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*Ingenuity for life*

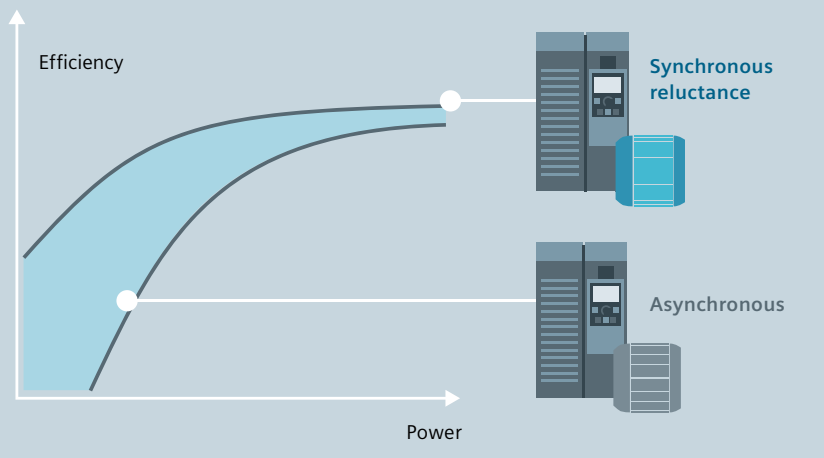


## Small step, big impact: a new dimension in efficiency

The innovative synchronous-reluctance drive system  
with SIMOTICS motors and SINAMICS converters

[siemens.com/reluctancedrivesystem](https://www.siemens.com/reluctancedrivesystem)

# Synchronous reluctance – the new drive generation



Synchronous-reluctance technology ensures a noticeably lower energy consumption, especially in the partial load range.

## Small step, big impact

The requirements placed on the efficiency of drive systems and the individual components are higher than ever before – and still rising. But the technical potentials of conventional asynchronous technology have been largely exhausted, and it would be almost impossible to achieve further efficiency improvements.

Synchronous-reluctance technology offers you an attractive alternative for more than just simple drive tasks, since the use of permanently excited synchronous motors is often uneconomical. It can achieve very high levels of efficiency at the rated operating point and under partial load, with both high power density and high dynamic performance. But for the system to release its full potential, all of the system components must be perfectly coordinated and integrated.

## An integrated system pays off

SIMOTICS reluctance motors are precisely harmonized and coordinated with SINAMICS converters to create a Siemens integrated synchronous-reluctance drive system. This pays off for you, since it provides all the benefits of proven, standard platforms, and combines them with future-oriented, energy-efficient synchronous-reluctance technology. Using the TIA Portal you can quickly and easily integrate the entire drive system into the automation environment. Perfectly coordinated software and services help you make full use of all critical optimization potentials throughout the entire lifecycle.

## Special drive performance

With regard to control properties, too, the synchronous-reluctance drive system must not hide its light under a bushel. Field-oriented vector control performance is better in all aspects than with comparable standard asynchronous motor systems. In conjunction with the SINAMICS S120 frequency converter, it is even possible to switch from standstill to continuous operation. This means there is no need for an encoder, even for demanding drive tasks. The high thermal overload capacity of the synchronous-reluctance motor generally means there is no need for an external fan set at all.



