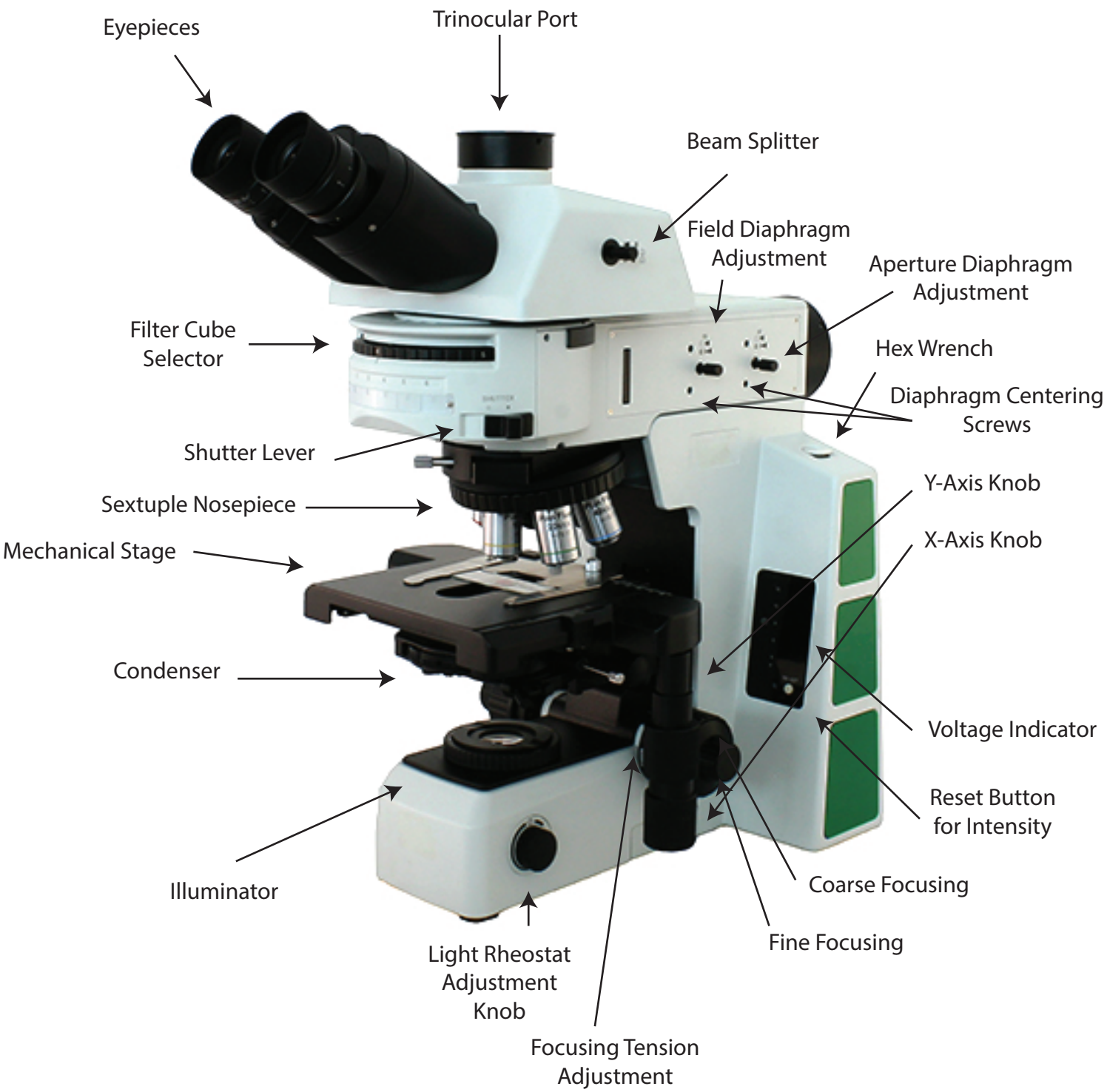
RB50 Microscope User's Manual

info@feinoptic.com

Microscope Components:

RB50 Fluorescence Microscope



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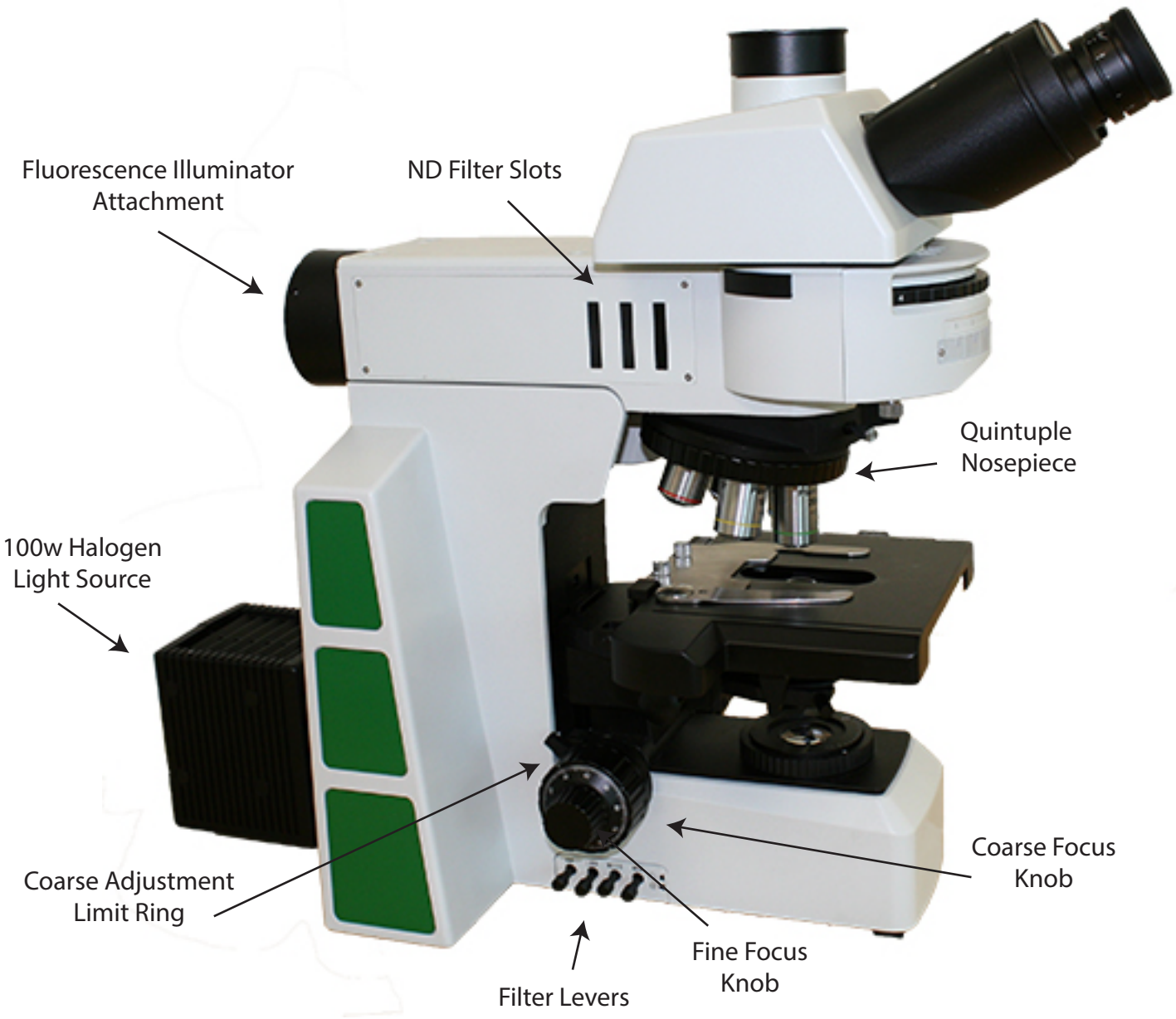

