

Cirrus

optimus+
sound level meters

Acoustic Fingerprint™
Audio triggering, recording & alerts

AuditStore™
Data verification for your noise measurements

VoiceTag™
Grabación de notas de audio

Optimus+ Green Sound Level Meters for Environmental & Occupational Noise Measurements



The Optimus Green sound level meters use the latest digital technology and industrial design to give you the perfect instrument for environmental noise measurements.

Applications

Environmental noise measurements

- Environmental noise impact assessments over short or long periods
- Environmental noise monitoring with remote data download over 3G and GPRS, as well as GPS location technology
- Boundary noise measurements and impact assessments
- Measurements to BS 4142, ISO 1996, Section 61 Notices
- Tonal analysis using to ISO 1996-2:2007 and the Cirrus Improved Method
- Detailed analysis using audio recording

Occupational noise measurements

- Occupational and industrial hygiene noise evaluations
- Hearing protection selection using HML or 1:1 octave band methods
- Workplace noise measurements to ISO9612

Simple noise measurements

- Noise ordinance and community noise assessments
- General noise measurements

Key features

- IEC 61672-1:2013 Class 1 & Class 2
- Simultaneous measurement and data logging of all available parameters
- Simultaneous A, C & Z frequency weightings
- Simultaneous F, S & I time weightings
- Real-time 1:1 & 1:3 octave band filters
- NR & NC values and curves on screen
- Tonal noise analysis (C variants)
- Up to 28 statistical Ln % values (C variants)
- Single 120dB measurement range
- Acoustic Fingerprint™ audio triggering, recording and alerts during measurements for replay and analysis
- VoiceTag™ audio note recording and AuditStore™ measurement verification
- Repeating measurements with manual or automatic control
- Pause and back-erase functions
- High resolution colour display and back-lit keypad for night-time measurements
- 4GB memory capable of storing over 10,000 measurements (expandable up to 32GB)
- Compatible with CK:670 & CK:680 series outdoor noise measurement kits
- Measure up to 170dB with the optional MV:200EH microphone system
- Bluetooth connectivity, compatible with Android and iOS devices

Measure everything. Forget nothing.

The **Optimus Green** sound level meter has been designed with ease-of-use as its most important feature, to enable you to get on with measuring and controlling noise and protecting people's hearing.

The instrument uses the very latest in digital technology and industrial design techniques to make everything as clear and simple as possible. All noise parameters are measured by the instrument at the same time, so there's never any risk of choosing the wrong setting and missing something crucial. With a wide 120dB measurement span, you won't need to worry about choosing the right range either.

Featuring a high resolution colour screen and a keypad that illuminates automatically in low light, the **Optimus** instruments are ideal for any noise application. The measurement data is displayed in a clear and simple format along with a real-time noise chart, so that you can see how the noise levels vary with time.

A standard **Optimus** can measure up to 140dB(A) and 143dB(C) peak with the standard microphone and preamplifier, and up to 170dB using the optional MV:200EH high-level noise microphone system.

The ideal solution for environmental & occupational noise

The **Optimus Green** sound level meters are ideal instruments for both environmental and occupational noise, and will give you all of the information you need, right at your finger tips.

Every measurement contains all of the available functions on the device, so there's no risk of selecting the wrong parameter or function and missing something important.

Environmental noise measurements

For environmental noise applications, an **Optimus Green** is the perfect instrument.

Comprehensive measurement capability

The overall L_{eq} , L_{max} and statistical $L_{n\%}$ values are measured along with a range of noise profiles, providing a complete picture of the noise under investigation.

Real-time 1:3 octave bands

The B & C variants of the instrument will measure and store real-time 1:3 octave bands from 6.3Hz to 20kHz throughout each and every measurement, with the overall value along with a time history, stored automatically.

Acoustic fingerprint triggers and audio recording

As well as the VoiceTag recording, the **Optimus Green** instruments provide audio recording during measurements using the Acoustic Fingerprint technology.

Recordings can be started either manually

or automatically when user-defined triggers are activated.

Audio recordings can be stored either as studio 96/32 quality, which can be used for later analysis; high 48/24 quality; or as standard 16/16 quality, which can be used for replay and source identification.

