

User Manual

Polarizing Infinity Trinocular Microscope With Transmitted and Reflected Light

Model M838PLTR Series

MicroscopeNet.com

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i. Caution

1. Open the shipping carton carefully to prevent any accessory, i.e. objectives or eyepieces, from dropping and being damaged.
2. Do not discard the 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 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

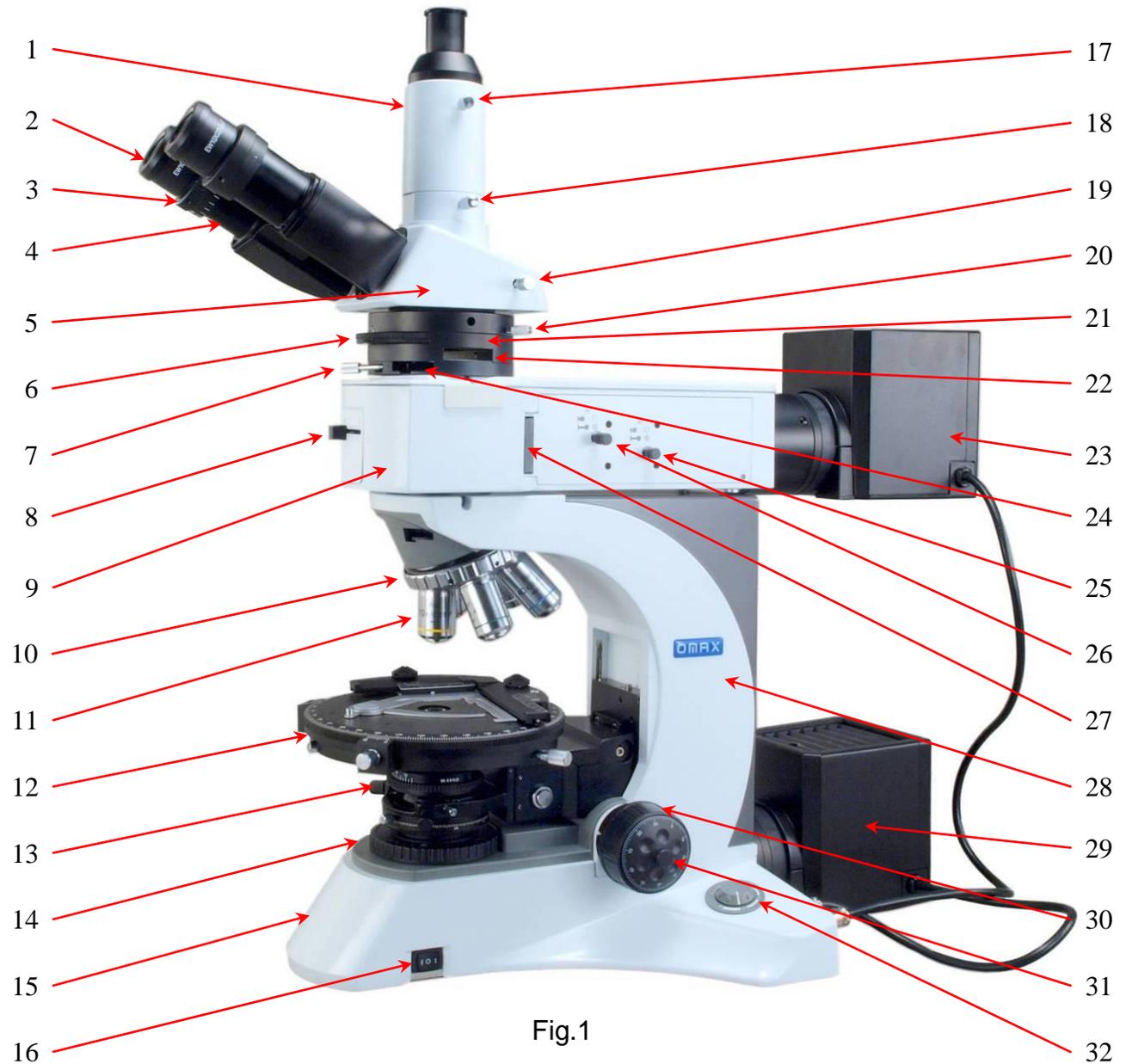


Fig.1

- | | | |
|-----------------------------|-----------------------------------|------------------------|
| 1. Phototube | 12. Stage | 22. Analyzer Slot |
| 2. Eyepiece | 13. Condenser | 23. Light Housing |
| 3. Diopter Ring | 14. Kohler Illumination | 24. Compensator Slot |
| 4. Eyepiece Tube | 15. Base | 25. Aperture Diaphragm |
| 5. Viewing Head | 16. Power Switch | 26. Field Diaphragm |
| 6. Bertrand Lens Switch | 17. Phototube Secure Screw | 27. Polarizer Slot |
| 7. Secure Screw | 18. Phototube Secure Screw | 28. Microscope Frame |
| 8. Light Path Switch | 19. Light Path Switch | 29. Light Housing |
| 9. Reflected Light Assembly | 20. Bertrand Lens Centering Screw | 30. Coarse Focus Knob |
| 10. Nosepiece | 21. Intermediate Attachment | 31. Fine Focus Knob |
| 11. Objective | | 32. Intensity Knob |

2 Installation

2.1 Installation of the reflected light assembly

- 1) Loosen the secure set screw 1 (see Fig.2) on the top of the microscope frame (27) with the Allen key and remove the black plastic cover.
- 2) Remove the plastic cap on the dovetail of the reflected light assembly (9).
- 3) Seat the dovetail into the socket on the top of the frame securely, and then tighten the set screw 1 (see Fig.2).

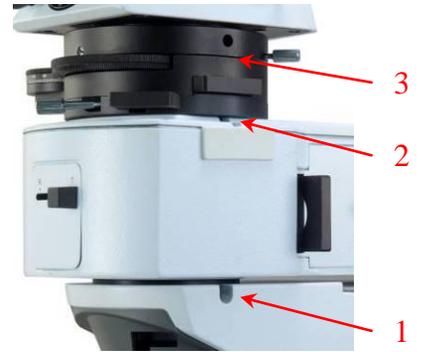


Fig. 2

2.2 Installing the intermediate attachment

- 1) Loosen the secure set screw 2 (see Fig.2) on the top of the reflected light assembly (9) with the Allen key provided; remove the plastic cover on the top.
- 2) Remove the cover on the dovetail at the bottom of the intermediate attachment (21).
