PRODUCT DATA

2238 Mediator with Basic SLM Software BZ7126

The 2238 Mediator is a high quality Class 1 integrating sound level meter that strikes an ideal balance between simplicity and power. Offering a sensible user interface and a variety of high-end features – including simultaneous measurement of RMS and Peak via two independently frequency weighted detectors – the Mediator executes basic measurements with enviable efficiency.

It is possible to store up to 500 measurement files in the 2238 for later transfer to a PC. Other attractive features include a filter to correct for windscreen effects and a stored calibration history.

What's more, the 2238 range includes a number of optional software modules for tackling more complex measurement tasks, making the Mediator an uncommonly flexible and powerful instrument.

2238 Mediator

Tentative

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Uses and Features

USES

- ❍ Measuring noise in work settings
- ❍ Making environmental noise checks
- ❍ Making general sound level measurements

FEATURES

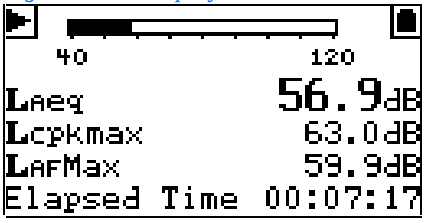
- ❍ Conformance with the following standards:
  IEC 651 – 1979 Type 1 I, EN 60651 Type 1 I
  IEC 804 – 1985 Type 1, EN 60804 Type 1
  Draft IEC 1672 / EN 61672 – April 1997 Class 1
  ANSI S1.4 3 – 1983 Type S1
- ❍ Simultaneous measurement of RMS and Peak with independent frequency weightings
- ❍ Manual control or pre-set measurement time with automatic storage
- ❍ AC and DC outputs
- ❍ Full instrument control via standard serial interface
- ❍ Semi-automatic calibration and stored calibration history
- ❍ Built-in filters to correct for windscreen effects and random/frontal sound incidence

Powerful Options

- ❍ 7815 Noise Explorer™, 7825 Protector™ and 7820/7821 Evaluator™ software for advanced analysis and reporting on a PC
- ❍ $^{1}/_{1}$-octave and $^{1}/_{3}$-octave filter set
- ❍ Additional software modules for increased functionality including logging, frequency analysis, statistics, periodic reporting and more

The 2238 Mediator

Fig. 1 Actual display size



Simple, Reliable Performance

The 2238 Mediator is ideally suited for making overall noise measurements in environmental and occupational settings. With two independent detectors working in parallel, it can measure a large number of parameters simultaneously, including RMS and Peak for the same signal. The 2238 also has built-in filters to correct for windscreen and sound incidence effects, ensuring Class 1 precision in all circumstances.

Natural User Interface

The 2238 features a large, logically laid out display and clearly marked keys for trouble-free operation. In addition, the user interface provides intelligent and flexible guidance throughout set-up and measurement. You can freely switch from one displayed parameter to another while measuring, for example, but you cannot change the set-up or otherwise compromise your measurement without being warned.

Data Storage and Processing

When loaded with Basic SLM Software, the Mediator can store up to 500 measurement files containing the start time, set-up information, calibration data and parameter values. Through an efficient file management facility, stored data can be recalled to the display and printed or transferred to a PC for further processing.

Auxiliary Outputs

The 2238's auxiliary sockets provide AC and DC signals derived from the RMS channel. The signal on the **Aux 1** socket is the range-adjusted AC output (unweighted or with the selected weighting). This is useful for making DAT recordings, which can be used for spectral analysis or to identify noise sources by listening. The signal on the **Aux 2** socket is the Fast-weighted instantaneous output from the DC converter.

Quick Calibration/Calibration History

Calibrating the Mediator is a simple matter of attaching a calibrator and starting the calibration routine. The program automatically calculates the microphone sensitivity and prompts you to keep the previous calibration or continue with an automatic re-calibration. The 2238 can be calibrated with a wide range of transducer sensitivities. For documentation purposes, the Mediator stores a calibration history (for print or display) containing values from the initial and last 20 calibrations.

A Smooth Growth Path

The 2238 Mediator design incorporates optional software modules that add powerful capabilities to the basic instrument. These programs run separately to focus the entire 2238 on specific applications, greatly increasing its measuring sophistication while maintaining the simplicity of dedicated operation. All software options install easily with a quick download, and there's room to install up to four at a time.

Enhanced Measurement Capabilities

Enhanced capabilities include simultaneous measurement of all broadband parameters, as well as generation of statistical distributions and periodic reports. A back-erase function is also available for quickly deleting disruptive noises while measuring without having to start over. In addition, the 2238's two input/output sockets can be enabled as external DC inputs or as input/output triggers (for synchronising measurements with external events or controlling external equipment).

