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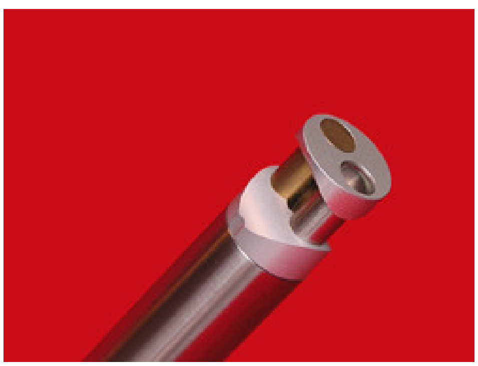
Support of Microflown probes in Test.Lab Rev. 10A

Summary

P-u probes allow measurement of sound intensity over a large frequency range. LMS Test.Lab Sound Intensity Testing supports Microflown PU probes, both the 1D and 3D USP probes. Visualization of 3D sound intensity on geometry, combined with traditional colored planes and overlaying pictures supported in Test.Lab from Rev. 10A.

Pressure – Particle Velocity probes



Sound intensity can be measured with very good accuracy with another kind of probe, the so-called PU probe, standing for Pressure-Particle Velocity probe, sometimes also called p-v probe. Microflown PU probes are a new generation of reduced combinations of pressure and particle velocity sensors, allowing the calculation of the sound intensity in its most simple form, i.e. $\vec{I} = p\vec{u}$.

The advantage of the Microflown PU probes is that they are small (the PU mini is in total about 4cm high, and 1.5cm of diameter), with both miniature sensors included in a single frame, and with easy connections.

Moreover, compared to common classical pressure-pressure probes, the PU probes allow measurement of the sound intensity over a single, large frequency range, from 20Hz to 10kHz, or depending on the model even up to 20kHz.

Unlike the pp-probe, the PU probe is not susceptible to the pressure/intensity index, allowing measurements in non-anechoic conditions.

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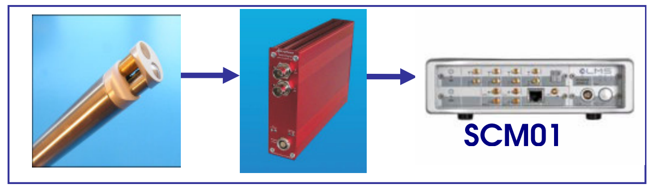
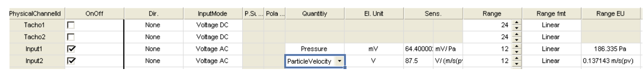
Setup & usage in Test.Lab

The support of standard PU probes was already supported in Test.Lab 9A in the LMS Test.Lab Sound Intensity Testing application, which was released Dec. 2008.

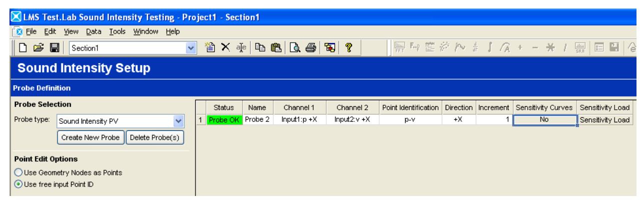
1. The PU probe is connected by lemo to a signal conditioner from Microflown, which delivers a pressure and a particle velocity output, as can be seen in the figure.

   In Test.Lab, the user defines these 2 signals in the Channel Setup.



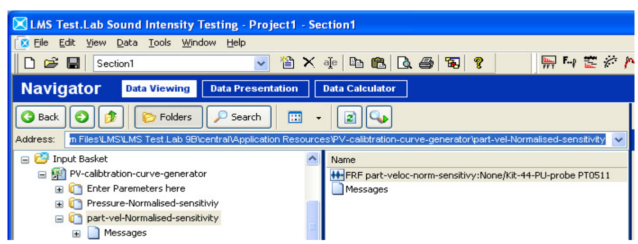


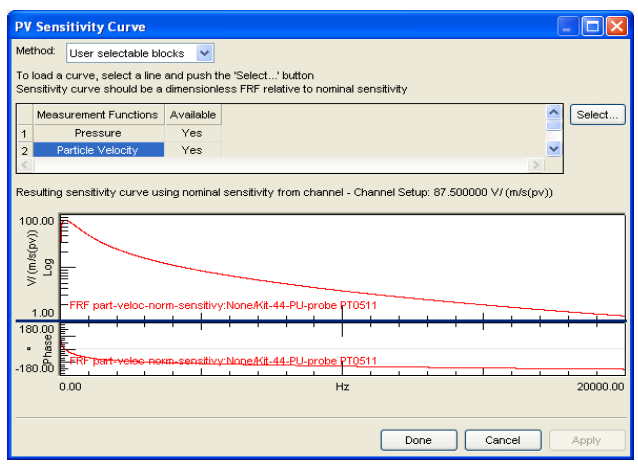
2. Next, the Sound Intensity Setup worksheet allows the definition of the probe to be used. The channels in the previous step are reused.



