

# **User Manual**

## **Binocular Compound Microscope**

**Model: CBM40X**



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## **i. Caution**

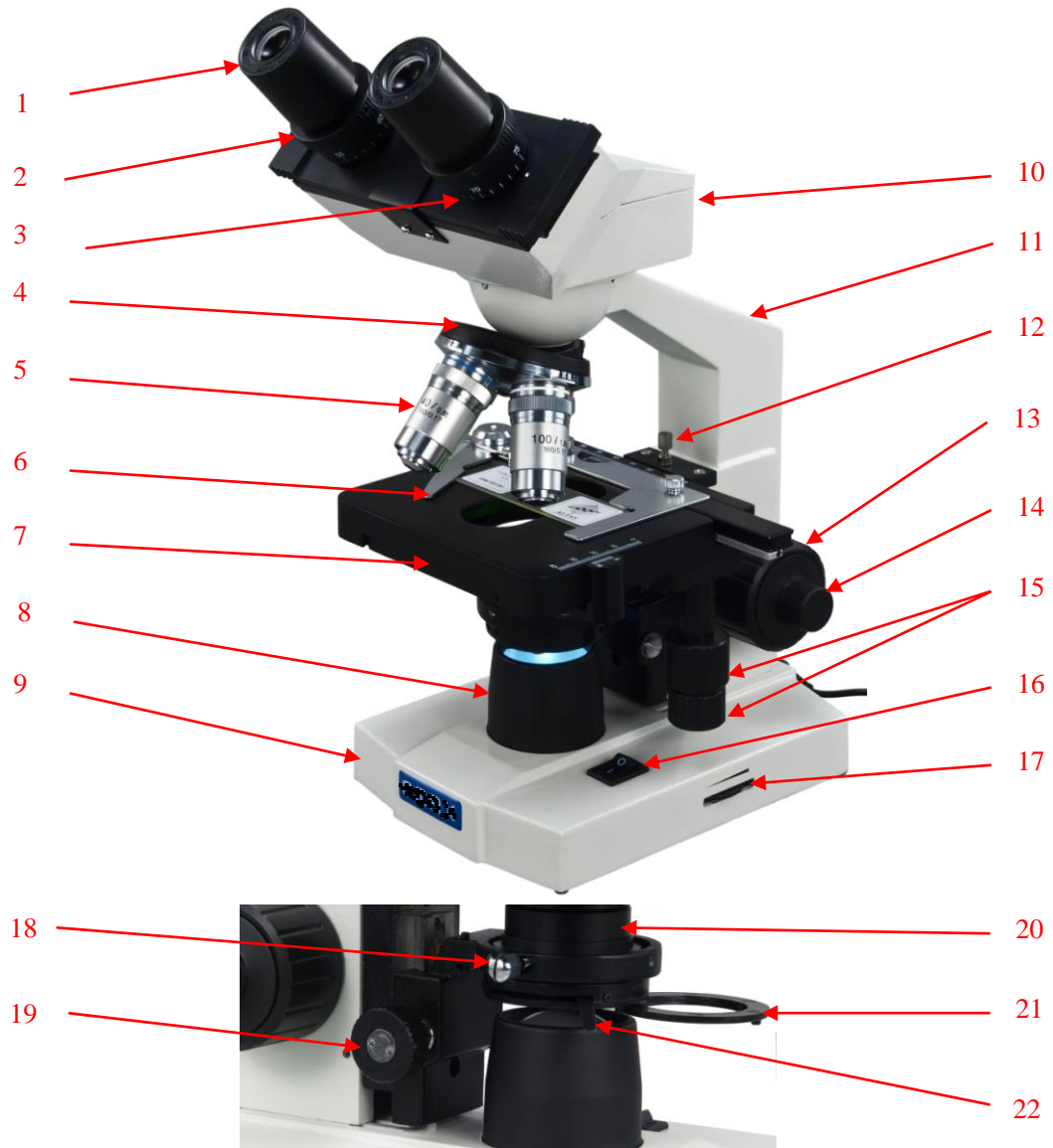
1. Open the carton carefully with a knife or paper cutter. Find the “UP” sign and place the Styrofoam container on the side that makes the arrow upward. If the “UP” sign is missing, please open the Styrofoam container gently to prevent any accessory, i.e. objectives or eyepieces, from dropping and being damaged.
2. Do not discard the molded Styrofoam container; the container should be retained should the microscope ever requires reshipment.
3. Keep the instrument out of direct sunlight, high temperature or humidity, and dusty environments. Ensure the microscope is located on a smooth, level and firm surface.
4. If any specimen solutions or other liquids splash onto the stage, objective or any other component, disconnect the power cord immediately and wipe up the spillage. Otherwise, the instrument may be damaged.
5. All electrical connectors (power cord) should be inserted into an electrical surge suppressor to prevent damage due to voltage fluctuations.
6. Confirm that the input voltage indicated on your microscope corresponds to your line voltage. The use of a different input voltage other than that as indicated will cause severe damage to the microscope.

