

***Motic***

---

SWIFTLINE

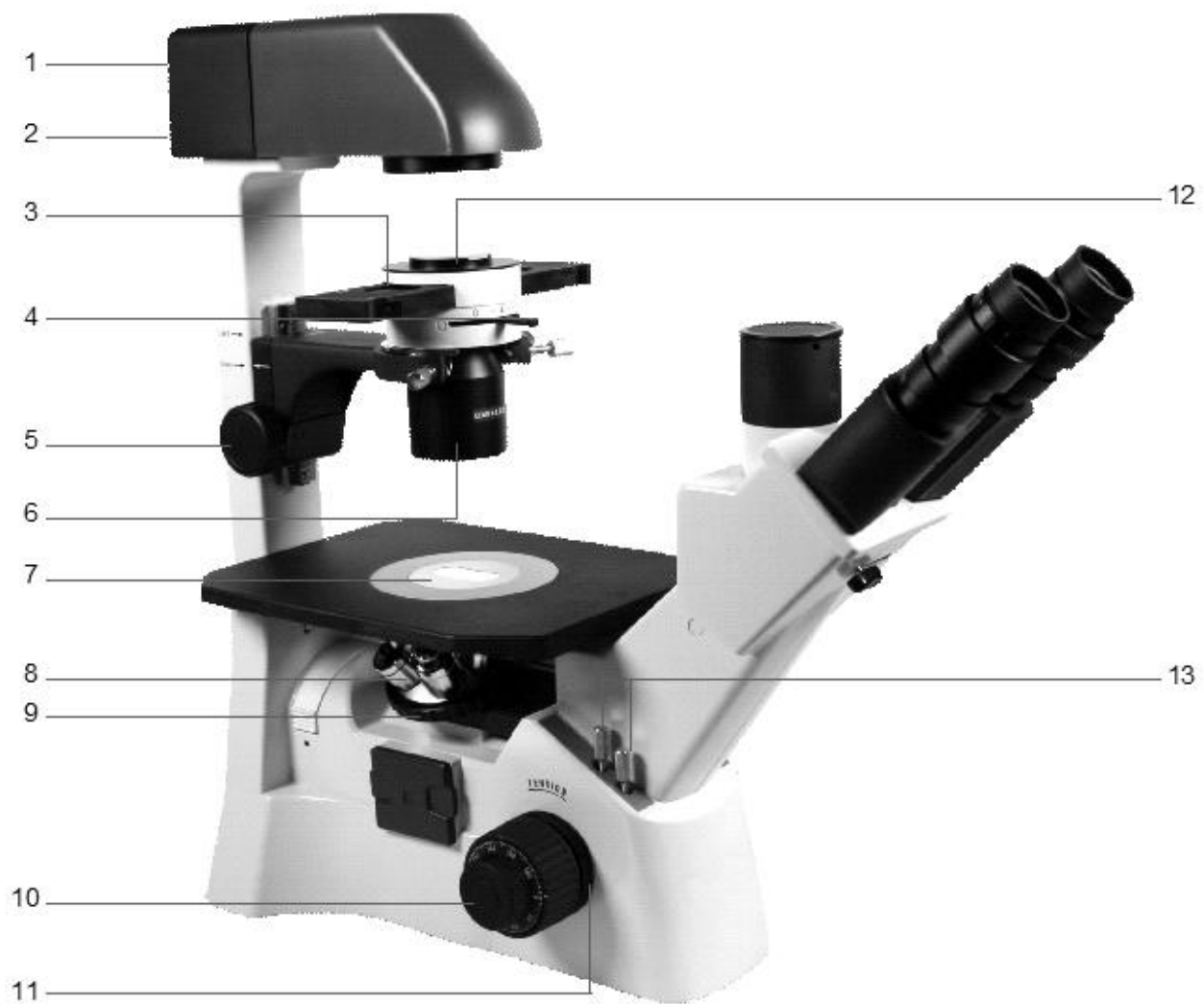
---

**Inverted Microscope  
Instruction Manual  
Model MAE-31R**

## TABLE OF CONTENTS

### SECTION

II	Specifications .....	4
III	Setting-up the Instrument .....	5
IV	Assembling the microscope Input voltage .....	6
1	Installing the lamp .....	6
2	Mounting the condenser.....	6
3	Installing Objectives .....	7
4	Mounting the eyepieces .....	7
V	Microscopic procedure Interpupillary distance adjustment .....	7
1	Diopter adjustment .....	8
2	Centering the Condenser .....	8
3	Centering the lamp.....	9
4	Brightfield microscopy .....	11
5	Phase-contrast microscopy .....	11
VI	Photo Procedure.....	13
VII	Troubleshooting Table .....	15
VIII	Care and maintenance .....	16
1	Lenses and filters.....	16
2	Cleaning of painted or plastic components.....	16
3	When not in use .....	16
IX	Warranty .....	17