Tonal noise detection

The D variants use either the ISO 1996-2:2007 Simplified Method or the Cirrus Improved Method to highlight tonal noise in 1:3 octave bands.

Repeating measurements

Measurements can be either started manually or automatically by the measurement control functions.

This allows the instrument to make repeated measurements over long periods of time, which is ideal when the instrument is used with an outdoor noise measurement kit.

Automatic audio measurements

An automatic audio measurement can be set up to record up to two minutes of audio at the start of each measurement.

Occupational noise & industrial hygiene measurements

As well as environmental noise functions, the **Optimus Green** instruments also provide a complete range of occupational noise functions.



UK & EU Noise at Work Regulations

If you are working to the UK Control of Noise at Work Regulations or the EU Physical Agents (Noise) Directive, L_{Aeq} and L_{Cpeak} values are measured at the same time, which allow the $L_{EP,d}$ ($L_{EX,8h}$) and the peak action levels to be determined. The exposure calculator also displays a projected $L_{EP,d}$ ($L_{EX,8h}$) for the current measurement.

The $L_{Ceq}-L_{Aeq}$ (C-A) value is also measured, which can be used to select PPE using the HML method.

OSHA, MSHA & other regulations

If you need to meet regulations such as OSHA HC & NC, MSHA HC or ACGIH, the two "virtual" noise meters in the dose view can be quickly configured to provide you with this information.

Octave band filters for noise control & selecting hearing protection

The **Optimus Green** A, B & C variants also feature real-time 1:1 octave band filters, which can be used to aid in the selection of PPE and for noise control applications. NR & NC curves and values are shown on-screen after a measurement.

NoiseTools software

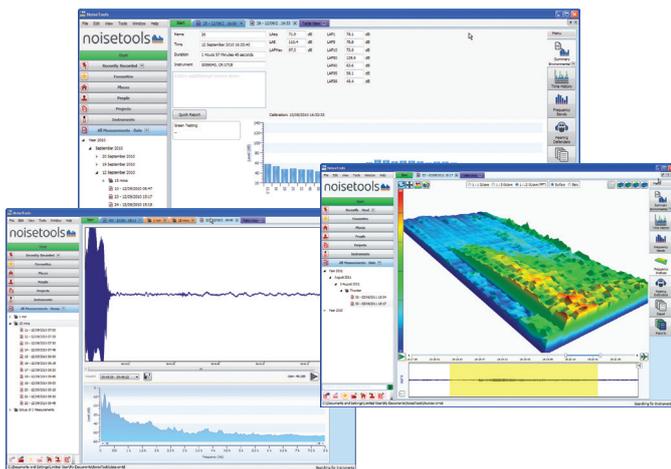
The NoiseTools software package gives you a quick and simple way to download, analyse and report your noise measurement information.

The initial summary screen shows you the most commonly used information and, through simple icons, gives you access to detailed measurement data. For advanced users, each and every parameter measured by the instrument is available for review and analysis, and the data can be exported for further use.

VoiceTag audio recordings can be played back for reference and are stored with the measurement data; they can also be converted into text-based notes. Audio recordings can be replayed and analysed in 1:1 octave bands.

To help you keep your noise measurement data organised and easy to find, NoiseTools allows each measurement to be allocated to people, places and projects.

NoiseTools is supplied free from any licensing restrictions or limits, allowing you to install the program on as many Windows PCs as needed, at no additional cost.



Outdoor measurement kits

Where there is a need to measure noise levels outdoors or over long periods of time, the **Optimus Green** sound level meter can be used in conjunction with the CK:670 and CK:680 series of outdoor measurement kits.

These kits comprise a weatherproof case, which contains the instrument and battery pack(s), along with an interface to an external power supply and a USB connection. The kits also include an outdoor microphone, which provides weather protection for the microphone capsule and connects via a 10m cable to the main enclosure.

The CK:685 contains a 3G/GPRS modem and GPS location receiver, which allows the noise measurement data to be downloaded remotely to the NoiseTools software suite via the Optimus Cloud system.

Datasheets for the CK:670 and CK:680 contain additional details about these two systems and can be downloaded from the Cirrus website at www.cirrusresearch.co.uk/library

AuditStore data verification

AuditStore™ is a new technology that helps to ensure that your noise measurement data is valid and trustworthy.



