Technical Specifications

Callisto™
Portable Audiometry,
REM & HIT
## Included and Optional Parts for the Callisto™ AC440 software

### Standard Parts for the Callisto™ Unit:
- Callisto™ Unit
- Callisto™ Suite DVD, incl. Instructions for use and Quick Guides.
- Callisto Carrying Bag
- Callisto Foam Insert (standard bag)
- Standard USB Cable (2m)
- Mouse Pad

### Optional Parts for the Callisto™ Unit
- Wheeled Carrying Case
- Callisto™ Foam Insert (optional bag with wheels)

### OtoAccess™ V1.01 Database CD, Complete

### AC440 Standard Parts
- DD45 or TDH 39 Audiometric Headset
- MTH400 Monitor Headset
- B71 Bone Conductor
- APS3 Patient response button

### AC440 Optional Parts
- TDH39 Audiometric Headset
- HDA300 Audiometric Headset 30° plugs
- Eartone 3A Insert earphones
- Eartone 5A Insert earphones
- IP30 Insert earphones
- B71 Bone Conductor
- B81 Bone Conductor
- Talk Back Microphone
- Edifier – Loudspeaker + wire
- SP85A Loudspeaker
- SP90A Loudspeaker

### Special Tests:
- High Frequency audiometry (HF440)
- Multi Frequency module (MF440)
- Speech from hard-drive (SFH440)
- SISI test
- Master Hearing Aid (MHA440),
- Hearing Loss Simulator (HLS440)
- Loudness Scaling (LS440)
- QuickSIN
- TEN test

### REM440 Standard Parts
- IHM60 In-situ Headset (kit)
- Probe Tubes 36 pcs
- Edifier Loudspeaker + Wire

### REM440 Optional Parts
- Extra Edifier Loudspeaker + Wire
- Callisto™ Coupler Base Kit which includes:
  - Coupler Base
  - Coupler Box
  - Reference Microphone
  - 2cc Coupler
  - 1/2 Microphone
  - BTE Adaptor with O
  - ITE Adaptor with O
  - Body Adaptor with O
  - BTE Tubing 26,5mm for BTE adaptor
  - SPL80 In-situ Probe Tip-set + Coupler Adaptor
  - Coupler Seal Wax

### HIT440 Standard Parts:
- TBS10 Test Box
- 2cc coupler with microphone and adaptors for ITE, BTE and Body Style HA
- Coupler seal wax
- Reference microphone

### HIT440 Optional parts:
- Couplers 1.2CC and 0.6CC: ITE, BTE, Ear simulator
- Calibration adaptor

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1) Note patient contact parts for single use.
General Technical Specifications

Callisto™ General Technical Specifications

Medical CE-mark: The CE-mark indicates that Interacoustics A/S meets the requirements of Annex II of the Medical Device Directive 93/42/EEC. Approval of the quality system is made by TÜV – identification no. 0123.

Standards:

Safety: IEC/ES 60601-1, 2005
CAN/CSA-C22.2 No. 601.1-M90
UL 60601-1:2003
Class I, Type B
IEC 60601-1-1 2000

EMC: IEC 60601-1-2 :2007

Audiometer Tone:
IEC 60465-1 2001/ANSI S3.6-2010, Type 1 Tone audiometer
IEC 60465-4 1994/ANSI S3.6-2010, High frequency audiometer

Audiometer Speech:
IEC 60465-2 1997/ANSI S3.6-2010 Type A or A-E, STAF-1996, Norway. Speech audiometer

Audiometer Calibration:
AC: DD45 PTB/DTU report 2009
TDH39: ISO 389-1 1998, ANSI S3.6-2010
HDA200: ISO 389-5 2006, ANSI S3.6-2010
E.A.R Tone 3A/5A: ISO 389-2 1994, ANSI S3.6-2010
BC: B71: ISO 389-3 1994, ANSI S3.6-2010
FF: ISO 389-7 2005, ANSI S3.6-2010
HF: ISO 389-8 2004, ANSI S3.6-2010
Effective masking: ISO 389-4 1994, ANSI S3.6-2010

Hearing Aid Analyzer:

Real ear measurement:

Specifications Callisto™ Hardware:

PC requirements: 1.6 GHz Dual core CPU or better (Intel recommended)
1GB RAM or more. (Windows 8: 1GB 32-bit; 2GB 64-bit)
Hard drive with min 20 GB of free space.
Minimum display resolution of 1024x768 pixels (1280x1024 or higher recommended)
DirectX 9 graphics with WDDM 1.0 or higher. (Intel/Nvidia recommended)
One or more USB ports, version 1.1 or higher.
DVD-Rom drive.