- 1. Lamp Socket Clamp Screw Knob
- 2. Lamp House Cover Clamp Screw
- 3. Annular Diaphragm
- 4. Condenser Diaphragm Lever
- 5. Condenser Focus Knob
- 6. Condenser Lens
- 7. Stage Plate Insert

- 8. Objectives
- 9. Revolving Nosepiece
- 10. Coaxial Coarse/Fine Focus Knob
- 11. Torque Adjusting Ring
- 12. Filter Retaining Ring
- 13. Hexagonal Centering Screwdrivers (x2)



1. Vertical Photo Port
2. Interpupillary Distance Scale
3. Diopter Adjustment Ring
4. Eyepiece
5. Optical Path Selector Lever
6. Filter Slider
7. Lamp House
8. Field Diaphragm Lever
9. Condenser Clamp Screw
10. Phase Slider
11. Condenser Clamp Holder Screw
12. Condenser Centering Screws
13. Stage Plate
14. Fluorescence Filter cassette Mount
15. Power Switch
16. Light Intensity Control Dial
17. Brightness Indicator (LED Segmented Display)

## II Specifications

- Magnification Ratio: 40X – 400X
- Eyepiece: N-WF 10X/22mm with diopter adjustment, +/- 5 diopter
- Objectives: Infinity Corrected

<b>Magnification</b>	<b>N.A.</b>	<b>W.D. (mm)</b>
Plan Achromat 4X	0.10	23.5
Plan Achromat Phase 10X	0.25	7.5
Plan Achromat Phase LWD 20X	0.40	7.0

- Condenser: Extra Long Working Distance N.A. 0.3 / W.D. 72mm
- Electrical Specifications:
  - Input: IEC 90-240V~, 35W, 50-60Hz, 0.6A Max (UL / CE)
  - Lamp: 6V, 30W Halogen (100hrs)
  - Fuse: 250V T2.5A

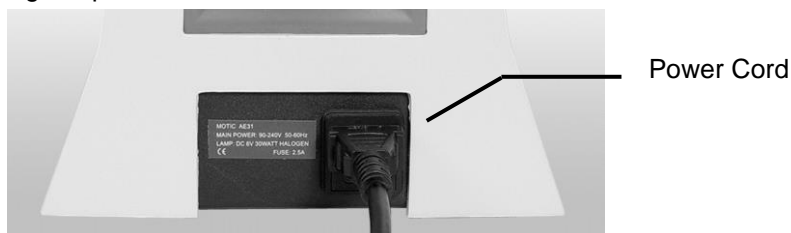
### **III Setting-up the Instrument**

#### **Working environment**

- The location should be free from dust, moisture, chemical vapors and mechanical vibrations.
- Do not situate the instrument in a warm and/or humid environment.
- Locate the instrument where the operator's line of vision is not directed towards a window, a lamp or a well-lit bright wall. The quality of the viewed image from the microscope will deteriorate where there is significant ambient light.

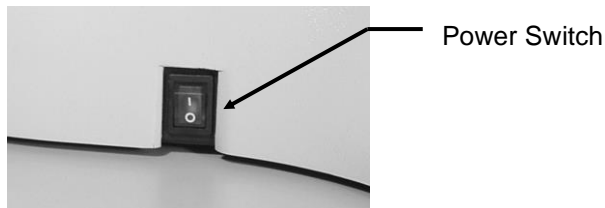
#### IV Assembling the microscope Input voltage

- Automatic voltage selection works with electrical outlets worldwide. However, 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.
- The use of an extension cord is discouraged and may damage the electrical components of the microscope.
- In order to prevent electric shock, always turn the power switch on the power supply off before connecting the power cord.