## ii. Care and Maintenance

1. Do not attempt to disassemble any component including eyepieces, objectives or focusing assembly.
2. Keep the instrument clean; remove dirt and debris regularly. Accumulated dirt on metal surfaces should be cleaned with a damp cloth. More persistent dirt should be removed using a mild soap solution. **Do not use organic solvents for cleansing.**
3. The outer surface of the optics should be inspected and cleaned periodically using an air stream from an air bulb. If dirt remains on the optical surface, use a soft cloth or cotton swab dampened with a lens cleaning solution (available at camera stores). All optical lenses should be swabbed using a circular motion. A small amount of absorbent cotton wound on the end of a tapered stick makes a useful tool for cleaning recessed optical surfaces. Avoid using an excessive amount of solvents as this may cause problems with optical coatings or cemented optics or the flowing solvent may pick up grease making cleaning more difficult. Oil immersion objectives should be cleaned immediately after use by removing the oil with lens tissue or a clean, soft cloth.
4. Observe the specimen with the 4X, 10X and 40X objectives in order, then observe the specimen with the 100X objective. Apply the immersion oil on the slide cover with the 100X objective. Do not let the immersion oil to contact with the dry objectives lens (especially the 40X). Clean the dry objective lens using the camera cleaning kit if the immersion oil is on the dry objectives lens. Clean the 100X objective lens first using the camera cleaning kit after observing the specimen with the 100X objective, then clean the specimen. More persistent dirt should be removed using a little bit alcohol. **Do not use organic solvents for cleansing.**
5. Store the instrument in a cool, dry environment. Cover the microscope with the dust cover when not in use.



# 1 Components Illustration



- |   |                        |    |                          |    |                            |
|---|------------------------|----|--------------------------|----|----------------------------|
| 1 | Eyepiece               | 9  | Microscope Base          | 17 | Brightness Intensity Dial  |
| 2 | Diopter Adjusting Ring | 10 | Viewing Head             | 18 | Condenser Lock Thumb Screw |
| 3 | Eyepiece Tube          | 11 | Microscope Body          | 19 | Condenser Control Knob     |
| 4 | Nosepiece              | 12 | Focusing Rack Stop Screw | 20 | Condenser                  |
| 5 | Objective              | 13 | Coarse Focus Knob        | 21 | Color Filter Holder        |
| 6 | Slide Holder           | 14 | Fine Focus Knob          | 22 | Iris Diaphragm Lever       |
| 7 | Mechanical Stage       | 15 | X-Y Stage Moving Knobs   |    |                            |
| 8 | Light Collector        | 16 | Power Switch             |    |                            |

## 2 Installation

### 2.1 Installation of the binocular viewing head

- 1) Loosen the head lock thumb screw (**Fig. 1**) on the top of the microscope body.

**Note:**

The thumb screw may not be pre-installed. Please find it in the same package of the microscope.

- 2) Remove the cap on the circular dovetail of the binocular viewing head.
- 3) Insert the binocular viewing head into the top of the microscope body; ensure that the dovetail is completely seated into the socket and tighten the thumb screw.

**Caution:**

Do not release the viewing head from your hand grip until you are sure the viewing head is installed securely.



