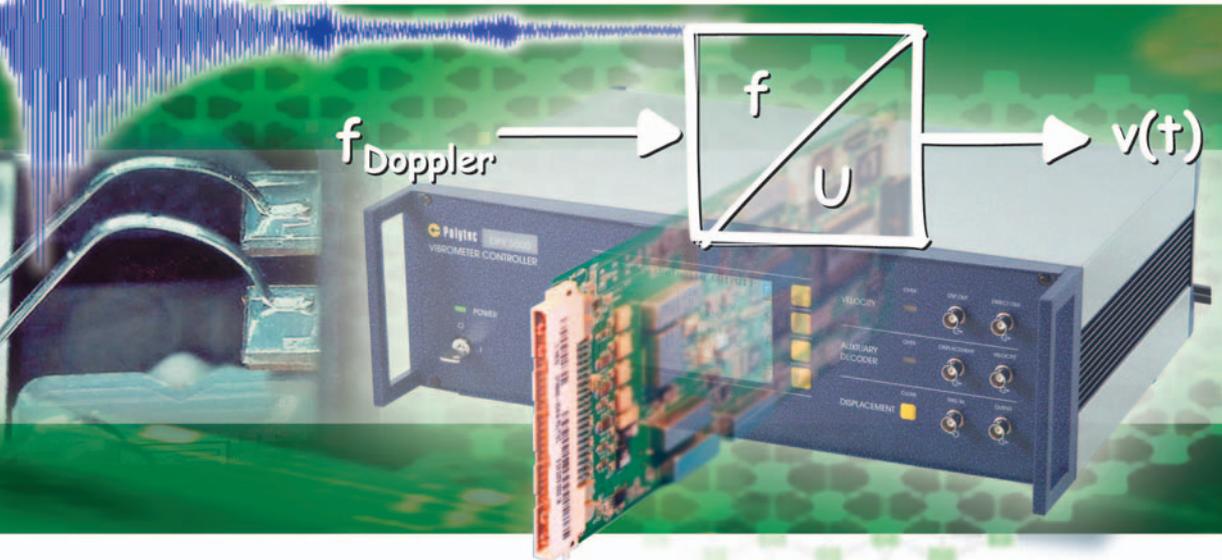# VD-05 *10 MHz Velocity Decoder*

MODULAR VIBROMETER SYSTEM

- **OFV-5000 Vibrometer Controller**
  - Velocity Decoders
  - Displacement Decoders

- **OFV-505/503 Standard Sensor Heads**

- **OFV-551/552 Fiber Interferometers**

MEASURING VELOCITY AT ULTRASONIC FREQUENCIES

Signal processing is one of the most sensitive parts of any Laser Doppler Vibrometer system. The VD-05 Velocity Decoder has been specifically developed to meet the exacting requirements for acquiring ultrasonic vibrations and impulses.

Velocity 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.

Polytec offers a range of analog and digital velocity decoders with different characteristics. The VD-05 Velocity Decoder has been developed as an auxiliary decoder for specific measurement applications, working independently of the other decoders installed in the controller.

The VD-05 Auxiliary 10 MHz Velocity Decoder

The VD-05 velocity decoder is designed to acquire high-frequency vibrations up to 10 MHz, as well as fast transient motions such as pulse-shaped signals. These applications are common for example in the domain of ultrasonic technology and micro mechanical systems. Despite the wide bandwidth, the VD-05 attains excellent resolution values with spectral signal evaluation. The maximum velocity of 3 m/s allows vibration amplitudes of approx. 50 nm at the upper limit of the operating frequency range.

Key Features of the VD-05

- Independent, auxiliary decoder
- Large bandwidth from 0.5 Hz to 10 MHz for acquisition of ultrasonic velocity signals
- Two measurement ranges of 0.5 m/s and 2.5 m/s full scale (peak)
- Maximum acceleration 1,600,000 g

VD-05 Technical Data

| Measurement Range	Maximum Full Scale (Peak)[1]	Resolution[2]	Signal Frequency Range	Max. Acceleration	Max. Linearity Error[3]
mm/s/V	m/s	µm s^{-1}/$\sqrt{Hz}$	Hz	g	% of reading
100	0.5	< 3	0.5 … 10 M	320,000	2
500	2.5	< 3	0.5 … 10 M	1,600,000	2

[1] The full scale values correspond to the nominal output voltage of 5 V$_{peak}$.
The range up to 6 V$_{peak}$ can be used at reduced linearity specifications.

[2] 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). The attainable resolution is frequency-dependent. The typical value refers to the center of the operating frequency range.

[3] The linearity error is defined as the amplitude-dependent, relative deviation of the scaling factor, referred to the scaling factor under calibration conditions (sinusoidal vibration, f = 100 kHz, amplitude 70% of full scale range, load resistance ≥ 1 MΩ).

VD-05 Range Diagram
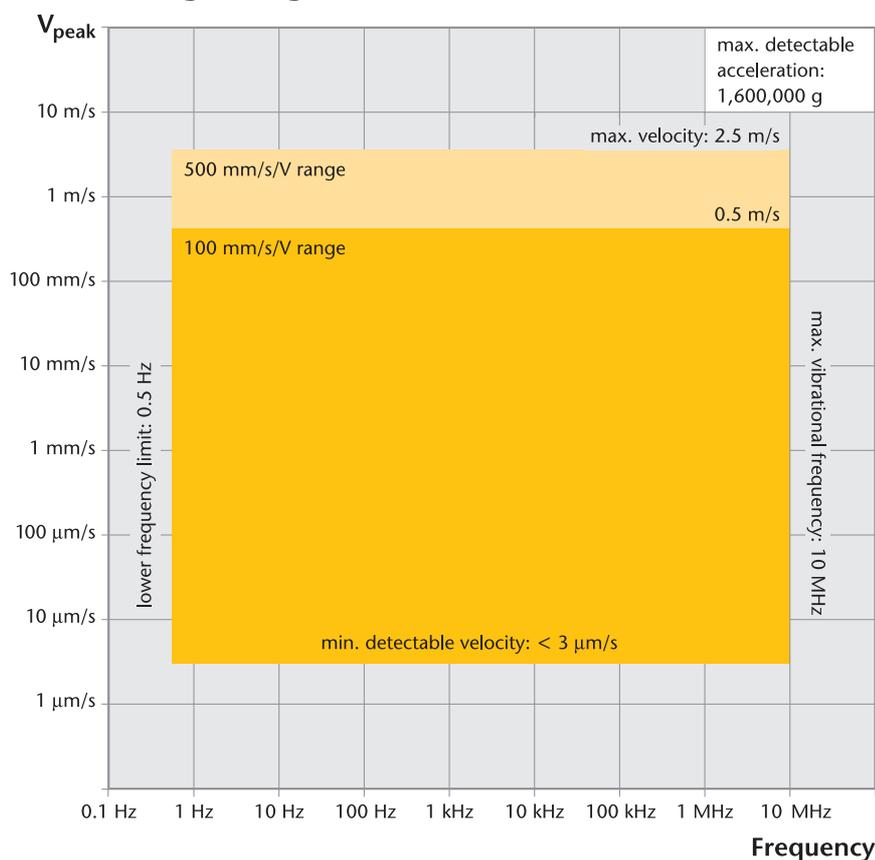
Data Acquisition

For PC-based data acquisition and processing we recommend our VibSoft Packages. VibSoft M2-40 is a comprehensive software best suited for the VD-05 Velocity Decoder including data acquisition board for dual channel data acquisition at 40 MHz bandwidth.

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.