The new ecodesign requirements for Motors and VSDs

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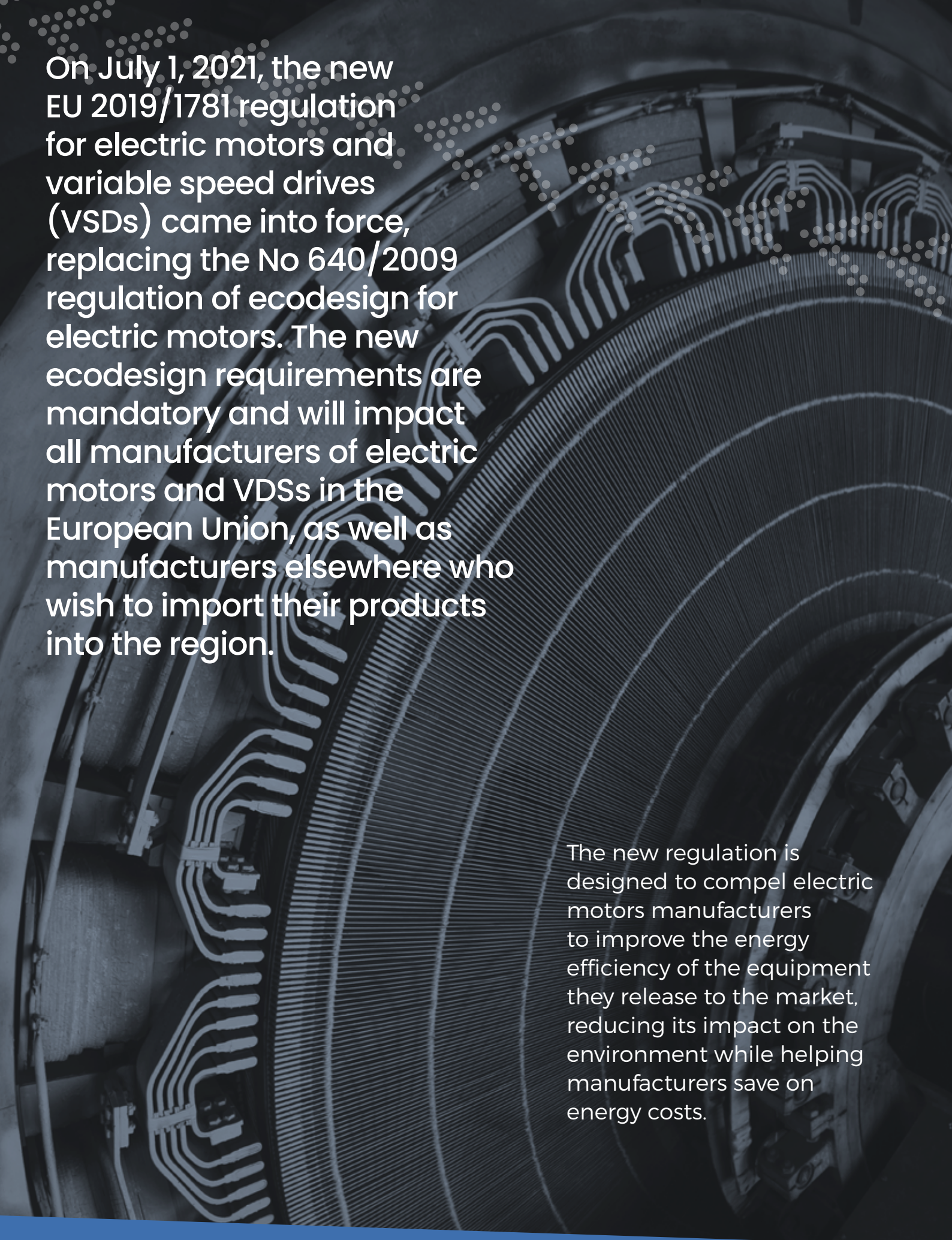


On July 1, 2021, the new EU 2019/1781 regulation for electric motors and variable speed drives (VSDs) came into force, replacing the No 640/2009 regulation of ecodesign for electric motors. The new ecodesign requirements are mandatory and will impact all manufacturers of electric motors and VDSs in the European Union, as well as manufacturers elsewhere who wish to import their products into the region.

The new regulation is designed to compel electric motors manufacturers to improve the energy efficiency of the equipment they release to the market, reducing its impact on the environment while helping manufacturers save on energy costs.

Background

Electric motors are responsible for about 50 per cent of the entire consumption of electricity worldwide. There are around eight billion electric motors in the European Union (EU), that's about eight motors for each citizen.

This includes motors of every size, from tiny ones used to drive cooling fans in laptops, to heavy-duty industrial motors. Motors are deployed in virtually all industrial sectors, as well as in a wide variety of white goods and consumer electronics.

Electric motors are also one of the categories of industrial equipment that consumes the most electricity and are therefore responsible for a huge chunk of manufacturers' electricity bills. These characteristics make electric motors the natural target for regulations aiming to reduce energy consumption and improve sustainability, while supporting economic development.

The ambitious goals outlined in the Paris Agreement established that governments should make a concerted effort to limit global warming to well below two degrees Celsius compared to pre-industrial levels. To meet these goals, it is essential to tackle the performance of electric motors.

