LumiTop 2700/4000
Spectrally enhanced imaging colorimeter

We bring quality to light.
Lab specs meet production speed

The LumiTop 2700/4000 combines the accuracy of Instrument Systems’ well-known spectroradiometers of the CAS series with the obvious advantages of imaging colorimetry.

**Perfect for production**
Because of this combination, the LumiTop 2700/4000 is perfect for use in display production lines or quality control, where the benefits and capabilities of both, the accurate spot measurement of spectroradiometers and the lateral resolution of camera measurements are highly valued.

**All-in-one solution**
Many different test applications can now be organized in a single test station:
- Measurement of luminance and color
- Evaluation of color and luminance uniformity or Mura effects
- Pixel metrology including pixel defect analysis
- Contrast measurement
- Analysis of white balance or color gamut
- Flicker and luminance modulation measurement
- Analysis of the acquired spectra

**Easy to integrate into production lines**
The LumiTop 2700/4000 is integrated in Instrument Systems’ comprehensive new software “LumiSuite”, which comes with a user-friendly GUI for laboratory applications and a powerful software development kit for easy implementation into any production line. The spectra measured as reference for the camera can be analyzed in more detail using Instrument Systems’ well-known software SpecWin Pro.

**Independent of display technology**
Due to the high absolute accuracy of the CAS spectroradiometer that is used as reference during each measurement, the performance of the solution is excellent for any display technology (or any other homogeneous samples). Moreover no golden sample or user calibrations are needed. This makes the solution particularly favorable when OLEDs or other narrow-banded light sources have to be investigated where classical imaging colorimeters based on XYZ filter technologies reach their limits.

**Modularity**
The LumiTop 2700/4000 is designed as a modular accessory to any of the spectroradiometers of the CAS series. Thus the same spectroradiometers can also be used with the telescopic optics TOP 150 or TOP 200.
### Technical specifications

<table>
<thead>
<tr>
<th>Measurement quantities</th>
<th>LumiTop 2700</th>
<th>LumiTop 4000</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D</td>
<td>Luminance, color</td>
<td>Luminance, color</td>
</tr>
<tr>
<td>Spot</td>
<td>Spectrum, luminance, color, flicker</td>
<td>Spectrum, luminance, color, flicker</td>
</tr>
</tbody>
</table>

#### General specifications

- **Operating system**: Windows 7/10 (64 bit)
- **Dimensions (l x w x h)**: LumiTop 2700 274 mm x 192 mm x 112 mm, LumiTop 4000 286 mm x 190 mm x 121 mm
- **Weight**: 3.7 kg (LumiTop 2700), 4.1 kg (LumiTop 4000)
- **Power supply**: 12 V (LumiTop 2700), 24 V (LumiTop 4000)
- **Operating temperature range**: 15 – 35 °C

#### Camera specifications

- **Effective resolution (h x v)**: LumiTop 2700 2750 x 2200 (6.1 megapixels, CCD), LumiTop 4000 4096 x 3000 pixels (12 megapixels, CMOS)
- **Pixel size**: 4.54 μm x 4.54 μm (LumiTop 2700), 3.45 μm x 3.45 μm (LumiTop 4000)
- **Dynamic range**: 61 dB (LumiTop 2700), 70 dB (LumiTop 4000)
- **AD converter**: 12 bit
- **Size sensor**: 1" (16.0 mm diagonal) (LumiTop 2700), 1.1" (17.52 mm diagonal) (LumiTop 4000)
- **Interface camera**: Gigabit Ethernet, Gigabit Ethernet, M12 12-Pin Female
- **Measurement range 2D**: L = 0.005 cd/m² – 5,000 cd/m² (LumiTop 2700), L = 0.02 cd/m² – 270,000 cd/m² (LumiTop 4000)
- **Accuracy and precision**
  - **Luminance (rel. to CAS)**: ±0.4 % (LumiTop 2700), ±0.0001 (LumiTop 4000)
  - **Color (rel. to CAS)**: ±0.4 % (LumiTop 2700), ±0.0001 (LumiTop 4000)
  - **Camera uniformity (RNU)**: ±0.35 % (LumiTop 2700), ±0.0013 (LumiTop 4000)
  - **Measurement time**
    - **Measurement time hybrid mode**: 0.5 s (LumiTop 2700), 0.7 s (LumiTop 4000)
    - **Measurement time camera only**: 0.5 s (LumiTop 2700), 0.7 s (LumiTop 4000)

