ETYMŌTIC RESEARCH INC.

Personal Noise Dosimeter

ER-200 User Guide

Firmware Version 6.1

TABLE OF CONTENTS

Introduction

Hearing loss from exposure to loud sound affects millions of people. Noise-induced hearing loss is preventable, but most people do not know how long they can listen to loud sound without risking hearing damage. A single noise exposure may not result in hearing loss, but permanent damage to the inner ear from noise adds up over time. The accumulation of too much noise day by day, year after year, is the determining factor in hearing loss risk. *A sound level meter* is a device that measures noise at a particular point in time, while a *dosimeter* measures sound levels for many hours and calculates the cumulative noise dose in percent.

Daily noise dose is determined by both the intensity of the sound and the amount of exposure time. A 100% dose means that a person has reached the maximum noise exposure for the day, and continued exposure to loud sound could lead to hearing loss. Ideally, hearing protection should be used before the dose reaches 100% since dose limits are based on averages, and some ears are more susceptible to noise damage than others. When the noise dose exceeds 50% a person has reached half the maximum noise exposure for the day and it's a good idea to use hearing protection to prevent over-exposure, particularly if a 50% dose reading is reached early in the day.

General Description

The ER-200 Personal Noise Dosimeter complies with most but not all of the requirements of a Type-2 Noise Dosimeter [ANSI S1.25-1991(R2002)]. It is an inexpensive, easy-to-use screening device that provides a good estimate of noise dose and alerts the user to the risk of over exposure. In cases of gunfire and other impulse noise, no conventional dosimeter measures the risk accurately because more specialized equipment is required.

The ER-200 has two modes of operation: Normal Mode measures and displays noise dose continuously for up to 16 hours, and Quick Check measures noise for two minutes, then calculates and displays the estimated dose *per hour*.

In Normal Mode, the dosimeter provides an early warning that the user is approaching over exposure and should use hearing protection. Quick Check provides a quick and easy way to measure a specific noise source to determine if permissible exposure levels will be exceeded (e.g., loud equipment, vehicles, power tools, music concerts or sporting events).

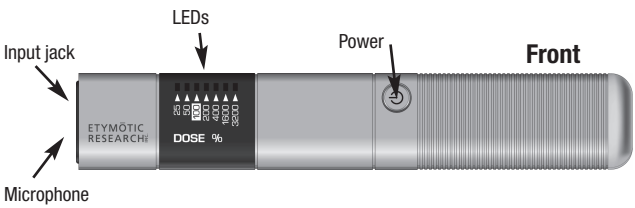
Getting Started

Package Contents:

- ER-200 Personal Noise Dosimeter
- Windscreen
- Batteries: Three AAAA Alkaline*
- User Guide
- Reference Card

*(AAAA batteries are available at retail locations and electronics retailers such as Radio Shack)

Identification of Parts



Battery Insertion

On the back side of the dosimeter, locate the arrow on the battery compartment.

- Press down and slide the cover off
- Insert three AAAA batteries (supplied)
- Replace cover

Windscreen

For accurate measurements, the 35 mm (1.4") windscreen included with the ER-200 should be used when noise is measured outdoors or near any turbulence, e.g., from a fan. The foam windscreen allows accurate measurement in winds up to 15 to 20 mph. Note: Blowing across the microphone opening on the dosimeter can cause the same turbulence as a 50 mph wind.

Operating Instructions

Note: Use the foam windscreen when measurements are made outdoors. Do not blow into the microphone opening because incorrect noise dose readings will result.

Normal Mode (Daily Dose) Test Time: Up to 16 hours

Power ON:

- Press and **release** the power button. The red 3200% LED is steady, followed by **one** LED sweep.
- The previously measured dose displays for about 10 seconds while the red 3200% LED remains steady.
- If the previous dose was 3200%, the red 3200% LED *flashes*.
- When the red 3200% LED turns off, a slow flashing of the green 25% LED begins, indicating the start of the measurement.
- The dosimeter continuously displays the current dose, indicated by a flashing LED.
- After 16 hours, the accumulated dose is displayed for about 8 minutes.
    - During the display period, the red 3200% LED is *steady* and the flashing LED indicates the dose. *In cases where the accumulated dose is 3200%, the red 3200% LED flashes*.
    - At the end of 8 minutes, the dosimeter automatically shuts off.
- The dose is stored in memory and is displayed when the device is powered on again.

Power OFF:

- To power off the dosimeter prior to its automatic shutdown: Press and **hold** the power button until a pair of lights flashes (about 3 seconds) then **release** the button.
- Wait 5 seconds before powering ON again.

Interpreting Results — Normal Mode

LED	Dose %	Risk Factor	Hearing Protection Needed	
green (slow flash)	< 25%	No risk of hearing loss	NO	
green (fast flash)	25%	No risk of hearing loss	NO	
green	50%	1/2 daily dose reached	NO	
yellow	100%	Limit of permissible exposure	YES	
red	200%	2x allowable daily dose	YES	**Muffled hearing and ringing in the ears is likely after unprotected exposure**
red	400%	4x allowable daily dose	YES	
red	1600%	16x allowable daily dose	YES	
red	3200%	32x allowable daily dose	YES	

Quick Check (Estimated *Hourly* Dose) Test Time: 2 minutes

Note: Use the foam windscreen when measurements are made outdoors. Do not blow into the microphone opening because incorrect noise dose readings will result.

