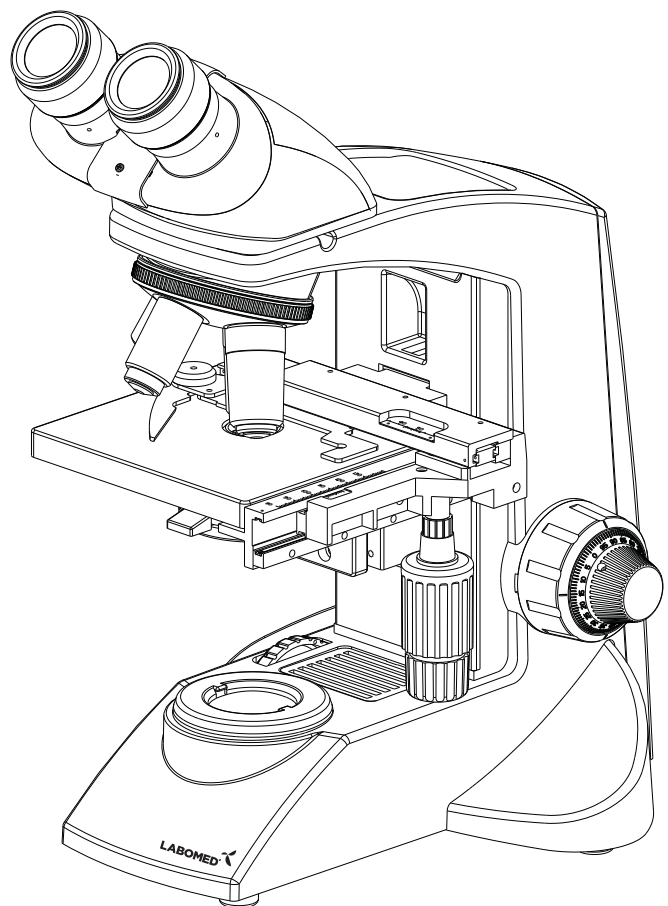


C x L User Manual

Laboratory Microscopy



To ensure proper use of this instrument as well as to avoid injury while operating instrument, understanding this manual completely before use is highly recommended.

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1 INTRODUCTION

The CxL is a laboratory microscope reflecting a modern design as well as the latest in optical and mechanical advancements.

Designed for professionals as well as students, this microscope offers many features and functions for a diverse set of applications.

Extra clarity and contrast is provided through a 360° rotatable Binocular body inclined at 45°.

The pressure die cast stand consists of Ball bearing 'friction less' sideways focusing to avoid any loss in motion.

The sturdy new stylish design provides comfort as well as stability.

The high powered objectives are spring loaded to prevent accidental damage to specimen slides.

The quadruple nosepiece has a comfortable ribbed grip for easy rotation that also safeguards the turret system against any damage. All positions are par-centered and par-focalised ensuring the highest level of accuracy.

The ball bearing mechanical stage allows smooth travel over a 76 x 50mm area with spring loaded stage clamps for retaining the specimen at the exact position desired. A 0.1mm vernier scale provides accurate location of specimen area.

The LED configuration is operational with an in-built re-chargeable battery and charging circuit. The battery will be charged with a direct input power supply of 110V-240V AC 50Hz/60Hz. This ensures continuous operation even under fluctuating voltages.

Our Halogen bulb (6V-20W) on this instrument has an average life span of up to 2000 hours and LED has an average life span of up to 100,000 hours.

The CxL comes equipped with a removable N.A. 1.25 Abbe condenser for brighter illumination levels and an iris diaphragm for better resolution and contrast control.

2 SAFETY INFORMATION

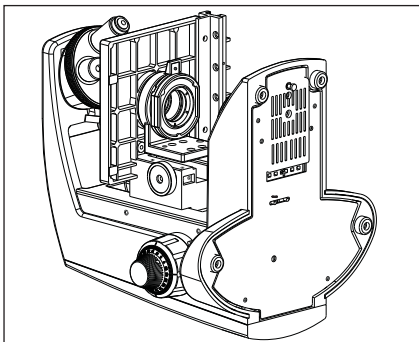


Fig. 1






1. After the microscope has been used for observation of a specimen containing bacteria, clean all parts coming in contact with the specimen to prevent infection.
 - Be sure to remove the specimen before moving this product.
 - In case the specimen is damaged by erroneous operation, it is important to clean all surfaces that may have come in contact with the specimen.
2. To avoid potential shock hazards and burns when replacing either halogen bulb or LED, turn the microscope's main switch to OFF position and disconnect power cord from wall outlet in advance. Whenever you replace bulb during use or right after use, allow lamp socket and bulb to cool before touching (Fig. 1)

Applicable bulb/LED replacement: 6V20W Halogen bulb P/N CX-013 or LED P/N 9135000-901

3. Install microscope on a sturdy, level table or bench and avoid any blockage of air vents on the bottom side of the base.
Do not place microscope on a flexible surface, as this could result in blocking the air vents and cause overheating/fire.
4. Always use the power cord provided by LABOMED. If the proper power cord is not used, product safety performance cannot be warranted.
5. When installing the microscope, route the power cord away from the microscope frame. Should the power cord come in contact with the microscopes base, the power cord could short circuit.
6. Always ensure that the grounding terminal of the microscope and that of the wall outlet are properly connected. If the equipment is not grounded, LABOMED can not warrant the electrical safety performance of the equipment.
7. Never allow metallic objects to penetrate the air vents of the microscope frame as this could result in user injury and equipment damage.
8. After operation of microscope, be sure to disconnect power cord from connector on the microscope or from the wall power outlet.




Safety Symbols

The following symbols are found on the microscope. For optimal use, it is recommended that users understand these symbols and always use the equipment as prescribed.

Symbol	Explanation
	Indicates that the surface has a tendency to heat up and should not be touched unless system has completely cooled down.
	Before use, carefully read the instruction manual. Improper use could result in injury to the user and/or damage to the equipment.
	Warning against risk of electric shock.
	Indicates that the main switch is ON.
	Indicates that the main switch is OFF.

Warning Label

A warning indication label is attached to every part where special precaution is required while handling and using the microscope. Always read the warnings.

Warning label position	Bottom of microscope frame	[Warning against high temperature in bulb/LED compartment]	
		[Warning against risk of electric shock]	
		[Warning against damage in non-compliance with instructions manual]	

If the warning label is stained or peeled off, contact your LABOMED distributor.

1 Getting Ready

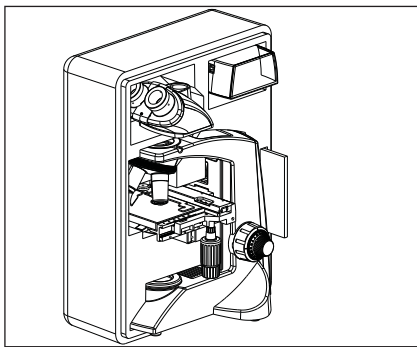



Fig. 2


1. A microscope is a precision instrument with delicate glass components. Please handle with care.
2. Do not use the microscope where it is subjected to direct sunlight, high temperature, humidity, dust and vibrations. (For the operating conditions, see chapter 15, "SPECIFICATIONS" on Page 24.)
3. The microscope is ventilated by natural convection. Be sure to leave enough space (10 cm or more) around body while installing it.
4. Arm handle is provided for carrying the microscope.

 **To prevent damage, do not hold the microscope by the stage or observation tube.**

Be sure to remove the specimen from the stage clip while transporting unit to avoid damage to the specimen slide.

2 Maintenance and Storage

1. Clean all glass components by wiping gently with cleaning cloth provided. To remove fingerprints or oil smudges, wipe with cleaning cloth slightly moistened with a mixture of petroleum (85%) and isopropanol (15%).

 **Since solvents such as petroleum and isopropanol are highly flammable, they must be handled carefully. Be sure to keep these chemicals away from open flames or potential sources of electrical sparks - for example, electrical equipment that is being switched "ON" or "OFF". Also remember to always use these chemicals only in a well-ventilated room.**

2. Do not attempt to use organic solvents to clean the microscope components other than the glass components. To clean non-glass components, use a lint-free, soft cloth slightly moistened with a diluted neutral detergent.

