**PRODUCT DATA**

**Hand-held Analyzer Types 2250-W and 2270-W for Vibration Measurements**
using FFT Analysis Software BZ-7230 and Enhanced Vibration and Low Frequency Option BZ-7234

Types 2250-W and 2270-W are the easy, safe and clever approach to machinery noise and vibration assessment, diagnostics and quality control. The analyzers combine advanced analysis techniques, tap-and-drag operation and a wide dynamic range to become the perfect on-location machine vibration tool.

Acceleration, velocity, and displacement are parameters traditionally used to assess a machine’s health when initially installed or after maintenance, repair or overhaul (MRO). The Crest Factor is used to detect and diagnose defects in roller element bearings.

Frequency analysis based on the fast Fourier transform (FFT) algorithm is an advanced tool for measurement and diagnostics of machinery noise and vibration. The frequency “profile” of a machine is its fingerprint, revealing its sources of noise and vibration and their paths to the measurement position.

**Uses and Features**

**Uses**
- Machinery troubleshooting
- Product development
- Quality control and inspection
- Maintenance, repair and overhaul (MRO)
- Single-channel FFT analysis of sound or vibration

**Features**
- Wide dynamic range
- PC software for analysis, reporting and archiving included
- User-defined metadata to aid documentation

**Enhanced Vibration**
- Time domain integration to velocity and displacement
- RMS and true peak in acceleration, velocity and displacement
- Peak-to-peak in displacement
- Optional 1/3-octave spectra in acceleration or velocity
- Crest factor with 1 kHz high-pass filter

**FFT Spectra**
- Up to 6400 lines of analysis
- Spans from 100 Hz to 20 kHz in a traditional 1-2-5 sequence
- Improved frequency resolution: down to 16 mHz, broadband or zoom
- Dual-overlay spectrum display
- Compare spectrum to reference spectrum
- Max. hold spectrum
- Capture transient events with signal level triggers, including pre-trigger

**Measurements**
- Transducer database
- CCLD input for accelerometers
- Relate noise or vibration to rotational speed with simultaneous tachometer
- Measurements in SI (metric) and UK/US units
- Unit scaling (RMS, Pwr, PSD, ESD, Peak, P-P)

**Quality Control**
- Tolerance windows with check against preset limits
- Quality Check template for quick and clear results
- TTL output for control of external devices

**Signal Recording (optional)**
- Record input signal, one channel for Types 2250-W and two channels with Type 2270-W, for later playback or analysis, 16- or 24-bit
Types 2250-W and 2270-W

Hand-held Analyzer Types 2250-W and 2270-W are both innovative, 4th generation analyzers from Brüel & Kjær with an award-winning design based on extensive research amongst sound and vibration technicians, engineers and consultants from around the world.

Type 2270-W, with its dual-channel measurement capability, and the single-channel Type 2250-W, can host many of the same measurement application modules.

Two such modules are FFT Analysis Software BZ-7230 and Enhanced Vibration and Low Frequency Option BZ-7234. FFT Analysis Software is a single-channel application that can be used one channel at a time on Type 2270-W. Enhanced Vibration and Low Frequency Option BZ-7234 allows single-channel measurements on Type 2250-W and dual-channel measurements on Type 2270-W. The measurement procedures and functionality are the same regardless of the analyzer.

See Ordering Information on page 16 for all available application modules.

Once you have taken your measurements, you need to do something with them. Your hand-held analyzer offers three storage options: internal disk, secure device (SD) memory cards or USB stick. From there, the included USB or LAN cable makes data transfer to an archive on your PC, or network location, easy. Alternatively, if you have used a memory card, just insert it into the computer’s card reader.

### Enhanced Vibration and Low Frequency Option BZ-7234

Vibration is often measured in units of velocity (in/s or mm/s) or displacement (Mil and mm). This is especially common in the maintenance, repair and overhaul (MRO) of valuable machines such as gas turbines and compressors.

Enhanced Vibration and Low Frequency Option BZ-7234 transforms the acceleration, measured by an accelerometer, to velocity and displacement. BZ-7234 uses time domain filters so that the actual peak values can be measured in acceleration, velocity and displacement and peak-to-peak values in displacement. Peak, peak-to-peak and RMS values are used to assess a machine’s health, for example the ISO10816 series of standards. It is also common to measure velocity and displacement in a limited frequency range. Enhanced Vibration and Low Frequency Option BZ-7234 also includes band-limiting filters, also in the time domain.

### FFT Analysis Software BZ-7230

The fast Fourier transformation (FFT) is a digital signal processing technique that converts a time record into a narrow-band constant bandwidth filtered spectrum. The measurement is defined by specifying a frequency span and a number of lines (or filters). A zoom facility allows you to focus on any part of the frequency range by specifying the centre frequency for the analysis span. FFT Analysis Software BZ-7230 allows resolutions down to 1/64 Hz, when you use a 100 Hz frequency span and 6400 lines of analysis.
FFT spectrum analysis (Fig.3) is ideal for noise or vibration source identification with 6400 lines of real-time frequency analysis at better than 5 Hz resolution – all the way to 20 kHz. Tapping the screen turns on the Frequency Correction algorithm*, which computes peak frequencies with ten times better resolution. The wide dynamic range (over 150 dB) allows accurate sound and vibration measurement on the first attempt.

FFT analysis is all about the details and the beauty of Hand-held Analyzer Types 2250-W and 2270-W is their details: secure in your hand, solid in construction and pleasantly intuitive. Each analyzer’s high-resolution touch-screen colour display brings enhanced usability and enables easy cursor and display parameter transition. Set-up is also easy. Connect and position your transducer, press Start/Pause and view your spectrum. If you want to zoom in, drag the stylus across the desired frequency span, tap Zoom and you can now measure using the correct range – Easy, Safe, Clever.

In addition to the standard FFT Analyzer template, the FFT Analysis Software comes with two supplementary templates:

**FFT Analyzer Advanced Template**
In this template, the Results tab offers a view with 11 selectable results, which can be configured by tapping on any parameter label.

The XL View tab provides a bar graph and three selectable results. The bar graph shows the FFT spectrum total, a user-selectable delta sum or a single-value parameter. The bar graph also incorporates a quick view of the maximum value (white line) and upper limit (red line) into its display.

**FFT Quality Check Template**
The FFT Quality Check template provides a bar graph and four selectable results in an easily readable large font. The bar graph shows the FFT spectrum total, a user-selectable delta sum or a single-value parameter. The bar graph also incorporates a quick view of the maximum value (white line) and upper limit (red line) into its display.

This template is particularly useful when tolerance windows are well established and FFT spectra are not needed for viewing, which is often the case with quality inspection tasks.

