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.

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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 accomodate 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.

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

Windscreen

Windscreen Sensor

Microphone/Preamplifier Stage:
• Falcon™ Range ½″ microphone and microphone preamplifier stage.
• The microphone preamplifier stage is able to drive an extension cable of up to 100 m, a valuable feature when a measurement requires remote location of the microphone

Microphone for commentary

Event Pushbutton:
• for marking events

Commentary Pushbutton:
• allows you to attach recorded messages to measurements

Navigation Pushbuttons:
• up/down, left/right arrow keys

Accept Pushbutton:
• accepts any changes made to parameters/setups

Back Erase/Exclude Pushbutton:
• allows you to erase the last 5 s of data
• mark logged data with an exclude marker

Stylus (stored)

Start/Pause Pushbutton:
• press to start a measurement
• press to pause a measurement

Red, yellow, green Status Indicators

Mounting thread

Reset Measurement Pushbutton:
• allows you to reset Type 2250's measurement buffers

Store Pushbutton:
• stores measurement results

Display:
• touch sensitive colour screen with backlight

FREQUENCY ANALYZER
\Woody Inc\Shed Spectrum1*
▶ 00:00:48
LAFmax   100 Hz   99,9 dB
LAF   100 Hz   99,0 dB
140
12.5 50 250 1kHz 4k 20k AZ
CPB   SLM   LARGE
11:42

Non-slip surfaces for safe grip

Battery Compartment for rechargeable battery pack

Power Switch

Type 2250

Brüel & Kjær

Thread for tripod/wrist strap

Output:
• Output socket for software determined signals

Cover for protecting connectors against the elements

Trigger Input

Input:
• for AC/DC or CCLD signals. Can be used when analysing electrical signals, for example, sound recordings

3.5 mm stereo socket for headphones:
• for reviewing recorded comments or listening to measurement signals

Reset button

Battery Charge:
• 8 – 24 V DC input from a universal mains adapter or external batteries

USB (On-the-Go) Interface:
• allows data transfer and remote control of the instrument directly with a host PC

Battery charge indicator LED

Slot for Compact Flash (CF) Card

Slot for Secure Digital (SD) memory card

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- **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.
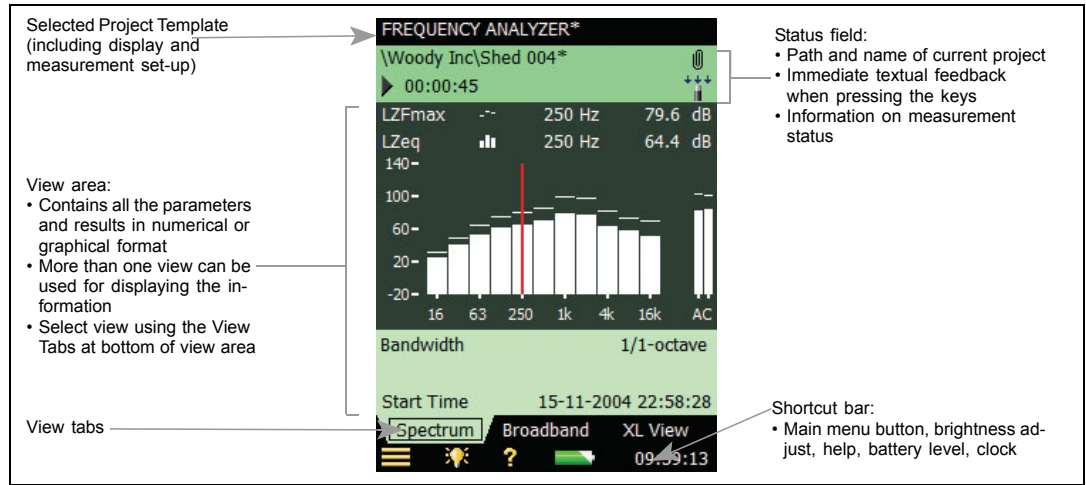
Using the Platform

