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INFLUENCE OF HUMIDITY ON AIR VELOCITY TRANSMITTERS

• The density of wet air is lower than the density of dry air. This means that for the same air velocity (which is verified by a Laser Doppler Anemometer) the real mass flow of wet air is less than of dry air.

Hot film anemometers or instruments based on similar measuring principles are actually measuring the mass flow. Because of lower air density, the measured velocity of wet air is lower than the actual velocity.

• However, the measured air velocity depends strongly on other parameters such as different thermal capacity, thermal conductivity, and heat transmission of the air.

Because wet air has a higher thermal conductivity than dryer air, the measured mass flow in wet air is higher than in dry air. Because of higher thermal conductivity, the measured velocity of wet air is higher than the actual velocity.

These errors are compensating each other. The overall effect is that **hot film anemometers measure in wet air at ambient temperature with negligible positive error.**

An exact number of the error based on the physical data is not available. According to E+ E's tests, the error is < 1.5 % at 53°C and 80 %RH.

The lower the temperature, the lower the error.