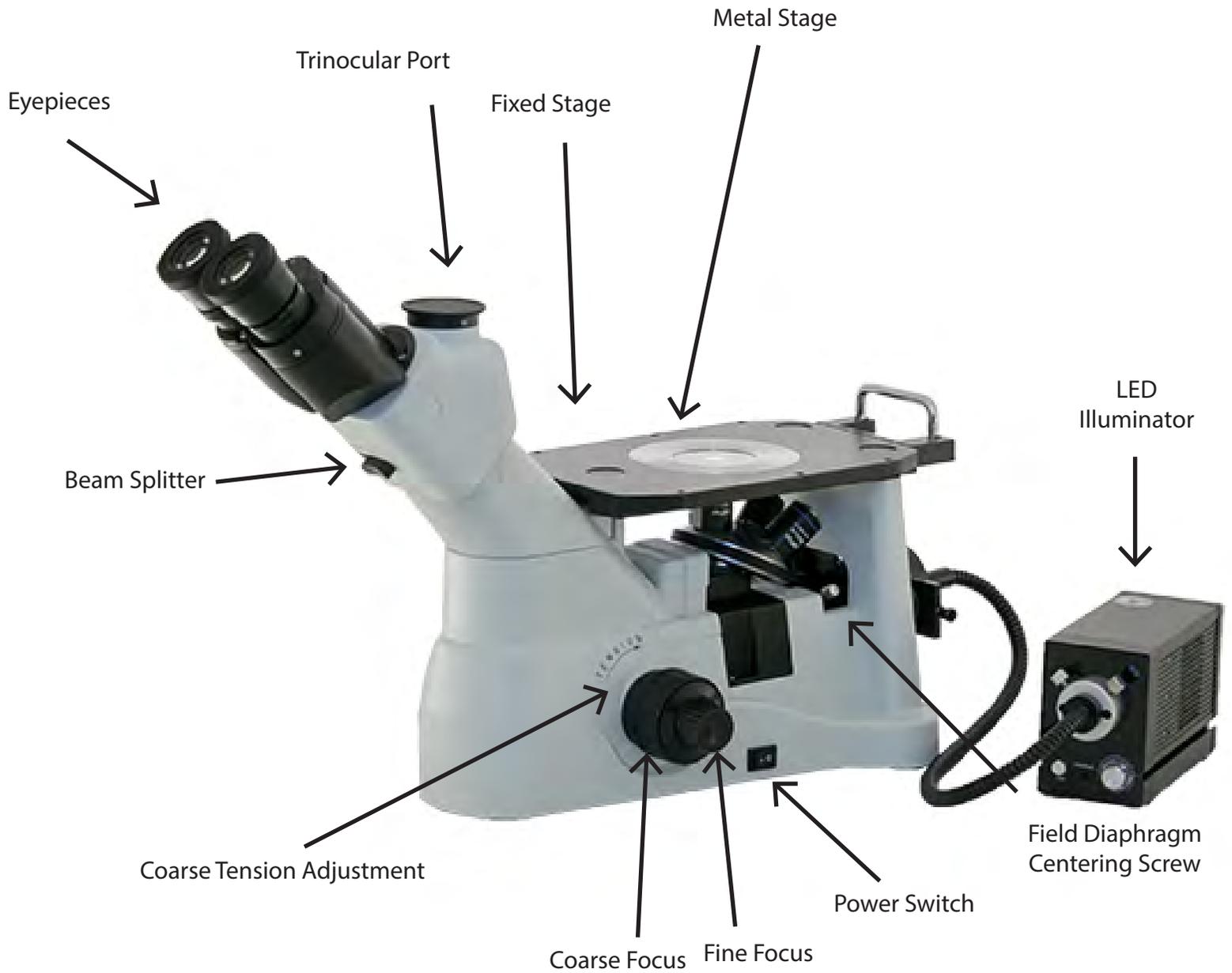


Mi40 Microscope User's Manual

