

Animal testing

Solutions for ABR/BAER & OAE

with high frequency option

for animal research &

veterinary applications



from budget friendly to comprehensive solutions

IHS offers a variety of hardware platforms and software applications for Auditory Evoked Potentials (AEP) and Otoacoustic Emissions (OAE) for auditory screening, clinical evaluation, and research in animals.

For veterinarians looking to obtain quick, automated Brainstem Auditory Evoked Responses (BAER) results, the PetScreener Solo device is an affordable and portable, easy to use solution.

For more comprehensive diagnostic evaluation, our Universal Smart Box platform with SmartEP can be used to record Auditory Brainstem Responses (ABR) up to 16kHz using high frequency insert earphones.

For researchers recording ABR and DPOAE responses at up to 32kHz, we are pleased to offer High Frequency Options for both SmartEP and SmartDPOAE on our flagship Universal Smart Box platform.

PetScreener

- Click ABR/BAER
- Toneburst ABR/BAER
- Automated Response/No-Response

SmartOAE

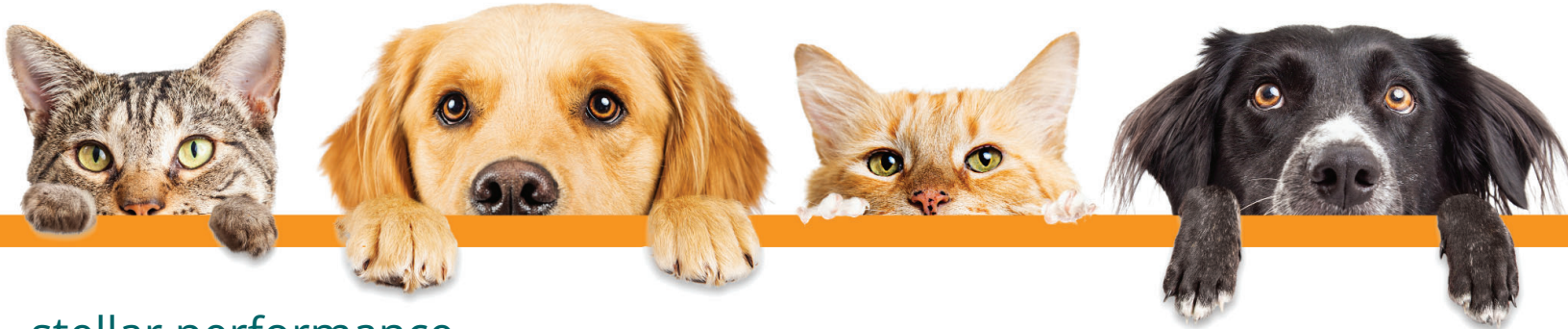
- Diagnostic DPOAE & TEOAE
- High Frequency DPOAE up to 32 kHz

SmartEP

- Diagnostic ABR/BAER
- Click ABR/BAER
- Toneburst ABR/BAER
- High Frequency testing at up to 32 kHz

SmartEP-ASSR

- Screening & Diagnostic ASSR
- Click, Toneburst or chirp ASSR
- High Frequency testing up to 32 kHz



