Hand-held Analyzer Type 2270-S for Sound Intensity Measurements
with Sound Intensity Software BZ-7233 and Sound Intensity Probe Kit for 2270 Type 3654

Portable and battery-operated, Hand-held Sound Intensity System based on Type 2270-S makes it easy for one person to make a sound intensity measurement from beginning to end. The powerful combination of Hand-held Analyzer Type 2270, Sound Intensity Software BZ-7233 and Sound Intensity Probe Kit Type 3654 enables you to make intensity measurements for noise source location and sound power calculations. Automatic measurement guidance and aural feedback during measurements allow you to concentrate on making a smooth scan of the area under investigation. The system provides on-the-spot analyses of sound intensity spectra, which can be exported via Measurement Partner Suite BZ-5503 to Microsoft® Excel® for sound power calculation or to PULSE™ Mapping for Hand-held Sound Intensity Type 7962 for noise contour mapping. The system is part of the Type 2270 hand-held platform with its vast range of sound and vibration analysis applications.

Uses, Benefits and Features

Uses
- Sound power and noise mapping on rotating machinery, compressors, pumps, gearboxes, transformers, heating systems, etc.
- Sound intensity measurements compliant with IEC 61043
- Sound power determination compliant with:
  - ISO 9614–1
  - ISO 9614–2
  - ANSI S12.12
  - ECMA 160
- Noise source location

Benefits
- Complete hand-held system with optional accessories
- Accessories from Type 2260-E can be used
- On-the-spot results
- Visual and aural feedback during measurements

Features
- 1/1- and 1/3-octave analyses
- Frequency range: 50 Hz–10 kHz using 12 mm spacer
- Laboratory and field calibration capability
- Measurement quality indicators
- Grid measurements of up to 25 surfaces with up to 15 × 15 segments
- Photographic, textual, metadata and verbal annotations
- Up to 30 metadata per segment
- Visual data manager keeps track of measurements and data
- Automatic sequence of segment measurements
- Ad hoc sequence of segment measurements
- Copy, exclude and delete options for segment results
- Number map, contour map and level curves of results and quality indicators
- Number map, contour map and level curves superimposed on Type 2270 camera image of the measurement object
- Utility software for archiving, reporting and exporting results
- Export to mapping software
- Generator output
- Proprietary broadband phase correction to extend dynamic range
- Signal recording as option
The combination of strict legislation and customer requirements has increased pressure on manufacturers to provide precise specifications of their products’ noise levels. The need to determine sound power escalates accordingly, but many manufacturers pale at the thought of making such complicated and time-consuming measurements. However, heavy equipment and a jungle of cables are made superfluous by this single-unit, hand-held sound intensity analyzer comprising Hand-held Analyzer Type 2270, Sound Intensity Software BZ-7233 and Sound Intensity Probe Kit Type 3654.

Sound Intensity Software BZ-7233 transforms the analyzer into a powerful measurement tool using the intensity technique to determine sound intensity levels and map noise. Simply swap the analyzer’s microphone for the sound intensity probe and start measuring. It is easy for just one person to make a sound intensity measurement from scanning to final result. A unique phase-calibration technique lets you make all your measurements with a 12 mm spacer covering a frequency range from 50 Hz to 10 kHz. If post-processing is required, you can use the included Measurement Partner Suite BZ-5503 to view and export data to spreadsheets, or export to PULSE Mapping for Hand-held Sound Intensity Type 7962 for noise contour mapping.

Sound Power Determination Using the Hand-held Sound Intensity System

We live in an ever-noisier world, and our awareness of noise has escalated dramatically, increasing the demand for noise-friendly surroundings. Manufacturers are aware of this and are labelling their machines, be they refrigerators or turbines, with their noise output according to national and international standards. Machines often consist of parts made by subsuppliers, so the noise labelling of each part is important as it enables the manufacturer to predict the noise output from a new machine. The stringent EU Machine Directives have also played a major role in the enforcement of product labelling.

Measurement Procedure
Consider a noise source standing on a reflecting floor. Imagine a virtual box that completely envelopes the source. The sound power from the source will radiate through the five free segments of the box (right, left, front, rear, top). Measure the average sound intensity for each of the five segments and the analyzer will calculate the resulting sound intensity and sound power for each segment and for the total box, taking the segment areas into account.