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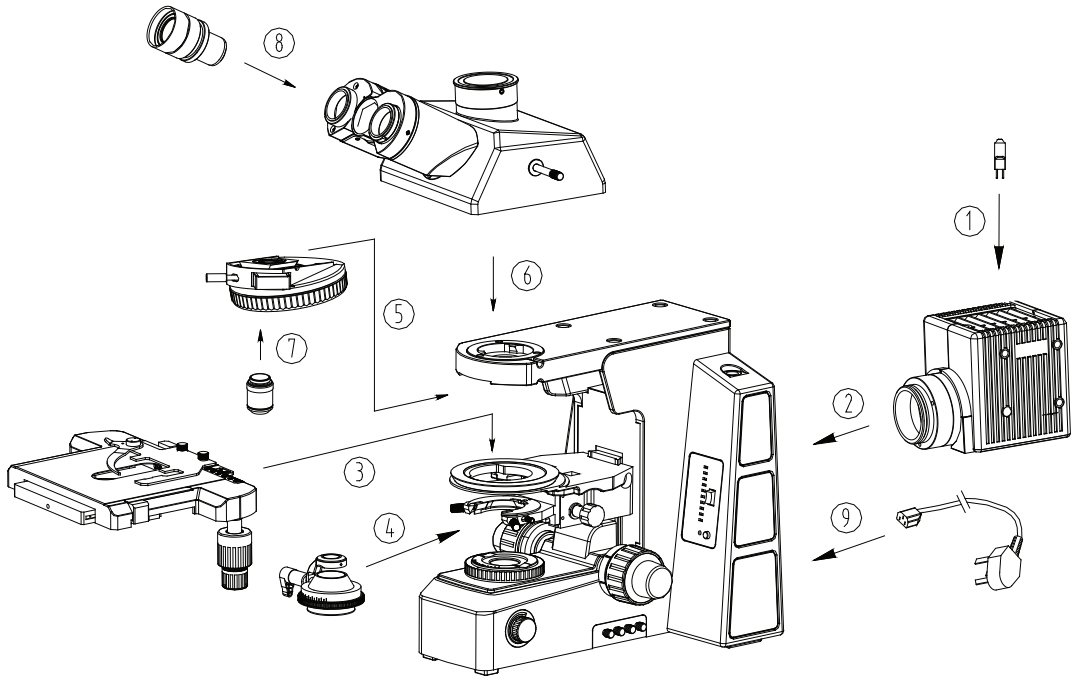
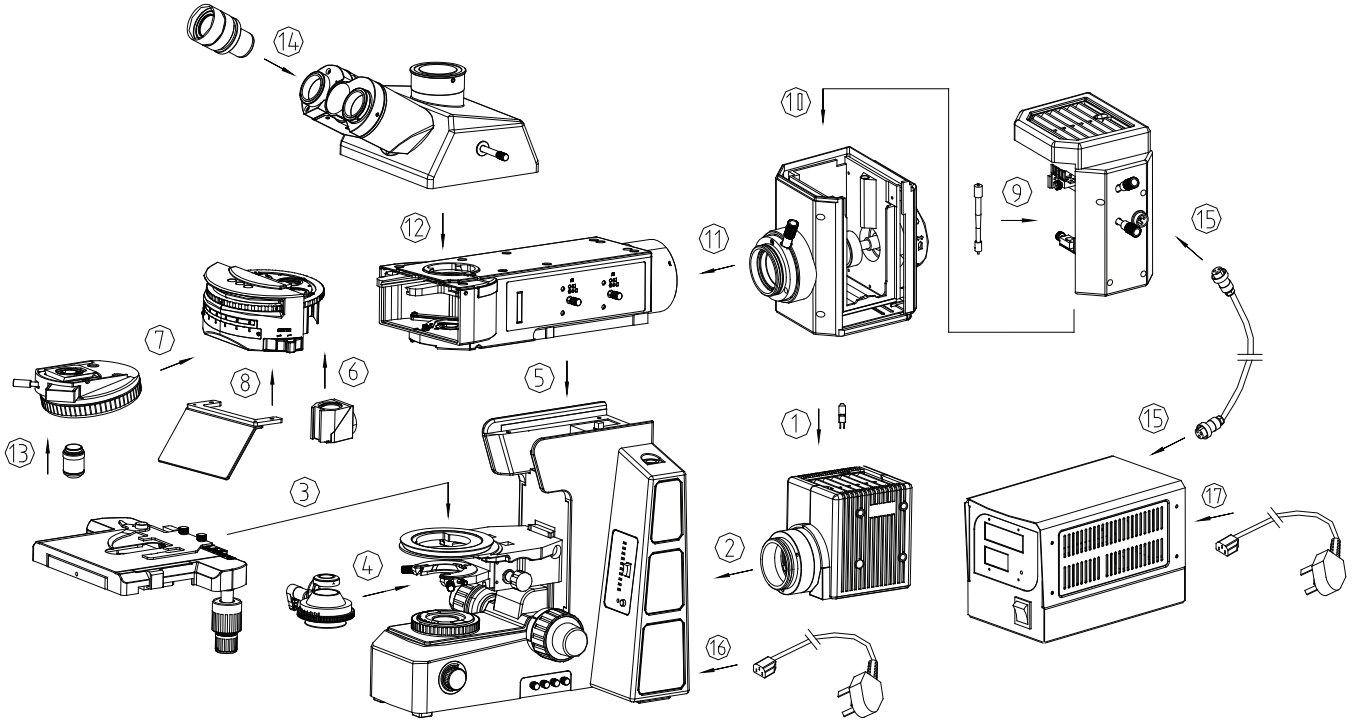
Binocular / Trinocular Microscope Assembly:

RB50 Microscope Assembly



RB50 Fluorescence Microscope Assembly

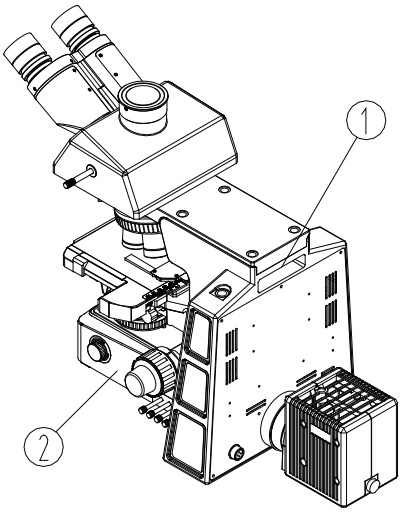


Before Use:

Do not shake or drop the microscope.