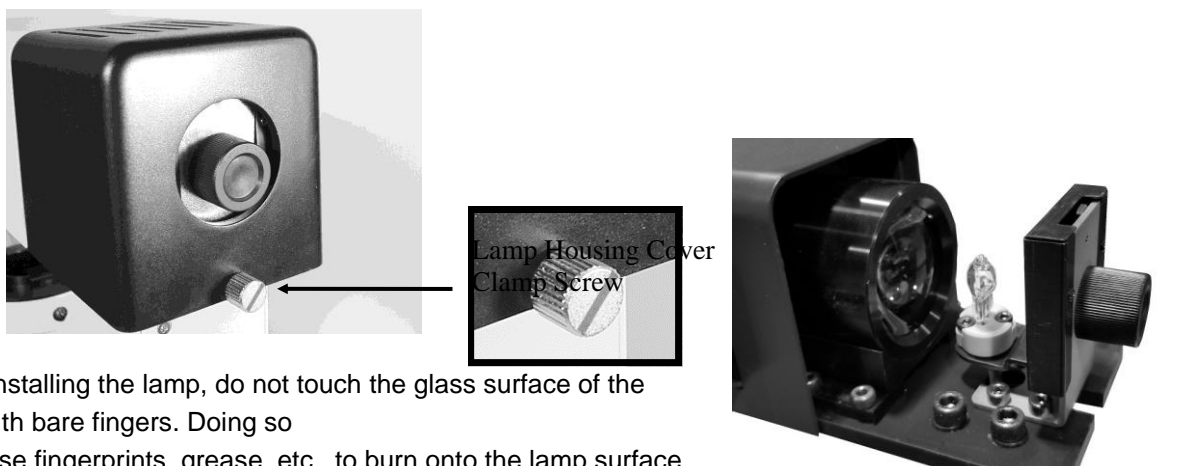


##### 1 Installing the lamp

- In order to prevent electric shock always turn the power switch off and unplug the power cord before replacing the lamp.



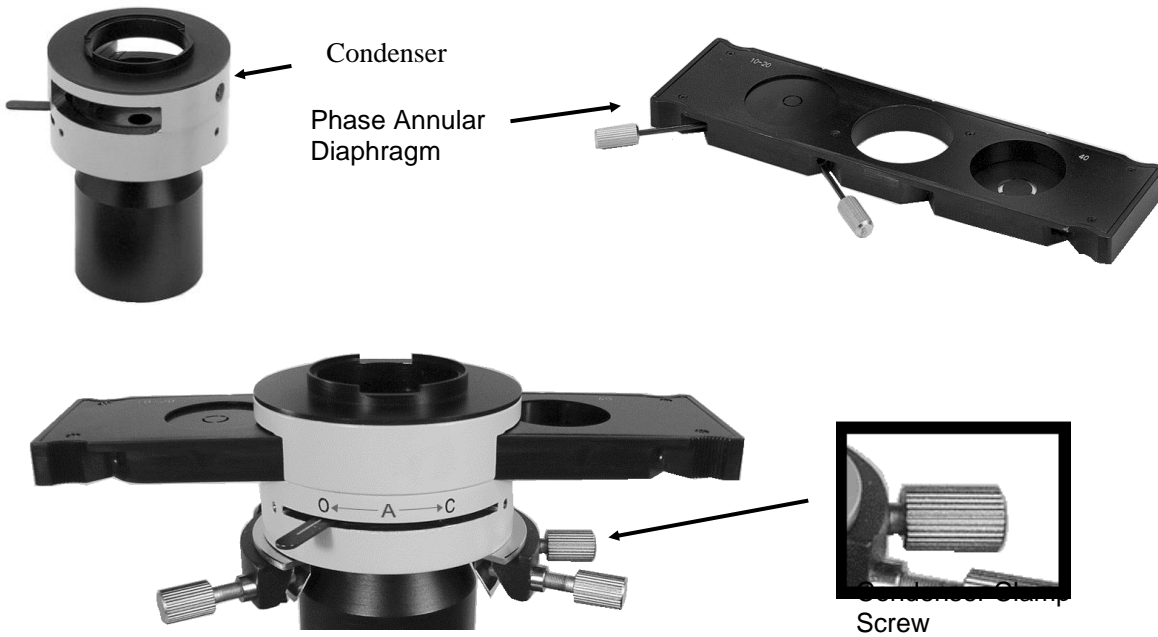
- Loosen and remove the lamp housing cover clamp screw using a coin. Then remove the lamp house cover.



- When installing the lamp, do not touch the glass surface of the lamp with bare fingers. Doing so will cause fingerprints, grease, etc., to burn onto the lamp surface, reducing the illumination provided by the lamp. If surface is contaminated, wipe it clean using lens tissue.
- Firmly insert the lamp into the socket pinholes until it reaches the limit, be careful not to tilt the lamp when mounting.
- Close the cover and fasten it with it with lamp housing cover clamp screw.

