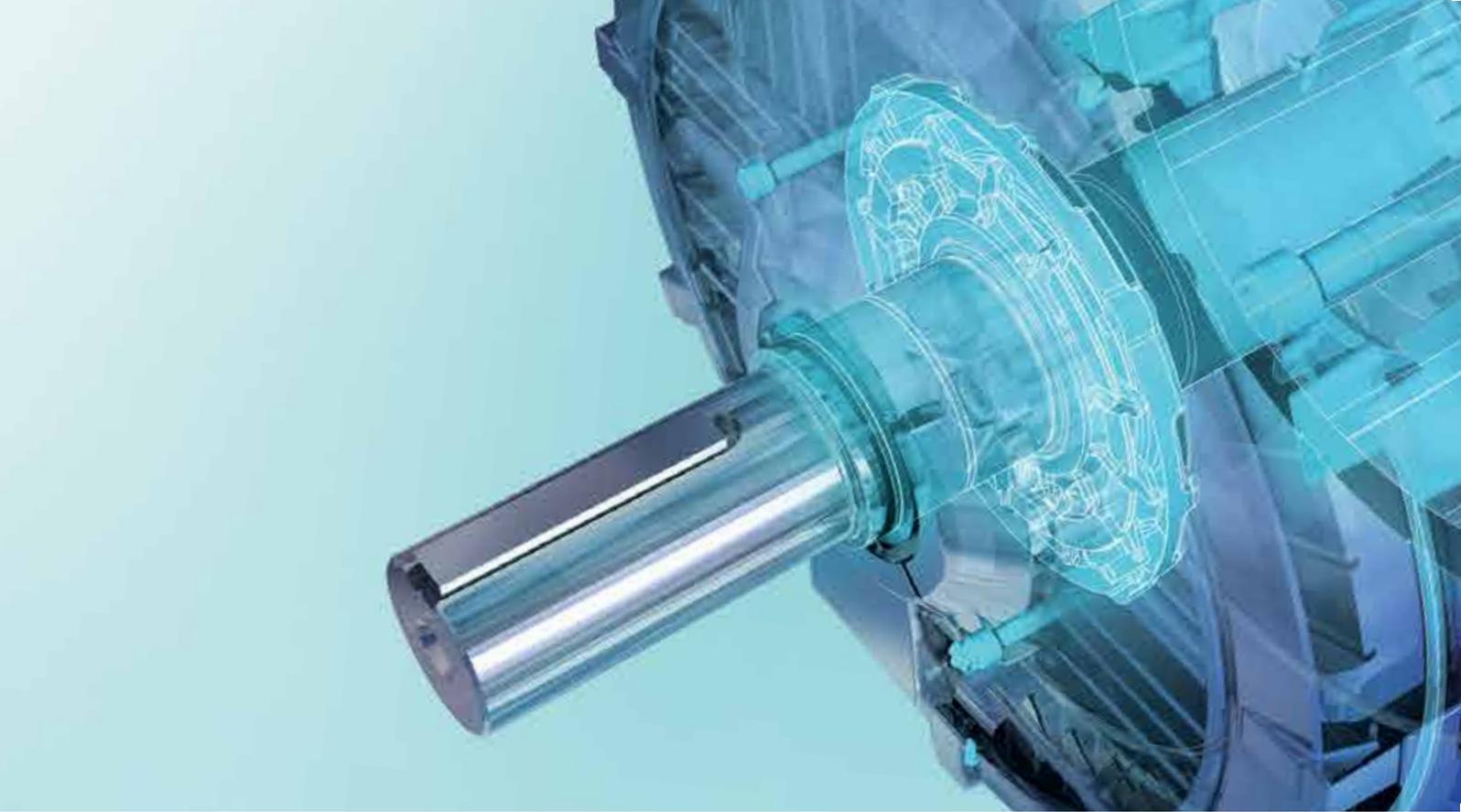


Brochure

EU MEPS

Efficiency requirements for
low voltage motors

Updated for stage 3 requirements
from January 1, 2017



Intro

EU MEPS (European Minimum Energy Performance Standard) sets mandatory minimum efficiency levels for new motors placed on the European market. The third and final stage of EU MEPS – in force from January 1, 2017 – makes IE3 the minimum efficiency class for most new single speed three-phase induction motors that are used direct online. IE2 motors can still be introduced to the market but they must be used with a VSD (variable speed drive).

