# GRAS 43BA-2

## 1/4" 0.4cc CCP High Frequency Coupler Kit



Connection: CCP
Volume: 0.4cc
IEC: 60318-8
Use: For hearing aid test up to 16 kHz

The GRAS 43BA-2 is a 1/4" 0.4cc High frequency coupler for test of hearing aids. It uses a 1/4" microphone and 1/4" preamplifier with CCP connection. The equivalent externally polarized version is GRAS 43BA-1.

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## Introduction

The GRAS 43BA-2 is a high frequency 1/4" 0.4cc coupler kit for test of hearing aids at frequencies up to 16 kHz. It is a complete kit with a 1/4" Pressure Microphone and a 1/4" Preamplifier with BNC connection and the same adapters known from the reference 2cc coupler. It is easy and safe to handle and calibrate because the microphone grid does not have to be removed for mounting or calibration.

## Typical applications and use

It is designed in accordance with the Technical Specification "IEC TS 62886:2016 Electroacoustics - Hearing aids - Method for measuring electroacoustic performance up to 16 kHz". It meets the need for an accurate and repeatable measurement method that can be used by designers of hearing aids and hearing aids receivers, and by fitters of hearing aids. IEC TS 62886 can be bought from the IEC webstore, https://webstore.iec.ch/publication/25718.

The small volume in combination with the 1/4" microphone results in a wide frequency range that makes it useful for high-frequency diagnostics. The extended frequency range also ensures that it is a future proof choice for high-frequency testing of wide-band hearing aids.

Its 0.4cc volume is a well defined cylinder where the diaphragm of the microphone is flush with the bottom of the cylinder. The cylinder is machined to within ±2% of the nominal 0.4cc volume. The exact volume for each individual coupler is stated in the accompanying calibration chart. The performance of the 0.4cc coupler can therefore be accurately simulated, and it can easily be a part of a complete simulation model.

The 43BA is designed for repetitive use and is equally suited for research, quality assurance and production test applications.

## Design

The 43BA is developed with and for the hearing aids industry. Through our close collaboration with global leaders within the industry, we found an increasing need for test of modern hearing aids at high frequencies. In accordance with the intentions of the previously mentioned IEC Technical Specification GRAS has designed a coupler kit capable of delivering differentiated and reproducible data up to 16 kHz.

Because of the small volume, the measured sound level from the 0.4cc coupler is 13.5 dB higher than with a 2cc coupler. This increase in level improves the signal-to-noise ratio compared to what is normally achievable with the 1/4" microphone used.

Another benefit of the small volume and the 1/4" microphone is the fact that the resonance frequency at 30 kHz is so high that it does not interfere with measurements in the audible frequency range. Therefore it can be used for measurements up to 16 kHz, one octave higher than achievable with the standardized 2cc coupler.

The 43BA-2 is designed to perform optimally with the GRAS 40BD Prepolarized Pressure Microphone, which is ideally suited for for sound measurements at high levels and high frequencies. It has a wide dynamic range for measuring sound pressure levels up to 168 dB. The preamplifier is the GRAS 26CS CCP Standard Preamplifier, Very Short. The 26CS is a small robust unit short enough for use in confined spaces like anechoic test chambers. It has a very low inherent-noise level, a wide dynamic range and a frequency response from below 2 Hz to above 200 kHz.

The microphone set is locked and kept firmly in position by a very precise locking mechanism, that automatically centers and locks the microphone at the same time, eliminating the risk of measurement

errors caused by incorrect positioning of the microphone. An O-ring ensures a tight sealing of the microphone. The microphone set can easily be removed for sensitivity calibration – without tools. There is never any need for removing the protective grid, neither for use, calibration or other handling of the microphone.

**Compatibility**

The GRAS 43BA-2 requires a power module or measurement instrumentation input that that can provide a constant current of app. 4 mA. The microphone set requires a Microdot-BNC cable that is part of the delivery. Various extension cables are available. The 0.4cc coupler housing fits all GRAS 1/2" 2cc standard ear mould and tube adapters.

**System verification**

For daily verification and check of your measurement setup we therefore recommend using a sound source like the GRAS 42AB Sound Calibrator. For proper sensitivity calibration we recommend using a reference sound source like the GRAS 42AP Intelligent Pistonphone.

**Performance and warranty**

GRAS microphone sets and couplers are all manufactured of high-quality materials and brand parts that were chosen and processed to ensure life-long stability and robustness.

All parts are manufactured and assembled at the factory in Denmark by skilled and dedicated operators in verified clean-room environments. The microphone diaphragm, body and unique protection grid are made of high-grade stainless steel and make the microphone set resistant to physical damage as well as corrosion caused by aggressive air or gasses.

This, together with the reinforced gold plated microphone terminal which guarantees a highly reliable connection, enables us to offer 5 years warranty against defective materials and workmanship.

The warranty for cables is 6 months.

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|---|---|---|
| Theoretical dynamic range lower limit with GRAS preamplifier | dB(A) | 44 |
| Theoretical dynamic range upper limit with GRAS preamplifier @ +28 V / ±14 V power supply | dB | 166 |
| Set sensitivity @ 250 Hz (±3 dB) | mV/Pa | 1.45 |
| Set sensitivity @ 250 Hz (±3 dB) | dB re 1V/Pa | -57 |
| Coupler volume | $mm^3$ | 0.4 ccm |
| Resonance frequency | kHz | 30 |
| Temperature range, operation | °C / °F | -30 to 60 / -22 to 140 |
| Temperature coefficient @250 Hz | dB/°C / dB/°F | -0.01 |
| Humidity range non condensing | % RH | 0 to 80 |
| CE/RoHS compliant/WEEE registered | | Yes/Yes/Yes |
| Connector type | | Microdot 10/32 |
| Weight | g / oz | 50 / 1.76 |

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

## Included

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| GRAS RA0252 | 0.4cc Coupler |
| GRAS 40BD | ¼" Prepolarized Pressure Microphone, High levels |
| GRAS 26CS | ¼" CCP Preamplifier with Microdot Connector, Very Short |
| GRAS AA0070 | 3 m Cable Microdot-BNC |
| GRAS RA0270 | Ear-mould Adapter Kit for RA0038 / RA0252 Couplers |
| GRAS RA0271 | Tube Adapter for RA0038 / RA0252 |
| GRAS RA0272 | In-Ear Adapter for RA0038 / RA0252 Couplers |

## Optional

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|---|---|
| GRAS AA0035 | 3-m BNC extension cable |
| GRAS AG0002 | CCP Input Adapter |
| GRAS 12AL | 1-Channel CCP Power Module with A-weighting Filter |
| GRAS 12AQ | 2-Channel CCP/LEMO Power Module with Signal Conditioning and Computer Interface |
| GRAS 42AP | Intelligent pistonphone |
| GRAS 42AG | Multifunction Sound Calibrator |

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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

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