Polytec

VibroFlex Range //

Datasheet

Remote detection of vibrations from distant structures

The Polytec VibroFlex laser Doppler vibrometer is a modular high-performance solution for non-contact vibration measurement. It offers unrivalled measurement performance and versatility for solving pressing vibration issues in both R&D and industrial quality control.

The VibroFlex family comprises the front-end VibroFlex Connect and a selection of non-contact laser sensor heads. Integrated with the VibSoft data acquisition and analysis software, the vibration measurement system is ready to go. Study acoustics, dynamics and vibrations on nano to macro structures without contact and with laser precision. VibroFlex Range is the outdoor-proof long-range laser sensor head designed for remote analysis of vibrating structures, model validation and health monitoring on large and distant structures from up to 500 m and even more. The laser sensor conveniently monitors structural dynamics and stability of buildings, operating machinery and critical production facilities, providing a fast and efficient on-site testing solution. The determined eigenfrequencies and deflections can be used e. g. for health monitoring or model validation of simulations. The patented multi-path interferometer technology QTec® grants highest signal quality even at long distances and on uncooperative surfaces.

VibroFlex – the superior flexibility in laser vibration measurement.

Highlights //

- Remote vibration analysis > 500 m with laser precision
- SWIR laser and QTec® for best SNR
- Measures on all surfaces, even corroded and dirty structures
- Remote access to distant and hazardous areas
- True zero Hz performance for precise determination of natural frequencies
- Patented coaxial Full HD camera for precise targeting
- Robust and outdoor-proof sensor (IP63)

Technical data //

General specifications	
Model	**VibroFlex Range VFX-I-150**
Weight	ca. 8.7 kg (11.1 kg incl. VIB-A-P08 und A-VIS-SCOP1)
Protection class	IP63 (protected against dust and spraying water)
Dimensions [w x h x l]	171 x 175 x 435 mm (6.7 x 6.9 x 17.1 inch)
Operating temperature	0 °C ... +40 °C (32 °F ... 104 °F)
Storage temperature	-10 °C ... +65 °C (14 °F ... 149 °F)
Relative humidity	max. 80%, non-condensing
Controller compatibility	VibroFlex Connect (with program version 1.2.24342.47541 or higher)
Maximum velocity	± 30 m/s
Targeting	• Visual targeting with visible green laser spot and additional reticle overlay in image of integrated Full HD camera on external TFT monitor • Fine adjustment (±1° tilt, ±1.5° pan), repeatability approx. 5 mm @ 100 m • Coarse adjustment with coarse positioning groove via 3-way geared head
Control elements	• Signal level (RSSI) indicator • Laser emission
Mechanical interfaces	• 3/8'' – 16 UNC thread for tripod in base plate • 3x M5 threads for quick release plate in base plate • 2x M6 threaded holes and fitting holes for mounting in base plate • 10-32 UNF-2B standard thread for accelerometer A-VIB-ACC1 at back side
Sensor cable connector	• Robust push-pull connector on sensor head for connection to VibroFlex • Connect front-end with the sensor cable VFX-C-110-Sxx

Compliance with standards		
Laser safety	IEC/EN 60825-1	
Electrical safety	IEC/EN 61010-1	
EMC	IEC/EN 61326-1	
	Emission:	Limit class B IEC/EN 61000-3-2 and 61000-3-3
	Immunity:	IEC/EN 61000-4-2 to 61000-4-6 and IEC/EN 61000-4-11
RoHs	IEC/EN 63000	

Optical specifications

Optical setup	QTec® heterodyne multi-path interferometer utilizing reception diversity. Protected by international patents
Laser type	Measurement laser: invisible (IR), wavelength 1550 nm, output power <10 mW (VIB-A-170 IR-Converter Card included in scope of supply). Targeting laser: visible (green), wavelength 520 ± 10 nm, effective output power < 1 mW , can be dimmed.
Laser class	Class 2, with both lasers in operation
Focus	Manual focus
Max. stand-off distance	More than 500 m [1]
Min. stand-off distance	5 m (0.75 m) [1]
Exit beam diameter (1/e²)	27.. 28 mm
Optical Signal Robustness OSR [2]	> 10,000 mm/dropout

