

# Sound-intensity Microphone Pair Type 40BI

## *Product Data and Specifications*

### *Typical applications*

- *Sound-intensity measurements*
- *Sound-power measurements*
- *Sound-source location*
- *IEC 61043 Standard instrumentation*

The Sound-intensity Microphone Pair Type 40BI (Fig. 1) is a pair of ¼-inch free-field microphones with extremely well-controlled phase characteristics for use in Sound-intensity Probes. The Sound-intensity Microphone Pair Type 40BI consist of two phase-matched ¼-inch externally polarized condenser microphones, two Right-angle Adaptors Type RA0006, one Straight Adaptor RA0007 and solid spacers for 6 mm, 12 mm and 25 mm intensity probe configurations.

These intensity microphones are part of G.R.A.S.'s full range of condenser microphones. They are a recent generation of precision measurement microphones with improved performance and long term stability. Their design is based on more than 40 years of experience and utilizes the advantages of new high-tech materials and machining techniques. They comply with the requirements of the international standard IEC 1094 *Measurement Microphones, Part 4: Specifications for working standard microphones* and their mounting threads (5.7 mm - 60 UNS-2) are compatible with all the usual available makes of measurement-microphone preamplifiers.

The most important feature of a sound-intensity probe is to be able to measure the real part of a complex sound intensity in highly reactive sound fields as well as in sound fields with a high level of background noise. This ability depends largely on the phase responses of the pair of intensity microphones and, for high-quality pairs, the difference in



*Fig. 1 Sound-intensity Microphone Pair Type 40BI*

phase responses must be extremely small. The pair of microphones in the Type 40BI comply with the phase requirements for a Class 2 Sound Intensity Probe in accordance with international IEC standard 1043 *Electroacoustics - Instruments for the measurements of sound intensity - Measurement with pairs of pressure sensing microphones*.

These microphones have a uniquely-designed pressure equalization system that ensures a well-defined lower limiting frequency and an extremely low sensitivity to sound pressure at the pressure-equalization channel. This results in precise phase characteristics and allows the microphones to be phase calibrated in a single port calibrator such as the G.R.A.S. Sound-intensity Calibrator Type 51AB. The phase difference between the two microphones in a Type 40BI pair is better than  $0.25^\circ$  from 50 Hz to 250 Hz and better than  $f/1000$  Hz at frequencies above 250 Hz, where  $f$  is the frequency in Hz. This has been obtained while still maintaining the high sensitivity of each microphone.

The Type 40BI can be mounted in the G.R.A.S. Intensity Probe Type 50AI (instead of the pair of ½-inch matched microphones Type 40AK normally supplied - see separate data sheet) The Intensity

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Probe Type 50AI is available in various versions for connecting directly to various general purpose frequency analyzers as well as special sound intensity analyzers (see separate data sheet).

Non-corrosive, stainless materials are used in manufacturing these microphones to enable them to withstand rough handling and corrosive environments.

All G.R.A.S. microphones are guaranteed for 5 years and are individually checked and calibrated before leaving the factory. An individual calibration chart is supplied with each microphone.

## Specifications

<b>Open-circuit sensitivity:</b> at 250 Hz. . . . .	4 mV/Pa	<b>IEC 1094-4 type designation:</b>	WS3F
<b>Polarization voltage:</b>	200 V	<b>Intensity-probe configuration specifications</b>	Sound Intensity Microphone Pair Type 40BI fulfils the phase requirements of a Class 2 Sound Intensity Probe in accordance with IEC International Standard 61043.
<b>Free-field frequency response (as a pair in a probe):</b> According to IEC 61043 1993 Class 1 and IEC 60651 Type 1 from 20 Hz to 10 kHz		<b>Difference in phase response:</b>	From 20 Hz to 1000 Hz. . . . . < 0.2° From 1000 Hz to 10 kHz. . . . . < f[kHz] x 0.2°
<b>Free-field frequency response (single microphone):</b>		<b>Difference in amplitude response:</b> (normalised at 250 Hz)	From 20 Hz to 2 kHz. . . . . < 0.2 dB From 2 Hz to 10 kHz. . . . . < 0.3 dB
4 Hz - 70 kHz . . . . .	± 2.0 dB	<b>Difference in sensitivity at 250 Hz:</b>	< 2dB
10 Hz - 40 kHz . . . . .	± 1.0 dB	<b>Length:</b>	With protection grid . . . . . 10.5 mm
<b>Resonant frequency:</b>		<b>Diameter:</b>	With protection grid . . . . . 6.9 mm Without protection grid . . . . . 6.35 mm
90° phase shift . . . . .	100 kHz	<b>Thread:</b>	Protection grid . . . . . 6.35 mm - 60 UNS Preamplifier . . . . . 5.7 mm-60 UNS
<b>Nominal cartridge capacitance:</b>		<b>Weight:</b>	1.5 g
Polarized. . . . .	7 pF	<b>Accessories included:</b>	Solid spacers for microphone separation: 6 mm, 12 mm and 25 mm
<b>Upper limit of dynamic range:</b>		Adapters, ¼-inch:	
3 % distortion . . . . .	166 dB re. 20 µPa	Straight . . . . .	RA0007
<b>Lower limit of dynamic range:</b>		Right angled (2) . . . . .	RA0006
Thermal noise: . . . . .	30 dBA re. 20 µPa		
<b>Mean temperature coefficient:</b>			
-10 to +50 °C . . . . .	0.01 dB/°C		
<b>Static-pressure coefficient:</b>			
250 Hz at 25 °C . . . . .	-0.0008 dB/kPa		
<b>Influence of humidity (250 Hz):</b>			
< 0.1 dB (0 - 100 % RH)			
<b>Influence of axial vibrations, 1 m/s<sup>2</sup>:</b>			
59 dB re. 20 µ Pa			
<b>Effective front volume:</b>			
Nominal at 250 Hz . . . . .	0.6 mm <sup>3</sup>		
<b>Temperature range:</b>			
-40 ° to +150 °C			

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

**G.R.A.S.**  
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