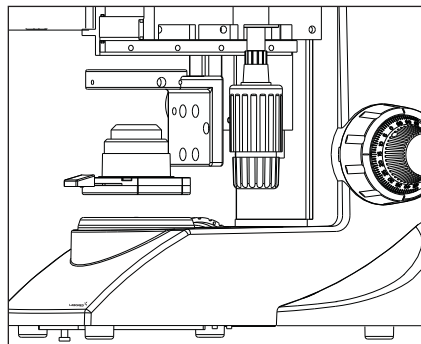


Fig. 3

3. Do not disassemble any part of the microscope as this could result in malfunction or mitigated performance.
4. When not using the microscope, ensure that the frame is fully cooled and store the unit in a dry locker or cover with a dust cover (provided).
5. To clean the condenser, fully loosen the securing knob (lower) and remove the condenser by lowering condenser bracket, wipe the front lens of the condenser with optical cleaning solution (mixture suggested above) and lens tissue.

3 Caution

If the microscope is used in a manner not specified by this manual, the safety of the user may not be warranted. In addition, the equipment may also suffer damage. Always use the equipment as outlined in this instruction manual.

4 Care & Maintenance

Your microscope has been engineered for a long and safe operational life with the least amount of maintenance required. In general, routine maintenance is limited to keeping the microscopes working parts lubricated and optics clean. Always cover the microscope with the provided dust cover when not in use.

1. Cleaning the lenses :

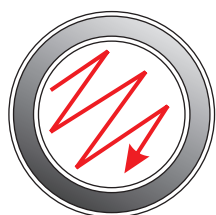
To clean the lens surfaces, remove dust using a soft brush or gauze (compressed air dust cans are ideal). For removing finger marks or grease, soft cotton cloth/ lens tissue or gauze lightly moistened with cleaning solution (85% petroleum ether and 15% isopropanol) should be used. For cleaning the objective optics, use xylene. Observe sufficient caution in handling xylene.

Cleaning procedure:

Place the objectives and/or eyepieces on a dust-free surface (e.g. fresh aluminum foil). All other optical components to be cleaned should be as accessible as possible.

- a. Blow all loose dust particles away with a dust blower.
- b. Remove all water-soluble dirt with distilled water. If this is unsuccessful repeat using a solution of diluted hand soap liquid. Remove any remaining residue with a dry cotton swab.
- c. To remove oil, use a solution of diluted hand-soap liquid initially. If this does not produce a satisfactory result, repeat the cleaning using a solvent (Optical Cleaning Solution 85% petroleum ether and 15% isopropanol).
- d. Grease must always be removed using a solvent.
- e. Cleaning is achieved by using a spiral motion from the center to the rim. Never wipe using zig-zag movements as this will only spread the dirt. With larger optical surfaces (e.g. tube lenses) the spiral motion starts initially at the rim before moving to the middle and is only then followed by a center to rim cleaning motion. Normally several spiral wipes are recommended.

We recommend pure, volatile petroleum ether or Optical Cleaning Solution as explained in point 3 above.



zig-zag motion (X)



spiral motion (✓)

Wipe using a spiral movement. Do not use a zig-zag motion!

2. Cleaning of painted surfaces :

Avoid the use of any organic solvent (e.g. thinner, xylene, ether, alcohol etc.) for cleaning of painted surfaces of the instrument. Painted surfaces can be cleaned with a very lightly moistened micro fiber cloth. Loose dust and other dirt can be removed using a brush of soft hair used exclusively for this purpose.

 **Caution:**

Do not use aggressive organic solvent such as acetone for cleaning painted surfaces and plastic parts of the microscope.

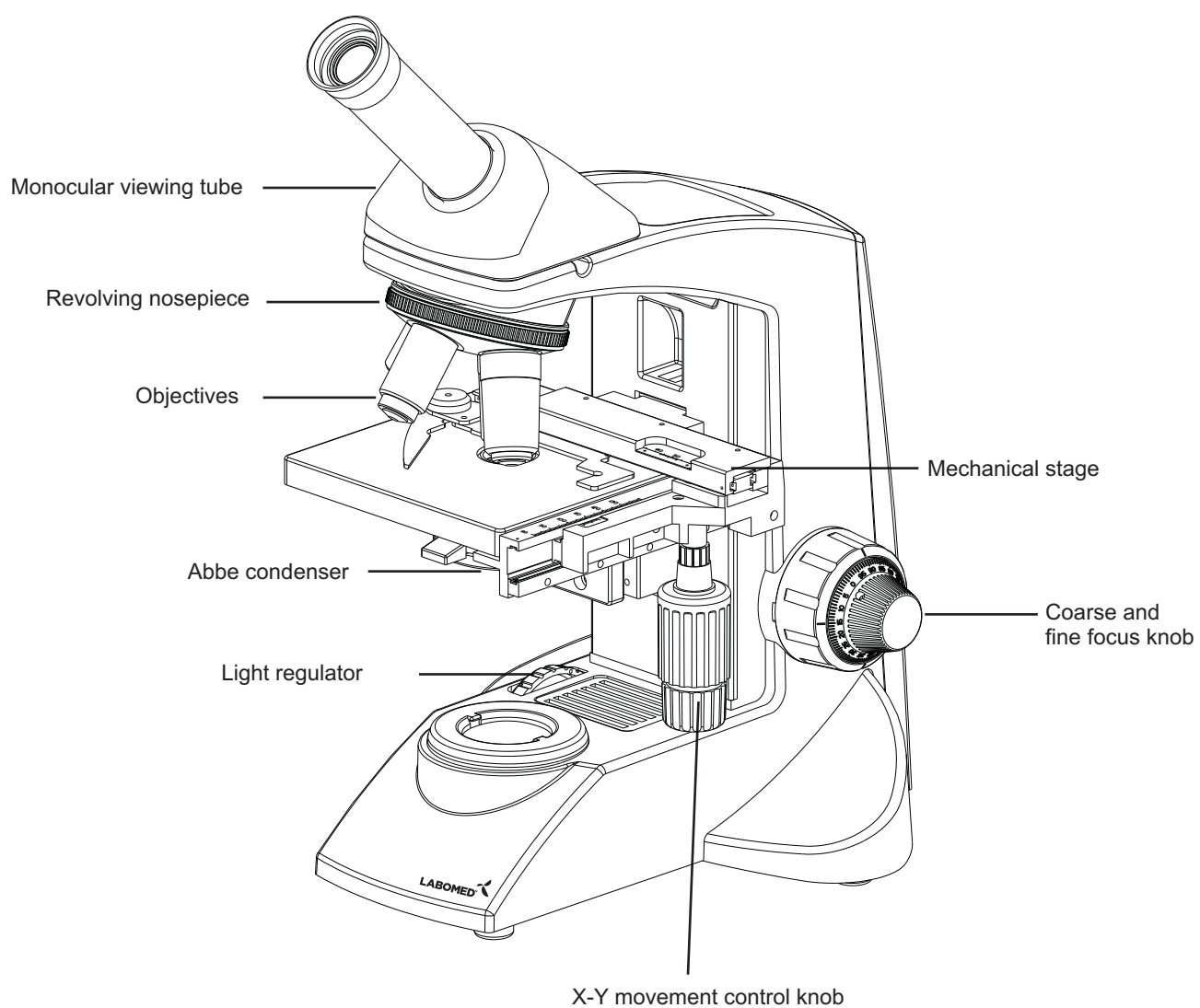
3. Never attempt to dismantle :

Never attempt to dismantle the instrument so as to avoid the possibility of impairing its operational efficiency and accuracy.

