CASELLA

dBadge2



dBadge2
Personal Noise Exposure Meter

Ideal for making noise exposure measurements, the dBadge2 is a shoulder worn dose meter that measures all workplace noise parameters simultaneously.



www.casellasolutions.com

dBadge2

Key Features

- Airwave software to check monitoring remotely
- Multiple ‘simulated’ dosimeters
- Full color display
- Motion Sensing
- 1 second time history profiling
- Pause function
- Measures all noise dose parameters simultaneously

Applications

- Complete shift exposure measurements
- Task based measurements
- Measurements in accordance with CFR 1910.95 (USA), ISO9612:2009, L108 Controlling Noise at Work.
- Selection of hearing protection



Intelligent display shows remaining hours of battery life and memory capacity



3 way chargers can be linked together and also act as a download station

Airwave

Use Airwave software on a mobile device to remotely monitor multiple dosimeters, without disturbing the wearer.



Start, stop and monitor the dosimeter remotely via an iOS or Android device.

(Airwave is available free in the Apple App Store and Google Play Store)

dBadge2

Simultaneous Measurements

The dBadge2 has a ‘multiple simulated dosimeter’ capability to display noise exposure results according to differing regional or international protocols. Regardless of what you have displayed, the dBadge2 always measures all parameters together.

- Simultaneous measurement and storage of all noise dose parameters
- Helps ensure the correct parameters are always measured
- Choose how many parameters to display

Simple Operation

With it’s two button operation, the dBadge2 couldn’t be easier to use. After switching the dBadge2 on, apply the acoustic calibrator and press one button to perform calibration. Then hold both keys down to start a measurement, it couldn’t be simpler!

- Lockable keys and display
- Automatic detection of acoustic calibrator
- Color coded display
- Easy to mount on employees’ shoulder

Intrinsically Safe

For use in flammable atmospheres, intrinsically safe models are available for potentially explosive areas such as in the oil and gas, petrochemical and mining industries.

Ex ia IIC T4 Ga

Ex ia IIIC T135°C Da

EX ia I Ma

Tamb: -20°C to +45°C

Advanced Features

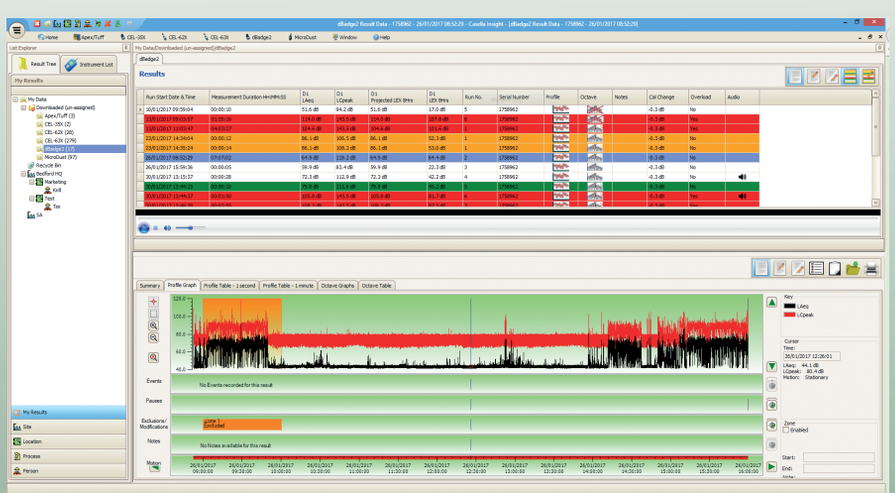
Different models of dBadge2 are available with advanced functions depending on your requirements.

- Audio notes at the start of a run to record measurement details
- Audio recording of level triggered events to identify anomalous noise
- Octave band analysis for the selection of hearing protection
- Motion sensing to assist in measurement validation

Downloading Data & Reporting



A Data Download Utility is free with measurement kits and downloads data to Excel, with automatic graphing of time history data. For more sophisticated data analysis and reporting Casella Insight can be purchased separately. Please refer to Casella Insight Data Sheet for more detail.



Technical Specification

Standards:	ANSI S1.25:1991 R2007, IEC 61252 Ed 1.1 (2002-3)
Linear Operating Range:	55.0-140.3 dB (A) RMS
Peak Measurement Range:	90.0-143.3dB (C or Z weighted),
Sound Exposure Range:	0.0- 6,100.0 Pa2Hours
Frequency Weightings:	A, C and Z, Type 2
Time Weightings:	Fast, Slow and Impulse
Exchange Rate:	Q=3 or Q=5dB exchange rates
Threshold and Criterion:	70-90dB in 1dB steps
Operating Temperature Range:	0°C to +40°C (for <±0.5dB error limit) -10°C to +50°C (for <±0.8dB error limit)
Ambient Pressure Range:	<±0.5dB over 85 - 112kPa,
Humidity Range:	<± 0.5dB over 30% - 90% (non-condensing),
Storage Temperature Range:	-10°C to +50°C,
Battery:	Internal NiMH, 800mAH
Run Time:	Typically 35 hours using Broadband Mode Typically 15 hours using Octave mode
Charge Time:	<6 Hours from fully discharged
Maximum Run Duration:	24 hours
Maximum number of Runs:	100
Storage Capacity:	Internal USD Flash memory - 300 hours of run data (including 1 second profile data) and up to 90 minutes of event audio recording.
PC Interface:	USB 2.0 Full speed 12Mbps via Docking Station.
Dimensions:	85L x 54W x 55H mm
Weight:	117g
Environmental I.P. Rating:	IP65 (with permeable air vent)

Ordering Information

dBadge2	dBadge2 Personal Noise Dosimeter
dBadge2Plus	dBadge2 Plus Personal Noise Dosimeter with Audio Recording
dBadge2Pro	dBadge2 Pro Personal Noise Dosimeter with Audio Recording and Real-time Octave Band frequency analysis

All dBadge2 units come complete with a Field Guide and Calibration Certificate. Operation manuals are available to download.
For Intrinsically Safe models add 'IS' after the "2" in the part number e.g. dBadge2ISPlus.

Instrument Kits

Instrument Kits are available in a kit case that holds up to 10 dBadge2 units. Kits also include the CEL-120/2 Acoustic Calibrator, docking station, USB download cable and data download utility.



Stored Data Sets

The dBadge2 simultaneously records and computes all noise data for every measurement run. The comprehensive set of data containing all of the below parameters is available to view and analyse within the Casella Insight PC application or using the download utility. The Dosimeter Set-ups D1, D2 and D3 define which parameters are displayed on the instrument itself but all values are automatically stored in the memory of the dBadge2 for download.

L_{Avg}

TWA (8hr)	Projected TWA 8hr	
Dose%	Proj Dose %	
L_{AEQ}	L_{CEQ}	L_{AIEQ}
L_{EPd} / LEX, 8h	Proj L_{EPd}/LEX, 8h	
L_{APk} + Time	L_{CPk} + Time	L_{ZPk} + Time
Pa2Hrs	Pa2Secs	

ISO Dose% (using ISO Criterion level)
ISO Proj Dose% (using ISO Criterion level)
Projected Exposure Points (using ISO Criterion level)
Exposure Points (using ISO Criterion level)
Exceedance time (L_{AS} > Exceedance level)
HML (LC-LA)

L_{Cpk} >135 (count)	L_{Cpk} >137 (count)	$L_{Cpk.}$ >140 (count)
L_{AFmx} + Time	L_{AFmin} + Time	
L_{ASmx} + Time	L_{ASmin} + Time	
L_{Almx} + Time	L_{Almin} + Time	

L_{AE}

Cumulative Motion Index (expressed as % motion detected during a measurement run).

Model Selection

	dBadge2	dBadge2 Plus	dBadge2 PRO
H-M-L (C-A)	●	●	●
Programmable delay timer	●	●	●
Fixed run timer	●	●	●
Pause function	●	●	●
Wireless*	●	●	●
Time history	●	●	●
Audio recording		●	●
Octave band			●

*Bluetooth 'Smart' Wireless may be disabled in any version using the USB utility App

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dBadge2 Quick Reference User Guide



CONTROLS

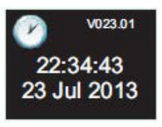


1. TURN THE DOSIMETER ON

1. Press and release the left hand key.

2. You will see the following sequence...







3. You can navigate and review data from the previous run by pressing the right key.



3. START A MEASUREMENT RUN

Note: if the battery or memory available is less than one hour, the run will not start.

To manually start a measurement run, press and hold both the left ‘L’ and the right ‘R’ keys down together which will initiate a 3 second countdown as shown.



You will see the following sequence:



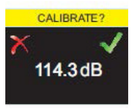
2. CALIBRATE THE DOSIMETER

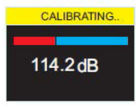
Note: the dBadge2 will not enter the calibration mode if a measurement run is taking place. If a run is in progress, stop the run.

1.Push the acoustic calibrator over the microphone.

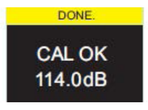


2.Press the right ‘R’ key to confirm you wish to calibrate.





3.Once the dBadge2 has successfully calibrated the ‘CAL OK’ message will appear.



