# SINAMICS S110 / S120

## Synchronous motors 1FK7, Generation 2

Configuration Manual · 10/2011

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Configuration Manual




Edition 10/2011

6SN1197-0AD16-0BP4

## Legal information

### Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

**⚠ DANGER**

indicates that death or severe personal injury **will** result if proper precautions are not taken.

**⚠ WARNING**

indicates that death or severe personal injury **may** result if proper precautions are not taken.

**⚠ CAUTION**

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

**CAUTION**

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

**NOTICE**

indicates that an unintended result or situation can occur if the relevant information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

### Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

### Proper use of Siemens products

Note the following:

**⚠ WARNING**

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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### Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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# Foreword

## Motor documentation

The motor documentation is organized in the following categories:

- General documentation e.g. catalogs
- Manufacturer/service documentation e.g. Operating Instructions and Configuration Manuals

## More information

Information on the following topics is available under the link:

- Ordering documentation/overview of documentation
- Additional links to download documents
- Using documentation online (find and search in manuals/information)

http://www.siemens.com/motioncontrol/docu

Please send any questions about the technical documentation (e.g. suggestions for improvement, corrections) to the following e-mail address:

docu.motioncontrol@siemens.com

## My Documentation Manager

The following link provides information on how to create your own individual documentation based on Siemens content, and adapt it for your own machine documentation:

http://www.siemens.com/mdm

## Training

The following link provides information on SITRAIN - training from Siemens for products, systems and automation engineering solutions:

http://siemens.com/sitrain

## Internet addresses for drive technology

Internet address for motors: http://www.siemens.com/motors

Internet address for products: http://www.siemens.com/motioncontrol

Internet address for SINAMICS: http://www.siemens.com/sinamics

## Target group

This documentation addresses project planners and project engineers as well as machine manufacturers and commissioning engineers.

## Benefits

The Configuration Manual supports you when selecting motors, calculating the drive components, selecting the required accessories as well as when selecting line and motor-side power options.

## Standard scope

The scope of the functionality described in this document can differ from the scope of the functionality of the drive that is actually supplied.

- Other functions not described in this documentation might be able to be executed in the drive. However, no claim can be made regarding the availability of these functions when the equipment is first supplied or in the event of servicing.
- The documentation can also contain descriptions of functions that are not available in a particular product version of the drive. The functionalities of the supplied drive should only be taken from the ordering documentation.
- Extensions or changes made by the machine manufacturer are documented by the machine manufacturer.

For reasons of clarity, this documentation does not contain all of the detailed information on all of the product types. This documentation cannot take into consideration every conceivable type of installation, operation and service/maintenance.

## Technical Support

For technical support telephone numbers for different countries, go to:

http://www.siemens.com/automation/service&support

## EC Declaration of Conformity

The EC Declaration of Conformity for the Low Voltage Directive can be found in the appendix to this documentation or on the Internet at: http://support.automation.siemens.com

There, as search term, enter the number **32732072** or contact your local Siemens office.

## Danger and warning information

**⚠ DANGER**

Commissioning is absolutely prohibited until it has been completely ensured that the machine, in which the components described here are to be installed, is in full compliance with the provisions of the EC Machinery Directive.

Only appropriately qualified personnel may commission the SINAMICS units and the motors.

These personnel must carefully observe the technical customer documentation associated with this product and be have knowledge of and carefully observe the danger and warning notices.

Operational electrical equipment and motors have parts and components which are at hazardous voltage levels. All of the work carried out on the electrical machine or system must be carried out with it in a no-voltage condition.

When the machine or system is operated, hazardous axis movements can occur.

SINAMICS drive units with motors can only be connected to the line supply via residual-current operated circuit breakers if it has been verified (in accordance with EN 61800-5-1) that the units are compatible with the particular residual-current operated circuit breaker.

In combination with the drive system, the motors are generally approved for operation on TN and TT systems with **grounded neutral** and on IT systems.

In operation on IT systems, the occurrence of a first fault between an active part and ground must be signaled by a monitoring device. In accordance with IEC 60364-4-41, it is recommended that the first fault be eliminated as quickly as is practically possible.

In systems with a **grounded external conductor**, an isolating transformer with grounded neutral (secondary side) must be connected between the supply and the drive system to protect the motor insulation from excessive stress. The majority of TT systems have a grounded phase conductor, so in this case an isolating transformer must be used.

**⚠ WARNING**

The successful and safe operation of this equipment and motors is dependent on professional transport, storage, installation and mounting as well as careful operator control, service and maintenance.

For special versions of the drive units and motors, information and data in the catalogs and quotations additionally apply.

In addition to the danger and warning information/instructions in the technical customer documentation supplied, the applicable domestic, local and plant-specific regulations and requirements must be carefully taken into account.

**⚠ CAUTION**

The motors can have surface temperatures of over +100 °C.

This is the reason that temperature-sensitive components, e.g. cables or electronic components may neither be in contact nor be attached to the motor.

When connecting up cables, please observe that they
– are not damaged
– are not subject to tensile stress
– cannot be touched by rotating components.

**CAUTION**

Motors should be connected in accordance with the operating instructions. They must not be connected directly to the three-phase supply because this will damage them.

SINAMICS units and motors are subjected to a voltage test during routine testing. It is not permitted to perform an additional high-voltage test on the motor; such a test can destroy electronic components such as the temperature sensor or encoder.

**CAUTION**

Motors with a DRIVE-CLiQ interface have an electronic rating plate containing motor and encoder-specific data. For this reason, encoder modules with a DRIVE-CLiQ interface or mounted Sensor Modules may only be operated on the original motor - and may not be mounted onto other motors or replaced by Sensor Modules from other motors.

The DRIVE-CLiQ interface has direct contact to components that can be damaged/destroyed by electrostatic discharge (ESDS). Neither hands nor tools that could be electrostatically charged should come into contact with the connections.

**Note**

When operational and in dry operating rooms, SINAMICS units with motors fulfill the Low-Voltage Directive.

In the configurations specified in the associated EC Declaration of Conformity, SINAMICS units with motors fulfill the EMC Directive.

## ESDS instructions and electromagnetic fields

**⚠ CAUTION**

An **e**lectrostatic-**s**ensitive **d**evice (ESDS) is an individual component, integrated circuit, or module that can be damaged by electrostatic fields or discharges.

ESDS regulations for handling boards and equipment:

When handling components that can be destroyed by electrostatic discharge, it must be ensured that personnel, the workstation and packaging are well grounded!

Personnel in ESD zones with conductive floors may only touch electronic components if they are
– grounded through an ESDS bracelet and
– wearing ESDS shoes or ESDS shoe grounding strips.

Electronic boards may only be touched when absolutely necessary.

Electronic boards may not be brought into contact with plastics and articles of clothing manufactured from man-made fibers.

Electronic boards may only be placed on conductive surfaces (table with ESDS surface, conductive ESDS foam rubber, ESDS packing bag, ESDS transport containers).

Electronic boards may not be brought close to data terminals, monitors or television sets. Minimum clearance to screens > 10 cm).

Measurements may only be carried-out on electronic boards and modules if
– the measuring instrument is grounded (e.g. via a protective conductor) or
– before making measurements with a potential-free measuring device, the measuring head is briefly discharged
(e.g. by touching an unpainted blank piece of metal on the control cabinet).

**⚠ DANGER**

It may be dangerous for people to remain in the immediate proximity of the product – especially for those with pacemakers, implants or similar – due to electric, magnetic and electromagnetic fields (EMF) occurring as a consequence of operation.

The machine/system operator and the people present near the product must observe the relevant guidelines and standards! These are, for example, in the European Economic Area (EEA) the Electromagnetic Fields Directive 2004/40/EC and the standards EN 12198-1 to 12198-3 and in the Federal Republic of Germany the Employer's Liability Insurance Association Regulations for the Prevention of Industrial Accidents BGV 11, with the relevant rule BGR 11 "Electromagnetic Fields".

Then a risk assessment must be carried out for every workplace, activities for reducing dangers and exposure for people decided upon and implemented, as well as determining and observing exposure and danger areas.

## Information regarding third-party products

| NOTICE |
| --- |
| This document contains recommendations relating to third-party products. This involves third-party products whose fundamental suitability is familiar to us. It goes without saying that equivalent products from other manufacturers may be used. Our recommendations are to be seen as helpful information, not as requirements or regulations. We cannot accept any liability for the quality and properties/features of third-party products. |

## Environmental compatibility

- Environmental aspects during development

  When selecting supplier parts, environmental compatibility was an essential criteria.

  Special emphasis was placed on reducing the envelope dimensions, mass and type variety of metal and plastic parts.

  Effects of paint-wetting impairment substances can be excluded (PWIS test)

- Environmental aspects during production

  Supplier parts and the products are predominantly transported in re-usable packing. Transport for hazardous materials is not required.

  The packing materials themselves essentially comprises paperboard containers that are in compliance with the Packaging Directive 94/62/EC.

  Energy consumption during production was optimized.

  Production has low emission levels.

- Environmental aspects for disposal

  Motors must be disposed of carefully taking into account domestic and local regulations in the normal recycling process or by returning to the manufacturer.

  The following must be taken into account when disposing of the motor:

  Oil according to the regulations for disposing of old oil (e.g. gear oil when a gearbox is mounted)

  Not mixed with solvents, cold cleaning agents of remains of paint

  Components that are to be recycled should be separated according to:

  – Electronics scrap (e.g. encoder electronics, sensor modules)
  – Iron to be recycled
  – Aluminum
  – Non-ferrous metal (gearwheels, motor windings)

## Residual risks of power drive systems

When carrying out a risk assessment of the machine in accordance with the EU Machinery Directive, the machine manufacturer must consider the following residual risks associated with the control and drive components of a power drive system (PDS).

1. Unintentional movements of driven machine components during commissioning, operation, maintenance, and repairs caused by, for example:
   - Hardware defects and/or software errors in the sensors, controllers, actuators, and connection technology
   - Response times of the controller and drive
   - Operating and/or ambient conditions not within the scope of the specification
   - Parameterization, programming, cabling, and installation errors
   - Use of radio devices / cellular phones in the immediate vicinity of the controller
   - External influences / damage
2. Exceptional temperatures as well as emissions of light, noise, particles, or gas caused by, for example:
   - Component malfunctions
   - Software errors
   - Operating and/or ambient conditions not within the scope of the specification
   - External influences / damage
3. Hazardous shock voltages caused by, for example:
   - Component malfunctions
   - Influence of electrostatic charging
   - Induction of voltages in moving motors
   - Operating and/or ambient conditions not within the scope of the specification
   - Condensation / conductive contamination
   - External influences / damage
4. Electrical, magnetic and electromagnetic fields generated in operation that can pose a risk to people with a pacemaker, implants or metal replacement joints, etc. if they are too close.
5. Release of environmental pollutants or emissions as a result of improper operation of the system and/or failure to dispose of components safely and correctly.

More extensive information concerning the residual risks associated with the PDS is provided in the relevant chapters of the technical user documentation.

# Table of contents

# Description of the motors

# 1

## 1.1 Features

### Overview

1FK7 motors are compact permanent-magnet synchronous motors. The available options, gear units and encoders, together with the expanded product range, mean that the 1FK7 motors can be optimally adapted to any application. They therefore also satisfy the permanently increasing demands of state-of-the-art machine generations.

1FK7 motors can be combined with the SINAMICS S110 / S120 drive system to create a powerful system with high functionality. The integrated encoder systems for speed and position control can be selected depending on the application.

The motors are designed for operation without external cooling and the heat is dissipated through the motor surface. 1FK7 motors have a high overload capability.

Figure 1-1 1FK7 motors

## Benefits

1FK7 Compact motors offer:

- Space-saving installation thanks to extremely high power/weight ratio
- Can be universally used for many applications
- Wide range of motors

1FK7 High Dynamic motors offer:

- Extremely high dynamic response thanks to low rotor moment of inertia

1FK7 High Inertia motors offer:

- Rugged closed-loop control properties for high or variable load moments of inertia
- Low optimization and commissioning overhead to compensate disturbances

## Area of application

- Machine tools
- Robots and handling systems
- Wood, glass, ceramics and stone working
- Packaging, plastics and textile machines
- Auxiliary axes

# 1.2 Torque overview

## 1FK7 Compact

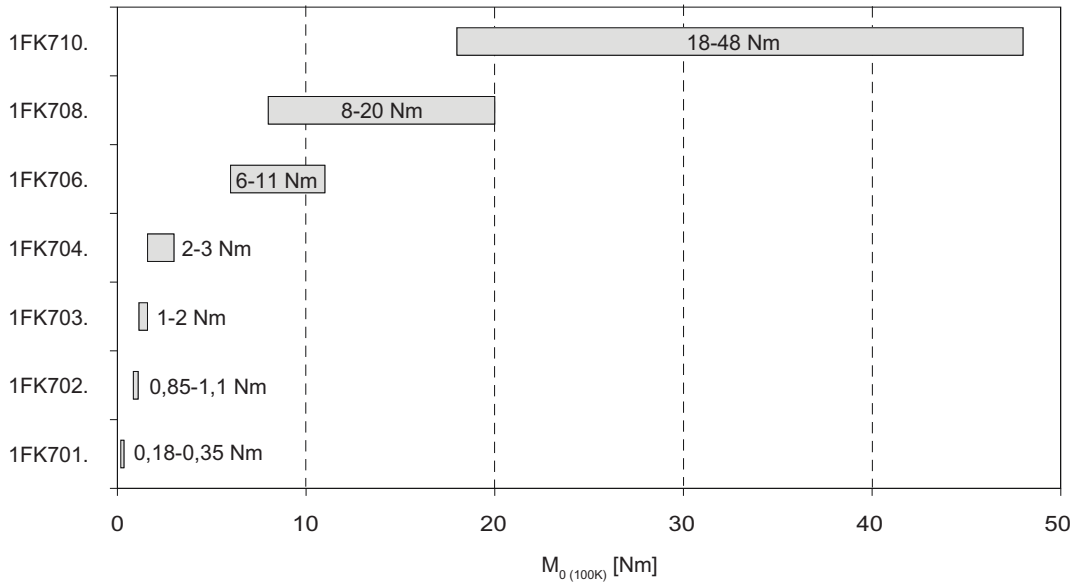



Figure 1-2 Static torques 1FK7 Compact

## 1FK7 High Dynamic

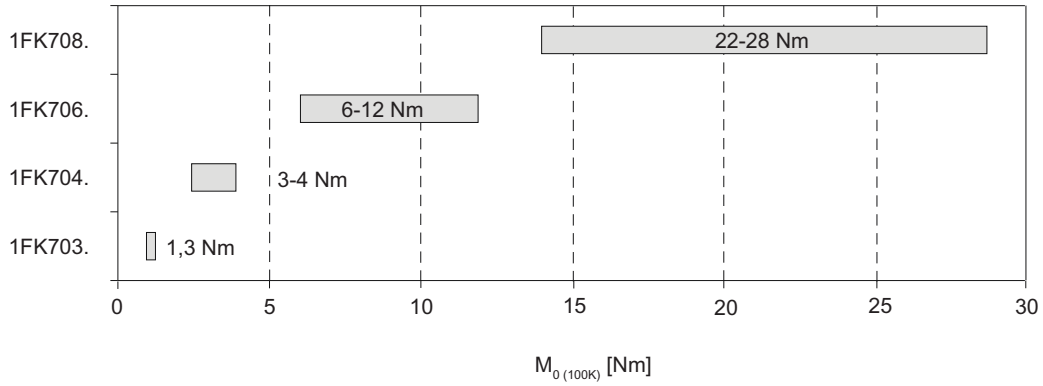



Figure 1-3 Static torques 1FK7 High Dynamic

### 1FK7 High Inertia

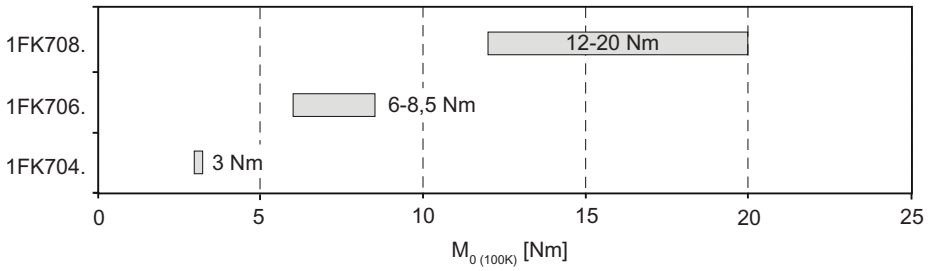



Figure 1-4 Static torques 1FK7 High Inertia

## 1.3 Technical features

Table 1- 1 Technical features

| | |
|---|---|
| Type of motor | Permanent-magnet synchronous motor |
| Magnet material | Rare-earth magnetic material |
| Cooling | Natural cooling |
| Insulation of the stator winding according to EN 60034-1 (IEC 60034-1) | Temperature class 155 (F) for a winding temperature of ΔT = 100 K at an ambient temperature of +40° C |
| Installation altitude (in accordance with EN 60034–1 and IEC 60034–1) | ≤ 1000 m above sea level, otherwise power derating |
| Type of construction in accordance with EN 60034-7 (IEC 60034-7) | IM B5 (IM V1, IM V3) |
| Degree of protection in accordance with EN 60034-5 (IEC 60034-5)[1)] | IP64; optional IP65 or IP65 + IP67 at the shaft gland |
| Temperature monitoring | KTY 84 temperature sensor in the stator winding |
| Paint finish | Anthracite (RAL 7016) |
| Drive shaft end acc. to DIN 748-3 (IEC 60072-1) | Plain shaft, optional shaft with fitted key and keyway (half-key balancing) |
| Radial eccentricity, concentricity and axial eccentricity acc. to DIN 42955 (IEC 60072–1) [2)] | Tolerance N (normal) |
| Vibration severity grade according to EN 60034-14 (IEC 60034-14) | Grade A is maintained up to rated speed |
| Sound pressure level $L_{pA}$ (1 m) in accordance with DIN EN ISO 1680, max. tolerance + 3 dB(A) | • 1FK701□ to 1FK704□: 55 dB(A)<br>• 1FK706□: 65 dB(A)<br>• 1FK708□ to 1FK710□: 70 dB(A) |

| | |
|---|---|
| Built-in encoder systems for motors without DRIVE-CLiQ interface | • IC2048S/R incremental encoder, sin/cos 1 Vpp, 2048 S/R [3] with C and D tracks for SH 20 to SH 100<br>• AM2048S/R absolute encoder 2048 S/R [3], 4096 revolutions Multiturn, with EnDat interface for SH 36 to SH 100<br>• AM512S/R absolute encoder 512 S/R [3], 4096 revolutions Multiturn, with EnDat interface, for SH 28<br>• AM16S/R absolute encoder 16 S/R [3], 4096 revolutions Multiturn, with EnDat interface, for SH 20 and SH 28<br>• Resolver, multipole (number of pole pairs corresponds to number of pole pairs of the motor)<br>• 2-pole resolver |
| Integrated encoder systems for motors with DRIVE-CLiQ interface | • AS24DQI absolute encoder single-turn 24 bit , for SH 36 to SH 100<br>• AM24DQI absolute encoder 24 bit + 12 bit multiturn, for SH 36 to SH 100<br>• AS20DQI absolute encoder single-turn 20 bit, for SH 36 to SH 100<br>• AM20DQI absolute encoder 20 bit + 12 bit multiturn, for SH 36 to SH 100<br>• IC22DQ incremental encoder, 22-bit + commutation position, 11 bit, for SH 28<br>• AM20DQ absolute encoder 20 bit + 12 bit multiturn, for SH 28<br>• AM15DQ absolute encoder 15 bit + 12 bit multiturn, for SH 28<br>• R15DQ resolver 15 bit, not for SH 20<br>• R14DQ resolver 14 bit, not for SH 20 |
| Connection | Connectors for signals and power, can be rotated |
| Holding brake | Optional integrated holding brake (free of backlash, 24 V) |

[1] 1FK701 only available in degree of protection IP54 with paint finish, planetary gearbox not possible

[2] Radial eccentricity of the shaft extension, concentricity of centering edge and axial eccentricity of the mounting flange to the axis of the shaft extension.

[3] P/R = Pulses/Revolution

# 1.4 Selection and ordering data, 1FK7 for DC link voltages 510 V to 720 V DC (line supply 380 V - 480 V 3 AC)

## 1.4.1 1FK701/1FK702 Compact

| Rated speed $n_N$ rpm | Shaft height SH | Rated power at ΔT=100 K $P_N$ kW | Static torque at ΔT=100 K $M_0$ Nm | Rated torque at ΔT=100 K $M_N$ Nm | Rated current at ΔT=100 K $I_N$ A | **Syncronous motor 1FK7 Compact** Order No. | Number of pole pairs | Moment of rotor inertia (without brake) J kgcm² | Weight (motor without brake) m kg | Efficiency [1] η % | Static current at ΔT=100 K $I_0$ A | Calculated power $P_{calc} = M_0 \times n_N / 9550$ $P_{calc}$ kW | Power connector size | Cable cross-section [2] mm² |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1FK7 Compact** for DC-Link 510 V to 720 V (line voltage 380-480 V 3 AC) | | | | | | | | | | | | | | |
| **6000** | 20 | 0.05 | 0.18 | 0.08 | 0.85 | 1FK7011-5AK71-1❑❑❑ | 4 | 0.064 | 0.9 | 62 | 1.5 | 0.1 | 0.5 | 4x1.5 |
| | | 0.1 | 0.35 | 0.16 | 0.85 | 1FK7015-5AK71-1❑❑❑ | 4 | 0.083 | 1.1 | 68 | 1.5 | 0.2 | 0.5 | 4x1.5 |
| | 28 | 0.38 | 0.85 | 0.6 | 1.4 | 1FK7022-5AK71-1❑❑❑ | 3 | 0.28 | 1.8 | 86 | 1.8 | 0.5 | 1 | 4x1.5 |

**Encoder systems for motors without DRIVE-CLiQ interface:**

| | | |
|---|---|---|
| 1FK7...-.....-.A | Incremental encoder sin/cos 1 Vpp 2048 S/R | IC2048S/R |
| 1FK7...-.....-.H | Absolute encoder EnDat 514 S/R (1FK702 only) | AM512S/R |
| 1FK7...-.....-.J | Absolute encoder EnDat 16 S/R | AM16S/R |
| 1FK7...-.....-.S | Resolver multipole | Resolver p=x |
| 1FK7...-.....-.T | Resolver 2-pole | Resolver p=1 |

**Encoder systems for motors with DRIVE-CLiQ interface:** (1FK702 only)

| | | |
|---|---|---|
| 1FK7...-.....-.D | Incremental encoder 22 bit | IC22DQ |
| 1FK7...-.....-.L | Absolute encoder 20 bit + 12 bit | AM20DQ |
| 1FK7...-.....-.V | Incremental encoder 22 bit | IC22DQ |
| 1FK7...-.....-.U | Resolver 15 bit multipole | R15DQ |
| 1FK7...-.....-.P | Resolver 14 bit 2-pole | R14DQ |

| | **Brake:** | **Shaft:** |
|---|---|---|
| 1FK7...-.....-..A | without | Fitted key and keyway |
| 1FK7...-.....-..B | with | Fitted key and keyway |
| 1FK7...-.....-..G | without | Plain shaft |
| 1FK7...-.....-..H | with | Plain shaft |

| | **Degree of protection:** | **Coating:** |
|---|---|---|
| 1FK7...-.....-...0 | IP64 (1FK702 only) | without paint finish |
| 1FK7...-.....-...2 | IP65 and DE-Flange IP67 (1FK702 only) | without paint finish |
| 1FK7...-.....-...3 | IP54 for 1FK701 / IP64 for 1FK702 | with paint finish |
| 1FK7...-.....-...5 | IP65 and DE-Flange IP67 (1FK702 only) | with paint finish |

[1] Optimum efficiency at continous load

[2] The current carrying capacity of the power cables complies with IEC 60204-1 for installation type C under continuous operating conditions at an ambient air temperature of 40 °C (104 °F), designed for I0 (100 K), PVC/PUR-insulated cable.

## 1.4.2 1FK703 - 1FK710 Compact

| Rated speed $n_N$ rpm | Shaft height SH | Rated power at ΔT=100 K $P_N$ kW | Static torque at ΔT=100 K $M_0$ Nm | Rated torque at ΔT=100 K $M_N$ Nm | Rated current at ΔT=100 K $I_N$ A | **Syncronous motor 1FK7 Compact** Order No. | Number of pole pairs | Moment of rotor inertia (without brake) J kgcm² | Weight (motor without brake) m kg | Efficiency [1] η % | Static current at ΔT=100 K $I_0$ A | Calculated power $P_{calc} = M_0 \times n_N / 9550$ $P_{calc}$ kW | Power connector size | Cable cross-section [2] mm² |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1FK7 Compact** for DC-Link 510 V to 720 V (line voltage 380-480 V 3 AC) | | | | | | | | | | | | | | |
| **2000** | 48 | 0.6 | 3.0 | 2.8 | 1.55 | 1FK7042-2AC71-1❑❑❑ | 4 | 2.9 | 4.6 | 88 | 1.6 | 0.6 | 1 | 4x1.5 |
| | 63 | 1.1 | 6.0 | 5.3 | 2.95 | 1FK7060-2AC71-1❑❑❑ | 4 | 7.7 | 7.1 | 90 | 3.15 | 1.3 | 1 | 4x1.5 |
| | | 1.5 | 8.5 | 7.0 | 2.65 | 1FK7062-2AC71-1❑❑❑ | 4 | 11.2 | 9.1 | 90 | 3.0 | 1.8 | 1 | 4x1.5 |
| | | 1.9 | 11.0 | 8.9 | 4.4 | 1FK7063-2AC71-1❑❑❑ | 4 | 14.7 | 11.1 | 91 | 5.3 | 2.3 | 1 | 4x1.5 |
| | 80 | 2.1 | 12.0 | 10.0 | 4.4 | 1FK7081-2AC71-1❑❑❑ | 4 | 20 | 12.9 | 93 | 5.0 | 2.5 | 1 | 4x1.5 |
| | | 2.6 | 16.0 | 12.5 | 6.3 | 1FK7083-2AC71-1❑❑❑ | 4 | 26 | 15.6 | 93 | 7.5 | 3.4 | 1 | 4x1.5 |
| | | 3.1 | 20.0 | 15.0 | 6.7 | 1FK7084-2AC71-1❑❑❑ | 4 | 32.5 | 18.3 | 93 | 8.5 | 4.2 | 1 | 4x1.5 |
| | 100 | 3 | 18.0 | 14.5 | 7.1 | 1FK7100-2AC71-1❑❑❑ | 4 | 54 | 17.6 | 92 | 8.4 | 3.8 | 1 | 4x1.5 |
| | | 4.3 | 27.0 | 20.5 | 9.7 | 1FK7101-2AC71-1❑❑❑ | 4 | 79 | 23.0 | 93 | 12.3 | 5.7 | 1.5 | 4x1.5 |
| | | 5.2 | 36.0 | 25.0 | 11.0 | 1FK7103-2AC71-1❑❑❑ | 4 | 104 | 28.5 | 93 | 14.4 | 7.5 | 1.5 | 4x1.5 |
| | | 7.7 | 48.0 | 37.0 | 16.0 | 1FK7105-2AC71-1❑❑❑ | 4 | 154 | 39.0 | 93 | 20.0 | 10.1 | 1.5 | 4x2.5 |
| **3000** | 48 | 0.8 | 3.0 | 2.6 | 2.0 | 1FK7042-2AF71-1❑❑❑ | 4 | 2.9 | 4.6 | 89 | 2.2 | 0.9 | 1 | 4x1.5 |
| | 63 | 1.5 | 6.0 | 4.7 | 3.7 | 1FK7060-2AF71-1❑❑❑ | 4 | 7.7 | 7.1 | 90 | 4.45 | 1.9 | 1 | 4x1.5 |
| | | 1.9 | 8.5 | 6.0 | 4.0 | 1FK7062-2AF71-1❑❑❑ | 4 | 11.2 | 9.1 | 91 | 5.3 | 2.7 | 1 | 4x1.5 |
| | | 2.3 | 11.0 | 7.3 | 5.6 | 1FK7063-2AF71-1❑❑❑ | 4 | 14.7 | 11.1 | 91 | 8.0 | 3.5 | 1 | 4x1.5 |
| | 80 | 2.1 | 8.0 | 6.8 | 4.4 | 1FK7080-2AF71-1❑❑❑ | 4 | 14.2 | 10.3 | 92 | 4.9 | 2.5 | 1 | 4x1.5 |
| | | 2.7 | 12.0 | 8.7 | 6.8 | 1FK7081-2AF71-1❑❑❑ | 4 | 20 | 12.9 | 93 | 8.7 | 3.8 | 1 | 4x1.5 |
| | | 3.3 | 16.0 | 10.5 | 7.2 | 1FK7083-2AF71-1❑❑❑ | 4 | 26 | 15.6 | 93 | 10.1 | 5 | 1 | 4x1.5 |
| | | 3.1 | 20.0 | 10.0 | 6.5 | 1FK7084-2AF71-1❑❑❑ | 4 | 32.5 | 18.3 | 93 | 12.1 | 6.3 | 1 | 4x1.5 |
| | 100 | 3.8 | 18.0 | 12.0 | 8.0 | 1FK7100-2AF71-1❑❑❑ | 4 | 54 | 17.6 | 92 | 11.1 | 5.7 | 1 | 4x1.5 |
| | | 4.9 | 27.0 | 15.5 | 11.6 | 1FK7101-2AF71-1❑❑❑ | 4 | 79 | 23.0 | 93 | 18.8 | 8.5 | 1.5 | 4x2.5 |
| | | 4.4 | 36.0 | 14.0 | 11.5 | 1FK7103-2AF71-1❑❑❑ | 4 | 104 | 28.5 | 93 | 26.0 | 11.3 | 1.5 | 4x4 |
| | | 8.2 | 48.0 | 26.0 | 18.0 | 1FK7105-2AF71-1❑❑❑ | 4 | 154 | 39.0 | 94 | 31.0 | 15.1 | 1.5 | 4x6 |

**Encoder systems for motors without DRIVE-CLiQ interface:**

| | | |
|---|---|---|
| 1FK7...-.....-.A | Incremental encoder sin/cos 1 Vpp 2048 S/R | IC2048S/R |
| 1FK7...-.....-.E | Absolute encoder EnDat 2048 S/R | AM2048S/R |
| 1FK7...-.....-.S | Resolver multipole | Resolver p=x |
| 1FK7...-.....-.T | Resolver 2-pole | Resolver p=1 |

**Encoder systems for motors with DRIVE-CLiQ interface:**

| | | |
|---|---|---|
| 1FK7...-.....-.B | Absolute encoder singleturn 24 bit | AS24DQI |
| 1FK7...-.....-.C | Absolute encoder 24 bit + 12 bit multiturn | AM24DQI |
| 1FK7...-.....-.Q | Absolute encoder singleturn 20 bit | AS20DQI |
| 1FK7...-.....-.R | Absolute encoder 20 bit + 12 bit multiturn | AM20DQI |
| 1FK7...-.....-.U | Resolver 15 bit, multipole | R15DQ |
| 1FK7...-.....-.P | Resolver 14 bit, 2-pole | R14DQ |

| | **Brake:** | **Shaft:** |
|---|---|---|
| 1FK7...-.....-..A | without | Fitted key and keyway |
| 1FK7...-.....-..B | with | Fitted key and keyway |
| 1FK7...-.....-..G | without | Plain shaft |
| 1FK7...-.....-..H | with | Plain shaft |

| | **Degree of protection:** |
|---|---|
| 1FK7...-.....-...0 | IP64 |
| 1FK7...-.....-...1 | IP65 |
| 1FK7...-.....-...2 | IP65 and DE-Flange IP67 |

[1] Optimum efficiency at continous load

[2] The current carrying capacity of the power cables complies with IEC 60204-1 for installation type C under continuous operating conditions at an ambient air temperature of 40 °C (104 °F), designed for I0 (100 K), PVC/PUR-insulated cable.

## *1.4 Selection and ordering data, 1FK7 for DC link voltages 510 V to 720 V DC (line supply 380 V - 480 V 3 AC)*

| Rated speed | Shaft height | Rated power at ΔT=100 K | Static torque at ΔT=100 K | Rated torque at ΔT=100 K | Rated current at ΔT=100 K | **Syncronous motor 1FK7 Compact** | Number of pole pairs | Moment of rotor inertia (without brake) | Weight (motor without brake) | Efficiency [1] | Static current at ΔT=100 K | Calculated power $P_{calc} = M_0 \times n_N / 9550$ | Power connector size | Cable cross-section[2] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $n_N$ | SH | $P_N$ | $M_0$ | $M_N$ | $I_N$ | Order No. | | J | m | η | $I_0$ | $P_{calc}$ | | |
| rpm | | kW | Nm | Nm | A | | | $kgcm^2$ | kg | % | A | kW | | $mm^2$ |
| **1FK7 Compact** for DC-Link 510 V to 720 V (line voltage 380-480 V 3 AC) | | | | | | | | | | | | | | |
| **4500** | 63 | 1.7 | 6.0 | 3.7 | 4.3 | 1FK7060-2AH71-1❑❑❑ | 4 | 7.7 | 7.1 | 90 | 6.3 | 2.8 | 1 | 4x1.5 |
| | | 1.4 | 8.5 | 3.0 | 3.3 | 1FK7062-2AH71-1❑❑❑ | 4 | 11.2 | 9.1 | 91 | 8.0 | 4 | 1 | 4x1.5 |
| | | 1.4 | 11.0 | 3.0 | 3.8 | 1FK7063-2AH71-1❑❑❑ | 4 | 14.7 | 11.1 | 90 | 12.0 | 5.2 | 1 | 4x1.5 |
| | 80 | 2.1 | 8.0 | 4.5 | 4.8 | 1FK7080-2AH71-1❑❑❑ | 4 | 14.2 | 10.3 | 92 | 7.4 | 3.8 | 1 | 4x1.5 |
| | | 1.8 | 12.0 | 3.8 | 4.9 | 1FK7081-2AH71-1❑❑❑ | 4 | 20 | 12.9 | 93 | 13.1 | 5.7 | 1 | 4x1.5 |
| | | 1.4 | 16.0 | 3.0 | 3.6 | 1FK7083-2AH71-1❑❑❑ | 4 | 26 | 15.6 | 93 | 15.0 | 7.5 | 1 | 4x1.5 |
| **6000** | 36 | 0.5 | 1.15 | 0.8 | 1.3 | 1FK7032-2AK71-1❑❑❑ | 3 | 0.65 | 2.7 | 88 | 1.7 | 0.7 | 1 | 4x1.5 |
| | | 0.6 | 1.6 | 1.0 | 1.3 | 1FK7034-2AK71-1❑❑❑ | 3 | 0.9 | 3.5 | 88 | 1.9 | 1 | 1 | 4x1.5 |
| | 48 | 0.7 | 1.6 | 1.1 | 1.85 | 1FK7040-2AK71-1❑❑❑ | 4 | 1.6 | 3.2 | 88 | 2.35 | 1 | 1 | 4x1.5 |
| | | 0.9 | 3.0 | 1.5 | 2.5 | 1FK7042-2AK71-1❑❑❑ | 4 | 2.9 | 4.6 | 89 | 4.4 | 1.9 | 1 | 4x1.5 |

**Encoder systems for motors without DRIVE-CLiQ interface:**

| | | |
|---|---|---|
| 1FK7...-.....-.A | Incremental encoder sin/cos 1 Vpp 2048 S/R | IC2048S/R |
| 1FK7...-.....-.E | Absolute encoder EnDat 2048 S/R | AM2048S/R |
| 1FK7...-.....-.S | Resolver multipole | Resolver p=x |
| 1FK7...-.....-.T | Resolver 2-pole | Resolver p=1 |

**Encoder systems for motors with DRIVE-CLiQ interface:**

| | | |
|---|---|---|
| 1FK7...-.....-.B | Absolute encoder singleturn 24 bit | AS24DQI |
| 1FK7...-.....-.C | Absolute encoder 24 bit + 12 bit multiturn | AM24DQI |
| 1FK7...-.....-.Q | Absolute encoder singleturn 20 bit | AS20DQI |
| 1FK7...-.....-.R | Absolute encoder 20 bit + 12 bit multiturn | AM20DQI |
| 1FK7...-.....-.U | Resolver 15 bit, multipole | R15DQ |
| 1FK7...-.....-.P | Resolver 14 bit, 2-pole | R14DQ |

| | **Brake:** | **Shaft:** |
|---|---|---|
| 1FK7...-.....-..A | without | Fitted key and keyway |
| 1FK7...-.....-..B | with | Fitted key and keyway |
| 1FK7...-.....-..G | without | Plain shaft |
| 1FK7...-.....-..H | with | Plain shaft |

| | **Degree of protection:** |
|---|---|
| 1FK7...-.....-...0 | IP64 |
| 1FK7...-.....-...1 | IP65 |
| 1FK7...-.....-...2 | IP65 and DE-Flange IP67 |

[1] Optimum efficiency at continous load

[2] The current carrying capacity of the power cables complies with IEC 60204-1 for installation type C under continuous operating conditions at an ambient air temperature of 40 °C (104 °F), designed for I0 (100 K), PVC/PUR-insulated cable.

## 1.4.3 1FK7 High Dynamic/1FK7 High Inertia

| Rated speed $n_N$ rpm | Shaft height SH | Rated power at ΔT=100 K $P_N$ kW | Static torque at ΔT=100 K $M_0$ Nm | Rated torque at ΔT=100 K $M_N$ Nm | Rated current at ΔT=100 K $I_N$ A | **Syncronous motor 1FK7 High Dynamic / 1FK7 High Inertia** Order No. | Number of pole pairs | Moment of rotor inertia (without brake) J kgcm² | Weight (motor without brake) m kg | Efficiency [1] η % | Static current at ΔT=100 K $I_0$ A | Calculated power $P_{calc} = M_0 \times n_N / 9550$ $P_{calc}$ kW | Power connector size | Cable cross-section[2] mm² |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1FK7 High Dynamic** for DC-Link 510 V to 720 V (line voltage 380-480 V 3 AC) | | | | | | | | | | | | | | |
| **2000** | 63 | 2.1 | 12.0 | 10.0 | 7.1 | 1FK7064-4CC71-1❑❑❑ | 3 | 7.5 | 15.4 | 93 | 8.1 | 2.5 | 1 | 4x1.5 |
| | 80 | 3.1 | 22.0 | 15.0 | 10.0 | 1FK7085-4CC71-1❑❑❑ | 4 | 22 | 23.0 | 92 | 13.5 | 4.6 | 1 | 4x1.5 |
| | | 3.8 | 28.0 | 18.0 | 9.0 | 1FK7086-4CC71-1❑❑❑ | 4 | 22 | 23.0 | 93 | 13.2 | 5.9 | 1 | 4x1.5 |
| **3000** | 48 | 1.2 | 4.5 | 3.7 | 3.45 | 1FK7044-4CF71-1❑❑❑ | 3 | 1.26 | 7.4 | 91 | 4.0 | 1.4 | 1 | 4x1.5 |
| | 63 | 1.7 | 6.4 | 5.4 | 5.3 | 1FK7061-4CF71-1❑❑❑ | 3 | 4.1 | 9.5 | 93 | 6.1 | 2 | 1 | 4x1.5 |
| | | 2.5 | 12.0 | 8.0 | 7.6 | 1FK7064-4CF71-1❑❑❑ | 3 | 7.5 | 15.4 | 93 | 10.8 | 3.8 | 1 | 4x1.5 |
| | 80 | 2 | 22.0 | 6.5 | 7.0 | 1FK7085-4CF71-1❑❑❑ | 4 | 22 | 23.0 | 92 | 22.0 | 6.9 | 1.5 | 4x4 |
| | | 2 | 28.0 | 6.5 | 5.7 | 1FK7086-4CF71-1❑❑❑ | 4 | 22 | 23.0 | 93 | 21.5 | 8.8 | 1.5 | 4x4 |
| **4500** | 48 | 1.2 | 3.5 | 2.6 | 3.3 | 1FK7043-4CH71-1❑❑❑ | 3 | 1 | 6.0 | 90 | 4.1 | 1.6 | 1 | 4x1.5 |
| | | 1.4 | 4.5 | 3.0 | 3.9 | 1FK7044-4CH71-1❑❑❑ | 3 | 1.26 | 7.4 | 91 | 5.4 | 2.1 | 1 | 4x1.5 |
| | 63 | 2 | 6.4 | 4.3 | 6.2 | 1FK7061-4CH71-1❑❑❑ | 3 | 4.1 | 9.5 | 93 | 8.7 | 3 | 1 | 4x1.5 |
| | | 2.4 | 12.0 | 5.0 | 7.0 | 1FK7064-4CH71-1❑❑❑ | 3 | 7.5 | 15.4 | 93 | 15.0 | 5.7 | 1 | 4x1.5 |
| **6000** | 36 | 0.6 | 1.3 | 0.9 | 1.6 | 1FK7033-4CK71-1❑❑❑ | 3 | 0.25 | 3.0 | 88 | 2.1 | 0.8 | 1 | 4x1.5 |
| | 48 | 1.3 | 3.5 | 2.0 | 3.5 | 1FK7043-4CK71-1❑❑❑ | 3 | 1 | 6.0 | 90 | 5.6 | 2.2 | 1 | 4x1.5 |
| **1FK7 High Inertia** for DC-Link 510 V to 720 V (line voltage 380-480 V 3 AC) | | | | | | | | | | | | | | |
| **2000** | 80 | 3.1 | 20.0 | 15.0 | 6.7 | 1FK7084-3BC71-1❑❑❑ | 4 | 99 | 23.0 | 93 | 8.5 | 4.2 | 1 | 4x1.5 |
| **3000** | 63 | 1.5 | 6.0 | 4.7 | 3.7 | 1FK7060-3BF71-1❑❑❑ | 4 | 12.5 | 7.9 | 90 | 4.45 | 1.9 | 1 | 4x1.5 |
| | | 1.9 | 8.5 | 6.0 | 4.0 | 1FK7062-3BF71-1❑❑❑ | 4 | 23.5 | 10.7 | 91 | 5.3 | 2.7 | 1 | 4x1.5 |
| | 80 | 2.7 | 12.0 | 8.7 | 6.8 | 1FK7081-3BF71-1❑❑❑ | 4 | 49 | 15.2 | 93 | 8.7 | 3.8 | 1 | 4x1.5 |
| | | 3.1 | 20.0 | 10.0 | 6.5 | 1FK7084-3BF71-1❑❑❑ | 4 | 99 | 23.0 | 93 | 12.1 | 6.3 | 1 | 4x1.5 |
| **6000** | 48 | 0.9 | 3.0 | 1.5 | 2.5 | 1FK7042-3BK71-1❑❑❑ | 4 | 5.1 | 5.1 | 89 | 4.4 | 1.9 | 1 | 4x1.5 |

**Encoder systems for motors without DRIVE-CLiQ interface:**

| | | |
|---|---|---|
| 1FK7...-.....-.A | Incremental encoder sin/cos 1 Vpp 2048 S/R | IC2048S/R |
| 1FK7...-.....-.E | Absolute encoder EnDat 2048 S/R | AM2048S/R |
| 1FK7...-.....-.S | Resolver multipole (not for High Inertia) | Resolver p=x |
| 1FK7...-.....-.T | Resolver 2-pole (not for High Inertia) | Resolver p=1 |

**Encoder systems for motors with DRIVE-CLiQ interface:**

| | | |
|---|---|---|
| 1FK7...-.....-.B | Absolute encoder singleturn 24 bit | AS24DQI |
| 1FK7...-.....-.C | Absolute encoder 24 bit + 12 bit multiturn | AM24DQI |
| 1FK7...-.....-.Q | Absolute encoder singleturn 20 bit | AS20DQI |
| 1FK7...-.....-.R | Absolute encoder 20 bit + 12 bit multiturn | AM20DQI |
| 1FK7...-.....-.U | Resolver 15 bit, multipole (not for High Inertia) | R15DQ |
| 1FK7...-.....-.P | Resolver 14 bit, 2-pole (not for High Inertia) | R14DQ |

| | **Brake:** | **Shaft:** |
|---|---|---|
| 1FK7...-.....-..A | without | Fitted key and keyway |
| 1FK7...-.....-..B | with | Fitted key and keyway |
| 1FK7...-.....-..G | without | Plain shaft |
| 1FK7...-.....-..H | with | Plain shaft |

| | **Degree of protection:** |
|---|---|
| 1FK7...-.....-...0 | IP64 |
| 1FK7...-.....-...1 | IP65 |
| 1FK7...-.....-...2 | IP65 and DE-Flange IP67 |

[1] Optimum efficiency at continous load

[2] The current carrying capacity of the power cables complies with IEC 60204-1 for installation type C under continuous operating conditions at an ambient air temperature of 40 °C (104 °F), designed for I0 (100 K), PVC/PUR-insulated cable.

# 1.5 Selection and ordering data, 1FK7 for DC link voltages 270 V to 330 V DC (line supply 200 V - 240 V 1 AC)

## 1.5.1 1FK701/1FK702 Compact

| Rated speed $n_N$ rpm | Shaft height SH | Rated power at ΔT=100 K $P_N$ kW | Static torque at ΔT=100 K $M_0$ Nm | Rated torque at ΔT=100 K $M_N$ Nm | Rated current at ΔT=100 K $I_N$ A | **Syncronous motor 1FK7 Compact** Order No. | Number of pole pairs | Moment of rotor inertia (without brake) J kgcm² | Weight (motor without brake) m kg | Efficiency [1] η % | Static current at ΔT=100 K $I_0$ A | Calculated power $P_{calc} = M_0 \times n_N / 9550$ $P_{calc}$ kW | Power connector size | Cable cross-section [2] mm² |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1FK7 Compact** for DC-Link 270 V to 330 V (line voltage 200-240 V 1 AC) | | | | | | | | | | | | | | |
| **6000** | 20 | 0.05 | 0.18 | 0.08 | 0.5 | 1FK7011-5AK21-1❑❑❑ | 4 | 0.0064 | 0.9 | 62 | 0.85 | 0.1 | 0.5 | 4x1.5 |
| | | 0.1 | 0.35 | 0.16 | 0.5 | 1FK7015-5AK21-1❑❑❑ | 4 | 0.083 | 1.1 | 68 | 0.85 | 0.2 | 0.5 | 4x1.5 |
| | 28 | 0.38 | 0.85 | 0.6 | 1.4 | 1FK7022-5AK21-1❑❑❑ | 3 | 0.28 | 1.8 | 85 | 1.8 | 0.5 | 1 | 4x1.5 |

**Encoder systems for motors without DRIVE-CLiQ interface:**

| | | |
|---|---|---|
| 1FK7...-.....-.A | Incremental encoder sin/cos 1 Vpp 2048 S/R | IC2048S/R |
| 1FK7...-.....-.H | Absolute encoder EnDat 512 S/R (1FK702 only) | AM512S/R |
| 1FK7...-.....-.J | Absolute encoder EnDat 16 S/R | AM16S/R |
| 1FK7...-.....-.S | Resolver multipole | Resolver p=x |
| 1FK7...-.....-.T | Resolver 2-pole | Resolver p=1 |

**Encoder systems for motors with DRIVE-CLiQ interface:** (1FK702 only)

| | | |
|---|---|---|
| 1FK7...-.....-.D | Incremental encoder 22 bit | IC22DQ |
| 1FK7...-.....-.L | Absolute encoder 20 bit + 12 bit | AM20DQ |
| 1FK7...-.....-.V | Incremental encoder 22 bit | IC22DQ |
| 1FK7...-.....-.U | Resolver 15 bit multipole | R15DQ |
| 1FK7...-.....-.P | Resolver 14 bit 2-pole | R14DQ |

| | **Brake:** | **Shaft:** |
|---|---|---|
| 1FK7...-.....-..A | without | Fitted key and keyway |
| 1FK7...-.....-..B | with | Fitted key and keyway |
| 1FK7...-.....-..G | without | Plain shaft |
| 1FK7...-.....-..H | with | Plain shaft |

| | **Degree of protection:** | **Coating:** |
|---|---|---|
| 1FK7...-.....-...0 | IP64 (1FK702 only) | without paint finish |
| 1FK7...-.....-...2 | IP65 and DE-Flange IP67 (1FK702 only) | without paint finish |
| 1FK7...-.....-...3 | IP54 for 1FK701 / IP64 for 1FK702 | with paint finish |
| 1FK7...-.....-...5 | IP65 and DE-Flange IP67 (1FK702 only) | with paint finish |

[1] Optimum efficiency at continous load

[2] The current carrying capacity of the power cables complies with IEC 60204-1 for installation type C under continuous operating conditions at an ambient air temperature of 40 °C (104 °F), designed for I0 (100 K), PVC/PUR-insulated cable.

## 1.5.2 1FK703/1FK704 Compact and 1FK703/1FK704 High Dynamic

| Rated speed $n_N$ rpm | Shaft height SH | Rated power at ΔT=100 K $P_N$ kW | Static torque at ΔT=100 K $M_0$ Nm | Rated torque at ΔT=100 K $M_N$ Nm | Rated current at ΔT=100 K $I_N$ A | **Syncronous motor 1FK7 Compact / 1FK7 High Dynamic** Order No. | Number of pole pairs | Moment of rotor inertia (without brake) J kgcm² | Weight (motor without brake) m kg | Efficiency [1] η % | Static current at ΔT=100 K $I_0$ A | Calculated power $P_{calc} = M_0 \times n_N / 9550$ $P_{calc}$ kW | Power connector size | Cable cross-section [2] mm² |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1FK7 Compact** for DC-Link 270 V to 330 V (line voltage 200-240 V 1 AC) | | | | | | | | | | | | | | |
| **3000** | 36 | 0.3 | 1.15 | 1.0 | 1.6 | 1FK7032-2AF21-1❑❑❑ | 3 | 0.65 | 2.7 | 85 | 1.7 | 0.4 | 1 | 4x1.5 |
| | | 0.5 | 1.6 | 1.45 | 1.8 | 1FK7034-2AF21-1❑❑❑ | 3 | 0.9 | 3.5 | 85 | 1.9 | 0.5 | 1 | 4x1.5 |
| | 48 | 0.8 | 3.0 | 2.6 | 3.5 | 1FK7042-2AF21-1❑❑❑ | 4 | 2.9 | 4.6 | 88 | 3.95 | 0.9 | 1 | 4x1.5 |
| **1FK7 High Dynamic** for DC-Link 270 V to 330 V (line voltage 200-240 V 1 AC) | | | | | | | | | | | | | | |
| **3000** | 36 | 0.4 | 1.3 | 1.2 | 2.05 | 1FK7033-4CF21-1❑❑❑ | 3 | 0.25 | 3.0 | 86 | 2.1 | 0.4 | 1 | 4x1.5 |
| | 48 | 0.9 | 3.3 | 3.0 | 3.7 | 1FK7043-4CF21-1❑❑❑ | 3 | 1 | 6.0 | 88 | 3.9 | 1 | 1 | 4x1.5 |

**Encoder systems for motors without DRIVE-CLiQ interface:**

| | | |
|---|---|---|
| 1FK7...-.....-.A | Incremental encoder sin/cos 1 Vpp 2048 S/R | IC2048S/R |
| 1FK7...-.....-.E | Absolute encoder EnDat 2048 S/R | AM2048S/R |
| 1FK7...-.....-.S | Resolver multipole | Resolver p=x |
| 1FK7...-.....-.T | Resolver 2-pole | Resolver p=1 |

**Encoder systems for motors with DRIVE-CLiQ interface:**

| | | |
|---|---|---|
| 1FK7...-.....-.B | Absolute encoder singleturn 24 bit | AS24DQI |
| 1FK7...-.....-.C | Absolute encoder 24 bit + 12 bit multiturn | AM24DQI |
| 1FK7...-.....-.Q | Absolute encoder singleturn 20 bit | AS20DQI |
| 1FK7...-.....-.R | Absolute encoder 20 bit + 12 bit multiturn | AM20DQI |
| 1FK7...-.....-.U | Resolver 15 bit, multipole | R15DQ |
| 1FK7...-.....-.P | Resolver 14 bit, 2-pole | R14DQ |

| | **Brake:** | **Shaft:** |
|---|---|---|
| 1FK7...-.....-..A | without | Fitted key and keyway |
| 1FK7...-.....-..B | with | Fitted key and keyway |
| 1FK7...-.....-..G | without | Plain shaft |
| 1FK7...-.....-..H | with | Plain shaft |

| | **Degree of protection:** |
|---|---|
| 1FK7...-.....-...0 | IP64 |
| 1FK7...-.....-...1 | IP65 |
| 1FK7...-.....-...2 | IP65 and DE-Flange IP67 |

[1] Optimum efficiency at continous load

[2] The current carrying capacity of the power cables complies with IEC 60204-1 for installation type C under continuous operating conditions at an ambient air temperature of 40 °C (104 °F), designed for I0 (100 K), PVC/PUR-insulated cable.

# 1.6 Rating plate data

The rating plate (type plate) contains the technical data relevant for the motor. A second rating plate is provided with the motor, and can be used for documentation purposes.

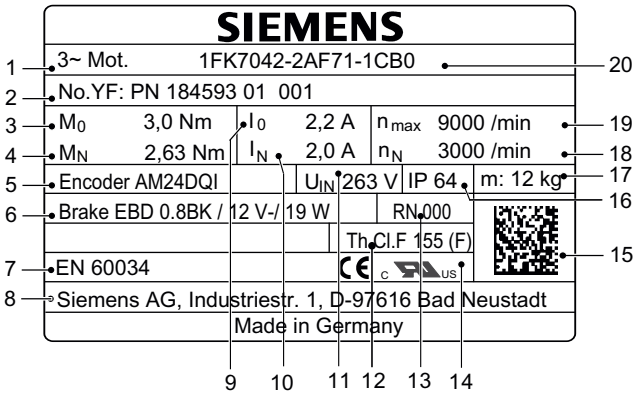



Figure 1-5 Schematic layout of rating plate

Table 1- 2 Description of the rating plate data

| Position | Description / technical data |
|---|---|
| 1 | Motor type: Synchronous motors |
| 2 | ID no., serial number |
| 3 | Static torque $M_0$ [Nm] |
| 4 | Rated torque $M_N$ [Nm] |
| 5 | Designation of the encoder type |
| 6 | Holding brake data: Typical, voltage, power consumption |
| 7 | Standard for all rotating electrical machines |
| 8 | Production address |
| 9 | Stall current $I_0$ [A] |
| 10 | Rated current $I_N$ [A] |
| 11 | Induced voltage at rated speed $U_{IN}$ [V] |
| 12 | Temperature class |
| 13 | Motor version |
| 14 | Standards and specifications |
| 15 | 2D code |
| 16 | Degree of protection |
| 17 | Motor weight m [kg] |
| 18 | Rated speed $n_N$ [rpm] |
| 19 | Maximum speed $n_{max}$ [rpm] |
| 20 | SIEMENS motor type/order number |

# 1.7 Motor overview/Assignment of Motor Module

## 1FK7 for SINAMICS S120 Booksize, DC link voltage 510 V to 720 V DC, (line voltage 380 V to 480 V, 3 AC)

Table 1- 3 1FK7 Compact

| Motor | | | Converter: SINAMICS S120 Booksize | | | Power cable |
|---|---|---|---|---|---|---|
| Order no. | $M_{0\ (100K)}$ [Nm] | Connector size / Cable cross-section | Order no. | $I_N$ [A] | $M_{max\ (100K)}$ [Nm] | Order no. |
| 1FK7011-5AK7 | 0.18 | 0.5 / 4x1.5 | 6SL312❑-❑TE13-0AA3 | 3 | 0.5 | 6FX5002-5DN20-❑❑❑❑ |
| 1FK7015-5AK7 | 0.35 | 0.5 / 4x1.5 | 6SL312❑-❑TE13-0AA3 | 3 | 1.0 | 6FX5002-5DN20-❑❑❑❑ |
| 1FK7022-5AK7 | 0.85 | 1 / 4x1.5 | 6SL312❑-❑TE13-0AA3 | 3 | 2.8 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7032-2AK7 | 1.15 | 1 / 4x1.5 | 6SL312❑-❑TE13-0AA3 | 3 | 4.2 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7034-2AK7 | 1.6 | 1 / 4x1.5 | 6SL312❑-❑TE13-0AA3 | 3 | 5.0 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7040-2AK7 | 1.6 | 1 / 4x1.5 | 6SL312❑-❑TE13-0AA3 | 3 | 4.0 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7042-2AC7 | 3.0 | 1 / 4x1.5 | 6SL312❑-❑TE13-0AA3 | 3 | 10.5 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7042-2AF7 | 3.0 | 1 / 4x1.5 | 6SL312❑-❑TE13-0AA3 | 3 | 8.2 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7042-2AK7 | 3.0 | 1 / 4x1.5 | 6SL312❑-❑TE15-0AA3 | 5 | 6.8 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7060-2AC7 | 6.0 | 1 / 4x1.5 | 6SL312❑-❑TE13-0AA3 | 3 | 11.4 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7060-2AF7 | 6.0 | 1 / 4x1.5 | 6SL312❑-❑TE15-0AA3 | 5 | 13.2 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7060-2AH7 | 6.0 | 1 - 4x1.5 | 6SL312❑-❑TE21-0AA3 | 9 | 15.8 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7062-2AC7 | 8.5 | 1 / 4x1.5 | 6SL312❑-❑TE13-0AA3 | 3 | 17.0 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7062-2AF7 | 8.5 | 1 / 4x1.5 | 6SL312❑-❑TE15-0AA3 | 5 | 16.0 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7062-2AH7 | 8.5 | 1 / 4x1.5 | 6SL312❑-❑TE21-0AA3 | 9 | 18.5 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7063-2AC7 | 11.0 | 1 / 4x1.5 | 6SL312❑-❑TE15-0AA3 | 5 | 20.8 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7063-2AF7 | 11.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-0AA3 | 9 | 24.3 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7063-2AH7 | 11.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-8AA3 | 18 | 30.9 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7080-2AF7 | 8.0 | 1 / 4x1.5 | 6SL312❑-❑TE15-0AA3 | 5 | 16.5 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7080-2AH7 | 8.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-0AA3 | 9 | 18.5 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7081-2AC7 | 12.0 | 1 / 4x1.5 | 6SL312❑-❑TE15-0AA3 | 5 | 24.0 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7081-2AF7 | 12.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-0AA3 | 9 | 24.7 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7081-2AH7 | 12.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-8AA3 | 18 | 31.2 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7083-2AC7 | 16.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-0AA3 | 9 | 36.7 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7083-2AF7 | 16.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-8AA3 | 9 | 28.5 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7083-2AH7 | 16.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-8AA3 | 18 | 36.7 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7084-2AC7 | 20.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-0AA3 | 9 | 41.9 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7084-2AF7 | 20.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-8AA3 | 18 | 55.0 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7100-2AC7 | 18.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-0AA3 | 9 | 38.1 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7100-2AF7 | 18.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-8AA3 | 18 | 54.0 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7101-2AC7 | 27.0 | 1.5 / 4x1.5 | 6SL312❑-❑TE21-8AA3 | 18 | 73.0 | 6FX❑002-5❑N21-❑❑❑❑ |
| 1FK7101-2AF7 | 27.0 | 1.5 / 4x2.5 | 6SL312❑-❑TE21-8AA3 | 18 | 52.0 | 6FX❑002-5❑N31-❑❑❑❑ |
| 1FK7103-2AC7 | 36.0 | 1.5 / 4x1.5 | 6SL312❑-❑TE21-8AA3 | 18 | 87.0 | 6FX❑002-5❑N21-❑❑❑❑ |
| 1FK7103-2AF7 | 36.0 | 1.5 / 4x4 | 6SL312❑-❑TE23-0AA3 | 30 | 77.0 | 6FX❑002-5❑N41-❑❑❑❑ |
| 1FK7105-2AC7 | 48.0 | 1.5 / 4x2.5 | 6SL312❑-❑TE23-0AA3 | 30 | 126.0 | 6FX❑002-5❑N31-❑❑❑❑ |
| 1FK7105-2AF7 | 48.0 | 1.5 / 4x6 | 6SL312❑-❑TE23-0AA3 | 30 | 87.0 | 6FX❑002-5❑N51-❑❑❑❑ |

Table 1- 4 1FK7 High Inertia

| Motor | | | Converter: SINAMICS S120 Booksize | | | Power cable |
|---|---|---|---|---|---|---|
| Order no. | $M_{0\ (100K)}$ [Nm] | Connector size / Cable cross-section | Order no. | $I_N$ [A] | $M_{max\ (100K)}$ [Nm] | Order no. |
| 1FK7042-3BK7 | 3.0 | 1 / 4x1.5 | 6SL312❑-❑TE15-0AA3 | 5 | 6.8 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7060-3BF7 | 6.0 | 1 / 4x1.5 | 6SL312❑-❑TE15-0AA3 | 5 | 13.2 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7062-3BF7 | 8.5 | 1 / 4x1.5 | 6SL312❑-❑TE15-0AA3 | 5 | 16.0 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7081-3BF7 | 12.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-0AA3 | 9 | 24.7 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7084-3BC7 | 20.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-0AA3 | 9 | 41.9 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7084-3BF7 | 20.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-8AA3 | 18 | 55.0 | 6FX❑002-5❑N01-❑❑❑❑ |

Table 1- 5 1FK7 High Dynamic

| Motor | | | Converter: SINAMICS S120 Booksize | | | Power cable |
|---|---|---|---|---|---|---|
| Order no. | $M_{0\ (100K)}$ [Nm] | Connector size / Cable cross-section | Order no. | $I_N$ [A] | $M_{max\ (100K)}$ [Nm] | Order no. |
| 1FK7033-4CK7 | 1.3 | 1 / 4x1.5 | 6SL312❑-❑TE13-0AA3 | 3 | 3.5 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7043-4CH7 | 3.5 | 1 / 4x1.5 | 6SL312❑-❑TE15-0AA3 | 5 | 8.3 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7043-4CK7 | 3.5 | 1 / 4x1.5 | 6SL312❑-❑TE21-0AA3 | 9 | 10.0 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7044-4CF7 | 4.5 | 1 / 4x1.5 | 6SL312❑-❑TE15-0AA3 | 5 | 11.0 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7044-4CH7 | 4.5 | 1 / 4x1.5 | 6SL312❑-❑TE21-0AA3 | 9 | 13.0 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7061-4CF7 | 6.4 | 1 / 4x1.5 | 6SL312❑-❑TE21-0AA3 | 9 | 17.0 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7061-4CH7 | 6.4 | 1 / 4x1.5 | 6SL312❑-❑TE21-0AA3 | 9 | 13.1 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7064-4CC7 | 12.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-0AA3 | 9 | 26.0 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7064-4CF7 | 12.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-8AA3 | 18 | 32.0 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7064-4CH7 | 12.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-8AA3 | 18 | 27.5 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7085-4CC7 | 22.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-8AA3 | 18 | 53.0 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7085-4CF7 | 22.0 | 1.5 / 4x4 | 6SL312❑-❑TE23-0AA3 | 30 | 51.0 | 6FX❑002-5❑N41-❑❑❑❑ |
| 1FK7086-4CC7 | 28.0 | 1 / 4x1.5 | 6SL312❑-❑TE21-8AA3 | 18 | 69.0 | 6FX❑002-5❑N01-❑❑❑❑ |
| 1FK7086-4CF7 | 28.0 | 1.5 / 4x4 | 6SL312❑-❑TE23-0AA3 | 30 | 66.0 | 6FX❑002-5❑N41-❑❑❑❑ |

## 1FK7 for SINAMICS S120 Booksize Compact, DC link voltage 510 V to 720 V DC, (line voltage 380 V to 480 V, 3 AC)

Table 1- 6 1FK7 Compact

| Motor | | | Converter: SINAMICS S120 Booksize Compact | | | Power cable |
|---|---|---|---|---|---|---|
| Order no. | $M_{0\ (100K)}$ [Nm] | Connector size / Cable cross-section | Order no. | $I_N$ [A] | $M_{max\ (100K)}$ [Nm] | Order no. |
| 1FK7011-5AK7 | 0.18 | 0.5 / 4x1.5 | 6SL3420-❑TE13-0AA0 | 3 | 0.5 | 6FX5002-5DN30-❑❑❑❑ |
| 1FK7015-5AK7 | 0.35 | 0.5 / 4x1.5 | 6SL3420-❑TE13-0AA0 | 3 | 1.0 | 6FX5002-5DN30-❑❑❑❑ |
| 1FK7022-5AK7 | 0.85 | 1 / 4x1.5 | 6SL3420-❑TE13-0AA0 | 3 | 3.4 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7032-2AK7 | 1.15 | 1 / 4x1.5 | 6SL3420-❑TE13-0AA0 | 3 | 4.5 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7034-2AK7 | 1.6 | 1 / 4x1.5 | 6SL3420-❑TE13-0AA0 | 3 | 6.5 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7040-2AK7 | 1.6 | 1 / 4x1.5 | 6SL3420-❑TE13-0AA0 | 3 | 5.1 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7042-2AC7 | 3.0 | 1 / 4x1.5 | 6SL3420-❑TE13-0AA0 | 3 | 10.5 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7042-2AF7 | 3.0 | 1 / 4x1.5 | 6SL3420-❑TE13-0AA0 | 3 | 10.5 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7042-2AK7 | 3.0 | 1 / 4x1.5 | 6SL3420-❑TE15-0AA0 | 5 | 10.3 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7060-2AC7 | 6.0 | 1 / 4x1.5 | 6SL3420-❑TE13-0AA0 | 3 | 15.6 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7060-2AF7 | 6.0 | 1 / 4x1.5 | 6SL3420-❑TE15-0AA0 | 5 | 18.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7060-2AH7 | 6.0 | 1 / 4x1.5 | 6SL3420-1TE21-0AA0 | 9 | 18.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7062-2AC7 | 8.5 | 1 / 4x1.5 | 6SL3420-❑TE13-0AA0 | 3 | 22.4 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7062-2AF7 | 8.5 | 1 / 4x1.5 | 6SL3420-❑TE15-0AA0 | 5 | 21.4 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7062-2AH7 | 8.5 | 1 / 4x1.5 | 6SL3420-1TE21-0AA0 | 9 | 24.6 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7063-2AC7 | 11.0 | 1 / 4x1.5 | 6SL3420-❑TE15-0AA0 | 5 | 29.1 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7063-2AF7 | 11.0 | 1 / 4x1.5 | 6SL3420-1TE21-0AA0 | 9 | 33.9 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7063-2AH7 | 11.0 | 1 / 4x1.5 | 6SL3420-1TE21-8AA0 | 18 | 35.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7080-2AF7 | 8.0 | 1 / 4x1.5 | 6SL3420-❑TE15-0AA0 | 5 | 21.7 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7080-2AH7 | 8.0 | 1 / 4x1.5 | 6SL3420-1TE21-0AA0 | 9 | 24.7 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7081-2AC7 | 12.0 | 1 / 4x1.5 | 6SL3420-❑TE15-0AA0 | 5 | 32.9 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7081-2AF7 | 12.0 | 1 / 4x1.5 | 6SL3420-1TE21-0AA0 | 9 | 33.9 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7081-2AH7 | 12.0 | 1 / 4x1.5 | 6SL3420-1TE21-8AA0 | 18 | 37.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7083-2AC7 | 16.0 | 1 / 4x1.5 | 6SL3420-1TE21-0AA0 | 9 | 49.3 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7083-2AF7 | 16.0 | 1 / 4x1.5 | 6SL3420-1TE21-8AA0 | 18 | 50.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7083-2AH7 | 16.0 | 1 / 4x1.5 | 6SL3420-1TE21-8AA0 | 18 | 49.3 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7084-2AC7 | 20.0 | 1 / 4x1.5 | 6SL3420-1TE21-0AA0 | 9 | 58.2 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7084-2AF7 | 20.0 | 1 / 4x1.5 | 6SL3420-1TE21-8AA0 | 18 | 61.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7100-2AC7 | 18.0 | 1 / 4x1.5 | 6SL3420-1TE21-0AA0 | 9 | 53.3 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7100-2AF7 | 18.0 | 1 / 4x1.5 | 6SL3420-1TE21-8AA0 | 18 | 55.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7101-2AC7 | 27.0 | 1.5 / 4x1.5 | 6SL3420-1TE21-8AA0 | 18 | 80.0 | 6FX❑002-5❑G22-❑❑❑❑ |
| 1FK7101-2AF7 | 27.0 | 1.5 / 4x2.5 | 6SL3420-1TE21-8AA0 | 18 | 70.4 | 6FX❑002-5❑G32-❑❑❑❑ |
| 1FK7103-2AC7 | 36.0 | 1.5 / 4x1.5 | 6SL3420-1TE21-8AA0 | 18 | 108.0 | 6FX❑002-5❑G22-❑❑❑❑ |

Table 1- 7 1FK7 High Inertia

| Motor | | | Converter: SINAMICS S120 Booksize Compact | | | Power cable |
|---|---|---|---|---|---|---|
| Order no. | $M_{0\ (100K)}$ [Nm] | Connector size / Cable cross-section | Order no. | $I_N$ [A] | $M_{max\ (100K)}$ [Nm] | Order no. |
| 1FK7042-3BK7 | 3.0 | 1 / 4x1.5 | 6SL3420-❑TE15-0AA0 | 5 | 10.3 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7060-3BF7 | 6.0 | 1 / 4x1.5 | 6SL3420-❑TE15-0AA0 | 5 | 18.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7062-3BF7 | 8.5 | 1 / 4x1.5 | 6SL3420-❑TE15-0AA0 | 5 | 21.4 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7081-3BF7 | 12.0 | 1 / 4x1.5 | 6SL3420-1TE21-0AA0 | 9 | 33.9 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7084-3BC7 | 20.0 | 1 / 4x1.5 | 6SL3420-1TE21-0AA0 | 9 | 58.2 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7084-3BF7 | 20.0 | 1 / 4x1.5 | 6SL3420-1TE21-8AA0 | 18 | 61.0 | 6FX❑002-5❑G10-❑❑❑❑ |

Table 1- 8 1FK7 High Dynamic

| Motor | | | Converter: SINAMICS S120 Booksize Compact | | | Power cable |
|---|---|---|---|---|---|---|
| Order no. | $M_{0\ (100K)}$ [Nm] | Connector size / Cable cross-section | Order no. | $I_N$ [A] | $M_{max\ (100K)}$ [Nm] | Order no. |
| 1FK7033-4CK7 | 1.3 | 1 / 4x1.5 | 6SL3420-❑TE13-0AA0 | 3 | 4.3 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7043-4CH7 | 3.5 | 1 / 4x1.5 | 6SL3420-❑TE15-0AA0 | 5 | 10.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7043-4CK7 | 3.5 | 1 / 4x1.5 | 6SL3420-1TE21-0AA0 | 9 | 10.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7044-4CF7 | 4.5 | 1 / 4x1.5 | 6SL3420-❑TE15-0AA0 | 5 | 13.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7044-4CH7 | 4.5 | 1 / 4x1.5 | 6SL3420-1TE21-0AA0 | 9 | 13.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7061-4CF7 | 6.4 | 1 / 4x1.5 | 6SL3420-1TE21-0AA0 | 9 | 17.3 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7061-4CH7 | 6.4 | 1 / 4x1.5 | 6SL3420-1TE21-0AA0 | 9 | 17.3 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7064-4CC7 | 12.0 | 1 / 4x1.5 | 6SL3420-1TE21-0AA0 | 9 | 32.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7064-4CF7 | 12.0 | 1 / 4x1.5 | 6SL3420-1TE21-8AA0 | 18 | 32.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7064-4CH7 | 12.0 | 1 / 4x1.5 | 6SL3420-1TE21-8AA0 | 18 | 32.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7085-4CC7 | 22.0 | 1 / 4x1.5 | 6SL3420-1TE21-8AA0 | 18 | 65.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7086-4CC7 | 28.0 | 1 / 4x1.5 | 6SL3420-1TE21-8AA0 | 18 | 90.1 | 6FX❑002-5❑G10-❑❑❑❑ |

## 1FK7 for SINAMICS S110/S120 Power Modules PM340, DC link voltage 510 V to 720 V DC, (line voltage 380 V to 480 V, 3AC)

Table 1- 9 1FK7 Compact

| Motor | | | Converter: SINAMICS S110 / S120 Power Module PM340 | | | Power cable |
|---|---|---|---|---|---|---|
| Order no. | $M_{0\ (100K)}$ [Nm] | Connector size / Cable cross-section | Order no. | $I_N$ [A] | $M_{max\ (100K)}$ [Nm] | Order no. |
| 1FK7011-5AK7 | 0.18 | 0.5 / 4x1.5 | 6SL3210-1SE11-7UA0 | 1.7 | 0.4 | 6FX5002-5DN30-❑❑❑❑ |
| 1FK7015-5AK7 | 0.35 | 0.5 / 4x1.5 | 6SL3210-1SE11-7UA0 | 1.7 | 0.8 | 6FX5002-5DN30-❑❑❑❑ |
| 1FK7022-5AK7 | 0.85 | 1 / 4x1.5 | 6SL3210-1SE12-2UA0 | 2.2 | 2.0 | 6FX❑002-5❑G10-❑❑❑❑ |

| Motor | | | Converter: SINAMICS S110 / S120 Power Module PM340 | | | Power cable |
|---|---|---|---|---|---|---|
| Order no. | $M_{0\ (100K)}$ [Nm] | Connector size / Cable cross-section | Order no. | $I_N$ [A] | $M_{max}$ (100K) [Nm] | Order no. |
| 1FK7032-2AK7 | 1.15 | 1 / 4x1.5 | 6SL3210-1SE11-7UA0 | 1.7 | 2.3 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7034-2AK7 | 1.6 | 1 / 4x1.5 | 6SL3210-1SE12-2UA0 | 2.2 | 3.7 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7040-2AK7 | 1.6 | 1 / 4x1.5 | 6SL3210-1SE13-1UA0 | 3.1 | 4.1 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7042-2AC7 | 3.0 | 1 / 4x1.5 | 6SL3210-1SE11-7UA0 | 1.7 | 6.4 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7042-2AF7 | 3.0 | 1 / 4x1.5 | 6SL3210-1SE12-2UA0 | 2.2 | 6.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7042-2AK7 | 3.0 | 1 / 4x1.5 | 6SL3210-1SE16-0❑A0 | 5.9 | 8.1 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7060-2AC7 | 6.0 | 1 / 4x1.5 | 6SL3210-1SE13-1UA0 | 3.1 | 11.1 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7060-2AF7 | 6.0 | 1 / 4x1.5 | 6SL3210-1SE16-0❑A0 | 5.9 | 14.7 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7060-2AH7 | 6.0 | 1 / 4x1.5 | 6SL3210-1SE17-7❑A0 | 7.7 | 13.6 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7062-2AC7 | 8.5 | 1 / 4x1.5 | 6SL3210-1SE13-1UA0 | 3.1 | 16.2 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7062-2AF7 | 8.5 | 1 / 4x1.5 | 6SL3210-1SE16-0❑A0 | 5.9 | 17.5 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7062-2AH7 | 8.5 | 1 / 4x1.5 | 6SL3210-1SE21-0❑A0 | 10.2 | 19.7 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7063-2AC7 | 11.0 | 1 / 4x1.5 | 6SL3210-1SE16-0❑A0 | 5.9 | 23.4 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7063-2AF7 | 11.0 | 1 / 4x1.5 | 6SL3210-1SE21-0❑A0 | 10.2 | 26.5 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7063-2AH7 | 11.0 | 1 / 4x1.5 | 6SL3210-1SE21-8❑A0 | 18 | 23.1 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7080-2AF7 | 8.0 | 1 / 4x1.5 | 6SL3210-1SE16-0❑A0 | 5.9 | 17.8 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7080-2AH7 | 8.0 | 1 / 4x1.5 | 6SL3210-1SE17-7❑A0 | 7.7 | 15.6 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7081-2AC7 | 12.0 | 1 / 4x1.5 | 6SL3210-1SE16-0❑A0 | 5.9 | 26.7 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7081-2AF7 | 12.0 | 1 / 4x1.5 | 6SL3210-1SE21-0❑A0 | 10.2 | 26.5 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7081-2AH7 | 12.0 | 1 / 4x1.5 | 6SL3210-1SE21-8❑A0 | 18 | 23.2 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7083-2AC7 | 16.0 | 1 / 4x1.5 | 6SL3210-1SE17-7❑A0 | 7.7 | 30.9 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7083-2AF7 | 16.0 | 1 / 4x1.5 | 6SL3210-1SE21-0❑A0 | 10.2 | 30.5 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7083-2AH7 | 16.0 | 1 / 4x1.5 | 6SL3210-1SE21-8❑A0 | 18 | 27.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7084-2AC7 | 20.0 | 1 / 4x1.5 | 6SL3210-1SE21-0❑A0 | 10.2 | 45.4 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7084-2AF7 | 20.0 | 1 / 4x1.5 | 6SL3210-1SE21-8❑A0 | 18 | 41.5 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7100-2AC7 | 18.0 | 1 / 4x1.5 | 6SL3210-1SE21-0❑A0 | 10.2 | 41.5 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7100-2AF7 | 18.0 | 1 / 4x1.5 | 6SL3210-1SE21-8❑A0 | 18 | 40.7 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7101-2AC7 | 27.0 | 1.5 / 4x1.5 | 6SL3210-1SE21-8❑A0 | 18 | 55.0 | 6FX❑002-5❑G22-❑❑❑❑ |
| 1FK7101-2AF7 | 27.0 | 1.5 / 4x2.5 | 6SL3210-1SE22-5❑A0 | 25 | 51.8 | 6FX❑002-5❑G32-❑❑❑❑ |
| 1FK7103-2AC7 | 36.0 | 1.5 / 4x1.5 | 6SL3210-1SE21-8❑A0 | 18 | 64.2 | 6FX❑002-5❑G22-❑❑❑❑ |
| 1FK7103-2AF7 | 36.0 | 1.5 / 4x4 | 6SL3210-1SE23-2❑A0 | 32 | 69.7 | 6FX❑002-5❑G42-❑❑❑❑ |
| 1FK7105-2AC7 | 48.0 | 1.5 / 4x2.5 | 6SL3210-1SE22-5❑A0 | 25 | 87.3 | 6FX❑002-5❑G32-❑❑❑❑ |
| 1FK7105-2AF7 | 48.0 | 1.5 / 4x6 | 6SL3210-1SE23-2❑A0 | 32 | 78.1 | 6FX❑002-5❑G52-❑❑❑❑ |

Table 1- 10 1FK7 High Inertia

| Motor | | | Converter: SINAMICS S110 / S120 Power Module PM340 | | | Power cable |
|---|---|---|---|---|---|---|
| Order no. | $M_{0\ (100K)}$ [Nm] | Connector size / Cable cross-section | Order no. | $I_N$ [A] | $M_{max\ (100K)}$ [Nm] | Order no. |
| 1FK7042-3BK7 | 3.0 | 1 / 4x1.5 | 6SL3210-1SE16-0❑A0 | 5.9 | 8.1 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7060-3BF7 | 6.0 | 1 / 4x1.5 | 6SL3210-1SE16-0❑A0 | 5.9 | 14.7 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7062-3BF7 | 8.5 | 1 / 4x1.5 | 6SL3210-1SE16-0❑A0 | 5.9 | 17.5 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7081-3BF7 | 12.0 | 1 / 4x1.5 | 6SL3210-1SE21-0❑A0 | 10.2 | 26.5 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7084-3BC7 | 20.0 | 1 / 4x1.5 | 6SL3210-1SE21-0❑A0 | 10.2 | 45.4 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7084-3BF7 | 20.0 | 1 / 4x1.5 | 6SL3210-1SE21-8❑A0 | 18 | 41.5 | 6FX❑002-5❑G10-❑❑❑❑ |

Table 1- 11 1FK7 High Dynamic

| Motor | | | Converter: SINAMICS S110 / S120 Power Module PM340 | | | Power cable |
|---|---|---|---|---|---|---|
| Order no. | $M_{0\ (100K)}$ [Nm] | Connector size / Cable cross-section | Order no. | $I_N$ [A] | $M_{max\ (100K)}$ [Nm] | Order no. |
| 1FK7033-4CK7 | 1.3 | 1 / 4x1.5 | 6SL3210-1SE12-2UA0 | 2.2 | 2.6 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7043-4CH7 | 3.5 | 1 / 4x1.5 | 6SL3210-1SE14-1UA0 | 4.1 | 6.8 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7043-4CK7 | 3.5 | 1 / 4x1.5 | 6SL3210-1SE16-0❑A0 | 5.9 | 7.1 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7044-4CF7 | 4.5 | 1 / 4x1.5 | 6SL3210-1SE14-1UA0 | 4.1 | 9.0 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7044-4CH7 | 4.5 | 1 / 4x1.5 | 6SL3210-1SE16-0❑A0 | 5.9 | 9.6 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7061-4CF7 | 6.4 | 1 / 4x1.5 | 6SL3210-1SE17-7❑A0 | 7.7 | 14.8 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7061-4CH7 | 6.4 | 1 / 4x1.5 | 6SL3210-1SE21-0❑A0 | 10.2 | 13.9 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7064-4CC7 | 12.0 | 1 / 4x1.5 | 6SL3210-1SE21-0❑A0 | 10.2 | 27.2 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7064-4CF7 | 12.0 | 1 / 4x1.5 | 6SL3210-1SE21-8❑A0 | 18 | 26.7 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7064-4CH7 | 12.0 | 1 / 4x1.5 | 6SL3210-1SE21-8❑A0 | 18 | 20.1 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7085-4CC7 | 22.0 | 1 / 4x1.5 | 6SL3210-1SE21-8❑A0 | 18 | 39.8 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7085-4CF7 | 22.0 | 1.5 / 4x4 | 6SL3210-1SE22-5❑A0 | 25 | 35.8 | 6FX❑002-5❑G42-❑❑❑❑ |
| 1FK7086-4CC7 | 28.0 | 1 / 4x1.5 | 6SL3210-1SE21-8❑A0 | 18 | 52.1 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7086-4CF7 | 28.0 | 1.5 / 4x4 | 6SL3210-1SE22-5❑A0 | 25 | 46.9 | 6FX❑002-5❑G42-❑❑❑❑ |

## 1FK7 for SINAMICS S110/S120 Power Modules PM340, DC link voltage 270 V to 330 V DC, (line voltage 200 V to 240 V, 1AC)

Table 1- 12 1FK7 Compact

| Motor | | | Converter: SINAMICS S110 / S120 Power Module PM340 | | | Power cable |
|---|---|---|---|---|---|---|
| Order no. | $M_{0\ (100K)}$ [Nm] | Connector size / Cable cross-section | Order no. | $I_N$ [A] | $M_{max\ (100K)}$ [Nm] | Order no. |
| 1FK7011-5AK2 | 0.18 | 0.5 / 4x1.5 | 6SL3210-1SB11-0❑A0 | 0.9 | 0.4 | 6FX5002-5DN30-❑❑❑❑ |
| 1FK7015-5AK2 | 0.35 | 0.5 / 4x1.5 | 6SL3210-1SB11-0❑A0 | 0.9 | 0.8 | 6FX5002-5DN30-❑❑❑❑ |
| 1FK7022-5AK2 | 0.85 | 1 / 4x1.5 | 6SL3210-1SB12-3❑A0 | 2.3 | 2.1 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7032-2AF2 | 1.15 | 1 / 4x1.5 | 6SL3210-1SB12-3❑A0 | 2.3 | 3.2 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7034-2AF2 | 1.6 | 1 / 4x1.5 | 6SL3210-1SB12-3❑A0 | 2.3 | 3.8 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7042-2AF2 | 3.0 | 1 / 4x1.5 | 6SL3210-1SB14-0❑A0 | 3.9 | 5.9 | 6FX❑002-5❑G10-❑❑❑❑ |

Table 1- 13 1FK7 High Dynamic

| Motor | | | Converter: SINAMICS S110 / S120 Power Module PM340 | | | Power cable |
|---|---|---|---|---|---|---|
| Order no. | $M_{0\ (100K)}$ [Nm] | Connector size / Cable cross-section | Order no. | $I_N$ [A] | $M_{max\ (100K)}$ [Nm] | Order no. |
| 1FK7033-4CF2 | 1.3 | 1 / 4x1.5 | 6SL3210-1SB12-3❑A0 | 2.3 | 2.7 | 6FX❑002-5❑G10-❑❑❑❑ |
| 1FK7043-4CF2 | 3.3 | 1 / 4x1.5 | 6SL3210-1SB14-0❑A0 | 3.9 | 6.4 | 6FX❑002-5❑G10-❑❑❑❑ |

# Configuration 2

## 2.1 Configuring software

### 2.1.1 Configuration tool SIZER for SIEMENS Drives

#### Overview

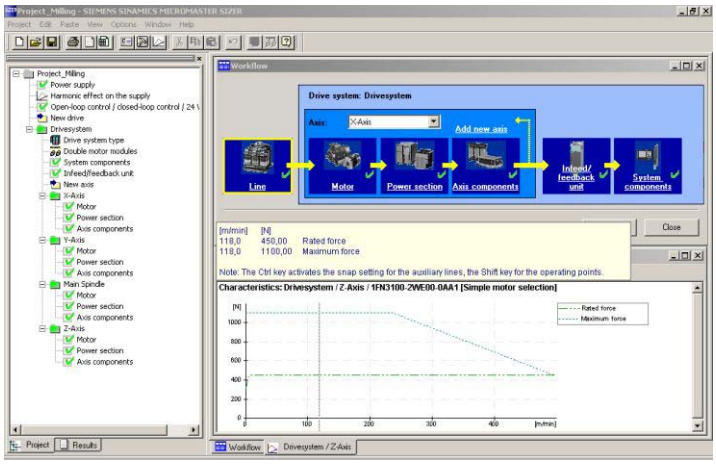



Figure 2-1 SIZER for SIEMENS Drives

The user-friendly configuration of the SINAMICS drive family is carried out using the configuration tool SIZER for SIEMENS Drives. It provides support for the technical planning of the hardware and firmware components required for a drive task. SIZER for SIEMENS Drives covers the full range of operations required to configure a complete drive system, from simple single drives to complex multi-axis applications.

