

# PRODUCT DATA

2238 Mediator with Frequency Analysis Software BZ7123



Frequency Analysis Software BZ7123 empowers the 2238 Mediator to solve advanced noise problems that are beyond the scope of time-domain measurements. With automatic scan of user-selected bands and clear graphical display of spectra, including cursor read-outs, the software provides essential information for noise analysis and troubleshooting.

The measured frequency range is 31.5 Hz to 8 kHz for  $1/1$ -octave bands and 20 Hz to 12.5 kHz for  $1/3$ -octave bands (centre frequencies).

**2238 Mediator**

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## Uses and Features

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- USES*
- Measuring resonances in the sound produced by machines with rotating parts or tube systems
  - Evaluating the effects of noise reduction measures (insulated walls, rubber pads, etc.)
  - Selecting hearing protection to match the frequency content of noise
  - Making measurements for sound power determination

- FEATURES*
- Bar graph display of spectra with cursor read-out of all parameters
  - Automatic serial scan of  $1/1$ -octave or  $1/3$ -octave filter bands
  - User-selected start and stop bands
  - Automatically time/accuracy optimised dwell times for each band
  - Full coverage of relevant frequency range:
    - $1/1$ -octave: 31.5 Hz to 8 kHz
    - $1/3$ -octave: 20 Hz to 12.5 kHz

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## Frequency Analysis Software

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### **An Important Analysis Tool**

Frequency analysis is an essential part of any noise reduction effort. It's the only way to measure the effectiveness of a soundproofing installation across the spectrum. Similarly, you must measure the frequency content of noise in order to choose appropriate hearing protection.

To run Frequency Analysis Software BZ 7123, the 2238 Mediator must be equipped with a filter set ( $1/1$ -octave and  $1/3$ -octave, see specifications).

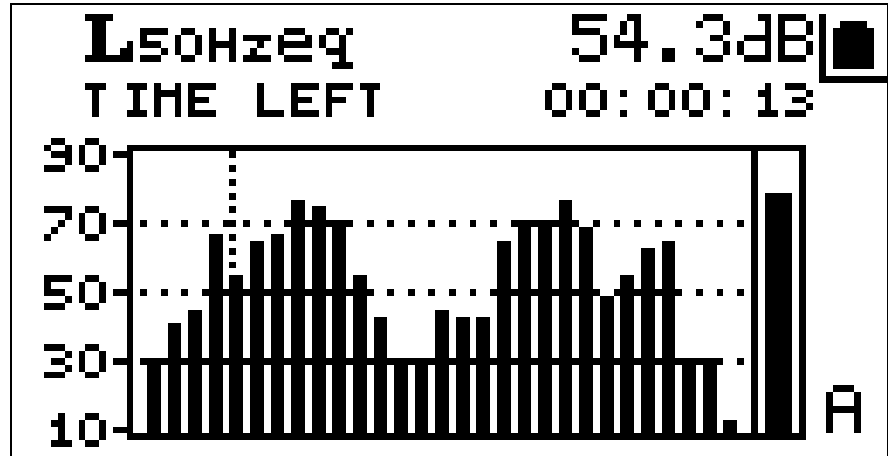
### **Automatic Measurements**

Frequency measurements are fast and simple with Frequency Analysis Software BZ 7123. All you do is select the start and stop bands, or use the default full range, and you're ready to begin. The software provides optimised dwell times for each of the selected bands and executes an automatic scan when you start the measurement. If you need to use a different dwell time, you can manually enter any value from one second to one hour. The measured parameters are  $L_{Xeq}$ ,  $L_{XYmax}$  and  $L_{XYmin}$ .

### **Graphic Display**

The frequency analysis software presents spectral information in bar graphs, providing a valuable overview of the measured noise. While scanning, the displayed graph is updated continuously and the remaining measurement time is reported. Numeric values are available through the "cursor read-out," which displays the parameter value at the current cursor position.

Fig. 1 The bar graph is updated during filter scan. All parameter values are available for display as numerical cursor read-outs



The spectra for  $L_{Xeq}$ ,  $L_{XYmax}$  and  $L_{XYmin}$  are measured simultaneously. The display is toggled between these three spectra and the standard SLM display by pressing one of the Mediator's keys.

### Storage and Printing

Up to 500 spectra can be stored. These can be recalled to the display and printed, or exported to a PC for advanced analysis and reporting with 7815 Noise Explorer™, 7825 Protector™ or 7820/21 Evaluator™ software.

### Serial Interface

Frequency Analysis Software BZ 7123 supports full instrument control via the serial interface.