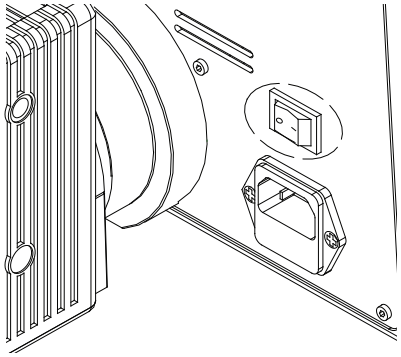
Do not not expose the microscope to direct sun, high temperatures, dust, or damp environments. Use a flat work surface. Indoor operating temp 41°~104°F (5°~40°C), max relative humidity of 80%.

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



When working, the surface of the light source will be warm. Make sure there is enough room for the heat to dissipate around the light source.

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 12V, 100W halogen bulb. (Part# 12v100wH).



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.

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.

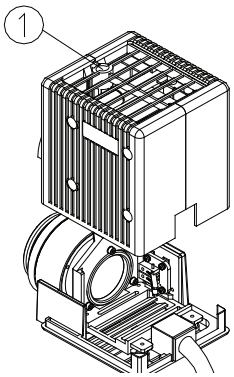
After use, cover the microscope with a dust cover and power off the light.

Objectives:

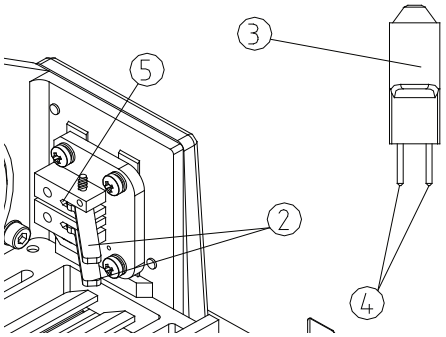
RB50 Infinity Corrected Objectives all have a parfocal distance of 45mm.
Recommended coverslip thickness is 0.17mm.

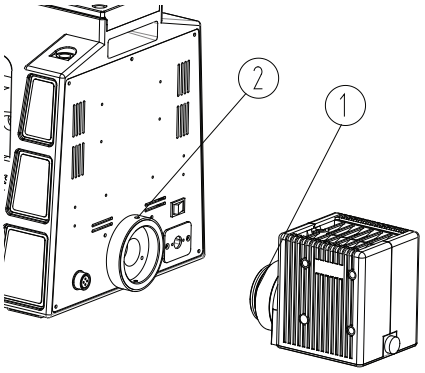
Objective Type	Part # / Magnification	Numerical Aperture	Working Distance
Plan Achromat	FPLN4 / 4x	0.10	11.9mm
	FPLN10 / 10x	0.25	12.1mm
	FPLN20 / 20x	0.40	1.5mm
	FPLN40 / 40x	0.65	0.36mm
	FPLN50 / 50x Oil	0.95	0.19mm
	FPLN60 / 60x	0.85	0.3mm
	FPLN100 / 100x Oil	1.25	0.18mm
Plan Semi Apochromat Fluor	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:

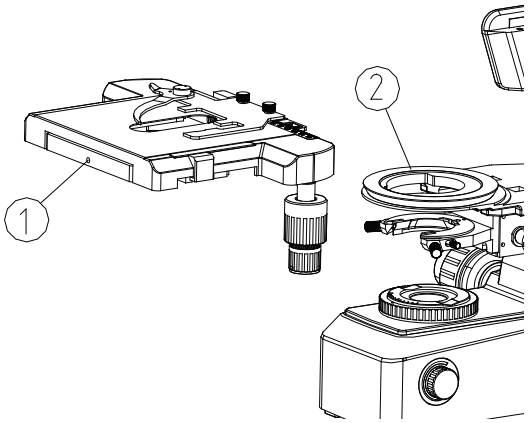


Light Source Assembly & Bulb Replacement:
Loosen the lock screw (1) completely with an M4 spanner and remove the cover.
Open the bulb lock (2).
Handle the bulb (3) with a clean glove or soft tissue (do not touch the bulb with fingers).
Insert the bulb pins (4) into the bulb holder (5).
The bulb should be vertical after assembly.
If any fingerprints got on bulb, wipe clean with a clean, soft cloth.
Replace bulb only with 12v, 100w halogen bulb (part# 12v100wH).
Before replacing the bulb, make sure to unplug and power off the microscope. Wait for the bulb housing to cool off before opening.





Light Source Microscope Assembly:
Push the light source holder (1) into the body of the microscope. Keep the light source horizontal in relation to the microscope body and tighten the screw (2).



Stage Assembly:
Loosen the set screw (1) on the stage.
Center the stage on the base, aligning the two “V” notches on the bottom of stage and on the condenser (2).
Tighten the set screw.

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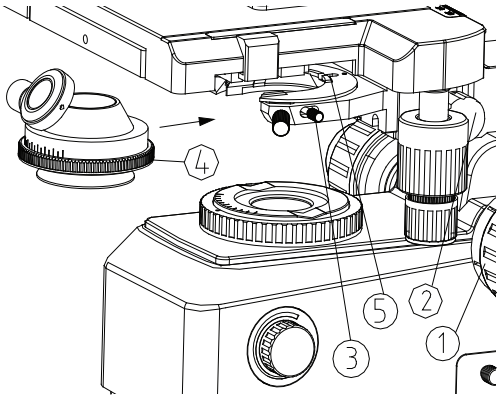
Step-by-Step Assembly:

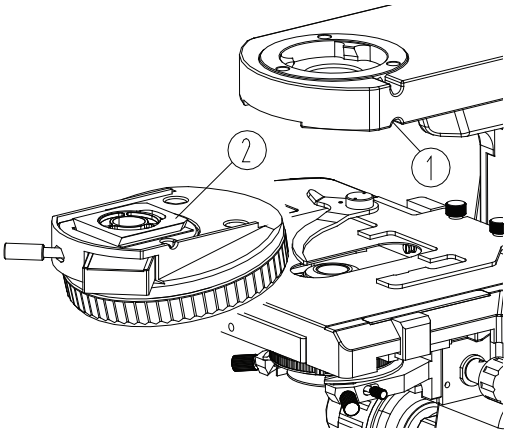
Condenser Assembly:

Rotate the coarse focusing knob (1) to raise the stage to its highest setting.
Rotate the condenser height adjustment knob (2) to lower the condenser bracket to its lowest setting.
Loosen the condenser set screw (3).
Swing out the front lens of the condenser with the scale facing forward. Line up the condenser screw (4) with the groove (5) of the condenser holder.
Tighten the condenser set screw (3) and raise the condenser to the highest position with the condenser height adjustment knob.



