

VERTICAL ILLUMINATOR

CAT. NO. 31-34-82

REFERENCE MANUAL



BAUSCH & LOMB
OPTICAL COMPANY
ROCHESTER 2, NEW YORK

BAUSCH & LOMB VERTICAL ILLUMINATOR

Attaching to Microscope

If the microscope to which the vertical illuminator is to be attached is equipped with a single or a multiple revolving nosepiece, this must first be removed. A single nosepiece is simply unscrewed from the microscope body tube adapter. A metal key is required to remove the revolving nosepiece. Remove one of the objectives from the nosepiece and set the opening in the revolving part in line with the body tube. Insert a flat metal key through the opening and engage the slots of the nosepiece retaining ring. The key used should fit the slots closely to prevent the key slipping while unscrewing the lock ring.

Remove the four locking screws (Fig. 1) from the top of the vertical illuminator; this will release the retaining ring and top plate from the body of the vertical illuminator. Screw the retaining ring, carrying the top plate, into the microscope body tube adapter, screwing it up tightly; the top plate will be free to rotate even when the retaining ring is drawn up tightly. Fasten the vertical illuminator body to the top plate, using the four locking screws. Before completely tightening these screws, orient the vertical illuminator so that the illuminating axis is pointing toward the front of the microscope, then tighten the screws securely.

Note: The vertical illuminator is primarily employed with objectives

which are designed for use with uncovered objects and for a body tube length of 215mm. When it is desired to use these objectives with the vertical illuminator on a biological type microscope with a tube length of 160mm, the difference in tube length should be compensated for by the insertion of the Cat. No. 31-34-86 Tube Length Compensating Lens. This lens screws into the female threads of the vertical illuminator retaining ring.

Illumination

The vertical illuminator has provisions for obtaining both conventional full aperture brightfield illumination and half-aperture illumination. The type of illumination in use will depend upon the position of the knurled knob which is on the left side of the vertical illuminator housing. When the knob is flush against its locating shoulder, as shown in Figs. 1 and 2, the illuminator is set for full aperture brightfield illumination; when pulled out to its greatest extent, half-aperture illumination is being used. In addition to this translatable motion, the knurled knob can be rotated through a small angle; the proper angular setting of this knob will be described below. Since full aperture brightfield illumination is the most extensively used of the two forms of illumination, we shall treat it in more detail first.

