

OFV-5000 *Vibrometer Controller*



MODULAR VIBROMETER SYSTEM

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

MEASURING VIBRATIONS

Polytec's modular vibrometer controller is continually improving to meet the needs of advanced vibration measurement applications. The latest design adds digital processing with a range of new features that make non-contact vibration analysis even more precise, simple, flexible and rewarding.

OFV-5000 Controller – The Soul of a Quality Vibrometer System

OFV-5000 replaces the widely respected OFV-3001 modular controller. Its advantages include improved vibration resolution and dynamic range from new digital/analog decoders, remote focus and focus memory (with OFV-505), more capacity for a wider range of modules and digital filtering. Polytec Laser Doppler Vibrometers operate on the Doppler principle, measuring back-scattered laser light from a vibrating structure, to determine its vibrational velocity and displacement. A vibrometer system is comprised of 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. This information is provided by OFV-5000 in either analog or digital form, for further data evaluation.

Functionality and Flexibility

- **Modular Approach**
A wide range of configurations offers optimal performance for the task with maximum flexibility and expandability to meet future needs.
- **Application-Specific Configuration**
By selecting from a choice of different analog and/or digital decoders, performance can be precisely tailored to match the demands of the application.
Several compatible standard-optic and fiber-optic sensor heads are available to meet specific needs for robustness, flexibility and ease-of-use.
- **Upgradeable to Scanning Vibrometer**
OFV-5000 is fully upgradeable to Polytec's new 1-D and 3-D Scanning Vibrometer systems for full field vibration analysis.
- **Remote Focus Functions**
Autofocus, remote focus and focus memory are all possible with the OFV-5000 controller used with the new OFV-505 sensor head.

Laser Vibrometry Expansion Options, using the OFV-5000 Controller

Expansion to a Scanning Vibrometer System

Sensor Head

Controller OFV-5000

Signal Decoder

Vibrometer System

PSV
PSV-3D
MSV
MMA

Flexible Signal Processing

The OFV-5000 controller is designed to accept a choice of signal processing modules, each optimized for different frequency, velocity or displacement performance.

Each module is therefore tuned for different measurement tasks by making the best use of the vibration information in the Doppler signal obtained by the sensor head.

Various analog and/or digital decoder options seamlessly cover the entire velocity range up to ± 10 m/s, displacements from the sub-nanometer to the meter range, and frequencies from DC to 20 MHz. Up to four decoders can be installed simultaneously to obtain the greatest possible flexibility. This flexibility also allows retrospective add-ons and modifications to meet future needs.

Vibrometer Measurement System

A system comprises an OFV-5000 controller, choice of decoder modules and a sensor head. A choice of standard single point and fiber-delivered single point sensors, or dual (differential) fiber sensors is available.

Expansion to Scanning Vibrometer Systems

A system based on the OFV-5000 can be extended to a full scanning vibrometer system by adding other components.

The Polytec Scanning Vibrometer (PSV) makes it possible to rapidly and automatically acquire vibration characteristics of complete surfaces, while the PSV-3D extends this to three-dimensional data acquisition and analysis. The Micro-Scanning Vibrometer and Micro Motion Analyser (MMA) have been developed to perform the same measurements on microstructures.

Selection and Combination of Signal Decoders

The OFV-5000 controller has four internal slots to accept up to four different signal decoders, depending on the desired measurement ranges. Two are specifically designated for velocity decoders and one is for the displacement decoder. An Auxiliary Slot is provided to take a further optional velocity or displacement decoder.

Please contact your local vibrometer sales or application engineer who will help you to select the appropriate decoders and VibSoft Software.

Velocity Decoders

The VD-01 velocity decoder offers the highest linearity for frequencies up to 50 kHz. The VD-02 has an extended range up to 1.5 MHz. The VD-04 3-range decoder is required if the DD-400 analog integrator displacement decoder is selected. VD-05 is intended for use in the Auxiliary Slot, and with a frequency response to 10 MHz is particularly well suited for ultrasonics applications. For the very best precision in the low velocity region (up to 500 mm/s), we recommend the VD-06 digital decoder.