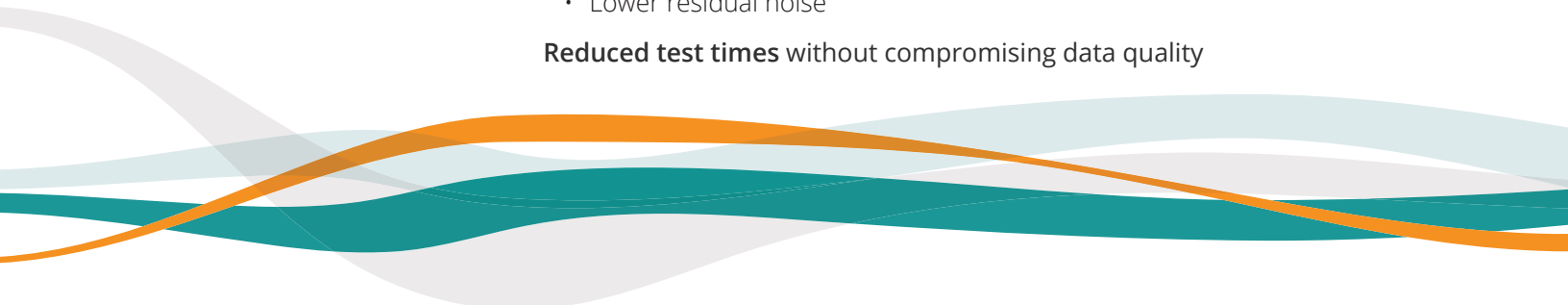
stellar performance

Over 35 years of engineering design experience, combined with unsurpassed expertise in evoked responses, have culminated in the **next generation bio-amplifier** bringing you **superior data quality** for evoked potentials and otoacoustic emissions.

Repeatable, reliable data you can count on

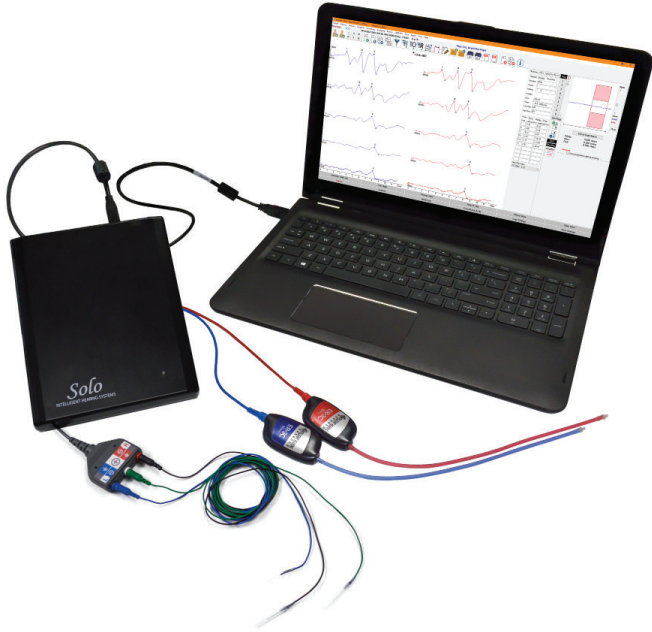
- High definition responses
- Cleaner, more robust responses
- Increased signal-to-noise ratio (SNR)
- Lower residual noise

Reduced test times without compromising data quality



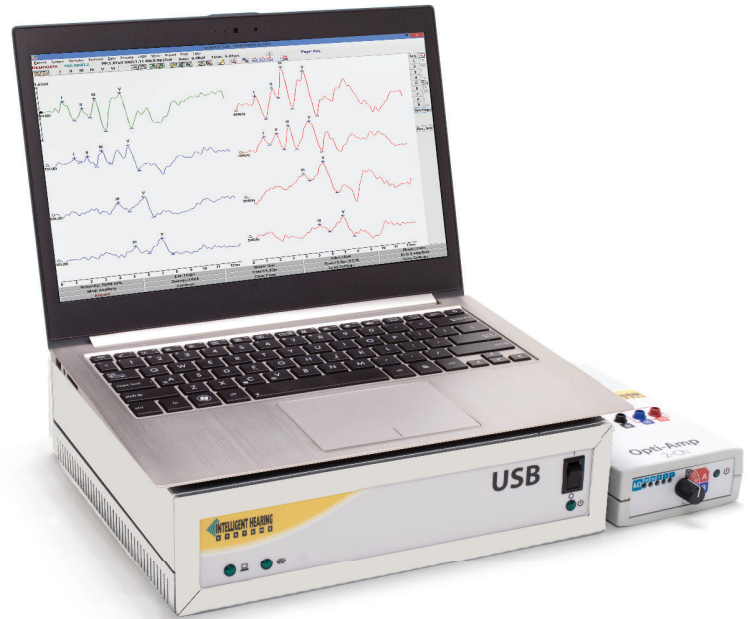
Solo

- One AEP channel
- ABR/BAER up to 8 kHz
- Internal bio-amplifier
- USB powered
- Cables feature quick disconnect connections