4. LOCK AND UNLOCK

1. To lock and unlock the dBadge2, press and hold the right ‘R’ key for 2 seconds then press the left ‘L’ key 3 times in quick succession as shown below:



2. A padlock symbol will be displayed to indicate that the dBadge2 is locked and will not display any measured data.

6. STOP RUN & TURN THE DBADGE2 OFF

Note: If the dBadge2 is locked, unlock as described above.

STOP A RUN

Press and hold the left ‘L’ and right ‘R’ keys simultaneously 3 seconds.

You will see the following sequence...



Stored data from the last measurement run will be shown.

TURN DOSIMETER OFF

To switch off the dBadge2, press and hold the left ‘L’ key for 3 seconds.



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Discover Monitoring Solutions for Noise, Dust and Vibration at:
www.casellasolutions.com

June 2011

CEL-35x *dB*adge

Including Intrinsically Safe (I.S.) Versions

Users Manual

HB3323-07

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Caution

UNDER NO CIRCUMSTANCES should this equipment be cleaned using a solvent based cleaner.

The CEL-35X *dB*adge contains no user serviceable parts, do not open product case as this would invalidate the warranty.

When in use, always use the windshield provided.

Use only the recommended CEL-252 microphone.

Damage caused by a failure to observe these warnings will NOT be covered by the normal warranty conditions.

When using the CEL-6351 pin mounting clips, care should be taken when fitting them to an employee so that the skin is not pierced accidentally.

Please refer to section 6.2 of this manual when changing *dB*adge mounting clips as placing the incorrect screw in the wrong hole can damage the *dB*adge.

Environmental Considerations



- Do not dispose of electronic equipment as municipal waste
- The WEE symbol shown above indicates that separate collection systems should be used

Instructions specific to hazardous area installations (reference European ATEX Directive (94/9/EC, Annex II, 1.0.6.)

The following instructions apply to equipment covered by certificate number Sira 07ATEX2032X for the CEL-35X/IS *dB*adge series:
The certificate number includes an „X" suffix indicating that the following special conditions of certification apply;

1. Parts of the enclosure are non-conducting and may generate an ignition–capable level of electrostatic charge under certain extreme conditions. The user should ensure that the equipment is not installed or used in a location where it may be subjected to external conditions (such as high-pressure steam), which might cause a build-up of electrostatic charge on non-conducting surfaces. Additionally, cleaning of the equipment should be done only with a damp cloth.
2. The *dB*adge Noise Dosemeter shall not be used in areas where a layer of coal dust may be deposited on the enclosure.
3. The microphone should not be removed in a hazardous area.
4. The equipment may be used with flammable gases and vapours with apparatus Groups IIA, IIB and IIC and with temperature classes T1 and T2.
5. The equipment is only certified for use in ambient temperatures in the range -20°C to +40°C and should not be used outside this range.
6. Repair of this equipment shall only be carried out by the manufacturer or in accordance with the applicable code of practice.
7. If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised. Aggressive substances e.g. solvents may affect polymeric materials.
8. Do not charge the batteries in a hazardous area. Only charge the CEL-35X or CEL-35X/IS using the recommended charger CEL-6362.
9. The CEL-120/2 must only be used to calibrate the CEL-35X or CEL-35X/IS in a non-hazardous atmosphere.

CONTENTS

1 INTRODUCTION 5
2 SUPPLIED EQUIPMENT 6
3 THE SYSTEM COMPONENTS 8
3.1 The CEL-35X *dB*adge 8
3.2 Mounting Clips 8
3.3 The CEL-6362 Charger 9
3.4 The Windshield 10
4 CHARGING THE CEL-35X 11
4.1 Charging 11
4.2 Linking Chargers Together 12
5 GENERAL OPERATION 13
5.1 Switching on the *dB*adge 13
5.2 Calibration 14
5.3 Starting A Measurement Run 16
5.4 Stopping A Measurement Run 19
5.5 Reviewing Measurement Run Data 20
5.6 Configuration Menu 22
5.7 Display Mode 25
5.8 Alarm Settings 26
6 MOUNTING THE CEL-35X 28
6.1 CEL-6351 Pin Mounting Clips 28
6.2 CEL-6352 Crocodile Clip Mounting Kit 29
6.3 CEL-6353 Harness Mounting Kit 30
6.4 CEL-6354 Hard Hat Mounting Kit 30
7 TECHNICAL SPECIFICATION 31
7.1 Specification 31
7.2 Microphone Specification (CEL-252) 32
8 SERVICING AND WARRANTY ARRANGEMENTS 33
9 TROUBLESHOOTING 34
10 APPENDIX 35
10.1 Glossary of Terms 35
10.2 Measured Parameters 39
10.3 Using the CEL-352 for the Selection of Hearing Protection 40
10.4 ATEX Certificate 42
10.5 FM Certificate 45

1 INTRODUCTION

The CEL-35X family consists of the CEL-350 *dB*adge, CEL-350L *dB*adge „Lite" and the CEL-352 *dB*adge „Plus". The CEL-35X *dB*adge is a unique solution to problems associated with the measurement of personal noise exposure. Using the latest digital technology ensures reliable and repeatable measurements. The CEL-35X *dB*adge has no cable like a traditional dosimeter, so is far easier to fit to an employee and is less likely to interfere with the individuals work. Casella CEL provides various mounting options for the *dB*adge.

The CEL-35X *dB*adge is very simple operate with just 2 keys, and can be locked to prevent tampering. After a measurement has been completed the noise badge can be downloaded via it's infra-red port to the Casella insight data management software. This will allow comprehensive analysis of an employee's exposure.

This manual describes the operation of the CEL-35X *dB*adge and the associated mounting options, as well as charging the *dB*adge.

Use of the CEL-35X/IS Intrinsically Safe (I.S.) *dB*adge is described, including special requirements for use under ATEX certification.

The CEL-350L is an entry level model that does not store the time history of the noise data.

The CEL-352 *dB*adge „Plus" measures additional values which allow for the selection of hearing protection via the Single Number Rating (SNR) or High, Medium, Low (HML) methods.



2 SUPPLIED EQUIPMENT

Carefully remove all components of the *dB*adge from the shipping container and check for possible damage or any missing items. If any items are not present or damaged please contact Casella CEL immediately. The following components should be included:

CEL-35X	*dB*adge (includes microphone CEL-252, windshield CEL-6356 and calibration certificate)

Or

CEL-35X/IS	I.S. *dB*adge (includes microphone CEL-252, windshield CEL-6356 and calibration certificate)

Where CEL-35X represents either a CEL-350 or CEL-352

CEL-6351	Pin Mounting Kit
CEL-6352	Crocodile Clip Mounting Kit (fitted to CEL-35X)

Instrument kits include the following parts:

HB-3323	*dB*adge Instruction Manual (on CEL-6357 software CD)
HB-3324	Field Guide (printed hard copy)
CEL-6362	3-way Charger Unit (including -PC18 Power Supply Unit)
CEL-6355	Kit Case for up to 10 *dB*adge Units
CEL-120/2	Class 2 Acoustic Calibrator (including calibration certificate)
193200B	Infra Red Download Cable (includes screwdriver)
CEL-6357	Casella insight data management software on CD including HB-3325 Software Manual and HB-3323 *dB*adge Manual
-HK111	Screwdriver for changing mounting clips

If a kit with 10 *dB*adges was purchased, the following item will be present:

CEL-6363	3-way charger extension unit (including C6359/0.2 cable)

Optional items at time of order:

D8147/Z	3 Point Harness
CEL-6351	Spare Pin Mounting Kit (5 Pack)
CEL-6352	Crocodile Clip Mounting Kit (5 Pack)
CEL-6354	Hard Hat Mounting Kit
CEL-6356	Spare Windshield
CEL-90336	USB Adaptor

3 THE SYSTEM COMPONENTS

3.1 The CEL-35X *dB*adge

The CEL-35X *dB*adge and controls are shown below in Figure 1. The two controls are the Left (L) and the Right (R) keys.



Figure 1

3.2 Mounting Clips

Upon delivery, the CEL-35X will be fitted with the CEL-6352 „Crocodile" mounting clips, as shown in Figure 2. Mounting clips can be changed using the screwdriver provided. For information on changing the mounting clips please see section 6.



Figure 2

3.3 The CEL-6362 Charger

A CEL-6362 is a drop-in intelligent 3-way charger unit, required to charge the internal Nickel Metal Hydride (NiMH) batteries on the CEL-35X *dB*adge. The CEL-6362 consists of the charger base, part number 193102B-01 and the -PC18 mains power supply unit (PSU). The PSU will require fitting with an appropriate plug connector (supplied) for the country of use.



Figure 3

Note that charger base 193102B-01 is for use with the CEL-35X and the CEL-35X/IS. The previous version of the charger base (193038B-01) can only be used with the CEL-35X and NOT the CEL-35X/IS.

Note that all versions of the *dB*adge should only be charged in non-hazardous areas in the absence of any flammable atmospheres.

3.4 The Windshield

During use, it is essential the *dB*adge is fitted with the CEL-6356 windshield (supplied). To calibrate the *dB*adge it is necessary to remove the windshield to gain access to the microphone. To remove the windshield, twist the black plastic ring below the foam anti-clockwise and lift the windshield to remove.



Figure 4

Once the CEL-35X *dB*adge has been calibrated (section 5.2) refit the windshield by placing the windshield back into the body of the *dB*adge and twisting clockwise, as shown previously in Figure 4.