- 3) Insert the dovetail of the attachment into the socket of the assembly. Ensure that it completely seats in, tighten the set screw 2 (see Fig.2).

2.3 Installing the viewing head

- 2) Loosen the secure set screw 3 (see Fig.2) in the intermediate attachment (21) with the Allen key provided, remove the plastic cover.
- 3) Remove the cap on the dovetail of the trinocular viewing head (5).
- 4) Seat the dovetail of the head into the socket of the attachment, and then tighten the set screw 3 (see Fig.2) with the Allen key provided.



Fig. 3

2.4 Installing the phototube

- 1) Find the two parts of the phototube in the package.
- 2) Screw the upper black part into the bottom white part and then tighten the phototube secure screw (17).
- 3) Loosen the phototube secure screw (18) on the photo port of the viewing head (5) and remove the plastic lid.
- 4) Insert the phototube into the port and then tighten the screw (18).

2.5 Installing the eyepieces

- 1) Remove the protective caps from the eyepiece tubes (4).
- 2) Insert the eyepieces into the eyepiece tubes (4).

2.6 Installing the condenser assembly (condenser and its rack)

- 1) Find the condenser assembly in the package.
- 2) Align the socket at the end of the condenser rack with the dovetail 1 (see Fig.4) on the frame and slide it all the way down.
- 3) Tighten the screw 2 (see Fig.4) with the Allen key provided

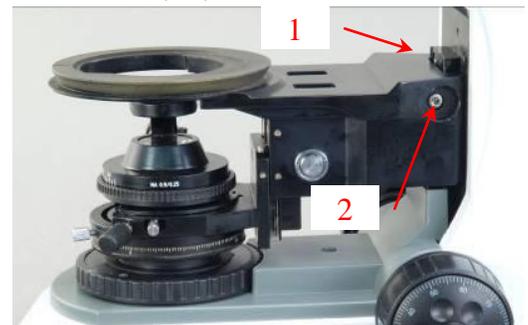


Fig. 4

2.7 Installing the rotary stage

- 1) Turn over the rotary stage and screw backwards the two stage centering screws 1 (see Fig.5)

- 2) Find the spring loaded rod 3 (see Fig.5) and align it with the notch 4 (see Fig.5), and then put the stage on the dovetail 5 (see Fig.5)
- 3) Turn the centering screws 1 (see Fig.5) to secure the stage on the dovetail 5 (see Fig.5)



Fig. 5

2.8 Installing the objectives

- 1) Adjust the coarse focus knob (30) until the stage (12) is at its lowest position.
- 2) Install the 4x objective into the nosepiece (10). Then in a clock-wise direction, rotate the nosepiece and install each succeeding higher power objective.

