G.R.A.S. 47AC 1/2" CCP Infra-Sound Microphone Set

Freq range: 0.09 Hz to 20 kHz
Dyn range: 20 dB(A) to 148 dB
Sensitivity: 8 mV/Pa

The G.R.A.S. 47AC is a 1/2" CCP free-field microphone set optimized for infra-sound measurements down to 0.09 Hz.

Technology

Introduction

The G.R.A.S. 47AC is a 1/2" CCP precision condenser microphone set for infra-sound measurements in open acoustic fields.

As a free-field microphone, 47AC is designed essentially to measure the sound pressure as it would appear if the microphone were not present, the sound field pointing towards the microphone.

At low frequencies, the disturbing effects of its presence in the sound field are minimal because the wavelengths are large compared to the size of the microphone.

At higher frequencies (>1 kHz), the effects of diffractions generally cause the measured sound pressure levels to increase with frequency. In a free-field microphone, the effects of diffraction are compensated for to provide a flat frequency response in a free-field for 0º incidence.

Design

G.R.A.S.
SOUND & VIBRATION

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The 47AC is especially designed for infra-sound measurements and can measure down to 0.09 Hz. To make this possible, it is furnished with an integrated low frequency adapter with a specially designed pressure equalization system and a dedicated preamplifier.

To make it possible for the microphone to measure sound with very long wavelengths, the pressure equalization system has a long settling time. It is therefore important that the 47AC is allowed sufficient time to settle in conditions with varying ambient pressure. How long depends on the specific circumstances, but about half a minute after the ambient pressure has stabilized is sufficient in most cases.

The preamplifier has TEDS for automatic sensor identification and reading of calibration data.

Typical applications and use

The low-frequency property combined with its high sensitivity and robust design make 47AC the obvious choice for infra-sound measurements - a fast growing discipline following the need for monitoring and reducing low-frequency noise from, for example, power and production plants and wind turbines.

With a lower limit below 0.1 Hz 47AC is also well suited for realistic measurements of supersonic booms which requires a microphone with a high bandwidth and the ability to capture steep low-frequency pressure variations.

Compatibility

To benefit from 47AC's low frequency capabilities, it is important that the analyzer input module, or sound level meter is designed to match 47AC. Many data acquisition/recording systems have a fixed or adjustable high-pass filter. In many cases this filter can have a cutoff frequency at 3 to 5 Hz, if not higher. Therefore, check if your data acquisition/recording system or conditioning power supply has a high pass filter (either hardwired or user configurable) and that it is compatible with the frequencies you are interested in.

We recommend that you consider using a GRAS 12AL power CCP module. It has a high pass filter at 0.07 Hz when used with the 47AC infrasound microphone set.

System verification

For sensitivity calibration at 250 Hz, we recommend using a pistonphone like G.R.A.S. 42AP Intelligent Pistonphone. A check at 1 kHz can be performed using a G.R.A.S. 42AB Sound Calibrator.

Low-frequency calibration requires the use of a special low-frequency calibrator. We therefore recommend that 47AC is send to G.R.A.S. for calibration.

Quality and warranty

All G.R.A.S. microphones are made of high-quality materials that will ensure life-long stability and robustness. The microphones are all assembled in verified clean-room environments by skilled and dedicated operators with many years of expertise in this field.

The microphone diaphragm, body, and improved protection grid are made of high-grade stainless steel, which makes the microphone resistant to physical damage, as well as corrosion caused by aggressive air or gasses.

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This, combined with the reinforced gold-plated microphone terminal which guarantees a highly reliable connection, enables G.R.A.S. to offer 5 years warranty against defective materials and workmanship.

Service

If you accidentally damage the diaphragm on a G.R.A.S. microphone, we can - in most cases - replace it at a very reasonable cost and with a short turn-around time. This not only protects your investment, but also pleases your quality assurance department because you don't have to worry about new serial numbers, etc.

Calibration

Before leaving the factory, all G.R.A.S. microphones are calibrated in a controlled laboratory environment using traceable calibration equipment.

