Technical Specifications

Affinity²

Hearing Aid Analyzer

Interacoustics

D-0105661-C – 11/2015

Included and Optional Parts

AC440	REM440	HIT440
Included parts: • Affinity2.0 AC440 CD • OtoAccess™ database CD • TDH39 Audiometric headset or DD45 Audiometric headset • MTH400 Headset • EMS400 Talk back microphone • B81 Bone conductor • APS3 Patient response button • Standard USB cable • Power cable 120 or 230V • Mouse pad • Instructions for Use document	**Included parts:** • Affinity2.0 REM440 CD • OtoAccess™ database CD • IHM60 In-situ headset with probe microphone and reference microphone (double) • Probe tubes, 36 pcs. • Standard USB cable • Power cable 120 or 230V • Mouse pad • Instructions for Use document	**Included parts:** • Affinity2.0 HIT440 CD • OtoAccess™ database CD • 2cc coupler with microphone and adaptors for ITE, BTE and Body Style HA • Coupler seal wax • Reference microphone • Standard USB cable • Power cable 120 or 230V • Mouse pad • Additional Information and Instructions for Use
Optional parts: • DAK70 Audiometer keyboard with live voice mic. • Earphone 3A insert earphones (5As may be substituted) • IP30 insert earphones • B81 Bone Conductor • B71 Bone Conductor • ACC60 Affinity2.0 carrying case • CIR22 Insert masking earphones • Audiocup enclosures • Peltor noise excluding headset • HDA280 Audiometric headset • HDA300 Audiometric headset • KOSS R80 high frequency headset • AP70 Power amplifier 2x70 Watt • SP90 Loudspeaker • SP85A Loudspeaker • SP90A Loudspeaker • AFC8 Sound cabin installation panel • Optical USB 1.1 isolation extension cable	**Optional parts:** • SPL60 Transducer kit for RECD measurement including probes and eartips • BET60 Box with eartips for for RECD measurement. • Calibration adaptor for in-situ reference • VSP440 Visible Speech Mapping module • Optical USB 1.1 isolation extension cable • ACC60 Affinity2.0 carrying case • Coupler microphone extension cable	**Optional parts:** • Battery adapters BAA675, BAA13, BAA312, BAA10, BAA5 • Couplers 1.2CC and 0.6CC: ITE, BTE, Ear simulator • TBS25M External test chamber incl. cables • ACC60 Affinity2.0 carrying case • Calibration adaptor • Optical USB 1.1 isolation extension cable • SKS10 Skull Simulator with power supply
Optional 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		

General Technical Specifications

Affinity2.0 Hardware - 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.	
Safety Standards	IEC 60601-1, UL60601-1, CAN/CSA-C22.2 No.60601-1 Class I, Applied parts type B, Continuous operation	
EMC Standard	IEC 60601-1-2 IEC 60645-1	
Calibration	Technical information is located in the specifications for the software modules. Calibration information and instructions are located in the Service manual.	
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.	
Operative System:	Windows XP or Windows Vista, Windows 7, Windows 8	
Display:	Minimum resolution of 1024x768 with hardware accelerated DirectX/Direct3D graphics card.	
Disc Space:	1GB RAM or more. (Windows 8: 1GB 32-bit; 2GB 64-bit)	
Compatible software	Noah 3.7, Noah 4,, OtoAccess™ and XML compatible Affinity$^{2.0}$ / Equinox$^{2.0}$ Suite VSP, HLS, MHA (simulators)	
Input Specifications	**Talk Back** **Mic. 1/TF & Mic. 2**	330µVrms at max. input gain for 0dB VU-reading Input impedance : 47.5KΩ
	Pat. Resp. L & R	Switches 3.3V to the logic input. (The switch current is 33µA)
	Inp. Aux. 1 & 2 **TB Coupler** **TB Coupler - internal TB (Affinity2.0 $^{-0}$ only)** **Insitu L & R - Probe mic.**	20mVrms at max. input gain for 0dB VU-reading Input impedance : 15KΩ
	CD1 & CD2	10mVrms at max input gain for 0dB VU-reading Input impedance : 10kΩ
	TB Ref. **TB Ref – internal TB (Affinity2.0 $^{-0}$ only)** **Insitu L & R - Ref. mic**	7mVrms at max. input gain for 0dB VU-reading Input impedance : 4,3KΩ
	Ref.Mic./Ext. **Coupler/Ext.**	Not in use
	Wave files	Plays wave file from hard disk drive
Output Specifications	**FF1 / FF2 (Terminal Block)** **TB Lsp.**	Up to 12.6Vrms by 8 Ω load 70Hz-20kHz ±3dB
	FF1/ FF2 **Sp 1, Sp 2, Sp 3, Sp 4**	Up to 7Vrms by 600Ω load 70Hz-20kHz ±3dB
	Left, Right **Ins. Left, Ins. Right** **Bone** **Ins. Mask.** **HF/HLS** **Insitu L, Insitu R**	Up to 7.0Vrms by 10Ω load 70Hz-20kHz ±3dB
	Monitor, Ass. Mon. **Sp. 1-4 Power Out**	Max.3.5Vrms. by 8 Ω load 70Hz-20kHz ±3dB

