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**Data Sheet**

**HMS II.3-33**
(Code 1230.1)

**HMS II.3-34**
(Code 1230.2)

**HEAD Measurement System with Ear Simulator and Artificial Mouth**

**Overview**

HMS II.3 is an Artificial Head Measurement System for measuring close-to-the-ear transducers in handsets, headsets, headphones, hearing protectors and hearing aids. By realistically replicating all acoustically relevant structures of the human anatomy, HMS II.3 also allows measurements of far-to-the-ear transducers such as hands-free equipment.

HMS II.3 is equipped with an impedance simulator in the right ear and an artificial mouth, both meeting the requirements in the ITU-T Recommendations P.57 and P.58. The mouth reproduces the complete spectrum of human voice, allowing super-wideband as well as fullband measurements in sending direction.

HMS II.3 is available in two variants: HMS II.3-33 with pinna simulator type 3.3 and HMS II.3-34 with pinna simulator type 3.4. Both variants support a wide variety of accessories.

**Description**

HMS II.3 is ideally suited for all measurements in the field of telecommunications under realistic conditions. It provides a recording and speech simulation system and thus supports measurements in sending and receiving direction. HMS II.3 has been designed for testing all kinds of transducers in handsets, headsets, hands-free devices, voice-operated equipment, hearing aids and hearing protectors.

The artificial mouth of HMS II.3 corresponds to ITU-T P.58 in its free-field characteristics, including diffraction and reflection at the shoulders and torso. Thus, it realistically reproduces the acoustic behavior of a test person. HMS II.3 also meets ITU-T P.58 regarding its geometrical dimensions. Its diffraction and reflection characteristics are comparable to those of a listening person.

HMS II.3 is available in two variants: HMS II.3-33 is equipped with the anatomically shaped pinna simulator type 3.3 according to ITU-T Recommendation P.57. This pinna simulator is recommended when the anatomy of the human ear plays an important part, e.g. for intra-concha headsets or hearing aids. HMS II.3-34 is fitted with the simplified pinna simulator type 3.4 according to ITU-T Recommendation P.57. This pinna allows the use of different ear canals.

The right ear comes equipped with an IEC 60318-4 (2010-01)-compliant impedance simulator. For binaural measurements, the left ear can be equipped likewise. If required, both ear simulators can also be retrofitted with the respective other type of pinna.

**Playback and recording**

For measurements, HMS II.3 connects to the communication analysis system ACQUA via the hardware platform labCORE. In combination with the necessary hardware modules including coreBEQ, individual equalization of binaural acoustical signals is possible. This includes support for various equalization variants, e.g. as requested in ITU-T Recommendation P.581. Alternatively to labCORE, the Binaural Equalizer BEQ II.1 can be used.

Measured signals can be recorded by a computer in real time. The individual settings made for each recording can be stored alongside. This allows the system to automatically adjust the output accordingly during playback. The artificial mouth is powered by the labCORE’s optional coreOUT-Amp2 module. ACQUA allows comfortable and precise equalization of the mouth. The two-way design of the mouth provides an excellent unequalized frequency response and a wide frequency range, making it ideally suited for super-wideband and fullband measurements.

In conjunction with the optional power box labPWR I.2 for labCORE, mobile recording and playback with the HMS II.3 is also possible (e.g. in vehicles).

**Accessories**

For measurements of handsets with HMS II.3, the artificial head allows mounting of the optional Handset Positioner HHP IV or HHP III.1. HHP IV is fully motorized and thus remotely controllable as well as fully automatable via ACQUA. HHP III.1 only allows manual positioning of the handset. Both Handset Positioners allow precise positioning of any handset at various locations and definable application forces to the pinna, ensuring meaningful and repeatable measurement results.

The supplied Torso Box HTB VI can house additional electronics accessories. Its compact design allows easy handling and transportation of the complete system, e.g. for mobile applications.
Delivery items

<table>
<thead>
<tr>
<th>HMS II.3-33 (Code 1230.1)</th>
<th>HMS II.3-34 (Code 1230.2)</th>
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</thead>
<tbody>
<tr>
<td>HMS II.3 (Code: see above)</td>
<td>Head and torso simulator</td>
</tr>
<tr>
<td>HEL/HER IV.2 (Code 1381/1382)</td>
<td>Anatomically shaped pinna simulator type 3.3 (left/right) according to ITU-T P.57</td>
</tr>
<tr>
<td>HEL/HER III.1 (Code 1248/1249)</td>
<td>Simplified pinna simulator type 3.4 (left/right) according to ITU-T P.57</td>
</tr>
<tr>
<td>ECS I.0 (Code 1357.1)</td>
<td>Ear canal simulator for pinna type 3.4, cylindrical</td>
</tr>
<tr>
<td>HIS R (Code 1232)</td>
<td>Impedance simulator for right ear including microphone according to ITU-T P.58</td>
</tr>
<tr>
<td>HTB VI (Code 1574)</td>
<td>HEAD torso box for portable artificial head measurements</td>
</tr>
<tr>
<td>CSB II (Code 9849)</td>
<td>Adapter Speakon Male &lt;-&gt; Banana plug</td>
</tr>
<tr>
<td>Accessories case HCC-HMS (Code 1641).</td>
<td>containing: microphone holder with 1/2” clip-on adapter, MRP pointer, lip ring, calibration adapter, 2.5 mm and 3 mm Allen keys, ear canal key</td>
</tr>
</tbody>
</table>

