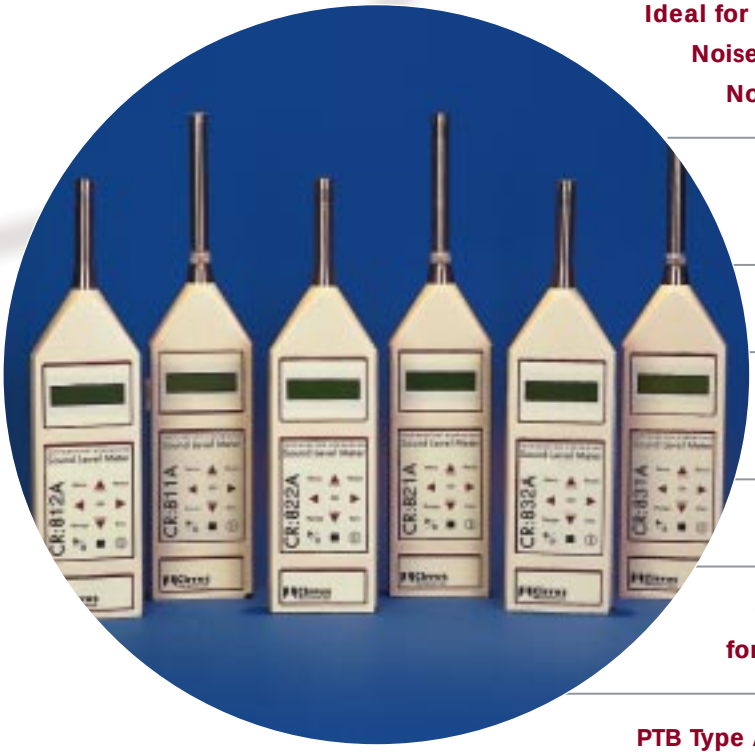
CR:800A

• Occupational Noise • Environmental Noise • Noise Control

Cirrus Research plc

• Product Development & Testing • Hearing Protector Selection

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

PTB Type Approval

The CR:800A 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:800A Series comprises 6 instruments, each providing different functions and features, from the basic CR:812A Type 2 Data Logging Sound Level Meter to the CR:831A 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:800A Series including outdoor measurement kits, power supplies, microphone extension cables and software.

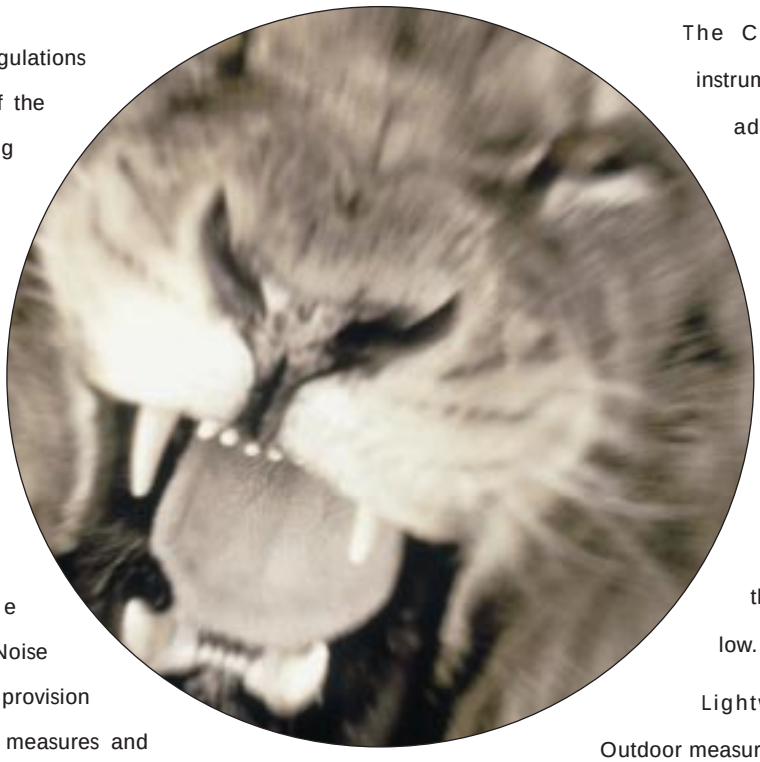
The entire range of CR:800A Series instruments has PTB Type Approval for Type 2 or Type 1 performance where appropriate.

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:800A Series provides the essential parameters needed to comply with these measurement standards and guidelines, such as L_{eq}, $L_{EP,d}$, and L_{Peak}.



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:800A Series, with the exception of the basic CR:811A and CR:812A 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 Defier2 software includes a database of over 70 hearing defender products which are used to provide a quick and reliable solution to the selection of appropriate protection.

