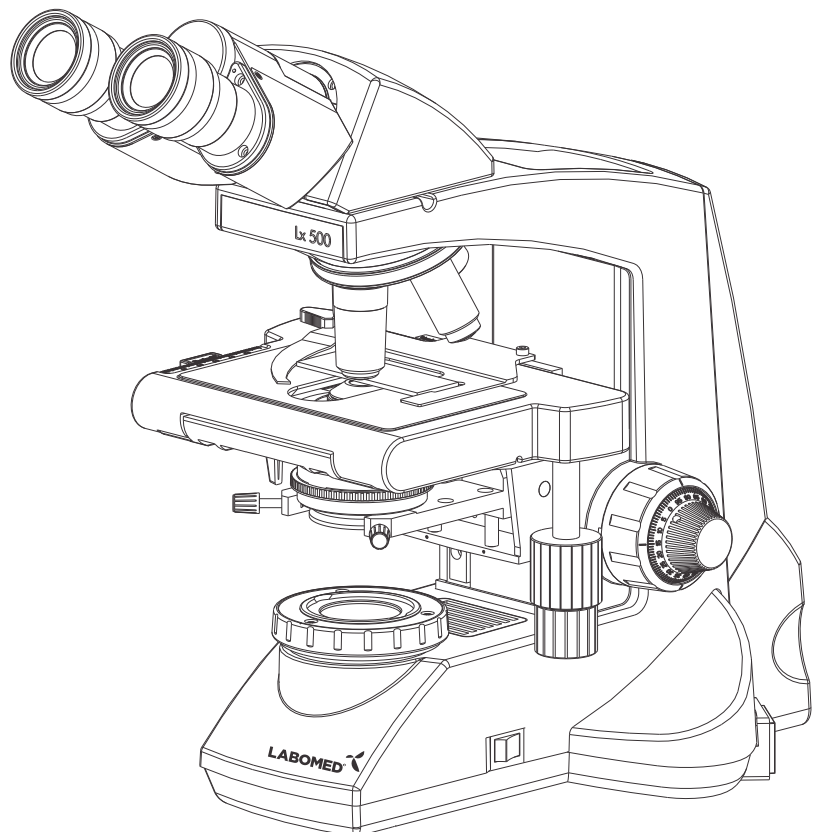


# Lx 500 User Manual

Research 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 Lx 500 is a research microscope reflecting a modern design as well as the latest in optical and mechanical advancements. Designed for professionals as well as clinicians, this microscope offers many features and functions for a diverse set of applications. Here are a few points highlighting the benefits of the Lx500:

- Extra clarity and contrast is provided through a 360° rotatable Binocular body inclined at 30° with IPD adjustments.
- The pressure die cast stand consists of ball bearing, friction based focusing mechanism to avoid any loss in motion.
- The sturdy new stylish design provides a high degree of comfort as well as stability.
- The high powered objectives are spring loaded to prevent accidental damage to specimen slides.
- The reverse angle 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.
- High power illumination is delivered through our well crafted Universal Power Supply operatable within a range of 100V-240V AC input. This ensures continuous operation even under fluctuating voltages.
- Our Halogen bulb (6V-30W) has an average life span of up to 500 hours.
- The Lx 500 comes equipped with a removable flip top N.A. 1.25 Abbe condenser with aspheric lens for brighter illumination levels, and an iris diaphragm for better resolution and contrast control.

## 2 SAFETY INFORMATION

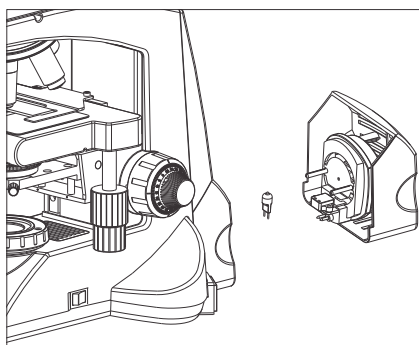


Fig. 1

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.


### Applicable bulb 6V30W Halogen bulb P/N EL-455

2. Install microscope on a sturdy, level table or bench and avoid any restriction of air vents in the base of the unit. Do not place microscope on a flexible surface, as this could result in blocking the air vents and cause overheating.
3. Always use the power cord provided by LABOMED. If the proper power cord is not used, product safety performance cannot be warranted.
4. 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 melt due to overexposure to heat.
5. Always ensure that the grounding terminal of the microscope and that of the wall outlet are properly connected. If the unit is not grounded, LABOMED can not warrant electrical safety.
6. Never allow metallic objects to penetrate the air vents of the microscope frame as this could result in user injury and damage to the microscope.
7. After operation of microscope, be sure to disconnect power cord from connector socket of 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
	This 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.
	Main switch is ON.
	Main switch is OFF.

 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 equipments as outlined in this instruction manual.

**1** Getting Started

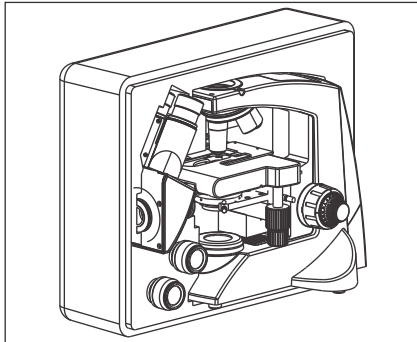


Fig. 2

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 14, "SPECIFICATIONS")
3. The microscope is ventilated by natural convection. Be sure to leave enough space (10 cm or more) around body when installing the unit.
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 and 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.

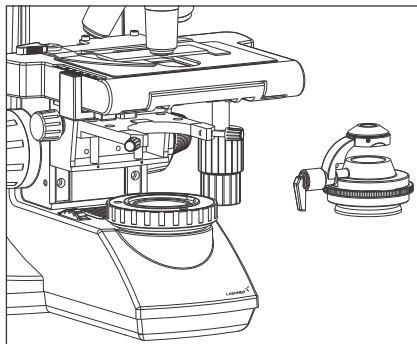


Fig. 3

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 before storing the unit in a dry locker or covering with a dust cover (provided).

5. To clean the condenser, fully loosen the securing knobs and remove the condenser by lowering condenser bracket then, wipe the front lens of the condenser with optical cleaning solution (mixture suggested above) and lens tissue.

The condenser can be re-attached by replacing the condenser in its seat, tightening securing screws, and raising condenser bracket to desired position.

