

LIST OF PARTICIPANTS

ABB AUTOMATION GROUP LTD - Switzerland www.abb.com/motorsdrives	J. HELMKE & CO. - ELEKTRISCHE MASCHINEN - Germany www.helmke.de
ABM GREIFENBERGER ANTRIEBSTECHNIK GmbH - Germany www.abm-antriebe.de	LAFERT SPA - Italy www.lafert.com
AEG FABRICA DE MOTORES, S.A. - Spain www.lafert.com	LEROY-SOMER MOTEURS - France www.leroy-somer.com
ARCELIK A.S. - GEN.PURPLECTR. MOTOR PLANT Turkey www.arcelik.com.tr	LOHER AG - Germany www.loher.de
ATB ANTRIEBSTECHNIK AG - Germany www.atb.de	M.G.M. MOTORI ELETTRICI SPA - Italy www.mgmrestop.com
BALDOR MOTORS AND DRIVES - United Kingdom www.baldor.co.uk	MARELLI MOTORI SPA - Italy www.fki-et.com
BROOK CROMPTON - United Kingdom www.brookcrompton.com	MOTORI BONORA S.R.L.FERRARA - Italy www.motoribonora.com
CANTONI MOTOR (BESEL SA, INDUKTA SA, CELMA SA, EMIT SA) Poland www.cantonimotor.com.pl	OEMER MOTORI ELETTRICI SPA - Italy www.oemer.it
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DUTCHI MOTORS B.V. - Netherlands www.dutchi.com	S.E.I.P.E.E. S.P.A. MOTORI ELETTRICI - Italy www.seipee.it
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FELTEN & GUILLEAUME ANTRIEBSTECHNIK GmbH - Germany www.moeller.net	SEW-EURODRIVE GmbH & Co. - Germany www.sew-eurodrive.de
FIMET- MOTORI E RIDUTTORI SPA - Italy www.fimet.com	SICME MOTORI SPA - Italy www.sicmemotori.it
GETRIEBEBAU NORD GmbH & Co. - Germany www.nord.com	SIEMENS AG - Germany www.siemens.com
GRUNDFOS MANAGEMENT A/S - Denmark www.grundfos.com	STÖBER ANTRIEBSTECHNIK GmbH & Co. - Germany www.stoerber.de
HANNING ELEKTRO-WERKE GmbH&Co KG - Germany www.hanning.com	TECO ELECTRIC EUROPE LTD - United Kingdom www.teco.co.uk
	VEM MOTORS GmbH - Germany www.vem-group.com
	WEGEURO - INDUSTRIA ELECTRICA SA - Portugal www.weg.com.be

LIST OF EUROPEAN NATIONAL MOTOR MANUFACTURER'S ASSOCIATIONS

ANIE-AsDE - Italy www.anie.it	REMA - United Kingdom www.Remauk.com
ANIMEE - Portugal www.animee.pt	SERCOBE - Spain www.sercobe.es
FEEL - Austria www.feel.at	SET - Finland www.electroind.fi
GIMELEC - France www.gimelec.fr	ZVEI - Germany www.ZVEI.org/antriebe



The EuroDEEM database is an independent software developed by the European commission for promoting new high efficiency motors to users and for helping European electricity suppliers and energy service companies to carry out Demand Side Management programmes as new services in a competitive electricity market. EuroDEEM is not only a simple software which can provide a comprehensive list of efficient motors available on the market, but it is also a selection and assessment tool, designed to consider and optimise the whole electric motor drive system. If you would like to know more about the energy savings associated with the use of a high efficiency system, please consult the EuroDEEM database at: <http://energyefficiency.jrc.cec.eu.int/eurodeem/index.htm>. More information can also be found at the website of the new European Programme Motor Challenge at: <http://energyefficiency.jrc.cec.eu.int/motorchallenge/index.htm>