Universal Smart Box

- Up to eight AEP channels
- Up to two OAE channels
- ABR/BAER up to 16 kHz using ER-2 inserts
- ABR/BAER up to 32 kHz using HFTs
- DPOAE up to 32 kHz using 10B+
- External bio-amplifier
- External power supply
- Optional low current electrical stimulator
- Optional visual stimulator



Duet

- Two AEP channels
- Up to two OAE channels
- ABR/BAER up to 8 kHz
- DPOAE up to 16 kHz
- Internal bio-amplifier
- Internal power supply



choose the device
best suited to your needs

PetScreener

The ideal tool for recording BAER in the veterinary clinic

PetScreener is an easy-to-use hearing screening system for pets designed with the veterinary clinic in mind.

simplified interface

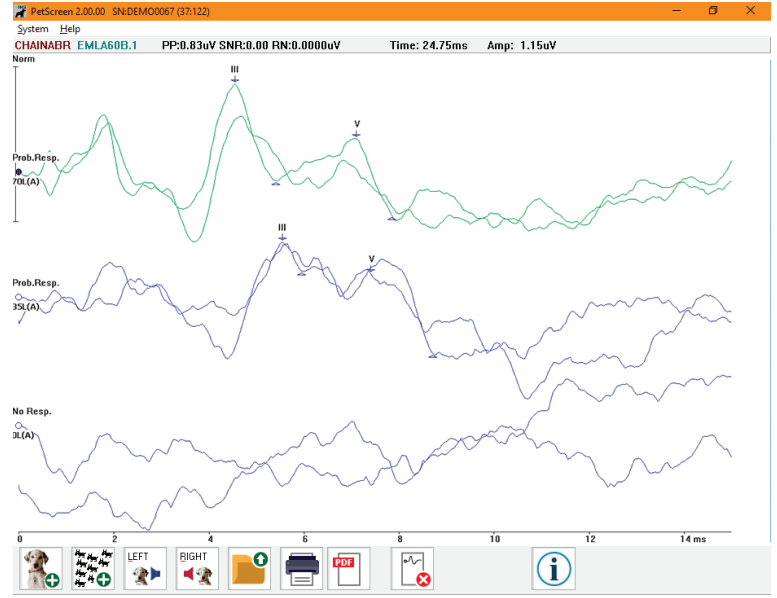
- Save time and acquire recordings quickly, right out of the box
- All necessary parameters are preprogrammed, just enter the pet's information and start
- Quick access from streamlined control panel
- On-screen display of impedance and ongoing EEG for quick assessment of testing conditions
- Easily mark waveforms using predefined peak labels, or create your own custom labels

various stimulation options

- Select from Clicks, 500 Hz, 1000 Hz, 2000 Hz or 4000 Hz stimulus signals
- Present in standard or chained-stimuli modes
- Output in dB SPL

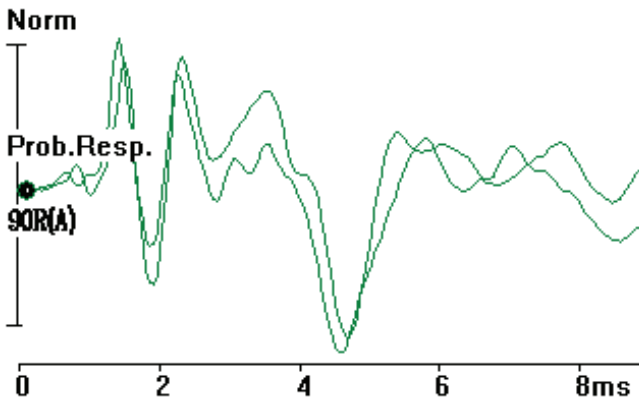
automatic response assessment

- The software labels recordings automatically with Probable Response or No-response indication as they are acquired, based on advanced detection algorithms
- Response indications can be reclassified, if desired, by the expert user



