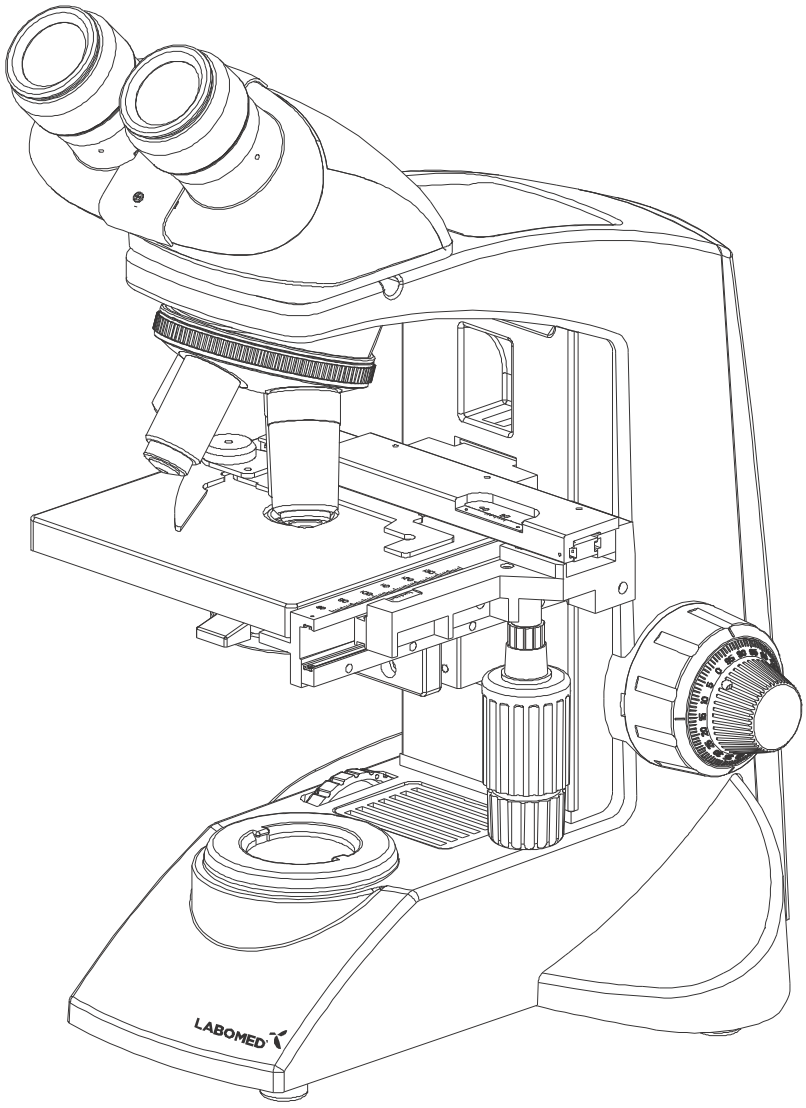
LABOMED
ideas for vision

C x L
Laboratory Microscopy

User Manual



To ensure correct use of this instrument and to avoid injury during operation, read this manual completely before use.

Part No.: 9135000-795
Issue 1.8

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1 INTRODUCTION

The CxL is a laboratory microscope that combines a modern design with current optical and mechanical engineering.

Designed for professionals and students alike, it offers many features and functions for a wide range of applications.

The 360° rotatable monocular, binocular or trinocular head is inclined at 45° and provides extra clarity and contrast.

The pressure die-cast stand has ball-bearing, “frictionless” side-mounted focusing that prevents any loss of motion.

The sturdy, modern design provides both comfort and stability.

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

The quadruple nosepiece has a comfortable ribbed grip for easy rotation that also protects the turret system against damage. All positions are parcentered and parfocal for the highest level of accuracy.

The ball-bearing mechanical stage provides smooth travel over a 76 x 50mm area, with spring-loaded stage clamps that hold the specimen exactly where you want it. A vernier scale with 0.1mm divisions allows accurate location of the specimen area.

The LED configuration operates from a built-in rechargeable battery and charging circuit. The battery is charged from a direct input power supply of 110V-240V AC 50Hz/60Hz. This ensures continuous operation even when the supply voltage fluctuates.

Our LED has an average life of up to 50,000 hours.

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

2 SAFETY INFORMATION

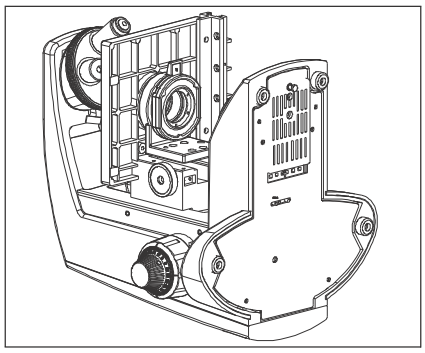


Fig. 1

1. After the microscope has been used to observe a specimen containing bacteria, clean all parts that came in contact with the specimen to prevent infection.
- Be sure to remove the specimen before moving this product.
- If the specimen is damaged by incorrect operation, clean all surfaces that may have come in contact with the specimen.

2. To avoid electrical hazards when replacing the LED, set the main switch of the microscope to OFF and disconnect the power cord from the wall outlet beforehand (Fig. 1).
3. Install the microscope on a sturdy, level table or bench and do not obstruct the air vents in the base of the unit. Do not place the microscope on a flexible surface, as this could block the air vents and cause overheating.
4. Always use the power cord provided by LABOMED. If the proper power cord is not used, the safety performance of the product cannot be warranted.
5. When installing the microscope, route the power cord away from the microscope frame. If the power cord comes in contact with the base of the microscope, it could melt from overexposure to heat.
6. Always make sure that the grounding terminal of the microscope and that of the wall outlet are properly connected. If the unit is not grounded, LABOMED cannot warrant electrical safety.
7. Never allow metal objects to enter the air vents of the microscope frame, as this could result in injury to the user and damage to the microscope.
8. After using the microscope, be sure to disconnect the power cord from the connector socket of the microscope or from the wall outlet.

SAFETY SYMBOLS

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

Symbol	Explanation
	This surface tends to heat up and must not be touched until the system has cooled down completely.
	Before use, read the instruction manual carefully. Improper use could result in injury to the user and/or damage to the equipment.
	Warning against risk of electric shock.
	Main switch is ON.
	Main switch is OFF.

WARNING LABEL

A warning label is attached to every part that requires special precaution during handling and use of the microscope. Always read the warnings.

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

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

1 GETTING STARTED

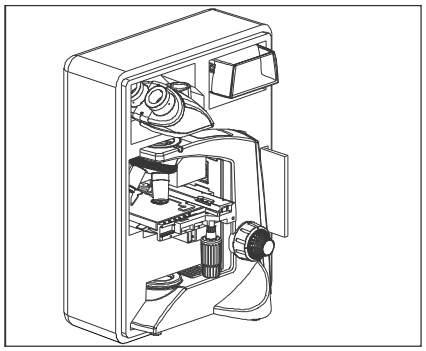


Fig. 2

1. A microscope is a precision instrument with delicate glass components. Handle it with care.
2. Do not use the microscope where it is exposed to direct sunlight, high temperature, humidity, dust or vibration. (For the operating conditions, see chapter 14, “SPECIFICATIONS”, on page 24.)
3. The microscope is cooled by natural convection. Leave enough space (10cm or more) around the unit when installing it.
4. Use the arm handle to carry the microscope.
   To prevent damage, do not hold the microscope by the stage or the observation tube.
   Remove the specimen from the stage clip before transporting the unit, to avoid damaging the specimen slide.

2 MAINTENANCE AND STORAGE

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

Solvents such as petroleum and isopropanol are highly flammable and must be handled carefully. Keep these chemicals away from open flames and potential sources of electrical sparks, for example electrical equipment that is being switched “ON” or “OFF”. Always use these chemicals only in a well-ventilated room.

2. Do not use organic solvents to clean 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.
3. Do not disassemble any part of the microscope, as this could result in malfunction or reduced performance.

