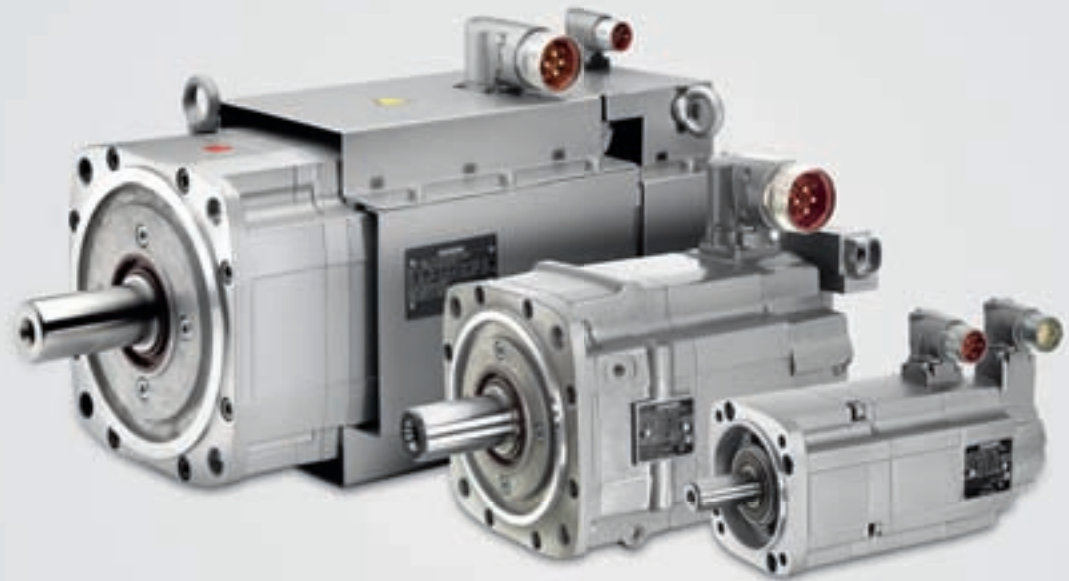


# Motor series 1FT7

Highly compact synchronous motors for  
high-performance motion control applications

Brochure · April 2009



## Motors

Answers for industry.

**SIEMENS**

# Motor series 1FT7

## Synchronous motors 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 1FT7 motor series, Siemens is offering 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

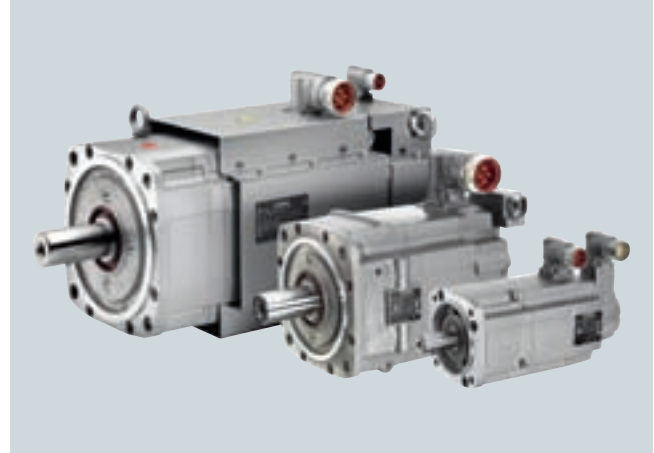
1FT7 motors are extremely efficient, permanent magnet synchronous motors which have been specially designed for use in high-performance motion control applications. Tailored to meet the requirements of different application profiles, two versions with different cooling systems are available:

- **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, forced-ventilated and water-cooled versions.
- **1FT7 High Dynamic** motors are defined by their extremely low intrinsic moment of inertia. They are used predominantly for applications with exacting dynamic response requirements. They are available as forced-ventilated or water-cooled models.

Thanks to their high degree of protection, 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 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.

Not only are 1FT7 motors highly efficient, but also extremely energy-efficient thanks to their low mass inertia.



