

## Hand-held Analyzer Types 2250 and 2270

Types 2250 and 2270 are innovative, hand-held analyzers from Brüel & Kjær. The analyzers' easy, safe and clever design philosophy is based on extensive research. Type 2250 has won several awards for its excellent ergonomics and design.

Both analyzers can host a number of applications including frequency analysis, logging, FFT, building acoustics and signal recording. Additionally, Type 2270 can simultaneously measure with two microphones, two accelerometers or one of each (requires 2-channel Option). All application modules can be ordered as part of a fully preconfigured instrument or separately at any time, as the need arises.

The combination of application modules and innovative hardware makes these analyzers dedicated solutions for performing high-precision measurement tasks in environmental, occupational and industrial application areas. Together with Measurement Partner Field App, MP Cloud support and Measurement Partner Suite for post-processing, they provide a total solution for your measurement needs.

### Uses and Features

#### Uses

- Class 1 sound measurements to latest international standards
- Environmental noise assessment and tone assessment (1/3-octave and FFT)
- Loudness and noise rating measurements
- Occupational noise evaluation
- Reverberation time measurements (see BP 2152)
- Building acoustics (see BP 2190)
- Product quality control (see BP 2183)
- Noise source identification using sound intensity (see BP 2341)\*
- Audiometer calibration
- Real-time analysis in 1/1- and 1/3-octave bands
- Analysis of logging profiles for broadband parameters and spectra
- Vibration criteria measurements
- Low-frequency building vibration according to ISO 8041:05 and DIN 45669 – 1:2010 – 09
- Whole-body and hand-arm human vibration measurements (RMS, MTVV and Crest Factor)
- Infrasound (G-weighting) measurements according to ISO 7196:1995 and ANSI S1.42 – 2001 (R2011)

\* Type 2270 only.



#### Features

- Hardware:
  - 2-channel measurement capability with any combination of microphones and accelerometers\*
  - Large, high-resolution, touch-sensitive colour screen
  - Communication via USB, LAN and options for Wi-Fi or 4G communication
  - Integral digital camera for documentation and reference\*
  - Automatic detection of and correction for windscreen
  - Robust and environmentally protected (IP44)
- Software:
  - Dynamic range in excess of 123 dB(A)
  - 0.5 Hz – 20 kHz broadband linear range
  - Personalized measurement, display and job setup
  - 'Smiley' quality indicators with hints and warnings
  - Timers for automatic start of measurement
  - Measurement Partner Cloud (MP Cloud)
  - Measurement Partner Field App
  - Measurement Partner Suite for comprehensive post-processing
  - GPS coordinates stored with measurement data
  - Simultaneous noise and weather data acquisition
  - 24- or 16-bit recording during all or parts of measurement

### Introduction

Types 2250 and 2270 are flexible hand-held analyzers that cover all your sound and vibration measurement and analysis needs – from the traditional uses in assessing environmental and workplace noise to industrial quality control and development.

The high-resolution touchscreen allows you to easily navigate through the setup menu tailoring one of the many predefined templates to precisely your measurement requirements. The large dynamic range copes with both the loudest noises and those just above the noise floor and the frequency range, extended with the low-frequency option, spans from 20 kHz down to infrasound for measurement of noise sources suspected of emitting very low frequency noise.

When on site, the weather station kit measures weather parameters that are stored on the analyzer together with the noise data. Measurement Partner Field App provides measurement annotation and control, keeping you out of the sound field and improving the quality of your measurement. After completion, upload your measurement data to MP Cloud and it is ready for you or a colleague to post-process using Measurement Partner Suite, which has tools to help you extract exactly what you need from your data.

This Product Data describes different combinations of software modules (applications) available for Type 2250 and Type 2270. All analyzers are delivered with the Sound Level Meter Software BZ-7222 enabled. These modern Class 1 Sound Level Meters (SLMs) fulfil the requirements up to and including the latest standard, IEC 61672–1 (see the specifications section for compliance information), and are delivered with a number of predefined measurement templates tailored to suit specific requirements.

### The Hand-held Analyzer Hardware

Great care has been taken to ensure that the hardware is ergonomically optimal in field use. Both Type 2250 and Type 2270 use the same award-winning design. The key features are shown in Fig. 1.

### Long-term and Continuous Noise Monitoring

For long-term and continuous noise monitoring, Brüel & Kjær offers a wide range of Noise Monitoring Terminal (NMT) and Noise Sentinel solutions that will meet and evolve with your needs. For more information, please consult [Product Data BP 2379](#) for NMT solutions and [Product Data BP 2389](#) for Noise Sentinel solutions.

### Alerting the Operator

Email or SMS/text messages can be sent to a PC or mobile device to inform operators instantly of noise events that require a response, battery power levels that require attention, memory storage status, calibration status and many other user-programmed trigger conditions. This is a very low-cost solution for receiving important alerts.

### Optional Applications

A variety of applications that can be used in any combination can be purchased when you need them and are delivered as easily installed licenses. The applications described in this Product Data are:

- **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, from the noise floor to 140 dB, the maximum measurable level
- **Logging Software BZ-7224** – freely select parameters to log at periods from 1 s to 24 hr. Running together with SLM Software, all broadband parameters can be logged. If Frequency Analysis Software is also enabled, spectra can be logged at the same rates. Logging (or noise profiling) is used to develop time histories for use in environmental noise as well as workplace noise assessment
- **Enhanced Logging Software BZ-7225** – continuously monitor and log periodic reports in addition to the features of Logging Software. Parameters such as  $L_{dn}$  and  $L_{den}$  are calculated
- **Signal Recording Option BZ-7226** – attach actual samples of the measured signal to your measurements using the actual measurement transducer

**Fig. 1** Key features of Hand-held Analyzer Types 2250 and 2270



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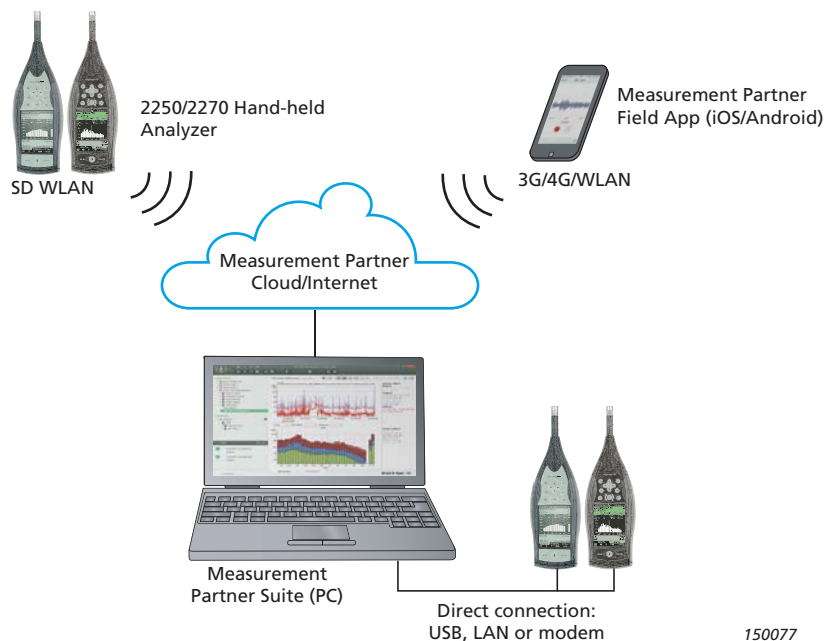
- **2-channel Option BZ-7229 (Type 2270 only)** – realize the full potential of your analyzer with 2-channel functionality for SLM, Frequency Analysis, Logging, Enhanced Logging and Building Acoustics software
- **Tone Assessment Option BZ-7231** – identify any 1/3-octave bands with audible tones above a set limit
- **Low Frequency Option BZ-7234** – measure infrasound (G-weighting) and building vibration ( $w_m$  weighting) with 1/3 octave spectra to very low frequencies

Information regarding the following applications can be found in their respective Product Data:

- **Reverberation Time Software BZ-7227** – start a basic measurement by clapping your hands. The ‘traffic light’ shows measurement status at a glance, and the resulting reverberation time (RT) spectrum is shown as well as the average RT for the room. For assessing the acoustic quality of auditoria, halls, public spaces and workplaces
- **Building Acoustics Software BZ-7228** – assess sound insulation in buildings and of building elements. Airborne as well as impact sound insulation can be measured, and final results shown on the spot to international (ISO) and 13 national standards. The required sound sources and PC reporting software are available, as well as complete building acoustics systems ([Product Data BP 2190](#))
- **FFT Analysis Software BZ-7230** – analyse using the Fast Fourier Transform (FFT) algorithm, the tool of choice for measurement and diagnostics of machinery noise and vibration. The ‘profile’ of a machine is its fingerprint, revealing sources of noise and vibration and their paths to the measurement position. Useful in product development, troubleshooting, quality control and environmental noise measurements ([Product Data BP 2183](#)). With Tone Assessment Option BZ-7231, FFT Analysis offers objective indication of tonal noise audibility and annoyance
- **Sound Intensity Software BZ-7233 (Type 2270 only)** – make sound intensity measurements from beginning to end. A single user can make complete intensity measurements for total sound power and noise source location. You can use the built-in camera to take a photo to aid in probe placement during measurement and for use as a background for a map of the results ([Product Data BP 2341](#))

## Connectivity

**Fig. 2**  
Secure access to  
measurement data  
from anywhere



### Remote Internet Communication

Access your data from anywhere by using various technologies. Types 2250 and 2270 allow direct operation through WiFi, modem communication (for example, 3G) or LAN (Ethernet).

### Measurement Partner Cloud (MP Cloud)

Take advantage of cloud capability with Types 2250 and 2270. The analyzers can communicate with MP Cloud via WiFi, mobile connection or LAN (Ethernet). Upload your measurement data directly to MP Cloud for merging in Measurement Partner Suite with annotations collected with Measurement Partner Field App.

Store your data safely and securely in MP Cloud and share Cloud archives with anyone on the planet.



Brüel & Kjær understands that our users sometimes need support immediately and at any time of the day. Therefore, we are also offering online support, where you can access it 24/7 and get the help you need.

The Measurement Partner learning centre provides access to manuals, guidelines, videos and tutorial videos, all designed to help you get the most out of your hand-held analyzer and noise monitoring software. You will also find help on software applications as well as general noise measurement techniques.

The Measurement Partner online community enables you to connect with thousands of hand-held analyzer users from around the world. The community gives you an opportunity to share your experiences with other hand-held analyzer and Measurement Partner Suite users, and to provide help to other members of the community on any aspect of sound and vibration measurement. Visit the Measurement Partner [Community](#) and [Learning Centre](#).

### Post-processing Software

**Fig. 3**  
Measurement Partner  
Suite BZ-5503



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.

### Annotating your Measurement Data

Measurement Partner Field App is the recommended solution for on-site annotation of your measurement data.

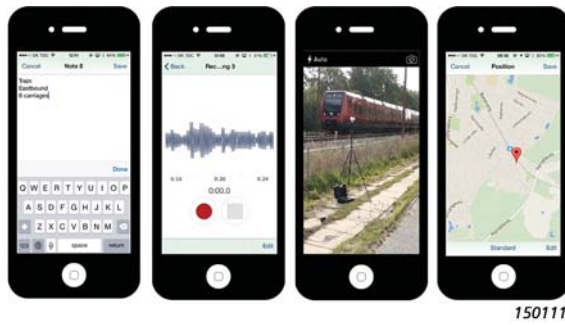
#### Measurement Partner Field App

Measurement Partner Field App transforms the way you work with your hand-held analyzer. It is an advanced companion app for the sound and vibration professional offering:

- Remote analyzer control
- Remote display
- Remote annotation of measurement data
- Cloud support

Whenever you stand next to your analyzer to operate it, you disturb the sound field. Therefore, we have released a field app that lets you stay away from your analyzer. Once your analyzer is powered on, you can wirelessly connect to it using Micro USB Wi-Fi Dongle UL-1050 for G4, Ethernet CF Card UL-1019 for G3.

**Fig. 4**  
View and edit  
annotations collected  
with the field app



Once connection is made to the analyzer, you are ready to start, stop and pause your measurement from a safe distance. During noise measurements, the instantaneous LAF profile is displayed on the field app. During vibration measurements, the Fast inst. profile is shown.

