# User Manual

# Trinocular Infinity Fluorescent Microscope

## Model M838FLR 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 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. All electrical connectors (power cord) should be inserted into an electrical surge suppressor to prevent damage due to voltage fluctuations.

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

7. 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.

8. The mercury bulb is not installed in the lamphouse. Install the bulb following the steps in **2.9** of this manual before performing fluorescent observation.

**Important:**

9. The lamp, lamphouse and adjacent parts will become very hot. Do not touch these parts until they have completely cooled. Never attempt to handle a hot bulb.

10. Keep the UV shield installed when conduct fluorescence observation.

11. To prolong the lifetime of mercury bulb,
    a) Don’t touch the glass surface of mercury bulb with bare fingers.
    b) Don’t turn the light off after less than 15 min of turning it on.
    c) The time between you turn the mercury lamp off and turn it on again should be at least 10 min.
12. Don’t adjust the mirror centering knobs (33, 39) on the EPI lamphouse, unless it is necessary.

# ii. Care and Maintenance

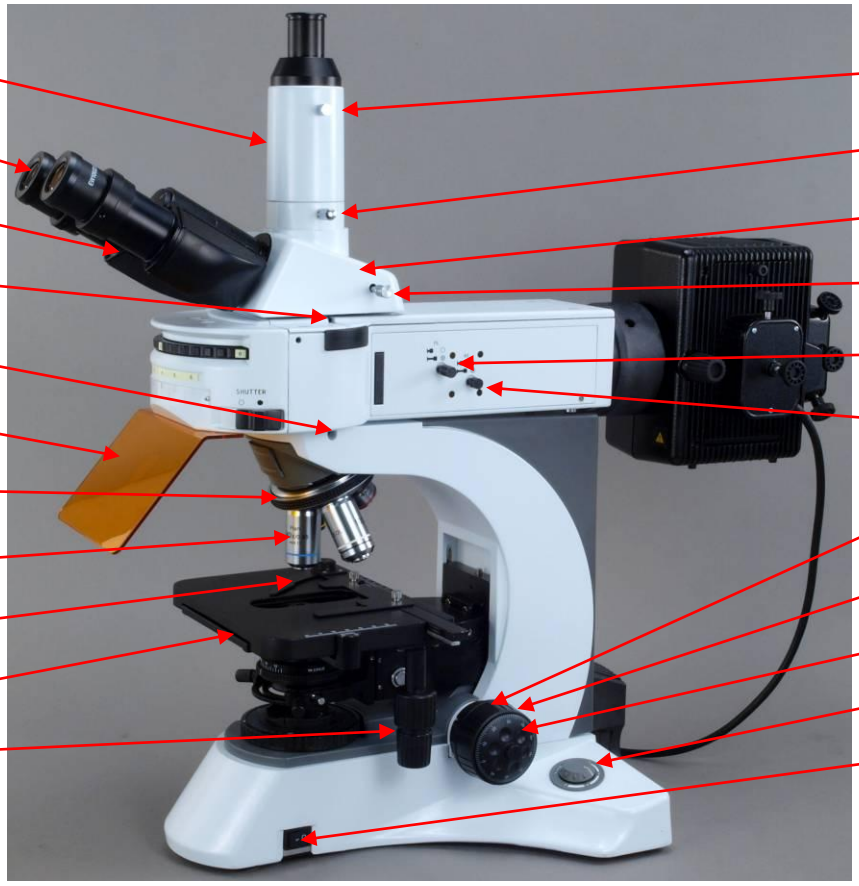
1. Do not attempt to disassemble any component including eyepieces, objectives or focusing assembly.