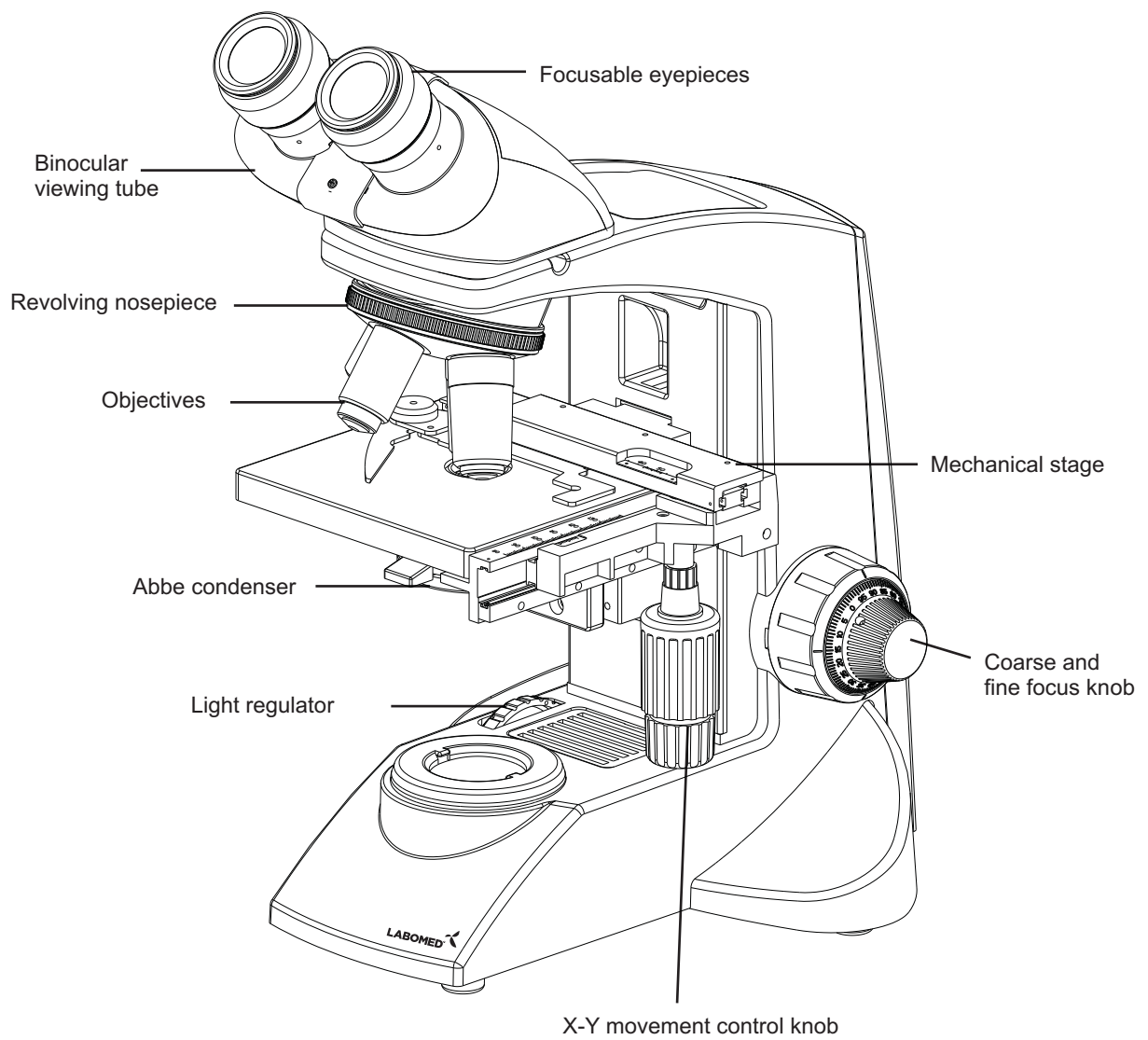
4. Periodical checking :

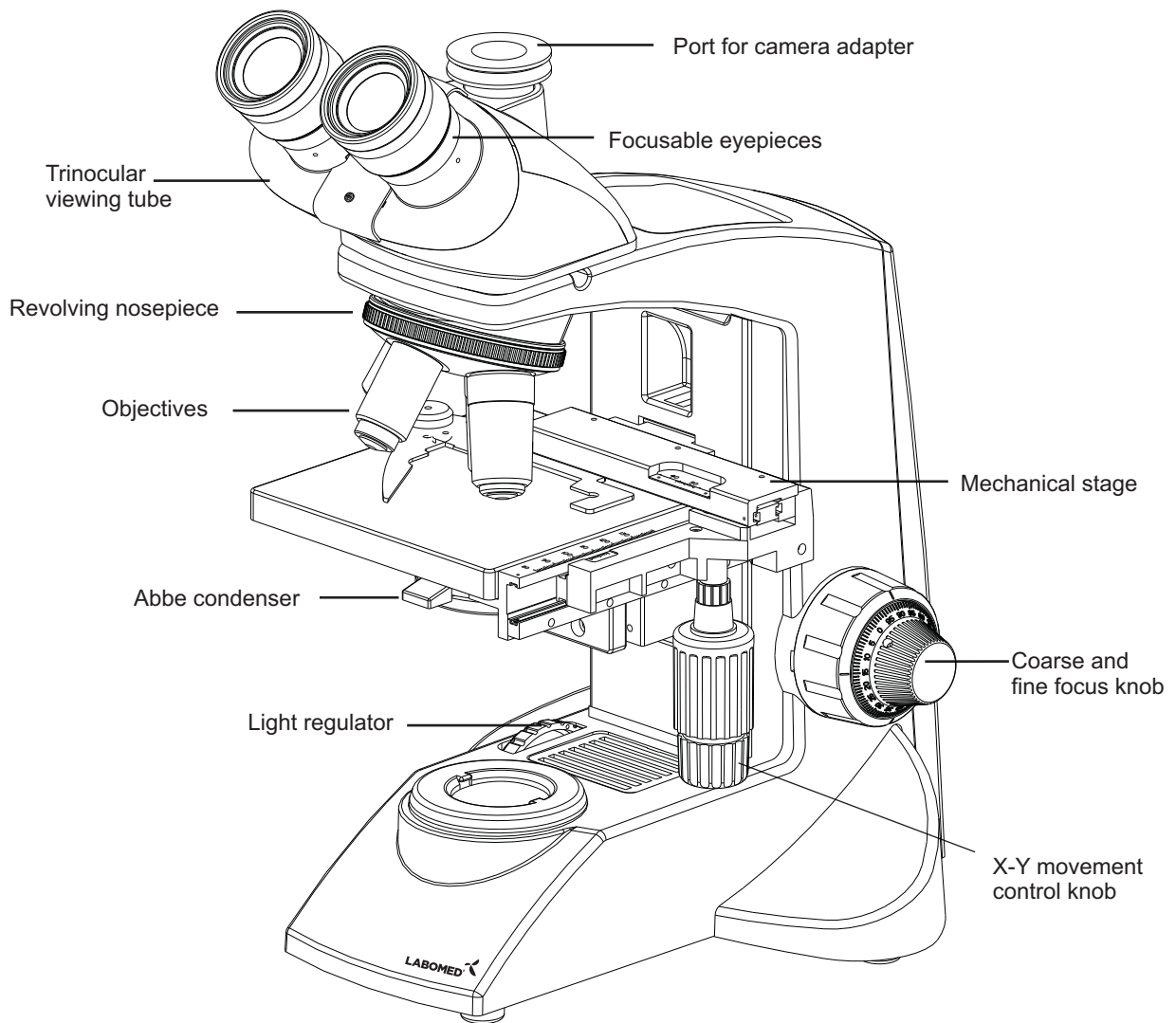
To maintain the performance of the instrument, we recommend customers have their microscopes serviced periodically by a factory authorized dealer/rep. For details, contact your nearest dealer or Labo America's main office in California.

