PHOTON+ Dynamic Signal Analyzer

USB 2.0 Powered Real-time Analyzer for Sound and Vibration Analysis

PHOTON+™ is a next-generation, ultra-portable, real-time analyzer designed for making fast and accurate vibration measurements with post-processing capabilities.

It offers the convenience and speed of the industry standard USB 2.0 interface, and comes with two to four analog input channels, plus a waveform source and tachometer channel.

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Uses and Features

Uses

- In-vehicle testing
- In-flight testing
- Low-level acoustic and vibration testing due to PHOTON+'s extremely low measurement noise floor
- Field, laboratory and anywhere you need to make measurements
- Remote measurements: PHOTON+ can be placed up to 5 metres (16.4 ft) from the connected PC; with USB hubs used as repeaters, this can be extended to up to 30 metres (98.4 ft)

With RT Pro™ Software
- Dynamic signal analysis: Time series analysis, FFT analysis, spectrum analysis and FRF and coherence
- Modal data acquistion compatible with popular modal packages: Force/exponential window and coordinate auto-incrementing
- Acoustic analysis: Real-time octave analysis and waterfall analysis
- Rotating machine diagnosis and analysis: Real-time order tracking, order analysis and waterfall analysis
- Environmental testing: Transient capture and SRS analysis
- Swept-sine measurements: Tracking filter analysis, log or linear sweeps, auto-gain control and manual sweep controls

Features

- Portable and lightweight: weighs approx. 227 g (8 oz)
- USB 2.0 interface
- Power over USB connection – you do not have to carry an extra power supply for PHOTON+
- Expandable multichannel analyzer with two to four inputs, one output (waveform source) and one tachometer
- Real-time FFT analyzer with frequency range up to 84 kHz
- 32-bit processing
- Wide dynamic range
- Built-in CCLD signal conditioning
- Easy installation: USB interface provides 'plug and play'
- Covers the full range of FFT analyzer, vibration analyzer and signal analyzer applications

With RT Pro Software:
- Windows®-based applications tailored for noise and vibration testing
- High-precision FFT analyzer: 24-bit with full anti-alias protection
- Fast real-time processing for quick setup, instant results and on-site data verification
- Programmable digital filtering, real-time zoom and signal calculator
- One-click real-time measurements, post-processing and data recording
- Waveform recording that streams gap-free data to a PC disk drive
- With data recorder: Tape recorder functionality with voice annotation

Brüel & Kjær

An Ultra-portable Dynamic Signal Analyzer

PHOTON+ makes any PC an instrument-quality portable dynamic signal analyzer for multichannel noise and vibration analysis. Powered via its USB 2.0 port, PHOTON+ runs off a laptop PC battery so you can take it with you wherever you go.

Fast Real-time FFT Analyzer

Designed for real-time signal analysis, PHOTON+ offers remarkable performance in an FFT analyzer with a measurement dynamic range of 115 dB and a 84 kHz real-time rate. The RT Pro software provides a comprehensive set of time and spectrum measurement tools for fast real-time monitoring and analysis even when out in the field. It also features easy-to-use applications with flexible measurement and signal processing capabilities.

High-end Data Recorder

PHOTON+ with data recorder software offers traditional tape recording with voice annotation. The quick migration to post-processing also accelerates the time from data acquisition to analysis of results.

Dynamic switching between multiple measurement projects lets you navigate easily between data recording, data post-processing and analysis, and real-time analysis. With just one instrument, you can use it as an FFT analyzer, vibration analyzer or signal analyzer with recorded data interpreted in a wide variety of ways without spending time translating the data file format or changing between different software programs.

