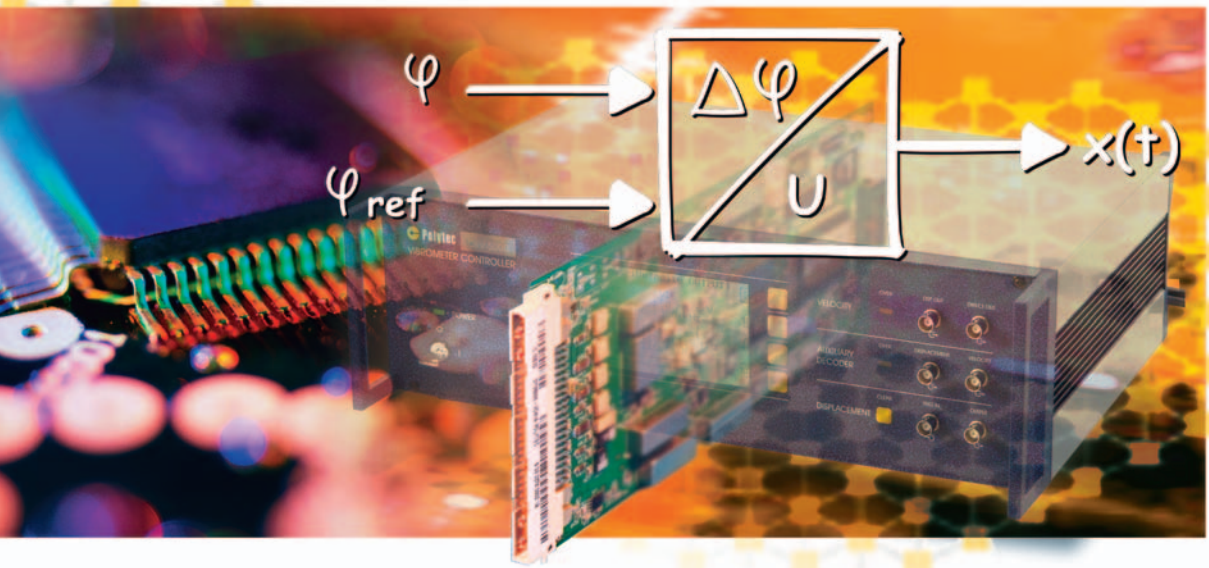
DD-100 *Displacement Decoder*



MODULAR VIBROMETER SYSTEM

- OFV-5000 Vibrometer Controller
  - Velocity Decoders
  - Displacement Decoders
- OFV-505/503 Standard Sensors
- OFV-511/512 Fiber-Optic Sensors

MEASURING VIBRATION DISPLACEMENT

Signal processing is one of the most sensitive parts of any Laser Doppler Vibrometer system. The quality of dedicated displacement decoders available for the OFV-5000 Controller defines the accuracy, linearity, sensitivity and signal-to-noise ratio of the system.

Displacement Decoding in Laser Vibrometer Systems

Polytec Laser Vibrometers measure the instantaneous velocity and displacement of a vibrating test structure from the Doppler shift in the frequency of back-scattered laser light.

A vibrometer system comprises controller electronics and a non-contact standard-optic or fiber-optic sensor head. The controller provides signals and power for the sensor head, and processes the vibration signals. These are electronically converted by specially developed decoders within the controller to obtain velocity and displacement information about the test structure.

A vibrometer system based on the OFV-5000 Controller can measure vibration frequencies from 0 Hz up to 20 MHz and displacements from the sub-nanometer to the meter range. Different measurement ranges demand appropriate decoders. To meet this demand Polytec offers a range of displacement decoders with different characteristics.

The DD-100 Basic Displacement Decoder

The DD-100 is designed to measure large translational displacement and vibration amplitudes where a resolution of 80 nm is sufficient. Dependent on the amplitude, it is suitable for vibration measurements up to 250 kHz.

The operating principle is based on an incremental method called fringe counting. An interferometric fringe corresponds to a surface displacement of half the laser wavelength. Fractional fringes are generated by electronic interpolation. The number of fringes is counted and transformed to an analog output voltage utilizing a digital-to-analog converter.

