



Simotics FD /
Sinamics G120P: a
powerful, highly
energy-efficient
system that is
optimized for
pump and fan
applications

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New EN 50598 energy-efficiency standards

From product to system

The new European EN 50598 standard that will soon come into effect describes, among other things, a method to identify the losses of frequency converters. With this standard, drive system operators can determine how much power their applications need based on application-specific load profiles. Integrated Drive Systems create the best conditions for meeting this goal.

Energy is becoming an increasingly scarce and expensive resource. For this reason, one of the five high-priority targets of the Europe 2020 strategy is to reduce primary energy consumption by 20% by the year 2020. Since electrically driven systems account for 70% of the power demand in industrial plants, the European Union issued the product-related 640/2009/EU Motor Regulation in July 2009. This regulation is based on the so-called ErP (Energy-related Products) regulation of the EU, which sets minimum standards for energy-related products from the domestic, services, and industrial sectors.

Emphasis on drive systems

Measures that apply only to products or components will not be enough if the EU is to meet its carbon reduction targets. This is why the most recent activities of the EU culminated in the new European energy efficiency standard that will come into effect at the end of 2014. It is a series of EN 50598 standards entitled "Ecodesign for power drive systems, motor starters, power electronics and their driven applications."

The new standard resulted from the close collaboration of Europump (the European Association of Pump Manufacturers), machine builders, and manufacturers of motors and drives and is based on the concept of an "extended product approach" that also takes the energy efficiency of the product's method of operation into account. The standard was jointly developed in the technical committee of CENELEC, the European Committee for Electrotechnical Standardization, and is intended to address not only pumps but all production machinery. This is why the new standard now considers all the relevant parameters that are needed to determine the energy efficiency of electrically driven production machinery.

Rating the energy efficiency of drive and motor systems

With EN 50598, the focus shifts from individual components to entire systems. Now, the energy efficiency requirements extend from individual drive components to all electrically driven production machinery, for example, pump systems. In this context, EN 50598-2, the second part of the three-part standard, is particularly relevant. It defines which information is needed to evaluate the energy efficiency of drive and motor systems and explains how losses are calculated. To minimize effort, the standard defines a total of eight operating points for which the losses must be determined and documented by the manufacturer. In the future, operators can calculate the power demands of their production machinery with their respective drives based on application-specific load profiles.

At a glance

- Simotics SD VSD10 line / Sinamics G120: investment-optimized drive system with low power demands (up to 200 kW)
- Simotics FD / Sinamics G120P: powerful system with high energy efficiency, optimized for applications with pumps and fans (from 200 kW) – power loss more than 35% lower than in the reference system
- Concept study of a motor with synchronous reluctance technology / Sinamics G120: highly efficient system with innovative synchronous reluctance technology (up to 200 kW)

There will also be an efficiency classification system with which components and systems can be comparatively ranked in terms of their energy efficiency. This means that frequency converters must be classified into categories IE 0, IE 1, or IE 2 and drive systems into categories IES 0, IES 1, or IES 2. As with the existing motor classes, higher numbers mean lower losses and thus higher energy efficiency.

Perfectly prepared for the standard

The new standard must be used for nonregenerative AC/AC frequency converters, motors with integrated converters, and converters with a power range of 0.12 kW to 1,000 kW and a supply voltage of 100 V to 1,000 V. Optionally, the standard can also be applied to regenerative AC/AC frequency converters, AC/DC and DC/AC converters, and converter and motor combinations.

With the triple integration of Integrated Drive Systems (IDS), Siemens offers its customers a perfectly matched system that can enable them to tap into the full energy-efficiency potential of their electrically driven production machinery. They can use the perfectly attuned portfolio of drives to optimize the entire drivetrain while also using the communication capabilities of higher-level processes as well as tools and services for lifecycle integration that take into account operating costs and environmental impact over the entire lifecycle of the machinery. ▶▶

