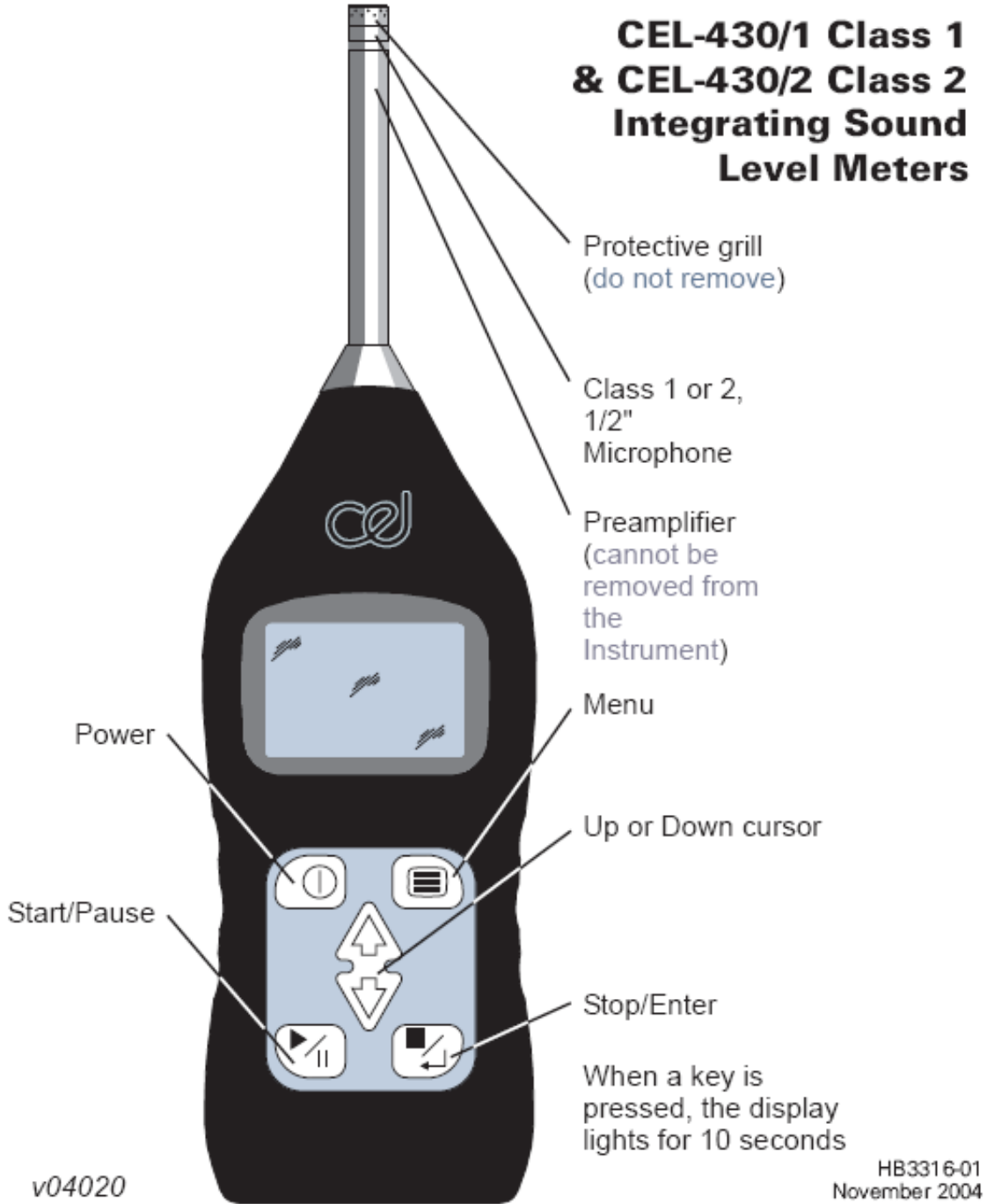




CEL-430/1 Class 1 & CEL-430/2 Class 2 Integrating Sound Level Meters



CEL-430/1 Class 1 & CEL-430/2 Class 2 Integrating Sound Level Meters Users Instructions

INTRODUCTION

The CEL-430 series Sound Level Meters are ideal for on-site surveys and were designed to meet the measurement requirements of Safety Engineers, Occupational Nurses, Industrial Safety Officers and other specialists who require inexpensive and simple to operate instrumentation.

