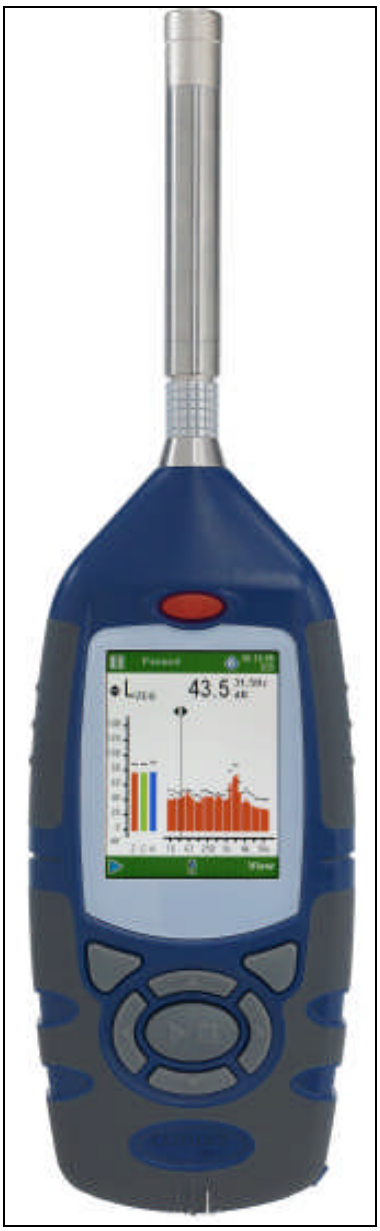
CEL 630 Series

Full Color Real Time Analyzers

Frequently Asked Questions

Casella USA announces the introduction of four new models to the CEL range of noise measurement equipment. The multi-function **CEL-630, CEL-631, CEL-632** and **CEL-633** Full Color Real Time Data Logging Analyzers are completely new versions of the popular CEL-450 and CEL-490 models. These FAQ's help to give an overview of the new models and answer some of the more typical questions and describe how they fit into the current overall product portfolio of CEL noise measurement instruments.



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FAQ's: INTRODUCTION

How do these instruments fit into the CEL product range?

CEL-240 Series

The simplest meters now include the CEL-240 series and include the CEL-240, 242, 244 and 246 models featuring ANSI type 2 accuracy sound level meters with Sound Pressure Level (SPL), Maximum Noise Level (Max), Average Noise Level (Leq/Lavg) (CEL-244, 246 only) and basic data logging (CEL-242, 246 only) measurement capabilities.

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.

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CEL-620 Series

The mid range instruments are the CEL-620 integrating sound level meter and the integrating environmental real time analyzer CEL-621. The CEL-620 is a simple instrument for broadband or octave band measurements only while the CEL-621 provides integrating/averaging and measurement of statistical parameters used in environmental noise measurements. The instruments are fitted with powerful DSP technology that allows many popular measurements to be made very simply. Both type 1 and type 2 models are available for the CEL-600 range and all of them have a full color, high resolution display.

CEL-630 Series

The top of the range meters are the **CEL-630, CEL-631, CEL-632** and **CEL-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.

What models are there in the CEL-630 range?

There are 4 main models, with three frequency variants and 2 accuracy variants available – the **CEL-630, CEL-631, CEL-632 and CEL-633**. Each model is available as a broadband **A** variant, a broadband plus octave band **B** variant or a broadband plus third octave **C** variant. Each model is available as a **Type 1** or **Type 2** accuracy meter depending on the selection of the microphone capsule. This makes a total of 24 possible variations to suit the exact requirement for a particular task. All are designed using the same body casing and internal hardware. The difference between them is in the internal firmware programming that gives them their specific measurement capabilities.

Key difference	CEL-630	CEL-631	CEL-632	CEL-633
Basic sound level meter functionality	Yes	Yes	Yes	Yes
Integrating/Averaging functionality with user selectable threshold	Yes	Yes	Yes	Yes
Maximum and minimum and peak	Yes	Yes	Yes	Yes
Single event level	Yes	Yes	Yes	Yes
Takt maximal level 3&5	Yes	Yes	Yes	Yes
Real time broadband mode	Yes in A model	Yes in A model	Yes in A model	Yes in A model
Real time Octave band frequency analysis mode	Yes in B model	Yes in B model	Yes in B model	Yes in B model
Real time Third Octave band frequency analysis mode	Yes in C model	Yes in C model	Yes in C model	Yes in C model
Run memory	Yes	Yes	Yes	Yes
USB interface to computer	Yes	Yes	Yes	Yes
Voice notes recording	Yes	Yes	Yes	Yes
Event threshold triggering			Yes	Yes
Periodic storage			Yes	Yes
Time history storage			Yes	Yes
Audio recording			Yes	Yes
Back erase			Yes	Yes
User selectable markers	Yes	Yes	Yes	Yes
Statistical parameters for environmental noise measurements		Yes 5 x LN%		Yes 5 x LN%
Direct printing on site	Yes	Yes	Yes	Yes

FAQ's: COMPARISONS TO PREVIOUS CEL MODELS

What is the main difference between the CEL-630 models?

The main difference is the addition of the 5 extra LN% parameters in the **CEL-631** models. The **CEL-630** is equipped with integrating sound level measurement capability and the **CEL-631** provides additional measurement of 5 broad band LN% values. The **CEL-630** is ideal for recording in variable or impulsive climates where the time averaging facility will be useful while the **CEL-631** is ideal for basic environmental noise measurements that require the statistical noise levels such as LN10% or LN90%. The new models may also be configured to display as many or as few noise parameters (up to a maximum of 9 during the run) from the complete list that is available. All the valid combinations of parameters are recorded for every run and are available for review after download to the computer. The **CEL-632** adds the capability to data log the time history information at regular intervals to provide max, min and time average data while the **CEL-633** adds the collection of 5 x LN% values to the recording.

Which earlier versions of CEL sound level meters now correspond to the new models?

The new **CEL-630** range consists of 24 models including the type 1 and type 2, basic broadband only, integrating broadband and octave band versions. The new **CEL-630** models now replace the earlier CEL sound level meters as follows;

- CEL-450.A2 becomes the **CEL-630.A2** (integrating broadband meter – type 2)
- CEL-450.A1 becomes the **CEL-630.A1** (integrating broadband meter – type 1)
- CEL-450.B2 becomes the **CEL-630.B2** (integrating meter with octave bands – type 2)
- CEL-450.B1 becomes the **CEL-630.B1** (integrating meter with octave bands – type 1)
- CEL-450.C2 becomes the **CEL-630.C2** (integrating meter with 1/3 oct bands – type 2)
- CEL-450.C1 becomes the **CEL-630.C1** (integrating meter with 1/3 oct bands - type 1)
- CEL-490.A2 becomes the **CEL-633.A2** (integrating broadband meter – type 2)
- CEL-490.A1 becomes the **CEL-633.A1** (integrating broadband meter – type 1)
- CEL-490.B2 becomes the **CEL-633.B2** (integrating meter with octave bands – type 2)
- CEL-490.B1 becomes the **CEL-633.B1** (integrating meter with octave bands – type 1)
- CEL-490.C2 becomes the **CEL-633.C2** (integrating meter with 1/3 oct bands – type 2)
- CEL-490.C1 becomes the **CEL-633.C1** (integrating meter with 1/3 oct bands - type 1)

Notes:

- The **2** suffix designates that the instrument is provided with the CEL-252 ANSI type 2 microphone (1/2" diameter).
- The **1** suffix designates that the instrument is provided with the CEL-251 ANSI type 1 microphone (1/2" diameter)
- The **A** suffix designates that the instrument is supplied as a broadband only meter with no frequency analysis capability (easily available as an upgrade) together with the standard CMC51 USB cable, foam windscreen and wrist strap.
- The **B** suffix designates that the instrument is supplied with whole octave band frequency analysis capability (plus the broadband capability) together with the standard CMC51 USB cable, foam windscreen and wrist strap.