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.
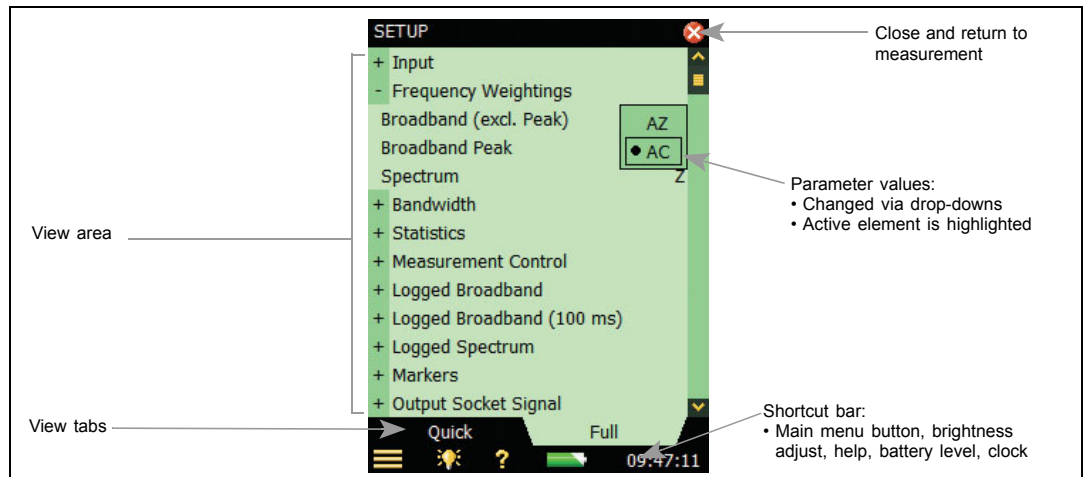
Display Options

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.

Fig. 2
Typical display when measuring

Selected Project Template (including display and measurement set-up)

Status field:
• Path and name of current project
• Immediate textual feedback when pressing the keys
• Information on measurement status

View area:
• Contains all the parameters and results in numerical or graphical format
• More than one view can be used for displaying the information
• Select view using the View Tabs at bottom of view area

View tabs

Shortcut bar:
• Main menu button, brightness adjust, help, battery level, clock

| FREQUENCY ANALYZER* |
| \Woody Inc\Shed 004* |
| ▶ 00:00:45 |
| LZFmax -·- 250 Hz 79.6 dB |
| LZeq 250 Hz 64.4 dB |
| Bandwidth 1/1-octave |
| Start Time 15-11-2004 22:58:28 |
| Spectrum Broadband XL View |
| 09:59:13 |

Fig. 3
Typical display when modifying/updating the measurement setup

Close and return to measurement

View area

View tabs

Parameter values:
• Changed via drop-downs
• Active element is highlighted

Shortcut bar:
• Main menu button, brightness adjust, help, battery level, clock

| SETUP |
| + Input |
| - Frequency Weightings |
Broadband (excl. Peak)	AZ
Broadband Peak	• AC
Spectrum	Z
+ Bandwidth
+ Statistics
+ Measurement Control
+ Logged Broadband
+ Logged Broadband (100 ms)
+ Logged Spectrum
+ Markers
+ Output Socket Signal
Quick Full
09:47:11

