



Optimus Green Sound Level Meters for Environmental & Occupational Noise Measurements



Applications

Environmental Noise Measurements

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

Occupational Noise Measurements

- Occupational & Industrial Hygiene Noise Evaluations
- Hearing Protector Selection using HML or 1:1 Octave Band Methods
- Workplace noise measurements to ISO9612

Simple Noise Measurements

- Noise Ordinance & Community Noise Assessments
- General Noise Measurements

Key Features

- IEC 61672-1:2013 Class 1 & Class 2
- LNE, PTB & APplus+ Type Approval
- Simultaneous measurement & 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 & curves on screen*
- Tonal noise analysis (C Versions)
- Up to 28 statistical Ln % values (C Versions)
- Single 120dB measurement range
- Acoustic Fingerprint™ audio triggering, recording & alerts during measurements for replay and analysis
- VoiceTag™ audio note recording & AuditStore™ measurement verification
- Repeating measurements with manual or automatic control
- Pause & Back Erase functions
- High resolution colour OLED display and backlit keypad for night-time measurements
- 4GB memory capable of storing over 10,000 measurements (expandable up to 32GB)
- Compatible with CK:670 & CK:680 outdoor noise measurement kits
- Measure up to 170dB with the optional MV:200EH microphone system



Measure Everything. Forget Nothing.

The **optimus green** sound level meters have been designed with ease of use as the most important feature, which lets you get on with measuring and controlling the noise.

The instruments use the very latest in digital technology and industrial design techniques to make everything as clear and simple as possible. All of the functions of the instrument are measured at the same time so there's no risk of choosing the wrong setting, and with a wide 120dB measurement span you don't need to worry about choosing the right range.

Featuring a high resolution colour OLED screen and a keypad that will illuminate 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 varies 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 & 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 so there's no risk of selecting the wrong parameter or function.

Environmental Noise Measurements

For environmental noise applications, an **optimus green** is the ideal 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 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, 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 instruments to make repeated measurements over long periods of time, ideal when the instrument is used with an outdoor noise measurement kit.

Occupational Noise & Industrial Hygiene Measurements

As well as the 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 & values are shown on screen after a measurement.

NoiseTools Software

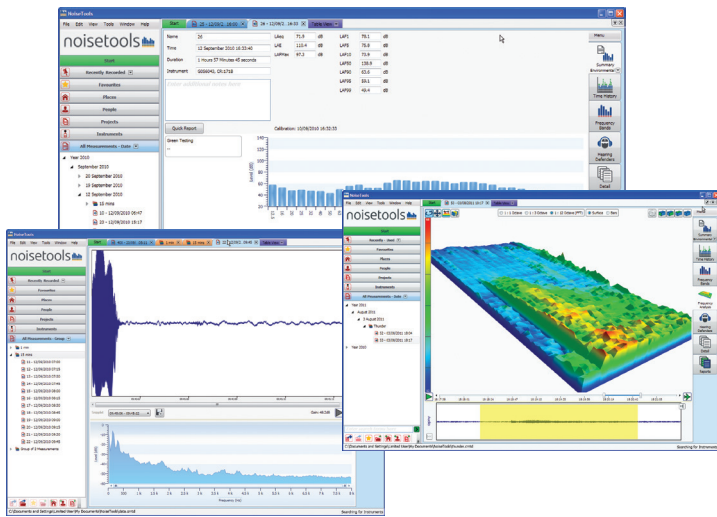
The NoiseTools software package gives you a quick and simple way to download, analyse and report your noise measurement information.

The initial summary screen shows you the most commonly used information and, through simple icons, gives you access to the detailed measurement data. For advanced users, each and every function 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 automatically stored with the measurement data, and audio recordings can be replayed and analysed in 1:12 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 PC's as needed at no additional cost.



Outdoor Measurement Kits

Where there is a need to measure noise levels outdoor or over long periods, the **optimus green** sound level meters can be used with the CK:670 and CK:680 outdoor measurement kits.

These kits comprise a weatherproof case which contains the instrument and battery pack(s) along with an interface to external power and USB. The kits also include the MK:170 outdoor microphone which provides weather protection for the microphone capsule and connects via a 10m cable to the main enclosure.

The CK:680 also contains a 3G/GPRS modem and GPS location receiver which allows the noise measurement data to be downloaded remotely to the NoiseTools software via the Optimus Cloud system.

When used with a single battery pack, the CK:670 can power the instrument for 7 days whereas the CK:680 can provide power for 6 days. Adding a further battery pack doubles the operating life and external power can be added if required.

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 you to ensure that your noise measurement data is valid and trustworthy. AuditStore allows the user 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 that is independent of the main memory card.

This data contains essential information about the measurement such as the time, date and duration, the LAeq, Peak(C) and LAmax, LA10 & LA90 (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 then the measurements can be checked against the AuditStore.

The NoiseTools software 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 which will be useful in any legal proceedings.