4 CHARGING THE CEL-35X

4.1 Charging

The CEL-35X *dB*adge uses internal NiMH batteries. Ensure the CEL-35X is fully charged prior to use by placing in the charger as shown in Figure 5. Note the CEL-35X will fit into charger units regardless of which mounting clips are attached.



Figure 5

Ensure the power supply (-PC18) is connected and the supply is switched on. The CEL-35X *dB*adge will automatically switch on during charging and display how much charge is within the *dB*adge, as shown in Figure 6. When the CEL-35X *dB*adge is charging the red LED will flash and the charge symbol will rotate on the top right of the display. The *dB*adge will display „Full" once charging is complete and the LED on the front of the instrument will turn blue. This should take approximately 1.5 hours from a discharged state. A charging time of about 30 minutes will be sufficient to perform greater than 8 hours of measurement. Once fully charged, the CEL-35X holds enough charge to run for approximately 28 hours.

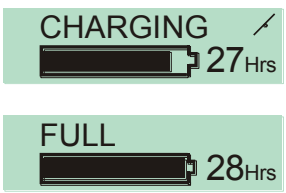


Figure 6

Note that once removed from the charger, the *dB*adge will automatically switch off. If returned to the charger the CEL-35X will charge for a minimum time of 10 minutes regardless of whether it is fully charged. This does not affect battery performance in any way. If the battery is fully discharged prior to being placed on a charger, the CEL-35X will be trickle charged for a short time prior to the fast charge cycle, this prevents damage to the batteries. If this occurs a „Pre-Charge" message will appear on the *dB*adge display.

4.2 Linking Chargers Together

The main CEL-6362 charger can be linked to the CEL-6363 charger extension unit via the C6359/0.2 cable supplied with the CEL-6363. Up to 3 CEL-6363 units can be linked to the CEL-6362 charger for charging up to 12 *dB*adge units as shown in Figure 7 below.

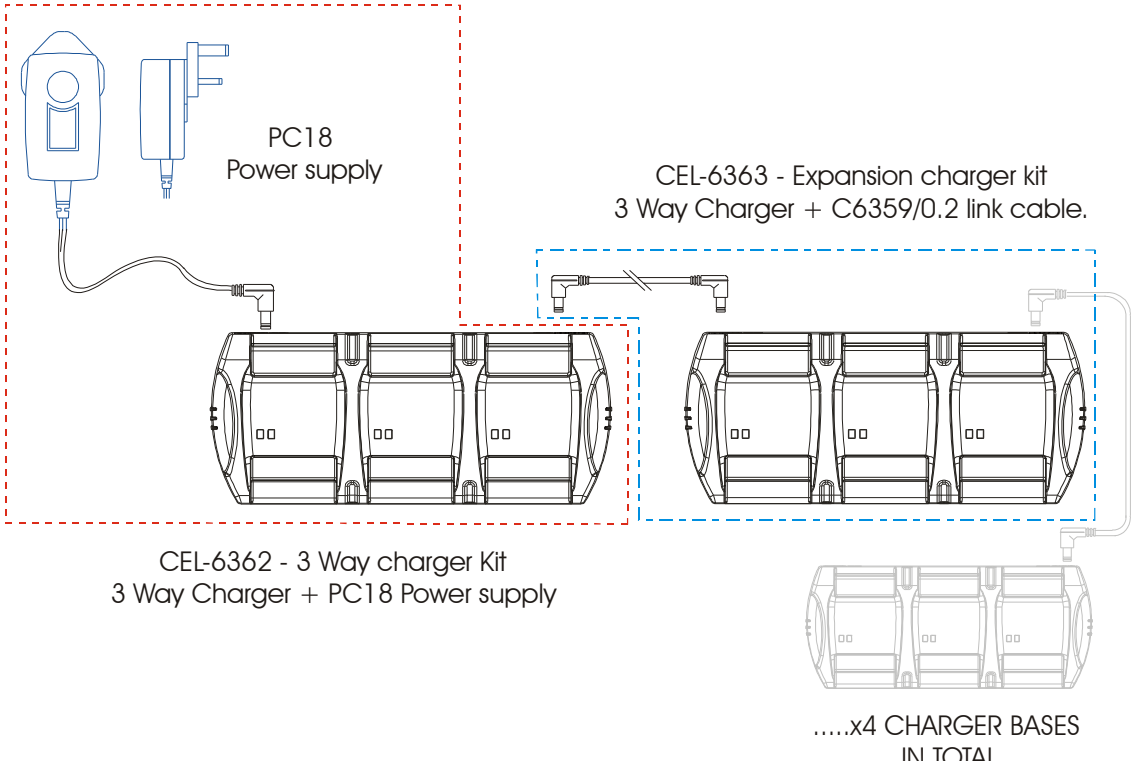
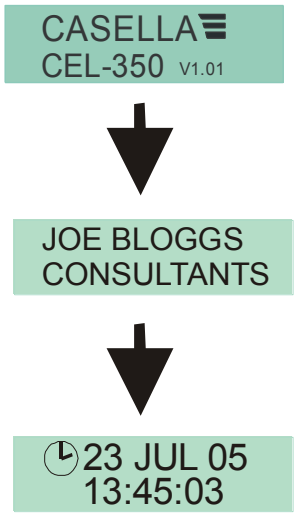


Figure 7

5 GENERAL OPERATION

5.1 Switching on the *dB*adge

Once the instrument is switched on by pressing the „L" key, it will display a start up sequence, shown in Figure 8. This displays the *dB*adge model number and firmware version (e.g. V1.07), followed by the „Custom Text" screen. This text can be configured using the Casella insight data management software. The screen will then change to the current time and date. This will automatically be set to the internal clock of the PC every time the *dB*adge is downloaded to Casella insight data management software.



Screen will show CEL-350L on *dB*adge „Lite" model or CEL-352 on *dB*adge „Plus" model.

Figure 8

The next screen shows the remaining battery life and memory as shown in Figure 9. The caution symbol ⚠ will be displayed on the left of the display if remaining memory or battery life are under 2 hours. The next screens show the instantaneous sound pressure level (SPL) currently being measured by the microphone and the current clock time set within the instrument.

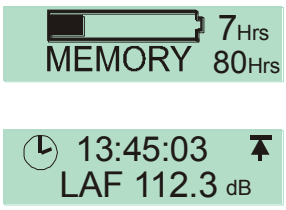


Figure 9

The subsequent screens will cycle through results from the last measurement run, as shown in Figure 10. Values shown will be dependent on whether the CEL-35X is configured to display ISO or OSHA parameters (see sections 5.6 & 5.7).

ISO VIEW

DURATION 07:45:12	LAEQ 89.9 LCPK 101.4 dB	PA² Hrs 3.20	PROJ DOSE 352.5 %

OSHA VIEW

DURATION 07:59:32	LAVG 111.4 LZPK 119.4 dB	OSHA DOSE 114.3 %	PROJ DOSE 175.3 %

Additional screen on CEL-352 *dB*adge „Plus" model:

LCEQ 92.4 dB LC-A 4.8 dB

Figure 10

Note: If „Pro Mode" is enabled additional menus will be displayed, see section 5.5.

The over-range symbol will be shown if the CEL-35X has been exposed to noise over the linear operating range. The screens will continue to automatically cycle through as shown in Figure 9 and 10 until another action is performed. Pressing the „R" key will stop the screens cycling for 5 seconds. Screens can also be manually cycled through by pressing the „R" key repeatedly. Note that if the memory is currently empty the screens shown in Figure 10 will not be shown.

5.2 Calibration

It is important to calibrate each *dB*adge before and after use, in accordance with workplace noise regulations. The *dB*adge records calibration levels and times which can be viewed later on Casella insight data management software.

Note that the *dB*adge will not enter calibration mode if a measurement run is taking place. If a run is in progress, stop the run according to section 5.4.

The windshield should be removed prior to calibration, refer to section 3.4.

Push the CEL-120/2 acoustic calibrator over the microphone as shown in Figure 11. The calibrator should be pushed on without twisting.



Figure 11

The CEL-35X *dB*adge will automatically recognise a 1kHz calibration tone is present and display the screen shown in Figure 12.

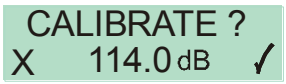


Figure 12

Press the „R" ✓ key to confirm you wish to calibrate the unit, it will take a few seconds to calibrate automatically to 114.0dB, during which time a progress bar will be displayed as shown in Figure 13.

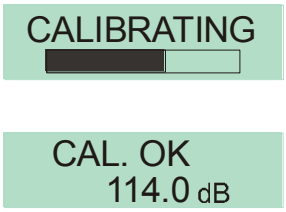


Figure 13

Once the unit has successfully calibrated the „Cal OK" message will appear. In the unlikely event an error message is displayed as shown in Figure 14, please refer to „Troubleshooting" section.

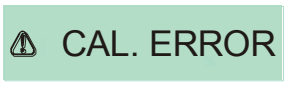


Figure 14

The CEL-35X is ready to take a measurement once the calibrator has been removed.

NOTE: The CEL-120/2 must only be used to calibrate the CEL-35X/IS in a non-hazardous atmosphere.