Supported Systems:
Windows® XP (SP2 or later and compatible),
Windows® VISTA
Windows® 7 (32 and 64 bit)
Windows® 8 (32 and 64 bit)

Available modules: Callisto™ Suite AUD, REM.

Database: OtoAccess™ and Noah-compatible office systems or later releases

Computer Communication: USB interface, compatible with USB1.1 or later.

Construction: Plastic cabinet.

Power: USB-powered with an internal “power boost” rechargeable battery and load balancer.
<table>
<thead>
<tr>
<th>Battery</th>
<th>NP120 3.7V 1700 mAH battery lithium ion 53x35.2x11.3.2 to 4.2V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation environment</td>
<td></td>
</tr>
<tr>
<td>Rel. Humidity:</td>
<td>30 – 90%</td>
</tr>
<tr>
<td>Temperature:</td>
<td>15-35°C</td>
</tr>
<tr>
<td>Ambient Pressure:</td>
<td>98 kPa – 104 kPa</td>
</tr>
<tr>
<td>Transport temperature:</td>
<td>-20-50 °C</td>
</tr>
<tr>
<td>Storage temperature:</td>
<td>0-50 °C</td>
</tr>
<tr>
<td>Humidity transportation &amp;</td>
<td>10% to 95% RH. Non condensing</td>
</tr>
<tr>
<td>storage:</td>
<td></td>
</tr>
<tr>
<td>Dimensions:</td>
<td>212 x 121 x 44 mm / 8.3 x 4.8 x 1.7 inches</td>
</tr>
<tr>
<td>Weight:</td>
<td>1.25 lbs (822g / 1.81 lbs with cradle)</td>
</tr>
</tbody>
</table>
## Technical Specifications of the AC440 Software

### Medical CE-mark:

The CE-mark indicates that Interacoustics A/S meets the requirements of Annex II of the Medical Device Directive 93/42/EEC. Approval of the quality system is made by TÜV – identification no. 0123.

### Audiometer Standards:

- **Tone:** IEC60645-1/ANSI S3.6 Type 1
- **Speech:** IEC60645-2/ANSI S3.6 Type A or A-E

### Transducers & Calibration:

Calibration information and instructions are located in the Service manual. Check the accompanying Appendix for RETSPL levels for transducers.

<table>
<thead>
<tr>
<th>Transducer Type</th>
<th>Calibration Report</th>
<th>Static Force</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD45 Air Conduction</td>
<td>PTB/DU report 2009</td>
<td>4.5N ±0.5N</td>
<td>1/2-1/24 octave</td>
</tr>
<tr>
<td>TDH39 Air Conduction</td>
<td>ISO 389-1 1998, ANSI S3.6-2010</td>
<td>4.5N ±0.5N</td>
<td>1/2-1/24 octave</td>
</tr>
<tr>
<td>HDA300 Air Conduction</td>
<td>ISO 389-8 2006, ANSI S3.6-2010</td>
<td>8.8N ±0.5N</td>
<td>1/2-1/24 octave</td>
</tr>
<tr>
<td>HDA280 Air Conduction</td>
<td>PTB report 2004</td>
<td>5N ±0.5N</td>
<td>1/2-1/24 octave</td>
</tr>
<tr>
<td>E.A.R Tone 3A/5A Air Conduction</td>
<td>ISO 389-2 1994, ANSI S3.6-2010</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP30 Air Conduction</td>
<td>ISO 389-2 1994, ANSI S3.6-2010 DES-2361</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CIR 33 Air Conduction</td>
<td>ISO 389-2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transducer Type</th>
<th>Calibration Report</th>
<th>Static Force</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>B71 Bone Conduction</td>
<td>ISO 389-3 1994, ANSI S3.6-2010</td>
<td>5.4N ±0.5N</td>
<td>1/2-1/24 octave</td>
</tr>
<tr>
<td>B81 Bone Conduction</td>
<td>ISO 389-3 1994, ANSI S3.6-2010</td>
<td>5.4N ±0.5N</td>
<td>1/2-1/24 octave</td>
</tr>
</tbody>
</table>