As an aid to scanning, a wire frame can be used to indicate the location of segments; alternatively, markers on the floor can be used to indicate the base of the box and a tape measure to show its height.
Measure one segment at a time, scanning it at a constant speed and covering equal areas in equal time. Hold the probe with its axis perpendicular to the segment, and the probe centre in the segment plane. A probe windscreen will reduce the disturbance due to air turbulence, which is often encountered outdoors or near fans.

**Features during measurement**
- Quality control of the measurement by means of quality indicators
- A back-erase to the latest pause (or back-erase the latest scan)
- Aural feedback to earphones for step-by-step guidance and information

This gives warnings regarding overloads and failed criteria, and a periodic sound signal assists you in keeping a steady scanning pace.

During the measurement you can use the Surface View for housekeeping. The coloured segments on top of the image of the measurement object are ideal for keeping track of the measurement process.

**Exporting and Viewing**

Sound intensity levels measured by the hand-held sound intensity system can be transferred to Measurement Partner Suite BZ-5503. You can then archive and view the data for the overall sound power. All data can be exported to Excel® or to text files in XML and various text formats. For noise contour mapping, data can be exported to PULSE Mapping for Hand-held Sound Intensity Type 7962 for noise source identification.
Annotations – Filling in the Blanks

**Fig. 6**
Use the built-in camera in Type 2270 to photograph the test device

Whatever the application, there is more to your measurements than just the bare numbers of your results. With annotations it is easy to attach comments, notes and images to measurement results by:

- Tapping in notes using the on-screen QWERTY keyboard
- Pressing the Commentary pushbutton to record using the built-in commentary microphone
- Taking a photo of the test device or measurement configuration, both for documentation and for keeping track of measurements (Fig. 6)

All annotations are automatically saved with the project and can be reviewed at any time.

**Fig. 7**
The Annotations page showing six user-defined metadata items and a pick-list for the Location entry

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

In addition, you can define the names and types of up to 10 text strings. The entry format can be editable text, a user-defined pick-list, numeric or an index number that automatically increments when a measurement is saved.

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

Calibration and Verification

**Fig. 8**
Complete calibration made using Sound Intensity Calibrator Type 4297

Complete calibration can be made using Sound Intensity Calibrator Type 4297. This includes pressure calibration of both channels, phase calibration of the two channels and verification of the pressure-residual intensity index. Phase calibration enhances the dynamic capability and extends the usable frequency range down to 50 Hz using a 12 mm spacer.

**Fig. 9**
Pressure calibration made with Sound Calibrator Type 4231

Pressure calibration alone can be performed using Sound Calibrator Type 4231 with Intensity Adaptor DP-0888, which provides 97 dB ±0.7 dB at 1 kHz.

The sound intensity system automatically compensates for resonances between the microphone and spacer in the frequency range 5 kHz to 10 kHz, thus enhancing the usable frequency range up to 10 kHz with a 12 mm spacer.
Noise Source Location

**Hand-held Power**
A sound intensity system tracks down puzzling and problematic noise sources efficiently and effortlessly. This versatile hand-held system makes it easy for you to manoeuvre around complex surfaces when solving problems.

**As a Simple Compass**
A compass display and instantaneous spectrum display are available for online source location. These will quickly navigate you to the problem area. The compass data is used to show the direction of incidence of the sound energy in relation to the probe for a specific frequency band or for the overall A- or Z-weighted level.

Noise Mapping

**Noise Mapping**

**Hand-held Power**
A complicated machine or structure radiates sound from several sources and absorbs sound in other places. In order to evaluate the effectiveness of noise reduction methods you need to know how much noise is radiated by the individual components of the machine. This means finding the sound power of those components. With its advanced housekeeping features, the hand-held sound intensity system is capable of collecting and storing a large number of measurements in a simple, flexible and effective way. Divide the surface of the structure into a number of segments and define a corresponding grid on the screen. Each segment may be assigned its own set of metadata.

**Hand-held Power**
Collect data by measuring at the centre of each segment. As you make the measurements one at a time, the system automatically helps you along by offering extensive information and guidance, which includes automatic selection of the next predefined segment, evaluation of the sound field as soon as the relevant information is available, and quick and easy overview facilities. Results can be analyzed as a number map. You can study maps of single frequency bands or alternatively look at total levels. To see contour maps, or 3D plots round an entire measurement surface, export data to the optional Type 7962 mapping software.

