

**Motic<sup>®</sup>**

**Epi-Illuminator  
Instruction Manual**

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MOTIC INCORPORATION LTD.

We are constantly endeavouring to improve our instruments and to adapt them to the requirements of modern research techniques and testing methods. This involves modification to the mechanical structure and optical design of our instruments.

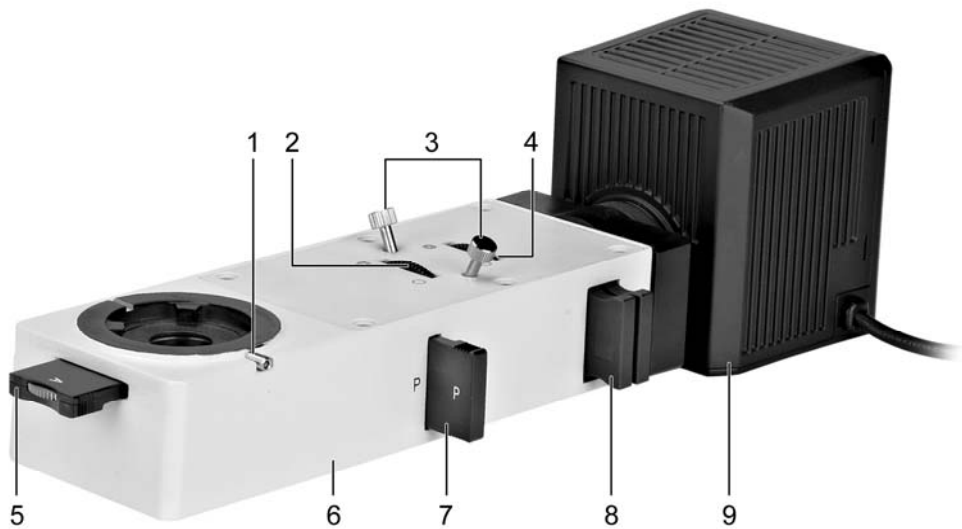
Therefore, all descriptions and illustrations in this instruction manual, including all specifications are subject to change without notice.

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## I. Nomenclature

### EPI Illuminator



1. Clamp screw	2. Field diaphragm adjustment wheel
3. Field diaphragm centering screw	4. Aperture diaphragm adjustment wheel
5. Analyser	6. Main body
7. Polariser (Optional)	8. Filter slider
9. 50W Halogen lamp house	