3 CxL Monocular

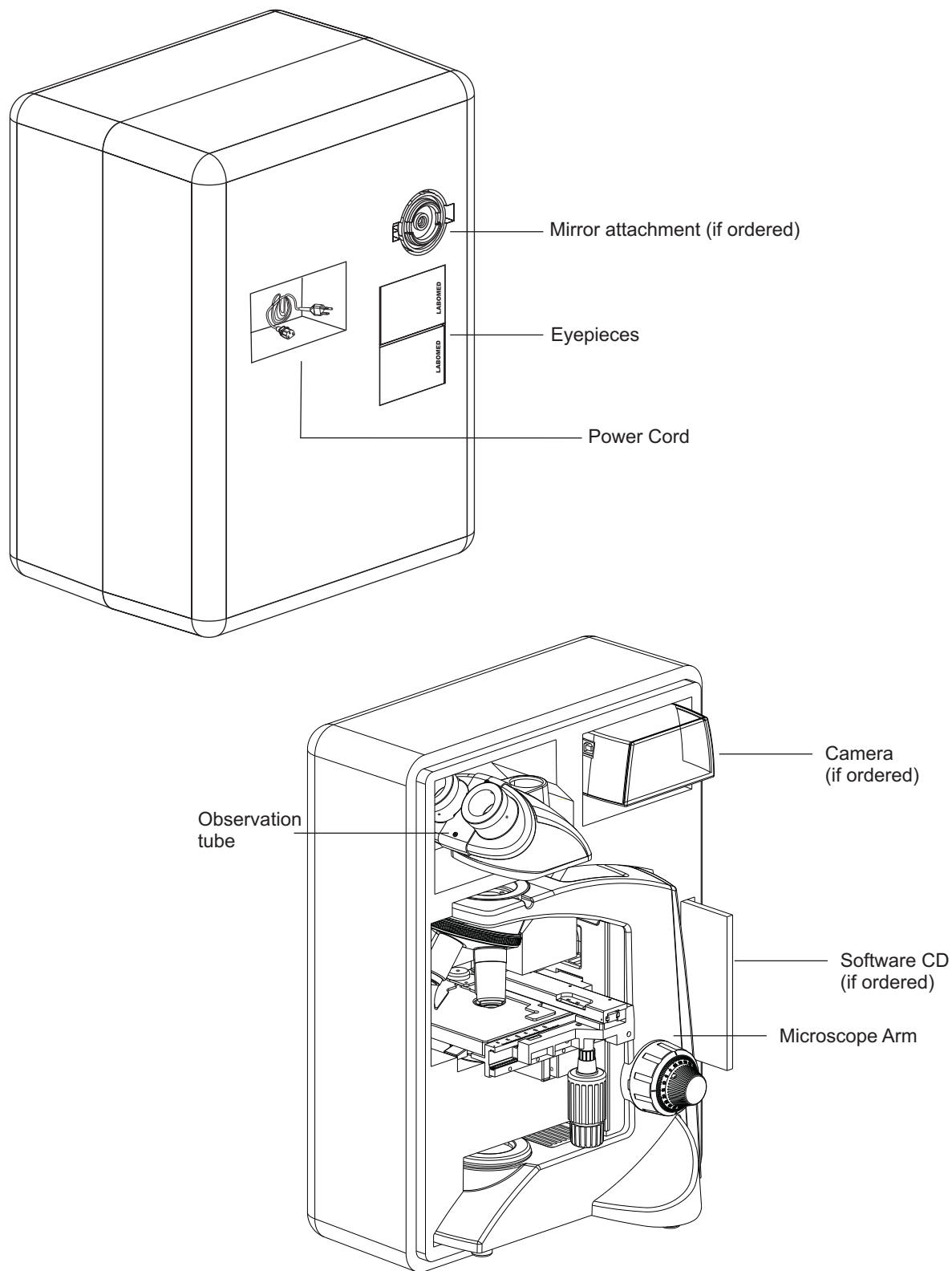


4 CxL Binocular

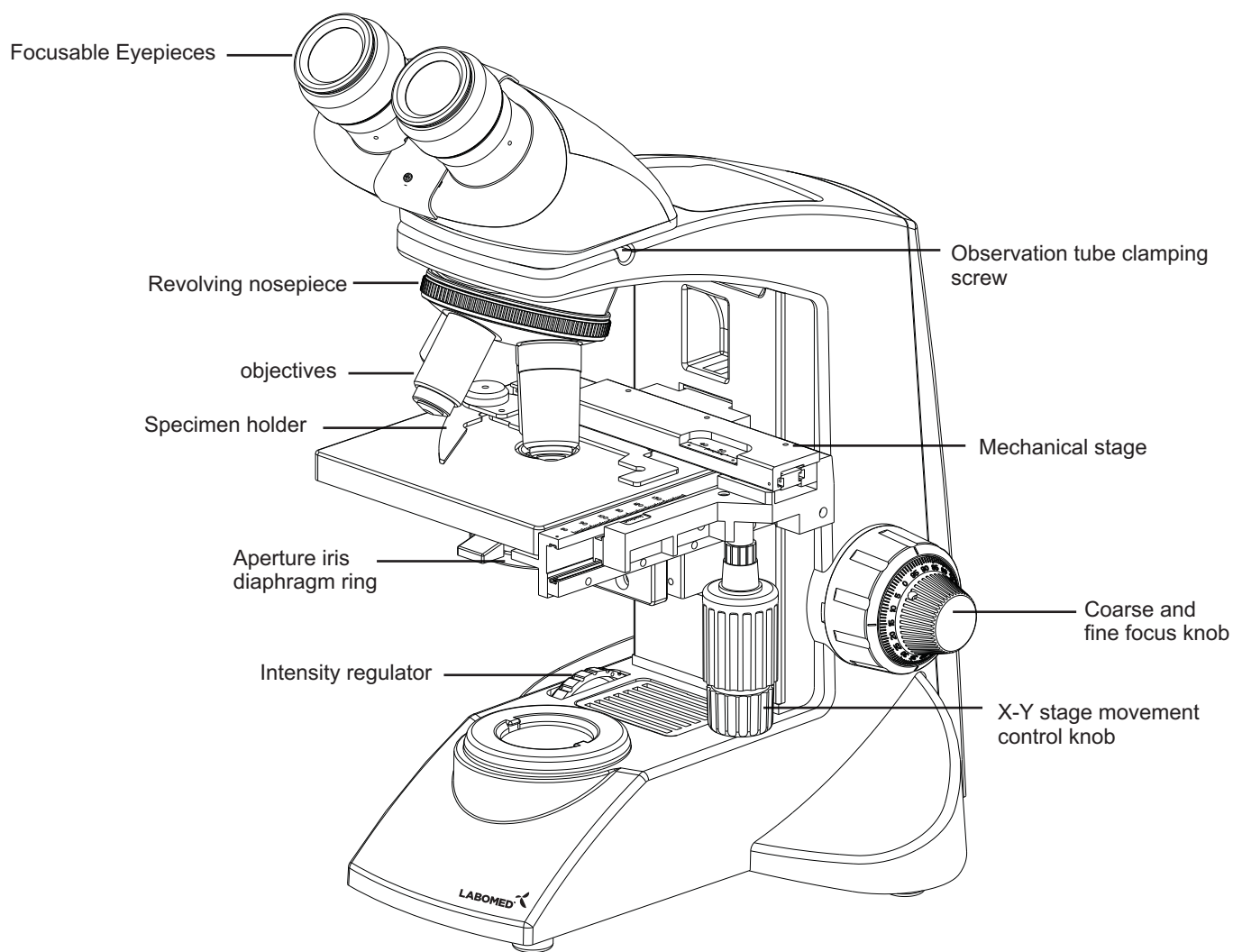




6 UNPACKING YOUR MICROSCOPE



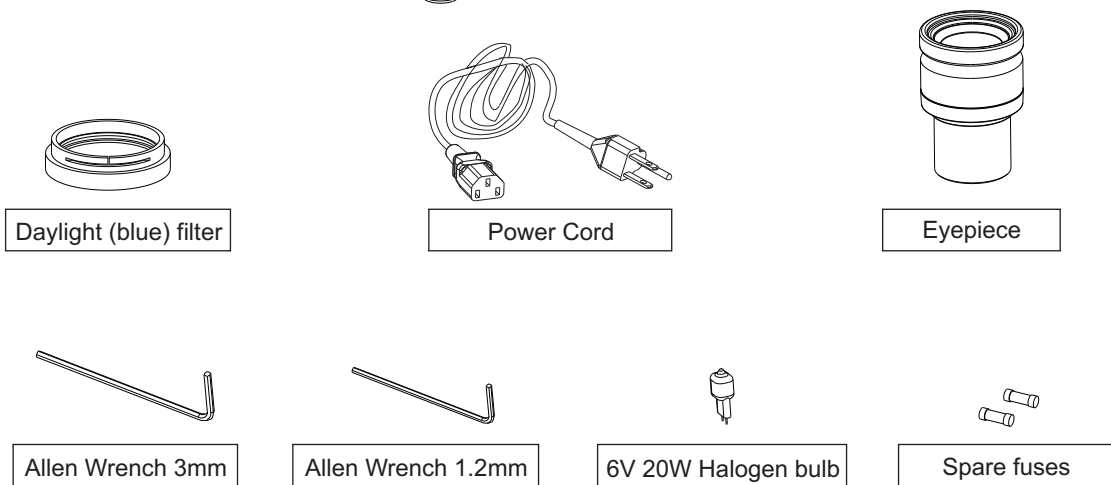
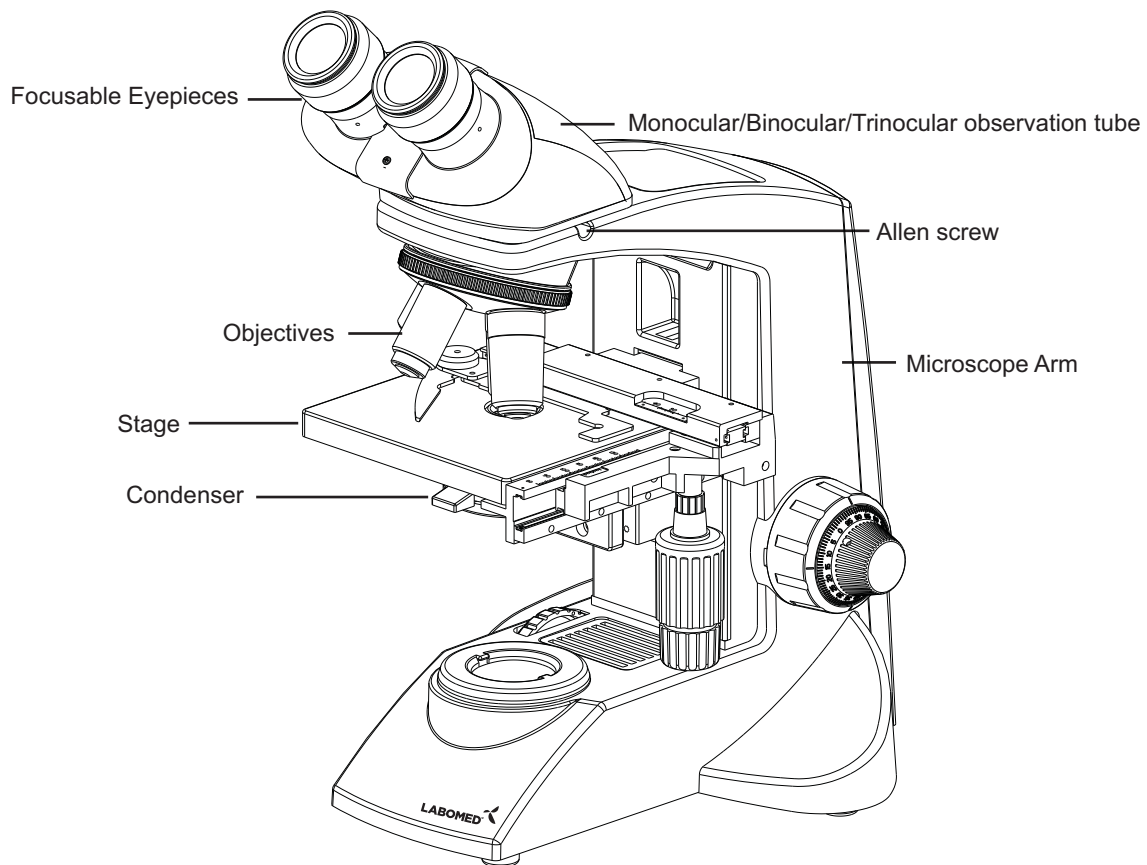
7 SYSTEM DIAGRAM