Environmental Noise

For Environmental Noise measurements, the parameters required differ from those for Occupation Noise, and all of the CR:800A Series provide these measurements as standard. The measurement of L_{max} and six 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 most 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:800A 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:831A and CR:832A 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:800A Series and allow measurements to be made over longer periods than a standard handheld instrument, an essential requirement where long term information is required.

General Noise Measurements

The CR:800A 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:800A Series measure two different types of data, Broadband and Frequency. The Frequency Analysis 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 the CR:800A Series include:

L_{eq}	The Time Averaged Sound Level
L_{max}	The Maximum Sound Pressure Level
L_{Peak}	The Maximum Peak Pressure Level
L_E	The Sound Exposure Level
L_n	The Statistical Levels for the measurement (6 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 will replace 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 as required.

The duration of the measurement can either be manual, 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 measurement duration is for example 1 hour throughout a 24 hour period. The instrument can be set to measure for 1 hour and to repeat until 24 measurements have been stored.

Time History

When making a Broadband measurement, the CR:800A Series also stores a noise profile, or Time History.

This information is stored as a 1 second Short L_{eq}. The Time History information is stored automatically with the Broadband measurements and can be downloaded to a PC with the other measurements.

Time History information can also be loaded into the optional Acoustic Editor for Windows program which allows more sophisticated analysis and event recognition to be carried out. If the Acoustic Editor program is installed on the PC, a link is available from the Broadband Measurement window to automatically load the information to the Acoustic Editor program.

Frequency Analysis

When fitted with the 1:1 or 1:3 Octave Band filters, the CR:800A 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

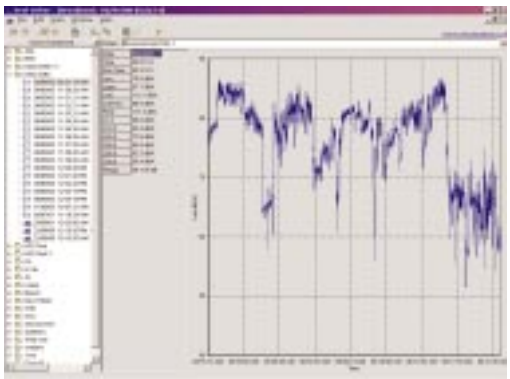
The CR:800A Series is supplied, as standard, with the Deaf Defier2 software. This program provides the following functions:

- Download Data from a CR:800A 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

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.

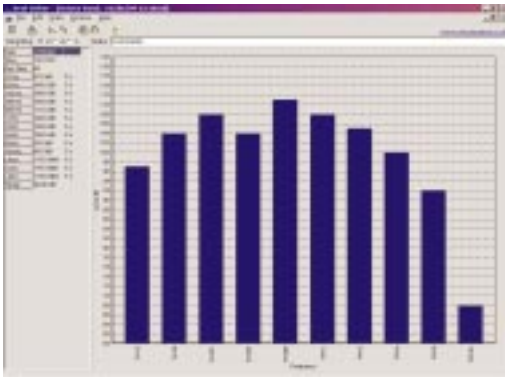


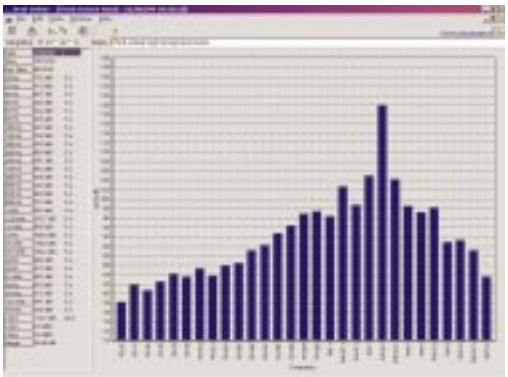
Measurements can be printed or copied to other programs for additional reporting. In addition, all data from a Broadband measurement can be exported to a CSV file that can be loaded into a spreadsheet. This export function includes the Time History data where required.

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:800A Series using the Z Frequency Weighting, but if required, the A and C Frequency Weightings can be applied by the software.





Hearing Protector Selector

Where 1:1 Octave Band measurements are available, the Deaf Defier2 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 Defier2 program and the Hearing Protector database can be downloaded from the Cirrus Research website.

Measurement Kits

The CR:800A Series can be supplied in complete measurement kits which include all of the accessories required to operate the instrument. The standard measurement kits include 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. The picture below shows a CK:812A Measurement Kit which contains the CR:812A Type 2 Sound Level Meter.

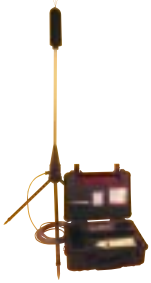
A complete measurement kit

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:800A 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 contain all the accessories provided by the standard measurement kits. Space is provided to hold an acoustic calibrator, a standard 90mm windshield, software, manuals, 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:800A require the MO:800/5 Remote Preamplifier option before they can be used with the Outdoor Measurement Kits.

