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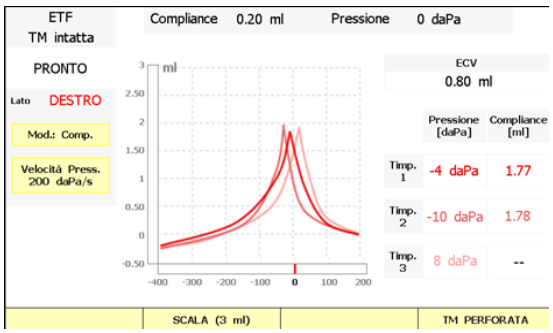
Performing Eustachian Tube Function (ETF) Test: a Guide to Controls and Settings

PRODUCT INSIGHTS

The Eustachian Tube Function (ETF) test is designed to assess the efficiency of the Eustachian tube under different physiological and pathological conditions. In Inventis instruments, the test is available in two modes: with intact tympanic membrane and with perforated tympanic membrane. Each mode provides specific interfaces and configurable parameters, enabling the operator to adapt the procedure to the patient's clinical needs. This Product Insight outlines the key controls, settings, and screen layouts required to conduct both types of ETF tests effectively, offering a practical guide for daily use.

ETF TEST WITH INTACT EARDRUM

To perform the ETF (Eustachian Tube Function) test, press the OTHER TESTS button on the instrument keyboard, then select the option using the left-hand knob. Function button 4 allows you to choose the type of test: ETF – TM Intact (with intact tympanic membrane) or ETF – TM Perforated (with perforated tympanic membrane).



Window for ETF test with intact eardrum

The layout closely resembles that of the tympanometry test, with the central portion of the screen displaying the graph for the selected ear. The main difference is found on the right-hand side, where the test results are shown.

On the horizontal axis, the pressure values correspond to the initial positive value and the final negative value of the sweep, as defined in the instrument Settings. As in tympanometry, when the tympanogram is displayed in absolute mode, a dash on the right side of the graph indicates the current compliance measurement.

> Test Parameters

The parameters that can be set directly from the ETF screen are the same as those available in the tympanometry

test. Specifically, the operator can:

- Modify the pressure sweep rate during the examination by pressing the Pressure Sweep button.
- Adjust the compliance scale of the graph using the SCALE function button. Note that the selectable scale values vary depending on the chosen tympanogram display mode (compensated or absolute).
- Switch between compensated and absolute display modes by touching the yellow-highlighted area. In absolute mode, compliance values are shown as measured, while in compensated mode they are displayed with the equivalent ear canal volume (ECV) subtracted.

All selected parameters are saved automatically by the instrument and retained at each successive power-up.

> How the Examination is Conducted

The first step is to select the ear tip best suited to the patient and insert the probe into the ear canal, ensuring a tight pressure seal. After selecting the ear to test (left or right), the procedure can be started by pressing the START/STOP button on the instrument or the corresponding button on the control box.

The test is based on the automatic acquisition of three tympanograms under different patient conditions:

- First tympanogram

The patient remains completely passive. Both the initial positive pressure and the final negative pressure can be configured from the Settings window.

- Second tympanogram

After the first tympanogram is acquired, the pressure in the ear canal is automatically raised to +400 daPa. Once this pressure is established, the patient is instructed to swallow several times to force open the Eustachian tube. When the patient has complied, press and hold the CONTINUE function button or the START button on the probe control box to record the second tympanogram.

- Third tympanogram

Following the second tympanogram, the pressure in the ear canal is automatically lowered to –400 daPa. The patient is again asked to swallow several times to open the Eustachian tube. To record the third tympanogram, press and hold the CONTINUE function button or the START button on the probe control box.

The three tympanograms are displayed in different shades of red (for the right ear) or blue (for the left ear), making them easy to distinguish.

> Test Results

The results of the ETF test are displayed on the right side of the window. The following values are calculated:

- ECV (Ear Canal Volume)

The compliance value measured at the starting pressure of the test, i.e., the highest pressure of the selected range. This value is also referred to as the equivalent volume.

- Pressure

The peak pressure values identified in each tympanogram.

- Pressure 1: peak pressure from the first acquisition (patient passive).
- Pressure 2: peak pressure measured during the second recording, when the patient is asked to swallow while middle ear pressure is at +400 daPa.
- Pressure 3: peak pressure measured during the third recording, when the patient is asked to swallow while middle ear pressure is at –400 daPa.

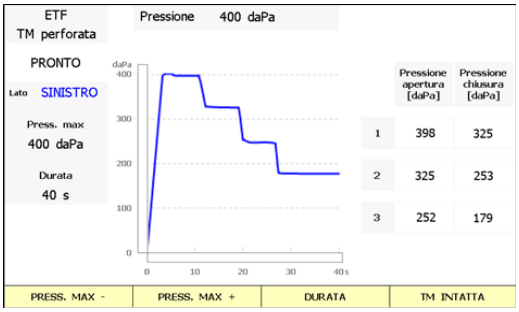
- Compliance

The amplitude of the tympanogram peak relative to the ECV. In absolute mode, this corresponds to the compliance measured directly at the tympanogram peak.

If one of the tympanogram peaks cannot be identified, the corresponding value will be replaced by the label "N.F." (NOT FOUND).

ETF TEST WITH PERFORATED EARDRUM

The ETF test with perforated eardrum is accessed by selecting the specific option from the ETF menu.



Window for ETF test with perforated eardrum

The interface follows the same layout as other tests:

- On the left side, information is shown regarding probe status and examination parameters (progress, maximum pressure value, and duration).
- The central area displays a graph of the pressure level in the ear canal during the test.

> Test Parameters

All parameters for this test can be set directly from the ETF screen; they are saved automatically and retained at subsequent power-ups. In particular, the operator can:

- Select the maximum pressure (via the PRESS. MAX function button). This represents the pressure to be applied in the patient's middle ear to evaluate Eustachian tube function. Values can be set between −600 daPa and +400 daPa, in 50 daPa steps (atmospheric pressure cannot be selected).
- Adjust the duration of the test (via the DURATION function button). Selectable values are 20, 30, 40, or 50 seconds.

At any time, the operator can switch to the ETF with intact eardrum mode by pressing the TM INTACT function button.

> How the Examination is Conducted

After selecting the most suitable ear tip and inserting the probe securely into the ear canal, the operator chooses the side (left or right) and starts the test by pressing the START/STOP button (or the equivalent control box button).

The ear canal is then pressurized to the selected value, after which the pressure pump switches off automatically. The patient is instructed to swallow repeatedly, forcing the Eustachian tube to open. When this occurs, the system registers a measurable drop in ear canal pressure.

> Test Results

Results are calculated automatically and displayed on the right side of the window in a results table. Three pairs of values are provided:

- Each pair consists of two pressure readings.
- The first value corresponds to the point at which a significant variation in pressure is detected.
- The second value indicates the stabilized pressure after the variation.

These values allow the identification of the pressures at which the Eustachian tube opens and closes.

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