The new synchronous-reluctance drive system

As a complete drive system, the reluctance motor with the gearbox and the frequency converter are perfectly coordinated and enable best-in-class operational results when combined together. This results in cost-effective operation of the whole system and high efficiency performance.

SIMOGEAR reluctance geared motor

Highlights

- High dynamic performance
- Excellent thermal behaviour
- High energy efficiency
To secure plants, systems and machines as well as networks against cyber attacks, a holistic Industrial Security concept must be implemented (and continuously updated) corresponding to current state-of-the-art technology. Products and solutions from Siemens are just one component of such a concept.

You can find additional information about Industrial Security at [http://www.siemens.com/industrialsecurity](http://www.siemens.com/industrialsecurity)
SIMOGEAR reluctance geared motor

The new synchronous-reluctance drive system.
The synchronous-reluctance solution allows for application in many different areas and with the major technical benefits compared to a standard asynchronous solution. The SIMOGEAR reluctance geared motor is particularly suited to conveyor technology and general machinery systems where applications with high energy efficiency are demanded. Together with the right frequency converter, the portfolio is very extensive. The drive system is typically used for rollers, chains and belt conveyors within the baggage and cargo handling facilities at airports. It also fits within warehouses and distribution logistics and in postal and packaging. It is commonly used in hoisting gears, scissor lift tables and monorail conveyors as well as in rollers, chains, belts and skids for the automotive industry.

The new SIMOGEAR synchronous-reluctance drive system consists of SIMOGEAR standard gear units, SIMOTICS synchronous-reluctance motors and SINAMICS frequency converters. With this solution, Siemens is widening the SIMOGEAR geared motors portfolio by newly combining the gearbox with the reluctance motor from SIMOTICS as a completely new offering for the customer. By combining the aforementioned products the customer benefits especially from the efficiency class compared and even exceeding IEC4, which scores with higher efficiency and lower losses, especially in a partial load than to comparable asynchronous motors. Highly energy efficient, the motor heats up less and provides a high operation reability due to its excellent thermal behavior. Because of that high service factors are achieved. This solution also boasts high dynamics thanks to the motor’s lower moment of inertia and optimized control. Commissioning is established quickly and easily by entering the motor code into the converter. The constant torque-speed characteristics up to the rated speed make an external fan redundant. In the drive system, all components are perfectly coordinated together.
In synchronous-reluctance motors, the speed is perfectly known due to the synchronous mode of operation. Precise speed is reached even without encoder. The system boasts with high dynamic performance through optimized control and low moment of inertia.

The SIMOGEAR reluctance geared motor has an output range from 0.55 to 4 kW and is available for SINAMICS G110M, G120D, G120, G120X and S120 converters. Optimum functionality of the drive system is provided by the interaction of the reluctance motor, gear unit and converter which are precisely matched to each other. This results in economical operation and efficient performance of the entire drive system.

Demands on the efficiency of drive systems are high nowadays so there is a big chance for synchronous-reluctance motors to show their efficiency improvements. The synchronous-reluctance solution is the step forward. The entire drive system benefits from the synchronous-reluctance solution which differs from the asynchronous in several ways.

As previously mentioned, the biggest advantage is the higher efficiency of the synchronous-reluctance drive system compared to the efficiency of the drive system with asynchronous motors. Also thermal limits are different; synchronous-reluctance motors reach high reliability of operation due to low motor temperature.

**Energy efficiency at rated load and partial load**

![Energy efficiency graph](image)

1. **Efficiency at rated load**
   - The efficiency of the drive system with the synchronous-reluctance motor is higher at rated load compared to the efficiency of the drive system with the IE4 asynchronous motor.

2. **Efficiency at partial load**
   - The efficiency of the drive system with the synchronous-reluctance motor is much higher at partial load than the efficiency of the drive system with the IE4 asynchronous motor.

**Thermal behaviour:**

High reliability of operation due to low motor temperature

Synchronous-reluctance motor has almost no losses in the rotor compared to the asynchronous motor. That results in a significant temperature reserve in the synchronous-reluctance motor. Based on that the synchronous-reluctance motor can be operated down to 10% of a rated speed with a rated torque (but the torque reduction is not necessary). Consequently the reluctance motor can be operated with a higher overload in a lower speed range compared to the asynchronous motor.

**Efficient with precise functions**

Therefore Siemens is expanding the SIMOGEAR portfolio which meets customer requirements as well as market standards regarding mounting dimensions. Shorter and compact design together with fine torque graduation is a standard for the SIMOGEAR gearboxes. Coupled with SIMOTICS reluctance motors and SINAMICS frequency converters, the new drive systems with an excellent operation appear. When you demand for highly efficient motors with the highest performance, this system is a perfect solution for your application.

![Efficiency chart](image)
### Technical data

<table>
<thead>
<tr>
<th>Type</th>
<th>Synchronous-reluctance drive system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency class</td>
<td>System efficiency class IES 2, motor efficiency exceeds IE4</td>
</tr>
<tr>
<td>Shaft height</td>
<td>SH80, SH90, SH112</td>
</tr>
<tr>
<td>Power range</td>
<td>0.55 kW – 4 kW*</td>
</tr>
<tr>
<td>Certificates</td>
<td>CE, UL/CSA, CCC**</td>
</tr>
<tr>
<td>Overload capacity</td>
<td>Up to 200%</td>
</tr>
<tr>
<td>Service</td>
<td>Synchronous-reluctance motor is easy to service due to absence of permanent magnets</td>
</tr>
<tr>
<td>Insulation system</td>
<td>Insulation system is optimized for converter operation</td>
</tr>
<tr>
<td>Gearboxes compatible</td>
<td>Helical, Parallel shaft, Helical worm, Bevel</td>
</tr>
<tr>
<td>Converters compatible</td>
<td>SINAMICS G110M, SINAMICS G120, SINAMICS G120D, SINAMICS G120X, SINAMICS S120</td>
</tr>
</tbody>
</table>

* 2.2 kW and 3 kW are implemented in SH112
** in preparation

### SIMOGEAR reluctance geared motors are compatible with SINAMICS converters

![SIMOGEAR reluctance geared motors compatible with SINAMICS converters]

- SINAMICS G110M
- SINAMICS G120
- SINAMICS G120D
- SINAMICS G120X
- SINAMICS S120

SIMOGEAR reluctance geared motor is included in Drive Technology Configurator
siemens.com/dt-configurator