Pumps, fans, compressors



Conveying



General machinery construction



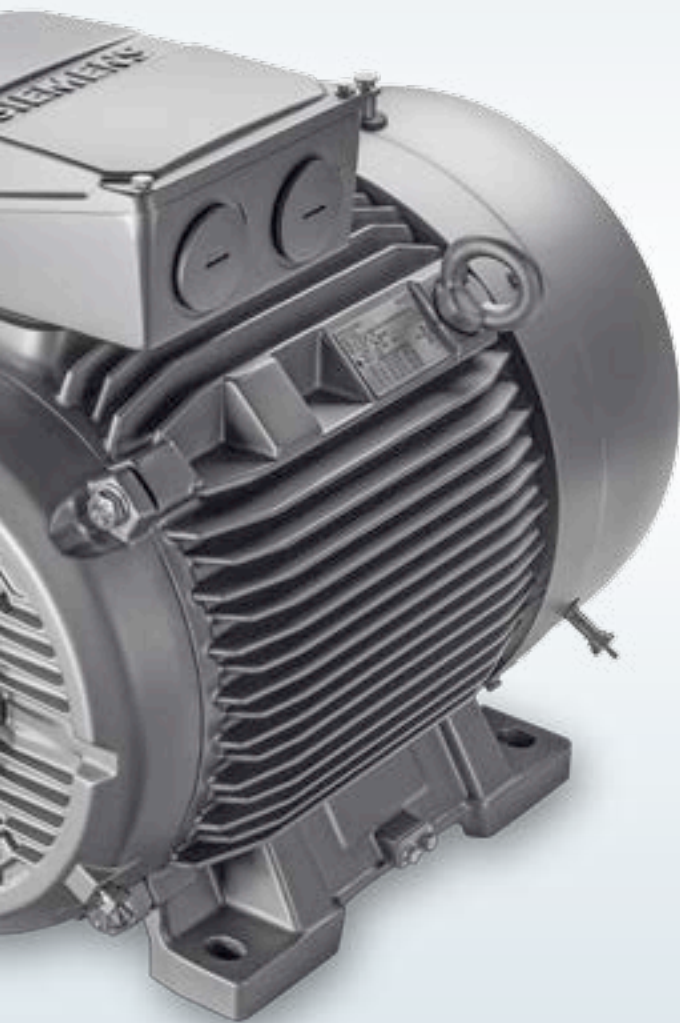
## Your advantages at a glance

**High energy efficiency**  
from the partial load range up to  
the rated operating point

**High dynamic performance**  
through optimized control and  
low intrinsic moment of inertia

**High degree of productivity**  
thanks to minimum operating costs,  
short cycles and high level of reliability  
in operation

# On the path to the digital transformation



Digitization is the key to rapid and efficient operation. The data matrix codes on the motor and on the converter provide you with technical data, spare parts and operating instructions. You just need a mobile device and the SIMOTICS Digital Data app for motors or the Siemens Industry Online Support app for converters. You can make design and engineering processes shorter and more flexible using 2D and 3D engineering data.

# Maximum efficiency

## Better dynamic performance, higher productivity

**High energy efficiency from the partial load range up to the rated operating point**

**Benefit from much higher system efficiency and maximized energy efficiency.**

- Higher efficiency at the rated operating point than with comparable asynchronous motors in efficiency class IE4
- Much lower losses in the partial load range than with asynchronous motors
- Losses further reduced thanks to adjustment with field weakening even in the partial-load range

**High dynamic performance through optimized control and low intrinsic moment of inertia**

**Adjust the required torque with precision and achieve faster response times.**

- Improved productivity thanks to faster acceleration in cyclic operation and faster cycles
- Faster response to load cycles thanks to faster motor magnetization
- More precise torque adjustment thanks to highly dynamic vector control

**High degree of productivity thanks to minimum operating costs, short cycles and high level of reliability in operation**

**Put together a powerful optimization package for your plant.**

- Low operating costs and high cost efficiency thanks to excellent energy-saving potentials
- Strong, measurable increase in plant productivity with shortened cycle times resulting from low moment of inertia
- Ease of entering motor codes in the converter shortens commissioning times



### On the path to the digital transformation

Data matrix codes give access to technical data, spare parts, and operating instructions.

- Basic devices (e.g. smartphones) in conjunction with Siemens apps are all that's needed
- Make design and engineering processes shorter and more flexible using 2D and 3D engineering data

### High overload capability for rugged, reliable operation

Take advantage of outstanding robustness and better functionality for the long term.

- High heat reserves thanks to minimal losses in the rotor when operating at normal performance levels
- Continuous operation over a speed control range of 1:10 possible without reducing torque
- Permanent overload capability of 20% over a 1:10 speed control range possible

### Precise speed for encoderless control through synchronous operation

Combine precision with reliability and efficiency.

- Synchronous technology ensures high speed consistency and control dynamics
- Optional Advanced Reluctance Control License expands encoderless operating range down to standstill (normally 1:10)
- Noticeable cost saving with no encoder or cabling

# Technical data

Selection data, synchronous-reluctance drive system with SINAMICS G120 for 50 Hz and 400 V line voltage