Power ON:

- Press and **hold the power button for 5 seconds**. The red 3200% LED is steady, followed by **several** LED sweeps. Release power button.
- The previously measured dose is displayed for about 10 seconds while the red 3200% LED remains steady.
- When the red 3200% LED turns off and the green 25% LED flashes, the two-minute Quick Check starts.
- After 2 minutes, the steady red 3200% LED indicates the test is over.
  - The flashing LED indicates the estimated dose *per hour*.
  - During the display period, the red 3200% LED remains *steady*, unless the estimated dose is 3200%, then the red 3200% LED *flashes*.
  - The estimated dose *per hour* displays for 1 minute, then the dosimeter shuts off.
  - The dose is stored in memory and is displayed when the device is powered on again.

Power OFF:

- To power off the dosimeter prior to its automatic shutdown: Press and **hold** the power button until a pair of lights flashes (about 3 seconds) then **release** the button.
- Wait 5 seconds before powering ON again.

Interpreting Results — Quick Check (2-minute test)

If the LED color is:	The estimated dose per hour is:	The estimated dose per 8 hours is:
green (slow flash)	< 25%	< 200%
green (fast flash)	25%	200%
green	50%	400%
yellow	100%	800%
red	200%	1600%
red	400%	3200%
red	1600%	
red	3200%	

Reading the Display

What the LEDs Mean

The dosimeter uses color-coded LEDs to display noise dose in percent.

Green (Safe): Noise dose is below 100%

Yellow (Borderline): Noise dose is greater than 100% and less than 200%

Red (High Risk)**:** Noise dose is greater than 200%

Rate

A slow flashing LED at 25% means that the noise dose is at or below 25% (i.e., between 0% and 25%). When the noise dose reaches 25%, the 25% LED flashes rapidly indicating that it is between 25% and 50%. Similarly, when the dose exceeds 50% but is less than 100%, the 50% LED flashes rapidly, etc.

What Dose % Means

Simply stated, noise dose is a measurement of noise exposure. It is the combination of the amount of sound and the amount of exposure time. Think of 100% as the limit of safe exposure, 200% as two times the permissible exposure limit, 400% as four times the limit, etc. The risk of hearing impairment grows with increasing noise dose. In some susceptible persons, a 100% dose indicates enough noise exposure to cause a small amount of hearing loss over time.

LED	Dose %	Risk Factor
green (slow flash)	<25%	No risk of hearing loss
green (fast flash)	25%	No risk of hearing loss
green	50%	1/2 daily dose reached
yellow	100%	Limit of permissible exposure
red	200%	2x allowable daily dose
red	400%	4x allowable daily dose
red	1600%	16x allowable daily dose
red	3200%	32x allowable daily dose

Auto Shut Off

In *Normal Mode*, the dosimeter shuts off 8 minutes after displaying the 16-hour accumulated daily dose. In *Quick Check*, the dosimeter shuts off 1 minute after displaying the estimated dose per hour.

Low Battery Indicator

The ER-200 measures battery strength each time the dosimeter is powered ON. If batteries are weak, a pair of lights flashes for 3 seconds. At the first low-battery alert, there is typically enough battery power remaining to measure a 16-hour day's dose. When batteries are too low to complete a 16-hour measurement cycle, a pair of lights will flash at startup and the unit immediately shuts OFF.

Calibration

The ER-200 dosimeter is factory calibrated. Flexibility in the dosimeter design allows exchange rates of 3, 4 or 5 dB, criterion levels from 75 to 90 dB and threshold levels from 75 to 85 dB; however, these settings are only configurable at the factory and are not adjustable by the user without PC interface software and other specialized equipment.

Specifications

The default settings used by the ER-200 for calculation of noise dose are consistent with ANSI S1.25–1991 (R2002) Specification for Personal Noise Dosimeters.

Calibration Accuracy: ± 2 dB
Dose Calculation Criteria:
- Exchange Rate: 3 dB
- Criterion Level: 85 dB
- Threshold Level: 75 dB
- Criterion Time: 8 hours
- Frequency Weighting: A
- Response: Slow

Temperature Range of Operation: -10°C to 45°C (14°F to 113°F)
Omni-directional Microphone: Flat from 100 Hz to 15 kHz
Earphone Monitor Jack (2.5 mm): 10 mV (-40 dB re 1V)
corresponds to 94 dB SPL ± 1 dB at 1 kHz
Frequency Weighting For Earphone Monitoring: Same as microphone (A)
Power Supply: Three AAAA batteries
RMS Detector: Dynamic range 60 dB (70 to 130 dB)
Battery Life: > 250 hours continuous use

Care and Maintenance

- Do not expose to extreme temperatures.
- Do not immerse in any liquids.
- Clean with a soft dry cloth.

Warranty

Etymotic Research, Inc. warrants this product against defects in material or workmanship for a period of one year from the date of original purchase. Etymotic will repair or replace the defective product at its option if returned within the warranty period to our service facility. This warranty is in lieu of all other warranties, expressed or implied, including, but not limited to, any implied warranty of merchantability or fitness for a particular purpose.

FCC & Industry Canada Statements

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Risk Factors For Hearing Loss

Health risks from excessive noise exposure include permanent hearing loss and tinnitus (ringing in the ears). Other factors such as genetics, exposure to smoke, pesticides, chemical solvents and certain medications increase the risk of hearing loss. Some of these factors make noise exposure more damaging to hearing than noise exposure alone. The dosimeter predicts average risk, not individual risk.

ETYMŌTIC RESEARCH INC.

61 Martin Lane, Elk Grove Village, Illinois 60007

www.etymotic.com

ER078101 10/09