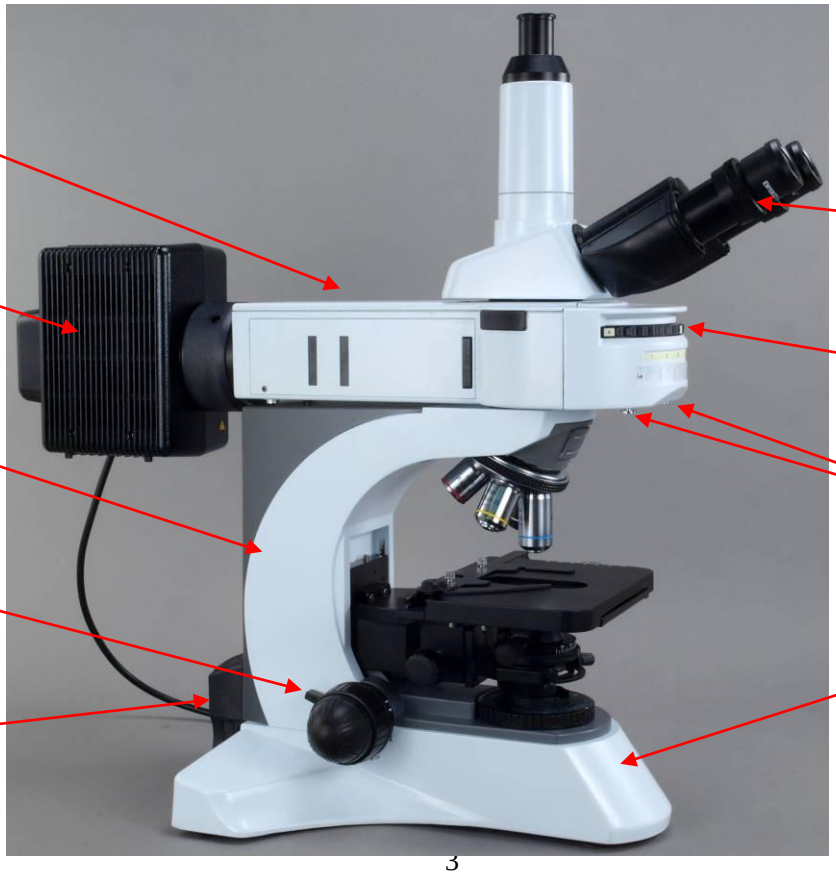
2. Keep the instrument clean; remove dirt and debris regularly. Accumulated dirt on metal surfaces should be cleaned with a damp cloth. More persistent dirt should be removed using a mild soap solution. **Do not use organic solvents for cleansing**.

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. Head Secure Screw
5. EPI Unit Secure Screw
6. UV Shield
7. Nosepiece
8. Objective
9. Slide Holder
10. Mechanical Stage
11. Translation Knobs
12. Thumb Screw
13. Phototube Secure Screw
14. Viewing Head
15. Phototube Switch
16. Field Diaphragm
17. Aperture Diaphragm
18. Focus Tension Ring
19. Coarse Focus Knob
20. Fine Focus Knob
21. Intensity Knob
22. Power Switch
23. EPI Unit
24. EPI Lamphouse
25. Microscope Frame
26. Focus Stop
27. Transmitted Lamphouse
28. Diopter Ring
29. Filter Turret
30. Shield Mounting Screws
31. Microscope Base
32. Lamphouse Cover Screw
33. Mirror Centering Knob
34. Bulb Centering Knob
35. Set Screw
36. Mirror Focus Knob
37. Collector Adjust Knob
38. Bulb Centering Knob
39. Mirror Centering Knob
40. Condenser Top Lens
41. Top Lens Knob
42. Condenser
43. Aperture Diaphragm Ring
44. Condenser Centering Screws
45. Color Filter Holder
46. Field Diaphragm Ring
47. Condenser Focus Knob
48. Lifetime display
49. Current Display
50. Reset Pin Hole
51. Trigger Button
52. Power Switch
53. Hertz Switch
54. DC Power outlet
55. AC Power Socket
56. Fuse Holders
57. Voltage Switch

# 2 Installation

## 2.1 Installation of the Epi-fluorescent unit

1) Loosen the secure set screw (5) on the top of the microscope frame (25) with the Allen key and remove the plastic cover.
2) Remove the cap on the dovetail of the Epi-fluorescent unit (23).
3) Seat the dovetail into the socket on the top of the frame securely, and then tighten the set screw (5).