This allows you to keep an eye on the status of your measurement without being close to the analyzer. This is particularly important when low noise levels are being measured such as for indoor measurements.

MP Field App supports notes, voice commentary, image, video and GPS annotations. All annotations can be uploaded to MP Cloud for merging with the project in Measurement Partner Suite.

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.

## 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 in the MP Cloud.

You can create a Cloud account by visiting the MP Cloud web service at [cloud.bksv.com](http://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 Micro-USB 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.

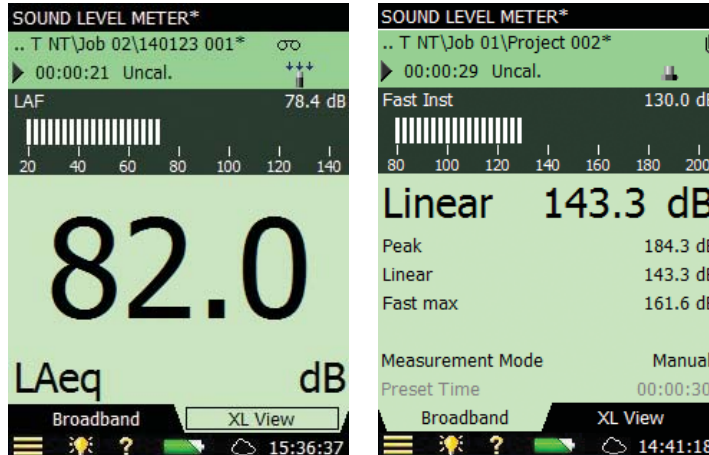
## 2-channel Measurement Option – BZ-7229

2-channel Option BZ-7229 adds an extra measurement channel to Hand-held Analyzer Type 2270. The two channels accept inputs from the same type of transducer (for example, two microphones) or different transducers (for example, one microphone and one accelerometer).

2-channel functionality is available for the following software modules: Sound Level Meter BZ-7222, Frequency Analysis BZ-7223, Logging BZ-7224, Enhanced Logging BZ-7225 and Building Acoustics Software BZ-7228. BZ-7229 is compatible with Signal Recording Option BZ-7226 and Low Frequency Option BZ-7234.

**Fig. 5**

Sound Level Meter Software displays with a sound measurement (left) and a vibration measurement (right) with an accelerometer, including the icons for added annotations, visible in the upper right corner

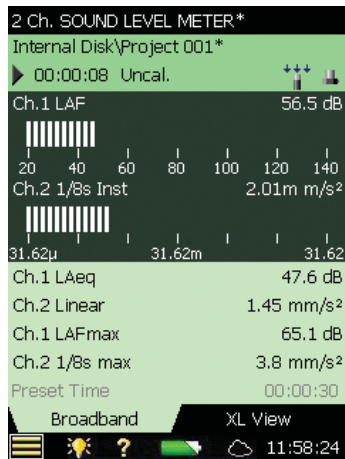


All Hand-held Analyzer Types 2250 and 2270 come with the Sound Level Meter Software enabled. This makes your analyzer a versatile broadband SLM. If you connect an accelerometer to the rear socket, it also functions as a Vibration Meter that can display parameters as engineering units or logarithmically in dB. The software complies with the latest international standard (IEC 61672-1) as well as national standards. For a complete list of measured parameters, see Specifications.

### 2-channel Measurements with BZ-7222

**Fig. 6**

Sound level meter software display showing 2-channel measurement. Channel 1 is noise, channel 2 is vibration in Engineering Units.



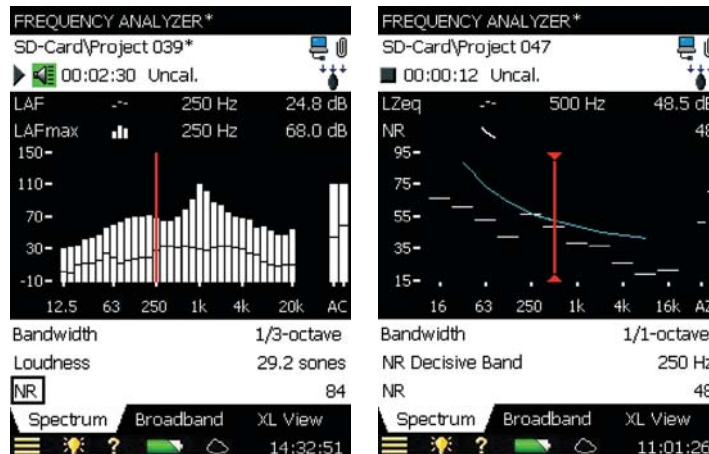
Type 2270 users with 2-channel Option BZ-7229 enabled can measure two channels of broadband values with any combination of transducers: two microphones, two accelerometers or one microphone and one accelerometer.

## Frequency Analysis Software – BZ-7223

**Fig. 7**

Frequency Analysis Software BZ-7223 displays (left to right): 1/3-octave showing dual spectra and generator icon, cursor readouts, Loudness and Noise Rating (NR) results

The decisive band and the corresponding NR curve is shown.



This application enables real-time measurements in 1/1- and 1/3-octave bands, adding frequency information to your data, making it easy to collect spectra, whatever the task.

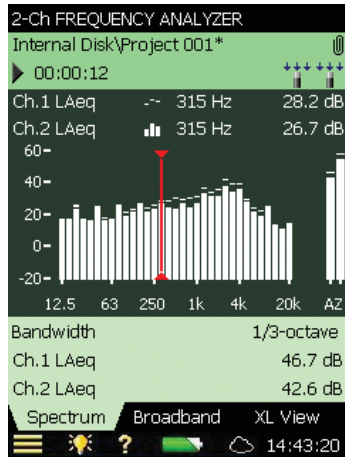
Each 1/1- or 1/3-octave band has a dynamic range in excess of 135 dB, from the noise floor to 140 dB, the maximum measurable level.

The available ranges are centre frequencies 8 Hz to 16 kHz (1/1-octave) and centre frequencies 6.3 Hz to 20 kHz (1/3-octave). The low-frequency option extends the ranges to 1 and 0.8 Hz, respectively.

Spectra can be A-, B-, C-, G- or Z-weighted. Five spectra and full spectral statistics are measured and stored. In addition, seven different  $L_N$  spectra and instantaneous values are available for display. Two spectra (for example, a minimum and maximum spectrum) can be superimposed on the display. All the broadband quantities measured by Sound Level Meter Software BZ-7222 are computed in parallel with the analysis. Spectral analyses can be documented using notes and voice annotations.

For a measured spectrum, single-number parameters, such as Noise Rating, Speech Interference Level and Loudness, can be calculated and displayed for noise impact analysis and limit comparison. A programmable generator is available for measurements requiring a sound source. You can select white or pink noise and set the upper and lower limits.

**Fig. 8**  
2-channel Frequency  
Analyzer display



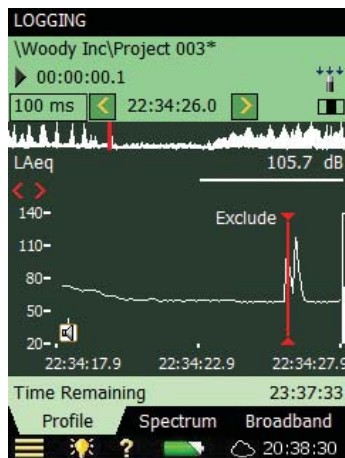
## 2-channel Measurements with BZ-7223

Type 2270 users with 2-channel Option BZ-7229 enabled can measure two spectra simultaneously with any combination of transducers. If the transducers are one microphone and one accelerometer, two independently scalable y-axes are available.

Simple difference calculations are available between channels when transducer type and weightings are compatible.

## Logging Software – BZ-7224

**Fig. 9**  
Single-channel logging  
display showing a  
LAeq profile with  
marker functionality  
on the analyzer



With Logging Software enabled, your analyzer becomes a versatile instrument for obtaining time histories (logging profiles). Logging Software allows you to select any of the available broadband parameters and log them at intervals from 1 s to 24 h. Additionally  $L_{Aeq}$  and/or  $L_{AF}$  can be simultaneously logged at 100 ms intervals.

If Frequency Analysis Software BZ-7223 is enabled, the Logging Software also lets you log spectra the same as your broadband values at intervals from 1 s to 24 h.

Logging Software BZ-7224 incorporates a number of features designed to make difficult field work as manageable as possible:

- Five user-definable markers can be set while you measure. Use these to annotate specific noise or vibration sources
- Markers can be set in the field using the stylus and the touch screen. Simply 'tap and drag' on the part of the profile you want to mark and select a marker from the drop-down list
- Markers can even be set after the noise event has passed. The display covers the latest 100 samples (100 s of profile when logging at 1 s intervals, otherwise more), so in most cases, you can wait for the event (or disturbance) to end before placing your marker. Alternatively, scroll back in the profile, freeze the display, and set your marker
- Voice annotations, using the commentary microphone, are attached to the exact point on the profile where the annotation is made

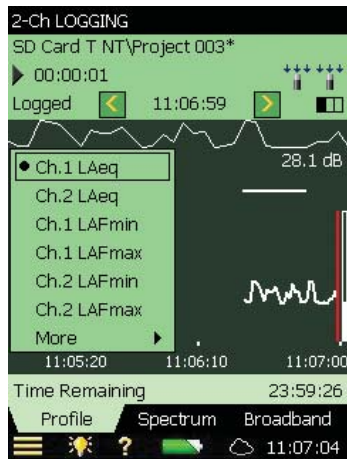
All markers and annotations are saved with the measurement and are imported into Measurement Partner Suite BZ-5503 where they are directly accessible in the profile.

Logging data are stored directly on SD cards and can be directly read from the SD card by Measurement Partner Suite. Large amounts of data can be quickly transferred directly from the analyzer using the USB cable or using a standard card reader. SDHC memory cards complying with the new SD 2.0 standard, offer up to 32 GB of removable data storage. This enables very long signal recordings and measurement profiles to be made.



For example, a project where all broadband parameters, one 100 ms parameter, all 1/3-octave spectra and full statistics are measured with a logging period of 1 s for a total duration 24 h will use 88 Mb.

**Fig. 10**  
2-channel Logging  
display



## 2-channel Measurements with BZ-7224

Type 2270 users with 2-channel Option BZ-7229 enabled can log measurement data using both input channels with any combination of transducers: two microphones, two accelerometers or one of each.

You can toggle between the two measurement channels on the analyzer display and can see both measurement channels on the same graph when the measurement data are transferred to Measurement Partner Suite BZ-5503 for post-processing.

## Enhanced Logging Software – BZ-7225

Enhanced Logging Software BZ-7225 builds on the functionality of Logging Software BZ-7224 and equips your analyzer for extended logging periods, allowing you to measure continuously, saving data to SD memory cards or USB devices.

Additional functionality includes:

- Measure continuously, saving data to SD memory cards or USB devices
- Reboot automatically and resume operation in case of power failure
- Save data in manageable portions (every 24 hr), selectable for download
- Make periodic reports; i.e., calculate measurement parameters at preset intervals (report periods)
- Measure  $L_{dn}$ ,  $L_{den}$ ,  $L_{day}$ ,  $L_{evening}$  and  $L_{night}$

A periodic report is similar to the *Measurement Total* of the Logging software, except it is made periodically. For example, you may need to know  $L_{Aeq}$  values at 1 h intervals during an extended logging period. The Enhanced logging software will do this for you.

Combining periodic reports with level triggered event markers and Signal Recording Option BZ-7226 provides an overview as well as a focus on essential details.

A typical setup for 24 hr of extended logging might be:

- Continuous measurement
- Hourly periodic reports
- Level triggered marker for events above  $L_{AF} = 60$  dB(A)
- Signal Recording of events (please refer to the Signal Recording Option BZ-7226)
- Logging of other parameters as required (please refer to the Logging Software BZ-7224)

After the measurement, you can check  $L_{dn}$  or  $L_{den}$ , the Total and the periodic reports, and then browse the events and sound recordings to verify the quality of your measurements. For semi-continuous logging, Measurement Partner Suite license BZ-5503-A enables you to remotely schedule the automatic download of projects from your analyzer to Measurement Partner.