vet-friendly features

- Patient demographics with owner contact information as well as pet name and breed
- Modifiable template list of breeds
- Manage your patients easily and keep organized records of previous tests
- Available on the 1 channel, USB powered portable Solo for a cost-effective and mobile solution
- Solid stainless steel sub-dermal electrodes with ultra sharp tip for low penetration resistance and low-noise, resulting in clear and reliable responses



customizable protocols

- Fast setup of screening protocols for different frequencies and intensities
- Save protocol files for future use, and load them whenever necessary
- Choose intensities, number of sweeps, stimulus type, stimulator, and rate



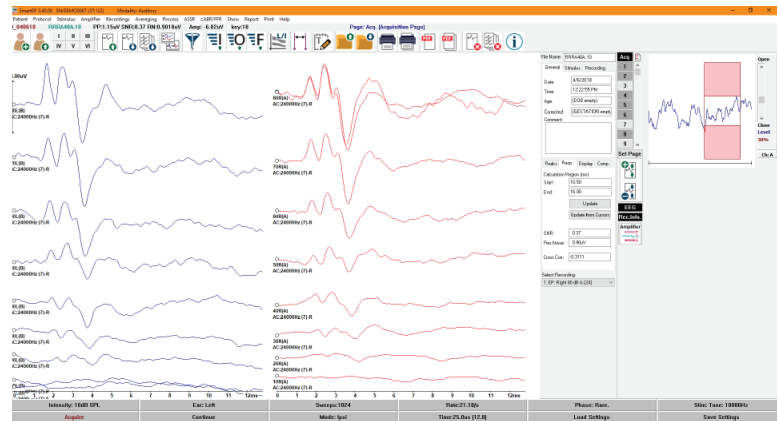
SmartEP

The ideal clinical tool for recording diagnostic ABR in humans and animals.

SmartEP is a highly advanced, full featured diagnostic evoked potential system. Designed with the audiology clinic in mind, it has been used to record brainstem evoked auditory responses in pets, service animals, and laboratory animals.

user friendly interface simplifies acquisition

- Improved tool-bar and button design for fast access to key features
- Easy access to all parameters from a simplified control panel and streamlined menus
- Quickly load your own or preset protocols
- Automated impedance checking with on-screen display
- Easily view ongoing EEG display for quick assessment of patient state during testing
- Great variety of options allow you to perform the tests the way you want
- Choose from a variety of stimuli, or generate or import your own custom stimuli
- Display or hide a subtle vertical grid or horizontal baseline



streamlined work flow

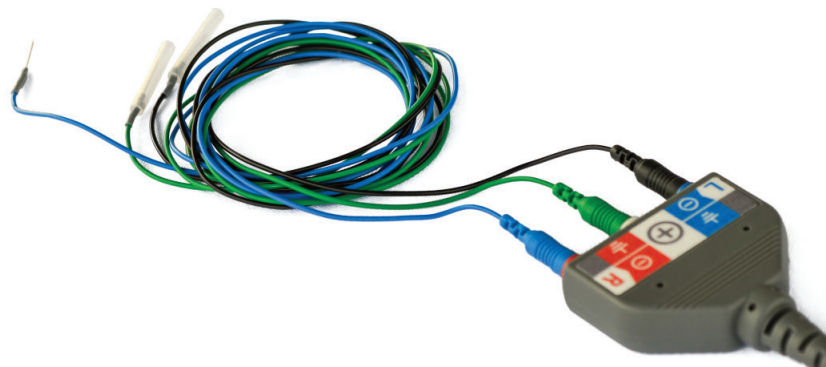
- Easily mark waveforms using over thirty predefined peak labels, or create your own custom labels. Easily adjust them using a mouse or keyboard
- View latencies and amplitudes of peaks directly on waveforms and in newly embedded recording information panel
- Automatically arrange recordings by intensity, acquisition order, or rate
- Quickly resize the waveforms using the zoom in/out buttons

