Energy efficiency class IE4 for decentralized installations

Mechatronic drive systems
MOVIGEAR® and DRC electronic motor
Rising energy prices are not the only reason for system manufacturers and operators to face the challenges of saving energy, reducing costs, and increasing profitability when planning new systems or expanding existing production facilities.

Decentralized installations have already been used since the end of the 90s as a profitable alternative to centralized solutions for spacious machines or production systems. It is in particular in spacious production plants that decentralized installation concepts can help achieve impressive cost savings. Unlike centralized solutions, control cabinet space and the amount of cabling is reduced significantly.

For example, using mechatronic MOVIGEAR® drive systems or DRC electronic motors with SNI communication (Single Line Network Installation) requires only one cable for energy and information transfer.

Decentralized components from SEW-EURODRIVE have always been innovative. MOVIMOT®, for example, the gearmotor with integrated frequency inverter has already been successfully used for decades in many conveyor systems in the most various industries. The new MOVIGEAR® mechatronic drive systems and the DRC electronic motor are two more energy efficient solutions SEW-EURODRIVE offers in energy efficiency class IE4.

Driving the world – with innovative drive solutions for all branches of industry and for every application. Products and systems from SEW-EURODRIVE for any application – worldwide. SEW-EURODRIVE products can be found in a variety of industries, e. g. automotive, building materials, food and beverage as well as metal-processing. The decision to use drive technology “made by SEW-EURODRIVE” stands for safety regarding functionality and investment.
With MOVIGEAR®, the mechatronic drive system for horizontal materials handling technology, SEW-EURODRIVE has set completely new standards already in 2008 in terms of profitability and functionality. MOVIGEAR® not only combines a gear unit with a motor and the matching drive electronics in one product but, above all, ensures that the technical and economic advantages of these three drive components are maintained and utilized in an optimum manner. Apart from that, MOVIGEAR® complies with efficiency class IE4 (Super Premium Efficiency).

Since the beginning of 2012, the DRC electronic motor has given fresh impetus to decentralized installations: its versatile fields of use due to the flexibility in mounting any type of gear unit and the optional mechanical brake make the DRC electronic motor stand for innovative drive technology and highest product quality „made by SEW-EURODRIVE“.

Two solutions with IE4: MOVIGEAR® and DRC electronic motor
The MOVIGEAR® mechatronic drive system is available in two sizes and two mechanical variants:

- MOVIGEAR® sizes
  - MGF.2 (torque class: 200 Nm)
  - MGF.4 (torque class: 400 Nm)

- MOVIGEAR® variants
  - MOVIGEAR® with hollow shaft and key
  - MOVIGEAR® with TorqLOC® hollow shaft mounting system

**Features and benefits**

- Compact design: Motor, gear unit and electronics are combined in a single mechatronic drive system
- Possible installation topologies / communication interfaces:
  - Single Line Network Installation (SNI), SEW system bus controller (DSC), binary (DBC) or AS-Interface (DAC)
- Simplified machine planning and design
- Optimized for horizontal conveyor applications
- Reduced number of variants due to wide setting range and universal mounting position
- Lower storage costs
- High degree of protection
- Hygienic surface design for applications in hygienic areas
- No air, dirt and germ swirls
- Reduction of energy costs by up to 50% due to the high efficiency of all components (gear unit, motor, electronics)
- High degree of reliability due to systematic development of all components
- Suited for use worldwide
  - Supply voltage of 380 ... 500 V at 50/60 Hz
- Reduced total costs and operating costs of the materials handling system
- safetyDRIVE functional safety STO (Safe Torque Off)
**NEW**: in IE4 and flexibility in mounting any type of gear unit: the DRC electronic motor

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### DRC electronic motor – Technical data:

<table>
<thead>
<tr>
<th>Features and benefits</th>
<th>DRC2 and DRC1</th>
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<tr>
<td></td>
<td>The figure shows the DRC1 and DRC2 motors as stand-alone motors for mounting to an SEW gear unit</td>
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</table>

The new DRC electronic motor consists of a permanent-field synchronous motor with integrated drive electronics. The motor is available in 2 sizes:

- **Power:**
  - Size DRC1: 0.55 kW (2.6 Nm rated torque)
  - Size DRC2: 1.5 kW (7.2 Nm rated torque)