SIZER for SIEMENS Drives supports all the configuration steps in a single workflow:

- Configuring the power supply
- Designing the motor and gearbox, including calculation of mechanical transmission elements
- Configuring the drive components
- Compiling the required accessories
- Selection of the line-side and motor-side power options

When SIZER for SIEMENS Drives was being designed, particular importance was placed on a high degree of usability and a holistic, function-based approach to the drive application. The extensive user navigation makes it easy to use the tool. Status information keeps you continually informed about how engineering is progressing.

The SIZER for SIEMENS Drives user interface is available in German and English. The drive configuration is saved in a project. In the project, the components and functions used are displayed in a hierarchical tree structure. The project view permits the configuration of drive systems and the copying/inserting/modifying of drives already configured.

The configuration process produces the following results:

- Parts list of components required (Export to Excel)
- Technical specifications of the system
- Characteristics
- Comments on system reactions
- Location diagram of drive and control components and dimension drawings

These results are displayed in a results tree and can be reused for documentation purposes. User support is provided by technological online help, which provides the following information:

- Detailed technical data
- Information about the drive systems and their components
- Decision-making criteria for the selection of components.

Table 2- 1 Order number for SIZER for SIEMENS Drives

| Configuration tool | Order number (MLFB) of the DVD |
|---|---|
| SIZER for SIEMENS Drives<br>German/English | 6SL3070-0AA00-0AG0 |

## Minimum system requirements

- PC or PG with Pentium™ III 800 MHz (recommended > 1 GHz)
- 512 MB RAM (1 GB recommended)
- At least 4.1 GB free hard disk space
- In addition, 100 MB free hard disk space on the Windows system drive
- Screen resolution 1024 × 768 pixels (1280 x 1024 pixels recommended)
- Windows™ 7 Professional (32 bit), 7 Ultimate (32 bit), XP Prof SP2, XP Home SP2, XP 64 bit SP2, Vista Business
- Microsoft Internet Explorer 5.5 SP2

## 2.1.2 STARTER drive/commissioning software

The STARTER commissioning tool provides

- Commissioning
- Optimization
- Diagnostics

Table 2- 2 Order number for STARTER

| Commissioning tool | Order number (MLFB) of the DVD |
|---|---|
| STARTER<br>German, English, French, Italian, Spanish | 6SL3072-0AA00-0AG0 |

### Minimum system requirements

- Hardware
  - PG or PC with Pentium III min. 800 MHz (recommended > 1 GHz)
  - 512 MB RAM (1 GB recommended)
  - Screen resolution 1024 × 768 pixels, 16-bit color depth
  - Free hard disk memory: min. 2 GB;
- Software
  - Microsoft Windows 2000 SP4
  - Microsoft Windows Server 2003 SP1 and SP2 (PCS7)
  - Microsoft Windows XP Professional SP2 and SP3
  - Microsoft Windows VISTA Business SP1 *)
  - Microsoft Windows VISTA Ultimate SP1 *)
  - Microsoft Internet Explorer V6.0 or higher

*) DCC cannot be used.
STARTER can be used on these operating systems only if it does not include the DCC option.

### 2.1.3 SinuCom commissioning tool

The simple-to-use commissioning software SinuCom is used for the commissioning of SINUMERIK controls in combination with the SINAMICS S120 drives and SIMODRIVE 611 digital.

Table 2- 3 Order number for SinuCom

| Commissioning tool | Order number (MLFB) of the DVD |
|---|---|
| SinuCom<br>German, English, French, Italian, Spanish | 6FC5862-2YC00-0YA0 |

## 2.2 Configuring procedure

### Motion control

Drives are optimized for motion control applications. They execute linear or rotary movements within a defined movement cycle. All movements should be optimized in terms of time.

As a result, drives must meet the following requirements:

- High dynamic response, i.e. short rise times
- Capable of overload, i.e. a high reserve for accelerating
- Wide control range, i.e. high resolution for precise positioning.

The following table "Configuring procedure" is valid for synchronous and induction motors.

## General configuring procedure

The function description of the machine provides the basis when configuring the drive application. The definition of the components is based on physical interdependencies and is usually carried out as follows:

Table 2- 4 Configuring procedure

| step | Description of the configuring activity | |
|---|---|---|
| 1. | Clarification of the type of drive | Refer to the next chapter |
| 2. | Definition of supplementary conditions and integration into an automation system | |
| 3. | Definition of the load, calculation of the maximum load torque and selection of the motor | |
| 4. | Selection of the SINAMICS Motor Module | Refer to catalog |
| 5. | Steps 3 and 4 are repeated for additional axes | |
| 6. | Calculation of the required DC link power and selection of the SINAMICS Line Module | |
| 7. | Selection of the line-side options (main switch, fuses, line filters, etc.) | |
| 8. | Specification of the required control performance and selection of the Control Unit, definition of component cabling | |
| 9. | Definition of other system components (e.g. braking resistors) | |
| 10. | Calculation of the current demand of the 24 V DC supply for the components and specification of the power supplies (SITOP devices, Control Supply Modules) | |
| 11. | Selection of the components for the connection system | |
| 12. | Configuration of the drive line-up components | |
| 13. | Calculation of the required cable cross sections for power supply and motor connections | |
| 14. | Inclusion of mandatory installation clearances | |

### 2.2.1 1. Clarification of the type of drive

The motor is selected on the basis of the required torque, which is defined by the application, e.g. traveling drives, hoisting drives, test stands, centrifuges, paper and rolling mill drives, feed drives or main spindle drives. Gearboxes to convert motion or to adapt the motor speed and motor torque to the load conditions must also be considered.

As well as the load torque, which is determined by the application, the following mechanical data is among those required to calculate the torque to be provided by the motor:

- Masses to be moved
- Diameter of the drive wheel
- Leadscrew pitch, gear ratios
- Frictional resistance
- Mechanical efficiency
- Traversing paths

- Maximum velocity
- Maximum acceleration and maximum deceleration
- Cycle time

### 2.2.2 2. Defining the supplementary conditions and integration into an automation system

You must decide whether synchronous or induction motors are to be used.

Synchronous motors are the best choice if it is important to have low envelope dimensions, low rotor moment of inertia and therefore maximum dynamic response ("Servo" control type).

Induction motors can be used to increase maximum speeds in the field weakening range. Induction motors for higher power ratings are also available.

The following factors are especially important when engineering a drive application:

- The line system configuration, when using specific types of motor and/or line filters on IT systems (non-grounded systems)
- The utilization of the motor in accordance with rated values for winding temperature rise 60 K or 100 K (for synchronous motors).
- The ambient temperatures and the installation altitude of the motors and drive components.
- Heat dissipation from the motors through natural ventilation, forced ventilation or water cooling

Other constraints apply when integrating the drives into an automation environment such as SINUMERIK or SIMOTION.

For motion control and technology functions (e.g. positioning), as well as for synchronous operation functions, the corresponding automation system, e.g. SIMOTION D, is used.

### 2.2.3 3. Definition of the load, calculation of max. load torque and definition of the motor

The motor-specific limiting characteristics provide the basis for defining the motors.

These define the torque or power characteristic versus the speed and take into account the motor limits based on the DC link voltage. The DC link voltage is dependent on the line voltage. In the case of torque drive the DC link voltage is dependent on the type of Line Module and the type of infeed module or infeed/regenerative feedback module.

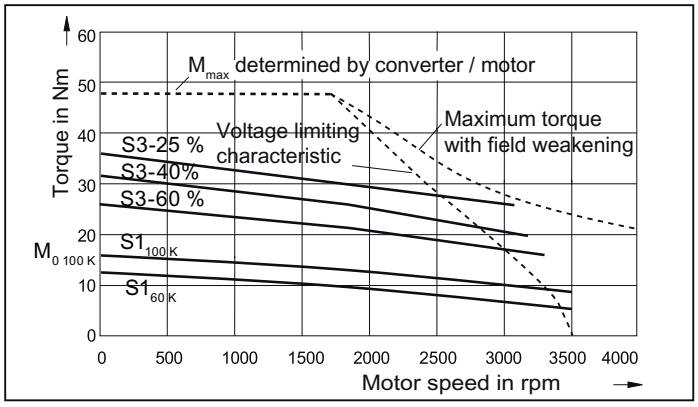



Figure 2-2 Limit characteristics for synchronous motors

The motor is selected based on the load which is specified by the application. Different characteristic curves must be used for different load events.

The following operating scenarios have been defined:

- Load duty cycle with constant ON period
- Load duty cycles with varying ON period
- Free duty cycle

The objective is to identify characteristic torque and speed operating points, on the basis of which the motor can be selected depending on the particular load.

Once the operating scenario has been defined and specified, the maximum motor torque is calculated. Generally, the maximum motor torque is required when accelerating. The load torque and the torque required to accelerate the motor are added.

The maximum motor torque is then verified with the limiting characteristic curves of the motors.

The following criteria must be taken into account when selecting the motor:

- The dynamic limits must be adhered to, i.e., all speed-torque points of the relevant load event must lie below the relevant limiting characteristic curve.
- The thermal limits must be adhered to, i.e. the RMS motor torque at the average motor speed resulting from the duty cycle must lie below the S1 characteristic curve (continuous duty).

## Load duty cycles with constant on period

For duty cycles with constant ON period, there are specific requirements for the torque characteristic curve as a function of the speed, for example:

M = constant, M ~ $n^2$, M ~ n or P = constant.

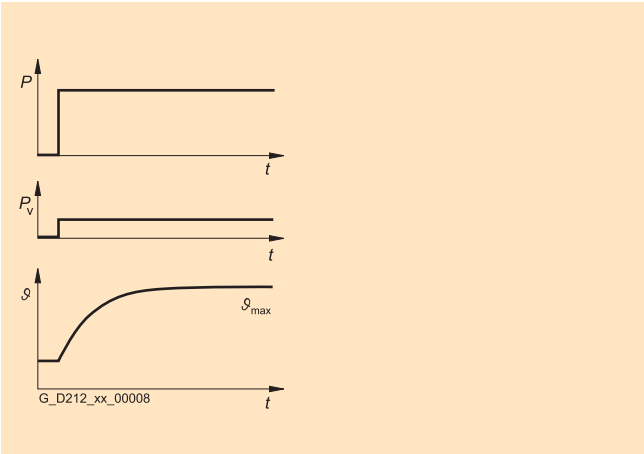



Figure 2-3 S1 duty (continuous operation)

These drives typically operate at a specific operating point. Drives such as these are dimensioned for a base load. The base load torque must lie below the S1 characteristic curve. In the event of transient overloads (e.g. when accelerating) an overload has to be taken into consideration. The overload current must be calculated relative to the required overload torque. The peak torque must lie below the voltage limiting characteristic.

In summary, the motor is selected as follows:

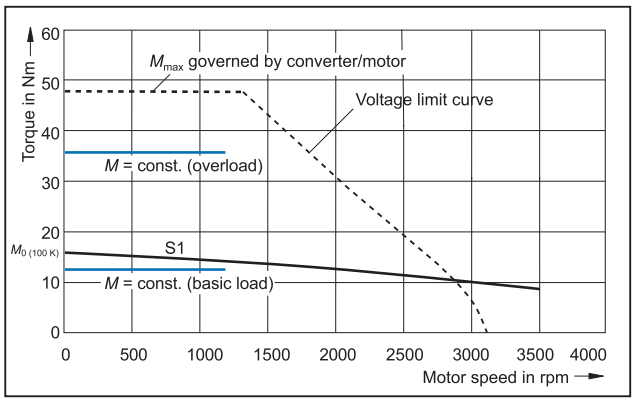



Figure 2-4 Selection of motors for load duty cycles with constant on period (examples)

## Load duty cycles with varying on period

As well as continuous duty (S1), standard intermittent duty types (S3) are also defined for load duty cycles with varying on periods. This involves operation that comprises a sequence of similar load cycles, each of which comprises a time with constant load and an off period.

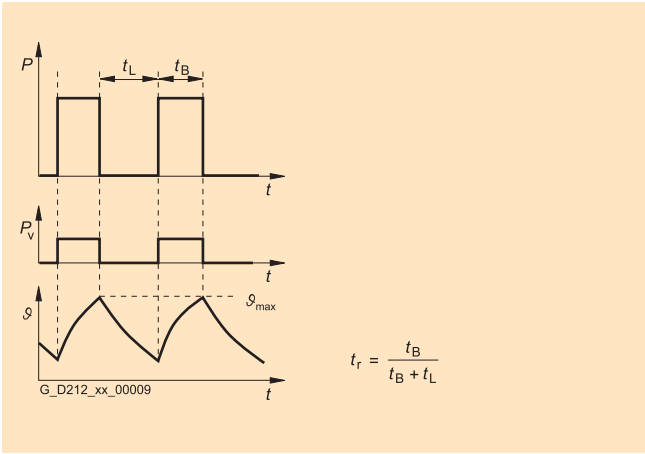



Figure 2-5 S3 duty (intermittent operation without influencing starting)

Fixed variables are usually used for the relative on period:

- S3 – 60%
- S3 – 40%
- S3 – 25%

The corresponding motor characteristics are provided for these specifications. The load torque must lie below the corresponding thermal limiting characteristic curve of the motor. An overload must be taken into consideration for load duty cycles with varying on periods.

## Free duty cycle

A load duty cycle defines the characteristics of the motor speed and the torque with respect to time.

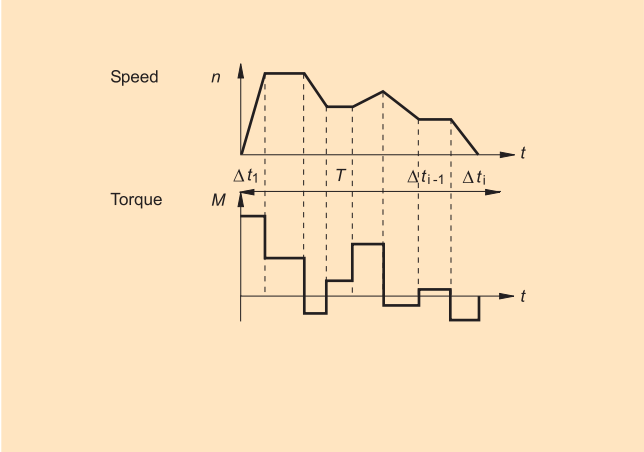



Figure 2-6 Example of a load duty cycle

A load torque is specified for each time period. In addition to the load torque, the average load moment of inertia and motor moment of inertia must be taken into account for acceleration. It may be necessary to take into account a frictional torque that opposes the direction of motion.

When a gearbox is mounted:
The gear ratio and gear efficiency must be taken into account when calculating the load and/or accelerating torque to be provided by the motor. A higher gear ratio increases positioning accuracy in terms of encoder resolution. For any given motor encoder resolution, as the gear ratio increases, so does the resolution of the machine position to be detected.

**Note**

The following formulas can be used for duty cycles outside the field weakening range. For duty cycles in the field weakening range, the drive system must be engineered using the SIZER engineering tool.

For the motor torque in a time slice $\Delta t_i$ the following applies:

$$M_{Mot,\,i} = \left(J_M + J_G\right) \bullet \frac{2\pi}{60} \bullet \frac{\Delta n_{Last,\,i}}{\Delta t_i} \bullet i + \left(J_{Last} \bullet \frac{2\pi}{60} \bullet \frac{\Delta n_{Last,\,i}}{\Delta t_i} + M_{Last,\,i} + M_R\right) \bullet \frac{1}{i \bullet \eta_G}$$

The motor speed is:

$$n_{Mot,\,i} = n_{Last,\,i} \bullet i$$

The RMS torque is obtained as follows:

$$M_{\text{Mot, eff}} = \sqrt{\frac{\sum M_{\text{Mot, i}}^2 \bullet \Delta t_i}{T}}$$

The average motor speed is calculated as follows:

$$n_{\text{Mot, mittel}} = \frac{\sum \frac{n_{\text{Mot, k, A}} + n_{\text{Mot, k, E}}}{2} \bullet \Delta t_i}{T}$$

| | |
|---|---|
| $J_M$ | Motor moment of inertia |
| $J_G$ | Gearbox moment of inertia |
| $J_{load}$ | Load moment of inertia |
| $n_{Load}$ | Load speed |
| i | Gear ratio |
| $\eta_G$ | Gearbox efficiency |
| $M_{load}$ | Load torque |
| $M_R$ | Frictional torque |
| T | Cycle time, clock cycle time |
| A; E | Initial value, final value in time slice $\Delta t_i$ |
| $t_e$ | ON period |
| $\Delta t_i$ | Time interval |

The RMS torque $M_{rms}$ must lie below the S1 curve.

The maximum torque $M_{max}$ is produced during the acceleration operation. $M_{max}$ must lie below the voltage limiting characteristic curve. In summary, the motor is selected as follows:

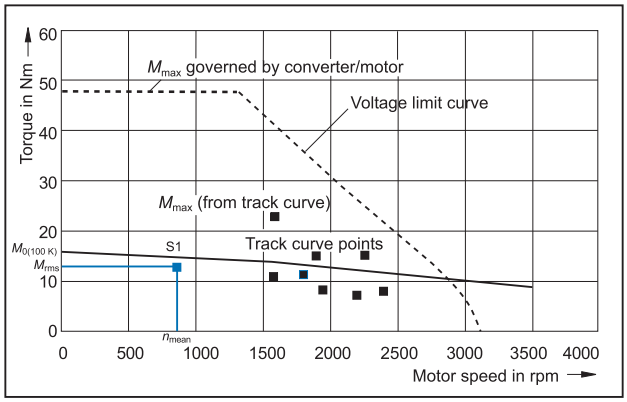



Figure 2-7 Selecting motors depending on the load duty cycle (example)

### Specification of the motor

Through variation, it is now possible to identify a motor which meets the requirements of the application (duty cycle).

In a second step, a check is made as to whether the thermal limits are maintained. To do this, the motor current at the base load must be calculated. The calculation depends on the type of motor used (synchronous motor, induction motor) and the particular application (duty cycle). When configuring according to duty cycle with constant ON period with overload, the overload current must be calculated relative to the required overload torque.

Finally, the other motor features must be defined by configuring the motor options.

# Mechanical properties of the motors 3

## 3.1 Cooling

For naturally-cooled motors, the heat loss is dissipated through thermal conduction, radiation and natural convection. As a consequence, adequate heat dissipation must be guaranteed by suitably mounting the motor.

To ensure sufficient cooling, a minimum clearance of 100 mm to adjacent components must be observed on 3 sides.

The rated data only applies when the ambient temperature does not exceed 40 °C (104 °F) as a result of the installation conditions.

## 3.2 Degree of protection

The degree of protection designation in accordance with EN 60034-5 and IEC 60034-5 is made using the letters "IP" and two digits (e.g. IP64).

IP = International Protection

1. digit = protection against the ingress of foreign bodies

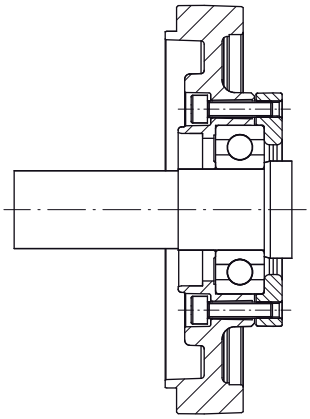
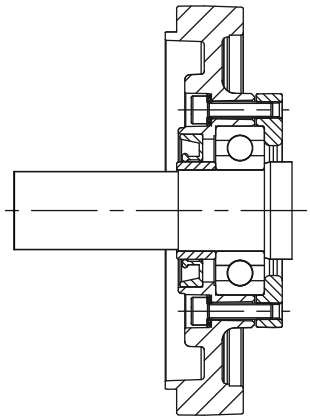
2. digit = protection against water

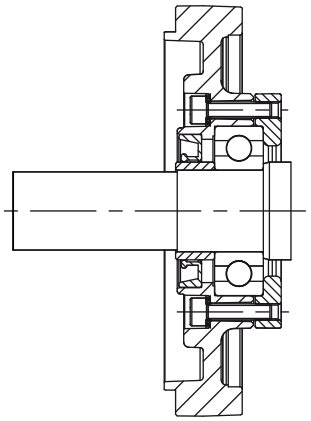
Since most cooling lubricants used in machine tools and transfer machines are oily, creep-capable, and/or corrosive, protection against water alone is insufficient. The servo motors must be protected by suitable covers.

Attention must be paid to providing suitable sealing of the motor shaft for the selected degree of protection for the motor.

## Sealing of the motor shaft

Table 3- 1 Sealing of the motor shaft

| Degree of protection acc. to EN 60034-5) | Shaft sealing using | Area of application |
|---|---|---|
| IP64 | Labyrinth seal  | It is not permissible that there is any moisture in the area around the shaft and the flange.<br>Note:<br>For IP 64 degree of protection it is not permissible that liquid collects in the flange.<br>Shaft outlet is not dust-tight |
| IP65 | Radial shaft sealing ring without annular spring  | Shaft outlet seal to protect against spray water and cooling-lubricating medium. It is permissible that the radial shaft sealing ring runs dry. Lifetime approx. 25000 h (nominal value).<br>For IP65 degree of protection it is not permissible that liquid collects in the flange. |

| Degree of protection acc. to EN 60034-5) | Shaft sealing using | Area of application |
|---|---|---|
| IP65, shaft outlet IP67 | Radial shaft sealing ring  | For this version, the shaft gland + flange has a degree of protection IP67. The rest of the motor has degree of protection IP65.<br>For gearbox mounting (for gearboxes that are not sealed) to seal against oil.<br>The sealing lip must be adequately cooled and lubricated by the gearbox oil in order to guarantee reliable function.<br>Lifetime approx. 10000 h (nominal value).<br>If a radial shaft sealing ring runs dry, then this has a negative impact on its functionality and the lifetime. |

## 3.3 Bearing version

The 1FK7 motors are equipped with permanently lubricated deep-groove ball bearings. The location bearing is at the DE.

## 3.4 Radial and axial forces

### 3.4.1 Calculating the belt pre-tension

$F_V$ [N] = 2 • $M_0$ • c / $d_R$ $F_V \leq F_{R, perm}$

Table 3- 2 Explanation of the formula abbreviations

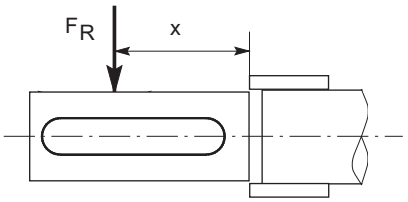
| Formula abbreviations | Unit | Description |
|---|---|---|
| $F_V$ | N | Belt pre-tension |
| $M_0$ | Nm | Motor static torque |
| c | — | Pre-tensioning factor: this factor is an empirical value provided by the belt manufacturer. It can be assumed to be as follows:<br>for toothed belts: c = 1.5 to 2.2<br>for flat belts c = 2.2 to 3.0 |
| $d_R$ | m | Effective diameter of the belt pulley |
| $F_{R, perm}$ | N | Permissible radial force |

When using other configurations, the actual forces, generated from the torque being transferred, must be taken into account.

## 3.4.2 Radial force loading

Point of application of radial forces $F_R$ at the shaft end

- for average operating speeds
- for a nominal bearing service life ($L_{10\,h}$) of 25 000 h




Maß x:
Abstand zwischen dem Angriffspunkt der Kraft $F_R$ und der Wellenschulter in mm.
Dimension x:
Distance between the point of application of the force $F_R$ and the shaft shoulder in mm.

Figure 3-1 Force application point at the DE

## 3.4.3 Radial force diagrams

### Radial force, 1FK7011

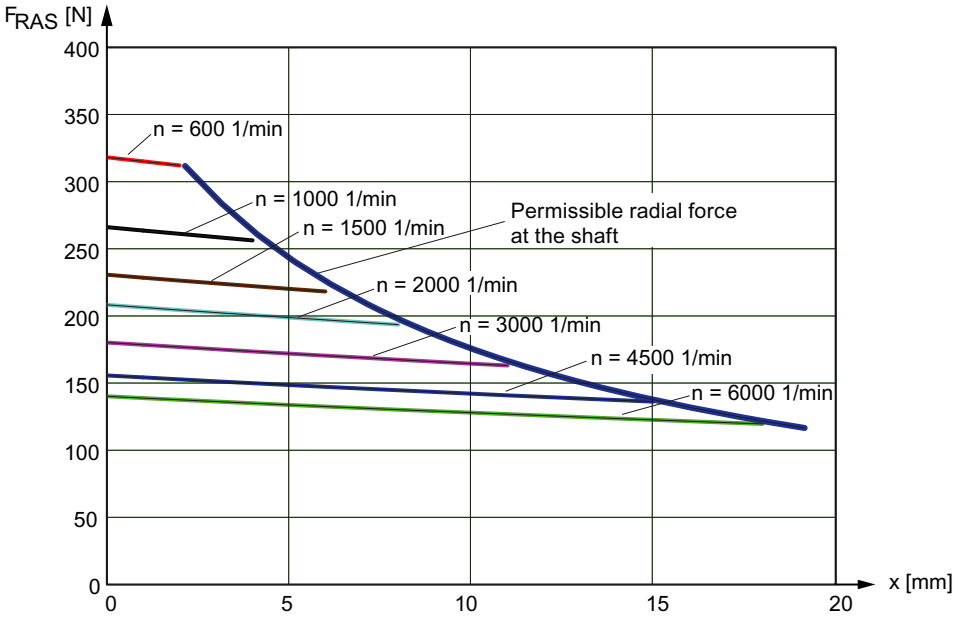



Figure 3-2 Radial force $F_R$ at a distance x from the shaft shoulder for a nominal bearing lifetime of 25000 h

## Radial force, 1FK7015

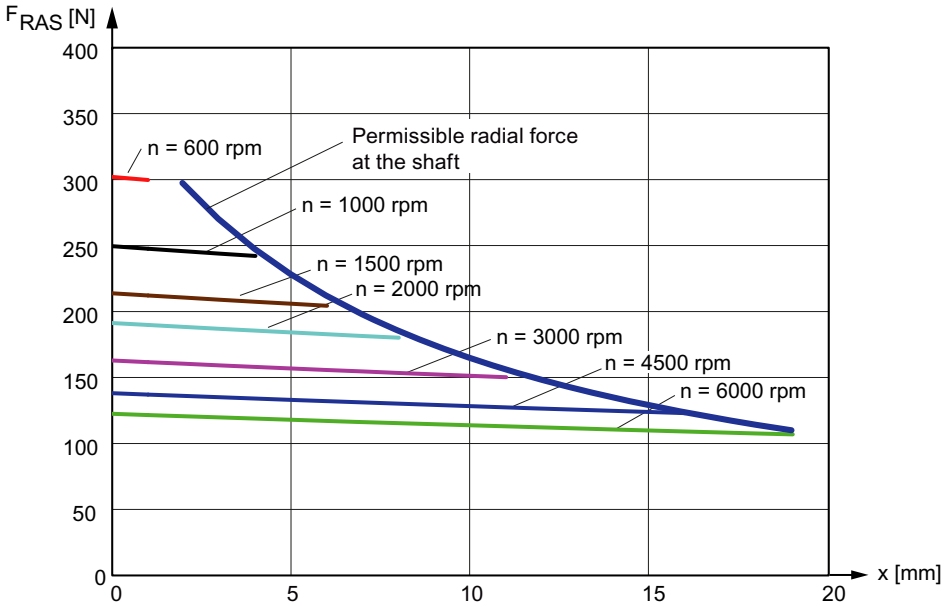



Figure 3-3 Radial force $F_R$ at a distance x from the shaft shoulder for a nominal bearing lifetime of 25000 h

## Radial force, 1FK702

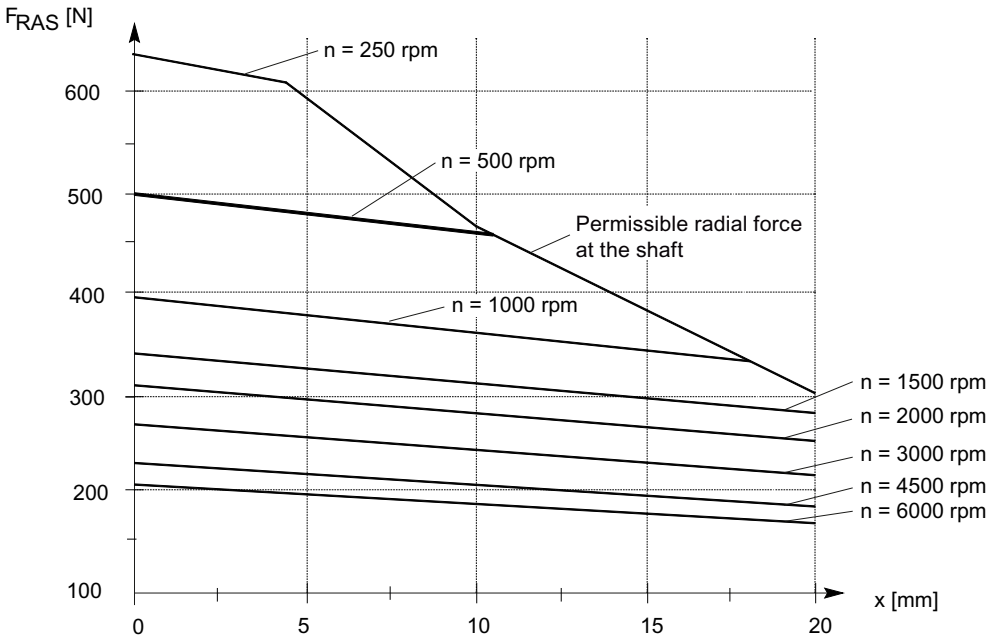



Figure 3-4 Radial force $F_R$ at a distance x from the shaft shoulder for a nominal bearing lifetime of 25000 h

## Radial force, 1FK703

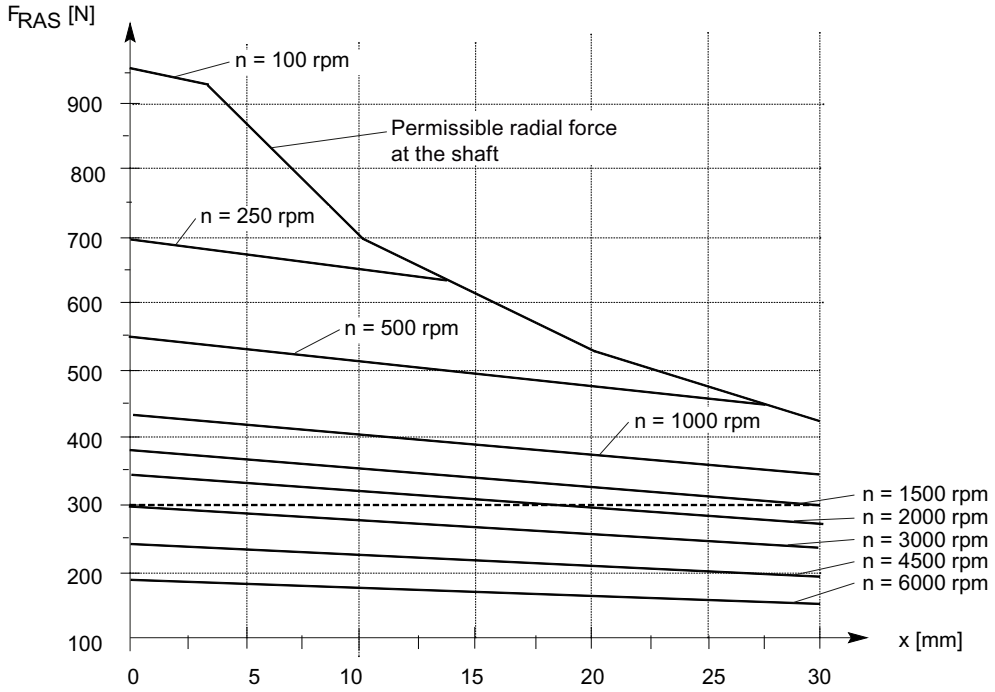



Figure 3-5 Radial force $F_R$ at a distance x from the shaft shoulder for a nominal bearing lifetime of 25000 h

## Radial force, 1FK704

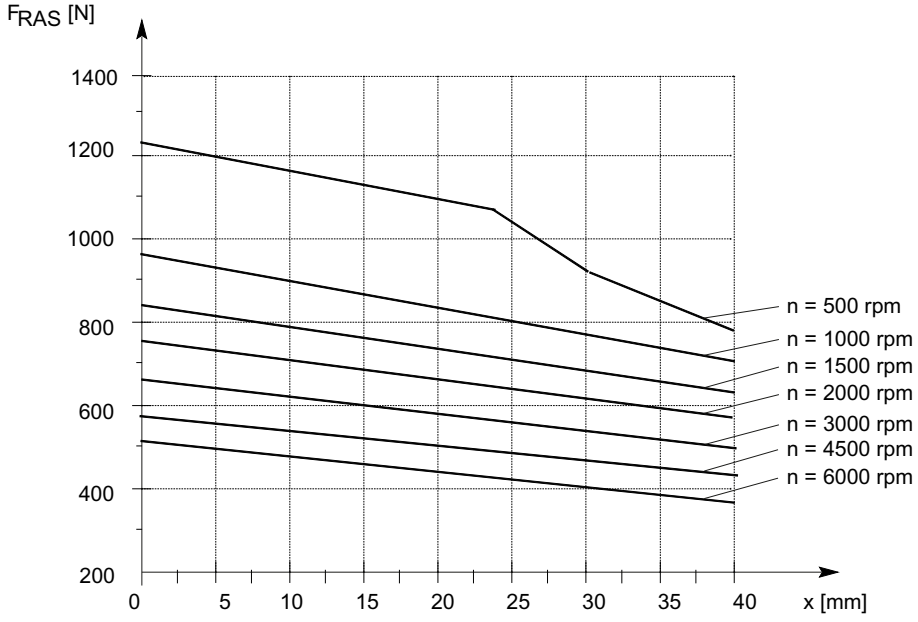



Figure 3-6 Radial force $F_R$ at a distance x from the shaft shoulder for a nominal bearing lifetime of 25000 h

## Radial force, 1FK706

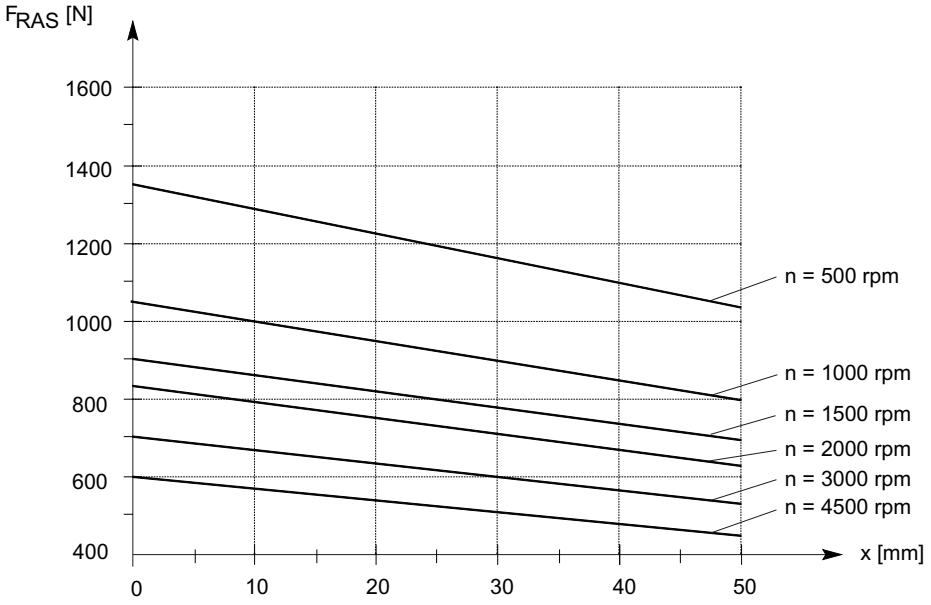



Figure 3-7 Radial force $F_R$ at a distance x from the shaft shoulder for a nominal bearing lifetime of 25000 h

## Radial force, 1FK708

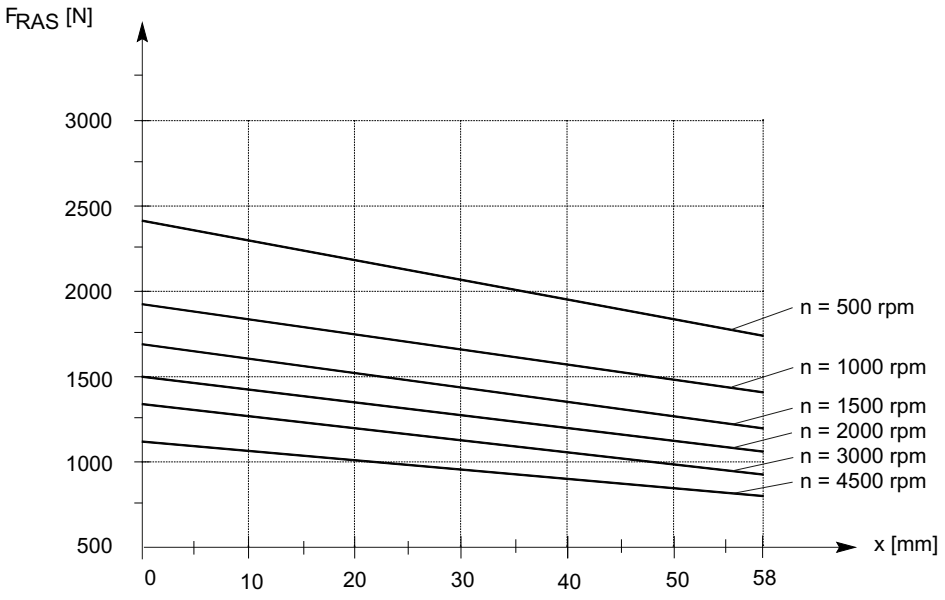



Figure 3-8 Radial force $F_R$ at a distance x from the shaft shoulder for a nominal bearing lifetime of 25000 h

### Radial force, 1FK710

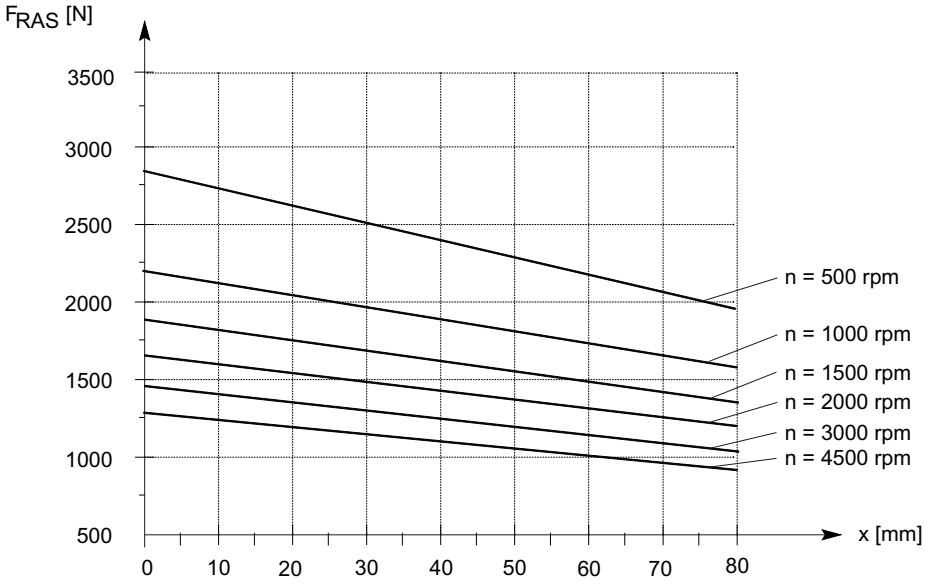



Figure 3-9 Radial force $F_R$ at a distance x from the shaft shoulder for a nominal bearing lifetime of 25000 h

## 3.4.4 Axial force stressing

When using, for example, helical toothed wheels as drive element, in addition to the radial force, there is also an axial force on the motor bearings. For axial forces, the spring-loading of the bearings can be overcome so that the rotor is displaced corresponding to the axial bearing play present.

| Shaft height | Displacement |
|---|---|
| 36 and 48 | approx. 0.2 mm |
| 63 to 100 | approx. 0.35 mm |

An axial force as large as the spring-loading is not permitted (100 ... 500 N). Premature failure is the result when the bearing is not pre-tensioned.

Calculating the permissible axial force: $F_A = F_R \bullet 0.35$

**⚠ WARNING**

**Motors with integrated holding brake**

Motors with integrated holding brake cannot be subject to axial forces!

## 3.5 Smooth running, concentricity and axial eccentricity

The shaft and flange accuracies are checked according to DIN 42955, IEC 60072-1. Any specifications deviating from these values are stated on the dimension drawings.

Table 3- 3 Radial eccentricity tolerance of the shaft to the frame axis (referred to cylindrical shaft ends)

| Shaft height | Motor | Standard N |
|---|---|---|
| 20 | 1FK701 | 0.03 mm |
| 28 | 1FK702 | 0.03 mm |
| 36 | 1FK703 | 0.035 mm |
| 48, 63 | 1FK704/1FK706 | 0.04 mm |
| 80, 100 | 1FK708/1FK710 | 0.05 mm |

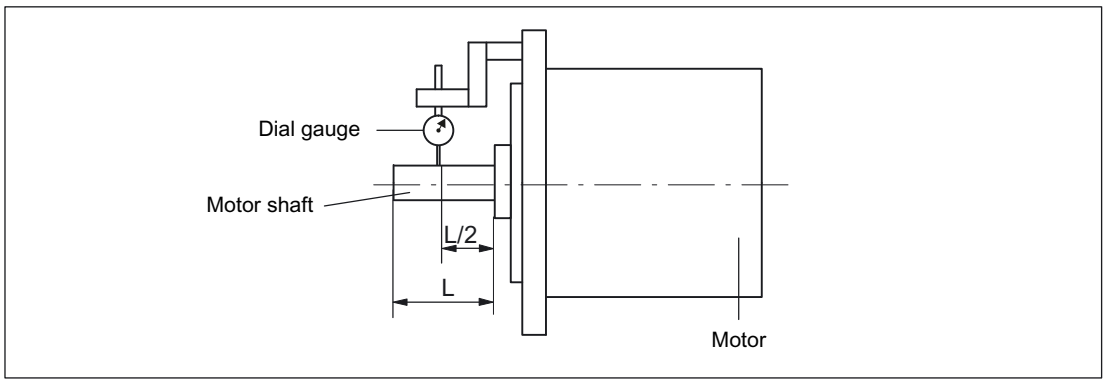



Figure 3-10 Checking the radial eccentricity

Table 3- 4 Concentricity and axial eccentricity tolerance of the flange surface to the shaft axis (referred to the centering diameter of the mounting flange)

| Shaft height | Motor | Standard N |
|---|---|---|
| 20 | 1FK701 | 0.06 mm |
| 28 | 1FK702 | 0.08 mm |
| 36, 48 | 1FK703/1FK704 | 0.08 mm |
| 63, 80, 100 | 1FK706/1FK708/1FK710 | 0.1 mm |

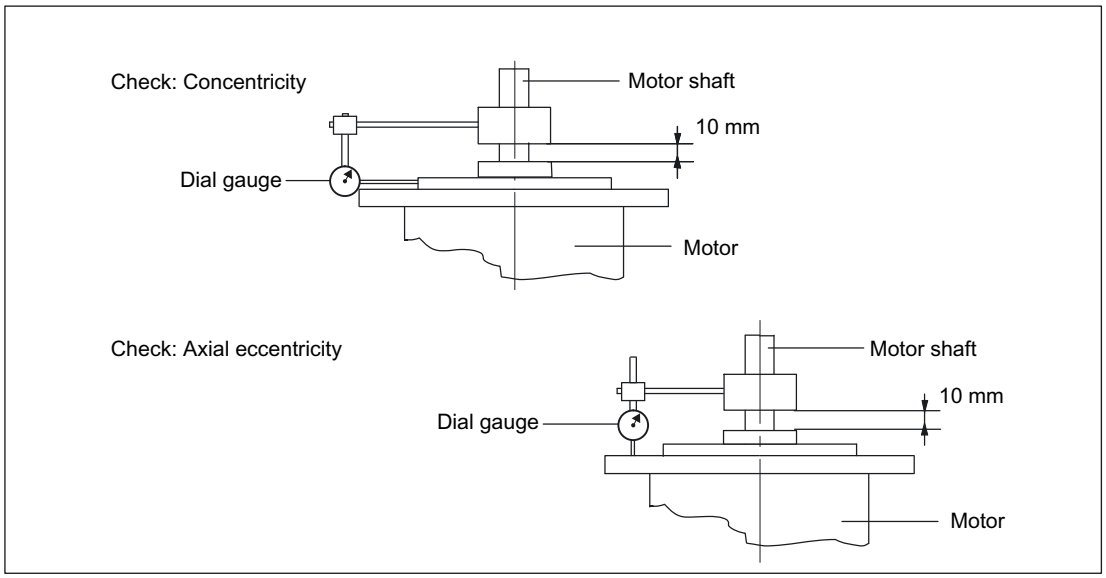



Figure 3-11 Checking the concentricity and axial eccentricity

## 3.6 Shaft end

The drive shaft end is cylindrical in accordance with DIN 748 Part 3, IEC 60072-1. The force-locked shaft-hub coupling is preferred for fast acceleration and reversing operation of the drives.

Standard: plain shaft

Option: keyway and key (half-key balancing)

## 3.7 Balancing

The motors are balanced according to DIN ISO 8821.

Motors with featherkey in the shaft are half-key balanced. The mass equalization for the protruding half key must be taken into account for the output elements.

## 3.8 Vibration severity grade

Motors with a keyway are balanced with a half fitted key by the manufacturer. The vibration response of the system at the installation location is influenced by transmission elements, any mounted parts, the alignment, the installation, and external vibrations. As a result, the motor's vibration values may change.

The motors conform to vibration severity grade A in accordance with EN 60034-14 (IEC 60034-14).

The specified values refer only to the motor. These values can be increased at the motor due to the overall vibration response of the complete system after the drive has been mounted.

The vibration severity level is maintained up to the rated speed ($n_N$).

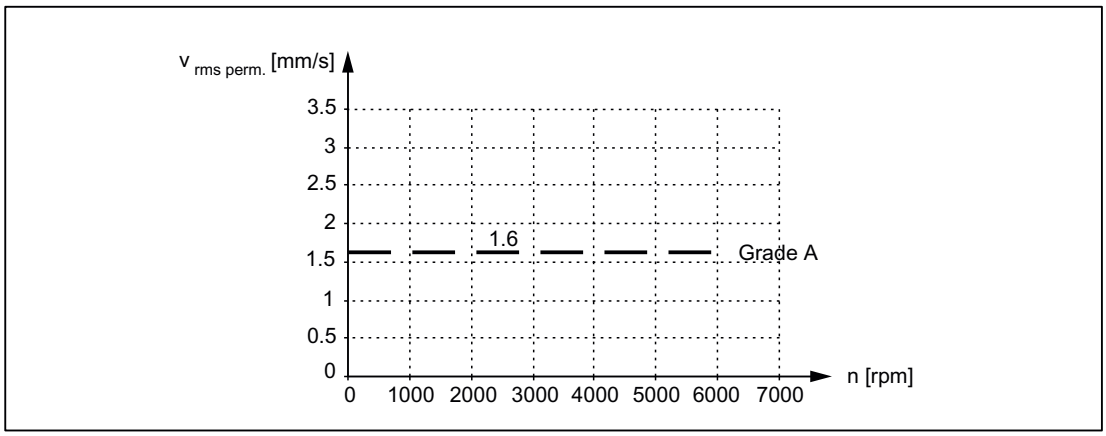



Figure 3-12 Vibration severity levels

## 3.9 Noise emission

When operated in the speed range 0 to rated speed, 1FK7 motors can reach the following measuring-surface sound pressure level Lp(A):

Table 3- 5 Sound pressure level

| Shaft height | Measuring-surface sound pressure level Lp(A) |
|---|---|
| 1FK701 to 1FK704 | 55 dB(A) + 3 dB tolerance |
| 1FK706 | 65 dB(A) + 3 dB tolerance |
| 1FK708 to 1FK710 | 70 dB(A) + 3 dB tolerance |

The motors are certified for a wide range of installation and operating conditions. These conditions such as rigid or vibration-isolated foundation design influence noise emission, sometimes significantly.

## 3.10 Paint finish

If no special color is selected, 1FK7 motors are painted in the standard anthracite color (RAL 7016).

Table 3- 6 Order codes of special colors (option)

| Designation | Order code |
|---|---|
| RAL 9005, jet black 1) | X01 |
| RAL 9001, cream white 1) | X02 |
| RAL 6011, reseda green 1) | X03 |
| RAL 7032, gray 1) | X04 |
| RAL 5015, sky blue 1) | X05 |
| RAL 1015, light ivory 1) | X06 |
| RAL 9006, white aluminum (paint suitable for foodstuff environments) 1) | X08 |
| RAL 9023, dark pearl gray 1) | X27 |
| Special paint finish for climate group Worldwide:<br>Primer and paint finish in anthracite, RAL 7016 1) | K23 |
| Special paint finish for climate group Worldwide:<br>Primer and other paint finish may be selected from X01 to X27 2) | K23+X... |
| Primed (unpainted) | K24 |

1) For the paint finish, 1FK701 and 1FK702 motors must be ordered with 3 or 5 at the 16th position of the order number.

2) For the primer, 1FK702 motors must be ordered with 0 or 2 at the 16th position of the order number.

# Technical data and characteristics

# 4

## 4.1 Operating range and characteristics

### Permissible operating range

The permissible operating range is limited by thermal, mechanical, and electromagnetic boundaries. The data in this documentation is valid for self-cooled motors up to an ambient temperature of 40 °C.

The temperature rise of the motor is caused by the losses generated in the motor (current-dependent losses, no-load losses, friction losses). The utilization of the motor depends on the cooling method (naturally cooled, forced ventilation, liquid-cooled). To adhere to the temperature limits, the permissible torque decreases with increasing speed, starting from static torque $M_0$.

### Permissible temperature range, characteristics $S1_{(100\,K)}$ and $S1_{(60\,K)}$

1FK7 motors can be operated up to an average winding temperature of 145 °C.

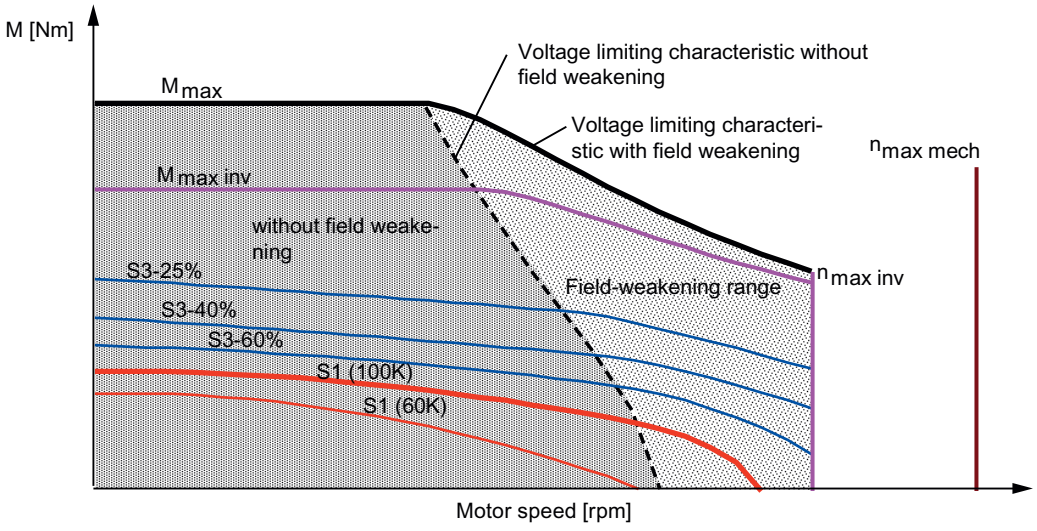



Figure 4-1 Torque characteristics of synchronous motors

For continuous operation, the limits of this permissible temperature range are represented by the S1 characteristic designated as 100 K. This corresponds to utilization according to temperature class 155 (F).

If a lower temperature class is necessary, for example

- If the temperature of the enclosure/housing must lie below 90° C for safety reasons
- If the motor temperature rise would have a negative impact on the machine

the S1 characteristic designated as 60 K can be selected. In this case the motor maintains temperature class 130 (B).

| ⚠ CAUTION |
| --- |
| Continuous duty in the area above the S1 characteristic curve is not thermally permitted for the motor. |

### Periodic intermittent operation, characteristics $S3_{25\%/40\%/60\%}$ and $M_{max}$

In periodic intermittent operation the motor can be subjected to higher loading as a function of the ON period (see also chapter headed "Engineering"). The S3 characteristics identified with the respective ON period (25%, 40% and 60%) apply.

As a general rule the cycle time is 10 minutes. The overtemperature is 100 K.

As an exception, for small motors a cycle time of 1 minute is specified and noted in the characteristic curves. A transient, high overload capacity up to the characteristic $M_{max}$ is provided over the complete speed setting range.

### Recommended Motor Module

In the chapter titled "Motor overview/Assignment of Motor Module" a Motor Module is recommended for each motor in accordance with its stall current. The maximum achievable torque is shown in the characteristic $M_{max\ Inv}$.

When configuring intermittent or overload operation, you must check whether a larger Motor Module may be required in order to provide the necessary peak current.

### Speed limits $n_{max\ mech}$ and $n_{max\ Inv}$

The speed range is limited by the mechanical limit speed $n_{max\ mech}$ (centrifugal forces at the rotor, bearing service life) or the electrical limit speed $n_{max\ Inv}$ (withstand voltage of the converter or max. frequency of the converter).

The maximum permissible speed $n_{max}$ is therefore the minimum of $n_{max\ mech}$ and $n_{max\ Inv}$.

| ⚠ CAUTION |
| --- |
| The maximum permissible speed (mechanical) $n_{max\ mech}$ must not be exceeded. |

**⚠ CAUTION**

When the machine is running (with shaft operated by motor or separately driven) at speeds higher than $n_{max\ Inv}$, a voltage in excess of the maximum permissible converter voltage might be induced in the winding. This can cause irreparable damage to the converter. No operation is therefore permissible above the speed $n_{max\ Inv}$ without protective measures or other additional measures. Siemens AG accepts no liability for any damage occurring as a result of failure to pay heed to this danger warning.

## Torque limit when operating on a SINAMICS S110 / S120 with field weakening

The field weakening function is active as standard for the SINAMICS S110 / S120 drive system. A field-weakening current is injected in such a way as to enable operation to the right of or above the voltage limiting characteristic. The shape of the voltage limiting characteristic for field weakening is determined by the winding version (armature circuit) and the magnitude of the converter output voltage.

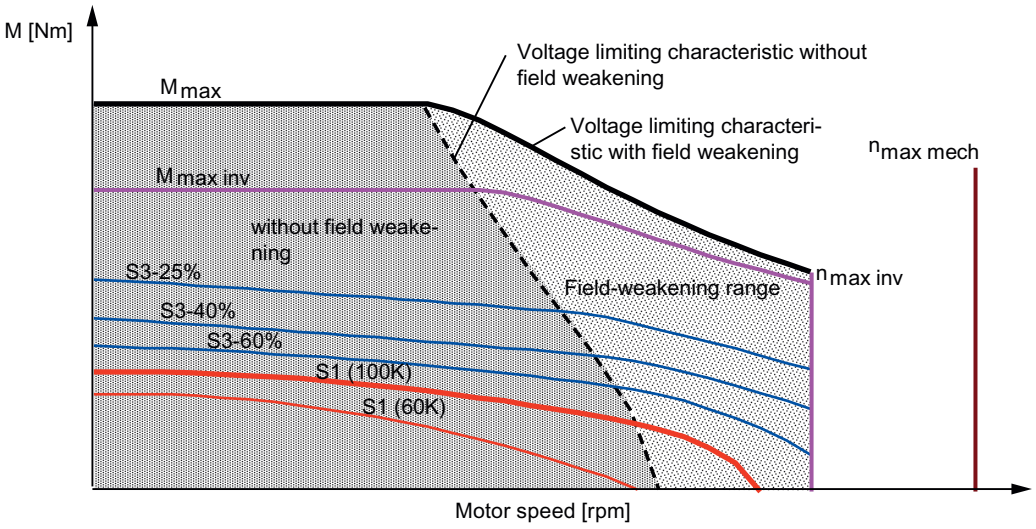



Figure 4-2 Shape of the voltage limiting characteristic with/without field weakening

The characteristic curve is shown for each winding version in a separate data sheet. The torque-speed diagrams for different converter output voltages are assigned to each data sheet:

Table 4- 1 Converter output voltages

| Drive system | Infeed module | Line supply voltage | DC link voltage | Output voltage |
|---|---|---|---|---|
| | | $U_{line}$ | $U_{DC\ link}$ | $U_{mot}$ |
| SINAMICS S110 / S120<br>3 AC 380 - 480 V | ALM<br>ALM<br>SLM<br>SLM | 400 V<br>480 V<br>400 V<br>480 V | 600 V<br>720 V<br>540 V<br>650 V | 425 V<br>510 V<br>380 V<br>460 V |
| SINAMICS S110 / S120<br>1 AC 230 V | AC/AC device | 230 V | 300 V | 180 V |

## Torque limit when operating on a SINAMICS S110 / S120 without field weakening

It is possible to deactivate the field weakening function with the SINAMICS S110 / S120 drive system. This therefore reduces the operating range that is available.

The shape of the voltage limiting characteristic is determined by the winding version (armature circuit) and the magnitude of the converter output voltage.

The voltage induced in the motor winding increases as the speed increases. The difference between the DC link voltage of the converter and the induced motor voltage can be used to apply the current.

This limits the magnitude of the current that can be impressed. This causes the torque to drop off quickly at high speeds. All operating points that can be achieved with the motor lie to the left of the voltage limiting characteristic curve shown as a dashed line.

The characteristic curve is shown for each winding version in a separate data sheet. The torque-speed diagrams for different converter output voltages are assigned to each data sheet:

Table 4- 2 Converter output voltages

| Drive system | Infeed module | Line supply voltage | DC link voltage | Output voltage |
|---|---|---|---|---|
| | | $U_{line}$ | $U_{DC\ link}$ | $U_{mot}$ |
| SINAMICS S110 / S120<br>3 AC 380 - 480 V | ALM<br>ALM<br>SLM<br>SLM | 400 V<br>480 V<br>400 V<br>480 V | 600 V<br>720 V<br>540 V<br>650 V | 425 V<br>510 V<br>380 V<br>460 V |
| SINAMICS S110 / S120<br>1 AC 230 V | AC/AC device | 230 V | 300 V | 180 V |

For different converter output voltages the voltage limiting characteristic curve must be shifted (offset) accordingly. See "Offset of the voltage limit characteristic"

## Winding versions

Several winding versions (armature circuits) for different rated speeds $n_N$ are possible within a motor frame size.

Table 4- 3 Code letter, winding version

| Rated speed $n_N$ [RPM] | Winding version (10. position of the Order No.) |
|---|---|
| 2000 | C |
| 3000 | F |
| 4500 | H |
| 6000 | K |

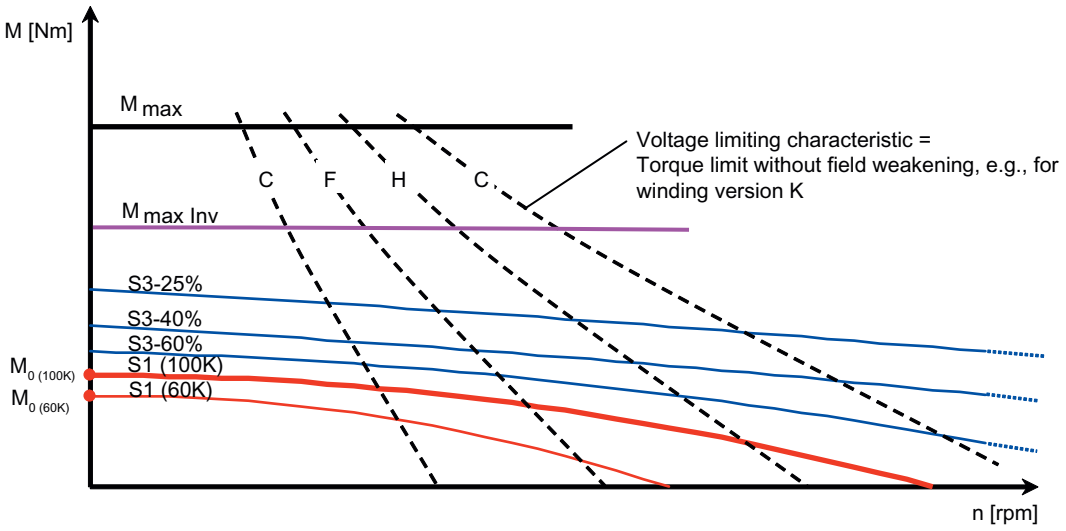



Figure 4-3 Speed-torque diagram

**Note**

The voltage limit characteristic of a motor with 6000 RPM rated speed lies far above that of the same motor type with 2000 RPM. However, for the same torque, this motor requires a significantly higher current.

For this reason, you should select the rated speed such that it does not lie too far above the maximum speed required for the application.

The size (rating) of the Motor Module (output current) can be minimized in this fashion

## Shifting the voltage limiting characteristic curve (only relevant when field weakening is deactivated)

| NOTICE |
| --- |
| A offset of the voltage limiting characteristic can only used in the case of approximately linear limiting characteristic curves. The voltage limiting characteristic can be offset only if the condition $U_{mot, new} > U_{iN}$ is fulfilled.<br>The induced voltage $U_{iN}$ can be taken from the motor rating plate or calculated according to the following formula: $U_{iN} = k_E \bullet n_N / 1000$ |

In order to identify the limits of the motor for a converter output voltage ($U_{mot}$) other than 380 V, 425 V, 460 V or 510 V, the relevant voltage limiting characteristic curve must be shifted (offset) for the particular new output voltage ($U_{mot, new}$).

The degree of offset is obtained as follows:

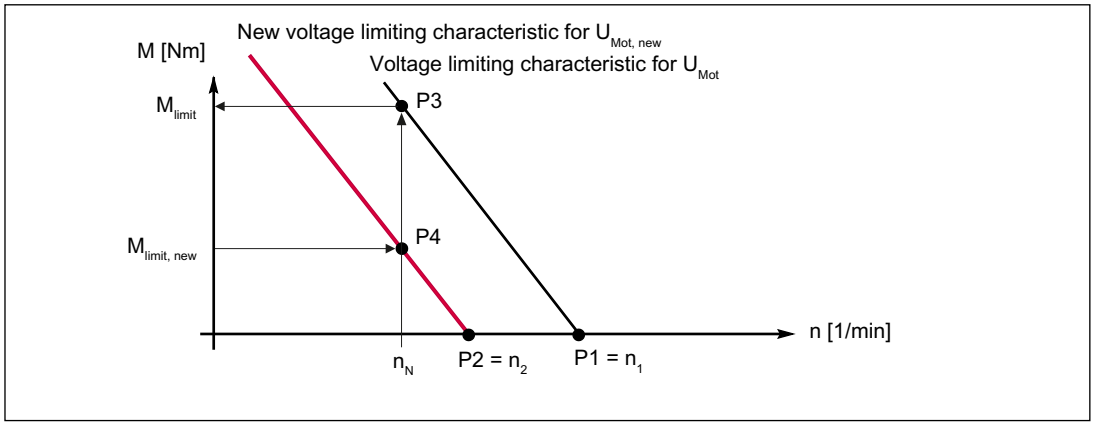
For an output voltage of $U_{mot, new}$, an offset is obtained along the X axis (speed) by a factor of:

$$\frac{U_{mot, new}}{U_{mot}}$$

$U_{mot, new}$ = new converter output voltage

$U_{mot}$ = drive converter output voltage from the characteristic curve for 380 V, 425 V, 460 V or 510 V

## Calculating the new torque limit with the new limiting characteristic




P1 Intersection of the voltage limiting characteristic on the x axis: calculate speed $n_1$

$$n_1 \text{ [rpm]} = \frac{U_{Mot}}{k_E \bullet 0{,}95} \bullet 1000$$

P2 Intersection of the new voltage limiting characteristic on the x axis; calculate speed $n_2$

$$n_2\ [rpm] = n_1 \bullet \frac{U_{mot,\ new}}{U_{Mot}}$$

P3 At $n_N$ draw a line vertically upwards up to the voltage limiting characteristic. This point of intersection is P3. On the left-hand side, read off $M_{limit}$.

P4 In order to determine P4, $M_{limit,\ new}$ must be calculated.

$$M_{limit,\ new} = \frac{U_{Mot,\ new} - U_{iN}}{U_{Mot} - U_{iN}} \bullet Mlimit$$

P4 is the intersection of $M_{limit,\ new}$and $n_N$. The new voltage limiting characteristic is obtained by connecting P2 and P4.

## Example of offset of voltage limiting characteristic curve without field weakening

Motor 1FK7032-5AK71; $n_N$ = 6000 rpm; $k_E$ = 45 V/1000 rpm

$U_{mot,\ new}$ = 290 V; calculated with $U_{mot}$ = 425 V

$U_{iN} = k_E \bullet n_N/1000$; $U_{iN} = 45 \bullet 6000/1000 = 270$ V

Condition: $U_{mot,\ new} > U_{iN}$ is fulfilled.

Calculation P1: $n_1 = \frac{425}{45 \bullet 0{,}95} \bullet 1000\ rpm = 9941.5\ rpm$

Calculation P2: $n_2 = \frac{290}{425} \bullet 9941.5\ rpm = 6783.6\ rpm$

Calculation P3: $M_{limit}$ read-off for nN = 6000 rpm and 425 V: approx. 4.9 Nm

Calculation P4: $M_{limit,\ new} = \frac{290 - 270}{425 - 270} \bullet 4.9\ Nm = 0.63\ Nm$

Enter and connect points P2 and P4. This line is the new voltage limiting characteristic for $U_{mot,\ new}$ = 290 V.

## Typical M/I characteristic

Because of saturation effects, the achievable torque cannot be calculated linearly from the current (particularly at high currents).

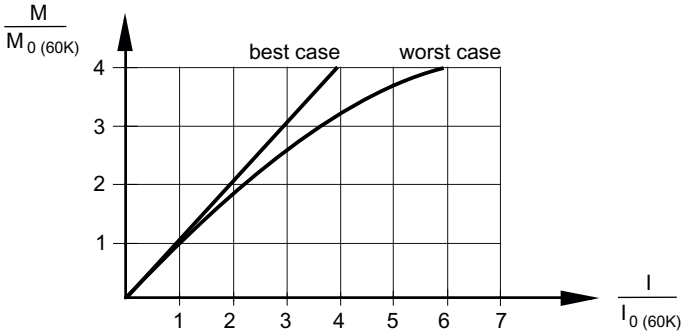



Figure 4-4 Torque-current characteristic curve for self-cooled motors

From $M_0$ (or $I_0$), the following formula can be used to determine the torque or the torque constant as a function of the current:

$$k_T(I) = \frac{M}{I}(I) = \frac{M_0}{I_0} + \frac{I - I_0}{I_{max} - I_0} \cdot \left(\frac{M_{max}}{I_{max}} - \frac{M_0}{I_0}\right)$$

## Tolerance data

The data shown in the data sheets are nominal values that are subject to natural scatter. The following tolerances apply:

Table 4- 4 Tolerance data in the motor list data

| Motor list data | | Typ. value | Max. value |
|---|---|---|---|
| Stall current | $I_0$ | ± 3 % | ± 7,5 % |
| Electrical time constant | $T_{el}$ | ± 5 % | ± 10 % |
| Torque constant | $k_T$ | ± 3 % | ± 7,5 % |
| Voltage constant | $k_E$ | ± 3 % | ± 7,5 % |
| Winding resistance | $R_{ph}$ | ± 5 % | ± 10 % |
| Moment of inertia | $J_{mot}$ | ± 2 % | ± 10 % |

## Effects of the temperature influence and parameter scatter on the characteristic

The torque-speed characteristics specified in the following chapter relate to the nominal values at operating temperature (shown as characteristic 3 in the chart below).

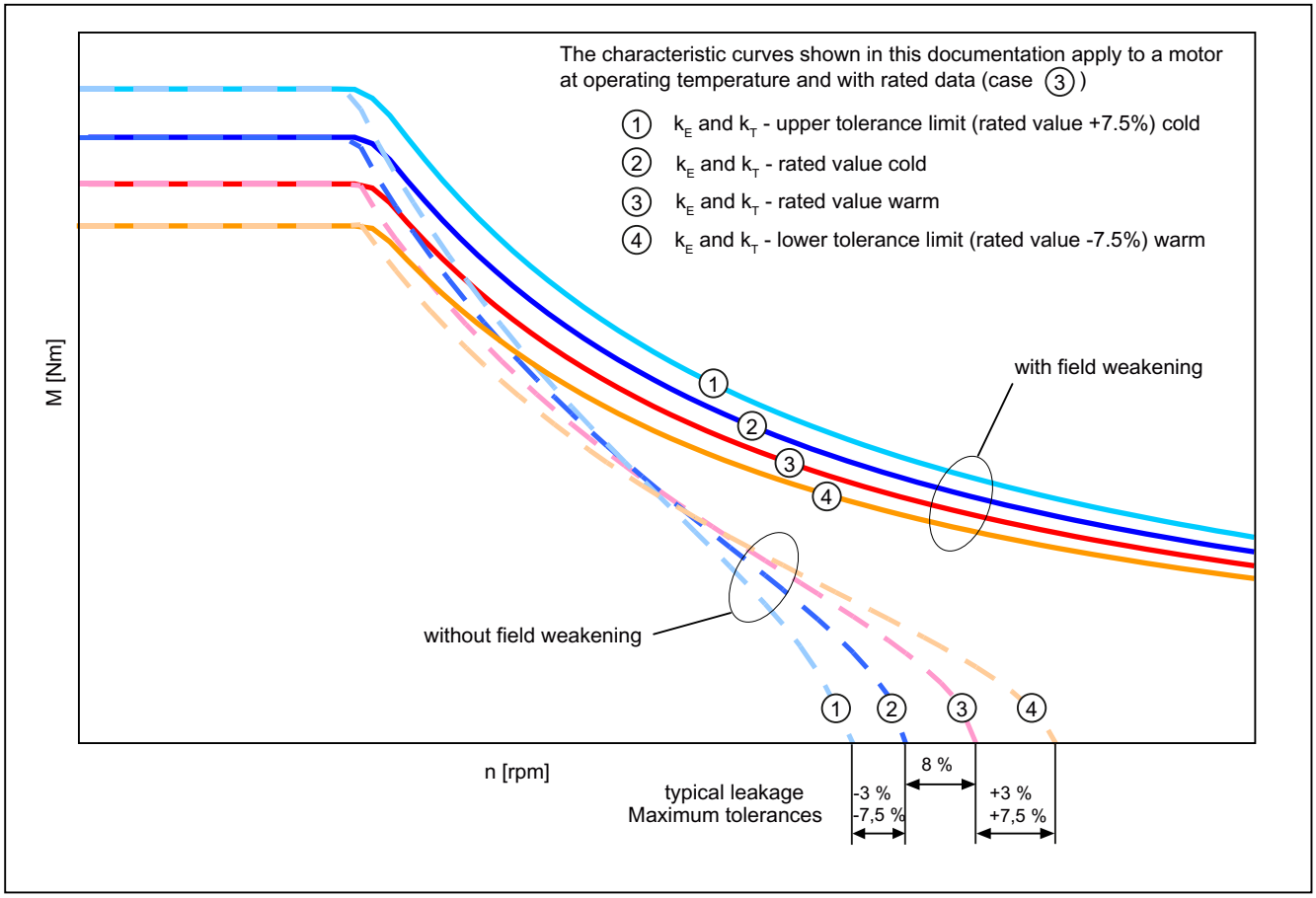



Figure 4-5 Effect of scatter

| NOTICE |
| --- |
| The motor temperature results in a clear displacement of the voltage limiting characteristic in the upper speed range. This must be taken into consideration during engineering (especially for applications in which the cold motor has to produce maximum speeds) with converter systems without field weakening. |

# 4.2 Torque-speed characteristic

The technical data of the relevant motor version are defined by rated operating points in the tables.

These rated operating points also correspond to the data stamped on the rating plate of the motor and to the data listed in the selection and ordering data sections of catalog PM 21 or NC 61.

