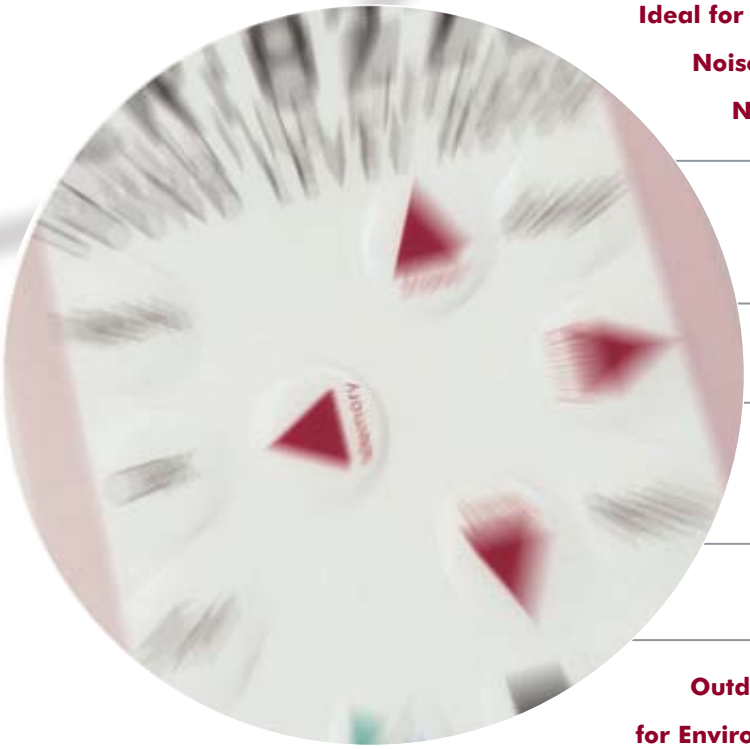
CR:800B

NoiseMeters Limited
www.noisemeters.com

Sound Level Meters

Introduction



Ideal for Noise at Work Assessments

Noise Control and Environmental Noise Measurements

Optional 1:1 and 1:3 Octave Band Filters for Frequency Analysis

Type 1 and Type 2 Accuracy

Data Logging of measured parameters

Full measurement kits available

Outdoor Measurement Kits available for Environmental Measurements

The CR:800B series is a range of high performance Sound Level Meters that provide the functions and features demanded by modern measurement standards and guidelines, while being designed specifically for ease of use.

The CR:800B series comprises 6 instruments, each providing different functions and features, from the basic CR:812B Type 2 Data Logging Sound Level Meter to the CR:831B Type 1 instrument with 1:1 and 1:3 Octave Band filters. All versions provide the same functions as the basic instruments.

The menu-driven operation allows quick access to the commonly used functions, while allowing more complex operations to be used when required. The instrument stores the last set-up, allowing the user to repeat measurements without having to reset the unit.

A range of accessories is available to complement the CR:800B series including outdoor measurement kits, power supplies, microphone extension cables and software.

Applications

- Occupational Noise
- Environmental Noise
- Product Development & Testing

Occupational Noise

All Noise at Work regulations require the assessment of the potential risk of hearing damage to employees, and the CR:800B series provides the essential parameters needed to comply with these measurement standards and guidelines, such as L_{eq}, $L_{EP,d}$ ($L_{EX,8h}$) and L_{CPeak}.

Where levels are beyond the limits set by Noise at Work regulations, the provision of effective noise control measures and hearing protection is often required. All of the CR:800B series, with the exception of the basic CR:811B and CR:812B units, can provide 1:1 Octave Band measurements, allowing the instrument to be used to determine the frequency content of the noise, and therefore to assist in the provision of a cost-effective solution. The Deaf Defier3 software includes a database of hearing defender products (PPE) which are used to provide a quick and reliable solution to the selection of appropriate protection. The CR:800B series are ideal for compliance with the EU Physical Agents (Noise) Directive.

