Instrument Systems
KONICA MINOLTA Group

TOP 200/150

Telescopic Optical Probes for radiance and luminance measurements

We bring quality to light.

Key features at a glance

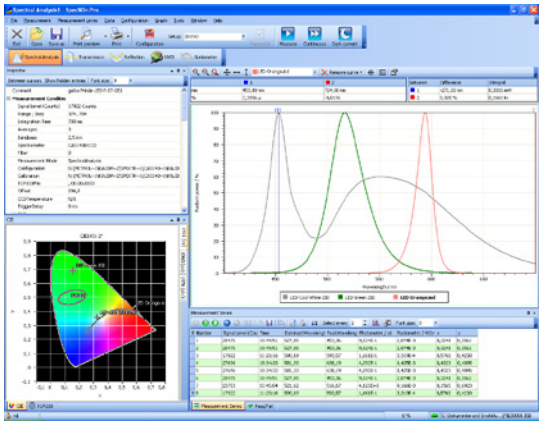
- Perfectly round and sharp measuring spot with optimized Pritchard style optical system
- Convenient focusing by internal view-finder camera
- Large number of lenses for wide range of measuring-spot sizes and distances to test samples
- The software allows up to different measuring-spot sizes to be selected
- Flexible fiber connection with patented mode
- Special versions (TOP 150) for blue light hazard measurement and production applications

01 \\ TOP 200 – Telescopic optical probe for radiance and luminance

In combination with a spectrometer, the TOP 200 Telescopic Optical Probe permits precise spot measurements of radiance and luminance, as well as the chromaticity of displays, panel graphics and other light sources. A multimode fiber is used to guide the light radiation from the TOP 200 to the spectrometer.

The patented mode mixer from Instrument Systems delivers uniform light transmission into the fiber and hence reproducible measurements even if the position of the fiber is changed.

The TOP 200 can be operated with all spectroradiometers in the CAS 140D Series as well as the DTS 500 Display Test System from Instrument Systems with SpecWin Pro software. Remote control for the TOP 200 is provided via a USB port.



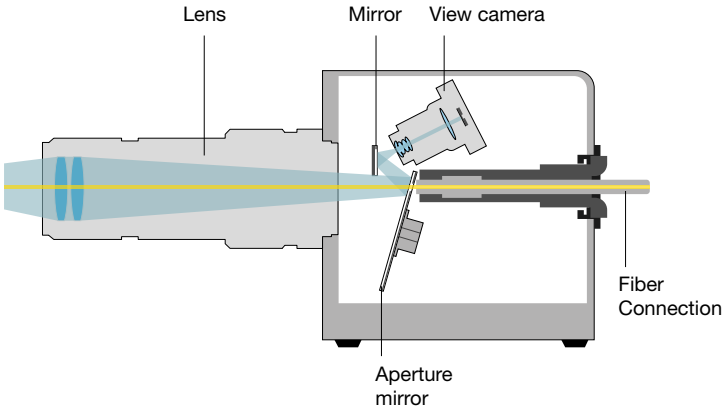
Analysis of an LED with SpecWin Pro software

02 \\ Mode of functioning

Optimized Pritchard style optical system

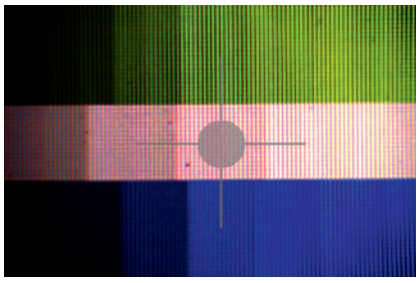
An innovative optical concept was implemented in the TOP 200. The aperture mirror is inclined at an angle of 15° to the plane of the image and this creates a sharply defined measuring spot.

The standard inclination angle of 45° used in competing products leads to unfocused edges because parts of the measuring spot are significantly displaced from the plane of the image. The holes drilled in the aperture mirror of the TOP 200 are also designed to be slightly elliptical in order to compensate for the 15° angle and guarantee a perfectly round measuring spot.



Mode of functioning of telescope optic with Pritchard style optical system

Perfectly sharp and round measuring spot with the TOP 200



View-finder image with closed aperture and visible measuring location

View-finder camera

The internal view-finder camera permits exceptionally convenient control and focusing of the desired measuring spot. The entire field of view of the view-finder camera is some 20 times bigger than the measuring spot in aperture position 2. The image generated by the view-finder camera is automatically stored in the measurement file and printed out in the reports. The position and size of the measuring spot is thereby explicitly documented.

