



**CYNMAR<sup>®</sup>**

## *N700 Series* Phase Contrast Microscopes

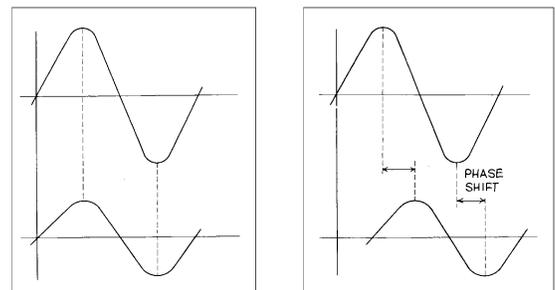
True Zernike Phase with  
Semi-Koehler Illumination



Phase contrast was devised to observe living, translucent specimens without staining, as staining will kill the living organism. Another advantage is that the movement of cilia or flagella can be seen in motion, which often helps to identify certain types of organisms.

The phase system is often called the Zernike Phase. The Dutch physicist F. Zernike received the Nobel Prize in 1953 for this work. Phase contrast is basically a method of taking a portion of the microscope light and treating it differently. The rings the user observes in the phase system shift the wavelength  $\frac{1}{4}$  of a wave, which creates the phenomenon of phase shift for the light.

By shifting the wavelength by  $\frac{1}{4}$ , the translucent invisible becomes visible within the phase system of the microscope. In the system there are phase rings within the objective, and phase rings in the condenser unit.



Carefully look at the five settings of the condenser system. The first setting is marked (0), which provides bright field microscope operations. There are 10, 20, 40, and 100 phase ring settings within the phase condenser to correspond to each objective in the nosepiece.

**NOTE:** In the Plan Phase System, the settings are 0, 10, 25, 40, and 100. The objectives are also 10, 25, 40, and 100.

Each system comes with a focusing phase tube eyepiece that is used to align the phase rings. In order for the phase system to function correctly, the phase rings must be in alignment. Each objective has a corresponding phase ring in the condenser, so when the 10x phase objective is being used, the 10x condenser phase ring needs to be turned into the optical path.

The microscope is equipped with a 20 watt halogen light and a rheostat to control the amount of light passing through the optical path. The advantage of a halogen light over a tungsten light is that the halogen does not accumulate gases inside and therefore does not affect the quality of light by becoming darker inside. In the halogen bulb, the metallic vapors are combined with iodine and redeposited on the filament. This prevents the bulb from turning darker with use. This is often referred to as a “clean bulb.”

### **OPERATING THE PHASE SYSEM**

There are two iris diaphragms, one of which is a small iris under the condenser. Both condensers are normally open, but the field iris may be closed slightly to reduce the amount of light. Keep in mind that the amount of light can be reduced by turning the rheostat down. It is best to experiment with the lighting conditions, as optimum conditions may vary depending on the particular object being observed in phase. If a video or a 35mm camera system is involved, the quantity of light may need to be reduced to get the correct exposures. Experimentation with the item under phase may be required.

In this system, three frosted, glass filters are provided: clear, blue, and green. The clear frosted filter is a neutral density filter that reduces the quantity of light without altering the quality of the light. The blue filter is used to convert the light quality to natural daylight. The green filter is often used to provide better contrast, but is also important for 35mm photography, and in many cases improves a video image. Using more than one filter at a time is not recommended.

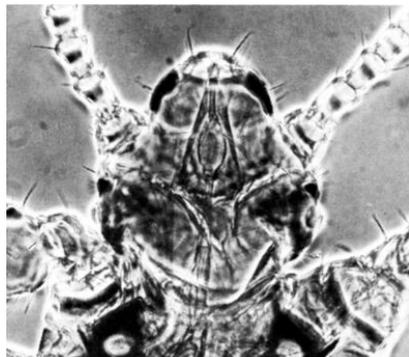
This system includes a 100x oil lens, which requires immersion oil. Place a small drop of oil on the top of the cover slip. The oil lens is then lowered into the small drop to remove the extraneous light. The oil does not alter the magnification or resolution. Oils recommended are Crown or Cargille’s Type A, which are nondrying oils.

Often the image can be improved by placing a drop of Cargille’s oil on top of the condenser and bringing the condenser up to the bottom of the slide. This also removes the extraneous light from the optical path. Crown or Cargille’s Type B oil is recommended for this procedure.

Carefully clean the top of the condenser and the 100x oil lens after the microscopic work is completed.

### **DARKFIELD CONDENSERS**

Dark field requires a special condenser with standard microscope objectives. With the dark field condenser in place, the field will look dark and living specimens will usually look white on top of the dark filed. This is another technique used to look at living specimens without staining. Two dark field condensers are available: one for the 10x, 20x, and 40x objectives; and one for the 100x oil objective.



### **Limited Warranty**

Purchase of items branded Cynmar® are warranted against defects in workmanship and materials for 90 days from the original purchase date. Should there be a defect or malfunction of the product, Cynmar® will repair or replace the product (at its option) free of charge excluding shipping charges, which remain the responsibility of the Purchaser. This limited warranty is void if the product has been subjected to damage, unreasonable use, improper service, modification, or other causes not arising from defects in original materials or workmanship.

Cynmar, LLC reserves the right to make changes in instrument design in accordance with scientific and mechanical progress, without notice and without obligation



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