

EU: Drives must be employed to save energy and CO₂ emission

EU recently adopted the Eco-Design directive that require better energy efficiency of motors - included their control devices. The requirements for electric motors will be tightened so that all electric motors from the 2011 must meet the IE2 requirements and in 2015 all industrial IE2 must be equipped with a variable speed drive - or meet the IE3 requirements.

Within EU there is approx. 85 million large electrical motors and these motors use 30 to 40 percent of the electricity used in Europe. When all motors meet the efficiency requirements - or are controlled by frequency converters - their energy consumption will drop by 20 - 30 % according to studies made by the EU commission. This corresponds to 7 % of the total EU electricity consumption, or all of Sweden's electricity consumption for a year.

As a leading provider of frequency converters globally, Danfoss have supported the urge for tighter rules.

"because IE3 motors are more expensive than IE2 motors I expect some will choose to apply drives. The cost incentive and higher awareness of variable speed drives will increase the market," says Senior Vice President of Danfoss Drives Ole Møller Jensen.

"There will be a lot of discussion on in the future about energy. We have considerable knowledge about this that we would like to share" he states.

The directive

The adopted directive concerns electrical motors in the power range



0,75 - 375 kW. that consume 70 % of the energy consumed within industrial areas. The total consumption within this area is 1,067,000,000,000 kWh - causing emission of emission of 427,000,000 t CO₂ .

The total consumption by industrial motors is expected to increase to 1252,000,000,000 kWh in 2020, where the total emission of green house gasses should be cut by 20 %.

Possible savings in 2020 - due to the Eco-Design directive are 135,000,000,000 kWh, corresponding to an annual reduction of 63,000,000 t CO₂ and savings of € 9 billion.

These savings correspond to the entire annual electricity consumption of Sweden in 2005.

IE efficiency classes

The IEC 60034-30 standard was published in the beginning of 2009 with global unified efficiency classes ("International Energy Efficiency Class")

- IE 1 = Standard Efficiency
- IE 2 = High Efficiency
- IE 3 = Premium Efficiency
- IE 4 = Super Premium

More European motor manufacturers are expected to officially introduce the IE classification at the HMI 2009 exhibition and only offer motors with IE classes.

IEC 60034-30 is also valid outside Europe.

Danfoss Drives has developed the VLT® drives to optimise the operation of energy efficient motors. This development will continue and be strengthened in the future.

Comparison eff vs. IE

Permissible values of the IE classes have adjusted to the former eff classes (considering 60034-2-1:2007)

Example: A 4-pole motor with 2,2 kW eff1 ($\eta=86,4\%$) is identical with IE2 ($\eta=85,3\%$)

IEC 60034-30	eff classes
IE1 (Standard Efficiency)	Comparable to eff2
IE2 (High Efficiency)	Comparable to eff1
IE3 (Premium Efficiency)	10-15% better than IE 2
IE4 (Super Premium)	-

IE4 is listed, but not defined in detail

The eff classifications will still be valid, but will lose importance.

Changes to happen

The Eco-Design directive requires the following steps:

From 16.06.2011	0.75 – 375 kW	IE2
From 01.01.2015	7.5 – 375 kW	IE3 or IE2 + VSD
From 01.01.2017	0.75 – 375 kW	

The directive has formalised the trend of using higher efficiency motors and will probably push the development of higher efficiency motors e.g PM motors.

Danfoss takes part in the development of technology for high efficiency motors incl PM motors.