6. Be sure to observe your local rules/regulation for product disposal.

### 3 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.

#### Optical Cleaning:

1. 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.
2. To clean the lens surfaces, remove dust using a soft brush or compressed air (cans available at your local electronics store). For removing finger marks or grease, soft cleaning cloth or lens tissue lightly moistened with cleaning solution (85% petroleum ether and 15% isopropanol) should be used. For cleaning the objective optics, use Methanol. Observe sufficient caution in handling Methanol. 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.
3. Blow all loose dust particles away with compressed air or mini dust blower.
4. 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.
5. 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).
6. Grease must always be removed using a solvent.
7. 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 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)



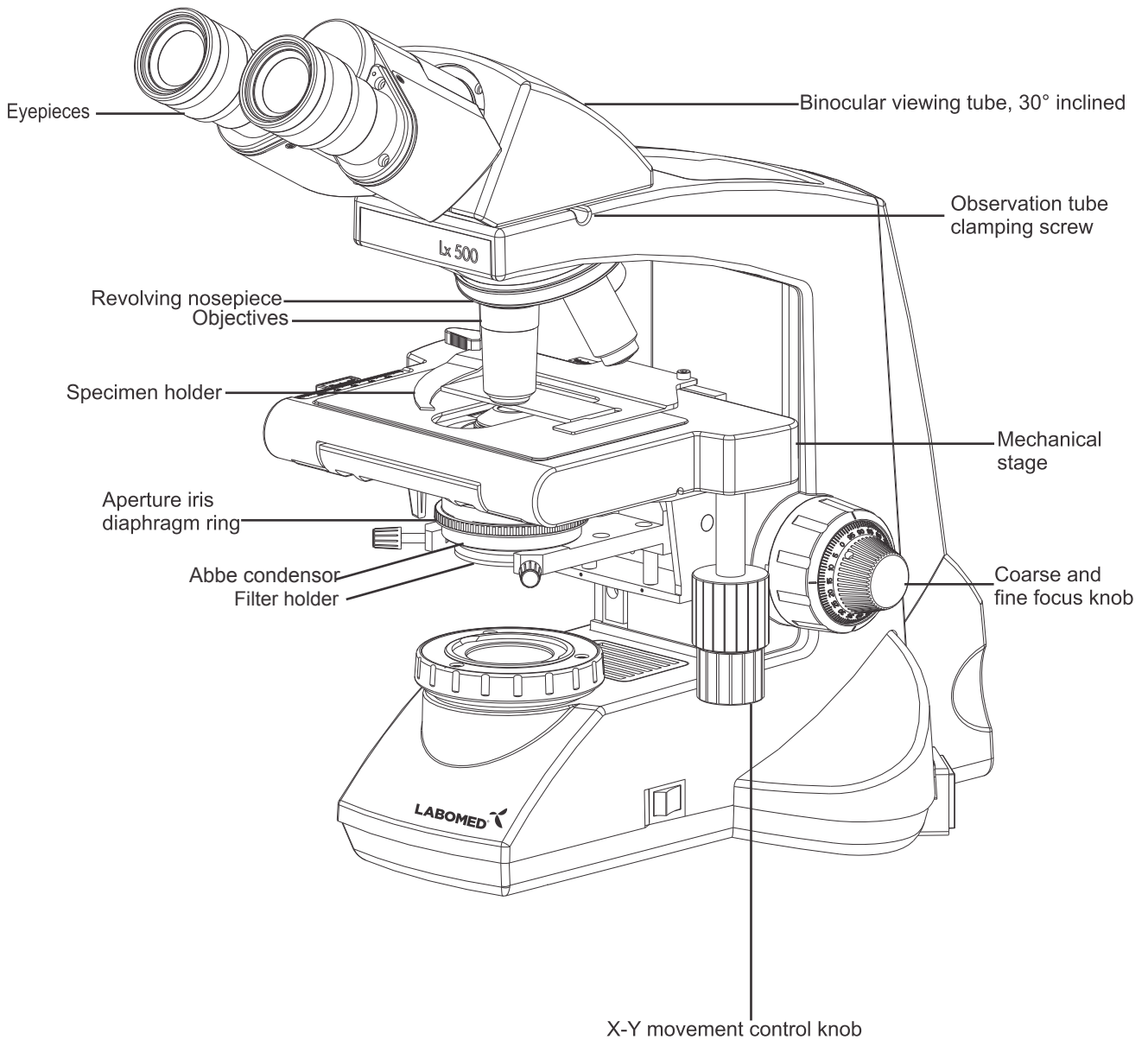
spiral motion (✓)

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

#### Cleaning of painted surfaces :

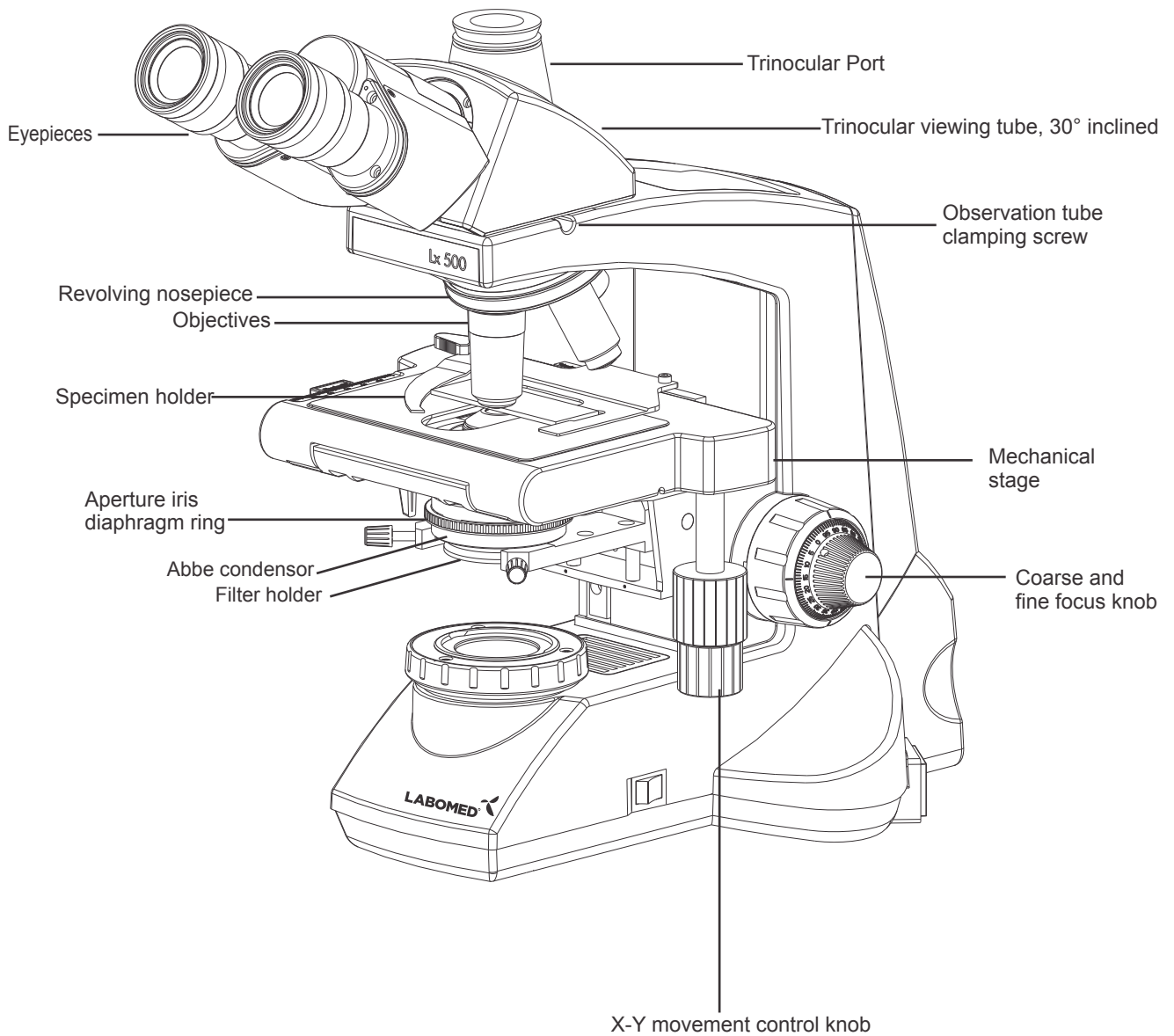
Avoid the use of any organic solvent ( e.g. thinner, xylene, ether, alcohol etc.) for cleaning of painted surfaces of the instrument. Painted surfaces can be cleaned with a very lightly moistened micro fiber cloth. Loose dust and other dirt particles can be removed using a soft bristle brush used exclusively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