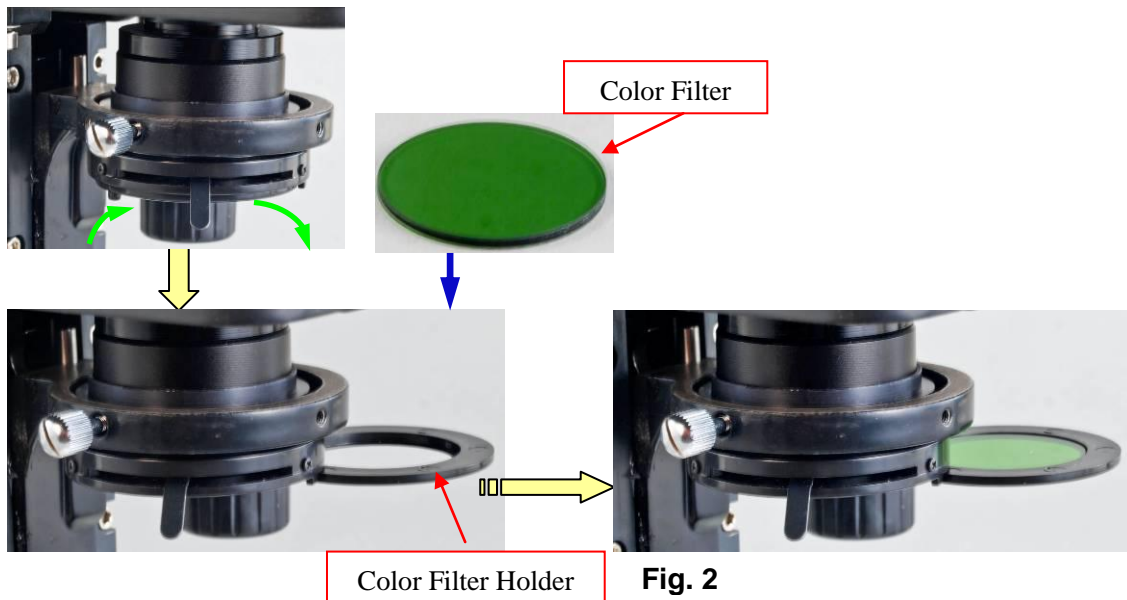
**Fig. 1**

### 2.2 Installation of the eyepieces

- 1) Remove the protective caps from the eyepiece tubes.
- 2) Insert the eyepieces into the eyepiece tubes.

### 2.3 Installation of the glass filter

- 1) Swing out the color filter holder under the condenser.
- 2) Place the filter into the holder as shown in **Fig. 2**, swing the holder in.



### 2.4 Installation of the camera (optional, may not be included in your package)

- 1) Take off the eyepiece from the eyepiece tube.
- 2) Insert the camera into the eyepiece tube, and then connect the camera to a computer via USB2.0 cable. See **Fig. 3**.
- 3) The manual for the camera is on a CD (or mini CD).



**Fig. 3**

Refer to the manual to install the driver and software on to the computer.

- 4) The camera is optional and may have different color and shape from the one in the figure, depending on the model purchased.

### 2.5 Installation of the dry darkfield condenser (*optional, may not included in your package*)

See section 7 (*Dry Darkfield Condenser Installation & Operation Instruction*)

## 3 Operation

### 3.1 Adjusting illumination

- 1) Plug the power cord into the power socket on the microscope and connect it to the power outlet.
- 2) Turn on the power switch.
- 3) Rotate the brightness intensity dial to increase or decrease the brightness.

### 3.2 Placing specimen

- 1) Place the slide on the mechanical stage.
- 2) Use the slide holder to gently secure the slide.
- 3) Turn the X and Y stage moving knobs to position the specimen in the center of viewing field.

#### Caution:

Be sure not to allow an objective to touch a specimen slide when changing objectives.

### 3.3 Adjusting interpupillary distance

While observing with both eyes, hold the left and right eyepiece tubes and slide the tubes in and out. The interpupillary distance is correct when the left and right fields of view converge completely into one image.

