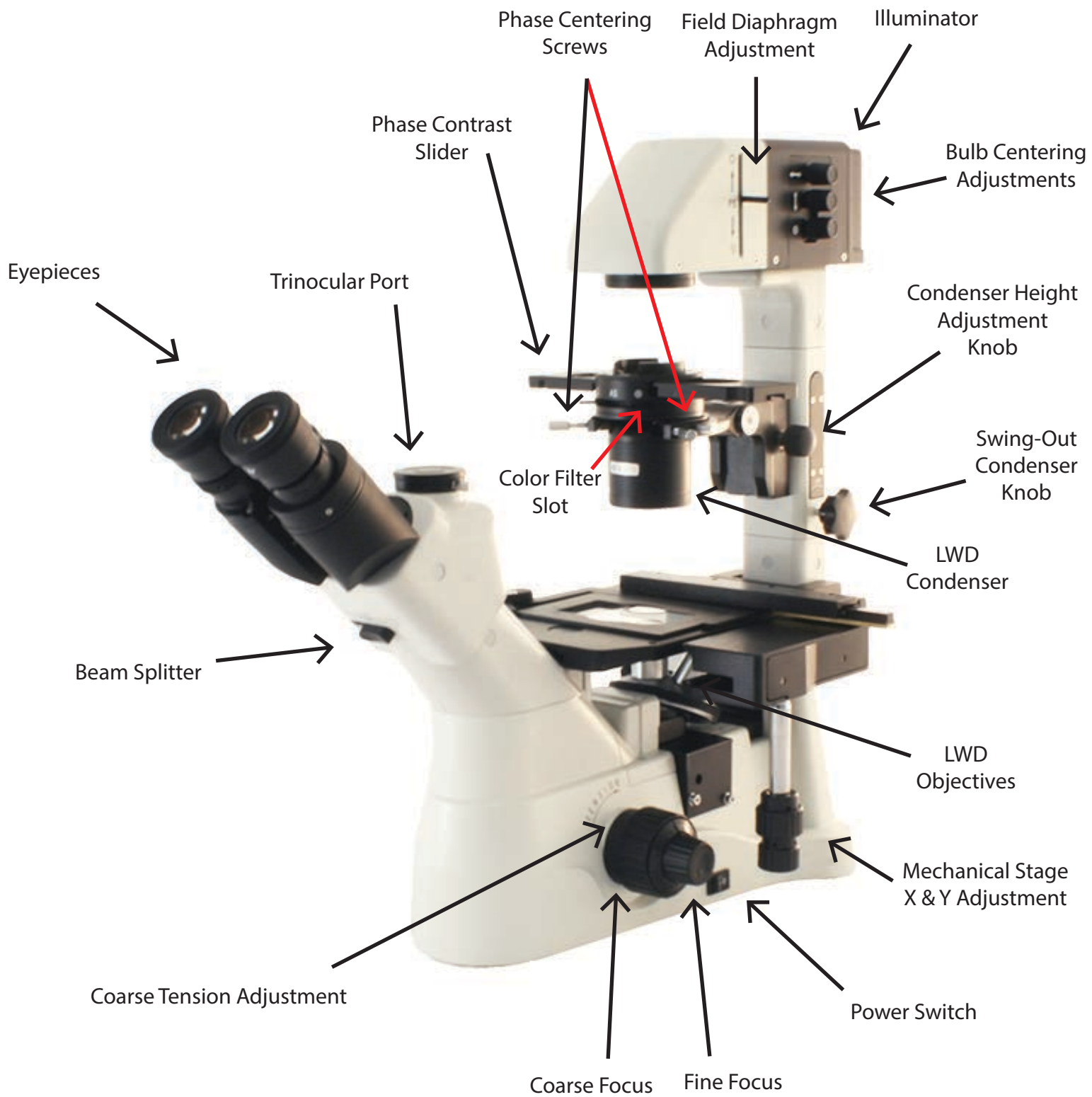


IRB40 Microscope User's Manual

for Inverted Biological Microscopes



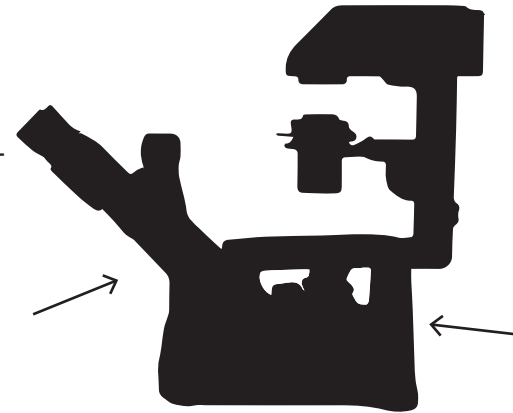
Microscope Components:



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 and the other hand to hold the back of the base as shown at right. Do NOT hold the microscope by the stage, focusing knob, head or light source when carrying it.



When working, make sure the light source has enough room for any heat to dissipate. Before replacing the fuse, make sure the power switch 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.

Microscope Assembly:



Installing the Bulb

Loosen the set screw shown at right to open the light housing bulb panel.

Using a glove or lens tissue paper, place the bulb into the socket as shown at right. Do not touch the bulb with your fingers.

Bulb: 6v, 30w Halogen #IRB40-001.

CAUTION: If replacing the bulb during or after operation, the bulb and housing will be very hot. Set the power switch to "O" off and remove the power cord. Allow some time for the bulb to cool.



