



When To Use IR Corrected Lenses

The human eye can see light in the visible range of the light spectrum, between wavelengths of ~ 400 and 700 nanometers.

Imagers in today's video security cameras can see light in the visible range as well as infrared (IR) light – in the light spectrum above the visible range. Lenses that correct for IR illumination can yield better performance in cameras that are sensitive to both kinds of light.

IR Focus Shift

The wavelength of IR light is longer than those wavelengths of the colors in visible light. Consequently, each wavelength of light has a different focal point. When both visible and IR light enter an ordinary lens, they do not focus on the same plane. The IR focal point is displaced, or “shifted.” This “focus shift” results in blurred images, reduced contrast and overall lower image quality.

IR Cut Filter

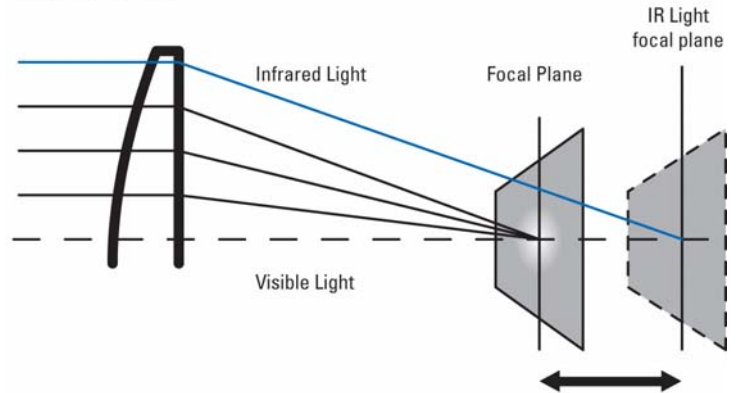
In the every day use of video security cameras, most forms of light include some form of IR illumination. Consequently, color and day/night cameras use an IR filter – a layer of optical glass that prevents IR light from entering the camera imager. Use of an IR filter eliminates the problem of IR focus shift, resulting in clear images with color rendered in the same way that the human eye perceives them. In day/night cameras, the IR filter is deployed when the camera is in “day” mode, making maximum use of visible light. In “night” mode the IR filter is removed, to allow IR illumination to enter the camera imager, enabling the camera to render images in dark and low-light environments.

IR Corrected Lenses

The purpose of an IR corrected lens is to compensate for the focus shift that results from the different wavelengths of visible and IR light. Using a combination of aspherical elements, special coatings, and extraordinary low-dispersion glass (ED), IR corrected lenses

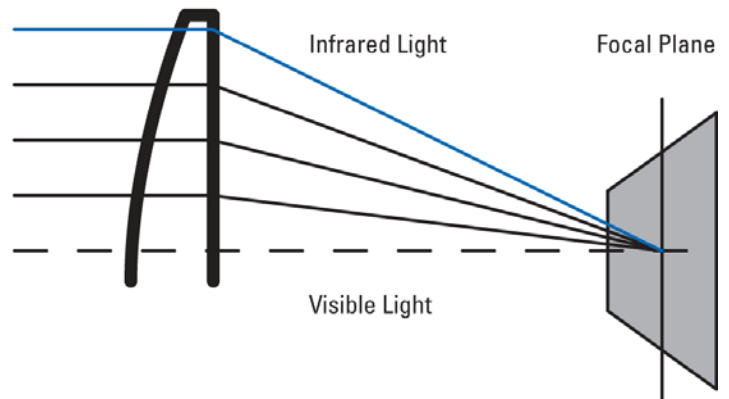
focus light energy on the same plane (or, at least, closer to the same plane than with ordinary lenses). The result is better focus, sharper contrast and better overall image quality.

Standard Lens



Out of focus caused by the focal plane difference. IR lens corrects this difference.

IR Lens



Both IR and visible light come to the same focal plane.

Day/Night Cameras

IR corrected lenses are particularly of benefit in day/night cameras, which “see” both visible and IR light. IR corrected lenses allow a camera's imager to take in visible and IR illumination in low-light “night” conditions (when the IR cut filter is not deployed), while eliminating the problem of IR focus shift.

Monochrome Cameras

Monochrome cameras are more sensitive to IR light, making them ideal for use in low-light environments. Because monochrome cameras typically do not use IR cut filters, they, too, will benefit from the use of an IR corrected lens.

Standard Color Cameras

A non-day/night color camera can use an IR corrected lens, though there may not necessarily be an appreciable boost in image quality. However, since most lighting environments include some mix of visible and IR light, an IR lens will theoretically improve any image, by focusing all wavelengths of light on the same plane. Therefore, it is possible that standard color cameras with IR lenses will deliver images with better contrast and less color fringing around the edges.

Note in the pictures below, there is little difference between the two daylight images. However, the night image with the IR corrected lens has sharper focus and contrast than the night image taken with the standard lens.

Conclusion

By eliminating the problem of IR focus shift, IR corrected lenses deliver superior image quality in a variety of lighting and camera environments. Particularly at night and in low-light situations, IR corrected lenses allow the use of maximum IR light, while providing clear focus

Standard lens

IR corrected Lens

Daylight



Night

