Objects of the experiments
1. Detecting the effect of a buoyancy force when a body is immersed in a liquid step by step
2. Demonstrating the independence of the buoyancy force of a completely immersed body on the depth of immersion

Setup

Preparation of the aluminium body:
- Thread a 30 cm long piece of fishing line through the bore of the aluminium body and knot the ends together.
- In order to have well-defined depths of immersion, make marks on one side of the aluminium body with a spacing of 1.5 cm.

Stand setup:
- Slide the 40 cm long stand tube over the other one by about 10 cm, and connect the tubes using the universal bosshead.
- Clamp the stand tube with the smaller diameter in the stand base.
- Fasten the Leybold-multiclamp to the other stand tube.
- The height of the stand setup can now be adjusted continuously by carefully loosening the lower screw of the universal bosshead.

Preparing the force measurement:
- Put the CASSY-Display into operation with the Sensor-CASSY being connected.
- Connect the force sensor to Input A.
- Switch the display of Input B off with the key NEXT (CASSY) at the display.
- Make the zero adjustment for the unloaded force sensor by pressing the key OFFSET (CALIBRATION) until the red LED blinks.
- After the zero has been adjusted, confirm by pressing the key OFFSET (CALIBRATION) once more.

Carrying out the experiment
1. Detecting the effect of a buoyancy force:
   - Determine the gravitational force of the aluminium body by means of the force sensor.
   - Then immerse the body in the beaker, which is filled with water.
   - Proceed step by step according to the marks on the body.
   - Each time read the acting force from the CASSY-Display.
2. Buoyancy force acting on a completely immersed body:
   - Slowly lower the completely immersed body in the water.
   - Observe the force displayed on the CASSY-Display.

Measuring example
1. Gravitational force of the aluminium body: $G = 1.0\, \text{N}$

<table>
<thead>
<tr>
<th>Depth of immersion $s$ in cm</th>
<th>Force $F'$ in N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>0.93</td>
</tr>
<tr>
<td>3.0</td>
<td>0.83</td>
</tr>
<tr>
<td>4.5</td>
<td>0.73</td>
</tr>
<tr>
<td>6.0</td>
<td>0.63</td>
</tr>
</tbody>
</table>

2. At any depth of immersion, a force $F'$ of 0.6 N is read from the display.

Evaluation
1. When a body is immersed in a liquid, a force acts on it in the opposite direction of the gravitational force. This force is called buoyancy force $F_b$. The magnitude of the buoyancy force is obtained from the difference of $G$ and $F'$: $F_b = G - F'$.
2. The buoyancy force acting on a body which is completely immersed in a liquid is independent of the depth of immersion.