Assemble the Objectives

Rotate the coarse focusing knob (1) until the condenser is in the low-limit location. The tension adjustment knob (2) can be rotated if the coarse focus knob is hard to turn or slips.

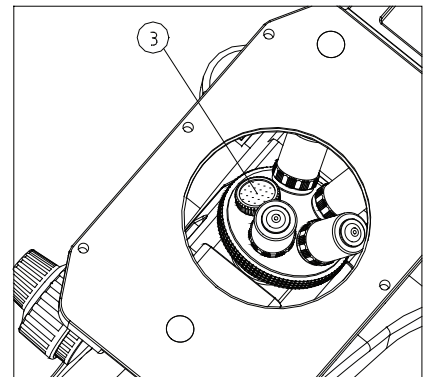
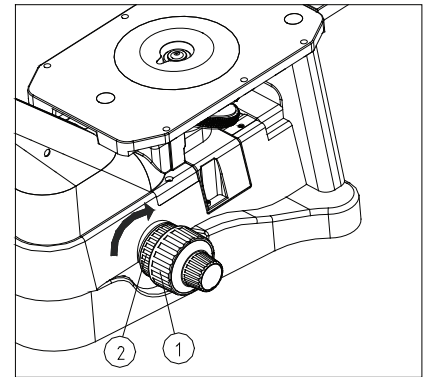
Install the objective into the nosepiece from the lowest magnification to highest in a clockwise direction.

If one of the objective holes is not being used seal it with the dust cap (3).

When using the microscope start focusing using the lowest magnification objective and work up to the higher magnification once the sample is in focus.

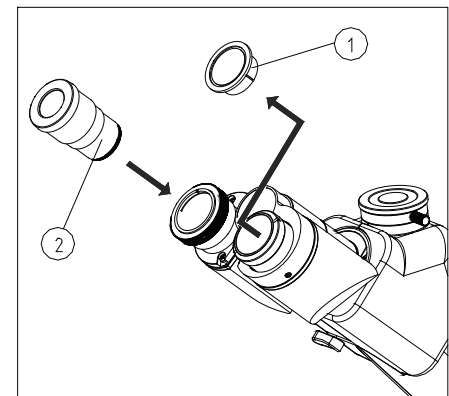
Clean the objective lenses on a regular basis to ensure clear images.

When moving an objective lens into the light path, make sure it clicks into place fully.



Install the Eyepieces

Remove the dust cover (1) from the eyetube and insert the eyepiece (2) into the tube all the way.





