
UNITRON®

EXAMET-5 MICROSCOPE SERIES

MANUAL



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SAFETY NOTES

1. Open the shipping carton carefully to prevent any accessory, i.e. objectives or eyepieces, from dropping and being damaged.
2. Keep the instrument out of direct sunlight, high temperature or humidity, and dusty environments.
3. If any specimen solutions or other liquids splash onto the stage, objective or any other component, disconnect the power cord immediately and wipe up the spillage. Otherwise, the instrument may be damaged.
4.  **LAMP REPLACEMENT -- CAUTION:** the glass envelope of the lamp may be extremely hot. DO NOT attempt to change the lamp before it is completely cooled or without wearing adequate skin protection.
5. All electrical connectors (power cord) should be inserted into an electrical surge protector to prevent damage due to voltage fluctuations.
6.  **FUSE REPLACEMENT --** For safety when replacing the fuse (ONLY replace with the same size, type and rating of original fuse), be sure the main switch is in the off position, disconnect the power cord from outlet, and replace the fuse. Reconnect the power cord and turn unit on.
7. Confirm that the input voltage indicated on your microscope corresponds to your line voltage. The use of a different input voltage other than indicated will cause severe damage to the microscope.
NOTE: Always plug the stereomicroscope power cord into a suitable grounded electrical outlet. A grounded 3-wire cord is provided.

CARE AND MAINTENANCE

1. Do not attempt to disassemble any component including eyepieces, objectives or focusing assembly.
2. Keep the instrument clean; remove dirt and debris regularly. Accumulated dirt on metal surfaces should be cleaned with a damp cloth. More persistent dirt should be removed using a mild soap solution. Do not use organic solvents for cleansing.
3. The outer surface of the optics should be inspected and cleaned periodically using an air stream from an air bulb. If dirt remains on the optical surface, use a soft, lint free cloth or cotton swab dampened with a lens cleaning solution (available at camera stores). All optical lenses should be swabbed using a circular motion. A small amount of absorbent cotton wound on the end of a tapered stick makes a useful tool for cleaning recessed optical surfaces. Avoid using an excessive amount of solvents as this may cause problems with optical coatings or cemented optics or the flowing solvent may pick up grease making cleaning more difficult.
4. Store the instrument in a cool, dry environment. Cover the microscope with the dust cover when not in use.
5. UNITRON® microscopes are precision instruments which require periodic servicing to maintain proper performance and to compensate for normal wear. A regular schedule of preventative maintenance by qualified personnel is highly recommended. Your authorized UNITRON distributor can arrange for this service.

INTRODUCTION

Congratulations on the purchase of your new UNITRON microscope. UNITRON microscopes are engineered and manufactured to the highest quality standards. Your microscope will last a lifetime if used and maintained properly. UNITRON microscopes are carefully assembled, inspected and tested by our staff of trained technicians in our New York facility. Careful quality control procedures ensure each microscope is of the highest quality prior to shipment.

UNPACKING AND COMPONENTS

Your microscope arrived packed in a molded shipping carton. ***Do not discard the carton:*** the shipping carton should be retained for reshipment of your microscope if needed. Avoid placing the microscope in dusty surroundings or in high temperature or humid areas as mold and mildew can form. Carefully remove the microscope from the shipping carton and place the microscope on a flat, vibration-free surface.

MODELS



Reflected Trinocular
#14350

(Shown with optional camera)