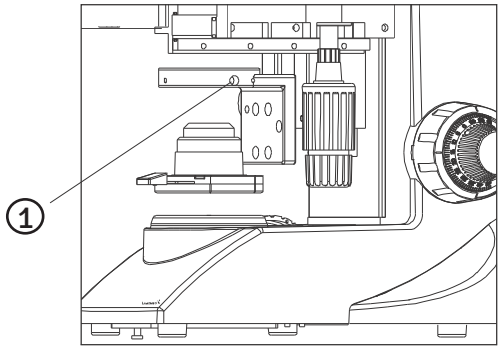


Fig. 3

4. When the microscope is not in use, make sure the frame has cooled down fully before storing the unit in a dry cabinet or covering it with the dust cover (provided).
5. To clean the condenser/phase turret, fully loosen the securing thumb screw (1) and remove the condenser, then wipe the front lens of the condenser with optical cleaning solution (the mixture suggested above) and lens tissue. To re-attach the condenser, place it in its seat, tighten the securing thumb screw and raise the condenser bracket to the desired position.
6. Observe your local rules and regulations for product disposal.

3 CAUTION

If the microscope is used in a manner not specified in this manual, the safety of the user may not be warranted, and the equipment may be damaged. Always use the equipment as described in this instruction manual.

4 CARE AND MAINTENANCE

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

1. Cleaning the lenses:
   To clean the lens surfaces, remove dust with a soft brush or gauze (compressed-air dust cans are ideal). To remove fingerprints or grease, use a soft cotton cloth or lens tissue lightly moistened with cleaning solution (85% petroleum ether and 15% isopropanol). For cleaning the optics, use xylene. Handle xylene with sufficient caution.
   Cleaning procedure:
   Place the objectives and/or eyepieces on a dust-free surface (e.g. 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 with a solution of diluted liquid hand soap. Remove any remaining residue with a dry cotton swab.
c. To remove oil, first use a solution of diluted liquid hand soap. If this does not give a satisfactory result, repeat the cleaning with a solvent (optical cleaning solution: 85% petroleum ether and 15% isopropanol).
d. Always remove grease with a solvent.
e. Clean with a spiral motion from the center to the rim. Never wipe with zig-zag movements, as this only spreads the dirt. On larger optical surfaces (e.g. tube lenses), start the spiral motion at the rim, work toward the middle, and only then follow with a center-to-rim cleaning motion. Several spiral wipes are normally recommended.

We recommend pure, volatile petroleum ether or optical cleaning solution, as described above.



Zig-zag motion (X)



Spiral motion (ᔓ)

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

2. Cleaning painted surfaces:
   Do not use any organic solvent (e.g. thinner, xylene, ether, alcohol) to clean the painted surfaces of the instrument. Painted surfaces can be cleaned with a very lightly moistened microfiber cloth. Loose dust and dirt can be removed with a soft-hair brush used only for this purpose.

Caution:
Do not use aggressive organic solvents such as acetone to clean painted surfaces and plastic parts of the microscope.

3. Never attempt to dismantle the instrument:
Never attempt to dismantle the instrument, as this could impair its operating efficiency and accuracy.

4. Periodic checks:
To maintain the performance of the instrument, we recommend having your microscope serviced periodically by a factory-authorized dealer or representative. For details, contact your nearest dealer or Labo America's main office in California.

5 CLEANING AND DISINFECTION

The following disinfectants are recommended for cleaning and disinfection.

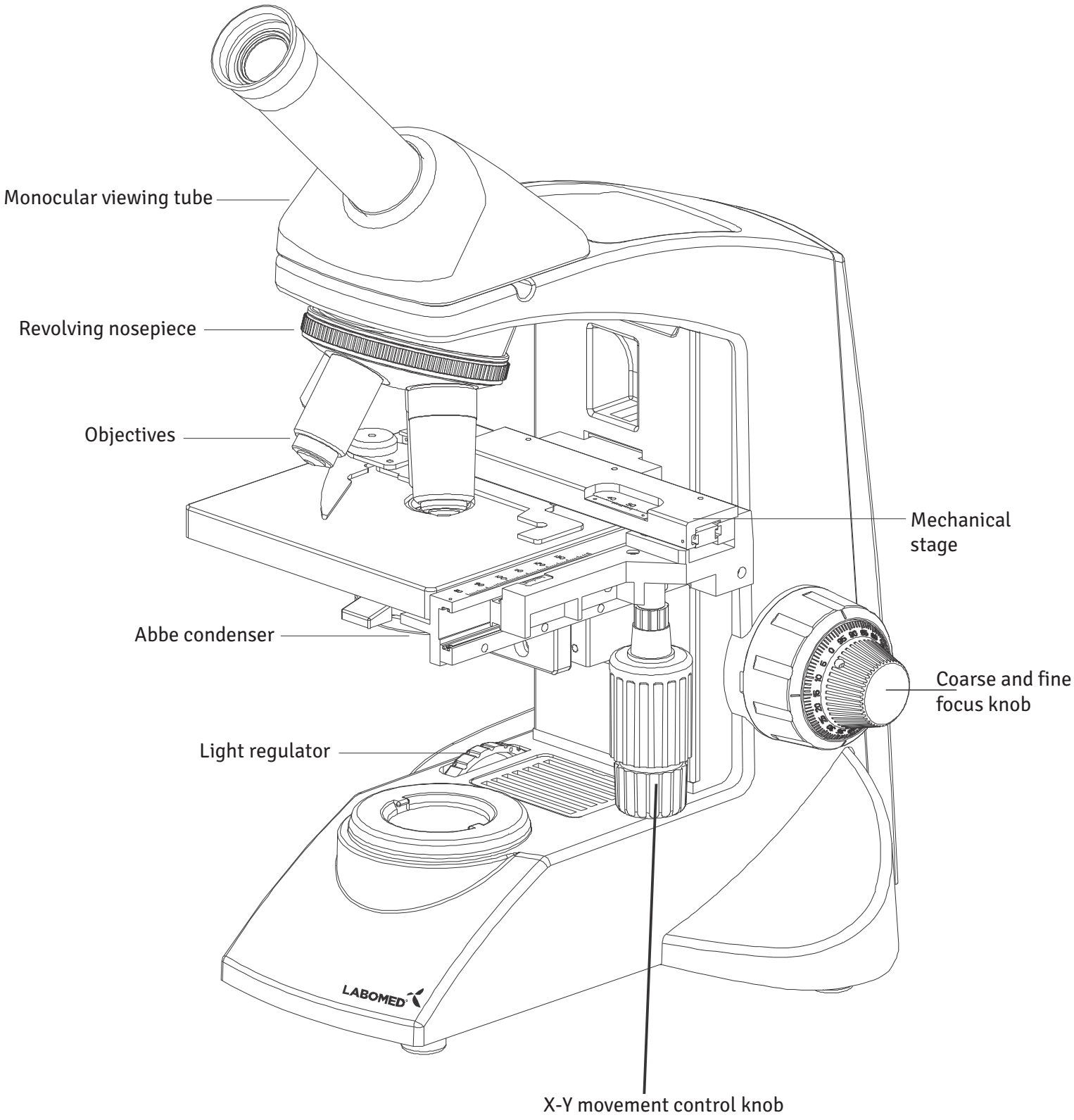
1. Normal household bleach (sodium hypochlorite 5%), at a strength of 5000 ppm (10 parts water to 1 part bleach).
2. 70% isopropyl alcohol.

