

## RSV-150 Remote Sensing Vibrometer

The detection of vibration, resonance frequencies and displacement on distant buildings, machine parts and other structures can be achieved quickly and effortlessly with the RSV-150 Remote Sensing Vibrometer. Designed for point-and-shoot measurement from a distance, its advanced laser Doppler interferometer technology eliminates time consuming contact sensor installation. Hence, the RSV-150 Remote Sensing Vibrometer is the ideal tool for cost-effective monitoring of the structural health or dynamic behavior of bridges, buildings and industrial plants.

For lab applications, a short range variant of the RSV-150 is also available. Its ability to measure on literally any surface without prior treatment puts the RSV-150 in a league of its own as one of the most sensitive optical vibration measurement systems worldwide.



### Benefits

- Works on nearly all surfaces including those that are encrusted and dirty
- Remote access to distant hazardous areas
- True 0 Hz performance – precise determination of natural frequencies for health monitoring and model validation
- Small laser spot size – precise targeting
- Easy set-up in minutes – no cabling or measurement point preparation
- Full visual control – easy targeting with integrated telescopic video camera

## RSV-150 Remote Sensing Vibrometer

Remote Detection of Vibrations on Distant Structures

Datasheet



# Technical Data



## General Specifications

Laser	Dual Class 2 laser source
Targeting	<ul style="list-style-type: none"> <li>■ Visual targeting with green laser spot and additional reticle overlay in telescopic camera image</li> <li>■ Coarse adjustment with geared tripod head (pan/tilt)</li> <li>■ Fine adjustment with adapter plate (<math>\pm 1^\circ</math> tilt, <math>\pm 1.5^\circ</math> pan), repeatability approx. 5 mm @ 100 m</li> </ul>
Operating temperature	+5 °C ... +40 °C (41 °F ... 104 °F)
Total weight	Approx. 30 kg (including storage case, excluding tripod)

RSV-I-150 Sensor Head	Short range lens <sup>1</sup>	Long range lens <sup>1</sup>
Optics	Manual focusing, min. stand-off distance 1 m, max. stand-off distance 5 m	Manual focusing, min. stand-off distance 5 m, max. stand-off distance <sup>2</sup> >300 m
Spatial resolution	Laser spot 135 $\mu\text{m}$ @ 1 m, depth of field 9 mm @ 1 m	Laser spot 7.5 mm @ 100 m, depth of field 28.7 m @ 100 m
Laser	<ul style="list-style-type: none"> <li>■ Targeting laser: wavelength 532 nm (green), effective output power &lt;1 mW</li> <li>■ Measurement laser: wavelength 1550 nm, output power 10 mW Class 2 with both lasers in operation</li> </ul>	
Signal level	LED bar indicator; indicates return signal strength	
Laser emission	Emission indicator LED on backplate	
Camera	PAL CCD color camera, 765 x 582 pixels	
Size L x W x H	402 mm x 165 mm x 145 mm incl. lens	
Operating temperature	+5 °C ... +40 °C (41 °F ... 104 °F)	
Weight	~8 kg (9.8 kg incl. fine adjustment adapter)	
Protection class	IP63 (dust and spray protection)	
Mechanical interfaces	<ul style="list-style-type: none"> <li>■ 1/4" – 20 UNC thread for tripod, 2 x M6 threaded holes at baseplate</li> <li>■ (3/8" – 16 UNC thread for tripod, if fine adjustment adapter is mounted)</li> <li>■ 10-32 UNF-2B standard thread for accelerometer (back)</li> </ul>	

<sup>1</sup> Optics are not interchangeable by the user.

<sup>2</sup> Depending on target reflectivity and amplitude.

## Accessories and Options

Targeting	A-VIS-SCOPI Scope with zoom optics, 3x zoom allows a wider field of view and easier selection of target on uniform structures like stay-cables
Monitor	A-MON-TFT3 5" monitor with tripod mount
Compensation	A-VIB-ACC01 Reference Accelerometer; measurement of ambient vibration
Video adaptor	A-CON-VIDEO USB Video Converter



Controller	RSV-E-150-B	RSV-E-150-M
Velocity output	Digital decoding featuring 8 sensitivity ranges: 0.4 mm/s/V – 100 mm/s/V, full scale (peak) 1 m/s; analog output $\pm 10$ V, BNC connector	Digital decoding featuring 8 sensitivity ranges: 12.25 mm/s/V – 2450 mm/s/V, full scale (peak) 24.5 m/s; analog output $\pm 10$ V, BNC connector
Displacement output	Digital decoding featuring 16 sensitivity ranges: 1 $\mu\text{m}/\text{V}$ – 100 mm/V, full scale (peak-peak) 2 m, analog output $\pm 10$ V, BNC connector	Digital decoding featuring 16 sensitivity ranges: 0.1225 $\mu\text{m}/\text{V}$ – 12.25 mm/V, full scale (peak-peak) 245 mm, analog output $\pm 10$ V, BNC connector
Resolution <sup>3</sup>	velocity: $< 0.5 \mu\text{m}/\text{s}/\sqrt{\text{Hz}}$ displacement 0.3 nm	velocity: $< 5 \mu\text{m}/\text{s}/\sqrt{\text{Hz}}$ displacement 0.38 nm
Bandwidth	0 Hz ... 25 kHz (range dependent)	0 Hz ... 2,000 kHz (range dependent)
Filter high pass	100 Hz, 10 Hz (suppression of ground vibration)	100 Hz, 10 Hz (suppression of ground vibration)
Low pass	1 kHz, 5 kHz	1 kHz, 10 kHz, 100 kHz