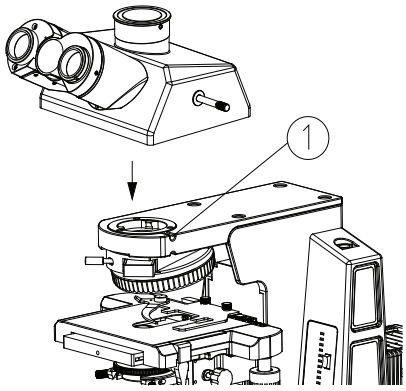
Nosepiece Assembly:

Loosen the set screw (1) on the microscope arm.
Line up the dovetail interface (2) of the nosepiece with the dovetail groove on the microscope arm and insert it into the body.
Tighten the set screw (1) on the microscope arm.



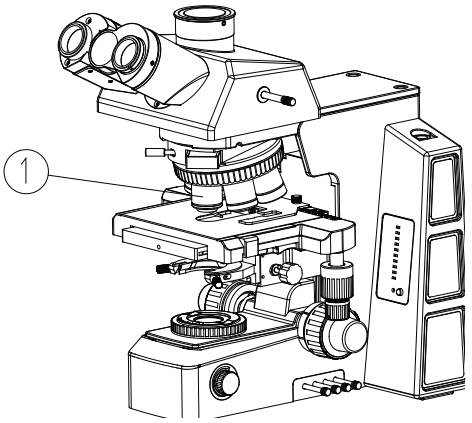
Head Assembly:

Loosen the head set screw (1) on the microscope arm.
From a right angled position, insert the coattail interface on the bottom of the head into the hole in the middle of the arm. Keep the eyetubes inclined forward.
Tighten the set screw (1) on the microscope arm.



Objective Assembly:

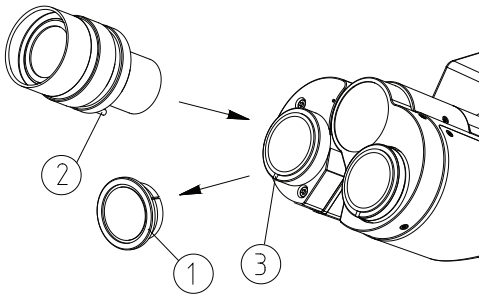
Rotate the coarse focusing knob to lower the stage.
Install the objectives (1) into the nosepiece from the lowest magnification to the highest magnification in a clockwise direction.
Search and focus for a sample starting with the lowest objective (4x or 10x) when operating. Then move up to a higher magnification.



Step-by-Step Assembly:

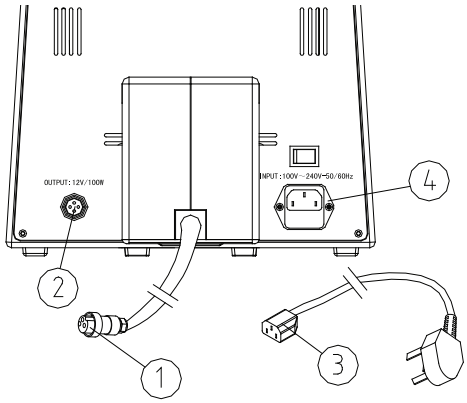
Eyepiece Assembly:

Remove the cover from the eyetube (1). Insert the eyepiece into the eyetube.
Match up the positioning screw (2) into the eyetube groove (3) when inserting the eyepiece into the eyetube.



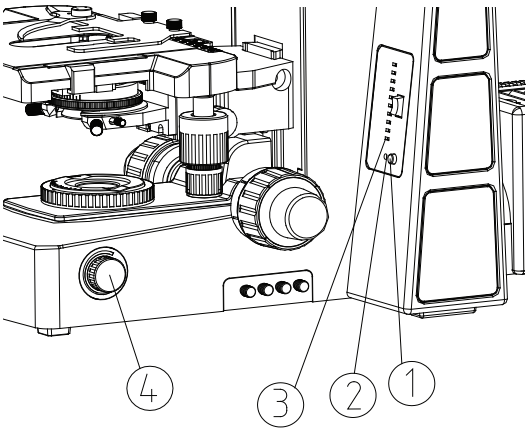
Power Cord Connection:

Set the main switch to "O" (off) position.
Connect the lower light source plug (1) into the socket (2) on the back of the microscope.
Insert one end of the power cord (3) into the power socket (4). Plug in the microscope.
Use only the power cord supplied by Fein Optic.



Illumination:

Turn the main power switch to "--" on.
Adjust the light rheostat control (4) until the illumination is comfortable for observation. Rotate the light rheostat knob clockwise to raise the voltage and brightness. Rotate counterclockwise to lower the voltage and brightness.
Press the light intensity reset button (1) to reset the light intensity to the preset position. Rotate the set screw (2) with a small flathead screwdriver to set the light intensity. Rotating it clockwise will raise the light intensity, counterclockwise will lower it.
Voltage indicator (3) shows voltage intensity.
Using bulbs in low voltage state will extend bulb life.
The rheostat knob will not work when the light intensity button is pressed.
Microscope light intensity is pre-set to the best light for photomicrography with a daylight-balanced (LBD) filter.



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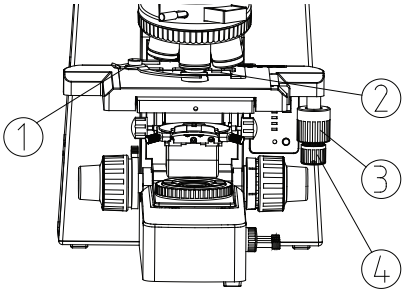
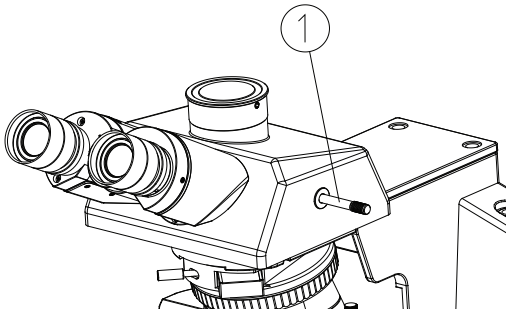
Step-by-Step Assembly:

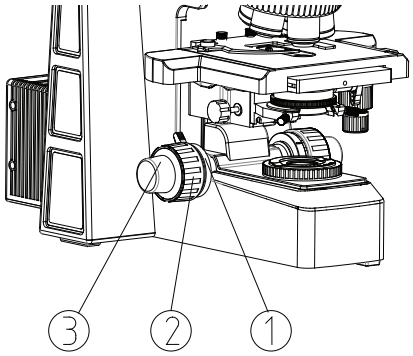
Slide Placement:
Push the slide holder clamp (1) backwards.
Place the slide between the slide holder clamp (1) and the slide holder (2) with the cover slip facing up.
Rotate the X-Axis knob (4) and the Y-Axis knob (3) to position the slide in the center under the objective.