Note: There are 5 openings on the nosepiece and only 4 of them have centering screws. The one with no centering screws is for 10X objective. Make sure the 10X objective is installed on the opening with no centering screws (see Fig.6)



Fig. 6

2.9 Installing the light housing (transmitted)

- 1) Loosen the set screws 1 (see Fig.7) with the Allen key provided in the package.
- 2) Take off the plastic cover to reveal the opening 2 (see Fig.7).
- 3) Insert the light housing into the opening as shown in Fig.7 and then tighten the set screws 1 (see Fig.7) to secure the light housing.
- 4) Insert the power cable 6 (see Fig.7) into the power socket 3 (see Fig.7) and secure it with the back nut 5 (see Fig.7).

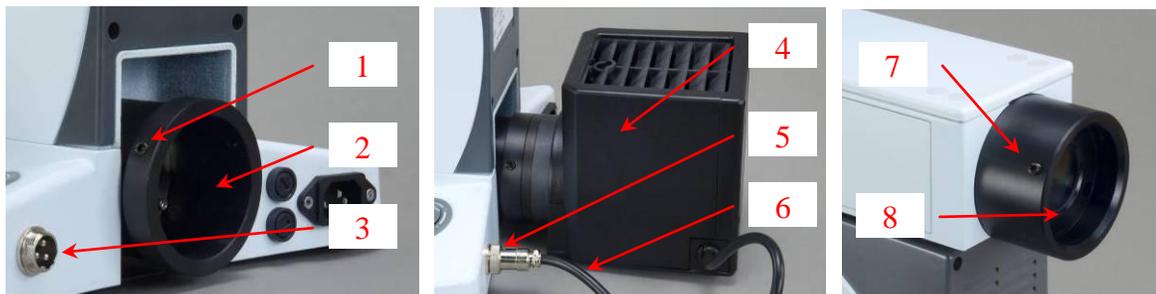


Fig. 7

2.10 Installing the light housing (reflected)

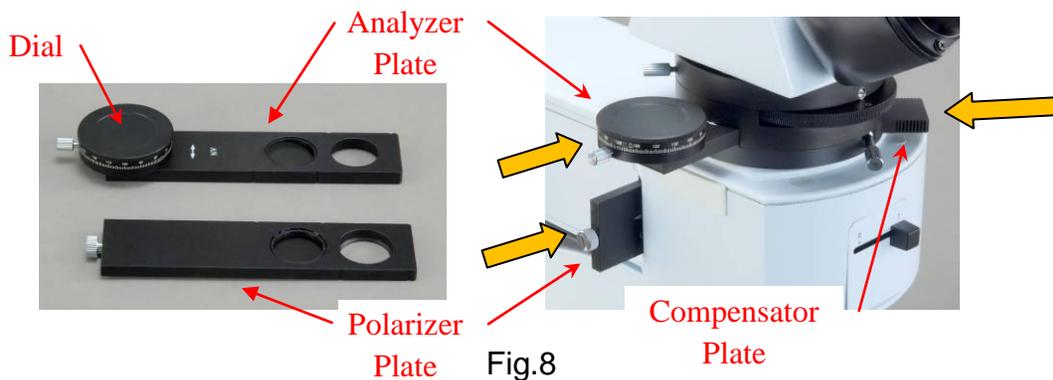
- 1) Loosen the set screws 7 (see Fig.7) with the Allen key provided in the package.
- 2) Take off the plastic cover to reveal the opening 8 (see Fig.7).
- 3) Insert the light housing into the opening and then tighten the set screws 7 (see Fig.7) to secure the light housing.
- 4) Insert the power cable into another power socket and secure it with the back nut.

Note: The light housing with longer power cord is reflected light housing; the one with shorter power cord is transmitted light housing.

2.11 Installing analyzer plate

Insert the analyzer plate into the analyzer slot (22) as shown in Fig.8

Note: There are two notches on each side of the analyzer plate, so that you will hear “click” when you insert it into the slot. The first “click” is the position of the opening in the light path; the second “click” is the position of the analyzer in the light path.



