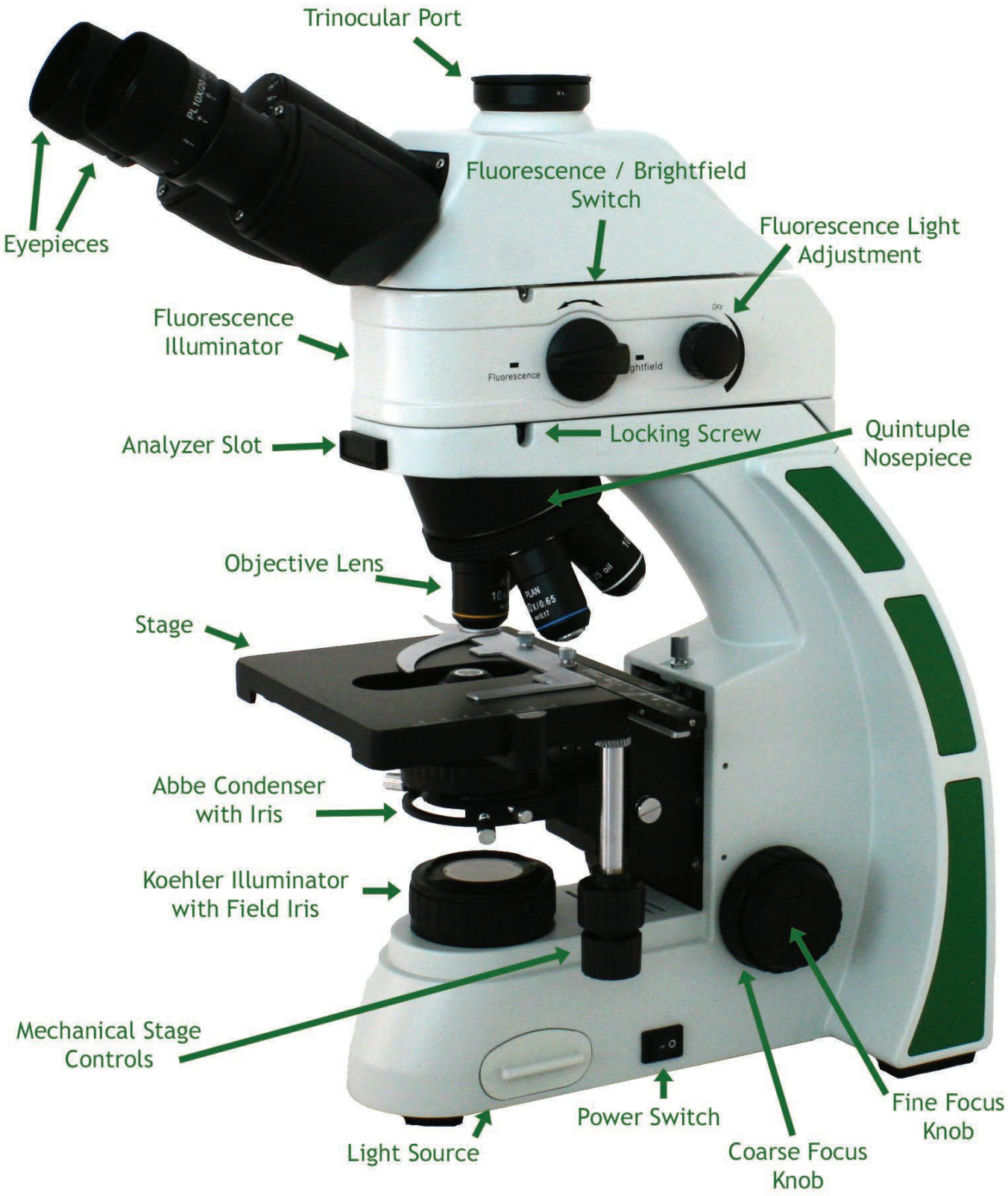
RB30 Microscope User's Manual

info@feinoptic.com

Microscope Components:



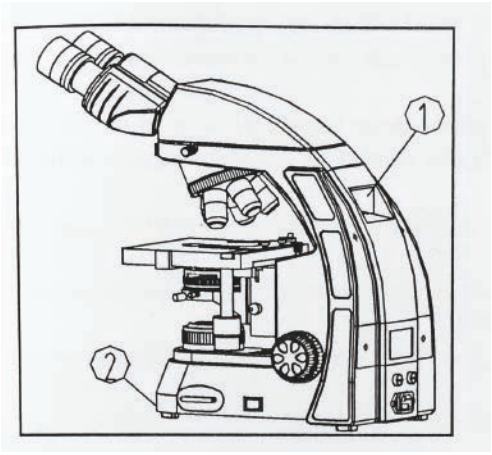
Before Use:

Do not shake or drop the microscope.

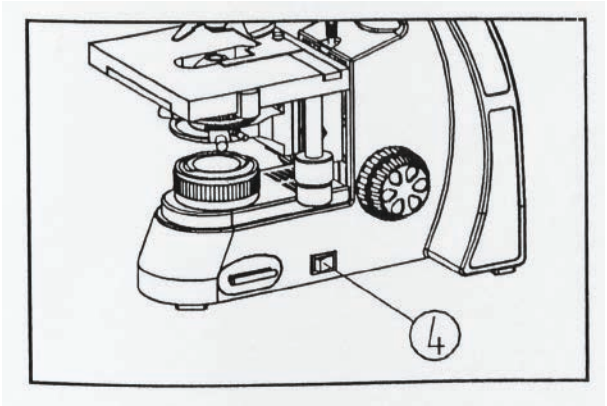
RB30T Trinocular Microscope

Do not not expose the microscope to direct sun, high temperatures, dust, or damp environments. Use a flat work surface.

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



Set the power switch to off "O" before replacing a bulb or fuse, and wait until the lamp is cool. The power switch (4) is located on the side of the base of the microscope. Microscope uses 3.3V 3W LED bulb, part # RB30-001.



