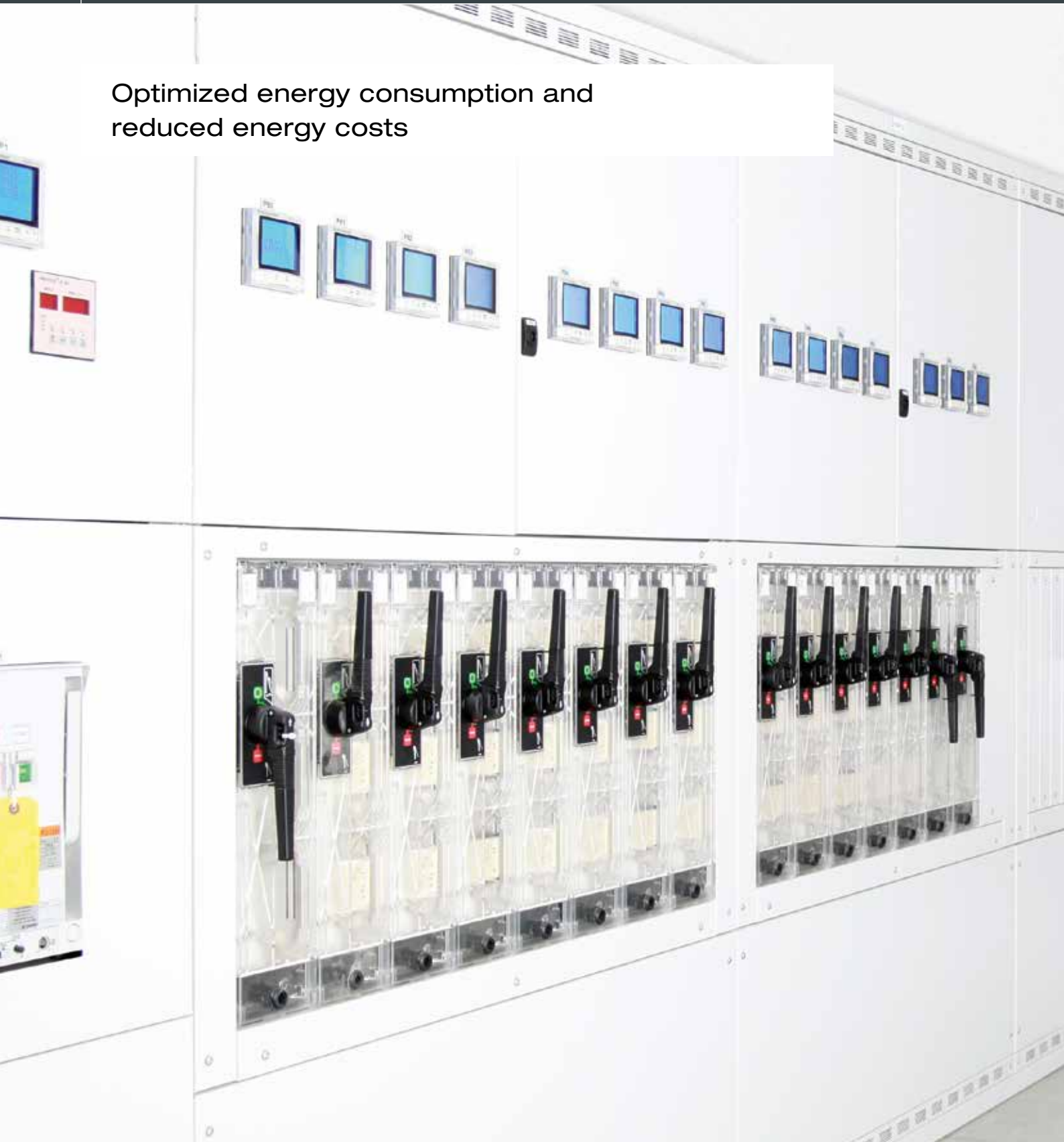


Energy Saving Solutions That Pay Off

effi**DRIVE**®



Optimized energy consumption and reduced energy costs



Dwindling resources, rising energy costs, the latest measures taken by governments to reduce CO₂ emissions and international efficiency regulations are also forcing the industry to analyze and evaluate both the consumption of energy and the efficient use of energy.