## 2.2 Installation of the trinocular viewing head

1) Loosen the set screw (4) on the top of the Epi-fluorescent unit (23) and remove the plastic cover.
2) Remove the cap on the dovetail of the trinocular viewing head (14).
3) Insert the trinocular viewing head (14) into the socket on the top of the EPI-fluorescent unit (25); ensure that the dovetail is completely seated into the socket; tighten the set screw (4).

**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 phototube

1) Loosen the thumb screw (13) on the top of the viewing head (14).
2) Insert the white part of the phototube (1) and tighten the thumb screw (13).
3) Insert the black part of the phototube (1) into the white part and thread it in.
4) Tighten the thumb screw (12) on the phototube (1).

## 2.4 Installation of the eyepieces

1) Remove the protective caps from the eyepiece tubes (3).
2) Insert the eyepieces (2) into the eyepiece tubes (3).

## 2.5 Installation of the EPI lamphouse

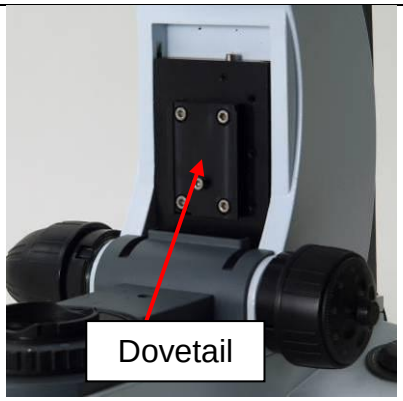
1) Remove the plastic caps on the lamphouse.
2) Loosen the set screws (see the right picture) and remove the black plastic cap on the back of the Epi-fluorescent unit (23), to where the lamphouse connects.
3) Insert the lamphouse (24) into the opening.
4) Tighten the set screws.

## 2.6 Installation of the transmitted lamphouse

Hold the transmitted lamphouse (27) and insert the 4 pins (2 thick and 2 thin) into the 4 holes at the lower back of the frame (25).

## 2.7 Installation of the stage

1) Adjust the coarse focus knob (19) so that the dovetail (see the pictures below) is at its lowest position.
2) Hold the stage, align the slot at back of the stage to the dovetail and slide down, as shown in the pictures below.
3) Arise the stage (10) by adjusting the focus knob (19); make sure the stage is completely slid down all the way to the end.
4) Tighten the set screw by Allen key to lock the dovetail joint, as shown in the pictures below.





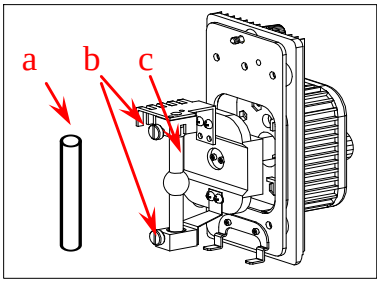
## 2.8 Installation of the objectives

1) Adjust the coarse focus knob (19) until the mechanical stage (10) is at its lowest position.
2) Install the lowest magnification objective (8) onto the nosepiece (7). 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.

## 2.9 Installation of the EPI mercury bulb




1) Loosen the screw (32) on lamphouse (24). Remove the cover.
2) Loosen the 2 set screws (b) and remove the plastic rod (a) from the bulb.
3) Insert the positive end (thick end) of mercury bulb (c) into the bottom holder. Then press the bottom holder down slightly to insert the negative end (thin end) into the upper holder.
4) Tighten the 2 set screws (b).

**Caution:**

- Don’t touch the glass surface of bulb with bare fingers.
- When replacing the bulb, make sure the power cord is disconnected and the power switch is turned off.
- The bulb and lamphouse are very hot during and short after operation. Don’t try to replace the mercury bulb or open the lamphouse until the lamphouse is cool down.
- After installing/replacing a mercury bulb, press the “RESET” (50) on the front panel of power supply to start the lifetime from zero on the lifetime display (48).

