SIEMENS

SIMOTICS
compact, dynamic and rugged

Experience a higher level of precision

usa.siemens.com/motion-control-motors

SIMOTICS motors
for every motion control application

Contents

Move it!

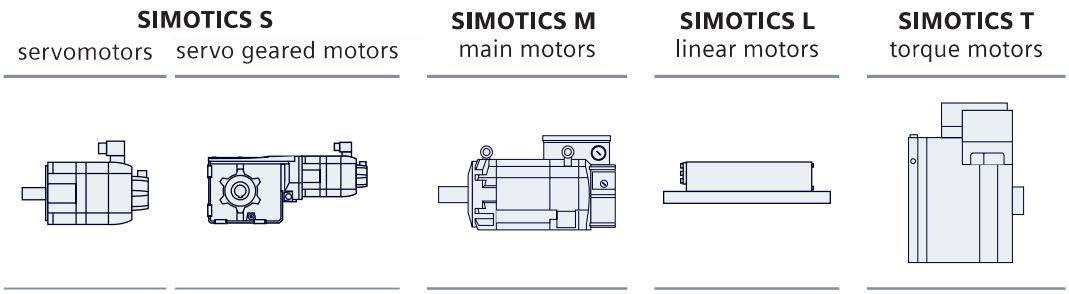
Since the development of the dynamo-electric principle by Werner von Siemens in 1866, innovative motor technology represents a core business of our company. In addition to low-voltage, DC and high-voltage motors, **SIMOTICS motors** have firmly established themselves in many industries when it comes to addressing demanding motion control applications.

The correct solution

Whether for precise and repeatable positioning, constant speed and high dynamic motion, long traversing paths or fast velocity changes—**the Siemens SIMOTICS portfolio of servo, main, linear and torque motors** has the optimum solution for every motion control application.

SIMOTICS motion control motors are based upon:

- More than 150 years of experience and innovation in electric motor technology
- The widest range of motors worldwide with optimum solutions for motion control applications in every manufacturing industry and power class
- Can be fully integrated into the drive-train to create overall systems, perfectly addressing the control concept
- Rugged and compact design for reliable, low-maintenance operation with the highest dynamic performance and precision
- A global network of skill sets and worldwide service around the clock



SIMOTICS motion control motors are perfectly harmonized and coordinated for operation with our SINAMICS family of drives. This simplifies the engineering and commissioning needed for high-performance applications in machine building and plant construction.

Optimum integration in the drive and control system

To optimize interaction with the drive, Siemens motors have a DRIVE-CLiQ interface to quickly transfer data—and transparently monitor important motor information. In addition, SIMOTICS motion control motors operate perfectly with SIMATIC, SINUMERIK and SIMOTION control systems from Siemens.

For specific questions related to your application, simply e-mail us: mc.us@siemens.com

Seamlessly integrated motion control solutions

Servomotors for every motion application

No matter whether positioning, angular synchronism, cyclic drives or path control in CNC machines—with SIMOTICS servomotors, you benefit from high dynamic performance, precision, compactness and ruggedness.

SIMOTICS S-1FK7

Highlights

- 3 versions with different moment of inertia versions—Compact, High Dynamic, High Inertia
- High efficiency 300% overload capability
- Resistant to shock and vibration—the encoder is mechanically decoupled
- Optional absolute encoder, incremental encoder or resolver
- Installation and service-friendly using a rotatable quick-release connector and field-replaceable encoder
- Digital DRIVE-CLiQ interface with electronic type plate for optimal connectivity to SINAMICS S120 drives
- Optionally with different types of gearboxes and backlash-free holding brake
- Cooling methods—natural cooling and forced ventilation

Typical application areas

- Packaging machines
- Plastics and textile machines
- Digital printing machines
- Wood, glass, ceramic and stone processing machines
- Robots, handling systems and conveyor technology
- Feed and auxiliary axes for CNC machines

Cost-efficient, flexible and universal

With our SIMOTICS S-1FK7 servomotors, depending upon the requirements relating to dynamic performance, control response, precision and space, there are three moment-of-inertia versions to select from—when required, also in combination with a gearbox.

SIMOTICS S-1FK7 Compact (CT)

High power density with a short length makes our SIMOTICS S-1FK7 Compact (CT) motors the clear choice for universal use in applications where space is restricted.