##### 2 Mounting the Condenser

- Mount the condenser with the index marks and aperture diaphragm lever facing forward. Then secure it with the clamp screw.



- Insert the phase annular diaphragm slider with centering hexagonal socket head screws facing the front. See the images above for reference.

### 3 Installing Objectives

- Remove the stage plate insert from the stage.
- Install the objectives into the nosepiece so that the magnification increases with clockwise rotation of the revolving nosepiece.



- Replace the stage plate insert.

### 4 Mounting the eyepieces

- Remove the dust caps from the eyepiece tubes.
- Insert the eyepieces into the eyepiece tubes.
- If the rubber eye guards are to be used, fit them in the groove around the eyepiece.



## V Microscopic procedure Interpupillary distance adjustment

- Before adjusting the interpupillary distance, bring a specimen into focus using the 10x objective.

- Adjust the interpupillary distance so that both the right and left field of view become one.
- This adjustment will enable the user to observe the specimen with both eyes



## 1 Diopter adjustment

- Diopter adjustment compensates for differences in vision between the left and right eyes. In addition to making observation through both eyes easier, this adjustment also reduces the extent to which focusing is lost when the objective magnification is changed. In particular, this occurs when a low power objective is used.
- Before adjusting the diopter, bring a specimen into focus using the 10x objective.
- Turn the diopter compensation ring on each eyepiece until the adjustment ring is adjusted to "0" position.



Diopter adjustment "0" position

- Position 40x objective into the optical path and bring the specimen image into focus by turning the coarse and fine focus knobs.
- Position either 4x or 10x objective into optical path. Without adjusting the fine and coarse focus knobs, turn the diopter rings on the eyepieces so that the specimen images in the left and right eyepieces are focused individually.
- Repeat the above step twice.

## 2 Centering the Condenser

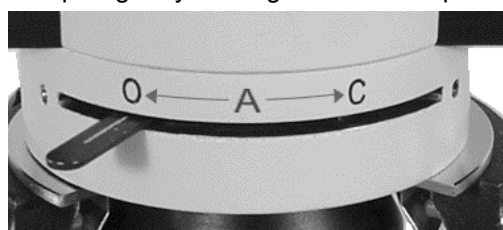
- Set position of the phase annular diaphragm slider in center opened position, of the condenser.



Center Open Position

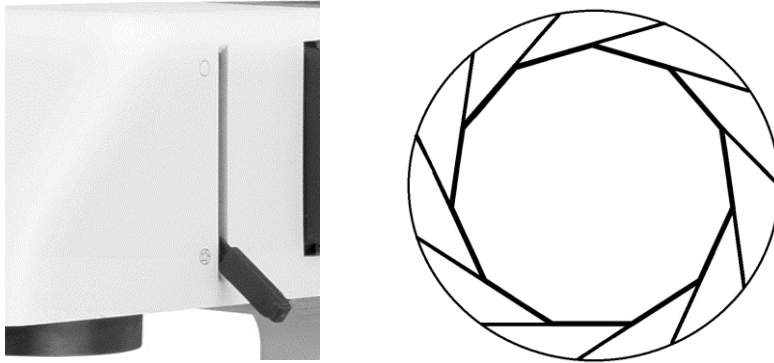


- Fully open the condenser diaphragm by moving lever to the open "O" position.

