

# 1FK7 Motor Series

Compact Synchronous Motors for  
Motion Control Applications

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## Motors

Answers for industry.

**SIEMENS**

# 1FK7 Motor Series

## The Proven Standard for Motion Control Tasks



### Overview

In machine and systems engineering, because of the wide variety of motion tasks, electric motors must fulfill various different requirements.

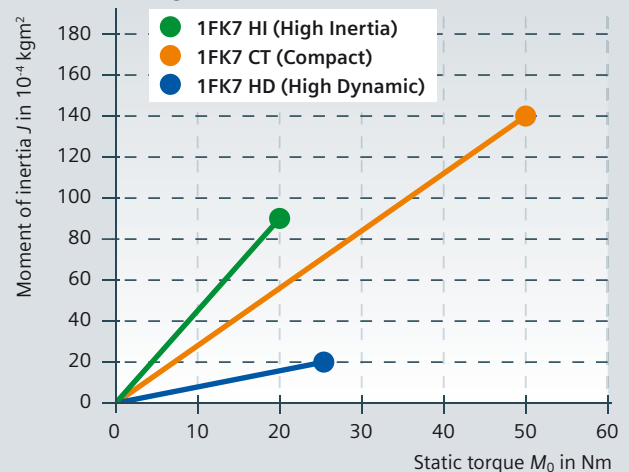
While applications with low demands of precision and dynamic response are often solved satisfactorily with standard induction motors, specially optimized synchronous motors are needed to successfully implement Motion Control applications.

With the motor series 1FK7, Siemens offers a range of synchronous motors designed specifically for the needs of Motion Control applications. Excellent dynamic characteristics, high overload capability, compact design and high durability as well as easy handling are the core characteristics of this motor series.

Available in a torque range from 0.18 to 48 Nm, 1FK7 motors are the first choice when it comes to providing easy and cost effective solutions for Motion Control applications.

1FK7 motors are naturally cooled and, with degrees of protection IP64 or IP65 (shaft exit IP67), very rugged in design. Because of their cross profile, the motors are quick and easy to install. A rotating plug adapter simplifies the connection and cable routing in all installation positions, thus reducing installation and servicing times.

### Schematic diagram



### Versions

Our permanent-magnet 1FK7 synchronous motors are available in three different versions

- **1FK7 CT motors (Compact):** When designing the 1FK7 CT motors, much thought was given to making them very compact.
- **1FK7 HD motors (High Dynamic)** are characterized by their extremely low moment of inertia. They are used in applications that place high demands on dynamic response.
- **1FK7 HI motors (High Inertia)** have a high rotor moment of inertia and are specifically designed for use in feed axes with high or alternating load inertias.

### Highlights

- Standstill torques of 0.18 – 48 Nm
- Rated speeds up to 6000 rpm
- Different inertia versions: Standard, High Dynamic, High Inertia
- Up to triple overload capacity
- Compact design
- High degree of protection IP64 or IP65 (shaft exit IP67)
- With a choice of absolute encoder, incremental encoder, resolver
- System interface DRIVE-CLiQ to SINAMICS S110 or SINAMICS S120 with electronic rating plate
- Can be supplied optionally with planetary gearbox, helical or bevel gearbox

# 1FK7 Motor Series



**1FK7 CT**  
Compact – for universal applications

1FK7 Compact motors offer high power density within extremely compact dimensions. Because of their short overall length, they are simply predestined to be installed in tight spaces.

Their compactness makes them the standard motor used in torque ranges of between 0.18 and 48 Nm. They make Motion Control axes exceptionally dynamic, thanks to their high overload capability.

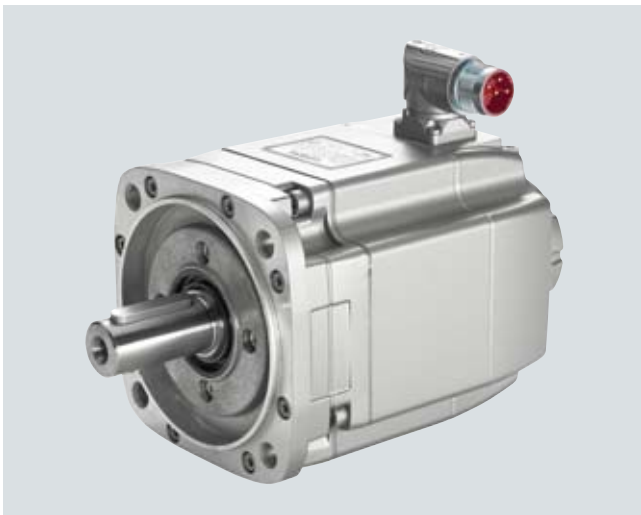
The motor spectrum comprises 22 types with 7 shaft heights and rated speeds up to 6000 rpm.



