Labotronics



Research Biological Microscope

LB-11RBM

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1. Safety Measures

1.1 Operation Notice

1) As the microscope is a high-precision instrument, always operate it with care, and avoid physical shake during the operation.
2) Do not expose the microscope to the sun directly, either not in high temperature, damp, dust, or acute shake. Ensure the worktable is flat and horizontal. The following environment is required when operating: Indoor temperature: 5°C - 40°C, Max relative humidity: 80%.
3) When moving the microscope, use both hands to hold its back hand-clasping ① and the front base ②, and lay it down carefully (refer to Figure 1).
   Note: It will damage the microscope by holding the stage, focusing knob, head, or light source when moving.

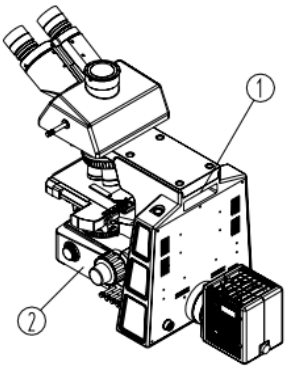


Figure-1

4) When working, the surface of a light source will be very hot. Ensure there is enough room for the heat dissipating around the light source.
5) Connect the microscope to the ground to avoid lightning strikes.
6) For safety, ensure the power switch is at "**O**" (off) and power it off before replacing the bulb or fuse (refer to **Figure 2**).
7) Wide voltage range is supported as 100-240V. An additional transformer is not necessary. Ensure the voltage is in this range.

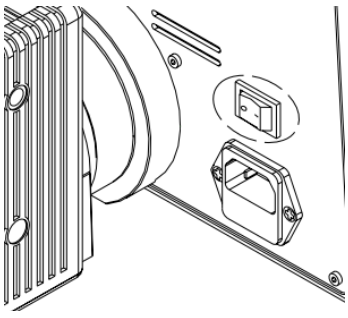


Figure-2

1.2 Safety Sign

Sign	Signification
	The surface gets hot and don't touch it with a bare hand.
	Study the instructions before use. The unsuitable operation would lead to a person being hurt or an instrument being faulty.
	Main switch ON
O	Main switch OFF

2. Introduction

Research Biological Microscope LB-11RBM is a unit with multiple splitting ratio options for professional analysis. Large sized rackless stage holds two slices simultaneously for comparative studies. Modular frame structure with cross arm and main body improves the system compatibility. Various optional accessories upgrades the unit and makes it more flexible for advanced application.

3. Features

1. Infinite color corrected optical system
2. High eye point wide field plan eyepiece for flat field view
3. Coarse adjustment stop and tightness adjustment function
4. Adjustable intensity by digital set and reset
5. Built-in transmitted filters for observation

4. Specifications

Model No.	**LB-11RBM**
Viewing head	Seidentopf Trinocular
Viewing head inclination	30° inclined
Interpupillary distance	50 mm ~ 76 mm
Frame	Biological frame (transmitted)
Splitting ratio Eyepiece	Trinocular = 100:0 or 20:80 or 0:100
Eyepiece	PL 10X/25 mm
	Diopter adjustable
Objective (Plan semi-apochromatic fluorescent objective)	4X/0.13 (infinity) ; WD = 18.5 mm
	10X/0.30 (infinity) ; WD = 10.6 mm
	20X/0.50 (infinity) ; WD = 2.33 mm
	40X/0.75 (infinity) ; WD = 0.6 mm
	100X/1.30 (infinity) ; WD = 0.21 mm
Nosepiece (with DIC slot)	Backward sextuple
Frame structure	Low position co-axial coarse and fine adjustment
	Coarse adjustment distance: 25 mm
	Fine precision: 0.001 mm
Stage (tension adjustable)	Double layers mechanical stage
	Size: 187 mm x 168 mm
	Moving range: 80 mm x 55 mm
	Precision: 0.1 mm
	Two-way linear drive
Condenser	Swing-out type achromatic condenser (N.A. 0.9)
Transmitted illumination	12 V/100 W Halogen lamp house
	Center pre-set
	Intensity adjustable

5. Applications

Used in biology, histology, pathology, bacteriology, pharmacy, medical laboratories and education institutes to observe cell, tissues and other specimens.

