

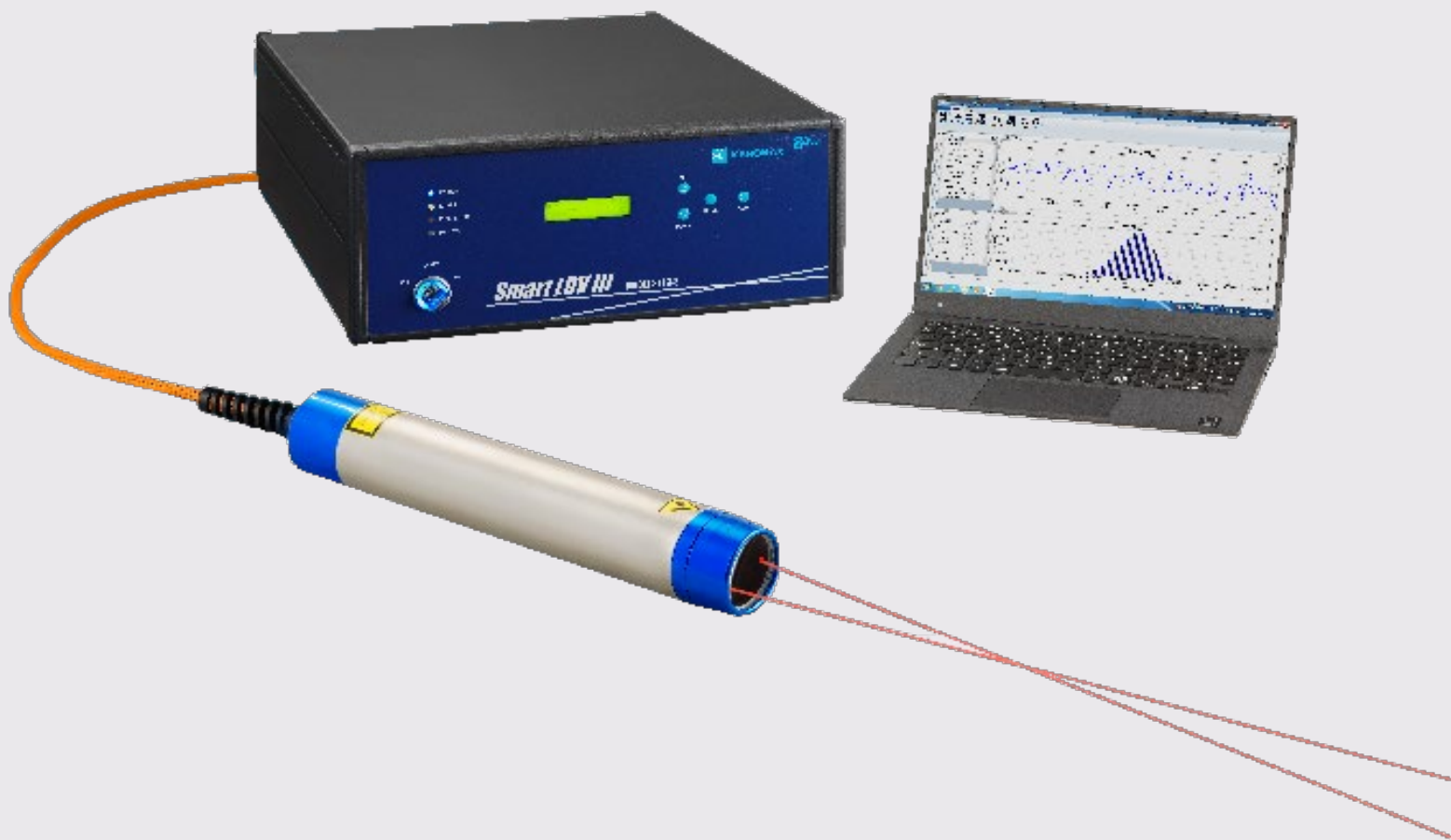
Perfection in fluids.

The right *flow*
by German engineering.