Integrated Full HD camera in VFX-I-150 sensor head

Alignment	Patented coaxial integration; parallax-free and aligned with laser focal plane
Resolution (h x v)	1920 x 1080 pixel
Video outputs	HD-SDI for external TFT monitor, Ethernet for connecting to computer

Working distance and laser spot size

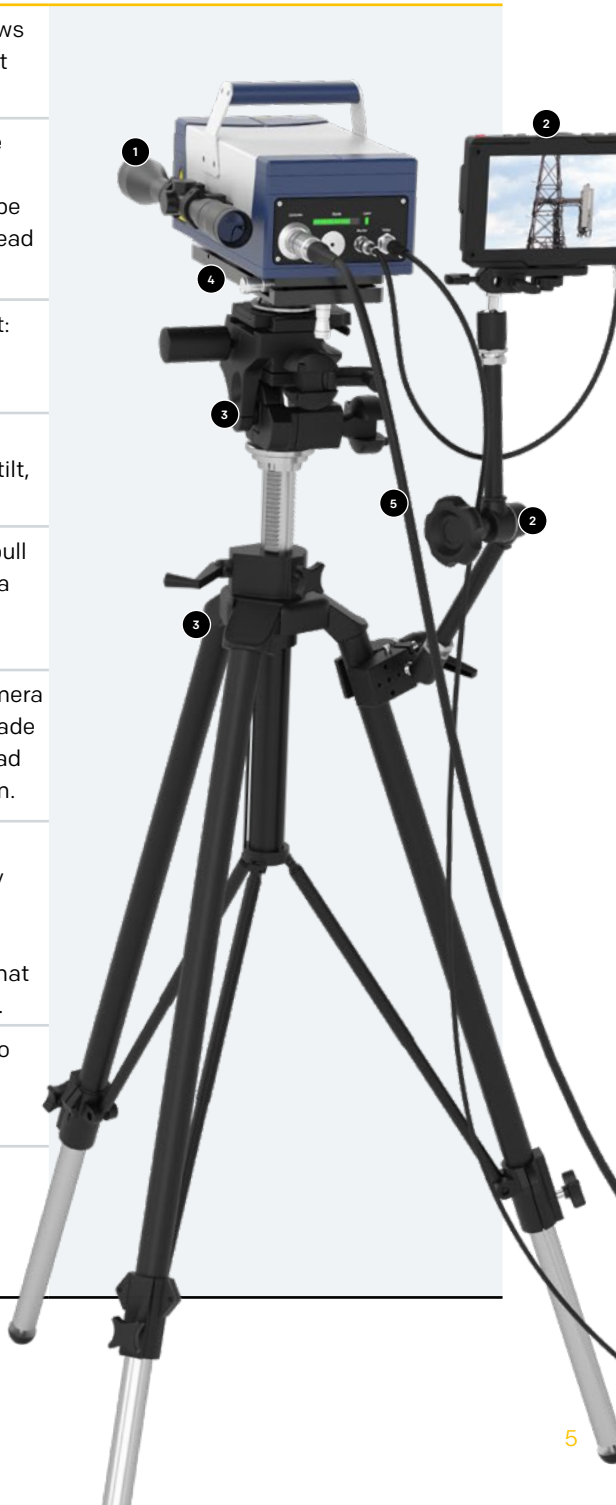
Stand-off distance [m] [1]	Typical spot size [mm]	Depth-of-field [m]	Camera field of view [m x m]
5	0.35	±0.062	0.18 x 0.10
10	0.71	±0.26	0.37 x 0.21
20	1.44	±1.05	0.74 x 0.42
50	3.64	±6.7	1.85 x 1.06
100	7.52	±28.7	3.70 x 2.12
150	12.1	±74	5.56 x 3.18
each additional m add	+ 0.09 mm	–	–

[1] Measured from the front edge of the front lens. Shorter stand-off distances between 0.75 m and 5 m are possible, when using the additional Close-Up lenses (see accessories).

