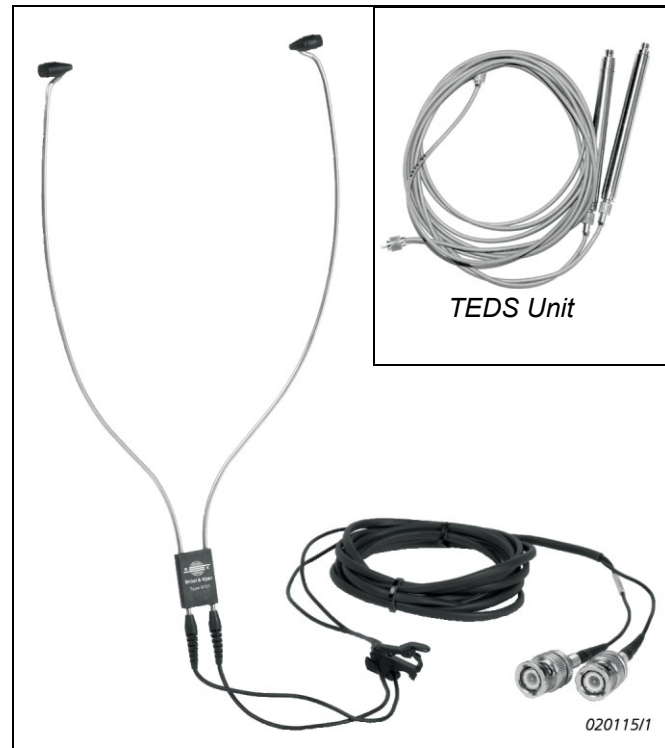


PRODUCT DATA

Binaural Microphone — Type 4101 Binaural Microphone with TEDS — Type 4101-A

Binaural Microphones Types 4101 and 4101-A are designed specifically for binaural sound recording where testing on a human subject is preferred, and/or the use of the traditional HATS method is precluded. The microphones are lightweight, do not affect normal hearing capabilities and consequently will not influence test results.



USES AND FEATURES

USES

- Binaural sound recording at the entrance to the human ear canal
- Sound recording where a vehicle's driver wears the Binaural Microphone
- Binaural recordings where the influence of the test-person's head and torso is important
- Sound recording of a helmeted person, for example, a motorcycle driver
- Psychoacoustic experiments requiring binaural sound recordings on human subjects
- Binaural recordings where the use of a traditional Head and Torso Simulator (HATS), for example, Sound Quality Head and Torso Simulator Type 4100, is impossible
- Evaluation of headphones and ear muffs on a human subject's head/ears

FEATURES

- Uses miniature, prepolarized condenser microphones that are positioned at the entrance to the ear canal and do not affect normal hearing capabilities
- Very lightweight: <10 g down to the cable clip with the remaining cable
- Connects to and powered from DeltaTron® input (3 to 10 mA) via a BNC plug
- Free-field and diffuse-field corrections available as an ASCII table and built into the PULSE™ Sound Quality Software Type 7698
- Low equivalent noise level of 23 dB(A)
- Calibration adaptor for Sound Calibrator Type 4231
- TEDS (Transducer Electronic Data Sheet) available in Type 4101-A

General

The Binaural Microphone's upper section comprises two 2 mm stainless-steel tubes. Because the microphone cables run through the inside of the tubes, either tube can be continuously bent without collapsing, and reshaped to suit test personnel. A miniature coaxial cable in one braid connects Microdot to BNC connectors. Additionally, a cable clip that can be attached to the test subject's clothing is supplied to relieve pressure on both the microphone's upper section and the test subject's ear canal, freeing them from supporting any unnecessary weight or stress exerted by the remaining cable.

The microphone capsules are specially selected versions of the well-proven miniature condenser microphones from DPA Microphones. They are mounted in a gold-plated capsule that is resistant to moisture.

Moulded rubber inserts and windshields, UA-2072, are included so that the ear can be cushioned when Type 4101 is worn under, for example, a crash helmet.

