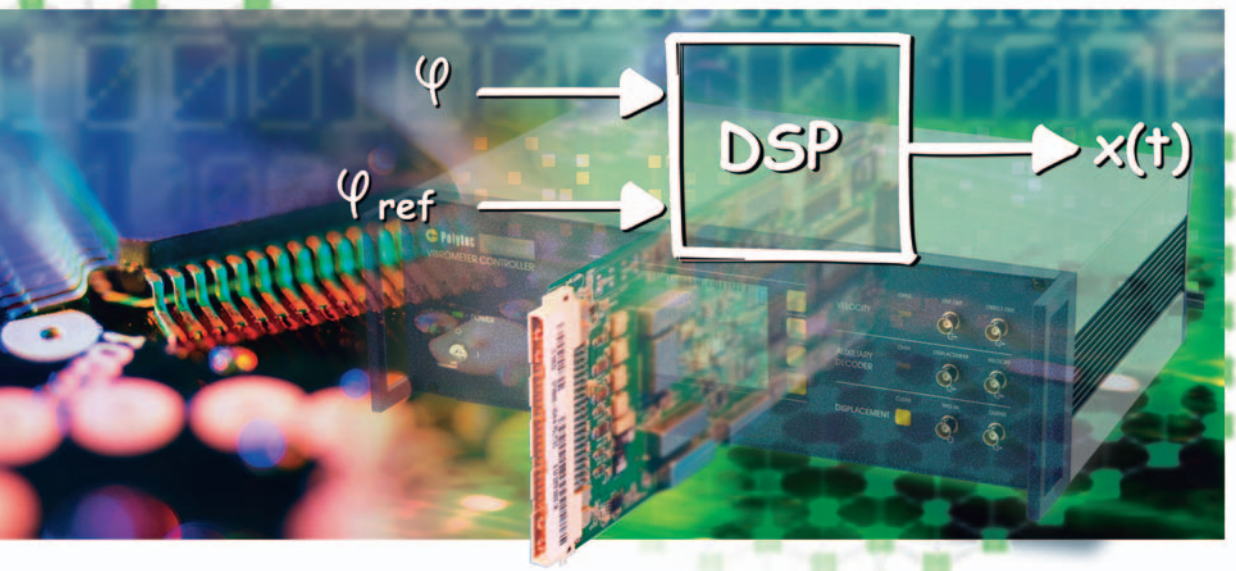
DD-500 *Digital Displacement Decoder*



MODULAR VIBROMETER SYSTEM

- OFV-5000
  Vibrometer Controller
  - Velocity Decoders
  - Displacement Decoders
- OFV-505/503
  Standard Sensor Heads
- OFV-551/552
  Fiber Interferometers

MEASURING VIBRATION DISPLACEMENT

Signal processing is one of the most sensitive parts of any Laser Doppler Vibrometer system. Proper design of a displacement decoder greatly improves the accuracy, linearity, sensitivity and signal-to-noise ratio of the system. The DD-500 is a high resolution digital displacement decoder based on state-of-the-art DSP technology.

Displacement Decoding in Laser Vibrometer Systems

Polytec Laser Doppler Vibrometers operate on the Doppler principle, measuring the frequency or phase shift of back-scattered laser light from a vibrating structure, to determine its vibrational velocity and displacement.

A vibrometer system is comprised of two basic elements: a controller and a sensor head. The controller provides control voltages and power to the sensor head and processes the raw sensor head output signal to extract the measurement data. This processing is performed by specially developed decoders within the controller to obtain velocity and displacement information about the vibration of the structure. An OFV-5000 based vibrometer system can measure vibration frequencies from 0 Hz up to 20 MHz and displacements from picometers to meters. Different measurement ranges demand appropriate decoders. To meet this demand Polytec offers a range of displacement decoders with different characteristics.

The DD-500 Digital Displacement Decoder

The DSP-based DD-500 provides the best resolution for a given bandwidth for all applications where the peak velocity does not exceed 0.5 m/s. A prerequisite for operating the DD-500 is that the velocity decoder VD-06 is installed.
The output signal of the DD-500 is available as a digital data stream in S/P-DIF format at the digital interface, as well as an analog signal.

Key Features

- DSP-based, high precision displacement decoder for demanding applications e.g. acoustics, micro systems, precision mechanics
- 16 measurement ranges
- Down to 15 pm resolution
- Frequency range from DC to 350 kHz
- Intelligent overflow handling

Measurement Range	Full Scale Output (peak-to-peak)[1]	Resolution[2]	Signal Frequency Range[3]	Maximum Velocity
µm/V	µm	nm	kHz	m/s
0.05	1	0.015	0 ... 350	0.5
0.1	2	0.03	0 ... 350	0.5
0.2	4	0.06	0 ... 350	0.5
0.5	10	0.15	0 ... 350	0.5
1	20	0.3	0 ... 350	0.5
2	40	0.6	0 ... 350	0.5
5	100	1.5	0 ... 350	0.5
10	200	3	0 ... 350	0.5
20	400	6	0 ... 350	0.5
50	1,000	15	0 ... 350	0.5
100	2,000	30	0 ... 350	0.5
200	4,000	60	0 ... 350	0.5
500	10,000	150	0 ... 350	0.5
1,000	20,000	300	0 ... 350	0.5
2,000	40,000	600	0 ... 350	0.5
5,000	100,000	1,500	0 ... 350	0.5

[1] The full scale values correspond to ±10 V output voltage swing.

[2] The resolution corresponds to the quantization step of approx. 0.4 mV at the analog output. In case of spectral signal analysis, a noise-limited resolution of < 0.5 pm/$\sqrt{}$Hz applies. The noise-limited resolution is defined as the signal amplitude (RMS) that produces 0 dB signal-to-noise ratio with 1 Hz spectral resolution, measured on 3M Scotchlite® Tape (reflective film).

[3] When a suitable measurement range has been selected for the digital velocity decoder.

Data Acquisition

For PC-based data acquisition and processing we recommend our VibSoft Packages.

VibSoft-1000 is a comprehensive software best suited for the DD-500 Displacement Decoder including data acquisition board for dual channel data acquisition at 1 MHz bandwidth. Four channels are accessible by using VibSoft-1004. For lower frequencies up to 80 kHz we recommend VibSoft-80 and VibSoft-84, resp.

Selection and Combination of Signal Decoders

For more information on selection and combination of signal decoders please see OFV-5000 Vibrometer Controller and Decoder Guidelines data sheets, or contact your local sales/application engineer. The data sheets can be downloaded from **www.polytec.com** or can be requested at your local Polytec Office.