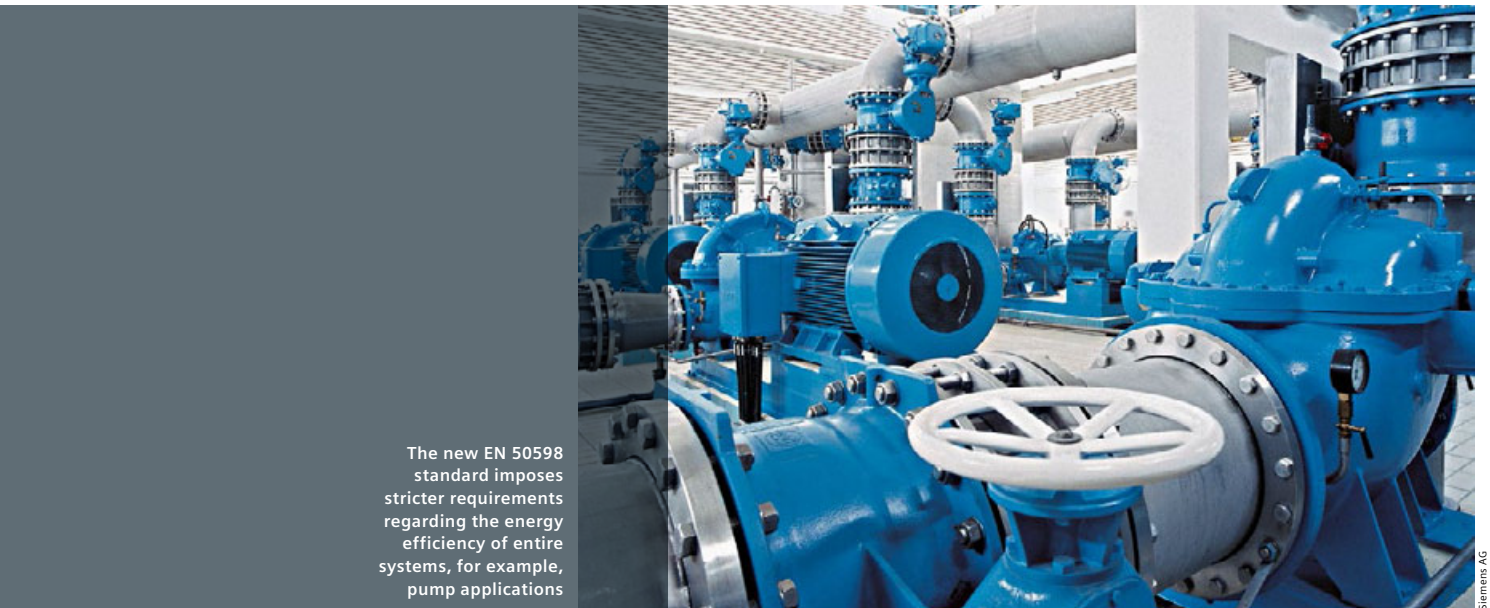
Well-matched combinations save energy

Motors in the Simotics SD VSD10 series, combined with Sinamics G120 inverters, have a system energy efficiency class of IES 1 and are an investment-optimized drive system with low power demands. The perfectly matched components contribute to lowering the energy costs. For instance, the currents and voltage of the motor are precisely matched to the inverter, making it possible to operate the system at the operating point with the highest energy efficiency. In class IES 2, the Simotics FD and Sinamics G120P units are a powerful drive system with high energy efficiency. Once a fan, pump, or compressor has been optimized for a squared load characteristic,

tages of this technology are the fast cold restart times, high controlling dynamics in encoderless operation, and low system costs thanks to the coordinated power modules. All the drive systems have special energy-efficiency functions such as Profi-energy and Eco Mode. In addition, all the necessary data for higher-level power management systems are made available.

Manufacturers and users benefit in equal measure

With EN 50598-2, converter and drive manufacturers will be able to determine the power loss of their products with a reasonable amount of effort. They will also benefit from reproducible testing condi-



The new EN 50598 standard imposes stricter requirements regarding the energy efficiency of entire systems, for example, pump applications

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this combination, which has been especially adapted for applications with pumps and fans, has only minimal losses at partial-load points. The motor and inverter combination is ideal when it comes to energy efficiency: the Sinamics G120P inverter has extremely low power loss and a variable-speed inverter fan that regulates itself according to the system's cooling needs. The rotor design of the Simotics FD, in contrast, has been optimized for speed control. This results in power loss that is more than 35% below the level of the reference system. The concept study revealed that the combination of an innovative motor with synchronous reluctance technology and Sinamics G120 inverters has the highest power efficiency in class IES 2 and at the same time the lowest lifecycle costs. The control has been optimized for synchronous motors and offers highly dynamic maximum efficiency at all operating points. The advan-

tions. In turn, users will be able to determine the power loss or rather the power demand of their applications based on application-specific load profiles and compare products in terms of their energy efficiency. In view of rising energy prices and the growing resource shortage, these factors are increasingly important; supported by the new standard, they will pave the way for sustainable economic activity. ■

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