



User's manual

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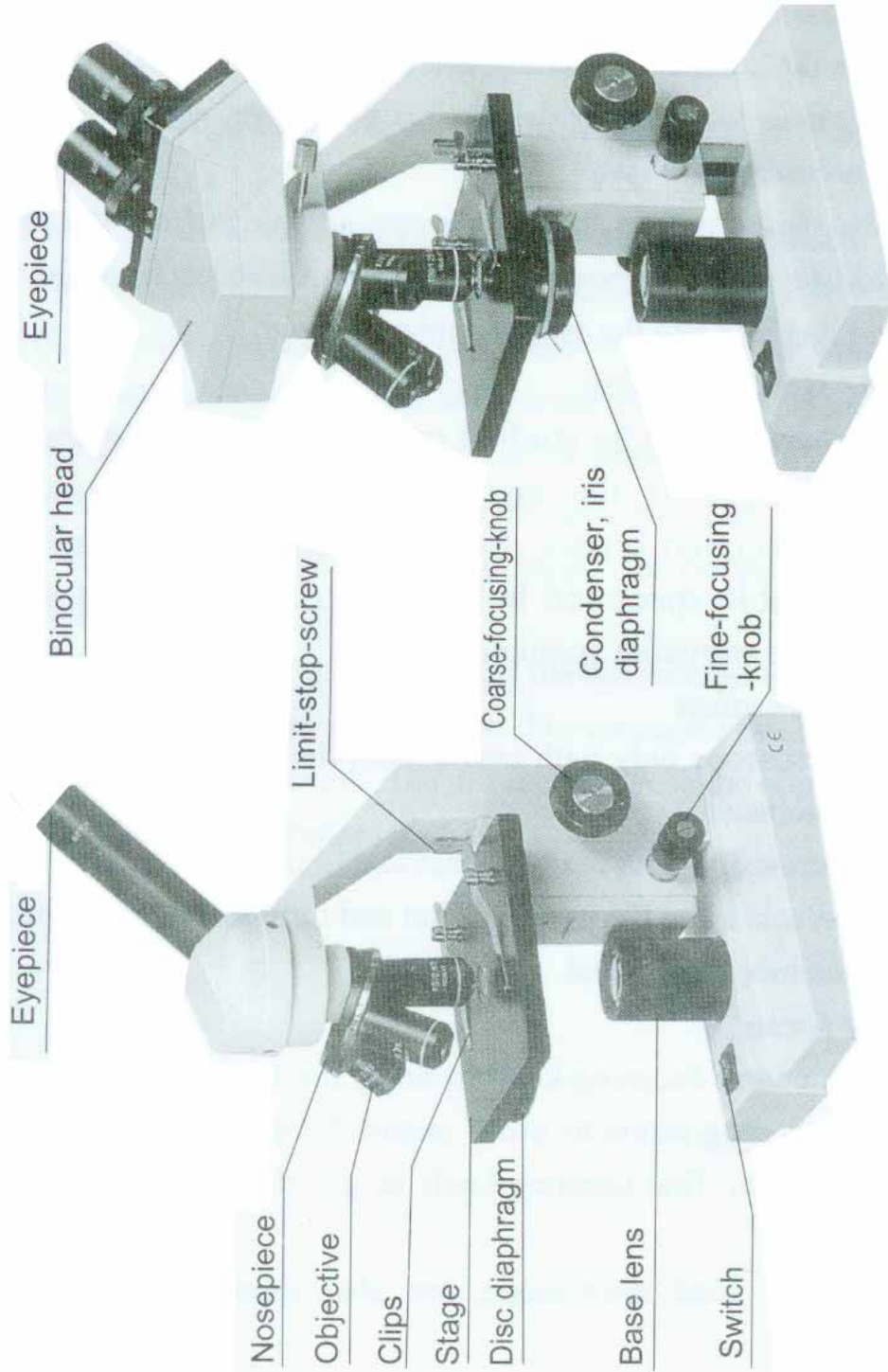
This instruction manual is for the Biological Microscope M series. To ensure the safety and obtain optimum performance and to familiarize yourself fully with use of this microscope, we recommend that you study this manual thoroughly before operating the microscope. Retain this instruction manual in an easily accessible place near the work desk for future reference.

1、 Operation

- (1) As the microscope is a precision instrument, always handle it with care, avoiding impact or abrupt movement during transportation.
- (2) Do not let the microscope emerge in the sun directly. Keep it in a dry and clean place. Avoid high temperature and acute shake. Following environment is required: Indoor temperature: 0°C ~ 40°C, Max relative humidity: 85%.
- (3) Avoiding impact the definition of the image, do not leave feculence and fingerprints on the lens surfaces.
- (4) Before using, examine to ensure the power supply voltage is consistent with the rating voltage.