# 3 Lx 500 Binocular

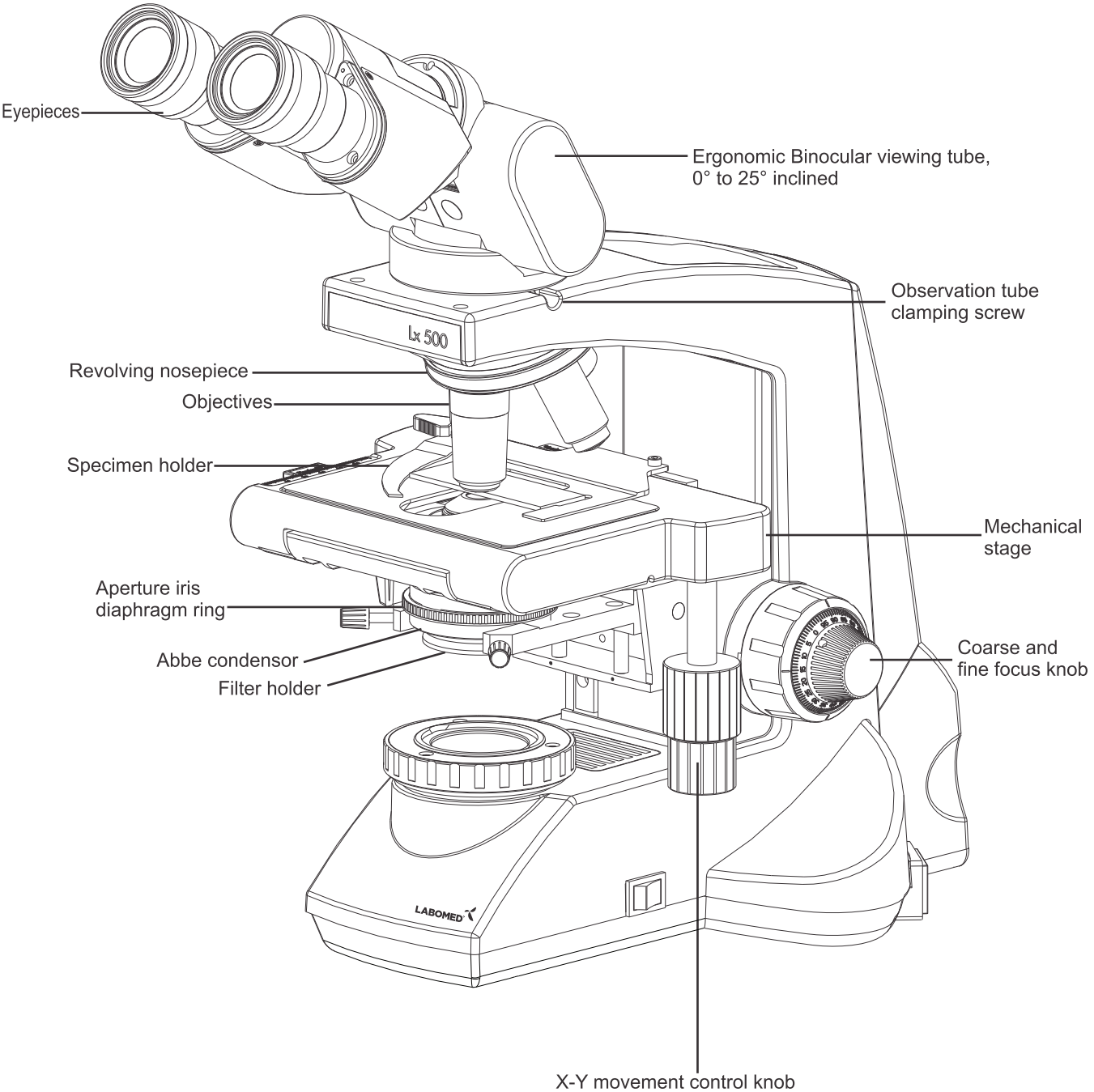




# 4 Lx 500 Trinocular

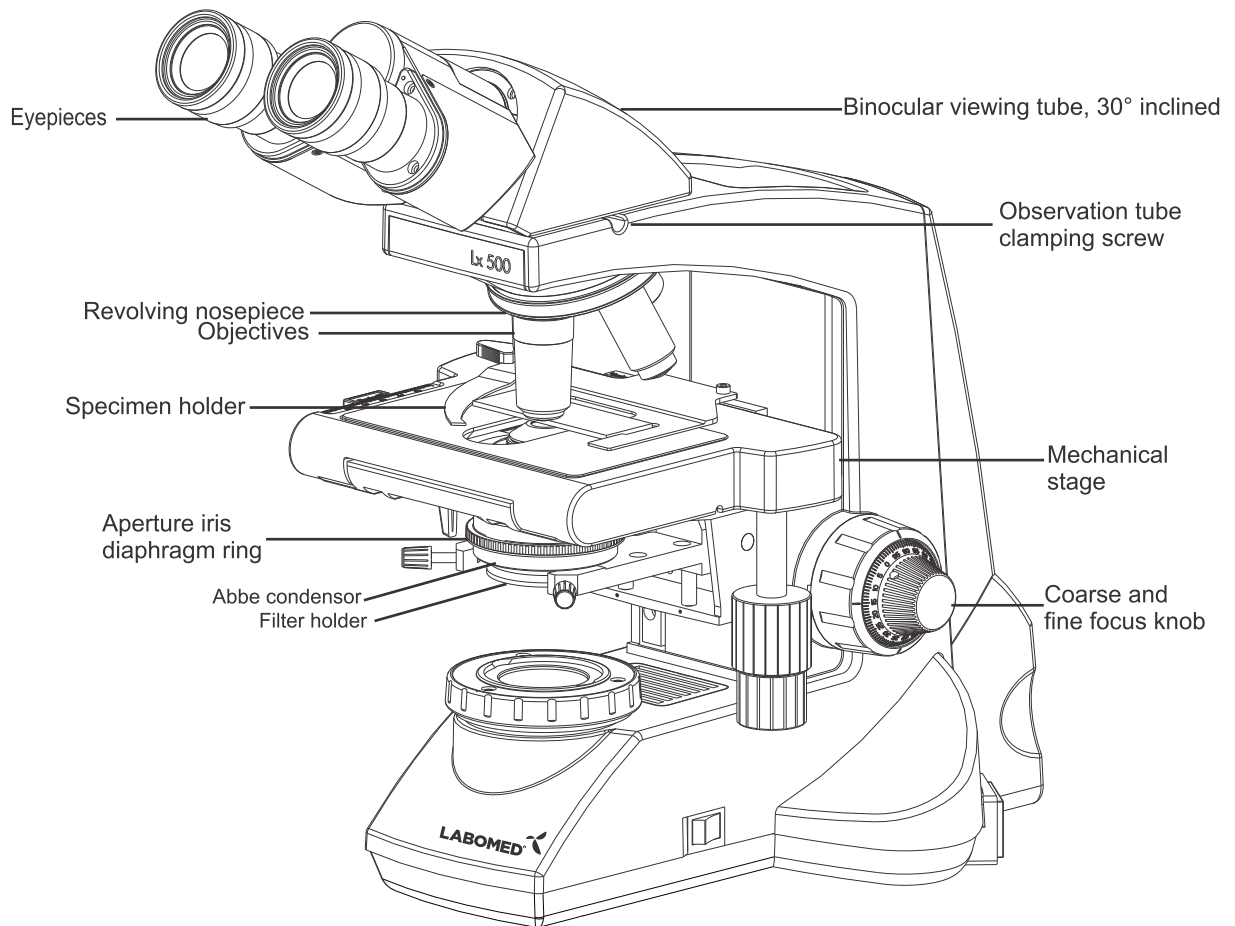


5 Lx 500 Ergonomic Binocular



# 6 STANDARD COMPONENTS

- After removing your microscope from its packaging, make sure that all of the following contents are present. "Please note that the contents of your microscope may vary as the optional configuration, contrasting method or viewing body opted for may not be of the standard configuration highlighted here"



