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Performing Acoustic Reflex Test: a Guide to Controls and Settings

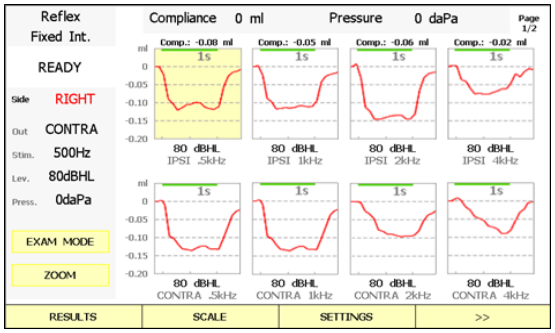
PRODUCT INSIGHTS

This Product Insight provides an overview of the operational features available for performing acoustic reflex testing with Inventis middle ear analyzers. The focus is on the different modes of examination, stimulus management, and pressure control options that allow clinicians to tailor the test according to patient needs. While the examples refer to the Clarinet series, the most advanced model in the Inventis portfolio, not all functionalities are available across every device. The aim is to highlight how the instrument's interface and settings support an efficient, customizable workflow for reliable acoustic reflex assessment.

ACOUSTIC REFLEX TEST WINDOW

The acoustic reflex test can be initiated by pressing the corresponding button on the keyboard or by selecting the dedicated area on the main display.

The graphical interface of the Acoustic Reflex Test window is shown below.



Acoustic Reflex Test window

The current test mode is indicated in the upper-left corner of the screen on a grey background. To change the mode, simply press function button 1 (EXAM MODE). The instrument will automatically store the last mode selected.

Regardless of the chosen mode, the bottom-left section of the display shows key information, including:

- the ear under examination,
- the pressure used during the test (Press.),
- and the current stimulus parameters:
  - Transducer (Out): Ipsi or Contra,
  - Stimulus (Stim.): frequency of the tone or type of noise,
  - Level (Lev.): intensity of the stimulus.

For pressure management, the operator can decide whether to perform the test entirely at atmospheric pressure (displayed as "Atm.") or at the tympanogram's peak pressure. If no tympanometry test has been carried out, the system defaults to 0 daPa.

On Clarinet, the pressure can also be set manually. In this case, the label "Man." is displayed next to the selected pressure value.

The main area of the screen is divided into eight boxes, each corresponding to the reflex curve obtained with a specific stimulation signal. The SCALE function button allows adjustment of the compliance axis, with selectable ranges of -0.05 to 0.2 ml or -0.1 to 0.4 ml. Curve polarity can also be inverted, as configured in the instrument settings.

Each box displays a green bar indicating the stimulus on-time, i.e. the duration for which the stimulus is active (configurable in the settings). Below the curve, the stimulus details (ear, frequency, intensity) are listed. Ipsilateral reflexes are displayed in darker tones, while contralateral reflexes appear in lighter ones, enhancing visual distinction.

The active box is highlighted with a yellow background. Navigation between boxes can be done by turning the right-hand knob. Selecting the ZOOM area enlarges the active box to full screen, allowing a more detailed view of the reflex curve. In this mode, the reflex amplitude is also shown. To exit, press ZOOM again or use the BACK button.

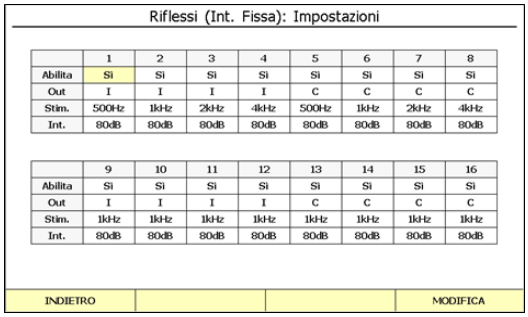
By pressing the SETTINGS function button, the operator can access a dedicated window to configure parameters for conducting reflex tests.

MODES OF CONDUCTING THE EXAMINATION

The acoustic reflex test can be conducted in several modes. The instrument will always default to the configuration used in the most recent test for each ear. The available modes may vary depending on the model and version of the device.

Fixed intensity

In this mode, a single stimulus signal is presented to the patient for each box. All boxes are preconfigured, and the operator can adjust the stimulus type by pressing function button 4 to access the settings window.



	1	2	3	4	5	6	7	8
Abilita	Si	Si	Si	Si	Si	Si	Si	Si
Out	I	I	I	I	C	C	C	C
Stim.	500Hz	1kHz	2kHz	4kHz	500Hz	1kHz	2kHz	4kHz
Int.	80dB	80dB	80dB	80dB	80dB	80dB	80dB	80dB

	9	10	11	12	13	14	15	16
Abilita	Si	Si	Si	Si	Si	Si	Si	Si
Out	I	I	I	I	C	C	C	C
Stim.	1kHz	1kHz	1kHz	1kHz	1kHz	1kHz	1kHz	1kHz
Int.	80dB	80dB	80dB	80dB	80dB	80dB	80dB	80dB

Window with settings for "fixed intensity" mode

Each of the 16 boxes can be configured independently with the following parameters:

- Enable: whether the box is active (Yes/No);
- Out: output type (IPSI/CONTRA);
- Stim.: stimulus type, i.e., tone frequency;
- Int.: stimulus intensity.

For safety reasons, a warning appears whenever a stimulus signal above 100 dB HL is selected. When exiting the settings screen, if at least one parameter has been modified, the operator is prompted to either save the changes or retain the previous settings. If changes are confirmed, all examination data will be deleted.

