

Science **made** smarter

# AT235

Middle ear  
assessment  
**made** ideal

Diagnostic  
& clinical  
tympanometry  
with basic  
audiometry



  
**Interacoustics**

Audiometry

**Tympanometry**  
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ABR

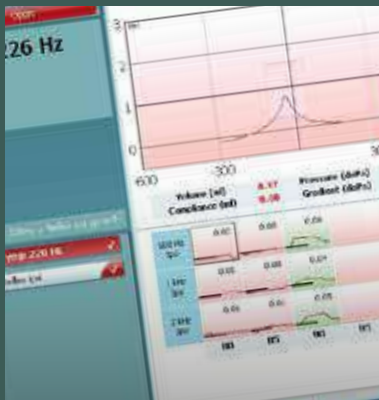
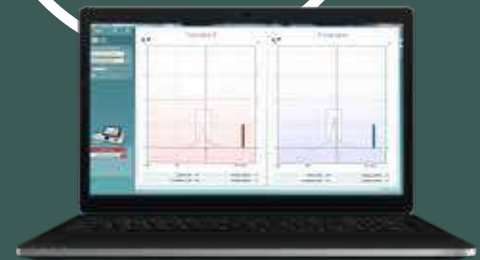
OAE

Hearing Aid Fitting

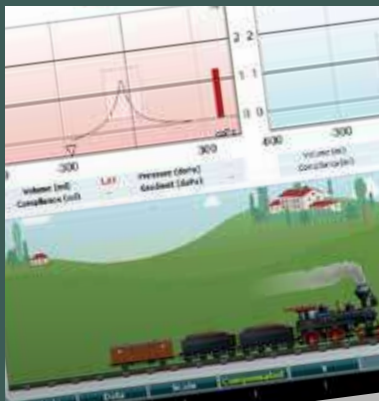
Balance

# User friendly & reliable middle ear analyzer

Flexible use  
& mounting  
User friendly  
& reliable



Tympanogram and reflex test results displayed simultaneously



Visual child distraction

The AT235 is an automatic middle ear analyzer ideal for diagnostic and screening evaluations.

## Test batteries

Test batteries of the AT235 include standard tympanometry, ipsilateral and contralateral acoustic reflex, reflex decay, two Eustachian tube function tests (the ETF 1 - Williams test and ETF 2 - Toynbee test) as well as air conduction audiometry including automated test function.

The AT235h, the extended version of the AT235, also includes high frequency probe tones to optimize testing of infants, manual tympanometry, reflex latency and the additional ETF test suitable in case of patulous tympanic membrane (continuous sensitive impedance measurement).

A basic air conduction pure tone audiometry function is a standard feature on the AT235. Basic pure tone audiograms may be generated manually or with an automatic HL function. All that is required is the purchase of an optional headset.

## Flexible use and mounting

Ergonomically designed and user friendly, the AT235 can be used as a desk unit, wall-mounted unit, or portable instrument.

An optional bracket for wall mounting is available, but the mounting holes also make it possible to use a standard bracket with VESA mounting that can be bought in many TV stores.

AT235 is the optimum solution if traveling between sites:

The AT235 can hold up to 500 clients and 50,000 sessions that, in combination with the optional SYNC mode, can be used to synchronize with the Interacoustics database OtoAccess™ or NOAH when returning to your office

A printer can be connected directly to the AT235 eliminating the need for a PC. Optional carrying case

## Child distraction

To help distract children while obtaining the tympanogram and reflex measures, the AT235 can present a train moving across the lower part of the screen.

| Test                                        | AT235 | AT235h |
|---------------------------------------------|-------|--------|
| Tymp 226Hz                                  | x     | x      |
| Tymp 678, 800 & 1000Hz                      |       | x      |
| Manual tympanometry                         |       | x      |
| Reflex Ipsilateral                          | x     | x      |
| Reflex Contralateral                        | x     | x      |
| ETF 1 test non-perforated tympanic membrane | x     | x      |
| ETF 2 test perforated tympanic membrane     | x     | x      |
| ETF 3 patulous tympanic membrane            |       | x      |
| Reflex Decay                                | x     | x      |
| Reflex Latency                              |       | x      |
| Pure tone audiometry                        | x     | x      |
| Modified Hughson-Westlake audiometry test   | x     | x      |

