User Manual

Trinocular Metallurgical Microscope

Model M838TRMD

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 items (i.e. objectives, eyepieces, etc.) 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.

9. **Important** Since equipped with 24V/100W halogen bulbs, it is important to protect your eyes from hurt by the super bright light. Make sure the intensity is adjusted to the comfortable level before you look into the eyepiece.

ii. Care and Maintenance

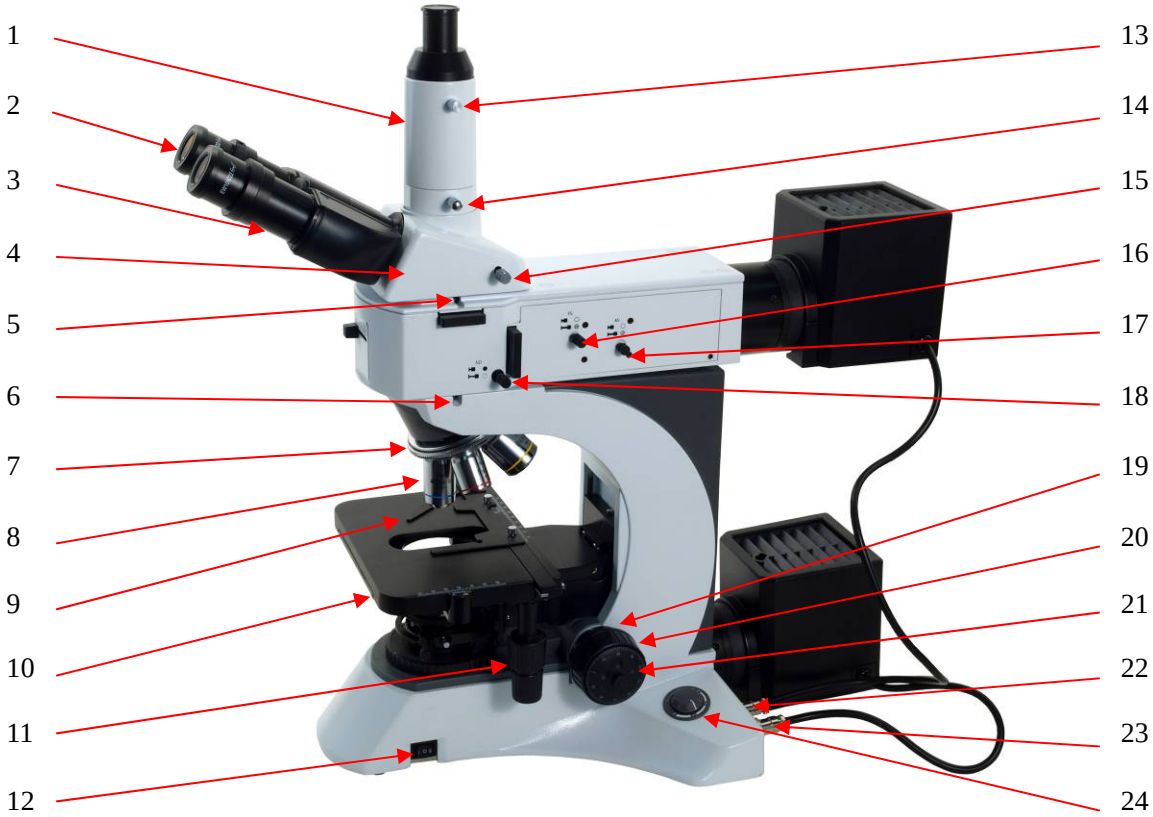
1. Do not attempt to disassemble any component including eyepieces, objectives or focusing assembly.

