

# GRAS 46AF

1/2" LEMO Free-field Standard  
Microphone Set



Freq range: 3.15 Hz to 20 kHz  
Dyn range: 17 dB(A) to 149 dB  
Sensitivity: 50 mV/Pa  
Use: For general acoustic diagnostics

The GRAS 46AF is a 1/2" Traditional Power (LEMO) free-field microphone set for measuring medium sound pressure levels at medium frequencies. It is terminated with a 7-pin LEMO connector and is TEDS compatible. The equivalent Constant Current Power (CCP) type is [GRAS 46AE](#).

## 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.

## Typical applications and use

The 46AF 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 makes it ideal for general diagnostics.

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

## Design

The GRAS 46AF is a high-performance standard

microphone set. In our clean-room environment the set is assembled and sealed with a label. However, the microphone set can be dismantled, if you wish to use the components separately.

### Microphone

The microphone cartridge is the high-quality IEC 61094 WS3F standardized [GRAS 40AF 1/2"](#) Externally Polarized Free-Field Microphone, designed for long-term reliability in multiple environments.

### Preamplifier

The preamplifier is the GRAS 26TK Preamplifier which is a special version inclusive TEDS of the [GRAS 26AK 1/2"](#) Standard Preamplifier with 7-pin LEMO 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 GRAS 46AF microphone set requires a power module or an analyzer input which can supply the preamplifier with power as well as 200 V polarization. If the power 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 7-pin LEMO connector. Cables with LEMO connectors of various types and lengths are available in standard as well as customized lengths.

The 46AF 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 [GRAS 42AG](#) Sound Calibrator.

For proper sensitivity calibration we recommend using a reference sound source like the [GRAS 42AP](#) Intelligent Pistonphone.

## Calibration

When leaving the factory, all GRAS 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: GRAS Traceable Calibration and GRAS Accredited Calibration.

GRAS 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 GRAS microphones are subjected to as an integral part of our quality assurance.

GRAS Accredited Calibration is performed by the GRAS 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](https://www.gras.com/calib).

## GRAS HALT

When our R&D team develops a measurement microphone, it must undergo the most demanding tests to prove that it can withstand our customers' daily test conditions. Using a series of Highly Accelerated Lifetime Tests (HALT) we ensure that our microphones live up to the high quality and precision that our customers have come to expect and trust. Our HALT tests actively accelerate the lifetime of a microphone by simulating the handling and use it is exposed to in real life situations.

For more about HALT, see <http://www.gras.dk/halt>.

## Quality and warranty

GRAS 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 GRAS microphone we will in most cases be able to

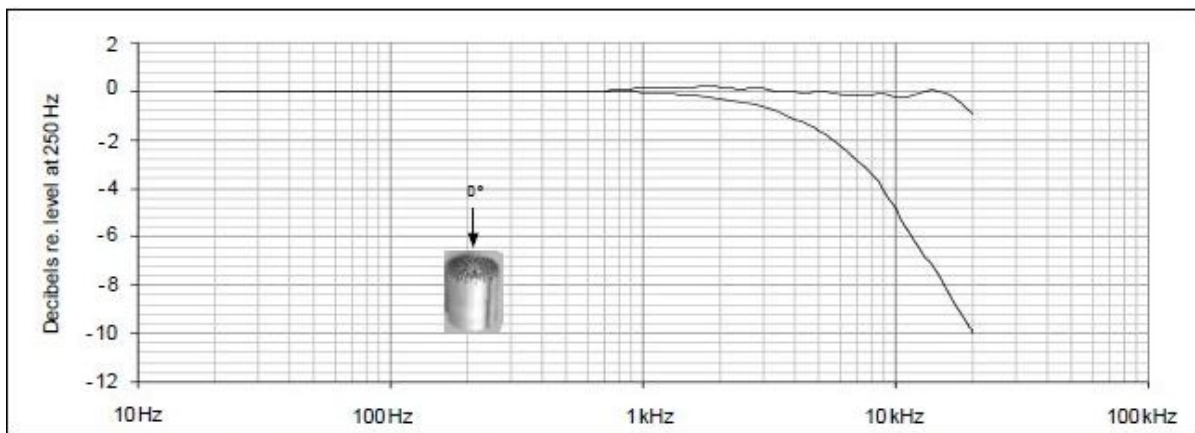
exchange it at a very reasonable cost and short turn-around time. This not only protects your investment but also meets your quality assurance department since you do not have to worry about new serial numbers etc.