Decoders can be used together. For example VD-02 used together with VD-06 will give the greatest dynamic range and optimal frequency and velocity performance. Alternatively, a DD-400 displacement integrator with VD-04, plus VD-06 will give velocity and displacement.

Displacement Decoders

DD-100 and DD-200 analog 14 bit displacement decoders take phase information from the Doppler signal to provide direct displacement signals, not derived from the velocity information. They may be used in conjunction with velocity decoders to provide full vibration characterization of the test structure.

Alternatively, OFV-5000 accepts the DD-500 digital displacement decoder with high resolution digital/analog output.

A further option is the DD-600 I&Q demodulator. This is designed to allow processing of the digital signal with the PC-based VibSoft-VDD package. This provides the highest resolution and dynamic range of all the displacement decoder options. DD-300 and DD-400 decoders are designed for use in the Auxiliary Slot. The high frequency DD-300 measures between 50 kHz and 20 MHz. The VD-400 employs an analog integrator.

DSP Filter

The DSP based adaptive filter module significantly improves the signal-to-noise ratio of the vibration signal by suppressing random and non-periodic noise for frequencies ranging from DC to 20 kHz. The adaptive filter can only be used in conjunction with the digital decoder VD-06.

Table of Decoder Combinations

Velocity Decoders		Displacement Decoder		Auxiliary Decoder		DSP Filter	
Slot 1	Slot 2	14-bit FC	or 16-bit DSP*	Velocity or Displacement			
VD-01	–	DD-100 or DD-200	–	VD-05**	DD-300	–	
VD-02	–		–			DD-400 or DD-300	–
VD-02	VD-06		DD-500**				LF-02
VD-04	–		–		DD-300	–	
VD-04	VD-06		DD-500**			LF-02	
–	VD-06	–	DD-500**	DD-300	LF-02		

* Instead of the internal displacement decoder, a DD-600 I&Q demodulator for external PC-based signal processing can also be installed (VibSoft-VDD)

** from 2004 onwards

OFV-5000 Technical Data

General Specifications	
Ambient temperature	+5 °C to +40 °C
Storage temperature	-5 °C to +60 °C
Relative humidity	20 % to 80 %, non-condensing
Power supply	Switch mode power supply with wide range input 100 ... 240 V
Weight	9.7 kg
Dimensions [W x H x L]	450 mm x 360 mm x 145 mm (19" housing)
Interface	RS-232
Display	Illuminated graphics LCD with menu assistance
Outputs analog	On the front: Velocity out, Displacement out, DSP out, Auxiliary out; On the back: Signal level out
Outputs digital	S/P-DIF optical and electrical

Sensor Head Compatibility	
Standard single point sensor heads	OFV-505, OFV-503 (also OFV-303, OFV-353)
Fiber optic sensor heads	OFV-511, OFV-512

Available Velocity Decoders*	
Analog decoders	
VD-01	max. 50 kHz, 5 measurement ranges (mm/s/V): 1, 5, 25, 125, 1000
VD-02	max. 1.5 MHz, 4 measurement ranges (mm/s/V): 5, 25, 125, 1000
VD-04	max. 250 kHz, 3 measurement ranges (mm/s/V): 10, 100, 1000
VD-05**	max. 10 MHz, 2 measurement ranges (mm/s/V): 100, 500
Digital decoders	
VD-06	max. 350 kHz, 3 measurement ranges (mm/s/V): 2, 10, 50

Available Displacement Decoders*	
DD-100	14 bit FC decoder, 250 kHz, 8 measurement ranges
DD-200	14 bit FC decoder, 250 kHz, 13 measurement ranges
DD-300	Ultrasonic displacement decoder, 20 MHz, 2 measurement ranges
DD-400	Analog integrator, 250 kHz, 3 measurement ranges
DD-500**	16 bit DSP decoder, 350 kHz, 16 measurement ranges
DD-600**	I&Q decoder, direct output of the quadrature signal, optional further processing with VibSoft-VDD

Adaptive Filter Module	
LF-02	DSP based, analog and digital output signal, frequency range: 0 – 22 kHz

* You will find detailed information in the Decoder Guidelines and Decoder data sheets

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