# Specifications 2238 with BZ7123

Specifications apply to the 2238 Mediator fitted with the supplied microphone and preamplifier and running Basic SLM Software (supplied as standard with each 2238 Mediator) and Frequency Analysis Software BZ 7123

## SYSTEM REQUIREMENTS:

The  $1/1$ -octave and  $1/3$ -octave filter set must be installed in the 2238 Mediator to support Frequency Analysis Software BZ 7123

## STANDARDS:

Conforms with the following:

- IEC 651–1979 Type 1 I, EN 60651 Type 1 I
- IEC 804–1985 Type 1, EN 60804 Type 1
- Draft IEC 1672 / EN 61672–April 1997 Class 1
- ANSI S1.43–1983 Type S1

## SUPPLIED MICROPHONE:

Type 4188 Prepolarized Free-field  $1/2$ " Condenser Microphone

**Nominal Sensitivity:** – 30 dB

**Frequency Range:** 8 Hz – 16 kHz  $\pm$  2 dB

**Capacitance:** 12 pF

## MICROPHONE PREAMPLIFIER:

ZC0030

**Extension Cables:** Available in lengths of 3m and 10 m

## MEASURING RANGES:

**Linear Operation Range:** 80 dB, adjustable to give full-scale readings in 10 dB steps over the following ranges:

- $1/1$ -octave: 90 – 140 dB
- $1/3$ -octave: 80 – 140 dB
- Broad-band: 100 – 140 dB

**Max. Peak Level:** 3 dB above full scale reading

**Upper Limit (RMS) for Crest Factor = 10:** 17 dB below full scale reading

## DETECTORS:

Simultaneous detection of spectrum and broad-band parameters

**Spectrum:**  $1/1$ -octave and  $1/3$ -octave band filters with two exponential time weightings (Fast, Slow) and a linear averaging detector. Selectable frequency weighting A, C or Lin

**Broad-band:** Two exponential time weightings (Fast, Slow) and a linear averaging detector. Selectable frequency weighting A, C or Lin

**Overload Detector:** Monitors all the frequency weighted channels

## INHERENT NOISE LEVEL:

This is due to the combination of electrical noise and microphone thermal noise at 20°C (68°F). Typical values with supplied microphone of nominal sensitivity (in dB):

Weighting	Electrical noise (2238)	Thermal noise (4188)	Combined Noise
"A"	14	14.5	17.4
"C"	17	13.2	18.5
Lin. 5 Hz – 20 kHz	22	14.2	23

## DISPLAY:

128 × 64 dot matrix display with backlight

**Measurement Display:** Range and quasi-analogue bar, plus four measurement parameters that can be freely selected from all available parameters during measurements

## MEASUREMENTS:

The available measurement parameters are listed below. RMS and Peak measurements run in parallel with individual frequency weightings

## Symbol Key:

X: Frequency weighting A, C or L

Y: Time weighting F or S

Detector 1	Detector 2
Spectrum	Broad-band
Stored	
$L_{eq}$	$L_{Xeq}$
$L_{Ymax}$	$L_{XYmax}$
$L_{Ymin}$	$L_{XYmin}$
Instantaneous (display only)	
$L_{eq}$ (dynamic average)	$L_{XYp}$
$L_{Yp}$	$L_{XYInst}$

## MEASUREMENT CONTROL:

Time/accuracy optimised scan time, or manually selected time Timers

The Mediator supports a total of four timers which allow set-up of measurement start times up to a month in advance

## CALIBRATION:

Can be performed using Sound Level Calibrator Type 4231 or Multifunction Acoustic Calibrator Type 4226. Initial calibration is stored for comparison with later calibrations

**Calibration History:** 20 latest calibrations

## MEMORY:

2 Mbytes. Up to 500 measurements can be stored, including time stamp, complete set-up and calibration data

## SERIAL PRINTER:

Measurement data can be printed on Portable Printer Type 2322 or on an IBM Proprinter-compatible printer

## Aux 1 OUTPUT:

**Connector:** 2 pin LEMO

**AC Output Signal:** Range-adjusted AC output, unweighted or with the frequency weighting selected on RMS detector 1. Short-circuit protected

**Output:** 1 V RMS corresponding to full-scale indication

**Max. Load:** 10 k $\Omega$  || 1 nF

**Output Impedance:** Typically 100  $\Omega$

## Aux 2 OUTPUT:

**Connector:** 2 pin LEMO

**DC Output Signal:** DC version of the signal on RMS detector 1 (Fast, Inst). Short-circuit protected

**Output:** 0 to 4.0 V DC (50 mV/dB)

**Update Rate:** 160 times per second

**Max. Load:** 10 k $\Omega$  || 1 nF

**Output Impedance:** Typically 100  $\Omega$

## CLOCK:

Real-time (calendar)

## SERIAL INPUT/OUTPUT:

Conforms to EIA/TIA 574 (RS232), coupled as Data Terminal Equipment (DTE). Cable is supplied with the 2238 Mediator

