CASELLA
A DIVISION OF TSI

USER MANUAL

62x

620 Series Enhanced Digital Sound Level Meter

HB3340-06

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Contents

Safety and warnings

The 620 series will not present a safety risk when you use it as instructed in this User Manual. However, it is possible that the environment where you use the instrument may present a safety risk. For this reason, always follow correct, safe working practices.

WARNING

Always be aware of the risks in the environment where you are working.

- The 620 series is **NOT** intrinsically safe. **DO NOT** use it in an atmosphere where explosive vapours or dusts might exist.
- Wear approved ear defenders when taking measurements in noisy environments.
- Wear approved protective PPE suitable for the environment where you are taking measurements.
- Always follow local safety regulations and be aware of risks in the area where you are working.

CAUTION

The 620 series is a precision instrument. Always handle it with care. Do not drop the instrument or subject it to mechanical shock. Do not expose to mechanical vibration as this can alter microphone performance. Limit exposure to vibration by using in a handheld configuration as necessary.

Do not overtighten the microphone which should only ever be finger tight. Don't use pliers to tighten or undo the microphone should it become stuck.

CAUTION

The 620 series contains no user serviceable parts. If a fault is suspected, return the instrument to Casella or a Casella approved service centre.

CAUTION

The 620 series operate from batteries (or optional mains power).

- Use only batteries of the correct type, and do not mix battery types in the instrument.
- Do not try to charge non-rechargeable batteries.
- Do not leave discharged batteries in the 620 series.

- Install new batteries as a complete set. Do not fit batteries that have a mixed state of charge.
- Remove all batteries from the 620 series if you will not use the instrument for a long time.
- Always follow local regulations to dispose of used batteries.

CAUTION

The 620 series is not waterproof. Do not immerse the instrument in water or use it in the rain.

CAUTION

Care should be taken that the operator does not unduly affect the sound field. Ideally the instrument should be mounted on a sturdy tripod with the microphone perpendicular to the source of the sound to be measured and the operator should be as far behind the instrument as possible. If the instrument is to be hand-held, then the arm of the operator should be stretched out as far as possible to minimise reflections from the operator's body.

Disposal

WEEE Notice

At the end of the instrument's life please do not throw away with the unsorted municipal waste. Please recycle with a registered WEEE handler.

Disclaimer

Do not use the 620 series until you have thoroughly familiarised yourself with this manual or have been instructed by a Casella engineer. A quick start guide will help you get started.

At the time of writing, this manual was up to date but due to continual improvements the final operating procedures may differ slightly from those in the manual. If there are any questions please contact Casella for clarification.

Casella makes continual advancements in its products and services. We therefore reserve the right to make changes and improvements to any information contained within this manual.

Whilst every care is taken to ensure that the information in this manual is correct, Casella will assume no responsibility for loss, damage or injury caused by any errors in, or omissions from, the information given.

Introduction

The 620 series is a range of Integrating Sound Level Meters designed to meet the demands of worldwide industrial health and safety professionals as well as general noise measurement applications fully compliant with international application and instrument standards.

The 620 series is based on the very latest digital signal processing (DSP) technology and has a colour TFT display (update rate 0.5s) with an intuitive user interface. It encompasses functionality from basic sound level measurement to integrating and real-time octave band analysis , the latter depending on the exact model.

Data is stored in a Comma Separated Variable (.csv) format, compatible with Microsoft Office applications, and files may be copied to a PC using a USB connection without the need for any propriety software packages.

Instrument features

The 620 series comprises several variants, where the letters (A or B) determine the model variant e.g. A for broadband and B for 1/1 octave band. A chargeable upgrade from A to a B model is available. Models are available in Class 1 or Class 2 accuracy signified by a number 1 or 2 (after the letter A or B). See Part Numbers and Accessories later for more information.

Key features

The 620 series provides A, C, and Z frequency weightings, Fast Slow and Impulse time weightings with cumulative storage and PC connectivity functions. A single measurement range of 140dB RMS is standard. Simultaneous L_{Aeq} and L_{Ceq} values are measured which may be used in the selection of hearing protection using the HML method. L_{avg} (used in the US) is available with a selectable threshold.

New features for 2023

New features for 2023 include audio voice notes, time history profiling and GPS location.

Frequency analysis

'B Models' provide integrating functionality combined with 1/1 octave band frequency analysis. Advanced DSP processing provides fast parallel processing of octave band results from 16Hz to 16kHz which may be displayed graphically or in numerical form and may be A, C or Z frequency weighted.

Controls

The 620 series has a compact, ergonomic and robust 'rubber grip' case design that fits comfortably in the hand when not mounted on a tripod. Referring to figure 1 below, the windshield (1) should be used at all times (except during Calibration) to cover and protect the microphone, which is screwed onto the fixed pre-amplifier (2).

When the instrument is switched ON by pressing the red key (3) it will run through a software initialisation and then default to a Stop mode, indicated by a Red Bar at the top and bottom of the screen.

To navigate 'within a screen' use the Cursor Keys (6) but note that not all the screens have navigable fields.

To navigate from one screen to another, use the left and right hand Soft Keys (5).

To start a measurement 'run', press the Run/Stop Key (7); to stop the run press the same key again.

The instrument has a single measurement range of 140dB (RMS) and 143.3dB (C) peak. No range adjustment is needed which greatly simplifies operation.

The 620 series measures all combinations of required parameters simultaneously with the required frequency and time weighting.

Note: There are no components of the Sound Level Meter intended to be operated in an environmentally controlled enclosure

Figure 1

Microphone and pre-amplifier

The 620 series has a fixed pre-amplifier and removeable ½ inch (12.7 mm) pre-polarised microphone. There are three types of microphone available depending on the accuracy Class and range requirements, namely:-

- CEL-251 microphone used on Class 1 versions, 50 mV/Pa sensitivity
- CEL-252 microphone used on Class 2 versions, 30 mV/Pa sensitivity
- MIC1 microphone and adaptor for high range use which is Class 1

The instrument is supplied with a microphone windshield which provides protection from both wind and minor mechanical damage and should always be fitted to the microphone (except during calibration).

Soft keys

The two soft keys (5) shown in figure 1 are located below the corresponding options displayed at the bottom of each screen. The operation of these two keys change, depending on which screen is displayed as shown by the overview of the operating system in figure 2.

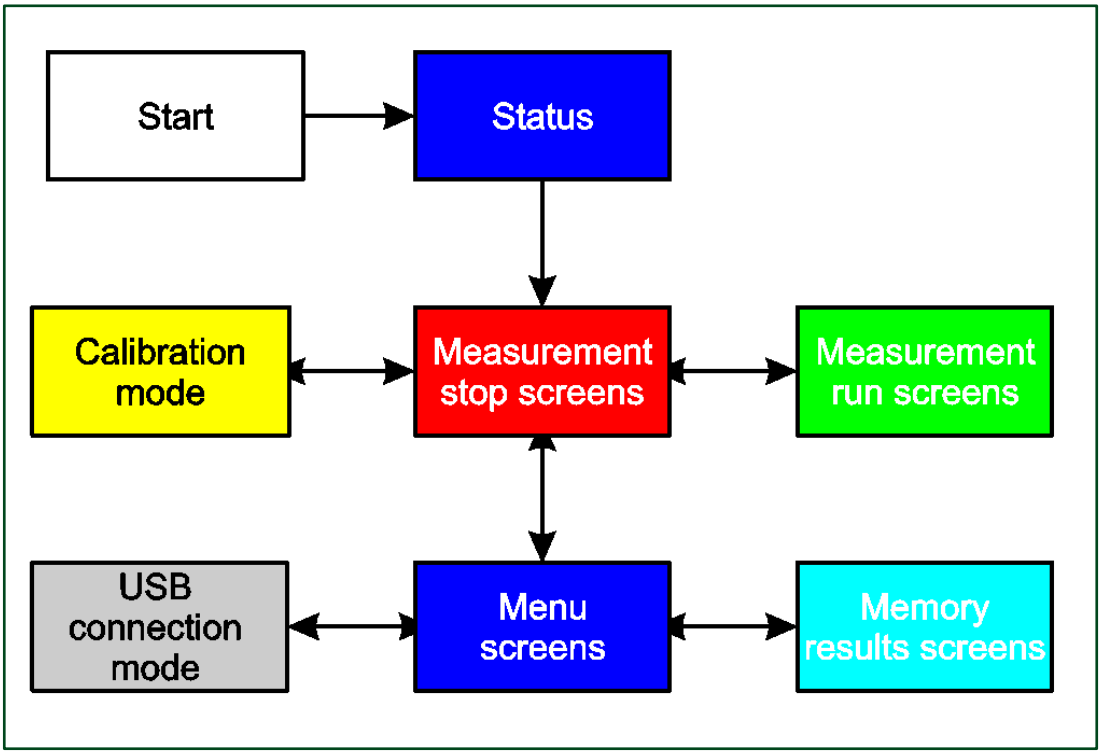


Figure 2

Generally, you press the soft key on the right to select a function, and press the soft key on the left to exit a screen or cancel a function.

The instrument screens have been designed with colour coded top and bottom bars to enable the user to know at a glance which part of the operating system is currently being accessed.

Colour coding in more detail is as follows in figure 3:

Screen Colour	Description
Red	Stop screens – These screens are displayed when the instrument has completed initialisation after power on, as well as before and after taking measurements.
Blue	Settings screens – These screens are used to set up the instrument correctly and includes settings such as date and time, language and backlight.
Light Blue	Memory Results screens – This is where the results from measurements are viewed.
Green	Run screens – These screens show a measurement is in progress, measured values are stored in the memory results.
Yellow	Calibration screen – This screen is automatically displayed upon application of a 1kHz Acoustic Calibrator. This is where the instrument is calibrated before and after taking measurements.

Figure 3

Navigation keys

The four Navigation keys (6 in figure 1) allow you to select items when highlighted on the main part of the screen.

Press the ▶, ◀, ▲ or ▼ navigation key to change to the next selection in the direction of the cursor arrow.

Run/Stop key

The Run/Stop key (7 in figure 1) ▶ ■ allows you to start and to stop a run manually (there is also a timed run duration timer detailed later).

Connectivity

A rubber cover on the bottom of the instrument reveals an external 12V DC power inlet, USB socket and Audio output socket described later.

Operation

This section describes how to use the instrument to take noise measurements using the minimum of settings.

Once the instrument has been prepared for use, it should be field calibrated as described later in this section.

Care should be taken that the operator does not unduly affect the sound field. Ideally the instrument should be mounted on a sturdy tripod with the microphone perpendicular to the source of the sound to be measured – the operator should be as far behind the instrument as possible. If the instrument is to be hand-held, then the instrument should be held out as far as possible to minimise reflections from the operator's body.

Batteries

To extend battery life, if the 620 series is not taking a measurement and there are no key presses, the instrument will automatically turn off after a period of 5 minutes. This auto power off facility is disabled when the 620 series is powered from external 12VDC or USB. For long term tests, where the batteries may become exhausted, use a 12VDC supply to power the 620 series. The auto power off facility is independent of the backlight time settings.

Note: The 12VDC can be plugged in at any time and will be automatically used instead of the batteries. With 12VDC or USB connected the battery condition symbol will show full charge and not the actual condition of any installed batteries.

Note:. When downloading data to a PC the 620 series can be powered by the USB connection. The 12VDC or USB connection will not re-charge batteries.

To fit the batteries (see figure 4):

1. Open the battery cover.
2. Check the battery compartment is clean and dry.
3. Fit three new AA Alkaline (or NiMH) batteries according to the polarity in the battery compartment.
4. Close the battery cover.
5. Always fit new batteries when the battery indicator shows battery strength is low to prevent the instrument switching OFF while in use.

Note: If there is evidence of leakage from previously installed batteries, contact Casella before using the instrument.

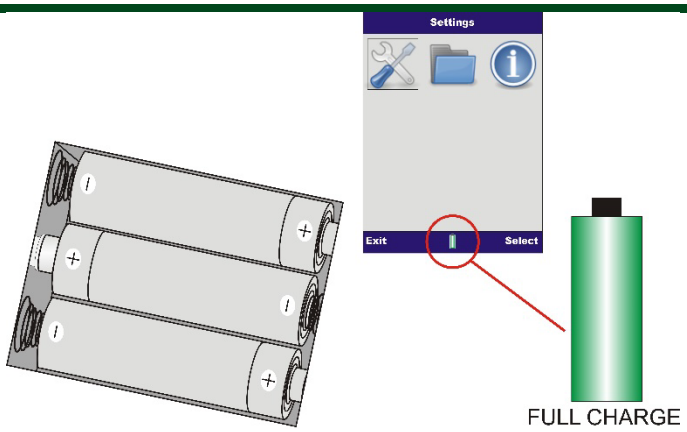


Figure 4

Turning the instrument On/Off

To turn the instrument on:

1. Press and release the red power On/Off key.
2. During the software initiation the start-up and status screen (figure 5) will display the firmware version (e.g. V018-03 indicates issue 3 of the firmware) and the serial number followed by the screens listed below (figure 6):
   - 620A models– Graph screen in the (red) stop mode (below left).
   - 620B models – Octave screen in the (red) stop mode (below right).

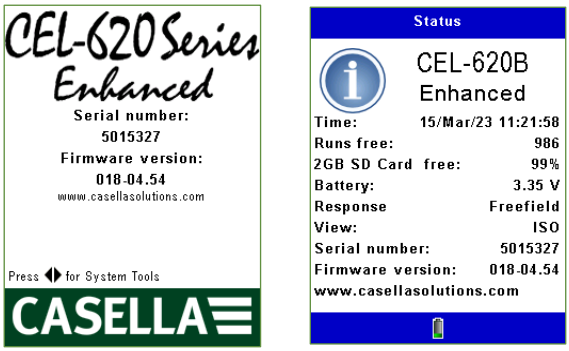


Figure 5

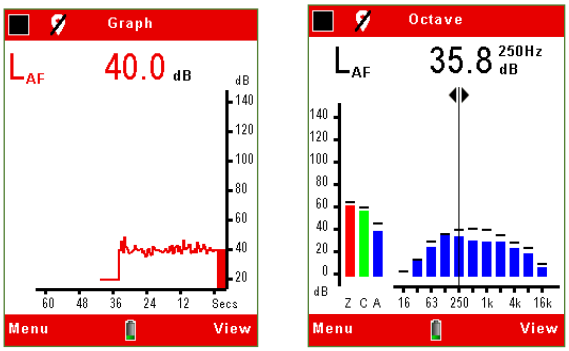


Figure 6

To turn off the instrument:

1. When the required measurements have been taken and in stop mode, press and hold the red power key for three seconds to switch off the instrument. The display will show a '3, 2, 1' count down.