Kanomax - Smart LDV III Laser-Doppler-Velocimeter

Brochure EPE-182045

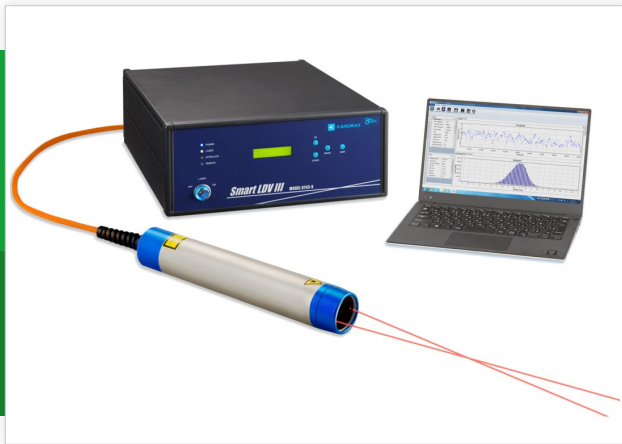


KANOMAX
The Ultimate Measurements



Kanomax Smart LDV III Laser-Doppler-Velocimeter

EPE-182045



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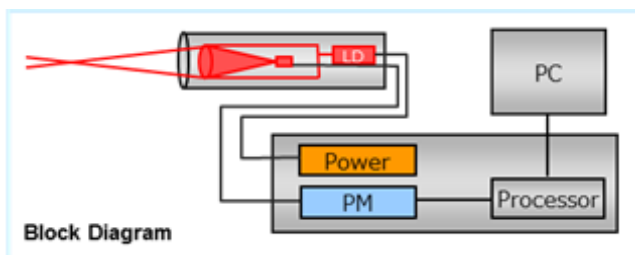
Non-intrusive measurement of absolute velocity

High quality and compact design
Applicable to complicated flow fields
Reverse flow measurement with frequency shifter

Description

A Laser-Doppler-Velocimeter (LDV) measures fluid velocity by utilizing coherence of laser light. It detects the Doppler shift frequency of the scattering light of particles in the fluid and calculates the velocity of the particles (fluid). With an LDV system, non-intrusive measurements without disturbing the measuring object, liquid, or gas flow, are achieved. No calibration is necessary and reverse flow measurements at a high resolution are also possible.

The Smart LDV III system is a high-quality and compact system, provides the absolute velocity value of the flow velocity with high repeatability and is applicable to complicated flow fields as it is independent from flow temperature and media.



Measurement diagram Smart LDV III

Features & Benefits

- ✓ Flow velocity range: max. -40 to 260 m/s
- ✓ Enhanced receiving sensitivity enabling high data-rate measurement
- ✓ Up to 60,000 velocity data/sec
- ✓ High-speed data transfer by USB3.0
- ✓ Probe designed as all-in-one; no alignment necessary
- ✓ Reverse flow measurement with frequency shifter

Applications

- ✓ Aerodynamic and hydraulic property measurement, e.g. in wind tunnels
- ✓ Measurement requiring high time-resolution
- ✓ Velocity measurement in fuel cells or stacks
- ✓ Comparison with CFD (Computational Fluid Dynamics)
- ✓ PIV accuracy tests
- ✓ Applicable to complicated flow fields, such as combustion fields since it is minimally affected by temperature and media

Our partner

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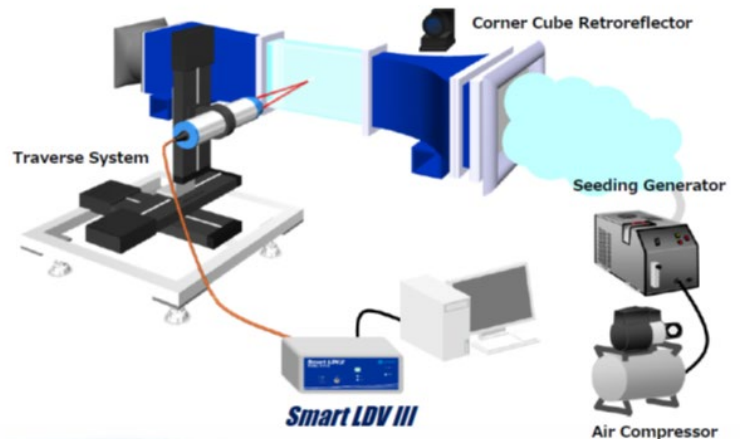
System configuration

System configuration

For the optical measurement, there must be an **observation window** or an open space with direct contact on the device under test (DUT). Distance between LDV probe and measuring point of the laser beam can be **between 150 to 400 mm**.