**1FK7 HD**  
High Dynamic – for maximum acceleration

1FK7 High Dynamic motors are characterized in addition to their high overload capacity by their low moment of inertia. Thereby, they reach an extremely high acceleration capacity. 1FK7 HD motors are especially suited to applications with very short cycle times, e.g. in packaging machines.

The spectrum includes 11 types with a torque range from 1.3 to 28 Nm and rated speeds up to 6000 rpm.



**1FK7 HI**  
High Inertia – for rugged closed-loop control

1FK7 High Inertia motors, as compared with the Compact version, have a higher rotor moment of inertia. For high load inertias, the increased rotor moment of inertia provides for a comfortable control response. The controller default settings are sufficient to ensure a good surface quality on the work-piece when the motor is employed on feed axes with high or variable load inertia.

The motor range includes 6 types with 3 shaft heights with torques from 3 to 20 Nm and rated speeds up to 6000 rpm.

# 1FK7 Motor Series

## Options

1FK7 motors are available with incremental and absolute encoders.

While the encoder can be linked to SINAMICS S120 and SINAMICS S110 drive systems over the DRIVE-CLiQ interface, the motors are also available with open encoder interface for operation on other servo converters.

## Variants with planetary and bevel gearboxes

All 1FK7 motors can be supplied with high-precision planetary gearbox.

Thanks to the available variants of gearboxes, the motors are suitable for a wide spectrum of applications in terms of:

- Speed/torque ranges
- Accuracy/dynamic response requirements.

All 1FK7 servo motor variants with gearbox are characterized by their smooth running, compact dimensions and low torsional backlash. These are some of the features which make them ideal for cyclic transmission in Motion Control applications.



1FK7 motors with LP+ gearbox

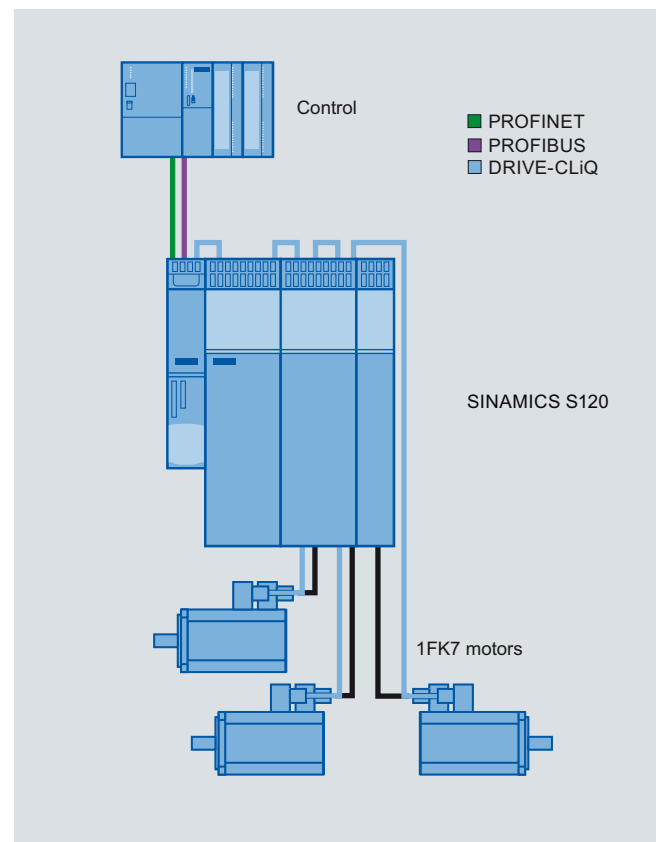
## Perfectly coordinated with the SINAMICS S110 and SINAMICS S120 drive systems

When developing the 1FK7 motors, we placed special emphasis on making them perfectly compatible with the SINAMICS S110/S120 drive systems.

