

# GRAS 45BB-5

Head & Torso for Ear- and Headphone Test, 2-Ch LEMO



Connection: Traditional Power Supply (200 V/LEMO)  
Channel(s): 2  
ANSI: S3.36, S3.25  
IEC: 60318-4  
ITU-T Rec. P.57 Type 3.3 based on ITU-T Rec. P.58

The 45BB-5 KEMAR Head & Torso for ear- and headphone test, 2-Ch LEMO is an acoustic research tool with built-in ear simulators that simulates the changes that occur to soundwaves as they pass a human head and torso. KEMAR fitted with pinna simulator, ear canal extension, and IEC 60318-4 Ear Simulator resembles the acoustic impedance of the human ear. Its corresponding CCP equivalent is [GRAS 45BB-6 KEMAR Head & Torso for Ear- and Headphone Test, 2-Ch CCP](#).

## Introduction

The KEMAR head and torso simulator was introduced by Knowles in 1972 and quickly became the industry standard for hearing-aid manufacturers and research audiologists (visit [KEMAR.us](https://www.kemar.us) to read the full story). It is based on worldwide average human male and female head and torso dimensions. It meets the requirements of ANSI S3.36/ASA58-2012 and IEC 60318-7:2011.

The GRAS 45BB KEMAR Head and Torso has the same dimensions and acoustical properties as the original KEMAR, but has been developed further by GRAS to meet the industry's demand for realistic measurements of hearing aids, headphones, and headsets. It provides acoustic diffraction similar to that encountered around the median human head and torso, both in the proximity and in the far-field.

As all the preconfigured 45BB KEMARs consist of the same basic 45BB KEMAR Non-configured, plus a set of application-specific accessories, the full information about a given KEMAR configuration is obtained by combining the information about the 45BB KEMAR Non-configured and the information for a given configured version as found in the present text. Read about the non-configured KEMAR [here](#).

## Design

The 45BB-5 is a KEMAR head and torso for 2-channel ear and headphone test, with externally polarized ear simulators and large 55 Shore 00 pinnae.

It is delivered fully configured, individually calibrated and ready for use. In addition to a system calibration certificate, a USB flash memory with simulation data is included.

The main configuration specific components of the

45BB-5 are the GRAS RA0045 Ear Simulator According to 60318-4 and the KB0066/KB50065 large pinnae.

### *The 60318-4 Ear Simulator*

The acoustic input impedance of the RA0045 Ear Simulator closely resembles that of the human ear and, as a result, loads a sound source in very much the same way.

It complies with IEC 60318-4 and is measured and calibrated according to ITU-T P.57. It embodies a number of carefully designed volumes connected via well-defined and precisely tuned resistive grooves. In an equivalent electrical circuit, capacitors would represent the volumes, and inductance and resistance would represent respectively air mass and air flow within the resistive grooves.

Read more about RA0045 [here](#).

### *The KB0065/KB0066 Pinna*

The KB0065 and KB0066 are large straight pinnae for use with a straight ear canal extension. The hardness is 55 Shore 00. They comply with the IEC and ITU-T recommendations.

The other accessories specific for this configuration are listed in the Ordering Info tab.

## Performance and warranty

KEMAR is made of components from our standard portfolio, all manufactured of high-quality material and branded parts that were chosen and processed to ensure life-long stability and robustness. This enables us to offer 2 years warranty against defective materials and workmanship.

Exceptions: Microphones included in KEMAR as for these our normal 5-year warranty apply. The warranty period for cables is 6 months.

