SINAMICS S120

Synchronous Built-in Motors 1FE1

Configuration Manual 06/2010

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06/2010
6SN1197-0AC01-0BP0

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 corresponding 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 for the specific task, 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 adhered to. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of the Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

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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℗ 11/2010

Preface

Information on the documentation

At http://www.siemens.com/motioncontrol/docu information is available on the following topics:

- Ordering documentation
  Here you can find an up-to-date overview of publications
- Downloading documentation
  Links to more information for downloading files from Service & Support.
- Researching documentation online
  Information on DOConCD and direct access to the publications in DOConWeb.
- Compiling documentation individually on the basis of Siemens content with the My Documentation Manager (MDM), see http://www.siemens.com/mdm
  The My Documentation Manager offers you a range of features for creating your own machine documentation.
- Training and FAQs
  Information on the range of training courses and FAQs (frequently asked questions) are available via the page navigation.

Target group

Planners and project 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 system that is actually supplied. Other functions not described in this documentation might be able to be executed in the drive system. This does not, however, represent an obligation to supply such functions with a new control or when servicing. Extensions or changes made by the machine manufacturer are documented by the machine manufacturer.

For the sake of simplicity, this documentation does not contain all detailed information about all types of the product and cannot cover every conceivable case of installation, operation, or maintenance.

Questions about this documentation

Please send any questions about the technical documentation (e.g. suggestions, corrections) to the following fax number or E-Mail address:

Fax	+49 (0) 9131 / 98-2176
E-mail	E-mail to: docu.motioncontrol@siemens.com

A fax form is available in the appendix of this document.

Information on the product

http://www.siemens.com/sinamics

EC Declarations of Conformity

The EC Declaration of Conformity for the EMC Directive can be found/obtained

- in the Internet:

  http://support.automation.siemens.com under entry ID 22383669 or
- with the responsible 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 devices may only be connected to the power supply via residual current protective devices if it has been verified (in accordance with EN 50178, Section 5.2.11.2) that the device is compatible with the residual current protective device. 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.

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 electrostatic-sensitive device (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 synchronous built-in motor 1

1.1 Features and system preconditions

Application

The 1FE1 series has been developed for directly-driven motor spindles. The built-in motor is a compact drive solution where the mechanical motor power is transferred directly to the spindle without any mechanical transmission elements.

As the motor is mounted between the spindle bearings, the motor spindle has a high degree of stiffness. This means, for example, that C-axis operation for lathes can be implemented using just one drive.

Standard 1FE1 built-in motors are water-cooled, permanent-magnet synchronous motors that are supplied as components (refer to the following diagram).

A complete spindle unit is created after the rotor has been mounted into the spindle box.

Figure 1-1 Components of 1FE1 synchronous built-in motors

Comparison of synchronous/induction motor technology

The most important advantages of synchronous motor technology with respect to induction motor technology are (assuming the same power rating and the same frame size):

- Higher torque (up to 60%) with the same active component volume (compare with 1PH2 motors). This results in a more compact machine design.
- Shorter acceleration times with the same moment of inertia.
- Lower cooling power with the same torque.

Temperature behavior of synchronous/induction motor technology:

- Typically, synchronous motor rotors have a different temperature characteristic than induction motor rotors. Under no load conditions and at high speeds, induction motor rotors are cooler (lower temperature increase) - while under full load conditions, rotors can reach temperatures of up to 250 °C.
- In the speed range up to 200% rated speed $n \leq 2 \cdot n_N$ a synchronous motor generates significantly less power loss in the rotor as a comparable induction motor rotor. This applies both for no-load operation as well as for operation with a load. This means that the bearing and rotor temperatures are lower, the spindle and material do not expand as much and a higher degree of precision is achieved.
- In the speed range $\geq 2 \cdot n_N$ up to the maximum motor speed, under no-load conditions, the synchronous motor can have a higher temperature rise than an induction motor. The reason for this is the field weakening current required, which, for a synchronous motor, must be additionally impressed in the winding in order to weaken the rotor field. For this speed range, typical temperature values for synchronous motors are 110 °C in the stator. However, the temperature increase when a load is connected (approx.10 ... 15 °C) is significantly lower when compared to an induction motor. The rotor of an induction motor can reach approx. 250 °C when a load is connected.
- The temperature characteristic/behavior must be taken into consideration when designing the spindle.

A comparison of torque/power for synchronous/induction motors:

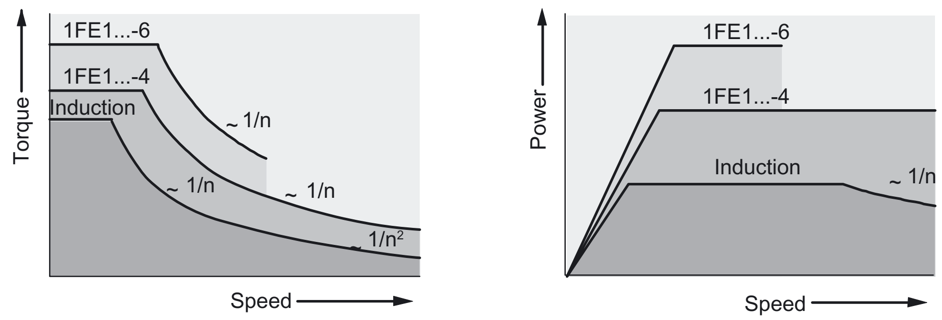


Figure 1-2 Comparison of the torque/power characteristics between 1FE1 built-in motors and induction motors

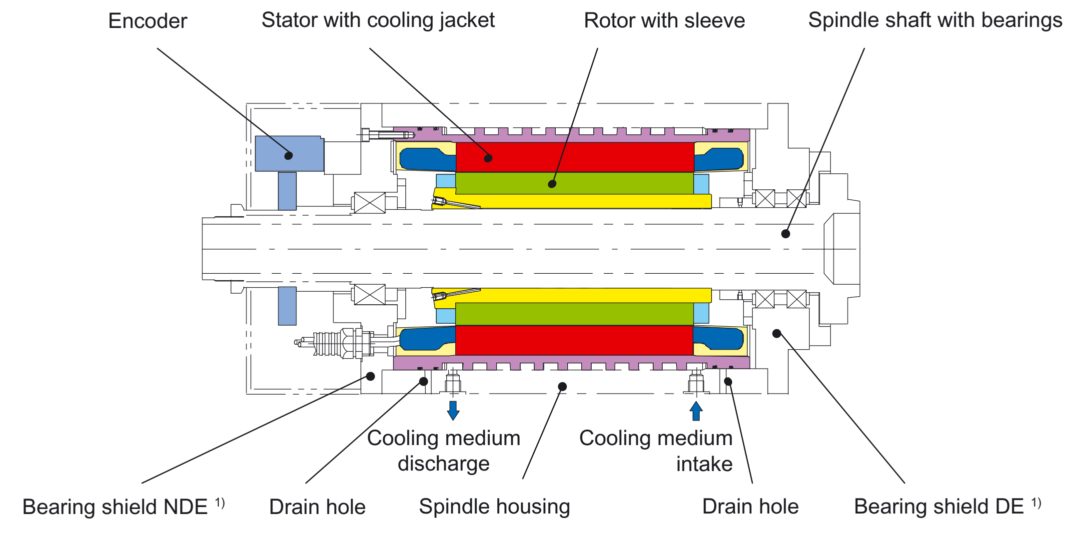
Synchronous motor with permanent magnets

Depending on the motor type, the rotor is equipped with **internal** (IPM) or with **external** (APM) permanent magnets.

Motor spindle

Generally, a motor spindle comprises the following modules (see the following diagram):

- Spindle housing
- Spindle shaft with bearings
- Built-in motor
- Cooling system
- Encoder system



1) DE = Drive End
NDE = Non Drive End

Figure 1-3 Motor spindle design

Note

The spindle manufacturer is responsible for designing the bearings, lubrication and cooling.

A ferritic spindle shaft is a prerequisite in order to achieve the electrical parameters.

Properties and application areas of built-in motors

1FE1 built-in motors can be adapted to a wide range of applications thanks to the different frame sizes. The main features are:

- As a result of its properties, the 4-pole series is especially suitable for high speed applications (e.g. for milling).
- As a result of their properties, the 6- and 8-pole series are especially suitable for machining at high torque levels (e.g. turning and grinding) and C-axis operation.
- Maximum speed: up to 40,000 rpm (depending on the frame size)
- Maximum rated torque: up to 820 Nm (depending on the frame size)
- The torque is transmitted to the spindle mechanically without play by means of a press fit.
- The rotor is completely machined. Additional machining after installation is not required.
  - Rotors **with** sleeve, depending on the version from the manufacturer, are pre-balanced or not balanced and can be disassembled.
  - Rotors **without** sleeves are not balanced. They cannot be disassembled without damage.

Note

EMF [2] > 820 V

Depending on the maximum EMF (pole wheel voltage > 820 V) a Voltage Protection Module (VPM) or the "Internal Voltage Protection" (IVP) function is required; see Chapter "Voltage limiting".

12. Position of the motor MLFB = 0: voltage limiting is not required

12. Position of the motor MLFB = 1: Voltage limiting is required

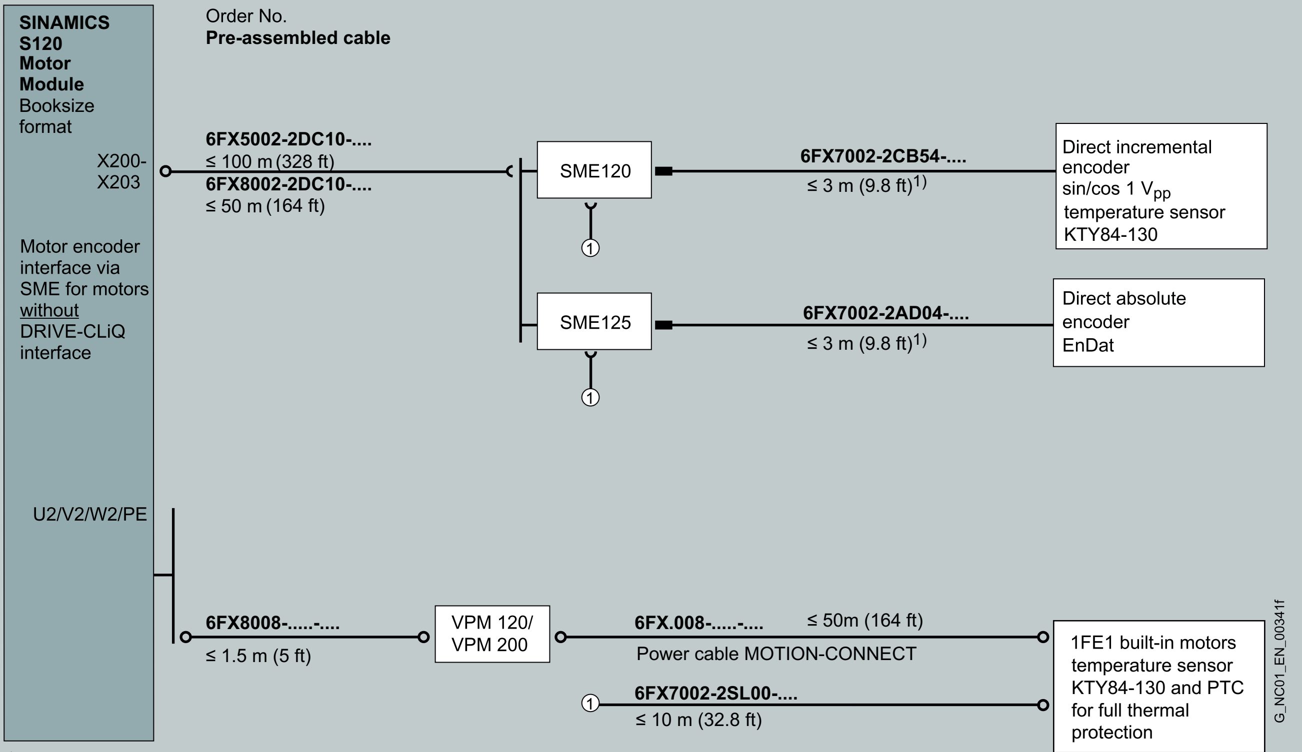
---

2) Electromotive force

System prerequisites

The following prerequisites must be fulfilled:

- Open-loop and closed-loop control modules
  - SINUMERIK 840D sl (from software release 2.4 and higher)
  - SINAMICS S120, PM340 (from software release 2.4 and higher)
- Hollow-shaft measuring system



1) Up to 10 m (32.8 ft) possible, dependent on encoder current consumption.

2) Pre-assembled cables, see selection and ordering data for synchronous motors.

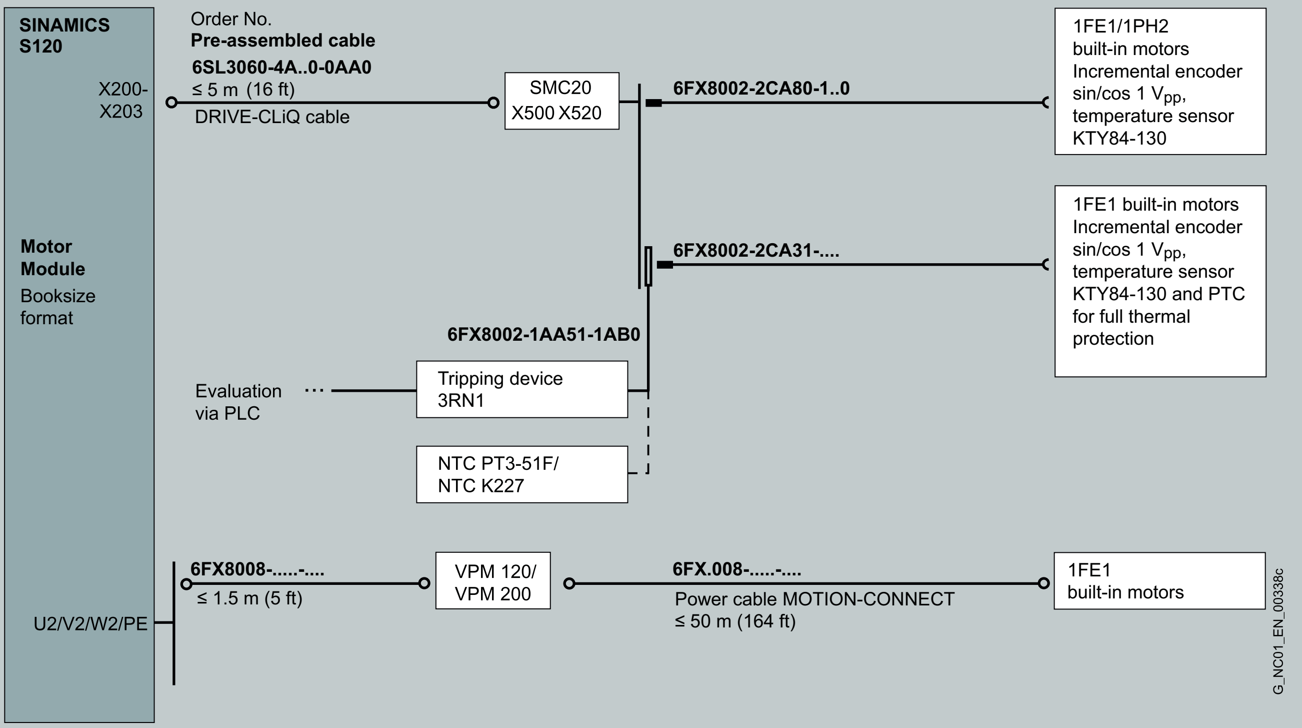


Figure 1-4 Connection overview

Magnetic attraction

Forces of attraction occur between the rotor and stator in electric motors to the magnetic principle.

The surrounding mechanical assembly must be able to withstand these forces. In order to avoid exciting vibration, the surrounding mechanical assembly (spindle shaft, bearings, spindle housing) should be designed to be as stiff as possible.

Mechanical system

The machining precision able to be achieved by the motor spindle is influenced in addition to the system stiffness (housing, bearings, spindle) also by the balance quality. The spindle manufacturer is responsible for the implementation and the proof.

> ⚠WARNING
>
> **Static charging of the rotor**
>
> The rotor can be statically charged at higher speeds depending on the mechanical spindle design as well as the properties of the spindle bearings (e.g. grease and minimum oil lubrication)! The spindle manufacturer must implement the appropriate countermeasures.
>
> When using ceramic bearings, the motor shaft should be grounded. If this is not done, flashover can occur between the shaft and the sensor housing!

Accuracy

The accuracy of a motor spindle is defined on one hand by the mechanical design and implementation and on the other hand by the closed-loop control technology and the encoder resolution.

Degree of protection

The motor components have degree of protection IP00.

The final degree of protection is defined by the spindle manufacturer as a result of the mechanical design of the spindle housing. Protection against touch, foreign bodies and water for electrical equipment is specified in accordance with EN 60034, Part 5.

Recommendation: IP54 (minimum degree of protection)

Closed loop control

The determining factors of closed-loop control include:

- the number of encoder signals per spindle revolution
- the precision achieved when mounting and adjusting the encoder system
- multiplication of the encoder signals
- the sampling time of the current and speed controller

1.2 Technical characteristics

Table 1- 1 Technical characteristics of built-in motors

Type of motor	Synchronous motor with permanent magnet rotor (4, 6 or 8-pole)
Type of construction	Individual components (IM 5110 acc. to IEC 60034-7) Stator, rotor
Degree of protection	IP00 (acc. to DIN IEC 60034, Part 5): Stator, rotor
Cooling	Water cooling with T_{H2O} = 25 °C acc. to EN 60034-1 and Q = 8 l/min
Standard protection - temperature monitoring	2x KTY 84 PTC thermistors in the stator winding (1x reserve)
Full protection (optional)	In addition to the standard protection 1 x PTC thermistor triplet (3 sensors in series) Can be evaluated, e.g. using a thermal motor protection unit: Order No.: 3RN1013-1GW10
Universal protection (optional)	Full protection + NTC PT3-51-F + NTC K227
Winding insulation	Temperature class 155 (F) acc. to EN 60034 permits an average winding temperature rise of 105 K. The power data are valid for a cooling water temperature of +5 - 25 °C.
Balance quality of the rotor (acc. to ISO 1940-1)	• Rotor with sleeve: Depending on the particular version, pre-balanced, balance quality G 2.5 reference speed 3600 rpm or non-balanced for complete balancing after mounting and installation • Rotor without sleeve: Not pre-balanced
Motor voltage (terminal voltage)	regulated: Maximum 3 AC 430 V_{rms} Non-regulated: Maximum 3 AC 460 V_{rms}
Supply voltage of the SINAMICS S120 drive system	ALM 400 V → V_{DClink} ≦ 600 V SLM 400 V → V_{DClink} ≦ 600 V SLM 480 V → V_{DClink} ≦ 634 V **Notice: ALM 480 V is not possible!**
Type of connection	Free single cables U1, V1, W1 (cables freely brought out); Length 0.5 m (preferred version) or 1.5 m
Torque ripple 1FE1 ... -6W 1FE1 ... -8W 1FE1 ... -4W	 ≦ 1 % at 20 rpm and M_N/2 referred to the rated torque ≦ 1 % at 20 rpm and M_N/2 referred to the rated torque ≦ 2 % at 20 rpm and M_N/2 referred to the rated torque
UL marking	Motors with the exception UL-1004 are permitted (overview, see diagram "Motors with UL marking; MLFB overview")

Note

Technical data are system data and are only applicable in conjunction with the specified system components (1FE1 built-in motor, SINAMICS S120, VPM, IVP etc.).

Scope of supply of the 1FE1 built-in motor

1. a) APM rotor core (rotor with composite fiber banding and external permanent magnets)

   or

   b) IPM rotor core (laminated rotor with internal permanent magnets)
2. Stator core with cooling jacket (optional, without cooling jacket)
3. Round sealing rings (4x) (for version with standard cooling jacket)
4. Motor rating plate (type plate)
5. Installation instructions
6. Circuit diagram

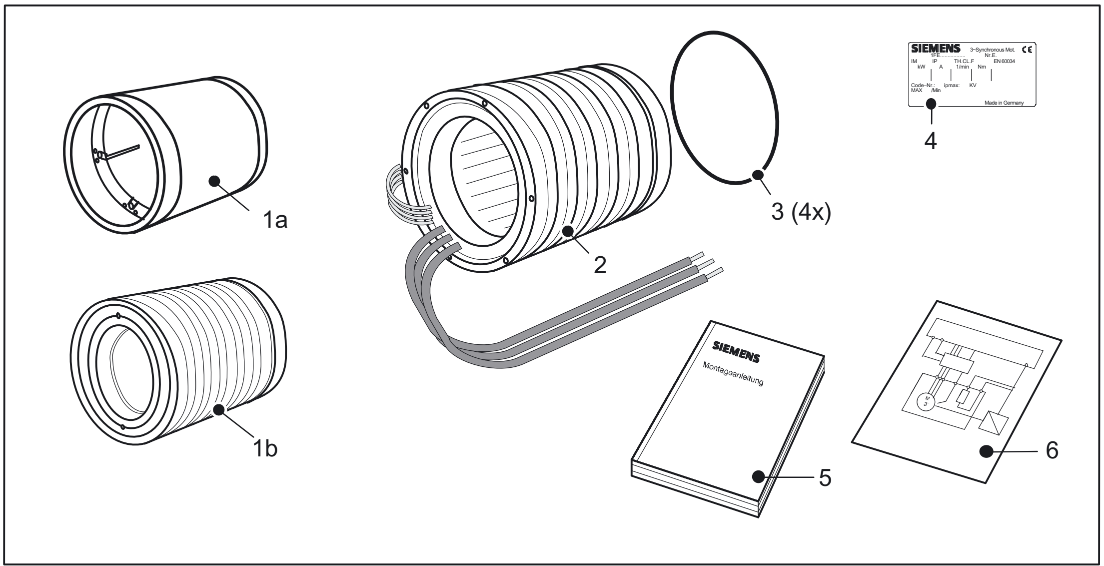


Figure 1-5 Scope of supply of the 1FE1 built-in motor

Note

Special versions and construction variants may differ in the scope of delivery with respect to certain technical aspects.

Storage and transport

The built-in motors should be stored indoors in dry, low-dust and low-vibration (V_{rms} < 0.2 mm/s) rooms.

- Permissible ambient temperature during storage and transport: -25 °C to +85 °C
- Relative humidity ≤ 75 % annual average

Motor rating plate (type plate)

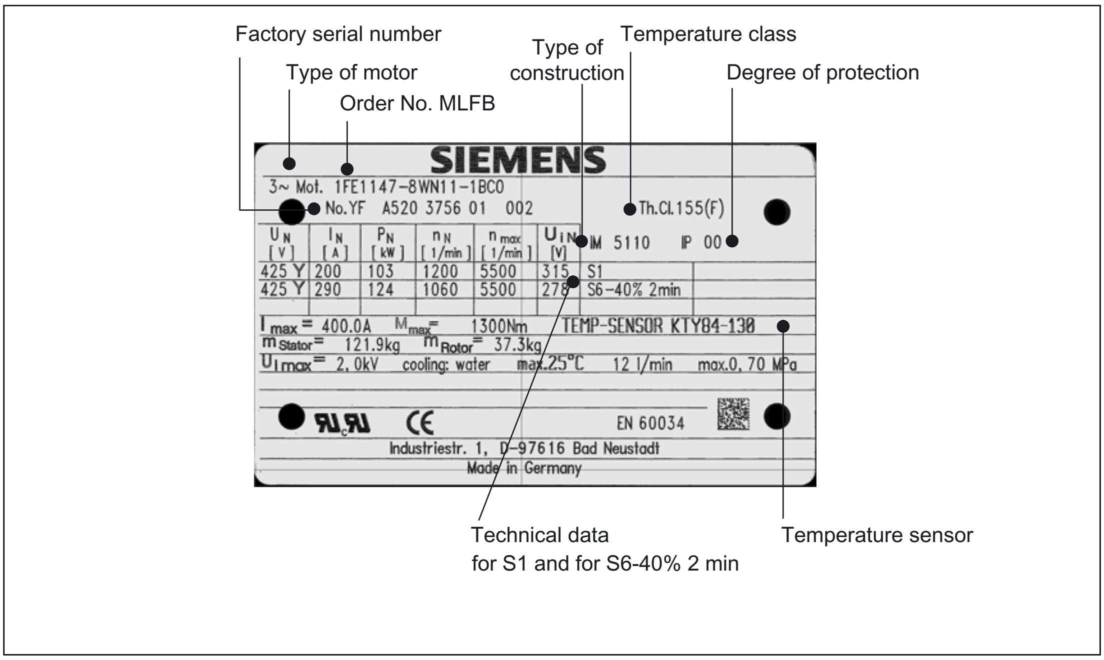


Figure 1-6 Motor rating plate for 1FE1147-8WN11-1BC0 (example)

UL marking

The following motors are UL-1004 certified:

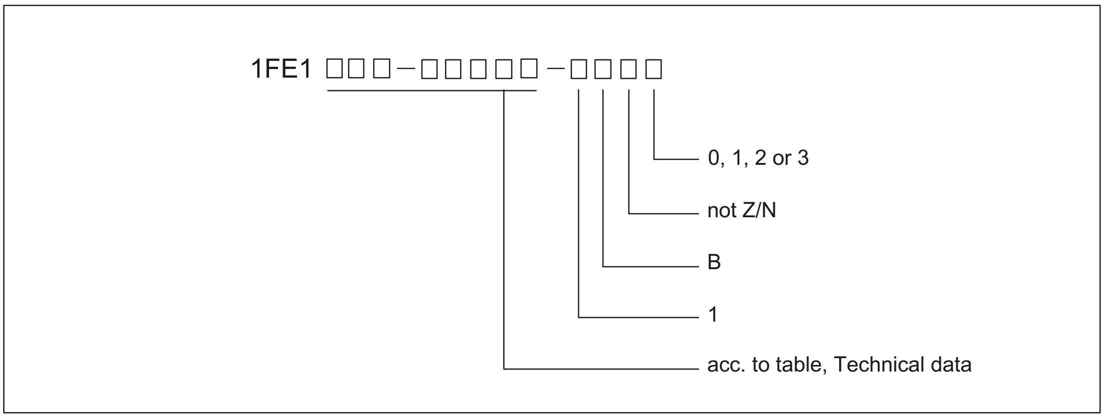


Figure 1-7 Motors with UL marking; MLFB overview

For all other motors, please inquire.

1.3 Order designation

Structure of the order designation

The order designation comprises a combination of digits and letters. It is divided into three hyphenated blocks.

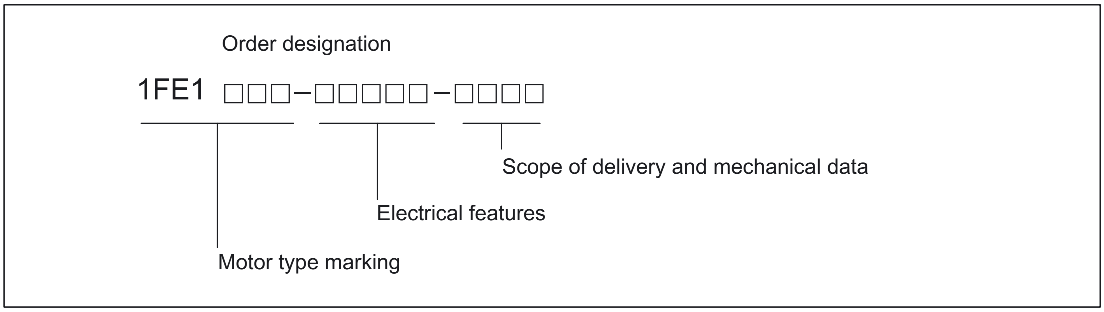


Figure 1-8 Order designation

Possible combinations, see Chapter Technical data (Page 27) or Catalog NC 61.
Please note that not every theoretical combination is possible in practice.

Order designation 1FE1 □□□–□□□□□–□□□□

- Water-cooled three-phase synchronous motor machine tool main spindle drive
- Frame size
- Overall length
- Lamination
  4 = 4–pole, 6 = 6–pole, 8 = 8–pole
- Cooling type (water cooled = W, H)
- Winding version: (e.g. H)
- Winding version
  0 = impregnated winding with standard protection (2 x KTY)
  1 = cast winding with standard protection (2 x KTY)
  3 = cast winding with full protection
  (2 x KTY + PTC thermistor triplet)
  5 = cast winding with universal protection:
  2 x KTY + PTC thermistor triplet
  + NTC PT3-51F + NTC K227
- Voltage limiting
  0 = voltage limiting is not required
  1 = voltage limiting required, e.g. VPM or IVP (see Table 3-5)
- Scope of supply
  1 = Stator and rotor
  2 = replacement part, only stator (W in rotor version)
  3 = replacement part, only rotor (W in stator version)
- Stator version
  A = version without cooling jacket [1)]
  B = standard version with cooling jacket
  W = replacement rotor, stator has no significance
- Rotor version (with different bore versions)
  A, R = without rotor sleeve
  B = with standard rotor sleeve
  (mounting compatible to 1PH2 motors)
  C, D, E = with rotor sleeve (large bore diameter)
  W = Replacement stator, rotor has no significance
- Type of connection
  0 = free cable ends 1500 mm (cable outlet at the larger housing outer diameter)
  1 = free cable ends 1500 mm (cable outlet at the smaller housing outer diameter) [1)]
  2 = free cable ends 500 mm, preferred version, cable outlet at the larger housing outer diameter
  3 = free cable ends 500 mm (cable outlet at the smaller housing outer diameter) [1)]

[1)] only available on request; please contact your local Siemens office

Figure 1-9 Details of the order designation

1.4 Technical data

Note

The values specified in the following tables are valid for water cooling and a cast winding design.

Table 1- 2 Technical data

Motor type	Rated torque M_N [Nm] 1)			Rated current I_N [A]			Maximum current I_{max} 2) [A]	Rated speed n_N [rpm]	Maximum speed n_{max} [rpm]
	S1	S6-40%	S6-25%	S1	S6-40%	S6-25%			
6-pole built-in motors									
1FE1041-6WM□0	4,5	6	7	13	17,5	21,5	26	15800	18000
1FE1042-6WR□0	11	14	16	19	26	32	38	10000	15000
1FE1051-6WK□0	10	12,4	14,0	20	29	36	40	8000	15000
1FE1051-6WN□0	10	12,6	14,0	15	22	27	30	6000	12000
1FE1052-6WK□0	18	23,0	26,7	37	54	68	74	7500	15000
1FE1052-6WN□0	20	25,2	29,0	30	44	55	60	5500	12000
1FE1054-6WN□0	37	46,0	52,5	60	88	110	120	6000	12000
1FE1061-6WH□0	13	17	21	21	30	37	42	8500	12000
1FE1061-6WY□0	13	17	21	8	11,5	14	16	3000	5000
1FE1064-6WN□1	56	81	97,0	56	80	100	112	4300	12000
1FE1064-6WQ□1	56	81	97,0	43	61	77	86	3400	10000
1FE1082-6WP□0	65	81	95	65	91	112	130	5000	8500
1FE1082-6WQ□1	65	81	95	60	84	103	120	4300	9000
1FE1082-6WS□0	65	81	95	45	62	76	90	3600	6000
1FE1082-6WW□1	65	81	95	30	42	51	60	2200	9000
1FE1083-6WP□0	97	127	147	66	92	110	132	3500	5500
1FE1084-6WR□1	130	175	200	60	84	103	120	2300	9000
1FE1084-6WU□1	130	175	200	45	64	79	90	1700	7000
1FE1084-6WX□1	130	174	200	30	42	52	60	1100	4500
1FE1091-6WN□0	28	36	41	24	35	43	48	3500	7000
1FE1091-6WS□0	30	36	41	15	19	23	30	2000	4000
1FE1092-6WN□0	66	85	98	58	84	103	116	3500	7000
1FE1092-6WR□1	66	85	98	41	58	72	82	3200	7000
1FE1093-6WN□0	100	128	147	83	120	150	166	3500	7000
1FE1093-6WS□0	100	128	148	53	76	94	106	2000	4000
1FE1093-6WV□1	100	128	149	43	60	75	86	1600	7000
1FE1113-6WU□1	150	190	220	60	91	114	124	2100	6500
1FE1113-6WX□1	150	190	220	43	62	78	86	1400	5700

Motor type	Rated torque M_N [Nm] [1]			Rated current I_N [A]			Maximum current I_{max} [2] [A]	Rated speed n_N [rpm]	Maximum speed n_{max} [rpm]
	S1	S6-40%	S6-25%	S1	S6-40%	S6-25%			
1FE1114-6WR□1	200	256	292	108	159	197	216	2000	6500
1FE1114-6WT□1	200	256	292	84	123	154	168	1400	6500
1FE1114-6WW□1	200	256	292	58	85	106	116	1000	6000
1FE1115-6WT□1	265	340	385	85	123	154	170	1500	6500
1FE1116-6WR□1	300	384	438	109	160	200	218	1200	6500
1FE1116-6WT□1	300	384	438	84	123	154	168	900	5500
1FE1116-6WW□1	300	384	438	60	87	108	120	700	4000
8-pole built-in motors									
1FE1144-8WL□1	430	610	690	133	193	241	266	1400	6500
1FE1145-8WN□1	585	795	890	200	290	360	400	1700	8000
1FE1145-8WS□1	585	795	890	130	188	235	260	1100	5000
1FE1145-8WQ□1	585	795	890	158	230	285	316	1300	6000
1FE1147-8WM□1	820	1110	1240	220	320	395	440	1300	6000
1FE1147-8WN□1	820	1110	1240	200	290	360	400	1200	5500
1FE1147-8WS□1	820	1110	1240	130	190	235	260	750	3500
1FE1147-8WQ□1	820	1110	1240	158	230	285	316	950	4200
4-pole built-in motors									
1FE1051-4HC□0	5	7	9	25	34,5	42	50	24000	40000
1FE1051-4WN□1	6,5	9	11	12	17	21	24	9500	30000
1FE1052-4HD□0	12	15	19	57	75	95	114	25000	40000 [4]
1FE1052-4HG□1	12	15	19	44	59	73	88	19000	40000 [4]
1FE1052-4WK□1	13	17	21	30	39	49	60	12500	30000
1FE1052-4WN□1	13	18	22	20	26	33	40	8000	30000
1FE1053-4HH□1	18	23	28	46	63	77	92	13500	40000 [4]
1FE1053-4WN□1	20	27	32	29	38	47	58	7900	30000
1FE1053-4WJ□1	20	27	32	36	49	60	72	11000	30000
1FE1072-4WH□1	28	40	48	64	96	119	128	9700	24000
1FE1072-4WL□1	28	40	48	45	68	84	90	6800	24000
1FE1072-4WN□1	28	40	48	36	54	67	72	5500	24000
1FE1073-4WN□1	42	59	71	65	97	120	130	6800	24000
1FE1073-4WT□1	45	64	75	30	44	55	60	3200	14000
1FE1074-4WM□1	60	86	100	97	144	176	194	7700	20000
1FE1074-4WN□1	56	79	95	91	136	168	182	7000	20000
1FE1074-4WT□1	60	85	95	53	77	95	106	4100	18000
1FE1082-4WN□1	42	55	63	42	60	76	84	3500	20000
1FE1082-4WR□1	42	55	63	24	34	43	48	2000	11000
1FE1083-4WN□1	63	83	95	77	110	137	154	4200	20000
1FE1084-4WN□1	84	110	127	105	150	187	210	4300	20000
1FE1084-4WP□1	78	110	127	79	120	150	160	4300	20000

Motor type	Rated torque M_N [Nm] 1)			Rated current I_N [A]			Maximum current I_{max} 2) [A]	Rated speed n_N [rpm]	Maximum speed n_{max} [rpm]
	S1	S6-40%	S6-25%	S1	S6-40%	S6-25%			
1FE1084-4WQ□1	84	110	127	83	119	147	166	3400	18000
1FE1084-4WT□1	84	110	127	60	85	105	120	3000	15000
1FE1085-4WN□1	105	138	159	105	150	187	210	3500	18000
1FE1085-4WT□1	105	140	160	60	85	105	120	2200	12000
1FE1085-4WQ□1	105	140	160	85	120	150	170	3000	16000
1FE1092-4WP□1	45	60	73	41	58	72	82	3400	18000
1FE1092-4WV□1	50	64	73	24	35	43	48	2000	10000
1FE1093-4WH□1	75	103	113	83	120	148	166	4500	18000
1FE1093-4WM□1	75	103	113	64	92	114	128	3500	18000
1FE1093-4WN□1	75	103	113	60	86	107	120	3300	16000
1FE1094-4WK□1	100	137	151	108	156	192	216	4400	18000
1FE1094-4WL□1	100	137	151	90	130	160	180	3800	18000
1FE1094-4WS□1	100	125	140	60	85	105	120	2500	13000
1FE1094-4WU□1	95	119	133	45	64	79	90	1800	10000
1FE1095-4WN□1	125	171	189	108	156	192	216	3500	18000
1FE1096-4WN□1	150	206	226	120	173	214	240	3300	16000
1FE1103-4WN□1	102	142	156	84	127	158	168	3600	16000
1FE1104-4WN□1	136	189	208	120	181	226	240	3800	16000
1FE1105-4WN□1	170	236	260	120	180	221	240	3000	16000
1FE1106-4WN□1	204	283	313	159	240	300	318	3400	16000
1FE1106-4WR□1	204	270	300	128	184	227	260	2900	14000
1FE1106-4WS□1	200	270	300	120	170	210	240	2700	12500
1FE1106-4WY□1	200	270	300	60	85	105	120	1200	6000
1FE1124-4WN□1	200	275	315	135	198	247	270	3000	14000
1FE1125-4WN□1	250	345	390	162	240	295	324	3000	14000
1FE1125-4WP□1	250	345	390	147	215	270	294	2500	12500
1FE1126-4WN□1	300	410	470	200	295	365	400	3000	14000
1FE1126-4WP□1	300	410	470	180	265	330	360	2500	12500
1FE1126-4WQ□1	300	410	470	147	215	270	294	2000	10000

1) Data for ΔT = 105 K

2) The maximum current I_{max} must not be exceeded due to the danger of demagnetization

3) with Motor Module 6SL3120-1TE28-5AA3 up to n_{max}= 16000 rpm possible
with Motor Module 6SL3120-1TE31-3AA3 up to n_{max}= 18000 rpm possible

4) For these built-in motors, a series reactor is required for safe and reliable operation
see Chapter 4 "Technical data and characteristics"
Note regarding the use of a series reactor:
The setting data of the drive system are only valid in conjunction with the specified reactor. The specified data cannot be guaranteed if a third-party reactor is used. If a series reactor is used, this represents a source of heat, surface temperatures can reach up to approx. 100 °C. For technical data, refer to Catalog NC61.

1.4.1 Selecting the Motor Module

The required Motor Modules are selected according to the peak and continuous currents that occur in the load cycle. If more than one motor is operated in parallel on one drive system, the total (summed) values of the peak and continuous currents must be taken into account.

The SIZER tool can be used to select a suitable Motor Module.

NOTICE

Synchronous built-in motors connected to controlled infeeds

For system configurations, where synchronous built-in motors are used together with regulated (closed-loop controlled) infeed units (e.g. Active Line Module), electrical oscillations can occur with respect to ground potential. These oscillations result in increased voltage loads (stress).

Factors that influence these system oscillations include among others:

- Cable lengths
- Size of the Motor Module
- Number of axes
- Motor size
- Winding design

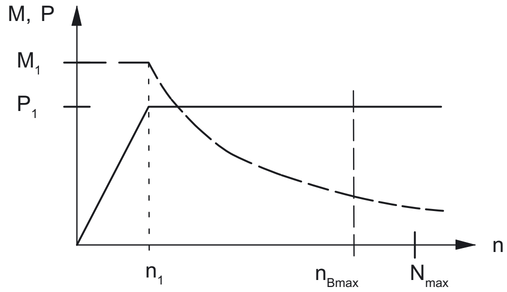
In order to avoid increased voltage loads (stress) or damage to the main insulation of the motor, for operation in the Active Line Mode, an Active Interface Module must always be used.

Use of smaller Motor Modules

Note

When smaller Motor Modules are used, for several motor types, the complete speed range cannot be used; this also applies even if the motor utilization is somewhat lower. Therefore, please contact your local Siemens office.

1.4.2 Calculating the acceleration time from the torque/power characteristic



$$t_h = \frac{\pi}{60} \cdot \frac{J_{tot}}{M_1} \left[n_1 + \frac{n_{Bmax}^2}{n_1} \right]$$

or

$$t_h = \frac{\pi^2}{1800} \cdot \frac{J_{tot}}{P_1} \left[n_1^2 + n_{Bmax}^2 \right]$$

Designations:

t_h	Acceleration time up to maximum speed in [s]
J_{tot}	Total moment of inertia (rotor and spindle) in [kgm²]
n_1	Transition speed in [rpm] (e.g. S6–25%)
n_{Bmax}	Maximum operating speed (≤ n_{max}) in [rpm]
N_{max}	Maximum speed in [rpm]
M_1	Accelerating torque in [Nm] (e.g. S6–25%)
P_1	Accelerating power in [W] (e.g. S6–25%)

Figure 1-10 Calculating the acceleration time

*) With the 200/250/257 A Motor Modules, the following motors achieve as maximum duty type S6-40%:
1FE1106-4WN11, 1FE1125-4WN11, 1FE1125-4WP11, 1FE1126-4WN11, 1FE1126-4WP11, 1FE1126-4WQ11;
The acceleration time does not change appreciably as a result.