AuditStore allows you to verify measurements that have been downloaded to the NoiseTools software against a secure data store within the instrument.

Each time you make a measurement with your **Optimus**, a selection of the overall data is stored into a separate secure memory unit that is independent of the main memory card.

This data contains essential information about the measurements, such as the time, date and duration, the L_{Aeq} , Peak(C) and L_{AFmax} , L_{A10} & L_{A90} (where available) and the overload indication.

In addition to the noise measurement data, information about the last calibration is also stored.

The AuditStore data can be downloaded from the instrument when required and the measurements can then be checked against the AuditStore for signs of tampering or other anomalies.

NoiseTools will check that the measurement information held in the main database and displayed on the screen matches the values within the AuditStore secure memory.

NoiseTools will display verification symbols if the information matches: a unique feature that will prove very useful should you ever become involved in legal proceedings regarding your noise measurement data.



CK:670 outdoor kit shown with optional CT:7 tripod

Standard measurement kits

Complete measurement kits are available for all **Optimus** instruments, which contain the sound level meter, an acoustic calibrator, a windshield, cables, batteries and other accessories. The measurement kits contain all of the accessories needed to carry out a thorough noise survey.

Details of the measurement kits are shown on the back of this datasheet.

Specifications

Applicable standards¹

IEC 61672-1:2013 Class 1 or Class 2¹
 IEC 61672-1:2002 Class 1 or Class 2 Group X
 IEC 60651:2001 Type 1 I or Type 2 I
 IEC 60804:2000 Type 1 or Type 2
 IEC 61252:1993 Personal sound exposure meters
 ANSI S1.4 - 1983 (R2006), ANSI S1.43 - 1997 (R2007)
 ANSI S1.25:1991
 IEC 61260:1996 & ANSI S1.11-2004
 DIN 45657:2005-03

Microphone

Class 1 Instruments MK:224/MK:229 pre-polarized
 Class 2 Instruments MK:216 pre-polarized

Microphone preamplifier

MV:200 removable preamplifier (All Versions)

Total measurement range:

20dB to 140dB RMS single range
 Noise floor: <18dB(A) Class 1, <21dB(A) Class 2

Frequency weightings

RMS & peak : A, C, & Z measured simultaneously

1:1 octave bands:

31.5Hz to 16kHz

1:3 octave bands:

6.3Hz to 20kHz (bands from 12.5Hz displayed,
 6.3Hz, 8Hz & 10Hz stored & downloaded) - B & C
 variants

Additional metrics:

$L_{Aeq} L_f$ (20Hz to 200Hz) & $L_{eq} L_f$ (20Hz to 200Hz)

Time weightings

Fast, Slow & Impulse measured simultaneously

Display

High resolution display
 Ambient light sensor and illuminated keypad

Memory

4GB (32GB factory fit option)

AuditStore

Measurement verification data stored in secure
 memory

Time history data rates (global settings)

10ms, 62.5ms, 100ms, 125ms, 250ms, 1/2 sec, 1 sec,
 2 sec (user selectable)

VoiceTag audio recording

Up to 30 seconds of audio notes with each
 measurement

Acoustic fingerprint audio recording

Off, manual, threshold triggered, advanced trigger
 User options:

Studio quality - 96kHz/32bit WAV format

High quality - 48kHz/24bit WAV format

Standard quality - 16kHz/16bit WAV format

Pre-Trigger & Post-Trigger

Integrators

Three simultaneous "virtual" noise meters. Integrator
 1 is preset to Q3 for Leq functions. Integrators 2 & 3
 can be configured with the following:

Exchange rate: 3, 4 or 5 dB

Threshold: 70dB to 120dB (1 dB steps)

Time weighting: None or slow

Criterion level: 70dB to 120dB (1 dB steps)

Criterion time: 1 to 12 hours in 1 hour steps

Integrator quick settings

EU, OSHA HC & OSHA NC, OSHA HC & ACGIH,
 MSHA HC & MSHA EC, Custom 1 & Custom 2

Ln statistical values

14 independent statistical Ln values calculated from
 $1/16^{th} L_{AF}$

7 preset to L1.0, L5.0, L10.0, L50.0, L90.0, L95.0 &
 L99.0

7 user defined Ln values

CR:172C & CR:171C allow for an additional 14
 Ln values with independent time and frequency
 weighting.