- Combination of a permanent-field synchronous motor (2000 rpm rated speed) with integrated drive electronics in a completely enclosed housing:
  - No fan
  - Degree of protection IP65 and IP66
  - Overload capacity of 250%
  - Great flexibility for mounting any gear unit:
    - A completely new mechatronic drive system is created together with a highly efficient helical-bevel, helical or parallel-shaft helical gear unit
    - IEC flanges for stand-alone motors and for combination with IEC adapters
  - With mechanical brake as option
  - Possible installation topologies / communication interfaces:
    - Single Line Network Installation (SNI), SEW system bus controller (DSC), binary (DBC) or AS-Interface (DAC)
  - Suited for use worldwide
  - Supply voltage of 380 ... 500 V at 50/60 Hz
  - Significant reduction in the number of variants
  - Simplified selection and project planning
  - safetyDRIVE functional safety STO (Safe Torque Off)
**Application options**

<table>
<thead>
<tr>
<th>Electronics cover without application slot, electronics cover with application slot (with installed GIO12B option)</th>
<th>The following types of electronics covers are available for all sizes of MOVIGEAR®/DRC-DSC and MOVIGEAR®/DRC-SNI units:</th>
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<tr>
<td>Electronics cover without application slot</td>
<td>Electronics cover without application slot</td>
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<tr>
<td>Electronics cover with application slot</td>
<td>Electronics cover with application slot</td>
</tr>
</tbody>
</table>

The electronics cover of MOVIGEAR®/DRC-DBC and MOVIGEAR®/DRC-DAC is designed without application slot.

Application options are installed in the application slot of MOVIGEAR®/DRC. These options implement specific interfaces, such as binary inputs or binary outputs. The energy supply of the option as well as the communication between MOVIGEAR®/DRC and the option is contactless.

**GIO12B application option**

The GIO12B application option allows for controlling up to 2 digital actuators and for processing up to 4 digital sensors.

**GIO13B application option**

The GIO13B application option comes equipped with the following interfaces:

- 1 digital output
- 4 digital inputs (two of them can be used as primary frequency input)
- 1 analog output
- 1 analog input

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**Impressive combination: Functionality and design of mechatronic drive systems**

MOVIGEAR® and DRC electronic motor
This flexibility and the resulting universal use make the mechatronic drive systems attractive for many industries, such as logistics, automobile industry, food and beverage industry, airport logistics, and construction industry. MOVIGEAR® and DRC electronic motor provide optimal and efficient mechatronic drive solutions, for example for belt and chain conveyors, corner transfer units or palletizers. Equipping the DRC with an optional brake makes it also suited for use in inclining tracks and hoists.

- Motor efficiency class IE4 allows for saving up to 50% of energy
- Mechatronic drive systems from a single source:
  All individual components are perfectly matched, are reliable and durable, and significantly contribute to a high level of system availability.
Using any opportunity to save energy is not only an important contribution to conserving the environment but also pays off financially. This also affects the selection and projecting of modern drive technology. The drive technology used and its overall efficiency play a crucial role in sustainably reducing the energy consumption in industrial applications.

A simple equation illustrates this:

\[ P_{\text{input}} = P_{\text{output}} + P_{\text{losses}} \]

This means that the costs for electrical energy input \( P_{\text{input}} \) are calculated from the effectively needed mechanical energy \( P_{\text{output}} \) plus losses \( P_{\text{losses}} \) resulting from the overall efficiency. The following applies disregarding the application and the system: Energy costs can only be reduced if energy losses during plant operation are kept as low as possible.
Verified by an independent entity:
Energy saving potential of up to 50%

“A comparison of the test results shows a significant efficiency advantage of MOVIGEAR® drives … over the entire load range.”

Source: Report of the University of Applied Sciences of Kaiserslautern on the efficiency measurement of the mechatronic drive system MOVIGEAR®

TÜV SÜD confirms that MOVIGEAR® requires up to 50% less energy compared to other drive systems available on the market and awards the mechatronic drive system the certificate “Energy-Efficient Plant Technology”.

University of Applied Sciences of Kaiserslautern
Department of Applied Engineering Sciences
**Tried and tested energy savers**

Mechatronic drive systems not only actively contribute to the conservation of resources and the environment, they also offer system manufacturers and operators a true cost-saving alternative to conventional, centralized installation solutions.

<table>
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<tr>
<th>MOVIGEAR®</th>
<th>DRC electronic motor</th>
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<tbody>
<tr>
<td>- High overall efficiency of the drive system</td>
<td></td>
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<td>- Optimized interfaces between motor and gear unit</td>
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<td>- Highly efficient gearing</td>
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<tr>
<td>- Great flexibility for gear units: A completely new mechatronic drive system is generated together with a highly efficient helical-bevel, helical or parallel-shaft helical gear unit</td>
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<tr>
<td>- Optionally with mechanical brake for hoists and inclining tracks</td>
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Reducing energy costs by increasing the overall efficiency

