PRODUCT DATA

Hand-held Analyzer — Type 2250

Sound Level Meter Software BZ 7222, Frequency Analysis Software BZ 7223, Logging Software BZ 7224 and Sound Recording Option BZ 7226

Type 2250 is the innovative, 4th generation, hand-held analyzer from Brüel & Kjær. The design philosophy is based on extensive research which concluded that the instrument should be easy and safe to use, while at the same time incorporating clever features. Type 2250 has been awarded several prizes for its combination of excellent ergonomics and attractive design.

Type 2250 can host a number of software modules, including frequency analysis, logging (profiling) and recording of the measured signal. These are available separately at any time – or you can order a fully pre-configured instrument from the factory.

The combination of software modules and innovative hardware makes the instrument into a dedicated solution for performing high-precision measurement tasks, in environmental, occupational and industrial application areas. As a result, you get the functionality you need now, plus the option of opening up for more functionality later – and your investment is securely protected.

Uses and Features

USES
- Environmental noise assessment and monitoring
- Occupational noise evaluation
- Selection of hearing protection
- Noise reduction
- Product quality control
- Class 1 sound measurements to the latest international standards
- Real-time analysis of sound in 1/1- and 1/3-octave bands
- Analysis of time histories for broadband parameters and spectra (Logging)
- Documentation of measurements using text and voice annotations
- Documentation of measurements through recording of measured sound

FEATURES
- Large, high-resolution, touch-sensitive colour screen
- Data storage on plug-in memory-cards
- Standard USB (On-the-Go) computer interface
- Dynamic range in excess of 120 dB
- 3 Hz – 20 kHz broadband linear frequency range
- Real-time frequency analysis in 1/1- or 1/3-octave bands
- Broadband and spectral data can be logged to obtain a time history for later analysis
- Sound recording of measured signal during all or parts of a measurement
- Personal measurement, display and job setup
- PC software included for setup, archiving, export and reporting
- Automatic detection of, and correction for, windscreen
- Robust and environmentally protected (IP44)

Brüel & Kjær
**Introduction**

Type 2250 has generous hardware and software specifications creating an extremely flexible instrument to cover your current and future measurement and analysis needs, ranging, for example, from the traditional uses in assessing environmental and workplace noise to industrial quality control and development. Type 2250 is a technological platform for realising measurement applications in a compact and robust hand-held instrument. Brüel & Kjær is committed to maintaining an ever-growing range of applications on this platform. As a platform, Type 2250 allows you to choose different combinations of software modules (applications). You can order a pre-configured instrument from the factory to meet your exact needs, or you can, at a later date, add functionality to your instrument. Additional applications are delivered as easily installed licenses and the software can be used in any combination. In this way your investment in the Type 2250 platform is securely protected and when your need for measurements and analyses expands, Type 2250 can accommodate them.

This data sheet describes the suite of software applications available for Type 2250. All instruments come with the Sound Level Meter Software (BZ 7222) enabled. This makes Type 2250 into a modern Class 1 Sound Level Meter (SLM). It fulfills the requirements of the latest standard, IEC 61672–1, as well as earlier standards (see the specifications section for detailed compliance information). Even in its most basic configuration, Type 2250 is delivered with a number of pre-defined measurement and display setups tailored to suit specific requirements. All the features making Type 2250 especially easy and safe to work with are included with this basic software, for example, annotation of measurements with spoken and written comments and automatic detection of the windscreen. This software, of course, also features a semi-automatic calibration procedure: it’s as simple as switching on the calibrator, preferably Type 4231, and tapping the **Calibrate** button.

**Post-processing Software**

The software modules are further enhanced by Brüel & Kjær’s post-processing software suite. All Type 2250 instruments include a dedicated PC software package (Utility Software for Hand-held Analyzers BZ 5503) which handles data transfer, archiving of data, export of data, setup, remote display, and software maintenance (for example, license installation and updates). Separately available post-processing applications include 7815 Noise Explorer™ for data viewing and archiving, 7820 Evaluator™ for advanced assessment of environmental noise, and 7825 Protector™ for assessing workplace noise.

**Optional Software Modules**

The software modules that are used in Type 2250 can be considered as blocks of optional functionality that can be enabled by license codes. Whichever modules you choose, you can be assured that a planned growth path is developing continuously with the product.

The optional software modules described in this data sheet are:

- **Frequency Analysis Software**, providing real-time analysis of the 1/1- and 1/3-octave filter bands over a wide frequency range with a dynamic range from the noise floor in each individual band to 140 dB.

- **Logging Software**, which allows free selection of parameters to log at periods from 1 s to 24 h. Running together with the Sound Level Meter Software all broadband parameters can be logged. If Frequency Analysis Software is also enabled, spectra can be logged at the same rates. Results are logged directly to CF or SD memory cards. Logging (or noise profiling) is used to develop time histories for use in environmental noise as well as workplace noise assessment.
3

Fig. 1 Key features of Hand-held Analyzer Type 2250

- **Power Switch**: Enables the device's power.

- **Windscreen**: Protects the sensor from external influences.

- **Navigation Pushbuttons**: A set of arrow keys for navigating menus.

- **Microphone/Preamplifier Stage**: Includes the Falcon™ Range ½" microphone and preamplifier stage.

