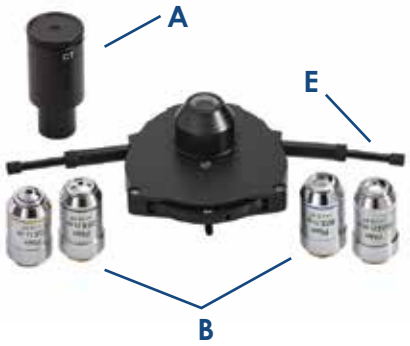
Phase Contrast

Instruction Manual



Mi5 Microscope



Innovation Microscope

i4 Microscope

A	Centering Eyepiece
B	Phase Objectives
C	Turret Condenser
D	Phase Alignment Wheels
E	Phase Alignment Rods

Introduction

Living cells, microorganisms, organelles, fibers, and protists come into view easily with the LW Scientific Phase Contrast systems. The Phase Contrast systems alter the path of transmitted light to make live and unstained or transparent objects easy to see, providing for excellent contrast and interior cell structure detail not visible under normal bright-field microscopy. The Phase Contrast system is available with the i4, Mi5, and Innovation microscopes.

Each Phase Contrast kit includes three components:

- "Turret" phase condenser, with both bright-field and 10X, 20X, 40X, and 100X phase settings
- 10X, 20X, 40X, and 100XR oil phase objectives
- Centering / Telescoping eyepiece

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Installation

Remove the normal bright-field condenser from the microscope. Store it carefully in a dust-free container. Move the stage to its highest position.

Install the phase turret condenser into the condenser holder. Insert the turret with the condenser lens pointing upward by sliding the turret into the horseshoe shaped condenser holder on the microscope. Make certain the metal pin on the underside of the condenser is aligned with the slot on the back of the condenser holder, and be sure the condenser is centered under the objective. When the turret is in place, tighten the thumbscrew on the microscope condenser holder until the turret is firmly installed.

i4 Microscope: The turret condenser has two phase alignment wheels attached under the front edge of the turret.

Mi5 Microscope: The two phase alignment rods are to be threaded into the rear left and right of the turret.

Innovation Microscope: The two phase alignment rods remain unattached and will be inserted later.

Install the phase objectives onto the microscope nosepiece. The phase objectives can be used for both phase and bright-field.

Bright-Field Applications

With the phase turret and phase objectives installed, simply turn the condenser wheel to the bright-field position ("BF" or "0").

The iris diaphragm, used to set the light aperture, is located on the turret condenser as follows:

i4 Microscope: The iris diaphragm of the turret phase condenser is functional when the turret wheel is set on "BF". Slide the thumb tab just below the "BF" wheel left or right to open or close the iris. (This tab is accessible only on the "BF" setting.)

Mi5 and Innovation Microscopes: The iris diaphragm of the turret phase condenser can be adjusted by rotating the metal tab on the underside of the turret phase condenser.

NOTE: Lower powered objectives have smaller apertures, so close the iris more. The iris should only be wide open when using the 100x oil objective in bright-field.

Phase Contrast Applications

The condenser creates a ring of light (like a halo) coming up through the specimen. The phase objectives have an internal darker annulus ring calibrated to match the halo from below. Once properly aligned, the light ring will be positioned underneath the dark ring (like a full eclipse), blocking the halo of light from shining directly into the user's eyes. The background will not be as bright, but the specimen will have a distinct glow as the light is refracted off the structures of the specimen. (See Figure 1 below)

Positioning The Stage and Condenser to their Highest Positions

Place a specimen slide on the stage and select the 10X objective. Turn the wheel on the turret until it is set on the matching power ("10/20" or "10"). Bring the specimen slide into focus and also raise the condenser to its highest position – nearly touching the underside of the slide.

Remove the slide and set it aside, leaving the stage in the focal plane (high position) and the condenser in its highest position for the entire alignment process.