Powering Up the Microscope

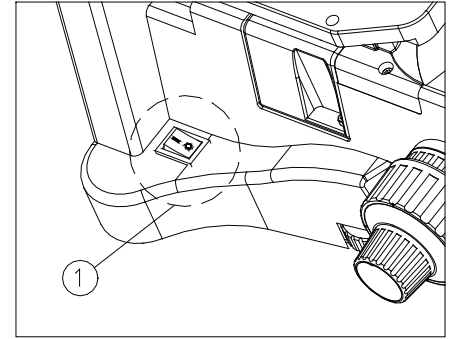
Turn the power switch (1) to "O" off before connecting the power cord. Insert the plug (2) into the microscope outlet (3).

Insert the other end of the power cord into the wall socket.

Do not force either end of the power cord, as it can damage the cord.

Use only the power cord supplied with the microscope.

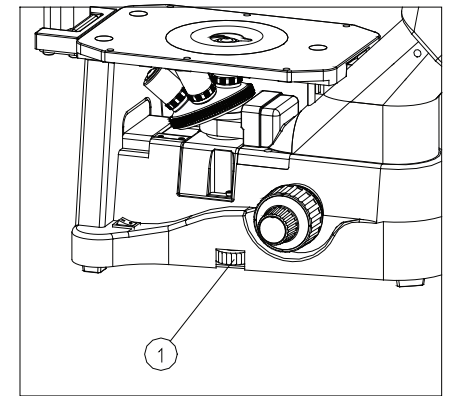
Voltage range = 90~240V.



Adjusting the Light

Use the rheostat control (1) to control the light intensity, making it brighter or dimmer.

Using the microscope at a lower voltage will increase the life of the bulb.



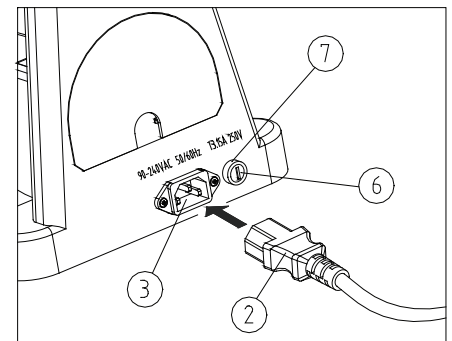
Replacing the Fuse

Turn the main power switch (1) to "O" off before replacing the fuse. Unplug the microscope.

Unscrew the fuse group (6) from the microscope base (7) with a flathead screwdriver.

Install a new fuse and replace the fuse group.

Fuse = 250V, 3.15A.

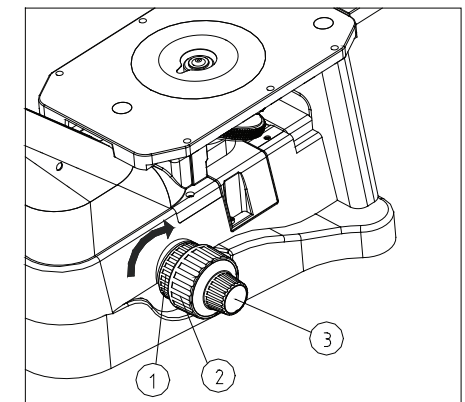


Focus Tension Adjustment

If the coarse focus knob (2) is hard to turn or turns easily and the sample falls out of focus, adjust the tension control knob (1).

Rotating the tension control knob clockwise will tighten the tension of the coarse focus knob. Counterclockwise will loosen the tension of the coarse focus knob.

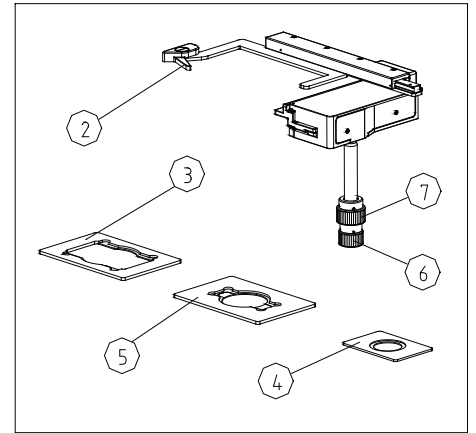
The fine focus knob (3) will not be affected by adjustments made with the tension focus adjustment knob.





