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**5102-M600
UPRIGHT METALLURGICAL
MICROSCOPE
OPERATION MANUAL**

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Parameter

① Specification:

Code	5102-M600			
Illumination	6V/30W halogen lamp, brightness is adjustable			
Objective (infinite plan achromatic)	5X	10X	40X	60X
Working distance	26.1mm	20.2mm	3.98mm	3.18mm
Numerical aperture	0.12	0.25	0.60	0.70
Magnification	50X~1000X			
Eyepiece (wide field)	10X(view field: Ø22mm)			
Stage	mechanical stage			
	size: 210×140mm			
	travel: 75×50mm			
Pupil distance	53~75mm			
Diopter adjustment	±5 diopter (one eyepiece)			
Dimension (L×W×H)	456×260×498mm			
Weight	11kg			

② Standard delivery :

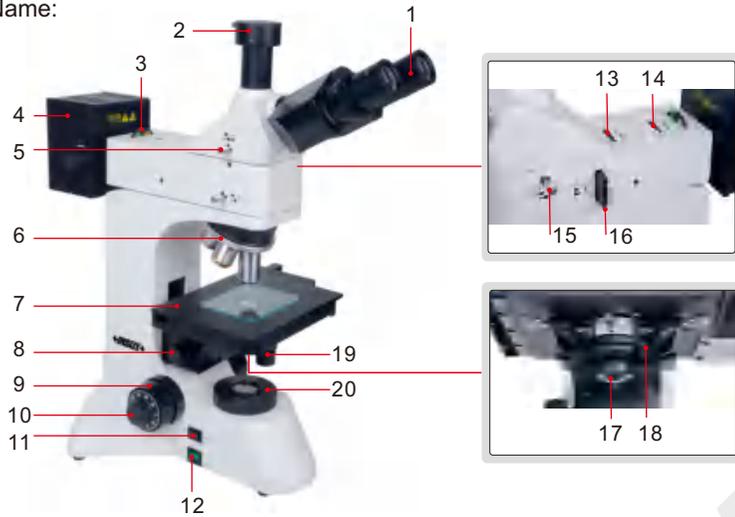
Main unit	1pc
Polarizer and analyzer	1pc of each
Anti-dust cover	1pc

Attention

- ◆ 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.
- ◆ 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 our company if any fault occurs.
- ◆ 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.
- ◆ 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).
- ◆ 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 our company.
- ◆ 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).
 - 1)To prevent burn, do not touch the bulb when the lamp is illuminated or within 10min after it goes out.
 - 2)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.
- ◆ 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.
- ◆ 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.

Structure

1 Name:



- 1.Eyepiece
- 2.Camera connector
- 3.Color filter
- 4.Lamp house
- 5.image to eyepiece/camera switch
- 6.Nosepiece
- 7.Stage
- 8.Spotlight lifting knob
- 9.Coarse focusing knob
- 10.Fine focusing knob
- 11.Lighting switch
- 12. Power on/off
- 13.View field diaphragm
- 14. Aperture diaphragm
- 15. Analyzer
- 16.Polarizer
- 17.Condenser
- 18.Aperture diaphragm
- 19.Stage moving knob
- 20.View field diaphragm

16. Replace Bulb and Fuse

1. Replace bulb

The unit light source is 6V30W halogen bulb for the model 5102-M600 and 12V30W (Transmission), 12V50W (Reflecting) halogen bulb for the model 5102-M600BD. When replace the halogen lamp, should ensure the specification in order to avoid electrical trouble. The following is operating steps.

- (1) Turn off the power switch, and unplug the power cord2, as shown in Fig.17.
- (2) Wait at least 30 minutes until the bulb and its surroundings have cool down. This is to prevent hand getting burnt by heat.
- (3) a. Take out the screws6, and pull out the lamp house cover, take out the bad bulb4, and place the new one.
b. Slow pull the lamp house cover5, take out the bad bulb4, and place the new one.
- (4) Connect the power cord and turn on power switch.
- (5) By the knob3 and loosen the adjustment screws7, The position of bulb can be adjust to the center.