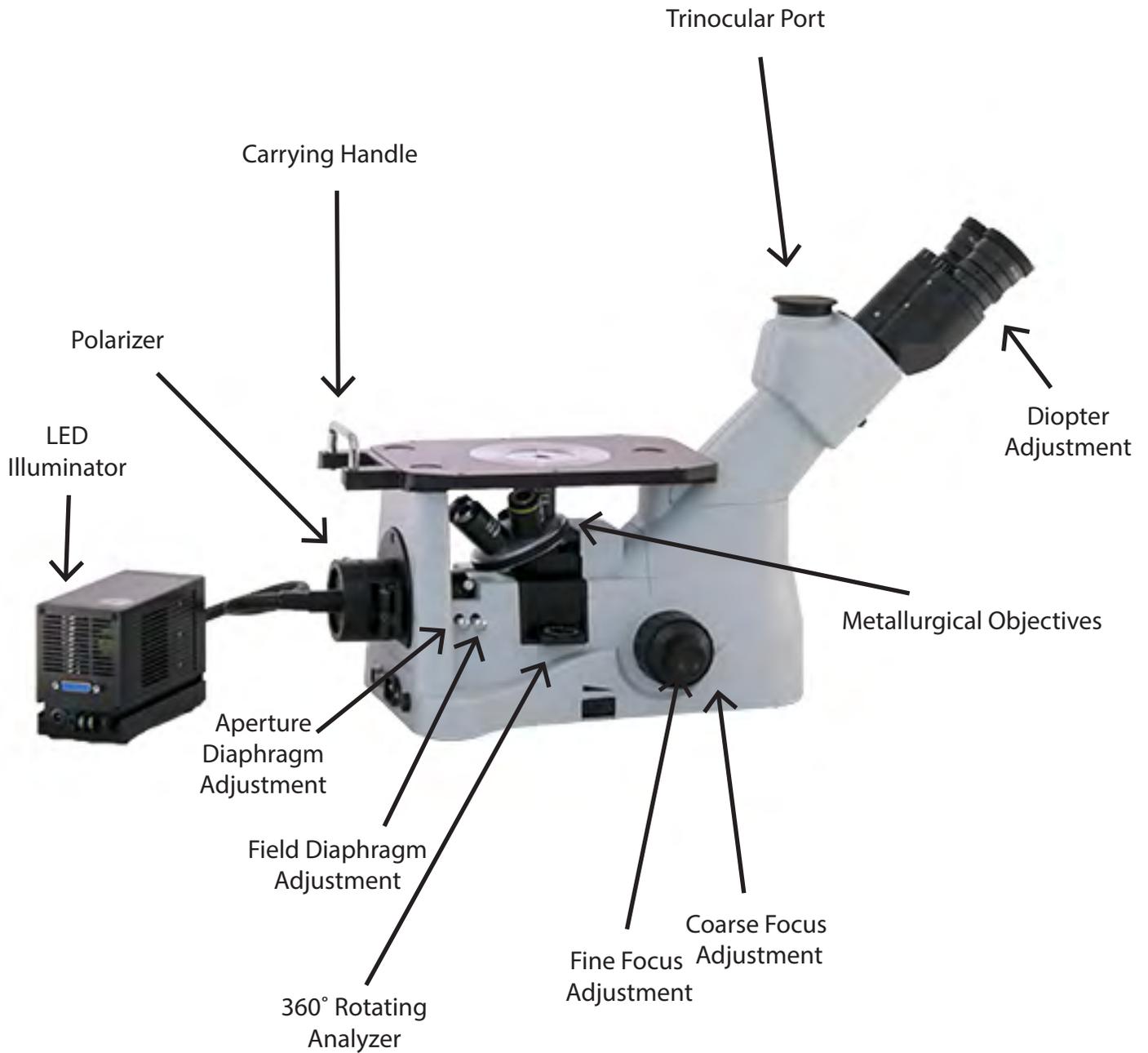
for Inverted Metallurgical Microscopes



Microscope Components:

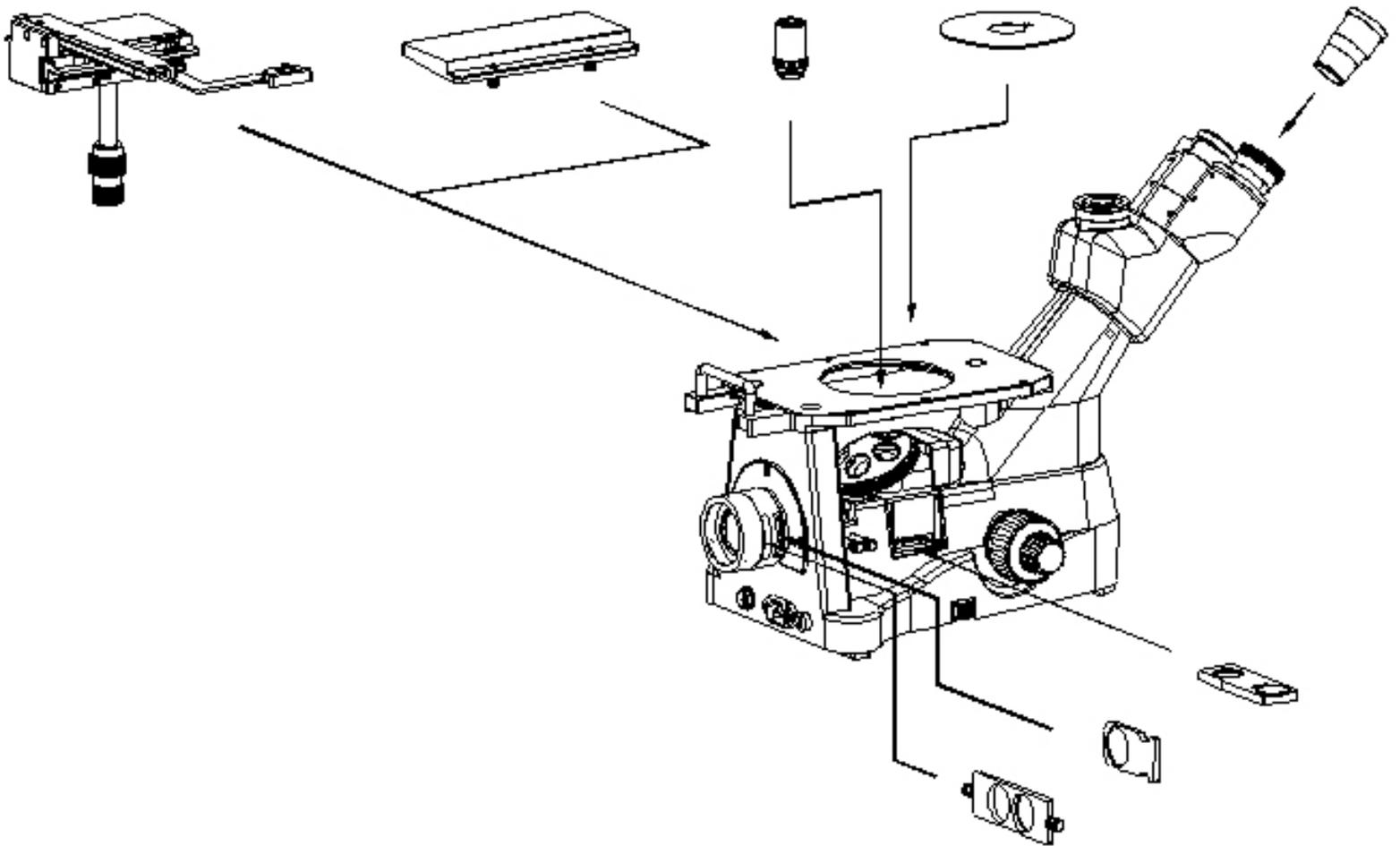


Microscope Components:



Microscope Assembly:

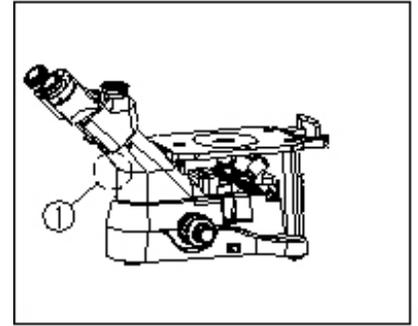
Follow the diagram below when assembling the microscope.



