



G.R.A.S. 46AE 1/2" CCP Free-field Standard Microphone Set

Freq range: 3.15 Hz to 20 kHz
Dyn range: 17 dB(A) to 138 dB
Sensitivity: 50 mV/Pa
Use: For general acoustic diagnostics

The G.R.A.S. 46AE is a 1/2" Constant Current Power (CCP) free-field microphone set for measuring medium sound pressure levels at medium frequencies. It is terminated with a BNC connector and is TEDS compatible. The equivalent traditional 200 V (LEMO) type is G.R.A.S. 46AF.

Technology

Introduction

Through a close cooperation with our customers, we know that data-safety is highly important because the costs related to unsuited and unreliable sensors may determine whether your project turns into a success or not.

For our users, data safety translates directly into requests for easier microphone selection, simple system configuration and reduction of measurement errors.

To meet these requirements, we invented the microphone set concept. It is simple, reliable and robust and consists of a microphone cartridge and preamplifier combination, which is calibrated as one unit. This eliminates errors because there is only one sensitivity value to account for and the risk of contaminating the interface is eliminated. Combine this with our unique and proven design and you have the most reliable measurement microphone sets available in the industry today.

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Typical applications and use

The 46AE is a free-field microphone set and as such optimized for all acoustic applications, where the location of the main sound source is known and the microphone can be pointed directly at it ensuring 0° incidence.

The medium frequency range makes it ideal for general acoustic diagnostics.

Regarding temperature range, see the Specifications. Should higher temperature limits be required, we recommend considering the G.R.A.S. probe microphones where the microphone and preamplifier can be isolated from the hot source.

Design

The G.R.A.S. 46AE is a high-performance 1/2" free-field standard microphone set for measuring medium sound pressure levels at medium frequencies. In our clean-room environment the set is assembled and sealed with a label. However, the microphone set can be dismounted, if you wish to use the components separately.

Microphone

The microphone cartridge is the high-quality IEC 61094 WS3F standardized [G.R.A.S. 40AE](#) 1/2" Pre-polarized Free-Field Microphone, designed for long-term reliability in multiple environments.

The pre-polarization is obtained through an electret that is inflicted on the microphone back-plate under highly controlled conditions. The electret is then charged to match the specified microphone sensitivity.

Preamplifier

The preamplifier is the [G.R.A.S. 26CA](#) 1/2" CCP Standard Preamplifier with BNC connector, and based on our well-known circuit board substrates. In the industry these are famous for their low self-noise, wide frequency and excellent slew rate performance.

Compatibility

To perform as specified the G.R.A.S. 46AE microphone set requires a constant current input module that can deliver 4 mA and 24 V unloaded CCP voltage supply. If the constant current supply is lower, the capability of driving long cables is reduced and consequently the upper frequency is reduced. If the voltage supply is lower it will influence the upper dynamic range.

The microphone set is terminated with a BNC connector. Ready to use coax cable assemblies of various types and lengths are available in standard as well as customized lengths.

The 46AE is IEEE 1451.4 TEDS v. 1.0 compliant. If your measurement platform supports Transducer Electronic Data Sheets you will be able to read and write data like properties and calibration data.

System verification

The functionality of TEDS is very useful to determine which microphone is connected to which input channel. However, it is not a check of whether the microphone is within specifications or not. For daily verification and check of your measurement setup, we therefore recommend using a sound source like the [G.R.A.S. 42AB](#) Sound Calibrator.

For proper sensitivity calibration we recommend using a reference sound source like the [G.R.A.S. 42AP](#) 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/calib](#).

Quality and warranty

G.R.A.S. microphone sets are made of components from our proven standard portfolio and are all manufactured of high-quality material and branded 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 a verified clean-room environment. 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 enforced gold-plated microphone terminal guarantees a highly reliable connection. Thanks to the high quality, our warranty against defective materials and workmanship is 5 years.

Service

Should you by mistake damage the diaphragm on a G.R.A.S. microphone we will in most cases be able to exchange it at a very reasonable cost and short turn-around time. This not only protects your investment but also meets your quality assurance department since you do not have to worry about new serial numbers etc.

