

PRODUCT DATA

Hand-held Sound Intensity Analyzer — Type 2270-G

with Sound Intensity Software BZ-7233 and Sound Intensity Probe Kit for 2270 Type 3654

Portable and battery operated, Hand-held Sound Intensity System Type 2270-G 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™ Noise Source Identification Type 7752 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 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
- Noise mapping

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
- Can use either ¼" or ½" intensity probe microphones

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
- 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

Sound Intensity Emerges from the Laboratory

Fig. 1
Getting to all those
difficult places

Sound Intensity Made Easy



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 Noise Source Identification Type 7752 software for noise contour mapping.

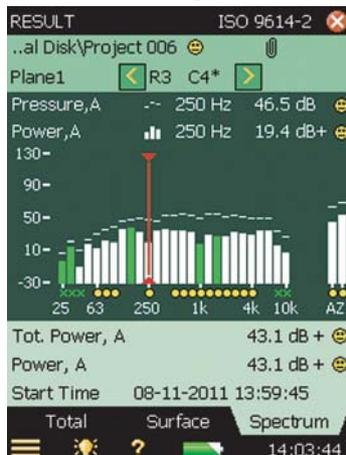
The combination of strict legislation and customer requirements has increased pressure on manufacturers to provide precise specifications of their products' noise levels. The need to determine sound power escalates accordingly, but many a manufacturer pales at the thought of having to make such complicated 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.

BZ-7233 transforms the hand-held analyzer into a powerful measurement tool using the intensity technique to determine sound intensity levels and map noise. Simply swap Type 2270'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

Sound Power Determination Using the Hand-held Sound Intensity System

Fig. 2
Sound intensity
spectrum

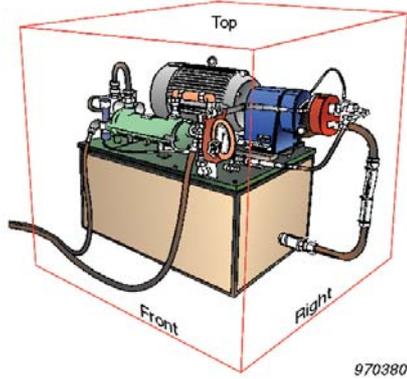
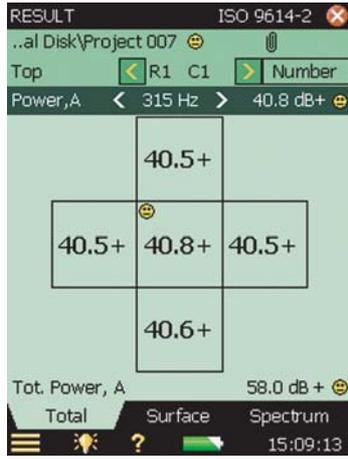
Noise Labelling and Standards



We live in a noisy world. As a result, our awareness of noise has escalated dramatically and we now demand 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 sub-suppliers, 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.

Fig. 3
 Predefined surfaces on the screen (left) representing the imaginary surfaces surrounding the sound source (right)

Measurement Procedure



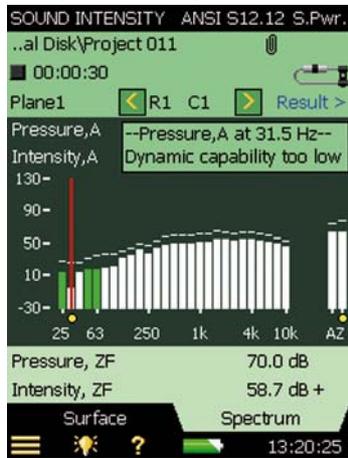
As an example, consider a noise source standing on a reflecting floor. Imagine a virtual box that completely envelops the source. The sound power from the source will radiate through the five free segments of the box (right, left, front, rear, top). Now measure the average sound intensity for each of the five segments. 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; or 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 any disturbance from air turbulence, which is often encountered outdoors or near fans.