From the original EU MEPS Regulation 640 in 2009 to the final stage at the beginning of 2017, this brochure describes how the regulations and requirements have evolved. We answer motor users' frequently asked questions, and we also take a look at likely future developments.

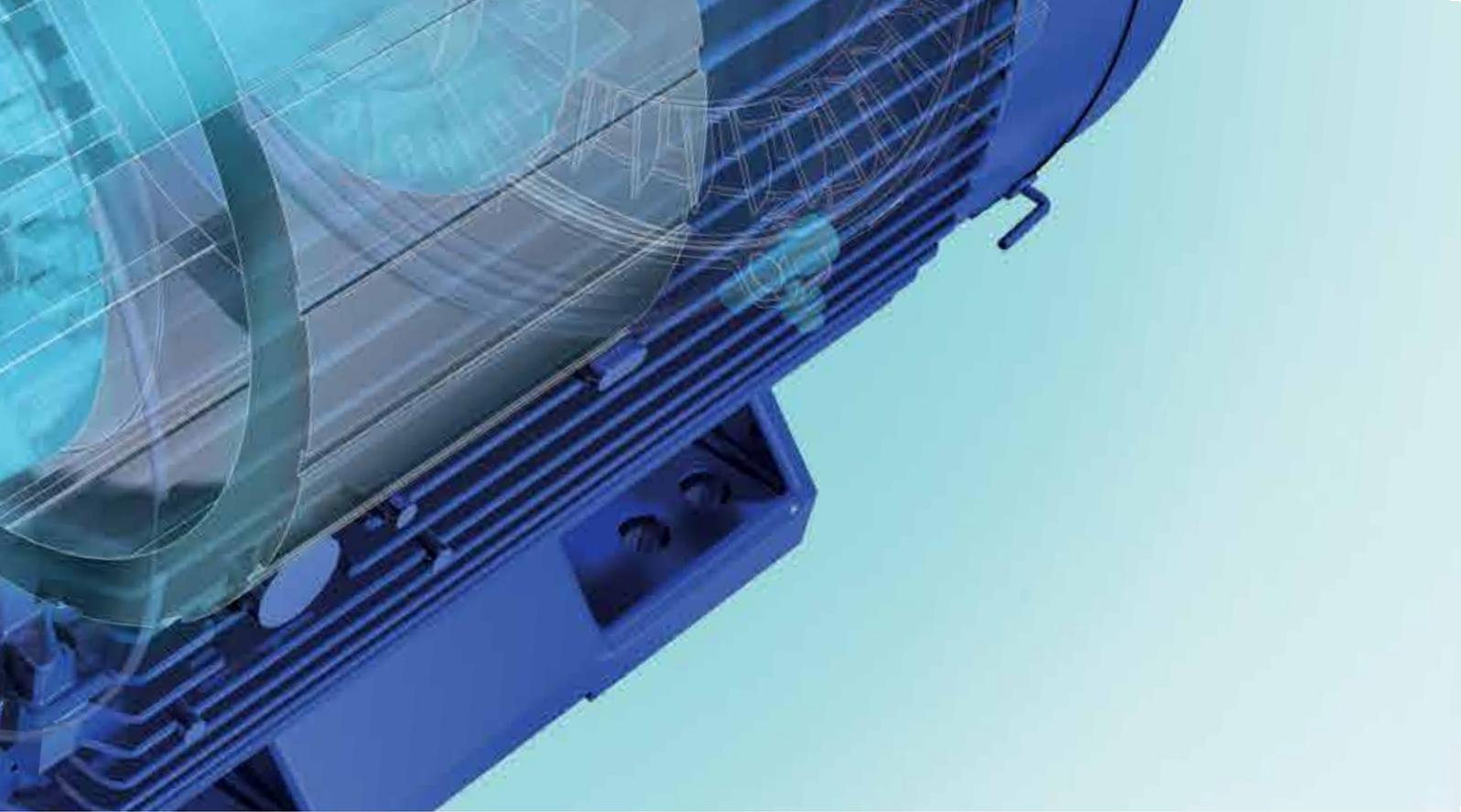
Energy efficiency requirements like EU MEPS mean important benefits for motor users. Electric motors consume around two-thirds of all electricity used in industry, so higher efficiency levels can mean big savings in energy and carbon dioxide emissions.