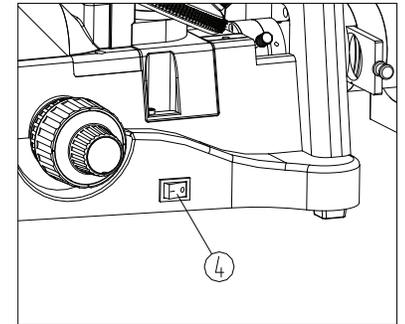
Before Use:



Do not shake or drop the microscope. Do not expose the microscope to direct sunlight or store in high temperature, damp or dusty areas. Make sure the workspace is horizontal. Indoor temperature should be between 41-104°F with a maximum relative humidity 80%. When moving the microscope, use one hand to hold the lower part of the observation tubes (1) and the other hand to hold the handle. Do NOT hold the microscope by the stage, focusing knob, head or light source when carrying it.



When working, make sure the light source (3) has enough room for any heat to dissipate. Before replacing the fuse, make sure the power switch (4) is in the "O" (off) position. Voltage range of 100~240V is supported. Make sure voltage is in this range. Only use the power cord supplied with the microscope.



Microscope Maintenance:



Wipe lenses gently with a soft tissue. Carefully wipe off fingerprints on the lens surface with a tissue moistened with a small amount of 3:7 mixture of alcohol and ether or dimethylbenzene, or a microscope cleaning solution.



Do not use organic solution to wipe the surfaces of other components. If needed use neutral detergent.



If the microscope becomes wet, power it off immediately and wipe all surfaces dry. Do not disassemble the microscope.

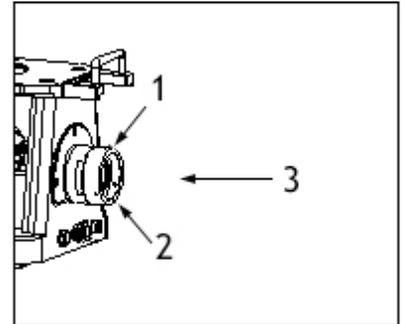


When not in use, cover the microscope with the dust cover.



Connecting the Illuminator

Loosen the set screws (1 & 2) with a coin or flathead screwdriver. The light guide inserts (3) into the illuminator port. Secure the light guide with the set screws.



Install the Objectives

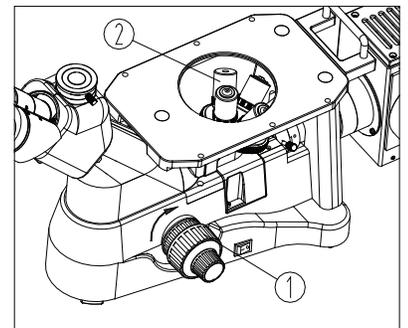
Rotate the coarse focus knob (1) until the nosepiece is in its lowest location.

Install the objectives (2) into the microscope nosepiece from the lowest magnification to the highest in a clockwise direction from the left to right.

Clean the objectives on a regular basis with lens tissue.

When searching and focusing on a sample start with the lowest magnification 5x or 10x lens, then move up to the higher magnification.

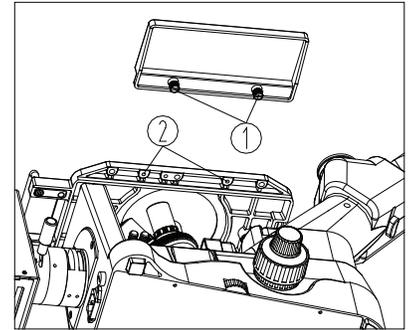
When changing magnification, twist the nosepiece until the next objective lens clicks into place.





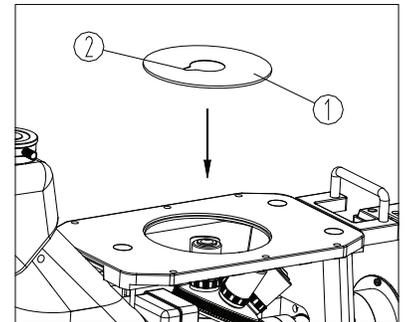
Assemble the Mechanical Stage

Attach the mechanical stage by lining up the set screws (1) on the mechanical stage with the screw holes on the microscope (2). Tighten the screws once the stage is attached.



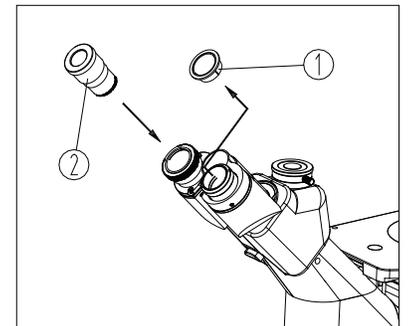
Assemble the Metal Stage Insert

Insert the metal stage (1) onto the microscope. The stage hole (2) should be right above the objective lens.



