

PRODUCT DATA

Pocket Front-end — Type 3560 L PULSE Lite Software — Types 7781, 7782, 7783

Pocket Front-end Type 3560 L and PULSE™ Lite software give you a full-featured analyzer in a small size; the power of a Brüel & Kjær CPB, FFT or Run-up/Run-down analyzer in a package small enough to fit in the accessory pocket of your laptop bag.

Pocket Front-end Type 3560 L is a member of the Type 3560 family of data acquisition units, available for use with PULSE software and applications. So you can easily combine the smallness of the Pocket Front-end with the features of a full-blown PULSE analyzer (see PULSE System Data sheet for details).

PULSE Lite software is a sub-set of the world-beating PULSE software. We have taken Brüel & Kjær' over sixty years of knowledge in sound and vibration testing and made packages that are simple to operate, but nevertheless built on the same analysis platform as PULSE. Your measurement results are just as valid as those made on a system requiring considerably more investment, but there is limited access to advanced features – hence Lite.

PULSE Lite software also has a growth path if your needs change. Data and projects from PULSE Lite are 100% compatible with PULSE, so upgrading is painless. See the latest information on www.bksv.com/PULSELite.



USES AND FEATURES

USES

- Basic acoustic analyzer
- Basic vibration analyzer
- Simple vibration analysis (FFT) (machinery vibration)
- Impact testing (FFT) (resonance analysis)
- CPB analysis (1/1-octave, 1/3-octave)
- Product noise evaluation (FFT or CPB)
- Run-up/Run-down analysis (FFT)
- Transient analysis (FFT or CPB) (analysis of non-stationary signals)

FEATURES

- Genuine ease of use with scenario-orientated user-interface
- Intelligent analysis-setup defaults that suit most applications
- Compact functionality
- Simple and efficient data management
- Easy integration with Microsoft® Excel for post-processing of data
- Growth potential – compatibility with PULSE family enables easy upgrade to greater functionality

Type 3560 L Pocket Front-end Hardware

FEATURES

- Ultra-compact PC Card and break-out box fits in laptop case so that it is always handy
- 2 channels of CCLD conditioning to power accelerometers, microphones, and impact hammers
- Two additional channels of direct input for tachometers and other externally conditioned transducers (requires 3560 L–L04 Run-up/Run-down Analyzer or PULSE software)
- Easily configured as a two-channel front-end for PULSE software and applications

A Powerful Measurement System

PULSE Lite software has many advanced features that allow users to immediately make accurate measurements:

- A Microsoft® Access-compatible transducer database and an automatic Calibration Master for managing and calibrating your transducers
- A task-oriented user interface that steps you through the measurement or quickly moves from one display setup to another
- Advanced cursors and cursor values:
 - Harmonic cursor for detecting harmonics in a signal
 - Delta, Reference, and Sideband cursors help to analyse spectra
 - Loudness cursor values for calculating the perceived loudness of a sound
 - Resonance cursor values for calculating a mode's damping by the half-power method
- Easy export of data:
 - Directly to Microsoft® Excel for post-analysis, reporting, and statistical analysis
 - as UFF format for export to ME'scopeVES™ Type 7754 for Modal Analysis
 - ASCII format for analysis in other programs or for reporting
- 'Live' reports inside Microsoft® Word where displays can be zoomed or modified and the cursor is still active, even on a customer's computer that is not running PULSE Lite
- PULSE Knowledge Library – Brüel & Kjær's catalogue of technical literature (application notes, primers, technical reviews, case studies) in a searchable database gives a solid foundation

Future Possibilities

Purchasing a PULSE Lite configuration as a measurement solution does not put you in a dead-end. Backed up by Brüel & Kjær's wealth of experience gained over decades, it is just a single product in a comprehensive range of sound and vibration measurement solutions tailored to all budgets, skill levels and requirements – the PULSE family. That is to say, if you invest in the Pocket Front-end and/or a PULSE Lite solution but later find that you need more measurement capability, PULSE Lite is your link to the PULSE family and an easy upgrade path.