Procedure:

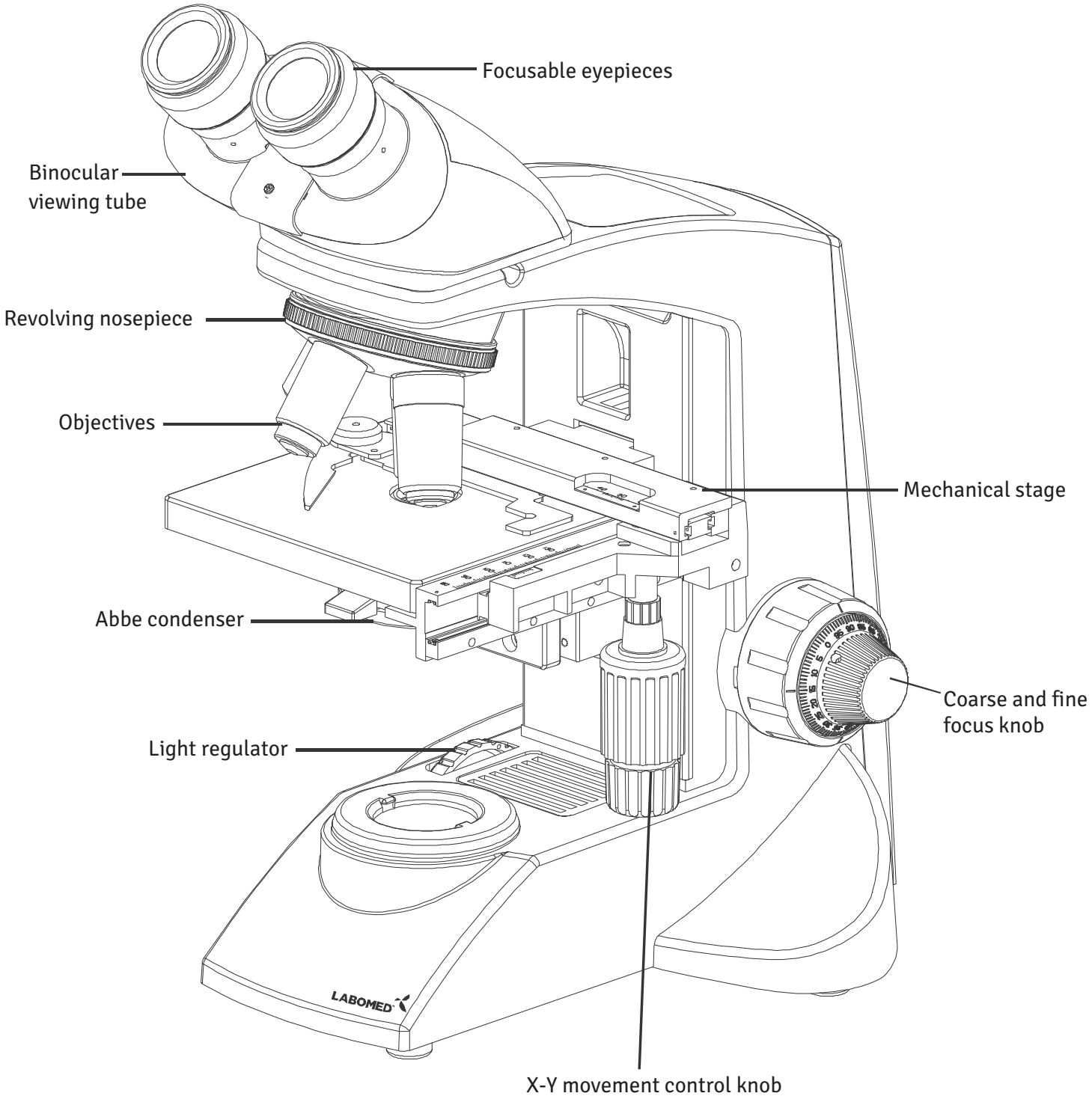
- Take a muslin cloth.
- Moisten it until it feels wet.
- Disinfect/clean the surface gently.

Note: 1. Wear a mask and gloves while cleaning and disinfecting.
2. When cleaning, the muslin cloth must not be dripping wet, to prevent seepage into and rusting of moving or bare parts.
3. Alcohol is flammable. Use it as a surface disinfectant in well-ventilated spaces only.