* Brüel & Kjaer Technical Review No. 4 1987, “Use of Weighting Functions in DFT/FFT Analysis” (Part II), Appendix F
Applications

**Machinery Analysis and Troubleshooting**

The portability of the analyzer gives you easy access to any product, lets you recall a baseline reference spectrum, and then compare it instantly with a spectrum you have just measured.

You can set the tolerance window feature over a range of frequencies to warn of machinery failure. Harmonic and delta cursors help you identify rotational and mesh frequencies, steering you efficiently toward operational deficiencies.

The analyzer's trigger input can even accept a tachometer input – providing a direct readout of RPM (see Fig. 6) with a gear ratio you define. The unique commentary feature of the analyzer lets you verbally record your field observations and attach them directly to the measurement result. The analyzer’s multi-user facility allows you to define user-specific configurations and measurement points, so you can organize your field measurements, and the included Measurement Partner Suite program makes it easy to review the results on your PC.

**Troubleshooting**

FFT Analysis Software BZ-7230 includes the analysis tools and measurement units for a wide range of troubleshooting applications. For example:

- Measuring an engine mount’s movement at idle RPM as displacement. Simply attach an accelerometer and set up the tachometer trigger input and the running speed will be displayed
- Spot-checking the output of a random vibration shaker is also easy. Use the stylus to set the delta cursor for the desired frequency span and read out the Power Spectral Density (PSD), then select g²/Hz or (m/s²)²/Hz as your reference units
- You can also easily find a component's resonant frequencies. Switch the analyzer’s FFT from continuous to transient signals and tap the component to excite its resonances. The internal trigger starts the measurement, and the FFT software will use a rectangular time window to capture the entire transient. Save the resonance spectrum as a reference then measure a machine's vibration spectrum to see if any resonance lines up with the operational frequencies

**Quality Testing and Inspection – Tolerance Windows**

Rotating or reciprocating elements (such as pistons, shafts and gears) in many machines, tools and vehicles lead to vibrations and noise. Measurements and analyses of that noise and vibration can be used to detect assembly faults and ensure compliance with required standards.

The tolerance windows feature in BZ-7230 makes quality control measurements easy.

The designers of the machine, tool or vehicle specify limits for permissible deviations. These specifications can be set up on Types 2250-W and 2270-W using one or several tolerance windows, each of which defines an upper and lower limit for the levels over a specific frequency range.

The value checked can be set to the level of the FFT lines or to the sum of FFT lines (delta sum).
Settings and preferences for a particular application can be saved collectively in templates. By recalling a template, Type 2250-W/2270-W is ready for specific measurements in just seconds, including the specification of tolerances. Up to 10 tolerance windows per template can be active at the same time, making it possible to test different tolerances for different frequency ranges in one measurement. In addition, it is possible to test for two limit ranges over the same frequency range, which is as easy as overlapping tolerance windows. In addition you can define tolerances for four non-FFT values; for example, two instantaneous parameters (LAF and Instantaneous RPM) and two average parameters (LAeq and Average RPM).

During measurement, the FFT spectrum and single values are compared to set limits (indicating ‘above upper limit’, ‘within limits’, ‘below lower limit’, ‘above and below limits’). The test is performed and indicated for each window. An overall result is also indicated. It will indicate ‘failed’ if the spectrum or single parameters crossed the upper or lower tolerances for any window or ‘passed’ if within the tolerances for all windows.

The pass/fail indication is also available as an electrical signal at the analyzer’s output socket. A 3.3 V DC output indicates an exceeded upper limit, a –3.3 V DC indicates levels below the lower limit, and an alternating ±3.3 V indicates violation of both limits. This feature makes it easy to utilize Types 2250-W and 2270-W in production control systems where the output signal can trigger warnings or start specific actions for the failed item. Being able to listen to the signal makes it easier to identify the problem source. You can therefore configure the analyzer to start recording automatically when data exceed tolerances (license for Signal Recording Option BZ-7226 is required). The input signal, which will be attached to the specific project, can be played back or exported to a PC for further analysis. For more information on BZ-7226, see page 6.

Quality Testing and Inspection – Programmable Automation
2250 REST: Using REST interface for the Type 2250/2270 platform, you can connect to an analyzer, set up and control it, and read out single values from the current measurement (but not complete projects). This interface uses HTTP and only requires the IP address of the instrument. This interface can be used from any platform (Windows®, Mac®, iOS, Android®, Linux, etc.).
The FFT analyzer’s dual-overlay display makes it easy to compare measurements between design iterations.

You can also benchmark competitive and previous generation products. Use narrow-band analysis to identify forcing functions and resonances to aid in setting the standards for the next generation product.

Measurement Partner Suite BZ-5503 makes it easy to transfer measurement data to a PC where data viewing, exporting and archiving complete the analysis and reporting project.

Metadata are supplementary information entries about your measurement that make archiving, retrieving and post-processing data easier and more efficient. Examples of metadata are file name, date and time, setup and annotations made by the operator.

In addition you can define the names and types of up to 30 text strings. The entry format may be editable text, a user-defined pick-list, numeric or an index number that automatically increments when a measurement is saved.

Metadata functionality can also be used for sorting measurements in Measurement Partner Suite BZ-5503.

Signal Recording Option BZ-7226 enables input signal recording for later playback or analysis. The recording can be automatic (lasting for the duration of the measurement), controlled manually, or last as long as the limit level is exceeded. Pre- and post-recording delays and duration limits can be set (FFT Analysis Software BZ-7230 only). The recording upper frequency limit can be reduced from the full 20 kHz in four steps to save memory. To optimize memory space or dynamic range, 16- or 24-bit recording resolution is available.

Signal recording files can be quite large, so you will be directed to store your measurements (and recording) on a memory card in either of the hand-held analyzer’s integrated SD card slot or on an attached USB stick. Types2250-W and 2270-W support SDHC cards, which provide memory capacity of up to 32 GB. The standard recorded .WAV files are easily input into other analysis tools, for example Bruel & Kjaer’s PULSE Reflex™ Core.
Uploading Measurement Data to Measurement Partner Cloud

Types 2250 and 2270 can send measurement data to Measurement Partner Cloud (MP Cloud) where projects are immediately available for post-processing, sharing or storage subject to account capacity. Only authorized users have access to the data when it is the MP Cloud.

You can create a Cloud account by visiting the MP Cloud web service at cloud.bksv.com. You open an account, register your analyzer serial numbers and perform a one-time pairing of analyzer and account, ensuring data security. You can also administer access to the account from the web service and order subscriptions to increase account capacity.

You can connect the hand-held analyzer to the Internet through modem, LAN or Wi-Fi connected to router. In the field, the analyzer can connect through Wi-Fi to hotspot on a smart device (Wi-Fi using CF-card UL-1019 for G1-G3 and Wireless USB-A Adapter UL-1050 for G4, respectively).