Inputs

Analog Channels	2 standard, expandable to 4 simultaneous channels. All have differential input with 1 MΩ impedance. Each input channel has overload detection before both the analog and digital anti-alias filters. Setup allows per channel selection of input voltage range (0.01 V, 0.1 V, 1 V, 10 V), transducer sensitivity, sensor type (for example, acceleration, force, pressure, etc.), and coupling selections for DC, AC (high-pass cutoff at 0.5 Hz) and CCLD
Electronics	Differential amplifier, programmable gain amplifier, anti-aliasing filters, and 24-bit analog-to-digital converter (ADC)
Filtering	An analog filter plus a 160 dB/octave linear-phase digital filter prevents aliasing and phase distortion
Frequency Range	Up to 84 kHz analysis frequency (192 k samples per second)
Voltage Ranges	±0.01, ±0.1, ±1.0, ±10 V
Signal Conditioning	Voltage or CCLD sensor power (2.4 mA, 22 Vpeak open circuit)
Maximum Input	±36 Vpeak without damage
Resolution	24-bit
Dynamic Range	115 dBfs two-tone test, 100 linear averages
Accuracy	±0.04 dB (1 kHz sine at full scale)
Channel Match Amplitude	Within ±0.04 dB
Channel Match Phase	±0.01 degree to 1 kHz ±0.2 degree to 21 kHz (from DC to 21 kHz, frequency response measurements, all inputs at full scale, linear average)
Frequency Accuracy	Within 0.01%

Outputs

Analog Channels	Waveform source standard
Electronics	24-bit digital-to-analog converter (DAC) with analog and digital anti-imaging filters
Filtering	A 160 dB/octave digital filter plus an analog filter to prevent aliasing and phase distortion
Frequency Range	Up to 42 kHz output frequency (96 k samples per second)
Voltage Ranges	±10 Vpeak
Resolution	24 bit
Dynamic Range	110 dBfs
Output Impedance	50 Ω
Maximum Current	24 mA peak

Hardware

Enclosure	Ruggedized case encloses low-noise input/output board with 32-bit floating point DSP processor
Connectors	BNC connectors for inputs Tachometer Waveform source (output) USB connector socket
User Interface	Two status LEDs, start/stop button
Input Expansion	From two to four total analog inputs using Hardware Activation code
PC Requirements	USB port compliant with USB specifications 2.0 and supplies 500 mA Microsoft® Windows® XP (32-bit), Windows® 7 (32- and 64-bit), Windows® 8, 8.1 and 10 operating systems Microsoft® Word 2003, 2007, 2010, 2013 or 2016
PC Expansion	PC upgrades and peripheral additions do not delay or interrupt data acquisition and real-time processing
Power	Powered from PC with 5 V DC
Power Consumption	Less than 2.5 W
Dimensions	Height: 2.8 cm (1.1 in) Width: 9.9 cm (3.9 in) Depth: 12.1 cm (4.8 in)
Weight	227 g (8.0 oz)
Temperature	5 to 45 °C (41 to 113 °F)
Humidity	10% to 90% RH non-condensing

Software

Architecture	All signal processing done in DSP Distributed processing relieves the PC from the burden of real-time processing. True multi-tasking allows the PC to deliver maximum graphics performance and responsiveness. The software provides on-line test status and management through text displays, software toggle buttons and screen displays of multiple time and/or frequency signals
Applications	Signal Analysis and Waveform Source; Modal Data Acquisition; Acoustic Analysis; Real-time Order Tracking; Transient Capture and SRS Analysis; Automatic Pass/Fail Testing; Swept-sine Measurement; Waveform Recording; Data Recording; and Re-calibration
Features	Online help; Consistent management of user-defined engineering units; single-click reporting with online graphics and test documentation of both setup parameters and signals through Microsoft® Word (saved on disk and/or printed)

Regulatory Compliance

Compliance	CE marking
Safety	EN/IEC 60950−1
EMC	FCC Part 15 (CFR 47) Class A, EN 61326 Class A, CISPR 22 Class A

Specifications – RT Pro Signal Analysis and Waveform Source Software

Real-time Spectrum Analysis

Real-time Rate	84 kHz for two channels with two auto-spectra and a cross-spectrum computed
Dynamic Range	115 dBFS
Frequency Range	DC to 84 kHz in 42 ranges
Zoom	21 spans from 17 Hz to 10.5 kHz. Max. upper frequency of 21 kHz
Resolution	Real-time mode[*]: 110, 225, 450, 900, 1800, 3600 spectral lines Online mode: Added selections for 7200, 14400, 28800, 57600, 115200 spectral lines
Windows	Kaisser-Bessel, Blackman, Blackman Max. Decay, Blackman Min. Sidelobe, Bartlett, Tukey, Welch

