LASER VIBROMETER

• VERSIONS WITH 1,2,4,8 OPTICAL

• NON-CONTACT MEASUREMENT OF LARGE (UP TO 10 mm) AND SMALL (DOWN TO 1 nm) **VIBRATIONS** • SMALL SIZED

(OPTICAL HEAD 60mm x 15 mm)

- HEADS AVAILABLE • FREQUENCY RANGE: FROM DC TO 1 MHz
 - DISPLACEMENT ANALOG **OUTPUT**
- WORKS ON ALL DIFFUSIVE SURFACES (METAL, RUBBER, PAPER, FABRIC, ETC.)
- NOVEL INTERFEROMETRIC **CONFIGURATION**
- EASY BEAM ALIGNMENT

This new Laser Vibrometer allows easy and accurate non-contact vibration measurements on all rough and diffusive surfaces (e.g.: unfinished metal, plastic, rubber, paper, fabric, etc.). It provides an analog electrical output diffusive surfaces and on back-reflecting surfaces. which is a replica of the target displacement (1 mV/µm responsivity), in a frequency range from DC to 1 MHz, with a minimum measurable displacement as small as 0.4 nm (for 1 Hz noise bandwidth), a peak-to-peak maximum vibration amplitude larger than 20 mm, and a maximum velocity of 0.15 m/s.

Great versatility allowed by the possibility of having up to • 8 optical heads (i.e., up to 8 independent optical channels) in a single instrument.



PRINCIPLE OF OPERATION

The new Laser Vibrometer is based on a novel and simple self-mixing interferometric scheme, and it uses a semiconductor diode laser. The Michelson interferometric configuration used in conventional Laser Doppler Vibrometers/Velocimeters (LDVs) includes several lenses, polarizing beamsplitters, waveplates and dual balanced photoreceiver. Conversely, the new self-mixing scheme is based on the coherent interference of the backscattered light directly into the laser diode cavity, and it needs a reduced set of optics and a single photodetector. The new

Laser Vibrometer has a high sensitivity that allows correct operation even for weak intensities of light backscattered by the target. Operation is demonstrated on nearly all

FEATURES

- Easy-to-use equipment
- Compact size of the optical head (60 mm x 15 mm)
- Displacement analog output
- Sub-micrometer resolution
- Measurement of large vibration / velocity •

VERSIONS

- 1, 2, 3, or 4 optical heads in a rack of 27 cm x 33 cm x $16 \text{ cm} (W \times D \times H)$
- Up to 8 optical heads in a rack of 49 cm x 33 cm x $16 \text{ cm} (W \times D \times H)$

APPLICATIONS

- Non-contact measurement of vibrations
- Material analysis
- Automotive
- Vibration measurement without mass-loading on small, soft and delicate structures
- Loudspeaker testing
- Piezoceramic testing
- Modal analysis
- On-line process control in industrial plants
- Quality tests

USE

The optical head shall be placed in front of the vibrating surface, at an operating distance between 0.1 and 0.4 m (user selectable). Electrical vibration signal is then readily available from the BNC output connector of the electronic unit. The signal can be supplied to an oscilloscope, or to a FFT analyzer for frequency domain analysis.

An LED-bar real-time signal strength indicator helps to avoid signal fading caused by speckle-pattern effects.



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Performance	
Resolution	Noise-limited
Noise Equivalent Displacement	400 pm/√Hz
Maximum measurable vibration (peak)	13.5 mm
Maximum measurable velocity	0.15 m/s
Output signal responsivity (displacement)	1 mV/µm
Output signal accuracy	1 %
Working distance ± depth of focus (on diffusive surface)	10, 20, 30 cm (± 3 cm)
Spatial transversal resolution	250 µm
Target surface	Diffusive or back-reflecting

Physical	
Laser power	17 mW
Laser wavelength	$770\pm10~\text{nm}$
Laser safety class	III B
Output signals	 Vibration displacement (analog)
Output connectors	BNC
Optical head dimensions	Length: 60 mm - Diameter: 15 mm
Electronic unit dimensions (W x D x H)	27 cm x 33 cm x 16 cm (up to 4 optical channels) 49 cm x 33 cm x 16 cm (up to 8 optical channels)
Power supply	220-240 V ac / 50-60 Hz

VIBROMETER PERFORMANCE





