PRODUCT DATA

Binaural Microphone Types 4101-B and 4965-B

Binaural Microphone Type 4101-B has been designed specifically for binaural sound recordings where testing on a human subject is preferred and/or where the use of the traditional head and torso simulator (HATS) method is precluded. These microphones are lightweight, do not affect normal hearing capabilities and, consequently, do not influence test results.

Type 4965-B consists of Type 4101-B together with a Bluetooth®-enabled headset for replaying recordings.

Uses and Features

Uses

- Binaural recordings near the entrance of the human ear canal
- Sound recordings where a vehicle driver wears the binaural microphone
- Binaural recordings where the influence of the test subject's head and torso is important
- Sound recordings of a helmeted test subject, such as a motorcycle driver
- Psychoacoustic experiments requiring binaural sound recording on human subjects
- Binaural recordings where the use of a traditional HATS, for example, Sound Quality Head and Torso Simulator Type 4100, is impossible
- Evaluation of headphones and earmuffs on a human subject
- Benchmarking vehicles for reference or processing into simple PULSE™ NVH Vehicle Simulator models
- Capturing vehicle behaviour during on-road evaluation or while using DTS On-Road Simulator
- Cabin noise measurements
- As general-purpose two-channel data recorders (replay with Type 4965-B only)

Features

- Easy-to-use with a lightweight and compact design
- Miniature, prepolarized condenser microphones that are positioned at the entrance to the ear canal and do not affect normal hearing capabilities
- Able to record two channels of sound
- Low equivalent noise level of 23 dB(A)
- Powered from constant current line drive (CCLD) input channel via BNC plug
- Free-field and diffuse-field correction data tables included and built into Sonoscout™ NVH Recorder
- Calibration adapter for use with Sound Calibrator Type 4231
- Transducer electronic data sheet (TEDS)
- Multi-country power supply
- Bluetooth-enabled headset for replay of recordings (Type 4965-B only)

Brüel & Kjær

The strength of binaural recording lies in capturing sound exactly as it is heard by the human test subject in order to recreate a 3D stereo sensation – thus allowing every listener the chance to play back the recording and experience sound, again and again, as if from the best seat in the house.

Binaural Microphone Types 4101-B and 4965-B are designed to be worn comfortably by a test subject for the purpose of making binaural recordings. Together, they provide a complete listening and playback solution for use with Brüel & Kjær's Sonoscout™ NVH Recorder. However, with CCLD conditioning, they can also be used in other sound recording scenarios.

Configurations

The binaural microphones are available in two configurations:

Type 4101-B Configuration

Type 4101-B is an in-ear microphone set designed with flexibility in mind. It comprises miniature condenser microphones that are mounted in moisture-resistant, gold-plated capsules.

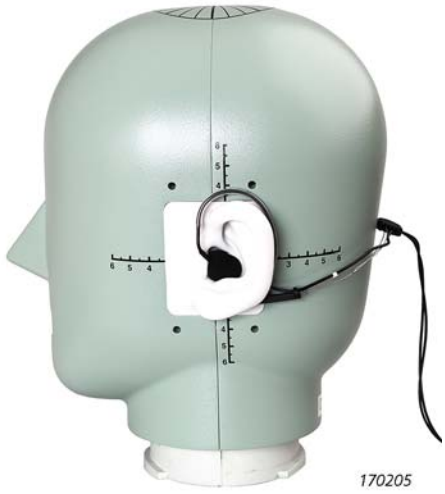

Fig. 1
Type 4101-B's microphone capsules rest in the concha of the ear, cushioned by foam windscreens. This makes for a comfortable fit inside a helmet

It comes with an ergonomic mount that wraps around the back of the user's head and ears. This mount can be easily adapted to suit any ear size and/or head shape for a secure yet comfortable fit. The individual microphone capsules sit in the concha of the ear, cushioned by the included foam windscreens (these are available in two different sizes to fit most users).

Compact and slim, Type 4101-B can be comfortably worn under a driver's or pilot's helmet. It features professional-grade cables and includes a cable clip that can be attached to the user's clothing to relieve pressure on both the cable's upper section and the user's ears, eliminating any unnecessary weight or stress from the remaining cable.

Type 4965-B Configuration

Type 4965-B includes Binaural Microphone Type 4101-B plus a pair of bone-conducting, Bluetooth-enabled headphones. This configuration is focused on NVH testing, where a person's perception of sound is investigated. The headphones are designed to be positioned next to the ears, thus giving the driver/passenger a perfect impression of the vehicle experience.

Fig. 2
Type 4965-B – which includes Binaural Microphone Type 4101-B and bone-conducting, Bluetooth-enabled headphones – for easy monitoring of captured data

As the headphones are separate from the microphone headset, they can be effortlessly removed to perform measurements while the test subject is wearing a helmet and/or is exposed to high gravitational forces.

Use of the headphones is optimal in combination with Sonoscout Type 3663. Measured sound data can be played back to the headphones via Bluetooth, which makes the user completely wire-independent from the measurement solution.

They are also ideal for obtaining data for use with PULSE™ NVH Vehicle Simulator Type 3644, as you can simultaneously record audio and vehicle performance data with Sonoscout and export it to an NVH Vehicle Simulator model for processing.

TEDS

The binaural microphones incorporate transducer electronic data sheets (TEDS). This means that the actual identity and loaded sensitivity of the left and right microphones are programmed into the TEDS memory, making set-up very easy and fool-proof.

