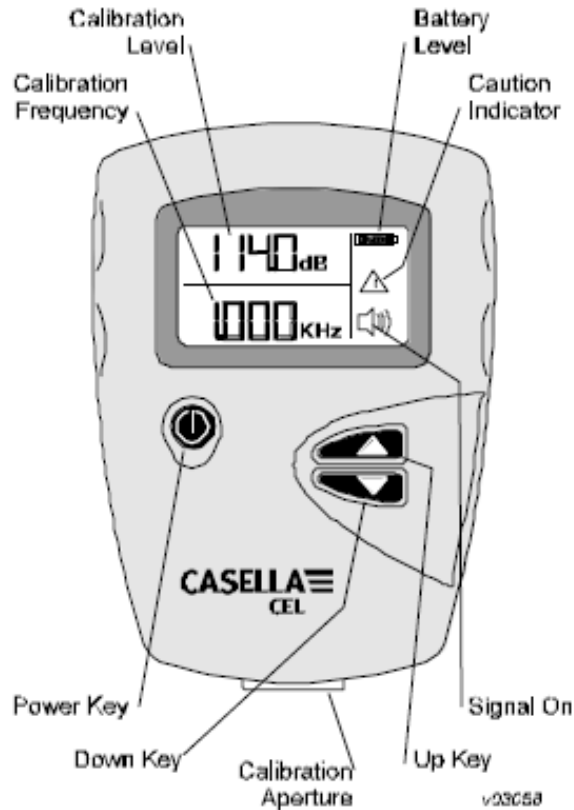


CEL-110 Acoustic Calibrators

CEL-110/1 & CEL-110/2 Acoustic Calibrators User Instructions



CEL-110/1 Acoustic Calibrator Class 1

CEL-110/2 Acoustic Calibrator Class 2C

INTRODUCTION

The CEL-110/1 and CEL-110/2 Acoustic Calibrators are an accurate and easily used means of calibrating sound level meters both in the laboratory and the field.

The CEL-110/1 satisfies the requirements of EN (IEC) 60942: 2003 Class 1 at user selected calibration levels of 94.0 dB and 114.0 dB. The CEL-110/2 satisfies the Class 2C standard at 114.0 dB. In addition, both instruments meet the requirements of ANSI S1.40 - 1984 (R1997).

These calibrators are intended for use with industry standard WS2 (half-inch) microphones, and may also be used to calibrate WS3 (quarter-inch) microphones by means of the CEL-4726 Coupler (supplied with the CEL-110/2).

The CEL-110/1 provides a highly stable reference level across changes in all environmental conditions. Corrections for variations in atmospheric pressure are not required.

The CEL-110/2 has a slight sensitivity to atmospheric pressure. However, the firmware permits optimisation of the created sound pressure level by user entry of the local atmospheric pressure.

Both calibrators generate a highly stable sine wave excitation in the acoustic cavity, with low harmonic distortion. The transducers used are pre-aged and matched to the driving circuits, so that the long term stability of the system is assured.

These calibrators offer a nominal pressure calibration level of 114.0 dB at a frequency of 1 kHz. The CEL-110/1 can also supply a calibration level of 94.0 dB at a frequency of 1 kHz.

Schedule Of Parts

A complete "CEL-110/1 Acoustic Calibrator" consists of the following items.

CEL-110/1 Calibrator (Class 1),

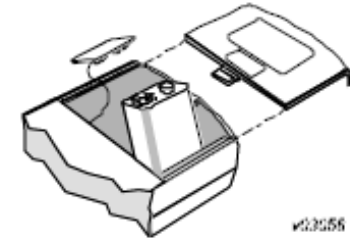
016003 (1 off) Battery, (PP3),
HB-3306 User Instructions.

A complete "CEL-110/2 Acoustic Calibrator" consists of the following items.

CEL-110/2 Calibrator (Class 2C),
CEL-4726 Microphone Coupler (1/4"),
016003 (1 off) Battery, (IEC type 6F22, for example PP3),
HB-3306 User Instructions.

PREPARATION FOR USE

The battery compartment is exposed by sliding open the cover on the rear of the instrument. Install a single 9 V battery.



For the most reliable operation with longest life, the use of an alkaline battery is recommended. Zinc carbon and nickel cadmium (rechargeable) batteries may also be used.

Clip the battery terminals firmly to the battery lead connector and replace the cover after installation.

Check the battery condition by switching the instrument ON, and observing the battery icon on the display. When an empty icon is shown or the icon blinks, replace the battery.

The instrument is now ready for use.

