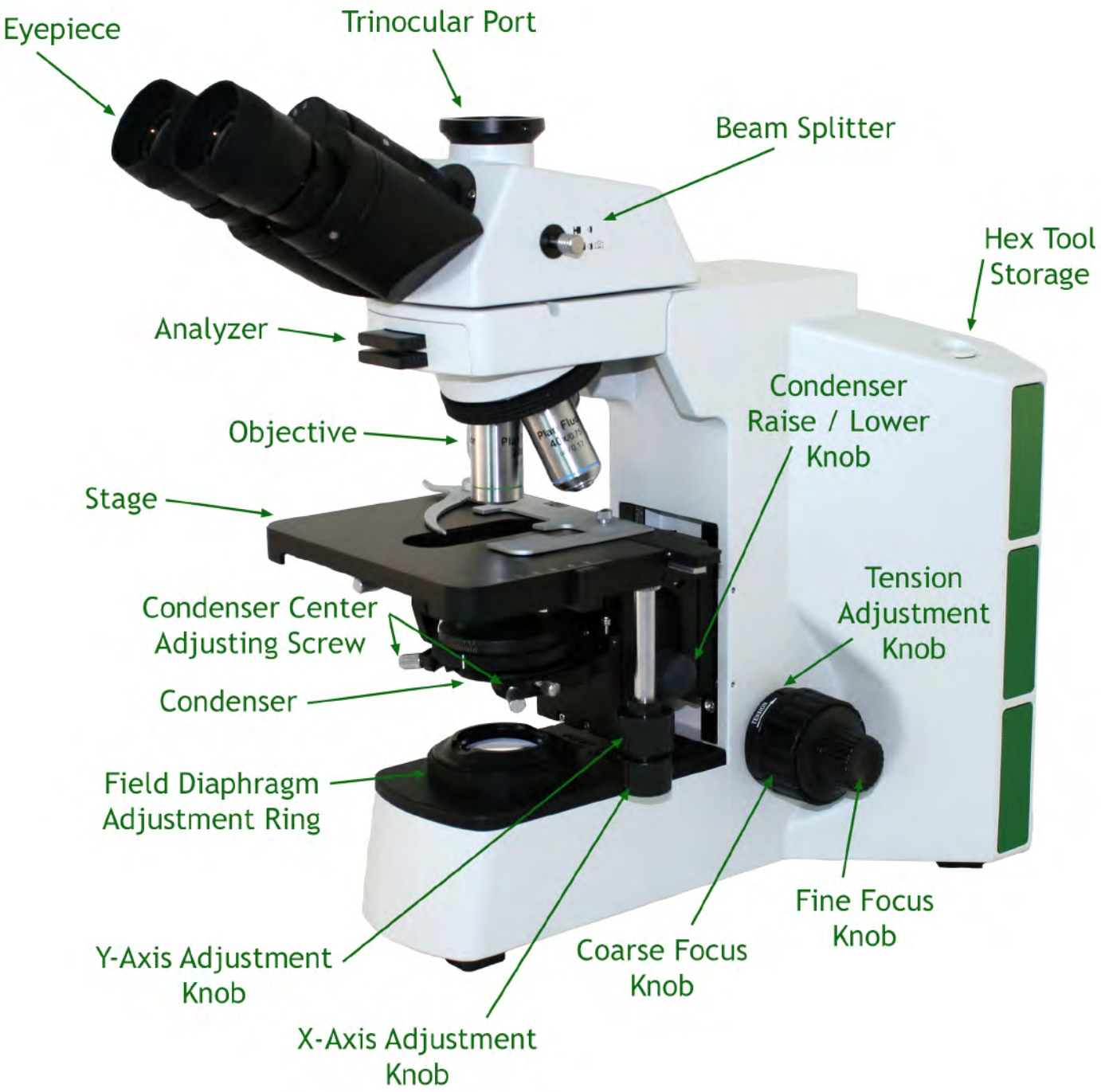
RB40 Microscope User's Manual

info@feinoptic.com

Microscope Components:



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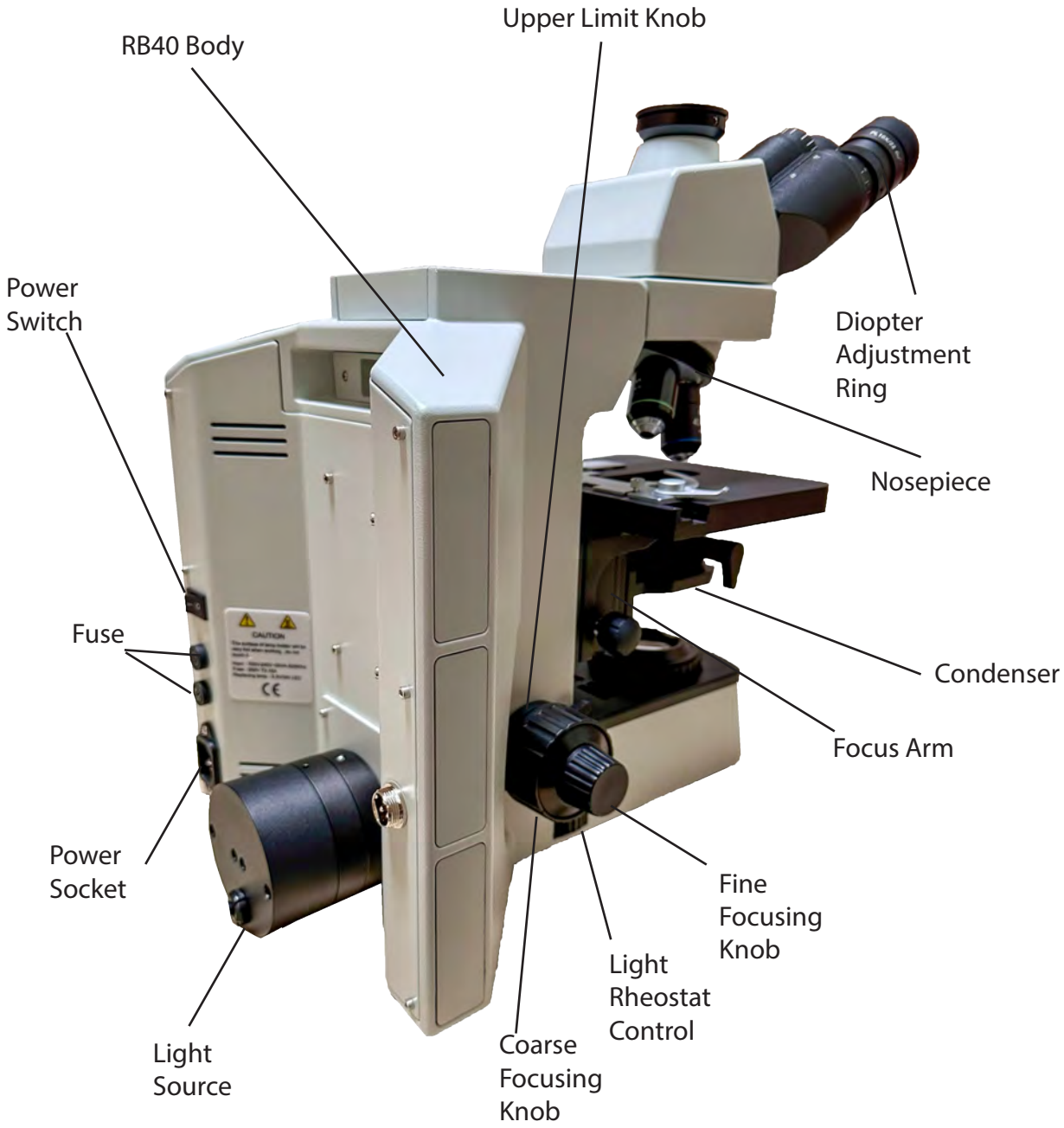

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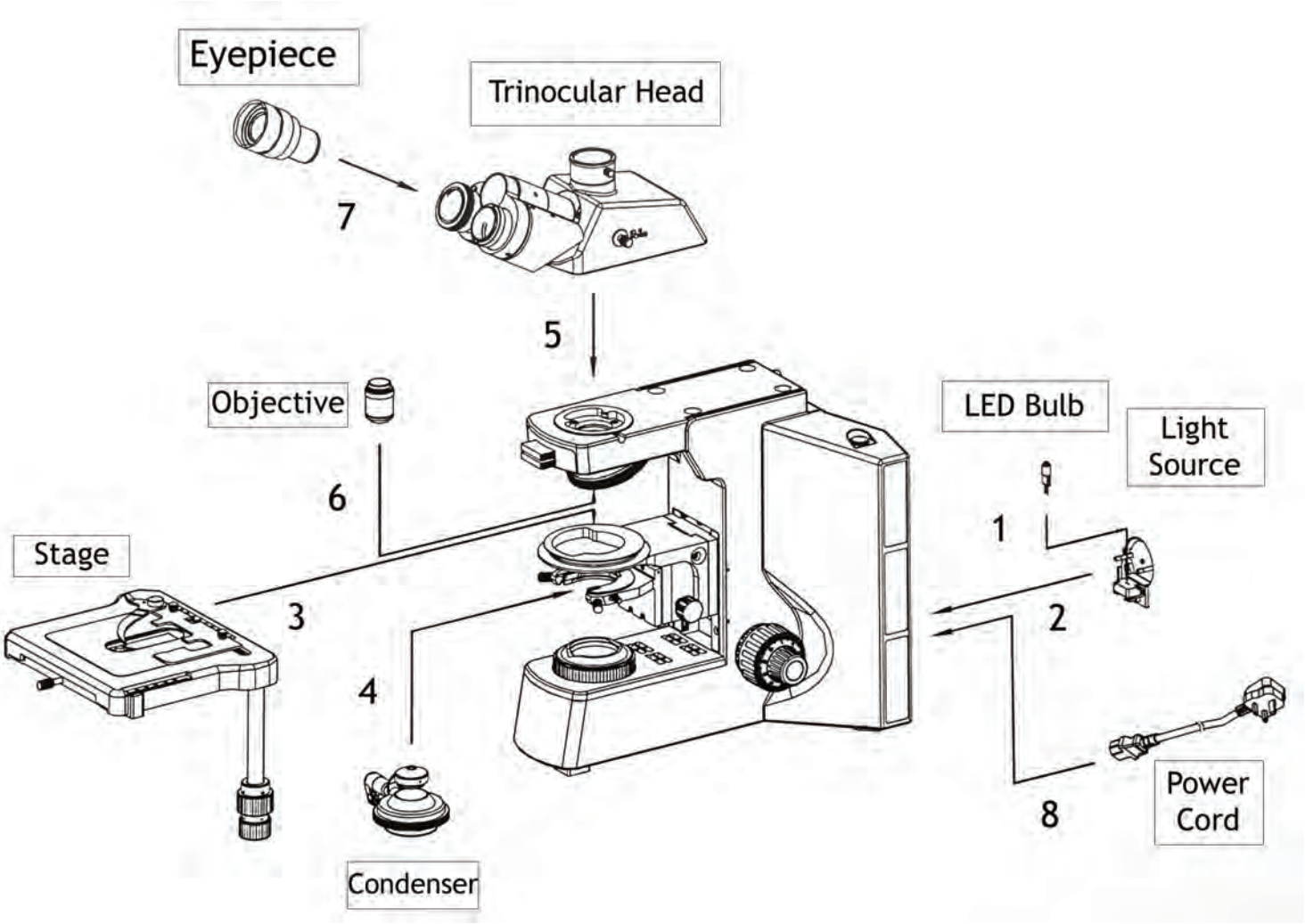
Binocular / Trinocular Microscope Assembly:



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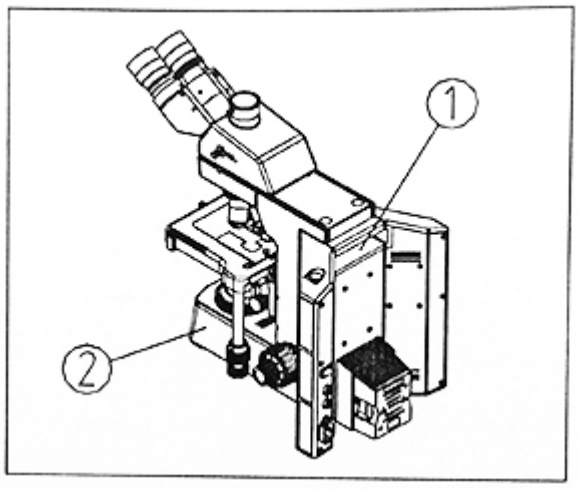
Before Use:

Do not shake or drop the microscope.

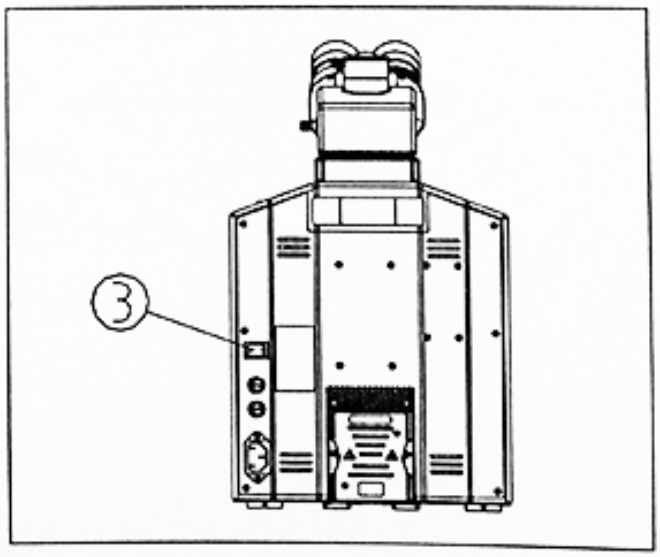
Do not not expose the microscope to direct sun, high temperatures, dust, or damp environments. Use a flat work surface. Indoor operating temp 41°~104°F (5°~40°C), max relative humidity of 80%.

When moving the microscope use both hands, holding by the handle at the back (1) and the base (2) as shown below.

RB40 Binocular Microscope



Set the power switch to off "O" before replacing a bulb or fuse, and wait until the lamp is cool. The power switch (3) is located on the back of the base of the microscope. Microscope uses 5W LED bulb.



Voltage range of 100~240V is supported. Additional transformer is not necessary. Use only an outlet with voltage in this range and use the power cord supplied with the microscope.

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Maintenance:

Wipe lenses gently with a soft tissue. Carefully remove excess oil from the 100x immersion oil lens. Wipe off fingerprints from lens surfaces with lens paper using a small amount of microscope cleaning solution or a 3:7 mixture of alcohol and ether or dimethylbenzene. (Alcohol and ether are flammable, do not place these chemicals near fire and clean in a ventilated area.)

When cleaning other surfaces of the microscope use water only. A basic detergent can be used to clean the surface if necessary, but ensure that all the detergent is removed from the frame with a clean, damp cloth prior to drying the surface.

If the microscope becomes wet during use, power off the microscope and dry the microscope thoroughly.

Do not disassemble the microscope.

After use, cover the microscope with a dust cover and power off the light.

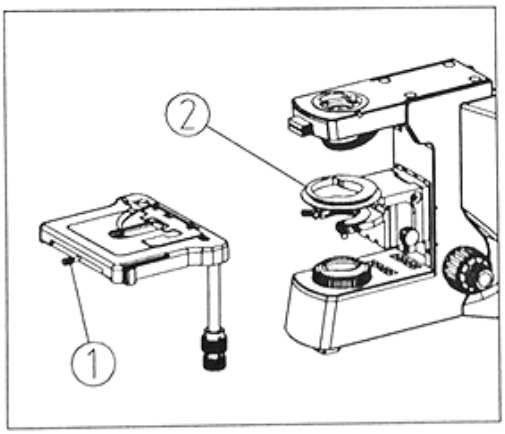
Objectives:

RB40 Infinity Corrected Objectives all have a parfocal distance of 45mm.
Recommended coverslip thickness is 0.17mm.