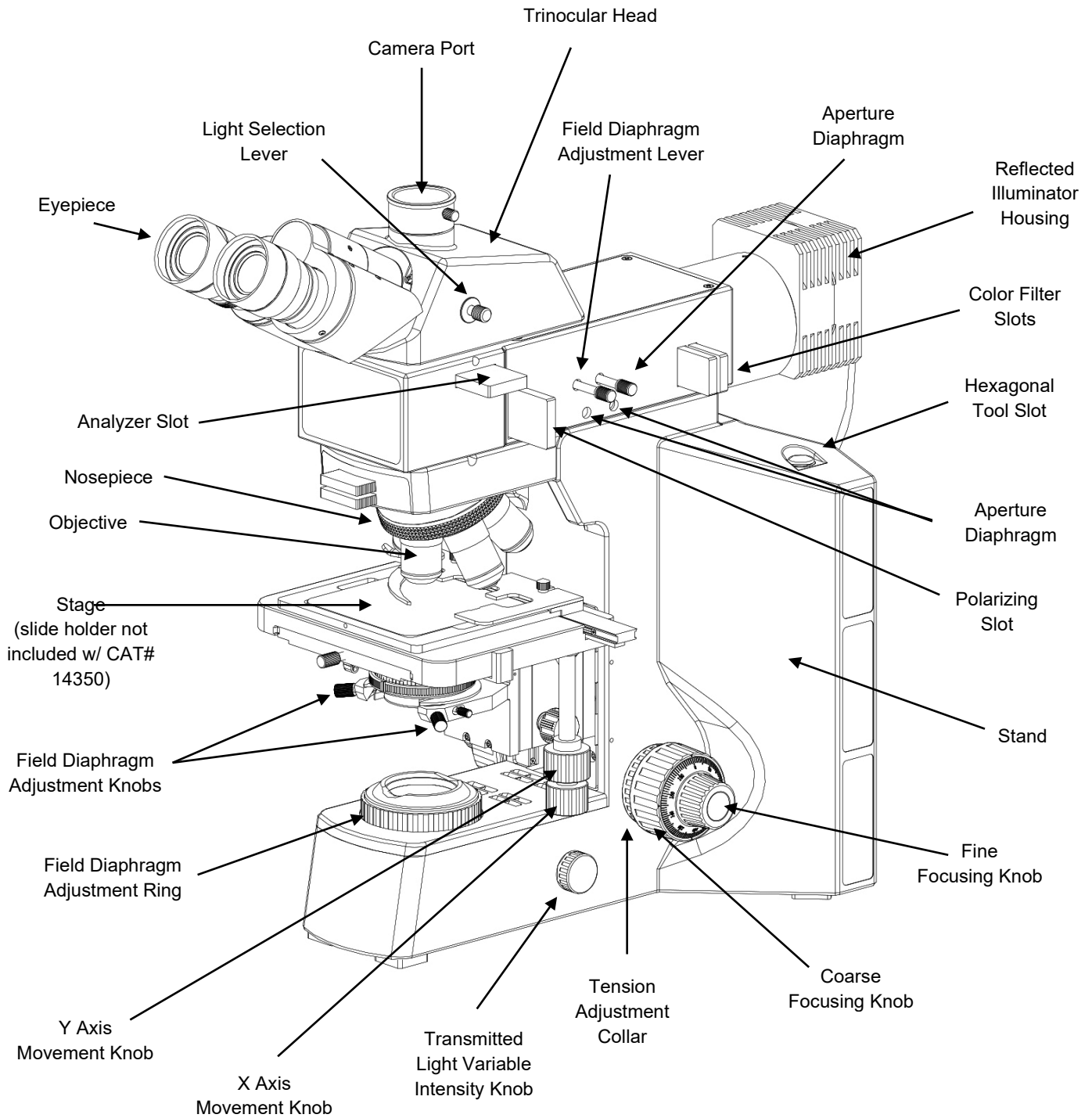
Reflected/Transmitted Trinocular
#14351



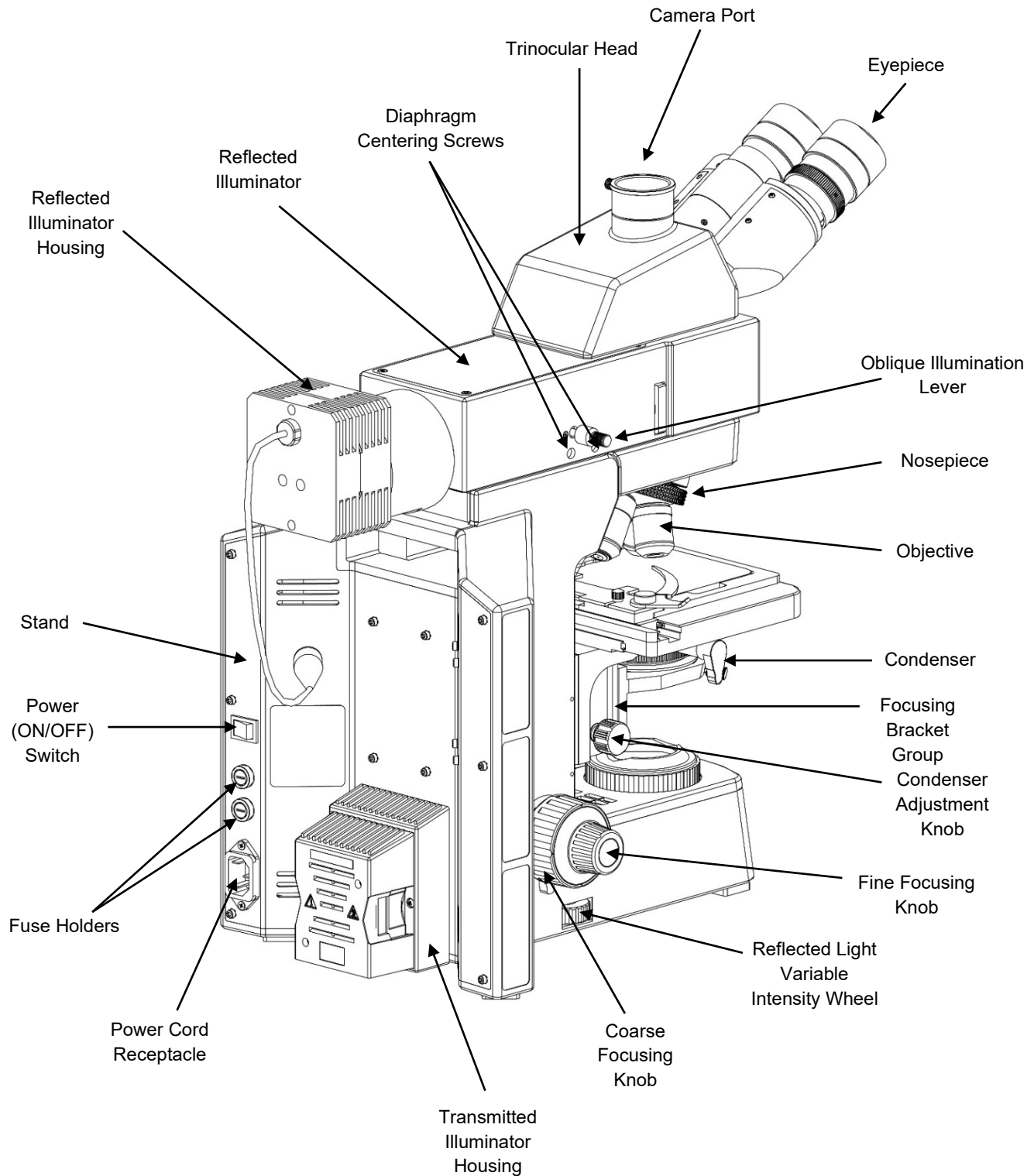
Reflected/Transmitted Trinocular
#14351

(Shown with optional camera)

COMPONENTS DIAGRAM 1 – Reflected Model



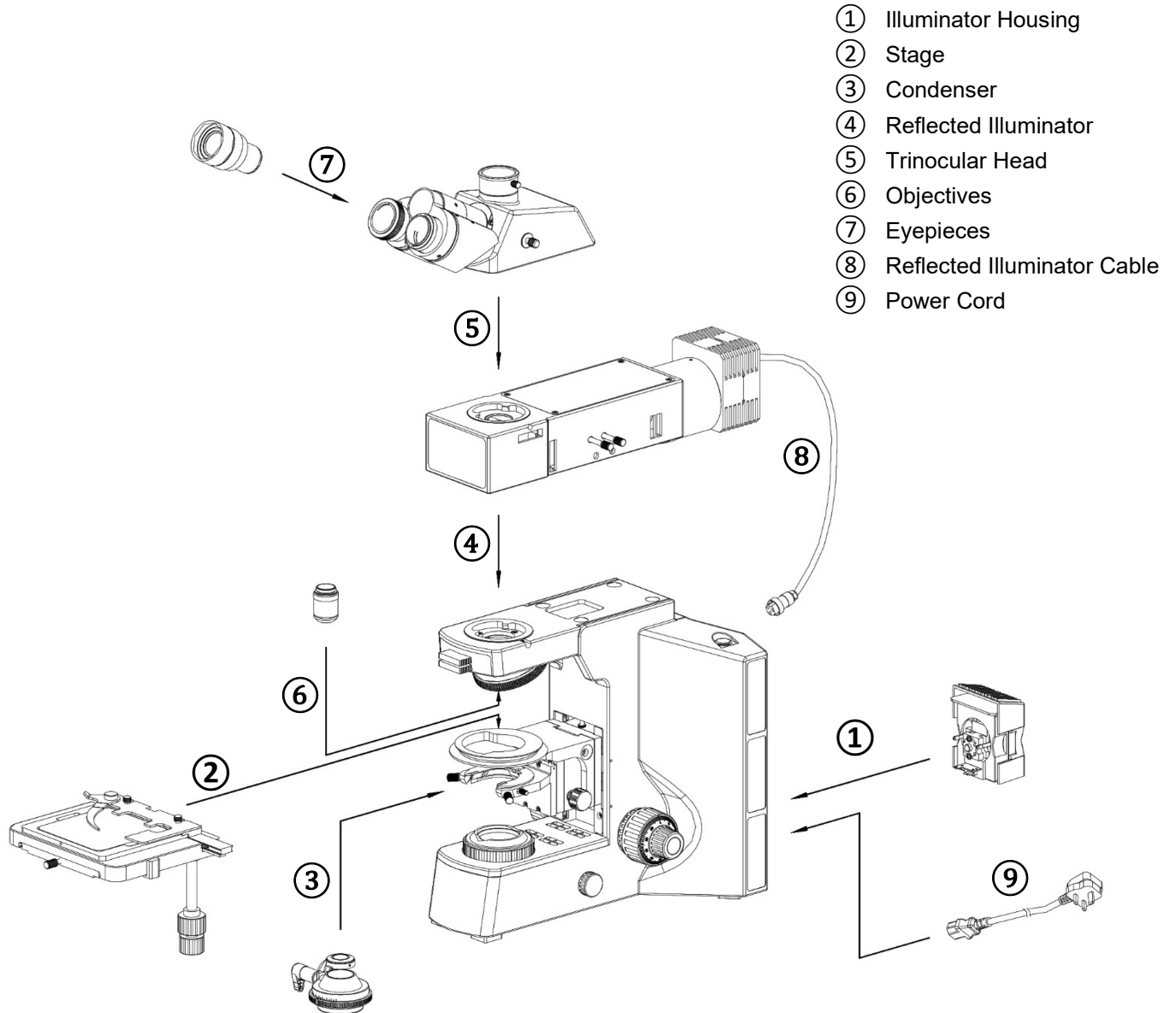
COMPONENTS DIAGRAM 2 – Reflected/Transmitted Model



ASSEMBLY

The diagram below shows how to assemble the various modules. The numbers indicate the order of assembly.

When assembling the microscope, make sure that all parts are free of dust and dirt, and avoid scratching any parts or touching glass surfaces.



DETAILED ASSEMBLY

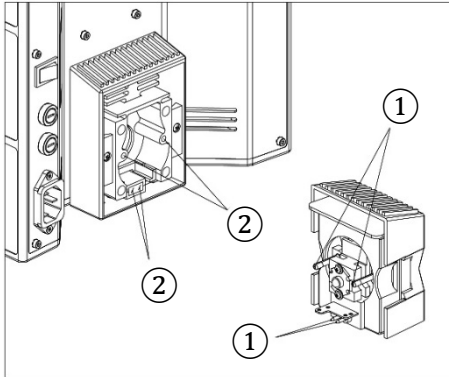


Fig. 1

Installing the Transmitted Lamp Housing (Fig. 1) – Models with transmitted light illumination only

Align the guide pins ① with the guide sockets ② and push the lamp housing securely into the stand.

Mounting the Stage (Fig. 2)

Completely loosen the lock screw ① on the stage. Carefully mount the stage onto the stage bracket ② by aligning and then positioning the ring on the underside of the stage slightly past the back of the ring on the bracket -- then gently slide the stage onto the bracket ring and secure the stage by tightening the lock screw.

NOTE: Slide holder not included with CAT# 14350 (reflected illumination only)

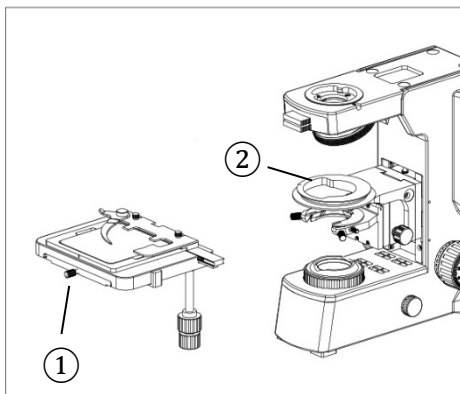


Fig. 2

Installing the Condenser (Fig. 3) – Models with transmitted light illumination only

Rotate the coarse focusing knob ① to raise the stage to its highest position.

Rotate the condenser knob ② lower the bracket for the condenser to its lowest position.

Completely loosen the condenser lock screw ③.

Swing out the top lens of the condenser ④ with the scale facing forward.

Align the lock screw ⑤ on the back side of the condenser with the slot on the condenser holder ⑥ and securely push the condenser into place.

Tighten the condenser lock screw ③ and raise the condenser to its highest position by rotating the condenser knob ②.

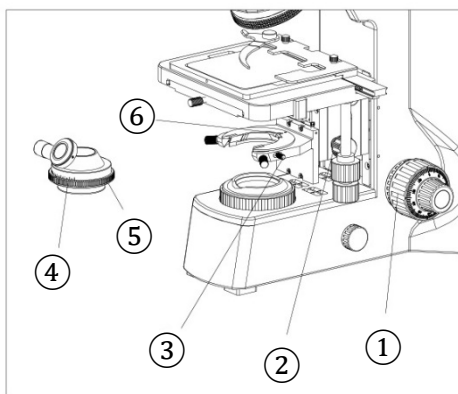


Fig. 3

DETAILED ASSEMBLY *(continued)*

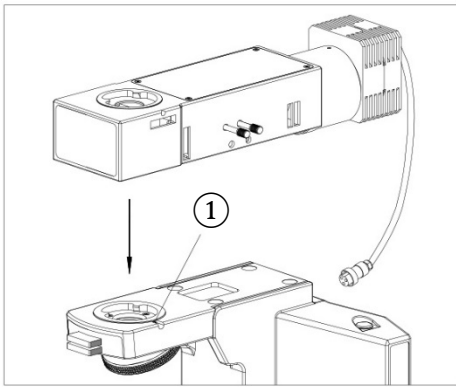


Fig. 4

Installing the Reflected Illuminator (Fig. 4)

Completely loosen the lock screw ① of the illuminator.