2、 Maintenance

- (1) All glass surfaces must always be kept clean. Fine dust on the optical surface should be blown off by means of a hand blower or gently wiped off with a soft lens tissue. Carefully wipe off oil or fingerprints on the lens surfaces with tissue moistened with a small amount of 3:7 mixture of alcohol and ether.
- (2) Do not use organic solution to wipe the surface of the other components. These parts, especially the plastic parts, should be cleaned with a neutral detergent.
- (3) Do not take down or assemble it yourself.
- (4) After use, cover the microscope with the dustcover provided, and keep it in a dry and clean place for preventing rust.



The microscope is housed in a molded styrofoam container.

First take the container out of the carton, and lay the container on its side. Open the container carefully and don't let the optical items drop down, avoiding them being damaged. Check carefully to ensure the arm and accessories are well.

Install the objective into the microscope nosepiece from the lowest magnification to the highest, in a clockwise direction from the rear.

Insert the eyepiece into the eyepiece tube.

2-1 *Set the specimen slide*

Place a specimen to be studied on a glass slide, and fix it by the slide-holder of the mechanical stage. If we use the movable specimen holder, fix the specimen by slide-holder of the movable specimen holder. Adjust its position by the switch of the movable specimen holder.

2-2 *Set illumination*

For the microscope only with mirror, turn the mirror to get the field of view illuminated.

For the microscope with built-in electrical illuminator, insert the plug of the main cable into the power socket and turn on the light switch to get the specimen illuminated.

2-3 *Adjust focus*

Adjust the coarse-focusing-knob to bring the slide into focus. Then lock the limit-stop-screw to avoid impact between the objective and slide. Adjust the fine-focusing-knob to get the image sharper and clearer.

For binocular head microscope, we also should do some more adjustments:

- (1) Hold the two ends of the head-cover and adjust the interpupillary distance by pushing or pulling the cover, until one circle of

light can be seen.

- (2) After finishing the interpupillary adjustment, look at the graduation value in the middle of the head-cover. Turn the two diopter-ring and aim the same graduation value at the graduation line on the eyetubes.

2-4 *Adjust diopter of binocular head*

If the diopter of the two eyes is not same, binocular head microscoper BM-100FL has compensating function. Turn the nosepiece to choose the objective 4X, and use the left eye to observe the left eyepiece. Adjust fine-focusing-knob and focus correctly. Use right eye to observe the right eyepiece. Gain the clear image by turning the diopter-ring up and down.

For the DM-100FL, after focusing by the 45° inclined head, adjust the adjusting ring of the vertical eyepiece tube until we can observe the object clearly.

2-5 *Adjust condenser*

For the microscope with Abbe condenser, make the Abbe condenser up or down to get the image brightness suitable for observacation.

2-6 *Adjust diaphragm*

For the microscope with disc diaphragm, turn the diaphragm to select a aperture to get the background brightness suitable.

For the microscope with iris diaphragm, adjust the aperture of the iris diaphragm to get the background brightness suitable.

2-7 *Choose the objective*

Turn the nosepiece to choose the objective. Objective selected should be set vertically right to the slide. Generally, first use the objective 4X to focus to reveal general structural image. Then use the high power objective to reveal smaller details.

When using the oil objective 100XR, a little of immersion oil must be put between the objective and the cover glass. In addition, only

when the Abbe condenser is on the arm, the 100XR objective can be used.

2-8 *Change the lamp*

Before changing the lamp, first pull the plug out off the electrical socket and wait for a while until the lamp cools down to avoid being burnt. Then screw off the base lens in an anti-clockwise direction and insert a new lamp and screw on the base lens.

3. General specifications

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M Series Biological Microscope General specifications (For option)

Install		Model			
Parts	Specifications	M-100F	M-100FL	DM-100FL	BM-100FL
WF eyepiece	WF10X/18mm				• (x2)
	WF10X/18mm with pointer	•	•	•	
	WF10X/18mm with reticle				
	WF15X/13mm				
	WF20X/10mm				
Huygens eyepiece	H5X/ H6X				
	H10X				
	H12.5X				
	H15X/ H16X				
195 objective	4X/0.10	•	•	•	•
	10X/0.25	•	•	•	•
	40XS/0.65	•	•	•	•
	60XS/0.85				
	100XS/1.25 (oil)				•
45°view head	Dual viewing head			•	
	Monocular head 360°rotating	•	•		
	Binocular head 360°rotating				•
Stand	Metal base and stand	•	•	•	•
Movable specimen holder	White holder				
	Black holder				
Nosepiece	Triple nosepiece	•	•	•	
	Quadruple nosepiece				•
Stage	110mmX120mm	•	•	•	•
	Built-in movable stage 125mmX130mm				
Polarized set					
Clips		•	•	•	•
Condenser	Single N.A.0.65	•	•	•	
	AbbeN.A.1.25				•
Diaphragm	Five-aperture disc diaphragm	•	•	•	
	Iris diaphragm				•
Illumination	φ42mm mirror	•			
	Built-in illuminator		•	•	•
Lamp	Tungsten bulb 115V/20W				
	Halogen bulb 230V/20W		•	•	•
Filter	Blue/Yellow/Green				