2. Replace fuse

The fuse is installed in the fuse socket 1, as shown in Fig.17, replace according the following steps.

- (a) Turn off the power switch and unplug the power cord2.
- (b) Loose the fuse1 socket nut, remove the damaged fuse and replace a new one.

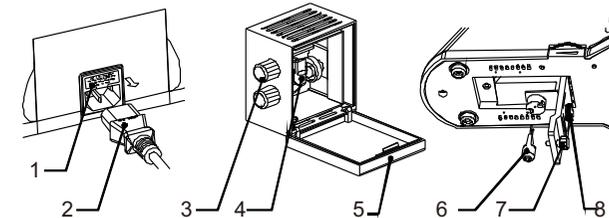


Fig.17

14. Open the power switch and adjust the brightness

For the 5102-M600, please open the power switch1 (push the switch to the “-”), when the lamp of transmission-reflecting is working, turn the brightness adjustment knob2 to the right brightness of field for eyes, as shown in Fig.15-a.

For the 5102-M600BD, please open the power switch5(push the switch to the “-”), and open the reflecting light/ transmission light switch4 (push the switch to the “Down”), turn the brightness adjustment knob 3 to the right brightness of field for eyes, as shown in Fig.15-b.

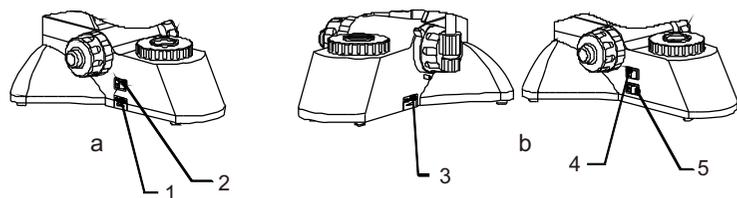


Fig. 15

15. Adjusting condenser

(1) Put the sample on the glass stage 3, adjust the substage adjustment knob 2, and make the condenser to the highest position.

(2) Turn 10X objective into optical path, turn down the field diaphragm 6 little compare with field, as shown in 16-a, if the field diaphragm not in the center of field, it can be adjusted by the screws 4 to the center of field, as be shown in Fig.16-b. Restart the field diaphragm to larger than field.

(3) Observing in the low magnification objective; please turn the accessional lens 1 to the light path.

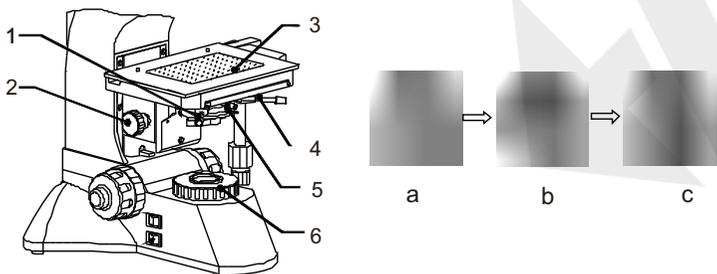


Fig. 16

② Installation:

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

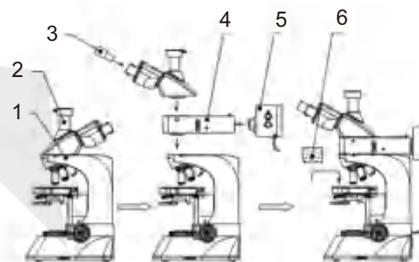


Fig. 1

1. Remove all parts from their packages and retain them in the event you need to transport the product. Take out the main body 1, demount interfix packing and dustproof covers.
 2. Loosen the set-screw by hexagon wrench and take out trinocular tube or binocular 2.
 3. Unpack reflected illumination and lamp house, take out the reflected illumination 4 and lamp house 5, demount dustproof covers.
 4. Mount the lamp house with reflected illumination and close the set-screw by hexagon wrench, then install the reflected illumination unit on the main body and close the set-screw by hexagon wrench. Connect the power supply input of lamp house to the power supply output of main body.
 5. Mount the trinocular or binocular on the reflected illumination and close the set-screw by hexagon wrench.
- Note: the eyepiece tube of trinocular or binocular locates the frontispiece of main body.
6. Install two eyepieces 3 into eyepiece tube, turn the eyepieces for about a circumference to make the eyepieces fit the eyepiece tube.
 7. Connect power supply to the power outlet of main body.
 8. Put the glass plate in the square slot of stage.
 9. Check the reliability and security of the above installations.
 10. Check and collate attached accessories and tools within the package, properly stored the accessories and tools to avoid missing.
 11. Schematic diagram of installation process as shown in fig.1.

3 Operation:

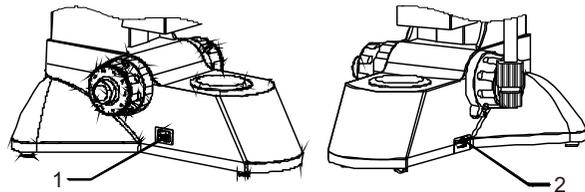


Fig.2

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

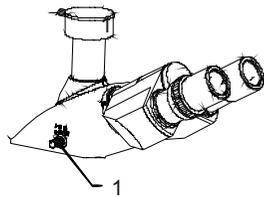


Fig.3

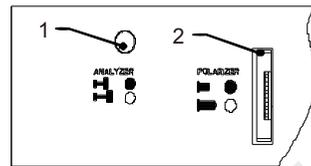


Fig.4

2. Check the position state of observation/photography switch pole 1. Push the pole in to observation with eyepiece, pull it out to photography. As shown in Fig.3.

3. Check the condition of analyzer pole 1. Pull the pole out optical path, as shown the mark “□○”. Check the condition of polarizer 2. Pull the polarizer out optical, as shown the remark “┃○”. As shown in Fig.4

4. Reset diopter adjustment ring

Turn the diopter ring 1 of the left eyepiece tube, and when the “0” diopter position is aligned with the side scale (mark white line), as shown in Fig. 5

(1) Turn the 40x objective into the light path, and with your right eyes observe the right eyepieces as far as when the specimen image into focus.

(2) When the specimen image not into focus, you need to adjust the diopter ring 1 with your left eyes observe the left eyepieces as far as you can observe clearly. This series of microscopes have N=5 diopter for you adjustment.

13. Operate trinocular device

This unit performs eyepiece and photographic observation, switch by push-pull rod 2, located at the right side of main frame body. The photography output is located at the top side of trinocular and covered by a dust-proof cap 2. as shown in Fig. 13. The following is operation steps.

(1) Loosen the fastening screws 1 of the photography output terminal, and remove the dust-proof cap 2.

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

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

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

(5) Push the push-pull rod 4 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 4, observe with eyepieces. Find a feature point in the field of view (a readily identifiable target, such as S point in Fig. 14-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. 14-b.

b. Push the push-pull rod 4, 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 pcs screws 3 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 1, turn the photographic device to make the displayed direction of the image inline with the direction of stage motion, then fasten the screws.

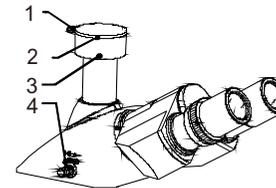


Fig.13

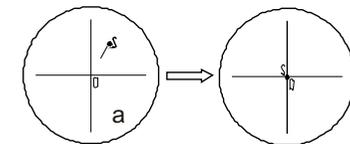


Fig.14

(5) The knob 4 is to lock the stage position of height; this function is making sure the long working distance of objective not to be touched with stage or simple. When the stage be locked in the preset position with turn the coarse, you can rapidly focus the image clear.