After measurement is completed and the project is saved, you log the analyzer into the cloud, and projects are uploaded to the cloud from the analyzer. To do this, you simply need to move your data to the Cloud folder, which is automatically created when you log on to your account. The data will now be ready for post-analysis in Measurement Partner Suite by anyone who has access to the relevant Cloud archive.
Post-processing Software

Measurement Partner Suite BZ-5503, in its basic configuration, comes with your hand-held analyzer (see product data BP 2430). It is Brüel & Kjær's state-of-the-art data viewing and post-processing toolbox for environmental noise and vibration.

The free, basic configuration provides data archive, preview and export capabilities, software maintenance and online display. Archives can be stored locally, on network drives or, alternatively, in MP Cloud for easy sharing with anyone on the planet.

Measurement Partner Suite also merges Field App annotations with the corresponding instrument project.

Additional valuable data analysis and post-processing tools are available on a time-limited subscription basis. You only pay for what you need, when you need it, with no penalty should your subscription lapse.

It is also possible to annotate your measurements directly on the analyzer using notes, voice commentaries and images (Type 2270 only). These are transferred to Measurement Partner Suite along with your measurement data.

Type 2250/2270 Platform Software Modules

Your hand-held analyzer has generous hardware and software specifications creating an extremely flexible instrument to cover your current and future measurement and analysis needs. For more information on the entire Type 2250/70 platform, see product data BP 2025.

Standard Software Modules
The following software modules (applications) are included with every Type 2250-W/2270-W analyzer:

- **Sound Level Meter Software BZ-7222** – standard sound level meter software according to IEC 61672–1/ ANSI
- **Frequency Analysis Software BZ-7223** – analyse, in real-time, the 1/1- and 1/3-octave filter bands with a dynamic range in excess of 135 dB
- **2-channel Option BZ-7229 (Type 2270 only)** – realize the full potential of your analyzer with 2-channel functionality for SLM, Frequency Analysis, Logging, Enhanced Logging, and Building Acoustics software
- **Tone Assessment Option BZ-7231** – when used in conjunction with the FFT Analysis application, this software provides an objective in-field assessment of tonal noise components
- **Noise Monitoring Software BZ-7232** – for use with Sentinel and Sentinel on Demand

Optional Software Modules
The Type 2250/70 analyzer platform allows you to choose different combinations of software modules. Modules can be purchased when needed and are delivered as easily installed licenses. In this way your investment in the analyzer platform is securely protected: when your need for measurements and analyses expands, the analyzer can accommodate them. Brüel & Kjær is committed to maintaining an ever-growing range of Type 2250/70 applications.

For information on the optional software modules, see product data BP 2025.
Configuration Functionality
The table below gives the functionality of Types 2250-W and 2270-W with software included as standard and with FFT Analysis BZ-7230 and Enhanced Vibration and Low Frequency Option BZ-7234.

<table>
<thead>
<tr>
<th>Functionality</th>
<th>Type 2250-W or Type 2270-W</th>
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<tr>
<td>Measurements in SI (metric) or UK/US units</td>
<td>Basic Analyzer</td>
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<td>FFT unit scaling (RMS, Pwr, PSD, ESD, Peak, P-P)</td>
<td>●</td>
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<td>FFT span from 100 Hz to 20 kHz</td>
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<td>Up to 6400 FFT lines</td>
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<td>FFT zoom analysis</td>
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<td>Tolerance windows with check against preset limits</td>
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<tr>
<td>Integration to velocity and displacement, frequency domain</td>
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<tr>
<td>Integration to velocity and displacement, time domain</td>
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<tr>
<td>Band-limited velocity and displacement</td>
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<tr>
<td>True peak-to-peak displacement</td>
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<tr>
<td>Crest factor including optional 1 kHz high-pass filter</td>
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<tr>
<td>RPM measurement from external tacho probe</td>
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<tr>
<td>Tacho pulse embedded in recording*</td>
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<tr>
<td>Peak particle velocity (PPV)</td>
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<tr>
<td>Human vibration filters: Wb, Wc, Wd, We, Wj, Wk, Wh, Wxb and KBF</td>
<td></td>
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<tr>
<td>1/3-octave velocity for vibration criteria</td>
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</tbody>
</table>

* Requires BZ-7226 Recording and PULSE Reflex Type 870x post-analysis software

Accredited Calibration and Hardware Maintenance at Brüel & Kjær
For Types 2250 and 2270, you can order accredited calibration and choose between DANAK, A2LA, UKAS, Eichamt (Austria), RvA, ENAC, NATA and Inmetro. We recommend you order accredited calibration together with a new instrument. Should the technician detect the need for adjustment during calibration, this can be performed while it is in our hands so you do not have to be without your analyzer. You can minimize the risk of unexpected costs by purchasing a hardware maintenance contract with a five-year warranty.

General Specifications – Types 2250-W and 2270-W

These specifications refer to Types 2270 and 2250 unless otherwise stated

**Hardware Interface**

**PUSHBUTTONS**
11 buttons with backlight, optimized for measurement control and screen navigation

**ON-OFF BUTTON**
Function: Press 1 s to turn on; press 1 s to enter standby; press for more than 5 s to switch off

**STATUS INDICATORS**
LEDs: Red, yellow and green

**DISPLAY**
Type: Transflective back-lit colour touchscreen 240 × 320 dot matrix
Colour Schemes: Five different – optimized for different usage scenarios (day, night, etc.)
Backlight: Adjustable level and time

**USER INTERFACE**
Measurement Control: Using pushbuttons
Set-up and Display of Results: Using stylus on touchscreen or pushbuttons
Lock: Pushbuttons and touchscreen can be locked and unlocked

**USB INTERFACE**
USB 2.0 OTG Micro AB and USB 2.0 Standard A sockets for Wireless
USB-A Adapter UL-1050, printer or weather station

**MODEM INTERFACE**
Connection to Internet through GPRS/EDGE/HSPA modem connected through the USB Standard A Socket.
Supports DynDNS for automatic update of IP address of host name

**PRINTER INTERFACE**
PCL printers, Mobile Pro Spectrum thermal printer or Seiko DPU S245/S445 thermal printers can be connected to USB socket

**MICROPHONE FOR COMMENTARY**
Microphone, which utilizes automatic gain control (AGC), is incorporated in underside of analyzer. Used to create voice annotations for attaching to measurements

**CAMERA (TYPE 2270 ONLY)**
Camera with fixed focus and automatic exposure is incorporated in underside of analyzer.
Used to create image annotations for attaching to measurements

