Polytec Scanning Vibrometers are state-of-the-art for fast noise and vibration measurements in research and development. They determine operational deflection shapes and Eigenmodes for NVH, acoustics, structural dynamics, ultrasonics, FEM validation and NDT, featuring frequency ranges up to 25 MHz.

The patented QTec® technology using a heterodyne multi-path interferometer concept provides highest optical sensitivity for high-fidelity measurements on all surfaces, which significantly reduces testing time – even on dark, biological, rotating or moving objects. This safe laser technology is perfect for challenging applications also on distant targets. QTec® makes vibration measurements faster, easier and more reliable than ever – for the most robust, unambiguous results.

PSV QTec Scanning Vibrometers are available as a compact and portable laptop version or as a practical rack-type workstation.

Highlights

- Non-contact and full-field with FEM-like spatial resolution
- Best SNR on engineered surfaces
- Up to 10x faster on engineered surfaces
- Open interface for your applications
- Scanner interface enabling tracking and CSLDV
- Expandable to 3D system

PSV QTec Scanning Vibrometer

Full-field vibration measurement

Datasheet

Technical data

PSV QTec Standard scope of supply	Compact PSV QTec A PSV QTec B PSV QTec H	Workstation PSV QTec A PSV QTec B PSV QTec H	Workstation PSV QTec HV
Vibrometer system & data acquisition	■ PSV-I-680 Scanning Head with high precision scanner and HD video camera ■ PSV-F-600 Front-End with digital broadband decoder		
	■ Data acquisition and signal generator board installed in front-end ■ PSV-C-505 Main Cable, 5 m	■ Data acquisition and signal generator board installed in front-end ■ PSV-C-510 Main Cable, 10 m	■ Data acquisition and signal generator board installed in front-end (for VibroLink mode [1]) ■ PSV-C-510 Main Cable, 10 m ■ PSV-E-630 Junction Box
Computer	■ PSV-W-610 Data Management System Compact[2]: Laptop with 17.3" (44 cm) screen, wireless mouse ■ Microsoft® Windows® operating system and PSV software preinstalled	■ PSV-W-600 Data Management System: 19" industrial PC, 24" (61 cm) TFT monitor, wireless keyboard and mouse ■ Microsoft® Windows® operating system and PSV software preinstalled	■ PSV-W-600 Data Management System: 19" industrial PC, 24" (61 cm) TFT monitor, wireless keyboard and mouse ■ Microsoft® Windows® operating system and PSV software preinstalled ■ Data acquisition and signal generator board installed in PC (for high frequency mode)
Accessories	■ PSV-A-CL-VID Set of Close-Up Lenses for Video Camera ■ Manuals		
	■ VIB-A-T02 Tripod with tip-tilt head and tripod bag ■ PSV-A-540 Storage Case for front-end ■ PSV-A-645 Storage Case for scanning head, data management system, main cable and accessories	■ VIB-A-T02 Tripod with tip-tilt head ■ PSV-A-015 System Cabinet	■ VIB-A-T02 Tripod with tip-tilt head ■ PSV-A-015 System Cabinet

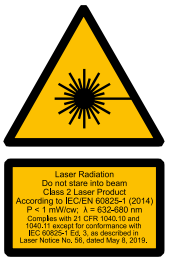
General specifications	
Power	100 VAC...240 VAC ±10%, 50/60 Hz; 500 VA (typical)
Environmental conditions	Operating temperature: 0 °C ... +40 °C (32 °F ... 104 °F) Storage temperature: –10 °C ... +65 °C (14 °F ... 149 °F) Relative humidity: max. 80%, non-condensing
Calibration	Every 24 months (recommended)

Compliance with standards	
Electrical safety	IEC/EN 61010-1
	IEC/EN 61326-1 Emission: FCC Class A, 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
Laser safety	IEC/EN 60825-1 (CFR 1040.10, CFR 1040.11)

[1] The VibroLink mode is available up to 100 kHz and takes advantage of the dedicated VibroLink data interface for fully digital low noise data transfer between the vibrometer and the data management system.

[2] Use of custom laptops on request.