The reflex test is started in the same way as other examinations, by pressing START/STOP on the instrument or the corresponding button on the control box. Once the pressure reaches the target value, all enabled boxes are examined sequentially, starting from the first. The test ends automatically once all enabled boxes have been completed. When threshold intensities are identified, the box is marked with the label "THR." (Threshold). Importantly, each stimulus is presented only after the instrument verifies the stability of the measured compliance value, in order to reduce false positives.

If the examination is interrupted, for example, due to loss of pressure or an "open/closed" probe status, the sequence can be resumed from the last completed box simply by pressing START/STOP again. It is also possible to test a single box by selecting it and pressing the STIMULUS button.

Automatic Threshold

This mode differs from fixed intensity mode in that

it automatically determines the minimum intensity of a given stimulus capable of eliciting the reflex, the Acoustic Reflex Threshold (ART).

As in fixed intensity mode, the boxes are preconfigured. For each box, the displayed level indicates either the intensity at which the test will start (if no data are available) or the intensity of the stimulus used for the stored curve.

To configure the boxes, the operator presses the SETTINGS function button to access the settings window. The parameters are set in the same way as for fixed intensity mode, with the addition of two items:

- Start: the initial level of the stimulus in the threshold search;
- Stop: the final level of the stimulus in the threshold search.

From the same window, the operator can also select the intensity increment applied during the search. Available values are 5 dB and 10 dB.

The procedure for starting the test on a single box, or examining all enabled boxes in sequence, is the same as described for fixed intensity mode.

For a single box, the algorithm works as follows:

- The stimulus is presented at the initial level. The system checks — using the check-box next to the stimulus on-time — whether the measured compliance has changed compared to the baseline value (no stimulus), by at least the amount defined by the selected sensitivity (see Settings).
- If a significant variation is detected, the instrument verifies measurement stability to reduce the risk of false positives (artifacts).
- When both conditions are satisfied, the ART is identified and the test ends automatically.

If no reflex is detected, the stimulus is increased by the selected increment and presented again. This sequence continues until the ART is found, or until the predefined final level is reached. If the maximum intensity is reached without reflex identification, the label "N.F." (Not Found) will appear.

The threshold search can also be run in accelerated mode (see Settings). In this mode, acquisition is stopped as soon as the measured value fails to meet the identification criterion, and the next higher intensity stimulus is presented immediately.

Growing Intensity

In this mode, the amplitude of the reflex is analyzed in relation to progressively increasing stimulus intensity.

On each side, up to two different stimulus signals (defined by the combination of output and stimulus type) can be examined. Each signal is associated with four boxes, which display the reflex curves recorded at incrementally higher intensities.

The operator can set both the increment value (1 dB, 2 dB, or 5 dB) and the maximum stimulus intensity. The test can also be configured to continue until the threshold is identified, in which case only the three boxes preceding the threshold will be displayed. These parameters are adjusted from the SETTINGS window.

The procedure for starting the test is the same as for other reflex modes. During the examination, the patient is presented with a sequence of four or more stimuli, automatically generated at increasing intensity. If the maximum set value or the maximum permitted by the selected stimulus/transducer is reached, the test is automatically interrupted.

Manual

In manual mode, unlike the preconfigured modes, the characteristics of the stimulus signal are selected directly from the test screen using the dedicated buttons. This mode also allows the operator to perform the exam without presenting any stimulus ("NO STIM.").

The test begins by pressing the START/STOP button, which establishes the pressure indicated on the display in the ear canal. The characteristics of the selected stimulus are shown above the active box. By pressing STIMULUS, the signal is delivered to the patient while data is simultaneously acquired and displayed. If a threshold is identified, the label "THR." (THRESHOLD) will appear on the box. The ear canal pressure is maintained until the operator ends the test

by pressing START/STOP again.

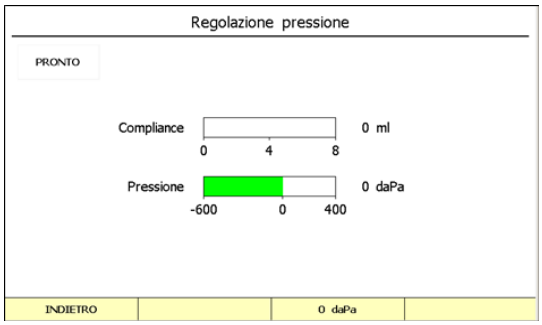
During the procedure, the operator can move from one box to another to test different conditions. If the stimulus type is changed, the examination automatically proceeds to the next box once the current one is completed.

Additional parameters for this mode include:

- the option to maintain the current intensity level when changing stimulus type;
- the ability to set a default intensity level for the stimulus, accessible via function button 4.

MANUAL PRESSURE ADJUSTMENT

The Manual Pressure Adjustment window is accessed by pressing the PRESSURE button.



Pressure adjustment window

At the top left of the screen, the probe status is displayed, while the central area shows two horizontal bars: one for the measured compliance values and one for the current target pressure. If a tympanometry test has been performed beforehand, the peak value of the tympanogram is also displayed above the compliance bar.

The target pressure can be adjusted to the desired value by turning the right-hand knob. To quickly return the pressure setting to atmospheric, the operator can press the 0 daPa function button.

Pressing BACK returns to the previous screen, with the target pressure automatically set to the last selected value.

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