LAXCO
MICROSCOPES REDEFINED

LMI-3000
Inverted Microscope System

Version 4.0

User Manual

CONTENTS

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1. Operation Notice

1. The microscope is a precision instrument, please operate carefully: avoid vibrating or jolting the microscope during operation.

2. Do not operate the microscope under conditions of direct sunlight, high temperature, high humidity, dust, or close to sources of vibration. Ensure the work surface is flat.

3. When lifting or carrying the microscope, use one hand to hold the arm of the microscope (1) and another hand to carry the front base (2) (see Fig. 1).

   *The microscope will be damaged if the stage, focus knobs, or head while moving.

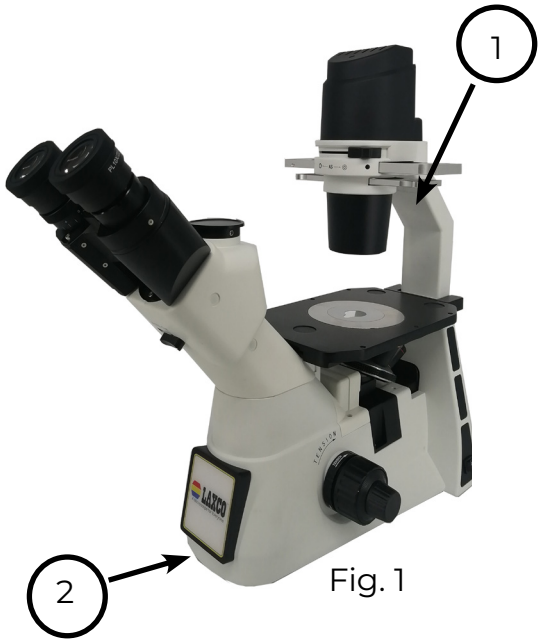


Fig. 1

4. The lamp may be hot when the microscope is on. Ensure there is enough space around the lamp housing for heat dissipation.

5. Ensure the microscope is properly grounded to avoid electric shock.

6. Ensure the power switch is in the “O” (off) position and wait until the lamp cools completely before replacing the bulb or fuse.

7. The input voltage is clearly marked on the back of the microscope. Ensure the power supply

Maintenance

1. Wipe the lens gently with a lens cloth. Carefully wipe off oil and fingerprints on the objective surfaces with a lens cloth moistened with a small amount of lens cleaning solution.

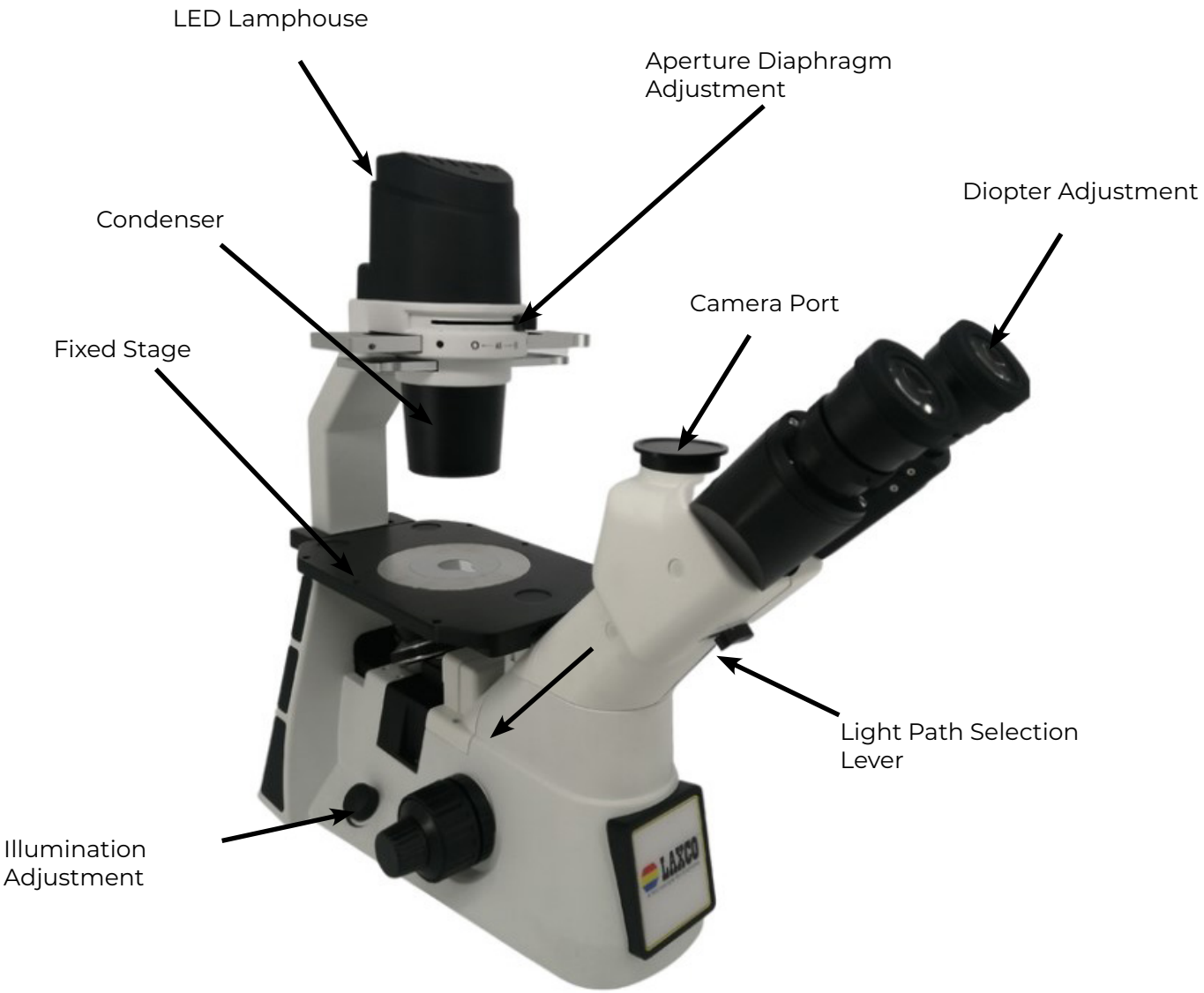
2. Lens cleaning solution is flammable. Turning on or off electronic devices (including the microscope) may produce a spark which could ignite the lens cleaning solution. Use these chemicals in a well-ventilated area.

3. Don’t use organic solutions to wipe the surfaces of the other components. Please use a neutral detergent if necessary.