- The **C** suffix designates that the instrument is supplied with whole octave and third octave band frequency analysis capability (plus the broadband capability) together with the standard CMC51 USB cable, foam windscreen and wrist strap.
- All **CEL-630** models can be supplied with optional Insight™ database software as part of the standard kit.

FAQ's : KEY PRODUCT FEATURES

Why is it advantageous to have a large dynamic range?

All the **CEL-630** instruments have a single measurement range of 120dB. This means that the unit effectively measures from its noise floor (~18dBA broadband) up to 143.3dBCpk. In octave or third octave mode this noise floor is even lower in each frequency band. Other instruments measure with a limited dynamic range (e.g. 70dB), so as the noise climate changes, adjustment to the selected measurement range is necessary. If this adjustment is not done correctly prior to the measurement starting then the instrument can overload or go under-range, meaning the measurement is potentially spoiled because of missed noise levels and inaccuracies. Also, instruments with smaller dynamic ranges can be limited for environmental use. This is because the dynamic range may be insufficient to cope with low night time and high daytime noise levels within the same run, especially during unattended monitoring. The large dynamic range of the **CEL-630** meters solves all of these problems and makes for an easy-to-use instrument. No adjustment to the measurement range is required by the user. It is always on the right range for the normal measurement task.

What is a real time analyser?

A 'Real Time Analyzer' describes how a noise meter takes measurements in frequency analysis modes. Essentially, each of the whole octave (or 1/3 octave) bands are measured in parallel (simultaneously). This gives a frequency spectrum of the noise on the instrument screen in 'Real Time' where all detail is shown at the same time. This is in contrast to older frequency analysers, which measured the octave bands sequentially. This meant that the units would start measuring at the lower frequency bands (e.g. 16 Hz) and step in turn up to the higher frequencies (e.g. 16 KHz) one band at a time. Real time analysers therefore have several unique advantages over sequentially analysers. Firstly, the measurement is much faster by the nature of simultaneous analysis. Secondly, it is more accurate as it will not miss any intermittent or transient noise. Thirdly, sequential analysers cannot be used for the measurement of environmental noise with respect to frequency. The nature of environmental noise is intermittent or variable so older sequential analysers simply miss some of the data as they step through the bands that are required for the measurement. The **CEL-630.B or CEL-630.C** models overcome all of these limitations by use of up to date DSP (Digital Signal Processing) technology.

What are Octave and One Third Octave bands and what are they used for?

Frequency analysis is used for many applications but the most common are as follows. Octave bands are most frequently used in occupational hygiene measurements. Workplace noise regulations stipulate that an employer should ensure any hearing protection supplied to an employee is *fit* for the purpose. Part of this means they are suitable for the noise the individual is being exposed to. The way this is done is by measuring the frequencies an employee is exposed to in octave bands and ensuring the hearing protection that is supplied offers good enough protection at frequencies where the dB level was highest. Third octave band analysis is mainly used for problem solving in noisy areas where a solution needs to be applied to a problem source. The extra detail compared with whole octave band analysis gives the acoustic engineer sufficient information to correctly diagnose the problem and supply or recommend an adequate solution.

Why is there a color LCD in the CEL-630?

The **CEL-630** models feature a full color, high resolution liquid crystal display (LCD) to show the noise readings to the user. The resolution of the display is 240 pixels horizontally by 320 pixels vertically. This is the same resolution as a quarter VGA screen as used in many personal digital assistant (PDA) pocket computers. The benefit of this very high resolution is that it makes viewing the screen very clear and sharp to see the fine detail in some of the displays.

Some older graphic LCD based sound level meters were fitted only with monochromatic displays to show “black” on “white” text and numbers. The limited resolution of these displays at typically 128 x 64 pixels made the screens look very “grainy”. Screens in the **CEL-630** series instruments are used to not only show the results but to show them with color coding to indicate to the user what “mode” the instrument is currently in. Red bars at the top and bottom of the screen indicate that the meter is currently “Stopped”. That is, in the standby mode ready to begin a run. Yellow bars indicate that the instrument is in the “Calibration” mode. Green indicates the instrument in the “Run” mode and collecting data. Dark blue indicates the meter is in the “Setup” mode and can be configured for operation. Light blue indicates the meter is in “Memory Recall” mode and is showing the previously stored run data.

Why do I need all the results from the CEL-630?

Many sound level meters are able to provide some of the popular noise parameters that many users need while others are not. Those meters that can potentially measure with a wide variety of combinations of frequency response, time response and exchange rate must be pre-configured or “Setup” prior to a measurement to be sure that they will collect the data in the right format that is appropriate for the measurement task required.

This can be a problem if the inexperienced user is not used to using the particular instrument every day for this task and so is likely to run the risk of overlooking a key setting that will potentially invalidate the readings. The **CEL-630** range eliminates all of these potential troubles because it stores the noise parameters with all the frequency weightings A, C and Z plus all the time responses S, F and I plus all the exchange rates Q=3, Q=4 and Q=5 for every run that it makes. Additionally, the statistical LN% parameters are also measured*. This means that the user is not forced to get the selection right before beginning the run because the instrument will always measure everything relevant that it is capable of and storing the results for later review and transfer to a computer.

Every run saves every relevant noise parameter that can easily be accessed through the USB interface and copied into a spreadsheet or text document. Special software is not required as every instrument can be connected to a personal computer and will appear in an Explorer window just as a standard memory card would do.
(* Note this feature is model dependant)

What does ‘data logging’ mean?

The term ‘data logging’ describes how an instrument stores the time history variations of certain noise parameters. For example, the **CEL-630** and **CEL-631** meters do not measure intervals (Periods/Profiles) of data. If the **CEL-630** was run for an hour, then only the overall (cumulative) data for the whole hour would be saved in the memory and downloaded to a PC. By this definition the **CEL-630 and CEL-631** models are not currently available as data logging instruments although they do store overall results in memory.

What are the differences between ‘periods’ and ‘profiles’?

Periods and profiles are used to obtain a time history recording of the noise. The difference between periods and profiles is really down to how much detail of this time history is required. Periods tend to measure more parameters of a long interval (e.g. 1 minute up to 1 hour), whereas profiles generally measure over a shorter interval of perhaps a few seconds to a few minutes to get additional detail of a few key parameters. The **CEL-632 and CEL-633** meters do measure in intervals and record all the noise parameters over the complete measurement run. A single answer is produced for the whole of the run for the maximum or the minimum or the average level. Plus data are logged at regular intervals of time to enable temporal variations to be captured.

FAQ's : UPGRADE OPTIONS

Can a CEL-630 instrument be upgraded from one model to another?

The **CEL-630** instruments have been designed around a common instrument hardware platform that allows considerable upgrade options to be available to users. This ensures that users can start with the model that suits their initial needs and that it can be upgraded at a later date when there are new tasks to perform. The user can upgrade from any model in the range to any higher model in the range without having to buy a completely new instrument as and when the requirements change in the future. This upgrade ability is a key feature of the **CEL-630** range of meters.

How do I upgrade for accuracy?

Upgrades include changing from a type 2 to a type 1 model to improve the accuracy of the measurements. Changing the CEL-252 microphone for the CEL-251 enables this very easily and can be easily accomplished by the user in the field. Both microphone capsules are designed to the industry standard ½" thread size and so can be easily substituted or swapped as required.

How do I add frequency analysis to a basic broadband model?