PULSE Lite Configurations

To make things easier to order, we have bundled the Pocket Front-end with three different PULSE Lite software packages:

- Type 3560 L–L02 PULSE Lite, Basic 2-channel FFT Analyzer
- Type 3560 L–L04 PULSE Lite, Basic 2-channel Run-up/Run-down Analyzer
- Type 3560 L–L06 PULSE Lite, Basic 2-channel CPB Analyzer

Type 3560 L–L02 PULSE Lite Basic 2-channel FFT Analyzer

Vibration and Acoustic Testing

- Measure the frequency and amplitude of vibration and noise by using the Fast Fourier Transform (FFT)
- Investigate the root cause of problems by using contour and waterfall displays to differentiate driving forces from natural resonances on variable speed objects
- Quantify the performance of parts by overlaying measurements
- Trigger on transient events like squeaks and rattles

Impact Testing

- Use an instrumented impact hammer to do ping testing
- Measure objects' resonant (natural) frequencies and damping
- Acquire measurements for Modal Analysis and Finite Element Model updating

Fig. 1 Typical vibration or acoustic test setup

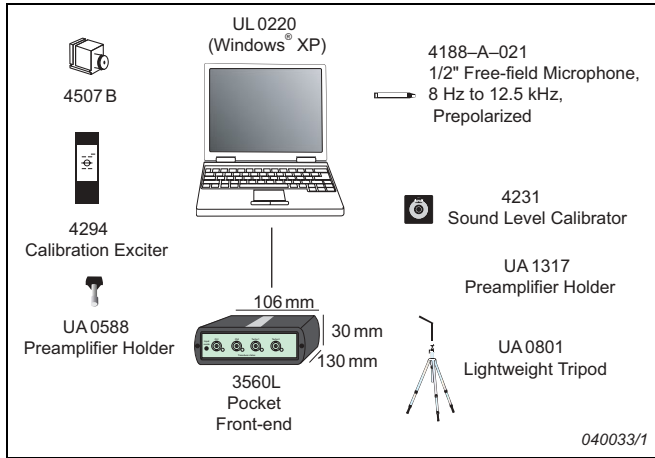


Fig. 2 Typical impact test setup

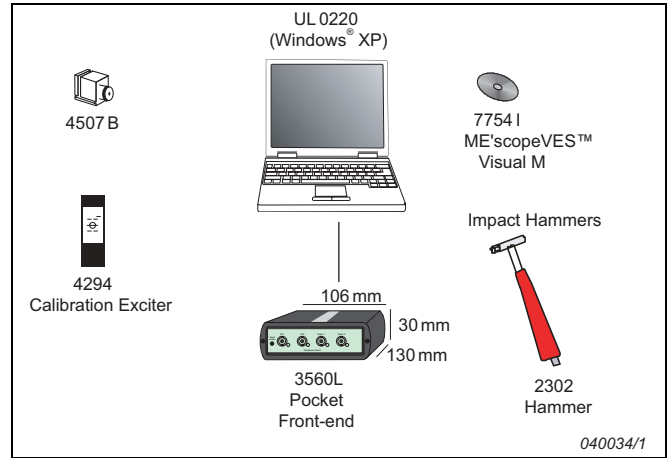


Table 1
Recommended instrumentation for objects by size

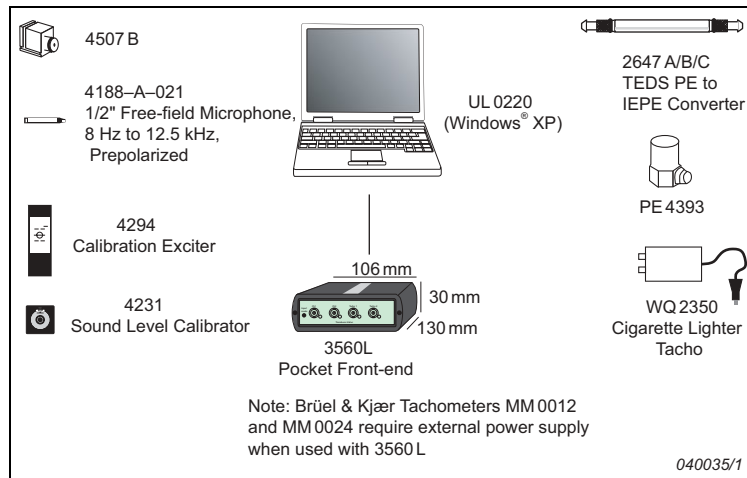
Object	Recommended Impact Hammer	Recommended Accelerometer
Circuit boards, turbine blades	Types 8203 and 2647 B Mini Impact Hammer with Charge-to-DeltaTron® Converter	Model 25A Miniature Accelerometer
Components	Type 2302 – 10 General Purpose Impact Hammer (0.3 lb.)	Type 4507 B – 001 Accelerometer
Car frames and machine tools	Type 2303 1 lb. Impact Hammer	Type 4507 B – 004 Accelerometer
Large shafts and larger machine tools	Type 2304 3 lb. Hand Sledge	Type 4507 B – 004 Accelerometer
Small buildings and small bridges	Type 2305 12 lb. Sledge Hammer	Model 752A 13 Accelerometer
Large structures or systems with unmeasurable forces	See PULSE Type 7760 Operational Modal Analysis Product Data BP 1889	