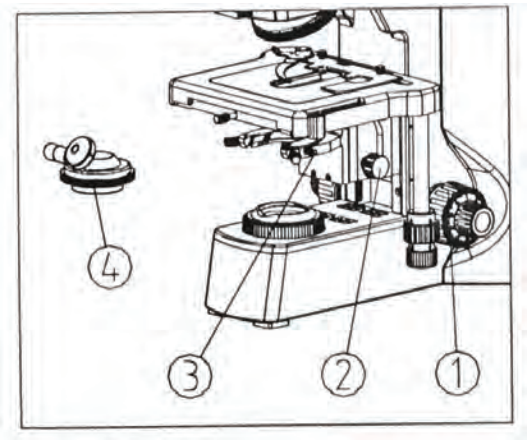
Objective Type	Part # / Magnification	Numerical Aperture	Working Distance
Plan Achromat	FPLN4 / 4x	0.10	11.9mm
	FPLN10 / 10x	0.25	12.1mm
	FPLN20 / 20x	0.40	1.5mm
	FPLN40 / 40x	0.65	0.36mm
	FPLN50 / 50x Oil	0.95	0.19mm
	FPLN60 / 60x	0.85	0.3mm
	FPLN100 / 100x Oil	1.25	0.18mm
Plan Semi Apochromat Fluor	SAPOFL4 / 4x	0.13	18.5mm
	SAPOFL10 / 10x	0.30	10.6mm
	SAPOFL20 / 20x	0.50	2.33mm
	SAPOFL40 / 40x	0.75	0.6mm
	SAPOFL100 / 100x Oil	1.28	0.21mm
Plan Phase Contrast	FPL-PH10 / 10x	0.25	12.1mm
	FPL-PH20 / 20x	0.40	1.5mm
	FPL-PH40 / 40x	0.65	0.36mm
	FPL-PH100 / 100x Oil	1.25	0.18mm

Step-by-Step Assembly:

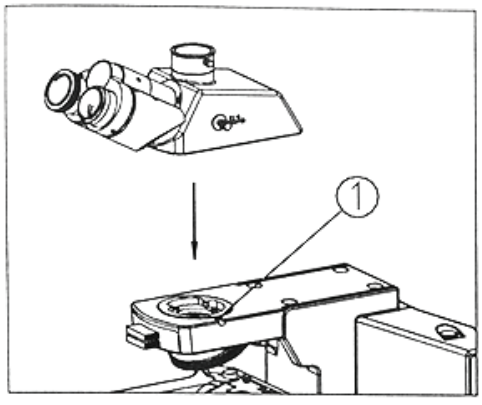
Light Source Assembly:
Align the LED Illuminator with the lamp housing and secure in place with the set screw located on top of the lamp housing.



Stage Assembly:
Loosen the lock-screw (1) on the stage.
Carefully seed the ring of the two "V" notches on the bottom of the stage into the "V" rounded groove (2).
Once in place tighten the lock-screw (1).



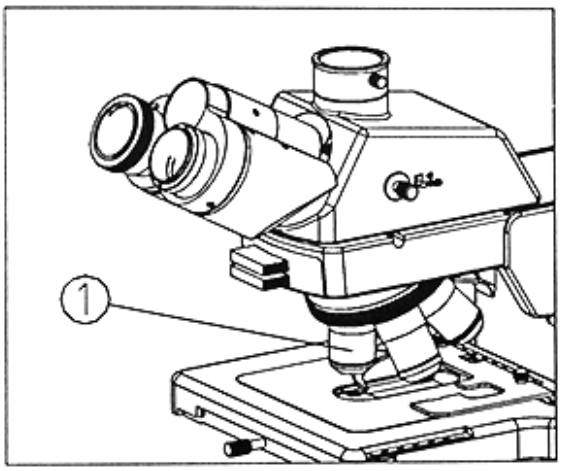
Condenser Assembly:
Rotate the coarse focus knob (1) to raise the stage to its highest level.
Rotate the condenser adjustment knob (2) to lower the condenser holder.
Loosen the condenser lock-screw (3).
Swing out the front lens of the condenser with the scale facing forward. Align the condneser screw with the groove in the condenser holder. Place the condenser in the holder.
Tighten the lock screw (3) and raise the condnser (2) to its highest position.



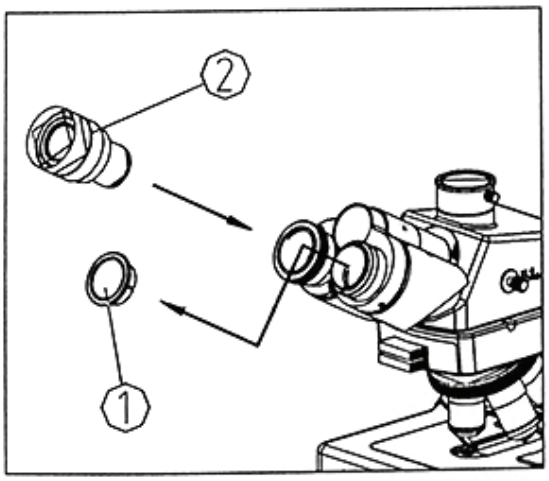
Head Assembly:
Loosen the head lock-screw (1).
Insert the head into the dovetail mount with the eyepieces facing forward.
Retighten the lock-screw (1).

