

Casella USA
17 Old Nashua Rd #15
Amherst, NH 03031 USA
TF (800) 366-2966
info@casellausa.com



CEL-240 Digital Sound Level Meter

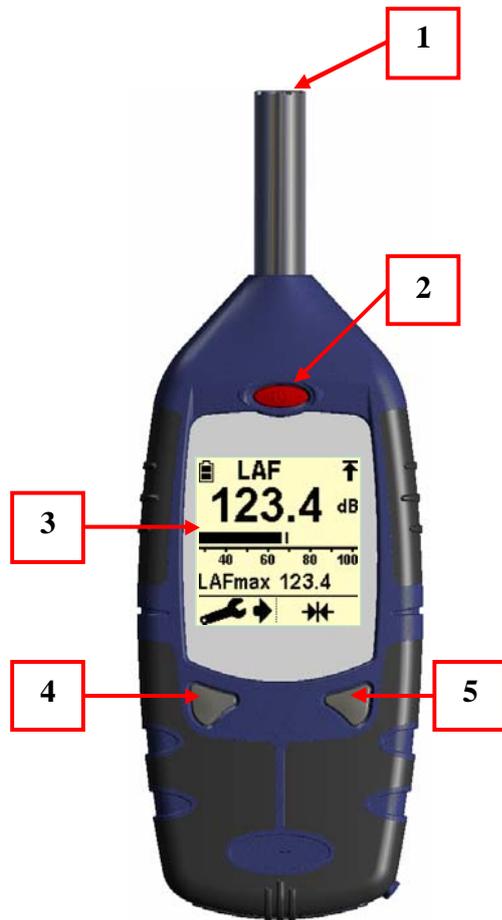


Operator Manual

HB-3331-01

Figures

A



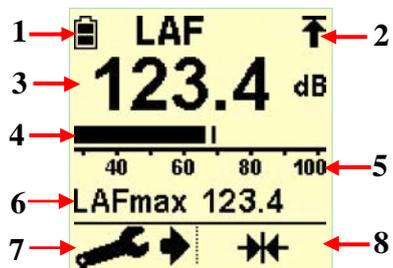
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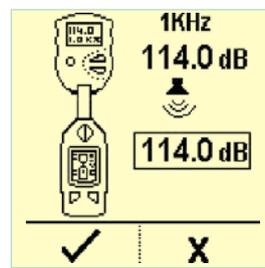
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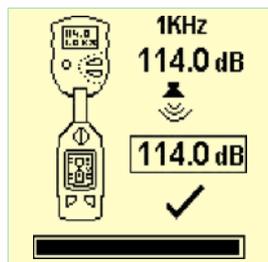
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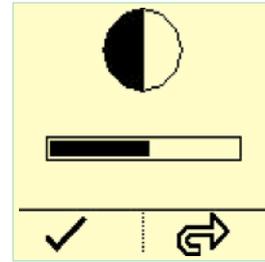
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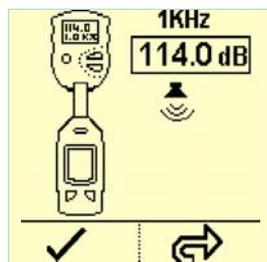
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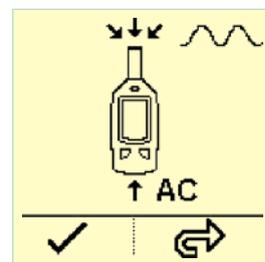
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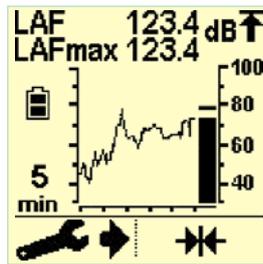
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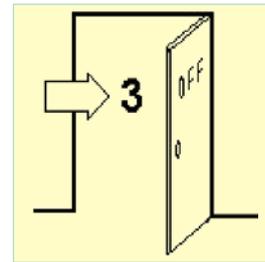
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CEL-240 Instruction Manual. HB3331-01 ENGLISH

Digital Sound Level Meter

December 07

Introduction

Congratulations on your purchase of the CEL-240 Digital Sound Level Meter. The CEL-240 has been designed to perform accurate noise measurements through a wide decibel range. The CEL-240 is a completely digital sound level meter, designed for stable, reliable performance, fully compliant with international sound level meter standards. This instruction manual is to help you get the most benefit from your CEL-240 and to ensure accurate noise measurements.

Diagrams

The illustrations and diagrams of the CEL-240 instrument and display screens are located at the beginning of this manual and are referenced in the operation of the instrument below. Please refer to the appropriate diagram at the beginning of this manual.

