Quality and innovation right from the start

SIMOTICS – Motors on the path to the digital enterprise
We create sustainable value for you through innovation, quality, and partnership.
Built by Siemens in 1896, this motor was in successful operation at Tsingtao Brewery, China from 1903 to 1995 – for more than 90 years. An innovative game-changer then, and a proof of the highest quality to this day.
Ready for the full potential of digitalization

Digitalization of drive technology has long ceased to be just a dream, and has become a powerful driver in its own right. We work with you to take this development forward. This creates an entirely new dimension in added value, characterized by faster times to market, even greater plant availability, and far higher levels of efficiency.

Intelligent drive systems fit seamlessly into every automation environment throughout their entire lifecycle, making the engineering process faster and saving power costs. At the same time, digitally supported drive technology opens up a new dimension in transparency: the huge volumes of data from motors and converters can be recorded, analyzed and turned into valuable data. Analysis of this data leads to new processes that can optimize other processes, evaluate machine status, and arrange an ideal maintenance schedule.

SIDRIVE IQ – the digital platform for entire drive systems

SIDRIVE IQ is a new digital platform to evaluate and make use of drive data from entire drive systems, using MindSphere, the cloud-based, open and multisector IoT operating system. The digital platform can be used to digitally monitor, analyze, and optimize drive systems, to maximize their availability, efficiency, performance, and serviceability. In turn, this increases productivity, forming the basis for a successful business both now and in the future. To make the drive components communication-capable, therefore, they are equipped with connectivity modules, e.g. SIMOTICS CONNECT for low-voltage motors.
From user-friendly to future-proof – the tools for your success

We assist you in selecting the right drive solution with qualified consulting and software solutions that let you compare your alternatives directly. You also get continuous access and transparency regarding the electrical and mechanical data from your motor.

**SinaSave energy efficiency tool**
You enter the conditions of use and SinaSave determines the energy savings potential and amortization periods and lets you compare different control types and product combination for pump and fan drive systems. Supported by diagrams, for example system power losses according to EN50598, you can make sound investment decisions with help from SinaSave. For more information, please visit: siemens.com/sinasave

**SIMOTICS EE COMPARATOR**
The SIMOTICS EE COMPARATOR gives you a reliable comparison of the SIMOTICS low-voltage motors in network and converter operation with only a few items of key data. The app calculates energy efficiency, possible energy cost savings, and the amortization period. The results, e.g. the break-even point, are also displayed in graph form. The tool also provides information on the local minimum efficiency requirements of low-voltage asynchronous motors in selected countries. For more information, please visit: siemens.com/simotics-ee-comparator

**Drive Technology Configurator**
Select the optimum gearboxes, motors, converters as well as the associated options and components, controllers, software licenses and connecting systems – comfortably, securely, and quickly with the Drive Technology Configurator. It provides all technical data sheets, operating instructions, certificates and 2D/3D dimension drawings as further support. For more information, please visit: siemens.com/dt-configurator

**SIMOTICS Digital Data app**
The SIMOTICS Digital Data app gives you quick access to important product information on your SIMOTICS motor at all times: Just scan the data matrix code affixed to the motor and you’ll receive the unit’s electrical and mechanical data. And your customers will immediately receive operating instructions or spare parts lists for your motor. For more information, please visit: siemens.com/digitaldataapp
Our low-voltage AC motors and drive systems are the most versatile tool for all applications in a performance range of 0.05 to 5,000 kilowatts (kW). With groundbreaking innovations and numerous advantages, including high efficiency across all load ranges, a positive energy balance, excellent explosion protection, and conformity with IEC or NEMA standards, our low-voltage motors and drive systems keep you one step ahead of the competition, ensuring the highest possible cost-effectiveness in operation.

siemens.com/low-voltage-motors

Low-voltage motors
Efficient and powerful
SIMOTICS SD next generation
The sturdy SIMOTICS Severe Duty Motors excel with their optimized performance and wide range of digital features. They are equally reliable under high stress caused by dust and vibrations and in the aggressive environments of the process industry. They also satisfy the requirements of efficiency classes IE3 and IE4, and comply with the system efficiency class IES2 (according to EN50598).

You can select from three variants: the SIMOTICS SD, with higher torque characteristics, the SIMOTICS SD Add with its lower starting currents and global certificates – and the extremely flexible SIMOTICS SD Pro, which convinces the world with converter operation up to 690 V and multi-voltage capability.

Your benefits:
• Optimization through digitization
  Increase process transparency and optimize serviceability – with the digital pioneer.
• Best-in-class design
  Gain more efficiency and flexibility in assembly.
• Future-oriented energy efficiency concepts
  Boost your competitiveness thanks to energy savings.
• Easy business, fast delivery
  Take your own performance to the next level along the entire value chain.

SIMOTICS XP
The new generation of motors for all explosion-protection applications. Decades of experience and expertise, and compliance with top quality standards form the basis for maximum safety and reliability. SIMOTICS XP also impresses with a short time to market, lower expenditure and reduced lifecycle costs.

Your benefits:
• Complete, coordinated range
  A technologically comprehensive platform concept for gas explosion protection zones 1 and 2, dust explosion protection zones 21 and 22, ignition protection classes Ex db, eb, ec, tb and tc, in addition to series and project production, fixed-speed applications and variable-speed operation
• Extremely reliable in tough day-to-day use
  High quality and robust design – best suited for chemically aggressive atmospheres, salty sea air, dirt, humidity, heat, cold, and vibrations, including structural vibrations
• Short project run times
  Short delivery times, no project-specific system tests for variable-speed operation, and all essential certificates available
• Reduced expenditure in all phases
  Simplified planning, procurement, engineering, integration, commissioning, service, and also warehousing and spare parts supply thanks to standardized tools and processes
• Customized industry solutions
  CHEMSTAR version, with preconfigured packages of options for the chemical and oil & gas industries
Synchronous-reluctance drive systems

The combination of SIMOTICS reluctance motors and SINAMICS G120 and SINAMICS S120 frequency converters offers unique advantages – now also with new shaft heights AH90 and AH225. This rounds out the motor portfolio, which now covers the range of ratings from 0.55 to 45 kW, with speeds of 1,500 to 3,000 rpm.

The coordinated system of SINAMICS G120 converters and synchronous-reluctance motors allows for the perfect control of pumps, fans and compressors. The SINAMICS S120 converter and SINAMICS reluctance control license even enable sensorless motor control down to standstill. This means it can be used with winders, servo pumps, and extruders.

Your benefits:

• **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

Latest references

Olbrich GmbH

**Location:** Bocholt, Germany  
**Industry:** Coating machinery  
**Challenge:** Swift speed changes (2 m/min to 200 m/min) and web tensions ranging from 10 N to 2,000 N would require a more expensive special induction motor instead of a standard induction motor, complicating the layout of the required gear  
**Solution:** SIMOTICS GP/SD reluctance motor in a systematic approach with SINAMICS S120  
**Innovation:** Precise speeds over a wide setting range, also available without encoder; permanent overload with 20 percent possible (SF 1.2); higher thermal utilization at low engine speeds (without forced ventilation)

Kaeser Kompressoren SE

**Location:** Coburg, Germany  
**Industry:** Compressed air systems  
**Challenge:** Kaeser Kompressoren SE wanted to maximize the energy-efficiency of its screw compressors, especially under partial load, and reduce its power costs in the process  
**Solution:** Highly efficient variable-speed operation with a SIMOTICS GP synchronous-reluctance motor and SINAMICS G120 converter  
**Innovation:** Energy efficiency increased by 10%, especially in the partial load range; perfect adjustability thanks to a coordinated drive system; easy to commission using a motor code; more compact, smaller installed volume and thus a saving of space; easier to service and better environmental balance since no magnetic raw materials are used

Neue Halberg-Guss GmbH

**Location:** Saarbrücken, Germany  
**Industry:** Automotive supplier, iron and aluminum casting  
**Challenge:** Modernizing two large radial blower systems to achieve higher energy efficiency and reliable operation of the thermal processes, re-certification according to ISO 50001  
**Solution:** Two SIMOTICS FD (Flexible Duty, 325-kW) motors with SINAMICS G120P converters  
**Innovation:** Reducing power costs by up to 10%, as SIMOTICS FD is designed for converter operation, and optimized for SINAMICS LV converters to increase system efficiency for full and partial load. Lower engineering costs, as motor and converter are perfectly harmonized and coordinated with one another.
Motors from large to small and from standard to customized

Ideal for simple and special applications

Optimized by digitalization: SIDRIVE IQ, SIMOTICS Digital Data app, Digital Twin
Siemens offers the world’s broadest range of motors for motion control applications, all perfectly matched to operate with our family of SINAMICS frequency converters. The advantages are compact design, excellent dynamics and precision, as well as high operating efficiency. Whether synchronous or asynchronous, with or without gear units as well as built-in motors and motor spindles, we have the right motor for your motion control application.

siemens.com/motion-control-motors
High dynamic performance, extremely compact design – SIMOTICS S

Whether for positioning in pick-and-place applications, for cyclic drives in packaging machines, or for path control in handling equipment and machine tools: Our permanent magnet SIMOTICS servo motors with the highest energy efficiency are the first choice wherever high dynamic performance and precise motion sequences are required. Depending on the application, they are available with different integrated encoders – from basic resolvers up to high-resolution absolute encoders. The series of SIMOTICS S motors is rounded off by SIMOTICS servo geared motors.

Your benefits:

• Servo motors for highly dynamic and precise positioning along with precision motion control
• Perfectly adapted to every drive task, thanks to a selection of moment-of-inertia versions
• Service- and installation-friendly quick-release connector that can be rotated, and replaceable encoder

Precise rotation up to 40,000 rpm – SIMOTICS M

SIMOTICS M are the main motors for applications where the primary focus is on a continuous and precise rotary motion of axes. They are perfect as the main drives for presses, as roll drives in printing and paper machines, and in textile and plastics machines. They are also used as winder drives – and are employed in machine tool spindles and cranes. With a power range extending from 2.8 up to 1,340 kW, they cover almost every application.

Your benefits:

• Main motors for precise and smooth operation of rotary axes and main drives
• Thanks to the modular system, the optimal motor can be configured with numerous options for every application
• Highest levels of efficiency can be achieved thanks to selection of synchronous or asynchronous version

Higher dynamics across the board – SIMOTICS L

SIMOTICS linear motors are the ideal solution if linear motion is to be executed with maximum dynamic performance and precision. The reason: elasticities, backlash, and friction effects as well as natural vibration in the drive train are avoided to a large extent. That's because when using linear motors, mechanical transmission elements – such as ballscrews, couplings and belts – are eliminated. This simplifies the machine design and reduces wear.

Your benefits:

• Linear motors for the highest dynamic performance and precision in linear motion
• Enormous force density in a compact design
• The motors require no maintenance, which means add to high technical availability

Highest precision for rotary axes – SIMOTICS T

SIMOTICS torque motors are optimized for high torques at low rated speeds. With a high-precision and dynamic performance as well as low wear (there are no mechanical transmission elements), they are desirable as built-in motors for rotary cycle machines, rotary indexing tables, and swiveling and rotary axes: for example, for machine tools. The same is true for the complete torque motors, which are used as rolling mill motor and winder drives in converting applications.

Your benefits:

• Torque motors for gearless direct drive with a high dynamic performance for all rotary axes
• Direct controllability; no elasticities in the drive train
• Low quantity of individual components reduces the number of interfaces, maintenance costs, and stock of spare parts

Individual solutions for special applications

Sometimes there's no way around application-specific solutions. We can offer you this: Based on our many years of experience, we work with our customers to design and implement application-specific motor solutions that are perfectly tailored to your requirements in terms of both design and performance. Not only this, you'll also profit from the high level of integration in our converter and control environment.
Latest references

Dr. Kurt Wolff GmbH & Co. KG
Location: Bielefeld, Germany
Industry: Cosmetics
Challenge: Utmost flexibility in production
Solution: Multi-Carrier-System based on SINAMICS S120 frequency converters and SIMOTICS S-1FK7 permanent-magnet synchronous motors for highest speed and easy programming using the SIMOTION SCOUT engineering system
Innovation: Innovative system solution for batch size one

Geiss AG
Location: Sesslach, Germany
Industry: Plastics machinery
Challenge: Simplify automation complexity
Solution: A new system concept based on the integration of SIMOTICS S-1FK7 servo motors, SINAMICS S120 drives with integrated technology functions, and SIMATIC components
Innovation: Thanks to synchronous servo motor technology, production processes are much more precise than with the former pneumatic drive

Goebel GmbH
Location: Darmstadt, Germany
Industry: Machine and plant construction
Challenge: Increasing machine availability
Solution: More versatile slitter rewinder based on SIMOTICS M-1PH8 main motors and Siemens components for drive technology
Innovation: Increased availability of the machine with comprehensive TIA system diagnostics

Dirinler Industrial Machineries Company
Location: Izmir, Turkey
Industry: Metalworking
Challenge: Quick and easy adjustment of quantities and forming processes
Solution: Servo-controlled press design based on SIMOTICS T-1FW3 torque motors and electronic motion control with the SIMOTION motion control system
Innovation: Flexibility and cost-effectiveness with high process reliability

Portfolio of motion control motors

S
Servo motors

M
Main motors

L
Linear motors

T
Torque motors
Innovative motor technologies in all power and performance classes

Condition Monitoring and data matrix code for easy availability and analysis of operating data for optimizing performance

Optimal system solutions, perfectly harmonized
A smart concept with a wide range of options makes the SIMOTICS HV motors the preferred choice for virtually any imaginable configuration with a power range from 200 kW up to 100 MW and more, speeds from 7 to 15,900 rpm, and torques up to 2,460 kNm and conformity with IEC and NEMA standards. Options include several cooling systems and explosion protection types (Ex n, Ex e, Ex d, and Ex p) as well as double protection variants for use in potentially hazardous areas. In addition, degrees of protection up to IP68 and special paint systems are available for use in aggressive atmospheres and under extreme conditions. We even supply SIMOTICS HV motors for use in temperatures as low as –60° Celsius and for applications with rigorous vibration quality requirements in line with the API standard. With its compact, modular, high-power, high-torque, and specialized series, SIMOTIC HV is the perfect fit for every drive application in the medium- and high-voltage range.

siemens.com/high-voltage-motors
Our latest innovations

Especially for high-voltage motors, the KPIs – efficiency, reliability, system availability, and consistent, end-to-end operating concepts – are strictly defined and the challenges are extensive. That’s why we’re committed to the highest standards of performance right from the motor development stage, backed by our decades of experience in the industry. Because we know that our equipment is critical for your system’s reliability. Discover the latest innovations in our portfolio of high-voltage motors:

SIMOTICS HV C

Our ultra-compact SIMOTICS HV C high-voltage motors are equipped with water jacket cooling and are available in a pressure-resistant version with revolutionary patented air cooling. Their standard design and light weight ensure simplified plant integration, which is further supported by variable terminal box positioning. In addition, a reworked motor base design provides for further improved vibration characteristics.

SIMOTICS HV M

Shorter project run times and greater reliability: High-voltage motors with a modular cooling concept are outstanding with their extremely short lead times and extensive adaptability for a wide range of applications. The fact that they perform reliably and with low vibration under even the most demanding of conditions also speaks for the SIMOTICS HV M motor series, as does its compliance with a wide range of industrial standards such as API.

SIMOTICS HV HP

Shorter project run times, lower costs – and an output range of up to 70 MW. SIMOTICS HV HP motors can be quickly implemented thanks to fast order processing, on-time delivery, and short lead times. They excel not only with their impressive efficiencies of up to 99%, but also with outstanding cost-effectiveness thanks to reduced operating costs. In addition, an easily removable housing, large service openings, and quick access to standard spare parts ensure completely smooth maintenance.

SIMOTICS AMB technology

The benefit of SIMOTICS Active Magnetic Bearing Technology is that of noncontacting bearings, and is both simple and ingenious. A floating shaft generates no friction, so there is no wear. And where there’s no risk of wear, there’s also no need for oil. This in turn eliminates the risk of oil leaks. But these are far from the only benefits. Increased energy efficiency, consistent end-to-end operating and service concepts, maximum system availability, and optimized operating costs are also powerful advantages.

Your benefits – digitalization as the key to success

• Cloud-based data analysis:
  Integration of the entire MV drive system in cloud-based data analysis

• Visualized data flows:
  Representation of bearing vibrations, bearing and winding temperatures

• Simulation of temperature curves:
  Cloud-based comparison of simulated temperature curves using actual measured data

• Digital twin:
  Increased efficiency and quality thanks to digital visualization, with shorter modification times and smooth operation

• Fault analysis:
  Future-oriented derivation of trends and forecasting options for long-term optimization of operations thanks to fault analysis and statistical evaluations
Latest references

Shougang Jingtang United Iron & Steel Co., Ltd
Location: Tangshan City, Hebei Province, China
Industry: Steel works
Application: For the two 5,500 m³ blast furnaces a blower station is necessarily set up. Three axial-flow BF blowers are installed inside the blower station. The maximum air volume of the blowers is 10,000 Nm³/min and the air pressure at outlets is 0.65 MPa(a).
Challenge: Maximum performance and significant cost savings at the Blast Furnace Blowers.
Solution/Innovation: 11 sync. motors, including three sets 60 MW motors, which are the largest electrical motors running in China. Six sets Load Commutated Inverters, including two sets of 14.5 MW SINAMICS GL150 starting converters for the blast furnaces, air separation units and sinter plants. Matching Transformers and a set of MV switchgears.

Oriental Energy Corporation
Location: Zhangjiagang, Jiangsu Province, China
Industry: Oil & Gas, Petro Chemical
Application: HV Motors for three compressor trains at PDH plant
Challenge: Build a highly reliable system to keep the piping in the complex process chain under constant pressure.
Solution/Innovation: Two 34 MV DOL (Direct On Line) High Voltage (HV) motors; a SINAMICS GL150 Medium Voltage (MV) converter, at present the power-wise largest MV converter in China; a SINAMICS GM150 MV converter, designed as special tandem solution, able to feed a compressor motor from two sides. This special design is the first one in the world; a 15 MV Variable Speed Drive with a speed range from 70 to 100 percent, including the first High Speed High Voltage motor in China.

Stadtwerke Düsseldorf AG
Location: Fortuna Power Plant, Dusseldorf, Germany
Industry: Combined cycle gas turbine power generation, district heating
Application: Boiler feed pump drives, district heating pumps, excitation system
Challenge: The Fortuna power plant currently holds three world records, attributable to the input from Siemens: It has a maximum net electrical output of 603.8 MW, electrical efficiency of around 61.5 percent, and a district heating supply of 300 MW. The resulting overall efficiency of the natural gas fuel is up to 85 percent.
Solution/Innovation: Two 3.7-MW modular high-voltage motors for the feedwater pumps, a robust water-cooled GM150 converter, and a THYRIPOL excitation system consisting of two modular high-voltage motors from Siemens and two SINAMICS GM150 (4-MW) medium-voltage drives, as well as low-voltage motors and drives.
Maximum reliability and long service life, even in extreme environments

Condition monitoring for simple availability and analysis of operating data for performance optimization

Energy efficiency and ultra compact design
SIMOTICS DC direct-current motors in the power range from 31.5 to 1,610 kW are of compact modular construction and can be deployed in difficult installation conditions. A comprehensive range of add-on modules is available as well as a diverse selection of monitoring and diagnostics options. The high quality of these motors is assured by our comprehensive quality management system. This guarantees reliable, fault-free operation.

siemens.com/dc-motors

DC motors
Maximum dynamic performance and reliability
High availability, optimized dynamic performance, and high reliability for disturbance-free operation

High power density with low envelope dimensions

The ideal partner for our SINAMICS DC Master converters, for low investment costs and high availability in the widest range of applications
Close to you and your customers – globally

- USA
- Brazil
- Mexico

Motors and/or generators
Converters
Gears
For more than 165 years, the name Siemens has been synonymous with internationality and worldwide presence. We are a global powerhouse positioned along the entire electrification value chain – from power generation, transmission, and distribution to smart grid solutions and the efficient application of electrical energy.