## 2.10 Installation of the UV shield

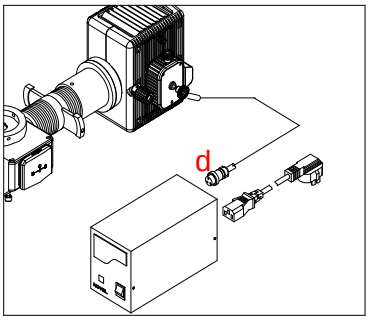
1) Align the two U-shaped notches on the shield (6) with the two screws (30) and slide them in.
2) Tighten the two screws (30).

## 2.11 Installation of the color filters

The color filter is simply put into the filter holder (45).

## 2.12 Connecting the power cord of fluorescence power

1) Turn the power switch (52) to the off position.
2) Insert the plug (d) into the socket (54) that labeled “OUT” at the back of power supply.
3) Connect the power cord to the AC power socket (55) and plug the other end into a wall outlet.



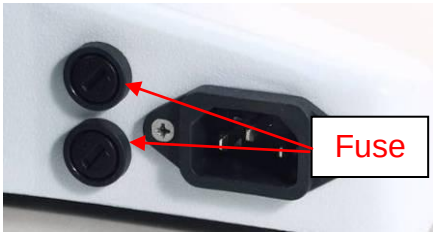

**Caution:** Before connect the cord to the wall outlet; make sure the voltage switch (57) and Hertz switch (53) is slide to the correct position for the right power source.

## 2.13 Replacing the transmitted halogen bulb

1) Unplug the power cord from the wall outlet.
2) Make sure the bulb is cooled down before you start to work.
3) Pull off the transmitted lamphouse (27).
4) Replace the halogen bulb and put the lamphouse (27) back onto the frame (25).

## 2.14 Replacing the fuses of EPI power supply

1) Turn the power switch (52) to the off position. Disconnected the power cord.
2) Turn the fuse holders (56) counter clock wise.
3) Replace the broken fuses and turn the holders back.




## 2.15 Replacing the fuses of transmitted illuminator

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

# 3 Operation

### 3.1 Transmitted illumination

1) Connect the power cord to the power outlet and the microscope.
2) Turn on the power switch (22).
3) Rotate the intensity knob (21) to increase or decrease the brightness

### 3.2 Epi-fluorescent illumination

1) Check if the hertz switch (53) and the voltage switch (57) at the back of power supply are correct. If not, slide them to the right position.
2) Turn the power switch (52) to “O” (off) position. Plug the power cord to the wall outlet.
3) Turn the power switch (52) to “I” (on) position to light the mercury lamp. The mercury lamp will be steady condition after 5-10min.
4) For first time use, some of the new mercury lamp may not work after you turn the power on. Keep the power switch at “I” (on) position and press the trigger button (51) less than 4 seconds. If it still doesn’t work, repeat the procedures again.

**Caution:**

- To prolong the lifetime of mercury bulb, don’t turn the light off after less than 15 min of turning it on.
- The time between the mercury lamp being turned off and on again should be at least 10 min.

### 3.3 Placing specimen

1) Place a specimen slide on the mechanical stage (10). Secure the slide gently with the slide holder (9).
2) Turn the X and Y translational knobs (11) to position the specimen for viewing.

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

### 3.4 Focusing

1) Rotate the nosepiece to turn the 4X objective in position.
2) Raise the mechanical stage (10) using the coarse focus knob (19) until the specimen is in focus. Then use the fine focus knob (20) 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 (26).

### 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 (19,20).
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 (28) until a sharp image is obtained.