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.

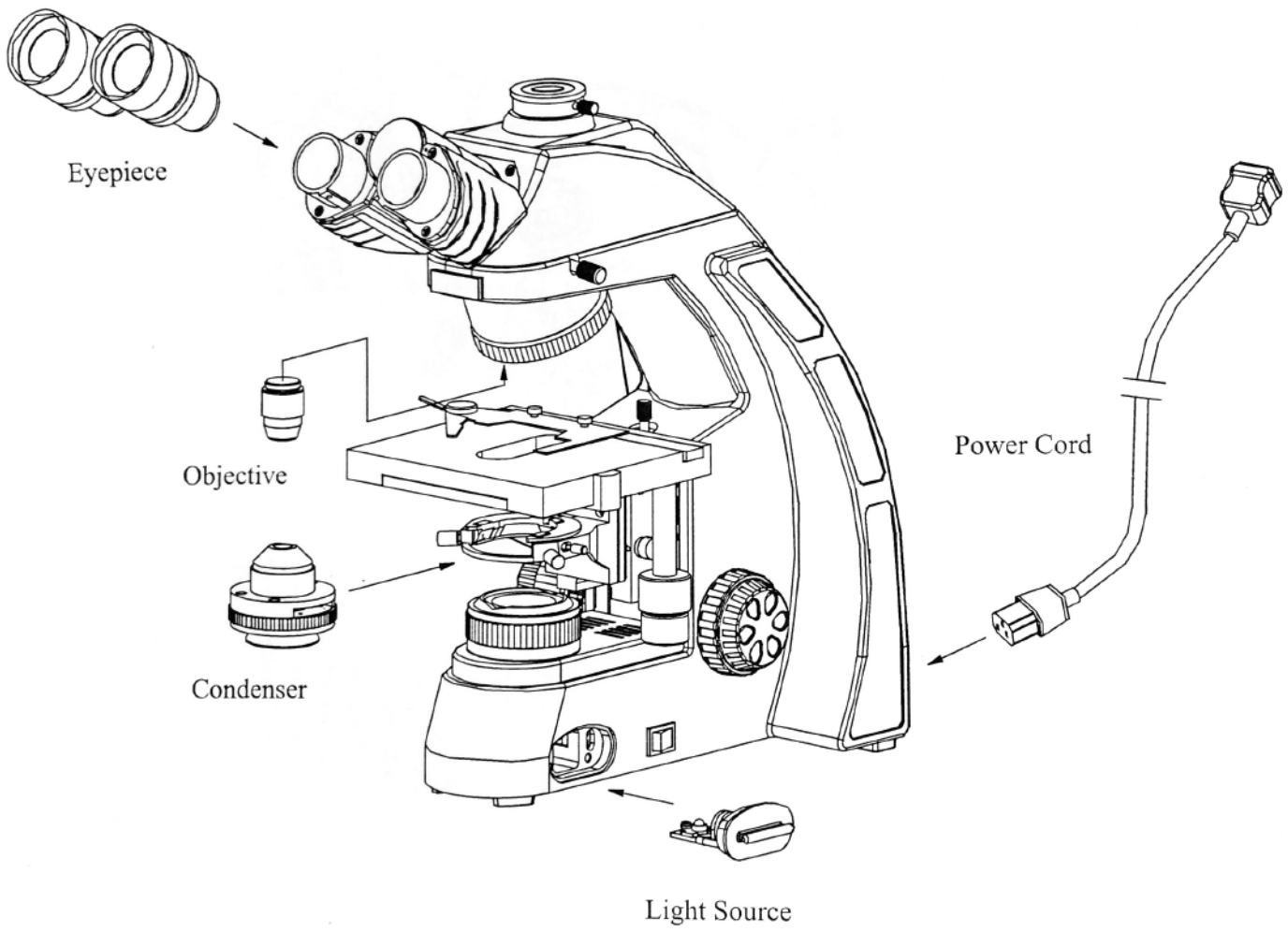
After use, cover the microscope with a dust cover and power off the light.

Objectives:

RB30 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

Binocular / Trinocular Microscope Assembly:



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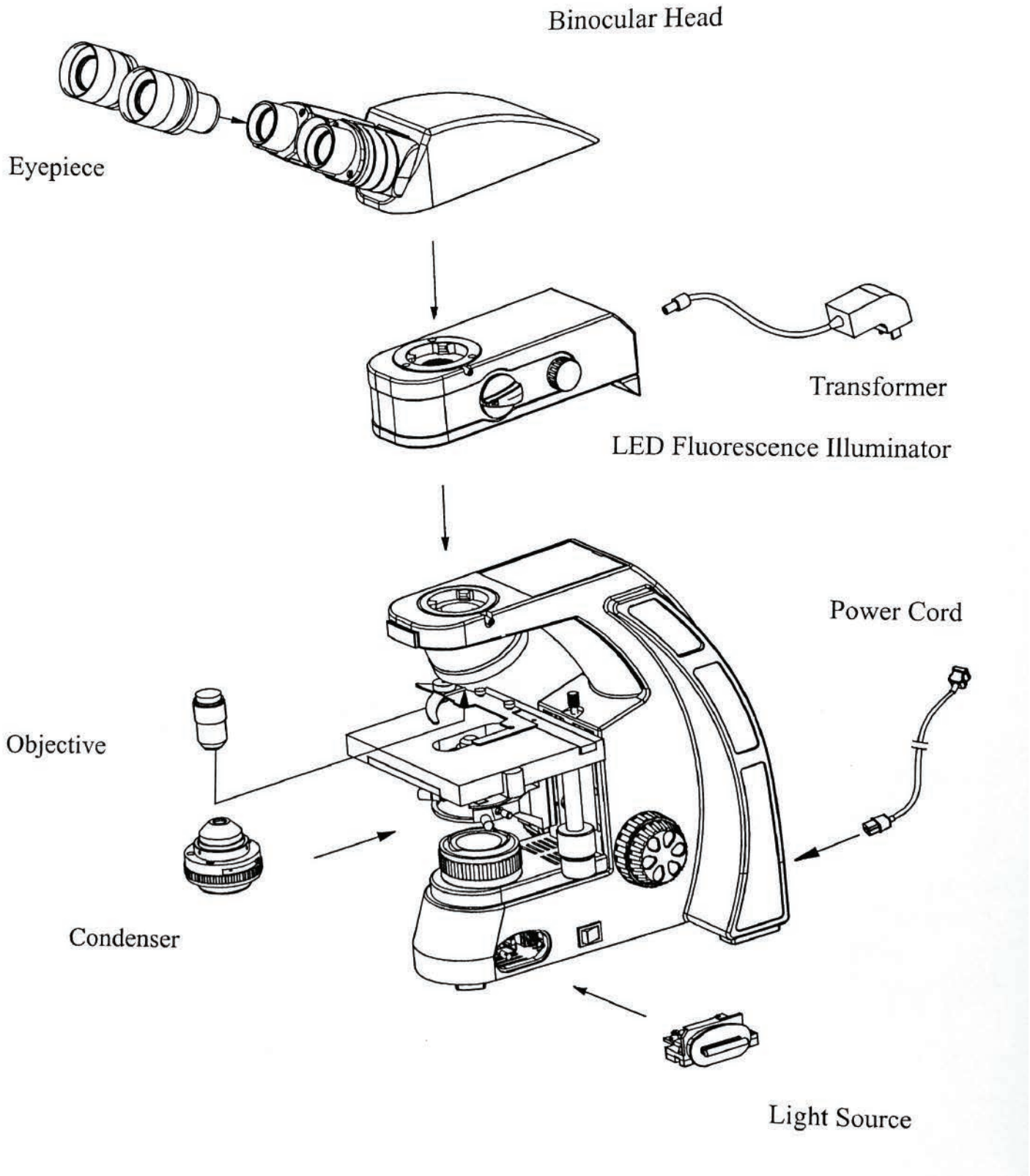
Fluorescence Microscope Assembly:



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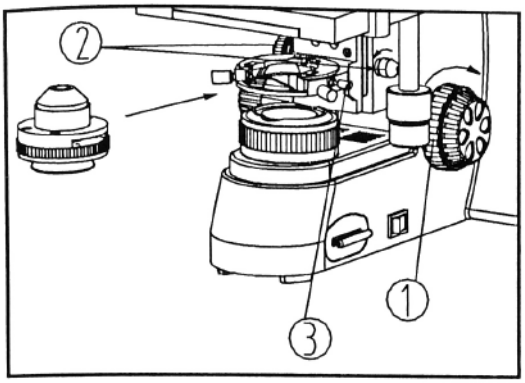
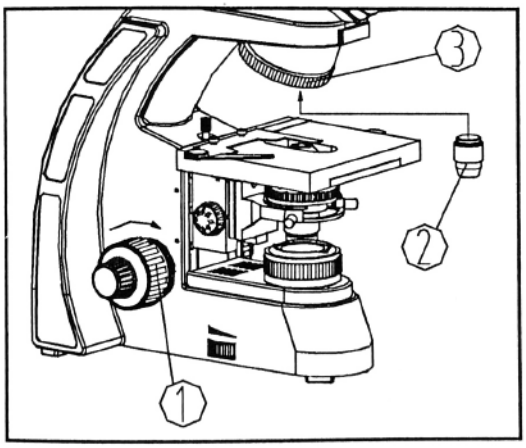
Step-by-Step Assembly:

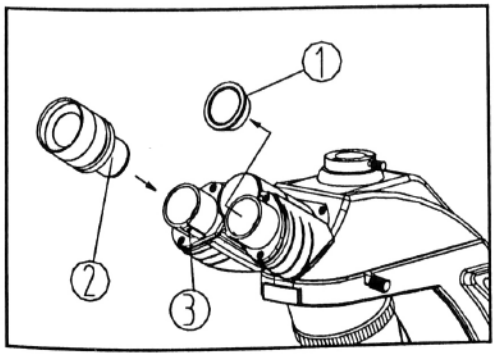
Condenser Assembly:
Rotate the coarse focus knob (1) to raise the stage to its highest position.
Rotate the condenser lowering knob (2) to lower the condenser bracket.
Loosen the condenser lock screw (3).
Insert the condenser and tighten the lock screw.
Raise the condenser back to the highest position.



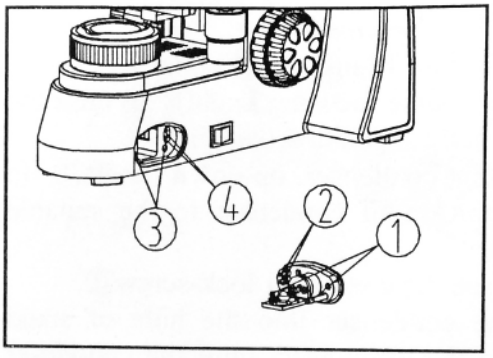
Objective Assembly:
Rotate the coarse focus knob (1) to lower the stage.
Install the objectives (2) into the nosepiece (3) from the lowest magnification to the highest in a clockwise direction from the rear.
When operating the microscope always start using the lowest objective (4x or 10x) to get the sample into focus before moving to a higher magnification.



Eyepiece Assembly:
Remove the cover from the eyetube (1).
Insert the eyepiece (2) into the eyetube.
When adjusting the diopter on the eyepiece, ensure the eyepiece is locked into the eyetube with the hex screw (3) to avoid having the eyepiece rotate in the eyetube.

