

Product description

MiniLDV™ System
VioSense Corporation



Background

Many fluid mechanics investigations require the use of small probes to measure velocity with high temporal and spatial resolution. Such investigations can range from basic turbulence research to design of fluid components or confirmation of CFD codes. Optical techniques provide the advantages of non-contact measurement, linear relationship between velocity and frequency and no need for calibration. A probe incorporating laser diode with diffraction grating beamsplitter allows such measurements to be performed using the Doppler effect to estimate velocity of tracer particles in a fluid.

System overview

The VioSense MiniLDV™ System is a miniature laser Doppler velocimeter system consisting of probe and burst processor. The output of the system is a time-resolved velocity measurement and statistical values of velocity. Automatic profiles of mean and rms velocity can be obtained using an optional traverse. A battery-operated version of the MiniLDV™ System and a variety of configurations, including 2D and 3D systems, are available.

Applications

- ▣ Fluid mechanics and turbulence research
- ▣ Fluid systems design
- ▣ Wind tunnel, water tunnel and water channel studies
- ▣ Confirmation of CFD codes
- ▣ Oceanographic and atmospheric studies
- ▣ Surface speed measurements

Features

- ▶ Non-contact, linear, no calibration required
- ▶ High spatial and temporal resolution
- ▶ Laser diode-based LDV probe incorporating fiber optics
- ▶ Optical frequency shift, available
- ▶ Battery operated and waterproof versions available
- ▶ High temperature housing available

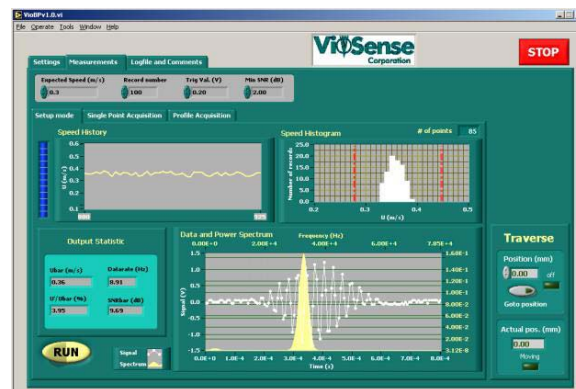
System components



The MiniLDV™ System components are shown on the left, consisting of: probe with cable and electronic driver box, VioBP-1™ Burst processor (digitizer, VioBP™ software and PC, not shown).

The MiniLDV™ Probe contains laser diode, diffraction grating beamsplitter, transmitting and receiving optics. A rotating diffraction grating for frequency shift is also available. The receiving fiber optic cable is connected to an electronic driver box, which contains the photodetector and power supply for the laser. The output from the driver box is bandpass filtered and digitized before being transferred to a PC for processing and output.

The software is a general purpose data acquisition and processing package with output of mean values and time records of velocity. When used with a traversing system, automatic velocity profiles can be obtained.

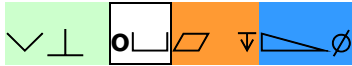


VioBP-1™ software user interface



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MiniLDV™ System specifications

Product ID: **1D MiniLDV-50™ Probe with VioBP-1™ Burst processor**

Description: miniature 1D laser Doppler velocimeter system

Measurement: velocity component U, perpendicular to fringes

Principle of operation: Doppler effect

Laser: wavelength: 785 nm

power: 30mw

Cable length: 15', other lengths available

Probe volume: size, $d_x \times d_y \times d_z$: 200 x 30 x 60 μm , typical

standoff distance in air, D: 50 mm, typical

fringe spacing: 4.6 μm , typical

Beam separation: 7.6 mm, typical

Photodetector dynamic range: DC - 10 MHz, 4kHz - 100 MHz also available

Digitizer: sampling rate: 100 MS/s

bandwidth: 100 MHz

timestamp resolution: 2 ns

max. output data rate: 10 kHz

Input buffer size: 16 MB, 32 MB also available

Velocity: range: 0.004 - 46 m/s, .018 - 460 m/s also available

resolution: .1%, typical

accuracy: .3%, typical, depends on SNR

Software: National Instruments LabVIEW® runtime

Outputs: $U_i, i = 1, N, U_{\text{bar}}, U_{\text{rms}}$

$U_{\text{bar}}(x,y,z), U_{\text{rms}}(x,y,z)$, using optional traverse

PC requirements: PCI bus, Windows 2000®, Intel Pentium4® recommended

Power: 110 v. AC/ 5 amps, DC and 220 v. AC versions, available

Operating temperature range: 0 - 40 °C

Probe: size: 38 mm (diameter) x 100 mm (length)

weight: 200 g

Product ID: **1D MiniLDV-100™ Probe & VioBP-1™ Burst processor**

specifications same as MiniLDV- 50™ Probe with VioBP-1™ Burst processor, above except:

Probe volume: size, $d_x \times d_y \times d_z$: 400 x 60 x 120 μm

standoff distance in air, D: 100 mm

fringe spacing: 9.3 μm

Velocity: range: 0.008 - 93 m/s, .040 - 930 m/s available

Product ID: **1D MiniLDV-150™ Probe & VioBP-1™ Burst processor**

specifications same as MiniLDV- 50™ Probe with VioBP-1™ Burst processor, above except:

Probe volume: size, $d_x \times d_y \times d_z$: 600 x 100 x 200 μm

standoff distance in air, D: 150 mm

fringe spacing: 14.0 μm

Velocity: range: 0.012 - 140 m/s, .050 - 1,400 m/s available

Specifications subject to change without notice. Some values are typical.



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