

VibroFlex Connect

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 includes 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.

Core of VibroFlex is the front-end Connect with its latest FPGA-based decoding technology, providing digital and analog signal outputs for velocity, displacement and acceleration. Configure your options freely, upgrade later and stay future-proof. Its high-performance signal processing assures reliable measurement data even under challenging conditions. Keep track of all relevant parameters and control via PC or the 7" large touch screen, avoiding any influences on the measurement by this no-touch concept.

VibroFlex – the new flexibility of laser vibration measurement.



Highlights

- Configure your options freely, upgrade later and stay future-proof
- Synchronous output of displacement, velocity and acceleration
- Large bandwidth from DC to 24 MHz, also upgradeable
- High velocity measuring range up to ± 30 m/s
- VibroLink digital interface for comfortable measurement data transfer (Ethernet TCP/IP)

VibroFlex Connect

Configurable core of the modular vibration sensing system

Datasheet



Technical data



General specifications

Model	VibroFlex Connect VFX-F-110
Interface/display	7" color touchscreen with interactive menu guidance for setup of front-end and sensor heads
Dimensions [W x H x D]	285 x 140 x 383 mm (11.2 x 5.5 x 15.1 inch)
Weight	ca. 7.3 kg
Protection class	IP20
Operating temperature	+5...+40 °C (41...104 °F)
Storage temperature	-10...+65 °C (14...149 °F)
Relative humidity	max. 80 %, non-condensing
Power supply	100...240 VAC ±10 %, 50/60 Hz
Power consumption	max. 150 VA

Metrological specifications

Analog signal outputs	3 BNC connectors (± 1 V @ 50 Ω ; ± 2 V @ 1 M Ω) for simultaneous and phase synchronized output of: <ul style="list-style-type: none"> • Velocity • Displacement ¹ • Acceleration¹
Digital signal outputs	VibroLink digital interface for measurement data (velocity) and signal level, requires VibSoft 5.5.1 (or newer) data acquisition and analysis software
Frequency bandwidth	DC to 24 MHz Up to 15 selectable frequency bandwidths: 1 kHz, 2 kHz, 5 kHz, 10 kHz, 20 kHz, 50 kHz, 100 kHz, 200 kHz, 500 kHz, 1 MHz, 1.5 MHz, 3 MHz, 6 MHz, 12 MHz, 24 MHz (depending on maximum frequency bandwidth of front-end)
Max. velocity	± 30 m/s ¹
High pass filters	Can be chosen individually for velocity, displacement and acceleration signal: 1 Hz, 2 Hz, 4 Hz, 8 Hz, 15 Hz, 30 Hz, 60 Hz, 120 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, 15 kHz, 30 kHz, 60 kHz (depending on selected frequency bandwidth)
Low pass filters	Defined by selected frequency bandwidth (see above)
Tracking filter	Slow, medium, fast
Signal level	<ul style="list-style-type: none"> • Bargraph on touchscreen and on sensor head • Output as DC voltage signal (BNC, 0 ... 2 V)
Analog input signals	CLEAR IN: resets displacement signal to zero (BNC); Analog mode and digital mode (TTL)
PC interface	Via integrated VibroLink connector and data cable (Ethernet): remote control of the instrument settings and digital transfer of measured velocity data to the VibSoft data acquisition and analysis software (requires VibSoft 5.5.1 or newer) or remote control of the instrument settings with web browser
Compatible sensor heads	<ul style="list-style-type: none"> • VibroFlex Neo • VibroFlex Xtra ² • VibroFlex Compact • VibroFlex Fiber
Supported sensor head wavelengths	<ul style="list-style-type: none"> • Visible red (633 nm) • IR (1550 nm)

¹ Depending on configuration

² Also supports MLV-I-120 Sensor Head Xtra (might require Firmware upgrade of the sensor head)

Configurable options

The VibroFlex Connect front-end offers a lot of flexibility: thanks to its various options for frequency bandwidth, output signals for measurands (velocity, displacement and acceleration), signal enhancement capabilities and accessories, which can be combined freely with each other, it fits perfectly to your application.