The task of ensuring that motors comply with official requirements is not always easy, however, and motor users often need advice and support. At ABB we have the products and tools to help our customers ensure their motors comply. A full range of EU MEPS compliant IE3 motors is available from production and stock.

We also supply a wide range of IE4 motors for additional energy savings, and our technology extends up to even higher efficiency levels. Naturally, our range of IE2 motors is also available for applications used with a VSD.

We have developed a special online tool – Optimizer – to help with the job of selecting the right MEPS compliant motors. Customers can choose the optimal motor for their needs by inputting parameters like running hours, electricity prices and CO₂ emissions. Optimizer also provides an easy way to access motor documentation.

With a full range of efficient and reliable motors, supported by the global ABB service network, customers can ensure they comply with EU MEPS while cutting energy consumption, reducing costs, and optimizing their cost of motor ownership.



In our view MEPS mean lower energy costs and emissions

ABB has long promoted the benefits of efficient motors, and welcomes the growing number of MEPS and other efficiency regulations around the world. As a leading player in the market, we help to advance MEPS and we play an active role in the bodies that set efficiency standards.

Foundations of MEPS

We believe that MEPS need to be based on the latest IEC (International Electrotechnical Commission) standards. An increasing number of countries are harmonizing their own regulations with IEC standards. This is a positive trend for motor users, as it makes it much easier to compare efficiency levels between manufacturers and enables global customers to use the same motor designs.

The main aim of any MEPS has to be improved energy efficiency. While harmonization of standards is a worthwhile goal, the primary objective of MEPS is to ensure energy efficiency.

In order for MEPS to be effective, a clear scope and unambiguous requirements are needed. Unscrupulous players seek to exploit loopholes – which results in less efficient motors and higher costs for motor users. Moreover this behavior means that national targets for energy savings and emission reductions cannot be achieved.

MEPS should not act as a barrier to market entry or affect fair competition. Additionally, MEPS should be targeted at mainstream products in order to really impact savings and emissions. There is generally no ecological justification for including niche products in the coverage of MEPS.

Market surveillance

Experience shows that MEPS need to be backed by effective market surveillance. In our opinion this is a crucial issue – without adequate and transparent market surveillance the potential energy savings will not be fully realized. Penalties for non-compliance should be sufficiently severe to ensure that there is fair competition in the market.

At ABB we regard the final stage of EU MEPS as a further step towards globally unified efficiency requirements for low voltage motors.

Future regulations should cover the practice of rewinding. In industry, rewinding is still seen as an option for larger motors, even though it can have a major impact on efficiency. Therefore we see the need for a standard at IEC/EN level similar to the USA's "Recommended Practice for the Repair of Rotating Electrical Apparatus".

Regulations EC 640/2009 and (EU) No. 4/2014 Europe

*Switzerland and
Turkey have also
confirmed the EU
MEPS efficiency
requirements as
legal requirements
following the
same timeline.



Original Regulation EC 640/2009



EU MEPS covers 2-, 4- and 6-pole single speed, three-phase induction motors in a power range of 0.75 to 375 kW rated up to 1000 V as per IEC/EN 60034-30. It covers all duty types as long as the motors are capable of continuous duty operation.