As a local partner with a global presence, we are represented in more than 190 countries. We manufacture at 25 international production sites in order to be close to you and to shorten the delivery time of our products to the minimum. We’re at home in your markets, and we understand your specific needs. In the motor business, that makes us the global leader with a regional face.
Digital services for your drive train

Digital Drive Train Services from Siemens provides you not only with the hardware, the connectivity and the platform, but also the associated digital services. Developed for the entire drive train, and usable on a modular basis to suit your requirements perfectly.

siemens.com/ddts

Industrial production demands a lot from your motors. How can you ensure a high level of availability for your drives? How can you get the most out of your system to ensure you really achieve the best possible productivity? Using digital, cloud-based services! Our Digital Drive Train Services keep you informed about the condition of your drive systems at all times. Using Remote Services, for example, you can respond directly to system outages and take action to fix the problem quickly – or have one of our service experts connect to your plant directly.

By using Condition Monitoring Services like Remote and Mobile Diagnostics, you can have the data from your drive train read out and checked. Service experts can perform mobile measurements on site as well as set up permanently installed measuring equipment in the plant. This will reduce the risk of unplanned downtimes, while optimizing your maintenance and service activities. In turn, Drive Train Analytics combines the Remote and Condition Monitoring Services approaches in the form of a cloud-based service solution for medium and high voltages to provide condition-based maintenance. Here, too, you benefit from early error identification and minimize your plant downtimes.

Using our Improvement and Optimization Services, you can also directly tackle important KPIs. Innovative Energy Performance Contracting, for example, can give you energy savings of up to 30 percent. All in all, you therefore have access to a whole package of benefits that will help you save time and costs.

Your benefits:

• **Remote Services:**
  Shorten your unplanned downtimes with improved troubleshooting and fault correction.

• **Condition Monitoring Services:**
  Minimize both planned and unplanned downtimes thanks to optimized maintenance activities.

• **Improvement and Optimization Services:**
  Optimize your asset performance by managing your assets using key performance indicators (KPIs).
Latest references

**ENGIE SA Germany**
(\textit{until April 2015: GDF Suez})

\textbf{Location:} Zolling Power Plant, Germany

\textbf{Industry:} Power plant operation

\textbf{Challenge:} Improve reliability and security of supply at a hard coal-fired power station with extremely high efficiency

\textbf{Solution:} Optimum solution Condition Monitoring – Remote Diagnostics for two medium-voltage motors, each with 1,600 kW power to drive the main coolant supply

\textbf{Innovation:} Motor Condition Monitoring boxes measure speed and vibration in operation, monitor all critical parameters, and enable deep analysis of the measured values.

---

**Südzucker AG**

\textbf{Location:} Zeitz, Saxony-Anhalt, Germany

\textbf{Industry:} Sugar factory

\textbf{Challenge:} Noticeable reduction in energy consumption in sugar production and implementing measures from a single source – with minimal commitment of own resources.

\textbf{Solution:} Measurement and detail analysis to assess potential savings. Conversion from mechanical rotation control to speed control using a new SIMOTICS FD motor via a SINAMICS frequency converter.

\textbf{Innovation:} Reducing the energy requirement at the secondary air pump by 38.7 percent (forecast: 38.5 percent), annual energy saving of more than 930,000 kWh, \textit{CO}_2 reduced by 680 metric tons per year.
Integration of drive technology
Impressive in use

Siemens Integrated Drive Systems offers the world’s only end-to-end all-round solution for comprehensive drive applications. The technology has a proven fit in many industries. For instance, our synchronous-reluctance drive systems excel in particular with their efficient performance, minimizing your energy costs in operation and reducing your payback time.

“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. Kroihner, Plant Manager, Knauf Integral KG

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

J. Döing, Head of Sales, Olbrich GmbH

Kaeser Kompressoren SE
Location: Coburg, Germany
Industry: Compressed air systems

Knauf Integral KG
Location: Satteldorf, Germany
Industry: Dry wall construction

Olbrich GmbH
Location: Bocholt, Germany
Industry: Coating machinery
siemens.com/simotics-poster