- **USB (On-the-Go) Interface**: Allows data transfer and remote control of the instrument with a host PC.

- **Input**: Accepts AC/DC or CCLD signals, suitable for analysing electrical signals like sound recordings.

- **Output**: Provides an output socket for software-determined signals.

- **Display**: A touch-sensitive color screen with backlight.

- **Microphone for Commentary**: Used for adding recorded messages to measurements.

- **Battery Charge**: Accepts a universal mains adapter or external batteries, input range 8 – 24 V DC.

- **Battery Compartment**: Stores the rechargeable battery pack.

- **Cover for protecting connectors**: Prevents water and dust damage.

- **Thread for tripod/wrist strap**: Enhances portability and stability.

- **Non-slip surfaces**: Provides a safe grip during use.

- **Stylus (stored)**: For precise and easy interaction with the screen.

- **Slot for Compact Flash (CF) Card and Secure Digital (SD) Memory Card**: For data storage.

- **Slot for Secure Digital (SD) Memory Card**: For storing measurement results.

- **Start/Pause Pushbutton**: Starts and pauses measurement processes.

- **Commentary Pushbutton**: Attaches recorded messages to measurements.

- **Accept Pushbutton**: Accepts changes to parameters and setups.

- **Back Erase/Exclude Pushbutton**: Erases the last 5 seconds of data or marks logged data with an exclude marker.

- **Event Pushbutton**: Marks important events.

- **Index Pushbutton**: Allows marking events.

- **Commentary Pushbutton**: Adds recorded messages to measurements.

- **Reset Measurement Pushbutton**: Resets Type 2250 measurement buffers.

- **Battery Charge Indicator LED**: Indicates the battery's charge status.

- **Reset button**: Restores default settings.

- **3.5mm stereo socket for headphones**: Used for reviewing recorded comments or listening to measurement signals.

- **Thread for tripod/wrist strap**: Enhances portability and stability.
• **Sound Recording Option**, which provides you with a uniquely versatile facility for attaching samples of the actually measured signal to your measurements. This option works with all software modules. The recording uses the measurement transducer, while voice annotations (standard in all modules) use a separate commentary microphone.

**Easy, Safe and Clever**
The instrument design was inspired by the requirements of users participating in in-depth workshops around the world and the results of our research showed that besides being fun to use, the new generation of analyzer should be easy, safe and clever. Type 2250 meets these requirements in many ways (all the features below are included with every configuration):

• Type 2250 is **easy** to use – its robustness, lightness and ergonomic design make it easy to grip, hold and operate single-handedly. Ingenious software ensures you can start measuring quickly. You will never feel lost in the menu structure, in every situation you are just one tap or press of a pushbutton away from where you started. The backlit pushbuttons are easy to use and the large, colour touchscreen is visible in both sunlight and in difficult lighting conditions depending on the colour-scheme chosen. Type 2250 incorporates a simple user interface that can be controlled by using the stylus or the pushbuttons. It has an easy and intuitive data storage concept and on-line guidance is included to help you get familiar with the instrument quickly.

• Type 2250 is **safe** to use – it was built for use outdoors and in difficult environmental conditions, so it is powered by rechargeable Li-Ion batteries (with high capacity) and the casing incorporates non-slip materials to ensure a safe grip. The software guides you safely through each measurement and status indicators show measurement progress, even at a distance. You can document your measurements on the spot using on-the-fly voice or text annotations. These are automatically attached to your measurement and transferred with your data to the PC, with all the housekeeping being taken care of. So, you will always know which results go where. Type 2250 includes a multi-user login facility, which allows preferences, setups and data for different users – or different tasks – to be kept separate.

• Type 2250 is **clever** – it incorporates various smart features for field use, including: specially positioned backlit pushbuttons to allow vital start-stop-save actions to be done by feel and at night, single-handedly; a separate built-in commentary microphone, giving you the option of recording your personal comments while measuring and automatically attaching them to your on-going measurement; ‘traffic light’ indicators to give you a quick indication of your measurement’s status – visible at a distance; a calibration history, allowing you to document your measurement’s validity; semi-automatic calibration procedure built-in; and the presence of a windscreen is automatically detected and corrected for by built-in filters.

### Using the Platform
Great care has been taken to ensure that the hardware is ergonomically optimal in field use. Similarly, the software design has focused not only on making valid measurements but also on making field use efficient, convenient and intuitive. You can control the instrument using stylus and touch-screen, using pushbuttons, or using a combination of the two. All changes to the display (for example, the on-the-fly choice of displayed parameters) are made using drop-down lists directly on the display. Just tap and choose exactly where you want the information.

Likewise, all user choices for setups (what to measure) and preferences (how to display it) are controlled using easy to understand lists, that can be expanded and collapsed. No more cluttered displays, choose only the parameters you want to see.

**Display Options**
As a user, you have several ways of tailoring the display to suit your specific needs. However, standard display elements are used to ensure commonality not only across different software modules, but also across different users, setups and preferences.
Type 2250 applies a default colour scheme for the display. This is like most examples in this data sheet. However, the instrument includes several schemes allowing you to make your own choice. Special schemes are always included for outdoor use in bright sunlight (where maximum contrast is needed) and for night-time use (where no interference with night vision is wanted).