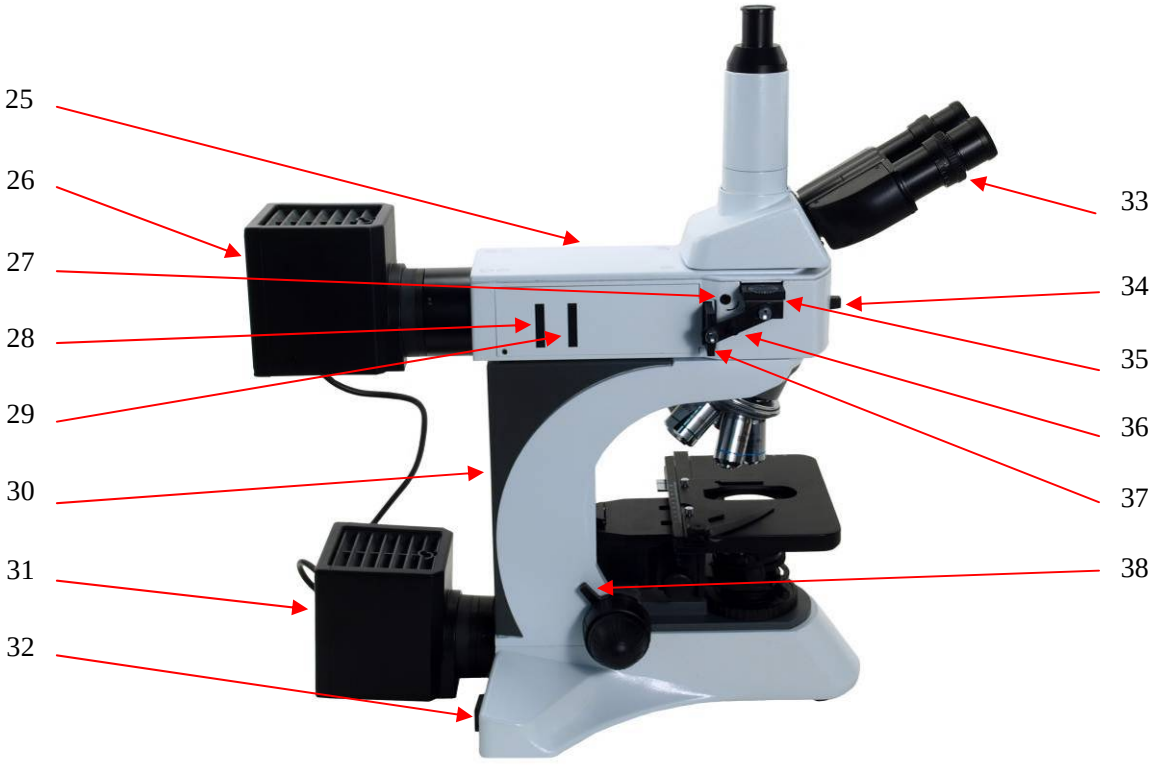
2. Keep the instrument clean; remove dirt and debris regularly. Accumulated dirt on metal surfaces should be cleaned with a damp cloth. More persistent dirt should be removed using a mild soap solution. **Do not use organic solvents for cleansing**.

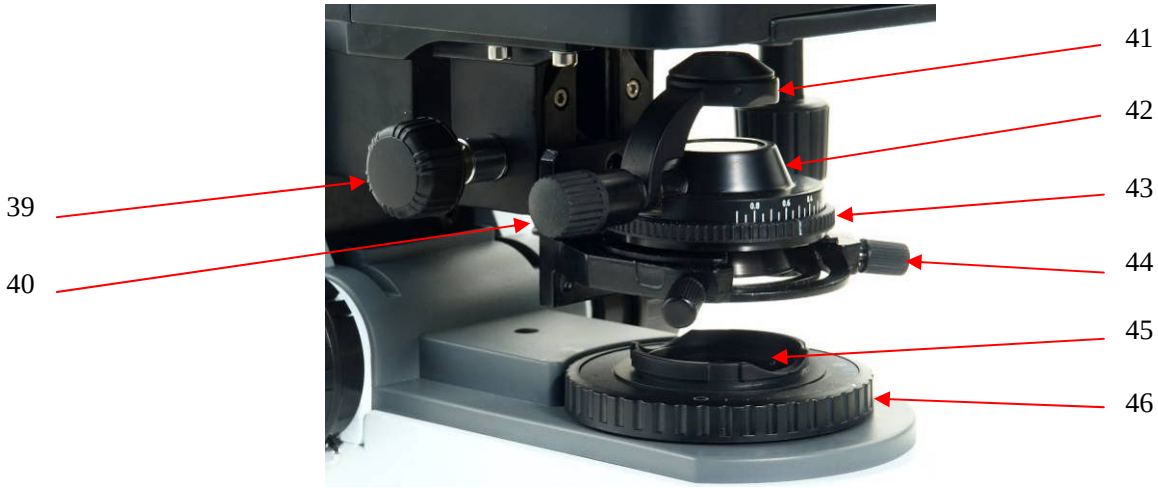
3. The outer surface of the optics should be inspected and cleaned periodically using an air stream from an air bulb. If dirt remains on the optical surface, use a soft cloth or cotton swab dampened with a lens cleaning solution (available at camera stores). All optical lenses should be swabbed using 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. Photo Tube
2. Eyepiece
3. Eyepiece Tube
4. Viewing Head
5. Set Screw
6. Set Screw
7. Nosepiece
8. Objective
9. Slide Holder
10. Mechanical Stage
11. Translation Knobs
12. Power Switch
13. Thumb Screw
14. Thumb Screw
15. Phototube Switch
16. Field Diaphragm
17. Aperture Diaphragm
18. ND Filter Switch
19. Focus Tension Ring
20. Coarse Focus Knob
21. Fine Focus Knob
22. DC Power Port
23. DC Power Port
24. Intensity Dial
25. Reflected Light Assembly
26. Reflected Light Housing
27. ND Filter Lock
28. Color Filter Slot
29. Color Filter Slot
30. Microscope Frame
31. Transmitted light Housing
32. Power Socket
33. Diopter Ring
34. Dark Field Switch
35. Analyzer
36. Connector
37. Polarizer
38. Focus Stop
39. Condenser Focus Knob
40. Top Lens Knob
41. Condenser Top Lens
42. Condenser
43. Aperture Diaphragm Adjusting Ring
44. Condenser Centering Thumb Screw
45. Light Collector
46. Field Diaphragm Adjusting Ring

