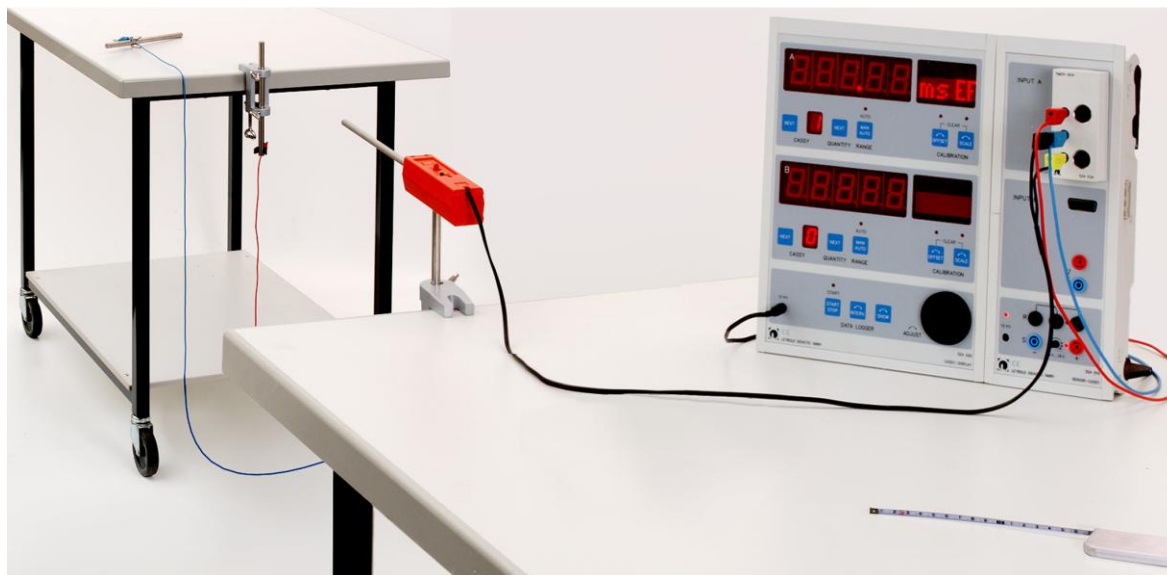


Acoustics
Propagation of soundVelocity of sound in air -
Measurement with Sensor-CASSY and CASSY-Display

Objects of the experiment

1. Determining the time t required by a sound pulse for covering the distance s
2. Calculating the velocity of sound v

Setup



In order to avoid sound propagation via the experiment table, it is indispensable to set up the stand rods and the microphone on separate tables.

Preparing the time measurement:

- Put the CASSY-Display into operation with the Sensor-CASSY being connected.
- Plug the timer box into Input A.
- Switch the display of Input B off by means of the key NEXT (CASSY) at the display.
- Connect the stand rods to Input E and the microphone to Input F of the timer box.
- Select the measurement quantity time (ms EF) with the key NEXT (QUANTITY).
- Switch the microphone on, and set it to pulse operation.

Apparatus

1 Multi-purpose microphone	586 26
1 Timer box	524 034
1 Sensor-CASSY 2	524 013
1 CASSY-Display USB	524 020USB
1 Steel tape measure, 2 m	311 77
2 Simple bench clamp	301 07
2 Stand rods 25 cm, 12 mm diam.	300 41
2 Clip plugs, small, set of 2	590 02ET2
1 Connecting lead, 32 A, 200 cm, red	501 35
1 Connecting lead, 32 A, 200 cm, blue	501 36

Carrying out the experiment

- Set up the microphone at a distance of 0.8 m from the clamped stand rod.
- Strike the clamped stand rod with the loose stand rod.
- Read the time from the CASSY-Display, and enter it into the table.
- Repeat the measurement several times for the same distance, and calculate the mean value of the measured times.
- Increase the distance to 1 m and 1.2 m and measure the times again.
- Calculate the velocity of sound from the quotient of s and t .

Measuring example

Distance s in m	*Time t in ms	Time t in s	Velocity of sound v in m/s
0.8	2.34	0.00234	341.9
1.0	2.92	0.00292	342.4
1.2	3.51	0.00351	341.8

*Time t : mean value

Evaluation

The velocity of sound can be determined by measuring the time t required by a sound pulse for covering a certain distance s . The velocity of sound is calculated from the quotient of s and t : $v = \frac{s}{t}$.

In the measuring example the mean value of the velocity of sound turns out to be $v = 342$ m/s (mean value).

The table value at 20°C is $v = 344$ m/s.