## MRL 100 Power unit

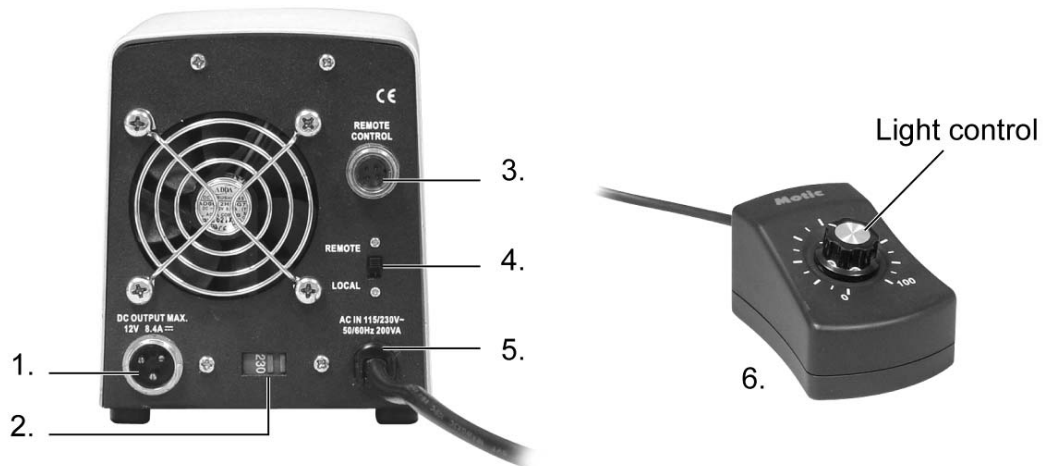


fig.1

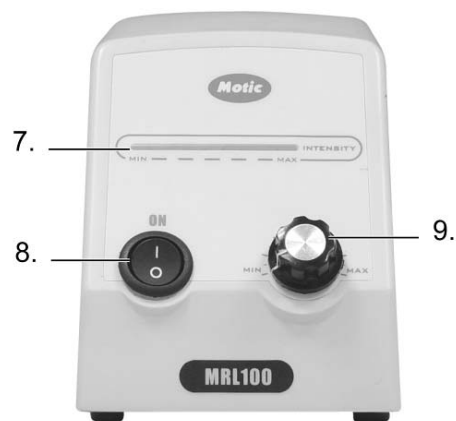


fig.2

1. Outlet socket	2. Supply voltage selection switch
3. Remote control connection socket	4. Light control mode switch
5. Power cord	6. Remote controller (Optional)
7. LED indicator	8. Main Switch
9. Brightness control knob	

## 1. Specifications

### a. Epi Illumination:

- 12V/50W Halogen; Reflected Light System
- Input: 115 / 230V~, 60 / 50Hz, 200VA
- Output: 12VDC, 8.4A max
- Fuse: 250V T2.5A (If the original fuse is blown, please replace with specified fuse)

### b. MRL 100 Power Unit:

- Supply Voltage: 115/230VAC  $\pm 15\%$  47~63Hz
- Output Voltage: 3V – 21VDC  $\pm 10\%$  (Halogen lamp working voltage)
- Output Current: max 8.4A

## 2. Operating Environment

### a. EPI Illumination

- Indoor use
- Altitude: Max 2000 meters
- Ambient temperature: 5°C to 40°C
- Maximum relative humidity: 75% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C
- Supply voltage fluctuations: Not to exceed  $\pm 10\%$  of the normal voltage.
- Pollution degree: 2 (in according with IEC60664)
- Installation / Overvoltage category: 2 (in according with IEC60664)
- Air pressure of 75kPa to 106kPa
- No hoar frost, dew, percolating water, rain

### b. MRL100 Power Unit

- Indoor use only
- Altitude: Max 2000 meters
- Operating temperature: 5°C to 45°C
- Storage temperature: -10°C to 60°C
- Maximum relative humidity:  
At 31°C, relative humidity at 80%,  
At 40 °C, decrease relative humidity to 50%.

- Installation category: II
- Pollution degree: 2
- Active environment quality: Conductive dust and corrosive gas free.
- Breaking capacity: 1750VAC / 5MA / one minute without breaking
- Internal fuse: T2.5AL 250V low breaking capacity glass tube fuse (with delay)
- Average problem-free usage: MTBF>10000H
- Dimensions (W x D x H ): 260 x 100 x 120 mm
- Weight: 1.35 Kg

### **3. Input voltage**

- Change the required input voltage manual by the voltage selector switch and always use a power cord that is rated for the voltage used in your area and that has been approved to meet local safety standards. Using the wrong power cord could cause fire or equipment damage.
- In case of using the extension cord, use only a power supply cord with a protective earth (PE) wire.
- In order to prevent electric shock, always turn the power switch on the power supply off before connecting the power cord.

### **4. Illumination**

- Halogen lamp

The quartz halogen lamp, used as a light source, has higher luminance and color temperature than conventional tungsten lamps. The luminance is approximately four times greater.

As long as the lamp voltage is kept constant, the halogen lamp maintains the same level of brightness and color temperature regardless of whether it is new or nearing the end of its life.

## II. Setting up the Microscope

### 1. EPI Illuminator

- Loosen the arms clamp screw. Insert the round dovetail adapter on the EPI illuminator into the dovetail mount on the microscope arm.