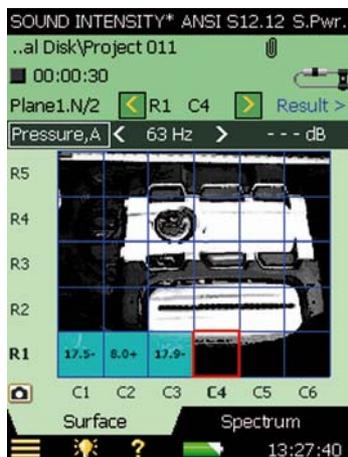
Fig. 4
 Measurement quality indicators: Dynamic Capability and Overload are checked and indicated

Support During Measurement



Features during measurement include quality control of the measurement by means of quality indicators, a back-erase to the latest pause (or back-erase the latest scan), and 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.

Fig. 5
 Housekeeping during measurement is done by coloured segments

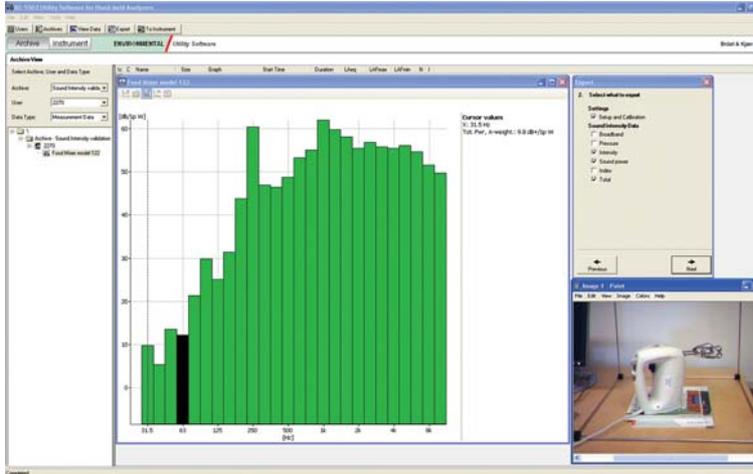


During the measurement you can use the Surface View for housekeeping. The coloured segments on top of the image of the measurement object are ideal for keeping track on the measurement process.

Exporting and Viewing

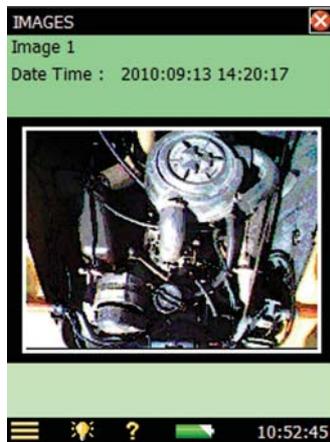
Sound intensity levels measured by the hand-held sound intensity system can be transferred to Measurement Partner Suite BZ-5503. You can then archive and view the data for the overall sound power. All data can be exported to Excel® or to text files in XML and various text formats. For noise contour mapping, data can be exported to PULSE Noise Source Identification Type 7752.

Fig. 6
Measurement Partner Suite BZ-5503 displays the overall sound power data from the measurement, and the data can be exported to spreadsheet, text or mapping applications



Annotations – Filling in the Blanks

Fig. 7
Use the built-in camera in Type 2270 to photograph the test device

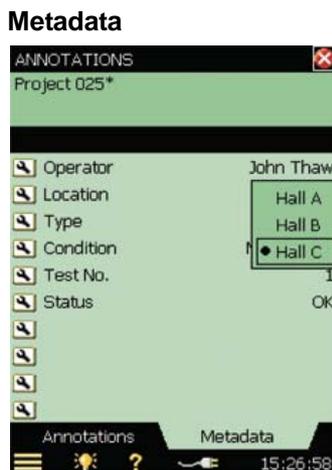


Whatever the application, there is more to your measurements than just the bare numbers of your results. With annotations it is easy to attach comments, notes and images to measurement results by:

- 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. 7)

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

Fig. 8
The Annotations page showing six user-defined metadata items and a picklist 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 may be editable text, a user-defined picklist, 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. 9
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. 10
Pressure calibration
made with Sound
Calibrator Type 4231