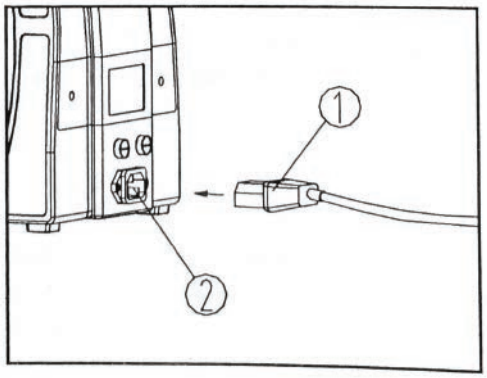


Light Source Assembly:
Align the orientation pin (1) and the power pin (2) to the holder (3) and socket (4).
Push the light source into the arm smoothly and plug it in.
Whenever replacing the bulb, turn off the power and ensure the bulb holder is not warm.
Replace entire LED light source if LED bulb is burned out. See page 15 of this manual for instructions.

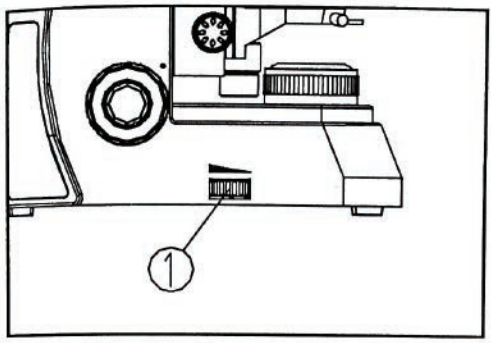


Step-by-Step Assembly:

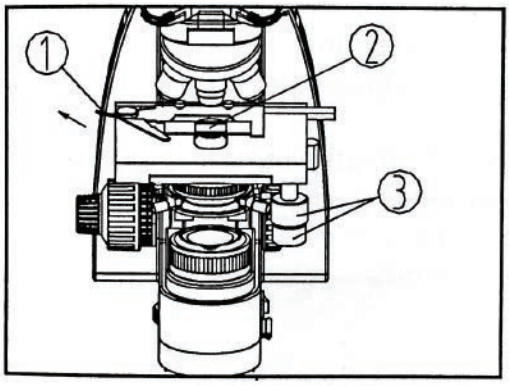
Power Cord Connection:
Set the power switch to "O" off before connecting the power cord.
Insert the connector (1) into the power socket (2).
Insert the plug into the power supply.
Voltage range 100~240V supported.
Connect power and make sure the instrument is grounded.



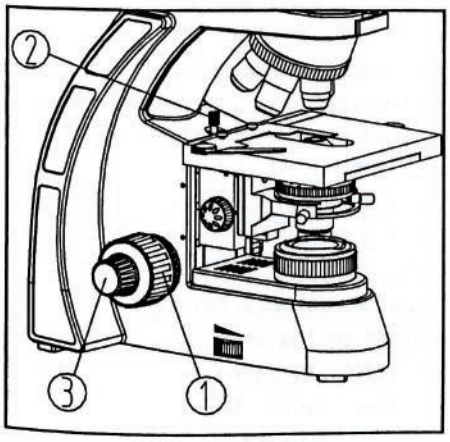
Illumination Adjustment:
Turn on the microscope switch.
Adjust the rheostat control (1) until the illumination is comfortable for observation. Rotate the rheostat knob clockwise to increase brightness and counterclockwise to decrease brightness.
Using the bulb at a lower brightness extends bulb life.



Slide Placement:
Push the specimen holder (1) back.
Place the slide (2) in the slot with the cover slip up.
Rotate the X and Y axis knob (3) to maneuver the slide so the specimen is in the center of the field of view.



Focus Adjustment:
Move the 4x objective into position.
Rotate the rack stop screw (2) to loosen it (this screw prevents the objective from hitting the slide at higher magnifications).
While looking through the eyepieces, rotate the coarse focus knob (1) until the image appears.
Rotate the fine fine focus knob (3) until the image is crisp and clear.
Retighten the rack stop screw (2).



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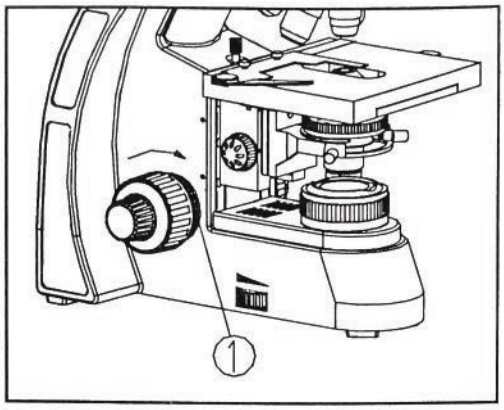
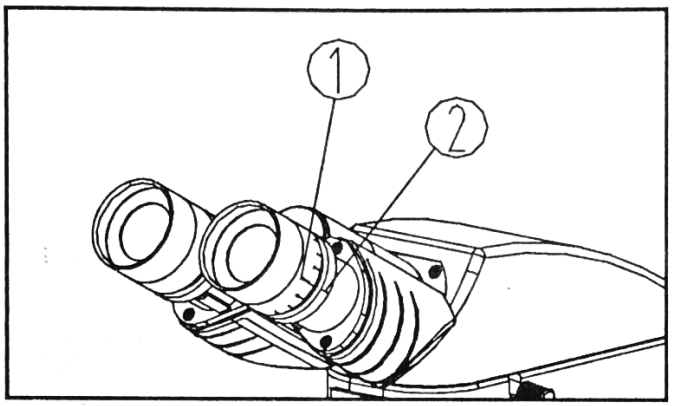
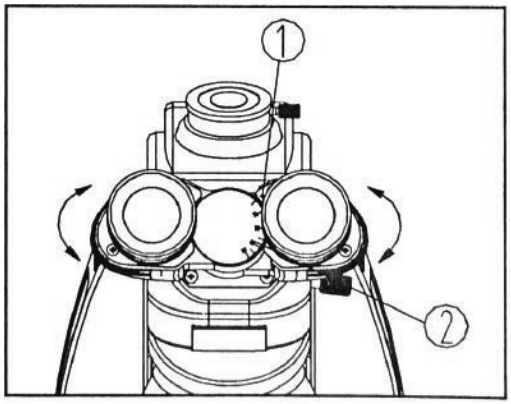
Step-by-Step Assembly:



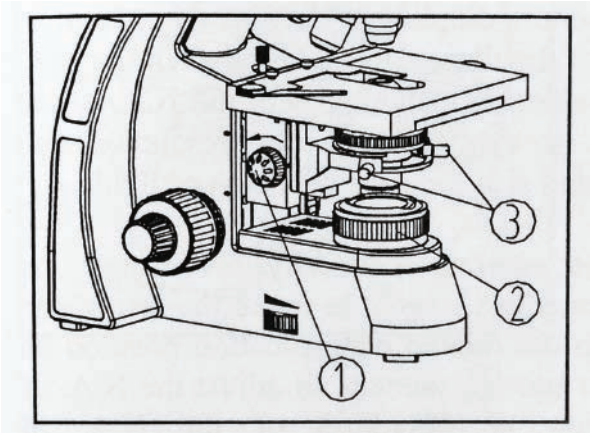
Adjusting Focus Tension:
If it becomes hard to move the coarse focus knob, or the stage drifts and the sample falls out of focus the tension needs to be adjusted.
Tighten the tension by adjusting the tension adjustment ring (1) in the direction of the arrow shown at right.
Loosen the tension by rotating the tension adjustment ring in the opposite direction.



Diopter Adjustment:
Align the scale to "0" on the diopter adjustment ring (1) with the scale (2).
Focus the microscope to a clear image while looking through one eyepiece only.
Look through the other eyepiece and rotate the diopter adjustment ring on that eyepiece until the image is clear.
If multiple people are using the microscope, note your diopter setting for quick transition from users.



Interpupillary Distance Adjustment:
When observing with both eyes, adjust the eyepieces (2) to fit your personal interpupillary distance.
The scale between the eyepieces (1) notes the interpupillary distance setting.

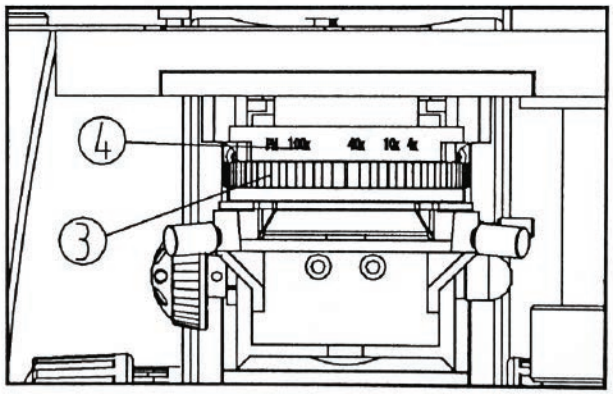


Centering the Condenser:
Rotate the condenser height knob (1) to raise the condneser up to the highest position.
Rotate the 10x objective into position and focus.
Rotate the field iris diaphragm adjustment ring (2) so the field is in the smallest position.
Rotate the condenser height knob (1) so the image is crisp and clear.
Adjust the condenser centering screws (3) so the image is in the center of the field of view.
Open the field iris diaphragm (2) slowly. If the image remains in the center, the condenser has been centered properly.

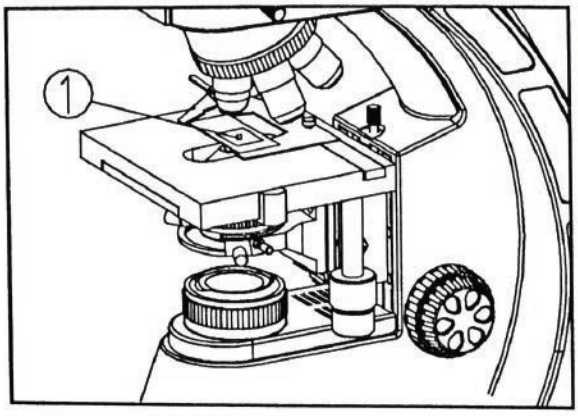
Step-by-Step Assembly:

Adjusting the Field Iris Diaphragm:
See image on the bottom of page 8 next to "Centering the Condenser" for reference.
By limiting the diameter of the beam of light entering the condenser, the field iris diaphragm (2) can improve the contrast of the image.

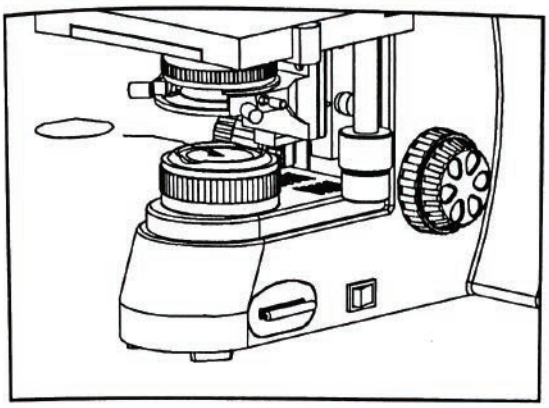
Aperture Diaphragm Adjustment:
The aperture diaphragm dictates the numerical aperture (NA) of the illumination.
The best resolution, contrast, and depth of field is obtained when the NA of the illumination matches with the NA of the objective.
Rotate the diaphragm adjusment ring (3) so the pointer matches up with the inscription (4) of the objective being used.



Using the 100x Immersion Oil Objective:
Start with the 4x objective and focus on the sample.
Place a drop of immersion oil (1) on the specimen.
Rotate the nosepiece counterclockwise so the 100x objective is in the light path and the oil seals the space between the objective and the cover slip.
Use the fine focus knob to obtain a clear image.
Make sure there are no air bubbles in the oil. If there are, rotate the nosepiece slightly to remove them.
Open the aperture diaphragm and field iris diaphragm fully.
After use, wipe the lens with a tissue moistened with microscope cleaning solution.