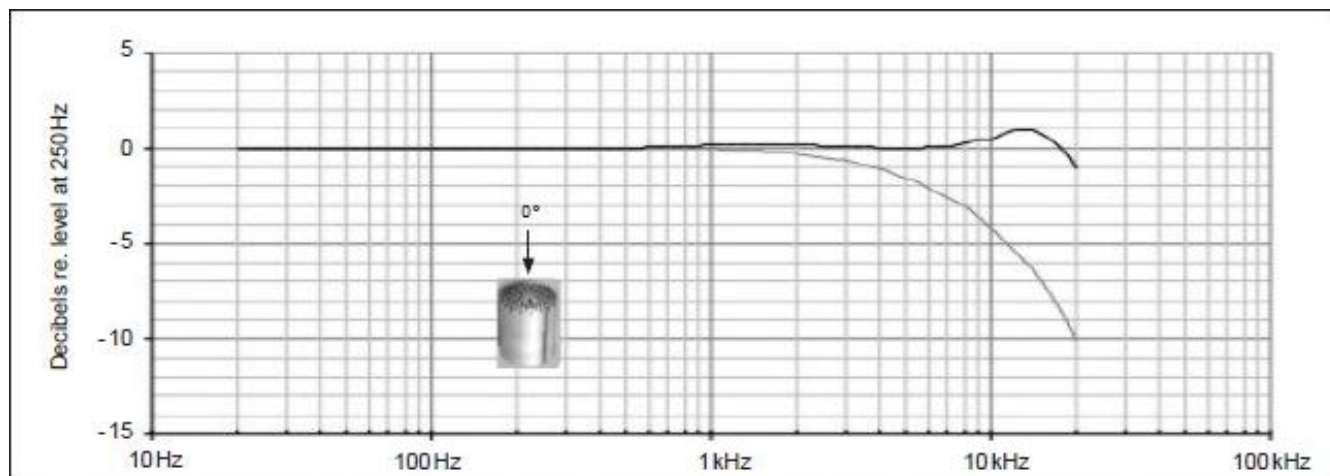
Specifications

| | | |
|--|---|------------------------|
| Frequency range (± 1 dB) | Hz | 5 to 10 k |
| Frequency range (± 2 dB) | Hz | 3.15 to 20 k |
| Dynamic range lower limit with G.R.A.S. preamplifier | dB(A) | 17 |
| Dynamic range upper limit with G.R.A.S. CCP preamplifier | dB | 138 |
| Set sensitivity @ 250 Hz (± 2 dB) | mV/Pa | 50 |
| Set sensitivity @ 250 Hz (± 2 dB) | dB re 1V/Pa | -26 |
| Output impedance | Ω | < 50 |
| 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 | | WS2F |
| Temperature range, operation | $^{\circ}\text{C} / ^{\circ}\text{F}$ | -30 to 70 / -22 to 158 |
| Temperature range, storage | $^{\circ}\text{C} / ^{\circ}\text{F}$ | -40 to 85 / -40 to 185 |
| Temperature coefficient @250 Hz | dB/ $^{\circ}\text{C}$ / dB/ $^{\circ}\text{F}$ | -0.01 / -0.006 |
| Static pressure coefficient @250 Hz | dB/kPa | -0.007 |
| Humidity range non condensing | % RH | 0 to 95 |
| Humidity coefficient @250 Hz | dB/% RH | -0.001 |
| Influence of axial vibration @1 m/s ² | dB re 20 μPa | 66 |
| 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 |