#### Extended version

AT235h is the extended version that offers high frequency probe tones (678, 800 and 1000Hz), manual tympanometry, reflex latency and the additional Eustachian tube test - patulous

Tympanometry  
& basic  
audiometry  
in one powerful  
device



# User friendliness brought to the next level

| Color: | Probe:                                                                              | Status:                                                        |
|--------|-------------------------------------------------------------------------------------|----------------------------------------------------------------|
| Red    |    | Right ear is selected. Probe is out of the ear.                |
| Blue   |    | Left ear is selected. Probe is out of the ear.                 |
| Green  |   | Probe is in the ear and a seal is maintained.                  |
| Yellow |  | Probe is in the ear and is blocked, leaking or too noisy.      |
| White  |  | The probe has just been attached. Probe status is yet unknown. |

Probe status displayed on probe / shoulder box

Customizable protocols

## Dedicated probe systems

The AT235 includes either a diagnostic probe or a clinical probe system to fit your needs.

The diagnostic probe is hand-held and ideal for quick tymps and a screening reflex.

The clinical probe is ideal for more lengthy exams where stability is important and noise from rattling should be avoided.

You can choose to have both probe systems included with your AT235. It is quick and easy to change between the two probe systems. The clinical probe shoulderbox can be placed on the client by using the optional headband, clips or key hanger.

Probe status is displayed on the probe shoulderbox for both probe systems which enables you to keep focus on the client. The probe has a button for remote change of ears - this also applies to both probe systems.

Both probe systems are very easy to take apart for cleaning.

## Customizable protocols to meet specific client types

AT235 offers the possibility to create user-defined test protocols by combining different tests from the test battery into one test flow. For instance you can create a simple screening procedure and a more in-depth evaluation. Avoid wasting time with different client types as each test protocol can have separate test limits to meet the need of a specific client types.

## Great overview of test results

The 10" adjustable display provides a great overview of the measurements where several test results can be seen on the same screen. The image is sharp and clear. The screen can be tipped and adjusted to avoid light reflection on the screen.

The built-in HDMI output makes it possible to show the screen on a projector or TV. This may be relevant in counseling sessions to help the client get a better understanding of the test results. It is also ideal for educational purposes, as students can easily follow the test results when displayed on a larger screen.

## Reduced number of buttons

Few dedicated buttons on the AT235 make it easy to navigate between various functions. Function buttons with changing help texts on the screen guide you to navigate efficiently.

Diagnostic probe

Clinical probe

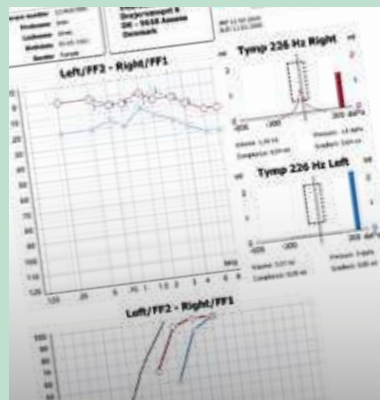
10"  
adjustable  
display



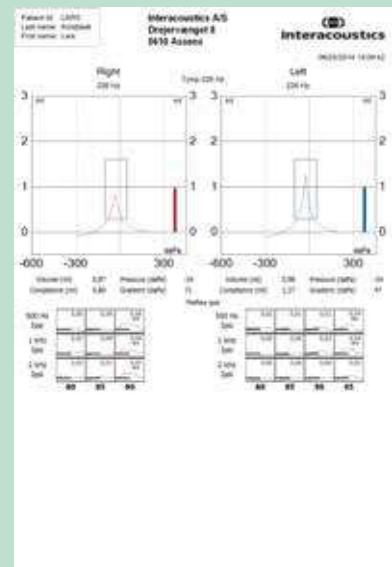
Optional wall mounting bracket offered

# PC Integration Printing Language options

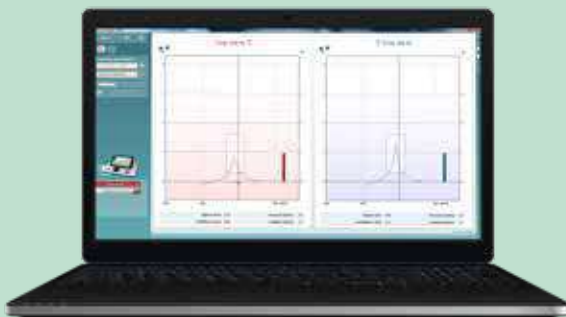
Direct printout from  
the AT235 or via  
customizable templates  
in the Diagnostic Suite  
software. Save in NOAH  
or the Interacoustics  
OtoAccess™ database.



