

Digital Laser Doppler Vibrometer

Vector-Series



OptoMET laser Doppler vibrometers (LDV) are very fast and easy-to-operate vibration measuring instruments. They are used for precise, non-contact, and non-reactive measurements of mechanical and acoustic parameters such as vibration displacement amplitude, velocity, and acceleration.

Thanks to our innovative digital signal processing technology and the highest optical sensitivity, our instruments provide quick and simple vibration measurements of even the most challenging systems, including high vibration frequencies, large working distances, small vibration amplitudes, high linearity, and high accelerations or velocities, ...

With these unique properties, OptoMET vibrometers can be used for numerous applications, ranging from microsystems and aerospace, from research and development laboratories to automated industrial applications.

Efficient and cost-saving

The Vector-Series is the flexible, efficient and cost-saving solution for various types of applications requiring noncontact vibration measurement.

Digital signal processing provides excellent linearity and measuring accuracy.

With a resolution of $8 \text{ nm s}^{-1}/\sqrt{\text{Hz}}$, it can reliably measure small vibrations and quiet noises. Exchangeable objective lenses permit a variable working distance from 5 mm to >100 m.

Performance characteristics:

- Maximum vibration velocity 10 m/s
- Up to 14 velocity measuring ranges
- Max. Frequency 10 MHz
- Ultrafast digital signal processing (ultraDSP)
- High resolution: up to $2 \text{ pm} / 2.5 \text{ nm s}^{-1}/\sqrt{\text{Hz}}$
- Variable working distances (5 mm to >100 m) with 6 different quick-change objective lenses
- Excellent linearity and measuring accuracy
- Compact design of the optics (interferometer) and the electronics (decoder) in one housing
- Easy-to-operate user interface, color touch display, rotary knobs and buttons to select the measuring ranges and settings
- Very legible display of the signal level
- Up to 3 analog voltage outputs
- Visible, eye-safe laser beam $\leq 1 \text{ mW}$, class II

Features

Ultrafast digital signal processing (ultraDSP)

A laser Doppler vibrometer with digital high-speed signal processing provides precise, high-resolution data enormously fast. It is thus far superior to conventional analog decoder solutions used for vibration measurement.

OptoMET developed the ultraDSP technology for laser vibrometry and thus achieved excellent performance specifications, with displacement and velocity resolutions of up to 2 pm and 2.5 nm s⁻¹/√Hz respectively, excellent linearity, and an extremely large frequency bandwidth of up to 10 MHz.

ultraDSP Advantages:

- Excellent speed- and displacement resolution
- High upper frequency limit
- Lower frequency limit DC
- Excellent linearity
- High measurement accuracy
- High aging stability
- "low noise" digital signal demodulation
- Variable working distances
- Insensitive to surface roughness / color

Excellent optical sensitivity

Low-noise signal converters/input stages, a highly precise heterodyne interferometer, and fast objective lenses allow measurements of almost any surface, irrespective of color, temperature, and roughness.

Measuring with light

The instrument uses highly visible red laser light with a wavelength of 633 nm. It measures picometer-scale vibrations and delivers true measured values without an additional sensor mass. The laser spot can be focused to a diameter of about 5.8 μm so that very small structures can be measured.

Always the correct working distance

From a microsystem to a high-rise building: the objective lenses can be exchanged in a matter of seconds so that the object can be measured at the appropriate working distance: from 5 mm to more than 100 meters.

There is an optional telescopic sight to facilitate fast setup when measuring at a large distance.

Perfect handling

The complete vibrometer has a very compact design. The laser, interferometer, controller and decoders for displacement, velocity, and acceleration, as well as the user interface are all accommodated in a portable housing. The instrument has a 12 V DC connection as well as an external 110/230 V AC power supply unit and can thus be used in the laboratory, in production, and in the field. It also has a touchscreen and separate rotary knobs for intuitive and user-friendly operation.