Specially harmonized power components, electronic nameplates, 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.

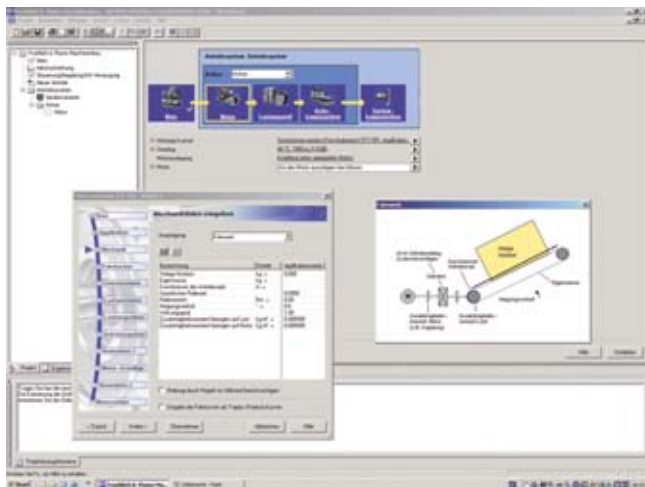


Integrating 1FK7 motors in the SINAMICS S120 drive system

# 1FK7 Motor Series

## User-friendly tools for dimensioning and design

### SIZER configuration tool



SIZER: Confident dimensioning of motors with motor wizard

The SIZER configuration tool allows you to dimension 1FK7 motors quickly and confidently.

Once you have entered the mechanical and process data for your application, SIZER will guide you reliably to the right motor. In addition to the electrical data of the motor, SIZER also provides an interface to CAD Creator, the tool for dimension sheets and CAD data for simple mechanical integration of the motor.

For more information about the SIZER configuration tool, please go to:

[www.siemens.com/sizer](http://www.siemens.com/sizer)

### CAD CREATOR – for dimension sheet and 2D/3D CAD data



CAD CREATOR: Easy and fast access to dimension sheets and CAD data

CAD CREATOR is a fast, uncomplicated tool which enables you to generate dimension sheets and CAD data for 1FK7 motors, e.g for use in design and plant documentation.

CAD CREATOR is supplied as standard with SIZER or can be ordered as a separate application online or on DVD.

For more information, please go to:

[www.siemens.com/cad-creator](http://www.siemens.com/cad-creator)

Additional information:

Catalog NC 61 (Equipment for Machine Tools)

Order No. E86060-K4461-A101-A3-7600

Catalog PM 21

(SIMOTION, SINAMICS S120 and Motors for Production Machines)

Order No. E86060-K4921-A101-A2-7600

### 1FK7 for 300 V DC link voltage

| 1FK7 servo motor<br>Natural cooling | Shaft height | Rated speed               | Static torque                             | Static current                           | Rated torque             | Rated current           | Moment of inertia without brake | Converter               |   |
|-------------------------------------|--------------|---------------------------|---|--|--------------------------|-------------------------|---------------------------------|-------------------------|---|
|                                     |              |                           |   |  |                          |                         |                                 | Rated current           | Suitable for SINAMICS S110/S120 Power Modules<br>Blocksize 230 V 1 AC |
| Type                                | SH           | $n_{\text{rated}}$<br>rpm | $M_0$<br>$\Delta T = 100 \text{ K}$<br>Nm | $I_0$<br>$\Delta T = 100 \text{ K}$<br>A | $M_{\text{rated}}$<br>Nm | $I_{\text{rated}}$<br>A | $J$<br>$10^{-4} \text{ kgm}^2$  | $I_{\text{rated}}$<br>A |   |
| <b>1FK7 CT (Compact)</b>            |              |                           |   |  |                          |                         |                                 |                         |   |
| 1FK7032-2AF2                        | 36           | 3000                      | 1.15                                      | 1.7                                      | 0.8                      | 2.3                     | 0.61                            | 2.3                     | 6SL3210-1SB12-3UA3  |
| 1FK7034-2AF2                        | 36           | 3000                      | 1.6                                       | 1.9                                      | 1.45                     | 1.8                     | 0.9                             | 2.3                     | 6SL3210-1SB12-3UA3  |
| 1FK7042-2AF2                        | 48           | 3000                      | 3   | 3.9                                      | 2.6                      | 3.5                     | 3                               | 3.9                     | 6SL3210-1SB14-0UA3  |
| 1FK7011-5AF2                        | 20           | 6000                      | 0.18                                      | 0.85                                     | 0.08                     | 0.5                     | 0.064                           | 0.9                     | 6SL3120-1TE13-0AA3  |
| 1FK7015-5AF2                        | 20           | 6000                      | 0.35                                      | 0.85                                     | 0.16                     | 0.5                     | 0.083                           | 0.9                     | 6SL3120-1TE13-0AA3  |
| 1FK7022-5AF2                        | 28           | 6000                      | 0.85                                      | 1.8                                      | 0.6                      | 1.4                     | 0.28                            | 2.3                     | 6SL3120-1TE13-0AA3  |
| <b>1FK7 HD (High Dynamic)</b>       |              |                           |   |  |                          |                         |                                 |                         |   |
| 1FK7033-7AF2                        | 36           | 3000                      | 1.3                                       | 2.2                                      | 1.2                      | 2                       | 0.27                            | 2.3                     | 6SL3210-1SB12-3UA3  |
| 1FK7043-7AF2                        | 48           | 3000                      | 2.7                                       | 3.9                                      | 3.9                      | 3.8                     | 1                               | 3.9                     | 6SL3210-1SB14-0UA3  |