SIMOTICS S-1FK7 High Dynamic (HD)

These motors set themselves apart as a result of their low rotor diameter. This minimizes the intrinsic moment of inertia and facilitates high-dynamic performance. This also makes them ideal when it comes to motion sequences with very short cycle times demanding high-dynamic performance.

SIMOTICS S-1FK7 High Inertia (HI)

The increased intrinsic moment of inertia of our SIMOTICS S-1FK7 High Inertia (HI) motors ensures an extremely rugged control response—ideal for applications with high and variable load moments of inertia.

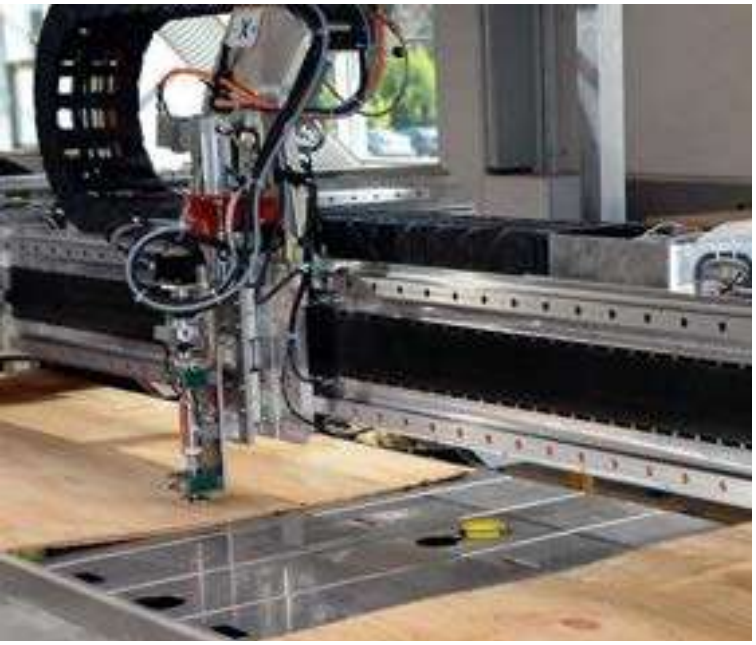
SIMOTICS S-1FK7 with mounted planetary gearbox

When specified, we can also supply S-1FK7 motors with a mounted planetary gearbox. High-precision and economic planetary gearboxes are available to address a wide range of applications. You benefit from high, smooth-running properties and compactness for motion control applications.

SIMOTICS S-1FK7 servomotors—overview

SIMOTICS S-1FK7	Standstill torque *	Rated speed *	Rated power *
CT—Compact	0.2–48 Nm	up to 6,000 rpm	0.05–8.2 kW
HD—High Dynamic	1.3–28 Nm	up to 6,000 rpm	0.6–3.8 kW
HI—High Inertia	3–48 Nm	up to 6,000 rpm	0.9–7.7 kW

* depending upon the version and type



SIMOTICS-S servomotors

SIMOTICS S-1FT7

Highlights

- Two versions with different moments of inertia—Compact, High Dynamic
- High efficiency and 400% overload capability (naturally cooled versions)
- High surface quality of the workpiece through low radial eccentricity and low torque ripple
- Either naturally-cooled, forced-ventilated or water-cooled
- IP67 degree of protection makes them extremely rugged—and encoders are mounted so they are decoupled from any oscillation and vibration
- Optional absolute encoder or incremental encoder
- Service- and installation-friendly using the crossover profile, quick release connector that can be rotated and field-replaceable encoder
- Digital DRIVE-CLiQ interface with electronic type plate for optimum connectivity to SINAMICS S120 drives
- Optional: holding brake with no backlash—and planetary gearbox with low backlash

Typical application areas

- CNC machine tools
- Packaging machines
- Plastics and textile machines
- Digital printing machines
- Conveyor technology and handling systems
- Wood, glass, ceramic and stone processing machines

Maximum power and performance with customized cooling and high efficiency

Our SIMOTICS S-1FT7 servomotors are completely in their element when it comes to high-performance motion control applications in the torque range up to 280 Nm. They are available in two, highly-efficient versions with various cooling methods.

SIMOTICS S-1FT7 Compact motors (CT)

Naturally cooled, force-ventilated or water-cooled 1FT7 motors are predominantly used where space is restricted and a high power density is required. Their low torque ripple makes them ideal for machine tool applications where high surface quality finish is very critical.