Fig. 4
Alternative display colour schemes – the left-hand display shows the maximum-contrast bright sunlight display. The right-hand display shows the night time display, which is optimised to take into account the physiology of human vision, allowing you to read the display without ruining your night vision.
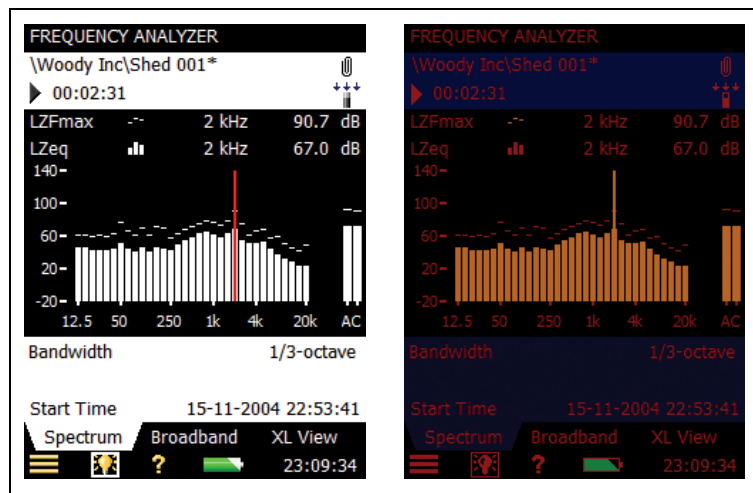
Type 2250 applies a default colour scheme for the display. This is like most examples in this data sheet. However, the instrument includes several schemes allowing you to make your own choice. Special schemes are always included for outdoor use in bright sunlight (where maximum contrast is needed) and 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.
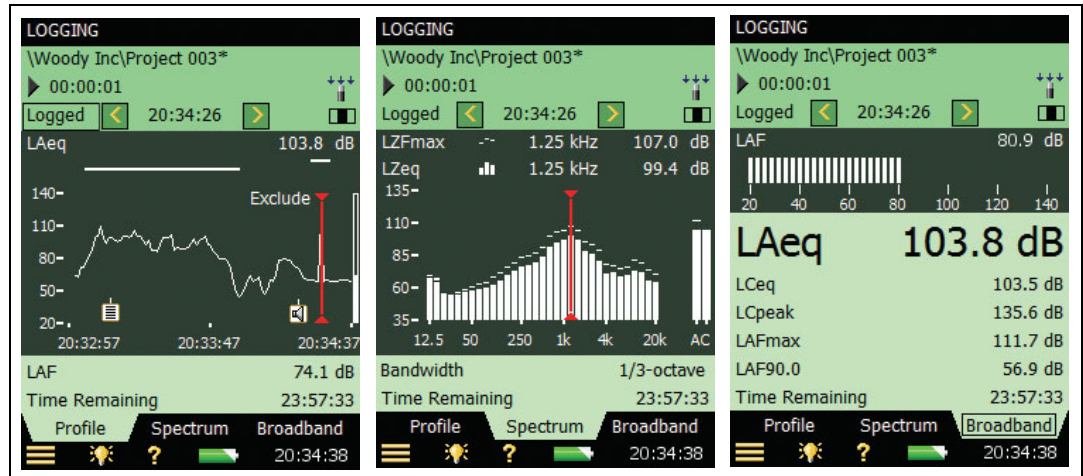
Sound Level Meter Software – BZ 7222

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.

Fig. 6

Example of a typical
SLM display, including
the icon for recording
annotations, visible in
the upper right hand
corner (see another
example in the right
hand display of Fig. 5)
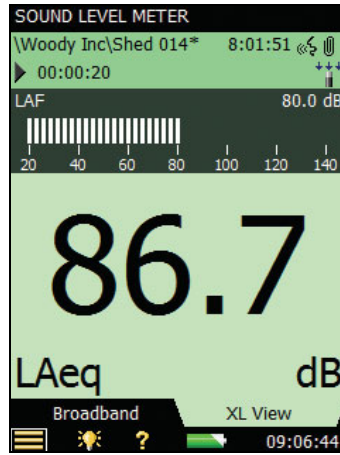
Voice annotations are recorded using a separate commentary microphone when the commentary pushbutton is pushed and held. Voice annotations and notes can be attached before, during and after the measurement. Spoken comments during the measurement should, of course, be made during a pause or with the microphone 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

Fig. 7
Example of 1/3-octave
frequency analysis.
Note that two spectra
are displayed
simultaneously

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
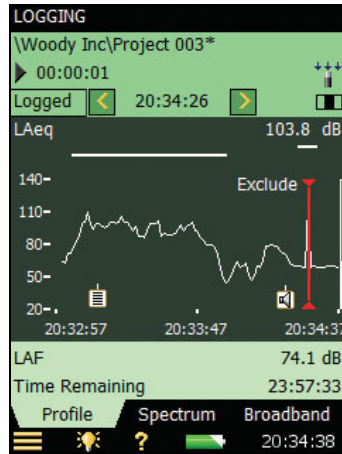
With the optional Logging Software enabled, Type 2250 becomes a versatile instrument for obtaining time histories. The Logging Software allows you to select freely among the broadband parameters and log them at intervals from 1 s to 24 h. At the same time L_{Aeq} and/or L_{AF} can be logged at 100 ms 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
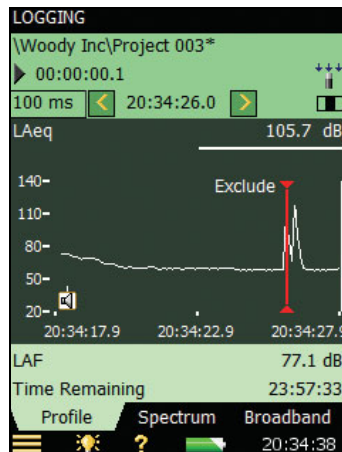
All markers and annotations are saved with the measurement, see Fig. 8 and Fig. 9. No further bookkeeping is required. When exporting data to, for example, 7820 Evaluator software for further analyses, markers, as well annotations, are directly accessible on the profile.

