

# Microflow<sup>®</sup> probes supported by PAK

## 1 The PU Probe

- Combines a Microflow<sup>®</sup> sensor for acoustic particle velocity with a pressure microphone
- Provides the signals for processing in two separate channels
- Suitable for measurement of sound intensity and sound power
- Suitable for measurement of acoustic surface impedance
- Suitable for non-contact measurement of structural vibrations (alternative to scanning laser or accelerometer)
- Also available as USP Probe that combines three Microflow<sup>®</sup> sensors for acoustic particle velocity with a pressure microphone (requires four separate channels for processing)



**PU Probe**  
(one-dimensional)



**USP Probe**  
(three-dimensional)

## 2 Implementation in PAK

### 2.1 How to connect

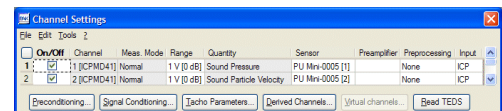
- The PU Probe needs its own signal conditioning system from Microflow<sup>®</sup>. The voltage output sockets from this amplifier provide the two signals at separate BNC connectors.
- These outputs delivering the signals from the Microflow<sup>®</sup> sensor and from the microphone can be connected to two separate channels of the ICP42 module (integrated into the PAK MKII frontend).



### 2.2 Definition of signals

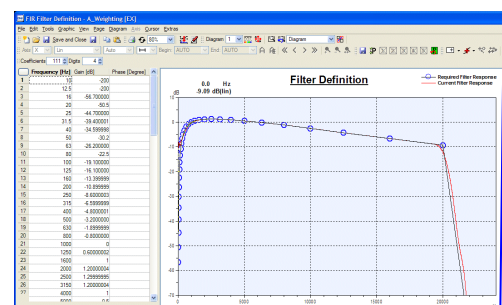
- The two PU Probe output signals, defined according to the SI unit system, can be selected in *PAK Channel Settings*.
- One output is processed as *sound pressure*, while the second output is processed as *acoustic particle velocity* data.
- The *PAK Equipment Manager* enables the handling of all data about the ID of probes, servicing status, etc.

The *PAK Equipment Manager* also supports the organisation of all sensors in a data base including checking in and out for mobile use without permanent connection to the server.



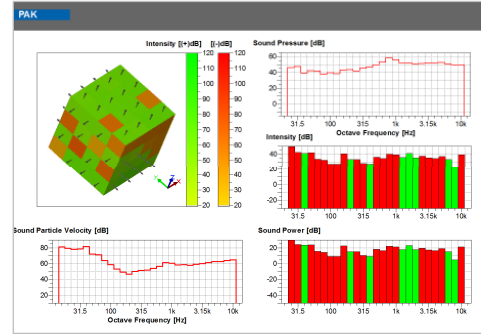
### 2.3 Calibration

- The standard version of the Microflow<sup>®</sup> signal conditioning system requires subsequent filtering.
- The *FIR-Filter module* featured in PAK is appropriate for calibration of probes of nonlinear frequency characteristic, such as Microflow<sup>®</sup> sensors. The calibration data can be imported via a CSV file.
- When the Microflow<sup>®</sup> signal conditioning system with integrated filter is used, the PAK system obtains linear data.



## 2.4 Measurement of Sound Intensity

- The solution in PAK for measuring sound intensity supports standard PP probes, but also one-dimensional and three-dimensional Microflown® probes.
- The processing and visualisation of analyzed data provides a range of options. These include standardized graphics and also many alternatives for individually designed diagrams.



## 2.5 Measurement of Acoustic Surface Impedance

- A very efficient way to measure acoustic impedance locally on a surface, and can be realized using a Microflown® PU probe and the PAK Arithmetics module.
- Able to measure acoustic particle velocity and sound pressure at the same point, the Microflown® PU Probe delivers an easy-to-handle data basis for calculation of acoustic surface impedance.
- The acoustic surface impedance of a sound-absorbing material on a wall can be locally measured without the use of a Kundt's tube. The results can be displayed as a function of frequency in real time.

$$Z_F(f) = \frac{|P(f)|}{|v(f)|} e^{i(\varphi_P(f) - \varphi_v(f))}$$

Equation for calculation of acoustic impedance of data acquired by the PU Probe.

PAK Arithmetics module **can also be configured by our Support Team** according to customer's requirements, making handling of applications easy.

## For details please address your enquiries to us!

- ⇒ Microflown® PU Probes
- ⇒ Microflown® USP Probes to measure three-dimensional acoustic particle velocity with sound pressure
- ⇒ PAK's adaptation of various Microflown® Probes
- ⇒ General measurement scenarios with PAK for vibration and acoustics

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