6. Instrument Introduction

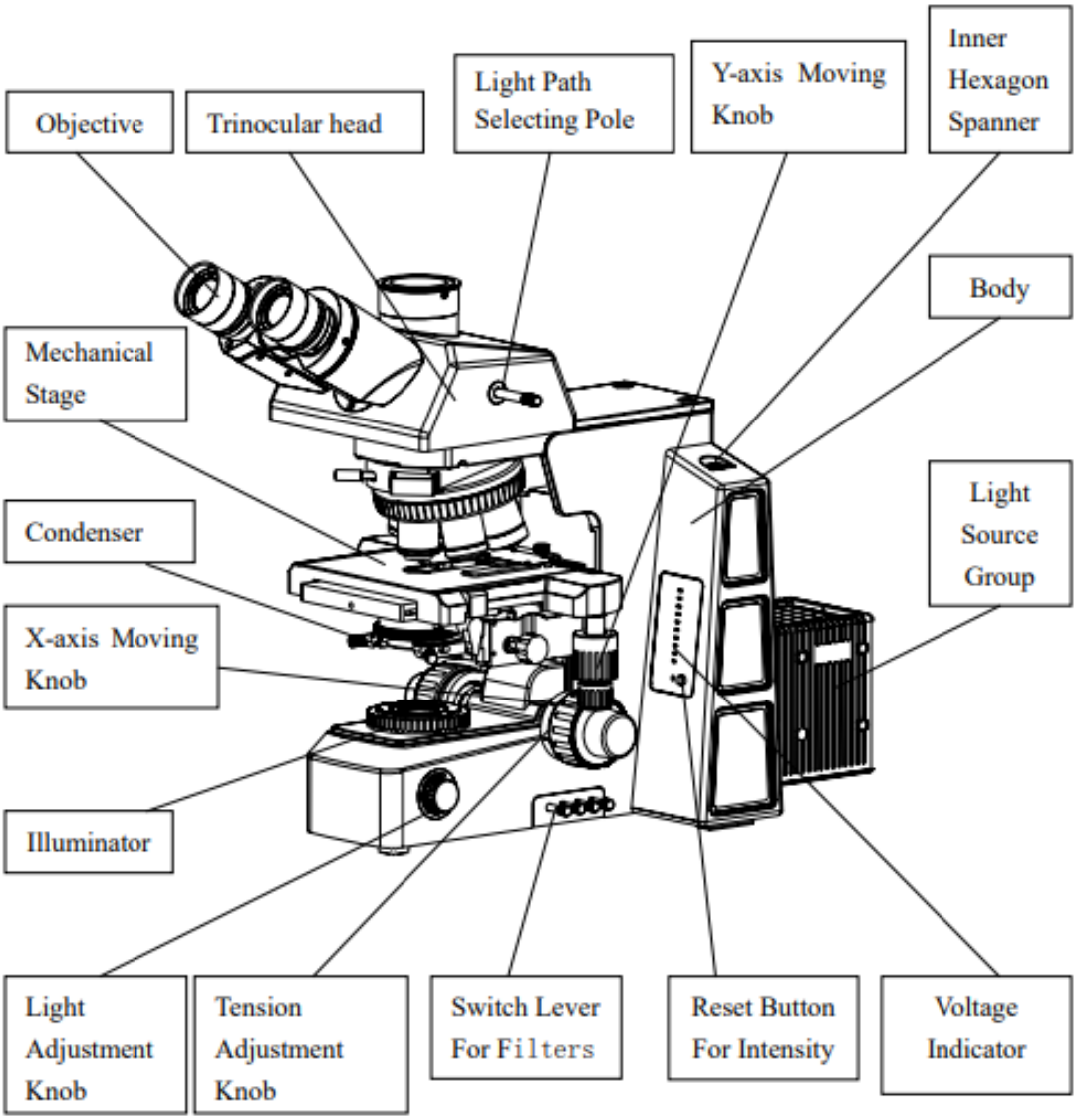


Figure-3

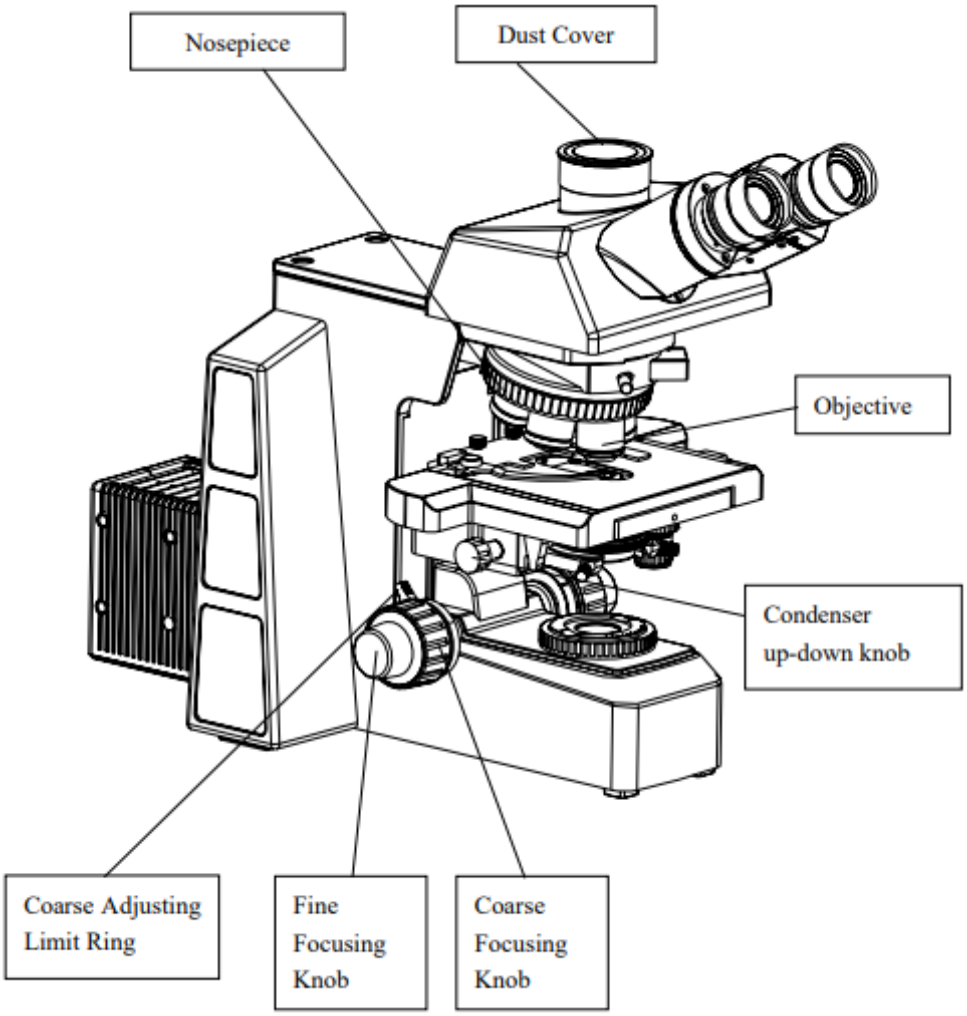

Nosepiece
Dust Cover
Objective
Condenser
up-down knob
Coarse Adjusting
Limit Ring
Fine
Focusing
Knob
Coarse
Focusing
Knob

Figure-4

7. Installation

7.1 Assembling Scheme

Following is the Assembling Scheme and the numbers denote the assembling order.
Note: Before assembling, ensure there are no dust, dirt, or other matters to affect the assembly. Assemble carefully and do not scrap any part or touch the glass surface.

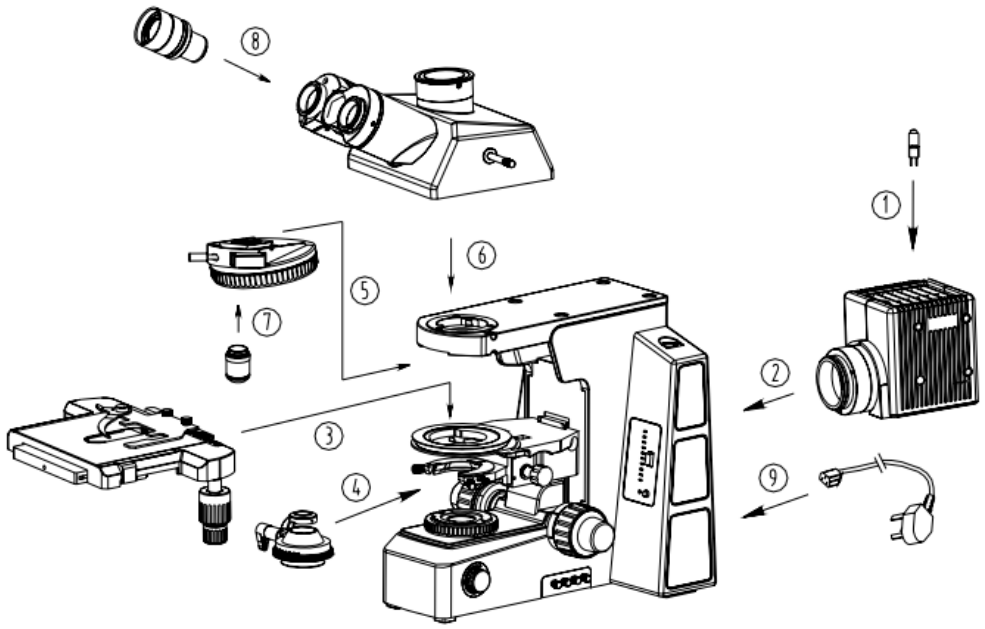


Figure-5

7.2 Assembling steps

7.2.1 Assemble and replace the halogen bulb

1) Loose lock-screw ① completely by M4 spanner, then take off the cover group. (refer to **Figure 6**)
2) Open the bulb lock piece② and take the bulb③ with a clean glove or soft tissue, insert the bulb pins④ into the jack on the bulb holder⑤, the bulb should be vertical after assembly. (refer to **Figure 7**)
