

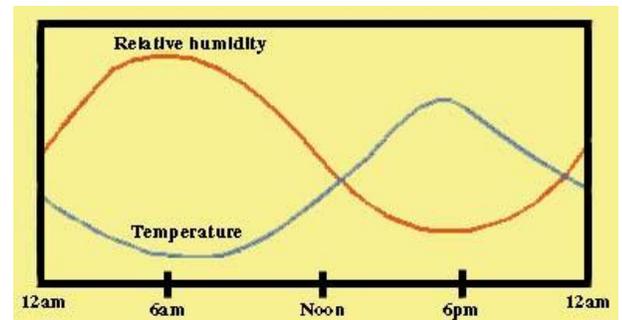
Understanding the Market: Humidity Range and Operational Parameters

Recent discussions at Rawal Devices have included engaging employees, new and old, in understanding how the APR Control fits into the air conditioning market.

We as an organization are constantly seeking new opportunities in which we can provide solutions to our customers. We want to find appropriate ways to help our salespeople and application engineers understand the way the APR Control ensures successful air conditioning system applications.

Rachel (in our office) had done some research and discovered a chart identifying the humidity levels for key cities in each of the United States. This was interesting information that I felt gave us a deeper understanding of how the APR Control *adds value*.

The data includes for each state, and for significant cities called out within each state; Average Relative Humidity (RH%) and Highest *Morning* and Highest *Afternoon* Relative Humidity (RH%). Contained in the information was average Humidity in each state in the US... (the ranking was irrelevant except to show that the northeast, for example, actually has higher average relative humidity than Florida, which is essentially in the tropics.)



To our team I asked the general question “Why is this information useful?” *How is this relevant to our work and how we help our customers and their clients?*

...By understanding that the peak or “Design Load” usually happens in the middle of the afternoon as a result of sun load and temperature conditions, the inevitable part load requirement that occurs during morning hours suggests this might be time of greatest need for the APR Control to modulate system capacity “to match changing load conditions...”

Sensible load drops at the same time as relative humidity is rising likely contributes to higher relative humidity in a conditioned space – where any fresh air/outside air introduction will contribute additional moisture to the space.

The core value of the APR Control is in its ability to provide capacity control response under varying load conditions while also maintaining the system (evaporator coil) in a dehumidifying mode during these part load conditions. So even in periods as short as a single day the need for modulation remains critical. This is simply reinforced by the ability of the APR Control to be effectively applied for modulation up to as much as 75% of system capacity in some cases (assuming proper understanding of staging, piping and oil entrainment to assure system longevity).



From where Rawal Devices started as a company and where I gained a majority of my HVAC systems application experience, the State of Connecticut; the data reveals 79% morning/52% afternoon Relative Humidity (RH%). Proximity to the ocean and warm ocean currents seem to contribute most significantly to this condition. And while the number of days a year the conditions range up to touch these extremes (5-10 days a year, for example), the need for effective operation is continuous throughout the cooling season.

It is during these periods that this high humidity tends to cause a build-up of moisture in the space as the thermostat causes a short cycling condition, resulting from satisfying the space thermostat too quickly. By keeping the system in dehumidifying mode and not overcooling the space, the APR Control can keep a space closer to comfortable temperature and humidity conditions. If only for a portion of the day...but the system can also satisfy full capacity needs (design condition) when load again builds as the day progresses and heat loads continue! Daily temperature range only matters in that, if you cannot keep the AC circuit operational, it cannot continue to dehumidify. The APR Control can enhance the AC system and provide continuous operation, giving it the continuous ability to dehumidify as needed without allowing the thermostat to be satisfied.

An often used example is the Mid-Atlantic states, generally in the Philadelphia area, where temperatures can swing from 60 to 90 degrees in a summer day, from a cool morning to a very hot afternoon, the APR Control has found a very strong reception in that area. This is because both the local need of the system and service demands, as well as the general high quality of the Engineers and Contractors and Service Personnel. This combination of factors has both benefited Rawal Devices and the general market in providing equipment capable of responding to all that that area requires. But the APR Control has been successfully applied in all 50 states...yes, even Alaska!

By creating a system and application solution serving full design load and a wide range of operating conditions, the APR Control allows the AC system to act as if it is not simply one size but many from the highest design demand to significantly reduced part load operation.



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