Amending Regulation EU 4/2014

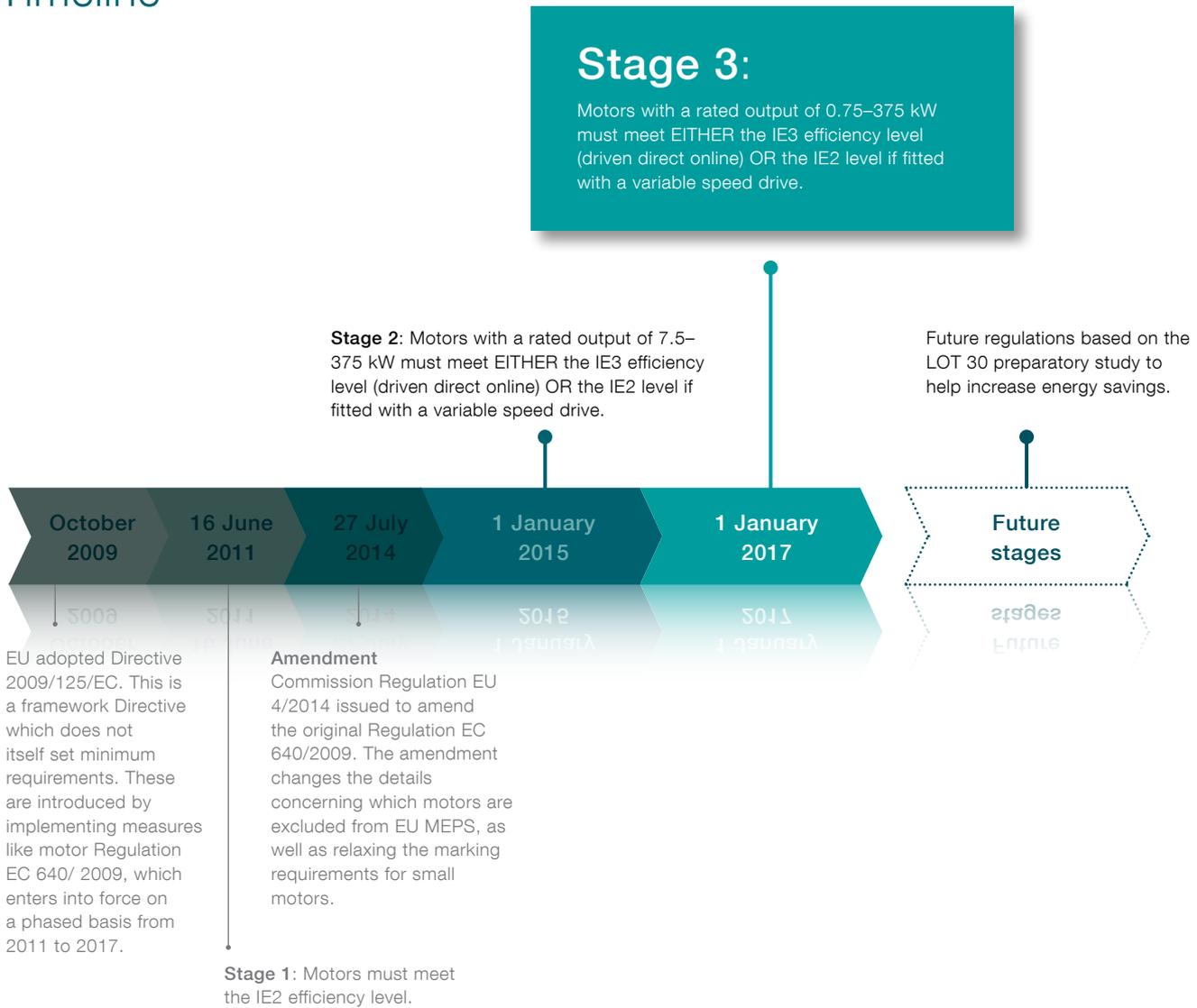
The amending Regulation came into force in mid-2014 and was intended to close loopholes in the original Regulation. The amendment was issued after it became clear that certain manufacturers were intentionally contravening the spirit of EU MEPS.

The amendment did not change the scope of EU MEPS, but instead clarified the original spirit of Regulation EC 640. The main changes are shown below.

The original Regulation excluded the following motors from the scope of EU MEPS:

motors designed to operate wholly immersed in a liquid;	change	specified to operate
motors completely integrated into a product where the motor's energy performance cannot be tested independently from the product;		no change
motors specifically designed to operate continuously :	change	specified to operate exclusively
at altitudes exceeding 1000 meters ASL;	change	4000 m
Outside the ambient air temperature range of -15°C ... +40°C	change	-30°C ... +60°C
where ambient air temperatures are less than -15 °C for any motor or less than 0 °C for a motor with air cooling;	change	water cooling
in maximum operating temperatures above 400°C;		no change
where the water coolant temperature at the inlet to a product is less than 5°C or exceeds 25°C;	change	0°C ... 32°C
in potentially explosive atmospheres as defined in Directive 94/9/EC;		no change
brake motors.		no change
Requirements for markings on motor rating plates:		
Manufacturers must mark efficiency at 100%, 75% and 50% of rated load.	change	In the case of small motors (ie, where the rating plate is small) only the efficiency for 100% rated load needs to be shown.

