

# AccuScreen TDA Specifications

## Device:

<b>Housing:</b>	Dimensions:	Max length:	23.0 cm (9")
		Max width:	9.5 cm (3 ¾")
		Max height:	5.3 cm (2")
		Weight:	550 g (19.4 oz)
<b>LCD :</b>	Dimensions:	65 x 43 mm	
	Resolution:	128 x 64 dot graphic LCD w. adjustable backlight	
<b>Keyboard:</b>		5 keys (AccuScreen) or 17 keys (AccuScreen PRO)	
<b>Sound:</b>		Piezo beeper for key click and info/warning jingles	
<b>Language settings:</b>		Up to 6 user selectable languages available	
<b>Device connectors:</b>	Serial:	SUB-D 9 pole	
	Probe:	12 pin	
	ABR:	4 pin	
<b>Power consumption:</b>	1.2W max		
<b>Power management:</b>	Auto backlight control, auto switch off, 2-level battery voltage sensor, battery saver		
<b>CPU:</b>	16 bit fixed-point DSP, 22.1 MIPS		
<b>AD / DA converter:</b>	2 channels AD, 2 channels DA		
<b>Resolution:</b>	16 bit		
<b>Sampling rate:</b>	Variable		
<b>Data memory:</b>	128 kByte built-in flash memory, unlimited storage time		
<b>Real time clock:</b>	Own battery, runs minimum 2 years		
<b>Interfaces:</b>	RS232 up to 115 kbps, infrared		
<b>Data transmission:</b>	Via cable:	Serial cable/SUB-D 9 pole m/w	
	Via infrared:	9600 baud/min	
<b>Operating conditions:</b>	Storage temperature range:	0° - 40°C (32° - 104°F)	
	Operation temperature range:	5° - 35°C (40° - 95°F)	
	Humidity:	20 - 80% rel.	

## Device class:

2a (according to Council Directive 93/42/EEC Appendix IX)

## Applied standards:

Council Directive 93/42/EEC concerning medical devices (1993)  
German "Medizinprodukte Gesetz" (MPG) (1994)  
EN ISO 9001 (1994)  
EN 46001 (1996)  
EN 60601-1 + A1 + A2 (1990/1993/1995)  
EN 60601-1-2 (1993)

**Battery & charger:**

<b>Battery:</b>	Rechargeable NiMH, 6V/1500 mA fully charged, 2 batteries supplied w. device, charge time approx. 2 hours.
	Operating time: 10 hours with fully charged battery
	Operating temperature range: 0° - 40°C (32° - 104°F)
	Storage temperature range: -20° - 35°C (-40° - 158°F)
<b>Charger:</b>	Wall charger: 100 - 240 V AC ± 10%
	50 - 60 Hz , 200 mA
	Supported batteries: 5 NiCd/NiMH 1-2 Ah
	Operating temperature range: 0° - 40°C (32° - 104°F)
	Storage temperature range: -20° - 35°C (-40° - 158°F)
	Charge current: Rapid charge (HL): 800mA ± 6%
	Trickle charge (EL): 21mA ± 15%
	Charge termination (HL to EL): -ΔU: approx. 0.7% with 5 cells (approx. 12 mV/cell)
	The -ΔU monitoring is activated after approx. 7 min. following commencement of charging
	Maximum charging time: 2 ½ hours ± 12%
	Charging control: The cell voltage is measured and detected every 107 sec. during a zero current of 80 ms.