Type 2250 makes a distinction between the measurement made and how it is displayed. Generally, Type 2250 constantly measures all the available quantities in parallel, what you see on the display are the parameters you have selected to see. All the other quantities are measured simultaneously, irrespective of your display preferences.
You can view any quantity being measured, either during your measurement, or at any time later. This also includes data transferred to a PC.

In all configurations, Type 2250 offers a variety of views of the same measurement. These views have no impact on the measurement, but they allow you to see exactly what you want, without interfering with any data. If, for example, you are logging broadband values as well as spectra, you can choose to observe the profile, the time history, the overall or current spectrum, or the overall or current broadband values. The choice of display has no influence on what is measured or stored.

**Fig. 5**
Example displays showing: (on the left) the Logging Software BZ 7224 display, with an on-line marker selection in the profile display; (in the centre) the current averaged spectrum from the same measurement and; (on the right) the broadband values from the same measurement. Select freely between these displays at any time.

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**Sound Level Meter Software – BZ 7222**

**SLM Module**
All Type 2250s come with the Sound Level Meter Software enabled. This makes Type 2250 into a versatile broadband sound level meter; it complies with the latest international standard (IEC 61672–1) as well as previous international and national standards.

All quantities are measured at the same time. For example, A and C frequency weighted levels are measured simultaneously, and at the same time F, S and I time weightings are applied in parallel. In addition, Peak levels are measured. Full statistics are also computed on-the-fly. Combine this with the dynamic range exceeding 120 dB and you will never miss a beat! You get all the parameters in one attempt, under-range is non-existent and you will have difficulties provoking an overload. The detailed list of available parameters can be found in the specifications section. You choose what you want on the display, but, at any time – during or after the measurement – all other parameters can be inspected and reported.

The standard package allows you to document your measurements with written notes and voice annotations. Notes are added using a virtual keyboard on the touch screen.
Voice annotations are recorded using a separate commentary microphone when the commentary pushbutton is pushed and held. Voice annotations and notes can be attached before, during and after the measurement. Spoken comments during the measurement should, of course, be made during a pause or with the microphone placed at a distance using an extension cable. These unique features allows you to document your measurement (where, when, how, etc.,) and always have this information attached to the measurement. Notes and voice annotations can be reviewed on the instrument itself or after the data has been transferred to a PC.

If Sound Recording Option BZ 7226 (see page 9) is also enabled, you can record all or part of the measured signal. This recording is safely stored with the measurement. Thus it is easy to document that measured levels are indeed related to a particular noise source under investigation.

**Frequency Analysis Software – BZ 7223**

**Frequency Analysis Software for Type 2250**

Frequency Analysis Software BZ 7223 is an optional software module. It allows you to make real-time measurements in 1/1- and 1/3-octave bands over a wide frequency range. This makes it a simple matter to obtain spectra in order to, for example, select hearing protection, qualify heat and ventilation systems, and assess tonality.

The following frequency ranges are available:

- 1/1-octave spectra (centre frequencies 8 Hz to 16 kHz)
- 1/3-octave spectra (centre frequencies 6.3 Hz to 20 kHz)

In each band you have a full and unrivalled dynamic range from the noise floor in that particular band to 140 dB. That is, a dynamic range generally in excess of 135 dB.

Spectra can be A-, C- or Z-weighted. Five spectra are measured and stored and, in addition, instantaneous values are available for display. Two spectra, for example, a minimum and maximum spectrum, can be superimposed on the display. As a matter of course, all the broadband quantities measured by Sound Level Meter Software BZ 7222 are computed in parallel with the frequency analysis. Spectral analyses can be documented using notes and voice annotations.

If Sound Recording Option BZ 7226 (see page 9) is also enabled, you can record all or part of the investigated signal. This recording is safely stored with the measurement, allowing you to produce convincing documentation that the high levels in the 4 kHz band, are in fact related to a hiss from a particular piece of machinery.
Logging Software – BZ 7224

Fig. 8
Logged values, displayed as a profile. Note that a text annotation (left) and a voice annotation (right) are attached.

With the optional Logging Software enabled, Type 2250 becomes a versatile instrument for obtaining time histories. The Logging Software allows you to select freely among the broadband parameters and log them at intervals from 1 s to 24 h. At the same time $L_{\text{Aeq}}$ and/or $L_{\text{AF}}$ can be logged at 100 ms intervals.

If Frequency Analysis Software BZ 7223 is enabled, the Logging Software additionally lets you log spectra at the same 1 s to 24 h periods.

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

Among the most salient of these features are the following:

- Five user-definable markers can be set on-the-fly in the profile. Use these, for example, to clearly indicate specific noise sources.
- Markers can be set directly on the profile display 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 fact’. The display covers the latest 100 samples (that is, 100 s of profile when logging at 1 s intervals, otherwise more) meaning that in most cases you can wait for the event (or disturbance) to stop before placing your marker. Alternatively, scroll back in the profile and set your marker.
- The profile display can be ‘frozen’ at any time (this happens automatically when you tap the screen), allowing you to work at ease.
- Voice annotations, using the commentary microphone, are attached to the exact point on the profile where the annotation is made. With the microphone on an extension cable, comments can be associated with particular parts of the profile without interfering with the measurement.