**Connector:** 9-pin D-type male

**Baud Rates:** 4800, 9600 and 19200. (38400 and 115200 for file transfer)

**Word Length:** 8 bits, no parity, 1 stop bit

**Handshake:** XON/XOFF, hardwired, modem

## SETTLING TIME:

**From Power On:** < 10 s

# Specifications (cont.)

**ENVIRONMENTAL EFFECTS:**

**Storage Temperature:** -25 to +60° C (-13 to +140° F)

**Operating Temperature:** -10 to +50° C (14 to 122° F)

**Effect of Temperature:** < 0.5 dB (-10 to +50° C)

**Effect of Humidity:** < 0.5 dB for 30% < RH < 90% (at 40° C, 1 kHz)

<b>CE</b>	CE-mark indicates compliance with: EMC Directive and Low Voltage Directive.
<b>EMC Emission</b>	<p><b>EN 50081-1:</b> Generic emission standard. Part 1: Residential, commercial and light industry.</p> <p><b>EN 50081-2:</b> Generic emission standard. Part 2: Industrial environment.</p> <p><b>CISPR 22:</b> Radio disturbance characteristics of information technology equipment. Class B Limits.</p> <p><b>FCC Rules, Part 15:</b> Complies with the limits for a Class B digital device.</p>
<b>EMC Immunity</b>	<p><b>EN 50082-1:</b> Generic immunity standard. Part 1: Residential, commercial and light industry. RF immunity implies that sound level indications of 45 dB or greater will be affected by no more than 0.5 dB.</p> <p><b>EN 50082-2:</b> Generic immunity standard. Part 2: Industrial environment. RF immunity implies that sound level indications of 60 dB or greater will be affected by no more than 0.5 dB.</p> <p>These levels of immunity are 14 dB better than required by IEC 1672.</p>
<b>Note:</b> The above conformance is guaranteed only when using accessories listed in this Product Data sheet.	

**BATTERIES:**

Four 1.5V LR6/AA alkaline cells

**Lifetime (at room temperature):**

- With filter selected: Typically > 6 hours
- With filter not selected: Typically > 8 hours

**EXTERNAL DC POWER SUPPLY:**

**Voltage:** regulated 7 to 14 V

**Power:** approximately 120 mA at 7 V

**WEIGHT AND DIMENSIONS:**

460g (with batteries), 257 × 97 × 41 mm

**LANGUAGE:**

Each instrument is loaded with English, German, French, Italian and Spanish text. You can select any of these languages at any time

**Filter set specifications:**

**STANDARDS:**

Conforms with the following:

- EN 61260/IEC 1260 (1995) Octave and 1/3-octave Bands Class 1
- ANSI S1.11-1986 Octave and 1/3-octave Bands, Order 3, Type 1D

**OCTAVE AND 1/3-OCTAVE BAND FILTERS:**

**Nominal Octave Band Centre Frequencies:** 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz and 8 kHz

**Nominal 1/3-octave Band Centre Frequencies:** 20 Hz, 25 Hz, 31.5 Hz, 40 Hz, 50 Hz, 63 Hz, 80 Hz, 100 Hz, 125 Hz, 160 Hz, 200 Hz, 250 Hz, 315 Hz, 400 Hz, 500 Hz, 630 Hz, 800 Hz, 1 kHz, 1.25 kHz, 1.6 kHz, 2 kHz, 2.5 kHz, 3.15 kHz, 4 kHz, 5 kHz, 6.3 kHz, 8 kHz, 10 kHz and 12.5 kHz

# Ordering Information

## Type 2238-D-001:

2238 Mediator sound level meter with Basic SLM Software and Frequency Analysis Software BZ 7123, plus  $1/1$ -octave and  $1/3$ -octave filter set

## Accessories Included:

Type 4188: Prepolarized Free-field  $1/2$ " Condenser Microphone  
ZC0030: Microphone Preamplifier  
AO 1386: 9-pole Cable with 25-pole Adaptor (for computer and serial printer)  
KE0323: Shoulder Bag  
UA 1236: Protective Cover  
QB0013: 4 Alkaline Batteries

## Optional Accessories

Type 7815: Noise Explorer™ Software  
Type 7825: Protector™ Software  
Type 7820/21: Evaluator™ Software  
Type 4231: Sound Level Calibrator  
Type 4226: Multifunction Acoustic Calibrator  
Type 2322A: Portable Printer (European version)  
Type 2322B: Portable Printer (UK version)

Type 2322C: Portable Printer (US version)  
UA 1251: Tripod  
UA 0237: Windscreen (90mm)  
AO 0560/0409: Microphone Extension Cable (10 m)  
AO 0561/0408: Microphone Extension Cable (3 m)  
UA 1254: Microphone Cable Holder (for tripod)  
UL 0064: Interface Module (serial to parallel converter)  
AO 0403: LEMO to BNC Cable (output/input cable)  
ZG 0386: Power Supply (European version)  
ZG 0387: Power Supply (UK version)  
ZG 0388: Power Supply (US version)  
KE 0325: Carrying Case (with insert for sound level meter, Calibrator Type 4231, Portable Printer Type 2322 and Tripod UA 1251)

## Upgrades:

BZ 7125: Enhanced SLM Software  
BZ 7124: Logging SLM Software

## Services Available with Delivery:

2238 CAF: Accredited Calibration  
2238 CAI: Accredited Initial Calibration  
2238 CAP: Accredited Calibration with Precalibration

Brüel & Kjær reserves the right to change specifications and accessories without notice