SIMOTICS S-1FT7 High Dynamic motors (HD)

This version sets itself apart as a result of the extremely low intrinsic moment of inertia. This makes them the clear choice for applications demanding the highest dynamic response and shortest cycle times. 1FT7 High Dynamic motors are available with forced ventilation and water cooling—and are characterized by their high continuous power capability.

SIMOTICS S-1FT7 with mounted planetary gearboxes

When specified, we can also provide S-1FT7 motors with mounted planetary gearboxes. High-precision planetary gearboxes are available to address a wide range of applications. With these motors, you benefit from high, smooth-running properties and a high degree of compactness for motion control applications.

Forced ventilation

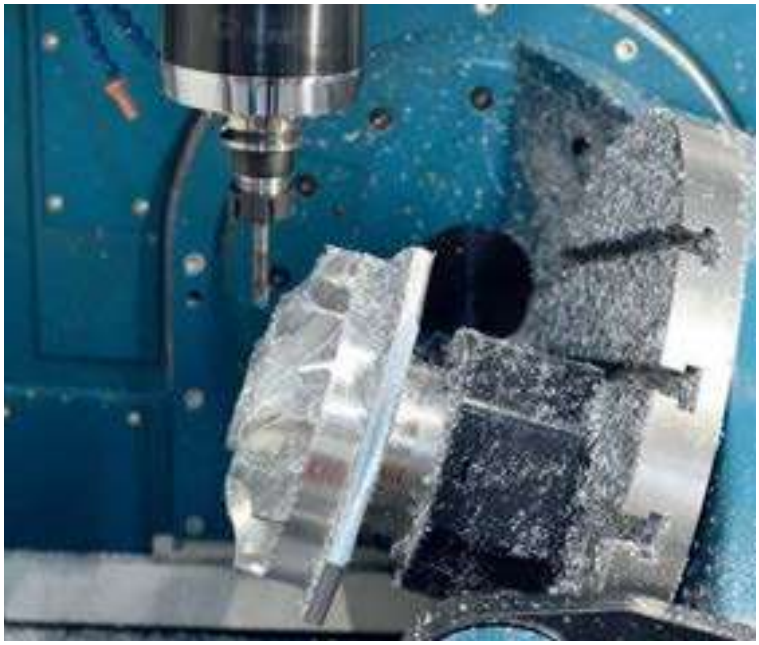
Natural cooling

Water cooling

SIMOTICS S-1FT7 servomotors—overview

SIMOTICS S-1FK7	Standstill torque *	Rated speed *	Rated power *
CT—Compact	2–280 Nm	up to 6,000 rpm	0.88–45.5 kW
HD—High Dynamic	14–105 Nm	up to 4,500 rpm	3.8–21.7 kW

* depending upon the version and type



SIMOTICS-S servo geared motors

SIMOTICS S-1FG1

Highlights

- Versions for standard (Compact) and especially fast load cycles (High Dynamic)
- Naturally cooled design with a high power density
- Helical gearing for very smooth operation
- Wide range of versions based on four gearbox types and up to 25 ratios
- High transmission ratio in the first gearbox stage allows two instead of three stage gearboxes to be used—resulting in a two percent higher efficiency with lower temperature rise
- Digital DRIVE-CLiQ interface with electronic type plate for optimum connectivity to SINAMICS S120 drives

Typical application areas

- Packaging machines
- Printing machines
- Wood and metal processing
- Palletizers and storage and retrival machines with hoisting, gantry and fork drives
- Dosing pumps and actuator drives

Open for a wide range of gearboxes

The concept of our SIMOTICS S-1FG1 servo geared motors is attractive as a result of the variable configuration options that can be used to create customized solutions—both regarding the type of construction and power rating. Irrespective of whether your application requires a helical, parallel shaft, bevel or helical worm gearbox, with high efficiencies, low torsional backlash and finely graduated ratios, these motors can optimally address a wide range of different motion control applications.

Optimum interaction

These servo geared motors are optimally adapted to the SINAMICS S120 drive system and the various commissioning tools. This facilitates seamless integration into the drive and automation environment.

Commissioning can be performed very quickly using the DRIVE-CLiQ system and electronic type plate. Pre-fabricated MOTION-CONNECT power and signal cables ensure that perfect connections can be established quickly and easily.