## 4.2.1 1FK7 motors connected to SINAMICS S110 / S120 with a line voltage of 3-ph. 380 V to 480 V AC

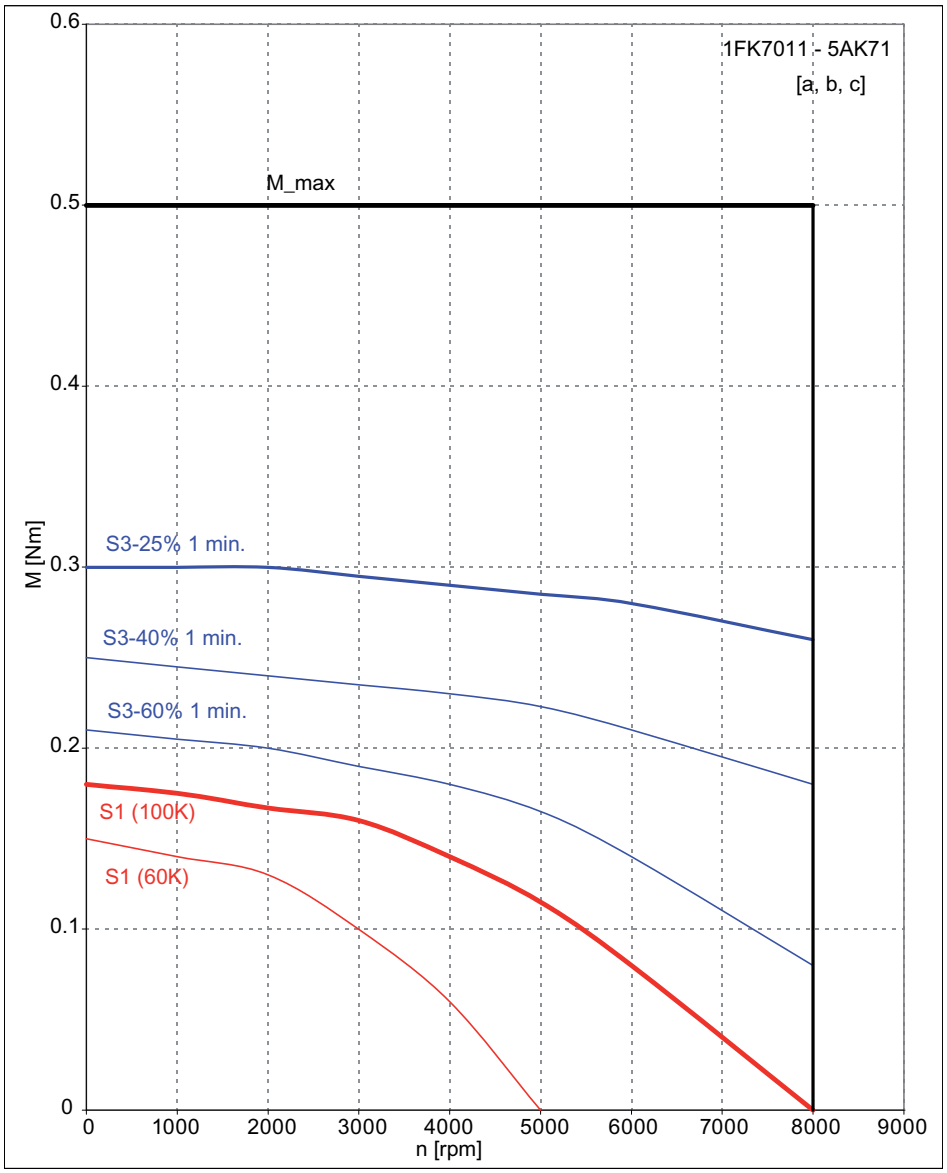
### 4.2.1.1 1FK7 Compact

Table 4- 5 1FK7011 Compact

| Technical data | Code | Unit | –5AK71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 6000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 0.08 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 0.85 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 0.18 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 1.5 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 0.15 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 1.2 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | RPM | 5000 |
| Optimum power | $P_{opt}$ | kW | 0.06 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 8000 |
| Maximum torque | $M_{max}$ | Nm | 0.5 |
| Maximum current | $I_{max}$ | A | 4.2 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.12 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 8.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 3.0 |
| Rotating field inductance | $L_D$ | mH | 4.2 |
| Electrical time constant | $T_{el}$ | ms | 1.4 |
| Mechanical time constant | $T_{mech}$ | ms | 4 |
| Thermal time constant | $T_{th}$ | min | 14 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.0064 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 1400 |
| Weight without brake | $m_{Mot}$ | kg | 0.9 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.0083 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 1400 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 1.0 |

| Technical data | Code | Unit | –5AK71 |
|---|---|---|---|
| **Recommended Motor Module 6SL312□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 3 |
| Maximum converter current | $I_{max\ Inv}$ | A | 6 |
| Max, torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 0.5 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 8000 |

The rated data are valid for a 600 V DC link voltage.



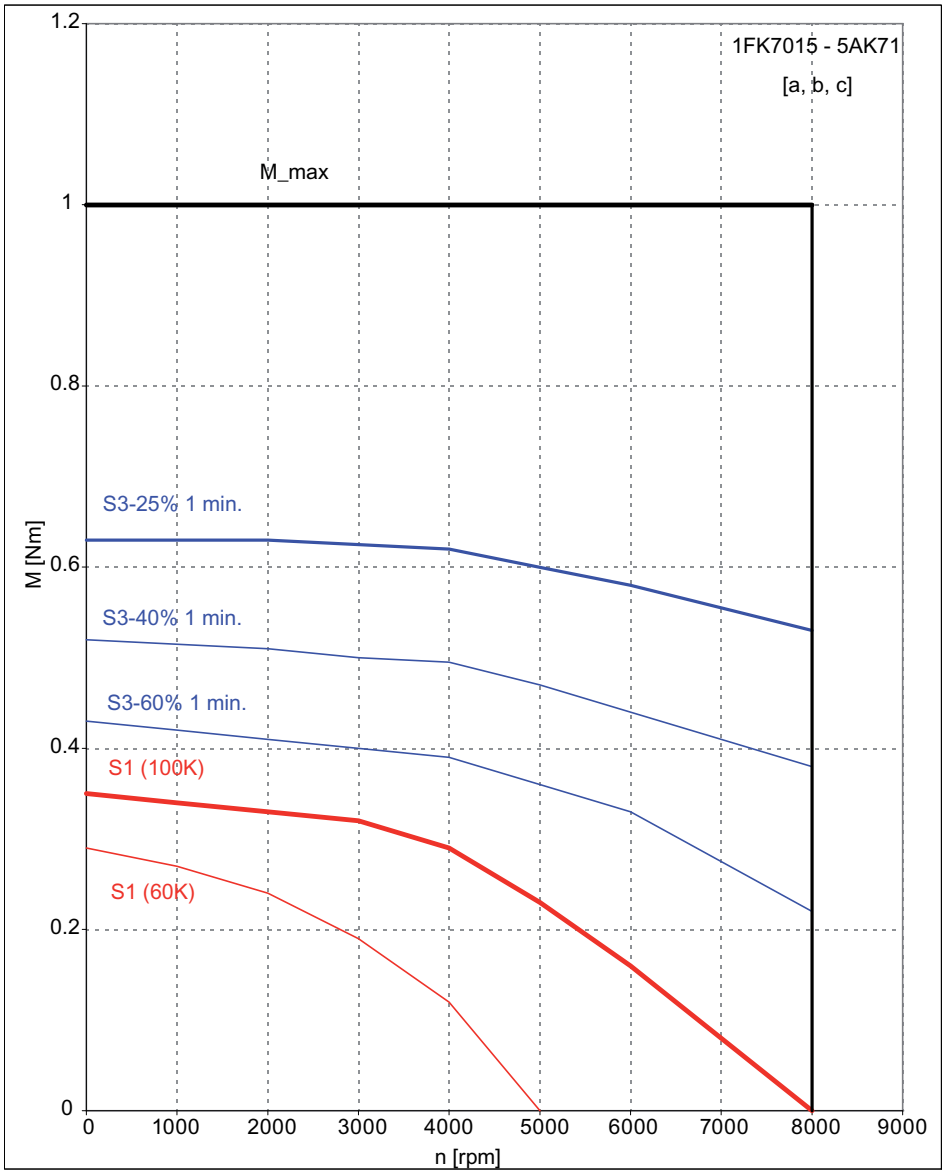

[a] SINAMICS SLM 400 V
[b] SINAMICS ALM 400 V
[c] SINAMICS SLM 480 V

Figure 4-6 1FK7011-5AK71

Table 4- 6 1FK7015 Compact

| Technical data | Code | Unit | –5AK71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 6000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 0.16 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 0.85 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 0.35 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 1.5 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 0.29 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 1.2 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 5000 |
| Optimum power | $P_{opt}$ | kW | 0.12 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 8000 |
| Maximum torque | $M_{max}$ | Nm | 1.0 |
| Maximum current | $I_{max}$ | A | 4.2 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.24 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 16.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 4.3 |
| Rotating field inductance | $L_D$ | mH | 8.4 |
| Electrical time constant | $T_{el}$ | ms | 2 |
| Mechanical time constant | $T_{mech}$ | ms | 1.9 |
| Thermal time constant | $T_{th}$ | min | 16 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.0083 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 1300 |
| Weight without brake | $m_{Mot}$ | kg | 1.1 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.0102 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 1300 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 1.2 |
| **Recommended Motor Module 6SL312□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 3 |
| Maximum converter current | $I_{max\ Inv}$ | A | 6 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 1.0 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 8000 |

The rated data are valid for a 600 V DC link voltage.



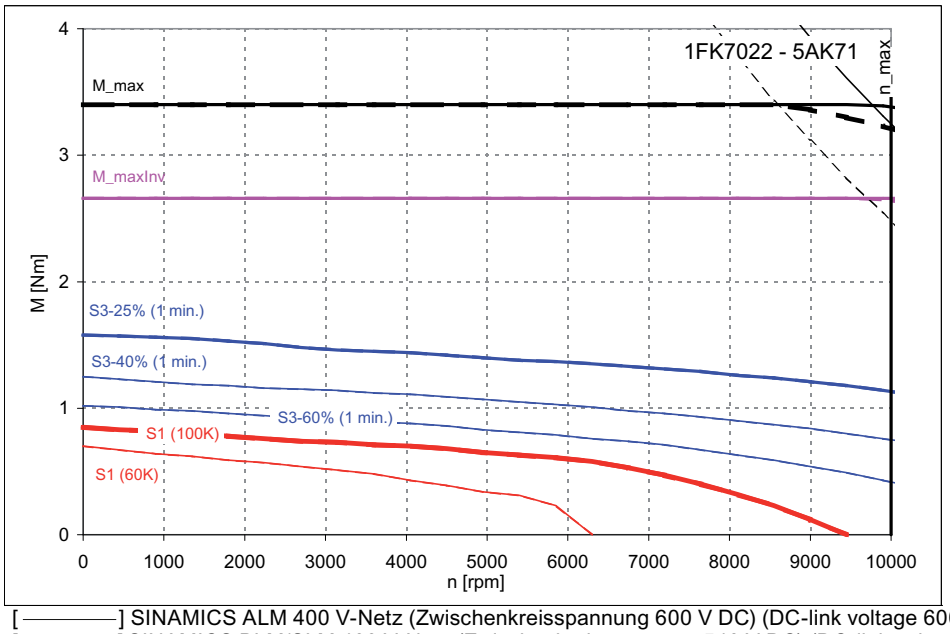

[a] SINAMICS SLM 400 V
[b] SINAMICS ALM 400 V
[c] SINAMICS SLM 480 V

Figure 4-7 1FK7015-5AK71

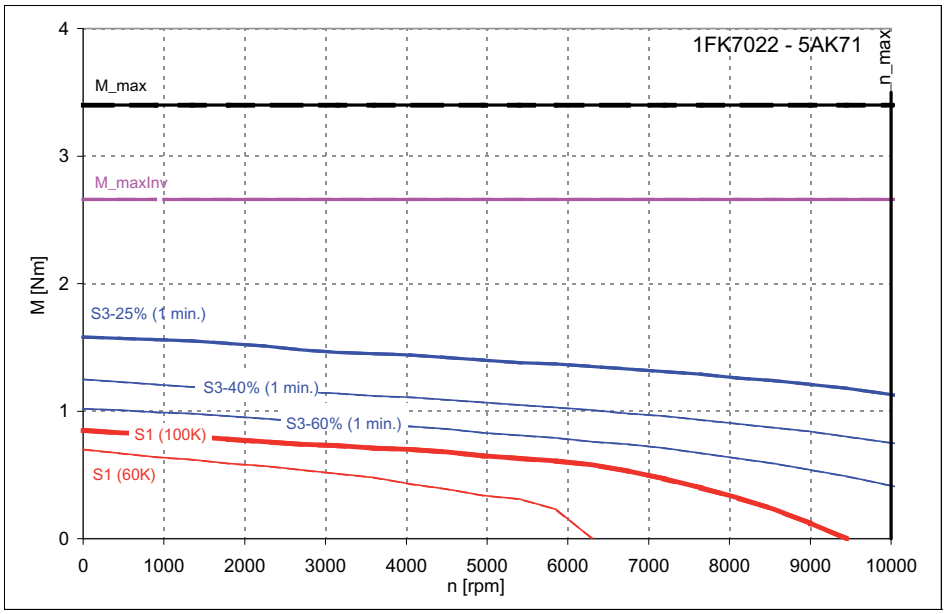
Table 4- 7 1FK7022 Compact

| Technical data | Code | Unit | –5AK71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 6000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 0.60 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 1.4 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 0.85 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 1.8 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 0.70 |
| Stall current (60 K) | $I_{0\ (60\ K))}$ | A | 1.5 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 6000 |
| Optimum power | $P_{opt}$ | kW | 0.38 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 10000 |
| Maximum torque | $M_{max}$ | Nm | 3.4 |
| Maximum current | $I_{max}$ | A | 8.0 |
| **Motor data** | | | |
| Pole number | 2p | | 6 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.46 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 29.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 4.2 |
| Rotating field inductance | $L_D$ | mH | 9.1 |
| Electrical time constant | $T_{el}$ | ms | 2.2 |
| Mechanical time constant | $T_{mech}$ | ms | 1.7 |
| Thermal time constant | $T_{th}$ | min | 18 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.028 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 3000 |
| Weight without brake | $m_{Mot}$ | kg | 1.8 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.035 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 3000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 2.0 |
| **Recommended Motor Module 6SL312□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 3 |
| Maximum converter current | $I_{max\ Inv}$ | A | 6 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 2.65 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 10000 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



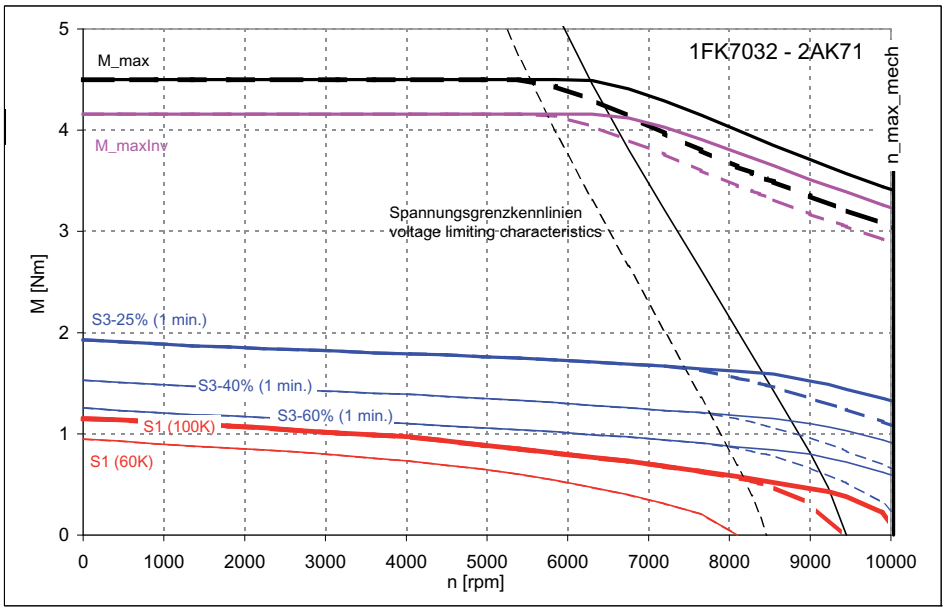

[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-8 1FK7022-5AK71

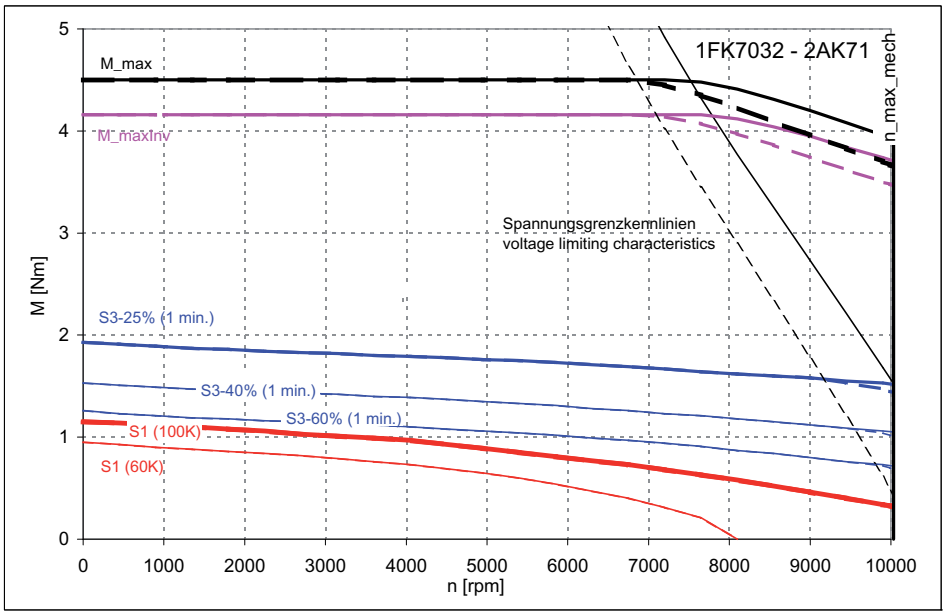
Table 4- 8 1FK7032 Compact

| Technical data | Code | Unit | –2AK71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 6000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 0.8 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 1.3 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 1.15 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 1.7 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 0.95 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 1.4 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 6000 |
| Optimum power | $P_{opt}$ | kW | 0.5 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 10000 |
| Maximum torque | $M_{max}$ | Nm | 4.5 |
| Maximum current | $I_{max}$ | A | 7.0 |
| **Motor data** | | | |
| Pole number | 2p | | 6 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.67 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 45.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 5.05 |
| Rotating field inductance | $L_D$ | mH | 17.3 |
| Electrical time constant | $T_{el}$ | ms | 3.45 |
| Mechanical time constant | $T_{mech}$ | ms | 2.20 |
| Thermal time constant | $T_{th}$ | min | 25 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.065 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 6000 |
| Weight without brake | $m_{Mot}$ | kg | 2.7 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.075 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 4100 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 3.1 |
| **Recommended Motor Module 6SL312□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 3 |
| Maximum converter current | $I_{max\ Inv}$ | A | 6 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 4.15 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 10000 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



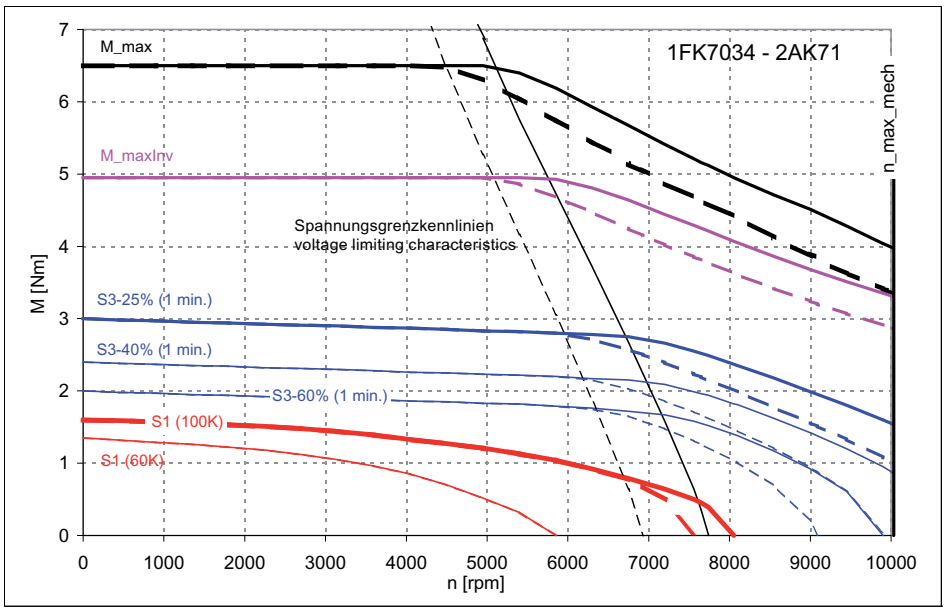

[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-9 1FK7032-2AK71

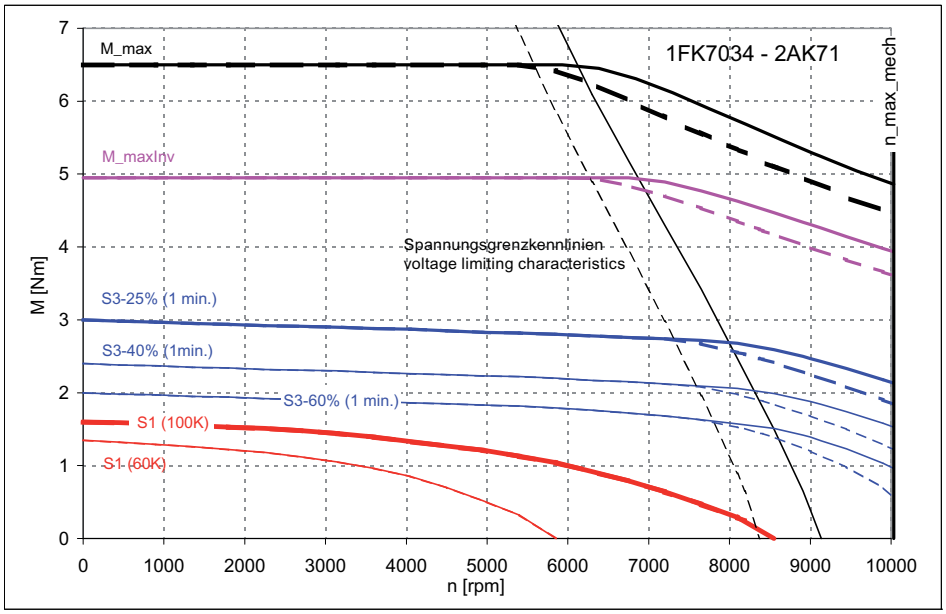
Table 4- 9 1FK7034 Compact

| Technical data | Code | Unit | –2AK71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 6000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 1.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 1.3 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 1.6 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 1.9 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 1.35 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 1.55 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 6000 |
| Optimum power | $P_{opt}$ | kW | 0.63 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 10000 |
| Maximum torque | $M_{max}$ | Nm | 6.5 |
| Maximum current | $I_{max}$ | A | 8.0 |
| **Motor data** | | | |
| Pole number | 2p | | 6 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.84 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 55.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 4.46 |
| Rotating field inductance | $L_D$ | mH | 17.2 |
| Electrical time constant | $T_{el}$ | ms | 3.85 |
| Mechanical time constant | $T_{mech}$ | ms | 1.71 |
| Thermal time constant | $T_{th}$ | min | 30 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.09 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 5300 |
| Weight without brake | $m_{Mot}$ | kg | 3.5 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.10 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 3750 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 3.9 |
| **Recommended Motor Module 6SL312□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 3 |
| Maximum converter current | $I_{max\ Inv}$ | A | 6 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 4.95 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 10000 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



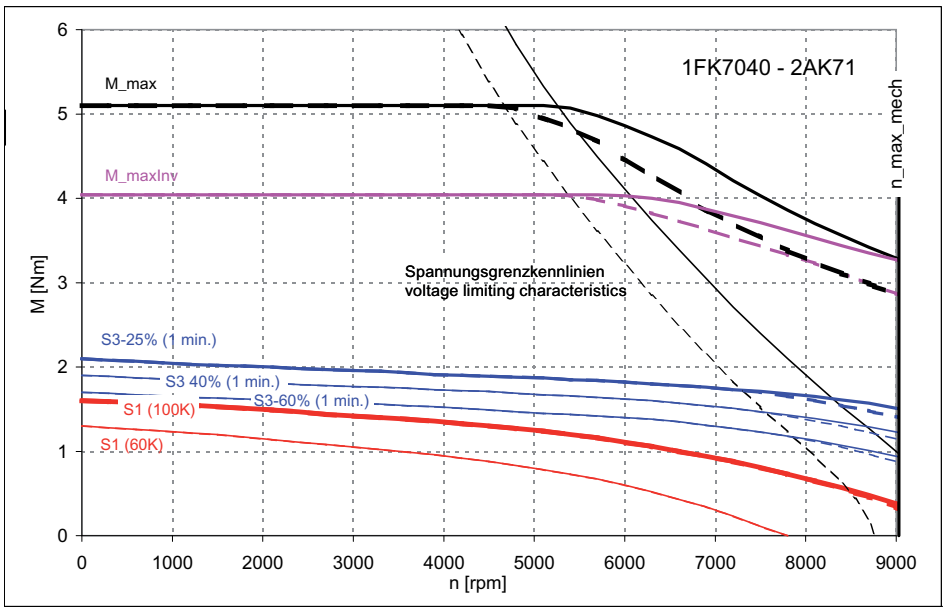

[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-10 1FK7034-2AK71

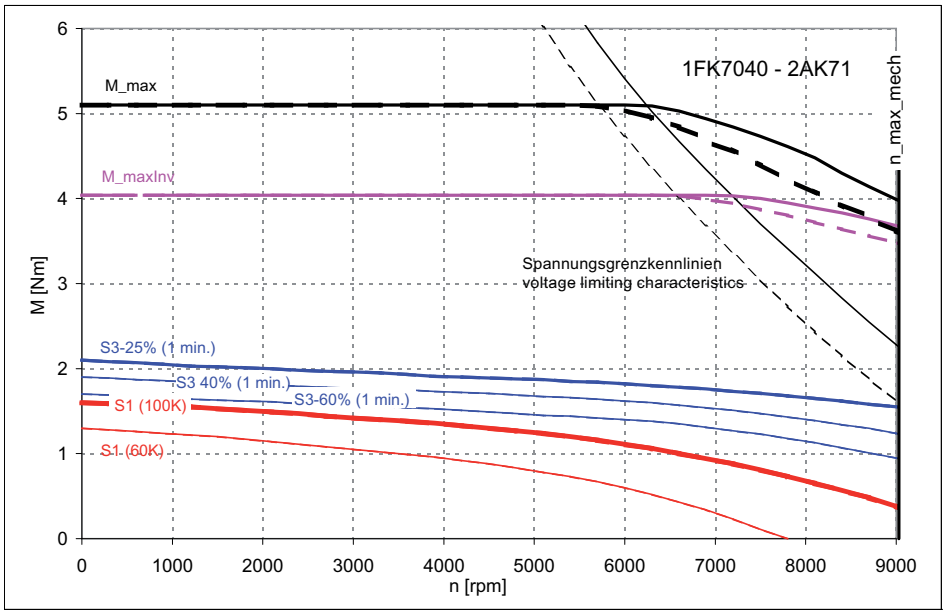
Table 4- 10 1FK7040 Compact

| Technical data | Code | Unit | –2AK71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 6000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 1.1 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 1.85 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 1.6 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 2.35 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 1.3 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 1.9 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 6000 |
| Optimum power | $P_{opt}$ | kW | 0.69 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 9000 |
| Maximum torque | $M_{max}$ | Nm | 5.1 |
| Maximum current | $I_{max}$ | A | 7.7 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.68 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 43.4 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 2.87 |
| Rotating field inductance | $L_D$ | mH | 16.5 |
| Electrical time constant | $T_{el}$ | ms | 5.7 |
| Mechanical time constant | $T_{mech}$ | ms | 3.0 |
| Thermal time constant | $T_{th}$ | min | 25 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.16 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 18700 |
| Weight without brake | $m_{Mot}$ | kg | 3.2 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.192 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 13000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 3.9 |
| **Recommended Motor Module 6SL312□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 3 |
| Maximum converter current | $I_{max\ Inv}$ | A | 6 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 4.0 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 9000 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



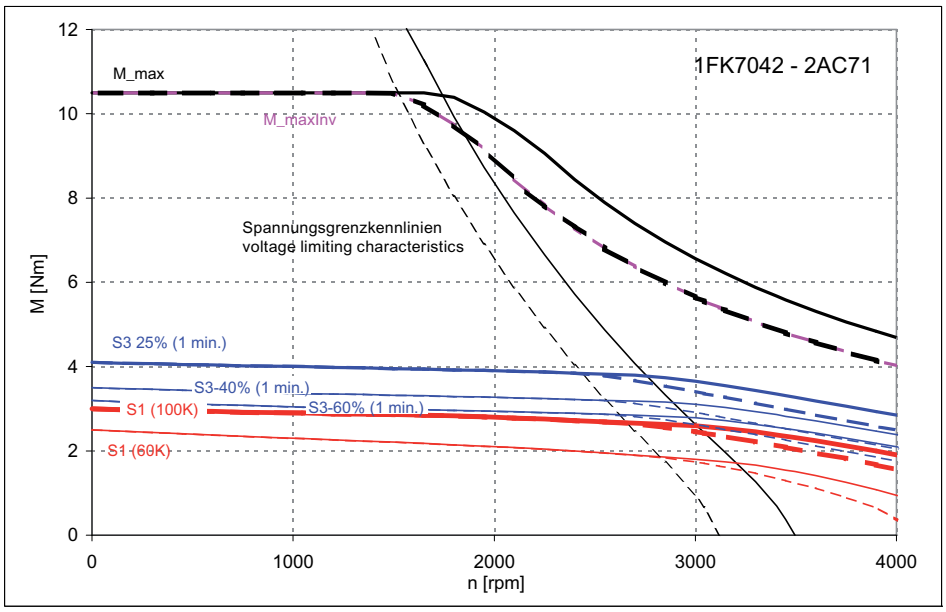

[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-11 1FK7040-2AK71

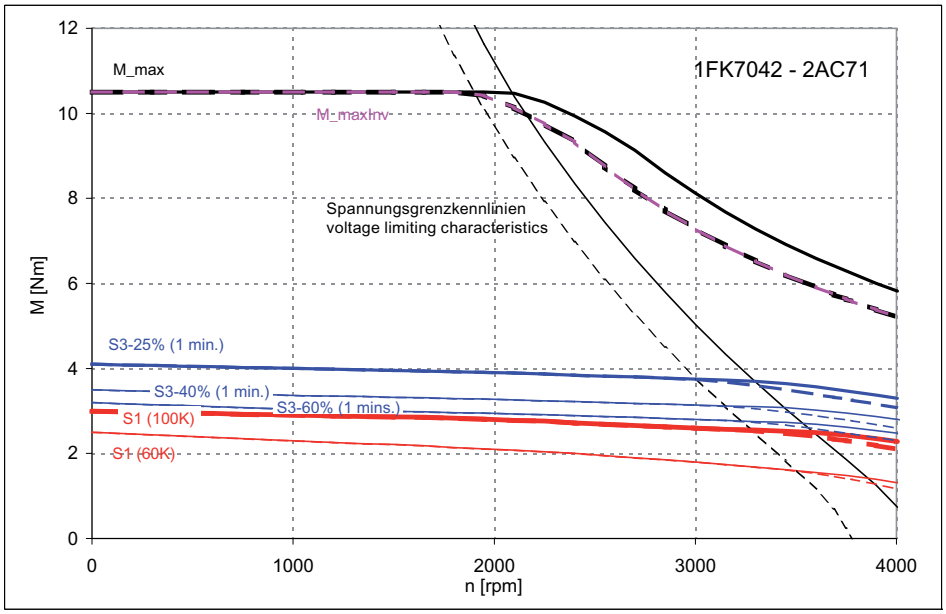
Table 4- 11 1FK7042 Compact

| Technical data | Code | Unit | –2AC71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 2000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 2.8 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 1.55 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 3.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 1.6 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 2.5 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 1.3 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2000 |
| Optimum power | $P_{opt}$ | kW | 0.59 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 9000 |
| Maximum torque | $M_{max}$ | Nm | 10.5 |
| Maximum current | $I_{max}$ | A | 5.6 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.865 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 122.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 8.6 |
| Rotating field inductance | $L_D$ | mH | 64 |
| Electrical time constant | $T_{el}$ | ms | 7.4 |
| Mechanical time constant | $T_{mech}$ | ms | 2.15 |
| Thermal time constant | $T_{th}$ | min | 30 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.29 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 15500 |
| Weight without brake | $m_{Mot}$ | kg | 4.6 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.32 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 11400 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 5.3 |
| **Recommended Motor Module 6SL312□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 3 |
| Maximum converter current | $I_{max\ Inv}$ | A | 6 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 10.5 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 4750 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



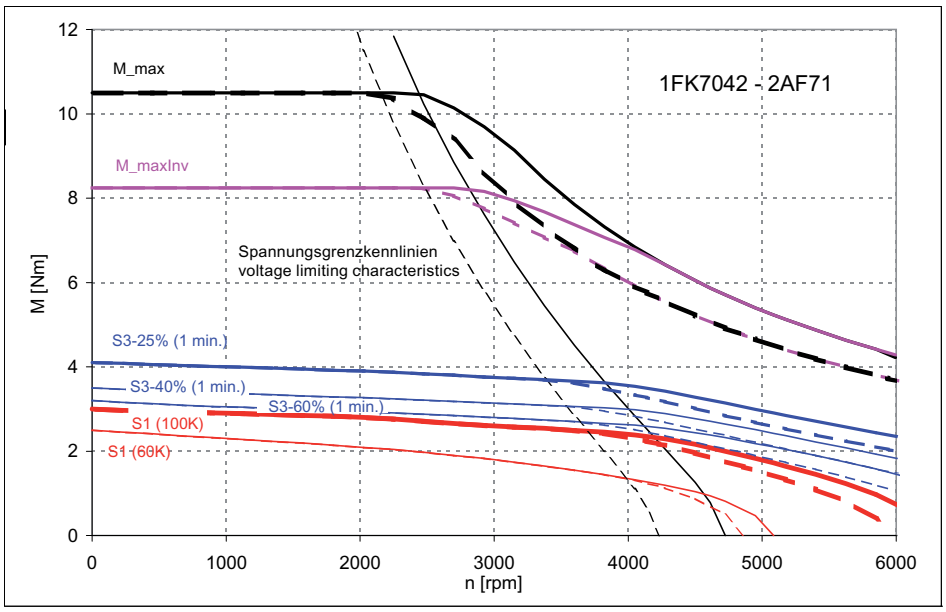

[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-12 1FK7042-2AC71

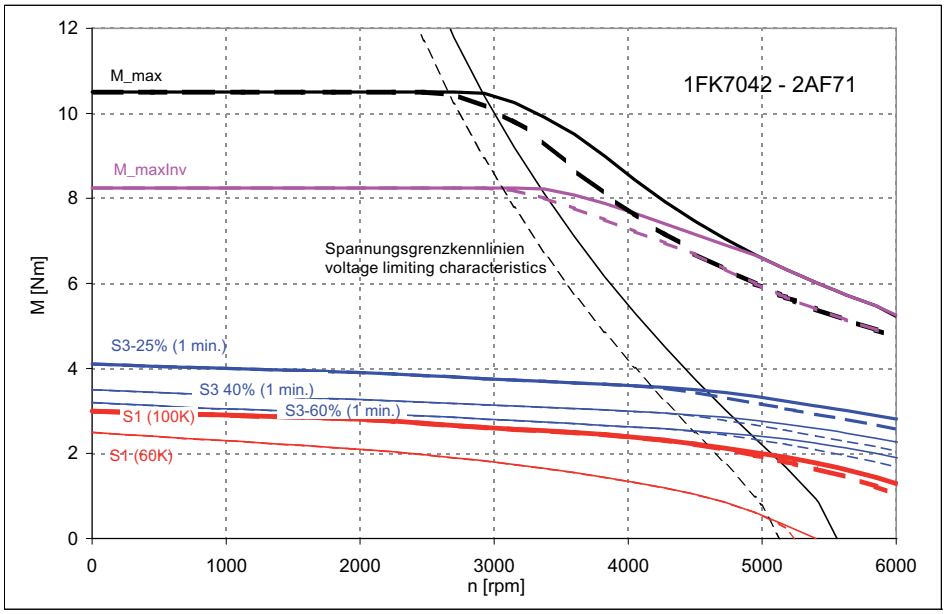
Table 4- 12 1FK7042 Compact

| Technical data | Code | Unit | –2AF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 2.6 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 2.0 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 3.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 2.2 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 2.5 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 1.8 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 0.82 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 9000 |
| Maximum torque | $M_{max}$ | Nm | 10.5 |
| Maximum current | $I_{max}$ | A | 7.6 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.375 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 90.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 4.67 |
| Rotating field inductance | $L_D$ | mH | 35.0 |
| Electrical time constant | $T_{el}$ | ms | 7.5 |
| Mechanical time constant | $T_{mech}$ | ms | 2.15 |
| Thermal time constant | $T_{th}$ | min | 30 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.29 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 15500 |
| Weight without brake | $m_{Mot}$ | kg | 4.6 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.32 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 11400 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 5.3 |
| **Recommended Motor Module 6SL312□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 3 |
| Maximum converter current | $I_{max\ Inv}$ | A | 6 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 8.2 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 6400 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



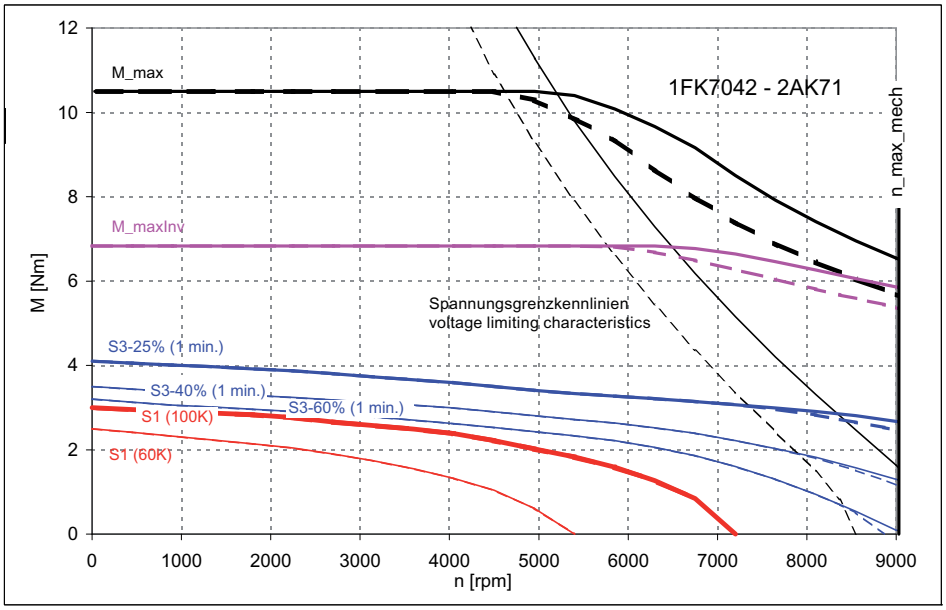

[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-13 1FK7042-2AF71

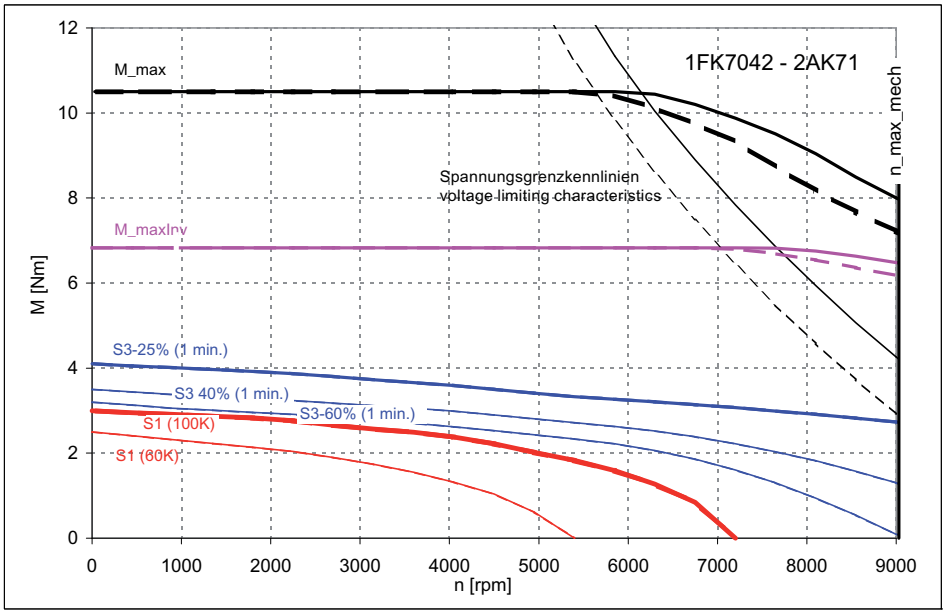
Table 4- 13 1FK7042 Compact

| Technical data | Code | Unit | –2AK71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 6000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 1.5 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 2.5 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 3.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 4.4 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 2.5 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 3.55 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 5000 |
| Optimum power | $P_{opt}$ | kW | 1.02 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 9000 |
| Maximum torque | $M_{max}$ | Nm | 10.5 |
| Maximum current | $I_{max}$ | A | 15.3 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.68 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 44.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 1.145 |
| Rotating field inductance | $L_D$ | mH | 8.6 |
| Electrical time constant | $T_{el}$ | ms | 7.5 |
| Mechanical time constant | $T_{mech}$ | ms | 2.15 |
| Thermal time constant | $T_{th}$ | min | 30 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.29 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 15500 |
| Weight without brake | $m_{Mot}$ | kg | 4.6 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.32 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 11400 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 5.3 |
| **Recommended Motor Module 6SL312□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 5 |
| Maximum converter current | $I_{max\ Inv}$ | A | 10 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 6.8 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 9000 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



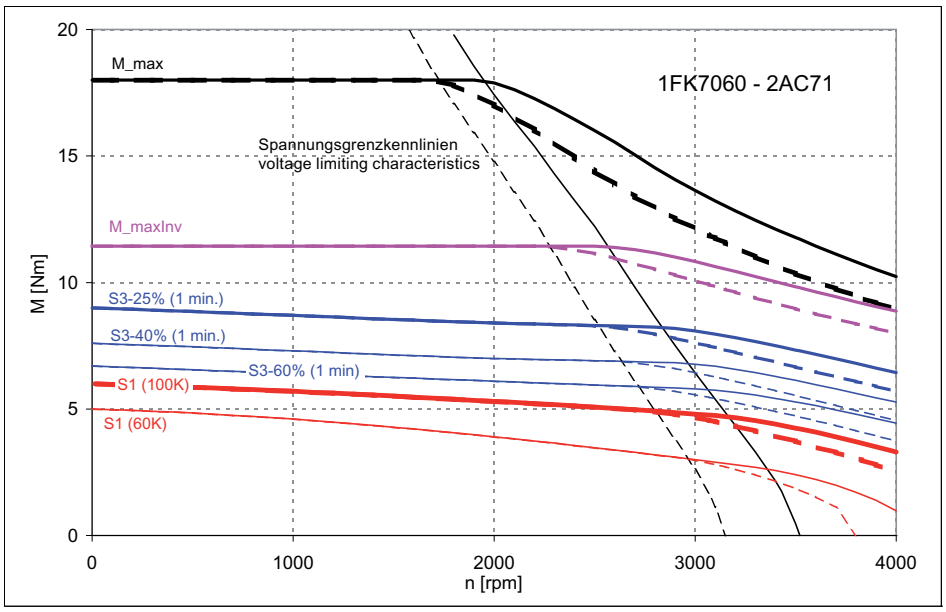

[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-14 1FK7042-2AK71

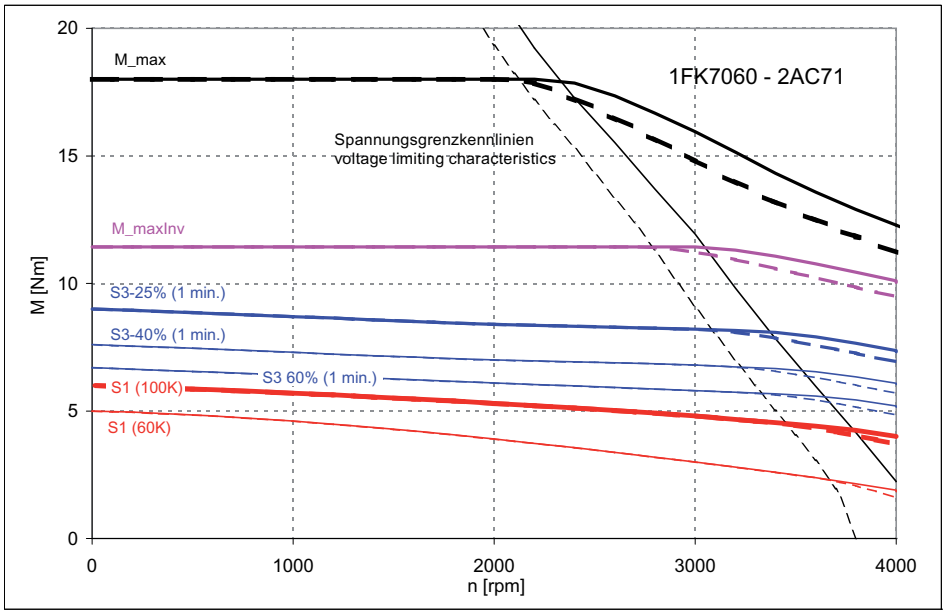
Table 4- 14 1FK7060 Compact

| Technical data | Code | Unit | –2AC71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 2000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 5.3 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 2.95 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 6.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 3.15 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 5.0 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 2.55 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2000 |
| Optimum power | $P_{opt}$ | kW | 1.11 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 7200 |
| Maximum torque | $M_{max}$ | Nm | 18.0 |
| Maximum current | $I_{max}$ | A | 10.7 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.905 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 121.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 2.75 |
| Rotating field inductance | $L_D$ | mH | 30.5 |
| Electrical time constant | $T_{el}$ | ms | 11.1 |
| Mechanical time constant | $T_{mech}$ | ms | 1.75 |
| Thermal time constant | $T_{th}$ | min | 30 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.77 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 40500 |
| Weight without brake | $m_{Mot}$ | kg | 7.1 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.87 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 28500 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 8.5 |
| **Recommended Motor Module 6SL312□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 3 |
| Maximum converter current | $I_{max\ Inv}$ | A | 6 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 11.4 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 4750 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



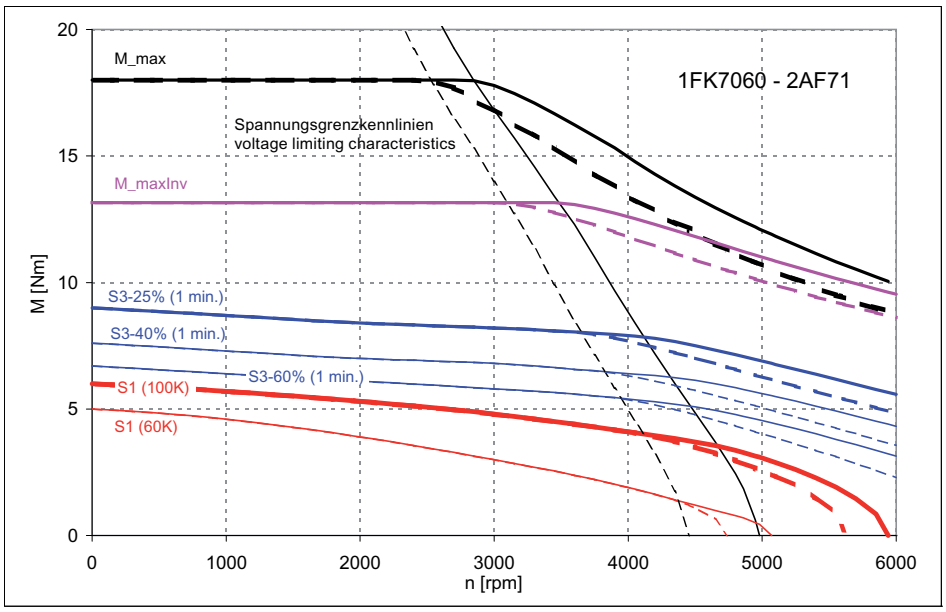

[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-15 1FK7060-2AC71

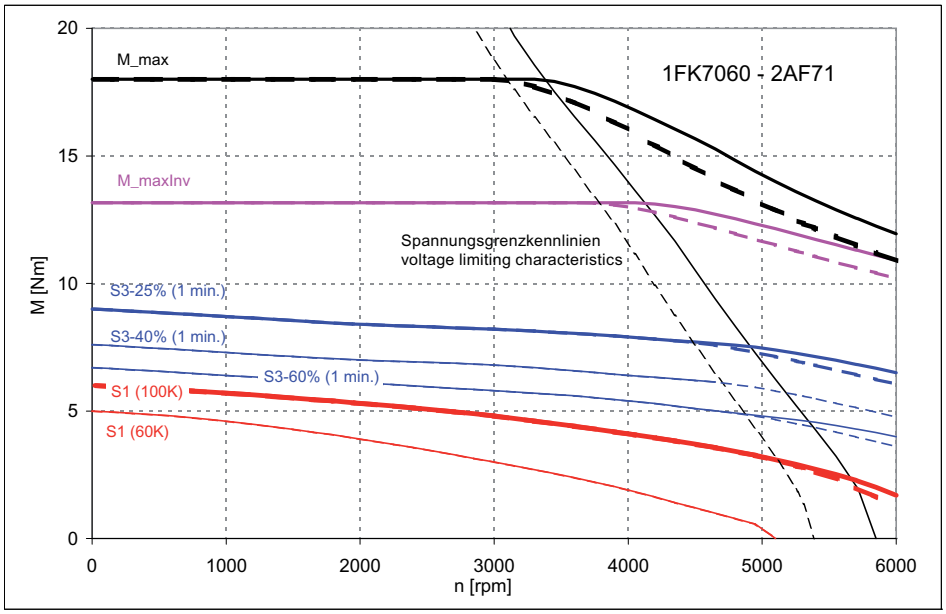
Table 4- 15 1FK7060 Compact

| Technical data | Code | Unit | –2AF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 4.7 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 3.7 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 6.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 4.45 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 5.0 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 3.6 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 1.48 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 7200 |
| Maximum torque | $M_{max}$ | Nm | 18.0 |
| Maximum current | $I_{max}$ | A | 15.0 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.33 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 85.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 1.35 |
| Rotating field inductance | $L_D$ | mH | 15.2 |
| Electrical time constant | $T_{el}$ | ms | 11.3 |
| Mechanical time constant | $T_{mech}$ | ms | 1.71 |
| Thermal time constant | $T_{th}$ | min | 30 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.77 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 40500 |
| Weight without brake | $m_{Mot}$ | kg | 7.1 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.87 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 28500 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 8.5 |
| **Recommended Motor Module 6SL312□-□TE15-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 5 |
| Maximum converter current | $I_{max\ Inv}$ | A | 10 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 13.2 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 6700 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



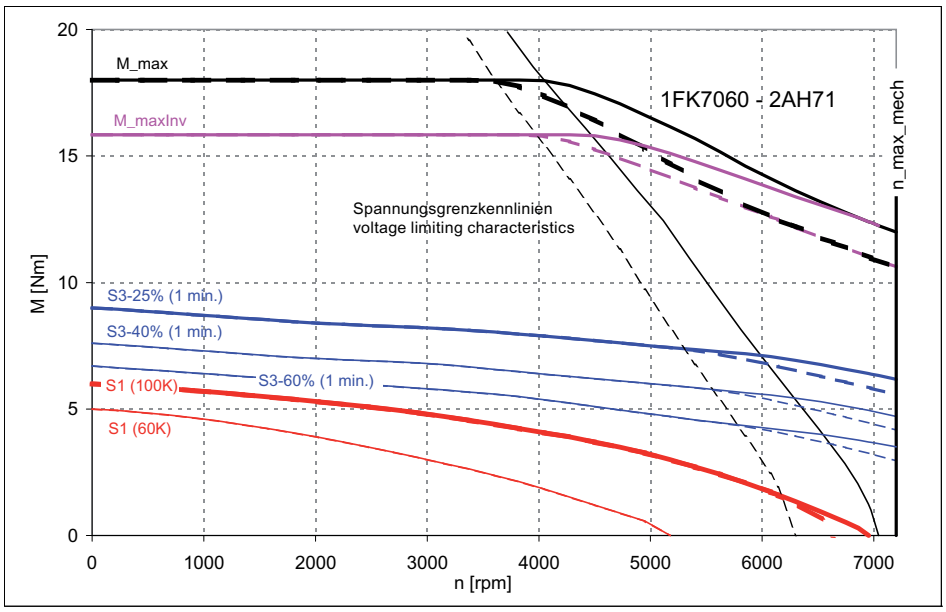

[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-16 1FK7060-2AF71

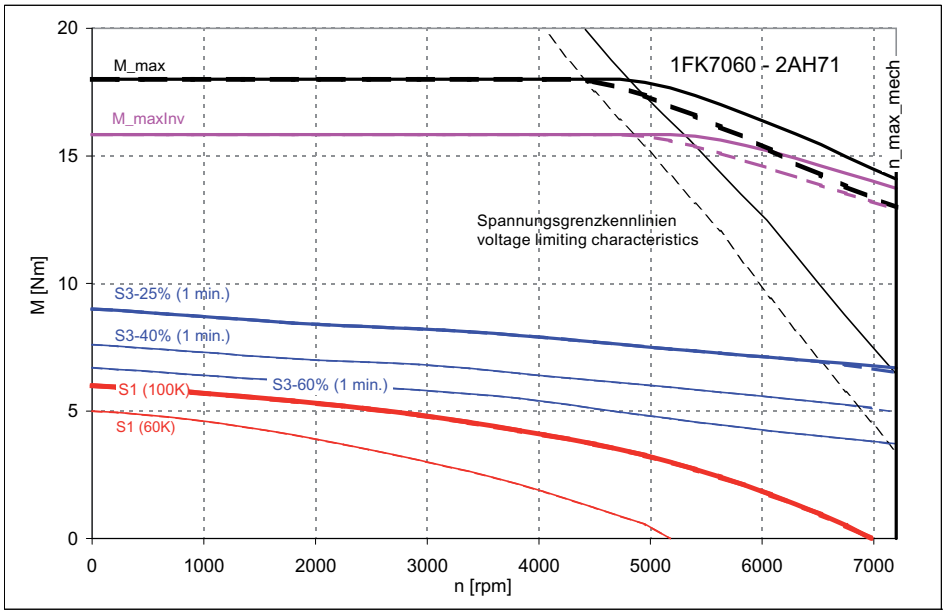
Table 4- 16 1FK7060 Compact

| Technical data | Code | Unit | –2AH71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 4500 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 3.7 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 4.3 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 6.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 6.3 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 5.0 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 5.1 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 4500 |
| Optimum power | $P_{opt}$ | kW | 1.74 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 7200 |
| Maximum torque | $M_{max}$ | Nm | 18.0 |
| Maximum current | $I_{max}$ | A | 21.5 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.95 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 60.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.695 |
| Rotating field inductance | $L_D$ | mH | 7.6 |
| Electrical time constant | $T_{el}$ | ms | 10.9 |
| Mechanical time constant | $T_{mech}$ | ms | 1.78 |
| Thermal time constant | $T_{th}$ | min | 30 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.77 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 40500 |
| Weight without brake | $m_{Mot}$ | kg | 7.1 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.87 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 28500 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 8.5 |
| **Recommended Motor Module 6SL312□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 18 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 15.8 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 7200 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



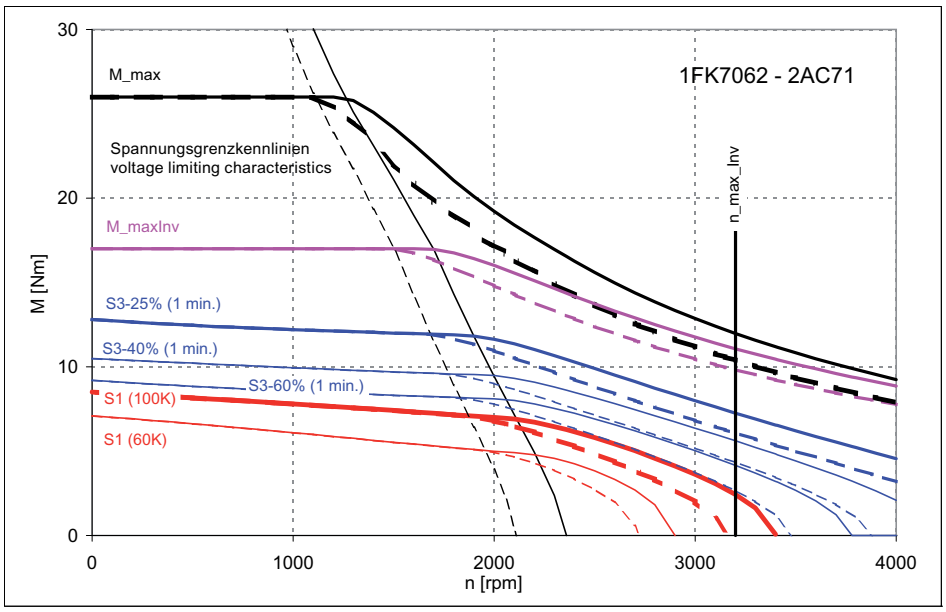

[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-17 1FK7060-2AH71

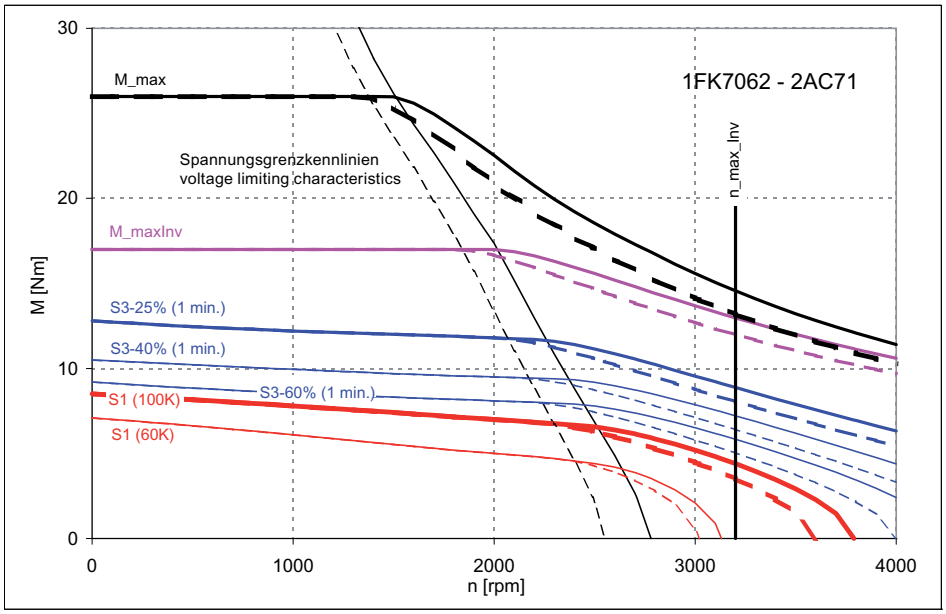
Table 4- 17 1FK7062 Compact

| Technical data | Code | Unit | –2AC71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 2000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 7.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 2.65 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 8.5 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 3.0 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 7.1 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 2.45 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2000 |
| Optimum power | $P_{opt}$ | kW | 1.34 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 7200 |
| Maximum torque | $M_{max}$ | Nm | 26.0 |
| Maximum current | $I_{max}$ | A | 10.9 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 2.83 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 180.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 3.59 |
| Rotating field inductance | $L_D$ | mH | 45.5 |
| Electrical time constant | $T_{el}$ | ms | 12.7 |
| Mechanical time constant | $T_{mech}$ | ms | 1.51 |
| Thermal time constant | $T_{th}$ | min | 35 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $1.12 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 37000 |
| Weight without brake | $m_{Mot}$ | kg | 9.1 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $122 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 26500 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 10.5 |
| **Recommended Motor Module 6SL312□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 3 |
| Maximum converter current | $I_{max\ Inv}$ | A | 6 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 17.0 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 3200 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



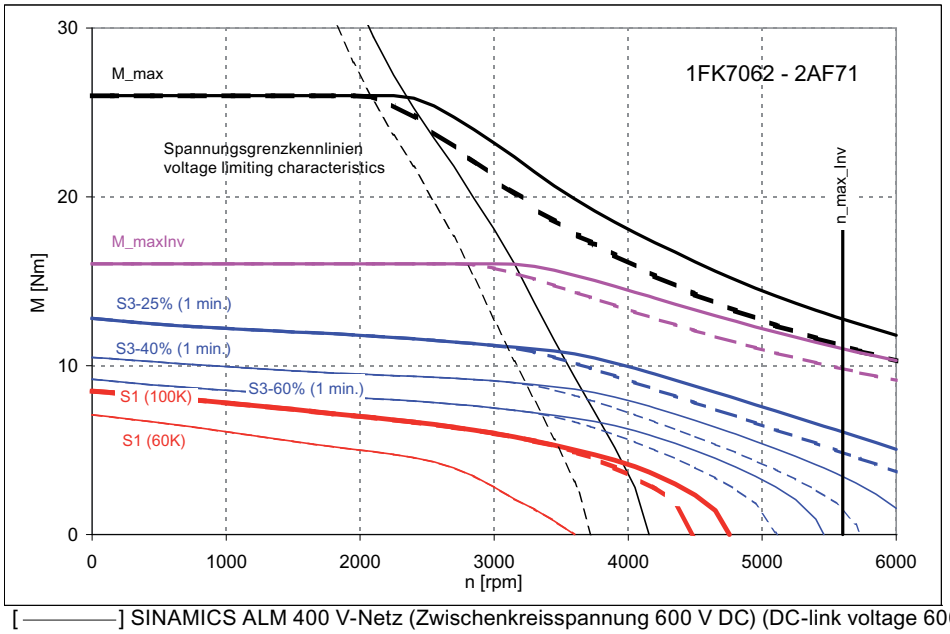

[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-18 1FK7062-2AC71

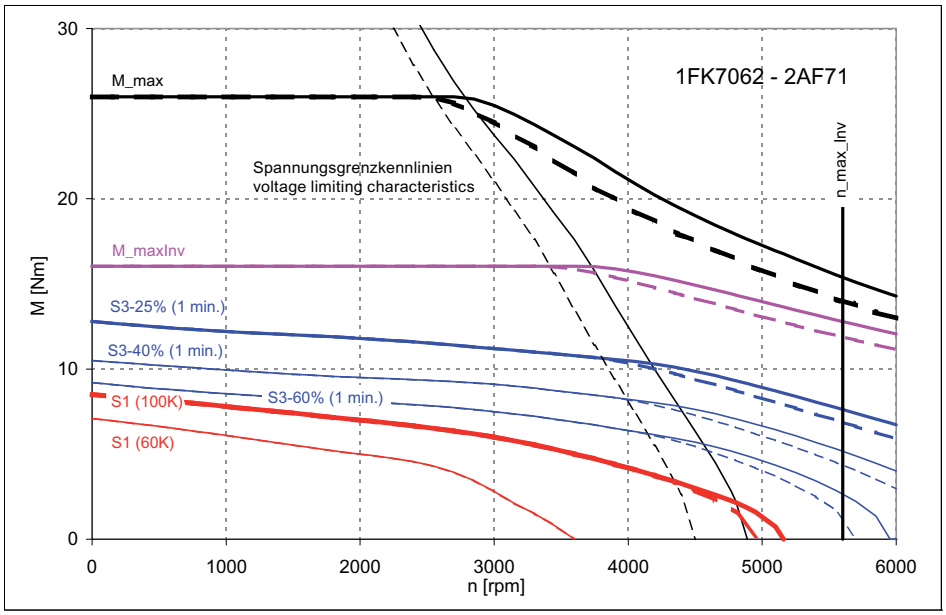
Table 4- 18 1FK7062 Compact

| Technical data | Code | Unit | –2AF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 6.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 4.0 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 8.5 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 5.3 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 7.1 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 4.3 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 1.6 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 7200 |
| Maximum torque | $M_{max}$ | Nm | 26.0 |
| Maximum current | $I_{max}$ | A | 19.2 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.605 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 102.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 1.145 |
| Rotating field inductance | $L_D$ | mH | 14.6 |
| Electrical time constant | $T_{el}$ | ms | 12.8 |
| Mechanical time constant | $T_{mech}$ | ms | 1.49 |
| Thermal time constant | $T_{th}$ | min | 35 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $1.12 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 37000 |
| Weight without brake | $m_{Mot}$ | kg | 9.1 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $1.22 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 26500 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 10.5 |
| **Recommended Motor Module 6SL312□-□TE15-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 5 |
| Maximum converter current | $I_{max\ Inv}$ | A | 10 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 16.0 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 5600 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



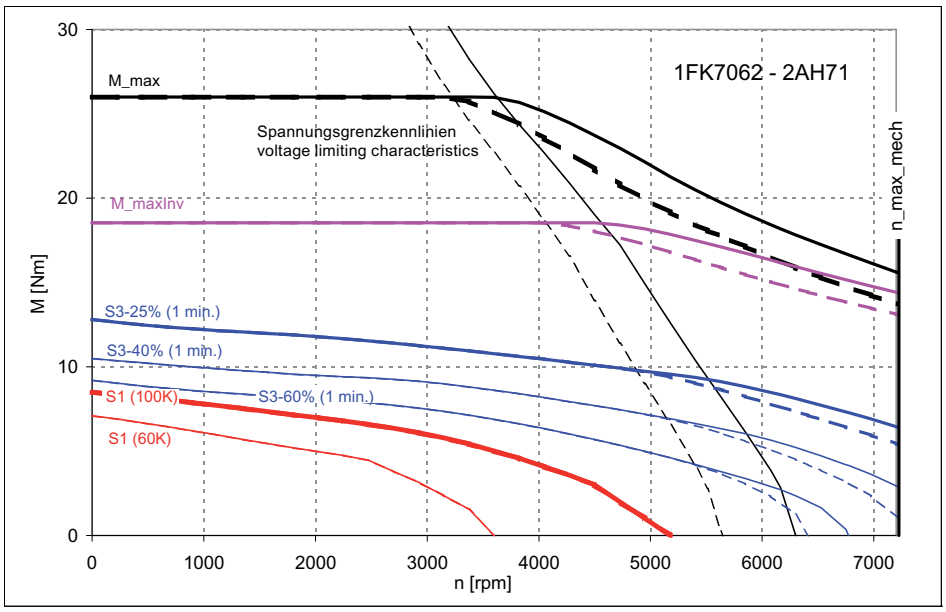

[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-19 1FK7062-2AF71

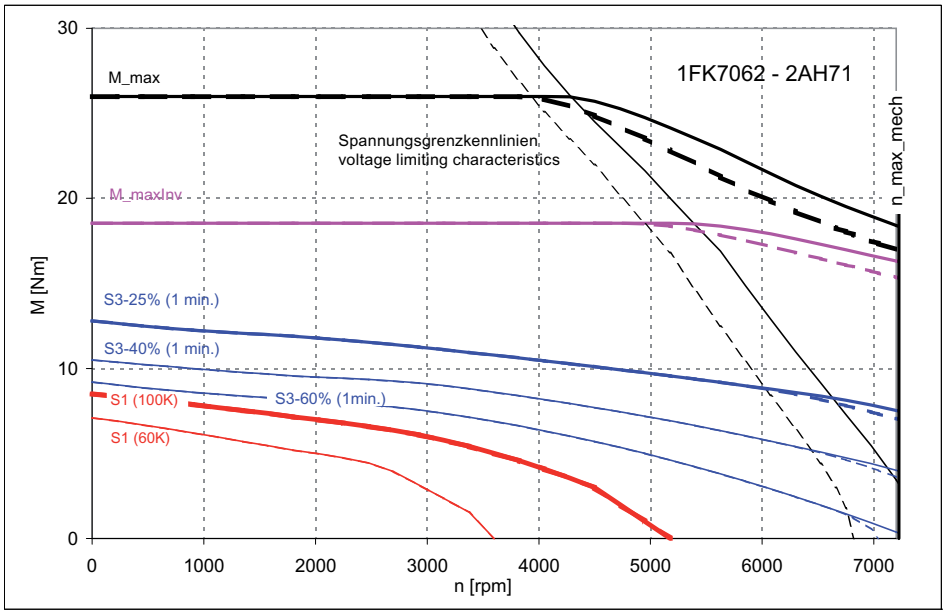
Table 4- 19 1FK7062 Compact

| Technical data | Code | Unit | –2AH71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 4500 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 3.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 3.3 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 8.5 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 8.0 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 7.1 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 6.5 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3500 |
| Optimum power | $P_{opt}$ | kW | 1.95 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 7200 |
| Maximum torque | $M_{max}$ | Nm | 26.0 |
| Maximum current | $I_{max}$ | A | 29.0 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.065 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 67.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.485 |
| Rotating field inductance | $L_D$ | mH | 6.4 |
| Electrical time constant | $T_{el}$ | ms | 13.2 |
| Mechanical time constant | $T_{mech}$ | ms | 1.44 |
| Thermal time constant | $T_{th}$ | min | 35 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $1.12 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 37000 |
| Weight without brake | $m_{Mot}$ | kg | 9.1 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $1.22 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 26500 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 10.5 |
| **Recommended Motor Module 6SL312□-□TE21-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 18 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 18.5 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 7200 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



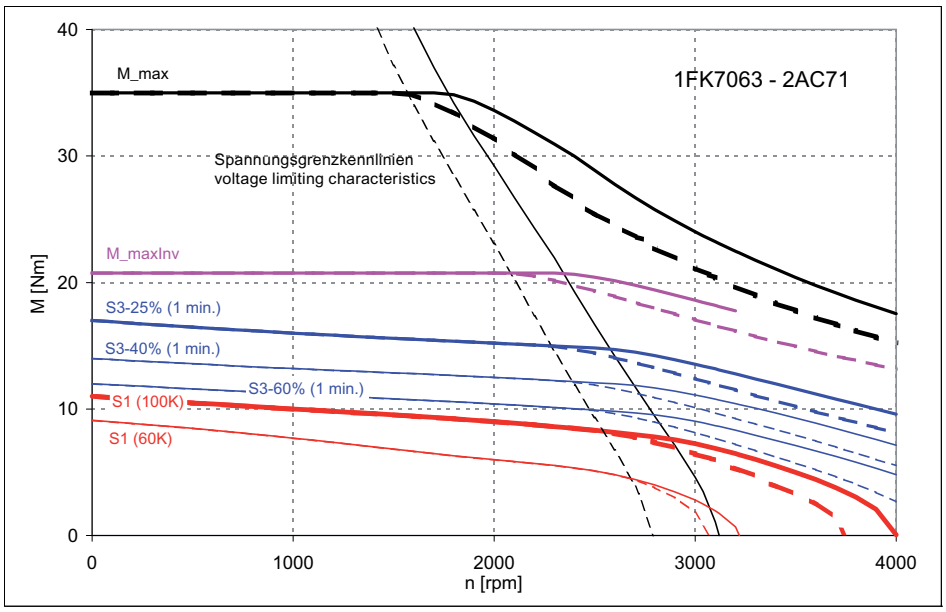

[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-20 1FK7062-2AH71

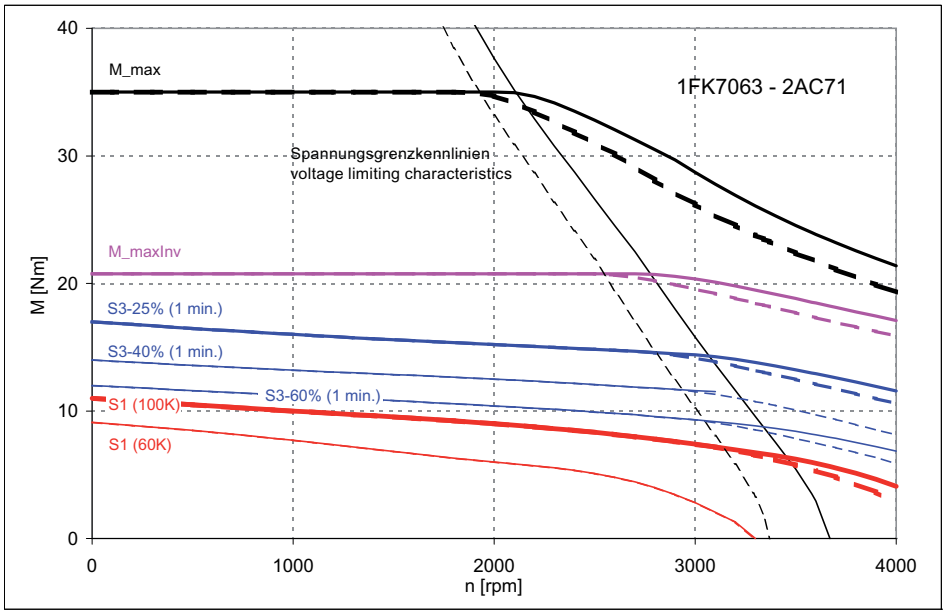
Table 4- 20 1FK7063 Compact

| Technical data | Code | Unit | –2AC71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 2000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 8.9 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 4.4 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 11.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 5.3 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 9.1 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 4.3 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2000 |
| Optimum power | $P_{opt}$ | kW | 1.86 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 7200 |
| Maximum torque | $M_{max}$ | Nm | 35.0 |
| Maximum current | $I_{max}$ | A | 18.5 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 2.08 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 136.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 1.445 |
| Rotating field inductance | $L_D$ | mH | 19.4 |
| Electrical time constant | $T_{el}$ | ms | 13.4 |
| Mechanical time constant | $T_{mech}$ | ms | 1.47 |
| Thermal time constant | $T_{th}$ | min | 40 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $1.47 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 34000 |
| Weight without brake | $m_{Mot}$ | kg | 11.1 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $1.57 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 25000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 12.5 |
| **Recommended Motor Module 6SL312□-□TE15-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 5 |
| Maximum converter current | $I_{max\ Inv}$ | A | 10 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 20.8 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 4200 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



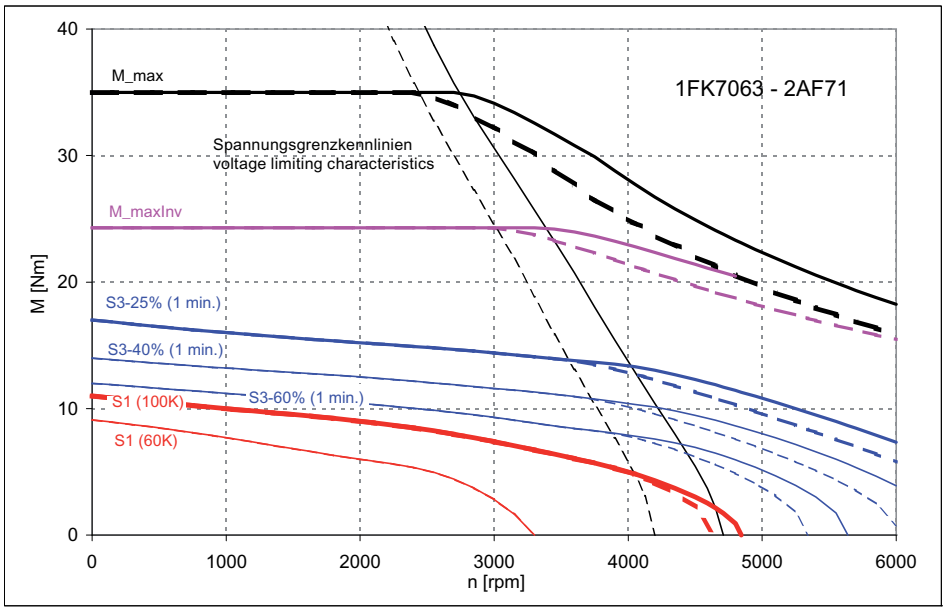

[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-21 1FK7063-2AC71

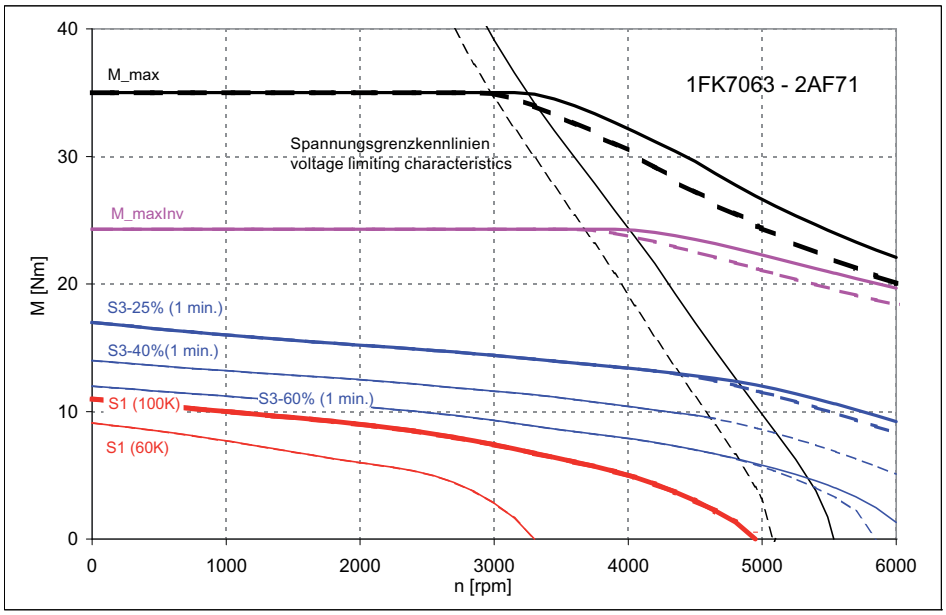
Table 4- 21 1FK7063 Compact

| Technical data | Code | Unit | –2AF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 7.3 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 5.6 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 11.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 8.0 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 9.1 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 6.5 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 2.3 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 7200 |
| Maximum torque | $M_{max}$ | Nm | 35.0 |
| Maximum current | $I_{max}$ | A | 28.0 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.37 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 90.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.635 |
| Rotating field inductance | $L_D$ | mH | 8.5 |
| Electrical time constant | $T_{el}$ | ms | 13.4 |
| Mechanical time constant | $T_{mech}$ | ms | 1.48 |
| Thermal time constant | $T_{th}$ | min | 40 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $1.47 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 34000 |
| Weight without brake | $m_{Mot}$ | kg | 11.1 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $1.57 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 25000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 12.5 |
| **Recommended Motor Module 6SL312□-□TE21-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 18 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 24.3 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 6400 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