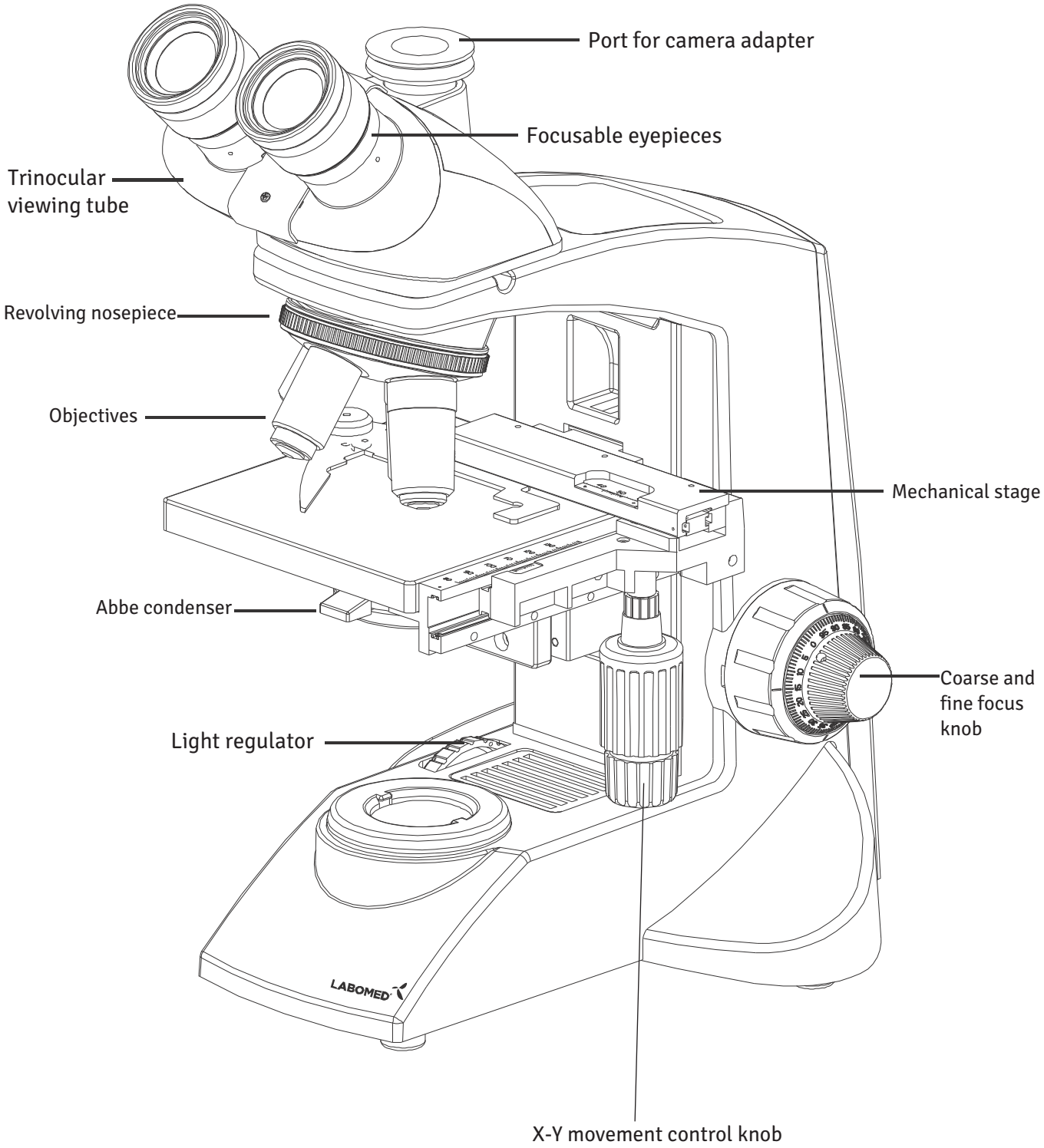
3 CxL MONOCULAR



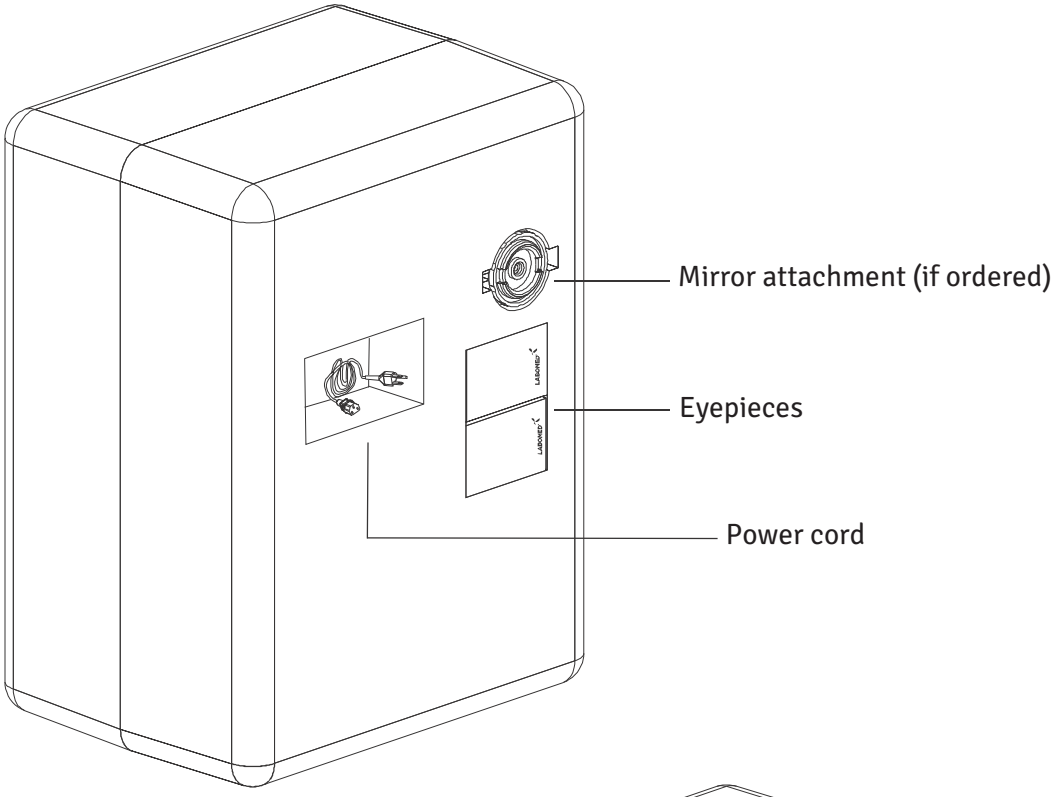
4 CxL BINOCULAR

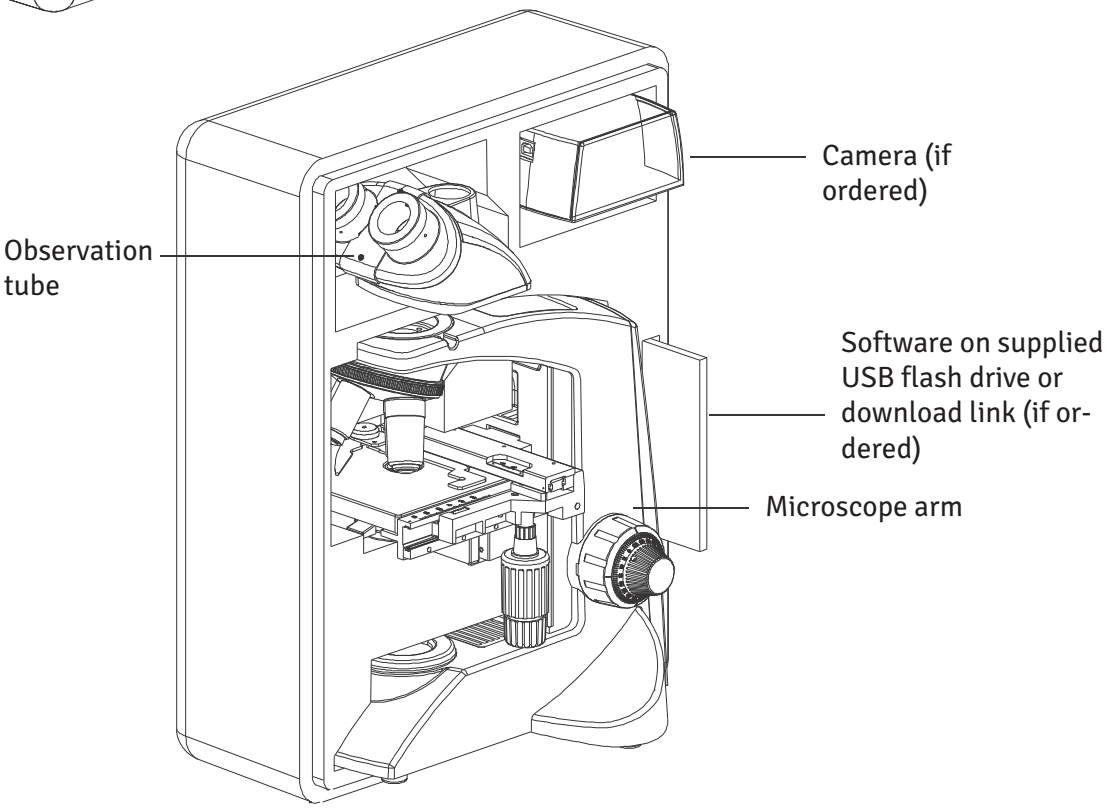


5 CxL TRINOCULAR



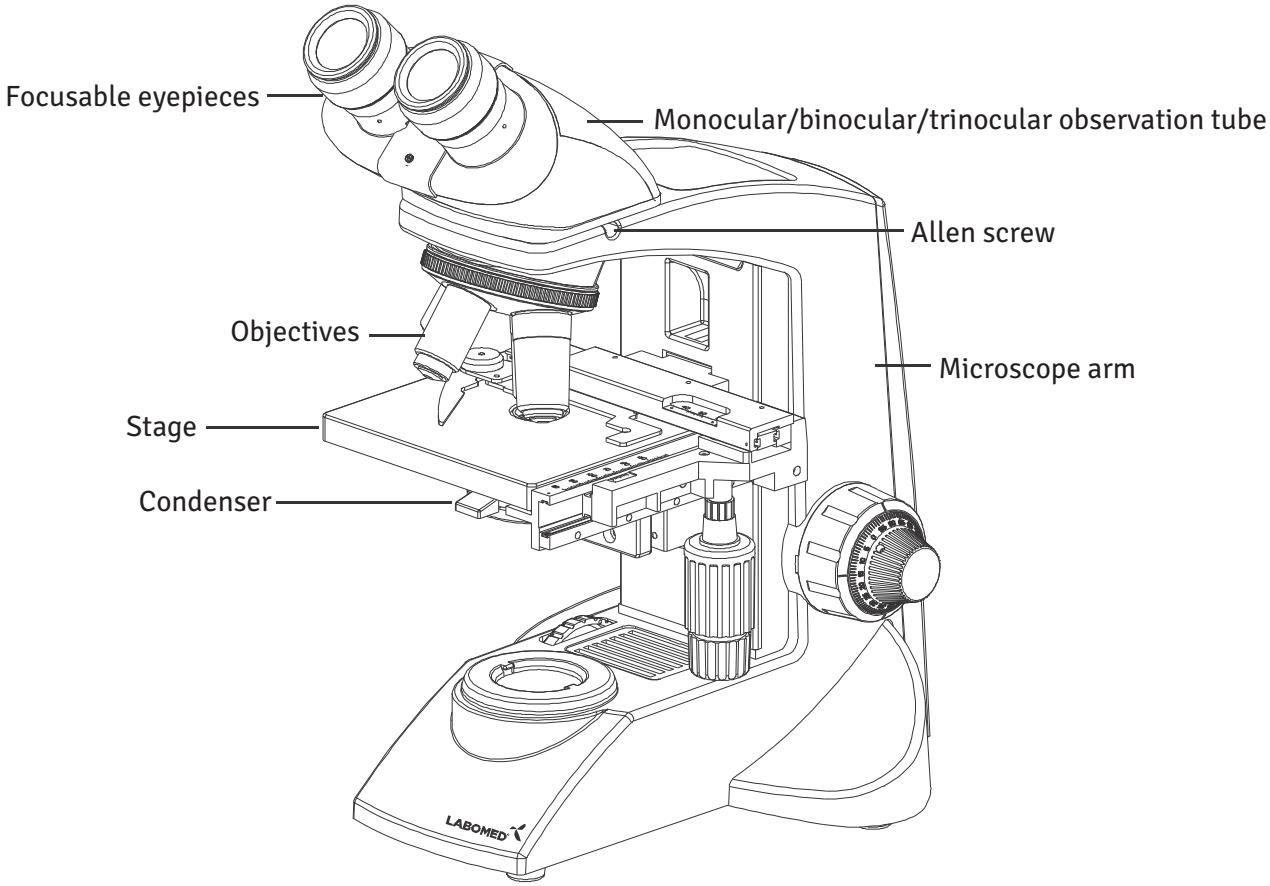
6 UNPACKING YOUR MICROSCOPE

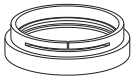




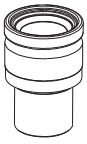
7 STANDARD COMPONENTS

- After removing your microscope from its packaging, make sure that all of the following contents are present.
- Configurations differ in the number of objectives, the type of observation head, the type of illumination and the optional accessories purchased.
- The objectives have been tightened firmly to prevent damage during transportation. To remove an objective, rotate it counterclockwise while gripping it with a rubber sheet or similar to avoid slipping.