### 3.7 Condenser focus adjusting

1) Turn the condenser focus knob (47) to raise or lower the condenser. The condenser is

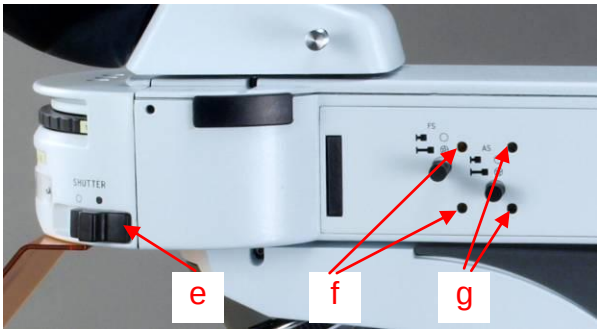
raised when using high power objectives and lowered when using low power objectives.

2) The top lens (40) is flipped up by turning the knob (41) when using high power objectives.

### 3.8 Establishing transmitted Kohler illumination

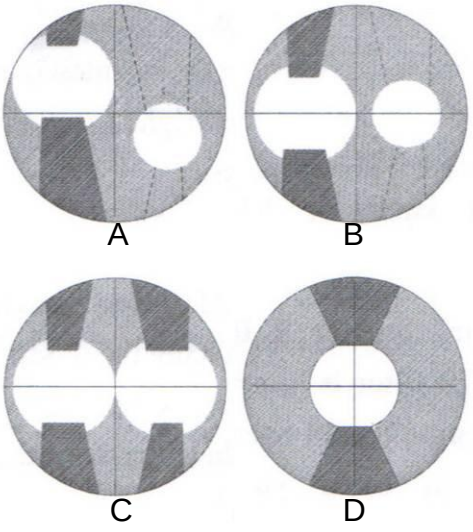
1) Turn the 10X objective into the light path.
2) Place a specimen on the stage (10) and secure it by the slide holders (9).
3) Turn the condenser top lens (40) into light path.
4) Turn the ring (46) to close the field iris diaphragm to its smallest setting.
5) Turn on the transmitted light and focus the specimen
6) Raise or lower the condenser till the image of field iris diaphragm is focused.
7) Turn the condenser centering screws (44) to move the image of the field iris diaphragm into the center of the viewing field.
8) Open the field diaphragm until the leaves are just outside the viewing field.

### 3.9 Establishing EPI Kohler illumination




1) Switch the light shutter (e) to "●" position.
2) Turn the filter turret (29) to put the "B" filter in the light path.
3) Switch the shutter (e) to "O" position.
4) Turn the 10X objective into the light path.
5) Place a specimen on the stage (10) and secure it by the slide holders (9).
6) Turn on the reflected light and focus the specimen.
7) Pull the field iris diaphragm bar (16) to close the iris to its smallest setting. The image of the iris leaves will be showed in the field of view.
8) Use the Allen key to adjust the two field diaphragm centering screws (f) to move the image of the iris to the center.
9) Push the bar (16) in to open the diaphragm until the leaves are just outside the viewing field.

### 3.10 Fluorescence illumination centering




1) Switch the light shutter (e) to "●" position.
2) Turn the filter turret (29) to put the "B" filter in the light path.
3) Turn the 10X objective into the light path.
4) Place the centering plate on stage (10). Through transmitted light observation, adjust the stage (10) until the crossline is in the center of the viewing field.
5) Remove the objective from nosepiece and leave the opening in the light path.
6) Pull out the field iris diaphragm bar (16) to close and push in the aperture iris diaphragm bar (17) to open it.
7) Switch the shutter (e) to "O" position.
8) Turn the collector adjust knob (37) to project the arc image on the centering plate and focus it. (see Fig. A).

9) Turn the bulb centering knob (34,38) to move the arc image and the mirror reflected arc image at the same horizontal level (see Fig. B)
10) Adjust the mirror focus knob (36) to focus the mirror reflected arc image (see Fig. C).
11) Turn the bulb centering knob (34, 38) to overlap the arc image with the mirror reflected arc image (see Fig. D).
12) Adjust the collector adjust knob (37) to make the field of view as bright as possible.
13) Maintain this condition until the next replacement of the mercury light bulb.