Note: The press and hold for three seconds feature prevents the instrument from being accidentally switched off during use.

Measurement screens

The instrument has four Run screens: The Main numerical screen, the Graph (level versus time) screen, and on B Models, the Octave and the Octave Values screen.

Switch the instrument on as previously detailed and the instrument is ready to make a measurement after approximately 15 seconds.

To manually start a measurement run press the **Run/Stop** key (D shown in figure 8).

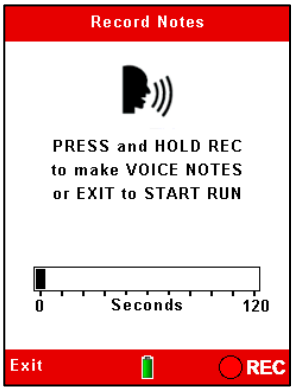


Figure 7

If **Voice Notes** have been selected (a new feature for 2023 models), these can be made at this point by pressing the corresponding REC soft key and talking into the instrument microphone or may be 'skipped' by pressing the corresponding **Exit** soft key.

This gives 120 seconds worth of recording additional notes such as location, the process and other pertinent information.

Voice notes may also be recorded after the measurement. See later in the Memory section.

If not selected, the header and footer bars turn green and the "Play" ▶ symbol is displayed in the top left-hand corner of the screen along with Run duration and incremental Run number in the top right.

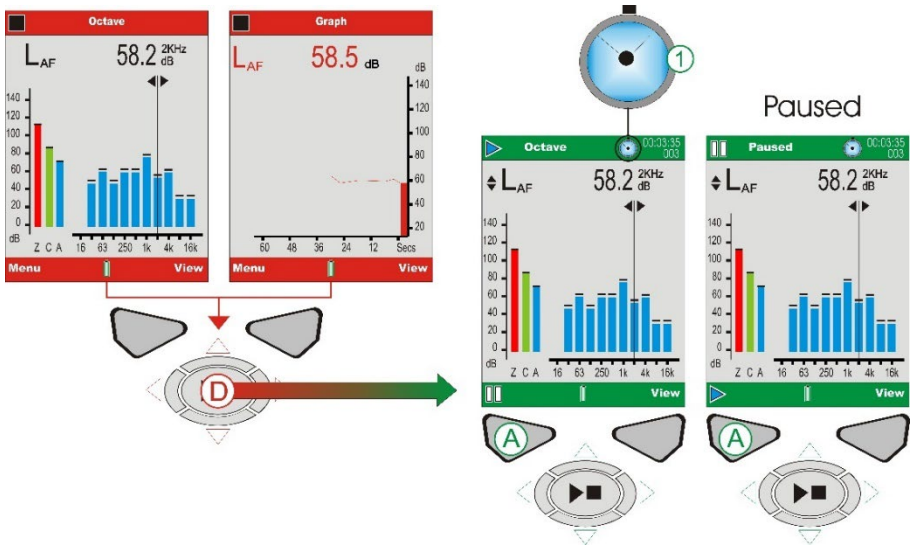


Figure 8 Run Screens

If the **Run Duration Timer** is set, a 'stopwatch' (symbol 1 in figure 8) will appear next to the countdown timer. The Run Duration timer is enabled and disabled in **Settings** detailed later. If the Run Duration is not set, the run timer will count up until the run is stopped manually by pressing the **Run/Stop** Key at which point you will be asked to confirm that you wish to stop the run by pressing the appropriate **Yes** or **No** soft key to prevent you from accidentally stopping a run.

The "Pause" symbol in the bottom left-hand corner of the screen and the corresponding soft key (A in figure 8) is the **Pause/Run** feature. When Pause is selected, **Paused** will 'flash' on the top of the screen. Simply pressing the corresponding **Play** soft key again will restart the measurement.

For the 620A models (refer to Figure 9), the broadband values can be viewed as a bar graph on the Main screen, or as a graphical time history on the Graph screen. Pressing the corresponding **View** soft key toggles between Graph and Main screens.

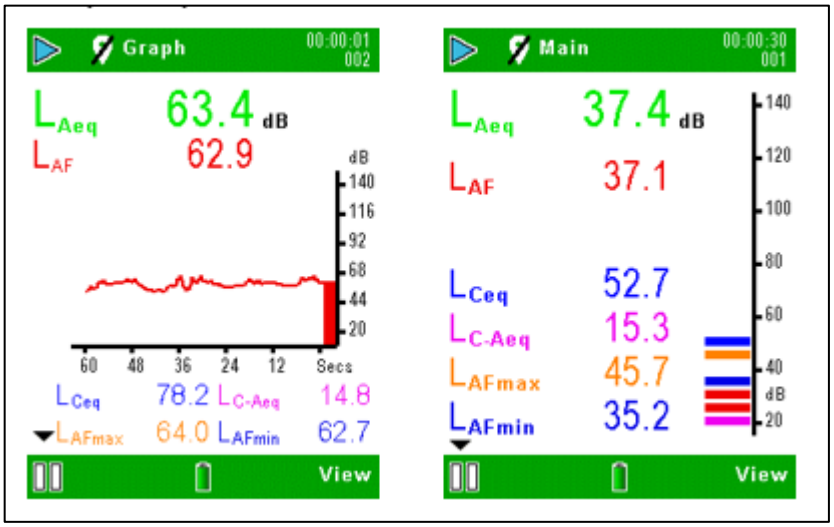


Figure 9 620A Run Screens

For the 620B models (refer to Figure 10), there are two additional octave screens. Press the corresponding **View** soft key to toggle between the four available screens. Use the ▶, ◀ navigation key to move across the frequency bands when in Octave graphical view and the ▲ or ▼ navigation key to toggle between instantaneous, LAF maximum, LMAX and LAEQ parameters. Each graph bar represents an octave band measured in Hz or kHz. To view a table of the octave values, press **View** again.

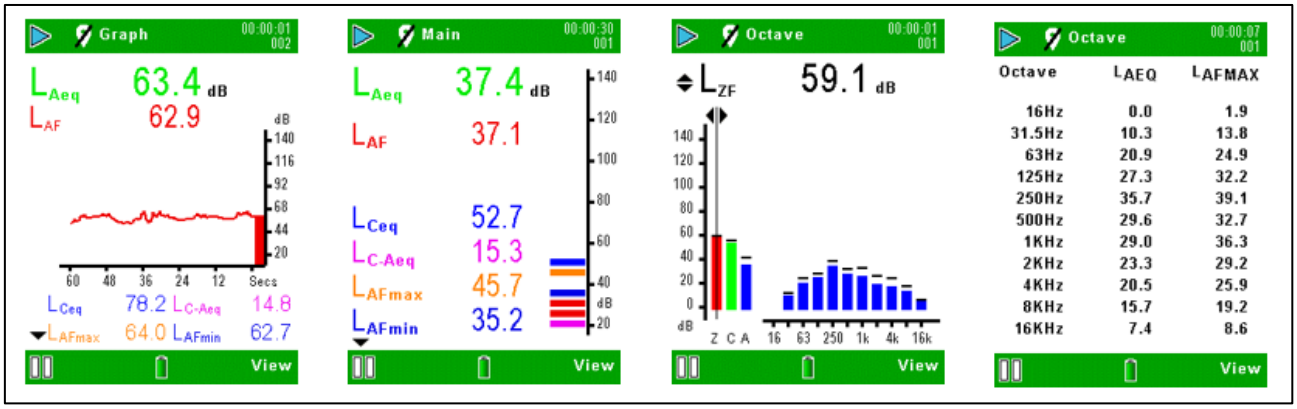


Figure 10 620B Run Screens

Peak and Max parameters are 'hold' parameters. This means that they will stay at their highest level for the duration of the measurement. Therefore, stopping and restarting a measurement removes the 'hold' of these maximum and peak values and acts as a reset, also the case for all other parameters. This is also the reset for an 'overrange' indication, which will stay on until the measurement is stopped.

Note: Operation of under-range and overload indication is described on page 43

Main Menu

Access the 'Main Menu' (figure 11) from either of the two Stop screens by pressing the corresponding **Menu** soft key.

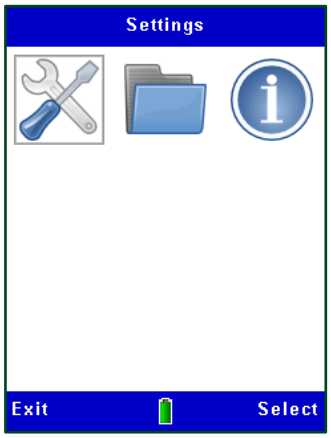


Figure 11

- **Settings** allows changes to the instrument setup.
- **Memory** allows viewing and deletion of stored results.
- **Status** displays information such as firmware version, battery voltage and free memory (as shown at instrument initialisation).

Settings

In this menu, you can access other sub-menus and options as shown in figure 12.

Use the ▶, ◀, ▲ or ▼ navigation keys to move within the screen and the corresponding **Select** or **Exit** soft key accordingly.

Figure 12

Setup	**Set Clock**	**Language**
Backlight	**Measurement Control**	**Run Duration**
Calibration Reference level	**Audio Recording**	

Set UP

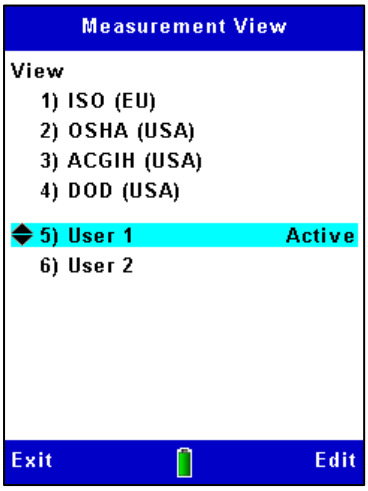


Figure 13

This screen shows the default measurement parameters which will be displayed for a given 'regime' and changes settings like the time constant, (Fast or Slow), Exchange rate (Q=3, 4 or 5), LEQ or LAVG with its associated thresholds.

There are two custom, User settings as shown **Active** in figure 13.

Use the ▶ , ◀ , ▲ or ▼ navigation keys to move within the screen and the corresponding **Activate** and **View** soft keys accordingly and **Exit** to return to the previous screen.

Note: Regardless of the view used, all parameters stored simultaneously and is independent of time history logging.

Set Clock

Use the ▲ or ▼ navigation keys to toggle between Time and Date (see figure 14) and the corresponding **Edit** soft key to make changes when highlighted. Use the ▶, ◀, ▲ or ▼ navigation keys and **Save** then **Exit** soft key to return to the previous screen(s).

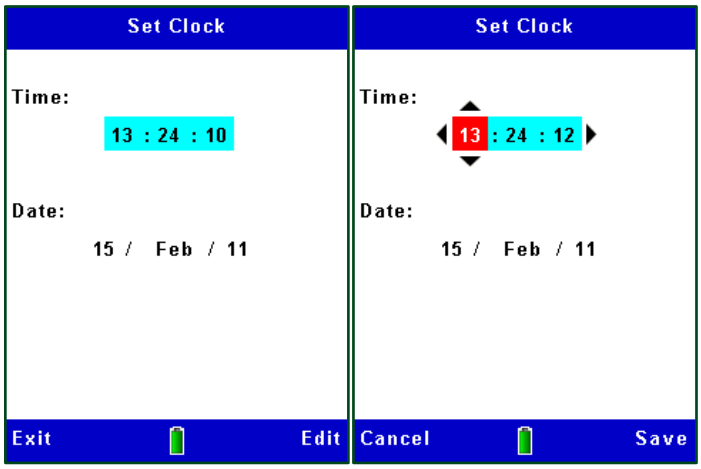


Figure 14 **Figure 15**

Note: Drift in displayed time over 24 hours is less than 5 seconds.

Language

Figure 16

The default language is UK English (see figure 16).

Use the ▶, ◀, ▲ or ▼ navigation keys and the corresponding **Select** soft key to choose the language of your choice

Press the corresponding **Exit** soft key to return to the previous screen(s).

Note: 'US' changes date format only

Backlight

Figure 17

The backlight is either permanently activated or turned On following a key press for a timed duration in minutes and seconds (see figure 17).

Use the ▲ or ▼ navigation keys and the corresponding **Edit** and **Save** (or **Cancel**) soft keys to choose the **Activation** type, **Duration** and **Brightness**

Press the corresponding **Exit** soft key to return to the previous screen(s)

Note: The brightness level affects battery life (see Technical Specifications)

Measurement Control

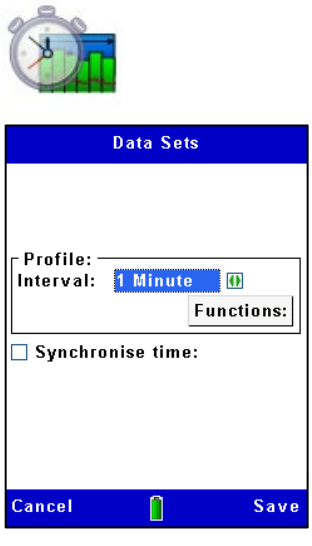


Figure 18

This new feature adds additional data sets which may be graphed as shown below (see figure 20).

Use the ▲ or ▼ to navigate and the corresponding **Edit** soft key and ▶, ◀ keys to select either 1, 2, 5, 10, 15,20,30 second or 1, 2, 5, 10, 15, 20, 30, minute profiles or **Off** to disable.

Once selected press the corresponding **Save** soft key

Use the ▶, ◀ to select **Synchronise time** (when highlighted) to synchronise the profile times with the main clock.

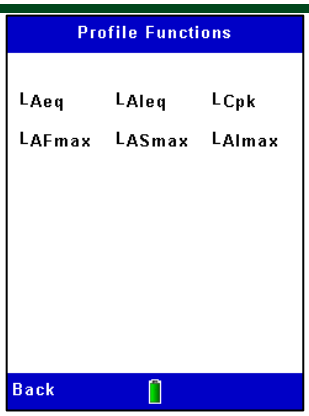


Figure 19

To view the profile functions (see figure 19), select the corresponding **More** soft key and the corresponding **Back** and **Exit** soft key to return to the previous screen(s).

