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**5101-M500
INDUSTRIAL MICROSCOPE
OPERATION MANUAL**

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VIDEO OF PRODUCTS.



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.Camera connector
- 2.WF10X eyepiece
- 3.Analyzer
- 4.Polarizer
- 5.Objective turret with five holes
- 6.Stage
- 7.Image to eyepiece/camera switch
- 8.View field diaphragm
- 9.Aperture diagram
- 10.Polarizer filter
- 11.Illumination
12. Stage moving knob
- 13.Power on/off
14. Illumination brightness adjustment

2 Installation:

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

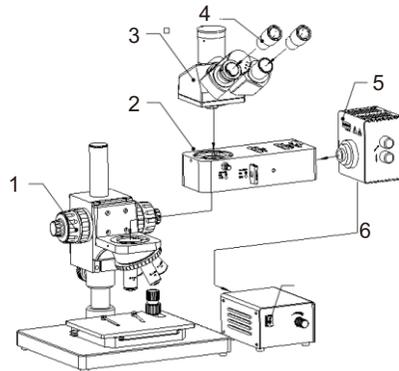


Fig. 1

As shown fig.1. The number in the following installation steps is shown in the installing diagram, such as "1" is "Main body" in Fig.1. the following is installation steps:

1. Take out the main body 1 , place it on a stable work bench, remove the supporting package and the dust cap (bag). Loose the knob on the back of Running up and down device, lift the device to a certain height, then lock the knob.
2. Take out reflected illuminator 2 and lamphouse 5. Firstly, install the reflected illuminator on the running up and down unit adapter, lock it with a inner hexagonal socket wrench. Secondly, install the lamp house and connected the power supply line.
3. Take out trinocular 3, eyepieces 4, power supply unit 6. Instal the trinocular on the top of reflected illuminator adopter and lock it. Remove the dust cap of eyepieces tube, insert eyepeces and turn them so that fits the eyepiece tube well.

Adjust the running up and down unit height

In the installation process, the step of adjusting running up and down unit is important. According to the working distance of objective and specimen height, set the running up and down unit height, so that can observe clara image in the effective focusing range and using any objectives. Accord the following steps to adjust, as shown the fig.2:

- a. Loose the knob of bearing sleeve, decline to a certain height, lock the knob again.

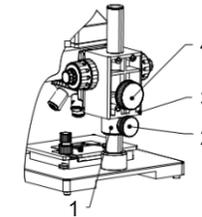


Fig.2

- b. Loose the knob of running up and down unit , decline the unit to the top of bearing sleeve and lock the knob again.
- c. When lift the running up and down unit, should loose the knob and lift the unit firstly, then locked at a certain height, finally, locked the bearing sleeve on the bottom of unit.

- (5) Check if the above installation is secure and safe.
- (6) Inspect and gather the accessories and tools enclosed in the package and keep them in a safe place to avoid misplacemen.

CAUTION: When adjust the running up and down unit, should accord the above operation method and steps, otherwise, the unit will quickly decline to break down, because the high magnification objective working distance is very short, the objective will hit the working stage if no careful.

3 Operation:



Fig.3

1. Turning on the power switch and adjust brightness control 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. 3.

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

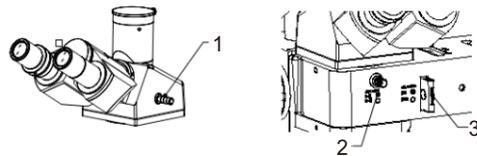


Fig. 4

2. Check the position state of observation / photography switch pole 1. Push the pole in to observation with eyepieces, pull it out to photography. As shown in Fig.4.
3. Check the position state of analyzer pole 2. Pull the pole out optical path, as show the remark "◼ ◦". Check the position state of polarizer 3. Pull the polarizer out optical, as show the remark "◼ ◦". As shown in Fig.4.

