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## Energy-efficient drives: well prepared with trend-setting technology!

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One of our guiding principles is to take on our responsibility for the environment and see water, wastewater and energy as a whole. We therefore promote the sustainable use of energy by using innovative technologies.

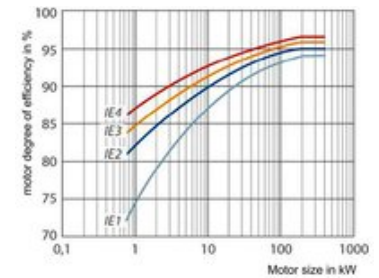
According to a study of the Fraunhofer Institut electric motors are responsible for about 40% of the total power consumption worldwide and about 70% of the power consumption in industries.

The international standards IEC 60034-30 dealt with the energy consumption of rotating electric machines already before 2009. The modified DIN EN 60034-30-1 published in 2014 picks up these requirements and tightens the standards even more.

- It includes all designs of mains-operated three-phase drives.
- Nominal output powers from 0.12 kW are required.
- It includes 2/4/6-pole and 8-pole machines.
- Efficiency classes IE1, IE2, IE3 and IE4 with 50 Hz and 60 Hz
- Motors for the use in areas where explosive gas-air mixtures are present

The future efficiency class IE5 is pre-announced for the next updated issue of the standards. Thus, an adjustment of the requirements to the state-of-the-art level is anticipated also for the next years. With the conventional asynchronous technology this aim can hardly be achieved, or even not at all. This is also the opinion of the standards committee.

Our own philosophy challenges us to go ahead of the legislator, the market and the present technology. In the course of the past two years we have reviewed in detail the technical options and innovations of the motor manufacturers. While, two years ago, the focus of the drive manufacturers was on high drive powers, with which an efficiency increase by only few percent could lead to considerable life-cycle cost reduction, the new standards places the focus on the smaller but more frequently used drives.



Degree of efficiency requirements for each efficiency class

Drive size		Market share	Share on energy consumption of electrical drives
Class	Power demand		
Small	< 0,75 kW	90%	9%
Medium	0.75 - 375 kW	10%	68%
Large	> 375 kW	0.03%	23%
Total			approx. 40% of world's energy consumption

As the table above shows, no noteworthy energy savings will be possible worldwide with only large-scale consumers. The greatest potential lies in the smaller and medium-size drives. The technical requirements are however higher for the latter as losses in bearings and for cooling can only be limited to a certain extent.

Especially with lower powers the present standard motors of efficiency class IE1 as used in "Ex" areas show a comparably poor degree of efficiency. The opposite picture shows how the degree of efficiency of a 1.1 kW drive improves from 75% with IE1 to 87.2% with IE4. This is a reduction of the losses by nearly 50% of what the standards are requesting.

We have successfully used synchronous permanent magnet motors in several projects in consultation with the customers. This resulted in a number of benefits:

- Significantly improved degree of efficiency both in full load and partial load operation
- High overload capacity
- IE4 achievable also in "Ex" zone 1
- Torque and power control via converters

- Independence from mains voltage and frequency
- Speed control

**We will carry on using the technological advantages of IE4 to further improve the capability of HUBER machines. Some machines with IE4 were already presented at last IFAT trade show in June 2016. We will continue to gradually change more of our machines to IE4 drives as well.**

In the future, we will control all parameters of the drive via the converter without the need to complete the drive train with individual measurements. We will be able to exploit the full energy saving potential in overload, full and partial load operation.

**With this innovative technology we and our customers will be well prepared for the challenges we will be faced with during the coming years!**

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