User Manual

Trinocular Metallurgical Microscope

Model M83MP
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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 items (i.e. objectives or 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.

4. If any specimen solutions or other liquids splash onto the stage, objective or any other component, disconnect the power cord immediately and wipe up the spillage. Otherwise, the instrument may be damaged.

5. **Important**: the lamp, lamp housing and adjacent parts will become very hot. Do not touch these parts until they have completely cooled. Never attempt to handle a hot halogen bulb.

6. All electrical connectors (power cord) should be inserted into an electrical surge suppressor to prevent damage due to voltage fluctuations.

7. For safety when replacing the halogen lamp or fuse, be sure the main switch is off, unplug the power cord, and only replace the halogen bulb after the bulb and the lamp house has completely cooled.

8. Confirm that the input voltage indicated on your microscope corresponds to your line voltage. The use of a different input voltage other than that as indicated will cause severe damage to the microscope.
ii. Care and Maintenance

1. Do not attempt to disassemble any component including 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. Oil immersion objectives should be cleaned immediately after use by removing the oil with lens tissue or a clean, soft cloth.

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

1. Viewing Head
2. Field Diaphragm
3. Aperture Diaphragm
4. Condenser Focus Lever
5. Lamp Housing
6. Lamp H Position Knob
7. Lamp V Position Knob
8. Stand
9. Focus Stop Lever
10. DC Power Port
11. AC Power Socket
12. Fuse Holder
13. Photo Tube
14. Eyepiece
15. Diopter Ring
16. Eyepiece Tube
17. Nosepiece
18. Objective
19. Stage
20. Clip
21. Base
22. Coarse Focus Knob
23. Fine Focus Knob
24. Analyzer Slot
25. Polarizer Slot
26. EPI Light Assembly
27. Set Screw
28. Color Filter Slots
29. Photo/Ocular Switch
30. Head Secure Screw
31. Stage Translation Knobs
32. Power Switch
2 Installation

2.1 Installation of the EPI lamp housing assembly

1) Loosen the set screw on the top of the stand with a screwdriver and remove the plastic cover.
2) Remove the cap on the dovetail of the EPI light assembly.
3) Seat the dovetail into the socket on the top of the stand securely, and then tighten the set screw.
4) Connect the electrical cord to the DC power port at the back of the stand.
5) The halogen bulb has been installed in the lamp housing already. Don't try to disassemble it.

2.2 Installation of the trinocular viewing head

1) Loosen the head secure screw on EPI light assembly and remove the plastic cover.
2) Remove the cap on the dovetail of the trinocular viewing head.
3) Seat the dovetail into the socket on the top of the stand securely, and then tighten the head secure thumb screw.

Caution: Do not release the head from your hand grip until you are sure that the head is installed securely.

2.3 Installation of the eyepieces

Remove the protective caps from the eyepiece tubes. Insert the eyepieces into the eyepiece tubes.

2.4 Installation of the objectives

1) Adjust the coarse focus knob until the mechanical stage is at its lowest position.
2) Install the lowest magnification objective into the nosepiece. Then in a clock-wise direction, rotate the nosepiece and install each succeeding higher magnification objective.

Note:
- Use the 10x objective to initially focus the image of your specimen.
- When changing the objective magnification, rotate the objective nosepiece until you hear a “click” sound. This ensures the objective is centered in the optical light path.

2.5 Installation of the color filters

Insert the selected color filter into the filter slot on the EPI light assembly.

2.6 Installation of the polarizing plates

Insert the polarizer and analyzer separately into the analyzer slot and polarizer slot on the EPI light assembly.

2.7 Fuse replacement

1) With a flat-head screwdriver, press and turn the fuse holder counter clock wise to remove it.
2) Replace the fuse with a new one.
3) Put the fuse holder back, press and turn it clockwise.

2.8 Lamp bulb replacement

1) Unplug the power cord from the wall outlet.
2) Take off the 4 screws from the lamp housing.
3) Remove the half of the lamp housing.
4) Make sure the bulb is cooled down before pulling out the bulb. Insert the new bulb into the sockets.
5) Put the half lamp housing back and tighten the 4 screws.
3 Operation

3.1 Adjusting illumination

1) Connect the power cord of microscope to a wall outlet, and turn on the power switch.
2) Rotate the intensity dial to increase or decrease the brightness.
3) Turn the lamp H knob and V knob to adjust its horizontal and vertical positions until the light in the field of view is even and bright.

3.2 Diaphragm adjustment

There are two diaphragms: aperture diaphragm and field diaphragm. You can get the perfect image only when the two diaphragms are at suitable size. Please adjust them when observing.

