



The Optical Engineering Experts®

**MERIDIAN® FOCUSING TARGET PROJECTOR**

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# Meridian<sup>®</sup> Focusing Target Projector (FTP)

The Meridian FTP series is a comprehensive range of small target projectors that may be used in standalone test setups or as the target projection source when measuring the performance of small aperture cameras in both Meridian<sup>®</sup> Starfield assemblies and the Meridian<sup>®</sup> FLEX platform. They are noteworthy for their compact size, closed loop control, maintenance of line of sight throughout the travel range, and several available options.

## VERSATILE OVER A RANGE OF TARGET DISTANCES

### METROLOGY

The projector provides a convenient means of creating a standard metrology target over a wide range of apparent object distances. This functionality enables the test engineer to perform camera testing over a range of conjugates and to perform through-focus resolution testing on fixed-focus cameras.

### SENSOR ALIGNMENT

Finding the best focus location in object space directly provides information regarding the location of the best focus image plane, and by knowing the location of best focus at several field points it is possible to deterministically optimize the alignment of sensors and cameras using a technique that does not require the sensor to be stepped through focus.

### OPTIONS

Focusing Target Projectors are offered in several different focal lengths, with various target configurations, and with a choice of LED illuminators. Optikos can assist you in determining the configuration that is most suitable for your application.

## REAL-TIME CONTROL THROUGH GUI APPLICATIONS OR FUNCTION LIBRARIES

Every FTP may be programmed to power up at a preset object distance and target brightness. However, the real utility of these devices is realized when these settings are dynamically changed using the RS485 interface. It is typical for these projectors to ship as part of a system that also includes the requisite MIB-USB-RS485 converter box, 12V power supply, and cabling. While the illuminator brightness and projected object distance may be controlled directly by issuing serial instructions, the most convenient means of controlling them is to make use of one of the GUI applications or function libraries that are offered by Optikos. Each projector is calibrated in units of object distance, so that the desired apparent object distance is specified directly in distance units, and target brightness is set from 0-100% of maximum.

Each FTP features two identical bus connectors and is assigned a unique address. Multiple FTPs may then be daisy-chained together and controlled from the same interface box. To ensure signal integrity, high reliability Lemo<sup>®</sup> connectors are used throughout.

## MECHANICAL INTERFACE FOR PRECISE MOUNTING AND ALIGNMENT

The focusing section of each FTP is common across the product line, while the front stainless steel barrel is specific to the focal length of the projector and includes all the FTP mounting features. The stainless steel barrel incorporates two sets of mounting features. Each interface includes a 1mm flange that is used to retain the device using standard cleats (available from Optikos). A notch in each flange is aligned to one of the target edges. The front interface incorporates a long register section that is intended to fit in a close bore such as is found in the Meridian<sup>®</sup> Starfield product line. The rear interface is closer to the center of mass of the device and has a larger diameter and a shorter register section. Mechanical interface drawings are available to customers on request.

If needed, an optional removable black cap is available to reduce ambient light reflections from the front of the FTP barrel.

## SPECIFICATIONS

| MERIDIAN® FOCUSING TARGET PROJECTOR                                            |                                                                                      |               |               |                |
|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------|---------------|----------------|
| FTP TYPE                                                                       | 018                                                                                  | 039           | 064           | 102            |
| Nominal Focal Length (mm)                                                      | 18                                                                                   | 39            | 64            | 102            |
| Clear Aperture (mm)                                                            | 8                                                                                    | 14            | 23            | 23             |
| Standard Target Type                                                           | 4mm Crossedge                                                                        | 5mm Crossedge | 8mm Crossedge | 10mm Crossedge |
| Standard Target Optical Density                                                | 1.3                                                                                  | 1.3           | 1.3           | 1.3            |
| Full target angular extent when collimated (°)                                 | 12.6                                                                                 | 7.3           | 7.1           | 5.6            |
| Closest Virtual Object Distance w.r.t. FTP Forward Flange (m)                  | 0.025                                                                                | 0.05          | 0.35          | 0.80           |
| Closest Real Image Distance w.r.t. FTP Forward Flange (m)                      | -0.10                                                                                | -0.30         | -0.60         | -1.20          |
| Maximum time to traverse adjustment range (s)                                  | 4                                                                                    | 4             | 4             | 4              |
| Uncertainty in reticle location w.r.t. objective lens focal plane (mm)         | ±0.012m                                                                              | ±0.012        | ±0.015        | ±0.020         |
| Maximum boresight deviation of target center w.r.t. FTP mounting features (°)† | 0.04                                                                                 | 0.04          | 0.02          | 0.01           |
| Maximum deviation of target edge from notch in mounting flange (°)             | 0.5                                                                                  | 0.5           | 0.5           | 0.5            |
| Illuminator options                                                            | White LED (3000K, 3500K, 4000K, 4500K (standard), 5000K, 5700K, 6500K), 950nm IR LED |               |               |                |

† The FTP is notable for maintaining boresighting over its travel range. The boresighting error is specified with respect to the mechanical mounting features of the barrel in angular units over the entire travel range. For finite apparent object distances, the lateral object shift may be calculated by measuring the distance to the object location from the front focal point of the FTP, and then applying the boresighting error. For example, an object projected by a 64mm FTP at a distance of 2m will have a maximum lateral uncertainty of  $2000 \tan 0.02^\circ = 0.70\text{mm}$ .



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## Get Started with Optikos

Optikos offers metrology products and *IQ Lab™* services for measuring lenses and camera systems, as well as engineering design and manufacturing for optically-based product development. Our standard products are suitable for any industry or application, and we will design a custom product for your specific needs. Learn more at [optikos.com](http://optikos.com).

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