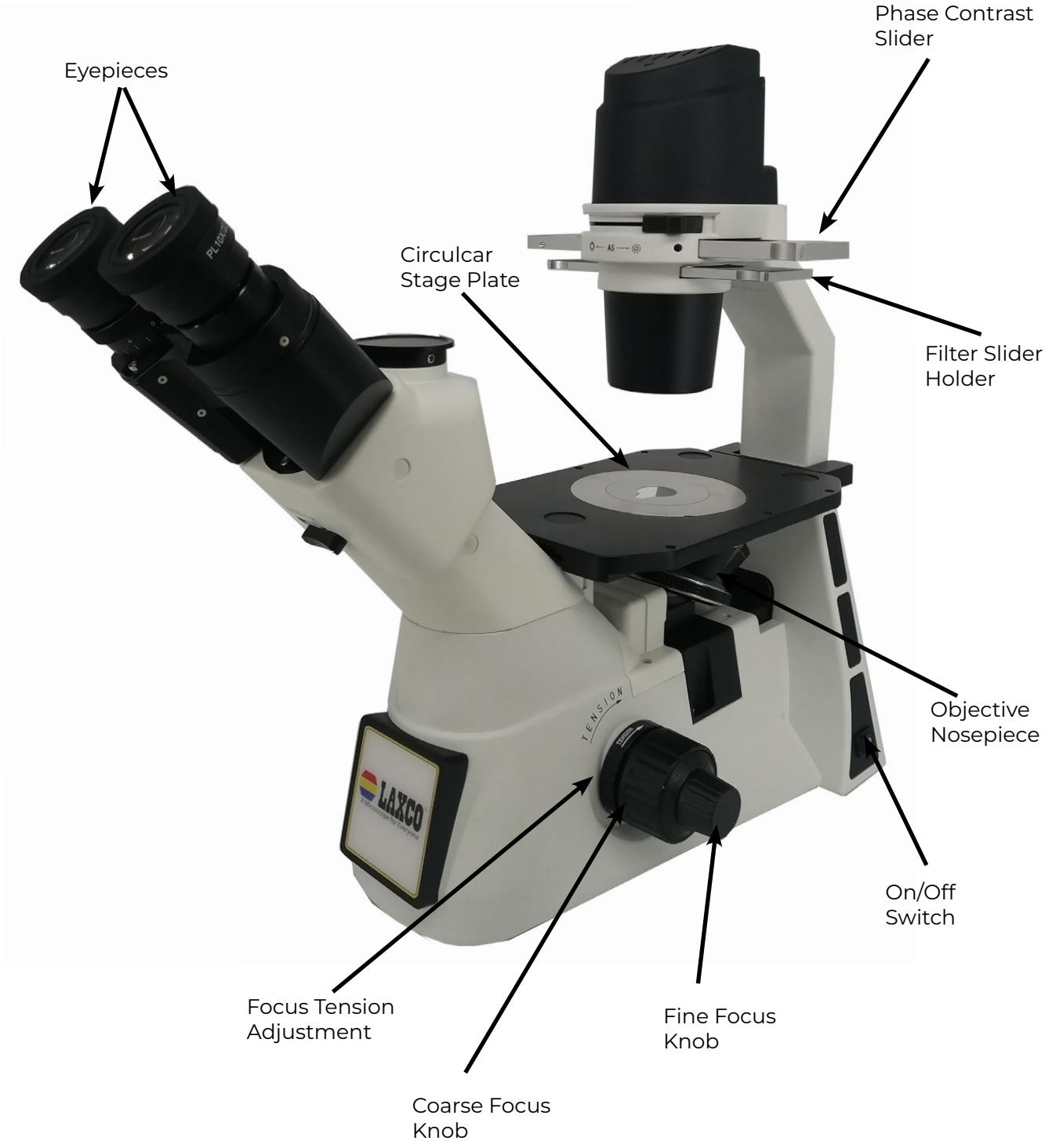
4. If the microscope is exposed to liquid during operation, power it off immediately and wipe it dry.