1) Aperture diaphragm: It controls the aperture angle of incident light. The aperture diaphragm should be adjusted according to different objectives.
2) Field diaphragm: It controls the size of field of view and reduces the inner incident light to make the high contrast. Normally the field diaphragm is set at the same size of the viewing field of the observing eyepiece.

3.3 Placing specimen

1) Place the specimen on the mechanical stage.
2) Secure the specimen with the clips if possible.
3) Turn the X and Y translation knobs to position the specimen for viewing.

Caution: Be sure not to allow an objective to touch a specimen slide when changing objectives.

3.4 Focusing

1) With the 10x objective in position, raise the mechanical stage using the coarse focus knob until the specimen is close to the objective.
2) Turn the coarse focus knob until the specimen is in focus. Then use the fine focus knob to obtain a sharp image. You may now switch to another magnification objective.

Tips: To prevent your specimen slide from making contact with an objective, raise the stage to its highest position without contacting the 100x objective, then tighten the focus stop lever.

3.5 Adjusting interpupillary distance

While observing with both eyes, hold the left and right eyepiece tubes and turn.

The interpupillary distance is correct when the left and right fields of view coincide completely with each other.

3.6 Adjusting eyepiece diopter

1) Using the 10x objective and your right eye only, observe your specimen through the
right eyepiece and bring it into focus by adjusting the focus knobs.

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 until a sharp image is obtained.

3.7 Condenser focus adjusting

Adjust the condenser focus lever close to the lamp housing to move the condenser forward or backward.

3.8 Adjusting tension

The tightness of the tension adjustment collar has been pre-set at the factory. If the mechanical stage drops by itself, rotate the tension adjustment collar located inside of the coarse focus knob on the power switch side until the tension is in maintained.

3.9 Brightfield observing

1) Make sure the polarizer and analyzer are not in the slots.
2) Turn the nosepiece so that the 10X objective at working position.
3) Put specimen on the stage.
4) Adjust the coarse and fine focusing knobs to get sharp image.
5) Adjust the stage translation knobs to move the interesting spot of the specimen in the field of view.
6) Turn the required magnification objective into light path and observe.

3.10 Polarization observing

1) Insert the analyzer plate into the analyzer slot, and the polarizer plate into the polarizer slot.
2) Operate following the steps in 3.9.
3) Turn the analyzer rotary dial from 0° to 90° to observe the polarized light image.

3.11 Photo/video observing, capturing and recording

1) Attach the photo tube onto the trinocular viewing head.
2) Pull the photo/ocular switch bar to the photo position.
3) Mount microscope camera (electronic eyepiece) onto the photo tube and connect the USB cable from camera to computer.
4) Open image observing software to examine. You also can capture images or record live videos through the software, depending on the functions provided by the software.
5) If a conventional camera used, you may need an adapter to connect your camera to the photo tube.

Note: Camera is not included. Electronic eyepieces are sold separately.
## 4 Specifications

### General

<table>
<thead>
<tr>
<th>Model</th>
<th>M83MP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Magnification</strong></td>
<td>40X, 80X, 100X, 200X, 400X, 800X, 1000X, 2000X</td>
</tr>
<tr>
<td><strong>Eyepiece</strong></td>
<td>WF10X/18, WF20X</td>
</tr>
<tr>
<td><strong>Objective</strong></td>
<td>Infinity-corrected plan field achromatic, DIN 4X, 10X, 40X(S), 100X(S,Dry)</td>
</tr>
<tr>
<td><strong>Viewing Head</strong></td>
<td>Siedentopf trinocular, 30° inclined, 360° swiveling, hinge interpupillary distance adjustment, adjustable diopter on left ocular tube</td>
</tr>
<tr>
<td><strong>Nosepiece</strong></td>
<td>Revolving, quadruple</td>
</tr>
<tr>
<td><strong>Illumination</strong></td>
<td>EPI illuminator, 6V/30W halogen, H/V position adjustable, intensity adjustable, with built-in condenser, iris aperture diaphragm, iris field diaphragm, 2 color filter slots and polarizer/analyzer slots</td>
</tr>
<tr>
<td><strong>Condenser</strong></td>
<td>Spiral adjustment, built in the EPI illuminator assembly</td>
</tr>
<tr>
<td><strong>Stage</strong></td>
<td>Triple layer mechanical stage with clips, size 15cm X 14cm, translation range 75mm X 50mm</td>
</tr>
<tr>
<td><strong>Focus system</strong></td>
<td>Coaxial coarse and fine focus knobs on both side with stop lever, Tension adjustable</td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td>AC 110V 50/60Hz</td>
</tr>
<tr>
<td><strong>Dimension</strong></td>
<td>18-7/8” x 7-5/8” x 20-5/8” (48cm x 19.5cm x 52.5cm)</td>
</tr>
<tr>
<td><strong>Net weight</strong></td>
<td>19 lb 3 oz (8.7kg)</td>
</tr>
</tbody>
</table>