Printout via Diagnostic Suite software and the Print Wizard.



Direct printouts from standard printer





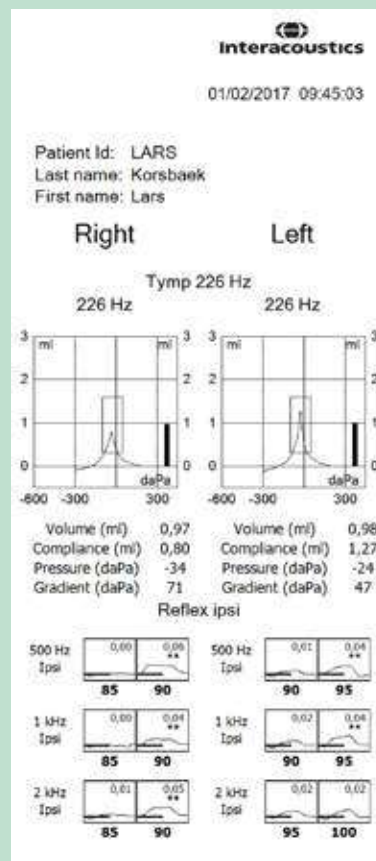
**Design your own reports.**  
Interacoustics software suites include a common embedded print wizard. This is a flexible tool that supports reporting requirements for streamlining workflow.

#### Supports several languages

The display language of the AT235 can be changed according to your need: Chinese, English, Finnish, French, German, Greek, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Spanish and Turkish.

#### Printing Options

You can print directly from the AT235 to a small 3" printer or a standard printer eliminating the need for a PC if you just want to print your measurement. If the data is downloaded to the Interacoustics OtoAccess™ database or NOAH, printouts may be generated through the PC.



Direct printout from 3" printer

#### Combined printing and reporting

The Print Wizard combines audiometric, impedance and fitting data for full client reporting.

Unlimited customizable templates are useful alternative templates for different test applications.

- Retrieve client demographics from OtoAccess™ and NOAH
- Merge audiometric and impedance test data onto a single page
- Text field for session observations and conclusions
- Insert bitmaps, such as clinic logos
- Individual session dates
- Highly configurable symbols for quick reference

# Science made smarter

## Interacoustics is more than state-of-the-art solutions

Our mission is clear. We want to lead the way in audiology and balance by translating complexity into clarity:

- Challenges made into clear solutions
- Knowledge made practical
- Invisible medical conditions made tangible and treatable

Our advanced technology and sophisticated solutions ease the lives of healthcare professionals.

We will continue to set the standard for an entire industry. Not for the sake of science. But for the sake of enabling professionals to provide excellent treatment for their millions of patients across the globe.

[Interacoustics.com](http://Interacoustics.com)

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[interacoustics.com](http://interacoustics.com)

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explore our  
full product  
range

## Related products



**Viot™**  
Video Otoscope



**AD629**  
Diagnostic audiometer



**Titan**  
Middle ear analyzer

## Product specifications

All technical and hardware specifications concerning all products can be downloaded from our website.

  
**Interacoustics**

Audiometry

Tympanometry  
~~~~~

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Hearing Aid Fitting

Balance



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# PA5

Pediatric  
testing **made**  
comfortable

One-handed  
operation



  
**Interacoustics**

Audiometry  
~~~~~

Tympanometry

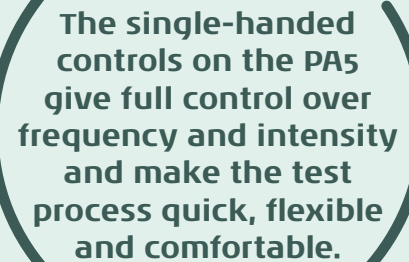
ABR

OAE

Hearing Aid Fitting

Balance





The single-handed controls on the PA5 give full control over frequency and intensity and make the test process quick, flexible and comfortable.

