

SOFTWARE FOR ACOUSTICS



SAMURAI — siNoise — SMT — NWWin — AcoustiCam — ME'scope — si++

SAMURAI™

SINUS Acoustic Multi-channel Universal Real-time Analysis Instrument

SAMURAI is our universal software package for noise and vibration measurements as well as real-time analysis with Soundbook, HARMONIE and NoiseLOG.

SAMURAI contains 2-, 4- or 8-channel sound level meters which are conforming to the IEC60651 / IEC 60804 / IEC 61672-1 standards. In Germany the system is officially calibratable using the siNoise program version (fixed setup). Additionally, we have obtained the type approval according to IEC 61672-1 and IEC 60260 (for 1/3 octaves) in Austria and Hungary. Because of the high system performance the user benefits from a wide range of functions simultaneously available on all measurements channels. SAMURAI features excellent display capabilities not only during the measurements but also during the post-processing of the measurement results. Simultaneously with the measurement and analysis, the data from all virtual instruments (sound levels, spectra, speed, video, slow channels) is stored in separate data streams.

SAMURAI offers a great variety of innovative functions:

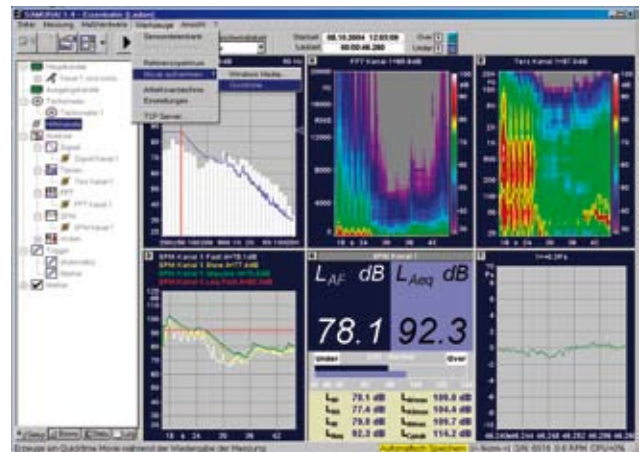
- Integration of a transducer database for all common transducer types
- Multi-analysis function including SLM, spectra, history, sonogram, waterfall, auxiliary channels
- Convenient adjustment of the display properties by the user
- File access via internal browser
- Data storage directly on external USB drives
- All statistical values can be calculated in octave and narrow bands
- Automatic calibration check before the measurement
- Complex triggers and markers
- Display of 1/3-octave and FFT spectra in the same window
- Window for tonality display
- Display of the measurement data versus time or versus RPM
- SAMURAI takes advantage of the PC sleep mode, switching it on/off for the defined measuring periods.

SAMURAI has a powerful Windows user interface enabling intuitive pen and touch screen operation. It supports the storage of various user-defined setups and offers a variety of storage modes.

The integrated **REPLAY Mode** allows the replay of stored measurements. In the **Easy Operator Mode** setups may be predefined for inexperienced users with restricted program access, thus enabling them to perform even complex measurements without the corresponding expert knowledge. The measurement values can be displayed in 1 to 16 windows, independent of the data acquisition and storage. The display properties may be set before, during and after the measurement.

Apart from the acoustic measurement channels, two digital inputs and outputs as well as five auxiliary channels for the acquisition of slow signals (only 2-/4-channel devices) are available. The digital inputs and outputs may be used as triggers, as tachometers or for GPS synchronization.

The output channels may optionally be fed with the input signals, the stored signals or internally generated signals, such as white or pink noise, simultaneously to the measurement. Furthermore, SAMURAI offers the possibility to record and replay an audio comment to each measurement.



SAMURAI includes the following virtual instruments as basic functions for each channel:

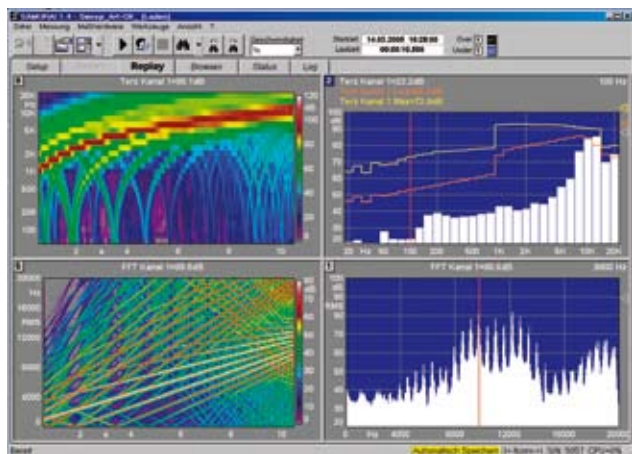
Sound level meter

Class 1 sound level meter according to IEC 60651 / 60804 / IEC 61672 with simultaneous measurement of A, C and Z frequency weighted as well as Fast, Slow and Impulse time weighted signals. In addition, the sound level meter includes 10 percentiles, an automatic impulse detection function, the measurement of Takt maximal, the measurement of impulsiveness and low frequency contents and a variety of intelligent triggers and markers. The parallel storage of up to 61 measurement values is performed at freely adjustable time intervals.