smart features

- Latency-Intensity graphs displaying normative data ranges are automatically generated from marked waveforms
- Quickly add, subtract, invert, time shift, or cross-correlate recordings
- Split-sweep view to easily and conveniently visualize single recording repeatability
- Multi-page display and reports with customizable page labels
- View recordings from multiple sessions on the same page
- Create grand averages from multiple sessions or multiple patients on the same page
- Easy PDF report generation
- Auto-save reports on when exiting the program
- Export recordings to ASCII text files

advanced options

- SmartVEMP for vestibular evoked myogenic potentials
- Advanced Auditory Research Module for Frequency Following Responses (FFR)
- Continuous Acquisition Module
- Low-current electrical stimulator for electrically evoked ABR animal research
- Visual Evoked Potential LED stimulator for animal research
- Pattern electroretinogram (PERG) software and visual stimulator for animal research (by Jorvec Corp.)



High Frequency Options

High Frequency add-on module for SmartEP, SmartEP-ASSR, and SmartDPOAE

Researchers have used our High Frequency Option, speakers, and microphones to record AEP and DPOAE on a wide range of animals including dogs, mice, guinea pigs, rats, gerbils, and chinchillas.

transducer options

We are pleased to offer the following transducers exclusively on the Universal Smart Box:

- IHS High Frequency Animal speakers allow users to output stimuli up to 32kHz
- Ergonomic ER-2 insert earphones for stimulus output at up to 16kHz
- 10B+ microphone can be coupled to ER-2 insert earphones for DPOAE up to 16kHz or to High Frequency Transducers for DPOAE up to 32kHz
- Sound field amplifier option
- Trigger-in/out option



calibration in animal ears

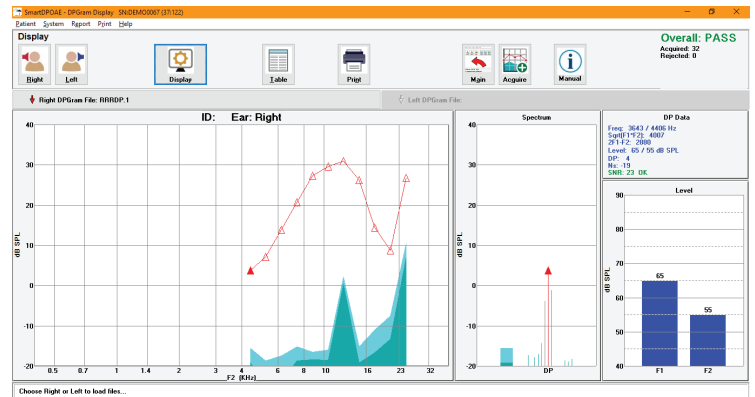
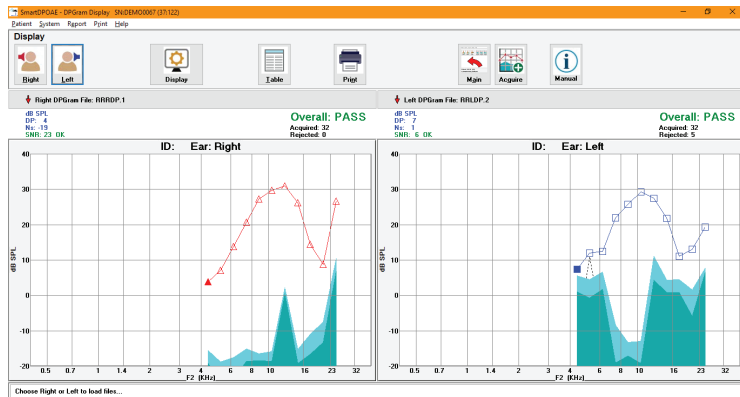
- Calibration utility facilitates in-ear calibration for each species using the 10B+ microphone
- Modifiable SPL calibration table can be saved for each species and easily loaded before testing
- Create custom hearing level correction per species using electrophysiological hearing thresholds



SmartDPOAE

Screening and diagnostic distortion product otoacoustic emissions.