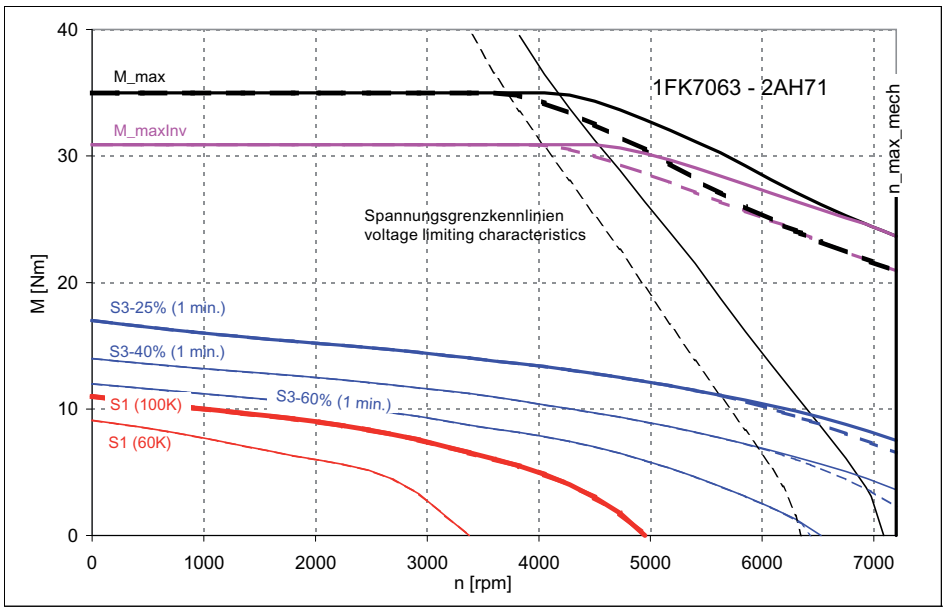

[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-22 1FK7063-2AF71

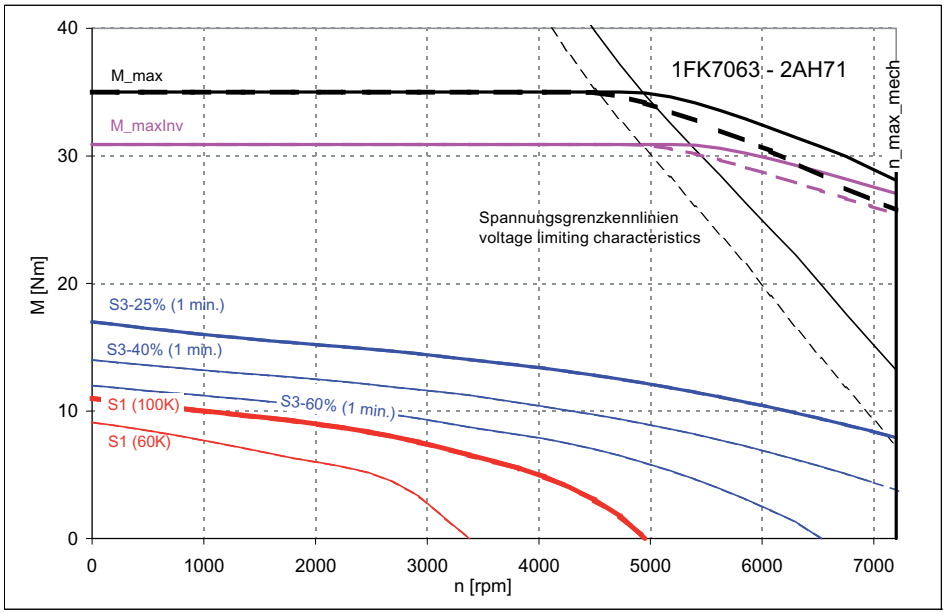
Table 4- 22 1FK7063 Compact

| Technical data | Code | Unit | –2AH71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 4500 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 3.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 3.8 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 11.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 12.0 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 9.1 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 9.7 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3300 |
| Optimum power | $P_{opt}$ | kW | 2.3 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 7200 |
| Maximum torque | $M_{max}$ | Nm | 35.0 |
| Maximum current | $I_{max}$ | A | 42.0 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.915 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 60.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.287 |
| Rotating field inductance | $L_D$ | mH | 3.8 |
| Electrical time constant | $T_{el}$ | ms | 13.2 |
| Mechanical time constant | $T_{mech}$ | ms | 1.51 |
| Thermal time constant | $T_{th}$ | min | 40 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $1.47 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 34000 |
| Weight without brake | $m_{Mot}$ | kg | 11.1 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $1.57 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 25000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 12.5 |
| **Recommended Motor Module 6SL312□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 18 |
| Maximum converter current | $I_{max\ Inv}$ | A | 36 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 30.9 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 7200 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



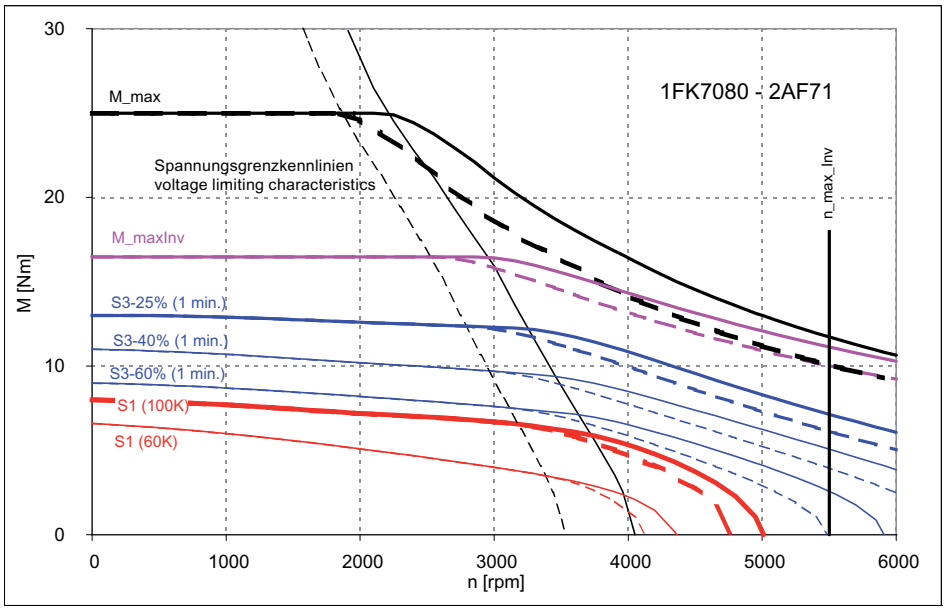

[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-23 1FK7063-2AH71

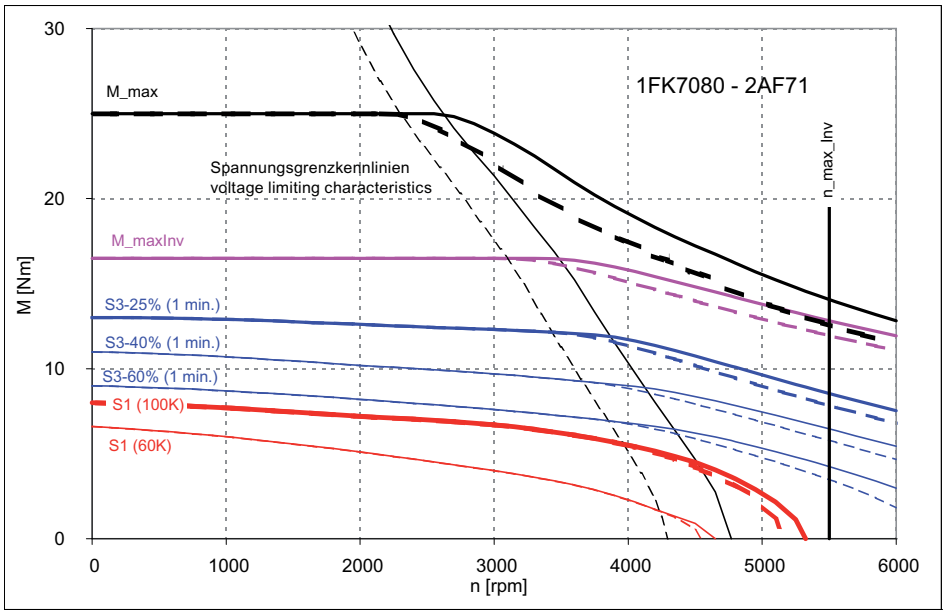
Table 4- 23 1FK7080 Compact

| Technical data | Code | Unit | –2AF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 6.8 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 4.4 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 8.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 4.9 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 6.6 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 4.0 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | RPM | 3000 |
| Optimum power | $P_{opt}$ | kW | 2.15 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 6000 |
| Maximum torque | $M_{max}$ | Nm | 25.0 |
| Maximum current | $I_{max}$ | A | 18.0 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.61 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 105.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.985 |
| Rotating field inductance | $L_D$ | mH | 17.2 |
| Electrical time constant | $T_{el}$ | ms | 17.5 |
| Mechanical time constant | $T_{mech}$ | ms | 1.52 |
| Thermal time constant | $T_{th}$ | min | 40 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $1.42 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 120000 |
| Weight without brake | $m_{Mot}$ | kg | 10.3 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $1.75 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 81000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 13.3 |
| **Recommended Motor Module 6SL312□-□TE15-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 5 |
| Maximum converter current | $I_{max\ Inv}$ | A | 10 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 16.5 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 5500 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



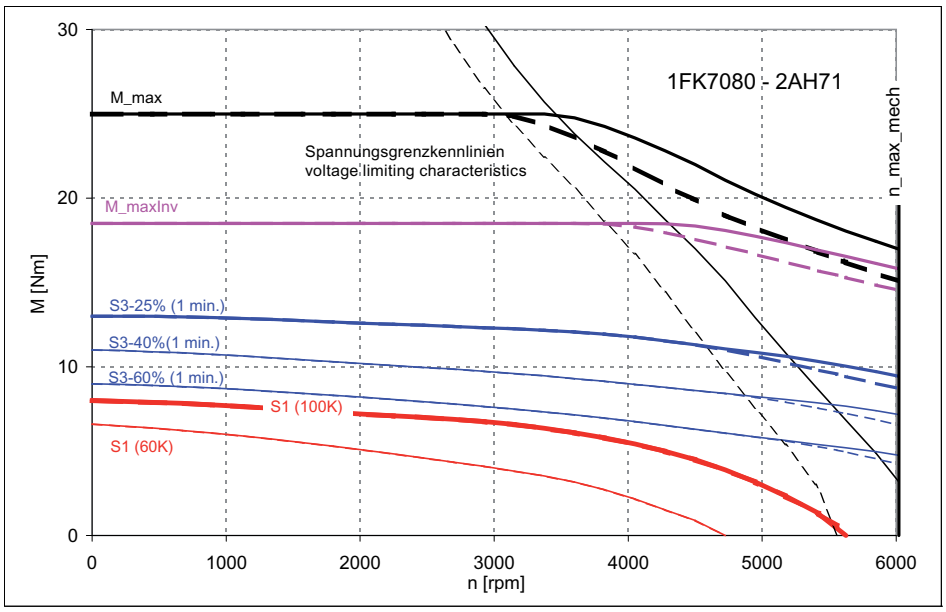

[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-24 1FK7080-2AF71

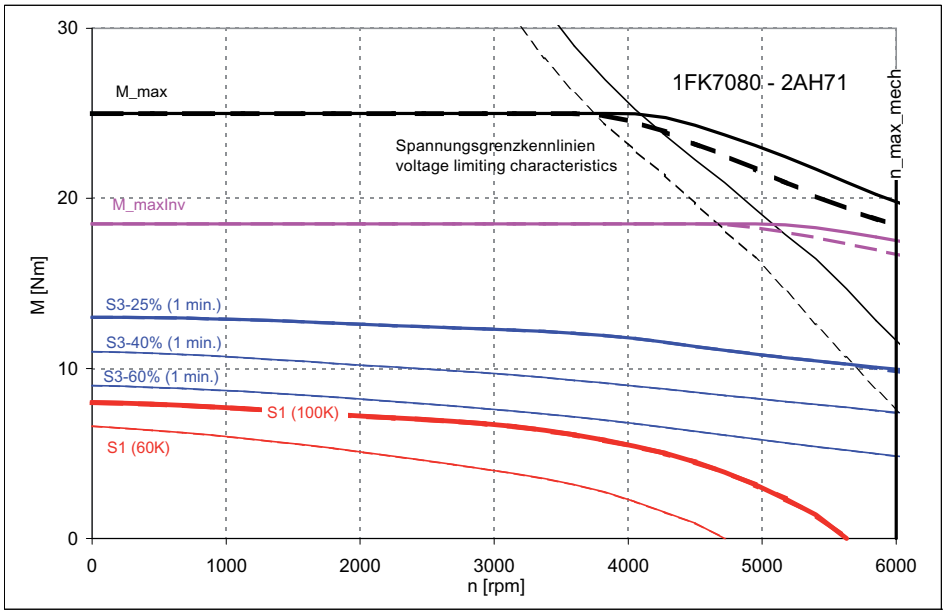
Table 4- 24 1FK7080 Compact

| Technical data | Code | Unit | –2AH71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 4500 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 4.5 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 4.8 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 8.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 7.4 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 6.6 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 6.0 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 4000 |
| Optimum power | $P_{opt}$ | kW | 2.4 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 6000 |
| Maximum torque | $M_{max}$ | Nm | 25.0 |
| Maximum current | $I_{max}$ | A | 27.5 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.08 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 68.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.421 |
| Rotating field inductance | $L_D$ | mH | 7.3 |
| Electrical time constant | $T_{el}$ | ms | 17.3 |
| Mechanical time constant | $T_{mech}$ | ms | 1.54 |
| Thermal time constant | $T_{th}$ | min | 40 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $1.42 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 120000 |
| Weight without brake | $m_{Mot}$ | kg | 10.3 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $1.75 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 81000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 13.3 |
| **Recommended Motor Module 6SL312□-□TE21-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 18 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 18.5 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 6000 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



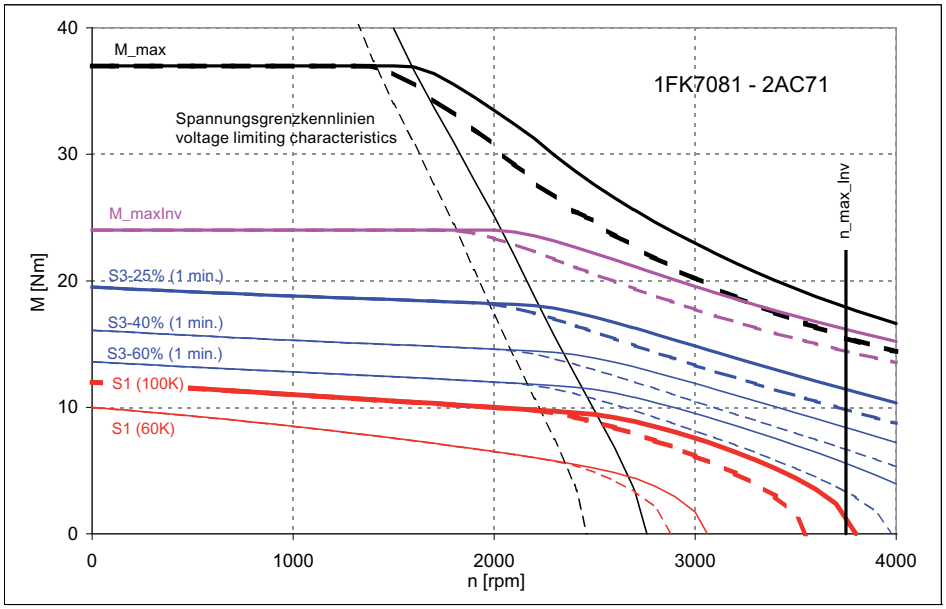

[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-25 1FK7080-2AH71

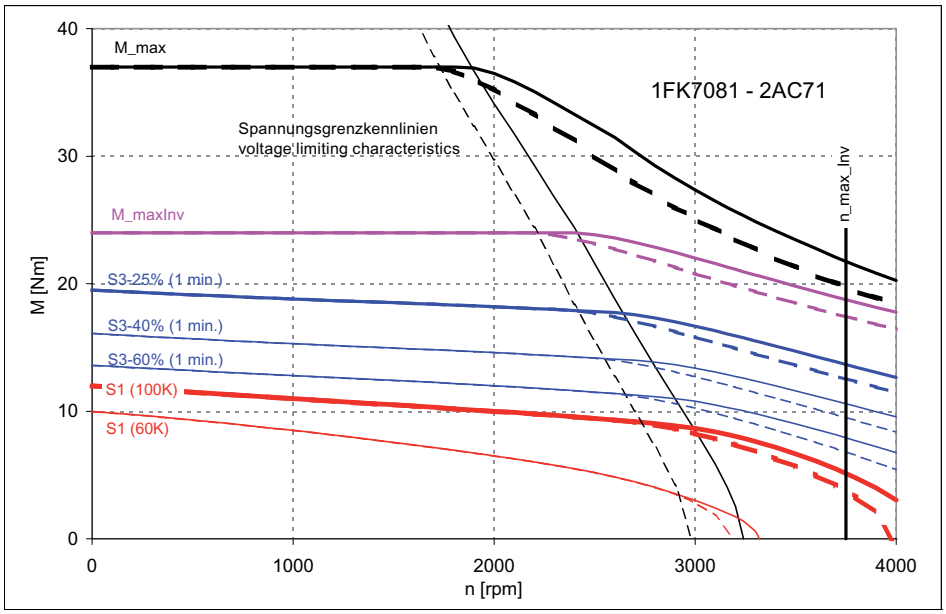
Table 4- 25 1FK7081 Compact

| Technical data | Code | Unit | –2AC71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 2000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 10.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 4.4 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 12.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 5.0 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 10.0 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 4.05 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2000 |
| Optimum power | $P_{opt}$ | kW | 2.1 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 6000 |
| Maximum torque | $M_{max}$ | Nm | 37.0 |
| Maximum current | $I_{max}$ | A | 17.2 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 2.4 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 154.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 1.275 |
| Rotating field inductance | $L_D$ | mH | 23.5 |
| Electrical time constant | $T_{el}$ | ms | 18.4 |
| Mechanical time constant | $T_{mech}$ | ms | 1.33 |
| Thermal time constant | $T_{th}$ | min | 45 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $2.00 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 109000 |
| Weight without brake | $m_{Mot}$ | kg | 12.9 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $2.35 \cdot 10^{-03}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 76000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 15.9 |
| **Recommended Motor Module 6SL312□-□TE15-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 5 |
| Maximum converter current | $I_{max\ Inv}$ | A | 10 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 24.0 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 3750 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



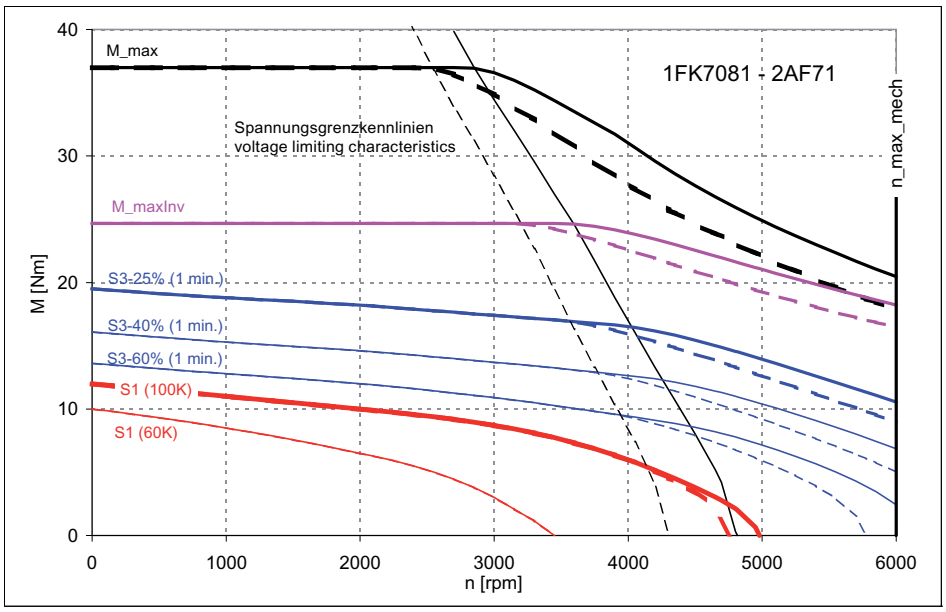

[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-26 1FK7081-2AC71

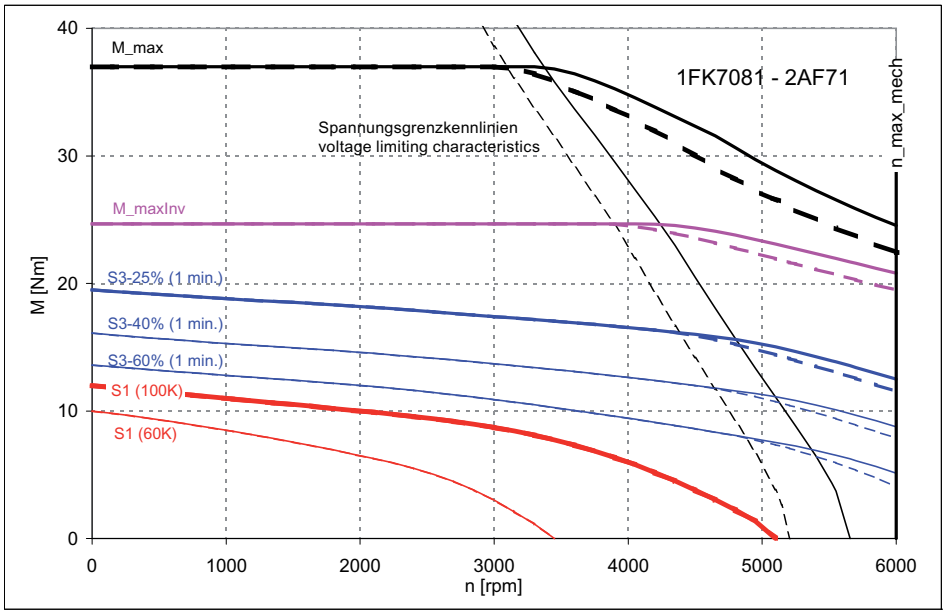
Table 4- 26 1FK7081 Compact

| Technical data | Code | Unit | –2AF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 8.7 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 6.8 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 12.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 8.7 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 10.0 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 7.1 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 2.75 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 6000 |
| Maximum torque | $M_{max}$ | Nm | 37.0 |
| Maximum current | $I_{max}$ | A | 30.0 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.375 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 88.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.424 |
| Rotating field inductance | $L_D$ | mH | 7.7 |
| Electrical time constant | $T_{el}$ | ms | 18.2 |
| Mechanical time constant | $T_{mech}$ | ms | 1.35 |
| Thermal time constant | $T_{th}$ | min | 45 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $2.00 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 109000 |
| Weight without brake | $m_{Mot}$ | kg | 12.9 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $2.35 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_t$ | Nm/rad | 76000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 15.9 |
| **Recommended Motor Module 6SL312□-□TE21-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 18 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 24.7 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 6000 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



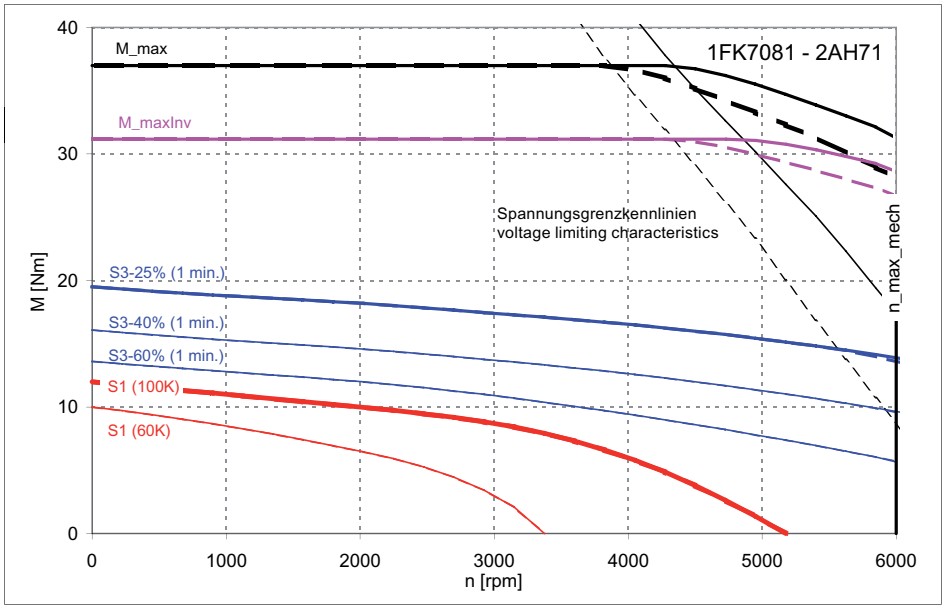

[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-27 1FK7081-2AF71

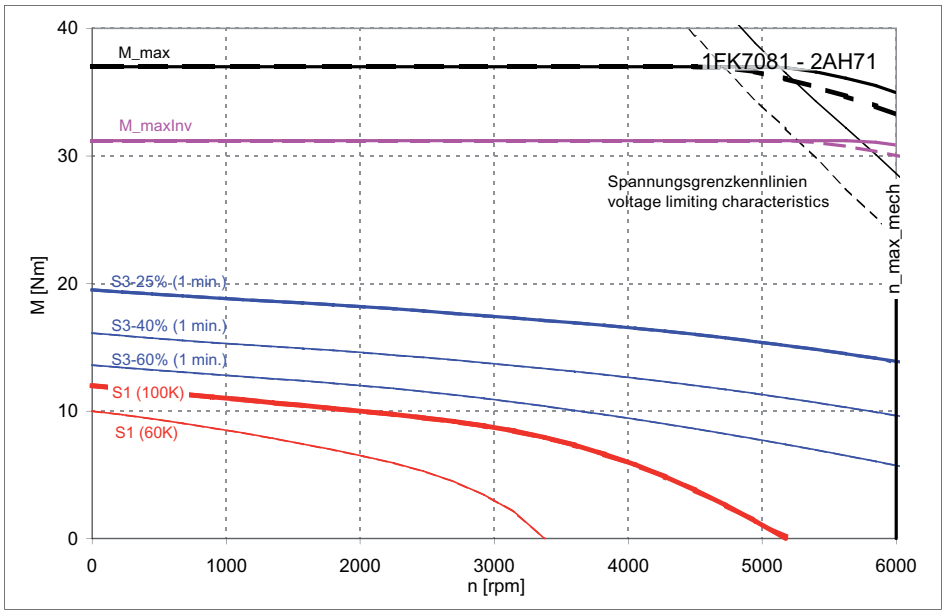
Table 4- 27 1FK7081 Compact

| Technical data | Code | Unit | –2AH71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 4500 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 3.8 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 4.9 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 12.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 13.1 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 10.0 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 10.6 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 2.75 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 6000 |
| Maximum torque | $M_{max}$ | Nm | 37.0 |
| Maximum current | $I_{max}$ | A | 45.0 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.915 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 59.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.1895 |
| Rotating field inductance | $L_D$ | mH | 3.4 |
| Electrical time constant | $T_{el}$ | ms | 17.9 |
| Mechanical time constant | $T_{mech}$ | ms | 1.36 |
| Thermal time constant | $T_{th}$ | min | 45 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $2.00 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 109000 |
| Weight without brake | $m_{Mot}$ | kg | 12.9 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $2.35 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 76000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 15.9 |
| **Recommended Motor Module 6SL312□-□TE21-8AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 18 |
| Maximum converter current | $I_{max\ Inv}$ | A | 36 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 31.2 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 6000 |

The rated data are valid for a 600 V DC link voltage.




[ ————— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



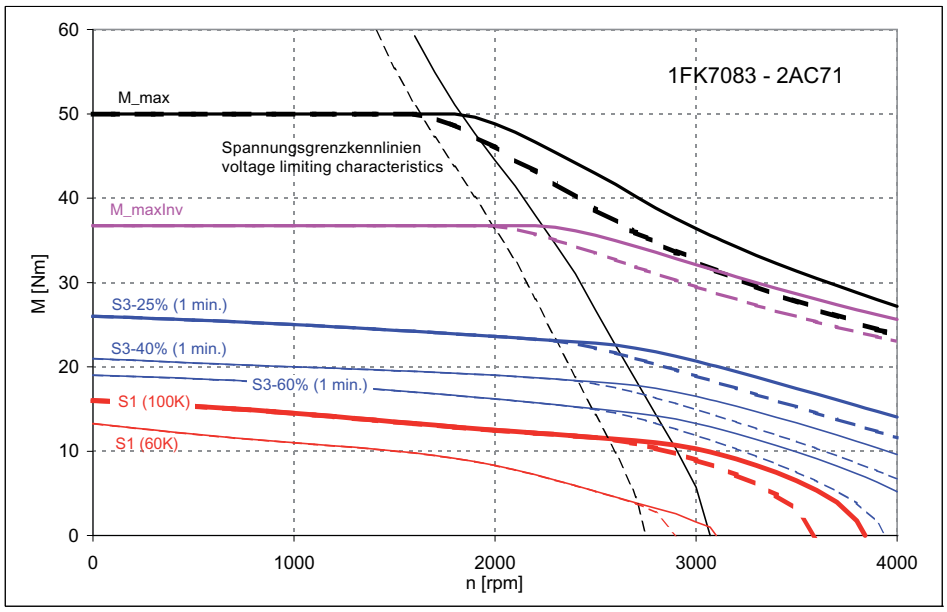

[ ————— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-28 1FK7081-2AH71

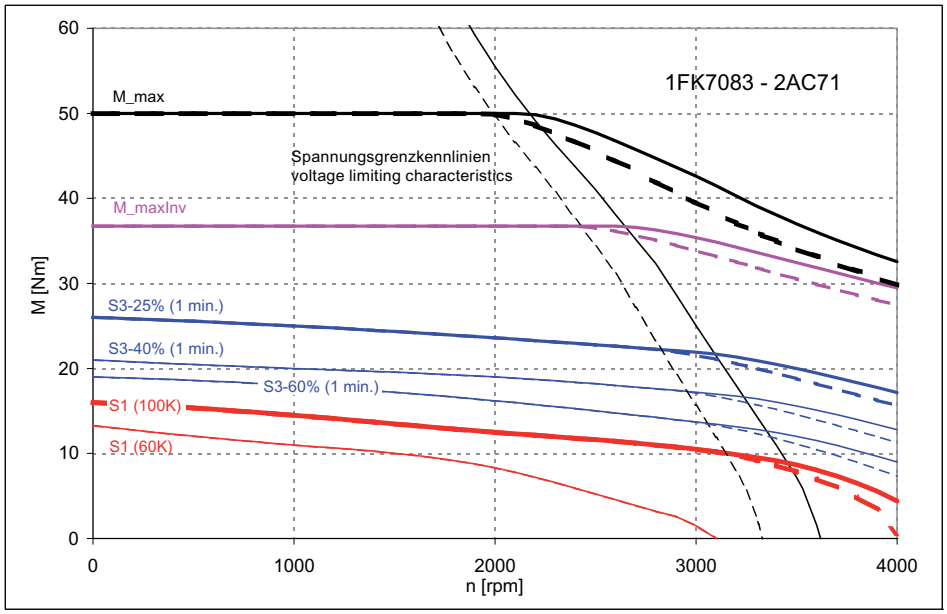
Table 4- 28 1FK7083 Compact

| Technical data | Code | Unit | –2AC71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 2000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 12.5 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 6.3 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 16.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 7.5 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 13.3 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 6.1 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2000 |
| Optimum power | $P_{opt}$ | kW | 2.6 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 6000 |
| Maximum torque | $M_{max}$ | Nm | 50 |
| Maximum current | $I_{max}$ | A | 27.5 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 2.13 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 138.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.66 |
| Rotating field inductance | $L_D$ | mH | 12.8 |
| Electrical time constant | $T_{el}$ | ms | 19.4 |
| Mechanical time constant | $T_{mech}$ | ms | 1.13 |
| Thermal time constant | $T_{th}$ | min | 50 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $2.60 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 101000 |
| Weight without brake | $m_{Mot}$ | kg | 15.6 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $2.95 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_t$ | Nm/rad | 72000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 18.6 |
| **Recommended Motor Module 6SL312□-□TE21-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 18 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 36.7 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 4150 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



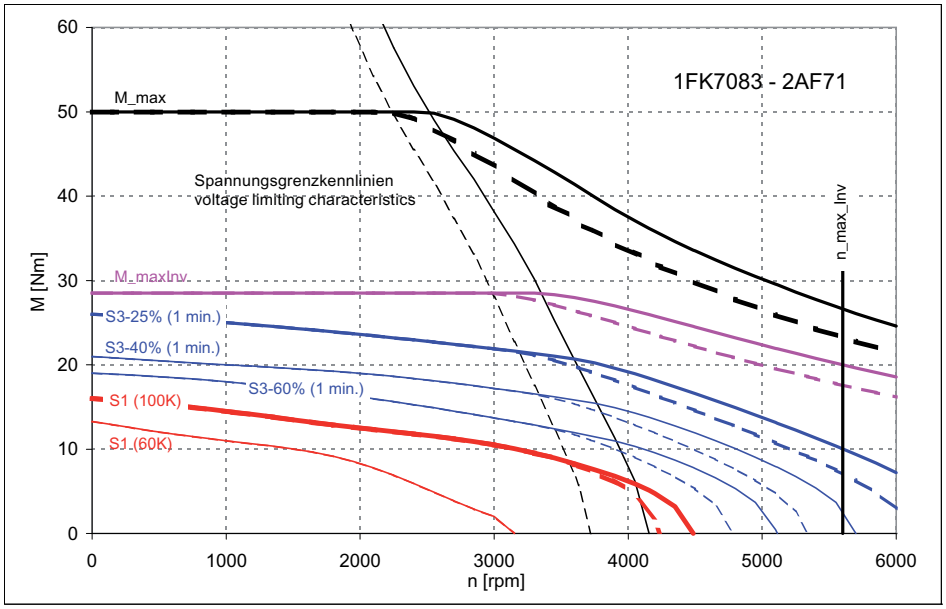

[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-29 1FK7083-2AC71

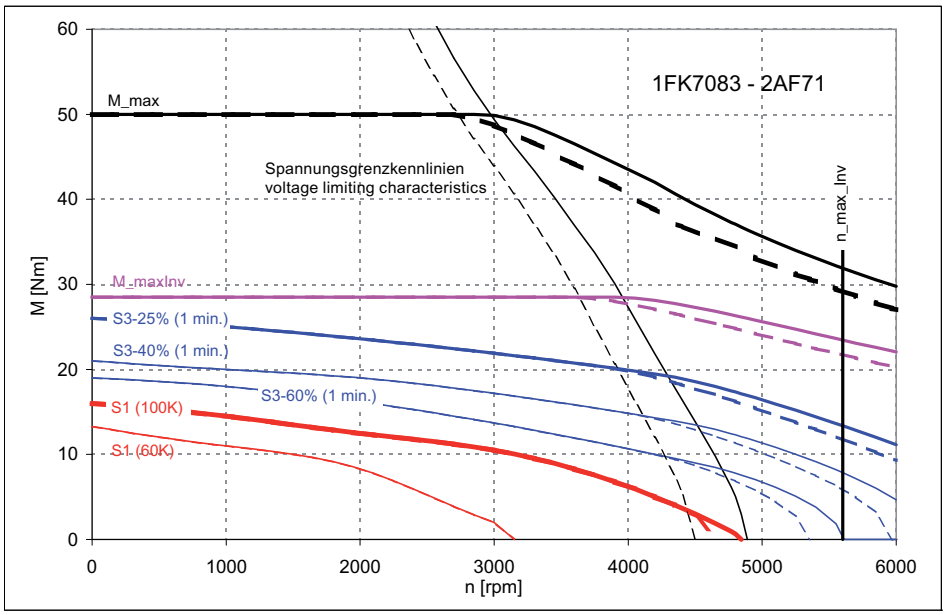
Table 4- 29 1FK7083 Compact

| Technical data | Code | Unit | –2AC71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 10.5 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 7.2 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 16.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 10.1 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 13.3 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 8.2 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 3.3 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 6000 |
| Maximum torque | $M_{max}$ | Nm | 50 |
| Maximum current | $I_{max}$ | A | 37.0 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.58 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 102.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.377 |
| Rotating field inductance | $L_D$ | mH | 7.0 |
| Electrical time constant | $T_{el}$ | ms | 18.6 |
| Mechanical time constant | $T_{mech}$ | ms | 1.18 |
| Thermal time constant | $T_{th}$ | min | 50 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $2.60 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 101000 |
| Weight without brake | $m_{Mot}$ | kg | 15.6 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $2.95 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 72000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 18.6 |
| **Recommended Motor Module 6SL312□-□TE15-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 18 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 28.5 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 5600 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



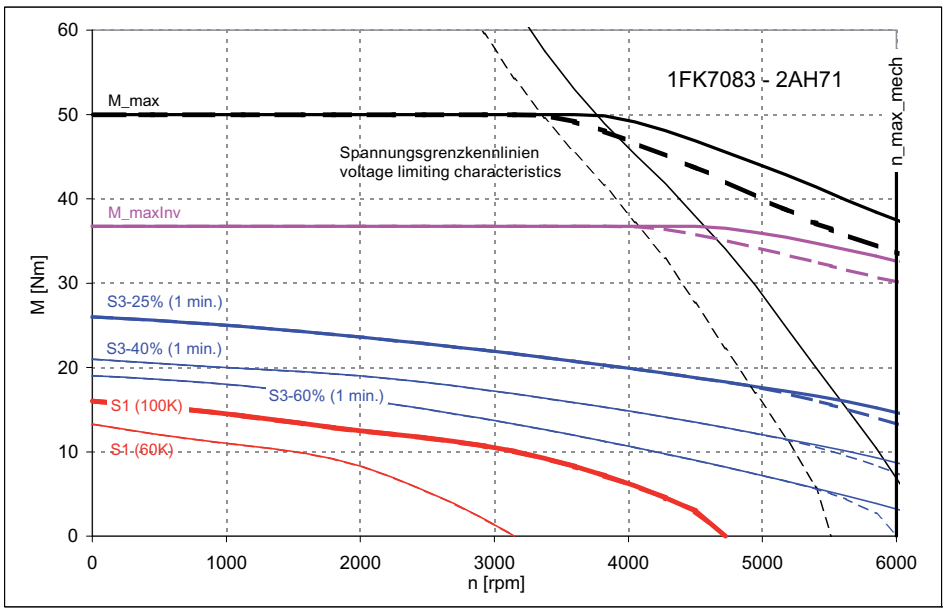

[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-30 1FK7083-2AF71

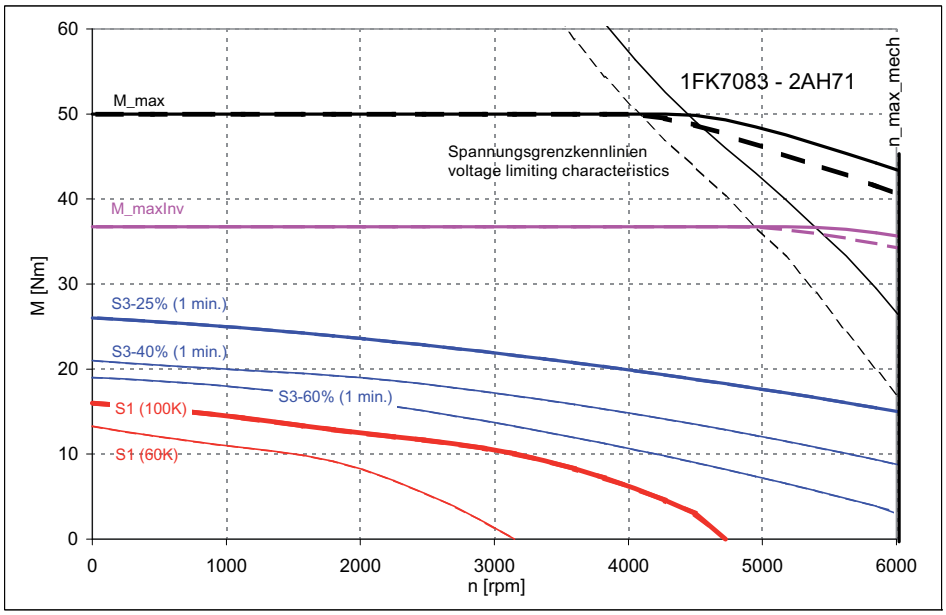
Table 4- 30 1FK7083 Compact

| Technical data | Code | Unit | –2AH71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 4500 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 3.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 3.6 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 16.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 15.0 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 13.3 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 12.2 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 3.3 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 6000 |
| Maximum torque | $M_{max}$ | Nm | 50 |
| Maximum current | $I_{max}$ | A | 55 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.065 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 69.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.1655 |
| Rotating field inductance | $L_D$ | mH | 3.2 |
| Electrical time constant | $T_{el}$ | ms | 19.3 |
| Mechanical time constant | $T_{mech}$ | ms | 1.14 |
| Thermal time constant | $T_{th}$ | min | 50 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $2.60 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 101000 |
| Weight without brake | $m_{Mot}$ | kg | 15.6 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $2.95 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 72000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 18.6 |
| **Recommended Motor Module 6SL312□-□TE21-8AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 18 |
| Maximum converter current | $I_{max\ Inv}$ | A | 36 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 36.7 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 6000 |

The rated data are valid for a 600 V DC link voltage.




[ ————— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



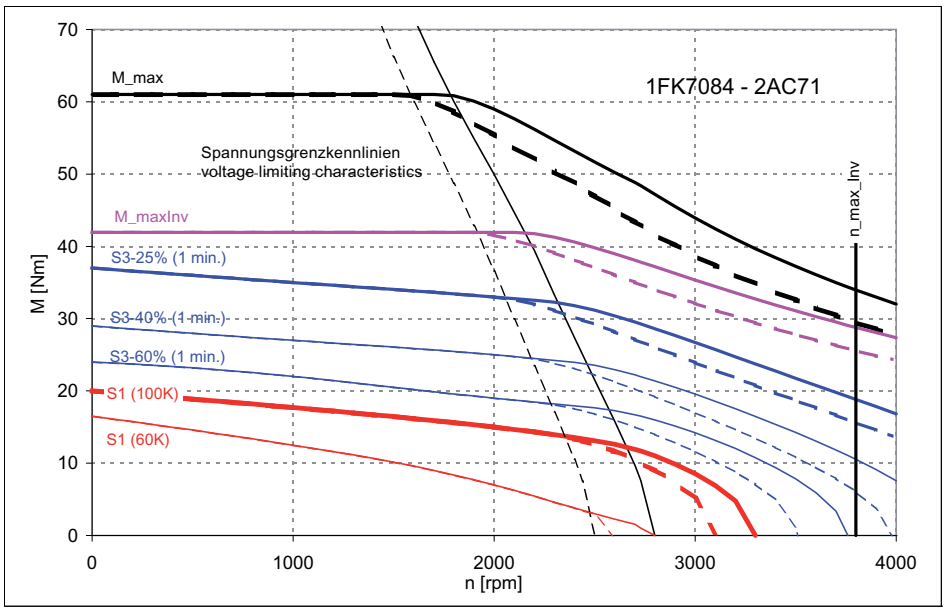

[ ————— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-31 1FK7083-2AH71

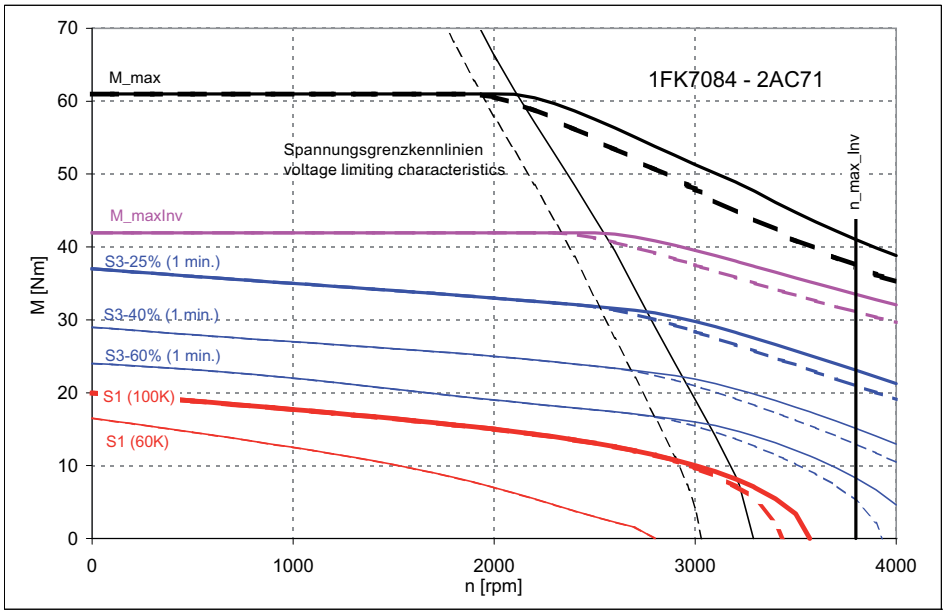
Table 4- 31 1FK7084 Compact

| Technical data | Code | Unit | –2AC71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 2000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 15.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 6.7 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 20.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 8.5 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 16.6 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 6.9 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2000 |
| Optimum power | $P_{opt}$ | kW | 3.15 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 6000 |
| Maximum torque | $M_{max}$ | Nm | 61 |
| Maximum current | $I_{max}$ | A | 28.5 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 2.36 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 152.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.585 |
| Rotating field inductance | $L_D$ | mH | 12.0 |
| Electrical time constant | $T_{el}$ | ms | 20.5 |
| Mechanical time constant | $T_{mech}$ | ms | 1.02 |
| Thermal time constant | $T_{th}$ | min | 55 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $3.25 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 93000 |
| Weight without brake | $m_{Mot}$ | kg | 18.3 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $3.55 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 68000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 21.3 |
| **Recommended Motor Module 6SL312□-□TE21-0AA□□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 18 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 41.9 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 3800 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



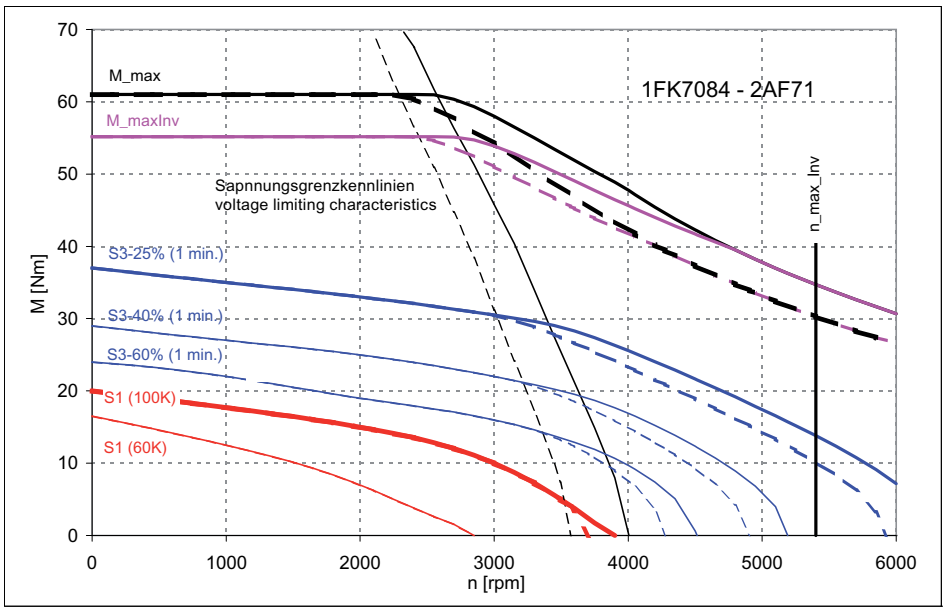

[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-32 1FK7084-2AC71

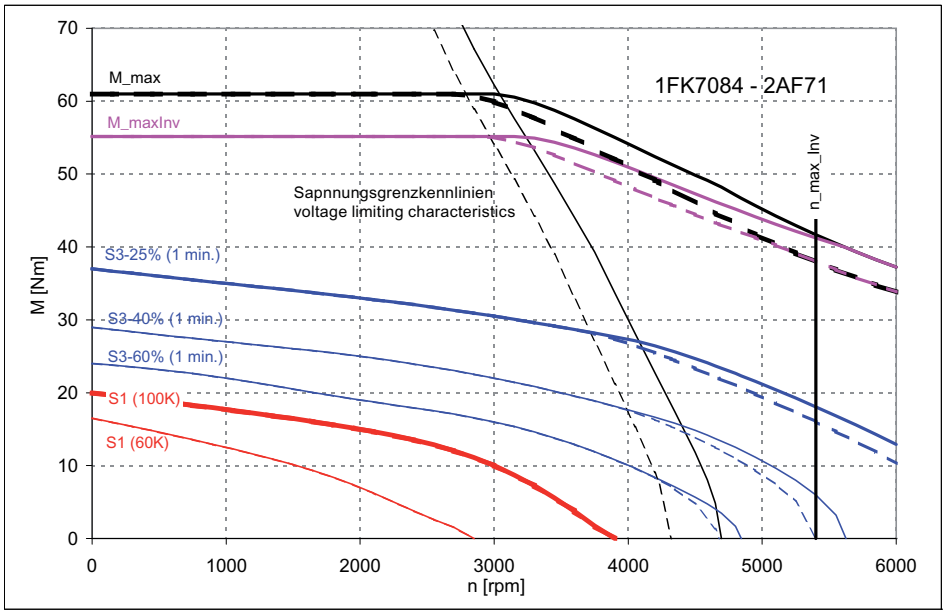
Table 4- 32 1FK7084 Compact

| Technical data | Code | Unit | –2AF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 10.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 6.5 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 20.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 12.1 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 16.6 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 9.8 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2500 |
| Optimum power | $P_{opt}$ | kW | 3.25 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 6000 |
| Maximum torque | $M_{max}$ | Nm | 61 |
| Maximum current | $I_{max}$ | A | 41.0 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.655 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 106.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.284 |
| Rotating field inductance | $L_D$ | mH | 5.9 |
| Electrical time constant | $T_{el}$ | ms | 21.0 |
| Mechanical time constant | $T_{mech}$ | ms | 1.01 |
| Thermal time constant | $T_{th}$ | min | 55 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $3.25 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 93000 |
| Weight without brake | $m_{Mot}$ | kg | 18.3 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $3.55 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 68000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 21.3 |
| **Recommended Motor Module 6SL312□-□TE21-8AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 18 |
| Maximum converter current | $I_{max\ Inv}$ | A | 36 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 55 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 5400 |

The rated data are valid for a 600 V DC link voltage.




[ ————— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



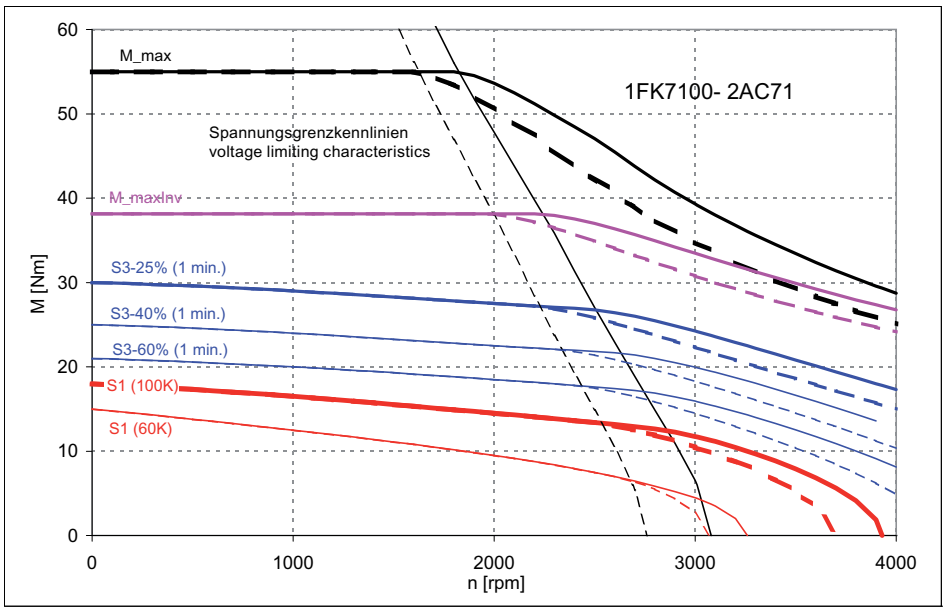

[ ————— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-33 1FK7084-2AF71

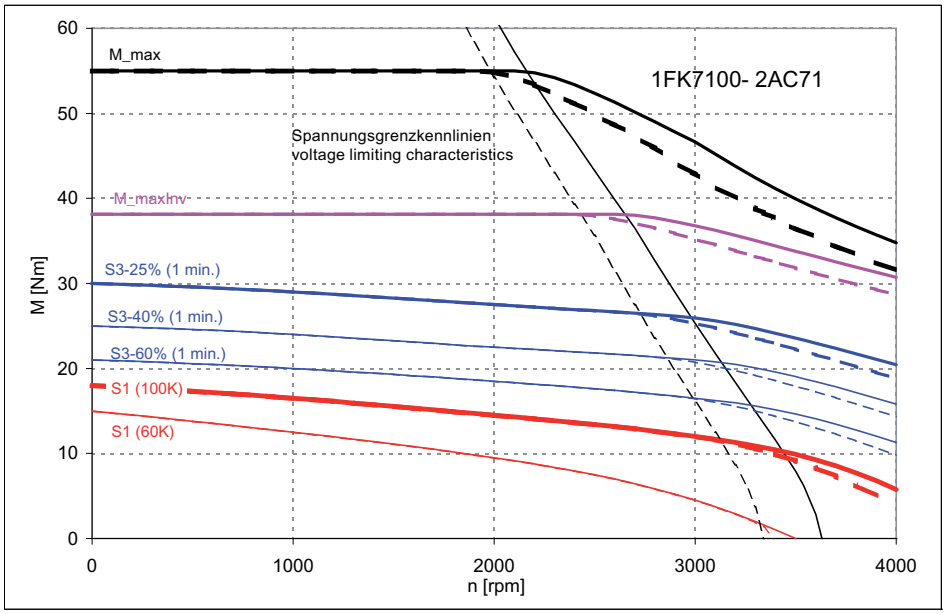
Table 4- 33 1FK7100 Compact

| Technical data | Code | Unit | –2AC71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 2000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 14.5 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 7.1 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 18.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 8.4 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 14.9 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 6.8 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2000 |
| Optimum power | $P_{opt}$ | kW | 3.05 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 5000 |
| Maximum torque | $M_{max}$ | Nm | 55 |
| Maximum current | $I_{max}$ | A | 28.0 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 2.14 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 138.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.55 |
| Rotating field inductance | $L_D$ | mH | 12.7 |
| Electrical time constant | $T_{el}$ | ms | 23.0 |
| Mechanical time constant | $T_{mech}$ | ms | 1.95 |
| Thermal time constant | $T_{th}$ | min | 55 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $5.40 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 183000 |
| Weight without brake | $m_{Mot}$ | kg | 17.6 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $6.20 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 135000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 21.0 |
| **Recommended Motor Module 6SL312□-□TE21-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 18 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 38.1 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 4200 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



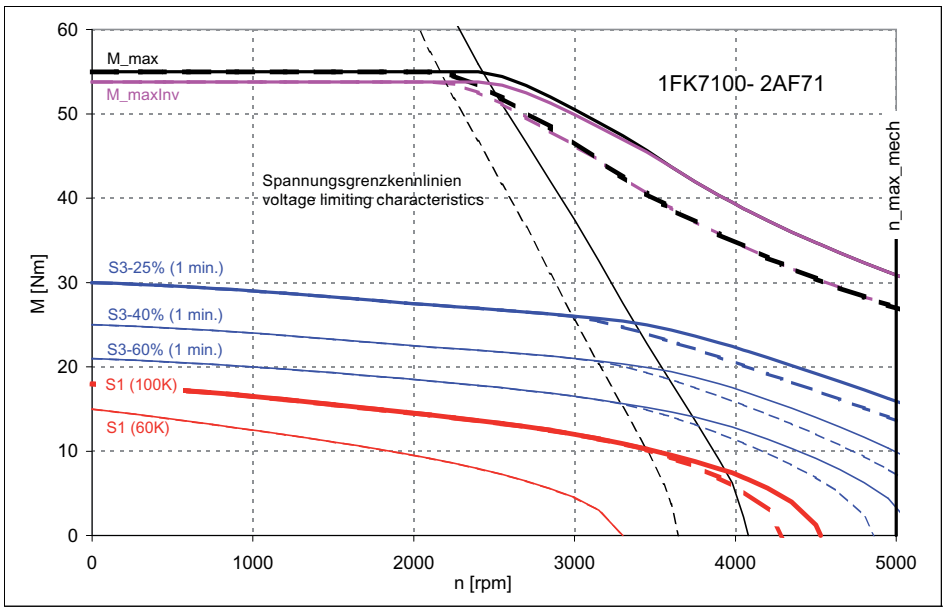

[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DClink voltage 650 V)

Figure 4-34 1FK7100-2AC71

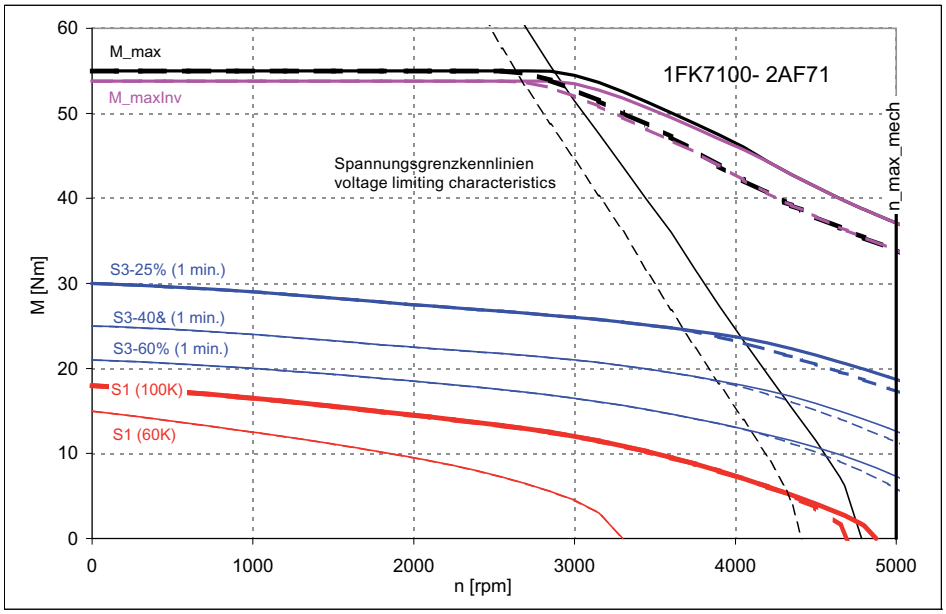
Table 4- 34 1FK7100 Compact

| Technical data | Code | Unit | –2AF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 12.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 8.0 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 18.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 11.1 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 14.9 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 9.0 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 3.75 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 5000 |
| Maximum torque | $M_{max}$ | Nm | 55 |
| Maximum current | $I_{max}$ | A | 37.0 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.62 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 104.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.324 |
| Rotating field inductance | $L_D$ | mH | 7.3 |
| Electrical time constant | $T_{el}$ | ms | 22.5 |
| Mechanical time constant | $T_{mech}$ | ms | 2.0 |
| Thermal time constant | $T_{th}$ | min | 55 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $5.40 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 183000 |
| Weight without brake | $m_{Mot}$ | kg | 17.6 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $6.20 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 135000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 21.0 |
| **Recommended Motor Module 6SL312□-□TE21-8AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 18 |
| Maximum converter current | $I_{max\ Inv}$ | A | 36 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 54 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 5000 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



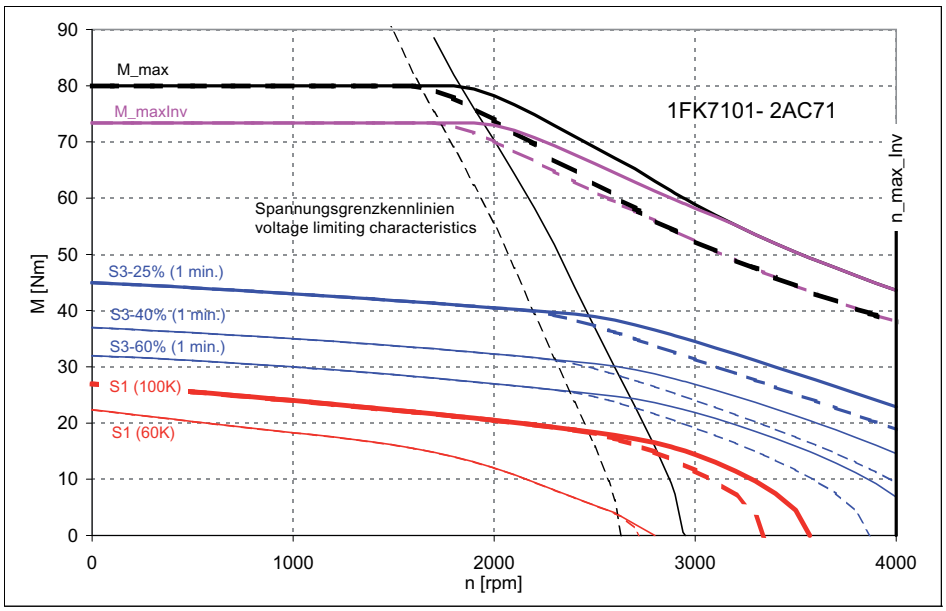

[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-35 1FK7100-2AF71

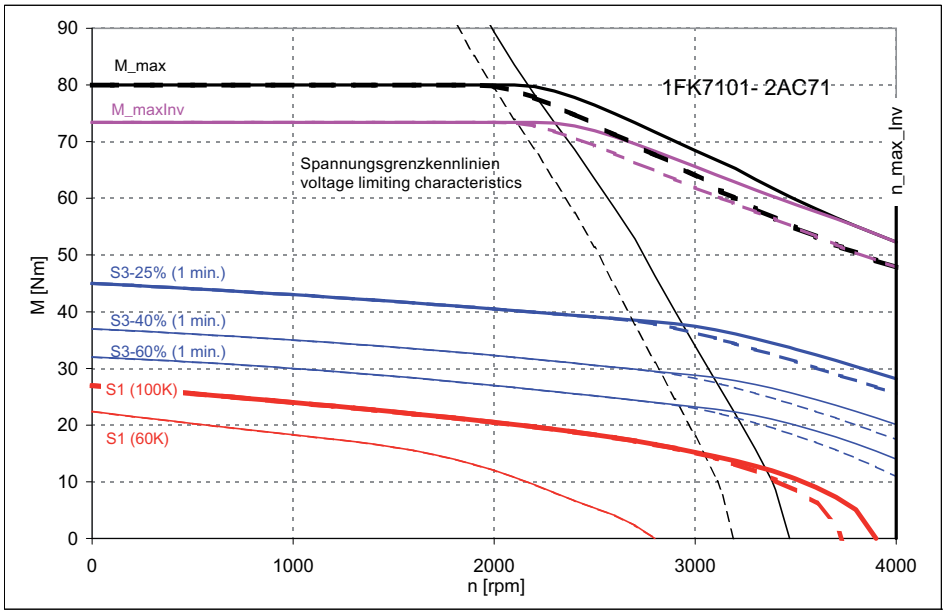
Table 4- 35 1FK7101 Compact

| Technical data | Code | Unit | –2AC71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 2000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 20.5 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 9.7 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 27.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 12.3 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 22.5 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 10.0 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2000 |
| Optimum power | $P_{opt}$ | kW | 4.3 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 5000 |
| Maximum torque | $M_{max}$ | Nm | 80 |
| Maximum current | $I_{max}$ | A | 40.5 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 2.15 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 144.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.343 |
| Rotating field inductance | $L_D$ | mH | 8.5 |
| Electrical time constant | $T_{el}$ | ms | 25.0 |
| Mechanical time constant | $T_{mech}$ | ms | 1.62 |
| Thermal time constant | $T_{th}$ | min | 60 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $7.9 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 164000 |
| Weight without brake | $m_{Mot}$ | kg | 23.0 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $8.7 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 116000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 27.5 |
| **Recommended Motor Module 6SL312□-□TE21-8AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 18 |
| Maximum converter current | $I_{max\ Inv}$ | A | 36 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 73 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 4000 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



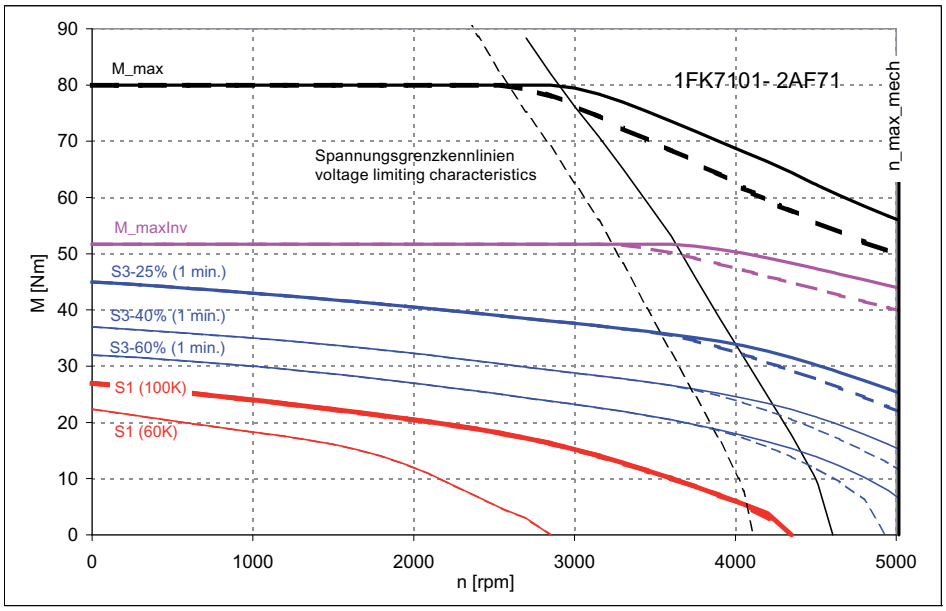

[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-36 1FK7101-2AC71

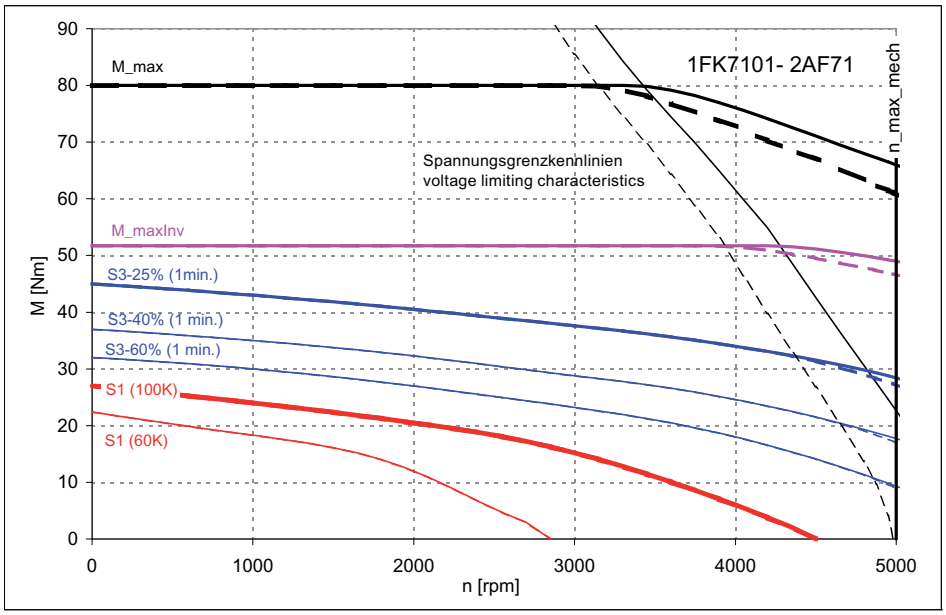
Table 4- 36 1FK7101 Compact

| Technical data | Code | Unit | –2AF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 15.5 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 11.6 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 27.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 18.8 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 22.5 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 15.2 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 4.85 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 5000 |
| Maximum torque | $M_{max}$ | Nm | 80 |
| Maximum current | $I_{max}$ | A | 63 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.435 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 92.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.141 |
| Rotating field inductance | $L_D$ | mH | 3.5 |
| Electrical time constant | $T_{el}$ | ms | 25.0 |
| Mechanical time constant | $T_{mech}$ | ms | 1.62 |
| Thermal time constant | $T_{th}$ | min | 60 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $7.9 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 164000 |
| Weight without brake | $m_{Mot}$ | kg | 23.0 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $8.7 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 116000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 27.5 |
| **Recommended Motor Module 6SL312□-□TE21-8AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 18 |
| Maximum converter current | $I_{max\ Inv}$ | A | 36 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 52 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 5000 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



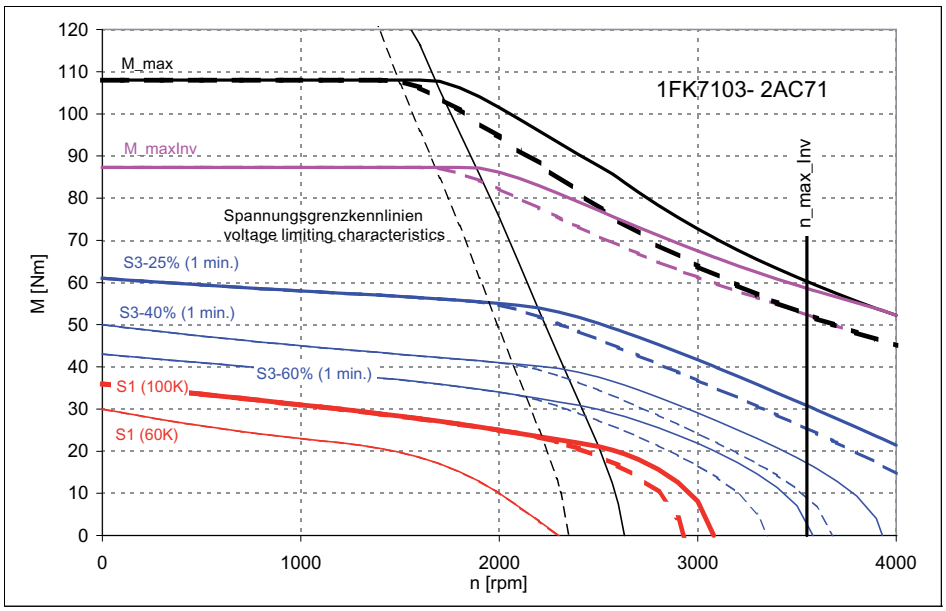

[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-37 1FK7101-2AF71

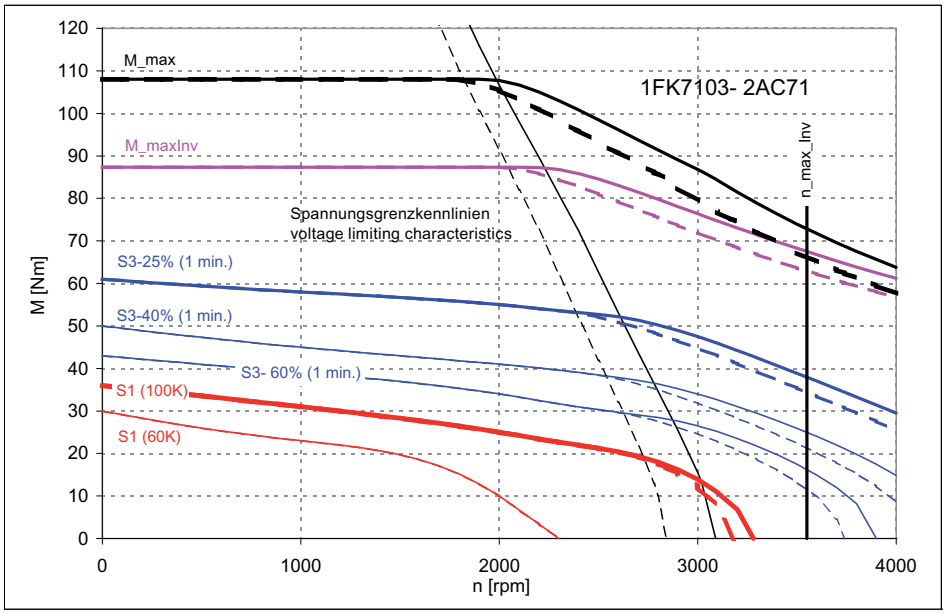
Table 4- 37 1FK7103 Compact

| Technical data | Code | Unit | –2AC71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 2000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 25.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 11.0 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 36.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 14.4 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 30.0 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 11.6 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2000 |
| Optimum power | $P_{opt}$ | kW | 5.2 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 5000 |
| Maximum torque | $M_{max}$ | Nm | 108 |
| Maximum current | $I_{max}$ | A | 46.5 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 2.45 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 162.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.288 |
| Rotating field inductance | $L_D$ | mH | 7.9 |
| Electrical time constant | $T_{el}$ | ms | 27.5 |
| Mechanical time constant | $T_{mech}$ | ms | 1.43 |
| Thermal time constant | $T_{th}$ | min | 65 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $10.4 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 148000 |
| Weight without brake | $m_{Mot}$ | kg | 28.5 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $11.2 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 108000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 33.0 |
| **Recommended Motor Module 6SL312□-□TE21-8AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 18 |
| Maximum converter current | $I_{max\ Inv}$ | A | 36 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 87 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 3550 |

The rated data are valid for a 600 V DC link voltage.