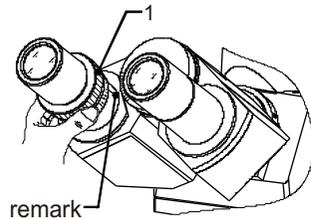


Fig.5

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. 5.

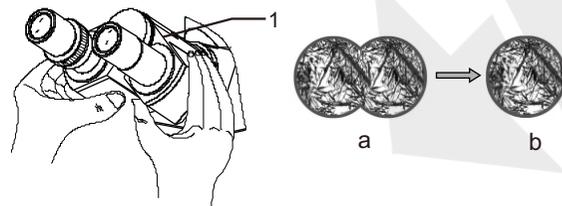


Fig.6

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.

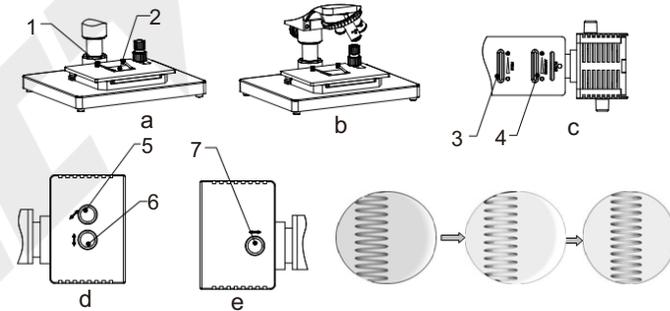


Fig.7

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 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 2 (about 40mmX50mm) and place it on the working stage, press it with spring clip 1, as shown in Fig.7-a.
- (2) Take out a objective and turn the nosepiece to make the through-hole into optical path, as shown in Fig.7-b.
- (3) Open the aperture diaphragm 3 and close the field diaphragm 4, At this point, a bright light spot will be shown on the white paper, with a filament image inside, as shown in Fig.7-f.
- (4) If the filament image is unclear, adjust the collector lens to make clear by adjusting knob 7.
- (5) If the filament image deviates from the center of the bright light spot, as shown in Fig.7-f, the bulb center should be adjusted, adjust the lamp transverse adjustment knob 5 and vertical adjustment knob 6 to calibrate bulb center

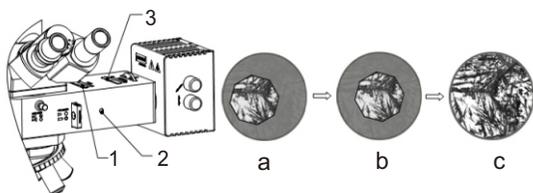


Fig.8

7. Inspecte the center of field diaphragm

- (1) Turn the 10X plan objective into optical path.
- (2) Open the aperture diaphragm 3, 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 2 and adjust the centering adjustment screw with two inner hexangular wrenchs 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.

8. Adjust the aperture diaphragm

The center of aperture diaphragm 3 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.

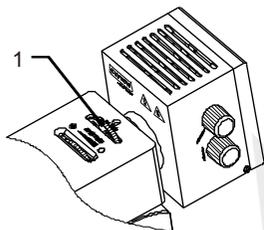


Fig.9

9. Adjust the filters

The filters are fixed in the slots of turnplate 1, there are yellow, green, blue filter and ground glass, 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.

10. Place the metallurgical specimen or sample
Place the metallurgical specimen or sample 3 on the stage and press with two spring clips. Turn the control knob 2 and 1 to adjust the stage longitudinal (Y) and transverse (X) movement , make the specimen or sample observation area located down the objective, as shown in Fig. 10.

11. Operate stage

The knob 2 control longitudinal movement, the knob 1 control transverse movement. The stage mobile range is 35mmX30mm for X and Y. As shown fig.10.

12. Operate coarse and fine focusing control knob

(1) Focus with the 10X objective

The coaxial coarse and fine focusing system is adopted in this instrument, with coarse tension adjusting device. 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. When focusing, firstly use 10X objective, turn coarse control knob to observe profile image, then turn fine control knob to focus the image clear. So that can observe image and focus it clear with high magnification objective, no break down this kind of objective which working distance is short.

