (OFF).
- (2) Insert one end of the power cord into the power socket② of the microscope. (Picture 8)
- (3) Plug the other end of the power cord into a power outlet.

☆ The power cord is easily damaged when bent and twisted, please do not use excessive force.

☆ Please use the power cord provided by us, and choose another suitable power cord if it is lost or damaged.

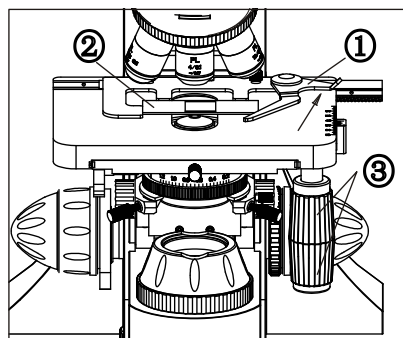
☆ The power socket should have a ground terminal to ensure that the instrument can be safely grounded.

III. Instructions



3.1 Lighting adjustment

- (1) Turn on the power, put the switch in the "I" state and the bulb will light up.
- (2) Rotate the brightness adjustment hand wheel ① to adjust the brightness to a comfortable viewing position (Picture 9)
- (3) Press the adjustment hand wheel① to switch the observation mode of different color temperature, there are 3 kinds of effects.



picture 10

3.2 Put slices

- (1) Gently push back the wrench ① on the slicer.
- (2) Put the cover glass of the sample ② into the slide holder, and release the spanner ① to clamp the slice firmly.
- (3) Turn the X and Y axis movement knobs ③ of the stage to move the slice to the center of the field of view and align it with the center of the objectives. (Picture 10)

3.3 Focusing

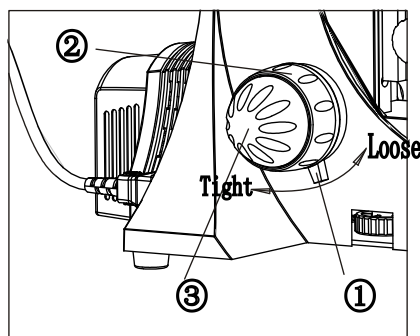
- (1) Turn the 4X objective into the optical path.
- (2) Loosen the coarse limit hand wheel ①, observe the right eyepiece, turn the coarse hand wheel ② until the outline of the specimen appears in the field of view, and then lock the coarse limit hand wheel in the direction shown in the picture.

☆ The coarse adjustment limit hand wheel can prevent the slice and the objective lens from colliding during focusing.

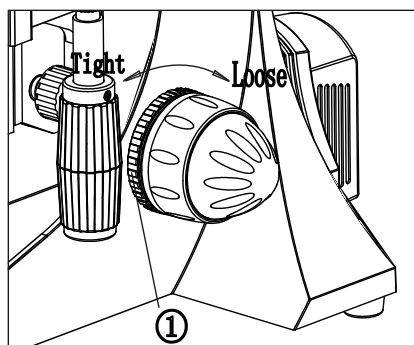
☆ Coarse adjustment limit hand wheel has no effect on micro hand wheel.

- (3) Turn the micro-hand wheel ③ to clearly observe the details of the specimen. (Picture 11)

☆ When using the 4X and 10X objectives, the aperture diaphragm and field diaphragm are opened to the maximum, and the condenser is moved out of the light path. Operation of the condenser is shown in "3.8 Condenser Centering".