5. Never disassemble the microscope, the performance will be affected or the instrument will be damaged.

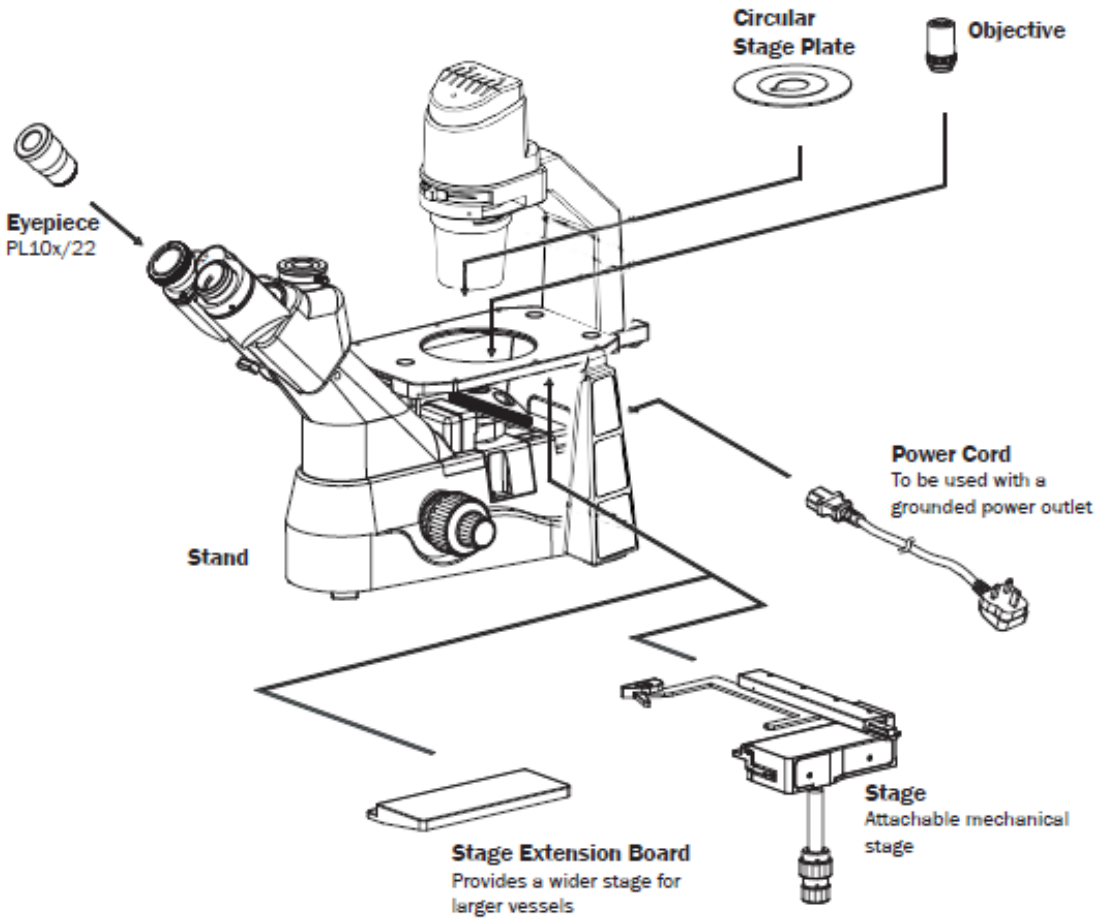
2. Instrument Components



2. Instrument Components



3. Assembly


Circular
Stage Plate
Objective
Eyepiece
PL10x/22
Power Cord
To be used with a
grounded power outlet
Stand
Stage
Attachable mechanical
stage
Stage Extension Board
Provides a wider stage for
larger vessels

3. Assembly

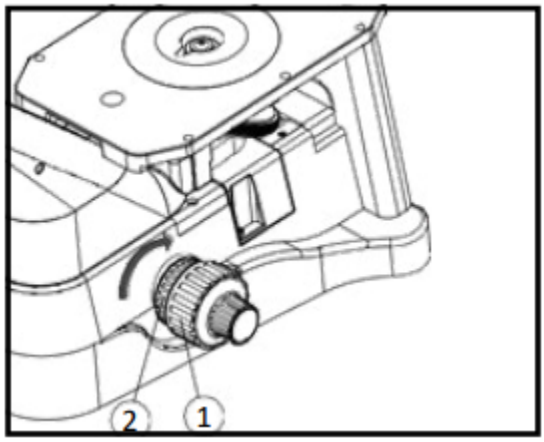


Fig. 6

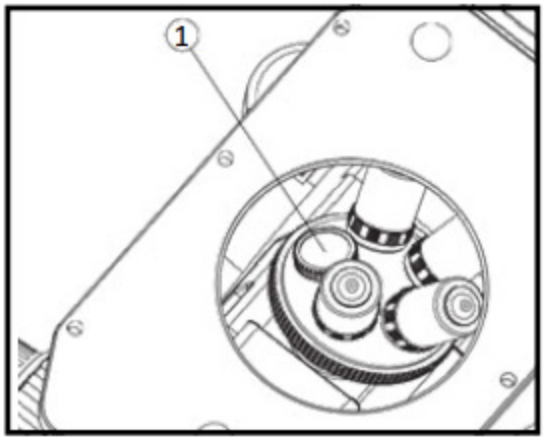


Fig. 7

Objective Assembly (Fig 6,7)

1. Rotate the coarse focus knob (1), until the objective nosepiece is at the lowest position. (Fig 6)

2. Install the objectives into the microscope nosepiece from the lowest magnification to the highest in a clockwise direction from the back of the microscope. Objectives can also be assembled by removing the metal/glass plate on the stage.

3. Cover any unused positions on the nosepiece with a dust cap (Fig 7) (1) to prevent contamination by dust and dirt.

4. Search and focus the sample with a low magnification objective (4x or 10x), then change to the higher magnification objective if required.

5. Turn the nosepiece to switch between objectives. The objective is in position when you hear a “click.”

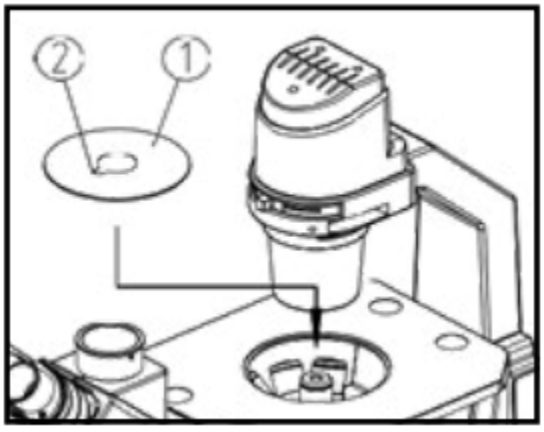


Fig. 8

Stage Plate Assembly (Fig 8)

1. Place the metal stage plate (1) into the opening in the stage with the “V” (2) facing the user. The glass stage plate allows the user to view which objective is being used.

2. Ensure that the stage plate is flush with the stage.

3. Assembly

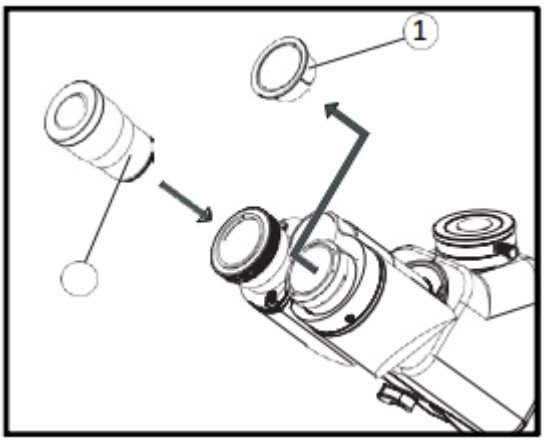


Fig. 9

Eyepiece Assembly (Fig 9)

1. Remove the eyetube cover (1).
2. Insert the eyepiece (2) into the eyetube.

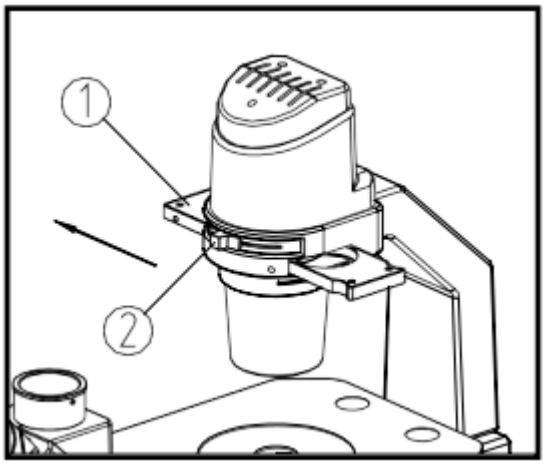


Fig. 10

Phase-contrast Slider Assembly (Fig 10)

1. Place phase-contrast slider (1) letter side up, into the holder from the right to the left.
2. To change setting, slide the correct phase ring into place.

