

# Phase Contrast Accessory for Lumascopes -- User Guide --



(Phase Contrast Accessory shown with Lumascope 600)

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# 1 Before You Begin

## 1.1 About the Phase Contrast Accessory for Lumascope Digital Microscopes

The Phase Contrast Accessory expands the capabilities of your Lumascope (LS) by enhancing visualization of transparent specimens including unstained samples. By using phase contrast, even living cells can be imaged in their natural state with high contrast and sharp clarity. This accessory can also be used to obtain high quality brightfield images.

**NOTE:** Lumascopes are to be used for research and educational purposes only.

## 1.2 Technical Support

For technical support, please contact Etaluma, Inc. at:

Tel: 760-298-CELL (2355)

E-mail: [info@etaluma.com](mailto:info@etaluma.com)

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# 2 Safe Operation of the Phase Contrast Accessory and Lumascopes

**IMPORTANT:** To ensure safe operation of the Phase Contrast Accessory with Lumascope Digital Microscopes, read this User Guide and follow all instructions and safety precautions to avoid hazards during set up and operation. Safe operation is the responsibility of the user. If you have questions or are uncertain about any information, contact Etaluma, Inc. or any authorized service provider before operating or obtaining service for any of the instruments.

## 2.1 Safety Considerations

### **WARNING**

Alerts you to important safety information or conditions where physical harm to the user or damage to the instrument is possible.

### **CAUTION**

Alerts you to important safety information.

## 2.2 General Safety

Place the Phase Contrast Accessory on a stable, level surface capable of supporting a minimum of 6.5 pounds (3 kg). Do not allow liquids to spill into the opening in the Lumascope™ stage. Do not use if cables have been damaged.

## 2.3 Eye Safety

The fluorescence excitation LEDs contained in Lumascopes 620, 600 and 500 are very bright to ensure detection of faint fluorescent signals. Each is directed upward through the objective and the opening in the Lumascopes stage.

**WARNING** DO NOT LOOK INTO LIGHT FROM THE LED!

## 2.4 Electrical Safety

Lumascopes are typically operated via power via the USB cable from the computer used to visualize the images and without external electrical power. Excitation LED brightness may be limited, depending on the USB port power capabilities of the computer. Lumascopes 620/600/500 can also be operated on 12 volt DC power supplied by the included transformer plugged into a standard 110 volt AC outlet. For any questions concerning instrument configuration, contact Etaluma, Inc.

**CAUTION** The USB cable connecting to the computer used to visualize the images also provides electrical power to the Lumascopes. To disconnect all power from the Lumascopes, disconnect the USB cable from the Lumascopes and, if external electrical power is used, unplug the power cord from the AC outlet.

# 3 Operation of the Phase Contrast Accessory

## 3.1 Unpacking the Phase Contrast Accessory

The Phase Contrast Accessory consists of the following (see Fig. 1 below):

- 1 Base
- 2 Phase Slider
- 3 Phase Mask
- 4 Support Post
- 5 Post Extension
- 6 Support Collar with Tightening Lever
- 7 LS 500/400 Phase Signal Cable
- 8 Illumination Condenser with Support Bracket
- 9 LS 500/400 Phase Power Cable (comprised of electrical cable with plug and power supply)
- 10 Power Extension Cable for LS 500/400 Phase Power Cable (extends the cable that connects to the Condenser)
- 11 LS 620/600 Phase Power/Signal Cable



Fig. 1. Phase Contrast Accessory components

### 3.2 Assembly of the Phase Contrast Accessory for LS 500/400

- 1 Screw the Support Post into the Base and tighten until snug (Fig. 2).
- 2 With the Tightening Lever of the Support Collar in the open position, slide the Support Collar over the Post and allow it to slide to the bottom (Fig. 2).
- 3 Place the Lumascope on top of the Base so that it is centered (approximately) over the circular plate of the Base.
- 4 Place the Support Bracket of the Condenser over the Post and allow it to slide down the Post until the top of the Bracket is approximately even with the top of the Post (Fig. 3). Raise the Support Collar until it meets the bottom of the Condenser Support Bracket and rotate the Tightening Lever so the Collar is stationary and supports the Condenser. The Condenser will still be able to rotate around the Post.
5. Measure the distance between the bottom of the Condenser and the height of a sample if placed on the stage. This distance should be approximately 7.2 cm. Adjust the height of the Condenser by loosening the Tightening Lever and sliding the Condenser Bracket up or down until the proper height is achieved.