Timeline



International standards

Regulation 640/2009 is technically based on two IEC (International Electrotechnical Commission) standards that are adopted to equivalent EN standards that are also called harmonized standards:

- IEC/EN 60034-2-1:2007 specifies methods for determining efficiency
- IEC/EN 60034-30:2009 defines efficiency classes

Relevant harmonized standards are introduced in the Official Journal of the European Union.

Future steps towards increased energy savings

Several energy efficiency initiatives are ongoing with regard to motors and other equipment such as pumps and compressors. The European Commission initiated the LOT 30 preparatory study to investigate potential energy savings outside the scope of Regulation EC 640/2009, both for low and high voltage motors. The basic intention is to evaluate the energy savings that could be achieved by bringing the future scope of the Regulation into line with IEC/EN 60034-30-1.

The current proposal* would extend the scope to cover output powers in the range 0.12–1000 kW. It would include small single- and three-phase motors, 8-pole motors, large LV and MV motors, motors for explosive atmospheres and brake motors, medium size motors (IE4), and VSDs (IE1). The IE2 with VSD option would be withdrawn, and certain mandatory information requirements introduced.

The proposed withdrawal of the option to use IE2 motors with VSDs is in line with developments in motor technology. IE3 and IE4 motors are now widely and easily available, opening the way towards even higher energy savings.

*Commission Draft Ecodesign Regulation August 2014

Markings and documentation



IE2 | EU REGULATION 640/2009
USE WITH VARIABLE
SPEED DRIVE ONLY!

IE2 | EU REGULATION 640/2009
USE WITH VARIABLE
SPEED DRIVE ONLY!

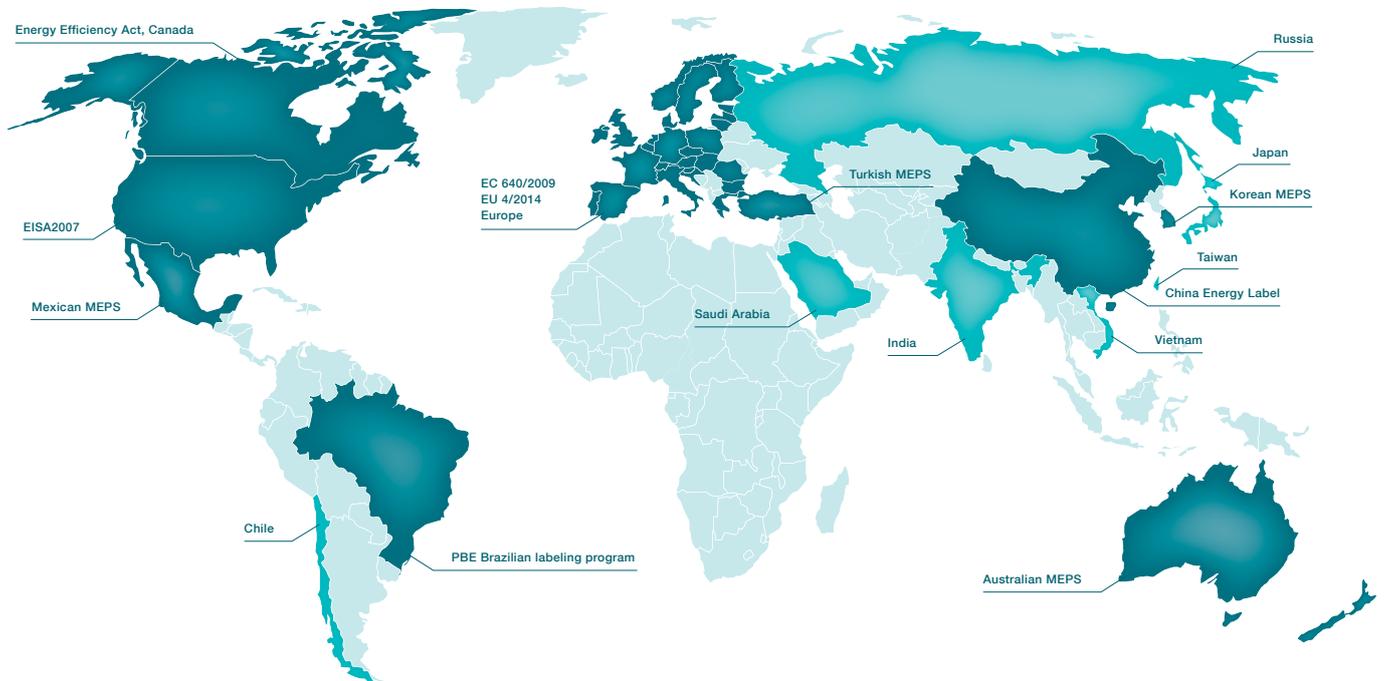
The original Regulation required manufacturers to mark rating plates with the nominal efficiency at 100%, 75% and 50% of the rated load. This was slightly relaxed by EU 4/2014, which allows marking of nominal efficiency at only 100% rated load in the case of small motors due to the limited size of their rating plates.