# One-handed operation

**The PA5 is a free field audiometer designed for trained healthcare professionals involved in testing young children. It features One-handed operation, silent buttons and a variety of light and sound stimuli.**

## **Conditioned Orientation Response**

Typically, two PA5s are used for the COR test, one in each hand. This allows the tester to use either unit to evoke head turn and provide visual reinforcement. The single-handed controls on the PA5 give full control over frequency and intensity and make the test process quick, flexible and comfortable.

## **Extended battery life**

The PA5 is powered by three standard AA batteries. It will turn off automatically after a period of inactivity and reactivate when a stimulation switch is touched.

## **Silent presentation buttons**

The two stimuli, light and sound, are controlled silent buttons. Both stimuli can be presented simultaneously by letting one finger touch both buttons. This gives full freedom in operating COR, VRA and APR tests.

## **Improved sensitivity**

The PA5 includes white noise as well as warble and narrow band stimuli. White noise has been shown to be especially useful for evoking responses in the early months.

## **Audiometric headphone**

With children old enough to cooperate, it is possible to connect a single TDH39 headphone to the PA5 and obtain audiometric thresholds. With a headphone attached, the PA5 automatically adjusts to the correct calibration for the TDH39.

## **A preview of the benefits**

- One-handed operation
- Silent presentation switch
- White noise stimulus for improved sensitivity
- Warble Tone
- Narrow Band Noise
- Flashing Light Stimulation
- TDH39 Audiometric Headphone (Optional)
- Robust, Lightweight
- Standard AA Batteries
- Automatic Battery Switch
- Automatic Battery Indication

## **Tests**

- Conditioned Orientation Response (COR)
- Visual Reinforcement Audiometry (VRA)
- Auropalpebral Reflex (APR)

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explore our  
full product  
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## Related products



**MT10**  
Handheld tympanometer



**Titan**  
Middle ear analyzer



**Viot™**  
Video Otoscope

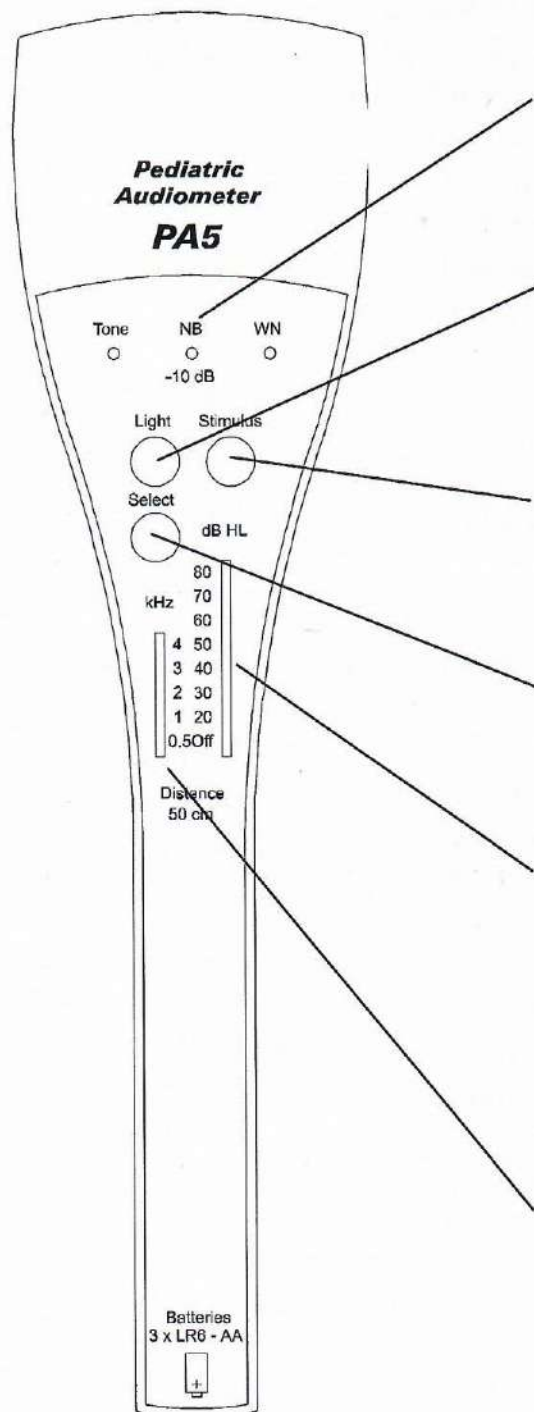
## Product specifications

All technical and hardware specifications concerning all products can be downloaded from our website.