FOR FURTHER INFORMATION PLEASE CONTACT



CEMEP

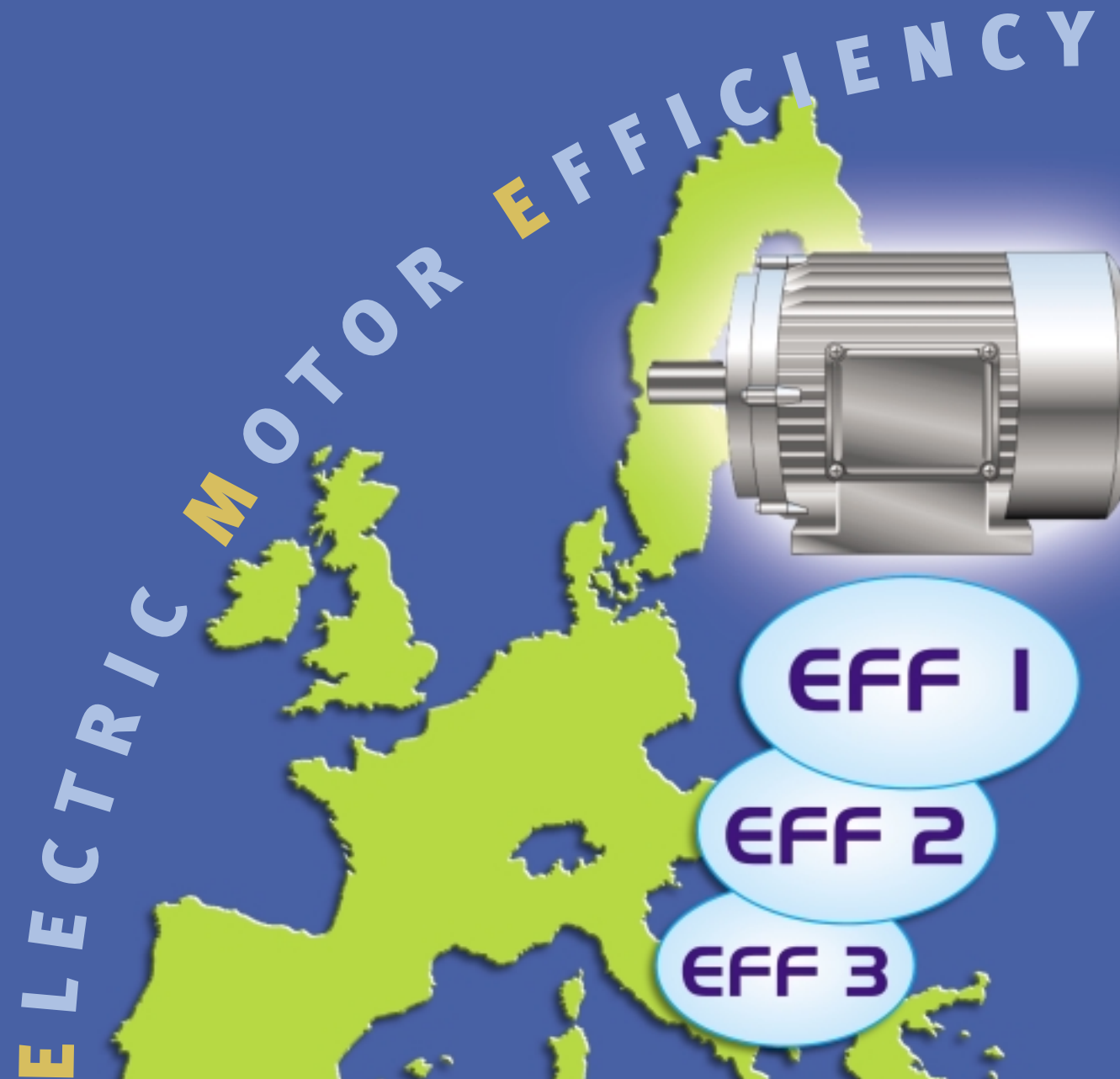
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SAVING EUROPE'S ENERGY AND ENVIRONMENT

"Do you know that over its life a motor can cost 100 times more to run than it did to buy? Buying a high efficiency motor (efficiency class EFF1) can pay for itself many times over in lower energy costs, thus saving you money and saving our environment".

The European Scheme to designate energy efficiency classes for low voltage AC motors has been in operation since 1999. This scheme established through co-operation between CEMEP and the European Commission is an important element of the European efforts to improve energy efficiency and thus reduce CO₂ emissions. Electric drive systems are responsible for the largest part of the electricity consumption. Therefore an increase of efficiency in motors (which are a part of the electric drive systems) will result in large energy savings for Europe. Now OEMs and

motor end-users can themselves decide, on the basis of easy to read information, whether currently used standard motors can be replaced by improved or high efficiency motors.