3) Loose the bulb lock piece②, lock the bulb, and install the cover group.

Note:

- Don't touch the bulb with your fingers. If there is a fingerprint left on the bulb, please wipe it with a clean soft cloth.
- Bulb selected only: 12V/100W Halogen bulb.
- Before replacing the bulb, ensure to cut off the main power and wait for both the bulb base and bulb to cool down.

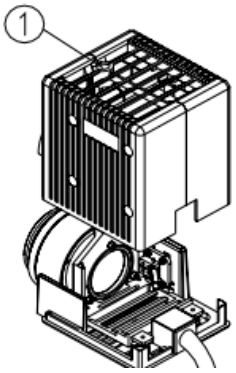


Figure-6

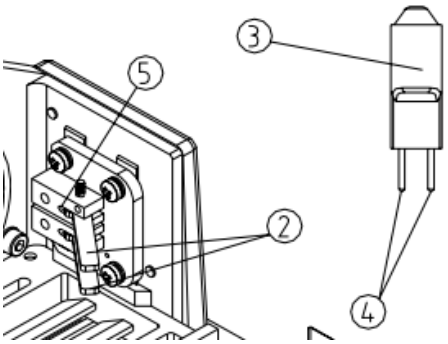


Figure-7

7.2.2 Assemble the light source group

Push the light source holder① into the body holder, Make the light source group horizontal with the body group, and lock the screw②. (refer to **Figure 8**)

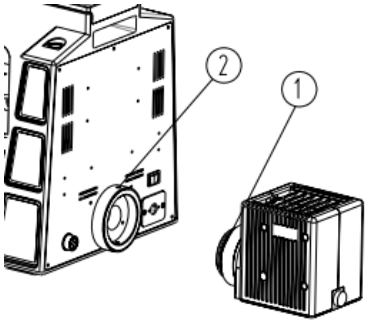


Figure-8

7.2.3 Assemble the stage

1) Loosen the lock-screw① on the stage fully. (refer to **Figure 9**)
2) From the rear area of the rounded hole center on the base, carefully ring the two "V" buttons on the bottom of the stage into the "V" rounded groove②, then screw down the lock screw①.