Environmental Noise

For Environmental Noise measurements, the parameters required differ from those for Occupational Noise, and all of the CR:800B series provide these measurements as standard. The measurement of L_{max}, L_{min}, and five L_n values, such as L_{10}, L_{90} and L_{95} in addition to the L_{eq} provide the measurement functions needed to comply with both current and future standards, regulations and guidelines. The Time History data stored by the instrument is often vital in the assessment of environmental noise, allowing the CR:800B series to be used where a standard Sound Level Meter would not provide sufficient detail of the noise climate. The environmental impact of an operation or location can be assessed using this additional data.

The CR:831B and CR:832B instruments can also provide, in addition to the Broadband measurements, 1:1 and 1:3 Octave Band filters, allowing the instruments to be used to identify and control noise sources that include distinct tones, which often cause complaints, even when the overall noise levels are low.

Lightweight and Heavyduty Outdoor measurement kits provide weather protection for the CR:800B series and allow measurements to be made over longer periods than a standard handheld instrument, an essential requirement where long term information is required. Over 7 days of 15 minute measurements can be stored, along with the corresponding short L_{eq} data.

General Noise Measurements

The CR:800B series can be used in a wide range of general noise measurement applications. The provision of L_{max} allows the instruments to be used for the measurement of vehicle noise levels. The use of optional extension cables enables the microphone and preamplifier to be located away from the Sound Level Meter. This allows measurements to be made in confined areas and in situations where interference from the operator would affect the validity of the data. Product development and testing is an application where this feature is often essential.

Measurements

The CR:800B series measure two different types of data, Broadband and Frequency. The Frequency data can be 1:1 Octave or 1:3 Octave depending upon the configuration of the instrument. In addition to the measured data, the instrument stores calibration records for later download.

Broadband Measurements

The standard measurements stored by all of the CR:800B series include:

L_{eq}	The Time Averaged Sound Level
L_{max}	The Maximum Sound Level
L_{min}	The Minimum Sound Level
L_{CPeak}	The Maximum Peak Pressure Level
L_E	The Sound Exposure Level
L_n	The Statistical Levels for the measurement (5 different L_n values)

The Broadband measurements are weighted with time and frequency according to the set-up of the instrument. In addition to these standard measurements, the instrument can be configured to store L_{Ieq} or L_{FTeq} in place of L_E.

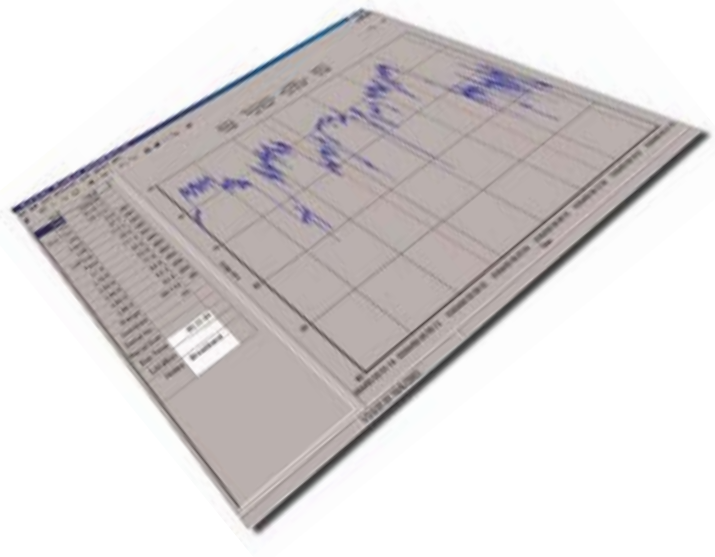
The Broadband measurement can be weighted with A, C or Z frequency weighting. Z weighting replaces Lin or Flat in the new IEC 61672 Standard for Sound Level Meters. The Time Weightings of F, S and I can be applied to the Broadband measurements L_{max}, L_{min} and the L_n's as required.

The duration of the measurement can be either open-ended, selected from a preset list or defined by the user as required. The measurements can also be set to automatically repeat a set number of times. This function can be essential for environmental noise applications where the required measurement duration may be 15 minutes repeating throughout a 24 hour period. The instrument can be set to measure for 1 hour and to repeat until 24 measurements have been stored. The measurements can also be configured to synchronise with the clock using the auto-sync function. This allows, for example, 1 hour measurements to start exactly on the hour.

Time History

When making a Broadband measurement, the instrument automatically stores a noise profile, or Time History, with the measurement.

