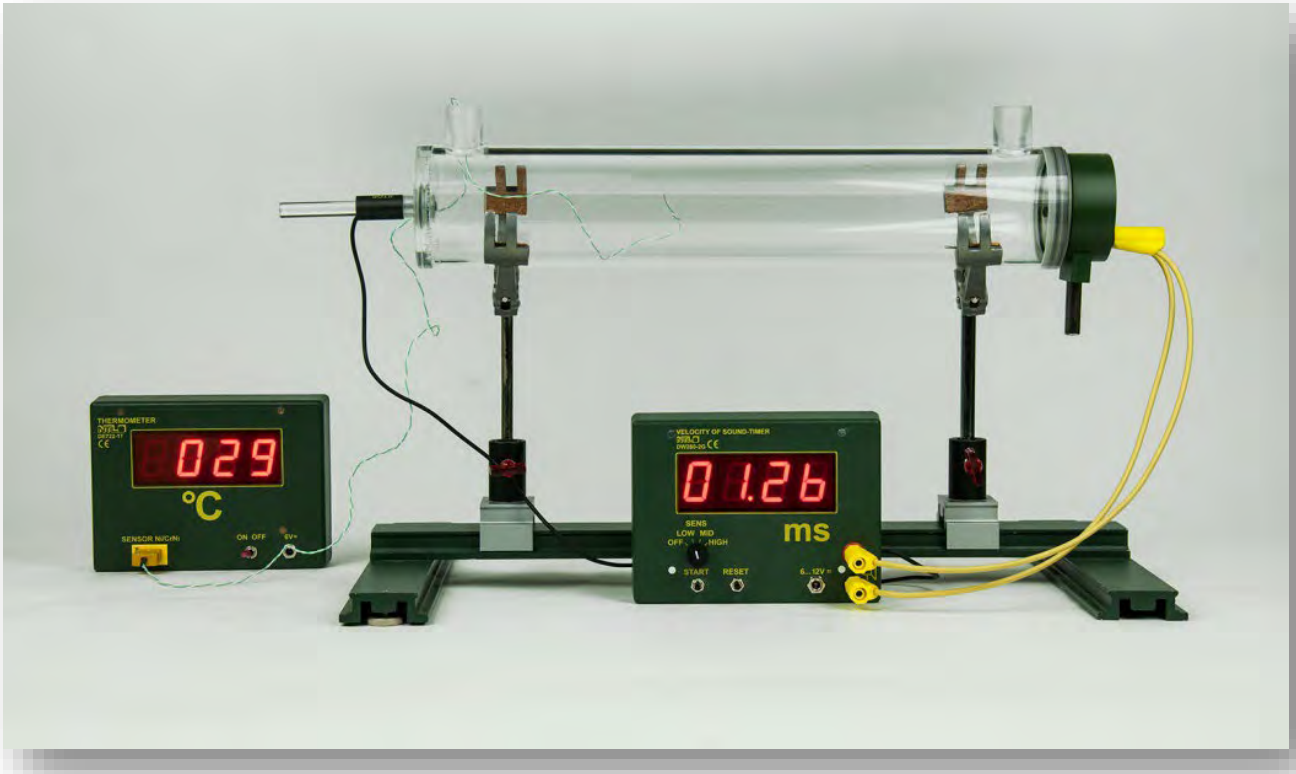
DETERMINATION OF THE SPEED OF SOUND IN AIR (IN A PIPE)

AKD 02.09a



Material:

Item Code	Qty	Description
DW280-2R	1	Tube for measuring sound velocity
DW280-2L	1	Loudspeaker, waterproof, on support
DW280-2G	1	Sound velocity meter "inno"
DS101-1G	1	Support base, large, L=500 mm
DS093-04	2	Sliding saddle "Sepp", H=40 mm
C7002-2A	2	Universal clamp, 0 - 80 mm, with cork
C9010-5A	1	Gas pressure can, helium
C9010-9A	1	Fine pressure regulation valve
C1520-1M	1	Vacuum hose, plastics, D=6 mm, L=100 cm
DE722-1T	1	Thermometer "inno", 1100 °C
DT701-4F	1	Hot air blower, 1200 W
	2	Connecting lead

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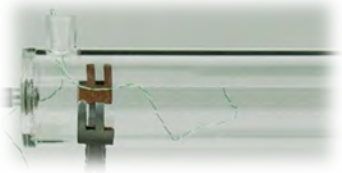
Setup:
The two tabs are positioned on the support base. The universal clamps are fixed in the sliding saddles and opened completely. The sound velocity meter is connected to the loudspeaker, the correct polarity must be ensured. The correct polarity is found out by measuring the "dead time" of the setup. To do this, the sound velocity meter is switched on and set to "Low". Now hold the microphone to the connected loudspeaker and make a measurement. If there is the slightest deviation, the polarity is correct. The value obtained should be noted, as it should be included in the calculations (~0,09 ms).

The waterproof speaker is then inserted into the tube (be sure to insert it completely into the tube, otherwise the distance between the microphone and the speaker will not be 40 cm).

The tube is placed in the opened universal clamps and brought into a horizontal position with them. The microphone of the sound velocity meter is inserted into the opening at the other end of the tube (do not insert the microphone too far).



The thermometer is inserted as deeply as possible into the tube.

Experiment:
First, the speed of sound in the air at room temperature is measured. To do this, first press the reset button and then take a measurement (the "Low" setting is sufficient). Several measurements can also be carried out and the mean value determined from them.

Result:
The distance between the microphone and the loudspeaker is 40 cm and we measured the time it takes for the sound to travel from the loudspeaker to the microphone. That is:

$$c = \frac{0{,}4\ m}{(0{,}00126 - 0{,}09)s} = 341{,}88\ m/s$$