2.12 Installing polarizer plate (reflected)

Insert the polarizer plate into the polarizer slot (27) as shown in Fig.8.

2.13 Installing the compensator plate

Insert one of the compensator plates into the slot (24) as shown in Fig.8.

Compensators:

- 1- Quartz wedge (Q plate)
- 2- Tint plate (1λ plate);
- 3- Quarter-wave plate ($1/4 \lambda$ plate)
- 4- Substitute plate

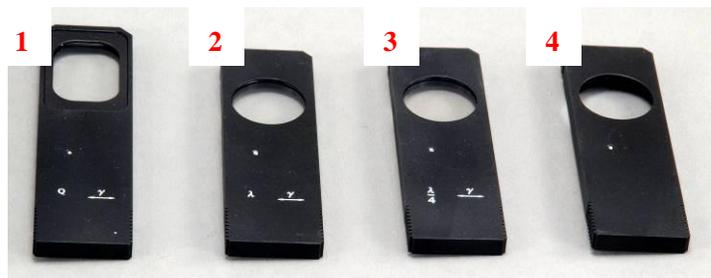


Fig. 9

2.14 Replacing the halogen bulb

- 1) Turn the power off and unplug the power cord. Wait for a while till the lamp and light housing cools down.
- 2) Loosen the screw 1 (see Fig.10) with the Allen key provided in the package.
- 3) Take off the cover.
- 4) Press the two levers 3 (see Fig.10) at the same time, and then pull out the halogen bulb 2 (Fig.10).
- 5) Insert new halogen bulb into the socket, and then release the levers 3 (see Fig.10)
- 6) Put back the cover and tighten the screw 1 (see Fig.10).

Caution: Don't touch the Halogen bulb with your bare fingers. The fingerprints left on the bulb will shorten the bulb's life.

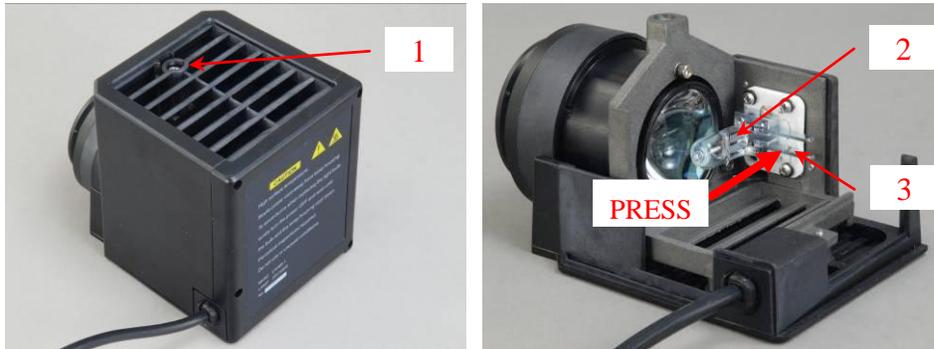


Fig. 10

2.15 Replacing the fuse

- 1) Find the fuse holders 1 (see Fig.11) at the back of the microscope.
- 2) With a flat screwdriver, press down the holder and turn counter clock wise to remove the holder.
- 3) Take out the holder and replace the fuse.
- 4) Insert the fuse holder into the socket and press it in with a flat screwdriver while turn clock wise.



Fig. 11

3 Operation

3.1 Adjusting illumination

- 1) Connect the power cord to the power outlet.
- 2) Set the light path switch (8) to the desired position (“R” for reflected light, “T” for transmitted light, see Fig.12).
- 3) Press the power switch (16) to turn the light on. (“I” and “II” for reflected and transmitted light separately, depend on which power socket the light using. Just try and find).
- 4) Rotate the intensity dial (32) to increase or decrease the brightness.

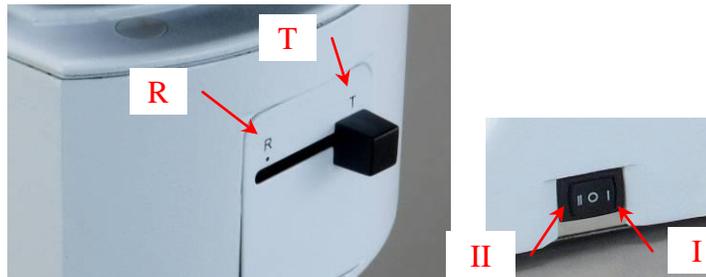


Fig. 12

3.2 Adjusting interpupillary distance

- 1) While observing with both eyes, hold the front part of the left and right eyepiece tubes (4) and swing (see Fig.13).
- 2) The interpupillary distance is correct when the left and right fields of view converge completely into one image.