As shown, position the illuminator above the dovetail hole, tilt it slightly down on the left and carefully slide the dovetail under the notches in the dovetail hole and set it into place. Make the sure it is seated properly, then tighten the lock screw ①.

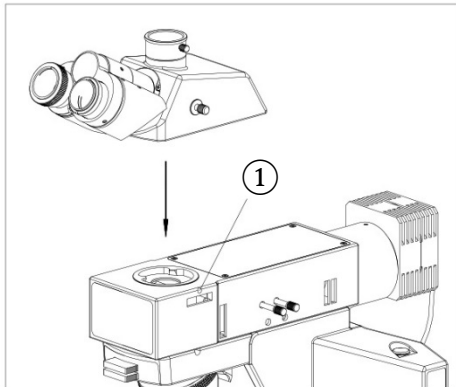


Fig. 5

Installing the Head (Fig. 5)

Completely loosen the lock screw ① of the head.

As shown, position the head and with it tilted slightly down on the right, slide the dovetail under the notches in the dovetail hole and set it into place with the two eyepiece tubes facing forward. Tighten the lock screw ①.

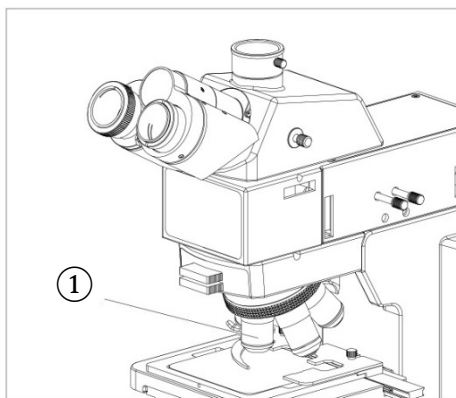


Fig. 6

Installing the Objectives (Fig. 6)

Rotate the coarse focusing knob to move the stage into its lowest position.

Install the objectives ① into the objective nosepiece from the lowest magnification to the highest in a clockwise direction from the rear.

DETAILED ASSEMBLY *(continued)*

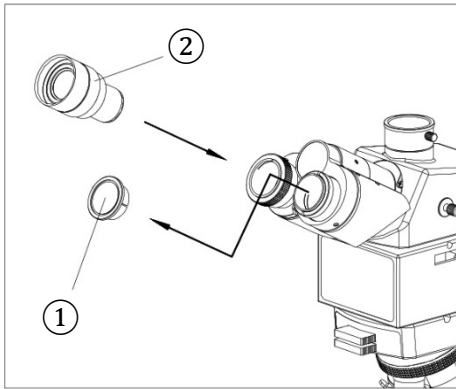


Fig. 7

Installing the Eyepieces (Fig. 7)

Remove the covers ① from the eyepiece tubes and carefully insert the each eyepiece ② into each of the eyepiece tubes.

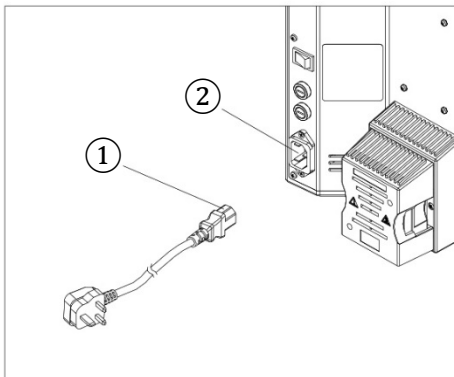


Fig. 8

Connecting the Power Cord (Fig. 8)

IMPORTANT: Use care when storing the power cord so that it does not bend or twist.

Use only the power cord provided with your microscope.

Make sure the power switch is at "0"(OFF).

Insert the female end ① of the power cord into the power supply socket ② on the base of the stand.

Plug the other end of the power cord into a grounded outlet.

OPERATION

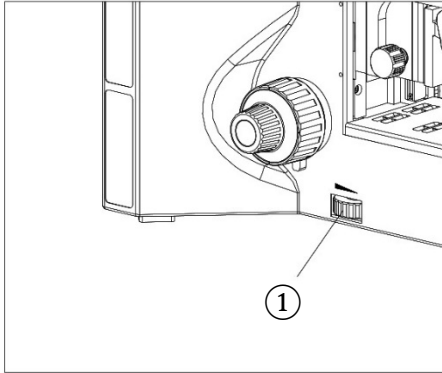


Fig. 9

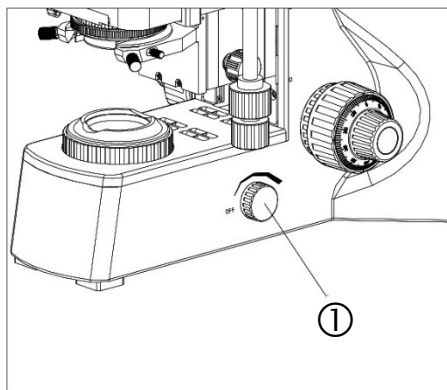


Fig. 10

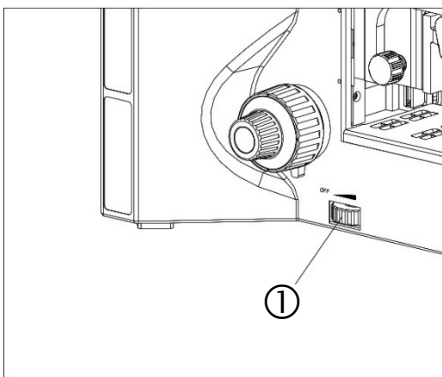


Fig. 11

Illumination (Fig. 9-11)

Transmitted Light (CAT# 14351 only) (Fig. 9-10)

Turn on the power switch on the back of the microscope to the ON (I) position.

Ensure the light adjustment wheel ① (Fig. 9) on the left side of the base of the stand is turned to the OFF position.

Turn the transmitted light adjustment knob ① (Fig. 10) until the illumination is comfortable for observation.

Reflected Light (Fig. 10-11)

Turn on the power switch on the back of the microscope to the ON (I) position.

Ensure the light adjustment knob ① (Fig. 10) on the right side of the base of the stand is turned to the OFF position.

Turn the reflected light adjustment wheel ① (Fig. 11) until the illumination is comfortable for observation.