* Up to 1800 lines with all functions enabled for all channels. Higher resolutions dependent on the number of functions and channels active

Signal Processing Functions

Time Domain	Time capture, auto-correlation and cross-correlation functions, and statistics
Frequency Domain	Real-time spectrum analysis, auto-power spectrum, cross-power spectrum, power spectral density, frequency response function, coherence function, Fourier transforms, impulse responses, cepstrum, and synthesized octave analysis (1/1, 1/3, 1/6, 1/12, 1/24, 1/48)
Amplitude Domain	Histogram (normalized and cumulative), statistical parameters (max., min., mean, peak, rms)

Waveform Source

Signals	Swept-sine, shaped random, shaped burst random, white noise, pseudo-random, burst random, burst chirp, chirp, sine wave, square wave, triangle wave, pulse train and DC level

Averaging

Modes	Time or frequency
Types	Exponential, linear, peak hold, peak hold for specified number of averages
Overlap Processing	User-defined percentage from 0% to 99%. Maximum overlap dependent on sampling rate
No. of Averages	1 to 32767 frames
Frame Reject	Automatic reject of frames with voltage overloads; manual accept/reject of overloaded frames; manual accept/reject for all frames

Triggering

Source	Input channel, waveform source signal, digital input, time delay, free run
Slope	Positive, negative, bipolar
Level	Percent of full-scale range or voltage level
Pre-/Post-trigger	User-selected number of samples. Up to 1023 samples before or up to 65535 samples after trigger point
Modes	Automatic or manual
Run Modes	Trigger first frame followed by free run; auto-trigger every frame; manually arm every frame

Measurement Controls

Measurement and source panel toggle buttons and toolbar icons provide easy access to test controls. For added convenience, commonly used commands are accessible via keyboard hotkeys

Controls	Start/stop, pause/continue, next frame buttons
Requests	Time capture, FFT, correlation, spectrum, FRF/coherence and histogram buttons
Parameters	Spectral lines, frame size, frequency range, sampling interval, spectral window, frames, trigger and average
Waveform Source	Start/stop, signal selection buttons
Icons	Reset frame averaging, Save signals and Quick report
Status Displays	Frame number, activity status, message box

Transient Capture

Sampling Rate	Up to 192000 samples per second in 42 settings
Frame Size	256, 512, 1024, 2048, 4096 or 8192 samples. Deep memory capture adds frame sizes: 16384, 32678, 65536, 131072 and 262144
Modes	Single frame or multiple frames

Signal Displays

Unlimited number of display windows in tile or cascade format with click and drag zoom, user annotation and cursors

Window Format	Per window selection of single, dual or four pane formats. Each pane can display single or multiple signals overlaid in either time or frequency. Independent choice of colour and texture for signals, grids, tick marks, labels, titles, etc.
Scale Format	Linear or logarithmic scales for X and Y axes with automatic or manual scaling
Cursors	Single or dual with X Y, ΔX, ΔY, ΔRMS and Q value readouts. Manual peak marks, automatic peak/valley detection and marks, harmonic and sideband cursor
Frequency Signals	Auto-spectrum, cross-spectrum, FFT, power spectrum, density, frequency response function, coherence
Signal Formats	Bode, magnitude, phase, unwrapped phase, polar, vector (Nyquist), real, imaginary
Engineering Units	English, SI, metric or mixed units for acceleration, velocity, displacement, force and pressure. User-definable
Normalization	Engineering units (EU), EUpeak, EUrms, EU^2/Hz, $EU/\sqrt{Hz}$, $EU^2 - S$/Hz, decibels (dB)
Frequency Axis	Hz or CPM
Time Signals	Input time histories, auto- and cross-correlation
Amplitude Signals	Histograms
Statistics	Strip chart output for rms, mean, peak, max. and min. values of input signals