CK:670 Outdoor Kit shown with optional CT:7 Tripod

Standard Measurement Kits

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

Type Approvals for Class 1 Instruments¹

LNE-25387-1 IEC 61672-1:2013
 NF EN 61672-1:2014
 IEC 61260:1996
 NF EN 61260:1996
 EN 61672-1:2003
 PTB-1.53-4052960 DIN EN 61672-1:2003-10
 DIN EN 61672-2:2004-08
 DIN 45657:2005-03
 Applus+ 02-001-B-6Z/13-R
 UNE-EN 61672-1:2005

Microphone

Class 1 Instruments MK:224 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 OLED display.
 Ambient light sensor & 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, 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
 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 1/16th 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

Measurement control with user selectable duration of manual, 1 min, 5 min, 10 min, 15 min, 30 mins, 1 hour, Lden
 Automatic Synchronisation & 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 & 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 & 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 & Analysis software supplied as standard. Compatible with Microsoft Windows XP, Vista, 7 & 8 (32bit & 64bit)

Measurement Functions²

CR:1720 & CR:1710

L_{XY}, L_{XYMax}, L_{XYMin}
 L_{Aeq}, L_{CPeak}, L_{ZPeak}, L_{APeak}, L_{CEq}, L_{Aeq}, L_{XE}, L_{AlEq}
 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_{CEq}, L_{Zeq}, L_{CPeak}, L_{ZPeak}, L_{APeak}, L_{AlEq}
 Time History of L_{Aeq}, L_{CEq}, L_{Zeq}, L_{CPeak}, L_{ZPeak}, L_{APeak}, L_{AlEq}
 Integrators 2 & 3: L_{AVG}, TWA, % Dose
 Time History of L_{AVG}
 Ln Values: 14 independent statistical values
 Audio recording during measurement
 Time, date & duration of measurement

CR:172A & CR:171A

L_{XY}, L_{XYMax}, L_{XYMin}
 L_{Aeq}, L_{CPeak}, L_{ZPeak}, L_{APeak}, L_{CEq}, L_{Aeq}, L_{XE}, L_{AlEq}
 Graph of Short L_{Aeq}, L_{CPeak}
 Measurement Run Time
 Integrators 2 & 3: TWA, Dose %, Est Dose %
 Real-Time 1:1 Octave Bands (Graphical & Numeric)
 NR & NC values & curves
 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_{AlEq}
 Time History of L_{Aeq}, L_{CEq}, L_{Zeq}, L_{CPeak}, L_{ZPeak}, L_{APeak}, L_{AlEq}
 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 & curves
 Ln Values: 14 independent statistical values
 Audio recording during measurement

Time, date & duration of measurement

CR:172B & CR:171B

L_{XY}, L_{XYMax}, L_{XYMin}
 L_{Aeq}, L_{CPeak}, L_{ZPeak}, L_{APeak}, L_{CEq}, L_{Aeq}, L_{XE}, L_{AlEq}
 Graph of Short L_{Aeq}, L_{CPeak}
 Measurement Run Time
 Integrators 2 & 3: TWA, Dose %, Est Dose %
 Real-Time 1:1 Octave Bands (Graphical & Numeric)
 Real-Time 1:3 Octave Bands (Graphical & Numeric)
 NR & NC values & 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_{AlEq}
 Time History of L_{Aeq}, L_{CEq}, L_{Zeq}, L_{CPeak}, L_{ZPeak}, L_{APeak}, L_{AlEq}
 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 & curves
 Ln Values: 14 independent statistical values
 Audio recording during measurement
 Time, date & duration of measurement

CR:172C & CR:171C

L_{XY}, L_{XYMax}, L_{XYMin}
 L_{Aeq}, L_{CPeak}, L_{ZPeak}, L_{APeak}, L_{CEq}, L_{Aeq}, L_{XE}, L_{AlEq}
 Graph of Short L_{Aeq}, L_{CPeak}
 Measurement Run Time
 Integrators 2 & 3: TWA, Dose %, Est Dose %
 Real-Time 1:1 Octave Bands (Graphical & Numeric)
 Real-Time 1:3 Octave Bands (Graphical & Numeric)
 Tonal Noise Detection in 1:3 Octave Bands
 NR & NC values & 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_{AlEq}
 Time History of L_{Aeq}, L_{CEq}, L_{Zeq}, L_{CPeak}, L_{ZPeak}, L_{APeak}, L_{AlEq}
 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 & curves
 Ln Values: 28 independent statistical values
 Audio recording during measurement
 Time, date & 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 optimum 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	Type Approval	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
CR:1720		✓		✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	CK:1720
CR:1710	✓		PTB, LNE Applus+	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	CK:1710
CR:172A		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	CK:172A
CR:171A	✓		PTB, LNE Applus+	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	CK:171A
CR:172B		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	CK:172B
CR:171B	✓		PTB, LNE Applus+	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	CK:171B
CR:172C		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	CK:172C
CR:171C	✓		PTB, LNE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	CK:171C

Standard Accessories

The optimum sound level meters are supplied, as standard, with the following accessories:
 User Manual
 Certificate of Calibration
 USB Data/Power Cable

Windshield
 NoiseTools Software CD

Measurement Kits

The optimum sound level meters are available as a complete measurement kit with the following accessories:
 optimum Sound Level Meter
 CR:514 Class 2 or CR:515 Class 1 Acoustic

Calibrator
 UA:237 90mm Windshield
 CK:300 Carrying Case
 User Manual & Certificates of Calibration
 USB Data/Power Cable & NoiseTools Software CD



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