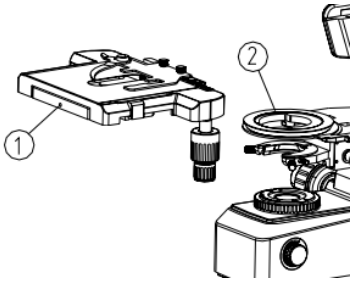


Figure-9

7.2.4 Assemble the condenser

1) Rotate the coarse focusing knob to raise the stage to ① the highest. (refer to **Figure 10**)
2) Rotate the condenser up-down knob to lower the ② condenser bracket to the lowest.
3) Loosen the condenser lock-screw fully ③.
4) Swing out the front lens of the condenser with the scale forward. Make the lock screw ④ of a condenser in alignment with the groove⑤ of the condenser stand. Push the condenser into the innermost of the stand.
5) Screw down the condenser lock-screw③ and raise the condenser to the highest position with the condenser up-down knob②.

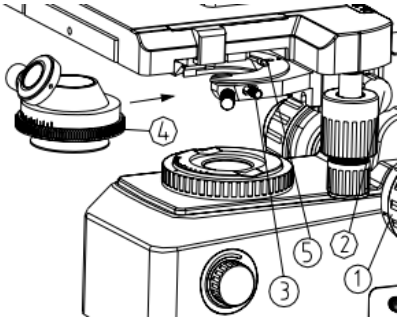


Figure-10

7.2.5 Assemble the nosepiece

1) Loose the lock screw① on the arm. (refer to **Figure 11**)
2) Match the dovetail interface② of the nosepiece with the dovetail groove of the arm, and push it to the bottom. Tighten the lock screw①.

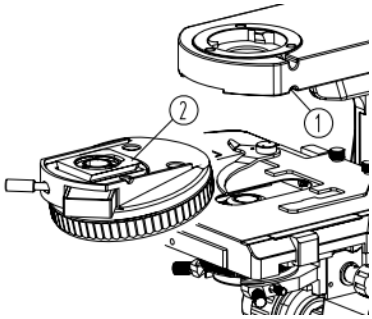


Figure-11

7.2.6 Assemble the head

1) Loosen the head lock-screw① fully. (refer to **Figure 12**)
2) From a little right position, insert the coattail interface on the bottom of the head into the hole of the middle head with a little left incline. Keep the two eyepiece tubes forward, and then screw down the lock screw①.

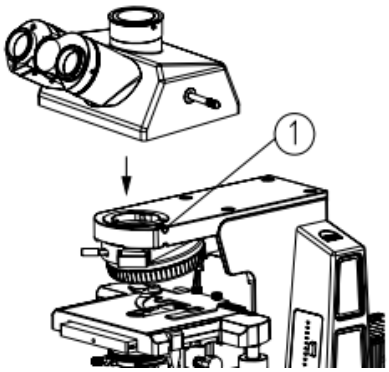


Figure-12

7.2.7 Assemble the objective

Rotate the coarse focusing knob to lower the stage. Install the objectives into the nosepiece from the lowest magnification to the highest in a clockwise direction. (refer to **Figure 13**)

Note:

- Search and focus the sample by low magnification objective (4X or 10X) when operating. Then get a change to the high magnification ones according to the observation requirements.
- When replacing the objective, rotate the nosepiece until it sounds “ka-da”, to ensure the objective is in the center of the light path.

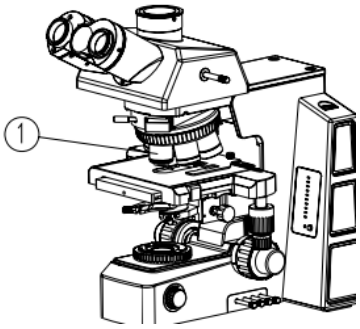


Figure-13

7.2.8 Assemble the eyepiece

1) Take down the cover of the eyepiece tube① (refer to **Figure 14**).
2) Insert the eyepiece into the eyepiece tube, until touches the bottom. Note: if there is a position screw on the eyepiece, match the position screw② to the groove③ on the eyepiece, and insert the eyepiece into the eyepiece tube, until touches the bottom.

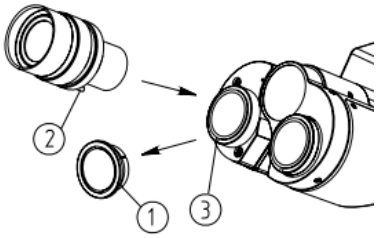


Figure-14

7.2.9 Connect the power cord

1) Ensure the main switch is at the **"O"** (OFF) position.
2) Match the gap of the lower light source aviation plug to the ① gap of the aviation socket② and insert it into the bottom. (refer to **Figure 15**)
3) Insert one end of the power cord③ into the power socket④ of the microscope.
4) Insert the other end of the power cord into the power supply socket.