All markers and annotations are saved with the measurement, see Fig. 8 and Fig. 9. No further bookkeeping is required. When exporting data to, for example, 7820 Evaluator software for further analyses, markers, as well annotations, are directly accessible on the profile.

Data are stored directly on SD or CF cards. BZ 7224 includes a suitable SD card. Data can be directly read from the SD card by the included PC software BZ 5503 (see page 11). This means that even large amounts of data can be quickly transferred to a PC.

In order to give an indication of the amount of memory required, some examples have been listed in the following section. Values should be compared to the standard size of the SD cards used, which start at 128 Mbyte.

For convenience, values for 1 s logging periods during 24 h are given. Other values easily compute from these:

- Five broadband parameters, no statistics: 1 Mbyte
- All broadband parameters, one 100 ms parameter: 3 Mbyte
- All broadband parameters, no statistics: 4 Mbyte
• All broadband parameters, one 100 ms parameter, all 1/3-octave spectra: 30 Mbyte
• All broadband parameters with full statistics: 51 Mbyte
• All broadband parameters, one 100 ms parameter, all 1/3-octave spectra, full statistics: 80 Mbyte

Space needed for annotations and recordings must, of course be added to this. As a guideline, 10 s of voice annotation requires approx. 312 kB.

If Sound Recording Option BZ 7226 (see following section) is also enabled, Logging Software BZ 7224 becomes even more versatile. In this case the actual signal can be recorded during, for example, a noise event. Recordings can be controlled manually, or automatically by a level trigger. BZ 7226 includes a pre-recording of sound (size of buffer dependent upon sample rate, see specifications), which means that sound recorded prior to the identification of an event is also included in the recording. The combination of recording the actual signal and making voice annotations on a separate channel provides exceptional documentation capabilities.

### Sound Recording Option – BZ 7226

Sound Recording BZ 7226 is an option that works with all other software modules. In all cases it allows you to make recordings of the actual measured signal, that is, the microphone signal used for measurements (this must not be confused with recorded voice annotations, which uses the commentary microphone). However, its detailed working is dependent upon which other software module is enabled and running. In any case, recordings are automatically attached to the measurement and kept with it, even after transfer of the data to a PC.

The purpose of the Sound Recording Option is to let you record the measurement signal in order to identify and document sound sources, for example:

- The measured $L_{Aeq}$ at 57 dB, did it actually stem from the rather distant compressor, or from other sources such as nearby birds or traffic? Not necessarily easy to evaluate on-site, very difficult to document convincingly later. If the signal is recorded: No discussion
- Is it really true that this noise is impulsive and should be penalised accordingly? If the signal is recorded: There may still be an argument, but it is based on facts
- Exceedances were identified while no operator was present. Did they originate from the plant under investigation or from another source. If the signal is recorded: No discussion

With Sound Level Meter Software BZ 7222 and Frequency Analysis Software BZ 7223, the Sound Recording Option BZ 7226 basically lets you do the following:

- Record all or parts of the measured signal giving rise to specific results, levels and spectra
- Set up your instrument so that recording can be set to start automatically when the measurement is started, or you can initiate recordings manually

With Logging Software BZ 7224, additional options are available:

- Recording of sound can be associated with the Event Marker. Use the Event key or set an Event marker on the profile display: The sound during the event is recorded and attached to the appropriate part of the profile
- Automatic detection of events – based on level exceedance is also possible, meaning that recordings can also be initiated when no operator is present

In all of the above cases the maximum duration of recordings can be set (Type 2250 is only limited by available storage on the memory card currently in use). Recording sound obviously requires large amounts of storage, therefore Sound Recording Option BZ 7226 allows the user to decide on the trade-off between storage needed and recording quality (sampling rate).
### Overview of Type 2250 Software Features

The table below presents a summary of the features of each of the software modules available with Type 2250. See Specifications for details.

<table>
<thead>
<tr>
<th>Feature</th>
<th>SLM Software</th>
<th>Frequency Analysis Software</th>
<th>Logging Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>120+dB Dynamic Range – no need for range switching</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Sound levels up to 140 dB with supplied Microphone Type 4189</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Sound levels up to 152 dB using Microphone Type 4191</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>IEC/ANSI SLM standards Type/Class 1</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Frequency weightings A, C, Z (linear) and time weightings F, S, I</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Free-field/diffuse-field correction</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Automatic windscreen detection and correction</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Pre-set time start/stop</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Back-erase – last 5 seconds of measurement data</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Multi-language user interface</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Context-sensitive help</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Voice and text annotation of measurements</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Display colour-schemes optimised for day, night, indoor and outdoor use</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Personal login – protects your personal setups from other users</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Broadband statistics based on $L_{Aeq}$ or $L_{AF}$</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Broadband frequency range: 3 Hz – 20 kHz</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>1/1-octave spectra (centre frequencies 8 Hz to 16 kHz)</td>
<td>●</td>
<td>●</td>
<td>a</td>
</tr>
<tr>
<td>1/3-octave spectra (centre frequencies 6.3 Hz to 20 kHz)</td>
<td>●</td>
<td>●</td>
<td>a</td>
</tr>
<tr>
<td>Logging of all or selected broadband parameters and spectra</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Logging period 1 s to 24 h</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>$L_{Aeq}$ and/or $L_{AF}$ logged every 100 ms</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Profile display</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Markers on profile display</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Remote control using Compact Flash modem</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Transfer of data files while measuring (USB or modem)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Recording of measured signal during measurement</td>
<td>●b</td>
<td>●b</td>
<td>●b</td>
</tr>
<tr>
<td>Recording of sound during noise events</td>
<td>●</td>
<td>●</td>
<td>b</td>
</tr>
</tbody>
</table>

a. Only if Frequency Analysis Software is enabled
b. Only if Sound Recording Option is enabled
Utility Software for Hand-held Analyzers BZ 5503 is an archiving tool for Type 2250 data and setups, and functions as the link between Type 2250 and post-processing or reporting software on a PC. It enables you to do the following:

**Control Type 2250 from a PC**
- Create users on Type 2250
- Manage data on Type 2250
- Transfer data to Type 2250
- Create, edit and transfer setups to Type 2250
- Control the instrument ‘on-line’ for demonstration purposes, or if you need a very large display

**Manage and archive data on a PC**
- Transfer data and setups from Type 2250 to an archive on the PC
- Transfer data between SD- or CF-Cards and the archives
- Keep data in archives, organized in job folders, per user – in the same way you have organised the data in Type 2250
- View data or annotations
- Export data to Type 7815, 7820 or 7825 for postprocessing and reporting
- Export data to Microsoft® Excel

**Keep your Type 2250 software up to date**
- Update software on Type 2250
- Install licenses for Type 2250 software

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**Recommended Application Software – For Use on PC**

For comprehensive data management and post-process reporting, consider using Type 2250 data together with one of following well-known PC-software packages:
- Type 7815 Noise Explorer – Data Viewing software
- Type 7820 Evaluator – Environmental Noise software
- Type 7825 Protector – Noise at Work software

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*Fig. 10*

A typical Evaluator display. The table shows Rating Level calculation results based on marked parts of the measured profile.

Noise Explorer, Evaluator and Protector all support a wide range of user-definable graphic and tabular displays. Graphs and tables can be imported into standard Windows® applications such as word processors and spreadsheets.

Evaluator Type 7820 has built-in calculation algorithms that allow you to produce compound sound level figures from several contributions (see Fig. 10).
Specifications – Type 2250 Platform

Some may have impulse or pure tone penalties, depending on which measurement standard you choose, for example, ISO 1996, DIN 45 645, TA Lärm, NF S 31-010, or BS 4142. (See Product Data BP 1752.)

Protector Type 7825 calculates noise exposure according to ISO 9612.2. For situations where only workpoint noise measurements are available, Protector can combine these measurements with a profile of a person’s movements, simulating their personal noise exposure. (See Product Data BP 1717.)

Compliance with Standards

CE-mark indicates compliance with the EMC Directive and Low Voltage Directive. C-Tick mark indicates compliance with the EMC requirements of Australia and New Zealand.

<table>
<thead>
<tr>
<th>Safety</th>
<th>EN/IEC 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use. UL 61010B–1: Standard for Safety – Electrical measuring and test equipment.</th>
</tr>
</thead>
</table>

Specifications – Type 2250 Platform

Specifications apply to Type 2250 fitted with Microphone Type 4189 and Microphone Preampifier ZC 0032

**SUPPLIED MICROPHONE**

*Type 4189*: Prepolarized 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 Preampifier Attenuation: 0.25 dB

Connector: 10-pin LEMO

Extension Cables: Up to 100 m in length between the microphone preampifier and Type 2250, 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:

<table>
<thead>
<tr>
<th>Weighting</th>
<th>Microphone</th>
<th>Electrical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot;</td>
<td>14.6 dB</td>
<td>12.6 dB</td>
<td>16.7 dB</td>
</tr>
<tr>
<td>&quot;C&quot;</td>
<td>13.6 dB</td>
<td>13.1 dB</td>
<td>16.4 dB</td>
</tr>
<tr>
<td>&quot;Z&quot; 5 Hz–20 kHz</td>
<td>15.3 dB</td>
<td>18.6 dB</td>
<td>20.3 dB</td>
</tr>
<tr>
<td>&quot;Z&quot; 3 Hz–20 kHz</td>
<td>15.3 dB</td>
<td>23.6 dB</td>
<td>24.2 dB</td>
</tr>
</tbody>
</table>

**KEYBOARD**

Pushbuttons: 11 keys with backlight, optimised 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 x 320 dot matrix

**Colour Schemes**: Five different – optimised 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 1.1 OTG Mini B socket

**INPUT SOCKET**

Connector: Triaxial LEMO

Input Impedance: ≥ 1 MΩ

Signal Source Impedance: < 200 Ω

Direct Input: Max. input voltage: ± 14.14 V peak

CCLD Input: Max. input voltage: ± 7.07 V peak

CCLD Current/voltage: 4 mA / 25 V

**TRIGGER SOCKET**

Connector: Triaxial LEMO

Max. Input Voltage: ± 20 V peak

Input Impedance: > 1 MΩ

**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: 2.2 Ω in each channel

**MICROPHONE FOR COMMENTARY**

Microphone, which utilises Automatic Gain Control (AGC), is incorporated in underside of instrument. Used to create voice annotations for attaching to measurements

**EXTERNAL DC POWER SUPPLY REQUIREMENTS**

Used to charge the battery pack in the instrument

**Voltage**: 8–24 V DC, ripple voltage < 20 mV

Some may have impulse or pure tone penalties, depending on which measurement standard you choose, for example, ISO 1996, DIN 45 645, TA Lärm, NF S 31-010, or BS 4142. (See Product Data BP 1752.)

