# User Manual

## Binocular Stereo Microscope

### Model M421 Series


MicroscopeNet.com

# Table of Contents

# i. Caution

1. Find the “UP” sign and place the styrofoam container on your table or bench so that the arrow is pointing upward. Open the shipping carton carefully to prevent any accessory, like eyepieces, from dropping and being damaged.

2. Do not discard the molded Styrofoam container. The container should be retained should the microscope ever requires reshipment.

3. Keep the instrument out of direct sunlight, high temperature or humidity, and dusty environments. Ensure that the microscope is located on a smooth, level and firm surface.

# ii. Care And Maintenance

1. Do not attempt to disassemble any components, like eyepieces, objectives or focusing assembly.

2. Keep the instrument clean; remove dirt and debris regularly. Accumulated dirt on metal surfaces should be cleaned with a damp cloth. More persistent dirt should be removed using a mild soap solution. **Do not use organic solvents for cleansing**.

3. The outer surface of the optics should be inspected and cleaned periodically using an air stream from an air bulb. If dirt remains on the optical surface, use a soft cloth or cotton swab dampened with a lens cleaning solution (available at camera stores). All optical lenses should be swabbed using a circular motion. A small amount of absorbent cotton wound on the end of a tapered stick makes a useful tool for cleaning recessed optical surfaces. Avoid using an excessive amount of solvents as this may cause problems with optical coatings or cemented optics or the flowing solvent may pick up grease making cleaning more difficult.

4. Store the instrument in a cool, dry environment. Cover the microscope with the dust cover when not in use.

# 1 Components Illustration


1. Diopter
2. Eyepiece
3. Eyepiece Tube
4. Viewing Head
5. Holding Ring
6. Set Screw
7. Objectives
8. Stage Clip
9. Stage
10. Base
11. Zoom Knob
12. Stand Post
13. Upper Light
14. Focusing Knob
15. Upper Light Intensity Dial
16. Lower Light Intensity Dial
17. Power Switch

# 2 Operation

## 2.1 Place the stage plate

Swing the stage clips aside and put the stage plate on. When observing with transmitted illumination, the glass stage plate should be put on.

## 2.2 Adjusting the illumination

1) Plug the power cord into a power outlet.
2) Press the power switch (17) to turn the lights on.
3) Turn the intensity dial (15) to adjust the brightness of upper light.
4) Turn the intensity dial (16) to adjust the brightness of lower light.

## 2.3 Place the specimen

1) Put the specimen in the center of the stage plate (9), and hold the specimen with the stage clips (8) if necessary.
2) Adjust the intensity dial of upper or lower light as necessary.

## 2.4 Focusing

1) Turn the zoom objective (7) to the lowest magnification 0.8X.
2) Turn the focusing knob (14) until the specimen is in focus.
3) Turn the zoom objective (7) to the desired magnification.
4) If the image is not clear, turn the focusing knob (14) slightly to get the specimen in focus.

**Note:**

If you observe the specimen with the 0.5X auxiliary objective lens and the extension sleeve, the microscope may not be able to focus at the highest position. In this case, you need to adjust the position of the focusing rack to obtain a longer working distance. (See ***Fig. 1***)

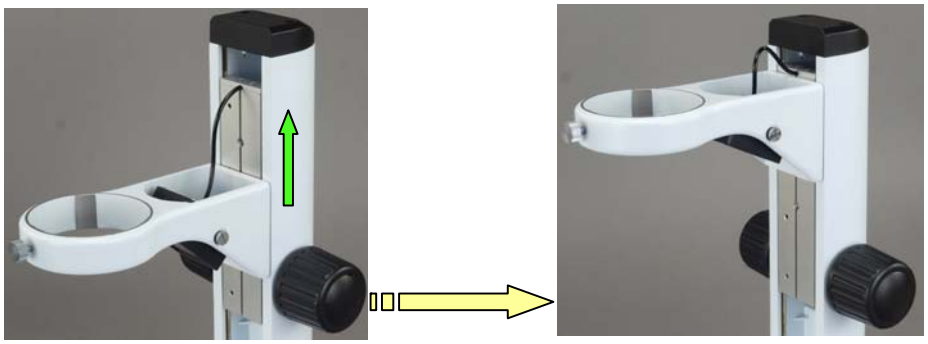

**Fig. 1**

## 2.5 Adjusting interpupillary distance

While observing with both eyes, hold the left and right eyepiece tubes (3) and slowly slide the tubes in or out, and adjust the distance between your eyes and the eyepieces slightly. (See ***Fig.2***)

The interpupillary distance is correct when the left and right fields of view converge completely with one image.

It may take some time to get the two view fields converge if you are not familiar with binocular observation.

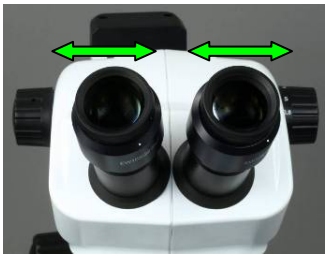

**Fig. 2**

## 2.6 Adjusting eyepiece diopter

1) Using your right eye only, observe your specimen through the right eyepiece and bring it into focus by adjusting the focus knob (14).
2) Then observe the specimen with your left eye only through the left eyepiece. If the specimen is not in focus, rotate the diopter ring (1) until a sharp image is obtained.
3) Since both sides are adjustable, you may also do the above in the opposite way, in other words, left eye first and right eye second.