## 2-channel Measurements with BZ-7225

2-channel Option BZ-7229 will work in the same way as for the Logging software BZ-7224. All additional functionality that Enhanced Logging software BZ-7225 offers over Logging software BZ-7224 is available on both channels for users running G4 hardware.

For Type 2270 users with older hardware, it is not possible to perform 2-channel measurements with Enhanced Logging (contact your Brüel & Kjær sales representative for details on the trade-in programme).

Signal Recording Option BZ-7226 works with all applications and enables you to make recordings of the actual measured signal with the microphone used for acoustic measurements (i.e., not the commentary microphone) or accelerometer used for vibration measurements. Signal recordings are automatically transferred with the data to Measurement Partner Suite and can be helpful in identifying noise sources during post-processing.

Another important use of signal recording is to record signals for later processing. This could be in industrial applications – analysing an engine run-up or a machinery process cycle – or in Environmental applications – recording noise for later post-processing in Measurement Partner Suite. With Measurement Partner Suite’s BZ-5503-C license, you can perform an FFT-based pure tone assessment on .WAV files.

In addition to manual and automatic signal recording, Logging Software BZ-7224 and Enhanced Logging Software BZ-7225 can trigger signal recording based on level exceedance, meaning that recordings can be automatically initiated when no operator is present.

The Signal Recording Option offers a choice of 24- or 16-bit recording with post processing supported in Measurement Partner. You can use 24-bit recording to capture the full 120 dB dynamic range of Type 2250/2270, which is convenient for later signal analysis. You can use 16-bit recording to consume less memory; however, this requires selecting the level range for recording (or using the automatic gain control).

## Tone Assessment Option – BZ-7231

**Fig. 11**  
*Performing an outdoor tone assessment measurement*



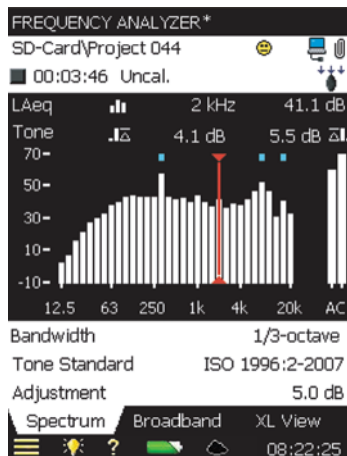
Noise can be described as tonal if it contains a noticeable or discrete, continuous note. This can include noises such as hums, hisses, screeches, drones, etc. Any such subjective description is open to discussion and contradiction when reported.

ISO 1996–2 (2007) Annex C, *Objective method for assessing the audibility of tones in noise-reference method*, provides measurement procedures to be used to verify the audibility of tones and to quantify them. Measurement results can therefore be compounded and help explain subjective reactions.

### Automatically Configured for ISO 1996 Assessments

Tone Assessment Option BZ-7231 offers a quick and easy ‘in-the-field’ objective assessment of tonal noise components, in compliance with ISO 1996 assessments. The facility to carry out the ISO standard tone assessment offers objective feedback about whether you have ‘found the problem’ or need to take further measurements. In addition, the analyzer offers an easy way of setting up the analysis to follow the ISO 1996–2 standard. When this option is selected, simply press Start and the analyzer automatically selects the appropriate measurement configuration and the measurement and analysis are in progress.

**Fig. 12**  
*Tone Assessment Option BZ-7221 showing 1/3-octave bands with audible tones higher than a set limit (tones are identified by the blue dots)*



### Used with BZ-7223: 1/3-octave Bands

Tone Assessment identifies any 1/3-octave bands with audible tones above a set level limit. The assessment is based on the band’s prominence versus adjacent bands. The adjustment is the penalty to add to L<sub>Aeq</sub>. The level of each 1/3-octave band is compared to the levels of its neighbours, and all tones as well as the overall penalty (adjustment) are indicated. The search parameters are user adjustable to suit national requirements.

### Used with BZ-7230: FFT

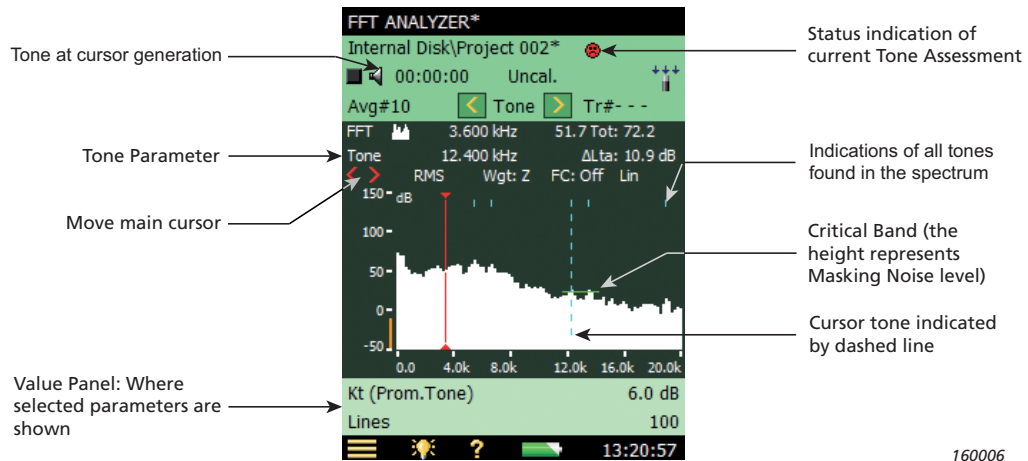
After a measurement, the calculation of tonal parameters for all the possible tonal candidates in the analysis takes only a few seconds, after which the following comprehensive list of results can be displayed on the spot:

- $K_t$  – the value added to the  $L_{Aeq}$  to give the tone-corrected rating level
- $\Delta L_{ta}$  – the audibility of all tones found in the same critical band as the selected tone
- $L_{pn}$  – the Total level of the masking noise in the band containing the selected tone
- $L_{pti}$  – the Level of the selected tone
- $L_{pt}$  – the total Level of all tones in the critical band containing the prominent tone
- Critical Band – the start and end of the critical band containing the selected tone

The  $L_{Aeq}$  and other broadband parameters are measured simultaneously by the analyzer and the tone corrected rating level can be calculated on the spot.

**Fig. 13**

Typical FFT spectrum display for the Tone Assessment option, showing the various fields and parameters

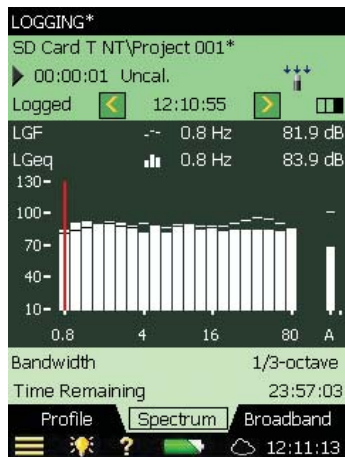


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### Enhanced Vibration and Low Frequency Option – BZ-7234

**Fig. 14**

Low Frequency Option showing G-weighted parameters  $L_{GF}$  and  $L_{Geq}$



Enhanced Vibration and Low Frequency Option BZ-7234 enables vibration and low-frequency sound functionality in Sound Level Meter BZ-7222, Frequency Analysis BZ-7223, Logging BZ-7224 and Enhanced Logging BZ-7225.

With the low-frequency sound option enabled and the appropriate transducer selection, infrasound (including G-weighting) measurements can be performed according to the most important international standards. For infrasound measurements use Low Frequency Microphone Type 4193 or Type 4964 optionally with the Low Frequency Adaptor UC-0211.

BZ-7234 also adds additional single- and dual-axis (with Type 2270) vibration capabilities. Time-domain integration and bandpass filtering allow measurement of:

- Peak particle velocity (PPV). Useful for monitoring buildings near blasting, construction and mining. For PPV measurements use accelerometers from Brüel & Kjær's Type 4533/4534 family (see [Product Data BP 2464](#))
- Vibration Criteria (requires Frequency Analysis Software BZ-7223). Used when doing location surveys for vibration-sensitive instruments (for example, electron microscopes) and tools. Also useful with logging of vibration near installed vibration-sensitive instruments using optional Logging Software BZ-7224.

For building vibration use Accelerometer Type 8344 (see [Product Data BP 2262](#)).

A wide range of human vibration weightings is also available:

- $W_m$  weighting for whole-body vibration measurements in buildings
- $W_b$ ,  $W_c$ ,  $W_d$ ,  $W_e$ ,  $W_k$  for whole-body vibration
- $W_h$  for hand-arm vibration
- $W_j$  for vertical head vibration

For human vibration use accelerometers from Brüel & Kjær's Type 4533/4534 family (see [Product Data BP 2464](#)).

## Adding Weather Parameters to Your Measurement Data

**Fig. 15**

*Hand-held analyzer measuring outdoor noise using Weather Station Kit MM-0316-A*



Weather conditions affect the propagation of sound, so wind speed and direction must be taken into account when measuring noise outdoors. Consequently, most environmental noise measurement standards define limits for wind speed and direction. To identify the portions of your measurement that are within allowable limits for wind speed and direction, use Weather Station Kit MM-0316-A (two parameters) or MM-0256-A (six parameters).

**Fig. 16**

*Weather Station Kit MM-0316-A*



The weather stations are based on ultrasound technology and operate well above the upper frequency limit of the microphone. Connect your weather station to your analyzer, turn it on, and you are ready to start measuring with no software setup necessary. The weather station is powered by the analyzer's battery, so there is no need for extra batteries.

### Post-processing of Weather Data

Noise and weather parameters are captured simultaneously on the analyzer and are available for display and post-processing in Measurement Partner Suite BZ-5503 along with your noise data when you are back in the office. To quickly identify the portions of your logging profile where wind speed and direction are within the allowed limits, use Measurement Partner's report and marker wizard (requires license BZ-5503-A).

### Outdoor Protection

For outdoor environmental noise measurements, your analyzer may need extra weather protection, offered by All-weather Case Type 3535-A and Outdoor Microphone Type 4952. For details, please refer to [Product Data BP 2251](#) and [Product Data BP 2099](#) respectively.




## Overview of Software Features

The table below presents a summary of the main features of each of the basic application modules available with Type 2250 and Type 2270. See Specifications for more details.

Feature	SLM Software	Frequency Analysis Software	Logging Software	Enhanced Logging Software
IEC/ANSI SLM standards Type/Class 1	•	•	•	•
120+ dB Dynamic Range – no need for range switching	•	•	•	•
Sound levels up to 140 dB with supplied Microphone Type 4189	•	•	•	•
Sound levels up to 152 dB using Microphone Type 4191	•	•	•	•
Frequency weightings A, B, C, Z (linear) and time weightings F, S, I	•	•	•	•
Free-field/diffuse-field correction	•	•	•	•
Automatic windscreen detection and correction	•	•	•	•
Preset time start/stop	•	•	•	•
Multi-language user interface	•	•	•	•
Context-sensitive help	•	•	•	•
Voice, metadata and text annotation of measurements	•	•	•	•
Display colour-schemes optimized for day, night, indoor and outdoor use	•	•	•	•
Personal login – protects your personal setups from other users	•	•	•	•
Broadband statistics based on $L_{Aeq}$ , $L_{AF}$ or $L_{AS}$	•	•	•	•
Maximum broadband range: 0.5 Hz – 20 kHz	•	•	•	•
Remote control using GPRS/EDGE/3G modem	•	•	•	•
Transfer of data files while measuring (USB, LAN or modem)	•	•	•	•
Recording of measured signal during measurement – 16 or 24 bit	•*	•*	•*	•*
Timers for automatic start of measurement	•	•	•	•
Occupational health parameters	•	•	•	•
Weather data and GPS input	•	•	•	•
G-weighting for infrasound parameters	•†	•†	•†	•†
$W_m$ -weighting for building vibration parameters	•†	•†	•†	•†
Back-erase – last 5 seconds of measurement data	•	•	•	•
Tone assessment		•‡	•‡	•‡
1/1-octave spectra (max. range 1 Hz to 16 kHz)		•	•**	•**
1/3-octave spectra (max range 0.8 Hz to 20 kHz)		•	•**	•**
Spectral statistics based on $L_{AF}$ or $L_{AS}$		•	•**	•**
Loudness and Noise Rating results		•	•**	•**
Charge Injection Calibration			•	•
Level triggers and recordings			•*	•*
Logging of all or selected broadband parameters and spectra			•	•
Logging period 1 s to 24 h			•	•
$L_{Aeq}$ , $L_{AS}$ , $L_{AF}$ logged every 100 ms			•	•
Profile display			•	•
Profile overview of entire measurement			•	•
Markers on profile display			•	•
Recording of signal during noise events			•*	•*
Periodic reports of all measured data				•
Report period 1 min to 24 h, Logging time up to 31 d				•
Timer trigger for recordings				•*
$L_{dn}$ , $L_{den}$ , $L_{day}$ , $L_{evening}$ , $L_{night}$				•
Continuous measurement				•