Protector Type 7825 calculates noise exposure according to ISO 9612.2. For situations where only workpoint noise measurements are available, Protector can combine these measurements with a profile of a person’s movements, simulating their personal noise exposure. (See Product Data BP 1717.)

Compliance with Standards

CE-mark indicates compliance with the EMC Directive and Low Voltage Directive. C-Tick mark indicates compliance with the EMC requirements of Australia and New Zealand.

<table>
<thead>
<tr>
<th>Safety</th>
<th>EN/IEC 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use. UL 61010B–1: Standard for Safety – Electrical measuring and test equipment.</th>
</tr>
</thead>
</table>
### MEASUREMENTS

- **N**: number between 0.1 and 99.9
- **V**: frequency weightings A, C or Z
- **X**: frequency weightings C or Z

### OVERLOAD DETECTOR

- Monitors the overload outputs of all the C- or Z-weighted one peak detector

### PARALLEL DETECTORS

- **Kit UA 1404**
- **Accessories**
  - **Sound Field**
    - Frequency response to compensate for:
      - For microphones of known types, BZ 7222 is able to correct the selected transducer
- The analogue hardware is set up automatically in accordance with:
  - Field Type, CCLD required, Capacitance and additional information.

### 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.

### CORRECTION FILTERS

- For microphones of known types, BZ 7222 is able to correct the frequency response to compensate for:

### TRANSFERS

- Transfers are described in a transducer database with information on:
  - Serial Number, Nominal Sensitivity, Polarization Voltage, Free-field Type, CCLD required, Capacitance and additional information.

### WARM-UP TIME

- From Power Off: <2 minutes
- From Standby: <10 seconds for prepolarized microphones

### TEMPERATURE

- **Operating Temperature**: –10 to +50°C (14 to 122°F), <0.1 dB
- **Storage Temperature**: –25 to +70°C (–13 to 158°F)

### HUMIDITY

- **IEC 60068–2–78**: Damp Heat: 90% RH (non-condensing at 40°C (104°F))
- **Effect of Humidity**: <0.1 dB for 0% < RH < 90% (at 40°C (104°F) and 1kHz)

### MECHANICAL

- Environmental Protection: IP44
- Non-operating:
  - **IEC 60068–2–6**: Vibration: 0.3 mm, 20 m/s², 10 – 500 Hz
  - **IEC 60068–2–27**: Shock: 1000 m/s²
  - **IEC 60068–2–29**: Bump: 4000 bumps at 400 m/s²

### WEIGHT AND DIMENSIONS

- **560 g (23 oz.) including rechargeable battery**
- **300 × 93 × 50 mm (11.8 × 3.7 × 1.9″)** including preamplifier and microphone

### CLOCK

- Back-up battery powered clock. Drift <0.5 s per 24 hour period

### ENdianiaf

- **Typical Operating Time**: >8 hours
- **Type**: BATTERY PACK
  - LEMO Type FFA.00, positive at centre pin when charging
  - **Power Consumption**:
    - <2.5 W, without battery charging, <10 W when charging
  - **Current Requirement**: min. 1.5 A

### SOFTWARE SPECIFICATIONS – SOUNb LEVEL METh S0FTWARE BZ 7222

<table>
<thead>
<tr>
<th>For Display and Storage</th>
<th>Start Time</th>
<th>Stop Time</th>
<th>Overload %</th>
</tr>
</thead>
<tbody>
<tr>
<td>L&lt;sub&gt;AE&lt;/sub&gt;</td>
<td>L&lt;sub&gt;AEq&lt;/sub&gt;</td>
<td>L&lt;sub&gt;Xeq&lt;/sub&gt;</td>
<td>L&lt;sub&gt;Xeq&lt;/sub&gt;</td>
</tr>
<tr>
<td>L&lt;sub&gt;ASmax&lt;/sub&gt;</td>
<td>L&lt;sub&gt;AFmax&lt;/sub&gt;</td>
<td>L&lt;sub&gt;XFmax&lt;/sub&gt;</td>
<td>L&lt;sub&gt;XFmax&lt;/sub&gt;</td>
</tr>
<tr>
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<td>L&lt;sub&gt;AFmin&lt;/sub&gt;</td>
<td>L&lt;sub&gt;XFmin&lt;/sub&gt;</td>
<td>L&lt;sub&gt;XFmin&lt;/sub&gt;</td>
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<td>L&lt;sub&gt;XEq&lt;/sub&gt;</td>
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</tr>
<tr>
<td>L&lt;sub&gt;AFTeq&lt;/sub&gt;</td>
<td>L&lt;sub&gt;AFTeq&lt;/sub&gt;</td>
<td>L&lt;sub&gt;AFTeq&lt;/sub&gt;</td>
<td>L&lt;sub&gt;AFTeq&lt;/sub&gt;</td>
</tr>
<tr>
<td>L&lt;sub&gt;AN1 or L&lt;sub&gt;AFN1&lt;/sub&gt;&lt;/sub&gt;</td>
<td>L&lt;sub&gt;AN2 or L&lt;sub&gt;AFN2&lt;/sub&gt;&lt;/sub&gt;</td>
<td>L&lt;sub&gt;AN3 or L&lt;sub&gt;AFN3&lt;/sub&gt;&lt;/sub&gt;</td>
<td>L&lt;sub&gt;AN6 or L&lt;sub&gt;AFN6&lt;/sub&gt;&lt;/sub&gt;</td>
</tr>
<tr>
<td>L&lt;sub&gt;AN4 or L&lt;sub&gt;AFN4&lt;/sub&gt;&lt;/sub&gt;</td>
<td>L&lt;sub&gt;AN5 or L&lt;sub&gt;AFN5&lt;/sub&gt;&lt;/sub&gt;</td>
<td>L&lt;sub&gt;Time Remaining&lt;/sub&gt;</td>
<td></td>
</tr>
</tbody>
</table>