The CEL-430/1 features a CEL- 251 free field pre-polarized Class 1 ½" Electret Microphone. The CEL-430/2 has a CEL- 252 free field pre-polarized Class 2 ½" Electret Microphone.

These instruments measure frequencies between 6 Hz and 30 kHz with a single wide measurement range that covers levels between 20 and 140 dB. Measurements are shown on a multi-parameter digital display.

Acoustic calibration is simplified by a system which enables the instrument to

recognise a 1 kHz input signal and select the calibration screen automatically.

The user can select a display language and an operating setup so that measurements will be made in accordance with European (ISO), German (DIN) or USA (OSHA) measurement standards, with simultaneous measurement and display of up to nine parameters.

Stored data can be recalled for archiving and manipulation by means of Casella CEL dB30 Application Software that also allows additional parameters to be included in the measurements.

SCHEDULE OF PARTS

A complete CEL- 430/1 Sound Level Meter consists of:
CEL- 430/1 Sound Level Meter,
CEL- 251 Class 1 ½" free field pre-polarized Electret Microphone,
CEL-2962 Windshield,
016004 (4 off) Alkaline-Manganese Battery 1.5 V AA,
HB3316 Users Instructions.

The following item is also required:
CEL-110/1 Acoustic Calibrator Class 1.

A complete CEL- 430/2 Sound Level Meter consists of:
CEL- 430/2 Sound Level Meter

CEL- 252 Class 2 ½" free field pre-polarized Electret Microphone.
CEL-2962 Windshield,
016004 (4 off) Alkaline-Manganese Battery 1.5 V AA,
HB3316 Users Instructions.

The following item is also required:
CEL-110/2 Acoustic Calibrator Class 2.

The following standard accessories may be ordered separately to allow more tasks to be undertaken by the sound level meters:

CEL- 6830 dB30 Application Software,
C6724/2 Communications Cable for PC,
CEL-6722 Instrument Case

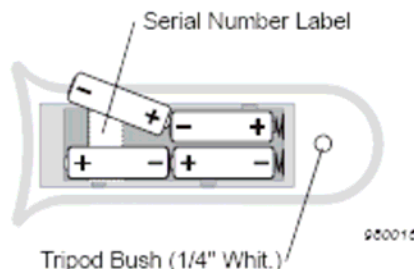
PREPARATION FOR USE

Screw the CEL-251/252 microphone finger tight on to the preamplifier.

Load four new AA batteries into the battery compartment (see Figure). Make sure they are inserted as shown.

Incorrect fitting of batteries may cause damage the instrument.

The instrument is now ready for operation.



START UP

1. Press  to switch the instrument ON or OFF.

The start up routine displays the following information:

Instrument model, firmware version, serial number and battery voltage.

A further screen displays the current setup followed by the measurement screen.

Press  to access the main menu.

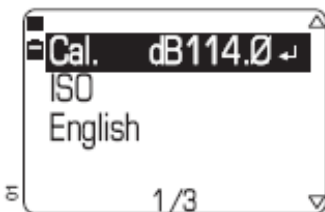
This menu indicates:

Stop icon shows that no run is under way,



Battery condition icon,

Current calibration level,



Current measurement template (ISO, DIN or OSHA),









Current display language (English, Français, Deutsch, Italiano, Español).

 and  show that up/down keys may be used to move the reverse video cursor to another option.







1 / 3 indicates that the first of three options has been selected.

 shows that further options are available via the  key.