### Effective masking

- **ISO 389-4 1994, ANSI S3.6-2010**

### Patient Response switch:

- Hand held push button.

### Patient communication:

- Talk Forward and Talk Back.

### Monitor:

- Output through external earphone or speaker.

### Stimuli:

- Pure tone, Wable tone, NB, SN, WN, TEN noise
- **Tone:** 125-20000Hz separated in two ranges 125-8000Hz and 8000-20000Hz. Resolution 1/2-1/24 octave.
- **Warble Tone:** 1-10 Hz sine +/- 5% modulation
- **Wave file:** 44100Hz sampling, 16 bits, 2 channels

### Masking

- Automatic selection of narrow band noise (or white noise) for tone presentation and speech noise for speech presentation.
- **Narrow band noise:** IEC 60645-1:2001, 5/12 Octave filter with the same centre frequency resolution as pure Tone.
- **White noise:** 80-20000Hz measured with constant bandwidth
- **Speech Noise:** IEC 60645-1993 125-6000Hz falling 12dB/octave above 1KHz +/-5dB

### Presentation

- Manual or Reverse, Single or multiple pulses, pulse time adjustable from 200mS-5000mS in 50mS steps. Simultaneous or alternating.

### Intensity

- Check the accompanying Appendix for maximum output levels

### Steps

- Available Intensity Steps is 1, 2 or 5dB

### Accuracy

- Sound pressure levels: ± 2 dB.
- Vibration force levels: ± 5 dB.

### Extended range function

- If not activated, the Air Conduction output will be limited to 20 dB below maximum output.

### Frequency

- **Range:** 125Hz to 8kHz (Optional High Frequency: 8 kHz to 20 kHz)
- **Accuracy:** Better than ± 1 %.

### Distortion (THD)

- Sound pressure levels: below 1.5 %
- Vibration force levels: below 3 %.

### Signal Indicator(VU)

- Time weighting: 350mS
- Dynamic range: -20dB to +3dB
- Rectifier characteristics: RMS
- Selectable inputs are provide with an attenuator by which the level can be adjusted to the indicator reference position(0dB)

### Storing capability:

- Tone audiogram: dB HL, MCL, UCL, Tinnitus, R+L
- Speech Audiogram: WR1, WR2, WR3, MCL, UCL, Aided, Unaided, Binaural, R+L.

### Compatible Software:

- Noah 4, Noah 3.7, OtoAccess™ and XML compatible
### Technical Specifications - REM440 Software