Fig.13

3.3 Adjusting eyepiece diopter

- 1) Using the 10x objective and your right eye only, observe your specimen through the 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 (3) until a sharp image is obtained.

3.4 Focusing

- 1) With the 10x objective in position, raise the stage using the coarse focus knob (30) until the specimen is close to the objective.
- 2) Turn the coarse focus knob (30) until the specimen is in focus. Then use the fine

focus knob (31) to obtain a sharp image. You may now switch to another objective.
3) When changing the objective magnification, rotate the objective nosepiece (10) until you hear a “click” sound. This ensures the objective is centered in the optical light path.

3.5 Adjusting focus knob tension

The tightness of the tension adjustment collar 2 (see Fig.14) has been pre-set at the factory. If the mechanical stage drops by itself, rotate the tension adjustment collar 2 with the tension wrench 1 (see Fig.14) until the tension is maintained.

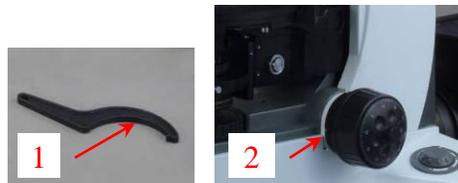


Fig.14

3.6 Condenser focus adjusting

- 1) Turn the condenser focus knob 1 (see Fig.15) to raise or lower the condenser. The condenser is raised when using high power objectives and lowered when using low power objectives.
- 2) The top lens 3 (see Fig.15) is flipped up by turning the knob 2 (see Fig.15) when using high power objective and/or in conoscopic observing mode.



Fig.15

3.7 Co-centering the stage and the objective

- 1) Remove the analyzer if it is installed and turn on the light.
- 2) Turn the 10X objective into the optical path.
- 3) Place a specimen on the stage and secure it by the slide holders 2 (see Fig.16).
- 4) Focus the specimen sharply.
- 5) Find a marked feature in the field of view, and make it to situate at point “O” (Center of the ocular’s crossline) by adjusting the mechanical stage translational knobs 1 (see Fig.16).
- 6) Rotate the stage, if the optical axis of the objective not coincides with the center of

the rotation of the stage, then, the target selected will rotate about certain center “S” (that is the rotating center of the stage), the trajectory of which is a circle (see Fig.17)

- 7) Turn the target point to the “O” and adjust the center of the stage by turning the centering screws 3 (see Fig.16) and allow the point “S” to move toward the point “O” and coincide with it.
- 8) Move the target back to the “O” point and repeat the co-centering procedures. Finally, the marked feature should stay at the center point “O” in the field of view as the stage is rotated, i.e. the stage and objective is co-centered.
- 9) After the stage has been centered, turn another objective into optical path and following the above procedures. The only difference is that you should adjust the centering screws of objective (see Fig.6) this time to move the point “O” toward the point “S” and coincide with it (see Fig.17). Following these procedures to align each objective with the stage.