Type 3560 L – L04 PULSE Lite Basic 2-channel Run-up/Run-down Analyzer

Order analysis by FFT and Tachometer

- All the features of 3560 L – L02 PULSE Lite Basic 2-channel FFT Analyzer plus third channel for tachometer
- Directly relate noise and vibration to rotating elements like engines, motors, and tyres
- Use contour and waterfall displays to measure how noise and vibration varies with RPM
- Extract multiples of fundamental rotation speed (orders) to determine sources of vibration

Fig. 3
Typical run-up/down test setup




Type 3560 L–L06 PULSE Lite Basic 2-channel CPB Analyzer

Acoustic Testing

- Measure sound using true digital 1/1- and 1/3-octave filters to meet ISO and ANSI standards
- Measure sound pressure level with linear and A-weighting
- Advanced perception of sound measurements including loudness to ISO 532 B standard
- Quantify the performance of parts by overlaying measurements
- Trigger on transient events like squeaks and rattles

Compliance with Standards

	<p>CE-mark indicates compliance with: EMC Directive and Low Voltage Directive. C-Tick mark indicates compliance with the EMC requirements of Australia and New Zealand</p>
<p>EMC Emission</p>	<p>EN/IEC 61000–6–3: Generic emission standard for residential, commercial and light industrial environments. EN/IEC 61000–6–4: Generic emission standard for industrial environments. CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits. FCC Rules, Part 15: Complies with the limits for a Class B digital device.</p>
<p>Temperature</p>	<p>IEC 60068–2–1 & IEC 60068–2–2: Environmental Testing. Cold and Dry Heat. Operating Temperature: –10 to +50°C (14 to 122°F) Storage Temperature: –25 to +70°C (–13 to 158°F)</p>
<p>Humidity</p>	<p>IEC 60068–2–3: Damp Heat: 93% RH (non-condensing at 40°C (104°F))</p>
<p>Mechanical</p>	<p>Operating (peak values): MIL–STD–810 C: Vibration: 12.7 mm, 15 m/s², 5–500 Hz Non-operating: IEC 60068–2–6: Vibration: 0.3 mm, 20 m/s², 10–500 Hz IEC 60068–2–27: Shock: 1000 m/s² IEC 60068–2–29: Bump: 4000 bumps at 400 m/s²</p>
<p>Enclosure</p>	<p>IEC 60529: Protection provided by enclosures: 3560 L: IP 30</p>

Specifications PULSE Lite – Type 3560 L–Lxx

PULSE Lite offers four templates:

- Basic FFT (2-channel)
- Basic CPB (2-channel)
- Impact Testing (2-channel)
- Run-up/Run-down (2-channel)

Basic FFT (Type 3560 L–L02)

FREQUENCY

Lines: 50 – 6400

Span: 10 Hz – 20 kHz in 1, 2, 5... and 2ⁿ steps

Overlap: 0%, 25%, 50%, 66.67%, 75% and Max%

AVERAGING

Mode: Exponential, Linear and Peak

Averages: User-definable

Time Weighting: Transient (Uniform) or Non-transient (Hanning)

Trigger: Free-run, signal or manual

WATERFALL PLOT

No. of Traces: 50

Increment: User-definable in seconds (free-run trigger) or new trigger (signal or manual trigger)

Basic CPB (Type 3560 L–L06)

FREQUENCY

Span: 16 Hz – 8 kHz (1/1-octave); 16 Hz – 16 kHz (1/3-octave)