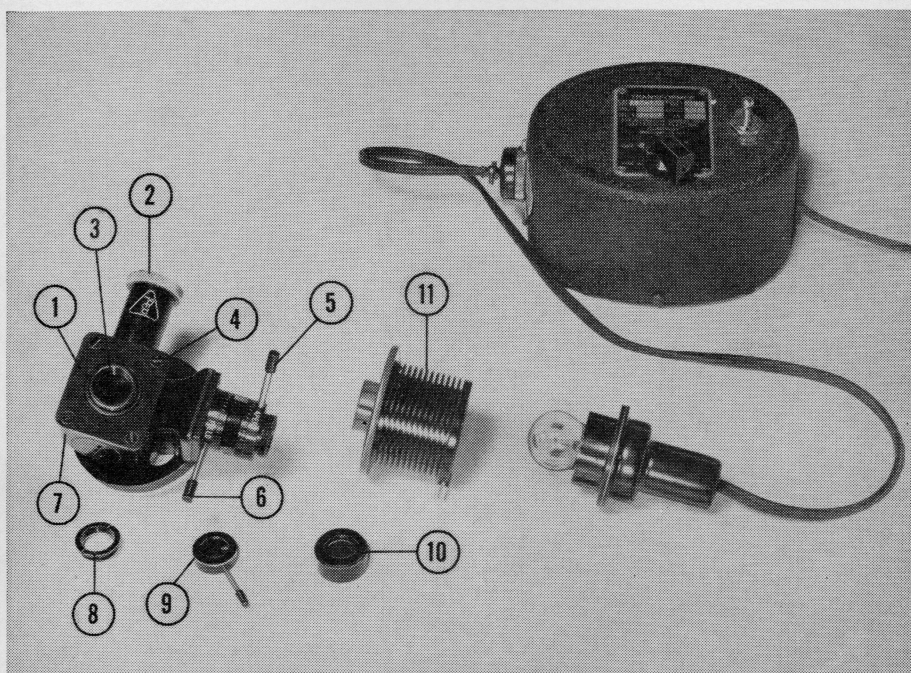


Figure 1

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|------------------------------|----------------------------------|
| 1. TOP PLATE | 6. FIELD DIAPHRAGM HANDLE |
| 2. KNURLED KNOB | 7. ACCESS HOLE PLUG |
| 3. RETAINING RING | 8. TUBE LENGTH COMPENSATING LENS |
| 4. LOCKING SCREW | 9. FILTER |
| 5. APERTURE DIAPHRAGM HANDLE | 10. SUPPLEMENTARY LENS |
| | 11. CLAMP SCREW |

Two iris diaphragms, one for aperture and the other for field control, are provided in order that the microscope can be used with its greatest effectiveness. The following procedure is recommended. Using the desired eyepiece and objective, focus the microscope on a polished specimen. Close the field diaphragm until its image comes into the field of view. Rotate the knurled knob until the field diaphragm image is centered to the field of view. Open the field diaphragm until its image is just outside of the field of view. Adjust the aperture diaphragm

until the image exhibits the optimum balance between contrast and resolution. The diaphragms are now adjusted to provide the best possible image for the objective, eyepiece, and specimen in use. Never use the aperture diaphragm to control the intensity of illumination—loss of contrast or resolution is sure to result.

To obtain half-aperture illumination, pull the knurled knob out to its greatest extent. Adjust the diaphragms as described above for full aperture brightfield illumination. Half-aperture illumination is essentially a form of

oblique illumination and finds its principal application in specimens showing considerable surface relief. Its use is recommended only for the longer focal length, lower power objectives.

A filter slot, located between the two iris diaphragms, is provided for the green filter (Cat. No. 31-34-94) or the Polaroid Polarizer (Cat. No. 31-34-95). A sliding cover closes the filter slot against dust when no filter is in use or serves to hold the filter securely in place when introduced. The cover slides around the illuminator tube and should be moved by its knurled handle.

To examine a specimen in polarized light, the Polaroid Polarizer should be inserted in the filter slot with its handle in the vertical position. The vibration direction of this polarizer is parallel to the slot in the rim of the mount, i.e., perpendicular to the handle. If the handle of the polarizer disc is tilted away from the vertical, the polarizing action occurring at the reflector surface in the vertical illuminator causes the light to become elliptically polarized, and complete extinction by an analyzer is not possible. Full aperture brightfield illumination is preferable to the half-aperture illumination for polarized light work. The Cat. No. 31-57-11 Cap Analyzer is recommended; this analyzer cups on over the eyepiece and can be oriented in any desired direction.

Specimen Mounting

If a satisfactory image of a specimen is to be obtained which is symmetrical over the field of view, it is essential that the specimen surface be not only flat, but also perpendicular to the optical axis of the microscope. The microscope stage is adjusted at the factory so that it is perpendicular to the axis, but it is

left to the microscope user to take the necessary precautions to mount the specimen so that it will be parallel to the stage surface. A specimen holder (Cat. No. 31-59-12) is available for mounting small specimens in plasticene or similar material so that the surface under study will be parallel to the stage surface.

Illuminating Unit

When the microscope is to be used primarily for visual observation, it is recommended that the Cat. No. 31-33-32-11 Illuminating Unit, which attaches directly to the vertical illuminator, be used. This unit employs a 6.5v, 2.75 amp lamp (Cat. No. 31-31-79) which must be operated through a resistance or transformer. The Cat. No. 31-36-45 Adjustable Transformer, the Cat. No. 31-36-47 Fixed Transformer, and the Cat. No. 31-36-44 Resistance are available for use with 115v line voltages.