PULSE Mapping for Hand-held Sound Intensity Type 7962 gives access to the 2270 Mapping template of Type 7761.
Temporal Variability

Type 2270-S calculates the temporal variability indicator of the sound field. It measures ten times for an averaging time of 8 to 12 seconds, as recommended by ISO 9614-1, and calculates the normalized standard deviation. If the value is too large, you can take action to reduce the temporal variability of extraneous intensity, or measure during periods of less variability, or increase the measurement period at each position.

Building Acoustics

Building acoustics applications such as leakage detection benefit enormously from the intensity technique. Sound intensity enables extra information regarding the contribution of various flanking and leakage transmissions to be gathered. In a traditional pressure-based measurement you get an apparent sound reduction index $R'$ that takes every type of transmission into account. Traditional measurements cannot identify individual transmission paths. This application identifies contributions of any particular segment of any given partition or surface. If a compound partition is to be studied, for example, a wall containing a window, the respective sound intensity for both the wall material and window can be found.

You can create a sound field on one side of a wall (the source room) with Power Amplifier Type 2734 or OmniPower™ Sound Source Type 4292-L internal noise generator. The analyzer’s built-in generator can be useful in some applications, particularly with wireless connection to the power amplifier/sound source.

Leakage

If measurements indicate a sound transmission loss problem or ‘hidden’ flanking transmission, the hand-held sound intensity system can conveniently be used to locate and quantify the noise source areas.

Accessories

The hand-held sound intensity system consists of Hand-held Analyzer Type 2270 with sound intensity software, and Sound Intensity Probe Kit Type 3654.

The probe kit comes with a weatherproof carrying case to house the analyzer, probe with windscreen, extension stem with handle, intensity adaptor for Type 4231, earphones and tape measure. Sound Intensity Microphone Pair Type 4197 includes 8.5, 12 and 50 mm microphone spacers as standard accessories.

The carrying case can also house optional accessories such as a sound calibrator, sound intensity calibrator and spare batteries.
Compliance with Environmental Standards

<table>
<thead>
<tr>
<th>Category</th>
<th>Standard(s)</th>
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<tbody>
<tr>
<td>Safety</td>
<td>EN/IEC 61010–1, ANSI/UL 61010–1 and CSA C22.2 No.1010.1</td>
</tr>
<tr>
<td>EMC Emission</td>
<td>EN/IEC 61000–6–3: Generic emission standard for residential, commercial and light industrial environments</td>
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<tr>
<td></td>
<td>EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements</td>
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<tr>
<td></td>
<td>CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits</td>
</tr>
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<td></td>
<td>IEC 61672–1, IEC 61260, IEC 60651 and IEC 60804: Instrumentation standards</td>
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<tr>
<td>Note:</td>
<td>The above is only guaranteed using accessories listed in this document</td>
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<tr>
<td>EMC Immunity</td>
<td>EN/IEC 61000–6–2: Generic standard – Immunity for industrial environments</td>
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<td></td>
<td>EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements</td>
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<tr>
<td></td>
<td>Cold and Dry Heat</td>
</tr>
<tr>
<td></td>
<td>Operating Temperature: –10 to +50 °C (14 to 122 °F)</td>
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<tr>
<td></td>
<td>Storage Temperature: –25 to +70 °C (–13 to 158 °F)</td>
</tr>
<tr>
<td>Humidity</td>
<td>IEC 60068–2–78: Damp Heat: 93% RH (non-condensing at +40 °C (104 °F)). Recovery time 2 ~ 4 hours</td>
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<tr>
<td>Mechanical</td>
<td>Non-operating:</td>
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<td></td>
<td>IEC 60068–2–6: Vibration: 0.3 mm, 20 m/s², 10 – 500 Hz</td>
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<td></td>
<td>IEC 60068–2–27: Bump: 1000 bumps at 400 m/s²</td>
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<tr>
<td></td>
<td>IEC 60068–2–27: Shock: 1000 m/s², 6 directions</td>
</tr>
<tr>
<td>Enclosure</td>
<td>IEC 60529 (1989): Protection provided by enclosures: IP 44*</td>
</tr>
</tbody>
</table>