5.3 Starting A Measurement Run

Ensure the windshield is fitted according to section 3.4. The windshield protects the microphone from any potential erroneous results from wind, but also helps to protect from any dust ingress, moisture or impact damage. Before taking a measurement run, ensure there is sufficient battery life and memory by looking at the screen shown in Figure 9. If necessary charge the *dB*adge as described in section 4.1 and clear the memory as described in section 5.6, or download the *dB*adge to Casella insight data management software.

Regardless of which display mode is selected (ISO or OSHA) ALL parameters are stored simultaneously and can be viewed via Casella insight data management software.

To start the measurement run, press and hold both the „L" and the „R" keys down together for 3 seconds as shown in Figure 15.



Figure 15

When these keys are held down together the display on the *dB*adge will begin a count down, as shown in Figure 16. The keys must be held down during the countdown for the measurement run to begin.

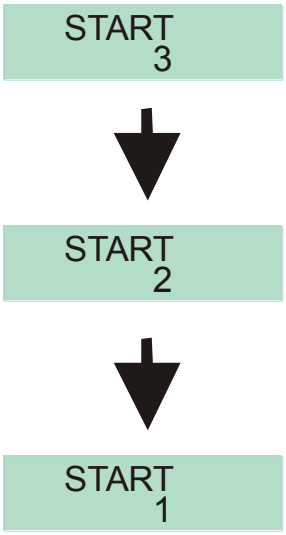


Figure 16

Once the measurement run has begun, the „Play" symbol ▶ will appear in the top left of the screen. The display will cycle between 2 screens. The first displays instantaneous sound pressure level (SPL) values and the duration of the measurement run so far. The second displays the status of the memory and battery. The screens are displayed below in Figure 17.

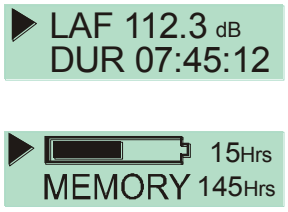


Figure 17

Casella CEL recommends the *dB*adge is locked to prevent the wearer from tampering with the unit. To do this, press and hold the „R" key whilst pressing the „L" key 3 times, as shown in Figure 18.



Figure 18

This will lock the keypad so any random presses of keys will not accidentally effect the measurement. The display of the CEL-35X will also change so as not to show any SPL values. This removes the temptation to shout into the microphone, as it has no visual effect. A padlock symbol will be shown in the bottom left of the screen to indicate the keypad is locked, as shown in Figure 19.

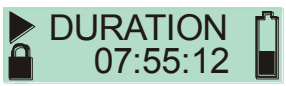


Figure 19

To unlock repeat the process shown in Figure 18.

Note: If „Autolock" is enabled from configuration menu, (section 5.6) the *dB*adge will automatically lock.

If during a measurement run, the remaining battery or memory capacity falls below 2 hours, the red LED will flash and the warning icon will be shown on the display.

5.4 Stopping A Measurement Run

If the CEL-35X *dB*adge is locked, first unlock the keypad by holding down the „R" key whilst pressing the „L" key 3 times, as shown in Figure 18. To stop the measurement run, press and hold the two keys simultaneously for the period of the countdown, as shown in Figure 20.

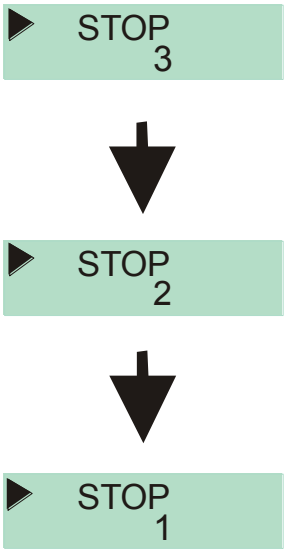
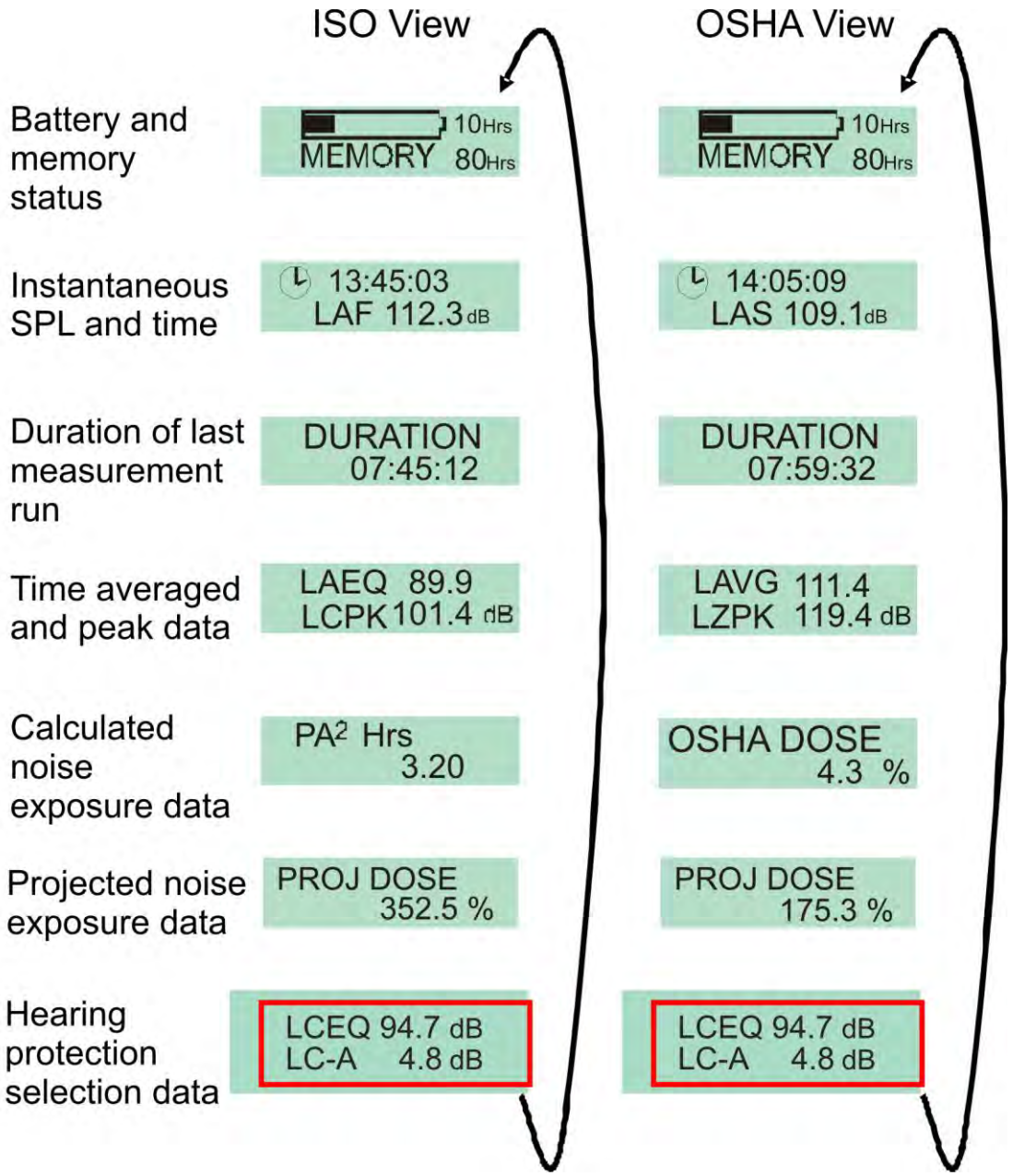


Figure 20

The display on the CEL-35X will then show the data from the measurement run that has just been completed, as shown in Figure 21. A new measurement run can be started immediately by following the steps described in section 5.3. Ensure enough battery life and memory capacity remains if a consecutive measurement run is to be performed.

5.5 Reviewing Measurement Run Data

As soon as a measurement run has been stopped, the *dB*adge will automatically display results from the completed measurement run. The display will automatically cycle as shown in Figure 21. The screen contents will depend upon which display mode is selected (ISO or OSHA).



The last screen, highlighted in red, is only available on the CEL-352 *dB*adge „Plus" model

Figure 21

If „Pro Mode" is enabled, screens shown in Figure 22 become viewable. The screen contents highlighted in blue will depend upon which display mode is selected (ISO or OSHA). To enable „Pro Mode" see section 5.6.