### 3.4 Adjusting eyepiece diopter

- 1) Rotate the 10x objective into position.
- 2) Rotate the diopter ring on the right eyepiece tube until its numerical value is the same as your interpupillary distance, for example, 70 in the right figure (See **Fig. 4**).
- 3) Close your left eye and bring the specimen into focus following the focusing procedures in 3.5.
- 4) Close your right eye and bring the same specimen into clear sharp focus by adjusting the diopter ring on left eyepiece tube only. Do not use focus knobs at this step.
- 5) Since both sides are adjustable, you may also do the above in the opposite way, in other words, left eye first and right eye second.

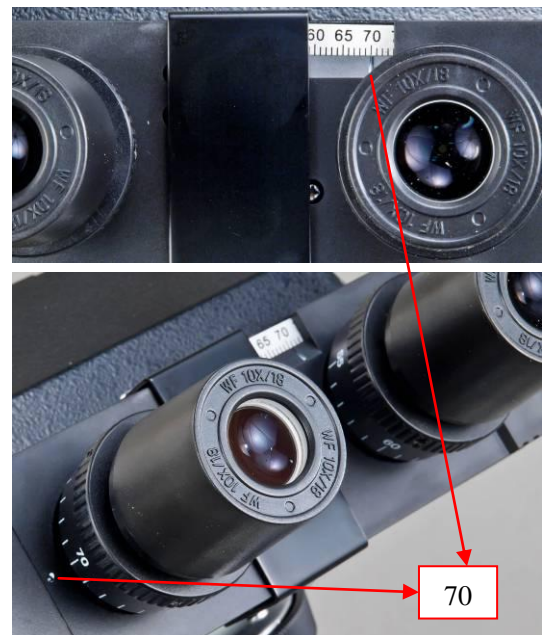


Fig. 4

### 3.5 Focusing

- 1) With the 10x objective in position, raise the mechanical stage using the coarse focus knob until the specimen is close to the objective
- 2) Turn the coarse focus knob until the specimen is in focus. Use the fine focus knob to obtain a sharp image. You may now switch to another magnification objective.
- 3) To get a good focused image, you may need to combine the focus knob adjustment and interpupillary distance adjustment, along with eyepiece diopter adjustment stated in **3.3** and **3.4**.



**Fig. 5**

#### Tips:

To prevent your specimen slide from making contact with an objective, turn the 100X objective in position and adjust the focusing rack stop screw (**Fig. 5**) so that the 100X objective will not contact the specimen while the stage is adjusted to its highest position. Give the stage a tiny extra moving space to ensure the objective can be focused every time.

### 3.6 Applying the immersion oil

- 1) Rotate the objective nosepiece to seat the observing position between the 40X and 100X objectives as shown in **Fig. 6 (a)**.
- 2) Place a drop of immersion oil on the slide cover as shown in **Fig. 6 (b)**.
- 3) Rotate the objective nosepiece to seat the 100X objective to the observing position until you hear a “click” sound.
- 4) After observing the specimen, use the camera cleaning kit to clean the 100X objective lens gently and the specimen in time.
- 5) If it is hard to clean, you need a little bit alcohol to clean the 100X objective lens and the specimen.



**(a)**



**(b)**

**Fig. 6**

#### Caution (important):

- When you use the 100X objective to observe the specimen, you have to finish observing the specimen with the 4X, 10X, 40X objectives.
- When you use the 100X objective to observe the specimen, you have to apply the immersion oil on the top of the slide cover.
- When you apply the immersion oil with the 100X objective, do not let the immersion oil to contact with the dry objective lenses (especially the 40x). If the immersion oil is on the dry objectives lens, please use the camera cleaning kit to



clean the objectives lens in time. The oil will damage the dry objective lenses.

- After observing the specimen with the 100X objective, clean the 100X objective lens first.

### 3.7 Adjusting condenser

- 1) Turn the condenser focus knob to raise or lower the condenser.
- 2) Raise the condenser when using high power objectives and lower it when using low power objectives.