**Image Size**: 2048 × 1536 pixels
**Viewfinder Size**: 212 × 160 pixels
**Format**: .jpg with exif information

**SECURE DIGITAL SOCKET**
2 × SD sockets
Connect SD and SDHC memory cards
LAN INTERFACE SOCKET
- Connector: RJ45-Auto-MDIX
- Speed: 100 Mbps
- Protocol: TCP/IP

INPUT SOCKET
One socket with Type 2250; two with Type 2270
Connector: Triaxial LEMO. Used for Direct input as well as input with constant current line drive (CCLD) power supply
Input Impedance: ≥ 1 MΩ
Direct Input: Max. input voltage: ±14.14 Vpeak, 10 VRMS for sinusoidal input signals, no damage for signals up to ±20 Vpeak. Source impedance ≤ 1 kΩ
CCLD Input: Max. input voltage: ±7.07 Vpeak (no indication for violation of this level), no damage for signals in the range −10 to +25 Vpeak
CCLD Current/voltage: 4 mA/25 V
CCLD Cable Break/Short Indication: Checked before and after measurements

TRIGGER SOCKET
Connector: Triaxial LEMO
Max. Input Voltage: ±20 Vpeak, no damage for signals up to +50 Vpeak
Input Impedance: >47 kΩ
CCLD Current/Voltage: 4 mA/25 V

OUTPUT SOCKET
Connector: Triaxial LEMO
Max. Peak Output Level: ±4.46 V
Output Impedance: 50 Ω

HEADPHONE SOCKET
Connector: 3.5 mm Minijack stereo socket
Max. Peak Output Level: ±1.4 V
Output Impedance: 32 Ω in each channel, short-circuit proof without affecting the measurement results
Sources: Input conditioned (gain adjustment −60 to +60 dB), playback of voice annotations and signal recordings (gain adjustment −60 to 0 dB) and playback of recordings (gain adjustment −60 to +60 dB); however, max. gain is 0 dB for 16-bit wave files

Storage
INTERNAL FLASH-RAM (NON-VOLATILE)
512 MB for user set-ups and measurement data
EXTERNAL MEMORY CARD
SD and SDHC Card: For store/recall of measurement data
USB MEMORY STICK
For store/recall of measurement data

Power
EXTERNAL DC POWER SUPPLY REQUIREMENTS
Used to charge the battery pack in the analyzer
Voltage: 8 – 24 V DC, ripple voltage <20 mV
Current Requirement: min. 1.5 A
Power Consumption: <2.5 W, without battery charging, <10 W when charging
Cable Connector: LEMO Type FFA.00, positive at centre pin

EXTERNAL AC MAIN SUPPLY ADAPTOR
Part No.: ZG-0426
Supply Voltage: 100 – 120/200 – 240 V AC; 47 – 63 Hz
Connector: 2-pin IEC 320

BATTERY PACK
Rechargeable Li-Ion battery
Part No.: QB-0061
Voltage: 3.7 V
Capacity: 5200 mAh nominal
Typical Operating Time:
Single-channel: >11 h (screen backlight dimmed); >10 h (full screen backlight)
Dual-channel: >7.5 h(full screen backlight)
Battery Cycle Life: >500 complete charge/discharge cycles
Battery Aging: Approximately 20% loss in capacity per year
Battery Indicator: Remaining battery capacity and expected working time may be read out in % and in time
Battery Fuel Gauge: The battery is equipped with a built-in fuel gauge, which continuously measures and stores the actual battery capacity in the battery unit
Charge Time: In analyzer, typically 10 hours from empty at ambient temperatures below 30 °C (86 °F). To protect the battery, charging will be terminated completely at ambient temperatures above 40 °C (104 °F). At 30 to 40 °C, charging time will be prolonged. With External Charger ZG-0444 (optional accessory), typically 5 hours
Note: It is not recommended to charge the battery at temperatures below 0 °C (32 °F) or over 50 °C (122 °F). Doing this will reduce battery lifetime

CLOCK
Back-up battery powered clock. Drift <0.45 s per 24-hour period

Environmental
WARM-UP TIME
From Power Off: <2 min
From Standby: <10 s for prepolarized microphones
WEIGHT AND DIMENSIONS
650 g (23 oz) including rechargeable battery
300 × 93 × 50 mm (11.8 × 3.7 × 1.9") including preamplifier and microphone

Wireless Connection to Mobile Device
Specifications apply to Wireless USB-A Adapter UL-1050
Operating Frequency: 2.4 GHz
Data Rate:
- IEEE 802.11n: up to 150 Mbps
- IEEE 802.11g: up to 54 Mbps
- IEEE 802.11b: up to 11 Mbps
Encryption/Authentication:
- 64/128-bit WEP
- WPA-PSK
- WPA2-PSK
Range: The range is similar to a standard WLAN unit, typically from 10 to 50 m (33 to 164'), depending on the environment and the number of other WLAN transmitters in the area (smartphones, Wi-Fi, etc.)

Power Requirements: Power Consumption: <1 W

Software Interface
USERS
Multi-user concept with login. Users can have their own settings with jobs and projects totally independent of other users
PREFERENCES
Date, time and number formats can be specified per user
LANGUAGE
User interface in Catalan, Chinese (People’s Republic of China), Chinese (Taiwan), Croatian, Czech, Danish, English, Flemish, French, German, Hungarian, Japanese, Italian, Korean, Polish, Portuguese, Romanian, Russian, Serbian, Slovenian, Spanish, Swedish, Turkish and Ukrainian
HELP
Concise context-sensitive help in Chinese (People’s Republic of China), English, French, German, Italian, Japanese, Polish, Romanian, Serbian, Slovenian, Spanish and Ukrainian
UPDATE OF SOFTWARE
Update to any version using BZ-5503 through USB or update via Internet
REMOTE ACCESS
Connect to the analyzer using:
• Measurement Partner Suite BZ-5503
• Measurement Partner Field App (iOS or Android smartphone app)
• the 2250/2270 SDK (software development kit)
• a REST interface through HTTP
• an Internet browser supporting JavaScript
The connection is password protected with two levels of protection:
• Guest level: for viewing only
• Administrator level: for viewing and full control of the analyzer

CLOUD
Connect to Measurement Partner Cloud on cloud.bksv.com for transferring data to an archive in the cloud for storage or easy synchronization with Measurement Partner Suite BZ-5503

Input
DUAL CHANNELS (Type 2270 only)
All measurements are made from either Ch.1 or Ch.2.
Two independent measurement channels are available on Type 2270 to enable you to measure various parameters, subject to having a dual-channel application license.

TRANSDUCER DATABASE
Transducers are described in a transducer database with information on Serial Number, Preamp ID, Nominal Sensitivity, CCLD Required and Weight.
The analogue hardware is set up automatically in accordance with the selected transducer.