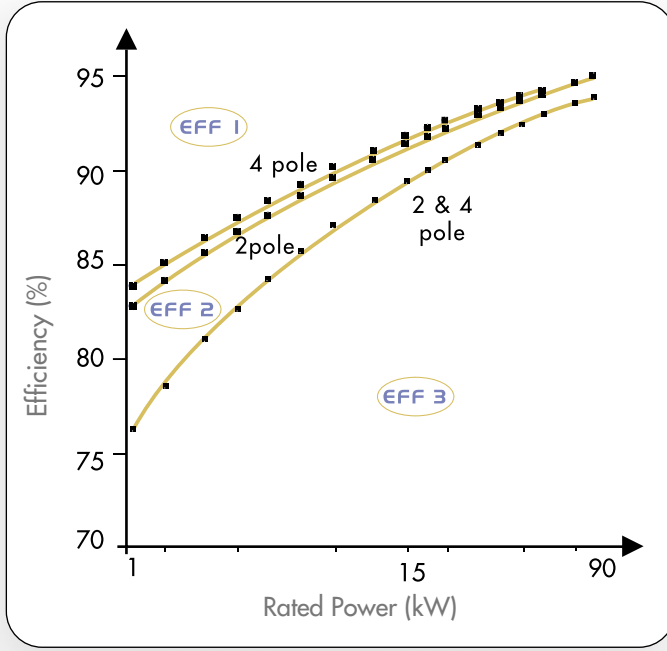
The anticipated results of the scheme will be:

- A reduction of European energy consumption;
- A reduction in cost for European enterprises;
- A reduction of European CO₂ emissions.

The new classification/banding scheme will inform motor users, in a simplified, visible manner about the importance of electric motor efficiency, making them more aware of the choice available when specifying or selecting motors. This is done by:

- Labelling motor name plate;
- Giving detailed information in catalogues;





HOW DOES IT WORK?

- Three classes of efficiency levels
 - Defined by two levels of efficiency per output and number of poles
 - Designate EFF3, EFF2 and EFF1
 - Labelled accordingly
 - Labels appear on motor rating plates
 - Efficiency expressed as percentage at full load and at ¾ load to be specified, together with the brand label in manufacturers' catalogues.
- The motors included in this scheme are defined as totally enclosed fan ventilated (normally IP 54 or IP55), three phase A.C. squirrel cage induction motors in the range 1.1 to 90 kW, having 2- or 4-poles, rated for 400V line, 50Hz, S1 duty class, in standard design. (Standard design can be interpreted as Design N according to EN 60034-12 and EN 50347).

WHY YOU SHOULD BUY AN EFF1 MOTOR?

- On average an EFF1 motor reduces energy losses by up to 40%, this means that in the case of high operating hours (e.g. 6000 hours per year), and a 15 kW motor, you can save about 4 MWh per year or more than 200 € of the electricity bill (at 0.05 €/kWh).
- Better and more material normally increases the lifetime of your motor.
- The higher purchase cost of EFF1 motors can be recouped in a short time, relatively to the lifetime of an electric motor.
- Recommended when operating hours and the cost of electricity result in economic savings, which yield an adequate return on investment, for example compared to the company's goal expressed in a number of months or years of pay-back.

THE FINANCIAL CASE FOR EFF1 MOTORS

This is an example on how to calculate in a quick manner the financial savings.

Annual saving = hrs x kW x %FL x €/kWh x (1/η_{std} - 1/η_{HEM})

- Where:
- hrs = annual running time (hours)
 - kW = motor rating in kW
 - %FL = Fraction of full load power at which motor runs
 - €/kWh = electricity cost in €/kWh
 - η_{std} = Efficiency of standard motor
 - η_{HEM} = Efficiency of HEM

If you're unsure of the efficiency of an existing motor, then the EFF class 2/3 boundary is a reasonable estimate for an un-repaired motor. If the motor had been repaired, allow a minimum of 0.5% loss in efficiency for each repair. If you're running below 100% load, then use the efficiency figures for part load - manufacturers will usually offer 75% and 50% load efficiencies in their brochures.

As an example, take a 4-pole 15 kW motor driving a water cooling pump, operating at full load for 6000 hours per year. Electricity costs 0.05 €/kWh, and the EFF1 and standard motors have efficiencies of 91.8% and for e.g. 88.2% respectively.