PSV-I-680 Scanning Head QTec	
Dimensions [W x L x H]	187 x 391 x 177 mm (7.37 x 15.40 x 6.97 in)
Weight	9.6 kg (21.2 lbs); 10.0 kg (22.1 lbs) with PSV-G-600 Geometry Scan Unit[1]
Laser type, vibrometer	▪ Measuring laser: wavelength 1,550 nm (invisible), Laser power <10 mW ▪ Pilot laser[2]: wavelength 520 nm (green), Laser power <1 mW, dimmable in 5 steps
Laser type, PSV-G-600 Geometry Scan Unit [1]	Wavelength 670 nm +/-5 nm (red); Laser power <1 mW
Laser safety class	Class 2
Working distance	125 mm ... ~100 m (PSV-G-600 Geometry Scan Unit [1] : 250 mm ... 50 m)
Scan angle [h x v]	50° x 40°
Scanner properties	Angular resolution <0.001°, Angular stability <0.001°/h, max. 50 scan points/s
Sample size	From a few mm² up to several m²
Camera	HD format, 30x optical zoom, max. field of view [h x v] 64° x 38°
Interfaces, electrical	Multi-pin bayonet connector, DIN plug for external scanner control
Interfaces, mechanical	Hexagon type tripod adapter for VIB-A-T02, 2x M6 thread



[1] Option
[2] Diameter pilot laser corresponds to diameter measuring laser. Misalignment between measuring laser and pilot laser typ. <0.03°.

PSV-F-600 Front-End	
Dimensions [W x D x H]	485 x 380 x 150 mm (19", 84HP/3U)
Weight	~10 kg (~22 lbs)
Protection class	IP-20
Interfaces, electrical	Front: BNC connectors for reference channels, signal generator, trigger; Rear: multi-pin bayonet connector for main cable, monitor velocity output (PSV QTec A/B/H only), RJ45 Ethernet VibroLink data interface
Interfaces, mechanical	19" Rack mount adapters

PSV-E-630 Junction Box (PSV QTec HV only)	
Dimensions [W x D x H]	485 x 320 x 44.5 mm (19", 84HP/1U)
Weight	1.1 kg (2.4 lbs)
Protection class	IP-20
Interfaces, electrical	Front: BNC connectors for 3 reference channels, signal generator, trigger Rear: conncetor for vibrometer channel and to data acquistion to PC
Interfaces, mechanical	19" Rack mount adapters

PSV QTec versions

Version	Number of reference channels	Number of signal generator channels
A	2	1
B	4	4
H	8	4
HV	8 (VibroLink mode [1]) 3 (high frequency mode)	4 (VibroLink mode [1]) 1 (high frequency mode)

Noise performance on engineered surfaces

Optical Signal Robustness OSR [6]	> 10,000 mm/dropout

Metrological specifications PSV QTec A

PSV-F-600 Front-End	Decoder	# of ranges	Full scale (peak) m/s	Decoder frequency range	Resolution [2] (µm/s)/√Hz	Resolution data interface [3] µm/s
Acoustics	DV-11	9	0.025 ... 12.5	0 Hz ... 20 kHz	0.01 ... 0.15	0.012 ... 5.96
Standard	DV-12	8	0.025 ... 5	0 Hz ... 50 (100) [4] kHz	0.01 ... 0.15	0.012 ... 2.4
High Speed	DV-13	9	0.025 ... 12.5	0 Hz ... 50 (100) [4] kHz	0.01 ... 0.15	0.012 ... 5.96
Enhanced	DV-14	12	0.0025 ... 12.5	0 Hz ... 50 (100) [4] kHz	0.01 ... 0.15	0.0012 ... 5.96
High Resolution	DV-03	14	0.0025 ... 30	0 Hz ... 50 (100) [4] kHz	0.01 ... 0.15	0.0012 ... 14

Metrological specifications PSV QTec B

PSV-F-600 Front-End	Decoder	# of ranges	Full scale (peak) m/s	Decoder frequency range	Resolution [2] (µm/s)/√Hz	Resolution data interface [23] µm/s
Enhanced	DV-02	10	0.025 ... 25	0 Hz ... 50 kHz	0.01 ... 0.15	0.012 ... 12
High Resolution	DV-03	14	0.0025 ... 30	0 Hz ... 50 (100) [4] kHz	0.01 ... 0.15	0.0012 ... 14

Metrological specifications PSV QTec H

PSV-F-600 Front-End	Decoder	# of ranges	Full scale (peak) m/s	Decoder frequency range	Resolution [2] (µm/s)/√Hz	Resolution data interface [3] µm/s
H	DV-03	14	0.0025 ... 30	0 Hz ... 100 kHz	0.01 ... 0.15	0.0012 ... 14