  
**Interacoustics**

## Operation Instruction

The instructions included in this manual describe the general functions of the instrument. A more detailed discussion is provided in the Operation Manual in English.



### Description of Control Panel

#### Indication of stimulus mode:

Indication LEDs informing the user of the present stimulus mode: Tone, NB or WN.

#### Light:

Light button to control the three red LEDs, which are arranged in a triangle above the speaker in order to condition the orientation reflex.

#### Stimulus:

Stimulus button to present the selected stimulus Tone, NB or WN.

#### Select:

Select button to select between the three different stimuli Tone, NB or WN.

#### Intensity dB HL:

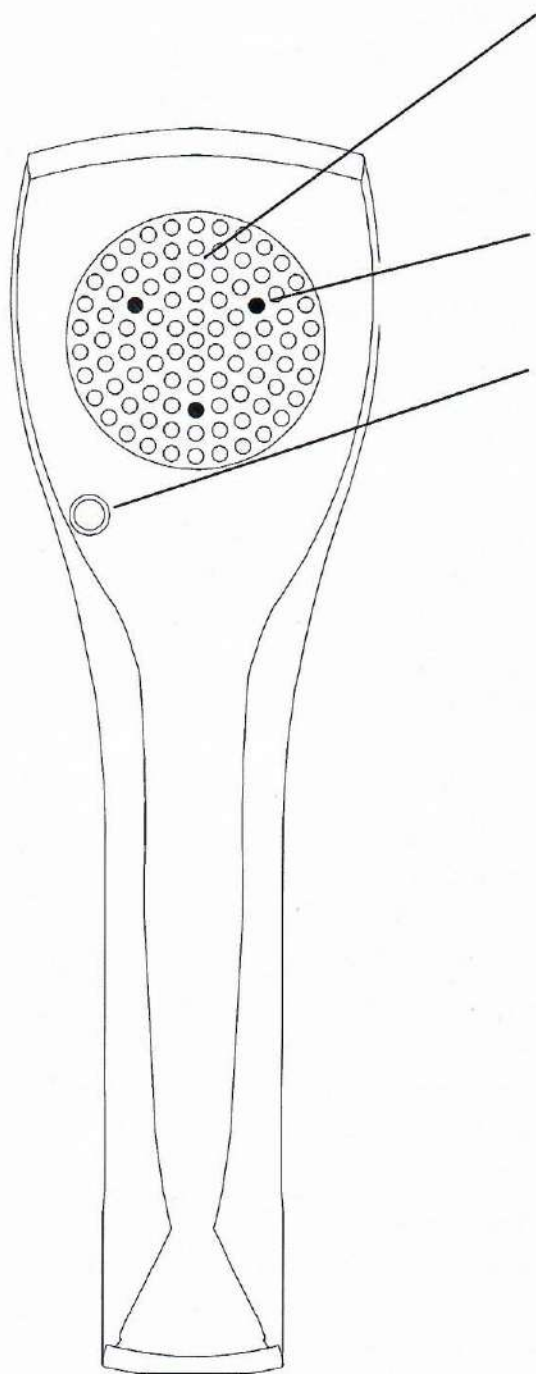
With the intensity control switch intensities between 20 and 80 dB HL can be selected in steps of 10 dB when the distance between the ear and the loudspeaker of the PA5 is 50 cm or the PA5 is switched off by leaving the intensity control switch in the "Off" position. When the PA5 is not activated for two minutes it will switch off automatically.

#### Frequency kHz:

With the frequency control switch it is possible to select between the following frequencies: 0.5, 1, 2, 3, and 4 kHz.



## Description of Stimulus Panel



### Loudspeaker:

The loudspeaker is to be found underneath the black grid. When used on a patient the grid should be positioned in a distance of 50 cm (20 inches) from the ear in order to obtain the intensities printed on the Control Panel.

### LEDs:

Three LEDs arranged in a triangle for conditioning of the orientation reflex.