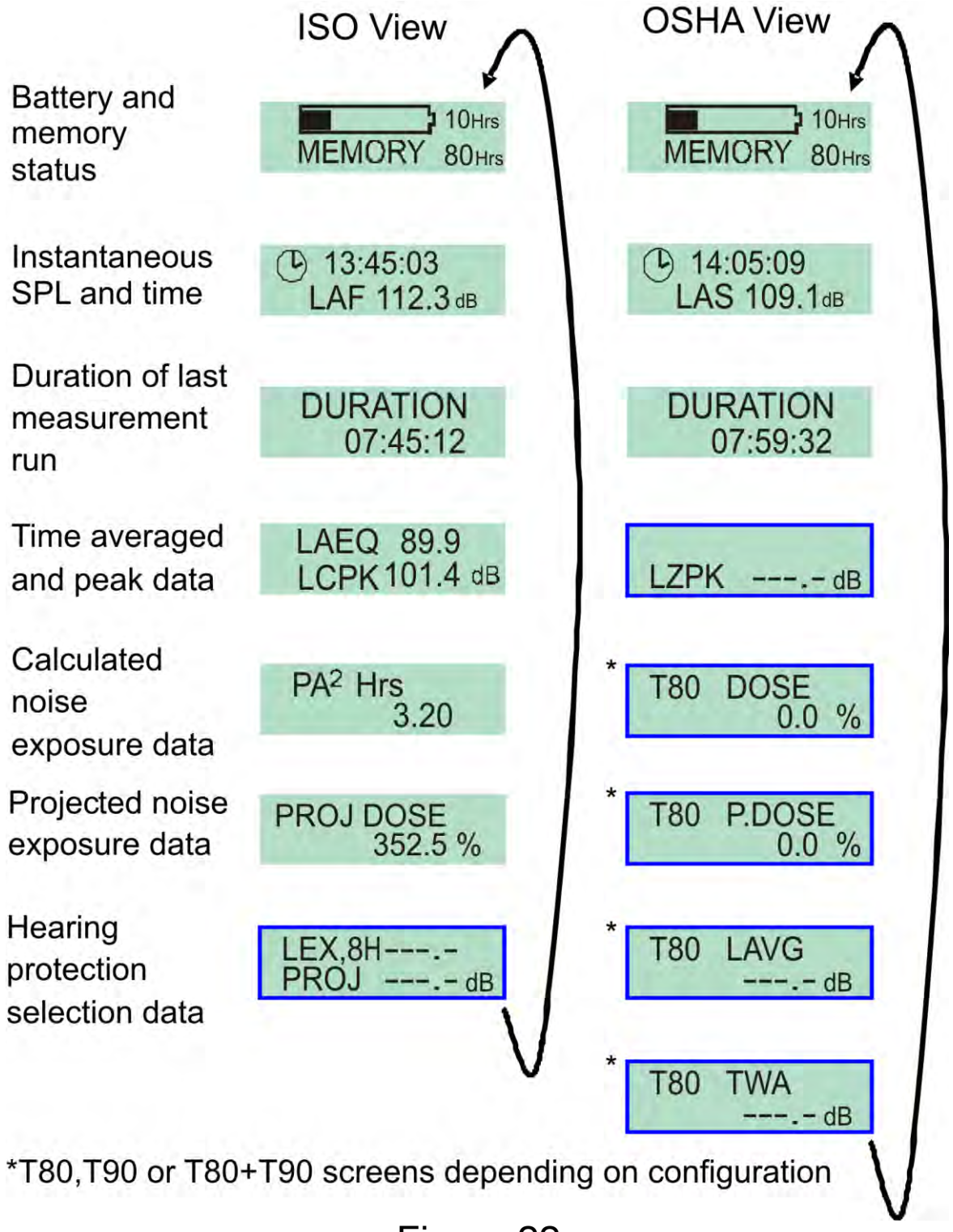


Figure 22

By pressing the „R" key when on any of these screens, the display will stop cycling for a period of 5 seconds.

On the CEL-352 *dB*adge „Plus", The LC-A is simply the L_{Ceq} minus the L_{Aeq} for use in the HML method for the selection of hearing protection. For detailed information on how to use these values to calculate the effectiveness of hearing protection, please see section 10.3.

5.6 Configuration Menu

The configuration menu is accessed by holding the „R" key down whilst switching on the *dB*adge („L"key), see Figure 23.

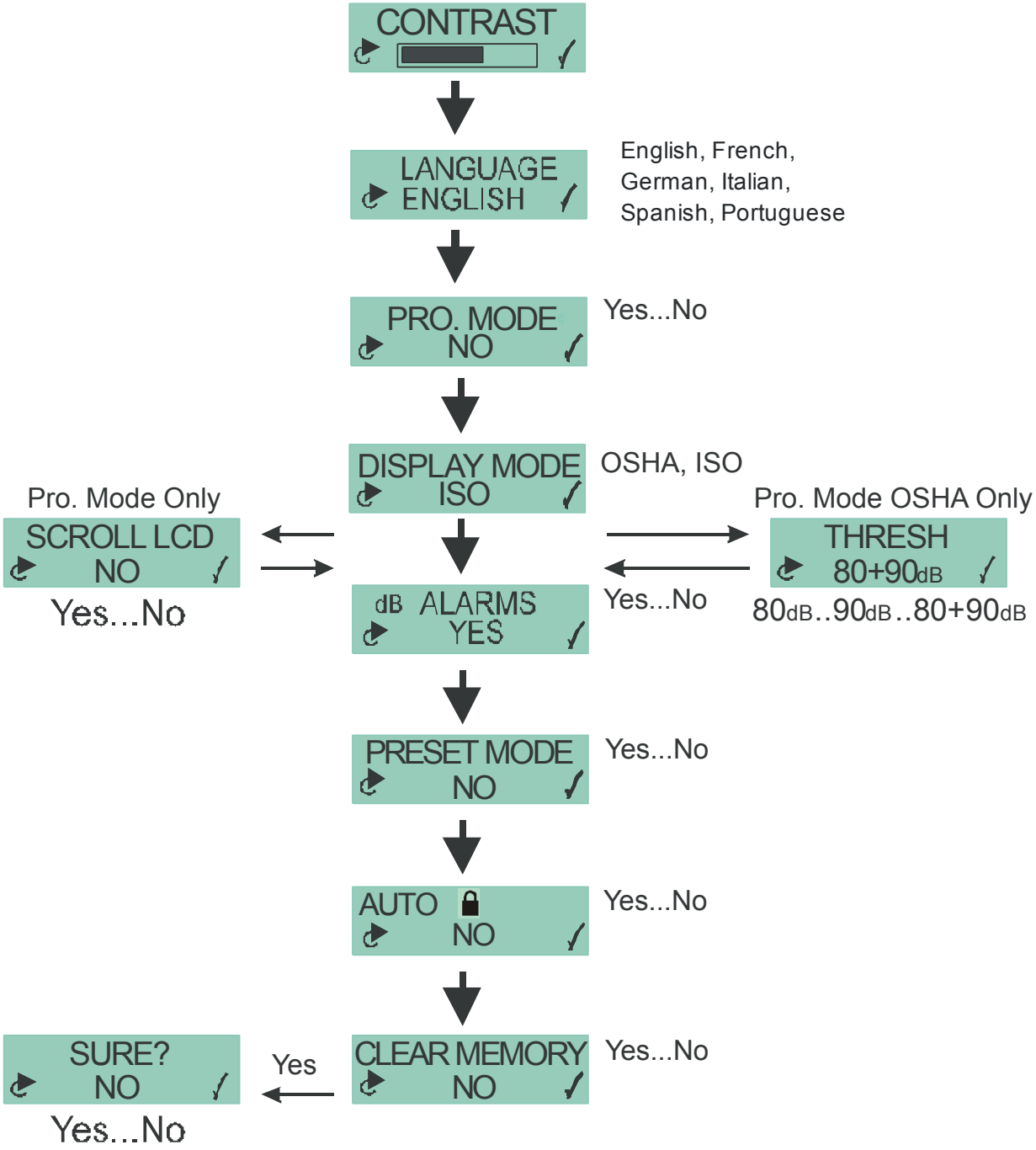


Figure 23

The first configuration screen to be displayed is the contrast menu. For each option within these menus press the „L" key to adjust what is on the screen then press „R" ✓ to confirm and move to next screen.

Contrast setting
You can adjust the display contrast for best viewing of the text on screen. There are 6 different contrast levels available.

Language setting
You can select one of the pre-programmed languages that are available. Currently these are English, French, German, Italian, Spanish, and Portuguese.

Pro Mode setting
You can select to leave the Pro Mode disabled for simplicity of displayed results or choose to enable it to show the calculated values at the 80 + 90, 80 only or 90 only threshold levels. (or values of Lex8h and Proj Lex8h)

Display mode setting
You can select either ISO or OSHA display modes for on screen results but both settings are measured and stored for all runs so that relevant data can be seen in the Casella insight data management software program from every run.

For further details about the „Display Mode" see section 5.7.

Threshold setting
This menu is only displayed if the OSHA display mode is selected in the previous step. You can select either both the 80 + 90, just the 80 dB (for the HCA) or just the 90 dB (for the PEL) on screen. The 80 + 90 setting gives the maximum number of displayed screens in the instrument but if only the tighter HCA (or lower threshold settings) are required for simplicity then select the 80 setting only. Similarly, if the 90 dB upper threshold is set then only the PEL results will be displayed on screen. In any of these 3 cases it should still be remembered that whatever the setting chosen here it will only affect the displayed results and that all the data will be stored to calculate every required parameter when downloaded to Insight software (and dB35).

Scroll LCD setting
You can choose to allow the display screens to scroll through as described above or you can select to switch off this function and step through the displayed dosimeter screens one by one manually.

dB Alarms setting
You can choose to enable or disable the high intensity blue flashing LED when the measured noise levels exceed the set threshold trigger levels chosen in the Casella insight data management software (or dB35) configuration setup. For further details see section 5.8.

Pre-set Mode (Run Duration Timers)
This mode allows a variety of settings from Off through to 12:00 in 30 minute steps by pressing the left button to show the value required and then pressing the right button to accept and move on to the next menu item. Press and hold in the left button to change through the selections more quickly. The run will start and run for the selected fixed duration time chosen in this menu.