Step-by-Step Assembly:

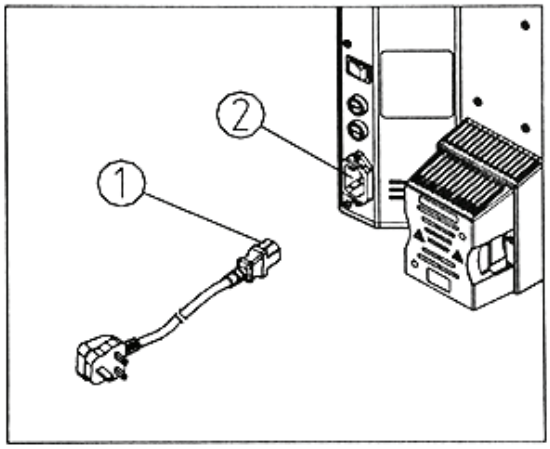
Objective Assembly:
Rotate the coarse focus knob to lower the stage.
Install the objectives into the nosepiece starting with the lowest magnification to the highest in a clockwise direction.
Always start viewing a sample with the lowest magnification objective, and once it is in focus move up to the next magnification objective.
Ensure that the objective lens has clicked into position before focusing.



Eyepiece Assembly:
Remove the eyetube dust cap (1).
Insert the eyepiece (2) into the eyetube.



Power Cord Assembly:
Set the power switch to "O" off.
Insert the end of the power cord (1) into the socket (2) of the microscope.
Insert the other end of the power cord into the power supply.
Do not ever use strong force with the power cord.
Use only the power cord supplied with the microscope.
Connect the power cord and make sure the microscope is grounded.



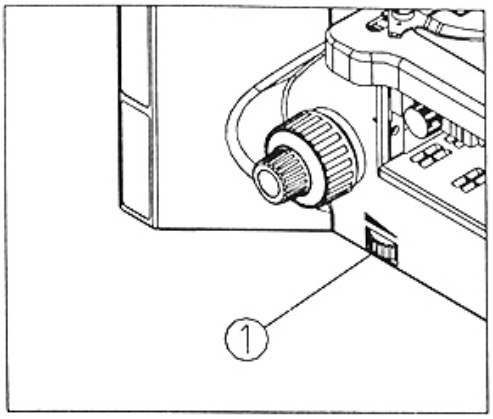
Microscope Operation:

Illumination:

Plug in the microscope and turn on the main power switch.

Adjust the rheostat control knob (1) until the illumination is bright. Turning the knob clockwise will increase brightness and turning it counter-clockwise will reduce brightness.

Using the light at a lower brightness setting will extend bulb life.

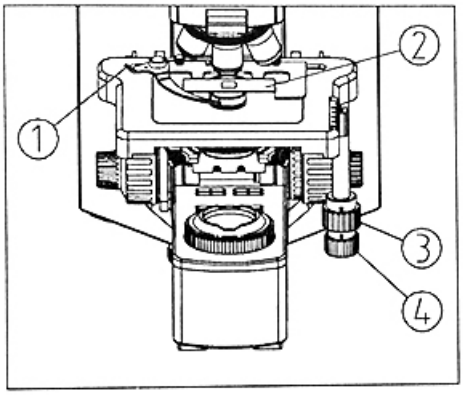


Positioning Slides:

Push the arm of the specimen holder (1) back.

Insert the slide (2) into the holder with the cover slip facing up.

Rotate the X-axis knob (4) and the Y-axis knob (3) to position the specimen in the center of the light path under the objective.



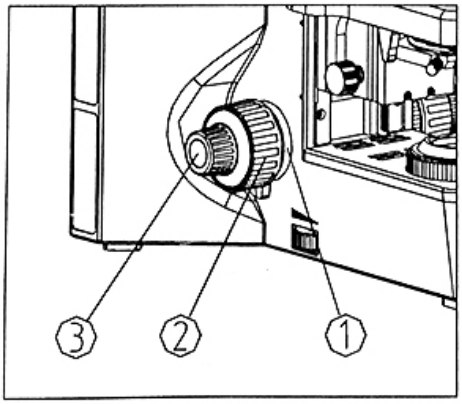
Adjusting Focus:

Place a slide on the stage. Move the 4x objective into position.

Loosen the upper limit knob (1) and then view the sample through the right eyepiece. Rotate the coarse focus knob (2) until the image is clear, then lock the upper limit knob (1).

The upper limit knob prevents the objective from hitting the slide when focusing.

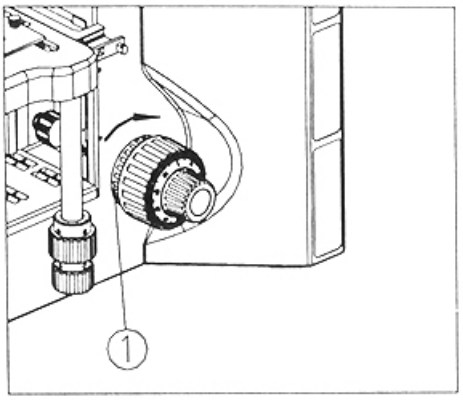
Use the fine focus knob (3) to finely focus the details of the slide.



Adjusting Focus Tension:

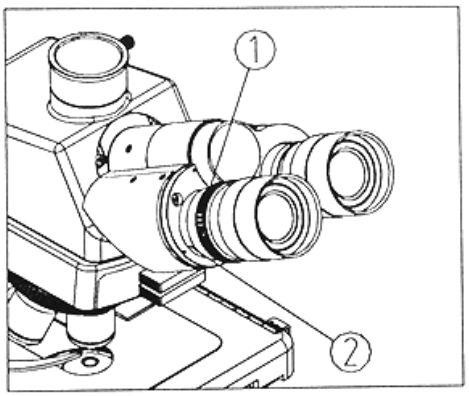
If the focus knob is very tight when focusing and hard to turn, or the stage drifts and the image falls out of focus, the focus tension needs adjustment.

Rotate the focus tension adjustment knob (1) in the direction of the arrow in order to tighten the focusing tension. Rotate it the opposite direction to loosen the focus tension.