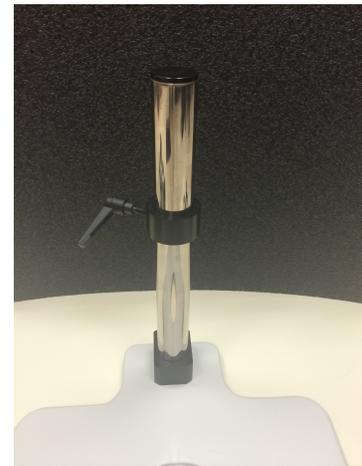


Fig. 2. Assembly of Base, Support Post, and Support Collar.



Fig. 3. Placement of the Condenser Support Bracket on the Post

### 3.3 Assembly of the Phase Contrast Accessory for LS 620/600

- 1 Screw the Support Post into the Base and tighten until snug.
- 2 Screw the Post Extension into the top of the Support Post (Fig. 4).
- 3 With the Tightening Lever of the Support Collar in the open position, slide the Support Collar over the Post and allow it to slide to the bottom (Fig. 4).
- 4 Place the Lumascope on top of the Base so that it is centered (approximately) over the circular plate of the Base.



Fig. 4. Support Post with Post Extension and Support Collar.

- 5 Place the Support Bracket of the Condenser over the Post and allow it to slide down the post (See Fig. 3) until the bottom of the Condenser is approximately 3 inches above the Lumascope stage. Raise the Support Collar until it meets the bottom of the Condenser Support Bracket and rotate the Tightening Lever so the Collar is stationary and supports the Condenser. The Condenser will still be able to rotate around the Post.
- 6 Measure the distance between the bottom of the Condenser and the height of a sample if placed on the stage. This distance should be approximately 7.2 cm. Adjust the height of the Condenser by loosening the Tightening Lever and sliding the Condenser Bracket up or down until the proper height is achieved.

### 3.4 Cables and Controls for LS 500/400 Operation

- 1 Assemble the LS 500/400 Phase Power Cable by inserting the electrical cable with plug into the power supply. Insert the round male end of the LS 500/400 Phase Power Cable into the port on top of the Condenser labeled “LED CONTROLLER” (Fig. 5), and plug the other end into an electrical outlet. If the distance to the outlet requires a longer cable, connect the round female end of the Power Extension Cable with the round male end of the LS 500/400 Phase Power Cable, and insert the round male end of the Power Extension Cable into the port on top of the Condenser labeled “LED CONTROLLER”.
- 2 Switch the ON/OFF switch of the LS 500/400 Phase Power Cable to the “ON” position, and verify that the green indicator light labeled “POWER” on the power supply is lit. Turn the switch labeled “B” (upper) on the right side of the Lumascope to the “ON” position.



Fig. 5. Cables and controls for Phase Contrast Accessory operation with LS 500/400.

3 Insert the square end of the LS 500/400 Phase Signal Cable into the port on top of the condenser labeled “TO LUMASCOPE ONLY!” (Fig. 5) and the other USB end into the USB port on the back of the Lumascope (Fig. 6). This connection allows Lumaview 500/400 to turn the Condenser LED on and off.

4 Turn the ON/REMOTE switch on the top of the Condenser (Fig. 5) to the ON position for manual control and the REMOTE position for Lumaview control.



Fig. 6. Back of Lumascope 500/400, showing USB port into which the LS 500/400 Phase Signal Cable is inserted.

### 3.5 Cables and Controls for LS 620/600 Operation

1 Insert the white end of the LS 600 Phase Power/Signal Cable into the port on top of the Condenser labeled “LED CONTROLLER” (Fig. 7) and the other end into the round port on the left side of the Lumascope back (labeled A in Fig. 8). DO NOT plug the Cable into the round port near the USB cable port on the right side of the Lumascope back (labeled C in Fig. 8).

2 In Lumaview 620/600, the condenser light is controlled by the “White LED” settings in the Illumination Settings dialog box. This allows Lumaview 620/600 to turn the Condenser on and off.



Fig. 7. Power/Signal Phase Cable for Phase Contrast Accessory operation with LS 620/600.

### 3.6 Adjusting the Vertical Illumination Position

1 Remove the Lumascope from the Base.

2 For **LS 500/400**, turn the illumination on by either 1) manually turning the switch on top of the condenser to the ON position, or 2) in the REMOTE position, control through Lumaview 500. For Lumaview control, open Lumaview 500 and with the cursor in the Live Image window, right click and open Illumination Settings. Ensure that the White LED box is checked.

