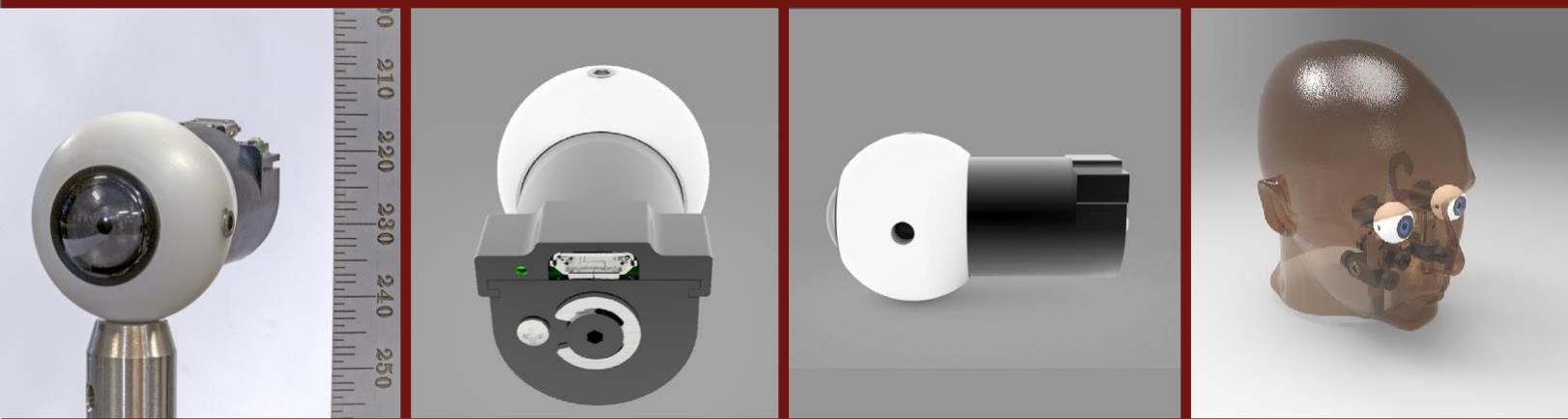# ES34 EYE SIMULATOR

FLUID FILLED EYE MODEL

DFC ES34 EYE SIMULATOR

The Distant Focus Eye Simulator is designed for testing and calibrating HMD and other virtual reality (VR) displays as well as direct view optical system such as binoculars and other telescopic sights. This eye model provides the designer with quick repeatable test data allowing fast design turn around and reduces the inconsistencies related to human test subjects.

Unlike other laboratory eye models, which have used more conventional flat-focal plane optics, our model follows the physical size and geometry of an actual human eye as closely as possible. This is enabled by the use of a fiber-coupled focal plane to simulate a realistic retinal shape. The ES34 eye model optics are derived from the "Eye Retinal Image" model by Rod Watkins (available in the Zemax Knowledge base), and is composed of two fused silica aspheres (toric surfaces) immersed in water. The edges of the optical elements were slightly thickened to allow for fabrication and handling, but the optical response is still very similar to the baseline eye model, and to the Navarro human eye.

The field of view of the ES34 eye model is 34.5º and is limited by the extent of the fiber faceplate that forms the spherical retinal surface. The fiber faceplate has a spatial pitch between fiber cores of 2.5µm (200 lp/mm), similar to the density of cones in the fovea. The aperture stop is a selectable mechanical circular aperture located between the fused silica cornea and internal lens, the same position as for the human iris.

The fiber faceplate is coupled to a 5 megapixel USB camera which can be read out using software provided.

FEATURES

- Available in a stand-alone monocular configuration or binocular configuration with adjustable IPD.
- Factory sealed water filed optical cavity for long service life.
- Focus adjustable from 6 inches (150 mm) to infinity.
- Multiple pupil sizes available. Factory swappable.
- 5 megapixel color sensor.
- USB 2.0 connectivity.
- Custom software compatible with Windows and Linux.
- Factory calibration and service available.
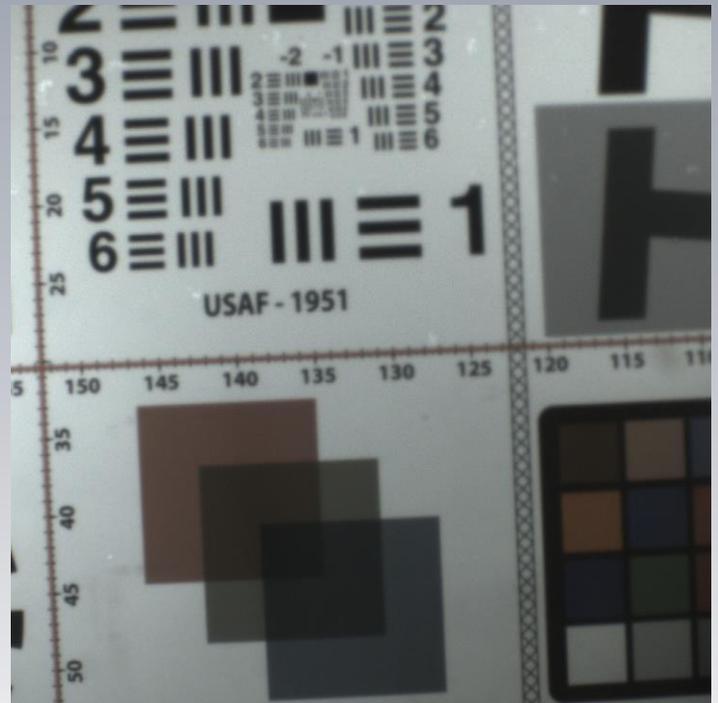
Optical chart at 90 inches with color correction.

