

MEASURING THE EQUIVALENT CONTINUOUS SOUND LEVEL (L_{eq}) WITH THE CA 1310



Equipment in buildings (heating, lifts, mechanical ventilation), professional machines and tools, transport, industrial, craft or leisure activities: there are multiple noise sources in our environment.

Depending on their nature, these different noise sources may be constant or intermittent, sometimes leading to significant variations in the sound levels during a given period.

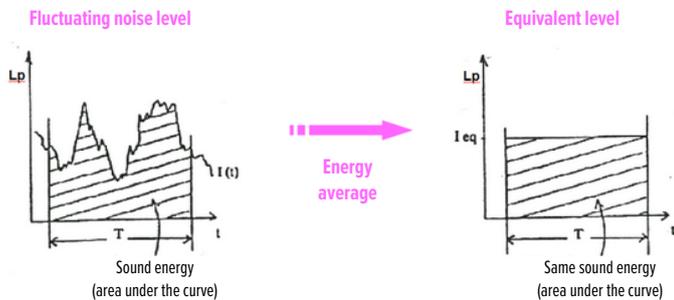
As a result, in many circumstances, “conventional” sound level meters may prove slightly limited, so integrating sound level meters may be necessary.





Acoustic signals usually fluctuate, so the indications provided by one-off measurements are not stable.

To characterize nuisance due to exposure for a duration T to a noise which varies over time, the concept of the equivalent continuous sound level $L_{Aeq,T}$ (expressed in dBA when type A frequency weighting is used). This is the continuous sound level which, over a given period, delivers the same amount of acoustic energy as the real fluctuating noise. This $L_{Aeq,T}$ value is easy to measure with an integrating sound level meter like the CA 1310, using a type A weighting filter.



Extract from bruitparif.fr

What duration should be chosen for the Leq?

Depending on the application, the duration of the Leq can be selected to provide information on a specific event (a train passing, for example) or to evaluate exposure during a specific work phase (cleaning with compressed air, for example).

It is sometimes necessary to assess the noise over a long period, for example when evaluating the environmental noise generated by road traffic, for which the Leq measurements may be performed at intervals over representative periods (e.g. calm periods during the day, rush hours, evening, night).



When should the Leq be measured?

For a simple assessment, the instantaneous sound pressure level reading may be valid if the noise measured is particularly stable.

If not, the measurement will be unusable, so you will need an Leq measurement.

Furthermore, this energy indicator is used in a wide range of regulatory reference documents, including the World Health Organization recommendations and the rules on noise exposure in the workplace. It is used regularly because a good correlation between this value and the auditory discomfort experienced by an individual exposed to noise has been observed in practice. From the measurement point of view, this indicator is also less sensitive to minor disturbances and can be measured on the ambient noise or only on specific noise sources or events.





Example of an application for measuring noise exposure in the workplace

At European level, directive 2003/10/CE defines the minimum health and safety requirements concerning workers' exposure to noise.

For the testing methodology, please refer to the ISO 9612 standard with which the CA 1310 complies as a Class 2 integrating sound level meter.

Measuring the Leq for a specific tasks on the workstation

Positioning of the sound level meter:

The levels measured must be representative which means they should be measured close to the worker's ear. Simply place the microphone in the positions where the worker's head is when performing the task (distance of 10 cm to 40 cm from the ear receiving the most exposure).

The foam wind guard supplied with the instrument helps to limit the noise caused by air streams.

Advantages of the CA 1310: a tripod insert on the back of the product and the possibility of detaching the microphone and using it remotely thanks to its extension (option).

Verification with an acoustic calibrator:

On-site checks can be carried out using an acoustic calibrator (accessory) so that you can verify the integrity of the measurement before performing it. A calm atmosphere is preferable for this operation.

Advantages of the CA 1310: possibility of making adjustments very simply.

Choice of weighting:

Type A frequency weighting is based on the sensitivity of the human ear. The time constant for the sound level meter should be chosen as follows:

- Slow constant / S (1s) for noises whose levels are stable.
- Fast constant / F (125 ms) for noises whose levels fluctuate significantly.



— DID — YOU KNOW?

