

# G.R.A.S. 40AZ 1/2" Prepolarized Free-field Microphone, Low Frequency

Freq range: 0.5 Hz to 20 kHz Dyn range: 14 dB(A) to 148 dB Sensitivity: 50 mV/Pa The 40AZ is a prepolarized free-field microphone with a large dynamic range and a wide frequency response. Its externally polarized equivalent is G.R.A.S. 40AN.

## Technology

#### Introduction

The G.R.A.S. 40AZ 1/2" free-field microphone is a precision condenser microphone for low-frequency (including infra-sound) measurements in open acoustic fields.

As a free-field microphone, 40AZ 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 (large wavelengths compared to the size of the microphone).

At higher frequencies (>1 kHz), the effects of diffractions generally cause microphones to measure sound pressure levels increasing 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  $0^{\circ}$  incidence.

The G.R.A.S. 26CG 1/4" high impedance preamplifier is available for use with 40AZ. The mounting thread (11.7



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mm - 60 UNS-2) is compatible with microphone preamplifiers for WS2P/F microphones.

### Typical applications and use

The low-frequency property combined with its high sensitivity and robust design make 40AZ 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 the increasing number of wind turbines.

### Compatibility

The 40AZ requires a standardized 1/2" or 1/4" CCP preamplifier and an input module that supports this technology with a BNC, SMB, or Microdot connector.

To benefit from 40AZ's low frequency capabilities, it is important that the microphone preamplifier, analyzer input module, or sound level meter is designed to match 40AZ.

### System verification

For daily verification and check of your measurement setup, we recommend using a calibrator like <u>G.R.A.S. 42AB</u> Sound Level Calibrator .

For proper sensitivity calibration, we recommend using a pistonphone like <u>G.R.A.S. 42AP</u> Intelligent Pistonphone.

### Calibration

When leaving the factory, all G.R.A.S. microphones have been calibrated in a controlled laboratory environment using traceable calibration equipment. Depending on the use, measurement environment and internal quality control programs we recommend that the microphone is recalibrated at least once a year.

We offer two kinds of calibration as an optional after-sales service: G.R.A.S. Traceable Calibration and G.R.A.S. Accredited Calibration.

G.R.A.S. Traceable Calibration is a traceable calibration performed by trained personnel under controlled conditions according to established procedures and standards. This is identical to the rigorous calibration that all G.R.A.S. microphones are subjected to as an integral part of our quality assurance.

G.R.A.S. Accredited Calibration is performed by the G.R.A.S. Accredited Calibration Laboratory that has been accredited in accordance with ISO 17025 by DANAK, the Danish Accreditation Fund.

If you want a new microphone set delivered with an accredited calibration in stead of the default factory calibration, specify this when ordering.

Learn more at gras/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.

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.

## **Specifications**

Frequency range (±1 dB)	Hz	1 to 10 k
Frequency range (±2 dB)	Hz	0.5 to 20 k
Dynamic range lower limit (microphone thermal noise)	dB(A)	14
Dynamic range lower limit with G.R.A.S. preamplifier	dB(A)	17
Dynamic range upper limit	dB	148
Dynamic range upper limit with G.R.A.S. preamplifier @ $+28 \text{ V} / \pm 14 \text{ V}$ power supply	dB	142
Dynamic range upper limit with G.R.A.S. preamplifier @ $+120 \text{ V} / \pm 60 \text{ V}$ power supply	dB	148
Dynamic range upper limit with G.R.A.S. CCP preamplifier	dB	138
Open-circuit sensitivity @ 250 Hz (±2 dB)	mV/Pa	50
Open-circuit sensitivity @ 250 Hz (±2 dB)	dB re 1V/Pa	-26
Resonance frequency	kHz	14
Microphone cartridge capacitance, typ.	pF	20
Microphone venting		Rear
Temperature range, operation	°C/°F	-40 to 120 / -40 to 248
Temperature range, storage	°C/°F	-40 to 85 / -40 to 185



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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/s <sup>2</sup>	dB re 20 µPa	62
CE/RoHS compliant/WEEE registered		Yes / Yes, Yes
Weight	g / oz	9 / 0,317

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



Typical frequency response





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Free-field corrections for different angles of incidence

## Dimensions



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Dimensions in mm







### 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.