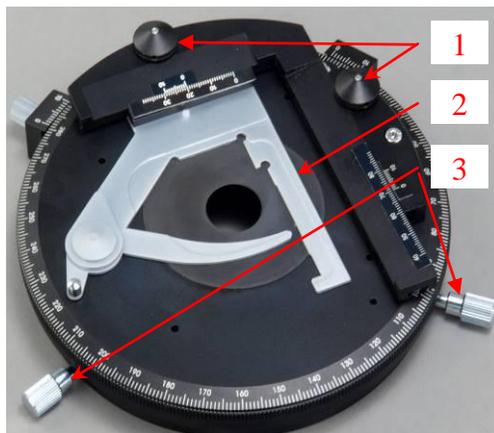


Fig. 16

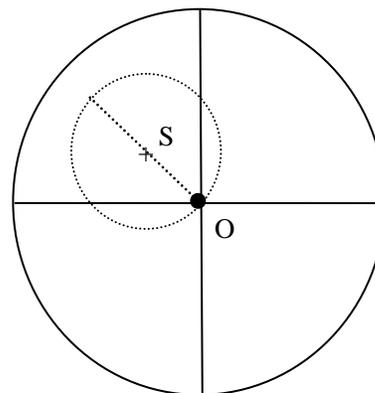


Fig.17

3.8 Establishing Kohler illumination (transmitted)

- 1) Turn the switch (8) to “T” position.
- 2) Turn on the transmitted light.
- 3) Remove the analyzer if it is installed and turn on the light.
- 4) Turn the 10X objective into the optical path.
- 5) Place a specimen on the stage and secure it by the slide holders 2 (see Fig.16).
- 6) Turn the condenser top lens 3 (see Fig.15) into light path.
- 7) Turn the ring 8 (see Fig.15) to close the field iris diaphragm to its smallest setting.
- 8) Focus the specimen
- 9) Focus the field iris diaphragm by raising or lowering the condenser.
- 10) Turn the condenser centering screws 5 (see Fig.15) to move the image of the field iris opening into the center of the eyepiece view field.
- 11) Open the field diaphragm until the iris leaves are just outside the viewing field.

3.9 Establishing Kohler illumination (reflected)

- 1) Turn the switch (8) to “R” position.
- 2) Turn on the reflected light.
- 3) Remove the analyzer if it is installed and turn on the light.

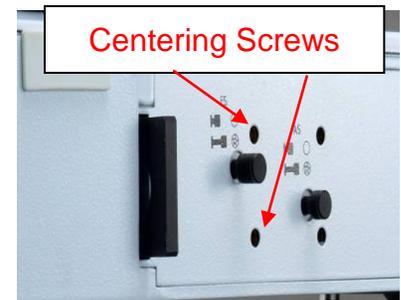


Fig. 18

- 4) Turn the 10X objective into the optical path.
- 5) Place a specimen on the stage and secure it by the slide holders 2 (see Fig.16).
- 6) Pull the rod (26) to close the field diaphragm to its smallest setting. The image of the iris leaves will be showed in the field of view.
- 7) Use the Allen key to adjust the two field diaphragm centering screws (see Fig.18) to move the image of the iris to the center.
- 8) Push the rod (26) until the iris leaves are just outside the viewing field.

3.10 Orthoscopic polarizing observing (reflected)

- 1) Slide the analyzer out of the light path.
- 2) Bring the specimen into sharp focus.
- 3) Slide the analyzer into the light path.
- 4) Rotate the analyzer dial (see Fig.8), or the polarizer ring 6 (see Fig.15), slowly to find the crossing position with the polarizer.

3.11 Orthoscopic polarizing observing (transmitted)

- 1) Slide the analyzer and polarizer out of the light path.
- 2) Bring the specimen into sharp focus.
- 3) Slide the analyzer and polarizer into the light path.
- 4) Rotate the analyzer dial (see Fig.8) slowly to find the crossing position with the polarizer.

3.12 Conoscopic polarizing observing

- 1) Set the microscope to the Orthoscopic observing mode.
- 2) High power objective is used normally for Conoscope observing.
- 3) Turn the condenser top lens into light path (if using transmitted light)
- 4) Turn the Bertrand lens switch dial (6) to the "B" position.
- 5) Turn the Bertrand lens centering screws (20) to center the Bertrand lens.
- 6) Adjust the dial 2 (see Fig.19) to focus the Bertrand lens.

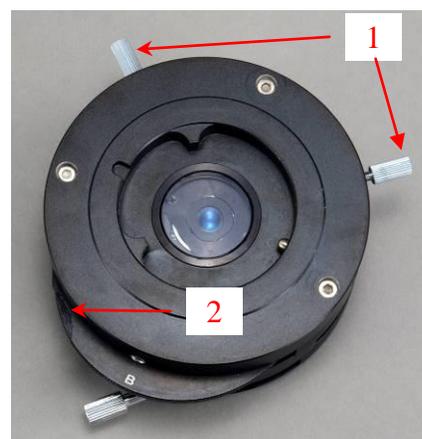


Fig.19

3.13 Photo/video observing, capturing and recording

- 1) Pull the switch rod (19) out to the photo position.
- 2) Mount microscope camera (electronic eyepiece) onto the photo tube as shown in Fig.20 and connect the USB cable from camera to computer.
- 3) 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. Please refer to the operation manual of the camera.
- 4) If a conventional camera used, you may need an adapter to connect your camera to the photo tube adapter.

Note: Camera is sold separately.



