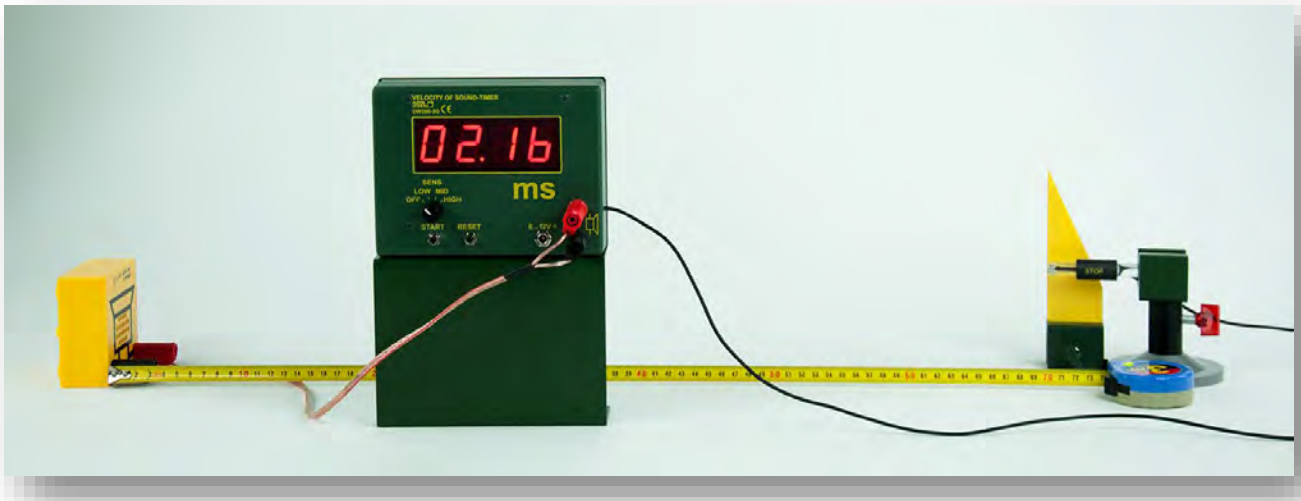
DETERMINATION OF THE SPEED OF SOUND IN AIR

AKD 02.08



Material:

Item Code	Qty	Description
DW280-2G	1	Sound velocity meter "inno"
P3120-5B	1	S-shaped assembly platform
MB240-1LS	1	MBC Loudspeaker with nose
DS085-1R	1	Round base with stand tube, uni
DS402-2G	1	Clamp on support
DG110-2G	1	Pointers for ruler, pair
P1100-1E	1	Measuring tape, L=300 cm
DG520-1G	1	Connecting lead, double, 200 cm

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Goal:

What is the speed of sound in air?

Setup:

- The clamp on support is clamped into the round base.
- This unit is placed about 100 cm away from the speaker.
- The sound velocity meter is pinned to the assembly platform.
- The receiver microphone of the measuring instrument is mounted into the clamp.
- The speaker and the meter are connected with the double cable.
- An exact distance of 100 cm is now set with the measuring tape.
- Pointers can also be set up for better visibility.

Experiment 1:

The sensitivity (SENS) on the meter is set to the "LOW" position.
We turn on the meter and press the "RESET" button to perform a zeroing.

For proper timing, the speaker must be connected with the correct polarity. The diaphragm must be moved forward by applying a positive voltage. To test, simply make a measurement with the microphone as close as possible to the membrane of the loudspeaker.

If the measured value is around 0.05 - 0.15 ms, the polarity is correct. If it is around 0.30 - 0.60 ms, the speaker is connected incorrectly.
It will not be damaged, the measurement will only be unnecessarily inaccurate.

We call the transit time determined in this way between the transducer and the microphone "dead time". This is due to the mass inertia which a loudspeaker needs to convert the voltage pulse into an air movement.

Dead time: ……. ms

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We start the first measurement with the "START" button.

At intervals of about 5 seconds, we perform 4 more measurements. The measured values are entered in the table below.

If there are faulty triggers or times that deviate significantly from the theory, the sensitivity is too high. If the device does not stop, the sensitivity is too low.

Measurement no.	1	2	3	4	5
Duration in ms					
Duration minus dead time					

Average time duration (dead time subtracted) from 5 measurements: …… ms

1 s / …… ms

Our determined speed of sound in air is thus: …… m/s

Experiment 2:

We change the measuring distance from 100 to 200 cm and perform the test again.
If necessary, the sensitivity must now be set to "HIGH".

Note:

The circuit for voltage increase needs about one second for recharging. If the start button is pressed unnecessarily quickly one after the other for multiple measurements, this can result in unnecessary dropouts (no stop) due to the decreasing volume, especially with low sensitivity. Be patient for this short time!

The choice of sensitivity has a slight effect on the measured values. This effect is based on the fact that the air movement requires a certain time, i.e. about 0.1 ms, due to the mass inertia from zero to full. At high sensitivity, the stop signal is already generated at a lower excitation than at low sensitivity. In everyday use, this effect is negligible. If you want to use the full possibilities of the device, you should also pay attention to this topic.