All motors must additionally show their IE class (IE2, IE3 or IE4) and year of manufacture on the rating plate. Manufacturers are also required to provide certain other technical documentation on their free-access websites.

ABB has long supported development efforts in the fields of energy efficiency and international standards, and stamps all motors covered by IEC/EN 60034-30-1 – including motors for explosive atmospheres – with the lowest efficiency values at 100%, 75% and 50% load and the associated IE code.

From January 1, 2015 EU MEPS has allowed IE2 motors to be placed on the European market only if they are fed by a VSD. Information about the obligation to use a VSD must be displayed on the rating plate or on an additional sticker/plate on the motor and in the motor's technical documentation. Examples of the sticker layout used by ABB and all other motor manufacturers belonging to CEMEP (the European Committee of Manufacturers of Electrical Machines and Power Electronics), can be found above.

Global MEPS



- MEPS in force
- MEPS under preparation

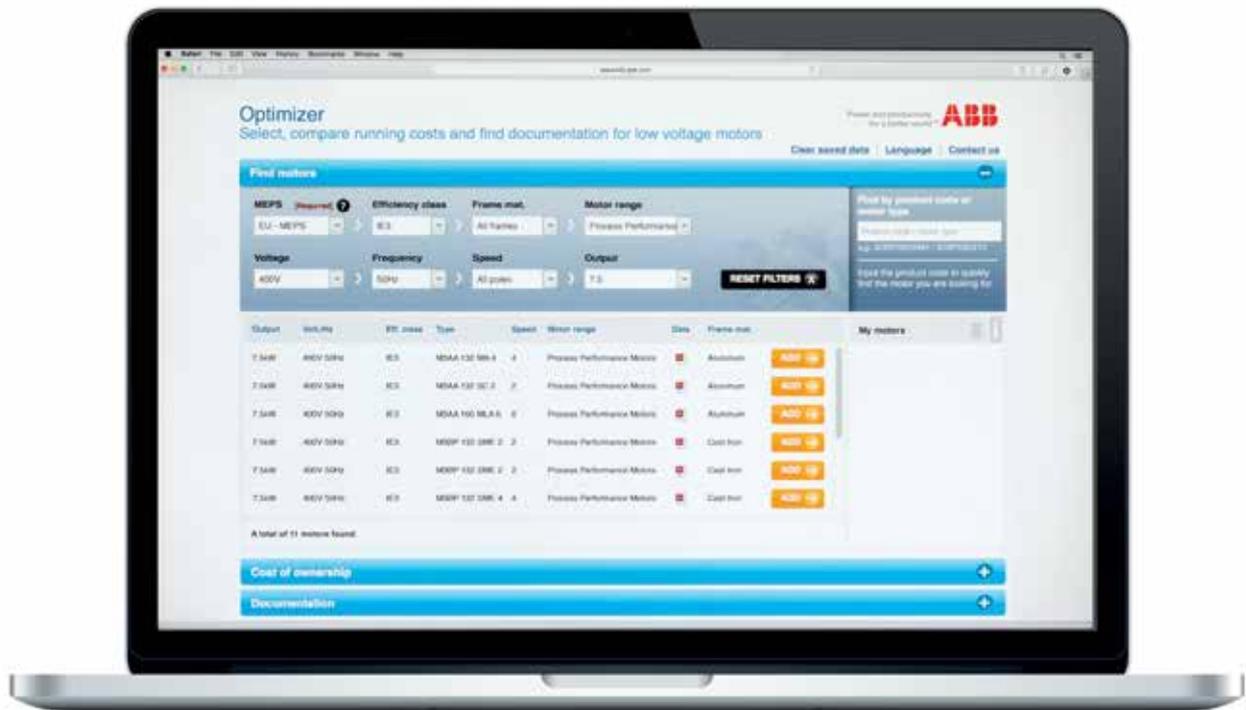
Internationally there is a clear trend towards harmonization of local standards with IEC standards. Where many countries previously had their own minimum efficiency levels, today most MEPS follow the IEC/EN 60034-30 IE class efficiency level limits. This trend is expected to continue and the IEC/EN 60034-30-1 standard is seen as a base for future MEPS.