1. Clamp Screw

- For the best image quality, install the EPI illuminator horizontally.

### 2. Eyepiece Tube

- ① Loosen the eyepiece clamp screw.
- ② Insert the dovetail adapter on the eyepiece tube into the dovetail mount on the microscope arm.
- ③ Tighten the eyepiece tube clamp screw to secure the eyepiece tube in place.



1. Eyepiece clamp screw



### **3. Filters**

- Pull out the slider on EPI illuminator
- Place the filter and/or ground glass in the filter holder on the slider and make sure the frosted side of ground glass is faced to the lamp.
- Push the slider to make sure the filter/ground glass stay in the optical path.

### **4. Power Cord**

- Connect the socket of the of the power cord to the AC inlet on the rear of the base of the microscope. Plug in the other end of the cord to an AC outlet with ground conductor.
- Plug the power cord from lamp house to the outlet on the rear panel of the microscope.

### III. Microscopy

#### 1. Illumination Brightness Adjustment



MRL100 Power Unit

- a. Confirm your local power supply rating and then at the back of the unit adjust the voltage selection switch accordingly (115V or 230V). Connect the lamp house cable to the socket.
- b. Choose the light control method as required:
  - Panel control: Set the "Light control mode switch" to "LOCAL". Place the unit on your desk and adjust the brightness by the brightness control knob on the front panel.
  - Remote control: Set the "Light control mode switch" to 'REMOTE'. Place the unit anywhere within 1.5 meters (as the cable allows) of your instrument, plug the remote control cable into the remote control socket and adjust the brightness with the remote control.
- c. Connect the power cord plug to the AC receptacle. Set the main switch to "I" (ON). The ventilation fan will start running and the LED indicator light will illuminate indicating the power has been connected. Now adjust the brightness by turning the

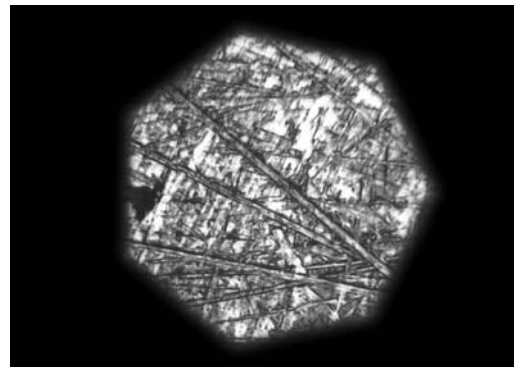
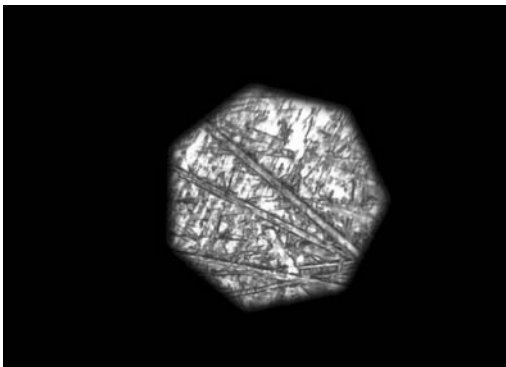
brightness control knob, clockwise to increase the brightness or counter clockwise to decrease it. The luminance of LED indicator light will be changed according to the adjustment by panel control.

## 2. Field Diaphragm Centering

- Clear diaphragm image can be obtained after the specimen is in focus.
- Adjust the aperture diaphragm until aperture diaphragm is 2/3 of field then center the aperture diaphragm via the knurled knob on the top of EPI illuminator.
- Set the aperture diaphragm slightly bigger than the field of view by turning the adjustment wheel.