Lamp Replacement

To remove the lamp socket assembly from the lamphouse, first loosen the clamp screw at the rear of the housing. Withdraw the socket assembly from the lamphouse. Remove the lamp from the socket by rotating the lamp about one-quarter turn counterclockwise. This will release the prefocusing flange from the holding pins, permitting the lamp to be lifted from the socket. To insert a new lamp rotate the prefocusing flange on the lamp base to align the slots with the holding pins in the socket and rotate the lamp clockwise to lock it in place. (The lamp may be inserted in the socket in one position only as determined by the slots in the

flange.) Insert the socket assembly into the lamphouse and lock it in place by tightening the clamp screw.

When ordering replacement lamps, specify Cat. No. 31-31-79.

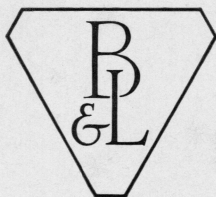
Separate Light Sources

If more intense illumination is desired than that supplied by the Cat. No. 31-33-32-11 Illuminating Unit, which attaches directly to the vertical illuminator, it will be necessary to use one of the more powerful units such as the Cat. No. 42-44-65 Illuminating Unit, which uses a 6v, 108 w ribbon filament lamp or the Cat. No. 42-44-85-65 Illuminating Unit which uses a 115v clock feed arc lamp. When using such external light sources, the Cat. No. 31-34-85 Supplementary Lens should be attached to the vertical illuminator. This lens mounts on the same threads as the attachable lamphouse. The proper arrangement of the apparatus is as follows. Place the illuminating unit approximately 6" from the vertical illuminator; the axis of the illuminating unit being at the same height as that of the horizontal axis of the vertical illuminator when the microscope is focused on the specimen under examination. The condenser lens of the illuminating unit should be focused to give an image of the light source on the supplementary lens. Adjust the vertical illuminator reflector plate so that the field diaphragm image of the vertical illuminator is centered to the field of view. Close the iris diaphragm of the illuminating unit until it (or its out of focus image) is visible in the microscope field. Adjust the distance between the microscope and the illuminating unit until this diaphragm comes into best focus (the microscope still focused on the specimen). Adjust the height of

the illuminating unit and/or the horizontal axis of the vertical illuminator until this diaphragm image is centered in the field of view. Adjust the tilt of the illuminating unit, if necessary, to center the image of the light source to the supplementary lens. Check the image of the field diaphragm again. By alternately adjusting the height and tilt of the illuminator, it will be possible to bring the light source image focused on and centered to the supplementary lens at the same time that the illuminating unit diaphragm is focused on and centered to the field of view. The two iris diaphragms on the vertical illuminator will continue to perform the same functions as described on page 4 and should be adjusted accordingly.

Cleaning the Reflector Plate

To minimize the necessity of cleaning the vertical illuminator reflector plate, one should always make it a practice to keep an eyepiece in the microscope and objectives on the nosepiece, and to keep the microscope covered when not in use. The reflector plate is very thin and, consequently, very fragile; extreme care should be exercised when cleaning this plate. An access hole is provided on the right side of the vertical illuminator body; remove the access hole plug, reach inside with a small camel's hair brush, and gently brush the dust off the plate. If necessary, the whole reflector plate mount may be removed from the vertical illuminator body by removing the four small screws on the left side of the body. Once again, exercise the utmost care when so doing to avoid striking the reflector plate against any part of its housing. Two locating pins will ensure the reflector plate mount being located properly when replaced.



Sketched below are the main offices and works of the Bausch & Lomb Optical Co., at Rochester, New York. There are other Bausch & Lomb plants in Rochester, N. Y.; Midland, Ontario, Canada; and Rio de Janeiro, Brazil. Sales offices are in many of the larger cities.

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