Calculation of the ramp-up time for built-in motors and for the operating mode S6 *)
Formula: th = (pi / 60) * (J total / M1) * (n1 + (nBmax customer spec.² / n1))

input data	**1) select a motor:**	**1FE1147-8WS11**	calculation
	2) type the customer specific moment of inertia [kgm²]:	1.00000	
	3) type the customer specific maximal speed [rpm]:	1000	

result of calculation		motor specific data	
ramp-up time th [s]:	**0.126**	J rot [kgm²]:	0.32915
		J total [kgm²]:	1.32915
motor current for ramp [A]:	**235**	n1 [rpm]:	616
Motor module without derating. With derating see sizer	**6SL3120-1TE32-0AA3**	nBmax customer specific [rpm]:	1000
		Nmax [rpm]:	3500

1.4.3 Rotor weights and moments of inertia

Table 1- 3 Rotor weights and moments of inertia

Motor MLFB	Order code Rotor	Sleeve yes = x	Balancing yes = x	Rotor weight [kg]	Moment of inertia [kg * m²]
6-pole built-in motors					
1FE1041–6W□□□–1BA□	-	-	-	0,33	0,00019
1FE1042–6W□□□–1BA□	-	-	-	0,57	0,00033
1FE1051–6W□□□ –1□A□	-	-	-	1,20	0,00106
1FE1051–6W□□□–1□C□	-	x	x	1,90	0,00152
1FE1052–6W□□□–1□A□	-	-	-	2,20	0,00195
1FE1052–6W□□□–1□C□	-	x	x	3,10	0,00248
1FE1054–6W□□□–1□A□	-	-	-	4,30	0,00380
1FE1061–6W□□□–1□A□	-	-	-	1,10	0,00141
1FE1061–6W□□□–1□B□	-	x	x	2,10	0,00242
1FE1064–6W□□□–1□A□	-	-	-	4,30	0,00553
1FE1082–6W□□□–1□A□	-	-	-	3,60	0,01048
1FE1082–6W□□□–1□B□	-	x	x	7,70	0,01841
1FE1082–6W□□□–1□C□	-	x	x	6,80	0,01710
1FE1082–6W□□□–1□D□	-	x	x	6,10	0,01604
1FE1083–6W□□□–1□A□	-	-	-	5,7	0,01659
1FE1083–6W□□□–1□B□	-	x	x	10,6	0,02535
1FE1084–6W□□□–1□A□	-	-	-	7,10	0,02067
1FE1084–6W□□□–1□B□	-	-	-	13,6	0,03959
1FE1084–6W□□□–1□C□	-	x	x	12,20	0,03068
1FE1091–6W□□□–1□A□	-	-	-	2,60	0,00814
1FE1091–6W□□□–1□B□	-	x	x	5,40	0,01423
1FE1091–6W□□□–1□C□	-	x	x	4,50	0,01293
1FE1092–6W□□□–1□A□	-	-	-	5,00	0,01566
1FE1092–6W□□□–1□B□	-	x	x	9,10	0,02398
1FE1092–6W□□□–1□C□	-	x	x	7,50	0,02155
1FE1092–6W□□□–1□N□ 1)	T37	x	-	8,30	0,02289
1FE1093–6W□□□–1□A□	-	-	-	7,40	0,02317
1FE1093–6W□□□–1□B□	-	x	x	12,70	0,03346
1FE1093–6W□□□–1□C□	-	x	x	10,50	0,03017
1FE1093–6W□□□–1□N□ 1)	T06	x	-	10,50	0,03017
1FE1113–6W□□□–1□A□	-	-	-	9,7	0,04765
1FE1113–6W□□□–1□D□	-	x	x	19,80	0,07747
1FE1113–6W□□□–1□E□	-	x	x	14,50	0,06512
1FE1114–6W□□□–1□A□	-	-	-	12,70	0,06239
1FE1114–6W□□□–1□B□	-	x	x	24,90	0,09843
1FE1114–6W□□□–1□C□	-	x	x	19,60	0,08650
1FE1114–6W□□□–1□N□ 1)	T46	x	-	22,40	0,09342
1FE1114–6W□□□–1□N□ 1)	T49	x	-	20,80	0,08971
1FE1114–6W□□□–1□N□ 1)	T52	x	-	18,60	0,08353
1FE1114–6W□□□–1□N□ 1)	T55	x	x	17,9	0,08279

Motor MLFB	Order code Rotor	Sleeve yes = x	Balancing yes = x	Rotor weight [kg]	Moment of inertia [kg * m²]
1FE1115–6W□□□–1□C□	-	x	x	23,80	0,10503
1FE1116–6W□□□–1□A□	-	-	-	18,90	0,09285
1FE1116–6W□□□–1□B□	-	x	x	35,80	0,14152
1FE1116–6W□□□–1□C□	-	x	x	28,20	0,12445
8-pole built-in motors					
1FE1144–8W□□□–1BA□	-	-	-	14,50	0,11447
1FE1144–8W□□□–1BC□	-	x	x	24,00	0,18349
1FE1145–8W□□□–1BC□	-	x	x	28,30	0,21636
1FE1145–8W□□□–1BD□	-	x	x	34,00	0,24759
1FE1145–8W□□□–1BE□	-	x	x	41,50	0,28115
1FE1147–8W□□□–1BC□	-	x	x	37,70	0,28823
1FE1147–8W□□□–1BD□	-	x	x	45,20	0,32915
4-pole built-in motors					
1FE1051–4W□□□–1BA□	-	-	-	0,70	0,00057
1FE1051–4H□□□–1BA□	-	-	-	0,60	0,00045
1FE1052–4W□□□–1BA□	-	-	-	1,35	0,00110
1FE1052–4H□□□–1BA□	-	-	-	1,15	0,00087
1FE1053–4W□□□–1BA□	-	-	-	2,00	0,00163
1FE1053–4H□□□–1BA□	-	-	-	1,70	0,00128
1FE1072–4W□□□–1□A□	-	-	-	2,20	0,00287
1FE1073–4W□□□–1□A□	-	-	-	3,30	0,00430
1FE1074–4W□□□–1□A□	-	-	-	4,40	0,00573
1FE1082–4W□□□–1□A□	-	-	-	3,10	0,00559
1FE1083–4W□□□–1□A□	-	-	-	4,70	0,00847
1FE1084–4W□□□–1□A□	-	-	-	6,20	0,01118
1FE1085–4W□□□–1□A□	-	-	-	7,70	0,01388
1FE1092–4W□□□–1□R□	-	-	-	3,80	0,00916
1FE1093–4W□□□–1□A□	-	-	-	7,50	0,01694
1FE1093–4W□□□–1□R□	-	-	-	5,60	0,01350
1FE1094–4W□□□–1□A□	-	-	-	9,60	0,02168
1FE1094–4W□□□–1□R□	-	-	-	7,50	0,01808
1FE1095–4W□□□–1□A□	-	-	-	11,70	0,02642
1FE1095–4W□□□–1□R□	-	-	-	9,30	0,02242
1FE1096–4W□□□–1□A□	-	-	-	13,90	0,03139
1FE1096–4W□□□–1□R□	-	-	-	11,20	0,02700
1FE1103–4W□□□–1□A□	-	-	-	5,30	0,01589
1FE1104–4W□□□–1□A□	-	-	-	7,00	0,02098
1FE1105–4W□□□–1□A□	-	-	-	8,70	0,02608
1FE1106–4W□□□–1□A□	-	-	-	10,50	0,03147
1FE1124–4W□□□–1BA□	-	-	-	12,10	0,05112
1FE1125–4W□□□–1BA□	-	-	-	15,00	0,06337
1FE1126–4W□□□–1BA□	-	-	-	18,00	0,07604

1) As an alternative, Z is also valid for N.

1.5 Converter pulse frequencies and derating

Motors whose maximum speeds exceed the following speeds must be operated with a converter frequency of 8 kHz.

- 4-pole: 20000 rpm
- 6-pole: 13300 rpm
- 8-pole: 10000 rpm

The appropriate Motor Module derating must be taken into account. The rated motor current is the basis when selecting the Motor Module.

The maximum speed can be increased under certain secondary conditions. However, in this case, Siemens must be consulted.

The SIZER tool can be used to select the corresponding Motor Module.

Note

The following setting data must be taken into consideration for the following motors to ensure optimum operation:

Table 1- 4 Setting data that deviate from the standard for certain 1FE1 motors

Motor MLFB	Converter pulse frequency f_T [kHz]	Current controller cycle time [μs]
1FE1042-6WN10	8	125
1FE1052-4HD10	8	62,5
1FE1053-4HH10	8	62,5

1.6 Cooling

⚠WARNING
The equipment must be safely disconnected from the supply before any installation or service work is carried out on cooling circuit components. Only qualified personnel may design, install and commission the cooling circuit.

1.6.1 Cooling circuit

The electrochemical processes that take place in a cooling system must be minimized by choosing the right materials. For this reason, mixed installations, i.e. a combination of different materials, such as copper, brass, iron, or halogenated plastic (PVC hoses and seals), should not be used or limited to the absolutely essential minimum.

A differentiation is made between 3 different cooling circuits:

- Closed cooling circuit
- Semi-open cooling circuit
- Open cooling circuit

Table 1- 5 Description of the various cooling circuits

Definition	Description
Closed cooling circuit	The pressure equalizing tank is closed (oxygen cannot enter the system) and has a pressure relief valve. The coolant is only routed in the motors and converters as well as the components required to dissipate heat.
Semi-open cooling circuit	Oxygen can only enter the cooling system through the pressure equalization tank, otherwise the same as "closed cooling circuit".
Open cooling circuit (tower system)	The coolant is cooled in a tower. In this case, there is intensive oxygen contact.

Note

Cooling circuits

Only closed and semi-open cooling circuits are permissible for motors. Converter systems must be connected before the motors in the cooling circuit.

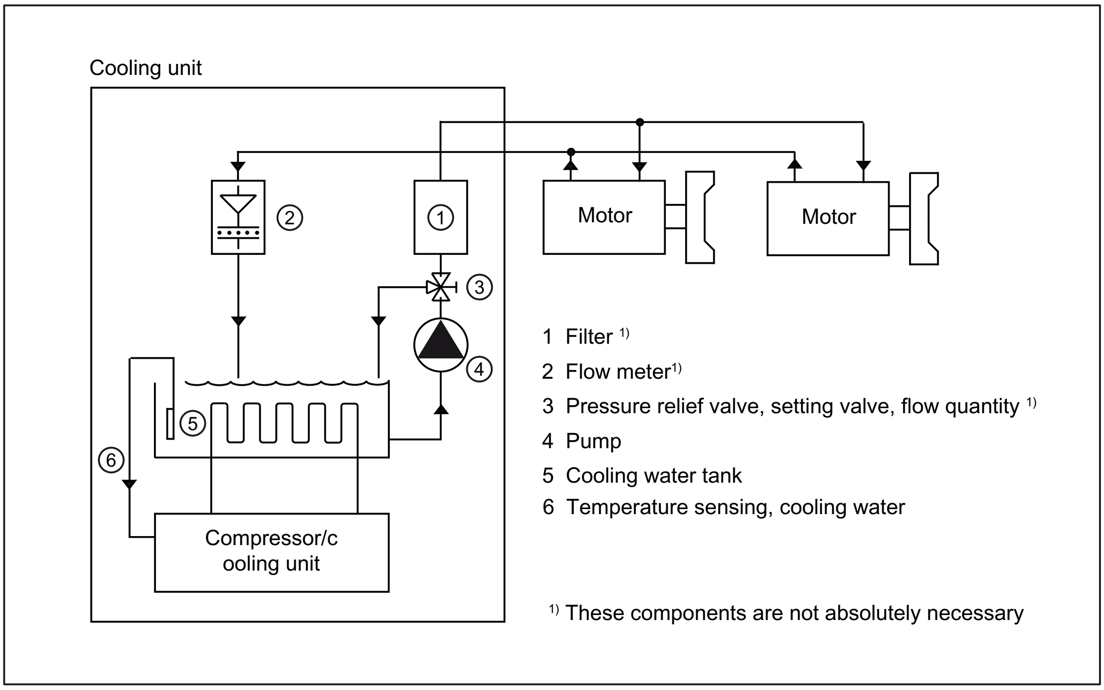


Figure 1-11 Example of a semi-open cooling circuit

Equipotential bonding

All components in the cooling system (motor, heat exchanger, piping system, pump, pressure equalization tank, etc.) must be connected to an equipotential bonding system. This is implemented using a copper bar or finely stranded copper cable with the appropriate cable cross-sections.

NOTICE
Under no circumstances may the coolant pipes come into contact with live components. There must always be an isolating clearance of > 13 mm! The pipes must be securely mounted and checked for leaks.

Materials used in the motor cooling circuit

The materials used in the cooling circuit must be coordinated with the materials in the motor.

Table 1- 6 Materials used in the motor cooling circuit

Cooling jacket design	Material
Cooling jacket	Steel or aluminum (depending on the type)
O rings	FKM

Materials and components in the cooling circuit

The following table lists a wide variety of materials and components which may or may not be used in a cooling circuit.

Table 1- 7 Materials and components of a cooling circuit

Material	Used as	Description
Zinc	Pipes, valves and fittings	Use is not permitted.
Brass	Pipes, valves and fittings	Can be used in closed circuits with inhibitor.
Copper	Pipes, valves and fittings	Can be used only in closed circuits with inhibitors in which the heat sink and copper component are separated (e.g. connection hose on units).
Common steel (e.g. St37)	Pipes	Permissible in closed circuits and semi-open circuits with inhibitors or Antifrogen N, check for oxide formation, inspection window recommended.
Cast steel, cast iron	Pipes, motors	Closed circuit and use of strainers and flushback filters. Fe separator for stainless heat sink.
High-alloy steel, Group 1 (V2A)	Pipes, valves and fittings	Can be used for drinking or municipal water with a chloride content up to <250 ppm, suitable according to definition in Chapter "Coolant definition".
High-alloy steel, Group 2 (V4A)	Pipes, valves and fittings	Can be used for drinking or municipal water with a chloride content up to <500 ppm, suitable according to definition in Chapter "Coolant definition".
ABS (**A**crylnitrile**B**utadiene**S**tyrene)	Pipes, valves and fittings	Suitable according to the definition in Chapter "Coolant definition". Suitable for mixing with inhibitor and/or biocide as well as Antifrogen N.
Installation comprising different materials (mixed installation)	Pipes, valves and fittings	Use is not permitted.
PVC	Pipes, valves, fittings and hoses	Use is not permitted.
Hoses		The use of hoses should be reduced to a minimum (connecting equipment) and must not be used as the main supply line for the complete system. Recommendation: EPDM hoses with an electrical resistance > 10^9 Ω (e.g. Semperflex FKD supplied from Semperit or DEMITTEL; from PE/EPD, supplied from Telle).
Gaskets	Pipes, valves and fittings	Use of FKM, AFM34, EPDM is recommended.
Hose connections	Transition Hose - pipe	Secure with clips conforming to DIN 2817, available e.g. from the Telle company.

The following recommendation applies in order to achieve an optimum motor heatsink (enclosure) lifetime:

- Engineer a closed cooling circuit with cooling unit manufactured out of stainless steel that dissipates the heat through a water-water heat exchanger.
- All other components such as cooling circuit cables and fittings manufactured out of ABS, stainless steel or general construction steel.

Cooling system manufacturers

BKW Kälte-Wärme-Versorgungstechnik GmbH	http://www.bkw-kuema.de
DELTATHERM Hirmer GmbH	http://www.deltatherm.de
Glen Dimplex Deutschland GmbH	http://www.riedel-cooling.com
Helmut Schimpke und Team Industriekühlanlagen GmbH + Co. KG	http://www.schimpke.org
Hydac System GmbH	http://www.hydac.com
Hyfra Industriekühlanlagen GmbH	http://www.hyfra.de
KKT Kraus Kälte- und Klimatechnik GmbH	http://www.kkt-kraus.de
Pfannenberg GmbH	http://www.pfannenberg.com
Rittal GmbH & Co. KG	http://www.rittal.de

Note

It goes without saying that equivalent products from other manufacturers may be used. Our recommendation should only be considered as such and is only intended as support. We never accept any responsibility for the properties and suitability of third-party products.

1.6.2 Engineering the cooling circuit

Pressure

The operating pressure must be set according to the flow conditions in the supply and return lines of the cooling circuit. The required coolant flow rate per time unit must be set according to the technical data of the equipment and motors.

The maximum permissible pressure with respect to the atmosphere in the heat sink and thus in the cooling circuit must not exceed 0.7 MPa (7 bar). If a pump that can achieve a higher pressure is used, suitable measures must be provided on the system side (e.g. safety valve $p \leq 0.7$ MPa, pressure control etc.) to ensure that the maximum pressure is not exceeded.

The pressure difference between the coolant in the supply and return lines should be selected as low as possible so that pumps with a flat characteristic can be used.

An additional flushback filter should be used in the circuit in order to help prevent blockages and corrosion. This allows any material deposits to be flushed out in operation.

Pressure drop in the motor

The nominal coolant flows specified in the following table must be maintained in order to ensure sufficient cooling.

Table 1- 8 Approximate pressure drop at the nominal coolant flow rate

Motor type	Flow rate [l/min]	Pressure drop [MPa]
1FE104□ to 1FE109□	8	0,03
1FE110□ to 1FE112□	10	0,03
1FE114□	12	0,03

Pressure equalization

If various components are connected up in the cooling circuit, it may be necessary to provide pressure equalization. Reactor elements must be fitted at the coolant outlet for the motor or the relevant components.

Avoiding cavitation

The pressure drop across a converter or motor must not exceed 0.2 MPa in continuous duty. Otherwise, the high flow rate results in damage due to cavitation and/or abrasion.

Connecting motors in series

For the following reasons, connecting motors in series can only be conditionally recommended:

- The required flow rates of the motors must be approximately the same (< a factor of 2)
- An increase in the coolant temperature can result in having to derate the second or third motor if the maximum coolant inlet temperature is exceeded.

Coolant inlet temperature

CAUTION
The coolant inlet temperature must be selected so that condensation does not form on the surface of the motor: $T_{cool} > T_{ambient} - 5$ K. Coolants which are colder than the ambient temperature tend to result in increased water condensation. The difference between the coolant inlet temperature and ambient temperature should therefore not exceed maximum 5 K (Kelvin). Furthermore, the inflow of coolant must be interrupted when the motor is idle for prolonged periods.

The motors are designed for operation up to a coolant inlet temperature of +25 °C, but still maintaining all of the specified motor data. Operation up to +40 °C cooling medium intake temperature is possible with de-rating (reduced power).

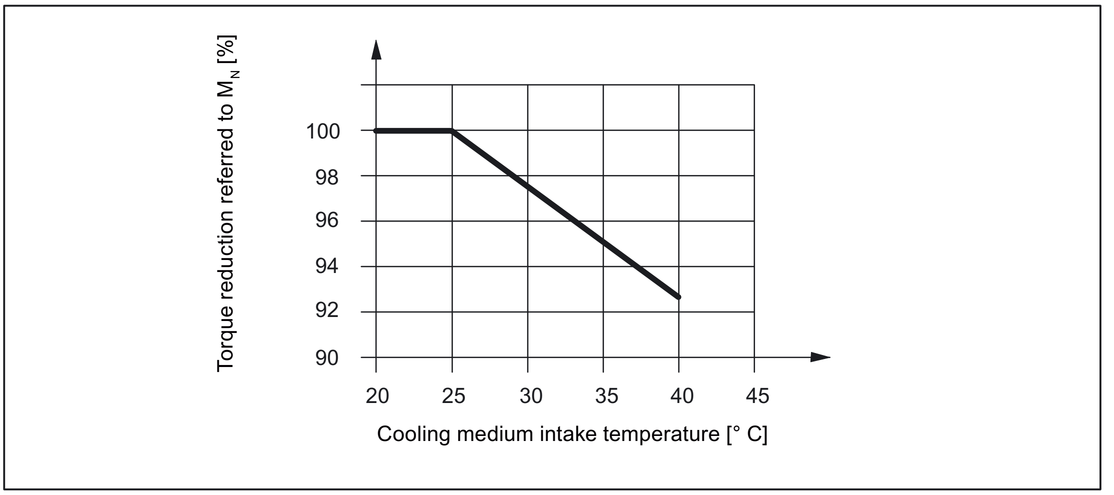


Figure 1-12 Influence of the cooling-medium intake temperature on M_N as a percentage

1.6.3 Cooling powers to be dissipated (power loss)

The cooling power to be dissipated can be determined as follows:

- Read off the power loss at rated power for n_{max} or n_N in the table "Cooling powers to be dissipated".
- Calculation using the calculation tool (PDF required); the power loss can be calculated within the shaded area (see graphics) for any load state and speed. P and n must lie within the shaded area. The secondary conditions and constraints must be observed.

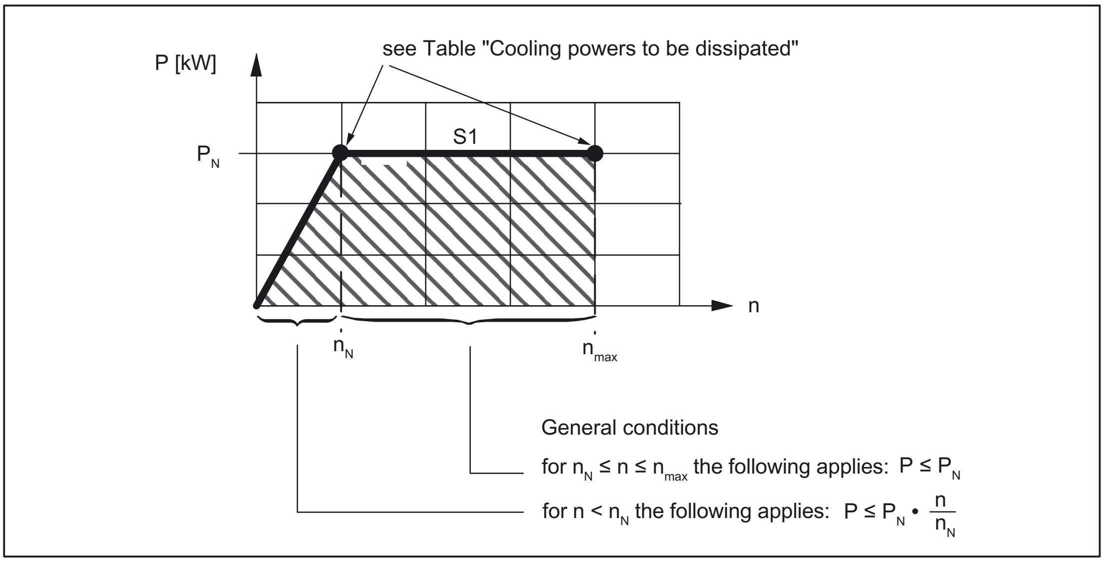


Figure 1-13 Calculating the power loss

Calculation for the total dissipation for a specific power and speed			
input data	1) select a motor:	select a motor, please	
	2) power [kW], input possible up to rated power:	0.000	calculation
	3) speed [RPM], input possible up to maximum speed:	0	

result of calculation	
rated power PN [W]:	0
maximum speed nmax [RPM]:	0
rated speed nN [RPM]:	0
dissipation do to input power and input speed [W]:	**0**
power dissipation for rated speed nN [W]:	**0**
power dissipation for maximum speed nmax [W]:	**0**

The values specified in the following table refer to a cooling-medium temperature of 25 °C and S1 duty.

The cooling powers to be dissipated at maximum speed and at rated speed are listed in the following table. Intermediate values can be linearly estimated proportional to the speed.

Table 1- 9 Cooling powers to be dissipated

Motor type	Cooling power to be dissipated [W] at maximum speed	Cooling power to be dissipated [W] at rated speed
6-pole built-in motors		
1FE1041-6WM10	1100	900
1FE1042-6WN10	1400	1400
1FE1042-6WR10	1400	1400
1FE1051-6WK10	1500	1400
1FE1051-6WN10	1500	1300
1FE1052-6WK10	2800	2500
1FE1052-6WN10	2400	2200
1FE1054-6WN10	4200	4200
1FE1061-6WH10	1600	1300
1FE1061-6WY10	1200	1000
1FE1064-6WN11	4300	2800
1FE1064-6WQ11	3200	3000
1FE1082-6WP10	3300	2600
1FE1082-6WQ11	3300	2500
1FE1082-6WS10	2500	2300
1FE1082-6WW11	3300	2200
1FE1083-6WP10	3300	3000
1FE1084-6WR11	5500	3800
1FE1084-6WU11	5000	3800
1FE1084-6WX11	4000	3300
1FE1091-6WN10	2000	1500
1FE1091-6WS10	1800	1300
1FE1092-6WN10	3000	2500
1FE1092-6WR11	3000	2300
1FE1093-6WN10	3600	3400
1FE1093-6WS10	3600	3400
1FE1093-6WV11	4000	3000
1FE1113-6WU11	4000	2800
1FE1113-6WX11	3800	2700
1FE1114-6WR11	4600	4100
1FE1114-6WT11	4600	4100
1FE1114-6WW11	4600	4100
1FE1115-6WT11	5800	4500
1FE1116-6WR11	6700	5500
1FE1116-6WT11	6000	5500

Motor type	Cooling power to be dissipated [W] at maximum speed	Cooling power to be dissipated [W] at rated speed
1FE1116-6WW11	5000	5000
8-pole built-in motors		
1FE1144-8WL11	8500	6000
1FE1145-8WN11	10000	7500
1FE1145-8WQ11	9500	7200
1FE1145-8WS11	7500	7000
1FE1147-8WM11	12000	8500
1FE1147-8WN11	10000	8500
1FE1147-8WQ11	10000	8500
1FE1147-8WS11	8500	8500
4-pole built-in motors		
1FE1051-4HC10	2000	1500
1FE1051-4WN11	1400	900
1FE1052-4HD10	3200	3000
1FE1052-4HG11	3200	2300
1FE1052-4WK11	2800	1600
1FE1052-4WN11	2800	1600
1FE1053-4HH11	3800	3600
1FE1053-4WN11	3800	2200
1FE1053-4WJ11	3800	2200
1FE1072-4WH11	3200	2000
1FE1072-4WL11	3200	2200
1FE1072-4WN11	3200	2200
1FE1073-4WN11	4500	2700
1FE1073-4WT11	2800	2400
1FE1074-4WM11	5000	3500
1FE1074-4WN11	5000	3500
1FE1074-4WT11	3800	2500
1FE1082-4WN11	2600	2000
1FE1082-4WR11	2000	2000
1FE1083-4WN11	3600	2800
1FE1084-4WN11	4600	3600
1FE1084-4WP11	5000	3600
1FE1084-4WQ11	4600	3600
1FE1084-4WT11	4200	3600
1FE1085-4WN11	5000	4100
1FE1085-4WQ11	5000	4100
1FE1085-4WT11	4000	4000
1FE1092-4WP11	3300	1900
1FE1092-4WV11	2000	1700
1FE1093-4WH11	4500	3100

Motor type	Cooling power to be dissipated [W] at maximum speed	Cooling power to be dissipated [W] at rated speed
1FE1093-4WM11	4500	3500
1FE1093-4WN11	4000	3100
1FE1094-4WK11	5300	3700
1FE1094-4WL11	5300	3700
1FE1094-4WS11	3500	3500
1FE1094-4WU11	3000	3000
1FE1095-4WN11	6500	4500
1FE1096-4WN11	6500	5000
1FE1103-4WN11	4500	3300
1FE1104-4WN11	5000	4000
1FE1105-4WN11	6000	4700
1FE1106-4WN11	8000	5500
1FE1106-4WR11	7500	5000
1FE1106-4WS11	7000	4800
1FE1106-4WY11	5000	5000
1FE1124-4WN11	6000	4500
1FE1125-4WN11	7500	5000
1FE1125-4WP11	7000	4800
1FE1126-4WN11	9000	6000
1FE1126-4WP11	8000	5800
1FE1126-4WQ11	7000	5500

1.6.4 Coolant

Table 1- 10 Water specifications for coolant

	Quality of the water used as coolant for motors with aluminum, stainless steel tubes + cast iron or steel jacket
Chloride ions	< 40 ppm, can be achieved by adding deionized water.
Sulfate ions	< 50 ppm
Nitrate ions	< 50 ppm
pH value	6 ... 9 (for aluminum 6 ... 8)
Electrical conductivity	< 500 μS/cm
Total hardness	< 170 ppm

Note

It is recommended to use deionized water with reduced conductivity (5 ... 10 µS/cm) (if required, ask the water utility for the values). According to 98/83/EC, drinking water may contain up to 2500 ppm of chloride!

Manufacturers of chemical additives can provide support when analyzing the water that is available on the plant side.

Table 1- 11 Coolant quality

	Coolant quality
Cooling water	According to the table "Water specifications for cooling water"
Corrosion protection	0.2 to 0.25 % inhibitor, Nalco TRAC100 (previously 0GE056)
Anti-freeze protection	When required, 20 - 30 % Antifrogen N (from the Clariant Company)
Dissolved solids	< 340 ppm
Size of particles in the coolant	< 100 µm

Note

The inhibitor is not required if it ensured that the concentration of Antifrogen N is > 20%.

Derating is necessary when the coolant has an antifreeze content of > 30% (seeOther coolants).

Other coolants (not water-based)

When using other coolants (e.g. oil, cooling lubricating medium) derating may be required in order that the thermal motor limit is not exceeded. The power reduction (derating) can be determined from the following data:

Density	ρ	[kg/m^3]
Specific thermal capacitance	c_ρ	[J/(kg•K)]
Thermal conductivity	λ	[W/(K•m)]
Kinematic viscosity	η	[m^2/s]
Flow rate	V	[rpm]
Third-party cooling jacket		Cooling jacket geometry is required

An inquiry must be set to the manufacturer's plant (Siemens Service Center).

Note

Oil-water mixtures with more than 10% oil require derating.

Biocide

Closed cooling circuits with soft water are susceptible to microbes. The risk of corrosion caused by microbes is virtually non-existent in chlorinated drinking water systems.

Antifrogen N has a biocidal effect even at the minimum required concentration of > 20 %. No strain of bacteria can survive if >20 % Antifrogen N is added.

The suitability of a biocide depends on the type of microbe. The following types of microbes are encountered in practice:

- Slime-forming bacteria
- Corrosive bacteria
- Iron-depositing bacteria

At least one water analysis per annum is recommended to determine the number of bacterial colonies. Suitable biocides are available from the manufacturer Nalco for example. The manufacturer's recommendations must be followed regarding the concentration and compatibility with any inhibitor used.

NOTICE
Biocides and Antifrogen N must not be mixed.

There are other manufacturers of chemical additives in the market. Equivalent products from other manufacturers may be used. The suitability must be checked by testing.

Manufacturers of chemical additives

Tyforop Chemie GmbH	http://www.tyfo.de
Clariant Produkte Deutschland GmbH	http://www.antifrogen.de
Cimcool Industrial Products	http://www.cimcool.net
FUCHS PETROLUB AG	http://www.fuchs-oil.com
Hebro chemie GmbH	http://www.hebro-chemie.de
HOUGHTON Deutschland GmbH	http://www.houghton.com
Nalco Deutschland GmbH	http://www.nalco.com
Schweitzer-Chemie GmbH	http://www.schweitzer-chemie.de

Note

It goes without saying that equivalent products from other manufacturers may be used. Our recommendation should only be considered as such and is only intended as support. We never accept any responsibility for the properties and suitability of third-party products.

1.6.5 Commissioning

When required, before connecting the motors and converters to the cooling circuit, the pipes should be flushed in order to avoid dirt entering the motors and converters.

After the units have been installed in the plant, the coolant circuit must be commissioned before the electrical systems.

Maintenance and service

It is recommended that the filling level and discoloration or turbidity of the coolant is checked at least once a year. Further, every year it must be checked as to whether the coolant still has the permissible specification.

If the coolant level has dropped, the loss should be corrected on closed or semi-open circuits with a prepared mixture of deionized water and inhibitor or Antifrogen N.

1.7 Thermal motor protection

The stator winding can be supplied with the following motor protection to sense (measure) and monitor the motor temperature:

Standard protection:	2 x KTY 84
Full protection (option):	2 x KTY 84 + 1 x PTC thermistor triplet (3 sensors in series)
Universal protection (option):	2 x KTY 84 + 1 x PTC thermistor triplet + NTC PT3-51F + NTC K227/33k/A1

⚠CAUTION

For water-cooled synchronous built-in motors, which are operated for longer than one minute at standstill with the standstill torque (for built-in motors this generally corresponds to the rated torque), one phase can be over-proportionally thermally stressed. As a consequence, it can be assumed that the continuous standstill torque will be reduced by up to 20%. For these types of applications, a thermistor triplet (PTC) should be used with an external tripping device or the I^2t-monitoring of the drive system should be used to provide thermal protection for the winding.

This statement contradicts the definition of the standstill torque in the Configuration Manual for servomotors. The reason for the difference is the thermal behavior of the time constant and the higher winding overhang temperature due to the active cooling.

NOTICE

The PTC and NTC thermistors are ESD components. Observe the ESD Notes in the preface.

Note

At rated load, the winding temperature can reach up to 150 °C.

1.7.1 Temperature evaluation using a KTY 84 (standard protection)

NOTICE

Full motor protection is not guaranteed when only a KTY 84 is used.

Under rated operation, the winding temperature can reach approx. 150 °C. The winding temperature Class 155 (F) is dimensioned for this operating state.

Using a KTY 84 thermistor, the motor is protected against overload while operational.

The drive system senses and evaluates the motor temperature using the KTY 84 sensor signal. An external tripping unit is not required. The PTC thermistor function is monitored.

1. Pre-alarm temperature

   When the pre-alarm temperature is exceeded, the drive system signals this using an appropriate fault signal. This fault signal must be externally evaluated. The signal is withdrawn if the motor temperature < pre-alarm temperature.

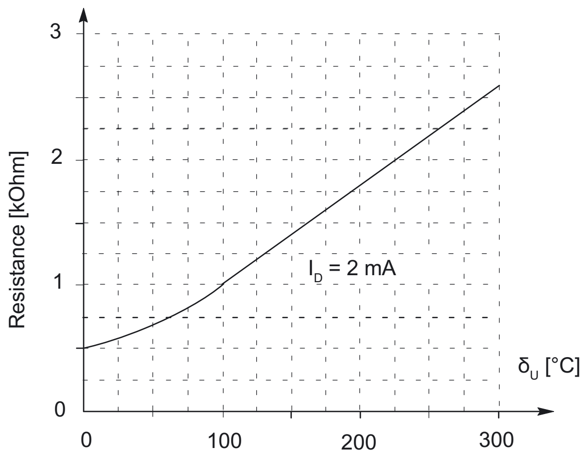
   If the pre-alarm temperature is exceeded for longer than 240 s (standard setting) or longer than the parameterized time, then a fault signal is issued and the drive is tripped (powered-down). Detailed description, see SINAMICS S120/S150 List Manual LH1.

2. Motor limit temperature

   When the motor temperature limit of 160 °C is exceeded, the drive system shuts down and signals this using an appropriate fault signal.

Table 1- 12 Technical data of the KTY 84 PTC thermistor

Designation	Description
Type	KTY 84
Resistance when cold (20 °C)	Approx. 580 Ω
Resistance when hot (100 °C)	Approx. 1000 Ω
Connection (see diagram, temperature monitoring connection)	via the encoder cable

Designation	Description
Cable cross-section Outer diameter	0.22 mm² 1.2 mm
Temperature characteristic	

1.7.2 Temperature evaluation using NTC thermistors (universal protection, option)

NOTICE
Temperature evaluation using the NTC K227 and NTC PT3-51F thermistors does not guarantee full motor protection.

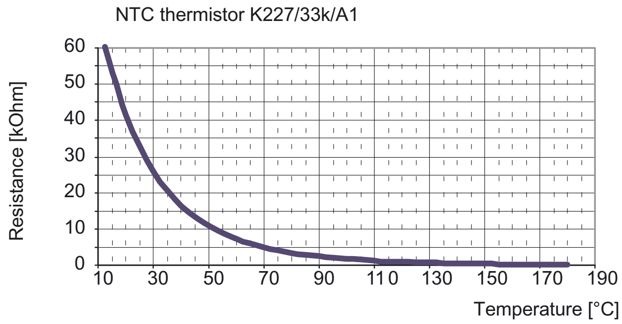
The NTC K227 and NTC PT3-51F thermistors are used if the drive system cannot evaluate the KTY PTC thermistor. They are intended when operating the motor on third-party systems. The connection should be established corresponding to the configuration and operating instructions of the third-party system.

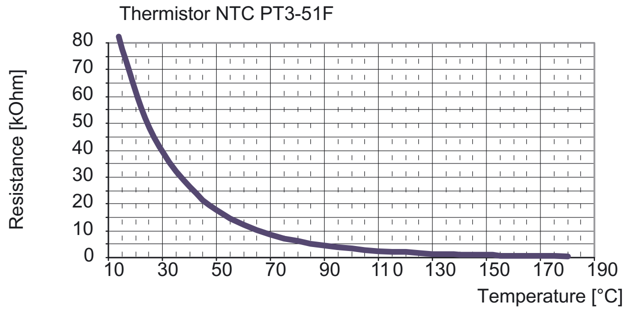
The drive system senses and evaluates the motor temperature using the sensor signal (refer to the drive system documentation).

Table 1- 13 Technical data, NTC K227 and NTC PT3-51

Designation	Technical data	
	NTC K227	NTC PT3-51F
PTC thermistor resistance (25 °C)	Approx. 32.8 kΩ	Approx. 49.1 kΩ
Resistance when hot (100 °C)	Approx. 1800 Ω	Approx. 3300 Ω
Connection (see diagram, temperature monitoring connection)	via the encoder cable	

Designation	Technical data	
	NTC K227	NTC PT3-51F
Cable cross-section	0.14 mm²	0.14 mm²
Outer diameter	0.8 mm	0.8 mm
Temperature characteristic		





1.7.3 Temperature evaluation using the PTC thermistor triplet (full motor protection, option)

For special applications (e.g. when a load is applied with the motor stationary or for extremely low speeds), the temperature of all of the three motor phases must be additionally monitored using a PTC thermistor triplet.

The PTC thermistor triplet must be evaluated using an external tripping/evaluation unit (this is not included in the scope of supply). This means that the sensor cable is monitored for wire breakage and short-circuit by this unit. The motor must be de-energized within 1 s when the response temperature is exceeded.

Table 1- 14 Technical data for the PTC thermistor triplet

Designation	Technical data
Type (acc. to DIN 44082–M180)	PTC thermistor triplet
PTC thermistor resistance (20 °C)	≤ 750 Ω
Resistance when hot (180 °C)	≤ 1710 Ω
Connection (see following diagram)	Via an external trip unit
Cable cross-section/outer diameter	0.14 mm²/0.9 mm
Response temperature	180 °C
Note: PTC thermistors do not have a linear characteristic and are therefore not suitable to determine the instantaneous temperature.	

1.7.4 Connection options

KTY 84 and PTC can be connected as follows:

- PTC via thermistor motor protection 3RN1013-1GW10, KTY 84 to SMC20
- PTC via thermistor motor protection 3RN1013-1GW10, KTY 84 directly to the drive system
- PTC and KTY 84 to SME120

Note

Additional information on connecting and operating the SMC20, refer to the documentation SINAMICS Function Manual 1 and List Manual 1.

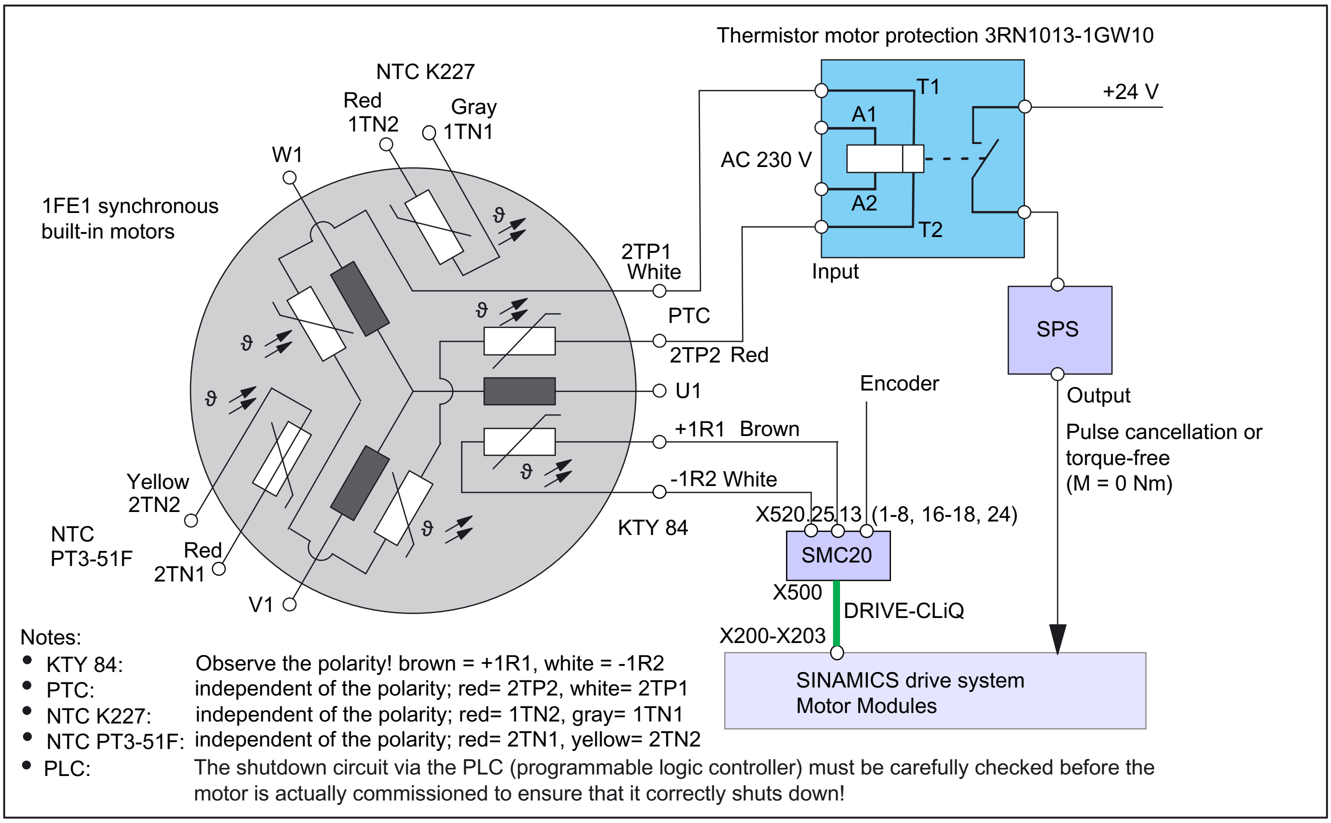
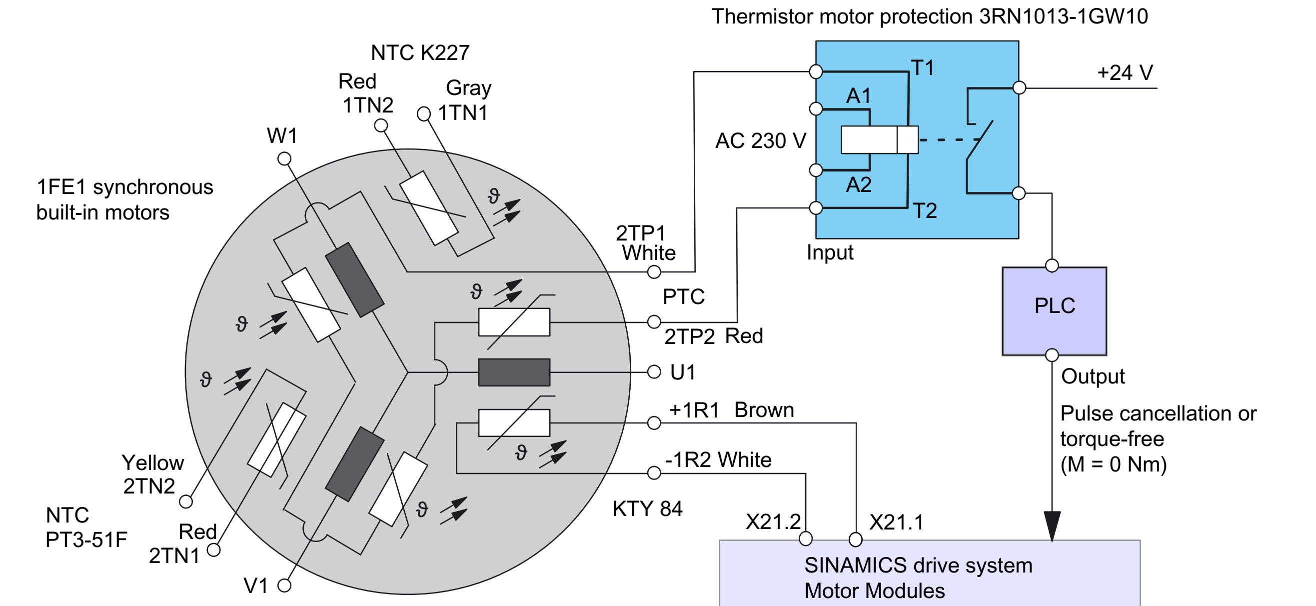


Figure 1-14 Connecting the PTC via thermistor motor protection 3RN1013-1GW10, KTY 84 to SMC20

Note

SMC20

Additional information on connecting and operating the SMC20, refer to the documentation SINAMICS Function Manual 1 and List Manual 1.