\* If Signal Recording Option is enabled  
‡ If Tone Assessment Option is enabled

† If Low Frequency Option is enabled  
\*\* If Frequency Analysis Software is enabled

	<p>The CE marking is the manufacturer's declaration that the product meets the requirements of the applicable EU directives</p> <p>RCM mark indicates compliance with applicable ACMA technical standards – that is, for telecommunications, radio communications, EMC and EME</p> <p>China RoHS mark indicates compliance with administrative measures on the control of pollution caused by electronic information products according to the Ministry of Information Industries of the People's Republic of China</p> <p>WEEE mark indicates compliance with the EU WEEE Directive</p>
<b>Safety</b>	EN/IEC 61010–1, ANSI/UL 61010–1 and CSA C22.2 No.1010.1: Safety requirements for electrical equipment for measurement, control and laboratory use
<b>EMC Emission</b>	<p>EN/IEC 61000–6–3: Generic emission standard for residential, commercial and light industrial environments</p> <p>EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements</p> <p>CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits</p> <p>IEC 61672–1, IEC 61260, IEC 60651 and IEC 60804: Instrumentation standards</p> <p><b>Note:</b> The above is only guaranteed using accessories listed in this document</p>
<b>EMC Immunity</b>	<p>EN/IEC 61000–6–2: Generic standard – Immunity for industrial environments</p> <p>EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements</p> <p>IEC 61672–1, IEC 61260, IEC 60651 and IEC 60804: Instrumentation standards</p> <p><b>Note:</b> The above is only guaranteed using accessories listed in this document</p>
<b>Temperature</b>	<p>IEC 60068–2–1 &amp; IEC 60068–2–2: Environmental Testing.</p> <p>Cold and Dry Heat.</p> <p>Operating Temperature: –10 to +50 °C (14 to 122 °F)</p> <p>Storage Temperature: –25 to +70 °C (–13 to 158 °F)</p>
<b>Humidity</b>	IEC 60068–2–78: Damp Heat: 93% RH (non-condensing at +40 °C (104 °F)). Recovery time 2 ~ 4 hours
<b>Mechanical</b>	<p>Non-operating:</p> <p>IEC 60068–2–6: Vibration: 0.3 mm, 20 m/s<sup>2</sup>, 10 – 500 Hz</p> <p>IEC 60068–2–27: Bump: 1000 bumps at 400 m/s<sup>2</sup></p> <p>IEC 60068–2–27: Shock: 1000 m/s<sup>2</sup>, 6 directions</p>
<b>Enclosure</b>	IEC 60529 (1989): Protection provided by enclosures: IP 44*

\* With preamplifier, extension cable or protection plug connected to the top socket and the hinged cover protecting the bottom connectors

## ADDITIONAL STANDARDS FOR MICRO USB WIRELESS ADAPTOR UL-1050\*

<b>Safety</b>	EN 60950–1:2006+A11:2009+A1:2010 +A12:2011
<b>EMC Emission</b>	<p>EN 301 489–1 V1.9.2</p> <p>EN 301 489–17 V2.2.1</p> <p>EN 55022: 2010+AC:2011</p>
<b>Spectrum &amp; Health</b>	<p>EN 300 328 V1.7.1</p> <p>EN 62311:2008</p>
<b>Restriction of Hazardous Substances</b>	EN 50581:2012

## FCC GRANT OF EQUIPMENT AUTHORIZATION FOR MICRO USB WIRELESS ADAPTOR UL-1050\*

<b>FCC Identifier</b>	KA2WA121A1
<b>FCC Rule Parts</b>	15c
<b>Frequency Range (MHz)</b>	2412.0 – 2462.0
<b>Output Watts</b>	0.269
<b>EC Declaration of Conformity</b>	1Tx1R 802.11bgn USB adapter
<b>C-Tick Authorization</b>	AS/NZS 4268: 2008+A1:2010

\* From the D-Link Corporation declaration of conformance for Wireless N 150 Micro USB Adaptor DWA-121.

## Specifications – Hand-held Analyzer Type 2250/2270 Platform

Specifications apply to Type 2250/2270 fitted with Microphone  
Type 4189 and Microphone Preamplifier ZC-0032

### Microphone

#### SUPPLIED MICROPHONE

**Type 4189:** Prepolarized Free-field ½" Microphone  
or

**Type 4190:** Free-field ½" Microphone

**Nominal Open-circuit Sensitivity:** 50 mV/Pa (corresponding to –26 dB re 1 V/Pa) ± 1.5 dB

**Capacitance:** 14 pF (at 250 Hz)

#### MICROPHONE PREAMPLIFIER ZC-0032

**Nominal Preamplifier Attenuation:** 0.25 dB

**Connector:** 10-pin LEMO

**Extension Cables:** Up to 100 m in length between the microphone preamplifier and Type 2250/2270, without degradation of the specifications

**Accessory Detection:** Windscreen UA-1650 can be automatically detected when fitted over ZC-0032

#### MICROPHONE POLARIZATION VOLTAGE

Selectable between 0 V and 200 V

#### SELF-GENERATED NOISE LEVEL

Typical values at 23 °C for nominal microphone open-circuit sensitivity:

Weighting	Microphone	Electrical	Total
"A"	14.6 dB	12.4 dB	16.6 dB
"B"	13.4 dB	11.5 dB	15.6 dB
"C"	13.5 dB	12.9 dB	16.2 dB
"Z" 5 Hz–20 kHz	15.3 dB	18.3 dB	20.1 dB
"Z" 3 Hz–20 kHz	15.3 dB	25.5 dB	25.9 dB

### Interface

#### KEYBOARD

**Pushbuttons:** 11 keys 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, amber and green

#### DISPLAY

**Type:** Transflective back-lit colour touch screen  
240 × 320 dot matrix

**Colour Schemes:** Five different – optimized for different usage scenarios (day, night, etc.)

**Backlight:** Adjustable level and on-time

#### USER INTERFACE

**Measurement Control:** Using pushbuttons on keyboard

**Setup and Display of Results:** Using stylus on touch screen or pushbuttons on keyboard

**Lock:** Keyboard and touch screen can be locked and unlocked

#### USB INTERFACE

USB 2.0 OTG Micro AB and USB 2.0 Standard A sockets for Wi-Fi Dongle 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

### Inputs/Outputs

#### 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 (2 - TYPE 2270 ONLY)

**Connector:** Triaxial LEMO

**Input Impedance:** ≥1 MΩ

**Direct Input:** Max. input voltage: ±14.14 V<sub>peak</sub>

**CCLD Input:** Max. input voltage: ±7.07 V<sub>peak</sub>

**CCLD Current/voltage:** 4 mA/25 V

#### TRIGGER SOCKET

**Connector:** Triaxial LEMO

**Max. Input Voltage:** ±20 V<sub>peak</sub>

**Input Impedance:** >47 kΩ

**Precision:** ±0.1 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

### 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

**Part No.:** QB-0061, Rechargeable Li-Ion battery

**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: >10 h (full screen backlight)
- Use of external interfaces (LAN, USB, Wi-Fi) will decrease battery operating time. Connecting a weather station or a GPS receiver can decrease battery operating with up to 20%. Connecting Wireless Adaptor UL-1050 can decrease battery operating time up to 35%
- 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. To protect the battery, charging will be terminated completely at ambient temperatures above 40 °C. 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 hr period

#### Storage

##### INTERNAL FLASH-RAM (NON-VOLATILE)

- For user setups and measurement data 512 MB

##### EXTERNAL SECURE DIGITAL MEMORY CARD

**SD and SDHC Card:** For store/recall of measurement data

##### USB MEMORY STICK

For store/recall of measurement data

#### 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

#### User 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, using Measurement Partner Field App (iOS or Android smartphone app), using the 2250/2270 SDK (Software Development kit), using a REST interface through HTTP or using an Internet browser supporting JavaScript. The connection is password protected

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

#### WIRELESS

Specifications apply to Wireless USB Adaptor 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 ft), 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 Specifications – Sound Level Meter Software BZ-7222

Conforms with the following National and International Standards:

- IEC 61672–1 (2013) Class 1
- IEC 60651 (1979) plus Amendment 1 (1993–02) and Amendment 2 (2000–10), Type 1
- IEC 60804 (2000–10), Type 1
- DIN 45657 (1997–07)
- ANSI S1.4–1983 plus ANSI S1.4A–1985 Amendment, Type 1
- ANSI S1.43–1997, Type 1

**Note:** The International IEC Standards are adopted as European standards by CENELEC. When this happens, the letters IEC are replaced with EN and the number is retained. Type 2250/2270 also conforms to these EN Standards

#### Input

##### CHANNELS (Type 2270 only)

All measurements are made from either Ch.1 or Ch.2

##### TRANSDUCERS

Transducers are described in a transducer database with information on Serial Number, Nominal Sensitivity, Polarization Voltage, Free-field Type, CCLD required, Capacitance and additional information. The analogue hardware is set up automatically in accordance with the selected transducer

##### CORRECTION FILTERS

For Microphone Types 4189, 4190, 4191, 4193, 4193 + UC-0211, 4950, 4952, 4952+EH-2152, 4955-A, 4964, 4964 + UC-0211 and 4184-A, BZ-7222 is able to correct the frequency response to compensate for sound field and accessories:



**Sound Field:** Free field or diffuse field (for Types 4952 and 4184-A only: 0° (Top) reference direction and 90° (Side) reference direction)

**Accessories:**

- Types 4189, 4190, 4964 and 4964 + UC-0211 only: None, Windscreen UA-1650 or Outdoor Microphone Kit UA-1404
- Types 4191, 4193, 4193 + UC-0211 and 4955-A only: None or Windscreen UA-1650
- Type 4950 only: None or Windscreen UA-0237

For Accelerometer Types 4397-A, 4513, 4513-001, 4513-002, 4514, 4514-001, 4514-002, 4533-B, 4533-B-001, 4533-B-002, 4534-B, 4534-B-001, 4534-B-002, 8324, 8341, 8344, 8347-C + 2647-D the lower frequency limit will be optimized to match the specifications for the accelerometer

**Analysis**

**DETECTORS**

Parallel detectors on every measurement:

**A- or B-weighted (switchable):** Broadband detector channel with three exponential time weightings (Fast, Slow, Impulse), one linearly averaging detector and one peak detector

**C- or Z-weighted (switchable):** As for A- or B-weighted

**Overload Detector:** Monitors the overload outputs of all the frequency weighted channels

**MEASUREMENTS FOR SOUND INPUT**

X = frequency weightings A or B

Y = frequency weightings C or Z

V = frequency weightings A, B, C or Z

U = time weightings F or S

Q = exchange rate 4, 5 or 6 dB

N = number between 0.1 and 99.9

**For Display and Storage:**

Start Time	Stop Time	Overload %
Elapsed Time	L <sub>Xeq</sub>	L <sub>Yeq</sub>
L <sub>XE</sub>	L <sub>YE</sub>	L <sub>Ceq</sub> –L <sub>Aeq</sub>
L <sub>XSmax</sub>	L <sub>XFmax</sub>	L <sub>XImax</sub>
L <sub>YSmax</sub>	L <sub>YFmax</sub>	L <sub>YImax</sub>
L <sub>XSmin</sub>	L <sub>XFmin</sub>	L <sub>XImin</sub>
L <sub>YSmin</sub>	L <sub>YFmin</sub>	L <sub>YImin</sub>
L <sub>Xleq</sub>	L <sub>Yleq</sub>	L <sub>Aleq</sub> –L <sub>Aeq</sub>
L <sub>AFTeq</sub>	L <sub>AFTeq</sub> –L <sub>Aeq</sub>	Time Remaining
L <sub>ep,d</sub>	L <sub>ep,dv</sub>	E
Dose	Proj. Dose	L <sub>vpeak</sub>
#VPeaks (>NNNdB)	#VPeaks (>137dB)	#VPeaks (>135dB)
T <sub>vpeak</sub>	L <sub>avUQ</sub>	TWA
TWAv	DoseUQ	Proj. DoseUQ
L <sub>Aeq,T1,mov,max</sub>	L <sub>Aeq,T2,mov,max</sub>	L <sub>Ceq,T1,mov,max</sub>
L <sub>Ceq,T2,mov,max</sub>	ΔL <sub>eq,T1,mov,max</sub>	ΔL <sub>eq,T2,mov,max</sub>
Avg. RPM		