Logging

It is also possible to load the Mediator with advanced logging functions, including the ability to log up to 10 user-selectable parameters at a time. An entire 2 Mbytes of memory is allotted to storing logging files, and there is a marking function for highlighting various types of noise occurrences ("junk" samples to be ignored, pure tones, machine-on intervals, etc.).

Frequency Analysis

For frequency analysis, an optional filter set must be installed, in addition to a dedicated software module. With these in place, the Mediator is able to make automatic time/accuracy-optimised serial scans of user-selectable $^{1}/_{1}$-octave bands and $^{1}/_{3}$-octave bands.

Stand-alone Filter Set

Alternatively, the filter set can be installed in the Mediator without the extra software. In this case, octave and $^{1}/_{3}$-octave filter bands can be selected as frequency weightings for the RMS detector.

Specifications 2238 with BZ7126

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)

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 ±2 dB
Capacitance: 12 pF

MICROPHONE PREAMPLIFIER:
ZC0030
Extension Cables: Available in lengths of 3 m and 10 m

MEASURING RANGES:
Linear Operation Range: 80 dB, adjustable to give full-scale readings from 100 to 140 dB in 10 dB steps
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 RMS and Peak with independent frequency weightings
RMS: Three selectable exponential time weightings (Fast, Slow, Impulse) and a linear averaging detector. Selectable frequency weighting A, C or Lin
Peak: Selectable frequency weighting C or Lin
Overload Detector: Monitors all the frequency weighted channels
Exchange Rate: 3 dB. In addition, 4 or 5 dB can be selected
Criterion Level: Can be set to OFF or in the range 70–140 dB
Threshold Level: Can be set in the range 0–120 dB

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 X 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:
V: Frequency weighting C or L
X: Frequency weighting A, C or L
Y: Time weighting F, S or I
Z: Time weighting F and S
Q: Exchange rate = 4 or 5 dB

Stored	Instantaneous (display only)
L_{Xeq}	L_{XYp}
L_{XZavQ}	L_{XYInst}
L_{AE}	L_{Vpk}
$L_{Aep,d}$	
E_A	
L_{XYmax}	
L_{XYmin}	
L_{Vpkmax}	
Number of Peaks	
$Dose\%_X$	
$Dose\%_{XZQ}$	
Overload%	
Underrange%	
Elapsed Time	

MEASUREMENT CONTROL:
Manual control, or pre-set measurement time in the range 1 s–24 h with automatic storage of measurement
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 the RMS detector. Short-circuit protected
Output: 1 V RMS corresponding to full-scale indication
Max. Load: 10 kΩ || 1nF
Output Impedance: Typically 100 Ω

Aux 2 OUTPUT:
Connector: 2 pin LEMO
DC Output Signal: DC version of 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 kΩ || 1nF
Output Impedance: Typically 100 Ω

CLOCK:
Real-time (calendar)

Tentative

Specifications (cont.)

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

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)

CE	CE-mark indicates compliance with: EMC Directive and Low Voltage Directive.
EMC Emission	**EN 50081–1:** Generic emission standard. Part 1: Residential, commercial and light industry. **EN 50081–2:** Generic emission standard. Part 2: Industrial environment. **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.
EMC Immunity	**EN 50082–1:** 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. **EN 50082–2:** 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.
	These levels of immunity are 14 dB better than required by IEC 1672.
Note: The above conformance is guaranteed only when using accessories listed in this Product Data sheet.	

BATTERIES:
Four 1.5 V LR6/AA alkaline cells
Lifetime (at room temperature): Typically > 8 hours

EXTERNAL DC POWER SUPPLY:
Voltage: regulated 7 to 14 V
Power: approximately 120 mA at 7 V

WEIGHT AND DIMENSIONS:
460 g (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

Additional Specifications for 2238-A-002 (version with filter set installed)

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

MEASURING RANGES:
Two Additional Ranges: Full-scale readings of 80 and 90 dB

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

BATTERIES:
Lifetime (at room temperature):
With filter selected: Typically > 6 hours

Ordering Information

Type 2238 – A – 001:
2238 Mediator sound level meter with Basic SLM Software

Type 2238 – A – 002:
2238 Mediator sound level meter with Basic SLM Software plus $^1/_1$-octave and $^1/_3$-octave filter set

Accessories Included:

Type 4188:	Prepolarized Free-field $^1/_2$″ Condenser Microphone
ZC 0030:	Microphone Preamplifier
AO 1386:	9-pole Cable with 25-pole Adaptor (for computer and serial printer)
KE 0323:	Shoulder Bag
UA 1236:	Protective Cover
QB 0013:	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 (90 mm)
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:

2238 MUF:	$^1/_1$-octave/$^1/_3$-octave Filter Set
BZ 7125:	Enhanced SLM Software
BZ 7124:	Logging SLM Software
BZ 7123:	Frequency Analysis Software (requires 2238 MUF filter set)

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

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