   The phase ring is fully in position when you hear a “click”.
3. Keep the aperture adjustment lever (2) in the position during phase-contrast observation.

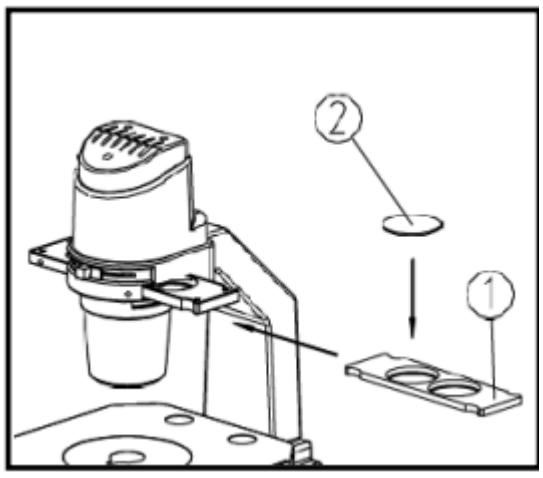


Fig. 11

Color Filter Assembly (For Transmitted Illumination) (Fig 11)

1. Turn the microscope off and allow the filter to cool before changing.
2. Slide out the filter holder (1), and place the color filter (2) in to the filter holder.
3. Ensure that the filter is flat and firmly pressed into the bottom of the filter holder. *Filters can be stacked if needed, but the thickness must not exceed 11mm.

3. Assembly

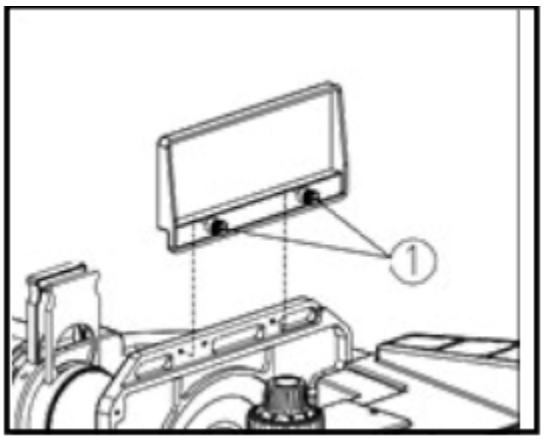


Fig. 12

Stage Extension and Mechanical Stage Assembly Optional (Fig 12)

The stage extension can be attached on both the left and right side of the stage to increase the stage size. The stage extension and the attachable mechanical stage both cannot be attached on the same side of the stage. For ease of use, it is recommended that the mechanical stage be attached to the right side of the stage and the stage extension be attached to the left side.

Attach the stage extension or mechanical stage as follows:

1. Screw the lock-screws (1) into the bottom of the stage extension.

2. Screw it into the bottom of the stage.

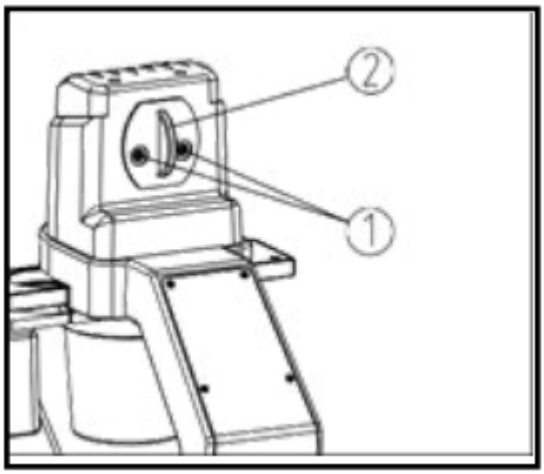


Fig. 13

Replacing the LED (Fig 13)

1. Remove the screws with allen wrench.

2. Remove the LED module (2).

3. Gently insert new LED module to avoid damage.

4. Replace screws (2).

5. Connect the power cored, and turn the On/Off switch to the “on” position.

* Before attempting to replace or remove the LED, unplug the microscope from all power sources, turn the power switch to the “off” position and allow the LED to cool completely.

4. Operation

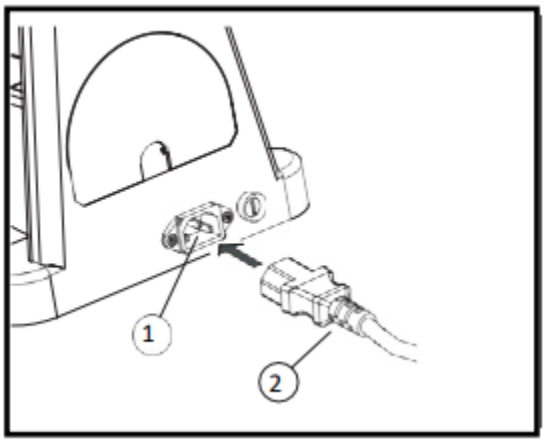


Fig. 14

Power Cord (Fig 14)

1. Turn the power switch to the “O” OFF position before connecting the power cord.

2. Insert the plug into the outlet on the back of the microscope.

3. Insert the 3-prong plug into a grounded outlet.

Fig. 15

Set Illumination (Fig 15)

1. Plug the microscope into a power outlet and turn the power switch (1) to the “I” ON position.

2. Use the illumination dimmer control (2) to adjust brightness.

3. Turn the dimmer clockwise to brighten the light, and counter-clockwise to darken it.

Focus Adjustment (Fig 16)

1. Put a specimen on the circular central stage, and then move the lowest mag. objective (4X or 10X) into the light path.

2. View the specimen through the eyepieces and rotate the coarse focusing knob until the image is in focus.

3. Rotate the fine focusing knob to bring the specimen into clear focus.

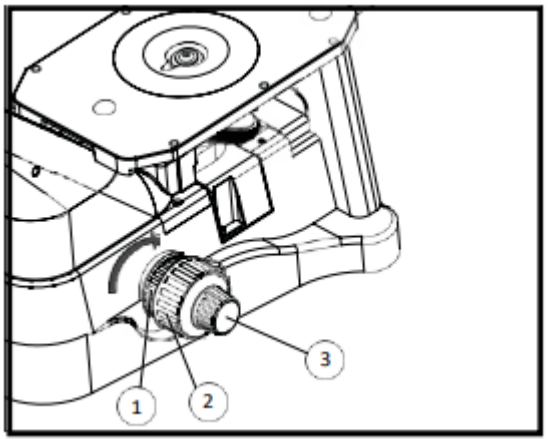


Fig. 16

Focus Tension Adjustment

If the coarse focus knob is difficult to rotate or the objective nosepiece “drifts” or loses focus this can typically be corrected by adjusting the focus tension.