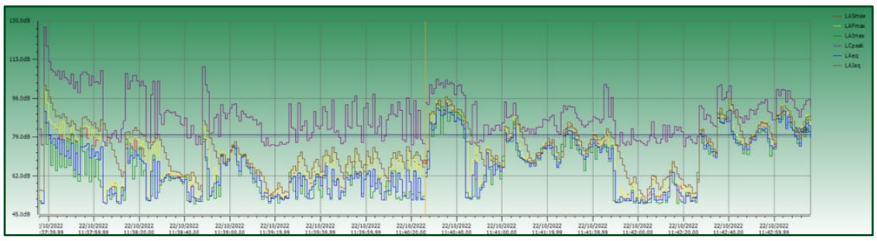


Figure 20 Example profiles when downloaded to insight software

Note: The profile functions can be viewed but not selected or deselected.

Run Duration

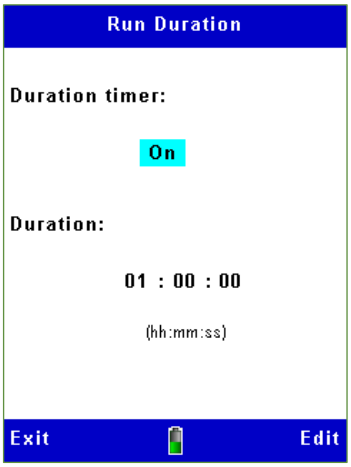


Figure 21

This changes the way a run starts and stops either by a manual key press (see the Measurement Screens section) or for a selectable fixed run Duration.

Press the corresponding **Edit** soft key and ▶, ◀ to select either **Off** (manual start/stop) or **On.**

Use the ▲ or ▼ key to select the **Duration** and press the corresponding **Edit** soft key and the ▶, ◀, ▲ or ▼ navigation keys to change the duration time in hours, minutes and seconds.

Press the corresponding **Save** soft key (or **Cancel**) and **Exit** soft key to return to the previous screen(s).

Calibration reference level

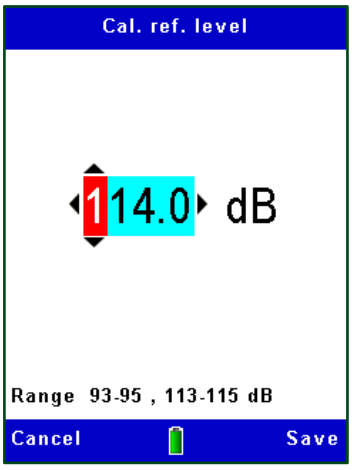


Figure 22

This allows the automatic calibration level to be set to match the value on the acoustic calibrator's calibration certificate, typically 94 dB (with an adjustment range from 93-95dB) or 114 dB (with an adjustment range of 113-115 dB) as shown in figure 22.

To change select the corresponding **Edit** soft key, then use the ▶, ◀, ▲ or ▼ keys to adjust the level to that shown on the calibrator's calibration certificate then **Save** (or **Cancel**) using the corresponding soft keys.

Press the corresponding **Exit** soft key to return to the previous screen(s).

Voice Notes

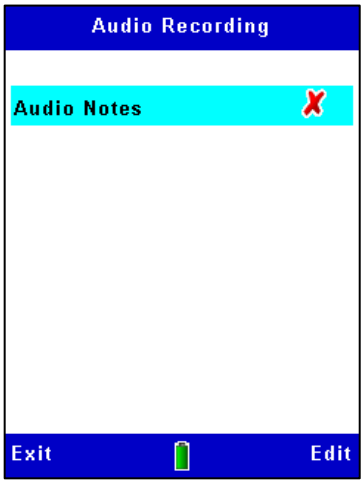


Figure 23

Audio voice notes may be added prior to a measurement run (if selected) by speaking into the instrument microphone. The 2GB memory gives 33 hours of storage.

Use the corresponding **Edit** soft key and the ▶, ◀ keys to select (or deselect as shown in figure 23)

Press the corresponding **Exit** soft key to return to the previous screen(s)

Memory

In this menu, you can access other sub-menus and options to view results, delete runs, retrospectively add voice notes and listen to audio.

Firstly select the date of the run(s) using the ▲ or ▼ navigation keys to highlight it and press the corresponding **Select** soft key for the data of interest as shown in figure 24.

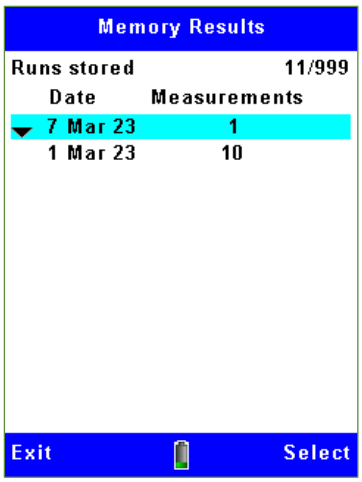


Figure 24

You can now see the individual run(s) for a given date in Figure 25. Again, use the ▲ or ▼ navigation keys to highlight the run of interest and press the corresponding **Select** soft key.

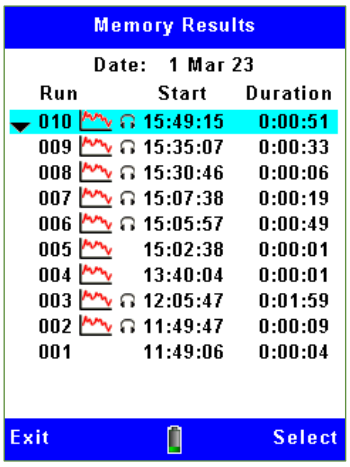


Figure 25

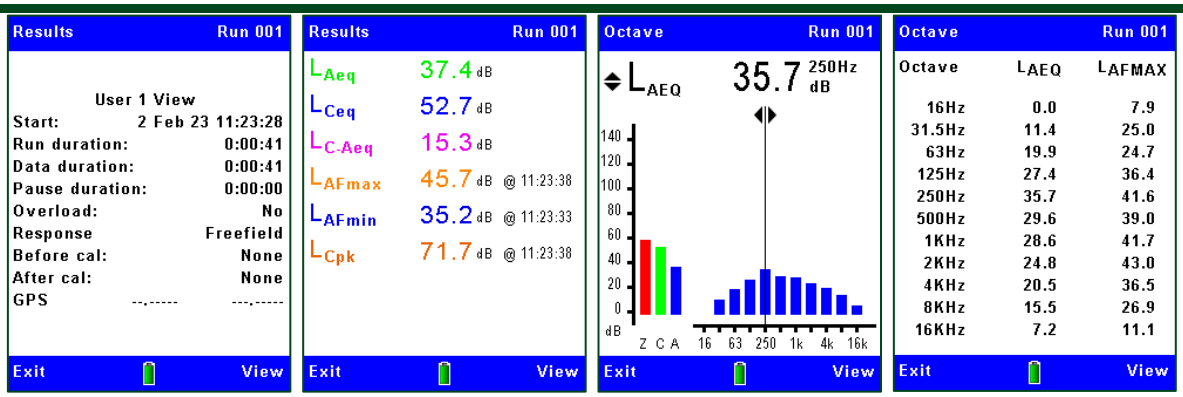
You now have a series of further options as shown in figure 26. Use the ▶, ◀, ▲ or ▼ navigation keys to move within the screen and the corresponding **Select** or **Exit** soft key accordingly.

Figure 26

View Results

This allows you to view the data stored for a given run (the run number is shown top right).

You can cycle through the screens by pressing the corresponding **View** soft key and **Exit** to return to the previous screen(s).



Note: The Octave screens are only available on 'B models'.

Delete

Use the ▲ or ▼ navigation keys to highlight an individual date to be deleted, **or all the stored runs to date**, and press the corresponding **Select** soft key. You will be asked to confirm that you want to delete or otherwise.

Record Voice Notes

This is a similar function to that shown in the Measurement Screens sections (figure 7) and allows you to retrospectively add (or edit) voice notes.

Note: Pressing REC will relace an existing voice note.

Event data audio

This allows you to listen to recorded voice notes using headphones connected to the Audio Jack socket shown in the Connectivity section (figure 29). Press ▶ ■ to replay.

Status

Figure 27 is a repeat of the screen shown when the instrument is first switched on and displays:

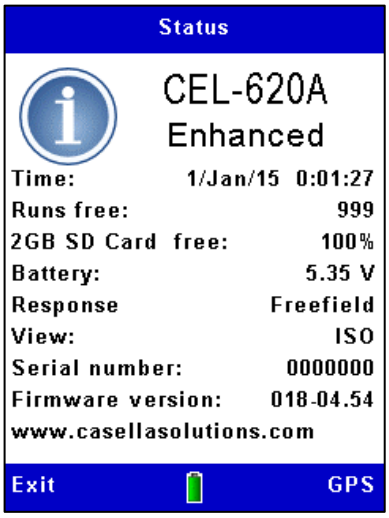


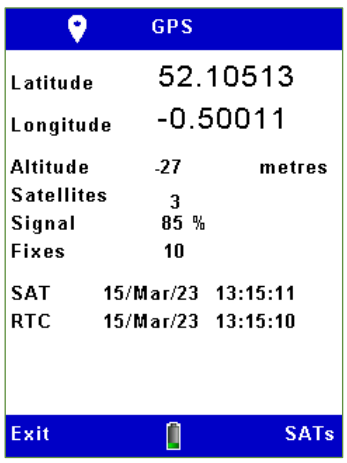
Figure 27

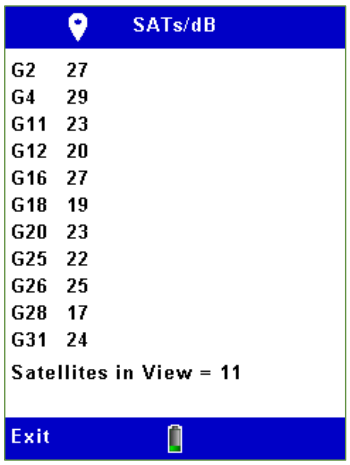
- Exact model variant
- Date & Time
- Number of measurement runs free
- Free memory
- Battery voltage
  - Microphone response i.e. Freefield (ISO) or Random (US)
- Measurement View (determines the Microphone response)
- Serial number
- Firmware version
- Customer set text

Pressing the corresponding **GPS** soft key displays the GPS status. This is a new feature for 2023.

GPS Location

GPS data can be seen on the instrument and is also appended to downloaded data assuming the unit has a GPS lock (shown by the symbol in the top of the screen). A brand-new lock with clear skies could be anywhere from 30 seconds to 2 minutes+. Keeping batteries in the unit will preserve the ephemeris data (for up to 30 days) and on the next instrument start-up, it could get a lock very quickly. Pressing the corresponding **SATs** soft key will show how many satellites in view.





Connectivity

A rubber cover on the bottom of the instrument reveals an external 12V DC power inlet, USB socket and Audio output socket.

Figure 29

Power socket

It is possible to use an external DC power supply. The instrument accepts 9 to 14V DC at typically 170mA via a 2.1mm Power Connector. The PC18 power supply is recommended (see Part Numbers and Accessories).

USB

The CEL-620 series acts as a removable storage device when connected to a PC by the CMC51 cable supplied.

See figure 29 for the location of the USB connection.

Once connected, the PC will automatically detect that the instrument is connected and within a few seconds have installed the necessary drivers.

An Explorer window will open on the PC to show the files on the instrument. Simply copy the files to your PC as required. Each measurement run is stored as a file within the CEL-62X in a .CSV format. This format will automatically open with MS EXCEL or similar office applications.

The files are named consecutively from 1 to 999, so the first run will be named R001.CSV. All measurement parameters are contained within these files, regardless of the displayed parameters selected within the instrument setup.

Audio socket

An AC output is available via a 2.5mm stereo audio jack (Barrel ground, Tip AC output) provided for remote monitoring, DAT tape / PC wav file recording or headphone applications.

The output level can be set **Low** or **High** see **System Tools**.

On the low range, a full-scale AC output of approximately 0.4 Vrms corresponds to a maximum sound pressure level of 96 dB. On the high AC output range, a full-scale output of approximately 0.94Vrms corresponds to a level of 140dB.

The AC output signal corresponds to the Z-weighted response of the instrument and has an output impedance of approximately 2.2 kΩ.

If you use the AC output, you should make certain the load impedance is as high as possible, and you should use a screened or co-axial cable of length 0.5 m to 10 m.

Note: Some offset and scaling will be required on the measuring system for accurate measurements.

A DC output is also available via the same 2.5mm stereo audio jack (Barrel ground, Ring DC output) provided for chart recorders, loggers etc.

Approx 1.4V DC full scale output corresponding to 140dB. Output impedance approx. 2.2kΩ. Load impedance should be as high as possible.

The DC output corresponds to the A weighted, Fast time response of the sound level meter.

Note: DC power input ground should be kept isolated from any signal ground

System Tools

This can only be selected during instrument initialisation by pressing the ◀ and ▶ keys simultaneously as indicated on the instrument screen.

The primary function is for calibration laboratories or diagnostic purposes and three options are available:

- 'Set USB Disk R/W' allows the mass storage device to have data written to it.
- 'Format All Memory' will format the USB memory.
- AC Output sets the output level **Low** or **High** (as shown in the Audio Socket section).

Note: All measurement data will be lost if the Memory is formatted!