4. Parameter/technical terms

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4-1 Objective

Type	Magnification	Numerical aperture (N.A)	Medium	Parfocal distance (mm)	Magnification market (color ring)
DIN achromatic objective 195mm	4X	0.10	Air	45	Red
	10X	0.25	Air	45	Yellow
	40X	0.65	Air	45	Light blue
	60X	0.85	Air	45	Deep blue
	100X	1.25	Cedar oil	45	White

4-2 Eyepiece

Type	Wide field			Huygens			
Magnification	10X	15X	20X	5X/6X	10X	12.5X	15X/16X
Field of view (mm)	φ18	φ13	φ11	φ15	φ12	φ10	φ8

4-3 Electrics

The electrics are assembled according to customer's order. There are two kinds for option.

220V~240V power supply : 220V~240V±10%, 50/60Hz

Lamp: 220V/20W tungsten lamp

The electrics have gained the CE and GS certification.

100V~120V power supply : 100V~120V±10%, 50/60Hz

Lamp: 110V/20W tungsten lamp

The electrics have gained the UL certification.

4-4 Parameter

(1) Total magnification:

20X~1600X

(2) Field of view:

φ0.08~φ4.5mm

(3) Mechanical tube length:

160mm

4. Parameter/technical terms

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(4) Object to primary image distance:

195mm

4-5 Technical terms

- (1) Total magnification = (magnification of objective) X (magnification of eyepiece)
- (2) Field of view = (line field of view of the eyepiece selected) ÷ (magnification of the objective selected)
- (3) N.A. = $n \cdot \sin \alpha$ (max), N.A. is very important parameter which marks the features of the objective and condenser. The “n” is the refractive index of the medium (air or immersion oil) between the cover glass of the objective and the specimen. The “ α ” is the half of the aperture angle. The N.A. is bigger, the resolution of the objective is higher.
- (4) Object to primary image distance: the distance between the object plane to the primary image plane. The conjugate distance is fixed.
- (5) Mechanical tube length: The distance between the objective shoulder and the ocular shoulder.

5. Troubleshooting

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Symptom	Cause	Remedy
Optics		
(1)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 condenser, objective, eyepieces, base, lens.	Clean the lens.
(2)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.
(3)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 thickness 0.17mm.
	The specimen faces down.	Make it face up.
	The immersion oil has accumulated on the dry objective.	Clean thoroughly.
	The immersion oil is not used for oil objective 100XR.	Use immersion oil.
	Air bubble in the immersion.	Get rid of the air bubble.
	Use wrong immersion oil.	Use a correct one.
	The aperture is not opened to correct size.	Adjust the iris diaphragm.
	Stains or dust has accumulated on the lens in the inlet of the head .	Clean lens.
The condenser is not in the right position .	Adjust the condenser.	
(4)One side of the field of view is dark or the image moves while focusing.	The specimen slide is not fixed.	Fix with clips .
	The nosepiece is not in the right position.	Turn the nosepiece into the right position.
(5)The field of view is not bright enough.	The iris diaphragm is not bigger enough .	Adjust the iris diaphragm.
	The condenser is not in the right position .	Adjust the condenser.
	Stain or dust has accumulated on the condenser, objective, eyepieces, base lens .	Clean lens.
(6)The image color is not true.	No filter is used.	Use correct filter.

5. Troubleshooting

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Symptom	Cause	Remedy
Mechanics		
(1) The image is not focused while using high power 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 thickness 0.17mm.
(2) 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 thickness 0.17mm.
(3) Can not move the slide smoothly.	The slide is not fixed correctly.	Adjust it correctly.
	The movable specimen holder is not fixed properly.	Tighten it.
Electrics		
(1) The bulb does not work.	No power supply.	Check the connection of the power cable.
	The bulb is not inserted correctly.	Insert it correctly.
	The bulb burnt out.	Replace it.
	The fuse burnt out.	Replace it.
(2) The bulb burnt out usually.	The voltage is too high.	Use correct power supply.
	Use a wrong bulb.	Replace with a correct one.
(3) The fuse burnt out usually.	The voltage is too high.	Use correct power supply.
(4) The bulb flickers or the brightness is not stable.	The bulb will burn out soon.	Replace with a new one.
	The wire doesn't connect all right.	Connect correctly.