1. Rotate the tension adjustment ring (1) according to the arrow direction in figure 16 to tighten the focus tension; rotate the tension adjustment ring in the opposite direction to loosen the tension.

4. Operation

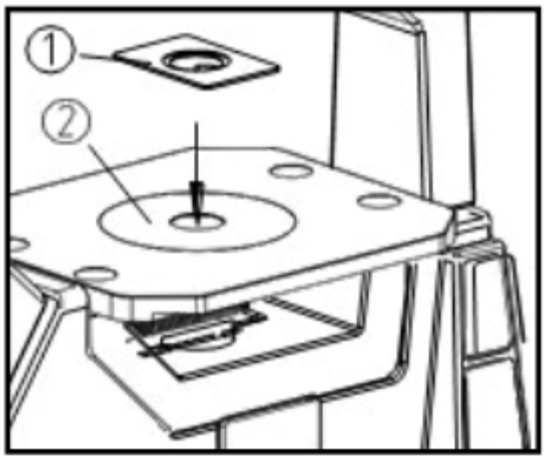


Fig. 17

Specimen Placement (Fig 17)

Several vessel holders are available for use with or without the mechanical stage. Refer to the Parts and Accessories section of this guide, for ordering information.

1. Place vessel holder on stage (2) or in mechanical stage clip.

2. Place vessel into holder.

3. Move the vessel holder manually or use the coaxial adjustment knobs on the mechanical stage to move the vessel.

* Please select vessel with a thickness of 1.2mm, Petri dish, culture flask etc., for best observation.

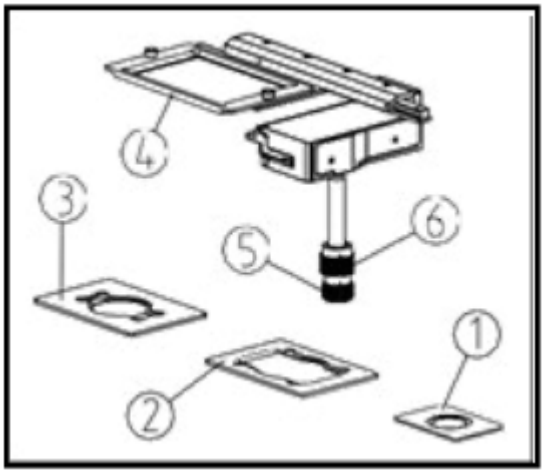


Fig. 18

Mechanical Stage (Optional) (Fig 18)

1. Place the multi-well plate on the mechanical stage age holder (4) when using 96 or 24 well plate.

2. Vessel Holders:

   - Yerasaki holder (2) for Terasaki board.
   - φ35mm petri dish holder (1) for φ35mm petri dish.
   - Specimen slide holder (3) to for a φ54 petri dish and specimen slide.
   - Rotate the x/y stage adjustment knobs (5) (6) to move the specimen.

* Carefully change the objective. The objective may collide with the circular central stage or the Petri dish holder when it is changed after observing with shorter working distance objective.

*Make sure to take off the circular stage plate of the stage when use the mechanical moving stage.

4. Operation

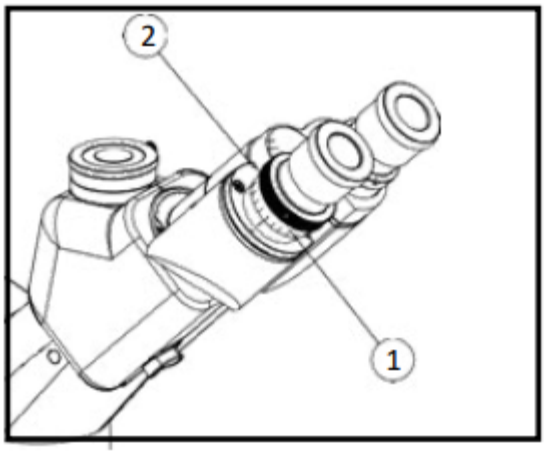


Fig. 19

Diopter Adjustment (Fig 19)

1. Look through the right eyepiece with your right eye and focus on a specimen using the coarse and fine focus adjustment knobs.

2. Once the image is clear in the right eyepiece, look through the left eyepiece with your left eye, turn the diopter adjustment ring (1) until the image is clear.

3. There is + or - 5 diopter on the diopter adjustment ring. The number on the scale that lines up with the "•" on the base (2) is your eye's diopter. Keep this index for future reference

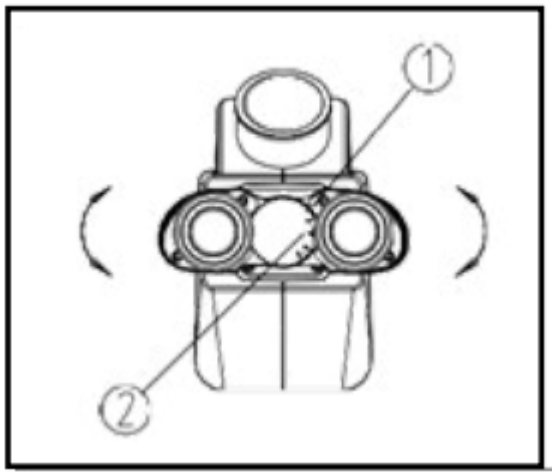


Fig. 20

Interpupillary Distance Adjustment (Fig 20)

1. While looking through both eyepieces, move the eyepieces together or apart until the field appears as one circle and viewing is comfortable

2. The number on the index (2) that lines up with the "." On the side (1) is the interpupillary distance of your eyes. Keep this index for future use.

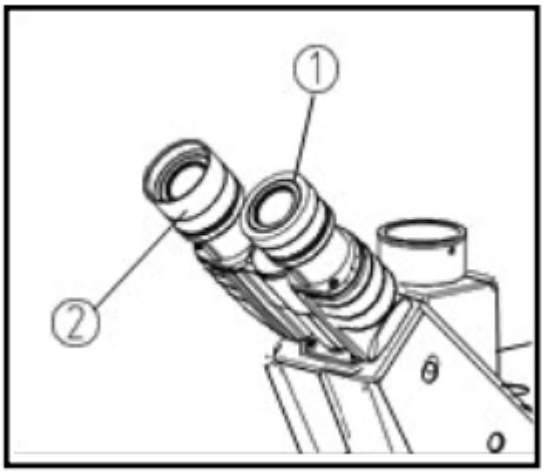


Fig. 21

Adjustment (Fig 21)

1. If the user wears glasses, turn the eyecup inward (1) to prevent glasses from touching the eyepiece and avoiding damage to the glasses and the eyepiece.

