

## Mechanics of liquids and gases

### Pressure in liquids

Pressure due to weight of water -  
Measurement using Sensor-CASSY and CASSY-Display

#### Object of the experiment

1. Measuring the gravity pressure as a function of the depth of immersion

#### Setup



#### Stand setup:

- Slide the 400 mm 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.
- The height of the stand setup can now be adjusted continuously by carefully loosening the lower screw of the universal bosshead.
- Wrap some paper around the upper end of the glass tube, and carefully fasten the tube with the Leybold multiclamp.

#### Preparation of the pressure measurement:

- Put the CASSY-Display into operation with the Sensor-CASSY being connected.
- Connect the pressure sensor to Input A.
- Switch the display of Input B off with the key NEXT (CASSY) at the display.
- Place the immersion tube immediately under the water surface, and press the key OFFSET (CALIBRATION) until the red LED blinks.
- Make the zero calibration by setting the digital display to zero with the adjustment knob ADJUST.
- After adjusting the zero, confirm by pressing the key OFFSET (CALIBRATION).

#### Apparatus

1 Pressure sensor S, $\pm 70$ hPa .....	524 066
1 Beaker, TPX, 3000 ml.....	664 134
1 Glass tubes, 80 x 8 mm diam., set of 10.....	665 201
1 Sensor-CASSY 2.....	524 013
1 CASSY-Display USB .....	524 020USB
1 Steel tape measure, 2 m.....	311 78
1 Stand base, V-shape, large .....	300 01
1 Stand tube, 450 mm, 10 mm diam., set of 2 ...	666 609ET2
1 Stand tube, 400 mm, 13 mm diam.....	666 607
1 Stand rod, 25 cm, 12 mm diam.....	300 41
2 Leybold multiclips .....	301 01
1 Universal bosshead .....	666 615
1 PVC tubing 8 mm diam., 1 m.....	604 502
1 Universal marker pens, set of 10 .....	309 45ET10

#### Carrying out the experiment

- Shift the immersion tube downwards in steps of 2 cm. Each time read the measured value from the CASSY-Display.

#### Remark:

For measuring the depth of immersion, the level of the water surface in the tube is relevant, not the position of the end of the immersion tube.

#### Measuring example

Depth of immersion $h$ in cm	Pressure $p$ in hPa
0	0
2	2.0
4	3.9
6	5.9
8	7.8
10	9.9

#### Evaluation

The pressure due to gravity in a liquid increases with the depth of immersion.

If the depth of immersion is increased by 10 cm, the gravity pressure increases by approximately 10 hPa.

#### Remark:

Here the water barometer built by Otto von Guericke may be referred to. This device enabled the air pressure to be measured with the aid of a 10 m high water column.