Your advantages with effiDRIVE® energy saving solutions

- Reach measurable results: Simply optimize energy consumption and in this way reduce energy costs
- Discover new and trend-setting technologies for many applications to achieve more energy efficiency
- Optimize energy consumption by selecting mature and energy-optimized components from a system of modular components that match your specific application
- Use expert knowledge and reach measurable improvements of efficiency and profitability:
 - Discover energy saving potential during project planning with the energy report by SEW-EURODRIVE
 - The determined energy demand, energy costs and CO₂ emissions are the basis for generating a customized, energy-efficient drive solution



Many components and details have to be analyzed to tap the full energy saving potential of drive technology applications. Energy-efficient solutions that save the desired amount of energy in one application might lead to a higher overall energy consumption in another. The one-fits-all approach is not the right one here.

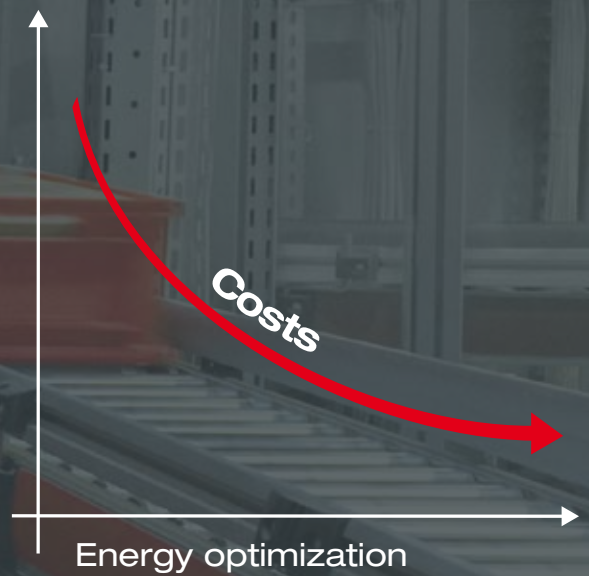
SEW-EURODRIVE draws from a wealth of experience of implemented and proven effiDRIVE® energy saving solutions. On pages 6 to 13, we present some solutions implemented in the food and beverage industry, in airport logistics, in a fresh air supply system for buildings, and in intralogistics taking a storage and retrieval system as an example. These solutions show how energy efficiency can be improved significantly and measurably.

Recognize energy saving potentials and increase efficiency



Many companies simply cannot afford to search for energy saving potentials during normal operation. The obvious energy consumers, such as production machines and plants, are monitored and optimized, of course.

However, finding "hidden" energy consumers, calculating their saving potential, and developing alternative solutions is much more complex and always takes a great deal of time and effort.



Energy costs of systems that have not been optimized in terms of their energy consumption can constitute up to 90% of the life cycle costs.

Opting for effiDRIVE® energy saving solutions when making new investments or when retrofitting your machines and systems will make you well prepared for future requirements:

- Recognize hidden energy consumers and reduce energy costs in the long-term
- Achieve more cost transparency
- Increase process efficiency
- Contribute sustainably to reducing CO₂ emissions



The basis of every effiDRIVE® energy saving solution is therefore an integral approach that takes account of all the energy saving potential. From material delivery to the entire production cycle and further processing to storage and shipping – machines and systems are used in

all these areas for manufacturing and moving goods. The drive technology used accounts for a considerable proportion of the total energy consumption. Energy-efficient drive components can drastically reduce this consumption.

effiDRIVE® in practice: Example of a bottle conveyor – beverage industry

Requirements: The production cycle in the beverage industry is characterized by a wide range of extremely varied tasks, such as palletizing and cask or bottle conveying in dry, wet, or hygienic areas. The drive technology for these tasks is exposed to special ambient conditions, such as heat, moisture, cleaning agents, etc.



Advantages by using MOVIGEAR®

Compact component, high overall efficiency, highest energy efficiency class

- Motor, gear unit and electronics combined in one component.
- Highest motor efficiency due to a permanent-field synchronous motor, meets IE4 (Super Premium Efficiency, according to IEC/TS 60034-31).
- Use of an efficiency-optimized parallel-shaft helical gear unit.
- Increased efficiency due to new electronic components and adjusted control modes.
- The overall system efficiency can be increased by 10% to 25% compared to conventional solutions.

Energy-efficient dimensioning of options

- Dynamic deceleration function DynaStop®: No energy is needed for releasing the mechanical brake; based on the motor power, this saves up to 5% of power.