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.

Feature	SLM Software	Frequency Analysis Software	Logging Software
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	●	●	●
IEC/ANSI SLM standards Type/Class 1	●	●	●
Frequency weightings A, C, Z (linear) and time weightings F, S, I	●	●	●
Free-field/diffuse-field correction	●	●	●
Automatic windscreen detection and correction	●	●	●
Pre-set time start/stop	●	●	●
Back-erase – last 5 seconds of measurement data	●	●	
Multi-language user interface	●	●	●
Context-sensitive help	●	●	●
Voice and text annotation of measurements	●	●	●
Display colour-schemes optimised for day, night, indoor and outdoor use	●	●	●
Personal login – protects your personal setups from other users	●	●	●
Broadband statistics based on L_{Aeq} or L_{AF}	●	●	●
Broadband frequency range: 3 Hz – 20 kHz	●	●	●
1/1-octave spectra (centre frequencies 8 Hz to 16 kHz)		●	●[a]
1/3-octave spectra (centre frequencies 6.3 Hz to 20 kHz)		●	●[a]
Logging of all or selected broadband parameters and spectra			●
Logging period 1 s to 24 h			●
L_{Aeq} and/or L_{AF} logged every 100 ms			●
Profile display			●
Markers on profile display			●
Remote control using Compact Flash modem	●	●	●
Transfer of data files while measuring (USB or modem)	●	●	●
Recording of measured signal during measurement	●[b]	●[b]	●[b]
Recording of sound during noise events			●[b]

a. Only if Frequency Analysis Software is enabled
b. Only if Sound Recording Option is enabled

Type 2250 PC Software – Utility Software for Hand-held Analyzers BZ 5503

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

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

Fig. 10
A typical Evaluator display. The table shows Rating Level calculation results based on marked parts of the measured profile
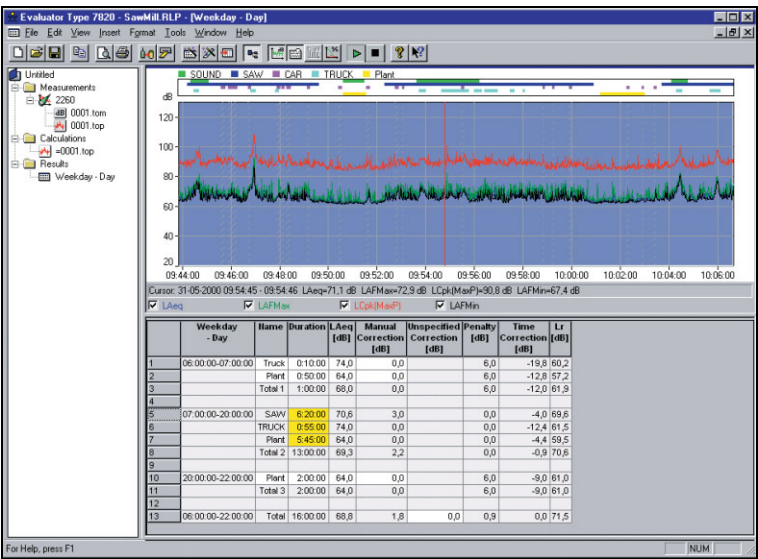
Noise Explorer, Evaluator and Protector all support a wide range of user-definable graphic and tabular displays. Graphs and tables can be imported into standard Windows® applications such as word processors and spreadsheets.

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

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, ⓒ	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.
Safety	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.
EMC Emission	EN/IEC 61000–6–3: Generic emission standard for residential, commercial and light industrial environments. CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits. FCC Rules, Part 15: Complies with the limits for a Class B digital device. IEC 61672–1, IEC 61260, IEC 60651 and IEC 60804: Instrumentation standards
EMC Immunity	EN/IEC 61000–6–2: Generic standard – Immunity for industrial environments. EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements. IEC 61672–1, IEC 61260, IEC 60651 and IEC 60804: Instrumentation standards

Specifications – Type 2250 Platform

Specifications apply to Type 2250 fitted with Microphone Type 4189 and Microphone Preamplifier 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 Preamplifier Attenuation: 0.25 dB
Connector: 10-pin LEMO
Extension Cables: Up to 100 m in length between the microphone preamplifier 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:

Weighting	Microphone	Electrical	Total
"A"	14.6 dB	12.6 dB	16.7 dB
"C"	13.6 dB	13.1 dB	16.4 dB
"Z" 5 Hz–20 kHz	15.3 dB	18.6 dB	20.3 dB
"Z" 3 Hz–20 kHz	15.3 dB	23.6 dB	24.2 dB

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 × 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: $\geq 1\,M\Omega$
Signal Source Impedance: $< 200\,\Omega$
Direct Input: Max. input voltage: $\pm 14.14\,V_{peak}$
CCLD Input: Max. input voltage: $\pm 7.07\,V_{peak}$
CCLD Current/voltage: 4 mA/25 V

TRIGGER SOCKET
Connector: Triaxial LEMO
Max. Input Voltage: $\pm 20\,V_{peak}$
Input Impedance: $> 1\,M\Omega$

OUTPUT SOCKET
Connector: Triaxial LEMO
Max. Peak Output Level: $\pm 4.46\,V$
Output Impedance: $50\,\Omega$

HEADPHONE SOCKET
Connector: 3.5 mm Minijack stereo socket
Max. Peak Output Level: $\pm 1.4\,V$
Output Impedance: $2.2\,\Omega$ 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

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

BATTERY PACK
Type: Li-Ion rechargeable
Typical Operating Time: > 8 hours

STORAGE SYSTEM
Internal Flash-RAM (non-volatile): 20 Mbyte for user setups and measurement data
External Secure Digital Memory Card (SD-card): For store/recall of measurement data
External Compact Flash Memory Card (CF-card): For store/recall of measurement data

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

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

TEMPERATURE
IEC 60068–2–1 & IEC 60068–2–2: Environmental Testing. Cold and Dry Heat.
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 1 kHz)

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

WEIGHT AND DIMENSIONS
650 g (23 oz.) including rechargeable battery
$300 \times 93 \times 50$ mm ($11.8 \times 3.7 \times 1.9''$) including preamplifier and microphone

LANGUAGE
User Interface in Catalan, Croatian, Czech, Danish, English, Flemish, French, German, Hungarian, Japanese, Italian, Polish, Romanian, Serbian, Slovenian, Spanish and Swedish

HELP
Concise context-sensitive help in Catalan, English, French, German, Italian, Polish, Romanian, Serbian, Slovenian and Spanish

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Software Specifications – 2250 Sound Level Meter Software BZ 7222

Conforms with the following National and International Standards:
- IEC 61672 – 1 (2002–05) 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 (R 1997) 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 also conforms to these EN Standards

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 microphones of known types, BZ 7222 is able to correct the frequency response to compensate for:
Sound Field: Free-field or Diffuse-field
Accessories: None, Windscreen UA 1650 or Outdoor Microphone Kit UA 1404

DETECTORS
Parallel Detectors on every measurement:
A-weighted 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-weighted
Overload Detector: Monitors the overload outputs of all the frequency weighted channels

MEASUREMENTS
X = frequency weightings C or Z
V = frequency weightings A, C or Z
N = number between 0.1 and 99.9

For Display and Storage

Start Time	Stop Time	Overload %
Elapsed Time	L_{Aeq}	L_{Xeq}
L_{AE}	L_{Xeq}-L_{Aeq}	L_{Vpeak}
L_{ASmax}	L_{AFmax}	L_{AImax}
L_{XSmax}	L_{XFmax}	L_{XImax}
L_{ASmin}	L_{AFmin}	L_{AImin}
L_{XSmin}	L_{XFmin}	L_{XImin}
L_{AIeq}	L_{XIeq}	L_{AIeq}-L_{Aeq}
L_{AFTeq}	L_{AFTeq}-L_{Aeq}	
L_{AN1} or L_{AFN1}	L_{AN2} or L_{AFN2}	L_{AN3} or L_{AFN3}
L_{AN4} or L_{AFN4}	L_{AN5} or L_{AFN5}	L_{AN6} or L_{AFN6}
L_{AN7} or L_{AFN7}	Time Remaining	

Only for Display as Numbers or Quasi-analogue Bars

L_{AS}	L_{AF}	L_{AI}
L_{XS}	L_{XF}	L_{XI}
$L_{AS(SPL)}$	$L_{AF(SPL)}$	$L_{AI(SPL)}$
$L_{XS(SPL)}$	$L_{XF(SPL)}$	$L_{XI(SPL)}$