Models originally purchased as broadband only versions, i.e. a **CEL-631.A** can be upgraded to include the octave bands, i.e. a **CEL-631.B,** by returning the units to an authorized Casella CEL Service Center where the new operational firmware will be programmed into the meter. No changes to the instruments hardware are required for upgrades to the new CEL-630 family. Specify the part number CEL-63X/UPAB to add the octave band features to a broadband instrument.

How do I change from an octave band to a third octave band model?

Models originally purchased as octave band only versions, i.e. a **CEL-632.B** can be upgraded to include the third octave bands, i.e. a **CEL-632.C,** by returning the units to an authorized Casella CEL Service Center where the new operational firmware will be programmed into the meter. No changes to the instruments hardware are required for upgrades to the new CEL-630 family. Specify the part number CEL-63X/UPBC to add the third octave band features to an octave band instrument.

How do I change from a CEL-630 to a CEL-631?

A basic **CEL-630** can be upgraded to add the extra features of a **CEL-631** (or any other model in the range) by returning the unit to an authorized Casella CEL Service Center where the new operational firmware will be programmed into the meter. Specify the part number CEL-630/UP631 to add the comprehensive time averaging features. The Casella Insight software package originally provided (option) with the **CEL-630** will still communicate with the upgraded **CEL-631** model.

FAQ's: INSTRUMENT OPERATION

How long will standard alkaline batteries last in a CEL-630?

A set of 3 AA alkaline cells can power a **CEL-630** meter for up to **12 hours** continuous operation at normal room temperature without the use of the backlight feature. Running time when using the backlight will reduce this but should still be more than 8 hours with the backlight setting on the low intensity mode. Lower temperatures will reduce useful battery life. Alkaline batteries are recommended for longest running time.

Can rechargeable batteries be used in a CEL-630?

NiCad rechargeable batteries can be used instead of alkaline batteries but will only last for about 3 hours at normal room temperature. The rechargeable battery pack will operate successfully down to lower temperatures than alkaline batteries and so are recommended in colder climates. NiCad batteries may be recharged externally and used repeatedly in these instruments as per the manufacturer's recommendations. Rechargeable NiMH batteries are also available in AA size formats if required and will have a considerably longer useful operational running time than traditional NiCad cells.

What other types of power supplies can be used for a CEL-630?

An external 12Vdc supply can be used to power the **CEL-630** meters from any standard ac mains source. The instrument draws approximately 170mA from the power supply under normal operation. The CEL-PC18 plug top mains transformer is available to power the **CEL-630** meters from a normal domestic 120 or 240 Vac supply. External dc power can also be provided from a car battery for long term unattended environmental noise surveys using an appropriate cable such as a C6708 fitted with a 2.1mm plug and alligator clips. The **CEL-630** meter can also be powered through the USB interface from a personal computer if required using the standard CMC51 cable or from a plug top USB power supply. The internal 3 x AA batteries may be left in the meter when powered from an external source in case there is an interruption to the external supply. The meter will immediately switch back to the internal batteries until external power is restored.

How can the instrument be operated in poor lighting conditions?

The **CEL-630** meter can be used in poor lighting conditions with a backlight that provides sufficient illumination to clearly view the screen display. The backlight is controlled from the keypad by pressing any button once configured. The duration that the backlight stays on for can be selected from the Instrument Setup menu. Selections can be made from Off through 1, 5, 10, 15 and 30 seconds delay to reduce the risk of wasting battery life. An "always on" choice is also available if the meter is to be powered from an external power source to prevent draining the internal batteries.

How can the instrument be simplified for a specific measurement task?

The most popular settings for industrial hygiene measurements around the world are already pre-programmed into the instrument's memory and can be selected from the SETUP menu. These include settings for OSHA, ACGIH, DoD, and ISO style measurements plus 2 separate user defined SETUPs. Any of the multitude of noise parameters that the **CEL-630** meters can measure can be selected (up to a maximum of 9) or deselected from the keypad to reduce the displayed values to just a single noise unit if required.

At least one parameter must be selected with the time average level Leq being the default value. The user defined SETUP can then be saved in the instruments memory. For example, the meter could be

set to measure just Max and Leq for a very simple measurement procedure without having to view any other unwanted or un-necessary parameters that may not be relevant to the particular measurement.

How can the CEL-630 be used for outdoor measurements?

The **CEL-630** instruments are designed to be used for long term noise recording outdoors when suitably protected against the weather in a case such as the CEL-6847 and with protection for the exposed microphone and preamplifier.

How is the microphone protected during outdoor operation?

The microphone and preamplifier used on the **CEL-632 and CEL-633** environmental meters need to be protected during outdoor measurement applications against the local effects of wind and rain. The CEL-6737 windscreen and protection system is provided as an optional accessory with the instrument and should be used at all times.

What communication options are available for use with the system?

Noise results stored in the **CEL-630** can be recovered by connecting a laptop PC to the USB port on the bottom of the meter with the standard USB CMC51 cable. The data files are stored as binary files and should be downloaded using the Casella Insight software with the CEL-63X Plugin. Runs are sequentially labelled in folder sorted by date and time and may be transferred to Insight software.

What baud rates are available for RS232 communication?

The data connection with a personal computer is made by the standard high speed USB method that is compliant with the type 2.0 standards. As such, baud rates are not relevant in this operation. In fact, connection to a computer is very simple. Just plug the meter into the computer and it will be automatically recognised as a standard memory device and will immediately become available for inspection using Casella Insight.

What real time digital output is available from a CEL-630 meter?

A digital output is available from any **CEL-630** meter through the standard USB socket on the bottom of the instrument that may be connected to a PC running a copy of special Casella CEL test program Windows software. Usually this is used by calibration laboratories to perform regular testing and revalidation.

What other outputs are available from a CEL-630 meter?

All **CEL-630** sound level meters feature an unconditioned (un-weighted) analog ac output signal available on a standard 2.5 mm jack socket that provides a voltage proportional to the signal level at the microphone. The ac signal is not affected by the frequency weighting selected in the meter so 'A' weighted measurements can be calculated and displayed in the instrument while the linear (un-weighted) noise level is output to a connected audio tape recorder for audio recordings or other suitable device such as for recording .wav files on a computer. The analog ac output signal is always the (un-weighted) broadband overall noise level even when the instrument is performing real time frequency analysis. The output level is 1 Vrms for a displayed level of 104 dB.

What other inputs are available for a CEL-630 meter?

A standard **CEL-630** sound level meter can be fitted with a line input adaptor such as the CEL-216 or CEL-516 for laboratory recalibration procedures. This allows standard electrical test signals to be injected into the instrument for compliance testing according to relevant national and international standards.

Is a log dc output available on a CEL-630 meter?

A log dc signal output is not available as standard on a **CEL-630** meter but is available as an option. Contact Casella USA for details of this option.

FAQ's: INSTRUMENT FUNCTION

INSTRUMENT SETUP

What type of microphone is fitted to a CEL-630 type 1 meter?

Precision versions of all the **CEL-630** models are fitted with a CEL-251 half-inch diameter pre polarized electret condenser microphone. This device does not require a 200 Vdc polarization voltage to energize the microphone and this leads to a more reliable meter when used in humid or moist environments.

Can other types of microphones be used with a CEL-630 meter?

Any other pre polarized electret condenser microphones of 50 mV/Pa nominal sensitivity can be used with a **CEL-630** meter but not the traditional air condenser types that require the 200 Vdc bias voltage supply since this is not present in the body of the meter. The type 2 variants of the **CEL-630** sound level meters are provided with a CEL-252 half-inch diameter pre polarized electret condenser microphone. This device also does not require a 200 Vdc polarization voltage to energize the microphone and this leads to a more reliable meter when used in humid or moist environments.