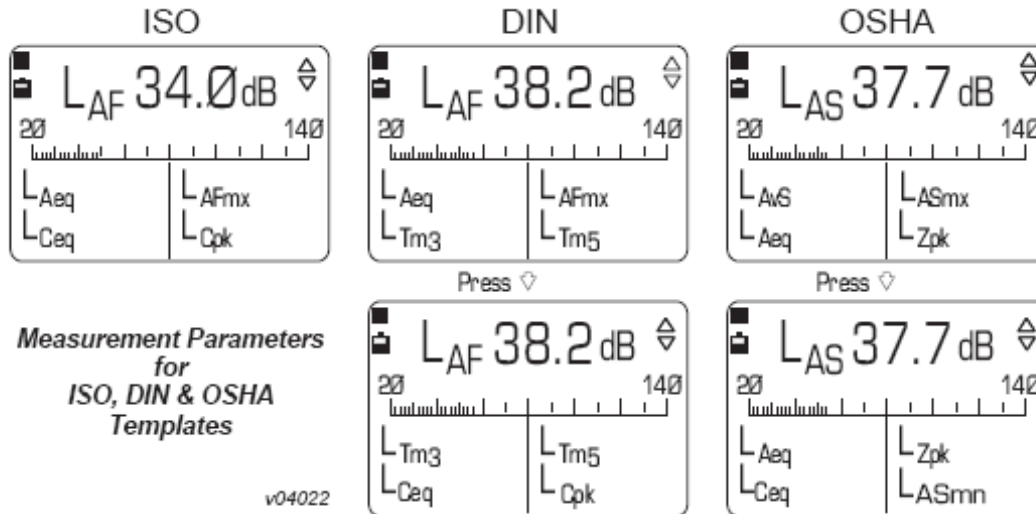
SELECT DISPLAY LANGUAGE

1. Start from the main menu.
2. Press  or  to move the cursor to the language option.
3. Press  to access the language options:
English,
Français,
Deutsch,
Italiano,
Español.
4. Use  or  to select the required display language.
5. Press  to accept the language and return to the main menu.

SELECT MEASUREMENT SETUP

1. Start from the main menu.
2. Press  or  to move the cursor to the desired setup option.
3. Press  to access the measurement setup options:
ISO (U.K and international standards),
DIN (German standards),
OSHA (USA standards).
4. Use  or  to select the required template.
5. Press  to accept the setup and return to the main menu.

The measurement parameters for these templates are shown in the figure opposite. Two user defined templates that can show up to nine parameters are also available. These must be prepared and loaded via dB30 Software



FIELD ACCURACY CHECK (ACOUSTIC CALIBRATION)

Perform a field accuracy check (acoustic calibration) immediately BEFORE and AFTER measurements using a CEL-110/1 Class 1 Acoustic Calibrator for the CEL-430/1 and CEL-110/2 Class 2 (or CEL-110/1) for the CEL-430/2. The CEL-110/1 produces a user switchable calibration signal of 94.0dB at 114.0dB at 1 kHz.

The earlier CEL-282/4 Class 1 and CEL-282 Class 2 Acoustic Calibrators may also be used. Both of these calibrators produce 114.0dB at 1kHz.

When the microphone is correctly inserted in the calibrator cavity, the acoustic calibration menu is automatically activated by switching the calibration signal ON while on the measurement screen.

The sound level meter identifies any steady tone* near 94dB at 250Hz or near 114dB at 1kHz as a calibration signal and displays the calibration menu automatically.

Acoustic calibration can also be initiated by highlighting the CAL. option on the main menu then pressing to display the calibration menu.

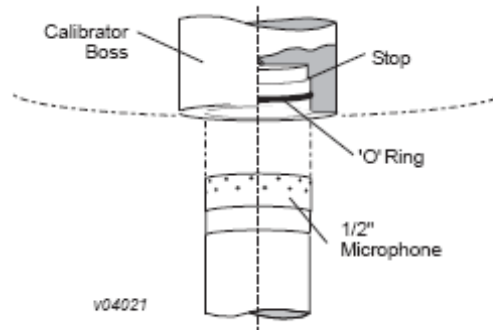
Perform an acoustic calibration as follows.

1. Carefully insert the microphone into the calibrator cavity.

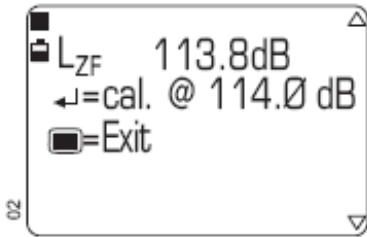
Note:* If you do not wish to perform an acoustic calibration, press to return to the measurement screen.


Make sure the microphone and calibrator are correctly aligned during insertion and calibration. The microphone could be damaged if not inserted squarely or excessive force is used.

2. Ensure that the microphone is in contact with the stop within the cavity shown in the figure.
3. Switch the sound level meter ON.



4. Wait for the start up sequence to finish, then with any measurement menu showing on the display, switch the calibrator ON. As soon as the calibration signal is detected, the calibration menu is displayed. Refer to calibrator instruction manual for operational guidance.