**Probe:**

<b>Probe plug:</b>	12-pin
<b>Probe cable:</b>	Flexible, shielded cable, approx. length: 1.3 m (39.5")
<b>Frequency response:</b>	200 Hz to 4.2 kHz (measured in 1.5 cm <sup>3</sup> test cavity)
<b>Speakers:</b>	Type: Magnetic: ED 1913/Knowles low distortion
	Signal bandwidth: 1.7 to 4.8 kHz
	Nominal impedance (at 1 kHz): 1,500 Ω
	Nominal DC resistance: 375 Ω
	DC bias current: 0.7 mA
<b>Microphone:</b>	Type: Electret, EM 3046/Knowles, with integrated FET pre-amplifier
	Signal bandwidth: 1.7 to 6.5 kHz
	Front-end sensitivity: Approx. 55 dB below 1V/mikrobar (0.1 N/m <sup>2</sup> )
<b>Output impedance:</b>	2,800 to 6,800 Ω (4,400 Ω nominal)
<b>Operating voltage:</b>	0.9 to 20 V DC
<b>Dimensions:</b>	Probe body: 10 mm Ø x 35 mm (0.4" Ø x 1.4")
	Probe tip: 3.5 mm Ø x 10 mm (0.14" Ø x 0.4")
<b>Ear tips:</b>	4 mm to 12 mm (0.15" to 0.47"), silicone
<b>Weight:</b>	Probe incl. probe adapter: 4 grams
<b>Probe tip (TEOAE):</b>	Exchangeable, green
<b>Probe tip (DPOAE):</b>	Exchangeable, blue
<b>Eartips:</b>	Standard (cylindric) : 11 sizes (4 – 12 mm)
	Mushroom: 1 size (6.5 mm)
	Tree tip: 1 size (4 – 7 mm)

**Measurement techniques:**

<b>TEOAE:</b>	Sampling rate:	16 kHz
	Evaluation method:	AccuScreen binomial statistics
	Stimulustype:	Non-linear click sequence
	Sound stimulus level:	73 dB SPL
	Stimules rate:	40....100Hz, microprocessor-controlled
	Signal bandwidth:	500 Hz to 4500 Hz
	Click rate:	Approx. 60 Hz
	Frequency range:	1.4 to 4 kHz
	Max. sound pressure:	Limited to 85 dB
	Display:	Statistical waveform, measurement progress, TEOAE detection level, noise level
<b>DPOAE:</b>	Sampling rate:	12.8 kHz
	Evaluation method:	Phase statistics
	Stimulus:	Primary tone pair, $f_2/f_1 = 1.24$
	Frame length:	512 samples
	Test frequencies (screening):	$f_2 = 2, 2.5, 3.2, 4$ kHz
	Test frequencies (diagnostic/multilevel):	$f_2 = 1.5, 2, 3, 4$ kHz
	Test level (screening):	$l_1/l_2 = 59/50$ dB SPL
	Test levels (diagnostic/multilevel):	$l_1/l_2 = 55/45$ dB SPL $l_1/l_2 = 65/55$ dB SPL
	Measurements per test:	Screening: 4 frequencies Diagnostic/multilevel: 4 frequencies x 2 levels
	Display:	Phase statistics diagram, test progress, noise
Result display:	PASS/REFER for all tested levels and frequencies	
<b>ABR:</b>	Sampling rate:	10.2 kHz
	Evaluation method:	Binomial statistics on template-convoluted signal
	Stimulus:	35 dB nHL, 40 dB nHL or 45 dB nHL click (user configurable)
	Click rate:	Approx. 55 Hz
	Frame length:	170 samples/17 ms
	Amplifier gain:	2000
	Amplifier CMRR:	> 100 dB
	Input impedance:	$10^{10} \Omega \parallel 50$ pF
	Input bias current:	< 10 nA
	Amplifier noise:	10 nV / $\sqrt{\text{Hz}}$ @ 1 kHz
	Input bandwidth:	70 Hz to 4 kHz
	Notch filter:	Digital, -40 dB @ 50Hz or 60 Hz (user configurable)
	Impedance sense current:	5 $\mu$ App
	Impedance sense signal:	200 Hz square wave
	Impedance test range:	1 to 99 k $\Omega$
	Impedance accepted for test:	< 12 k $\Omega$
	Impedance control:	Before test, periodically during test, stimulus continues during impedance control
	Display:	Statistical graph, test progress, EEG-level, ABR detection probability
	Electrodes:	Disposable hydrogel-electrodes (FDA approved)