

CR:800B Series

Cirrus
Research plc
dedicated to noise measurement



Sound Level Meters

Introduction

Key Features

- > Ideal for both Occupational and Environmental noise measurements
- > Complies with the latest IEC 61672 standard as well as IEC 60651 and IEC 60804 for compliance with noise measurement standards
- > Available with Class 1 or Class 2 accuracy
- > Options of 1:1 and 1:3 Octave Band Filters
- > 1:1 Octave Band Filters to help in the selection of hearing protection (PPE) using the Deaf Defier3 software
- > 1:3 Octave Band Filters for environmental noise measurements and tonal analysis
- > Data Logging of up to 1,300 measurements giving over 12 days of 15 minute measurements, ideal for environmental noise measurements
- > Deaf Defier3 software supplied as standard to provide measurement reports, analysis and presentation
- > AC Output for use with external analysis and recording equipment
- > Outdoor measurement kits available to allow for unattended environmental noise monitoring
- > 2 Year standard warranty with 10 year extended warranty giving you up to 12 years of cover

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.

From Noise at Work Risk Assessments to Vehicle Noise Testing to Environmental Noise Measurements, the CR:800B Series provides a solution.

Data logging of the measured parameters is standard and up to 12 days of data can be stored. The Deaf Defier3 software, which is supplied as standard, allows this measurement data to be downloaded, analysed and measurement reports created.

Available with Class 1 or Class 2 accuracy along with the options of 1:1 & 1:3 Octave Band Filters, there is an instrument to meet your noise measurement needs.

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

The instruments have been designed to be simple to use whilst meeting the latest Standards for Sound Level Meters.

Reliable, accurate and affordable, the CR:800B Series are the ideal instruments for your noise measurement applications.



Occupational Noise Measurements



- > Simultaneous measurement of $L_{A_{p1}}$, $L_{A_{eq}}$, $L_{A_{Fmax}}$ and $L_{C_{peak}}$
- > Time history of noise levels
- > Risk Assessment of Workplace Noise Levels
- > Ideal for noise measurements in accordance with the Noise at Work Regulations and EU Directive 2003/10/EC
- > Measurements for the selection of hearing protection with CR:822B & CR:821B using Octave Band Filters
- > Calculate Noise Exposures with the Deaf Defier Software and create measurement reports

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 $L_{C_{Peak}}$.

Where the noise levels are beyond the limits set by Noise at Work regulations, the provision of effective noise control measures and hearing protection are 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 is used to provide a quick and reliable solution to the selection of appropriate protection.

Environmental Noise



- > Boundary noise measurements
- > External noise impact assessments
- > Machinery noise testing
- > Motorsport noise measurements
- > Entertainment noise
- > Noise Profile measurements up to 12 days

For Environmental Noise measurements, the parameters required differ from those for Occupational Noise, and all of the CR:800B instruments 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 measurement 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 12 days of 15 minute measurements can be stored, along with the corresponding short L_{eq} data.

General noise measurements



- > R&D noise measurements
- > Production line noise testing
- > Quality control
- > Sound power measurements
- > Fire alarm testing

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 Sound Pressure
L_E	The Sound Exposure Level (SEL)
L_n	The Statistical Levels for the measurement

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_{leq} 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 specified 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 Leq.

Over 12 days of Time History data can be stored, allowing the CR:800B series to be used for logging long periods of data.

This information can be used, for example, to analyse noise events and to identify individual noise sources such as aircraft.

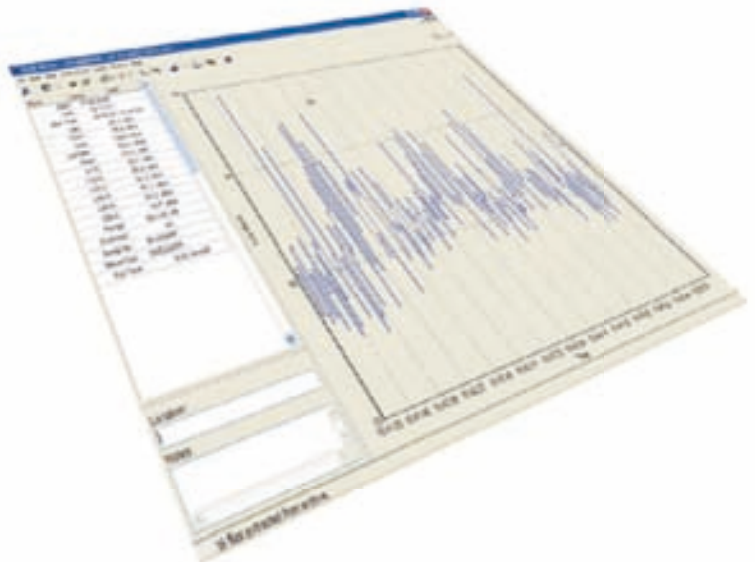
Frequency Analysis

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 'Z' Weighted Leq 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.