<table>
<thead>
<tr>
<th>Medical CE-mark:</th>
<th>The CE-mark indicates that Interacoustics A/S meets the requirements of Annex II of the Medical Device Directive 93/42/EEC. Approval of the quality system is made by TÜV – identification no. 0123.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Ear Measurement Standards:</td>
<td>IEC 61669, ISO 12124, ANSI S3.46.</td>
</tr>
<tr>
<td>Stimuli:</td>
<td>Warble Tone, Pure Tone, Random noise, Pseudo random noise, Band limited white noise, Chirp, ICRA, Real Speech, any other sound file (automatic calibration available).</td>
</tr>
<tr>
<td>Frequency range:</td>
<td>100Hz – 10kHz</td>
</tr>
<tr>
<td>Frequency accuracy:</td>
<td>Less than ± 1 %</td>
</tr>
<tr>
<td>Distortion:</td>
<td>Less than 2%</td>
</tr>
<tr>
<td>Intensity range:</td>
<td>40 – 90 dB</td>
</tr>
<tr>
<td>Intensity accuracy:</td>
<td>Less than ± 1.5 %</td>
</tr>
<tr>
<td>Measurement Intensity Range:</td>
<td>Probe microphone 40-140 dB SPL ± 2 dB.</td>
</tr>
<tr>
<td>Frequency Resolution:</td>
<td>1/3, 1/6, 1/12, 1/24 octave or 1024 point FFT.</td>
</tr>
<tr>
<td>Probe microphone:</td>
<td>Intensity: 40 – 140 dB</td>
</tr>
<tr>
<td>Reference microphone:</td>
<td>Intensity: 40 – 100 dB</td>
</tr>
<tr>
<td>Intensity Accuracy:</td>
<td>Less than ± 1.5 dB</td>
</tr>
<tr>
<td>Cross talk</td>
<td>Cross talk in the probe and probe tube will alter the obtained results with less than 1 dB at all frequencies.</td>
</tr>
<tr>
<td>Available tests:</td>
<td>REUR, REIG, RECD, REAR, REAG, REOR, REOG, REUG, Input – Output</td>
</tr>
<tr>
<td>Compatible Software:</td>
<td>Noah 4, Noah 3.7, OtoAccess™ and XML compatible</td>
</tr>
</tbody>
</table>
**HIT440 Software - Technical Specifications**

<table>
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<th><strong>Medical CE-mark:</strong></th>
<th>The CE-mark indicates that Interacoustics A/S meets the requirements of Annex II of the Medical Device Directive 93/42/EEC. Approval of the quality system is made by TÜV – identification no. 0123.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hearing Aid Analyzer Standards:</strong></td>
<td>IEC 60118-0, IEC 60118-7, ANSI S3.22.</td>
</tr>
<tr>
<td><strong>Frequency Range:</strong></td>
<td>100-10000Hz.</td>
</tr>
<tr>
<td><strong>Frequency Resolution:</strong></td>
<td>1/3, 1/6, 1/12 and 1/24 octave or 1024 point FFT.</td>
</tr>
<tr>
<td><strong>Frequency Accuracy:</strong></td>
<td>Less than ± 1 %</td>
</tr>
<tr>
<td><strong>Stimulus Signal:</strong></td>
<td>Warble Tone, Pure Tone, Random noise, Pseudo random noise, Band limited white noise, Chirp, ICRA, Real Speech, any other sound file (automatic calibration available).</td>
</tr>
<tr>
<td><strong>Sweep Speed:</strong></td>
<td>1,5 – 12 sec.</td>
</tr>
<tr>
<td><strong>FFT:</strong></td>
<td>Resolution 1024 points.</td>
</tr>
<tr>
<td><strong>Stimulation Intensity Range:</strong></td>
<td>40-100 dB SPL in 1 dB step.</td>
</tr>
<tr>
<td><strong>Intensity Accuracy:</strong></td>
<td>Less than ± 1.5 dB</td>
</tr>
<tr>
<td><strong>Measurement Intensity Range:</strong></td>
<td>Probe microphone 40-145 dB SPL ± 2 dB.</td>
</tr>
<tr>
<td><strong>Stimulus Distortion:</strong></td>
<td>Less than 1 % THD.</td>
</tr>
<tr>
<td><strong>Available tests:</strong></td>
<td>Additional tests can be designed by user</td>
</tr>
<tr>
<td><strong>OSPL90</strong></td>
<td>Harmonic Distortion</td>
</tr>
<tr>
<td><strong>Full On Gain</strong></td>
<td>Intermodulation Distortion</td>
</tr>
<tr>
<td><strong>Input/Output</strong></td>
<td>Microphone Directionality</td>
</tr>
<tr>
<td><strong>Attack/Recovery Time</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Reference Test Gain</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Frequency Response</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Equivalent Input Noise</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Pre-Programmed Protocols:</strong></td>
<td>HIT440 software comes with a set of Test Protocols loaded. Additional Test Protocols can be designed by user, or easily imported into the system.</td>
</tr>
<tr>
<td><strong>Compatible Software:</strong></td>
<td>Noah 3.7, Noah 4., OtoAccess™ and XML compatible</td>
</tr>
</tbody>
</table>