NTi AUDIO

Made in Switzerland

Room Acoustics
MEASUREMENT SOLUTIONS

XL3 OR XL2 ACOUSTIC ANALYZER

DS3 DODECAHEDRON LOUDSPEAKER

PA3 AMPLIFIER

MR-PRO SIGNAL GENERATOR

TALKBOX CALIBRATED SOUND SOURCE

δ-CLAPPER IMPULSIVE SOURCE

ROOM ACOUSTICS REPORTER PC SOFTWARE

www.nti-audio.com

Measurement Solutions for Room Acoustics

For legitimate and standards-compliant Room Acoustics measurements, such as STIPA Speech Intelligibility, Reverberation Time and background noise levels, you need a proper set of measurement tools. These should be robust, portable and easy to use, so that you can evaluate even rigorous environments.

Effortless Measurement Process

Essential for Room Acoustics analysis are the XL2 or XL3 Acoustic Analyzer and the Room Acoustics Reporter PC software. When measuring the Reverberation Time (RT), for example, the XL2 automatically triggers measurements on the clocked pink noise signal produced by the DS3 Dodecahedron Loudspeaker, or on the impulse from the δ-Clapper (pronounced delta-Clapper) or a bursting balloon. The XL2 then precisely records the decay spectra, and calculates the RT result as well as the correlation and measurement uncertainty.

The XL3 Acoustic Analyser also records the audio signal during the measurement and calculates the result according to four common methods (T20, T30, T15, EDT) simultaneously.

Room Acoustics Reporter PC Software

XL2 and XL3 Acoustic Analyzer

Overview of Measurements

Sound Pressure Level

The XL2 and XL3 measure a respectable assortment of values, including all relevant levels such as Leq, maximum, and minimum sound levels, using frequency weighting A, C and Z as well as time weighting Fast, Slow and Impulse. Further, percentile statistics are automatically calculated.

For long-term measurements, all levels can be saved, with selectable intervals, in log files on the built-in SD card. In addition, both sound level meters offer the parallel recording of audio files (WAV) in order to fully document and evaluate the sound level measurements.
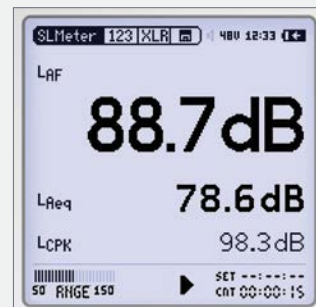
Background Noise Spectrum

In addition to the broadband levels, the XL2 and XL3 simultaneously measure the real-time spectrum in 1/3-octave or octave band resolution in accordance with the IEC 61260 class 0 standard. The results of the broadband sound level and 1/3-octave band measurement are available in parallel as averaging, maximum or minimum levels. The spectral values can also be recorded in log files.
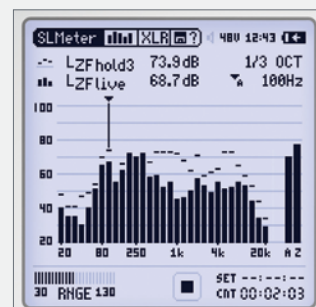
Reverberation Time

Both the XL2 and XL3 Acoustic Analyzers measure the energy decay in the range from 63 Hz to 8 kHz by the Schroeder method in 1/1 octave bands. Automatic triggering and averaging of multiple measurements simplifies the operation and minimizes the measurement time. Use either an impulse source or an interrupted pink noise as the test signal. The optional Extended Acoustic Pack extends the RT measurement to a 1/3 octave resolution.

The measurement results are analysed directly on the device.
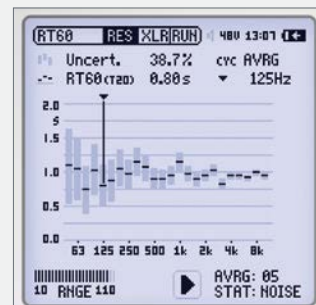
STIPA Speech Intelligibility Option

With the STIPA option installed, the XL2 Acoustic Analyzer measures speech intelligibility in accordance with the IEC 60268-16: 2020 standard (edition 5 and previous). It supports ambient noise correction as well as the automatic averaging of several measurement cycles.

The XL2 displays the Speech Transmission Index (STI) and the Common Intelligibility Scale (CIS) results, along with the individual levels and modulation indices of the seven octave bands. With this, for example, the distraction and privacy distances in open-plan offices can be determined in accordance with the ISO 3382-3 standard.
(STIPA measurement will be available for the XL3 Sound Level Meter from Q2/2024)
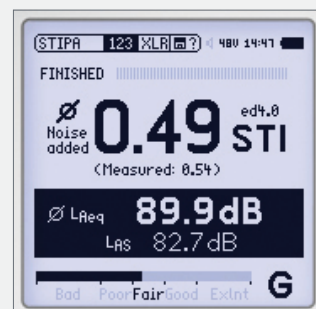
Noise Curves