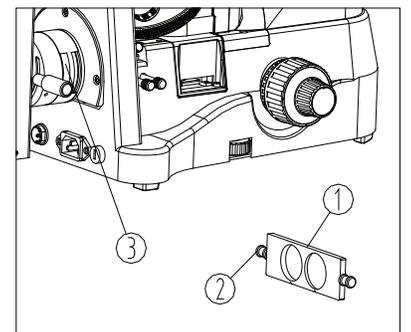
Assemble the Eyepieces

Remove the eyetube covers (1) from the eyetubes. Insert the eyepiece (2) into the eyetube all the way.



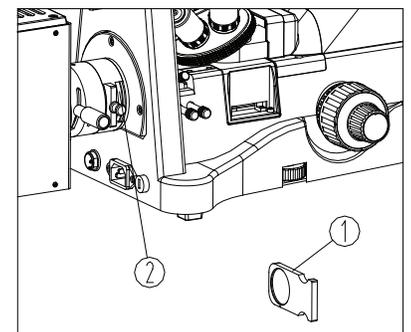
Insert the Ground Glass Filter Slider

Remove one handle (2) from the ground glass filter slider (1) and insert the slider into the slot (3) on the illuminator connector panel. It should click into place. Reattach the handle (2) that was removed in order to slide the slider into the slot.



Insert the Color Filter or Polarizer

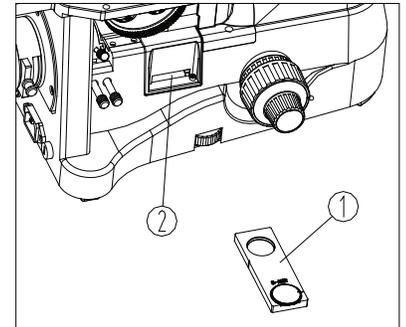
Insert the color filter slider or polarizer (1) into the slot on the illuminator connector panel (2). The slider should click into place.





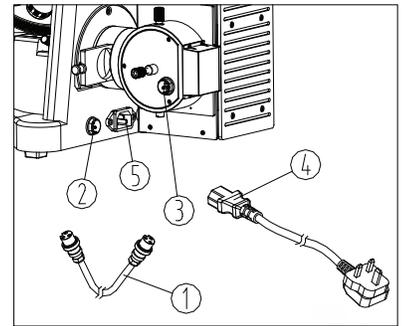
Insert the 360° Rotatable Analyzer

Insert the analyzer (1) facing up into the slot below the objective lenses (2). The analyzer should click into place.



Connect the Power Supply

Ensure the main switch is in the "O" off position. Insert one side of the wire (1) into the aviation plug socket (2) and lock it with the screw. Insert the other side of the wire (1) to the aviation socket (3). Insert the power cord (4) into the microscope body power socket (5). Insert the other end into the power outlet.



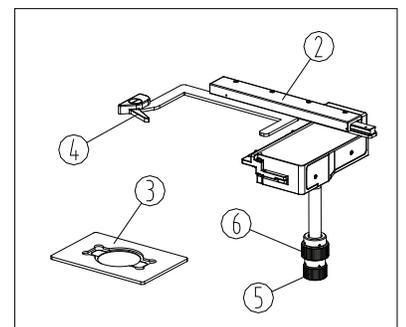
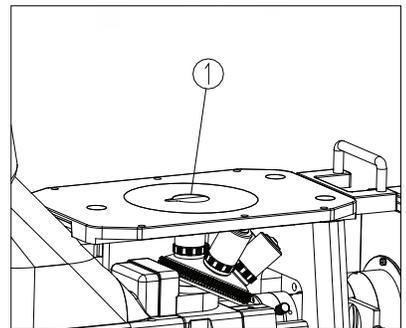
Illumination

Turn on the power supply on the lower left of the LED box. The knob on the lower right will allow rheostat control for intensity of the LED light.