In France, 1 in 3 workers reports exposure to noise levels which are hazardous for health*

*Extract from INRS,
Source: Summer 2017 survey

Configuration of the Leq duration:

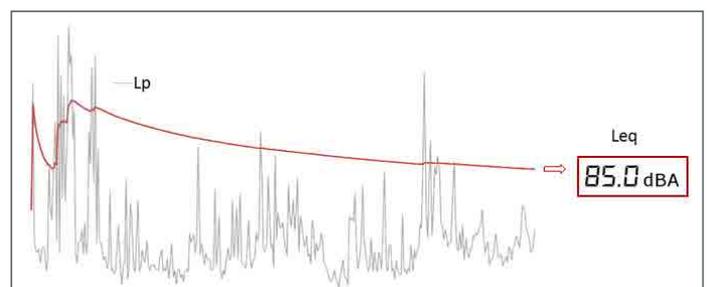


The key on the CA 1310 can be used to select the duration as required among the following values: 10 seconds, 1 minute, 5 minutes, 10 minutes, 30 minutes, 1 hour, 2 hours, 4 hours, 8 hours, 16 hours, 24 hours.



This second key can be used to switch to Leq mode and start, pause or stop acquisition.

Advantages of the CA 1310: the possibility of rereading the time-stamped Leq value measurements on the CA 1310 or in the SL Software supplied for PC.



Example of results extracted from SL-Software



Main specifications

CA 1310 SPECIFICATIONS

Microphone	1/2" electret-condenser microphone
Measurement range	30.0 to 130.0 dB
Frequency range	20 Hz to 8 kHz
Accuracy (subject to reference to 94 dB, 1 kHz)	± 1 dB
Frequency weighting	A / C
Time weighting	FAST: 125 ms / SLOW: 1 second

FUNCTIONS

Measurement modes	SPL (Sound Pressure Level), Leq (Equivalent continuous sound level), MaxL (Maximum sound Level), MinL (Minimum sound Level)
Integration time for continuous equivalent sound level (Leq)	As required, from the following values: 10 sec, 1 min, 5 min, 10 min, 15 min, 30 min, 1 h, 8 h, 24 h
Recording	64,000 points
Time display and time-stamping	Yes
Min/Max	Yes

DISPLAY

Digital display	0.1 dB resolution / Display refresh rate: 500 ms
Bargraph	50 segments, Display refresh rate: 50 ms
Backlighting	Yes

POWER SUPPLY

Batteries	1.5V AA x 4
Battery life	More than 60 hours

PHYSICAL SPECIFICATIONS

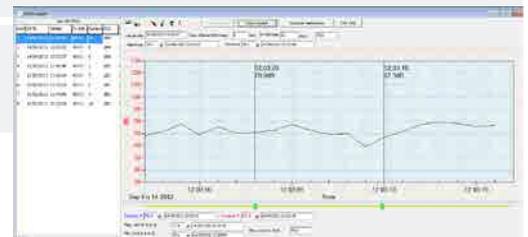
Interfaces	Micro USB for data transfer or use of mains power supply AC / DC jack analogue output: AC output: 1 Vrms at full scale / DC output: 10 mV / dB
Tripod insert	Yes
Dimensions / weight	262 x 75 x 39 mm / 390 g (with batteries)
Ingress protection	IP 40

ENVIRONMENTAL SPECIFICATIONS

Operating temperature	0 to 40 °C
Operating temperature	-10 to 60 °C
Humidity	10 to 90 %RH

GENERAL INFORMATION

Compliance	IEC 61672-1 Class 2 / ANSI S1.4 Type 2
Warranty	2 years
SL-Software data processing software	Graphical representation or value table – Data export – Real-time mode



Standard state at delivery

- CA 1310: delivered in a hard case with rechargeable batteries, foam wind guard, software on CD-Rom, 1 male Jack plug, user's manual, verification certificate.

To order:

CA 1310 integrating sound level meter.....P016510300

Accessories & replacement parts:

- CA 833 sound level meter calibrator.....P01185301
- Foam wind guard.....P01102083
- 5-metre sound level meter microphone extension cable.....P01102190
- USB mains adapter (supplied with USB/µUSB cable).....P01651023
- 4 AA/LR6 rechargeable batteries + charger.....HX0053

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