

ABB solutions for starting and protecting IE3 motors

Our products are fully compliant to IE3 regulations

Background

In the past few years new laws have been introduced into the European Union with the purpose of reducing energy consumption and improving environmental performance of products throughout their entire life-cycle.

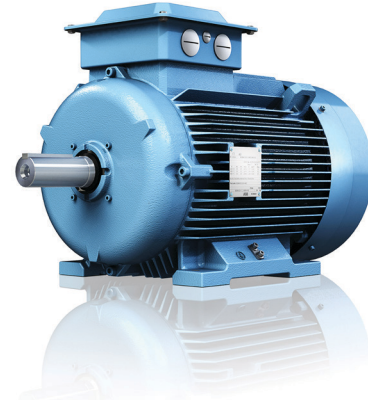
In particular, the Eco-design regulation 640/2009/EC and the amendment EU/4/2014 set mandatory efficiency requirements for 2-, 4-, and 6-poles, single speed, three-phase squirrel cage induction motors, in the power range of 0.75 kW to 375 kW, rated up to 1000 V and at the basis of continuous duty operation.

The new regulation prescribes that:

- From January 2015: motors from 7.5 to 375 kW must fulfill the efficiency level IE3, or IE2 if associated with a variable speed drive.
- From January 2017: also motors from 0.75kW must fulfill the efficiency level IE3, or IE2 if associated with a variable speed drive .

IE stands for International Efficiency and is a new classification system for induction motors, defined into IEC 60034-30-1 standard:

- IE1 (Standard Efficiency)
- IE2 (High Efficiency)
- IE3 (Premium Efficiency)



The EU directives cover the majority of new motor installations and replacements of motors in existing installations, but there are some exceptions:

- Motors specified to operate wholly immersed in a liquid
- Motors completely integrated into a product
- Motors specified to operate exclusively:
 - At altitude exceeding 4000 m
 - When ambient air temperature exceed 60°C
 - In maximum operating temperature above 400°C
 - Where ambient air temperatures are less than -30°C for any motor or less than 0°C for a motor with water cooling
 - Where the water coolant temperature at the inlet to a product is less than 0°C or exceeding 32°C
 - In potentially explosive atmosphere as defined in Directive 94/9/EC
- Brake motors

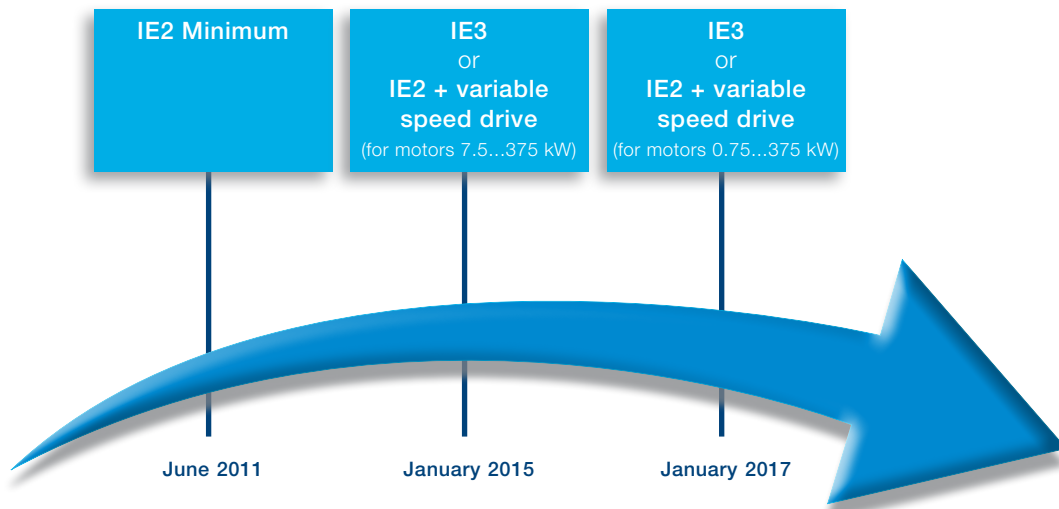


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IE3 motors are better than IE2 in all cases

According to the new EU Directive, from January 2015 IE3 motors shall be used as standard solution with conventional starting equipment. It is still possible to use the less efficient IE2 motors but only when associated with a variable speed drive.