	DC	Voltage: 5VDC Current: 0.5A
	TB Loop	Up to 100mA/meter 70Hz-20kHz ±3dB
	FF Loop	
	Batt. Sim.	Voltage: 1.1 – 1.6VDC Impedance range: 0 – 25 Ω.
	Batt. Sim. - Internal TB (Affinity2.0 $^{.0}$ only)	
Data Connections	**USB/PC**	USB B socket for connection to PC (compatible with USB 1.1 and later)
	USB	USB A socket for connection of other USB devices (Internal USB 1.1 hub)
	Keyb.	Serial Peripheral Interface Bus (SPI interface) Check the Service manual for more information.
Internal test box:	Built in test box holds telecoil drive as well as special dual speaker set for checking directional microphone function.	
Supported Systems	Windows® XP (SP2 or later and compatible), Windows® VISTA Windows® 7 (32 and 64 bit) Window® 8 (32 and 64 bit)	
Dimensions (LxWxH)	Affinity2.0 $^{.0}$: 42 x 38 x 14 cm / 16.5 x 15 x 5.5 inches	
Weight	Affinity2.0 $^{.0}$: 5.5 kg / 12.1 lbs.	
Power supply	100-240 V~, 50-60Hz	
Power Consumption:	195VA	
Operation environment	Temperature: Re. Humidity:	15-35°C 30-90% Non condensing
Transport and storage	Transport temperature: Storage temperature: Re. Humidity:	-20-50°C 0-50°C 10-95% Non condensing

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	
Air Conduction		
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	ISO 389-8 2006, ANSI S3.6-2010	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	
Bone Conduction	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
Free Field	ISO 389-7 2005, ANSI S3.6-2010	
High Freqency	ISO 389-5 2004, ANSI S3.6-2010	
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 60645-2:1993 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 Freqency: 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 attunuator 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

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.	
Real Ear Measurement Standards:	IEC 61669, ISO 12124, ANSI S3.46.	
Stimuli:	Warble Tone, Pure Tone, Random noise, Pseudo random noise, Band limited white noise, Chirp, ICRA, Real Speech, any other sound file (automatic calibration available).	
Frequency range:	100Hz – 10kHz	
Frequency accuracy:	Less than ± 1 %	
Distortion:	Less than 2%	
Intensity range:	40 – 90 dB	
Intensity accuracy:	Less than ± 1.5 %	
Measurement Intensity Range:	Probe microphone 40-145 dB SPL ± 2 dB.	
Frequency Resolution:	1/3, 1/6, 1/12, 1/24 octave or 1024 point FFT.	
Probe microphone:	Intensity: 40 – 140 dB	
Reference microphone:	Intensity: 40 – 100 dB	
Intensity Accuracy:	Less than ± 1.5 dB	
Cross talk	Cross talk in the probe and probe tube will alter the obtained results with less than 1 dB at all frequencies.	
Available tests:	REUR REIG RECD REAR REAG	REORREOG REUG Input – Output FM Transparency Ear Level, FM only
Compatible Software:	Noah 4, Noah 3.7, OtoAccess™ and XML compatible	

HIT440 Software - 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.		
Hearing Aid Analyzer Standards:	IEC 60118-0, IEC 60118-7, ANSI S3.22.		
Frequency Range:	100-10000Hz.		
Frequency Resolution:	1/3, 1/6, 1/12 and 1/24 octave or 1024 point FFT.		
Frequency Accuracy:	Less than ± 1 %		
Stimulus Signal:	Warble Tone, Pure Tone, Random noise, Pseudo random noise, Band limited white noise, Chirp, ICRA, Real Speech, any other sound file (automatic calibration available).		
Sweep Speed:	1,5 – 12 sec.		
FFT:	Resolution 1024 points. Averaging: 10 – 500.		
Stimulation Intensity Range:	40-100 dB SPL in 1 dB step.		
Intensity Accuracy:	Less than ± 1.5 dB		
Measurement Intensity Range:	Probe microphone 40-145 dB SPL ± 2 dB.		
Stimulus Distortion:	Less than 1 % THD.		
Battery Simulator:	Standard and custom types are selectable		
	Standard battery	*Impedance[Ω]*	*Voltage[V]*
	Zinc air 5	8	1.3
	Zinc air 10	6	1.3
	Zinc air 13	6	1.3
	Zinc air 312	6	1.3
	Zinc air 675	3.5	1.3
	Mercury 13	8	1.3
	Mercury 312	8	1.3
	Mercury 657	5	1.3
	Mercury 401	1	1.3
	Silver 13	10	1.5
	Silver 312	10	1.5
	Silver 76	5	1.5
	Custom types	0 – 25	1.1 – 1.6
Available tests:	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 Battery Current Drain Microphone Directionality Coil Frequency Response Coil Harmonic Distortion Coil Full-On Gain Response	
Pre-Programmed Protocols:	HIT440 software comes with a set of Test Protocols loaded. Additional Test Protocols can be designed by user, or easily imported into the system.		
Compatible Software:	Noah 3.7, Noah 4,, OtoAccess™ and XML compatible		