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# Technical Specifications

## Callisto™ Portable Audiometry, REM & HIT

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# Included and Optional Parts for the Callisto™ AC440 software

<p><b>Standard Parts for the Callisto™ Unit:</b></p> <ul style="list-style-type: none"> <li>• Callisto™ Unit</li> <li>• Callisto™ Suite DVD, incl. Instructions for use and Quick Guides.</li> <li>• Callisto Carrying Bag</li> <li>• Callisto Foam Insert (standard bag)</li> <li>• Standard USB Cable (2m)</li> <li>• Mouse Pad</li> </ul> <p><b>Optional Parts for the Callisto™ Unit</b></p> <ul style="list-style-type: none"> <li>• Wheeled Carrying Case</li> <li>• Callisto™ Foam Insert (optional bag with wheels)</li> </ul>		
<b>AC440</b>	<b>REM440</b>	<b>HIT440</b>
<p><b>AC440 Standard Parts</b></p> <ul style="list-style-type: none"> <li>• DD45 or TDH 39 Audiometric Headset</li> <li>• MTH400m Monitor Headset</li> <li>• B71 Bone Conductor</li> <li>• APS3 Patient response button</li> </ul> <p><b>AC440 Optional Parts</b></p> <ul style="list-style-type: none"> <li>• TDH39 Audiometric Headset</li> <li>• HDA300 Audiometric Headset 30° plugs</li> <li>• Eartone 3A Insert earphones<sup>1)</sup></li> <li>• Eartone 5A Insert earphones<sup>1)</sup></li> <li>• IP30 Insert earphones</li> <li>• B71 Bone Conductor</li> <li>• B81 Bone Conductor</li> <li>• Talk Back Microphone</li> <li>• Edifier – Loudspeaker + wire</li> <li>• SP85A Loudspeaker</li> <li>• SP90A Loudspeaker</li> </ul> <p>Special Tests: <b>Optional special tests:</b></p> <ul style="list-style-type: none"> <li>• High Frequency audiometry (HF440)</li> <li>• Multi Frequency module (MF440)</li> <li>• Speech from hard-drive (SFH440)</li> <li>• SISI test</li> <li>• Master Hearing Aid (MHA440),</li> <li>• Hearing Loss Simulator (HLS440)</li> <li>• Loudness Scaling (LS440)</li> <li>• QuickSIN</li> </ul>	<p><b>REM440 Standard Parts</b></p> <ul style="list-style-type: none"> <li>• IHM60 In-situ Headset (kit)</li> <li>• Probe Tubes 36 pcs</li> <li>• Edifier Loudspeaker + Wire</li> </ul> <p><b>REM440 Optional Parts</b></p> <ul style="list-style-type: none"> <li>• Extra Edifier Loudspeaker + Wire</li> <li>• Callisto™ Coupler Base Kit which includes: <ul style="list-style-type: none"> <li>○ Coupler Base</li> <li>○ Coupler Box</li> <li>○ Reference Microphone</li> <li>○ 2cc Coupler</li> <li>○ ½" Microphone</li> <li>○ BTE Adaptor with</li> <li>○ ITE Adaptor with</li> <li>○ Body Adaptor with</li> <li>○ BTE Tubing 27mm for BTE adaptor</li> <li>○ SPL60 In-situ Probe Tip-set + Coupler Adaptor<sup>1)</sup></li> <li>○ Coupler Seal Wax</li> </ul> </li> </ul>	<p><b>HIT440 Standard Parts:</b></p> <ul style="list-style-type: none"> <li>• TBS10 Test Box</li> <li>• 2cc coupler with microphone and adaptors for ITE, BTE and Body Style HA</li> <li>• Coupler seal wax</li> <li>• Reference microphone</li> </ul> <p><b>HIT 440 Optional parts:</b></p> <ul style="list-style-type: none"> <li>• Couplers 1.2CC and 0.6CC: ITE, BTE, Ear simulator</li> <li>• Calibration adaptor</li> </ul>

<sup>1)</sup> Note patient contact parts for single use.