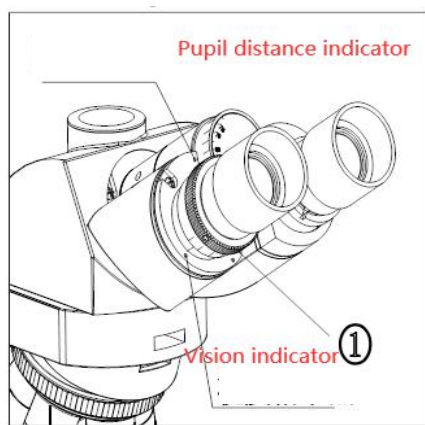
picture 11



picture 12

3.4 Adjustment of the tightness of the focusing

If the hand feel is heavy during rough focusing, or the specimen leaves the focal plane due to the automatic lowering of the stage after focusing, it can be solved by turning the elastic adjustment ring ①, and the focus of the focusing mechanism can be changed by rotating according to the picture. (Picture 12)



picture 13

3.5 Vision adjustment

After the image of the right eyepiece is clear, if the image of the left eyepiece is not clear, turn the diopter adjustment ring ① until the left eye can observe a clear image through the eyepiece. (Picture 13)

The visual adjustment ring is engraved with ± 5 diopters, the value of the aligned straight line is the current diopter value of the eye, and the left indicating point " • " also plays the same marking function.

☆ Please remember the diopter value of your eyes, and turn the diopter adjustment ring to the corresponding position next time.

3.6 Pupil distance adjustment

Adjust the pupil distance of the observation seat, hold the left and right prism seat by hand and rotate around the rotation axis until the images observed by the left and right eyes coincide. Pupil distance adjustment range: 50 ~ 76mm. (Picture 14)

In Figure 13, the indication point " • " above the left eyepiece holder points to the scale on the pupil distance sign, and the corresponding value is the current observer's pupil distance.

☆ Please remember your pupil distance value for your next use.

3.7 Adjusting the stage

During observation, the specimen can be moved to the x-axis and y-axis respectively by rotating the x-axis and y-axis moving knobs of the stage. If the moving direction of the stage is inconsistent with the moving direction of the image, you can adjust the stage according to the following steps: (Picture 15)

(1) Slightly loose the tightening screw of the stage

Turn the stage clockwise or anti-clockwise, until the image moves with the stage on the same axis, and tighten the screw ①.

Rotation angle:

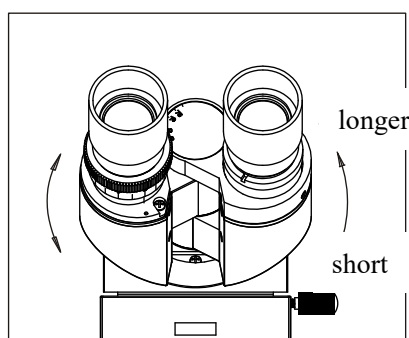
Right hand position: 90 degree clockwise, 20 degree anti-clockwise;

Left hand position: 20 degree clockwise, 90 degree anti-clockwise.

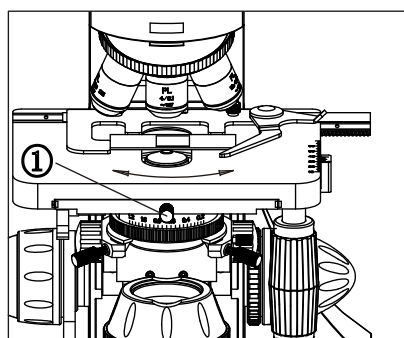
3.8 condenser centering adjustment

(1) Rotate the lifting knob and the lift the condenser to the ceiling.

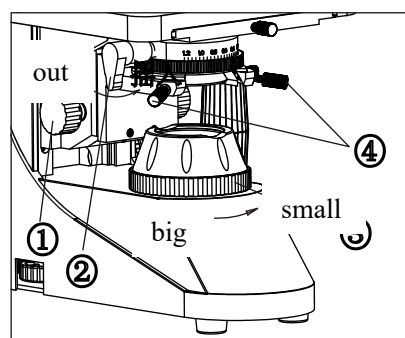
(2) Pull the wrench ② and shift the front group lens into the light path. (Picture16)



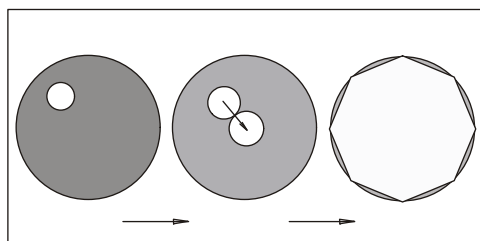
picture 14



Picture15



Picture16



Picture 17

When using the objectives with magnification higher than 20x, the front lens of the condenser shall be shifted in the light path.

(3) Shift the 20x objective into the light path and focus on the specimen.

(4) Rotate the field diaphragm adjusting ring ③ narrow the field diaphragm to the minimum position. At this time, the image formed by the field diaphragm can be observed in the eyepiece.

(5) Adjust the condenser lifting knob until the image is clear.

(6) Adjust the adjusting screw ④ until the image is in the middle of the field.

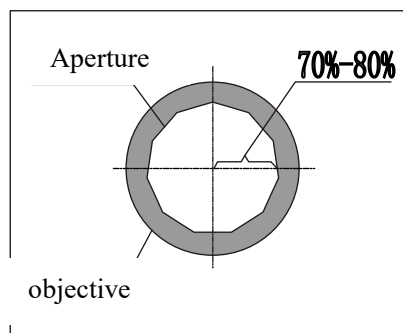
(7) Gradually widen the field diaphragm. If the image formed by the field diaphragm is always in the middle of the field and can be inscribed with the field, the condenser has been correctly aligned.

(Picture 17)

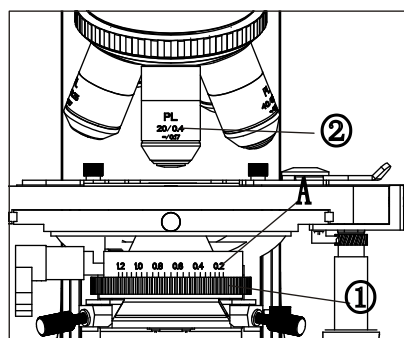
(8) When actually using the microscope, please slightly widen the field diaphragm until the image circumscribes to the field.

3.9 Field diaphragm

The field aperture limits the diameter of the light beam entering the condenser, so as to block the excess light at the periphery and enhance the image response. When the imaging of the field aperture is just at the outer edge of the field of view, the objective lens can play the most superior performance and get the clearest specimen image.



Picture18



Picture 19

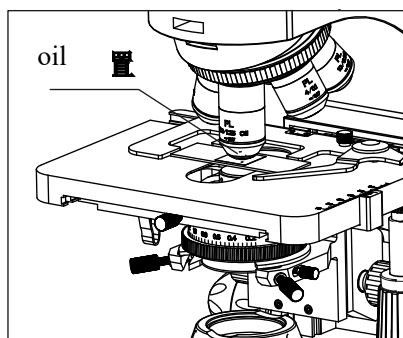
3.10 Aperture diaphragm

The aperture aperture determines the numerical aperture of the lighting system. Matching the numerical aperture of the lighting system with that of the objective lens can result in better image resolution, contrast and the increase the depth of field.

The contrast of the samples is usually low, thus, for the best contrast and the clearest image, it is recommended to adjust the aperture of the condenser to 70% ~ 80% of the numerical aperture of the objective lens (Picture 18). The adjustment steps: remove the eyepiece, observe through the eyepiece barrel, adjust the aperture diaphragm adjusting ring ① in Picture 19 until the image shown in

Picture 18 appears, and then adjust according to this proportion.

Use of scale: adjust the condenser numerical aperture scale to 80% of the numerical aperture ② marked on the objective. For example, when using a 40x objective (the numerical aperture is 0.65), adjust the marking line of the aperture at 0.52 (0.65×0.8).



Picture 20

3.11 use of oil immersion objectives

- (1) Focus on the specimen under 4x objective.
- (2) Drip one drop of oil on observation part. (Picture 20)
- (3) Turn the nose-piece and shift the oil immersion objective in, and using the fine focal knob to focus on the specimen.

☆ Make sure no bubbles in the oil because they can affect the imaging.

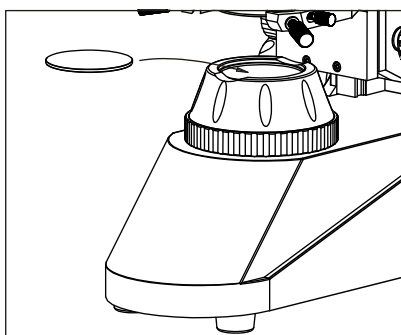
a. When checking the bubbles, remove the eyepiece and open the field diaphragm and aperture diaphragm thoroughly. Look through the eyepiece barrel and observe the outline of objective's aperture (it should be round and bright).

b. When eliminating the bubbles, slightly turn the nose piece and wave the oil immersion objective back and forth for several times.

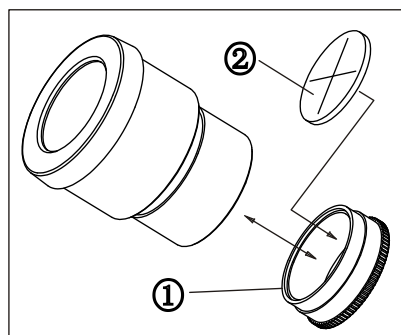
(4) After finished using the oil immersion objective, carefully wipe the front lens with clean gauze and or lens wipes dipped in Ethanol ethyl ether mixture (mixed with 3:7) or xylene.

☆ Do not shift other objectives in before the oil immersion objective was cleaned, or the dry objectives may stained by oil.

☆ Too much xylene can dissolve the adhesive on the objective lens.



Picture 21



Picture 22

3.12 use of color filter

Color filter can moderate the background light and improve the contrast of the image. (Picture 21)

The filters have four colors namely yellow, green, blue and white.

☆ The filters shall be installed with blurred side downward.

3.13 use of the reticle

- (1) Spin the reticle ① off the pressing ring.
- (2) Put the reticle in the pressing ring ①, with scale ② upward.
- (3) Install the pressing ring ① equipped with reticle into the eyepiece. (Picture 22)

☆ The size of the reticle $\varnothing 24 \times 1.2\text{mm}$. Attention: The scaled side shall be upward.

IV.Specifications

4.1 parameters for objectives

Categories	Optical system	Magnification	N. A. (mm)	W.D. (mm)	Conjugate distance (mm)	Parfocal distance (mm)	Coverslip thickness (mm)
Infinite plan chromatic objective	dry	4×	0.13	17.15	∞	45	0.17
	dry	10×	0.30	7.68	∞	45	0.17
	dry	40×	0.75	0.78	∞	45	0.17
	oil	100×(S)	1.30	0.15	∞	45	0.17

☆Attention: The refraction index of the immersion oil is 1.515.

4.2 parameters for eyepieces

Categories	Magnification	Field of view(mm)
High vision plan eyepiece	10×	Φ23

4.3 Total magnification

total objective eyepiece	4×	10×	40×	100×
10×	40×	100×	400×	1000×

4.4 Condenser: Swing-Out Achromatic Condenser, NA1.2/0.22

4.5 Coaxial coarse and fine focus adjustment mechanism: with coarse adjustment upper limit and elastic adjustment device, total stroke 25mm

4.6 Slightly twist the handwheel to adjust the accuracy: 0.002mm

4.7 Movement range of mechanical table: X-axis direction: 77mm, Y-axis direction:

60mm

4.8 Condenser lifting stroke: 35mm

4.9 Iris diaphragm aperture of the condenser: $\Phi 2 \sim \Phi 30$ mm

4.10 Light source: Input: 100V \sim 240V wide voltage

Bulb type: dual color temperature LED light source

V.Common Troubleshooting

If you find any fault when using the microscope, please check the instrument according to the following tips. If you still can't find the cause of the fault, please find an experienced professional for repair or contact the manufacturer directly.