Beam Splitter:
When using the trinocular microscope, in order to send light up to the camera (trinocular) port, pull the beam splitter (1) out. When the beam splitter is pushed in all the light will go to the eyepieces.
When it is pulled out part way light will go to the camera and the eyepieces. And when it is pull out 100%, all light will go to the trinocular port.



Focusing Adjustment:
Place a slide on the stage. Move the 4x objective into position.
Loosen the upper limit lever (1), then observe through the right eyepiece. Rotate the coarse focusing knob (2) until the image appears in the field of view, then lock the upper limit lever (1).
The upper limit lever can prevent the objective from touching the slide when focusing.
The upper limit lever does not affect the fine focus knob.
Rotate the fine focus knob (3) to obtain a clear image.
When observing with the 4x or 10x objective, open both the aperture diaphragm and field iris diaphragm to the maximum position and swing out the front condenser lens.



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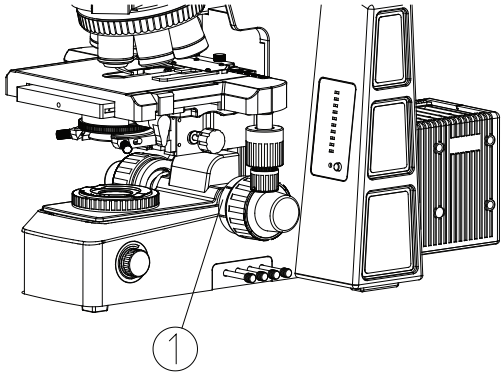
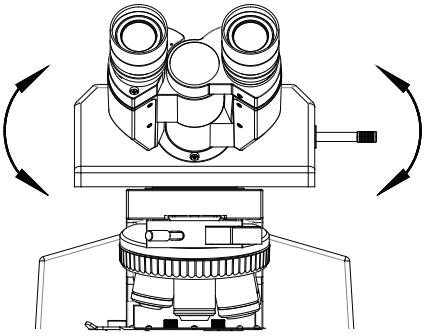
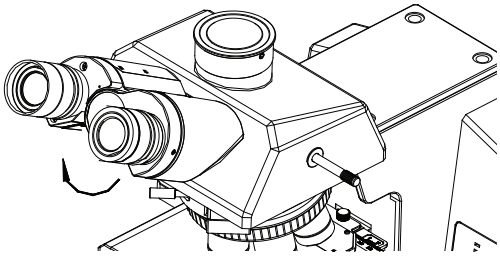
Step-by-Step Assembly:



Focus Tension Adjustment:
If the focus knob is very tight or the stage drifts after being focused, the tension adjustment knob (1) should be adjusted. Rotating the knob clockwise will tighten the tension and rotating it counterclockwise will loosen the tension of the focus knob.



Interpupillary Distance Adjustment:
When using both eyepieces for observation, hold the base of the eyetubes and rotate the eyepieces around the axis to adjust the interpupillary distance until you see only one field of view.
The mark on the left eyepiece points to the scale of the interpupillary distance indicator. The value is the interpupillary distance. When multiple people use the microscope, rememebr your interpupillary distance number for quick transitions between users.
Interpupillary adjustment range from 50-76mm.



Eye Shields:
If the user is wearing glasses, the eyeshield will prevent the glasses from touching the eyepieces. Fold open the eyeshield even if the user doesn't wear glasses, to prevent stray light from disturbing observation.

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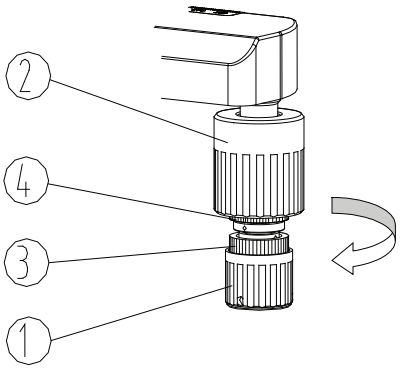
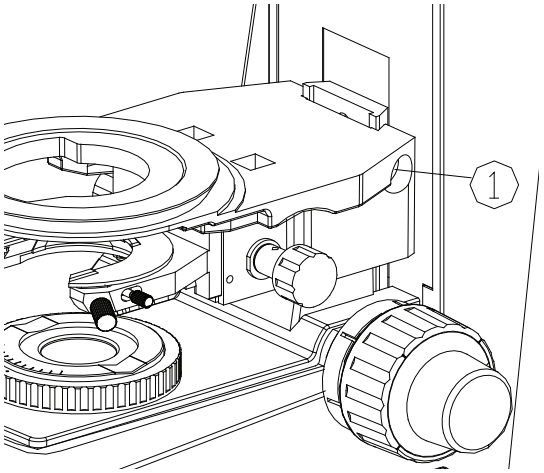
Step-by-Step Assembly:

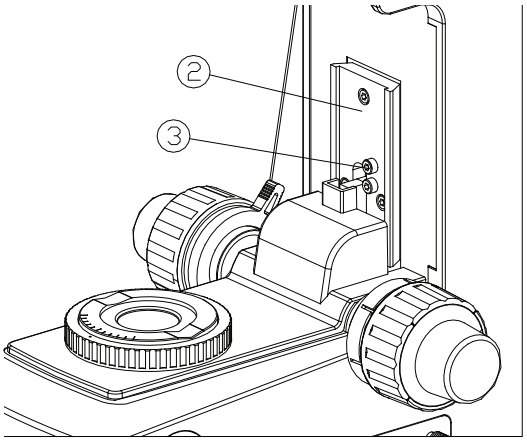
Stage Adjustment:
When looking through the microscope, move the stage by rotating the X-Axis adjustment knob (1) and the Y-Axis adjustment knob (2). The movement range of the X-Axis and Y-Axis is 80 x 55mm.



X-Axis & Y-Axis Knob Adjustment:
Hold the X-Axis knob (1), tighten the Y-Axis knob (2) to expose the adjustment knob.
Rotate the X-Axis knob (3) or the Y-Axis knob (4) in clockwise (the direction of the arrow shown at right) to reduce tension, or increase the tension by rotating the knob counterclockwise.
If the tension is too tight, a creaking sound will be heard from the stage, or the accuracy of the stage stop will be reduced.

Stage Rail Adjustment:
After extended years of use, the stage rail may become offset and the movement range may become shortened. Follow these steps to fix it.
Horizontal: Hold the sample holder, and move the stage rail left and right until you hit the limit stop.
Vertical: Hold the top surface of the stage and move the sample holder back and forth until you hit the limit stop.
Reflected Illumination: Lower the stage bracket. The microscope can adapt to view a sample of no more than 35mm, which is useful when observing thick objects.
Move the stage to the lowest position, then remove the stage from the microscope.
Loosen the stage bracket lock screw (1) and remove the stage bracket.
Rotate the coarse focusing knob and raise the focus board (2) to the position where the limit screw (3) can be seen from the mirror arm.
Loosen and remove the limit screw (3).
Reinstall the stage bracket and the stage.





