

Standard Control Sequences

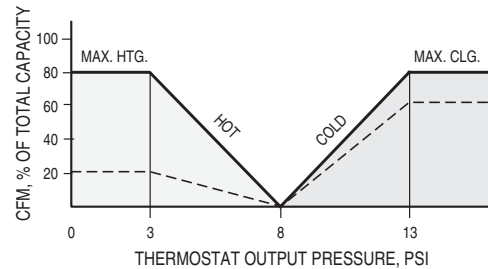
Pneumatic • Pressure Independent • 3000 Controller

The typical control diagrams shown on this page represent the most commonly used dual duct control strategies. The schematics illustrate operation with a direct acting thermostat. Similar control sequences are available for use with reverse acting thermostats. Further variations for each sequence include right or left hand cold deck and damper failure state, normally open or normally closed upon loss of main air. Application specific control strategies are available from your **Nailor** representative.

Control Sequence DP1 • Model 3210

- Variable Volume – Hot and Cold Airflow without Mixing and Zero Minimum
- Hot and Cold Deck Inlet Sensing.

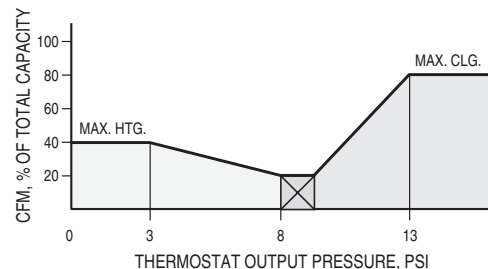
The hot and cold decks are set for equal or unequal maximum air volumes, with minimum setting of zero flow at 8 psi. With rise in room temperature the cold air damper will open to the preset maximum airflow in response to signals from room stat. The hot air damper will be closed. As the space temperature drops the cold air damper modulates to shut off at 8 psi and then the hot air damper begins to open. If the space temperature continues to drop, the hot air damper opens to the maximum setting. No mixing of hot or cold airflow occurs.



Control Sequence DP2 • Model 3230 and 3240

- Variable Volume – Hot and Cold Airflow with Mixing at Minimum Flow
- Total Air Sensing – In Common Discharge • (Hot Deck Make-up Illustrated)

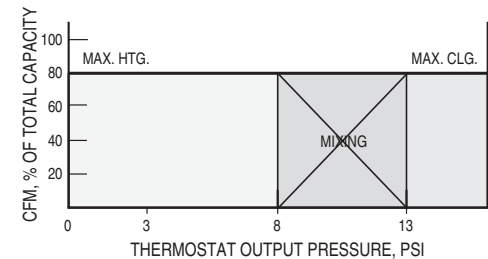
The hot and cold decks may be for equal or unequal maximum air volumes. The cold duct minimum flow rate is set for zero at 8 psi, while the hot duct minimum setting at 8 psi may be set at any desired volume up to but not exceeding its maximum setting. As the hot duct sensor located downstream is measuring total airflow, when thermostat output pressure begins to exceed 8 psi and the cold deck begins to open, the hot duct damper starts closing again and holds total airflow at the hot duct minimum setting. As the cooling load increases and the cold deck continues to open, the cold airflow, which is not controlled by the downstream sensor, exceeds the hot duct minimum setting at which point the hot duct damper is fully closed.



Control Sequence DP3 • Model 3230 and 3240

- Constant Volume – Mixing Hot and Cold Airflow
- Total Air Sensing – In Common Discharge • (Hot Deck Make-up Illustrated)

A downstream velocity sensor controls the hot deck and also holds total airflow of any hot-cold air mixture to a constant volume. Because the hot air velocity sensor is downstream of the unit, it directly measures the condition that is being controlled, i.e., total flow. The cold duct controls operate independently in response to signals from a room stat. The hot and cold deck maximum airflows are set for the same maximum flow rate. The hot deck minimum is set for zero flow at 13 psi. The cold deck minimum is set for zero flow at 8 psi. This arrangement will provide an extremely accurate constant volume flow cooling range over the entire heating and cooling range.



Standard Control Sequences

Analog Electronic • Pressure Independent

The typical control diagrams shown on this page are based on our standard **CSP 5000 Series** or **CSP 4000 Series** electronic controller/actuator. They feature the adjustment of minimum and maximum flow set points at the room thermostat, rather than at the box controller. The electronic room thermostat has a dual set point for heating and cooling.

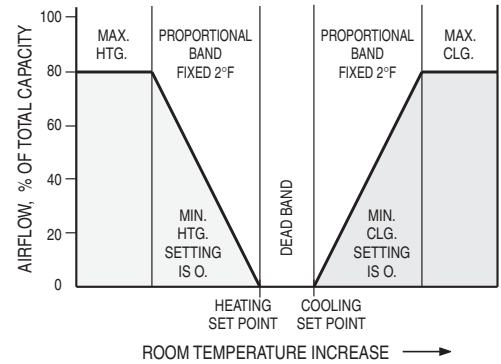
Control Sequence DE1 (CSP 5000) • Model 3210

- Variable Volume – Hot and Cold Airflow without Mixing and Zero Minimum

- Hot and Cold Deck Inlet Sensing

The hot and cold decks are set for equal or unequal maximum air volumes each with a minimum setting of zero.

At full cooling demand, the hot deck valve is closed, and the cold deck valve is at maximum cooling. On a drop in room temperature, the cold deck modulates down to zero in response to thermostat demand. On a further drop in room temperature, the hot deck begins to open and airflow increases from zero to its maximum setting.

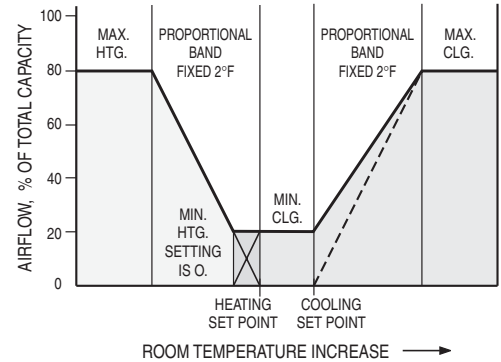


Control Sequence DE2 (CSP 5000) • Model 3230 or 3240

- Variable Volume – Hot and Cold Airflow with Limited Mixing
- Hot and Cold Deck Inlet Sensing
- Minimum Air From Cold Deck

The hot and cold decks are set for equal or unequal maximum air volumes. The hot deck has a minimum setting of zero. The minimum air is from the cold deck.

At full cooling demand, the hot deck valve is closed, and the cold deck valve is at maximum cooling. On a drop in room temperature, the cold deck modulates down to the minimum setting (or zero) in response to thermostat demand. On a further drop in room temperature, the hot deck volume increases from zero to its maximum setting and the cold deck goes to zero.



Control Sequence DE3 (CSP 4000) • Model 3230 or 3240

- Constant Volume – Hot Deck Make-Up
- Total Air Sensing In Common Discharge (Hot Deck Make-up)

The cold deck is set for calibrated minimum and maximum airflows required from the cold deck. The hot deck controller, with its sensor located in the common discharge, is set for the required constant volume, which must be equal to, or greater than the cold deck maximum flow.

At full cooling demand, the cold deck valve is at maximum cooling, and the hot deck valve is closed. On a drop in room temperature, the cold deck volume reduces to its minimum setting. As the cold deck volume reduces, the hot deck valve adds the additional air required to maintain the constant volume setting.

(This sequence is also available using the **CSP 5000 Series** controller actuator, except that hot and cold deck inlet sensing is utilized. Control Sequence DE4).