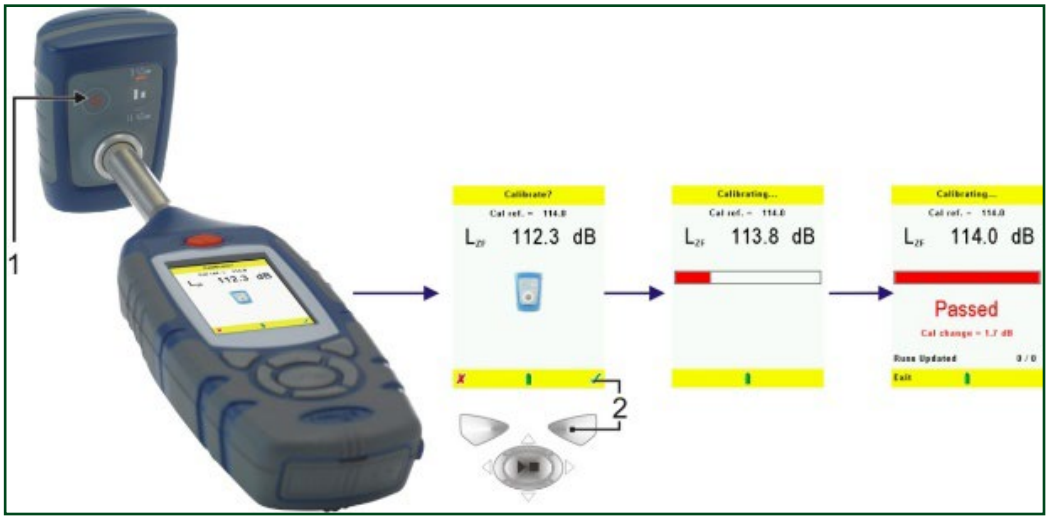
Calibration

Note: The Instrument must be at a STOP screen before the acoustic calibrator is fitted.

It is recommended that an acoustic calibration using a CEL-120/2 with CEL-252 microphone (or CEL-120/1 with CEL-251 and MIC1) calibrator is performed before and after taking measurements.

To perform a calibration:

1. Switch on the acoustic calibrator.
2. Check the acoustic calibrator has a 114dB (or 94dB) output.
3. Fit the acoustic calibrator firmly over the microphone. The instrument automatically detects a 1kHz tone from a 114dB (or 94dB) calibrator and enters calibration mode.
4. Press the right key (2) to perform a calibration or press the left key to exit calibration mode. When calibration is complete, the calibration complete screen and the word PASSED will be displayed.
5. A calibration change value is shown at the bottom of the screen. This identifies the change since the previous calibration.
6. Remove and switch off the acoustic calibrator.
7. Press the left exit key to return to the stop screen.



Technical specifications

Technical area	Specification
Applicable Standards	IEC 61672-1:2013
	CEL-620B model only, IEC 61260 Class 1 Octave filters
	ANSI S1.4 - 1983 (R2006), ANSI S1.43 - 1997 (R2007)
	CEL-620B model only, ANSI S1.11-2004 (R2009)
Total measurement range	Microphone CEL-251 and CEL-252:20 to 140dB RMS (single range), 143.0 dB Peak Microphone MIC1:45 to 165dB RMS (single range), 168dB Peak*
Frequency weightings	RMS & Peak: Simultaneous A, C & Linear (Z)
Time weightings	Simultaneous Slow, Fast & Impulse
Amplitude weightings	Q3, Q4 and Q5 (Q4 & Q5 applicable to Lavg only)
Thresholds	70 to 90 (dB) in 1 dB steps (applicable to Lavg only)
Noise floor	<33dB(A) Class 2 (with CEL-252), <25dB(A) Class 1(with CEL-251_ For high range MIC1: <40.9dB(A)*
Runs stored	999, up to 24 hour length per run. 33 hours of audio notes. Up to 1 years storage with 1s time history selected. **Note:** Maximum integration and averaging time for measurements is 24 hours. Minimum run time and therefore integration/averaging time is 1s.
Measured Parameters	**CEL-620A**: LXY, LXYmax, LXYmin, LXeq, LXpeak, Lavg, LC-LA, LAIeq, LATM3, LATM5 (LATM3 & 5 with F or I time constant), LAE, LAeqT80. **CEL-620B**: LXY, LXYmax, LXYmin, LXeq, LXpeak, Lavg, LC-LA, LAIeq, LATM3, LATM5 (LATM3 & 5 with F or I time constant), LAE, LAeqT80 **Octaves**: LXY, LXeq, LXYmax (F or S time constant). Where X is the frequency weighting A, C or Z and Y represents time weighting Fast (F), Slow (S) or Impulse (I). All weightings simultaneously measured where appropriate.
Frequency bands	11 octave bands 16Hz to 16kHz (CEL-620B model only)
Calibration information	Stores pre and post run calibration date, time and level
Display	320x240 pixel transmissive colour TFT
Output (P.C.)	USB 2.0 ‘A’ to ‘Mini B’
Batteries	3 x AA Alkaline (supplied) or rechargeable
Battery life	11 hours with backlight on, up to 20 hours backlight off
External power	9-14V DC at 250mA via 2.1mm connector

Tripod mount	1/4” Whitworth socket
Size mm (in)	72 x 229 x 31mm (2.8 x 9.0 x 1.2”)
Weight gm (oz)	295g (10.4oz)
Environmental	Temp 0 -40°C (Class 2), -10 to 50°C (Class 1) (storage -20 to 60°C) RH 5% to 90% (non-condensing), Pressure 65-108kPa. Note: If measurments are to take place outside of specified environmental conditions accuracy may not remain within Class 1 or 2 as per the specification. In low pressure environments the sensitivity of the 620 series may increase or decrease.

Additional information required for testing

As required by IEC61672-1 section 9.3

a) Reference Sound Pressure Level

The reference sound pressure level is selectable to be 94 dB or 114 dB.

b) Reference Level Range

The CEL-62X is a single level range instrument of 0 to 140 dB. The high range version is a single level range instrument of 55 to 165 dB*.

c) Microphone Reference Point

The microphone reference point is the centre of the diaphragm of the microphone. The 0º reference direction is perpendicular to the microphone diaphragm. This applies to CEL-251, CEL-252 and MIC1 microphones.

d) Acoustical Frequency Response Testing

The pressure to free field correction data for the CEL-251 microphone used for periodic testing.

Frequency	0º Free Field Corrections using a Bruel & Kjaer 4226 Calibrator	0º Free Field Corrections with Wind Screen using a Bruel & Kjaer 4226 Calibrator	0º Free Field Corrections using a Bruel & Kjaer UA0033 Electrostatic Actuator	0º Free Field Corrections with Wind Screen using a Bruel & Kjaer UA0033 Electrostatic Actuator	Expanded Uncertainty of Corrections at 95% probability (k=2)
Hz	**dB**	**dB**	**dB**	**dB**	**dB**
31.5	0	0	-0.1	-0.1	0.25
63	0	0	-0.2	-0.2	0.25
125	0	0	-0.2	-0.2	0.25
250	0	0	-0.2	-0.2	0.25
500	-0.2	-0.2	-0.2	-0.2	0.25
1000	0	0.1	0	0.1	0.25
2000	0.3	0.7	0.3	0.7	0.25
4000	0.7	1.4	0.8	1.5	0.25
8000	2.8	2.5	3.1	2.8	0.35
12500	5.3	4.1	6.2	5.0	0.50
16000	6.4	4.5	7.8	5.9	0.50

The pressure to free field correction data for the CEL-252 microphone used for periodic testing.

Frequency	0° Free Field Corrections using a Bruel & Kjaer 4226 Calibrator	Expanded Uncertainty of Corrections at 95% probability (k=2)
Hz	dB	dB
63	0.49	0.25
125	0.01	0.25
250	0.06	0.25
500	-0.02	0.25
1000	0.02	0.25
2000	0.97	0.25
4000	2.50	0.25
8000	3.13	0.35

The pressure to free field correction data for the MIC1 microphone used for periodic testing.

Frequency	0° Free Field Corrections using a Bruel & Kjaer 4226 Calibrator	Expanded Uncertainty of Corrections at 95% probability (k=2)
Hz	dB	dB
63	0.62	0.25
125	0.10	0.25
250	0.13	0.25
500	0.20	0.25
1000	-0.21	0.25
2000	0.32	0.25
4000	1.01	0.25
8000	-0.09	0.35

e) Linear Operating Range

The lower and upper limits of the linear operating ranges (dB) for electrical input, or using a CEL-251 microphone; (add 10dB to the lower limit when using a CEL-252 microphone).

Weighting	31.5Hz	1 kHz	4kHz	8kHz	12.5kHz
A	30 to 100	30 to 140	30 to 141	30 to 138	30 to 134
C	32 to 137	32 to 140	32 to139	32 to 136	32 to 132
Z	38 to 140	38 to 140	38 to 140	38 to 140	38 to 140
CPeak	65 to 140	65 to 143	65 to 142	65 to 139	65 to 135

The lower and upper limits of the linear operating ranges (dB) for electrical input, or using a MIC1 microphone*.

Weighting	31.5Hz	1 kHz	4kHz	8kHz	12.5kHz
A	55 to 125	62 to 165	63 to 166	61 to 163	58 to 159
C	56 to 162	62 to 165	63 to 164	61 to 162	58 to 158
Z	65 to 165	65 to 165	65 to 165	65 to 165	65 to 165
CPeak	65 to 165	65 to 168	65 to 167	65 to 165	65 to 161

f) Linearity Measurements Starting Point

The starting point for measuring level linearity errors is 114dBZ (74.6dBA).

g) Electrical Input

For a CEL-251 and CEL-252 microphone, the input device to apply electrical signals to the pre-amplifier is a series 18pF +/- 5% capacitor. The CEL-516-02 can be used for this purpose. The electrical self-generated noise can be measured with the supplied shorting plug attached to the CEL-516-02. For a MIC1 microphone, the part number CEL-517-01 input adaptor can be used, which is 6pF. When fitted with the MIC1 microphone, periodic testing with electrical signals should be applied via the ½ inch integrated preamp, **not** including the ½ to ¼ inch adaptor MPA1.

h) Self-Generated Noise

Noise levels shown for electrical levels are typical values when the electrical input adaptors are fitted to the sound level meter. Combination of CEL-251 microphone thermal noise and meter electrical noise.

Weighting	Electrical Typical dB	Electrical Max dB	Microphone Thermal dB	Combined Typical dB	Combined Max dB
A	18.0	20.0	16.0	20.0	22.0
C	21.0	23.0	16.8	22.0	24.0
Z	28.0	30.0	16.8	28.0	30.5

Combination of CEL-252 microphone thermal noise and meter electrical noise.

Weighting	Electrical typical dB	Combined Typical dB
A	20.0	21.3
C	23.0	28.6
Z	30.0	40.4

Combination of MIC1 microphone thermal noise and meter electrical noise.

Weighting	Electrical typical dB	Combined typical dB
A	39.1	40.9
C	41.2	45.7
Z	48.5	54.1

Note: No changes are anticipated to self generated nosie due to component aging. Values shown are at reference environmental conditions. Averaging times for measurements were >30s.

i) Highest Level

The highest sound pressure level designed to be measured by the CEL-62X sound level meter when fitted with a CEL-251 or CEL-252 microphone is 140dB. When fitted with a MIC1 microphone the highest sound pressure level is 165dB. The highest peak to peak voltage that can be applied to the pre-amplifier input via the CEL-516 or the CEL-517- is 28.5V.

j) Power Supply Voltage Range

The CEL-62X can be powered from three internally fitted AA batteries, or an external 12VDC supply (2.1mm connector, tip +ve), or 5VDC USB supply from a PC.

Internal batteries – range 3 to 5 volts. The battery condition symbol will start to flash as a warning when the batteries have discharged to 3.3 volts, and the meter will stop a run and turn off when the batteries have discharged to less than 3 volts to ensure no data is measured that does not meet the requirements of IEC 61672.

12VDC supply range is 9 to 14 volts.

USB supply range is 4.5 to 5.5 volts.

k) Display Device

The display device will display the complete linear operating range.

l) Environmental Stabilisation Time

The typical time to stabilise after sudden changes in environment conditions.

5 minutes after a 10 ^{o}C change in temperature.

5 minutes after a 30% change in humidity (non-condensing).

15 seconds after a 5kPa change in ambient pressure.

m) Electric Field Strength Greater Than 10 V/m

The 620 series has not been tested for field strengths greater than 10 V/m.

n) EMC Emissions

Emissions were no greater in any one plane or any mode of operation.

o) EMC Susceptibility

The CEL-62X has slightly higher susceptibility with the Y plane facing the radiating antenna.

X is in the direction of the microphone, Z is in the direction of the display, and Y is in the direction side-on to the case.

Casella CEL-620 with CEL-251 Microphone Free Field response with and without Wind Screen.

Nominal Frequency	Actual Frequency	0 Degree Free Field Response	0 Degree Free Field Corrections	Effect of Wind Screen	0 Degree Free Field Response with wind Screen	0 Degree Free Field Corrections with Wind Screen	Expanded uncertainty of Corrections (k=2)
Hz	Hz	dB	dB	dB	dB	dB	dB
250	**251.19**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.20**
315	316.23	-0.1	0.1	0.0	-0.1	0.1	0.20
400	398.11	0.1	-0.1	0.0	0.1	-0.1	0.20
500	**501.19**	**0.1**	**-0.1**	**0.0**	**0.1**	**-0.1**	**0.20**
630	630.96	0.0	0.0	0.1	0.1	-0.1	0.20
800	794.33	0.1	-0.1	0.1	0.2	-0.2	0.20
1000	**1000.00**	**-0.1**	**0.1**	**0.1**	**0.0**	**0.0**	0.20
1250	1258.92	0.0	0.0	0.2	0.2	-0.2	0.20
1600	1584.89	-0.4	0.4	0.3	-0.1	0.1	0.20
2000	**1995.26**	**-0.2**	**0.2**	**0.4**	**0.2**	**-0.2**	0.20
2240	2238.72	0.1	-0.1	0.4	0.5	-0.5	0.20
2500	2511.88	0.4	-0.4	0.5	0.9	-0.9	0.20
2800	2818.38	0.2	-0.2	0.5	0.7	-0.7	0.20
3150	3162.27	-0.3	0.3	0.6	0.3	-0.3	0.20
3550	3548.13	-0.9	0.9	0.7	-0.2	0.2	0.20
4000	**3981.07**	**0.0**	**0.0**	**0.7**	**0.7**	**-0.7**	0.20
4500	4466.83	0.0	0.0	0.7	0.7	-0.7	0.30
5000	5011.86	-0.1	0.1	0.6	0.5	-0.5	0.30
5600	5623.40	-0.4	0.4	0.5	0.1	-0.1	0.30
6300	6309.56	-0.7	0.7	0.2	-0.5	0.5	0.30
7100	7079.45	-0.1	0.1	-0.1	-0.2	0.2	0.30
8000	**7943.27**	**-0.3**	**0.3**	**-0.3**	**-0.6**	**0.6**	0.30
8500	8413.94	-0.4	0.4	-0.4	-0.8	0.8	0.30
9000	8912.49	-0.6	0.6	-0.5	-1.1	1.1	0.30
9500	9440.59	-0.8	0.8	-0.5	-1.3	1.3	0.30
10000	9999.98	-0.9	0.9	-0.7	-1.6	1.6	0.30
10600	10592.52	-0.8	0.8	-0.7	-1.5	1.5	0.30
11200	11220.16	-0.6	0.6	-0.9	-1.5	1.5	0.30
11800	11885.00	-1.0	1.0	-1.0	-2.0	2.0	0.30
12500	12589.23	-0.7	0.7	-1.2	-1.9	1.9	0.30
13200	13335.19	-1.0	1.0	-1.3	-2.3	2.3	0.30
14000	14125.35	-0.9	0.9	-1.4	-2.3	2.3	0.30
15000	14962.33	-1.0	1.0	-1.5	-2.5	2.5	0.30
16000	**15848.90**	**-0.9**	**0.9**	**-1.9**	**-2.8**	**2.8**	0.30
17000	16788.00	-1.0	1.0	-2.1	-3.1	3.1	0.30
18000	17782.76	-1.0	1.0	-2.4	-3.4	3.4	0.30
19000	18836.45	-1.0	1.0	-2.7	-3.7	3.7	0.30
20000	19952.58	-1.3	1.3	-2.6	-3.9	3.9	0.30

Corrections below 250Hz are 0.0dB.