[2] The Optical Signal Robustness OSR quantifies the statistical lateral movement in mm between two dropouts. It is a measure for the noise performance of the instrument on typical engineered surfaces. A high value indicates a high signal-to-noise ratio in all operating conditions. For test conditions refer to application note VIB-G-030.

Options and accessories //

1 A-VIS-SCOP1 Telescopic Sight	Telescopic sight with variable magnification allows a wider field of view and easier selection of target on repeating structures like stay-cables.
2 A-MON-TFT4 Monitor Set	7" TFT monitor with tripod mount displays image of integrated, coaxial Full HD camera with reticle overlay for comfortable and easy targeting. Can be connected directly to HD-SDI output of sensor head with 75 Ω BNC cable (included, length 1 m).
3 VIB-A-T07 Tripod with Geared Head	Rigid tripod with 3-way geared head. Adjustment: Tilt +90° to -30°, Pan 360° for easy coarse positioning.
4 VIB-A-P08 Fine Adjustment	Fine adjustment for precise positioning of the laser spot even at large stand-off distances (±1° tilt, ±1.5° pan, repeatability approx. 5 mm @ 100 m).
5 VFX-C-110-Sxx Sensor Cable	Sensor cable with robust and easy to use push-pull connector for the sensor head for connecting to a VibroFlex Connect front-end. Length: 5 m, 10 m or 20 m
C-001-00xx-INDU Data cable (Industrial version)	Ethernet cable for connecting the integrated camera in the sensor head with a computer. Industrial grade connector M12 (Ethernet, X-coded) for sensor head and RJ45 for computer. Length: 5m, 10 m or 20 m.
A-MPS-001 Mobile Power Supply	Mobile power supply for A-MON-TFT4 monitor, includes high-performance rechargeable battery (lithium-polymer), battery charger with adapter plates for EU, UK, US and AU sockets, a Power supply cable and a convenient waterproof bag, that allows to attach the battery directly to the tripod.
A-VIB-ACC1 Compensation Sensor	Accelerometer with isolation stud, can be used to measure and compensate for ambient vibration. Can be mounted on backplate of sensor head.
VIB-A-CAS19 Transp. Case (VibroFlex Range VFX-I-150)	Robust transportation case for the sensor head with Fine adjustment and Telescopic sight, Sensor cable, Data cable, Monitor set and further accessories.



Close-up lenses for smaller working distances

The high-aperture optics of VibroFlex Range are designed for best optical sensitvity at long range. A choice of close-up lenses is available to accommodate to distances between 0.75 m and 5 m for occasional use in the lab.

Optical specifications with close-up lenses

Stand-off distance [m]	Typical spot size [mm]	Depth-of-field [mm]	Camera field of view [mm x mm]
0.75	0.05	±1.3	28 x 16
0.87	0.06	±1.8	32 x 19
1.05	0.075	±2.6	39 x 22
1.25	0.09	±3.8	46 x 26
1.7	0.12	±7.1	62 x 35
2.5	0.172	±15	91 x 52

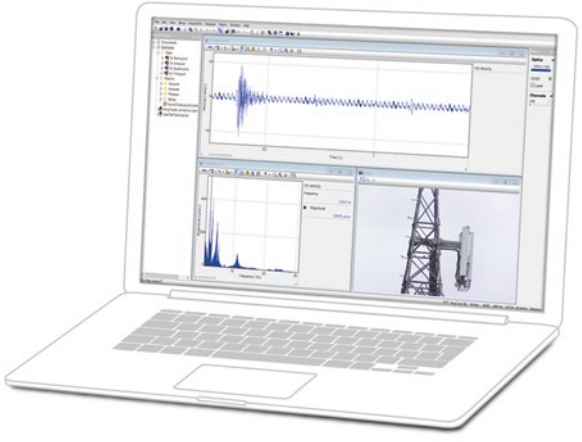
Ranges of stand-up distances with different combinations of close-up lenses