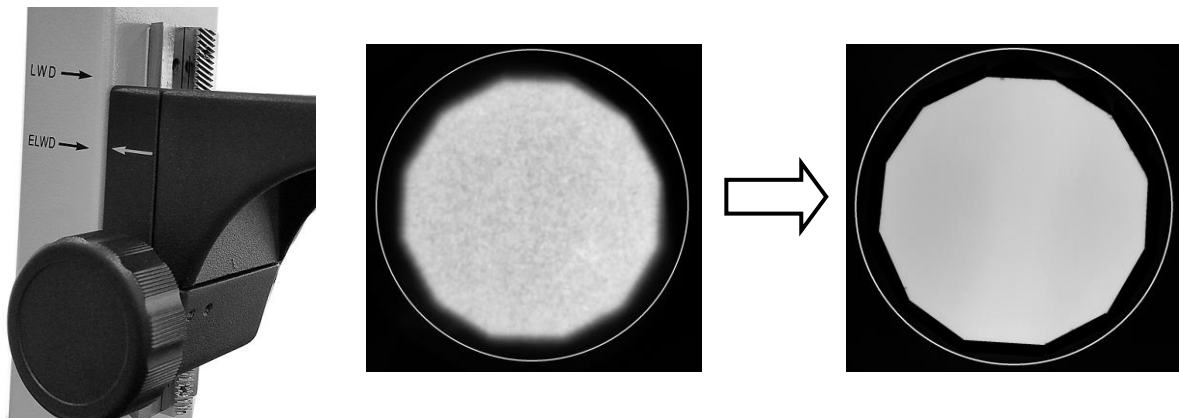




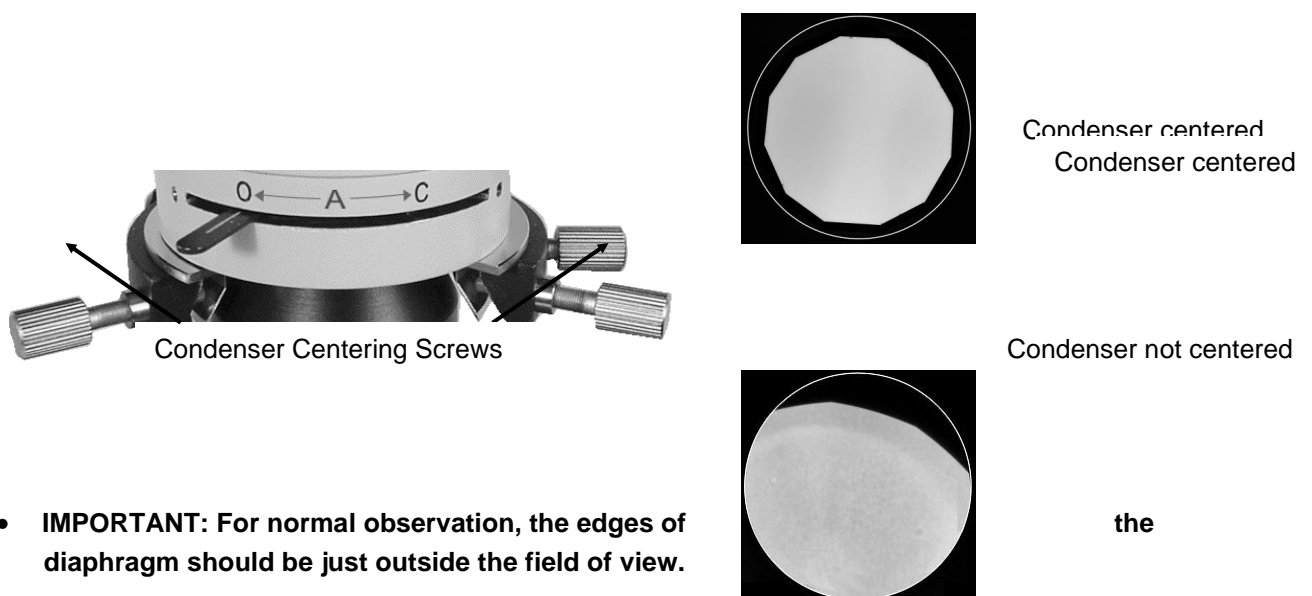
- Turn the light intensity down and switch to the 10x objective.
- Close the field of view diaphragm, 3/4 of the way. This lever is located on the lamp housing. This will close down the iris diaphragm in the lamp housing and become visible through the eyepiece field of view.



- Turn the condenser focus knob up or down until the iris edges sharpen in the field of view.



- Adjust the condenser centering screws so that the center of the field diaphragm image matches the center of the field of view. This adjustment is easier to make if the field diaphragm size is reduced slightly smaller than the eyepiece field of view.



- **IMPORTANT:** For normal observation, the edges of diaphragm should be just outside the field of view.

### 3 Centering the lamp

- Set the Phase annular diaphragm slider in the open center position.

Center Open Position



- Close the condenser diagram down completely – moving lever to C



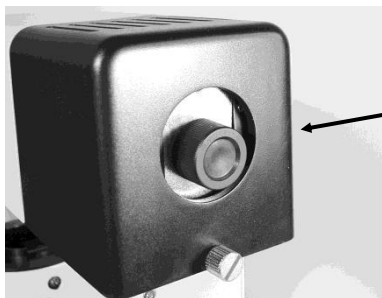
- Fully open the condenser and remove the



field of diaphragm and diffuser filter slide.



