PRODUCT DATA

Sound Quality Head and Torso Simulator — Types 4100 and 4100 D

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 4100 D 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 4100 D 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 a 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.

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 4100 D 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 4100 D 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.

Specifications – Type 4100

MICROPHONES AND PREAMPLIFIERS
Two Type 4190–L–002 microphone/preamplifier assemblies with built-in TEDS, each comprising a ½″ Falcon Range Microphone Type 4190* placed in the bottom of the concha, and Falcon series Preamplifier Type 2669 L* 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
138 dB peak with Preamplifier Type 2669 and battery power supplies
Preamp. Lower Limiting Frequency: <2 Hz (–3 dB)

Specifications – Type 4100 D

MICROPHONES AND PREAMPLIFIERS
Two Type 4189–A–002 microphone/preamplifier assemblies with built-in TEDS, each comprising a ½″ Falcon Range Microphone Type 4189* 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: 138 dB peak with DeltaTron Preamplifier Type 2671
Preamp. Lower Limiting Frequency: <12 Hz (–3 dB)

* See separate Product Data for details

Common Specifications – Types 4100, 4100 D

PINNA SIMULATOR
Dimensions similar to those specified in ITU–T Rec. P.58, IEC 959 and ANSI S3, 36–1985, 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 36–1985

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: 480×440×210 mm (18.9×17.3×8.3″)
Weight: 7.9 kg (17.4 lb.)

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

Ordering Information

Types 4100 and 4100 D Sound Quality Head and Torso Simulator
Include the following accessories:

BC 0200:	Calibration Chart
DP 0887:	Calibration Adaptor
UA 1043:	Support Leg
UA 1052:	Handle
UC 5290:	Tripod Mounting Adaptor

CALIBRATION OPTIONS

CAI 4100	Accredited Initial Calibration
CAI 4100 D	Accredited Initial Calibration
CAF 4100	Accredited Calibration
CAF 4100 D	Accredited Calibration
TCF 4100	Conformance Test
TCF 4100 D	Conformance Test

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