(6) The tension of the coarse focus control knob 2 is adjustable and preset at the factory for ease of use. If wish to adjust the coarse focus tension, turn the knob 3 to tension adjustment. Turn the wheel anticlockwise decrease the tension, and clockwise increases it, as indicated by the arrow in the figure 11.

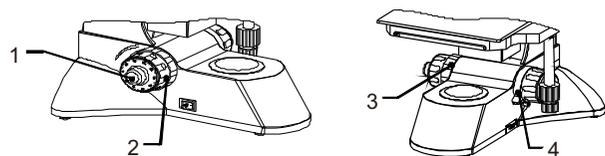


Fig.11

12. Observe in polarized light

Observe in polarized light to distinguish double refraction features matter, such as crystal of liquid macromolecule polymer, biomedical polymer and liquid crystal, widely used in geology, mechanics, metallurgy, electron and etc. Equipped with polarizer 1 and analyzer 2, the polarizer can be adjusted from 0°~360° and drawn out, but the analyzer can't be adjusted and drawn out.

Push the analyzer pole and polarizer into optical path, rotate the turnplate of polarizer to make them orthogonal polarization, the field of view will be dark. Pay attention to the direction when install the polarizer, insert it from right of illuminator to left, the position slot is located up according the direction of arrow "↑" that marked on the polarizer, as shown in Fig. 12.

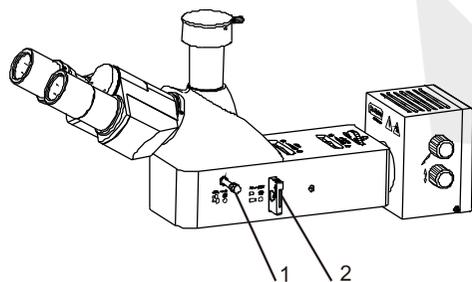


Fig.12

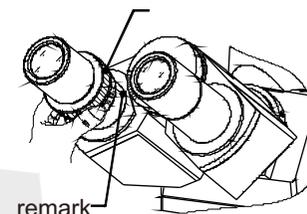


Fig.5

5. Adjustment of 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.6-a, alter the exit pupil center distance of the eyepiece tubes by turning the left or right frame body 1 until the field of view becomes a fully overlapped circle, as shown in Fig.6-b

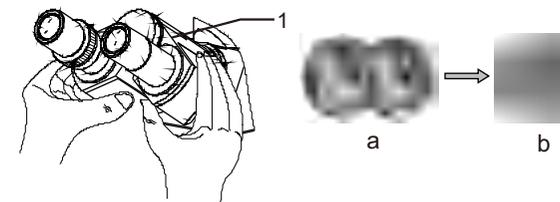


Fig.6

6. Check the center of light source

The optical system center of light source has been calibrated before factory release. But the center may deviate due to any possible, for example violent vibration or inclination during transport, so that check the center of light source according the following steps.

- (1). Prepare a piece of white paper 1 (about 40mm×50mm) and place it on the working stage, press it with spring clip 1.
- (2). Take out a objective from the nosepiece and turn to make the through-hole into optical path.
- (3). Open the field diaphragm 2 and aperture diaphragm 3, At this point, a bright light spot will be shown on the white paper, with a filament image inside, as shown in Fig.7-a

- (4) If the filament image is unclear, adjust the collector lens to make clear by adjusting knob 6
- (5) If the filament image deviates from the center of the bright light spot, as shown in Fig.7-b, the bulb center should be adjusted, adjust the lamp transverse adjustment knob 4 and vertical adjustment knob 5 to calibrate bulb center.

