

LEAVING AIR TEMPERATURE CONTROL OPTIONS

Supply Air Control Strategy

DX-DOAS and DX-HOAS units can use three unique methods to control supply air temperature. The first and simplest strategy is referred to as Supply Air Temperature Control. This method maintains a constant supply air temperature (SAT) regardless of the season and space requirements.

However, two other strategies can achieve greater energy efficiency – Zone Reset of Supply Air Temperature Control as well as Outdoor Air Reset of Supply Air Temperature Control. Both of these methods allow the design engineer to integrate the loads of the DX-DOAS and the main air handler. Because supply air temperature can be varied by the DX-DOAS, the main air handler can be downsized to save compressor and fan energy since the latent load is minimized or eliminated for this sensible cooling system.

Supply Air Temperature Control

In this basic mode, the unit always maintains the supply air setpoint value, regardless of the outdoor or inside room temperature. This fundamental control allows the outdoor air to be conditioned to a neutral temperature (e.g. 72° F) in all seasons. The main air handler for the space controls the actual space temperature. This strategy uses a duct-mounted discharge temperature sensor to provide a feedback signal to the PID controller and maintain a precise SAT regardless of the conditions of the entering air. The SAT on the system is maintained at $\pm 0.2^\circ$ F DB when the compressor is running.

This method enables the DX-DOAS system to deliver neutral air while the main air handler must be sized for the zone's full load.

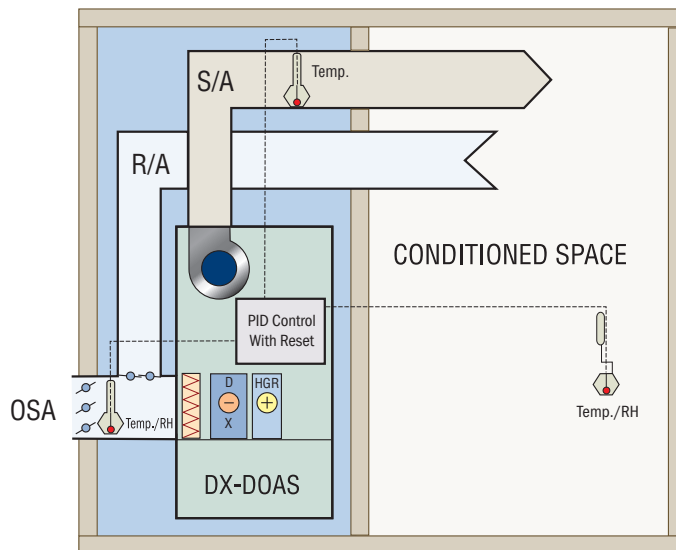


Figure 1 - Zone Reset Control Configuration

Zone Reset of Supply Air Temperature Control

This strategy combines a wall-mounted zone sensor with a duct-mounted sensor to provide supplemental sensible heating or cooling to the conditioned space (see figure 1). The zone sensor completes a feedback loop to the controller such that the supply air temperature setpoint is adjusted to maintain a targeted zone temperature due to changing conditions in the zone. When the system's compressors are energized, the controller will vary the amount of hot gas being rejected to the reheat coil. In the auxiliary heating mode it varies the auxiliary heating output. The controller varies the supply air temperature within a fixed range (e.g., 60° to 95° F) to maintain a room's setpoint (conditional upon system's capacity).

In this strategy, the DX-DOAS unit becomes the first stage cooling or heating system with the main air handler being the second stage. This is best applied if rooms have similar load characteristics. While a DX-DOAS primarily focuses on dehumidifying and reheating the air, the unit provides a secondary benefit in the cooling mode. Should the space temperature rise above the setpoint, the system can switch to the cooling mode and reject the resulting heat to the condenser. Because the DX-DOAS assumes a large portion of the cooling load, the size of the main air handler can be reduced proportionally to provide second stage cooling.

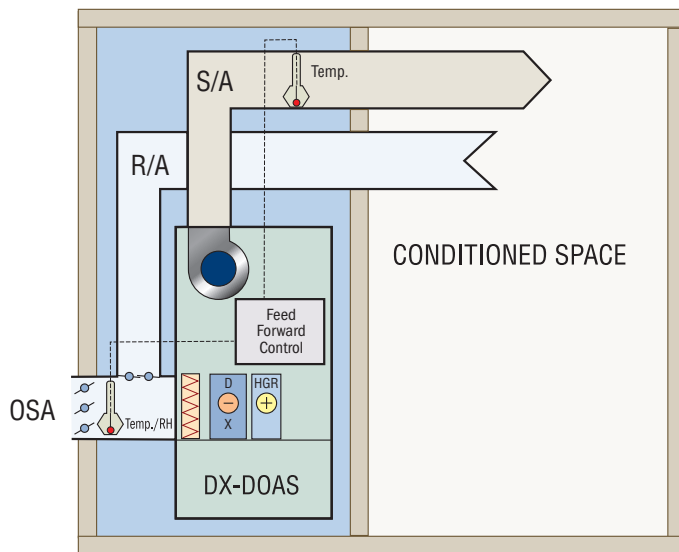


Figure 2 - Outdoor Air Reset Control Configuration


Outdoor Air Reset

This strategy uses feed-forward logic in that the controller resets SAT based on the outdoor air temperature. (See Figure 2.) As outdoor air becomes warmer and more humid, the DX-DOAS will identify that the space needs cooling and thus lower the SAT of the system. If the outdoor air turns cooler, it will reset the SAT to a warmer temperature. Four temperature ranges are established. All reset setpoints are adjustable between 60° and 95° F, but cannot overlap.

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