6. Press  and the instrument will automatically calibrate to the selected level.
7. Remove calibrator once complete.



5. The CEL-110/1 provides calibration levels of 94.0dB and 114.0dB. As a general rule, try to calibrate at a level at least 20dB higher than the background. For most applications it is recommended that calibration is performed at 114.0dB. The CEL-110/2, CEL-284/2 and CEL-282 all supply 114.0dB at 1kHz.
For further information about the calibrators, please refer to their individual instructions.


MEASUREMENT

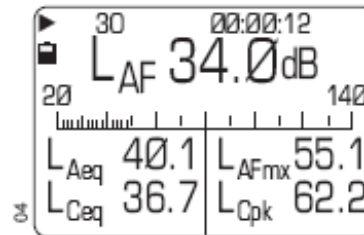
With the correct measurement setup selected and following acoustic calibration, perform measurements as follows:-





1. Start from the main menu.
2. Press  to display the measurement screen.
When the DIN or OSHA templates are in



use, pressing  or  will display a further measurement menu.
In stop mode, only the sound pressure level will be displayed.

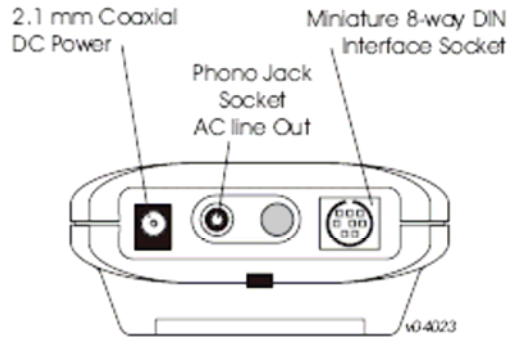
3. Press  to start a measurement run.
A Run icon replaces the Stop icon on the display, a run number and elapsed time are shown.
Measurement levels for the remaining parameters are displayed.



4. During the run, if any sound occurs that the user does not wish to include in the accumulated values, press  to pause the measurement. Press  again to resume measurement once the unwanted noise has stopped.
6. When the run has continued for an appropriate time - perhaps according to a measurement specification, press  to stop the measurement.
The final values for the run remain on the measurement menu(s).
7. Press  again to clear the values from the run ready for further measurement.

USE WITH OTHER EQUIPMENT

The figure shows the following connection possibilities available on the CEL-430.
 2.1 mm coaxial socket for external power 9 to 14VDC at a typical 150mA.
 Phono Jack socket for AC Line Out with 0.5V RMS full scale output corresponding to 98dB into a minimum load impedance of 22kΩ.
 8-way miniature DIN RS232 Socket for connection with a PC when the sound level meter is used with dB30 Application Software.



SPECIFICATION

Measurement Standards:

The CEL 430/1 and /2 integrating sound level meters comply with the following international standards:
 IEC 61672: 2002 (Electroacoustics - Sound Level Meters) Group 'X' instruments, Performance Class 1 or 2 as relevant to instrument model.
 IEC 60651: 1979, IEC 60804: 2000,
 ANSI S1.4: 1963.

Dimensions:

340 x 100 x 40 mm including pre-amplifier and microphone.
 Weight: 550g with batteries

Measurement Ranges:

Single 20 -140dB range: Linear operating range defined by the self-generated noise of the instrument only,
 Peak levels: A,C and Z available to 143dB,
 Dynamic Range: Typically 123dBA,
 Level detector: digitally derived true root mean square (RMS) detection, 0.1dB display resolution.

Electrical Noise Floor:

Noise floor with 18pF dummy mic: typically 16dBA,
 Total inherent Noise including microphone thermal noise at 20°C typically <18.5dBA,
 Total linear A-weighted measurement range: 30 to 140dBA

Frequency Response:

6Hz to 30kHz (upper and lower 3dB frequencies).
 Digital Sampling rate: 67.2kHz.

Time Weightings:

Slow and Fast according to IEC 61672.
 Parallel processing permits simultaneous time weightings to be measured.

Amplitude Weighting:

Q = 3, 4 and 5.
 Parallel processing allows simultaneous measurement of Leq (Q=3), Lavg (Q=4) and Lavg (Q=5).

RMS Frequency Weightings:

A, C and Z weightings satisfying IEC61672: 2002 Class 1.
 Filter weightings are derived simultaneously via DSP.

Correction Filters:

Built in correction filter for random incidence microphones that is activated automatically with OSHA template, or via dB30 PC software.