Frequency bandwidth

Choose between 7 different maximum frequency bandwidths from 50 kHz to 24 MHz covering the acoustic and the ultrasonic range.

Option	Description	
VFX-BW-50kHz	50 kHz maximum frequency bandwidth (For usage of VibroFlex Xtra, the options VFX-VelPerformance or VFX-VelHighSpeed are required in addition)	S
VFX-BW-100kHz	100 kHz maximum frequency bandwidth (For usage of VibroFlex Xtra, the options VFX-VelPerformance or VFX-VelHighSpeed are required in addition)	O
VFX-BW-500kHz	500 kHz maximum frequency bandwidth	O
VFX-BW-1MHz	1 MHz maximum frequency bandwidth	O
VFX-BW-3MHz	3 MHz maximum frequency bandwidth	O
VFX-BW-12MHz	12 MHz maximum frequency bandwidth	O
VFX-BW-24MHz	24 MHz maximum frequency bandwidth	O

S = Standard / O = Option

Velocity output

The velocity limit of minimum ± 6 m/s can be extended by adding performance options (see also page 6). For extending the velocity resolution, the option VFX-VelResS offers additional measurement ranges down to ± 1 mm/s (full scale).

Maximum velocity options		
Option	Description	
VFX-VelBase	Base (± 6 m/s)	S
VFX-VelPerformance	Performance (± 12 m/s)	O
VFX-VelHighSpeed	High Speed (± 30 m/s)	O

S = Standard / O = Option

Velocity resolution options		
Option	Description	
VFX-VelResH	High resolution Most sensitive measurement range ± 0.01 m/s (peak)	S
VFX-VelResS	Super fine resolution Extra fine resolution thanks to additional velocity measurement ranges. Most sensitive measurement range ± 0.001 m/s (peak)	O

S = Standard / O = Option

Displacement output

In addition to the velocity output, the displacement output option VFX-DispOut can be added. The maximum displacement can be scaled with various options up to ± 2.5 m. For resolving smallest movements, super fine measurement ranges can be chosen (see also page 7).



Maximum displacement options

VFX-DispL	Standard Displacement Range Allows displacement measurements up to ± 200 mm (peak)	S
VFX-DispXL	Extended Displacement Range Additional displacement range ± 500 mm (peak) (requires a sensor head and front lens with corresponding depth of field)	O
VFX-DispXXL	Extended Displacement Range XXL Additional displacement ranges ± 500 mm, ± 1 m and ± 2.50 m (peak) (requires a sensor head and front lens with corresponding depth of field)	O

S = Standard / O = Option

Displacement resolution options

Option	Description	
VFX-DispResH	High resolution Most sensitive measurement range ± 0.5 μm (peak) with a resolution of 16 pm.	S
VFX-DispResS	Super fine resolution Most sensitive measurement range ± 10 nm (peak) with a resolution of 0.3 pm.	O

S = Standard / O = Option

Acceleration output

Adding the acceleration output option VFX-AccOut enables measuring accelerations up to 100×10^6 m/s² at frequencies up to 3 MHz (see also page 8). Recommended for measuring frequencies up to 100 kHz.

Signal enhancement

For reliable measurement results with best signal-to-noise ratio even under difficult conditions, the included Tracking filter with three ranges is available.