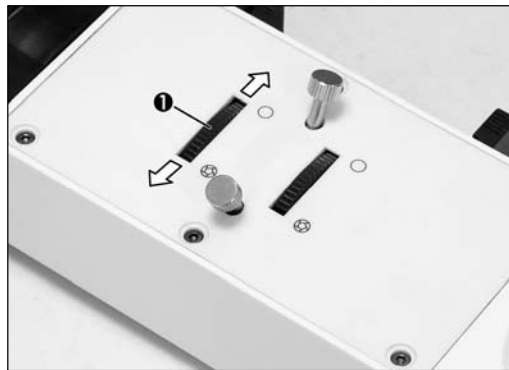


1. Field Diaphragm Adjustment Wheel    2. Field Diaphragm Centering Screw



### 3. Use of Aperture Diaphragm

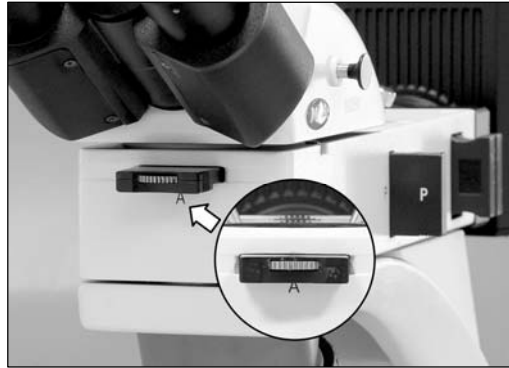
- The condenser aperture diaphragm is provided for adjusting the numerical aperture (N.A.) of the illuminating system of the microscope, it decides the resolution of the image, contrast, depth of focus and brightness.
- Stopping down will lower the resolution and brightness but increase the contrast and depth of focus.
- It is recommended that the aperture diaphragm is set at  $2/3$  of the objective N.A to get the best contrast and image quality.
- To adjust the aperture diaphragm:  
Adjust the condenser aperture diaphragm lever referring to the condenser aperture scale, or by observing the diaphragm image visible on the exit pupil inside the eyepiece tube, or by using a centering telescope after removing one of the eyepieces and focusing on the aperture diaphragm.



1. Aperture Diaphragm Adjustment Wheel

### 4. Use of Polariser and Analyser

- Insert the polariser (marked with "P") into the front slot of EPI.
- Insert the Analyser (marked with "A") into the side slot of EPI.
- Analyser is rotatable and the color of specimen with polarization will be changed when rotating.



## 5. Brightness and Contrast Adjustment

- Blue filter is used for color temperature adjustment in routine microscopy and photomicrography.
  - Frost filter reduces irregularity in the illumination field, but also reduces the brightness.
  - To ensure enough brightness, remove the frost filter out of light path when using the high magnification objectives and low reflectivity of sample.
- For the best contrast and image quality, adjust the condenser aperture diaphragm lever accordingly when the objective changed.

## IV. Troubleshooting Table

As you use your instrument, you may occasionally experience a problem.

The troubleshooting table below contains the majority of frequently encountered problems and the possible causes.

### Optical

Problem	Possible Cause
Vignetting or uneven brightness in the field of view or field of view only partially visible	Lamp not installed properly
	Condenser not mounted correctly
	Condenser is set too low
	Aperture diaphragm closed too far
Dust or dirt in the field of view	Filter not in placed in properly
	Aperture diaphragm closed too far
Poor image (low contrast or resolution)	Condenser is set too low
	Aperture diaphragm closed too far
Image tinged yellow	Lamp voltage is set too low
	Blue filter is not being used

### Electrical

Lamp does not light	Power supply not plugged in
	Lamp not installed
	Lamp burnt out
Inadequate brightness	Specified lamp not being used
Lamp blows out immediately	Specified lamp not being used
Lamp flickers	Connectors are not securely connected
	Lamp near end of service life
	Lamp not securely plugged into socket

## V. Care and Maintenance

### 1. EPI Illumination

#### a. Cleaning of painted or plastic components

- Do not use organic solvents (thinners, alcohol, ether, etc.). Doing so could result in discolouration or in the peeling of paint.
- For stubborn dirt, moisten a piece of gauze with diluted detergent and wipe clean.
- For plastic components, only moisten a piece of gauze with water and wipe clean.

