VA-Lab 2/4 represents the most cost-effective 2 or 4-channels solution for all your needs in Acoustics Measurement and Analysis.

Features
A complete set of application oriented modules for measurements and analysis of acoustic signals.

- Simultaneous real-time 2/4 channel FFT, 1/n octave, and cross-spectra, etc.
- Long term noise monitoring for environmental noise analysis or product noise monitoring
- Measurement of sound absorption coefficients in impedance tube according to ISO10534-1 and ISO10534-2
- Measurement of sound transmission in impedance tube using four-microphone technique (VA-Lab4 only)
- Multi-channel reverberation time measurements
- Measurement of Sound Insulation between rooms and automatic calculation of Indices.
- Sound power measurements based on ISO 3745 with 2/4 channels
- Sound Intensity measurements and partial sound power calculations
- Audio analysis for frequency responses and harmonic distortions.
- Data recording and playback

Applications
Building industry, Materials, Construction Machines, Environmental, Electric appliances/IT, and Household appliances.

Technical Specifications
VA-Lab2 supports the following hardware from BSWA:

- **MC3022**: 2 channel ICCP inputs; 2 channel outputs; USB powered. Recommended for field uses.
- **MC3522**: 2 channel ICCP inputs; 2 channel outputs; USB powered, built-in power amplifier to drive loudspeakers (needs 220V AC power for amplifier) Recommended for impedance tube; and audio analysis
- **VS302USB**: 2 channel ICCP inputs; 2 channel outputs; 220V AC powered. Recommended for Lab uses.

VA-Lab4 supports the following hardware from BSWA:

- **MC3242**: 4 channel ICCP inputs; 2 channel outputs; USB powered. Recommended for field use
- **MC3642**: 4 channel ICCP inputs with gain x1, x10, and x100; 2 channel outputs. Recommended for lab use.
VA-Lab2/4 Standard Functions

- VA-Lab Hardware management & configuration
- Transducers and Calibrations
- Signal recording: Direct-to-disk (PC)
- Signal playback to earphone
- Signal playback to analyzer
- Statistics: RMS, RMS in band, Leq, Min, Max, Peak, P-P, Average, Disparity, Skew, Kurtosis, Statistics vs. time
- Narrow Band Analysis up to 12,800 lines (from 20Hz to Max Bandwidth and zoom)
- Broad Band Analysis up to 1/24th (from 20Hz to Max Bandwidth)
- Average FFT, Average Cross Spectrum, Average 1/n analysis
- Octave vs. Time
- Real time Display
- Sine, Peak/Noise Noise; Sweep; Multi-tone
- User defined signal in .Wav formats
- Vibration Measurements (VA-Lab4 only)

VA-Lab Optional Software Modules

- Environmental Noise Monitoring: RMS, RMS in band, Leq, Min, Max, Peak, P-P, Ln, 1/3 Octave vs time.
- Reverberation Measurements
- Sound Intensity Measurements
- Sound Power Measurements using 2/4 channels
- Sound Insulation between rooms using 2/4 channels
- Sound absorption measurements in the impedance tube
- Sound transmission loss measurements in impedance tube (VA-Lab4 only)
- Sound absorption measurement in R-Cabin or reverberation room (VA-Lab4 only)
- Audio signal analysis for frequency response and total harmonics distortion.
VA-Lab is an acoustical measurement software developed by BSWA. VA-Lab takes the advantage of computer power and performs all signal analysis within the computer. VA-Lab supports BSWA Data Acquisition Hardware and Microphones. It is an affordable and easy to use acoustic measurement software.

VA-Lab is developed based on the international standards and BSWA experiences in acoustics. These experiences span from environmental, architectural, industrial, and audio acoustical measurements. VA-Lab has module design with the special applications according to ISO standard requirements, such as Sound Power, Sound Insulation, and Impedance Measurements.