Measurement control

Single or repeat measurement control with user
 selectable duration of manual, 1 min, 5 min, 10 min,
 15 min, 30 mins, 1 hour, Lden

Automatic synchronisation and repeat

Pause

Back-erase with user selectable duration

Dimensions

Size: 283mm x 65mm x 30mm

Weight: 300gms/10oz

Batteries

4 x AA alkaline

Battery life

Typically 12 hours with alkaline AA

Typically 20 hours with lithium AA non-rechargeable

Battery life is dependent upon the battery type and
 quality, and screen brightness

Connections

USB Type B to PC

AC & DC output via ZL:174 (2 x Phono, 1m)

Multi-pin IO for external power via ZL:171 cable
 (2.1mm socket)

External power: 5v-15v via MultiIO socket via ZL:171
 cable (2.1mm socket)

Tripod Mount

1/4" Whitworth socket

Case

Material: high impact ABS-PC with soft touch back
 and keypad

Environmental

Temperature: Operating -10°C to +50°C,
 Storage -20°C to +60°C

Humidity:

Up to 95% RH non-condensing

Electromagnetic performance

IEC 61672-1:2002 & IEC 61672-2:2003

Except where modified by EN 61000-6-1:2007 & EN
 61000-6-1:2007

Language options

English, French, German, Spanish as standard

Other language options may be available

Software support

NoiseTools download, configuration and analysis
 software supplied as standard. Compatible with
 Microsoft Windows 7, 8 & 10 (32bit & 64bit)

Bluetooth

BLE compatible with Android and iOS devices

Cirrus mobile applications available from Google Play
 and the App Store

Measurement functions²

CR:1720 & CR:1710

L_{XV} L_{XYMax} L_{XYMin}

L_{Aeq} L_{Cpeak} L_{Zpeak} L_{APeak} L_{Ceq} L_{Aeq} L_{Xe} L_{Aeq}

Graph of short L_{Aeq} L_{Cpeak}

Measurement run time

Integrators 2 & 3: TWA, dose %, est dose %

14 statistical Ln% values

Stored functions

L_{XYMax} & time history of L_{XYMax}

L_{Aeq} L_{Cpeak} L_{Zpeak} L_{APeak} L_{Aeq}

Time history of L_{Aeq} L_{Ceq} L_{Zeq} L_{Cpeak} L_{Zpeak} L_{APeak} L_{Aeq}

Integrators 2 & 3: L_{AVG} , TWA, % dose

Time history of L_{AVG}

Ln Values: 14 independent statistical values

Audio recording during measurement

Time, date and duration of measurement

CR:172A & CR:171A

L_{XV} L_{XYMax} L_{XYMin}

L_{Aeq} L_{Cpeak} L_{Zpeak} L_{APeak} L_{Ceq} L_{Aeq} L_{Xe} L_{Aeq}

Graph of short L_{Aeq} L_{Cpeak}

Measurement run time

Integrators 2 & 3: TWA, dose %, est dose %

Real-time 1:1 octave bands (graphical and numerical)

NR & NC values and curves

14 statistical Ln% values

Stored functions

L_{XYMax} & time history of L_{XYMax}

L_{Aeq} L_{Cpeak} L_{Zpeak} L_{APeak} L_{Aeq}

Time history of L_{Aeq} L_{Ceq} L_{Zeq} L_{Cpeak} L_{Zpeak} L_{APeak} L_{Aeq}

Integrators 2 & 3: L_{AVG} , TWA, % dose

Time history of L_{AVG}

1:1 octave bands: overall L_{eq} & L_{eq} time history for
 each band, NR & NC values and curves

Ln values: 14 independent statistical values

Audio recording during measurement

Time, date and duration of measurement

CR:172B & CR:171B

L_{XV} L_{XYMax} L_{XYMin}

L_{Aeq} L_{Cpeak} L_{Zpeak} L_{APeak} L_{Ceq} L_{Aeq} L_{Xe} L_{Aeq}

Graph of short L_{Aeq} L_{Cpeak}

Measurement run time

Integrators 2 & 3: TWA, dose %, est dose %

Real-time 1:1 octave bands (graphical and numerical)

Real-time 1:3 octave bands (graphical and numerical)