8

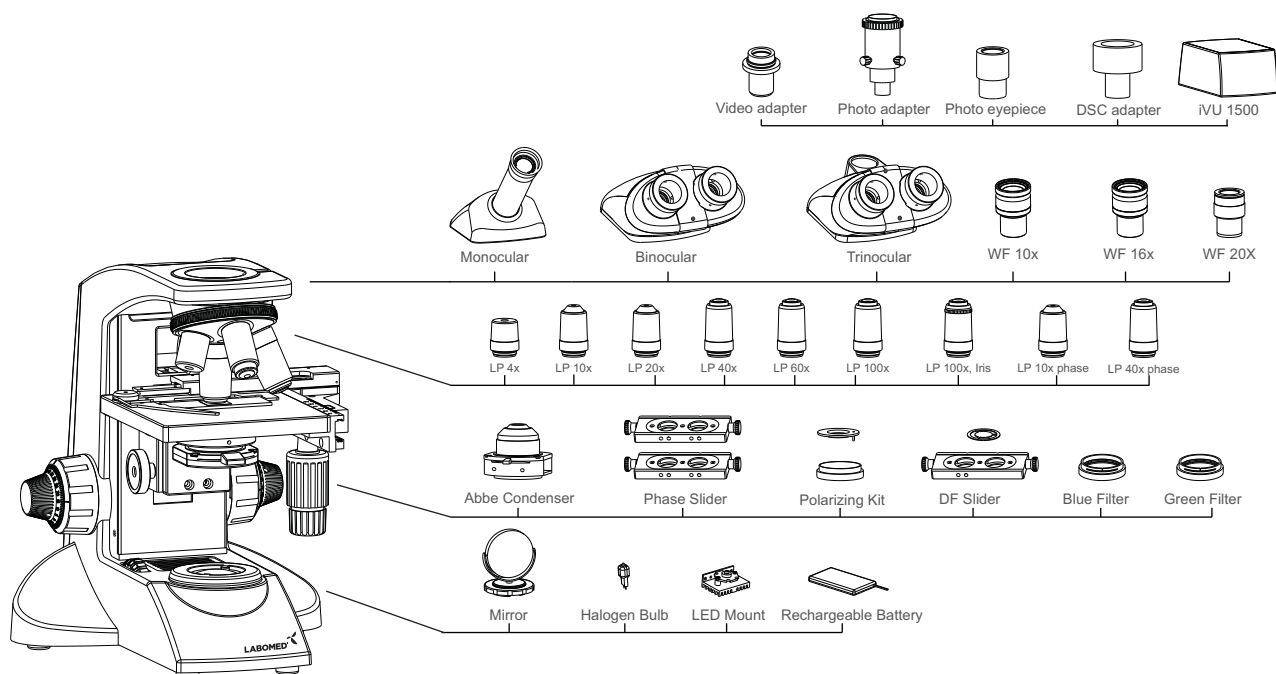
STANDARD COMPONENTS

- After removing microscope from packaging, make sure that all of the following contents are present.
- The differences in configurations are the number of objectives, type of observation head, type of illumination and purchased optional accessories.
- The objectives have been adjusted for a tight fit to prevent any damage during transportation. To remove an objective, rotate it counterclockwise while gripping it with a rubber sheet, etc. to avoid any slippage.



9 OPTIONAL ACCESSORIES

System Diagram of Optional Accessories



Installation and Operation of Optional Accessories

1 Darkfield Slider

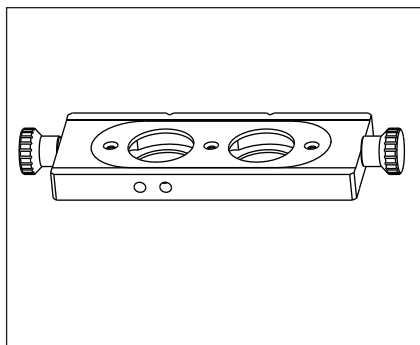


Fig. 4

The darkfield slider enables darkfield observation using an objective from 4X to 40X.

2 Reflection Mirror

The reflection mirror is designed to be used in out door observation settings wherein a power source is not readily available. The mirror attachment makes it possible to use natural light to illuminate your specimen.

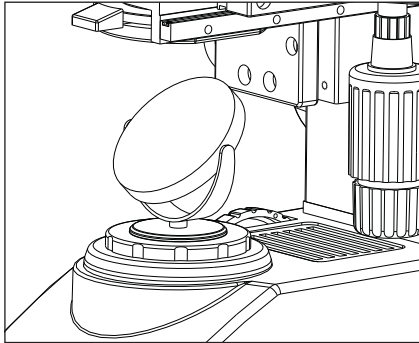


Fig. 5

The microscope should be installed in any place that is not exposed to direct sunlight. Direct sunlight reflection can cause eye injury, or in some cases, blindness.

The eyepieces should be oriented toward the rear of the microscope so that the reflection mirror receives unobstructed light. To do this, loosen the observation tube clamping knob and rotate the tube 180°.

1. Fit the reflection mirror in the window lens of the microscope frame by aligning the mounting tab.
2. Remove the daylight filter because it renders the image blue under natural light conditions.
3. The reflection mirror (fig. 5) should be pointed toward anywhere with stray light. While observing the image through the eyepieces, adjust the orientation of the reflection mirror to capture stray light.

A planar reflection mirror is used normally. However, if the image brightness is uneven or the outside view is visible in the image, use a concave reflection mirror

3 Optional Eyepieces

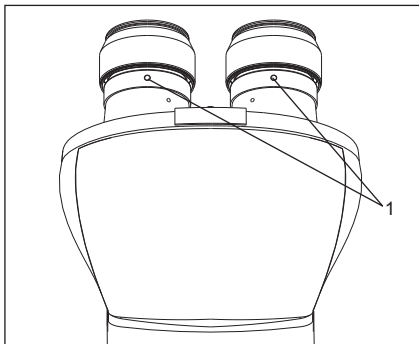


Fig. 6

The standard 10X eyepieces are clamped using screws.

1. Using allen wrench 1.2mm, loosen the clamping screw (1) from the ocular tube and remove it.
2. Insert the optional eyepieces into the ocular sleeve and tighten the clamping screw(1).

10 INITIAL SET UP

1 Objectives

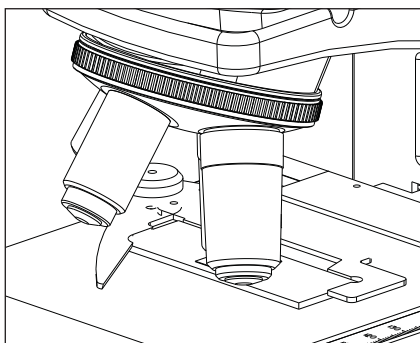


Fig. 7

Objectives are factory set. Objectives are par-centered and parfocalised during assembly phase.

