

SIEMENS



Motors

SIMOTICS S-1FT7 Servomotors

The Compact Servomotors for
High-Performance Motion Control
Applications

Brochure

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SIMOTICS S-1FT7 Servomotors

The Servomotors for High-Performance Applications

Overview

The wide range of motion control tasks in mechanical and plant engineering results in an equally wide range of requirements for electrical drives.

While applications with low demands of precision and dynamic response are often solved satisfactorily with standard induction motors, specially optimized synchronous motors are needed to successfully implement motion control applications.

With its SIMOTICS S-1FT7 motor series, Siemens offers a range of synchronous motors which has been specially developed to perform well in very challenging operating environments and is thus ideally suited for use in high-precision, highly dynamic motion control applications on production machinery and machine tools.

The product

SIMOTICS S-1FT7 motors are extremely efficient, permanent-magnet servomotors which have been specially designed for use in high-performance motion control applications. Tailored to meet the requirements of different application profiles, two versions with different cooling systems are available:

- **1FT7 Compact** motors are characterized by their compact design and high power density. They are employed primarily for applications where small mounting depth is a key requirement. These motors are available as naturally cooled, force-ventilated and water-cooled versions.
- **1FT7 High Dynamic** motors are characterized by their extremely low intrinsic moment of inertia. They are used predominantly for applications with exacting dynamic response requirements. They are available as force-ventilated or water-cooled motors.

Thanks to their high degree of protection, SIMOTICS S-1FT7 motors are extremely robust. Moreover, they feature an innovative encoder coupling which provides the built-in encoder with highly effective protection against shock loads acting on the motor shaft.

The provenly successful cross profile (up to shaft height 100) of the 1FT7 motors makes them quick and easy to install. A rotatable connector with quick-release lock eases connection and cable guidance, whatever the mounting position of the motor, thus reducing installation and servicing times.



SIMOTICS S-1FT7

Highlights

- Good dynamic response across the entire speed range
- High overload capability ($\sim 4 \times M_o$ with natural cooling)
- Extremely precise thanks to:
 - High encoder resolution
 - High shaft and flange accuracy
- Superior surface quality due to reduced torque ripple
- High power density
- Available with natural cooling, water cooling and forced ventilation
- Compact design
- High degree of protection up to IP67
- Sturdy, vibration-isolated encoder mounting
- Quick and easy mounting thanks to:
 - Cross profile (up to shaft height 100)
 - Rotatable connectors with quick-release lock
- DRIVE-CLiQ encoder replacement possible in the field

SIMOTICS S-1FT7 Servomotors



SIMOTICS S-1FT7 Compact CT

SIMOTICS S-1FT7 Compact motors are available in shaft heights 36 to 132 for static torques from 2 Nm to 280 Nm and rated speeds from 1,500 rpm to 6,000 rpm.

Thanks to their outstanding radial eccentricity and low torque ripple, they are ideally suited for use in high-precision feed drives in machine tools. Typical applications are turning and grinding machines and milling machines in mold making. In addition, they are the perfect solution for dynamic motion control and positioning applications in production machines.

With their very small mounting depth, SIMOTICS S-1FT7 Compact motors can be installed in the most restricted spaces.

A key characteristic of the water-cooled variant is its high power density. As the heat input into the machine is minimal, the water-cooled option is recommended for applications where precision is an essential requirement.



SIMOTICS S-1FT7 High Dynamic HD

SIMOTICS S-1FT7 High Dynamic motors are available in shaft heights 63 to 100 for static torques from 14 Nm to 105 Nm and rated speeds from 2,000 rpm to 4,500 rpm. They are characterized by an extremely low mass inertia and thus excellent dynamic properties.

These motors feature all the right properties to make them suitable for very exacting applications in machine tools and production machinery. The performance characteristics of SIMOTICS S-1FT7 High Dynamic motors are particularly sought after in machines used typically in the printing, textiles and packaging industries. Their outstanding dynamic response permits very short cycle times, thereby increasing machine productivity.



SIMOTICS S-1FT7 with SP+ planetary gearbox

SIMOTICS S-1FT7 Servomotors

Overarching properties and options

In addition to the different cooling methods:

- Natural cooling
- Forced ventilation
- Water cooling

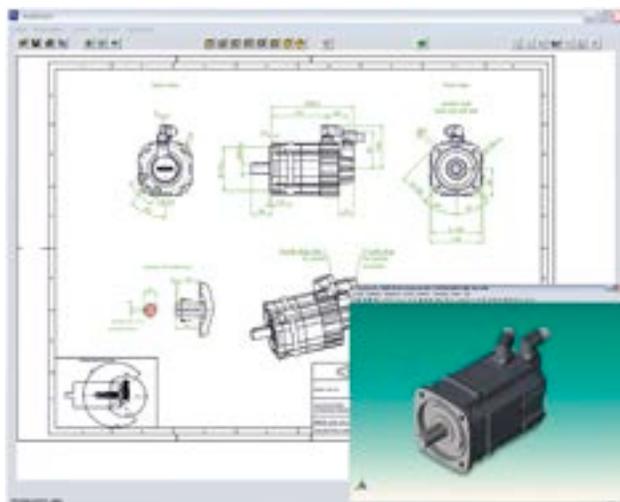
the user can also select other options for the SIMOTICS S-1FT7 motors:

- Degrees of protection IP64, IP65, IP67
- Incremental / absolute encoder, high-resolution
- Zero-backlash holding brake
- Variants with planetary gearbox

Simple engineering

High-performance tools help speed up the mechanical and electrical design process of your machine. The CAD CREATOR displays dimension sheets of the actual motor with all options. 3D drawings generated by the tool can then be used straight away in the machine or plant design.