Fig.20

4 Specifications

Total Magnifications	50X, 100X, 200X, 400X, 500X, 1000X
Viewing Head	Siedentopf trinocular, 30° inclined, 360° swiveling Swing interpupillary distance adjustment 48mm – 75mm Adjustable diopter ring on left ocular tube
Eyepieces	2 WF10X/22 high eyepoint 1 WF10X/22 with crossline high eyepoint 1 WF10X/22 with scale crossline high eyepoint 1 WF10X/22 with grids high eyepoint
Objectives	strain free Infinity plan achromatic objectives 5X/0.12 ∞/-, W.D. 15.5mm 10X/0.25 ∞/-, W.D. 10.0mm 20X/0.40 ∞/0, W.D. 4.30mm 50X/0.75 ∞/0, W.D. 0.32mm (spring) 100X/0.80 ∞/0, W.D. 2mm (spring) 40X/0.65 ∞/0.17, W.D. 0.54mm (spring) 100X/1.25 ∞/0.17, W.D. 0.13mm (spring, oil)
Nosepiece	Revolving, quintuple, reversed, objective center adjustable
Condenser (transmitted)	strain free Abbe condenser with flip-top lens and iris diaphragm, NA=0.9/0.25 Center adjustable
Focus system	Coaxial coarse and fine focusing, tension adjustable
Rotary Stage	Circular stage, 360° rotatable, minimum graduation 1° (0.1° when using vernier), diameter 170mm With click-stop mechanism Mechanical stage installed, range 30mm x 40mm
Analyzer	Slide in and out of the light path, 0° - 360° rotatable Minimum graduation 1° (0.1° when using vernier),
Polarizer (transmitted)	Mounted on the bottom of the condenser, 360° rotatable Minimum graduation 2°
Polarizer (EPI)	Slide in and out of the light path
Bertrand Lens	Can be switch in and out of the light path, Center adjustable, Focusing adjustable
Compensators	Quarter-wave plate (1/4 λ plate) Tint plate (1 λ plate) Quartz wedge (Q plate)
Cameras (<i>optional</i>)	Refer to the cameras specifications

Illumination (transmitted)	Kohler system with field iris diaphragm and aperture iris diaphragm Halogen bulb 24V/100W, brightness adjustable
Illumination (EPI)	Kohler system with field iris diaphragm and aperture iris diaphragm Halogen bulb 24V/100W, brightness adjustable
Filter (transmitted)	Blue
Filter (EPI)	Blue, green, yellow, white
Power	AC 100V – 240V, 50Hz/60Hz, 2.5A
Dimension	56cm x 28cm x 62cm (22in x 21-1/4in x 24-1/2in)

5 Optional Parts

(The optional parts may be included in some models or sold separately.)

	Model	Sensor	Resolution	Operating System	Software
	A3513U	CMOS USB2.0	1280 x 1024 (1.3MP)	MS Windows Mac OS 10.8 and up Linux (2.6 or above)	Included
	A3520U		1600 x 1200 (2.0MP)		
	A3530U		2048 x 1536 (3.0MP)		
	A3550U		2592 x 1944 (5.0MP)		
	A3590U		3488x2616 (9.0MP)		
	A35100U		3584 x 2748 (10.0MP)		
	A35140U		4096 x 3288 (14.0MP)		
	A3550U3	CMOS USB3.0	2560 x 1922 (5.0MP)		
	A35100U3		3584 x 2746 (10.0MP)		
	A35140U3		4096 x 3286 (14.0MP)		
	A35180U3		4912 x 3684 (18.0MP)		
	CPZJ-150R	CMOS	2560 x 1920 (5.0MP)	N/A	N/A

6 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 condenser is off the center	Adjust the condenser
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 when using objective with mark $\infty/0.17$
	Slide cover attached to the slide	Do not use slide cover when using objective with mark $\infty/0$
	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 not right	Adjust the condenser according to 3.6 and 3.7
	Not using top lens of condenser	Turn the top lens into the light path when using high power objective

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 knob
Image is too bright	Lamp intensity is too high	Adjust the light intensity by rotating the intensity knob
Insufficient brightness	Lamp intensity is too low	Adjust the light intensity by rotating the intensity knob
	Aperture diaphragm closed too far	Open to the proper setting
	Condenser is positioned not right	Adjust the condenser according to 3.6 and 3.7
	Not using top lens of condenser	Turn the top lens into the light path when using high power objective

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	Tension adjustment is set too low	Increase the tension on the focusing knobs
Fine focus is ineffective	Tension adjustment is set too high	Loosen the tension on the focusing knobs