Why the new regulation?

Initial calculations based on the Working Plan — the initiative associated with the previous regulation, estimated the potential to deliver in excess of 260 TWh of annual final energy savings in 2030 across the continent if we were to make changes in several different areas. This is the equivalent of reducing greenhouse gas emissions by approximately 100 million tonnes per year in 2030. Electric motors were one of the priority product groups listed in the Working Plan, with the earlier legislation estimating 10 TWh of annual final energy savings from this product group alone.

By introducing the new regulation, additional net electricity savings of 10TWh per year are expected to be achieved. This should reduce net greenhouse gas emissions by 3Mt CO2 equivalent annually by 2030, compared with the higher levels that would be emitted if we weren't to take action.

What changes in 2021?

From July 1, 2021, lower efficiency products will no longer be accepted in the market, as a wider range of motors are brought into scope and held to higher standards. This applies to products placed onto the market or put into service in Europe after these dates.

Exceptions exist in relation to repairing products containing motors that were placed on the market before the new regulation came into force. This will avoid scrapping equipment early if motors can be repaired and is designed to avoid problems if it is impossible to replace a non-compliant motor with a compliant one without disproportionate costs to the end user.

Previously, the scope of the regulations only covered 3-phase motors ranging from 0.75 kW to 375 kW, leaving motors outside this power range excluded. From 2021, this will no longer be the case.

The energy efficiency of a motor is expressed in International Energy efficiency classes (IE), IE1 being the lower class and IE5 the highest. Under the previous regulation, motors must reach the IE2, IE3 or IE4 efficiency level, depending on their rated output and other characteristics.

The impending regulation requires all new 2-, 4-, 6- and 8-pole motors in the power range of 0.75-1000kW to meet IE3 efficiency class. Also included this time are Ex ec, Ex d, Ex de, Ext motors, brake motors with an external brake and motors with IC418 cooling. Sizes from 0.12-0.75 kW will also need to meet IE2 class for the first time.

The previous legislation allowed for an IE2 motor to be used provided it was controlled by a VSD, but this will no longer be the case. Drives are also included for the first time, with AC drives needing to meet their own classification of IE2.

As with the 2016 updates to the legislation that saw the market share for IE3 premium class motors rise from 0 per cent to 29 per cent, we are likely to see a continued shift towards energy efficient products in response to these latest motor regulations.

An opportunity, not a restriction

Instead of viewing the new ecodesign requirements as restrictive, plant managers should see this as an opportunity. A more efficient motor can generate savings ranging from a few euros to tens of thousands euros over its lifetime, depending on its power and use pattern. In industrial applications, this saving is likely to be at the higher end of this scale.

On top of this, increased usage of VSDs in relevant applications can lead to considerable savings. This is encouraged by the regulation by requiring manufacturers of both motors and drives to provide relevant energy efficiency data at different speed/ torque points.

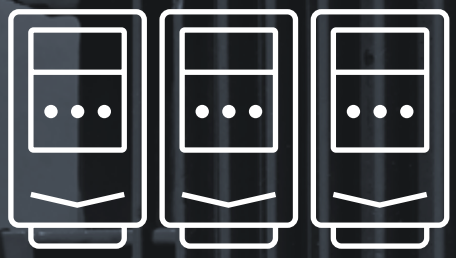
The new regulation will help end users cut their electricity bills significantly, while contributing towards a global goal of reducing greenhouse gas emissions. For those that want to go one step further, there are ways to improve the energy efficiency of operations.

Choose the right load factor

The load factor represents the average load of a motor compared with its capacity over a specific period of time. The load factor significantly impacts the energy consumption of an electric motor.

Motors are most efficient when operating at full or near full load conditions, and the highest energy efficiency is achieved at load factors of 75 to 80 per cent. However, efficiency progressively decreases at a load factor of 50 per cent or less.

As a result, it is essential to install the right motor size for your application. Bigger is not always better — in fact, an unnecessarily large motor capacity will substantially increase your energy bill.



Variable speed drives

VSDs regulate the speed and rotational force or output torque of a motor, so that it matches the speed required by the process is it driving. Without a VSD, your motor will run at full capacity all the time, even when a much lower speed might be sufficient to effectively power your application.

Using a VSD can reduce a motor's electrical consumption by up to 55 per cent. This means that in some cases, the initial investment for a VSD can be amortised in just a few months. In spite of this, less than 10 per cent of all electric motors used globally are equipped with VSDs.

Switch it off

As obvious as this might sound, leaving a motor on when not in use is not only wasteful, it also leads to overheating and ultimately shortens your device's lifespan. Using an automated switch-off system can be helpful to give your motor a break whenever possible.

To reduce the strain of frequent start and stop, you can also invest in a soft starter. This device can be added to an electric motor to limit the surge of current and torque that characterises the start-up process, to achieve a smoother, more gradual start. Not only will a soft starter reduce your motor's energy consumption, it will also limit mechanical stress on the motor, its shaft and the power cables.

If you need help sourcing the most efficient motor for your application, visit **www.euautomation.com**. Here, you can find all of the motors that we currently have available, plus an online chat function for further advice.