You are now ready for annulus ring alignment for the 10x objective.

Using the Centering Eyepiece to View the Annulus Rings

Remove one of the 10x eyepieces and set it to the side. Insert the centering/telescoping eyepiece (marked "CT") into the eyetube. Adjust the microscope illumination to the maximum brightness setting and look through the centering eyepiece with one eye. Adjust the centering eyepiece to telescope outward until the annulus rings (See Figure 1 below) are in focus.

i4 Microscope: The very top portion of the CT eyepiece screws upward to focus. When in focus you should see a dark ring and a bright ring of light in the field of view as pictured in Figure 1.

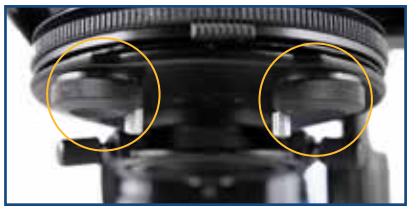
Mi5 and Innovation: Unscrew the silver set-screw on the side of the CT eyepiece and raise the top portion to focus. Once annulus rings are in focus, tighten the set-screw to hold the top portion of the CT eyepiece in place. You should see a dark ring and a bright ring of light in the field of view as pictured in Figure 1.

Annulus Ring Alignment Process

When the annulus rings are in focus you are ready to begin the alignment process. Each objective power has a corresponding position on the turret condenser. This alignment process will need to be performed for each of the phase objectives.

Figure 1

i4 Microscope: Look through the CT eyepiece. Using your thumbs, gently rotate the 2 wheels on the front underside of the condenser until the light ring is centered under the dark ring. Once centered, the wheels can be locked into place with the smaller silver thumbscrews on each wheel.



Mi5 Microscope: Make sure the two alignment rods are installed (threaded) into the rear left and right openings of the turret condenser.

Look through the CT eyepiece. Push the two alignment rods in at the rear left and right of the turret condenser, feeling when the rods engage into the internal (not visible) set screws. This process must be repeated for each magnification power, until each annulus ring is aligned individually within the turret. Once aligned, the condenser should not need to be realigned unless condenser is moved.

Innovation Microscope: Insert the two silver alignment rods into the holes at the rear of the condenser. Look through the CT eyepiece. Push the two alignment rods inward, feeling when the rods engage into the internal (not visible) set screws. Turn the two alignment rods until the light ring is centered under the darker annulus ring. This process must be repeated for each magnification power. Once aligned, the condenser should not need to be realigned unless condenser is moved. Remove the silver adjustment screws and store them in a safe place for future use.

When your rings are properly aligned, the image you see through the eyepiece should resemble a full eclipse with the light ring completely under (or within) the darker ring. (See Figure 1 above)

Remove the CT eyepiece, replace the normal eyepiece, and begin phase contrast observation. Adjust the condenser vertically to achieve the best phase contrast, starting with the condenser at the highest setting closest to the slide.

To change phase powers, simply rotate your objectives and turn the wheel on the turret condenser to the matching power.

Troubleshooting Tips

1. If you are unable to align the two rings because they are too far offset, and/or the light ring (halo) appears to be oval rather than round, make certain that the condenser is "grossly" aligned directly under the objectives. There are two alignment screws below the condenser on the condenser holder ring that will move the entire condenser front/back and left/right. The condenser needs to be centered beneath the objective before the fine adjustment of the annulus rings can be accomplished.

Gross Alignment Thumb Screws:
Used to position condenser under the objectives

2. On some objective powers you may notice more than one set of rings. To determine which are the annulus rings, simply move your turret alignment wheels or rods while observing the rings. The light ring that moves is the annulus ring that you should be viewing and aligning.

3. Follow the guidelines in your microscope manual for cleaning your Phase Contrast Kit. Lens paper, lens cleaning solution, and air can be used on your phase components. Cover your microscope and/or keep your phase kit in dust-free containers when not in use.

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