**Weather Data** (requires weather station):

Wind Dir. avg.	Wind Dir. min.	Wind Dir. max.
Wind Speed avg.	Wind Speed min.	Wind Speed max.
Amb. Temp.	Amb. Humidity	Amb. Pressure
Rainfall		

**Only for Display as Numbers or Quasi-analog Bars:**

L <sub>XS</sub>	L <sub>XF</sub>	L <sub>XI</sub>
L <sub>YS</sub>	L <sub>YF</sub>	L <sub>YI</sub>
L <sub>XS(SPL)</sub>	L <sub>XF(SPL)</sub>	L <sub>XI(SPL)</sub>
L <sub>YS(SPL)</sub>	L <sub>YF(SPL)</sub>	L <sub>YI(SPL)</sub>
L <sub>XN1</sub> or L <sub>XUN1</sub>	L <sub>XN2</sub> or L <sub>XUN2</sub>	L <sub>XN3</sub> or L <sub>XUN3</sub>
L <sub>XN4</sub> or L <sub>XUN4</sub>	L <sub>XN5</sub> or L <sub>XUN5</sub>	L <sub>XN6</sub> or L <sub>XUN6</sub>
L <sub>XN7</sub> or L <sub>XUN7</sub>	LV <sub>peak,1s</sub>	Trig. Input Voltage
Std.Dev.	L <sub>Aeq,T1,mov</sub>	L <sub>Aeq,T2,mov</sub>
L <sub>Ceq,T1,mov</sub>	L <sub>Ceq,T2,mov</sub>	ΔL <sub>eq,T1,mov</sub>
ΔL <sub>eq,T2,mov</sub>	Inst. RPM	

**Instantaneous Weather Data:**

Wind Dir.	Wind Speed
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**Instantaneous GPS Data:**

Latitude	Longitude
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**MEASUREMENTS FOR VIBRATION INPUT**

**For Display and Storage:**

Start Time	Stop Time	Overload %
Elapsed Time	Time Remaining	
aLinear	aLin(1k–20kHz)	
aFast max	aF max(1k–20kHz)	
aSlow max	aS max(1k–20kHz)	
aFast min	aF min(1k–20kHz)	
aPeak	aT <sub>Peak</sub>	
Crest Factor	Avg. RPM	

**Only for Display as Numbers or Quasi-analog Bars:**

aFast Inst	aF Inst(1k–20kHz)
aSlow Inst	aS Inst(1k–20kHz)
Inst RPM	Trig. Input Voltage

**Instantaneous GPS Data:**

Latitude	Longitude
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**MEASUREMENTS FOR DIRECT INPUT**

**For Display and Storage:**

Start Time	Stop Time	Overload %
Elapsed Time	Time Remaining	
Linear	Fast max	Slow max
Fast min	Slow min	Peak
T <sub>Peak</sub>	Crest Factor	Avg. RPM

**Only for Display as Numbers or Quasi-analog Bars:**

Fast Inst	Slow Inst
Inst RPM	Trig. Input Voltage

**Instantaneous GPS Data:**

Latitude	Longitude
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**MEASURING RANGES**

When using Microphone Type 4189:

**Dynamic Range:** From typical noise floor to max. level for a 1 kHz pure tone signal, A-weighted: 16.6 to 140 dB

**Primary Indicator Range:** In accordance with IEC 60651: A-weighted: 23.5 dB to 122.3 dB

**Linearity Range:** In accordance with IEC 60804: A-weighted: 21.4 dB to 140.8 dB

**Linear Operating Range:** In accordance with IEC 61672:

- A-weighted: 1 kHz: 24.8 dB to 139.7 dB
- C-weighted: 25.5 dB to 139.7 dB
- Z-weighted: 30.6 dB to 139.7 dB

**Peak C Range:** In accordance with IEC 61672: 1 kHz: 42.3 dB to 142.7 dB

## SAMPLING FOR STATISTICS

The Statistics can be based on either  $L_{XF}$ ,  $L_{XS}$  or  $L_{Xeq}$ :

- Statistics  $L_{XFN1-7}$  or  $L_{XSN1-7}$  are based on sampling  $L_{XF}$  or  $L_{XS}$ , resp., every 10 ms into 0.2 dB wide classes over 130 dB
- Statistics  $L_{XN1-7}$  are based on sampling  $L_{Xeq}$  every second into 0.2 dB wide classes over 130 dB

Full distribution saved with measurement

The Std.Dev. (Standard Deviation) parameter is calculated from the statistics

## 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 1038. The displayed RPM is the measured RPM divided by the RPM gear ratio

## Measurement Display and Control

### 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 ( $m/s^2$ ) or US/UK units (g)), direct data as voltage in dB or V, housekeeping data as numbers in relevant format.

Instantaneous measurement  $L_{XF}$  or Fast Inst is displayed as a quasi-analog bar

### MEASUREMENT CONTROL

**Manual:** Manually controlled single measurement

**Automatic:** Preset measurement time from 1 s to 24 hr in 1 s steps

**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 flash 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

## Signal Monitoring

The input signal can be monitored using an earphone/headphones connected to the headphone socket, or it can be fed to the output socket

### OUTPUT SIGNAL

**Input Conditioned:** A-, B-, C- or Z-weighted

**Gain Adjustment:** –60 dB to 60 dB

$L_{XF}$  output (every ms) as a DC voltage between 0 V and 4 V

DC output for calibration purposes: 0 dB ~ 0 V and 200 dB ~ 4 V

### HEADPHONE SIGNAL

Input signal can be monitored using this socket with headphones/earphones

**Gain Adjustment:** –60 dB to 60 dB

## 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

## Calibration

Initial calibration is stored for comparison with later calibrations

### ACOUSTIC

Using Sound Calibrator Type 4231 or custom calibrator. The calibration process automatically detects the calibration level when Sound Calibrator Type 4231 is used

### ELECTRICAL

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

### 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 setups. Setups 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)

## Software Specifications – Frequency Analysis Software BZ-7223

The specifications for BZ-7223 also include the specifications for Sound Level Meter Software BZ-7222.

### 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

### Input

#### CHANNELS (TYPE 2270 ONLY)

All measurements are made from either Ch.1 or Ch.2

### Frequency Analysis

#### 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

#### MEASUREMENTS FOR SOUND INPUT

X = frequency weightings A, B, C or Z, Y = time weightings F or S

Data for Storage

Full Spectral Statistics

#### Spectra for Display and Storage:

$L_{Xeq}$	$L_{XSmax}$	$L_{XFmax}$
$L_{XSmin}$	$L_{XFmin}$	

#### Spectra for Display Only:

$L_{XS}$	$L_{XF}$	$L_{XYN1}$
$L_{XYN2}$	$L_{XYN3}$	$L_{XYN4}$
$L_{XYN5}$	$L_{XYN6}$	$L_{XYN7}$

#### Single Values:

SIL	PSIL	SIL3
-----	------	------

$L_{Xeq}(f1-f2)^*$

NR NR Decisive Band

RC RC Classification

NCB NCB Classification

NC NC Decisive Band

Loudness Loudness Level

\* where f1 and f2 are frequency bands in the spectrum

#### MEASUREMENTS FOR VIBRATION AND DIRECT INPUT

#### Spectra for Display and Storage:

Linear	Fast max	Slow max
Fast min	Slow min	

#### Spectra for Display Only:

Fast Inst	Slow Inst
-----------	-----------

#### Single Values:

Linear  $(f1 - f2)^*$

\* where f1 and f2 are frequency bands in the spectrum

### MEASURING RANGES

When using Microphone Type 4189:

**Dynamic Range:** From typical noise floor to max. level for a pure tone signal at 1 kHz 1/3-octave: 1.1 to 140 dB

**Linear Operating Range:** In accordance with IEC 61260, 1/3-octave:  $\leq 20.5$  to 140 dB

### SAMPLING FOR OCTAVE OR 1/3-OCTAVE STATISTICS

X = frequency weightings A or B

The Statistics can be based on either  $L_{XF}$  or  $L_{XS}$ :

- Statistics  $L_{XFN1} - 7$  or  $L_{XSN1} - 7$  are based on sampling  $L_{XF}$  or  $L_{XS}$ , respectively, every T ms into 1 dB wide classes over 150 dB;

T = 100 for frequency range set to 12.5 – 20 kHz

T = 200 for frequency range set to 6.3 – 20 kHz

Full distribution can be saved with measurement

### Displays

#### MEASUREMENT DISPLAYS

**Spectrum:** One or two spectra superimposed + A/B and C/Z broadband bars

**Table:** One or two spectra in tabular form

**Y-axis:** Range: 5, 10, 20, 40, 60, 80, 100, 120, 140, 160 or 200 dB. Auto zoom or auto scale available. Sound data are displayed as dB values, vibration data as dB values or in physical units (SI units ( $m/s^2$ ) or US/UK units (g)), direct data as voltage in dB or V

**Cursor:** Readout of selected band

### Generator

#### INTERNAL GENERATOR

Built-in pseudo-random noise generator

**Spectrum:** Selectable between Pink and White

**Crest Factor:**

- Pink Noise: 4.4 (13 dB)
- White Noise: 3.6 (11 dB)

**Bandwidth:** Selectable:

- Lower Limit: 50 Hz (1/3-oct.) or 63 Hz (oct.)
- Upper Limit: 10 kHz (1/3-oct.) or 8 kHz (oct.)

**Output Level:** Independent of bandwidth

- Max.: 1  $V_{rms}$  (0 dB)
- Gain Adjustment: –60 to 0 dB

When bandwidth is changed, the level for all bands is automatically adjusted to comply with the set output level

**Correction Filters:** For Sound sources Type 4292, Type 4295 and Type 4296: Flat or Optimum

**Repetition Period:** 175 s

**Output Connector:** Output socket

#### EXTERNAL GENERATOR

Selectable as alternative to Internal Generator (for microphone input only)

To control external noise generator, set:

- **Levels:** 0 V (Generator off), 4.5 V (Generator on)
- **Rise-time and Fall-time:** 10  $\mu s$

The noise generator is turned on and off automatically during the measurement

**Escape Time:** 0 to 60 s

**Build-up Time:** 1 to 10 s

The generator can be turned on and off manually for checking equipment and sound levels

## Software Specifications – Logging Software BZ-7224

The specifications for BZ-7224 include the specifications for Sound Level Meter Software BZ-7222. BZ-7224 adds:

### Logging

#### MEASUREMENTS

**Logging:** Measurement data logged at preset periods into files on:

- SD Card
- USB Memory Stick

**Logging Period:** From 1 s to 24 hr with 1 s resolution

**Fast Logging:**  $L_{AF}$ ,  $L_{AS}$  and  $L_{Aeq}$  (sound input) or Fast Inst, Slow Inst and Linear (vibration and Direct input) can be logged every 100 ms, irrespective of logging period. For sound input you can also log LAF every 10 ms – this can only be stored and not displayed on the analyzer; it can be displayed on Measurement Partner Suite BZ-5503

**Broadband Data Stored at each Logging Interval:** All, or up to 10 selectable broadband sound data incl. Trig. Input Voltage, Avg. RPM, Weather data, and  $L_{Aeq,T,move}$  (for vibration and direct input: up to 5 parameters)

**Broadband Statistics Stored at each Logging Interval:** Full distribution, or none (sound input only)

**Spectrum Data Stored at each Logging Interval:** All, or up to three selectable spectra (license for BZ-7223 required)

**Spectral Statistics Stored at each Logging Interval:** Full distribution, or none (sound input only, license for BZ-7223 required)

**Logging Time:** From 1 s to 31 days with 1 s resolution

**Measurement Total:** For the logging time, in parallel with logging: All broadband data, statistics and spectra (license for BZ-7223 required)

#### MARKERS

One data exclusion marker and four user-definable markers for on-line marking of sound categories heard during the measurement  
Events can be set manually

#### TRIGGERS

Markers can be set and signal recordings can be started (license for BZ-7226 required) when a broadband level is above or below a specified level

#### ANNOTATIONS

On-line annotations with spoken comments, written notes or images (Type 2270 only)

#### Calibration

##### CHARGE INJECTION CALIBRATION (CIC)

Injects an internally generated electrical signal in parallel with the microphone diaphragm. A manual CIC can be performed whenever there is no measurement in progress

An automatic CIC can be performed at the start and end of a logging measurement

#### Measurement Displays

**Profile:** Graphical display of selectable measurement data versus time. Fast display of next or previous marker, profile overview of entire measurement

**Y-axis:** Range: 5, 10, 20, 40, 60, 80, 100, 120, 140, 160 or 200 dB. Auto zoom or auto scale available. Sound data are displayed as dB values, vibration data as dB values or in physical units (SI units ( $m/s^2$ ) or US/UK units (g)), direct data as voltage in dB or V.