1FT7 motors

### Highlights

- Good dynamic response across the entire speed range
- High overload capability (4 x  $M_0$  with natural cooling)
- Extremely precise due to
  - low torque ripple
  - high encoder resolution
  - high shaft and flange accuracy
- High power density
- Compact design
- High degree of protection
- Sturdy, vibration-isolated encoder mounting
- Quick and easy mounting due to
  - cross profile
  - rotatable connectors with quick-release lock

# Motor series 1FT7

Synchronous motors for high-performance applications

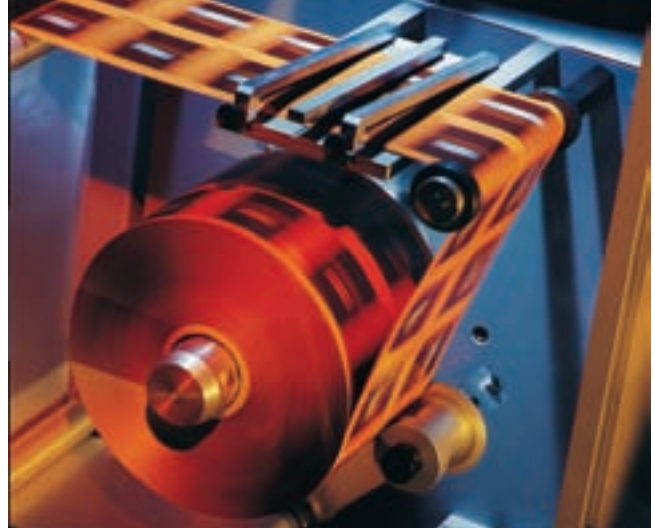


**1FT7 Compact CT**

1FT7 Compact motors are available in shaft heights 36 to 100 for static torques of between 2 and 125 Nm (17.7 to 1106.25 lb<sub>f</sub>-in) and rated speeds of between 1500 and 6000 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, 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.



**1FT7 High Dynamic HD**

1FT7 High Dynamic motors are available in shaft heights 63 to 80 for static torques of between 17 and 61 Nm (150.45 to 539.85 lb<sub>f</sub>-in) and rated speeds of between 3000 and 4500 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 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.



*1FT7 motor with planetary gearbox SP+*

# Motor series 1FT7

## Synchronous motors for high-performance applications

### Overarching properties and options

In addition to the different cooling methods

- natural cooling
- forced ventilation and
- water cooling,

the user can also select other options for the 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 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 necessary components plus the relevant order data.



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

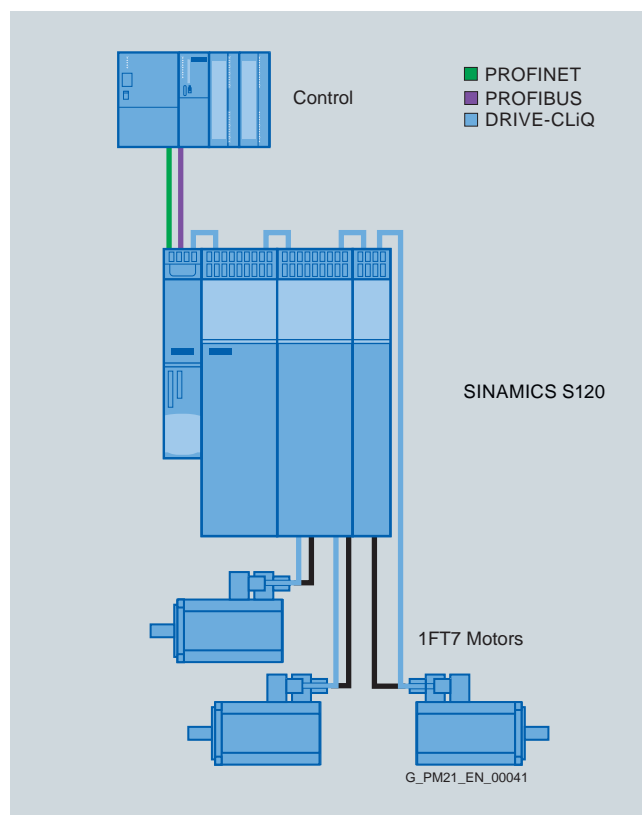
### Optimum coordination with the SINAMICS drive system

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

Specially harmonized power components, electronic rating plates, 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.