Adjusting a Sample

Place the sample in the center of the stage (1). In order to secure the sample, use the holder (3) along with the attachable mechanical stage (2). The clip (4) will hold the sample holder in place. The mechanical stage can be adjusted with the X-Axis adjustment (5) or the Y-Axis adjustment (6) in order to move the sample to the desired location. Working range is 120mm x 80mm.

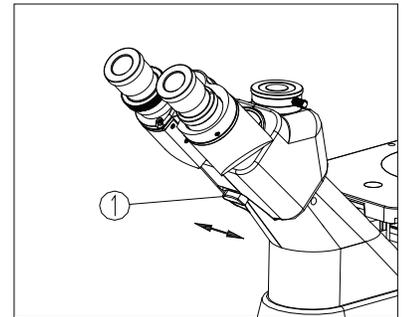




Using the Beam Splitter

Slide the beam splitter (1) to direct light 20% to the eyepieces and 80% to the trinocular port (camera).

Slide the beam splitter the other direction to send light 100% to the eyepieces.

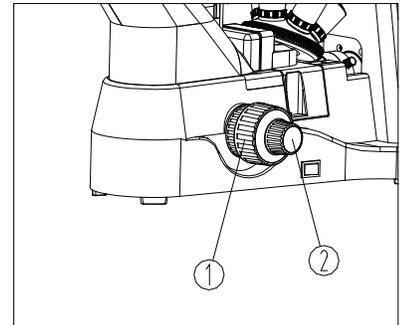


Focusing

Place the sample on the stage and move the 5x objective into the light path.

The surface of the sample should be perpendicular to the objective.

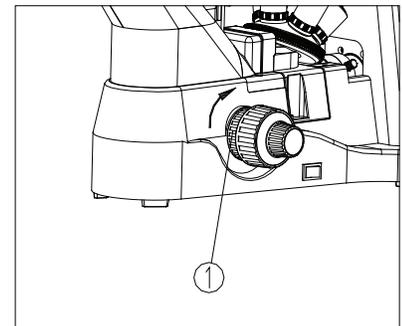
Adjust the right diopter adjustment ring to "0" and look through the right eyepiece. Adjust the coarse focus knob (1) and then the fine focus knob (2).



Adjust the Focusing Tension

If it is hard to turn the coarse focus knob or the sample falls out of focus (the stage drifts), solve the problem by adjusting the focus tension adjustment ring (1).

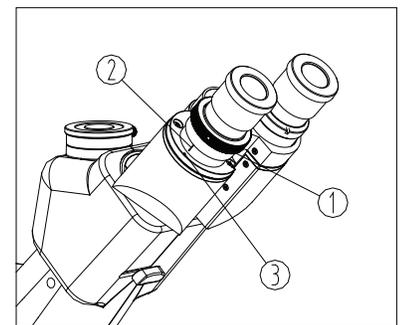
To tighten the focus mechanism turn the tension ring clockwise. To loosen the tension turn it counterclockwise.



Adjust the Diopters

Turn the coarse focusing knob and then the fine focus knob to get a clear image while viewing through the left eyepiece only. Then look through the right eyepiece. If the image is unclear rotate the diopter adjustment ring (1).

There is a +/-5 diopter on the ring. The number shown on the diopter (2) is your eye's specific setting. Note the number that lines up with the mark on the side of the eyetube (3). Remember this number if multiple people are using the microscope.

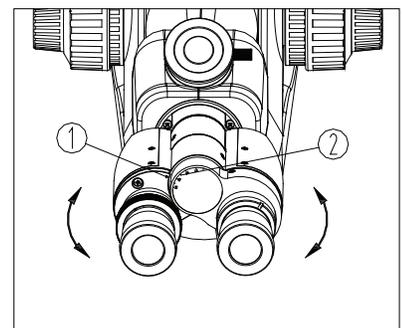


Adjust the Interpupillary Distance

When using both eyepieces, hold the base of the prism and rotate them around the axis until there is only one field of view.

The mark (1) on the side will line up with a number (2) that shows your specific interpupillary distance. Remember this number if multiple people are using the microscope.

Interpupillary adjustment range = 50~75mm.

