CARoLINE

Acoustic testing based on airborne and structure-borne sound

- use in development, testing and series production
- synchronous recording of up to 8 acoustic measurement channels
- I/O resources for triggering, gate control and synchronization
- standard interfaces for integration into complex production lines or end-of-line testing systems
- comprehensive visualization and analysis functions including machine learning (AI)
- monitoring option of acoustic data recording using headphones
- offline version to create or edit test sequences with the help of simulated measurement data

GOPEL electronic
Enjoy Testing

Application

Machine learning

- analysis and evaluation of data with the help of machine learning
- neuronal networks, SVM, autoencoder and much more

Acoustic testing

- testing of acoustics, function and assembly quality of noise-generating components

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Airborne sound

- analysis of sounds generated by the UUT
- recording of the UUT during the test with environmental noises
- positioning of the sensors on the test bench

Classical analysis

- analysis and evaluation of the data with the help of classical mathematical methods
- order analysis, bandpass, third-octave analysis, roughness, tonality etc.

Data acquisition

- testing of UUT in various operating states and load modes
- data recording for signal analysis using CARoLINE system

Structure-borne sound

- analysis of vibrations and natural frequencies of electromotive assemblies
- insulated recording of UUT against external noise during test
- sensors can be mounted magnetically or by spring force

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Hardware & Sensors

Measurement method

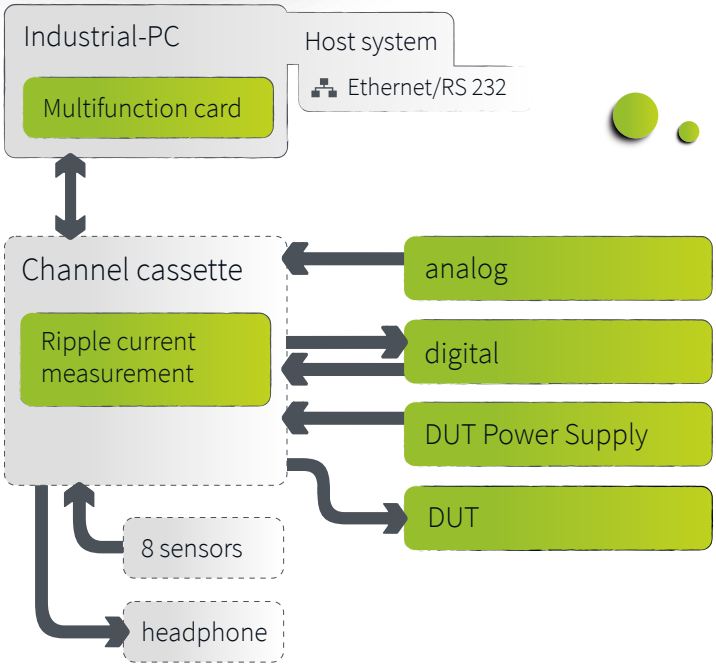
- determination of the driving speed via measurement of the current ripple or the hall signal by the signal conditioning module
- direct measurement of sensor signals

Parameters

A/D converter	16 bit
sampling rate	44.1 kHz
sensor inputs	8 IEPE inputs
analog inputs	2 inputs ±100 V differential
digital inputs	2 inputs 30 V potential-free
sensor supply IEPE	4 mA, can be individually switched off
sensors	microphones, structure-borne sound sensors, laser vibrators, force sensors etc.

Sensors

- sensors with integrated IEPE amplifier
- power can be switched off by channel cassette
- connection of different sensors possible
- structure-borne sound sensors can be mounted magnetically or by spring force
- positioning of the microphones at the test system near the UUT
- sensors have to be acoustically decoupled from the base frame of the test system