Selecting the Light Path (Fig. 12)

To observe through the binocular head, push the light path selection lever ① all the way in.

To observe with the trinocular head, pull the light path selection lever ① all the way out.

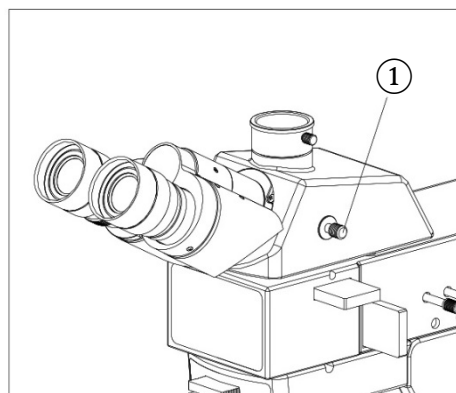


Fig. 12

OPERATION *(continued)*

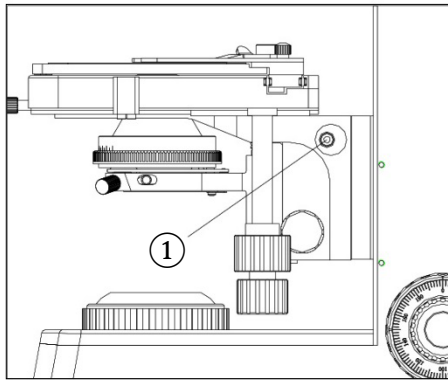


Fig. 13

Adjusting the Bracket (Fig. 13)

For specimens taller than 27mm, adjust stage travel with the bracket lock screw ①.

Hold the bracket and loosen the bracket lock screw ① with the included Allen (hex wrench).

Move the bracket to the appropriate position, and tighten the bracket lock screw ①.

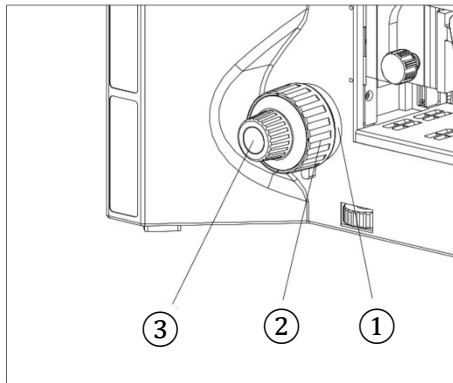


Fig. 14

Focusing (Fig. 14)

Place a specimen on the stage and secure it with the clips.

Turn the 5X objective into the light path.

Loosen the coarse tension adjustment knob ① and observe the specimen through the right eyepiece with your right eye. Rotate the coarse focusing knob ② until the image appears in the field of view, then lock the coarse adjustment knob ①.

To see sharpen or see more detail in the specimen, rotate the fine focusing knob ③.

NOTE: the coarse adjustment limit stop prevents the sample from touching the objective.

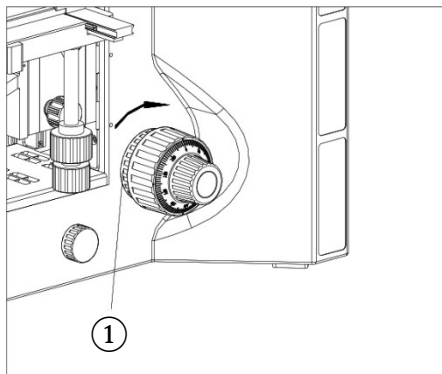


Fig. 15

Adjusting the Focus Tension (Fig. 15)

To adjust tension, hold both left and right focus adjustment knobs ① with both hands, hold the left knob (to prevent it from turning), and rotate the right knob clockwise to increase (tighten) or counterclockwise to decrease (loosen) the focus knob tension.

After tension adjustment has been completed, always rotate both adjustment knobs in the same direction.

OPERATION *(continued)*

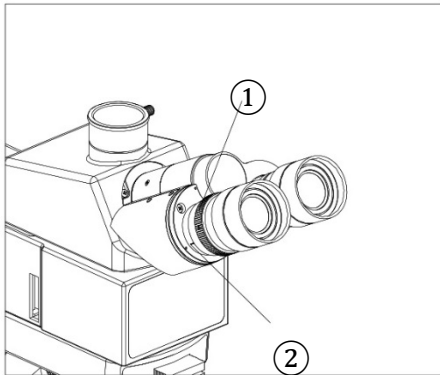


Fig. 16

Adjusting the Diopter (Fig. 16)

After focusing the image with the right eye/eyepiece, observe the image through the left eye/eyepiece. Rotate the diopter adjustment collar ① until the image becomes clear.

The diopter range is ± 5 and the value aligned with the scale ② is your diopter setting. Be sure to write down your diopter setting, as settings will vary from user to user.

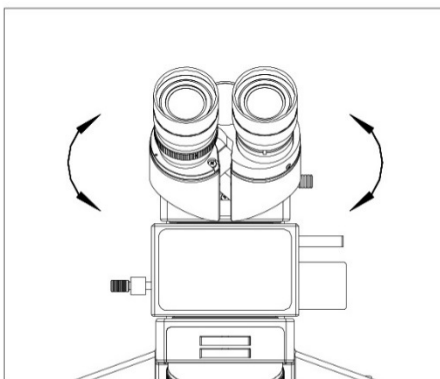


Fig. 17

Adjusting Interpupillary Distance (Fig. 17)

Different users have different interpupillary distances (this distance is between the centers of the pupils of each eye). When the operator changes, it will be necessary to adjust the interpupillary distance.

While looking through the eyepieces, hold the left and right eyetubes of the viewing head and adjust the eyetubes by opening or closing them until the left and right fields of view coincide completely and you are able to see a complete circle.

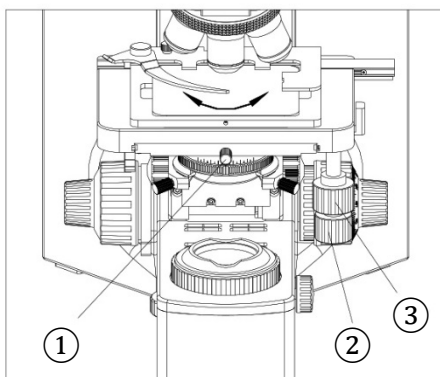


Fig. 18

Adjusting the Stage (Fig. 18)

When observing, move the stage by rotating the X ② and Y ③-axis adjustment knobs. If the moving direction of the stage is different from the image's, rotate the stage to adjust it:

Loosen the stage lock screw ①. Rotate the stage clockwise or counterclockwise until the moving direction of the stage is the same as the image's, then tighten the lock screw.