The VA-Lab function modules include:

- **BASIC**: FFT based signal analysis for vibration and acoustics
- **ENV**: Sound pressure level and environment noise measurements
- **IMP**: Two and four microphone methods for absorption and TL measurements in Impedance tube according to ISO10534
- **SI**: Sound intensity measurements
- **REV**: Reverberation time measurements according to ISO3382
- **TL**: Sound Insulation measurements for building material according to ISO 140.
- **POWER**: Sound Power Measurements according to ISO3745
- **AUDIO**: Audio testing by using stepped sweeping, frequency response and THD are tested at one time

VA-Lab software works with MC3022, MC3522, MC3242 and NI Compact DAQ hardware. The MPA201 microphone is commonly used with the VA-Lab systems.

**Main Features of VA-Lab BASIC:**

- **FFT Analysis**: general signal analysis including FFT, CPS, Transfer Function, Coherence, Auto Correction, Cross Correction, Cepstrum, etc. Data can be captured and saved in real-time mode
- **1/n Octave**: general 1/n octave analysis for sound and vibration signals, n=1,3,6,9,12,24
- **Calibration**: user selection of sound or vibration calibration
- **Signal Generator**: sine, square, triangle, sawtooth wave, white noise, pink noise, frequency sweep, multi-tone, tone burst, wavefile, etc.
- **Record**: Wave file or time series signal record and play back
**Architectural Module**

VA-Lab ARCH module provides reverberation time measurements and sound transmission loss measurements according to ISO standards.

**Main Features of VA-Lab ARCH**

- Two methods: interrupted noise, impulse response measure reverberation time in 1/1 or 1/3 octave frequencies according to ISO 3382
- Sound pressure decay curves display, support user-defined reverberation time calculation
- Airborne sound insulation of building elements Measurement
- Measurements of impact sound insulation of floors
- Automatically calculate single-number quantity: Rw, Xw, and its spectrum adaptation

**Environment Module**

VA-Lab ENV is a powerful sound level meter. It supports maximum 10 channel sound pressure level measurements at 10 locations. Each channel can perform multi-task analysis such as statistical levels, 1/3 octave, and levels vs. time.

VA-Lab ENV has built-in data logger function, it can continuously log the overall and spectral data into the memory.

Using MC 3022 and MPA215 microphones, VA-Lab ENV satisfies IEC 61672 Class II accuracy requirements.

**Main Features of VA-Lab ENV**

- Simultaneously measure SPL, RMS, MAX, MIN, PEAK, LEQ, SEL, L10, L50, and L90
- A, C, Lin weighting
- Fast, Slow, Impulse
- Continuous, Time limited optionally
- Spectral data logger associated time history 1/1 or 1/3 octave Real-time display
- Sound level analysis at user defined intervals
- Long time monitoring of sound pressure levels, up to 5 hours in one graph
Sound Power Module

In order to determine the sound power level produced by the noise source, one method is measuring the sound pressure level on the measurement surface enveloping a noise source.

VA-Lab Power module is specially designed to satisfy sound power level test according to ISO3745. With NI Compact DAQ and BSWA microphones, the noise level can be tested simultaneously in 10 channels; the sound power level is calculated automatically based on the measurement surface area.

With microphone conditioning unit MC104 (MC1010 is 10 channel version), the background noise can be below 20 dBA for some critical measurements.

Main Features

- No limited to the number of microphone positions, but total number of positions measured simultaneously is limited by the channels of hardware
- Real-time sound pressure level and spectrum measurement
- Environment correction according to ISO 3745 2003
- Correction for background sound pressure levels have two choice: correction sound pressure at each test point or at the average result of all test points
- Correction for background noise with appointed range,(10~20dB ISO 3745, 6~15dB ISO 3744, 3~10dB ISO 3746, etc.)
- A and linear weighting
- Time-averaged sound pressure of each Octave frequency, Average time is optional

All the result build in measurement procedures are saved and can be ascended and checked

Scalable solution

Accessories Recommended

- MC3022: 2-channel data acquisition
- MC3242: 4-channel data acquisition
- MC3012: 12-channel data acquisition
- MC1012: 12-channel microphone conditioning with gain of X0.1,X1,X10
- MF720: Microphone hemisphere array with 20 positions
- MF710: Microphone hemisphere array with 10 positions
- MPA231: 1/2 " prepolarized free-filed measurement microphone, Type I
- MPA416: 1/4 " prepolarized free-filed measurement microphone, Type II
Sound Intensity Module

The measurement of Sound Intensity provides information of magnitude and direction of the sound field, which is used in a variety of applications such as the determination of sound power and the noise source localizations.