**X-axis:** Scroll facilities

**Cursor:** Readout of measurement data at selected time

#### Notifications

**Alarm Conditions** (in addition to those specified for BZ-7222):

- CIC failed
- Trigger Level exceeded

## Software Specifications – Enhanced Logging Software BZ-7225

The specifications for BZ-7225 include the specifications for Logging Software BZ-7224. BZ-7225 adds:

### Logging

#### For Display and Storage

$L_{dn}$ ,  $L_{den}$ ,  $L_{day}$ ,  $L_{evening}$  and  $L_{night}$

Selectable Day, Evening and Night periods and penalties (sound input only)

**Periodic Reports:** Measurement data logged at a preset report period into files on:

- SD Card
- USB Memory Stick

**Report Period:** From 1 min to 24 h with 1 min resolution

**Broadband Data and Statistics Stored at each Reporting Interval:** All including Weather data

**Spectrum Data Stored at each Reporting Interval:** All (license for BZ-7223 required)

**Spectral Statistics Stored at each Reporting Interval:** Full distribution, or none (sound input only, license for BZ-7223 required)

**Logging Time:** From 1 s to 31 days with 1 s resolution or Continuous  
Data are saved in separate projects for every 24 hr of logging – at a user-defined time of day

Automatic reboot and resume of operation in case of power failure

#### TRIGGERS

Signal Recording Timer

For periodically starting a signal recording (license for BZ-7226 required)

#### Level Triggers

Markers can be set and signal recordings can be started (license for BZ-7226 required) when a broadband or frequency band level is above or below a specified level. Hold off time between triggers can be set.

You can specify up to four independent Level Triggers to be active at four different times during the day

#### Calibration

##### CHARGE INJECTION CALIBRATION (CIC)

Injects an internally generated electrical signal in parallel with the microphone diaphragm. A manual CIC can be performed whenever there is no measurement in progress

An automatic CIC can be performed at the start and end of a logging measurement. The CIC can be set to occur up to 4 times in each 24 hour period

**CIC Duration:** 10 s

#### Notifications

**Alarm Conditions** (in addition to those specified for BZ-7224):  $L_{Aeq}$  for the latest Report Period exceeds a set threshold



## Software Specifications – Signal Recording Option BZ-7226

Signal Recording Option BZ-7226 is enabled with a separate license. It works with all analyzer software: Sound Level Meter, Frequency Analysis, Logging Software, Enhanced Logging Software and Reverberation Time Software

For data storage, Signal Recording requires:

- SD Card
- USB Memory Stick

### RECORDED SIGNAL

A-, B-, C- or Z-weighted signal from the measurement transducer

### 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.

Sampling Rate (kHz)	8	16	24	48
Maximum Pre-recording (s) 16-bit	470	230	150	70
Maximum Pre-recording (s) 24-bit	310	150	96	43
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 tachometer trigger information are stored in the .WAV file, allowing BZ-5503 and PULSE to analyse the recordings

### Functions with BZ-7222 and BZ-7223

**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

### Functions with BZ-7224 and BZ-7225

**Manual Control of Recording (using Manual Event or Back-erase pushbutton, or an external signal):** Recording during all of the event, or for preset minimum and maximum duration. A Sound marker is set while recording. Selectable pre- and post-recording time

**Manual Control of Recording (using touch screen):** Recording for the selected time period (subject to the limitations of the pre-recording buffer). A Sound marker is set for the selected time period

**Automatic Control of Recording:** An event can be triggered when a broadband level is above or below a specified level. Recording during all of the event or for preset minimum and maximum duration. Selectable pre- and post-recording time

### Functions with BZ-7227

**Automatic Control of Recording:** Start of recording when measurement is started  
16-bit recording format only

## Software Specifications – Reverberation Time Software BZ-7227

### Standards

Conforms with the relevant parts of the following:

- IEC 61672-1 (2013) Class 1
- IEC 60651 (1979) plus Amendment 1 (1993-02) and Amendment 2 (2000-10), Type 1
- IEC 61260-1 (2014), 1/1-octave Bands and 1/3-octave Bands, Class 1
- ANSI S1.4-1983 plus ANSI S1.4A-1985 Amendment, Type 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
- ISO 140
- ISO 3382
- ISO 354

### CORRECTION FILTERS

For Microphone Types 4189, 4190, 4191, 4193, 4950, 4952, 4952+EH-2152, 4955-A, 4964 and 4184-A, BZ-7227 is able to correct the frequency response to compensate for sound field and accessories

### Broadband Measurements

#### DETECTORS

**A- and C-weighted** broadband detectors with F exponential time weighting

**Overload Detector:** Monitors the overload outputs of all the frequency weighted channels

### MEASUREMENTS

$L_{AF}$  and  $L_{CF}$  for display as numbers or quasi-analogue bars

### MEASURING RANGES

When using Microphone Type 4189:

**Dynamic Range:** From typical noise floor to max. level for a 1 kHz pure tone signal, A-weighted: 16.6 to 140 dB

**Primary Indicator Range:** In accordance with IEC 60651, A-weighted: 23.5 dB to 122.3 dB

**Linear Operating Range:** In accordance with IEC 61672:

- A-weighted: 23.5 dB to 122.3 dB
- C-weighted: 25.5 dB to 139.7 dB
- Z-weighted: 30.6 dB to 139.7 dB

### Frequency Analysis

#### CENTRE FREQUENCIES

**1/1-oct. Band Centre Frequencies:** 63 Hz to 8 kHz

**1/3-oct. Band Centre Frequencies:** 50 Hz to 10 kHz

### MEASUREMENTS

$L_{ZF}$  spectrum for display only

$L_{Zeq}$  spectra sampled at 5 ms intervals

### MEASURING RANGES

When using Microphone Type 4189:

**Dynamic Range:** From typical noise floor to max. level for a pure tone signal at 1 kHz 1/3-octave: 1.1 to 140 dB

**Linear Operating Range:** In accordance with IEC 61260, 1/3-octave:  $\leq 20.5$  dB to 140 dB

## Internal Generator

Built-in pseudo-random noise generator

**Spectrum:** Selectable Pink or White

**Crest Factor:**

- Pink noise: 4.4 (13 dB)
- White noise: 3.6 (11 dB)

**Bandwidth:** Follows measurement frequency range

- Lower Limit: 50 Hz (1/3-oct.) or 63 Hz (oct.)
- Upper Limit: 10 kHz (1/3-oct.) or 8 kHz (oct.)

**Output Level:** Independent of bandwidth

- Max.: 1 V<sub>rms</sub> (0 dB)
- Gain Adjustment: -60 to 0 dB

When bandwidth is changed, the level for all bands is automatically adjusted to comply with the set output level

**Correction Filters for Sound Sources Type 4292, Type 4295 and Type 4296:** Flat or Optimum

**Turn-on Time and Turn-off Time:** Equivalent to RT = 70 ms

**Repetition Period:** 175 s

**Output Connector:** Output Socket

**Control:** See Measurement Control

## External Generator

Selectable as alternative to internal generator

For controlling external noise generator

**Levels:** 0 V (Generator off), 4.5 V (Generator on)

**Rise-time and Fall-time:** 10  $\mu$ s

**Control:** See Measurement Control

## Reverberation Time

EDT, T20 and T30 in octave or 1/3-octave bands

**Decays:** Measured and stored using averaging time of 5 ms

**Evaluation Range:** 0 to -10 dB for EDT, -5 to -25 dB for T20 and -5 to -35 dB for T30

**Measurement Time:** Automatic selection of measurement time for the decays based on the actual reverberation time of the room

**Maximum Measurement Time:** from 2 to 30 s

**Averaging:** EDT, T20 and T30 measurements can be averaged (arithmetic averaging or ensemble averaging)

**EDT, T20 and T30 Calculation:** From slope in evaluation range

**Slope Estimation:** Least squares approximation

**Quality Indicators:** Quality Indicators with status information like Overload, Curvature in %, etc.; extensive list of status information.

Quality indicators are available on reverberation time spectra for each frequency band, and as overall quality indicators for each measurement position and for the total project (room)

**Reverberation Time Range:** Max. 50 s, min. 0.1 – 0.7 s, depending on bandwidth and centre frequency

**Wide Band Reverberation Time:** The arithmetic average of the Reverberation Time within a selectable frequency range is calculated

## Measurement Display and Control

### OVERVIEW MAP

Map of Source and Receiver positions with reverberation time readout for a selectable frequency band on each measurement position together with quality indicator

**Organization of Source and Receiver Positions:** measure at all receiver positions for each source or measure in a number of positions (1 to 10) for each source

Source and Receiver positions can be added, moved or deleted

### OVERVIEW TABLE

Table of measurement positions with reverberation time readout for selectable frequency band on each position together with quality indicator

Positions can be included/excluded from Room average

### SOUND LEVEL SPECTRUM

LZF spectrum plus A and C broadband bars

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

**Cursor:** Readout of selected band

Quality indicator for each frequency band

### REVERBERATION TIME SPECTRUM

One or two spectra can be displayed

**Y-axis:** Range: 0.5, 1, 2, 5, 10 or 20 s. Auto zoom available

**Cursor:** Readout of selected band

Quality Indicator for each frequency band

### REVERBERATION TIME SPECTRUM TABLE

One or two spectra can be displayed in tabular form

### DECAY

Decay curve for a position or the room average available for each frequency band

Display of evaluation range and regression line

Readout of Curvature in %

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

### MEASUREMENT CONTROL

**Measurement Sequence:** Supports measuring:

- at all receiver positions before using another source
- at a receiver position for all sources before measuring at a new position
- at subsequent receiver positions without source information, or
- at manually selected source and receiver positions

During measurement, the instantaneous sound level spectrum is displayed. After measurement, the reverberation time is displayed

**Interrupted Noise Excitation:** Measurements are started manually and can be automatically stored on completion of measurement

The noise generator is turned on and off automatically

**Escape Time:** 0 to 60 s

**Build-up Time:** 1 to 10 s

**Number of Decays per Measurement:** 1 to 100, ensemble averaged into one decay

The generator can be turned on and off manually for checking equipment and sound levels

Serial Measurements: Selected frequency bands can be measured serially, that is, one by one in an automatic sequence. This can be done automatically in combination with the parallel measurement

**Impulse Excitation:** Manual start of first measurement. When level (say from starter pistol) exceeds the user-selected trigger level, the decay is recorded and backwards integration performed (Schroeder method). The trigger can then be armed automatically for measuring at the next position

**Signal Recording:** (requires license for Signal Recording Option BZ-7226) Recording of the Z-weighted measured signal can be done at each position. For data storage, Signal Recording requires:

- SD Card
- USB Memory Stick

## Measurement Status

### ON SCREEN

Information such as *overload*, *awaiting trigger* and *running/paused* are displayed on screen as icons