Calibration
Initial calibration is stored for comparison with later calibrations. For accelerometer Types 4397-A, 8341, 4533-B, 4533-B-001, 4533-B-002, 4534-B, 4534-B-001, 4534-B-002, 8344, 8347-C, and 8324, the lower frequency limit will be optimized to match the specifications for the accelerometer. Initial calibrations for each transducer are stored for comparison with later calibrations.

ELECTRICAL
Uses internally generated electrical signal combined with a typed-in value of microphone sensitivity.

MECHANICAL
Using Calibrator Exciter Type 4294 or custom calibrator.

DIRECT ELECTRICAL
Using an external voltage reference.

CALIBRATION HISTORY
Up to 20 of the last calibrations made are listed and can be viewed on the analyzer.

Data Management
METADATA
Up to 30 metadata annotations can be set per project (text from keyboard or text from pick list, number from keyboard or auto-generated number).

PROJECT TEMPLATE
Defines the display and measurement set-ups. Set-ups can be locked and password-protected.

PROJECT
Measurement data stored with the project template.

JOB
Projects are organized in jobs.
Explorer facilities for easy management of data (copy, cut, paste, delete, rename, open project, create job, set default project name).

Measurement Control
MANUAL CONTROLS
Reset, Start, Pause, Back-erase, Continue and Store the measurement manually.

AUTO-START
A total of 10 timers allow set up of measurement start times up to a month in advance. Each timer can be repeated. Measurements are automatically stored when completed.

BACK-ERASE
The last 5 s of data can be erased without resetting the measurement.

Measurement Status
ON SCREEN
Information such as overload and running/paused are displayed on screen as icons.

TRAFFIC LIGHTS
Red, yellow and green LEDs show measurement status and instantaneous overload as follows:
• Yellow LED flashing every 5 s = stopped, ready to measure
• Green LED flashing slowly = awaiting calibration signal
• Green LED on constantly = measuring
• Yellow LED flashing slowly = paused, measurement not stored
• Red LED flashing quickly = intermittent overload, calibration failed

NOTIFICATIONS
Sends an SMS or email daily at a specified time or if an alarm condition is fulfilled.
Alarm Conditions:
• Disk Space below set value
• Trig. Input Voltage below set value
• Internal Battery enters set state
• Change in Measurement State
• Reboot of analyzer

Annotations
VOICE ANNOTATIONS
Voice annotations can be attached to measurements so that verbal comments can be stored together with the measurement.
Playback: Playback of voice annotations can be listened to using an earphone/headphones connected to the headphone socket.
Gain Adjustment: -60 dB to +60 dB.

TEXT ANNOTATIONS
Text annotations can be attached to measurements so that written comments can be stored with the measurement.

GPS ANNOTATIONS
A text annotation with GPS information can be attached (Latitude, Longitude, Altitude and position error). Requires connection to a GPS receiver.

IMAGE ANNOTATIONS (TYPE 2270 ONLY)
Image annotations can be attached to measurements. Images can be viewed on the screen.

Measurements
DUAL-CHANNEL MEASUREMENTS (TYPE 2270 ONLY)
Two independent measurement channels are available on Type 2270 to enable you to measure various parameters, subject to having a dual-channel application license.

REFERENCE ENVIRONMENTAL CONDITIONS
Air Temperature: 23 °C
Static Pressure: 101.325 kPa
Relative Humidity: 50%
Broadband Analysis

DETECTORS
Parallel detectors on every measurement:
- **Detector 1**: Broadband detector with two exponential time weightings (Fast, Slow)
- **Detector 2**: Broadband detector (1 kHz – 20 kHz) with two exponential time weightings (Fast, Slow)
- **One peak detector**
- **Overload Detector**: Monitors the overload outputs of all the frequency weighted channels

MEASUREMENTS

**RPM MEASUREMENT**
RPM is measured on the signal connected to Trigger input when Tacho is set to On
**Range**: 1 to 6,000,000 RPM
**Gear Ratio**: 10⁻⁵ to 10²⁸. The displayed RPM is the measured RPM divided by the RPM gear ratio

**MEASUREMENT DISPLAYS**
- **SLM**: Measurement data displayed as numbers of various sizes and one quasi-analog bar
- Measured sound data are displayed as dB values, vibration data as dB values or in physical units (SI units (m/s²) or US/UK units (g)), direct data as voltage in dB or V, housekeeping data as numbers in relevant format.
- Instantaneous measurement Lₓₓ or Fast Inst is displayed as a quasi-analog bar

Frequency Analysis

**STANDARDS**
Conforms with the following national and international standards:
- IEC 61260–1 (2014), 1/1-octave Bands and 1/3-octave Bands, Class 1
- IEC 61260 (1995–07) plus Amendment 1 (2001–09), 1/1-octave Bands and 1/3-octave Bands, Class 0
- ANSI S1.11–1986, 1/1-octave Bands and 1/3-octave Bands, Order 3, Type 0–C
- ANSI S1.11–2004, 1/1-octave Bands and 1/3-octave Bands, Class 0
- ANSI/ASA S1.11–2014 Part 1, 1/1-octave Bands and 1/3-octave Bands, Class 1

**CENTRE FREQUENCIES**
- **1/1-oct. Band Centre Frequencies**: 8 Hz to 16 kHz
- **1/3-oct. Band Centre Frequencies**: 6.3 Hz to 20 kHz

Software Specifications – FFT Analysis Software BZ-7230

Specifications for FFT analysis are given for the analyzer with software BZ-7230 installed and fitted with one of the recommended transducers (see table below)

**FFT ANALYSIS**

**Sampling Frequency**: Downsampling from 51.2 kHz
**Frequency Span**: 100 Hz, 200 Hz, 500 Hz, 1 kHz, 2 kHz, 5 kHz, 10 kHz, 20 kHz
**Lines**: 100, 200, 400, 800, 1600, 3200, 6400*
**Zoom Centre Frequency**: Can be set so that the Frequency Span is placed in the range 0 to 20 kHz
**Spectrum**: Averaged and Maximum
**Pre-weighting**: Z (none), A, B or C (microphone input only)

**Measuring**
Measurements can be manually started and stopped using a pushbutton or an external signal

**EXPONENTIAL AVERAGING**
With an averaging time of up to 999 spectra, measured with Hanning window and 67% overlap

**LINEAR AVERAGING**
Up to 8,388,607 spectra measured with Hanning window and 67% overlap
**Triggered Start**

**TRANSIENT SIGNAL TYPE**
Linear averaging of up to 32,767 triggered spectra measured with rectangular window and 0% overlap