#### Note:

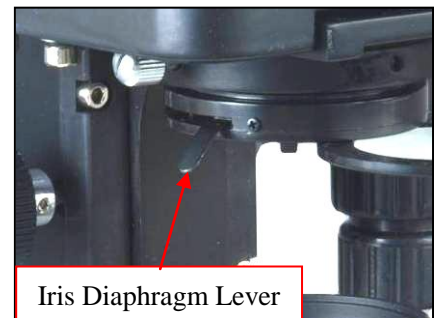
- The centering of the condenser and the light axis of the objective are factory adjusted. Do not attempt re-adjustment.
- The highest position of the condenser has been factory adjusted. Do not attempt re-adjustment.

### 3.8 Adjusting iris aperture diaphragm

Swing the iris diaphragm lever (**Fig. 7**) left or right to adjust the aperture size.

#### Note:

The iris diaphragm is designed to adjust the aperture size, not to adjust the brightness although the brightness will be changed when it's adjusted. When aperture is adjusted to smaller size, the contrast will be increased and the depth of field will be increased as well. Turn up the intensity of the light if the image is too dim.



**Fig. 7**

### 3.9 Camera (*optional, may not included in your package*)

- 1) Bring the microscope into focus by following the procedures in **3.5**.
- 2) Install the camera by following the procedures in **2.4**.
- 3) Open image observing software to examine.
- 4) You also can capture images or record live videos through the software, depending on the functions provided by the software.

#### Note:

Please refer to the manuals in the camera's CD for the details of installation and operation of the camera.

### 3.10 Dry Darkfield condensers observation (*optional, may not included in your package*)

See section 7 (*Dry Darkfield Condenser Installation & Operation Instruction*)


## 4 Specifications

<b>General</b>	
Model	CBM40X
Total Magnification	40X, 100X, 400X, 1000X
Viewing Head	Binocular, inclined 45°, swiveling 360°
Interpupillary Distance	Sliding adjustment, 2-3/16" ~ 2-15/16" (55mm ~ 75mm)
Diopter Adjustment	On both eyepiece tubes
Eyepieces	1 pair of wild field WF10X/18
Nosepiece	Revolving quadruple
Objectives	Achromatic DIN 4X/0.10 160/0.17 10X/0.25 160/0.17 40X/0.65 160/0.17(spring), 100X/1.25 160/0.17(spring, oil)
Condenser	Abbe, NA=1.25, w/ iris diaphragm Rack and pinion adjustment
Focus Mechanism	Coaxial coarse and fine focusing knobs on both sides with rack stop
Mechanical Stage	Double layer, dimension: 4-1/2" x 4-15/16" (115mm x 125mm) X-Y translational range: 2-13/16" x 1-3/16" (70 mm x 30 mm)
Illumination	Transmitted, LED, variable intensity
Cameras ( <i>optional</i> )	Refer to the cameras specifications
Dry Darkfield Condensers ( <i>optional</i> )	Refer to the Dry Darkfield Condensers Installation & Operation Instruction
Power Supply	AC/DC adapter, 100V-240V (UL approved)
Dimension	9-1/16" x 7-1/8" x 13" (23cm x 18cm x 33cm)
Net weight	7 lbs 2 oz (3.25 kg)




## 5 Optional Parts

(The optional parts may be included in some models or sold separately.)

### 1) Darkfield Condensers

	Model	Darkfield Condenser	Numerical Aperture	Objective	Mounting Size(diameter)
	C191	Dry	0.7-0.9	-	37mm

### 2) Cameras

	Model	Resolution	Operating System	Software
	C1502	640 x 480 (0.3MP)	MS Windows Mac OS X 10.6-10.8	Included
	C35134	1280 x 1024 (1.3MP)	MS Windows Mac OS 10.8 and up Linux (2.6 or above)	
	C3520U	1600 x 1200 (2.0MP)		