Polarization/Connection		200 V / Traditional
Frequency range ( $\pm 1$ dB)	Hz	5 to 10 k
Frequency range ( $\pm 2$ dB)	Hz	3.15 to 20 k
Dynamic range lower limit with GRAS preamplifier	dB(A)	17
Dynamic range upper limit with GRAS preamplifier @ +28 V / $\pm 14$ V power supply	dB	142
Dynamic range upper limit with GRAS preamplifier @ +120 V / $\pm 60$ V power supply	dB	149
Set sensitivity @ 250 Hz ( $\pm 2$ dB)	mV/Pa	50
Set sensitivity @ 250 Hz ( $\pm 2$ dB)	dB re 1V/Pa	-26
Output impedance	$\Omega$	75
Power supply min. to max. (single/balanced)	V	28 to 120 / $\pm 14$ to $\pm 60$
DC-offset, min., single supply	V	$0.5 \times V_s - 1$
DC-offset, max., single supply	V	$0.5 \times V_s + 4$
DC-offset, balanced supply	V	-1 to 4
Microphone venting		Rear
IEC 61094-4 Designation		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	-0.011
Humidity range non condensing	% RH	0 to 90
Humidity coefficient @250 Hz	dB/% RH	-0.001
Influence of axial vibration @1 m/s <sup>2</sup>	dB re 20 $\mu\text{Pa}$	62
TEDS UTID (IEEE 1451.4)		27 v. 1.0
Connector type		7-pin LEMO (FGG.1B.307)
CE/RoHS compliant/WEEE registered		Yes / Yes/Yes
Weight	g / oz	33 / 1.164

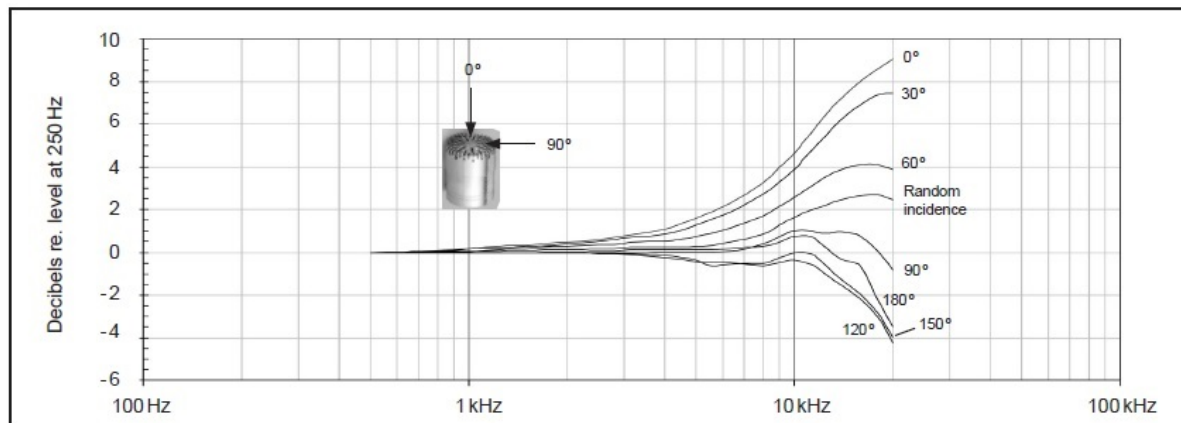
## GRAS HALT Test Parameters\*

Humidity 90%	@50°C	48 hours
Drop - horizontal orientation of microphone, attached to 2 kg load	m	1
Drop - vertical, grid downwards	m	1
Vibration - horizontal and vertical	@8g	15 hours

