

PARTICLE-I IMAGING SYSTEM

Laboratory
Particle
Measurements

Size and shape

Particle
Concentrations and

Number Density

Particle Velocity

Turn-key operation



The **Particle-I Imaging (PII) instruments** have been developed specifically for laboratory particle studies that require precise measurement of particle and droplet size distributions, number density, and concentration.

The **Particle-I high-speed imaging system** takes advantage of the latest advances in CMOS sensing technology and combines it with an innovative LED particle illumination method to deliver precise measurements of particulate size and shape. **Particle-I** instruments incorporate high-intensity pulsed LEDs that are used to simultaneously illuminate the particulate field. Pulse durations as short as 25 nanoseconds are possible resulting in blur-free particle images. The LED illumination is collected by a receiver lens which creates a shadow (or bright-field image) of the particles on the CMOS sensor.

The use of LEDs significantly reduces measurement errors due to intensity variations and diffraction noise that are a problem for bright-field imaging instruments using lasers. Furthermore, LED illumination does not pose any significant danger of eye damage to the user. The optics and electronics are packaged in a rugged enclosure that protects the instrument. The pulsed LEDs used in the probe provide stability, ruggedness, highly uniform illumination, very long lifetime, and high reliability.

The **Particle-I** instrument offers turn-key operation with a fully automated setup feature. The complete instrument includes the transmitter and receiver heads, data acquisition computer, image acquisition card, and the AIMS system software. The software analysis package includes sophisticated algorithms for identifying particles that are in focus, calculating various shape parameters, and classifying particles into various size and shape displays. Methods for differentiating between liquid drops and solid irregular-shaped particles are also included. The LEDs can be double-pulsed to measure drop velocity using the Particle Tracking Velocimetry method (PTV).

Technical Specifications

Size dynamic range	1000:1
Estimated size accuracy	+/- 2.5 μ m
Estimated size resolution	+/- 2.5 μ m
Velocity measurement range	< 300 m/s
Concentration	+/- 15%
Distance between receiver and transmitter windows	100 to 500 mm, selectable
Illumination type	Pulsed LEDs, 470 nm wavelength
Droplet Velocity Measurements (PTV)	-100 to 200 m/s
Camera (CMOS Digital)	
Camera frame rate	to 400 fps
Camera resolution	2600 x 2160 pixels 5.6 Mpix
Sampling area at 3 μ m/pix	6 mm x 2.7 mm
Continuous sampling	< 1 terabyte
Shields for the optics can be easily customized to fit application.	

†**U.S. Patents**
 10,705,001 B2
 10,578,538 B2



Ice particles



*Droplet image for a flow speed of 200knts
 Quasi-real time display of results
 (Real time display of all data is not possible)*

Our research facility and manufacturing plant is located in Sunnyvale, California, where we serve our North American customers. Our distributor partners provide valuable services to our customers in other parts of the world.

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+86-10-62623871	+49-(0)551-9004-0	+91.80.2572.9425 59	+81-3-3405-1288	+34608756759