Dimensioning in line with demand

- High overload capacity allows for dimensioning in line with demand meaning lower installed system power with highest overall efficiency.

Special product features for the food and beverage industry

- Smooth surface design prevents accumulation of dirt and simplifies cleaning.
- Fully enclosed system, uses the principle of surface cooling, no additional fans or blowers required, no dirt is sucked in, germs and bacteria cannot be distributed by air swirls.
- Meets hygienic design requirements.



Measurable success of the effiDRIVE® energy saving solution

Comparison of	Standard variant	effiDRIVE® solution
Components	105 helical-worm gearmotors with standard motors and standard inverters in the control cabinet	Mechatronic drive system MOVIGEAR® SNI with 105 MOVIGEAR® drive units
Investment	94%	100%
Energy costs/year*	€ 44 150	€ 34 500
Energy consumption	128%	100%
Amortization time		1.3 years
CO₂ reduction/year		65 t
The effiDRIVE® solution with MOVIGEAR® saves a total of € 35 700 after only 5 years of operation.		

*The calculation is based on: 3 500 hours of operation/year x € 0.10 /kWh x system power

Energy saving potential = up to 50%

effiDRIVE® in practice: Example of a baggage handling system – airport logistics

Requirements: In "traditional baggage handling", belt conveyors, collection conveyors, vertical translators, lifts, circular storage units and sorting lines ensure smooth and fast transportation of the baggage items. The drive technology used here must be compact, intelligent, and flexible.



Benefits of using helical-bevel gear units and the DRE../DRN.. energy efficiency motors

Increased motor efficiency

- The energy-efficient DRE.. and DRN.. motors comply with the efficiency requirements of the international standard IEC 60034-30-1. They are labeled IE2 (High Efficiency) and IE3 (Premium Efficiency).

Increased gear unit efficiency

- Replacing helical-worm gear units with efficiency optimized helical-bevel gear units results in an increased efficiency of up to 30% depending on gear unit size and reduction ratio.

Improved energy balance

- The combination of efficiency-optimized helical-bevel gear units with highly efficient motors offers an overall energy saving potential of 10%.



Measurable success of the effiDRIVE® energy saving solution

Comparison of	Standard variant	effiDRIVE® solution
Components for a project with 100 drive units each	Helical-worm gear unit with standard motor SA57 DV100 L4	Helical-bevel gear unit with energy-efficient DRE.. motor KA37 DRE..100 L4
Investment	77%	100%
Energy costs/year*	€ 71 500	€ 65 560
Energy consumption	110%	100%
Amortization time		Approx. 2.2 years
CO₂ reduction/year		40 t
The effiDRIVE® solution with helical-bevel gear units and energy-efficient motors saves a total of € 17 300 after only 5 years of operation.		

*The calculation is based on: 3 500 hours of operation/year x € 0.10 /kWh x system power

Energy saving potential = up to 10%

effiDRIVE® in practice: Example of a fresh air supply system for buildings

Requirements: The energy saving potential of so-called ancillary components is often underestimated. The system analyzed in this example supplies fresh air to a building. It comprises of a total of 24 ventilation systems installed on the roofs of the halls, each ventilation system consisting of 4 connected individual fans. The fans are driven by pole-changing motors without gear units directly via belts.



Benefits of using the MOVITRAC® B standard inverter and the energy efficient DRE../DRN.. motors

Process and speed adjustment = reduced output speed

- The process can be adjusted to the actual demand through stepless speed and torque control for more energy efficiency and reduced power demand.

Increased motor efficiency

- Optimized motor efficiency: In comparison with standard motors, energy-efficient motors DRE.. (IE2 = High Efficiency) and DRN.. (IE3 = Premium Efficiency) reduce power losses by up to 40%.
- Thanks to the MOVITRAC® B energy-saving function and the resulting dynamic adaptation of the magnetization current, the motor can be operated in the part-load range with optimum efficiency at any operating point.

Reduced overall energy consumption

- Annual energy cost savings of € 95 000: After the modification of the fresh air supply system, the highly efficient DRE.. motors (IE2) in combination with the MOVITRAC® B standard inverter reduce the overall energy consumption by more than 16%.
- Not yet included in the calculation: Additional energy savings achieved by continuous adaptation of the work process so that the speed is adjusted to the actual requirements.