Rotation angle:

For right hand, clockwise 90°, counterclockwise 20°.

For Left hand, clockwise 20°, counterclockwise 90°.

OPERATION *(continued)*

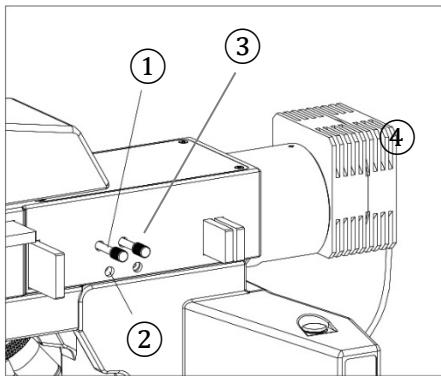


Fig. 19

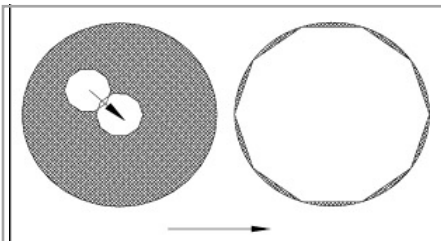


Fig. 20

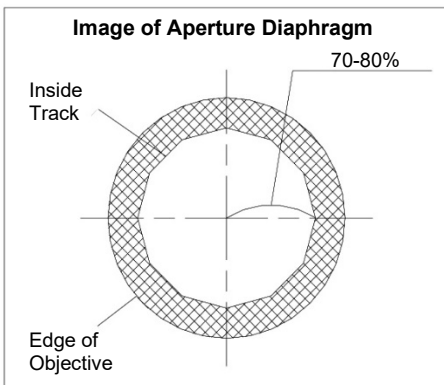


Fig. 21

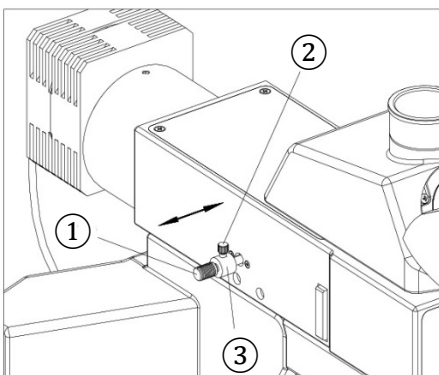


Fig. 22

**Adjusting the Field Diaphragm (Fig. 19-20)
Reflected Illumination**

By limiting the amount of light entering the condenser, the field diaphragm can prevent other light and strengthen the image contrast. When the image is just on the edge of the field of view, the objective will obtain the clearest image.

Push the field diaphragm adjustment lever ① all the way in to minimize the field diaphragm.

Observe the image through the eyepiece and adjust the field diaphragm centering screws ② on both sides of the illuminator until the image is in the center (Fig. 20).

Slowly open the field diaphragm adjustment lever ①. When the image in the diaphragm field is aligned with the field of view, the field diaphragm is centered.

**Adjusting the Aperture Diaphragm (Fig. 19 & 21)
Reflected Illumination**

The aperture size is increased or decreased by opening or closing the aperture diaphragm adjustment lever ③. When the aperture is closed, the brightness and resolution are decreased but the contrast and range of focus are increased. If the aperture diaphragm is opened, the brightness and resolution are increased; however, the contrast and range of focus are diminished.

For optimal viewing conditions set the condenser aperture diaphragm lever to match the magnification of the objective in the optical path.

**Adjusting the Oblique Illumination (Fig. 22)
Reflected Illumination**

When the oblique illumination lever ① is pushed all the way in, the system is in oblique illumination observation; when pulled all the way out, it is in normal reflected illumination observation.

To adjust the limit block for various specimen requirements, loosen the lock screw ② on the limit block ③, then move the limit block according to the direction shown in Fig. 24 and tighten the lock screw when adjusted to the appropriate position.

OPERATION *(continued)*

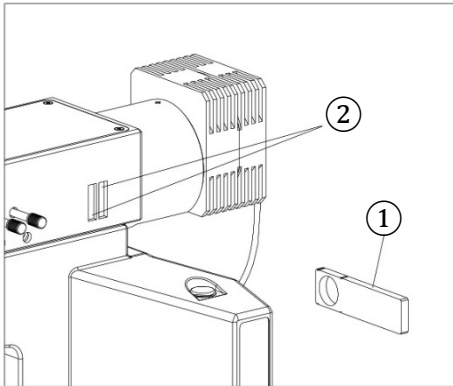


Fig. 23

Using the (Optional) Color Filters (Fig. 23) Reflected Illumination

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

Insert an color filter ① into one of the slots ② as shown.

When not using a color filter, insert the blank filter into the filter slot.

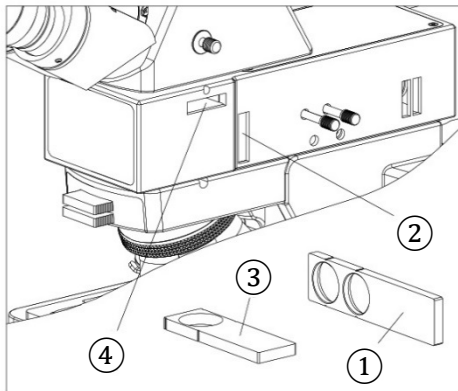


Fig. 24

Using the Simple Polarizer (Fig. 24-25) Reflected Illumination

The simple polarizer includes the polarizer and the analyzer.

Insert the polarizer ① into the polarizer slot ② of the illumination system as shown. Be sure to pull out the color filter when using the polarizer.

Insert the analyzer ③ into the analyzer slot ④ as shown.

The polarizer and the analyzer are orthogonal when the 360° rotating analyzer is zero adjusted (or the fixing analyzer is used).

Dialing the rotatable analyzer drive plate can change the orthogonal state of the polarized light.