(When the calibrator is to be out of service for long periods, remove the battery.)

OPERATION

Field Accuracy Check (Acoustic Calibration)



Perform a field accuracy check (acoustic calibration) with the CEL-110/1 or CEL-110/2 immediately before and after

CEL-110 ACOUSTIC CALIBRATORS

measurements are made with a sound level meter or sound measuring system as follows.

Caution


Make sure the microphone and calibrator (plus coupler when used) are correctly aligned during insertion as the microphone could be damaged if not inserted squarely or excessive force is used.

1. With a WS3 (quarter-inch) microphone, first ensure that the microphone is carefully inserted up to the stop within the cavity of the CEL-4726 Coupler (supplied with CEL-110/2).
2. Carefully insert the coupler (complete with microphone) up to the stop within the calibrator cavity.
Note that the coupler flange does not fit flush against the calibrator rim.
3. With a WS2 (half-inch) microphone, ensure that the microphone is carefully inserted up to the stop within the calibrator cavity.
4. Switch the measuring instrument ON.
5. Select a suitable measuring range and frequency weighting for the calibration; refer to the measuring instrument handbook.
6. Press  to switch the calibrator ON.
First, all segments of the LCD display are highlighted together as a test.
Then the display shows 110.1 to identify a CEL-110/1, or 110.2 to identify a CEL-110/2.
X.XXX will identify the firmware version.
Finally the operating screen will be displayed and the calibration signal start.
7. The caution icon  may be displayed until the instrument has stabilised under control. If a microphone is not inserted, or not fully inserted, the icon will remain lit with the instrument unable to maintain control.




When this condition persists for 8 seconds, the calibrator output is stopped and the instrument switched OFF automatically.

Once a stable calibration signal is achieved, the icon is removed and the calibration signal will continue for two minutes, or until 8 seconds after the microphone is removed.

If a longer calibration period is required, switch ON by holding  down until all three curves of the calibration output icon are shown. The calibration signal will now be continuous, or stop 2 minutes after the microphone is removed.


Both calibrators can generate a calibration level of 114.0 dB at 1 kHz.

In addition, the CEL-110/1 can also generate a calibration level at 94.0 dB.

8. On the CEL-110/1 only, select the required calibration level. In most cases, 94.0 dB is sufficient, however in noisy environments, the caution icon  may be displayed, indicating that the 114.0 dB level should be used. As a general rule, try to calibrate at a level at least 20 dB higher than the background.

Press either  or  to toggle between the 114.0 dB and 94.0 dB levels.

9. Wait 3 seconds for the output to stabilise.
10. If necessary, adjust the calibration control of the measuring instrument until it shows the correct indication (114.0 dB or 94.0 dB).
11. After use, remove the microphone plus any coupler from the calibrator. The calibrator will automatically switch itself OFF after 8 seconds.

The calibrator can also be switched OFF by holding down  for about 3 seconds. A count down will be shown.






COMPENSATION FOR AMBIENT AIR PRESSURE

A separate compensation for variations in atmospheric pressure is not required for the CEL-110/1 as the calibration level is kept

within specification over the pressure range 650 to 1080 mbar (an altitude range of 600 m, 2000 ft).

The CEL-110/2 does require a small compensation as it has a very low coefficient to changes in atmospheric pressure (typically 0.0003 dB/mbar). Therefore this model incorporates a pressure compensation procedure that can be used to optimise accuracy when the atmospheric pressure is significantly different from reference conditions (1013 mbar).

Use this procedure as follows. A good quality barometer will be required.

1. Install a microphone and switch the CEL-110/2 ON, as described in Operation.
2. Wait for the operating screen to be displayed.
3. Press  and  at the same time.
The upper part of the display will change to show the ambient pressure in mbar.
4. Press  or  to adjust the indicated level to show the atmospheric pressure given by the barometer.
5. Press  to save the new calibration and return to the operating screen.

These acoustic calibrators are designed to calibrate sound level meters that use CEL-192 and CEL-250 Microphones. However, because of the nature of their design, they are suitable for use with all WS2 (half-inch) and WS3 (quarter-inch) microphones, without the need for a value correction.

CE COMPLIANCE

The CEL-110/1 and CEL-110/2 Acoustic Calibrators comply with the EMC Directive 89/336/EEC of the European Union. They have been tested according to the standard delivery schedule and comply with the following standards.

- EN 61000-4-2 Testing and measuring techniques - electrostatic discharge immunity tests,
- EN 61004-3 Electromagnetic field immunity tests,
- EN 61000-6-3 Emission standard for residential, commercial and light industrial environments.

