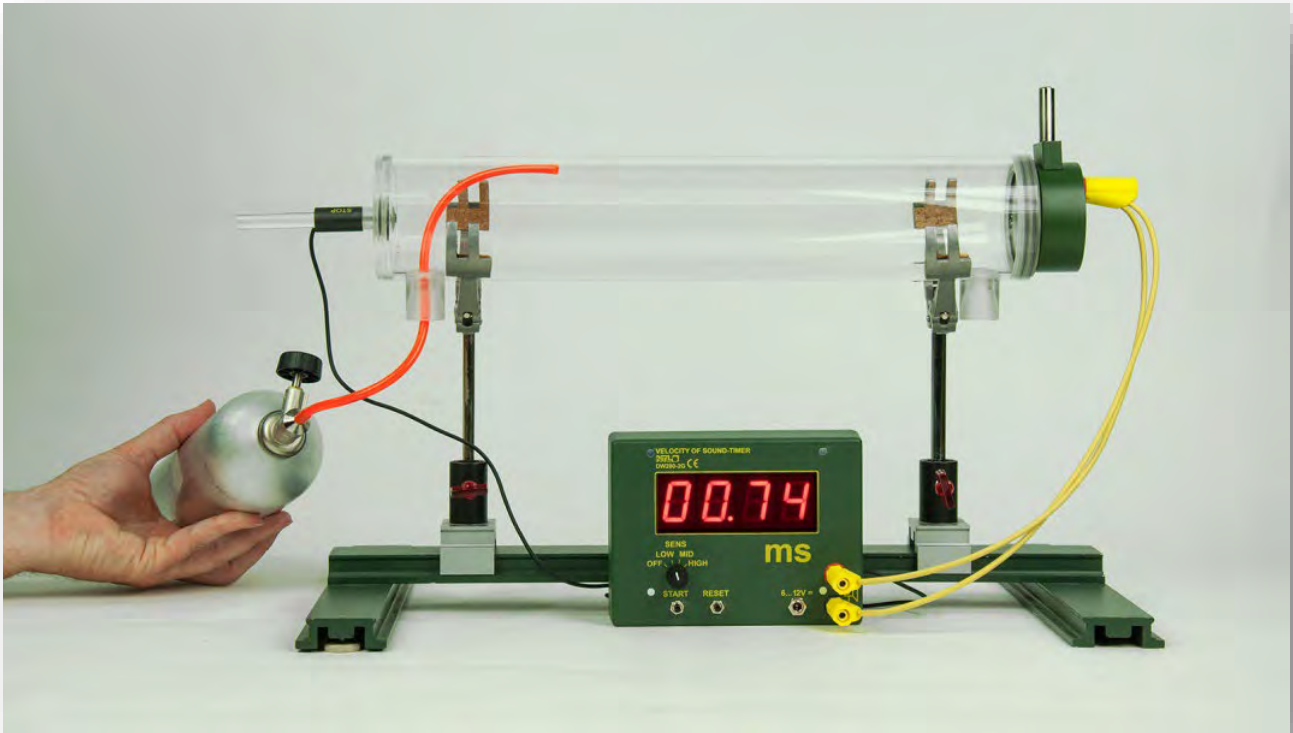


DETERMINATION OF THE SPEED OF SOUND IN HELIUM

AKD 02.09c



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
	2	Connecting lead

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Goal:

Sound propagates faster in helium than in air.

Setup:

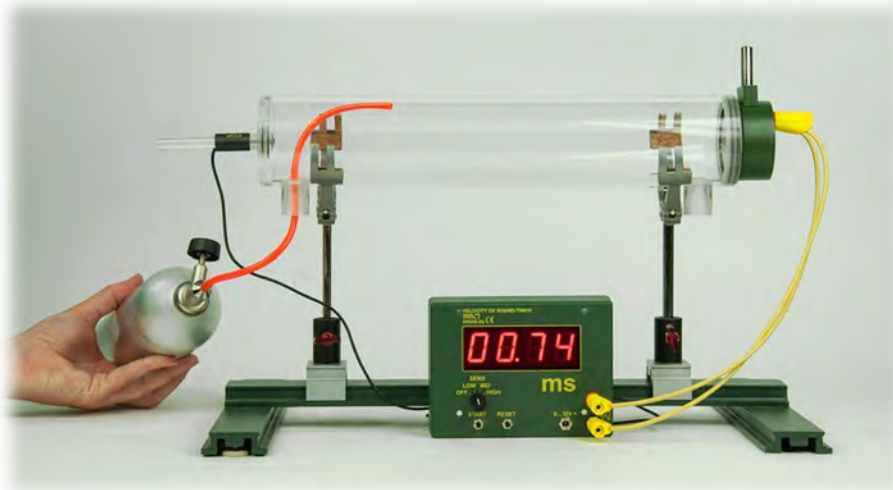
The two sliding saddles are positioned on the support base. The universal clamps are fixed in sliding saddles and opened completely. The sound velocity meter is connected to the loudspeaker, here the correct polarity must be ensured. The correct polarity is found out by measuring the "dead time" of the 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 ($\sim 0,09 \text{ ms}$)

The waterproof loudspeaker is then inserted into the tube (be sure to insert it completely into the tube, otherwise the distance between the microphone and the loudspeaker will no longer 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 push the microphone in too far).

Experiment:

First, a measurement is made with air. Then helium is introduced into the tube via a hose. It is necessary to turn the tube 180° , because the helium can displace the air in the tube (the tube has a volume of approx. 2 liters). If the tube is filled with sufficient helium, a measurement is taken (the "Low" setting is sufficient).



Ergebnis:

The speed of sound is calculated as follows:

$$c = \frac{0,4 \text{ m}}{(0,00074 - 0,09) \text{ s}} = 615,38 \text{ m/s}$$

The guide value is around 1000 m/s. If this is not reached, there is too little helium in the tube.