Casella CEL-620 with CEL-252 Microphone Free Field response with and without Wind Screen.

Frequency (Hz)						
Nominal	Exact	0 degree free field response	0 degree free field corrections	Windscreen effect	Windscreen corrections	0 degree free field corrections with windscreen
Hz	*Hz*	*dB*	*dB*	*dB*	*dB*	*dB*
63	63.096	0	-0.11	0.03	-0.03	-0.14
80	79.433	0	-0.15	-0.21	0.21	0.06
100	100	0	-0.14	-0.16	0.16	0.02
125	125.893	0	-0.11	-0.13	0.13	0.02
160	158.489	0	-0.1	-0.15	0.15	0.05
200	199.526	0	-0.1	-0.2	0.2	0.1
250	251.189	0	-0.1	-0.18	0.18	0.08
315	316.228	-0.14	-0.1	-0.16	0.16	0.06
400	398.107	-0.01	-0.1	-0.16	0.16	0.06
500	501.187	-0.05	-0.1	-0.19	0.19	0.09
630	630.957	-0.06	-0.1	-0.15	0.15	0.05
800	794.328	-0.11	-0.1	-0.08	0.08	-0.02
1000	1000	-0.34	-0.1	-0.1	0.1	0
1250	1258.93	-0.33	-0.14	-0.05	0.05	-0.09
1600	1584.89	-0.76	-0.1	0.12	-0.12	-0.22
2000	1995.26	-0.38	-0.15	0.2	-0.2	-0.35
3150	2511.89	0.5	-0.13	0.21	-0.21	-0.34
3150	3162.28	-0.26	-0.12	0.34	-0.34	-0.46
4000	3981.07	-0.03	-0.12	0.28	-0.28	-0.4
5000	5011.87	-0.4	-0.1	0.23	-0.23	-0.33
6300	6309.57	-0.62	-0.1	0.16	-0.16	-0.26
8000	7943.28	-0.68	-0.1	0.05	-0.05	-0.15
10000	10000	-0.56	-0.17	-0.45	0.45	0.28
12500	12589.3	-0.79	-0.13	-0.95	0.95	0.82
16000	15848.9	-1.14	-0.13	-1.52	1.52	1.39

Corrections below 63Hz are 0.0dB.
Expanded uncertainties (k=2) Factors are the same as the appropriate frequency as for the CEL-251 microphone.

Casella CEL-620 with MIC1 Microphone Free Field response (NOTE a windscreen is not used on this version).

Nominal Frequency	Frequency Exact	0 Degree Free Field Response	0 Degree Free Field Corrections	Expanded Uncertainty (k=2)
Hz	Hz	dB	dB	dB
63	63.096	0.00	0.00	0.20
80	79.433	0.00	0.00	0.20
100	100	0.00	0.00	0.20
125	125.893	0.00	0.00	0.20
160	158.489	0.00	0.00	0.20
200	199.526	0.05	-0.05	0.20
250	251.189	0.00	0.00	0.20
315	316.228	-0.04	0.04	0.20
400	398.107	0.16	-0.16	0.20
500	501.187	0.10	-0.10	0.20
630	630.957	0.07	-0.07	0.20
800	794.328	0.08	-0.08	0.20
1000	1000	-0.17	0.17	0.20
1250	1258.93	-0.06	0.06	0.20
1600	1584.89	-0.25	0.25	0.20
2000	1995.26	-0.12	0.12	0.20
3150	2511.89	0.54	-0.54	0.20
3150	3162.28	-0.61	0.61	0.20
4000	3981.07	0.35	-0.35	0.20
5000	5011.87	0.01	-0.01	0.30
6300	6309.57	-0.51	0.51	0.30
8000	7943.28	-0.13	0.13	0.30
10000	10000	-0.45	0.45	0.30
12500	12589.3	-0.71	0.71	0.30
16000	15848.9	-0.70	0.70	0.30

Corrections below 63Hz are 0.0dB.

CEL-620 with CEL-251 Microphone directional response (dB) relative to zero degrees.

Orientation of CEL-62X - Display at 0 degrees relative to ground.

Nominal Frequency (Hz)	Actual Frequency (Hz)	0 Deg	10 Deg	20 Deg	30 Deg	40 Deg	50 Deg	60 Deg	70 Deg	80 Deg	90 Deg	100 Deg	110 Deg	120 Deg	130 Deg	140 Deg	150 Deg
500	501.19	0.00	0.01	0.01	0.00	-0.02	-0.05	-0.09	-0.20	-0.20	-0.26	-0.32	-0.35	-0.37	-0.36	-0.36	-0.34
630	630.96	0.00	0.02	0.04	0.05	0.06	0.06	0.05	-0.06	-0.06	-0.15	-0.25	-0.33	-0.38	-0.40	-0.41	-0.41
800	794.33	0.00	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	-0.04	-0.14	-0.29	-0.41	-0.45	-0.46	-0.42
1000	1000.00	0.00	0.01	0.03	0.03	0.04	0.05	0.06	0.02	0.02	0.01	-0.02	-0.14	-0.31	-0.38	-0.34	-0.29
1250	1258.92	0.00	0.02	0.03	0.01	-0.08	-0.21	-0.33	-0.15	-0.15	-0.05	-0.07	-0.15	-0.32	-0.59	-0.63	-0.51
1600	1584.89	0.00	0.00	0.00	-0.04	-0.09	-0.12	0.01	0.00	0.00	-0.07	0.20	0.18	0.03	-0.29	-0.61	-0.45
2000	1995.26	0.00	0.03	0.06	0.02	-0.20	-0.49	-0.36	-0.30	-0.30	-0.13	-0.25	-0.12	0.02	-0.19	-0.69	-0.98
2240	2238.72	0.00	-0.01	-0.12	-0.35	-0.50	-0.40	-0.56	-0.46	-0.46	-0.63	-0.41	-0.64	-0.24	-0.45	-0.94	-1.28
2500	2511.88	0.00	-0.08	-0.35	-0.60	-0.55	-0.70	-1.09	-1.37	-1.37	-0.98	-1.05	-0.85	-0.86	-0.75	-1.08	-1.60
2800	2818.38	0.00	-0.03	-0.06	0.06	-0.01	-0.76	-0.93	-1.59	-1.59	-1.60	-0.92	-1.19	-1.29	-0.64	-0.91	-1.84
3150	3162.27	0.00	-0.07	-0.04	0.29	0.41	0.11	-0.07	-0.72	-0.72	-0.97	-1.26	-0.70	-0.73	-0.69	-0.46	-1.24
3550	3548.13	0.00	-0.02	0.06	0.58	0.95	0.50	0.87	-0.54	-0.54	-0.40	-0.38	-0.20	-0.48	-0.55	-0.22	-0.66
4000	3981.07	0.00	-0.10	-0.58	-1.00	-0.75	-0.96	-0.29	-1.17	-1.17	-1.84	-1.75	-1.67	-1.22	-1.86	-1.32	-1.90
4500	4466.83	0.00	0.12	0.26	-0.18	-0.57	-1.11	-0.76	-1.06	-1.06	-1.70	-2.28	-2.28	-1.23	-1.70	-1.44	-1.52
5000	5011.86	0.00	-0.12	-0.57	-0.28	-0.41	-0.83	-1.52	-1.00	-1.00	-1.77	-2.63	-2.54	-2.24	-1.69	-2.71	-2.05
5600	5623.40	0.00	-0.13	-0.10	-0.07	-0.39	-0.88	-1.05	-1.10	-1.10	-1.21	-2.21	-2.66	-2.52	-1.59	-2.57	-1.97
6300	6309.56	0.00	0.03	0.50	0.47	0.22	-0.09	-0.88	-1.62	-1.62	-1.27	-1.82	-2.42	-2.64	-2.36	-2.36	-2.59
7100	7079.45	0.00	0.04	0.07	-0.45	-1.21	-1.38	-1.33	-3.14	-3.14	-2.42	-3.01	-4.30	-4.12	-3.39	-2.70	-4.15
8000	7943.27	0.00	-0.10	-0.41	-0.55	-0.61	-1.36	-1.79	-2.97	-2.97	-3.78	-2.67	-4.08	-4.64	-3.96	-3.80	-4.48
8500	8413.94	0.00	0.19	-0.15	-0.40	-1.00	-1.13	-2.07	-2.69	-2.69	-4.11	-3.20	-3.82	-5.66	-4.53	-4.05	-4.45
9000	8912.49	0.00	-0.21	-0.18	-0.75	-1.03	-1.72	-1.96	-2.25	-2.25	-4.89	-3.90	-3.40	-6.09	-4.88	-4.44	-4.72
9500	9440.59	0.00	0.33	-0.21	-0.23	-0.58	-1.18	-2.38	-2.72	-2.72	-4.04	-4.07	-3.56	-6.49	-4.93	-4.45	-5.00
10000	9999.98	0.00	-0.32	-0.55	-0.90	-1.43	-2.00	-2.30	-3.20	-3.20	-3.74	-5.31	-4.73	-6.06	-6.30	-4.77	-4.87
10600	10592.52	0.00	-0.21	-0.05	-0.51	-0.86	-1.67	-2.42	-4.85	-4.85	-4.05	-5.98	-5.57	-5.96	-6.64	-5.33	-5.81
11200	11220.16	0.00	0.17	-0.38	-0.62	-1.24	-1.87	-2.57	-4.84	-4.84	-4.29	-6.15	-5.55	-6.62	-7.64	-5.84	-6.57
11800	11885.00	0.00	0.10	-0.45	-0.71	-1.39	-1.95	-2.83	-4.67	-4.67	-5.10	-5.99	-6.49	-6.43	-8.77	-6.67	-7.11
12500	12589.23	0.00	-0.01	-0.59	-1.03	-1.44	-2.32	-3.12	-4.75	-4.75	-6.33	-6.14	-7.87	-6.60	-9.13	-7.33	-7.62

Maximum expanded uncertainty of above data with 95% probability (k=2)

500Hz to 1kHz	0.3dB
>1kHz to 4kHz	0.5dB
>4kHz to 8kHz	1.0dB
>8kHz to 12.5kHz	1.5dB

CEL-620 with CEL-251 Microphone directional response (dB) relative to zero degrees.
Orientation of CEL-62X - Display at 90 degrees relative to ground.