SIMOTICS S-1FG1 servo geared motors—overview

Geared motor type	Helical [1]	Parallel shaft [1]	Bevel [2]	Helical worm [3]
Gearbox designation	Z29–Z129 D29–D129	FZ29–FZ129 FD29–FD129	B29–B49 K39–K149	C29–C89
Max. drive torque (Nm)	14–1,890 (Z) 146–5,000 (D)	17–5,000 (FZ) 163–5,010 (FD)	15–465 (B) 24–8,160 (K)	46–1,480
Range of transmission ratios	3.4–62.5 (Z) 39.3–373 (D)	3.6–65.2 (FZ) 46.4–413 (FD)	3.5–59.3 (B) 5.2–244.3 (K)	6.2–102.5

[1] 2-stage (Z), 3-stage (FD) [2] 2-stage (B), 3-stage (K) [3] 2-stage

Helical geared motor

Parallel shaft geared motor

Bevel geared motor

Helical worm geared motor

Our servo-drive systems can be simply engineered for your application

SIMOTICS S-1FL6 and SINAMICS V90

Highlights

- Two versions with different moments of inertia—Low and High Inertia
- 300% overload capability and high IP65 degree of protection
- With either incremental or absolute encoder
- Quick release connector for simple motor installation
- Servo tuning and machine optimization using the auto-tuning function
- All frame sizes have an integrated braking resistor
- Optional with / without brake—as well as with plain shaft or feather key

Typical application areas

- Handling systems, automatic equipping and assembly machines
- Packaging and labeling machines
- Metal-forming machines
- Printing machines
- Winders and unwinders

Can be flexibly configured in the lower power range

Together with SINAMICS V90 drives, SIMOTICS S-1FL6 servomotors form a seamlessly integrated drive system with eight drive sizes and seven motor versions. Based upon their optimized moment of inertia, the motors handle continuous motion such as winding and punching—with very high, smooth running characteristics. Versions with a very low moment of inertia are available for motion sequences demanding a high dynamic performance with high positioning accuracy.

SIMOTICS S-1FL6 servomotors—overview

SIMOTICS S-1FL6	Standstill torque *	Rated speed *	Rated power *
LI—Low Inertia	0.16 – 6.37 Nm	up to 5,000 rpm	0.05 – 2.0 kW
HI—High Inertia	1.27 – 33.4 Nm	up to 3,000 rpm	0.4 – 7.0 kW

* depending upon the version and type

SIMOTICS S-1FK2/1FT2/1FS2 and SINAMICS S210

Highlights

- Two versions with different moments of inertia—Compact and High Dynamic
- High efficiency and 300% overload capability
- With either multi-turn absolute or absolute encoder
- Extremely simple to commission with web-server, motor parameters are automatically read in—and the drive system can be perfectly optimized using the One Button Tuning function
- One Cable Connection (OCC) to connect the motor to the drive

Typical application areas

- Packaging machines and filling systems
- Feeding, removing, mounting and stacking systems
- Wood, glass, ceramic and stone processing machines
- Digital printing machines
- Plastics and textile machines
- CNC machine tools
- Robots and handling systems

Perfect interaction to address high requirements

SIMOTICS S-1FK2 motors have been specifically developed for use with SINAMICS S210 drives—to create a servo-drive system with five power classes from 50 up to 6,400 watts. This means that low loads can be moved with an extremely high dynamic response and high loads can be positioned with a high degree of precision. Motors are connected to the drives through an innovative connection system called One Cable Connection—OCC with quick release. This combines power conductors, encoder signal and brake in one thin cable along with a single, compact plug connector that can be rotated—simplifying installation and increasing drive ruggedness.

SIMOTICS S-1FK2 servomotors—overview

SIMOTICS S-1FK2	Standstill torque *	Rated speed *	Rated power *
CT—Compact	0.64–40 Nm	3,000 rpm	0.2–6.4 kW
HD—High Dynamic	0.16–16 Nm	3,000 rpm	0.05–3.3 kW

* depending upon the version and type

Note:
1. SIMOTICS S-1FT2 servomotors have similar overview data with additional options.
2. SIMOTICS S-1FS2 servomotors are available with food grade stainless steel shaft/housing and no edges. Degree of protection for housing IP69K (max 30 bar). Suitable for Cleaning in Place (CIP). Standstill torque 3–23 Nm Rated speed up to 3,000 rpm Rated power 0.8–2.5 kW