Class II laser product label

DO NOT STARE INTO BEAM Class 2 Laser Product
Laser CLASS 2: visible, red laser beam, 632.8 nm, output power: ≤1 mW



DO NOT STARE INTO BEAM
CLASS 2
visible, red laser beam
output power: ≤1 mW

General data

Measured quantity	Velocity, displacement, acceleration
Frequency bandwidth	0 Hz - 10 MHz
Signal processing	Digital (OptoMET UltraDSP)
Source impedance	50 Ohm
Working distances	Variable working distance from 5 mm to >100 m
Laser wavelength	632.8 nm, visible, red laser beam
Laser safety class	Output power: <1 mW, class II, eye-safe
Optics	Auto- and manual focusing
User interface output	Color screen 3.5" + 20 segment LED bargraph
User interface input	Touch screen, knobs with push-button, key switch (power)
Operating temperature range	+5 to 40°C
Dimensions	Length x width x height (excluding handle and lens): 380 x 180 x 148 mm
Weight	8 kg + objective lens
Power supply	110 -240 V AC (50-60Hz) or 12 V DC
Analog output	- Up to 3 BNC analog outputs - Data rate: 160 MSamples/s @ 16-bit - Output voltage range: ± 2 V

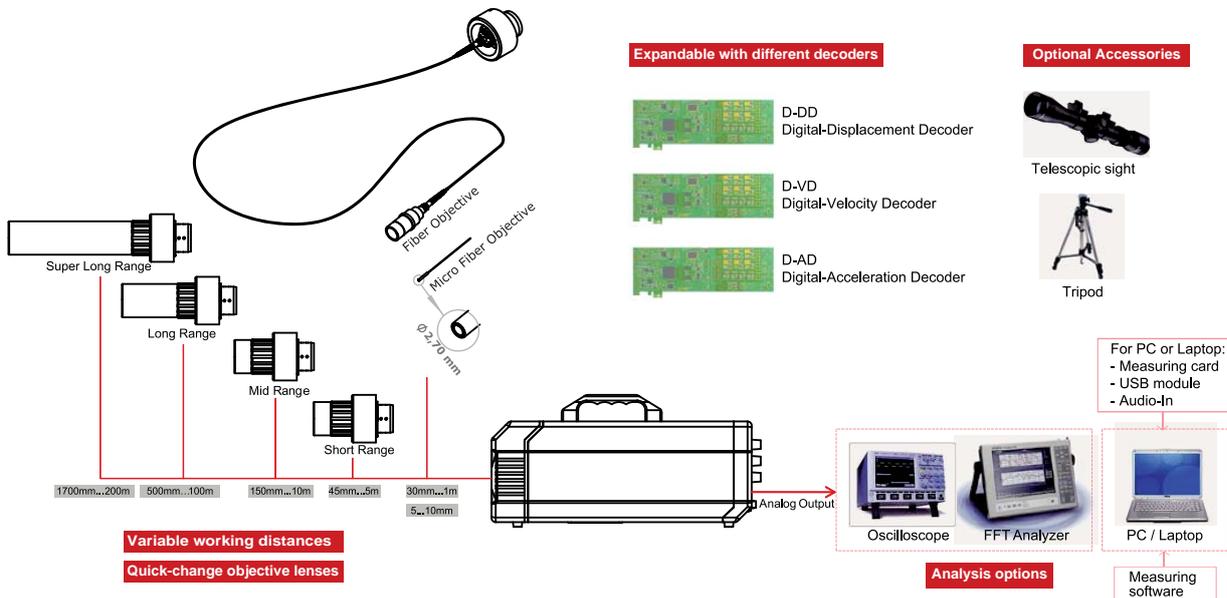
Configuration

Specification	Vector-Basis	Vector-Sense	Vector-Speed	Vector-HF	Vector-Master
BNC analog output	velocity	velocity, displacement	velocity, displacement	velocity, displacement	velocity, displacement, acceleration
Frequency range	DC - 500 kHz	DC - 1 MHz	DC - 2.5 MHz	DC - 10 MHz	DC - 10 MHz
Velocity-decoder	D-VD-1	D-VD-2	D-VD-3	D-VD-4	D-VD-5
Velocity measuring ranges	10 mm/s - 2 m/s	1 mm/s - 2 m/s	10 mm/s - 10 m/s	10 mm/s - 5 m/s	1 mm/s - 10 m/s
Number of velocity measuring ranges	8	11	11	9	14