- Loosen, don't remove the lamp socket clamp screw using the knob. This will allow the knob to move around with little resistance.



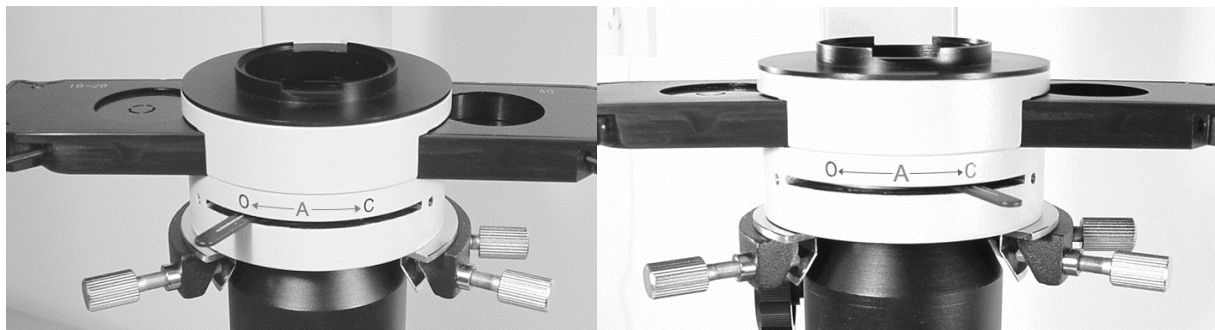
Lamp Socket Clamp  
Screw Knob

- Holding the lamp socket clamp screw, move the lamp filament image to the center of the condenser diaphragm iris. The filament will be visible looking down from above through the top of the condenser. Once centered tighten down the lamp socket clamp screw.
- After finishing the above lamp centering procedure, re-insert the filter slider.



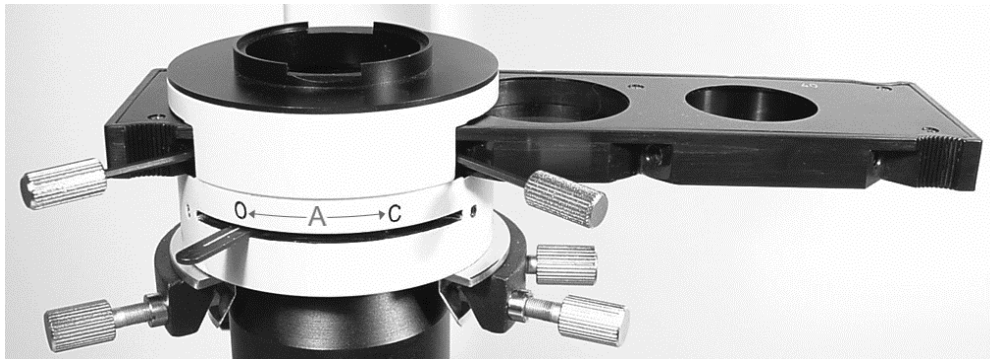
#### 4 Brightfield microscopy

- Set the Phase annular diaphragm slider in the centered open position.
- Bring the specimen image into focus.
- Adjust the opening of the field of view diaphragm, for normal observation the size of the diaphragm should be just outside the edge of the field of view.
- The condenser aperture diaphragm is provided for adjusting the numerical aperture (N.A.) of the illuminating system of the microscope. It is important because it determines the resolution of the image, contrast, depth of focus and brightness.
- Closing down the aperture diaphragm will lower the resolution and brightness but increase the contrast and depth of focus. By closing down the N.A. of the condenser to  $\frac{2}{3}$  of the N.A. of the objective, an image of suitable contrast will be obtained.



#### 5 Phase-contrast microscopy

- Phase contrast objectives are labeled "Ph"
- Fully open the aperture diaphragm. Position the Phase annular diaphragm slider to 10 -20. Set slider to 40 when using a 40x (Ph3) objective. See picture below.



- Bring the 10x (Ph1) objective into optical path.