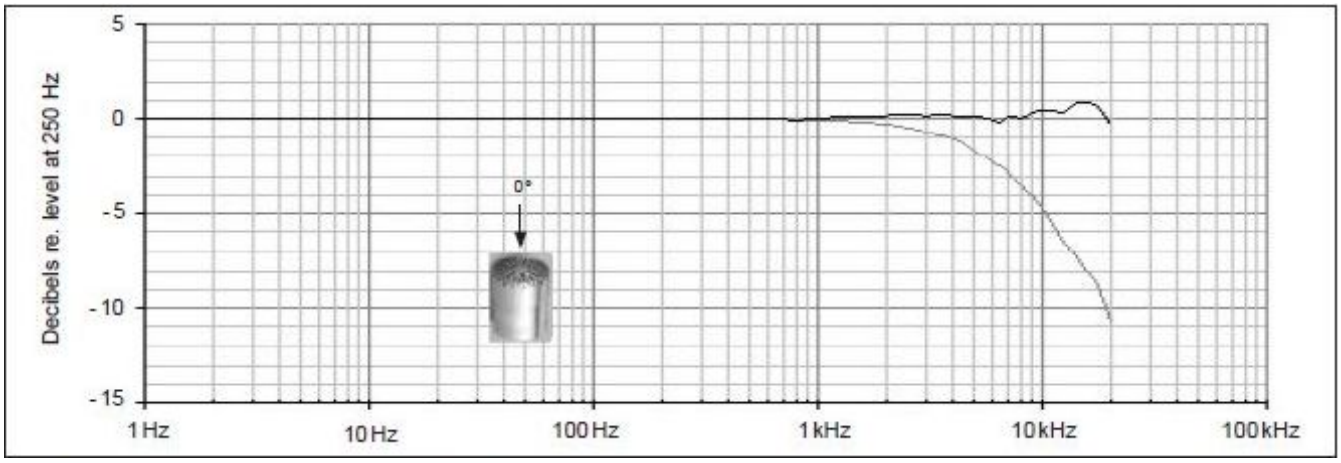
Depending on the use, measurement environment, and internal quality control programs, we recommend recalibrating the microphone at least once a year.

The 47AC comes with two calibration charts, a standard calibration certificate stating its sensitivity and frequency response above 250 Hz, and a chart documenting its frequency response below this frequency.

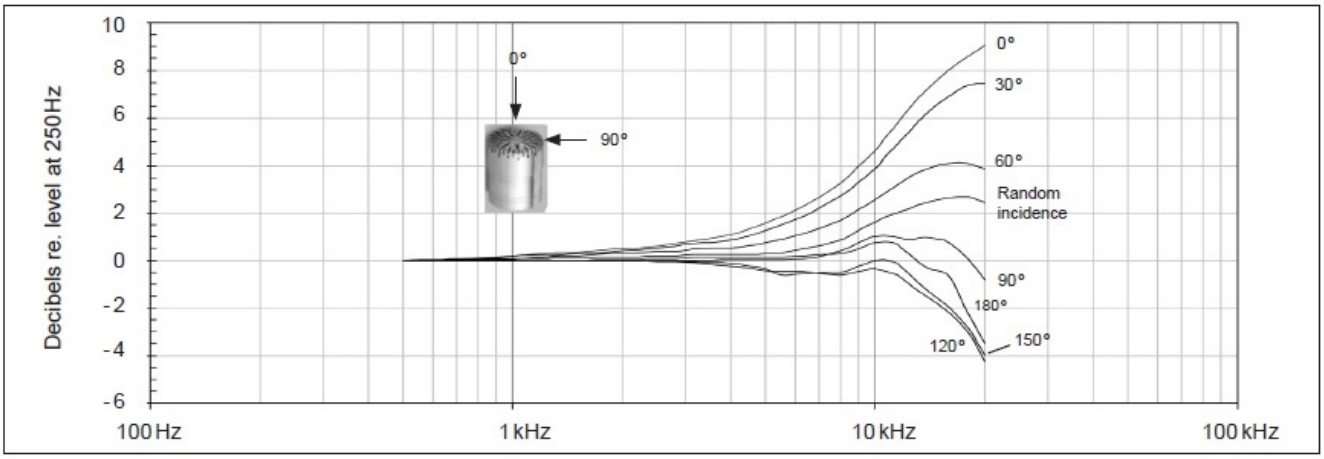
Specifications

Frequency range (±1 dB)	Hz	1 to 10 k
Frequency range (±3 dB)	Hz	0.09 to 20 k
Dynamic range lower limit (microphone thermal noise)	dB(A)	20
Dynamic range upper limit	dB	148
Set sensitivity @ 250 Hz (±2 dB)	mV/Pa	8
Output Voltage Swing, min. @ 24-28 V CCP voltage supply	Vp	8
Power supply min. to max.	mA	2 to 20
DC bias voltage, typ.	V	12
Microphone venting		Rear
IEC 61094-4 Compliance		WS2P
Temperature range, operation	°C / °F	-30 to 70 / -22 to 158
Temperature range, storage	°C / °F	-40 to 85 / -40 to 185
Temperature coefficient @250 Hz	dB/°C / dB/°F	-0.01 / -0.006

Static pressure coefficient @250 Hz	dB/kPa	-0.008
Humidity range non condensing	% RH	0 to 100
Humidity coefficient @250 Hz	dB/% RH	-0.001
Influence of axial vibration @1 m/s²	dB re 20 µPa	62
TEDS UTID (IEEE 1451.4)		27 v. 1.0
Connector type		BNC
CE/RoHS compliant/WEEE registered		Yes/Yes/Yes
Weight	g / oz	33 / 1.164