Fig. 1
Cushioning of ears using moulded rubber inserts

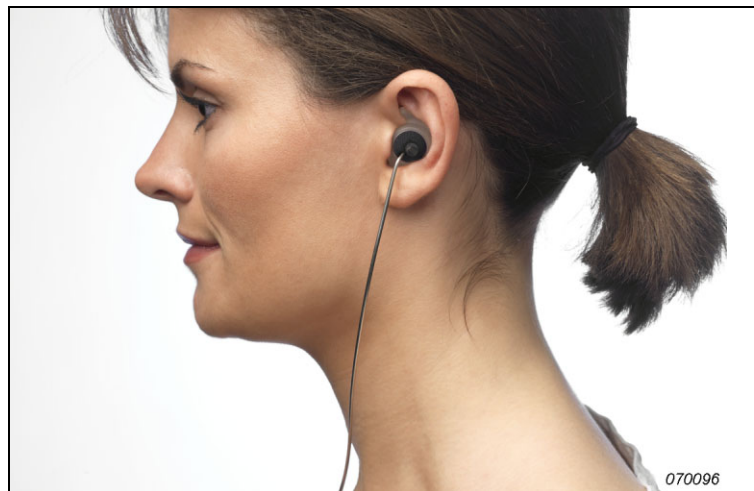
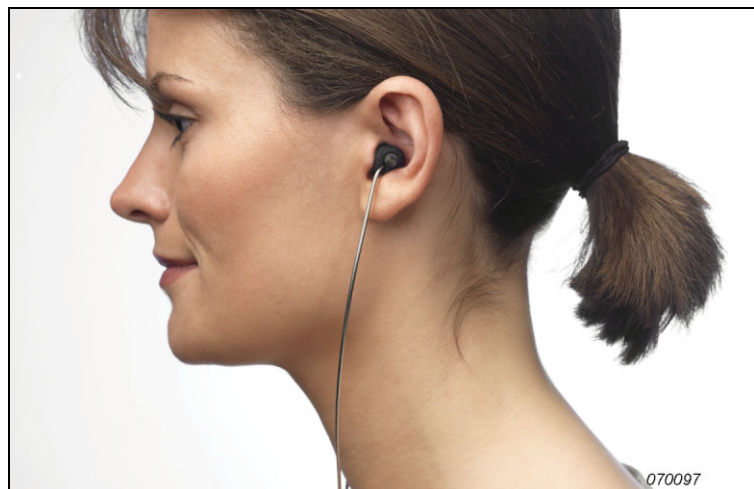


Fig. 2
Cushioning of ears using small windshields inverted



Calibration

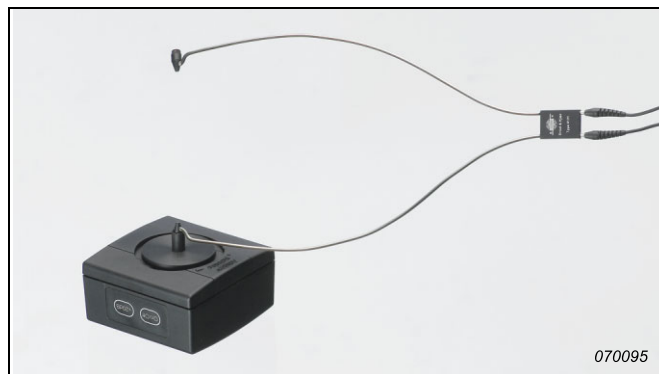
The microphones are selected based on matching frequency responses. Operating in the open ear canal of the test person, the Binaural Microphone is calibrated with Head and Torso Simulator Type 4128, which also has an open ear canal.

In a diffuse sound field, the Binaural Microphone is measured for its diffuse-field response mounted on HATS Type 4128. The free-field response at 0 degree frontal incidence is measured in the same way but in an anechoic room. In both cases, the results are averaged over several different mountings of the Binaural Microphone on HATS Type 4128.



The resulting data are shown in the table on page 4 and also included in PULSE Sound Quality Software Type 7698.