Data Export

RT Pro provides seamless data interfaces to advanced analysis packages

Binary File Formats	Binary, ME'scopeVES™, MATLAB®, UFF, WAV, Agilent® SDF, Test for I-deas ATI/AFU, Brüel & Kjær Common (BKC)
ASCII File Formats	UFF, X−Y pair, Y only

Signal Calculator

This feature allows you to create customised signals. All signals are calculated and displayed 'live' during testing

Operations	Add
	Subtract
	Multiply
	Divide
	Single and double integration or differentiation
	A-, B- and C-weighting
	Square
	Square root
	Mobility
	Compliance
	Sine
	Cosine
	Tan
	Arctan
	Inverse FFT
	HAV-weighting
	Conjugate
	Magnitude
	RealPart
	ImaginaryPart
	FFT

Advanced Graphics

Quantities		Spectra and time histories versus time
Plot Formats		Waterfall (3D display), waterfall with single or dual pane, spectrograms or colour contour (2D) plots
Waterfall Analysis:		
Cursors:	3D Cursor	Dual-axis cursor with trace colour highlighted in both axes
	Synch. Cursor	Synchronized cursor positioning for all cursors in all windows
X Axis		Hertz or CPM; linear or log scale
Y Axis		Engineering Units (EU), EUpeak, EUrms, EU^2/Hz, $EU/\sqrt{Hz}$, $EU^2 - S$/Hz, decibels (dB)
Z Axis		Seconds or RPM
3D Orientation		Viewing angle interactively set by mouse
Slice Plot		Selectable as X slice or Z slice

Post-test Documentation (Reporting)

Microsoft® Word	Icon for single-click generation of data plots and test reports, including measurement parameter listings, test logs and formatted signal plots. Custom report templates can also be made

Modal Data Acquisition

FRF and Coherence	Arbitrary assignment of response−excitation pairs from among available inputs. H1 and H2 FRF calculations
Spectrum	Auto-spectra only or auto-spectra and cross-spectra
Time Capture	Frame size up to 262144 (using deep memory capture)
Special Windows	Force/exponential window with user-defined start point, flat-top points and damping factor
Modal Coordinates	Entry of measurement point, axis and sense in Channel Parameters table or via On-line Coordinate Update table
Auto-incrementing	Automatic updating of roving measurements using pre-set measurement point increment
Frame Reject	Automatic reject of frames with voltage overloads; manual accept/reject of overloaded frames; or manual accept/reject for all frames
Modal Package Interface	Data interface for popular modal analysis packages

RPM Spectrum Processing

TACHOMETER

Pulses/Rev.	1 to 1024
Gear Ratio	Ratio of two numbers, each from 0.1 to 10000
RPM Range	1 < RPM < 300000
RPM Accuracy	100 ppm (typical)
Level Range	Programmable from 0.25 V to 10 V

RPM TRIGGER

Level	RPM plus tolerance setting
Slope	Run-up, run-down, absolute value

RUN MODES

RPM Waterfall	Low RPM, high RPM, delta RPM
Frame Size	256, 512, 1024, 2048, 4096 samples*
Spectral Lines	110, 225, 450, 900 or 1800 lines*
Averaging	Stable (linear), peak hold or exponential
Overlap	User-defined from 0 to 99%. Max. overlap dependent on sampling rate
Windowing	Hanning, Hamming, Flat-top, Uniform, Bartlett, Tukey, Blackman, Blackman (4th) max., Blackman (4th) min., Welch
Waterfall Plots	Amplitude vs hertz vs RPM or seconds. All other attributes: As per Advanced Graphics

* Up to 1800 lines with all functions enabled for all channels. Higher resolutions dependent on the number of functions and channels active

Signal Reader

API for Microsoft® ActiveX® that provides access to binary data files through programs such as MATLAB, LabVIEW™, Visual Basic®, Visual C, etc.

