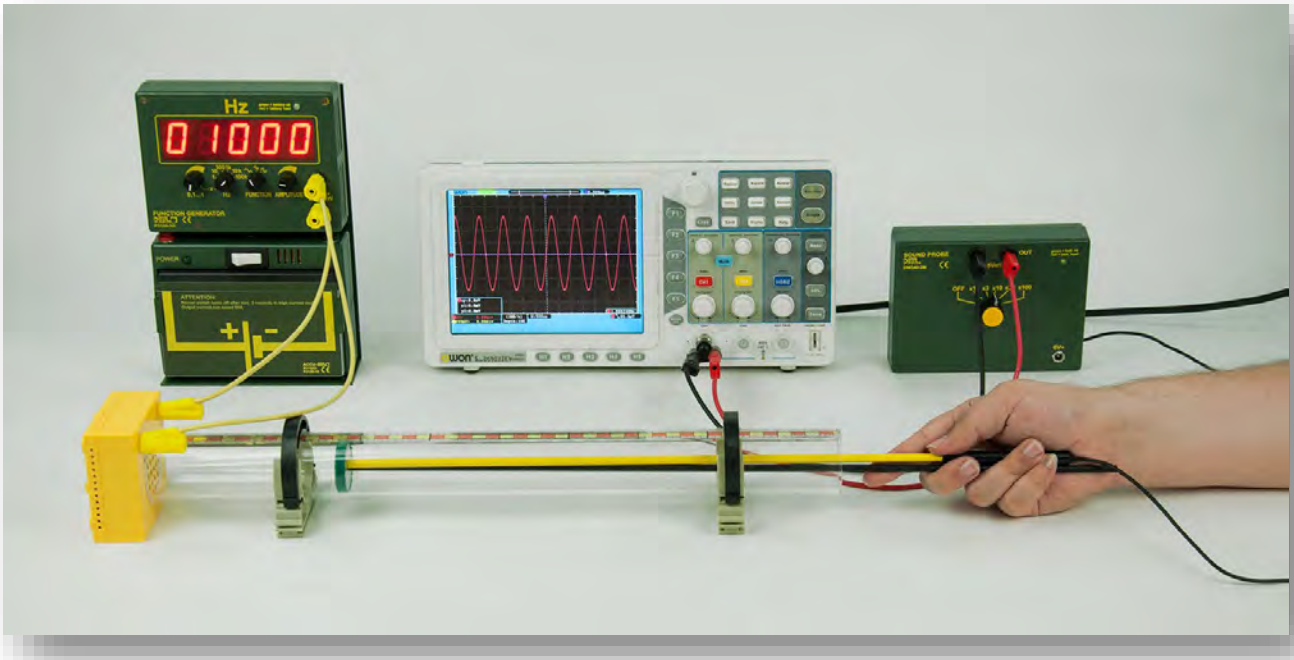
RESONANCE TUBE – SPEED OF SOUND 2

AKD 04.03



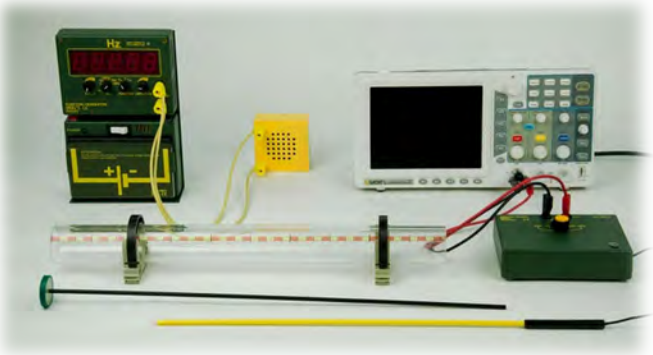
Material:

Item Code	Qty	Description
P1350-2K	1	Resonance tube "compact"
P1350-2S	1	Piston for resonance tube
P1351-2H	2	Holder for resonance tube, small
MB240-1LS	1	MBC Loudspeaker with nose
DW340-2M	1	Measuring microphone "inno"
P3120-4A	1	L-shaped assembly platform
P3120-1G	1	Function generator with digital display "inno"
P3120-1B	1	Rechargeable battery, "inno", 6V/10 Ah
DE751-3A	1	Oscilloscope, two-channel, 30 MHz, with VGA
	4	Connecting lead

RESONANCE TUBE – SPEED OF SOUND 2

AKD 04.03

Setup:
The holders are pushed onto the resonance tube so that the tube can stand on the table. The loudspeaker is placed at one end of the resonance tube and connected to the function generator, which was plugged together with the battery. The measuring microphone is connected to the oscilloscope. The piston is put into the resonance tube. The following measuring ranges are set on the oscilloscope: 1 V; 500 µs. The measuring microphone requires a gain factor of 10.



Experiment:
The function generator is switched on. A frequency of 1000 Hz is set on it (see note). The measuring microphone is held against the piston while it is moved. In this way, the minima/maxima and the wavelength can be determined exactly.

Result:
The movement of the piston changes the amplitude of the oscillation on the oscilloscope. If you measure the distance between one minima/maxima and the next but one (see graphic), you get the wavelength λ.

The speed of sound for room temperature can then be calculated:

$c = \lambda * f \rightarrow c = 0{,}34\,m\ *\ 1000\,Hz = 340\,m/s$

Note:
The resonance tube has a length of 50 cm, which means that the frequency must be at least 670 Hz for a whole oscillation (three minima/two maxima) to occur within the tube.