Grundfos endorses the use of high efficiency IE5 motors and pump solutions globally
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 **E-motors are the ideal solution for better efficiency and reducing energy consumption**

It is said that as much as half of the world’s electricity is consumed by motors1. Motor-driven systems in the industry sector alone consumes 64% of the electric energy, while the commercial sector consumes 20% and the residential sector consumes 13%2. There is a growing focus on improving the efficiencies of motors and reducing energy consumption to meet the carbon emission targets around the world. There is a lot of excitement around the world of motors, given the recent high profile investments in this area, validation from key governments and industry leaders to further promote the development and adoption on energy efficient motors across the various sectors.

The International Efficiency (IE) standards stipulate the energy efficiency and basically has set five levels of motor efficiency: IE1 to IE5. The highest efficiency level being IE5 the ‘Ultra-Premium Efficiency’. These IE codes serve as a reference for governments who specify the efficiency levels for their minimum energy performance standards for motors in their respective countries.

Pumps account for a large portion of this electricity consumed across the various sectors, especially in industries and commercial sectors. As a world leading manufacturer of pumps and pump equipment, Grundfos makes electrical motors of exceptional quality. Grundfos has several decades of experience in building state-of-the-art electronic controlled pumps (E-pumps) and been manufacturing its own motors with integrated frequency converters with energy-saving and speed control functionality for domestic, commercial, and industrial pump applications. In fact, the world’s first speed controlled pump with integrated frequency converter saw the light of day in its laboratories back in the late 1980s, and, ever since, Grundfos has worked intensively to optimise and extend its E-pump programme every year.

Grundfos is dedicated to keep at the forefront of the technological development, introducing truly innovative solutions for the benefit of its customers and the environment. Grundfos’ E-pumps with integrated frequency converter are designed with total control, customer convenience, and environmental sustainability in mind. Grundfos’ MGE E-motors exceeds the IE5 requirements - for example, looking at a MGE 11.0 kW 3x380-500V medium speed, the IE5 requirement for the motor efficiency is 93.2%, but the Grundfos MGE E-motor exceeds that by more than 2% by having a motor efficiency of 95.7% at 380V/2600 rpm. The PDS (Power Drive System, including Variable Frequency Drive or VFD) efficiency of a MGE 11,0 kW reaches as highs as 93.2% at 380V/2900 rpm. So even including the VFD the MGE motor matches the IE5 requirements for the motor part itself.

Commenting on the growing focus and adoption of E-Motors, Markus Brandstetter, Chief Technology Officer, Grundfos says: “Digital transformation is inevitable across the various segments and we at Grundfos are proud to pioneer in creating the products and digital solutions of the future. Our focus on developing IE5 E-motors is strategic not only for our business, but we see that it is a critical solution to alleviate the world’s energy and climate issues. E-motors are known to not only improve the efficiency of the entire system but also help in reducing energy consumption and helping us mitigate climate change. This is what we push further to the benefit of our customers and end-users in reducing cost and CO2 emissions.”

High efficiency E-pumps with IE5 motors contribute substantially to energy savings and reduced CO2 footprint. Grundfos estimates that the yearly avoided CO2 emission can be significant. In 2020 alone the avoided CO2 emissions from Grundfos E-pumps was 270,000 tons.

Further, the in-built application control in MGE E-Motors reduces not only the energy consumption of the pump itself but also optimizes the performance and efficiency of the entire system.

Grundfos is witnessing a strong market trend where more pumps are being fitted with VFDs and control units. The market for VFDs, including those applied with pumps, is witnessing a projected annual growth of around 6% in the coming years due to growing urbanization, industrialization and rising government mandates for energy efficiency3. Another growth driver is the need for manufacturers to optimize their manufacturing processes and cut operational costs, and even small reductions in speed and flow lead to significant energy cost savings.

**Why choose an E-Motor?**

E-motors offer increased functionality, making them easy to use in a wide-range of complex applications. These E-motors provide a range of benefits over standard motors such as:

* The MGE E-motor provides superior energy efficiency even beyond IE5 standard
* IE5 motor losses is at least 30% lower than the IE3, this alone reduces the energy consumption by 10% with a typical pump load profile
* The pump, motor and frequency converter are perfectly matched for optimized pump efficiency
* Choosing the right control mode in MGE for the application can provide even more energy savings for the entire system of up to 75% compared to uncontrolled pumps.

**Energy and cost savings with optimised efficiency**

The Grundfos MGE E-motors are the most energy efficient yet. These permanent magnet synchronous motors (PMSM) are designed especially for frequency converter operations and optimised for pump applications and high part-load efficiency. The motor PMSM also has a built-in frequency converter that enables variable-speed operation with benefits in pump applications ranging from energy savings, process control, extra functionalities, built-in motor protection, higher performance and more compact pumps, reduced water hammer due to long ramp times and low starting currents.

This results in lower energy and lifecycle costs. Adjusting the speed of the pump based on demand, rather than throttling the system flow with a valve, also results in no excess pressure causing stress in the system and noise in the valve due to cavitation and reduced power consumption due to lower pump speed.