Figure A: CEL-240

1. Microphone
2. Power button
3. Display
4. Left key
5. Right key

Figure D: Display

1. Battery indicator
2. Over range indicator
3. decibel level
4. Analogue display bar
5. Measurement scale

Figure B: Battery Compartment

1. Battery direction
2. ¼" Tripod socket

Figure C: Connections

1. USB Socket
2. Auxiliary socket (2.5mm Stereo)

Figure E: Calibration screen

Figure F: Completed calibration

Figure G: Contrast adjustment screen

Figure H: Calibration level setting

Figure I: Source input selection

Figure J: Time history display

6. Maximum decibel level Figure K: Power off screen
7. Instrument settings
8. Reset

Preparation for Use

Install three AA Alkaline (or NiMH) batteries observing polarity (Figure B).

Always replace batteries when the battery indicator (Figure D.1) shows the batteries are low to prevent the CEL-240 switching off during monitoring.

The CEL-240 is now ready for operation.

General Operation

1. Switch on by pressing the power button (Figure A.2). The instrument displays the firmware version (e.g. v1.01) and serial number (e.g. 0108121) followed by the main measurement screen (Figure D).
2. Calibrate the instrument as required. See 'Calibration' section.
3. Place the windshield over the microphone prior to any measurement.
4. The CEL-240 will display a bargraph (Figure D) or time history (Figure J) display. See 'Instrument Settings' to change time and frequency weightings, or type of display.
5. Instantaneous and maximum sound pressure levels are displayed on the measurement screen with the relevant time and frequency weighting. The maximum sound pressure level can be reset by pressing the right key  at any time.
6. Once measurements are complete, switch off the instrument by holding down the power key (Figure A.2). The power key needs to be held down for 3 seconds to prevent accidental switch off.

Calibration

It is recommended that an acoustic calibration is performed using a CEL-110/2 or CEL-110/1 calibrator before and after measurements as follows:- Switch on the acoustic calibrator (refer to calibrator instruction manual). If the calibrator has 114dB output, ensure the CEL-240 is set to the 60-130dB range. Place calibrator firmly over the microphone.

The CEL-240 automatically detects a 1KHz tone from a 94 or 114dB calibrator and enters calibration mode (Figure E). Press left key  to perform a calibration or right key  to exit. Upon successful calibration, the screen will be as in Figure F.

Instrument Settings

When on the measurement screen, settings can be changed using the left key (settings button)  (Figure D.7). Once pressed, an arrow will appear next to the settings button  to show you are in the settings menu. Consecutively pressing the left button will cycle through setting screens. Pressing the right key will make changes to the current selection. Current settings are saved when switched off.

1. Time weightings (Fast, Slow or Impulse)
2. Measurement range (30-100dB or 60-130dB)
3. Frequency weightings (A or C)
4. Display type, either bargraph or time history graph (1 or 5 minute time base)

Time weightings: Use Fast response for comparatively stable noise, or select Slow response for slowly varying noise. Impulse response may be selected for more rapidly varying and impulsive noise.

Measurement range: Care should be taken to select the correct measurement range depending on the noise climate being measured. Ensure the noise being measured is within the measurement range such that the over range indicator  is not displayed (Figure D.2). Noise levels below the measurement range are displayed as ‘--.dB’

Frequency weightings: Frequency weightings are used to represent the human ears response to noise. The ‘A’ weighting is typically used for general noise measurements. ‘C’ weighting is used at very high noise levels.

Display type: The main display can be changed between a bargraph (Figure D) to a time history display (Figure J). The time history shows how the maximum sound pressure has varied through either a 1 minute or 5 minute time base. Press the right key to select the bargraph  123.4, 1 minute  1min, or 5 minute time history  5min. Press the left key  to confirm the changes and return to the measurement screen.

Configuration Menu

The configuration menu is used to make changes to three specific settings:

- Display contrast
- Calibration level
- Signal input source

To enter the configuration menu, hold down the right key when the CEL-240 is switched off and press the ‘power’ key. The ‘Contrast’ screen is then displayed (Figure G). Press the right key  to adjust the contrast as appropriate and then press the left  key to accept the changes.

The calibration level screen will then be displayed (Figure H). This screen is used to set the exact reference level used by the acoustic calibrator. Refer to the calibration certificate for the acoustic calibrator for the calibrator output level.

The 'Signal input source' screen (Figure I) will then be shown. **NOTE:** this option is for the use of acoustic laboratories only. This allows the signal input to be routed from either the inbuilt microphone or from an external signal generator connected via the auxiliary 2.5mm headphone socket. Press the right key  to switch between microphone input  or Alternating Current input . The default power up selection is for microphone input. Press the left key  to confirm any changes.

Specification

General

Designed to provide functionality with respect to the following international standards:

IEC 61672-1 2002-5 (Electro-Acoustics – Sound Level Meters) Group 'X' instruments, Performance Class 2.