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Step-by-Step Assembly:

Centering the Condenser:

Rotate the condenser raise/lower knob (1) to raise the condenser up to the highest position.

Rotate the spanner (2) on the condenser to move the front lens into the light path. Use this condenser lens in the light path when the objective is 20x or higher.

Move the 20x objective into the light path and focus on the sample.

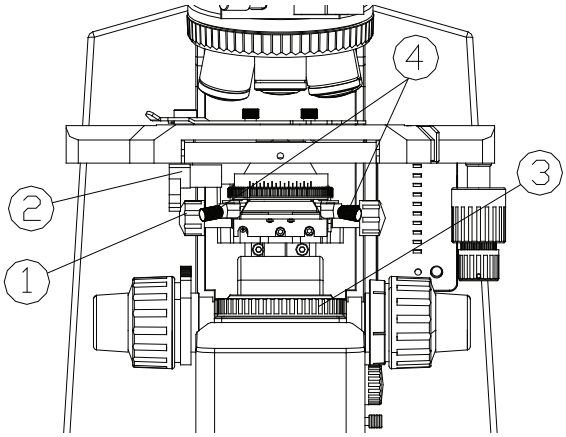
Rotate the field iris diaphragm adjustment ring (3) to put the field diaphragm at the smallest position where the field can be observed through the eyepieces.

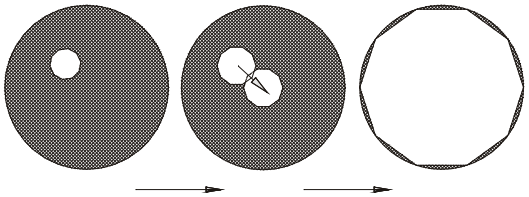
Rotate the condenser raise/lower knob to adjust the image to its clearest.

Adjust the condenser centering screws (4) to place the image in the center of the field of view.

Open the field iris diaphragm gradually. If the image is in the center all the time and inscribed to the field of view, the condenser has been centered properly. (See field of view images at right).

When using the microscope you can enlarge the field iris diaphragm a bit and make the image circumscribed to the field of view.

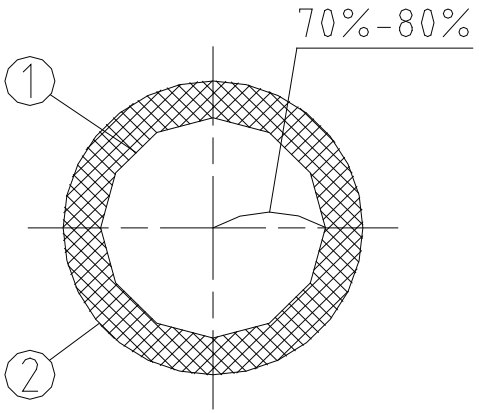




Field Diaphragm Adjustment:

By limiting the diameter of light entering the condenser, the field diaphragm can prevent other light from entering the field of view and strengthen the image contrast. When the image is just on the edge of the field of view, the objective will perform best and the clearest image will be obtained.

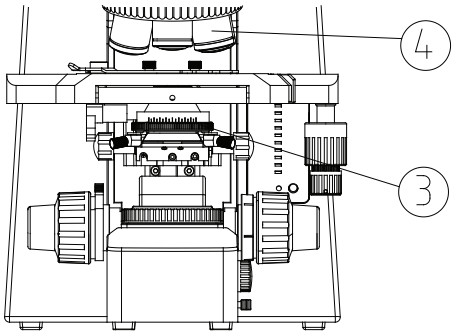
Rotate the field iris diaphragm adjustment ring (3) clockwise to enlarge the field diaphragm. Rotate it counterclockwise to close the field iris diaphragm.



Aperture Diaphragm Adjustment:

The aperture diaphragm determines the numerical aperture (NA) of the illumination system. If the NA of the illumination system matches the NA of the objective lens, the best resolution, contrast and depth of field is observed.

Adjust the aperture diaphragm ring (3) to control the size of the diaphragm. If necessary remove the eyepiece and observe from the eyetube while adjusting the aperture diaphragm ring until the scale of the condenser is set to 80% value of the objective (4).



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Using Color Filters:

A color filter can make the background light more suitable and strengthen the image contrast.

When an external color filter is used, place a 45mm diameter filter into the groove on top of the illuminator (1).

Place the rough side of the filter facing down.

When an internal filter is used, pull the knob (2-5) to the outmost position to move the filter into the light path. When not in use, push the knob back in to move the filter out of the light path.

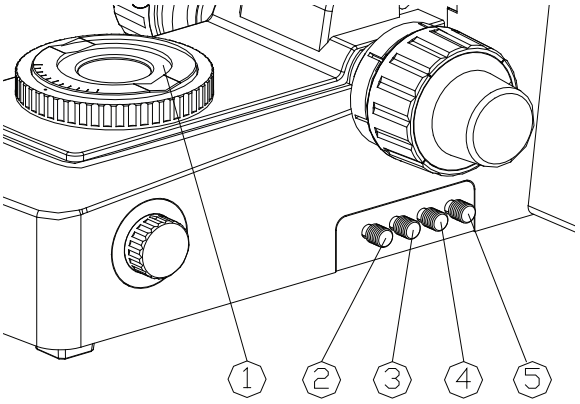
FILTERS:

(2) ND6 - Neutral density filter used for light intensity adjustment, transmission of 6%.

(3) ND25 - Neutral density filter used for light intensity adjustment, trnasmission of 25%.

(4) LBD - Daylight Balancing Filter

(5) Optional Filter



Fuse Replacement:

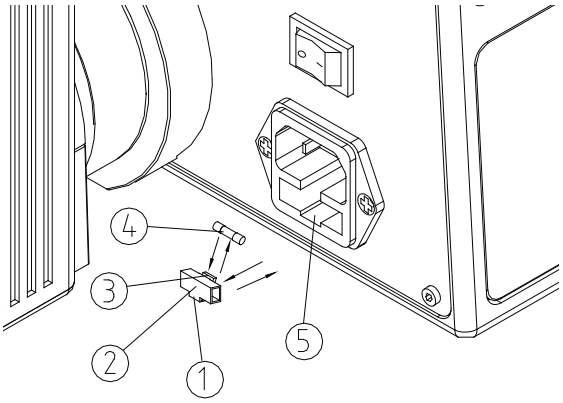
Before replacing the fuse, set the main power switch to "O" (OFF) and remove the plug.

Fasten the flute (1) under the fuse holder (2) and remove the fuse holder (2) from the socket (5).

Remove the fuse (4) from the flute (3) and replace with a new one.

Put the flute (3) back into the fuse holder (2) and return to the socket (5) by clicking into place.

Required Fuse: 250V, 3.15A.