#### b. Bulb Replacement

- To avoid potential shock hazard, always set the power switch to “O” (OFF) and disconnect the power cord before replacing the bulb.
- The bulb, lamp housing and areas near these will be extremely hot during and right after use. Please replace the bulb with a soft cloth during use or allow it cools down right after use

- The applicable halogen bulb is the 12V 50W halogen long-life bulb.
- ❶ Fully loosen the slotted head knurled screw on the back of the lamp house.
- ❷ Lift the lamp house to remove.
- ❸ Remove the old bulb with a piece of gauze and insert the new bulb's pins all the way into the pin holes on the lamp socket.
- Fit the lamp house from above and tighten the slotted head knurled screw.





- c. Disinfecting the Instrument
- Follow the standard procedures for your laboratory.
- d. When not in use
- When not in use, cover the instrument with vinyl dust cover and store in a place low in humidity where mould is not likely to form.
  - Store the filters in a container or desiccator with drying agent.
  - Proper handling of the microscope will ensure years of trouble free service.
  - If repair become necessary, please contact your Motic agency or our Technical Service direct.



## **2. MRL100 Power Unit**

- a. Use the instrument in an area with good air circulation. Do not place large devices or devices that emit large amounts of heat near the instrument. When the instrument is in use, make sure the air intakes at the base and sides and the fan at the back of the unit are kept free from obstructions as this will ensure proper heat dispersal. As well, do not cover the outer surface of the instrument with paper, cloth or any other object that will affect heat dispersal.
- b. If the instrument has been used for a period time and suddenly does not illuminate, it is possible the bulb has reached the end of its life. A new bulb of the same specifications should be installed. When in use, the instrument should not be frequently turned on and off as this will shorten the life of the bulb and damage the electronics.
- c. When installing and using the internally housed halogen bulb and filter, protect from oil stains by avoiding contact with bare hands. If contaminated, use absorbent cotton dipped slightly in an ethyl-alcohol mixture to wipe clean.
- d. Do not position the equipment so that it is difficult to unplug the power supply cord from the unit.
- e. The instrument should be kept clean and free of dust, moisture and oil to ensure the machine's proper electrical insulation. When cleaning the outer surface of the instrument, do not use water or any corrosive cleaning agents. Use a clean piece of silk cloth dipped slightly in benzene to wipe clean. If the instrument is not to be used for an extended period of time, place it back into its box and store in a low humidity environment.
- f. When using the fiber optic light, do bend at a right-angle or even slightly less than a right-angle as this will cause the optic fiber to break. The light's input/output plugs and the flexible tube's joints are especially susceptible to breakage.


- g. Before using this instrument, ensure the local power supply voltage rating is the same as at least one of the voltage conversion switch settings on the back panel of the unit. As well, be sure not to randomly switch the voltage setting at any time as this may damage the instrument.
  
- h. Users should respect local safety protocol and must bear full responsibility for the safe operation of this instrument. Should the instrument become damaged, do not attempt to disassemble and/or repair. Contact the distributor's service department or send the instrument directly to the manufacturer for repairs.

**Note:**

- If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
  
- Avoid placing the instrument in locations exposed to direct sunlight, dust, vibration, high temperature, high humidity and where it is difficult to unplug the power supply cord.

## VI. Warning labels

The following warning labels (or symbols) are found on the microscope, Study the meaning of the warning labels (or symbols) and always use the equipment in the safest possible manner.

Warning Label / Symbol	Explanation
	Indicates that the surface becomes hot, and should not be touched with bare hands.
	Indicates that the main switch is ON.
○	Indicates that the main switch is OFF.
~	Indicates alternating current.

Proper handling of the microscope will ensure years of trouble free service.

If repair become necessary, please contact your Motic agency or our Technical Service directly.

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