### Headphone Connector:

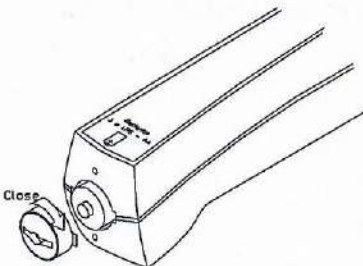
Connector for single Headphone TDH39S (optional). When the headphone is connected PA5 will automatically go to Pure Tone stimulation and correct calibration for Pure Tone Audiometry will be applied.

## Battery Description

### Replacing Batteries:

To replace old batteries unscrew the small black lid in the narrow end of PA5 and the batteries can be taken out.

Replace with three new AA batteries. When inserting the new batteries make sure that they are inserted correctly according to the small drawing in the bottom part of the control panel.



PA5 contains 3 batteries, size LR6, AA or Mignon.

### Approximate Battery Lifetime:

The battery lifetime using Alkaline battery type:

|                                        |           |
|----------------------------------------|-----------|
| With the instrument switched off:      | 12 months |
| With 80 dB tone switched on:           | 10 hours  |
| With 80 dB tone and light switched on: | 4 hours   |

### Battery Level indication:

When the batteries need to be replaced the LED indication for the present used stimulus will gradually reduce in light intensity and finally switch off.

**Note:** Always remove the batteries when the instrument is left unused for a longer period.





## Technical Specifications

The technical specifications provided here cover the general aspects of the instrument, while more specific details can be found in the Operation Manual in English.

**Standards:**

IEC 60645-1, Type 5

Sound Pressure Level of the loudspeaker: ISO 389-7

Sound Pressure Level of the headphone: ISO 389-1

**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.

**Power:**

Batteries : 3 x AA, LR6 or Mignon.  
Alkaline or rechargeable (NiMH or NiCa).

**Frequencies:**

500, 1000, 2000, 3000, 4000 Hz.

**Stimuli:**

Warble Tone, NB, WN.

**Intensities:**

Distance 50 cm : 30 – 80 dB HL in 10 dB steps, Warble Tone and WN  
20 – 70 dB in NB  
Distance 16 cm : increases the indicated intensity by 10 dB.

**Warble Frequency:**

5 Hz,  $\pm 5\%$ .

**Stimulation using TDH39S:**

Pure Tone: 500, 1000, 2000, 3000 and 4000 Hz.

Intensities of 30 – 80 dB (independent calibration applied when TDH39 is connected).

**Sound Source:**

Built in loudspeaker or headphone TDH39S (independent calibration registers).

**Light Stimulation:**

3 LED's arranged in a triangle, flash speed 5 Hz.

**Tone and Light Stimulation:**

Silent touch switch.

**Approximate Battery Lifetime:**

The battery lifetime using Alkaline battery type:

With the instrument switched off: 12 months

With 80 dB tone switched on: 10 hours

With 80 dB tone and light switched on: 4 hours

**Dimensions:**

L x W x H : 25 x 7 x 5 cm / 9.8 x 2.7 x 2 inches

Weight : 0.36 kg incl. batteries



**Detachable Parts**

- 3 Batteries
- Carrying Bag
- Operation Manual
- CE manual

**Concerning repair**

1. Interacoustics is only considered to be responsible for the validity of the CE marking, effects on safety, reliability and performance of the equipment if:

assembly operations, extensions, readjustments, modifications or repairs are carried out by authorized persons,

a 1 year service interval is maintained

the electrical installation of the relevant room complies with the appropriate requirements, and

the equipment is used by authorized personnel in accordance with the documentation supplied by Interacoustics.

2. It is important that the customer (agent) fills out the RETURN REPORT every time a problem arises and sends it to Interacoustics, Drejervænget 8, DK-5610 Assens, Denmark. This should also be done every time an instrument is returned to Interacoustics. (This of course also applies in the unthinkable worst case of death or serious deterioration to patient or user).
3. When instrument fuses need renewal, the correct type as stated on the instrument shall be used.