### MEASUREMENT RANGES

- **Dynamic Range**: From typical noise floor to max. level for a 1 kHz pure tone signal, A-weighted: 16.7 to 140 dB
- **Linearity Range**: In accordance with IEC 60804, A-weighted, 1 kHz: 22.9 dB to 140 dB
- **Linear Operating Range**: In accordance with IEC 61672, A-weighted, 1 kHz: 26.3 dB to 140 dB
- **Peak C Range**: In accordance with IEC 61672: 30.4 dB to 143 dB

### SAMPLING FOR STATISTICS

- The Statistics can be based on either L<sub>AF</sub> or L<sub>Aeq</sub>:
  - **Statistics LAN1-7** are based on sampling L<sub>AF</sub> every 10 ms into 0.2 dB wide classes over 120 dB
  - **Statistics LAFN1-7** are based on sampling L<sub>Aeq</sub> every second into 0.2 dB wide classes over 120 dB
- Full distribution saved with measurement

### MEASUREMENT DISPLAYS

- **SLM**: Measurement data displayed as numbers of various sizes and one quasi-analogue bar
- Measured data are displayed as dB values, housekeeping data as numbers in relevant format.
- Instantaneous measurement L<sub>AF</sub> is displayed as a quasi-analogue bar
**Software Specifications – 2250 Frequency Analysis Software BZ 7223**

The specifications for BZ 7223 include the specifications for 2250 Sound Level Meter Software BZ 7222. BZ 7223 adds:

**STANDARDS**
Conforms with the following National and International Standards:
- IEC 61260 (1995–07) plus Amendment 1 (2001–09), 1/1-octave Bands and 1/3-octave Bands, Class 0
- ANSI S1.11–1986 (R 1993), 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

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

**MEASUREMENTS**
X = frequency weightings A, C or Z

**Output Signal**: Input conditioned; A-, C- or Z-weighted
Gain Adjustment: –60 dB to 0 dB
**Headphone Signal**: Input signal can be monitored using this socket with headphones/earphones
Gain Adjustment: –60 dB to 60 dB

**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/earphones connected to the headphone socket
Gain Adjustment: –60 dB to 0 dB

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

**DATA MANAGEMENT**
- Project Template: Defines the display and measurement setups
- Project: Measurement data stored with the Project Template
- Job: Projects are organised in Jobs. Explorer facilities for easy management of data (copy, cut, paste, delete, rename, view data, open project, create job, set default project name)

**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

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**Software Specifications – 2250 Logging Software BZ 7224**

The specifications for BZ 7224 include the specifications for 2250 Sound Level Meter Software BZ 7222. BZ 7224 adds:

**MEASUREMENTS**
- Logging: Measurement data logged at pre-set periods into files on external SD- or CF-cards
- Logging Period: From 1 s to 24 hours in 1 s steps
- Fast Logging: L_Ap and L_Aeq can be logged every 100 ms, irrespective of logging period
- Spectrum Data Stored at each Logging Interval: All, or up to 3 selectable spectra (license for BZ 7223 required)
- Logging Time: From 1 second to 31 days with 1 s resolution

**Output Signal**: Input conditioned; A-, C- or Z-weighted
Gain Adjustment: –60 dB to 60 dB
**Headphone Signal**: Input signal can be monitored using this socket with headphones/earphones
Gain Adjustment: –60 dB to 60 dB
**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/earphones connected to the headphone socket
Gain Adjustment: –60 dB to 0 dB

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

**DATA MANAGEMENT**
- Profiles: Graphical display of selectable measurement data versus time

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

X-axis: Scroll facilities
Cursor: Readout of measurement data at selected time

软件规格 – 声音录制选项 BZ 7226

声音录制选项 BZ 7226 可以单独使用。它与所有在本数据表中描述的软件工作。声音水平计，频谱分析，和日志软件。

录制信号
无加权信号来自测量传感器。

采样率和预录制
声音被缓冲以备录制。这允许在事件被检测后立即录制。

<table>
<thead>
<tr>
<th>采样率 (kHz)</th>
<th>最大预录制 (s)</th>
<th>声音质量</th>
<th>内存 (KB/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>100</td>
<td>低</td>
<td>16</td>
</tr>
<tr>
<td>16</td>
<td>50</td>
<td>良</td>
<td>32</td>
</tr>
<tr>
<td>24</td>
<td>30</td>
<td>中</td>
<td>48</td>
</tr>
<tr>
<td>48</td>
<td>10</td>
<td>高</td>
<td>96</td>
</tr>
</tbody>
</table>