Data Recorder

The data recorder provides a user-friendly tape recorder interface for easy and quick data recording for all active channels and includes voice channel annotation via the PC sound card. The data recorder also provides quick and seamless transition to data playback and processing via the RT Pro Playback option(s). Note that real-time analysis cannot be performed while using the data recorder

Max. Rate	524 k samples per second aggregate
Data Formats	Binary, X−Y ASCII, Y-only ASCII, UFF binary, UFF ASCII, WAV, Agilent SDF, Test for I-deas ATI/AFU, Brüel & Kjær Common (BKC)
On-line Displays	Input time histories for all inputs Channel status Recording view with summary of index files Recording events Voice records
Post-processing	Via playback in RT Pro Playback
Voice Recording	Unlimited number of voice recordings Each voice record: Up to 10 s

Waveform Recorder

This software option enables streaming of long data records. Each record contains gap-free data simultaneously sampled for all active channels. Note that on-line signal analysis can be performed during waveform recording

Max. Rates	524 k samples per second aggregate
Data Formats	Binary, X−Y ASCII, Y-only ASCII, UFF binary, UFF ASCII, Wave, Agilent SDF, Test for I-deas ATI/AFU, Brüel & Kjær Common (BKC)
On-line Displays	Input time histories for all inputs; channel status including voltage levels and overloads; FFT; auto-spectra, cross-spectra; FRF; coherence statistics; and waterfall displays are also possible

Real-time Order Tracking

METHOD 1: REAL-TIME DIGITAL RESAMPLING TECHNIQUE

Order Span	1st up to 320th order tracked; 1 < RPM < 300000
Order Resolution	0.025, 0.05, 0.1, 0.125, 0.25, 0.5, 1.0 Max. order 20: 0.025 to 1 Max. order 40: 0.05 to 1 Max. order 80: 0.1 to 1 Max. order 160: 0.125 to 1 Max. order 320: 0.25 to 1
Number of Orders	Up to 20 orders simultaneously tracked on-line
Amplitude Extraction	Based on DFT frequency domain extraction of order amplitudes
Run Mode	Run-up, run-down and free run. Selectable number of runs with automatic rejection of data that violates the run mode criterion (wrong RPM direction)
Waterfall Plots	Amplitude vs. Order vs. RPM. All other attributes: As per Advanced Graphics Option

METHOD 2: FFT-BASED AMPLITUDE DETECTION

Order Span	1st up to 20th order tracked; 1 < RPM < 300000
Order Resolution	Set by FFT lines and frequency range (max. usable RPM limited by resolution, tach pulse rate, pulses/rev. and averaging used)
Number of Orders	Up to 20 orders simultaneously tracked on-line

Amplitude Extraction	Selectable based on fixed bandwidth, fixed spectral lines or frequency range. Additionally, proportional bandwidth (from 1% to 100%) in post-processing mode
Waterfall Plots	All attributes as per Advanced Graphics Option

Environmental Data Reduction

TRANSIENT CAPTURE

Sampling Rates	Up to 192000 sps in 41 settings
Frame Size	256, 512, 1024, 2048, 4096 or 8192 samples
Modes	Single frame, multiple frames
Averaging	Exponential, linear, peak hold, peak hold for specified number of averages

SHOCK RESPONSE SPECTRUM:

SRS Analysis	Up to 14 octave range using maxi-max, negative maximum and positive maximum analysis techniques. User specifies high and low frequencies, reference frequency, damping ratio or Q value, and resolution (1/1, 1/3, 1/6, 1/12, 1/24, 1/48)

Acoustic Analysis

REAL-TIME OCTAVE ANALYSIS:

Method	Real-time time domain octave filtering
Standards	1/1-octave: Conforms to ANSI standard S 1.11−1986, Order 7, Type 1−D, Extended and Optional Frequency Ranges 1/3-octave: Conforms to ANSI standard S 1.11−1986, Order 3, Type 1−D, Extended and Optional Frequency Ranges
Frequency Ranges	1/1-octave: Two inputs: 1 Hz – 16 kHz Four inputs: 1 Hz – 8 kHz 1/3-octave: Two inputs: 1 Hz – 20 kHz Fours inputs: 10 Hz – 20 kHz
Weighting	Linear, A, B and C selectable
Averaging Modes	Linear, exponential or peak hold
Sound Level Detectors	Peak, hold, impulse, fast and slow sound level measurements
Measurement Period	From 1.3 ms to 48 hours
FFT Auto-spectra:	Simultaneously measured during real-time octave acquisition
Averaging	None, exponential, linear or peak hold
Resolution	225, 450 or 900 spectral lines
Windows	Hanning, Hamming, Flat-top, Uniform, Kaiser-Bessel, Blackman, Blackman max. Decay, Blackman min. sidelobe, Bartlett, Tukey, Welch
Frequency Signals	1/1 and 1/3-octave spectra and auto-spectra
Barchart Display	Solid or transparent with multiple signal overlays
Time Signals	Input time histories, overall level (linear or A/B/C-weighted) versus time, user-selected octave band level versus time