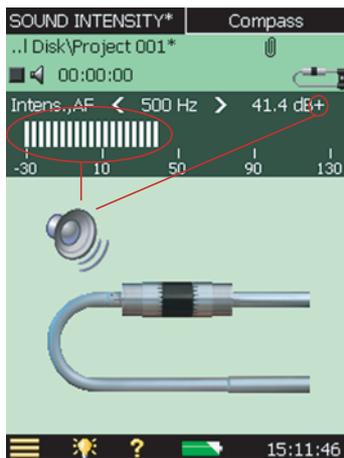


Pressure calibration alone can be performed using Sound Calibrator Type 4231 with Coupler DP-0888, which provides 97 dB \pm 0.7 dB at 1 kHz.

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

Fig. 11
Compass display for
noise source location



Hand-held Power

Sound Intensity System Type 2270-G 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 on-line 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.

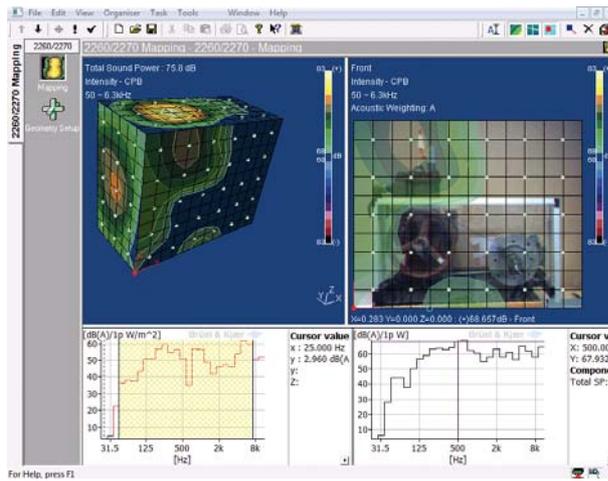
Noise Mapping

Fig. 12
A 5 \times 6 contour map



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.

Fig. 13
Data from Type 2270-G can be exported to PULSE Noise Source Identification Type 7752 and displayed as 2D and 3D maps



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 analysed 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 7752 mapping software.

Temporal Variability

Fig. 14
Determination of temporal variability

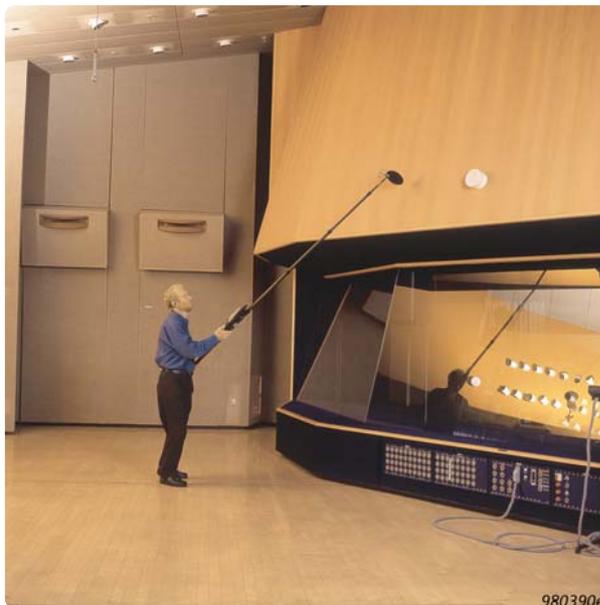


Type 2270-G calculates the temporal variability indicator of the sound field. It measures ten times for an averaging time of 8 to 12 s, as recommended by ISO 9614-1, and calculates the normalised standard deviation. If the value is too large, you can take action to reduce the temporal variability of 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.

Fig. 15
Mapping the sound reduction to find leakages between studio and control room



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' which takes every type of transmission into account. Traditional measurements cannot identify individual transmission paths, but with this application you can identify 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 for the window can be found.