- Class 1 according to IEC 60561, 60804, 61672
- Level with Fast, Slow, Impulse, Peak time weightings
- Simultaneous A, C, Z frequency weightings
- L_p , L_{max} , L_{min} , L_{eq} , L_{peak} Of all level values
- L_E , $L_{Atm1/3/5}$, L_n

Frequency analyzer

Real-time 1/3 octave analysis for octave center frequencies from 0.04 Hz...40 kHz and FFT analysis with 100...25,600 lines; each analysis option includes freely selectable averaging modes and storage intervals. Additionally, the sum levels for each are displayed and stored. Up to 8 channels may be simultaneously displayed in a single window as momentary, maximum, minimum and Leq spectra. The 1/3 octave analyzer is based on digital filters and complies with Class 0 according to the IEC 61260 standard.



Real-time 1/3 octave analyzer:

- 1/3 octave filter according to IEC 61260 Class 0
- Bands of 0.04 Hz...40 kHz freely selectable
- Display as bar, contour or line graph

FFT analyzer:

- FFT analyzer with 100...25,600 lines
- Frequency range of 0...19.5 Hz to 0... 40 kHz selectable
- Display as bar, contour or line graph

Sound signal storage

Triggered time signal storage with a freely selectable bandwidth of DC...40 kHz (decimation filters for recording 1/2...1/1024, interpolation filters for replay) to reduce the data volume.

Level recorder

- Level recorder for all sound level meter values
- Level recorder for all frequency analyzer bands
- Level recorder for all additional auxiliary channels

Reverberation time measurement

Reverberation time measurement in 1/3 octaves using the excitation types:

- Interrupted noise
- Impulse
- Sine-sweep (only with the Multi Generator option).

The signal outputs may be used as (pink) noise generators.

Software options available for SAMURAI:

Option: HVMA

The Human Vibration Multi-Analyzer enables the measurement of human vibration on three spatial axes using all weighting filters according to the ISO 2631 and ISO 5349 standards. The values for the x-, y-, and z-axis as well as the resulting vector for hand/arm and whole-body vibration with Comfort and Health weighting are displayed simultaneously.

Option: Automation:

Automatic comparison of a frequency analysis with reference spectra and their management as well as an automatic reaction of the device (sending a message, switching an output signal or starting an application, e.g. to send an email).

Option: Vibration Meter

This option includes single and double integration of a time signal as well as third order high-pass and low-pass filtering with switch-selectable edge frequencies. This option complies with standards for vibration meters on machines according to ISO 2945, ISO 7919, DIN ISO 10816 for the settings HP=10 Hz and LP=1 kHz.

Option: Fractional octaves

This option includes 1/1, 1/3, 1/6, 1/12 or 1/24 octaves up to 40 kHz in real-time. All filters comply with Class 0 according to IEC 61260.

The bandwidth may be freely selected between 0.04 Hz...40 kHz. Momentary, maximum, minimum and Leq spectra can be displayed simultaneously.

Option: NoiseCam

In addition to audio recording, the NoiseCam option in combination with a webcam allows a video to be recorded with a freely selectable compression rate. Two measurement values from a sound level meter or HVMA channel can be superimposed on the video. Thus measurement sequences and conditions can be easily and clearly documented. The export to any multimedia standard format enables the video to be replayed on every PC. Thus, a clear documentation of sound level exceedances may also be delivered to the originator or to the authorities via internet.

Option: Multi Generator

Apart from the noise generator this option includes the signal shapes: sine, rectangle, triangle, impulse, multi-sine, logarithmic and linear sine-sweep as well as pseudorandom noise. Freely defined signals or stored measurement values as .WAV files may also be output synchronously to the data acquisition and FFT analysis.

Option: Pass-By

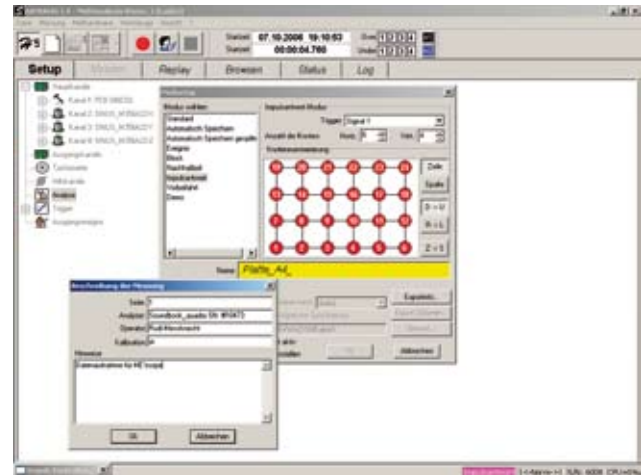
This option is for the innovative vehicle pass-by noise measurement according to ISO 362 using the StarPass system (described on page 9). The measurement of the vehicle speed and the detection of the entering and leaving of the measurement section are performed by a highly precise GPS system. The driver controls the measurement sequence and receives all necessary information over a small TFT display on the dashboard of the vehicle. During this measurement, SAMURAI is operated remotely by StarPass via TCP/IP.