Automated Test

PASS/FAIL LIMITS AND CRITERIA

Limits Checking	Multiple, simultaneous limit checks on frequency domain, time domain, and amplitude domain signals
Limits Definition	Pass/fail limit criteria may be defined based on: • User-created Limit tables • Measured signals resident in memory • Signals imported from ASCII files • Synthesized signals generated by using Signal Calculator function
Limit Tables	High- or low-limit curves defined based on Breakpoint table. Interpolation on linear−linear, log−linear, linear−log or log−log basis
Limits Import	Limit Tables seeded from imported ASCII, UFF or binary file. ASCII files generated by spreadsheet, MATLAB or other software
Limit Scaling	Limit curve scaling by using a user-defined value as a multiplying constant or offset value
Limit Check Range	Sample-by-sample checking (time domain) or line-by-line checking (frequency domain). Check range may be the whole range or a user-defined
Limit Threshold	User-defined percentage of values outside of limits to trigger fail flag

Overall Limits	Fail detection based on the rms, maximum, mean, minimum, or peak value (time and amplitude domain only)
Actions on Fail Flag	Display alarm message, sound PC beep, generate test report, abort measurement, send email and source on
User Messages	User message strings displayed on test failure
Frequency Domain	Auto- and cross-spectra, 1/1 and 1/3 real-time octave spectra, frequency response function and coherence and SRS
Time Domain	Time histories, synchronously averaged time records, auto- and cross-correlations (overall value limit checking only for correlations)
Amplitude Domain	HIstograms (overall value limit checking only)

TEST SCHEDULE
User-defined sequence of events that are automatically executed during the test

Events	Measurement duration (hours, minutes, seconds), limit checking on/off, start or stop the source signal, timed pause, save signals, and generate a test report Logic for sequence loop and nested loop

Specifications – RT Pro Post-processing Software

RT Pro Playback

GENERAL FEATURES

Signal Displays	Same specifications as for RT Pro Real-time Signal Analysis and Waveform Source
Signal Calculator	
Documentation	

SIGNAL PROCESSING FUNCTIONS

Time Domain	Time capture, auto-correlation and cross-correlation functions, statistics
Frequency Domain	Spectrum analysis, auto-power spectrum, cross-power spectrum, power spectral density, frequency response function, coherence function, Fourier transforms, impulse responses, cepstrum, and synthesized octave analysis (1/1, 1/3, 1/6, 1/12, 1/24, 1/48)
Amplitude Domain	Histogram (normalized and cumulative), statistical parameters: Max., min., mean, peak, rms

SPECTRUM ANALYSIS

Resolution	110 to 115200 spectral lines[*]
Windows	Hanning, Hamming, flat-top, uniform, force/exponential, Kaiser-Bessel, Blackman, Blackman max. decay, Blackman min. sidelobe, Tukey, Welch

* Maximum lines may be limited by PC memory

TRIGGERING

Modes	Automatic or manual
Types	Trigger first frame followed by free run; auto-trigger every frame; manual arm every frame

AVERAGING

Modes	Time or frequency
Types	Exponential, linear, peak hold, peak hold for specified number of averages
Overlap Processing	User-defined percentage from 0% to 99%