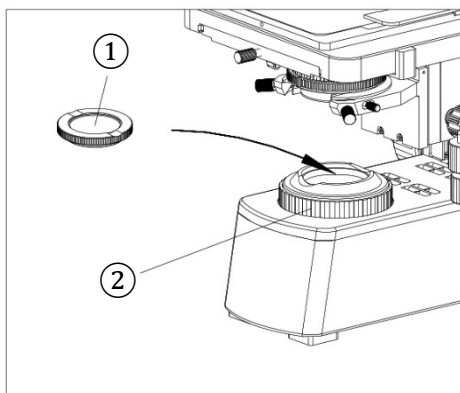


Fig. 25

Transmitted Illumination

Insert the polarizer ① into the top receptacle of the field diaphragm holder ②. (Fig. 25)

Insert the analyzer into the analyzer slot ④ (Fig. 24).

OPERATION *(continued)*

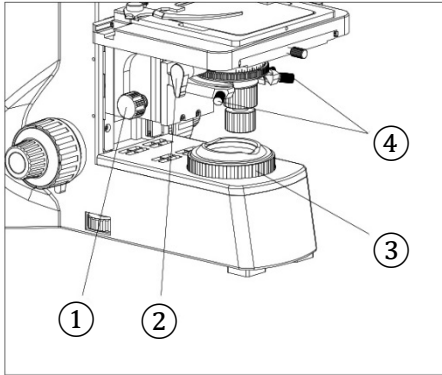


Fig. 26

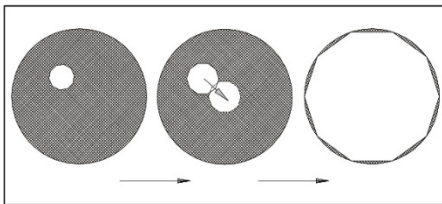


Fig. 27

Centering the Condenser
Transmitted Illumination (Fig. 26-27)

Turn the condenser adjustment knob ① to raise it to its highest position.

Turn the spanner ② to move the front lens into the light path.

Rotate the 20x objective into the light path and focus the specimen.

Rotate the field diaphragm adjustment ring ③ to move the field diaphragm to the smallest position. The image of field diaphragm can be observed through the eyepiece.

Adjust the condenser centering adjustment screws ④ to center the image of field diaphragm to the field of view.

Open the field diaphragm slowly. If the image is in the center and inscribed to the field of view, the condenser is correctly centered (Fig. 27). In use, you can enlarge the field diaphragm a bit and make the image circumscribed to the field of view.

Adjusting the Field Diaphragm (Fig. 25)
Transmitted Illumination

By limiting the amount of light entering the condenser, the field diaphragm can prevent other light and strengthen the image contrast. When the image is just on the edge of the field of view, the objective will obtain the clearest image.

Rotate the field diaphragm adjustment ring ② (Fig. 25) clockwise to enlarge the field diaphragm, counterclockwise to decrease it.

OPERATION *(continued)*

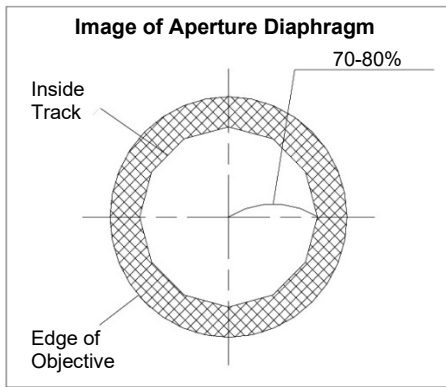


Fig. 28

Adjusting the Aperture Diaphragm Transmitted Illumination (Fig. 25, 28-29)

The aperture diaphragm ① decides the numerical aperture of the illumination system. If the N.A. of the illumination matches the N.A. of the objective ②, you'll achieve better resolution and contrast and increase the depth of field.

As the contrast is usually low, adjust the condenser aperture diaphragm to 70-80% of the objective N.A. being used. If necessary, remove the eyepiece to observe through the eyepiece tube. Adjust the aperture diaphragm adjustment ring ② (Fig. 25) to adjust proportion until you see the image (Fig. 28).

Use of graduation: set the N.A. of the condenser to 80% of the N.A. of objective (Fig. 28).

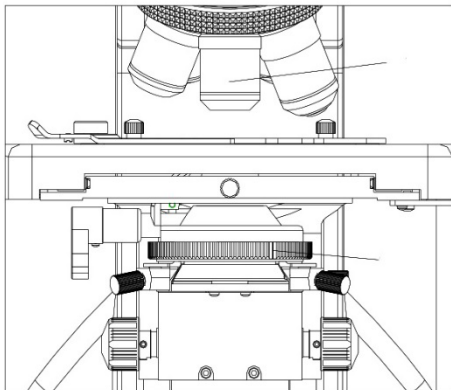


Fig. 29

Using the (Optional) Color Filters (Fig. 29) Transmitted Illumination

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

To insert a filter, place it as shown in Fig. 30 with the rough side down.

When not using a color filter, insert the blank filter into the filter slot.

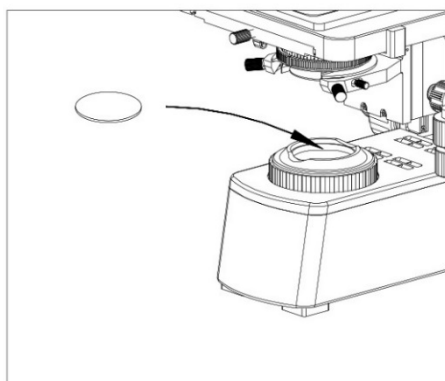


Fig. 30

OPERATION *(continued)*

⑤

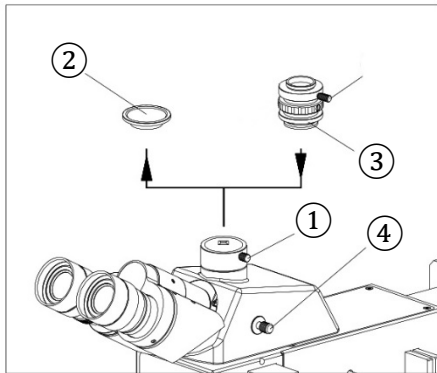


Fig. 31

Using a Microscopy Camera (Fig. 31)

(Optional)

1. Loosen the lock screw ① and remove the dust cap ② on the camera port.
2. Remove the dust cover ③ on the c-mount adapter and thread the adapter onto the camera.
3. Install the camera with the c-mount adapter into the photo port.
4. Tighten the lock screw ①.
5. Pull the light path selection lever ④ out to allow light to enter the camera for observation.