Distant Focus Corporation

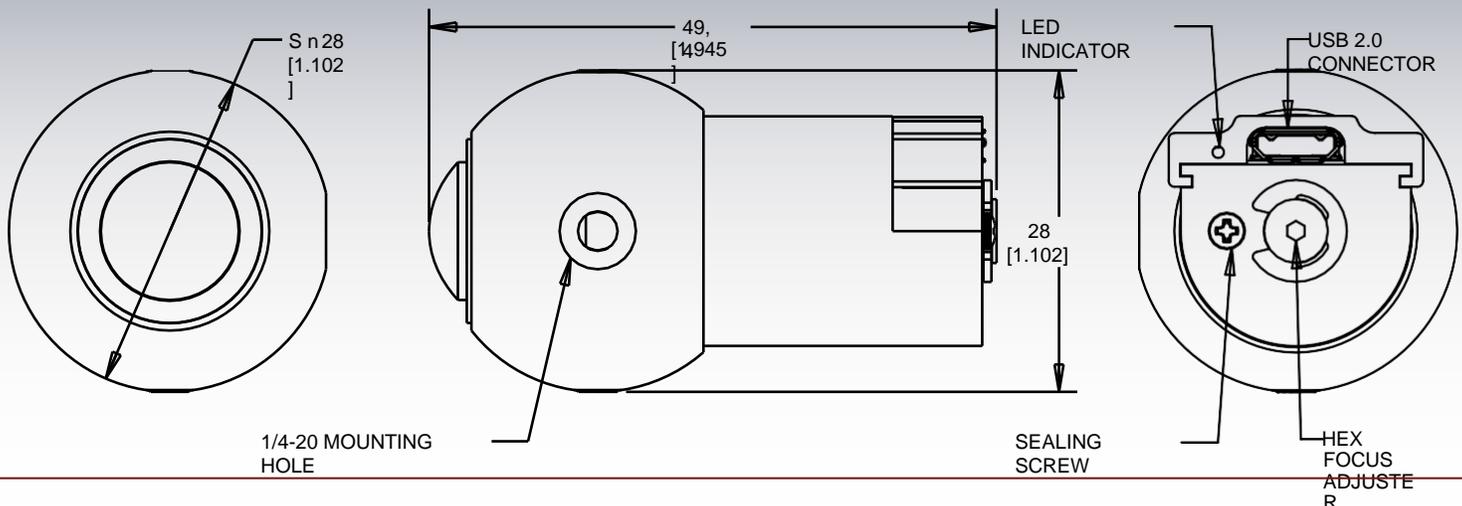| ES34 System Specifications	
Usable FOV	20º diagonal
iFOV	0.85 arc minute
Accommodation	Manual adjustment 6 inches (150m) to infinity
Pupil	3 options (F/8, F/5, F/3)
Construction	Anodized aluminum. All components contained within a constant volume sealed water cavity.
Supported OS	Ubuntu (10.04, 12.04, 14.04, 16.04) Windows (XP, 7, 10)
Software	Custom software provided to operate USB camera. Controls available for frame rate, exposure, per color gain, and region of interest. Auto gain, exposure, and white balance can be enabled on the sensor. Processed data consists of bad pixel correction, PRNU, geometric distortion correction, demosaicing, color matrix correction, and histogram based exposure adjustment. Calibration data is measured for each device. Software can also supply raw data is if needed.

Internal Camera Specifications	
Resolution	2592 x 1944
Pixel Size	1.75µm
Sensor	OV5653
Sensor Shutter	rolling shutter
Sensor Bit Depth	8-bit, 10-bit
Sensor Max SNR	37 dB
Frame Rate	5 FPS @ full resolution, 8-bit mode
Power	750mW
Interface	USB 2.0
Output Image Formats	8/16-bit TIFF, JPG, RAW binary

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LED INDICATOR

USB 2.0 CONNECTOR

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1/4-20 MOUNTING HOLE

SEALING SCREW

HEX FOCUS ADJUSTER

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