



Investigation into the energy efficiency of EC evaporator fans

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Summary

Preliminary like for like test on an integral case showed that by utilising EC, energy efficient technology on the evaporator circuit alone, 1.8MW of electricity can be saved per annum, that is 775 kg of CO² per 3-fan display case. In large supermarkets there are up to 600 fans in the store giving 155 tonnes of CO² saving per year.

It is noted that lifetime improvements of up to twice can also be made. Standard operating lifetimes of Q motors is approximately 40,000hrs where as an EC equivalent is typically 75,000hrs.

Introduction

ebm-papst has worked with both original equipment manufacturers and end users to reduce electricity consumption by the exploitation of energy efficient motors. EC motors are DC motors with integral AC to DC conversion allowing easy connection to AC mains with the energy saving and control benefits of a DC motor.

This report describes tests carried out on the fan circuit of a 6 foot integral display case containing three evaporator fans

Test techniques

Evaporator fans

A comparison was made of the actual power consumption of 3 off nominal 7watt shaded pole motor (impeller in 200mm ring) with EC motors, both with 200mm diameter impellers.

Power measurements were logged at 10-minute intervals on the main circuit supplying the fans for a period of 21 hours. The shaded pole fans were tested running at full speed and the EC fans were tested at the reduced speed determined to give the same fan performance using the techniques described below.

During the test period the temperature of the display case was measured in three positions and logged every 10 seconds. An average figure was calculated to give an indication of the display case performance.



Figure 1 - EC motor with integral 200mm impeller and housing



Figure 2 - shaded pole motor with separate 200mm impeller

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Results

A comparison of the shaded pole motor and EC motor power consumption is shown in table 1. This shows that the peak instantaneous power for the 3 shaded pole motors was 92.5W and for the 3 EC motors 14.4W. The measurements show that there was a 1.6KW energy saving with the EC motors over the 21 hour test programme.

	Voltage (V)	Frequency (Hz)	Current (A)	Power (kW)	Total power consumed during test - 16 hrs (kWh)
Shaded pole motor	248	49.9	0.605	0.0925	1.9175
EC motor	245	49.9	0.1625	0.0144	0.3025
<i>saving</i>				<i>0.0781</i>	<i>1.615</i>

Table 1

Discussion and Conclusions

Using the existing circumstances, these results have shown that the use of EC technology reduces the energy consumed in the fan and controller circuit by 0.7MW per annum in the 3 fan evaporator fan display cabinet tested. In these calculations, it was assumed that the fans would run continuously throughout the year.

It is noted that lifetime improvements of up to twice can also be made. Standard operating lifetimes of Q motors is approximately 40,000hrs where as an EC equivalent is typically 75,000hrs.

A comparison of the performance of the display cabinet using the various types of fan shows that the performance of the speed controlled fans was reasonably well matched to the shaded pole ones.

Table 2

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