Enhanced Dehumidification:

Optimizing Humidity Control for Variable Speed AC Systems in Humid and Temperate Environments

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AIRSYS

Balance the Environment

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Summary

While its commonly understood that variable speed AC systems driven by inverter technology are quieter and helps prevent common and yet uncomfortable temperature swings in conventional AC units, the benefits of additional compressor control on indoor humidity, the other key component for indoor comfort, is often less explored.

The purpose of this whitepaper is to discuss enhanced dehumidification strategy made available by more precise control of the AC compressor system, as well as its benefit over traditional AC and reheat.

Background

Dehumidification is the process through which indoor moisture is removed from a building. An air conditioning system achieves dehumidification by cooling the air beyond its dew point and collecting moisture on the indoor heat exchanger. Once enough moisture is collected to form larger droplets, the system drains the water out of the unit through a drainpipe.

As cooling the air beyond its dew point is an integral part of dehumidification, in a hot and humid environment, the natural byproduct of dehumidification, cooling, is often preferred. However, in a temperate and humid environment where cooling is not needed, long periods of dehumidification can often lead to overcooling. In some applications, this overcooling is tolerated whereas some would require reheating the air that is being supplied to the room. This often comes in the form of a dedicated reheat coil in the AC system, or having a separate dehumidifier altogether. Both options can add significant cost to the project, take up valuable indoor space, and reduce overall efficiency.

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AIRSYS Enhanced Dehumidification Package

AIRSYS Enhanced Dehumidification Package offers a multi-layer approach to dehumidify the indoor space while prevent overcooling of the space and increasing the overall efficiency of the system

Variable Speed Compressor

Variable speed compressor allows precise control over cooling and allows fine adjustment in relation to return temperature and air volume to deliver smooth temperature and humidity gradients

Smart Humidity Control

Built-in Smart Humidity Control and Sensor Packaged allows the system to automatically and seamlessly transition between standard, dehumidification, and reheat modes, depending on the indoor conditions

Energy Recovery Ventilator

Energy recovery ventilator (ERV) consist of enthalpy exchange cube that allows fresh air intake while minimizing humidity intake. This preconditioning reduces unpredictable latent load from the outside air while improving efficiency by reducing the need for dehumidification in the first place

Optional PTC Reheat

PTC heaters that automatically adjusts and reduces current draw is its temperature rises. These types of heaters allow more gradual heating, reduces energy waste from overheating and enables the control system to gradually adjust the VFD compressor and give it much more precise control over supply air temperature.

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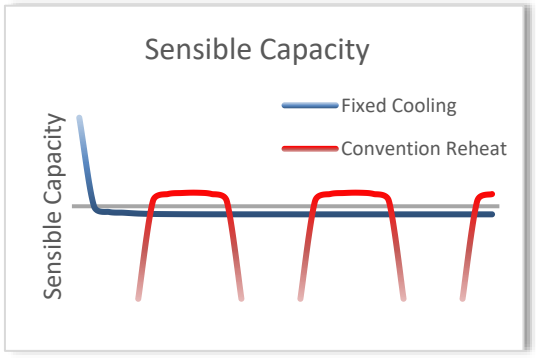
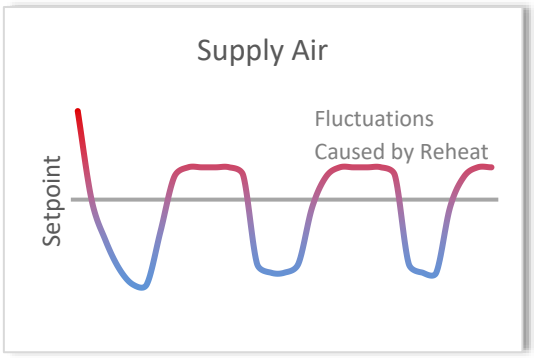
Net Zero Sensible Dehumidification

For any indoor living space, introduction of fresh outside air is critical to ensure comfortable and breathable air. However, the condition of this fresh air can be unpredictable and provides a variable load for AC unit to handle. For fixed speed systems, this makes so that even units that are fine-tuned at the time of design and installation, their cooling and reheat will never be balanced for any significant period of time.

The result is non-zero net sensible capacity, which means the system needs to either stop reheat and engage cooling only and unable to sufficiently dehumidify the room before the room is over cooled.

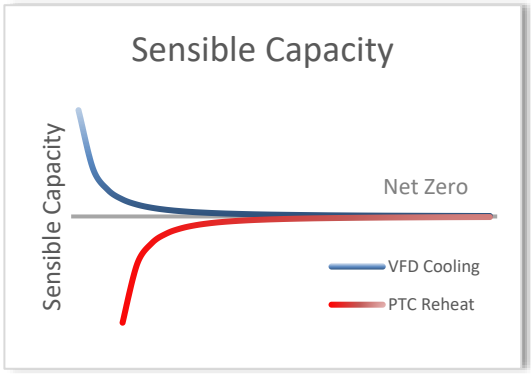
Conventional AC and Reheat

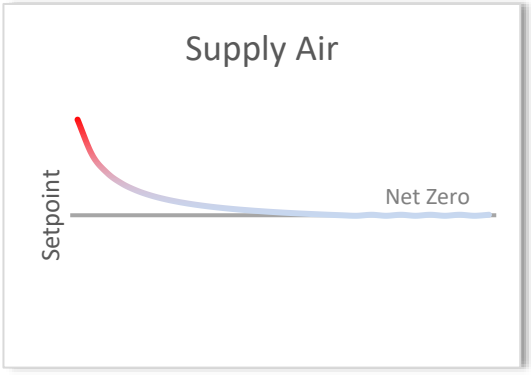




By combining features to precisely match sensible capacity of the compressor with the gradual changing PTC heater, the AIRSYS Dehumidification Package sustains net zero sensible for a and fresh indoor air, minimizing temperature and humidity swings while eliminate energy waste from overheating and overcooling the supply air.

AIRSYS Dehum Package





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