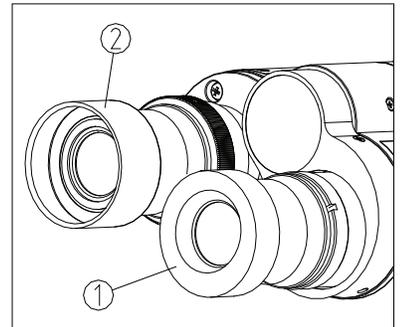




Using the Eye Shields

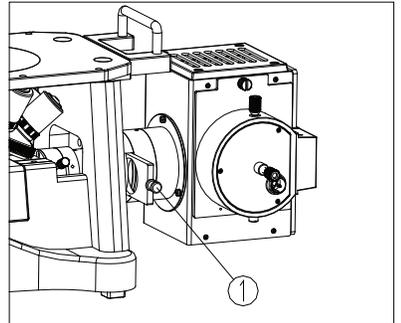
If the user wears glasses, turn the eye shields down (1) to prevent the glasses from touching the eyepiece and avoid damaging the glasses or the eyepieces.

Open the eyesheids (2) to prevent stray light from disturbing observation.



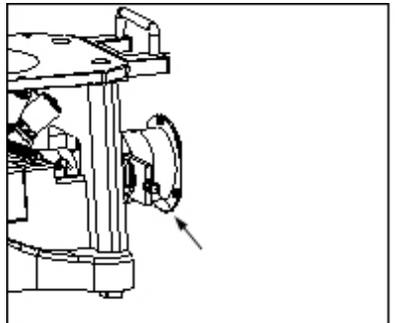
Use the Ground Glass Filter

When the ground glass filter slider (1) is pulled to the left it is used to center the filament. When it is pulled to the right it will help create uniform illumination. Typically this filter is set to the right in the engaged position.



Use the Color Filter

The color filter can make the background more suitable and improve image reflection. There are four types of color filters that are typically used: blue, green, yellow and white.



Adjust the Field Diaphragm

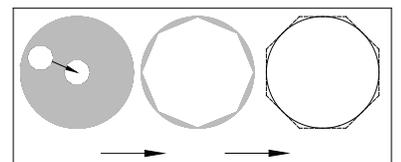
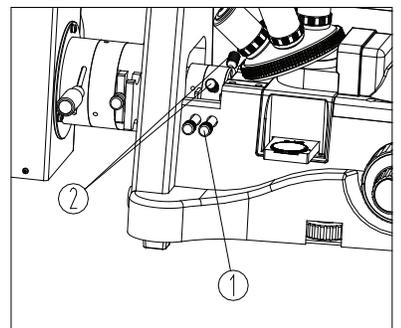
By limiting the diameter of the beam of light entering the condenser, the field diaphragm can strengthen image contrast. When the image of the field diaphragm is on the edge of the field of view the clearest image is obtained.

Adjust the field diaphragm rod (1) to minimize the field diaphragm. The image of the field diaphragm can be seen through the eyetube.

Adjust the right and left centering screws (2) on the field diaphragm until the image is centered.

Open the field diaphragm slowly. If the image is inscribed in the field of view, the field diaphragm has been centered properly.

Open the field diaphragm slightly when using the microscope.



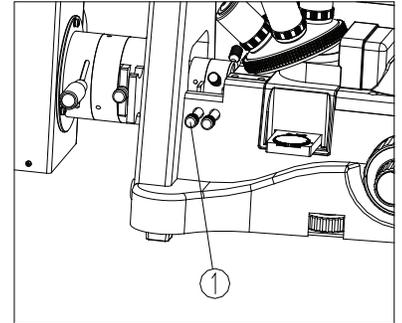


Adjust the Aperture Diaphragm

The aperture diaphragm decides the numerical aperture (NA) of the illumination. If the NA of the illumination matches the NA of the objective, the best resolution is obtained with increased contrast and depth of field.

Adjusting the aperture diaphragm is the same as adjusting the field diaphragm.

Adjust the size of the aperture diaphragm for comfortable viewing.



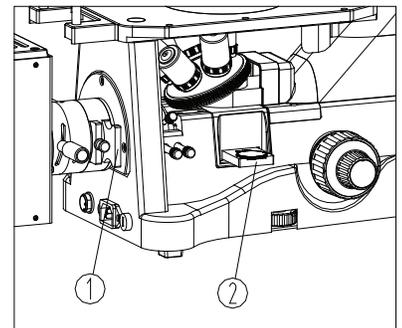
Using the Simple Polarizing Kits

The simple polarizing kit includes the polarizer (1) and the 360° rotating analyzer (2).