Option	Description	
VFX-TRACK	Tracking Filter 3 steps: slow, medium, fast	S

S = Standard

Accessories

Accessories		
Option	Description	
VFX-C-100-S05 Sensor Cable 5 m	Sensor cable with quick lock connectors for connecting a VibroFlex sensor head to the VibroFlex Connect front-end (length 5 m).	S
VFX-C-100-S10 Sensor Cable 10 m	Sensor cable with quick lock connectors for connecting a VibroFlex sensor head to the VibroFlex Connect front-end (length 10 m).	O
VFX-C-100-S20 Sensor Cable 20 m	Sensor cable with quick lock connectors for connecting a VibroFlex sensor head to the VibroFlex Connect front-end (length 20 m).	O
VFX-C-100-D02 Data Cable	Data cable (length 2 m) for connecting VibroFlex Connect to a computer. Industrial grade connector M12 and RJ45 (Ethernet, X-coded). Allows configuration via web browser and data transfer via VibroLink.	S
A-RMK-0001 Rack Mounting Kit	Rack Mounting Kit with two handles on the front and additional flanges for mounting the VibroFlex Connect front-end in a 19" rack.	O
VIB-A-CAS12 Transportation Case (VibroFlex Connect VFX-F-110)	Transportation Case for VibroFlex Connect.	O

S = Standard / O = Option



A-RMK-0001 Rack Mounting Kit



VIB-A-CAS12 Transportation Case

VibSoft data acquisition and analysis software

VibSoft is a comprehensive and easy-to-use software package for digital vibration data acquisition and analysis. VibSoft closes the gap between raw signal acquisition and profound analysis of vibration measurement data. The VibroLink interface allows for direct and fully digital data acquisition via Ethernet. Alternatively, the multi-channel DAQ units permit connecting additional analog inputs like other sensors, processing data up to 40 MHz. 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.

Polytec offers a wide range of accessories for setting up and performing measurements. Please contact your local vibrometer sales engineer or visit our website www.polytec.com/vibroflex for more detailed information.

Velocity performance specifications



Measurement range (peak)	Maximum frequency range ¹	Optimum frequency bandwidth f_{opt}	Typical resolution ² at frequency bandwidth f_{opt} for sensor heads VibroFlex			Maximum acceleration	
			Neo, Compact	Fiber	Xtra		
			$\frac{nm/s}{\sqrt{Hz}}$	$\frac{nm/s}{\sqrt{Hz}}$	$\frac{nm/s}{\sqrt{Hz}}$		
m/s	kHz	kHz				m/s^2	
0.001	100	1	1.5	9	4	628	O ⁵
0.002	100	2	1.5	6	4	1,250	O ⁵
0.005	100	5	2	6	6	3,140	O ⁵
0.01	3,000	10	3	4	8	188,000	S ⁶
0.02	3,000	20	7	5	12	376,000	S ⁶
0.05	3,000	50	10	11	30	942,000	S ⁶
0.1	24,000	100	18	25	80	15,000,000	S ⁶
0.2	24,000	200	40	40	300	30,100,000	S ⁶
0.5	24,000	500	70	100	600	75,300,000	S ⁶
1	24,000	1,000	150	200	600	150,000,000	S ⁶
2	24,000	3,000	400	450	1,300	301,000,000	S ⁶
5	24,000	6,000	800	900	2,400	753,000,000	S ⁶
6	24,000	6,000	800	900	2,400	904,000,000	S ⁶
10	24,000	12,000	1,600	1,500	5,000	1,500,000,000	O ⁷
12	100 ³ 24,000 ⁴	50 12,000	300	400	5,000	7,530,000 ³ 1,800,000,000 ⁴	O ⁷
20	24,000	24,000			10,000	3,010,000,000	O ⁸
25	24,000	24,000			10,000	3,760,000,000	O ⁸
30	100	50			1,000	18,800,000	O ⁸

S = Standard / O = Option

¹ Frequency range from 0 Hz up to given value. Maximum frequency bandwidth depending on system configuration.

² The noise-limited resolution is defined as the signal amplitude (rms) at which the signal-to-noise ratio is 0 dB and with 1 Hz spectral resolution.

Maximum linearity error: 0.5% for all measurement ranges.

³ For sensor heads VibroFlex Neo, Compact or Fiber.

⁴ For sensor head VibroFlex Xtra.

⁵ Requires option Super fine resolution (VFX-VelResS).

⁶ Standard: included with base configuration Maximum velocity VFX-VelBase (± 6 m/s) and Velocity resolution VFX-VelResH.