Are these two equivalent alternatives?

In order to secure the highest efficiency in your installation, it is strongly recommended to use the more efficient IE3 class as your new standard solutions for motors in all cases.

IE3 motors can be effectively associated with standard starter solutions, like contactor starters, manual motor starters, or the more advanced softstarters.

These starters solutions represent the best options in terms of energy and cost saving in case of applications that run at constant speed.

The use of a variable speed drive is to be considered when the application requires it, like when there is a need for speed control.

What differs an IE3 motor from motors with lower efficiency?

The new modern IE3 motors are able to reach higher efficiency thanks to innovative designs and the use of more conducting material.

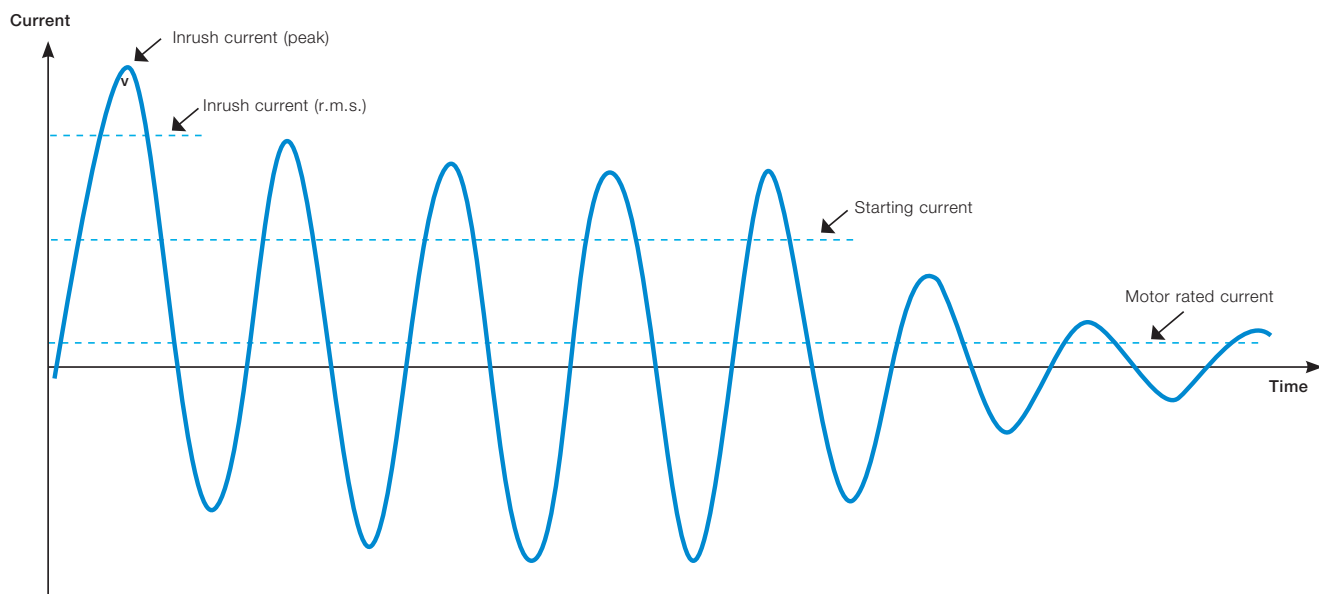
The design, giving higher efficiency will ultimately show a lower rated motor current for any given kW rating. However during the starting phase of the motor there may be an increase of inrush and starting current. The increased inrush and starting current can in some cases affect the selection of the starter components as well as the short circuit protection device.

To be able to offer the best possible starter solutions, ABB performed many tests on different motors, to learn what the relevant data are when starting these motors, taking also into consideration the findings of ABB's own motor manufacturing.