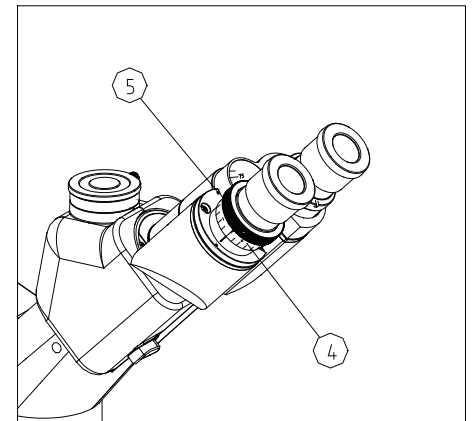
Attaching Mechanical Stage

Open the sample clip (2) to hold the Terasaki holder (3), or 35mm Petri Dish holder (4) or specimen slide holder (5) in place. Adjust X-axis by rotating the X-axis adjustment knob (6). Adjust Y-axis by rotating the Y-axis adjustment knob (7). Working range of 120mm x 80mm.



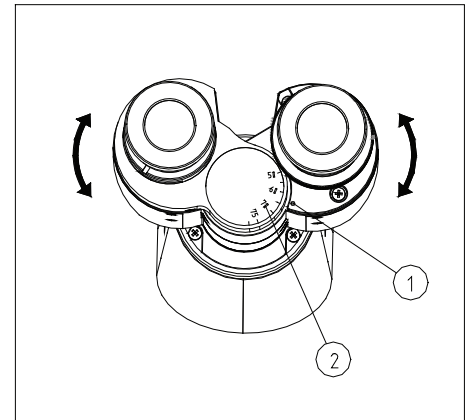
Adjusting the Diopters

Turn the coarse focus knob and then the fine focus knob to get a clear image while looking through the right eyepiece. Then look through the left eyepiece. If the image is not clear, rotate the diopter adjustment ring (4). If multiple people are using the microscope, note the setting (5) on the diopter for your specific diopter setting. This will make it easier to set up the microscope for your eyes each time.



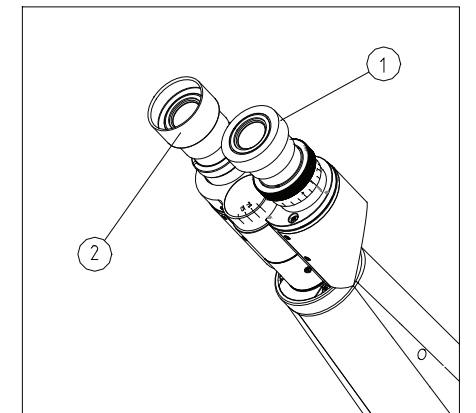
Adjusting the Interpupillary Distance

When using both eyepieces for observation, hold the base of the prism and rotate the eyepieces around the axis until you see only one field of view through the eyepieces. There is a dot (1) on the side that will line up with your specific interpupillary distance adjustment number (2). Remember this number if multiple people are using the microscope.



Using the Eyeshields

If the user wears glasses, turn the eye shield down (1) to prevent the glasses from touching the eyepiece and damaging either one. Open the eyeshields (2) to prevent stray light from disturbing observation.

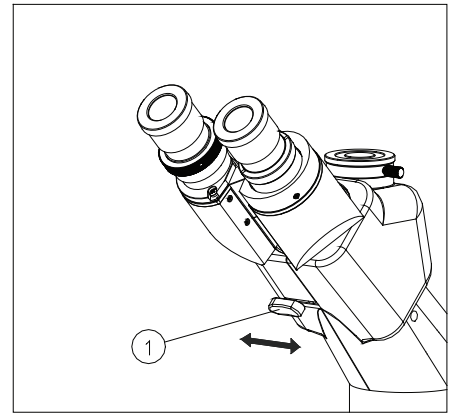




Adjusting the Beam Splitter

Shifting the beam splitter lever (1) to the right will send light 100% to the eyepieces.