C-Mount Assembly:

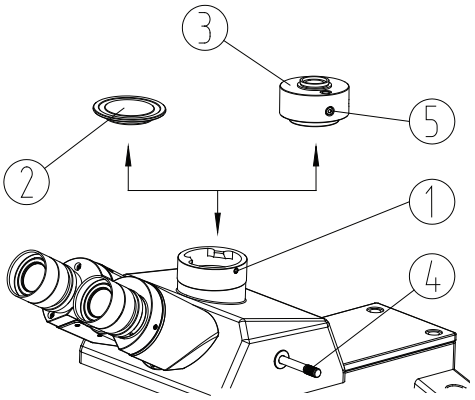
Loosen the set screw (1) of the trinocular head and remove the dust cover (2).

Remove the dust cover from the c-mount (3). Insert the c-mount adapter into the trinocular port and retighten the set screw (1).

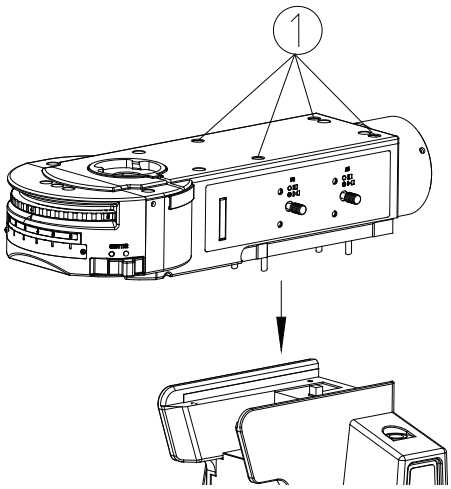
Screw the microscopy camera onto the c-mount.

Focus the c-mount with the focusing adjustment (5) so the c-mount is in focus when the eyepieces are in focus.

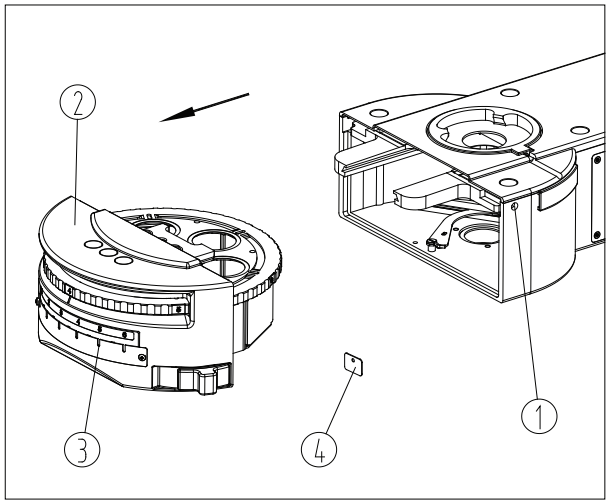
Pull the beam splitter (4) out to direct light to the camera.



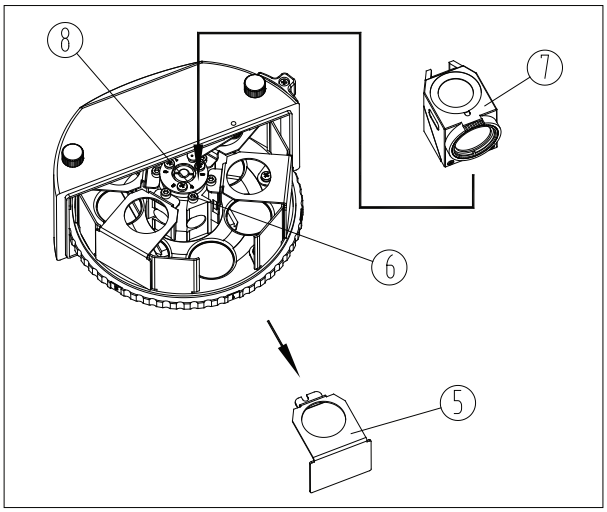
Fluorescence Assembly:



Fluorescence Illuminator Assembly:
Remove the caps (1) from the illuminator.
Place the illuminator on the microscope body then slide it toward the light source to make the epi-illuminator flat with the body.
Tighten the four M5 hex screws in the illuminator with the spanner and replace the caps (1).



Fluorescence Filter Set Assembly:
Loosen the right side set screw (1) on the turntable fluorescence illuminator with a M4 inner hex wrench and pull the front cover (2) out of the dovetail groove.
The blinker board (5) is installed in the fluorescence filter group. When using the fluorescence filter group, first loosen the set screw (6) with the inner hex wrench and remove the blinker board (5).
Place the diaphragm slice of the fluorescence filter group (7) which should be assembled upward, and match it with the dovetail wedge from the front group (2) and push down. Tighten the set srew (6).
Check the ID (8) on the dovetail interface and insert the nameplate (4) of the fluorescence filter group into the interface (3) with the same number in front of the front cover group (2).
Repeat above steps to assmple other fluorescence filter groups into the turntable.
Match the dovetail wedge of the front cover group (2) with the dovetail groove on the turntable epi-illuminator, and push down. Tighten the set screw (1).



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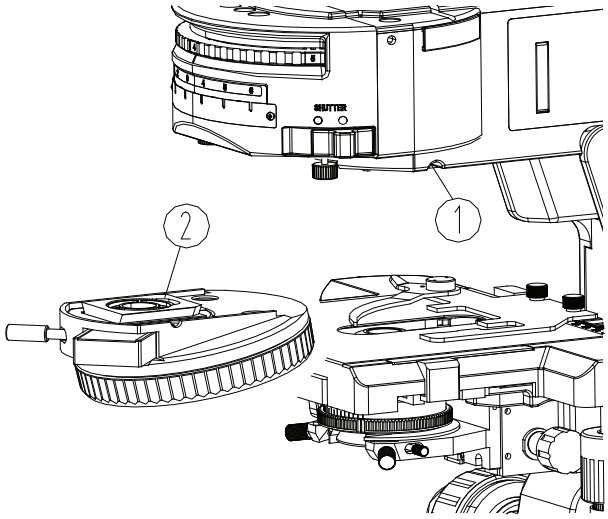
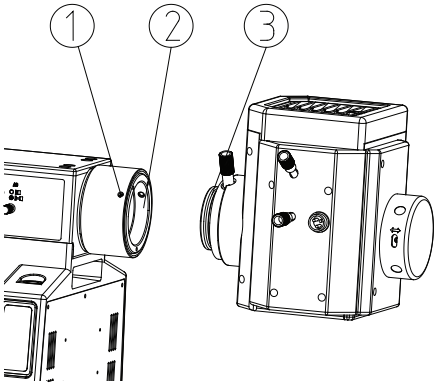
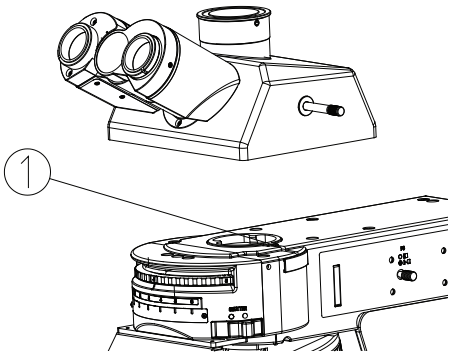
Fluorescence Assembly:



Nosepiece Assembly:
Loosen the set screw on the arm (1).
Match the dovetail interface (2) of the nosepiece with the dovetail groove of the arm. Push the nosepiece into the slot.
Tighten the set screw (1).