- Highest motor efficiency due to permanent-field synchronous motor. Already today, the motor efficiency complies with efficiency class IE4 (Super Premium Efficiency) of the international standard IEC 60034  
- New electronic components and intelligent control modes  
- Proven energy-saving potential of up to 50% depending on the application  
- Significantly reduced reactive power consumption compared to motors operated directly on the mains supply helps ensure that reactive power limit values are complied with  
- Sustainable reduction of CO₂ emissions helps protecting the environment
Latest measurements on a belt conveyor in a logistics center show the following result:

- Average reduction of the power consumption by approx. 820 kwh/year per drive
- Reduction of energy consumption by 56%
- Reduction of CO₂ emissions of 532 kg/year per drive
- € 98.00 of energy saved per drive/year

* Calculation based on customer data with energy costs of 0.12 €/kwh and a runtime of 16 hours per day and 220 days per year.

The higher costs compared to conventional drive solutions are compensated within only one or two years by the saved energy expenses.
In addition to objectives such as “higher productivity” or “cost reduction”, the system environment is becoming an increasingly important criterion for the development of modern machines and systems. Until now, compliance with normative limit values has served system operators as a gauge for determining the environmental impact. In the meantime however, the creation of high-quality workplaces has become one of the key purchase criteria. This is why the influences on the system environment, such as noise emission, are analyzed thoroughly.
Low noise emissions improve the quality of the workplace

In conventional drives, air swirls and vibrations in the fan guard account for most of the noise. This is the reason why SEW-EURODRIVE aimed at developing a drive without fan.

This has now been successfully achieved with the mechatronic components: both MOVIGEAR® and the DRC electronic motor do not have a fan and therefore significantly contribute to reducing noise in the plant.
Demanding areas of application?  
No Problem

Clean room

Energy efficiency and cleanliness in clean rooms are not mutually exclusive, at least not when using the decentralized drive components of SEW-EURODRIVE, MOVIGEAR® and the DRC electronic motor are easy to clean and comply with the demanding requirements on the hygienic conditions in clean rooms with regard to air quality and permitted number and size of particles released.

The EN ISO 14644 standard stipulates the requirements on clean rooms and associated clean room areas. The mechatronic MOVIGEAR® drive system complies, for example, with air cleanliness class 2 according to ISO 14644-1 and consumes about 50% less energy than conventional drive solutions.

Energy efficiency in clean rooms made easy: Many machine and plant operators have already been benefitting from the impressive energy-saving potential of MOVIGEAR® and DRC in their production and logistics facilities and have been successfully implementing “clean room compliant” decentralized concepts.

For example suited for the
– Food industry
– Chemical, pharmaceutical and cosmetic industries
– Biotechnology and medical technology
– Semiconductor industry and solar panel production
Wet areas

The mechatronic MOVIGEAR® drive system variant for use in wet areas is specifically designed for applications in permanently wet areas, such as hygienic areas in the food and beverage industry. Even regular acidic or caustic wet cleaning is no problem and cleaning inaccessible areas is possible thanks to the non-stick properties of the surface. The smooth surface prevents dirt from adhering to it – the mechatronic components are virtually self cleaning.

### MOVIGEAR®: Wet area features

| Design                  | – Smooth overall design  
|                         | – Compact unit consisting of gear unit, motor and electronics facilitates the thorough cleaning of the entire drive system – meets hygienic design requirements |
| **Without fan**         | – No swirling of air, dirt, and particles 
|                         | – Completely enclosed mechatronic drive system 
|                         | – No fan, no ventilator, which means 
|                         | - No dirt is sucked in 
|                         | - No air swirls 
|                         | - No germs and bacteria are distributed |
| **MOVIGEAR® variants for use in wet areas** | Special non-stick surface HP200 
|                         | – Makes for easy cleaning 
|                         | – Prevents paint flaking at the interfaces as the surface is applied prior to assembly and covers the edges of the individual components 
|                         | – Prevents particles from sticking to the surface 
|                         | – Is resistant against mechanical stress and common cleaning agents 
|                         | External screws and the output shaft are made of stainless steel |
| **Cost-effectiveness**  | – Minimized cleaning efforts reduce cleaning and idle times and ultimately operating costs |
| **Sample applications** | – Hygienic and aseptic conveyors in the beverage industry 
|                         | – Systems in cheese dairies and butcher shops 
|                         | – “Splash zones” in the food industry |
Installation topologies of mechatronic drive systems: SNI and SEW system bus

Single Line Network Installation

With MOVIGEAR® SNI and the DRC electronic motor SNI, completely new system concepts can be implemented as energy and data are transferred via one standard cable. This principle is referred to as Single Line Installation. Simplified installation leads to significantly reduced installation and system costs.