Key Features of the DD-100

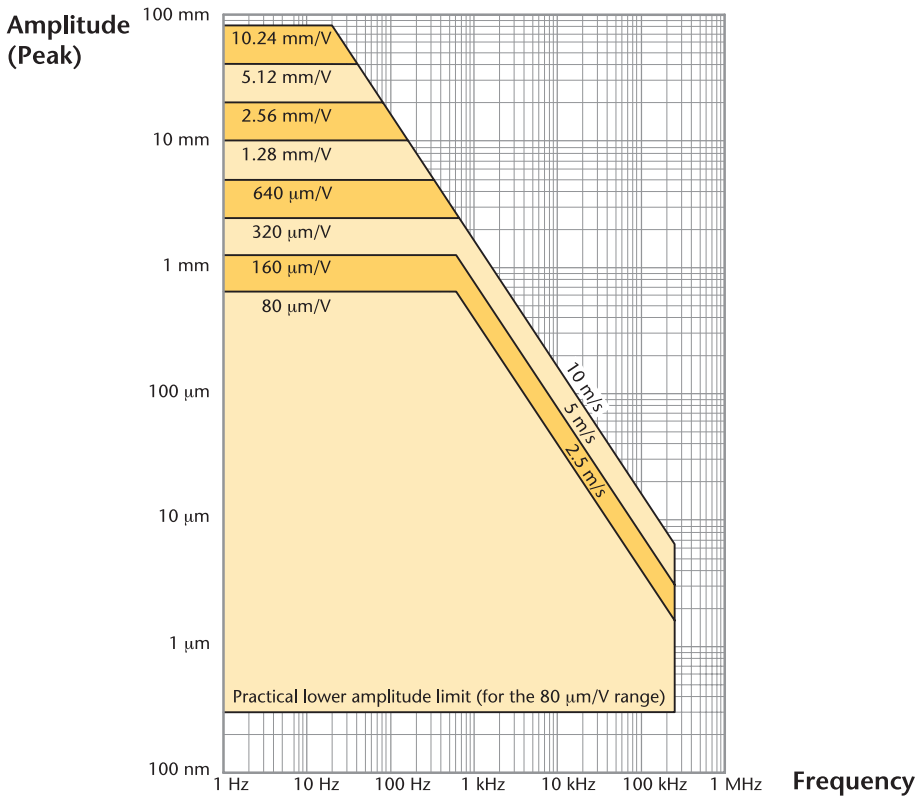
- Digital fringe counting
- 8 measurement ranges with a dynamic range of 14 bit each (> 80 dB)
- Best resolution < 80 nm
- Frequency range from DC to 250 kHz

DD-100 Technical Data

Measurement Range	Full Scale Output (Peak to Peak)*	Resolution**	Signal Frequency Range	Max. Velocity
mm/V	mm	µm	kHz	m/s
0.08	1.28	0.08	0 – 250	2.5
0.16	2.56	0.16	0 – 250	5.0
0.32	5.12	0.32	0 – 250	10.0
0.64	10.24	0.64	0 – 250	10.0
1.28	20.48	1.28	0 – 250	10.0
2.56	40.96	2.56	0 – 250	10.0
5.12	81.92	5.12	0 – 250	10.0
10.24	163.84	10.24	0 – 250	10.0

* The full scale values correspond to the maximum output voltage swing of ± 8 V.
**The resolution is understood as 1digit of the fringe counter output or 1 mV at the analog output, resp.

DD-100 Range Diagram



Data Acquisition

For PC-based data acquisition and processing we recommend our VibSoft Packages. VibSoft-FC is a comprehensive software best suited for the DD-100 decoder for acquiring the vibrometer digital fringe count output signal. It features data acquisition in time and frequency domain, digital filters, signal averaging and real-time integration and differentiation.

For more information on selection and combination of signal decoders please see OFV-5000 and Decoder Guide data sheets, or contact your local vibrometer sales/application engineer.

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