#### CAS specifications

- **CAS 140D**: Interface CAS USB, PCIe, Gigabit Ethernet
- **CAS 140CT**: Interface CAS USB, PCIe USB
- **CAS 120**: Interface CAS USB, PCIe, Gigabit Ethernet, M12 12-Pin Female
- **Measurement range CAS**: L = 0.003 cd/m² – 4 x 10³ cd/m² (LumiTop 2700), L = 0.015 cd/m² – 6 x 10³ cd/m² (LumiTop 2700), L = 0.10 cd/m² – 1.5 x 10⁴ cd/m² (LumiTop 4000)
- **Accuracy and precision**
  - **Luminance (rel. to CAS)**: ±3.0 % (LumiTop 2700), ±0.0015 (LumiTop 4000)
  - **Color (rel. to CAS)**: ±3.5 % (LumiTop 2700), ±0.0015 (LumiTop 4000)
  - **Instrumental precision CAS**: ±0.1 % (LumiTop 2700), ±0.0001 (LumiTop 4000)
  - **Polarization sensitivity**: ±2.0 % (LumiTop 2700), ±0.002 (LumiTop 4000)

#### Flicker specifications

- **Flicker range**: 5 cd/m² – ca. 600 cd/m²
- **Flicker accuracy**: ±1 dB
- **Flicker instrumental precision**: ±0.02 dB

#### Spot size and field of view at selected working distances for 29 mm lens (f/2.8)

<table>
<thead>
<tr>
<th>Working distance [mm]</th>
<th>385</th>
<th>400</th>
<th>500</th>
<th>700</th>
<th>800</th>
<th>1000</th>
<th>1200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field of view [mm] 1</td>
<td>138 x 110</td>
<td>144 x 115</td>
<td>187 x 149</td>
<td>271 x 217</td>
<td>313 x 251</td>
<td>398 x 319</td>
<td>482 x 387</td>
</tr>
<tr>
<td>Field of view diagonal [in]</td>
<td>7.0</td>
<td>7.3</td>
<td>9.4</td>
<td>13.7</td>
<td>15.8</td>
<td>20.1</td>
<td>24.3</td>
</tr>
</tbody>
</table>

#### LumiTop 2700

<table>
<thead>
<tr>
<th>Field of view [mm] 2</th>
<th>156 x 114</th>
<th>163 x 119</th>
<th>211 x 155</th>
<th>307 x 225</th>
<th>355 x 260</th>
<th>450 x 330</th>
<th>546 x 400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field of view diagonal [in]</td>
<td>7.6</td>
<td>8.0</td>
<td>10.3</td>
<td>15.0</td>
<td>17.3</td>
<td>22.0</td>
<td>26.8</td>
</tr>
</tbody>
</table>

1) Inclusive lens and fiber exit.
2) Without CAS, with mode mixer.
3) External neutral density filters on the lens (OD 0.3/0.6/0.9) are available for increasing the upper measurement limit or measuring modulated light sources.
4) Lower measurement limit based on a signal to noise ratio of 10:1 for maximum exposure time (60 seconds LumiTop 2700 / 10 seconds LumiTop 4000), Upper measurement limit based on a signal level < 80 % for a white (non-modulated) LED light source using for minimum exposure time (1 ms LumiTop 2700 / 27 μs LumiTop 4000). Immediately after calibration relative to calibration standard.
5) Typical value for maximum deviation from average of repeated CAS measurements with a linear polarized light source and varying polarization angle.
6) 2x of repeated measurements of one instrument (L ≈ 100 cd/m²)
7) 4000). Immediately after calibration.
8) RNU (response non-uniformity) is defined as 99.7 % percentile of the deviation of the mean image value; calculated for an image with 16 pixels (LumiTop 2700) / 21 pixels (LumiTop 4000) cropped at each edge and 10 by 10 pixels (LumiTop 2700) / 13 by 13 pixels (LumiTop 4000) binning (34 averages) immediately after calibration with reference used for flat-field correction.
9) Time between beginning of two subsequent measurements using the SDK; determined with a camera exposure time of 20 ms and CAS exposure time of 200 ms for a white LED (L = 500 cd/m²). Depends mainly on PC processing capability.
10) Lower measurement limit based on a signal to noise ratio of 10:1 for maximum exposure times 65 s for CAS 140D and CAS 140CT, 20 s for CAS 120. Upper measurement limit based on a signal level < 80 % for a white (non-modulated) LED light source using a CAS internal optical density filter OD4 and minimum exposure time (10 ms CAS 140CT / 4 ms CAS 140D and CAS 120). Values valid for CAS 140CT, CAS 120 with 100 μm and CAS 140D with 250 μm slit width.
11) 2e of repeated measurements of one instrument.
12) Maximum deviation from average of repeated CAS measurements with a linear polarized light source and varying polarization angle.
13) 10 ms CAS 140CT / 4 ms CAS 140D and CAS 120. Values valid for CAS 140CT, CAS 120 with 100 μm and CAS 140D with 250 μm slit width.
14) 2e of repeated measurements of one instrument.
Instrument Systems is continually working on the further development of its products. Technical changes, errors and misprints do not justify claims for damages. For all other purposes, our Terms and Conditions of Business shall be applicable.