Reference Conditions:

20°C air temperature,
 101.325kPa atmospheric pressure,
 65% Relative Humidity,
 Nominal reference level: 114.0dB at 1kHz

Operating Environment:

Humidity: 5 to 90% RH in the absence of condensation,
 Temperature range: -10 to +50°C (Class 1),
 0 to +40°C (Class 2),
 Pressure: > 65 to 108kPa.

Effect of Temperature:

Electrical accuracy of instrument <±0.2dB over the range -10 to +50°C,
 Temperature coefficient of CEL-251/252 Microphone: 0.02dB/°C,

Effect of Humidity

Less than ±0.5dB over the range 25 to 90% relative humidity (Non condensing), relative to the value at reference conditions.

Storage Environment:

Humidity: 0 to 90%RH in the absence of condensation,

Temperature range: -20 to +60°C,
Pressure: 65 to 108kPa,

Microphones:

Class 1 CEL-251 pre-polarized free field
½" microphone,
Nominal sensitivity: 50mV/Pa,
Capacitance: 18pF.
Class 2 CEL 252 pre-polarized free field
½" microphone,
Nominal sensitivity: 50 mV/Pa,
Capacitance: 17pF.

Alternative Class 1 microphone options:
B&K 4189, CEL-250,
Preamplifier is non removable.

Calibration:

All models use a removable ½" microphone.
A dummy microphone may be used for
electrical test purposes.
Calibrator tone (250Hz or 1Khz) is
auto-detected.
Auto calibration to a user specified
reference level.
Date, time and calibration level are
recorded.

Power Supply:

External DC: 9 to 14VDC at typical 150mA.
Inrush current 1000mA.
2.1 mm Power connector.
Internal Batteries: 4 x AA Alkaline cells,
Battery Life: Typically >15 hours.
Batteries may safely be left in the
instrument whilst operating from an
external supply.
Remove batteries when the instrument is
to be out of service for some time. A built in
lithium battery will maintain stored data and
set ups.

AC Output:

Approx 0.5VRMS full scale output
corresponding to 98dB.
Minimum load impedance 22kΩ.

DC Output (optional):

From interface socket providing
0 to 2VDC for 0 to 140dB indication.
2kΩ output impedance

Internal Clock:

Date and time accuracy better than 2sec
per day.
Set automatically via P.C software.

Electromagnetic Compatibility:

The 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 electro-
magnetic field tests.
IEC 61000-4-6 Electromagnetic compatibility
(EMC) - Immunity to
conducted disturbances
induced by radio frequency
fields. Tested at 10 V/m or
greater.

Effects of AC Power Frequency Fields:

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

Menu Languages:

English, French, German, Spanish, Italian.

Tripod Mounting:

Socket to mount on standard ¼" camera
tripod thread (Whitworth).

Display:

Transflective Monochrome LCD 128 x 64
LED backlight - automatic operation for
10sec on key press.

Serial IO Port

RS232 via mini DIN connector and cable
C6724/2 @ 19200 baud.

Digital Control:

Remote PC control commands to permit
change of instrument setup, control of the
instrument's measurements, or to perform
in-house testing.

Data Storage:

All 33 cumulative measurement functions
are recorded for every measurement run.
Each data set includes run start time,
duration, run number, last calibration value
with time and date, sound field response
(free field or random).
This stored data can be retrieved ONLY via
the dB30 Application Software.
The storage capacity is 99 runs, with the
oldest runs overwritten when the memory
is full.

Measurement Duration:

Determined by user start/stop keypresses.
Maximum duration 24 hours.

Measured Noise Functions:

The CEL-430/1 and /2 simultaneously
measure and calculate all 33 noise functions.

	Leq	LF	LS	LFmn	LSmn	LFmx	LSmx	Lpk	Lavg (Q=4)	Lavg (Q=5)	Ltm3 (F)	Ltm5 (F)	Le
A	x	x	x	x	x	x	x	x	x	x	x	x	x
C	x	x	x	x	x	x	x	x	x	x			
Z	x	x	x	x	x	x	x	x	x	x			

MANUFACTURERS SERVICING AND WARRANTY ARRANGEMENTS

To ensure it's conformity with the specification, this instrument is thoroughly inspected and it's accuracy verified prior to dispatch. All technical information is filed under the instrument serial number, which should, therefore, be quoted in any correspondence.

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.

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 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 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 it's original packing or an equivalent 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.

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 Verification 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.

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

CEL and DAWE instrumentation and software are designed, manufactured and serviced by:

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