The SIZER for Siemens Drives configuration software helps you configure the motors and guides you through the process of selecting all the necessary drive components. Starting from the type of application in question, the software provides a step-by-step guide to dimensioning your motor resulting in a list of all the components along with the relevant order data.



The CAD CREATOR provides a range of dimension drawings for the mechanical design

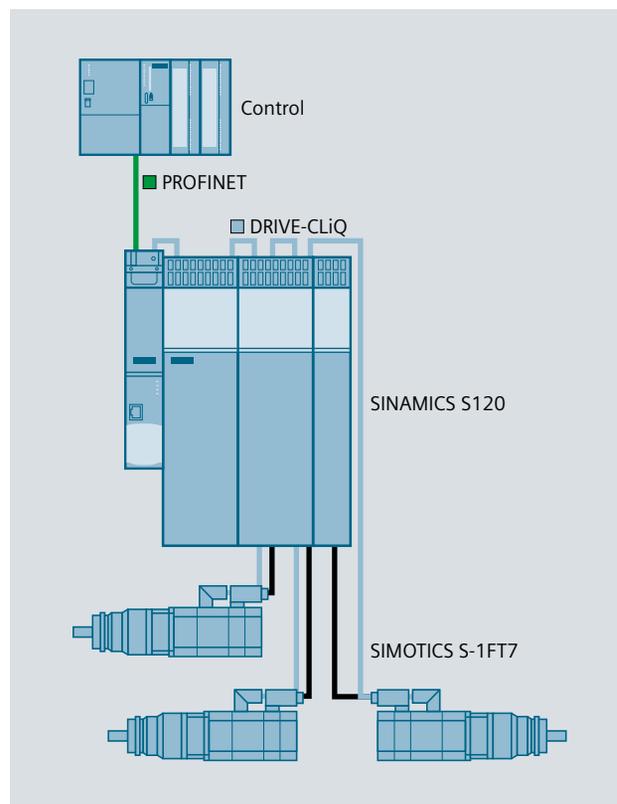
Optimum coordination with the SINAMICS drive system

When developing the SIMOTICS S-1FT7 motors, we placed special emphasis on making them perfectly compatible with the SINAMICS S120 drive system.

Specially harmonized power components, the electronic rating plate and the ability to integrate the motors via the DRIVE-CLiQ system interface ensure quick and easy commissioning as well as problem-free operation.

The field-weakening function extends the useful speed range of the motors.

Prefabricated MOTION-CONNECT signal and power cables offer an easy, reliable method for connecting the components.



Integrating the SIMOTICS S-1FT7 motor into the SINAMICS S120 drive system

SIMOTICS S-1FT7 Servomotors

Compact Construction, Quick Connection



Construction, interfaces and connections of SIMOTICS S-1FT7 motors (using the example of the natural cooling version, SH 48)



SIMOTICS S-1FT7 motor SH 100 with forced ventilation



SIMOTICS S-1FT7 motor SH 80 with water cooling

SH: shaft height

SIMOTICS S-1FT7 Servomotors

Technical Specifications

					
Motor type	1FT7 Compact			1FT7 High Dynamic	
Cooling type	Natural cooling	Forced ventilation	Water cooling	Forced ventilation	Water cooling
Shaft height	36 ... 132	80 ... 132	63 ... 100	63 ... 100	63, 80
Degree of protection	IP64, IP65, IP67	IP64, IP65	IP64, IP65, IP67	IP64, IP65	IP64, IP65, IP67
Construction type	IM B5				
Line voltage	400 ... 480 V				
Rated power P_{rated}	0.85 ... 17 kW	5 ... 45.5 kW	3.1 ... 34.2 kW	3.8 ... 10.8 kW	5.7 ... 21.7 kW
Rated speed n_{rated}	1,500 ... 6,000 rpm	2,000 ... 4,500 rpm	1,500 ... 6,000 rpm	2,000 ... 4,500 rpm	3,000 ... 4,500 rpm
Rated torque M_{rated}	1.4 ... 108 Nm	21 ... 250 Nm	9.2 ... 125 Nm	11 ... 82 Nm	16 ... 51 Nm
Static torque M_0	2 ... 170 Nm	27 ... 280 Nm	10 ... 125 Nm	14 ... 105 Nm	19 ... 61 Nm
Overload capability	~4	3	~2.5	3	~2.5
Connection method	Signal connection via connector or DRIVE-CLiQ interface, power connection via power connector (rotatable up to connector size 1.5)				
Insulation of stator winding	Temperature class 155 (F) for ambient temperatures up to 40 °C		Temperature class 155 (F) for coolant inlet temperatures up to 30 °C	Temperature class 155 (F) for ambient temperatures up to 40 °C	Temperature class 155 (F) for coolant inlet temperatures up to 30 °C
Encoder system with DRIVE-CLiQ interface	Absolute encoder, single-turn, 24 bit Absolute encoder, 24 bit, multi-turn				
Encoder system without DRIVE-CLiQ interface	Incremental encoder sin/cos 1 V _{pp} 2048 S/R Absolute value encoder EnDat 2048 S/R				
Gearboxes	Optional planetary gearbox SP+				
Converter system	SINAMICS S120				

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