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, 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.

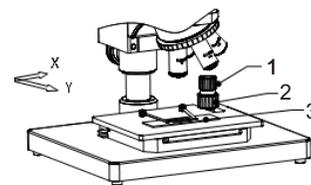


Fig.10

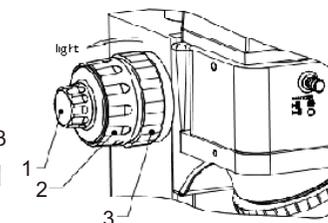


Fig.11

13. Diopter adjustment

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 $N=\pm 5$ diopters.

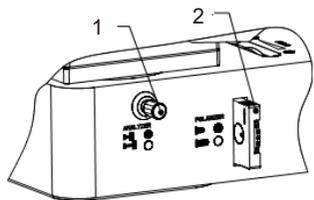


Fig. 12

14. 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, the polarizer can be adjusted from $0^\circ\sim 360^\circ$ 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 orthogonal polarization, the field of view will be dark. Pay attention to the direction when install the polarizer, insert it from right of illumination to left, the position slot is located up according the direction of arrow " " that marked on the polarizer, as shown in Fig. 12.

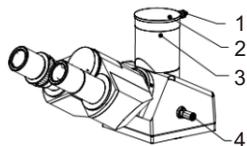


Fig. 13

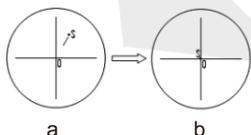


Fig. 14

15. Operate trinocular device

This unit performs eyepiece and photographic observation, switch by push-pull rod 4, 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. The following is operation steps.

(1) Loosen the fastening screws 1 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.

(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, 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, 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.

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 and vertical adjustment knob 6 to calibrate bulb center

16. Replace Bulb and Fuse

1. Replace bulb

The unit light source is 6V30W for the model 5101-M500 and 12V50W for the model 5101-M500BD. 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 1, and unplug the power cord, as shown in Fig.15-a.

(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) Catch hold of the lamp house back cover and pull out backward , take out the defective bulb and replace a new one. Close the back cover again.

(4) Connect the power cord and turn on power switch.

(5) Check and adjust the center of the bulb according to the above-mentioned centering method for alignment of illuminator in the inverted microscope .

2. Replace fuse

The fuse is installed in the fuse socket 3, replace according the following steps.

(1) Turn off the power switch and unplug the power cord.

(2) Loose the fuse socket nut, remove the damaged fuse and replace a new one.

(3) Connect the power cord and turn on the power switch to check whether the fuse well

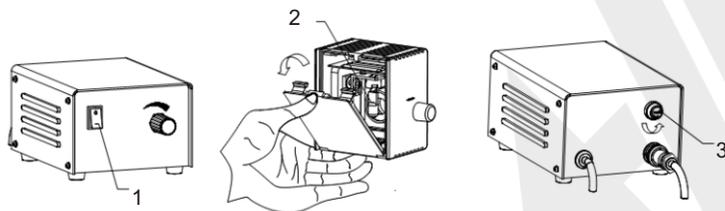


Fig.15

Parameter

① Specification:

Code	5101-M500			
Illumination	6V/30W halogen lamp, brightness is adjustable			
Objective (infinite plan achromatic)	5X	10X	20X	50X
Working distance	26.1mm	20.2mm	8.8mm	3.68mm
Numerical aperture	0.12	0.25	0.40	0.70
Magnification	50X~500X			
Eyepiece (wide field)	10X(view field: Ø22mm)			
Stage	mechanical stage			
	size: 160×140mm			
	travel: 35×30mm			
Pupil distance	53~75mm			
Diopter adjustment	±5 diopter (one eyepiece)			
Dimension (L×W×H)	415×345×380mm			
Weight	14kg			

② Standard delivery :

Main unit	1pc
Anti-dust cover	1pc