China, the EU, Turkey, the US, Canada, Mexico, and Korea all use IEC compliant efficiency limits in their MEPS. In the case of the USA, there is equivalence between the NEMA and IEC efficiency levels. NEMA Premium, for example, is equivalent to the IEC IE3 60 Hz values. In Brazil and Australia the minimum efficiency limits are mostly the same as in the IEC standard, but there are some differences in the smaller output powers.

Despite the harmonization of minimum efficiency limits, the different local regulations still diverge in many significant ways.

The different MEPS are also expanding beyond low voltage (LV) motors. China has taken the lead in the energy efficiency of high voltage (HV) motors, having established the first compulsory MEPS for HV motors in late 2014. The US has a voluntary HV motor efficiency standard in place. The fact that these forerunners have already reached the implementation phase sends out a strong signal that other markets should follow. Europe must take its place at the forefront of the drive to save energy and reduce CO₂ emissions.

Optimizer selects the optimal motor for any MEPS



Use the Optimizer to quickly select the optimal motor, get easy access to technical documentation, and learn more about efficiency and energy savings.

Optimizer

Optimizer is ABB's easy-to-use online tool to select the optimal motor for any MEPS worldwide. Optimizer also includes a calculator to compute the cost of ownership of different motors and provides fast access to drawings, test reports and data sheets in the ABB library.

Optimizer can be used in the web browser of regular PCs or downloaded as an iPad app.

To use the tool go to www.abb.com/motors&generators

Frequently asked questions

Are manufacturers still allowed to produce IE2 motors?

IE2 motors may still be placed on the European market under stage 3 of EU MEPS as long as they are used with a VSD and marked accordingly (see Markings and documentation). Motors with a rated output in the range 0.75 to 375 kW that are to be fed direct online must be IE3 products as from January 1, 2017.

When I purchase a motor, how can I be sure that it meets the requirements of EU MEPS?

Check the motor rating plate and read the Declaration of Conformity, which should show compliance with the Ecodesign Directive 2009/125/EC and Regulation 640/2009. The rating plate should be stamped with the efficiency class – IE2 as a minimum if the motor is to be used with a VSD and IE3 if the motor is to be DOL fed – and efficiency values (see Markings and documentation). The IE class stamped on the plate must be based on the lowest efficiency value at the rated voltage/frequency/output combination shown on the rating plate.

IE2 motors must also have a marking to indicate that they can be used only with a VSD. ABB uses a sticker for this purpose (see Markings and documentation).

Does EU MEPS cover motors for explosive atmospheres?

No, EU MEPS does not yet cover all the motor types covered by IEC/EN 60034-30-1. Some motors (such as motors for explosive atmospheres) are included in IEC/EN 60034-30-1 but excluded from EU MEPS. Motors for explosive atmospheres (and many other types of motor) are included in the LOT 30 preparatory study initiated by the European Commission. This study will form a basis for future Regulations.

Does EU MEPS cover marine motors?

Article 1 (3) of the Ecodesign Directive stipulates that the Directive does not apply to means of transport for persons or goods. It follows that an implementing Regulation should not apply to products that are designed only for use in a means of transport for persons or goods (for example, electric motors designed only for use on a ship). However, if a product is designed both for use in a means of transport for persons or goods and for a non-transport use, it should comply with all relevant requirements of the applicable implementing measure.