All objectives have been secured for a tight fit to prevent them from coming loose during transit. To remove an objective, rotate it counterclockwise while holding it with a rubber sheet, etc. to avoid any slippage.

2 Observation Head

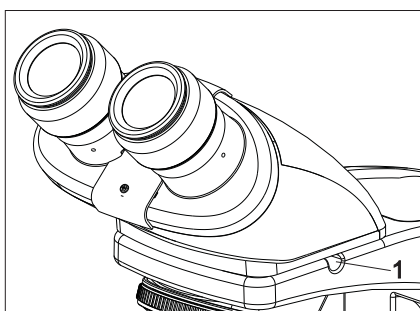


Fig. 8

Install the observation head using following procedure:

1. Using allen wrench 3mm, loosen the Head Locking Screw (1) and remove the dust cover cap provided in dovetail cavity as well as on observation head dovetail.
2. Mount the Observation Head by engaging the dovetail provided at the bottom of the head into the dovetail cavity provided in the microscopes arm.
3. Tighten the Head Locking Screw (1) after positioning the Observation Head as desired.

3 Eyepieces

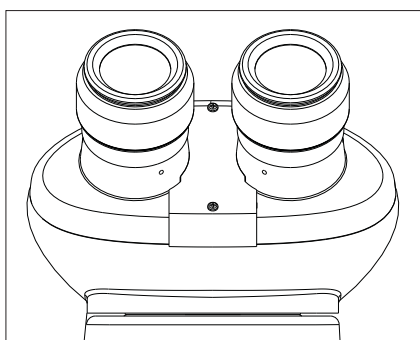


Fig. 9

Insert the eyepieces into the ocular tube of Observation Head using following procedure:

1. Remove the protective caps from the observation tube.
2. Insert 10x eyepieces into the ocular sleeve and tighten the clamping screw (1) using allen wrench 1.2mm. See figure 10.

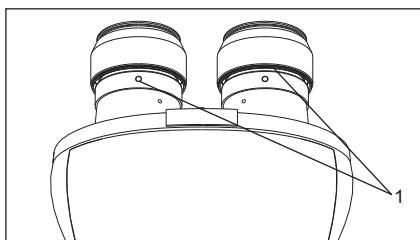


Fig. 10

11 ASSEMBLY

Each standard set can be assembled by simply attaching filter and power cord.

1 Installing or Replacing the Bulb

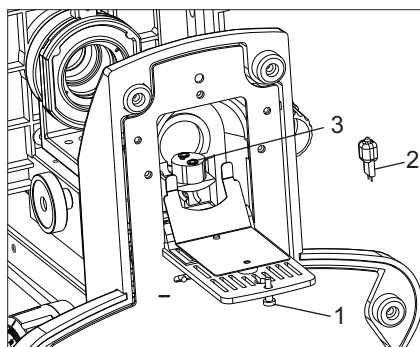


Fig. 11

Before attaching the bulb, remove the parts that may drop such as the filter and specimen from the microscope frame, and place the microscope on its back so that the bottom plate is exposed.

1. Pull the lock knob (1) on the bottom to open lamp housing door (fig. 11).
2. Hold the halogen bulb (2) without taking it out of the polyethylene bag so as not to taint the bulb with fingerprints and push the bulb into the pin holes on the socket (3). After attaching, remove the polyethylene bag.
3. With the lock knob pulled out, close the lamp housing door, then push the lock knob back to lock the cover.

Applicable bulb: 6V20W Halogen bulb P/N CX-013

Always use the designated bulb. Using a bulb other than those specified by LABOMED may lead to a fire hazard. Fingerprints or stains on the lamp bulb reduce its life. If contamination occurs, wipe bulb surface with a cloth slightly moistened with alcohol.

⚠ Caution: For Bulb Replacement During Use or Right After Use

The bulb, lamp socket and areas near these will be extremely hot during and right after use. Set the main switch to "O" (OFF), disconnect the power cord from the wall outlet, and allow the bulb and lamp socket to cool before replacing the bulb with a new bulb of the designated type. Cooling time may vary to users discretion.

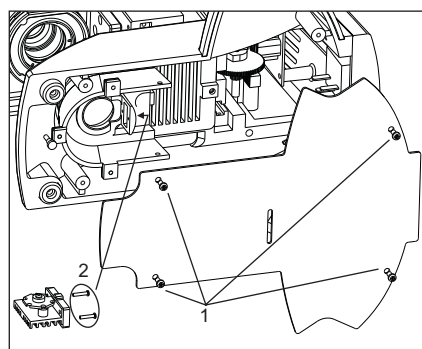


Fig. 12

Procedure for LED replacement (figure 12):

1. Lay the microscope on a clean surface toward right so that the microscope base is exposed.
2. Using a screw driver, unscrew four screws (1) to open the bottom plate of the microscope.
3. Remove two screws (2) provided on the lamp housing (use screw driver).
4. Replace existing LED mount with live LED mount.
5. Reverse the steps 3 to 1, to complete the process.

Applicable LED replacement: LED P/N 9135000-901

2 Mounting the Daylight (Blue) Filter

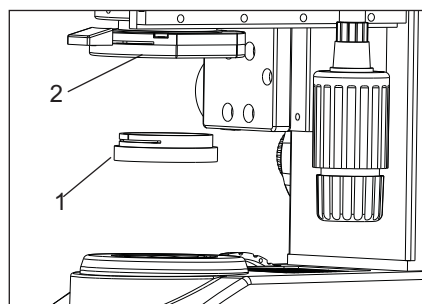
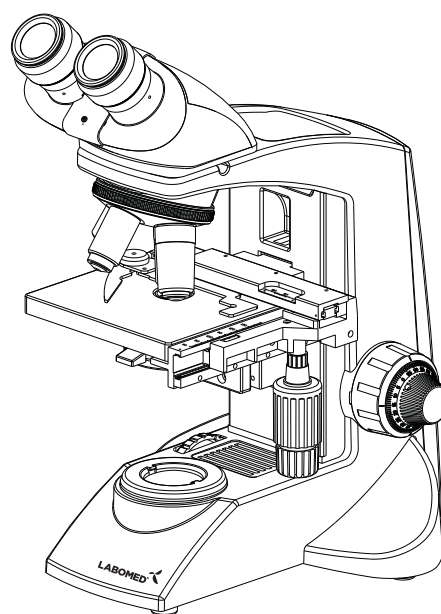
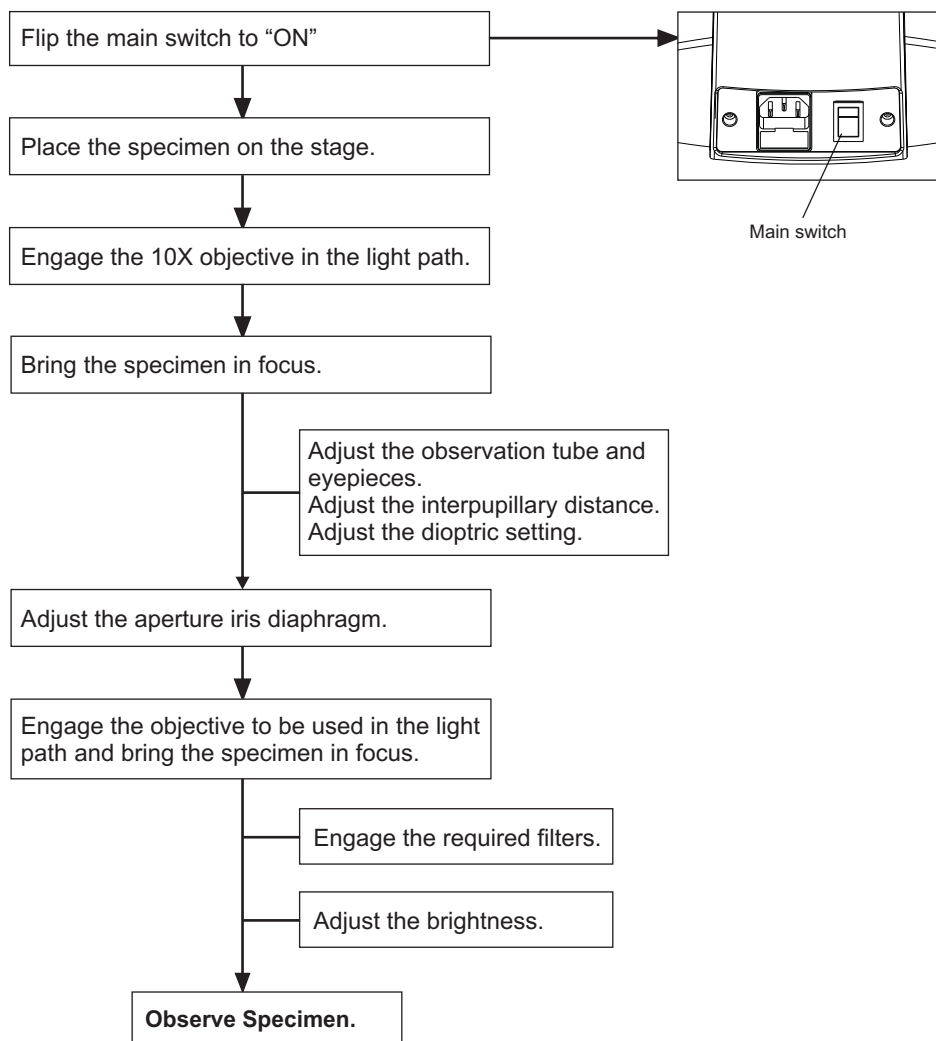


Fig. 13

This filter modifies the color of observation light into a natural color (daylight color).