[ ————— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



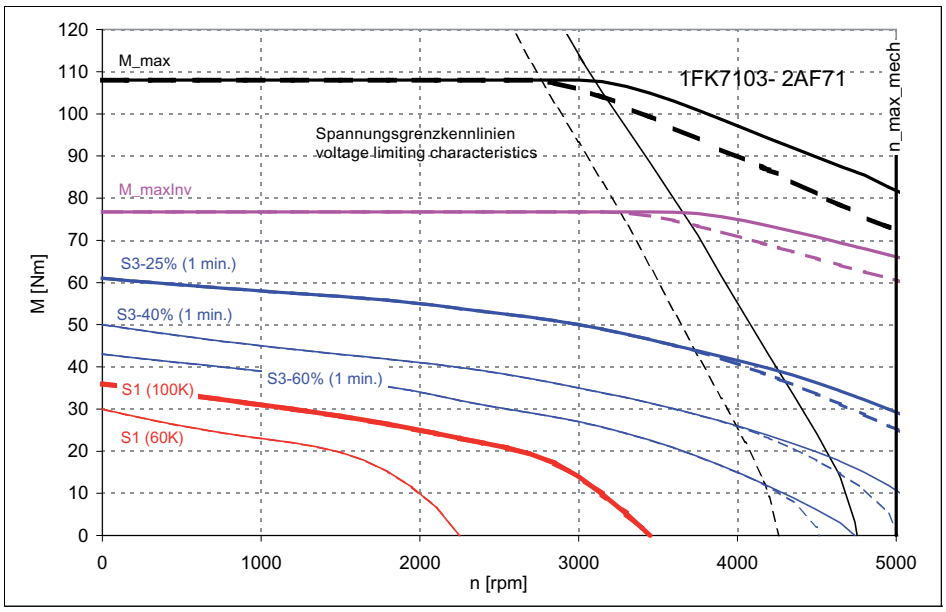

[ ————— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-38 1FK7103-2AC71

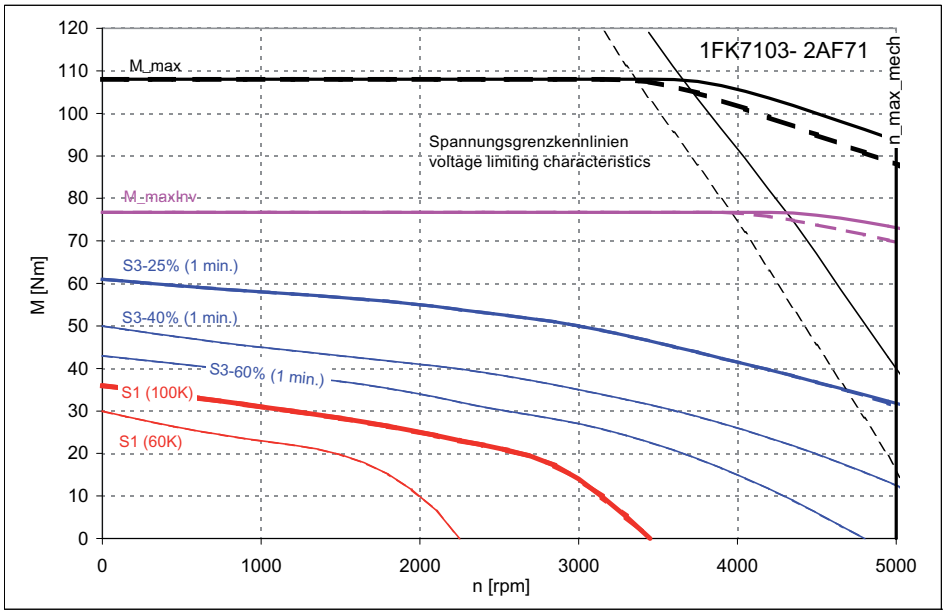
Table 4- 38 1FK7103 Compact

| Technical data | Code | Unit | –2AF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 14.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 11.5 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 36.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 26.0 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 30.0 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 21.0 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2500 |
| Optimum power | $P_{opt}$ | kW | 5.4 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 5000 |
| Maximum torque | $M_{max}$ | Nm | 108 |
| Maximum current | $I_{max}$ | A | 84 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.385 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 89.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.0895 |
| Rotating field inductance | $L_D$ | mH | 2.4 |
| Electrical time constant | $T_{el}$ | ms | 27.0 |
| Mechanical time constant | $T_{mech}$ | ms | 1.46 |
| Thermal time constant | $T_{th}$ | min | 65 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $10.4 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 148000 |
| Weight without brake | $m_{Mot}$ | kg | 28.5 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $11.2 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 108000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 33.0 |
| **Recommended Motor Module 6SL312□-□TE23-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 30 |
| Maximum converter current | $I_{max\ Inv}$ | A | 56 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 77 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 5000 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



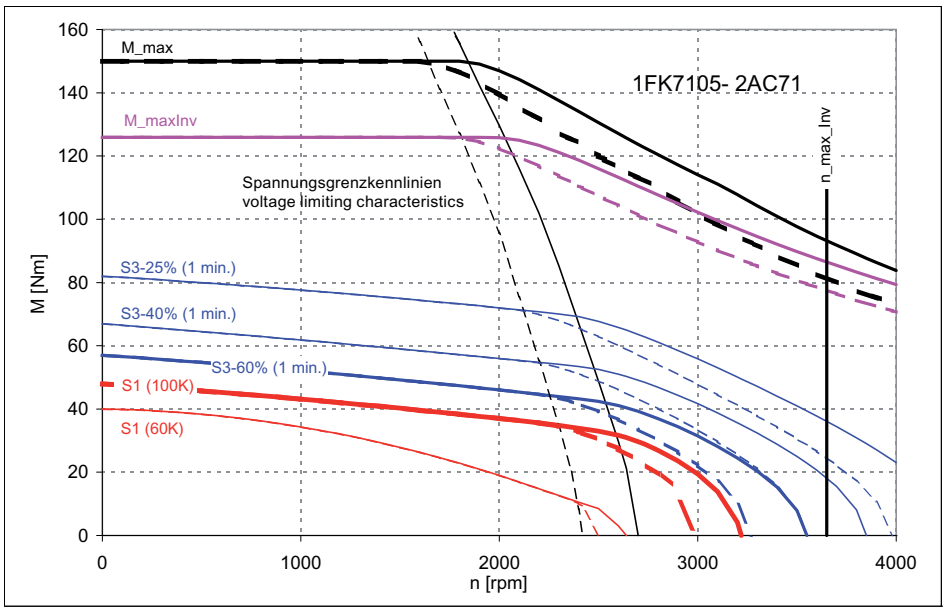

[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-39 1FK7103-2AF71

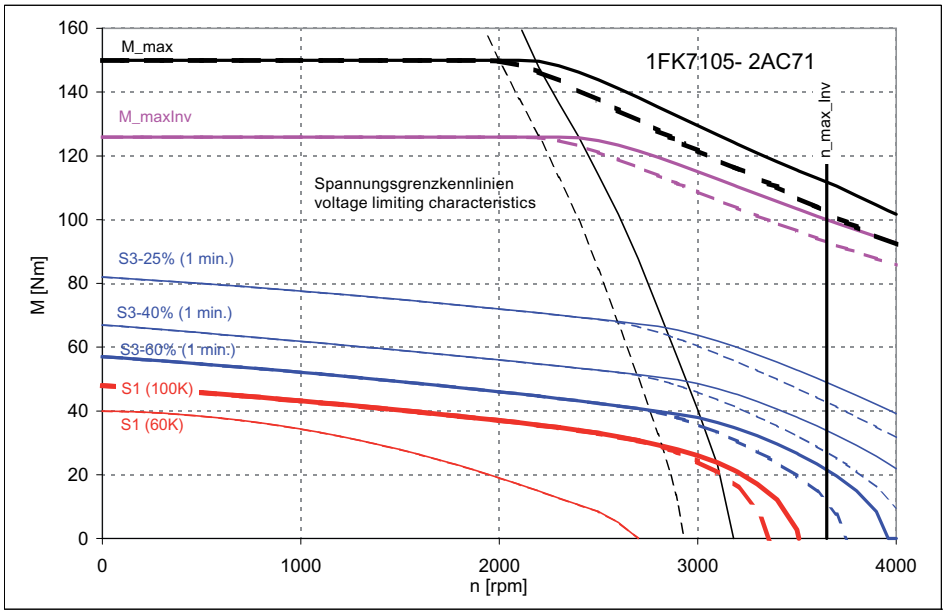
Table 4- 39 1FK7105 Compact

| Technical data | Code | Unit | –2AC71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 2000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 37.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 16.0 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 48.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 20.0 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 40.0 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 16.2 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2000 |
| Optimum power | $P_{opt}$ | kW | 7.7 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 5000 |
| Maximum torque | $M_{max}$ | Nm | 150 |
| Maximum current | $I_{max}$ | A | 71 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 2.37 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 157.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.175 |
| Rotating field inductance | $L_D$ | mH | 4.5 |
| Electrical time constant | $T_{el}$ | ms | 25.5 |
| Mechanical time constant | $T_{mech}$ | ms | 1.4 |
| Thermal time constant | $T_{th}$ | min | 70 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $15.4 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 125000 |
| Weight without brake | $m_{Mot}$ | kg | 39.0 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $16.2 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 95000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 43.5 |
| **Recommended Motor Module 6SL312□-□TE23-0AA□□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 30 |
| Maximum converter current | $I_{max\ Inv}$ | A | 56 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 126 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 3650 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



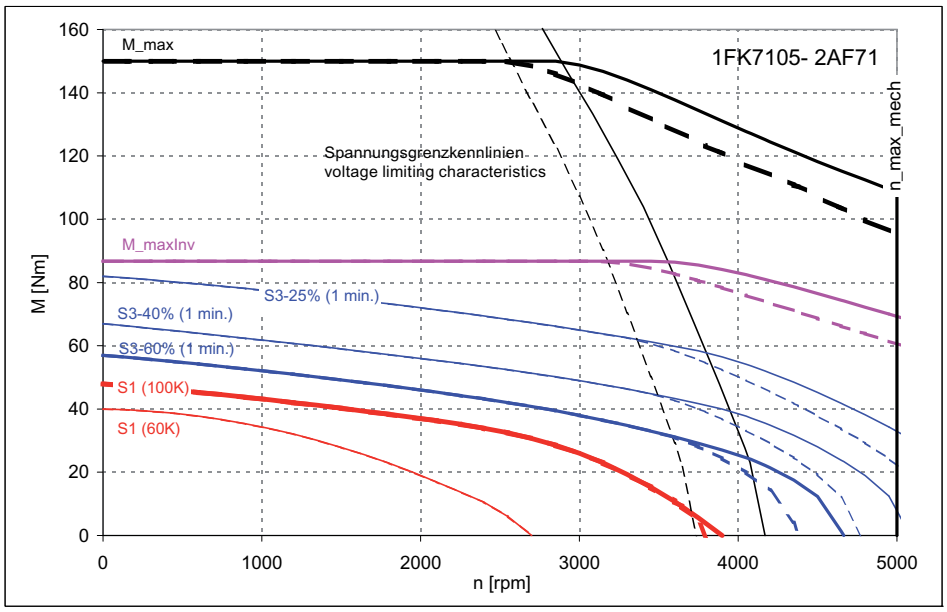

[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-40 1FK7105-2AC71

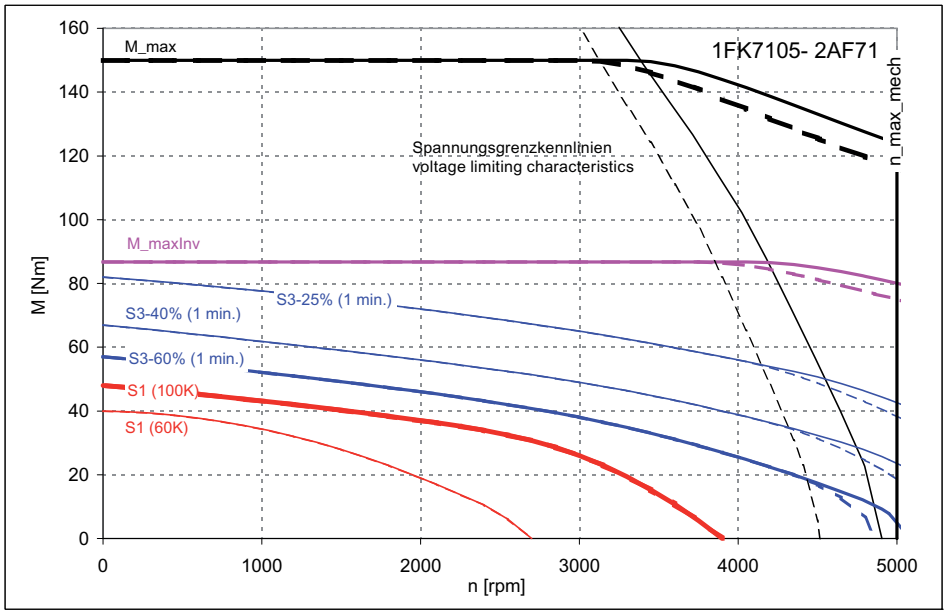
Table 4- 40 1FK7105 Compact

| Technical data | Code | Unit | –2AF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 26.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 18.0 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 48.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 31.0 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 40.0 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 25.0 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 8.2 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 5000 |
| Maximum torque | $M_{max}$ | Nm | 150 |
| Maximum current | $I_{max}$ | A | 109 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.55 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 102.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.073 |
| Rotating field inductance | $L_D$ | mH | 1.9 |
| Electrical time constant | $T_{el}$ | ms | 26.0 |
| Mechanical time constant | $T_{mech}$ | ms | 1.4 |
| Thermal time constant | $T_{th}$ | min | 70 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $15.4 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 125000 |
| Weight without brake | $m_{Mot}$ | kg | 39.0 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $16.2 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_t$ | Nm/rad | 95000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 43.5 |
| **Recommended Motor Module 6SL312□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 30 |
| Maximum converter current | $I_{max\ Inv}$ | A | 56 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 87 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 5000 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)




[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

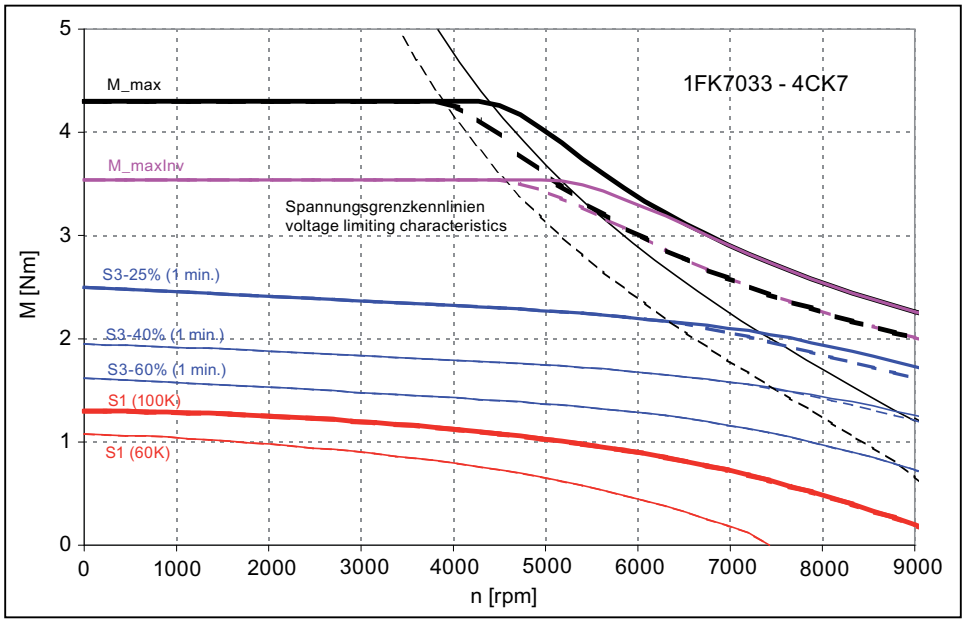
Figure 4-41 1FK7105-2AF71

### 4.2.1.2 1FK7 High Dynamic

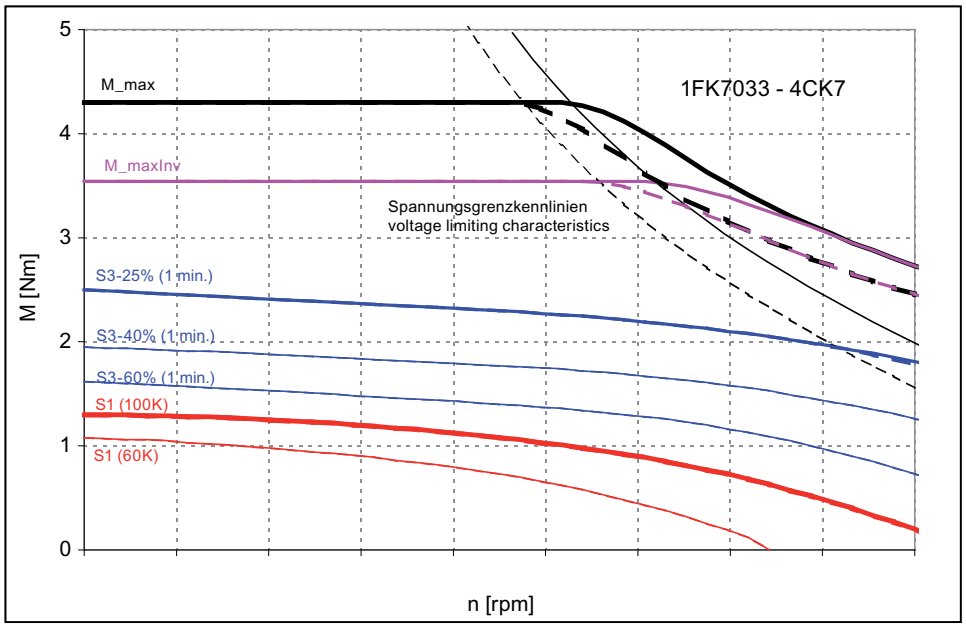
Table 4- 41 1FK7033 High Dynamic

| Technical data | Code | Unit | –4CK71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 6000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 0.9 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 1.6 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 1.3 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 2.1 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 1.08 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 1.7 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 6000 |
| Optimum power | $P_{opt}$ | kW | 0.57 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 10000 |
| Maximum torque | $M_{max}$ | Nm | 4.3 |
| Maximum current | $I_{max}$ | A | 7.6 |
| **Motor data** | | | |
| Pole number | 2p | | 6 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.62 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 39.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 3.51 |
| Rotating field inductance | $L_D$ | mH | 22.0 |
| Electrical time constant | $T_{el}$ | ms | 6.3 |
| Mechanical time constant | $T_{mech}$ | ms | 0.68 |
| Thermal time constant | $T_{th}$ | min | 25 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.025 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 7300 |
| Weight without brake | $m_{Mot}$ | kg | 3.0 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.035 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 4700 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 3.4 |
| **Recommended Motor Module 6SL321□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 3 |
| Maximum converter current | $I_{max\ Inv}$ | A | 6 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 3.5 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 10000 |

The rated data are valid for a 600 V DC link voltage.




[———] SINAMICS ALM 400V-Netz (Zwischenkreisspannung 600V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400V-Netz (Zwischenkreisspannung 540V DC) (DC-link voltage 540 V)



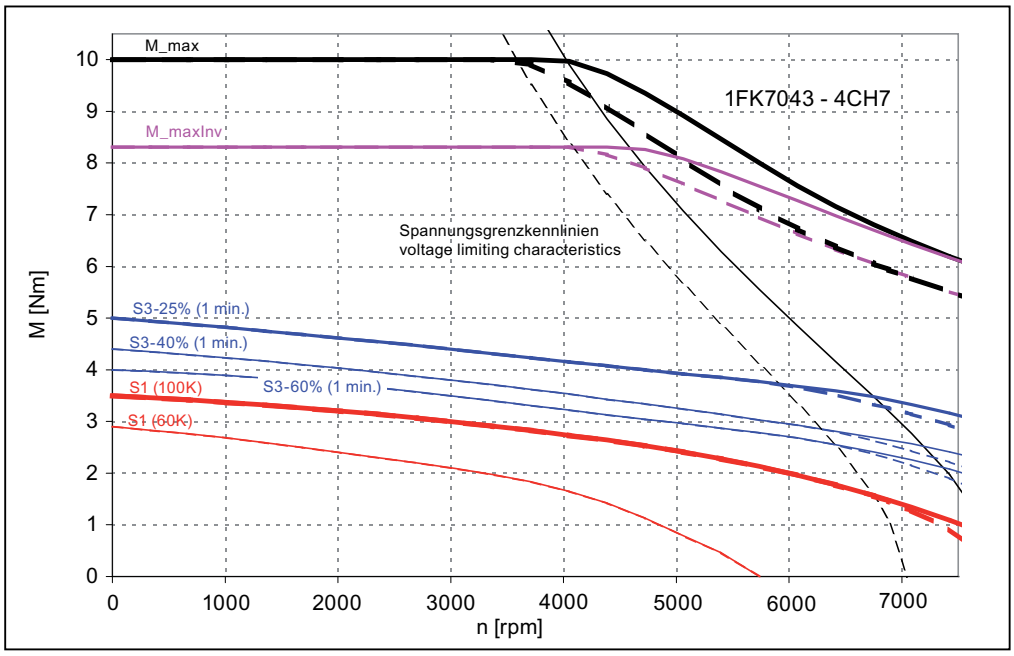

[———] SINAMICS ALM 480V-Netz (Zwischenkreisspannung 720V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480V-Netz (Zwischenkreisspannung 650V DC) (DC-link voltage 650 V)

Figure 4-42 1FK7033-4CK71

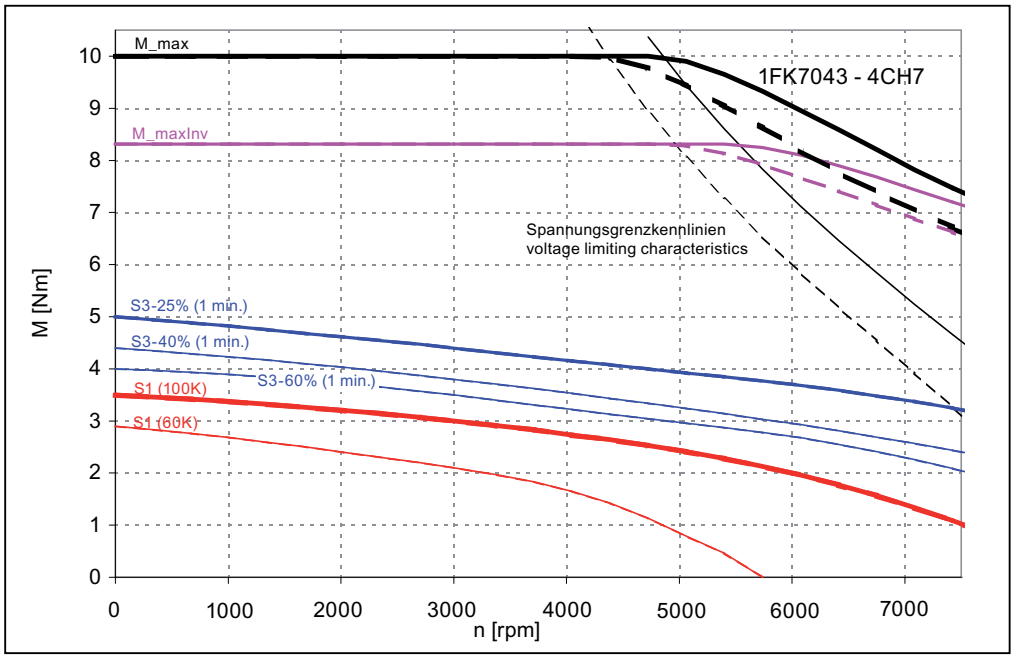
Table 4- 42 1FK7043 High Dynamic

| Technical data | Code | Unit | –4CH71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 4500 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 2.6 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 3.3 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 3.5 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 4.1 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 2.9 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 3.3 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 4500 |
| Optimum power | $P_{opt}$ | kW | 1.23 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 9000 |
| Maximum torque | $M_{max}$ | Nm | 10.0 |
| Maximum current | $I_{max}$ | A | 12.5 |
| **Motor data** | | | |
| Pole number | 2p | | 6 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.855 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 54.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 1.2 |
| Rotating field inductance | $L_D$ | mH | 13.6 |
| Electrical time constant | $T_{el}$ | ms | 11.3 |
| Mechanical time constant | $T_{mech}$ | ms | 0.49 |
| Thermal time constant | $T_{th}$ | min | 40 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.1 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 11400 |
| Weight without brake | $m_{Mot}$ | kg | 6.0 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.136 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 9000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 6.6 |
| **Recommended Motor Module 6SL321□-□TE15-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 5 |
| Maximum converter current | $I_{max\ Inv}$ | A | 10 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 8.3 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 9000 |

The rated data are valid for a 600 V DC link voltage.




[———] SINAMICS ALM 400V-Netz (Zwischenkreisspannung 600V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400V-Netz (Zwischenkreisspannung 540V DC) (DC-link voltage 540 V)



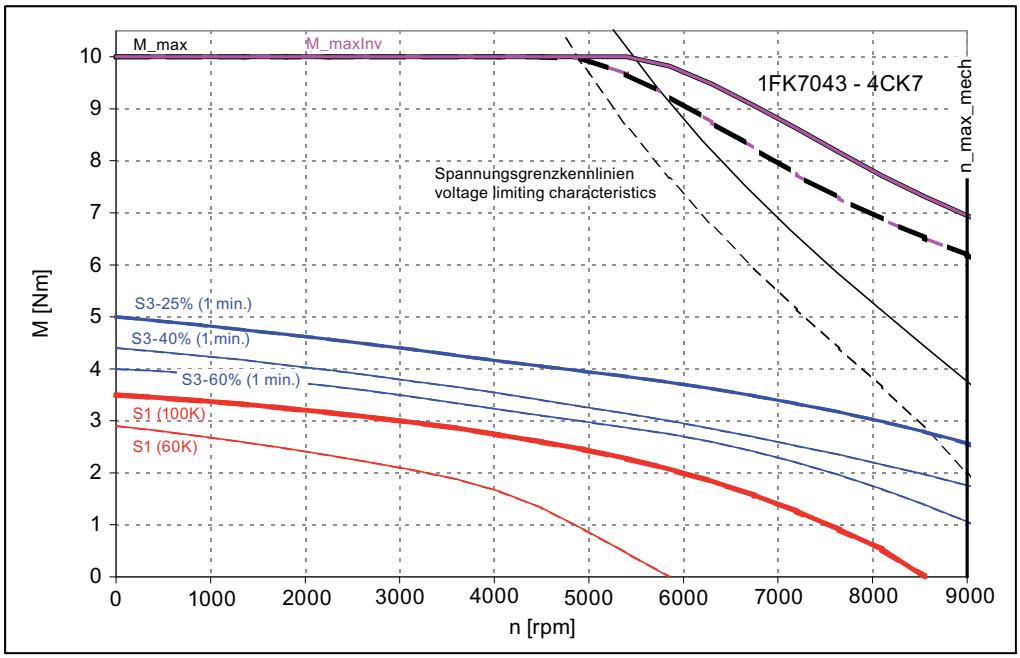

[———] SINAMICS ALM 480V-Netz (Zwischenkreisspannung 720V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480V-Netz (Zwischenkreisspannung 650V DC) (DC-link voltage 650 V)

Figure 4-43 1FK7043-4CH71

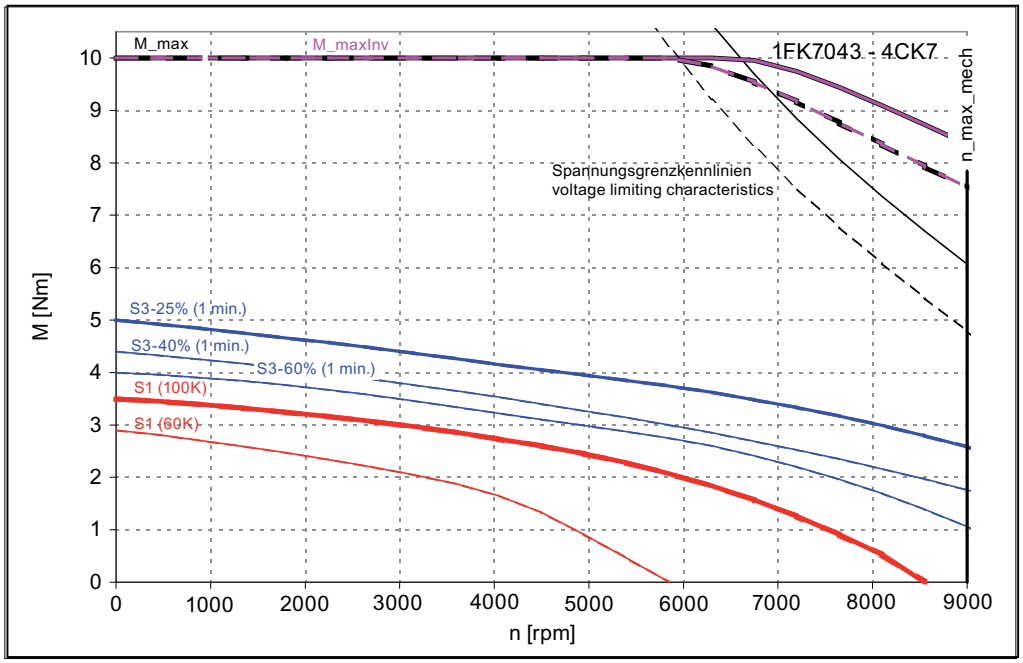
Table 4- 43 1FK7043 High Dynamic

| Technical data | Code | Unit | –4CK71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 6000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 2.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 3.5 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 3.5 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 5.6 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 2.9 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 4.5 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 6000 |
| Optimum power | $P_{opt}$ | kW | 1.26 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 9000 |
| Maximum torque | $M_{max}$ | Nm | 10.0 |
| Maximum current | $I_{max}$ | A | 17.0 |
| **Motor data** | | | |
| Pole number | 2p | | 6 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.63 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 39.8 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.645 |
| Rotating field inductance | $L_D$ | mH | 7.4 |
| Electrical time constant | $T_{el}$ | ms | 11.5 |
| Mechanical time constant | $T_{mech}$ | ms | 0.49 |
| Thermal time constant | $T_{th}$ | min | 40 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.1 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 11400 |
| Weight without brake | $m_{Mot}$ | kg | 6.0 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.136 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 9000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 6.6 |
| **Recommended Motor Module 6SL321□-□TE15-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 18 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 10.0 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 9000 |

The rated data are valid for a 600 V DC link voltage.




[———] SINAMICS ALM 400V-Netz (Zwischenkreisspannung 600V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400V-Netz (Zwischenkreisspannung 540V DC) (DC-link voltage 540 V)



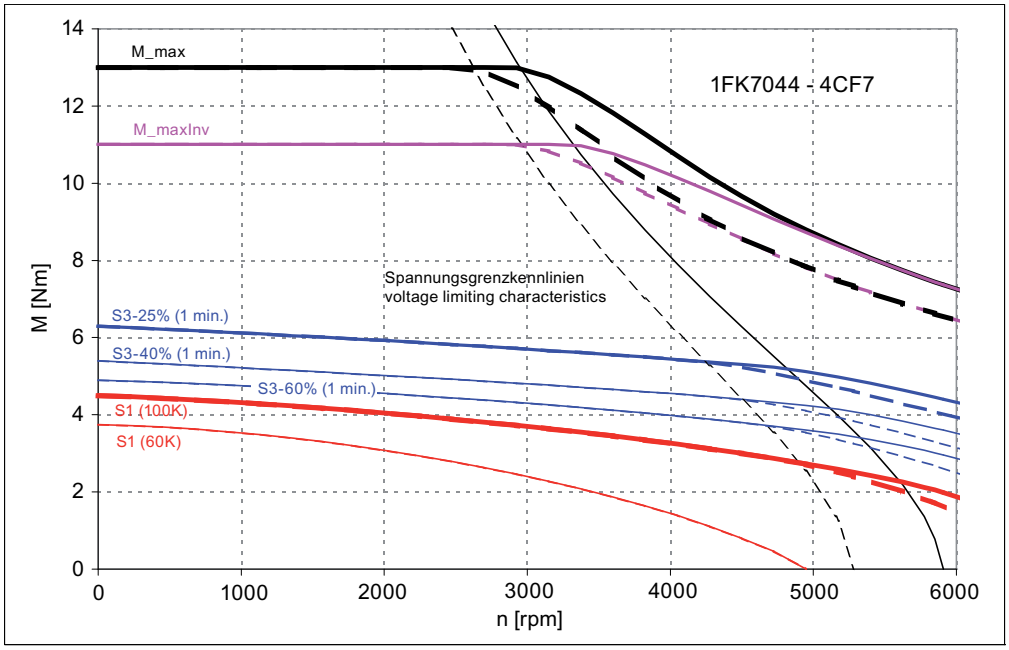

[———] SINAMICS ALM 480V-Netz (Zwischenkreisspannung 720V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480V-Netz (Zwischenkreisspannung 650V DC) (DC-link voltage 650 V)

Figure 4-44 1FK7043-4CK71

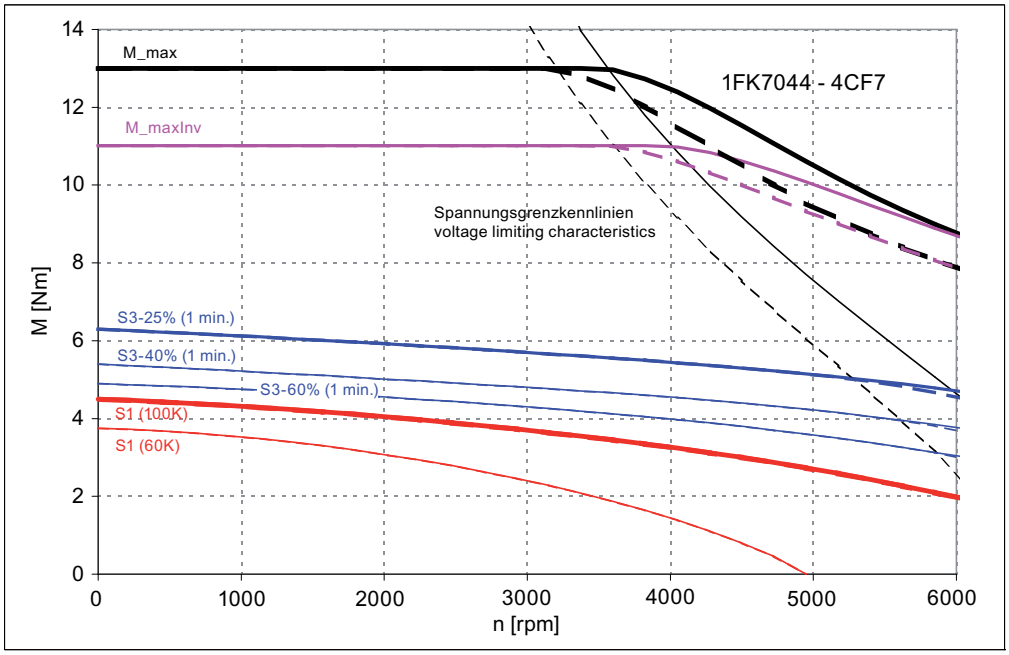
Table 4- 44 1FK7044 High Dynamic

| Technical data | Code | Unit | –4CF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 3.7 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 3.45 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 4.5 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 4.0 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 3.75 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 3.2 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 1.16 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 9000 |
| Maximum torque | $M_{max}$ | Nm | 13.0 |
| Maximum current | $I_{max}$ | A | 12.1 |
| **Motor data** | | | |
| Pole number | 2p | | 6 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.13 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 72.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 1.49 |
| Rotating field inductance | $L_D$ | mH | 18.8 |
| Electrical time constant | $T_{el}$ | ms | 12.6 |
| Mechanical time constant | $T_{mech}$ | ms | 0.44 |
| Thermal time constant | $T_{th}$ | min | 45 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.126 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 9800 |
| Weight without brake | $m_{Mot}$ | kg | 7.4 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.162 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 7900 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 8.0 |
| **Recommended Motor Module 6SL312□-□TE15-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 5 |
| Maximum converter current | $I_{max\ Inv}$ | A | 10 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 11.0 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 8050 |

The rated data are valid for a 600 V DC link voltage.




[———] SINAMICS ALM 400V-Netz (Zwischenkreisspannung 600V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400V-Netz (Zwischenkreisspannung 540V DC) (DC-link voltage 540 V)



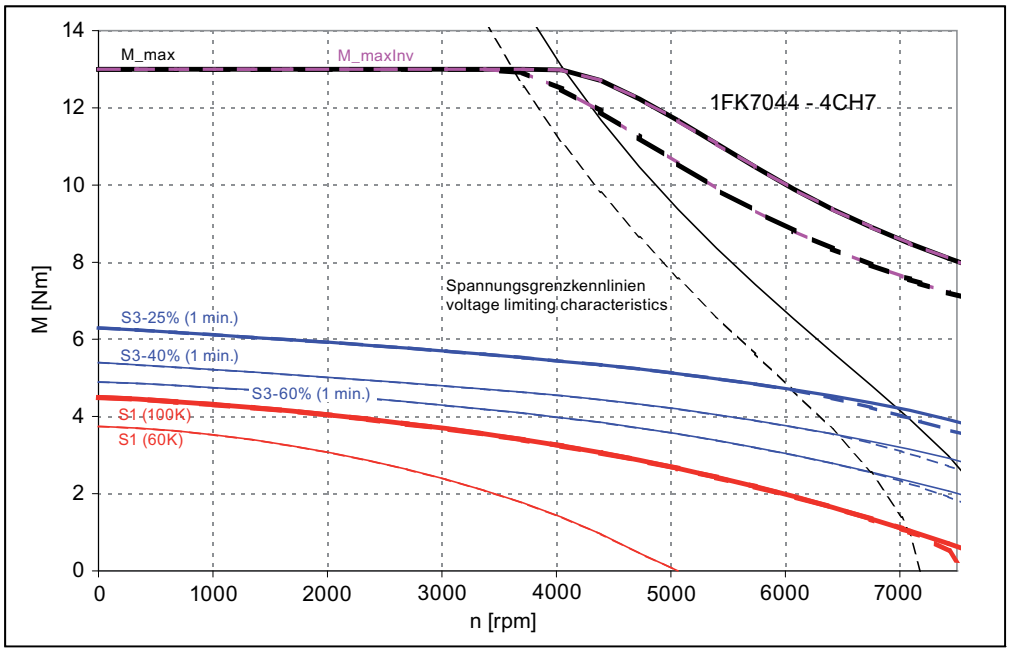

[———] SINAMICS ALM 480V-Netz (Zwischenkreisspannung 720V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480V-Netz (Zwischenkreisspannung 650V DC) (DC-link voltage 650 V)

Figure 4-45 1FK7044-4CF71

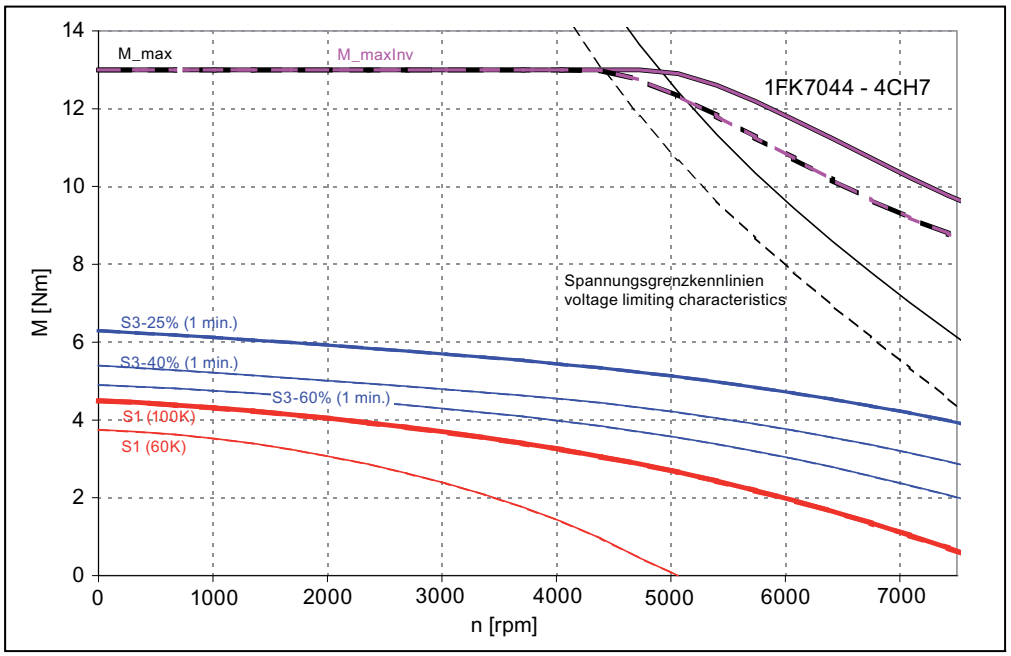
Table 4- 45 1FK7044 High Dynamic

| Technical data | Code | Unit | –4CH71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 4500 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 3.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 3.9 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 4.5 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 5.4 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 3.75 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 4.35 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 4500 |
| Optimum power | $P_{opt}$ | kW | 1.41 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 9000 |
| Maximum torque | $M_{max}$ | Nm | 13.0 |
| Maximum current | $I_{max}$ | A | 16.4 |
| **Motor data** | | | |
| Pole number | 2p | | 6 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.835 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 53.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.815 |
| Rotating field inductance | $L_D$ | mH | 10.2 |
| Electrical time constant | $T_{el}$ | ms | 12.5 |
| Mechanical time constant | $T_{mech}$ | ms | 0.44 |
| Thermal time constant | $T_{th}$ | min | 45 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.126 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 9800 |
| Weight without brake | $m_{Mot}$ | kg | 7.4 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.162 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 7900 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 8.0 |
| **Recommended Motor Module 6SL321□-□TE15-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 18 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 13.0 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 9000 |

The rated data are valid for a 600 V DC link voltage.




[———] SINAMICS ALM 400V-Netz (Zwischenkreisspannung 600V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400V-Netz (Zwischenkreisspannung 540V DC) (DC-link voltage 540 V)



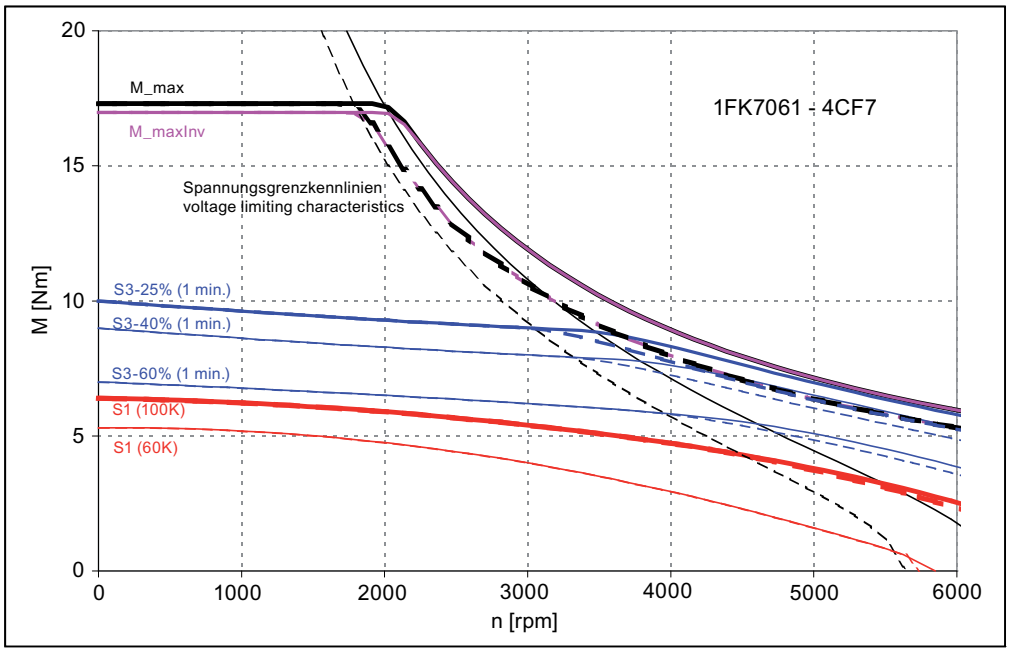

[———] SINAMICS ALM 480V-Netz (Zwischenkreisspannung 720V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480V-Netz (Zwischenkreisspannung 650V DC) (DC-link voltage 650 V)

Figure 4-46 1FK7044-4CH71

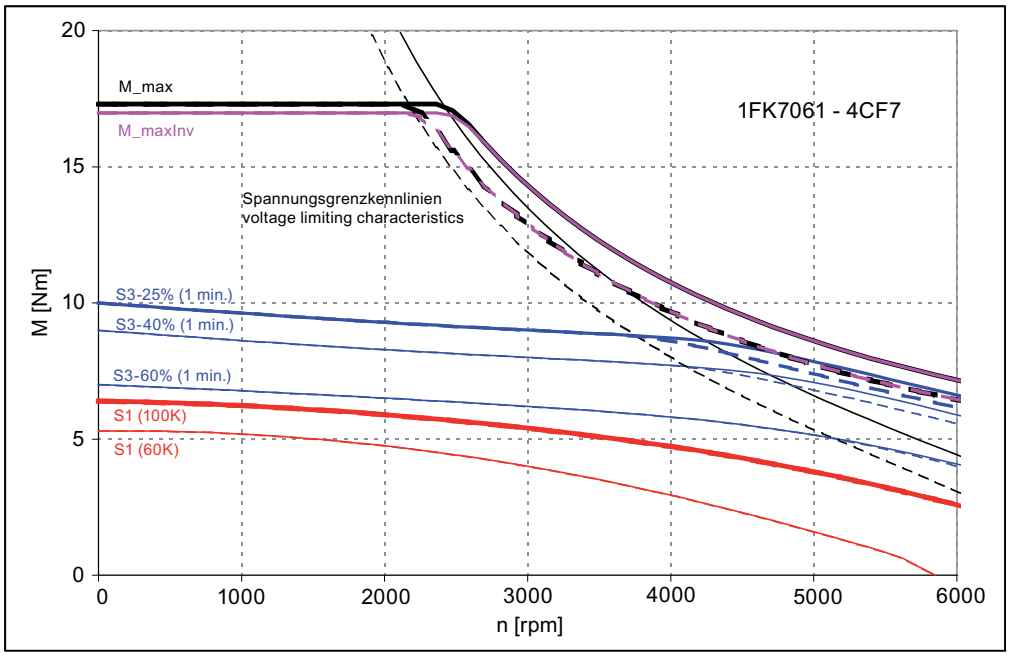
Table 4- 46 1FK7061 High Dynamic

| Technical data | Code | Unit | –4CF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 5.4 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 5.3 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 6.4 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 6.1 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 5.3 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 4.95 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 1.7 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 7500 |
| Maximum torque | $M_{max}$ | Nm | 17.3 |
| Maximum current | $I_{max}$ | A | 18.5 |
| **Motor data** | | | |
| Pole number | 2p | | 6 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.05 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 67.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.715 |
| Rotating field inductance | $L_D$ | mH | 22.0 |
| Electrical time constant | $T_{el}$ | ms | 31.0 |
| Mechanical time constant | $T_{mech}$ | ms | 0.79 |
| Thermal time constant | $T_{th}$ | min | 45 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.41 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 36500 |
| Weight without brake | $m_{Mot}$ | kg | 9.5 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.51 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 26500 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 11.0 |
| **Recommended Motor Module 6SL312□-□TE21-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 18 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 17.0 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 7500 |

The rated data are valid for a 600 V DC link voltage.




[———] SINAMICS ALM 400V-Netz (Zwischenkreisspannung 600V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400V-Netz (Zwischenkreisspannung 540V DC) (DC-link voltage 540 V)



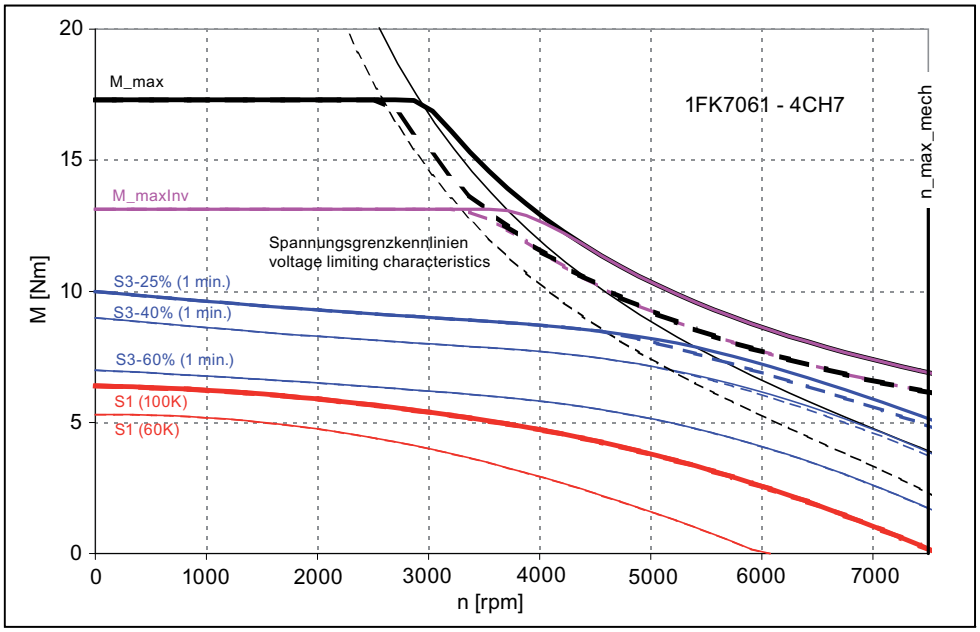

[———] SINAMICS ALM 480V-Netz (Zwischenkreisspannung 720V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480V-Netz (Zwischenkreisspannung 650V DC) (DC-link voltage 650 V)

Figure 4-47 1FK7061-4CF71

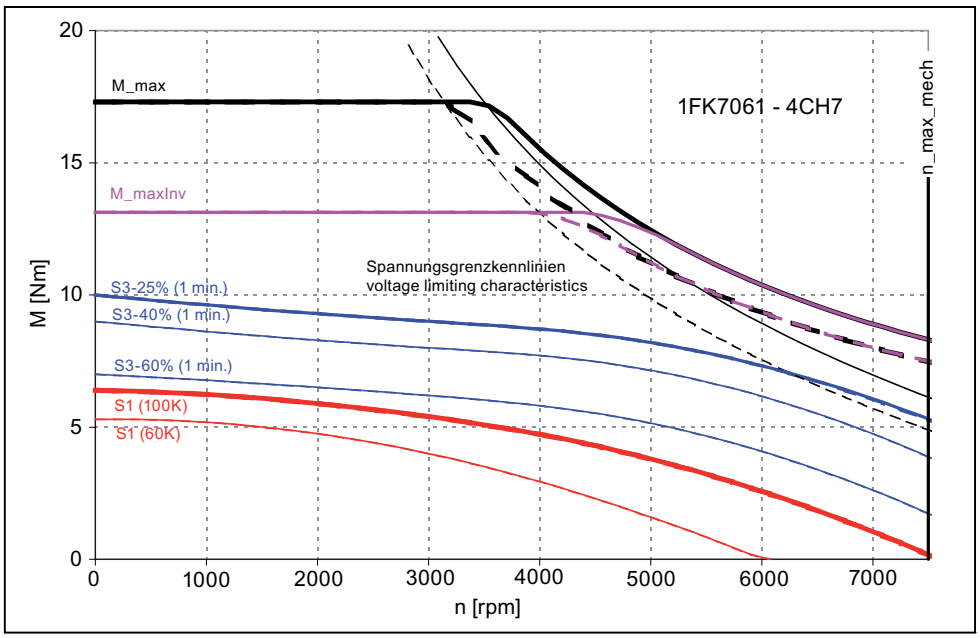
Table 4- 47 1FK7061 High Dynamic

| Technical data | Code | Unit | –4CH71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 4500 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 4.3 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 6.2 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 6.4 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 8.7 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 5.3 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 7.1 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 4500 |
| Optimum power | $P_{opt}$ | kW | 2.05 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 7500 |
| Maximum torque | $M_{max}$ | Nm | 17.3 |
| Maximum current | $I_{max}$ | A | 26.5 |
| **Motor data** | | | |
| Pole number | 2p | | 6 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.73 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 47.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.348 |
| Rotating field inductance | $L_D$ | mH | 10.7 |
| Electrical time constant | $T_{el}$ | ms | 30.5 |
| Mechanical time constant | $T_{mech}$ | ms | 0.79 |
| Thermal time constant | $T_{th}$ | min | 45 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.41 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 36500 |
| Weight without brake | $m_{Mot}$ | kg | 9.5 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.51 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 26500 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 11.0 |
| **Recommended Motor Module 6SL312□-□TE21-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 18 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 13.1 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 7500 |

The rated data are valid for a 600 V DC link voltage.




[———] SINAMICS ALM 400V-Netz (Zwischenkreisspannung 600V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400V-Netz (Zwischenkreisspannung 540V DC) (DC-link voltage 540 V)



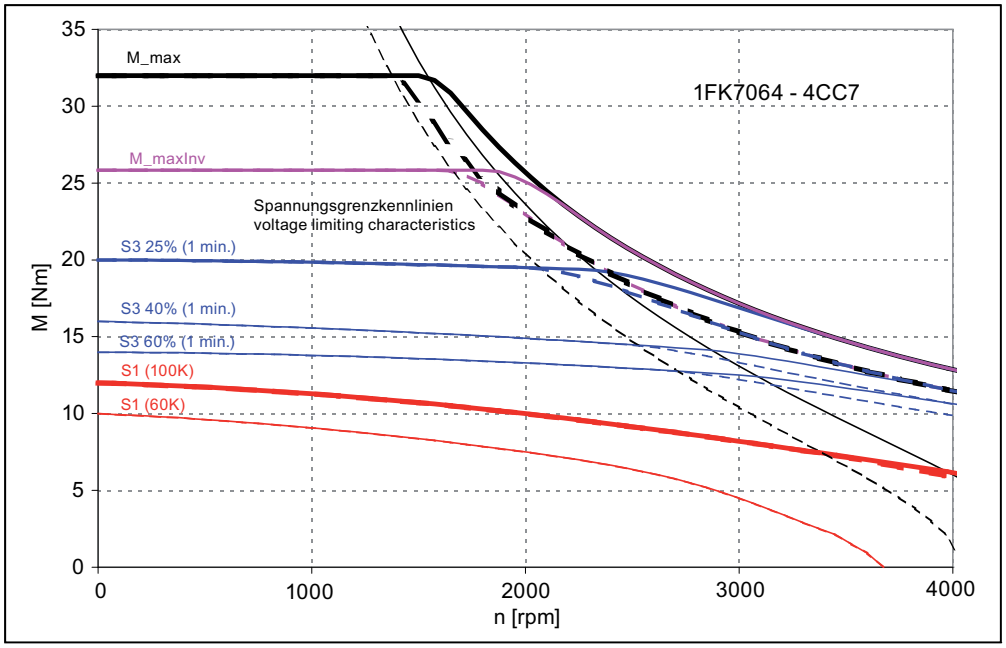

[———] SINAMICS ALM 480V-Netz (Zwischenkreisspannung 720V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480V-Netz (Zwischenkreisspannung 650V DC) (DC-link voltage 650 V)

Figure 4-48 1FK7061-4CH71

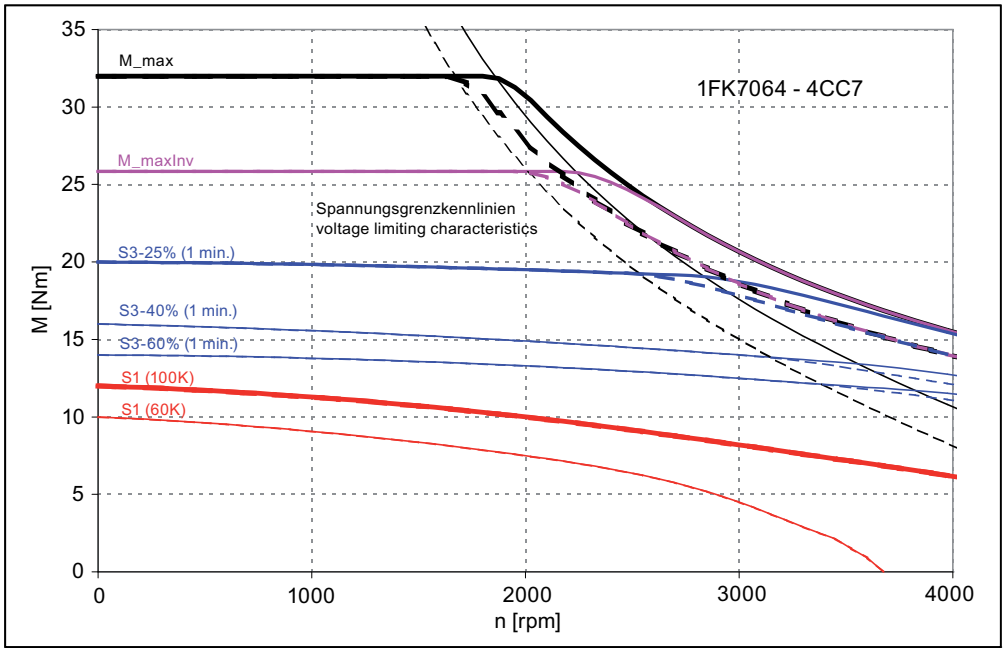
Table 4- 48 1FK7064 High Dynamic

| Technical data | Code | Unit | –4CC71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 2000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 10.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 7.1 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 12.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 8.1 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 10.0 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 6.6 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2000 |
| Optimum power | $P_{opt}$ | kW | 2.1 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 7500 |
| Maximum torque | $M_{max}$ | Nm | 32.0 |
| Maximum current | $I_{max}$ | A | 25.0 |
| **Motor data** | | | |
| Pole number | 2p | | 6 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.48 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 94.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.585 |
| Rotating field inductance | $L_D$ | mH | 21.5 |
| Electrical time constant | $T_{el}$ | ms | 37.0 |
| Mechanical time constant | $T_{mech}$ | ms | 0.6 |
| Thermal time constant | $T_{th}$ | min | 55 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.75 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 29500 |
| Weight without brake | $m_{Mot}$ | kg | 15.4 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.85 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 22500 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 16.8 |
| **Recommended Motor Module 6SL312□-□TE21-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 18 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 26.0 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 6150 |

The rated data are valid for a 600 V DC link voltage.




[———] SINAMICS ALM 400V-Netz (Zwischenkreisspannung 600V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400V-Netz (Zwischenkreisspannung 540V DC) (DC-link voltage 540 V)



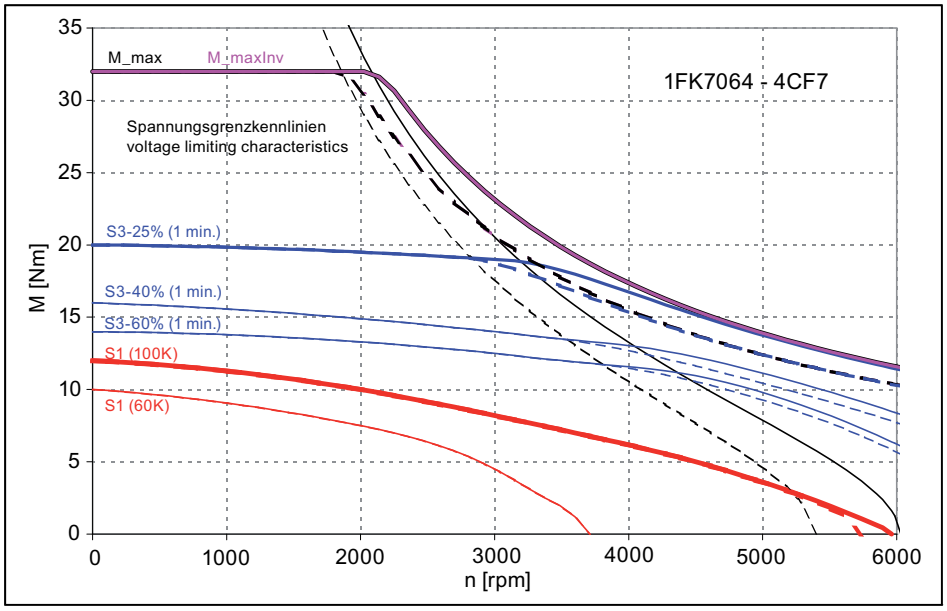

[———] SINAMICS ALM 480V-Netz (Zwischenkreisspannung 720V DC) (DC link-voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480V-Netz (Zwischenkreisspannung 650V DC) (DC-link voltage 650 V)

Figure 4-49 1FK7064-4CC71

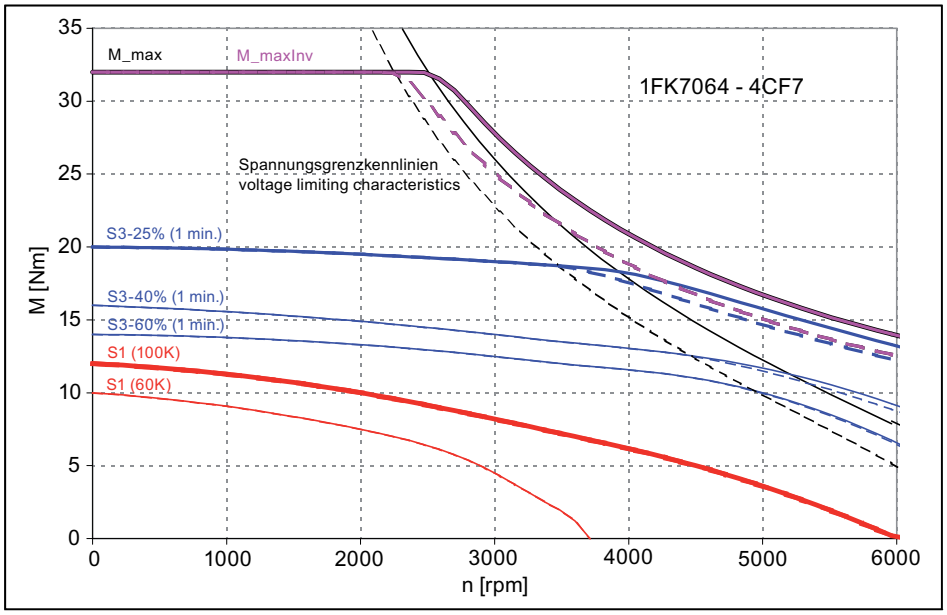
Table 4- 49 1FK7064 High Dynamic

| Technical data | Code | Unit | –4CF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 8.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 7.6 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 12.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 10.8 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 10.0 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 8.7 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 2.5 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 7500 |
| Maximum torque | $M_{max}$ | Nm | 32.0 |
| Maximum current | $I_{max}$ | A | 33.0 |
| **Motor data** | | | |
| Pole number | 2p | | 6 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.11 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 70.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.348 |
| Rotating field inductance | $L_D$ | mH | 12.0 |
| Electrical time constant | $T_{el}$ | ms | 34.5 |
| Mechanical time constant | $T_{mech}$ | ms | 0.64 |
| Thermal time constant | $T_{th}$ | min | 55 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.75 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 29500 |
| Weight without brake | $m_{Mot}$ | kg | 15.4 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.85 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 22500 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 16.8 |
| **Recommended Motor Module 6SL312□-□TE21-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 18 |
| Maximum converter current | $I_{max\ Inv}$ | A | 36 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 32.0 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 7500 |

The rated data are valid for a 600 V DC link voltage.




[———] SINAMICS ALM 400V-Netz (Zwischenkreisspannung 600V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400V-Netz (Zwischenkreisspannung 540V DC) (DC-link voltage 540 V)



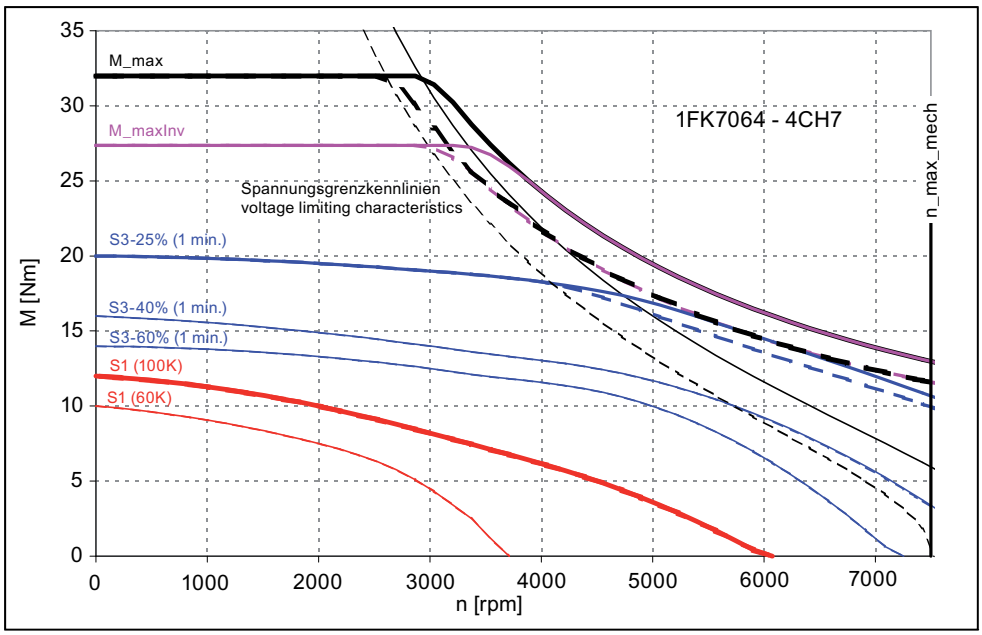

[———] SINAMICS ALM 480V-Netz (Zwischenkreisspannung 720V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480V-Netz (Zwischenkreisspannung 650V DC) (DC-link voltage 650 V)

Figure 4-50 1FK7064-4CF71

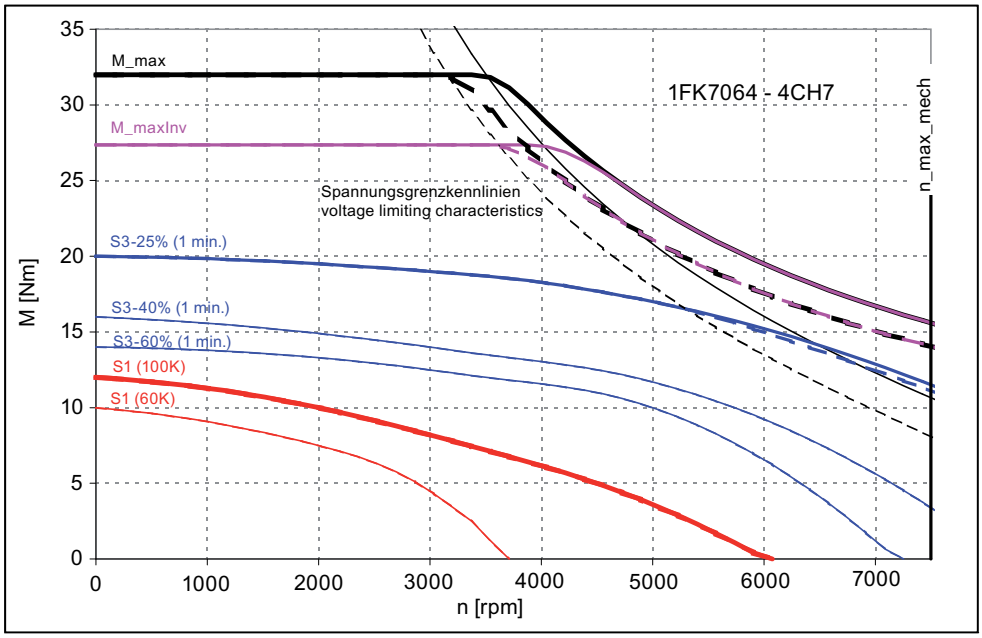
Table 4- 50 1FK7064 High Dynamic

| Technical data | Code | Unit | –4CH71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 4500 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 5.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 7.0 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 12.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 15.0 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 10.0 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 12.2 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3500 |
| Optimum power | $P_{opt}$ | kW | 2.75 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 7500 |
| Maximum torque | $M_{max}$ | Nm | 32.0 |
| Maximum current | $I_{max}$ | A | 46.0 |
| **Motor data** | | | |
| Pole number | 2p | | 6 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.8 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 50.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.17 |
| Rotating field inductance | $L_D$ | mH | 6.2 |
| Electrical time constant | $T_{el}$ | ms | 36.5 |
| Mechanical time constant | $T_{mech}$ | ms | 0.6 |
| Thermal time constant | $T_{th}$ | min | 55 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.75 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 29500 |
| Weight without brake | $m_{Mot}$ | kg | 15.4 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.85 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 22500 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 16.8 |
| **Recommended Motor Module 6SL312□-□TE21-8AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 18 |
| Maximum converter current | $I_{max\ Inv}$ | A | 36 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 27.5 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 7500 |

The rated data are valid for a 600 V DC link voltage.




[———] SINAMICS ALM 400V-Netz (Zwischenkreisspannung 600V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400V-Netz (Zwischenkreisspannung 540V DC) (DC-link voltage 540 V)



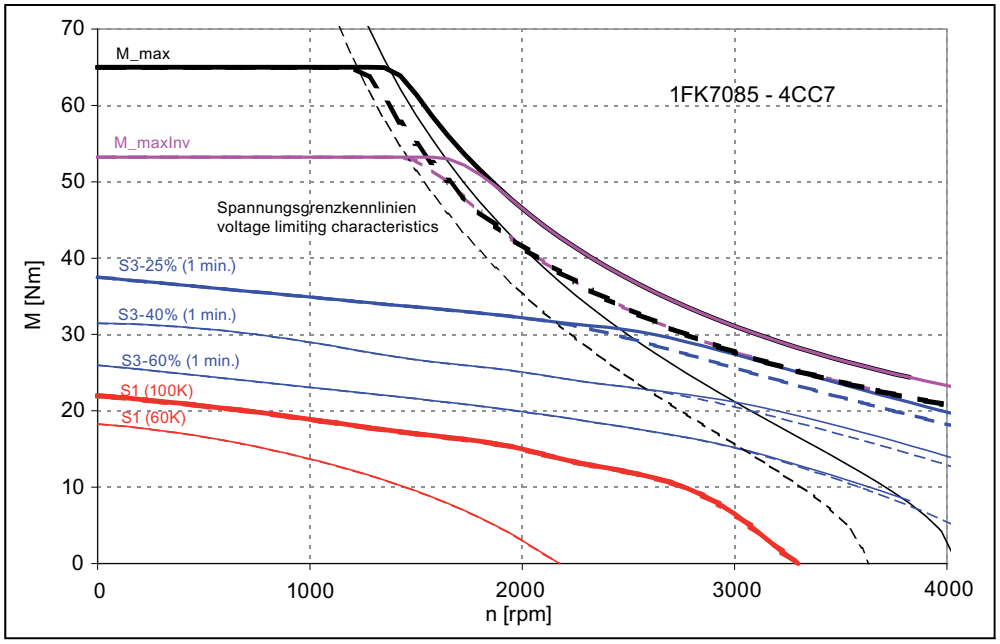

[———] SINAMICS ALM 480V-Netz (Zwischenkreisspannung 720V DC) (DC link-voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480V-Netz (Zwischenkreisspannung 650V DC) (DC-link voltage 650 V)

Figure 4-51 1FK7064-4CH71

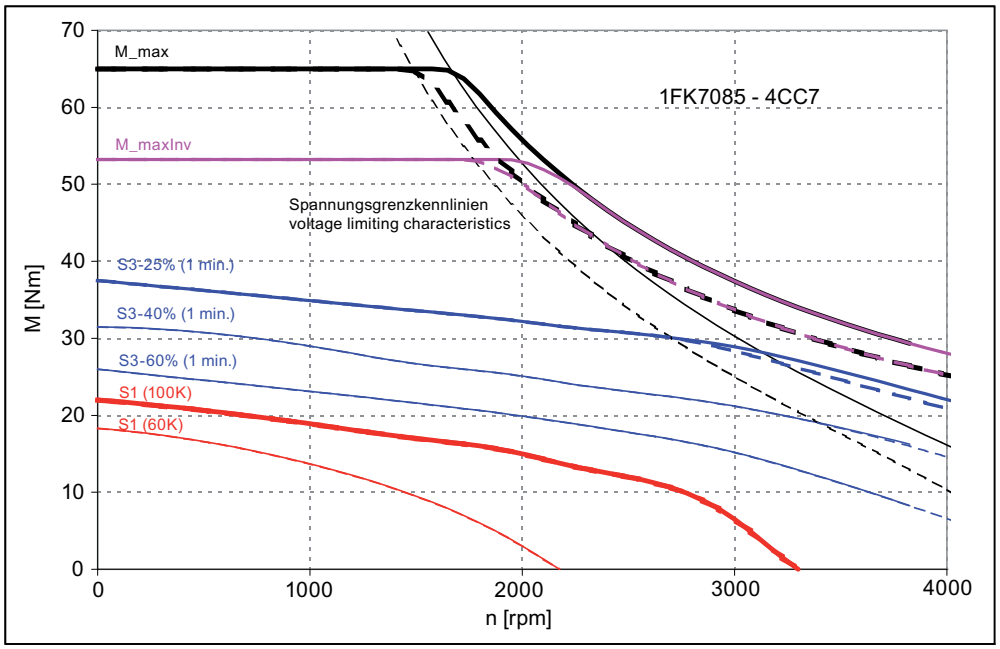
Table 4- 51 1FK7085 High Dynamic

| Technical data | Code | Unit | –4CC71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 2000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 15.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 10.0 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 22.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 13.5 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 18.3 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 10.9 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2000 |
| Optimum power | $P_{opt}$ | kW | 3.15 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 6000 |
| Maximum torque | $M_{max}$ | Nm | 65 |
| Maximum current | $I_{max}$ | A | 51 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.63 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 105.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.309 |
| Rotating field inductance | $L_D$ | mH | 9.8 |
| Electrical time constant | $T_{el}$ | ms | 31.5 |
| Mechanical time constant | $T_{mech}$ | ms | 0.77 |
| Thermal time constant | $T_{th}$ | min | 45 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $2.2 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 84000 |
| Weight without brake | $m_{Mot}$ | kg | 23.0 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $2.55 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 63000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 26.0 |
| **Recommended Motor Module 6SL312□-□TE21-8AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 18 |
| Maximum converter current | $I_{max\ Inv}$ | A | 36 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 53 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 5500 |

The rated data are valid for a 600 V DC link voltage.




[———] SINAMICS ALM 400V-Netz (Zwischenkreisspannung 600V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400V-Netz (Zwischenkreisspannung 540V DC) (DC-link voltage 540 V)



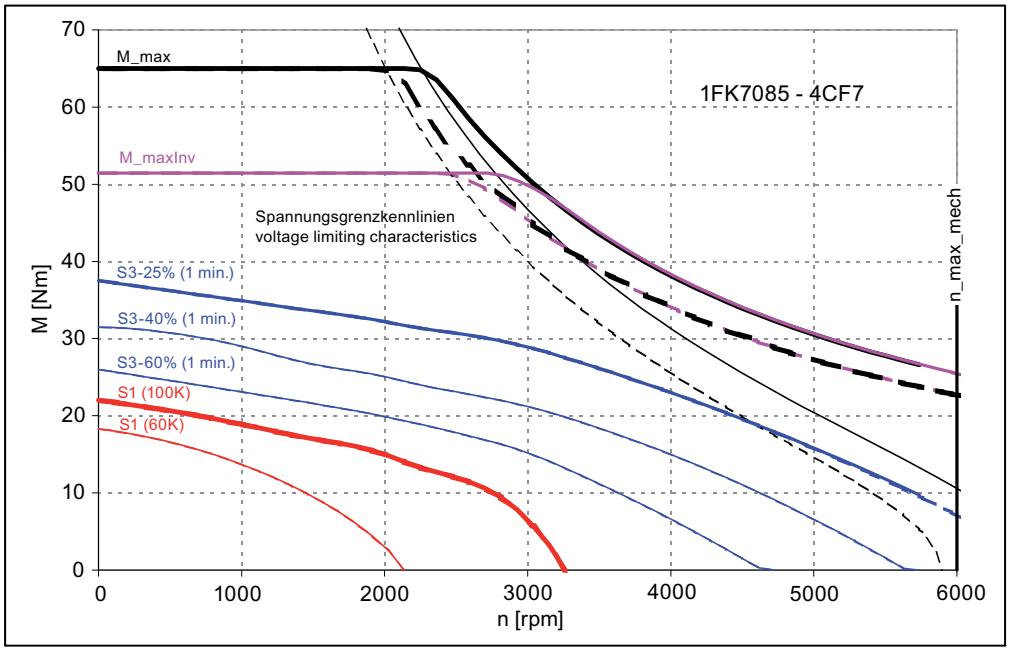

[———] SINAMICS ALM 400V-Netz (Zwischenkreisspannung 600V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400V-Netz (Zwischenkreisspannung 540V DC) (DC-link voltage 540 V)

Figure 4-52 1FK7085-4CC71

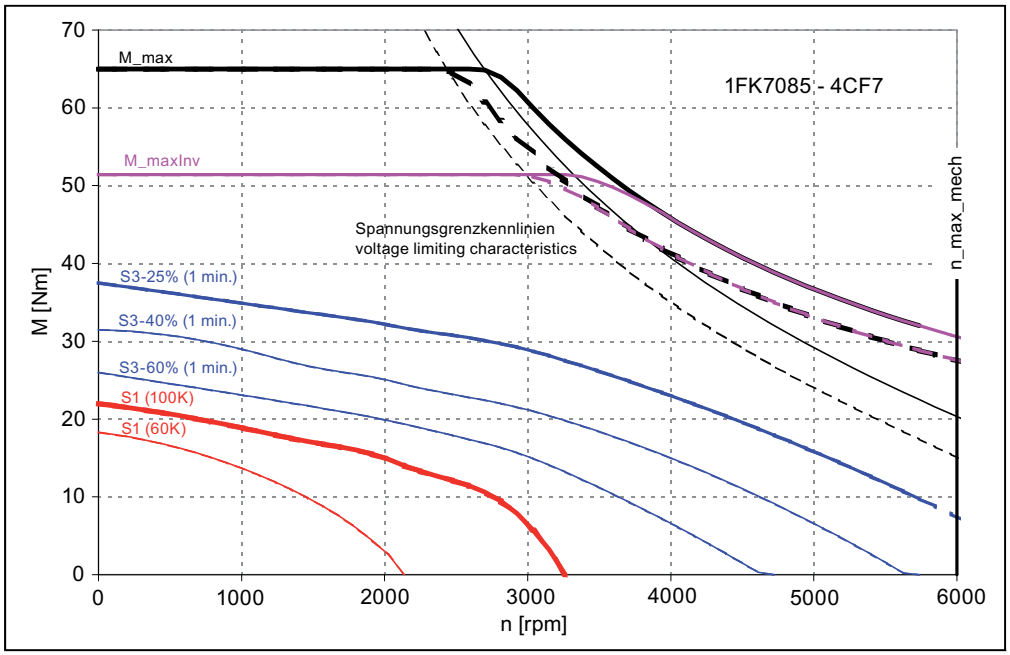
Table 4- 52 1FK7085 High Dynamic

| Technical data | Code | Unit | –4CF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 6.5 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 7.0 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 22.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 22.0 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 18.3 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 17.8 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2500 |
| Optimum power | $P_{opt}$ | kW | 3.15 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 6000 |
| Maximum torque | $M_{max}$ | Nm | 65 |
| Maximum current | $I_{max}$ | A | 84 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.0 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 64.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.118 |
| Rotating field inductance | $L_D$ | mH | 3.7 |
| Electrical time constant | $T_{el}$ | ms | 31.5 |
| Mechanical time constant | $T_{mech}$ | ms | 0.78 |
| Thermal time constant | $T_{th}$ | min | 65 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $2.2 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 84000 |
| Weight without brake | $m_{Mot}$ | kg | 23.0 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $2.55 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 63000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 26.0 |
| **Recommended Motor Module 6SL312□-□TE21-8AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 30 |
| Maximum converter current | $I_{max\ Inv}$ | A | 56 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 51 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 6000 |

The rated data are valid for a 600 V DC link voltage.




[———] SINAMICS ALM 400V-Netz (Zwischenkreisspannung 600V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400V-Netz (Zwischenkreisspannung 540V DC) (DC-link voltage 540 V)



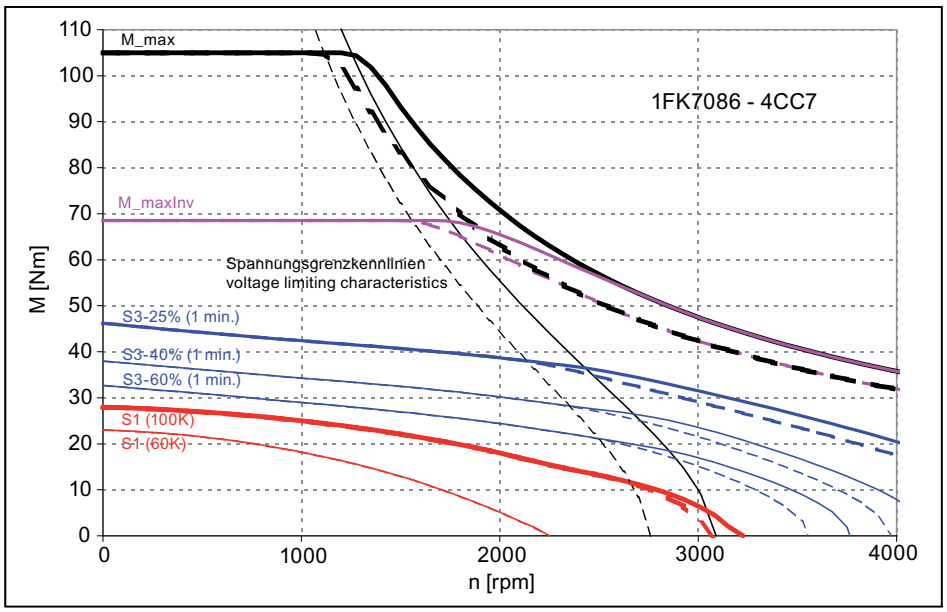

[———] SINAMICS ALM 480V-Netz (Zwischenkreisspannung 720V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480V-Netz (Zwischenkreisspannung 650V DC) (DC-link voltage 650 V)

Figure 4-53 1FK7085-4CF71

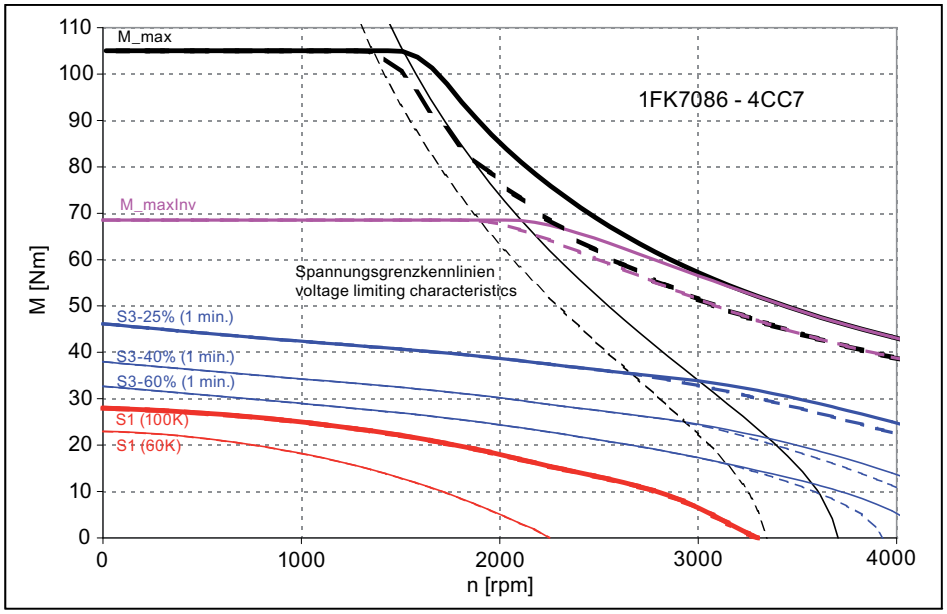
Table 4- 53 1FK7086 High Dynamic

| Technical data | Code | Unit | –4CC71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 2000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 18.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 9.0 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 28.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 13.2 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 23.0 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 10.7 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 200 |
| Optimum power | $P_{opt}$ | kW | 3.75 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 6000 |
| Maximum torque | $M_{max}$ | Nm | 105 |
| Maximum current | $I_{max}$ | A | 71 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 2.12 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 138.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.309 |
| Rotating field inductance | $L_D$ | mH | 8.2 |
| Electrical time constant | $T_{el}$ | ms | 26.5 |
| Mechanical time constant | $T_{mech}$ | ms | 0.455 |
| Thermal time constant | $T_{th}$ | min | 65 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $2.2 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 84000 |
| Weight without brake | $m_{Mot}$ | kg | 23.0 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $2.55 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 63000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 26.0 |
| **Recommended Motor Module 6SL312□-□TE21-8AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 18 |
| Maximum converter current | $I_{max\ Inv}$ | A | 36 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 69 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 4200 |

The rated data are valid for a 600 V DC link voltage.




