

# NOISE AND VIBRATION MEASUREMENT

DEWETRON CARES FOR YOUR SLEEP!



DEWETRON

- > Integrated noise and vibration measurement system
- > Compliant to ISO 3744
- > Fully Automated measurement procedure with user guidance
- > Spectrum analysis, RPM determination, Temperature logging
- > Data plausibility check
- > Data storage into existing data base

## FURTHER INFORMATION?

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## FULLY AUTOMATED MEASUREMENT SYSTEM

A minibar in the room is a mandatory amenity for all good hotels. Such minibar refrigerators therefore need to be as silent as possible so not to disturb sleeping guests.

A manufacturer of such compressors approached DEWETRON for a measurement system to assess the noise and vibration caused by the compressor in an anechoic test chamber. The measurement system not only will acquire signals through the sensors but, it also will guide the operator through the test process, which is usually not performed by a trained measurement specialist.

### A USUAL MEASUREMENT CONSISTS OF TWO PARTS:

- > Sound measurement
- > Vibration measurement

A measurement process will start immediately, after a defined time (warmup period) or temperature is triggered. On demand, only sound or only vibration can be measured. The raw measurement files will be evaluated and a range of results extracted. Those results are saved in multiple data files of a desired format. All measurement results from all test sites are automatically dropped into a "file based" data base. The customer maintains a self-made reporting tool (ie: a complex MS Excel macro), this tool requires a strictly defined file format. Apart from the measurement on the UUTs, regular measurements on reference sound sources and background measurements are required. These results are required as inputs for the data evaluation of the UUTs measurement files.



## THE CHALLENGE

### HARDWARE REQUIREMENTS

- > Several channels for noise measurement with ICP microphones (noise level < 20dBA!!)
- > Several channels for vibration measurement
- > Several pressure sensors
- > Several temperature channels for compressor case
- > 1 Hz FFT resolution
- > 20 kHz bandwidth
- > 24 Bit AD Conversion

### SOFTWARE REQUIREMENTS

Prior to each test the operator needs to enter META data. Predefined dropdown menus within the software offer possible options. New options may be entered and will be added permanently to the menu.

### MEASUREMENT PROCESS

The software will guide the operator through the measurement process. First the compressor is put in place in the chamber and connected to gas and power supplies. The operator enters the meta data (describing the UUT, the purpose, supply and test engineer), Then separate measurement files for noise and vibration are recorded. Finally, the file recording the post processing routing is performed. In this process several files in specified formats are generated.

At regular intervals a microphone calibration is mandatory. The calibration results are logged into a text file to monitor long term behavior.

### MEASUREMENT PARAMETER

The data acquisition system needs to access the following parameters:

- > Sound pressure measurement with Octave bands, A weighting (scaling to dBA)
- > Sound power per channel with Octave bands,
- > Total sound power with Octave bands,
- > Octave bands of sound power
- > FFT analysis for noise, vibration and pressure
- > Temperature chart
- > Chepstrum analysis
- > Psycho acoustic parameter (sharpness, loudness, roughness, etc.)
- > RPM tracking

These calculations must to comply to standard OENORM\_EN\_ISO\_3744. The customized source code is provided to the enduser so that they are in the position to maintain the program by themselves, without any dependency from DEWETRON.



## OUR SOLUTION

### HARDWARE

DEWE2-M7s or TRIONet  
3 x TRION-2402-dACC-BNC-6

### SOFTWARE

TRION-API 2.5  
DEWETRON LabVIEW Open System framework  
Custom made client  
CAL Microphone V1.1

## SCREENSHOTS

In this client the microphones get calibrated channel by channel, the calibration values are stored in a log file and get considered on the channel scaling.