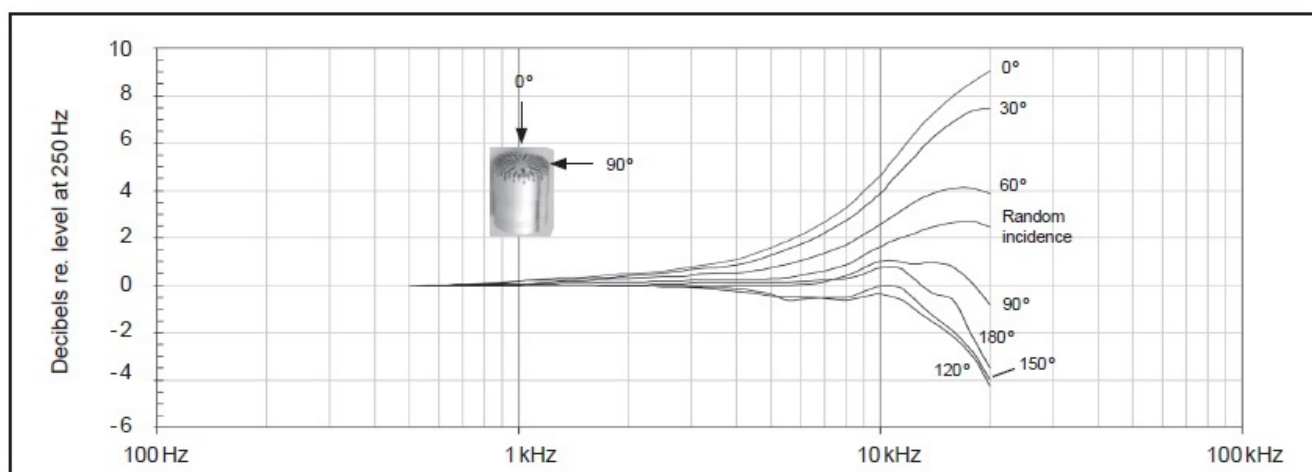
Test conditions

Temperature: 20C

Pressure: 760mm



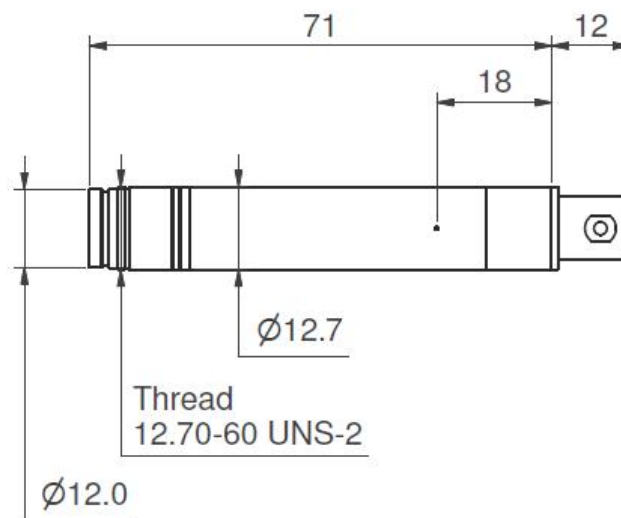
Typical frequency response. Upper curve shows free-field response for 0°, lower curve shows pressure response.



Free-field corrections for different angles of incidence

Dimensions

Dimensions in mm



Ordering info

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Optional items

| | |
|------------------------------------|--|
| G.R.A.S. AA0035 | 3 m BNC - BNC Cable |
| G.R.A.S. AA0039-CL | Customized length BNC - BNC Cable |
| G.R.A.S. AL0008 | 1/2" Microphone Holder, POM |
| G.R.A.S. AL0012 | 1/2" Microphone Holder, Stainless Steel |
| G.R.A.S. AL0005 | Swivel head |
| G.R.A.S. AL0006 | Tripod |
| G.R.A.S. RA0020 | 1/2" Nosecone |
| G.R.A.S. AM0069 | Windscreen for 1/2" Microphones |
| G.R.A.S. RA0131 | 1/2" Rain protection cap |
| G.R.A.S. 12AL | 1-Channel CCP Power Module with A-weighting filter |
| G.R.A.S. 12AQ | 2-Channel Universal Power Module with signal conditioning and PC interface |
| G.R.A.S. 42AB | Sound Calibrator, Class 1 |
| G.R.A.S. 42AP | Intelligent Pistonphone, Class 0 |
| G.R.A.S. CA0029 | Traceable Calibration of Microphone Set |
| G.R.A.S. CA2301 | Accredited Calibration of Microphone Set |



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.

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.