- Fit the daylight filter (1) into the bottom of the condenser (2) until it clicks into place. See figure 13.

12 SUMMARY OF BRIGHTFIELD OBSERVATION PROCEDURE



13 DETAILED OBSERVATION PROCEDURE

1 Turning the Lamp ON

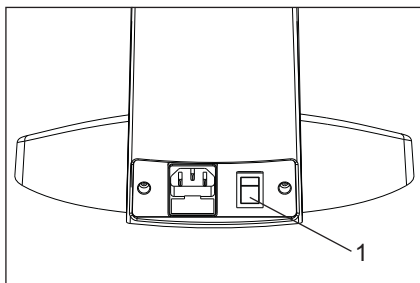


Fig. 14

1. Flip the main switch to "I" (ON) as shown in figure 14.
2. Rotating the light intensity adjustment knob (fig. 15) in the direction of the arrow increases brightness and rotating it in the opposite direction decreases brightness. The figures around the knob indicate the intensity level.

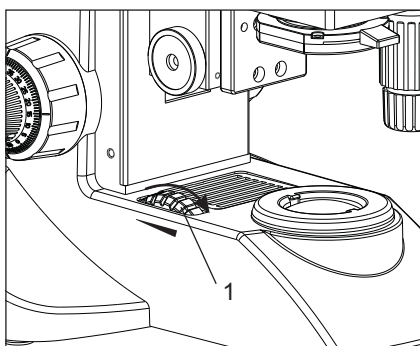


Fig. 15

2 Placing specimen on the stage

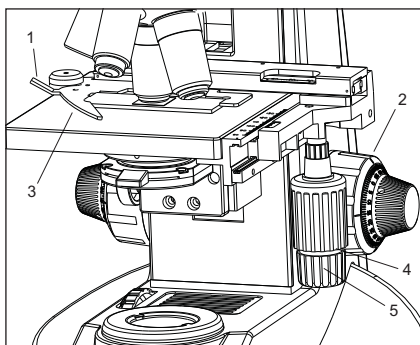


Fig. 16

Place the specimen gently on the stage. If the bow-shaped lever (3) is returned with a strong force or the control knob (1) or the bow-shaped lever is released in the middle, the slide glass may be broken. See figure 16.

1. Rotate the coarse adjustment knob (2) in anticlockwise direction to fully lower the stage.
 2. Open the bow-shaped lever (3) outward by pulling lever handle (1), place the specimen by sliding the specimen glass plate(s) on the stage from the front toward the rear.
 3. After positioning your specimen slides, return the bow-shaped lever (3) gently by slowly releasing control knob (1).
 4. Rotating the upper co-axial knob controlling the Y-axis movement (4) moves the specimen in the vertical direction. Rotating the lower knob which is the X-axis movement control Knob (5) moves the specimen in the horizontal direction.
- **Do not adjust the specimen holder directly by hand, for this will damage the rotary mechanisms.**
 - **When the specimen holder reaches stop position, the rotation force of the above knobs become heavy. Stop rotating the knob at this time.**

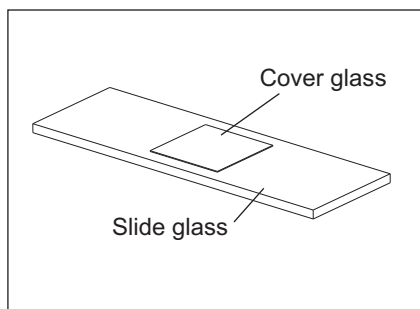


Fig. 17

Cover glass

This is the glass plate placed on the specimen. For optimum optical performance, the cover glass thickness, which is the distance from its surface to the specimen surface, should be 0.17 mm.

Slide glass

This glass plate should ideally have a length of 76 mm, width of 26 mm ± 1 mm and thickness between 0.9 and 1.4mm.

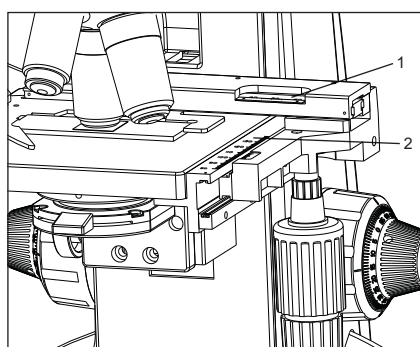


Fig. 18

Specimen holder scales

These scales allow for easy identification of the specimen's position (coordinates), making it easy to return to a particular region of interest after scanning the slide.

1. The horizontal coordinate can be read at position (1) on the specimen holder (fig.18).
2. The vertical coordinate can be read at the index line (2).

3 Adjusting the Focus

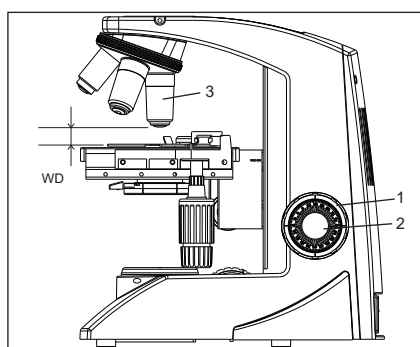


Fig. 19

Focusing Procedure

1. Rotate the coarse adjustment knob (1) clockwise so that the objective (3) is as close as possible to the specimen (We recommend starting with 10X). See figure 19.
2. While observing the specimen through the eyepieces, slowly rotate the coarse adjustment knob (1) counterclockwise to lower the stage.
3. When coarse focusing of the specimen is obtained (an image is detected), rotate the fine adjustment knob (2) for fine focusing.

Working Distance (WD)

The WD refers to the distance between each objective and the specimen, when precise focus of the specimen is obtained.

Objective Magnification	4X	10X	40X	100X
WD (mm)	22	10.5	0.56	0.1

4 Adjusting the Interpupillary Distance

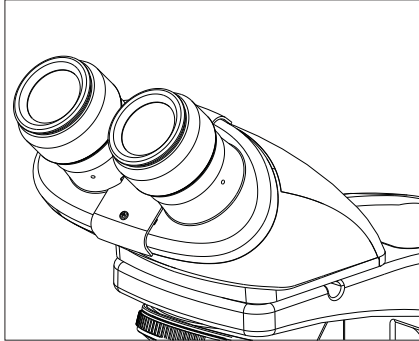


Fig. 20

The inter-pupillary distance adjustment consists of regulating the two eyepieces to align with both eyes' pupils so that you can observe a single microscopic image through two eyepieces in stereo vision. This greatly helps to reduce fatigue and discomfort during observation.

While looking through the eyepieces, move both eyepieces until the left and right fields of view coincide completely. The position of index dot • indicates the inter-pupillary distance value.

Note your interpupillary distance so that it can be quickly duplicated.

5 Adjusting the Diopter

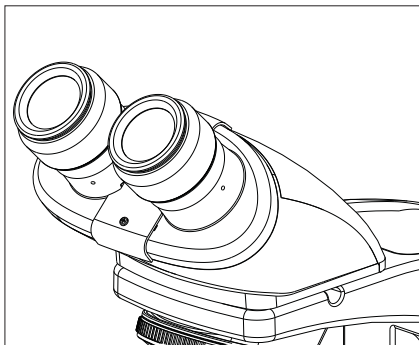


Fig. 21

Procedure for adjusting the diopter:

1. Rotate the right eyepiece to match the markings of your IPD (If your IPD is 64, rotate the eyepiece to 64 mark).
2. While looking through the right eyepiece with your right eye, rotate the coarse and fine adjustment knobs to bring the specimen into focus.
3. While looking through the left eyepiece with your left eye, rotate only the diopter adjustment ring on the eyepiece until specimen is at its best possible focus.