2. Open the eyecup (2) for users without glasses. In this mode, the eyecup can prevent unwanted outside light.

4. Operation

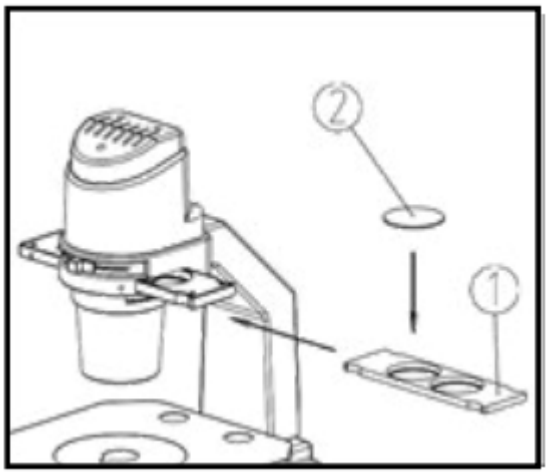


Fig. 22

Color Filters (Fig 22)

Color filters are used to enhance the viewing of a specimen and in photomicrography. Color filters (2) can overlay in the filter holder (1); ensure that they lay flat in the filter holder and the thickness doesn't exceed 11mm. Refer to Fig 23, for filter application.

COLOR FILTER	PURPOSE
IF550	Monochromatic contrast color filter (green) Used in phase-contrast observation
LBD	Color temperature transition color filter. Used in brightfield observation

Fig. 23

4. Operation

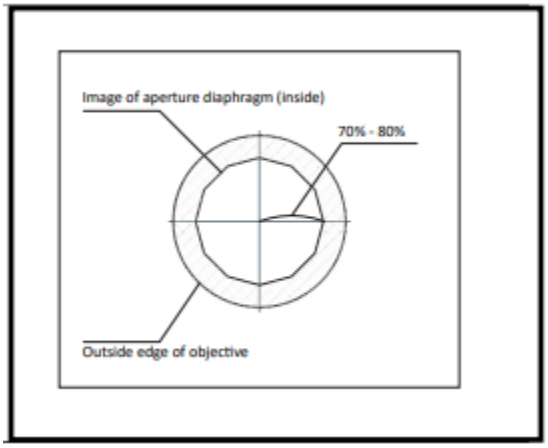


Fig. 24

Aperture Diaphragm Adjustment (Fig 24)

1. The aperture diaphragm determines the numerical aperture of the illumination in brightfield observation. If the N.A. of illumination matches the N.A. of the objective, you can obtain better resolution and contrast, and increase the depth of field.

2. Usually, adjust the N.A. to its 70%~80% when observing the specimen. Adjust the aperture diaphragm to " " when observing the bacteria specimen.

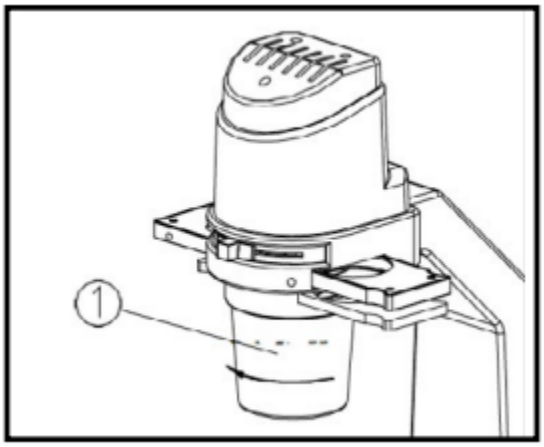


Fig. 25

Condenser Lens Removal (Fig 25)

1. The condenser lens can be removed to view specimens in large vessels. Unscrew the condenser lens (1) to increase the working distance

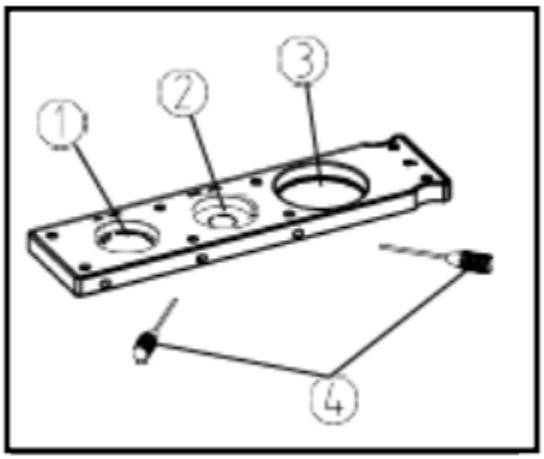


Fig. 26

Phase Contrast Slider (Fig 26)

Phase center adjustable slider

1. Phase ring for use with 4x and 10x phase contrast objectives. (1)

2. Phase ring for 20x and 40x phase contrast objectives (2).

3. Open position for brightfield observation (3).

4. Phase ring alignment tools (4).

4. Operation

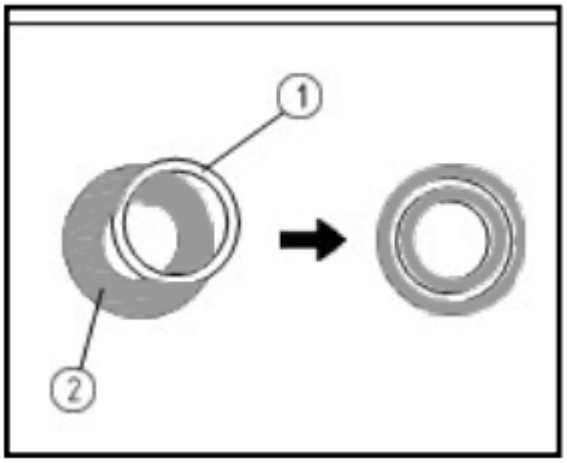


Fig. 27

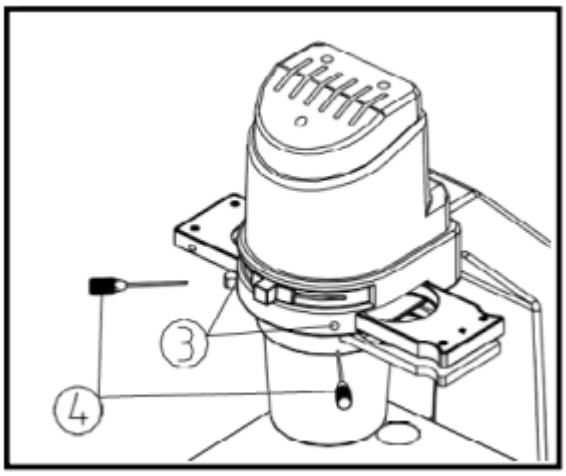


Fig. 28

Centering the Phase Contrast Annuli (Fig 27 & 28)