This information is stored as a 1 second Short L_{eq}. Over 7 days of Time History data can be stored, allowing the CR:800B series to be used for logging long periods of data.



Frequency Analysis

When fitted with the 1:1 or 1:3 Octave Band filters, the CR:800B series can provide a sequential sweep through the filter bands, with a minimum duration of 1 minute for the 1:1 Octave Band filters and 3 minutes for the 1:3 Octave Band filters. The sweep can be automatic or manual as required. The L_{eq} is stored for each filter band, along with an overall L_{Aeq}, L_{Ceq} and L_{Zeq} value.

The 1:1 Octave Band filters cover the range of 31Hz to 16kHz, and the 1:3 Octave Band filters cover 25Hz to 16kHz.

The MO:800/6 option can be fitted to the 1:3 Octave Band filter to add a 20Hz and 20kHz filter band.

Software

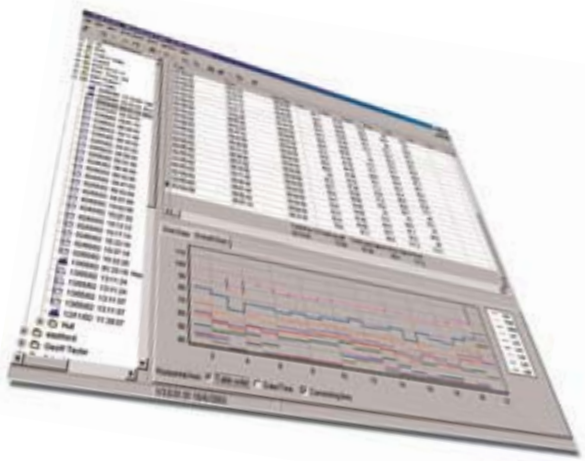
The CR:800B series is supplied, as standard, with the Deaf Defier3 software. This program provides the following functions:

- Download Data from a CR:800B series Sound Level Meter
- Store measurements in Folders to organise data
- Enter Comments and Notes for each measurement
- Display measurements individually or in a tabular format
- Select Hearing Protection (where 1:1 Octave Band measurements are available)
- Print and export measurements
- Calculate NR & NC figures (where 1:1 Octave Band data is available)

Broadband Measurements

Broadband measurements are displayed in both a tabular and graphical format. The numerical values for the measurement are listed down the left side and include the time, date, duration and measurement range along with the Time and Frequency weightings used for each parameter.

Where the data has been downloaded, the Time History graph is shown on the right side. The default for the graph is to show the entire measurement period and to automatically scale the Y axis. However, a zoom function is provided to allow more detail to be shown on the graph.

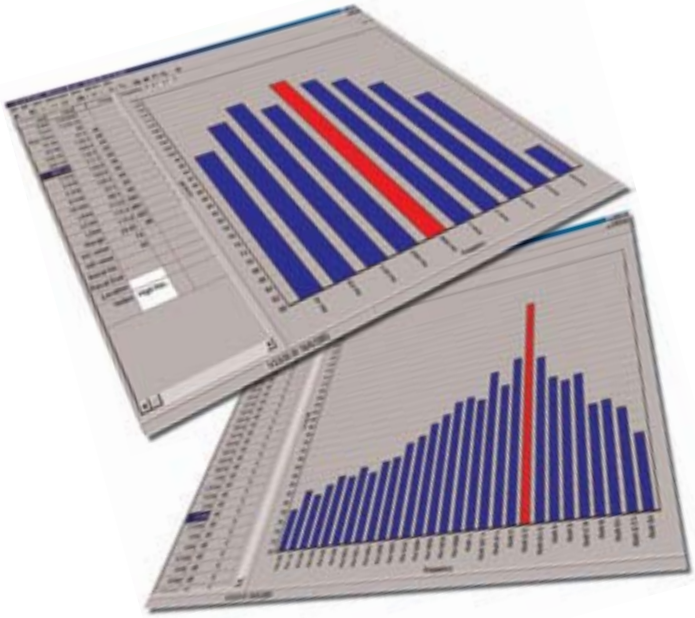


Measurements can be printed or copied to other programs for additional reporting. In addition, all data from a Broadband measurement can be exported in a wide range of formats for use in other applications.