## 5 Specificații

### 5.1 Specificații tehnice AT235

| General                        |                                                                                                                                                                                                                              |                                                                                                                                                                                   |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Marcajul medical CE:           | Marcajul CE arată că Interacoustics A/S îndeplinește cerințele din Anexa II ale Directivei 93/42/CEE privind dispozitivele medicale.<br>Aprobarea sistemului de calitate este dată de către TÜV – număr de identificare 0123 |                                                                                                                                                                                   |
| Standarde:                     | Siguranță:                                                                                                                                                                                                                   | IEC 60601-1 Clasa I Tip B elemente aplicate                                                                                                                                       |
|                                | CEM:                                                                                                                                                                                                                         | IEC 60601-1-2                                                                                                                                                                     |
|                                | Impedanță:                                                                                                                                                                                                                   | IEC 60645-5 (2004)/ANSI S3.39 (2012), Tip 1                                                                                                                                       |
|                                | Audiometru:                                                                                                                                                                                                                  | IEC60645-1 (2012)/ANSI S3.6 (2010), Tip 4                                                                                                                                         |
| Mediul de operare:             | Temperatură:                                                                                                                                                                                                                 | 15 – 35 °C                                                                                                                                                                        |
|                                | Umiditate relativă:                                                                                                                                                                                                          | 30 – 90%                                                                                                                                                                          |
|                                | Presiune ambientală:                                                                                                                                                                                                         | 98 kPa-104 kPa                                                                                                                                                                    |
|                                | Timp de încălzire:                                                                                                                                                                                                           | 1 minut                                                                                                                                                                           |
| Afișaj afișajul                | color de 10 inchi cu rezoluție mare de 1024x600                                                                                                                                                                              |                                                                                                                                                                                   |
| Transport și depozitare:       | Temperatura de depozitare:                                                                                                                                                                                                   | 0°C – 50°C                                                                                                                                                                        |
|                                | Temperatura de transport:                                                                                                                                                                                                    | -20 – 50 °C                                                                                                                                                                       |
|                                | Umiditate relativă:                                                                                                                                                                                                          | 10 – 95%                                                                                                                                                                          |
|                                |                                                                                                                                                                                                                              |                                                                                                                                                                                   |
| Depozit intern                 | 500 de clienți și 50.000 de sesiuni                                                                                                                                                                                          |                                                                                                                                                                                   |
| Bateria internă                | CR2032 3V, 230mAh, Li. Nu poate fi accesată de utilizator.                                                                                                                                                                   |                                                                                                                                                                                   |
| Control PC:                    | USB:                                                                                                                                                                                                                         | Intrare/ieșire pentru comunicare cu computerul.<br>Datele pot fi trimise și salvate în computer și stocate în OtoAccess™ (este necesar modulul de sincronizare Diagnostic Suite). |
| Imprimanta termică (opțional): | Tip: MPT-III                                                                                                                                                                                                                 | Imprimantă termică MPT-III cu role de hârtie pentru imprimare. Imprimare la comandă prin USB                                                                                      |
| Sursa de alimentare            | UE60                                                                                                                                                                                                                         | Folosiți doar unitatea de alimentare specificată de tip UE60                                                                                                                      |
|                                |                                                                                                                                                                                                                              | Intrare: 100-240 VCA 50-60 Hz, 1,5 A<br>Ieșire: 24,0 VCC                                                                                                                          |
| Dimensiuni                     | Î x L x L                                                                                                                                                                                                                    | 29 x 38 x 7,5 cm                                                                                                                                                                  |
| Masa AT235                     |                                                                                                                                                                                                                              | 2,5 kg                                                                                                                                                                            |

| Sistemul de măsurare a impedanței |                                                                              |                                                                                                                                                                                                             |
|-----------------------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ton sondă:                        | Frecvență:<br>Nivel:                                                         | 226 Hz, 678 Hz, 800 Hz, 1000 Hz; tonuri pure; ±1%<br>85 dB SPL (≈ 69 dB HL) ±1,5 dB                                                                                                                         |
| Presiunea aerului:                | Control:<br>Indicator:<br>Interval:<br>Limită de presiune:<br>Viteza pompei: | Automat.<br>Valoarea măsurată apare pe afișajul grafic.<br>de la -600 la +400 daPa. 5%<br>-750 daPa și +550 daPa.<br>Automat, Rapid 300 daPa/s, Mediu 200 daPa/s, Încet 100 daPa/s, Foarte încet 50 daPa/s. |
| Reactanță:                        | Interval:                                                                    | De la 0,1 la 8,0 ml la un ton al sondei de 226 Hz (volum auricular: de la 0,1 la 8,0 ml) și de la 0,1 la 15 mmho la 678, 800 și un ton al sondei de 1000 Hz.<br>Toate ±5%                                   |
| Tipuri de testare:                | Timpanometrie                                                                | Automată, în care presiunea la pornire și la oprire poate fi programată de utilizator cu ajutorul funcției de configurare.<br>Control manual al tuturor funcțiilor.                                         |