Does the microphone capsule have to be switched to change between IEC and ANSI type measurements?

No, it is not necessary to switch microphone capsules as with some older sound level meter designs. The **CEL-630** meters have a software selection in the instrument SETUP menu option that enables the different correction factors of the IEC and ANSI specifications for the frequency response of the meter to signals at different angles. The supplied microphone capsule is designed to fulfil the requirements of the IEC standard with a free field response. A switchable frequency correction circuit in the meter changes the response to match the random incidence tolerances required by many ANSI standards or when the meter is used in enclosed spaces in a reverberant sound field.

How are non-acoustic signals input into a CEL-630 meter?

A suitable line input adaptor such as the CEL-216 screwed to the thread of the preamplifier of the instrument provides a means of connecting the **CEL-630** to the output of a suitable signal source. This allows the meter to be subjected to electrical audio range test signals from an acoustics calibration laboratory to provide compliance testing against relevant standards.

How many SETUPs can be stored in a CEL-630?

Every **CEL-630** has 6 default SETUPs that are pre-configured at the factory with the correct settings to satisfy the major industrial hygiene and environmental measurement methodologies. In addition each instrument can store 2 extra user-configured SETUPs in memory. The SETUPs are starting configurations that are available for selection to begin a new run without having to change the meter each time. The SETUPS provide for the display of up to maximum of 9 parameters to be displayed on screen during a measurement. However, every combination of frequency weighting, time weighting and amplitude weighting is stored in all runs in every **CEL-630** model. This means that every run will contain every result combination that the **CEL-630** is capable of measuring without having to worry about getting it right before the run begins. Inspection of the downloaded run data file after a run has finished will always provide the appropriate measurement parameter.

Do I have to select the SETUP each time before a run?

Once a SETUP has been chosen by the user, it will become the default configuration for the **CEL-630** and will be remembered the next time the instrument is switched on. It is only necessary to switch on, perform the acoustic calibration as normal and then press the start run key to begin making valid measurements. The last used SETUP is displayed on screen during the start-up routine.

When does a run actually start in a CEL-630?

A run will begin immediately after the start key is pressed in a **CEL-630** meter if being used in the manual mode or when instructed by the internal real time clock when in the timer mode.

How many delayed start and stop timers are available in the CEL-630?

There are 6 delayed start and stop timers in the **CEL-630** meters. Measurements may be started and ended manually (except when using the duration timer) by the user from the keypad or by using the delayed timer controls.

Is it possible to select the delay start and stop timers from the keypad of the CEL-630?

Yes, this is possible.

Is it possible to turn off a set of delay timer pairs in the CEL-630?

Yes, this is possible.

How many repeats can be selected in a CEL-630?

The repeat control can be enabled indefinitely until the memory is full.

Can individual runs be deleted from the instrument?

Individual runs can be deleted from the memory of a **CEL-630** meter using the keypad. Use the MEMORY RECALL MENU to inspect and/or DELETE a single (or all) runs from the memory. Runs are displayed in a directory sorted by date and time and can be selected using the down and up arrow keys and then the SELECT key. A message is displayed asking the user to confirm the deletion of the selected run (or runs) and they are then permanently deleted when the confirm key is pressed again.

How many Threshold levels can be set in the CEL-630?

A single threshold level can be set in the **CEL-630** instruments at any integer dB value from 70 to 90 dB or Off. If this option is selected then the threshold level can be used in order to exclude all the noise measured by the instrument for the time average or TWA result that is below the selected cut-off level. Change or enable the threshold level setting (for broadband measurements only) by selecting the SETUP option and pressing the Enter key. Selection of the threshold level can be made in 1 dB increment steps to suit the measurement purpose required by the relevant legislation. This function is usually required in US workplace noise legislation.

What Criterion level can be set in the CEL-630?

A Criterion level cannot be selected in any **CEL-630** meter. The setting of a criterion level is only necessary for the measurement of the percentage noise dose and since the **CEL-630** meters do not perform this measurement, it is not available in the SETUP menus. Every noise Dose% measurement must have a criterion level and criterion time set to reference the percentage dose values to for the allowable 100% daily exposure value. A **CEL-630** meter measures the decibel equivalent of the percentage dose value, which is the Time Average (Leq, LDOD or Lavg) level.

MEASUREMENT RANGES

What measurement ranges do the CEL-630 meters cover?

All **CEL-630** meters are equipped with a single measurement range covering an ultra wide 120 dB span. This covers the complete normal overall audio range from 20 to 140 dB in 1 single setting.

What is the broadband noise floor in the CEL-630 models?

The inherent electrical noise level in the **CEL-630** meter is approximately less than 20 dB (A) for type 1 meters and less than 24 dB (A) for type 2 meters. This limits the lowest level readings that can accurately be measured to about 10 dB more than the noise floor for type 1 versions. Any readings lower than these limits should be treated with caution, as they will be affected by the electrical noise in the instrument's circuitry and may not be within the type tolerances allowed by the standards.

What are the noise floor limits when using filters?

Octave band noise floor limits are as follows.

Center Frequency (Hz)	16	31	63	125	250	500	1k	2k	4k	8k	16k
Noise floor (dB)	15.3	13.9	12.2	12.2	9.2	6.3	5.7	7.6	10.9	14.0	15.0

The noise floor limits in the table above were established by substituting a CEL-516 Dummy Microphone for the standard CEL-251 precision microphone capsule fitted to a type 1 **CEL-630.B** meter. This unit has a similar capacitance (18pF) to the normal microphone and allows the residual electrical noise level, expressed as the Leq, to be measured in each measured octave band. Valid acoustic measurements are normally available with an octave band sound level meter from a level 10 dB above the noise floor for less than 0.4 dB error in the displayed result.

Third octave band noise floor limits are as follows:

Center Frequency (Hz)	12.5	16	20	25	31	40	50	63	80	100	125
Noise floor (dB)	24.0	24.3	24.6	24.2	23.5	22.9	22.2	21.8	21.0	20.2	19.8
Center Frequency (Hz)	160	200	250	315	400	500	630	800	1k	1k25	1k6
Noise floor (dB)	19.1	18.4	18.3	18.0	17.5	17.5	17.4	17.2	17.5	17.7	17.8
Center Frequency (Hz)	2k	2k5	3k15	4k	5k	6k3	8k	10k	12k5	16k	20k
Noise floor (dB)	18.4	18.9	19.3	20.2	21.1	22.0	23.3	24.4	25.4	26.8	27.7

The noise floor limits in the table above were established by substituting a CEL-516 Dummy Microphone for the standard CEL-251 precision microphone capsule fitted to a type 1 **CEL-630.C** meter. This unit has a similar capacitance (18pF) to the normal microphone and allows the residual electrical noise level, expressed as the Leq, to be measured in each third octave band. Valid acoustic measurements are normally available with a third octave band sound level meter from a level 10 dB above the noise floor for less than 0.4 dB error in the displayed result.

How many measurements can be made with the CEL-630 or 621?

Currently, every **CEL-630** meter can store the overall results from up to 999 separate measurements in a large memory of 1 Gbyte. The firmware uses a reserved area of this memory to save all the overall results from the 999 runs. Some of the memory is not used for data storage but is reserved for housekeeping functions.

What is the range for peak measurements?

The peak detector in the **CEL-630** instruments covers the whole measurement range with the overload point approximately 3 dB above the rms. level at the top of the range. This gives a normal top limit of 143 dB for accurate peak results.

MEASURED PARAMETERS

What results can be measured for the whole run?

The following parameters will be measured in a **CEL-630.A** meter.