# Technical data

## 1FK7 for 600 V DC link voltage

| 1FK7 servo motor<br>Natural cooling<br>Type | Shaft height<br>SH | Rated speed<br>$n_{rated}$<br>rpm | Static torque<br>$M_0$<br>$\Delta T = 100$ K<br>Nm | Static current<br>$I_0$<br>$\Delta T = 100$ K<br>A | Rated torque<br>$M_{rated}$<br>Nm | Rated current<br>$I_{rated}$<br>A | Moment of inertia without brake<br>$J$<br>$10^{-4}$ kgm <sup>2</sup> | Converter                         |   |
|---|--------------------|-----------------------------------|--|--|-----------------------------------|-----------------------------------|--|-----------------------------------|---|
|   |                    |                                   |  |  |                                   |                                   |  | Rated current<br>$I_{rated}$<br>A | Suitable for SINAMICS S120 Motor Module Booksize *) |
| <b>1FK7 CT (Compact)</b>                    |                    |                                   |  |  |                                   |                                   |  |                                   |   |
| 1FK7042-2AC7                                | 48                 | 2000                              | 3  | 1.6  | 2.8                               | 1.5                               | 3.01   | 3                                 | 6SL3120-1TE13-0AA3                                  |
| 1FK7062-2AC7                                | 63                 | 2000                              | 8  | 2.8  | 6.4                               | 2.5                               | 11.2   | 3                                 | 6SL3120-1TE13-0AA3                                  |
| 1FK7063-2AC7                                | 63                 | 2000                              | 8.9  | 4.5  | 4.4                               | 5.3                               | 15.1   | 5                                 | 6SL3120-1TE15-0AA3                                  |
| 1FK7081-2AC7                                | 80                 | 2000                              | 12   | 5.1  | 10                                | 4.6                               | 20.2   | 5                                 | 6SL3120-1TE15-0AA3                                  |
| 1FK7083-2AC7                                | 80                 | 2000                              | 12.5   | 6.5  | 6.5                               | 7.8                               | 27.3   | 9                                 | 6SL3120-1TE21-0AA3                                  |
| 1FK7084-2AC7                                | 80                 | 2000                              | 20   | 8.8  | 15                                | 7.1                               | 32.3   | 9                                 | 6SL3120-1TE21-0AA3                                  |
| 1FK7100-2AC7                                | 100                | 2000                              | 14.5   | 7.3  | 7                                 | 8.6                               | 55.3   | 9                                 | 6SL3120-1TE21-0AA3                                  |
| 1FK7101-2AC7                                | 100                | 2000                              | 36   | 12.3   | 30.5                              | 9.6                               | 80   | 18                                | 6SL3120-1TE23-0AA3                                  |
| 1FK7103-2AC7                                | 100                | 2000                              | 36   | 14.7   | 25                                | 11.5                              | 105  | 18                                | 6SL3120-1TE23-0AA3                                  |
| 1FK7105-2AC7                                | 100                | 2000                              | 48   | 20   | 37                                | 16                                | 156  | 30                                | 6SL3120-1TE23-0AA3                                  |
| 1FK7042-2AF7                                | 48                 | 3000                              | 3  | 2.2  | 2.6                               | 1.95                              | 3  | 3                                 | 6SL3120-1TE13-0AA3                                  |
| 1FK7060-2AF7                                | 63                 | 3000                              | 6  | 4.5  | 4.7                               | 3.7                               | 7.95   | 5                                 | 6SL3120-1TE15-0AA3                                  |
| 1FK7062-2AF7                                | 63                 | 3000                              | 8  | 5  | 5.1                               | 3.5                               | 11.2   | 5                                 | 6SL3120-1TE15-0AA3                                  |
| 1FK7063-2AF7                                | 63                 | 3000                              | 11   | 8  | 7.3                               | 5.6                               | 15.1   | 9                                 | 6SL3120-1TE21-0AA3                                  |
| 1FK7080-2AF7                                | 80                 | 3000                              | 8  | 4.8  | 6.8                               | 4.4                               | 15   | 5                                 | 6SL3120-1TE15-0AA3                                  |