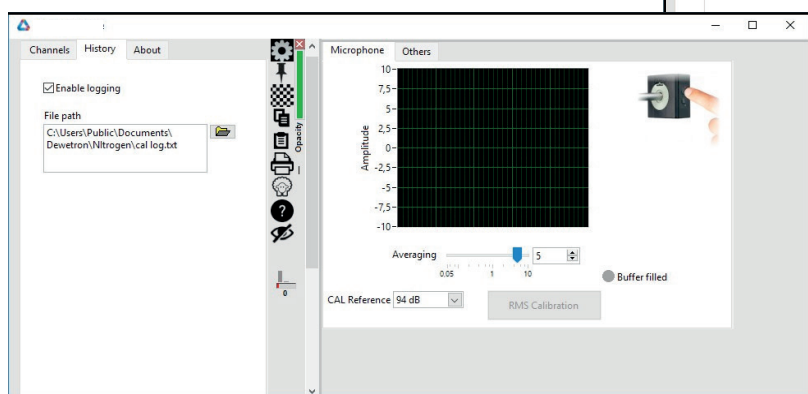


Figure 1: Microphone calibration

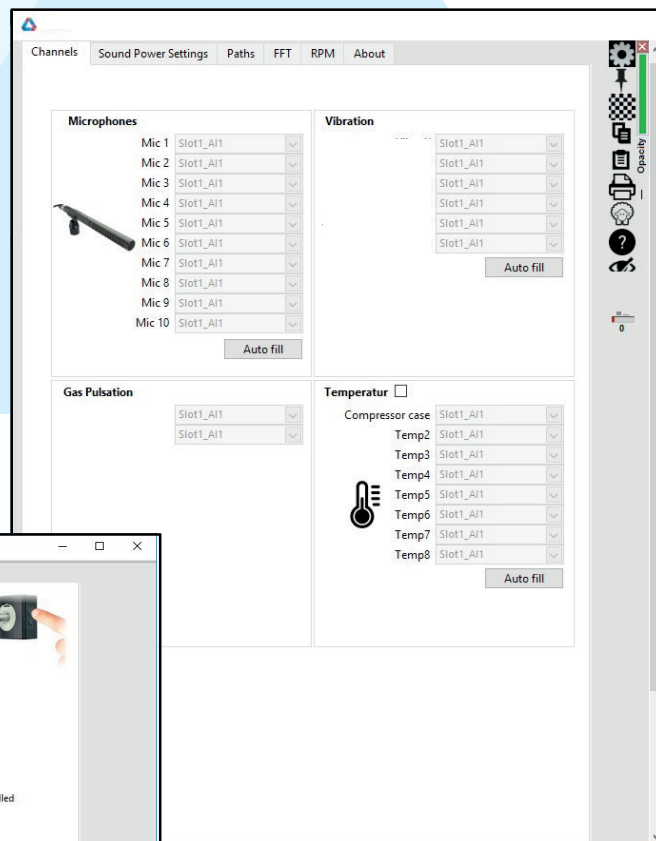


Figure 2: Channel assignment setup

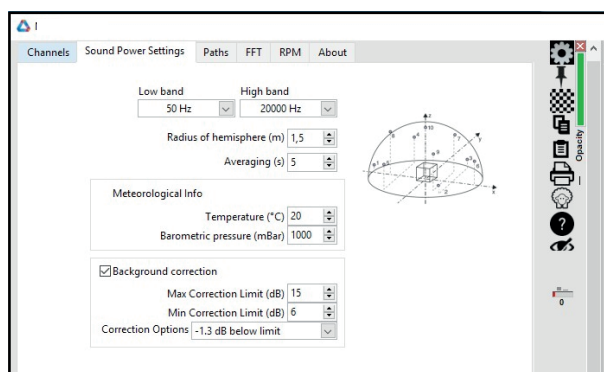


Figure 3: Sound power calculation setup

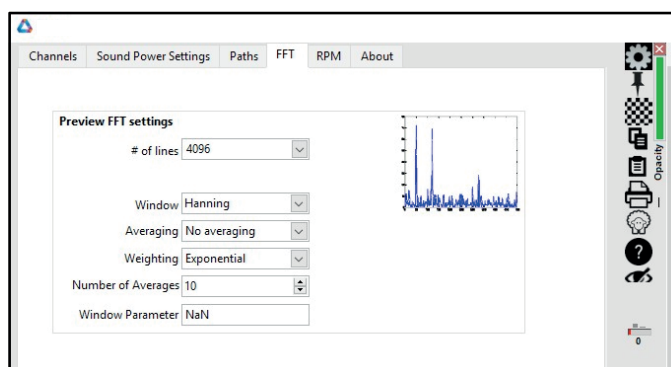


Figure 4: FFT setup

This window configures the parameter for the live FFT preview.

In this window the meta data are to be entered before the recording gets started.