Saving = 6000 x 15 x 100% x 0.05 x (1/91.8 - 1/88.2)
Annual energy saving = 200 €

TECHNICAL BACKGROUND OF EFFICIENCY VALUES

- For motors designed for a voltage range e.g. 380...420V, the declared efficiency values are based on the average voltage 400V.
- Efficiency values are determined on the basis of the summation of losses method in accordance with EN 60034-2 + A1:1996+A2:1996.
- Tolerances are in accordance with EN 60034-1 + A1:1997.
- The same reference temperature is used for ¾ load and full load. Efficiencies for any other point can be calculated with sufficient accuracy.

Class definition for 4-pole motors

Kw	EFF3 motors η _n	EFF2 motors η _n	EFF1 motors η _n
1.1	< 76.2	≥ 76.2	≥ 83.8
1.5	< 78.5	≥ 78.5	≥ 85.0
2.2	< 81.0	≥ 81.0	≥ 86.4
3	< 82.6	≥ 82.6	≥ 87.4
4	< 84.2	≥ 84.2	≥ 88.3
5.5	< 85.7	≥ 85.7	≥ 89.2
7.5	< 87.0	≥ 87.0	≥ 90.1
11	< 88.4	≥ 88.4	≥ 91.0
15	< 89.4	≥ 89.4	≥ 91.8
18.5	< 90.0	≥ 90.0	≥ 92.2
22	< 90.5	≥ 90.5	≥ 92.6
30	< 91.4	≥ 91.4	≥ 93.2
37	< 92.0	≥ 92.0	≥ 93.6
45	< 92.5	≥ 92.5	≥ 93.9
55	< 93.0	≥ 93.0	≥ 94.2
75	< 93.6	≥ 93.6	≥ 94.7
90	< 93.9	≥ 93.9	≥ 95.0

Class definition for 2-pole motors

Kw	EFF3 motors η _n	EFF2 motors η _n	EFF1 motors η _n
1.1	< 76.2	≥ 76.2	≥ 82.8
1.5	< 78.5	≥ 78.5	≥ 84.1
2.2	< 81.0	≥ 81.0	≥ 85.6
3	< 82.6	≥ 82.6	≥ 86.7
4	< 84.2	≥ 84.2	≥ 87.6
5.5	< 85.7	≥ 85.7	≥ 88.6
7.5	< 87.0	≥ 87.0	≥ 89.5
11	< 88.4	≥ 88.4	≥ 90.5
15	< 89.4	≥ 89.4	≥ 91.3
18.5	< 90.0	≥ 90.0	≥ 91.8
22	< 90.5	≥ 90.5	≥ 92.2
30	< 91.4	≥ 91.4	≥ 92.9
37	< 92.0	≥ 92.0	≥ 93.3
45	< 92.5	≥ 92.5	≥ 93.7
55	< 93.0	≥ 93.0	≥ 94.0
75	< 93.6	≥ 93.6	≥ 94.6
90	< 93.9	≥ 93.9	≥ 95.0

IN ALL THE OTHER SITUATION YOU SHOULD BUY AN EFF2 MOTOR

- On average an EFF2 motor still reduces energy losses by up to 20%, this means that in the case of 2000 h/a, a 15 kW motor can save 0.6 MWh annually with a minimum price premium.
 - This Class EFF2 guarantees a satisfactory efficiency at a minimum price premium.
- As general rule motors in class EFF3 offer a very low efficiency and represent an un-economic investment in most of the situations, therefore they are not recommended.

EXPECTED SAVINGS:

- Drives systems, optimised for high efficiency motors (EFF1) and VSD could avoid several large power stations in Europe and the associated pollution.
- The replacement of all current EFF3 motors with EFF2 motors could save up to 6 TWh per year, this would be much higher if EFF1 motors were selected.
- This means that with an electricity price of 0.05 € per kWh, Europe could save 300 Mio. € per year or more.

OTHER OPERATIONAL FACTORS AFFECTING EFFICIENCY VALUES:

Efficiency classification gives customer a simple tool for optimising their motor purchase. A more sophisticated tool is the EuroDEEM database (see below).

Engineers and buyers should be fully aware of the fact that other parameters and factors, such as load conditions, temperature, line supply quality, can result in significant efficiency variations when in operation.

If detailed calculations about the amount of energy cost savings are needed, use EuroDEEM or ask any of the motor suppliers at the next page for further information.