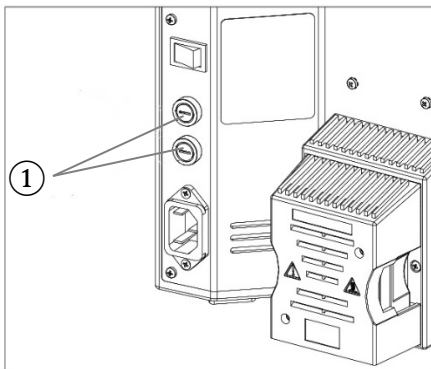


Fig. 32

Replacing the Fuse (Fig. 32)

Turn the power switch to "O" (OFF) before replacing the fuse.

Unplug the power cord from the outlet and disconnect it from the back of the microscope.

NOTE: there are two fuse holders on the back of the microscope. The top fuse holder corresponds to the top/reflected illuminator; the bottom fuse holder corresponds to the bottom/transmitted illuminator.

Unscrew the fuse holder corresponding to the illuminator that is not lighting with a flat head (--) screwdriver.

Install a new fuse and re-install the fuse holder and tighten with the screwdriver.

Plug the power cord into the back of the microscope and into the wall outlet.

Turn on the microscope (I).

Use only the appropriate fuse for replacement: 250v 3.15a (CAT# 142-30-03).

TROUBLESHOOTING

Under certain conditions, performance of this unit may be adversely affected by factors other than defects. If a problem occurs, please review the following list and take remedial action as needed. If you cannot solve the problem after checking the entire list, please contact your local dealer for assistance.

OPTICAL SYSTEM

Problem	Cause	Solution
The bulb is bright but it is dark in field of view	Field diaphragm is not large enough	Enlarge the field diaphragm
	Polarizer or analyzer is used	Pull them out
	The beam splitter is in the trinocular observation position	Move the beam splitter lever to the binocular observation position
The side of the field of view is dark or not even	The nosepiece is not in the right position	Turn the nosepiece into the correct position
	Stain or dust has accumulated on the lens (objective or eyepieces)	Clean the lens
	The color filter, polarizer or analyzer is not in the correct position	Insert them or move out of the light path
	Beam splitter is not in right position	Move it into the correct position
Stain or dust is observed in the field of view	Stains have accumulated on the specimen	Clean the specimen
	Stains have accumulated on the lens	Clean the lens
Unclear image	Cover glass on the specimen slide	Use the one without cover
	The specimen and the objective are not vertical	Adjust it
	The aperture is not opened correctly	Adjust it
	Stain or dust has accumulated on the lens of eyepiece	Clean the lens
	Beam splitter is not in right position	Move it into the correct position
One side of the image is dark or the image moves while focusing.	The specimen slide is not clamped	Clamp it with the stage clips
	The nosepiece is not in the correct position	Turn the nosepiece into the correct position
The eyes feel tired easily -- the right field of view doesn't superimpose with the left	Interpupillary distance is wrong	Adjust the interpupillary distance
	Diopter adjustment is wrong	Adjust the diopter
	The eyepiece for the right eye is different from the left one	Use the same eyepieces

MECHANICAL SYSTEM

Problem	Cause	Solution
The objective touches the cover glass while turning the nosepiece	Stage is too high	Lower it to an appropriate position
Coarse focusing knob is too tight	Tension adjustment ring is too tight	Loosen it to an appropriate position
Stage moves and cannot stay on the focal plane	Tension adjustment ring is too loose	Tighten it to an appropriate position
Coarse focusing knob cannot rise	The coarse limit screw is locked	Loosen the screw
The image moves obviously when touching the stage	The stage is fastened incorrectly	Fasten the stage correctly

ELECTRICAL SYSTEM

Problem	Cause	Solution
The bulb does not work	No power supply	Check the connection of the power cord
	The bulb burnt out	Replace it
The field of view is not bright enough	The light adjustment knob is not adjusted correctly	Adjust correctly
The bulb flickers or the brightness is not stable	The bulb will burn out soon	Replace with a new one
	The wire doesn't connect well	Connect correctly

MAINTENANCE

Please remember to **never** leave the microscope with eyepieces removed and always protect the microscope with the dust cover when not in use.

SERVICE

UNITRON microscopes are precision instruments which require periodic servicing to keep them performing properly and to compensate for normal wear. A regular schedule of preventative maintenance by qualified personnel is highly recommended. Your authorized UNITRON distributor can arrange for this service. Should unexpected problems be experienced with your instrument, proceed as follows:

1. Contact the UNITRON distributor from whom you purchased the microscope. Some problems can be resolved simply over the telephone.
2. If it is determined that the microscope should be returned to your UNITRON distributor or to UNITRON for warranty repair, pack the instrument in its original Styrofoam shipping carton. If you no longer have this carton, pack the microscope in a crush-resistant carton with a minimum of three inches of a shock absorbing material surrounding it to prevent in-transit damage. The microscope should be wrapped in a plastic bag to prevent Styrofoam dust from damaging the microscope. Always ship the microscope in an upright position; **NEVER SHIP A MICROSCOPE ON ITS SIDE**. The microscope or component should be shipped prepaid and insured.

LIMITED MICROSCOPE WARRANTY

This microscope is warranted to be free from defects in material and workmanship for a period of five (5) years for mechanical and optical components and one (1) year for LED bulb and electrical components from the date of invoice to the original (end user) purchaser. This warranty does not cover damage caused in-transit, misuse, neglect, abuse or damage resulting from improper servicing or modification by other than UNITRON approved service personnel. This warranty does not cover any routine maintenance work or any other work, which is reasonably expected to be performed by the purchaser. Normal wear is excluded from this warranty. No responsibility is assumed for unsatisfactory operating performance due to environmental conditions such as humidity, dust, corrosive chemicals, deposition of oil or other foreign matter, spillage or other conditions beyond the control of Unitron Ltd. This warranty expressly excludes any liability by Unitron Ltd. for consequential loss or damage on any grounds, such as (but not limited to) the non-availability to the End User of the product(s) under warranty or the need to repair work processes. Should any defect in material, workmanship or electronic component occur under this warranty contact your UNITRON distributor or UNITRON® at (631) 543-2000. This warranty is limited to the continental United States of America. All items returned for warranty repair must be sent freight prepaid and insured to Unitron Ltd., 73 Mall Drive, Commack, NY 11725 – USA. All warranty repairs will be returned freight prepaid to any destination within the continental United States of America. For all foreign warranty repairs, return freight charges are the responsibility of the individual/company who returned the merchandise for repair.