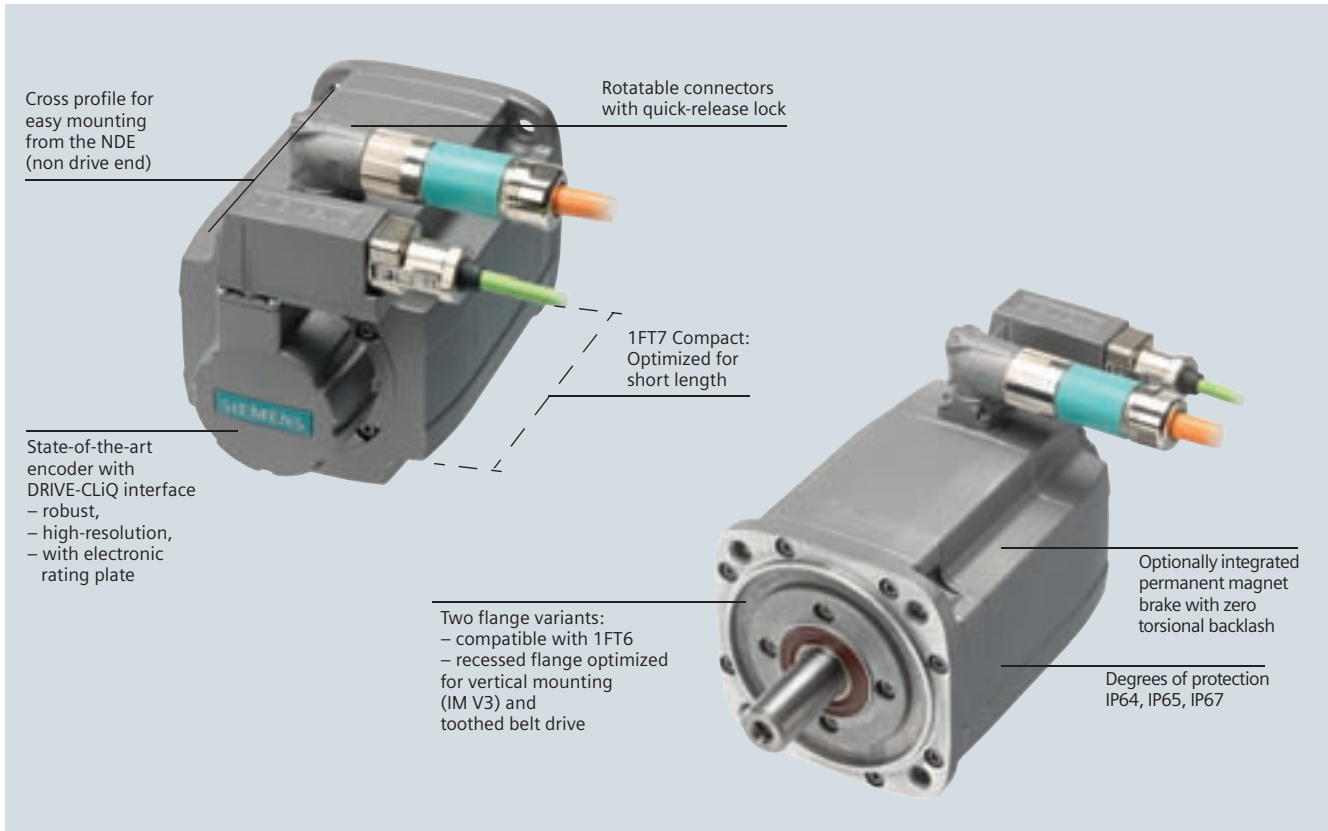
Prefabricated MOTION-CONNECT signal and power cables offer an easy, reliable method for connecting the components.