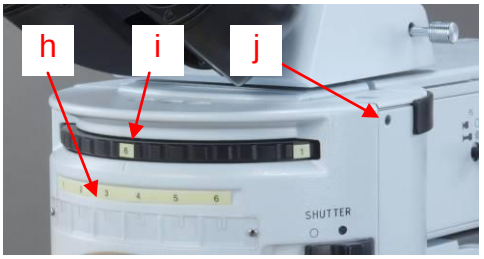
**Important:** Don't adjust the mirror centering knobs (33, 39), unless it's necessary. The mirror has been centered in factory. There is no way to recover it to the factory state after the mirror is adjusted.

### 3.11 Adjusting aperture iris diaphragm

Turn the aperture diaphragm ring to adjust the aperture size.

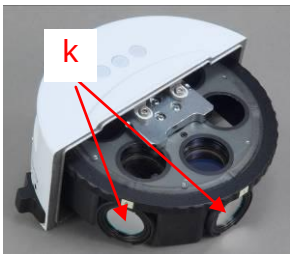
### 3.12 Adjusting tension

The tension of the focus mechanism has been pre-set at the factory. If the mechanical stage drops by itself, rotate the focus tension adjustment ring (18) with the tension wrench until the tension is in maintained.




### 3.13 Observing with transmitted illumination

1) Switch the light shutter (e) to "●" position
2) Turn the Filter Turret (29) to a position that no filter cube installed.
3) Adjust interpupillary distance, diopter, field and aperture diaphragm, and focus following the procedures in this manual




### 3.14 Mark the filters

1) Loosen the screw (j) with an Allen key and pull filter turret (29) out.
2) Turn the filter turret upside down and will find the letters G, B, U, V on each side of the filter cubic (k).
3) Match the numbers (i) with each turret and mark them down at the front side (h).
4) Insert the turret (29) back the tighten the screw (j)

### 3.15 Observing with Epi-fluorescent illumination

1) Put the specimen on the stage.
2) Turn on the mercury lamp.
3) Turn the filter turret (29) to put the desired filter cube into the light path.
4) Switch the shutter (e) to "O" position.
5) Bring the specimen into focus.

### 3.16 Photo/video observing, capturing and recording

1) Mount microscope camera (electronic eyepiece) onto the photo tube and connect the USB cable from camera to computer.
2) Pull the phototube switch bar (15) out to the photo position.
3) 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.
4) If a conventional camera used, you may need an adapter to connect your camera to the phototube.

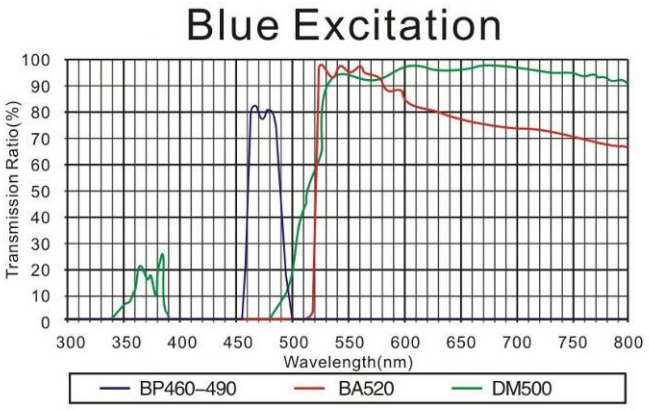
**Note:** Microscope digital camera is optional.