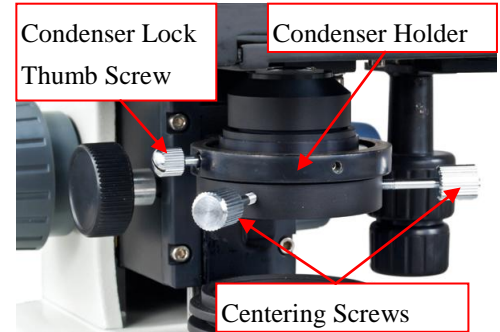
## 6 Troubleshooting Guide

Problem	Cause	Solution
Lamp does not light when switched on	No electrical power	Check power cord connection
	LED or power unit dead	Contact seller for service
Darkness at the periphery	Revolving nosepiece not in click stop position	Revolve the nosepiece to click-stop position by swinging the objective correctly into the optical path
Uneven brightness in the field of view	The diffusion filter is not in the light path	Check the diffusion filter and make sure it's in the light path
Insufficient brightness	Diffusion filter used when using 100X objective	Swing out the diffusion filter when using 100X objective
Dirt or dust on the view	Dirt or dust on the lens eyepiece, condenser, objective, collector lens or specimen	Clean the lens with a camera cleaning kit
	Dirt or dust on the specimen	Clean the specimen
Poor image quality or not able to get focused image	No slide cover attached to the slide	Attach a 0.17mm slide cover
	Slide cover is too thick or thin	Use a slide cover of the appropriate thickness (0.17mm)
	Slide may be upside down (specimen at the bottom)	Turn slide over so the cover-glass faces up
	Diopter adjustment is not set properly	Readjust the diopter settings
	Immersion oil is on a dry objective (especially the 40X)	Check the objectives, clean if necessary
	No immersion oil used with 100X objective	Use immersion oil
	Air bubbles in immersion oil	Remove bubbles
	Specimen rises from stage surface	Secure the specimen in the slide holder
	Condenser aperture is closed or open too much	Open or close properly
	Condenser is positioned too low or too high	Move condenser upper or lower
Image is black screen through camera ( <i>optional</i> )	No enough lighting or driver not installed properly	Adjust the light intensity by rotating the intensity control dial
		Check the camera manual
Image is totally white through camera ( <i>optional</i> )	The light is too bright	Manually adjust the exposure in the software. See manual for details.

## 7 Dry Darkfield Condenser Installation & Operation Instruction

### 1) Mounting the dry darkfield condenser

- Rotate the nosepiece and set the 4x objective in position.
- Loosen and raise the focusing rack stop screw to the highest position.
- Turn the coarse focus knob to raise the mechanical stage to the highest position without contacting the 4X objective.
- Turn the condenser control knob to raise the condenser to the highest position.
- Loosen the condenser lock thumb screw, pull down the condenser and take it off, insert the dry darkfield condenser in, and tighten the condenser lock thumb screw (See **Fig. 8**).
- Re-adjust the condenser height to its normal position.
- Re-adjust the mechanical stage height to its normal position.
- Lower the focusing rack stop screw back and use the bolt to lock it when needed.



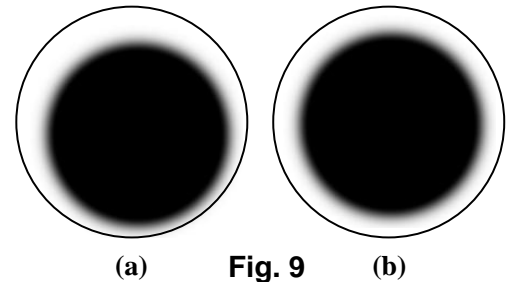
**Fig.8**

#### Note:

When raising the mechanical stage, do not make contact with the objective.

### 2) Centering the dry darkfield condenser

- Turn the 4X objective to the light path.
- Turn the condenser focus knob to lower the condenser till a dark spot showed in the viewing field as shown in **Fig. 9 (a)**.
- Turn the condenser translational centering screws to move the dark spot to the center as shown in **Fig. 9 (b)**.



**Fig. 9**

### 3) Place the slide on the stage.

### 4) Raise the condenser all the way to the top and then lower it a little bit.

### 5) Follow the procedures in this manual to bring the sample on slide in focus and observe.

### 6) Move the condenser up or down slightly to get the best darkfield viewing.

#### Note:

- The dry darkfield condenser is used with the dry objectives only.
- The dry darkfield condenser works with the 4X, 10X, 40X objectives.
- The dry darkfield condenser does not work with the 100X oil immersion objective.