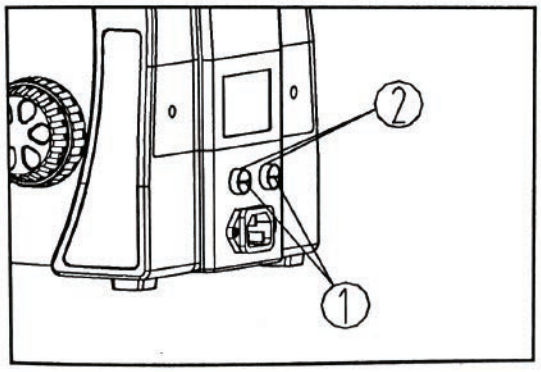


Using Filters:
Filters can increase the contrast in microscopy images.
The filter sits on top of the light as shown at right.
The RB30 accepts a 45mm diamter filter.

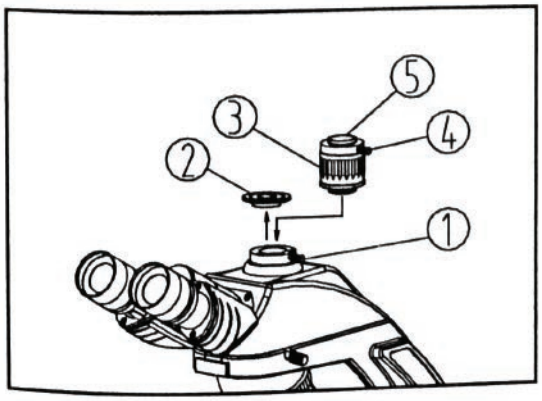


Step-by-Step Assembly:

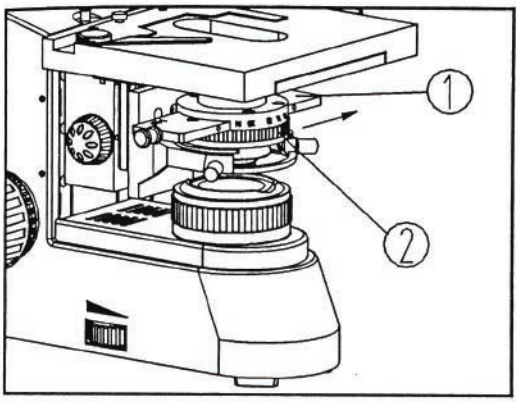
<u>Replacing the Fuse:</u>
Turn the power switch to "O" off.
Remove the power cord.
Unscrew the fuse group (1) from the base (2) with a flathead screwdriver.
Install a T250V, 3.15A fuse.



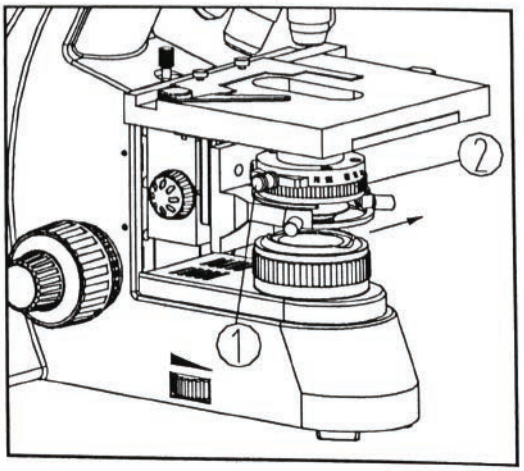
<u>C-Mount Assembly:</u>
Loosen the trinocular head set screw (1) and remove the trinocular port dust cap (2).
Remove any dust cover caps from the c-mount (3).
Insert the c-mount into the trinocular port as image shows at right and tighten the set screw (1).
Loosen the c-mount set screw (4).
Connect the camera to the c-mount threads (5) and tighten the set screw.
When the eyepieces are in focus, adjust the focus on the c-mount with an allen key to parfocal the camera with the eyepieces.



<u>Phase Contrast Slider Assembly:</u>
Insert the slider (1) from left to right with the inscription facing up.
Each hole in the phase slider has a corresponding position.
When using phase contrast make sure the adjustment ring on the aperture diaphragm (2) is set to "PH".
Each phase objective should be used with the corresponding phase ring diaphragm (for example 10xPH with 10x ring).
The phase slider is pre-centered.



<u>Darkfield Slider Assembly:</u>
Insert the slider (1) from left to right with the inscription facing up.
When using darkfield adjust the aperture diaphragm to an open position.
The darkfield ring diaphragm adjustment (1) is located on the left side of the slider.



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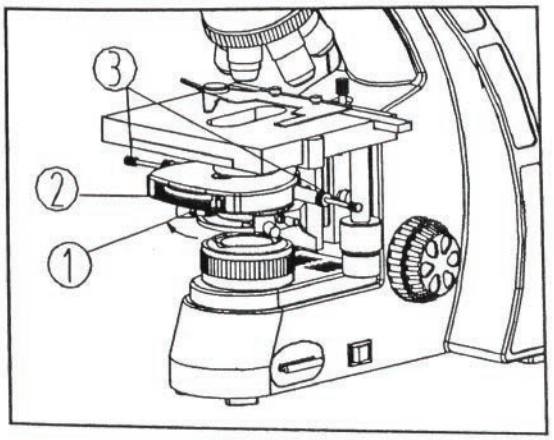
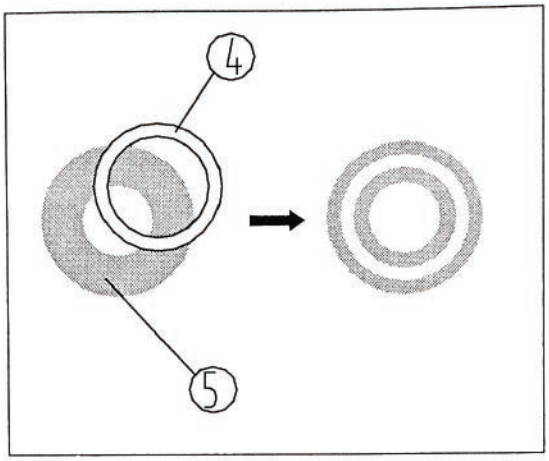
Full Phase Contrast / Polarization Assembly:

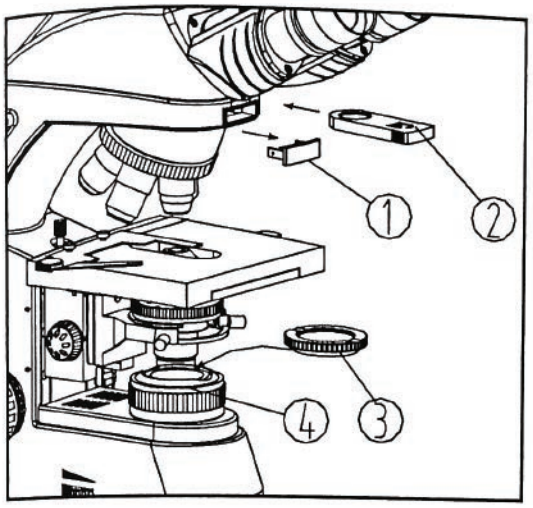
<u>Phase Contrast Condenser Assembly:</u>
Install phase contrast objective lenses.
Insert the condenser into the holder and tighten set screw.
Rotate the phase adjustment ring (2) to "BF" (brightfield) until it clicks into place.
Focus on a sample to ensure condenser is installed straight.



<u>Centering the Phase Condenser:</u>
Slide the aperture diaphragm lever (1) to the furthest left position while the aperture diaphragm is fully open.
Place a specimen on the stage and focus.
Remove one eyepiece and insert the phase centering telescope.
Set the phase adjustment ring (2) to correspond with the phase objective being used (example: PH10x with 10x objective).
Adjust the centering telescope to get a clear image of the phase ring and halo in the field of view.
Center the rings (4) and (5) by adjusting the centering screws (3) on the phase condenser.
If the phase condenser is not centered prior to use phase contrast microscopy observation will not be possible.



<u>Polarization Assembly:</u>
Simple polarization includes both a polarizer (3) and analyzer (2).
Remove analyzer dust cap (1) from microscope and insert analyzer facing up.
Place the polarizer (3) on the lamphouse (4).
Rotate the polarizer when looking through the microscope.



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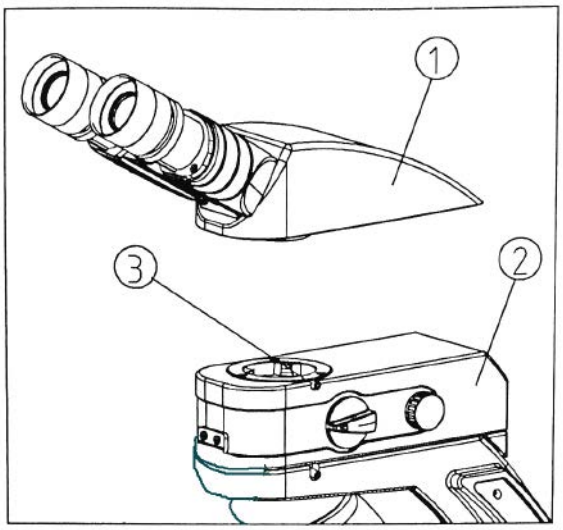
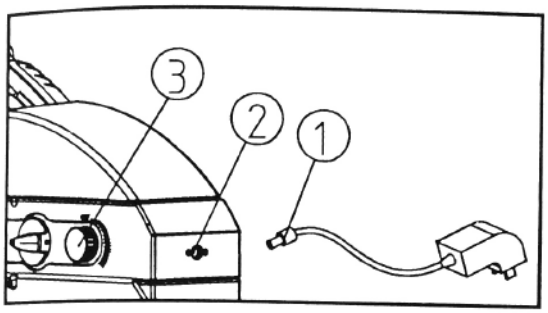
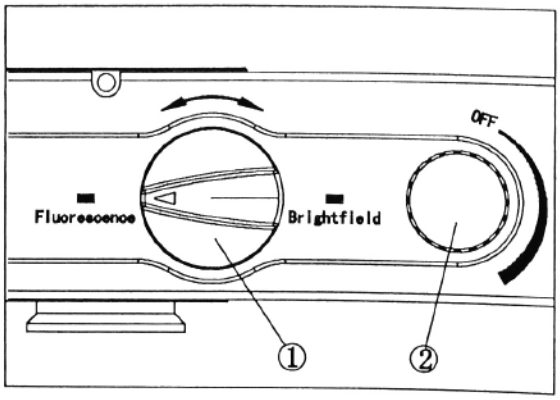
Fluorescence Light Assembly:



Installing the Fluorescence Illuminator:
Place the fluorescence module (2) on the microscope body and tighten the set screw.
Place the binocular / trinocular head on top of the fluorescence module and tighten the set screw (3).



Insert transformer (1) into socket (2) and then plug directly into outlet.



Fluorescence Light Adjustment:
Fluorescence / Brightfield adjustment knob (1) can be rotated 180 degrees to switch between brightfield and fluorescence.
Rotate the light adjustment knob (2) clockwise to make the light brighter.

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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.
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.

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.