Measuring Noise Curves provides an objective assessment of the background noise in a room. The Noise Curve value reported by the XL2, is derived from the acoustic spectrum as the highest reference curve touched. The XL2 also determines the Speech Interference Level (SIL) in parallel. The Noise Curve measurement function is available with the XL2 Spectral Limits option.
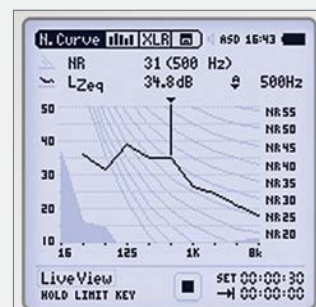
Convenient Professional Reports

The Room Acoustics Reporter PC software provides the data visualization and allows acoustic experts to perform detailed evaluation. Taking into account the volume of the room and the objects within it, the software also helps with the choice of size and quantity of additional sound absorbers, should they be deemed necessary to improve the acoustics of the room. The software also complies with the most relevant national and international standards (see page 6) and creates standards-compliant reports.

Measurement Data

The recorded measurement data can be loaded directly from the measurement device into the Room Acoustic Reporter on your PC. Thanks to a sensible file naming convention, the software then automatically color codes and groups results to differentiate, for example, between measurements taken before and after a room treatment.
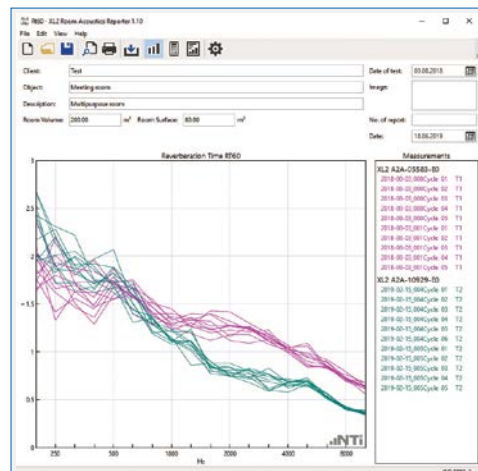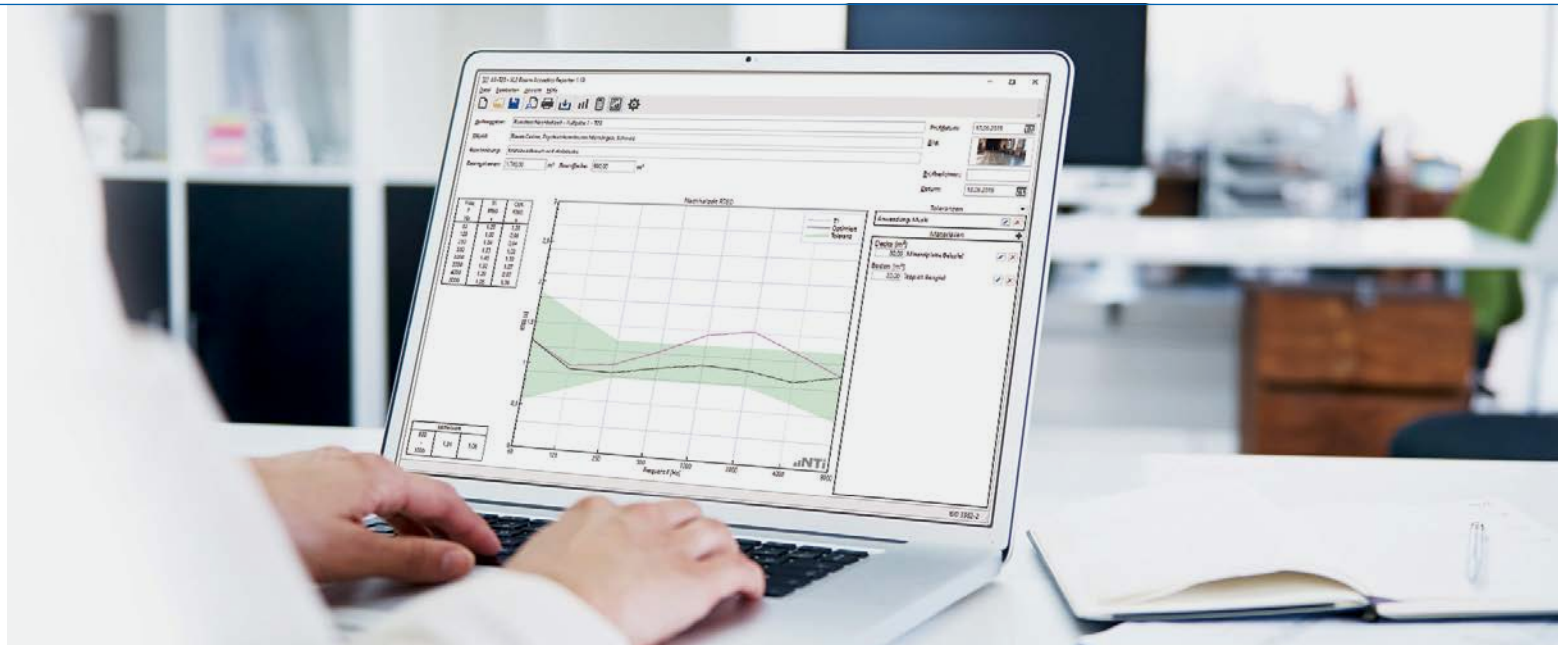