3 For the **LS 620/600**, turn the illumination on by either 1) manually turning the switch on top of the condenser to the ON position, or 2) in the REMOTE position, control through Lumaview 600. For Lumaview control, open Lumaview 600 and with the cursor in the Live Image window, right click and open Illumination Settings. Ensure that the White LED box is checked and control brightness using the slider.

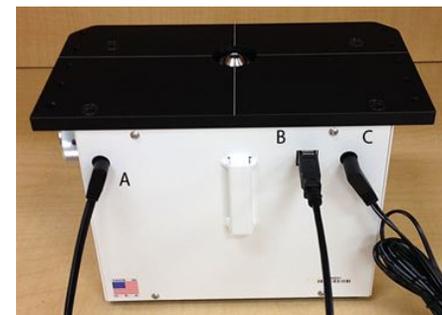


Fig. 8. Back of Lumascope 620/600, showing (A) port for the LS 620/600 Phase Power/Signal Cable.

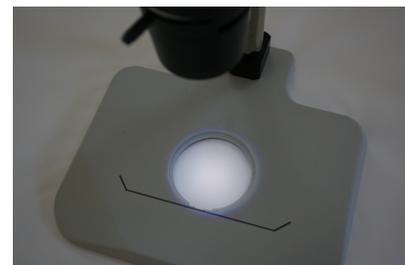


Fig. 9. Properly aligned illumination.

4 Adjust the Condenser so that the illumination is centered over the circular plate in the Base (Fig. 9). Tighten the knob on the back of the Condenser Support Bracket so the Condenser can no longer rotate around the Post.

5 Insert the Phase Mask into one of the three circular openings in the Phase Slider with “Ph\_” facing up. Objectives with > 4x magnification are used with the Ph1 mask; 4x objectives are used with the Ph0 mask. Ensure that the Mask is centered in the opening. If the Mask is not centered in the circular opening, use a 1.5 mm hex wrench to adjust the Mask set screws on the Slider.

6 Insert the Phase Slider into the Condenser horizontally so that the three notches along one long edge face toward the Condenser Support Bracket (see photo on first page). When moving the Slider back and forth to center any of the three positions with the Condenser, you should feel a distinct “click” as it settles into position.

7 Ensure that the illumination with the Mask rings is centered over the circular plate in the Base (Fig. 10). Move the Lumascope back onto the Base and ensure that the illumination with the Mask rings is centered on the objective. If the Mask is not centered on the circular plate or the objective, use a 1.5 mm hex wrench to adjust the Mask set screws on the Slider.

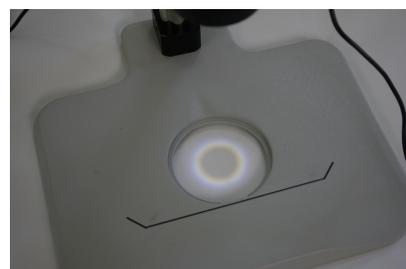


Fig. 10. Properly aligned illumination with Phase Mask in place.

### 3.7 Acquiring a Brightfield Image

Open Lumaview on your computer and place the sample on the Lumascope stage. With the Slider in position with no mask, adjust the illumination brightness by moving the horizontal lever on the Condenser front and/or the circular knob on the LS 500/400 Phase Power Cable (latter for **LS 500/400** only). Focus the image using the focus knob on the Lumascope.

### 3.8 Acquiring a Phase Contrast Image

Move the Phase Slider so the Phase Mask is centered within the Condenser and focus the image using the focus knob on the Lumascope. Adjust the illumination brightness by moving the horizontal lever on the Condenser front. When imaging on an LS 620/600, illumination brightness may also be adjusted by moving the White LED slider in the Lumaview Illumination Settings dialog box.

Small adjustments in the height of the condenser and/or shifts in the Lumascope's position on the Base may also provide more phase contrast. To change the height of the condenser, turn the two knobs (they move together) on the side of the Condenser Support Bracket, e.g., rotating the knobs clockwise when looking from the right side raises the Condenser. The two side knobs can be tightened so as to ensure the Condenser stays at the desired height by holding the left side knob firmly while turning the right side knob (labeled “TENSION” with arrow) clockwise.

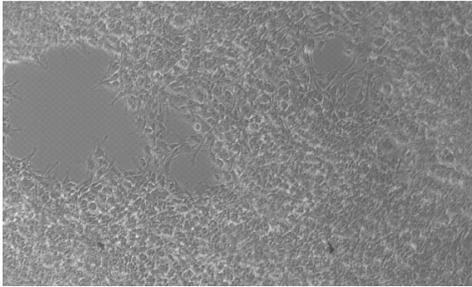


Fig. 11. Phase contrast image of 13-week fetal-derived human neural stem cells at 20x.