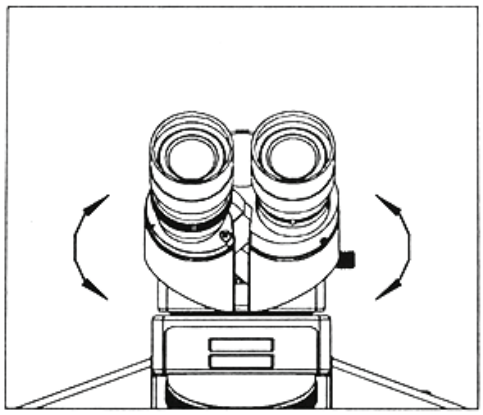


Microscope Operation:

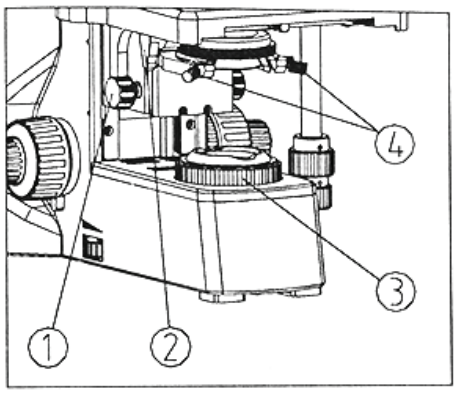
Adjusting the Diopter:
After obtaining a clear image in the right eyepiece, observe the sample with the left eyepiece. Rotate the diopter adjustment ring (1) until the image is clear.
There are +/-5 diopters on the diopter adjustment ring. If multiple people regularly use the microscope, note your individual diopter setting for a faster transition between users.



Adjusting the Interpupillary Distance:
When using both eyepieces for observation, hold the base and rotate the eyepieces to adjust the interpupillary distance. When looking through the microscope there should be only one merged field of view. Adjustable range of 50-76mm.



Centering the Condenser:
Rotate the condenser adjustment knob (1) to raise it up to the highest position.
Rotate the swing-out lens (2) to move the top lens into the light path. (Use the top lens for 20x and greater objectives).
Rotate the field iris diaphragm adjustment ring (3) so it is closed down as much as possible with the image still visible through the eyepieces.
Adjust the condenser adjustment knob (1) to obtain the clearest image.
Adjust the condenser centering screws (4) so the image is centered.
Once the condenser is centered open the field diaphragm a bit for brighter specimen viewing.



Adjusting the Field Iris Diaphragm:
The field iris diaphragm (3) strengthens image contrast by limiting the diameter of the light entering the condenser. Keep the diaphragm closed down so the light is just on the edge of the field of view.

Microscope Operation:

Adjusting the Aperture Diaphragm:
The aperture diaphragm decides the numerical aperture (NA) of the illumination system. The best resolution, contrast and depth of field is obtained when the NA of the illumination system matches the NA of the objective.
Match the setting on the aperture diaphragm (3) with the NA of the objective (4), or slightly below the NA of the objective.

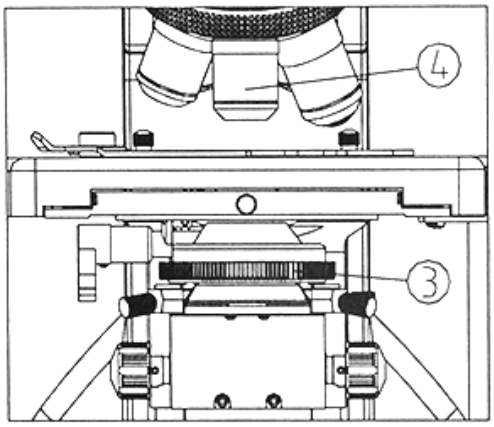
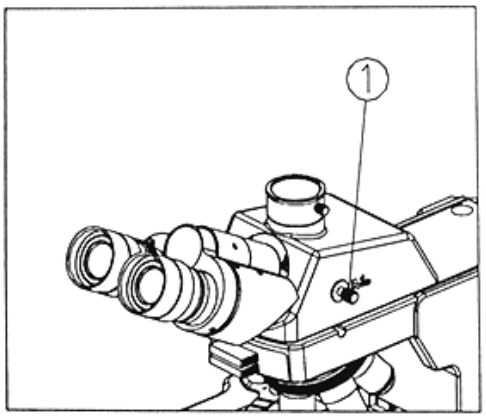
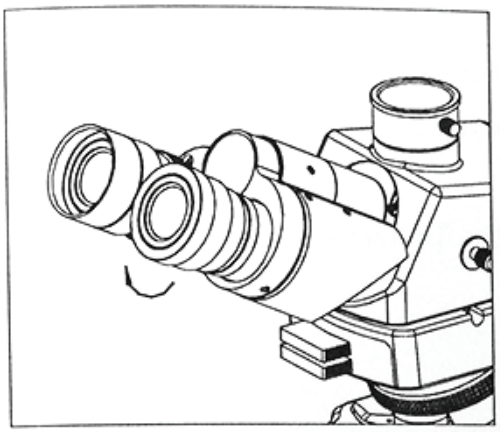


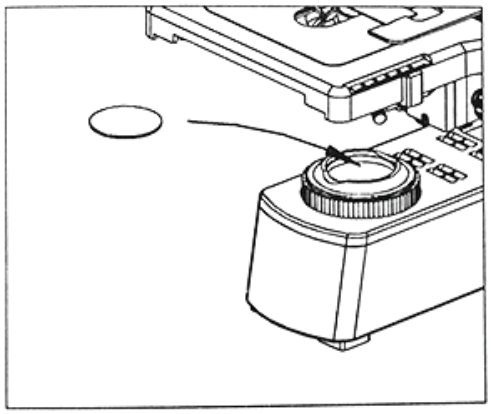
Photo Microscopy & the Beam Splitter:
When using a microscope camera, pull out the beam splitter (1) to direct all the light up the trinocular port to the camera. When using the eyepieces, ensure the beam splitter is pushed all the way in.