**CONTINUOUS SIGNAL TYPE**
Linear averaging of up to 32,767 spectra measured with Hanning window and 67% overlap. Up to 32,767 spectra are averaged on each trigger

**TRIGGERS**
**Delay**: From 16,383 samples before the trigger time to 300 seconds after
**Hold Off**: 0 to 300 s
**Internal Trigger**: Uses the time signal from the measurement transducer. The Internal Level is set in the relevant measurement units
**External Trigger**: Uses the Trigger Input. The External Level is set in the range –20 to 20 V
**Offset at Trigger Input**: Typically between –70 mV and 200 mV
**Hysteresis (only for External Trigger)**: 0 to 10 V
**Slope (only for External Trigger)**: Rising, Falling

**MEASUREMENT RANGE**
(See table below)
The lower limit of the measurement range is influenced by self-generated random noise and self-generated tones called spurious signals. The influence of the random part can be reduced to a level below the spurious signals by selecting a small analysis bandwidth (small span and many lines). Therefore, the lower limit is specified as the maximum Peak level of the spurious signal lines.

One for high levels, where the upper limit is the overload limit, and one for low levels

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* The actual number of lines is one more than stated, to provide symmetry around the centre frequency.

BZ-7230 has only one measuring range but the spurious level depends on the peak level of the signal. Therefore, two specifications are given.
**Measurement ranges with the recommended transducers**

<table>
<thead>
<tr>
<th>Transducer</th>
<th>Nominal Sensitivity</th>
<th>Spurious Free Dynamic Range for High Levels</th>
<th>Spurious Free Dynamic Range for Low Levels</th>
<th>Typical Frequency Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>4397-A</td>
<td>1 mV/(m/s²)</td>
<td>3 mm/s² – 5 km/s² Peak</td>
<td>300 µm/s² – 75 m/s² Peak</td>
<td>1.256.3 Hz – 20 kHz</td>
</tr>
<tr>
<td>4533-B</td>
<td>1 mV/(m/s²)</td>
<td>3 mm/s² – 5 km/s² Peak</td>
<td>300 µm/s² – 75 m/s² Peak</td>
<td>0.26.3 Hz – 12.8 kHz</td>
</tr>
<tr>
<td>4534-B</td>
<td>1 mV/(m/s²)</td>
<td>3 mm/s² – 5 km/s² Peak</td>
<td>300 µm/s² – 75 m/s² Peak</td>
<td>0.26.3 Hz – 12.8 kHz</td>
</tr>
<tr>
<td>4533-B-001</td>
<td>10 mV/(m/s²)</td>
<td>300 µm/s² – 500 m/s² Peak</td>
<td>30 µm/s² – 7.5 m/s² Peak</td>
<td>0.26.3 Hz – 12.8 kHz</td>
</tr>
<tr>
<td>4534-B-001</td>
<td>50 mV/(m/s²)</td>
<td>60 µm/s² – 100 m/s² Peak</td>
<td>6 µm/s² – 1.5 m/s² Peak</td>
<td>0.26.3 Hz – 12.8 kHz</td>
</tr>
<tr>
<td>8341</td>
<td>10 mV/(m/s²)</td>
<td>300 µm/s² – 500 m/s² Peak</td>
<td>30 µm/s² – 7.5 m/s² Peak</td>
<td>0.76.3 Hz – 10 kHz</td>
</tr>
<tr>
<td>8344</td>
<td>250 mV/(m/s²)</td>
<td>12 µm/s² – 20 m/s² Peak</td>
<td>1.2 µm/s² – 300 mm/s² Peak</td>
<td>0.26.3 Hz – 3 kHz</td>
</tr>
<tr>
<td>8347-C + 2647-D</td>
<td>1 mV/(m/s²)</td>
<td>3 mm/s² – 7 km/s² Peak</td>
<td>300 µm/s² – 75 m/s² Peak</td>
<td>1.256.3 Hz – 12.8 kHz</td>
</tr>
</tbody>
</table>

The Typical Frequency Response shows the ±1 dB limits for Direct Input and microphones, and the ±10% limits for accelerometers.

**RPM MEASUREMENT**

RPM is measured on the signal connected to Trigger input when Tacho is set to On.

**Range**: 1 to 6000000 RPM

**Instantaneous RPM**: Instantaneous RPM is only displayed (and not stored).

**Average RPM**: Displayed and stored together with each Spectrum result. In Linear Averaging it is an average over the same time as the spectrum. In Exponential averaging it is the last measured RPM divided by the RPM Gear Ratio.

**Gear Ratio**: 10⁻⁵ to 10³. The displayed RPM are the measured RPM divided by the RPM Gear Ratio.

**OVERLOAD**

**Instantaneous Overload**: Instantaneous overload is displayed as an icon on the display and is also indicated by the traffic light.

**Spectrum Overload**: Displayed and stored together with each spectrum result.

**DISPLAY SPECTRA**

Two spectra superimposed.

**Scaling**: RMS, Peak, Peak-to-Peak, Power, PSD, ESD

**Reference Spectrum**: Compare spectrum to stored (measured) reference.

**Axis**: Logarithmic or linear Y-axis; Logarithmic or linear X-axis

**X-axis**: Display full frequency range or expand the X-axis until only 20 FFT lines are displayed. Scroll available.

**Y-axis Display Range**: 5, 10, 20, 40, 60, 80, 100, 120, 140, 160, 180 or 200 dB. Auto-zoom or Auto-scale available.

**Digital Post-weighting**: Z (none) or A-weighting*

**DISPLAY PARAMETERS**

**Sound**: Sound pressure level in dB.

**Vibration**: Acceleration, velocity or displacement in dB or physical units. SI units (m/s², m/s or m) or US/UK units (g, m/s or Mil).

**Direct**: Voltage in dB or V

**CURSORS**

**Readings**: Total level within the spectrum.

**Frequency Correction**: For spectra measured with a Hanning window, spectral peaks are interpolated to a higher precision.

**Main**: Reads level versus frequency.

**Symmetrical Delta and Delta**: Defines lower and upper frequency limit for any part of the spectrum and calculates the level sum within that frequency range.

**Harmonic**: Identifies fundamental frequency and harmonics in the spectrum and calculates the Total Harmonic Distortion† (THD)

**Reference**: Reads the difference between the main cursor Y-value and the reference cursor Y-value.

**TOLERANCE CHECK**

**Tolerance Window**: Determines the upper and lower levels and the top and bottom frequency at which the spectrum is checked. The check can either be made on all the FFT Lines within the specified range or on the Delta Sum of the lines.

The following parameters are measured for check on Delta Sum with exponential averaging:

- Delta Sum
- Max Delta Sum
- RPM at time for Max Delta Sum
- LAeq at time for Max Delta Sum
- FFT Spectrum at time for Max Delta Sum

Up to 10 tolerance windows can be specified per template.

