



Balancing Systems with ECM Motors

“Electronically Commutated Motor” or ECM, is a brushless DC motor that is being integrated in a variety of systems today. ECM motors are designed to operate more efficiently by maintaining a predetermined CFM set point at different programmable settings. It is best compared to the cruise control feature in an automobile. While driving, once a desired MPH is established, the driver releases control of the speed by initiating the automobile’s cruise control setting. When the vehicle senses an incline in terrain, the engine accelerates to maintain the desired MPH. Likewise, when the vehicle begins to travel down a steep grade, the motor reduces to maintain the selected MPH. The ECM motor functions very similar. As the filter loads, the motor will increase RPM to maintain the programmed airflow. When the characteristics of the air changes in the heating and cooling seasons, ECM motors will increase/decrease based on the static pressure changes and will adjust to overcome resistances in the system.

So how do we balance a moving target? As dampers are adjusted during the balancing process, these motors adjust to maintain a particular control point (CFM or SP). The Trane TAM7 Heat Pump is a common AHU utilized in many different applications including libraries, office suites, barracks, etc. This particular AHU has a “dip switch” system that allows the TAB technician the ability to adjust the multiple airflow setting according to design requirements (See attached excerpt from Trane submittal). A configuration of Dip Switches 1 and 2 determines the airflow in cooling and heating modes. Switches 3 and 4 control the Blower Off and Delay settings, and



switch 5 allows the TAB technician to engage/disengage the 'constant' and 'torque' modes that control the ECM motor. Torque mode allows the ECM motor to operate more efficiently by constantly adjusting to maintain desired airflow. It is critical that the TAB technician not only adjust switches 1 and 2 for the recommended airflow but temporarily disable 'torque' mode and adjust into the 'constant' mode prior to balancing. It is highly recommended that when balancing one of these systems with ECM motors, that the technician review the manufacturer's submittal information prior to testing. Each manufacturer provides a detailed description on how to adjust and balance their units.

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