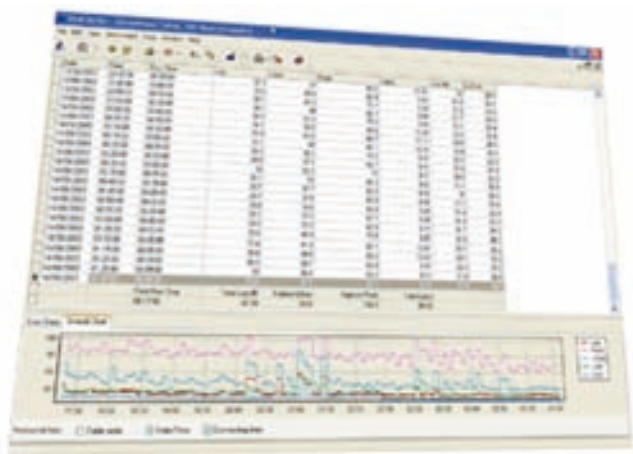
The MO:800/6 option can be fitted to the 1:3 Octave Band filter to add a 20Hz and 20kHz filter band to the existing 1:3 Filter Bands.



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, Locations 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 hand 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 hand 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. Also, 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 Cirrus Research website.

For further details of the software, please visit the Cirrus website.



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.

A measurement kit is the recommended way to purchase a Sound Level Meter kit as it contains a suitable Acoustic Calibrator. All noise measurement equipment should be calibrated regularly to ensure that it is operating and measuring correctly.

The standard measurement kit includes the following components:

- > CR:515 or CR:514 Acoustic Calibrator
- > UA:237 Windshield
- > CK:250 Carrying Case
- > Deaf Defier3 Software
- > RS232 & USB Data Cable
- > Operating Manuals & Certificates of Calibration
- > Batteries & Accessories



The measurement kits for the the Class 1 Sound Level Meters (CR:811B, CR:821B & CR:831B) are supplied with the Class 1 CR:515 Acoustic Calibrator and the Class 2 Sound Level Meters (CR:812B, CR:822B and CR:832) are supplied with the CR:514 Class 2 Acoustic Calibrator.

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.

Both of these kits provide a secure, weatherproof enclosure for the Sound Level Meter and an Outdoor Microphone.



CK:508 Lightweight Outdoor Measurement Kit shown with optional CT:3 Tripod

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 used for both of the outdoor measurement kits contains the same accessories included in the standard measurement kits. Space is provided to hold an acoustic calibrator, a standard 90mm windshield, software CD, 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 Preamp option before they can be used with the Outdoor Measurement Kits.



CK:408 Heavy Duty Outdoor Measurement Kit

Specifications

Applicable Standards

IEC 61672-1:2003 Class 1 or 2 Group X
IEC 60651:2001 Type 1 I or Type 2 I
IEC 60804:2000 Type 1 or Type 2
ANSI S1.4 with NK:70 Random Incidence Adaptor
1:1 & 1:3 Octave Filters IEC 61260 Class 1 (where fitted)

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 Fixed 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 Weighting

Channel 1 'A', 'C' or 'Z'
Channel 2 'C' for Peak
Z weighting is a flat frequency response of 8Hz - 20kHz \pm 1.5dB excluding microphone response. When either 1:1 or 1:3 Octave Band filters are selected the 'Z' weighting is used.

Measurement Range (Typical)

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_{Aeq} L_{Ceq} or L_{Zeq}
 L_{CPeak}
 L_{AP} L_{AS} L_{AI} L_{CP} L_{CS} L_{CI} L_{ZP} L_{ZS} or L_{ZI} (not stored)
 L_{AFmax} L_{ASmax} L_{Almax} L_{CFmax} L_{CSmax} L_{CImax} L_{ZFmax} L_{ZSmax} or L_{ZImax}
 L_{AFmin} L_{ASmin} L_{Almin} L_{CFmin} L_{CSmin} L_{CImin} L_{ZFmin} L_{ZSmin} L_{ZImin}
 L_{AE} L_{CE} or L_{ZE} L_{Aeq} L_{Ceq} or L_{Zeq} L_{AFeq}
 $L_{0.1}$ to $L_{99.9}$ (five simultaneous user-selected values available)
Date and time
1 second Short Leq 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 (L_{Aeq} L_{Ceq} or L_{Zeq}).

Short Leq (L_{Aeq} L_{Ceq} or L_{Zeq}).
Up to 13 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 Leq (broadband mode)
Graphical 1:1 and 1:3 Octave Band (recall mode only)
Recalled stored measurements
Measurement Range
Instrument settings

Dimensions

Type 1 340 mm \times 75 mm \times 25 mm
Type 2 300 mm \times 75 mm \times 25 mm

Weight

450 g.

Batteries

2 \times 1.5 v 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

External Power

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

Electromagnetic Performance

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

Output Cables

Standard: RS232 ZL:800 RS232 Cable & ZL:101 USB to Serial Adaptor
Optional

ZL:803 Serial Printer Cable to 9pin Male SubD Plug
ZL:802 AC Output 2m to 3.5mm Stereo Jack
ZL:804 AC Output 2m to Male BNC

Software Support (+ Version Only)

Deaf Defier3 for Windows. (Version v3.2.0 or later)
The Deaf Defier3 for Windows requires Microsoft Windows 98SE or later

The Deaf Defier3 Software is supplied with no licensing restrictions. Updates can be downloaded from the Cirrus Research plc website.

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:

Instrument	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:

Factory Upgrades:

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	Addition of 20Hz & 20kHz 1:3 Octave Band Filters to CR:832B or CR:831B

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

ZL:800	RS232 Cable to 9pin Female SUB-D supplied as standard
ZL:803	Serial Printer Cable to 9 pin Male SUB-D
ZL:802	AC Output 2m to 3.5mm Stereo Jack
ZL:804	AC Output 2m to Male BNC

Power Supply

CU:195A Mains Power Supply. Specify UK, EU or USA type plug.



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