Metrological specifications PSV QTec HV

PSV-F-600 Front-End	Decoder / Acquisition mode	# of ranges	Full scale (peak) m/s	Decoder frequency range	Resolution [2] (µm/s)/√Hz	Resolution data interface [3] µm/s
Ultrasonics	DV-05 / VibroLink mode	14	0.0025 ... 30	0 Hz ... 100 kHz	0.01 ... 0.15	0.0012 ... 14
	DV-05 / high frequency mode	14	0.0025 ... 30 [5]	0 Hz ... 6 MHz	0.01 ... 48	0.095 ... 1144
Ultrasonics Enhanced	DV-08 / VibroLink mode	14	0.0025 ... 30	0 Hz ... 100 kHz	0.01 ... 0.15	0.0012 ... 14
	DV-08 / high frequency mode	14	0.0025 ... 30 [5]	0 Hz ... 25 MHz	0.01 ... 48	0.095 ... 1144

[1] The VibroLink mode is available up to 100 kHz and takes advantage of the dedicated VibroLink data interface for fully digital low noise data transfer between the vibrometer and the data management system.

[2] 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™ (reflective film). The attainable resolution is frequency-dependent.

[3] Corresponds to the quantization step of the internal digital interface (PSV QTec A/B/H and PSV QTec HV in VibroLink mode) and the internal analog interface (PSV QTec HV in high frequency mode) respectively

[4] Figure in brackets: option

[5] Available up to 100 kHz, else 25 m/s

[6] 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	
PSV-G-600 Geometry Scan Unit	Laser distance sensor integrated in scanning head to measure the sample geometry from sensor head perspective.
A-GEO-EVA3D 3D Geometry Scanner	Handheld geometry scanner for high resolution 3D geometry acquisition of the sample.
PSV-A-526 Protective Window	Protects the scanning mechanism against dust, wind and acoustic excitation at high dB levels.
PSV-A-EXT External Scanner Control	Allows for an additional control of the scanning mirrors by external voltage signals. Enables Continuous Scanning Vibrometry and tracking applications. Shipped with PSV-E-EXT Junction Box for accessing position feedback and optical signal strength.
PSV-A-015 System Cabinet	Ergonomic mobile workstation with storage for all parts and accessories.
PSV-C-5xx Main Cable	Available length: 5, 10, 20 and 30 m.
PSV-A-T37 Vertical Holder	For convenient overhead vertical mounting for the scanning head onto standard aluminium profile bars, e.g. for shaker tests
Accessories for measurements on small parts	
PSV-A-610-I Close-up Unit	For close-up measurements, on small parts without parallax.
PSV-A-CL-200 Micro Scan Lens	Special optics for laser spot minimization and parallel beam scanning for small shiny parts. Requires PSV-A-610-I Close-up Unit.
PSV-A-RLight Ring Light	Fiber optic ring light for illumination of small test objects. Requires PSV-A-610-I Close-up Unit.
PSV-A-T18 Vertical Test Stand	Motorized positioning of PSV scanning head for small part testing.
Accessories for (brake) acoustics and modal analysis	
PSV-A-430 Acoustic Gate Unit	Activates the measurement if noise exceeds a certain threshold.
PSV-A-MIR-S001/A-MIR-S002 Mirror Set	Mirror set for measurements in difficult-to-access areas. The mirror set comprises 4 (PSV-A-MIR-S002: 5) front coated mirrors including magnetic fixtures.
A-VIB-HEAD Headphones	High-end closed headphones to listen to the vibrometer signal.

PSV-A-610-I Close-up Unit for measuring on very small samples

A-GEO-EVA3D 3D Geometry Scanner for acquisition of 3D geometry

PSV-A-015 System Cabinet serves as mobile workstation

Software standard features

Control

- Remote control via VibroLink Ethernet
- Laser: x-y position, auto focus, pilot laser brightness
- Video camera: zoom, focus, color
- Remote control of reference vibrometers (VibroFlex, VibroGo and OFV series)

Measurement setup

- Real time HD video display during setup and scan
- Geometry scan (option, scanning head with distance sensor required)
- Automatic and manual definition of scan point grids:
  - Standard mode: selection of various basic geometries for grid definition (polygon, circle, rectangle) with different grid types (polar, hexagonal, rectangular). Point density and rotation freely selectable. Subtraction of objects. Converting of objects to points for manipulation of individual points. Assignment of focus values to objects for signal optimization.
  - Point mode: Creation and editing of individual scan points, grouping, assignment of focus values and meshing. Visual grid generation by defining scan points at the current laser position.
  - Refining, Coarsening, Merging of points with close proximity
  - VideoTriangulation®: Image processing for precise superposition of measurement points in the video image and the laser on the sample