When using the polarizer remove the color filter from the light path.

Dialing the turntable on the 360° rotating analyzer can change the orthogonal states of the polarized light.

When the turntable on the analyzer is set to "0" the analyzer and polarizer are in the orthogonal state.



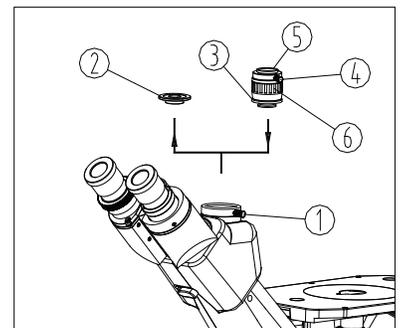
Objective Type	Part # / Magnification	Numerical Aperture	Working Distance
LWD Plan Achromat	FMPLN5 / 5x	0.15	10.8mm
	FMPLN10 / 10x	0.30	12.2mm
	FMPLN20 / 20x	0.45	4mm
	FMPLN50 / 50x	0.55	7.9mm
Semi APO Brightfield	BF-SAPO-M5 / 5x	0.15	19.5mm
	BF-SAPO-M10 / 10x	0.30	10.9mm
	BF-SAPO-M20 / 20x	0.50	3.2mm
	BF-SAPO-M50 / 50x	0.80	1.2mm
	BF-SAPO-M100 / 100x	0.90	1mm

Using the C-Mount Adapter

Loosen the set screw (1) on the trinocular port and remove the dust cover (2).

Remove the dust covers from the c-mount adapter (3) and place the c-mount on the trinocular port, tightening the set screw (1). Loosen the set screw (4) on the c-mount adapter to remove the c-mount (5). Connect the camera and then replace the c-mount adapter.

Adjust the image through the eyepieces and then pull the beam splitter to direct light to the camera. If the camera image is not clear, adjust the c-mount focus (6) until the image is clear in both the eyepieces and the camera at the same time.





Optical Troubleshooting

Problem	Cause	Solution
Light is bright, but field of view is dark.	Field diaphragm is not large enough.	Open the field diaphragm.
	Rheostat on light is turned down.	Adjust the rheostat.
	Polarizer or analyzer blocking light.	Remove polarizer/analyzer.
	Beam splitter is pulled out.	Push the beam splitter in.
Side of the field of view is dark or uneven.	Nosepiece is not clicked into position.	Rotate nosepiece into place.
	Stain or dust has accumulated on the condenser, objective, eyepieces or light source.	Clean surfaces of condenser, objectives, eyepieces and light source.
	The filter, polarizer or analyzer is not in position.	Remove / reinsert filters and sliders.
	Beam splitter is not in correct position.	Adjust the beam splitter.
Dust is observed in the field of view.	Dust has accumulated on the specimen.	Clean the sample.
	Dust is on the objective or eyepiece.	Clean the objective and eyepieces.
Image is not clear.	A cover slip is being used.	Remove cover slip.
	The sample is not vertical to the objective.	Adjust sample.
	Aperture diaphragm not open.	Adjust aperture diaphragm.
	Stain or dust is on the lens.	Clean eyepiece / objective.
	Beam splitter is not in correct position.	Adjust beam splitter.
One side of field of view is dark or the image moves while focusing.	Specimen is not fixed.	Adjust sample on stage.
	Nosepiece is not clicked into position.	Click nosepiece into place.
Eyes fatigue quickly during use or the right field of view doesn't match with the left.	Interpupillary distance is not set properly.	Adjust interpupillary distance.
	Diopter adjustment is not set properly.	Adjust the diopters.
	Different eyepieces are being used in the left and right eyetube.	Use the same eyepieces in each eyetube. Use the Fein Optic FPL-WF10x, FN22 Eyepieces.



Mechanical & Electrical Troubleshooting

Problem	Cause	Solution
Mechanical Troubleshooting:		
Coarse focusing knob is too tight.	Tension knob is too tight.	Loosen tension knob slightly.
Stage drifts or falls.	Tension knob is too loose.	Tighten tension knob slightly.