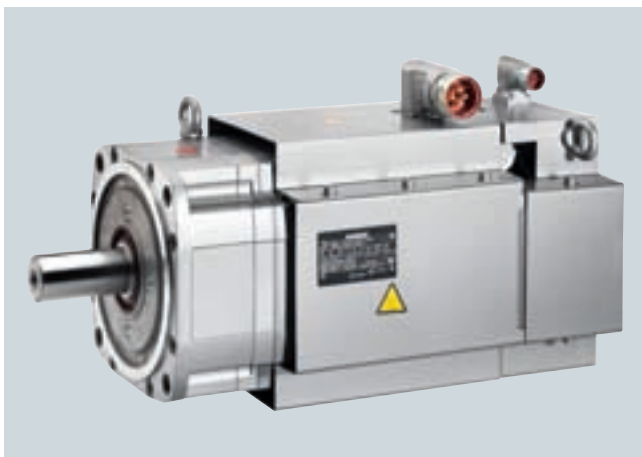
Integrating the 1FT7 motor into the SINAMICS S120 drive system

# Motor series 1FT7

Compact construction, quick connection



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



1FT7 motor SH 100 with forced ventilation





1FT7 motor SH 80 with water cooling

SH: Shaft height

# Motor series 1FT7

## Technical data

					
Motor type	1FT7 Compact			1FT7 High Dynamic	
Cooling method	Natural cooling	Forced ventilation	Water cooling	Forced ventilation	Water cooling
Shaft height	36 ... 100	80, 100	63 ... 100	63, 80	63, 80
Degree of protection	IP64, IP65, IP67	IP64, IP65	IP64, IP65, IP67	IP64, IP65	IP64, IP65, IP67
Construction type	IM B5				
Supply voltage	400 ... 480 V				
Rated power $P_{rated}$	0.84 ... 10.5 kW (1.13 ... 14.08 HP)	5 ... 20.7 kW (6.71 ... 27.76 HP)	3.14 ... 34 kW (4.21 ... 45.59 HP)	4.4 ... 10.8 kW (5.9 ... 14.48 HP)	5.7 ... 21.7 kW (7.64 ... 28.83 HP)
Rated speed $n_{rated}$	1500 ... 6000 rpm	2000 ... 4500 rpm	1500 ... 4500 rpm	3000, 4500 rpm	
Rated torque $M_{rated}$	1.4 ... 61 Nm (12.9 ... 539.85 lb <sub>f</sub> -in)	21 ... 78 Nm (185.85 ... 690.3 lb <sub>f</sub> -in)	9.2 ... 125 Nm (81.14 ... 1106.25 lb <sub>f</sub> -in)	13 ... 33 Nm (115.05 ... 292.05 lb <sub>f</sub> -in)	16 ... 51 Nm (141.6 ... 451.35 lb <sub>f</sub> -in)
Static torque $M_0$	2 ... 70 Nm (17.7 ... 619.5 lb <sub>f</sub> -in)	27 ... 92 Nm (238.95 ... 814.2 lb <sub>f</sub> -in)	10 ... 125 Nm (88.5 ... 1106.25 lb <sub>f</sub> -in)	17 ... 48 Nm (150.45 ... 424.8 lb <sub>f</sub> -in)	19 ... 61 Nm (168.15 ... 539.85 lb <sub>f</sub> -in)
Overload capability	4	3	~2.5	3	~2.5
Connectors	Signal connection via connector or DRIVE-CLiQ interface, power connection via power connector (rotatable)				
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	Incremental encoder 22-bit Absolute encoder 22-bit	–	Incremental encoder 22-bit Absolute encoder 22-bit	–	Incremental encoder 22-bit Absolute encoder 22-bit
Encoder system without DRIVE-CLiQ interface	Incremental encoder sin/cos 1Vpp 2048 counts per turn Absolute encoder EnDat 2048 counts per turn				
Gearing	Optional planetary gearbox SP+				
Converter system	SINAMICS S120				

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