BRNO UNIVERSITY OF TECHNOLOGY

FACULTY OF MECHANICAL ENGINEERING

ENERGY INSTITUTE

Dept. of Thermodynamics and Environmental Engineering

System for noise and vibration diagnostics

This mobile system is designed for laboratory as well as operative/normative noise and vibration analysis indoor and outdoor. It is universal equipment composed of two parts: independent hand-held two-channel sound/vibro meter with the acoustic intensity probe and four-channel analyser "all-in-one" controlled with a laptop. Other equipment for complex noise and vibration measurement, mechanical signal diagnostics, recording, analysis, data visualization and further processing is available.

SPECIFICATION

- hand-held analyser – Class 1 sound level meter (Brüel & Kjær 2270-A-D00)
- LDS PHOTON „all-in-one“ analyser (USB 986A0186)
- a set for sound source localisation 3654 with calibrator 4297, according IEC 61043 standard
- software for frequency analysis 1/1 and 1/3 oct. (BZ-7223)
- time series recording (BZ-7226)
- FFT analyser (BZ-7230)
- software for sound source localisation (BZ-7233)
- vibration sensors IEPE TEDS 10 mV/g, 2× side terminal (4533-B), 2× axial terminal (4534-B)
- vibration sensor calibrator (4294)
- 2× set microphone – preamplifier (4189-A-021)
- laser tacho probe (2981)
- equipment for noise measurement in flowing air and wind

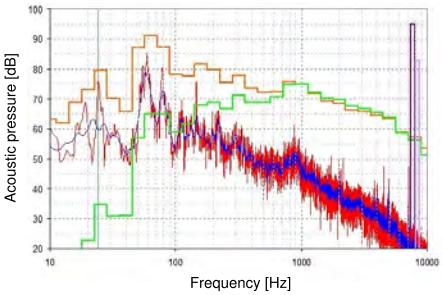
- LDS PHOTON+

- sound level meter – type 2270

- sound intensity probe

TYPICAL APPLICATIONS

- sound source localisation using acoustic intensity probe, near field noise measurement
- estimation of vibro-acoustic parameters of technical devices, constructions and processes, e. g. HVAC devices and components, flowing medium sources (compressors, fans, vacuum pumps, pumps, air conditioning units etc.), noise reduction components
- aero-acoustics – flow generated noise (turbulence, wakes, etc.)
- spectrum analysis, order tracking, waveform recording, transient capture and SRS
- diagnostics of technical problems of constructions and machines, rotating machinery analysis
- modal testing
- sound quality analysis – psycho-acoustics (e. g. according ISO 532 A, B)



- left: FFT and 1/3 octave analysis of acoustic pressure, right: sound intensity mapping near a combustion engine

PROVIDED RESULTS

- simultaneous 4 to 6 channel measurement of acoustic pressure and vibration acceleration, 24 bit resolution, dynamic range 115 dB, 84 kHz sampling
- acoustic pressure measurement with A, B and C weighting filters and fast, slow and impulse time weighting, dynamic range: 16.6 to 140 dB, frequency range 6.3 Hz to 20 kHz
- FFT analysis, with evaluation of FFT RMS, Pwr, PSD, ESD, Peak, P-P, FFT spectra (up to 6400 lines, 16 mHz resolution), order tracking, rotating machinery analysis 1/3 (8 Hz to 16 kHz) and 1/1 (6.3 Hz to 20 kHz) octave analysis
- sound meter complies to EN 61672-1 and provides sound evaluation according
- ISO 1996-2 and ISO 9612
- acoustic intensity according EN 61043, EN ISO 9614-1, ISO 9614-2 (50 Hz to 10 kHz)
- acoustic power
- vibration acceleration measurement: 4 sensors, 1 to 3 directions

REFERENCES

- TTS eko s.r.o. Trebic (Examination of noise reduction at dispatching centre of ORC cogeneration unit, Character of noise produced by ORC cogeneration unit) (2005)

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