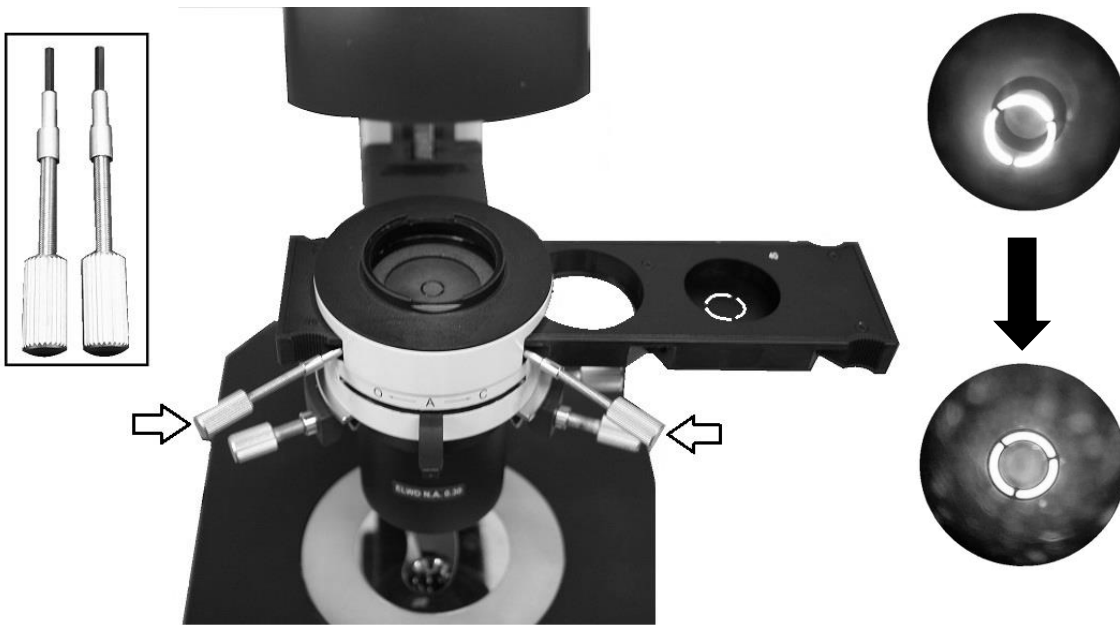


- Remove either eyepiece from the eyepiece tube and insert the phase centering telescope in its place.



- Loosen the locking screw of the centering telescope eyepiece and slide out until both the phase plate image of the objective and the annular diaphragm image of the phase slider are in focus.

- If the objective phase plate and the annular of the slider do not coincide, use the two hexagonal screwdrivers supplied with the microscope to bring the slider annular ring to the center of the phase plate, so that the image of the annular diaphragm is concentric with the phase plate image.



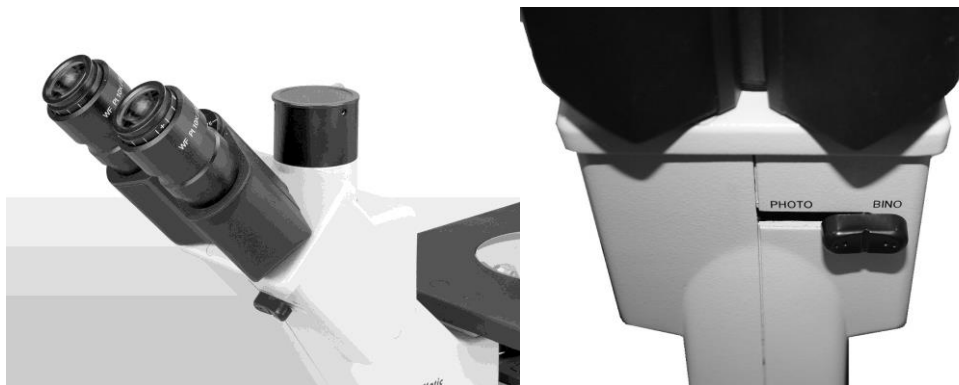
- If the slider annular ring image is moved from the phase plate image in the objective, a low phase contrast image will result.
- For phase contrast microscopy at the maximum contrast, use GIF (Green interference filter) in the optical path.
- Place the filter in the designated retaining ring above the phase annular diaphragm slider.

#### Filter selection

Filter type	Procedure
GIF (Green interference) 546nm	For phase contrast and contrast adjustment with black and white film
NCB (Neutral Color Balance) Blue	For general microscopy and color photomicrography

## VI Photo Procedure

- The optical path selector lever can be used to set the optical path to either the Binocular tube 100:0 or Binocular tube/vertical tube 20:80 (observation: photo).



- Before starting, make sure all prior steps in this manual are followed.
- In order to attach a camera to the microscope, an additional camera adapter must be purchased. See picture below for reference. Also refer to the parts and accessories section on page 17.