2 Installation

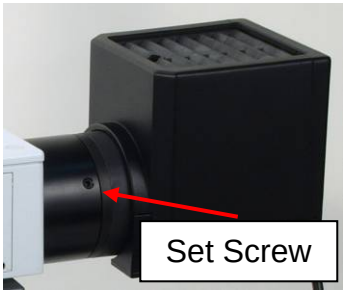
2.1 Installation of the stage

1) Adjust the focus knob (20) so that the tail is at its lowest position.
2) Hold the stage, align the slot at back of the stage to the tail and slide down.
3) Arise the stage (10) by adjusting the focus knob (20), make sure the stage is completely slid down all the way to the end.
4) Tighten the screw by Allen key to lock the dovetail joint.

2.2 Installation of the reflected light assembly

1) Loosen the secure set screw (6) on the top of the microscope frame (30) with the Allen key and remove the plastic cover.
2) Remove the cap on the dovetail of the reflected light assembly (25).
3) Seat the dovetail into the socket on the top of the frame securely, and then tighten the set screw (6).

2.3 Installation of the light housing



1) Remove the white plastic caps on each light housing.
2) Loosen the set screws and remove the black plastic caps on the back of the reflected light assembly (25) and the microscope frame (30), to where the light housings connect.
3) Insert the light housings (26, 31) into each opening. The one with longer power cord should be the reflected light housing (26). The other with shorter power cord is the transmitted light housing (31).
4) Connect each of the cords to either of the DC ports (22, 23) at the back of the frame.
5) Tighten the set screws.

2.4 Installation of the trinocular viewing head

1) Loosen the set screw (5) on the top of the reflected light assembly (25) and remove the plastic cover.

2) Remove the cap on the dovetail of the trinocular viewing head (4).

3) Insert the trinocular viewing head (4) into the socket on the top of the light assembly (25); ensure that the dovetail is completely seated into the socket; tighten the set screw (5).

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

2.5 Installation of the phototube

1) Loosen the thumb screw (14) on the top of the viewing head (4).

2) Insert the white part of the phototube (1) and tighten the thumb screw (14).

3) Insert the black part of the phototube (1) into the white part and thread it on.

4) Tighten the thumb screw (13) on the phototube (1).

2.6 Installation of the eyepieces

1) Remove the protective caps from the eyepiece tubes (3).

2) Insert the eyepieces (2) into the eyepiece tubes (3).

2.7 Installation of the objectives

1) Adjust the coarse focus knob (20) until the mechanical stage (10) is at its lowest position.

2) Install the lowest magnification objective (8) into the nosepiece (7). Then in a clock-wise direction, rotate the nosepiece and install each succeeding higher magnification objective. (Install the two DF/BF objectives (10X, 20X) into the large openings, the three BF objectives (5X, 40X, 50X, or 100X) into the small openings of the quintuple nosepiece.)

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.

2.8 Light bulb replacement

1) Unplug the power cord from the wall outlet.

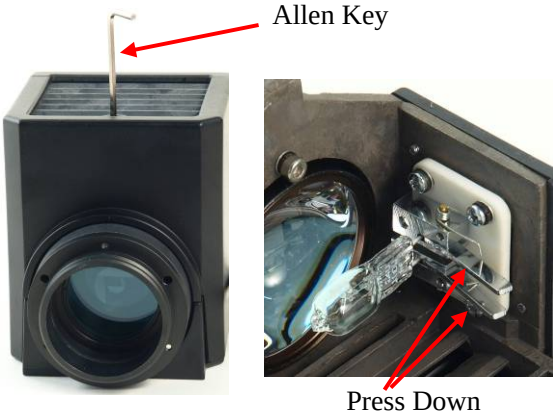
2) Make sure the bulb is cooled down before you star to work.