In practice, marine motors rated for 60 Hz only are excluded from the scope of the Regulation due to frequency, whereas marine motors rated for 50 Hz fall inside the scope of the Regulation as they can be used for other purposes as well.

Does EU MEPS cover brake motors?

No. Brake motors are excluded from Commission Regulation EC 640/2009. The amendment did not change this exclusion, but the situation will change according to the LOT 30 preparatory study, and based on the draft proposal brake motors will be included in the future.

Why was the altitude limit in Regulation EU 4/2014 raised from 1000 to 4000 meters?

It was brought to the attention of the authorities that certain manufacturers were twisting the rules by stamping standard motors with altitudes in excess of 1000 m and so avoiding the IE2 minimum requirements. For practical purposes the new altitude of 4000 m covers all installations within the European Union market area.

Does EU MEPS cover 'dual purpose' smoke extraction motors?

The answer depends on the type of motor:

Yes, if the motor can be tested by the motor manufacturer at rated power and normal ambient with its own fan. This type of motor is covered by EU MEPS and must have the correct IE markings.

No, if the motor cannot be tested independently at rated power (ie, it requires a fan supplied by an outside manufacturer). These products – known as TEAO or Totally Enclosed, Air Over motors – are not covered by EU MEPS.

What is the exact definition of continuous duty?

The Regulation states that motors rated for continuous duty are covered. This means motors that are capable of continuous operation at their rated power with a temperature rise within the specified insulation temperature. Apart from motors rated for continuous operation (S1), other duty cycles to be considered as continuous duty are: S6, continuous duty with intermittent loads and S3, intermittent duty with a continuous duty factor of 80% or more. Duty types are defined in IEC/EN 60034-1 Rotating electrical machines – Part 1: Rating and performance.

Does EU MEPS cover motors intended for VSD use?

Operation with a variable speed drive does not exclude a motor from the scope of the Regulation. When a motor is labelled for mains operation, it must meet the Regulation and must be designed as IE2 as of June 16, 2011. Only motors specified to operate exclusively with a VSD (motors that cannot be used directly online) are excluded from the Regulation.

Does EU MEPS cover motors rated over 1000 V (HV motors)?

EU MEPS does not apply to motors rated over 1000 V at present. However, the recently finalized LOT 30 preparatory study investigated the potential for further reducing energy consumption by extending the regulations to cover motor types that are not currently included. The study was initiated by the European Commission and it included HV motors. The study found that there is a need firstly to prepare a standard that defines IE classes for HV motors, and then to proceed with drafting a future Regulation.

China has taken the lead with regard to HV motors and introduced a compulsory energy efficiency requirement from 2014 onwards. In addition the US already has a voluntary efficiency standard in place for HV motors.

Is repairing and re-installing non-compliant motors allowed?

Yes, manufacturers and repair shops may repair or rewind motors and return them to the customer after the requirements come into force. Repairing and returning to use is not considered to be 'placing on the market' and hence the requirements do not apply.

Does it make economic sense to rewind motors?

Even though rewinding is an option, the user should carefully consider the advantages of replacing the motor rather than having it rewound. Each rewind normally reduces a motor's efficiency. If not properly carried out the reduction can be as much as 3% or more, and in the worst case the motor may not be used at its rated power.

When total life cycle costs are taken into account, a new high efficiency motor is generally a better alternative than rewinding. The initial purchase cost of a motor is typically 1–2% of the total cost of ownership, and is much lower than the motor's lifetime operating expenses. In many cases the payback period for a new motor is less than two years.

Who is responsible for market surveillance in the EU?

The individual EU member states are responsible for organizing market surveillance. The states have appointed authorities to carry out surveillance. In Denmark, for example, surveillance is the responsibility of the Danish Energy Agency, which arranges motor testing on a regular basis to verify compliance with the Regulation.

If I come across a non-compliant motor what should I do?

Non-compliant products cause real financial losses for motor users in the form of higher energy costs, and they also compromise fair competition among motor manufacturers. It is therefore important that they are removed from the market. If you discover a non-compliant motor within the EU market, it is recommended that you report it to the market surveillance authority in your own country. Information on how to contact the national market surveillance authorities can be found at:

http://ec.europa.eu/enterprise/policies/sustainablebusiness/documents/eco-design/national-contacts/index_en.htm



For more information go to:
www.abb.com/motors&generators

Contact us

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