Measurements View
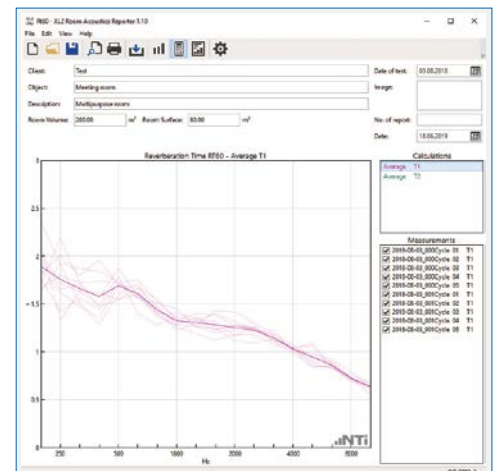
Calculations View

with the Room Acoustics Reporter

Analyzing the Data

Consecutive Reverberation Time measurements will vary and can even create outliers due to incorrect triggering and/or external disturbances. The software helps you to remove these invalid measurements, and then calculates the average value for the report.
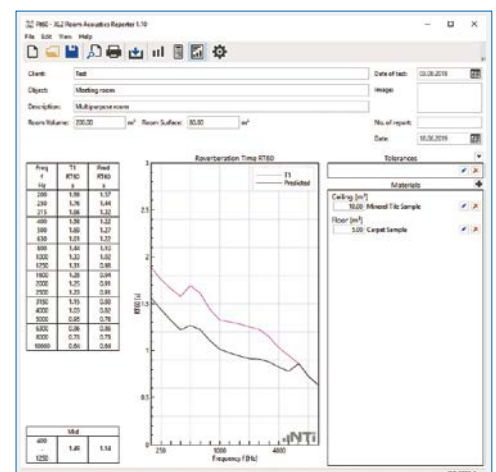
Results

Next, the Room Acoustics Reporter shows the average reverberation time in a table as well as in a standardized chart with a range of 50 Hz to 10 kHz. The mid-frequency result is also shown in the report.

Simulation

Too much reverberation in a room can be detrimental to the acoustic quality, while acoustically "dry" spaces can also be perceived as unpleasant. To check if the room complies with standards, the Room Acoustics Reporter software provides tolerance bands within which the reverberation time should fall.

The target reverberation time can be simulated in the software by placing virtual damping material on the ceilings and walls. The Room Acoustics Reporter provides an extensive library of materials together with their absorption coefficients. The software also supports the simulation of objects in the room e.g. how a crowd or furniture can affect reverberation time.

Results View

Which devices do you need?


XL2 or XL3 Analyzer for Room Acoustics

> Easy to use

> Highest Precision

> Removable SD card

> More Measurement Functions

> Type Approved

> Sound Level and RT Measurements, STIPA, Noise Curves

XL2 Acoustic Analyzer

Room Acoustics Reporter Software

> Effortless import of data from the XL2

> Immediate results

> Simulation possibilities

> Professional reports

> Measurement of absorbers in reverberation chambers according to
ISO 354:2003, AST C423-17
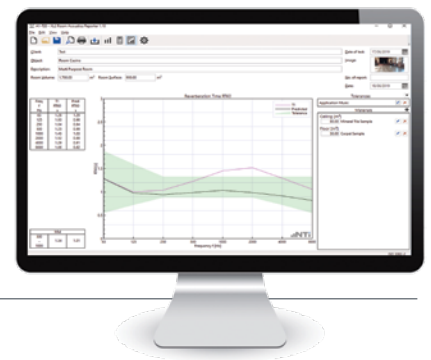
Room Acoustics Reporter PC Software

International Standards

> Level: IEC 61672

> Spectrum: GB 50371, GB 50526, IEC 61260

> STI: IEC 60268-16:2011

> RT: ISO 3382-1, 3382-2, ASTM E2235, DIN 18041:2016, ÖNorm 8115-3:2005, ASR A3.7:2021

> Noise Curves: ISO 1996:1971, ANSI S12.2-1995, ANSI S12.2-2019, ASA 1971

Sound Sources for your Measurements

Dodecahedron Speaker Kit DS3 + PA3

> Lightweight (7.5 kg / 16.5 lbs) and compact

> Typical sound power level 120.5 dB

> Longterm level deviation < 1 dB

> Equalized frequency response acc. ISO 16283, ISO 3382

> Wireless remote control

Minirator MR-PRO

> Precision Signal Generator

> Big choice of test signals

> Load your own audio files (WAV)

δ-Clapper

> Impulsive source

> Simple manual operation

> Reverberation Time RT

> Very wide acoustic dispersion range

TalkBox

> Individually calibrated

> Simulates a human talker (60 dBA @ 1 Meter)

> Choice of test signals

> Minimal intrinsic noise at high output levels

> Ideal reference loudspeaker for conference room calibration

12.23