[———] SINAMICS ALM 400V-Netz (Zwischenkreisspannung 600V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400V-Netz (Zwischenkreisspannung 540V DC) (DC-link voltage 540 V)



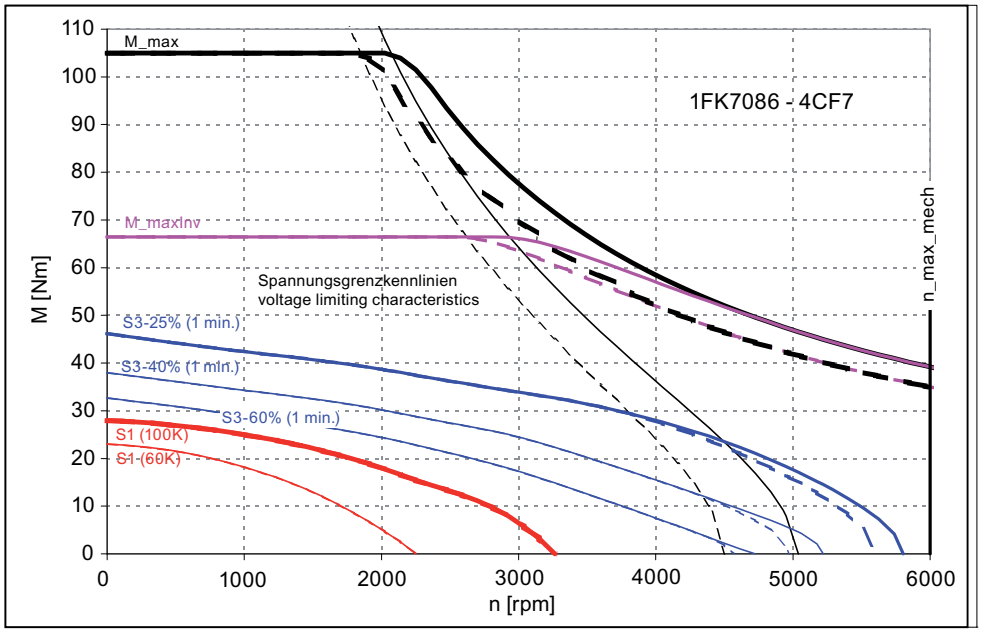

[———] SINAMICS ALM 400V-Netz (Zwischenkreisspannung 600V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400V-Netz (Zwischenkreisspannung 540V DC) (DC-link voltage 540 V)

Figure 4-54 1FK7086-4CC71

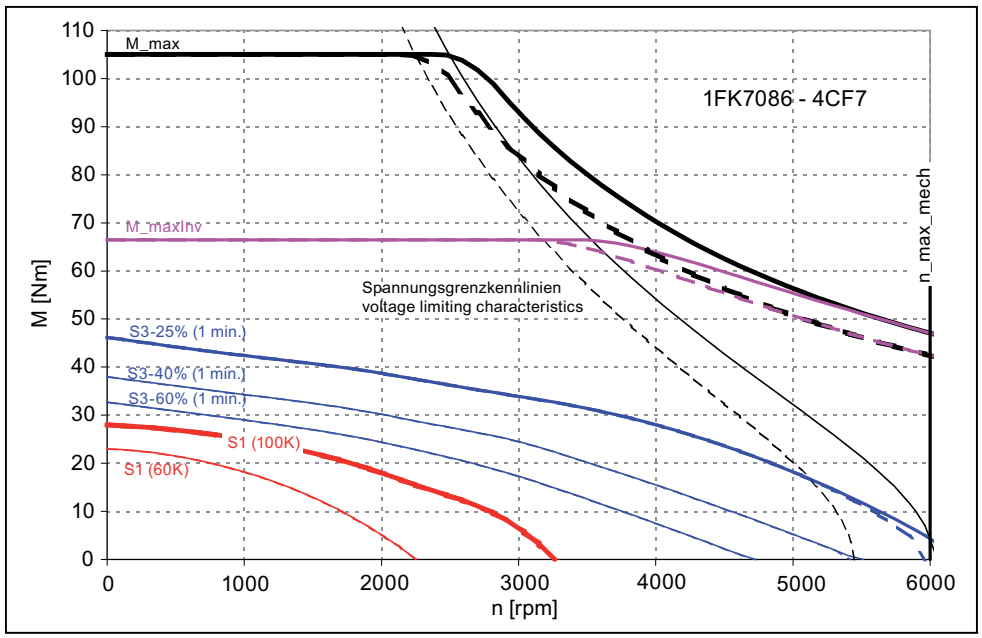
Table 4- 54 1FK7086 High Dynamic

| Technical data | Code | Unit | –4CF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 6.5 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 5.7 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 28.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 21.5 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 23.0 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 17.4 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2000 |
| Optimum power | $P_{opt}$ | kW | 3.75 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 6000 |
| Maximum torque | $M_{max}$ | Nm | 105 |
| Maximum current | $I_{max}$ | A | 115 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.3 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 84.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.118 |
| Rotating field inductance | $L_D$ | mH | 3.1 |
| Electrical time constant | $T_{el}$ | ms | 26.5 |
| Mechanical time constant | $T_{mech}$ | ms | 0.46 |
| Thermal time constant | $T_{th}$ | min | 65 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $2.2 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 84000 |
| Weight without brake | $m_{Mot}$ | kg | 23.0 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $2.55 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 63000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 26.0 |
| **Recommended Motor Module 6SL312□-□TE23-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 30 |
| Maximum converter current | $I_{max\ Inv}$ | A | 56 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 66 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 6000 |

The rated data are valid for a 600 V DC link voltage.




[———] SINAMICS ALM 400V-Netz (Zwischenkreisspannung 600V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400V-Netz (Zwischenkreisspannung 540V DC) (DC-link voltage 540 V)




[———] SINAMICS ALM 480V-Netz (Zwischenkreisspannung 720V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480V-Netz (Zwischenkreisspannung 650V DC) (DC-link voltage 650 V)

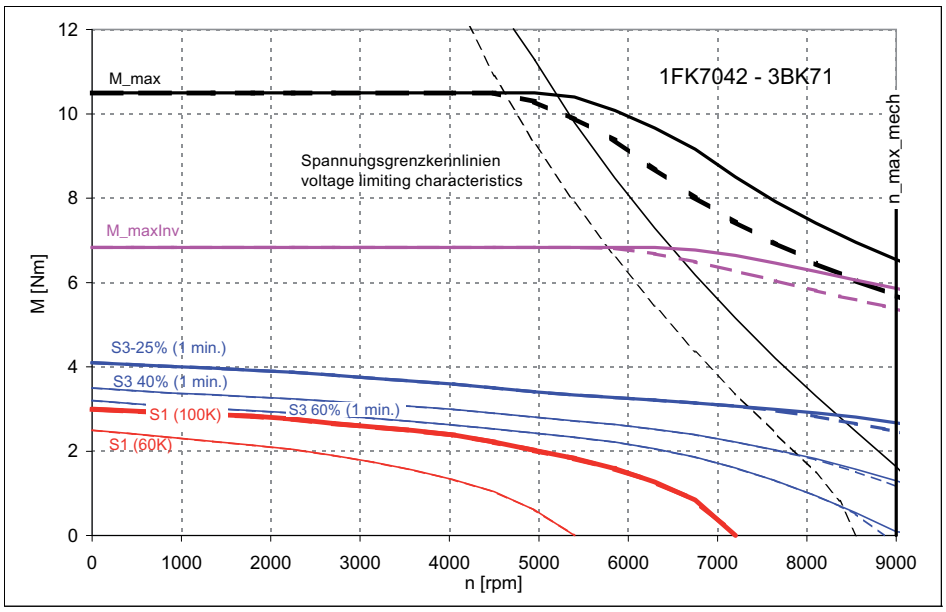
Figure 4-55 1FK7086-4CF71

### 4.2.1.3 1FK7 High Inertia

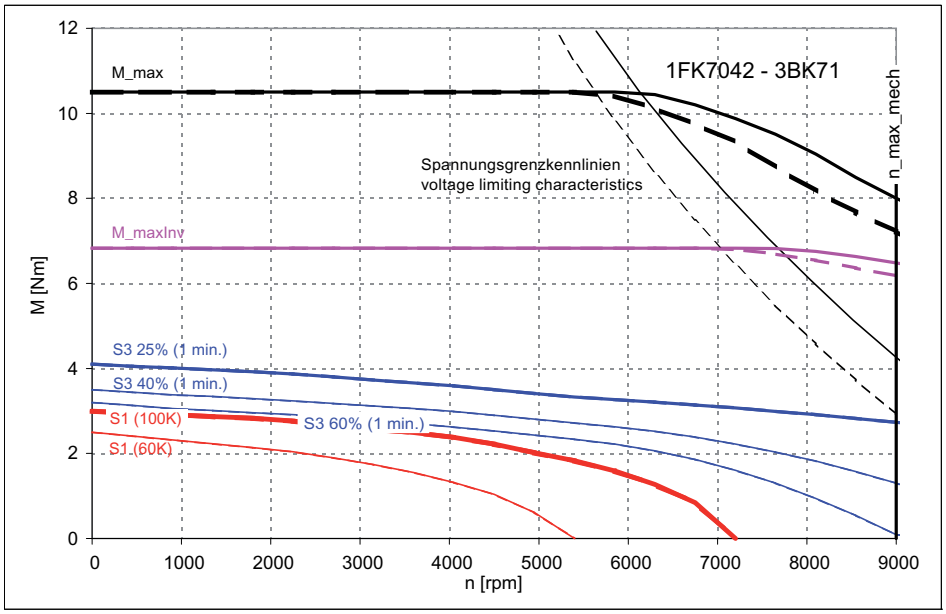
Table 4- 55 1FK7042 High Inertia

| Technical data | Code | Unit | –3BK71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 6000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 1.5 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 2.5 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 3.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 4.4 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 2.5 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 3.55 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 5000 |
| Optimum power | $P_{opt}$ | kW | 1.02 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 9000 |
| Maximum torque | $M_{max}$ | Nm | 10.5 |
| Maximum current | $I_{max}$ | A | 15.3 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.68 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 44.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 1.145 |
| Rotating field inductance | $L_D$ | mH | 8.6 |
| Electrical time constant | $T_{el}$ | ms | 7.5 |
| Mechanical time constant | $T_{mech}$ | ms | 3.8 |
| Thermal time constant | $T_{th}$ | min | 30 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.51 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 14600 |
| Weight without brake | $m_{Mot}$ | kg | 5.1 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.54 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 10900 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 5.8 |
| **Recommended Motor Module 6SL312□-□TE15-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 5 |
| Maximum converter current | $I_{max\ Inv}$ | A | 10 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 6.8 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 9000 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



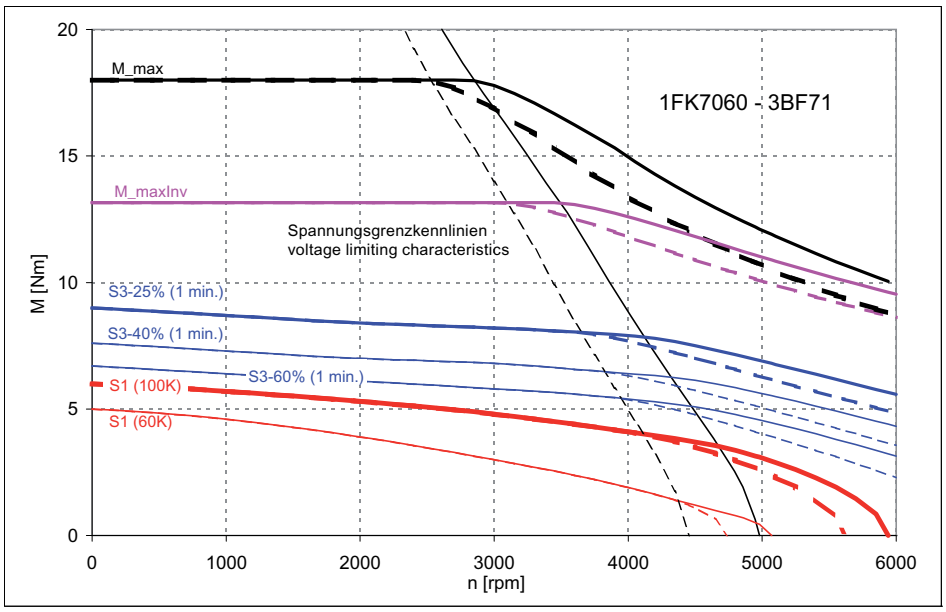

[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-56 1FK7042-3BK71

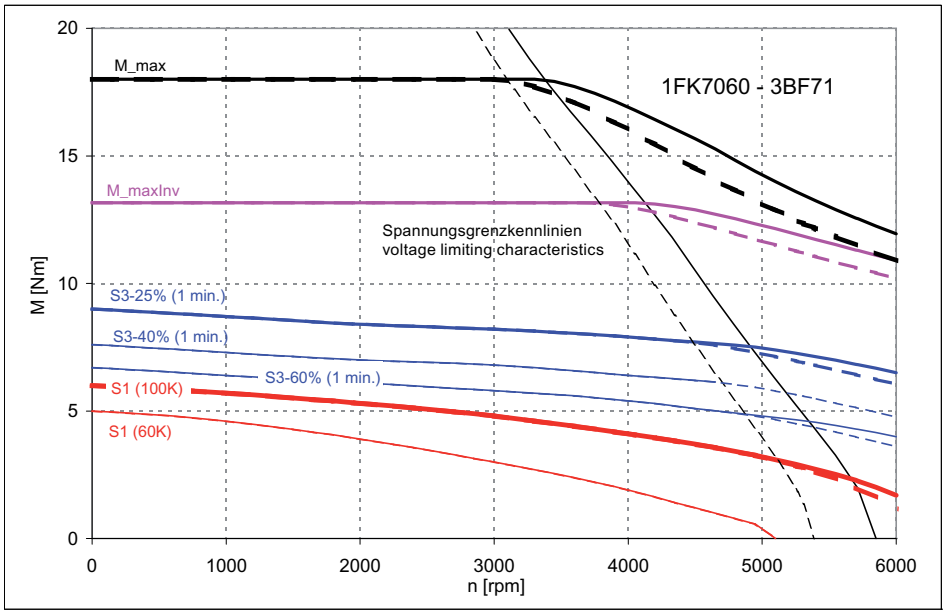
Table 4- 56 1FK7060 High Inertia

| Technical data | Code | Unit | –3BF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 4.7 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 3.7 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 6.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 4.45 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 5.0 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 3.6 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 1.48 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 7200 |
| Maximum torque | $M_{max}$ | Nm | 18.0 |
| Maximum current | $I_{max}$ | A | 15.0 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.33 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 85.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 1.35 |
| Rotating field inductance | $L_D$ | mH | 15.2 |
| Electrical time constant | $T_{el}$ | ms | 11.3 |
| Mechanical time constant | $T_{mech}$ | ms | 2.8 |
| Thermal time constant | $T_{th}$ | min | 30 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $1.25 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 38500 |
| Weight without brake | $m_{Mot}$ | kg | 7.9 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $1.35 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 27500 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 9.3 |
| **Recommended Motor Module 6SL312□-□TE15-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 5 |
| Maximum converter current | $I_{max\ Inv}$ | A | 10 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 13.2 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 6700 |

The rated data are valid for a 600 V DC link voltage.




[————] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[– – – – –] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



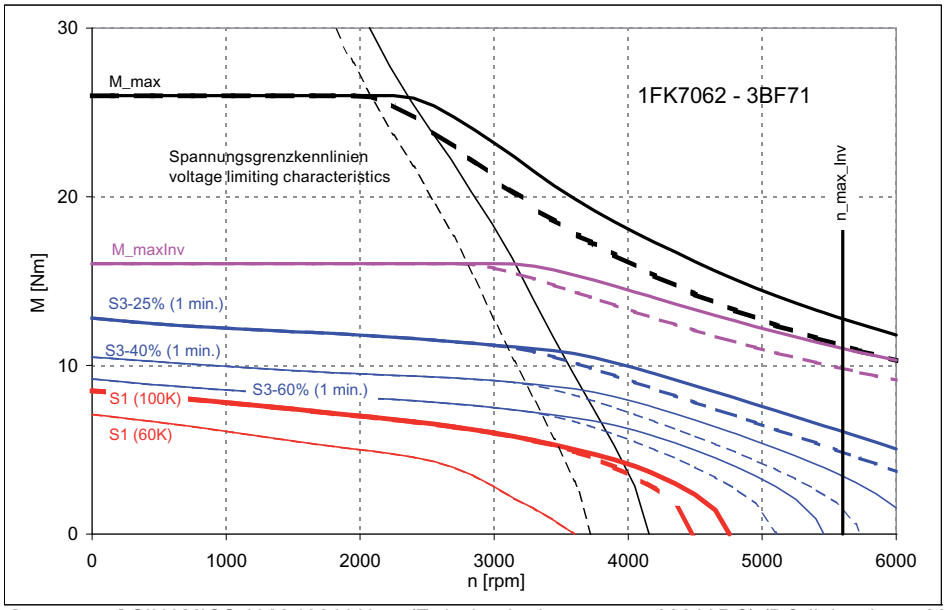

[————] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[– – – – –] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-57 1FK7060-3BF71

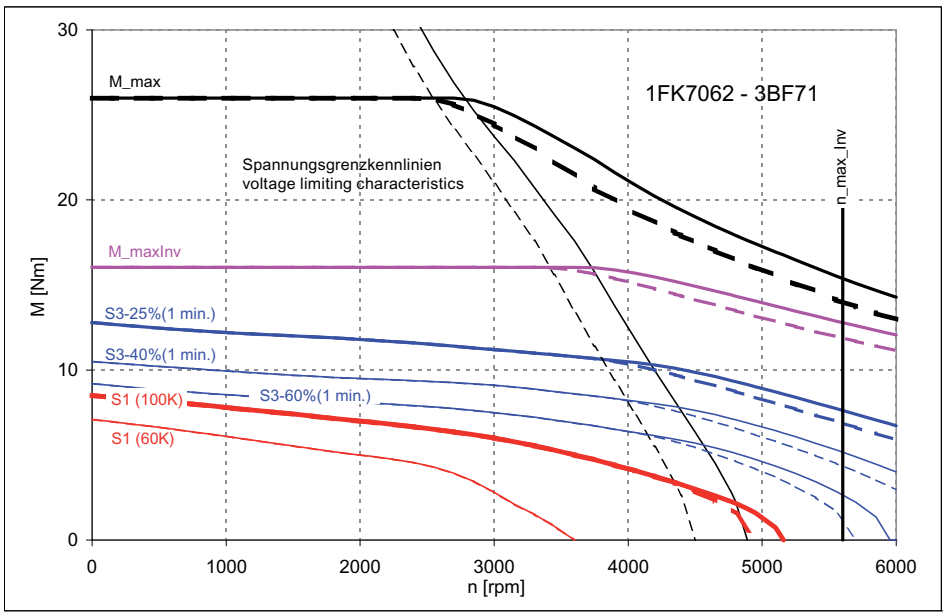
Table 4- 57 1FK7062 High Inertia

| Technical data | Code | Unit | –3BF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 6.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 4.0 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 8.5 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 5.3 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 7.1 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 4.3 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 1.6 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 7200 |
| Maximum torque | $M_{max}$ | Nm | 26.0 |
| Maximum current | $I_{max}$ | A | 19.2 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.605 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 102.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 1.145 |
| Rotating field inductance | $L_D$ | mH | 14.6 |
| Electrical time constant | $T_{el}$ | ms | 12.8 |
| Mechanical time constant | $T_{mech}$ | ms | 3.15 |
| Thermal time constant | $T_{th}$ | min | 35 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $2.35 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 34500 |
| Weight without brake | $m_{Mot}$ | kg | 10.7 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $2.45 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 25000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 12.1 |
| **Recommended Motor Module 6SL312□-□TE15-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 5 |
| Maximum converter current | $I_{max\ Inv}$ | A | 10 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 16.0 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 5600 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



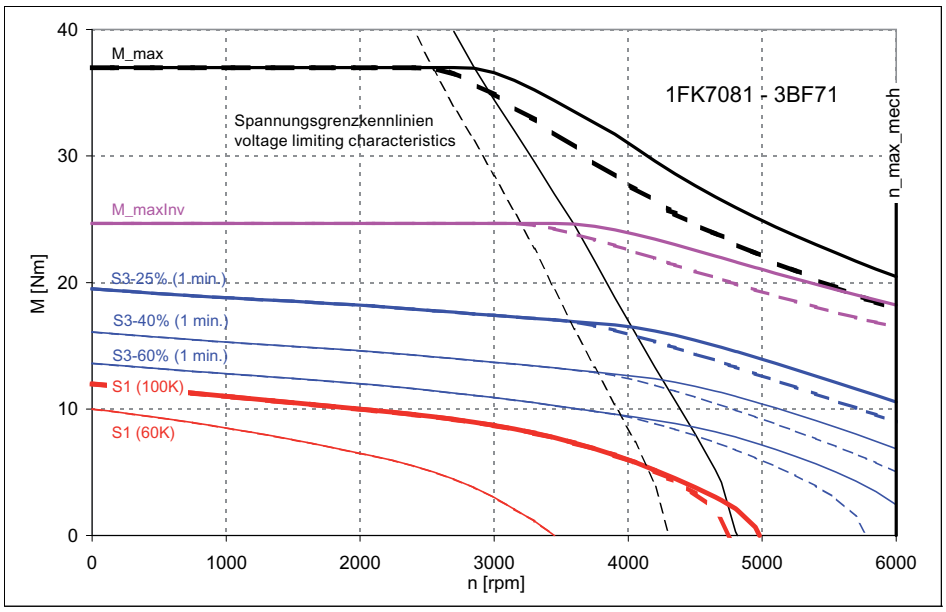

[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-58 1FK7062-3BF71

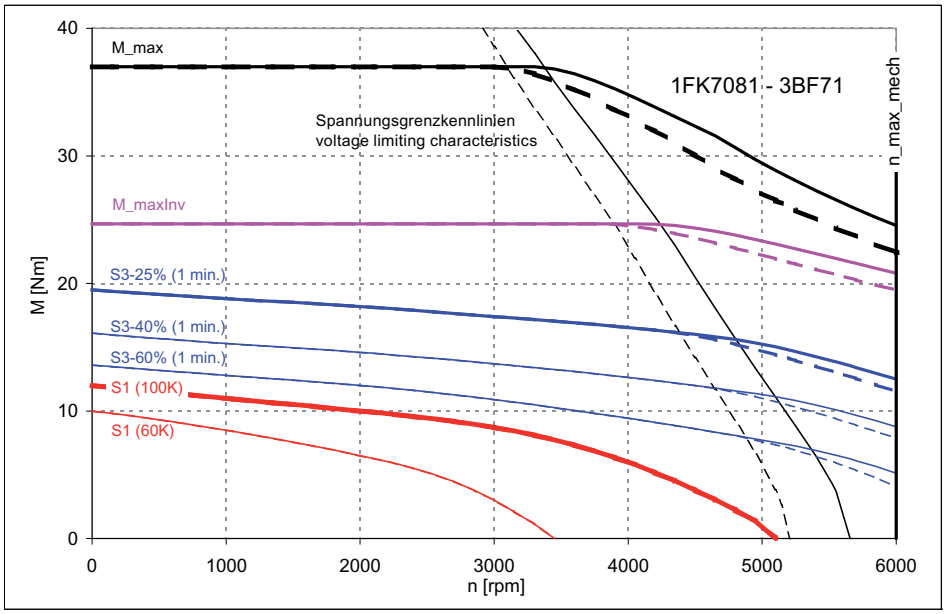
Table 4- 58 1FK7081 High Inertia

| Technical data | Code | Unit | –3BF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 8.7 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 6.8 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 12.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 8.7 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 10.0 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 7.1 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 2.75 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 6000 |
| Maximum torque | $M_{max}$ | Nm | 37.0 |
| Maximum current | $I_{max}$ | A | 30.0 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.375 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 88.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.424 |
| Rotating field inductance | $L_D$ | mH | 7.7 |
| Electrical time constant | $T_{el}$ | ms | 18.2 |
| Mechanical time constant | $T_{mech}$ | ms | 3.3 |
| Thermal time constant | $T_{th}$ | min | 45 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $4.90 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 100000 |
| Weight without brake | $m_{Mot}$ | kg | 15.2 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $5.20 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 71000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 18.2 |
| **Recommended Motor Module 6SL312□-□TE21-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 18 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 24.7 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 6000 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



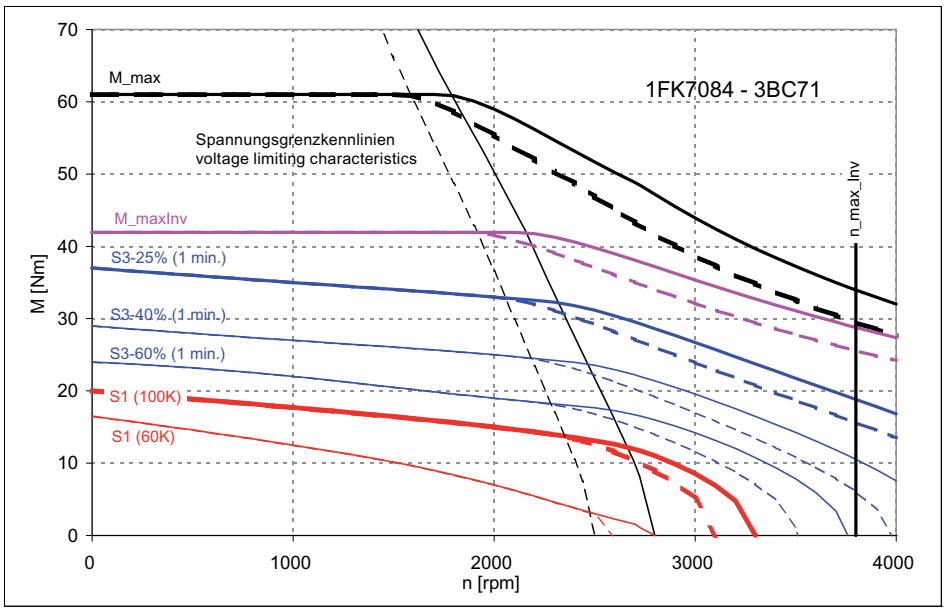

[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-59 1FK7081-3BF71

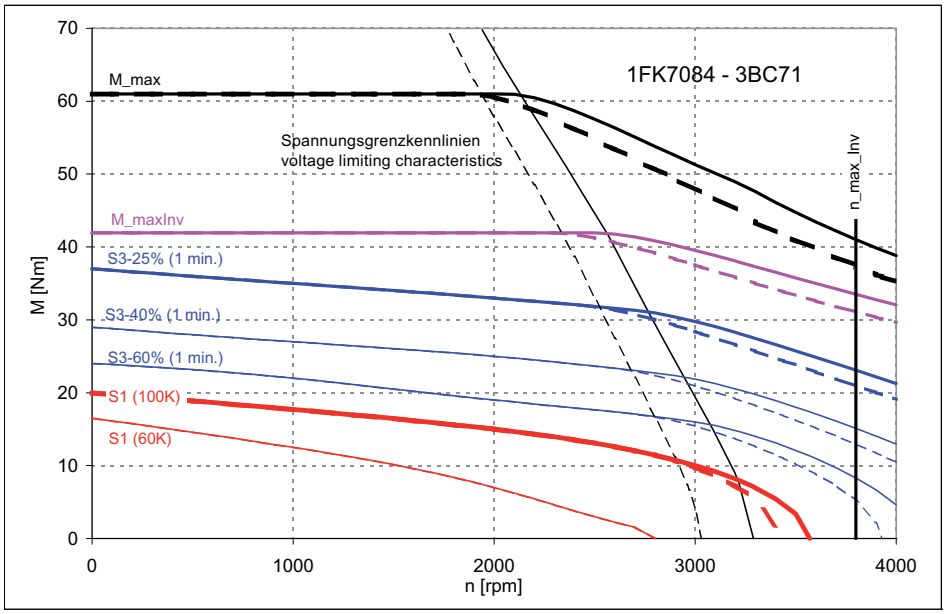
Table 4- 59 1FK7084 High Inertia

| Technical data | Code | Unit | –3BC71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 2000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 15.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 6.7 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 20.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 8.5 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 16.8 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 6.9 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2000 |
| Optimum power | $P_{opt}$ | kW | 3.15 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 6000 |
| Maximum torque | $M_{max}$ | Nm | 61 |
| Maximum current | $I_{max}$ | A | 28.5 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 2.36 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 152.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.585 |
| Rotating field inductance | $L_D$ | mH | 12.0 |
| Electrical time constant | $T_{el}$ | ms | 20.5 |
| Mechanical time constant | $T_{mech}$ | ms | 3.1 |
| Thermal time constant | $T_{th}$ | min | 55 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $9.9 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 82000 |
| Weight without brake | $m_{Mot}$ | kg | 23.0 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $10.2 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 62000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 26.0 |
| **Recommended Motor Module 6SL312□-□TE215-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 18 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 41.9 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 3800 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)



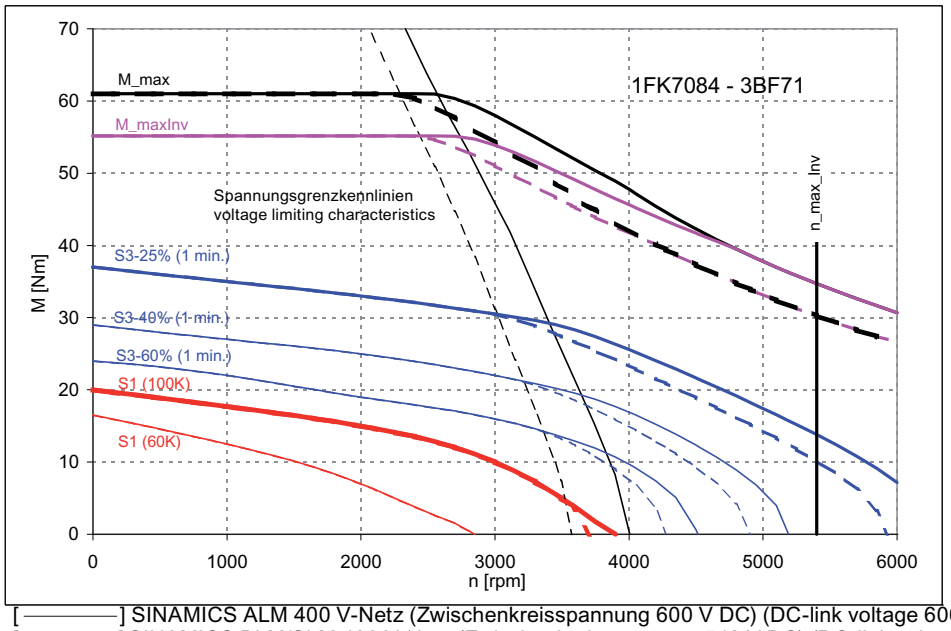

[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

Figure 4-60 1FK7084-3BC71

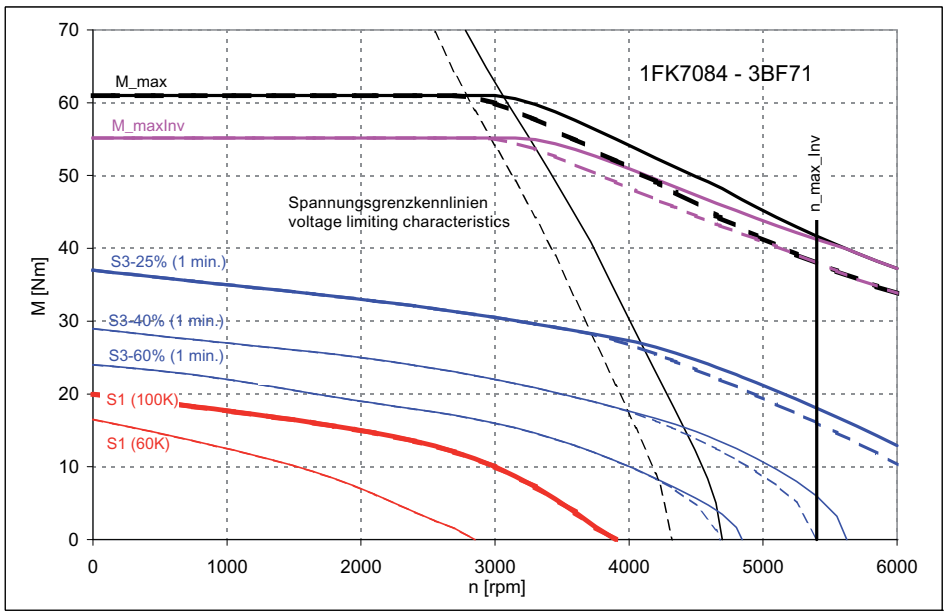
Table 4- 60 1FK7084 High Inertia

| Technical data | Code | Unit | –3BF71 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 10.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 6.5 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 20.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 12.1 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 16.6 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 9.8 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 2500 |
| Optimum power | $P_{opt}$ | kW | 3.25 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 6000 |
| Maximum torque | $M_{max}$ | Nm | 61 |
| Maximum current | $I_{max}$ | A | 41.0 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 1.655 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 106.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 0.284 |
| Rotating field inductance | $L_D$ | mH | 5.9 |
| Electrical time constant | $T_{el}$ | ms | 21.0 |
| Mechanical time constant | $T_{mech}$ | ms | 3.1 |
| Thermal time constant | $T_{th}$ | min | 55 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $9.90 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 82000 |
| Weight without brake | $m_{Mot}$ | kg | 23.0 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $1.02 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 62000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 26.0 |
| **Recommended Motor Module 6SL312□-□TE21-8AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 18 |
| Maximum converter current | $I_{max\ Inv}$ | A | 36 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 55 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 5400 |

The rated data are valid for a 600 V DC link voltage.




[ ———— ] SINAMICS ALM 400 V-Netz (Zwischenkreisspannung 600 V DC) (DC-link voltage 600 V)
[ – – – – – ] SINAMICS BLM/SLM 400 V-Netz (Zwischenkreisspannung 540 V DC) (DC-link voltage 540 V)




[ ———— ] SINAMICS ALM 480 V-Netz (Zwischenkreisspannung 720 V DC) (DC-link voltage 720 V)
[ – – – – – ] SINAMICS BLM/SLM 480 V-Netz (Zwischenkreisspannung 650 V DC) (DC-link voltage 650 V)

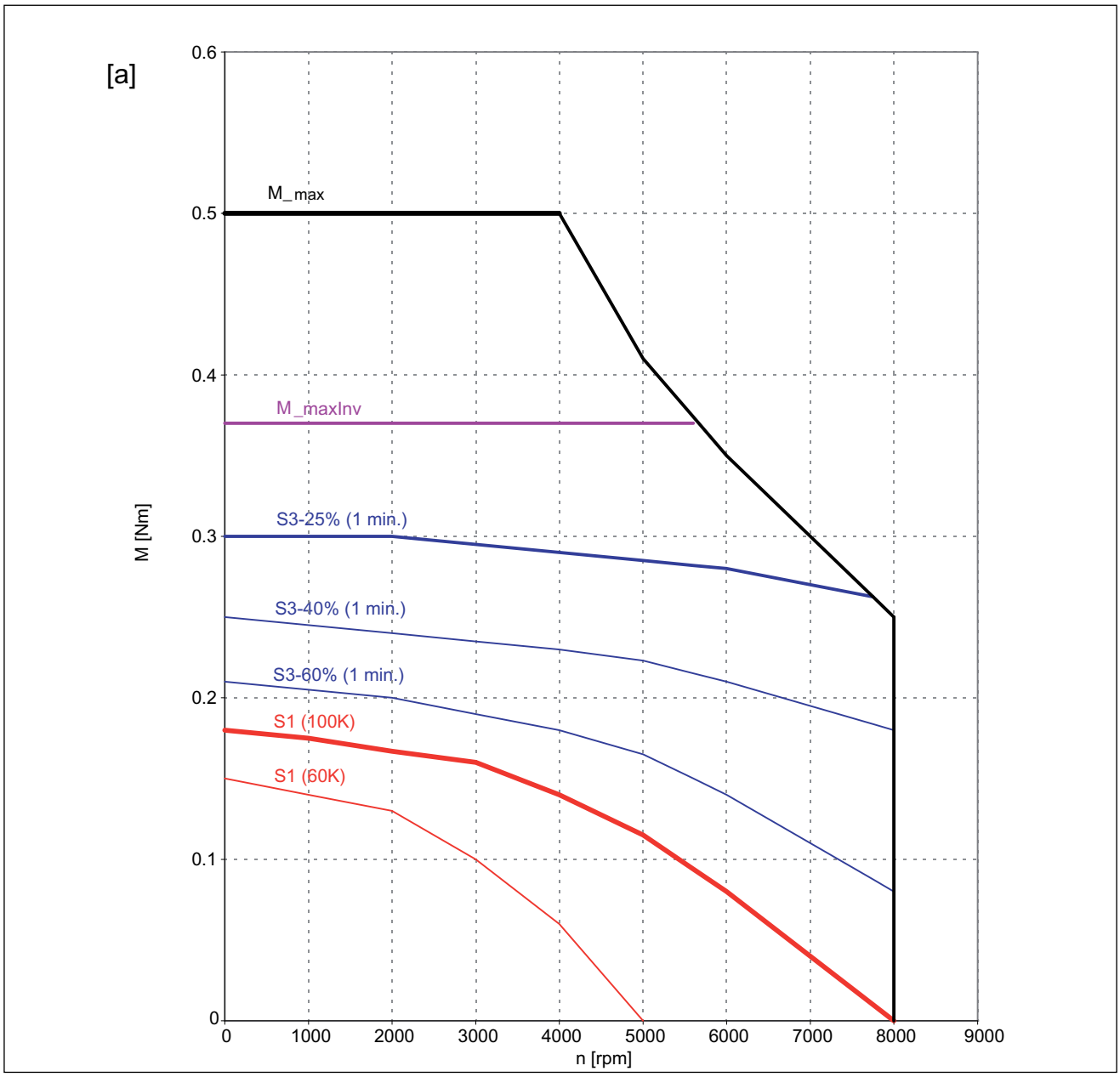
Figure 4-61 1FK7084-3BF71

## 4.2.2 1FK7 motors on SINAMICS S110 / S120 POWER MODULE with a line voltage of 1-ph. 200 V to 240 V AC

### 4.2.2.1 1FK7 Compact and 1FK7 High Dynamic

Table 4- 61 1FK7011 Compact

| Technical data | Code | Unit | –5AK21 | |
|---|---|---|---|---|
| Configuration data | | | | |
| Rated speed | $n_N$ | rpm | 6000 | |
| No. of poles | 2p | | 8 | |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 0.08 | |
| Rated current | $I_N$ | A | 0.5 | |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 0.15 | |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 0.18 | |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 0.7 | |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 0.85 | |
| Moment of inertia (with brake) | $J_{MotBr}$ | $10^{-4}$ kgm$^2$ | 0.083 | |
| Moment of inertia (without brake) | $J_{Mot}$ | $10^{-4}$ kgm$^2$ | 0.064 | |
| Optimum operating point | | | | |
| Optimum speed | $n_{opt}$ | rpm | 5000 | |
| Optimum power | $P_{opt}$ | kW | 0.06 | |
| Limit data | | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 8000 | |
| Max. permissible speed (converter) | $n_{max\ Inv}$ | rpm | 8000 | |
| Max. torque | $M_{max}$ | Nm | 0.5 | |
| Max. current | $I_{max}$ | A | 2.4 | |
| Physical constants | | | | |
| Torque constant | $k_T$ | Nm/A | 0.21 | |
| Voltage constant | $k_E$ | V/1000 rpm | 14 | |
| Winding resistance at 20°C | $R_{ph}$ | Ohm | 9.4 | |
| Cyclic inductance | $L_D$ | mH | 13 | |
| Electrical time constant | $T_{el}$ | ms | 1.4 | |
| Mechanical time constant | $T_{mech}$ | ms | 4.1 | |
| Thermal time constant | $T_{th}$ | min | 14 | |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 1400 | |
| Weight with brake | $m_{MotBr}$ | kg | 1.0 | |
| Weight without brake | $m_{Mot}$ | kg | 0.9 | |
| Recommended Power Module 6SL3210-1SB11-0UA0 | | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 0.9 | |
| Max. converter current | $I_{max\ Inv}$ | A | 1.8 | |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 0.37 | |

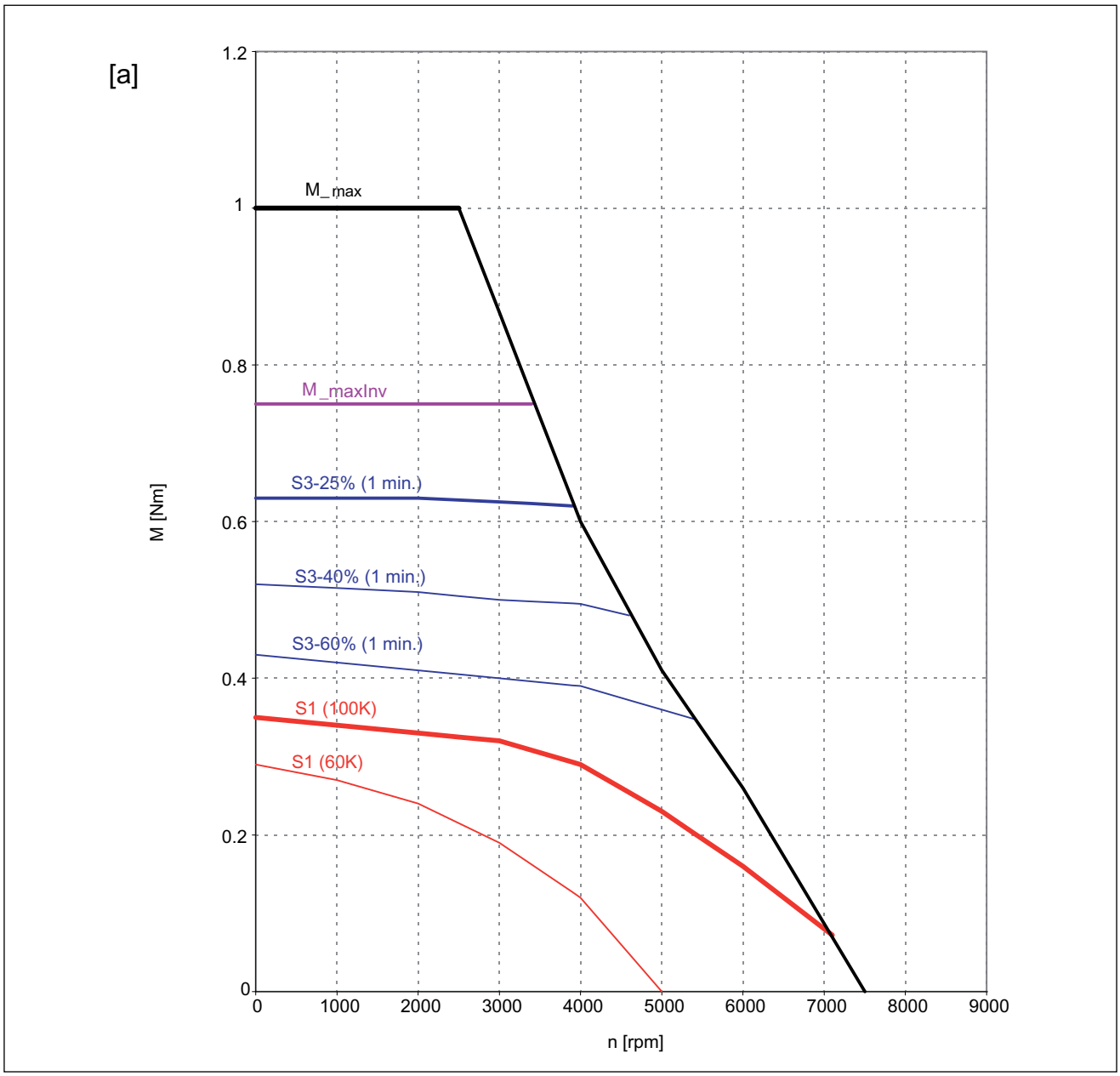



[a] SINAMICS 1AC 230 V

Figure 4-62 1FK7011-5AK21

Table 4- 62 1FK7015 Compact

| Technical data | Code | Unit | –5AK21 | |
|---|---|---|---|---|
| Configuration data | | | | |
| Rated speed | $n_N$ | rpm | 6000 | |
| No. of poles | 2p | | 8 | |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 0.16 | |
| Rated current | $I_N$ | A | 0.5 | |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 0.29 | |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 0.35 | |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 0.7 | |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 0.85 | |
| Moment of inertia (with brake) | $J_{MotBr}$ | $10^{-4}$ kgm$^2$ | 0.102 | |
| Moment of inertia (without brake) | $J_{Mot}$ | $10^{-4}$ kgm$^2$ | 0.083 | |
| Optimum operating point | | | | |
| Optimum speed | $n_{opt}$ | rpm | 5000 | |
| Optimum power | $P_{opt}$ | kW | 0.12 | |
| Limit data | | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 8000 | |
| Max. permissible speed (converter) | $n_{max\ Inv}$ | rpm | 8000 | |
| Max. torque | $M_{max}$ | Nm | 1 | |
| Max. current | $I_{max}$ | A | 2.4 | |
| Physical constants | | | | |
| Torque constant | $k_T$ | Nm/A | 0.42 | |
| Voltage constant | $k_E$ | V/1000 rpm | 28 | |
| Winding resistance at 20°C | $R_{ph}$ | Ohm | 13.6 | |
| Cyclic inductance | $L_D$ | mH | 26 | |
| Electrical time constant | $T_{el}$ | ms | 1.9 | |
| Mechanical time constant | $T_{mech}$ | ms | 1.9 | |
| Thermal time constant | $T_{th}$ | min | 16 | |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 1300 | |
| Weight with brake | $m_{MotBr}$ | kg | 1.2 | |
| Weight without brake | $m_{Mot}$ | kg | 1.2 | |
| Recommended Power Module 6SL3210-1SB11-0UA0 | | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 0.9 | |
| Max. converter current | $I_{max\ Inv}$ | A | 1.8 | |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 0.75 | |

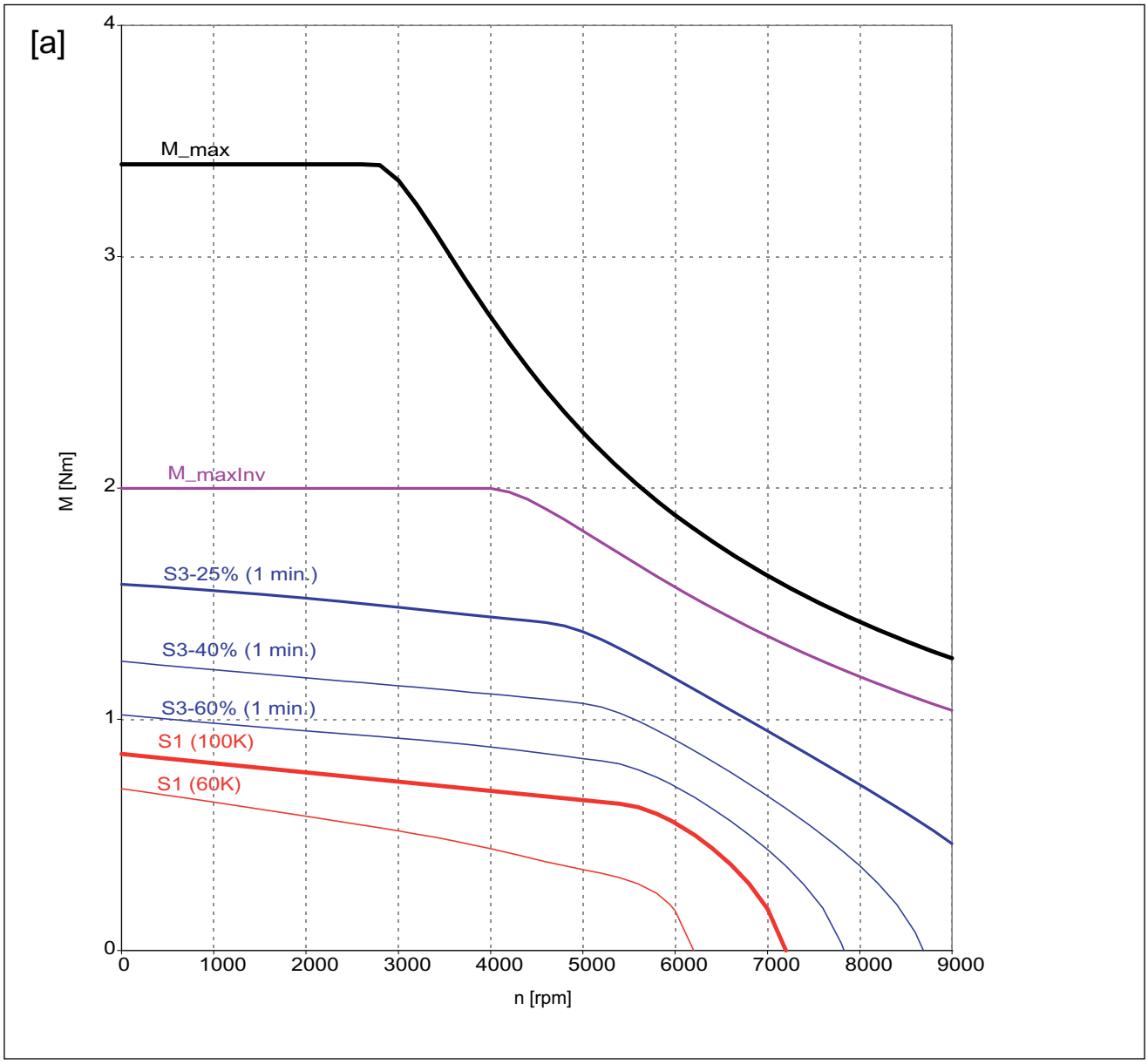



[a] SINAMICS 1AC 230 V

Figure 4-63 1FK7015-5AK21

Table 4- 63 1FK7022 Compact

| Technical data | Code | Unit | –5AK21 | |
|---|---|---|---|---|
| Configuration data | | | | |
| Rated speed | $n_N$ | rpm | 6000 | |
| No. of poles | 2p | | 6 | |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 0.6 | |
| Rated current | $I_N$ | A | 1.4 | |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 0.7 | |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 0.85 | |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 1.5 | |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 1.8 | |
| Moment of inertia (with brake) | $J_{MotBr}$ | $10^{-4}$ kgm$^2$ | 0.35 | |
| Moment of inertia (without brake) | $J_{Mot}$ | $10^{-4}$ kgm$^2$ | 0.28 | |
| Optimum operating point | | | | |
| Optimum speed | $n_{opt}$ | rpm | 6000 | |
| Optimum power | $P_{opt}$ | kW | 0.38 | |
| Limit data | | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 10000 | |
| Max. permissible speed (converter) | $n_{max\ Inv}$ | rpm | 9990 | |
| Max. torque | $M_{max}$ | Nm | 3.4 | |
| Max. current | $I_{max}$ | A | 8.0 | |
| Physical constants | | | | |
| Torque constant | $k_T$ | Nm/A | 0.46 | |
| Voltage constant | $k_E$ | V/1000 rpm | 29 | |
| Winding resistance at 20°C | $R_{ph}$ | Ohm | 4.2 | |
| Cyclic inductance | $L_D$ | mH | 9.1 | |
| Electrical time constant | $T_{el}$ | ms | 2.2 | |
| Mechanical time constant | $T_{mech}$ | ms | 1.7 | |
| Thermal time constant | $T_{th}$ | min | 18 | |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 3000 | |
| Weight with brake | $m_{MotBr}$ | kg | 2.0 | |
| Weight without brake | $m_{Mot}$ | kg | 1.8 | |
| Recommended power module 6SL3210-1SB12-3UA0 | | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 2.3 | |
| Max. converter current | $I_{max\ Inv}$ | A | 4.6 | |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 2.0 | |

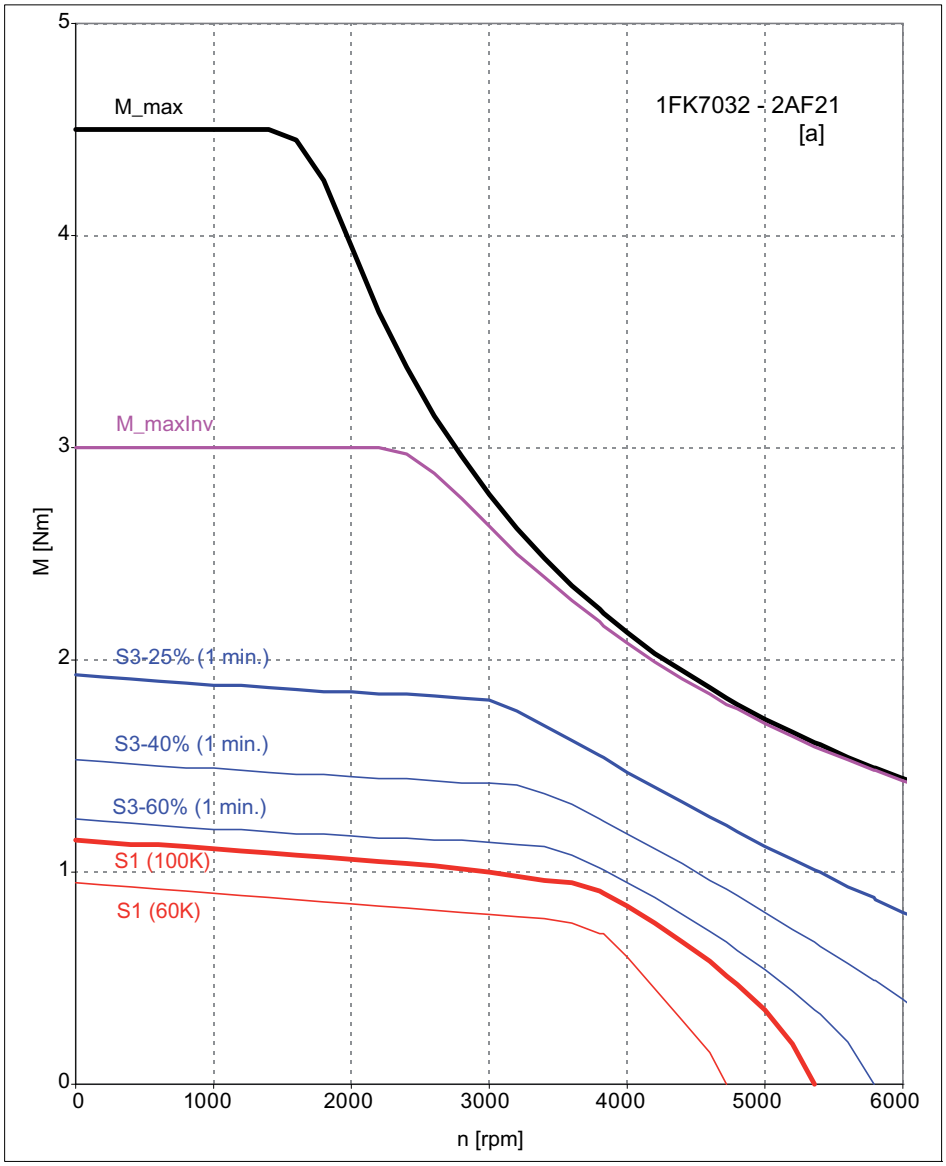



[a] SINAMICS 1AC 230 V

Figure 4-64 1FK7022-5AK21

Table 4- 64 1FK7032 Compact

| Technical data | Code | Unit | –2AF21 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 1.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 1.6 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 1.15 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 1.7 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 0.95 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 1.4 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 0.315 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 10000 |
| Maximum torque | $M_{max}$ | Nm | 4.5 |
| Maximum current | $I_{max}$ | A | 7.0 |
| **Motor data** | | | |
| Pole number | 2p | | 6 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.67 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 45.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 5.05 |
| Rotating field inductance | $L_D$ | mH | 17.3 |
| Electrical time constant | $T_{el}$ | ms | 3.45 |
| Mechanical time constant | $T_{mech}$ | ms | 2.2 |
| Thermal time constant | $T_{th}$ | min | 25 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.065 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 6000 |
| Weight without brake | $m_{Mot}$ | kg | 2.7 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.075 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 4100 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 3.1 |
| **Recommended Motor Module 6SL312□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 2.3 |
| Maximum converter current | $I_{max\ Inv}$ | A | 4.6 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 3.0 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 6400 |

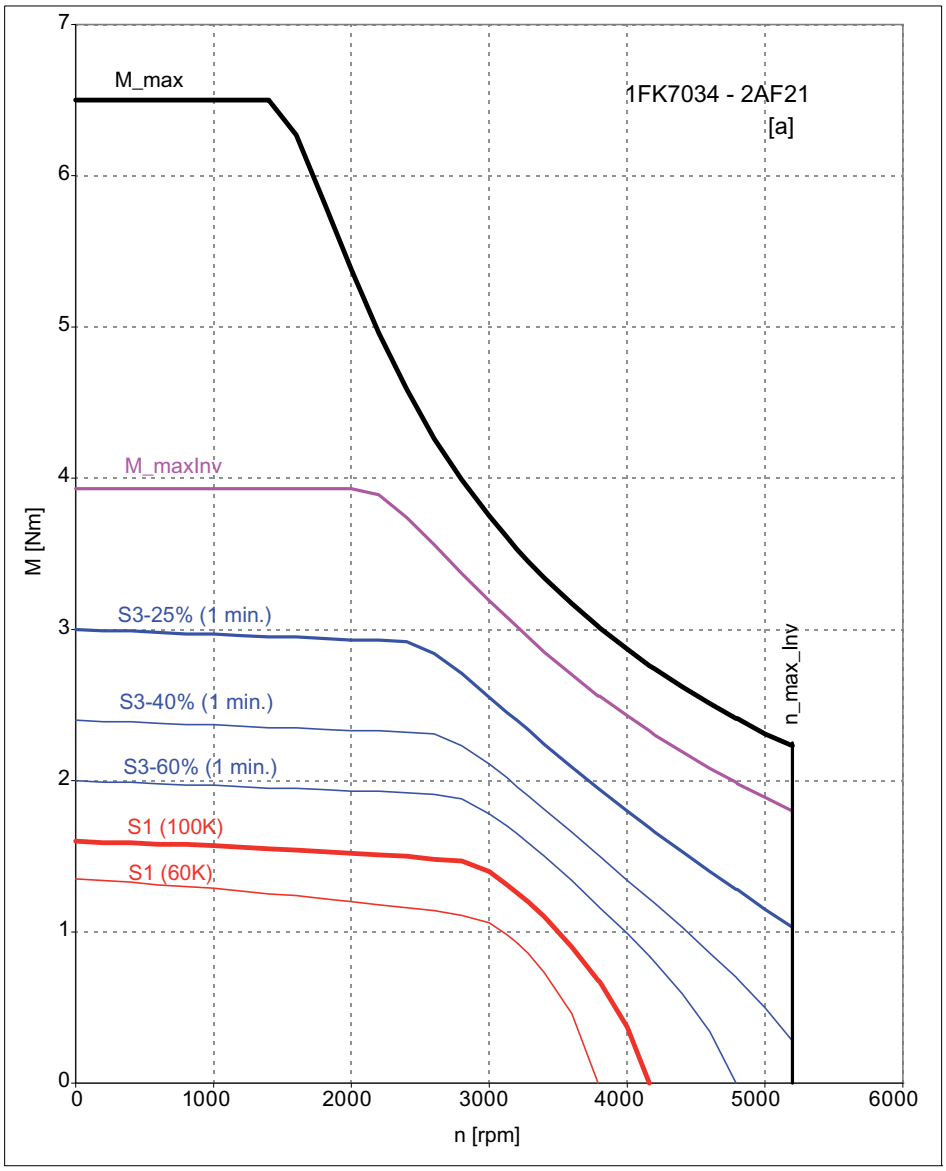



[a] SINAMICS 1 AC 230 V

Figure 4-65 1FK7032-2AF21

Table 4- 65 1FK7034 Compact

| Technical data | Code | Unit | –2AF21 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 1.45 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 1.8 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 1.6 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 1.9 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 1.35 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 1.55 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 0.455 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 10000 |
| Maximum torque | $M_{max}$ | Nm | 6.5 |
| Maximum current | $I_{max}$ | A | 8 |
| **Motor data** | | | |
| Pole number | 2p | | 6 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.84 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 55.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 4.46 |
| Rotating field inductance | $L_D$ | mH | 17.2 |
| Electrical time constant | $T_{el}$ | ms | 3.85 |
| Mechanical time constant | $T_{mech}$ | ms | 1.71 |
| Thermal time constant | $T_{th}$ | min | 30 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.09 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 5300 |
| Weight without brake | $m_{Mot}$ | kg | 3.5 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.10 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 3750 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 3.9 |
| **Recommended Motor Module 6SL312□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 2.3 |
| Maximum converter current | $I_{max\ Inv}$ | A | 4.6 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 3.9 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 5200 |

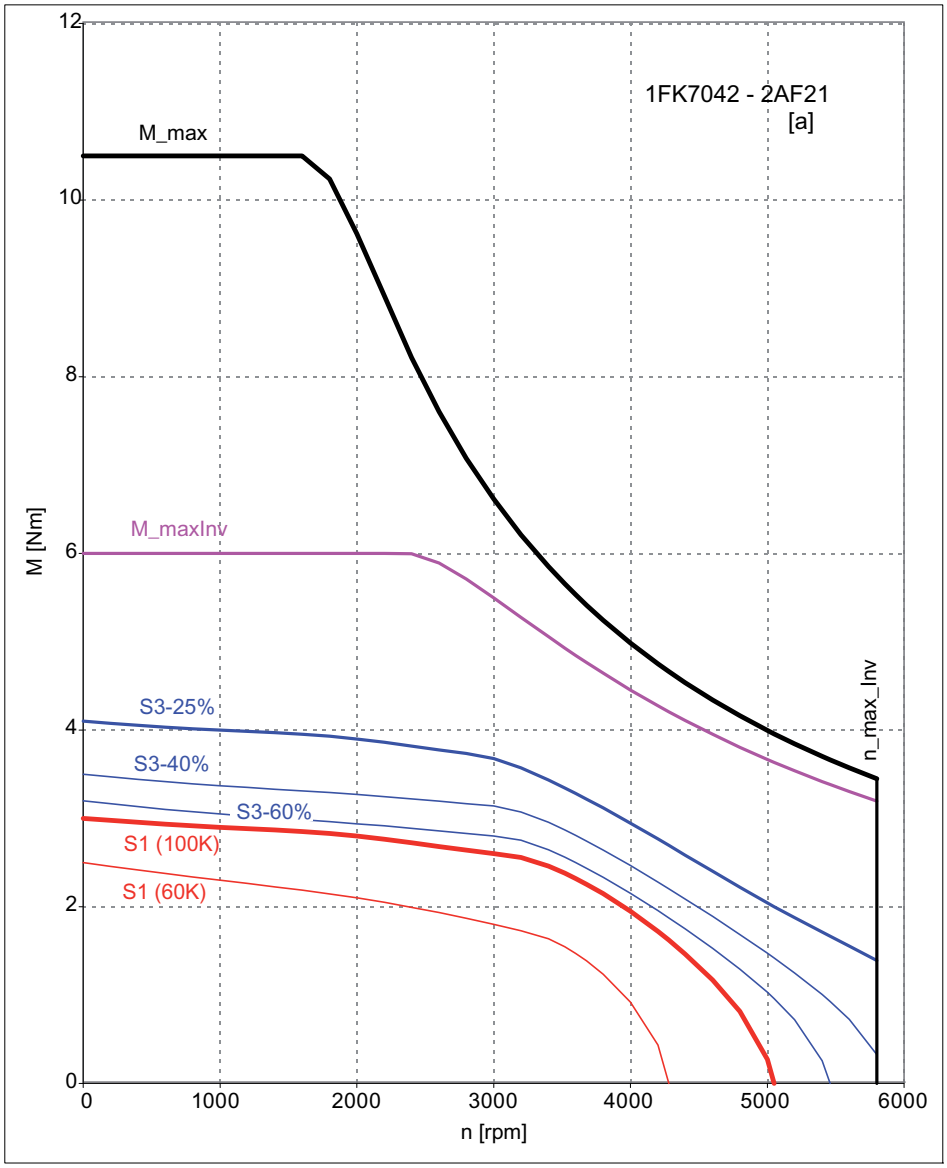



[a] SINAMICS 1 AC 230 V

Figure 4-66 1FK7034-2AF21

Table 4- 66 1FK7042 Compact

| Technical data | Code | Unit | –2AF21 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 2.6 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 3.5 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 3.0 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 3.95 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 2.5 |
| Stall current (60 K) | $I_{0\ (60\ K))}$ | A | 3.2 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 0.82 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 9000 |
| Maximum torque | $M_{max}$ | Nm | 10.5 |
| Maximum current | $I_{max}$ | A | 13.8 |
| **Motor data** | | | |
| Pole number | 2p | | 8 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.76 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 49.6 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 1.435 |
| Rotating field inductance | $L_D$ | mH | 10.6 |
| Electrical time constant | $T_{el}$ | ms | 7.4 |
| Mechanical time constant | $T_{mech}$ | ms | 2.15 |
| Thermal time constant | $T_{th}$ | min | 30 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.29 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 15500 |
| Weight without brake | $m_{Mot}$ | kg | 4.6 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.32 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 11400 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 5.3 |
| **Recommended Motor Module 6SL312□-□TE13-0AA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 3.9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 7.8 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 6.0 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 5800 |

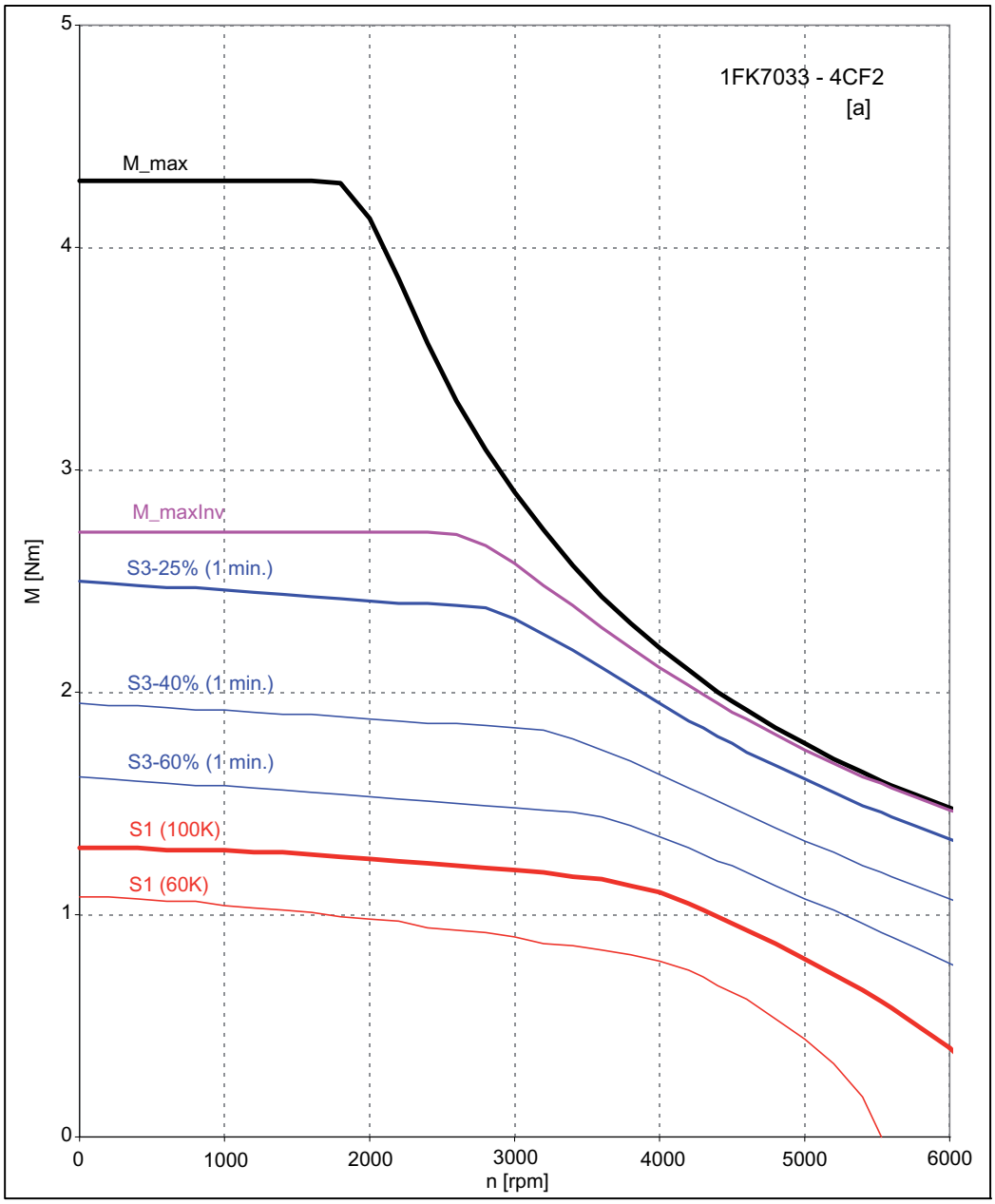



[a] SINAMICS 1 AC 230 V

Figure 4-67 1FK7042-2AF21

Table 4- 67 1FK7033 High Dynamic

| Technical data | Code | Unit | –4CF21 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 1.2 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 2.05 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 1.3 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 2.1 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 1.08 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 1.7 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 0.375 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 10000 |
| Maximum torque | $M_{max}$ | Nm | 4.3 |
| Maximum current | $I_{max}$ | A | 7.6 |
| **Motor data** | | | |
| Pole number | 2p | | 6 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.62 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 39.5 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 3.51 |
| Rotating field inductance | $L_D$ | mH | 22.0 |
| Electrical time constant | $T_{el}$ | ms | 6.3 |
| Mechanical time constant | $T_{mech}$ | ms | 0.68 |
| Thermal time constant | $T_{th}$ | min | 25 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.025 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 7300 |
| Weight without brake | $m_{Mot}$ | kg | 3.0 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.035 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 4700 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 3.4 |
| **Recommended Motor Module 6SL321□-□SB12-3UA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 2.3 |
| Maximum converter current | $I_{max\ Inv}$ | A | 4.6 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 2.7 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 7150 |

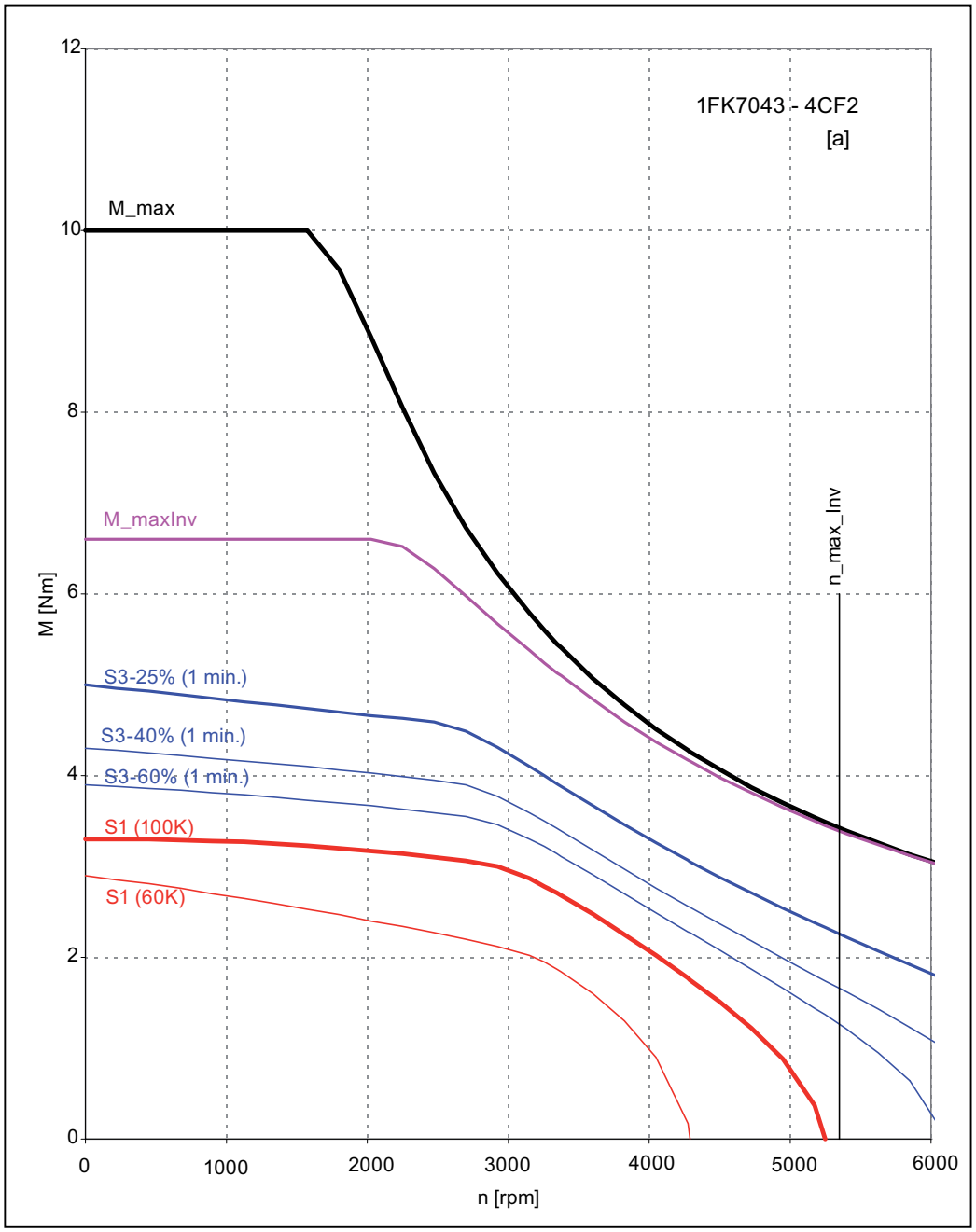



[a] SINAMICS 1 AC 230 V

Figure 4-68 1FK7033_4CF21

Table 4- 68 1FK7043 High Dynamic

| Technical data | Code | Unit | –4CF21 |
|---|---|---|---|
| **Configuration data** | | | |
| Rated speed | $n_N$ | rpm | 3000 |
| Rated torque (100 K) | $M_{N\ (100\ K)}$ | Nm | 3.0 |
| Rated current (100 K) | $I_{N\ (100\ K)}$ | A | 3.7 |
| Static torque (100 K) | $M_{0\ (100\ K)}$ | Nm | 3.3 |
| Stall current (100 K) | $I_{0\ (100\ K)}$ | A | 3.9 |
| Static torque (60 K) | $M_{0\ (60\ K)}$ | Nm | 2.9 |
| Stall current (60 K) | $I_{0\ (60\ K)}$ | A | 3.3 |
| **Optimum operating point** | | | |
| Optimum speed | $n_{opt}$ | rpm | 3000 |
| Optimum power | $P_{opt}$ | kW | 0.94 |
| **Limit data** | | | |
| Max. permissible speed (mech.) | $n_{max\ mech}$ | rpm | 9000 |
| Maximum torque | $M_{max}$ | Nm | 10.0 |
| Maximum current | $I_{max}$ | A | 12.5 |
| **Motor data** | | | |
| Pole number | 2p | | 6 |
| Torque constant (100 K) | $k_T$ | Nm/A | 0.845 |
| Voltage constant (at 20 °C) | $k_E$ | V/1000 rpm | 54.0 |
| Winding resistance (at 20 °C) | $R_{ph}$ | Ω | 1.2 |
| Rotating field inductance | $L_D$ | mH | 13.6 |
| Electrical time constant | $T_{el}$ | ms | 11.3 |
| Mechanical time constant | $T_{mech}$ | ms | 0.5 |
| Thermal time constant | $T_{th}$ | min | 40 |
| Moment of inertia | $J_{Mot}$ | $kgm^2$ | $0.1 \cdot 10^{-3}$ |
| Shaft torsional stiffness | $c_t$ | Nm/rad | 11400 |
| Weight without brake | $m_{Mot}$ | kg | 6.0 |
| **Motor data with integrated brake** | | | |
| Moment of inertia with brake | $J_{Mot\ Br}$ | $kgm^2$ | $0.136 \cdot 10^{-3}$ |
| Shaft torsional stiffness with brake | $c_{t\ Br}$ | Nm/rad | 9000 |
| Weight with brake | $m_{Mot\ Br}$ | kg | 6.6 |
| **Recommended Motor Module 6SL321□-□SB13-9UA□** | | | |
| Rated converter current | $I_{N\ Inv}$ | A | 3.9 |
| Maximum converter current | $I_{max\ Inv}$ | A | 7.8 |
| Max. torque at $I_{max\ Inv}$ | $M_{max\ Inv}$ | Nm | 6.6 |
| Maximum permissible speed (converter) | $n_{max\ Inv}$ | rpm | 5350 |




[a] SINAMICS 1 AC 230 V

Figure 4-69 1FK7043_4CF21

# 4.3 Dimension drawings

## CAD CREATOR

Thanks to its easy to understand interface, the CAD CREATOR allows you to find the following quickly

- dimension drawings
- 2D/3D CAD data

and supports you when generating plant/system documentation regarding project-specific information. The data for motors, drives and CNC controls is currently available in the online version.

You can find further information on the Internet at: http://www.siemens.com/cadcreator

### Motors

- 1FK7, 1FT7, 1FT6 synchronous motors
- 1FE1 built-in synchronous motors
- 1FW3 complete torque motors
- 1FW6 built-in torque motors
- 1FK7, 1FT7, 1FT6 geared motors
- 1PH8 synchronous/induction motors
- 1PH7, 1PH4, 1PL6, 1PM4, 1PM6 induction motors
- 2SP1 motor spindles
- 1FN3 linear motors

### SINAMICS S120

- Control Units
- Power Modules (blocksize, chassis)
- Line Modules (booksize, chassis)
- Line-side components
- Motor Modules (booksize, chassis)
- DC link components
- Additional system components
- Load-side power components
- Encoder system connection
- MOTION-CONNECT connection system

**SIMOTION**

- SIMOTION D
- SIMOTION C

**SINUMERIK solution line**

- Control systems
- Operator components for CNC controls

## How up-to-date are the dimension drawings

**Note**

Siemens AG reserves the right to change the dimensions of the motors as part of mechanical design improvements without prior notice. This means that dimensions drawings can go out-of-date. Up-to-date dimension drawings can be requested at no charge from your local SIEMENS representative.