- To attach the C0.5X adapter to your camera, simply screw onto your C-Mount camera. Remove the cap on the camera port of your microscope, by loosening the knurled screw. Then attach the C0.5X and lock into place with the knurled screw.



- Then follow the directions of use, for your camera.

## VII Troubleshooting Table

The troubleshooting table below contains the most frequently encountered problems and their possible causes.

### Optical and Operating Problems

Problem	Possible Cause
Vignetting or uneven brightness in the field of view or field of view only partially visible	Lamp not installed properly
	Filter slider in intermediate position
	Phase slider not in click-stop position
	Incorrect condenser mounting
	Condenser is set too low
	Condenser is not centered
	Field diaphragm closed too far
	Aperture diaphragm closed too far
	Revolving nosepiece not clicked into position
	Optical path selector lever in intermediate position
Dust or dirt in field of view	Aperture diaphragm closed too far
	Field of view diaphragm image not focused on specimen surface
	Dust or dirt on specimen's surface
Image quality: No image under phase contrast or details cannot be viewed	Brightfield objective being used
	Phase annular diaphragm not in optical path
	Phase annular diaphragm and objective phase symbol do not match
	Slider annular ring image has moved away from the objective phase plate image
	Field of view diaphragm image not focused on specimen surface
	Thickness of specimen holder is outside the compensating range of objective
Eye strain or fatigue	Interpupillary distance not adjusted
	Diopter adjustment not made
	Inadequate illumination
	Field of view of left and right eyepiece differ

### Electrical

Lamp does not light	Power supply not plugged in
	Lamp not installed
	Lamp burnt out – 100hrs Average Life
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

**Never attempt either of the following actions, since doing so will damage the focusing mechanism:**

- Rotate the left and right knob while holding the other.
- Turning the coarse and fine focus knobs further than their limit.

## **VIII Care and maintenance**

### **1 Lenses and filters**

- To clean lens surfaces or filters, first remove dust using compressed air. If dust still persists, use a soft/clean brush or gauze.
- A soft gauze or lens tissue lightly moistened with pure alcohol should only be used to remove grease or fingerprints.
- Use petroleum benzine to clean immersion oil.
- Use petroleum benzine only to remove immersion oil from objective lenses.
- Because petroleum benzine and absolute alcohol are both highly flammable, be careful handling around open flame.
- Do not use same area of gauze or tissue, to wipe more than once.

### **2 Cleaning of painted or plastic components**

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

### **3 When not in use**

- When not in use, cover the instrument with dust cover and store in a place low in humidity where mould is not likely to form.
- Store the objectives, eyepieces and filters in a container or desiccator with drying agent.



## **IX Warranty**

### **Motic Swift Line Warranty**

The Motic Swift Line 5 Year Warranty assures that the microscope is guaranteed against defects in material and workmanship for 5 years from the purchase date of the product. Electrical components are covered for 1 year; video components are covered for one year after purchase. Normal wear, routine maintenance, light bulbs, power supplies, rechargers, batteries, fuses, cords, add-on accessories, damage resulting from repair by unauthorized parties, accident, alteration, shipping, misuse or abuse is not covered. Determination of warranty is at the technician's discretion.

Defective products covered by the warranty will be repaired free of charge when they are returned, postpaid.

#### **Warranty Process**

An official Return Material Authorization (RMA) number must accompany any return, including a copy of the original sales or purchase receipt, with the RMA number also clearly written on the exterior of the shipping box. Microscope(s) must be shipped back to originating location or sales office. A detailed description of the difficulty must be enclosed with the returned unit, shipped freight pre-paid to Motic Instruments USA, Inc. Motic Instruments USA, Inc, after evaluation and warranty determined, will repair, or replace at no charge and return. If, after evaluation, failure was caused by misuse, alterations, accident, or abnormal conditions of operation, an estimate of repairs will be submitted for your approval prior to work being performed.

#### **For Product and Customers outside the US**

For customers living outside the United States, Motic Instruments USA, Inc. will provide standard warranty service. However, all inbound & outbound shipping cost, including taxes and tariffs, are the responsibility of the consumer.

#### **For questions about warranty and repairs:**

- Toll Free: 1-800-275-3716
- Email: [rma@moticusa.com](mailto:rma@moticusa.com)

#### **For Digital Technical Support, including software:**

- Toll Free: 1-877-901-4141
- [technical@motic-america.com](mailto:technical@motic-america.com)