Auto Lock
This choice is off by default but allows the user to lock the unit during the run to prevent the display from showing any run information other than the run time and battery condition. The lock function can be switched on and off during a run by holding the right button in and pressing the left button three times in succession quickly. This allows a supervisor to inspect the run results so far at any time during a typical day"s measurement in the field.

Clear memory setting
You can choose to leave any runs in the memory or to delete them manually prior to beginning new measurements with this control. This may be needed before starting a series of long runs before being able to download to the computer program.

When on the clear memory screen, the memory can be cleared by first pressing the „L" key to change the „No" option on the screen to „Yes". Then press the „R" ✓ key to confirm. A second screen will appear requesting confirmation that you wish to delete the memory. Use the „L" key to change the option to „Yes" and if you wish to delete the memory press „R" ✓ to confirm.

Once all the options within the configuration menu have been set, the display will return to the standard screens as described in section 5.

5.7 Display Mode

The selected display mode specifies which key results are displayed on the screen upon completion of a measurement run. Regardless of which display mode is set, the *dB*adge measures ALL parameters during every measurement run. Once downloaded to the Casella insight data management software, all measured data can be viewed. The key displayed results set can be either configured to ISO (for Europe) or OSHA (for U.S.A), as shown in the table below.

DATA	ISO	OSHA
Instantaneous SPL	L_{AF}	L_{AS}
Time Averaged Parameter	L_{Aeq}, L_{Ceq}*	L_{Aavg}, L_{Ceq}*
Peak Value	L_{Cpeak}	L_{Zpeak}
Dose Value	Pa^2Hours, Projected % Dose	% Dose, Projected % Dose

* CEL-352 *dB*adge „Plus" model only

For a definition of each of these terms please see Appendix 1, section 10.1.

Note that for the OSHA data, the L_{Aavg} and the % dose data use a threshold of 80dB and a criterion value of 90dB. For a full list of all the measurement parameters available from Casella insight data management software, please refer to Appendix 1, section 10.2.

5.8 Alarm Settings

Alarm levels can be set within the Casella insight data management software based on action levels for local workplace noise regulations. They can be used by an employer as a visual indicator of an individual's exposure throughout the day and can be switched „on" or „off" as per section 5.6. If these pre-determined alarm levels are exceeded then the blue LED on the front of the CEL-35X will flash. The location of the LED is shown in Figure 24.



Figure 24

The default alarm levels will depend on which display mode is selected, either ISO or OSHA mode. The default levels are summarised in the following table.

Display Setup	Blue LED Off	Blue LED Flashing Slow	Blue LED Flashing Fast
ISO	Leq <=79.9dB(A) AND Lpk <=134.9dB(C)	Leq >=80 & <=84.9 dB(A) OR Lpk >=135 & <=136.9 dB(C)	Leq >=85dB(A) OR Lpk >=137dB(C)
OSHA	Lavg (T=80) <=84.9dB(A) AND Lpk <=139.9dB(Z)	Lavg (T=80) >=85 (A) OR Lpk >=140dB(Z)	Lavg (T=80) >=85dB(A) AND Lpk >=140dB(Z)

For the ISO mode, the alarm levels are based upon the EU directive 2003/10/EC. OSHA levels are based upon the American Occupational Safety and Health Administration (OSHA) regulations. As an example, if the CEL-35X is in ISO mode, and the Leq rises above 80dB(A) then the LED will flash slowly (approx once per second). If an impulsive noise occurs above 137dB(C) peak, the blue LED will flash quickly (approximately twice per second). Note that for peak levels the action level only needs to be exceeded once during the day for the employee to be over the relevant action level. However, for the time-averaged data (Leq and Lavg) the LED may switch on and off depending on how the employees‟ exposure varies throughout the day. It is important to realise alarm indications are based on the average or peak levels since the start of the run, and not averaged to 8 hours.

6 MOUNTING THE CEL-35X

The recommended location for mounting a noise exposure meter varies depending upon the legislation specific to a country. Most countries recommend a position close to the ear (10-15cm) so the *dB*adge can be mounted on a collar or shoulder. The UK legislation recommends mounting on the top of the shoulder to avoid reflections from the head and body affecting the measurements as much as possible. All mounting clips are attached to the CEL-35X *dB*adge by two screws. By removing the screws with the screwdriver provided, the mounting clips can be changed. As shown in Figure 25, please reinsert the screws into the correct hole, otherwise damage could be caused to the *dB*adge.



Correct Screw Orientation

Figure 25

6.1 CEL-6351 Pin Mounting Clips

These clips can be mounted to a variety of clothing. Caution should be used when fitting these to an employee to avoid piercing the skin. These clips should not be used on fire retardant clothing as piercing the outer layer will compromise the employees‟ protection.

Illustrations of the CEL-6351 and CEL-6352 mounting clips are shown in Figures 26 & 27.



CEL-6351 Pin Mounting Kit

Figure 26

6.2 CEL-6352 Crocodile Clip Mounting Kit

The CEL-6352 crocodile mounting clips are fitted to the CEL-35X *dB*adge upon delivery as they can be fitted to virtually any clothing type. The CEL-6352 is used for attaching the CEL-35X to clothing and should be used where piercing the employees‟ clothing is not desired.



CEL-6352 Crocodile Clip
Mounting Kit –Front/Rear

Figure 27

Note, when any of the mounting clips are ordered, they are supplied in packs of 5, i.e. enough to fit 5 *dB*adge units.

6.3 CEL-6353 Harness Mounting Kit

The CEL-6351 is used for attaching the CEL-35X to the D8147 harness or an existing harness that the employee may wear. The CEL-6351 Pin kit and the D8147 are pictured in Figure 28.



CEL-6351 Pin Mounting Kit,
Fitted to D8147 Harness

Figure 28

6.4 CEL-6354 Hard Hat Mounting Kit

The CEL-6354 hard hat mounting kit can be used to fit the CEL-35X *dB*adge to most hard hats. It consists of a loop with four hooks which loop over the rim of the hard hat. The CEL-6351 pin clips are used to connect the hard hat mounting kit to the *dB*adge.



CEL-6354 Hard Hat
Mounting Kit



CEL-6354 Fitted to a
Hard Hat

Figure 29

7 TECHNICAL SPECIFICATION

7.1 Specification

Sound Exposure Meter/Dosimeter Standards:
IEC 61252: 2002, BS EN 61252: 1997, ANSI S1.25 - 1992 for dosimeters and sound exposure meters.

The CEL-35X conforms to the requirements for EMC emissions and immunity as specified in IEC 61000-4-2/6-1, 61000-4-6/6-2, 61000-4-3/CISPR 61000-6-3.

Electromagnetic and electrostatic compatibility:
The CEL-35X was tested with a pink noise acoustic source of 85dB and complies with the immunity requirements of clause 15 (IEC 61252). No additional devices are connected during normal use.

There is no degradation in performance or loss of functionality following the application of electrostatic discharges.

All settings and orientations of the instrument have similar radio-frequency emissions. These radio-frequency emissions are within the specified limits of this standard.

All modes of operation have similar immunity to power and radio frequency fields.

Linear Operating Range:	65.0-140.3dB(A) RMS,
Peak Measurement Range:	95.0-143.3dB(C or Z),
Sound exposure Range:	0.01- 99999 Pa^2Hours, 0.01- 99999 %,
Freq Weightings:	A, C and Z Type 2,
Time Weightings:	Fast, Slow and Impulse,
Amplitude:	Q=3 or Q=5dB exchange rates,
Threshold:	70-90dB in 1dB steps via Casella insight data management software,
Criterion:	70-90dB in 1dB steps via Casella insight data management software,
Clock:	Accuracy better than 1min per month,
Under Range:	1dB below the bottom of the range,

Indication

Overload Indication:	140.4dB RMS (i.e. 0.1dB above the top of the range),
Peak Overload Value:	143.4dB Peak Linear (i.e. 3.1dB above the top of the range),
Stabilisation Time:	3 seconds after power up,

Operating Environment

Temperature:	0^{o}C to +40^{o}C,
Pressure:	65 - 108kPa,
Humidity ± 0.5dB:	30% - 90% (non-condensing),
Magnetic Fields:	Negligible,

Storage Environment

Temperature:	-10^{o}C to +50^{o}C,

Battery:	Internal NiMH, 28 hour battery life,
Charge Time:	Less than 90 minutes from discharged,
Dimensions mm (in):	72x47x52 (2.8x1.8x2.0),
Weight g (oz):	68 (2.4),

The CEL-35X/IS Intrinsically Safe *dB*adge is labelled with the following:

ATEX:
I M1
II 1G
EEx ia IIC T2 (222 °C)
EEx ia I
(T_a = -20^{o}C to +40^{o}C)

FM/CSA:
Class 1
Division 1
Groups A, B, C and D.
Temperature classification T2

7.2 Microphone Specification (CEL-252)

Classification:	Type 2
Nominal Open-Circuit Sensitivity (250Hz):	-28dB ± 3.0dB (30mV/Pa)
Polarization voltage**:**	0V
Capacitance (polarized, 250Hz):	11-15pF
Operating temperature range:	0 to +40^{o}C
Cartridge thermal noise:	25dB(A)
Dimensions:	IEC 61094-4 Type WS 2

8 SERVICING AND WARRANTY ARRANGEMENTS

To ensure 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 be quoted in any correspondence. 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 it"s 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. 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.

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.

