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Technical Articles

Maximising Efficiency: Calculating Savings in the Electric Motor Industry

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Maximising Efficiency: Calculating Savings in the Electric Motor Industry

Efficiency is paramount in the electric motor industry, where every percentage point gained can translate into significant cost savings for customers. This article delves into the world of motor efficiency, outlining what it is and how to calculate the savings that result from choosing more efficient motors. We'll also touch on the importance of Minimum Efficiency Performance Standards (MEPS) and how they are aligned with international standards, ensuring a sustainable and energy-efficient future.

Understanding Motor Efficiency

Motor efficiency, expressed as a percentage, represents the ratio of power consumed by the motor to the power converted into useful mechanical energy delivered at the output shaft. In simple terms, it measures how effectively a motor converts electrical energy into useful mechanical work. A higher motor efficiency percentage signifies a more energy-efficient motor, reducing operational costs and environmental impact.

Whole of Life Efficiency Calculation

To assess the economic benefits of choosing a more efficient motor, it's crucial to calculate the "whole of life" cost. This calculation accounts for various factors, including the initial cost of the motor (Pi), its output rating in kilowatts (kW), the number of operating hours (Hrs), the unit cost of power (kW Hr), and the motor's minimum efficiency at a given load (Eff).

The formula for the whole of life cost (Ct) is as follows: $Ct = Pi + (kW \times Hrs \times Unit\ cost) \times (100/Eff)$

Let's break down the calculation using an example:

Calculation 1 – 150kW 4 Pole Motor Operating at Full Load: Premium TECO MAXe3 Motor $Pi + (150kW \times 32,850 \times \$0.30) \times (100/96.9\ Eff) Pi + (\$1,478,250) \times (1.032) Pi + (\$1,525,541.79) Ct = \$15,990.00 + \$1,525,541.79 Ct = \$1,541,531.79$

Standard Efficiency Motor

$Pi + (150kW \times 32,850 \times \$0.30) \times (100/96.0\ Eff) Pi + (\$1,478,250) \times (1.0416) Pi + (\$1,539,745.20) Ct = \$12,904.00 + \$1,539,745.20 Ct = \$1,552,649.20$

By selecting the Premium TECO MAXe3 motor, an end user can save \$11,117.41 over five years. It's important to note that motors are expected to have a 20-year operational life, further magnifying the long-term savings potential.

Minimum Efficiency Performance Standards (MEPS)

MEPS, or Minimum Efficiency Performance Standards, play a pivotal role in promoting energy efficiency in the electric motor industry. In the ANZ region, MEPS aligns with the international standard IEC 60034-30, ensuring that motors ranging from 0.73 kW to <185 kW, with 2, 4, 6, and 8 poles and voltages up to 1100 VAC, meet efficiency requirements.

Motor efficiency must comply at either full load or $\frac{3}{4}$ full load conditions, with testing methods following the guidelines set by the IEC 60034-2-1 standard. These standards are crucial in reducing energy consumption, operational costs, and greenhouse gas emissions while improving the overall sustainability of electric motor usage.

In the electric motor industry, efficiency isn't just a buzzword; it's a critical factor that impacts a customer's bottom line. Calculating the "whole of life" cost and adhering to Minimum Efficiency Performance Standards can result in substantial savings over the long term. By choosing more efficient motors, customers not only reduce operational expenses but also contribute to a more sustainable and environmentally friendly future. Investing in high-efficiency motors is a strategic decision that pays dividends both economically and ecologically.

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