The LDV system detects the Doppler shift frequency of the scattering light of moving **tracer particles** in the fluid. If these are not available per se, they may have to be introduced into the application using an **atomizer** or smoke generator, since no measurement can take place without tracer particles.

The **Smart LDV III without frequency shifter** is a laser Doppler velocimeter that is suitable for applications in which absolute velocity should be measured, but flow direction is not a concern. The **Smart LDV III with frequency shifter** is suitable for applications in which a backflow occurs and is of interest to be determined. When the application requires the knowledge of flow direction and/or when the flow is very low or fluctuates over 0 m/s, the Smart LDV III with frequency shifter is recommended.



Example for a typical system configuration of the Smart LDV III



Corner cube mirror

If measurements are to be carried out at different measuring points, a **traverse system** is optionally available with which the LDV probe can be positioned under software control at several measuring points.

Moving axis	X, Y, Z axis*
Stroke	500 mm*
Positioning accuracy	± 0.02 mm (X axis)**
Drive system	Stepping motor
Controller	Traverse compatible version of LDV software

* Reference examples

** Positioning accuracy for Y and Z axis varies depending on the load

When measuring scattered light, a distinction is made between back and forward scattering generated by the particles. The forward scattering (in the same direction as the laser beam) is about 100 times stronger than the backward scattering. With a powerful photomultiplier, mostly, the detection of the backward scattering is enough for many applications. Optionally, the stronger forward scattering can be reflected by a **corner cube mirror** and thus the signal intensity can be significantly increased.



Traverse system



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Kanomax Smart LDV III Laser-Doppler-Velocimeter

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Technical specifications & ordering information

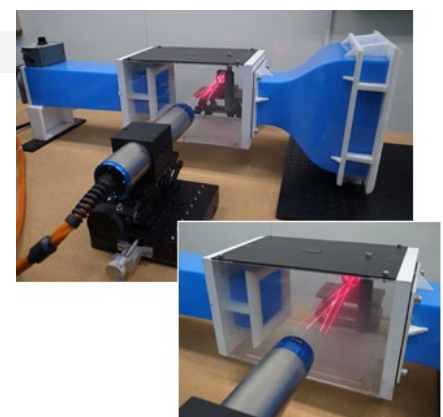
Technical specifications

Flow velocity range	-40 m/s ... 260 m/s (f = 400 mm, Smart LDV III with frequency shifter)
Optical System	
Laser	LD $\lambda=660$ nm, 60 mW
Focal length f (for air)	150 mm, 200 mm, 250 mm, 300 mm, 350 mm, 400 mm
Measurement volume size	0.13 mm x 1.3 mm (f = 200 mm)
Measurement method	Back scatter / Forward scatter (Option)
Probe size	d = 61 mm x 345 mm
Shift frequency	Smart LDV III w/o frequency shifter: --- Smart LDV III with frequency shifter: 0.01 – 10 MHz
Power supply	AC 100 - 240V
Signal Processor	
Signal processing	> 8 bit FFT (1024, 512, 256, 128 points)
Frequency band	1 kHz - 40 MHz (8 ranges)
Max data rate	60,000 speed data/sec*
Validation	Burst spectrum ratio
Interface	USB3.0
Software	
Max. number of data	100,000
Real time monitor	Burst waveform Burst spectrum Velocity histogram
Analysis function	Minimum, maximum and mean flow velocity, standard deviation, turbulence intensity, skew factor, flatness factor velocity histogram, time series display
Data output	CSV format
Supported Operating System	Windows 10 (64bit only) English / Japanese

*depending on measurement condition

Ordering information

Item number	Description
181988	Smart LDV III w/o frequency shifter
181989	Smart LDV III with frequency shifter
Options	
182046	PC with English operating system
182006-11	Additional lens
182029-33	Corner cube mirror
182034	Traverse system



Application example: Smart LDV III measurements on table top wind channel for students



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