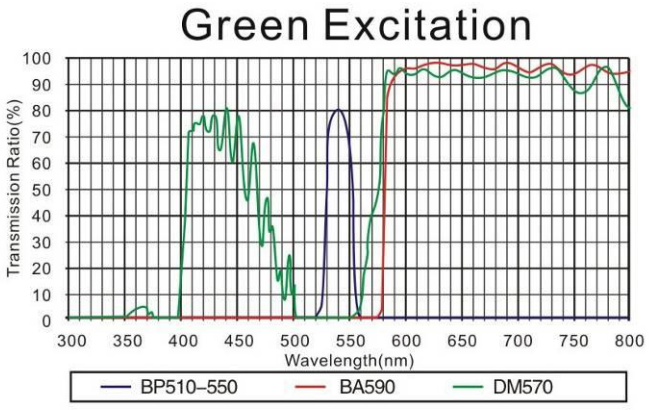
# 4 Specifications

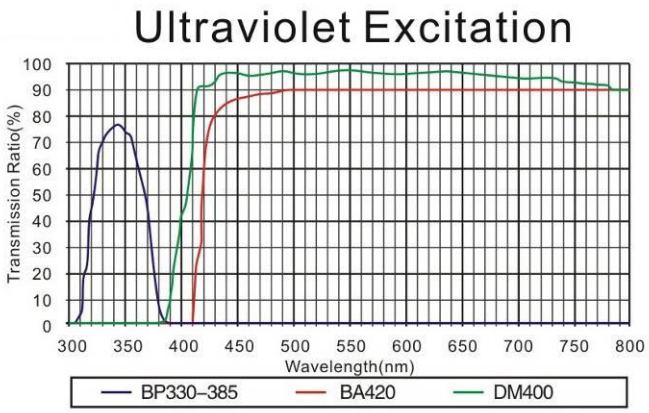
| | |
|---|---|
| Magnification | 40X, 100X, 400X, 1000X |
| Eyepiece | EW10X/22, high eye point, Φ22mm wide field of view |
| Objective | Plan infinity objectives achromatic<br>4X/0.10 ∞/-<br>10X/0.25 ∞/0.17<br>40X/0.65 ∞/0.17 (spring)<br>100X/1.25 ∞/0.17 (oil, spring) |
| Viewing Head | Siedentopf trinocular, inclined 30º, swiveling 360º<br>Hinge interpupillary distance adjustment, 48mm-75mm (1-7/8" – 3")<br>Diopter ring on left ocular tube |
| Nosepiece | Revolving, quintuple, reversed |
| Stage | Double layer mechanical, dimension 185mm X142mm (7-9/32" x 5-19/32")<br>Coaxial X and Y translational knob, range 75mm X 55mm (2-3/16"x3") |
| Focus system | Coaxial coarse and fine focus knobs on both sides with focus stop<br>tension adjustable, focus stroke 27mm, fine division 0.001mm |
| Transmitted Kohler illumination | |
| Condenser | NA=0.9/0.25, with a flip up top lens, built-in aperture iris diaphragm<br>Center adjustable, rack and pinion adjustment |
| Collector | With built-in field iris diaphragm, and color filter holder |
| Illuminator | 6V/30W Halogen bulb, intensity adjustable |
| Power | AC 115V, 50/60Hz |
| Epi-fluorescent illumination | |
| Collector | Built-in, spiral adjustment |
| Diaphragm | Aperture iris diaphragm, center adjustable<br>Field iris diaphragm, center adjustable |
| Cameras (***optional***) | Refer to the cameras specifications |
| Illuminator | 100W HBO super high-pressure spherical mercury lamp, center adjustable |
| Filter turret | Six spaces available, with shutter, easy to mount third party filters |
| Filter Cube | Blue, Green, Ultraviolet and Violet |
| UV shield | included |
| Power | 100W, AC 115V/230V, 50Hz/60Hz switchable, with digital displays for lifetime (hour) and current (A) |

