VAISALA

Application Note

www.vaisala.com

How to Choose the Right Parameter for Humidity Control in HVAC

Most people working in the HVAC field are familiar with relative humidity (RH) as a parameter used to measure and control buildings. But RH is not always the best choice as a control parameter. In some cases there are options that will make the conditions more stable or the system commissioning easier. Let´s take a look at the different options.

Relative Humidity

Relative humidity is treated as the default humidity measure in HVAC. It is the best choice for controlling office and other spaces where human comfort is the main purpose, RH is a quite good choice as a control parameter. It allows flexibility in the temperature settings without changing RH control settings, for instance allowing higher temperatures in the summertime and lower temperatures during the winter heating season. It is also directly related to human comfort and many biological processes such as mold growth. A drawback is that very tight temperature and humidity control is difficult to achieve as the temperature affects the relative humidity as well. Thus, two controls may start fighting each other causing oscillation in the control loops.

Dew Point Temperature

The Dew point temperature (Td) indicates at which temperature you will see the onset of condensation. A low dew point temperature indicates dry conditions and a high dew point indicates high humidity. The dew point cannot exceed the ambient temperature. When the dew point is the same as the ambient temperature, you have reached saturation and the RH is 100%. The advantage of using dew point in HVAC controls is that it is not affected by temperature changes. This is an advantage if you need really tight and stable control for both temperature and humidity. The control circuits are independent of each other, so changing the temperature does not change the dew point in the controlled space and vice versa. Dew point and temperature control is used in spaces with the highest requirements for stability, like labs, museums, and data centers.

Wet Bulb Temperature

The wet bulb temperature indicates the temperature to which a water surface can be cooled by evaporation. This cooling effect varies with the relative humidity of the ambient air. When the air is saturated with water there is no evaporation and no available cooling. The wet bulb temperature is used to control cooling towers which can give access to low-cost cooling especially in hot and dry climates. If the humidity is too

high and the wet bulb temperature approaches the ambient temperature it does not make sense to run the cooling towers as the available cooling effect is too small.

Enthalpy

Enthalpy indicates how much energy needs to expended to get to the measured state from a reference state, usually dry air at 0 °C. The most common unit is kJ/kg. If you know the enthalpy of return air and make up air, you can decide directly if you should re-condition return air or replace it with outdoor air. This is not immediately evident just from temperature measurements as the humidity of the air impacts the enthalpy more than the temperature. Enthalpy is thus the measure of choice when your target is to maximize energy savings.

All of these humidity measures can be calculated from measured RH and temperature. You can do this in your control system, but many modern humidity transmitters can do the job for you. For instance, the Vaisala HMD62 duct humidity sensor allows you to select the desired humidity output in the field with a DIP-switch. Vaisala also offers a free of charge online humidity calculator that makes parameter conversions easy.

VAISALA

Please contact us at
www.vaisala.com/contactus

www.vaisala.com

Scan the code for more information