CEL 240 Series

Digital Sound Level Meters

Frequently Asked Questions

Casella USA is proud to announce the **CEL-240** series sound level meters. These FAQ's help to give an overview of the current models, answer some of the more typical questions that arise and describe how they fit into the overall CEL product portfolio of noise measurement instruments.

CEL-240

"EZ does it"

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FAQ's: INTRODUCTION

How does the instrument fit into the CEL range?

CEL-240 Series

The simplest meters in the CEL range include the new **CEL-240** series. These 4 models are ANSI type 2 accuracy sound level meters with instantaneous Sound Pressure Level (SPL), Maximum Noise Level (Max) and optional Time Averaging Lavg and Leq measurement capabilities. Some models feature time history data logging and memory with download to computer.

CEL-350 Series

The range of cableless personal noise dosimeters includes the CEL-350 Lite, the popular CEL-350 and the CEL-352 Plus. The new CEL-350 dBadge dosimeter adds a small badge style dosimeter with cable-less microphone to the range for added convenience. The CEL-35X series includes a complete range of features and measurement capabilities for all workplace noise applications including OSHA, ACGIH and ISO protocols.

CEL-620 Series

Part of the advanced range sound level meters, the CEL-620 and 621 provide recording of the noise level against frequency to provide a modern real time octave band analyzer. The 620 and 621 instruments are fitted with parallel (real time) frequency analysis capability for either full octave or third octave band measurements. ANSI type 1 and type 2 meters with storage for the overall answer set with all measurements made in every run.

CEL-630 Series

The top of the range meters are the CEL-630, 631, 632 and 633 real time analyzers which feature parallel capture of level against time and frequency. The meters measure all noise parameters simultaneously and offer options for just overall level recording or full time history data logging. The CEL-630 series are available as ANSI Type 1 or Type 2 accuracy meters depending on the selection of the microphone capsule.

FAQ's: COMPARISON OF MODELS

What models are there in the range?
Four model variants are available – the **CEL-240, 242, 244 and 246**. It is a completely new design compared to the earlier CEL-231 & 254 models in the original 200 series.

What are the main features & benefits of the CEL-240?
The main differences between the CEL-240 series and the earlier 231/254 instruments are the use of digital signal processing (DSP) technology and a low power consumption microprocessor that is unique in such a low cost instrument. The meters feature the instantaneous sound level plus the maximum hold feature on all screens plus a real time bar graph display. This makes all the **CEL-240** models extremely useful in circumstances where the noise levels are fluctuating and where the time history trending graph will be useful for seeing changing noise levels of short events. A simple digital output is also available to link to a personal computer for basic data logging applications. Two models in the range feature simple on board data logging of time history information.

FAQ's: OPERATION

How long will standard alkaline batteries last in a CEL-240?
A set of 3 x AA alkaline cells can power a **CEL-240** meter for more than **35 hour's** continuous operation at normal room temperature. Lower temperatures will reduce useful battery life. Good quality alkaline batteries are recommended for longest running time.

Can rechargeable batteries be used in a CEL-240?
A set of 3 x AA NiMH rechargeable batteries can be used instead of alkaline batteries and battery life will be around the same time at normal room temperature. The rechargeable batteries will operate successfully down to lower temperatures than an alkaline battery set. NiMH batteries must be recharged outside the **CEL-240** and can be used repeatedly in these instruments. When NiMH batteries are run down they can be recharged in a few hours and used again up to the number of recharge cycles recommended by the battery manufacturer. Typically this will be around 300 – 500 charge cycles.

How can the instrument be powered from an external source?
The **CEL-240** meter is designed to be powered from an external supply via the USB connector that is available on the bottom of the meter. This takes the usual 5Vdc supply from the USB port of a laptop or desktop computer via a suitable cable or plug top power adaptor.