9 TROUBLESHOOTING

Symptom	Possible Cause	Suggested Solution
The *dB*adge will not switch on	The *dB*adge batteries are flat	Charge the *dB*adge unit (see section 4)
Incorrect time or date is displayed when turning on the *dB*adge	The time and date has not been set or PC clock is set incorrectly	Connect the *dB*adge to Casella insight data management software to set time and date, ensuring PC clock is set correctly
„Cal Error" Message appears when calibrating *dB*adge	Calibrator is not switched on	Switch on calibrator, see calibrator manual
	Calibrator is incorrectly fitted	Push calibrator firmly over microphone
*dB*adge will not enter calibration mode	*dB*adge is not switched on or a measurement is taking place	Ensure *dB*adge is switched on, if a measurement run is taking place, see section 5.4 to stop the measurement
„Battery Fail" message appears on display	Batteries are flat	Charge the *dB*adge, see section 4.1
„Memory Full" message appears on display	All memory has been used	Download measurement runs to Casella insight data management software or clear memory, see section 5.6

On power up and during operation, *dB*adge monitors hardware and software operation and will display an error if it finds a problem.

In the unlikely event this occurs, the *dB*adge will try to save any data if it is in a measurement run. Should the error persist after switching the *dB*adge off then on again, contact Casella CEL.

10 APPENDIX

10.1 Glossary of Terms

This Appendix gives a glossary of the acoustic terminology used in this handbook and in the CEL-35X *dB*adge and Casella insight data management software. For further information, please contact Casella CEL or your local representative.

A-Weighting
A standard weighting of the audible frequencies designed to approximate the response of the human ear to noise.

Acoustic Calibrator
An instrument that provides a reference noise source with a standard level and frequency used to calibrate and check the performance of sound level meters and noise dosimeters.

ANSI S1.25 - 1991
The U.S. Standard for Noise Dosimeters.

C-Weighting
A standard weighting of the audible frequencies. In the *dB*adge system it is used for the measurement of peak sound pressure level.

Criterion Level (CL)
This is the normalised eight hour average weighted sound level in dB that corresponds to the maximum permitted daily exposure or 100% noise dose.

Criterion Time (CT)
This is the time, in hours, used in the calculation of the %Dose.

dB(A)
A-weighted sound level in decibels.

dB(C)
C-weighted sound level in decibels.

dB(Z)
Z-weighted sound level in decibels.

Decibel (dB)
The standard physical unit for measuring sound level and noise exposure.

Estimated Exposure in Pa^2h
A calculated estimate of the exposure that would be received by the wearer if the average level measured continues for the period defined by the criterion time. Expressed in Pascal squared hours (Pa^2h).

Fast Time Weighting
A standard time weighting applied by the sound level measurement instrument.

IEC 61252
The International Standard for Personal Sound Exposure Meters.

LAE
The A-weighted exposure level is the level that would contain the same amount of energy in one second as the actual noise has during the whole measurement period.

LAeq
The A-weighted equivalent level is the level that would contain the same amount of noise energy as in the actual noise, effectively giving an average level over the measurement period. Following the ISO procedures, doubling the energy results in a 3dB change in the Leq. This is denoted by exchange rate Q=3. For example, if the noise level in a factory was a constant 85dB and the measurement period was 4 hours, the LAeq would be 85dB(A). The calculation of LAeq DOES NOT USE a Threshold as in the calculation of LAVG.

LAF
The A-weighted sound level measured with Fast time weighting.

LAS
The A-weighted sound level measured with Slow time weighting.

LASmax
The maximum A-weighted sound level measured with Slow time weighting.

LAVG
This is a parameter used in OSHA measurements. It is the average sound level over the measurement period (equivalent to Leq). Normally the term is used when the exchange rate Q is some value other than 3, such as for measurements used for the OSHA Hearing Conservation Amendment with Q=5. A Threshold value is used during the calculation of LAVG, where any levels below the threshold are not included. For example, assume the threshold level is set to 80dB and the exchange rate is 5dB (Q = 5). If a one hour measurement was taken in an environment where the noise levels vary between 50 and 70dB, the sound level would never exceed the Threshold so the instrument would record no value for the LAVG. However, if the sound level exceeds the 80dB Threshold for only a few seconds, only these seconds will contribute to the LAVG, giving a level of around 40dB, which is much lower than the actual ambient sound levels in the measured environment.

LCpeak
The peak C-weighted sound level.

LEP,d
This is the daily personal noise exposure defined by ISO 1999. It is the LAeq normalised to an 8 hour Criterion Time, i.e. a standard day. Assuming the noise level for the rest of the 8 hour reference period is "quiet", the LEP,d will be: lower than the Leq when the measurement duration is less than 8 hours, equal to the Leq for a measurement of 8 hours, higher than the Leq for measurements longer than 8 hours. For example, if a noise measurement was made for 4 hours and the LAeq value was 90dB(A), the LEP,d value would be calculated to be 87dB(A) as the measurement duration is half the 8 hour Criterion Time and the exchange rate is 3 dB.

LCeq
The C-weighted equivalent level is the level that would contain the same amount of noise energy as in the actual noise, effectively giving an average level over the measurement period. Following the ISO procedures, doubling the energy results in a 3dB change in the Leq. This is denoted by exchange rate Q=3.

Peak
The maximum level in dB reached by the sound pressure at any instant during a measurement period. With the *dB*adge, Peak is measured with either C, Z or A weighting. It is the true peak level of

the pressure wave, which should not be confused with the highest sound pressure level, termed Lmax.

Slow Time Weighting
A standard time weighting applied by the noise measurement instrument.

SPL
The sound pressure level. This is the basic physical measure of noise, and is normally expressed in dB.

Threshold
A threshold below which sound levels are excluded from calculation. OSHA measurements use an 80 dB threshold and call for a hearing conservation program to be implemented when the eight hour TWA exceeds 85 dB (50% dose).

TWA
This is a parameter used in OSHA measurements. The time weighted average is the daily personal exposure level calculated from the LAVG and measurement duration.

Z-Weighting
Effectively this is a linear, or un-weighted measurement. In the *dB*adge system it is used for the measurement of peak sound pressure level against the OSHA standard.

10.2 Measured Parameters

ISO:	LAeq, LCpeak, LAEP,d, Pa2Hours Projected %dose (Q=3)
OSHA:	LAavg (Q=5), LZpeak, LASmax, %dose (Q=5), TWA Projected %dose (Q=5)
General:	LAFmax, LAFmin, LASmin (via dB35) LAleq, LAImax, LAImin, LApeak
Time history:	LAeq, LZpeak, LCpeak, LAavg (Q=5) Stored as 1 minute values (except CEL-350L)

The dBadge „Plus" additionally provides simultaneous measurements of LCeq, and LAeq, together with calculated LCeq-LAeq, used for the selection of hearing protection.

Regardless of which display mode is selected (ISO or OSHA) ALL parameters are stored simultaneously and can be viewed via Casella insight data management software. The CEL-35X also stores other parameters and 2 „dose histograms". This allows other data to be calculated and displayed on the Casella insight data management software. The total mix of parameters either displayed on the CEL-35X or those that can be displayed on the Casella insight data management software are summarised below.

Run Number
Serial Number
Start Date
Start Time
End Time
Duration[1]
L_{Aeq}[1]
L_{Ceq}[2]
L_{Aavg}[1 * #]
L_{Apeak}[1]
L_{Cpeak}
$L_{Cpeak\ >135\ (count)}$
$L_{Cpeak\ >137\ (count)}$
$L_{Cpeak\ >140\ (count)}$
L_{Zpeak}[1]
TWA[* #]
$L_{AEP,d}$
$L_{EX,8h}$
Projected $L_{EX,8h}$
L_{AIeq}
L_{AFmax}
L_{AFmin}
L_{ASmax}
L_{ASmin}
L_{AImax}
L_{AImin}
Calibration Times and Dates
Pa^2hr[1]
Pa^2sec
L_{AE}
%dose[1 #]
Projected %dose[1 * #]
HML[2]

*with Q5, threshold 70-90 (default 80dB) and criterion 70-90 (default 90dB) in 1dB steps.

Threshold T80…T90… or T80+T90.

[1] displayed on the CEL-35X, remainder shown on Casella insight data management software
[2] displayed on CEL-352 *dB*adge „Plus" model only

The *dB*adge also stores 1-minute values of the following parameters (Except *dB*adge „Lite"):

L_{Aeq}, L_{Aavg}, L_{Cpeak}, L_{Zpeak}.

10.3 Using the CEL-352 for the Selection of Hearing Protection

The CEL-352 *dB*adge „Plus" can be used for the selection of hearing protection by 2 different methods. These are the Single Number Rating (SNR) and the High, Medium, Low (HML) methods. Hearing protection manufacturers will provide data as follows:

HML values H=31 M=25 L=17
SNR value = 28

The SNR value is a single value which represents the attenuation of the hearing protection. The Sound Pressure Level (SPL) at the ear can be calculated as follows:

A-weighted SPL at the ear = L_{Ceq} – SNR

For example, if the measured L_{Ceq} from the CEL-352 *dB*adge „Plus" was 102dB, and using the value for SNR in the example above

A-weighted SPL at the ear = 102 – 28 = 74dB(A)

The HML method is a more effective method of calculating the effectiveness of hearing protection because it takes into account the frequency component of the noise. This is because the H, M and L values is the attenuation of the hearing protection at high, medium and low frequencies respectively.

