Science **made** smarter

For Research Use Only*

ER-2 Insert Earphones

ER-2 Tubephone Insert Earphones
- ER-2 earphones are equalized to remove the 2.7 kHz ear canal resonance to create a flat pressure response at the eardrum.
- For research on humans and animals.
- Accurate reproduction of signals recorded at the Kemar manikin eardrum.
- 16-kHz bandwidth.
- 70+ dB isolation between ears; reduces the need for masking.
- 30+ dB external noise exclusion.
- Eliminates collapsed ear-canal problem.
- Convenient coupling to the ear.
- Small constant-diameter sound-delivery tubes (1.35 mm ID × 2.16 mm OD).

Specifications

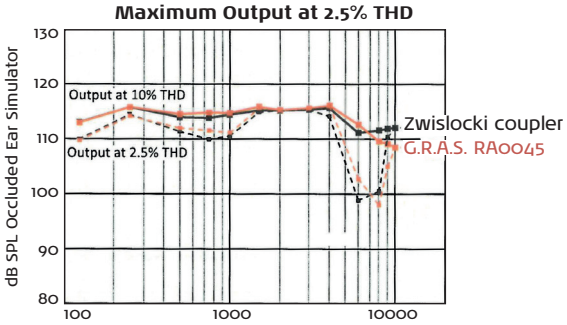
1 kHz Sensitivity: 100 dB SPL for 1.0 V (100 mW) AC Drive; limits ±3 dB.
Impedence: 10 Ohms, nominal (12 Ohms at 100 Hz; 8 Ohms at 20 kHz).
Safe Operating Limits: Maximum continuous sine-wave drive: 2.5 V RMS.
Maximum Peak Voltage for 1% duty cycle: 20 V.
Acoustic Polarity: + Electric (small pin) = + Acoustic.

System includes
- Tubephone insert earphones.
- 7' cable assembly with dual-mono 6.33 mm (1/4") plugs.
- 50 regular foam eartips (13 mm).
- 10 baby foam eartips (10 mm).
- 2 extra sound-delivery tubes.
- 1 velcro neckstrap.

Data supplied

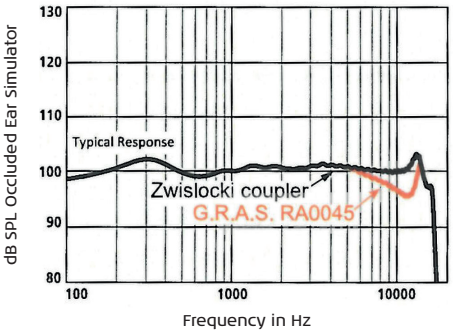
Individual frequency-response curves and distortion measurements are provided with each pair of ER-2 earphones.

Maximum Output at 2.5% THD

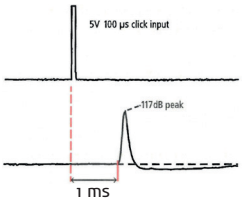


*This product is provided for research purposes only, and is not intended for clinical diagnostic use.

Typical Frequency Response
Measured with 1.0 V Drive



Typical Click Response
Measured in Occluded-Ear Simulator



Approximate Output Limits

Frequency in Hz	Maximum Undistorted Output <2.5% THD		Maximum Useful Output <10% THD	
	dB SPL in Zwislocki Coupler	Equivalent dB HL	SPL in Zwislocki Coupler	Equivalent dB HL
125	105	75		
250	108	89	111	92
500	108	96	111	99
750	108	99	111	102
1000	108	99	115	106
1500	117	107	120	110
2000	120	105	125	110
3000	118	103	126	111
4000	109	96	123	110
6000	100	87	110	97
8000	112	98	115	101

Etymotic Research by Interacoustics.
Interacoustics has taken over the Etymotic Research line of research products. This includes the manufacturing and distribution of the current Etymotic Research line. You can order these research systems directly at Interacoustics.com

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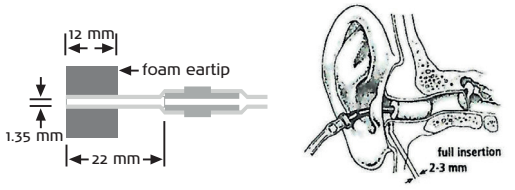
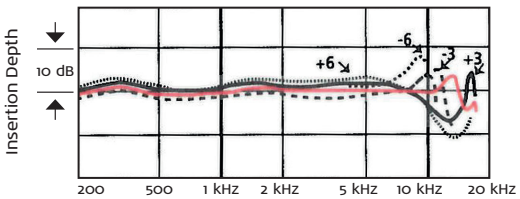




Eartip coupling

Foam eartips developed for insert earphones are produced with consistent dimensions to ensure proper calibration and test accuracy.

