GRAS 40AI

1/2" Ext. Polarized Intensity Microphone Pair

Freq response: IEC 61043
Dyn range: 20 dB(A) to 157 dB
Sensitivity: 25 mV/Pa

The 40AI is an IEC 61094-compliant, WS2F ½" externally polarized sound-intensity microphone pair especially suited for sound-intensity and sound-power measurements, sound-source location and IEC 61043 Standard Instrumentation. Its equivalent prepolarized version is GRAS 40GI

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Introduction

The 40AI is an IEC 61094-compliant, WS2F ½" externally polarized sound-intensity microphone pair. Read about the prepolarized equivalent [40GI].

The 40AI microphone pair consists of two phase-matched free-field condenser microphones with extremely well-controlled phase characteristics for use in sound-intensity probes. Their standard mounting threads make them compatible with all the usual available makes of measurement-microphone preamplifiers.

As a microphone pair, the free-field frequency response of the 40AI complies with IEC 61043 1993 Class 1 and IEC 60651 Type 1.

Two 40AI microphones are included in 40AK microphone set, which is used in the GRAS LEMO Sound Intensity Probe Type 50AI.

40AI is individually factory-calibrated and delivered with a calibration chart stating its specific open-circuit sensitivity and pressure frequency response.

Typical applications and use

The 40AI is designed for sound-intensity and sound-power measurements, as well as sound-source localization, which is why it is included in the 50AI probe. Each 40AI microphone pair is phase matched according to the phase specifications for a Class 1 Sound Intensity Probe in accordance with international IEC 61043, Electroacoustics - Instruments for the Measurement of Sound Intensity - Measurements with Pairs of Pressure Sensing Microphones, 1993.

The quality of a sound intensity probe microphone is its ability to measure the real part of a complex sound intensity in highly reactive sound fields as well as in sound fields exposed to high levels of background noise. This ability depends largely on the phase responses of the microphone pair. The individual phase matching of each 40AI ensures that any differences in phase responses are extremely small.

The 40AI is also used for ranking of sound sources. When mounted in a sound-intensity probe such as the 50AI, the microphones can pinpoint the area generating the most noise, which may then require additional measurements, depending on the measurement procedures and processes used. The sound-intensity microphones reveal the weak and strong points when identifying noise sources. Sound-source ranking is useful as long as the background noise doesn't exceed the noise source.

Compatibility

The 40AI requires a standardized ¼" LEMO preamplifier and an input module that supports this technology.

System verification

For daily verification and check of your measurement setup, we recommend using a calibrator like GRAS Sound Level Calibrator 42AB.

For proper sensitivity calibration, we recommend using a pistonphone like GRAS Intelligent Pistonphone 42AP. 40AI cannot be calibrated with the 51AC-S1 Sound Intensity Calibration Adapter.

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.

Quality and warranty

All GRAS 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 GRAS to offer 5 years warranty against defective materials and workmanship.

Service

If you accidentally damage the diaphragm on a GRAS 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

Polarization/Connection		200 V / Traditional
Frequency range (±1 dB)	Hz	50 Hz - 8 kHz.
Frequency range (±2 dB)	Hz	10 Hz - 20 kHz
Dynamic range lower limit (microphone thermal noise)	dB(A)	20
Dynamic range upper limit with GRAS preamplifier @ +28 V / ±14 V power supply	dB	145
Dynamic range upper limit with GRAS preamplifier @ +120 V / ±60 V power supply	dB	157
Set sensitivity @ 250 Hz (±1 dB)	mV/Pa	25
Set sensitivity @ 250 Hz (±1 dB)	dB re 1V/Pa	-32
IEC 61094-4 Compliance		WS2F
Temperature range, operation	°C / °F	-40 to 150 / -40 to 320
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	-0.007
Humidity range non condensing	% RH	0 to 100
Humidity coefficient @250 Hz	dB/% RH	-0.001
Influence of magnetic field @80 A/m, 50 Hz	dB re 20 µPa	34
Influence of axial vibration @1 m/s²	dB re 20 µPa	62
CE/RoHS compliant/WEEE registered		Yes / Yes / Yes
Weight	g / oz	10 / 0.353

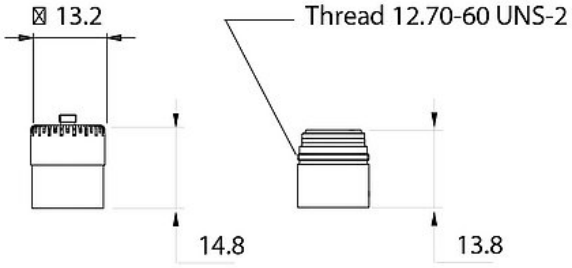
Sound Intensity Microphone Pair Type 40AI fulfills the phase requirements of a Class 1 Sound IntensityProbe in accordance with IEC International Standard 61043.

- Difference in phase response: From 50 Hz to 250 Hz < 0.05°
- From 250 Hz to 6.3 kHz < f/5000°
- Difference in amplitude response (normalised at 250 Hz):
  From 20 Hz to 1 kHz < 0.2 dB
  From 20 Hz to 5 kHz < 0.4 dB
- Difference in sensitivity at 250 Hz: < 1dBDifference in polarized capacity:< 0.6 pF

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

Dimensions

Dimensions in mm.



Optional items

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GRAS 26AK	1/2" Standard Preamplifier with Integrated Connector
GRAS 42AG	Multifunction Sound Calibrator
GRAS 42AP	Intelligent Pistonphone, Class 0
GRAS CA0001	Traceable Calibration of Microphone
GRAS CA2001	Accredited Calibration of Microphone

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 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 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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