When the aperture is closed, the measuring location of the sample is visible, and software superimposes a reticle to mark the position of the measuring spot. As soon as the aperture port has been selected, the physical measuring spot, i.e. the aperture port is visible as a black circle.

Two alternative view-finder cameras are offered. They vary in resolution and sensitivity. The standard configuration of the TOP 200 has a resolution of 752 x 480 pixels and features a high sensitivity. It is also suited for test objects with lower brightness. The alternative view-finder camera has a resolution of 1600 x 1200 pixels, but is slightly less sensitive.

03 \\ Features

A large number of lenses

A large number of lenses can be flange-mounted securely and quickly on the TOP 200 using the F-mount bayonet connector from Nikon. This system covers a large range of different measuring-spot diameters and object distances.

Most lenses are suitable for the visible and near infrared spectral range. A special high resolution lens (TOP100-322) with a focal length of 105 mm and close-up lenses with 2-fold or 4-fold distance reduction can be supplied for measurements in the UV/VIS range. A collision guard for operation with the DTS 500 positioning system system is available.

Lens		**50 mm focal length**			**HRL 90**
Measuring distance*		**228 mm**	**500 mm**	**1 m**	**230 mm**
Aperture	Diameter	Measuring-spot diameter [mm]			
1	0.125 mm	0.44	1.11	2.34	0.075
2	0.25 mm	0.89	2.22	4.67	0.15
3	0.5 mm	1.77	4.44	9.34	0.3
4	0.8 mm	2.84	7.1	13.94	0.5
Field of view of the view-finder camera [mm]					
Width [mm]		20.2	54	116	3.7
Height [mm]		12.9	35	74	2.3

* Distance between test sample and TOP 200 front panel

Choice of measuring-spot sizes

The size of the measuring spot depends on the lens used, the aperture port selected, and the distance to the sample.

If the HRL 90 high-resolution lens is used, measuring-spot sizes as low as 0.075 mm are achieved allowing even very small features of panel graphics in the passenger cell of a car or an aircraft cockpit to be analyzed with sufficient resolution.

Patented mode mixer

The light radiation is launched into the spectrometer via an optical fiber that uncouples the aperture size from the entrance slit and hence the spectral resolution of the spectrometer. Spectroradiometers without optical fiber coupling are significantly flawed because the spectral resolution changes with the diameter of the measuring spot.

The patented mode mixer compensates for changes in position and hence changes in transmission properties of the multimode fiber. The measuring error with mode mixer is less than 1 % compared with up to 20 % without mode mixer. The mode mixer also offers another significant advantage because mixing the light results in polarization scrambling which reduces the polarization error to approximately 0.4 %. LCD displays can therefore be measured very accurately.

LED spot light

Locating the desired measuring point and focusing on it is often very difficult with unilluminated test samples in a dark room. This is why an LED spot light is supplied as standard with each TOP 200. The LED spot light can be connected to the TOP 200 as necessary and the flexible swan-neck attachment guarantees convenient and reliable illumination of the test sample at distances up to half a meter.

Test equipment with TOP 150 + CAS 140D for Blue Light Hazard Measurement of an LED

04 \\ TOP 150 – Model with single aperture for production applications

The TOP 150 features only one single aperture (instead of 4) and is used large-scale in production testing, e.g. of flat panel displays. It is specialized for radiance and luminance with excellent long-term stability. A special application is possible with a certain TOP 150 variant: the evaluation of LED lamps and luminaires according to blue light hazard (BLH) as described in Standards IEC 62471 and IEC/TR 62778.

TOP 150 with mode mixer

Special Application Example: Blue Light Hazard Measurement with TOP 150

The fast-growing significance of state-of-the-art solid-state lighting (SSL) light sources in the living and working environment raises important questions with regard to safety. These include photobiological safety, and in particular blue light hazard (BLH). Blue light can cause photochemical damage to the retina, and may result in degeneration of the macula.

The BLH weighting function in the SpecWin Pro covers the wavelength range between 300 and 700 nm, and has a maximum at 435–440 nm. In view of the striking blue peaks of white LEDs, the question of hazard from SSL light sources must be posed. Instrument Systems offers high-end spectroradiometers and accessories for sensitive and fast measurements in the lab and production. Direct spectral radiance measurement from 360 nm can be performed with a TOP 150 telescopic optical probe in combination with a stray-light corrected CAS 140D array spectrometer calibrated to the spectral radiance.

The 7 mm aperture positioned on the objective lens defines the reference plane for the distance measurements. When the test sample is positioned at the distance of 200 mm from the lens aperture, the internal aperture of the TOP 150-BLH defines the measuring spot of 2.2 mm on the sample. The internal view-finder camera enables easy positioning of the measuring spot on the region of the sample with the highest radiance and therefore highest blue light hazard.