Notes:

- KTY 84: Observe the polarity! brown = +1R1, white = -1R2
- PTC: independent of the polarity; red= 2TP2, white= 2TP1
- NTC K227: independent of the polarity; red= 1TN2, gray= 1TN1
- NTC PT3-51F: independent of the polarity; red= 2TN1, yellow= 2TN2
- PLC: The shutdown circuit via the PLC (programmable logic controller) must be carefully checked before the motor is actually commissioned to ensure that it correctly shuts down!

Figure 1-15 Connecting the PTC via thermistor motor protection 3RN1013-1GW10, KTY 84 directly to the drive system

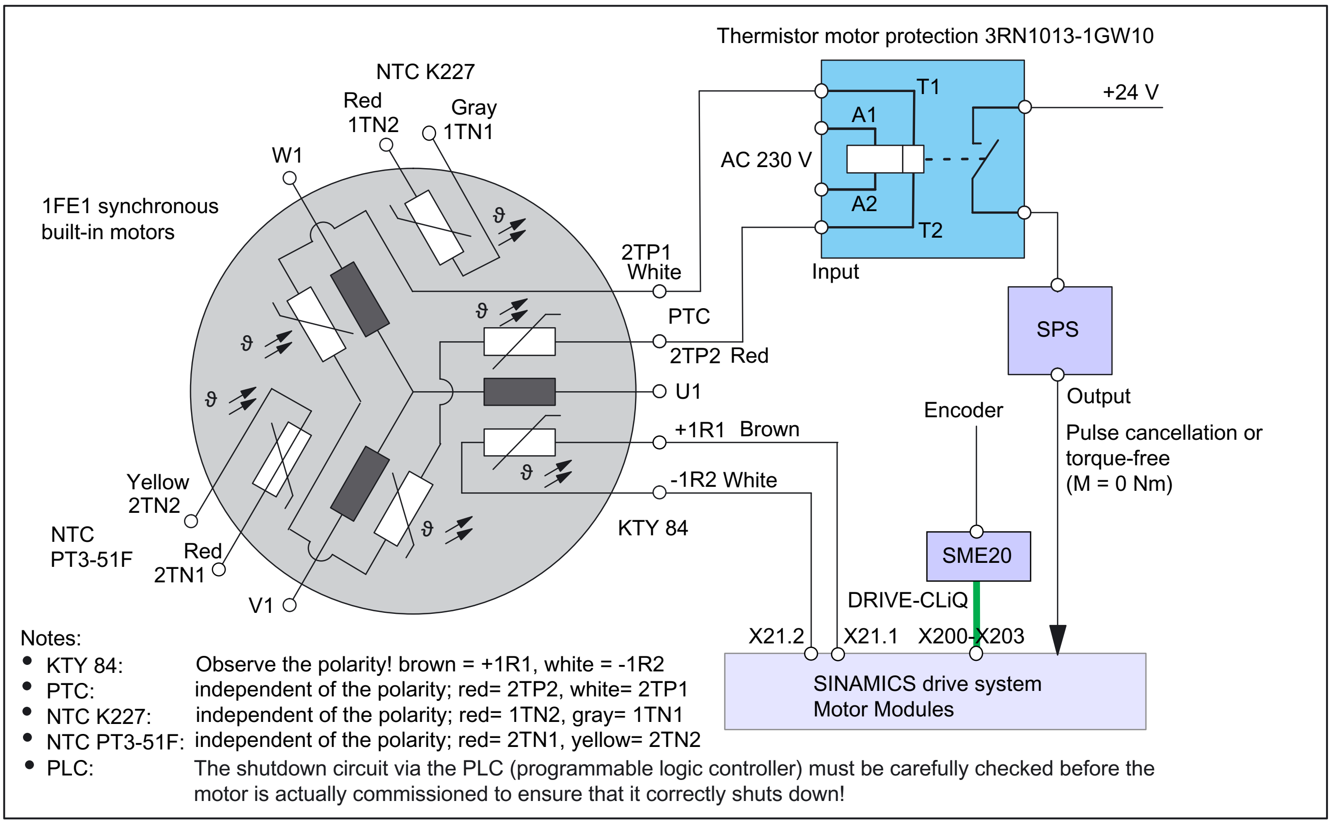


Figure 1-16 Connecting the PTC via thermistor motor protection 3RN1013-1GW10, KTY 84 directly to the drive system

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Note

SME20

Additional information on connecting and operating the SME20, refer to the documentation SINAMICS Function Manual 1 and List Manual 1.

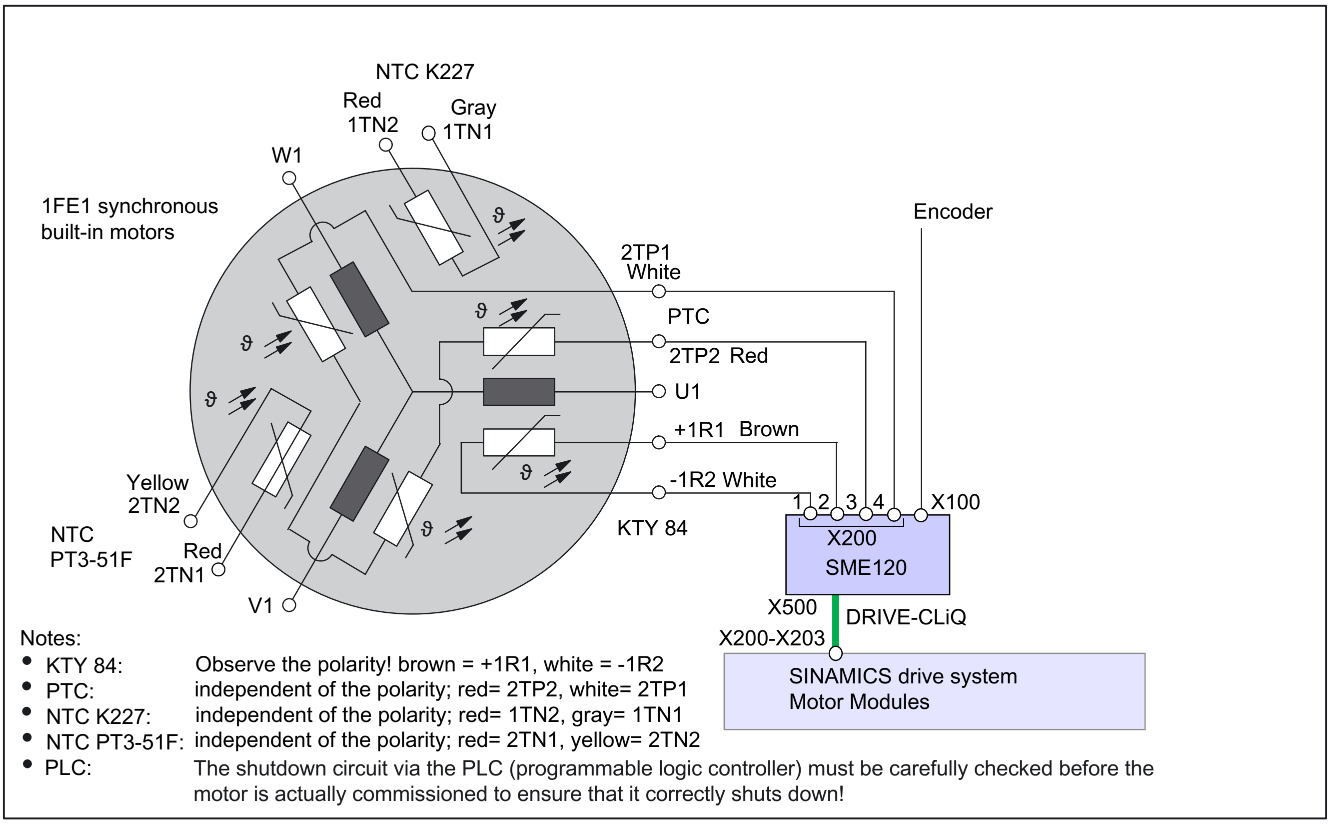


Figure 1-17 Connecting the PTC and KTY 84 to SME120

Note

SME120

Additional information on connecting and operating the SME120, refer to the documentation SINAMICS Function Manual 1 and List Manual 1.

1.8 Encoder system

Function

The encoder system has the following functions:

- Actual speed value encoder for closed-loop speed control
- Position encoder for closed-loop position control

The rotor position is determined when switching on using the "pole position identification" software function, see Chapter Commutation angle (Page 56).

Encoder systems that can be used

Typically, toothed wheel encoders or a comparable hollow shaft encoder system with sinusoidal voltage signals 1 Vpp are used.

The encoder system is not included in the scope of supply (option).

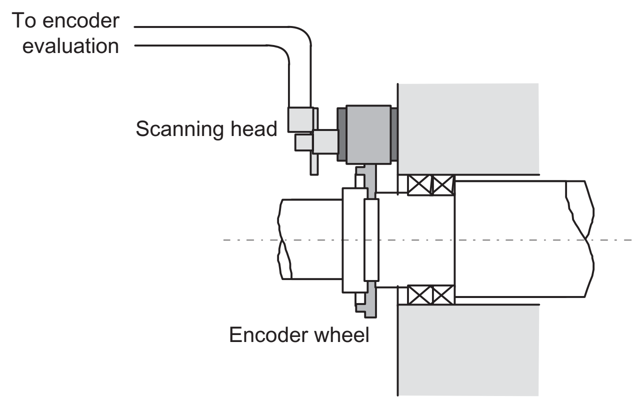


Figure 1-18 Encoder mounting schematic

Commercially available measuring systems from various manufacturers can be used. For example

Lenord und Bauer, type GEL 2443; www.lenord.de/produkte/sensorline/einbau/gel2443/

- Johannes Heidenhain, type ERM 280; www.heidenhain.de
- VS-Sensorik; type RGxxx; www.vs-sensorik.com

These are non-Siemens (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. The user is responsible in checking and ensuring the necessary compatibility in the particular application. We cannot guarantee the properties/features of third-party products. Please contact the specified manufacturer directly for technical information or questions regarding orders.

1.9 Commutation angle

NOTICE
With synchronous spindles, the angle must be determined or entered when the spindle is first commissioned or when the spindle is replaced!

The "installed" permanent magnetic field of the rotor must be synchronized with the electrically generated magnetic field of the stator. This enables the two magnetic fields of the stator and rotor to be optimally superimposed on one another.

This "synchronization angle" relative to the zero mark of the encoder system can be measured and saved in the drive system (commutation angle offset).

Pole position identification / determining the commutation angle for SINAMICS

1. Select a Motor Module and select the (closed-loop) control type "Speed control with encoder".
2. Select the synchronous built-in motor in the motor selection list; then press the "Continue" key.
3. Select a speed encoder (hollow-shaft incremental encoder, 1 V_{pp}); then press the "Enter data" key.
4. The pole position identification routine provides coarse synchronization. The encoder has a zero mark, therefore, after the zero mark has been crossed, the pole position can be automatically adjusted to the zero mark position (fine synchronization). The zero mark position must be electrically adjusted (p0431). Fine synchronization is recommended (p0404.15 = 1), as it avoids measurement spread and allows the determined pole position to be automatically checked.
5. "Pole position identification" must be selected in the encoder data screen under coarse synchronization. "Zero marks" should be selected for fine synchronization. The other fields are already pre-assigned. The "Saturation-based 1st + 2nd harmonic" is selected and acknowledged using "Pole position ID parameter".
6. The configuration has been completed once the Wizards have been completed and data has been downloaded into the drive. The correct pole position identification technique (p1980) is pre-assigned with the motor-specific identification currents (p0325, p0329) and their selection (p1982).
7. Before determining the commutation angle offset, the control sense of the drive should be checked, i.e. for motor clockwise rotation, the encoder must supply positive speed actual values in r0061.
8. The correct commutation angle offset (p0431) should be determined by selecting p1990 = 1. In the expert list, switch-on the drive using the commissioning tool (control panel) (PLI is performed) p1990 = 1. Then enter a low speed setpoint. After the zero mark has been crossed for the first time, the determined commutation angle offset is automatically entered into p0431. Alarm A07971 is output during the determination routine. p1990 is automatically set to the value of 0 at the end of the measurement.
9. The automatically determined value in p0431 should be subject to a plausibility check. Several techniques are recommended in the parameter description for p1990 (see SINAMICS S120/S150 List Manual LH1).

If the angle is already known (e.g. final acceptance report), then this value should be used to check the value that has been determined.

Note

Deviations > 5°

For deviations > 5°, the authorized technical personnel of the manufacturer must be contacted.

1.9.1 Pole position identification, induction-based

- This functions both for rotors that can freely rotate as well as for rotors that are mechanically locked.
- The accuracy when determining the rotor position depends on the magnetic characteristics of the motor.
- A minimum current is required for the pole position identification. This means that the following must apply when selecting the Motor Module and the motor:

  Rated current (S1 current), Motor Module ≥ 50 % of the rated motor current.
- When using series reactors or for motors with a low degree of saturation, the accuracy when determining the rotor position is low or the pole position identification does not provide any result at all.

1.9.2 Pole position identification, motion-based

- The rotor must be able to freely rotate.
- The rotor position is determined with a high accuracy.
- Independent of the magnetic motor characteristics.
- The quality of the result is not influenced when using series reactors.

1.9.3 Special issues regarding pole position identification for specific motors

For various high-speed main spindle synchronous motors (low-inductance motors and for motors with series reactor belonging to the high-speed 2-series), the electrical pole position angle cannot be determined with satisfactory quality using the inductance-based pole position identification technique.

This involves, for example:

- 1FE104□-6WN10-...
- 1FE1052-4H□□□ (High-Speed 2 series)
- 1FE1053-4H□□□ (High-Speed 2 series)

Although induction-based pole position identification is sufficiently accurate to start the motor, an optimum efficiency is however not achieved.

There are two alternative strategies when operating the specified motors:

1. Changing-over the pole position technique from saturation-based to motion-based.

   Prerequisite:

   The rotor must be free to rotate when switching on. If this cannot be reliably done in operation, because e.g. in the case of a fault, the spindle is blocked by the tool, then the motion-based pole position identification cannot be used.

2. Determining the angular commutation offset using motion-based pole position identification and operationally starting the motor using saturation-based pole position identification.

   Prerequisite:

   Encoder with zero mark (the zero mark is used for fine commutation).

   Description:

   When commissioning the motor for the first time or when re-commissioning it, the precise commutation angle is determined using motion-based pole position identification. In this case, the motor must be able to freely rotate. After the commutation angle has been precisely determined and saved in the parameter, then the saturation-based pole position identification is selected. The saturation-based pole position identification technique is normally used. After it has been switched on, the motor initially operates using the less accurate commutation angle; at the latest after one revolution after it crosses the zero mark for the first time, the saved (precise) commutation angle is read-in.

   Procedure:

   – Change over the pole position identification technique from saturation-based to motion-based; set p1980 to "10".

   – Activate the zero mark for fine commutation;

     Set p0404 bit 15 to "1".

   – Before enabling the motor, activate the "commutation angle offset commissioning support";

     Set p1990 to "1".

   – The commutation angle offset is automatically entered in p0431.

     Subsequent steps: Changeover the pole position identification technique from motion-based to saturation-based; set p1980 to "1".

NOTICE
When the encoder has been removed (when maintaining the spindle) the commutation angle must be re-determined (this must only be carried out by qualified personnel).

Note

Software prerequisites for both of these strategies

The drive software must support the induction-based and motion-based techniques; from software release 6.x and higher

Brief installation overview 2

2.1 Safety instructions for installation

⚠DANGER
Safety in magnetic and electromagnetic fields It is mandatory that the safety markings according to VBG A8 are carefully observed. As part of the current accident prevention regulations, the access and presence of personnel close to synchronous built-in motors should be carefully managed and regulated. Personnel with active implants, e.g. heart pacemakers or ferro-magnetic parts implanted in their body (containing iron) must not work with these motors in this work environment. Personnel with heart pacemakers must always maintain a safety clearance of at least 0.5 m. For personnel with implants, the limit value is specified to be 0.5 mT (Millitesla) according to the rules for safety and health at workplaces that are exposed (i.e. the presence of hazardous substances in the air as a result of electric, magnetic or electromagnetic fields). In the area where magnetized rotors are being installed, the special effects (magnetic force/fields) on electromagnetic devices, computers, watches, data carriers - such as e.g. credit and telephone cards, company IDs - should be carefully observed.

⚠WARNING
It is important that the Installation Instructions are carefully observed when engineering/configuring the system and before assembly/disassembly. These also include the safety and hazard notes regarding the installation. Order number for the installation instructions: 610.43000.02 German/English 610.40082.01 Italian/Spanish/French. The installation instructions can be obtained as follows: • are supplied with each built-in motor • available through the Siemens Intranet and on DOCONCD • can be ordered from your local Siemens office • https://apps01.industry.siemens.com/content/00000100/Extranet/Intranet/Public_Documents/SIMODRIVE/deutsch/1FE1_M_1202_de_en.pdf It is **not** possible to assemble/disassemble the motors using this Configuration Manual "Synchronous Built-in motors 1FE1".

⚠WARNING

Hazards are involved when handling, storing and installing 1FE1 rotor cores equipped with permanent magnets. Only qualified, suitably trained personnel who clearly understand the special hazards involved may work with and on these parts.

Note

The installation and storage locations for 1FE1 rotor cores are marked with the safety markings according to VBG A8.

There is a risk of injury as a result of the high magnetic forces. As a consequence, the rotor must be handled using suitable production and installation equipment.

1FE1 rotor cores must always be provided with a non-magnetic protective cover (≥ 20 mm) to separate them from ferromagnetic parts. Under no circumstances is it permissible that the rotors are placed down directly onto magnetic surfaces, e.g. steel floors or surfaces (risk of crushing).

Rotors equipped with magnets must always be stored in their original packaging. It must be ensured that the environment is dry, dust-free and not subject to any significant level of vibration.

W09 – Warning about a hazardous location
W27 – Warning - hand injuries
W13 – Warning - magnetic field
P11 – Prohibited for personnel with pacemaker

Figure 2-1 Warning label supplied

2.2 Installing the rotor (brief description)

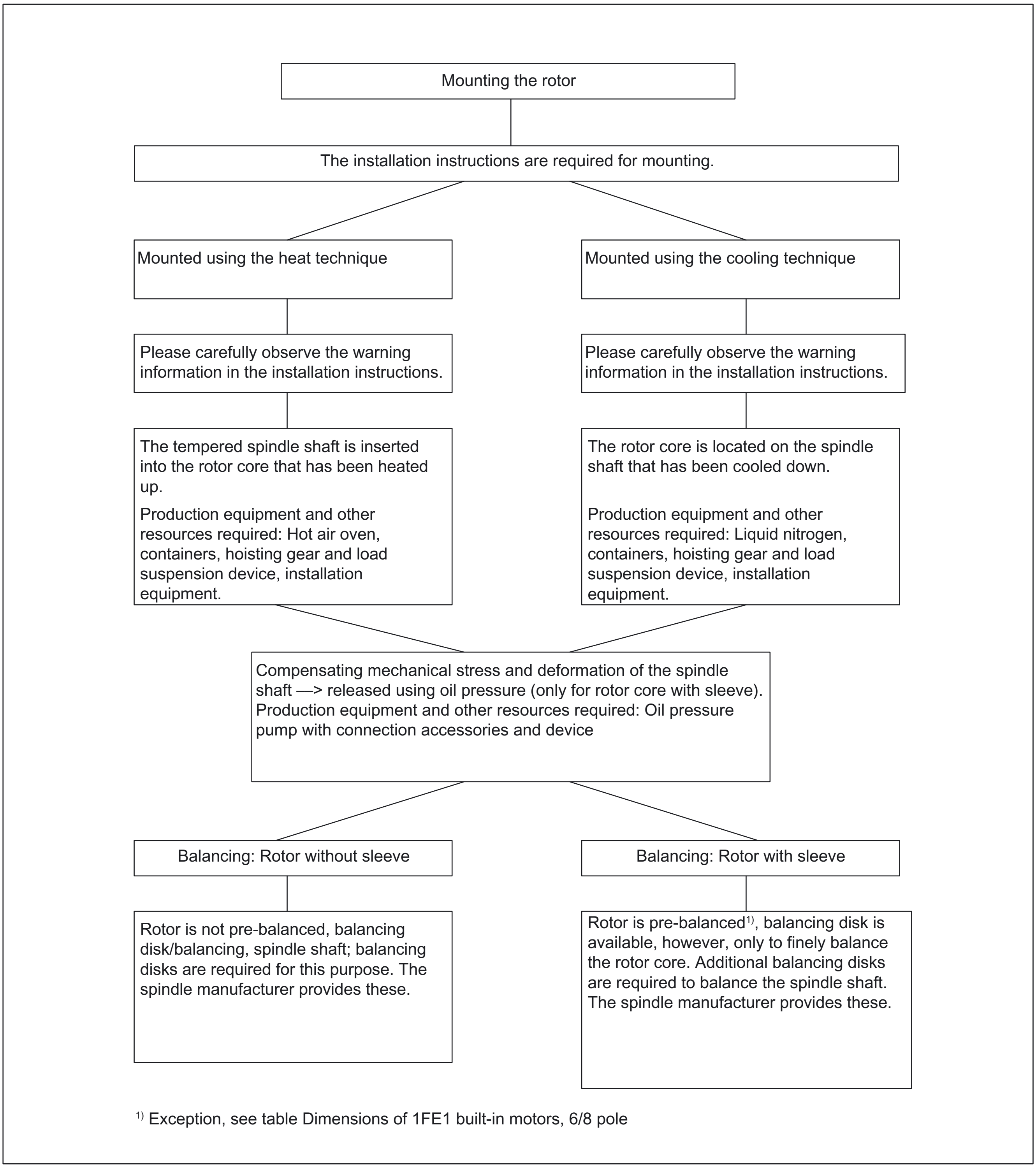


Figure 2-2 Procedure for installing the rotor

2.3 Removing the rotor (brief description)

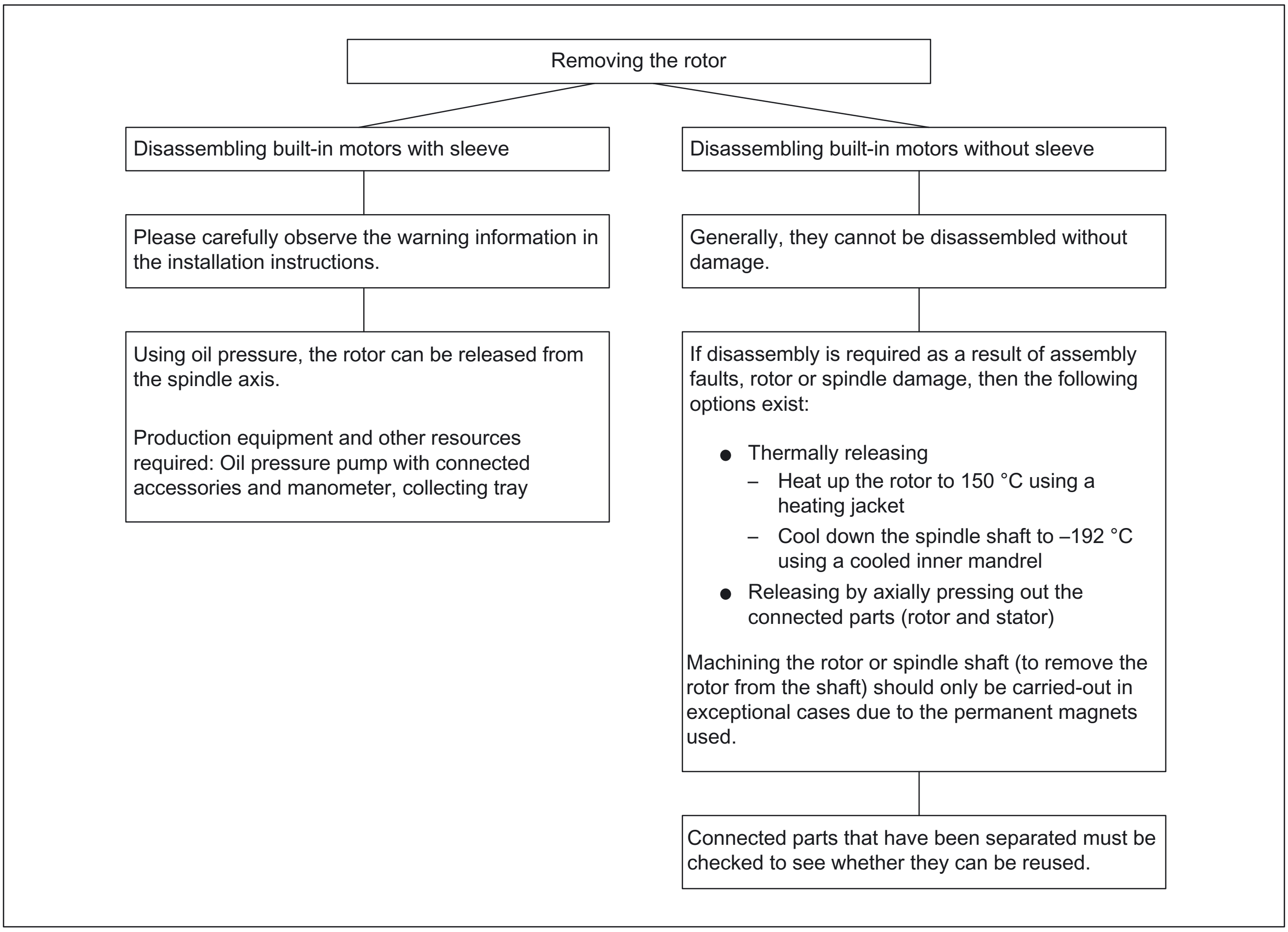


Figure 2-3 Procedure for removing the rotor

2.4 Installing the stator (brief description)

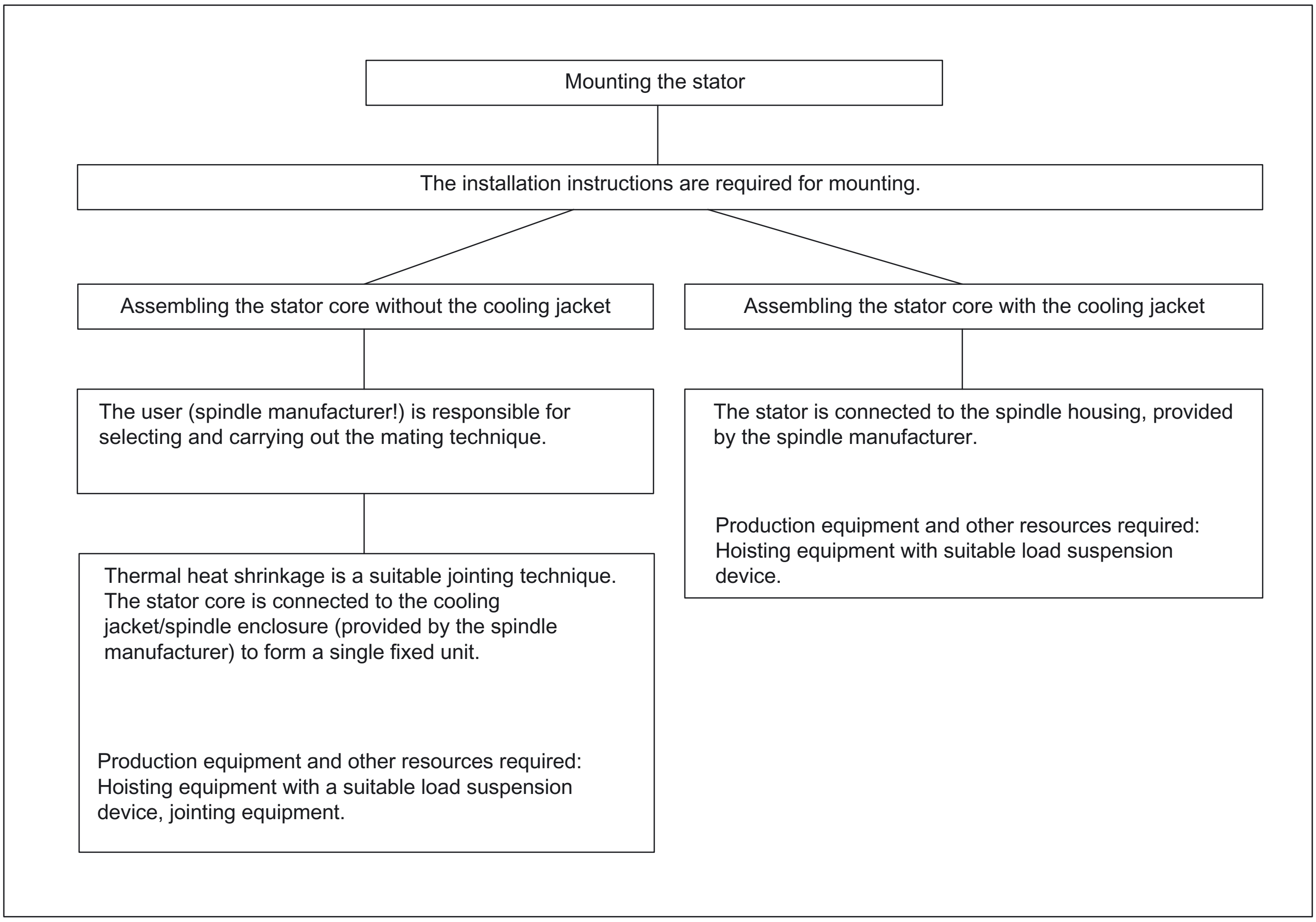


Figure 2-4 Procedure for installing the stator

2.5 Installing the motor spindle (brief description)

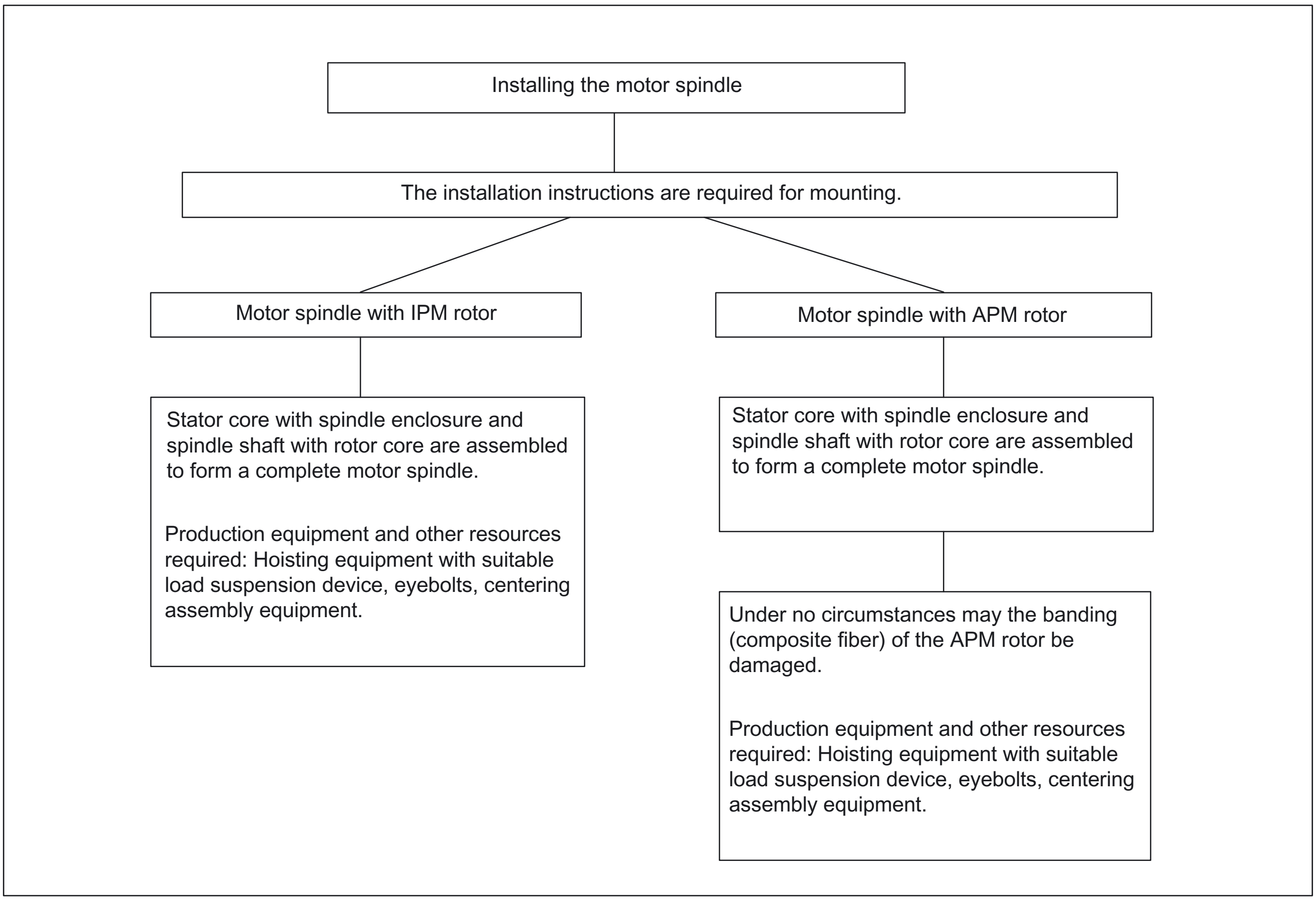


Figure 2-5 Procedure for installing the motor spindle

2.5.1 Magnetic forces

⚠WARNING
Higher magnetic forces are present as a result of the permanent magnets in the rotor; these magnetic forces can draw the spindle into the stator bore (note that there is a risk of crushing!).

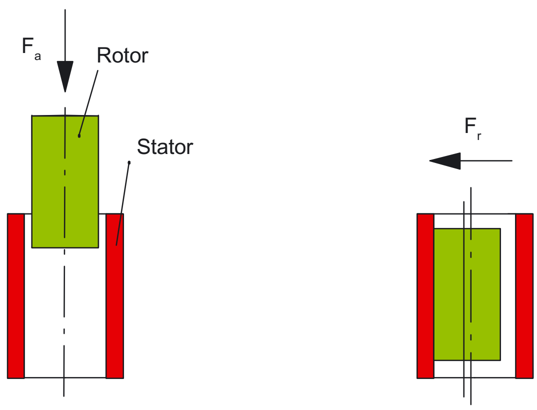


Figure 2-6 Magnetic forces

Note

The radial forces specified in the following table are maximum values that occur if the rotor comes into contact with the stator at one side. For an ideally centric rotor (no eccentricity), the resulting radial force is zero.

The radial force between a centric rotor and the rotor in contact with the stator can be linearly converted (calculated air gap, 0.5 mm) depending on the eccentricity.

Table 2- 1 Magnetic forces (radial forces)

Motor type	F_a [N]	F_r [N]
6-pole built-in motors		
1FE1041-6□□□□	180	200
1FE1042-6□□□□	180	400
1FE1051-6□□□□	180	200
1FE1052-6□□□□	180	400
1FE1054-6□□□□	180	800
1FE1061-6□□□□	250	250
1FE1064-6□□□□	250	1000
1FE1082-6□□□□	350	700

Motor type	F_a [N]	F_r [N]
1FE1083-6□□□□	350	1050
1FE1084-6□□□□	350	1400
1FE1091-6□□□□	360	350
1FE1092-6□□□□	360	700
1FE1093-6□□□□	360	1050
1FE1113-6□□□□	450	1300
1FE1114-6□□□□	450	1700
1FE1115-6□□□□	450	2200
1FE1116-6□□□□	450	2600
8-pole built-in motors		
1FE1144-8□□□□	700	2400
1FE1145-8□□□□	700	3000
1FE1147-8□□□□	700	4200
4-pole built-in motors		
1FE1051-4□□□□	180	290
1FE1051-4H□□□	200	150
1FE1052-4□□□□	180	580
1FE1052-4H□□□	200	300
1FE1053-4□□□□	180	870
1FE1053-4H□□□	200	450
1FE1072-4□□□□	260	700
1FE1073-4□□□□	260	1050
1FE1074-4□□□□	260	1400
1FE1082-4□□□□	300	850
1FE1083-4□□□□	300	1275
1FE1084-4□□□□	300	1700
1FE1085-4□□□□	300	2125
1FE1092-4□□□□	340	1000
1FE1093-4□□□□	340	1500
1FE1094-4□□□□	340	2000
1FE1095-4□□□□	340	2500
1FE1096-4□□□□	340	3000
1FE1103-4□□□□	250	750
1FE1104-4□□□□	250	1000
1FE1105-4□□□□	250	1250
1FE1106-4□□□□	250	1500
1FE1124-4□□□□	350	1800
1FE1125-4□□□□	350	2300
1FE1126-4□□□□	350	2800

2.5.2 Types (IPM, APM)

IPM rotors are rotors with **internally located** permanent magnets.

APM rotors are rotors with **externally located** permanent magnets.

Table 2- 2 Assignment of the type to the built-in motors

Motor type	IPM rotors		APM rotors	
	without sleeve	with sleeve	without sleeve	with sleeve
6-pole built-in motors				
1FE104□-6	–	–	X	–
1FE105□-6	X	X	–	–
1FE106□-6	X	X	–	–
1FE108□-6	X	X	–	–
1FE109□-6	X	X	–	–
1FE111□-6	X	X	–	–
8-pole built-in motors				
1FE1144□-8	–	–	X	–
1FE1145□-8	–	–	–	X
1FE1147□-8	–	–	–	X
4-pole built-in motors				
1FE105□-4W	X	–	–	–
1FE105□-4H	–	–	X	–
1FE107□-4	X	–	–	–
1FE108□-4	X	–	–	–
1FE109□-4	X	–	–	–
1FE110□-4	–	–	X	–
1FE112□-4	–	–	X	–

Design

The rotors of built-in motors are finish machined and are mounted directly onto the motor spindle shaft without any subsequent machining.

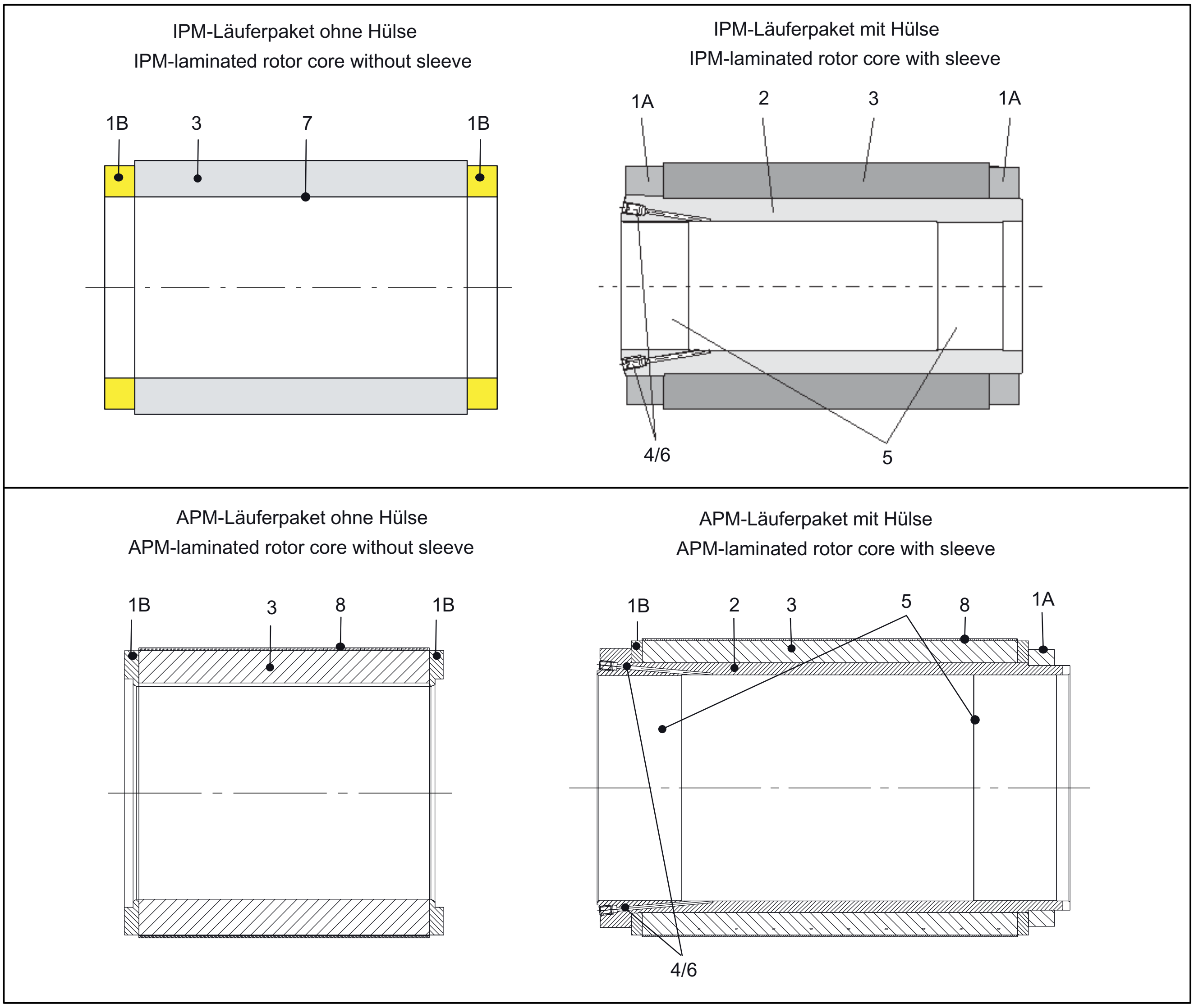


Figure 2-7 Typical design of IPM and APM rotor cores with and without sleeve; for a description of the code numbers, refer to the following table

Table 2- 3 Description of the code numbers in Fig.

Code number	Description	Code number	Description
1A	Locking plate	5	Step interference fit
1B	Balancing disk	6	Grub screw
2	Sleeve	7	Cylindrical interference fit
3	Rotor core	8	Composite fiber
4	Pressurized oil connection		

Rotor sleeves

Note

Built-in motors without rotor sleeve:

The force is transmitted without any play and without a sleeve. Larger outer spindle diameters are achieved due to the fact that there is no rotor sleeve. Generally, it is not possible to release the group (rotor and stator) using the version without sleeve.

Built-in motors with rotor sleeve:

The rotor is located on an inner sleeve with step interference fit. The interference fit can be released by injecting oil under pressure without influencing the joint surfaces.