Shifting the beam splitter to the left will direct light 20% to the eyepieces and 80% to the camera.



Using Color Filters

Color filters can be beneficial when capturing images through the microscope. The color filter slots into the condenser.

Use the LDB color filter to obtain a more neutral hue when observing brightfield and capturing images.

Color filters should not be more than 11mm thick. They can be overlapped if they do not exceed this thickness.

The green interference filter is used for phase contrast.

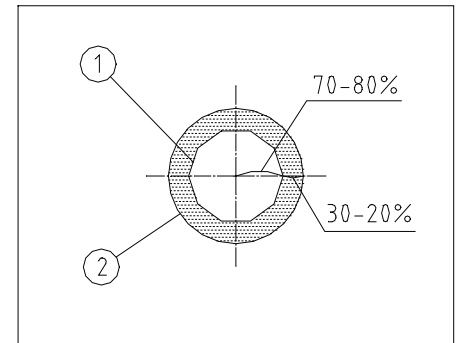


Adjusting the Aperture Diaphragm

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

When adjusting the aperture diaphragm, the objective can be moved out of the light path. Observe through the eyetube and adjust the aperture diaphragm lever so that the aperture diaphragm (1) is about 70-80% of the field of view (2).

Adjust the aperture diaphragm lever to the \otimes setting when observing bacteria.

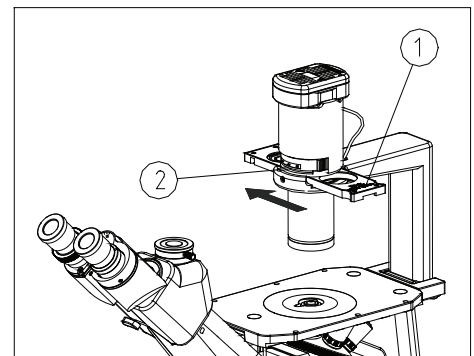


Assembling the Phase Slider

Place the phase slider (1) facing up in the condenser (2).

Each slot will click into place.

Place the aperture diaphragm adjustment lever set to O when using phase contrast.



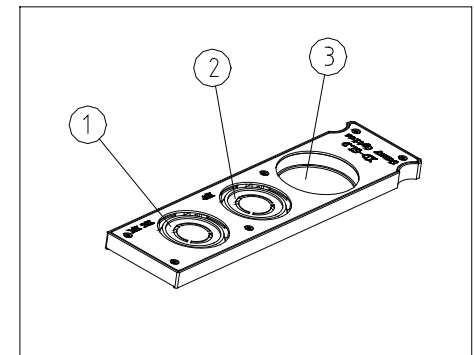
Using the Phase Slider

The phase slider fits into the condenser and has three slots on it.

Slot (1) is for use with 10x / 20x phase contrast objectives.

Slot (2) is for use with 40x phase contrast objectives.

Slot (3) is empty and is intended for a 45mm diameter color filter or simply using it for brightfield work.





Centering the Phase Stop

Place a specimen on the stage and focus.

Remove the eyepiece and replace it with the centering telescope (CT). Insert it into the eyetube without diopter adjustment.