Daylight (blue) filter



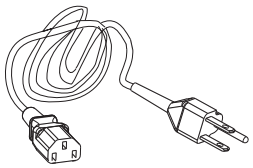
Eyepieces



Allen wrench 3mm



Allen wrench 1.5mm



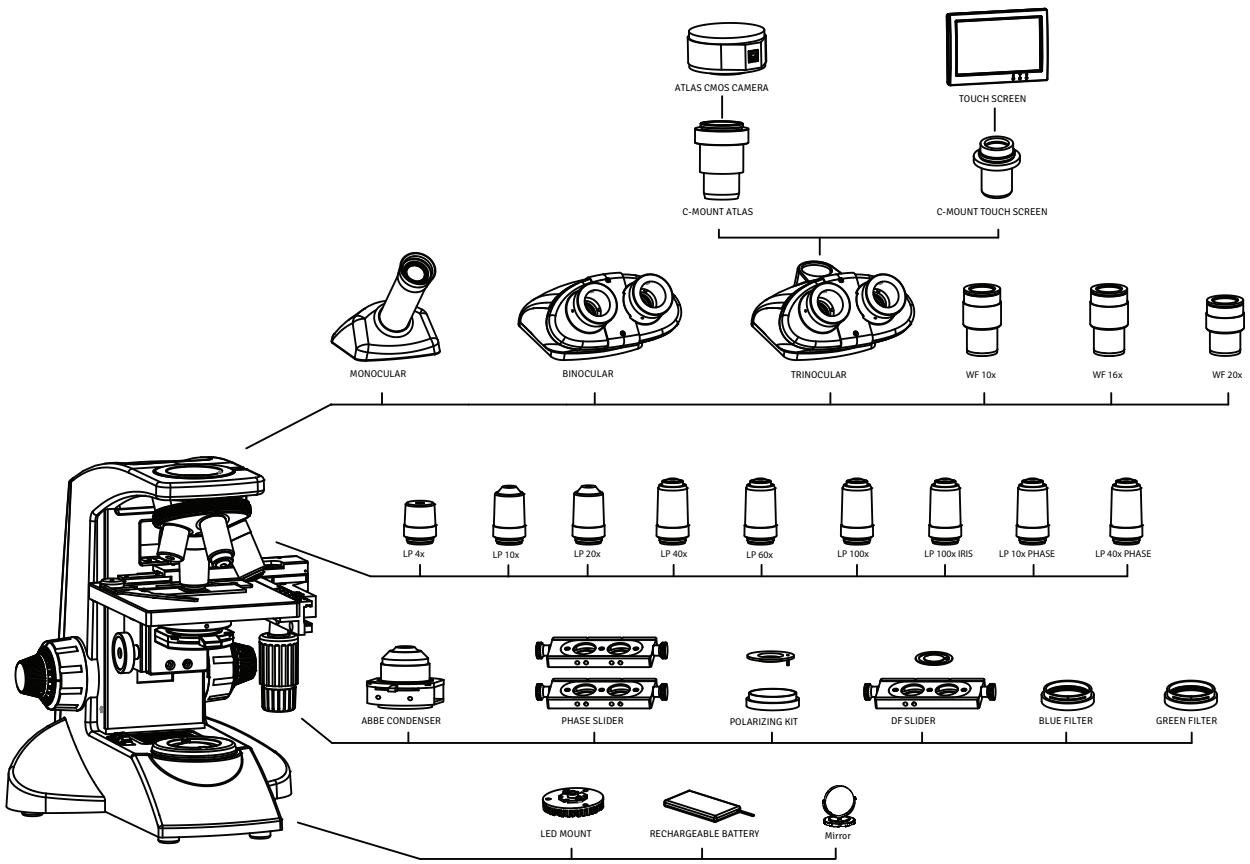
Power cord



Spare fuses

8 OPTIONAL ACCESSORIES

SYSTEM DIAGRAM OF OPTIONAL ACCESSORIES



INSTALLATION AND OPERATION OF OPTIONAL ACCESSORIES

1 DARKFIELD SLIDER

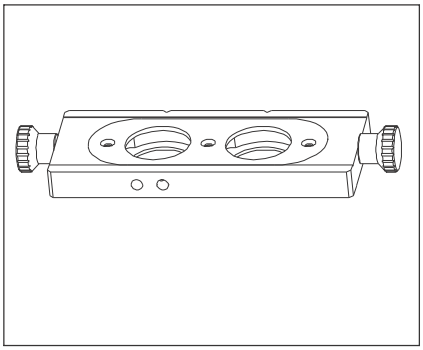


Fig. 4

The darkfield slider enables darkfield observation with objectives from 4X to 40X.

2 REFLECTION MIRROR

The reflection mirror is designed for outdoor observation where a power source is not readily available. The mirror attachment makes it possible to illuminate your specimen with natural light.

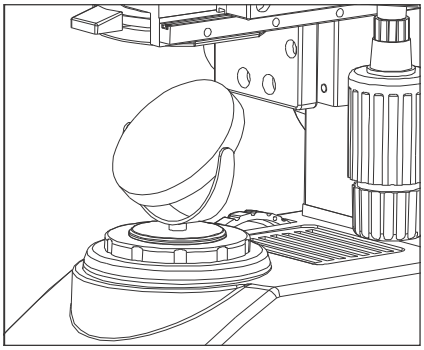


Fig. 5

Install the microscope in a place that is not exposed to direct sunlight. Reflected direct sunlight can cause eye injury or, in some cases, blindness.

Turn the eyepieces 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 into the window lens of the microscope frame by aligning the mounting tab.
2. Remove the daylight filter, because it makes the image blue under natural light.
3. Point the reflection mirror (Fig. 5) toward a source of stray light. While observing the image through the eyepieces, adjust the orientation of the reflection mirror to capture the stray light.

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

3 OPTIONAL EYEPIECES

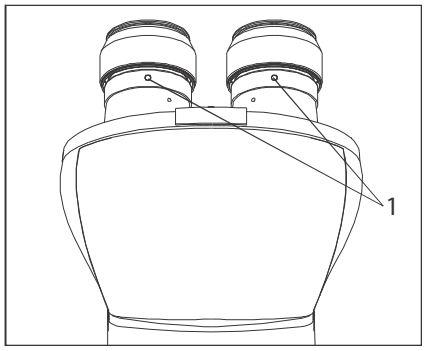


Fig. 6

The standard 10X eyepieces are clamped with screws.

1. Using the 1.5mm Allen wrench, loosen the clamping screw (1) on the ocular tube and remove the eyepiece.
2. Insert the optional eyepieces into the ocular sleeve and tighten the clamping screw (1).

9 INITIAL SETUP

1 OBJECTIVES

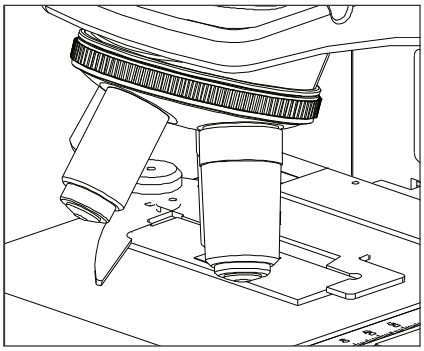


Fig. 7

The objectives are factory set. They are parcentered and parfocalized during assembly.
All objectives have been tightened firmly to prevent them from coming loose in transit. To remove an objective, rotate it counterclockwise while holding it with a rubber grip to avoid slipping.