Can the microphone of a CEL-240 be removed?
The microphone unit of a **CEL-240** is not removable therefore remote operation is not normally possible. In special circumstances it may be possible to fit a length of plastic tubing of 1/2" internal diameter over the end of the microphone in order to place the open end near to a machine noise source that would be dangerous to approach so closely.

Can the CEL-240 be used for outdoor measurements?

The **CEL-240** is not designed for extended use outdoors since it is not completely sealed against the likely wind and rain that would damage the meter and spoil such measurements.

How quickly does the digital display update during measurements?

The digital display shows samples of the continuous rms sound pressure level updated twice every second. This is a compromise between updating the display too quickly making it too difficult to see the readings and being too slow for the update routine in which case the display would appear very sluggish. In a non-integrating instrument tests have shown about 2 or 3 times a second to be about the optimum rate that the brain can interpret without missing valuable information.

Is the time history trace stored in the CEL-240?

All the models in the **CEL-240** series have a display mode that allows the user to see the last 1 minute or 5 minute trend of the changing instantaneous noise levels as they vary. These samples are not stored in the **CEL-240** and **244** instrument but they are saved into memory in the **CEL-242** and **246** models. A real time output of the current sound level is available at the mini USB connector at the bottom of the meter for output to a suitable data logging device such as a computer.

What outputs are available from the CEL-240?

The 2.5 mm three-pole jack socket on the bottom of the case of the **CEL-240** meters provides both the ac and log dc signals to external equipment. The ac output signal is used for connection to an audio tape recorder or spectrum analyser. The dc output is used to provide a signal to a data logger or paper chart recorder.

What are the characteristics of the ac output?

The ac output is a conditioned signal that has been passed through the selected frequency weighting. This means that it will give either an ‘A’ or ‘C’ response signal that represents the pressure waveform at the microphone. The ‘C’ setting is recommended for making audio recordings since it has a better (wider and flatter) frequency response than the ‘A’ weighting. The ac signal is available on the 2.5 mm jack socket at a level of up to 0.85 V rms for full scale deflection. This means that for a sound level of 100 dB measured on the Lo range of the meter the output would be 0.85 V rms. A signal at half the range FSD would output a voltage of 0.425 V rms and so on. A signal may still be present below the minimum scale deflection but may not still be linear at such low levels.

What are the characteristics of the dc signal?

The dc signal is a more slowly varying voltage after the time weighting network in the meter. Therefore, it will represent the same signal as seen on the display. It will have the selected ‘A’ or ‘C’ frequency and either the Slow, Fast or Impulse time weighting. The signal is optionally available on the 2.5 mm stereo jack socket at a level of up to 1.3 V rms at full scale deflection on each range. It increases at a rate of nominally 18.6 mV/dB for each range. A noise level of 100 dB on the Lo range would produce an output of 1.3 V rms while the same noise level but measured on the Lo range would produce an output of 0.742 V rms.

What are the characteristics of the digital output?

The digital output is produced every 1 second and provides both the A and the C frequency weighted sound level with the selected time response (S, F or I). The **CEL-240** meters have been designed to appear as an industry standard memory card format when connected to a personal computer. The optionally available program for the **CEL-240** meters, called dB24, produces a standard text file format data file in the form of a list of date, time and the 1 second A and C sound levels with a carriage return. This can be imported into many standard office programs such as word processors or spreadsheets for further manipulation and graphing.

FAQ's: INSTRUMENT FUNCTION

What measurement ranges does the CEL-240 cover?

The **CEL-240** meters are equipped with two measurement ranges each covering a 70 dB dynamic span. These ranges cover the overall levels from 30 to 100 dB on the low (Lo) range setting, and levels from 60 to 130 on the high (Hi) range setting.

What results can be measured in a CEL-240?

The **CEL-240** meters will measure the following parameters during the measurement run:

- The **instantaneous sound pressure level** during the run,
- The maximum RMS level or **Lmax**,
- The last 1 minute or 5 minutes displayed as a trend graph over the full 70 dB range selected
- Additionally, the **CEL-244** and **246** models also measure the **Lavg** and the **Leq**

What rms frequency weightings are available in the CEL-240?