|                          |                                                                              |                                                                                                                                 |
|--------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
|                          | Funcția 1 pentru trompa lui Eustachio - timpan neperforat                    | Testul Williams                                                                                                                 |
|                          | Funcția 2 pentru trompa lui Eustachio - Timpan perforat                      | Testul Toynbee                                                                                                                  |
|                          | Funcția 3 pentru trompa lui Eustachio - Trompa lui Eustachio este permeabilă | Măsurarea impedanței senzitive continue                                                                                         |
| <b>Funcții de reflex</b> |                                                                              |                                                                                                                                 |
| Surse de semnal:         | Ton – contra, reflex:                                                        | 250, 500, 1000, 2000, 3000, 4000, 6000, 8000 Hz, Bandă largă, Trece sus și jos                                                  |
|                          | Ton – Ipsi, reflex:                                                          | 500, 1000, 2000, 3000, 4000 Hz bandă largă, trece sus și jos.                                                                   |
|                          | Zgomot NB – contra, reflex                                                   | 250, 500, 1000, 2000, 3000, 4000, 6000, 8000 Hz                                                                                 |
|                          | Zgomot NB – ipsi, reflex                                                     | 1000, 2000, 3000, 4000 Hz                                                                                                       |
|                          | Durata stimulului:                                                           | 750 ms                                                                                                                          |
|                          | Acceptarea reflexului                                                        | Reglabilă între 2% și 6%, sau schimbare de 0,05 – 0,15 ml în volumul canalului urechii.                                         |
|                          | Intervale                                                                    | Dimensiunea pasului redusă până la 1 dB.                                                                                        |
|                          | Intensitate max.                                                             | 90, 100, 120 dBHL.                                                                                                              |
| Ieșiri:                  | Căști Contra:                                                                | Căști TDH39, căști DD45, căști cu fixare în ureche CIR și/sau căști cu fixare în ureche EARTone 3A pentru măsurarea reflexului. |
|                          | Căști Ipsi:                                                                  | Căști cu sondă încorporate în sistemul sondă pentru măsurarea reflexului.                                                       |
|                          | Conectarea sondei                                                            | Conectarea sistemului electric și de aer la sondă.                                                                              |
| Tipuri de testare:       | Reflex manual                                                                | Control manual al tuturor funcțiilor.                                                                                           |
|                          | Reflex automat                                                               | Intensități unice<br>Creșterea reflexului                                                                                       |
|                          | Diminuarea reflexului                                                        | Automată, 10 dB peste prag și controlat manual cu durate ale stimulului de 10.                                                  |
|                          | Latența reflexului                                                           | Automată, primele 300 ms de la începerea stimulului.                                                                            |

|                                |                                                                                                                                |                    |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------|
| <b>Funcțiile audiometrului</b> |                                                                                                                                |                    |
| Semnale:                       | Frecvențe Hz:                                                                                                                  | Intensități dB HL: |
|                                | 125                                                                                                                            | De la -10 la 70    |
|                                | 250                                                                                                                            | De la -10 la 90    |
|                                | 500                                                                                                                            | De la -10 la 100   |
|                                | 1000                                                                                                                           | De la -10 la 100   |
|                                | 2000                                                                                                                           | De la -10 la 100   |
|                                | 3000                                                                                                                           | De la -10 la 100   |
|                                | 4000                                                                                                                           | De la -10 la 100   |
|                                | 6000                                                                                                                           | De la -10 la 100   |
|                                | 8000                                                                                                                           | De la -10 la 90    |
| Tipuri de testare              | Determinarea limitei automate (Hughson Westlake modificat).<br>Testare automată: durată de 1-2 s reglată în intervale de 0,1 s |                    |