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

Specifications – Type 2270 with Sound Intensity Probe Type 3654 and Sound Intensity Software BZ-7233

Specifications are given for Type 2270-S with software BZ-7233 installed and using Sound Intensity Probe Kit Type 3654, including ½” Microphone Pair Type 4197 and Dual Preamplifier Type 2683. Unless otherwise noted, values are given under reference ambient conditions with nominal sensitivities for the microphones and preamplifiers and with a 12 mm spacer. A license for Sound Intensity Software BZ-7233 is required to run the system. Sound Level Meter Software BZ-7222 is included with Type 2270-S. For transducer-specific specifications, see product data BP 2324

REFERENCE CONDITIONS
Reference Sound Pressure Level: 94 dB
Reference Frequency: 250 Hz
Reference Temperature: +20 °C

Reference Static Pressure: 1013.25 hPa
Reference Relative Humidity: 65%

INSTRUMENTATION STANDARDS
Conforms with the following standards:
• IEC 61043 (1993–12) Class 1
• IEC TS 62370 (2004–05)
• IEC 61260 (1995–07) plus Amendment 1 (2001–09), 1/1-octave Bands and 1/3-octave Bands, Class 0
• ANSI S1.11–1986, 1/1-octave Bands and 1/3-octave Bands, Order 3, Type 0-C
• ANSI S1.11–2004, 1/1-octave Bands and 1/3-octave Bands, Class 0

SOUND POWER STANDARDS
Conforms with the following standards:
FREQUENCY RANGE
1/1- and 1/3-octave spectral measurements based on a linear electrical frequency response (Z freq. weighting)
1/1-octave Band Centre Frequencies: 31.5 Hz – 8 kHz
1/3-octave Band Centre Frequencies: 25 Hz – 10 kHz

FREQUENCY WEIGHTING
Z- and A-weighted total results are based on weighted summation of spectral bands in the frequency range 22 Hz – 11.3 kHz. Frequency bands can be manually excluded from calculation

PRESSURE-RESIDUAL INTENSITY INDEX
The minimum pressure-residual intensity index for the analyzer (the “Processor” in IEC 61043), measured with pink noise at a band-filtered level of 114 dB in the high range, is shown in the figure below.

**Fig. 1** Minimum pressure-residual intensity index for the analyzer

ENHANCED PHASE MATCHING
The phase matching of the sound intensity system can be enhanced using a Sound Intensity Calibrator Type 4297

HIGH-FREQUENCY COMPENSATION
High-frequency compensation is made for the 1/2” microphone and 12 mm spacer combination. The mean pressure and sound intensity spectra can then be measured at frequencies up to 10 kHz (one octave higher than the normal theoretical limit)

DETECTORS
Linear Integration: 1 s to days in 1 s steps
Overload Detector: Monitors the two channels for overload

AUTORANGE
Manual and automatic range controls are provided

SPACER SETTINGS
Spacer Length: 6 – 200 mm in 0.5 mm steps

AMBIENT CONDITIONS SETTINGS
Measurements are automatically compensated for the current temperature and ambient pressure set by the user

Measurements
SPECTRA
Simultaneous measurement of mean pressure and intensity

TEMPORAL VARIABILITY
Assessment of whether or not the sound field is stationary. Measured in accordance with ISO 9614–1. Result stored with project

Signal Monitoring
Headphone Output: Can be set to output the input mean pressure signal, the aural feedback signal or both to be monitored with headphones/earphones
Gain Adjustment: –60 dB to +60 dB

Output Socket: Can be set to output the Intensity AF, CF or ZF broadband level as a voltage between –4.47 V and +4.47 V. Gain is 20 dB/V. Lowest level (=0 V) can be set

Internal Generator
Built-in pseudo-random noise generator
Spectrum: Selectable between Pink and White
Crest Factor:
- Pink Noise: 4.4 (13 dB)
- White Noise: 3.6 (11 dB)

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

Output Level: Independent of bandwidth
Max.: 1 Vrms (0 dB)
Gain Adjustment: –60 to 0 dB