VA-Lab SI module provides a simple system for sound intensity measurements. The system requires two-channel (or two channels of multi-channel) data acquisition hardware and intensity probe SI502. The measurements of sound intensity become very easy task.

Main Features

- SIL and SPL real-time display in 1/1 or 1/3 Octave
- Linear, A, B, C weighting
- Environment correction
- Average setting optional
- Residual Index of Intensity and pressure
- Result can be saved for further analysis: sound power

Most Economical & Portable Solution

- MC3022: two-channel DA
- SI002: Intensity Probe
- VA-Lab SI Module: Software
**VA-LAB IMP** is the software module for impedance tube measurements. It supports sound absorption and sound insulation measurements in BSWA SW series impedance tubes. The software works with BSWA MC3522 and MC3242 hardware for data acquisition and analysis.

VA-LAB IMP supports two methods to measure the absorption coefficients of material.

- **Method using Standing Wave Ratio (ISO10534-1)**
- **Transfer Function Method (ISO10534-2)**

The Standing Wave Ratio (SWR) is a traditional method, which needs to generate a standing wave in the impedance tube. VA-Lab can calculate the absorption coefficients by capturing the maximum and minimum value of the sound pressure in the tube. The other acoustic parameters such as reflectance coefficient, impedance ratio, and admittance ratio can be calculated based on the first minimum position of the pressure.

The Transfer Function Method uses two fixed microphones to acquire sound pressure near the sample. VA-Lab IMP can accurately separate the incident wave and reflected wave, then calculate the absorption coefficients. An extended frequency range can be obtained from the combination of measurement results gained in different diameters of the tubes. It automatically calculates the acoustic properties of material at a wide frequency range of interests.

VA-Lab IMP supports four microphones transfer function method for sound insulation measurements. It uses the published formula to calculate the transmitted energy through the sample, and then calculate the TL values.

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**Main Features of VA-Lab IMP**

- Two methods to measure the absorption coefficients
- Built-in tone generator (Method using STANDING Wave Ratio)
- Capture the Maximum and Minimum lever then calculate the absorption automatically when using standing wave ratio
- Built-in pink noise generator (Transfer Function Method)
- Meteorological information used
- Three kinds of tube and support user-defined size
- Gives linear & Octave data synchronously
- The data measured on different tubes can be combined into full-frequency
VA-Audio is a software module for characterizing the performance of electroacoustic products, audio electronics, and transducers. With the simplicity of operation required for production line QC, yet the extensive analysis tools necessary for R&D, VA-Audio is suitable for use throughout the design and manufacturing process.

BSWA audio test system consists of VA-Audio software, MC3522 data acquisition hardware, and microphones. The artificial mouth and artificial ear is optional items for audio measurements.

Main Features of VA-Audio:

- **Modes of Operations**: Stepped Sine, Frequency Sweep, Multi-tone, and User-defined
- **Stepped Sine**: Supports 1/1, 1/3, 1/6, 1/9, 1/12 Octave or User-defined frequencies. The user defined time intervals
- **Frequency Sweeping**: Supports linear and logarithm sweeping
- **Multi-tone Test**: Supports up to 15 frequency tones
- **User-defined Mode**: Supports signal generator (Sine, square, sawtooth, White noise, and Pink noise, wavefile, tone burst); time signal recording and post-processing
- **Control Limit**: Easy set-up limits for quality control. Pass/Failure indication
- **Real-time Frequency Analysis**: Frequency response and THD
- **Harmonic Distortion**: supports maximum 30th order of harmonic distortion. User defined distortion analysis
- **Loudspeaker Calibration**: Automatic adjustment for output signals to make flat response of sound sources.
- **Sensitivity Test**: Supports microphones and transducer testing
- **Signal Analysis**: Supports FFT, 1/n octave, and sound pressure level
- **Free file correction**: used for standard microphone test
- **Data Freeze**: current data can compared with the fore data