Acoustic Analysis Playback

OCTAVE ANALYSIS

Method	Time domain octave filtering
Standards	1/1-octave: Conforms to ANSI standard S 1.11−1986, Order 7, Type 1−D, Extended and Optional Frequency Ranges 1/3-octave: Conforms to ANSI standard S 1.11−1986, Order 3, Type 1−D, Extended and Optional Frequency Ranges
Weighting	Linear, A, B, C selectable
Averaging Modes	Linear, exponential, peak hold
Sound Level Detectors	Peak hold, impulse, fast and slow sound level measurements
FFT Auto-spectra	Simultaneously calculated with octave spectrum
Frequency Signals	1/1- and 1/3-octave spectra and auto-spectra
Barchart Display	Solid or transparent with multiple signal overlays
Time Signals	Input time histories, overall level (linear or A/B/C-weighted) versus time, user-defined octave band level versus time

HIGH-RESOLUTION OCTAVE ANALYSIS

Method	Octave-based DFT synthesis method gives true logarithmic distributed frequency spectrum
Octave Resolution	1/1, 1/3, 1/6, 1/12, 1/24, 1/48
FFT Resolution	225, 450 or 900 spectral lines
Time Signals	Input time histories

SRS Analysis Playback

SHOCK RESPONSE SPECTRUM

SRS Analysis	Up to 14 octave range using maxi-max, negative maximum and positive maximum analysis techniques. User specifies high and low frequencies, reference frequency, damping ratio or Q value, and resolution (1/1, 1/3, 1/6, 1/12, 1/24, 1/48)

Order Tracking Playback

Method	Digital resampling technique
Order Span	1st up to 320th order tracked; 1 < RPM < 300000
Order Resolution	0.025, 0.05, 0.1, 0.125, 0.25, 0.5, 1.0
Number of Orders	Up to 55 orders simultaneously tracked on-line
Amplitude Extraction	Based on DFT frequency domain extraction of order amplitudes
Run Mode	Run-up, run-down, free run. Selectable number of runs with automatic rejection of data that violates the run mode criterion (wrong RPM direction)

Ordering Information

System

Type 986A0186   PHOTON+ with RT Pro Software
includes the following hardware and software:
- Two inputs
- One waveform source
- One tachometer input
- One USB cable
- Data Recording
- RT Pro Signal Analysis and Waveform Source (for real-time measurements)
- RT Pro Waveform Recorder
- RT Pro Playback (for data post-processing)
- PHOTON+ Re-calibration Software
- NET-Integrator™ Run-time License

Software

DSA-300   RT Pro Advanced Analysis Package
includes the following applications:
- RT Pro Automated Test
- Environmental Data Reduction (SRS analysis)
- Acoustic Analysis (1/1- and 1/3-octave spectra)
- Real-time Order Tracking
- Swept-sine Measurement
- Order Tracking Playback
- Acoustic Analysis Playback
- SRS Analysis Playback

Accessories Available Separately

OPTIONAL HARDWARE
Type 845-084100   Single-channel Analog Input (add one or two inputs to the base system)

OPTIONAL SOFTWARE
NET-103-02   NET-Integrator™ ActiveX® Application Interface

MODAL EXCITATION HARDWARE
Type 8204   Miniature Impact Hammer
Type 8206   Impact Hammer, for general purposes
Type 8207   Heavy Duty Impact Hammer – 1-pound head
Type 8208   Heavy Duty Impact Hammer – 3-pound head
Type 8210   Heavy Duty Impact Hammer – 12-pound head
Type 5961   Hand-held Exciter

MODAL ACCELEROMETERS
Type 4394   Miniature CCLD Accelerometer
Type 4507-B-001   CCLD TEDS Accelerometer
Type 4535-B   Triaxial CCLD Accelerometer

MODAL ANALYSIS SOFTWARE
Using PULSE Reflex™ Modal Analysis
Basic System
Type 8700   PULSE Reflex Base
Type 8720-A   PULSE Reflex Modal Analysis Pack

Advanced System for Multiple Reference Impact Testing (MRIT)
Type 8700   PULSE Reflex Base
Type 8721-A   PULSE Reflex Advanced Modal Analysis Pack

Software Maintenance

TCS-303   Software Maintenance and Support Agreement for RT Pro Software

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