• **This is a special feature provided to compensate the tube length change while changing IPD setting. Follow this procedure to obtain optimum parfocality of system to your IPD setting.**

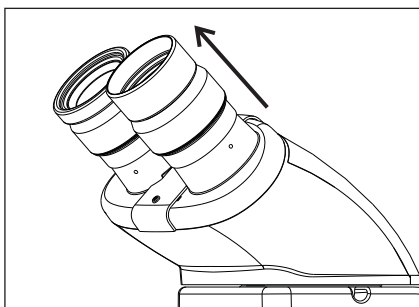


Fig. 22

Using the Eye Shades

When Wearing Eyeglasses

Use with the eye shades in the normal, folded-down position. This will prevent the eyeglasses from being scratched.

When Not Wearing Eyeglasses

Extend the folded eye shades outwards (direction of the arrow) to prevent extraneous light from entering into your line of vision.

6 Adjusting the Condenser Position and Aperture Iris Diaphragm

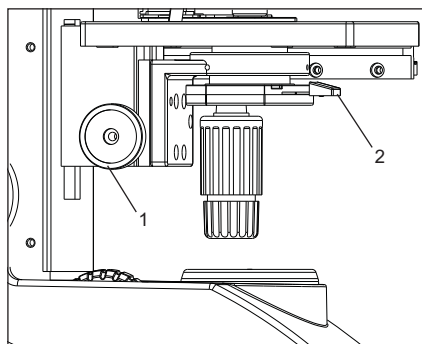


Fig. 23

The condenser is most often used in the highest position. If the observed field of view is not uniform enough, it may be improved by lowering the condenser slightly.

Rotate the condenser height adjustment knob (1) in clockwise direction to move the condenser to the highest position.

Slide the aperture iris diaphragm (2), so that the aperture of the objective in use is fully illuminated.

7 Switching the Objectives

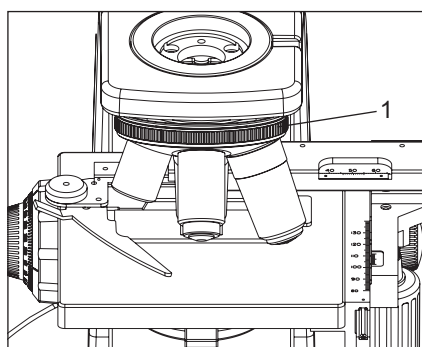


Fig. 24

Hold and rotate the revolving nosepiece (1) so that the objective to be used is in line above the specimen. Always use the ribbed grip to rotate the objective nosepiece.

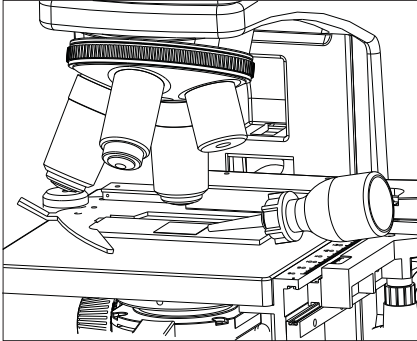


Fig. 25

The designated immersion oil should be in contact with the top lens of the 100X immersion objective. If not, the specimen will appear distorted and dull. It is recommended that LABOMED immersion oil is always used.

Immersion Process:

1. Bring the specimen in focus using first the 10x, then 40x objective.
2. Disengage the 40x cycling towards 100x, and place a drop of immersion oil on the center point of the specimen.
3. Rotate the revolving nosepiece to engage the immersion objective and rotate the fine adjustment knob to bring the specimen into focus **(Since air bubbles in the oil will affect the image quality, make sure that the oil is free of bubbles. To remove bubbles, rotate the revolving nosepiece slightly to agitate the oil).**
4. The condenser of this microscope manifests the full performance when oil is placed between the slide glass and the front lens of condenser. If oil is not placed there, the observed image may appear dark.
5. After use, remove oil from the objective front lens by wiping with lens tissue slightly moistened with petroleum (85%) and isopropanol (15%) mixture.

⚠ Caution

If immersion oil makes contact with your eyes, rinse eyes out thoroughly with fresh water. If immersion oil makes contact with skin, wash affected areas with soap and water. If prolonged discomfort is experienced, consult your physician immediately.

14 TROUBLESHOOTING GUIDE

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

Trouble	Cause	Remedy
1. Uneven brightness in observation field	The objective is not engaged in the light path	Engage the objective into position Until the nose turret clicks
	The condenser is too low	Raise up to achieve maximum light
	The objective, eyepiece, condenser and/or window lens are dirty	Clean them thoroughly
2. Dust or stains are visible in observation field	The eyepiece, condenser, window lens and/or specimen glasses are dirty	Clean them thoroughly with lens tissue and alcohol
3. Observation image has glare	The condenser is too low	Raise it
	The condenser iris diaphragm ring is excessively closed	Adjust the aperture according to the objective magnification
4. Observation image is hazy or unclear	The objective is not engaged in the light path	Engage the objective into position until it clicks
	The objective, eyepiece, condenser and/or specimen glasses are dirty	Clean them thoroughly
	Immersion oil is not used with an immersion objective.	Use immersion oil
	Bubbles are present in immersion oil	Remove the bubbles by agitation
	The specified immersion oil is not used	Use the immersion oil supplied by Labomed
5. Part of image is defocused	The objective is not properly engaged in the light path	Engage the objective into position Until the nose turret clicks
	The specimen is not set properly on the stage	Set the specimen correctly on the stage and secure using the specimen holder
6. High-magnification objective touches specimen just before coming into focus	The specimen is upside down	Set the specimen correctly with the cover glass on the top
7. Coarse focus adjustment cannot lower the stage low enough	The condenser is too low	Raise the condenser
8. Fields of view of two eyes do not match	The interpupillary distance is not adjusted properly	Adjust IPD
	IPD compensation for the two eyes is not set	Adjust it correctly
	The left and right eyepieces are of different magnification	Replace one of them so that the left and right eyepieces are identical

Trouble	Cause	Remedy
9. Objective hits the specimen when an objective is switched to a higher magnification objective	The specimen is upside down	Set the specimen correctly with the cover glass on the top
	The cover glass is too thick	Use a cover glass with thickness of 0.17mm
	The stage is raised too high	Lower the stage
	The slide is slipped from the slide holder	Re-position the slide in the slide holder
	Slide is of excessive thickness	Use slide having thickness between 0.9 and 1.4mm
10. Bulb/LED does not light	Bulb/LED is not mounted	Attach a bulb/LED
	Bulb/LED is blown	Replace the bulb/LED
	The power cord is unplugged	Plug it securely
	Fuse is blown	Check and replace with live fuse
	Battery is low	Charge battery
11. Bulb/LED blows easily	The specified bulb/LED is not used	Replace with a specified bulb/LED

15 SPECIFICATIONS

1. Illumination	Built-in illumination system LED / Halogen			
2. Focusing mechanism	Stage height adjustment mechanism Fine adjustment scale: 3.0 μ m per graduation Fine adjustment stroke: 0.2mm per turn Total stroke: 12.7mm Co-axial coarse and fine focusing on ball drive			
3. Revolving nosepiece	Quadruple positions fixed (front oriented)			
4. Observation tube		Monocular	Binocular	Trinocular
	Field number	18	18	18
	Tube tilting angle	45°	45°	45°
	Interpupillary distance adjustment range	NA	54-74	54-74
5. Stage	Size	135 x 124mm (with mechanical stage)		
	Movement range	76 x 50mm		
	Specimen holder	Holds a single specimen		
6. Condenser	Type	Abbe condenser (daylight filter detachable)		
	N. A.	1.25		
	Aperture iris diaphragm	Built-in		
7. Dimensions	255.0mm (L) x 227.0mm (W) x 375.23mm (H)			
8. Electrical	Battery	7.4V, 1000mAH		
	Charging time	up to 5 hours (with totally consumed battery)		
	Back up time	up to 4 hours		
9. Operating environment	Indoor use Altitude: Max. 2000 meters Ambient temperature: 5° to 40°C (41° to 104° F) Maximum relative humidity: 80% for temperature up to 31°C (88°F), decreasing linearly through 70% at 34°C (93°F), to 50% relative humidity at 40°C (104°F) Supply voltage fluctuations: Not to exceed \pm 10% of the normal voltage. Pollution degree: 2 (in accordance with IEC60664) Installation/Overvoltage category: II (in accordance with IEC60664)			



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