### TRAFFIC LIGHT

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 trigger or calibration signal
- Green LED on constantly = measuring
- Yellow LED flashing slowly = paused, measurement not stored
- Red LED flashing quickly = intermittent overload, calibration failed

## Calibration

Initial calibration is stored for comparison with later calibrations

## ACOUSTIC

Using Sound Calibrator Type 4231 or custom calibrator. The calibration process automatically detects the calibration level when Sound Calibrator Type 4231 is used

## ELECTRICAL

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

## CALIBRATION HISTORY

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

## Signal Monitoring

Input signal A-, C- or Z-weighted can be monitored using an earphone/headphones connected to the headphone socket

**Headphone Signal:** Input signal can be monitored using this socket with headphones/earphones

**Gain Adjustment:** –60 dB to 60 dB

## Annotations

### VOICE ANNOTATIONS

Voice annotations can be attached to the Reverberation Time Project, to Sources, to Receivers and to measurements at each Position

**Playback:** Playback of voice annotations or signal recordings can be listened to using earphone/headphones connected to the headphone socket

**Gain Adjustment:** –60 dB to +60 dB

## TEXT AND IMAGE ANNOTATIONS

Text and image (Type 2270 only) annotations can be attached to the Reverberation Time Project, to Sources, to Receivers and to measurements at each Position

## GPS ANNOTATIONS

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

## Data Management

**Project Template:** Defines the display and measurement setups

**Project:** Measurement data for all positions defined in a room are 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)

For specifications and details on documenting results in Qualifier Type 7830 and Qualifier Light Type 7831, please refer to Product Data BP 1691

## Software Specifications – 2-channel Option BZ-7229

2-channel Option BZ-7229 is enabled with a separate license. It adds 2-channel functionality to Sound Level Meter, Frequency Analysis, Logging, Enhanced Logging and Building Acoustics Software and to Signal Recording Option on Type 2270

Please refer to Product Data BP 2190 for 2-channel Building Acoustics Software specifications

In general the 2-channel option adds an extra channel of measurement data. The two channels can have input from same type of transducers (such as two microphones) or two different transducers (such as one microphone and one accelerometer)

### SELF-GENERATED NOISE LEVEL

Typical values at 23 °C for nominal microphone open-circuit sensitivity:

#### High Range:

Weighting	Microphone	Electrical	Total
"A"	14.6 dB	28.3 dB	28.5 dB
"B"	13.4 dB	26.9 dB	27.1 dB
"C"	13.5 dB	27.0 dB	27.2 dB
"Z" 5 Hz–20 kHz	15.3 dB	31.2 dB	31.3 dB
"Z" 3 Hz–20 kHz	15.3 dB	32.1 dB	32.2 dB

#### Low Range:

Weighting	Microphone	Electrical	Total
"A"	14.6 dB	12.4 dB	16.6 dB
"B"	13.4 dB	11.5 dB	15.6 dB
"C"	13.5 dB	12.9 dB	16.2 dB
"Z" 5 Hz–20 kHz	15.3 dB	18.3 dB	20.1 dB
"Z" 3 Hz–20 kHz	15.3 dB	25.5 dB	25.9 dB

### MEASURING RANGES

The full level measuring range is covered in two range settings: High Range for the least sensitive range and Low Range for the most sensitive range

When using Microphone Type 4189:

#### Broadband Analysis

**Dynamic Range:** From typical noise floor to max. level for a 1 kHz pure tone signal, A-weighted:

- High Range: 28.5 to 140 dB

- Low Range: 16.6 to 110 dB

**Primary Indicator Range:** In accordance with IEC 60651, A-weighted:

- High Range: 41.7 dB to 122.3 dB
- Low Range: 23.5 dB to 92.3 dB

**Linearity Range:** In accordance with IEC 60804, A-weighted:

- High Range: 39.6 to 140.8 dB
- Low Range: 21.4 to 110.8 dB

**Linear Operating Range:** In accordance with IEC 61672:

- A-weighted: 1 kHz
  - High Range: 43.0 dB to 139.7 dB
  - Low Range: 24.8 dB to 109.7 dB
- C-weighted: 1 kHz
  - High Range: 41.7 dB to 139.7 dB
  - Low Range: 25.5 dB to 109.7 dB
- Z-weighted: 1 kHz
  - High Range: 45.9 dB to 139.7 dB
  - Low Range: 30.6 dB to 109.7 dB

**Peak C Range:** In accordance with IEC 61672, 1 kHz:

- High Range: 58.5 dB to 142.7 dB
- Low Range: 42.3 dB to 112.7 dB

### Frequency Analysis

**Dynamic Range:** From typical noise floor to max. level for a pure tone signal at 1 kHz 1/3-octave:

- High Range: 18.5 to 140 dB
- Low Range: 1.3 to 110 dB

**Linear Operating Range:** In accordance with IEC 61260:

- High Range: ≤39.3 to 140 dB
- Low Range: ≤20.6 to 110 dB

## Measurements with BZ-7222 and BZ-7223

Two channels, each with all the data from the single channel measurement, except for common housekeeping parameters like Start Time, Elapsed Time, etc. and weather and GPS data.

**Underrange Detector:** Monitors the underrange of all the frequency-weighted detectors. Underrange is set if level is below lower limit of Linear Operating Range. Detectors available for both Ch. 1 and Ch. 2

### AUTORANGE

Manual and automatic range controls are provided

**Spectrum Display** (for BZ-7223)

Spectra from both channels can be superimposed. Data from different transducer types are displayed with individual Y-axis

**Spectra for Display** (microphone input):

- Ch.1 – Ch.2  $L_{Xeq}$
- Ch.2 – Ch.1  $L_{Xeq}$

X = A, B, C or Z

**Spectra for Display** (accelerometer or direct input):

- Ch.1 – Ch.2 Linear
- Ch.2 – Ch.1 Linear

**Single Values for Display** (microphone input):

- Ch.1 – Ch.2  $L_{Xeq}$
- Ch.2 – Ch.1  $L_{Xeq}$
- Ch.1 – Ch.2  $L_{Yeq}$
- Ch.2 – Ch.1  $L_{Yeq}$

X = A or B. Y = C or Z

**Single Values for Display** (accelerometer or direct input):

- Ch.1 – Ch.2 Linear
- Ch.2 – Ch.1 Linear
- Ch.1 – Ch.2 Linear detector 2 (Acc. input only)
- Ch.2 – Ch.1 Linear detector 2 (Acc. input only)

## Measurements with BZ-7224 and BZ-7225

**Fast Logging:** Up to a total of four of the 100 ms parameters from the two channels can be logged (incl. the 10 ms parameter for sound input)

Broadband Data Stored at Each Logging Interval:

All, or up to 10 selectable broadband values from the two channels

**Spectrum Data Stored at each Logging Interval:** All, or up to four selectable spectra from the two channels (license for BZ-7223 required)

**2-channel Signal Recording** (license for BZ-7226 required): 2-channel Signal Recording is available in Sound Level Meter, Frequency Analysis, Logging and Enhanced Logging Software

The signals from the two channels can be recorded into a “stereo” wave file of either  $2 \times 24$ -bit or  $2 \times 16$ -bit

## SAMPLING RATE AND PRE-RECORDING FOR 2-CHANNEL RECORDING

Sampling Rate (kHz)	8	16	24	48
Maximum Pre-recording (s) 16-bit	230	110	70	30
Maximum Pre-recording (s) 24-bit	150	70	43	16
Memory (KB/s) 16-bit	32	64	96	192
Memory (KB/s) 24-bit	48	96	144	288

## Software Specifications – Tone Assessment Option BZ-7231

### LICENSE

Tone Assessment Option BZ-7231 is enabled with a separate license and can be used with the FFT template (BZ-7230) or with 1/3-octave and logging template (BZ-7223, BZ-7224 and BZ-7225))

### FFT Based Tone Assessment (with BZ-7230 Only)

#### STANDARD

Tone assessment is based on the measured FFT spectrum in accordance with ISO 1996:2007 Acoustics – Description, assessment and measurement of environmental noise – part 2: Determination of environmental noise levels. Annex C (informative) Objective method for assessing the audibility of tones in noise – Reference method

#### SPECTRA ASSESSED

Any displayed sound FFT spectrum (FFT, Ref or Max) may be assessed. Assessment is made as post-processing, that is, when measurement is paused or stopped

#### SETUP ACCORDING TO STANDARD

Setups in violation of the standard are indicated as such on the display, you may then accept to apply the default setup

Tone assessment will be made if possible, in spite of standard violations

**Tone Seek Criterion:** 0.1 to 4.0 dB in 0.1 dB steps

#### TONE AT CURSOR

A sinusoidal tone is available at the Headphone output, to help confirm identified tones

**Frequency:** the frequency is selected by the Main cursor

**Gain:** –70 dB to +10 dB

**Options:** The generated tone can be mixed with the input signal

#### TONE ASSESSMENT CURSOR

All tones found are indicated in the display.

The Tone cursor is initially placed at the most prominent tone, and can then be stepped through the tones found.

You can also use the main cursor to step through the tones

#### RESULTS

Results are displayed in the Tone panel and in the Value panel

They are not saved with the measurement

**All Tones:** Frequency, Tone level  $L_{pti}$ , Masking noise level  $L_{pn}$ , Audibility  $\Delta L_{ta}$ , Critical Band CB, Tone vs. Noise Level difference  $\Delta L_{ts}$ , Audibility criterion  $\Delta L_{ts,krit}$

**Most Prominent Tone:** Tone Level  $L_{pt}$ , Adjustment  $K_t$

### QUALITY INDICATORS

On the display, a quality indicator (smiley) will indicate that a hint is available for tone assessment quality. Click on the indicator to see the hint

### 1/3-octave Based Tone Assessment (with BZ-7223/24/25 Only)

Tone assessment is based on the measured 1/3-octave spectrum in accordance with either the international ‘ISO 1996:2007 Acoustics – Description, assessment and measurement of environmental noise – part 2: Determination of environmental noise levels. Annex D (informative) Objective method for assessing the audibility of tones in noise – Simplified method’ or the Italian law ‘DM 16-03-1998: Ministero dell’ambiente, Decreto 16 marzo 1998’

#### SPECTRA ASSESSED

The displayed 1/3-octave spectrum ( $L_{eq}$ ,  $L_{max}$  or  $L_{min}$ ) may be assessed. Assessment is made as post-processing, that is, when measurement is paused or stopped

#### SETUP ACCORDING TO STANDARD

Setups in violation of the standard are indicated as such on the display. You can then accept to apply the default setup. Tone assessment will be made if possible, in spite of standard violations. For tone assessment according to ISO 1996-2, Annex D, you can set the division between the Low and Middle frequency range, the division between the Middle and High frequency range, and the limits for the level differences between adjacent bands.

For tone assessment according to DM 16-03-1998, the tones are tested against loudness contours. Select between ISO 226: 1987 Free-field, 1987 Diffuse-field and 2003 Free-field

#### RESULTS

Tones are indicated above the spectrum when *Tone* is selected as spectrum parameter. The resulting adjustment can be viewed on the Value panel. It is not saved with the measurement



## 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 G-weighting and human vibration parameters and adds 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

### G-weighting

Specifications for G-weighting apply to Type 2250/2270 fitted with one of the Microphone Types 4193 or 4964 (both with or without the Low Frequency Adaptor UC-0211) and Microphone Preamplifier ZC-0032

### Standards

Conforms with the following national and international standards:

- ISO 7196:1995
- ANSI S1.42–2001 (R2011)

### Analysis

#### DETECTORS

G-weighted (replacing C/Z-weighted) broadband detectors with one 10 s exponential time weighting, one linearly averaging detector and one peak detector.