3) Take off the screw on the top of the light housing with the Allen key.

4) Take off the cover.

5) Press down the two levers.

6) Replace the light bulb.



2.9 Fuses 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 clock wise

2.10 Installation of the polarizer/analyzer

1) Take off the white covers on the analyzer slot.
2) Remove the plate inside the polarizer slot.
3) Align the analyzer plate (35) and polarizer plate (37) with a right angle and insert them into the slots.

2.11 Installation of the color filters

The color filters for the reflected light are inserted into the slots (28, 29) on the reflected light assembly (25).

The color filter for the transmitted light is put on the top of light collector lens (45).

2.12 Locking the ND filter

The ND filter is locked with the BF/DF switch to avoid hurting eyes by the bright light.

The ND filter can be adjusted separately after being unlocked by inserting the Allen key into the lock hole (27) and loosening the screw.

Important: keep locking the ND filter to prevent your eyes from being hurt when you switch from darkfield to brightfield observation. Only unlock it when necessary.

3 Operation

3.1 Adjusting illumination

1) Connect the power cord of microscope to a wall outlet, and press the power switch (12) to the I position (transmitted) or II position (reflected).
2) Rotate the intensity dial (24) to increase or decrease the brightness.

3.2 Placing specimen

1) Place the specimen plate or slide on the mechanical stage (10). Use the slide holder (9) to gently secure the plate or slide.
2) Turn the X and Y translational control knobs (24) to position the specimen for viewing.

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

3.3 Diaphragm adjustment

There are two diaphragms for each illumination: 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.

- Reflected illumination

1) Slide the field diaphragm bar (16) to adjust the diameter of the opening.
2) Slide the aperture diaphragm bar (17) to adjust the diameter of the opening.

- Transmitted illumination

1) Turn the adjusting ring (46) to adjust the field diaphragm.
2) Turn the adjusting ring (43) to adjust the aperture diaphragm.

3.4 Focusing

1) With the 5X objective in position.
2) Raise the mechanical stage (9) using the coarse focus knob (20) until the specimen is in focus. Then use the fine focus knob (21) to obtain a sharp image. You may now switch to another magnification objective.

Tips: To prevent your specimen from making contact with an objective, raise the stage to its highest position without contacting the 100x objective, then tighten the focus stop (38).

3.5 Adjusting interpupillary distance

While observing with both eyes, hold the left and right eyepiece tubes (3) and swing them.

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

3.6 Adjusting eyepiece diopter

1) Using the 10X objective and your right eye only, observe your specimen through the

right eyepiece (2) and bring it into focus by adjusting the focus knobs (20, 21).

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 (33) until a sharp image is obtained.

3.7 Condenser adjusting

1) Put the 5X objective in the light path and turn the field diaphragm ring (46) until a bright spot showed in a dark field.
2) Center the bright spot by adjusting the two centering screws (44).
3) The highest position of the condenser (42) has been set up in factory. No need to re-adjust.
4) Turn the condenser focus knob (39) to raise or lower the condenser. The condenser is raised when using high power objectives and lowered when using low power objectives.
5) Turn the knob (40) to swing the top-lens (41) on or off, when needed.

3.8 Adjusting tension

The tension of the focus mechanism has been pre-set at the factory. If the mechanical stage drops by itself, rotate the tension adjustment ring (19) with the tension wrench until the tension is in maintained.

3.9 Brightfield observing

1) Slide the dark field switch (34) to the BF (bright field) position.
2) Turn the desired objective at working position.
3) Adjust the coarse and fine focusing knobs (20, 21) to get sharp image.
4) Adjust aperture diaphragm (17 or 43) and field diaphragm (16 or 46) accordingly to make the image perfect.

3.10 Darkfield observing

1) Slide the dark field switch (34) at the DF (darkfield) observing position.
2) Turn darkfield objective 10X or 20X at working position.
3) Turn the intensity dial (24) to get enough light.
4) Adjust the coarse and fine focusing knob (20, 21) to get sharp image.
5) Adjust the aperture diaphragm (17 or 43) and field diaphragm (16 or 46) accordingly to make the image perfect.

3.11 Polarization observing

1) Insert the polarizer (37) and analyzer (35) into the slots.
2) Slide the BF/DF switch (34) to the BF side.
3) Turn the graduated dial on the analyzer to observe the polarized light image.