SIMOTICS reluctance motor (VSD4000 line)								SINAMICS G120 frequency converter			
Rated power (kW)	Frame size	Torque (Nm)	Rated current (A)	Rated speed (rpm)	Max. speed SIMOTICS GP/ SIMOTICS SD (rpm)	Motor code	Motor Article No.	Frame size	Power Module Article No. *		
0.55	80M	3.5	1.6	1,500	3,200/3,200	60017	1FP1 ■ 14-0DB22-1 ...	A	6SL3210-1PE11-8	■	L1
0.75	80M	4.8	2.2	1,500	3,200/3,200	60018	■ 14-0DB32-1 ...	A	6SL3210-1PE12-3	■	L1
		2.4	2.1	3,000	- /6,000	60019	5 14-0DF22-1 ...				
1.1	90S	7.0	2.8	1,500	3,200/3,200	60021	■ 14-0EB02-1 ...	A	6SL3210-1PE13-2	■	L1
	80M	3.5	3.0	3,000	- /6,000	60020	5 14-0DF32-1 ...				
1.5	90M	9.5	3.8	1,500	3,200/3,200	60022	■ 14-0EB42-1 ...	A	6SL3210-1PE14-3	■	L1
	90S	4.8	4.0	3,000	- /6,000	60023	5 14-0EF02-1 ...				
2.2	112M	14.0	5.3	1,500	3,200/3,200	60025	■ 14-1BB02-1 ...	A	6SL3210-1PE16-1	■	L1
	90L	7.0	5.8	3,000	- /6,000	60024	5 14-0EF42-1 ...				
3.0	112M	19.1	7.1	1,500	3,200/3,200	60026	■ 14-1BB12-1 ...	A	6SL3210-1PE18-0	■	L1
		9.5	7.2	3,000	- /6,000	60027	5 14-1BF12-1 ...				
4.0	112M	25.5	10.0	1,500	3,200/3,200	60028	■ 14-1BB22-1 ...	A	6SL3210-1PE21-1	■	LO
		12.7	9.8	3,000	- /6,000	60029	5 14-1BF22-1 ...				
5.5	132S	35.0	12.6	1,500	3,200/3,200	60030	■ 14-1CB02-1 ...	B	6SL3210-1PE21-4	■	LO
		17.5	12.9	3,000	- /5,600	60032	5 14-1CF02-1 ...				
7.5	132M	47.5	17.1	1,500	3,200/3,200	60031	■ 14-1CB22-1 ...	B	6SL3210-1PE21-8	■	LO
	132S	23.8	17.3	3,000	- /5,600	60033	5 14-1CF12-1 ...				
11	160M	70.0	25.0	1,500	3,000/3,200	60034	■ 14-1DB22-1 ...	C	6SL3210-1PE22-7	■	LO
		35.0	24.5	3,000	- /4,800	60036	5 14-1DF22-1 ...				
15	160L	95.0	34.0	1,500	3,000/3,200	60035	■ 14-1DB42-1 ...	C	6SL3210-1PE23-3	■	LO
	160M	47.5	34.0	3,000	- /4,800	60037	5 14-1DF32-1 ...				
18.5	180M	118.0	42.0	1,500	2,610/3,000	60011	■ 14-1EB22-1 ...	D	6SL3210-1PE23-8	■	LO
	160L	59.0	41.5	3,000	- /4,800	60038	5 14-1DF42-1 ...				
22	180L	140.0	49.0	1,500	2,610/3,000	60012	■ 14-1EB42-1 ...	D	6SL3210-1PE24-5	■	LO
		70.0	50.0	3,000	- /4,600	60014	5 14-1EF22-1 ...				
30	200L	191.0	68.0	1,500	2,610/3,000	60013	■ 14-2AB52-1 ...	D	6SL3210-1PE26-0	■	LO
		96.0	68.0	3,000	- /4,500	60015	5 14-2AF42-1 ...				
37	225S	235.0	79.0	1,500	- /3,000	60039	■ 14-2BB02-1 ...	E	6SL3210-1PE28-8	■	LO
	200L	118.0	82.0	3,000	- /4,500	60016	5 14-2AF52-1 ...				
45	225M	286.0	96.0	1,500	- /3,000	60040	■ 14-2BB22-1 ...	E	6SL3210-1PE31-1	■	LO
		143.0	99.0	3,000	- /4,500	60041	5 14-2BF22-1 ...				

Motor series	■
SIMOTICS GP – aluminum frame	0
SIMOTICS SD – cast iron frame	5

EMV filter	■
Non-filtered	U
Class A filter	A

Other converters in the SINAMICS family perfectly coordinated with the SIMOTICS reluctance motor:



SINAMICS S120



SINAMICS G120X



SINAMICS G110M



SINAMICS G120D

# Synchronous-reluctance motors

## Impressive in use



Kaeser  
Kompressoren SE



*“This drive principle, which has been known for decades, has been perfected technically in series motors so that users around the world can now benefit from this innovative technology”.*

W. Hartmann, Head of Marketing  
Kaeser Kompressoren SE

*“The Siemens synchronous-reluctance system has proven its worth. We have been able to prove real savings in energy costs”.*

T. Kroiher, Plant Manager,  
Knauf Integral KG



Knauf Integral KG

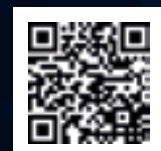


Olbrich GmbH



*“Siemens is a partner – especially when it comes to developing new and innovative methods”.*

J. Döing, Head of Sales, Olbrich GmbH



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