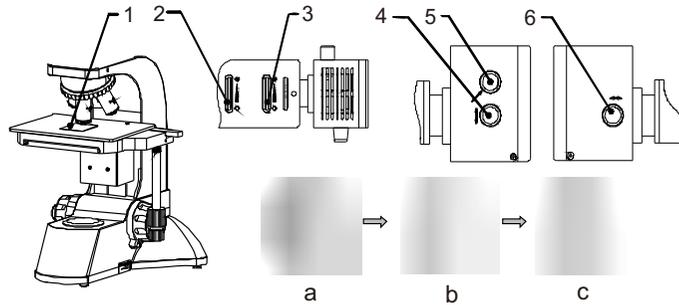


Fig.7

7. Inspect the center of field diaphragm

- (1) Turn the 10X plan objective into optical path.
- (2) Open the aperture diaphragm 2, and close the field diaphragm 1, a light spot will be seen in the field of view, as shown in Fig.8-a.
- (3) If the light spot deviates from the center of the field of view, as shown in Fig.8-a, take out the plastic dustproof caps 3 and adjust the centering adjustment screw with two inner hexangular wrenches to make the field diaphragm center superposition with the field of view center, as shown Fig.8-b, then cover the adjusting hole again.
- (4) Open the field diaphragm, so that the observed specimen image fills field, as shown in Fig.8-c.

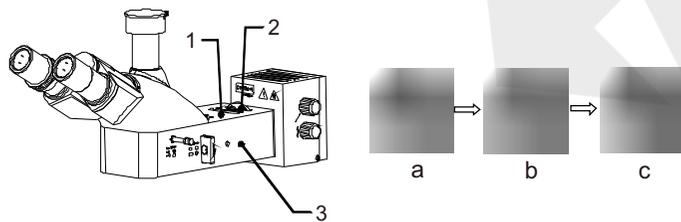


Fig.8

8. Adjust the aperture diaphragm

The center of aperture diaphragm 2 has been calibrated before factory release, so that it has no use for centering. When use low magnification objective, adjust the aperture diaphragm bigger, use high magnification objective, adjust the aperture diaphragm smaller, as shown in Fig.8.

9. Adjust the filters

The filters are fixed in the slots of turnplate 1, there are yellow, green, blue filter, ground glass and through-hole. Turn the turnplate to switch different filters or ground glass through to exchange the image underlay or adjust the brightness of illumination, as shown in Fig. 9.

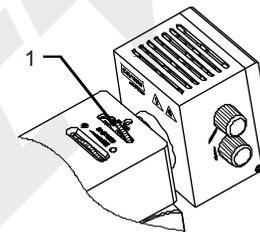


Fig.9

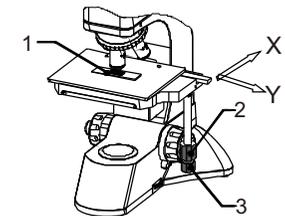


Fig.10

10. Place the metallurgical specimen or sample

Place the metallurgical specimen or sample 1 on the stage and press with two spring clips. Turn the control knob 2 and 3 to adjust the longitudinal (Y) and transverse (X) movement of the stage, make the specimen or sample observation area under the objective, The knob 2 control the longitudinal movement, the knob 3 control transverse movement. The stage mobile range is 50mmX70mm for X and Y. as shown in Fig. 10

11. Operate coarse and fine focusing control knob

The coaxial coarse and fine focusing system is adopted in this instrument, with coarse tension adjusting device.

- (1) The control knob 1 is for fine focusing, the control knob 2 is for coarse focusing. Turn the coarse focusing control knob 2 anticlockwise to lift the objective and clockwise to lower it. As shown Fig.11.
- (2) Turn the nosepiece 1 to make 10X objective into optical path (when it turns in place, the objective will snap automatically).
- (3) Turn the coarse focusing control knob 3 to lift the stage to the highest point, then observe and turn the coarse focusing control knob slowly to lower it, when a specimen image appears in the field of view, stop turning the coarse focusing control knob.
- (4) Turn the fine focusing control knob 2 for fine focusing to make the specimen image clear.