Nominal Frequency (Hz)	Actual Frequency (Hz)	0 Deg	10 Deg	20 Deg	30 Deg	40 Deg	50 Deg	60 Deg	70 Deg	80 Deg	90 Deg	100 Deg	110 Deg	120 Deg	130 Deg	140 Deg	150 Deg
500	501.19	0.00	0.00	0.00	0.00	-0.01	-0.03	-0.06	-0.11	-0.16	-0.21	-0.25	-0.27	-0.28	-0.28	-0.28	-0.27
630	630.96	0.00	0.00	0.02	0.04	0.06	0.07	0.06	0.02	-0.04	-0.12	-0.21	-0.28	-0.33	-0.34	-0.34	-0.34
800	794.33	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.05	0.02	-0.07	-0.20	-0.31	-0.35	-0.36	-0.33
1000	1000.00	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.04	0.03	0.04	0.04	-0.08	-0.26	-0.34	-0.30	-0.23
1250	1258.92	0.00	0.01	0.03	0.02	-0.07	-0.22	-0.34	-0.31	-0.15	-0.05	-0.03	-0.05	-0.24	-0.59	-0.65	-0.51
1600	1584.89	0.00	-0.01	-0.03	-0.09	-0.15	-0.15	0.02	0.16	0.01	-0.05	0.24	0.24	0.11	-0.25	-0.64	-0.47
2000	1995.26	0.00	-0.01	0.01	-0.05	-0.28	-0.50	-0.36	-0.20	-0.31	-0.07	-0.26	-0.09	0.15	-0.11	-0.73	-1.05
2240	2238.72	0.00	-0.07	-0.24	-0.49	-0.56	-0.36	-0.54	-0.87	-0.59	-0.54	-0.28	-0.54	-0.10	-0.27	-0.92	-1.35
2500	2511.88	0.00	-0.10	-0.30	-0.44	-0.42	-0.80	-1.12	-0.82	-1.25	-0.95	-0.79	-0.72	-0.75	-0.45	-1.02	-1.58
2800	2818.38	0.00	-0.02	0.01	0.14	-0.02	-0.76	-0.84	-1.22	-1.37	-1.78	-1.18	-0.94	-1.12	-0.34	-0.69	-1.88
3150	3162.27	0.00	0.07	0.26	0.57	0.41	0.02	-0.06	-1.16	-0.83	-0.68	-1.38	-0.80	-0.52	-0.26	-0.21	-1.36
3550	3548.13	0.00	-0.12	0.07	0.77	1.23	1.10	1.03	0.44	-0.53	-0.38	-0.31	-0.26	-0.45	-0.49	0.62	-0.59
4000	3981.07	0.00	-0.27	-0.82	-1.02	-0.98	-0.98	0.18	-0.16	-1.03	-1.78	-1.55	-1.66	-1.13	-1.64	-0.51	-1.49
4500	4466.83	0.00	0.14	0.10	-0.57	-0.96	-2.12	-1.25	-0.69	-1.10	-2.06	-2.95	-2.20	-2.33	-1.84	-1.34	-1.50
5000	5011.86	0.00	-0.22	-0.42	0.14	-0.03	-0.18	-2.12	-1.99	-0.54	-1.24	-2.52	-2.73	-2.35	-1.45	-2.52	-1.18
5600	5623.40	0.00	-0.14	-0.12	-0.60	-0.45	-0.69	-0.37	-2.01	-1.84	-0.68	-2.16	-2.45	-2.31	-2.50	-2.53	-0.85
6300	6309.56	0.00	0.30	0.96	0.94	0.22	-1.14	-1.36	-0.25	-1.95	-2.02	-1.50	-2.13	-3.21	-3.48	-2.99	-1.10
7100	7079.45	0.00	0.16	0.06	-0.99	-1.64	-1.27	-0.83	-2.04	-3.21	-2.66	-2.37	-4.39	-3.44	-2.61	-3.21	-4.29
8000	7943.27	0.00	-0.28	-0.34	-0.55	-0.47	-1.52	-1.83	-1.99	-2.41	-4.06	-3.14	-3.68	-5.20	-3.60	-4.02	-4.53
8500	8413.94	0.00	-0.08	-0.66	-0.73	-1.06	-1.11	-2.71	-2.49	-2.77	-4.26	-4.25	-3.27	-6.01	-4.69	-4.62	-5.45
9000	8912.49	0.00	0.01	0.15	-0.40	-0.93	-1.50	-1.36	-3.30	-2.57	-3.43	-4.29	-2.58	-5.63	-4.75	-4.34	-5.53
9500	9440.59	0.00	-0.12	-0.61	-0.98	-1.07	-1.95	-2.23	-3.69	-3.05	-3.79	-6.18	-3.46	-7.41	-4.96	-5.05	-5.91
10000	9999.98	0.00	-0.12	-0.03	-0.36	-1.42	-1.54	-2.70	-2.36	-3.47	-3.48	-4.85	-4.69	-6.53	-6.43	-5.02	-5.12
10600	10592.52	0.00	0.09	-0.66	-0.64	-0.95	-2.05	-2.18	-3.76	-5.49	-4.18	-5.30	-7.67	-4.94	-7.23	-5.49	-5.74
11200	11220.16	0.00	-0.16	-0.36	-1.00	-1.78	-2.14	-3.28	-3.76	-4.71	-4.82	-5.82	-7.95	-5.48	-8.29	-6.30	-6.97
11800	11885.00	0.00	-0.17	-0.40	-1.05	-1.36	-2.36	-3.06	-3.89	-4.67	-6.56	-6.05	-8.09	-5.45	-9.54	-6.80	-7.32
12500	12589.23	0.00	-0.34	-0.59	-1.05	-2.02	-2.69	-3.45	-4.72	-5.59	-7.47	-6.61	-8.44	-6.05	-10.78	-7.16	-8.12

Maximum expanded uncertainty of above data with 95% probability (k=2)

500Hz to 1kHz	0.3dB
>1kHz to 4kHz	0.5dB
>4kHz to 8kHz	1.0dB
>8kHz to 12.5kHz	1.5dB

CEL-620 with CEL-252 Microphone directional response (dB) relative to zero degrees, horizontal plane.
Orientation of CEL-62X - Display at 0 degrees relative to ground.

Freq, Hz	Horizontal directional response of 62X with CEL-252 microphone measured in anechoic free field dB																		
	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°	130°	140°	150°	160°	170°	180°
251.2	0	0.4	-0.1	0.2	-0.3	0.1	0.1	0.1	0.2	0.1	-0.2	0.2	0.2	0	-0.1	0.3	0.4	0.2	0
316.2	0	0	-0.4	-0.5	0.2	-0.4	-0.5	-0.1	-0.2	-0.2	-0.4	-0.2	-0.2	-0.4	-0.5	-0.2	-0.1	-0.6	-0.3
398.1	0	0.4	0.6	0.2	-0.1	0.2	-0.4	0.4	0.3	0.6	0	0.6	0.8	0.7	0.2	0.5	0.6	0.7	0.8
501.2	0	-0.2	-0.2	-0.2	-0.3	-0.4	-0.3	-0.4	-0.3	-0.3	-0.7	-0.4	-0.7	-0.6	-0.6	-0.5	-0.5	-0.3	-0.4
631	0	0	0	0	-0.2	-0.1	-0.1	-0.1	-0.3	-0.3	-0.3	-0.5	-0.4	-0.5	-0.3	-0.4	-0.3	-0.2	-0.4
794.3	0	-0.1	0	0	0	0	0.1	0	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.3	-0.2	-0.1	-0.1	0
1000	0	0.1	0.1	0.1	0	0.1	0.2	0.2	0.2	0.1	0	-0.1	-0.1	-0.3	-0.2	-0.2	-0.1	-0.1	-0.1
1258.9	0	0	0	0	0	0	0	0	0.2	0.3	0.3	0	-0.3	-0.4	-0.3	-0.2	0	0.1	0.1
1584.9	0	0.1	0.1	0.3	0.2	0.4	0.4	0.2	0.3	0.4	0.5	0.7	0.4	0.1	0.1	0.1	0.3	0.6	0.6
1995.3	0	0	0	-0.1	-0.4	-0.7	-0.5	-0.4	-0.3	-0.4	-0.3	0	-0.2	-0.7	-1	-1	-0.7	-0.4	-0.3
2238.7	0	-0.1	-0.2	-0.3	-0.3	-0.3	-0.6	-0.5	-0.3	-0.4	-0.5	-0.3	0.3	-0.1	-0.5	-0.5	-0.1	0.2	0.3
2511.9	0	0	-0.2	-0.3	-0.6	-0.8	-0.8	-1.1	-1	-0.7	-0.7	-0.7	-0.9	-0.8	-1.1	-1.5	-1.2	-0.7	-0.6
2818.4	0	0	0.1	0	-0.4	-0.8	-1.2	-1.3	-1.7	-1.5	-1.5	-1.8	-1.1	-1.2	-1.8	-2	-1.7	-1.1	-0.9
3162.3	0	0	0	0.1	0.2	0.2	-0.5	-1	-1	-1.2	-0.7	-0.5	-1	-0.5	-0.8	-1.5	-1.2	-0.5	-0.2
3548.1	0	0	-0.1	0.1	0.5	0.6	0.7	0	-0.7	-0.5	-0.4	-0.4	-0.7	-0.3	-0.4	-1	-1.1	-0.1	0.3
3981.1	0	-0.1	-0.4	-0.9	-1	-0.8	-0.4	-0.3	-1.2	-1.8	-2.1	-1.7	-1.1	-1.6	-1.2	-2	-2.1	-1.1	-0.7
4466.8	0	-0.1	-0.2	-0.6	-0.8	-1.5	-1.4	-0.9	-1.1	-2.2	-2.6	-2.3	-1.6	-2	-1.8	-2.3	-2.9	-1.7	-1
5011.9	0	-0.1	-0.1	-0.3	-0.2	-0.7	-1.3	-1	-0.9	-1.4	-2.7	-2.4	-1.6	-1.8	-1.7	-2	-3	-1.6	-0.7
5623.4	0	-0.1	-0.1	0.1	-0.5	-0.8	-1.3	-1.5	-1	-1.6	-2.6	-2.6	-2.3	-1.6	-2.1	-2.1	-3.6	-2.3	-1.1
6309.6	0	-0.1	-0.1	-0.2	0	0	-0.7	-1.8	-1.7	-1.3	-1.7	-3.4	-2.6	-1.7	-2.7	-2.3	-3.4	-2.6	-1.2
7079.5	0	-0.1	-0.1	-0.4	-1.1	-1.7	-1.1	-2.1	-3.2	-2.5	-2.7	-3.6	-3.1	-3	-3.2	-3.3	-4.5	-4.4	-2.9
7943.3	0	-0.1	-0.3	-0.5	-0.9	-1.5	-1.7	-1.6	-3	-3.4	-2.5	-4.4	-4.9	-3.6	-3.2	-3.6	-4.2	-4.8	-2.8
8414	0	0	-0.3	-0.6	-0.6	-1.3	-2.2	-2.2	-2.6	-4	-3	-4.1	-5.1	-4	-3.6	-4.2	-4.4	-5.7	-3.3
8912.5	0	0	-0.1	-0.5	-1	-1.2	-2.2	-2.5	-2.5	-4.6	-3.2	-3.4	-5	-4.4	-3.9	-4.4	-4.3	-5.8	-3.4
9440.6	0	-0.1	-0.3	-0.3	-0.8	-1.3	-2	-3	-2.4	-4.4	-4.3	-3.8	-5.7	-4.9	-4.6	-5	-4.6	-6.5	-4
10000	0	-0.1	-0.5	-1	-1.2	-2	-2.1	-3.7	-3.5	-4.2	-5.3	-4.2	-6.6	-5.5	-5.3	-5.4	-5.2	-7.3	-4.6
10592.5	0	-0.1	-0.2	-0.7	-1.4	-1.8	-2.6	-3.4	-4	-3.9	-6.5	-4.7	-6.7	-6.5	-5.5	-5.9	-5.6	-7.9	-5
11220.2	0	0	-0.2	-0.6	-1.2	-1.9	-2.6	-2.8	-4.8	-4	-6.5	-5	-6.1	-6.8	-5.6	-6.1	-5.9	-7.9	-5.2
11885	0	-0.1	-0.4	-0.7	-1.4	-2	-3.1	-3.6	-5.1	-4.7	-6.5	-5.9	-6.3	-7.6	-6.1	-6.5	-6.6	-8.6	-5.9
12589.3	0	-0.1	-0.5	-1	-1.5	-2.3	-3.2	-4.1	-4.6	-5.6	-6	-6.9	-6.9	-8.7	-7.1	-7.3	-7.5	-9.2	-6.6
13335.2	0	-0.1	-0.4	-0.9	-1.7	-2.4	-3.3	-4.5	-4.7	-7	-6	-8.4	-6.6	-9.4	-7.6	-7.4	-7.9	-9.3	-6.8
14125.4	0	-0.1	-0.5	-1	-1.7	-2.7	-3.5	-4.9	-5.2	-7.3	-6.2	-9.2	-7.4	-9.4	-7.7	-8	-8.5	-9.5	-7.5
14962.4	0	-0.1	-0.6	-1.2	-1.9	-2.9	-4	-4.8	-6.5	-7	-6.9	-9.8	-7.8	-9.9	-8.7	-8.7	-9.5	-9.9	-7.9
15848.9	0	-0.1	-0.5	-1.1	-2	-3	-4.1	-5.1	-6.9	-6.8	-8.5	-9.3	-8.2	-10.4	-9.8	-9.4	-9.9	-10	-8.8
16788	0	-0.2	-0.6	-1.3	-2.3	-3.2	-4.5	-5.8	-6.7	-6.9	-9.8	-9.1	-10	-10.7	-10.7	-10.1	-10.5	-10.1	-9.2
17782.8	0	-0.1	-0.6	-1.4	-2.2	-3.6	-4.6	-6.1	-6.9	-8.7	-10.6	-9.1	-11.4	-10.7	-11.6	-10.9	-11.3	-10.6	-10.1
18836.5	0	-0.2	-0.8	-1.5	-2.7	-3.7	-5.2	-6.4	-7.8	-10	-10.3	-9.5	-11.9	-11.3	-12	-10.9	-11.1	-10.5	-10.4
19952.6	0	-0.2	-0.8	-1.7	-2.7	-4.2	-5.6	-7.1	-8.9	-9.8	-9.2	-11	-13.8	-11.4	-12.8	-11.7	-12	-11.3	-11.3

CEL-620 with CEL-252 Microphone directional response (dB) relative to zero degrees, vertical plane.

Orientation of CEL-62X - Display at 0 degrees relative to ground.