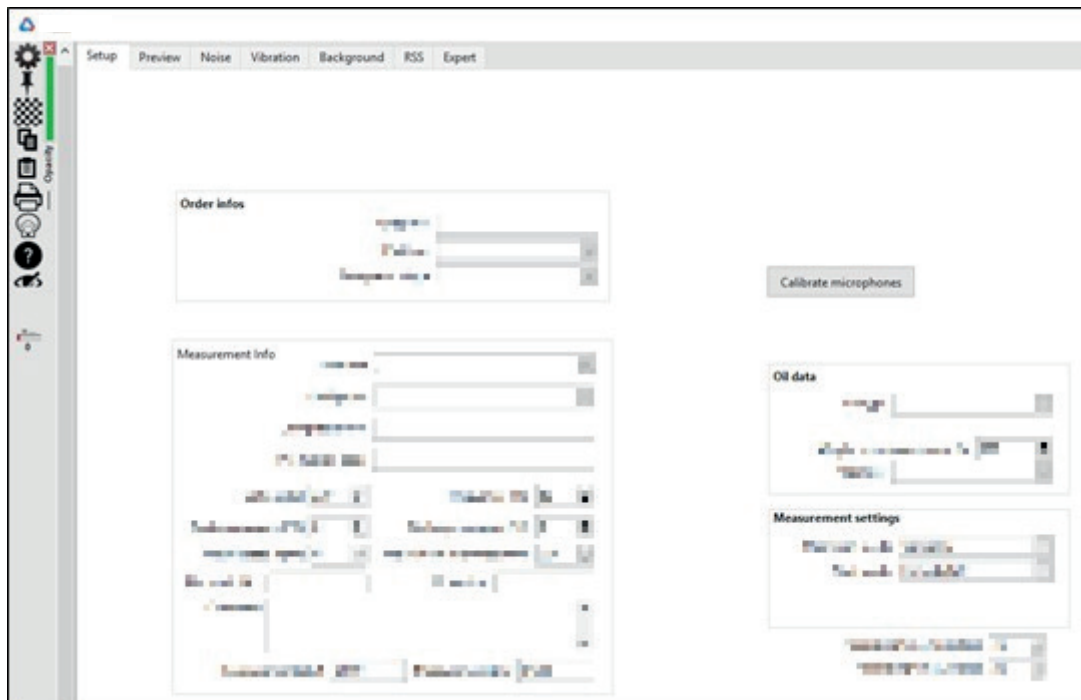


Figure 5: Entering META data

In this window the live FFT spectra of noise and vibration as well as the temperature charts are displayed.



Figure 6: Live FFT preview

This window displays the octave analysis of the sound pressure (upper) and sound power (lower).

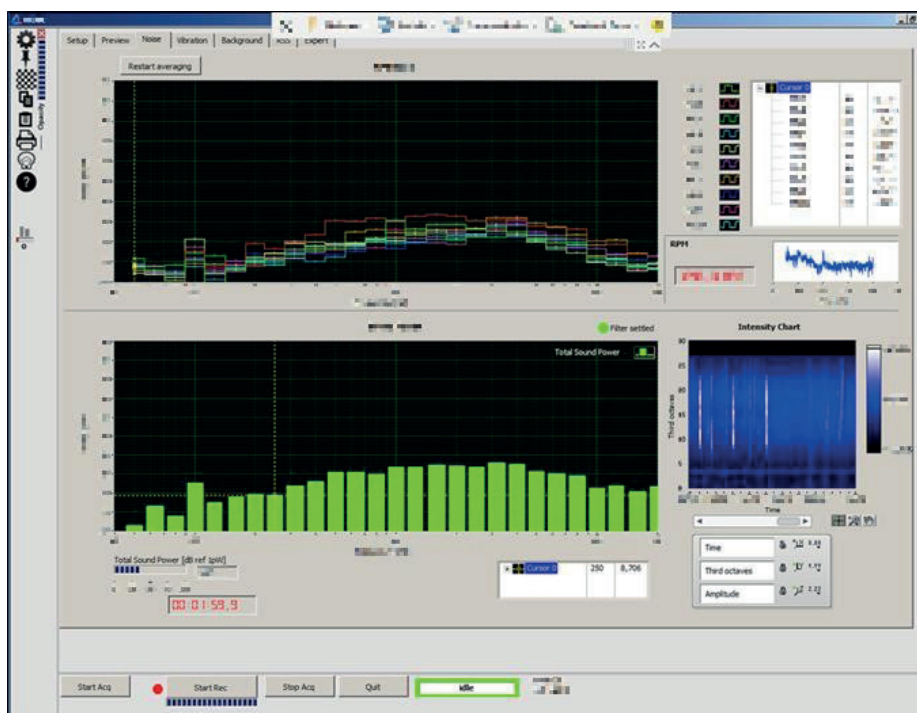


Figure 7: Sound pressure and Sound power spectrum



## THE EXPERT

### ANDREAS KIESLINGER

Andreas Kieslinger graduated from the Federal Higher Technical Institute in Weiz near Graz in Austria and is a longtime employee of DEWETRON with over 20 years of experience. In this time he has held many position from system manufacturing, service, customer support, application engineering, software development, sales support to sales management. Today he's the product manager for "Open Systems" and responsible for designing proprietary customer solutions from the component level up to tailor-made turnkey solutions.

FURTHER QUESTIONS? **CONTACT THE AUTHOR:**  
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