To create a sound field on one side of the wall (in the source room) use the internal noise generator in Power Amplifier Type 2734 and OmniPower Sound Source Type 4292-L. In some applications, the built-in generator of Type 2270-G can be useful, also offering wireless connection to the power amplifier/sound source.

Leakage

If measurements indicate a leakage problem or “hidden” flanking transmission, the hand-held sound intensity system can conveniently be used for noise source location.

Accessories

Fig. 16
Sound Intensity System including Probe Kit Type 3654



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.

The case can also house optional accessories such as a sound calibrator, sound intensity calibrator and spare batteries.

100114

Fig. 17
Hand-held Sound Intensity System Type 2270-G



KE-0458
Carrying Case



QA-0236
Tape Measure



DP-0888
Intensity Adaptor
for 4231



HT-0015
Earphones



BZ-7233
Sound Intensity
Software



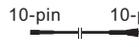
UA-0781
Ellipsoidal
Windscreen



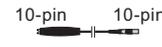
4197
Sound Intensity
Microphone Pair



2683
Dual Preamplifier
10-pin



UA-1439
Extension
Stem



UA-1440
Handle with
Integral Cable



2270 Hand-held Analyzer
including
4189 Microphone
ZE-0032 Microphone Preamplifier

100129/1

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.
Safety	EN/IEC 61010–1, ANSI/UL 61010–1 and CSA C22.2 No. 1010.1: Safety requirements for electrical equipment for measurement, control and laboratory use.
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. IECTS 62370 and IEC 61260: Instrumentation standards. Complies with Canadian standard ICES–001.
EMC Immunity	EN/IEC 61000–6–2: Generic standards – Immunity for industrial environments. EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements. IECTS 62370 and IEC 61260: Instrumentation standards.

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

Specifications are given for Type 2270-G 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. Licenses for Sound Level Meter Software BZ-7222 and Sound Intensity Software BZ-7233 are required to run the system. 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:

- ISO 9614–1:1993 (E)
- ISO 9614–2:1996 (E)
- ANSI S12.12–1992
- ECMA 160:1992

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

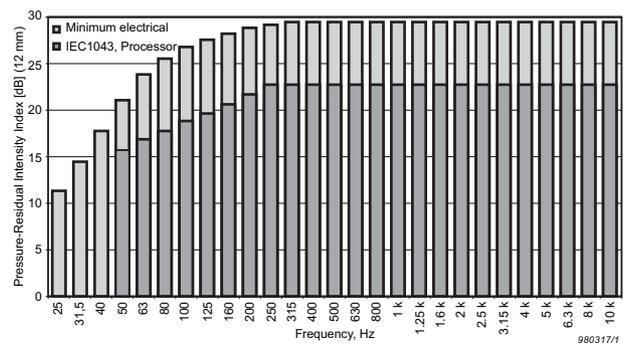
FREQUENCY WEIGHTING

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 Fig. 18

Fig. 18 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 ½" 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

TRANSDUCER DATABASE

The microphone pair is described in the transducer database with information on Serial No., Preamplifier ID, Nominal Sensitivity, Polarization Voltage and Free-field Type. In addition to ½" Microphone Pair Type 4197, ½" Microphone Pair Type 4181 and ¼" Microphone Pair Type 4178 (consisting of two phase-matched microphones Type 4939) are supported

CORRECTION FILTERS

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

CALIBRATION

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: Using internally generated electrical signal combined with typed-in value of microphone sensitivity

Calibration History: Up to 20 of the latest calibrations made are listed and can be viewed on the instrument

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

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

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

Manual Controls: Reset, Start, Pause, Back-erase, Continue and Store the measurement manually

Measurement Mode: Manual or Automatic. Automatic Save option in Automatic mode

Back Erase: It is possible to erase backwards to the latest pause or to erase the latest scan when using ISO 9614–2 and ECMA 160 standards

Aural Feedback: Periodic sound signal to earphones to assist your measurement process

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

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 organised as a rectangle
- Each segment can contain one measurement

- Height and width dimensions can be set for the segments or set for the 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
- The image is 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-l 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 organised 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 colors can be adjusted

