

# GRAS 45BC-4

KEMAR Head & Torso with Mouth Simulator for Telephone Test, 1-Ch CCP



Connection: Constant Current Power (0 V/CCP)  
Channel(s): 1  
ANSI standards: S3.36, S3.25  
IEC standards: 60318-4 (formerly 60711), 60318-7 (formerly 60959)  
Special feature: Telephone test

The 45BC-4 KEMAR Head & Torso with Mouth Simulator and TEDS for Telephone Test, 1-Ch CCP is configured with pinnae and with IEC 60318-4 Ear Simulator and ear canal extension in the right ear. Due to the design of KEMAR, realistic measurement in a sound environment as experienced by a human being using a hearing aid is possible. In addition, the 45BC-3 is provided with a mouth simulator for testing the microphone in the telephone. The 45EA handset positioning system is included. Its CCP equivalent is [GRAS 45BC-3 KEMAR Head & Torso with Mouth Simulator for Telephone Test, 1-Ch LEMO](#).

## 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](http://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 current 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 45BC KEMARs consist of the same basic 45BC 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 45BC KEMAR Non-configured and the information for a given configured version as found in the present text. Read about the non-configured KEMAR [here](#).

## TEDS Compatibility

All CCP-based KEMAR configurations are IEEE 1451.4 TEDS v. 1.0 compliant. If your measurement platform supports Transducer Electronic Data Sheets (TEDS), you will be able to read and write data like properties and calibration data.

## Design

The 45BC-4 is a KEMAR Head & Torso with Mouth Simulator for Telephone Test, with prepolarized ear simulator and large straight pinnae. A special

feature of this configuration is the 45EA Handset Positioning System.

45BC-4 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 45BC-4 are the GRAS mouth simulator, the RA0045-S1 Ear Simulator According to 60318-4, the KB1065/KB1066 Large Straight Pinnae and the 45EA Handset Positioning System.

*GRAS Mouth Simulator according to ITU-T Rec. P51 with built-in power amplifier*

The maximum continuous signal the mouth can produce in 1/3-octave bands is 100dB re. 20µPa in the frequency range of 100Hz to 16kHz. Its loudspeaker accepts an external signal either directly or via its own built-in power amplifier (when power is applied).

*The 60318-4 Ear Simulator*

The acoustic input impedance of the RA0045-S1 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 the [RA0045-S1 Ear Simulator](#).

## *The KB0065/KB0066 Pinnae*

The KB0065 and KB0066 are large straight pinnae for use with a straight ear canal extension. The hardness is 35 Shore 00. They comply with the IEC and ITU-T recommendations.

## *The 45EA Handset Positioning System*

The 45EA Handset Positioning System is designed for the head and torso simulator with Mouth Simulator. With this combination, you can make very realistic in-situ measurements on mobile telephones as well as conventional handsets.

You can mount the system on the KEMAR without additional tools. The system can be mounted on either side of KEMAR, and you can easily switch it from one side to the other side.

Read more about the [45EA Handset Positioning System](#).

Other accessories 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 chosen and processed to ensure life-long stability and robustness. This enables us to offer a two-year warranty against defective materials and workmanship.

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

# Specifications

**GRAS 45BC-4 KEMAR Head &  
Torso with Mouth Simulator for  
Telephone Test, 1-Ch CCP**

Page: 4

Connector type		BNC
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 CCP preamplifier	dB	146
Resonance frequency	kHz	13.5
Temperature range, operation	°C / °F	-30 to 60 / -22 to 140
Temperature range, storage	°C / °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), 60318-7 (former 60959)
ITU-T recommendations		P.380
Weight	g / oz	11.45 k / 404
MOUTH SIMULATOR		.
Output impedance	Ω	8
Maximum power, continuous	W	10
Maximum power, pulsed 2 sec.	W	50

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

## Included items

<a href="#">GRAS 45BC</a>	KEMAR Head & Torso with GRAS mouth simulator, non-configured
<a href="#">GRAS KB1065</a>	KEMAR Large Right Ear 35 Shore 00
<a href="#">GRAS KB1066</a>	KEMAR Large Left Ear 35 Shore 00
GRAS RA0237	Straight Ear Canal Extension Kit for KEMAR (2 pcs)
<a href="#">GRAS RA0045-S1</a>	IEC 60318-4 Ear Simulator, Prepol. version
GRAS 26CS	1/4" CCP Standard Preamplifier with 0.4 m cable, Short
<a href="#">GRAS RA0001</a>	Adapter for 1/2" Microphone and 1/4" Preamplifier
GRAS GR0408	Exterior Ear Canal
GRAS GR0409	Union Nut
<a href="#">GRAS AA0018-S</a>	Microdot-BNC Cable, 35 cm
<a href="#">GRAS AA0035</a>	BNC-BNC Cable, 3 m
<a href="#">GRAS 46BD</a>	1/4" CCP Pressure Standard Microphone Set
<a href="#">GRAS AA0070</a>	Microdot-BNC Cable, 3 m
GRAS 45EA	Handset Positioning System

## Optional items

### Power Modules for Pre-polarized Ear Simulators and Microphones

<a href="#">GRAS 12AL</a>	1-Channel CCP Power Module with A-weighting filter
<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

## 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)

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

GRAS RA0249	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

<a href="#">GRAS RA0251</a>	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.
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## Extension Cables

GRAS AA0034	BNC-BNC Cable, 2 m
<a href="#">GRAS AA0035</a>	BNC-BNC Cable, 3 m
GRAS AA0036	BNC-BNC Cable, 5 m
<a href="#">GRAS AA0037</a>	BNC-BNC Cable, 10 m

## Flight Case

GRAS KM0094	PELI Case for KEMAR
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## 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
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## 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 and related equipment for industries where acoustic measuring accuracy and repeatability are of the utmost importance. This includes applications and solutions for customers within the fields of aerospace, automotive, audiology, consumer electronics and other highly demanding industries. GRAS microphones are designed to live up to the high quality, durability and accuracy that our customers have come to expect, trust and require. GRAS Sound & Vibration is represented through subsidiaries and distributors in more than 40 countries and is part of Axiometrix Solutions, a leading test solutions provider comprised of globally recognized measurement brands. Read more at [www.grasacoustics.com](http://www.grasacoustics.com)

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