Resolution of the velocity	8 nm s ⁻¹ /Hz	2.5 nm s ⁻¹ /Hz	8 nm s ⁻¹ /Hz	8 nm s ⁻¹ /Hz	2.5 nm s ⁻¹ /Hz
Max. velocity	2 m/s	2 m/s	10 m/s	5 m/s	10 m/s
Displacement-Decoder	optional: D-DD-1	D-DD-2	D-DD-3	D-DD-4	D-DD-5
Displacement measuring ranges	± 50 nm - ± 50 mm				
Number of Displacement measuring ranges	19				
Resolution of Displacement	2 μ m				
Acceleration-Decoder	optional: D-AD-1	optional: D-AD-2	optional: D-AD-3	optional: D-AD-4	D-AD-5
Acceleration measuring ranges	160 g - 640000 g	1.6 g - 1.28 Mg	160 g - 16 Mg	160 g - 32 Mg	1.6 g - 16 Mg
Number of Acceleration measuring ranges	8	11	11	9	14
Displacement high pass filter	60 Hz / 20 kHz	60 Hz / 20 kHz	60 Hz / 20 kHz	60 Hz / 20 kHz	60 Hz / 20 kHz
Trackingfilter	slow / fast				
Low pass filters	2.5, 5, 10, 20, 50, 100 kHz				

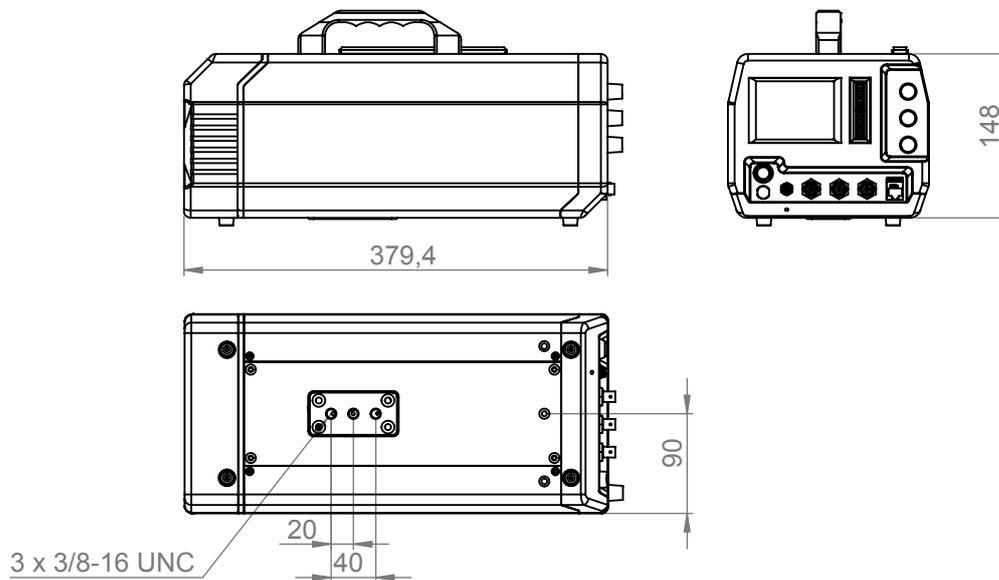
Objective lens

objective lenses	M-F-OBJ	F-OBJ	OBJ-SR	OBJ-MR	OBJ-LR	OBJ-SLR
	Micro Fiber Objective	Fiber Objective	Short Range Objective	Mid Range Objective	Long Range Objective	Super Long Objective
Focal length (mm)	2	40 / 60 / 100	25	50	100	200
Min. stand-off distance (mm)	5	30 / 50 / 90	45	150	500	1700
Min. spot size in μ m	9	5,8 / 8,8 / 12,9	25	30	65	85
Working distance	5 ... 10 mm	30 mm ... 1 m	45 mm ... 5 m	150 mm ... 10 m	500 mm ... 100 m	1.7 m ... 200 m

Set-up



Dimension of the Vibrometer



Indicator / operating

1	Touch screen LCD 3.5-Inch
2	Signal Level
3	Displacement measuring ranges
4	Velocity measuring ranges
5	Acceleration measuring ranges
6	Ethernet
7	Output acceleration
8	Output velocity
9	Output displacement
10	Power
11	Lock
12	Laser