Bulb Replacement:

1. Turn off and unplug the microscope and slide out the bulb compartment.

2. Notice where the "+" and "-" symbols are on the bulb assembly and which color wire is connected to each.

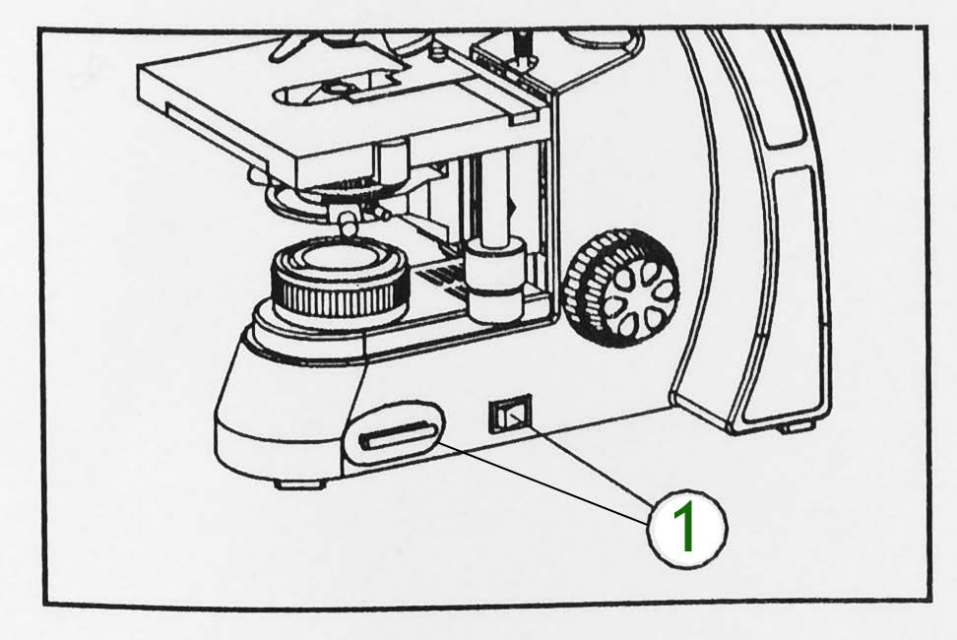
3. Disconnect the wires from the bulb assembly and unscrew the bulb assembly from the bulb compartment.

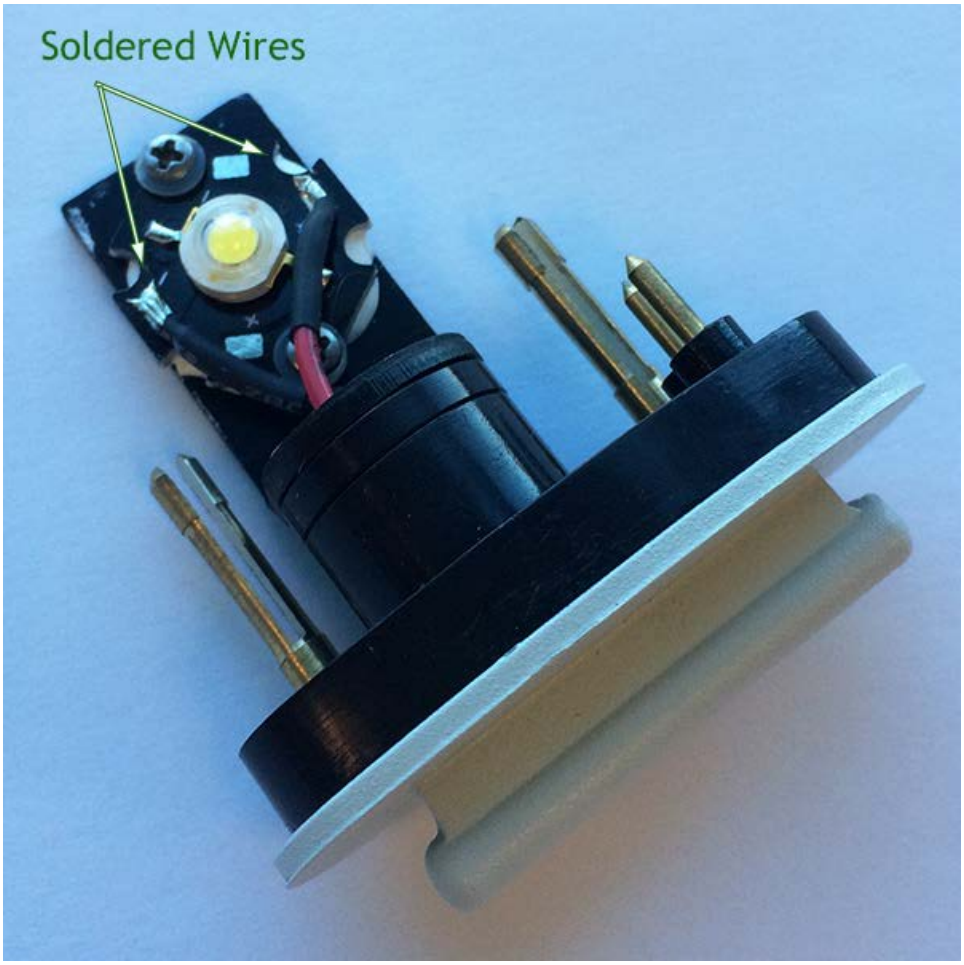
4. Solder the wires to the new bulb assembly in the same location as the old bulb assembly.

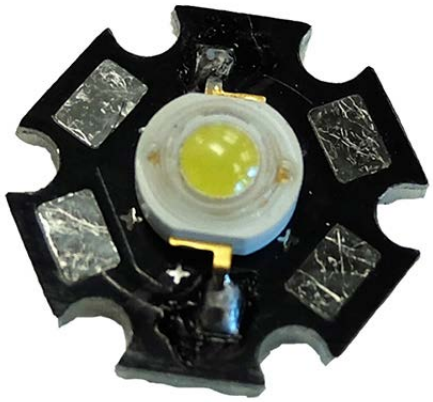
5. Rescrew the bulb assembly back onto the bulb holder compartment.

6. Reinsert the bulb holder back into the microscope.

7. Power the microscope on and turn on the light.







RB30-001 Replacement LED Bulb Assembly

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