Freq, Hz	Vertical directional response of 62X with CEL-252 microphone measured in anechoic free field dB																		
	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°	130°	140°	150°	160°	170°	180°
251.2	0	0.1	0.1	0.1	0	0	0	0	0	-0.1	-0.1	-0.2	-0.2	-0.2	-0.3	-0.3	-0.3	-0.3	-0.3
316.2	0	0	0	0	-0.1	0	0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.3	-0.3	-0.3	-0.3
398.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.1	-0.1	-0.1	0
501.2	0	0	-0.1	-0.1	-0.2	-0.2	-0.3	-0.3	-0.3	-0.3	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	0	0	0
631	0	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.3	-0.3	-0.4	-0.4	-0.5	-0.4	-0.4	-0.3	-0.3	-0.2	-0.2	-0.2
794.3	0	0	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0	-0.1	-0.1	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1
1000	0	0	-0.1	-0.1	-0.1	-0.1	-0.1	0	-0.1	-0.1	-0.3	-0.4	-0.4	-0.4	-0.4	-0.3	-0.2	-0.1	-0.1
1258.9	0	-0.1	-0.1	-0.1	-0.1	-0.1	0	0.1	0.2	0.3	0.1	-0.2	-0.4	-0.5	-0.4	-0.2	0	0.1	0.2
1584.9	0	0.1	0.2	0.3	0.3	0.4	0.3	0.2	0.3	0.5	0.9	1	0.6	0.1	-0.2	0	0.3	0.6	0.6
1995.3	0	-0.1	-0.2	-0.3	-0.6	-0.8	-0.7	-0.7	-0.8	-0.7	-0.4	-0.1	-0.3	-0.8	-1	-1	-0.6	-0.2	0
2238.7	0	0	-0.1	-0.1	-0.1	-0.2	-0.5	-0.4	-0.4	-0.5	-0.4	0.1	0.5	0	-0.7	-0.8	-0.4	0	0.1
2511.9	0	-0.1	-0.2	-0.4	-0.7	-0.9	-1	-1.4	-1.2	-1.2	-1.2	-1.2	-1	-0.8	-1.4	-1.9	-1.4	-0.9	-0.6
2818.4	0	0	-0.1	-0.3	-0.7	-1	-1.4	-1.6	-2.1	-1.7	-2	-1.9	-1	-1.1	-1.8	-2.3	-1.9	-1.2	-0.9
3162.3	0	0.1	0.2	0.4	0.5	0	-0.5	-0.8	-0.9	-1.3	-0.8	-0.8	-1	-0.1	-0.7	-1.7	-1.4	-0.5	-0.3
3548.1	0	-0.2	-0.3	0	0.8	1	0.8	-0.3	-0.6	-0.7	-0.8	-1	-0.7	0	-0.1	-1.1	-1.2	-0.1	0.3
3981.1	0	-0.2	-0.8	-1.3	-1.4	-1	-0.2	-0.2	-1.7	-1.9	-2.4	-1.7	-1.6	-1.4	-0.8	-1.9	-2.3	-1.1	-0.6
4466.8	0	0.1	0.1	-0.2	-1.3	-2.2	-1.8	-0.9	-1	-2.7	-2.5	-2.2	-2.4	-1.9	-1.5	-2.3	-3.2	-1.8	-1.1
5011.9	0	-0.2	-0.3	-0.5	0.2	-0.2	-2.7	-1.7	-0.9	-1.5	-2.8	-2.4	-2.6	-2.4	-1.2	-2.1	-3.3	-1.7	-0.9
5623.4	0	0.1	-0.1	-0.7	-1.1	-0.5	-0.7	-2.6	-2.2	-1.5	-2.7	-2.7	-2.9	-3	-1.2	-2	-4	-2.3	-1.2
6309.6	0	0	0	0.4	0.8	-1.2	-1.2	-0.3	-2.3	-1.8	-1.6	-2.1	-3.3	-3.1	-3	-1.3	-3.1	-2.4	-1.3
7079.5	0	0.1	0	-0.6	-1.8	-1.6	-0.6	-2.3	-3.7	-2.5	-2.2	-5.1	-3.1	-2.9	-4	-3.5	-5.5	-4.6	-3
7943.3	0	-0.1	-0.3	-0.9	-0.7	-1.5	-2.5	-1.9	-2.7	-4.9	-3	-3.7	-4.5	-3.7	-4.7	-3.1	-5.2	-5.4	-3.2
8414	0	-0.1	-0.2	-0.4	-0.9	-0.9	-2.4	-2.2	-2.6	-4	-3.6	-3.1	-5.7	-4.2	-4.4	-3.6	-4.9	-6	-3.4
8912.5	0	0.1	-0.4	-0.5	-0.9	-1.2	-1.7	-2.8	-2.4	-3.2	-5.1	-3	-5.8	-4.4	-4.1	-4	-4.7	-6.4	-3.7
9440.6	0	0	0	-0.6	-0.9	-1.7	-1.6	-3.3	-3	-3.4	-5.6	-2.6	-6.3	-5	-4.5	-4.6	-5	-6.6	-4.1
10000	0	-0.2	-0.7	-0.8	-1.4	-1.8	-2.8	-3.3	-4.1	-4.1	-6.4	-4.5	-6.4	-5.7	-5.6	-5.6	-5.9	-7.7	-4.7
10592.5	0	0	-0.2	-0.8	-0.8	-1.8	-2.2	-2.4	-4.7	-3.9	-4.8	-5.1	-5.7	-5.3	-5.6	-5.7	-5.7	-7.6	-4.5
11220.2	0	-0.1	-0.3	-0.5	-1.4	-1.9	-2.7	-3.7	-4.4	-4.4	-5.3	-7.1	-5.5	-7.8	-5.9	-6.5	-6.2	-8.5	-5.1
11885	0	-0.1	-0.4	-0.9	-1.1	-2.1	-3.1	-3.6	-3.9	-5.8	-5.3	-8.4	-4.6	-9.3	-6	-7.5	-6.7	-9.6	-5.8
12589.3	0	-0.2	-0.7	-1	-2	-2.6	-3.2	-4.4	-5.3	-6.9	-6.4	-8.5	-5.9	-9.7	-7.3	-9.2	-7.3	-10.7	-6.7
13335.2	0	-0.1	-0.2	-0.9	-1.3	-2.3	-3.3	-4.3	-5.1	-6.2	-5.7	-7.9	-6.6	-10.3	-7.1	-9.2	-7.2	-10.6	-6.7
14125.4	0	-0.2	-0.7	-1.1	-2	-2.9	-3.7	-4.9	-5.8	-6.3	-7.9	-8	-7.9	-10	-8.2	-9.2	-7.6	-12	-7.6
14962.4	0	-0.3	-0.6	-1.1	-1.7	-2.9	-4	-5	-6.2	-6.9	-9.1	-8.3	-10.3	-9.6	-9	-8.5	-8	-12.7	-8.1
15848.9	0	-0.2	-0.5	-1.3	-2	-3	-4.3	-5.4	-6.6	-7.5	-9.2	-8.5	-12.1	-8.8	-9.7	-8.8	-8.6	-13.5	-8.8
16788	0	-0.2	-0.6	-1.1	-2.2	-3.2	-4.3	-5.6	-6.9	-8.2	-8.6	-8.6	-11.6	-7.9	-11.5	-9.6	-8.8	-13.2	-9.1
17782.8	0	-0.1	-0.6	-1.4	-2.2	-3.6	-5	-6.1	-7.3	-8.8	-9.3	-10	-11.5	-9.4	-13.2	-11.9	-10.1	-14.6	-10.2
18836.5	0	-0.1	-0.8	-1.3	-2.5	-3.7	-4.9	-6.5	-8.3	-9.6	-10.1	-12.4	-12.2	-10.5	-13.8	-11.6	-11.5	-15.3	-10.9
19952.6	0	-0.2	-0.6	-1.6	-2.4	-4	-5.7	-7	-8.2	-9.1	-10.3	-12.7	-12.5	-12.1	-16.6	-10.7	-13.3	-16.3	-11.7

CEL-620 with MIC1 Microphone directional response (dB) relative to zero degrees, horizontal plane.

Orientation of CEL-62X - Display at 0 degrees relative to ground.

Freq, Hz	Horizontal Directional response of 62X with MIC1 microphone measured in anechoic free field dB																		
	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°	130°	140°	150°	160°	170°	180°
251.2	0	-0.1	-0.1	-0.1	0	-0.1	-0.1	-0.2	-0.2	-0.2	-0.1	-0.2	-0.2	-0.1	-0.2	-0.2	-0.1	-0.1	-0.2
316.2	0	-0.1	-0.2	-0.1	-0.1	-0.1	-0.2	-0.1	-0.2	-0.2	-0.2	-0.3	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
398.1	0	-0.1	-0.1	0	0	-0.1	-0.2	-0.1	-0.1	-0.1	-0.2	-0.2	-0.1	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1
501.2	0	0	-0.1	0	-0.1	-0.1	-0.2	-0.2	-0.3	-0.3	-0.3	-0.4	-0.5	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
631	0	0	0	0	0	0	0	-0.1	-0.1	-0.2	-0.3	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.3
794.3	0	-0.2	-0.2	0	-0.1	-0.2	-0.2	-0.1	-0.1	-0.1	-0.3	-0.3	-0.4	-0.5	-0.4	-0.4	-0.4	-0.4	-0.4
1000	0	0	0	0	0	0	0.1	0.1	0.2	0.1	0	-0.1	-0.2	-0.2	-0.1	-0.1	0	0	0.1
1258.9	0	0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0	0.2	0.2	0	-0.3	-0.4	-0.4	-0.3	-0.2	-0.1	-0.1
1584.9	0	0	0	0.1	0.2	0.3	0.3	0.2	0.2	0.2	0.4	0.4	0.3	0.1	0	0	0.2	0.3	0.4
1995.3	0	0	0	-0.1	-0.3	-0.6	-0.5	-0.3	-0.3	-0.4	-0.4	0	0.2	-0.2	-0.6	-0.6	-0.3	-0.1	0
2238.7	0	0	-0.2	-0.3	-0.3	-0.3	-0.6	-0.7	-0.6	-0.6	-0.5	-0.5	-0.5	-0.4	-0.7	-1.1	-0.9	-0.5	-0.4
2511.9	0	0	0	-0.2	-0.4	-0.7	-0.6	-0.9	-1	-0.8	-1	-0.7	-0.2	-0.5	-0.8	-1	-0.8	-0.4	-0.3
2818.4	0	0.1	0.3	0.4	0.2	-0.1	-0.5	-0.5	-0.8	-0.5	-0.3	-0.5	-0.8	-0.2	-0.7	-1.2	-0.8	-0.3	-0.1
3162.3	0	0	0.1	0.2	0.6	0.9	0.5	0	-0.1	-0.5	-0.1	-0.4	-0.1	0.1	-0.2	-0.7	-0.8	-0.1	0.2
3548.1	0	-0.1	-0.3	-0.3	0.1	0.3	0.9	0.4	-0.2	-0.3	-0.6	0	0.2	-0.1	0.1	-0.8	-0.7	0.1	0.4
3981.1	0	0	-0.3	-0.8	-1.1	-1.2	-0.7	-0.3	-0.9	-1.5	-1.7	-0.7	-0.9	-1	-1.1	-1.7	-2	-1.1	-0.7
4466.8	0	0.1	0.1	0.1	0.3	-0.5	-0.6	-0.1	0.2	-0.7	-0.9	-0.6	-0.5	-0.5	-0.6	-1.1	-1.7	-0.5	0
5011.9	0	0.1	0.2	0	0.1	-0.1	-0.2	-0.4	0.1	0	-1.1	-0.5	-0.5	-0.3	-0.4	-1	-1.7	-0.6	0.1
5623.4	0	0	0	0.3	0.3	0.2	0	-0.1	0	0.3	-0.4	-0.8	-0.7	0.2	-0.3	-0.6	-1.7	-0.8	0.3
6309.6	0	0	0	-0.1	0	0.6	0.6	0.1	0	0.1	0.5	-0.8	-0.1	0.2	-0.7	-0.6	-1.3	-0.7	0.6
7079.5	0	0.1	0.1	0.3	0.2	-0.4	-0.1	0.3	-0.6	0	0.4	-0.5	-0.7	-0.3	-0.4	-0.8	-1.7	-1.8	-0.3
7943.3	0	-0.1	-0.2	-0.3	-0.4	-0.6	-1	-0.6	-0.5	-1.8	-0.1	-1.2	-1.5	-1	-0.7	-1.4	-2	-2.5	-0.8
8414	0	-0.1	-0.2	-0.4	-0.5	-0.5	-1.1	-1.3	-0.2	-1.8	-0.6	-0.6	-1.7	-1.5	-1	-1.5	-2.1	-2.9	-1.1
8912.5	0	-0.1	-0.3	-0.3	-0.8	-0.7	-0.8	-1.6	-0.5	-1.7	-1	-0.5	-2	-1.4	-1	-1.6	-2	-3.1	-1.1
9440.6	0	-0.1	-0.4	-0.7	-0.8	-1.5	-1.1	-2.1	-1.6	-1.4	-2.4	-1.1	-2.8	-1.7	-1.8	-2.3	-2.5	-3.9	-1.9
10000	0	0	0.1	-0.2	-0.8	-1.1	-1.5	-1.5	-2.2	-1	-2.6	-0.9	-2.7	-2.3	-2	-2.1	-2.5	-3.8	-1.7
10592.5	0	-0.1	-0.3	-0.5	-0.7	-1.3	-2.2	-1.5	-3	-1.3	-3.4	-1.6	-2.6	-3.3	-2.2	-2.5	-3	-4.4	-2
11220.2	0	-0.1	-0.3	-0.5	-1	-1.3	-2	-2.3	-3.1	-2.4	-3.1	-2.2	-2.1	-3.4	-2.4	-2.9	-3.4	-4.8	-2.4
11885	0	0	-0.1	-0.5	-0.8	-1.4	-1.9	-2.9	-2.2	-3.2	-2.4	-3	-2.5	-3.5	-2.5	-2.9	-3.8	-5.2	-2.6
12589.3	0	0	0	0	-0.6	-0.9	-1.4	-2.5	-2	-4	-1.8	-3.9	-1.9	-4.4	-2.8	-3	-3.8	-5.1	-2.5
13335.2	0	0	-0.1	-0.2	-0.2	-0.9	-1.5	-2.1	-2.7	-3.9	-2.2	-4.4	-2.2	-4.4	-2.8	-3.3	-4.1	-5.4	-2.9
14125.4	0	0	0	-0.1	-0.3	-0.5	-1.2	-1.6	-3.1	-2.5	-2.5	-4	-1.9	-3.9	-2.6	-3.3	-4.2	-5.1	-2.8
14962.4	0	0.1	0	0.1	-0.1	-0.3	-0.8	-1.8	-2.8	-2.2	-3.7	-3.4	-2.2	-3.4	-3.4	-3.6	-4.2	-5.1	-3
15848.9	0	0	-0.1	-0.2	-0.2	-0.5	-0.8	-1.7	-2	-2.7	-5	-2.9	-2.9	-4	-4	-3.7	-4.4	-5.3	-3.3
16788	0	-0.1	-0.2	-0.6	-0.6	-0.9	-1	-1.6	-2.4	-4.3	-4.6	-2.7	-4.6	-3.9	-4.3	-4.1	-4.7	-5.4	-3.8
17782.8	0	-0.1	-0.5	-0.8	-1.4	-1.3	-1.9	-2.2	-3.4	-5.1	-4.4	-3.6	-5.8	-4.3	-5.3	-4.6	-5.2	-5.9	-4.6
18836.5	0	-0.1	-0.5	-1.1	-1.6	-2.4	-2.3	-2.9	-4	-4.3	-4.1	-5.1	-6.9	-4.9	-6.6	-5.4	-5.6	-6.3	-5.6
19952.6	0	0	-0.3	-0.9	-1.7	-2.2	-2.7	-3.1	-3.4	-4.1	-5.2	-7.1	-7.3	-4.8	-6.6	-6.1	-6.3	-6.9	-6.4

CEL-620 with MIC1 Microphone directional response (dB) relative to zero degrees, vertical plane.

Orientation of CEL-62X - Display at 90 degrees relative to ground.