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

Repetition Period: 175 s

Output Connector: Output Socket

Analysis

SURFACE AND PROJECT DEFINITION
- Setups and measurements for a given measurement session and measurement of temporal variability are stored in a project
- A project can contain up to 25 surfaces (Custom) or 5 surfaces pre-structured as a box (Box)
- A surface is defined as a plane with a number of segments of equal size organized as a rectangle
  - Each segment can contain one measurement
  - Height and width can be set for the segments or total surface
  - For ANSI S12.12, each surface is doubled using N/2 and N segments
  - Dimensions can be set in SI units or US/UK units
  - A surface can contain up to 15 × 15 segments
  - Definitions of surface and segments can be modified at any time (before, during or after a measurement)
  - Measurements can be stored in previously measured segments, overwriting existing data (a warning is displayed)
  - Individual segments can be deleted
  - The measured data of a segment can be copied to other positions

 IMAGES
- Image annotations can be selected as background for surfaces
- The selected part of the image can be adjusted to match the surface
- Displayed in black and white and can be made darker or lighter for optimal visibility together with grid and readouts on the screen

CALCULATIONS
- Sound power can be calculated for each segment, surface or total surface
- Frequency bands or segments can be manually included in or excluded from calculations
- The following status information is available for each frequency band or segment:
  - Data excluded; Dynamic capability too low; Overload;
  - Underrange; Repeatability failed; Extraneous noise too high;
  - Averaging time too short; Convergence index failed; High levels outside tot.; A frequency range; Temporal variability too high; Sound field is non-uniform
- Quality indicators based on status information are shown in the measurement displays

Measurement Displays
SPECTRUM
Display of one or two spectra plus calculated Z- or A-weighted totals. Quality indicators are shown below each frequency band
Available Spectra: Sound pressure (Z- or A-weighted), sound intensity (Z- or A-weighted), p-I index, dynamic capability, scan difference, repeatability limit
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 and quality indicator for each frequency band

SPECTRUM TABLE
One or two spectra can be displayed in tabular form

SURFACE
For display of all segments organized in a rectangle
• The segments are displayed in the correct height/width ratio
• A grid of segments can be superimposed on the surface
• Segments are coloured in accordance with the measurement status:
  - The current position is green when measurement is in progress and yellow when paused and not saved.
  - All segments with saved data are blue
• The values from a selectable frequency band are displayed together with quality indicators
• The surface can be superimposed on an image
• The transparency of the colours can be adjusted

TOTAL VALUES
Single values displayed as numbers: sound pressure, sound intensity, p-I index (all Z- or A-weighted)

COMPASS
For display of the direction of the incident sound energy near the probe

Result Displays

SPECTRUM
Display of one or two spectra plus calculated Z- and A-weighted totals.
Quality indicators are shown below each frequency band
Available Spectra (per segment, surface and total surface): Sound pressure (Z- or A-weighted), sound intensity (Z- or A-weighted), p-I index, dynamic capability, sound power (Z-or A-weighted)

General Specifications

Hardware Interface

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

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

STATUS INDICATORS
LEDs: Red, yellow and green

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

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

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

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

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

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

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

SECURE DIGITAL SOCKET
2 × SD sockets
Connect SD and SDHC memory cards

LAN INTERFACE SOCKET
• Connector: RJ45 Auto-MDIX
• Speed: 100 Mbps
• Protocol: TCP/IP

TWO INPUT SOCKETS
Connector: Triaxial LEMO
Input Impedance: ≥1 MΩ
Direct Input: Max. input voltage: ±14.14 V<sub>peak</sub>
CCLD Input: Max. input voltage: ±7.07 V<sub>peak</sub>
CCLD Current/voltage: 4 mA/25 V
TRIGGER SOCKET
Connector: Triaxial LEMO
Max. Input Voltage: ±20 V_{peak}
Input Impedance: >47 kΩ
Precision: ±0.1 V

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

HEADPHONE SOCKET
Connector: 3.5 mm Minijack stereo socket
Max. Peak Output Level: ±1.4 V
Output Impedance: 32 Ω in each channel

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

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

EXTERNAL AC MAIN SUPPLY ADAPTOR
Part No.: ZG-0426
Supply Voltage: 100 – 120/200 – 240 V AC; 47 – 63 Hz
Connector: 2-pin IEC320

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

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

Environmental
WARM-UP TIME
From Power Off: <2 min
From Standby: <10 s for prepolarized microphones