Displayed Function			Sound level meter response						
Function name (dB)	**Format**	**Displayed screen example**	**Frequency weighting (w)**			**Time response (t)**			**Notes**
			Z	C	A	S	F	I	
Instantaneous sound level	L(wt)	LAF	√	√	√	√	√	√	Measures single w and t weightings
Maximum level	L(wt)mx	LZSmax	√	√	√	√	√	√	Lmx adopts frequency weighting as selected for sound level
Minimum level	L(wt)mn	LZSmin	√	√	√	√	√	√	Lmn adopts frequency weighting as selected for sound level
Time average level	LwEQ	LAEQ	√	√	√	NA	NA	NA	Sound level value changes to LEQ during a measurement run. Simultaneous C and A.
Peak level	L(w)Pk	LCPEAK	√	√	√	NA	NA	NA	A pk available only on USER SETUPs
Impulse average level	L(w)IEQ	LAIEQ	NA	NA	√	NA	NA	NA	Impulsive LEQ
ACGIH average level	LAEQT80	LAEQT80	NA	NA	√	NA	NA	NA	LAEQ with threshold and Q=3 exchange rate
Sound exposure level	L(w)E	LAE	NA	NA	√	NA	NA	NA	
Taktmaximal level 3 sec	LTM3	LTM3	NA	NA	√	NA	√	NA	
Taktmaximal level 5 sec	LTM5	LTM5	NA	NA	√	NA	√	NA	
Statistical parameters *	LN%	LN90%	√	√	√	√	√	√	4 fixed plus 1 user selectable
OSHA average level	L(w)AVG	LAVG	NA	NA	√	√	NA	NA	LAVG based on selected threshold, Q=5 or 4 and Slow response
HML	LC-LA	LC-LA	NA	√	√	NA	NA	NA	LEQ only, LAVG not required

Note – NA means not available. * - only available in CEL-631 & 633 models in broadband mode

The following data will be stored for the whole measurement run in a **CEL-630.B/C** meters.

Displayed Function			Sound level meter response						
Function name (dB)	**Format**	**Displayed screen example**	**Frequency weighting (w)**			**Time response (t)**			**Notes**
			Z	C	A	S	F	I	
Instantaneous sound level	L(wt)	LAF	√	√	√	√	√	NA	
Maximum level	L(wt)mx	LZSmax	√	√	√	√	√	NA	Only Z weighting is saved
Time average level	LwEQ	LAEQ	√	√	√	NA	NA	NA	Only Z weighting is saved

Note – NA means not available.

What if not all of these parameters are required for a particular measurement?
In a **CEL-630** in broadband mode the user can select or de-select any of the potential parameters to make the display of the instruments as comprehensive or as simple as the specific task requires. A full survey may require many parameters, but for a very simple survey, only one or two noise functions may be needed. The rest can be disabled from the run by the operator simply using the keypad. At least one parameter must be selected for a run and if not specifically selected by the user then the Leq will be chosen by default. Even if the function is not selected for display on the LCD it will still be saved in the memory and downloaded to Casella Insight software packages as part of the complete data set.

What is the % resolution of the statistical parameters stored in a CEL-631 or 633?
These parameters are calculated to 0.1% during a measurement run.

What is the amplitude resolution of the histogram of noise samples in a CEL-631 or 633?
These parameters are calculated to a resolution of 1 dB class widths during a measurement run.

What additional results can be stored by the CEL-631 compared to the CEL-630?
In broadband mode the **CEL-631** additionally stores five statistical parameters (LN% percentile values) that are calculated with one of the available frequency and time weightings. These include 4 fixed values set at LN10%, LN50%, LN90% and LN95% plus a user selectable value that can be selected from LN1% to LN99% for specific measurement purposes. If the **CEL-631** is an octave or third octave band model (**CEL-631.B or C**) then the statistical parameters are only stored for the broadband levels and not in the narrow frequency bands.

What additional results can be stored for the time history profiles in the CEL-632 or 633?
Time history information is measured and stored in the current versions of the **CEL-632 and CEL-633** meters.

What rms frequency weightings are available in the CEL-630 meters?
Three simultaneous broadband frequency weightings are provided in a **CEL-630** for the measurement and potential display of the rms noise levels – the 'A' and 'C' weightings according to the international standards defined in IEC-651 and ANSI S1.4 plus the new Z weighting as specified in IEC-61672. Tolerances for these weightings are as specified in the class 1 category of these documents.

What is the new Z rms frequency weighting available in the CEL-630 meters?

The new Z (or zero) weighting is designed to provide a specific frequency response for un-weighted measurements that were originally known as “Lin” or “All pass”. Instruments from different manufacturers had many variations of their own version of an un-weighted frequency response. This could lead to inconsistencies when comparing data obtained from different meters from different manufacturers. The purpose of the new ‘Z’ weighting is to establish a known response in the newer sound level meters to allow valid comparisons to be made when broadband measurements are not made with the more usual ‘A’ or ‘C’ frequency weightings. The actual tolerances of the new ‘Z’ frequency weighting are shown in IEC 61672-Part 1 published in 2002.

What frequency weightings are available for peak measurements in the CEL-630 meters?

Three broadband frequency weightings are provided in a **CEL-630** for the measurement of the peak noise levels namely the ‘Z’, ‘C’ and ‘A’ weightings according to the international standards defined in IEC-651 and ANSI S1.4.

What time weightings are available in the CEL-630 meters?

All **CEL-630** instruments are equipped with the Slow, Fast and Impulse time weightings to suit all normal noise measurement requirements for general-purpose noise, environmental noise and personal noise at work measurements. All three of the time weightings are calculated simultaneously in all models.

What exchange rates or Q values are available in the CEL-630 meters?

The exchange rate Q=3 is always available in the **CEL-630** meters and it is also possible to select the values 4 and 5 depending on the requirements of the relevant standards. These are provided for the collection of noise results to satisfy the US Noise at Work regulations as specified in the OSHA, MSHA, ACGIH or DoD relevant workplace noise documents.

How can the calculation of LEP,d be made for non-standard working days?

The **CEL-630** meters do not measure the LEP,d directly so this value would need to be calculated after a measurement has finished from the Leq.

How can the calculation of TWA be made for non-standard working days?

The **CEL-630** meters do not measure the TWA directly so this value would need to be calculated after a measurement has finished from the Lavg.

What is the difference between LEP,d and LEP,v?

LEP,d calculations assume that the total run contains all of the noise exposure that a worker will receive during his shift. This information is then normalised to the standard 8-hour daily dose and expressed as a decibel value. Therefore, if the meter is used for less than the whole working day it will not have enough time to collect all of the noise energy that is going to occur and the LEP,d will be lower than the true value.

On the other hand, by knowing the expected working duration of an operator prior to a run the sound level meter can measure the noise exposure for a shorter representative period. This can be only a few minutes in some circumstances where the noise levels are relatively steady. The calculation will then expand that short measured noise to the full working time and then normalise that value to the standard 8-hour daily dose expressed in decibels. In this case a shorter run than a full workday will always produce the right LEP,d as long as the short measurement is completely representative of the normal working day.

What is the difference between TWA and TWAv?

TWA calculations assume that the total run contains all of the noise exposure that a worker will receive during his shift. This information is then normalised to the standard 8-hour daily dose and expressed as a decibel value. Therefore, if the meter is used for less than the whole working day it will not have enough time to collect all of the noise energy that is going to occur and the TWA will be lower than the true value.

On the other hand, by knowing the expected working duration of an operator prior to a run the sound level meter can measure the noise exposure for a shorter representative period. This can be only a few minutes in some circumstances where the noise levels are relatively steady. The calculation will then expand that short measured noise to the full working time and then normalise that value to the standard 8-hour daily dose expressed in decibels. In this case a shorter run than a full workday will always produce the right TWA as long as the short measurement is completely representative of the normal working day.