# General Technical Specifications

## Callisto™ General Technical Specifications

<b>Medical CE-mark:</b>	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.	
<b>Standards:</b>	<b>Safety:</b>	IEC/ES 60601-1, 2005 CAN/CSA-C22.2 No. 601.1-M90 IEC 60601-1 1988 .A1:1991, A2:1995 UL 60601-1:2003 Class I, Type B IEC 60601-1-1 2000
	<b>EMC:</b>	IEC 60601-1-2 :2007
	<b>Audiometer Tone:</b>	IEC 60645-1 2001/ANSI S3.6-2010 , Type 1 Tone audiometer IEC 60645-4 1994/ANSI S3.6-2010 , High frequency audiometer
	<b>Audiometer Speech:</b>	IEC 60645-2 1997/ANSI S3.6-2010 Type A or A-E, STAF-1996, Norway. Speech audiometer
	<b>Audiometer Calibration:</b>	AC: DD45 PTB/DTU report 2009 TDH39: ISO 389-1 1998, ANSI S3.6-2010 HDA200: ISO 389-5 2006, ANSI S3.6-2010 HDA300: PTB Report 1.61-4064893/13 2013 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
	<b>Hearing Aid Analyzer:</b>	IEC 60118-0 1983, IEC60118-1 1998, IEC 60118-7 2005, ANSI S3.22-2003.
	<b>Real ear measurement:</b>	IEC61669 2001, ISO12124 2001, ANSI S3.46-1997
<b>Specifications Callisto™ Hardware:</b>		
<b>PC requirements:</b>		2 GHz Intel Core 2 Duo CPU 2GB Ram 1.5 GB available disk space 1024x768 resolution (1280x1024 or higher recommended) Hardware accelerated DirectX/Direct3D graphics card.
<b>Supported Systems:</b>		Windows® 7 SP1 (x86 and x64) Windows 8 / 8.1 (x86 and x64) Windows 10 (x86 and x64)
<b>Available modules:</b>		Callisto™ Suite AUD, REM, HIT.
<b>Database:</b>		OtoAccess and Noah-compatible office systems or later releases
<b>Computer Communication:</b>		USB interface, compatible with USB1.1 or later.
<b>Construction:</b>		Plastic cabinet.
<b>Power:</b>		USB-powered with an internal “power boost” rechargeable battery and load balancer. Average: 300mA (Max: 500mA)
<b>Battery :</b> <b>Battery working voltage :</b> <b>Operation environment:</b>		NP120 3.7V 1700 mAH battery lithium ion 53x35.2x11. 3.2 to 4.2V
	<b>Rel. Humidity:</b> <b>Temperature:</b> <b>Ambient Pressure:</b>	15 – 90% 10-35° 98 kPa – 104 kPa



<b>Transport temperature:</b>		-20-50 °C
<b>Storage temperature:</b>		0-50 °C
<b>Humidity transportation &amp; storage:</b>		10% to 95% RH. Non condensing
<b>Dimensions:</b>		212 x 121 x 44 mm / 8.3 x 4.8 x 1.7 inches
<b>Weight:</b>		1.25 lbs (822g / 1.81 lbs with cradle)

## Technical Specifications of the AC440 Software

<b>Medical CE-mark:</b>	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.	
<b>Audiometer Standards:</b>	Tone: IEC60645-1/ANSI S3.6 Type 1 Speech: IEC60645-2/ANSI S3.6 Type A or A-E	
<b>Transducers &amp; Calibration:</b>	Calibration information and instructions are located in the Service manual. Check the accompanying Appendix for RETSPL levels for transducers	
<b>Air Conduction</b>		
DD45	PTB/DTU report 2009	Headband Static Force 4.5N ±0.5N
TDH39	ISO 389-1 1998, ANSI S3.6-2010	Headband Static Force 4.5N ±0.5N
HDA300	PTB report 1.61-4064893/13 2013	Headband Static Force 8,8N ±0.5N
HDA280	PTB report 2004	Headband Static Force 5N ±0.5N
E.A.R Tone 3A/5A	ISO 389-2 1994, ANSI S3.6-2010	
IP30	ISO 389-2 1994, ANSI S3.6-2010 DES-2361	
CIR 33	ISO 389-2	
<b>Bone Conduction</b>	Placemenet: Mastoid	
B71	ISO 389-3 1994, ANSI S3.6-2010	Headband Static Force 5.4N ±0.5N
B81	ISO 389-3 1994, ANSI S3.6-2010	Headband Static Force 5.4N ±0.5N
<b>Free Field</b>	ISO 389-7 2005, ANSI S3.6-2010	
<b>High Frequency</b>	ISO 389-5 2004, ANSI S3.6-2010	
<b>Effective masking</b>	ISO 389-4 1994, ANSI S3.6-2010	
<b>Patient Response switch:</b>	Hand held push button.	
<b>Patient communication:</b>	Talk Forward and Talk Back.	
<b>Monitor:</b>	Output through external earphone or speaker.	
<b>Stimuli:</b>	Pure tone, Wable tone, NB, SN, WN, TEN noise	
<b>Tone</b>	125-16000Hz separated in two ranges 125-8000Hz and 8000-16000Hz. Resolution 1/2-1/24 octave.	
<b>Warble Tone</b>	1-10 Hz sine +/- 5% modulation	
<b>Wave file</b>	44100Hz sampling, 16 bits, 2 channels	
<b>Masking</b>	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:	80-16000Hz measured with constant bandwidth	
Speech Noise.	IEC 60645-2:1993 & ANSI S3.6 2010:125-6000Hz falling 12dB/octave above 1KHz +/-5dB	
<b>Presentation</b>	Manual or Reverse. Single or multiple pulses. pulse time adjustable from 200mS-5000mS in 50mS steps. Simultaneous or alternating.	
<b>Intensity</b>	Check the accompanying Appendix for maximum output levels	
Steps	Available Intensity Steps is 1, 2 and 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.	
<b>Frequency</b>	Range: 125Hz to 8kHz (Optional High Frequency: 8 kHz to 16 kHz) Accuracy: Better than ± 1 %	
<b>Distortion (THD)</b>	Sound pressure levels: below 1.5 % Vibration force levels: below 3 %.	
<b>Signal Indicator(VU)</b>	Time weighting: 350mS Dynamic range: -20dB to +3dB Rectifier characteristics: RMS Selectable inputs are provide with an attnuator by which the level can be adjusted to the indicator reference position(0dB)	
<b>Storing capability:</b>	Tone audiogram: dB HL, MCL, UCL, Tinnitus, R+L Speech Audiogram: WR1, WR2, WR3, MCL, UCL, Aided, Unaided, Binaural, R+L.	
<b>Compatible Software:</b>	Noah 4, Noah 3.7, OtoAccess™ and XML compatible	