CEL-110 ACOUSTIC CALIBRATORS

SPECIFICATION

Type:

CEL-110/1: Calibrator to EN (IEC) 60942: 2003 Class 1,
CEL-110/2: Calibrator to EN (IEC) 60942: 2003 Class 2C,
Both calibrators meet ANSI S1.40 - 1984 (R1997).

Calibration reference condition:

23°C, 101.3 kPa, and 50%RH.

Reference Microphone:

B & K 4133, Nominal load volume: 190 mm³.

Calibration level: (at reference conditions)

CEL-110/1: 114.0 dB \pm 0.15 dB and 94.0 dB \pm 0.15 dB,
CEL-110/2: 114.0 dB \pm 0.2 dB.

Calibration frequency:

1 kHz \pm 1 Hz.

Stabilising time:

3 S.

Sensitivity to load volume change:

0.0002 dB/mm³

Short term level stability:

< \pm 0.1 dB for CEL-110/1,
< \pm 0.2 dB for CEL-110/2.

Total harmonic distortion:

Less than 1%.

Tolerance limits for the CEL-110/1 (Class 1) over full environmental conditions:

Static pressure range: 650 to 1080 mBar,
Air temperature range: -10 to +50°C,
Relative humidity range: 25 to 90% RH,
Pressure coefficient: <0.0007 dB/kPa,
Better than < \pm 0.4 dB deviation over environmental ranges.

Tolerance limits for the CEL-110/2 (Class 2) over full environmental conditions:

Static pressure range: 650 to 1080 mBar,
Air temperature range: -10 to +50°C,
Relative humidity range: 25 to 90% RH,
Pressure coefficient: <0.003 dB/kPa (with software compensation via user input),
Better than < \pm 0.6 dB deviation over the environmental range.

Storage temperature range:

-20 to +70°C.

Battery:

1 x 9 V,PP3.

An alkaline battery is recommended as it offers a continuous battery life better than 20 hours, which is equivalent to 2 minutes of operation per day for almost 2 years.

Power consumption:

Typically <17 mA at 114 dB.

Dimensions:

71 x 40 x 100 mm (2.8 x 1.6 x 4.0 in).
Weight: (including battery) 170 g (0.39 lb).

MANUFACTURERS SERVICING & WARRANTY ARRANGEMENTS

In order to ensure its rigid conformity with the requirements of the specification, this instrument is thoroughly inspected and calibrated prior to dispatch from the factory. All technical information for an individual instrument is filed under the instrument serial number. Therefore, the serial number should be quoted in any correspondence concerning the instrument. The manufacturers undertake to rectify any defect in the instrument that is directly attributable to faulty design or assembly, and which becomes apparent during the warranty period. In order to take advantage of this warranty, the instrument must be returned, carriage paid, to the manufacturer's factory or accredited agent, where necessary repairs will be carried out. Normally the warranty period runs for 12 months from the date of receipt of goods, with exceptions on certain specialised components supplied by other manufacturers which are warranted for shorter periods. Some of the specialised components used in this instrument may be subject to longer guarantees by their actual manufacturers, and in all such cases, the benefit of these undertakings will be passed on to the user. However, CASELLA CEL's liability is limited to items of their own manufacture, and they do not accept liability for any loss resulting from the operation or interpretation of the results from this equipment. A comprehensive Instrument Calibration Maintenance Agreement (ICMA) scheme is available to extend the initial warranty period of this instrument. At the end of the first

warranty period, it is recommended that the equipment be returned to the Service and Re-calibration Department at Bedford, where it will be inspected and entered into the ICMA scheme as required. The warranty will then be extended for the period stated on the individual schedule. Please contact your local CASELLA CEL agent for full details of this service. In addition, CEL Instruments Ltd. has a UKAS accredited laboratory No. 0237 which is able to perform certain acoustic calibrations with traceability to U.K. National Standards, details on request.

In the event of a malfunction developing during the warranty period, the instrument should be carefully packed and returned either to CASELLA CEL's local agent, or in the case of domestic sales, to the CASELLA CEL Service Department at Bedford. Please include the following information:

- Instrument Type(s), Serial Number(s) and Firmware version number(s).
- Customer name and address,
- Contact name and phone number,
- Details of any PC and software involved, including version number(s).
- Reason for returning the equipment with a detailed description of the fault,
- List of any error messages that may have been displayed.

The necessary adjustments or repairs will be carried out, and the instrument returned as soon as possible.

After the warranty has expired (except on approved accounts) service work is undertaken against quotations, and all packing and transit costs are charged extra.

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