The spindle manufacturer thermally mounts the rotor onto the spindle (thermal shrinking). To ensure torque transmission without any play, in the area of the interference fit, the spindle must be machined with the specified dimensions and tolerances.

2.5.3 Balancing recommendations for rotor without sleeve

- Rotors with sleeve in the B, C, D and E versions are supplied with balance quality G 2.5 (reference speed 3600 rpm) according to DIN ISO 1940.
- Rotors without sleeve are not balanced.

After the rotor has been mounted onto the spindle it may be necessary to finely balance the overall system - rotor-spindle. The required balance planes must be provided on the spindle system. It is not permissible to remove material from the rotor core.

After the rotor without sleeve has been mounted onto the spindle, the overall system - rotor-spindle - must be finely balanced. The balancing disks required are not included in the scope of supply.

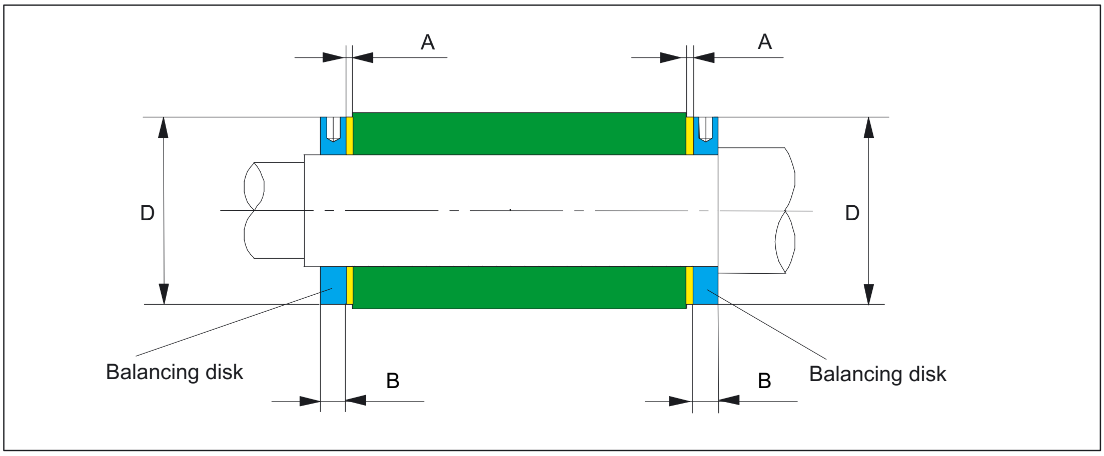


Figure 2-8 Recommended balancing disks for rotors without sleeve; dimensions A, B and D, refer to the following table

Table 2- 4 Dimensions A, B and D for the recommended balancing disks

Motor type	A [mm] [1]	B [mm]	D [mm]
1FE104□-6□□□	The balancing disk end stop is the rotor sleeve	10	52
1FE105□-6□□□	5 [3]	10	70
1FE106□-6□□□	4	10	80
1FE108□-6□□□	4	12	117
1FE109□-6□□□	5 [3]	12	125
1FE111□-6□□□	5 [3]	12	155
1FE114□-8□□□ [2]	The balancing disk end stop is the rotor sleeve	12	190
1FE1144□-8□□□ [2]	22	15	186
1FE105□-4□□□	4	10	63
1FE105□-4H□□	7,5	10	63
1FE107□-4□□□	4	10	80
1FE108□-4□□□	4	10	95
1FE109□-4□□□ rotor d_i = 72 mm rotor d_i = 80 mm	 5 [3] 4	 12 12	 108 108
1FE110□-4□□□	4 [3]	12	120
1FE112□-4□□□	4 [3]	12	145

1) Minimum clearance A between the rotor and external balancing disk for magnetic materials. Clearance A is eliminated for non-magnetic materials (refer to the recommendations, dimension drawings).

2) Version only with rotor sleeve, not pre-balanced

3) Clearance is provided as a result of the rotor locking plates (= aluminum or non-magnetic steel). The balancing disk can be in contact with the rotor locking plate.

Installation dimensions

The mounting dimensions can be taken from the dimension drawings, see Chapter Dimension drawings (Page 279).

A minimum spindle wall thickness is specified in the area of the interference fit. These can be taken from the dimension drawings, see Chapter Dimension drawings (Page 279).

Notes on the balance quality, see Chapter Dimension drawings (Page 279).

2.6 Packing and transport

Note

The standard packing of the 1FE1 rotor cores is suitable for transport by truck, rail or ship according to the DB Guidelines (without certification).

The packing of 1FE1 rotors is not suitable for transport by air. Special IATA regulations apply in this case.

Electrical connection 3

3.1 Safety instructions

⚠DANGER
Electrical equipment must be installed so that it does not present any hazards. Notes on this are provided in EN 60204-1 (VDE 0113).

⚠DANGER
To prevent accidents by touching active parts, protective measures are required both against direct as well as indirect contact. Notes on this are provided in EN 60364-4-41 (DIN VDE 0100, Part 410) and DIN VDE 0106, Part 100. All work must only be undertaken with the system in a no-voltage condition. As a result of the integrated permanent magnets, voltage is present at the motor terminals when the rotor is rotating (up to 2 kV).

⚠WARNING
The stator core must be electrically connected to the cooling jacket. There must be a good electrical connection between the cooling jacket and the spindle box to ensure a sufficiently good electrical connection to the spindle box. The cross-section represents the effective contact surface. The spindle manufacturer is responsible in ensuring that the complete motor spindle is grounded in compliance with all of the applicable regulations.

⚠DANGER
Risk of electric shock! **When an installed built-in motor rotates, potentially dangerous voltages are induced at the cable ends of the motor.** Insulate terminals and leads in open cable ends or take measures to prevent built-in motors that have been installed from rotating. There is also a risk of crushing.

⚠DANGER
Danger due to high leakage currents If high leakage currents are present, more stringent requirements may apply to the PE conductor. Warning signs may also be required. You can find more detailed information in standard EN 61800-5-1.

Protective measures against residual voltages

⚠DANGER
There is a shock hazard danger due to the residual voltages at the built-in motor terminals!
When the power supply voltage is switched-off, active parts of the motor can have a charge of more than 60 µC. In addition, at open-circuit cable ends – e.g. when a connector is withdrawn – even after the power has been disconnected, a voltage of more than 60 V is present for 1 s. Apply the appropriate measures to provide protection against residual voltages!

3.1.1 High-voltage test

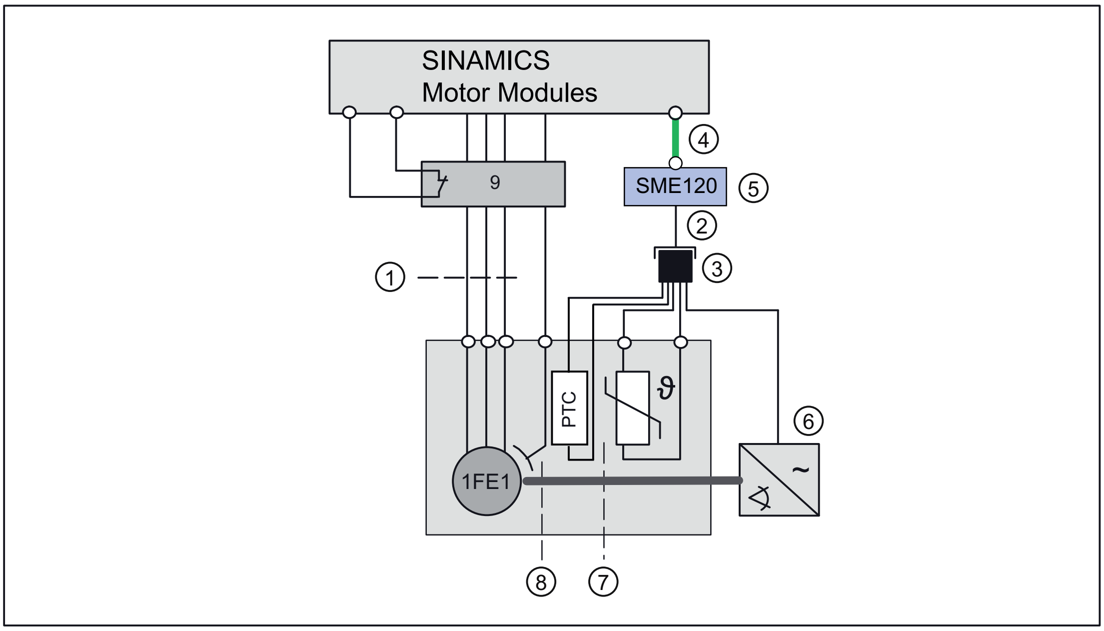
Before being shipped, the stators of the built-in motors are subject to a high-voltage test in compliance with EN 60034-1.

However, the Standards Commission recommends that when electrical components are mounted/installed (such as built-in motors), that a new high-voltage test according to EN 60034-1 is carried-out after the final mounting and assembly. If users perform an additional high-voltage test, then only 80% of the test voltage may be applied when testing according to EN 60034-1.

⚠CAUTION
If the test voltage is connected to a temperature sensor, then the temperature sensor will be destroyed. Before performing the test, the cable ends of the temperature sensors must be short-circuited!

3.2 Connection technology

3.2.1 Connection overview



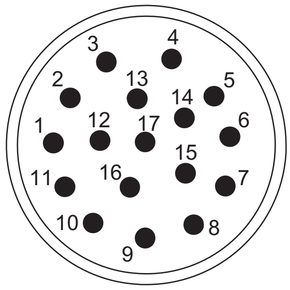
① Power cable
② Signal line, draggable or only conditionally draggable
③ Signal connector, 17-pin, male thread, MLFB 6FX2003-1CF17
Optional mounting flange that can be retrofitted MLFB 6FX2003-7DX00
④ DRIVE-CLiQ cable 6FX□002-2DC10_□□□, draggable or only conditionally draggable
⑤ SME120, encoder, motor side, connector kits 6FX2003-0SA12, 12-pin
⑥ Encoder
⑦ Temperature sensor (+1 reserve)
⑧ Ground connection
⑨ Voltage limiting (VPM, IVP), only if EMF > 820 V

Figure 3-1 Connection overview

Connection pin assignment for 17-pin flange socket with pin contacts

Table 3- 1 Connection pin assignment, 17-pin flange socket

Pin	Signal
1	A
2	A*
3	Data
4	not connected
5	Clock
6	not connected
7	M encoder
8	+1R1
9	-1R2
10	P encoder
11	B
12	B*
13	Data*
14	Clock*
15	M sense
16	P sense
17	not connected



3.2.2 Terminal box

The terminal box must have as a minimum, degree of protection IP54 according to DIN IEC 60034-5. Correspondingly, seals must be provided between the spindle box and terminal box as well as at the terminal box cover.

The terminal box is not included in the scope of supply.

3.2.3 Connecting cables

The power connection is fed out from a winding overhang of the stator. The free cable ends are fed to a terminal box that has to be provided by the spindle/machine manufacturer.

We recommend that the free cable ends are fed out at the spindle box in a suitable protective tubing with cable gland. Effective strain relief must be provided. The required minimum bending radii must be carefully maintained (3 to 4 x the outer cable diameter).

Standard cables from the range of accessories of the SINAMICS drive system are used from the spindle box interface and onwards.

Because of the high voltages involved, cables that are suitable for higher mechanical requirements should be used in conjunction with a connection socket and VPM.

The maximum length of the connecting cable is 50 m with and without VPM.

The temperature sensor is connected in the flanged connection socket of the encoder.

3.2.4 Cable cross-sections and outer cable diameter

The values specified in the following table refer to the cable outlet of the motor.

Additional connecting cables should be configured corresponding to the rated current according to EN 60204-1, depending on cable routing type C (cables and conductors routed along walls and in cable trays) and the ambient temperature.

Table 3- 2 Cable cross-sections (Cu) and outer diameter of the connecting cables

Motor type	L = 0.5 m [1]		L = 1.5 m [2]	
	Cable cross-section per phase [mm²]	Outer cable diameter [mm]	Cable cross-section per phase [mm²]	Outer cable diameter [mm]
6-pole built-in motors				
1FE1041-6WM□0	2,5	4,4	-	-
1FE1042-6WN□0	2,5	4,4	-	-
1FE1042-6WR□0	2,5	4,4	-	-
1FE1051-6WN□0	2,5	4,4	2,5	4,4
1FE1051-6WK□0	2,5	4,4	2,5	4,4
1FE1052-6WN□0	2,5	4,4	2,5	4,4
1FE1052-6WK□0	4,0	5,5	4,0	5,5
1FE1054-6WN□0	6,0 [3]	6,3 [3]	6,0 [3]	6,3 [3]
1FE1061-6WH□0	2,5	4,4	2,5	4,4
1FE1061-6WY□0	2,5	4,4	2,5	4,4
1FE1064-6WN□1	6,0	6,3	6,0	6,3
1FE1064-6WQ□1	4,0	5,5	6,0	6,3
1FE1082-6WP□0	10	7,9	10	7,9
1FE1082-6WS□0	4	5,5	6	6,3
1FE1082-6WQ□1	6	6,3	10	7,9
1FE1082-6WW□1	2,5	4,4	2,5	4,4
1FE1084-6WR□1	6,0	6,3	10,0	7,9
1FE1083-6WP□0	10,0	7,9	10,0	7,9
1FE1084-6WU□1	4,0	5,5	6,0	6,3
1FE1084-6WX□1	2,5	4,4	2,5	4,4
1FE1091-6WN□0	2,5	4,4	2,5	4,4
1FE1091-6WS□0	2,5	4,4	2,5	4,4
1FE1092-6WN□0	6,0	6,3	10,0	7,9
1FE1092-6WR□1	4,0	5,5	6,0	6,3
1FE1093-6WN□0	10,0	7,9	16,0	9,0
1FE1093-6WS□0	6,0	6,3	10,0	7,9
1FE1093-6WV□1	4,0	5,5	6,0	6,3
1FE1113-6WU□1	6,0	6,3	10,0	7,9
1FE1113-6WX□1	4,0	5,5	6,0	6,3
1FE1114-6WR□1	16,0	9,0	25,0	11,0
1FE1114-6WT□1	10,0	7,9	16,0	9,0

Motor type	L = 0.5 m 1)		L = 1.5 m 2)	
	Cable cross-section per phase [mm²]	Outer cable diameter [mm]	Cable cross-section per phase [mm²]	Outer cable diameter [mm]
1FE1114-6WW□1	6,0	6,3	10,0	7,9
1FE1115-6WT□1	10,0	7,9	16,0	9,0
1FE1116-6WR□1	16,0	9,0	25,0	11,0
1FE1116-6WT□1	10,0	7,9	16,0	9,0
1FE1116-6WW□1	6,0	6,3	10,0	7,9
8-pole built-in motors				
1FE1144-8WL□1	25,0	11,0	2 •16	9,0
1FE1145-8WN□1	2•16	9,0	2 •16	9,0
1FE1145-8WQ□1	2•10	7,9	2 •16	9,0
1FE1145-8WS□1	25,0	11,0	25,0	11,0
1FE1147-8WM□1	2 •16	2 • 9,1	2 • 25	2 • 11
1FE1147-8WN□1	2 •16	9,0	2 •16	9,0
1FE1147-8WQ□1	2 •10	7,9	2 •16	9,0
1FE1147-8WS□1	25,0	11,0	25,0	11,0
4-pole built-in motors				
1FE1051-4HC□0	2,5	4,4	2,5	4,4
1FE1051-4WN□1	2,5	4,4	2,5	4,4
1FE1052-4HD□0	6,0	6,3	6,0	6,3
1FE1052-4HG□1	4,0	5,5	6,0	6,3
1FE1052-4WN□1	2,5	4,4	2,5	4,4
1FE1052-4WK□1	2,5	4,4	4,0	5,5
1FE1053-4HH□1	4,0	5,5	6,0	6,3
1FE1053-4WN□1	2,5	4,4	2,5	4,4
1FE1053-4WJ□1	4,0	5,5	4,0	5,5
1FE1072-4WH□1	6,0	6,3	10,0	7,9
1FE1072-4WL□1	4,0	5,5	6,0	6,3
1FE1072-4WN□1	2,5	4,4	4,0	5,5
1FE1073-4WN□1	6,0	6,3	10,0	7,9
1FE1073-4WT□1	2,5	4,4	2,5	4,4
1FE1074-4WM□1	16,0	9,0	16,0	9,0
1FE1074-4WN□1	10,0	7,9	16,0	9,0
1FE1074-4WT□1	6,0	6,3	6,0	6,3
1FE1082-4WN□1	4,0	5,5	6,0	6,3
1FE1082-4WR□1	2,5	4,4	2,5	4,4
1FE1083-4WN□1	10,0	7,9	16,0	9,0
1FE1084-4WN□1	16,0	9,0	25,0	11,0
1FE1084-4WP□1	10,0	7,9	16,0	9,0
1FE1084-4WQ□1	10,0	7,9	16,0	9,0
1FE1084-4WT□1	6,0	6,3	10,0	7,9
1FE1085-4WN□1	16,0	9,0	25,0	11,0

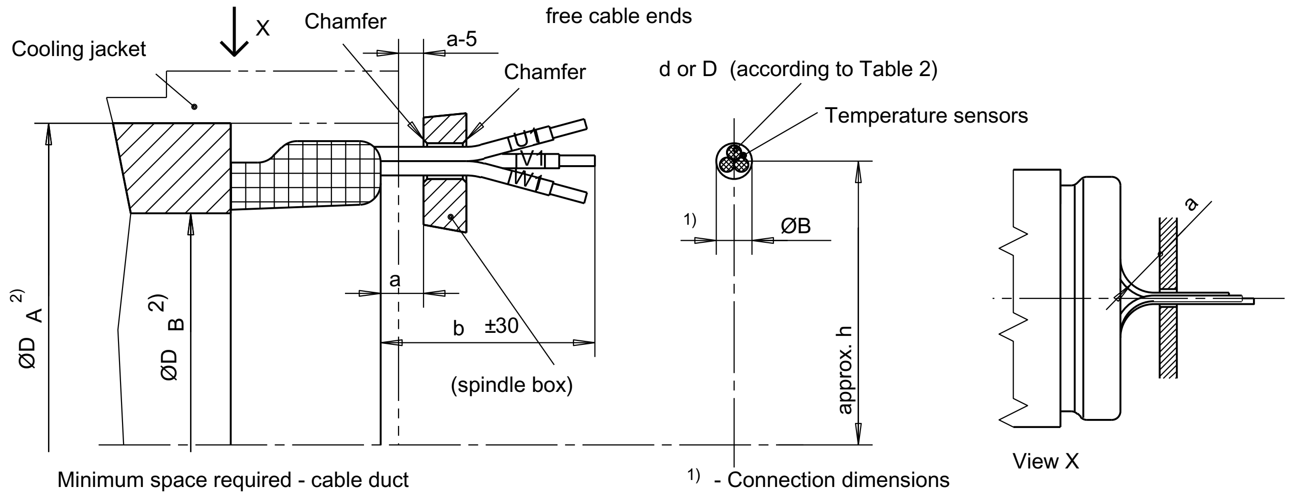
Motor type	L = 0.5 m 1)		L = 1.5 m 2)	
	Cable cross-section per phase [mm²]	Outer cable diameter [mm]	Cable cross-section per phase [mm²]	Outer cable diameter [mm]
1FE1085-4WT□1	6,0	6,3	10,0	7,9
1FE1085-4WQ□1	10,0	7,9	16,0	9,0
1FE1092-4WP□1	4,0	5,5	6,0	6,3
1FE1092-4WV□1	2,5	4,4	2,5	4,4
1FE1093-4WH□1	10,0	7,9	16,0	9,0
1FE1093-4WM□1	6,0	6,3	10,0	7,9
1FE1093-4WN□1	6,0	6,3	10,0	7,9
1FE1094-4WK□1	16,0	9,0	25,0	11,0
1FE1094-4WL□1	10,0	7,9	16,0	9,0)
1FE1094-4WS□1	6,0	6,3	10,0	7,9
1FE1094-4WU□1	4,0	5,5	6,0	6,3
1FE1095-4WN□1	16,0	9,0	25,0	11,0
1FE1096-4WN□1	16,0	9,0	25,0	11,0
1FE1103-4WN□1	10,0	7,9	16,0	9,0
1FE1104-4WN□1	16,0	9,0	25,0	11,0
1FE1105-4WN□1	16,0	9,0	25,0	11,0
1FE1106-4WN□1	2 • 10	7,9	2 • 16	9,0
1FE1106-4WR□1	25,0	11,0	2 • 16	9,0
1FE1106-4WS□1	25,0	11,0	25,0	11,0
1FE1106-4WY□1	6,0	6,3	10,0	7,9
1FE1124-4WN□1	25,0	11,0	2 • 16	9,0
1FE1125-4WN□1	2 • 16	11,0	2 • 16	9,0
1FE1125-4WP□1	25,0	11,0	2 • 16	9,0
1FE1126-4WN□1	2 • 16	11,0	2 • 16	9,0
1FE1126-4WQ□1	25,0	11,0	2 • 16	9,0
1FE1126-4WP□1	2 • 16	11,0	2 • 16	9,0

1) According to EN 46200 can only be used in the motor spindle

2) Notes on using cables is provided in VDE 0298, Part 3 and Part 4

3) Teflon cable

Cable version



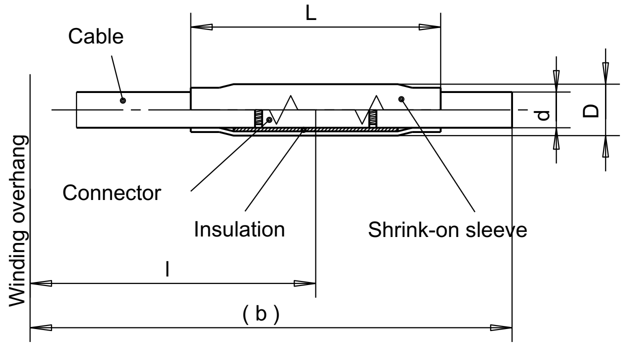
Cable length	type
b ≤ 1500	single-part
b > 1500	two-part *)

Table 1 - Cable design

$B = n \cdot d$ or D
$h = \frac{D_A + D_B}{4}$
$a = 5 \cdot d$

3)

*) two-part cable design (dimensions D, L and l only for two-part cable design)



Cable cross-section 1)	typical values D	typical values L	cable-Ø d	dimension l
2.5	7	70	4.4	2)
4	9	75	5.5	
6	10	75	6.3	
10	11	80	7.9	
16	12	85	9.0	
25	16	90	11.0	

Table 2 - Dimensions of single cable

1) Cable cross-sectional area and number of single cables see Configuration Manual or electrical data sheet.
Note: if necessary, provide oblong hole as cable duct for large cable cross-sections.

2) For dimensions refer to stator dimension drawing/ for dimensions refer to "dimension sheet - stator"

3) 3 single cables n = 2.3 (n = 3.2 for d = 4.4; n = 2.7 for d=5.5 and d = 6.3)
6 single cables n = 3.3 (n = 3.7 for d = 4.4)
Dimension d or D according to Table 2

Figure 3-2 Cable version

3.2.5 Recommended grounding

Note

A protective conductor must be connected at the spindle box through a good electrical connection. Further, it must be ensured that there is a good electrical connection between the spindle box and the cooling jacket.

EN 60204-1 (VDE 0113) provides information regarding the minimum cross-section of the protective conductor.

When grounding it must be ensured that there is a good conductive transition between the protective conductor and spindle box, which is protected against corrosion (e.g. bare contact surfaces with a coating of Vaseline).

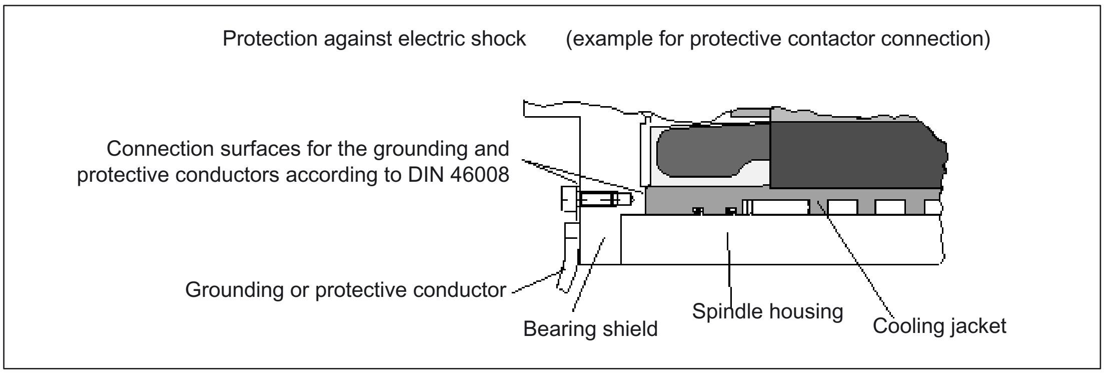


Figure 3-3 Recommended grounding

3.3 Voltage limiting

NOTICE
EMF > 820 V
Depending on the maximum EMF (pole wheel voltage > 820 V), voltage limiting is required in order to limit the DC link voltage at the converter if a fault develops.
12. Position of the motor MLFB = 0: Voltage limiting is not required
12. Position of the motor MLFB = 1: Voltage limiting is required

If the line voltage fails at maximum motor speed or if the drive converter pulses are canceled as a result of the power failure, the synchronous motor regenerates at high voltage back into the DC link. The voltage protection detects a DC link voltage that is too high (DC > 820 V) and short-circuits the 3 motor supply cables. The energy remaining in the motor is converted into heat as a result of the short-circuit and causes the motor to quickly brake.

For SINAMICS S120, the following can be used as voltage limiting:

- the VPM (Voltage Protection Module) or
- the IVP function (Internal Voltage Protection) in conjunction with
  - a CSM for secure voltage supply and
  - and a Braking Module with the appropriate braking resistor

Operation without voltage limiting

⚠WARNING
If a motor with an EMF > 820 V is operated without voltage limiting, then the motor must not be operated at the maximum speed specified in the technical data. Siemens will accept no liability for any damage caused by not observing this rule.

Calculating the maximum permissible speed for operation without voltage limiting:

$$n_{max\_new} \text{ [rpm]} = \frac{820 \text{ [V]} \cdot 1000}{k_E \text{ [V/1000 rpm]} \cdot \sqrt{2}}$$

k_E = voltage constant, see Chapter 4 "Technical data and characteristics".

3.3.1 Voltage Protection Module (VPM)

The VPM is not included with the 1FE1 built-in motors and must be separately ordered, see Catalog NC 61.

⚠DANGER
The VPM can be used up to a maximum motor EMF of 2 kV. The use of motors with a higher EMF can possibly lead to risk of injury.

Integration and system prerequisites of the VPM

The VPM must be installed between the motor and drive system (at a maximum distance from the drive system of 1.5 m). No switching elements may be added to the U, V, W connection cables between the drive system, VPM and motor! Use shielded motor feeder cables.

System requirements:

- SINAMICS S120 booksize (6SL31xx-xxxxx-xxxx3)
- SINUMERIK 840D sl from software release 1.3 and higher

Technical data

Table 3- 3 Technical data VPM

Designation	VPM 120	VPM 200 DYNAMIC
MLFB for metric glands	6SN1113-1AA00-1JA1	6SN1113-1AA00-1KC1
Dimensions H • W • D [mm]	300 • 150 • 180	300 • 250 • 260
Connection, drive system (cable cross-section)	U3, V3, W3; M50 (max. 50 mm^2)	U3, V3, W3; 2 • M50 (max. 2 • 50 mm^2)
Connection, motor side (cable cross-section)	U4, V4, W4; M50 (max. 50 mm^2)	U4, V4, W4; 2 • M50 (max. 2 • 50 mm^2)
Signaling contact 1 • M16 Max. cable cross-section	1 • NC contact (floating) 24 V DC ≦ 1.5 mm^2	1 • NC contact (floating) 24 V DC ≦ 1.5 mm^2
Rated current	≦ 3 AC 120 A_{rms}	≦ 3 AC 200 A_{rms}
Max. permissible short-circuit current	90 A	200 A
Short-time loading	2 • I_N for approx. 500 ms	3 • I_N for approx. 500 ms
Connection length, drive system	≦ 1.5 m	≦ 1.5 m
Connection length, motor side	≦ 50 m	≦ 50 m
Power loss • Normal operation • Short-circuit operation with I_N	 approx. 0 W approx. 360 W (max. 2 min)	 approx. 0 W approx. 1.1 kW (max. 2 min)
Tripping voltage	830 V DC +/- 1%	830 V DC +/- 1%
Degree of protection	IP20	IP20
Ambient temperature	0 ... 50 °C	0 ... 50 °C

Designation	VPM 120	VPM 200 DYNAMIC
Installation altitude	1000 m above sea level (otherwise power reduction)	1000 m above sea level (otherwise power reduction)
Vibratory load (acc. to DIN EN 60721)	up to 1 g	up to 1 g
Shock load (acc. to DIN EN 60721)	up to 10 g	up to 10 g
Max. permissible braking duration	≦ 2 min	≦ 2 min
Weight	approx. 6 kg	approx. 13 kg

Capacity of the drive system with VPM

In order that a defined DC link voltage is not exceeded when a fault develops, and to limit the voltage rate-of-rise, the DC link must have a minimum capacitance, which can be calculated according to the following rule of thumb:

$C_{DC\ link\ min}$ [μF] = I_{Nmotor} [A] • 33.33

This DC link capacitance required must be taken into account when configuring the system.

Maximum permissible braking duration with VPM

The maximum braking duration for a terminal short-circuit (with VPM) can be approximately calculated as follows:

$t_{Br} = K \cdot 10^{-6} \cdot J_{tot} \cdot n^2$

t_{Br} = braking duration in [s]

K = brake constant [(s • min²)/(kg • m²)]

J_{tot} = total moment of inertia ($J_{rot} + J_{ext}$) in [kgm²]

J_{rot} = rotor moment of inertia

n = maximum speed in [rpm]

Note

It must be ensured that the braking time t_{Br} is ≦ 120 s.

Selecting the VPM and determining the brake constant K

Table 3- 4 Selecting the VPM; brake constant K

Motor type [1)]	VPM	Brake constant (K)
6-pole built-in motors		
1FE1064-6WN11	VPM 120	1,0
1FE1064-6WQ11	VPM 120	1,1
1FE1082-6WQ11	VPM 120	1,8
1FE1082-6WW11	VPM 120	2,0
1FE1084-6WR11	VPM 120	1,2
1FE1084-6WU11	VPM 120	1,3
1FE1084-6WX11	VPM 120	1,5
1FE1092-6WR11	VPM 120	2,3
1FE1093-6WV11	VPM 120	1,0
1FE1113-6WU11	VPM 120	2,0
1FE1113-6WX11	VPM 120	2,2
1FE1114-6WR11	VPM 120	1,1
1FE1114-6WT11	VPM 120	1,1
1FE1114-6WW11	VPM 120	1,1
1FE1115-6WT11	VPM 120	1,4
1FE1116-6WR11	VPM 120	0,9
1FE1116-6WT11	VPM 120	0,9
1FE1116-6WW11	VPM 120	1,9
8-pole built-in motors		
1FE1144-8WL11	VPM 200 DYNAMIC	0,8
1FE1145-8WN11	VPM 200 DYNAMIC	0,6
1FE1145-8WQ11	VPM 200 DYNAMIC	0,8
1FE1145-8WS11	VPM 200 DYNAMIC	0,9
1FE1147-8WM11	IVP [2)]	0,5
1FE1147-8WN11	VPM 200 DYNAMIC	0,6
1FE1147-8WQ11	VPM 200 DYNAMIC	0,7
1FE1147-8WS11	VPM 200 DYNAMIC	0,8
4-pole built-in motors		
1FE1051-4WN11	VPM 120	5,5
1FE1052-4HG11	VPM 120	1,3
1FE1052-4WN11	VPM 120	3,4
1FE1052-4WK11	VPM 120	3,2
1FE1053-4HH11	VPM 120	3,3
1FE1053-4HJ11	VPM 120	2,1
1FE1053-4WN11	VPM 120	2,5
1FE1072-4WH11	VPM 120	3,3
1FE1072-4WL11	VPM 120	2,7
1FE1072-4WN11	VPM 120	3,6

Motor type [1]	VPM	Brake constant (K)
1FE1073-4WN11	VPM 120	2,6
1FE1073-4WT11	VPM 120	2,8
1FE1074-4WM11	VPM 200 DYNAMIC	2,3
1FE1074-4WN11	VPM 120	2,3
1FE1074-4WT11	VPM 120	2,0
1FE1082-4WN11	VPM 120	3,6
1FE1082-4WR11	VPM 120	5,3
1FE1083-4WN11	VPM 120	2,7
1FE1084-4WN11	VPM 120	2,2
1FE1084-4WP11	VPM 120	1,8
1FE1084-4WQ11	VPM 120	2,6
1FE1084-4WT11	VPM 120	2,3
1FE1085-4WN11	VPM 120	1,8
1FE1085-4WT11	VPM 120	2,5
1FE1085-4WQ11	VPM 120	2,1
1FE1092-4WP11	VPM 120	3,7
1FE1092-4WV11	VPM 120	5,7
1FE1093-4WH11	VPM 120	2,7
1FE1093-4WM11	VPM 120	2,7
1FE1093-4WN11	VPM 120	3,0
1FE1094-4WK11	VPM 120	2,3
1FE1094-4WL11	VPM 120	2,3
1FE1094-4WS11	VPM 120	3,0
1FE1094-4WU11	VPM 120	3,5
1FE1095-4WN11	VPM 120	1,9
1FE1096-4WN11	VPM 120	1,9
1FE1103-4WN11	VPM 120	1,3
1FE1104-4WN11	VPM 200 DYNAMIC	1,1
1FE1105-4WN11	VPM 200 DYNAMIC	0,9
1FE1106-4WN11	VPM 200 DYNAMIC	0,9
1FE1106-4WR11	VPM 200 DYNAMIC	1,11
1FE1106-4WS11	VPM 200 DYNAMIC	1,3
1FE1106-4WY11	VPM 120	1,7
1FE1124-4WN11	VPM 200 DYNAMIC	1,1
1FE1125-4WN11	VPM 200 DYNAMIC	0,9
1FE1125-4WP11	VPM 200 DYNAMIC	1,0
1FE1126-4WN11	VPM 200 DYNAMIC	0,8
1FE1126-4WQ11	VPM 200 DYNAMIC	1,1
1FE1126-4WP11	VPM 200 DYNAMIC	0,9

[1] only those motors that must be operated with VPM are listed in the table

[2] Internal Voltage Protection

Wiring diagram

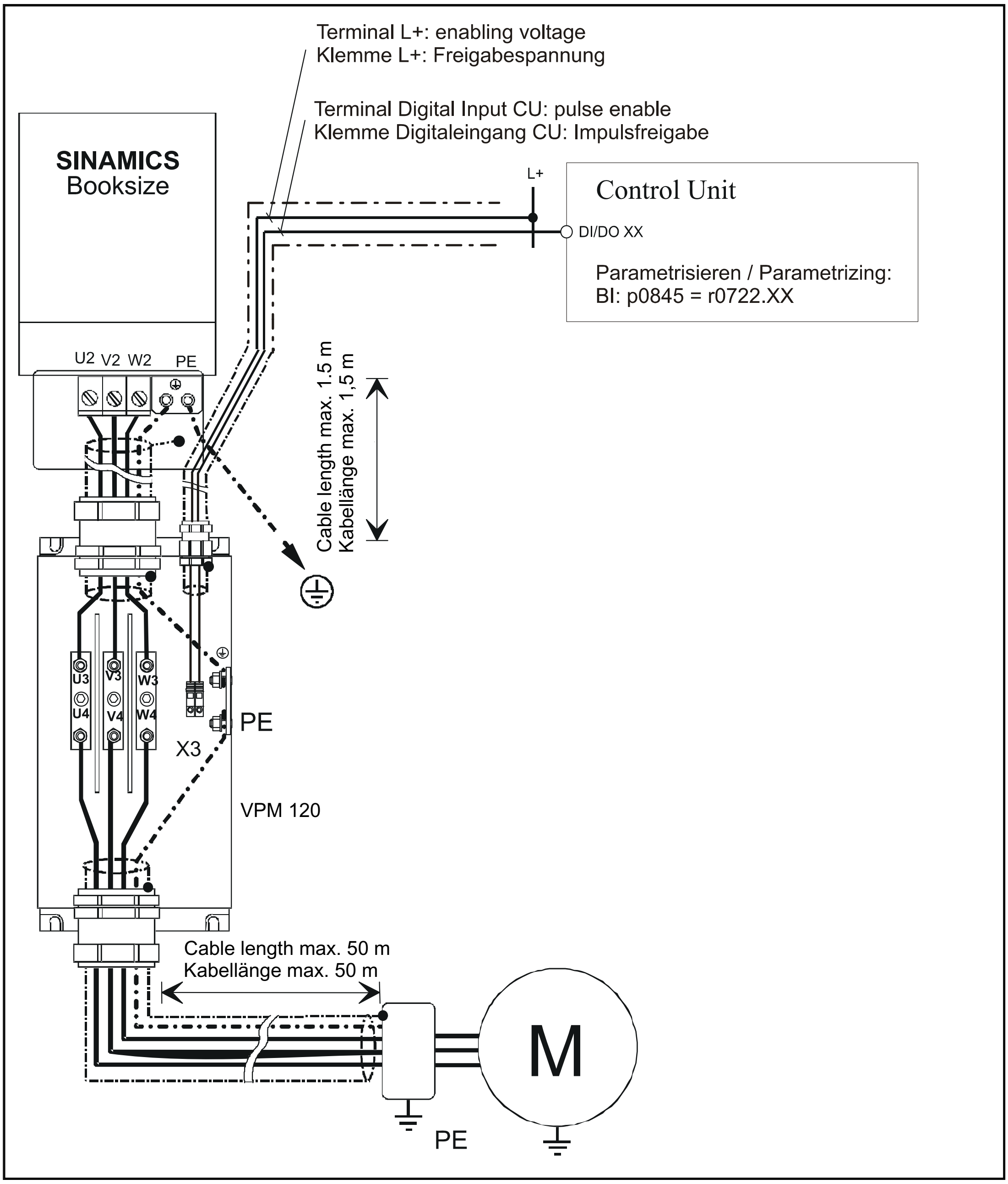


Figure 3-4 Wiring diagram VPM 120

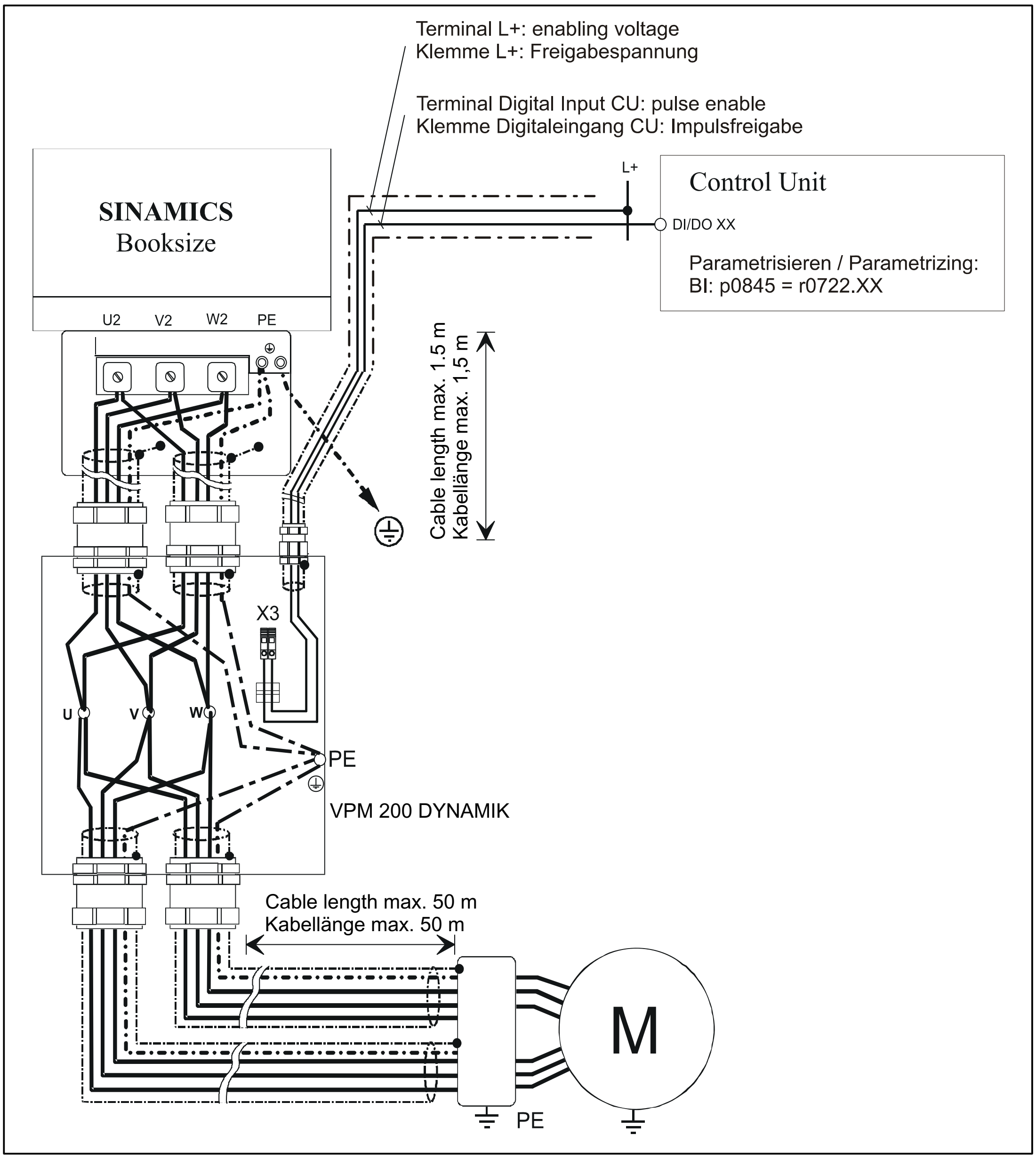


Figure 3-5 Wiring diagram VPM 200/VPM 200 DYNAMIC

3.3.2 Internal Voltage Protection (IVP)

The IVP function is only capable of functioning in conjunction with SINAMICS S120 booksize and/or SINUMERIK solutionline. Available as standard function from SW 2.5 and higher.

For detailed information, see the SINAMICS S120 /FH1/ Function Manual.

Technical data and characteristics 4

4.1 P/n and M/n diagrams

Built-in motors must be continually cooled independent of the operating mode.

Note

The values in the characteristics and those specified are valid for water cooling and a cast winding design.