<sup>3</sup> The noise-limited resolution is defined as the signal amplitude (rms) at which the signal-to-noise ratio is 0 dB with 1 Hz spectral resolution, measured on 3M Scotchlite™ Tape (retro-reflective film) in a distance of 5 m. The attainable resolution is frequency-dependent and is specified for frequencies above 10Hz.

#### RSV-E-150 Controller general Properties

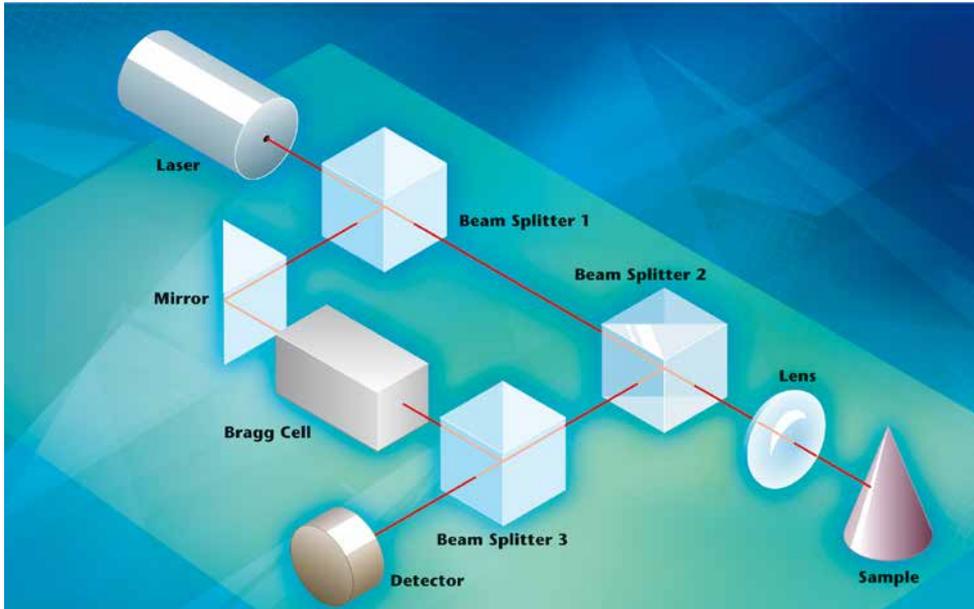
Video output	CVBS signal, 1 V p-p/75 $\Omega$ , BNC, PAL standard
Direct voltage output	12V DC for the optional monitor
Settings	LCD display and soft keys, software remote control via USB (with supplied control application Vibrometer Panel)
Signal level	LED bar indicator and RSSI voltage output (BNC)
Size L x W x H	235 mm x 320 mm x 150 mm (1/2 19", 42 HP/3 U)
Operating temperature	+5 °C ... +40 °C (41 °F ... 104 °F)
Weight	6 kg
Power supply	AC adaptor: 100 VAC...240 VAC $\pm 10\%$ , 50/60Hz DC Voltage Connection: 12 VDC...24 VDC $\pm 10\%$
Power input	Max. 75 W, max. 60 W for DC power supply
Protection class	IP20
PC interfaces	USB 1.1, system remote control

#### VibSoft-20 Data Acquisition System

Features	Easy-to-use USB data acquisition 204,800 FFT lines; time domain analysis up to 64 MSamples Integrated live video; SignalProcessor for post processing; export filters; macro programming interface; remote control of controller sensitivity and filters
Input	VIB-E-220 Frontend, USB 2.0; 2 channels, IEPE sensor power supply, AC and DC coupling
Bandwidth	20 kHz per channel
System requirements	Windows® 7 Ultimate 64-bit Hardware requirements: AMD Athlon XP 3000+, 1 GB RAM, DVD-ROM drive, graphics board compatible with DirectX 9.0c, 3 free USB 2.0 ports



Laser Radiation  
Do not stare into beam  
Class 2 Laser Product  
According to IEC/EN 60825-1 (2008)  
Complies with 21 CFR 1040.10 and 1040.11  
except for deviations pursuant to  
Laser Notice no. 50, dated 24 June 2007  
P ≤ 1 mW/cw,  $\lambda = 633 \text{ nm}$



### How Does it Work?

The RSV-150 is based on the laser Doppler principle. The diagram shows schematically how this physical effect is exploited in the LDV. A laser beam is focused onto a vibrating target, which modulates the laser frequency through the Doppler effect.

A fraction of the modulated beam is scattered back and collected by the long range lens.

Inside the sensor, an interferometer is used to detect this modulation and convert it into a high-frequency electrical signal. A controller demodulates the FM signal into voltages that represent either the velocity of the object or its displacement.

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