2 OBSERVATION HEAD

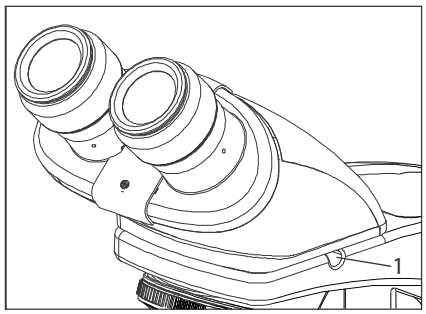


Fig. 8

Install the observation head as follows:
1. Using the 3mm Allen wrench (provided), loosen the head locking screw (1) and remove the dust cover caps from the dovetail cavity and from the dovetail of the observation head.
2. Mount the observation head by engaging the dovetail at the bottom of the head in the dovetail cavity of the microscope arm.
3. Position the observation head as desired, then tighten the head locking screw (1). See Fig. 8.

3 EYEPIECES

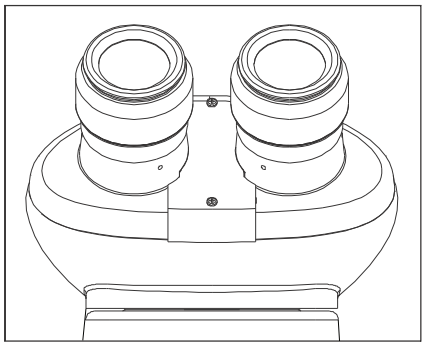


Fig. 9

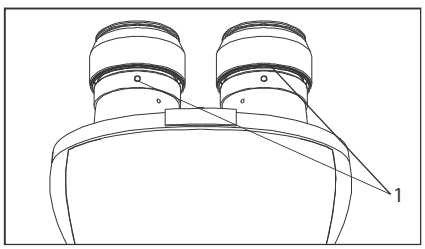


Fig. 10

Insert the eyepieces into the ocular tubes of the observation head as follows:
1. Remove the protective caps from the observation tube.
2. Insert the 10x eyepieces into the ocular sleeves and tighten the clamping screw (1) with the 1.5mm Allen wrench. See Fig. 10.

10 REPLACEMENT OF CRITICAL COMPONENTS

Each standard set is assembled simply by attaching the filter and the power cord.

1 PROCEDURE FOR LED REPLACEMENT

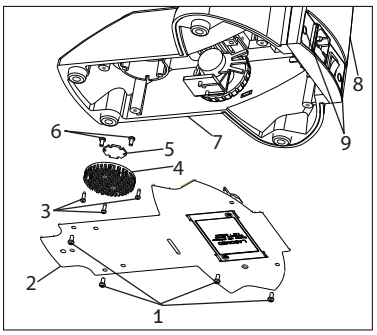


Fig. 12

1. Screws SS 658
2. Base plate 9135100-301
3. Heat shield screws SS 714
4. Heat shield 9135000-524
5. Star LED 9135000-901
6. LED screws SS 658
7. Stand
8. Back cover plate 9135000-102
9. Decorative cap 8123000-202

Figure 12

1. Pull out the two decorative caps (shown as 9) from the back cover plate.
2. Using a Phillips screwdriver, remove the two screws (shown as 9) to detach the back cover plate from the stand.
3. Lay the microscope on its back cover on a clean surface to expose the base plate.
4. Using a Phillips screwdriver, remove the four screws (shown as 1) to open the bottom plate of the microscope.
5. Cut the cable tie holding the LED wire and detach the LED wire connector from the PCB mounted on the back cover plate.
6. Detach the heat shield from the critical mount by removing the 3 screws (shown as 3) with a Phillips screwdriver.
7. Detach the LED from the heat shield by loosening the 3 screws (shown as 6).
8. Fit the new LED on the heat shield and connect the wires to the PCB.
9. Reverse steps 6 to 1 to complete the process.

Applicable LED replacement: LED P/N 9135000-901

2 PROCEDURE FOR LED BATTERY REPLACEMENT

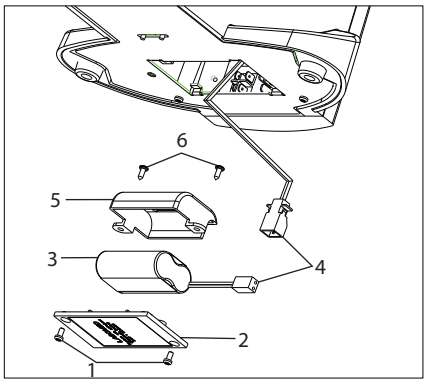


Fig. 13

1. Battery cover screws (bottom) SS 658
2. Battery cover 9135100-204
3. Battery 9135000-903
4. Cable clamp EL-488
5. Battery cover LED 9135100-201
6. Battery clamp screws SS 658

Figure 13

1. Lay the microscope on its back cover on a clean surface to expose the base plate.
2. Using a Phillips screwdriver, remove the four screws (shown as 1) to open the battery cover on the bottom plate.
3. Detach the connector of the connecting wires (shown as 4).
4. Remove the two screws (shown as 6) on the battery clamp with a Phillips screwdriver.
5. Replace the existing battery with a new battery from LABOMED (see the part number below).
6. Reverse steps 5 to 1 to complete the process.

Applicable LED battery replacement: P/N 9135000-903

3 INSTALLING OR REPLACING THE FUSE

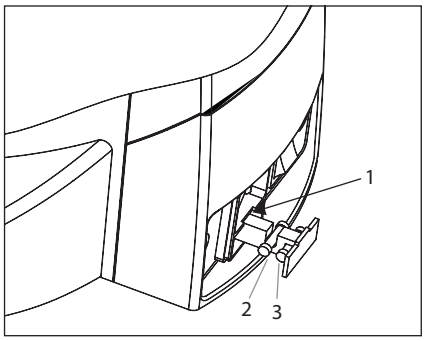


Fig. 14

Before replacing the fuse, remove any parts that may fall, such as the filter and the specimen, from the microscope frame. Turn the microscope around so that the AC inlet on its back is visible (Fig. 14).

1. Use a flat-head screwdriver to open the fuse holder (shown as 1).
2. The fuse tray comes out with the live fuse (shown as 2) and the spare fuse (shown as 3). Do not pull the fuse tray out with force; it is locked and does not come out completely.
3. Replace the primary fuse (shown as 2) with the spare fuse.
4. Push the fuse tray back in.

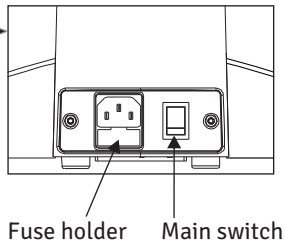
Always use the designated fuse. Using a fuse other than one specified by LABOMED may cause a fire hazard.

CAUTION: Fuse replacement

Set the main switch to “O” (OFF) and disconnect the power cord from the wall outlet.

SUMMARY OF THE BRIGHTFIELD OBSERVATION PROCEDURE

Set the main switch to “ON”.



Place the specimen on the stage.

Engage the 10X objective in the light path.

Bring the specimen into focus.

Adjust the observation tube and eyepieces:
Adjust the interpupillary distance.
Adjust the diopter setting.

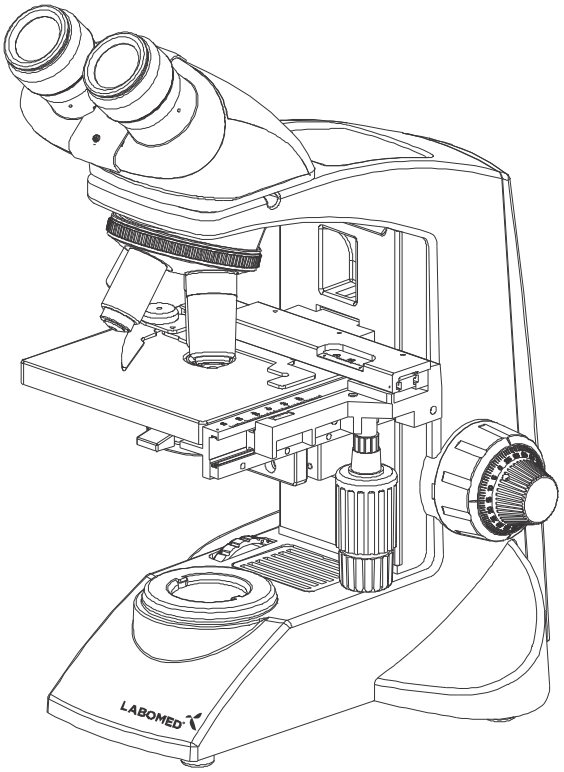
Adjust the aperture iris diaphragm.