**Single Values Check**: Tolerances can be set for the parameters: L₁ₐ₉, Instantaneous RPM, L₁ₑ₉ and Average RPM.

**Indication**: Results for each tolerance window and for the four single values can be displayed. An Overall Result (combination of all results) and a Latched Result (latched during measurement) can be displayed and indicated in the status panel.

When tolerance limits are violated, a recording can be started (license for BZ-7226 required) and a 3.3 V DC signal (above upper limit), a −3.3 V DC (below lower limit) or a signal alternating between 3.3 V and −3.3 V (both above and below limits) can be output to the Output Socket.

**BAR GRAPH**

LAF, LZF, Total of Spectrum and Delta Sum can be displayed on a bar graph with indication of Max Delta Sum and Upper and Lower Limits. For engineering units, the axis on bar graph can be logarithmic or linear and can be zoomed.

**Broadband Parameters**

Broadband parameters are measured simultaneously with the FFT parameters, however, their measurement starts when the Start/Pause pushbutton is pressed and it ends at the nearest whole second after the end of the FFT measurement.

When Type Type2250/2270 is fitted with an accelerometer, the following broadband parameters can be displayed in engineering units:

- LX₁ₑ₉
- LY₁ₑ₉
- LYFmax
- LX₁ₐ₉
- LXFmax
- LY₁ₐ₉
- LYFmin

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† Total Harmonic Distortion (THD) is the sum (in %) of all the harmonics relative to the sum of the fundamental and all the harmonics.
Software Specifications – Enhanced Vibration and Low Frequency Option BZ-7234

Enhanced Vibration and Low Frequency Option BZ-7234 is enabled with a separate license. It adds human vibration parameters, and integration and double integration of the acceleration signal for vibration and displacement parameters to Sound Level Meter, Frequency Analysis, Logging and Enhanced Logging Software and adds low frequency 1/1- and 1/3-octave analysis to Frequency Analysis, Logging and Enhanced Logging Software.

General Vibration
Specifications for general vibration parameters apply to Type 2250/2270 fitted with an accelerometer.

Analysis
Conforms with the following International standards:
• ISO 2954
• ISO 10816 series

Human Vibration
Specifications for Human Vibration parameters apply to Type 2250/2270 fitted with an accelerometer.

Standards
Conforms with the following International Standards:
• ISO 8041:2005
• ISO 5349–1
• ISO 2631 series
• DIN 45669-1:2010–09

Analysis
DETECTORS
Two broadband detectors can each be set to one of the weightings:

<table>
<thead>
<tr>
<th>Weighting</th>
<th>Centre Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acc Linear</td>
<td>Vel 0.3 – 1000 Hz</td>
</tr>
<tr>
<td>Wb</td>
<td>Wc</td>
</tr>
<tr>
<td>We</td>
<td>Wj</td>
</tr>
</tbody>
</table>

MEASUREMENTS
Single Values for Display and Storage:
MTTV, KBFmax, KBFtm

Single Values for Display Only:
aW,1s, KBF

Low Frequency 1/1- and 1/3-octave Analysis

Frequency Analysis

CENTRE FREQUENCIES
1/1-oct. Band Centre Frequencies: 1 Hz to 16 kHz
1/3-oct. Band Centre Frequencies: 0.8 Hz to 20 kHz

Standards
Conforms with the following National and International Standards:
• IEC 61260–1 (2014), 1/1-octave Bands and 1/3-octave Bands, Class 1
• IEC 61260 (1995–07) plus Amendment 1 (2001–09), 1/1-octave Bands and 1/3-octave Bands, Class 0
• ANSI S1.11–1986, 1/1-octave Bands and 1/3-octave Bands, Order 3, Type 0–C
• ANSI S1.11–2004, 1/1-octave Bands and 1/3-octave Bands, Class 0
• ANSI/ASA S1.11–2014 Part 1, 1/1-octave Bands and 1/3-octave Bands, Class 1

Vibration Measurements
Brüel & Kjær recommends Low-level Accelerometer Type 8344 for low-frequency vibration measurements.
Software Specifications – Signal Recording Option BZ-7226

Signal Recording Option BZ-7226 is enabled with a separate license. For data storage, signal recording requires:
• SD Card
• USB Memory Stick

RECORDED SIGNAL
A-, B-, C- or Z-weighted sound signal from the microphone or acceleration signal from the accelerometer

AUTOMATIC GAIN CONTROL
The average level of the signal is kept within a 40 dB range, or the gain can be fixed

SAMPLING RATE AND PRE-RECORDING
The signal is buffered for the pre-recording of the signal. This allows the beginning of events to be recorded even if they are only detected later.

Specifications – Measurement Partner Suite BZ-5503

BZ-5503 is included with Types 2250 and 2270 for easy synchronization of setups and data between the PC and hand-held analyzer. BZ-5503 is supplied on ENV DVD BZ-5298

PC REQUIREMENTS
Operating System: Windows® 7, 8.1 or 10 (all in 32-bit or 64-bit versions)
Recommended PC:
• Intel® Core™ i3
• Microsoft®.NET 4.5
• 2 GB of memory
• Sound card
• DVD drive
• At least one available USB port
• Solid State Drive

ONLINE DISPLAY OF TYPE 2250/2270 DATA
Measurements on the analyzer can be controlled from the PC and displayed online with the PC, using the same user interface on the PC as on the analyzer
Display: 1024 x 768 (1280 x 800 recommended)

DATA MANAGEMENT
Explorer: Facilities for easy management of analyzers, users, jobs, projects and project templates (copy, cut, paste, delete, rename, create)
Data Viewer: View measurement data (content of projects)
Synchronization: Project templates and projects for a specific user can be synchronized between PC and analyzer and between local and cloud archives. Measurement Partner Suite BZ-5503 merges Measurement Partner Field App annotations with the corresponding analyzer project

USERS
Users of Type 2250/2270 can be created or deleted

EXPORT FACILITIES
Excel*: Projects (or user-specified parts) can be exported to Microsoft® Excel® (Excel 2003 – 2016 supported)

Memory (KB/s) 16-bit | 16 | 32 | 48 | 96
Memory (KB/s) 24-bit | 24 | 48 | 72 | 144

PLAYBACK
Playback of signal recordings can be listened to using the earphone/headphones connected to the headphone socket

RECORDING FORMAT
The recording format is either 24- or 16-bit wave files (extension .wav) attached to the data in the project, easily played back afterwards on a PC using BZ-5503, Type 7820 or 7825. Calibration information and possible tacho trigger information are stored in the .wav file allowing BZ-5503 and PULSE to analyse the recordings

