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The Optical Engineering Experts®

Meridian® Sol-55 GSF Target Projector

The Meridian Sol-55 projector is a modular light source that is used when measuring the glare spread function (GSF) of camera assemblies. GSF is a measure of how much light from a bright source in or out of the field of view of the camera reaches other locations of the image (think of the image flare when the sun is in the the field of view of a camera). The path that that this "stray light" takes typically includes ghost imaging and scattering from optical and non-optical surfaces. The Sol-55 projector provides a laboratory and production floor source for characterizing GSF.

CONTROLLED ILLUMINATION

OBJECT SIZE

GSF is typically assessed by comparing the signal in the image from the illumination source (the "object") with the signal at a part of the image into which the object is not imaged (the "background"). When performing this measurement in lenses, it is typical for the object diameter to extend over 5% of the horizontal field of view. In cameras, it may be sufficient to cover less of the field and to instead require a certain number of pixels to be covered. Other requirements may simply specify a fixed object size (such as ½° for a simulated sun). To accommodate different setups, it is frequently necessary to change the angular extent of the object when testing different cameras. The Sol-55 projector achieves this by employing interchangeable object aperture drawers to set the object size. Each drawer is engraved with the aperture size and includes a 2-wire EEPROM containing information about the aperture which is read by the Sol-55 projector. Object aperture drawers are also color coded so that production setups may be easily configured before being verified by interrogation of the projectors.

STRAY LIGHT CONTROL

An important aspect to any stray light measurement is to ensure that the test setup itself is not a contributor of spurious stray light. This is especially true for a GSF measurement in which the background should not be indirectly illuminated by the projector, since this measurement frequently employs high dynamic range techniques that span several decades of signal level. The Sol-55 projector addresses this important requirement in several ways. Firstly, the NA (numerical aperture or cone angle) of the light that passes through the object aperture is controlled so as to ensure that the illumination does not impinge on the sides of the projector lens barrel. Careful baffling and special coatings inside the barrel control the behavior of light that may be reflected back into the lens barrel. The illumination NA is controllable by the user through an aperture wheel, the position of which may be read and reported by the projector. As a special feature, an image of this aperture may be focused onto the device under test (DUT). Doing so minimizes the degree to which overfilling the the front surface of the DUT leads to backscattered light within the test enclosure from surfaces immediately adjacent to the camera. The location of the source aperture focus is factory set according to the customer's specifications using color coded spacers.

The objective lens in the Sol-55 is removeable so that it may be cleaned by the user should it ever become contaminated. Additionally, the front of this assembly features an external thread and an arrangement of magnets. These features may be used to attach shielding components as needed. A magnetically adhered ring coated with a high emissivity coating is supplied as standard.

INTENSITY CONTROL

The illuminator in the Sol-55 is a high power white LED. Current to this LED is controlled by integrated circuitry and may be set remotely over an RS485 communication bus. The rear of the Sol-55 projector features two identical 4-pin connectors. Two pins supply 36VDC power, and the remaining two constitute the half-duplex RS485 bus. Each Sol-55 projector is factory assigned an address that is stored in its internal EEPROM, enabling multiple projectors to be daisy-chained together and commanded separately. One of two interfaces boxes is used to establish the RS485 architecture from either an Ethernet or USB input, and to add the 36VDC power to the 4-pin bus.

REAL-TIME CONTROL THROUGH GUI APPLICATIONS OR FUNCTION LIBRARIES

The Sol-55 projector may be programmed to power up at a preset object brightness. However, the real utility of these devices is realized when these settings are dynamically changed using the RS485 interface. In a production setting, such as at an end of line test station, the illuminator brightness and projected object distance may be controlled directly by issuing serial instructions from the customer's software, and the configuration of the instrument may be interrogated in the same way. For evaluation and R&D testing purposes, the most convenient means of control is to make use of the GUI application that is offered by Optikos.

SPECIFICATIONS

Meridian® Sol-55 GSF Projector	
Apparent Object Distance	Infinity (collimated)
Illuminator	White LED, 3500K
Objective Lens Nominal Focal Length	120mm
Maximum Object Aperture Diameter	10mm†
Minimum Working Distance (for focused source aperture)	100mm (must be factory configured)
Typical Working Distance	100mm-300mm
Objective Clear Aperture	37mm
Outside Diameter	55mm
Operating Power Requirements	36VDC, 200mA
Maximum Projectors in Single Daisy Chain	20
Length	270mm
Mass	850g
Operating Temperature Range	10-30°C
Operating Humidity Range	30-70% (non-condensing)

† The maximum object diameter that may be used without vignetting or illuminating the inside of the Sol-55 barrel depends on the selected source aperture diameter and the working distance. Optikos will advise on the optimal configuration for a particular test setup.

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