ECM™ Fan Motor Option

Note: Contact Titus regarding EC motor data before project submission

THE ENERGY EFFICIENT SOLUTION

Titus offers an alternative to the PSC motor that significantly increases the operating efficiency of fan coil units. This motor is frequently referred to as an ECM (electronically commutated motor). It is a brushless DC (BLDC) motor utilizing a permanent magnet rotor. The motor has been in production for years and is commonly used in residential HVAC units. Fan speed control is accomplished through a microprocessor based variable speed controller (inverter) integral to the motor. The motor provides peak efficiency ratings between 70 & 80% for most applications.

ECM FEATURES AND BENEFITS

Ultra-High Motor & Controller Energy Efficiency DC motors are significantly more efficient than AC motors. Due to the permanent magnet, DC design, the ECM maintains approximately 75% efficiency at all speeds.

Pressure Independent Fan Volume

The integral microprocessor based controller includes a feature that provides sensorless (no external feedback) constant airflow operation by automatically adjusting the speed and torque in response to system pressure changes. This breakthrough will no doubt have far reaching benefits and endless applications. For starters, the fan volume supplied to the space will not significantly change as a filter becomes loaded. The air balance process will become simpler and more accurate since the fan volume will not need to be re-adjusted after the diffuser balance is accomplished.

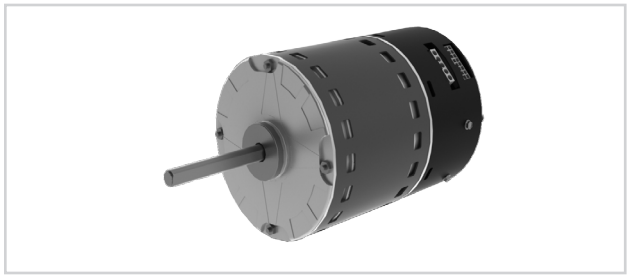
Factory Calibrated Fan Volume

Due to the pressure independent feature, the fan capacity is calibrated at the factory at the nominal airflow rate. Within the published flow rate and external pressure limits, the fan motor will automatically adjust to account for the varying static pressure requirements associated with different unit configurations and downstream duct configurations. This feature should not preclude the final field air balance verification process during the commissioning stage of a project. An electronic (PWM) speed control device is provided to allow field changes of the fan capacity as the need arises. Fan volume can be field calibrated in two fashions. First, a potentiometer is provided allowing manual adjustment using an instrument type screwdriver. In addition, the fan volume can be calibrated through the BMS using an analog output (2 to 10VDC typical) to the speed controller. A fan volume verses DC volts calibration chart is provided.

Designer / Owner Flexibility

The ECM incorporates ball bearings in lieu of sleeve bearings typically utilized with an induction motor. Unlike a sleeve bearing motor, the ECM does not have a minimum RPM requirement for bearing lubrication.

This allows it to operate over a much wider speed range. A reduced spare parts inventory is another plus.



Custom Applications — Programmable Fan Operation

Boundless control opportunities arise due to the controllability of a DC motor combined with an integral microprocessor. Various input signals can direct the motor to behave in an applicationspecific mode. For instance, multiple discrete fan capacities can be achieved. In addition, the fan speed can be varied in response to the space temperature load. The fan is also programmed for a soft start. The motor starts at a low speed and slowly TEAMSs up to the required speed.

Extended Motor Life

The high motor efficiency provides a significantly reduced operating temperature compared to an induction motor. The lower temperature increases the longevity of all electrical components and therefore the life of the motor. The ball bearings do not require lubrication and do not adversely impact the motor life. Most fan coil applications will provide a PSC motor life between 60,000 and 100,000 hours. Expected ECM motor life will be considerably longer than a PSC motor, due to the reduced operating temperature and ball bearing components.

Application

Most variable speed electronic devices, including the ECM operate with a rectified and filtered AC power. As a result of the power conditioning, the input current draw is not sinusoidal; rather, the current is drawn in pulses at the peaks of the AC voltage. This pulsating current includes high frequency components called harmonics. Harmonic currents circulate on the delta side of a Delta-Wye distribution transformer. On the Wye side of the transformer, these harmonic currents are additive on the neutral conductor. A transformer used in this type of application must be sized to carry the output KVA that will include the KVA due to circulating currents.