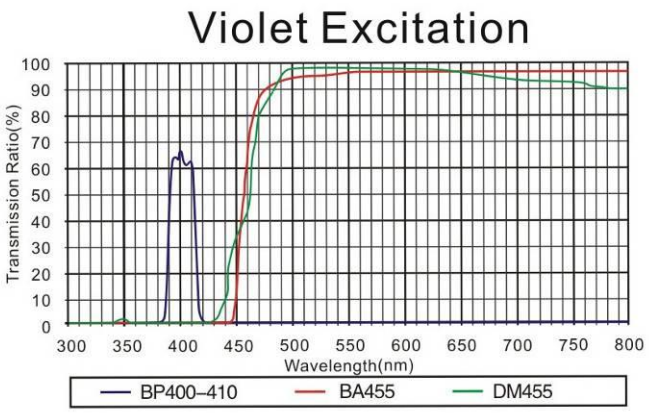
## Fluorescent filter cubes

| Excitation | Diachronic Mirror | Excitation Filter | Barrier Filter | Application |
|---|---|---|---|---|
| U | DM400 | BP330-385 | BA420 | - Auto-fluorescence observation<br>-DAPI: DNA<br>-Hoechest 332528, 33342, Chromosome |
| V | DM455 | BP400-410 | BA455 | -Catecholamines<br>-5-hydroxy tryptamine<br>-Tetracycline:Skeleton,Teeth |
| B | DM500 | BP460-490 | BA520 | -FITC: Fluorescent antibody method<br>-Acidine orange: DNA,RNA<br>-Auramine: Tubercle bacillus<br>-EGFP,S65T,RSGFP |
| G | DM570 | BP510-550 | BA590 | -Rhodamine,TRITC: Fluorescent antibody method<br>-Propidium iodide: DNA<br>-RFP |



# 5 Optional Parts

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

| | Model | Sensor | Resolution | Operating System | Software |
|---|---|---|---|---|---|
|  | A3520U | CMOS USB2.0 | 1600 x 1200 (2.0MP) | MS Windows<br>Mac OS 10.8 and up<br>Linux (2.6 or above) | Included |
|  | A3590U | | 3488x2616 (9.0MP) | | |
|  | A35100U | | 3584 x 2748 (10.MP) | | |
|  | A35140U | | 4096 x 3288 (14.0MP) | | |
|  | A3514UPB | CCD USB2.0 | 1360 x 1024 (1.4MP) | | |
|  | 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 |
|---|---|---|
| Although the reflected EPI light is on, the field of view is dark or invisible | The light shutter at close setting | Switch the shutter (e) to “O” position |
| | The fluorescent filter cube is not in the right position | Turn the turret to a click-stop position |
| | The field diaphragm not in the center | Center the field iris diaphragm |
| | The aperture and field iris diaphragm are not opened enough | Open and adjust the aperture and field diaphragm |
| 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 field iris diaphragm are not opened enough | Open field diaphragm |
| | The field diaphragm not in the center | Center the field iris diaphragm |
| | The EPI fluorescent light bulb is not at the center | Adjust the position of the bulb |
| | The EPI collector focus position is not correct | Adjust to a proper position |
| | The EPI fluorescent filter cube is not in the right position | Turn the turret to a click-stop position |
| Dirt or dust on the view | Dirt or dust on the lens eyepiece, condenser, objective, collector lens | 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 |
| | Aperture is closed or open too much | Open or close properly |

| | | |
|---|---|---|
| | Condenser top lens not in use | Flip up the top lens when using high power objective |
| | The field diaphragm not in the center | Center the field iris diaphragm |
| | The aperture and field iris diaphragm are not opened enough | Open and adjust the aperture and field diaphragm |
| | Condenser is not in the right position | Adjust the condenser |

**ELECTRICAL PROBLEMS**

| Problem | Cause | Solution |
|---|---|---|
| Lamp does not light when switched on | No electrical power | Check power cord connection |
| | The power cord is connected improperly | Connect it properly |
| | Lamp bulb burnt out | Replace bulb |
| | Fuse blown out | Replace fuse |
| | The mercury bulb in not installed | Install the mercury bulb |
| | The auto ignition system is malfunction | Set the main switch of the power supply unit to OFF then ON again. (Repeated ON-OFF is possible in this case) |
| The mercury light flickers or the brightness is low | The phenomenon is observed in a short period after ignition | Wait for 10 minutes or more after ignition |
| | The mercury bulb life has expired | Replace the mercury bulb |

**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 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 top lens not in use | Flip up the top lens when using high power objective |
| | Condenser not in right position | Adjust the position of the condenser |

**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 |