05 \\ Our test laboratories – accredited quality

Instrument Systems offers systems for measurements of spectral radiance and spectral irradiance, for which our in-house, ISO 17025 accredited test laboratory confirms the metrological traceability by provided test report. These systems are therefore ideally suited for measurements in the accredited scope of ISO 17025 and other international standards that require proof of metrological traceability This enables our customers to demonstrate the quality of measurements to any third party. All standards used are directly traceable to the reference standard of the national laboratories PTB (Germany) or NIST (USA). The test certificates included with our measuring instruments depict details of the traceability chain.

06 \\ Service and support

We at Instrument Systems are setting a benchmark not only with our products. Our services secure the long-term value of your investment and guarantee optimum productivity over the entire period of use.

Our service offerings include the following:

- Engineering services
- Technical advice, also post-sales
- Re-calibration with certificate
- Instrument repair and hardware upgrade
- Software updates

07 \\ Technical specifications

Model	TOP 200	TOP 150
Spectral range	Determined by the lens (see ordering information)	
View-finder camera	752 x 480 or 1600 x 1200 pixel, RGB	752 x 480 pixel, RGB
View-finder camera sensitivity	approx. 1.5 to 100,000 or 3 to 1,200,000 cd/m²	approx. 1.5 to 100,000 cd/m²
Aperture diameter	0.125 / 0.25 / 0.5 / 0.8 mm	customer specific
Dimensions basic unit (L x H x W)	141.5 mm x 136 mm x 98.3 mm	131.5 mm x 113 mm x 89.3 mm
Weight	2.2 kg	1.5 kg
Power supply	100 VAC to 240 VAC, 50/60 Hz	4.75 to 5.25 V via USB 2.0
PC connection	USB 2.0	
Operating temperature range	+10 °C to +35 °C	
Relative humidity	< 70 % non-condensing	
Base plate	¼-20 UNC, 4 x M6	

08 \\ Ordering information

Order number	Description
TOP 200 / TOP 150 basic unit and optical fibers with mode mixer	
TOP200-100	Basic unit with Pritchard-style optics, motorized wheel with 6 apertures, and view-finder camera with 752 x 480 pixels; (without fiber, without lens)
TOP200-100-2	Basic unit with Pritchard-style optics, motorized wheel with 6 apertures, and view-finder camera with 1600 x 1200 pixels; (without fiber, without lens)
TOP200-104	Adapter for connecting a fiber bundle to the TOP 200
TOP200-105	Adapter for connecting an SMA fiber bundle to the TOP 200
TOP200-203	Fiber guide with integrated mode mixing (D50, 90° version) and PLG adapter; fiber length 2.3 m wavelength range 300 to 2200 nm; supports accessory recognition with CAS 140D
TOP200-204	Fiber guide with integrated mode mixing (D50, 90° version) and PLG adapter; fiber length 2.3 m wavelength range 190 to 1350 nm; supports accessory recognition with CAS 140D
TOP200-212	Fiber guide with integrated mode mixing (D50, 90° version) and PLG adapter; fiber length 3.5 m; wavelength range 300 to 2200 nm; supports accessory recognition with CAS 140D
TOP150-100	Basic unit with Pritchard-style optics, single aperture, and view-finder camera with 752 x 480 pixels; (without fiber, without lens)
TOP150-110	Basic unit with Pritchard-style optics, single aperture, and without view-finder camera; (without fiber, without lens)
TOP150-226	Fiber guide with integrated mode mixing (D50. 90° version) and PLG adapter; fiber length 2.3 m; wavelength range 300 to 2200 nm; supports accessory recognition with CAS 140D
TOP150-228	Fiber guide with integrated mode mixing (D50, 90° version) and PLG adapter; fiber length 3.5 m; wavelength range 300 to 2200 nm; supports accessory recognition with CAS 140D
TOP150-BLH	A telescopic optical probe with viewfinder camera facilitates positioning and faster measurement of BLH for light sources that exhibit no radiation below 360 nm
TOP 200 / TOP 150 lenses and close-up lenses for visible and near infrared spectral range	
TOP100-307	25 mm fixed focal length; F/2.6; 370 to 1100 nm
TOP100-317	50 mm fixed focal length; F/2.8; 370 to 1100 nm
TOP100-319	High-resolution objective lens, 90 mm focal length; 370 to 1100 nm
TOP100-322	Objective lens, 105 mm focal length, F/4.0; 200 to 800 nm
TOP 200 / TOP 150 accessories	
TOP100-400	Tripod stand with tilting head for TOP 150/200

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