|   |   |   |
|---|---|---|
| Connector type  |   | 7-pin LEMO (FGG.1B.307)                           |
| Set sensitivity @ 250 Hz ( $\pm 2$ dB)  | mV/Pa                                   | 12.5  |
| Set sensitivity @ 250 Hz ( $\pm 2$ dB)  | dB re 1V/Pa                             | -38.5   |
| Theoretical dynamic range lower limit with GRAS preamplifier                                    | dB(A)                                   | 25  |
| Theoretical dynamic range upper limit with GRAS preamplifier @ +28 V / $\pm 14$ V power supply  | dB                                      | 151   |
| Theoretical dynamic range upper limit with GRAS preamplifier @ +120 V / $\pm 60$ V power supply | dB                                      | 163   |
| Resonance frequency   | kHz                                     | 13.5  |
| Temperature range, operation  | $^{\circ}\text{C}$ / $^{\circ}\text{F}$ | -30 to 60 / -22 to 140                            |
| Temperature range, storage  | $^{\circ}\text{C}$ / $^{\circ}\text{F}$ | -40 to 65 / -40 to 149                            |
| Humidity range non condensing   | % RH                                    | 0 to 95%  |
| ANSI standard   |   | S3.36, S3.25                                      |
| IEC standard  |   | 60318-4 (former 60711),<br>60318-7 (former 60959) |
| ITU-T recommendations   |   | P.380   |
| Weight  | g / oz                                  | 11.45 k / 404                                     |

GRAS Sound & Vibration reserves the right to change specifications and accessories without notice.

## Included items

|                             |   |
|-----------------------------|---|
| <a href="#">GRAS 45BB</a>   | KEMAR Head & Torso, Non-configured                  |
| <a href="#">GRAS KB0065</a> | KEMAR Large Right Ear 55 Shore 00                   |
| <a href="#">GRAS KB0066</a> | KEMAR Large Left Ear 55 Shore 00                    |
| GRAS RA0237                 | Straight Ear Canal Extension Kit (2 pcs)            |
| <a href="#">GRAS RA0045</a> | IEC 60318-4 Ear Simulator (2 pcs)                   |
| GRAS GR0408                 | Exterior Ear Canal (2 pcs)                          |
| GRAS GR0409                 | Union Nut (2 pcs)                                   |
| GRAS 26AS-S3                | 1/4" Preamp, Short version with 0.4 m Cable (2 pcs) |
| <a href="#">GRAS GR0010</a> | Adapter for 1/2" Microphone and 1/4" Preamp (2 pcs) |
| <a href="#">GRAS AA0008</a> | LEMO 7-pin - LEMO 7-pin Cable, 3 m (2 pcs)          |

## Optional items

### Power Modules for Externally Polarized Ear Simulators and Microphones

|                           |  |
|---------------------------|--|
| <a href="#">GRAS 12AK</a> | 1-Channel Power Module with gain, filters and SysCheck generator           |
| <a href="#">GRAS 12AD</a> | 1-Channel Power Module   |
| <a href="#">GRAS 12AA</a> | 2-Channel Power Module with gain, filters and SysCheck generator           |
| <a href="#">GRAS 12AR</a> | 2-Channel Power Module   |
| <a href="#">GRAS 12AQ</a> | 2-Channel Universal Power Module with signal conditioning and PC interface |

### For Ear Simulator Calibration

|                             |  |
|-----------------------------|--|
| <a href="#">GRAS 42AP</a>   | Intelligent Pistonphone (250 Hz or 251.2 Hz, 114 dB +/- 0.05 dB) |
| <a href="#">GRAS 42AA</a>   | Pistonphone (250 Hz, 114 dB +/- 0.08 dB)                         |
| <a href="#">GRAS RA0157</a> | 1/2" Calibration Adapter for KEMAR Pinna                         |

### Pinna Simulators

|                             |                                   |
|-----------------------------|-----------------------------------|
| <a href="#">GRAS KB0060</a> | KEMAR Small Right Ear 55 Shore 00 |
|-----------------------------|-----------------------------------|

|                             |  |
|-----------------------------|--|
| <a href="#">GRAS KB0061</a> | KEMAR Small Left Ear 55 Shore 00                   |
| <a href="#">GRAS KB0065</a> | KEMAR Large Right Ear 55 Shore 00                  |
| <a href="#">GRAS KB0066</a> | KEMAR Large Left Ear 55 Shore 00                   |
| <a href="#">GRAS KB1060</a> | KEMAR Small Right Ear, 35 Shore 00                 |
| <a href="#">GRAS KB1061</a> | KEMAR Small Left Ear 35 Shore 00                   |
| <a href="#">GRAS KB1065</a> | KEMAR Large Right Ear 35 Shore 00                  |
| <a href="#">GRAS KB1066</a> | KEMAR Large Left Ear 35 Shore 00                   |
| <a href="#">GRAS KB0090</a> | KEMAR Large Right Ear (VA-Style/SQ) 55 Shore 00    |
| <a href="#">GRAS KB0091</a> | KEMAR Large Left Ear (VA-Style/SQ) 55 Shore 00     |
| <a href="#">GRAS KB1090</a> | KEMAR Large Right Ear (VA-Style) 35 Shore 00       |
| <a href="#">GRAS KB1091</a> | KEMAR Large Left Ear (VA-Style) 35 Shore 00        |
| <a href="#">GRAS KB5000</a> | KEMAR Large Right Anthropometric Pinna 35 Shore 00 |
| <a href="#">GRAS KB5001</a> | KEMAR Large Left Anthropometric Pinna 35 Shore 00  |