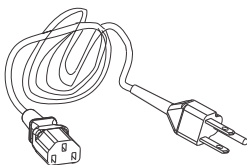
Daylight (blue) filter



Paired Eyepieces



Allen Wrench 3mm



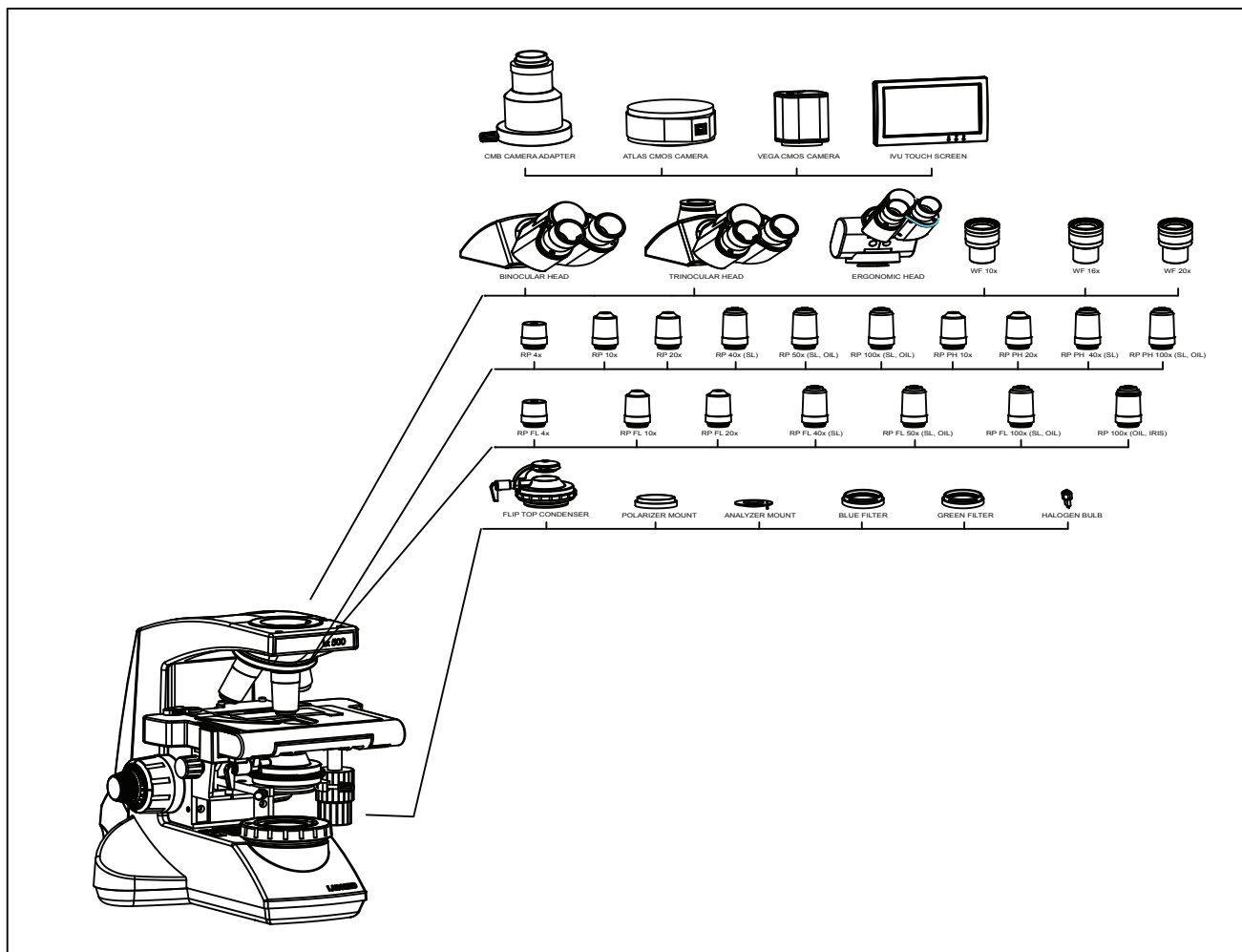
Power Cord



Immersion oil

# 7 OPTIONAL ACCESSORIES

## System Diagram of Optional Accessories



## Installation and Operation of Optional Accessories

### 1 Camera Module System

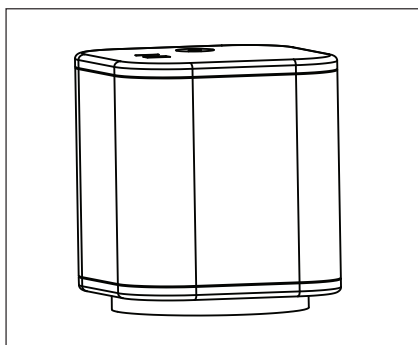


Fig. 4

1. Mount the Video adapter 1/2" on Trinocular observation head.
2. Mount Camera Module System on Video adapter.

## 2 Optional Eyepieces

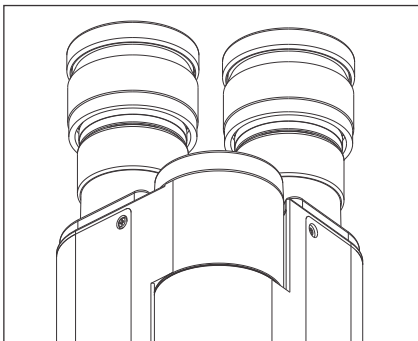


Fig. 5

10X eyepieces are provided. To replace:

1. Pull out the 10x eyepieces out from the observation heads ocular tube.
2. Insert desired eyepieces in empty ocular tube.

## 3 Phase Turret

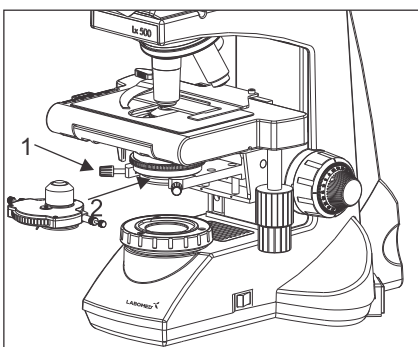


Fig. 6

1. Remove the condenser from its position by loosening the two thumb screws (1) on both sides of the condenser as shown in figure 6.
2. Place the **phase annulus turret** in position from where the condenser has been removed.
3. The long “push in to engage” thumbscrews (2) on both sides of the phase turret are provided for proper alignment of the phase ring. By disengaging these screws, the phase turret can be adjusted at any desired phase annulus (10x, 20x, 40x & 100x) by turning the thumbwheel to the desired position. There is also an ‘0’ setting on the thumbwheel for bright field application