Note

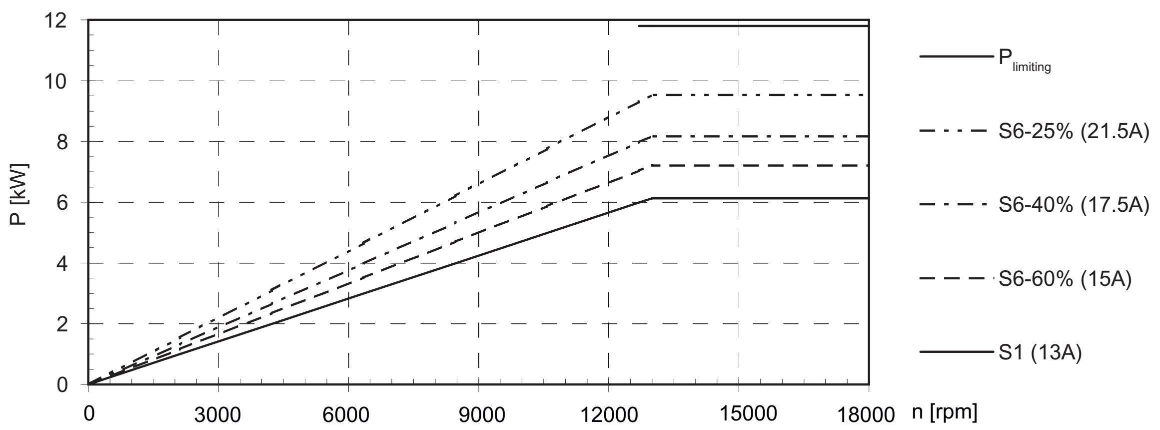
Depending on the mechanical design of the motor spindle, various levels of frictional losses occur (e.g. bearing losses, eddy losses, losses at rotary glands).

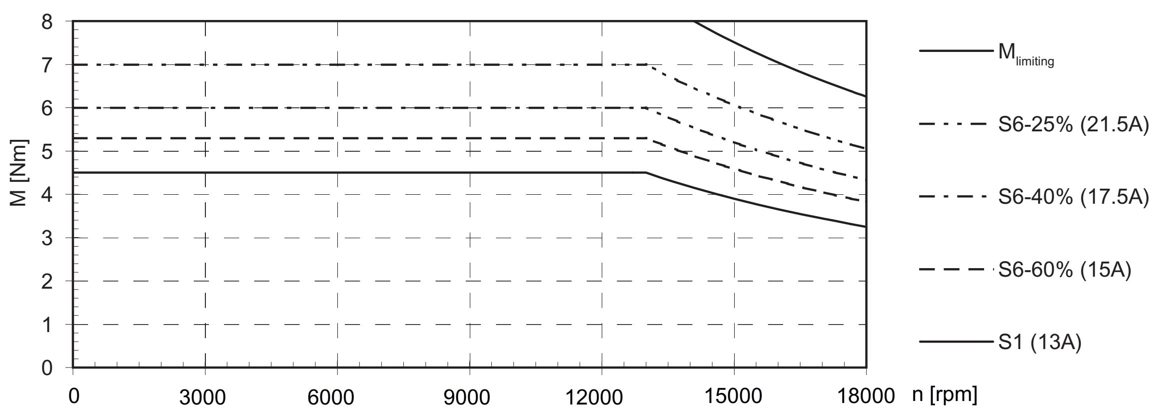
As the built-in motor manufacturer is not aware of the magnitude of these losses, the motor power ratings and torques, specified in this documentation, refer to the values that the built-in motor transfers to the spindle. All of the frictional losses must be subtracted from the specified values in order to determine the net power output at the shaft.

4.2 P/n and M/n diagrams for 6-pole built-in motors

Table 4- 1 SINAMICS, 3-ph. 380 V AC, SMART Line Module, (SLM), 1FE1041-6WM□0

Rated power	P_N	kW	6,1
Rated speed	n_N	rpm	13000
Rated torque	M_N	Nm	4,5
Rated current	I_N	A	13
Maximum current	I_{max}	A	26
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	18000
Maximum torque	M_{max}	Nm	9
Moment of inertia	J_{rot}	kg m²	0,00019
Voltage constant	k_E	V/1000 rpm	29
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	2,5
Rotor weight	m_{rot}	kg	see Table 1-3

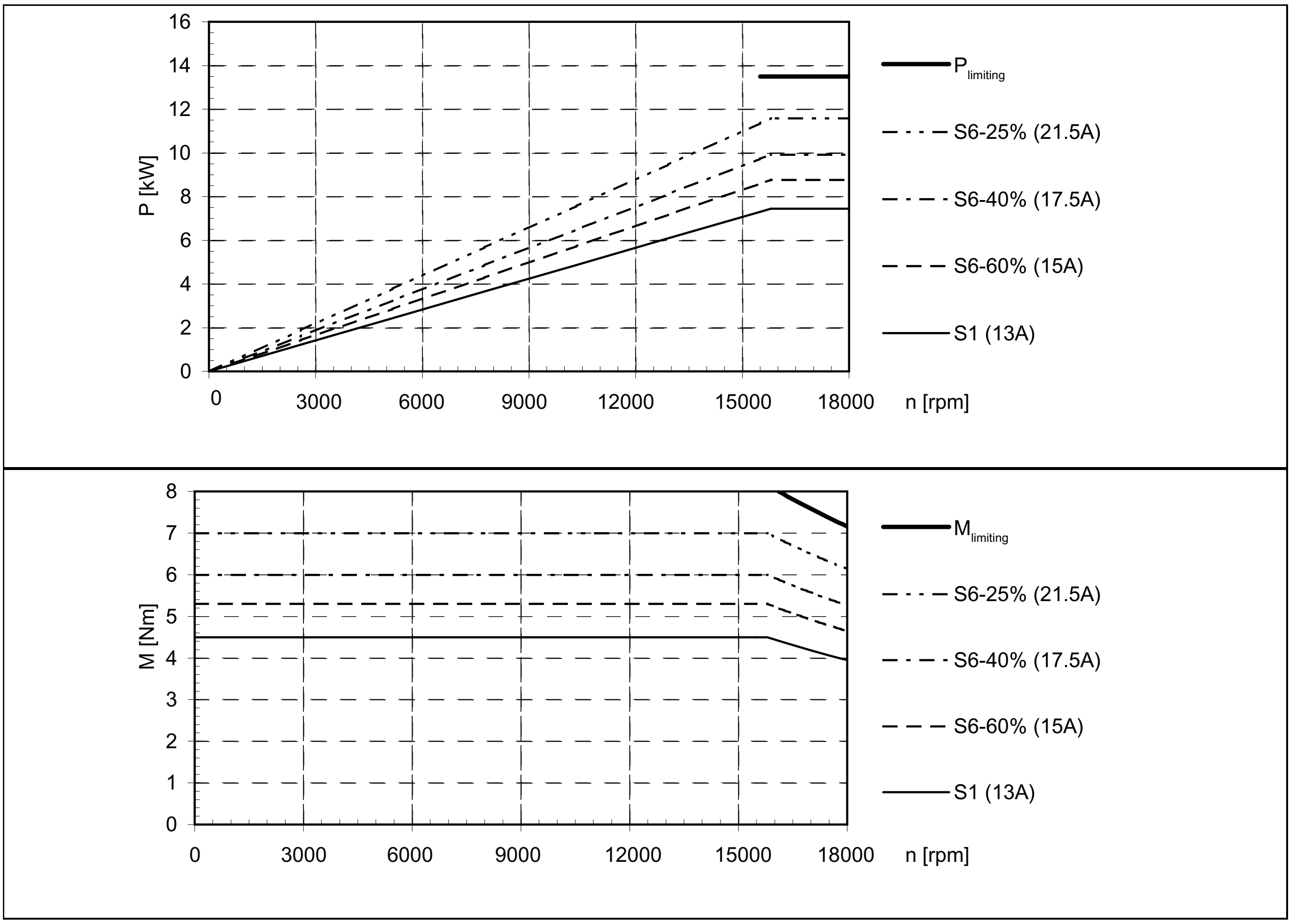




The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 2 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1041-6WM□0

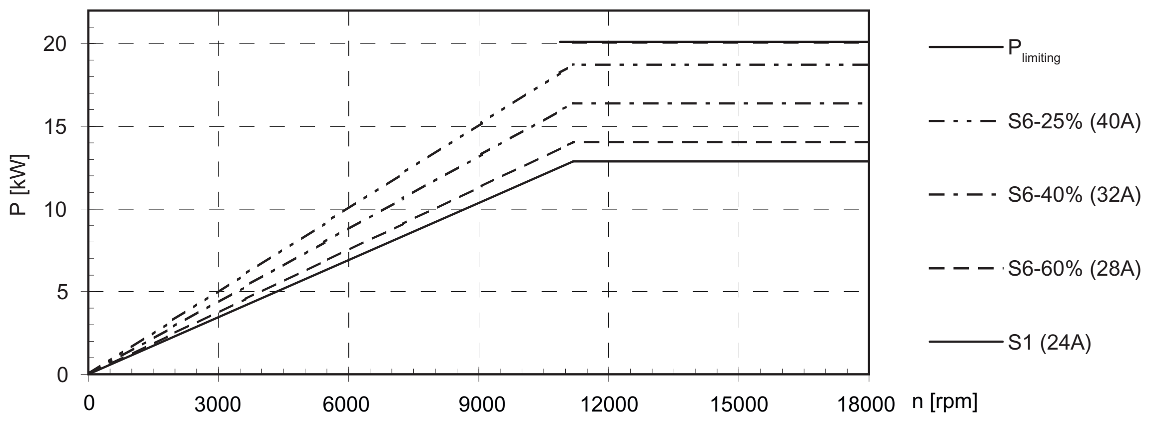
Rated power	P_N	kW	7,4
Rated speed	n_N	rpm	15800
Rated torque	M_N	Nm	4,5
Rated current	I_N	A	13
Maximum current	I_{max}	A	26
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	18000
Maximum torque	M_{max}	Nm	9
Moment of inertia	J_{rot}	kg m²	0,00019
Voltage constant	k_E	V/1000 rpm	29
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	2,5
Rotor weight	m_{rot}	kg	see Table 1-3

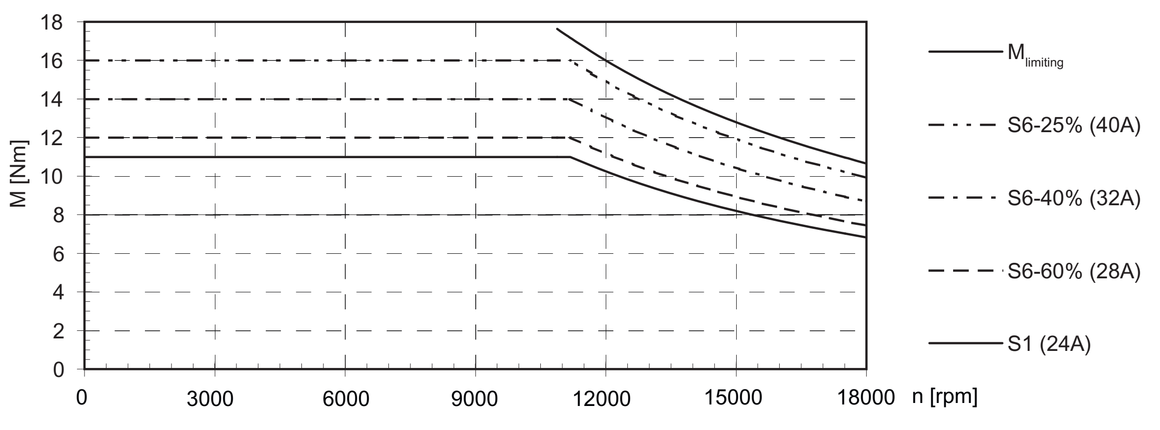


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 3 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1042-6WN□0

Rated power	P_N	kW	12,9
Rated speed	n_N	rpm	11180
Rated torque	M_N	Nm	11
Rated current	I_N	A	24
Maximum current	I_{max}	A	48
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	18000
Maximum torque	M_{max}	Nm	20
Moment of inertia	J_{rot}	kg m²	0,00033
Voltage constant	k_E	V/1000 rpm	33
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	6
Rotor weight	m_{rot}	kg	see Table 1-3

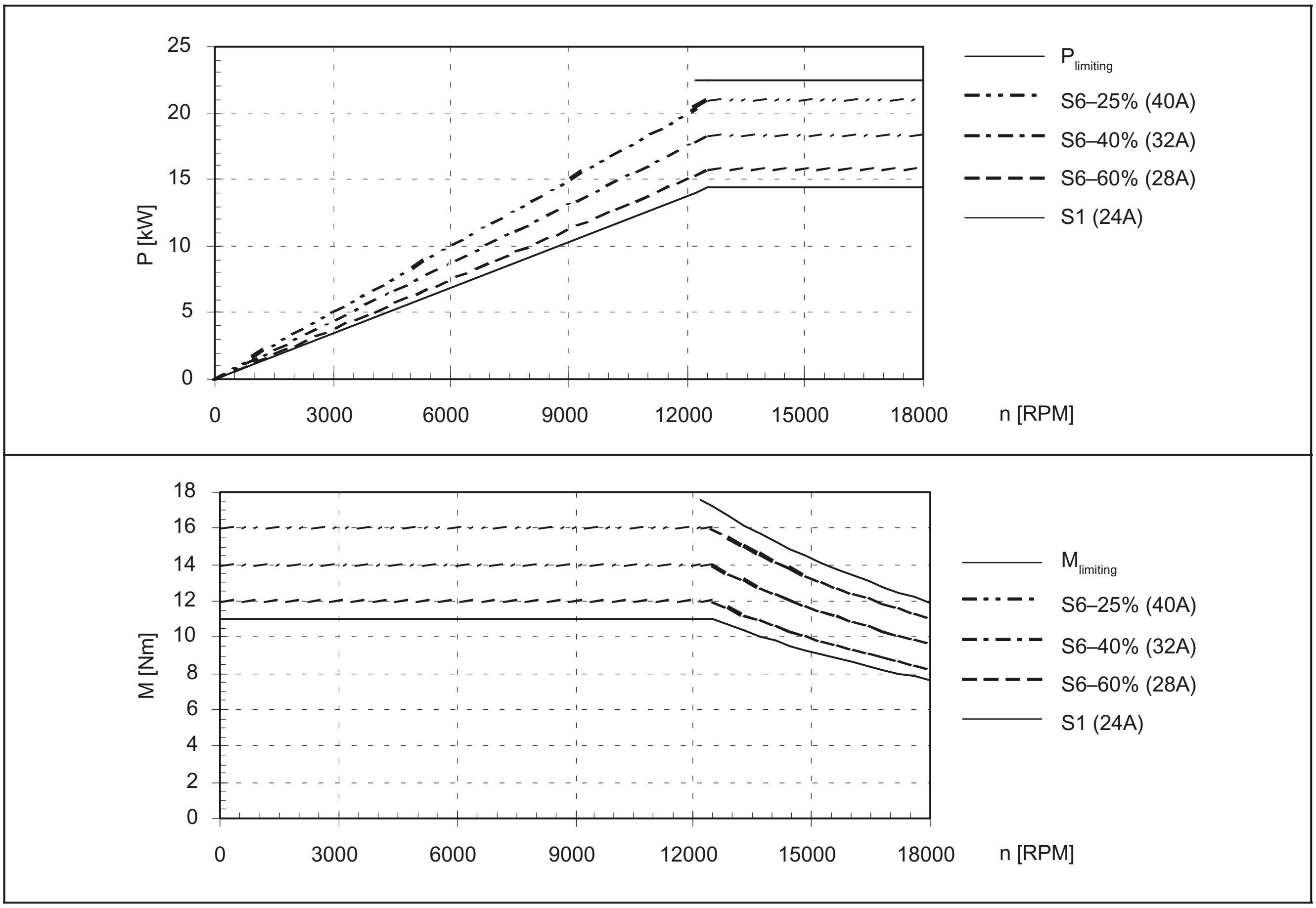




The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 4 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1042-6WN□0

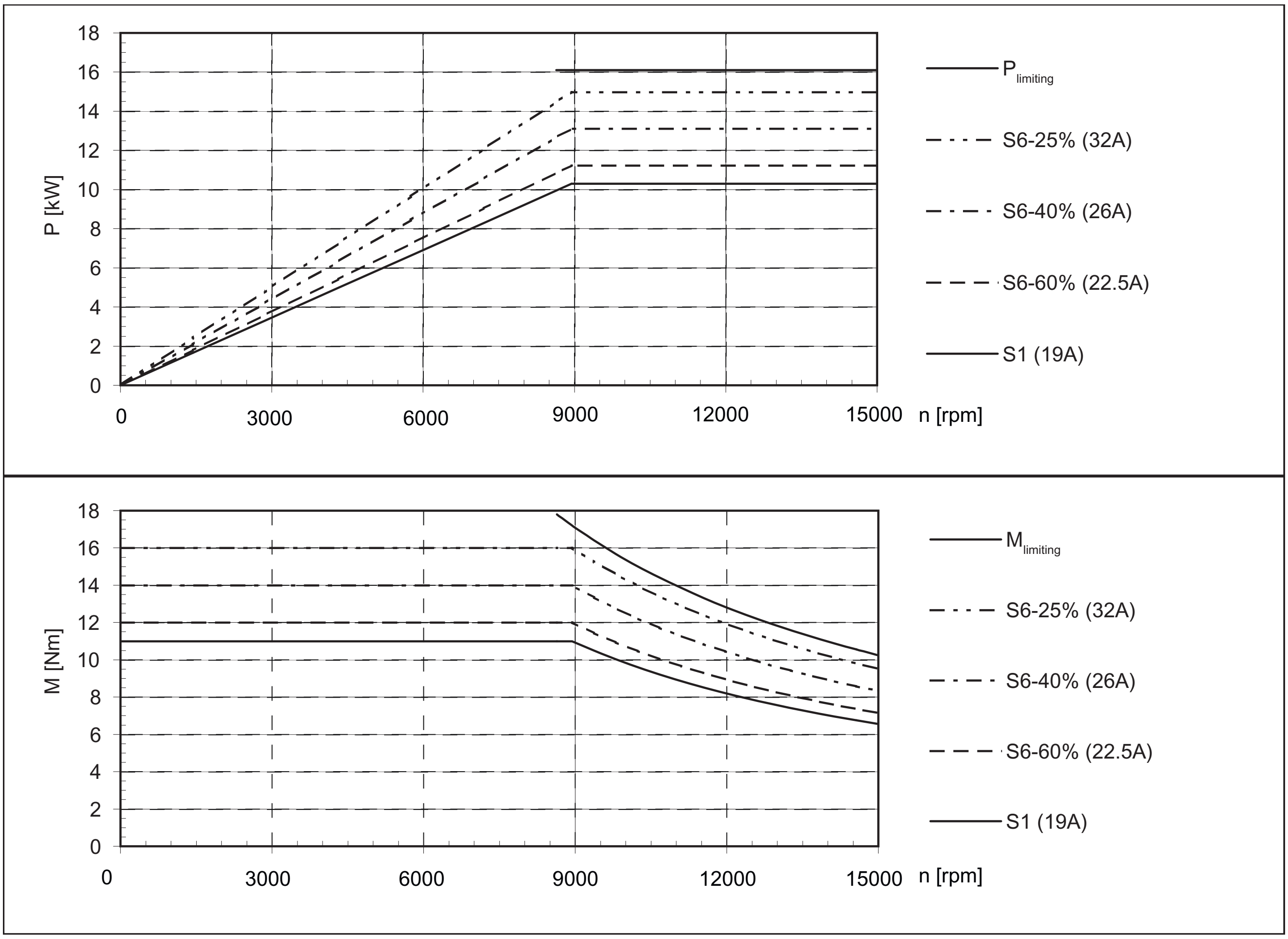
Rated power	P_N	kW	14,4
Rated speed	n_N	rpm	12500
Rated torque	M_N	Nm	11
Rated current	I_N	A	24
Maximum current	I_{max}	A	48
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	18000
Maximum torque	M_{max}	Nm	20
Moment of inertia	J_{rot}	kg m^2	0,00033
Voltage constant	k_E	V/1000 rpm	33
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	6
Rotor weight	m_{rot}	kg	see Table 1-3



The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 5 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1042-6WR□0

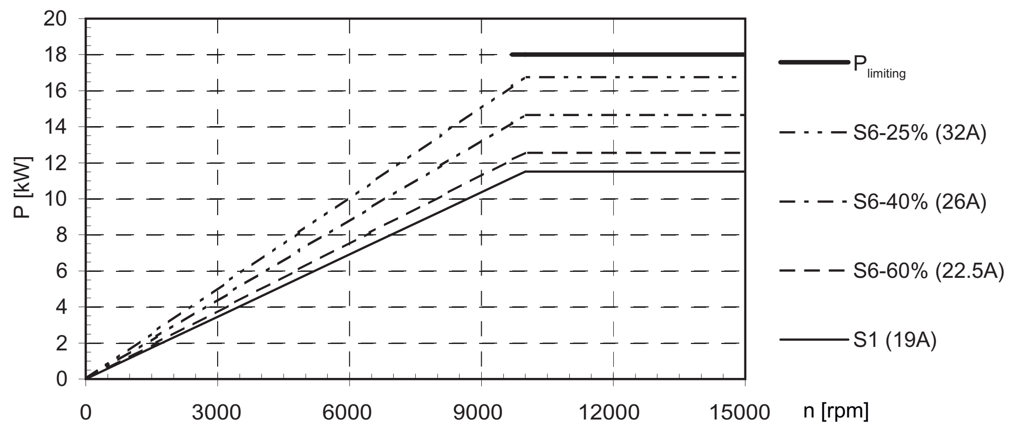
Rated power	P_N	kW	10,3
Rated speed	n_N	rpm	8940
Rated torque	M_N	Nm	11
Rated current	I_N	A	19
Maximum current	I_{max}	A	38
Maximum speed	n_{max}	rpm	15000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	15000
Maximum torque	M_{max}	Nm	20
Moment of inertia	J_{rot}	kg m²	0,00033
Voltage constant	k_E	V/1000 rpm	41
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	6
Rotor weight	m_{rot}	kg	see Table 1-3

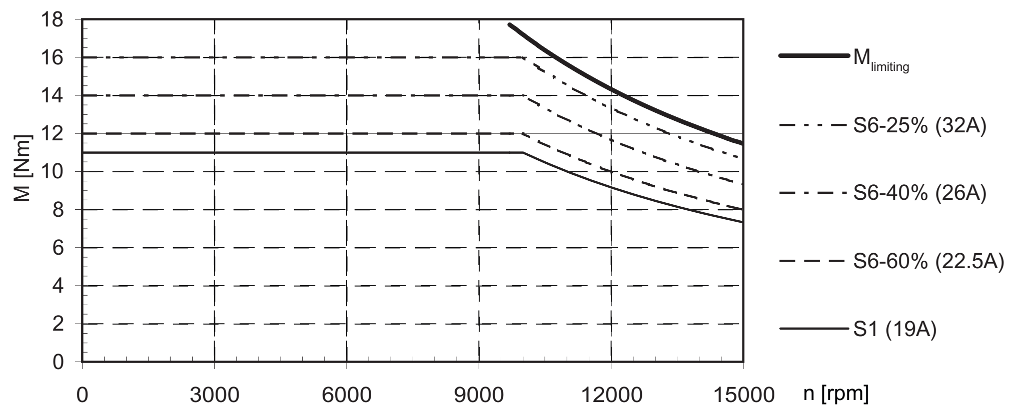


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 6 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1042-6WR□0

Rated power	P_N	kW	11,5
Rated speed	n_N	rpm	10000
Rated torque	M_N	Nm	11
Rated current	I_N	A	19
Maximum current	I_{max}	A	38
Maximum speed	n_{max}	rpm	15000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	15000
Maximum torque	M_{max}	Nm	20
Moment of inertia	J_{rot}	kg m^2	0,00033
Voltage constant	k_E	V/1000 rpm	41
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	6
Rotor weight	m_{rot}	kg	see Table 1-3

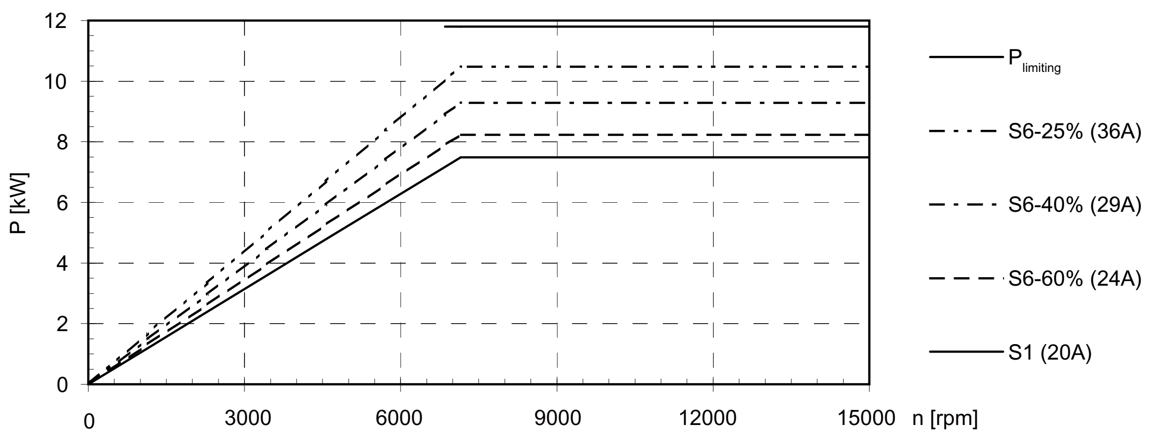


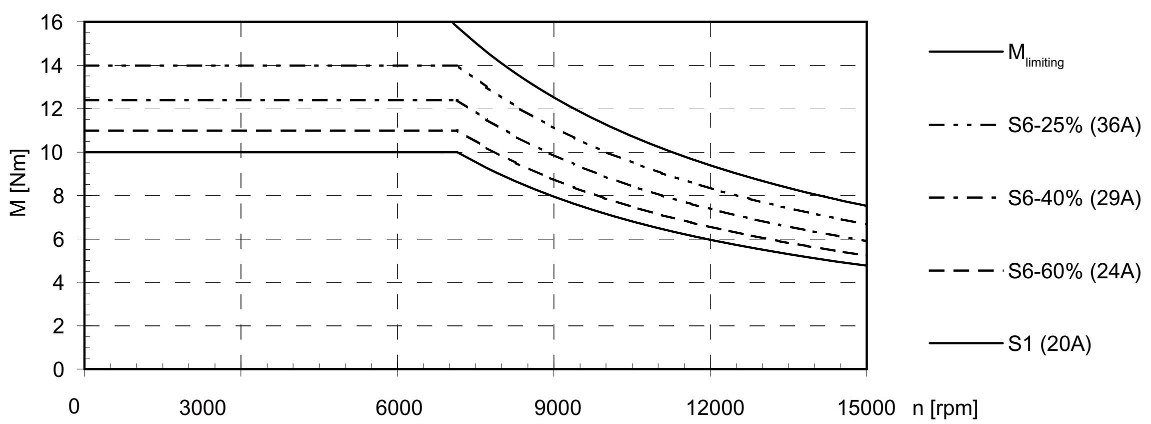


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 7 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1051-6WK□0

Rated power	P_N	kW	7,5
Rated speed	n_N	rpm	7150
Rated torque	M_N	Nm	10
Rated current	I_N	A	20
Maximum current	I_{max}	A	40
Maximum speed	n_{max}	rpm	15000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	15000
Maximum torque	M_{max}	Nm	17
Moment of inertia	J_{rot}	kg m²	0,00106
Voltage constant	k_E	V/1000 rpm	36
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	4
Rotor weight	m_{rot}	kg	see Table 1-3

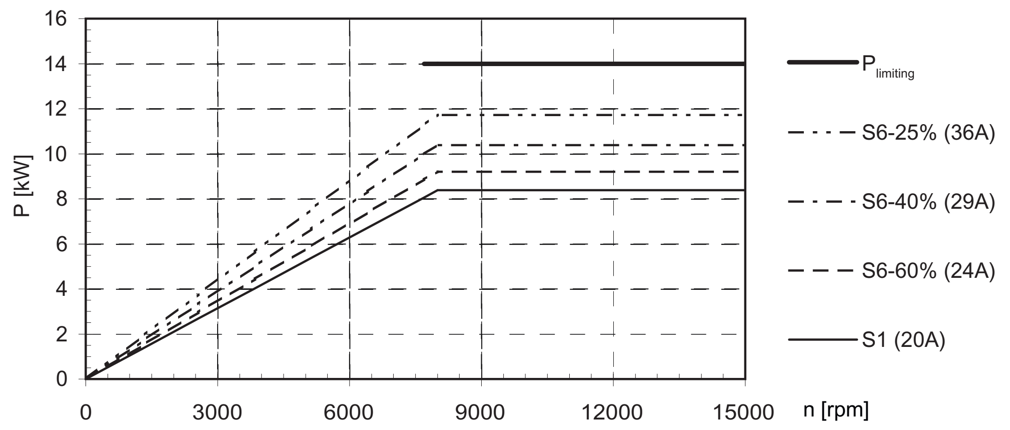


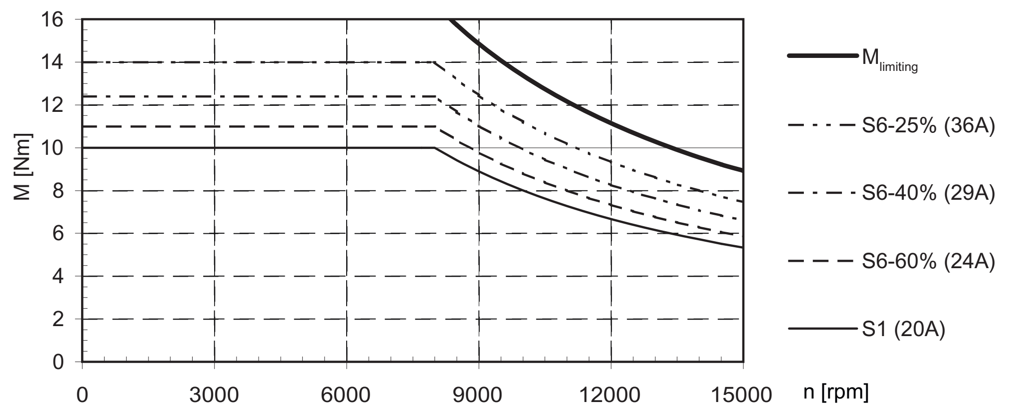


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 8 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1051-6WK□0

Rated power	P_N	kW	8,3
Rated speed	n_N	rpm	8000
Rated torque	M_N	Nm	10
Rated current	I_N	A	20
Maximum current	I_{max}	A	40
Maximum speed	n_{max}	rpm	15000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	15000
Maximum torque	M_{max}	Nm	17
Moment of inertia	J_{rot}	kg m²	0,00106
Voltage constant	k_E	V/1000 rpm	36
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	4
Rotor weight	m_{rot}	kg	see Table 1-3

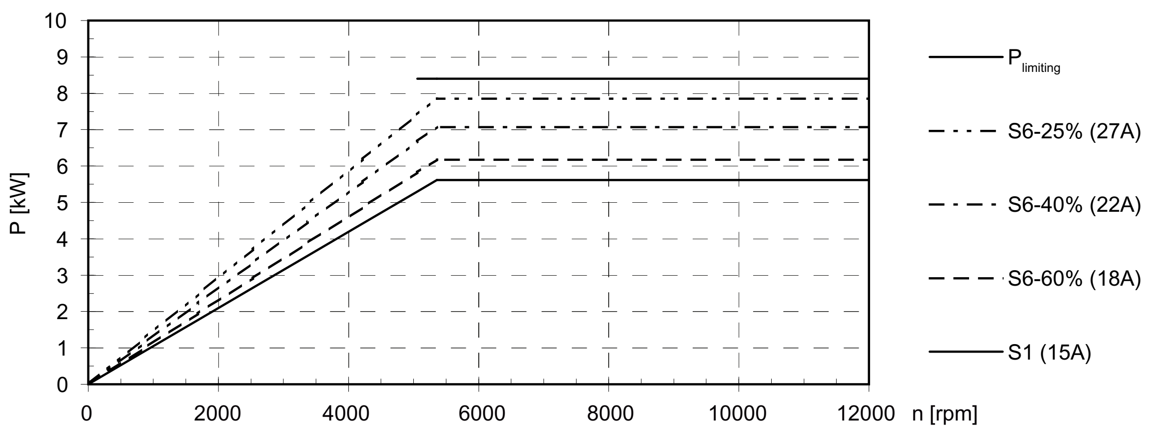


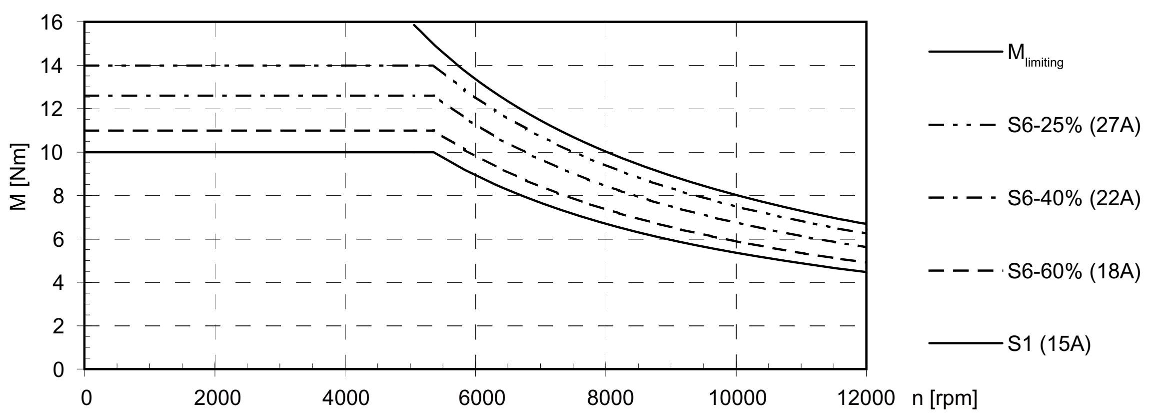


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 9 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1051-6WN□0

Rated power	P_N	kW	5,6
Rated speed	n_N	rpm	5360
Rated torque	M_N	Nm	10
Rated current	I_N	A	15
Maximum current	I_{max}	A	30
Maximum speed	n_{max}	rpm	12000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	12000
Maximum torque	M_{max}	Nm	17
Moment of inertia	J_{rot}	kg m²	0,00106
Voltage constant	k_E	V/1000 rpm	47
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	4
Rotor weight	m_{rot}	kg	see Table 1-3

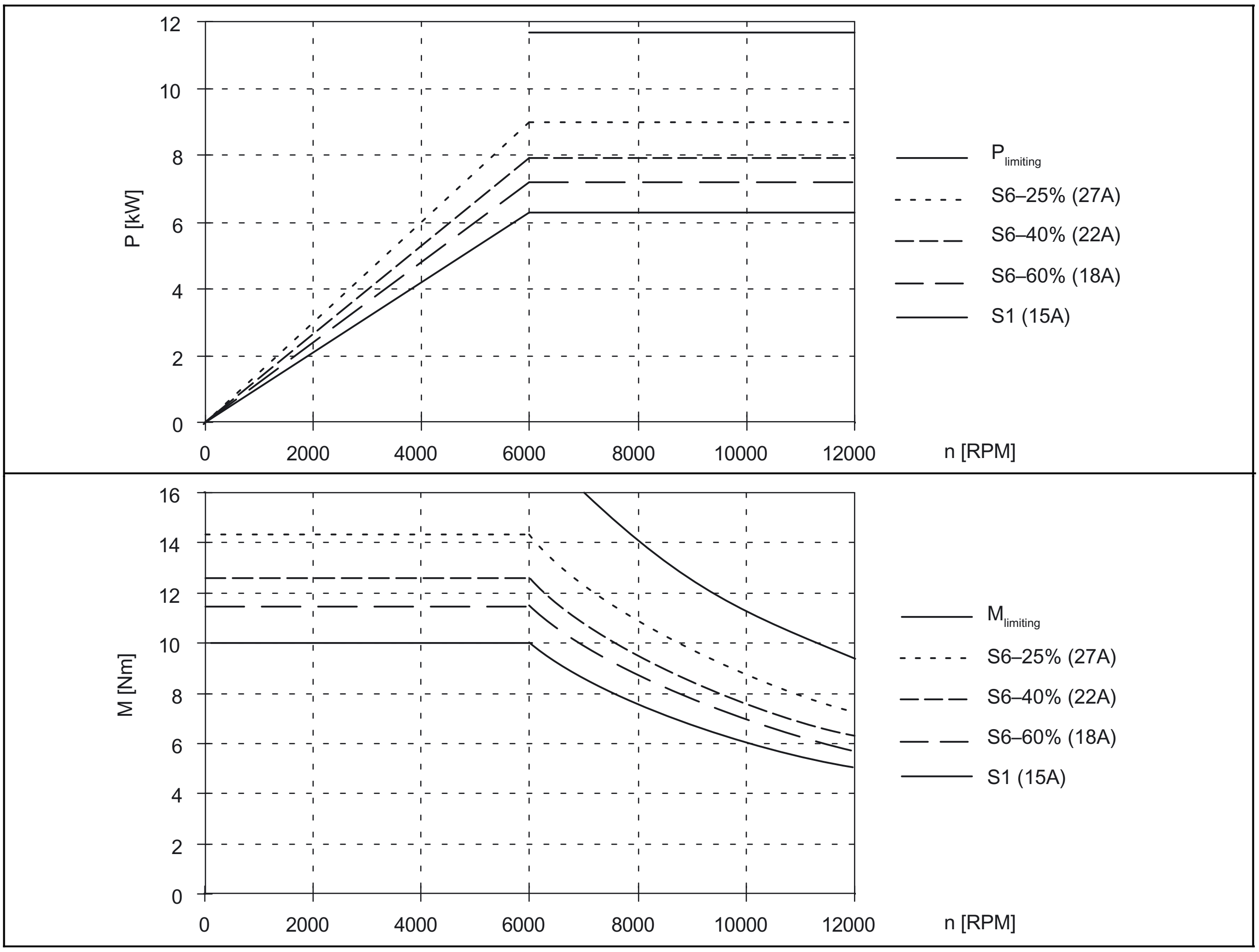




The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 10 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1051-6WN□0

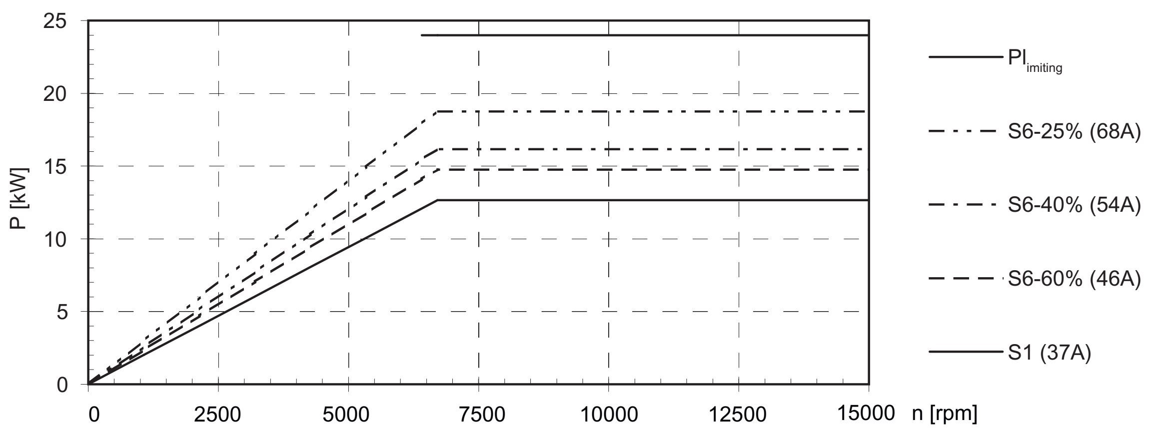
Rated power	P_N	kW	6,3
Rated speed	n_N	rpm	6000
Rated torque	M_N	Nm	10
Rated current	I_N	A	15
Maximum current	I_{max}	A	30
Maximum speed	n_{max}	rpm	12000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	12000
Maximum torque	M_{max}	Nm	17
Moment of inertia	J_{rot}	kg m^2	0,00106
Voltage constant	k_E	V/1000 rpm	47
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	4
Rotor weight	m_{rot}	kg	see Table 1-3

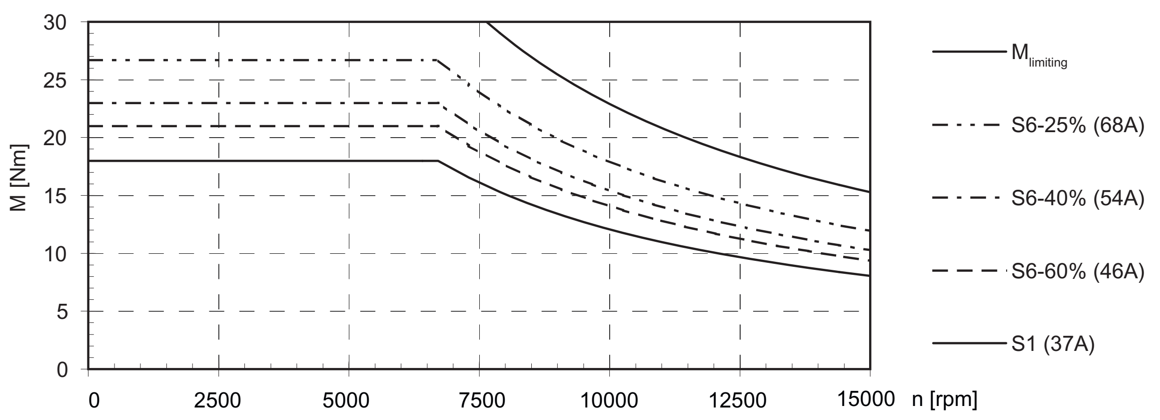


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 11 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1052-6WK□0

Rated power	P_N	kW	12,6
Rated speed	n_N	rpm	6710
Rated torque	M_N	Nm	18
Rated current	I_N	A	37
Maximum current	I_{max}	A	74
Maximum speed	n_{max}	rpm	15000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	15000
Maximum torque	M_{max}	Nm	35
Moment of inertia	J_{rot}	kg m²	0,00195
Voltage constant	k_E	V/1000 rpm	36
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	6
Rotor weight	m_{rot}	kg	see Table 1-3