Note:

- Don't use strong force when the power cord is bent or twisted, otherwise it will be damaged.
- If the wire is lost or damaged, choose one with the same specifications.
- Connect the power cord appropriately to ensure the instrument is connected to the ground.

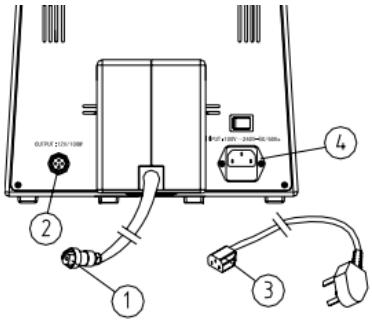


Figure-15

8. Operations

8.1 Set illumination

1) Put through the power and turn on the main power switch to"—" (refer to **Figure 16**).
2) Adjust the light adjustment knob ④ until the illumination is comfortable for observation. Rotate the light adjustment knob clockwise to raise the voltage and brightness. Rotate the light adjustment knob counterclockwise to lower the voltage and brightness.
3) Press the light intensity reset button①, and reset the light intensity to the preset position. Rotate the setting screw② with a small "-" type screwdriver to set the light intensity. Rotate it clockwise to raise the light intensity, while lowering it counterclockwise.

Note:

- The number on the right of the Voltage Indicator③ shows the voltage.
- Use of bulbs in the low-voltage state can extend the bulb life.
- When the light intensity reset button is pressed, rotating the light adjustment knob does not work.
- The light intensity of this machine is preset to the best for photomicrography by LBD filter. (About 8V, at the location of sign).

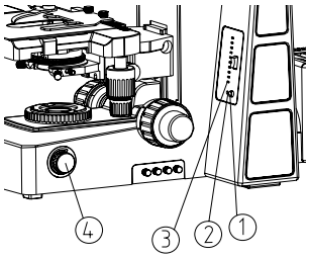


Figure-16

8.2 Place the Specimen slide

1) Push the wrench ① of the specimen holder backward (refer to **Figure 17**).
2) Loosen the wrench①, and clamp the slide② by the clips while the cover glass faces up.
3) Rotate the X-axis knob④ and Y-axis knob③. Move the specimen to the center (alignment with the center of the objective).

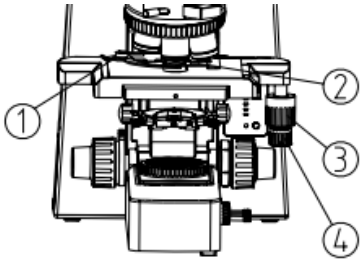


Figure-17

8.3 Select the light path

For the trinocular head, the light path selecting pole① controls the light-energy ratio of binocular and trinocular. When the light path selecting pole is pushed to the innermost, all the light will enter the binocular head. When the light path selecting pole is pulled to the middle position, binocular and trinocular can be observed simultaneously. When it is pulled to the utmost, all the light will enter the trinocular head, which can only be used for trinocular observation (TV&Photography). (refer to **Figure 18)**

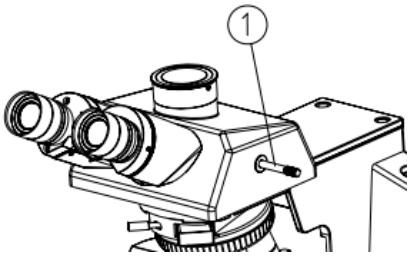


Figure-18

8.4 Adjust Focusing

1) Put the slice on the stage and hold it down with the clip. Shift the 4X objective into the light path. (refer to **Figure 19**)
2) Loosen the random upper limit knob, ① then observe the right eyepiece with the right eye. Rotate the coarse focusing knob until the image appears ② in the view field, then lock the random upper limit knob.

Note:

- The random upper limit knob can prevent the objective from touching the slice when focusing.
- The random upper limit knob does not react on the fine focusing knob.

3) Rotate the fine focusing knob for clear details ③.

Note: When observing with the 4X or 10X objective, open both the aperture diaphragm and field diaphragm to the maximum position and swing out the front condenser lens. Refer to "**8.9 Center the Condenser"** for condenser operations.

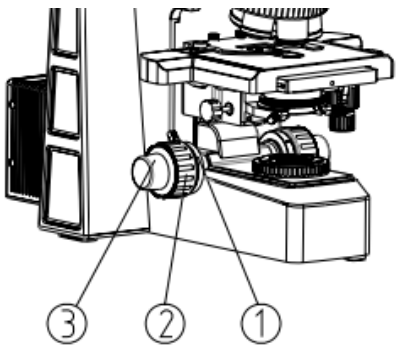


Figure-19

8.5 Adjust the Focusing Tension

If the handle is very heavy when focusing the specimen leaves the focus plane after focusing, or the stage declines itself, rotate the tension adjustment knob① according to the arrowhead pointed direction. **(Refer to Figure 20)**