| 1FK7081-2AF7                                | 80                 | 3000                              | 12   | 9  | 8.7                               | 7                                 | 20.2   | 9                                 | 6SL3120-1TE21-0AA3                                  |
| 1FK7083-2AF7                                | 80                 | 3000                              | 16   | 10.4   | 10.5                              | 7.4                               | 27.3   | 9                                 | 6SL3120-1TE21-0AA3                                  |
| 1FK7084-2AF7                                | 80                 | 3000                              | 20   | 12.5   | 10                                | 6.8                               | 32.3   | 18                                | 6SL3120-1TE21-8AA3                                  |
| 1FK7100-2AF7                                | 100                | 3000                              | 18   | 11.2   | 12                                | 8                                 | 55.3   | 18                                | 6SL3120-1TE21-8AA3                                  |
| 1FK7101-2AF7                                | 100                | 3000                              | 27   | 19   | 15.5                              | 11.8                              | 79.9   | 30                                | 6SL3120-1TE23-8AA3                                  |
| 1FK7103-2AF7                                | 100                | 2500                              | 36   | 27.5   | 20.5                              | 16.5                              | 105  | 30                                | 6SL3120-1TE23-0AA3                                  |
| 1FK7105-2AF7                                | 100                | 3000                              | 48   | 31   | 26                                | 18                                | 156  | 45                                | 6SL3120-1TE24-5AA3                                  |
| 1FK7060-2AH7                                | 63                 | 4500                              | 6  | 6.2  | 3.7                               | 4.1                               | 7.95   | 9                                 | 6SL3120-1TE21-0AA3                                  |
| 1FK7063-2AH7                                | 63                 | 4000                              | 11   | 12   | 5                                 | 6.1                               | 15.1   | 18                                | 6SL3120-1TE21-8AA3                                  |
| 1FK7080-2AH7                                | 80                 | 4000                              | 8  | 7.4  | 5.7                               | 5.6                               | 15   | 9                                 | 6SL3120-1TE21-0AA3                                  |
| 1FK7083-2AH7                                | 80                 | 3500                              | 16   | 15   | 8.3                               | 9                                 | 27.3   | 18                                | 6SL3120-1TE21-8AA3                                  |
| 1FK7011-5AK7                                | 20                 | 6000                              | 0.18   | 1.5  | 0.08                              | 0.85                              | 0.064  | 3                                 | 6SL3120-1TE13-0AA3                                  |
| 1FK7015-5AK7                                | 20                 | 6000                              | 0.35   | 1.5  | 0.16                              | 0.85                              | 0.083  | 3                                 | 6SL3120-1TE13-0AA3                                  |
| 1FK7022-5AK7                                | 28                 | 6000                              | 0.85   | 1.8  | 0.6                               | 1.4                               | 0.28   | 3                                 | 6SL3120-1TE13-0AA3                                  |
| 1FK7032-2AK7                                | 36                 | 6000                              | 1.1  | 1.7  | 0.8                               | 1.3                               | 0.61   | 3                                 | 6SL3120-1TE13-0AA3                                  |
| 1FK7034-2AK7                                | 36                 | 6000                              | 1.6  | 1.9  | 1                                 | 1.3                               | 0.9  | 3                                 | 6SL3120-1TE13-0AA3                                  |
| 1FK7040-2AK7                                | 48                 | 6000                              | 1.6  | 2.25   | 1.1                               | 1.7                               | 1.69   | 3                                 | 6SL3120-1TE13-0AA3                                  |
| 1FK7042-2AK7                                | 48                 | 5000                              | 3  | 4.4  | 2                                 | 3.1                               | 3  | 5                                 | 6SL3120-1TE15-0AA3                                  |
| <b>1FK7 HD (High Dynamic)</b>               |                    |                                   |  |  |                                   |                                   |  |                                   |   |