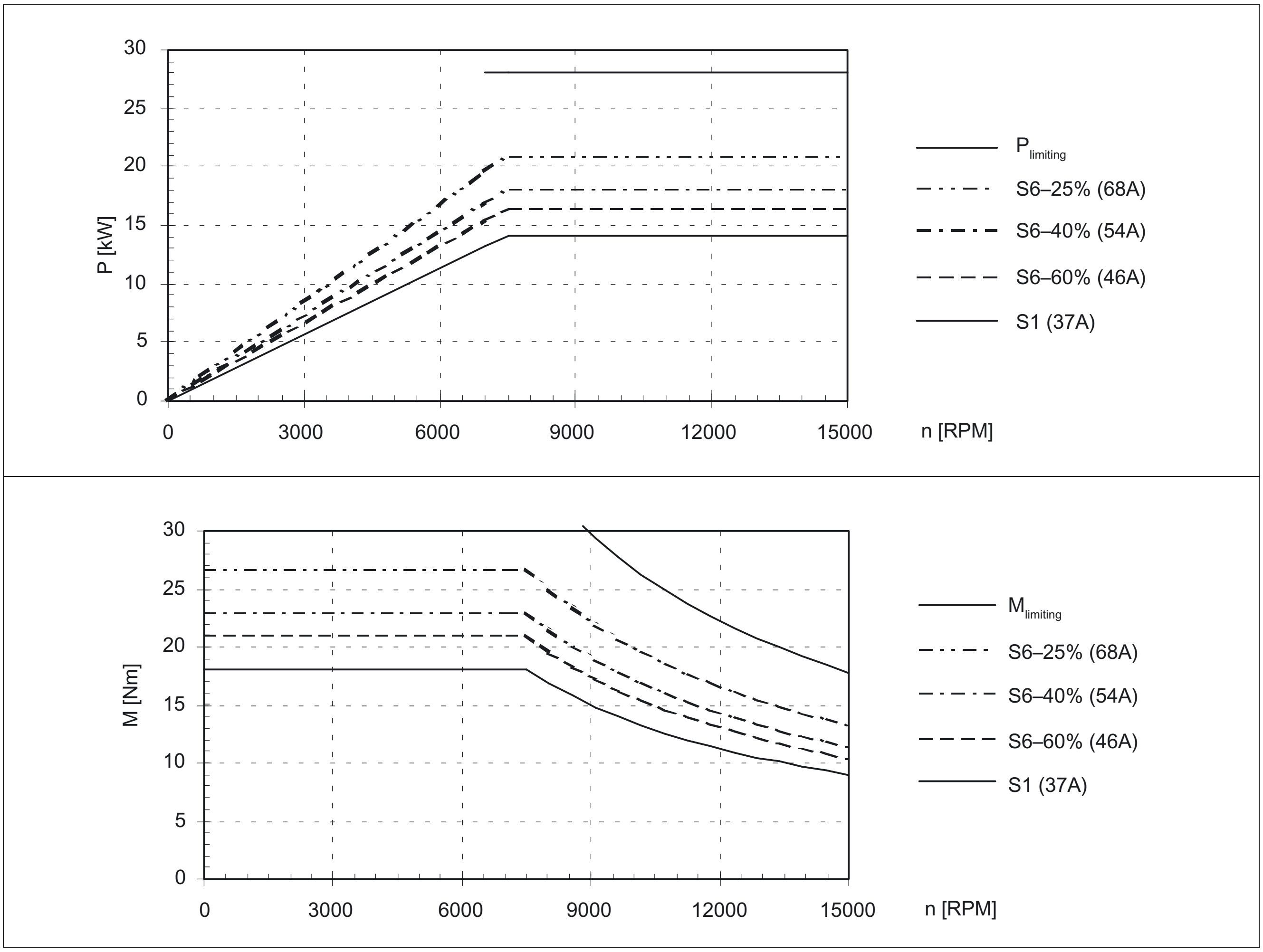




The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 12 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1052-6WK□0

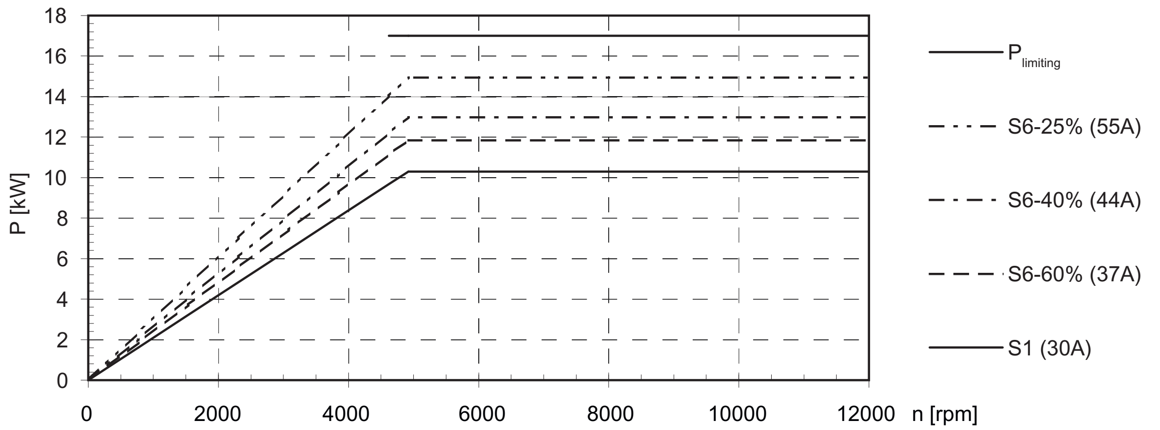
Rated power	P_N	kW	14
Rated speed	n_N	rpm	7500
Rated torque	M_N	Nm	18
Rated current	I_N	A	37
Maximum current	I_{max}	A	74
Maximum speed	n_{max}	rpm	15000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	15000
Maximum torque	M_{max}	Nm	35
Moment of inertia	J_{rot}	kg m^2	0,00195
Voltage constant	k_E	V/1000 rpm	36
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	6
Rotor weight	m_{rot}	kg	see Table 1-3

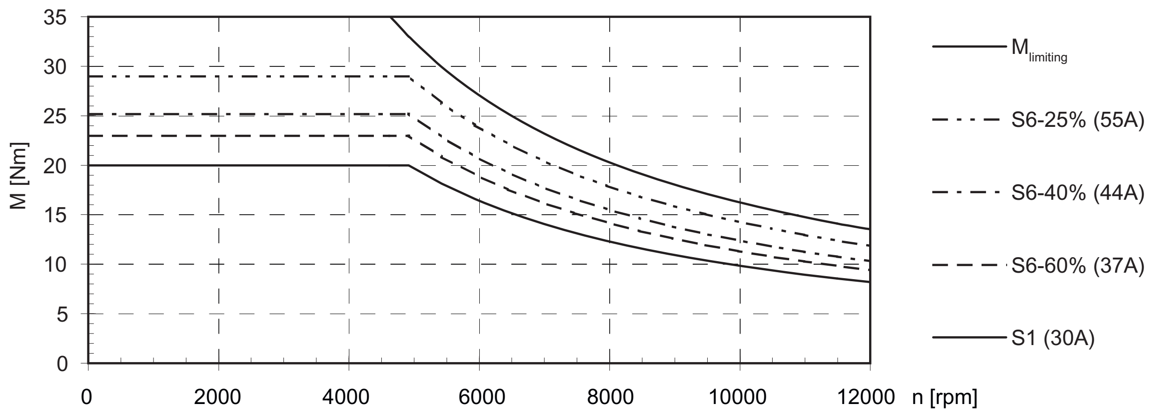


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 13 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1052-6WN□0

Rated power	P_N	kW	10,3
Rated speed	n_N	rpm	4920
Rated torque	M_N	Nm	20
Rated current	I_N	A	30
Maximum current	I_{max}	A	60
Maximum speed	n_{max}	rpm	12000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	12000
Maximum torque	M_{max}	Nm	35
Moment of inertia	J_{rot}	kg m²	0,00195
Voltage constant	k_E	V/1000 rpm	47
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	6
Rotor weight	m_{rot}	kg	see Table 1-3

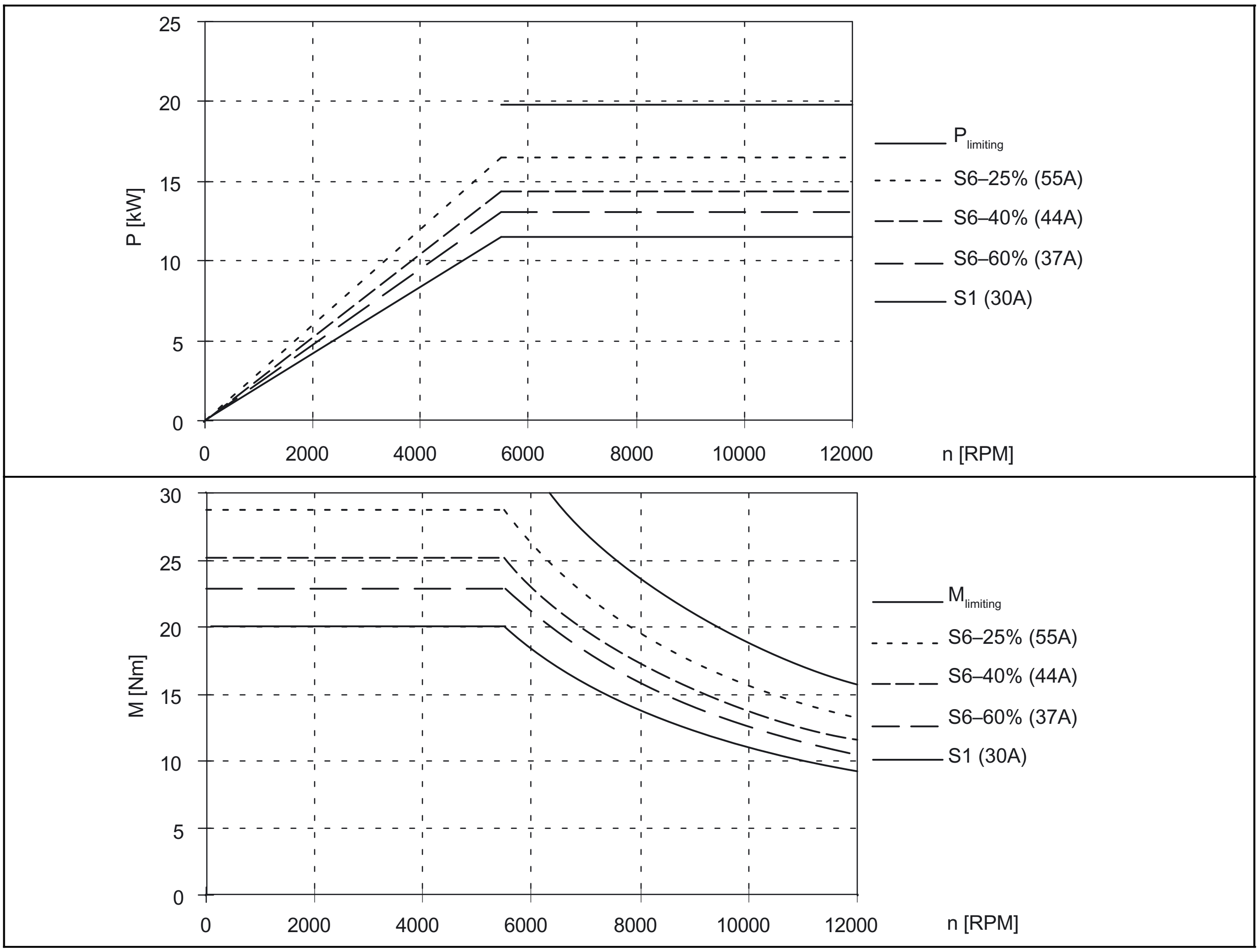




The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 14 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1052-6WN□0

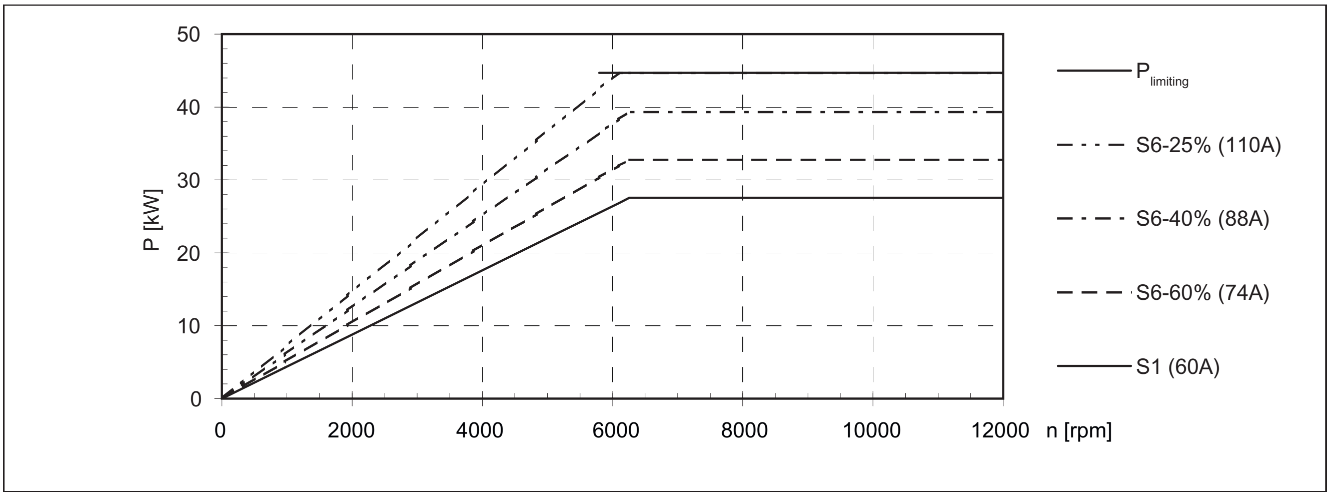
Rated power	P_N	kW	11,5
Rated speed	n_N	rpm	5500
Rated torque	M_N	Nm	20
Rated current	I_N	A	30
Maximum current	I_{max}	A	60
Maximum speed	n_{max}	rpm	12000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	12000
Maximum torque	M_{max}	Nm	35
Moment of inertia	J_{rot}	kg m²	0,00195
Voltage constant	k_E	V/1000 rpm	47
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	6
Rotor weight	m_{rot}	kg	see Table 1-3

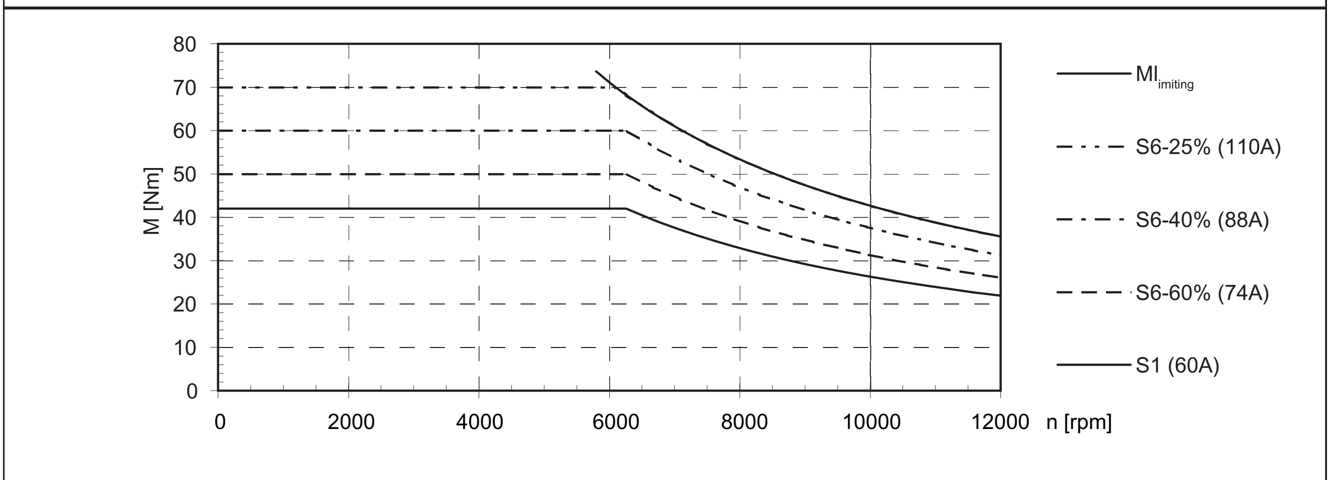


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 15 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1054-6WN□0

Rated power	P_N	kW	27,5
Rated speed	n_N	rpm	6260
Rated torque	M_N	Nm	42
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	12000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	12000
Maximum torque	M_{max}	Nm	74
Moment of inertia	J_{rot}	kg m^2	0,0038
Voltage constant	k_E	V/1000 rpm	46
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	10
Rotor weight	m_{rot}	kg	see Table 1-3

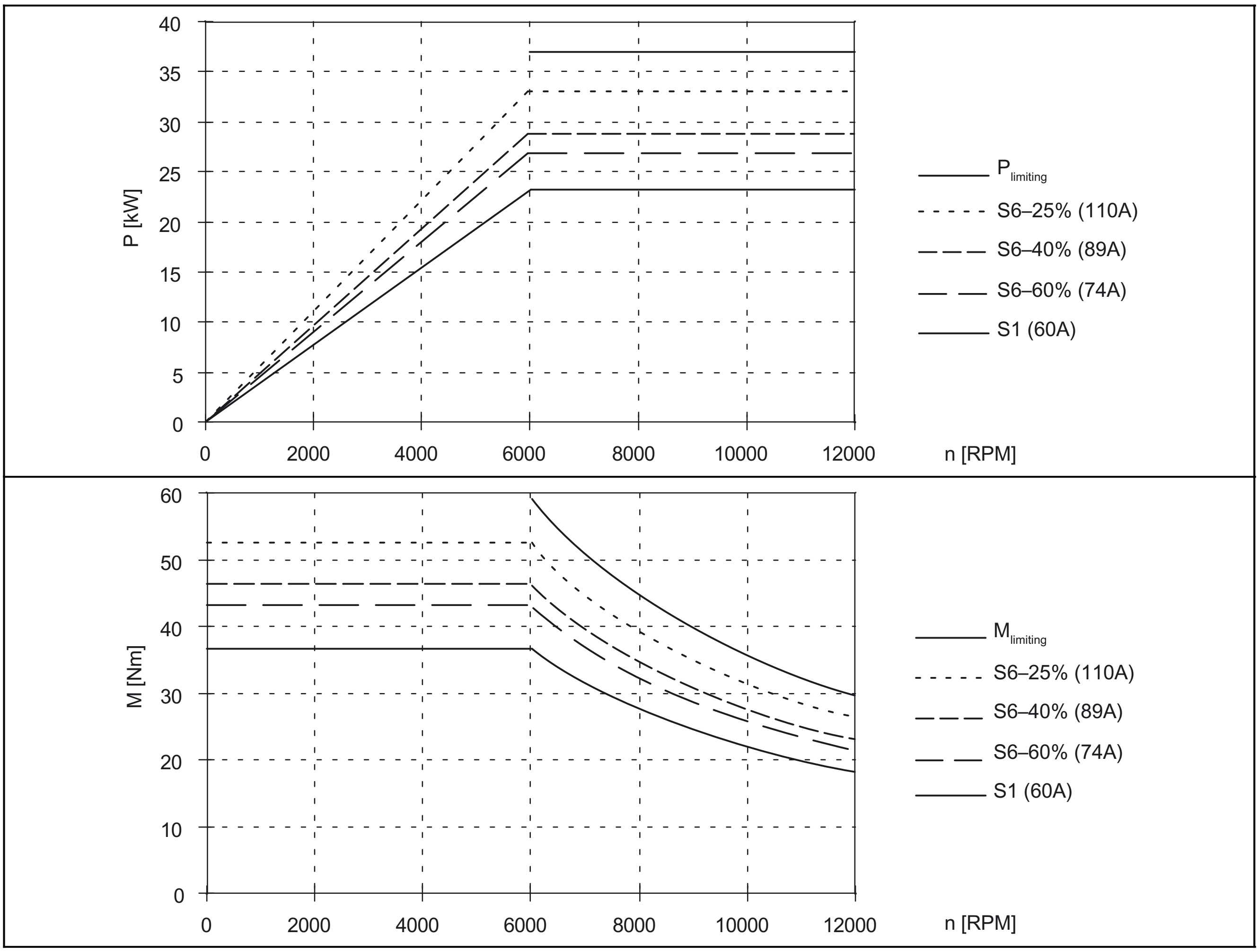




The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 16 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1054-6WN□0

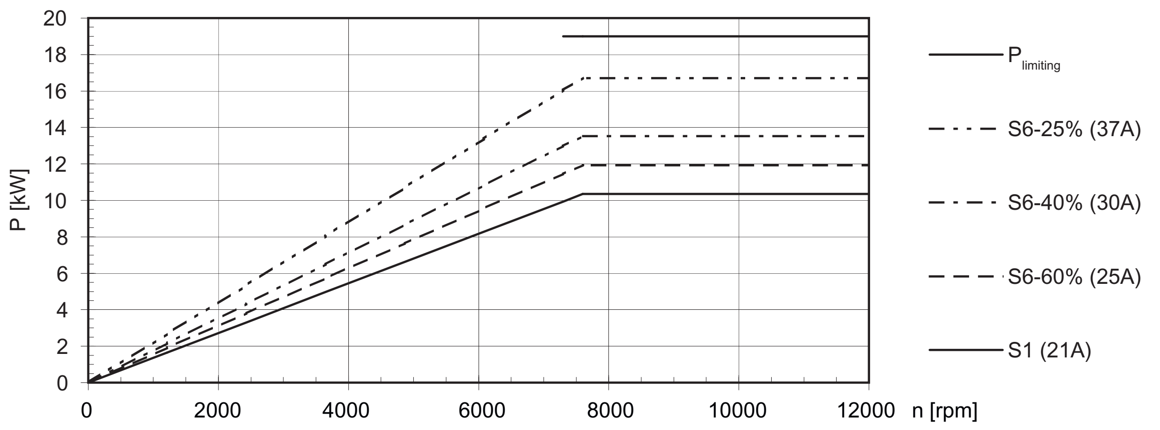
Rated power	P_N	kW	23
Rated speed	n_N	rpm	6000
Rated torque	M_N	Nm	37
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	12000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	12000
Maximum torque	M_{max}	Nm	74
Moment of inertia	J_{rot}	kg m²	0,0038
Voltage constant	k_E	V/1000 rpm	44
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	10
Rotor weight	m_{rot}	kg	see Table 1-3

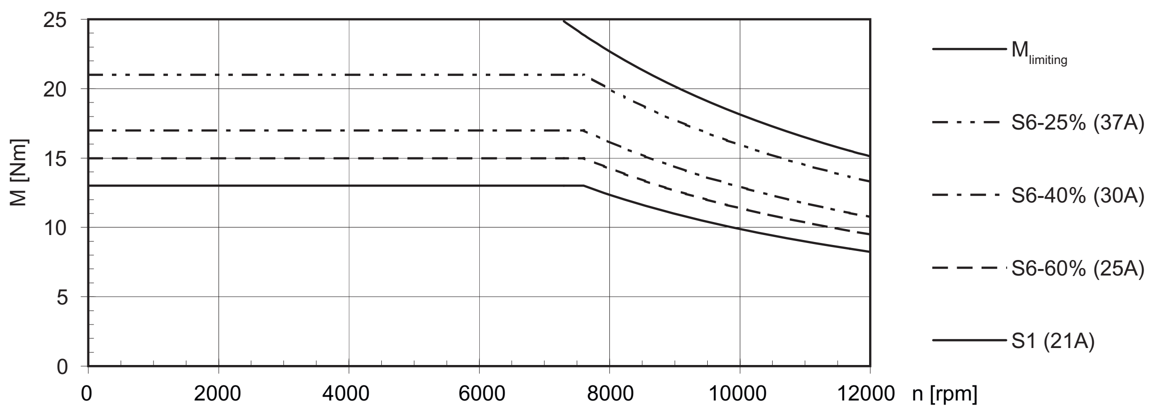


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 17 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1061-6WH□0

Rated power	P_N	kW	10,3
Rated speed	n_N	rpm	7600
Rated torque	M_N	Nm	13
Rated current	I_N	A	21
Maximum current	I_{max}	A	42
Maximum speed	n_{max}	rpm	12000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	12000
Maximum torque	M_{max}	Nm	24
Moment of inertia	J_{rot}	kg m^2	0,00141
Voltage constant	k_E	V/1000 rpm	42
Thermal time constant	T_{therm}	min	1,5
Stator weight with cooling jacket	m_{st}	kg	4
Rotor weight	m_{rot}	kg	see Table 1-3

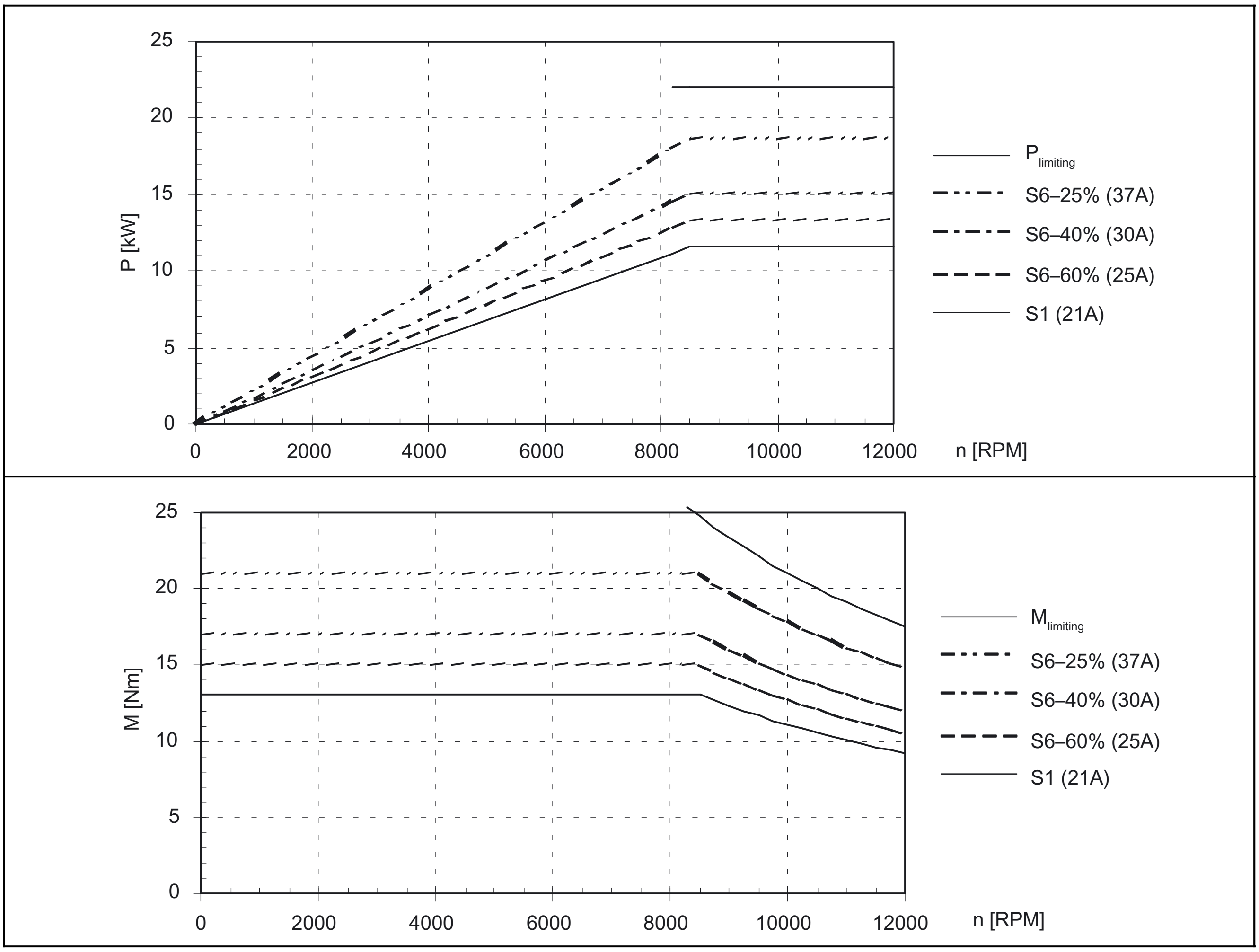




The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 18 SINAMICS, 3-ph 400 V AC, Active Line Module, (ALM), 1FE1061-6WH□0

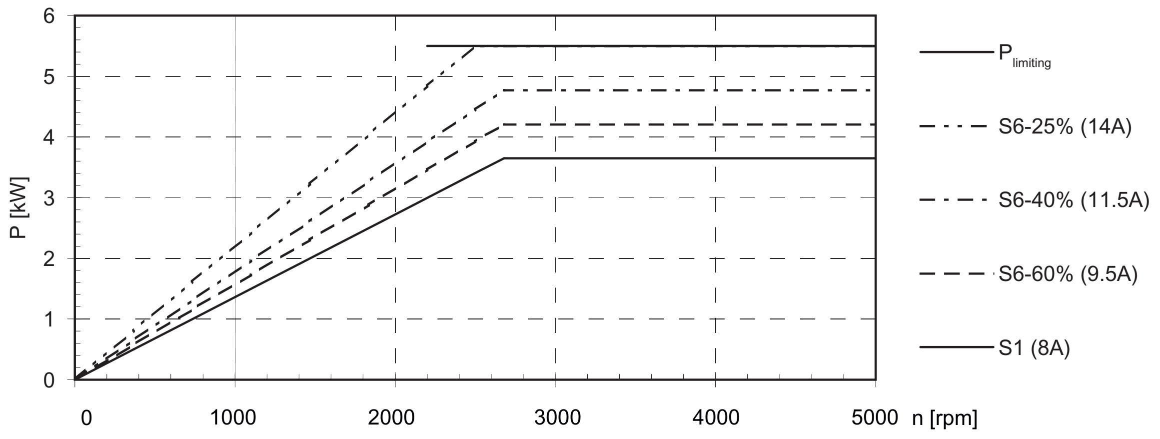
Rated power	P_N	kW	11,6
Rated speed	n_N	rpm	8500
Rated torque	M_N	Nm	13
Rated current	I_N	A	21
Maximum current	I_{max}	A	42
Maximum speed	n_{max}	rpm	12000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	12000
Maximum torque	M_{max}	Nm	24
Moment of inertia	J_{rot}	kg m^2	0,00141
Voltage constant	k_E	V/1000 rpm	42
Thermal time constant	T_{therm}	min	1,5
Stator weight with cooling jacket	m_{st}	kg	4
Rotor weight	m_{rot}	kg	see Table 1-3

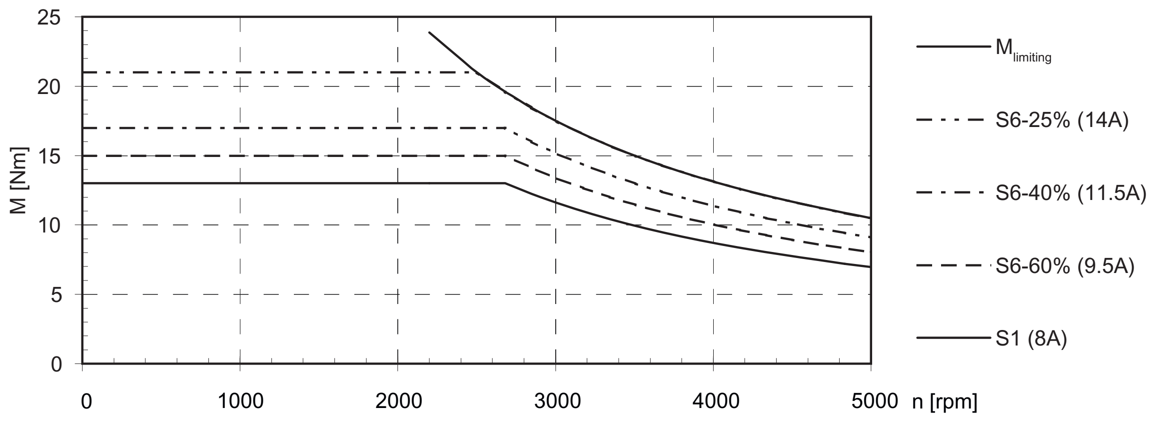


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 19 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1061-6WY□0

Rated power	P_N	kW	3,6
Rated speed	n_N	rpm	2680
Rated torque	M_N	Nm	13
Rated current	I_N	A	8
Maximum current	I_{max}	A	16
Maximum speed	n_{max}	rpm	5000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5000
Maximum torque	M_{max}	Nm	24
Moment of inertia	J_{rot}	kg m²	0,00141
Voltage constant	k_E	V/1000 rpm	108
Thermal time constant	T_{therm}	min	1,5
Stator weight with cooling jacket	m_{st}	kg	4
Rotor weight	m_{rot}	kg	see Table 1-3

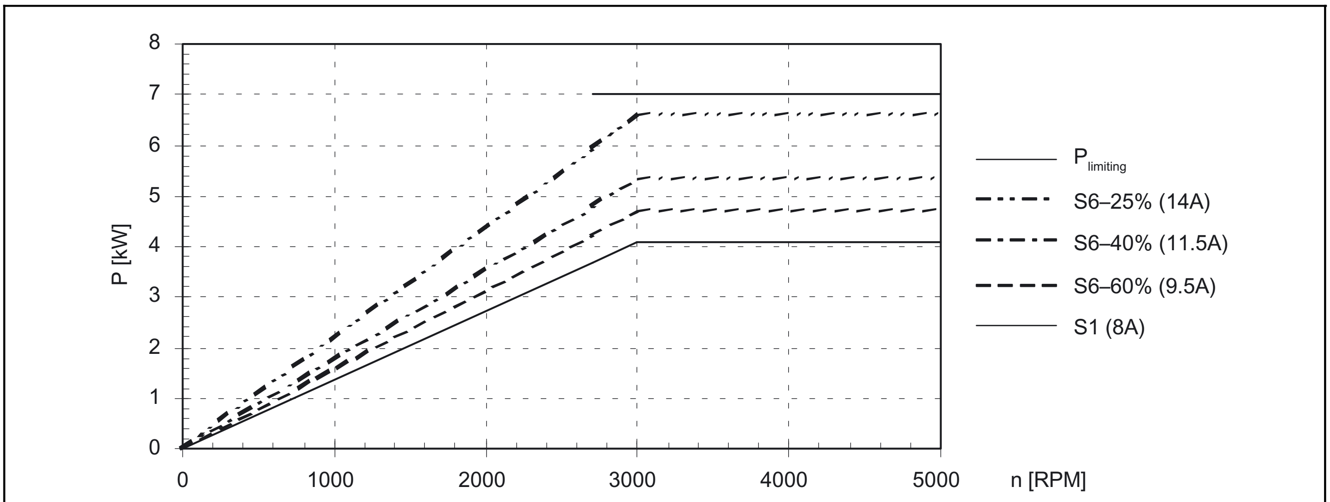


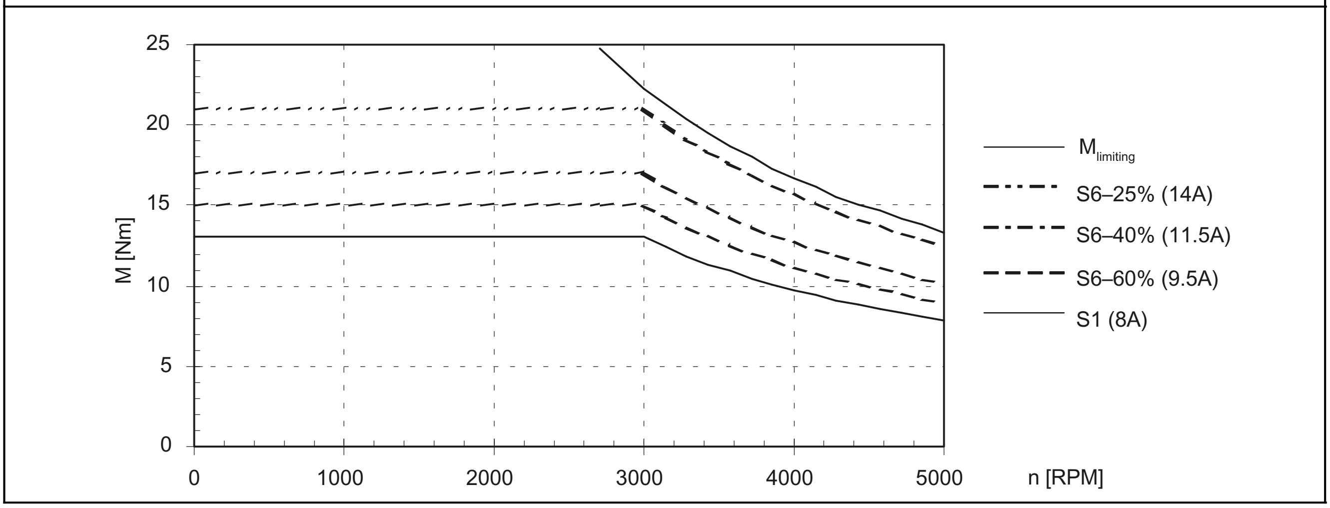


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 20 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1061-6WY□0

Rated power	P_N	kW	4
Rated speed	n_N	rpm	3000
Rated torque	M_N	Nm	13
Rated current	I_N	A	8
Maximum current	I_{max}	A	16
Maximum speed	n_{max}	rpm	5000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5000
Maximum torque	M_{max}	Nm	24
Moment of inertia	J_{rot}	kg m^2	0,00141
Voltage constant	k_E	V/1000 rpm	108
Thermal time constant	T_{therm}	min	1,5
Stator weight with cooling jacket	m_{st}	kg	4
Rotor weight	m_{rot}	kg	see Table 1-3

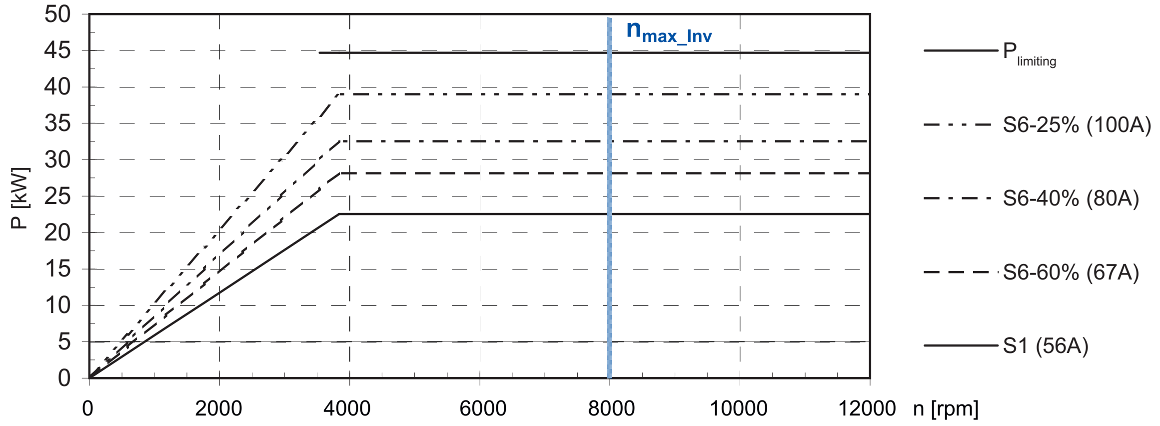


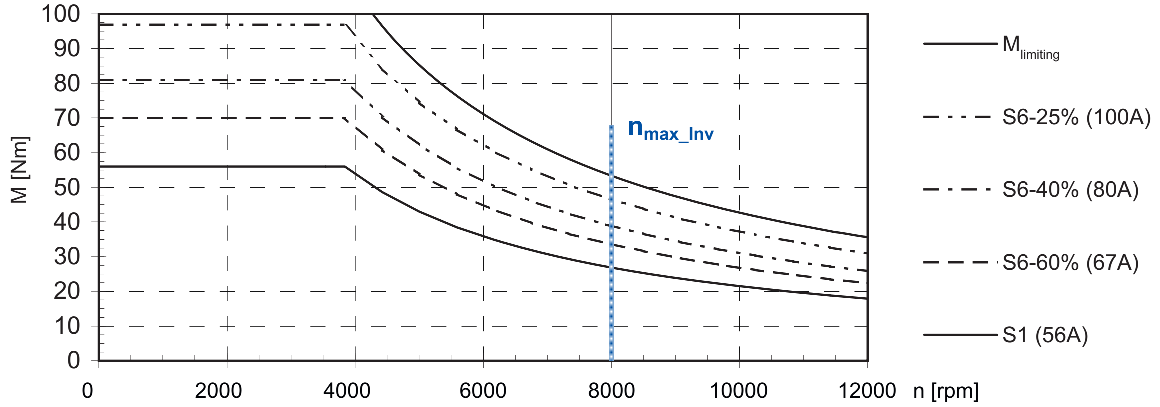


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 21 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1064-6WN□1

Rated power	P_N	kW	22,5
Rated speed	n_N	rpm	3840
Rated torque	M_N	Nm	56
Rated current	I_N	A	56
Maximum current	I_{max}	A	112
Maximum speed	n_{max}	rpm	12000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	8000
Maximum torque	M_{max}	Nm	105
Moment of inertia	J_{rot}	kg m²	0,00553
Voltage constant	k_E	V/1000 rpm	72
Thermal time constant	T_{therm}	min	1,5
Stator weight with cooling jacket	m_{st}	kg	10
Rotor weight	m_{rot}	kg	see Table 1-3

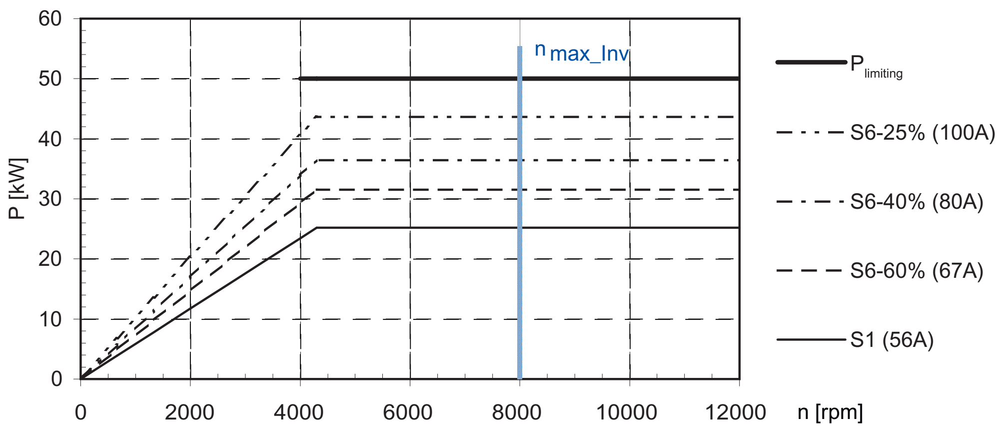


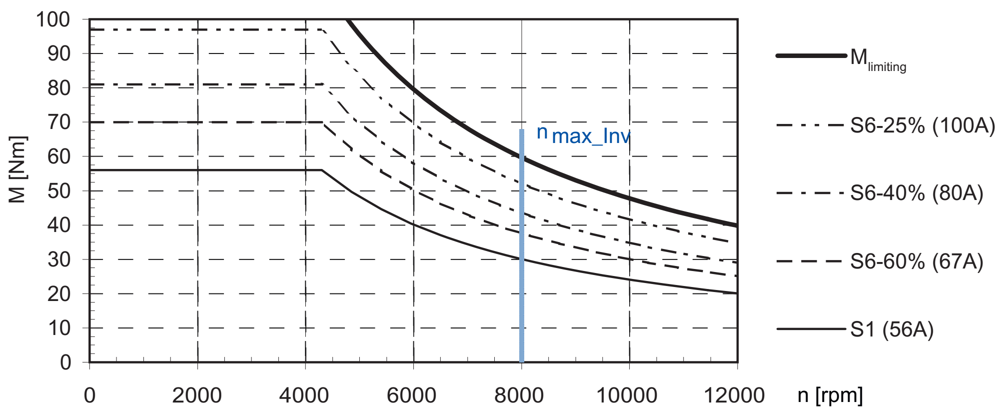


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 22 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1064-6WN□1