Calibration

The microphones are selected based on matching frequency responses. Operating in the test subject's open ear canal, the binaural microphone set is calibrated with Head and Torso Simulator Type 4128, which also has an open ear canal.

In a diffuse sound field, the binaural microphone set is measured for its diffuse-field response mounted on Type 4128. The free-field response at zero-degree frontal incidence is measured in the same way but in an anechoic room. In both cases, the results are averaged over several mountings of the microphones on Type 4128.

The resulting data are included in Sonoscout. The free-field and diffuse-field responses, as well as the individual factory sensitivity calibration data, are available at www.bksv.com for download.

Fig. 3
Calibration of the binaural microphone using Adapter DP-0893 and Sound Calibrator Type 4231

In-use level calibration of the binaural microphone set is performed using the supplied calibration adapter together with Sound Calibrator Type 4231. Using the adapter, the output level from the calibrator will be increased by 0.35 dB ±0.2 dB.

Compliance with Standards

CE RCM China RoHS WEEE	The CE marking is the manufacturer's declaration that the product meets the requirements of the applicable EU directives RCM mark indicates compliance with applicable ACMA technical standards – that is, for telecommunications, radio communications, EMC and EME China RoHS mark indicates compliance with administrative measures on the control of pollution caused by electronic information products according to the Ministry of Information Industries of the People's Republic of China WEEE mark indicates compliance with the EU WEEE Directive
Safety	EN/IEC 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use ANSI/UL 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use
EMC Emission	EN/IEC 61000–6–3: Generic emission standard for residential, commercial and light industrial environments EN/IEC 61000–6–4: Generic emission standard for industrial environments CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits FCC Rules, Part 15: Complies with the limits for a Class B digital device
EMC Immunity	EN/IEC 61000–6–1: Generic standards – Immunity for residential, commercial and light industrial environments EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements RF field sensitivity: <1.2 mV **Note:** The above is only guaranteed using accessories listed in this document
Temperature	IEC 60068–2–1 & IEC 60068–2–2: Environmental Testing. Cold and Dry Heat Operating Temperature: Type 4101-B: –40 to +45 °C (–40 to +113 °F) Type 4965-B: 0 to +45 °C (+32 to +113 °F)
Humidity	IEC 60068–2–78: Damp Heat: 90% R.H. Non-condensing

Table 1 *Typical diffuse- and free-field response for Type 4101-B when mounted on HATS Type 4128 with incidence directly from the front*

1/3-octave (Hz)	Free-field (dB)	Diffuse-field (dB)
100	−0.24	0.37
125	−0.12	0.26
160	−0.03	0.41
200	0.11	0.56
250	0.30	0.65
315	0.54	0.88
400	0.90	1.86
500	1.06	1.34
630	0.90	1.79
800	1.82	1.41
1000	1.23	1.97
1250	1.76	2.89
1600	2.47	3.25
2000	4.83	4.49
2500	6.02	4.43
3150	5.50	3.89
4000	7.96	6.38
5000	9.31	8.69
6300	6.94	9.01
8000	−1.61	3.44
10000	−2.29	1.37
12500	−1.23	−0.20
16000	+1.58	−3.01
20000	−9.67	−2.26

Microphone

CARTRIDGE TYPE
Prepolarized, gold-plated condenser element with vertical diaphragm

FREQUENCY RANGE
20 Hz – 5 kHz, ±2 dB re 1 kHz, 3 dB soft boost at 5 – 20 kHz when measured in a free field for individual microphones at 0° incidence

SENSITIVITY
Nominally 20 mV/Pa ±3 dB at 1 kHz

EQUIVALENT NOISE LEVEL, A-WEIGHTED
Typically, 23 dB(A) re 20 µPa

TOTAL HARMONIC DISTORTION
<3% at 120 dB SPL (sine)

PREAMPLIFIER OUTPUT IMPEDANCE
30 – 40 ohms

CABLE DRIVE CAPABILITY
Up to 3 m (9.84 ft)

CABLE LENGTH
2.30 m (7.54 ft) from capsule to connector

WEIGHT
<10 g (0.35 oz) (down to cable clip)

Headphones (Type 4965-B only)

SPEAKER TYPE
Bone-conducting transducers

FREQUENCY RESPONSE
20 Hz – 20 kHz

BLUETOOTH VERSION
4.1

COMPATIBLE PROFILES
A2DP, AVRCP, HSP, HFP

WIRELESS RANGE
10 m (33 ft)

BATTERY
Rechargeable lithium ion

CONTINUOUS PLAY
6 hours

STANDBY TIME
10 days

CHARGING TIME
1.5 hours

WEIGHT
36 g (1.26 oz)

Ordering Information

Type 4101-B Binaural Microphone with TEDS
Includes the following accessories:
- DP-0893: Calibration Adapter
- 2 × JP-0145: UNF 10−32 to BNC adapter
- 2 × WA-1705: UNF 10−32 to SMB adapter
- 2 sets of foam windscreens
- Zip Case

Type 4965-B Binaural Microphone with TEDS and Headphones
Includes Type 4101-B plus the following items:
- HT-0025: Bluetooth-enabled bone-conducting headphones
- ZG-0473: Multi-country power supply for headphones
- Transport Box

Supported Brüel & Kjær Hardware

Type 4231 Sound Calibrator

Brüel & Kjær Services

TRACEABLE CALIBRATION
4101-CFF Binaural Microphone with TEDS, Factory Standard Calibration*

* Calibration of sensitivity at 1 kHz for both channels

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