The tests and analyzes clearly show that Premium Efficiency motors (IE3 motors) in general will draw a higher starting current than IE1 and IE2 motors. Estimation is a 15% higher starting currents compared to IE2 motors.

Once the IE3 motor reach the full speed, the rated motor current is lower for the same load conditions, as a result of the higher efficiency and the wanted energy saving.

Motor-starting current characteristics



How to be IE3 ready?

Thanks to ABB's knowledge about Premium Efficiency motors, it has been possible to retest and reconfirm our products to be sure we continue to offer safe and reliable starter solutions matching the true market needs.

ABB performed following tests in laboratories:

- Define new settings of the protections in the MCCB's
- Match the contactors making and breaking performance, to secure the functionality and life length of the starter combination and equipment
- ABB's modern range of AF-contactors has been tested from the beginning to match modern motors

Be comfortable and use a solution from ABB

After all the testing, analysis and verifications, ABB is able to state – We are IE3 ready.

You will find the complete ABB IE3 motor starter offering on our web page new.abb.com/low-voltage in the software tool, SOC (Selected Optimized Coordination Tool).

Tables for different types of starting methods are available, like direct-on-line, star-delta and softstarter. In particular, tables with softstarters represent an effective way for reducing the impact of the higher starting currents while allowing the use of smaller contactors and short circuit protection devices.

<http://applications.it.abb.com/SOC>

SOC - SELECTED OPTIMIZED COORDINATION

Motor protection
Selectivity
Back-up
Other devices protection

Coordination tables for motor protection

→ Selection
→ What's new on SOC

→ Info on IE3 Motors

Clear selection
Motor efficiency class: ANY IE1/IE2 IE3

Protection Device	Rated Voltage	Short-Circuit Current		Starter Type	Coordination Type	Overload Relay	Motor Rated Power
		[kA]					
All	All	All	All	All	All	All	Overview
ACB	240Vac	3		DOL-NS	IEC Type 1	Embedded	0
Fuses	400Vac	5		DOL-HD	IEC Type 2	TOL	0,06
MCCB	415Vac	10		SD-NS	UL Type A	EOL	0,09
MMS	440Vac	12		SS-NS-IL	UL Type C	UMC	0,12
	460Vac	16		SS-NS-ID	UL Type D		0,18
	480Vac	18		UL	UL Type E		0,25
	500Vac	20			UL Type F		0,37
	525Vac	22			UL Component		0,5
	600Y/347Vac	25					0,55

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The two ways to select a suitable combination of starter components for IE3 motors.

Option 1. Easy and safe – saving your engineering time

Use the predesigned IE3 starter solutions on the ABB home page, www.abb.com/low-voltage. It's a very fast and also safe way to select a starter solution. ABB has strictly used the indicated higher inrush current for the IE3 motors when designing the tables to secure the function and the reliability.

Option 2. Fully optimized and safe solution – cost efficient and space saving

You will get the most optimized solution if checking the motor data first before you select the final coordination table. Selection alternative 1 will always provide a well working starter combination for the IE3 motors for the selected kW, voltage, short-circuit current, starter type etc.



More information about our IE3 ready products can be found on the web at:



new.abb.com/low-voltage/campaigns/ie3-ready

But in some cases this combination might be a little bit oversized as some of the IE3 motors do not show a significant increase of inrush and starting current. In these cases you can still use coordination tables for IE1-IE2 motors and find a slightly more optimized and cost effective starting solution for you application.

If the information on the starting current of the motor is available and if you want to use this to check if you can optimize the starter combination, then you shall follow the guide below:

- For motors having a starting current below 7.5 times the rated current then you can use the existing coordination tables for IE1-IE2 motors on the SOC- tool.
- For motors having a starting current higher than 7.5 times the rated current then you shall go for the new coordination tables for IE3 motors.



You can find the address of your local sales organisation on the ABB home page

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Control Products Low Voltage Products
SE-72161 VÄSTERÅS, Sweden
www.abb.com

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