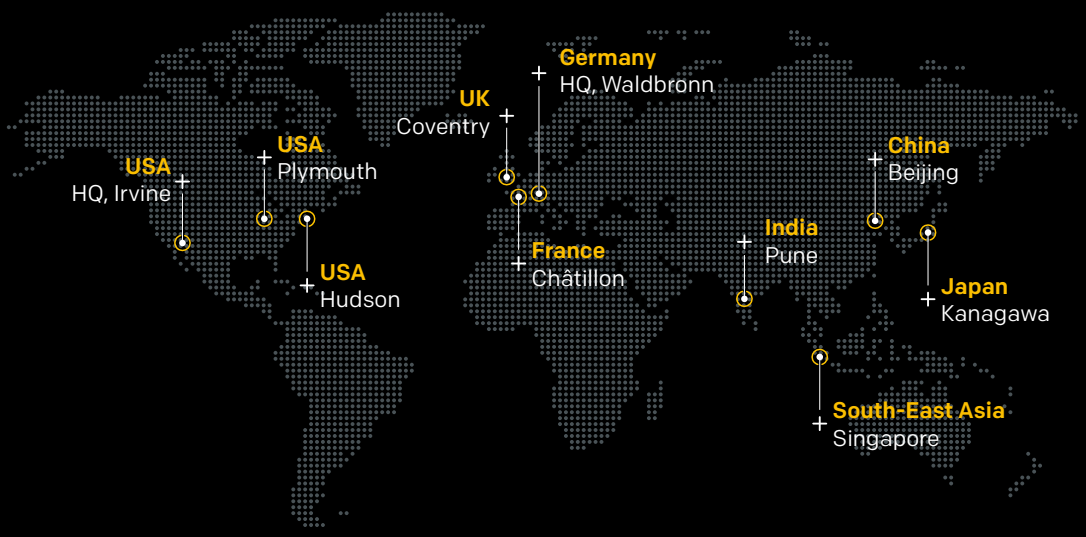
Min. stand-off distance	Max. stand-off distance	Number of required close-up lenses of type...			Possible with set of close-up lenses VIB-A-...			
[m]	[m]	VIB-A-166	VIB-A-261	VIB-A-500	CLS01	CLS02	CLS03	CLS04
0.75	0.87	2	–	–	–	•	–	–
0.87	1.05	1	1	–	•	–	–	•
1.05	1.35	–	2	–	–	–	•	–
1.25	1.7	1	–	–	•	•	–	•
1.7	2.6	–	1	–	•	–	•	•
2.5	5.0	–	–	1	–	–	–	•

VibSoft: Data acquisition and analysis //

VibSoft is a comprehensive and easy-to-use software package for digital or analog vibration data acquisition and analysis and remote control of VibroFlex Range and other Polytec laser vibrometers. It closes the gap between raw signal acquisition and profound analysis of vibration measurement data even with special filters and signal enhancement dedicated to laser vibrometers. Further options like the powerful SignalProcessor (a Polytec math library for post-processing) and a scripting engine for individual post-processing and control make VibSoft an extremely powerful tool.

The VibroLink interface allows for direct and fully digital data acquisition via Ethernet. Thus, VibSoft-VL is the ideal light-weight solution for mobile use – set up quickly and easily, with reduced cabling and no need for additional data acquisition hardware.
The USB based compact data acquisition system VibSoft-20 can be used for measuring frequencies up to 20 kHz enabling the connection of one additional analog sensor. Suitable for laptop computers. Comprises VIB-E-220 Junction box.





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