Frequency Measurements

For Frequency measurements made using either the 1:1 or 1:3 Octave Band filters, the information is displayed as a bar graph, with the numerical data shown on the left for reference along with the measurement time, date and duration. Comments and notes can also be entered for future reference.

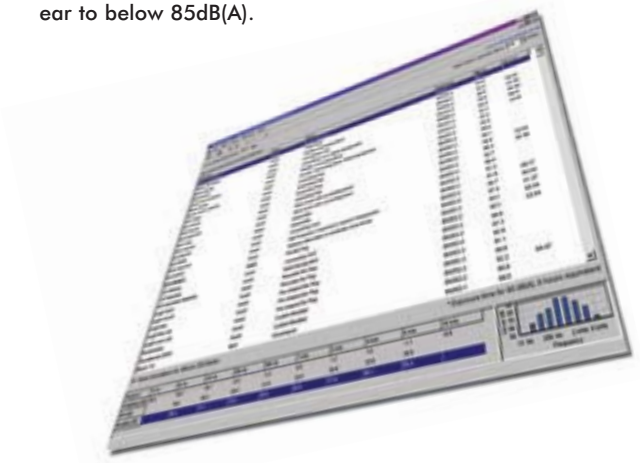
Individual Frequency bands can be highlighted using the cursor. The measurements are always made by the CR:800B series using the Z Frequency Weighting, but if required, the A and C Frequency Weightings can be applied by the software.



The software can also calculate and display NR and NC values and curves from 1:1 Octave Band data.

Hearing Protector Selector

Where 1:1 Octave Band measurements are available, the Deaf Defier3 software can calculate the assumed protection from a range of Hearing Protector products. The calculations are made using the frequency data from the measurement, and the resulting information can be printed or exported for later reference. The results can also be filtered to remove, for example, products that do not reduce the noise level at the ear to below 85dB(A).



Updates for the Deaf Defier3 program and the Hearing Protector database can be downloaded from the web.

Measurement Kits

The CR:800B series can be supplied in a complete measurement kit which includes all of the accessories required to operate the instrument. The standard measurement kit includes the following components:

CR:513A Class 1L Acoustic Calibrator

UA:237 Windshield

CK:250 Carrying Case

Please refer to the ordering information at the end of this datasheet for details of the measurement kits.

A complete measurement kit

The CR:513A Acoustic Calibrator can be replaced, at an extra cost, with the CR:511F Acoustic Calibrator which has PTB Type Approval. The CK:250 Carrying Case can also hold a microphone extension cable and has been designed to protect the Sound Level Meter and Acoustic Calibrator from damage during transit and storage.

Outdoor Measurement Kits

Where measurements are to be made outdoors, the Sound Level Meter should be protected from rain and wind. If the measurements are to be made over a short period and the weather conditions are fine, the Sound Level Meter can be mounted on a tripod and the UA:237 Windshield used to reduce wind induced noise.

If the measurements are to be made over a longer period or if the weather conditions cannot be guaranteed, an Outdoor Measurement Kit should be used. The CR:800B series can be used with two different Outdoor Measurement Kits, the CK:408 and CK:508.

CK:408 Heavyduty Kit

CK:508 Lightweight Kit

Both of these kits provide a secure, weatherproof enclosure for the Sound Level Meter and an Outdoor Microphone. The CK:508 Lightweight Outdoor Kit has been designed to be used for short term measurements, such as overnight, whilst the CK:408 Outdoor Kit has been designed for longer term use.

The Weatherproof case that is used for both of the outdoor measurement kits contains all the accessories provided by the standard measurement kits. Space is provided to hold an acoustic calibrator, a standard 90mm windshield, software, batteries and operating manuals.

For full details of the Outdoor Measurement Kits, please see the appropriate datasheet. Please note that Type 2 versions of the CR:800B require the MO:800/5 Remote Preamplifier option before they can be used with the Outdoor Measurement Kits.