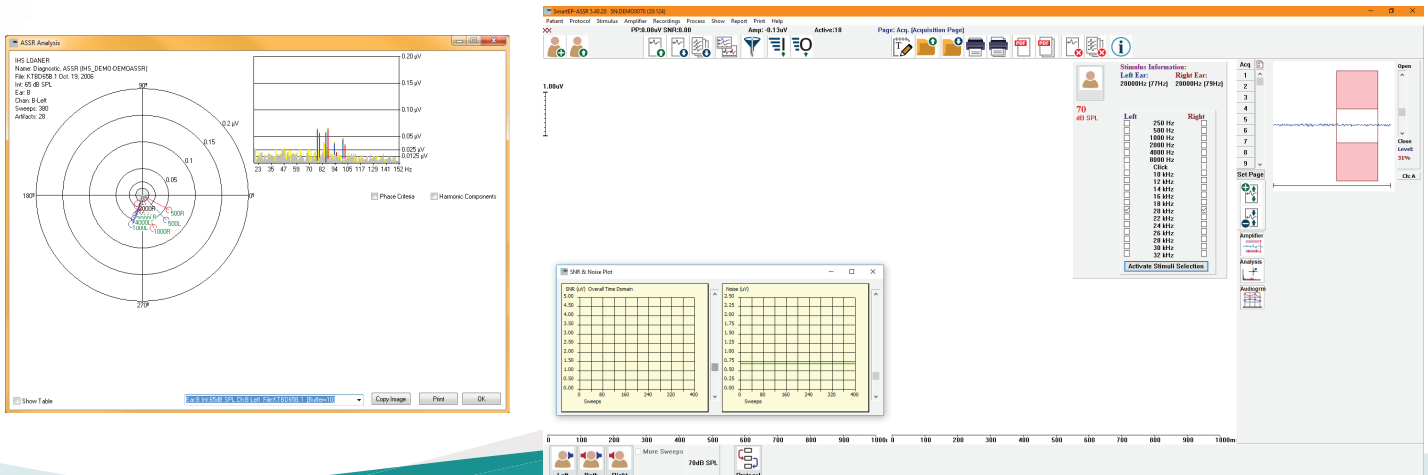
- Fast and easy setup with up to 41 frequencies per ear in a single test sequence
- Automatic probe-fit check and in-ear calibration for increased accuracy
- Easy-to-interpret colorful DP Grams and detailed information for each frequency tested
- Clear Pass or Refer indications based on user-selected passing criteria
- User-customizable display of normative ranges on the DP Gram facilitates response analysis
- High frequency option
- Built-in scripting feature allows you to define sequences of frequencies and intensities for automated data collection
- Optional graphical display of noise standard deviation for improved interpretation



SmartEP-ASSR

Full-featured screening and diagnostic Auditory Steady State Response

- Provides quick, accurate threshold detection using automated statistical analysis
- Test both ears at the same time
- Stimulus: Clicks, Tones, iChirps, and user-defined
- Frequencies: 250, 500, 1000, 2000, 4000, and 8000 Hz, and high frequencies from 10 kHz to 32 kHz in 2kHz increments.
- Harmonic component analysis for improved threshold detection and reduced test times
- Automated audiogram generation in SPL and HL
- Cost effective add-on to SmartEP



Specifications

Universal Smart Box

A/D Converter: 16-bit.

Sampling rate:

Standard: from 200 Hz to 40 kHz.