TOTAL VALUES

Single values displayed as numbers: Sound Pressure, Sound Intensity, p-l 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-l index, dynamic capability, sound power (Z-or A-weighted)

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

Available spectra per segment: Scan difference, repeatability limit
Available spectra for the total surface: Field non-uniformity, field non-uniformity limit, extraneous noise, convergence index, convergence index limit
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 the segments organised in a rectangle

- The segments are displayed in the correct height/width ratio
- A grid can be superimposed on the surface
- The surface can be superimposed on an image
- **Number:** The values from a selectable frequency band are displayed together with quality indicators
- **Curve:** Displays curves of equal levels from a selectable frequency band
- **Contour:** Displays colors between the curves of equal levels from a selectable frequency band
- **For Curve and Contour:** Hide/show maxima, zoom in or out, auto scale, transparency adjustment and two color scales

TOTAL

For display of surface results organised in a list or a exploded box:

- Include/exclude a surface from calculation of total surface results

TOTAL VALUES

Single Values per Segment, Surface or Total Surface Displayed as Numbers: Sound pressure, sound intensity, p-I index, sound power (all Z- or A-weighted)

Single values for field non-uniformity (A-weighted), start time, stop time, overload, time remaining

General Specifications

KEYBOARD

Pushbuttons: 11 keys with backlight, optimised for measurement control and screen navigation

ON-OFF BUTTON

Function: Press for 1 s to turn on. When on: press for 1 s to enter standby or press for more than 5 s to switch off

STATUS INDICATORS

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 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

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 2.0 OTG Micro AB and USB 2.0 Standard A sockets

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

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

IMAGE ANNOTATIONS

Image annotations can be attached to measurements

Images can be viewed on the screen

METADATA

Up to 10 metadata annotations can be set per project (text from keyboard or text from pick list, number from keyboard or auto-generated number)

DATA MANAGEMENT

Project Template: Defines the display and measurement setups. Setups can be locked and password protected

Project: Measurement data stored with the Project Template

Job: Projects are 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)

LAN INTERFACE SOCKET

- Connector: RJ45 Auto-MDIX

- Speed: 100 Mbps

- Protocol: TCP/IP

TWO INPUT SOCKETS

Connector: Triaxial LEMO

Input Impedance: $\geq 1\text{ M}\Omega$

Direct Input: Max. input voltage: $\pm 14.14\text{ V}_{\text{peak}}$

CCLD Input: Max. input voltage: $\pm 7.07\text{ V}_{\text{peak}}$

CCLD Current/Voltage: 4 mA/25 V

TRIGGER SOCKET

Connector: Triaxial LEMO

Max. Input Voltage: $\pm 20\text{ V}_{\text{peak}}$

Input Impedance: $> 47\text{ k}\Omega$

Precision: $\pm 0.1\text{ V}$

OUTPUT SOCKET

Connector: Triaxial LEMO

Max. Peak Output Level: $\pm 4.46\text{ V}$

Output Impedance: $50\ \Omega$

HEADPHONE SOCKET

Connector: 3.5 mm Minijack stereo socket

Max. Peak Output Level: $\pm 1.4\text{ V}$

Output Impedance: $32\ \Omega$ 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

CAMERA

Camera with fixed focus and automatic exposure is incorporated in underside of instrument.

Used to create image annotations for attaching to measurements

Image Size: 2048 × 1536 pixels

Viewfinder Size: 212 × 160 pixels

Format: jpg with exif information

STORAGE SYSTEM

INTERNAL FLASH-RAM (NON-VOLATILE)

For user setups and measurement data: 512 MB

EXTERNAL SECURE DIGITAL MEMORY CARD

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

USB MEMORY STICK

For store/recall of measurement data

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

MAINS POWER SUPPLY

Supply Voltage: 100 – 120/200 – 240 V AC; 47 – 63 Hz

Connector: 2-pin IEC320

BATTERY PACK

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

Voltage: 3.7 V

Capacity: 5200 mAh nominal

Typical Operating Time:

- Single-channel: >11 h (screen backlight dimmed); >8.5 h (full screen backlight)
- Dual-channel: >7.5 h (full screen backlight)

Use of external interfaces (LAN, USB, WLAN) will decrease battery operating time

Battery Cycle Life: >500 complete charge/discharge cycles

Battery Indicator: Remaining battery capacity and expected working time can be read out in % and in time

Charge Time: In instrument, typically 10 hours from empty at ambient temperatures below 30°C. To protect the battery, charging will be terminated completely at ambient temperatures above 40°C. At 30 to 40°C charging time will be prolonged. With External Charger ZG-0444 (optional accessory), typically 5 hours

Note: It is not recommended to charge the battery at temperatures below 0°C or over 50°C (32°F or 122°F). Doing this will reduce battery lifetime

CLOCK

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

WARM-UP TIME

From Power Off: <2 minutes

From Standby: <10 s for prepolarized microphones

TEMPERATURE

IEC 60068–2–1 and 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: IP 44

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

650 g (23 oz) including rechargeable battery

300 × 93 × 50 mm (11.8 × 3.7 × 1.9") incl. preamplifier and microphone

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, Italian, Japanese, Korean, Polish, Portuguese, Romanian, Serbian, Slovenian, Spanish, Swedish and Turkish

HELP

Concise context-sensitive help in English, French, German, Italian, Japanese, Korean, Polish, Portuguese, Romanian, Serbian, Slovenian and Spanish

UPDATE OF SOFTWARE

Update to any version from 4.0 and up using BZ-5503 through USB or via Internet

WEB PAGE

Connect to the analyzer using an Internet browser supporting JavaScript®. The connection is password protected

Two levels of protection:

- Guest level: for viewing only
- Administrator level: for viewing and full control of the analyzer

Specifications – Measurement Partner Suite BZ-5503

BZ-5503 is included with Type 2250/2270 for easy synchronisation of setups and data between PC and analyzer. It is supplied on DVD BZ-5298

ON-LINE DISPLAY OF TYPE 2250/2270 DATA

Measurements on Type 2250/2270 can be controlled from the PC and displayed on-line with the PC, using the same user interface on the PC as on Type 2250/2270

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)

Synchronisation: Project Templates and Projects for a specific user can be synchronised between PC and Type 2250/2270

USERS

Users of Type 2250/2270 can be created or deleted

EXPORT FACILITIES

Microsoft® Excel®: Projects (or user-specified parts)

Brüel & Kjær Software: Projects can be exported to Predictor-LimA Type 7810, Noise Explorer Type 7815, Acoustic Determinator Type 7816, Evaluator Type 7820, Protector Type 7825, Qualifier (Light) Type 7830 (7831), and PULSE Noise Source Identification Type 7752

POST-PROCESSING

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

- Logging Module BZ-5503-A
- Spectrum Module BZ-5503-B

These two 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. For more information see the product data for Measurement Partner Suite, [BP 2430](#)

TYPE 2250/2270 SOFTWARE UPGRADES AND LICENSES

BZ-5503 controls Type 2250/2270 software upgrades and licensing of the Type 2250/2270 applications

INTERFACE TO TYPE 2250/2270

USB v. 2.0, LAN or Internet connection

LICENCE MOVER

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

PC REQUIREMENTS

Operating System: Windows® 7 or XP (both in 32-bit or 64-bit versions)

Recommended PC:

- Intel® Core™ 2 Duo
- Microsoft® .NET 4.0
- 2 GB of memory
- Sound card
- DVD drive
- At least one available USB port

Ordering Information

Type 2270-G Hand-held Analyzer Type 2270 with Sound Level Meter Software BZ-7222 and Sound Intensity Software BZ-7233

Included with Type 2270-G:

- BZ-7233: Sound Intensity Software
- BZ-7222: Sound Level Meter Software
- Type 4189: Prepolarized Free-field ½" Microphone
- ZC-0032: Microphone Preamplifier
- AO-1494: USB Standard A to USB Micro B Interface Cable, 1.8 m (6 ft)
- BZ-5298: Environmental Software DVD (including Measurement Partner Suite BZ-5503)
- UA-1650: 90 mm diameter Windscreen with Auto-detect
- UA-1651: Tripod Extension for Hand-held Analyzer
- UA-1673: Adaptor for Standard Tripod Mount
- DH-0696: Wrist Strap
- KE-0440: Travel Bag
- KE-0441: Protective Cover
- FB-0669: Hinged Cover for Type 2270
- HT-0015: Earphones
- UA-1654: 5 Extra Styli
- AO-1449: LAN Interface Cable
- QB-0061: Battery Pack
- ZG-0426: Mains Power Supply

Systems and Kits

Type 2270-G-001 Hand-held Sound Intensity System including Type 2270-G and Sound Intensity Probe Kit Type 3654

Type 2270-G-002 Hand-held Sound Intensity System including Type 2270-G, Sound Intensity Probe Kit Type 3654, Sound Intensity Calibrator Type 4297 and PULSE Noise Source Identification Type 7752

Included with Sound Intensity Probe Kit Type 3654

- Type 4197: Sound Intensity Microphone Pair
- Type 2683: Dual Preamplifier
- UA-1439: Extension Stem
- UA-1440: Handle with Integral Cable
- UA-0781: Ellipsoidal Windscreen
- DP-0888: Intensity Adaptor for Type 4231 – providing 97 dB ±0.1 dB at 1 kHz
- HT-0015: Earphones
- QA-0236: Tape Measure
- KE-0458: Carrying Case for Type 2270 and Probe Kit

BZ-7233-100 Sound Intensity Kit for 2270 including Sound Intensity Software BZ 7233 and Sound Intensity Probe Kit Type 3654

BZ-7233-200 Sound Intensity Kit for 2270 including Sound Intensity Software BZ 7233, Sound Intensity Probe Kit Type 3654, Sound Intensity Calibrator Type 4297 and PULSE Noise Source Identification Type 7752

BZ-7233-300 Sound Intensity Kit for 2270 including Sound Intensity Software BZ 7233 and PULSE Noise Source Identification Type 7752

TRADEMARKS

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Accessories and Components Available Separately

CALIBRATION

Type 4231 Sound Calibrator (fits in Type 3654)
Type 4297 Sound Intensity Calibrator (fits in Type 3654)

MEASURING

BZ-7233 Sound Intensity Software for 2270
Type 3654 Sound Intensity Probe Kit
AO-0440-D-015 Signal Cable, LEMO to BNC, 1.5 m (5 ft)
AO-0646 Sound Cable, LEMO to Minijack, 1.5 m (5 ft)
AO-0697-030 Microphone Extension Cable, 10-pin LEMO, 3 m (10 ft)
AO-0697-100 Microphone Extension Cable, 10-pin LEMO, 10 m (33 ft)
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 7752 PULSE Noise Source Identification (mapping software)
M1-7752-N Annual Software Maintenance and Support Agreement for PULSE Noise Source Identification Type 7752

POST-PROCESSING

BZ-5503-A Logging Module
BZ-5503-B Spectrum Module

Service Products

2270-UPG Upgrade from Version 1.XX to latest version
2270-EW1 Extended Warranty, one year extension
2270-MW1 5-year Warranty including Yearly Accredited Calibration – annual payment
2270-MW5 5-year Warranty including Yearly Accredited Calibration
2270-CV1 Initial Pressure-Residual Intensity Index Verification of Types 2270-G and 3654
2270-CVF Pressure-Residual Intensity Index Verification of Types 2270-G and 3654
3654-CAI Sound Intensity Probe Kit, Initial Accredited Calibration
3654-CAF Sound Intensity Probe Kit, Accredited Calibration
4297-CAI Sound Intensity Calibrator Accredited Initial Calibration
4297-CAF Sound Intensity Calibrator Accredited Calibration
4197-CAF ½" Microphone Pair for Sound Intensity, Accredited Calibration

For more accessories, please refer to the Type 2250/2270 platform product data, [BP 2025](#)

