

# LED-Flashlight 300

White and blue light sources for  
volumetric flow field measurements

For volumetric flow field measurement techniques like **Tomographic PIV** and **Shake-the-Box** the usual laser illumination can often be replaced by high-power LED illumination. The **LED-Flashlight 300** provides an array of 72 white or blue high-power LEDs in an area of 300 x 100 mm<sup>2</sup>. The small divergence angle of +/- 5° allows the illumination of measurement volumes with a cross section of about 300 x 100 mm<sup>2</sup> at 1 m working distance. Optional Fresnel lenses can be used for smaller or larger cross sections.



LED-Flashlight 300 blue



LED-Flashlight 300 white

## Advantages

- ▶ Compared to low- and especially high-repetition-rate PIV lasers, **LED-Flashlight 300** has important advantages for volumetric illumination:
- ▶ It is much more compact, made up only by the LED module itself and a small power supply, allowing easy transportation and mounting, without potential laser misalignment. No maintenance efforts are needed.
- ▶ It is safe to operate, requiring no particular laser safety infrastructure and training.
- ▶ The incoherent light ensures high image quality with constant homogeneous particle brightness in time and space without laser speckle effects. Laser illumination often exhibits darker regions due to fringes in the laser beam profile causing less reliable particle tracking.
- ▶ The amount of light output is similar to high-repetition-rate lasers at a fraction of the cost.

## Applications

The **LED-Flashlight 300** is designed for large measurement volumes in air, e.g. with Helium-filled soap bubbles (HFSB), or in water applications up to cubic meters. Especially for water applications **LED-Flashlight 300 blue** together with fluorescent particles and corresponding camera filters is highly recommended to suppress reflections and stray light from the environment.

## Operating modes

The **LED-Flashlight 300** supports two operating modes: the *pulsed-overdrive* mode and the *free-trigger* mode.

## Pulsed-overdrive mode

The pulsed-overdrive mode is specifically designed for particle based velocity measurements. The LEDs are operated above the nominal LED current to generate short pulses at very high light intensities. Compared to nanosecond laser pulse durations, the lengths of LED pulses need to be much longer to gather enough light. To protect the LEDs at such high current, the duty cycle is limited to a maximum of 10 %. Consequently, for a maximal particle shift of e.g. 10 pixel, a particle image is smeared by 1 pixel at most. 1 pixel smearing has been found to be acceptable for **Tomographic PIV** and **Shake-the-Box** analysis.

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**Free-trigger mode**

In the free-trigger mode at lower peak power, the **LED-Flashlight 300** can either be used for constant illumination (100 % duty cycle), e.g. for experimental adjustment, or can be triggered with an arbitrary pulse sequence, e.g. for dual-pulse or multi-pulse illumination.

Multiple **LED-Flashlight 300** modules are seamlessly combined to obtain larger cross sections with different aspect ratios, e.g. with four modules a cross section of 600 x 200 mm<sup>2</sup> or 400 x 300 mm<sup>2</sup> can be readily obtained.



**Specifications**

<b>Size</b>	337 x 117 x 153 mm <sup>3</sup>
<b>Weight</b>	5.3 kg (LED module) 1.6 kg (power supply)
<b>LEDs</b>	72 white or blue high-power, high efficiency LEDs
<b>Opening angle</b>	10° (+/- 5°)
<b>Working distance</b>	typ. 500 mm – 2000 mm
<b>Electrical power</b>	avg. 300 W
<b>Efficiency</b>	20 % (free-trigger), 10 % (pulsed-overdrive)
<b>Light pulse trigger</b>	0 – 20 kHz, TTL-level
<b>Jitter</b>	< 15 ns
<b>Mode selection</b>	manual switch or remote (TTL)
<b>Safety features</b>	temperature control, LED trigger protection

Mode	Power emitted light	Duty cycle	Max. pulse energy	Pulse length
Pulsed-overdrive	290 W	0 - 10 %	145 mJ @ 200 Hz 29 mJ @ 1 kHz 2.9 mJ @ 10 kHz	2.5 μs – 335 μs
Free-trigger (white)	60 W	0 - 100 %	60 W x Δt	2.5 μs – ∞ (cw)

**Ordering information**

Part number	Description
1103445	LED-Flashlight 300 white
1103446	LED-Flashlight 300 blue

Data provided by LaVision is believed to be true. However, no responsibility is assumed for possible inaccuracies or omissions. All data are subject to change without notice.

Feb-19

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