**Note: Refer to the user manual provided with the Phase Contrast kit for centering and alignment.**

## 1 Objectives

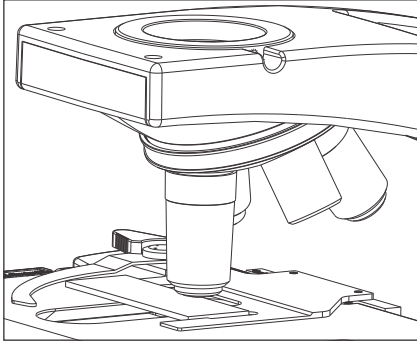


Fig. 7

Objectives are factory set. Objectives are par-centered and par-focalised during assembly.

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 grip to avoid any slippage.

## 2 Observation Head

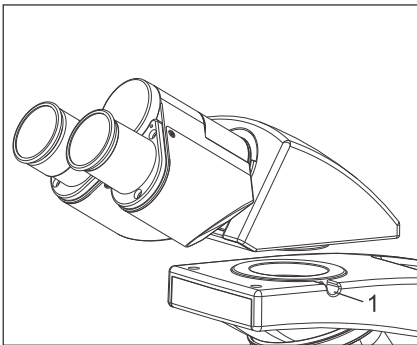


Fig. 8

Install the observation head using the following procedure:

1. Using allen wrench 3mm (provided), 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. See figure 8.

## 3 Eyepieces

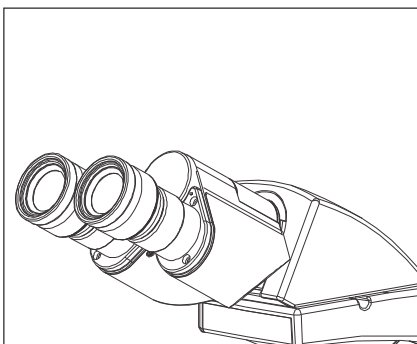


Fig.9

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 spring loaded and to prevent undesired rotation of eye pieces. See figure 9.

# 9 ASSEMBLY

Each standard set can be assembled by simply attaching the observation head, eyepieces and power cord.

## 1 Installing or Replacing the Lamp Bulb

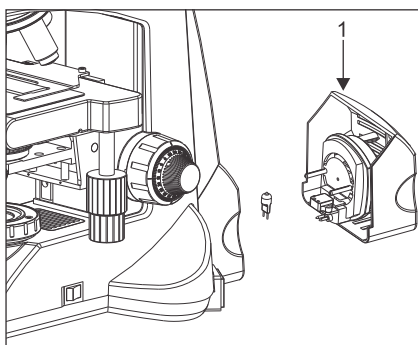


Fig. 10

Before attaching the lamp 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 out the lamp house cover (1) to detach it.
2. Pull up the lamp from the lamp holder & replace with lamp.
3. Replace the lamp house cover.

**Always use the designated bulb. Using a bulb other than those specified by LABOMED may lead to a fire hazard and decentering of light. 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.