NR & NC values and curves

$L_{eq} L_f$ (20Hz to 200Hz)

14 statistical Ln% values

Stored functions

L_{XYMax} & time history of L_{XYMax}

L_{Aeq} L_{Ceq} L_{Zeq} L_{Cpeak} L_{Zpeak} L_{APeak} L_{Aeq}

Time history of L_{Aeq} L_{Ceq} L_{Zeq} L_{Cpeak} L_{Zpeak} L_{APeak} L_{Aeq}

Integrators 2 & 3: L_{AVG} , TWA, % dose

Time history of L_{AVG}

1:1 & 1:3 octave bands: overall L_{eq} & L_{eq} time history
 for each band

NR & NC values and curves

Ln values: 14 independent statistical values

Audio recording during measurement

Time, date and duration of measurement

CR:172C & CR:171C

L_{XV} L_{XYMax} L_{XYMin}

L_{Aeq} L_{Cpeak} L_{Zpeak} L_{APeak} L_{Ceq} L_{Aeq} L_{Xe} L_{Aeq}

Graph of short L_{Aeq} L_{Cpeak}

Measurement run time

Integrators 2 & 3: TWA, dose %, est dose %

Real-time 1:1 octave bands (graphical and numerical)

Real-time 1:3 octave bands (graphical and numerical)

Tonal noise detection in 1:3 octave bands

NR & NC values and curves

$L_{eq} L_f$ (20Hz to 200Hz)

Up to 28 statistical Ln% values

Stored functions

L_{XYMax} & time history of L_{XYMax}

L_{Aeq} L_{Ceq} L_{Zeq} L_{Cpeak} L_{Zpeak} L_{APeak} L_{Aeq}

Time history of L_{Aeq} L_{Ceq} L_{Zeq} L_{Cpeak} L_{Zpeak} L_{APeak} L_{Aeq}

Integrators 2 & 3: L_{AVG} , TWA, % dose

Time history of L_{AVG}

1:1 & 1:3 octave bands: overall L_{eq} & L_{eq} time history
 for each band

Tonal noise detection in 1:3 octave bands

NR & NC values and curves

Ln values: 28 independent statistical values

Audio recording during measurement

Time, date and duration of measurement

where x=A, C, Z; y= F, S, I

Other functions may be calculated by the NoiseTools
 software and displayed on download.

Notes

1. Please contact Cirrus Research plc for details of the standards
 and approvals that are available on specific instrument types.
 2. For details of the displayed and stored parameters, please
 refer to the Optimus user manual for full specifications.
 All specifications, features and values are typical and are subject
 to change without notice.

Instrument Selection

Function/ Instrument	Class 1	Class 2	Sound Level Functions	Leq/Peak Functions	TWA/ Dose Functions	Data Logging	Pause & Back Erase	AuditStore	Acoustic Fingerprint Audio Recording	VoiceTag Note Recording	1:1 Octave Band Filters	1:3 Octave Band Filters	NR & NC Curves on screen	Tonal Noise Detection	Ln values	Software Support	3G/GPRS Modem & GPS Support	Measurement Kit	Bluetooth*
CR:1720		✓	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	CK:1720	✓
CR:1710	✓		✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	CK:1710	✓
CR:172A		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	CK:172A	✓
CR:171A	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	CK:171A	✓
CR:172B		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	CK:172B	✓
CR:171B	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	CK:171B	✓
CR:172C		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	CK:172C	✓
CR:171C	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	CK:171C	✓

Standard accessories

The Optimus sound level meters are supplied, as
 standard, with the following accessories:

User manual

Certificate of Calibration

USB data/power cable

Windshield

NoiseTools software DVD

*Bluetooth low-energy

Measurement kits

The Optimus sound level meters are available as
 a complete measurement kit with the following
 accessories:

Optimus sound level meter

CR:514 Class 2 or CR:515 Class 1 acoustic calibrator

UA:237 90mm windshield

CK:300 carrying case

User manual and Certificates of Calibration

USB data/power cable and NoiseTools software DVD



Acoustic House
 Bridlington Road
 Hunmanby
 North Yorkshire
 YO14 0PH
 United Kingdom

T: 0845 230 2434 (UK)

+44 1723 891655

F: +44 1723 891742