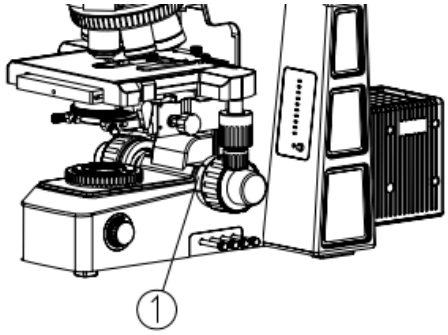


Figure-20

8.6 Adjust the Interpupillary Distance

When using two eyes to observe, hold the bases of the prism and rotate them around the axis to adjust the interpupillary distance, until there is only one field of view. (refer to **Figure 21**)
The dot "·" on the left eyepiece base points to the scale of the interpupillary distance indicator. The scale value is the interpupillary distance. Adjustable range: 50-76mm.
Note: Remember your eye's interpupillary distance, so that you can use it next time.

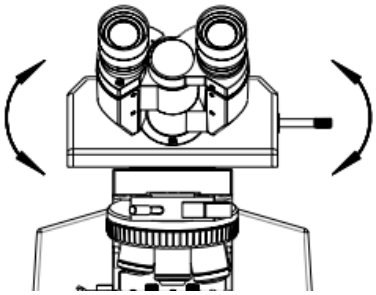


Figure-21

8.7 Use the Eye-cap

1) Turn over the eye cap if the user is wearing glasses so that it can prevent the glasses from touching the eyepieces and avoid damaging both glasses and eyepieces.
2) Open the eye cap if the user doesn't wear glasses so that it can prevent stray light from disturbing the observation. (refer to **Figure 22**)

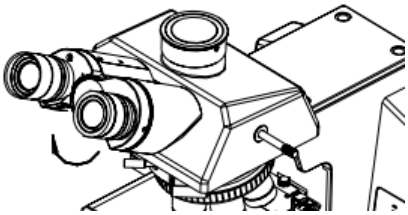


Figure-22

8.8 Adjust Stage

When observation, move the stage by rotating the x-axis adjustment knob① and the y-axis adjustment knob② (refer to **Figure 23**). The moving range of the x-axis and y-axis is 80x55mm. Adjust the x-axis and y-axis knob:

1) Hold the x-axis knob①, and tighten up the y-axis knob ②, to expose the adjustment knob.
2) Rotate the x-axis knob③ or the y-axis knob④ clockwise (the direction of the arrow), to reduce tension, while increasing tension counterclockwise.

Note: If the tension is too tight, a creak sound will be heard when landing the stage; or the accuracy of the stage stop will be reduced.

Caution: After a long time of use, the stage rail may be offset, and the moving range will be shortened. However, it is not a fault and can be easily regulated in the following method.

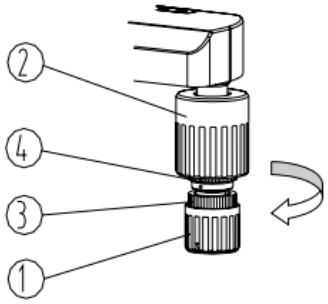


Figure-23

Process:

Horizontal: Hold the sample holder, and move left and right the stage rail, hit the limit stopper. **Vertical:** Hold the top surface of the stage and move back and forth, hit the limit stopper.

For reflected illumination:

Lowering the stage bracket, the microscope can adapt the height of the sample to no more than 35mm, which is very useful when observing metallurgical samples and other thick objects.

1) Move the stage to the lowest, and then remove the stage from the microscope.
2) Loosen the stage bracket lock screw①, and then remove the stage bracket. (refer to **Figure 24**).
3) Rotate the coarse focusing knob, and rise the focus skateboard② to the position where the limit screw③ can be seen from the mirror arm. (refer to **Figure 25**)
4) Loosen and remove the limit screw③.
5) Reinstall the stage bracket and the stage.

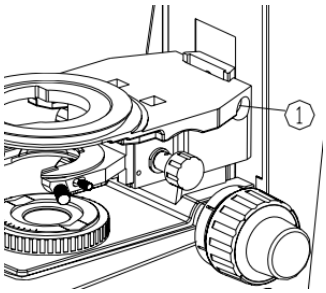


Figure-24

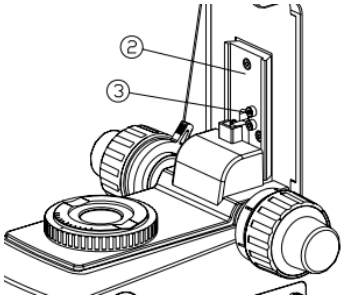


Figure-25

8.9 Center the condenser

1) Rotate the condenser up-down knob① to raise it to the highest position. (refer to **Figure 26**)
2) Rotate the spanner② to move the front lens into the light path.
   Note: Move the front lens of the condenser into a light path when the objective is beyond 20X.
3) Move the 20X objective into the light path and focus the specimen.
4) Rotate the field diaphragm adjustment ring③ to put the field diaphragm to the smallest position, then the image of the field diaphragm can be observed through the eyepiece.
5) Rotate the condenser up-down knob to adjust the image to the clearest.
6) Adjust the condenser center adjusting screw④ to put the image to the center of the field of view.
7) Open the field diaphragm gradually. If the image is in the center all the time and inscribed to the field of view, it shows condenser has been centered correctly. (refer to **Figure 27**)
8) In actual use, you can enlarge the field diaphragm a bit and make the image circumscribed to the field of view.

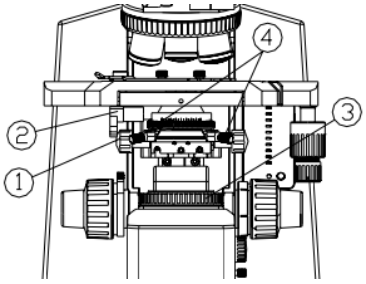


Figure-26



Figure-27

8.10 Adjust the filed diaphragm

By limiting the diameter of light entering the condenser, the field diaphragm can prevent other light and strengthen the image contrast. When the image is just on the edge of the field of view, the objective can perform best and obtain the clearest image. Rotate the field diaphragm adjustment ring ③ in clockwise, to enlarge the field diaphragm; otherwise, to decrease it counterclockwise. (refer to **Figure 26**)

8.11 Adjust the aperture diaphragm

The aperture diaphragm decides the numerical aperture of the illumination system. If the N.A. of the illumination system matches the N.A. of the objective, it can obtain better resolution and contrast and increase the depth of field. Adjust the aperture diaphragm adjusting ring③ to control the size of the diaphragm. Take off the eyepiece, if necessary, observe from the eyepiece tube, and adjust the aperture diaphragm adjusting ring③ until see the figure as shown in **Figure 27** (refer to **Figure 27** and **Figure 28**). Use of scale: set the scale of condenser N.A. to the 80% value of objective④ N.A (refer to **Figure 28**). In actual use, adjust the aperture diaphragm according to the size of the sample image contrast, until it's comfortable for observation and the contrast is good.

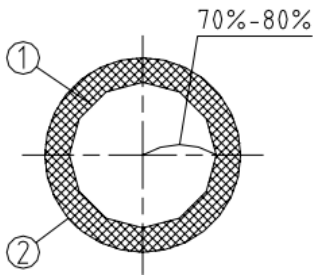


Figure-27

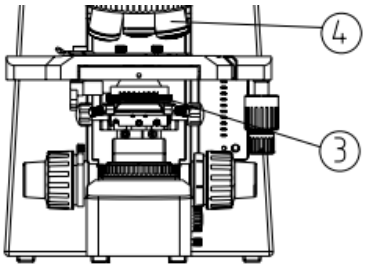


Figure-28

8.12 Use the color filter

The color filter can make the background light more suitable and strengthen the image contrast. When an external color filter is used, put a diameter 45mm filter into the groove of the condenser base① (**refer to Figure 29**).

Note:

- There are four colors of filter selectable: blue, green, yellow, and white.
- Place the rough side of the filter downwards.

When an internal color filter is used, pull the pole②— ⑤ to the outmost, the filter will be moved into the light path. Otherwise, push the pole into the innermost, and the filter will be moved out of the light path. (refer to **Figure 29**)

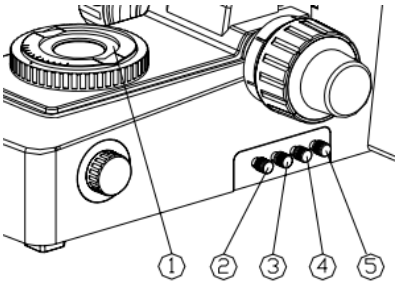


Figure-29

	Filter type/function
②	ND6 (Neutral density filters, used for light intensity adjustment, which transmission is 6%)
③	ND25 (Neutral density filters, used for light intensity adjustment, which transmission is 25%)
④	LBD (Chroma balance, daylight-type color filters)
⑤	OP (Optional) Filter base

8.13 Replace the Fuse

1) Before replacing a fuse, set the main power supply at **"O"** (OFF) and take off the plug.
2) Fasten the flute ① under the fuse holder ② by fingers, and take out the fuse holder ② from the socket ⑤. Then take off the fuse ④ from the above flute ③ and replace it with a new one. Then put it into the flute ③ and push the fuse holder ② into the socket ⑤, until the sound of "kada" is heard. (refer to **Figure 30**).
Note: Specifications of the fuse: 250V, 3.15A.

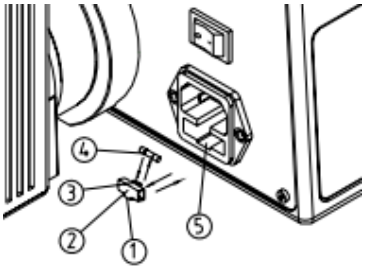


Figure-30

8.14 Assemble and use the TV device

1) Loosen the lock screw of the trinocular head, ①, and take out the dust cover ② (See **Figure 31**).
2) Take down the dust cover of the TV adapter. ③ Insert the TV adapter into the trinocular head as shown in the figure and screw down the lock screw. ①
3) Screw CCD or video camera into CTV, and ensure it is locked.
4) For binocular observation, pull the light path selecting pole④ to the outmost and observe the image. If the image is unclear, rotate the adjustment crew⑤ until it is clear.