Fluorescence Light Source Assembly:
Loosen the set screw (1) on the fluorescence illuminator.
Push the light source holder (2) into the fluorescence illuminator holder (3). Make sure the upper plane of the light source group is horizontal.
Tighten the set srew (1).
When operating, make sure there is enough space around the light source for heat to escape, especially on the top and bottom.



Head Assembly:
Loosen the set screw (1) on the fluorescence illuminator.
From the right side, insert the dovetail interface on the bottom of the head into the hole in the middle of the head with a slight incline. Keep the eyetubes facing forward.
Tighten the set screw (1).
Assemble the eyepieces and objectives.

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Fluorescence Assembly:

Centering the Field Diaphragm:

By adjusting the field diaphragm, the beam of light is adjusted according to the objective and will create sharper image contrast.

To prevent a fluorescence decrease, narrow the field diaphragm and reduce the illuminated part of the sample.

Adjust the field diaphragm to match that of the objective being used.

Rotate the turntable so fluorescence filter B or G is in the light path. (If unavailable use another filter).

Rotate the objective to place 10x in the light path.

Push the shutter (1) to "O" open position.

Focus the slide on the stage.

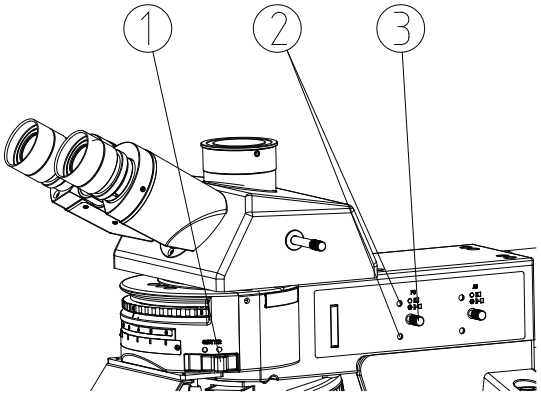
Pull the field diaphragm lever (3) all the way out to close the field diaphragm to the smallest position. Push it in all the way to open it to the largest position.

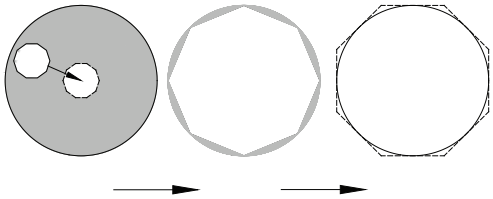
Look through the eyepiece to view the image of the field diaphragm.

Adjust the field diaphragm centering screws (2) on the side of the illuminator with an inner hex wrench to move the image to the center of the field of view.

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

When using the microscope, open the field diaphragm a little past the image border in order to obtain a quality lit image.





Centering the Aperture Diaphragm:

The aperture diaphragm dictates the numerical aperture (NA) of the illumination system. If the NA of the illumination system matches the NA of the objective, the result is better resolution, contrast and an increase in the depth of field.

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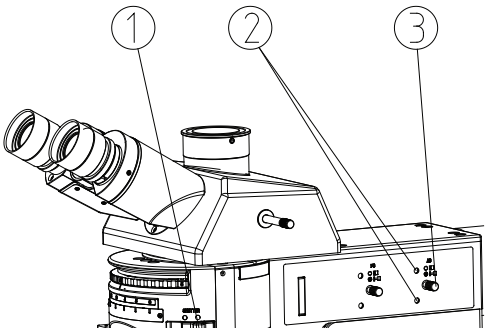


Centering the Aperture Diaphragm:

Rotate the turntable to place the fluorescence filter B or G into the light path. (If there is no fluorescence filter B or G use another).

Rotate the 10x objective into the light path.

Put the shutter (1) to position "O" to open the light path.

Focus on a slide on the stage.

Pull the aperture diaphragm lever (2) all the way out to close the aperture diaphragm to its smallest position.

Remove one eyepiece and replace it with the centering telescope. Adjust the centering telescope to find the image of the aperture diaphragm in the field of view.

Adjust the two aperture diaphragm centering screws (3) on the side of the illuminator with the inner hex wrench to move the image into the center of the field of view.

Open the aperture diaphragm gradually, if the image is inside the field of view, the aperture diaphragm has been centered properly.

In fluorescence observation, push the aperture diaphragm lever (2) to open the aperture diaphragm to the largest position.

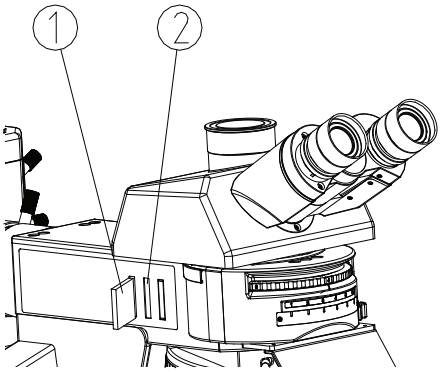
The aperture diaphragm is centered at the factory before shipment.

If a high-brightness excitation light is used, the fluorescence of the sample will decrease. In this case use the ND filter to reduce the brightness of the excitation light. If no ND filter is available, narrow the aperture diaphragm to obtain the same result.

Fluorescence Assembly:

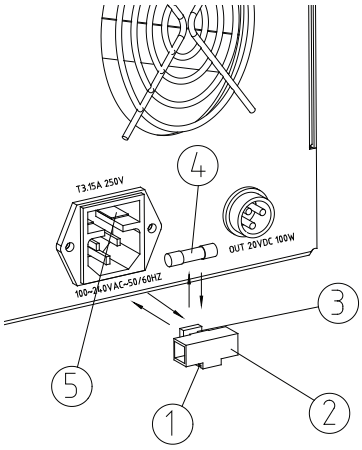
Installing Filters:

Image contrast and background light can be adjusted by using filters.
Insert desired filter or ND filter into position (1) and position (2) on the side of the microscope.
The filter idenfication side of the filter should face the observer when inserting the filter into the microscope.



Relacing the Fuse:

Turn the microscope power to "O" OFF and unplug the microscope.
Fasten the flute (1) under the fuse holder (2) and remove the fuse holder (2) from the socket (5).
Remove the fuse (4) from the flute (3) and replace it with a new one. Replace the flute (3) by pushing into the fuse holder (2) into the socket (5) until it clicks into place.



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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.

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.	Coarse focusing limit knob is locked.	Loosen coarse focus limit knob.
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.
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 # 12v100wH.
Field of view is not bright enough.	Incorrect bulb is being used.	Replace bulb with part # 12v100wH.
	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 # 12v100wH.