Grundfos’ MGE E-Motors are currently utilized in a wide range of its pumps, including the multi stage pump ranges CRE, CME, MTRE the single stage pump ranges TPE, NBE, NKE and Booster systems that serve multiple applications.

**Looking beyond just motors to the entire system**

Grundfos iSOLUTIONS brings a new era of intelligence to pump systems and water technology with solutions that look beyond individual components and optimise the entire system. Powered by the company’s deep understanding of water, Grundfos iSOLUTIONS utilises intelligent pumps, cloud connectivity and digital services. Together they enable real-time monitoring, remote control, fault prediction and system optimisation to help you reach a new level of performance.

Grundfos iSOLUTIONS delivers the optimal combination of pumps, drives and auxiliary components for the specific application, incorporating special features and functions and building on application knowledge and experience. iSOLUTIONS allows easy integration of pumps, drives, measurement, controls, protections, and communication, saving you valuable engineering, installation and commissioning time.

**Recent installations & their impact**

Grundfos has many success stories from around the world on how E-Motors and iSOLUTIONS are helping its customers solve their water management issues as well as helping them converse water and energy, thereby reducing their costs and carbon emissions.

* Buildings unlock up to 80% energy savings with simple pump swaps: Taka Solutions (an energy consulting company) worked with Grundfos to determine the problems around the existing HVAC (heating, ventilation and air conditioning) pumping systems in three buildings belonging to H&H Property Management and Development in Dubai - Indigo Towers (residential), Green Tower (commercial) and Falcon Tower (residential). These building were experiencing unusually high electricity costs. A Grundfos Energy Check determined that the buildings were equipped with oversized pumps, inefficient operation and poor balancing in their constant, primary chiller systems and these pumps ran at constant speed. Thus, Grundfos recommended changing to close-coupled, end-suction pumps with variable frequency drives – intelligent NB-E pumps. These could provide the exact flow requirements to the chillers without wastage and improve the Delta-T to five degrees Celsius. A simple, turnkey solution. H&H saw results almost immediately. At Indigo Tower, the pumps previously used 36 kW every hour. After the upgrade, they used between 7-10 kW/h. Now two years in operation, they use 81% less electricity than previously. In addition, pump efficiency is not only better, but also the efficiency of the whole HVAC system. Actual payback time on the investment is just eight months. The numbers on the other two building retrofits in 2018 tell similar stories. Falcon Tower cut its pumps’ electricity consumption by 46% and Green Tower cut its use by 57%. Overall, the buildings cut their total energy savings – including that from chillers, ventilation and lights – between 20-25%.
* Effective monitoring helps resolve operational issues - saving water and cost while increasing production: Based on the findings of the Grundfos iSOLUTIONS MONITOR, CPKelco based in Køge, Denmark, installed two new CRNE3-23 pump with a 11 kW MGE motor. This solution has not only helped solving CPKelco’s problems but it also had a positive long-term effect on their CAPEX and OPEX. CAPEX, because the offered solution had a lower cost than the old system; and OPEX, because of energy savings and a 50% reduction in water consumption, as well as savings on service and a higher production. This is a fantastic example of how Grundfos can help its customers not only monitor their pumps, but also the system in which they are installed.
* At Grant’s distilleries in United Kingdom, Grundfos replaced the fixed-speed CR pumps for boiler feed on four steam boilers with a steam capacity from 12.5 tons to 30 tons with a steam pressure of 10 bar, with Grundfos iSOLUTIONS CRIE15-8 pumps with MGE motors. They also removed the modulating valve from the boiler. The CRIE pump controls the level in the steam boilers, going up and down in speed depending on demand. At the same time, the Grundfos pumps use built-in functions in the drive – that is limit-exceed and signal relay output – to control a bypass valve to secure flow through the economiser when the burner is running but the boiler is not calling for water. All control is handled by the drive at exactly the right time to have a safe and efficient boiler operation and reduce complexity. The outcome has been a 40 percent energy saving on one pump alone which equates to about 5.000 GBP a year. On top of that a 6 % saving on the gas usage for the boiler as a result of the more stable level control.

Three words, which can easily describe Grundfos’ MGE-motors are reliable, customizable and energy efficient. Since it was first introduced in the 1990’s, these motors have set the standard in the business. This combined with the digitalization of pumps, is changing the game for most industries right now, enabling new opportunities previously not possible, but also disrupting the normal. Grundfos has embedded our deep understanding of efficient and optimal pump operation into the MGE motors to create a cutting edge product - and when put together with the reliability of E-motors, this reduces the payback time of an E-pump. This is an important achievement. In combination with our pumps, these motors can give our customers an unsurpassed level of efficiency.

**Sources:**

1 & 2: https://www.sciencedirect.com/topics/engineering/electric-energy-consumption#:~:text=Concerning%20the%20worldwide%20situation%2C%20it,19%25%20to%20the%20total%20consumption

3 : https://www.grandviewresearch.com/industry-analysis/variable-frequency-speed-drives-vfd-vsd-market

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