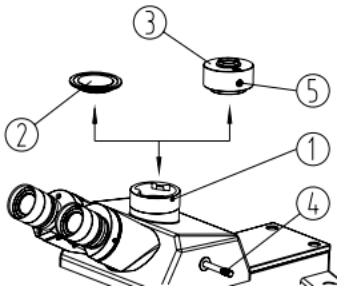


Figure-31

9. Maintenance

1) Wipe the lens gently with a soft tissue. Carefully wipe off the oil marks and fingerprints on the lens surfaces with a tissue moistened with a small amount of 3:7 mixture of alcohol and ether or dimethylbenzene.
   Note: As the alcohol and ether are flammable, don't place this chemical near to fire or fire source. For example, when turning on or turning off the electrical device, use this chemical in a ventilated place.
2) Don't use an organic solution to wipe the surfaces of the other components. Use the neutral detergent if necessary.
3) If the microscope is damped by liquid, power it off immediately and wipe it dry.
4) Never disassemble the microscope, otherwise the performance will be affected, or the instrument will be damaged.
5) After using, cover the microscope with a dust cover.

10. Troubleshooting

As the performance of the microscope can't playfully be due to unfamiliar operations, the table below can provide some solutions.

Problem	Cause	Solution
The bulb is bright but it is dark in the field of view.	The field diaphragm is not large enough.	Enlarge the field diaphragm.
	The condenser is too low.	Adjust the condenser.
	The condenser is not centered.	Center the condenser.
	The light path selecting pole is in the trinocular observation position.	Push the light path selecting pole to the binocular observation position.
The side of the field of view is dark or not even.	The nosepiece is not in the right position.	Turn the nosepiece into the right position.
	Stain or dust has accumulated on the lens (condenser, objective, or eyepieces).	Clean the lens.
Stain or dust is observed in the field of view.	Stains have accumulated on the specimen.	Clean the specimen.
	Stains have accumulated on the lens.	Clean the lens.
Unclear image	No cover glass on the specimen slide.	Add the cover glass.
	The cover glass is not standard.	Use a standard cover glass with a thickness of δ0.17mm.
	The specimen faces down.	Put the specimen face up.
	The immersion oil has accumulated on the dry objective.	Clean thoroughly.
	The immersion oil is not used for the oil objective.	Use immersion oil.
	Air bubbles in the immersion.	Get rid of the air bubble.
	Use the wrong immersion oil.	Use the correct one. (Cedar oil)
	The aperture diaphragm is not opened correctly.	Adjust it.
	Stain or dust has accumulated on the lens of the eyepiece.	Clean the lens.
	The condenser is too low.	Adjust the condenser.
	The specimen slide is not fixed.	Fix it with clips.

One side of the image is dark or the image moves while focusing.	The nosepiece is not in the right position.	Turn the nosepiece into the right position.
	The condenser is not centered.	Center the condenser.
The eyes feel tired easily. The right field of view doesn't superpose with the left.	The interpupillary distance is incorrect.	Adjust the interpupillary distance.
	The diopter adjustment is incorrect.	Adjust the diopter.
	The eyepiece for the right eye is different from the left one.	Use the same eyepieces.
Cannot focus when using high magnification objective.	The cover glass faces down.	Put the cover glass to face up.
	The cover glass is not standard.	Use a standard cover glass with a thickness of δ0.17mm.
The objective touches the cover glass while turning the nosepiece.	The cover glass faces down.	Put the cover glass to face up.
	The cover glass is not standard.	Use a standard cover glass with a thickness of δ0.17mm.
The coarse focusing knob is too tight.	The tension adjustment knob is too tight.	Loosen it to an appropriate position.
Stage declines itself and cannot stay on the focal plane.	The tension adjustment knob is too loose.	Tighten it to an appropriate position.
The coarse focusing knob cannot rise.	The coarse focusing limit knob is locked.	Loosen the coarse focusing limit knob.
The coarse focusing knob cannot decline.	The condenser is too low.	Raise the condenser.
Cannot move the slide smoothly.	The slide is not fixed correctly.	Adjust it correctly.
	The movable specimen holder is not fixed properly.	Adjust it correctly.
The image moves obviously when touching the stage.	The stage is fastened incorrectly.	Fasten the stage correctly.
The bulb does not work.	No power supply.	Check the connection of the power cable.
	The bulb is not installed correctly.	Install it correctly.
	The bulb burns out.	Replace it.
The bulb burnt out usually.	A wrong bulb is used.	Replace it with the correct one.
The field of view is not bright enough.	A wrong bulb is used.	Replace it with the correct one.

	The use of a light-adjusting knob is incorrect.	Adjust it correctly.
The bulb flickers or the brightness is not stable.	The bulb will burn out soon.	Replace it with a new one.
	The wire doesn't connect well.	Connect it correctly.

11. Accessories

Optional Accessories

Accessory No	Accessory	Specifications
RBMA1	Eyepiece	PL 10X/25 mm, diopter adjustable
RBMA2	Eyepiece	PL 10X/26.5 mm , diopter adjustable
RBMA3	Eyepiece	PL 10X/26.5 mm. with rectile, diopter adjustable
RBMA4	Nosepiece	Backward Quintuple
RBMA5	Nosepiece	Backward Septuple
RBMA6	Camera adapter	0.5X/0.65X/1X focusing C-mount
RBMA7	Camera	Cooled CCD Camera
RBMA8	Calibration slide 0.01 mm	
RBMA9	Attachment	DIC attachment