LIFT AT AN AIRFOIL

MED 19.18

Material:

Item-no.	Qty.	Description
DS090-3K	1	Claw base "Sepp", 260 x 220 mm
DM701-2L	1	Blower 12 V
P3130-2Q	1	Fixed voltage transformer 12V DC/10 A
DM711-2T	1	Airfoil, model, with scale
DM125-3C	1	Digital balance, electronic, 2000/0.1 g

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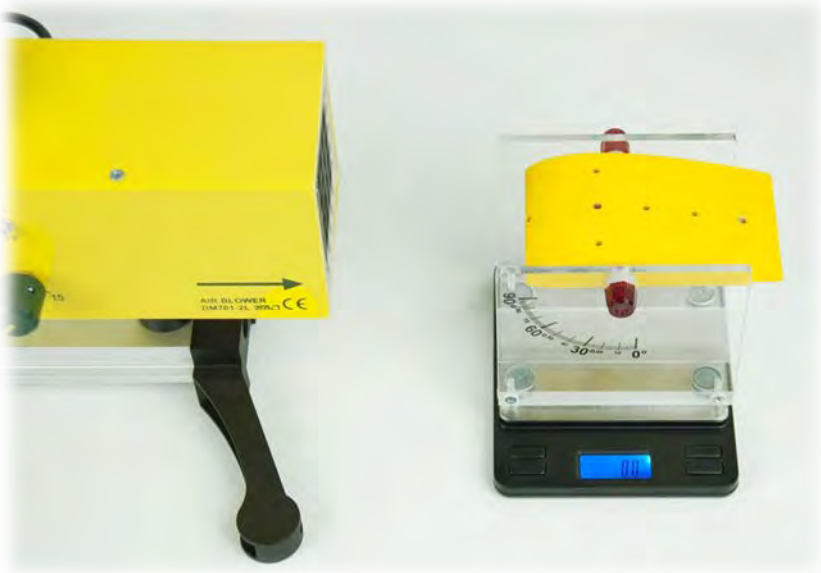
Purpose
Detection and investigation of the lifting force as a function of the angle of incidence (= angle between stream and the surface of the airfoil) and the flow speed.

Preparation
- the blower is inserted into the sliding saddle and screwed down tightly
- the digital balance is placed 10 cm in front of the blower
- the airfoil model is placed on the digital balance
- the rotary knob for the flow speed of the blower is turned to the very left
- the blower is powered by a fixed voltage transformer (12 V DC, min. 6 A)

Experiment 1
The digital balance is turned off. If it is not automatically tared we tare it to 0.
We turn on the blower and slowly increase the flow speed to 5 m/s.
We read off the value from the digital balance.

Afterwards we increase the flow speed to 10 – 15 m/s.
Again we read off the values from the digital balance.



Lift	Flow speed		
Angle	5 m/s	10 m/s	15 m/s
0 °			
5 °			
10 °			
15 °			
20 °			

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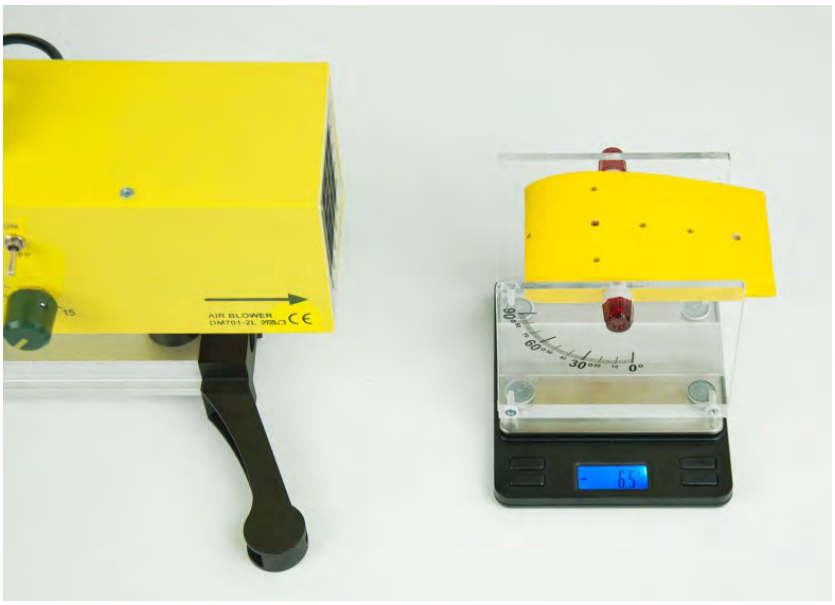
Series of experiments
We change the angle of incidence and repeat the measurements from before.
The investigated values are transferred to the chart again.

On one side we investigate the dependence of the lifting force from the flow speed; on the other side we investigate the dependence of the lifting force from the angle of incidence.



Attention
The measured values given in the technical literature were determined by measurements in a laboratory wind tunnel.
The deviation of the measured values determined in this test is attributable to the measuring arrangement simplified here.
This experimental arrangement, of course, has only model character.

Note
When kite flying or water kiting, the deflection downwards of the air stream or the water stream causes an upwards counterforce which depends on the speed and the intensity of the deflection (angle of incidence).
If (like most airfoils) aerodynamic body has an asymmetrical profile (the top side is more bended than the bottom side), the lifting force caused by the pressure difference between the top and bottom side is added.
If the angle of incidence is 0 ° this lifting force acts solely.

If the angle of incidence is too big, the flow at the top of the wing breaks and whirls are created; the lifting force force disappears and the air resistance increases.
A too steeply inclined aircraft sags forward and only once gets enough lifting force again when the airstream has builds up free of turbulences again and when the speed has increased.