3.12 Photo/video observing, capturing and recording

1) Attach the photo tube (1) onto the trinocular viewing head (4).

2) Pull the phototube switch bar (15) out to the photo position.

3) Mount microscope camera (electronic eyepiece) onto the photo tube and connect the USB cable from camera to computer.

4) Launch image observing software to examine the specimen on the screen. 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 phototube.

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

4 Specifications

Model	M838TRMD
Magnification	50x, 75x, 100x, 150x, 200x, 300x, 400x, 500x, 600x, 750x, 1000x, 1500x
Eyepiece	EW10X/22, high eye point, Φ22mm field of view EW15X, Φ15mm field of view
Objective	Plan infinity objectives for bright field 5X/0.12 ∞/-, 40X/0.65 ∞/0.17 (spring) 50X/0.75 ∞/0 (spring) 100X/0.80 ∞/ 0 (dry, spring) 100X/1.25 ∞/0.17 (oil, spring) Plan infinity objectives for darkfield/brightfield 10X/0.25 ∞/ - 20X/0.40 ∞/0
Viewing Head	Trinocular, inclined 30º, swiveling 360º, hinge interpupillary distance adjustment, diopter ring on left ocular tube
Nosepiece	Revolving, quintuple, reversed
Focus system	Coaxial coarse and fine focusing, minimum fine focusing adjustment at 0.001 mm
Condenser	NA=0.9, with a top lens NA=0.25, with aperture iris diaphragm Center adjustable
Stage	Double layer mechanical, dimension 186mm X138mm, translational range 74mm X 50mm
Reflected Illumination	Halogen lamp 24V/100W, intensity adjustable With aperture and field iris diaphragm
Transmitted Illumination	Halogen lamp 24V/100W, intensity adjustable With field iris diaphragm on collector lens
Power	AC 100-240V, 50Hz/60Hz, 2.5A

5 Troubleshooting Guide

OPTICAL PROBLEMS

Problem	Cause	Solution
Darkness at the periphery or uneven brightness in the field of view	Revolving nosepiece not in click stop position	Revolve the nosepiece to click-stop position by swinging the objective correctly into the optical path
	The light source of the bulb is not at the center	Adjust the position of the bulb
Dirt or dust on the view	Dirt or dust on the lens eyepiece, condenser, objective, collector lens or specimen	Clean the lens with a camera cleaning kit
Poor image quality	No slide cover attached to the slide	Attach a 0.17mm slide cover
	Slide cover is too thick or thin	Use a slide cover of the appropriate thickness (0.17mm)
	Slide may be upside down	Turn slide over so the cover-glass faces up
	Immersion oil is on a dry objective (especially the 40x)	Check the objectives, clean if necessary
	No immersion oil used with 100x objective	Use immersion oil
	Air bubbles in immersion oil	Remove bubbles
	Condenser aperture is closed or open too much	Open or close properly
	Condenser is positioned too low	Position the condenser upward

ELECTRICAL PROBLEMS

Problem	Cause	Solution
Lamp does not light when switched on	No electrical power	Check power cord connection
	Lamp bulb burnt out	Replace bulb
	Fuse blown out	Replace fuse

IMAGE PROBLEMS

Problem	Cause	Solution
Image moves while focusing	Specimen rises from stage surface	Secure the specimen or specimen plate in the slide holder
	Revolving nosepiece is not in the click-stop position	Revolve the nosepiece to the click-stop position
Image tinged yellow	Blue filter not used	Use daylight blue filter
	Lamp intensity is too low	Adjust the light intensity by rotating the intensity control dial
Image is too bright	Lamp intensity is too high	Adjust the light intensity by rotating the intensity control dial
Insufficient brightness	Lamp intensity is too low	Adjust the light intensity by rotating the intensity control dial
	Aperture diaphragm closed too far	Open to the proper setting
	Condenser position too low	Position the condenser upward

MECHANICAL PROBLEMS

Problem	Cause	Solution
Image will not focus with high power objectives	Slide upside down	Turn the slide over so the cover glass faces up
	Cover glass is too thick	Use a 0.17mm cover glass
High power objective contacts slide when changed from low power objective	Slide upside down	Turn the slide over so the cover glass faces up
	Cover glass is too thick	Use a 0.17mm cover glass
	Diopter adjustment is not set properly	Readjust the diopter settings
Slippage of focus when using the coarse focusing knob Fine focus is ineffective	Tension adjustment is set too low	Increase the tension on the focusing knobs
	Tension adjustment is set too high	Loosen the tension on the focusing knobs