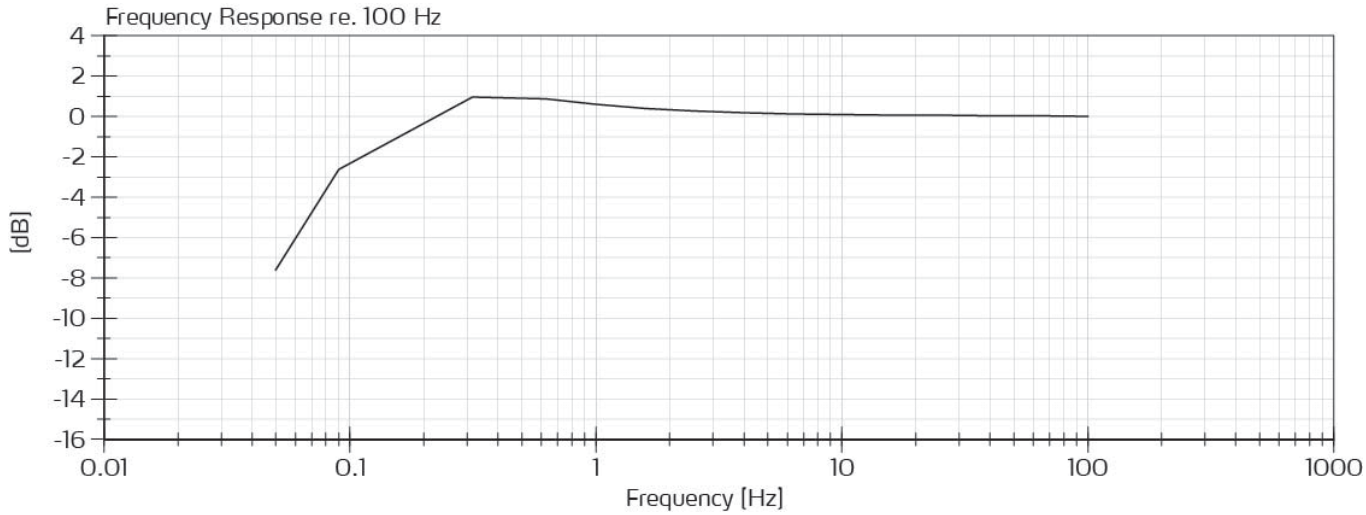


Typical frequency response



Free-field corrections for different angles of incidence

Typical frequency response below 250 Hz



G.R.A.S. Sound & Vibration reserves the right to change specifications and accessories without notice.

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We make Microphones

Tradition

Since the establishment in 1994, G.R.A.S. has been 100% dedicated to developing and manufacturing high-quality measurement microphones and related acoustic equipment. G.R.A.S. was founded by the Danish acoustics pioneer Gunnar Rasmussen who for more than 60 years has contributed to the world of sound and vibration with his unique ideas and designs. From the first reproducible 1" condenser measurement microphone that enabled quality measurements and instrumentation for acoustic calibration, Mr. Rasmussen's ingenuity and foresight led to the world's most popular acoustic sensor: The 1/2" measurement microphone. Then the 1/4" and 1/8" microphones followed with outstanding dynamic and high-frequency capability that brought higher definition and transparency into impulse noise diagnostics. Many variants have been made available over the years; all based on Gunnar Rasmussen's original 1" pressure microphone design.

Innovation

At G.R.A.S., we and our customers benefit daily from Mr. Rasmussen's exceptional understanding of acoustics, physics, electronics and measurement needs. Not only in R&D but throughout the organisation, we are proud to develop, produce and offer the broadest range of high-quality measurement microphones and accessories in the industry. And as a family company, now owned and managed by the two sons, Per Rasmussen and Peter Wulf-Andersen, we safeguard our heritage and knowledge to help create new opportunities with our customers. We work with everybody with an interest in sound or noise within the fields of aerospace, automotive, audiology, consumer electronics, noise monitoring, building acoustics and telecommunications, metrology, education, consultancy, legislation and system integration.

Quality

At G.R.A.S. we know that in order for you to trust your measurement results; signal quality, stability and robustness are essentials. And because we also know how you handle and use the microphones in your daily work, we design and build them to perform under real life conditions – and beyond.

When developing measurement microphones, our R&D team uses a series of highly accelerated life tests (HALT) to ensure that our microphones live up to the high quality and precision our customers have come to expect and trust. Thus to simulate the handling and use a microphone is exposed to when working outside the lab – in real life situations - we bake it, we humidify it, we shake it and we try to break it - all to make sure that you can trust your measurement results - every time.

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All our microphones are solely produced in stainless steel and in a quality that allows for a 5 year warranty. Should you by mistake damage the diaphragm on a G.R.A.S. microphone, our special technique enables repair at very reasonable price.

Partners

G.R.A.S. is represented worldwide in more than 40 countries by subsidiaries and distributors. Whether you are searching for a multi-channel solution or just a replacement microphone for your sound level meter G.R.A.S. will help solve your needs. Visit gras.dk for your local G.R.A.S. partner.

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