Functions
Manual Control of Recording: Recording can be manually started and stopped during a measurement using a pushbutton or an external signal
Automatic Control of Recording: Start of recording when measurement is started. Minimum and Maximum recording time can be preset

Brüel & Kjaer Software: Projects can be exported to PULSE Reflex

POST-PROCESSING
Measurement Partner Suite is a suite of modules, including post-processing tools for data acquired with Type2250/2270. The following post-processing modules are available:
• Logging Module BZ-5503-A
• Spectrum Module BZ-5503-B
• WAV File Analysis Module BZ-5503-C
These modules help to assess logging data and measured spectra, such as calculating contribution from markers on a logging profile or correcting spectra for background noise

HAND-HELD ANALYZER SOFTWARE UPGRADES AND LICENSES
The software controls analyzer software upgrades and licensing of the analyzer applications

INTERFACE TO HAND-HELD ANALYZER
USB, LAN or Internet connection

LICENSE MOVER
To move a license from one analyzer to another use BZ-5503 together with License Mover VP-0647

LANGUAGE
User Interface in Chinese (People’s Republic of China), Chinese (Taiwan), Croatian, Czech, Danish, English, Flemish, French, German, Hungarian, Japanese, Italian, Korean, Polish, Portuguese, Romanian, Russian, Serbian, Slovenian, Spanish, Swedish, Turkish and Ukrainian

HELP
Concise context-sensitive help in English

* Not all data are available in all exports. The data exported are dependent on the type and target of the export.
Ordering Information

To measure vibration, order these analyzer and software module combinations:

**Single-Channel Measurements**

**Type 2250-W Hand-held Analyzer**
with one or both of:
- BZ-7230 FFT Analysis Software
- BZ-7234 Enhanced Vibration and Low Frequency Option

**Dual-Channel Measurements**

**Type 2270-W Hand-held Analyzer (two-channel)**
with one or both of:
- BZ-7230 FFT Analysis Software
- BZ-7234 Enhanced Vibration and Low Frequency Option

**Both Types 2250-W and 2270-W include the following as standard:**
- Software:
  - BZ-7222: Sound Level Meter Software
  - BZ-7223: Frequency Analysis Software
  - BZ-7231: Tone Assessment Option
  - BZ-7232: Noise Monitoring Software
  - BZ-7229: 2-channel Option (Type2270-W only)
- Accessories:
  - FB-0679: Hinged Cover (Type 2250 only)
  - FB-0699: Hinged Cover (Type 2270 only)
  - QB-0061: Battery Pack
  - ZG-0426: Mains Power Supply
  - Accessory Kit UA-1710-D01 including:
    - KE-0441: Protective Cover for Hand-held Analyzer
    - UL-1050: Wireless USB-A (M) Adaptor
    - UA-1651: Tripod Extension for Hand-held Analyzer
    - UA-1654: 5 Extra Stylus
    - UA-1673: Adaptor for Standard Tripod Mount
    - DH-0696: Wrist Strap
    - DD-0594: Protection Plug for Hand-held Analyzer without Preamplifier
    - AO-1494: Cable, USB 2.0, USB-A (M) to USB-micro-B (M) black, 1.8 m (5.9 ft), max. +70 °C (158 °F)
    - BZ-5298: Software, Environmental Software DVD
These accessories are also available separately

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**Software and Accessories Available Separately**

**SOFTWARE MODULES**

- BZ-7224 Logging Software
- BZ-7225 Enhanced Logging Software
- BZ-7225-UPG Upgrade from Logging Software BZ-7224 to Enhanced Logging Software BZ-7225 (does not include memory card)
- BZ-7226 Signal Recording Option
- BZ-7229 2-channel Option (Type 2270 only)

**PC SOFTWARE**

- BZ-5503-A Measurement Partner, Logging Module
- BZ-5503-B Measurement Partner, Spectrum Module
- BZ-5503-C Measurement Partner, WAV File Analysis Module
- BZ-5503-D Measurement Partner Field App for iOS and Android (free download at App Store® and Google Play™)
- BZ-5503-E Measurement Partner Cloud Entry Level, free cloud storage
- BZ-5503-F-012 Measurement Partner Cloud Basic, basic cloud storage subscription for one year
- BZ-5503-G-012 Measurement Partner Cloud Professional, enterprise cloud storage subscription for one year
- Type 7825 Protector™ – calculation software of personal noise exposure

**MISCELLANEOUS**

- Type 2981 Laser Tachometer Probe
- Type 4294 Calibration Exciter
- UA-0588 Tripod Adaptor for ½” Microphone/Preamplifier Assemblies
- UA-0801 Small Tripod
- UL-1009 SD Memory Card
- UL-1017 SDHC Memory Card
- ZG-0444 Charger for QB-0061 Battery Pack
- QS-0007 Tube of Cyanoacrylate Adhesive
- UA-0642 Mounting Magnet for accelerometer 10–32 UNF mounting
- UA-1077 Mounting Magnet for accelerometer M3 mounting
- YJ-0216 Beeswax for mounting accelerometer
- KE-0440 Travel Bag
- KE-0459 Shoulder Bag

**CABLES**

- AO-0440-D-015 Signal Cable, LEMO to BNC, 1.5 m (5 ft)
- AO-0701-D-030 Accelerometer Cable, LEMO to M3, 3 m (10 ft)
- AO-0702-D-030 Accelerometer Cable, LEMO to 10–32 UNF, 3 m (10 ft)
- AO-0722-D-050 Accelerometer Cable, LEMO to MIL-C-5015, 5 m (16 ft)
- AO-0726-D-030 Cable for Laser Tachometer Probe, LEMO to SMB, 3 m (10 ft)
- AO-0726-D-050 Cable for Laser Tachometer Probe, LEMO to SMB, 5 m (16 ft)
- AO-0727-D-015 Signal Cable, LEMO to BNC Female, 1.5 m (5 ft)
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2270-CAI</td>
<td>Accredited Initial Calibration of Type 2270</td>
<td>2250-CTF</td>
<td>Traceable Calibration of Type 2250</td>
</tr>
<tr>
<td>2270-CAF</td>
<td>Accredited Calibration of Type 2270</td>
<td>2250-TCF</td>
<td>Conformance Test of Type 2250, with certificate</td>
</tr>
<tr>
<td>2270-CTF</td>
<td>Traceable Calibration of Type 2270</td>
<td>4533-CAF</td>
<td>IEPE Accelerometer, Accredited Calibration</td>
</tr>
<tr>
<td>2270-TCF</td>
<td>Conformance Test of Type 2270, with certificate</td>
<td>4533-CTF</td>
<td>IEPE Accelerometer, Traceable Calibration</td>
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