#### MEASUREMENTS

Y = time weightings F or S

**Spectra for Display and Storage (BZ-7223 required):**

$L_{Geq}$                        $L_{GSmax}$                        $L_{GFmax}$   
 $L_{GSmin}$                        $L_{GFmin}$

**Spectra for Display Only (BZ-7223 required):**

$L_{GS}$                        $L_{GF}$                        $L_{GYN1}$   
 $L_{GYN2}$                        $L_{GYN3}$                        $L_{GYN4}$   
 $L_{GYN5}$                        $L_{GYN6}$                        $L_{GYN7}$

**Single Values for Display and Storage:**

$L_{Geq}$                        $L_{G10max}$                        $L_{G10min}$   
 $L_{Gpeak}$                        $T_{Gpeak}$

### Single Values for Display Only:

$L_{G10}$                        $L_{Gpeak,1s}$

#### MEASURING RANGES

G-weighted Linear Operating Range at G-filter reference frequency 10 Hz

#### Single Range:

Microphone	Low (dB)	High (dB)
4193	41.0	161.0
4194 + UC-0211	44.1	151.4
4964	29.6	149.0
4964 + UC-0211	32.6	139.3

#### High Range:

Microphone	Low (dB)	High (dB)
4193	41.6	161.0
4194 + UC-0211	51.8	151.4
4964	30.3	149.0
4964 + UC-0211	41.7	139.3

#### Low Range:

Microphone	Low (dB)	High (dB)
4193	41.0	131.0
4194 + UC-0211	44.1	147.4
4964	29.6	119.0
4964 + UC-0211	32.6	137.3

### 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

### Analysis

#### DETECTORS

Addition to the Acc Linear and Acc 1k-20kHz settings for the two broadband detectors:

Vel 3 – 20 000 Hz      Vel 0.3 – 1000 Hz      Vel 10 – 1000 Hz  
Vel 1 – 100 Hz      Dis 10 – 1000 Hz      Dis 30 – 300 Hz  
Dis 1 – 100 Hz

The weighting for the peak detector can be set to one of the settings chosen for the broadband detectors or Acc Linear

The weighting for the spectrum detectors can be set to Acc Linear or Vel 3 – 20000 Hz, Vel 0.3 – 1000 Hz, Vel 10 – 1000 Hz or Vel 1 – 100 Hz

**Single Values for Display and Storage:** Peak-Peak for displacement

### 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:

Acc Linear	Vel 0.3 – 1000 Hz	Vel 1 – 100 Hz
$W_b$	$W_c$	$W_d$
$W_e$	$W_j$	$W_h$
$W_k$	$W_m$	$W_{xb}$
$W_{hb}$	$W_{mb}$	

$W_{mb}$  is the band limiting part of  $W_m$ .  $W_{hb}$  is the band limiting part of  $W_h$  and  $W_{xb}$  is the band limiting part of  $W_b$ ,  $W_c$ ,  $W_d$ ,  $W_e$ ,  $W_j$  and  $W_k$ . The weighting for the peak detector can be set to one of the settings chosen for the broadband detectors or Acc Linear. The weighting for the spectrum detectors can be set to Acc Linear or Vel 0.3 – 1000 Hz or Vel 1 – 100 Hz

### MEASUREMENTS

Single Values for Display and Storage:

MTVV	$KBF_{max}$	$KBF_{Tm}$
Peak-Peak		

Single Values for Display Only:

aW,1s	KBF
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## 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

### Sound Measurements

Low-frequency sound measurements require use of a low-frequency microphone. This can be Type 4193 or Type 4964, both together with Low-frequency Adaptor UC-0211

### Vibration Measurements

Brüel & Kjær recommends Low-level Accelerometer Type 8344 for low frequency vibration measurements

## Specifications – Measurement Partner Suite BZ-5503

BZ-5503 is included with Types 2250, 2250-L 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

### ON-LINE DISPLAY OF TYPE 2250/2250-L/2270 DATA

Measurements on the analyzer can be controlled from the PC and displayed on-line with the PC, using the same user interface on the PC as on the analyzer

**Display:** 1024 × 768 (1280 × 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 – 2013 supported)

**Brüel & Kjær Software:** Projects can be exported\* to Predictor-Lima Type 7810, Acoustic Determinator Type 7816, Evaluator Type 7820, Protector Type 7825 or Qualifier (Light) Type 7830 (7831)

### POST-PROCESSING

Measurement Partner Suite is a suite of modules, including post-processing tools for data acquired with Type 2250/2270. 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

- USB Connection:
- USB ver. 2.0

### LICENSE MOVER

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

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

## 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

## Ordering Information

<b>Type 2250-A</b>	Hand-held Analyzer with Sound Level Meter Software BZ-7222
<b>Type 2250-B</b>	Hand-held Analyzer with Sound Level Meter BZ-7222 and Frequency Analysis Software BZ-7223
<b>Type 2250-C</b>	Hand-held Analyzer with Sound Level Meter Software BZ-7222 and Logging Software BZ-7224
<b>Type 2250-D</b>	Hand-held Analyzer with Sound Level Meter Software BZ-7222, Frequency Analysis Software BZ-7223 and Logging Software BZ-7224
<b>Type 2250-E</b>	Hand-held Analyzer with Sound Level Meter Software BZ-7222, Frequency Analysis Software BZ-7223, Enhanced Logging Software BZ-7225 and Signal Recording Software BZ-7226
<b>Type 2270-A</b>	Hand-held Analyzer with Sound Level Meter Software BZ-7222
<b>Type 2270-B</b>	Hand-held Analyzer with Sound Level Meter BZ-7222 and Frequency Analysis Software BZ-7223
<b>Type 2270-C</b>	Hand-held Analyzer with Sound Level Meter Software BZ-7222 and Logging Software BZ-7224
<b>Type 2270-D</b>	Hand-held Analyzer with Sound Level Meter Software BZ-7222, Frequency Analysis Software BZ-7223 and Logging Software BZ-7224
<b>Type 2270-E</b>	Hand-held Analyzer with Sound Level Meter Software BZ-7222, Frequency Analysis Software BZ-7223, Enhanced Logging Software BZ-7225 and Signal Recording Software BZ-7226

Included with Hand-held Analyzer Type 2250/2270:

- Microphone:
  - Type 4189: 1/2" Prepolarized Free-field Microphone or
  - Type 4190: 1/2" Free-field Microphone
- ZC-0032: Microphone Preamplifier
- AO-1494: USB Standard A to USB Micro B Interface Cable for hardware version 4, 1.8 m (6 ft)
- AO-1476: USB Standard A to USB Mini B Interface Cable for hardware versions 1 – 3, 1.8 m (6 ft)
- BZ-5298: Environmental Software, including Measurement Partner Suite BZ-5503
- UA-1650: 90 mm dia. Windscreen with AutoDetect
- UA-1651: Tripod Extension for Hand-held Analyzer
- UA-1673: Adaptor for Standard Tripod Mount
- DH-0696: Wrist Strap
- KE-0440: Travel Bag
- KE-0441: Protective Cover
- FB-0679: Hinged Cover (Type 2250 only)
- FB-0699: Hinged Cover (Type 2270 only)
- HT-0015: Earphones
- UA-1654: 5 Extra Styli
- QB-0061: Battery Pack
- ZG-0426: Mains Power Supply
- UL-1050: USB Wi-Fi dongle for hand-held analyzers for hardware version 4

## Software and Accessories Available Separately

### SOFTWARE MODULES

BZ-7223	Frequency Analysis Software
BZ-7224	Logging Software (including memory card)
BZ-7225	Enhanced Logging Software (including memory card)

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-7227	Reverberation Time Software
BZ-7229	2-channel Option (Type 2270 only)
BZ-7228	Building Acoustics Software
BZ-7230	FFT Software
BZ-7231	Tone Assessment Option
BZ-7233	Sound Intensity Software (Type 2270 only)
BZ-7234	Enhanced Vibration and Low Frequency Option

### ANALYZER COMPONENTS

ZG-0444	Charger for QB-0061 Battery Pack
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### CALIBRATION

Type 4231	Sound Calibrator (fits in KE-0440)
Type 4226	Multifunction Acoustic Calibrator
Type 4228	Pistonphone
Type 4294	Calibration Exciter
Type 4194-002	Calibration Exciter for Type 8344

### MEASURING

Type 3535-A	All-weather Case (see Product Data BP 2251)
Type 4964	Low-frequency Microphone
Type 8344	Low-level Accelerometer
AO-0440-D-015	Signal Cable, LEMO to BNC Male, 1.5 m (5 ft)
AO-0646	Sound Cable, LEMO to Minijack, 1.5 m (5 ft)
AO-0697-D-030	Microphone Extension Cable, 10-pin LEMO, 3 m (10 ft)
AO-0697-D-100	Microphone Extension Cable, 10-pin LEMO, 10 m (33 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	Signal Cable, LEMO to SMB (for Tacho Probe MM-0360/2981), 3 m (10 ft)
AO-0727-D-010	Signal Cable, LEMO to BNC Female, 1 m (3.3 ft)
AO-0727-D-015	Signal Cable, LEMO to BNC Female, 1.5 m (5 ft)
JP-1041	Dual 10-pole Adaptor
UA-0587	Tripod
UA-0801	Small Tripod
UA-1317	Microphone Holder
UA-1404	Outdoor Microphone Kit
UA-1672	AutoDetect Insert for UA-1650
UC-0211	Low-frequency Adaptor
UL-1009	SD Memory Card for hand-held analyzers
UL-1013	CF Memory Card for hand-held analyzers, for hardware versions 1 – 3
UL-1017	SDHC Memory Card for hand-held analyzers
MM-0256-A	Weather Station Kit
MM-0316-A	Weather Station Kit
Included with MM-0256-A or MM-0316-A:	
• MM-0256-002: Six Parameter Weather Station (and mounting kit)	
• MM-0316-002: Two Parameter Weather Station (and mounting kit)	
• AO-0657: USB Cable	
• AO-0659: Cable M12 8-pin (F) to LEMO 1-B 8-pin (M), 10 m (33.3 ft)	
• BR 1779: Weather Station Field Guide	
• DB-4364: Weather Station Pole Adapter	
• KE-4334: Weather Station Carrying Case	

- QX-0016: Screwdriver
- QX-1171: 2.5 mm Hex Wrench
- UA-1707-A: Weather Station Tripod Adaptor
- ZH-0689: Weather Station USB Adaptor

#### MEASURING WITH REVERBERATION TIME SOFTWARE BZ-7227

Type 2734-A	Power Amplifier*
Type 2734-B	Power Amplifier with built-in UL-0256 Wireless Audio System*
UL-0256	Wireless Audio System*
Type 4292-L	OmniPower Sound Source*
KE-0449	Flight Case for Type 4292-L*
KE-0364	Tripod Carrying Case for Type 4292-L
Type 4224	Sound Source
Type 4295	Omnidirectional Sound Source*
KE-0392	Carrying Case for Type 4295*
AO-0523-D-100	Cable, from Type 2250/2270 to power amplifier, 10 m (33 ft)
AO-0524-D-100	Cable from Type 2250/2270 to Type 4224, 10 m (33 ft)
AQ-0673	Cable, from power amplifier to sound source, 10 m (33 ft)
UA-1476	Wireless Remote Control*

#### POST-PROCESSING

Type 7831	Qualifier Light
Type 7830	Qualifier

#### INTERFACING

BZ-5503-A	Logging Module (see Product Data BP 2430)
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\* For sound source systems and components, please see Product Data BP 1689 or BP 0066.

BZ-5503-B  
BZ-5503-C

Type 7820  
Type 7825

UL-1016

UL-1019

UL-0250

Spectrum Module (see Product Data BP 2430)  
WAV File Analysis Module (see Product Data BP 2430)  
Evaluator – data viewing and calculation software  
Protector – software for calculation of Personal Noise Exposure  
10/100 Ethernet CF Card for hardware versions 1 – 3  
CF WLAN Card for Hand-held Analyzers for hardware versions 1 – 3  
USB to RS-232 Converter for hardware version 4

#### Service Products

##### MAINTENANCE

2250-EW1	Extended Warranty, one year extension
2250-MW5	5-year Warranty, including yearly Accredited Calibration
2270-EW1	Extended Warranty, one year extension
2270-MW5	5-year Warranty, including yearly Accredited Calibration

##### ACCREDITED CALIBRATION

2250-CAI	Accredited Initial Calibration of Type 2250
2250-CAF	Accredited Calibration of Type 2250
2250-CTF	Traceable Calibration of Type 2250
2250-TCF	Conformance Test of Type 2250, with certificate
2270-CAI	Accredited Initial Calibration of Type 2270
2270-CAF	Accredited Calibration of Type 2270
2270-CTF	Traceable Calibration of Type 2270
2270-TCF	Conformance Test of Type 2270, with certificate

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