Two broadband frequency weightings are provided in the **CEL-240** meters for the collection of the rms noise levels – the 'A' and 'C' weightings according to the international standards defined in IEC-651 and ANSI S1.4. Tolerances for these weightings are as specified in the type 2 classifications of these documents. This allows the **CEL-240** meters to be used for measuring the NRR rating method for choosing hearing protectors against excessively high workplace noise exposure.

What time weightings are available in the CEL-240?

The **CEL-240** meters are equipped with the Slow and Fast and Impulse time weightings to suit many requirements for general-purpose noise measurements. Use the Slow time response to "dampen" the readings to make it easier to see what is happening. Use the Fast response to more accurately follow the changing noise levels as they rise and fall. Use the Impulse response only when the regulations require it.

What exchange rates or Q values are available in the CEL-240?

The **CEL-244** and **246** meters offer the 5 and 3 dB exchange rate in the meters since they are instruments that can measure the time average noise levels. Varying noise levels can be measured using the **CEL-244** or **246** models to satisfy the US Noise at Work regulations as specified in the OSHA or ACGIH relevant documents. For most Noise at Work measurements for OSHA the meter should be set to the A frequency weighting and the Slow time response on the 60 to 130 dB Hi range.

How do I calibrate the CEL-240?

All **CEL-240** meters have a unique easy calibration routine that simply involves fitting the acoustic calibrator over the microphone and switching it on. The **CEL-240** meter will automatically detect the 1 kHz fixed level tone and will offer the user the choice to perform the calibration or to leave it as it was and abort the process. One push of the button on the front panel of the instrument will set the gain circuits in the meter to match to expected level of the calibrator and the process takes about 5 seconds to complete. No adjustments with screwdrivers or other keypad controls are required. The auto-calibration function can be used with both 114.0 and 94.0 dB acoustic calibrators that operate at the industry standard frequency of 1 kHz. This is pre-selected in the **CEL-240** meters in the configuration menu prior to the calibration process being initiated.

FAQ's: ACCURACY & RESULTS

What accuracy is the instrument designed to fulfil?

All **CEL-240** instruments comply with the international standards in the type 2 classifications that classify the sound level meter as general-purpose instruments. This specifies an overall expected accuracy of +/- 2 dB under typical field measurement conditions. Use of the **CEL-244** and **246** instruments as area noise dosimeters by using the averaging function can also be undertaken.

Are any results saved when using the SLM mode?

Results are saved in the **CEL-242** and **246** data logging instruments when selected by the operator and downloaded to the computer using the CasellaDrive software. The **CEL-240** series is also intended to allow any of the instruments to be used as a simple sound level meter for quick hand held surveys or as a basic front end to a data logging system in conjunction with a personal computer running the optional dB24 software. In this case the computer must always be with the meter to act as the storage device if it is the **CEL-240** or **244** model.

FAQ's: APPLICATIONS

What markets is the instrument designed for?

There are three main markets for the **CEL-240** series meters

- a simple meter for monitoring noise exposure in the workplace
- a general purpose sound level meter for many environmental nuisance sources
- a short term noise meter for quick measurements on specific noise sources

How are these markets catered for by the CEL-240?

For many basic noise measurements the A weighted Slow response sound level will be all that is required. For more specific noise measurements of sounds with a transient nature the C weighting and the maximum hold feature will be of help. The meter can also be used as a simple teaching aid in many noise or general sound studies especially with the optional digital output to a computer. The tripod mount allows the meter to be fixed at a chosen location for longer term measurements that are not likely to be adversely affected by the weather conditions. The data logging capabilities of the **CEL-242** and **246** models give added versatility.

For more details on the **CEL-240** series, or any of the other Casella CEL products, please contact us:

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