What results may be can be stored in frequency analysis mode in a CEL-630 meter?

Since there is no frequency analysis mode available in any of the **CEL-630.A** meters there will be no results available. The results that can be stored in a **CEL-630.B or C** model depend upon the SETUP measurement mode selected by the user. The user selected analysis mode offered includes a real time frequency mode where all the filter bands are measured simultaneously and a complete spectrum of the source noise is established in every band at the same time. This ensures that no impulses are missed as in a single swept filter measurement. This is called Real Time frequency analysis and enables measurements to be made quickly and accurately under all circumstances. The broadband ‘Z’, ‘C’ and ‘A’ weighted noise levels are also measured along with the octave (or third octave) bands according to the selection of the user to give a complete understanding of the variations in the noise source during the measurement. Either whole octaves or third octaves can be measured by the **CEL-630** models but not at the same time. The user must choose which form of analysis to perform prior to the start of a measurement. If third octave band data is stored during a measurement then the whole octave results can always be calculated afterwards by combining the 3 relevant bands together using simple logarithmic addition.

TIMERS & RUN LENGTH

Is the run timer function available in the CEL-630?
Runs in a **CEL-630** may be started and stopped by the user from the keypad or using the built-in real time clock. Runs in a **CEL-630** started by the timer can be stopped at the end of any set run duration period automatically or when forced by the user manually.

Does the timer function operate in the CEL-630.B or C in octave band modes?
Yes. The **CEL-630.B or C** model can use the duration timer function to control the collection of data in broadband and octave (or third octave) band modes.

What time intervals are available for measuring regular periods in the CEL-630 meters?
Period timing intervals available in the **CEL-632** and **CEL-633** versions of the **CEL-630** meters include the following choices; 1, 2, 5, 10, 15, 20, 30 minutes, 1, 2, 4, 6, 8, 12 and 24 hours.

What time intervals are available for measuring the profiles in the CEL-630 meters?
Profile timing intervals available in the **CEL-632** and **CEL-633** versions of the **CEL-630** meters include the following choices; 0.1, 1, 2, 5, 10, 15, 20, 30 seconds, 1 minute. In addition to regular profile intervals as shown the **CEL-632** and **CEL-633** versions of the meter have an event detection system that triggers above user selectable limits and can record the noise profiles at either 10 millisec, 100 millisec or 1 second intervals during the time that the trigger conditions are met.

What fixed durations are available for the overall run time in the CEL-630 meters?
The fixed duration time for a run is available in the **CEL-630** models. Once a run is started, it will finish automatically at the end of the selected fixed run time duration and save the overall results. Fixed durations can be selected from 1 second to 24 hours 1 sec intervals.

Can the Synchronise Timer function be selected from the keypad?
Yes. This feature is available in the current versions of the **CEL-630** meters. A run in a **CEL-632** or **CEL-633** will begin as soon as the start run button is pressed on the keypad but will shorten the first period to synchronize the data collection to the real time clock to produce answers that align on the hour.

What is the shortest run duration that can be stored in the CEL-630 meters?
The shortest run length that can be stored is 1 second in the **CEL-630** models.

What is the longest run duration that can be stored in the CEL-630 meters?
The longest run that can be stored and correctly annotated in a **CEL-630** is 24 hours and 00 minutes.

Can a run be paused to remove unwanted noise levels?
A run can be paused in all **CEL-630** models to allow for any unwanted noises that might be occurring during the middle of a specific noise survey to be excluded from the overall results. Press the pause button to begin the pause condition and press it again to release the pause and continue with the collection of noise into the memory. The Pause feature may be used as often as required. Any noise levels measured while the pause function is active will not affect the results for any of the calculated cumulative values of max, min, average etc. since the duration clock is also paused during this time. The Pause control works in both broadband and octave (or third octave) band analysis modes of operation. The CEL-630 meters also feature a back erase feature that removes data from the memory up to 10 seconds before the erase key is pressed to delete something that has just happened if it was not expected and caught the user unawares.

FAQ's: ACCURACY & RESULTS

What standards apply to these instruments?

There are numerous national and international standards around the world that are used to define and specify the performance of sound level meters. The new **CEL-630** instruments satisfy the new International sound level meter standard, IEC 61672 published in 2002. Prior to this standard the acoustic and electro-acoustic requirements for sound level meters were specified within two international standards - IEC 60651 (formerly IEC 651) 'Sound level meters', published in 1994 and IEC 60804 (formerly IEC 804) 'Integrating-averaging sound level meters' published in 1985.

The two standards have now been replaced by a single standard, IEC 61672:2002; this is then subdivided into different parts to define requirements for specifications, pattern evaluation testing and also the requirements for periodic testing. The **CEL-630** instruments satisfy performance requirements of both the old and new standards.

In the USA the corresponding sound level meter standards, which apply, are ANSI S1.4 for basic sound level meters and ANSI S1.43 for integrating sound level meters.

The 'B' and 'C' variants of the **CEL-630** meters offer frequency analysis capabilities by providing whole octave or third octave band measurements. For these 'narrow band' measurements filter shapes have been designed to satisfy performance requirements defined within IEC 61260 'Electro acoustics - Octave–band and Fractional Octave band filters'.

The equivalent standard defining whole Octave and Fractional Octave filters in the USA is ANSI S1.11-1986.

What do these standards mean?

The standards are used to define a wide range of acoustic and electro-acoustic test methods and performance requirements. They are intended to confirm an instrument performs and measures the noise (sound) correctly over a wide range of measurement and environmental conditions. Tests include: -

- Instrument Calibration or checking the field sensitivity of the microphone (using a sound calibrator)
- Peak C sound level response
- Directional response of sounds arriving off the main axis of the microphone
- Frequency weightings – A, C, Z
- Level linearity, overload and under-range indication.
- Analogue or digital outputs
- Self-generated noise and minimum measurable levels
- Timing facilities based on the internal clock
- Time weightings F and S
- Tone burst response for short duration signals
- Radio frequency emissions and susceptibility to radio fields or static discharges
- Immunity to disturbances on power supply and AC power sources.
- Response to repeated tone bursts
- Stability in different ambient conditions: Static pressure, air temperature, and relative humidity

What accuracy are the instruments designed to comply with?

The different versions and variants of the **CEL-630** instruments comply with the relevant international standards in the type 1 (Class 1) and type 2 (Class 2) categories. These standards generally refer to the models in the type 1 range as '**Precision**' instruments with an expected accuracy of ± 0.7 dB under reference conditions. Models in the type 2 ranges are generally called '**General-purpose**' instruments with an overall expected accuracy of +/- 1.5 dB under reference conditions. In normal field measurement conditions, the type 1 accuracy instruments may be found to have ± 1.5 dB tolerances and the type 2 version ± 2.3 dB tolerances. Use of the instruments in any specific situation may produce wider tolerances than this depending on how the microphone is positioned relative to the sound field. Model numbers end in a 1 or 2 to denote their conformance to either the type or type 2 specifications respectively.

How is the calibration carried out in a CEL-630?

Calibration can be carried in two ways in a **CEL-630** meter. The **CEL-630** meters allow an acoustic calibration target value to be entered in to the unit (either 114.0 or 94.0 dB +/- 1.0 dB) that will be used for all future field calibrations. This will be performed by simply placing the recommended acoustic calibrator over the microphone and then starting the autocal routine This sets the response of the meter at the current level to the known fixed level previously entered. This is the automatic calibration method. For the most accurate results the user should be aware of any small correction factors that may be necessary as a result of the local air pressure (e.g. height above sea level), temperature and humidity considerations. See the Operator Manual for the Acoustic Calibrator for more details on the correction factors associated with performing a field calibration.