Main motors with outstanding performance up to 40,000 rpm

SIMOTICS M-1PH8

Highlights

Extended power range from 2.8 kW to 1,340 kW

Flexible configuration options
- Induction, synchronous or reluctance motor versions
- Force-ventilated or water-cooled
- Solid or hollow shaft
- Wide range of bearing concepts
- Various encoder types for closed-loop speed control and high-precision positioning

High smooth-running characteristics and ruggedness thanks to the outstanding true running and low vibration severity at maximum speeds of up to 24,000 rpm

High-dynamic performance and short accelerating time

Winding switchover (star / delta)

Simple and flexible connection system

Commissioning using the electronic rating plate via digital DRIVE-CLiQ interface

Typical application areas

SIMOTICS M-1PH8 induction motors
- Machine tool spindles
- Paper and printing machines, winders
- Hoisting equipment and cranes
- Wood, glass, ceramics and stone processing machines
- Test stands
- Presses
- Plastics and textile machines
- Wire-drawing machines

SIMOTICS M-1PH8 synchonous motors
- Machine tools
- Servo-presses and cross-cutters
- Printing machines
- Extruders, calenders and rubber injection systems
- Foil machines and systems producing non-woven fibers
- Rod mills and cable stranding machines
- Coiler and winder drives

Modular power houses

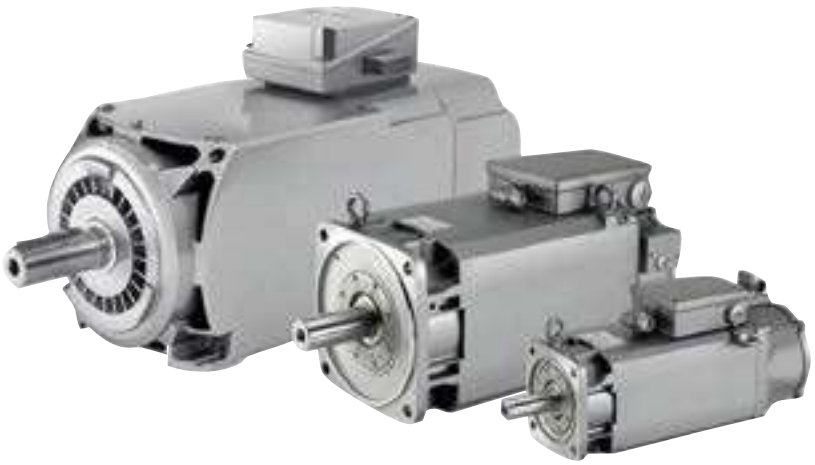
The sophisticated modular design offers various degrees of protection and cooling methods—as well as several options to electrically and mechanically integrate the main motor.

Whether induction, synchronous or reluctance, it's always SIMOTICS

SIMOTICS M-1PH8 induction motors are the ideal choice for applications where—in addition to the higher drive power—the primary focus is on precise, smooth-running characteristics and precise controllability of the axes. Additionally, you can operate them together with SINAMICS G120 drives which, when compared to standard main motors, extends the applications that they can realize as a result of the wider speed range. This allows them to address new, more compact machine concepts.

When the focus is on high-rated torque, our compact SIMOTICS M-1PH8 synchronous motors have unbeatable smooth-running operation. With a wide range of options, they can be flexibly adapted to every application, and are available with forced ventilation as well as with water cooling. This is a typical requirement for machine tools and printing machines—but also for servo-presses, rod mills and more.

Application-specific advantages of reluctance motor versions include:
- Unchanged dimensions and interfaces
- High torque density
- Low rotor inertia
- High efficiency within large torque vs. speed range
- Encoderless or with encoder
- System release for SINAMICS G120 and S120 drives



SIMOTICS M-1PH8 induction and synchronous main motors—overview

SIMOTICS M-1PH8	Standstill torque *	Rated speed *	Max. speed *	Rated power *
Induction	2.9–12,435 Nm	400–10,000 rpm	up to 24,000 rpm	2.8–1,340 kW
Synchronous	94–approx. 1,650 Nm	700–3,600 rpm	up to 4,500 rpm	15–310 kW
Reluctance	200–450 Nm	1,000–2,800 rpm	up to 3,700 rpm	21–121 kW

* depending upon the version and type