Level calibration of the Binaural Microphone when in use, is performed using the special calibration adaptor together with Sound Calibrator Type 4231. Using the adaptor, the output level from the calibrator will be increased by $0.35 \text{ dB} \pm 0.2 \text{ dB}$.

Fig. 3
Calibration of Type 4101 using Adaptor DP-0978 and Sound Calibrator Type 4231



Compliance with Standards

 	CE-mark indicates compliance with: EMC Directive and Low Voltage Directive. C-Tick mark indicates compliance with the EMC requirements of Australia and New Zealand.
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: $< 1.2 \text{ mV}$. Note: The above is only guaranteed using accessories listed in this Product Data sheet.
Temperature	IEC 60068-2-1 & IEC 60068-2-2: Environmental Testing. Cold and Dry Heat. Operating Temperature: -10 to $+45^\circ\text{C}$ (14 to 113°F) Storage Temperature: -20 to $+70^\circ\text{C}$ (-4 to $+158^\circ\text{F}$).
Humidity	IEC 60068-2-78: Damp Heat: 90% R.H. Non-condensing

Specifications – Binaural Microphone Type 4101, 4101-A

Cartridge Type: Prepolarized, gold-plated condenser element with vertical diaphragm

Microphone Size: 12.7 mm length, 5.4 mm capsule diameter

Frequency Range: 20 Hz – 8 kHz, ± 2 dB re 1 kHz, 3 dB soft boost at 8 – 20 kHz when measured in 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 μ Pa

Maximum Sound Pressure Level: 134 dB SPL before damage

Total Harmonic Distortion: <3% at 114 dB SPL (sine)

Preamplifier Output Impedance: 30 – 40 ohms

Cable Drive Capability: Up to 3 m

Cable Length: 2.30 m from capsule to connector

Weight: <10 g (down to cable clip)

Typical diffuse- and free-field response for Type 4101 when mounted on Head and Torso Simulator Type 4128 with incidence directly from the front

1/3-octave (Hz)	Free Field (dB)	Diffuse Field (dB)	1/3-octave (Hz)	Free Field (dB)	Diffuse Field (dB)
100	-3.00	0.20	1600	-0.94	5.08
125	-2.90	0.80	2000	1.50	5.62
160	-3.20	1.28	2500	3.64	5.26
200	-2.50	1.13	3150	3.95	5.34
250	-2.48	1.71	4000	6.58	7.86
315	-2.40	1.82	5000	6.66	9.11
400	-1.20	2.02	6300	2.40	7.68
500	-1.35	2.58	8000	-7.70	2.94
630	-0.71	3.39	10000	1.00	2.76
800	-0.25	3.31	12500	6.70	3.53
1000	0.00	3.63	16000	1.80	2.59
1250	-1.50	4.10	20000	0.30	3.34

Ordering Information

Type 4101 Binaural Microphone

Type 4101-A Binaural Microphone with TEDS

4101-MU1 Upgrade Binaural Microphone Type 4101 to Binaural Microphone with TEDS Type 4101-A

• 2×AO-0463-D-030: PVC insulated flexible cable, 10–32 UNF to 10-32 UNF connector, 3 m (10 ft.) 70°C (158°F)

Included Accessories

TYPE 4101

- DP-0978: Calibration Adaptor for Binaural Microphone Type 4101
- 2×JP-0194: Input Adaptor with series resistor, BNC to 10–32 UNF Microdot socket
- UA-2072: Microphone Holder and Windshields for Type 4101

TYPE 4101-A

- 2×ZZ-0245: TEDS Unit
- Type 4101: Binaural Microphone (and accessories)

Service Products

ACCREDITED CALIBRATION

4101-CAF Accredited Calibration

4101 A-CAF Accredited Calibration

TRACEABLE CALIBRATION

4101-A-CFF Binaural Microphone, Factory Standard Calibration^a

4101-A-CFF Binaural Microphone with TEDS, Factory Standard Calibration^a

a. Calibration of sensitivity at 1 kHz for both channels

Brüel & Kjær reserves the right to change specifications and accessories without notice

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