### Eyepieces

<table>
<thead>
<tr>
<th>Designation</th>
<th>Magnification</th>
<th>Field of View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wide Field</td>
<td>10X</td>
<td>18mm</td>
</tr>
<tr>
<td>Wide Field</td>
<td>20X</td>
<td>9.5mm</td>
</tr>
</tbody>
</table>

### Objectives

<table>
<thead>
<tr>
<th>Magnification</th>
<th>Numerical Aperture</th>
<th>Thickness of slide cover</th>
<th>Working Distance</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>4X</td>
<td>0.10</td>
<td>-</td>
<td>25.4mm</td>
<td>Infinity-corrected, achromatic, dry</td>
</tr>
<tr>
<td>10X</td>
<td>0.25</td>
<td>-</td>
<td>11.0mm</td>
<td>Infinity-corrected, achromatic, dry</td>
</tr>
<tr>
<td>40X</td>
<td>0.60</td>
<td>-</td>
<td>2.8mm</td>
<td>Infinity-corrected, achromatic, retractable, dry</td>
</tr>
<tr>
<td>100X</td>
<td>0.90</td>
<td>0</td>
<td>0.7mm</td>
<td>Infinity-corrected, achromatic, retractable, dry</td>
</tr>
</tbody>
</table>
## 5 Troubleshooting Guide

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darkness at the periphery or uneven brightness in the field of view</td>
<td>Revolving nosepiece not in click stop position</td>
<td>Revolve the nosepiece to click-stop position by swinging the objective correctly into the optical path</td>
</tr>
<tr>
<td></td>
<td>The light source of the bulb is not at the center</td>
<td>Adjust the position of the bulb</td>
</tr>
<tr>
<td>Dirt or dust on the view</td>
<td>Dirt or dust on the lens eyepiece, condenser, objective, collector lens or specimen</td>
<td>Clean the lens with a camera cleaning kit</td>
</tr>
<tr>
<td>Poor image quality</td>
<td>Immersion oil is on a dry objective (especially the 40x and 100x)</td>
<td>Check the objectives, clean if necessary</td>
</tr>
<tr>
<td></td>
<td>Condenser aperture is closed or open too much</td>
<td>Open or close properly</td>
</tr>
<tr>
<td></td>
<td>Condenser is positioned not correct</td>
<td>Adjust the condenser</td>
</tr>
<tr>
<td>Lamp does not light when switched on</td>
<td>No electrical power</td>
<td>Check power cord connection</td>
</tr>
<tr>
<td></td>
<td>Lamp bulb burnt out</td>
<td>Replace bulb</td>
</tr>
<tr>
<td></td>
<td>Fuse blown out</td>
<td>Replace fuse</td>
</tr>
<tr>
<td>Image moves while focusing</td>
<td>Specimen rises from stage surface</td>
<td>Secure the specimen</td>
</tr>
<tr>
<td></td>
<td>Revolving nosepiece is not in the click-stop position</td>
<td>Revolve the nosepiece to the click-stop position</td>
</tr>
<tr>
<td>Image tinged yellow</td>
<td>Blue filter not used</td>
<td>Use daylight blue filter</td>
</tr>
<tr>
<td></td>
<td>Lamp intensity is too low</td>
<td>Adjust the light intensity by rotating the intensity control dial</td>
</tr>
<tr>
<td>Image is too bright</td>
<td>Lamp intensity is too high</td>
<td>Adjust the light intensity by rotating the intensity control dial</td>
</tr>
<tr>
<td>Insufficient brightness</td>
<td>Lamp intensity is too low</td>
<td>Adjust the light intensity by rotating the intensity control dial</td>
</tr>
<tr>
<td></td>
<td>Aperture diaphragm closed too far</td>
<td>Open to the proper setting</td>
</tr>
<tr>
<td></td>
<td>Condenser position is not correct</td>
<td>Adjust the condenser</td>
</tr>
<tr>
<td>High power objective contacts specimen when changed from low power objective</td>
<td>Diopter adjustment is not set properly</td>
<td>Readjust the diopter settings</td>
</tr>
<tr>
<td>Slippage of focus when using the coarse focusing knob Fine focus is ineffective</td>
<td>Tension adjustment is set too low</td>
<td>Increase the tension on the focusing knobs</td>
</tr>
</tbody>
</table>