Manual

Key features

- Acoustic characteristics according to ITU-T P.58
- Award-winning design
- Mobile use in conjunction with portable hardware

Receiving direction (ear):

- Supports anatomically shaped pinna simulator type 3.3 and the simplified type 3.4 according to ITU-T P.57
- Individual digital equalization in ACQUA
- Ear simulator according to IEC 60318-4 (2010-01) (right ear)
- High quality microphone with low inherent noise floor

Sending direction (mouth):

- Artificial mouth according to ITU-T P.58
- Digital equalization via ACQUA
- Two-way-design with wide frequency range for super-wideband and fullband measurements

Applications

- Measurement of telephone terminal equipment
- Measurement of hands-free devices
- Measurement of headsets
- Testing of telephones
- Testing of active and passive hearing protection systems
- Testing of hearing aids
- Quality control

General Requirements

Hardware:

- **labCORE (Code 7700)**, modular multi-channel hardware platform
- **labCORE modules**
  - **coreBUS (Code 7710)**, I/O bus mainboard
  - **coreIN-Mic4 (Code 7730)**, Input module, microphone (4 channels), for receiving direction
  - **coreOUT-Amp2 (Code 7720)**, Output module, power amplifier (2 channels), for sending direction
  - **BEQ II.1 (Code 1347)**, Digital binaural equalizer (extended version with USB, pulse in, analog out), alternatively to labCORE

Software:

- **ACQUA (Code 6810)**, Basic analysis software, full-license version

HMS II.3 with optional Motorized Handset Positioner HHP IV
Technical Data

Receiving characteristics (ear)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission range</td>
<td>3 Hz – 20000 Hz</td>
</tr>
<tr>
<td>Dynamic range</td>
<td>&gt; 110 dB</td>
</tr>
<tr>
<td>Frequency response</td>
<td>According to ITU-T P58</td>
</tr>
<tr>
<td>Directivity characteristics</td>
<td>According to ITU-T P58</td>
</tr>
</tbody>
</table>

Sending direction (mouth)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission range</td>
<td>approximately 50 Hz – 20000 Hz</td>
</tr>
<tr>
<td>Power limit</td>
<td>max. 20 W (sine)</td>
</tr>
<tr>
<td></td>
<td>max. 50 W (music)</td>
</tr>
<tr>
<td></td>
<td>(maximum power is electrically limited upwards of 6 kHz)</td>
</tr>
<tr>
<td>Impedance</td>
<td>4 Ω</td>
</tr>
<tr>
<td>Distortion factor</td>
<td>Exceeds ITU-T P58</td>
</tr>
</tbody>
</table>

Environmental conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Operating temperature range</td>
<td>0°C – 50 °C, 32°F – 122°F</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-20°C – 70°C, -4°F – 158°F</td>
</tr>
</tbody>
</table>

Dimensions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>Overall dimensions (W x H x D)</td>
<td>approx. 450 x 400 x 180 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>approximately 5.4 kg</td>
</tr>
</tbody>
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Options

- **HIS L (Code 1231)**, Impedance simulator for left ear including microphone
- **HEL/HER III.1 (Code 1248/1249)**, Anatomically shaped pinna type 3.3 (left/right) according to ITU-T P57
- **HEL/HER IV.2 (Code 1381/1382)**, Simplified pinna type 3.4 (left/right) according to ITU-T P57
- **ECS I.1-I.3 (Code 1357.2-1357.4)**, Ear canal simulation small/medium/large for Pinna type 3.4
- **HHP IV (Code 1406)**, Motorized handset positioner according to IEEE 269 and ITU-T P64
- **HHP III.1 (Code 1403)**, Handset positioner according to IEEE 269 and ITU-T P64
- **HWS (Code 1960)**, Windshield for outdoor recording

- **HMT III (Code 1961)**, Height-adjustable tripod for HMS
- **HSC IV (Code 1524)**, HMS carrying case
- **TLP (Code 1967)**, Triaxial laser pointer for HMS II.3 positioning