## 2 Fuse Replacement

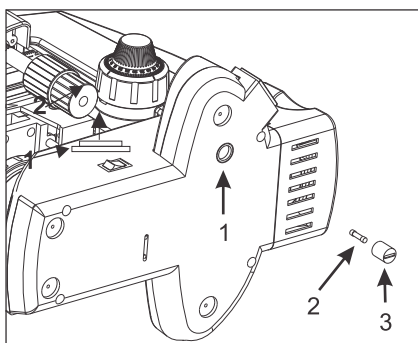


Fig. 11

Before replacing the fuse, remove the parts that may drop such as the filter and specimen from the microscope frame. Turn over the microscope to its bottom so that the fuse holder is visible.

1. Use a flat head screw driver to open the fuse holder (1).
2. The fuse holder (3) will come out with dead fuse.
3. Replace the dead fuse (2) with the live fuse.
4. Engage the fuse tray back in.

**Always use the designated Fuse. Using a fuse other than those specified by LABOMED may lead to a fire hazard.**

### Caution: For Fuse replacement

**Set the main switch to "O" (OFF), disconnect the power cord from the wall outlet.**

## 3 Mounting the Daylight (Blue) Filter

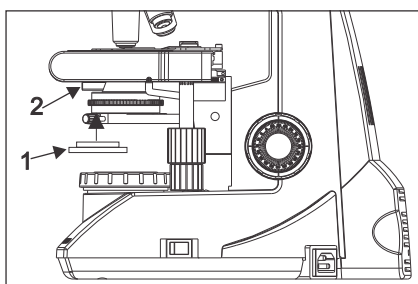
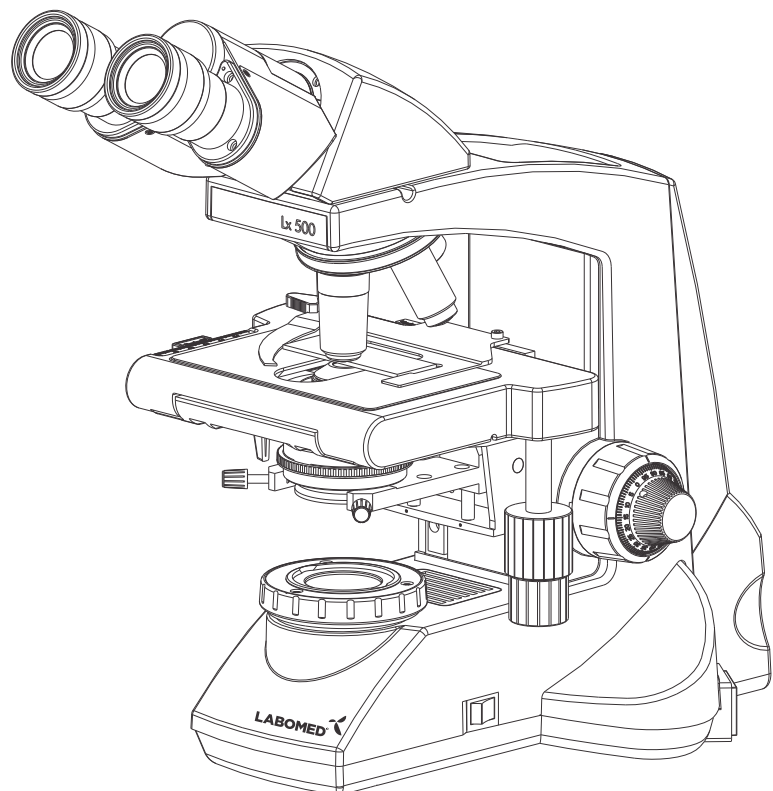
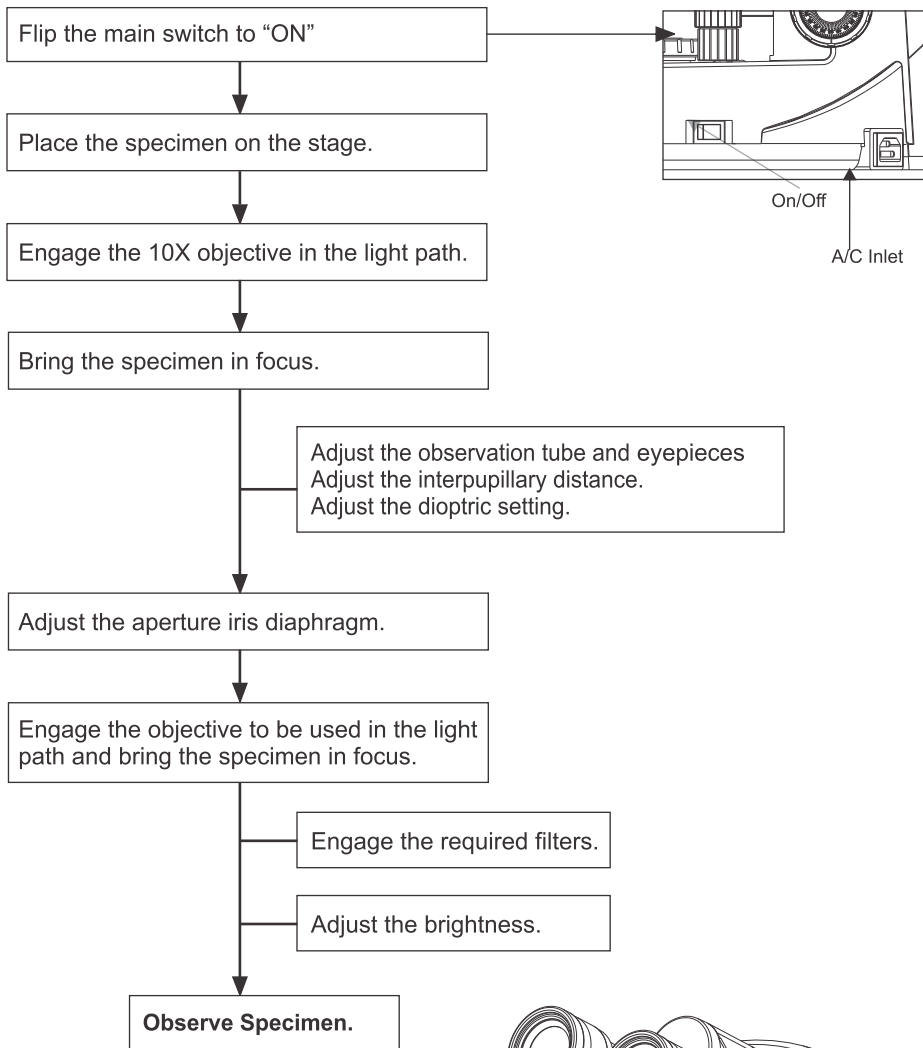


Fig. 12

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

- Fit the filter (1) into the bottom of the condenser (2) until it clicks into place. (Figure 12).