\*For a short introduction to HALT, see the section "GRAS HALT" above



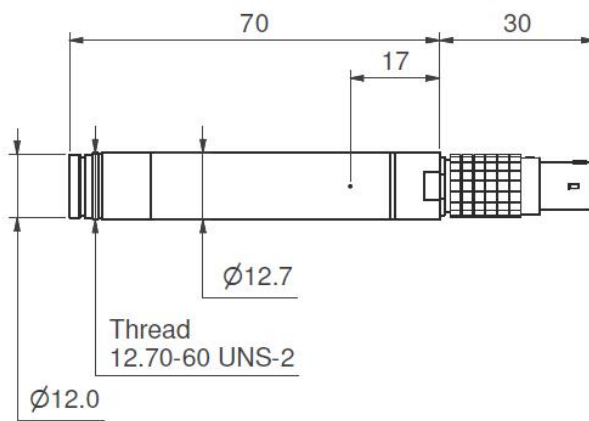
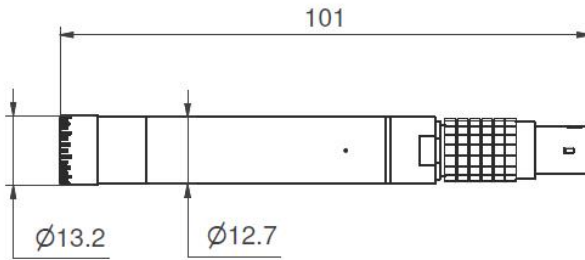
Typical frequency response. Upper curve shows free-field response for 0°, lower curve shows pressure response.



Free-field corrections for different angles of incidence

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

Dimensions in mm



## Optional items

<a href="#">GRAS AA0008</a>	3 m LEMO 7-pin - LEMO 7-pin Cable
<a href="#">GRAS AA0020-CL</a>	Customized Length LEMO 7-pin - LEMO 7-pin Cable
<a href="#">GRAS AL0008</a>	1/2" Microphone Holder, POM
<a href="#">GRAS AL0012</a>	1/2" Microphone Holder, Stainless Steel
GRAS RA0122	Random Incidence Corrector
<a href="#">GRAS AL0005</a>	Swivel head
<a href="#">GRAS AL0006</a>	Tripod
<a href="#">GRAS RA0020</a>	1/2" Nosecone
<a href="#">GRAS AM0069</a>	Windscreen for 1/2" Microphones
<a href="#">GRAS RA0131</a>	Rain-protection cap for 1/2" microphones
<a href="#">GRAS 12AA</a>	2-Channel Power Module with gain, filters and SysCheck generator
<a href="#">GRAS 12AQ</a>	2-Channel Universal Power Module with signal conditioning and PC interface
<a href="#">GRAS 42AG</a>	Multifunction Sound Calibrator, Class 1
<a href="#">GRAS 42AP</a>	Intelligent Pistonphone, Class 0
GRAS CA0029	Traceable Calibration of Microphone Set
GRAS CA2301	Accredited Calibration of Microphone Set
GRAS CA0001	Traceable Calibration of Microphone
GRAS CA2001	Accredited Calibration of Microphone

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



# GRAS Worldwide

Subsidiaries and distributors in more  
than 40 countries

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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 to industries where acoustic measuring accuracy and repeatability is of utmost importance in R&D, QA and production. This includes applications and solutions for customers within the fields of aerospace, automotive, audiology, and consumer electronics. GRAS microphones are designed to live up to the high quality, durability and accuracy that our customers have come to expect and trust.

**GRAS** Sound  
& Vibration