**Technical Specifications - REM440 Software**

<b>Medical CE-mark:</b>	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.	
<b>Real Ear Measurement Standards:</b>	IEC 61669, ISO 12124, ANSI S3.46.	
<b>Stimuli:</b>	Warble Tone, Pure Tone, Random noise, Pseudo random noise, Band limited white noise, Chirp, ICRA, Real Speech, any other sound file (automatic calibration available).	
<b>Frequency range:</b>	100Hz – 10kHz	
<b>Frequency accuracy:</b>	Less than $\pm 1\%$	
<b>Distortion:</b>	Less than 2%	
<b>Intensity range:</b>	40 – 90 dB	
<b>Intensity accuracy:</b>	Less than $\pm 1.5\%$	
<b>Measurement Intensity Range:</b>	Probe microphone 40-140 dB SPL $\pm 2$ dB.	
<b>Frequency Resolution:</b>	1/3, 1/6, 1/12, 1/24 octave or 1024 point FFT.	
<b>Probe microphone:</b>	Intensity: 40 – 140 dB	
<b>Reference microphone:</b>	Intensity: 40 – 100 dB	
<b>Intensity Accuracy:</b>	Less than $\pm 1.5$ dB	
<b>Cross talk</b>	Cross talk in the probe and probe tube will alter the obtained results with less than 1 dB at all frequencies.	
<b>Available tests:</b>	REUR REIG RECD REAR REAG	REOR REOG REUG Input – Output
<b>Compatible Software:</b>	Noah 4, Noah 3.7, OtoAccess™ and XML compatible	

## HIT440 Software - Technical Specifications

<b>Medical CE-mark:</b>	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.	
<b>Hearing Aid Analyzer Standards:</b>	IEC 60118-0, IEC 60118-7, ANSI S3.22.	
<b>Frequency Range:</b>	100-10000Hz.	
<b>Frequency Resolution:</b>	1/3, 1/6, 1/12 and 1/24 octave or 1024 point FFT.	
<b>Frequency Accuracy:</b>	Less than $\pm 1\%$	
<b>Stimulus Signal:</b>	Warble Tone, Pure Tone, Random noise, Pseudo random noise, Band limited white noise, Chirp, ICRA, Real Speech, any other sound file (automatic calibration available).	
<b>Sweep Speed:</b>	1,5 – 80 sec.	
<b>FFT:</b>	Resolution 1024 points. Averaging: 10 – 500.	
<b>Stimulation Intensity Range:</b>	40-100 dB SPL in 1 dB step.	
<b>Intensity Accuracy:</b>	Less than $\pm 1.5$ dB	
<b>Measurement Intensity Range:</b>	Probe microphone 40-145 dB SPL $\pm 2$ dB.	
<b>Stimulus Distortion:</b>	Less than 1 % THD.	
<b>Available tests:</b>	Additional tests can be designed by user	
	OSPL90 Full On Gain Input/Output Attack/Recovery Time Reference Test Gain Frequency Response Equivalent Input Noise	Harmonic Distortion Intermodulation Distortion Microphone Directionality
<b>Pre-Programmed Protocols:</b>	HIT440 software comes with a set of Test Protocols loaded. Additional Test Protocols can be designed by user, or easily imported into the system.	
<b>Compatible Software:</b>	Noah 3.7, Noah 4., OtoAccess™ and XML compatible	