Type Approval

The CR:800A Series has Type Approval from the PTB in Germany for the full range and in Spain for the CR:831A instrument. Type Approval is an independent test of the performance of the instrument to the specifications that are claimed by the manufacturer. All of the CR:800A series has been approved by the PTB, the German National test laboratory, and the CR:831A has been approved by the Spanish National test laboratory. The PTB Type Approval numbers are listed below:

CR:811A	Type 1	Approval No. 21.21/00.15
CR:812A	Type 2	Approval No. 21.21/00.18
CR:821A	Type 1	Approval No. 21.21/00.16
CR:822A	Type 2	Approval No. 21.21/00.19
CR:831A	Type 1	Approval No. 21.21/00.17
CR:832A	Type 2	Approval No. 21.21/00.20

For further information regarding Type Approval, please contact your local representative or visit the Cirrus Research website.

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 61672:2001 Class 1 or 2 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:200C Integral Preamplifier

Time Weightings

	'F' (Fast)	to IEC 60651:1979 Type 1 I or Type 2 I
	'S' (Slow)	to IEC 60651:1979 Type 1 I or Type 2 I
	'I' (Impulse)	to IEC 60651:1979 Type 1 I or Type 2 I
Peak Detector <	50µs	

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 including 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) Type 1 25dB(A) to 140dB(A) Type 2 143dB(C) Peak (80 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

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_{Aeq}, L_{Ceq}, or L_{Zeq}
L_{AE}, L_{CE},or L_{ZE}, L_{AIeq}, L_{CIeq}, or L_{ZIeq}, L_{AFTeq}
$L_{0.1}$ to $L_{99.9}$ (six simultaneous user-selected values available)
Run time to resolution of 1 sec up to 100 days.
Date and time
1 second Short L_{eq} Noise Profile

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)
LAeq, LCeq, or LZeq (stored)
Run time to resolution of 1sec up to 100 days.
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

4Mbit of memory that allows storage of data sessions as follows:

270 sets of data in broadband mode
160 sets of data in octave filter mode
70 sets of data in third-octave mode.
Or pro-rata storage for mixed measurements.

Noise Profile

Short Leq (L_{Aeq},L_{Ceq}, or L_{Zeq}).
Up to 70 hrs 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 270 measurements (broadband mode only)

Display

2 line backlit LCD showing:
Selected measurement parameter with level
Warnings for Overload, Under Range and Low Battery
Time & Frequency Weighting
Elapsed measurement time
Recalled stored measurements
Measurement Range
10 second backlight on key press
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 >26 hours
Filter Mode	Typically >14 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
Via 8 pin mini Din socket with supplied ZL:800A Cable

Baud Rate:	9600	Data Bits: 8
Stop Bit:	1	Parity: None

Outputs

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

Output Cables

RS232	ZL:800 RS232 Cable to 9pin Female DIN ZL:803 Serial Printer Cable to 9pin Male DIN
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

3v DC @ 500mA , Centre Pin Positive (+ve)
1.3mm coaxial socket
CU:801 Mains Power Supply (UK)
CU:802 Mains Power Supply (EU)
CU:803 Mains Power Supply (USA)

Software Support

Deaf Defier2 for Windows. The Deaf Defier2 for Windows requires the following:
Microsoft Windows 95 or later
4Mb 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

Electromagnetic Performance

EN 55022:1994
EN 61000-4-2:1995
EN 61000-4-3:1996
EN 61000-4-3:1996
ENV 50204:1995
EN 61000-4-8:1994

Ordering Information

The CR:800A 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:811A	CK:811A	CR:811A Type 1 Sound Level Meter
CR:812A	CK:812A	CR:812A Type 2 Sound Level Meter
CR:821A	CK:821A	CR:821A Type 1 Sound Level Meter with 1:1 Octave Band Filters
CR:822A	CK:822A	CR:822A Type 2 Sound Level Meter with 1:1 Octave Band Filters
CR:831A	CK:831A	CR:831A Type 1 Sound Level Meter with 1:1 & 1:3 Octave Band Filters
CR:832A	CK:832A	CR:832A 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:800A 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
	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

Cirrus Research plc

Acoustic House, Bridlington Road,
Hunmanby, North Yorkshire Y014 0PH England
Tel: +44 (1723) 891655
Fax: +44 (1723) 891742
e-mail (sales): sales@cirrusresearch.co.uk
e-mail (technical support): support@cirrusresearch.co.uk
website: www.cirrusresearch.co.uk

Your Cirrus Agent: