

# CEL-350 *dB*Badge Micro Noise Dosimeter

## Frequently Asked Questions

Casella USA is proud to announce the introduction of a new model to the CEL range of noise measurement equipment. The multi-function **CEL-350 *dB*Badge** Micro Noise Dosimeter compliments the existing CEL-300 range of personal noise dosimeters with a number of unique features. These FAQ's help to give an overview of the new model, answer some of the more typical questions and describe how it fits into the overall CEL product portfolio of noise measurement instruments.

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CEL-350 *dB*Badge  
Micro Noise Dosimeter

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The CEL range of products include the CEL-200 series of simple sound level meters, the CEL-300 Series Convertible noise dosimeters, the CEL-400 Series Classic octave band real time meters and the CEL-500 Series Real time analyzers.

Key points of these series are as follows;

### **CEL-200 Series Simple sound level meters –**

Two models are available, the CEL-231 and the 254 meters. ANSI Type 2.

### **CEL-300 Series Personal noise dosimeters –**

Two models are available, the CEL-320 and the data logging 360 meters. ANSI Type 2.

### **CEL-400Series Real time octave band analyzers –**

Three main models are available; the CEL-430 ultra wide range integrating sound level meter, the CEL-450 meter and the data logging 490 meter. Three variants of the 450 and 490 are available for each meter offering broadband only, octave band and third octave band frequency analysis using parallel filters. ANSI Type 1 and Type 2.

### **CEL-500 Series Real time analyzer systems–**

Three main models are available, the CEL-553 analyzer, the 573 logging analyzer and the 593 logging and event analyzer. Three variants are available for each analyzer offering broadband only, octave band and third octave band frequency analysis using parallel real time filters. ANSI Type 1.

## INTRODUCTION

### ***How does the new CEL-350 instrument fit into the CEL range?***

The new CEL350 model fits into the CEL-300 range of personal noise dosimeters along with the existing CEL-320 and CEL-360 dosimeter models.

### ***What models are there in the new range?***

Currently there is one new model called the CEL-350 Micro Noise Dosimeter that is designed to be worn by the worker to collect the noise exposure data during a representative working day.

### ***How does the new CEL-350 Micro Noise Dosimeter work compared with regular noise dosimeters?***

In a regular noise dosimeter such as the CEL-320 or CEL-360 there is the main body of the meter plus a separate microphone. The microphone for these types of instruments is on the end of a length of cable so that the body of the dosimeter is worn on the worker's belt and the microphone is placed near the hearing zone. The CEL-350 Micro Noise Dosimeter is a complete instrument including the microphone built-in to the main body of the instrument. As such it is worn on the shoulder or hardhat as close to the hearing zone as possible.

### ***Is there a separate controller needed for the CEL-350 Micro Noise Dosimeter?***

No. The new CEL-350 is a completely standalone instrument that does not rely on any other instrument to see the results. The only other item needed to use the CEL-350 is a regular standard acoustic calibrator with a ½" cavity such as the CEL-110/2.

## COMPARISON TO EXISTING MODELS

### ***What are the main differences between the new CEL-350 and the existing CEL-320 and 360?***

The existing CEL-320 and CEL-360 models are fully functional, stand-alone noise dosimeters that have an integral memory and display with a control keypad. The CEL-350 Micro Noise Dosimeter is a simplified version of a logging noise dosimeter yet still includes a display and some limited external controls for the user. Simplifying the design of the CEL-350 unit allows a very cost effective dosimeter to be achieved in a very compact unit.

### ***Does the new CEL-350 Micro Noise Dosimeter replace the existing CEL dosimeters?***

No. The existing CEL-320 and CEL-360 personal noise dosimeters will continue alongside the new CEL-350 Micro Noise Dosimeter. The CEL-320 and CEL-360 units can be used for additional types of measurements than can the CEL-350 that is primarily aimed at Workplace Noise applications only.

## OPERATION

### ***How does the CEL-350 attach to the operator?***

The CEL-350 is intended to be worn close to the hearing zone therefore it is supplied as standard with a set of clothing pin clips that can be attached to overalls or a shirt near the shoulder area.

### ***What other attachment methods are there?***

Also provided as standard are a set of harness clips and an alligator clip set. An optional hard hat-mounting clip set is available for use in areas such as the construction industry or wherever head protection is mandated.

***Can a rechargeable battery be used in a CEL-350?***

Yes, the battery pack in the CEL-350 consists of 2 half-size NiMH AAA cells. This set of batteries is hard wired into the instrument and is not user changeable. A new rechargeable battery pack should be used to replace the originals in the CEL-350 Micro Noise Dosimeter when it no longer holds the charge. This replacement procedure can be carried out during the normal recalibration process when the instrument is returned to Casella CEL service laboratory. The rechargeable battery pack in the CEL-350 is not intended to be a user serviceable item.

***How long will standard batteries last in a CEL-350?***

The battery pack in the CEL-350 will last for up to 30 hours running time. After that running time the instrument will not have enough power to continue the measurement but it will be able to retain any stored data safely in the memory until it is recharged again in the approved manner with the CEL-6350 charger unit.

***How long does it take to recharge the battery in a CEL-350?***

When a completely discharged CEL-350 Micro Noise Dosimeter is plugged into a CEL-6350 multi-charger unit it will be completely charged in about two and a half hours. A quick 30 minute charge time is enough to provide a full 8-hour run time for the CEL-350. There is no memory effect with the NiMH battery pack and the dosimeters do not need to be left on the charger to stay charged although there may be a small amount of battery leakage over extended periods of time.

***Can the CEL-350 be left on the charger when it is fully charged?***

Yes, this will not damage the internal battery pack and is the recommended charging process. The CEL-6350 multi-charger units have been designed to allow up to 3 separate CEL-350 Micro Noise Dosimeters to be charged at the same time.

***How long will the battery in the CEL-350 hold its charge?***

The CEL-350 Micro Noise Dosimeter will display the amount of running time available from the battery pack as it is charging.

***How often should I recharge the CEL-350?***

The CEL-350 Micro Noise Dosimeter can be safely left for extended periods of time up to a few months in between charges. It will always indicate the current battery life remaining whenever switched on so you will always know what length of measurement can be obtained.

***How can the instrument be made tamper proof?***

The CEL-350 Micro Noise Dosimeter can be locked once a run has started by the supervisor to prevent unauthorized attempts to access the screen information. This makes the unit particularly safe and secure when used unsupervised. The run in progress icon and the duration of the run so far are displayed when the unit is locked out.

***How can the instrument be simplified for a specific measurement task?***

The design of the CEL-350 Micro Noise Dosimeter is such that it retains a single setup configuration in its memory so that it will always perform the same measurement every time it is used. It is not necessary to choose from a number of possible setups. There are 2 separate display modes available from the configuration menu to suit either the US OSHA regulations or the ISO regulations. This is purely for the display only since whatever is being displayed the instrument is always collecting the complete set of results for both OSHA and ISO recordings.

***Can the CEL-350 be used for community noise measurements?***

The CEL-350 Micro Noise Dosimeter should not be used for community noise measurements. The measurement range only extends down to 65 dB and this is too high for successful environmental noise measurements.

***How robust is the CEL-350 Micro Noise Dosimeter?***

The CEL-350 Micro Noise Dosimeter is designed to be robust and to withstand the wear and tear associated with practical noise measurements in an industrial environment. It is manufactured using the same material as is used in many automobile bumpers. One of the main problems with traditional style noise dosimeters is that the microphone cable can get damaged or pulled which can then affect the integrity of the measurements or cause no signal at all to get to the dosimeter. Snagging of the microphone cable can also lead to possible danger for the employee and so this is eliminated in the CEL-350. This is not the case with the instrument since it has the microphone capsule built-in. Also, since the controls can be locked on the CEL-350 Micro Noise Dosimeter, the risk of tampering or misuse is considerably reduced.

***What happens if the microphone is damaged?***

The CEL-350 Micro Noise Dosimeter is fitted with a CEL-252 type 2 general-purpose electret microphone capsule. This is screwed into the input stage of the CEL-350 and can be easily changed by the user if it gets damaged in use. The standard windscreen is provided with every CEL-350 to offer some protection for the microphone against the ingress of wind or dust when in use.

***Does pc software come with the CEL-350 Micro Noise Dosimeter?***

Yes, the CEL-350 Micro Noise Dosimeter is supplied with the CEL-6357 dB35 Windows software program that downloads measurements from the dosimeter to the PC. The measurements can then be viewed and manipulated with the software using the structure of a database program. Options are provided to export the data into a spreadsheet for reporting and further analysis.

***I only have a USB port on my computer; can I still download my results from the CEL-350?***

Yes, the CEL-350 Micro Noise Dosimeter has an infrared serial RS232 Output that communicates with the pc via the CMC39 IR interface module to a 9 way serial connector. Most computers have a suitable 9 Pin RS232 port, but for those that don't, the CEL-90336 RS232 to USB adaptor is provided as part of all standard measurement kits.

***How long does it take to download a run?***

A complete 8-hour shift measurement takes approximately 6 seconds to download to the pc. A completely full memory of 180 hours of recording will take just over 2 minutes to transfer to the pc program.

***What are the minimum requirements of the pc to run the dB35 software?***

Hardware requirements are:

- Pentium III 1 GHz processor
- 128 Mbyte memory
- 20 Gbyte hard drive
- CDROM drive for installation

#### Operating system requirements

- MS Windows 2000 with Service pack 4
- MS Windows XP Home or Professional with service pack 2
- MS Windows NT 4 with service pack 6a

## INSTRUMENT FUNCTION.....

### .....SETUP

#### ***How many different SETUPS can be stored in a CEL-350?***

Only a single setup configuration is stored in the CEL-350 Micro Noise Dosimeter for simplicity.

#### ***Do I have to select the SETUP each time before a run?***

Since a CEL-350 Micro Noise Dosimeter only has a single setup there is no need to select it to begin a new measurement run.

#### ***How do I change the setup configuration in a CEL-350?***

The setup configuration is fixed in the CEL-350 Micro Noise Dosimeter so it is not necessary to have to change it to make measurements.

#### ***When does a run actually start in a CEL-350?***

A new measurement run starts immediately when the Run command is given to the CEL-350 Micro Noise Dosimeter.

#### ***When does a run actually stop in a CEL-350?***

An existing run ends when the CEL-350 is halted using the buttons on the side of the unit. Any period data profiles for the unfinished last minute will not be saved but the overall results will be completely correct for the calculations of noise dose and TWA and will include this last sub 1-minute interval.

#### ***Are delayed start and stop timers available in the CEL-350?***

It is not currently possible to set delay start and stop timers for a measurement in the CEL-350 Micro Noise Dosimeter.

#### ***How many runs can be stored in the memory of the CEL-350?***

The memory of a CEL-350 is configured such that any single run will take at least 1 hour of recording space in the memory. Up to 180 hours of memory are available in an empty instrument so up to 180 sets of data can be stored in a CEL-350 Micro Noise Dosimeter.

#### ***How many repeats can be selected in a CEL-350?***

No repeats of a run can be selected in a CEL-350 Micro Noise Dosimeter since the memory is configured to have manually started and stopped measurement runs.

#### ***Can individual runs be deleted from the instrument?***

Yes, the run data stored in the CEL-350 Micro Noise Dosimeter will be saved until the erase command is used to clear the memory prior to starting a new set of measurements. The erase command can be sent from the dB35 software or from the configuration menu in the instrument. All runs stored in the memory of the CEL-350 will be deleted at the same time.

**How many Threshold levels can be set in the CEL-350?**

The data are saved in the CEL-350 Micro Noise Dosimeter in such a way as to be able to apply any number of thresholds using the dB35 software after the runs are downloaded to the pc. Thresholds can be set in 1 dB steps over the range from 70 to 90 dB. The default is 80 dB.

**What Criterion levels can be set in the CEL-350?**

Any criterion level can be selected for the data from the CEL-350 Micro Noise Dosimeter once results are downloaded to the dB35 software package. Criterion values from 70 to 90 dB can be selected in the software in 1 dB steps. The default is 90 dB.

**Are there any alarms available in the CEL-350?**

Yes, there are 2 visual alarms available in the CEL-350 Micro Noise Dosimeter that uses 2 separate high intensity micro LED's. These are used to signal warnings for the battery life, memory available and the accumulated measured noise exposure so far in a run. The function of the Red LED is shown below and is common to either the OSHA or the ISO display configuration mode. These are shown below;

| Red LED  |  |  |
|--|--|--|
| Off  | Flashing slowly on                             | On continuously  |
| Battery and memory good for > 2 hour recording | < 2 hours of remaining battery life and memory | Fatal error, switch off and seek advice from Casella service |

The function of the Blue LED is dependent on the display mode selected in the instrument configuration menu at switch on.

| Blue LED          |   |  |  |
|-------------------|---|--|--|
| Setup for display | Off   | Flashing slowly every 1.5 sec                | Flashing quickly every 0.5 sec               |
| OSHA              | Lavg (Thr=80) <=84.9 dB<br>AND<br>LZpk <=139.9 dB | Lavg (Thr=80) >=85 dB<br>OR<br>LZpk >=140 dB | Lavg (Thr=80) >=85 dB<br>AND<br>LZpk >140 dB |
| ISO               | Laeq <=79.9 dB<br>AND<br>LCpk <=134.9 dB          | Laeq >=80 dB<br>OR<br>LCpk >135 & <=136.9 dB | Laeq >85 dB<br>AND<br>LCpk >=137 dB          |

**Is it possible to change the alarm levels if future legislation requires?**

Yes, it is possible to change the trigger levels at which the Blue LED starts to give warnings using the dB35 software package. This is in case the various noise exposure regulations change during the lifetime of the CEL-350 dosimeter.

**Can the alarm function be disabled if required?**

Yes, the alarm function can be disabled if it is not required for future measurement runs using the configuration menu at switch on time. Simply toggle this function ON or OFF as desired.

**.....MEASUREMENT RANGE**

**What measurement range does the CEL-350 cover?**

The CEL-350 Micro Noise Dosimeter covers and includes the range from 65 to 140 dB for the measurement of time varying noise levels.

### ***What happens to noise levels below 80dB(A)?***

Any noise level that is below the 80 dB threshold level is still stored in the dose histograms in the CEL-350 Micro Noise Dosimeter and will not be included in the results for the dose and TWA calculations shown on the screen. This is in line with the US OSHA recommendations for noise instruments used for noise dosimetry measurements. The noise levels are still available when downloaded to the dB35 pc program for later analysis using different protocols.

### ***How many measurements can be stored with the CEL-350?***

Up to 180 measurements can be stored in a CEL-350 Micro Noise Dosimeter since every run regardless of its actual duration uses 1 hour of the available memory.

### ***What range does the peak measurement cover?***

The range of the peak detector is from 70 to 140 dB for the measurement of the upper noise limit in situations where the noise climate includes impact or impulsive sources as required by the US OSHA regulations.

## **.....PARAMETERS**

### ***What results can be stored for the whole measurement run?***

The CEL-350 Micro Noise Dosimeter stores the following values;

- the unique instrument ID serial #,
- the run number in the memory,
- the acoustic calibration record including date, time and level,
- the start date and time of the run,
- the end date and time of the run,
- the measurement run duration,
- the actual time average level ( $L_{avg}$ ) with the Q=5 exchange rate,
- the actual time average level LAeq with the Q=3 exchange rate,
- the measured noise dose % with the Q=5 dB exchange rate,
- the measured noise dose % with the Q=3 dB exchange rate,
- the personal sound exposure level Pa<sup>2</sup>hr,
- the personal sound exposure level Pa<sup>2</sup>sec,
- the time weighted average level TWA,
- the personal exposure level LEP,d,
- the sound exposure level LAE,
- the impulse weighted time average level LAleq,
- the peak level LZ<sub>pk</sub>,
- the peak level LC<sub>pk</sub>,
- the A weighted Fast maximum sound level LAFmx,
- the A weighted Fast minimum sound level LAFmn,
- the A weighted Slow maximum sound level LASmx
- the A weighted Slow minimum sound level LASmn,
- the A weighted impulse maximum sound level LAImx,
- any rms. overload exceedance above 140 dB(A),
- any peak overload exceedance above 143 dB(Z) or dB(C),
- and the battery status.

The CEL-350 Micro Noise Dosimeter also stores the 4 profiles every 1 minute including the Q=5

time average level, the unweighted peak, the Q=3 time average level and the C peak level.

***What if not all of these parameters are required for a particular measurement?***

It is not possible to disable any of the measured and stored parameters. They are all measured and collected by the CEL-350 unit. The dB35 software allows the results to be limited as far as being used and displayed in the pc after a run.

***What rms frequency weightings are available in the CEL-350?***

The standardized 'A' broadband frequency weighting is provided in the CEL-350 Micro Noise Dosimeter as specified in many workplace noise regulations for the measurement of the dose% and time average levels.

***What frequency weightings are available for peak measurements in the CEL-350?***

The standardized 'Z' and 'C' broadband frequency weightings are provided in the CEL-350 Micro Noise Dosimeter as specified in many workplace noise regulations for the measurement of the peak exceedance level.

***What time weightings are available in the CEL-350?***

The CEL-350 Micro Noise Dosimeter can have either the Slow time weighting for US OSHA style measurements or none for European ISO style measurements where no weighting is specified or the Fast time weighting for some of the measured values.

***What exchange rates or Q values are available in the CEL-350?***

The CEL-350 Micro Noise Dosimeter has both the Q=5 dB exchange rate for US OSHA style measurements and Q=3 (equal energy principle) for European ISO style measurements in every measurement run.

***How can the calculation of LEP,d be made for non-standard working days?***

The European ISO style unit LEP,d for non-standard working days must be calculated externally to the CEL-350 once the time history profiles have been transferred to the computer.

***How can the calculation of TWA be made for non-standard working days?***

The US OSHA style unit TWA for non-standard working days must be calculated externally to the CEL-350 once the time history profiles have been transferred to the computer.

***What is the difference between LEP,d and LEP,v?***

The unit LEP,d is always calculated based on a time interval of 8 hours whereas the LEP,V unit can be calculated for any other time interval of not exactly 8 hours.

***What is the difference between TWA and TWA,v?***

The unit TWA is always calculated based on a time interval of 8 hours whereas the TWA,v unit can be calculated for any other time interval of not exactly 8 hours.

**.....TIMERS & RUN LENGTH**

***What time intervals are available for measuring the profiles in the CEL-350?***

A single fixed time interval of 1 minute is available for measuring the time history profiles in a CEL-350 Micro Noise Dosimeter. This is the best compromise for simplicity and detail for most noise dosimetry measurements giving adequate time resolution for later calculations in software when necessary for "what if?" purposes.

***What fixed durations are available for the overall run time in the CEL-350?***

Run times are controlled manually by the user of the CEL-350 Micro Noise Dosimeter so do not currently have any fixed times associated with them.

***Can the measurement be synchronized to the real time clock?***

No. Measurements begin as soon as the start run key is pressed on the CEL-350 Micro Noise Dosimeter.

***What is the shortest run duration that can be stored in the CEL-350?***

The shortest measurement run that can be stored can be as little as a minute. However, it is recommended that longer measurements be carried out to obtain a representative period of recording covering all of the significant sources of noise in the workplace situation.

***What is the longest run duration that can be stored in the CEL-350?***

The longest run duration is linked to the operational life of the battery in the CEL-350 Micro Noise Dosimeter. This is in the order of 30 hours.

## **ACCURACY & RESULTS**

***What standards and accuracy are the instruments designed to fulfill?***

The CEL-350 Micro Noise Dosimeter has been designed to meet the requirements of ANSI S1.4 1991 when configured in the OSHA setup and IEC 61252:2002 when configured for ISO setup. It also meets ANSI S1.25 1991 when used as a Noise dosimeter or for Personal Noise Exposure Meters.

***Is the CEL-350 certified Intrinsically Safe for use in hazardous areas?***

Not yet. The current version of the CEL-350 Micro Noise Dosimeter is not suitable for use in hazardous environments, which require UL or an Eex or ATEX certification. An intrinsically safe version of the CEL-350 Micro Noise Dosimeter is planned for this application in the near future.

***How often does the CEL-350 need to be recalibrated?***

As with all noise measurement equipment, the CEL-350 Micro Noise Dosimeter and CEL-110/2 Acoustic calibrator should be recalibrated at least every 2 years. The CEL-350 Micro Noise Dosimeter and CEL-110/2 Calibrator should be recalibrated together as they are used as a set. Instruments should be returned to the manufacturer for a traceable recertification each year or as the local regulations require.

***What results can be calculated and displayed?***

Although it is not a direct reading sound level meter the CEL-350 does have an integral display that is used to display a certain limited set of data depending on whether the OSHA or the ISO mode has been selected from the configuration menu for the unit.