Fault	Cause	Troubleshooting method
Specimen imaging is not clear	Put the specimen upside down	Reposition the specimen
	Inappropriate coverslip thickness	Use 0.17mm thick coverslips
	Dirt on the lens	wipe clean
	Oil immersion objective is not oiled	Add cedar oil
	air bubbles in oil	Turn the converter left and right several times
	Dry objective is stained with oil	wipe clean the oil
	Aperture diaphragm is not open properly	Adjust the size of the aperture stop

	Condenser position is incorrect	Adjust the up and down position of the condenser
	Using an unsuitable immersion oil	Use immersion oil with a refractive index of 1.515
Uneven illumination of the field of view	The converter is not in place	Turn the converter into place
	Dirt on the lens	wipe clean
	The specimen is not laid flat	Lay the specimen flat
	The condenser is not aligned in the center	Adjust the condenser center
The bulb brightness is turned to maximum, but the field of view lighting is not bright enough	The field diaphragm is not wide enough	Open the field diaphragm wider
	The condenser is not aligned in the center	Adjust the condenser center
	Condenser position is too low	Raise the condenser
	Aperture diaphragm opened too small	Appropriately open the aperture diaphragm wider
Smudges or dust appear in the field of view	Dirt builds up on the specimen	clean the specimen
	Dirt builds up on the lens	clean the lens
The high-power	Put the specimen upside	Reposition the specimen

objective cannot focus, and the lens touches the specimen when the low-power objective is turned to the high-power objective	down	
Left and right eye images do not overlap	interpupillary distance is not properly adjusted	Adjust the distance between the left and right eyepiece tubes to make it consistent with the observer's interpupillary distance
Eyes are prone to swelling and dizziness	The left eyepiece tube diopter is not adjusted properly	Readjust the left eyepiece tube diopter
Coarse handwheel rotates very tightly	The elastic adjustment ring is locked too tightly	Loosen appropriately
The stage descends automatically first and cannot stop on the focal plane during observation	The elastic adjustment ring is too loose	Lock appropriately
Coarse handwheel cannot raise up	The coarse adjustment limit handwheel is locked	Loosen the coarse adjustment limit handwheel
Coarse handwheel cannot go down	Condenser mount lowered too low	Raise the condenser mount
Specimen movement	The specimen is not	Reposition the specimen

is not smooth	properly placed	
	Slice clips not securely fastened	Fasten the slice clip
The image moves noticeably when touching the stage	Stage is not fixed properly	Fixed the stage

6.Maintenance

6.1 The instrument must be placed in a dry, cool, ventilated place, and be careful to avoid moisture and heat.

6.2 Pay attention to cleaning the optical parts frequently. For dust, you can use a blower ball or a soft brush to clean it, or gently wipe it with a clean gauze. If you want to remove fingerprints and oil stains, please use a clean gauze or lens tissue dipped in a small amount of pure ethanol-ether mixture (mixed in a ratio of 3:7) to gently wipe off.

6.3 Do not use organic solvents to wipe the non-optical surfaces of the microscope. Use gauze dipped in clean water to wipe these surfaces. For stubborn stains, neutral detergents can be used to clean them.

☆Both ethanol and ether are extremely flammable. Be careful not to place these chemicals near working light sources, open flames or possible sources of electrical sparks, such as when electronic equipment is turned on and off, try to use these chemicals in a well-ventilated room .

6.4 If the microscope is wet with liquid when working, please cut off the power immediately and wipe it dry.

6.5 After using the instrument, cover it with a dust cover. If the microscope will not be used for a long time, it is best to remove the eyepiece and objective lens and put them in a

moisture-proof tank. Pay attention to put the original dust cap and converter plug back into the eyepiece tube and on the converter after removing the eyepiece and objective lens,.

☆Product design is continually being improved, but these improvements may not be described in this manual.