Specifications

Applicable Standards

Sound Level Meter	IEC 60651:1979 Type 1 I or Type 2 I IEC 60804:1985 Type 1 or Type 2 IEC 61672-1:2003 Class 1 or 2 Group X ANSI S1.4 with NK:70 Random Incidence Adaptor Fitted
1:1 & 1:3 Octave Band Filters (where fitted)	IEC 61260 Class 1

Microphone

Type 1 MK:224 pre-polarized Free-field 1/2" Condenser
Type 2 MK:216 pre-polarized Free-field 1/2" Condenser
Random Incidence to ANSI S1.4 with NK:70 Adaptor

Microphone Preamplifier

Type 1	MV:200C Removable Preamplifier
Type 2	MV:200 Integral Preamplifier

Time Weightings

'F' (Fast)	to IEC 61672-1:2003 Class 1 or 2
'S' (Slow)	to IEC 61672-1:2003 Class 1 or 2
'I' (Impulse)	to IEC 61672-1:2003 Class 1 or 2

Frequency Weightings

Channel 1	'A', 'C' or 'Z'
Channel 2	'C' for Peak

Z weighting is a flat frequency response of 8Hz - 20kHz ±1.5dB excluding microphone response. When either 1:1 or 1:3 Octave Band filters are selected the 'Z' weighting is used.

Measurement Range

Broadband	21dB(A) to 140dB(A) Class 1 25dB(A) to 140dB(A) Class 2 143dB(C) Peak (70 to 140dB Range)
1:1 Octave Band Filters	19dB(Z) to 140dB(Z)
1:3 Octave Band Filters	14dB(Z) to 140dB(Z)

Noise Floor (Typical)

Broadband	18dB(A) Type 1, 20dB(A) Type 2
1:1 Octave Band Filters	12dB(Z) @ 1kHz 1:1 Octave Band
1:3 Octave Band Filters	7dB(Z) @ 1kHz 1:3 Octave Band

Available Measurements

The following metrics can be displayed for a recorded session and stored:

Broadband Mode

L_{CPeak}
L_{AF}, L_{AS}, L_{AI}, L_{CF}, L_{CS}, L_{CI}, L_{ZF}, L_{ZS} or L_{ZI} (not stored)
L_{AFmax}, L_{ASmax}, L_{AImax}, L_{CFmax}, L_{CSmax}, L_{CImax}, L_{ZFmax}, L_{ZSmax} or L_{ZImax}
L_{AFmin}, L_{ASmin}, L_{AImin}, L_{CFmin}, L_{CSmin}, L_{CImin}, L_{ZFmin}, L_{ZSmin}, L_{ZImin}
L_{Aeq}, L_{Ceq}, or L_{Zeq}
L_{AE}, L_{CE},or L_{ZE}, L_{Aleq}, L_{Cleq}, or L_{Zleq}, L_{AFTeq}
$L_{0.1}$ to $L_{99.9}$ (five simultaneous user-selected values available)
Date and time
1 second Short L_{eq} Noise Profile (L_{Aeq}, L_{Ceq} or L_{Zeq})

Filter Mode

1:1 or 1:3 filter selected
Selected frequency
Filtered L_{ZS},L_{ZF} or L_{ZI} (not stored)
Filtered L_{Zeq} (stored)
L_{Aeq}, L_{Ceq}, or L_{Zeq} (stored)
Date and time

Frequency Bands (Nominal Frequencies)

1:1 Octave Band	31Hz to 16kHz
1:3 Octave Band	25Hz to 16kHz. 20Hz & 20kHz 1:3 Octave Band with MO:800/6 Factory Option

Memory

16Mbit memory allowing up to:

1300 broadband measurements
770 1:1 octave measurements
330 1:3 octave measurements

For example, broadband mode allows 12 days of 15 minute measurements to be stored.

Calibration records are automatically stored in the instrument memory.

Noise Profile

Short Leq (L_{Aeq},L_{Ceq}, or L_{Zeq}).
Up to 8 days at 1 second acquisition

Automatic Measurements

The unit can be set to record and store data over fixed times of:

1 minute	5 minutes
10 minutes	15 minutes
30 minutes	1 hour
8 hours	12 hours

or a user defined period

Automatic Repeat: From 2 to 999 measurements (broadband mode only)

Auto-synchronise to the clock.