1. Place specimen on the stage and focus it.
2. Make sure the matched phase ring (in the phase-contrast objective) and the light ring (in the phase-contrast slider) are in the light path.
3. Loosen the lock screw of the centering telescope and observe the centering telescope (1) when pulling the upper part of it focus with the phase ring (2) of the focusing objective. Screw down the lock screw when it is in clear focus.
4. Insert the alignment tools (4) into two holes (3) in the phase-contrast slider, and then adjust them until the phase rings are aligned over each other.
5. Repeat steps for all phase ring/objective combinations.

• If the phase rings are not centered, the user will not achieve optimal phase-contrast observation.

4. Operation

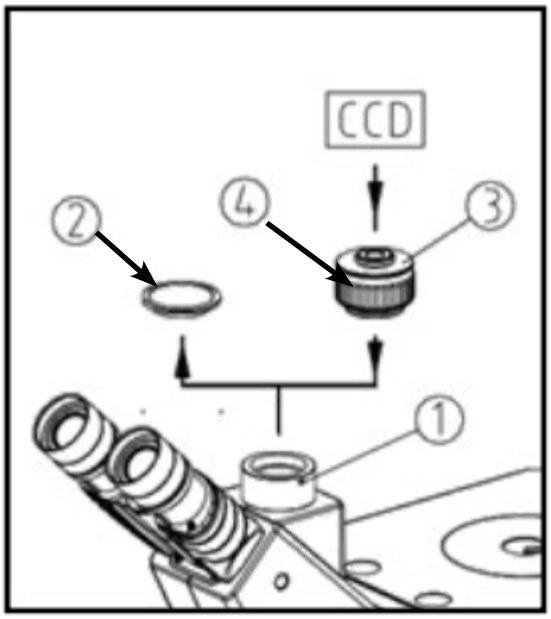


Fig. 29

C-mount Assembly (Fig 29)

1. Loosen the lock-screw (1) on the trinocular head and remove the dust-cover (2).

2. Remove the dust-cover caps of the c-mount adapter (3) and the camera. Insert the screw thread end of c-mount adapter onto the camera, and then install the c-mount into the camera port.

3. Tighten down the lock-screw.

4. During observation if the image displayed by the camera is not in parfocal with the eyepieces, adjust the focus ring (4) on the camera adapter until the image is in focus.

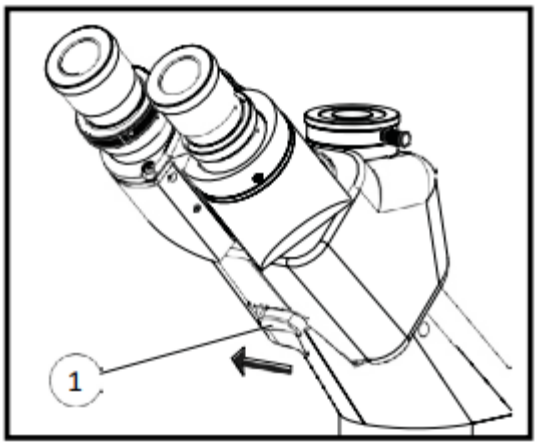


Fig. 30

Light Path Selection (Fig 30)

The light path selection lever (1) diverts the light from the eyepieces to the trinocular tube. When the lever is pushed to the right the specimen can be viewed through the binocular eyepieces. When the lever is pushed to the left the specimen can be viewed through the trinocular tube, typically used for attaching a camera. When the lever is pushed to the left, 80% of the light is directed to the trinocular tube and 20% is directed to the eyepieces so the specimen can be viewed through both the trinocular tube and the eyepieces.

5. Accessories

EYEPIECES	
PART #	DESCRIPTION
LMCP-PLN10X22	WF HP PL 10X Eyepiece, 22mm FOV
LMCP-PLN10X22TR	WF HP PL 10X Eyepiece w/Diopter Adjustment, 22mm FOV & Reticle
LMCP-PL14X16	WF HP PL 15X Eyepiece, 16mm FOV

FILTERS	
PART #	DESCRIPTION
LMCP-LBD	Φ45 Color Temperature Shift Filter
LMCP-XY-FCF	Φ45 Yellow Contrast Filter
LMCP-IF550	Φ45 Green Contrast Filter
LMCP-XY-FCF	Φ45 Neutral Color Temperature Filter

STAGE MICROMETERS	
PART #	DESCRIPTION
MP-SM100	1mm ruled with 0.01mm div
MP-SM100-C	1mm ruled with 0.01mm div, NIST Cert
MP-SM101	0.04" ruled with 0.001" div
MP-SM101-C	0.04' ruled with 0.001" div, NIST Cert

STAGE ACCESSORIES	
PART #	DESCRIPTION
LMCP-XDCPG	Glass stage plate
LMCP-XDCPM	Metal stage plate (Φ25 center hole)
LMCP-XDCPM2	Metal stage plate (Φ12 center hole)
LMCP-XDCPM3	Metal stage plate (crescent shaped hole)
LMCP-XDSGM	Mechanical Stage, Travel 120mm X 80mm
LMCP-XDSGEX	Stage Extension Plate
LMCP-XDSGHJ01	Φ35 Petri dish holder
LMCP-XDSGHJ02	Slides holder
LMCP-XDSGHJ03	Terasaki holder

C-MOUNT ADAPTERS	
PART #	DESCRIPTION
LMCP-CX50MCTV0.35	0.35X C-Mount Adapter, Focusable
LMCP-CX-50OCTV0.5	0.5X C-Mount Adapter, Focusable
LMCP-CX-50CV06.5	0.65X C-Mount Adapter, Focusable
LMCP-CX50CTV1	1X C-Mount Adapter, Focusable

CAMERA	
PART #	DESCRIPTION
SeBaCam5C	5MP Digital Color Camera, CMOS,w/SeBaView Imaging Sorftware
SeBaCam10C	10MP Digital Color Camera, CMOS, w/SeBaView Imaging Software
SeBaCam 1.7C	14MP Digital Color Camera, CMOS, w/SeBaView Imaging Software
SeBaCamCool1.4C SeBaCamCool1.4M	1.4MP Digital Camera, CCD, W/SeBaView Imaging Software. Available in Color and Monochrome