| 1FK7044-7AF7                                | 48                 | 3000                              | 4  | 4.5  | 3.5                               | 4                                 | 1.28   | 5                                 | 6SL3120-1TE15-0AA3                                  |
| 1FK7061-7AF7                                | 63                 | 3000                              | 6.4  | 6.1  | 5.4                               | 5.3                               | 3.4  | 9                                 | 6SL3120-1TE21-0AA3                                  |
| 1FK7064-7AF7                                | 63                 | 3000                              | 12   | 11   | 8                                 | 7.5                               | 6.5  | 18                                | 6SL3120-1TE21-8AA3                                  |
| 1FK7085-7AF7                                | 80                 | 2500                              | 22   | 22.5   | 12                                | 12.5                              | 23   | 30                                | 6SL3120-1TE23-0AA3                                  |
| 1FK7086-7AF7                                | 80                 | 2000                              | 28   | 21   | 18                                | 14.5                              | 23.5   | 30                                | 6SL3120-1TE23-0AA3                                  |
| 1FK7043-7AH7                                | 48                 | 4500                              | 3.1  | 4.5  | 2.6                               | 4                                 | 1.01   | 5                                 | 6SL3120-1TE15-0AA3                                  |
| 1FK7044-7AH7                                | 48                 | 4500                              | 4  | 6.3  | 3                                 | 4.9                               | 1.28   | 9                                 | 6SL3120-1TE21-0AA3                                  |
| 1FK7061-7AH7                                | 63                 | 4500                              | 6.4  | 8  | 4.3                               | 5.9                               | 3.4  | 9                                 | 6SL3120-1TE21-0AA3                                  |
| 1FK7064-7AH7                                | 63                 | 4500                              | 12   | 15   | 5                                 | 7                                 | 6.5  | 18                                | 6SL3120-1TE21-8AA3                                  |
| 1FK7033-7AK7                                | 36                 | 6000                              | 1.3  | 2.2  | 0.9                               | 1.5                               | 0.27   | 3                                 | 6SL3120-1TE13-0AA3                                  |
| 1FK7043-7AK7                                | 48                 | 6000                              | 3.1  | 6.4  | 2                                 | 4.4                               | 1  | 9                                 | 6SL3120-1TE21-0AA3                                  |
| <b>1FK7 HI (High Inertia)</b>               |                    |                                   |  |  |                                   |                                   |  |                                   |   |
| 1FK7042-3BK7                                | 48                 | 6000                              | 3  | 4.4  | 1.5                               | 2.45                              | 5.05   | 5                                 | 6SL3120-1TE15-0AA3                                  |
| 1FK7060-3BF7                                | 63                 | 3000                              | 6  | 4.5  | 4.7                               | 3.7                               | 12.5   | 5                                 | 6SL3120-1TE15-0AA3                                  |
| 1FK7062-3BF7                                | 63                 | 3000                              | 8  | 5  | 5.1                               | 3.5                               | 23.4   | 5                                 | 6SL3120-1TE15-0AA3                                  |
| 1FK7081-3BF7                                | 80                 | 3000                              | 12   | 9  | 8.7                               | 7                                 | 49   | 9                                 | 6SL3120-1TE21-0AA3                                  |
| 1FK7084-3BF7                                | 80                 | 3000                              | 20   | 12.5   | 10                                | 6.8                               | 99   | 18                                | 6SL3120-1TE21-8AA3                                  |
| 1FK7084-3BC7                                | 80                 | 2000                              | 20   | 8.8  | 15                                | 7.1                               | 99   | 9                                 | 6SL3120-1TE21-0AA3                                  |

\*) For other SINAMICS S110/S120 Power/Motor Modules, please refer to Catalogs PM21, PM22, NC 61 or SINAMICS SIZER configuration tool

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