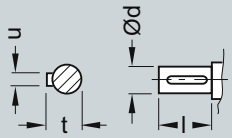
## 4.3.1 1FK7 motors

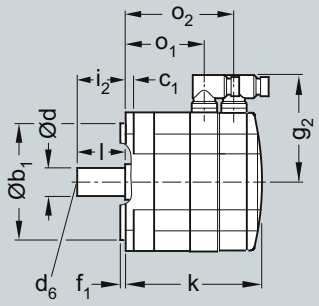
| For motor | | Dimensions in mm (inches) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Shaft extension DE | | | | |
| Shaft height | Type | DIN IEC | $b_1$ N | $c_1$ LA | $e_1$ M | f AB | $f_1$ T | $g_2$ – | $i_2$ – | $s_2$ S | **d** **D** | $d_6$ – | l E | t GA | u F |
| **1FK7 Compact** | | | | | | | | | | | | | | | |
| 20 | 1FK701 | | 30 (1.18) | 7 (0.28) | 46 (1.81) | 40 (1.57) | 2,5 (0.10) | 66 (2.60) | 18 (0.71) | 4,5 (0.18) | **8** **(0.31)** | – | 18 (0.71) | 8,8 (0.35) | 2 (0.08) |
| 28 | 1FK702 | | 40 (1.57) | 10 (0.39) | 63 (2.48) | 55 (2.17) | 2,5 (0.10) | 75 (2.95) | 20 (0.79) | 5,4 (0.21) | **9** **(0.35)** | M3 | 20 (0.79) | 10,2 (0.40) | 3 (0.12) |

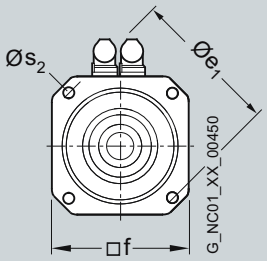
| | | Encoder systems: Resolver Absolute encoder AM16S/R / AM15DQ | | | | | | Encoder systems: Incremental encoder IC2048S/R / IC22DQ Absolute encoder AM2048S/R / AM22DQ AM512S/R / AM20DQ AM32S/R / AM16DQ | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | without holding brake | | | with holding brake | | | without holding brake | | | with holding brake | | |
| Shaft height | Type | k LB | $o_1$ – | $o_2$ – | k LB | $o_1$ – | $o_2$ – | k LB | $o_1$ – | $o_2$ – | k LB | $o_1$ – | $o_2$ – |
| **1FK7 Compact** | | | | | | | | | | | | | |
| 20 | 1FK7011 | 140 (5.51) | 89 (3.50) | 118 (4.65) | 140 (5.51) | 89 (3.50) | 118 (4.65) | 155 (6.10) | 89 (3.50) | 118 (4.65) | 155 (6.10) | 89 (3.50) | 118 (4.65) |
| | 1FK7015 | 165 (6.50) | 114 (4.49) | 143 (5.63) | 165 (6.50) | 114 (4.49) | 143 (5.63) | 180 (7.09) | 114 (4.49) | 143 (5.63) | 180 (7.09) | 114 (4.49) | 143 (5.63) |
| 28 | 1FK7022 | 153 (6.02) | 95 (3.74) | 128 (5.04) | 175 (6.89) | 95 (3.74) | 150 (5.91) | 178 (7.01) | 95 (3.74) | 128 (5.04) | 200 (7.87) | 95 (3.74) | 150 (5.91) |

1FK701
1FK702

Shaft design
with fitted key



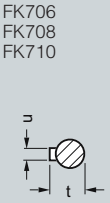



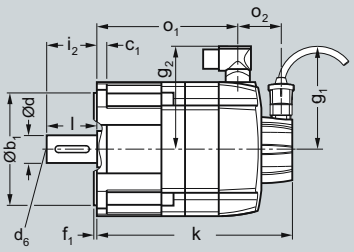
| Shaft height | Type | DQI-Encoder with DRIVE-CLiQ interface (without resolver) $g_1$ – | $g_2$ – | $o_2$ – | without brake k LB | without brake $o_1$ – | with brake k LB | with brake $o_1$ – | Encoder systems without DRIVE-CLiQ interface (without resolver) $g_1$ – | $g_2$ – | $o_2$ – | without brake k LB | without brake $o_1$ – | with brake k LB | with brake $o_1$ – |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1FK7 Compact** | | | | | | | | | | | | | | | |
| 36 | 1FK7032-2A | 104,5 (4.11) | 78 (3.07) | 50 (1.97) | 173 (6.81) | 111 (4.37) | 200 (7.87) | 138 (5.43) | 78 (3.07) | 78 (3.07) | 47 (1.85) | 173 (6.81) | 111 (4.37) | 200 (7.87) | 138 (5.43) |
| | 1FK7034-2A | | | | 198 (7.80) | 136 (5.35) | 225 (8.86) | 163 (6.42) | | | | 198 (7.80) | 136 (5.35) | 225 (8.86) | 163 (6.42) |
| 48 | 1FK7040-2A | 104,5 (4.11) | 90 (3.54) | 50 (1.97) | 147 (5.79) | 85 (3.35) | 179 (7.05) | 117 (4.61) | 94 (3.70) | 90 (3.54) | 52 (2.05) | 152 (5.98) | 85 (3.35) | 184 (7.24) | 117 (4.61) |
| | 1FK7042-2A | | | | 174 (6.85) | 112 (4.41) | 206 (8.11) | 144 (5.67) | | | | 179 (7.05) | 112 (4.41) | 211 (8.31) | 144 (5.67) |
| 63 | 1FK7060-2A | 104,5 (4.11) | 104 (4.09) | 50 (1.97) | 168 (6.61) | 106 (4.17) | 203 (7.99) | 141 (5.55) | 102 (4.02) | 104 (4.09) | 52 (2.05) | 173 (6.81) | 106 (4.17) | 208 (8.19) | 141 (5.55) |
| | 1FK7062-2A | | | | 190 (7.48) | 128 (5.04) | 226 (8.90) | 163 (6.42) | | | | 195 (7.68) | 128 (5.04) | 231 (9.09) | 163 (6.42) |
| | 1FK7063-2A | | | | 213 (8.39) | 151 (5.94) | 248 (9.76) | 186 (7.32) | | | | 218 (8.58) | 151 (5.94) | 253 (9.96) | 186 (7.32) |
| 80 | 1FK7080-2A | 104,5 (4.11) | 119 (4.69) | 48 (1.89) | 171 (6.73) | 111 (4.37) | 223 (8.78) | 163 (6.42) | 94 (3.70) | 119 (4.69) | 50 (1.97) | 176 (6.93) | 111 (4.37) | 228 (8.98) | 163 (6.42) |
| | 1FK7081-2A | | | | 190 (7.48) | 130 (5.12) | 242 (9.53) | 182 (7.17) | | | | 195 (7.68) | 130 (5.12) | 247 (9.72) | 182 (7.17) |
| | 1FK7083-2A | | | | 209 (8.23) | 149 (5.87) | 261 (10.28) | 201 (7.91) | | | | 214 (8.43) | 149 (5.87) | 266 (10.47) | 201 (7.91) |
| | 1FK7084-2A | | | | 229 (9,02) | 168 (6,61) | 281 (11.06) | 221 (8.70) | | | | 234 (9.21) | 168 (6.61) | 286 (11.26) | 221 (8.70) |
| 100 | 1FK7100-2A | 104,5 (4.11) | 137 (5.39) | 53 (2.09) | 183 (7.20) | 118 (4.65) | 220 (8.66) | 170 (6.69) | 94 (3.70) | 137 (5.39) | 55 (2.17) | 188 (7.40) | 118 (4.65) | 225 (8.86) | 170 (6.69) |
| | 1FK7101-2A | | 158 (6.22) | | 209 (8.23) | 144 (5.67) | 261 (10.28) | 196 (7.72) | | 158 (6.22) | | 214 (8.43) | 144 (5.67) | 266 (10.47) | 196 (7.72) |
| | 1FK7103-2A | | | | 235 (9.25) | 170 (6.69) | 287 (11.30) | 222 (8.74) | | | | 240 (9.45) | 170 (6.69) | 292 (11.50) | 222 (8.74) |
| | 1FK7105-2A | | | | 287 (11.30) | 222 (8.74) | 339 (13.35) | 274 (10.79) | | | | 292 (11.50) | 222 (8.74) | 344 (13.54) | 274 (10.79) |
| **1FK7 High Inertia** | | | | | | | | | | | | | | | |
| 48 | 1FK7042-3B | 104,5 (4.11) | 90 (3.54) | 50 (1.97) | 187 (7.36) | 125 (4.92) | 219 (8.62) | 157 (6.18) | 94 (3.70) | 90 (3.54) | 52 (2.05) | 192 (7.56) | 125 (4.92) | 224 (8.82) | 157 (6.18) |
| 63 | 1FK7060-3B | 104,5 (4.11) | 104 (4.09) | 50 (1.97) | 182 (7.17) | 120 (4.72) | 217 (8.54) | 155 (6.10) | 102 (4.02) | 104 (4.09) | 52 (2.05) | 187 (7.36) | 120 (4.72) | 222 (8.74) | 155 (6.10) |
| | 1FK7062-3B | | | | 216 (8.50) | 153 (6.02) | 251 (9.88) | 189 (7.44) | | | | 221 (8.70) | 153 (6.02) | 256 (10.08) | 189 (7.44) |
| 80 | 1FK7081-3B | 104,5 (4.11) | 119 (4.69) | 48 (1.89) | 211 (8.31) | 151 (5.94) | 264 (10.39) | 203 (7.99) | 94 (3.70) | 119 (4.69) | 50 (1.97) | 216 (8.50) | 151 (5.94) | 269 (10.59) | 203 (7.99) |
| | 1FK7084-3B | | | | 270 (10.63) | 209 (8.23) | 322 (12.68) | 262 (10.31) | | | | 275 (10.83) | 209 (8.23) | 327 (12.87) | 262 (10.31) |
| **1FK7 High Dynamic** | | | | | | | | | | | | | | | |
| 36 | 1FK7033-4C | 104,5 (4.11) | 78 (3.07) | 50 (1.97) | 183 (7.20) | 121 (4.76) | 210 (8.27) | 148 (5.83) | 78 (3.07) | 78 (3.07) | 47 (1.85) | 183 (7.20) | 121 (4.76) | 210 (8.27) | 148 (5.83) |
| 48 | 1FK7043-4C | 104,5 (4.11) | 90 (3.54) | 56 (2.20) | 200 (7.87) | 132 (5.20) | 232 (9.13) | 164 (6.46) | 94 (3.70) | 90 (3.54) | 58 (2.28) | 205 (8.07) | 132 (5.20) | 237 (9.33) | 164 (6.46) |
| | 1FK7044-4C | | | | 225 (8.86) | 157 (6.18) | 257 (10.12) | 189 (7.44) | | | | 230 (9.06) | 157 (6.18) | 262 (10.31) | 189 (7.44) |
| 63 | 1FK7061-4C | 104,5 (4.11) | 104 (4.09) | 50 (1.97) | 203 (7.99) | 141 (5.55) | 238 (9.37) | 176 (6.93) | 102 (4.02) | 104 (4.09) | 52 (2.05) | 208 (8.19) | 141 (5.55) | 243 (9.57) | 176 (6.93) |
| | 1FK7064-4C | | | | 267 (10.51) | 205 (8.07) | 302 (11.89) | 240 (9.45) | | | | 272 (10.71) | 205 (8.07) | 307 (12.09) | 240 (9.45) |
| 80 | 1FK708.-4CC | 104,5 (4.11) | 119 (4.69) | 48 (1.89) | 257 (10.12) | 197 (7.76) | 309 (12.17) | 249 (9.80) | 94 (3.70) | 119 (4.69) | 50 (1.97) | 262 (10.31) | 197 (7.76) | 314 (12.36) | 249 (9.80) |
| | 1FK708.-4CF | | 139 (5.47) | | | | | | | 139 (5.47) | | | | | |

| For motor | | Dimensions in mm (inches) | | | | | | | | | Shaft extension DE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shaft height | Type | DIN IEC | $a_1$ P | $b_1$ N | $c_1$ LA | $e_1$ M | f AB | $f_1$ T | $i_2$ – | $s_2$ S | **d** **D** | $d_6$ – | l E | t GA | u F |
| **1FK7 Compact/High Dynamic/High Inertia** | | | | | | | | | | | | | | | |
| 36 | 1FK703 | | 90 (3.54) | 60 (2.36) | 8 (0.31) | 75 (2.95) | 72 (2.83) | 3 (0.12) | 30 (1.18) | 6,5 (0.26) | **14** **(0.55)** | M5 | 30 (1.18) | 16 (0.63) | 5 (0.20) |
| 48 | 1FK704 | | 120 (4.72) | 80 (3.15) | 10 (0.39) | 100 (3.94) | 96 (3.78) | 3 (0.12) | 40 (1.57) | 6,5 (0.26) | **19** **(0.75)** | M6 | 40 (1.57) | 21,5 (0.85) | 6 (0.24) |
| 63 | 1FK706 | | 155 (6.10) | 110 (4.33) | 10 (0.39) | 130 (5.12) | 126 (4.96) | 3,5 (0.14) | 50 (1.97) | 9 (0.35) | **24** **(0.94)** | M8 | 50 (1.97) | 27 (1.06) | 8 (0.31) |
| 80 | 1FK708 | | 194 (7.64) | 130 (5.12) | 11,5 (0.45) | 165 (6.50) | 155 (6.10) | 3,5 (0.14) | 58 (2.28) | 11 (0.43) | **32** **(1.26)** | M12 | 58 (2.28) | 35 (1.38) | 10 (0.39) |
| 100 | 1FK710 | | 245 (9.65) | 180 (7.09) | 13 (0.51) | 215 (8.46) | 192 (7.56) | 4 (0.16) | 80 (3.15) | 14 (0.55) | **38** **(1.50)** | M12 | 80 (3.15) | 41 (1.61) | 10 (0.39) |

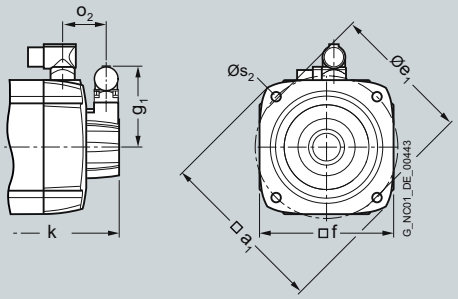
1FK703
1FK704
1FK706
1FK708
1FK710




Encoder systems
with DRIVE-CLiQ interface




Encoder systems
without DRIVE-CLiQ interface

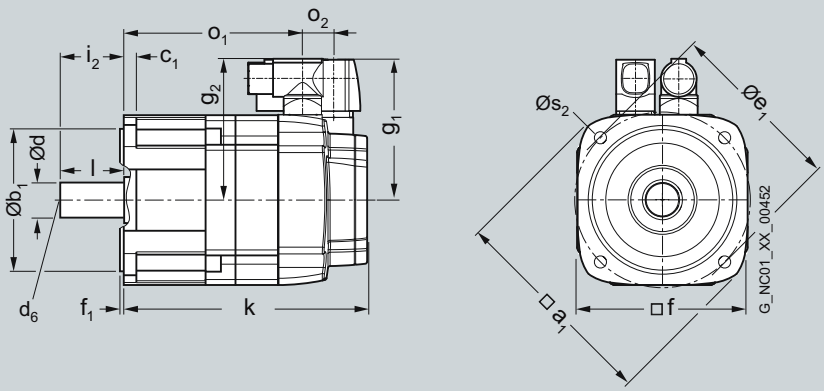


| Shaft height | Type | Resolver with/without DRIVE-CLiQ interface | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | without bake | | with brake | |
| | | $g_1$ – | $g_2$ – | $o_2$ – | k LB | $o_1$ – | k LB | $o_1$ – |
| **1FK7 Compact** | | | | | | | | |
| 36 | 1FK7032-2A | 80 (3.15) | 80 (3.15) | 15 (0.59) | 153 (6.02) | 117 (4.61) | 180 (7.09) | 144 (5.67) |
| | 1FK7034-2A | | | | 178 (7.01) | 142 (5.59) | 205 (8.07) | 169 (6.65) |
| 48 | 1FK7040-2A | 90 (3.54) | 90 (3.54) | 23 (0.91) | 132 (5.20) | 85 (3.35) | 164 (6.46) | 117 (4.61) |
| | 1FK7042-2A | | | | 160 (6.30) | 112 (4.41) | 192 (7.56) | 144 (5.67) |
| 63 | 1FK7060-2A | 103 (4.06) | 104 (4.09) | 23 (0.91) | 153 (6.02) | 106 (4.17) | 189 (7.44) | 141 (5.55) |
| | 1FK7062-2A | | | | 176 (6.93) | 128 (5.04) | 211 (8.31) | 163 (6.42) |
| | 1FK7063-2A | | | | 198 (7.80) | 151 (5.94) | 234 (9.21) | 186 (7.32) |
| 80 | 1FK7080-2A | 118 (4.65) | 119 (4.69) | 21 (0.83) | 157 (6.18) | 111 (4.37) | 209 (8.23) | 163 (6.42) |
| | 1FK7081-2A | | | | 176 (6.93) | 130 (5.12) | 228 (8.98) | 182 (7.17) |
| | 1FK7083-2A | | | | 195 (7.68) | 149 (5.87) | 247 (9.72) | 201 (7.91) |
| | 1FK7084-2A | | | | 214 (8.43) | 168 (6.61) | 266 (10.47) | 221 (8.70) |
| 100 | 1FK7100-2A | 136 (5.35) | 137 (5.39) | 26 (1.02) | 169 (6.65) | 118 (4.65) | 206 (8.11) | 155 (6.10) |
| | 1FK7101-2A | | | | 195 (7.68) | 144 (5.67) | 247 (9.72) | 196 (7.72) |
| | 1FK7103-2A | | | | 221 (8.70) | 170 (6.69) | 273 (10.75) | 222 (8.74) |
| | 1FK7105-2A | | | | 273 (10.75) | 222 (8.74) | 325 (12.80) | 274 (10.79) |
| **1FK7 High Dynamic** | | | | | | | | |
| 36 | 1FK7033-4C | 81 (3.19) | 80 (3.15) | 15 (0.59) | 163 (6.42) | 127 (5.00) | 190 (7.48) | 154 (6.06) |
| 48 | 1FK7043-4C | 90 (3.54) | 90 (3.54) | 23 (0.9) | 186 (7.32) | 138 (5.43) | 218 (8.58) | 170 (6.69) |
| | 1FK7044-4C | | | | 211 (8.31) | 163 (6.42) | 243 (9.57) | 195 (7.68) |
| 63 | 1FK7061-4C | 103 (4.06) | 104 (4,09) | 23 (0.9) | 188 (7.40) | 141 (5.55) | 224 (8.82) | 176 (6.93) |
| | 1FK7064-4C | | | | 252 (9.92) | 205 (8.07) | 288 (11.34) | 240 (9.45) |
| 80 | 1FK708.-4CC | 118 (4.65) | 119 (4.69) | 21 (0.83) | 243 (9.57) | 197 (7.76) | 295 (11.61) | 250 (9.84) |
| | 1FK708.-4C | | | | | | | |

| For motor | | Dimensions in mm (inches) | | | | | | | | | Shaft extension DE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shaft height | Type | DIN IEC | $a_1$ P | $b_1$ N | $c_1$ LA | $e_1$ M | f AB | $f_1$ T | $i_2$ – | $s_2$ S | **d** **D** | $d_6$ – | l E | t GA | u F |
| **1FK7 Compact/High Dynamic** | | | | | | | | | | | | | | | |
| 36 | 1FK703 | | 90 (3.54) | 60 (2.36) | 8 (0.31) | 75 (2.95) | 72 (2.83) | 3 (0.12) | 30 (1.18) | 6,5 (0.26) | **14** **(0.55)** | M5 | 30 (1.18) | 16 (0.63) | 5 (0.20) |
| 48 | 1FK704 | | 120 (4.72) | 80 (3.15) | 10 (0.39) | 100 (3.94) | 96 (3.78) | 3 (0.12) | 40 (1.57) | 6,5 (0.26) | **19** **(0.75)** | M6 | 40 (1.57) | 21,5 (0.85) | 6 (0.24) |
| 63 | 1FK706 | | 155 (6.10) | 110 (4.33) | 10 (0.39) | 130 (5.12) | 126 (4.96) | 3,5 (0.14) | 50 (1.97) | 9 (0.35) | **24** **(0.94)** | M8 | 50 (1.97) | 27 (1.06) | 8 (0.31) |
| 80 | 1FK708 | | 194 (7.64) | 130 (5.12) | 11,5 (0.45) | 165 (6.50) | 155 (6.10) | 3,5 (0.14) | 58 (2.28) | 11 (0.43) | **32** **(1.26)** | M12 | 58 (2.28) | 35 (1.38) | 10 (0.39) |
| 100 | 1FK710 | | 245 (9.65) | 180 (7.09) | 13 (0.51) | 215 (8.46) | 192 (7.56) | 4 (0.16) | 80 (3.15) | 14 (0.55) | **38** **(1.50)** | M12 | 80 (3.15) | 41 (1.61) | 10 (0.39) |

1FK703
1FK704
1FK706
1FK708
1FK710

Encodersystem with resolver



## 1FK7 motors with planetary gearboxes, series SP+

SP+ planetary gearbox

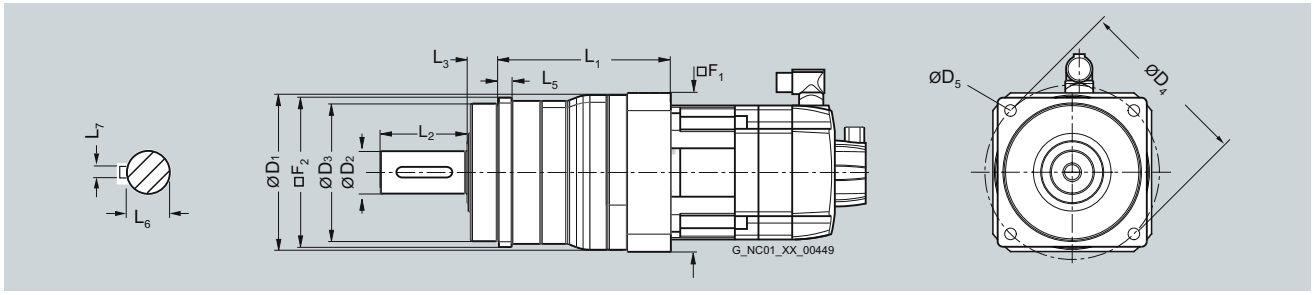
Dimension in mm (inches)

| Type | Motor Type | SP+ planetary gearbox single-stage **-MF1** D1 | F1 | L1 | SP+ planetary gearbox two-stage **-MF2** D1 | F1 | L1 |
|---|---|---|---|---|---|---|---|
| **SP060S-** | 1FT702/1FK702 | 68 (2.68) | 70 (2.76) | 89,3 (3.52) | 70 (2.76) | 60 (2.36) | 108 (4.25) |
| | 1FT703/1FK703 | 68 (2.68) | 70 (2.76) | 94 (3.70) | 68 (2.68) | 70 (2.76) | 116 (4.57) |
| | 1FT704/1FK704 | 91 (3.58) | 90 (3.54) | 106 (4.17) | – | – | – |
| **SP075S-** | 1FT702/1FK702 | 91 (3.58) | 90 (3.54) | 107,8 (4.24) | 95 (3.74) | 70 (2.76) | 119 (4.69) |
| | 1FT703/1FK703 | 91 (3.58) | 90 (3.54) | 107,8 (4.24) | 95 (3.74) | 70 (2.76) | 123,4 (4.86) |
| | 1FT704/1FK704 | 91 (3.58) | 90 (3.54) | 111,5 (4.39) | 91 (3.58) | 90 (3.54) | 135,6 (5.34) |
| **SP100S-** | 1FT702/1FK702 | – | – | – | 118 (4.65) | 90 (3.54) | 142,3 (5.60) |
| | 1FT703/1FK703 | – | – | – | 118 (4.65) | 90 (3.54) | 142,3 (5.60) |
| | 1FT704/1FK704 | 115 (4.53) | 120 (4.72) | 122 (4.80) | 118 (4.65) | 90 (3.54) | 146 (5.75) |
| | 1FT704/1FK706 | 115 (4.53) | 120 (4.72) | 129 (5.08) | 115 (4.53) | 120 (4.72) | 164 (6.46) |
| **SP140S-** | 1FT704/1FK704 | – | – | – | 152 (5.98) | 120 (4.72) | 186,3 (7.33) |
| | 1FT706/1FK706 | 146 (5.75) | 150 (5.91) | 162,3 (6.39) | 152 (5.98) | 120 (4.72) | 193,3 (7.61) |
| | 1FT708/1FK708 | 146 (5.75) | 150 (5.91) | 171,3 (6.74) | 146 (5.75) | 150 (5.91) | 220 (8.66) |
| | 1FT710/1FK710 | 146 (5.75) | 190 (7.48) | 171,3 (6.74) | – | – | – |
| **SP180S-** | 1FT706/1FK706 | – | – | – | 212 (8.35) | 150 (5.91) | 234 (9.21) |
| | 1FT708/1FK708 | 207 (8.15) | 210 (8.27) | 198 (7.80) | 212 (8.35) | 150 (5.91) | 242,9 (9.56) |
| | 1FT710/1FK710 | 207 (8.15) | 210 (8.27) | 203,5 (8.01) | 212 (8.35) | 190 (7.48) | 242,9 (9.56) |
| **SP210S-** | 1FT708/1FK708 | – | – | – | 215 (8.46) | 210 (8.27) | 272 (10.71) |
| | 1FT710/1FK710 | 215 (8.46) | 190 (7.48) | 242 (9.53) | 215 (8.46) | 210 (8.27) | 272 (10.71) |
| **SP240S-** | 1FT708/1FK708 | – | – | – | 245 (9.65) | 210 (8.27) | 297,5 (11.71) |
| | 1FT710/1FK710 | 245 (9.65) | 240 (9.45) | 273 (10.75) | 245 (9.65) | 210 (8.27) | 297,5 (11.71) |

SP+ planetary gearbox

Dimension in mm (inches)

| Type | D2 | D3 | D4 | D5 | F2 | L2 | L3 | L5 | L6 | L7 |
|---|---|---|---|---|---|---|---|---|---|---|
| **1FT7/1FK7 motor with SP+ planetary gearbox, single-stage/two-stage** | | | | | | | | | | |
| SP060S-MF1/-MF2 | 16 (0.63) | 60 (2.36) | 68 (2.68) | 5,5 (0.22) | 62 (2.48) | 28 (1.10) | 20 (0.79) | 6 (0.24) | 18 (0.71) | 5 (0.20) |
| SP075S-MF1/-MF2 | 22 (0.87) | 70 (2.76) | 85 (3.35) | 6,6 (0.26) | 83 (3.27) | 36 (1.42) | 20 (0.79) | 7 (0.28) | 24,5 (0.96) | 6 (0.24) |
| SP100S-MF1/-MF2 | 32 (1.26) | 90 (3.54) | 120 (4.72) | 9 (0.35) | 112 (4.41) | 58 (2.28) | 30 (1.18) | 10 (0.39) | 35 (1.38) | 10 (0.39) |
| SP140S-MF1/-MF2 | 40 (1.57) | 130 (5.12) | 165 (6.50) | 11 (0.43) | 140 (5.51) | 82 (3.23) | 30 (1.18) | 12 (0.47) | 43 (1.69) | 12 (0.47) |
| SP180S-MF1/-MF2 | 55 (2.17) | 160 (6.30) | 215 (8.46) | 13,5 (0.53) | 168,5 (6.63) | 82 (3.23) | 30 (1.18) | 15 (0.59) | 59 (2.32) | 16 (0.63) |
| SP210S-MF1/-MF2 | 75 (2.95) | 180 (7.09) | 250 (9.84) | 17 (0.67) | 168,5 (6.63) | 105 (4.13) | 38 (1.50) | 17 (0.67) | 79,5 (3.13) | 20 (0.79) |
| SP240S-MF1/-MF2 | 85 (3.35) | 200 (7.87) | 290 (11.42) | 17 (0.67) | 168,5 (6.63) | 130 (5.12) | 40 (1.57) | 20 (0.79) | 90 (3.54) | 22 (0.87) |



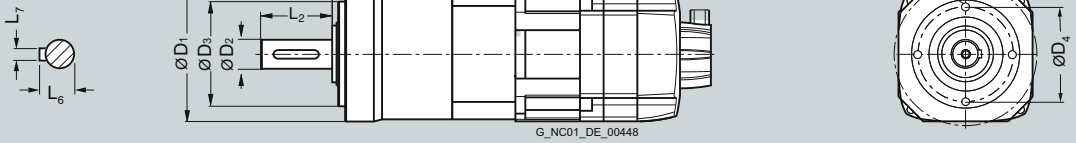
## 1FK7 motors with planetary gearbox, series LP+

LP+ planetary gearbox

Dimension in mm (inches)

| Type | Motor Type | L1 | L2 | L3 | L5 | L6 | L7 | D1 | D2 | D3 | D4 | D5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1FK7 with LP+ planetary gearbox** | | | | | | | | | | | | |
| LP050-MO1 | 1FK702 | 63 (2.48) | 18 (0.71) | 6,5 (0.26) | 8 (0.31) | 13,5 (0.53) | 4 (0.16) | 50 (1.97) | 12 (0.47) | 35 (1.38) | 44 (1.73) | M4 |
| LP070-MO1 | 1FK702 | 83 (3.27) | 28 (1.10) | 8 (0.31) | 10 (0.39) | 18 (0.71) | 5 (0.20) | 70 (2.76) | 16 (0.63) | 52 (2.05) | 62 (2.44) | M5 |
| | 1FK703 | 90 (3.54) | | | | | | | | | | |
| LP090-MO1 | 1FK704 | 112 (4.41) | 36 (1.42) | 10 (0.39) | 12 (0.47) | 24,5 (0.96) | 6 (0.24) | 90 (3.54) | 22 (0.87) | 68 (2.68) | 80 (3.15) | M6 |
| | 1FK706 | 122 (4.80) | | | | | | | | | | |
| | 1FK708 | 132 (5.20) | | | | | | | | | | |
| LP120-MO1 | 1FK706 | 140 (5.51) | 58 (2.28) | 12 (0.47) | 16 (0.63) | 35 (1.38) | 10 (0.39) | 120 (4.72) | 32 (1.26) | 90 (3.54) | 108 (4.25) | M8 |
| | 1FK708 | 150 (5.91) | | | | | | | | | | |
| LP155-MO1 | 1FK708 | 168,5 (6.63) | 82 (3.23) | 15 (0.59) | 20 (0.79) | 43 (1.69) | 12 (0.47) | 155 (6.10) | 40 (1.57) | 120 (4.72) | 140 (5.51) | M10 |
| | 1FK710 | 188,5 (7.42) | | | | | | | | | | |

1FK703
1FK704
1FK706
1FK708
1FK710



# Motor components

# 5

## 5.1 Thermal motor protection

A temperature-dependent resistor is integrated as temperature sensor to monitor the motor temperature.

Table 5- 1 Features and technical data

| | |
|---|---|
| Type | KTY 84 (PTC thermistor) |
| Resistance when cold (20°C) | Approx. 580 Ω |
| Resistance when hot (100°C) | Approx. 1000 Ω |
| Connection | via signal cable |

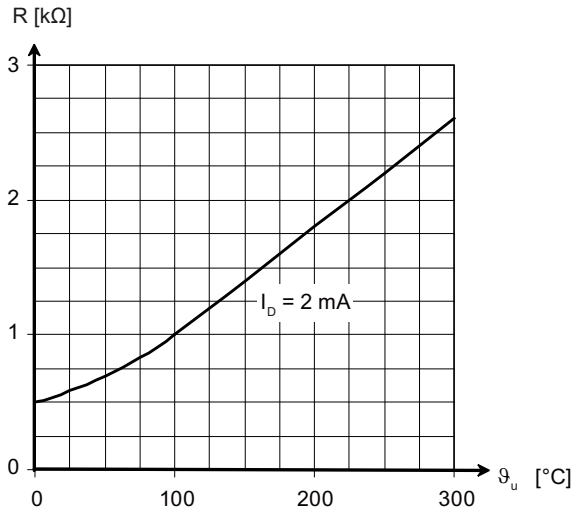



Figure 5-1 Resistance characteristic

The evaluation of the winding temperature is carried out in the converter. When a fault occurs, an appropriate message is output at the drive converter. When the motor temperature increases, a message "Alarm motor overtemperature" is output; this must be externally evaluated. If this signal is ignored, the drive converter shuts down with the appropriate fault message after a preset time period or when the motor limiting temperature or the shutdown temperature is exceeded.

**⚠ CAUTION**

The integrated temperature sensor only protects the synchronous motors to a certain extent against overloads:

1FK701 to 1FK704: up to 2 • $I_{0\,(60\,K)}$ and speed ≠ 0
1FK706 to 1FK710: up to 4 • $I_{0\,(60\,K)}$ and speed ≠ 0

For load applications that are critical from a thermal perspective - e.g. overload when the motor is stationary or an overload of $M_{max}$ longer than 4 s, adequate protection is no longer available. The "thermal motor model $i^2t$ monitoring" function must be activated in the converter.

The temperature sensor is part of a SELV circuit, which can be destroyed if high voltage is applied. The temperature sensor is designed so that the DIN/EN requirement for "protective separation" is fulfilled.

# 5.2 Encoder (option)

## 5.2.1 Encoder selection

### Encoder systems with DRIVE-CLiQ interface

For motors with an integrated DRIVE-CLiQ interface, the analog encoder signal is internally converted to a digital signal. No further conversion of the encoder signal in the drive system is necessary. Motors with DRIVE-CLiQ interface simplify commissioning and diagnostics, as the motor and encoder system are identified automatically.

### Encoder systems without a DRIVE-CLiQ interface

For motors without an integrated DRIVE-CLiQ interface, the analog encoder signal is first converted into a digital signal in the drive system. For these motors as well as external encoders, the encoder signals must be connected to SINAMICS S110 / S120 via Sensor Modules.

Table 5- 2 Encoders for 1FK7 motors

| Without DRIVE-CLiQ | | | With DRIVE-CLiQ | | | Absolute position within a rotation (single-turn) | Absolute position over 4096 revolutions (multi-turn) | Can be used for Safety Integrated Extended Functions |
|---|---|---|---|---|---|---|---|---|
| Encoders | Marking in the MLFB | | Encoders | Marking in the MLFB | | | | |
| - | - | | AS24DQI | B | | Yes | No | Yes |
| - | - | | AM24DQI | C | | Yes | Yes | Yes |
| - | - | | AS20DQI | Q | | Yes | No | Yes |
| - | - | | AM20DQI | R | | Yes | Yes | Yes |
| AM2048S/R | E | | AM22DQ | F | | Yes | Yes | Yes |
| AM512S/R | H | | AM20DQ | L | | Yes | Yes | Yes |
| AM16S/R | J | | AM15DQ | V | | Yes | Yes | No |
| IC2048S/R | A | | IC22DQ | D | | No | No | Yes |
| Resolver p=1 | T | | R14DQ | P | | Yes | No | No |
| Resolver p=3 | S | | R15DQ | U | | No | No | No |
| Resolver p=4 | S | | R15DQ | U | | No | No | No |

Not every encoder is available for every motor frame size

## Replacing an encoder

- General

For 1FK703 to 1FK710 motors, the encoder module (with the exception of resolver) can be simply replaced without requiring encoder adjustment.

The motors concerned can be identified by the 14th position in the order number.

Incremental encoders are referenced every time the system is started.

| NOTICE |
|---|
| Absolute value encoders must be referenced again after the encoder has been replaced. |

- Motors with DRIVE-CLiQ

| NOTICE |
|---|
| **Motor data (electronic rating plate)**<br>You must ensure that the new encoder contains the correct motor data. If it does not, the motor may move in an uncontrolled fashion and cause significant material damage. |

You can purchase a preprogrammed encoder module from the Siemens Service Center by quoting the relevant order number and serial number. If your encoder module is not preprogrammed, it must be programmed with the correct motor data prior to use.

### 5.2.2 Encoder connection for motors with a DRIVE-CLiQ interface

Motors with DRIVE-CLiQ interface have an internal Sensor Module. This includes an electronic rating plate. This simplifies commissioning for the SINAMICS S110 / S120 drive system, since all the motor parameters are set automatically.

**⚠ WARNING**

Encoder modules with a DRIVE-CLiQ interface or Sensor Module contain motor and encoder-specific data as well as an electronic rating plate. This is why it may only be operated on the original motor - and must not be mounted onto other motors or replaced by modules from other motors.

The contacts of the DRIVE-CLiQ interface have direct contact to components that can be damaged/destroyed by electrostatic discharge (ESDs). Neither hands nor tools that could be electrostatically charged should come into contact with the connections.

### 5.2.3 Encoder connection for motors without DRIVE-CLiQ interface

Motors without an integrated DRIVE-CLiQ interface are connected via the 17-pin or 12-pin flange socket (see the section titled "Connection system").

### 5.2.4 Incremental encoders

#### Description

This encoder senses relative movements and does not supply absolute position information. In combination with an evaluation logic, a zero point can be determined using the integrated reference mark, which can be used to calculate the absolute position.

The encoder outputs sine and cosine signals. These can be interpolated using evaluation logic (usually 2048x) and the direction of rotation can be determined. In the version with a DRIVE-CLiQ interface, this evaluation logic is already integrated in the encoder.

#### Function and technical data

- Angular measuring system for commutation
- Speed actual value sensing
- Indirect incremental measuring system for the position control loop
- One zero pulse (reference mark) per revolution

Table 5- 3 Technical data for incremental encoders

| Encoders | Code | Operating voltage | Max. current drain | A-B track: Resolution incremental (sin/cos periods per revolution) | C-D track: Rotor/commutation position (sin/cos periods per revolution) | Angular error |
|---|---|---|---|---|---|---|
| **without DRIVE-CLiQ interface** | | | | | | |
| 1FK701 and 1FK702:<br>Incremental encoder sin/cos 1 Vpp, 2048 S/R with C and D tracks | IC2048S/R | 5 V ±5 % | 140 mA | 2048 S/R (1 Vpp) | 1 S/R (1 Vpp) | ± 80 " |
| 1FK703 to 1FK710:<br>Incremental encoder sin/cos 1 Vpp, 2048 S/R with C and D tracks | | | | | | ± 40 " |
| **with DRIVE-CLiQ interface** | | | | | | |
| 1FK701 and 1FK702:<br>Incremental encoder 22 bit resolution 4.194.304, internal 2048 S/R) + commutation position 11 bit | IC22DQ | 24 V | 180 mA | 4.194.304 (=22 bit) | 2048 (=11 bit) | ± 80 " |
| 1FK703 to 1FK710:<br>Incremental encoder 22 bit resolution 4.194.304, internal 2048 S/R) + commutation position 11 bit | | | | | | ± 40 " |

Mech. speed limit for all incremental encoders: 12000 rpm

Note: The "Single-turn absolute value encoders" are other encoders which can be used as incremental encoders in the SINAMICS drive system.

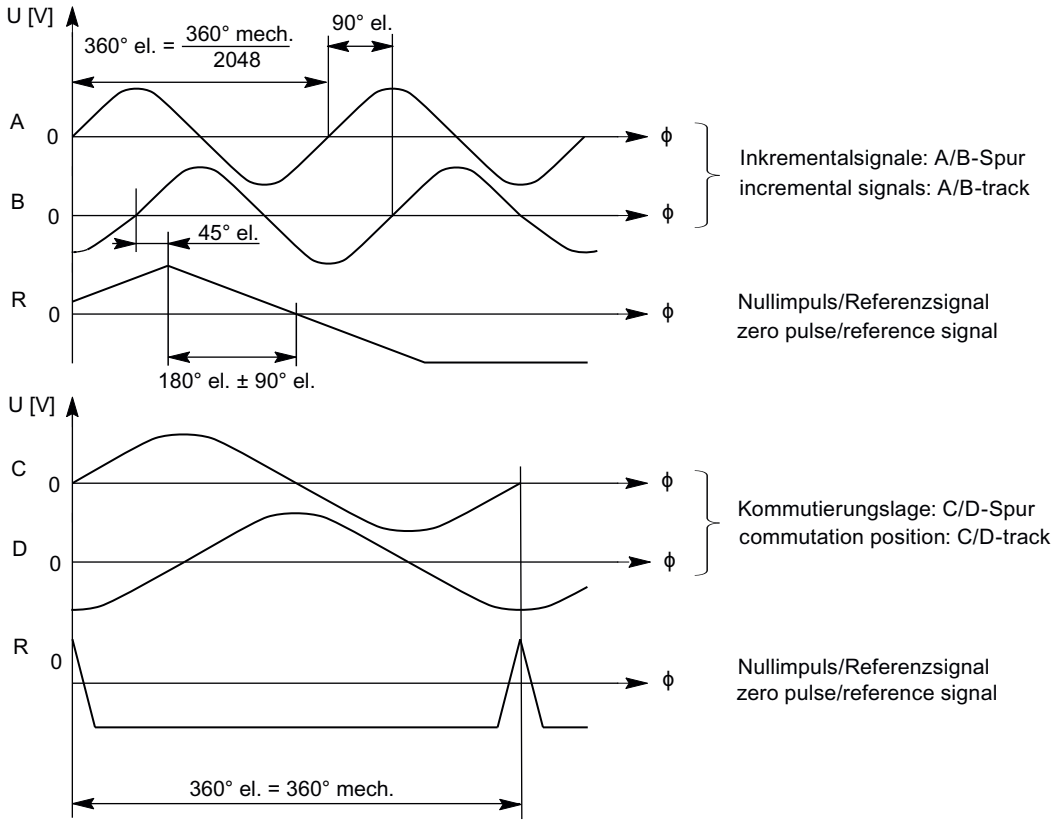



Figure 5-2 Signal sequence and assignment for encoder IC2048S/R without DRIVE-CLiQ interface for a positive direction of rotation

For encoder connection, pin assignment, and cables, refer to the section titled "Connection system".

## 5.2.5 Absolute value encoder

### Description, multiturn absolute encoder

This encoder outputs an absolute angular position between 0° and 360° in the specified resolution. An internal measuring gearbox enables it to differentiate between 4096 rotations. So with a ball screw, for example, the absolute position of the slide can be determined over a long distance.

### Description, absolute value singleturn

This encoder outputs an absolute angular position between 0° and 360° in the specified resolution. In contrast to the multi-turn absolute value encoder, it has no measuring gearbox and can therefore only supply the position value within one revolution. It does not have a traversing range.

## Function and technical data

- Angular measuring system for commutation
- Speed actual value sensing
- Indirect measuring system for absolute position determination within a revolution
- Indirect measuring system for determining the absolute position within a traversing range of 4096 revolutions
- For multi-turn encoders: Indirect measuring system for absolute position determination within a traversing range
- Indirect incremental measuring system for position control loop

Table 5- 4 Technical data, absolute value encoder without DRIVE-CLiQ interface

| Designation | Code | Operating voltage | Max. current drain | Absolute resolution (singleturn) | Traversing -range (multiturn) | A-B track: Resolution incremental (sin/cos periods per revolution) | Angular error |
|---|---|---|---|---|---|---|---|
| **Serial absolute position interface: EnDat 2.1** | | | | | | | |
| Absolute value encoder 2048 S/R, (4096 revolutions, multi-turn, with EnDat interface) | AM2048S/R | 5 V ±5% | 200 mA | 8192 (=13 bit) | 4096 (=12 bit) | 2048 S/R (1 Vpp) | ±40" |
| Absolute value encoder 512 S/R, (4096 revolutions, multi-turn, with EnDat interface) | AM512S/R | 5 V ±5% | 200 mA | 8192 (=13 bit) | 4096 (=12 bit) | 512 S/R (1 Vpp) | ±80" |
| Absolute value encoder 16 S/R, (4096 revolutions, multi-turn, with EnDat interface) | AM16S/R | 5 V ±5% | 210 mA | 8192 (=13 bit) | 4096 (=12 bit) | 16 S/R (1 Vpp) | ±480" |

Table 5- 5 Technical data, absolute value encoder with DRIVE-CLiQ interface

| Designation | Code | Operating voltage | Max. current drain | Absolute resolution (singleturn) | Traversing-range (multiturn) | Angle error |
|---|---|---|---|---|---|---|
| **Serial absolute position interface: DRIVE-CLiQ** | | | | | | |
| Absolute encoder, single-turn, 24 bit | AS24DQI | 24 V | 110 mA | 16.777.216 (=24 bit) | - | ±40" |
| Absolute encoder 24 bit + 12 bit multiturn | AM24DQI | 24 V | 110 mA | 16.777.216 (=24 bit) | 4096 (=12 bit) | ±40" |
| Absolute encoder, single-turn, 20 bit | AS20DQI | 24 V | 110 mA | 1.048.576 (=20 bit) | - | ±120" |
| Absolute encoder 20 bit + 12 bit multiturn | AM20DQI | 24 V | 110 mA | 1.048.576 (=20 bit) | 4096 (=12 bit) | ±120" |
| Absolute encoder 22 bit + 12 bit multiturn | AM22DQ | 24 V | 210 mA | 4.194.304 (=22 bit) | 4096 (=12 bit) | ±40" |

| Designation | Code | Operating voltage | Max. current drain | Absolute resolution (singleturn) | Traversing-range (multiturn) | Angle error |
|---|---|---|---|---|---|---|
| Absolute encoder 20 bit + 12 bit multiturn | AM20DQ | 24 V | 210 mA | 1.048.576 (=20 bit) | 4096 (=12 bit) | ±80" |
| Absolute encoder 15 bit + 12 bit multiturn | AM15DQ | 24 V | 210 mA | 32.768 (=15 bit) | 4096 (=12 bit) | ±480" |

Mech. speed limit for all absolute value encoders: 12000 rpm

Signal sequence and assignment of the A/B track; refer to Fig. "Incremental encoders".

**Note**

**Reduction of the thermal permissible rated torque for 1FK701 and 1FK702**

As a result of the reduced maximum operating temperature of absolute encoders in shaft heights 20 and 28 with respect to incremental encoders, the thermally permissible rated torque of the relevant motors is reduced by 10 %.

## 5.2.6 Resolver

### Description

The number of sine and cosine periods per revolution corresponds to the number of pole pairs of the resolver. In the case of a 2-pole resolver, the evaluation electronics may output an additional zero pulse per encoder revolution. This zero pulse ensures a unique assignment of the position information in relation to an encoder revolution. A 2-pole resolver can therefore be used as a single-turn encoder. 2-pole resolvers can be used for motors with any number of pairs of poles. With multi-pole resolvers, the pole pair numbers of the motor and the resolver are always identical. The resolution is correspondingly higher than for 2-pole resolvers.

### Function and technical data

- Angular measuring system for commutation
- Speed actual value sensing
- Indirect incremental measuring system for the position control loop

Table 5- 6 Technical data, resolver without DRIVE-CLiQ interface

| Designation | Short designation | Excitation voltage rms, excitation frequency | Angle error |
|---|---|---|---|
| 2-pole resolver | Resolver p=1 | 2 ... 8 V,<br>5 ... 10 Khz | ±840° for 1FK703 to 1FK710<br>±1200° for 1FK701 and 1FK702 |
| 6-pole resolver | Resolver p=3 | 2 ... 8 V,<br>5 ... 10 Khz | ±420° |

| Designation | Short designation | Excitation voltage rms, excitation frequency | Angle error |
|---|---|---|---|
| 8-pole resolver | Resolver p=4 | 2 ... 8 V,<br>5 ... 10 Khz | ±240° |
| Calculation of the output signals | Gear ratio $\ddot{U}$ = 0.5 ±5%<br>$U_{sine\ track} = \ddot{U} \times U_{excitation} \times \sin \alpha$<br>$U_{cosine\ track} = \ddot{U} \times U_{excitation} \times \cos \alpha$<br>$\alpha = \arctan (U_{sine\ track} / U_{cosine\ track})$ | | |

Table 5- 7 Technical data, resolver with DRIVE-CLiQ interface

| Designation | Short designation | Supply voltage | Resolution | Angle error |
|---|---|---|---|---|
| Resolver 15 bit, resolution 32768, internal, multi-pole | R15DQ | 24 V | 32.768 (=15 bit) | ±420° for 6-pole<br>±240° for 8-pole |
| Resolver 14 bit resolution 16384, internal, 2-pole | R14DQ | 24 V | 16.384 (=14 bit) | ±840° for 1FK703 to 1FK710<br>±1200° for 1FK701 and 1FK702 |

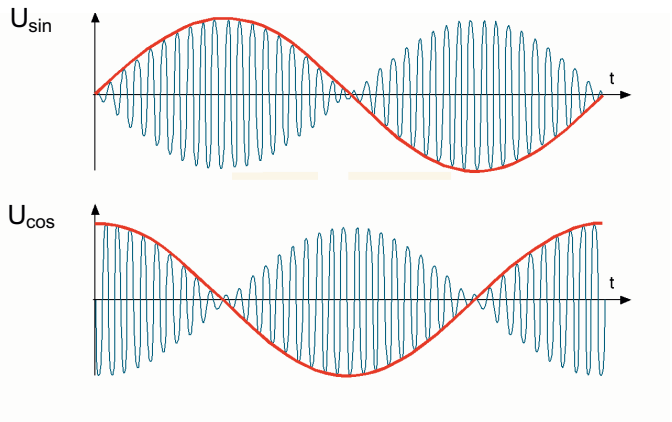



Figure 5-3 Output signals, resolver

# 5.3 Holding brake (option)

## 5.3.1 Properties

- The holding brake is used to clamp the motor shaft when the motor is at a standstill. The holding brake is **not** a working brake that is used to brake a motor that is still rotating.
- Restricted Emergency Stop operation is permissible. Up to 2000 braking operations can be executed with 300% rotor moment of inertia as external moment of inertia from a speed of 3000 RPM without the brake being subject to an inadmissible amount of wear. The specific highest switching work for each emergency braking operation may not be exceeded.
- The rated voltage of the holding brake is 24 VDC.

**⚠ CAUTION**

The rated voltage is 24 VDC +/- 10%. Voltages outside this tolerance bandwidth can result in faults.

Inadmissible wear means that the braking function can no longer be guaranteed! It is not permissible to exceed the above specified Emergency Stop conditions or to repeatedly briefly accelerate the motor against a holding brake that is still closed. This means that the switching times of the brakes and relays must be taken into account in the drive control and enable functions.

**NOTICE**

Motors with or without holding brake cannot be subsequently retrofitted!

Motors with holding brake are longer by the mounted space required (refer to the dimension drawings).

## 5.3.2 Permanent-magnet brake

The magnetic field of the permanent magnets results in a pulling force on the brake armature disk. This means that in the no-current condition, the brake is closed and the motor shaft is held.

When 24 V DC rated voltage is connected to the brake, the solenoid – through which current flows – establishes an opposing field. As a result the force of the permanent magnets is neutralized and the brake opens without residual torque on account of the spring return. The permanent magnet brake has torsion-proof connection to the rotor of the motor. This is the reason that this brake is almost without any play.

| CAUTION |
| --- |
| Motors with integrated permanent-magnet holding brake cannot be subject to axial forces at the shaft end! This applies when installing the system and during operation. |

### 5.3.3 Motor-side connection of the holding brake

In combination with the MOTION CONNECT power cable with integrated brake connection cable, the holding brake in the motor is intended for direct connection to the SINAMICS converter. Since safe electrical isolation from the motor winding is guaranteed for the brake cable in the motor and the power cable is designed as an enforced insulation, no further protection circuits are required in this case.

### 5.3.4 Protective circuitry for the brake

The brake can be activated via an external power supply. Since safe electrical isolation from the motor winding is guaranteed for the brake cable in the motor and the power cable is designed as an enforced insulation, this can also be a PELV (PELV = protective extra low voltage) supply. The relay K1, located between coil and contact, must also have enforced insulation in order to protect the internal logic voltage.

In the case of an external activation, the brake has to be provided with a protective circuit (see Fig. "Suggested circuit for the external power supply"). This protective circuit avoids parasitic voltage peaks and guarantees the switching times indicated (see Table "Technical data of holding brakes used").

The minimum voltage of 24 V DC -10% must be available at the connector on the motor side in order to guarantee that the brake reliably opens. If the maximum voltage of 24 V DC +10% is exceeded, the brake could re-close. The voltage drop along the brake feeder cable must be taken into consideration. The voltage drop ΔV for copper cables can be calculated approximately as follows:

$$_{\Delta}U\ [V] = 0.042 \bullet (l/q) \bullet I_{brake}$$

l = Cable length [m]

q = Brake core cross section [$mm^2$]

$I_{brake}$= Direct current of the brake [A]

| CAUTION |
| --- |
| In order to avoid overvoltages when shutting down and the possible negative impact on the plant or system environment, a protective circuit must be integrated into the feeder cable (see figure below) |

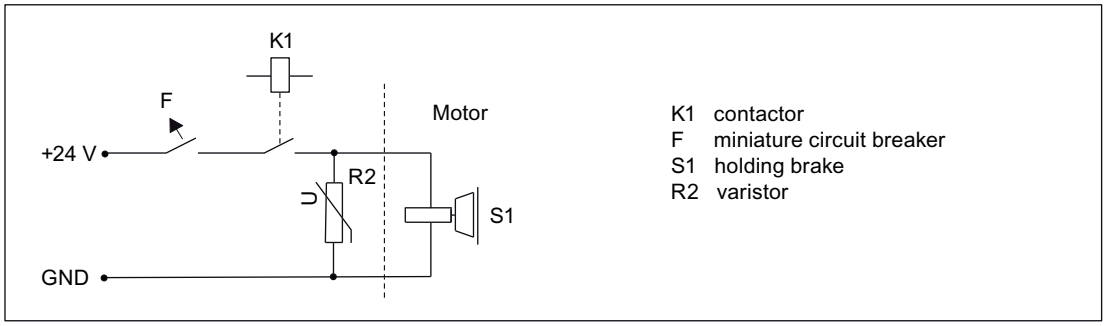



Figure 5-4 Suggested circuit for the external power supply with protective circuit

Table 5- 8 Example: Electronic components for the recommended circuit

| Electr. component | Examples | | |
| --- | --- | --- | --- |
| F | 3RV10 circuit-breaker with current paths connected in series (if required with mounted auxiliary contact 3RV1901 to provide a feedback signal for the drive). | or | Miniature circuit-breaker 5SX21 (if required with mounted auxiliary contact to provide a feedback signal for the drive). |
| K1 | Auxiliary contactor 3RH11 | or | Contactor 3RT10 |
| R2 | Varistor SIOVS14K30 (EPCOS) | | |

## 5.3.5 Technical data of the holding brake

Table 5- 9 Technical data of the holding brakes

| Motor type | Holding torque $M_4$ | Dynamic torque $M_{1m}$ | DC current | Opening time $T_0$ | Closing time With varistor $t_{c1}$ | Highest switched energy |
| --- | --- | --- | --- | --- | --- | --- |
| | [Nm] | [Nm] | [A] | [ms] | [ms] | [J] |
| **Permanent-magnet brakes for 1FK7 Compact, High Dynamic and High Inertia** | | | | | | |
| 1FK701□ | 0.4 | 0.3 | 0.3 | 30 | 20 | 2 |
| 1FK702□ | 1 | 0.7 | 0.3 | 30 | 20 | 8 |

| Motor type | Holding torque $M_4$ | Dynamic torque $M_{1m}$ | DC current | Opening time $T_0$ | Closing time With varistor $t_{c1}$ | Highest switched energy |
|---|---|---|---|---|---|---|
| | [Nm] | [Nm] | [A] | [ms] | [ms] | [J] |
| 1FK703□ | 1.9 | 1 | 0.3 | 50 | 30 | 40 |
| 1FK704□ | 4 | 3 | 0.5 | 70 | 30 | 150 |
| 1FK706□ | 13 | 8.5 | 0.8 | 100 | 50 | 380 |
| 1FK708□ | 22 | 11 | 0.9 | 200 | 60 | 1400 |
| 1FK7100 | 23 | 11 | 1.0 | 300 | 70 | 3380 |
| 1FK7101 | 43 | 25 | 1.0 | 300 | 70 | 3380 |
| 1FK7103 | | | | | | |
| 1FK7105 | | | | | | |

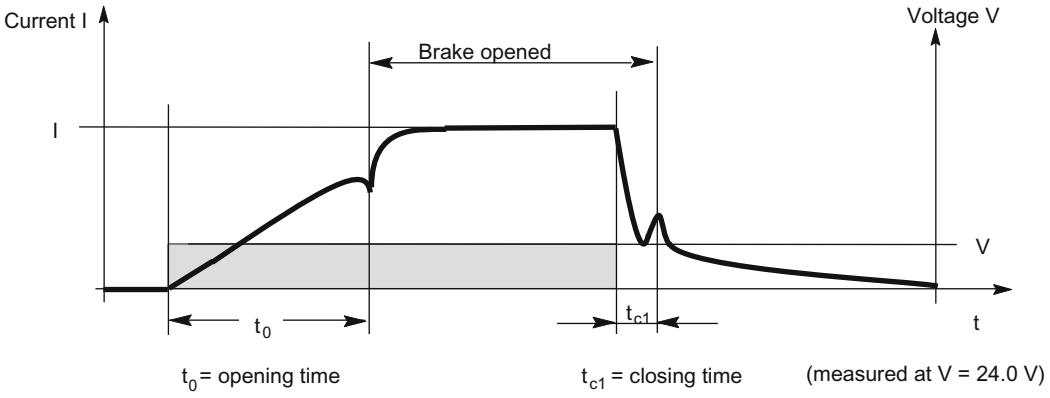



Figure 5-5 Terminology (time) for holding operation

## Holding torque $M_4$

The holding torque $M_4$ is the highest permissible torque with which the closed brake can be loaded in steady-state operation without slip (holding function when motor is stationary).

## Dynamic braking torque $M_{1m}$

The dynamic braking torque $M_{1m}$ is the smallest mean dynamic braking torque that can occur for an Emergency Stop.

## 5.4 Brake resistances (armature short-circuit braking)

For transistor PWM converters, when the DC link voltage values are exceeded or if the electronics fails, then electrical braking is no longer possible. If the drive which is coasting down, can represent a potential hazard, then the motor can be braked by short-circuiting the armature. Armature short-circuit braking should be initiated at the latest by the limit switch in the traversing range of the feed axis.

The friction of the mechanical system and the switching times of the contactors must be taken into account when determining the distance that the feed axis takes to come to a complete stop. In order to avoid mechanical damage, mechanical stops should be located at the end of the absolute traversing range.

For servomotors with integrated holding brake, the holding brake can be simultaneously applied to create an additional braking torque – however, with some delay.

**CAUTION**

The converter pulses must first be canceled and this actually implemented before an armature short-circuit contactor is closed or opened. This prevents the contactor contacts from burning and eroding and destroying the converter.

**⚠ WARNING**

The drive must always be operationally braked using the setpoint input. For additional information, refer to the Converter Configuration Manual.

The optimum braking torque of the servomotor in regenerative operation can be obtained using armature short-circuit with a matching external resistor circuit.

Possible ordering address: http://www.frizlen.com

**Note**

It goes without saying that equivalent products from other manufacturers may be used. Our recommendations should be considered as such. We cannot accept any liability for the quality and properties/features of third-party products.

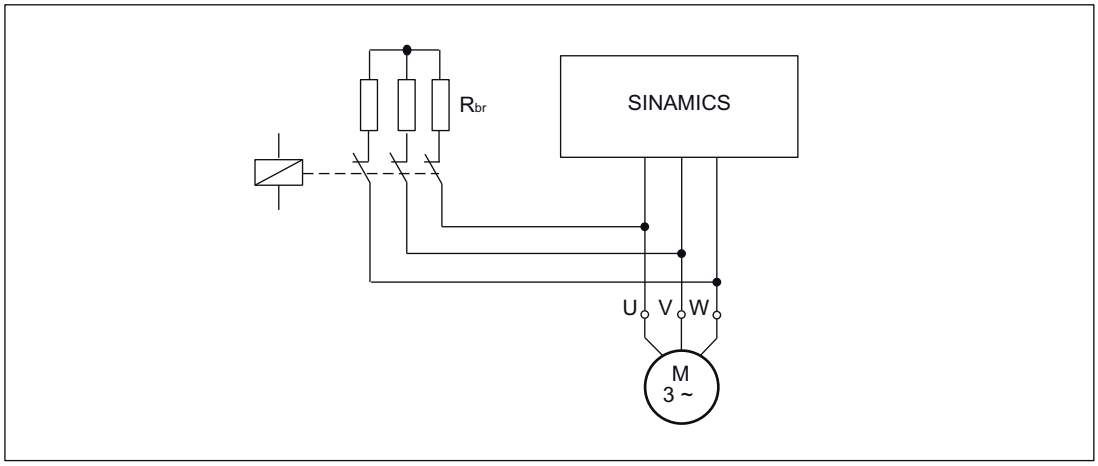



Figure 5-6 Circuit (schematic) with brake resistors

## Rating

The ratings of the resistors must match the particular $I^2t$ load capability. The resistors can be dimensioned so that a surface temperature of 300° C can occur briefly (max. 500 ms). In order to prevent the resistors from being destroyed, braking from the rated speed can occur max. every 2 minutes. Other braking cycles must be specified when ordering the resistors. The external moment of inertia and the intrinsic motor moment of inertia are decisive when dimensioning these resistors.

The kinetic energy must be specified when ordering in order to determine the resistor rating.

$$W = \frac{1}{2} \bullet J \bullet \omega^2$$

$$\omega = \frac{2 \bullet \pi}{60} \bullet n$$

W = kinetic energy [Ws]
J = Moment of inertia [kgm²]
ω = Angular speed [s⁻¹]
n = Speed [rpm]

## Calculating the braking time

Braking time: $t_B = \frac{J_{tot} \bullet n}{9.55 \bullet M_B}$

Moment of inertia: $J_{tot} = J_{mot} + J_{external}$

$t_B$ = Braking time [s]
n = operating speed [rpm]
$M_B$ = average braking torque [Nm]
$J_{tot}$ = moment of inertia [kgm²]
$J_{mot}$ = motor moment of inertia [kgm²]
$J_{external}$ = external moment of inertia [kgm²]

| NOTICE |
| --- |
| When determining the run-on distance, the friction (taken into account as allowance in $M_B$) of the mechanical transmission elements and the switching delay times of the contactors must be taken into consideration. In order to prevent mechanical damage, mechanical end stops should be provided at the end of the absolute traversing range of the machine axes. |

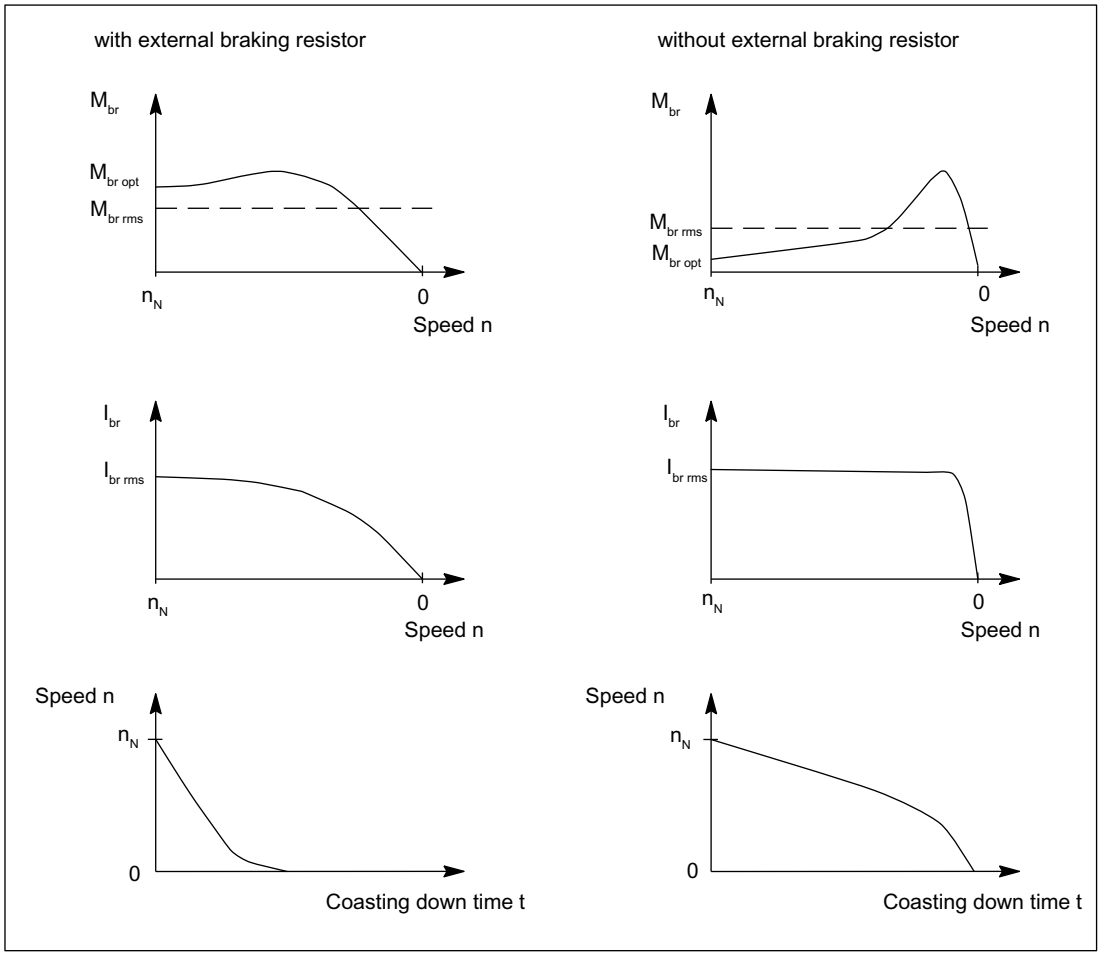



Figure 5-7 Armature short-circuit braking

## 5.4.1 Dimensioning of braking resistors

The correct dimensioning ensures an optimum braking time. The braking torques which are obtained are also listed in the tables. These data apply to braking operations from the rated speed and moment of inertia $J_{external} = J_{mot}$. If the drive is braked from another speed, then the braking time cannot be proportionally reduced. However, longer braking times cannot occur if the speed at the start of braking is less than the rated speed.

The data in the following table is calculated for rated values according to the data sheet. The variance during production as well as iron saturation have not been taken into account here. Higher currents and torques can occur than those calculated as a result of the saturation.

## 1FK7 Compact

Table 5- 10 Dynamic braking for 1FK7 Compact

| Motor type | Braking resistor, external | Average braking torque | | Maximum braking torque | rms braking current | |
|---|---|---|---|---|---|---|
| | | Without external braking resistor | With external braking resistor | | Without external braking resistor | With external braking resistor |
| | $R_{opt}$ [Ω] | $M_{br\ rms}$ [Nm] | $M_{br\ rms}$ ($R_{opt}$) [Nm] | $M_{br\ max}$[Nm] | $I_{br\ rms}$ [A] | $I_{br\ rms}$ ($R_{opt}$)[A] |
| 1FK7011-5AK71 | 2.3 | 0.13 | 0.14 | 0.17 | 2.5 | 2.3 |
| 1FK7015-5AK71 | 6.2 | 0.23 | 0.28 | 0.35 | 2.6 | 2.3 |
| 1FK7022-5AK71 | 4.1 | 1.0 | 1.2 | 1.5 | 5.9 | 5.4 |
| 1FK7032-2AK71 | 11.3 | 1.0 | 1.4 | 1.8 | 4.7 | 4.3 |
| 1FK7034-2AK71 | 11.8 | 1.5 | 2.2 | 2.7 | 5.8 | 5.3 |
| 1FK7040-2AK71 | 17.9 | 0.5 | 1.0 | 1.3 | 3.6 | 3.2 |
| 1FK7042-2AC71 | 18.2 | 1.6 | 2.1 | 2.7 | 2.6 | 2.4 |
| 1FK7042-2AF71 | 17.3 | 1.3 | 2.1 | 2.6 | 3.5 | 3.2 |
| 1FK7042-2AK71 | 9.7 | 0.8 | 2.1 | 2.6 | 7.1 | 6.4 |
| 1FK7060-2AC71 | 10.0 | 2.6 | 4.4 | 5.5 | 5.4 | 4.9 |
| 1FK7060-2AF71 | 8.2 | 2.1 | 4.4 | 5.5 | 7.7 | 6.9 |
| 1FK7060-2AH71 | 6.5 | 1.6 | 4.4 | 5.5 | 11.0 | 9.8 |
| 1FK7062-2AC71 | 15.5 | 3.6 | 6.6 | 8.2 | 5.4 | 4.9 |
| 1FK7062-2AF71 | 8.0 | 2.8 | 6.6 | 8.2 | 9.7 | 8.7 |
| 1FK7062-2AH71 | 5.5 | 2.1 | 6.5 | 8.1 | 14.5 | 13.0 |
| 1FK7063-2AC71 | 6.7 | 4.7 | 8.8 | 10.9 | 9.7 | 8.7 |
| 1FK7063-2AF71 | 4.7 | 3.7 | 8.8 | 11.0 | 14.6 | 13.1 |
| 1FK7063-2AH71 | 3.3 | 2.8 | 8.7 | 10.8 | 21.7 | 19.5 |
| 1FK7080-2AF71 | 9.8 | 2.1 | 5.9 | 7.3 | 8.4 | 7.5 |
| 1FK7080-2AH71 | 6.5 | 1.6 | 5.9 | 7.3 | 12.9 | 11.6 |
| 1FK7081-2AC71 | 8.6 | 4.1 | 9.3 | 11.6 | 9.0 | 8.1 |
| 1FK7081-2AF71 | 4.4 | 3.2 | 9.3 | 11.6 | 15.8 | 14.2 |
| 1FK7081-2AH71 | 3.0 | 2.4 | 9.4 | 11.7 | 23.9 | 21.4 |
| 1FK7083-2AC71 | 4.7 | 5.9 | 13.7 | 17.1 | 14.9 | 13.3 |
| 1FK7083-2AF71 | 4.0 | 4.6 | 13.8 | 17.1 | 20.2 | 18.1 |
| 1FK7083-2AH71 | 2.9 | 3.3 | 13.6 | 17.0 | 29.7 | 26.6 |
| 1FK7084-2AC71 | 4.4 | 7.3 | 17.7 | 21.9 | 17.4 | 15.6 |
| 1FK7084-2AF71 | 3.4 | 5.5 | 17.6 | 21.9 | 24.9 | 22.3 |
| 1FK7100-2AC71 | 4.8 | 5.2 | 13.8 | 17.1 | 15.0 | 13.4 |
| 1FK7100-2AF71 | 4.3 | 4.0 | 13.7 | 17.1 | 19.7 | 17.6 |

| Motor type | Braking resistor, external $R_{opt}$ [Ω] | Average braking torque | | Maximum braking torque $M_{br\ max}$[Nm] | rms braking current | |
|---|---|---|---|---|---|---|
| | | Without external braking resistor $M_{br\ rms}$ [Nm] | With external braking resistor $M_{br\ rms}$ ($R_{opt}$) [Nm] | | Without external braking resistor $I_{br\ rms}$ [A] | With external braking resistor $I_{br\ rms}$ ($R_{opt}$)[A] |
| 1FK7101-2AC71 | 3.2 | 8.2 | 22.5 | 28.0 | 23.4 | 21.0 |
| 1FK7101-2AF71 | 2.1 | 6.1 | 22.4 | 27.9 | 36.4 | 32.6 |
| 1FK7103-2AC71 | 3.0 | 10.3 | 30.5 | 37.9 | 28.2 | 25.3 |
| 1FK7103-2AF71 | 1.4 | 7.9 | 30.6 | 38.0 | 51.4 | 46.0 |
| 1FK7105-2AC71 | 1.7 | 17.9 | 50.6 | 62.8 | 48.2 | 43.1 |
| 1FK7105-2AF71 | 1.1 | 13.3 | 50.2 | 62.4 | 70.0 | 66.2 |

Table 5- 11 Dynamic braking for 1FK7 Compact connected to a Power Module 1 AC 230 V

| Motor type | Braking resistor, external $R_{opt}$ [Ω] | Average braking torque | | Maximum braking torque $M_{br\ max}$[Nm] | rms braking current | |
|---|---|---|---|---|---|---|
| | | Without external braking resistor $M_{br\ rms}$ [Nm] | With external braking resistor $M_{br\ rms}$ ($R_{opt}$) [Nm] | | Without external braking resistor $I_{br\ rms}$ [A] | With external braking resistor $I_{br\ rms}$ ($R_{opt}$)[A] |
| 1FK7011-5AK21 | 6.9 | 0.13 | 0.14 | 0.17 | 1.4 | 1.3 |
| 1FK7015-5AK21 | 19.1 | 0.23 | 0.28 | 0.34 | 1.5 | 1.3 |
| 1FK7022-5AK21 | 4.4 | 1.0 | 1.1 | 1.4 | 5.7 | 5.2 |
| 1FK7032-2AF21 | 3.5 | 1.2 | 1.3 | 1.7 | 4.3 | 4.0 |
| 1FK7034-2AF21 | 3.3 | 2.1 | 2.2 | 2.8 | 5.9 | 5.5 |
| 1FK7042-2AF21 | 3.6 | 1.9 | 2.8 | 3.4 | 8.4 | 7.6 |

## 1FK7 High Dynamic

Table 5- 12 Dynamic braking for 1FK7 High Dynamic

| Motor type | Braking resistor, external $R_{opt}$ [Ω] | Average braking torque | | Maximum braking torque $M_{br\ max}$[Nm] | rms braking current | |
|---|---|---|---|---|---|---|
| | | Without external braking resistor $M_{br\ rms}$ [Nm] | With external braking resistor $M_{br\ rms}$ ($R_{opt}$) [Nm] | | Without external braking resistor $I_{br\ rms}$ [A] | With external braking resistor $I_{br\ rms}$ ($R_{opt}$)[A] |
| 1FK7033-4CK71 | 17.2 | 0.5 | 0.9 | 1.1 | 3.3 | 3.0 |
| 1FK7043-4CH71 | 8.4 | 1.1 | 2.6 | 3.3 | 7.3 | 6.5 |
| 1FK7043-4CK71 | 6.3 | 0.9 | 2.6 | 3.3 | 9.9 | 8.8 |
| 1FK7044-4CF71 | 7.4 | 1.7 | 3.4 | 4.2 | 7.0 | 6.3 |
| 1FK7044-4CH71 | 6.4 | 1.4 | 3.4 | 4.2 | 9.5 | 8.5 |

| Motor type | Braking resistor, external $R_{opt}$ [Ω] | Average braking torque | | Maximum braking torque $M_{br\ max}$[Nm] | rms braking current | |
|---|---|---|---|---|---|---|
| | | Without external braking resistor $M_{br\ rms}$ [Nm] | With external braking resistor $M_{br\ rms}$ ($R_{opt}$) [Nm] | | Without external braking resistor $I_{br\ rms}$ [A] | With external braking resistor $I_{br\ rms}$ ($R_{opt}$)[A] |
| 1FK7061-4CF71 | 9.7 | 0.7 | 2.5 | 3.1 | 5.6 | 5.0 |
| 1FK7061-4CH71 | 7.2 | 0.5 | 2.5 | 3.1 | 8.1 | 7.2 |
| 1FK7064-4CC71 | 6.2 | 1.7 | 5.0 | 6.2 | 8.0 | 7.2 |
| 1FK7064-4CF71 | 5.3 | 1.3 | 5.1 | 6.3 | 10.8 | 9.7 |
| 1FK7064-4CH71 | 4.2 | 1.0 | 5.0 | 6.3 | 15.0 | 13.4 |
| 1FK7085-4CC71 | 3.8 | 3.2 | 10.3 | 12.8 | 14.8 | 13.2 |
| 1FK7085-4CF71 | 2.2 | 2.4 | 10.3 | 12.8 | 24.0 | 21.5 |
| 1FK7086-4CC71 | 3.1 | 7.4 | 21.3 | 26.5 | 23.2 | 20.7 |
| 1FK7086-4CF71 | 1.8 | 5.6 | 21.1 | 26.3 | 37.6 | 33.6 |

Table 5- 13 Dynamic braking for 1FK7 High Dynamic connected to a Power Module 1 AC 230 V

| Motor type | Braking resistor, external $R_{opt}$ [Ω] | Average braking torque | | Maximum braking torque $M_{br\ max}$[Nm] | rms braking current | |
|---|---|---|---|---|---|---|
| | | Without external braking resistor $M_{br\ rms}$ [Nm] | With external braking resistor $M_{br\ rms}$ ($R_{opt}$) [Nm] | | Without external braking resistor $I_{br\ rms}$ [A] | With external braking resistor $I_{br\ rms}$ ($R_{opt}$)[A] |
| 1FK7033-4CF21 | 6.9 | 0.7 | 0.9 | 1.1 | 3.3 | 3.0 |
| 1FK7043-4CF21 | 5.2 | 1.4 | 2.6 | 3.3 | 7.3 | 6.5 |

## 1FK7 High Inertia

Table 5- 14 Dynamic braking for 1FK7 High Inertia

| Motor type | Braking resistor, external $R_{opt}$ [Ω] | Average braking torque | | Maximum braking torque $M_{br\ max}$[Nm] | rms braking current | |
|---|---|---|---|---|---|---|
| | | Without external braking resistor $M_{br\ rms}$ [Nm] | With external braking resistor $M_{br\ rms}$ ($R_{opt}$) [Nm] | | Without external braking resistor $I_{br\ rms}$ [A] | With external braking resistor $I_{br\ rms}$ ($R_{opt}$)[A] |
| 1FK7042-3BK71 | 9.7 | 0.8 | 2.1 | 2.6 | 7.1 | 6.4 |
| 1FK7060-3BF71 | 8.2 | 2.1 | 4.4 | 5.5 | 7.7 | 6.9 |
| 1FK7062-3BF71 | 8.0 | 2.8 | 6.6 | 8.2 | 9.7 | 8.7 |
| 1FK7081-3BF71 | 4.4 | 3.2 | 9.3 | 11.6 | 15.8 | 14.2 |
| 1FK7084-3BC71 | 4.4 | 7.3 | 17.7 | 21.9 | 17.4 | 15.6 |
| 1FK7084-3BF71 | 3.4 | 5.5 | 17.6 | 21.9 | 24.9 | 22.3 |

# 5.5 Gearbox

## 5.5.1 Dimensioning the gearbox

### Overview

- The following influencing parameters should be taken into consideration:
  - acceleration torque, permanent torque, number of cycles, cycle type, permissible input speed, mounting position, torsional backlash, torsional stiffness, and radial and axial forces.
  - Worm gearboxes are only conditionally suitable for reversing operation with servo applications.
- Technical data should be obtained from the catalogs of the gearbox manufacturers and similar sources.
- If the gearbox oil is in contact with the motor flange, then suitable shaft and flange seals must be selected.

### Dimensioning for S3 duty

When engineering geared drive systems you can use the motor characteristic without reduction. Please note the permissible maximum torque and the permissible gearbox input speed.

$M_{Mot} = M_{out} / (i \bullet \eta_G)$

The motor and gearbox are assigned as follows: $M_{max, gear} \geq M_{0\ (100\ K)} \bullet i \bullet f$

| | |
|---|---|
| $M_{max, gear}$ | Max. permissible drive torque |
| $M_{0\ (100\ K)}$ | Motor static torque |
| i | Gear ratio |
| f | Supplementary factor $f = f_1 \bullet f_2$ |

$f_1 = 2$ for motor accelerating torque

$f_2 = 1$ for ≤1000 gearbox switching cycles / h

$f_2 > 1$ for > 1000 switching cycles / h (refer to the gearbox catalog)

e.g. $f_2 = 1.5$ for 3000 switching cycles / h

$f_2 = 1.8$ for 5000 switching cycles / h

$f_2 = 2.0$ for 8000 switching cycles / h

| NOTICE |
| --- |
| Switching cycles can also be superimposed vibration! The supplementary factor ($f_2$) is then not sufficient when dimensioning the gearbox and gearboxes may fail.<br>The complete system should be optimized so that the higher-level vibration is minimized. |

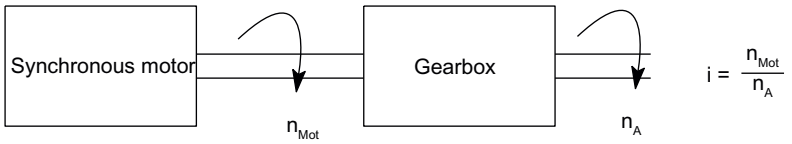



Figure 5-8 Gear ratio

The load torque and the required start-up velocity define the gearbox output torque, the output speed and therefore the output power.

The required drive power is calculated from this:

$P_{out}$ [W] = $P_{mot}$ [W] • $\eta_G$ = (π/30) • $M_{mot}$ [Nm] • $n_{mot}$ [rpm] • $\eta_G$

## Dimensioning for S1 duty

The gearbox itself generates heat due to friction and acts as a thermal barrier preventing heat from being dissipated through the motor flange. This is the reason that the torque must be reduced for S1 duty.