Option: TCP/IP Interface

This option allows all functions of SAMURAI to be controlled via network connection, permitting SAMURAI to be integrated into complex systems. All functions can be started by network commands. Except for time data, all data streams can be transmitted via the network in real-time.

Option: TCP/IP Client

Remote control of SAMURAI via any network. Commands, status messages and measurement data are transmitted via wireless network or GSM connection and displayed as in SAMURAI. Up to 12 devices can be controlled simultaneously. During the measurement, the sound level, the level history and the spectra are displayed.



Option: Transfer FRF

This option supports the measurement of the transfer function of a structure using an impulse hammer and a triax-accelerometer. After the editing of the geometry, the user is guided through the measurement.

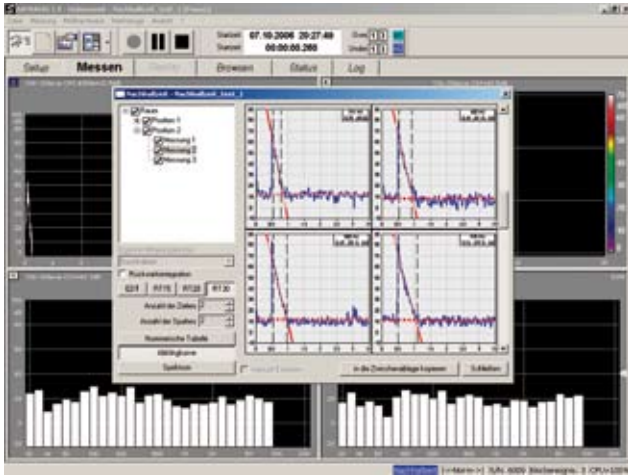
The trigger levels are controlled automatically and the user has the possibility to manually correct the measuring sequence. The transfer functions are then displayed. The data can be exported to ME'scope (UFF).

Option: Building Acoustics

SAMBA is user-oriented software for the convenient performance of measurements and analyses necessary in building acoustics. Apart from reverberation time measurements (already included in the basic scope of SAMURAI), this option allows the source and receiving spectra as well as the background noise signal to be determined.

It calculates the insulation for airborne and impact sound according to the standards. The menu navigation optimally supports the user in this work. Measurement, analysis and report functions are integrated into a cohesive and clear user interface.

During the measurements performed with SAMBA, the SAMURAI display is also available, e.g. 1/3 octave display for the individual channels. The selectability of the measurement signal (noise, impulse or sine-sweep) guarantees optimal results.



SAMBA main features:

- Management of source/receiving rooms and transmission paths
- Clear navigation including status display
- Selectable frequency ranges (e.g. 125 - 3150 Hz or 50 - 5000 Hz)
- Online display of the current 1/3 octave spectrum in SAMURAI
- Measurement of reverberation time spectra and level decay curves
- Time history of frequency band
- Automatic averaging of several microphones and measurements
- Calculation and display of the background noise level from the transmission/reverberation time measurement
- Standards integrated
 - ISO 140-4 (Measurements, airborne sound insulation)
 - ISO 140-7 (Measurements, impact sound insulation)
 - ISO 717-1 (Rating, airborne sound insulation)
 - ISO 717-2 (Rating, impact sound insulation)
- Usage of internal or external generators
- Flexible creation of a measurement report including form and result export
- Option to control the measurement sequence remotely
- Creation and printing of the measurement protocols according to the standard

Option: Sound power measurements

The measurement of the sound power in 1/3 octaves and as sum level using various geometries and numbers of microphones can be performed in real-time or as post-processing.

The menu navigation optimally supports the user in this work. Measurement, analysis and report functions are integrated into a cohesive and clear user interface. During the measurements performed with the sound power option the SAMURAI display is also available, e.g. 1/3 octave display for the individual channels.

Depending on the requirements and the number of available measurement channels, the measurements can be performed simultaneously or sequentially. In addition, further operational parameters of the object under examination (e.g. RPM or power) may be measured and visualized synchronously.

The sound power is calculated automatically according to the ISO 3744 and ISO 3746 standards.

Option: Order tracking

The order tracking option is used to calculate and display spectra versus the orders of a base frequency or versus RPM. For this option we offer a variety of RPM sensors which are connected to tachometer input 1 or 2 using a special adapter box which also provides the power supply for the LASER sensors.

Option: Sound intensity (in preparation)

Sound intensity measurements according to ISO 9614 Part 1 and 2 including sound mapping superimposed on digital photos.

This option allows the measurement of the sound power at a stationary background noise level without requiring free-field conditions. The user is guided through the whole measurement sequence and the measurement criteria are monitored automatically in accordance with the standard. The program also supports the calibration of the sound intensity probes.