In the alternative laboratory calibration method the microphone is substituted for an equivalent line input of similar electrical impedance and an electrical test signal is connected to the meter. This enables the meter to be periodically tested using laboratory grade oscillators and digital volt meters for full compliance and performance testing.

What results can be calculated and displayed in the broadband SLM mode?

The parameters that can be calculated and displayed in the broadband SLM mode of both instruments is shown in an earlier table. Up to a maximum of 9 separate parameters may be selected by the user out of the total list shown.

Some parameters that can be displayed such as the Lavg will depend on the selection of the amplitude weighting (or Q factor) and the time weighting. The SLM mode uses the Run/Stop key to select or deselect the currently indicated parameter in the LCD screen. The set of up to 9 selected parameters may be saved in one of two User SETUPs in memory so that they are ready for the next time the instrument is used for making the same measurements. These 2 User SETUPs are in addition to the 4 pre-programmed SETUPs that are provided in all instruments.

What results are measured and saved in the octave band mode?

In the **CEL-63X.B and CEL-63X.C** models in addition to the above list of broadband results that can be measured the meter will also measure and display the 3 broadband levels with the selected time response plus the 11 octave (or 33 third octave) bands simultaneously. The instantaneous level, the maximum level and the time average level of every band are measured with the ability to pre-weight the octave filters with the Z, C or A frequency weighting first if required.

How are the results of a frequency analysis shown in the memory recall screens?

Sets of data stored from carrying out frequency analysis in a **CEL-63X.B or CEL-63X.C** are shown as a spectrum in graphical histogram format when the memory recall screens are selected. Both the maximum spectrum and the time average spectrum can be shown on the display by pressing the UP

or DOWN arrow keys. The next screen shows a single screen listing of the 11 octave (or 33 third octave) band values for the maximum and the average noise levels.

Can the actual band level values be displayed on recall from a frequency scan?

When the required spectrum is recalled from memory and displayed on the screen of the **CEL-63X.B or CEL-63X.C** meter, simply press the VIEW key to go to the next screen that shows the listing in tabular format for all 11 octave (or third octave) bands.

What is the range of results saved for an octave band scan?

A standard octave band analysis in a **CEL-63X.B** will measure three broadband levels and all the 11 octaves from **16 Hz to 16 kHz** center frequencies to give a total of 14 sets of band results per spectrum. All bands are always measured for all SETUPs chosen by the user. The unweighted octave band levels are stored and downloaded to the computer with the A or C broadband weightings applied after the measurement. This is done internally in the **CEL-63X.B** for display on screen.

What is the range of results saved for a third octave band scan?

A standard third octave band analysis in a **CEL-63X.C** will measure three broadband levels and all the 33 third octaves from **12.5 Hz to 20 kHz** center frequencies to give a total of 36 sets of band results per spectrum. All bands are always measured for all SETUPs chosen by the user. The unweighted third octave band levels are stored and downloaded to the computer with the A or C broadband weightings applied after the measurement. This is done internally in the **CEL-63X.C** for display on screen.

What are the broadband channels during a frequency analysis?

By default, a frequency measurement in octave or band analysis uses the 'A' weighting during the display of the frequency analysis. The 3 overall broadband levels are measured simultaneously with the frequency bands to make sure that no information is lost as could be the case with the traditional scanning method. It is also possible to change the main frequency weighting to pre-weight a spectrum using any of the three broadband weightings, A, C or Z, available in every **CEL-63X.B or C** meter by selecting and saving the choice in the USER SETUP 1 or 2. The unweighted, or Z, octave (or third octave) band levels are saved for the maximum and average spectrums to provide the traditional dB levels in octave (or third octave) bands for further acoustical analysis.

How long does it take to perform a frequency band analysis in a CEL-630?

For octave band measurements in a **CEL-63X.B or C**, the time taken to measure all of the 11 (or 33) bands will depend upon the variability of the noise climate. For a typical steady state noise, an octave (or third octave) band measurement could be completed in a few seconds. Storage after 10 or 15 seconds may be enough to adequately describe the spectrum observed during data capture. If the levels are more variable then the averaging time should be longer such that each band contains enough of the noise signal to make sure that a valid answer is obtained. This may need 5 minutes or 10 minutes or even longer if necessary depending on local circumstances and the variability of the noise climate.

Can the dwell time in frequency analysis measurements be controlled by the user?

The dwell time is a feature of earlier scanning or sequential frequency analyzers that were only able to measure 1 octave band at a time. In the **CEL-63X.B or C** models all frequency analysis is performed in parallel so all frequencies are captured simultaneously.

Can more than one frequency measurement be performed in a CEL-630?

A **CEL-63X.B or C** meter stores 1 cumulative frequency analysis per run (with Leq, LN% and max spectra depending on the model). It also stores the same number of frequency analyses for every period that is measured.

Can repeated frequency scans be performed in a CEL-630?
Yes. It is possible to select a repeat period interval time in a **CEL-632.B or C or 633.B or C** instrument.

Can the timers be used for frequency analysis in a CEL-630?
The duration timer can be used to control how long a measurement will last once it is started by the user. The measurement will stop automatically at the end of the duration period and the run results will be saved to memory. If a run is started manually but not stopped by the user then it will automatically end after 24 hours maximum recording time.

What happens when a single frequency band is selected in a CEL-630?
It is not possible to select a single frequency band to measure in a **CEL-63X.B or C**. All bands are measured for every run at the same time.

Can frequency analysis scans be carried out manually?
Yes. All frequency analysis measurements are carried out manually in as much as the user decides when to start a run and when to stop it using the keypad of the **CEL-63X.B or C** meter.

Can the spectrum limits be selected for a scan?
No. This is not available in the current versions of the **CEL-63X.B or C** meter.

What happens in a measurement if the noise is very variable?
Simply make the measurement duration long enough to allow the average noise level spectrum to stabilize. This will be seen on screen by the spectrum display appearing to “freeze” and not to move any more. This usually indicates that enough time has been spent and a valid answer is now available.

Can the spectrum be ‘A’ weighted during an octave band scan?
Yes. By selecting the broadband overall ‘A’ weighting characteristic, it is possible to pass the microphone signal through the required broadband channel first and then through the octave (or optional third octave) filters. The spectrum can also be pre-weighted with the ‘C’ network first as well using the same process. The spectrum results can also be ‘C’ weighted prior to measurements starting with the **CEL-63X.B or C** meter. The spectrum bands will change color to take on the color of the selected broadband weighting; blue for pre ‘A’ weighted, red for pre ‘C’ weighted and green for pre ‘Z’ weighted (normal unweighted octave (or third octave) band analysis).

Are results saved when using the SLM mode?
All displayed results are saved in the **CEL-63X.A** models plus all the rest of the combination of parameters indicated in the table above. Even though only a maximum of 9 parameters are displayed on screen during the measurement all of the complete list will still be measured and saved for later transfer to a computer for inspection and inclusion in reports.

How can a run be stopped in a CEL-630?
Pressing the RUN/STOP button on the keypad of a **CEL-630** gives the user two choices as follows. The run can be **stopped** immediately by pressing the YES key or left to continue recording by pressing the NO key. If a run is stopped immediately (YES) after the Stop key is pressed then all further data logging or measurement ceases at that point and the run can then be inspected on

screen or downloaded to the computer. If the continue option (NO) is selected, then all the results up to that point will be saved and the run will continue as if nothing had happened at that point. If no button is pressed within 5 seconds, the instrument continues with the current run as if no interruption had been made to the measurement. Only runs that have been “stopped” can be downloaded to a pc or inspected on the LCD screen.