Display

Graphical LCD with Quasi-Analogue Display
Selected measurement parameter with level
Warnings for Overload, Under Range
Battery Level & External Power Indicators
Time & Frequency Weighting
Elapsed measurement time
Real time short L_{eq} (broadband mode)
Graphical 1:1 and 1:3 Octave Band (recall mode only)
Recalled stored measurements
Measurement Range
Instrument settings

Dimensions

Type 1	340mm x 75mm x 25mm
Type 2	300mm x 75mm x 25mm

Weight

450 gms

Batteries

2 x 1.5v Alkaline LR6/AA

Battery Life

Broadband	Typically >30 hours
Filter Mode	Typically >20 hours

Environmental

Temperature Operating	-10°C to +50°C
Storage	-20°C to +60°C
Humidity	Up to 95% RH Non Condensing

External Connections

RS232 Communications to a 9 pin connector
Via 8 pin mini Din socket with supplied
ZL:800 Cable

Outputs

Outputs via 8 pin mini Din socket using optional cables
AC output unweighted
DC output weighted

Output Cables

Standard

RS232	ZL:800 RS232 Cable to 9pin Female SubD Plug

Optional

	ZL:101 USB to Serial Adaptor
	ZL:803 Serial Printer Cable to 9pin Male SubD Plug
AC Output	ZL:802 2m to 3.5mm Stereo Jack
	ZL:804 2m to Male BNC
DC Output	ZL:805 2m to Male BNC Converter

External Power

12v-16.5v DC @ 100mA
CU:195A recommended
Specify UK, EU or US plug type

Software Support

Deaf Defier3 for Windows. The Deaf Defier3 for Windows requires the following:
Microsoft Windows 95 or later
6Mb of available hard-disk space for program files
CD-ROM Drive
VGA or higher resolution monitor, Super VGA Recommended
Microsoft compatible mouse or pointing device
9 Pin RS232 (Serial) Port or USB using ZL:101 (optional)
PC specification
Minimum: PII 266 MHz
Recommended: PIII 500 MHz

Electromagnetic Performance

EN 55022:1998
EN 61000-4-2:1995
EN 61000-4-3:2002
EN 61000-4-8:1994

Ordering Information

The CR:800B series can be ordered in a variety of forms.
The table below shows the Sound Level Meter and Measurement Kit reference numbers:

Sound Level Meter	Measurement Kit	Type
CR:811B	CK:811B	CR:811B Type 1 Sound Level Meter
CR:812B	CK:812B	CR:812B Type 2 Sound Level Meter
CR:821B	CK:821B	CR:821B Type 1 Sound Level Meter with 1:1 Octave Band Filters
CR:822B	CK:822B	CR:822B Type 2 Sound Level Meter with 1:1 Octave Band Filters
CR:831B	CK:831B	CR:831B Type 1 Sound Level Meter with 1:1 & 1:3 Octave Band Filters
CR:832B	CK:832B	CR:832B Type 2 Sound Level Meter with 1:1 & 1:3 Octave Band Filters

A range of factory upgrades are available to enhance the performance of the CR:800B series.
These options include:

MO:800/1	Upgrade from Type 2 to Type 1
MO:800/2	Upgrade from Broadband to 1:1 Octave Band Filters
MO:800/3	Upgrade from Broadband to 1:1 & 1:3 Octave Band Filters
MO:800/4	Upgrade from 1:1 to 1:1 & 1:3 Octave Band Filters
MO:800/5	Remote Preamplifier for Type 2 Instruments
MO:800/6	20Hz & 20kHz 1:3 Octave Band Filters

Microphone Extension Cables

ZL:202 2m microphone extension cable
ZL:205 5m microphone extension cable
ZL:210 10m microphone extension cable
ZL:215 15m microphone extension cable
ZL:220 20m microphone extension cable
ZL:225 25m microphone extension cable

Output Cables

RS232	ZL:800 RS232 Cable to 9pin Female SUB-D supplied as standard
	ZL:803 Serial Printer Cable to 9 pin Male SUB-D
AC Output	ZL:802 2m to 3.5mm Stereo Jack
	ZL:804 2m to Male BNC
DC Output	ZL:805 2m to Male BNC Converter Cable
	0-1v DC Output (optional)
Power Supply	CU:195A Mains Power Supply. Specify UK, EU or USA type plug.

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