- Do not cut the sound tube. A change of 10 mm in the length of the sound tube will change the frequency response by 0.5 dB at some frequencies.
- ER-2 foam eartips have clear tubing which should be fully inserted on the tip of the sound tube, leaving 22 mm from the end of the eartip. The eartips are 12 mm long, so the required insertion depth into the ear canal is obtained when the edge of the eartip is 2-3 mm past the entrance of the ear canal. Consistent insertion is important for test repeatability above 8 kHz. The graph to the right shows the importance of proper insertion depth on frequency response above 8 kHz ("+" indicates deeper insertion; "-" indicates shallower insertion in mm).

Tubing length

The smooth frequency response of ER-2 earphones depends on maintaining a total of 292 mm (11.5 inches) sound channel between the case wall and the eartip outlet. Of these 292 mm total, 22 mm are provided in the eartip, 5.5 mm are provided by the small metal tip, and 264.5 mm are provided by the sound-delivery tubes. Extra sound-delivery tubes are included with the earphones. Replacement sound-delivery tubes are available from Sanibel Supply.

Instructions for use

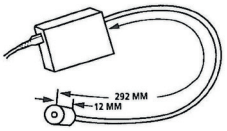
1. Examine the ear canal for obstruction or excessive cerumen.
2. Examine the eartip and the sound-delivery tubes to ensure they are not blocked.
3. Insert the clear tubing of the foam eartip completely onto the tip of the sound tube.
4. Roll the foam tip to a size that will fit the ear canal.
5. Insert the eartip well into the ear canal. Interaural attenuation is improved with deep insertion.
6. Allow foam to expand to acoustically seal the ear canal.
7. Eartips are single use only.
8. Replace the sound tubes if they crack, harden, discolor, or otherwise appear unusable.

Impedance

Since the ER-2 input impedance is 10 Ohms, a low-output impedance signal source is required for constant voltage drive. Note the specifications and frequency-response graph on page 1. Interacoustics recommends an amplifier with an output impedance of <1 Ohm.

Calibration

If ER-2 earphones are simply plugged into the audiometer calibrated for 10-ohm THD-39 headphones, a rough estimate of output in HL will be the dial setting -20 dB. More accurate calibration can be performed by use of the table on the right-hand side the correct coupler insert.



Slowly roll and squeeze the eartip into as small a diameter as possible

ANSI S3.6 (1996) and ISO 389.2 (1994)
Reference Thresholds
Sound Pressure levels in dB re: 20µPa

Frequency (Hz)	Occduded Ear Simulator	HA-2 with Rigid Tube	HA-1
125	28.0 (98.0)	26.0 (96.0)	26.5 (86.5)
250	17.5 (87.5)	14.0 (84.0)	14.5 (84.5)
500	9.5 (79.5)	5.5 (75.5)	6.0 (76.0)
750	6.0 (76.0)	2.0 (72.0)	2.0 (72.0)
1000	5.5 (75.5)	0.0 (70.0)	0.0 (70.0)
1500	9.5 (79.5)	2.0 (72.0)	0.0 (70.0)
2000	11.5 (81.5)	3.0 (73.0)	2.5 (72.5)
3000	13.0 (83.0)	3.5 (73.5)	2.5 (72.5)
4000	15.0 (85.0)	5.5 (75.5)	0.0 (70.0)
6000	16.0 (86.0)	2.0 (72.0)	-2.5 (67.5)
8000	15.5 (85.5)	0.0 (70.0)	-3.5 (66.5)

Accessories / Replacement Parts
(available from Sanibel Supply)

ER1-02
7' cable assembl y with dual-mon o 6.33 mm (1/4") plugs

ER3-05
Hook-and-loop clips
6/pkg

ER1-21
Sound-deliver y tube replacements with adapters
4/pkg

ER1-04
Sound-deliver y tube adapters
10/pkg

ER1-14A
Disposable foam eartips (regular, 13 mm)
50/pkg

ER1-14B
Disposable foam eartip s (baby, 10 mm)
50/pkg

ER1-14C
Disposable foam eartips (jumbo, 18 mm)
24/pkg

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