# 10 SUMMARY OF BRIGHTFIELD OBSERVATION PROCEDURE





# 11 DETAILED OBSERVATION PROCEDURE

## 1 Turning the Lamp ON

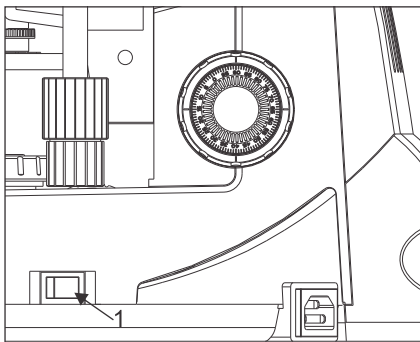


Fig. 13

1. Flip the main switch to "I" (ON) as shown in Figure 13.
2. Rotating the light intensity adjustment knob (Fig. 14) in the direction of the arrow increases brightness and rotating knob in the opposite direction decreases brightness. The intensity bar next to the knob indicates the direction of intensity level.

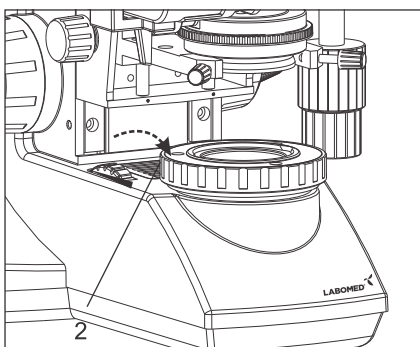


Fig. 14

## 2 Placing specimen on the stage

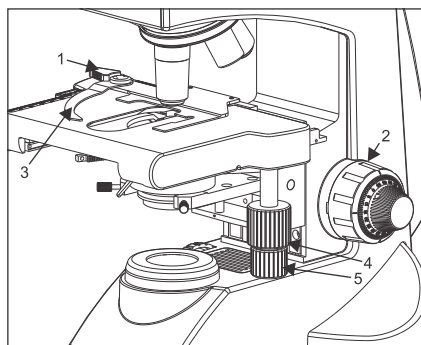


Fig. 15

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 on lever handle (1), place the specimen by sliding the specimen glass plate(s) on 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 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 (5) moves the specimen in the X-axis or horizontal direction.

**Do not adjust the specimen holder directly by hand. This will damage the rotary mechanisms.**

**When the specimen holder reaches stop position, the rotation force of the X/Y knobs become stiff. Stop rotating the at this point.**

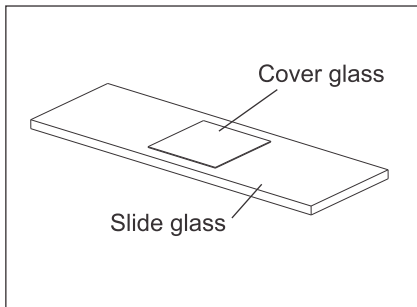


Fig. 16

### 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 top 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  $\pm 1$  mm and thickness between 0.9 and 1.4 mm.

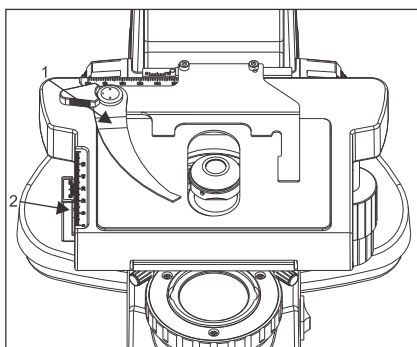


Fig. 17

### “Vernier 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. (Figure 17.)

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

## 3

### Adjusting the Focus

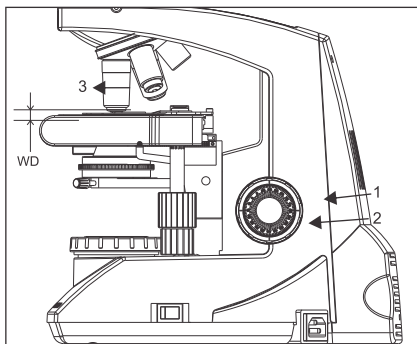


Fig. 18

### 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).
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 (a blurry image is observed), rotate the fine adjustment knob (2) for fine detail focusing in anticlockwise direction.

### Working Distance (WD)

The WD refers to the distance between each objective and the specimen,

Objective Magnification	4X	10X	40X	100X
WD (mm)	30.5	4.82	0.55	0.11

#### 4 Adjusting the Interpupillary Distance (IPD)

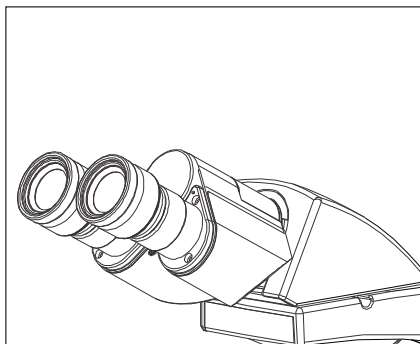


Fig. 19

The inter-pupillary distance adjustment consists of moving 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 laterally 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 referred to in the future. This may need when multiple users work with the microscope.

#### 5 Adjusting the Diopter

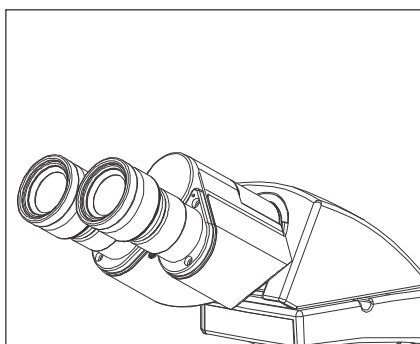


Fig. 20

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 0 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 diopter adjustment ring on the eyepiece until specimen is at its best possible focus.

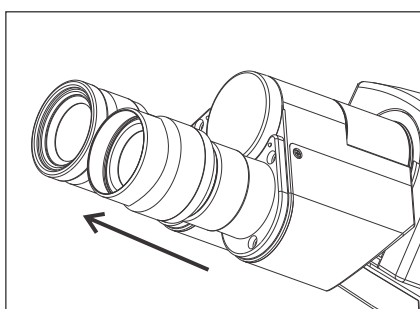


Fig. 21

#### Using the Eye Guards

##### When Wearing Eyeglasses

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

##### When Not Wearing Eyeglasses

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

## 6 Centering the Condenser

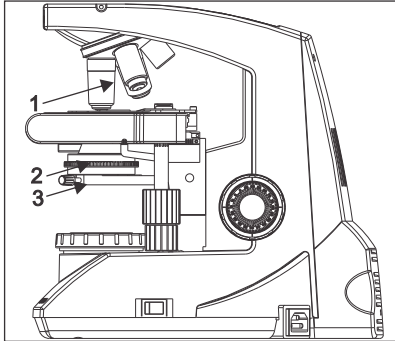
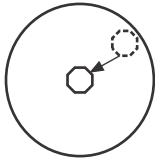


Fig. 22



There is a possibility of having the condenser de-centered during shipping. It is mandatory to check the centering before observing the specimen as it is required to distribute even light to the specimen.