How many periods can be stored in a CEL-630?
This depends on the setting of the period timer interval feature in the **CEL-630** meters.

Can runs be made continuous in a CEL-630?
Yes. This feature is available in the **CEL-632 and CEL-633** versions of the meters by simply letting the recording continue. Runs are automatically stopped after 24 hours at midnight and a new run begins immediately. Many days of recording can be “stitched” together using the Casella Insight software with the CEL-63X Plugin.

How many profile points in total can be stored in the CEL-630?
This feature is available in the **CEL-632 and CEL-633** meters up to a maximum of 400 separate runs with 1 minute periods and 1 second profiles.

What happens when the memory in a CEL-630 is full?
When a **CEL-630** meter fills up all the available recording memory it will stop collecting samples after 999 complete sets of data are saved. An overall data set (cumulative result) is always stored in a **CEL-630** no matter what the length of the run since the registers are large enough to accommodate long and short measurement times and a set amount of memory size is required to hold the overall values that are measured independent of the duration of the run.

How many profiles can be stored in a single run in a CEL-632 or 633?
Since the maximum recording run time is 24 hours and the minimum profile interval is 1 second the total number of profile intervals is 86,400.

How long does the memory last when recording time history profiles in a CEL-630?
There is enough memory for 400 days of 1 minute periods and 1 second profiles. The overall recording duration will also depend on the power supply available for the meter during the run. An instrument that looses power during an extended measurement will constantly monitor the battery voltage and will switch itself off safely when the available power level becomes too low to adequately operate the meter. All run data up to that point is saved before switch off.

FAQ's: APPLICATIONS

What markets are the instruments designed for?

There are a number of markets for the **CEL-630** series instruments.

- A general purpose hand held sound level meter
- An integrating meter for any workplace noise measurements
- An octave (or third octave) band frequency analyzer
- A product noise measurement device
- A short to medium term environmental survey meter

How are these markets catered for by the CEL-630 meters?

Using any of the **CEL-630** instruments as '**A**' version instruments enables simple noise surveys to be undertaken as a hand held sound level meter. Typical applications for this include noise at work, plant noise surveys, product noise reduction studies and basic community noise nuisance measurements. The **CEL-630** meters can be used as front end for other noise monitoring systems that may require the line output capabilities of the instrument to be used.

Specifying the **'B'** (or **'C'**) version of the **CEL-630** instrument with the octave (or third octave) band filters allows a comprehensive frequency analysis instrument to be obtained. All the **CEL-630** models provide information on the overall levels of noise for the whole of the run in terms of the simple maximum and minimum and peak noise levels. In addition, the **CEL-630.A, B or C** models can be used to measure and store time average results during the measurement to enable a more comprehensive picture of the noise level variation to be assessed correctly. Additionally, the **CEL-631** models provide 5 statistical noise parameters that are very useful when describing the variation in the noise climate over a period of interest and the **CEL-632** and **CEL-633** provide a data logging version with periodic storage of noise levels.

The **CEL-63X.B and C** models also calculate and save the full range of octave (or third octave) band information in real time required by some workplace applications and community noise surveys. The **CEL-630.A** is an ideal instrument for basic industrial hygiene measurements or sound power surveys and the **CEL-63X.B or C** models will find most use whenever the extra frequency information is required for more comprehensive noise studies.

What do I need to measure noise in the workplace?

In order to calculate an 8-hour noise dose (TWA) a representative sample of the noise using the Lavg function is required. This gives an average level of the noise over the measurement interval. If the noise reading becomes steady then it is said to be representative of the day as a whole, as long as it is known that there are no other noise events that will take place after the sample measurement ends. The calculation of TWA can be done by the user manually from the LAeq, LDOD or the Lavg.

For measurements according to the OSHA regulations a cut-off level (or threshold) must be applied to the measurements such that any noise below the cut-off level is excluded from the overall result. This is available in all the **CEL-630** meters and is user selectable to a value in 1 dB steps between 70 and 90 dB. A cutoff level of 80 dB(A) is required by OSHA for the measurement of the noise for Hearing Conservation Program considerations. The single highest peak level must also be obtained as the L_{zpk} value during the measurement. All the **CEL-630** meters can be used for workplace noise measurements. The B versions will provide additional frequency information for the correct prescription of hearing protectors or noise control methods. These sorts of workplace measurements can be made with either type 1 Precision or type 2 General Purpose accuracy meters.

What do I need to measure community nuisance noise sources?

There are several parameters that may be required to measure environmental noise depending on which environmental standard or local community noise ordinance is being used or is in force. For most measurement standards the LAeq (time average noise level) is used as well as an overall maximum noise level. The LAeq levels are often used for the calculation of the Day Night Level together with the necessary corrections for the time of day. The **CEL-633.A** is best suited for this type of work since it will also regularly calculate the statistical parameters or percentile LN% values.

What do I need to make product noise measurements?

There are many aspects to product noise testing. The **CEL-630.A** meters can be used very easily and quickly to assess the total noise levels from machinery for basic noise control purposes since both the overall 'C' and 'A' weighted levels are measured. The difference between these two values LC-LA can give some basic understanding of the amount of low frequency noise that is present. More detailed analysis of the frequency content can be done by an octave or third octave band (B or C version) of a **CEL-63X** if there are specific tonal components present in the equipment to be measured. The real time filter capability enables measurements to be made much faster in octaves (or third octaves) than with a traditional scanning or sequential octave band analyzer.

The sound power level can also be calculated by measuring the noise emitted at various fixed points around the noise source in question in accordance with the relevant international standards. Usually a type 1 Precision version of the instrument will be used for these applications.

FAQ's : CALIBRATION AND SERVICE

Do I need to get the CEL-630 meter calibrated?

The **CEL-630** series meter should always be used in conjunction with a suitable acoustic calibrator (e.g. CEL-120). This should be used for 'field' checks before and after use to verify the instrument sensitivity is correct. However, most types of legislation require periodic laboratory calibration of both the instrument together with the acoustic calibrator. This is a much more detailed calibration than with a field calibrator and covers all aspects of the sound level meter, such as instrument linearity and the frequency weighting curves and response to tone bursts. The result of the tests are two calibration certificates, one for the instrument and one for the calibrator, each of which will detail the relevant results, the standards followed and that the instrument has passed (or failed and why).

What different types of calibration are there?

There are two main types of calibration of instrument calibration available from Casella USA, the Manufacturers Certificate of Calibration (MCC) and a UKAS Certificate of Calibration (UCC). The MCC satisfies many legislative requirements such as the OSHA 1910:95 Noise Regulations and is the normal standard certificate for instrument calibration. Manufacturer's recommended testing procedures are followed using test equipment traceable to national NIST standards as the primary reference source. The UCC is a UK national traceable standard, which gives additional accuracy control and documentation that some specialized measurement standards require. In short, it depends upon the particular requirements your measurements need to satisfy.

How often should the CEL-630 meter be calibrated?

It is recommended that the **CEL-630** meter together with its matching acoustic calibrator be returned for calibration on a yearly basis. The UKAS standard in the UK, for example, stipulates that this must be the case. Some legislation (e.g. US OSHA Noise at Work Regulations) requires a calibration no more than every two years as a minimum. Again it is worth checking the particular legislative requirements for the particular measurements that are needed to make sure that these are not missed or forgotten. Often the company quality assurance policy can be investigated to see what it stipulates for all its measurement equipment as this will have a bearing on the regular calibration of company instruments that may be used for technical assessments of product noise or workplace noise.

For more details on the new **CEL-630** series instruments, or any of the other Casella USA products, please contact us:

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