Using the Eyeshields:
Open the eyeshields so they are not folded down over the eyepiece. This prevents extra light from disturbing observation and if the user wears glasses it also prevents the glasses from touching the eyepieces.



Using Filters:
Microscope filters can make the background light more suitable and strengthen image contrast. If the filter has a rough and smooth side, the rough side should be placed facing down on top of the light source. The RB40 accepts a 45mm diameter filter.



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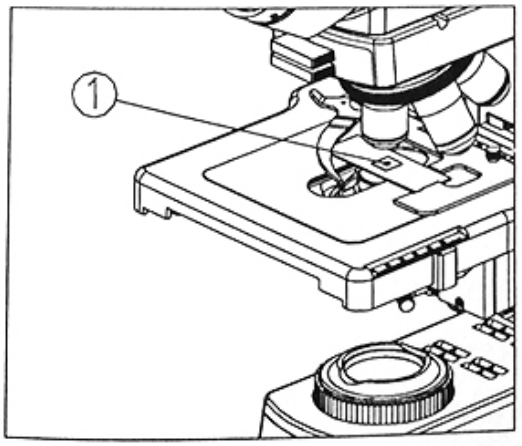
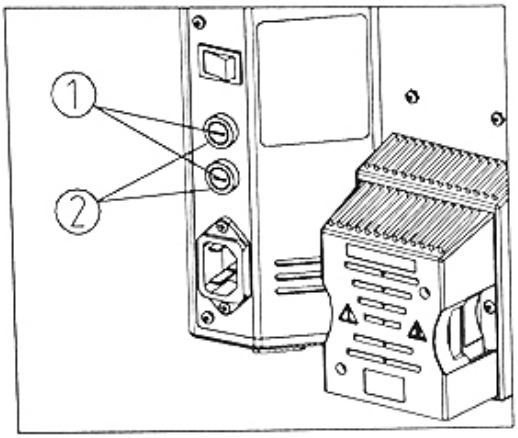
Using the 100x Oil Objective:

Start by focusing the 4x objective on the sample.
Place a drop of oil (1) on top of the cover slip.
Rotate the nosepiece counter-clockwise and rotate the 100x oil objective into the light path. Use the fine focusing knob to focus. If there are any air bubbles rotate the nosepiece slightly to remove the air bubble.
After use, wipe the front of the lens with lens cleaning tissue moistened with microscope cleaning solution.
Do not use another objective lens before cleaning the oil.



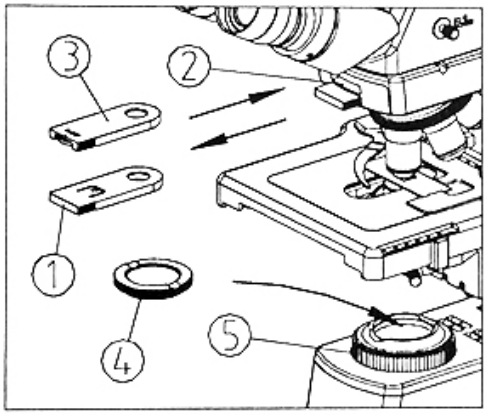
Replacing the Fuse:

Turn the main power switch to "O" off. Remove the power cord. Unscrew the fuse group (1) from the fuse base (2) with a flathead screw driver. Install a new fuse (250V, 3.15A) and replace the fuse group.



Assemble & Operate Polarization:

Polarizing includes the polarizer (4) and 360˚ rotatable analyzer (3).
Remove the dust cap (1) from the socket (2) on the front of the microscope body. Insert the analyzer (3) into the socket (2).
Place the polarizer (4) on the light house.
Rotate the analyzer (3) to begin simple polarization observation.
When the field of view is darkest, the polarizer and analyzer are in the polarized orthogonal state.



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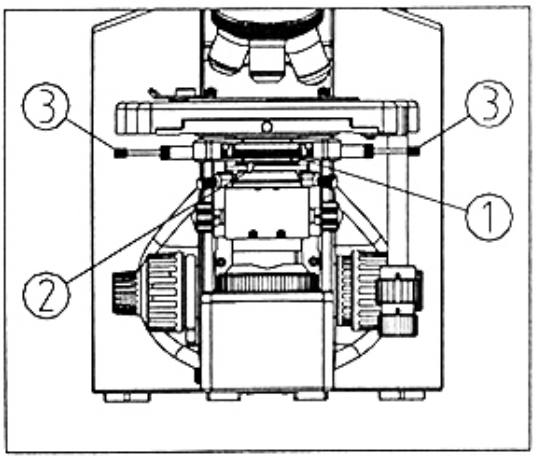
Full Phase Contrast Assembly:

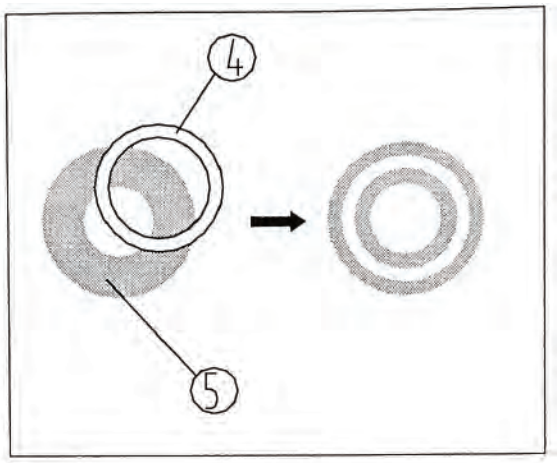
Phase Contrast Condenser Assembly:

Install phase contrast objective lenses.
Insert the condenser into the holder and tighten set screw.
Rotate the phase adjustment ring (1) to "BF" (brightfield) until it clicks into place.
Focus on a sample to ensure condenser is installed straight.
For phase contrast observation the ring diaphragm magnification (1) should match the phase objective magnification. (example: PH10x with 10x objective).
For brightfield observation move the setting to BF.



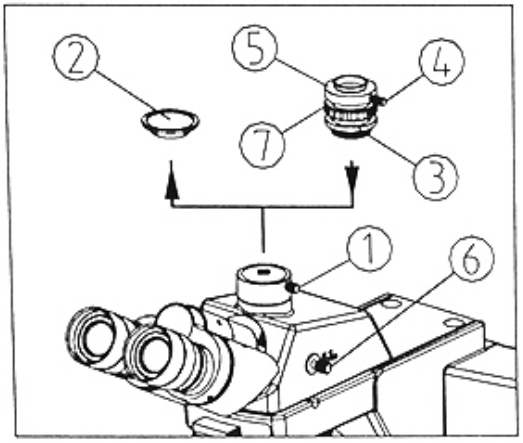
Centering the Phase Condenser:

Rotate the 10x phase objective into position and set the condenser adjustment (1) to 10x.
Move the aperture diaphragm lever (2) all the way to the left.
Place a specimen on the stage and focus.
Remove one eypeiece and replace with the phase centering telescope.
Loosen the screw on the centering telescope and move it up and down to adjust the image of the halo (4) and the phase ring (5) until they overlap and are centered, then tighten the screw.
Adjust the phase contrast centering levers (3) to center the halo (4) with the phase ring (5).
Remove the centering telescope and replace the eyepiece.
Perform centering for each objective lens.
Phase contrast can not be observed without first centering the phase condenser.



C-Mount Assembly:

Remove the dust cap (2) from the trinocular port and loosen the set screw (1). Remove the dust cap (3) from the c-mount adapter and insert into the trinocular port. Tighten the set screw.
Connect the c-mount threads (5) with the camera and tighten the set screw (4).
Pull out the beam splitter (6) to direct light up to the camera.
Adjust the focusing c-mount if the camera image is not parfocalled with the eyepieces.



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Troubleshooting:

Optical Troubleshooting

Problem	Cause	Solution
LED light is bright, but field of view is dark.	Field diaphragm is not large enough.	Open the field diaphragm.
	Condenser is too low.	Adjust the condenser.
	Condenser is not centered.	Center the condenser.
	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.	Cleaan surfaces of condenser, objectives, eyepieces and light source.
Stain or dust is observed in the field of view.	Stain has accumulated on the specimen.	Clean the sample cover slip.
	Dust or stain is on the objective or eyepiece.	Clean the objective and eyepieces.
Image is not clear.	No cover glass placed on the slide.	Add a cover slip to sample.
	Cover glass is not the standard size.	Use cover glass thickness 0.17mm.
	Cover slip is on the bottom of the slide.	Put cover glass face up.
	Immersion oil has dried on objective lens.	Clean objective lens.
	No oil immersion was used with 100x lens.	Use immersion oil.
	Air bubble in immersion oil.	Adjust lens to remove bubble.
	Incorrect type of immersion oil used.	Use Type A, non-drying oil.
	Aperture is not open or set properly.	Adjust the iris diaphragm.
	Condenser is not set up properly.	Adjust the condneser.
One side of field of view is dark or the image moves while focusing.	Specimen slide is not fixed.	Affix slide in mechanical stage.
	Nosepiece is not clicked into position.	Click nosepiece into place.
	Condenser is not centered properly.	Center the condenser.
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/22 Eyepieces.

Troubleshooting:

Mechanical & Electrical Troubleshooting

Problem	Cause	Solution
Can not get the objective lens to focus.	The cover glass is not facing up.	Put the cover glass face up.
	The cover glass is not standard thickness.	Use cover glass thickness 0.17mm.
Objective touches the cover glass when rotating the nosepiece.	The cover glass is not facing up.	Put the cover glass face up.
	The cover glass is not standard thickness.	Use cover glass thickness 0.17mm.
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.
Coarse focusing knob won't raise higher.	Rack stop limit is locked and not aligned properly.	Raise the rack stop limit slightly.
Coarse focusing knob won't lower far enough.	The base of the condenser is too low.	Raise the condenser.
Slide will not move smoothly.	The slide is not positioned correctly.	Adjust slide position.
	The movable specimen holder is not attached properly.	Adjust specimen holder.
Image jumps when stage is touched.	Stage is not fastened properly.	Reattach the stage.
LED Light does not work.	Power is not turned on.	Check power cable connection.
	LED light is not inserted properly.	Check light connection.
	LED light is burned out.	Replace LED Light.
Field of view is not bright enough.	Rheostat adjustment is turned down.	Adjust the rheostat control.
Bulb flickers or the brightness is not stable.	The connector pins or the wires for the bulb are not connected properly.	Check wire connections and connector pins for the bulb.