Data acquisition

- AC and DC coupling for reference channels
- Automatic phase compensation vibrometer vs. reference channels
- IEPE and TEDS support for reference channels (VibroLink mode only)
- Triggering on measurement signals or digital inputs
- Gate Input: Control of the scan process by an external TTL gate signal (not available for A model)
- Frequency domain measurements with up to 819,200 FFT lines
- Averaging: magnitude, complex, peak hold
- Digital filters: HP, LP, band pass, notch
- Windowing: Rectangle, Bartlett, Blackman-Harris, Exponential, Flat Top, Force, Hamming, Hanning, Tapered Hanning
- Real time integration and differentiation (s, v, a)
- Signal optimization: Signal Enhancement and Speckle Tracking

Analysis (Spectral)

- Cursor modes: delta, harmonic, max., band
- Curve fitting for damping estimation (-3dB, zeta, Q)
- Display of magnitude, phase, real- and imaginary part
- Calculation of FRF, H1, H2, AP, CP, ESD, PSD and coherence
- Peak-finder in frequency spectrum

Analysis (Deflection Shapes / ODS)

- Frequency or band selective 1D and 3D animation
- Free choice of clipping planes and profile cuts
- Display and animation in pseudo colors, video image “skin” or imported texture
- Show and hide components/groups of measurement points, editable point index

Import and export filters

- Vibration data: Universal File Format (ASCII, Binary), ASCII, WAV
- Geometry: Universal File Format, STL, ASCII (CSV, import only)
- Graphics and animations (export only): GIF, JPG, BMP, TIFF, PNG, Animated GIF, MP4, WMV
- Import of external measurement data and mapping onto measurement points of the PSV scan point grid
- More filters optional

Automation and scripting

Programming and scripting interface Polytec File Access:
API for retrieval, programming and scripting via external applications supporting Microsoft’s Component Object Model (COM), e.g. Visual Basic .NET®, C#, MATLAB®, LabVIEW™ and Python.

Software options

Model	PSV QTec Scanning Vibrometer	-A	-B	-H	-HV
Preparation					
GeoPro Extended Geometry Processing	Additional import filters für geomety data with texture (OBJ, PLY) and extended toolkit for editing of scan point grid (automatic refining and coarsening using a user defined target density).	O	O	O	O
Signal Generator	Internal arbitrary signal generator for vibration excitation.	S	S	S	S
Measurement					
FastScan	Fast scan routine for analyzing the response of structures at a single frequency.	S	S	S	S
Time Domain Animation	Time domain data are acquired while scanning. Allows for “slow motion” animation e.g. of surface waves propagation or switches.	S	S	S	S
Multi Frame	For triggered measurements on combustion engines and brakes.	–	O	O	O[1]
Analysis & interfaces					
SignalProcessor	The user interface to the math library included in the PSV software, designed as an easy-to-use spreadsheet.	O	O	S	S
Principal Component Analysis	Principal component analysis for MIMO measurements in experimental modal analysis.	–	–	O	O[1]
PolyWave Software Suite	Scalable post-processing software suite for comprehensive analysis of vibration test data. Comprises modules for experimental modal analysis, operational modal analysis and order analysis.	O	O	O	O
Data Export to ME’scope	Data export to Vibrant’s ME’scope modal analysis software.	O	O	O	O
ASAM ODS	Import and export of data in ASAM ODS 5.3.0 ATFX standard.	O	O	O	O
Audio Output	Makes vibration data audible. Allows listening to live and stored vibration signals.	O	O	O	O
Desktop Analysis Version	Desktop version of PSV software for offline post processing and presentation of measurement results.	O	O	O	O
Automation and programming interface					
Macro Programming	WinWrap® Basic Engine: Visual Basic® for Applications (VBA) compatible. Allows automation of test routines. Comprises a large selection of sample macros for measurement setup, preparation, data acquisition and analysis for easy adaptation to your task.	O	S	S	S
Application specific macros	Polytec gladly supports you in the development of new macros tailored to your needs.	O	O	O	O
Maintenance package					
Software Maintenance Basic	Basic software maintenance. Free PSV software updates for a period of 1 year (-H, -M, -HV: 2 years).	S	S	S	S
Extended Software Maintenance	Entitles for software updates for an additional period. Available in 12 month increments.	O	O	O	O
University Program	Lifetime update license for universities and education (terms and conditions apply).	O	O	O	O

S: Standard;
O: Option;
–: Not available

[1] VibroLink mode only

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