In the OSHA mode the following limited items are displayed to give the user a degree of confidence that the readings are as expected.

- Remaining memory time
- Remaining battery life
- Current time
- Current Slow weighted sound pressure level
- Duration of the current run in hh:mm:ss

- The time average noise level with the Q=5 exchange rate in dB
- The Z weighted peak noise level in dB
- The actual noise dose% with a threshold of 80 and a criterion of 90 dB

In the ISO mode the following items are displayed;

- Remaining memory time
- Remaining battery life
- Current time
- Current Slow weighted sound pressure level
- Duration of the current run in hh:mm:ss
- The time average noise level with the Q=3 exchange rate in dB
- The C weighted peak noise level in dB
- The sound exposure level in Pa<sup>2</sup>hr

### ***How many runs can be stored in a CEL-350 Micro Noise Dosimeter?***

The CEL-350 Micro Noise Dosimeter stores up to 180 runs. The duration of these runs can be any length but the data logging of the Time History Profiles is fixed at a maximum of 30 hours of 1-minute data. This data is always stored as four separate profiles at 1 minute intervals and includes;

- The time average level (LAvg) with the Q=5 exchange rate in dB
- The time average level (LAeq) with the Q=3 exchange rate in dB
- The Z weighted peak level in dB
- The C weighted peak level in dB
- Any Overload flags for the period

### ***How many profile points in total can be stored in the CEL-350?***

There is storage space in the CEL-350 for 64kbytes of data. This is allocated as shown below.

- 4 profiles every 1 minute
- 240 profiles per hour
- Maximum of 180 hours memory allocation
- 43,200 profile points for a completely full memory

### ***How many profiles can be stored in a single run in a CEL-350?***

The battery life of a CEL-350 Micro Noise Dosimeter is about 30 hours so at 1-minute intervals a single run can store the results for about 30 x 60 x 4 = 7200 time history profiles.

### ***How long does the memory last when recording profiles in a CEL-350?***

At the end of the normal 30 hour battery life of a CEL-350 Micro Noise Dosimeter when the power supply is too low to continue with measurements there is still enough power to maintain the contents of the memory for long enough to be able to download to the dB35 software package. All run data will be saved and the dosimeter will switch itself off safely to preserve the recorded values.

### ***What happens if the battery pack runs down during a measurement?***

Run data are stored in a non-volatile E<sup>2</sup> ROM chip that does not require a backup battery to hold the measurements. If the battery pack runs out during a measurement then all the results up to the last full minute will be saved and the CEL-350 will shut down in an orderly fashion and no data will be lost.

***What is the standard warranty on the CEL-350?***

The standard warranty for the CEL-350 Micro Noise Dosimeter is 12 months parts and labor from the date of receipt of the instrument. After the first 12 months the Casella USA main office in Amherst, NH will handle the recalibration and any repairs that may be necessary.

## **APPLICATIONS**

***What markets are the instruments designed for?***

The primary market for the CEL-350 Micro Noise Dosimeter is for industrial hygiene measurements to make assessments of workplace noise exposure. This would be to satisfy the OSHA regulatory body that any individuals in a workplace are being subjected to excessive amounts of noise beyond the legal limits specified in 29 CFR Occupational Noise Exposure 1910-95. Since the CEL-350 stores data with both the Q=5 and Q=3 exchange rates simultaneously it is possible to also satisfy the recommendations of NIOSH and ACGIH from a single measurement run.

***How does the CEL-350 cater for these markets?***

Although there are many types of noise dosimeters available both from Casella CEL and from other manufacturers the CEL-350 offers a significant addition to the capabilities of many users who have a need for multiple noise dosimeters for workplace noise assessments. The unit costs of more than 2 or 3 Micro Noise Dosimeters start to become very attractive for larger and larger kits when compared to conventional dosimeters. Since a single CEL-350 Micro Noise Dosimeter does not require any specialized reader unit to retrieve the data it can be used on its own and it is very easy and cost efficient to add more CEL-350 dosimeters to a system in order to cover large numbers of workers. The standard software package, called dB35, provides a very easy yet powerful download and reporting system to keep track of all the relevant details of all the measurements undertaken with a CEL-350 Micro Noise Dosimeter system. The results from stored recordings can be sorted by applying filters depending on the noise exposure levels and printed very quickly and easily.