USES
- Recording vehicle noise for sound quality evaluation and testing
- Recording noise from domestic appliances, office equipment, etc., for sound quality optimisation
- Recording noise from sub-suppliers’ products and components to evaluate and optimise their sound quality
- Evaluation of headphones, and hearing protectors where a blocked ear canal is desired
- Binaural sound and music recording

FEATURES
- Directivity optimised for sound-image localisation
- Type 4100 includes Falcon Range® Preamplifiers Type 2669 L with CIC facility
- Type 4100 D includes DeltaTron® Preamplifiers Type 2671
- High sensitivity, low noise, ½” Falcon microphones
- IEEE P1451.4-capable transducers with TEDS (Transducer Electronic Data Sheet)
- Manikin with surfaces and pinnae modelling the geometry of the average adult head and torso
- ITU-T compliance with the acoustic requirements of ITU–T Rec. P.58, IEC 959 and ANSI S3 36–1985, except for exclusion of the ear canal
- Adjustable neck angle
- Light and robust
- Accredited calibration available

General
Sound Quality Head and Torso Simulators Types 4100 and 4100D are manikins designed for sound quality testing.
Two microphones, positioned at the entrances to the ear canals on the manikin’s head, simulate the spatial separation from ear to ear of a human head and ensure a signal that includes the interference patterns caused by the head and upper body. This gives an extremely accurate three-dimensional recording.
Two moulded-silicone pinna simulators sit around the microphones to provide directivity patterns similar to the human ear.
The simulator has a sound-dampening fabric cover which slips easily over the manikin’s neck. This assists in changing the reflections from the body and shoulders to obtain the correct directivity.

The position of the head can be adjusted by turning the neck ring so that the head looks straight forward or slightly down at an angle of 17°.
Microphones are easily installed or removed by screwing or unscrewing them from the ear cavities.
Types 4100 and 4100D contain IEEE P1451.4-capable transducers with standardised Transducer Electronic Data Sheets (TEDS). This feature allows automatic front-end and analyzer setup, based on information stored in the transducer. This information includes, for example, sensitivity, serial number, manufacturer and calibration date.

Sound Quality
The sound quality of the noise from a product, as perceived by a human being, is an increasingly important factor when assessing the total quality of the product.
This applies to all forms of transport: vehicles, aircraft, trains and ships. Household and office machinery products
are also increasingly subject to the optimisation of their sound quality.

Sub-suppliers of products and components to the above-mentioned industries are often required to include an acceptable sound quality as part of the product specifications.

**Subjective Listening Tests**

The final evaluation of the sound quality of a product is normally made using a selected group of people – a jury in a listening test.

To have the jury listen to the sound in reality, for example each jury member driving a car and then reporting on the sound quality, is very time consuming and costly. To overcome this, Type 4100 can be used to make a high-quality binaural recording of the product’s noise on the hard disk of a portable PC with high-quality sound card. This can then be simultaneously presented to all members of the jury off-site.

### Specifications – Type 4100

**Microphones and Preamplifiers**

Two Type 4100—002 microphone/preamplifier assemblies with built-in TEDS, each comprising a ½” Falcon Range Microphone Type 4100* placed in the bottom of the concha, and Falcon series Preamplifier Type 2669† with charge injection calibration (CIC) facility and LEMO connector

Microphone Sensitivity: 50 mV/Pa. Individually calibrated

Upper Limit of Dynamic Range: 148 dB SPL at 3% distortion

Max. Sound Pressure Level: 159 dB peak with Preamplifier Type 2669 and mains driven power supplies

Preamp. Lower Limiting Frequency: <2 Hz (-3 dB)

### Specifications – Type 4100D

**Microphones and Preamplifiers**

Two Type 4100D—002 microphone/preamplifier assemblies with built-in TEDS, each comprising a ½” Falcon Range Microphone Type 4100D* placed in the bottom of the concha and a DeltaTron Preamplifier Type 2671† with BNC connector

Microphone Sensitivity: 50 mV/Pa. Individually calibrated

Upper Limit of Dynamic Range: 146 dB SPL at 3% distortion

Max. Sound Pressure Level: 158 dB peak with DeltaTron Preamplifier Type 2671

Preamp. Lower Limiting Frequency: <12 Hz (-3 dB)

* See separate Product Data for details

### Ordering Information

Types 4100 and 4100D Sound Quality Head and Torso Simulator

Include the following accessories:

- BC0200: Calibration Chart
- DP0887: Calibration Adaptor
- UA1043: Support Leg
- UA1052: Handle
- UC5290: Tripod Mounting Adaptor

### Calibrations Options

- CAL/4100: Accredited Initial Calibration
- CAL/4100 D: Accredited Initial Calibration
- CAF/4100: Accredited Calibration
- CAF/4100 D: Accredited Calibration
- TCF/4100: Conformance Test
- TCF/4100 D: Conformance Test

However, to avoid bias errors in this process, it is important that the acoustic properties of the recording and playback are as accurate as possible. Types 4100 and 4100D have therefore been designed to have a frequency response to sounds coming from all directions which closely approximates the direction-dependent human response, and to have inter-aural time differences very close to those of the average person.

### System for Sound Quality Optimisation

Quite often, the first evaluation of the sound quality of a product, as perceived by the jury, is not satisfactory. Therefore, the recorded signals from Types 4100 and 4100D can be modified using a wide range of time/frequency domain editing techniques using a sound quality software program and a PC. The modified signals can then be compared with the original, by the jury, in a listening test. If the modified signal is preferred, information on the changes in the noise can be used by the product designer to obtain – by physical changes – improved sound quality.

### Common Specifications – Types 4100, 4100D

**Pinnna Simulator**

Dimensions similar to those specified in ITU-T Rec. P.58, IEC 959 and ANSI S3.6-1985, except for the ear canal extensions

**Head and Torso Shapes**

The main dimensions comply with the dimensional requirements of ITU-T Rec. P.58 and the reports from IEC 959 and ANSI S3.6-1985

**Shoulder Damping Fabric**

The shoulders, chest and back are covered with a damping fabric to adjust diffraction. The fabric has a minimum of 10% absorption in the range of 100 Hz to 20 kHz

**Left/Right Ear Tracking**

±1 dB up to 5 kHz

±3 dB up to 8 kHz

**Calibration**

Sensitivity calibration can be made using a calibrator or pistonphone with Calibration Adaptor DP 0887

**Dimensions and Weight**

**Head Height:** 700 mm (27.6")

**Torso:** 480 x 440 x 210 mm (18.9 x 17.3 x 8.3")

**Weight:** 7.9 kg (17.4 lb.)

*CE* mark indicates compliance with EMC Directive and Low Voltage Directive. (See also Microphone and Preamplifier Product Data)

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