ANSI S1.4 Type 2A Specification for Sound Level Meters

Range: Display range: 30-130dB(A) RMS, available in 2 ranges, 30-100dB and 60-130dB. Linear operating range 10dB above noise floor.

RMS Frequency Weightings

A and C filter weightings, satisfying IEC 61672-1: 2002 Class 2, ANSI S1.4 Type 2A.

Noise Floor

Total noise floor typically <33dB(A).

Frequency Response

Overall frequency response as per IEC 61672-1: (2002) Class 2, ANSI S1.4 Type 2A.

Time Weightings

Fast, Slow and Impulsive according to IEC 61672-1: (2002), ANSI S1.4 Type 2A.

Reference Conditions

20°C air temperature, 65% Relative Humidity, 101.325kPa atmospheric pressure. Nominal reference level = 114.0dB at 1kHz. Free field perpendicular incidence.

Operating Environmental Conditions

Humidity: 5 to 90% RH in the absence of condensation.

Temperature range: 0 to 40°C.

Pressure: 65 to 108kPa

Effects of Humidity: Less than ± 0.5 dB over the range 30 to 90% relative humidity (non-condensing), relative to the value at reference conditions.

Storage Environmental Conditions

Humidity: 0 to 90% RH in the absence of condensation.
Temperature range: -20 to +60°C.
Pressure: 65 to 108kPa

Microphone

Internal electret capsule 10mV/Pa nom +/-3dB within ½” preamplifier.

Calibration

Auto calibration by application of 1kHz @ 114 or 94dB calibrator (CEL-110/2 or CEL-110/1). ± 1 dB calibration range.

Power Supply

External DC: 5VDC (via USB 5 pin mini B)
Batteries: 3x AA, Rechargeable NiMH or Alkaline cells
Battery Life: Typically 35 hours
Power consumption: ~65mA

Electromagnetic Compatibility

Instrumentation is designed and tested to comply with the following EMC and ESD Standards:-

IEC 61000-4-2 Testing and Measuring Techniques - Electrostatic discharge immunity tests.
IEC 61000-4-3 Electromagnetic compatibility (EMC) - Radiated electromagnetic field tests.
IEC 61000-4-6 Electromagnetic compatibility (EMC) - Immunity to conducted disturbances induced by radio frequency fields. Tested at 10V/m or greater.

Effects of AC Power Frequency Fields

Less than ± 0.5 dB change in 74dB(A) 925Hz reference level when subjected to 160A/m AC magnetic field at 50 and 60Hz.

Display

128x128 Mono Graphics LCD, 0.5 seconds update rate.

Connectivity

USB: USB 2.0 via ‘mini B’ socket. For SPL output (software required) weighted as per selected frequency and time weightings.

AUX Socket (2.5mm stereo):

AC output provided for DAT tape / PC wav file recording or headphone applications. Approx 0.5V RMS Full Scale Deflection (FSD) 'A' weighted output on selected range. Minimum load impedance 22k Ω . (Optional DC Output via internal configuration, 0 to 3.3V DC for FSD on selected range. Output corresponds to selected weighting, 2k Ω Output impedance).

AC input used for electrical calibration, switched on via configuration menu.

Service and Warranty

The manufacturer undertakes to rectify any defect in the instrument 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.

The warranty period runs for 24 months from the date of receipt of goods, with exceptions on certain specialised components supplied by other manufacturers that may be warranted for shorter or longer periods by their actual manufacturers. In all such cases, the benefit of these undertakings will be passed on to the user. 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. To obtain repair under warranty, the instrument should be packed and returned in its original packing or an equivalent either to CASELLA CEL's local agent, or in the case of U.K. domestic sales, to the CASELLA CEL Service Department at Bedford., UK. 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 and a list of any error messages that may have been displayed.

For calibration, service or technical support enquires please contact:

E-mail: technicalsupport@casellameasurement.com

Telephone: +44(0)1234 847777

CASELLA CEL

Regent House,

Wolseley Road,

Kempston,

Bedford,

MK42 7JY, U.K.

Phone: +44 (0) 1234 844 100

Fax: +44 (0) 1234 841 490
E-mail: info@casellacel.com
Web: www.casellacel.com

CASELLA USA

17 Old Nashua Road,
15, Amherst,
NH 03031,
U.S.A.
Toll Free: +1 (800) 366 2966
Fax: +1 (603) 672 8053
E-mail: info@casellaUSA.com
Web: www.casellaUSA.com

CASELLA ESPANA S.A.

Polígono Európolis
Calle C, nº4B
28230 Las Rozas - Madrid
Spain
Phone: + 34 91 640 75 19
Fax: + 34 91 636 01 96
E-mail: online@casella-es.com
Web: www.casella-es.com