Measurable success of the effiDRIVE® energy saving solution

Comparison of	Standard variant	effiDRIVE® solution
Components for a project with 96 building fans each	Pole-changing asynchronous motors and fan adjustment	Controlled energy-efficient motors DRE..180 M4 and MOVITRAC® B standard inverter with energy-saving function
Investment	0% (existing)	100%
Energy costs/year*	€ 675 000	€ 580 000
Energy consumption	116%	100%
Amortization time		Approx. 2.7 years
CO₂ reduction/year		720 t
The effiDRIVE® solution with energy-efficient motor and MOVITRAC® B standard inverter saves a total of € 218 500 after only 5 years of operation. This calculation does not even include the energy saved by the continuous adaptation of the process and speed to the actual demand.		

*The calculation is based on: 7 200 hours of operation/year x € 0.084 /kWh x system power

Energy saving potential = over 16%

effiDRIVE® in practice: Example of a storage/retrieval system – intralogistics

Requirements: Storage and retrieval systems are wasting a lot of energy. The reason is that in a conventional design, the released regenerative energy is converted into heat in a braking resistor when the lifting unit descends and when the horizontal drive decelerates. This is different with an effiDRIVE® energy saving solution where the released energy is re-used efficiently because it is recycled.



Benefits of using MOVIDRIVE® B application inverters with the MOVI-PLC® motion and logic controller (freely programmable)

Utilization of released energy by using it directly in other axes

- Released energy is recycled: The two MOVIDRIVE® inverters responsible for controlling the travel and lifting axes share their DC links so that the electric energy released by one axis can be directly re-used by the second axis.

- Intelligent control of the travel and lifting axis by the higher-level MOVI-PLC® motion and logic controller: The shortest possible total time is not extended, while the travel and lifting axis are operated with optimum efficiency within the time frame.

Reduced overall energy consumption

- The tried and tested package solution "Intelligent DC link coupling for storage and retrieval units" reduces the energy consumption by up to 50% at maximum utilization of the unit and its dynamic properties.
- Reduced overall energy consumption: Savings of € 1 450 per year (with minimum investment costs and slightly higher costs for installation).



Measurable success of the effiDRIVE® energy saving solution

Comparison of	Standard variant	effiDRIVE® solution
Project components	Conventional control: released energy is dissipated via a braking resistor	Intelligent DC link coupling with MOVIDRIVE® application inverters with MOVI-PLC® motion and logic controller
Energy costs/year*	€ 7 200	€ 5 750
Energy consumption	125%	100%
Amortization time		Immediately
CO₂ reduction/year		10 t
The effiDRIVE® solution with MOVIDRIVE® application inverters and MOVI-PLC® motion and logic controller saves a total of € 7 250 after only 5 years of operation.		

*The calculation is based on: Energy consumption/single cycle x 880 single cycles/day x 350 days/year x € 0.10 /kWh

Energy saving potential = up to 25%

Modular energy efficiency system: The product portfolio for more efficiency

Gearmotors and standard inverters

Decentralized drives / mechatronics

Save up to 70% of energy
with energy-efficiency optimized components

Just one individual drive component with optimized energy efficiency can be sufficient to achieve a positive energy balance of a plant. This is the reason why the modular energy saving system comprises only energy-efficient and efficiency optimized components. Specific requirements regarding energy consumption of the application are already considered during the development phase. In the right combination, the components result in impressive energy saving solutions.

Servo drive technology



Components from the modular energy saving system

1. Gearmotors and standard inverters
 - Application and standard inverters MOVIDRIVE® and MOVITRAC® with intelligent DC link coupling or optional regenerative power supply unit for recycling released energy.
 - Motors from the DR.. motor system meet the energy efficiency classes IE2, IE3, and IE4.
2. Decentralized drives / mechatronics
 - The mechatronic drive system MOVIGEAR® and the DRC.. electronic motor meet energy efficiency class IE4.
 - Energy-efficient decentralized controllers such as MOVIFIT® or MOVIPRO®.
3. Servo drive technology
 - E.g. MOVIAxis® multi-axis servo inverter, combined with regenerative power supply modules, storage or compact supply modules (energy recycling).