Bandwidth: 1/1-octave and 1/3-octave

Weighting: Linear and A-weighting

AVERAGING MODE

Linear: Averaging time user-definable in seconds

Exponential Time Weighting: 1 s (slow) and 1/8 s (fast)

Hold: None, Maximum Hold and Minimum Hold on the individual bands

Trigger: Free-run, signal or manual

WATERFALL PLOT

No. of Traces: 50

Increment: User-definable in seconds (free-run trigger) or new trigger (signal or manual trigger)

Impact Testing (Type 3560 L–L02)

FREQUENCY

Lines: 50 – 6400

Span: 10 Hz – 20 kHz in 1, 2, 5... and 2ⁿ steps

AVERAGING

Mode: Exponential, Linear and Peak

Averages: user-definable

Time Weighting: Uniform Window or Force (hammer) + Exponential (response)

Signal Trigger: Input 1 Signal

Trigger Level: user-definable in % of max. input

Delay: –10% of time record length

WATERFALL PLOT

No. of Traces: maximum 50

Increment: by validation of the measurement using 'Accept' button

Run-up/Run-down Testing (Type 3560 L–L04)

Lines: 50 – 6400

Span: 10 Hz – 20 kHz in 1, 2, 5... and 2ⁿ steps

Overlap: 0%, 25%, 50%, 66.67%, 75% and Max%

AVERAGING

Mode: Exponential only

Averages: User-definable

Time Weighting: Hanning Window

TRIGGER

Start: User-definable in RPM

Stop: User-definable in RPM

Update: User-definable in RPM

TACHO

Pulses/Rev.: User-definable (400 to 1200000 pulses per minute)

Order Traces: Up to four user-definable orders

Data Validation and Display Plots

- Level Meter
- RPM Meter (Type 3560 L–L04 only)
- Time wave form
- Autospectra
- FRF magnitude and phase (Type 3560 L–L02 only)
- Coherence (Type 3560 L–L02 only)
- Bode plots (Type 3560 L–L02 only)
- Waterfall plots
- Contour plots

Cursor and Cursor Fields

- Main
- Harmonic
- Delta
- Reference
- Sideband
- Acoustic level
- Corrected frequency
- Resonance
- Minimum value
- Maximum value
- Total
- Delta/Total
- Speed (Type 3560 L–L04 only)
- Loudness – Diffuse and Free-field to ISO 532 B (Type 3560 L–L06 only)

Display Functionality

Each display can be manipulated via mouse-menu commands:

- Zoom
- Unzoom
- Overlay Curve
- Delete Overlay
- Save Active Curve
- Copy Active Curve
- Spectral Units – Power (mean square), Root Mean Square, Power Spectral Density, RMS Spectral Density, Energy Spectral Density
- Acoustic Weighting – As signal, A-weighted, B-weighted, C-weighted, D-weighted, Linear
- $j\omega$ -Weighting: $1/j\omega^2$, $1/j\omega$, None, $j\omega$, $j\omega^2$

Data Export

- Export of selected functions in PULSE ASCII File or Universal File Format (UFF)
- Direct export of selectable functions to Microsoft® Excel

Typical Specifications – PC-card Pocket Front-end Type 3560 L

FREQUENCY RANGE INPUT 1 & 2

5 Hz to 20 kHz: -3 dB
10 Hz to 18 kHz: ±0.3 dB

SAMPLING FREQUENCY

$f_s = 48 \text{ kHz}$

INPUT VOLTAGE

Input 1 and 2: $7.07 V_{\text{peak}}$
Tacho 1 and 2: $22.36 V_{\text{peak}}$

INPUT IMPEDANCE

>20 k Ω

ABSOLUTE MAXIMUM VOLTAGE

Direct: ±50 V

CCLD (Input 1 and 2): -10 to +30 V

SUPPLY FOR CCLD SENSORS

Input 1 and 2: 3 mA from +24 V

Tacho 1 and 2: No power supply, Direct only

CROSSTALK

< -90 dB @ 1 kHz

HARMONIC DISTORTION

< -80 dB @ 1 kHz

RESOLUTION

16-bit

PHASE DIFFERENCE INPUT 1 AND 2

±0.1° at 20 Hz

±1° at 20 kHz

OVERLOAD DETECTION

Cable fault detection (short and open)