Engage the objective to be used in the light path and bring the specimen into focus.

Engage the required filters.

Adjust the brightness.

Observe specimen.



12 DETAILED OBSERVATION PROCEDURE

1 TURNING THE LAMP ON

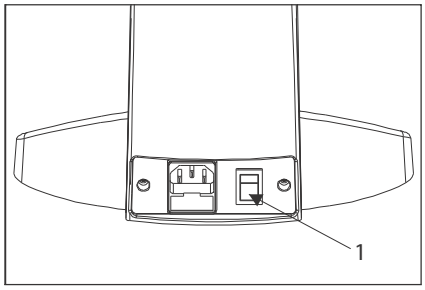


Fig. 15

1. Set the main switch to “I” (ON) as shown in Fig. 15.

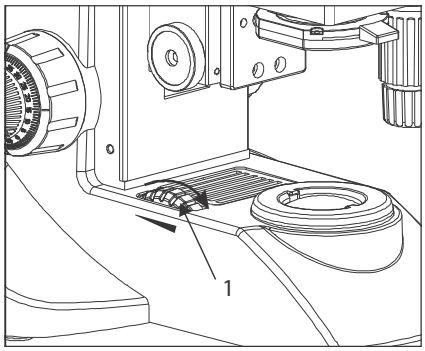


Fig. 16

2. Turning the light intensity knob (Fig. 16) in the direction of the arrow increases the brightness; turning it in the opposite direction decreases the brightness. The intensity bar next to the knob shows the direction of increasing intensity.

2 PLACING THE SPECIMEN ON THE STAGE

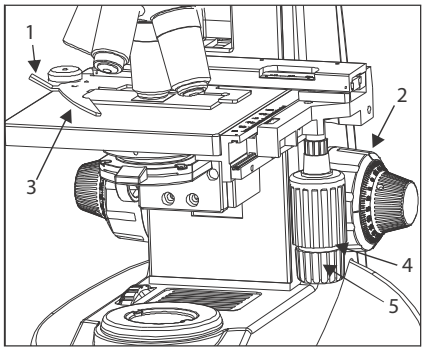


Fig. 17

Place the specimen gently on the stage. If the bow-shaped lever (3) snaps back with strong force, or if the control knob (1) or the bow-shaped lever is released halfway, the slide glass may break. See Fig. 17.

1. Rotate the coarse adjustment knob (2) counterclockwise to lower the stage fully.
2. Open the bow-shaped lever (3) outward by pulling the lever handle (1), and place the specimen by sliding the slide glass onto the stage from the front toward the slide seat at the rear.
3. After positioning your specimen slides (2 max.), return the bow-shaped lever (3) gently by slowly releasing the control knob (1).
4. Rotating the upper coaxial knob (4) moves the specimen along the Y axis (vertical direction). Rotating the lower knob (5) moves the specimen along the X axis (horizontal direction).

Do not move the specimen holder directly by hand, as this will damage the rotary mechanisms.

When the specimen holder reaches its stop position, the X/Y knobs become stiff. Stop rotating them at this point.

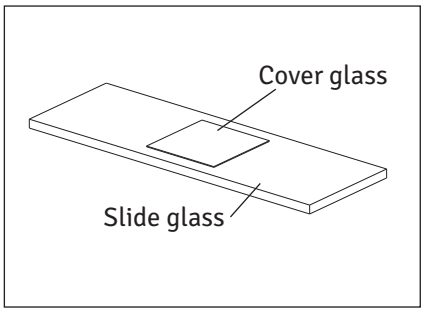


Fig. 18

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 0.17mm.

Slide glass

This glass plate should ideally be 76mm long, 26mm ± 1mm wide and between 0.9 and 1.4mm thick.

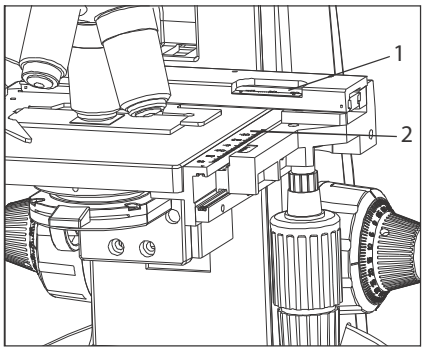


Fig. 19

Specimen holder scales

These scales identify the position (coordinates) of the specimen, so you can easily return to a particular region of interest after scanning the slide.

1. The horizontal coordinate is read at position (1) on the specimen holder (Fig. 19).
2. The vertical coordinate is read at the index line (2).

3 ADJUSTING THE FOCUS

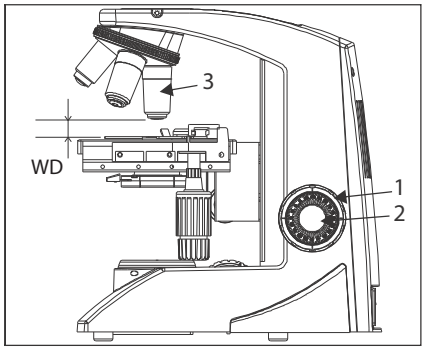


Fig. 20

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 the 10X). See Fig. 20.
2. While observing the specimen through the eyepieces, slowly rotate the coarse adjustment knob (1) counterclockwise to lower the stage.
3. When the specimen is in coarse focus (an image is visible), rotate the fine adjustment knob (2) to focus the fine detail.

Working distance (WD)

The WD is the distance between each objective and the specimen when the specimen is in sharp focus.

Objective magnification	4X	10X	40X	100X
WD (mm)	17	6.44	0.5	0.1

4 ADJUSTING THE INTERPUPILLARY DISTANCE (IPD)

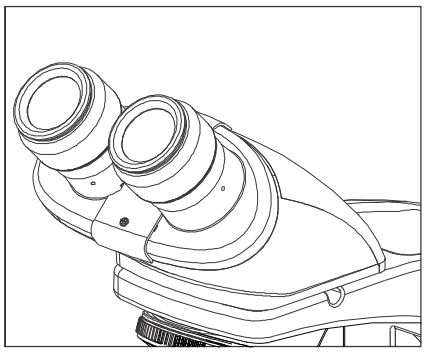


Fig. 21

Interpupillary distance adjustment aligns the two eyepieces with the pupils of both eyes, so that you see a single microscope image through the two eyepieces in stereo vision. This greatly reduces fatigue and discomfort during observation.
While looking through the eyepieces, move both eye tubes sideways until the left and right fields of view coincide completely. The position of the index dot (•) indicates the interpupillary distance value.
Note your interpupillary distance so that you can set it again quickly.

5 ADJUSTING THE DIOPTER

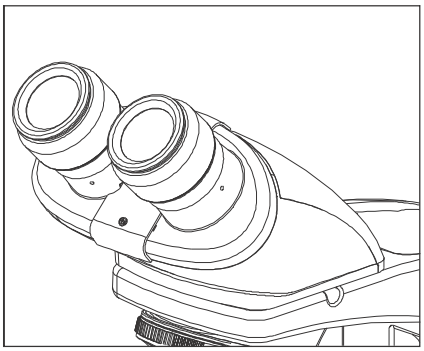


Fig. 22

Procedure for adjusting the diopter:
1. Rotate the right eyepiece to the center of the diopter scale markings.
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 the specimen is in the best possible focus.

This feature compensates for the change in tube length when the IPD setting is changed. Follow this procedure to obtain optimum parfocality of the system at your IPD setting.

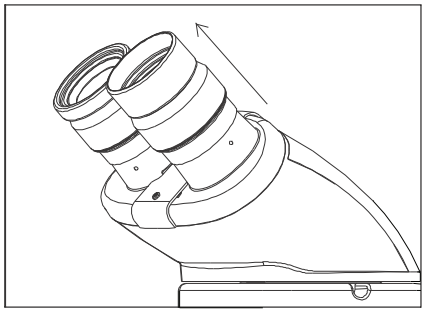


Fig. 23

Using the Eye Guards

When wearing eyeglasses
Use the eye guards in the normal, folded-down position. This prevents the eyeglasses from being scratched.

When not wearing eyeglasses
Extend the folded eye guards outward (direction of the arrow) to keep ambient light out of your line of vision.