Freq, Hz	Vertical Directional response of 62X with MIC1 microphone measured in anechoic free field dB																		
	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°	130°	140°	150°	160°	170°	180°
251.2	0	-0.1	-0.2	-0.2	-0.2	-0.4	-0.1	-0.3	-0.2	-0.2	-0.3	-0.3	-0.2	-0.5	-0.3	-0.3	-0.3	-0.4	-0.3
316.2	0	-0.2	-0.1	-0.2	-0.2	-0.2	-0.3	-0.3	-0.3	-0.5	-0.4	-0.4	-0.5	-0.4	-0.4	-0.4	-0.4	-0.3	-0.3
398.1	0	-0.2	-0.7	-0.7	-0.4	-0.5	-0.5	-0.3	-0.6	-0.2	-0.6	-0.5	-0.5	-0.7	-0.6	-0.6	-0.1	-0.6	-0.3
501.2	0	0.2	0	-0.1	0	-0.3	-0.1	-0.4	-0.3	-0.3	-0.6	-0.7	-0.6	-0.5	-0.8	-0.6	-0.4	-0.5	-0.3
631	0	0	0.1	0	0	0	0	-0.1	-0.1	-0.2	-0.3	-0.4	-0.4	-0.4	-0.4	-0.4	-0.3	-0.3	-0.3
794.3	0	0	-0.1	0	0.1	0	0.1	0.1	0	-0.1	-0.1	-0.3	-0.4	-0.4	-0.5	-0.4	-0.3	-0.3	-0.3
1000	0	0.1	0.1	0	0.1	0.1	0.1	0.2	0.3	0.3	0.2	0.1	0	-0.1	-0.1	0	0.1	0.2	0.2
1258.9	0	0	0	0.1	0.1	0.1	0.2	0.2	0.4	0.5	0.5	0.3	0	-0.1	-0.1	0	0.2	0.2	0.3
1584.9	0	-0.1	-0.1	0.1	0.2	0.3	0.2	0.3	0.2	0.3	0.6	0.8	0.7	0.3	0.1	0.2	0.3	0.6	0.5
1995.3	0	0	0	-0.1	-0.3	-0.5	-0.7	-0.7	-0.8	-0.6	-0.3	0.1	0	-0.8	-1.1	-1	-0.6	-0.4	-0.2
2238.7	0	0	-0.2	-0.4	-0.5	-0.4	-0.6	-0.7	-0.5	-0.8	-1	-0.6	0.1	0	-0.8	-1	-0.5	-0.1	0.1
2511.9	0	0	-0.1	-0.1	-0.3	-0.6	-0.6	-0.7	-0.9	-0.6	-0.7	-0.4	-0.1	-0.2	-0.7	-1.1	-0.8	-0.3	-0.1
2818.4	0	0	0.1	0.2	-0.1	-0.3	-0.7	-0.8	-1	-1.1	-1.1	-1.6	-1	-0.2	-1.1	-1.8	-1.4	-0.7	-0.5
3162.3	0	0.1	0.4	0.6	0.6	0.7	0.3	-0.1	-0.2	-0.5	-0.5	-0.3	-0.1	0.3	0.1	-0.9	-0.9	-0.1	0.3
3548.1	0	-0.1	-0.5	-0.7	0.1	0.8	0.9	0.4	-0.3	-0.1	-0.5	-0.1	-0.7	0.3	0.4	-0.9	-1.1	-0.1	0.3
3981.1	0	0	-0.2	-0.9	-1.5	-1.6	-0.2	0	-0.5	-1.3	-1	-1.2	-1.4	-1	-0.4	-1.5	-2.2	-1.1	-0.5
4466.8	0	0.3	0.8	1	0.6	-0.5	-1.1	0.6	0.8	0	-0.4	-0.9	-0.4	-0.9	0.4	-0.8	-1.7	-0.5	0.2
5011.9	0	-0.1	-0.2	-0.4	0.2	0.8	-0.2	-1.5	0.6	0.6	-0.8	-0.9	-0.8	-1.3	0	-0.6	-2.1	-0.9	0
5623.4	0	0.2	0.4	0.3	-0.5	-0.5	0.9	0.1	-1.7	0.9	0.4	-1.1	-0.8	-1.4	0	0	-2.7	-1	0.1
6309.6	0	0	0	-0.1	1.2	0.9	-1.2	1.1	0.4	-1.5	0.1	0.5	-0.9	-1.3	-1.7	0.7	-1.3	-0.7	0.4
7079.5	0	0	0.6	0.9	0.4	-1.3	0.1	0.3	0	-0.1	1.3	-1.1	0.1	0.5	-0.9	0	-2.4	-2.1	-0.4
7943.3	0	-0.2	-0.2	-0.3	-0.6	0	-1.3	-0.8	-0.4	-1.3	-0.8	-0.2	-2	-1.3	-1	-0.6	-2.3	-3.6	-1.3
8414	0	0	-0.2	-0.2	-0.4	-0.5	-0.2	-1.2	-0.4	-0.3	-1.7	0.7	-2.1	-0.9	-0.5	-0.8	-1.7	-3.9	-1.2
8912.5	0	0.2	0.3	-0.5	-0.6	-1.3	-0.7	-2	-1.2	-0.6	-2.9	0.1	-2.5	-1.1	-1.2	-2	-1.8	-4.2	-1.8
9440.6	0	-0.2	-0.5	-0.4	-1.2	-1.1	-1.8	-1.6	-2.4	-1.7	-2.9	-1.2	-2.5	-1.9	-2.3	-2.9	-2.3	-5.2	-2.5
10000	0	0.1	-0.1	-0.6	-0.5	-1.3	-1.7	-1.2	-2.7	-1.6	-1.7	-2	-2	-2.8	-2.4	-3.2	-2.2	-5.3	-2.3
10592.5	0	-0.2	-0.2	-0.2	-1	-1.3	-1.8	-2.3	-2.4	-2.2	-1.7	-3.7	-1.6	-3.7	-2.6	-4.2	-2.4	-5.8	-2.7
11220.2	0	-0.1	-0.4	-0.8	-0.7	-1.3	-2.1	-2.6	-2.1	-3.2	-2.4	-4.4	-1	-4.3	-2.7	-4.2	-2.6	-6.2	-3.1
11885	0	-0.1	-0.2	-0.3	-1.1	-1.4	-1.4	-2.6	-2.6	-4.2	-2.6	-4.3	-1.5	-5	-2.9	-4.2	-2.9	-6.7	-3.4
12589.3	0	0	0.1	-0.2	-0.3	-0.9	-1.9	-2.4	-3.4	-2.7	-2.7	-3.2	-1.9	-4.4	-2.6	-3.4	-2.9	-6.9	-3.2
13335.2	0	-0.1	-0.3	-0.1	-0.6	-0.9	-1.4	-2	-2.8	-2.7	-3.4	-2.7	-3.5	-4.1	-2.8	-3.3	-3.4	-7.1	-3.6
14125.4	0	-0.2	0	-0.2	-0.2	-0.7	-1.5	-2.2	-2.8	-3.1	-4.6	-3	-4.1	-3.5	-2.9	-3.1	-3.5	-7.1	-3.7
14962.4	0	0.1	0.2	-0.1	-0.1	-0.2	-0.6	-1.5	-2.4	-3.5	-3.7	-2.5	-5.4	-2.2	-4.3	-3.4	-3.7	-7.1	-3.9
15848.9	0	0.1	-0.4	-0.2	-0.5	-0.7	-0.9	-1.8	-2.6	-3.5	-3.1	-3.2	-5.2	-1.5	-4.9	-4	-3.9	-6.8	-3.9
16788	0	-0.1	-0.2	-0.6	-0.6	-0.9	-1.2	-1.7	-2.5	-3.7	-3.6	-4	-3.9	-2.2	-5.2	-5	-4.7	-7.4	-4.7
17782.8	0	0	-0.6	-0.8	-1.5	-1.5	-1.7	-2.3	-3.3	-4	-4.9	-6.1	-4.7	-3.7	-6.5	-4.8	-5.5	-7.8	-5.4
18836.5	0	-0.2	-0.6	-1.2	-1.6	-2.4	-2.6	-2.7	-3.2	-4.3	-5.3	-6.2	-5.4	-5.4	-7.7	-4.5	-7.1	-8.8	-6.5
19952.6	0	-0.1	-0.2	-1	-1.7	-2.3	-2.9	-3.3	-4.1	-5.5	-6.8	-6.8	-5.6	-6.7	-8.7	-4.7	-8.5	-9.7	-7.4

Sound Calibrators – Level Corrections

Sound level calibrators apply sound pressure to a microphone in a closed cavity. The response of a microphone in a free field at 1kHz will be slightly different to that of a pressure field. Also some calibrators are affected by the volume of the microphone changing the volume of the calibrator cavity.
The wind screen has an affect on the free field response at 1kHz and this can be compensated for during calibration. NOTE the wind screen is not used with the MIC1 microphone.

Calibration corrections for the CEL-251 and CEL-252 Microphones.

Calibrator	Calibration Level Correction no Wind Screen	Calibration Level Correction with Wind Screen	IEC 60942
Casella CEL-120/1	-0.1dB	0.0dB	Type 1
Casella CEL-120/2	-0.1dB	0.0dB	Type 2
Bruel & Kjear 4231	-0.1dB	0.0dB	Type 1 approved
Cirrus CR:515	-0.1dB	0.0dB	Type 1 approved

Calibration corrections for the CEL-252 Microphone

Calibrator	Calibration Level Correction no Wind Screen	Calibration Level Correction with Wind Screen	IEC 60942
Casella CEL-120/1	-0.1dB	0.0dB	Type 1
Casella CEL-120/2	-0.1dB	0.0dB	Type 2

Calibration corrections for the MIC1 Microphone.

Calibrator	Calibration Level Correction	IEC 60942
Casella CEL-120/1	0.01dB	Type 1
Casella CEL-120/2	0.01dB	Type 2

Examples (applicable to using the CEL-251 and CEL-252 microphones)
The CEL-62X can be calibrated at a nominal level of 94dB or 114dB dependent on the type of calibrator used.

If a CEL-120/1 is used and the certified output of the calibrator is 113.98dB, and it is intended to use the sound level meter without the wind screen, then the calibration level will need to be set to 113.88, rounded to 113.9dB.
Calibrator level 113.98
Correction -0.1
Calibration level = 113.88 rounded to 113.9dB

If a Cirrus CR:515 is used and the certified output of the calibrator is 94.04dB, and it is intended to use the sound level meter with the wind screen fitted, then the calibration level will need to be set to 94.04, rounded to 94.0dB

Calibrator level 94.04
Correction 0.0
Calibration level = 94.04 rounded to 94.0dB

Notes for measuring at low noise levels:

If the measured sound level is less than 10 dB above the SLM's noise floor, uncertainty becomes significant, and the measurement should either be corrected or flagged as potentially inaccurate.

If the signal is not at least 10 dB above the noise floor, and you want to estimate the true sound level, you can apply a logarithmic subtraction (assuming uncorrelated signals):

$$L_{\text{corrected}} = 10 \cdot \log_{10}(10^{L_{\text{measured}}/10} - 10^{L_{\text{noise}}/10})$$

L_{measured}: the measured SPL

L_{noise}: the known noise floor of the meter

The known noise floor of the instrument is on section h, page 30-31.

Over Range Overload Indication

An arrow pointing upwards ⇧ near the top right-hand corner of the screen shows that an overload noise level exceeding the instrument's measurement range has occurred. This overload will be shown at peak levels greater than 143.25dBZ, for other frequencies the overload icon may be displayed for higher or lower values of dBA or dBC.
If this occurs during a measurement run, the measurement values shown will be incorrect, and you may need to consider the validity of any measurements made.

Under Range Indication

CEL-620 instruments provide single measurement range which extends from 140dB down into the electrical noise floor of the circuitry and thermal noise of the microphone. The under-range indicator (an arrow pointing downwards) is displayed when the level at the microphone falls below either 38 dBZ, 30 dBA or 32 dBC. The under-range indicator operates for all frequency ratings concurrently. This means that due to the variation of the frequency weightings with frequency, the actual level at which the under-range indicator is displayed will depend on the frequency content of the signal.
The under-range warning is displayed for a minimum of 1 second or as long as the signal remains below one of the lower boundary levels.
Should both an under range and over range condition occur during a run, an arrow pointing up and down ⇳ will be displayed.

Declarations

UKCA & CE DECLARATION OF CONFORMITY

Casella declares that this product is in compliance with the essential requirements and other relevant provisions of applicable UK and EC directives. A copy of the relevant Declaration of Conformity for this product may be obtained by clicking on the product compliance documentation link at www.casellasolutions.com.

WEEE - INFORMATION FOR EU MEMBER STATES ONLY

The use of the WEEE symbol indicates that this product may not be treated as household waste. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. For more detailed information about recycling of this product, please contact your local waste disposal service or contact the agent where you purchased the product.

Servicing, maintenance and support

Servicing

The CEL 620 series has no user serviceable parts with the exception of the microphone and if a fault is suspected, return the instrument to Casella or a Casella approved service centre.

The warranty DOES NOT extend to cleaning or general servicing of the instrument.

Casella's in-house service department offers a comprehensive range of repair and calibration services designed to maintain a fast and efficient back-up for all our products. The Service Department is operated in accordance with our BSI registration for products manufactured by us. We will however, undertake the repair of other manufacturer's equipment.

For further information please contact our service department at our UK headquarters (salessupport@casellasolutions.com) or contact an approved servicing distributor. We will be happy to provide quotations for individual repairs or provide annual maintenance under contract.

Support

For support, please got to casellasolutions.com or email us at salessupport@casellasolutions.com.

Part numbers and accessories

620 series models	
CEL-620A2	Integrating Digital Sound Level Meter (Class 2)
CEL-620B2	Integrating Octave Band Sound Level Meter (Class 2)
CEL-620A1	Precision Integrating Digital Sound Level Meter (Class 1)
CEL-620B1	Precision Integrating Octave Band Sound (Class 1)

All instruments include a, Field Guide, Certificate of Conformity, Windshield and USB cable

Complete kits are available with an appropriate accuracy class of acoustic calibrator (CEL-120/1 or /2), standard kit case, windshield, instruction manuals and USB cable.

For a complete instrument kit add /K1 to the part number. A full list of accessories and part numbers follows.

Accessory Part Number	Description
CEL-6840	Standard ‘K1’ kit case
206084D	Executive kit case
CEL-6841	Windshield
CEL-120/1	Acoustic Calibrator Class 1
CEL-120/2	Acoustic Calibrator Class 2
CEL-6718	Lightweight tripod
CEL-251	Microphone Class 1
CEL-252	Microphone Class 2
PC18	Universal power supply
CMC51	USB download cable – note this is the prime interface cable (2m).

User Notes