PASCAL'S VASES - HYDROSTATIC PARADOX

MED 15.06

Material:

Item-no.	Qty.	Description
DM410-1B	1	Pascal's Vases
C1000-1H	1	Beaker glass, 1000 ml, low form, Borosilicate

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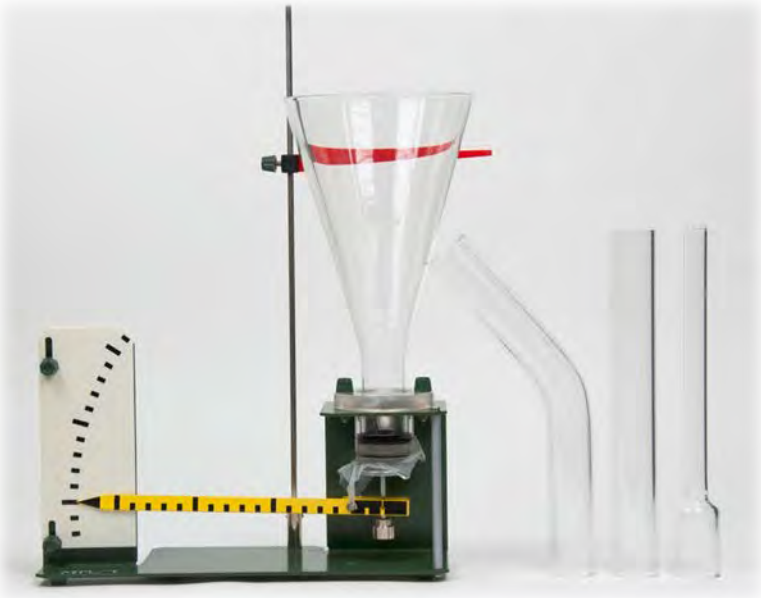
Purpose
Demonstration of the Hydrostatic Paradox

Preparation
- place the Pascal´s Vases on a stable horizontal surface

- check the tightness of the membrane (instructions can be found at the end of this manual)

- the pressure plate on the right end of the pointer should press against the membrane

- loosen the screws on the scale so that you can move the scale until the pointer rests on the big marking line of the scale



Experiment 1
The first attachment body, the glass funnel, is inserted into the cuff of the cylinder.

Lightly coloured water is now carefully poured into the attachment body.

Observe the deflection of the pointer - the pointer deflection indicates the pressure force acting on the membrane.

The attachment body should be filled up to about 5 - 7 cm below the upper edge.

Result
The higher the liquid pillar the higher the pressure force.
Move the red marker to the water level and fixed it at this position.

The deflection of the pointer (and thus the pressure force of the water on the membrane) is noted in the chart on the next page.

The attachment body is held in place so that the entire apparatus can be lifted and the liquid can be emptied back into the beaker.

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Experiment 2
Now the second attachment body, the tube with taper, is inserted into the cuff of the cylinder.

Lightly coloured water is now carefully poured into the attachment body until the red marker.

Read the pressure force that is acting on the membrane off and note in the chart.

Determine also the pressure force with the straight and with the crooked tube.

Attachement body	**Pressure force on the membrane** (Number of divisions on the scale)
Glass funnel	
Tube tapered	
Tube straight	
Tube crooked	

Attention
It is very important that the liquid pillar has the same height all the time (means that the liquid should always reach until the red marker). Pay attention to the parallax!

Result
If the density, the gravitational acceleration and the area remain the same the pressure force only depends on the height of the liquid.

$$F = p \times A = \rho \times g \times h \times A$$

(ρ ... density, g ... gravitational acceleration, h ... height of the liquid, A ... pressed area)

Note
After the end of the series of experiments the pointer should be fixed with a rubber band to avoid damaging the membrane.

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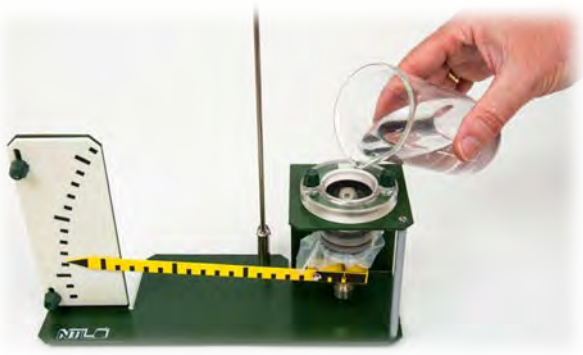
Checking the tightness of the membrane

By pouring some water into the cylinder we check whether the membrane is tight.

If no water escapes the tightness is given.
If the membrane is not tight it must be replaced.



Replacing the membrane

The cuff is unscrewed from the plate and lifted up.

Remove the O-ring from the groove.

A new membrane is pulled over and fastened again with the O-ring.