⁷ Requires option VFX-VelPerformance (± 12 m/s) or option VFX-VelHighSpeed (± 30 m/s).

⁸ Requires option VFX-VelHighSpeed High Speed (± 30 m/s).

Frequency bandwidth	Signal delay for VibroFlex Neo, Compact or Fiber	Signal delay for VibroFlex Xtra
6 MHz .. 24 MHz	6 μ s	8 μ s
1 MHz .. 3 MHz	20 μ s	20 μ s
200 kHz, 500 kHz	40 μ s	40 μ s
50 kHz, 100 kHz	400 μ s	440 μ s
5 kHz .. 20 kHz	900 μ s	950 μ s
1 kHz, 2 kHz	2.5 ms	2.76 ms

The signal delay is independent of the selected measurement range and the switched on filters. It depends on the set frequency bandwidth. It is identical for velocity, displacement and acceleration.

Displacement performance specifications ¹

Measurement range (peak)	Maximum frequency range ²	Resolution ³	available with the following options				
			μm	kHz	pm	VFX-DispResS	VFX-DispResH / VFX-DispL
0.01	24,000	0.31	○				
0.02	24,000	0.63	○				
0.05	24,000	1.56	○				
0.1	24,000	3.13	○				
0.2	24,000	6.25	○				
0.5	24,000	15.63			S		
1	24,000	31.25			S		
2	24,000	62.5			S		
5	24,000	156.3			S		
10	24,000	312.5			S		
20	24,000	625			S		
50	24,000	1,563			S		
100	24,000	3,125			S		
200	24,000	6,250			S		
500	24,000	15,625			S		
1,000	24,000	31,250			S		
2,000	24,000	62,500			S		
5,000	24,000	156,250			S		
10,000	24,000	312,500			S		
20,000	24,000	625,000			S		
50,000	24,000	1,562,500			S		
100,000	24,000	3,125,000			S		
200,000	24,000	6,250,000			S		
500,000	24,000	15,625,000				○	○
1,000,000	24,000	31,250,000					○
2,500,000	24,000	78,125,000					○



S = Standard / O = Option

¹ Displacement output requires option VFX-DispOut.

² Frequency range from 0 Hz to the given value. Maximum frequency bandwidth depending on system configuration.

³ The resolution corresponds to the quantization step at the analog output. Noise limited resolution: < 30 fm/Hz¹ for sensor heads VibroFlex Neo and VibroFlex Compact, < 45 fm/Hz¹ for sensor head VibroFlex Fiber and < 100 fm/Hz¹ for VibroFlex Xtra in the smallest measurement range. The noise-limited resolution is defined as the signal amplitude (rms) at which the signal-to-noise ratio is 0 dB with an 1 Hz spectral resolution.

Acceleration performance specifications ¹



Measurement range (peak)	Maximum frequency range ²	Measurement range (peak)	Maximum frequency range ²
m/s ²	kHz	m/s ²	kHz
10	3,000	50,000	3,000
20	3,000	100,000	3,000
50	3,000	200,000	3,000
100	3,000	500,000	3,000
200	3,000	1,000,000	3,000
500	3,000	2,000,000	3,000
1,000	3,000	5,000,000	3,000
2,000	3,000	10,000,000	3,000
5,000	3,000	20,000,000	3,000
10,000	3,000	50,000,000	3,000
20,000	3,000	100,000,000	3,000

¹ Acceleration output requires option VFX-AccOut.

² Frequency range from 0 Hz to the given value. Maximum frequency bandwidth depending on system configuration. For acceleration measurements a maximum frequency bandwidth of 100 kHz is recommended.

Compliance with standards

Laser safety	IEC/EN 60825-1	
Electrical safety	IEC/EN 61010-1	
EMC	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	

Shaping the future since 1967

High tech for research and industry.
Pioneers. Innovators. Perfectionists.

Find your Polytec representative:
www.polytec.com/contact

Polytec GmbH · Germany
Polytec-Platz 1-7 · 76337 Waldbronn