Instruction for use of Polymeter

The polymeter is a hairhygrometer combined with a thermometer for measuring of air temperature and relative humidity. By means of these two values it is possible to ascertain saturation vapour pressure, vapour pressure, absolute humidity, dew-point and saturation deficit.

Notions of humidity measuring

The air contains always a quantum of water in form of vapour. This vapour causes a certain pressure, called vapour pressure. The capacity of the air for moisture is limited. Therefore it is a maximum, called saturation vapour pressure. The saturation vapour pressure is in high degree depending on temperature.
Relative humidity is the relation between present vapour pressure and saturation vapour pressure. If the air is cooling, there is an increase of relative humidity in case of constant moisture. The temperature, at which 100 percent relative humidity is reached, is called dew-point Further cooling then causes condensation of water in form of dew or frozen-fog.

Air temperature and saturation vapour pressure

On the left side of thermometer-scale you can read air temperature. The right side shows the corresponding saturation vapour pressure.

Example:
The air temperature may be + 8 °C. To this temperature corresponds a saturation vapour pressure of 10.5 hPa.

Relative humidity

The exterior scale of hygrometer dial shows the relative humidity in percent.

Vapour tension

The present vapour pressure in hPa is the saturation vapour pressure multiplied with 1/100 of the relative humidity.

Example:
Saturation vapour tension may be 10.6 hPa. The hygrometer shows the value of 50%.
Then is the vapour pressure 10.6 hPa x 0.5 = 5.3 hPa.

Absolute humidity

The absolute humidity is the moisture content in gramm per cubic metre air. The value of absolute humidity is in the range from – 10 °C up to + 20 °C equal to the 0.75 fold of vapour pressure.

Example:

The vapour pressure may be 5.3 hPa. Them are 4 gramms of water in 1 cubic metre of the air.

Dew-Point

The dew-point will be determined by looking for the value which corresponds with the present vapour pressure on rigth side of thermometer-scale and then by reading of the corresponding temperature value on the left side.

Approximately you can ascertain dew-point by substraction of the temperature value, which is indicated on the inferior scale of hygrometer dial from the present air temperature.

Example:

To the vapour tension of 5.3 hPa corresponds a dew-point of –1.6 °C.
The present temperature is + 8 °C.
The value on the inferior scale is for 50% v. h. 10.
Then you will calculate for dew-point + 8 °C – 10 °C = – 2 °C.

Saturation deficit

The saturation deficit is the difference between saturation vapour pressure and the present vapour pressure.

Example:

The saturation vapour pressure may be 10.6 hPa, the vapour pressure 5.3 hPa. The saturation deficit is 10.6 – 5.3 = 5.3 hPa.

Forecast of night-frost

A special significance has the polymeter for the forecast of night-frost. The physical base for this is the following.

In the night the earth is radiating haet to the space. Especially high radiating will be if the sky is uncovered. The cooling of earth by radiation causes cooling of the air layers near by the ground. If the dew-point is readed and the water vapour is condensating, the cooling will be limited (Condensating causes heating).

The lower the dew-point, the greater will be the cooling at night. If the dew-point in the evening is at 0 °C or lower, there is a great probability of night-frost.