WEIGHT AND DIMENSIONS
650 g (23 oz) including rechargeable battery
300 × 93 × 50 mm (11.8 × 3.7 × 1.9") including preamplifier and microphone

Software Interface

USERS
Multi-user concept with login. Users can have their own settings with jobs and projects totally independent of other users

PREFERENCES
Date, time and number formats can be specified per user

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

HELP
Concise context-sensitive help in Chinese (People’s Republic of China), English, French, German, Italian, Japanese, Polish, Romanian, Serbian, Slovenian, Spanish and Ukrainian

UPDATE OF SOFTWARE
Update to any version using BZ-5503 through USB or update via Internet

Input

TRANSDUCER DATABASE
Transducers are described in a transducer database with information on Serial Number, Preamplifier ID, Nominal Sensitivity, Polarization Voltage and Free-field Type. In addition to ½” Microphone Pair Type 4197, ⅜” Microphone Pair Type 4181 and ⅝” Microphone Pair Type 4178 (consisting of two phase-matched Microphones Type 4939 are supported)

CORRECTION FILTERS
For microphone pairs Type 4197 and Type 4181, the analyzer is able to correct the frequency response to compensate for Ellipsoidal Windscreen UA-0781

Calibration

Initial calibration is stored for comparison with later calibrations

ACOUSTIC
Individual (pressure) gain calibration of the two input channels can be performed using Sound Intensity Calibrator Type 4297, Sound Intensity Calibrator Type 3541-A, Sound Calibrator Type 4231 with Coupler DP-0888 or a custom calibrator

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

VERIFICATION
Verification of the pressure-residual intensity index can be made using Sound Intensity Calibrator Type 4297. Pressure-residual intensity index is stored with the calibration and on each measurement for documentation purposes and for calculating the dynamic capability

FIELD CHECK
A field check of the intensity measured with the probe in normal and reversed position can be performed

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

Data Management

METADATA
Up to 30 metadata annotations can be set per project (text from keyboard or text from pick list, number from keyboard or auto-generated number)
PROJECT TEMPLATE
Defines the display and measurement set-ups. Set-ups can be locked and password-protected

PROJECT
Measurement data stored with the project template

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

Measurement Control
MANUAL OR SEMI-AUTOMATIC
Measurements are started manually and the user is guided through the measurement for each segment. After storing the measurement for one segment, the analyzer is automatically ready to measure the next segment. 16 different segment sequences are available. For ISO 9614-2 and ECMA 160, the measurement supports two scans per segment with repeatability check

AURAL FEEDBACK
Periodic sound signal to earphones to assist your measurement process

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

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

BACK-ERASE
It is possible to erase backwards to the latest pause

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

Annotations
VOICE ANNOTATIONS
Voice annotations can be attached to measurements so that verbal comments can be stored together with the measurement

Playback: Playback of voice annotations can be listened to using an earphone/headphones connected to the headphone socket

Gain Adjustment: −60 dB to +60 dB

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

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

IMAGE ANNOTATIONS (TYPE2270 ONLY)
Image annotations can be attached to measurements. Images can be viewed on the screen

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

PC REQUIREMENTS
Operating System: Windows® 7, 8.1 or 10 (all in 32-bit or 64-bit versions)

Recommended PC:
• Intel® Core™ i3
• Microsoft®.NET 4.5
• 2 GB of memory
• Sound card
• DVD drive
• At least one available USB port
• Solid State Drive

ONLINE DISPLAY OF TYPE 2250/2270 DATA
Measurements on the analyzer can be controlled from the PC and displayed online with the PC, using the same user interface on the PC as on the analyzer

Display: 1024 x 768 (1280 x 800 recommended)

DATA MANAGEMENT
Explorer: Facilities for easy management of analyzers, users, jobs, projects and project templates (copy, cut, paste, delete, rename, create)

Data Viewer: View measurement data (content of projects)

Synchronization: Project templates and projects for a specific user can be synchronized between PC and analyzer and between local and cloud archives. Measurement Partner Suite BZ-5503 merges Measurement Partner Field App annotations with the corresponding analyzer project