HF systems: from 160 Hz to 128 kHz.

Adjustable Gain.

Adjustable High Pass and Low Pass filters (-6 dB/Oct).

Adjustable artifact rejection level and time region.

Selectable Notch Filter (-12 dB/Oct)

Common Mode Rejection:

≥ 105 dB @ 1 kHz

≥ 120 dB @ 60/50 Hz,
notch filter off

Noise Level: ≤ 0.333 μ V RMS

Input Impedance: > 5 MOhms

ER-3C Insert Earphones:

Intensity: 0 - 130 dB SPL

Frequency Range: 125 - 10000 Hz

ER-2 Insert Earphones:

Intensity: 0 - 118 dB SPL

Frequency Range: 125 - 16000 Hz

High Frequency Transducers:

Intensity: 0 - 94 dB SPL

Frequency Range: 500 - 32000 Hz

TDH Headphones:

Intensity: 0- 120 dB SPL

Frequency Range: 125 - 12000 Hz

Bone Transducer:

Intensity: 0 - 98 dB SPL

Frequency Range: 250 - 8000 Hz

ER-10D OAE Probe:

Intensity: 0 - 100 dB SPL

Frequency Range: 125 - 16000 Hz

ER-10B+ OAE Microphone

Sound field amplifier and speakers

Duet

Two channels

A/D Converter: 16-bit

Sampling rate: 200 to 40000 Hz

High Pass: 0.1 - 300 Hz

Low Pass: 30 - 5000 Hz

Adjustable artifact rejection level and time region

Line Frequency Notch Filter (-12 dB/Oct)

Common Mode Rejection:

≥ 110 dB @ 1 kHz

≥ 110 dB @ 60/50 Hz,
notch filter off

Noise Level: ≤ 0.27 μ V RMS

Input Impedance: > 10 MOhms

ER-3C Insert Earphones:

Intensity: 0 - 130 dB SPL

Frequency Range: 125 - 10000 Hz

TDH Headphones:

Intensity: 0- 120 dB SPL

Frequency Range: 125 - 12000 Hz

Bone Transducer:

Intensity: 0 - 98 dB SPL

Frequency Range: 250 - 8000 Hz

ER-10D OAE Probe:

Intensity: 0 - 100 dB SPL

Frequency Range: 125 - 16000 Hz

Sound field amplifier and speakers

Solo

One channel

A/D Converter: 16-bit

Gain: 100K

High Pass: 30 Hz (-12 dB/Oct)

Low Pass: 1500 Hz (-12 dB/Oct)

Adjustable artifact rejection level and time region

Line Frequency Notch Filter (-12 dB/Oct) 50 or 60 Hz

Common Mode Rejection:

≥ 105 dB at 1 kHz

≥ 115 dB at 60/50Hz

Noise Level: ≤ 200 nV RMS

Input Impedance: > 10 MOhms

Sampling rate: 200 to 40000 Hz

ER-3C Insert Earphones:

Intensity: 0 - 130 dB SPL

Frequency Range: 125 - 8000 Hz

USB Powered:

+5V DC, 0.65 A 3.25W

Operating Environment

Portable Equipment

Indoor use

Operating temperature: 15 °C - 35 °C

Relative humidity: 15% to 90% at 40 °C non-condensing

Altitude: 0 - 3000 m

Storage

Temperature: 0 °C - 50 °C

Standards Compliance

Safety: IEC 60601-1

Class II, Type BF

EMC: IEC 60601-1-2

EP: IEC 60601-2-40

Medical Device Directive: 93/42/EEC

Computer Requirements

Windows 10 operating system

Minimum 4 GB RAM

Minimum 5 GB hard drive space

Min display vertical resolution of 900 px,
Full HD (1920 x1080) recommended.

Grounded, 3-prong power supply

Compliant with IEC 60950

Mouse or other pointing device

One available USB Port

Removable media, network drive, or secure
Internet storage site for data backup
(recommended)