Energy saving experts: Your partners for more efficiency

The optimum energy-efficient solution is not only achieved by the components alone but also depends to a large degree on prior analysis and consulting. This is why our energy saving experts perform a detailed and all-encompassing analysis of the application. They clarify the specific requirements of the industry and the application and make sure that all relevant factors for energy saving are recognized and systematically implemented. For your measurable success: Energy consumption and energy costs are reduced and less CO₂ is emitted.

Realize and act: The right strategy at the right time

A tool that supports you in this effort is the energy consumption analysis, for example. This analysis is a new function of the "SEW Workbench" project planning tool. The **"energy report"** resulting from

this analysis shows the total energy consumption for the specific application and the configured drive train and forms the basis for selecting the most energy-efficient drive technology components.

Kundendaten	
Kunde	FA. Muster Fabrik
Projekt	WCH000001
Name	FA. Musterwerk

Berechnungsgrundlagen	
Einheitspreis	0,000000 € / kWh
Zufuhrzeit	24 h
Lebenszeit in Stunden	8760
Lebenszeit in Jahren	1

Antriebsdaten	
Antriebsart	Motorantrieb
Antriebsleistung	1000 W

Energiebedarfsanalyse			
pro Fühler	Energiebedarf	Energiekosten	CO2 Emissionen
pro Jahr	1000 kWh	0,000000 €	0,000000 kg
pro Jahr	1000 kWh	0,000000 €	0,000000 kg

Energiekosten	
Energiekosten	0,000000 €
CO2 Emissionen	0,000000 kg

The energy demand, energy costs and CO₂ emissions determined during the energy consumption analysis are the basis for generating a customized, energy-efficient drive solution.



Energy consulting – overview of services

1. Identifying and assessing the potentials for saving energy

- Collecting application-specific customer data
- Advising on normative and legal requirements
- Identifying energy saving potential
- Prioritizing measures (package of measures)

2. Developing an optimization concept

- Detailed analysis and determining the exact saving potentials
- Defining the necessary investment
- Calculating the profitability
- Documenting the consultation results (optimization concept)

3. Verifying the energy saving solution in addition to the technical implementation of the measures

- Checking the result by verifying the predicted saving potentials (power measurement)
- Suggesting additional measures for improvement, if necessary

Always at your fingertips with this app: Efficiency standards worldwide

On June 16, 2011, minimum efficiency levels for 2-, 4-, and 6-pole asynchronous AC motors in the power range from 0.75 to 375 kW came into effect in the European Economic Area (EEA). From this date, the initial distribution of Standard Efficiency motors (IE1) for use in the EEA will be prohibited.

The implementing regulation for ErP Directive 2009/125/EC stipulates the mandatory use of energy-efficient motors.

- As of January 1, 2015, motors in the power range from 7.5 to 375 kW must either meet IE3 requirements, or they can be operated as IE2 motors on a standard inverter.

- As of January 1, 2017, this provision will apply to all motors with a power rating of 0.75 kW and higher.

The DR.. motors from the modular energy saving system from SEW-EURODRIVE comply with existing and future regulations and standards worldwide.



Saving energy made easy

Undoubtedly, the investment costs for electrical drives are minor when compared to the amount of the overall investment in a system or plant, but they have a decisive influence on the follow-up costs. The **“energy saving calculator”** from SEW-EURODRIVE is a software tool that helps you determine the energy-saving potential created by using energy-efficient motors. The calculator is available on the Internet free of charge.

<http://www.ie-guide.com/conversion-aid.html>

You can compare the energy consumption of standard motors (IE1 = Standard Efficiency) with that of energy-efficient motors (IE2 = High Efficiency, IE3 = Premium Efficiency) with one mouse click and calculate the respective amortization times for the investment.

The calculation log can be downloaded in PDF format.

“IE Guide”:

Your guide to worldwide efficiency regulations



Available on the
App Store

<http://www.ie-guide.com>



Which energy efficiency class will become mandatory when and in what country?

The “IE Guide” provides answers to these questions: Always at your fingertips as app, or as web application at www.ie-guide.com or www.sew-eurodrive.com.

Extended app features

1. Energy saving calculator

- Enter the motor data of the currently used “standard motor”
- The energy-saving calculator shows an energy-efficient motor as alternative as well as the resulting savings of costs and energy, the amortization period of the additional investment, and the savings of CO₂ emissions.

2. Conversion aid for motors

supports by providing technical data when changing to an energy-efficient motor.

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How we're driving the world



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Driving the world

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