Rated power	P_N	kW	25
Rated speed	n_N	rpm	4300
Rated torque	M_N	Nm	56
Rated current	I_N	A	56
Maximum current	I_{max}	A	112
Maximum speed	n_{max}	rpm	12000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	8000
Maximum torque	M_{max}	Nm	105
Moment of inertia	J_{rot}	kg m²	0,00553
Voltage constant	k_E	V/1000 rpm	72
Thermal time constant	T_{therm}	min	1,5
Stator weight with cooling jacket	m_{st}	kg	10
Rotor weight	m_{rot}	kg	see Table 1-3

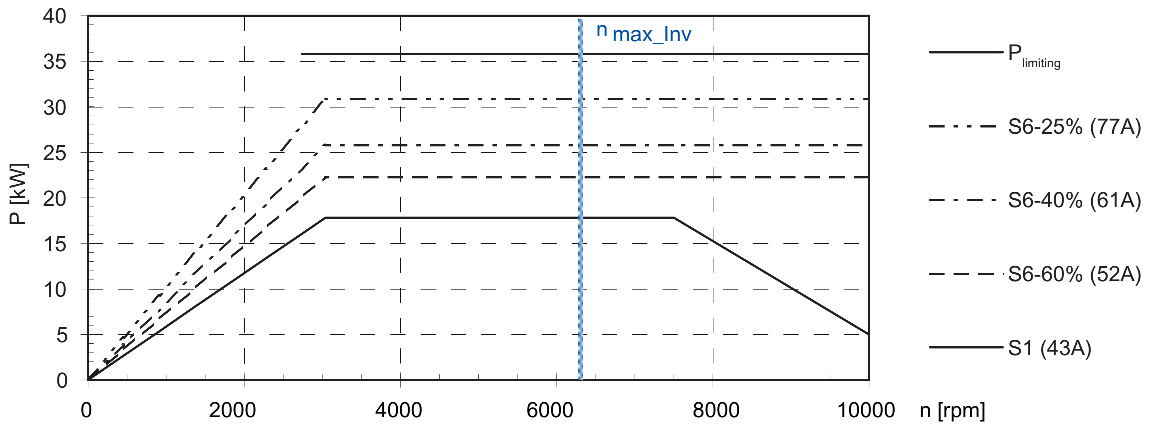


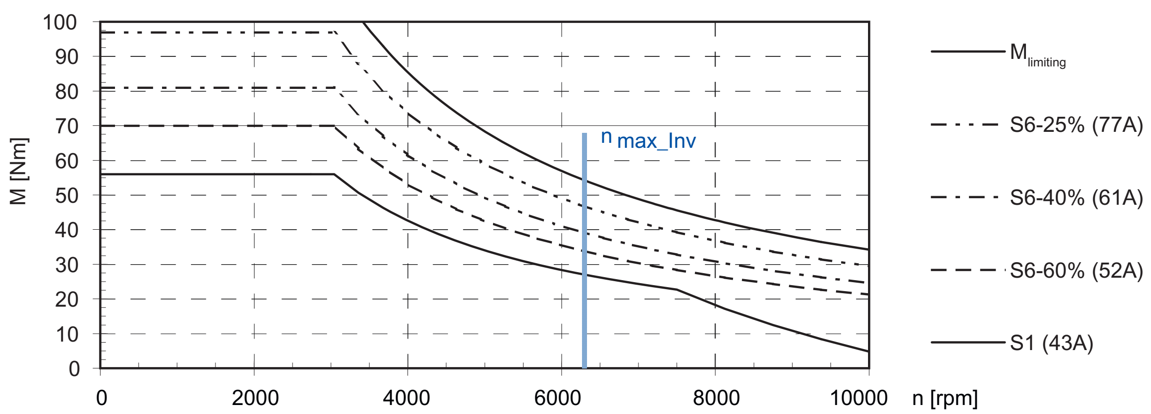


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 23 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1064-6WQ□1

Rated power	P_N	kW	17,8
Rated speed	n_N	rpm	3040
Rated torque	M_N	Nm	56
Rated current	I_N	A	43
Maximum current	I_{max}	A	86
Maximum speed	n_{max}	rpm	10000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6300
Maximum torque	M_{max}	Nm	105
Moment of inertia	J_{rot}	kg m²	0,00553
Voltage constant	k_E	V/1000 rpm	92
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	10
Rotor weight	m_{rot}	kg	see Table 1-3

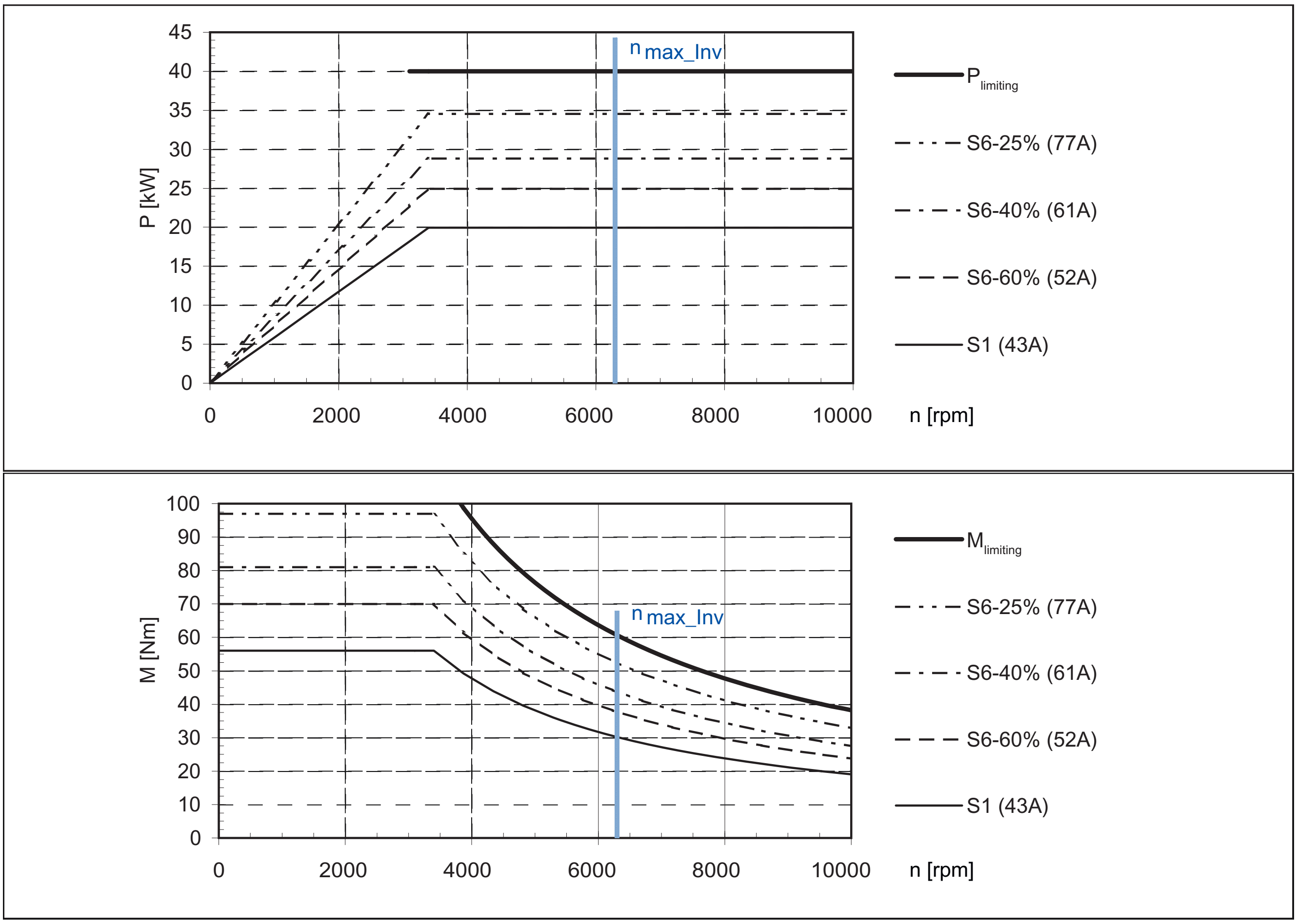




The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 24 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1064-6WQ□1

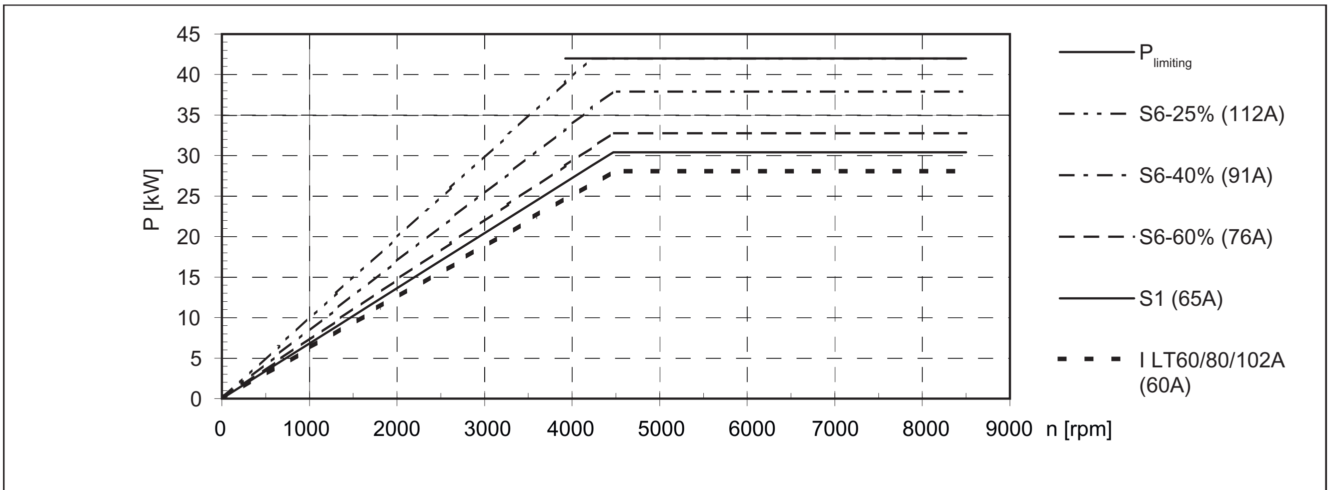
Rated power	P_N	kW	20
Rated speed	n_N	rpm	3400
Rated torque	M_N	Nm	56
Rated current	I_N	A	43
Maximum current	I_{max}	A	86
Maximum speed	n_{max}	rpm	10000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6300
Maximum torque	M_{max}	Nm	105
Moment of inertia	J_{rot}	kg m^2	0,00553
Voltage constant	k_E	V/1000 rpm	92
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	10
Rotor weight	m_{rot}	kg	see Table 1-3

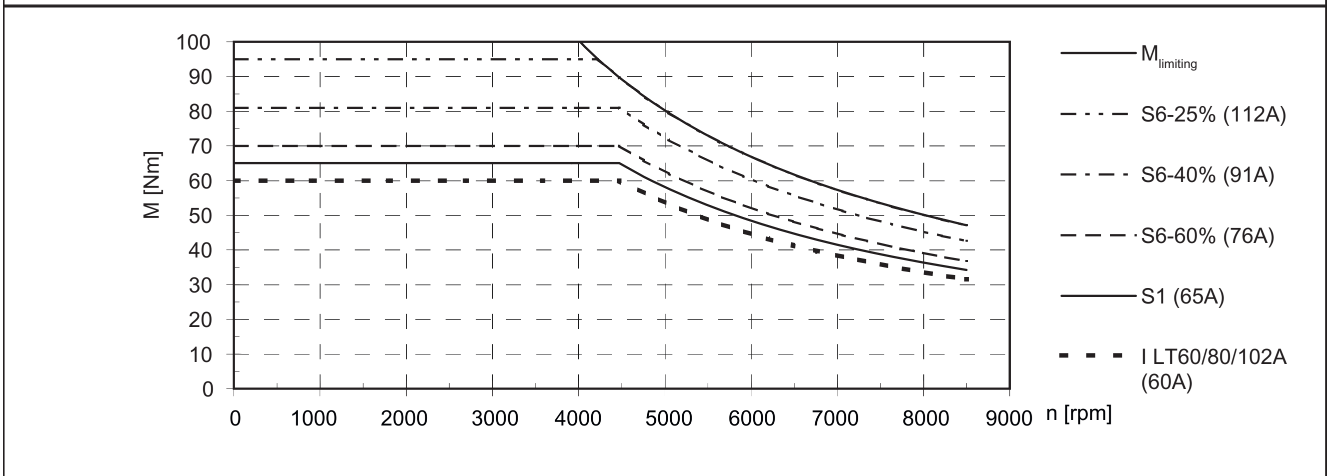


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 25 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1082-6WP□0

Rated power	P_N	kW	30,4
Rated speed	n_N	rpm	4470
Rated torque	M_N	Nm	65
Rated current	I_N	A	65
Maximum current	I_{max}	A	130
Maximum speed	n_{max}	rpm	8500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	8500
Maximum torque	M_{max}	Nm	107
Moment of inertia	J_{rot}	kg m^2	0,01048
Voltage constant	k_E	V/1000 rpm	68
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	10
Rotor weight	m_{rot}	kg	see Table 1-3

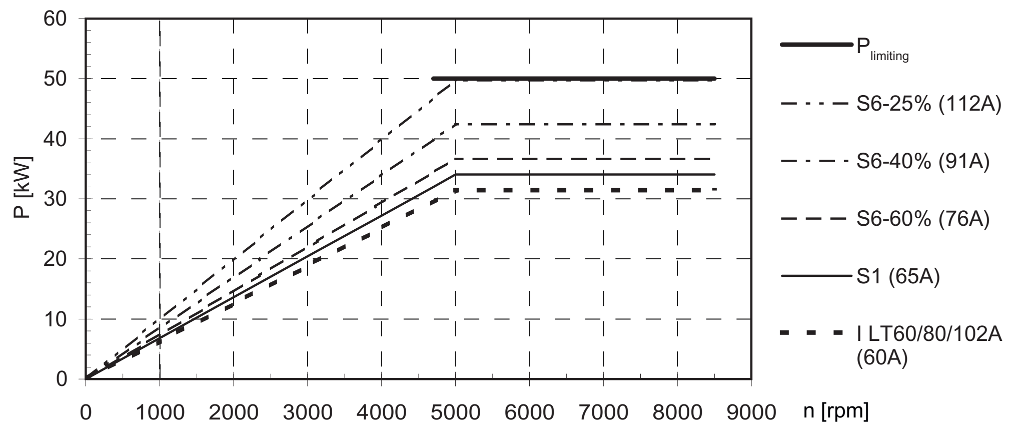


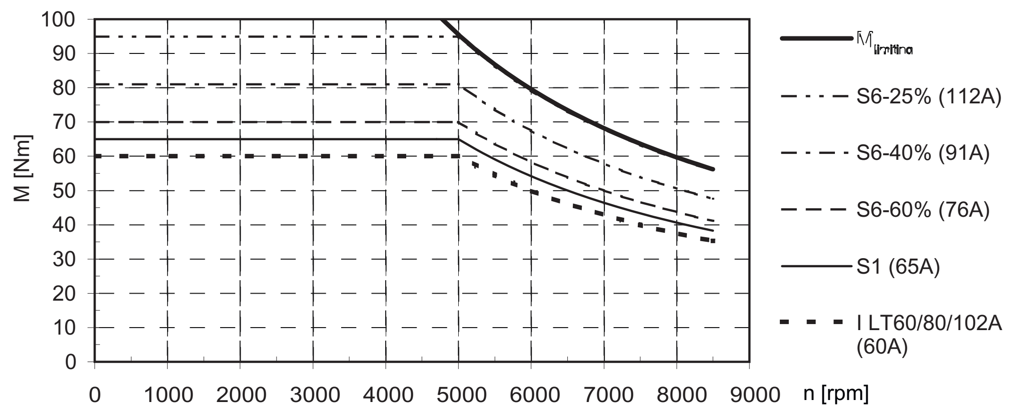


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 26 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1082-6WP□0

Rated power	P_N	kW	34
Rated speed	n_N	rpm	5000
Rated torque	M_N	Nm	65
Rated current	I_N	A	65
Maximum current	I_{max}	A	130
Maximum speed	n_{max}	rpm	8500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	8500
Maximum torque	M_{max}	Nm	107
Moment of inertia	J_{rot}	kg m²	0,01048
Voltage constant	k_E	V/1000 rpm	68
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	10
Rotor weight	m_{rot}	kg	see Table 1-3

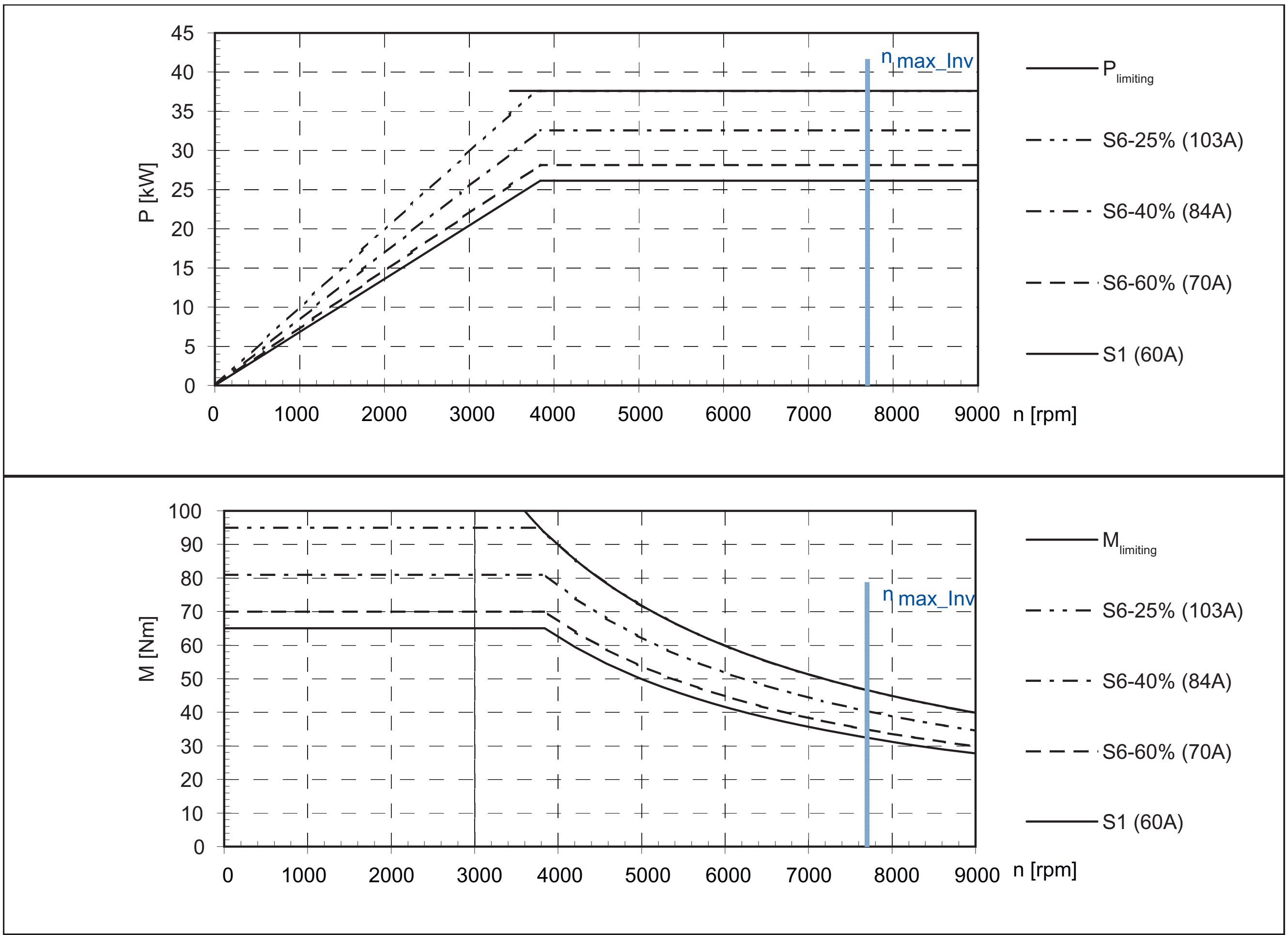




The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 27 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1082-6WQ□1

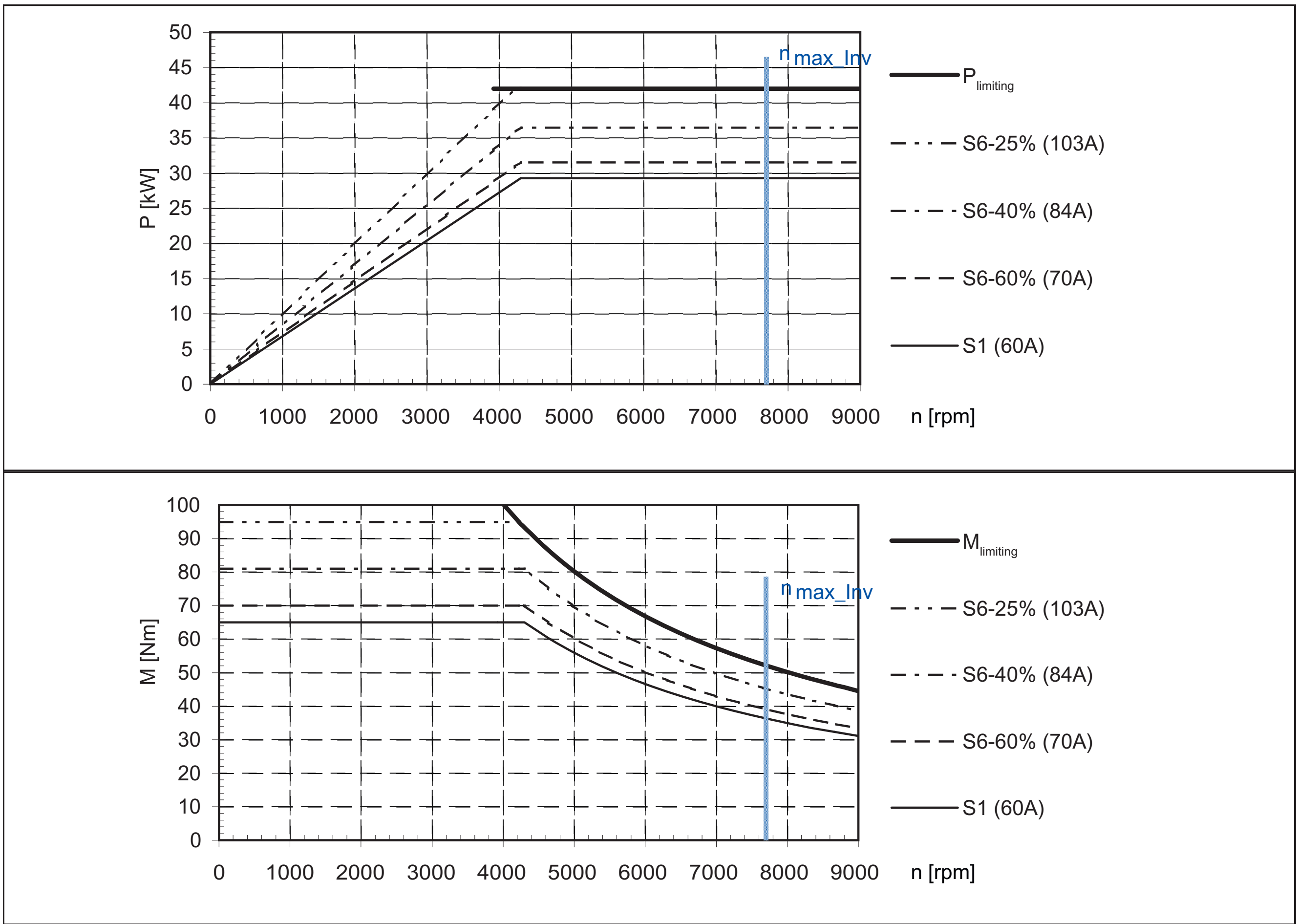
Rated power	P_N	kW	26,1
Rated speed	n_N	rpm	3840
Rated torque	M_N	Nm	65
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	9000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7700
Maximum torque	M_{max}	Nm	107
Moment of inertia	J_{rot}	kg m²	0,01048
Voltage constant	k_E	V/1000 rpm	75
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	10
Rotor weight	m_{rot}	kg	see Table 1-3



The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 28 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1082-6WQ□1

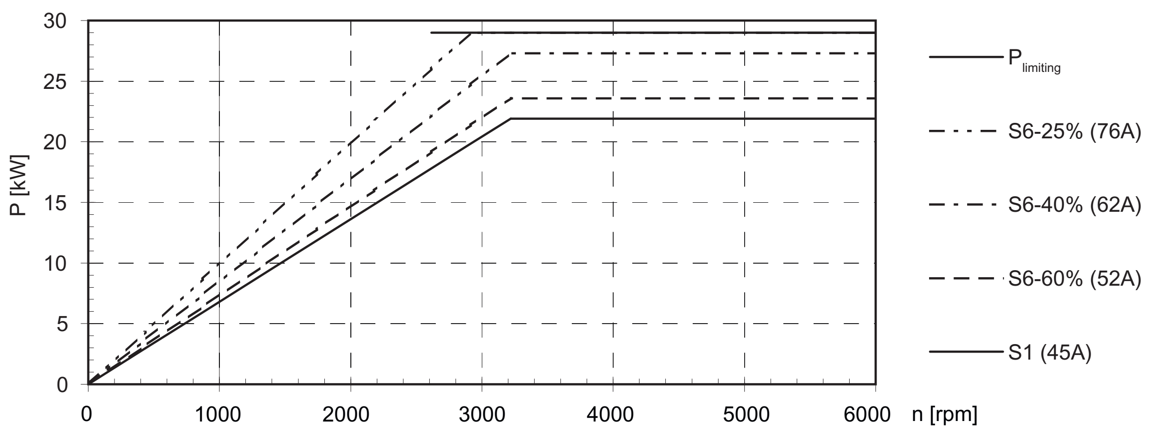
Rated power	P_N	kW	29,3
Rated speed	n_N	rpm	4300
Rated torque	M_N	Nm	65
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	9000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7700
Maximum torque	M_{max}	Nm	107
Moment of inertia	J_{rot}	kg m²	0,01048
Voltage constant	k_E	V/1000 rpm	75
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	10
Rotor weight	m_{rot}	kg	see Table 1-3

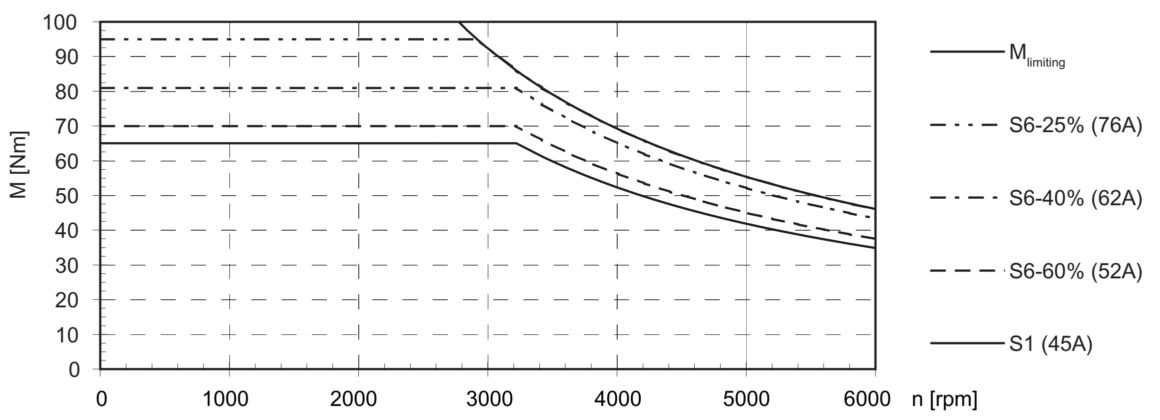


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 29 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1082-6WS□0

Rated power	P_N	kW	21,9
Rated speed	n_N	rpm	3220
Rated torque	M_N	Nm	65
Rated current	I_N	A	45
Maximum current	I_{max}	A	90
Maximum speed	n_{max}	rpm	6000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6000
Maximum torque	M_{max}	Nm	107
Moment of inertia	J_{rot}	kg m²	0,01048
Voltage constant	k_E	V/1000 rpm	98
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	10
Rotor weight	m_{rot}	kg	see Table 1-3

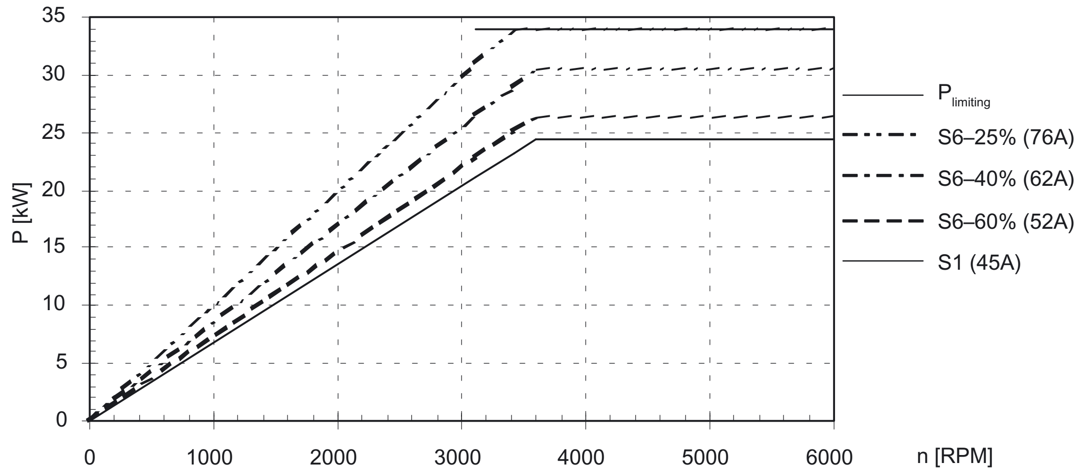


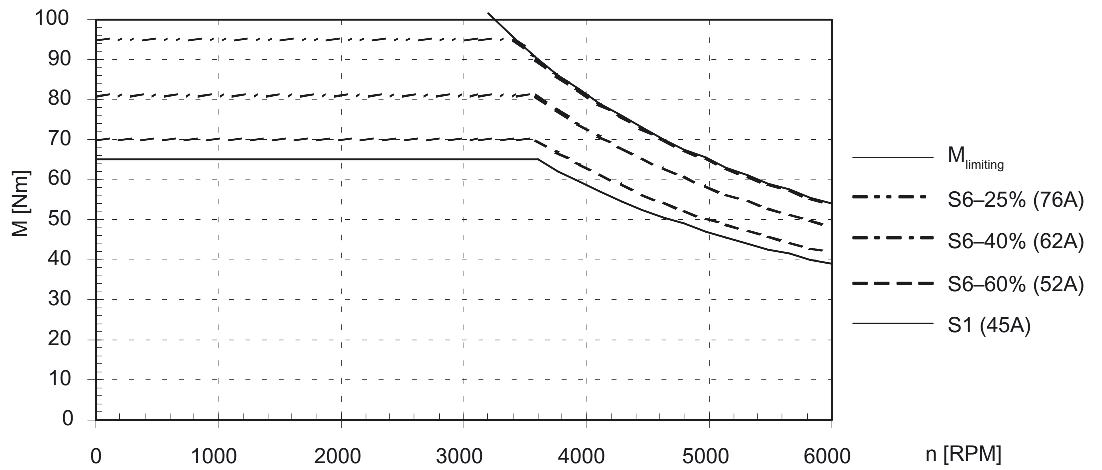


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 30 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1082-6WS□0

Rated power	P_N	kW	24,5
Rated speed	n_N	rpm	3600
Rated torque	M_N	Nm	65
Rated current	I_N	A	45
Maximum current	I_{max}	A	90
Maximum speed	n_{max}	rpm	6000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6000
Maximum torque	M_{max}	Nm	107
Moment of inertia	J_{rot}	kg m²	0,01048
Voltage constant	k_E	V/1000 rpm	98
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	10
Rotor weight	m_{rot}	kg	see Table 1-3

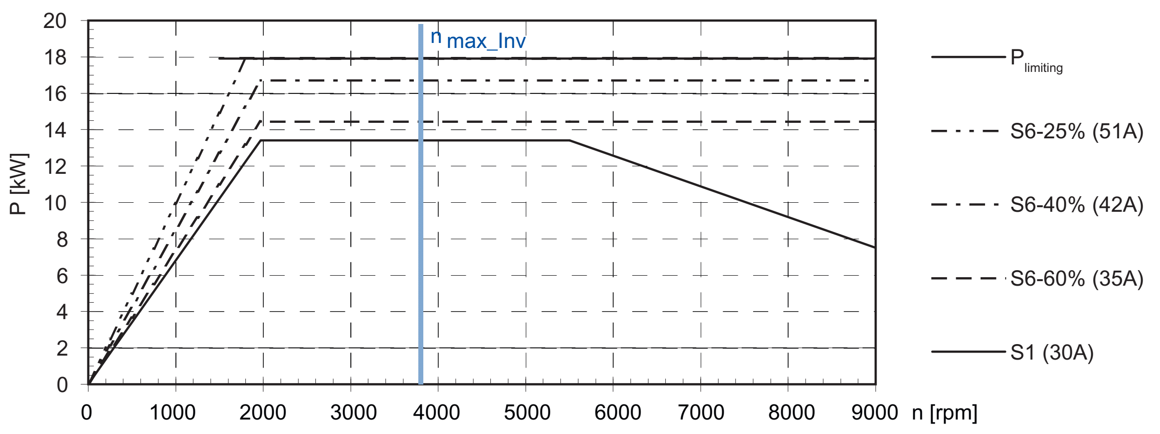


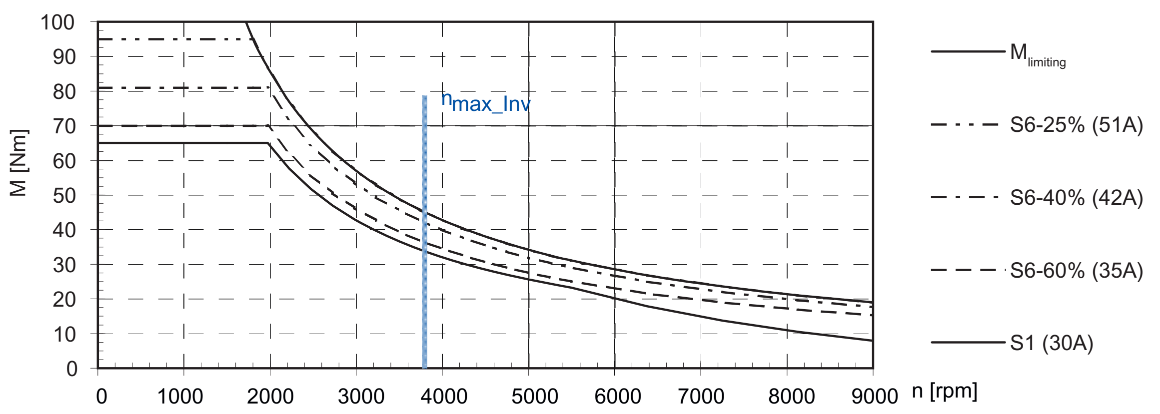


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 31 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1082-6WW□1

Rated power	P_N	kW	13,4
Rated speed	n_N	rpm	1970
Rated torque	M_N	Nm	65
Rated current	I_N	A	30
Maximum current	I_{max}	A	60
Maximum speed	n_{max}	rpm	9000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	3800
Maximum torque	M_{max}	Nm	107
Moment of inertia	J_{rot}	kg m²	0,01048
Voltage constant	k_E	V/1000 rpm	151
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	10
Rotor weight	m_{rot}	kg	see Table 1-3

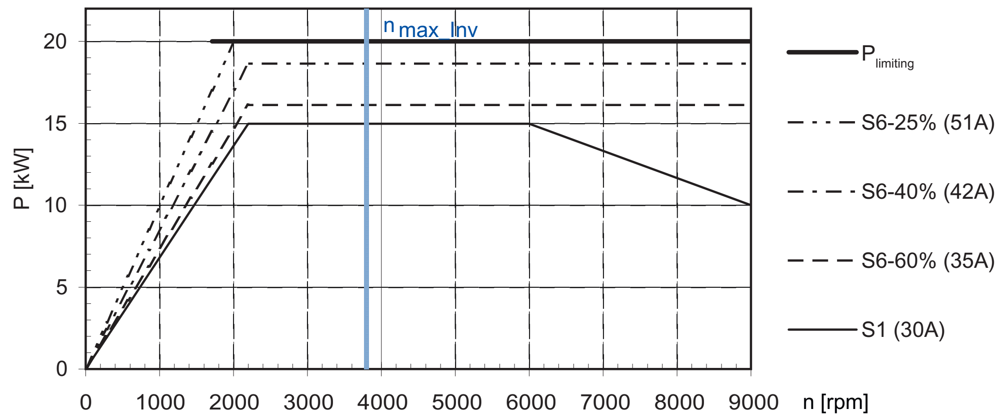


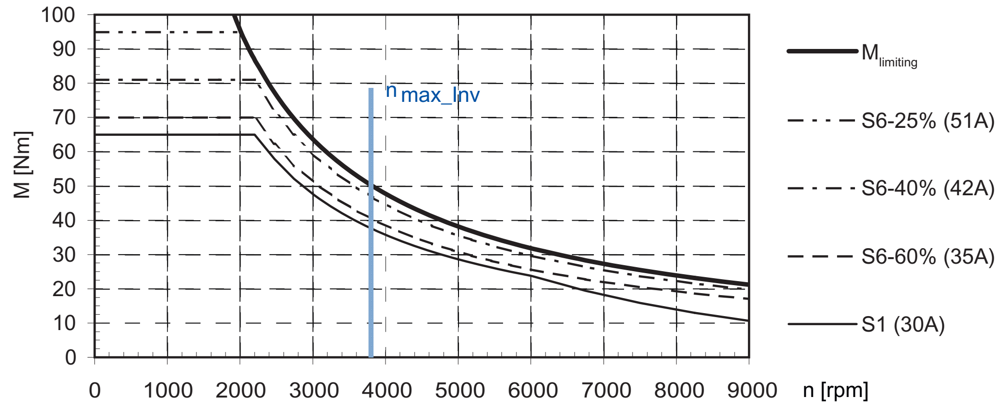


The data for duty type S6 are valid for a 2 min. duty cycle

Table 4- 32 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1082-6WW□1

Rated power	P_N	kW	15
Rated speed	n_N	rpm	2200
Rated torque	M_N	Nm	65
Rated current	I_N	A	30
Maximum current	I_{max}	A	60
Maximum speed	n_{max}	rpm	9000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	3800
Maximum torque	M_{max}	Nm	107
Moment of inertia	J_{rot}	kg m^2	0,01048
Voltage constant	k_E	V/1000 rpm	151
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	10
Rotor weight	m_{rot}	kg	see Table 1-3

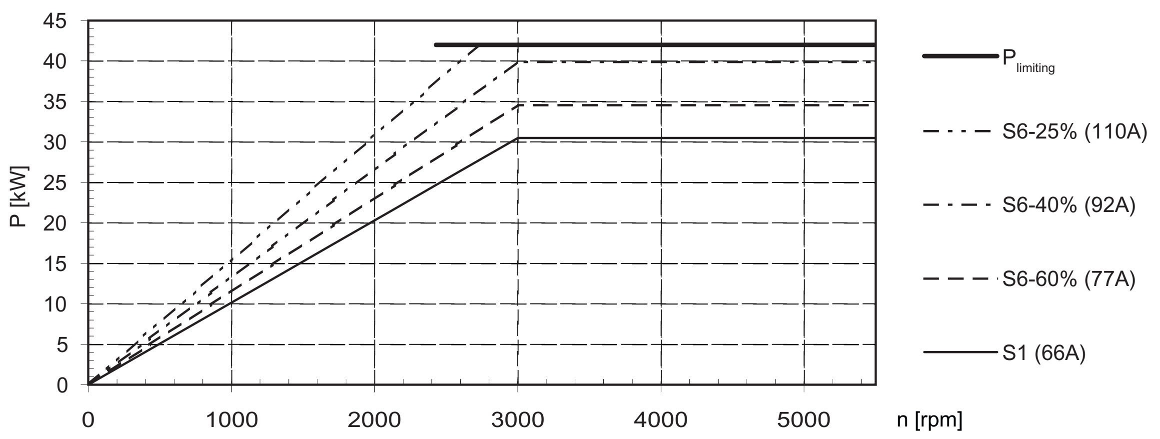


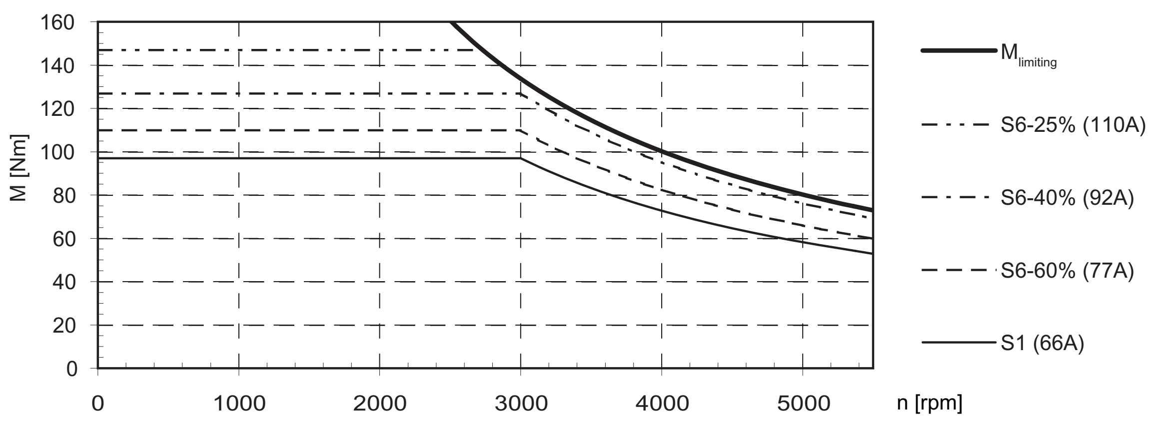


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 33 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1083-6WP□0

Rated power	P_N	kW	30,5
Rated speed	n_N	rpm	3000
Rated torque	M_N	Nm	97
Rated current	I_N	A	66
Maximum current	I_{max}	A	132
Maximum speed	n_{max}	rpm	5500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5500
Maximum torque	M_{max}	Nm	161
Moment of inertia	J_{rot}	kg m^2	0,016
Voltage constant	k_E	V/1000 rpm	102
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	17
Rotor weight	m_{rot}	kg	see Table 1-3