Digital Overload

DYNAMIC RANGE (Linear 10 Hz – 20 kHz)

Type 3560 L Channel No.	Input Range (V)	Windows® Operating System	Equivalent Noise (μV_{rms}) 6400 line FFT	Spurious-free Dynamic Range (dB)
1 & 2	7.07	XP	146	109
		2000	504	105
	2.236	XP	148	103
		2000	189	102
	0.707	XP	166	92
		2000	202	92
3 & 4 (Tacho)	22.36	XP	442	109
		2000	1596	105
	7.07	XP	435	106
		2000	578	103
	2.236	XP	494	95
		2000	617	92

DIMENSIONS

Height: 30 mm (1.25 inches)

Width: 106 mm (4.25 inches)

Depth: 130 mm (5.13 inches)

Weight: 300 g (10.6 ounces)

RECOMMENDED PC REQUIREMENTS FOR POCKET ANALYSIS

Microsoft® Windows® XP, greater than 1 GHz processor, 512 MB RAM, one Type II PC Card slot, 1024 × 768 screen resolution

Ordering Information

Type 3560 L PC-card Pocket Front-end

3560 L – L02 PULSE Lite Basic 2-channel FFT Analyzer

including:

Type 7781 – N2 Basic FFT 1 – 2-channel License
M1 – 7781 – N2 Software Maintenance and Support Agreement
Type 3560 L PC-card Pocket Front-end

3560 L – L04 PULSE Lite Basic 2-channel Run-up/down Analyzer

including:

Type 7781 – N2 Basic FFT 1 – 2-channel License
M1 – 7781 – N2 Software Maintenance and Support Agreement
7783 – N2 Run-up/down Analysis Option 1 – 2-channel License
M1 – 7783 – N2 Software Maintenance and Support Agreement
Type 3560 L PC-card Pocket Front-end

TRADEMARKS

Microsoft is a registered trademark of Microsoft Corporation in the United States and/or other countries
ME'scopeVES is a trademark of Vibrant Technology Inc.

Brüel & Kjær reserves the right to change specifications and accessories without notice

HEADQUARTERS: DK-2850 Nærum · Denmark · Telephone: +45 4580 0500
Fax: +45 4580 1405 · www.bksv.com · info@bksv.com

Australia (+61) 2 9889-8888 · Austria (+43) 1 865 74 00 · Brazil (+55) 11 5188-8166
Canada (+1) 514 695-8225 · China (+86) 10 680 29906 · Czech Republic (+420) 2 6702 1100
Finland (+358) 9-755 950 · France (+33) 1 69 90 71 00 · Germany (+49) 421 17 87 0
Hong Kong (+852) 2548 7486 · Hungary (+36) 1 215 83 05 · Ireland (+353) 1 807 4083
Italy (+39) 0257 68061 · Japan (+81) 3 5715 1612 · Republic of Korea (+82) 2 3473 0605
Netherlands (+31) 318 55 9290 · Norway (+47) 66 77 11 55 · Poland (+48) 22 816 75 56
Portugal (+351) 21 416 9040 · Singapore (+65) 377 4512 · Slovak Republic (+421) 25 443 0701
Spain (+34) 91 659 0820 · Sweden (+46) 8 449 8600 · Switzerland (+41) 44 8807 035
Taiwan (+886) 2 2502 7255 · United Kingdom (+44) 14 38 739 000 · USA (+1) 800 332 2040

Local representatives and service organisations worldwide

3560 L – L06 PULSE Lite Basic 2-channel CPB Analyzer including:

Type 7782 – N2 Basic CPB 1 – 2-channel License
M1 – 7782 – N2 Software Maintenance and Support Agreement
Type 3560 L PC-card Pocket Front-end

Optional Accessories

Type 7783 – N2 PULSE Lite 1 – 2-channel Run-up/Run-down Analysis Option

DP 1002 Connector Clamp Kit for PC-card Soundcard (included with Type 3560 L)

SOFTWARE UPGRADE TO FULL PULSE SYSTEMS

Type 7770 – N2 Upgrade to PULSE 2-channel FFT Analysis
Type 7771 – N2 Upgrade to PULSE 2-channel CPB Analysis
Type 7700 – N2 Upgrade to PULSE 2-channel FFT and CPB Analysis

Brüel & Kjær 