## Ear Mould Simulators

|                             |  |
|-----------------------------|--|
| <a href="#">GRAS KB0110</a> | Ear Mould Simulator for 2 mm Inner diameter tubing |
| <a href="#">GRAS KB0111</a> | Ear Mould Simulator for 3 mm Inner diameter tubing |

## Ear Canal Extension and Microphone Holder Kits (kits with 2 pcs and O-rings)

|                             |  |
|-----------------------------|--|
| <a href="#">GRAS RA0237</a> | Straight Ear Canal Extension Kit for KEMAR   |
| <a href="#">GRAS RA0238</a> | VA-tapered Ear Canal Extension Kit for KEMAR   |
| <a href="#">GRAS RA0239</a> | Ear canal Extension Kit w. silicone lining for KEMAR                                   |
| <a href="#">GRAS RA0240</a> | Holder for long 1/2" microphone Kit for KEMAR  |
| <a href="#">GRAS RA0241</a> | Holder for short 1/2" microphone Kit for KEMAR   |
| <a href="#">GRAS RA0243</a> | Holder for 1/2" microphone Kit for KEMAR   |
| <a href="#">GRAS RA0244</a> | O-ring kit for KEMAR, 2 pcs.   |
| <a href="#">GRAS RA0249</a> | Straight Ear Canal Extension Kit for KEMAR, made of POM, for binaural hearing aid test |

|             |   |
|-------------|---|
| GRAS RA0250 | Tapered Ear Canal Extension Kit for KEMAR, made of POM, for binaural hearing aid test |
|-------------|---|

## KEMAR Retrofit Kit for Binaural Hearing Aid Test

[GRAS RA0251](#)

KEMAR Retrofit Kit for Binaural Hearing Aid Test:  
The Kit includes Ear Holder Plates, mounting bolts and the RA0249 and RA0250 Ear Canal Extension Kits. Included items are made of POM, Nylon and Teflon.

## KEMAR Retrofit Kit for Anthropometric Concha and Canal Pinna

[GRAS RA0311](#)

KEMAR Retrofit Kit for Anthropometric Concha and Canal Pinna.  
The Kit includes Ear Simulator Holder, 2 finger screws and a 3 mm Allen Key.

## Extension Cables

[GRAS AA0008](#)

LEMO 7-pin - LEMO 7-pin Cable, 3 m

[GRAS AA0009](#)

LEMO 7-pin - LEMO 7-pin Cable, 10 m

[GRAS AA0020-CL](#)

LEMO 7-pin - LEMO 7-pin Cable, Customized Length xxxx cm

## Flight Case

GRAS KM0094

PELI Case for KEMAR

## Simulation Model of KEMAR

GRAS KB3000

Simulation Model of KEMAR with large pinnae

GRAS KB3001

Simulation Model of KEMAR with small pinnae

## Stand for KEMAR

GRAS AL0026

Loudspeaker stand for KEMAR, Ø 35 mm

## Miscellaneous

GRAS KB0000

KEMAR Handbook

GRAS KB0010

T-Shirt for KEMAR

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# GRAS Worldwide

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## ABOUT GRAS SOUND & VIBRATION

GRAS is a worldwide leader in the sound and vibration industry. We develop and manufacture state-of-the-art measurement microphones to industries where acoustic measuring accuracy and repeatability is of utmost importance in R&D, QA and production. This includes applications and solutions for customers within the fields of aerospace, automotive, audiology, and consumer electronics. GRAS microphones are designed to live up to the high quality, durability and accuracy that our customers have come to expect and trust.

**GRAS** Sound & Vibration