Careful design must be provided when connecting single-phase products to three-phase systems to avoid potential problems such as overheating of neutral wiring conductors, connectors, and transformers. In addition, design consideration must be provided to address the degradation of power quality by the creation of wave shape distortion. In summary, proper consideration must be given to the power distribution transformer selection and ground neutral conductor design to accommodate the 3-phase neutral AMPs shown in the adjacent table. Specific guidelines are available from the factory.

Fan Curves / ECM™ Motor

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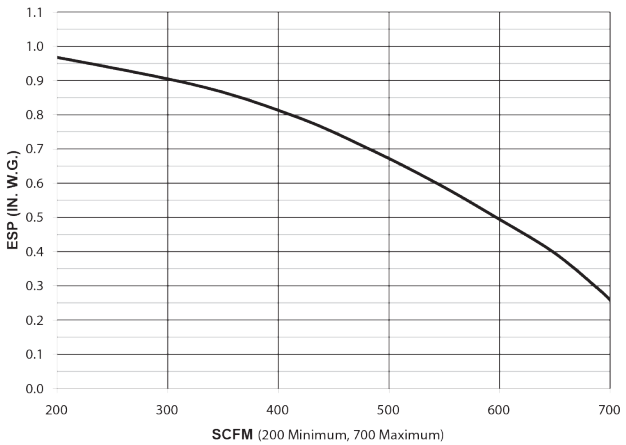
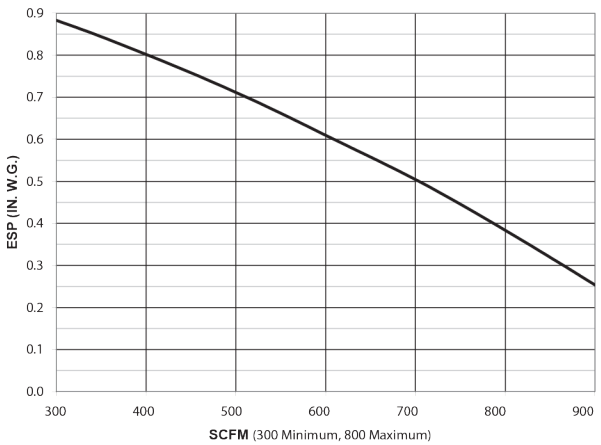
GENERAL FAN NOTES, ECM MOTORS

1. Fan curves depict actual performance at the maximum speed of the ECM motor. Depending upon external static pressure, flow rates are achievable anywhere within the curve boundary by adjusting the motor speed through the electronic interface control board.
2. Airflow rates will be constant for varying degrees of external static pressure caused by filter loading or other duct system variables once the electronic interface control board is set to desired flow rate
3. Fan curves compensate for the pressure losses of the unit cabinet, coil rows, and a loaded throwaway filter For job specific fan curves please run the Titus TEAMS Coil Selection Program.
4. ECM motors operate using a rectified AC power source that is converted to a non-sinusoidal DC power wave form. Harmonic distortion may occur and circulate on the power distribution system. Circulating harmonic currents are potentially additive on the neutral conductors of 3-phase, 4-wire Wye distribution systems. Neutral conductors must be engineered to account for the additional current (amperes) encountered.
5. See page 92 for ECM motor electrical data