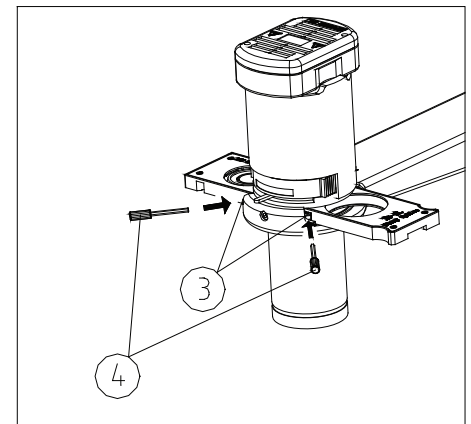
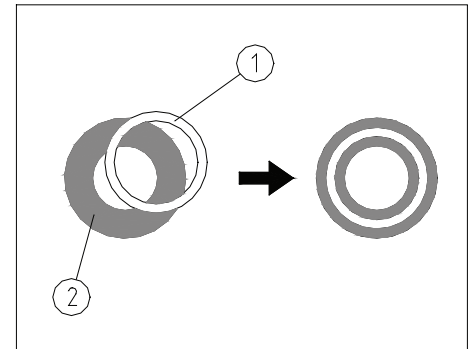
Make sure the light rings from the phase objective and the slider are in the field of view.

While looking through the centering telescope, turn the fine focus knob to view the light loop (1) to focus on the phase loop of the objective (2).

Insert the phase center adjustment screws (4) into the two holes (3) on the phase slider and adjust them until the light loop (1) is centered over the phase loop (2) as shown above.

Repeat these steps for each phase objective and phase stop on the slider.

Failure to center the phase slider may result in poor phase contrast images.



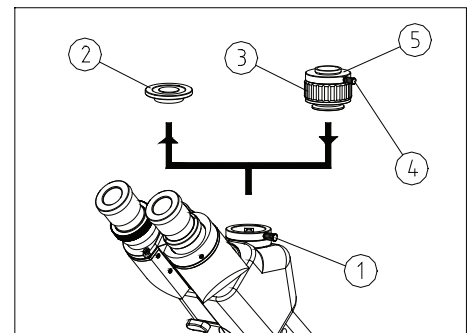
Assembling the C-Mount Adapter

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

Insert the c-mount adapter into the trinocular port (1) and tighten the set screw (1).

Loosen the set screw (4) on the c-mount and remove the c-mount threads to connect to the microscope camera.

Once the camera is connected reattach to the c-mount adapter.



Microscope Objectives:

Objective Type	Part # / Magnification	Numerical Aperture	Working Distance
L Plan Achromat	LPL4 / 4x	0.10	22mm
	LPL40 / 40x	0.65	3.71mm
L Plan Phase	LPLPH10 / 10x	0.25	7.94mm
	LPLPH20 / 20x	0.40	7.66mm
	LPLPH40 / 40x	0.60	3.71mm
L Plan Phase Semi Apochromat Fluor	LPLPHF20 / 20x	0.45	5.91mm
	LPLPHF40 / 40x	0.65	1.61mm
L Plan Semi Apochromat Fluor	LPLFL4 / 4x	0.13	18.52mm
	LPLFL10 / 10x	0.30	7.11mm
	LPLFL20 / 20x	0.45	5.91mm
	LPLFL40 / 40x	0.65	1.61mm
	LPLFL60 / 60x	0.75	1.04mm



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.
	Lamp is not connected properly.	Check bulb and housing.
	Beam splitter is engaged.	Adjust the beam splitter.
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 phase contrast slider is not in position all the way.	Check and adjust phase contrast slider.
	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.	Objective is not in place.	Adjust objective.
	Aperture is not opened properly.	Adjust Iris Diaphragm.
	Thickness of slide/petri dish is not 1.5mm.	Use 1.5mm slide / petri dish.
	Phase contrast has not been centered.	Center phase slider / 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.
	Light is not centered properly.	Center the light bulb.
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.

Electrical Troubleshooting:		
Problem	Cause	Solution
Light does not work.	Power is not turned on.	Check power cable connection.
	Bulb is not installed properly.	Check light connection.
	Bulb is burned out.	Replace Bulb.
Bulb burns out quickly.	Incorrect bulb is being used.	Replace bulb with part # IRB40-001.
Field of view is not bright enough.	Incorrect bulb is being used.	Replace bulb with part # IRB40-001.
	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.
	The bulb needs to be replaced.	Replace bulb with part # IRB40-001.