3. Since the Microflown PU probes are not completely linear, specific amplitude and phase corrections for both the pressure and the particle velocity can be found in a calibration document. These calibration values will translate in a sensitivity curve that is generated in an Excel file, and can be accessed directly in Test.Lab, using the Excel Data Driver.

   This sensitivity curve has to be selected in the probe definition for both the pressure and the particle velocity sensor.





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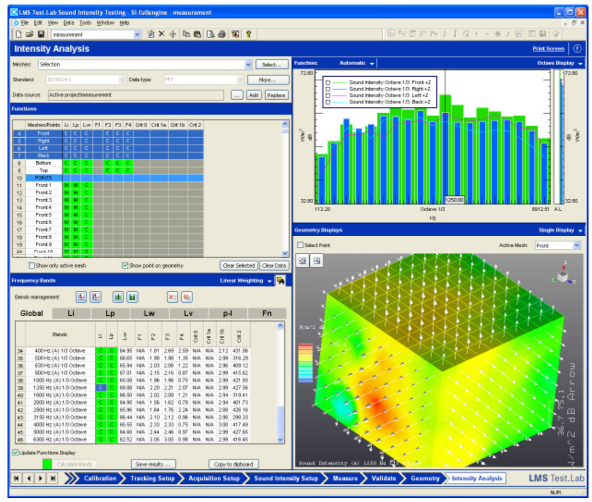
4. The Sound Intensity measurements & analysis can now be started.



P-U probes with 3D partial velocity measurement

The Microflown technology for PU probes also allows to measure particle velocity in 3 orthogonal directions, thereby allowing 3D sound intensity measurements.

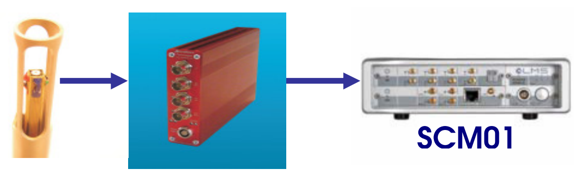
These 3D probes are called USP (Ultimate Sound Probe), and come in three different sizes.

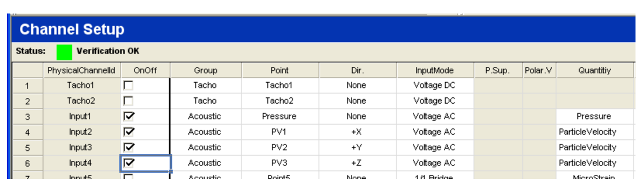
Setup & usage in Test.Lab

USP probes are supported already since Test.Lab 9A in the LMS Test.Lab Sound Intensity Testing application, which was released Dec. 2008.

1. The USP probe is connected by lemo to a signal conditioner from Microflown, which delivers a pressure and 3 particle velocity outputs, as can be seen in the figure.

   In Test.Lab, the user defines 1 pressure and 3 particle velocity signals.





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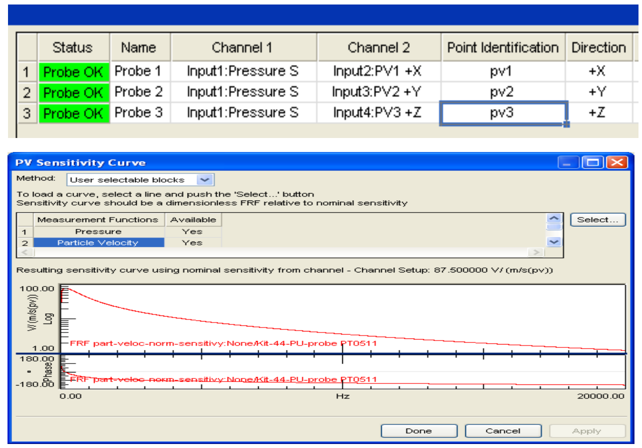
2. Next, the Sound Intensity Setup worksheet allows the definition of the USP probe to be used. The channels in the previous step are reused. 3 probes are actually defined, all with the same pressure.

   Reference curves are selected for each direction of the 3D probe.



3. The measurement will then proceed as normal, but the visualization is done in 3D, as vectors on a geometry, thereby expressing the flow of the acoustical energy. Full geometry and display capabilities of Test.Lab available, such as Active Pictures, and quad displays on the right. Also includes the possibility to add a picture onto the geometry for easy and straightforward interpretation of the data.