Installation topology with SNI controller

**Features**
- Single control
- Reduction in the number of components
- Bus lines do not have to be routed in the field
- No risk of hidden faults in the bus cabling
- Reduced startup times
- Shorter project runtimes/reduction of project costs
- safetyDRIVE functional safety: Safe Torque Off (STO) up to PL e according to EN ISO 13849-1

**Application options**
- As drive for applications with high breakaway and starting torques
- Conveyor systems with variable speeds
- As drive for applications that require soft and/or defined startup behavior
- As group drive for easier implementation of synchronous operation

**Application examples**
- Belt conveyors
- Pallet conveyors
- Roller and wheel conveyors
- Screw conveyors
- Container and packaging unit transports
- Chain and drag-chain conveyors
- Small hoists and ascending conveyors
High performance and fast bus communication

The SEW system bus allows for the functional integration of MOVIGEAR® DSC and the DRC electronic motor DSC in applications close to the machine. High performance and short response times distinguish this variant and enable the reliable implementation of challenging drive tasks.

Installation topology with SEW system bus controller

<table>
<thead>
<tr>
<th>MOVIGEAR® and DRC electronic motor with SEW system bus (DSC)</th>
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<tbody>
<tr>
<td><strong>Features</strong></td>
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<tr>
<td>- Line wiring</td>
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<tr>
<td>- Single control</td>
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<tr>
<td>- Integrated communication interface</td>
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<td>- Fast communication for short cycle times</td>
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<tr>
<td>- Hybrid cable for minimum installation effort</td>
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<tr>
<td>- System bus controller for control cabinet or fieldbus installation with integrated PLC</td>
</tr>
<tr>
<td>- High drive dynamics and performance</td>
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<td>- safetyDRIVE® functional safety: Safe Torque Off (STO) up to PL e according to EN ISO 13849-1</td>
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<td>- As drive for applications with high breakaway and starting torques</td>
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<tr>
<td>- As drive for conveyor systems that have to be operated dynamically at varying speeds</td>
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<tr>
<td>- For forming intelligent function groups</td>
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<tr>
<td>- Universal use due to wide control range of 1:2000</td>
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<table>
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<tr>
<th><strong>Application examples</strong></th>
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<tr>
<td>- Pallet conveyors</td>
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<td>- Machine-integrated conveyor belts</td>
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<td>- Feeding conveyors</td>
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<tr>
<td>- Synchronized feeder conveyors</td>
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<tr>
<td>- Reversing drives</td>
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</table>
Stand-alone operation

The "binary" installation topology solution with MOVIGEAR® DBC and the DRC electronic motor DBC from SEW-EURODRIVE are specifically suited for stand-alone applications as well as applications with simple functions: DIP switches and potentiometers allow for simple and fast startup, no PC is required. The devices can be controlled via binary inputs either by a central PLC or in local/manual mode.

Installation topology binary

**MOVIGEAR® and DRC electronic motor binary (DBC)**

**Stand-alone operation**

**Features**
- Simple startup without PC using DIP switches and potentiometer
- Parameterizable fixed speeds and ramps
- Binary input control and signal relay evaluation via PLC
- Local/manual operation via binary inputs
- Interface for diagnostics and parameterization
- safetyDRIVE® functional safety: Safe Torque Off (STO) up to PL e according to EN ISO 13849-1

**Application options**
- Simple stand-alone applications and single applications
- For applications that require soft startup behavior
- Applications with two fixed speeds
- For applications with high breakaway torques
- Applications with functional safety

**Application examples**
- Simple conveyors
- Rotary tables
- Actuating drives
- Agitators and mixers
- Crushers and shredders
- Presses
Cost-effective fieldbus connection

The installation topology with AS-Interface is the simple fieldbus connection variant for MOVIGEAR® DAC and the DRC electronic motor DAC. Parameterizable fixed speeds and ramps, integrated STO safety function and connection options for external sensors ensure fast and extremely efficient implementation of material handling systems.

Installation topology with AS-Interface

**MOVIGEAR® and DRC electronic motor AS-Interface (DAC)**

**Features**
- Parameterizable fixed speeds and ramps
- Control via standard AS-Interface specification
- Connection of external sensors on the actuator
- Voltage supply for connected sensors
- Local/manual operation via binary inputs
- Interface for diagnostics and parameterization
- safetyDRIVE® functional safety: Safe Torque Off (STO) up to PL e according to EN ISO 13849-1

**Application options**
- Simple fieldbus connection
- For applications that require soft startup behavior
- Signal feedback of connected sensors
- For applications that require a lot of space
- Applications with functional safety

**Application examples**
- Accumulating roller conveyors
- Roller and wheel conveyors
- Pallet conveyors
- Rotary tables
- Small hoists and ascending conveyors
SEW-EURODRIVE is right there for you:

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