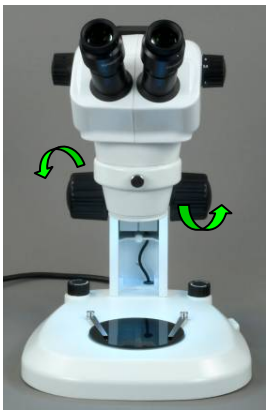

**Fig. 3**

## 2.7 Adjusting tension of focusing knobs

The tightness of the tension has been pre-set at the factory. If the mechanical stage drops by itself, rotate the both focusing knobs with both hands to opposite directions at the same time to adjust the tension (see ***Fig.3***).

# 3 Specifications

| | |
|---|---|
| Model | M421 series |
| Total Magnification | Zoom 8X ~ 50X, expandable to 4X ~ 200X by adding lenses |
| Viewing Head | Binocular, inclined 45º, swiveling 360º<br>Adjustable Interpupillary distance 2” ~ 2-15/16” (52mm ~ 75mm) |
| Eyepieces | 1 pair of high eye-point widefield EW10X/22, diopter adjustment on both eyepiece;<br>1 pair of widefield WF20X/12, diopter adjustment on both eyepiece ***(optional)***<br>1 pair of widefield WF30X/9, diopter adjustment on both eyepiece ***(optional)*** |
| Objectives | Zoom 0.8X ~ 5X, expandable to 0.4X ~ 10X by adding lenses<br>Zoom ratio: 6.3:1 |
| Auxiliary Objective Lenses ***(optional)*** | 2X and 0.5X (included extension sleeve for 0.5X objective lens) |
| Focusing Mechanism | Rack and pinion, focusing knobs on both sides<br>Tool free tension adjustment |
| Working Distance | 4-5/8” (117mm) without auxiliary objective lenses<br>If auxiliary objective lens is added, see ***working distance and field of view of add-on auxiliary lenses*** |
| Field of View | 3/16” ~ 1-1/16” (5mm ~ 27.5mm) without auxiliary objective lenses<br>If auxiliary objective lens is applied, see ***working distance and field of view of add-on auxiliary lenses*** |
| Stage Plate | Clear glass plate: 4” (100mm) in diameter<br>White/black plastic plate: 4” (100mm) in diameter |
| Illumination | Main power switch<br>Incident (upper): 30 LED matrix<br>Transmitted (lower): 60 LED matrix<br>Intensity dials for each light |
| Power Supply | 110V-240V, 50/60Hz |
| Dimension | 11-1/2” x 9-1/2” x 13-3/8” (29.1cm x 24cm x 34cm) |
| Net weight | 5kg (11 lb) |

| Eyepieces | | | |
|---|---|---|---|
| Designation | Magnification | Field of View | Mount Size |
| Wide Field | 10X | 22mm | 30mm |
| Wide Field | 20X ***(optional)*** | 12mm | 30mm |
| Wide Field | 30X ***(optional)*** | 9mm | 30mm |

| Magnifications | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Eyepiece | 10X | | | 20X ***(optional)*** | | | 30X ***(optional)*** | | |
| Objective | Zoom 0.8X~5X | | | Zoom 0.8X~5X | | | Zoom 0.8X~5X | | |
| Auxiliary Lens | - | 0.5X ***(optional)*** | 2X ***(optional)*** | - | 0.5X ***(optional)*** | 2X ***(optional)*** | - | 0.5X ***(optional)*** | 2X ***(optional)*** |
| Magnification | Zoom 8X~50X | Zoom 4X~25X | Zoom 16X~100X | Zoom 16X~100X | Zoom 8X~50X | Zoom 32X~200X | Zoom 24X~150X | Zoom 12X~75X | Zoom 48X~300X |

| Working Distance and Field of View of Add-on Auxiliary Objective Lenses | | | |
|---|---|---|---|
| Auxiliary Objective Lens | Eyepiece | Field of View | Working Distance |
| No | EW10X/22 | 27.5mm ~ 5mm (1-1/16” ~ 3/16”) | 117mm (4-5/8”) |
| | WF20X/12 | 15mm ~ 2.5mm (19/32” ~ 3/32”) | |
| | WF30X/9 | 9.5mm ~ 1.75mm (3/8” ~ 1/16”) | |
| 0.5X ***(optional)*** | EW10X/22 | 56mm ~ 9mm (2-1/4” ~ 3/8”) | 213mm (8-3/8") |
| | WF20X/12 | 30mm ~ 5mm (1-3/16” ~ 3/16”) | |
| | WF30X/9 | 19.5mm ~ 3.25mm (3/4” ~ 1/8”) | |
| 2X ***(optional)*** | EW10X/22 | 14mm ~ 2.5mm (9/16” ~ 3/32”) | 43mm (1-11/16") |
| | WF20X/12 | 7.5mm ~ 1.25mm (9/32” ~ 3/64”) | |
| | WF30X/9 | 5mm ~ 1mm (3/16” ~ 1/32”) | |

# 4 Troubleshooting Guide

| Symptom | Cause | Remedy |
|---|---|---|
| Totally dark in the view field | The cover of objectives is still on | Take off the cover of objectives |
| Stains or dust on the field of view | Stains or dust on the eyepieces or objectives | Clean the lens with a camera cleaning kit |
| | Stains or dust on the specimen | Clean the specimen |
| Image moves while focusing | Specimen rises from stage surface | Secure the specimen |
| Lamp does not light when switched on | No electrical power | Check power outlet<br>Check power cord connection |