Application:
Series fan powered terminals equipped with the above control package are designed to provide variable primary air volume to a constant volume fan terminal to accomplish variable volume/variable temperature (VVT) control when connected to a VVT zone thermostat. The constant volume series fan pulls air from the ceiling plenum to provide constant volume airflow to the zone when the primary air damper is providing less than design clm to the zone. VVT systems provide the flexibility to alternately satisfy both heating and cooling loads using a heating/cooling primary air source. By multiplexing the primary air, VVT systems can satisfy these diverse building loads. Two-stage electric reheat coils located at each terminal can additionally satisfy zone heating loads when the equipment is providing cooling. The minimum airflow set point may be set to zero. The fan provides airflow across the heat coil when the primary air source is off.

A wall-mounted thermostat located in each zone will sense load requirements and activate the control sequence to accommodate cooling or heating. Load requirements and sound level acceptability govern terminal sizing. This control package provides the following sequences of operations:

A. Cooling: When the primary air source is providing cooling (as detected by the primary air sensor). Refer to numbers on flow diagram. See Fig. 1.
   1. 1-2 indicates that maximum primary airflow is established by the user-defined maximum airflow set point until the zone comes under control at 2.
   2. Beginning at 2, the primary airflow is regulated over a throttling range by the damper until the user-defined minimum airflow set point is reached at 3.
   3. 3-4 indicates that, should the zone temperature continue to fall, the damper will hold primary air at the minimum airflow set point.

NOTE: The minimum airflow set point could be set to zero by the user. In this case, the damper will hold a fully closed position if the zone temperature continues to fall.

B. Electric reheat: When the primary air source is cooling (as detected by the primary air sensor), refer to numbers on flow diagram.
   1. As the zone temperature falls below the occupied heating set point, the Occupied Heating mode is in effect at 4.
   2. At 1.5 degrees below the heat set point, the first stage will be energized. If the demand is greater than 2.0 degrees the second stage will be energized.
   3. As the zone temperature rises, the stages of heat which were energized will be turned off when the zone demand is less than 0.5 degrees F.

C. Heating: When the primary air source is providing heated air (as detected by the primary air sensor), and supplemental heat is disabled. Refer to numbers on flow diagram.
   1. At 6, the maximum primary airflow is established by the maximum airflow set point until the zone comes under control at 5.

Figure 1 - Sequence of Operation for VVT, Cooling with Staged Electric Heat

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2. Beginning at 5, the primary airflow is regulated over a throttling range by the damper until the minimum airflow set point is reached at 4.

3. At 4, the primary air is held at minimum airflow set point as long as the zone’s temperature remains above the heating set point.

D. Unoccupied time period: (cooling)
When the unoccupied period is reached, the user-defined occupied cooling set point is reset upward to a user-defined unoccupied cooling set point. The damper will throttle in the same manner (as per A) during the unoccupied period, using the unoccupied cooling set point.

E. Unoccupied time period: (auxiliary heat)
When the unoccupied period is reached, the user-defined occupied heating set point is reset downward to a user-defined unoccupied heating set point. The damper will operate in the same manner (as per B) during the unoccupied period. The fan will start and the electric heat stages will operate as required to satisfy the heating load.

F. Unoccupied time period: (heating)
When the unoccupied period is reached, the user-defined occupied heating set point is reset downward to a user-defined unoccupied heating set point. The damper will operate in the same manner (as per C) during the unoccupied period, using the unoccupied heating set point.