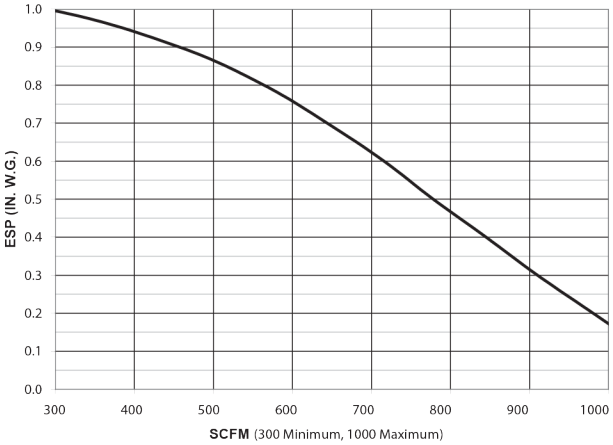
THHP Size 06 with 1/3 HP ECM Motor



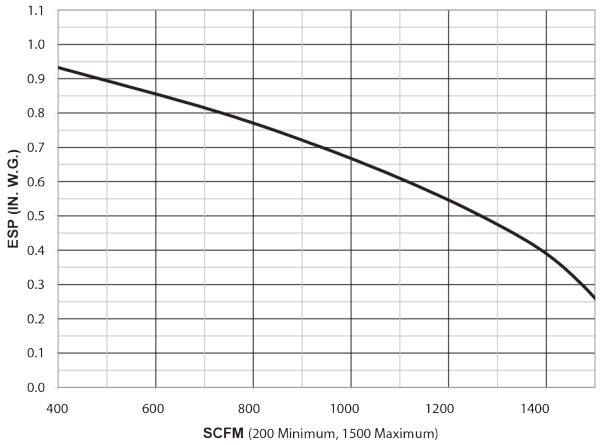
THHP Size 08 with 1/3 HP ECM Motor



THHP Size 10 with 1/3 HP ECM Motor



THHP Size 12 with 1/3 HP ECM Motor



FAN CURVES / ECM MOTOR

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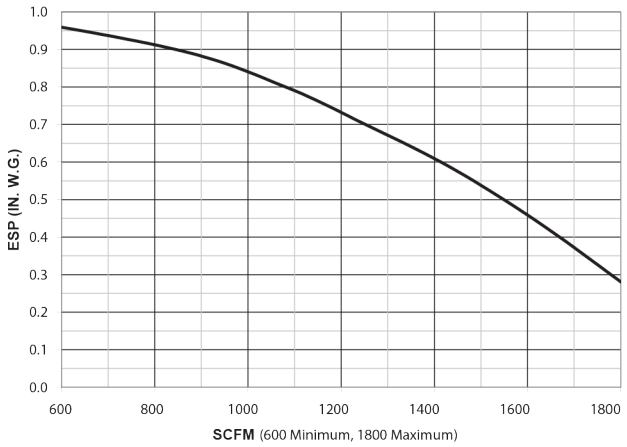
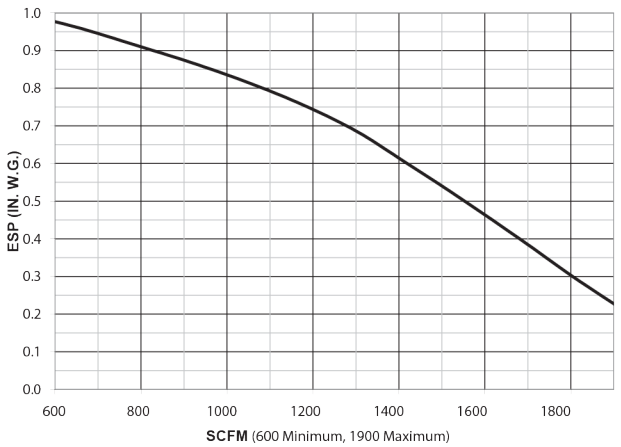
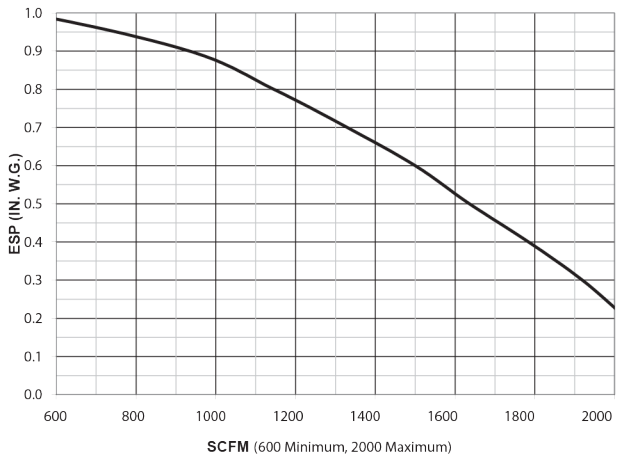
THHP Size 14 with 1/3 HP ECM Motor



THHP Size 16 with 1/3 HP ECM Motor



THHP Size 18 with 1/3 HP ECM Motor



ECM™ AIRFLOW

Unit Size	Factory Set CFM	CFM Range	
		Min.	Max.
06	600	200	700
08	800	300	900
10	1000	300	1000
12	1200	400	1500
14	1400	600	1800
16	1600	600	1900
18	1800	600	2000
20	2000	600	2000