### For models with Koehler illumination:

1. Bring the 10x objective (1) in the front position.
2. Move the condenser to the highest point.
3. Close the koehler. (2) Focus the light spot as show in the illustration below.
4. Use the centering screws (3) provided on left and right sides of the condenser bracket to bring the light spot to center of the view field.

## 7 Adjusting the Condenser Position and Aperture Iris Diaphragm

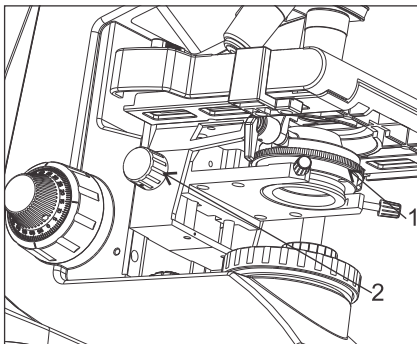


Fig. 23

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

1. Rotate the condenser height adjustment knob (2) to move the condenser to the highest or desired position.
2. The aperture iris diaphragm ring (1) has an objective magnification scale (4X, 10X, 40X, 100X). Rotate the ring so that the magnification of the objective is clearly visible while using the microscope.

## 8 Switching the Objectives

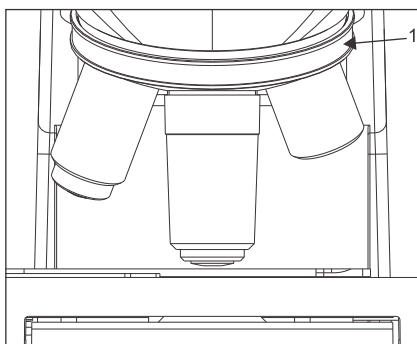


Fig. 24

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

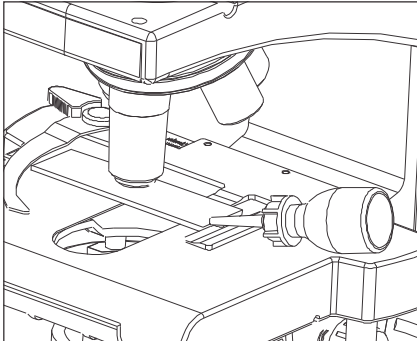


Fig. 25

The designated immersion oil should be in contact with the cover 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 an ether (70%) alcohol (30%) 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.**

# 12 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 corrective action as needed. If problem persists, please contact LABOMED or your local LABOMED dealer.

Observation	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 more light (Pg#18)
	The objective, eyepiece, condenser and/or window lens are dirty	Clean them thoroughly as previously prescribed in "Optical Cleaning"(pg#4)
2. Dust or stains are visible in observation field	The eyepiece, condenser, window lens and/or specimen glass is dirty	Clean glass parts thoroughly with lens tissue and cleaning solution prescribed in "Optical Cleaning"(Pg#4)
3. Glare visible in field of View	The condenser is too low	Raise condenser light
	The condenser iris diaphragm ring is closed	Adjust the aperture according to the objective magnification (Pg# 18)
4. Observation image is hazy or unclear	The objective is not engaged in the light path	Engage the objective into position until it clicks (Pg# 18)
	The objective, eyepiece, condenser and/or specimen glass is dirty	Clean glass parts thoroughly with lens tissue and cleaning cloth
	Immersion oil is not used with an immersion objective.	Use immersion oil as suggested (Pg# 19)
	Bubbles are present in immersion oil	Remove the bubbles by agitation (Pg# 19)
	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 (Pg# 15)
6. Coarse focus adjustment cannot lower the stage low enough	The condenser is too low	Raise the condenser
7. Fields of view through both eyepieces is inconsistent	The interpupillary distance is not adjusted properly	Adjust IPD to the appropriate setting (Pg# 17)
	Dioptric compensation for the two eyes is not set	Adjust diopter settings (Pg# 17)
	The left and right eyepieces are of different magnification	Ensure that both eyepieces are of same magnification. LABOMED does not recommend using third party eyepieces in conjunction with LABOMED microscopes.

Observation	Cause	Remedy
8. Objective hits the specimen when an objective is switched to a higher magnification objective	The specimen slide is upside down	Set the specimen correctly with the cover glass facing upwards
	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 has slipped from the slide holder	Re-position the slide in the slide holder
	Slide is of excessive thickness	Use slides with thickness between 0.9 and 1.4mm
9. Bulb does not turn On	Bulb is not mounted	Attach a bulb
	Bulb is blown	Replace the bulb
	The power cord is unplugged / Not firmly secured	Ensure power cord is securilly plugged into the box socket + wall outlet
	Fuse is blown	Check and replace with live fuse
	Battery is low	Charge battery
10. Bulb blows easily	The specified bulb is not used	Replace with the specified bulb

# 13 SPECIFICATIONS

1. Illumination	Built-in illumination system Halogen			
2. Focusing mechanism	Stage height adjustment mechanism Fine adjustment scale: 0.003µm per graduation Fine adjustment stroke: 0.3mm per turn Total stroke: 12.7mm Co-axial coarse and fine focusing on ball drive			
3. Revolving nosepiece	Quintuple positions fixed (Reverse angle)			
4. Observation tube		Binocular	Trinocular	Ergonomic
	Field number	22 (Standard)	22 (Standard)	22 (standard)
	Tube tilting angle	30°	30°	0°-25°
	Interpupillary distance adjustment range	48-75	48-75	48-75
5. Stage	Size	200 x 160mm (with mechanical stage)		
	Movement range	76 x 50mm		
	Specimen holder	Double specimen		
6. Condenser	Type	Fliptop Abbe condenser (daylight filter detachable)		
	N. A.	1.25		
	Aperture iris diaphragm	Built-in		
7. Dimensions & Weight	301.0mm (L) x 227.0mm (W) x 420.mm (H); 9 kg net			
8. Electrical	Halogen	6V-30W		
	Bulb life	Upto 500 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 ±10% of the normal voltage. Pollution degree: 2 (in accordance with IEC60664) Installation/Overvoltage category: II (in accordance with IEC60664)			





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