MEASURING 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_{AF} or L_{Aeq}:
- Statistics L_{AFN1-7} are based on sampling L_{AF} every 10 ms into 0.2 dB wide classes over 120 dB
- Statistics L_{AN1-7} are based on sampling L_{Aeq} 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_{AF} is displayed as a quasi-analogue bar

MEASUREMENT CONTROL
Manual: Manually controlled single measurement
Automatic: Pre-set measurement time from 1 s to 24 hours in 1 s steps
Manual Controls: Reset, Start, Pause, Back-erase, Continue and Store the measurement manually

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

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 instrument

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-, 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/headphones 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

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

For Display and Storage

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

For Display Only

L_{XS}	L_{XF}

MEASURING RANGES
Dynamic Range: From typical noise floor to max. level for a pure tone signal at 1 kHz 1/3-octave: 1.7 to 140 dB

MEASUREMENT DISPLAYS
Spectrum: One or two spectra superimposed + A and C/Z 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

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 with 1 s resolution
Fast Logging: L_{AF} and L_{Aeq} can be logged every 100 ms, irrespective of logging period
Broadband Data Stored at each Logging Interval: All, or up to 10 selectable broadband data
Broadband Statistics Stored at each Logging Interval: Full distribution, or none
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

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

MARKERS AND EVENTS
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, or an event can be triggered when a broadband level is above or below a specified level

ANNOTATIONS
On-line annotations with spoken comments or written notes

MEASUREMENT DISPLAYS
Profile: 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

Software Specifications – Sound Recording Option BZ 7226

Sound Recording Option BZ 7226 is enabled with a separate license. It works with all the software described in this data sheet: Sound Level Meter, Frequency Analysis, and Logging Software.

RECORDED SIGNAL
Unweighted signal from the measurement transducer.

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

Sampling Rate (kHz)	Maximum Pre-recording (s)	Sound Quality	Memory (KB/s)
8	100	Low	16
16	50	Fair	32
24	30	Medium	48
48	10	High	96

FUNCTIONS WITH BZ 7222 AND BZ 7223
Manual Control of Recording: Recording can be manually started and stopped during a measurement

Automatic Control of Recording: Start of recording when measurement is started. Maximum recording time can be preset

FUNCTIONS WITH BZ 7224
Manual Control of Recording (using Event pushbutton):
Recording during all of the event, or for preset maximum duration. A Sound marker is set while recording. Selectable pre-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 maximum duration. Selectable pre-recording time

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

RECORDING FORMAT
The recording format is wave-files (extension .wav) attached to the data in the project, easily played-back afterwards on a PC

Software Specifications – Utility Software for Hand-held Analyzers BZ 5503

BZ 5503 is included with Type 2250 for easy synchronisation of setups and data between PC and Type 2250. BZ 5503 is supplied on CD-ROM BZ 5298

ON-LINE DISPLAY OF TYPE 2250 DATA
Measurements on Type 2250 can be controlled from the PC and displayed on-line with the PC, using the same user interface on the PC as on Type 2250

DATA MANAGEMENT
Explorer: Facilities for easy management of Instruments, Users, Jobs, Projects and Project Templates (copy, cut, paste, delete, rename, create)
Data Viewer: View measurement data (content of projects)
Template Editor: Editor for changing setups in Project Templates
Synchronisation: Project Templates and Projects for a specific user can be synchronised between PC and Type 2250

USERS
Users of Type 2250 can be created or deleted

EXPORT FACILITIES
Excel: Projects (or user specified parts) can be exported to Microsoft® Excel
Type 7815/20/25: Projects can be exported to Noise Explorer Type 7815, Evaluator Type 7820 or Protector Type 7825

TYPE 2250 SOFTWARE UPGRADES AND LICENSES
The utility software controls Type 2250 software upgrades and licensing of the Type 2250 applications

INTERFACE TO TYPE 2250
USB ver. 1.1

PC REQUIREMENT
Operating System: Windows® 2000/Windows® XP, Microsoft®.NET
Recommended PC: Pentium® III (or equivalent) processor, 128 Mbyte RAM, SVGA graphics display/adaptor, sound card, CD ROM drive, mouse, 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. 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 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 (5 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 & Kjær representative for further information.

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