The required motor torque is calculated as follows:

$$M_{Mot} = \sqrt{\left(\frac{M_{ab}}{i \bullet \eta_G} + M_V\right)^2 - M_V^2} \quad \text{mit} \quad M_V = a \bullet b \bullet \frac{n_{Mot}}{60}\left(1 - \eta_G\right) \bullet \frac{k_T^2}{R_{Strw}}$$

| | |
| --- | --- |
| $M_{Mot}$ | Motor torque [Nm] |
| $M_V$ | Calculated "torque loss" [Nm] |
| a | π/3 for 1FT7/1FK7 motors supplied with sinusoidal current |
| b | Weighting factor for gearbox losses (without dimensions); b = 0.5 |
| $\eta_G$ | Gearbox efficiency |
| i | Gearbox ratio (i > 1) |
| $k_T$ | Torque constant [Nm/A] |
| $M_{out}$ | Gearbox output torque [Nm] |
| $n_A$ | Output speed of gearbox [rpm] |
| $n_{Mot}$ | Motor speed [rpm] |
| $R_{Strw}$ | Resistance when hot of the motor phase [Ω]; $R_{Strw}$ = 1.4 • $R_{Str}$ (see chapter headed "Technical data and characteristics") |
| $P_{out}$ | Gearbox output power [W] |

$P_{Mot}$ Motor power [W]

π pi = 3.1416

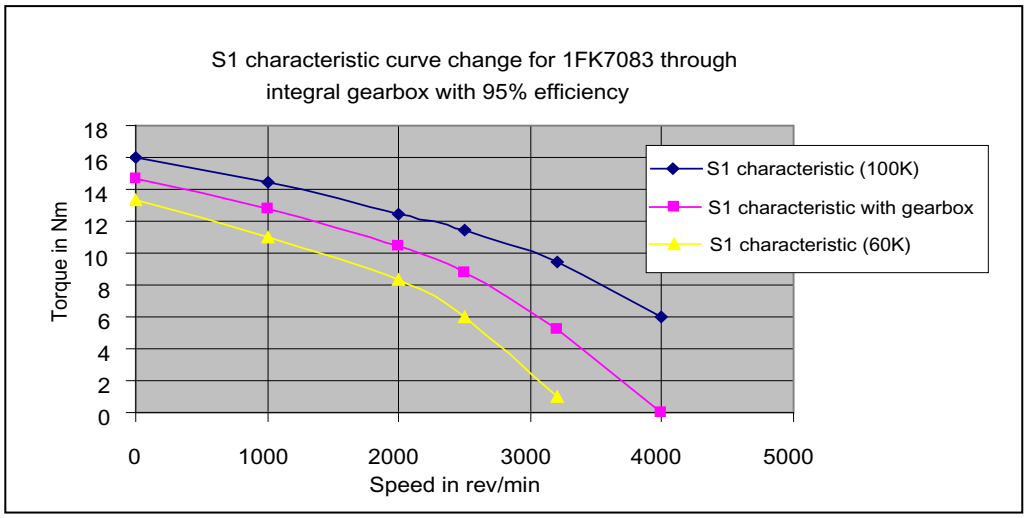



Figure 5-9 Example: 1FK7083 with angled gearbox (characteristic)

Information for additional characteristics: $S1_{gearbox} = S1_{100K} - (S1_{100K} - S1_{60K}) / 2$

## Starting behavior of a motor when a gearbox is mounted

| NOTICE |
| --- |
| During commissioning, it should be assumed that an increased current will be drawn due to the lubrication characteristics (inadequate distribution of grease and oil) and the fact that the shaft sealing ring is being run-in. |

## 5.5.2 Motors with planetary gears

### 5.5.2.1 Characteristics of SP+ series

#### Overview

1FK7 motors can easily be combined with planetary gearboxes to form compact coaxial drive units. The gearboxes are flanged directly at the DE of the motors.

When selecting the gearbox, ensure that its maximum permissible input speed is not exceeded by the maximum speed of the motor. In the case of high operating frequencies, allowance must be made for the withstand ratio $f_2$. The frictional losses of the gearbox must always be taken into account when engineering geared drives.

The gearboxes are only available in a non-balanced design.

#### Benefits

- High efficiency:
  > 97% single-stage
  > 94% 2-stage
- Minimum torsional play:
  ≤ 4 arcmin single-stage
  ≤ 6 arcmin 2-stage
- Power transmission from the central sun wheel to the planetary pinions
- No shaft deflections in the planetary pinions set due to the symmetrical force distribution
- Very low moment of inertia and hence short acceleration times of the motors
- Output shaft bearings dimensioned for high cantilever and axial loads with preloaded tapered-roller bearings
- The gearboxes are connected to the motor shaft via an integrated clamping hub A plain motor shaft end is necessary for this purpose. Radial eccentricity tolerance N in accordance with DIN 42955 and vibration severity grade A in accordance with EN 60034-14 are sufficient. The motor flange is adapted via adapter plates.
- Output shaft of gearbox exactly coaxial with the motor
- The gearboxes are sealed (seal between the gearbox and motor) and filled with oil at the factory. They are lubricated and sealed for their service life. The gearboxes are suitable for all mounting positions.
- Degree of protection of gearbox: IP65
- Small dimensions
- Low weight

## Integration

The gearboxes assigned to the individual motors and the gear ratios available for these motor/gearbox combinations are listed in the selection table below. When making a selection, the maximum permissible input speed of the gearbox must be observed (this is the same as the maximum motor speed).

The motor/gearbox combinations listed in the following selection tables are mainly intended for cyclic operation S3 - 60% (ON period ≤ 60% and ≤ 20 min). Reduced maximum motor speeds and output torques apply for use in S1 continuous duty (ON period > 60% or > 20 min). The gearbox temperature may not exceed 90 °C

1FK7 motors for gearbox mounting must be implemented as follows:

- Plain motor shaft extension
- Protection class IP65
- Paint finish
  - paint finish is required for 1FK702 motors
  - 1FK703 to 1FK710 motors are only available, painted

## 5.5.2.2 Selection and ordering data, series SP+

### Selection and ordering data, single-stage planetary gear, SP+ series

| Motor | Planetary gearbox single-stage | | | Available gear ratio i = | | | | Motor speed, max. S3-60 % | Output torque, max. S3-60 % | Radial output shaft loading, max.[1] | Axial output shaft loading, max.[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Type | Torsional backlash | Gearbox weight, approx. | 4 | 5 | 7 | 10 | $n_{G1}$ ($n_1$) | $M_{G2}$ ($T_{2B}$) | $F_r$ ($F_{2Rmax}$) | $F_a$ ($F_{2Amax}$) |
| | | arcmin | kg (lb) | | | | | rpm | Nm ($lb_f$-ft) | N ($lb_f$) | N ($lb_f$) |
| 1FK7022 | SP 060S-MF1 | ≤ 4 | 1.9 (4.2) | ✔ | ✔ | ✔ | ✔ | 6000 | 40 (295) | 2700 (607) | 2400 (540) |
| 1FK7032 | | | | ✔ | ✔ | ✔ | ✔ | | (32 for i = 10) | | |
| 1FK7033 | | | | ✔ | ✔ | ✔ | ✔ | | | | |
| 1FK7034 | | | | ✔ | ✔ | ✔ | ✔ | | | | |
| 1FK7040 | SP 075S-MF1 | ≤ 4 | 3.9 (8.6) | ✔ | ✔ | ✔ | ✔ | 6000 | 110 (81.1) | 4000 (899) | 3350 (753) |
| 1FK7042 | | | | ✔ | ✔ | ✔ | ✔ | | (90 for i = 10) | | |
| 1FK7043 | | | | ✔ | ✔ | ✔ | ✔ | | | | |
| 1FK7044 | | | | ✔ | ✔ | ✔ | ✔ | | | | |
| 1FK7060 | SP 100S-MF1 | ≤ 3 | 7.7 (17.0) | ✔ | ✔ | ✔ | ✔ | 4500 | 300 (221) | 6300 (1416) | 5650 (1270) |
| 1FK7061 | | | | ✔ | ✔ | ✔ | ✔ | | (225 for i = 10) | | |
| 1FK7062 | | | | ✔ | ✔ | ✔ | ✔ | | | | |
| 1FK7063 | | | | ✔ | ✔ | ✔ | ✔ | | | | |
| 1FK7064 | | | | ✔ | ✔ | ✔ | ✔ | | | | |
| 1FK7080 | SP 140S-MF1 | ≤ 3 | 17.2 (37.9) | ✔ | ✔ | ✔ | ✔ | 4000 | 600 (442) | 9450 (2124) | 9870 (2219) |
| 1FK7081 | | | | ✔ | ✔ | ✔ | ✔ | | (480 for i = 10) | | |
| 1FK7083 | | | | ✔ | ✔ | ✔ | ✔ | | | | |
| 1FK7084 | | | | ✔ | ✔ | ✔ | ✔ | | | | |
| 1FK7085 | | | | ✔ | ✔ | ✔ | ✔ | | | | |
| 1FK7086 | | | | ✔ | ✔ | ✔ | ✔ | | | | |
| 1FK7100 | SP 180S-MF1 | ≤ 3 | 34 (75.0) | ✔ | ✔ | ✔ | ✔ | 3500 | 1100 (810) | 14700 (3305) | 14150 (3181) |
| 1FK7101 | | | | ✔ | ✔ | ✔ | ✔ | | (880 for i = 10) | | |
| 1FK7103 | | | | ✔ | ✔ | ✔ | ✔ | | | | |
| 1FK7105 | | | | ✔ | ✔ | ✔ | – | | | | |
| 1FK7105 | SP 210S-MF1 | ≤ 3 | 56 (123) | – | – | – | ✔ | 2500 | 2500 (1844)<br>(2400 for i = 7<br>1900 for i = 10) | 21000 (4721) | 30000 (6744) |
| | Gear shaft | | | Order code | | | | | | | |
| | With fitted key | | | J02 | J03 | J05 | J09 | | | | |
| | Without fitted key | | | J22 | J23 | J25 | J29 | | | | |

Preconditions:

With the following motor versions, SP+ planetary gearboxes can be mounted:

- Plain motor shaft extension, shaft and flange accuracy tolerance N, without/with holding brake
- IP65 degree of protection

SP+ planetary gearboxes can therefore only be ordered with these 1FK7 motors:
1FK7□□□-□□□□1-1□G1
1FK7□□□-□□□□1-1□H1
for 1FK702□: 1FK702□-□□□□1-1□G5
1FK702□-□□□□1-1□H5

When ordering a motor with gearbox, -Z should be added to the order number.

Example:

1FK7042 motor without holding brake
with single-stage SP+ planetary gearbox
with i = 7 and gear shaft without fitted key.
1FK7042-2AF71-1AG5-Z; J25

✔ Possible
– Not possible
[1] In reference to the output shaft center.

## Technical data, single-stage planetary gear, SP+ series

| Planetary gearbox with 1FK7 motor | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Single-stage Type | Gear ratio | Motor speed | Output torque | Moments of inertia of gearbox (referred to the drive) | | | | | |
| | | Continuous duty S1[1] | | 1FK702 | 1FK703. | 1FK704. | 1FK706. | 1FK708. | 1FK710. |
| | | $n_{N1}$ | $M_{N2}$ ($T_{2N}$) | $J_1$ | $J_1$ | $J_1$ | $J_1$ | $J_1$ | $J_1$ |
| | | rpm | Nm ($lb_f$-ft) | $kgcm^2$ ($lb_f$-$in^2$) | $kgcm^2$ ($lb_f$-$in^2$) | $kgcm^2$ ($lb_f$-$in^2$) | $kgcm^2$ ($lb_f$-$in^2$) | $kgcm^2$ ($lb_f$-$in^2$) | $kgcm^2$ ($lb_f$-$in^2$) |
| SP 060S-MF1 | 4 | 3300 | 26 (19.2) | 0.15 (0.05) | 0.22 (0.08) | – | – | – | – |
| | 5 | 3300 | 26 (19.2) | 0.12 (0.04) | 0.20 (0.07) | – | – | – | – |
| | 7 | 4000 | 26 (19.2) | 0.10 (0.03) | 0.18 (0.06) | – | – | – | – |
| | 10 | 4000 | 17 (12.5) | 0.09 (0.03) | 0.17 (0.06) | – | – | – | – |
| SP 075S-MF1 | 4 | 2900 | 75 (55.3) | – | – | 0.78 (0.27) | – | – | – |
| | 5 | 2900 | 75 (55.3) | – | – | 0.68 (0.23) | – | – | – |
| | 7 | 3100 | 75 (55.3) | – | – | 0.59 (0.20) | – | – | – |
| | 10 | 3100 | 52 (38.4) | – | – | 0.54 (0.19) | – | – | – |
| SP 100S-MF1 | 4 | 2500 | 180 (133) | – | – | – | 3.04 (1.04) | – | – |
| | 5 | 2500 | 175 (129) | – | – | – | 2.61 (0.89) | – | – |
| | 7 | 2800 | 170 (125) | – | – | – | 2.29 (0.78) | – | – |
| | 10 | 2800 | 120 (88.5) | – | – | – | 2.07 (0.71) | – | – |
| SP 140S-MF1 | 4 | 2100 | 360 (265) | – | – | – | – | 11.0 (3.76) | – |
| | 5 | 2100 | 360 (265) | – | – | – | – | 9.95 (3.40) | – |
| | 7 | 2600 | 360 (265) | – | – | – | – | 9.01 (3.08) | – |
| | 10 | 2600 | 220 (162) | – | – | – | – | 8.44 (2.88) | – |
| SP 180S-MF1 | 4 | 1500 | 750 (553) | – | – | – | – | – | 33.9 (11.6) |
| | 5 | 1500 | 750 (553) | – | – | – | – | – | 27.9 (9.53) |
| | 7 | 2300 | 750 (553) | – | – | – | – | – | 22.2 (7.59) |
| | 10 | 2300 | 750 (553) | – | – | – | – | – | 19.2 (6.56) |
| SP 210S-MF1 | 10 | 2000 | 1000 (738) | – | – | – | – | – | 53.1 (18.1) |

[1] The limit values in the table apply for S1 continuous duty (ON time > 60 % or > 20 min) for a maximum gearbox temperature of 90 °C (194 °F).

## Selection and ordering data, 2-stage planetary gear, SP+ series

| Motor | Planetary gearbox two-stage | | | Available gear ratio i = | | | | | Motor speed, max. S3-60 % | Output torque, max. S3-60 % | Radial output shaft loading, max.[1] | Axial output shaft loading, max.[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Type | Torsional backlash | Gearbox weight, approx. | 16 | 20 | 28 | 40 | 50 | $n_{G1}$ ($n_1$) | $M_{G2}$ ($T_{2B}$) | $F_r$ ($F_{2Rmax}$) | $F_a$ ($F_{2Amax}$) |
| | | arcmin | kg (lb) | | | | | | rpm | Nm ($lb_f$-ft) | N ($lb_f$) | N ($lb_f$) |
| 1FK7022 | SP 060S-MF2 | ≤ 6 | 2 (4.41) | ✔ | ✔ | ✔ | – | – | 6000 | 40 (29.5) | 2700 (607) | 2400 (540) |
| 1FK7032 | | | | ✔ | ✔ | – | – | – | | | | |
| 1FK7033 | | | | ✔ | ✔ | – | – | – | | | | |
| 1FK7022 | SP 075S-MF2 | ≤ 6 | 3.6 (7.9) | – | – | – | ✔ | ✔ | 6000 | 110 (81.1) | 4000 (899) | 3350 (753) |
| 1FK7032 | | | | – | – | ✔ | ✔ | ✔ | | | | |
| 1FK7033 | | | | – | – | ✔ | ✔ | ✔ | | | | |
| 1FK7034 | | | | ✔ | ✔ | ✔ | – | – | | | | |
| 1FK7040 | | | | ✔ | ✔ | ✔ | – | – | | | | |
| 1FK7042 | | | | ✔ | ✔ | – | – | – | | | | |
| 1FK7043 | | | | ✔ | – | – | – | – | | | | |
| 1FK7034 | SP 100S-MF2 | ≤ 5 | 7.9 (17.4) | – | – | – | ✔ | ✔ | 4500 | 300 (221) | 6300 (1416) | 2400 (540) |
| 1FK7040 | | | | – | – | – | ✔ | ✔ | | | | |
| 1FK7042 | | | | – | – | ✔ | ✔ | ✔ | | | | |
| 1FK7043 | | | | – | ✔ | ✔ | ✔ | ✔ | | | | |
| 1FK7044 | | | | ✔ | ✔ | ✔ | ✔ | – | | | | |
| 1FK7060 | | | | ✔ | ✔ | ✔ | – | – | | | | |
| 1FK7061 | | | | ✔ | ✔ | – | – | – | | | | |
| 1FK7062 | | | | ✔ | ✔ | – | – | – | | | | |
| 1FK7044 | SP 140S-MF2 | ≤ 5 | 17 (37.5) | – | – | – | – | ✔ | 4000 | 600 (442) | 9450 (2124) | 9870 (2219) |
| 1FK7060 | | | | – | – | – | ✔ | ✔ | | | | |
| 1FK7061 | | | | – | – | ✔ | ✔ | ✔ | | | | |
| 1FK7062 | | | | – | – | ✔ | ✔ | – | | | | |
| 1FK7063 | | | | ✔ | ✔ | ✔ | – | – | | | | |
| 1FK7064 | | | | ✔ | ✔ | ✔ | – | – | | | | |
| 1FK7080 | | | | ✔ | ✔ | ✔ | ✔ | – | | | | |
| 1FK7081 | | | | ✔ | ✔ | ✔ | – | – | | | | |
| 1FK7083 | | | | ✔ | ✔ | – | – | – | | | | |
| 1FK7084 | | | | ✔ | – | – | – | – | | | | |
| | Gear shaft | | | Order code | | | | | | | | |
| | With fitted key | | | J12 | J13 | J15 | J16 | J17 | | | | |
| | Without fitted key | | | J32 | J33 | J35 | J36 | J37 | | | | |

Preconditions:

With the following motor versions, SP+ planetary gearboxes can be mounted:

- Plain motor shaft extension, shaft and flange accuracy tolerance N, without/with holding brake
- IP65 degree of protection

SP+ planetary gearboxes can therefore only be ordered with these 1FK7 motors:
1FK7□□□-□□□□1-1□G1
1FK7□□□-□□□□1-1□H1
for 1FK702□: 1FK702□-□□□□1-1□G5
1FK702□-□□□□1-1□H5

When ordering a motor with gearbox, -Z should be added to the order number.

Example:

1FK7042 motor without holding brake
with single-stage SP+ planetary gearbox
with i = 7 and gear shaft without fitted key.
1FK7042-2AF71-1AG5-Z; J25

✔ Possible
– Not possible
[1] Referred to the center of the output shaft at 100 rpm.

| Motor | Planetary gearbox two-stage | | | Available gear ratio i = | | | | | Motor speed, max. S3-60 % | Output torque, max. S3-60 % | Radial output shaft loading, max.[1] | Axial output shaft loading, max.[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Type | Torsional backlash | Gearbox weight, approx. | 16 | 20 | 28 | 40 | 50 | $n_{G1}$ ($n_1$) | $M_{G2}$ ($T_{2B}$) | $F_r$ ($F_{2Rmax}$) | $F_a$ ($F_{2Amax}$) |
| | | arcmin | kg (lb) | | | | | | rpm | Nm ($lb_f$-ft) | N ($lb_f$) | N ($lb_f$) |
| 1FK7062 | SP 180S-MF2 | ≤ 5 | 36.4 (80.3) | – | – | – | – | ✔ | 4000 | 1100 (811) | 14700 (3305) | 14150 (3181) |
| 1FK7063 | | | | – | – | – | ✔ | ✔ | | | | |
| 1FK7064 | | | | – | – | – | ✔ | ✔ | | | | |
| 1FK7080 | | | | – | – | – | – | ✔ | | | | |
| 1FK7081 | | | | – | – | – | ✔ | ✔ | | | | |
| 1FK7083 | | | | – | – | ✔ | – | – | | | | |
| 1FK7084 | | | | – | ✔ | ✔ | – | – | | | | |
| 1FK7085 | | | | ✔ | ✔ | – | – | – | | | | |
| 1FK7086 | | | | ✔ | ✔ | – | – | – | | | | |
| 1FK7100 | | | | ✔ | ✔ | ✔ | – | – | | | | |
| 1FK7101 | | | | ✔ | ✔ | – | – | – | | | | |
| 1FK7103 | | | | ✔ | – | – | – | – | | | | |
| 1FK7083 | SP 210S-MF2 | ≤ 6 | 55 (121) | – | – | – | ✔ | ✔ | 3500 | 2400 (1770) (2500 for i = 20) | 21000 (4721) | 30000 (6744) |
| 1FK7084 | | | | – | – | – | ✔ | ✔ | | | | |
| 1FK7085 | | | | – | – | ✔ | ✔ | – | | | | |
| 1FK7086 | | | | – | – | ✔ | – | – | | | | |
| 1FK7100 | | | | – | – | – | ✔ | ✔ | | | | |
| 1FK7101 | | | | – | – | ✔ | – | – | | | | |
| 1FK7103 | | | | – | ✔ | – | – | – | | | | |
| 1FK7105 | | | | ✔ | ✔ | – | – | – | | | | |
| 1FK7101 | SP 240S-MF2 | ≤ 6 | 80.6 (178) | – | – | – | ✔ | ✔ | 3500 | 4500 (3319) (4000 for i = 40 4300 for i = 50) | 30000 (6744) | 33000 (7419) |
| 1FK7103 | | | | – | – | ✔ | ✔ | – | | | | |
| 1FK7105 | | | | – | – | ✔ | – | – | | | | |
| | Gear shaft | | | Order code | | | | | | | | |
| | With fitted key | | | J12 | J13 | J15 | J16 | J17 | | | | |
| | Without fitted key | | | J32 | J33 | J35 | J36 | J37 | | | | |

Preconditions:

With the following motor versions, SP+ planetary gearboxes can be mounted:

- Plain motor shaft extension, shaft and flange accuracy tolerance N, without/with holding brake
- IP65 degree of protection

SP+ planetary gearboxes can therefore only be ordered with these 1FK7 motors:

1FK7□□□-□□□□1-1□G1
1FK7□□□-□□□□1-1□H1
for 1FK702□: 1FK702□-□□□□1-1□G5
1FK702□-□□□□1-1□H5

When ordering a motor with gearbox, -Z should be added to the order number.

Example:

1FK7042 motor without holding brake
with single-stage SP+ planetary gearbox
with i = 7 and gear shaft without fitted key.
1FK7042-2AF71-1AG5-Z; J25

✔ Possible
– Not possible
[1] In reference to the output shaft center.

## Technical data, 2-stage planetary gear, SP+ series

| Planetary gearbox with 1FK7 motor | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Two-stage Type | Gear ratio | Motor speed | Output torque | Moments of inertia of gearbox (referred to the drive) | | | | | |
| | | Continuous duty S1[1] | | 1FK702 | 1FK703. | 1FK704. | 1FK706. | 1FK708. | 1FK710. |
| | | $n_{N1}$ | $M_{N2}$ ($T_{2N}$) | $J_1$ | $J_1$ | $J_1$ | $J_1$ | $J_1$ | $J_1$ |
| | | rpm | Nm ($lb_f$-ft) | kgcm$^2$ ($lb_f$-in$^2$) | kgcm$^2$ ($lb_f$-in$^2$) | kgcm$^2$ ($lb_f$-in$^2$) | kgcm$^2$ ($lb_f$-in$^2$) | kgcm$^2$ ($lb_f$-in$^2$) | kgcm$^2$ ($lb_f$-in$^2$) |
| SP 060S-MF2 | 16 | 4400 | 26 (19.2) | 0.08 (0.03) | 0.17 (0.06) | – | – | – | – |
| | 20 | 4400 | 26 (19.2) | 0.07 (0.02) | 0.16 (0.06) | – | – | – | – |
| | 28 | 4400 | 26 (19.2) | 0.06 (0.02) | – | – | – | – | – |
| SP 075S-MF2 | 16 | 3500 | 75 (55.3) | – | 0.23 (0.08) | 0.55 (0.19) | – | – | – |
| | 20 | 3500 | 75 (55.3) | – | 0.20 (0.07) | 0.53 (0.19) | – | – | – |
| | 28 | 3500 | 75 (55.3) | – | 0.18 (0.06) | 0.50 (0.17) | – | – | – |
| | 40 | 3500 | 75 (55.3) | 0.10 (0.03) | 0.17 (0.06) | – | – | – | – |
| | 50 | 3800 | 75 (55.3) | 0.10 (0.03) | 0.16 (0.06) | – | – | – | – |
| SP 100S-MF2 | 16 | 3100 | 180 (132) | – | – | 0.81 (0.28) | 2.18 (0.75) | – | – |
| | 20 | 3100 | 180 (132) | – | – | 0.70 (0.24) | 2.07 (0.71) | – | – |
| | 28 | 3100 | 180 (132) | – | – | 0.60 (0.20) | 1.97 (0.67) | – | – |
| | 40 | 3100 | 180 (132) | – | 0.38 (0.13) | 0.55 (0.19) | – | – | – |
| | 50 | 3500 | 175 (129) | – | 0.38 (0.13) | 0.54 (0.19) | – | – | – |
| SP 140S-MF2 | 16 | 2900 | 360 (266) | – | – | – | 3.19 (1.09) | 10.3 (3.52) | – |
| | 20 | 2900 | 360 (266) | – | – | – | 2.71 (0.93) | 9.77 (3.34) | – |
| | 28 | 2900 | 360 (266) | – | – | – | 2.34 (0.80) | 9.41 (3.22) | – |
| | 40 | 2900 | 360 (266) | – | – | – | 2.10 (0.72) | 9.16 (3.13) | – |
| | 50 | 3200 | 360 (266) | – | – | 1.39 (0.48) | 2.08 (0.71) | – | – |
| SP 180S-MF2 | 16 | 2700 | 750 (553) | – | – | – | – | 12.4 (4.24) | 13.5 (4.61) |
| | 20 | 2700 | 750 (553) | – | – | – | – | 10.9 (3.73) | 12.0 (4.10) |
| | 28 | 2700 | 750 (553) | – | – | – | – | 9.48 (3.24) | 10.6 (3.62) |
| | 40 | 2700 | 750 (553) | – | – | – | 5.51 (1.88) | 8.67 (2.96) | – |
| | 50 | 2900 | 750 (553) | – | – | – | 5.45 (1.86) | 8.61 (2.94) | – |
| SP 210S-MF2 | 16 | 2500 | 1500 (1106) | – | – | – | – | – | 34.5 (11.8) |
| | 20 | 2500 | 1500 (1106) | – | – | – | – | – | 31.5 (10.8) |
| | 28 | 2500 | 1500 (1106) | – | – | – | – | 30.0 (10.3) | 30.0 (10.3) |
| | 40 | 2500 | 1500 (1106) | – | – | – | – | 28.5 (9.74) | 28.5 (9.74) |
| | 50 | 2500 | 1500 (1106) | – | – | – | – | 28.3 (9.67) | 28.3 (9.67) |
| SP 240S-MF2 | 28 | 2500 | 2500 (1844) | – | – | – | – | – | 30.5 (10.4) |
| | 40 | 2500 | 2500 (1844) | – | – | – | – | – | 28.2 (9.64) |
| | 50 | 2500 | 2500 (1844) | – | – | – | – | – | 27.9 (9.53) |

[1] The limit values in the table apply for S1 continuous duty (ON time > 60 % or > 20 min) for a maximum gearbox temperature of 90 °C (194 °F).

### 5.5.2.3 Characteristics of the LP+ series

#### Overview

1FK7 motors can be combined with planetary gears to form compact coaxial drive units. The gearboxes are flanged directly at the DE of the motors.

When selecting the gearbox, ensure that its maximum permissible input speed is not exceeded by the maximum speed of the motor. In the case of high operating frequencies, allowance must be made for the withstand ratio $f_2$. The frictional losses of the gearbox must always be taken into account when engineering geared drives.

The gearboxes are only available in a non-balanced design and with fitted key.

#### Benefits

- High efficiency, single-stage: > 97 %
- Minimal torsional backlash, 1-stage: ≤ 12 arcmin
- Power transmission from the central sun wheel to the planet wheels
- No shaft deflections in the planet wheel set as the force is symmetrically distributed
- The gearboxes are connected to the motor shaft via an integrated clamping hub A plain motor shaft end is necessary for this purpose. Radial eccentricity tolerance N in accordance with DIN 42955 and vibration severity grade A in accordance with EN 60034-14 are sufficient. The motor flange is adapted via adapter plates
- Output shaft of gearbox exactly coaxial with the motor
- The gearboxes are suitable for all mounting positions
- The gearboxes are sealed (seal between gearbox and motor) and filled with grease in the factory. They are lubricated and sealed for their service life.
- Degree of protection of gearbox: IP64
- Small dimensions
- Low weight

#### Integration

1FK702□ to 1FK710□ synchronous motors can be supplied ex works (SIEMENS) complete with a flange-mounted planetary gearbox.

The gearboxes assigned to the individual motors as well as the gearbox ratios, available for these motor-gearbox combinations are listed in the Selection and ordering data table. When making a selection, the maximum permissible input speed of the gearbox must be observed (this is the same as the maximum motor speed).

The motor/gearbox combinations listed in the selection tables are mainly intended for cyclic operation S3 - 60% (ON period ≤ 60% and ≤ 20 min). Reduced maximum motor speeds and output torques apply for use in S1 continuous duty (ON period > 60% or > 20 min). The gearbox temperature may not exceed 90 °C

1FK7 motors for gearbox mounting must be implemented as follows:

- Plain motor shaft extension
- Degree of protection IP64
- Paint finish
  - paint finish is required for 1FK702 motors
  - 1FK703 to 1FK710 motors are only available, painted

### 5.5.2.4 Selection and ordering data, series LP+

| Motor | Planetary gearbox LP+ single-stage<br>Torsional backlash ≤ 12 arcmin | | Available gear ratio i = | | Input speed, max.<br>S3-60 % | Output torque, max.<br>S3-60 % | | Output shaft radial force, max.[1] | Gearbox moment of inertia |
|---|---|---|---|---|---|---|---|---|---|
| Type | Type | Gearbox weight, approx.<br>kg<br>(lb) | 5 | 10 | $n_{G1}$<br>rpm | $M_{G2}$ at i = 5<br>Nm<br>($lb_f$-ft ) | $M_{G2}$ at i = 10<br>Nm<br>($lb_f$-ft ) | $F_r$<br>N<br>($lb_f$) | $J_G$ at i = 5/10<br>$10^{-4}$ kgm$^2$<br>($10^{-3}$ $lb_f$-in-s$^2$) |
| 1FK7022 | LP 050-MO1 | 0.75 (1.65) | ✔ | – | 8000 | 12 (8.9) | 11 (8.1) | 650 (146) | 0.055 (0.05 |
| 1FK7022 | LP 070-MO1 | 2 (4.41) | – | ✔ | 6000 | 35 (25.8) | 32 (23.6) | 1450 (326) | 0.28 (0.25) |
| 1FK7032 | | | ✔ | ✔ | | | | | |
| 1FK7033 | | | ✔ | ✔ | | | | | |
| 1FK7034 | | | ✔ | ✔ | | | | | |
| 1FK7040 | LP 090-MO1 | 4 (8.82) | ✔ | ✔ | 6000 | 90 (66.4) | 80 (59.0) | 1900 (427) | 1.77 (1.57) |
| 1FK7042 | | | ✔ | ✔ | | | | | |
| 1FK7043 | | | ✔ | ✔ | | | | | |
| 1FK7044 | | | ✔ | ✔ | | | | | |
| 1FK7060 | LP 120-MO1 | 8.6 (19.0) | ✔ | ✔ | 4800 | 220 (162) | 200 (148) | 4000 (899) | 5.42 (4.80) |
| 1FK7061 | | | ✔ | ✔ | | | | | |
| 1FK7062 | | | ✔ | ✔ | | | | | |
| 1FK7063 | | | ✔ | ✔ | | | | | |
| 1FK7064 | | | ✔ | – | | | | | |
| 1FK7080 | LP 155-MO1 | 17 (37.5) | ✔ | ✔ | 3600 | 450 (332) | 350 (258) | 6000 (1349) | 25.7 (22.8) |
| 1FK7081 | | | ✔ | ✔ | | | | | |
| 1FK7083 | | | ✔ | ✔ | | | | | |
| 1FK7084 | | | ✔ | ✔ | | | | | |
| 1FK7085 | | | ✔ | ✔ | | | | | |
| 1FK7086 | | | ✔ | ✔ | | | | | |
| 1FK7100 | | | ✔ | ✔ | | | | | |
| 1FK7101 | | | ✔ | – | | | | | |
| 1FK7103 | | | ✔ | – | | | | | |
| 1FK7105 | | | ✔ | – | | | | | |
| | Gear shaft<br>With fitted key | | Order code<br>V40 | V42 | | | | | |

Preconditions:

With the following motor versions, LP+ planetary gearboxes can be mounted:

- Plain motor shaft extension, shaft and flange accuracy tolerance N, without/with holding brake
- IP64 degree of protection

LP+ planetary gearbox can therefore only be ordered with these 1FK7 motors:
1FK7□□□-□□□□1-1□G0
1FK7□□□-□□□□1-1□H0
for 1FK702□: 1FK702□-□□□□1-1□G3
1FK702□-□□□□1-1□H3

When ordering a motor with gearbox, -Z should be added to the order number.

Example:

1FK7042 motor with holding brake with single-stage LP+ planetary gearbox with i = 5 and gear shaft with fitted key.
1FK7042-3BK71-1AH0-Z; V40

Continuous duty

Continuous duty is permissible at the rated speed and rated torque. The gearbox temperature may not exceed 90 °C (194 °F).

| Planetary gearbox LP+ single-stage<br>Torsional backlash ≤ 12 arcmin | Rated input speed | Rated output torque | |
|---|---|---|---|
| Type | $n_{G1}$<br>rpm | $M_{G2}$ at i = 5<br>Nm ($lb_f$-ft) | $M_{G2}$ at i = 10<br>Nm ($lb_f$-ft) |
| LP 050-MO1 | 4000 | 5.7 (4.2) | – |
| LP 070-MO1 | 3700 | 18 (13.3) | 16.5 (12.2) |
| LP 090-MO1 | 3400 | 45 (33.2) | 40 (29.5) |
| LP 120-MO1 | 2600 | 110 (81.1) | 100 (73.8) |
| LP 155-MO1 | 2000 | 320 (236) | 190 (140) |

✔ Possible
– Not possible
[1] Referred to the center of the output shaft at 100 rpm.

# 5.6 Drive coupling

## Function description

In order to achieve optimum drive-out characteristics, ROTEX® GS couplings supplied by KTR should be used. The advantages of ROTEX® GS couplings include:

- 2 to 4x torsional stiffness of a belt-driven gearbox
- No intermeshing teeth (when compared to belt gearboxes)
- Low moment of inertia
- Good control behavior

They must be optimally harmonized with existing machine masses, the mounted mechanical system, the machine stiffness, etc.

KTR provides assistance in the selection of the coupling, refer to http://www.ktr.com

# Connection system

# 6

## 6.1 SINAMICS drive I/O

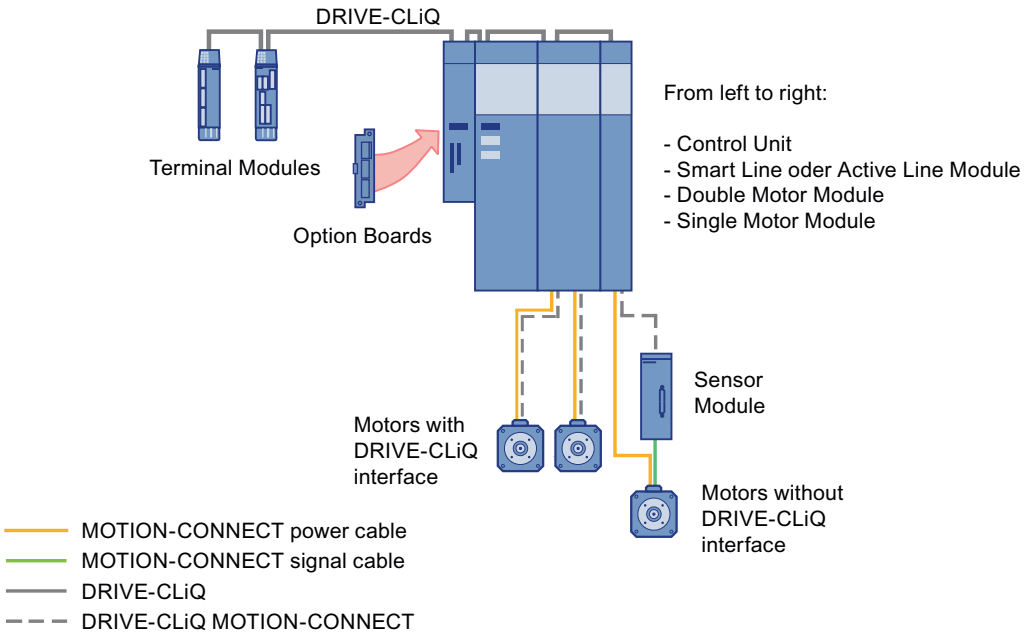



Figure 6-1 Example: SINAMICS S120 system overview

# 6.2 Power connection

**⚠ WARNING**

Before carrying out any work on the motor, please ensure that it is powered-down and the system is locked-out so that the motor cannot re-start!

The motors are not designed to be connected directly to the line supply.

## Connection assignment, power connector at the motor

Power connections U, V, W
Brake connection BD1+, BD2- (only when ordered)

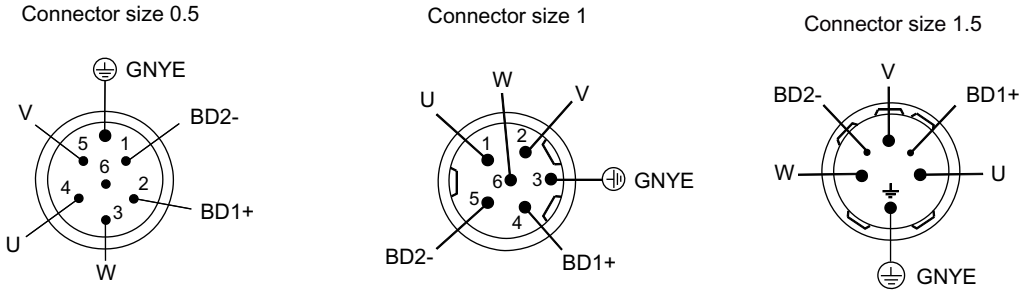



Figure 6-2 Power connection

## Connecting-up notes

The overall system compatibility is only guaranteed when using shielded power cables.

Shields must be incorporated in the protective grounding concept. Protective ground should be connected to conductors that are open-circuit and that are not being used and also electrical cables that can be touched. If the brake feeder cables in the SIEMENS cable accessories are not used, then the brake conductor cores and shields must be connected to the cabinet ground (open-circuit cables result in capacitive charges!).

Connecting cables should be appropriately strain relieved.

## Current-carrying capacity for power and signal cables

The current-carrying capacity of PVC/PUR-insulated copper cables is specified for routing types B1, B2 and C under continuous operating conditions in the table with reference to an ambient air temperature of 40 °C. For other ambient temperatures, the values must be corrected by the factors from the "Derating factors" table.

Table 6- 1 Cable cross section and current-carrying capacity

| Cross section | Current-carrying capacity rms; AC 50/60 Hz or DC for routing type | | |
|---|---|---|---|
| [mm²] | B1 [A] | B2 [A] | C [A] |
| **Electronics (according to EN 60204-1)** | | | |
| 0.20 | - | 4.3 | 4.4 |
| 0.50 | - | 7.5 | 7.5 |
| 0.75 | - | 9 | 9.5 |
| **Power (according to EN 60204-1)** | | | |
| 0.75 | 8.6 | 8.5 | 9.8 |
| 1.00 | 10.3 | 10.1 | 11.7 |
| 1.50 | 13.5 | 13.1 | 15.2 |
| 2.50 | 18.3 | 17.4 | 21 |
| 4 | 24 | 23 | 28 |
| 6 | 31 | 30 | 36 |
| 10 | 44 | 40 | 50 |
| 16 | 59 | 54 | 66 |
| 25 | 77 | 70 | 84 |
| 35 | 96 | 86 | 104 |
| 50 | 117 | 103 | 125 |

1) Extrapolated values

Table 6- 2 Derating factors for power and signal cables

| Ambient air temperature [°C] | Derating factor according to EN 60204-1 Table D1 |
|---|---|
| 30 | 1.15 |
| 35 | 1.08 |
| 40 | 1.00 |
| 45 | 0.91 |
| 50 | 0.82 |
| 55 | 0.71 |
| 60 | 0.58 |

# 6.3 Signal connection

DRIVE-CLiQ is the preferred method for connecting the encoder systems to SINAMICS.

Motors with a DRIVE-CLiQ interface can be ordered for this purpose. Motors with a DRIVE-CLiQ interface can be directly connected to the associated motor module via the available MOTION-CONNECT DRIVE-CLiQ cables. The MOTION-CONNECT DRIVE-CLiQ cable is connected to the motor in degree of protection IP67. The DRIVE-CLiQ interface supplies power to the motor encoder via the integrated 24 VDC supply and transfers the motor encoder and temperature signals and the electronic type plate data, e.g. a unique identification number, rating data (voltage, current, torque) to the control unit. The MOTION-CONNECT DRIVE-CLiQ cable is used universally for connecting the various encoder types. These motors simplify commissioning and diagnostics, as the motor and encoder type are identified automatically.

## Encoder connection on motors with DRIVE-CLiQ

Motors with DRIVE-CLiQ can be directly connected to the corresponding Motor Module via the available DRIVE-CLiQ cables (MOTION-CONNECT). This data is transferred directly to the Control Unit.

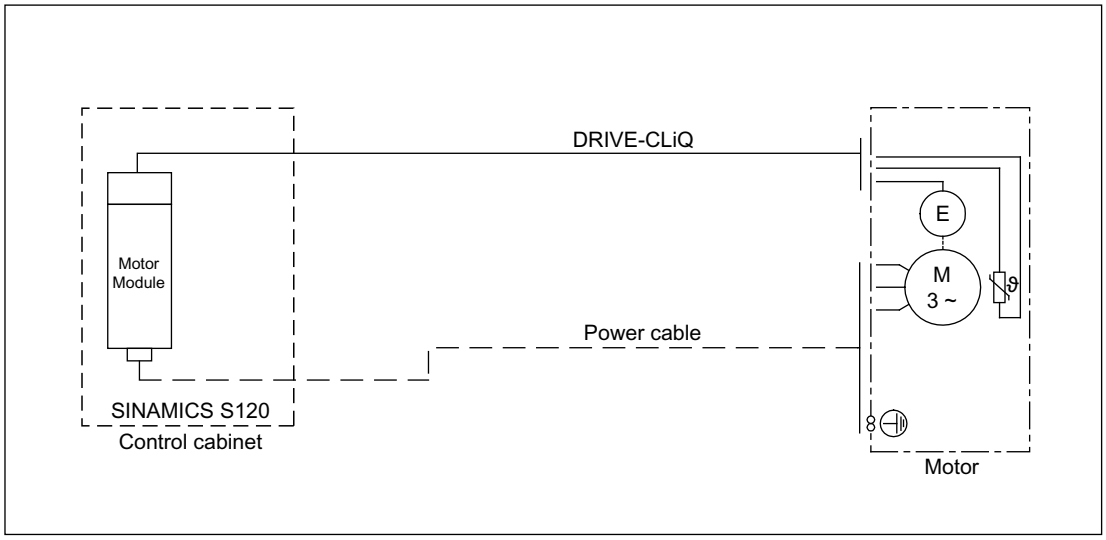



Figure 6-3 Example: Encoder interface with DRIVE-CLiQ

## Cables on motors with DRIVE-CLiQ

With DRIVE-CLiQ, the same cable is used for all encoder types. Only prefabricated cables from Siemens (MOTION-CONNECT) may be used.

Table 6- 3 Prefabricated cable

| 6FX | □ | 002 | - | □DC□□ | - | □□<br>□ | 0 |
|---|---|---|---|---|---|---|---|
| | ↓<br>↓<br>5 MOTION-CONNECT 500<br>8 MOTION-CONNECT 800 | | | | | ↓ ↓ ↓<br>Length<br>max. cable length 100 m<br>max. cable length 50 m | |

## Encoder connection on motors without DRIVE-CLiQ

If a motor is not equipped with a DRIVE-CLiQ interface, the speed encoder and temperature sensor are connected via a signal connector.

Motors without DRIVE-CLiQ require a Sensor Module Cabinet (SMC) for operation with a SINAMICS S110 / S120 drive system. The motor is connected to the SMC via a signal line. The SMC is connected to the Motor Module via a DRIVE-CLiQ cable (MOTION-CONNECT).

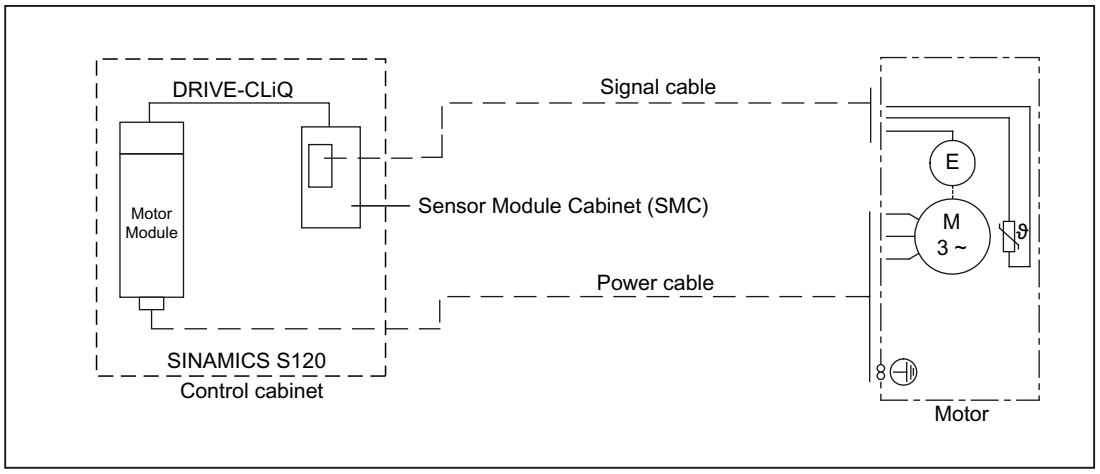
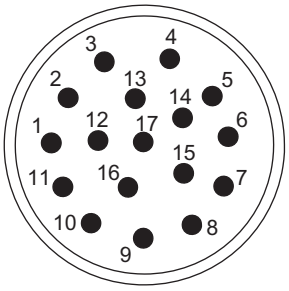



Figure 6-4 Example: Encoder interface without DRIVE-CLiQ

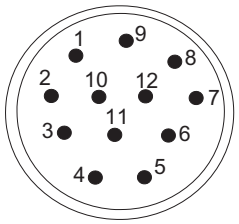
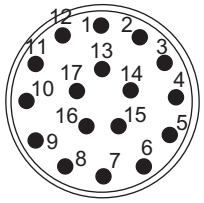
## Incremental encoder and absolute encoder without DRIVE-CLiQ

Table 6- 4 Pin assignment for 17-pin angle plug with pin contacts

| PIN No. | Incremental encoders | Absolute encoders | | | | When viewing the plug-in side (pins) |
|---|---|---|---|---|---|---|
| | IC2048S/R | AM2048S/R | AM512S/R | AM32S/R | AM16S/R | |
| 1 | A | A | | | |  |
| 2 | A* | A* | | | | |
| 3 | R | data | | | | |
| 4 | D* | not connected | | | | |
| 5 | C | clock | | | | |
| 6 | C* | not connected | | | | |
| 7 | M encoder | M encoder | | | | |
| 8 | +1R1 | +1R1 | | | | |
| 9 | –1R2 | –1R2 | | | | |
| 10 | P encoder | P encoder | | | | |
| 11 | B | B | | | | |
| 12 | B* | B* | | | | |
| 13 | R* | data* | | | | |
| 14 | D | clock* | | | | |
| 15 | 0 V sense | 0 V sense | | | | |
| 16 | 5 V sense | 5 V sense | | | | |
| 17 | not connected | not connected | | | | |

## Resolver without DRIVE-CLiQ

Table 6- 5 Connection assignment for 12/17-pin flange socket

| PIN No. | Description of the signals | | When viewing the plug-in side (pins) |
|---|---|---|---|
| | **12-pin**<br>**Connector size 1 for 1FK702□ to 1FK710□** | **17-pin**<br>**Connector size 0.5 for 1FK701□** | |
| 1 | S2 | +1R1 |  Connector size 1 |
| 2 | S4 | –1R2 | |
| 3 | not connected | not connected | |
| 4 | not connected | S1 | |
| 5 | not connected | S3 | |
| 6 | not connected | not connected | |
| 7 | R2 | S2 | |
| 8 | +1R1 | S4 | |
| 9 | –1R2 | not connected | |
| 10 | R1 | R1 | |
| 11 | S1 | R2 | |
| 12 | S3 | not connected |  Connector size 0.5 |
| 13 | --- | not connected | |
| 14 | --- | not connected | |
| 15 | --- | not connected | |
| 16 | --- | not connected | |
| 17 | --- | not connected | |

## Cables on motors without DRIVE-CLiQ

It is recommended to use prefabricated cables from Siemens (MOTION-CONNECT). These offer many advantages over cables made by other manufacturers in terms of operational reliability, quality, and cost.

Table 6- 6 Cables

| Motor | Connector type | Connector size | Cables [4] Incremental encoder | Cables [4] Absolute encoder | Cables [4] Resolver |
|---|---|---|---|---|---|
| 1FK701 | SPEED-CONNECT | 0.5 | 6FX□002-2CN20-□□□0 [2] | 6FX□002-2EN20-□□□0 [2] | 6FX□002-2FN20-□□□0 [1] |
| 1FK702 | Union nut | 1 | 6FX□002-2CA31-□□□0 [1] | 6FX□002-2EG10-□□□0 [1] | 6FX□002-2CF02-□□□0 [3] |
| 1FK703<br>1FK704<br>1FK706<br>1FK708<br>1FK710 | SPEED-CONNECT | 1 | 6FX□002-2CQ31-□□□0 [1] | 6FX□002-2EQ31-□□□0 [1] | - |

1) Max. cable length 100 m

2) Max. cable length 50 m

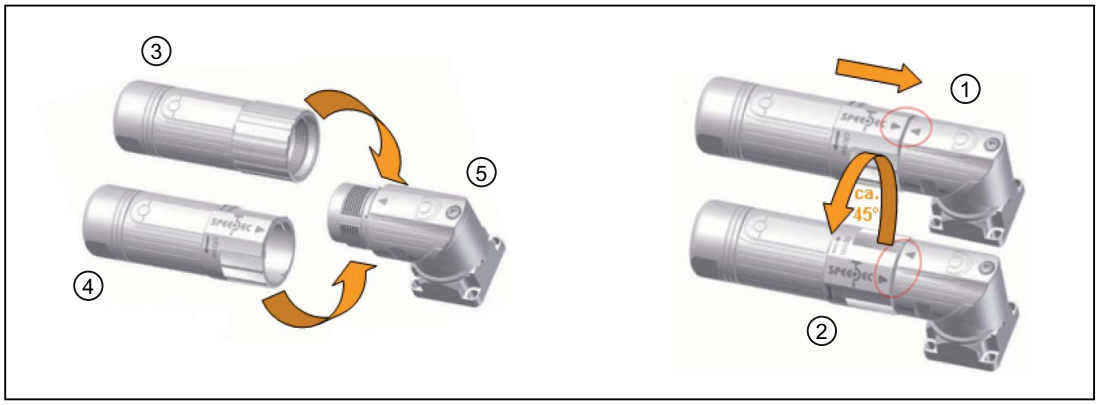
3) Max. cable length resolver multi-pole 50 m, 2-pole resolver 130 m

4) 6FX5 = MOTION-CONNECT 500, 6FX8 = MOTION CONNECT 800

For other technical data and length code, refer to Catalog, Chapter "MOTION-CONNECT connection system"

## 6.4 Quick-release lock

The motors can be connected via a quick-release catch (SPEED-CONNECT). The motor connectors are designed in such a way that both the new quick-release lock cables and the conventional cables with screw-type connection can be used.




1+2 Establishing a contact with the SPEED-CONNECT connector
3 Screw-type connection
4 SPEED-CONNECT
5 Motor connectors with SPEED-CONNECT

Figure 6-5 Quick-release lock

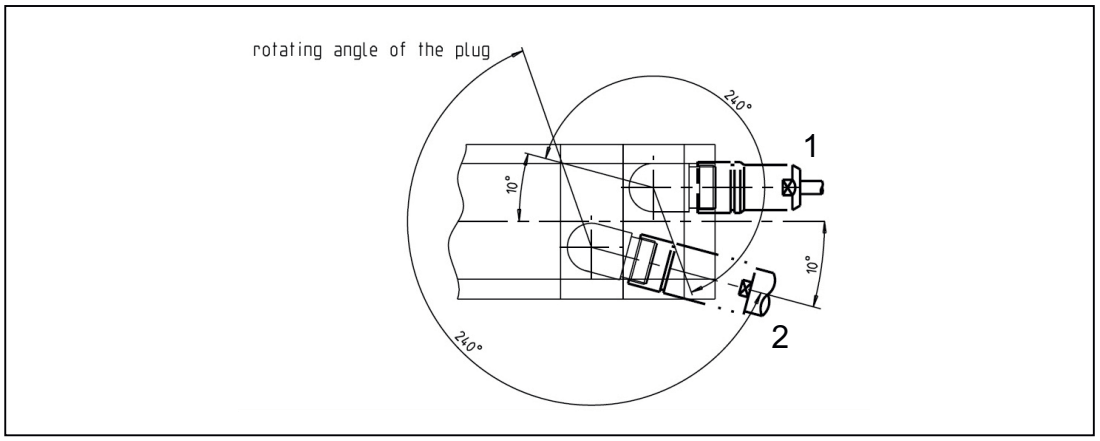
## 6.5 Rotating the connector at the motor

Power connectors and signal connectors can be rotated to a limited extent. A suitable socket connector can be used to rotate the angle plug. The socket connector must be completely screwed on in order to avoid damaging the pin contacts. For encoders with integrated Sensor Modules (DQI) the cable outlet towards the top is fixed and cannot be changed.

| NOTICE |
| --- |
| **Rotating the connectors**<br>• It is not permissible that the specified rotation range is exceeded.<br>• In order to guarantee the degree of protection, max. 10 revolutions are permissible.<br>• Connectors should be rotated using the matching mating connector located on the connector thread. Only rotate Sensor Modules by hand. The use of pipe wrenches, hammers, or similar is not permitted. |

Table 6- 7 Direction of rotation and max. torque when rotating

| Connectors | Rotation range | Max. torque when rotating |
|---|---|---|
| Power connector, size 0.5 | 270° | 8 Nm |
| Power connector, size 1 | 270° | 12 Nm |
| Signal connector (without DRIVE-CLiQ) | 230° for 1FK701<br>180° for 1FK702 | 8 Nm<br>12 Nm |
| Signal connector (with DRIVE-CLiQ) | 270° | 8 Nm |



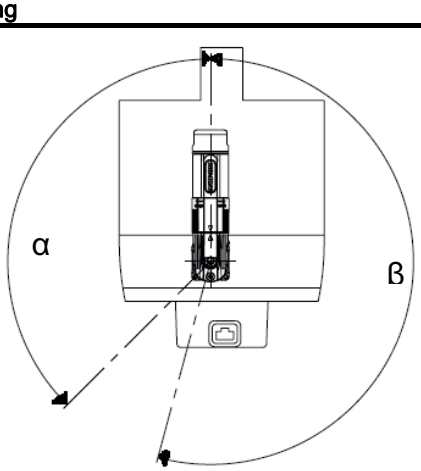

1 Signal connector

2 Power connector

Figure 6-6 For 1FK701/1FK702 the connector can be rotated

## Ability to rotate the power connector for motors with DRIVE-CLiQ interface without Sensor Modules 1FK7□□□-□□□□□-□X□□; X = B, C, Q, R

Table 6- 8 Rotation range of the power connector

| Motor | Angle α | Angle β | Connector size | Drawing |
|---|---|---|---|---|
| 1FK703 | 122° | 208° | 1 |  |
| 1FK704<br>1FK706<br>1FK708<br>1FK710 | 135° | 195° | 1 | |
| 1FK708<br>1FK710 | 195° | 140° | 1.5 | |



## Ability to rotate the connectors for motors without a DRIVE-CLiQ interface and for motors with DRIVE-CLiQ interface via Sensor Modules 1FK7□□□-□□□□□-□X□□; X = A, E, H, D, F, L

Table 6- 9 Rotation range of the power connector

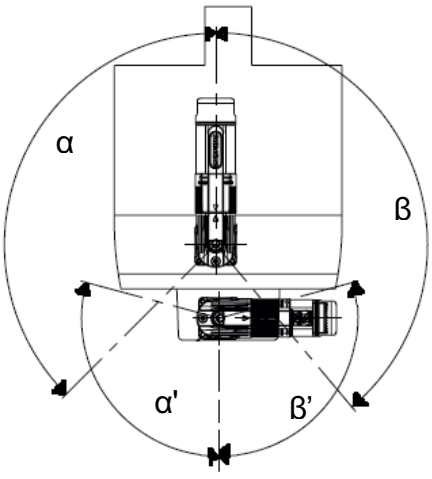
| Motor | Angle α | Angle β | Connector size | Drawing |
|---|---|---|---|---|
| 1FK703 | 122° | 158° | 1 |  |
| 1FK704<br>1FK706<br>1FK708 | 135° | 140° | 1 | |
| 1FK710 | 135° | 195° | 1 | |
| 1FK708<br>1FK710 | 195° | 140° | 1.5 | |

Table 6- 10 Rotation range of the signal connector

| Motor | with DRIVE-CLiQ via Sensor Module | | connector without DRIVE-CLiQ | | Drawing |
|---|---|---|---|---|---|
| | Angle α´ | Angle β´ | Angle α´ | Angle β´ | |
| 1FK703 | 160° | 130° | 160° | 135° | See Table, "Power connectors" |
| 1FK704 | 145° | 140° | 145° | 130° | |
| 1FK706 | 140° | 145° | 150° | 135° | |
| 1FK708<br>1FK710 | 105° | 100° | 105° | 105° | |

Table 6- 11 Max. torque when rotating

| Connectors | Max. torque when rotating |
|---|---|
| Power connector, size 1 | 12 Nm |
| Power connector, size 1.5 | 20 Nm |
| Signal connector (without DRIVE-CLiQ) | 12 Nm |
| Signal connector (with DRIVE-CLiQ) | 8 Nm |

# Information about using the motors

# 7

## 7.1 Transport / storage before use

The motors should be stored indoors in dry conditions with low-dust and low vibration levels ($v_{eff}$ < 0.2 mm/s). The motors should not be stored longer than two years at room temperature (+5° C to +40° C) to retain the service life of the grease.

Observe the additional notes regarding transport and storage in the operating instructions.

## 7.2 Environmental conditions

Operating temperature range: -15° C to +40° C (without any restrictions).

All of the catalog data refer to an ambient temperature of 40° C, mounted so that the motors are not thermally insulated and an installation altitude up to 1000 m above sea level.

Under conditions other than those specified above (ambient temperature > 40°C or installation altitude > 1000 m above sea level), the permissible torque/power must be determined using the factors from the following table.

Ambient temperatures and installation altitudes are rounded-off to 5° C or 500 m respectively.

Table 7- 1 Factors to reduce the torque/power (de-rating)

| Installation altitude above sea level [m] | Ambient temperature in ° C | | | | |
|---|---|---|---|---|---|
| | < 30 | 30 - 40 | 45 | 50 | 55 |
| 1000 | 1.07 | 1.00 | 0.96 | 0.92 | 0.87 |
| 1500 | 1.04 | 0.97 | 0.93 | 0.89 | 0.84 |
| 2000 | 1.00 | 0.94 | 0.90 | 0.86 | 0.82 |
| 2500 | 0.96 | 0.90 | 0.86 | 0.83 | 0.78 |
| 3000 | 0.92 | 0.86 | 0.82 | 0.79 | 0.75 |
| 3500 | 0.88 | 0.82 | 0.79 | 0.75 | 0.71 |
| 4000 | 0.82 | 0.77 | 0.74 | 0.71 | 0.67 |

## 7.3 Routing cables in a damp environment

| NOTICE |
| --- |
| If the motor is mounted in a humid environment, the power and signal cables must be routed as shown in the following figure. |

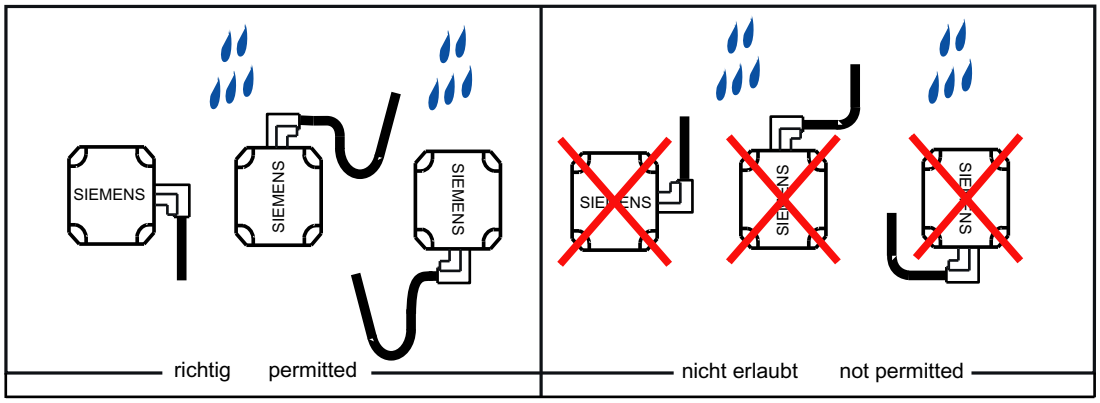
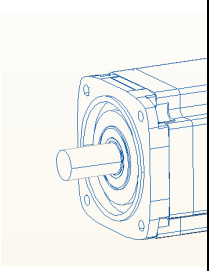
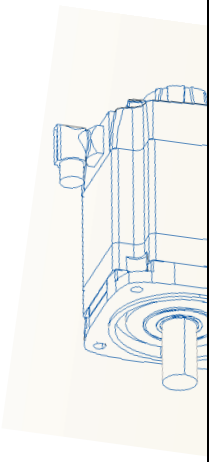
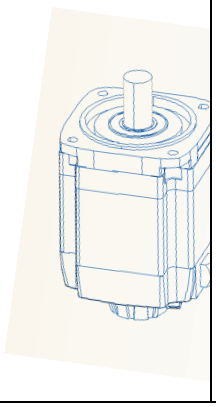



Figure 7-1 Principle cable routing in a moist environment

# 7.4 Types of construction

Table 7- 2 Designation of types of construction (acc. to IEC 60034-7)

| Designation | Representation | Description |
|---|---|---|
| IM B5 |  | Standard |
| IM V1 |  | The 1FK7 motors can be used in types of construction IM V1 and IM V3 without special ordering.<br>Note:<br>When configuring the IM V3 type of construction, attention must be paid to the permissible axial forces (force due to the weight of the drive elements) and especially to the necessary degree of protection. |
| IM V3 |  | |

# 7.5 Mounting conditions

Some of the motor power loss is dissipated through the flange when the motor is connected to the mounting flange.

### Non-thermally insulated mounting

The following mounting conditions apply for the specified motor data:

Table 7- 3 Non-thermally insulated mounting conditions

| Shaft height | Steel plate, width x height x thickness [mm] | Mounting surface[$m^2$] |
|---|---|---|
| 1FK701□ | 120 x 100 x 10 | 0.012 |
| 1FK702□ to 1FK704□ | 120 x 100 x 40 | 0.012 |
| 1FK706□ to 1FK710□ | 450 x 370 x 30 | 0.17 |

For larger mounting surfaces, the heat dissipation conditions improve.

### Thermally insulated mounting without additionally mounted components

For non-ventilated motors, the motor torque must be reduced by between 5 % and 10 %. We recommend configuring the motor using the $M_{0\ (60\ K)}$ values. As the speed increases, the reduction factor rises (see Fig. "Effect of the mounting conditions on the S1 characteristic").

### Thermally insulated mounting with additionally mounted components

- Holding brake (integrated in the motor). No additional torque reduction required
- Gearbox; the torque has to be reduced (see Fig. "Effect of the mounting conditions on the S1 characteristics")

### Effect of thermally insulated/non-insulated mounting without and with gearbox

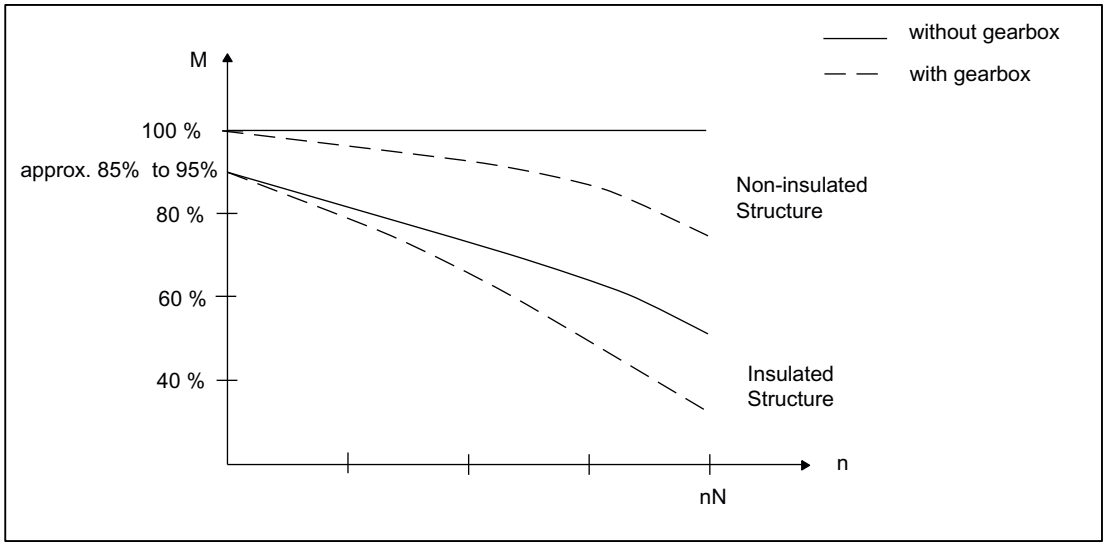



Figure 7-2 Effect of the mounting conditions on the S1 characteristic

## 7.6 Vibratory load

For perfect function and to comply with the motor specification (particularly the bearing service life) the vibration values specified in the following table must not be exceeded.

Table 7- 4 Vibration values

| | |
|---|---|
| Vibration speed $v_{rms}$ according to ISO 10816 | Max. 4.5 mm/s |
| Vibration acceleration $a_{peak}$ axial 1) | 25 m/s$^2$ |
| Vibration acceleration $a_{peak}$ radial 1) | 50 m/s$^2$ |

1) For motors with separately driven fans, the limit value for axial and radial vibration acceleration is limited to 10 m/s$^2$ .

The measurement points should be selected in accordance with ISO 10816-1 Paragraph 3.2. The vibration values must not exceed the specified limits at any measurement point.

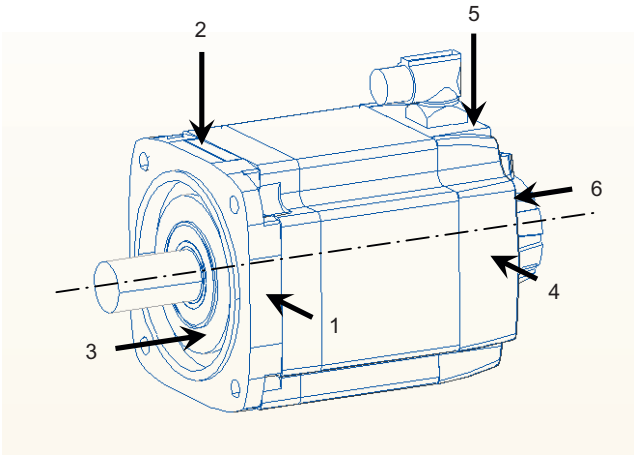



Figure 7-3 Vibration values at the measurement points

The **vibration acceleration** must be measured in a frequency band of 10 to 2000 Hz. The maximum peak value in the time range is to be considered.

To measure the **vibration speed**, the measuring equipment must fulfill the requirements of ISO 2954.

## 7.7 Permissible line system configurations

In combination with the drive system, the motors are generally approved for operation on TN and TT systems with **grounded neutral** and on IT systems.

In operation on IT systems, the occurrence of a first fault between an active part and ground must be signaled by a monitoring device. In accordance with IEC 60364-4-41 it is recommended that the first fault should be eliminated as quickly as practically possible.

In systems with a **grounded external conductor**, an isolating transformer with grounded neutral (secondary side) must be connected between the line supply and the drive system to protect the motor insulation from excessive stress. The majority of TT systems have a grounded external conductor, so in this case an isolating transformer must be used.

# Appendix A

## A.1 Description of terms

### Rated torque $M_N$

Thermally permissible continuous torque in S1 duty at the rated motor speed.

### Rated speed $n_N$

The characteristic speed range for the motor is defined in the speed-torque diagram by the rated speed.

### Rated current $I_N$

RMS motor phase current for generating the particular rated torque. Specification of the RMS value of a sinusoidal current.

### Rated converter current $I_{N\ conv}$

RMS converter output current (per phase) that can be supplied on a continuing basis by the recommended Motor Module The recommended Motor Module is determined with the stall current $I_{0\ (100K)}$.

### Braking torque $M_{br\ eff}$

$M_{br\ eff}$ corresponds to the average braking torque for armature short-circuit braking that is achieved through the upstream braking resistor $R_{opt}$.

### Braking resistance $R_{opt}$

$R_{opt}$ corresponds to the optimum resistance value per phase that is switched in series external to the motor winding for the armature short-circuit braking function.

### DE

Drive end = Drive end of the motor

### Cyclic inductance $L_D$

The cyclic inductance is the sum of the air gap inductance and leakage inductance relative to the single-strand equivalent circuit diagram. It consists of the self-inductance of a phase and the coupled inductance to other phases.

### Torque constant $k_T$ (value for a 100 K average winding temperature rise)

Quotient obtained from the static torque and stall current.

Calculation: $k_T = M_{0,\ 100\ K} / I_{0,\ 100\ K}$

The constant applies up to approx. 2 • $M_{0,\ 60\ K}$ in the case of self-cooled motors

**Note**

This constant is not applicable when configuring the necessary rated and acceleration currents (motor losses!).

The steady-state load and the frictional torques must also be included in the calculation.

### Electrical time constant $T_{el}$

Quotient obtained from the rotating field inductance and winding resistance. $T_{el} = L_D/R_{Str}$

### Maximum speed $n_{max}$

The maximum mechanically permissible operating speed $n_{max}$ is the lesser of the maximum mechanically permissible speed and the maximum permissible speed at the converter.

### Maximum torque $M_{max}$

Torque that is generated at the maximum permissible current. The maximum torque is briefly available for high-speed operations (dynamic response to quickly changing loads).

The maximum torque is limited by the closed-loop control parameters.

### Maximum torque (limited by converter) $M_{max\ conv}$

The maximum torque that can be applied (temporarily) for operation on the recommended motor module.

### Max. current $I_{max}$

This current limit is only determined by the magnetic circuit. Even if this is briefly exceeded, it can result in an irreversible de-magnetization of the magnetic material. Specification of the RMS value of a sinusoidal current.

### Maximum converter current $I_{max\ conv}$

RMS converter output current (per phase) that can be supplied temporarily by the recommended motor module

### Maximum permissible speed (mechanical) $n_{max}$.

The maximum mechanically permissible speed is $n_{max\ mech}$. It is defined by the centrifugal forces and frictional forces in the bearing.

### Maximum permissible speed at converter $n_{max\ conv}$

The maximum permissible operating speed for operation at a converter is $n_{max\ conv}$ (e.g. limited by withstand voltage, maximum frequency).

### Mechanical time constant $T_{mech}$

The mechanical time constant is obtained from the tangent at a theoretical ramp-up function through the origin.

$T_{mech} = 3 \bullet R_{Str} \bullet J_{Mot}/k_T^2$ [s]

$J_{Mot}$ = Servomotor moment of inertia [kgm$^2$]

$R_{Str}$ = Phase resistance of the stator winding [Ohm]

$k_T$ = Torque constant [Nm/A]

### NDE

Non-drive end = Non-drive end of the motor

## Optimum operating point

Operating point at which the maximum continuous output of the motor is normally provided at high efficiency (see figure below).

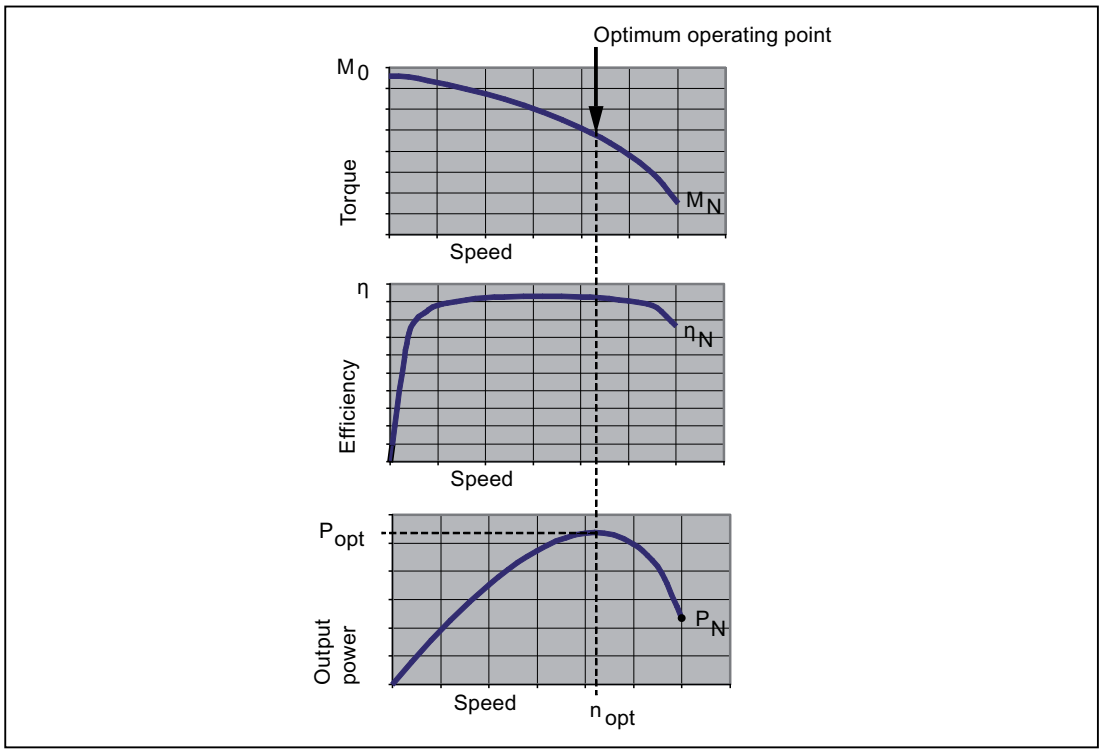



Figure A-1 Optimum operating point

## Optimum speed $n_{opt}$

Speed at which the optimum motor power is output.

If the rated speed is less than the optimum speed, the rated speed is indicated.

## Optimum power $P_{opt}$

Power achieved at the optimum speed.

The rated speed is the optimum speed (see optimum speed), the optimum power corresponds to the rated power.

## Number of poles 2p

Number of magnetic north and south poles on the rotor. p is the number of pole pairs.

### Voltage constant $k_E$ (value at 20° C rotor temperature)

Rms value of the induced motor voltage at a speed of 1000 rpm and a rotor temperature of 20 °C.

### Static torque $M_0$

Thermal limit torque at motor standstill corresponding to utilization according to 100 K or 60 K. This can be output for an unlimited time when n = 0 rpm. $M_0$ is always greater than the rated torque $M_N$.

### Stall current $I_0$

Motor phase current to generate the particular stall torque ($M_0 = k_T \bullet I_0$). Specification of the RMS value of a sinusoidal current.

### Thermal time constant $T_{th}$

Defines the increase in the motor frame temperature when the motor load is suddenly increased (step function) to the permissible S1 torque. The motor has reached 63% of its final temperature after $T_{th}$.

### Moment of inertia $J_{Mot}$

Moment of inertia of rotating motor parts. $J_{Mot}$ = without brake, $J_{MotBr}$ = with brake.

### Shaft torsional stiffness $c_{t\,Mot}$

This specifies the shaft torsional stiffness from the center of the rotor laminated core to the center of the shaft end. $c_{t\,Mot}$ = without brake, $c_{t\,MotBr}$ = with brake.

### Winding resistance $R_{Str}$ at 20 °C winding temperature

The resistance of a phase at a winding temperature of 20° C is specified. The winding has a star circuit configuration.

# A.2 Declaration of conformity

SIEMENS

## EG-Konformitätserklärung
## *EC Declaration of Conformity*

**No. 664.20022.21**

| | |
|---|---|
| Hersteller:<br>*Manufacturer:* | **Siemens Aktiengesellschaft**<br>Industrie Sector<br>DT MC EWN |
| Anschrift:<br>*Address:* | Industriestraße 1<br>97615 Bad Neustadt a. d. Saale<br>Germany |
| Produktbezeichnung:<br>*Description of the product:* | **Drehstrom – Synchronmotor, Servoantrieb Typ 1FK7...**<br>*Three-phase synchronous servo-motor, type 1FK7…* |

Die bezeichneten Produkte stimmen in der von uns in Verkehr gebrachten Ausführung mit den Vorschriften folgender Europäischer Richtlinie überein:
*The products described above in the form as delivered are in conformity with the provisions of the following European Directive:*

2006/95/EG Richtlinie des Europäischen Parlaments und de Rates vom 12.Dezember 2006 zur Angleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen.
*Directive of the European Parliament and the Council of 12. December 2006 on the approximation of the laws of the Member States related to electrical equipment designed for use within certain voltage limits.*

Die Konformität mit der Richtlinie wird nachgewiesen durch die Einhaltung folgender Normen:
*Conformity to the Directive is assured through the application of the following Standards:*

EN 60034-1*): 2004 EN 60204-1 : 2006
***) mit allen relevanten Teilen / *with all relevant parts***

**Die Sicherheitshinweise und Betriebsanleitungen sind zu beachten.**
*The safety and manual documentation have to be considered in detail.*

Erste CE - Kennzeichnung: 2002 */ first CE - marking: 2002*

Die bezeichneten Produkte sind zum Einbau in andere Maschinen bestimmt. Die Inbetriebnahme ist solange untersagt, bis die Konformität des Endproduktes mit der Richtlinie 2006/42/EG festgestellt ist.
Alle Sicherheitshinweise der zugehörenden Produktdokumentation sind zu beachten sowie dem Endanwender zur Kenntnis zu geben.
Diese Erklärung stellt keine Beschaffenheits- und Haltbarkeitsgarantie gemäß § 443 BGB dar.

*The products supplied are intended exclusively for installation in a machine. Commissioning is prohibited until it has been established that the end product conforms with the Directive 2006/42/EU. All safety instructions in the associated product documentation must be observed and given to the end user for his/her information.*
*This declaration contains no condition and durability guarantee to § 443 BGB (German Civilian Code).*

Bad Neustadt, den 10.02.2010

Siemens Aktiengesellschaft

i.V. Frank ..... i.V. Dainat .....

Frank Michael,
*Head of the Electric Motor Factory, Bad Neustadt*

Dr. Jan Dainat,
*Head von Engineering Department (KT)*

Diese Erklärung bescheinigt die Übereinstimmung mit der genannten Richtlinie, ist jedoch keine Zusicherung von Eigenschaften.
*This declaration certifies the conformity to the specified Directive, but contains no assurance of properties.*

Ersatz für / *Substitute for* 664.20022.21 Stand / *Status*: 02/2002

**Ausgabestand / *Status*: 02/2010**
**Erstausgabe / *first document*: 02/2002**

# Index

## V

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