OBJECTIVES	
PART #	DESCRIPTION
LMCP-OLIP4	LWD Infinity Plan Achromatic Objective 4x/0.1 N.A. WD=22mm
LMCP-OLIP10	LWD Infinity Plan Achromatic Objective 10x/0.25 N.A. WD=7.94mm
LMCP-OLIP20	LWD Infinity Plan Achromatic Objective 40X/0.40 N.A. WD=7.66mm
LMCP-OLIP40	LWD Infinity Plan Achromatic Phase Contrast Objective 40x/0.60 N.Z. WD=3.71mm
LMCP-OLIP60	LWD Infinity Plan Achromatic Objective 60x/0.70 N.A. WD=2.50mm
LMCP-OLIPP2N4A	LWD Infinity Plan Achromatic Phase Contrast Objective 4x/0.13 N.A. WD = 10.4 mm
LMCP-OLIPP2N10	LWD Infinity Plan Achromatic Phase Contrast Objective 10x/0.25 N.A. WD = 7.3 mm
LMCP-OLIPP2N20	LWD Infinity Plan Achromatic Phase Contrast Objective 20x/0.40 N.A. WD = 6.8 mm
LMCP-OLIPP2N40A	LWD Infinity Plan Achromatic Phase Contrast Objective 40x/0.65 N.A. WD = 3.05 mm
LMCP-OLIPF4	LWD infinity Plan Fluorite Objective 4X/0.13 WD = 18.52mm
LMCP-OLIPF10	LWD Infinity Plan Fluorite Objective 10X/0.30 WD = 7.11mm
LMCP-OLIPF20	LWD Infinity Plan Fluorite Objective 20X/0.45 N.A. WD = 5.91mm
LMCP-OLIPF40	LWD Infinity Plan Fluorite Objective 40X/0.65 WD = 1.61mm
LMCP-OLIPF60	LWD Infinity Plan Fluorite Objective 60X/0.75 N.A. WD = 1.04mm
LMCP-OLIPP2F20	LWD Infinity Plan Fluorite Phase Contrast Objective 20X/0.45 N.A. WD = 5.91mm
LMCP-OLIPP2F40	LWD Infinity Plan Fluorite Phase Contrast Objective 40X/0.65 N.A. WD = 1.61mm

6. Troubleshooting

SYMPTOMS	POTENTIAL CAUSE	SOLUTION
LED is bright but the light in the field of view is not bright enough	The LED has burned out Dimmer is turned down	Replace LED Turn up the dimmer
Side of the field of view is dark or not even	The nosepiece is not in the correct position The color filter and its holder are placed incorrectly. The phase-contrast slider is not in the corrected position	Reposition nosepiece Insert the filter tray correctly Reposition slider
Stain or dust is observed in the field of view	Stains have accumulated on the specimen Stains have accumulated on the lens	Clean or change the specimen Clean the lens
Unclear Image	The nospiece is not in the correct position. Aperture is not open correctly Stain or dust has accumulated on the condenser, objective, eyepieces or base lens The thickness of specimen slide or Petri dish is not 1.5mm The phase ring of phase contrast slider is not matched with objective. The phase rings are not centered The light loop and the phase ring deviate when observing the edge of the Petri dish.	Reposition nosepiece Adjust the iris diaphragm Clean the lens Use a vessel with thickness of 1.5mm Use correct phase ring setting for objective Center phase rings Move the Petri dish to get the best phase-contrast effect.
Some parts of the image are not on the focal plane	Objective is not place in the light path. The specimen is placed on the stage incorrectly The optical effect of the Petri dish is not good.	Reposition nosepiece Reposition specimen Use a petri dish with a smooth surface

6. Troubleshooting

SYMPTOMS	POTENTIAL CAUSE	SOLUTION
Eyes tire easily seeing two fields of view	Interpupillary distance is wrong Diopter adjustment is wrong Eye not accustomed to binocular observation	Adjust the interpupillary distance Adjust the diopter See the entire view-field with steady observation
MECHANICS		
Coarse focus knob is too tight	Tension adjustment knob is too tight	Slightly loosen tension knob
Image drifts out of the focal plane or the stage drifts	Tension adjustment knob is too loose	Slightly tighten the tension knob
ELECTRICAL		
No illumination	No power The bulb is not installed correcly Dimmer is turned down The bulb burnt out	Check connection of power cable and plug into known working outlet Re-install bulb correcly Turn up the dimmer switch Replace the bulb
The LED burns out soon after	Not using the correct LED	Use the correct LED
The field of view is not bright enough	Not using the correct bulb Dimmer is turned down	Use the correct LED Turn up the dimmer switch
The bulb flickers or the brightness is not stable	The bulb is almost burnt out Lamp base is not connected to illumination device correctly	Replace the bulb Reconnect the lamp

7. Warranty Information

1. Statement of Limited Product Warranty

2. Laxco warrants its microscopes in respect to optical and mechanical components against defects in material and/or workmanship for 5 years from the date of original purchase to the original purchaser. Warranty for electrical items/components is 1 year from the date of original purchase. The warranty does not apply to any instrument which has become worn, defective, damaged or broken due to abuse, misuse, tampering, or unauthorized repairs. Under this warranty, Laxco Inc. will repair or replace, without charge to the purchaser, any part which upon our examination, appears to be defective in materials or workmanship.

3. Returned Goods Policy for Repair or Replacement Parts

4. To return goods for repair or replacement, please contact Laxco Customer Service at 425-686-3081.

   Please be prepared to supply the following information:

   - Your name, return shipping address and telephone number
   - Catalog/Model number of the item(s)you are returning
   - Serial Numbers if applicable
   - Description of the product's problem or reason for the return
   - Date the item was purchased.

The Customer Service Representative will issue you a Return Materials Authorization (RMA) number. Please label the outside of your shipping container with this number.

Thank you for purchasing our products. If you are unable to complete the installation of your products, contact Laxco Inc. customer support or with suggestions or comments on this manual? We are always working to meet the needs of our customers, and we appreciate your suggestions. Please e-mail us at sales@laxcoinc.com, making sure to include the title of this manual and the pertinent page numbers.

Laxco, Inc.
18303 Bothell-Everett Hwy, Suite 140
Mill Creek, WA 98012
www.laxcoinc.com

Contact us:
For customer service: 425-686-3081, option 1
For service support: 425-686-3081, option 2
For technical support: 425-686-3081, option 3

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