The LC-A value displayed on the CEL-352 *dB*adge „Plus" (see Figure 21) is the $L_{Ceq} - L_{Aeq}$. It is important to know this because using the HML method requires 2 different formulas depending on the $L_{Ceq} - L_{Aeq}$ value, as shown below:

If $L_{Ceq} - L_{Aeq}$ is less than or equal to 2:

$$PNR = M - \frac{(H-M)}{4} \times (L_{Ceq} - L_{Aeq} - 2)$$

If $L_{Ceq} - L_{Aeq}$ is greater than 2:

$$PNR = M - \frac{(M-L)}{8} \times (L_{Ceq} - L_{Aeq} - 2)$$

Where PNR is the predicted noise level reduction provided by the hearing protection. For example, if from the CEL-352 *dB*adge „Plus" the values were:

L_{Ceq} 102.4dB L_{Aeq} 98.6dB

Therefore, as the $L_{Ceq} - L_{Aeq}$ value is greater than 2:

$$PNR = M - \frac{(M-L)}{8} \times (L_{Ceq} - L_{Aeq} - 2)$$

From the example of the hearing protector mentioned above:

$$PNR = 25 - \frac{(25-17)}{8} \times (102.4 - 98.6 - 2)$$

$$PNR = 25 - 1 \times 1.8$$

$$PNR = 25 - 1.8$$

$$PNR = 23.2dB$$

The A-weighted SPL at the ear = $L_{Aeq} - PNR$

The A-weighted SPL at the ear = 98.6 – 23.2 = 75.4 = 75dB(A)*

***Note:** some countries assume that „real world factors" will effectively reduce the effectiveness of hearing protection. For example, in the UK a further standard 4dB is taken off the PNR, so in this case the value at the ear would be 79dB(A).

10.4 ATEX Certificate

sira CERTIFICATION

1 **EC TYPE-EXAMINATION CERTIFICATE**

2 Equipment intended for use in Potentially Explosive Atmospheres Directive 94/9/EC

3 Certificate Number: **Sira 07ATEX2032X** Issue: **2**

4 Equipment: **CEL-35X/IS *dB*adge Series Noise Dosemeter**

5 Applicant: **Casella CEL**

6 Address: Regent House
Wolseley Road
Kempston
Bedford
MK42 7JY
UK

7 This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Sira Certification Service, notified body number 0518 in accordance with Article 9 of Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential reports listed in Section 14.2.

9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule to this certificate, has been assured by compliance with the following documents:

EN 60079-0:2009
EN 60079-11:2007
EN 60079-26:2006

10 If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EC type-examination certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.

12 The marking of the equipment shall include the following:

I M1
II 1G
Ex ia IIC T2(222°C) Ga
Ex ia I Ma
(T_a = -20°C to +40°C)

Project Number 52A21075
C. Index 12

This certificate and its schedules may only be reproduced in its entirety and without change.

D R Stubbings
Certification Manager

Sira Certification Service
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Form 9400 Issue 1

sira
CERTIFICATION

SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE **Sira 07ATEX2032X**
Issue 2

13 **DESCRIPTION OF EQUIPMENT**

The CEL-35X/IS *dB*adge series is a miniature, fully integrated Noise Dosemeter used for the measurement of personal noise exposure. The series covered by this certificate are CEL-35X/IS, where X is any number from 0 to 9. The product is designed to be worn using a range of fixing methods, alternatively it may be mounted on a hard hat.

The device comprises a plastic enclosure that contains two printed circuit boards, an LCD display and rechargeable cells. Two rubber keys located on the sides of the product are used to control the instruments operation.

Power to the device is provided from two, internal and non-removable ½-AAA, cylindrical, nickel metal hydride cells. Two exposed contacts are located on the rear of the product for connection to a purpose designed, drop in, charger system. The charge contacts are protected from reverse current flow by three blocking diodes. The unit is not to be charged within a hazardous area. Battery charging is only permitted using charger model number CEL-6362.

Noise is monitored using a screw on, ½" back, electret microphone, this is a high impedance capacitive type sensor, which can be removed for replacement or product testing. Measured noise data is downloaded to a PC (in the non-Hazardous area) using an infrared cable free communication link.

Variation 1 - This variation introduced the following changes:

i. The replacement of the existing case with a rubberised style case with enhanced ingress protection.
ii. The introduction of minor circuit changes which do not affect the intrinsic safety of the product.

Variation 2 - This variation introduced the following changes:

i. A change of cell type from a GP 33AAAH to a Shenzhen H-½ AAA 250mAh NiMH cell, with a corresponding change to the product description and temperature class
ii. The addition of a Condition of Certification
iii. The removal of the Special Conditions for Safe Use dealing with static
iv. The use of a Yeebo LCD with Sitronix ST7549T integrated circuit to replace the UltraChip UC1602 LCD
v. Recognition that the equipment complies with EN 60079-0:2009, EN 60079-11:2007 and EN 60079-26:2006. The original standards against which this certificate was issued: EN 50014:1997, EN 50020:2002, EN 50284:1999 and EN 50303:2000 have been removed from Section 9.

This certificate and its schedules may only be reproduced in its entirety and without change.

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CERTIFICATION

SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE **Sira 07ATEX2032X**
Issue 2

14 **DESCRIPTIVE DOCUMENTS**

14.1 **Drawings**

Refer to Certificate Annexe.

14.2 **Associated Sira Reports and Certificate History**

Issue	Date	Report number	Comment
0	26 April 2007	R52A15494A	The release of the prime certificate.
1	24 July 2009	R52A19171A	The introduction of Variation 1.
2	15 March 2010	R21075A/00	The introduction of Variation 2.

15 **SPECIAL CONDITIONS FOR SAFE USE** (denoted by X after the certificate number)

15.1 The *dB*adge Noise Dosemeter shall not be used in areas where a layer of coal dust may be deposited on the enclosure.

15.2 The microphone shall not be removed in the hazardous area.

16 **ESSENTIAL HEALTH AND SAFETY REQUIREMENTS OF ANNEX II** (EHSRs)

The relevant EHSRs that are not addressed by the standards listed in this certificate have been identified and individually assessed in the reports listed in Section 14.2.

17 **CONDITIONS OF CERTIFICATION**

17.1 The use of this certificate is subject to the Regulations Applicable to Holders of Sira Certificates.

17.2 Holders of EC type-examination certificates are required to comply with the production control requirements defined in Article 8 of directive 94/9/EC.

17.3 When the Shenzhen 250 mAh cells are soldered to the PCB, the manufacturer shall ensure that the segregation between positive and negative of ≥0.5mm through solid insulation and ≥1.5 mm creepage is maintained on the positive terminal.

This certificate and its schedules may only be reproduced in its entirety and without change.

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10.5 FM Certificate

FM Approvals
1151 Boston Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: 781 762 4300 F: 781-762-9375 www.fmapprovals.com

CERTIFICATE OF COMPLIANCE

HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

CEL-35a/IS dBadge Noise Dosemeter
IS / I / ABCD / T2

a = 0 – 9, Firmware

Special condilions of use
1) The batteries shall only be re-charged using the Casella CEL-6362 charger unit with nominal output parameters of 5.2V 220mA.
2) The microphone shall not be removed in the hazardous area
3) The dBadge Noise Dosemeter shall not be used in area where a layer of coal dust may be deposited on the enclosure

Equipment Ratings:

Intrinsically Safe for use in Class I, Division 1, Groups, A, B, C and D Hazardous (Classified) Locations with a temperature classification of T4.

FM Approved for:

Casella CEL Limited
Bedford, MK42 7JY
United Kingdom

6/07

3029871
Page 1 of 2

FM Approvals

This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

Class 3600	1998
Class 3610	2007
Class 3810	2005

Original Project ID: 3029871 Approval Granted: October 1, 2007

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date
100319	April 6, 2010		

FM Approvals LLC

J. E. Marquedant

J. E. Marquedant
Group Manager, Electrical

6 April 2010
Date

6/07

3029871
Page 2 of 2

FM Approvals
1151 Boston Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: 781 762 4300 F: 781-762-9375 www.fmapprovals.com

CERTIFICATE OF COMPLIANCE

HAZARDOUS LOCATION ELECTRICAL EQUIPMENT PER CANADIAN REQUIREMENTS

This certificate is issued for the following equipment:

CEL-35a/IS dBadge Noise Dosemeter
IS / I / ABCD / T2

a = 0 – 9, Firmware

Special conditions of use
1) The batteries shall only be re-charged using the Casella CEL-6362 charger unit with nominal output parameters of 5.2V 220mA.
2) The microphone shall not be removed in the hazardous area
3) The dBadge Noise Dosemeter shall not be used in area where a layer of coal dust may be deposited on the enclosure

Equipment Ratings:

Intrinsically Safe foe use in Class I, Division 1, Groups, A, B, C and D Hazardous (Classified) Locations with a temperature classification of T4.

FM Approved for:

Casella CEL Limited
Bedford, MK42 7JY
United Kingdom

FM Approvals

This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

CSA-C22.2 No 157	1992
CSA C22.2 No. 1010.1	2004

Original Project ID: 3029871C Approval Granted: October 1, 2007

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date
100319	April 6, 2010		

FM Approvals LLC

J. E. Marquedant
Group Manager, Electrical

6 April 2010
Date