6 ADJUSTING THE CONDENSER POSITION AND APERTURE IRIS DIAPHRAGM

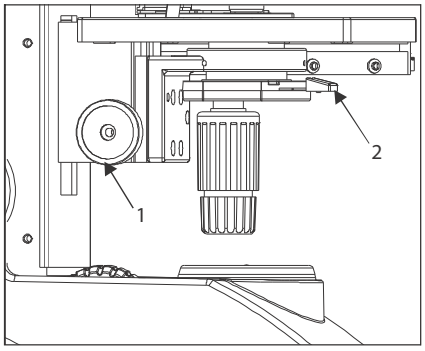


Fig. 24

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

Rotate the condenser height adjustment knob (1) clockwise to move the condenser to its highest or the desired position.
Slide the aperture iris diaphragm lever (2) so that the aperture of the objective in use is fully illuminated.

7 SWITCHING THE OBJECTIVES

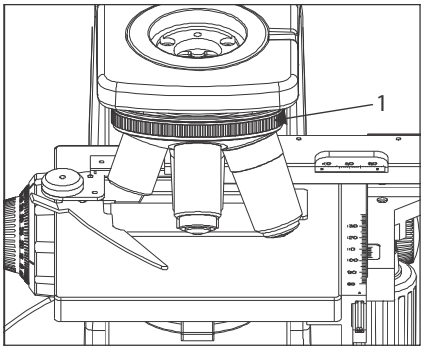


Fig. 25

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 nosepiece.

8 MOUNTING THE DAYLIGHT (BLUE) FILTER

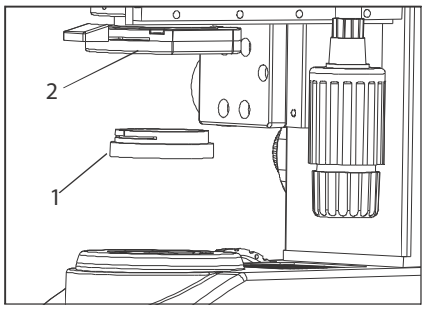


Fig. 26

This filter changes the color of the observation light to a natural color (daylight color).

- Fit the daylight filter (1) into the bottom of the condenser (2) until it clicks into place. See Fig. 26.

9 USING THE 100X IMMERSION OBJECTIVE

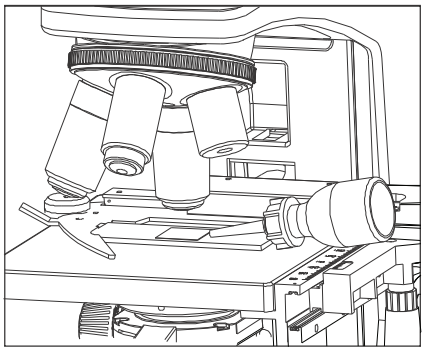


Fig. 27

The designated immersion oil must be in contact with the front lens of the 100X immersion objective. Otherwise the specimen will appear distorted and dull. We recommend always using LABOMED immersion oil.

Immersion process:

1. Bring the specimen into focus first with the 10x objective, then with the 40x objective.
2. Swing the 40x objective out of the light path toward the 100x position, and place a drop of immersion oil on the center 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.

(Air bubbles in the oil affect the image quality, so make sure the oil is free of bubbles. To remove bubbles, rotate the revolving nosepiece slightly to agitate the oil.)

4. The condenser of this microscope delivers its full performance when oil is placed between the slide glass and the front lens of the condenser. Without oil there, the image may appear dark.
5. After use, remove the oil from the front lens of the objective by wiping it with lens tissue slightly moistened with a mixture of petroleum (85%) and isopropanol (15%).

Caution:

If immersion oil comes into contact with your eyes, rinse them thoroughly with fresh water. If immersion oil comes into contact with your skin, wash the affected area with soap and water.
If discomfort persists, consult a physician immediately.

13 TROUBLESHOOTING GUIDE

Under certain conditions, the performance of the unit may be adversely affected by factors other than defects. If problems occur, review the following list and take corrective action as needed. If the problem persists, contact LABOMED or your local LABOMED dealer.

OBSERVATION	CAUSE	REMEDY
1. Uneven brightness in the field of view	The objective is not engaged in the light path	Engage the objective until the nosepiece clicks into position
	The condenser is too low	Raise it to get more light
	The objective, eyepieces, condenser and/or window lens are dirty	Clean them thoroughly
2. Dust or stains are visible in the field of view	The eyepieces, condenser, window lens and/or specimen glass are dirty	Clean the glass parts thoroughly with lens tissue and cleaning solution
3. Glare visible in the field of view	The condenser is too low The condenser iris diaphragm ring is closed	Raise it Adjust the aperture to suit the objective magnification
4. Image is hazy or unclear	The objective is not engaged in the light path	Engage the objective until it clicks into position
	The objective, eyepieces, condenser and/or specimen glass are dirty	Clean the glass parts thoroughly
	Immersion oil is not used with an immersion objective	Use immersion oil as recommended
	Bubbles in the immersion oil	Remove the bubbles by agitating the oil
	The specified immersion oil is not used	Use the immersion oil supplied by LABOMED
5. Part of the image is out of focus	The objective is not engaged in the light path	Engage the objective until the nosepiece clicks into position
	The specimen is not placed correctly on the stage	Place the specimen correctly on the stage and secure it with the specimen holder
6. Coarse focusing cannot lower the stage far enough	The condenser is too low	Raise the condenser
7. The fields of view of the two eyepieces do not match	The interpupillary distance is not adjusted correctly	Adjust the IPD
	Diopter compensation for the two eyes is not set	Set it correctly
	The left and right eyepieces have different magnifications	Replace one of them so that the left and right eyepieces are identical

OBSERVATION	CAUSE	REMEDY
8. The objective hits the specimen when you switch to a higher-magnification objective	The specimen slide is upside down	Place the specimen correctly, with the cover glass facing up
	The cover glass is too thick	Use a cover glass 0.17mm thick
	The stage is raised too high	Lower the stage
	The slide has slipped from the slide holder	Reposition the slide in the slide holder
	The slide is too thick	Use slides between 0.9 and 1.4mm thick
9. LED does not turn on	LED is not installed	Install an LED
	LED has burned out	Replace the LED
	The power cord is unplugged or not firmly connected	Plug it in securely
	Fuse has blown	Replace it with a working fuse
	Battery is low	Charge the battery
10. LED burns out quickly	The specified LED is not used	Replace it with the specified LED
11. High-magnification objective touches the specimen just before it comes into focus	The specimen is upside down	Place the specimen correctly, with the cover glass on top

14 SPECIFICATIONS

1. Illumination	Built-in illumination system, LED			
2. Focusing mechanism	Stage height adjustment mechanism Fine adjustment scale: 3.0µm per graduation Fine adjustment stroke: 0.3mm per turn Total stroke: 12.7mm Coaxial coarse and fine focusing on ball drive			
3. Revolving nosepiece	Quadruple, fixed positions (reverse angle)			
4. Observation tube		Monocular	Binocular	Trinocular
	Field number	18	18	18
	Tube tilt angle	45°	45°	45°
	Interpupillary distance adjustment range	NA	54-74	54-74
5. Stage	Size	167 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	LED battery	7.4V, 1500mAh		
	Charging time	Up to 5 hours (from a fully discharged battery)		
	Total battery time	8-12 hours, depending on the light intensity setting		
9. Operating environment	Indoor use Altitude: max. 2000 meters Ambient temperature: 5° to 40°C (41° to 104°F) Maximum relative humidity: 80% for temperatures 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 ±10% of the nominal voltage Pollution degree: 2 (in accordance with IEC 60664) Installation/overvoltage category: II (in accordance with IEC 60664)			

Revision History

Rev. No.	Date of Release	DCR #	Change	App. By
1.4	March 27, 2019	DCR/08/19	System diagram	S. Bal
1.5	June 1, 2020		Disinfection	S. Bal
1.6	April 26, 2021	DCR/13/21	Eyepiece locking screw changed from 2.5 to 3.0mm	S. Bal
1.7	April 14, 2022	DCR/06/22	Reviewed and up-dated for typo-graphical errors	S. Bal
1.8	October 10, 2023	DCR/17/23	Battery life updated	S. Bal

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