与 BZ 7222 和 BZ 7223 的功能

手动控制录制：可以手动启动和停止录制。

自动控制录制：在测量开始时启动录制。可以预设最大录制时间。

捕获模式

- 捕获模式（使用事件按钮）：在事件发生时捕获。可以选择预录制时间。
- 捕获模式（使用触摸屏）：在选定的时间段内捕获（受预录制缓冲的限制）。选择预录制时间。
- 捕获模式：事件可以被触发，当带宽水平超过或低于指定的水平时。可以预设最大录制时间。

播放
声音录音的播放可以使用耳机/耳机连接到耳机插座。

录制格式

录音格式为.wav文件（扩展名.wav）附加到项目中的数据，可以在PC上轻松播放。

软件规格 – 手持分析仪的实用软件 BZ 5503

BZ 5503 随 Type 2250 提供，用于在PC和Type 2250之间同步设置和数据。

在线显示 Type 2250 数据

测量可以在PC上控制和显示在PC上显示的和与PC相同的用户界面。

数据管理

- 探索器：对仪器、用户、工作、项目和项目模板的管理（复制、剪切、粘贴、删除、重命名、创建）。
- 数据查看器：查看项目数据（项目内容）。
- 模板编辑器：编辑项目模板的设置。
- 同步：项目模板和项目可以与PC和Type 2250同步。

用户

Type 2250的用户可以创建或删除。

导出功能

- Excel：可以导出项目，包括用户指定的部分。
- Type 7815/20/25：可以导出到Noise Explorer Type 7815，评估器Type 7820或保护器Type 7825。

Type 2250软件升级和许可证

该实用软件控制Type 2250软件升级和Type 2250应用程序的许可。

接口到Type 2250

USB版本1.1

PC要求

- 操作系统：Microsoft® 2000/Windows® XP。Microsoft® .NET。
- 推荐PC：Pentium® III（或等效）处理器、128MB RAM、SVGA图形显示适配器、声卡、CD ROM驱动、鼠标、USB，Windows® XP。
Ordering Information

PACKAGES
Type 2250 A Hand-held Analyzer with Sound Level Meter Software
Type 2250 B Hand-held Analyzer with Sound Level Meter and Frequency Analysis Software
Type 2250 C Hand-held Analyzer with Sound Level Meter and Logging Software
Type 2250 D Hand-held Analyzer with Sound Level Meter, Frequency Analysis and Logging Software

SOFTWARE MODULES AVAILABLE SEPARATELY
BZ 7223 2250 Frequency Analysis Software
BZ 7224 2250 Logging Software
BZ 7226 Sound Recording Option

COMPONENTS INCLUDED WITH TYPE 2250 HAND-HELD ANALYZER
Type 4189 Prepolarized Free-field ½ ″ Microphone
ZC 0032 Microphone Preamplifier
AO 1476 USB Standard A to USB Mini B Interface Cable, 1.8 m (6 ft)
BZ 5298 Environmental Software, including Utility Software for Hand-held Analyzers
UA 1650 90 mm dia. Windsreen 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 for Type 2250
FB 0679 Hinged Cover for Hand-held Analyzer
HT 0015 Earphones
UA 1654 5 Extra Styli
QB 0061 Battery Pack
ZG 0426 Mains Power Supply

COMPONENTS INCLUDED WITH 2250 LOGGING SOFTWARE
BZ 7224
UL 1009 SD Memory Card for Hand-held Analyzers

Accessories and Components Available Separately

ANALYZER
ZG 0444 Charger for QB 0061 Battery Pack

CALIBRATION
Type 4231 Sound Level Calibrator (fits in KE 0440)
Type 4226 Multifunction Acoustic Calibrator
Type 4228 Pistonphone
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

MEASURING
Type 3592 Outdoor Measuring Gear (see Product Data BP 1744)
AO 0440 Signal cable, LEMO to BNC, 1.5 m (5 ft)
AO 0646 Sound Cable, LEMO to Minijack, 1.5 m (6 ft)
AO 0441 Microphone Extension Cable, 10-pin LEMO, 3 m (10 ft)
AO 0442 Microphone Extension Cable, 10-pin LEMO, 10 m (33 ft)
UA 0587 Tripod
UA 0801 Small Tripod
UA 1317 Microphone Holder
UA 1404 Outdoor Microphone Kit
UA 1672 AutoDetect Insert for UA 1650

INTERFACING
Type 7815 Noise Explorer – data viewing software
Type 7820 Evaluator – data viewing and calculation software
Type 7825 Protector – software for calculation of Personal Noise Exposure

SERVICE PRODUCTS
2250-EW1 Extended Warranty, one year extension
2250-MW1 5 Years Warranty including yearly Accredited Calibration – annual payment
2250-MW5 5 Years Warranty including yearly Accredited Calibration

Please contact your local Brüel & Kjaer representative for further information.

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