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

Brüel & Kjær Software: Projects can be exported* to Predictor-LimA Type 7810, Acoustic Determinator Type 7816, Protector Type 7825, Qualifier (Light) Type 7830 (7831), PULSE Mapping for Hand-held Sound Intensity Type 7962/7752/7761 or PULSE Reflex

POST-PROCESSING
Measurement Partner Suite is a suite of modules, including post-processing tools for data acquired with Type2250/2270. The following post-processing modules are available:
• Logging Module BZ-5503-A
• Spectrum Module BZ-5503-B
• WAV File Analysis Module BZ-5503-C

These modules help to assess logging data and measured spectra, such as calculating contribution from markers on a logging profile or correcting spectra for background noise

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

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

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

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

BZ-7233  Sound Intensity Software for Type 2270
Type 3654  Sound Intensity Probe Kit
included with Sound Intensity Probe Kit Type 3654:
• Type 4197: Sound Intensity Microphone Pair
• Type 2683: Dual Preamplifier
• DP-0888: Intensity Adaptor for Type 4231
• HT-0015: Earphones
• KE-0458: Carrying Case for Type2270 and Probe Kit
• QA-0236: Tape Measure
• UA-0781: Ellipsoidal Windscreen
• UA-1439: Extension Stem
• UA-1440: Handle with Integral Cable

Type 2270-S  Hand-held Analyzer
included with Type 2270-S:
• Type 4189: Prepolarized Free-field ½” Microphone
• AO-1494: USB Standard A to USB Micro B Interface Cable, 1.8 m (6’)
• AO-1449: LAN Interface Cable
• BZ-5298: Environmental Software DVD (including Measurement Partner Suite BZ-5503)
• BZ-7222: Sound Level Meter Software
• BZ-7223: Frequency Analysis Software
• BZ-7229: 2-channel Option
• BZ-7231: Tone Assessment Option
• BZ-7232: Noise Monitoring Software
• DH-0696: Wrist Strap
• FB-0669: Hinged Cover for Type 2270
• HT-0015: Earphones
• KE-0441: Protective Cover
• QB-0061: Battery Pack
• UA-1654: 5 Extra Styli
• UA-1650: 90 mm diameter Windscreen with Auto-detect
• UA-1651: Tripod Extension for hand-held analyzer
• UA-1673: Adapter for Standard Tripod Mount
• ZC-0032: Microphone Preamplifier
• ZG-0426: Mains Power Supply

Accessories and Components Available Separately

CALIBRATION
Type 4231  Sound Calibrator (fits in Type 3654)

Type 4297  Sound Intensity Calibrator (fits in Type 3654)

MEASURING
Type 3654  Sound Intensity Probe Kit
AO-0440-D-015  Signal Cable, LEMO to BNC, 1.5 m (5’)
AO-0646  Sound Cable, LEMO to Minijack, 1.5 m (5’)
AO-0697-030  Mic. Extension Cable, 10-pin LEMO, 3 m (10’)
AO-0697-100  Mic. Extension Cable, 10-pin LEMO, 10 m (33’)
UA-0587  Tripod
UA-0801  Small Tripod
UL-1009  SD Memory Card for hand-held analyzers
UL-1017  SDHC Memory Card for hand-held analyzers

INTERFACING
Type 7962  PULSE Mapping for Hand-held Sound Intensity
M1-7962-N  Software Maintenance and Support for Type 7962
Type 7761  PULSE Acoustic Test Consultant (mapping software)
M1-7761-N  Software Maintenance and Support for Type 7761

POST-PROCESSING
BZ-5503-A  Logging Module (see product data BP2430)
BZ-5503-B  Spectrum Module (see product data BP2430)
BZ-5503-C  WAV File Analysis Module (see product data BP2430)

Service Products
2270-EW1  Extended Warranty, one year extension
2270-CVI  Initial Pressure-Residual Intensity Index Verification of Type2270-S with Type 3654
2270-CVF  Pressure-Residual Intensity Index Verification of Type2270-S with Type 3654
3654-CAI  Accredited Initial Calibration for Type 3654
3654-CAF  Accredited Calibration for Type 3654
4297-CAI  Accredited Initial Calibration for Type 4297
4297-CAF  Accredited Calibration for Type 4297
4197-CAF  Accredited Calibration for Type 4197

For more accessories, please refer to the Type 2250/2270 platform product data, BP 2025