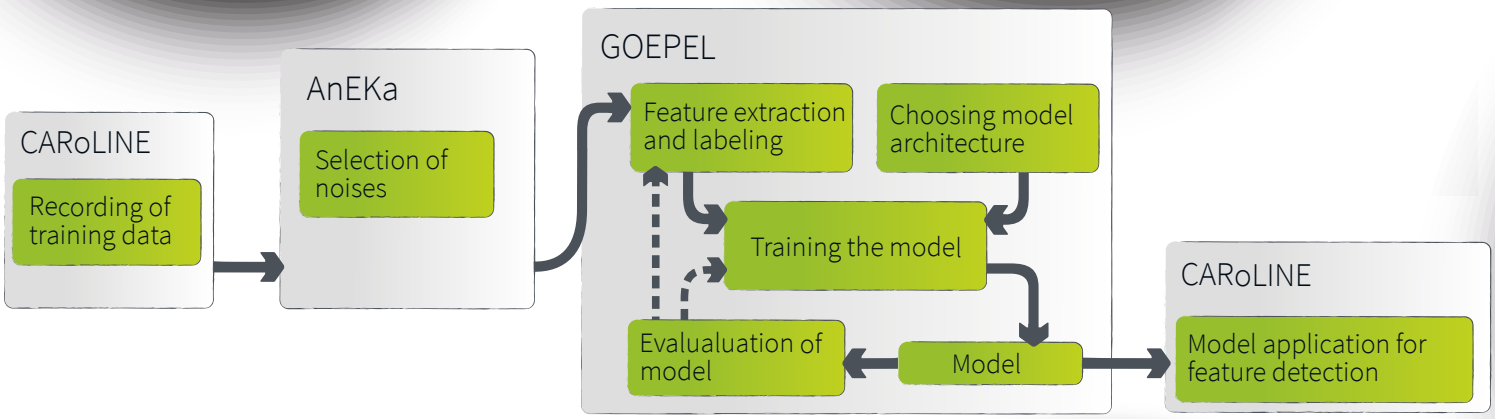


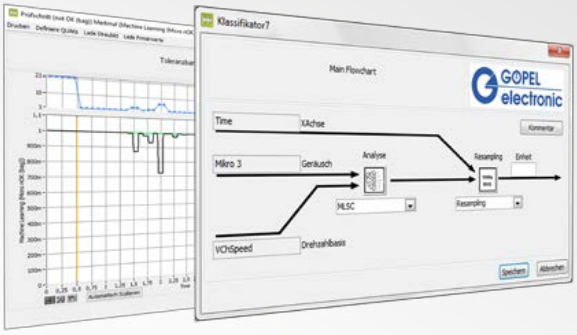
AnEKa

- software for the selection of noise ranges in acoustic data
- milliseconds accurate annotation
- graphic display of annotation areas
- up to nine noise classes
- interfaces for machine learning

AnEKa

Analysis for development of classifiers





Artificial intelligence

- evaluation of acoustic signals through artificial intelligence machine learning
- usable for airborne and structure-borne noise
- no expert knowledge required for the creation of complex analysis procedures

Acoustic testing

with artificial intelligence

Analysis & Software

Preparation

- creation of individual test sequences with existing or own modules and analysis functions
- user guidance for creation of own features
- setting of reference variables and trigger conditions

Analysis features

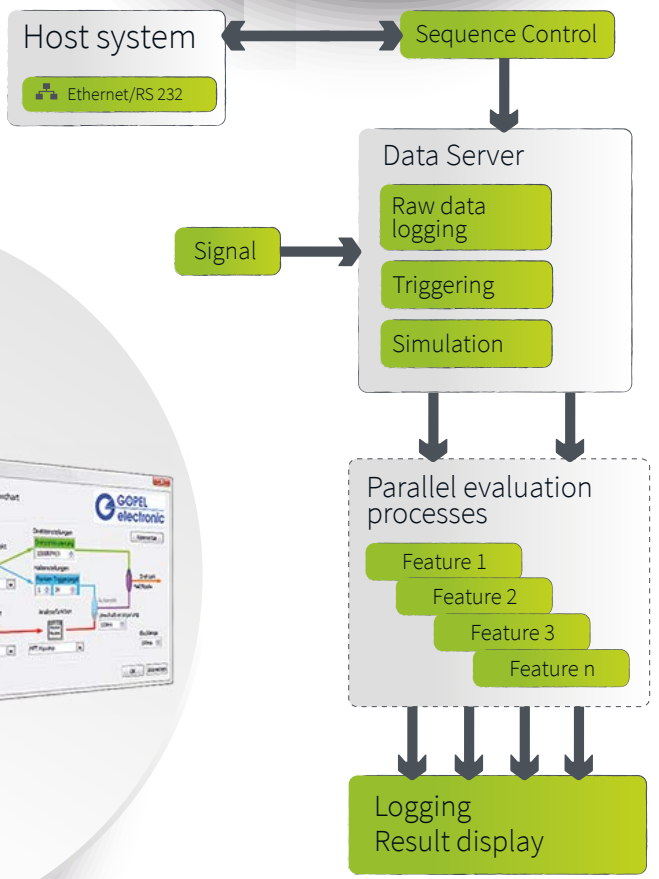
- speed determination from hall signal or current ripple
- order analysis, third octave analysis
- psychoacoustic evaluations (roughness, tonality)
- automatic tolerance band creation on the basis of a defined number of UUT data
- statistic function, spread pattern display
- models of machine learning

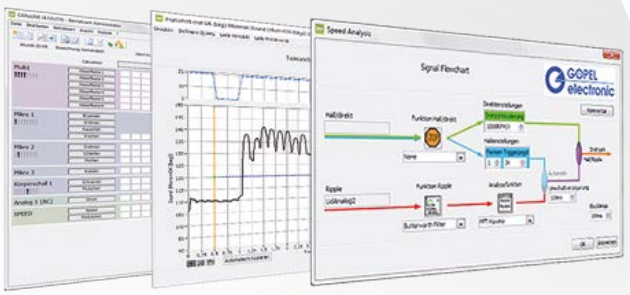
Trigger sources

- level of incoming noise signal
- threshold value at analog inputs
- status change at digital inputs
- command from the higher-level system via the host interface
- predefined time interval

Evaluation

- evaluation of the results during a test sequence parallel to data recording
- visualization of a completely evaluated data block every 100 ms
- choice between temporal or position-dependent display (e.g. adjustment track or angle of rotation)
- evaluation of the recorded noise signals based on analysis indices (ANI)





Made in Germany

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