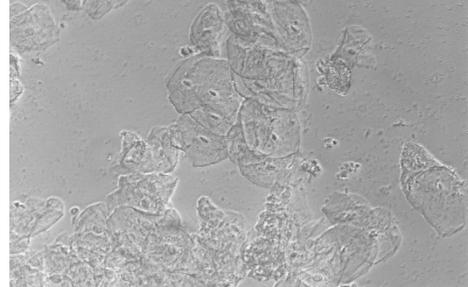


Fig. 12. Phase contrast image of human buccal cells at 40x.

## **4 Warranties and Disclaimers**

### **4.1 Standard Warranty**

Following are the terms for the standard warranty provided for the Phase Contrast Accessory.

#### **Limited Warranty**

Etaluma Inc. warrants that each unit manufactured by Etaluma Inc. is free from defects in workmanship and material for twelve months from the date of delivery. This warranty does not apply to any Unit that has been subjected to misuse, misapplication, neglect (including without limitation, inadequate or unauthorized maintenance by third party), accident, or improper installation, modification, adjustments, or repair. Products supplied by Seller, but manufactured by others, are warranted only to the extent of the manufacturer's warranty. All products are warranted F.O.B. Point of Manufacture.

#### **Disclaimer of Warranty**

The foregoing warranty constitutes Seller's only warranty in connection with any sale, and is in lieu of all other warranties expressed or implied, written or oral: THERE ARE NO IMPLIED WARRANTIES OR MERCHANTABILITY OR FITNESS OF ANY PRODUCT FOR A PARTICULAR PURPOSE.

#### **Exclusive Remedy**

BUYER'S SOLE AND EXCLUSIVE REMEDY AND ETALUMA'S SOLE AND EXCLUSIVE OBLIGATION AND LIABILITY FOR BREACH OF THE LIMITED WARRANTY SHALL BE LIMITED TO REPAIRING OR REPLACING THE PRODUCT FOUND BY SELLER TO BE DEFECTIVE OR NONCONFORMING.

At Seller's request, Buyer shall send, at Buyer's expense, any allegedly defective product to the facility where it was manufactured.

The remedy set forth above is exclusive. The repair or replacement of the product constitutes fulfillment of all liabilities of Seller to Buyer under the warranties above-mentioned, whether based on contract, negligence of any kind, strict liability or tort, or otherwise with respect to or arising out of product furnished under the sales contract.

### **Limitation of Liability**

Buyer expressly agrees that, notwithstanding any other provisions of this contract, under no circumstances shall Seller's total aggregate liability exceed the price paid by the Buyer for the product.

BUYER EXPRESSLY AGREES THAT SELLER WILL NOT BE LIABLE UNDER ANY THEORY OF LIABILITY FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, WITHOUT LIMITATION, THE LOSS OF USE, INCOME, PROFITS, DATA, OR PRODUCTION; OR INCREASED COST OF OPERATION; OR DAMAGE TO MATERIAL, ARISING IN CONNECTION WITH THE SALE, INSTALLATION, USE OF, INABILITY TO USE, OR REPAIR OR REPLACEMENT OF SELLER'S PRODUCTS EVEN IF IT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, THE PARTIES AGREE TO THE ALLOCATION OF LIABILITY RISK WHICH IS SET FORTH IN THIS SECTION.

Buyer shall indemnify and hold Seller harmless for any claims, suits or demands from buyer's employees, workers, contractors, agents or any other persons beyond the limitation provided in this section.

### **Limitation on Claims and Actions**

Any claim by Buyer for breach of the foregoing warranty shall be deemed waived by Buyer unless submitted to Seller in writing within thirty (30) days from the date Buyer discovered or by reasonable inspection should have discovered the alleged breach and within one year from the date the Unit was delivered.

## **4.2 Disclaimers**

### **Document**

Every effort has been made to supply complete and accurate information to the Buyer. Etaluma Inc., however, makes no representations of warranties of any kind concerning the contents of this publication. Under no circumstances will Etaluma Inc. be held liable for any loss of data, property, injury to User, or other damages pertaining to or caused by the use of this publication or any omissions. Additionally, Etaluma Inc. assumes no responsibility for its use nor any infringements of the intellectual property of other third parties that would result. The information contained in this User Guide is subject to change without notice. Etaluma, Inc. reserves the right to make changes and product improvements at any time and without prior notice. Contact Etaluma, Inc. for information regarding current specifications.

## **Application and Usage**

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