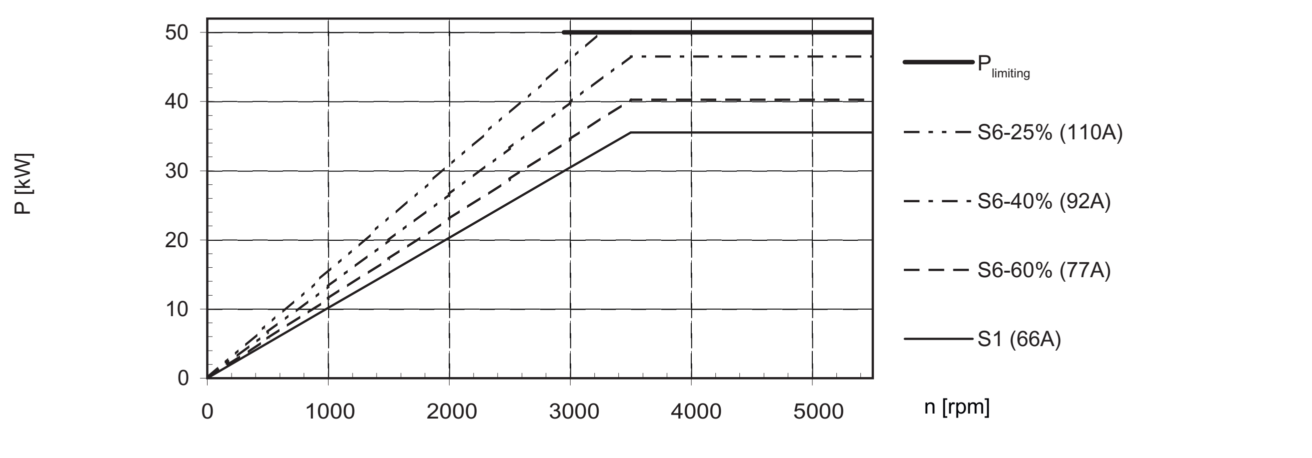


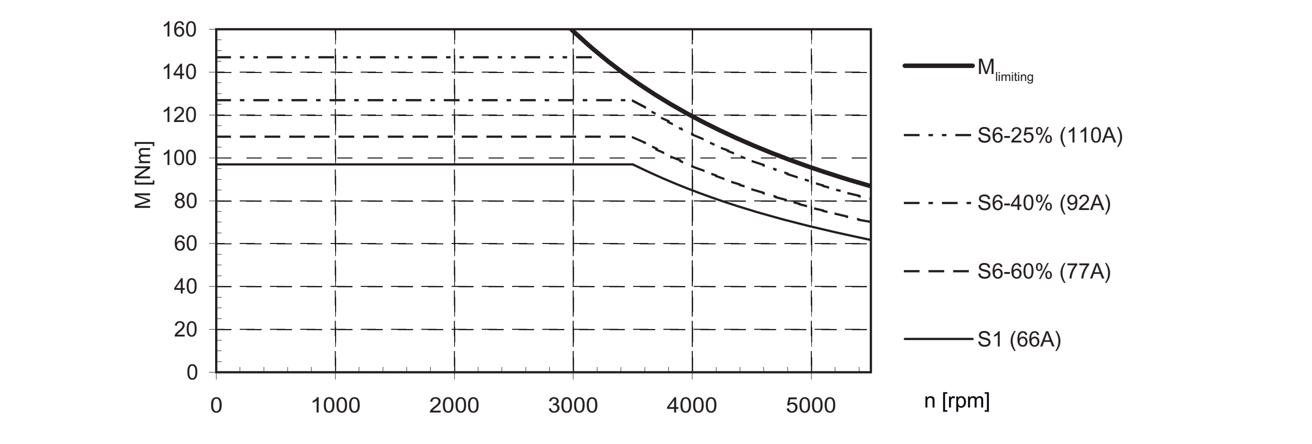


The data for duty type S6 are valid for a 2 min. duty cycle

Table 4- 34 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1083-6WP□0

Rated power	P_N	kW	35,5
Rated speed	n_N	rpm	3500
Rated torque	M_N	Nm	97
Rated current	I_N	A	66
Maximum current	I_{max}	A	132
Maximum speed	n_{max}	rpm	5500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5500
Maximum torque	M_{max}	Nm	161
Moment of inertia	J_{rot}	kg m^2	0,016
Voltage constant	k_E	V/1000 rpm	102
Thermal time constant	T_{therm}	min	2
Stator weight with cooling jacket	m_{st}	kg	17
Rotor weight	m_{rot}	kg	see Table 1-3

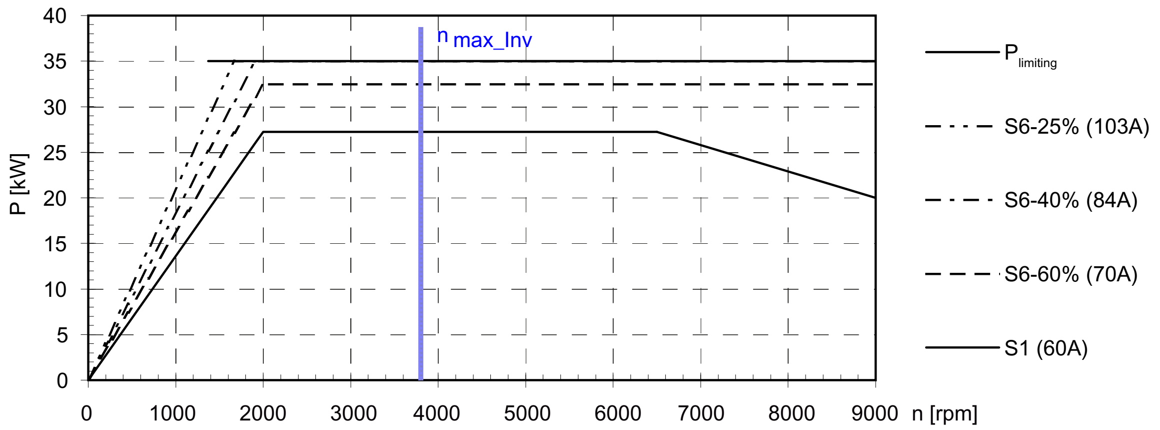


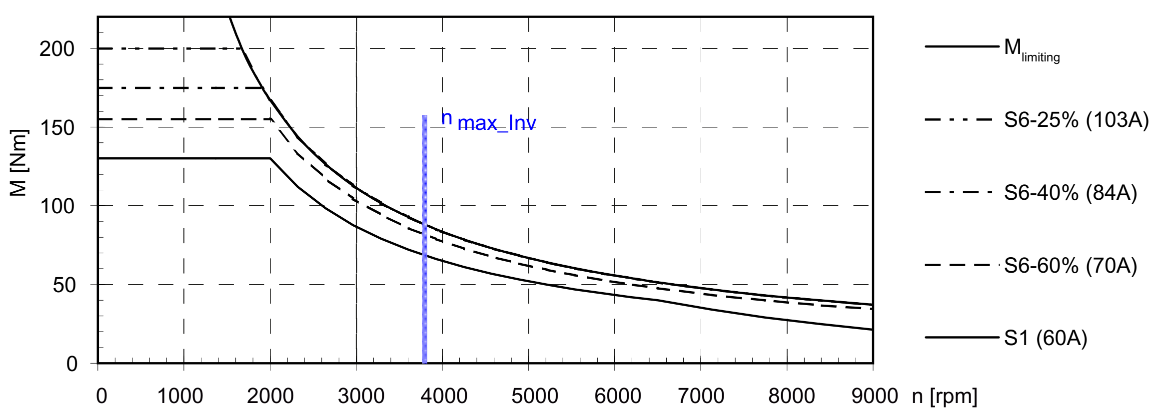


The data for duty type S6 are valid for a 2 min. duty cycle

Table 4- 35 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1084-6WR□1

Rated power	P_N	kW	27,2
Rated speed	n_N	rpm	2000
Rated torque	M_N	Nm	130
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	9000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	3800
Maximum torque	M_{max}	Nm	215
Moment of inertia	J_{rot}	kg m^2	0,02067
Voltage constant	k_E	V/1000 rpm	150
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	22
Rotor weight	m_{rot}	kg	see Table 1-3

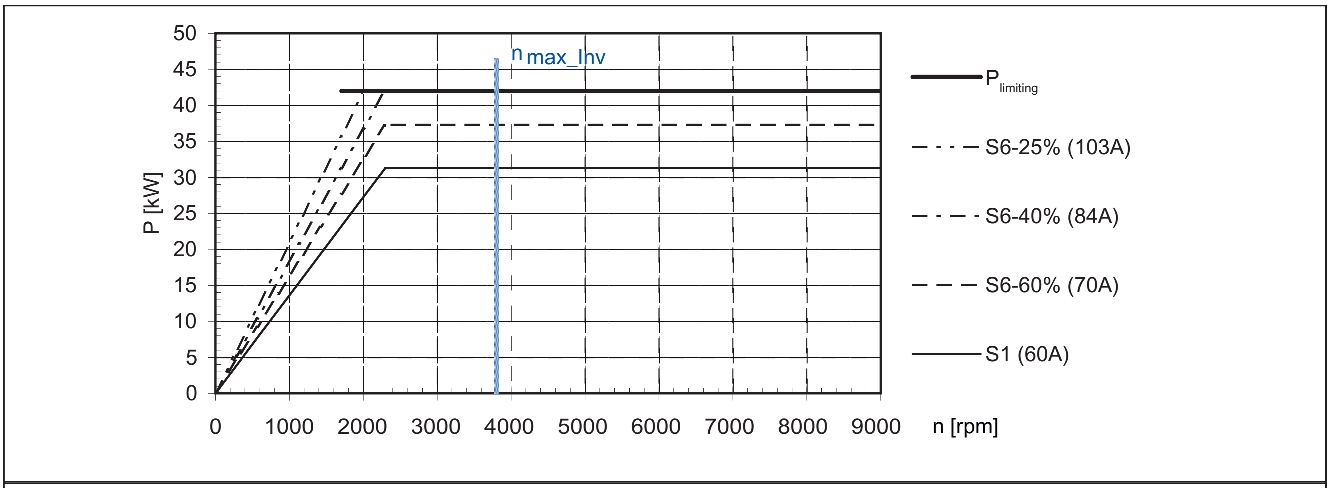


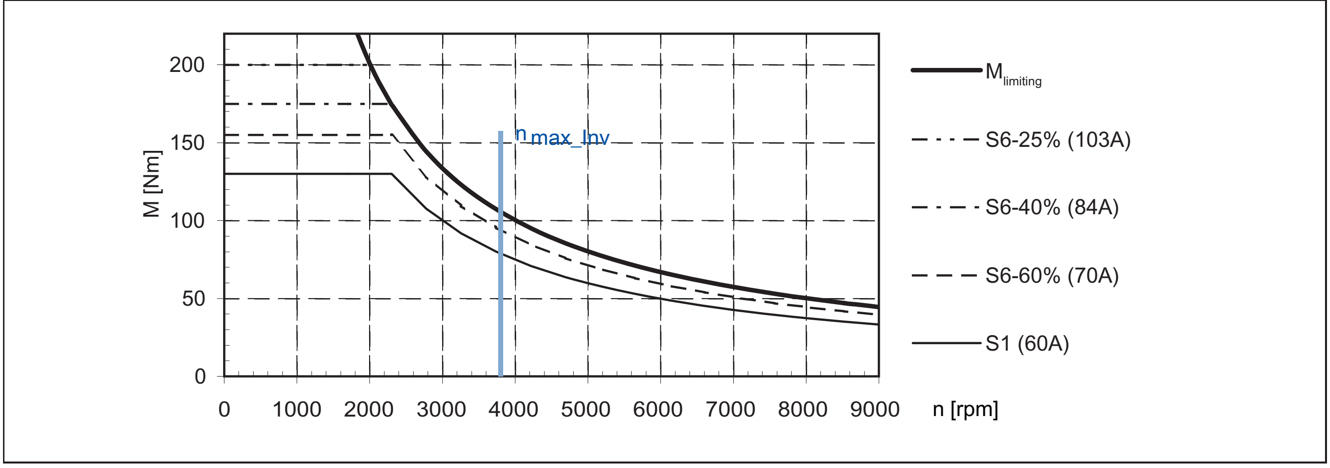


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 36 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1084-6WR□1

Rated power	P_N	kW	31
Rated speed	n_N	rpm	2300
Rated torque	M_N	Nm	130
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	9000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	3800
Maximum torque	M_{max}	Nm	215
Moment of inertia	J_{rot}	kg m²	0,02067
Voltage constant	k_E	V/1000 rpm	150
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	22
Rotor weight	m_{rot}	kg	see Table 1-3

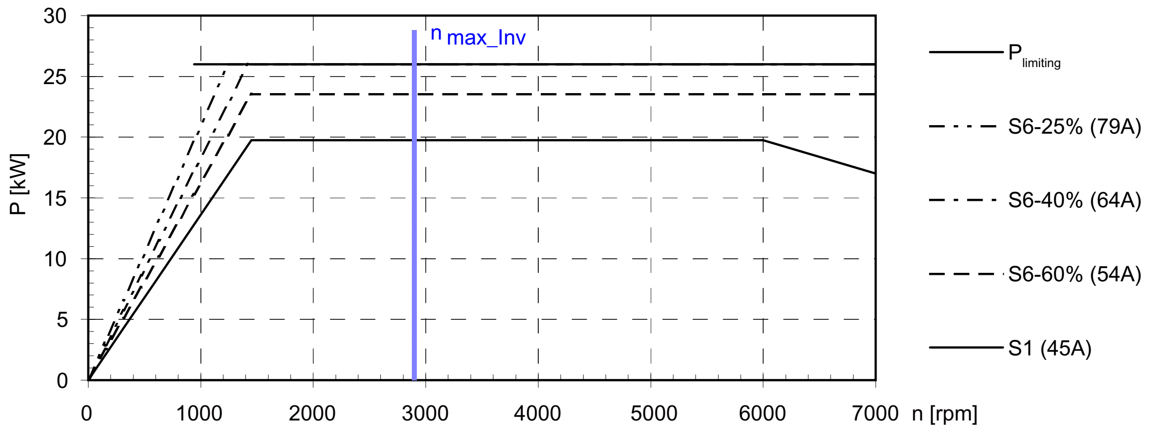


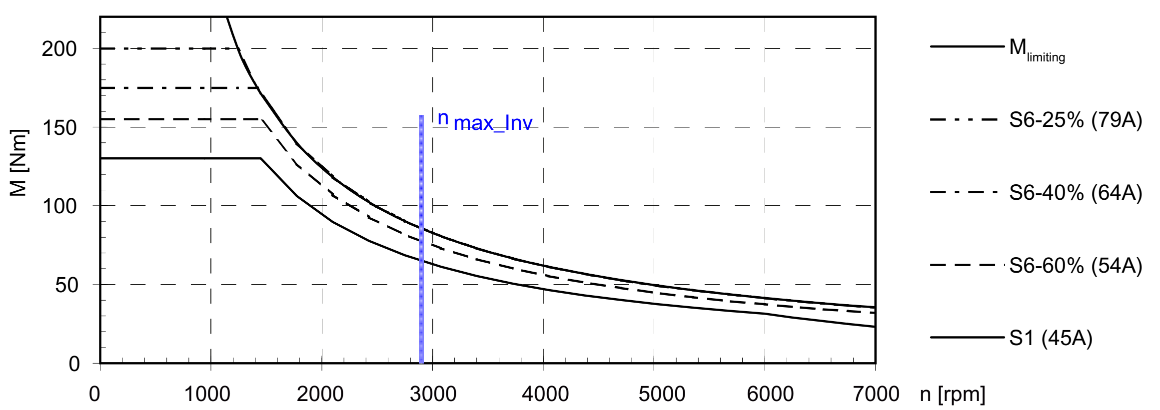


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 37 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1084-6WU□1

Rated power	P_N	kW	19,7
Rated speed	n_N	rpm	1450
Rated torque	M_N	Nm	130
Rated current	I_N	A	45
Maximum current	I_{max}	A	90
Maximum speed	n_{max}	rpm	7000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2900
Maximum torque	M_{max}	Nm	215
Moment of inertia	J_{rot}	kg m²	0,02067
Voltage constant	k_E	V/1000 rpm	195
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	22
Rotor weight	m_{rot}	kg	see Table 1-3

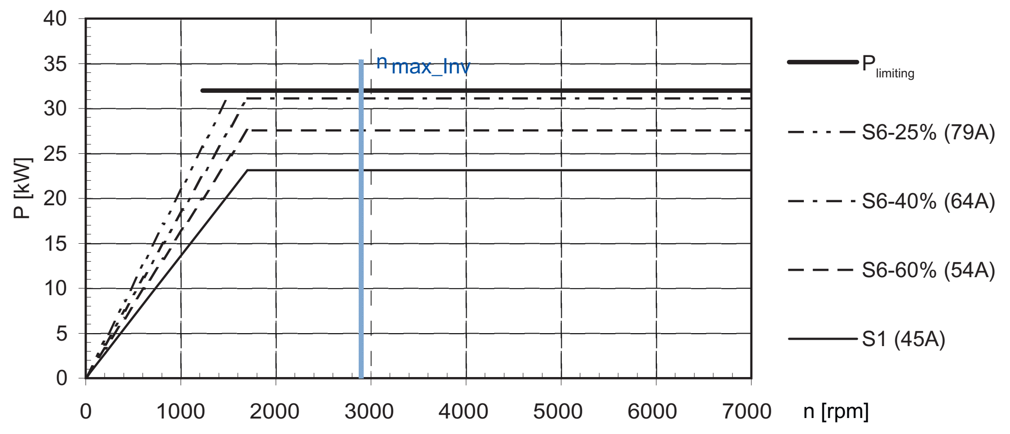


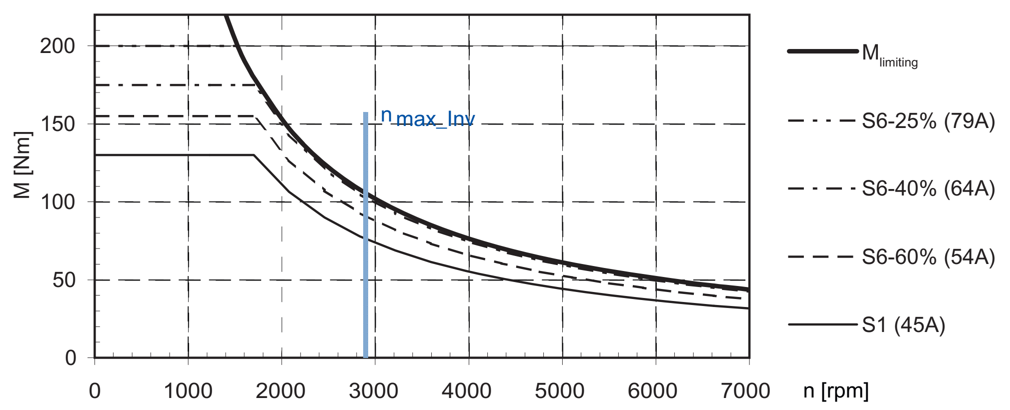


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 38 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1084-6WU□1

Rated power	P_N	kW	23
Rated speed	n_N	rpm	1700
Rated torque	M_N	Nm	130
Rated current	I_N	A	45
Maximum current	I_{max}	A	90
Maximum speed	n_{max}	rpm	7000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2900
Maximum torque	M_{max}	Nm	215
Moment of inertia	J_{rot}	kg m²	0,02067
Voltage constant	k_E	V/1000 rpm	195
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	22
Rotor weight	m_{rot}	kg	see Table 1-3

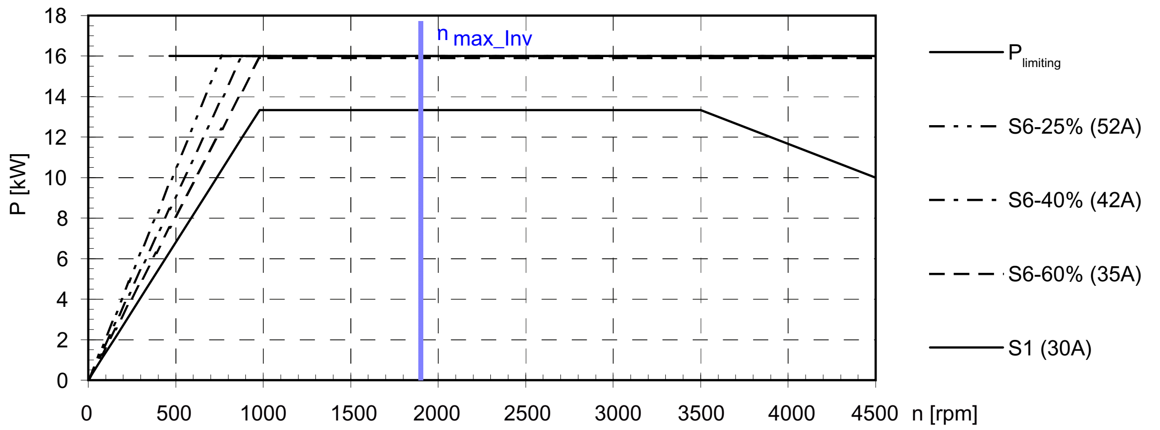


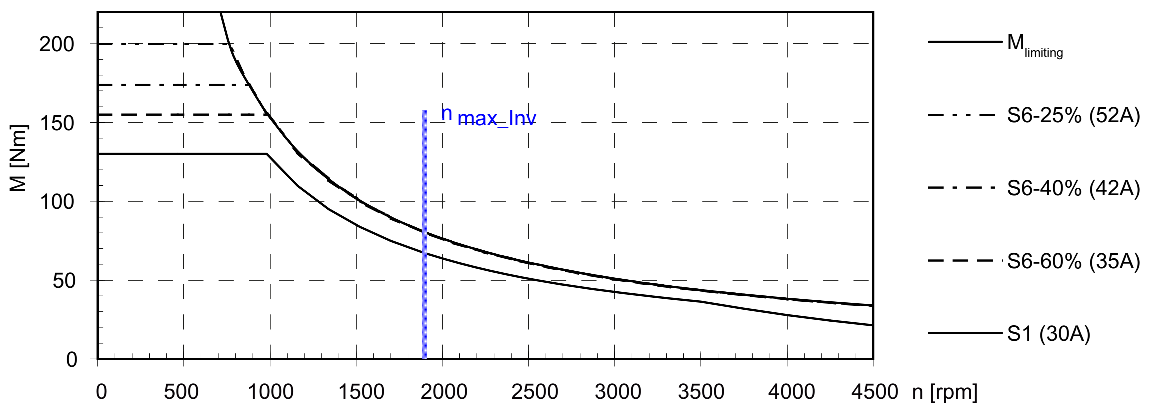


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 39 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1084-6WX□1

Rated power	P_N	kW	13,3
Rated speed	n_N	rpm	980
Rated torque	M_N	Nm	130
Rated current	I_N	A	30
Maximum current	I_{max}	A	60
Maximum speed	n_{max}	rpm	4500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	1900
Maximum torque	M_{max}	Nm	215
Moment of inertia	J_{rot}	kg m²	0,02067
Voltage constant	k_E	V/1000 rpm	302
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	22
Rotor weight	m_{rot}	kg	see Table 1-3

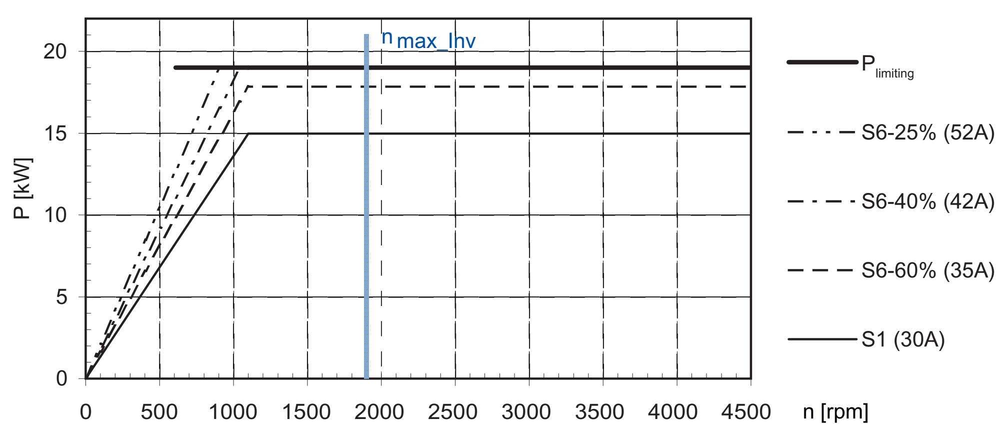


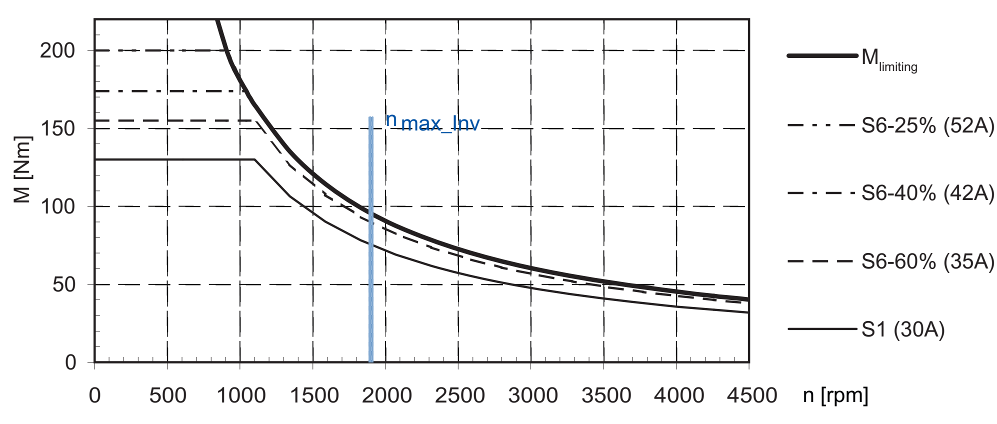


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 40 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1084-6WX□1

Rated power	P_N	kW	15
Rated speed	n_N	rpm	1100
Rated torque	M_N	Nm	130
Rated current	I_N	A	30
Maximum current	I_{max}	A	60
Maximum speed	n_{max}	rpm	4500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	1900
Maximum torque	M_{max}	Nm	215
Moment of inertia	J_{rot}	kg m²	0,02067
Voltage constant	k_E	V/1000 rpm	302
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	22
Rotor weight	m_{rot}	kg	see Table 1-3

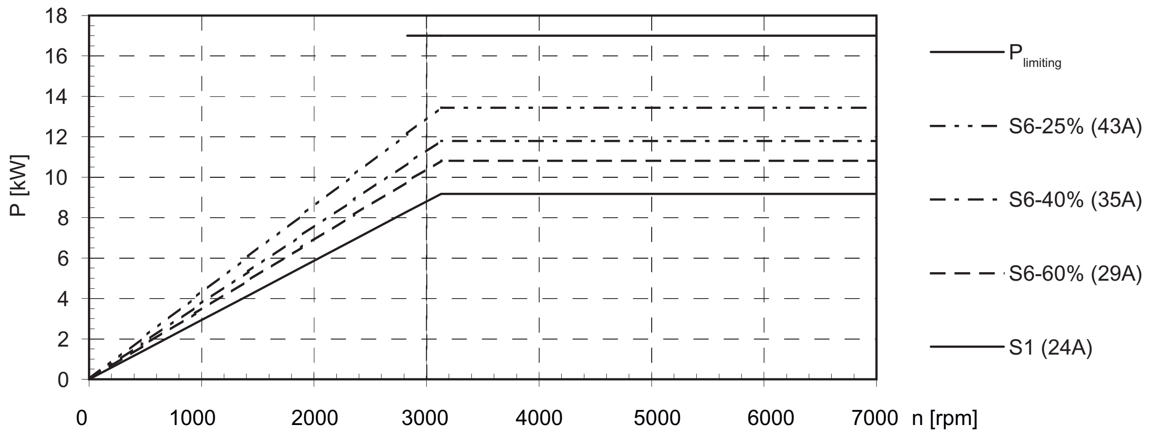


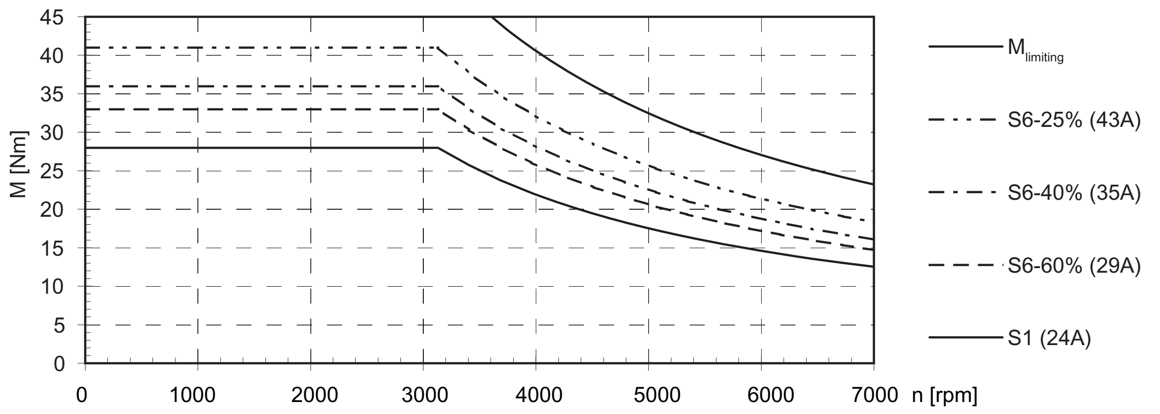


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 41 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1091-6WN□0

Rated power	P_N	kW	9,2
Rated speed	n_N	rpm	3130
Rated torque	M_N	Nm	28
Rated current	I_N	A	24
Maximum current	I_{max}	A	48
Maximum speed	n_{max}	rpm	7000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7000
Maximum torque	M_{max}	Nm	50
Moment of inertia	J_{rot}	kg m²	0,00814
Voltage constant	k_E	V/1000 rpm	80
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	14
Rotor weight	m_{rot}	kg	see Table 1-3

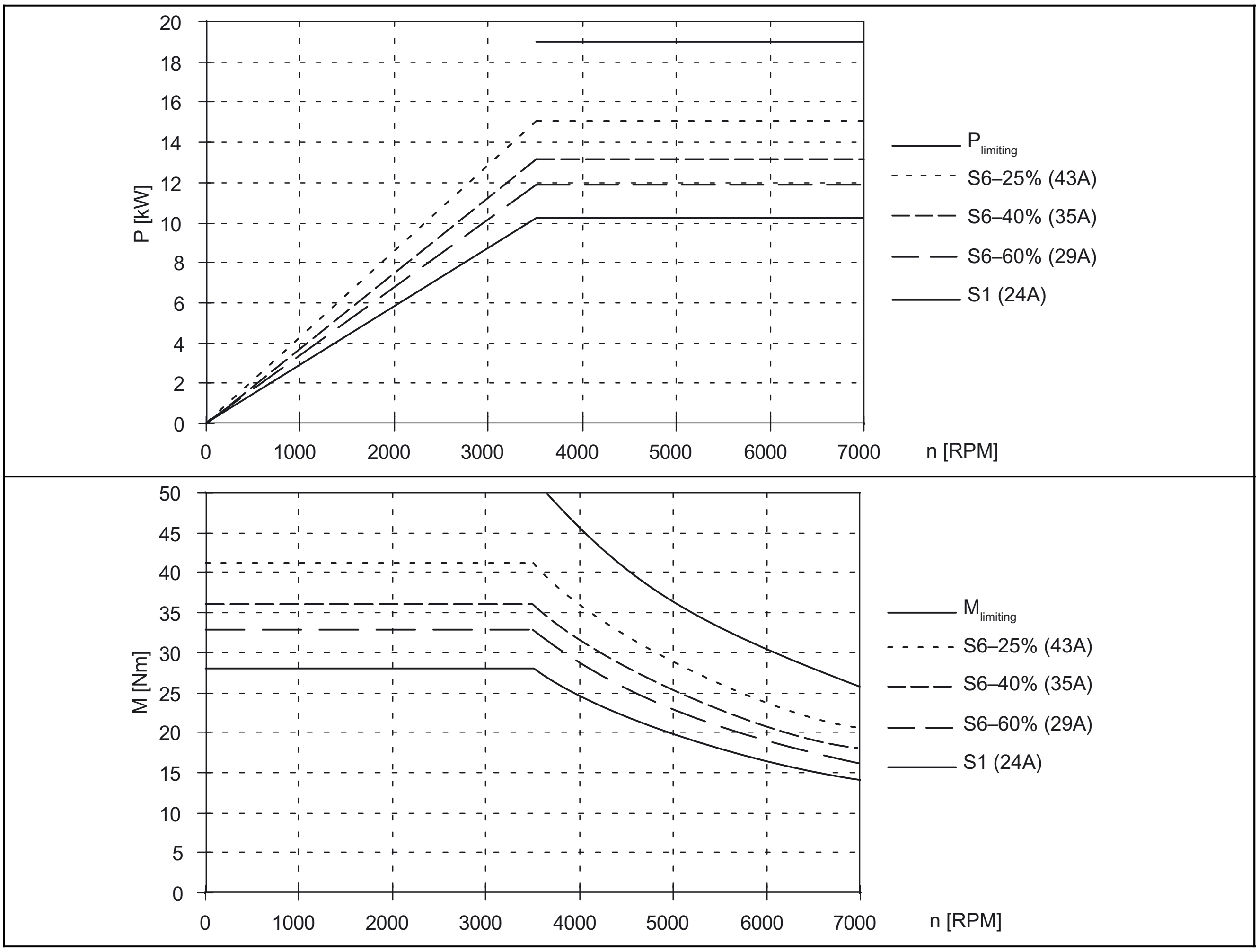




The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 42 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1091-6WN□0

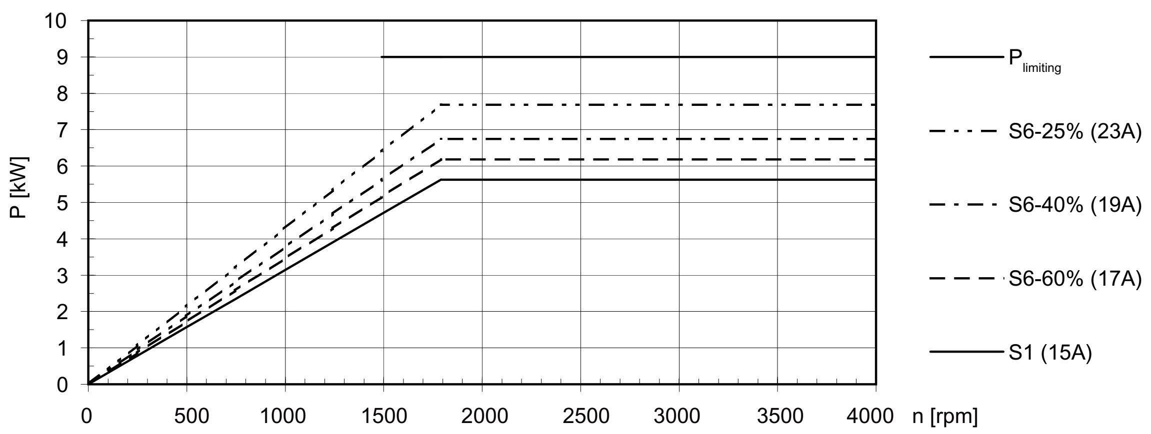
Rated power	P_N	kW	10
Rated speed	n_N	rpm	3500
Rated torque	M_N	Nm	28
Rated current	I_N	A	24
Maximum current	I_{max}	A	48
Maximum speed	n_{max}	rpm	7000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7000
Maximum torque	M_{max}	Nm	50
Moment of inertia	J_{rot}	kg m²	0,00814
Voltage constant	k_E	V/1000 rpm	80
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	14
Rotor weight	m_{rot}	kg	see Table 1-3

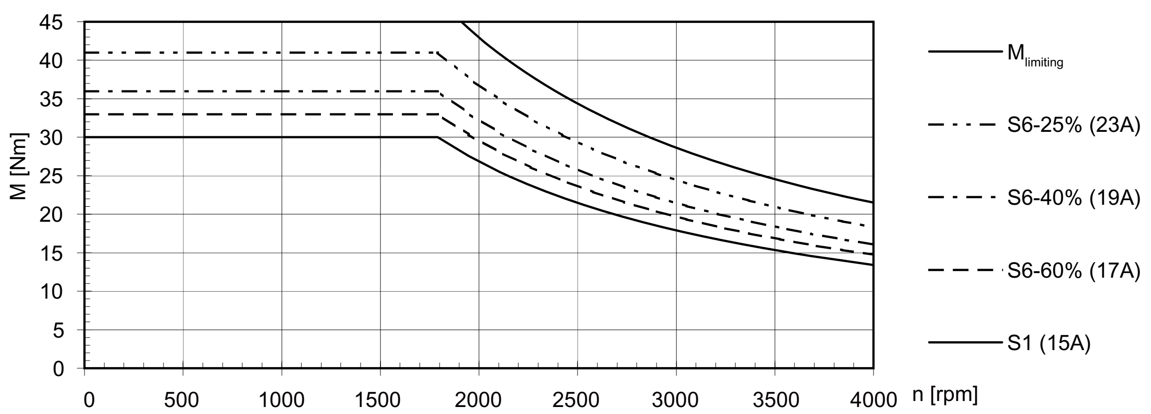


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 43 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1091-6WS□0

Rated power	P_N	kW	5,6
Rated speed	n_N	rpm	1790
Rated torque	M_N	Nm	30
Rated current	I_N	A	15
Maximum current	I_{max}	A	30
Maximum speed	n_{max}	rpm	4000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	4000
Maximum torque	M_{max}	Nm	50
Moment of inertia	J_{rot}	kg m^2	0,00814
Voltage constant	k_E	V/1000 rpm	140
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	14
Rotor weight	m_{rot}	kg	see Table 1-3

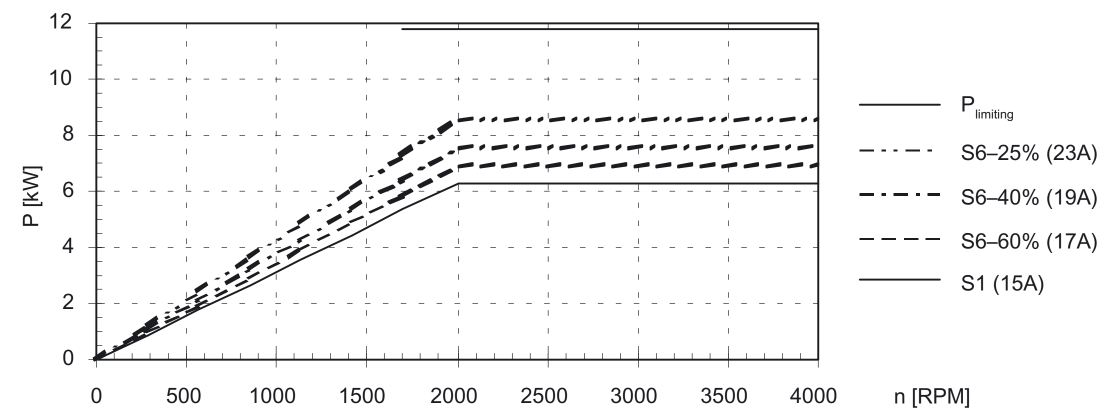


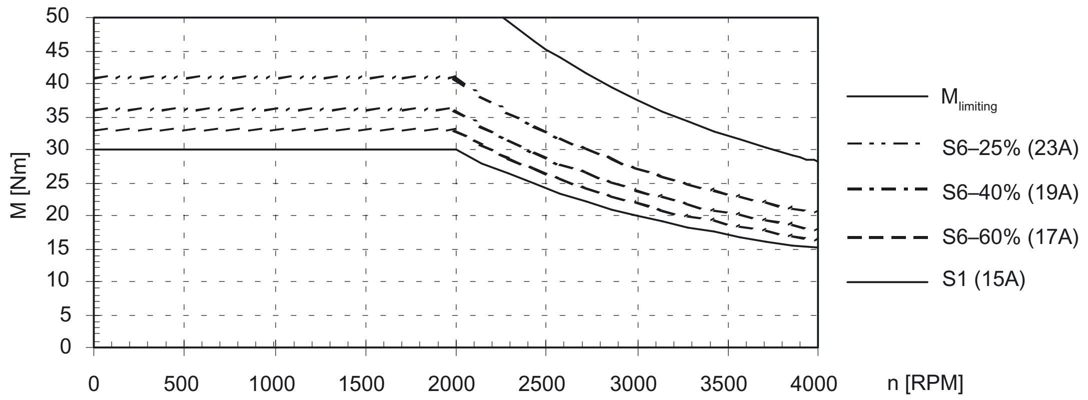


The data for duty type S6 are valid for a 5 min. duty cycle.

Table 4- 44 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1091-6WS□0

Rated power	P_N	kW	6,3
Rated speed	n_N	rpm	2000
Rated torque	M_N	Nm	30
Rated current	I_N	A	15
Maximum current	I_{max}	A	30
Maximum speed	n_{max}	rpm	4000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	4000
Maximum torque	M_{max}	Nm	50
Moment of inertia	J_{rot}	kg m²	0,00814
Voltage constant	k_E	V/1000 rpm	140
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	14
Rotor weight	m_{rot}	kg	see Table 1-3

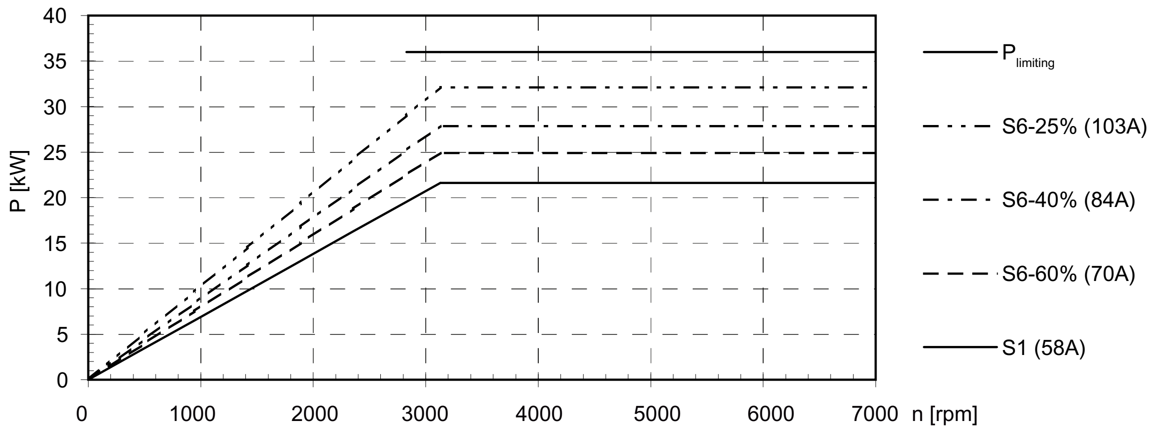


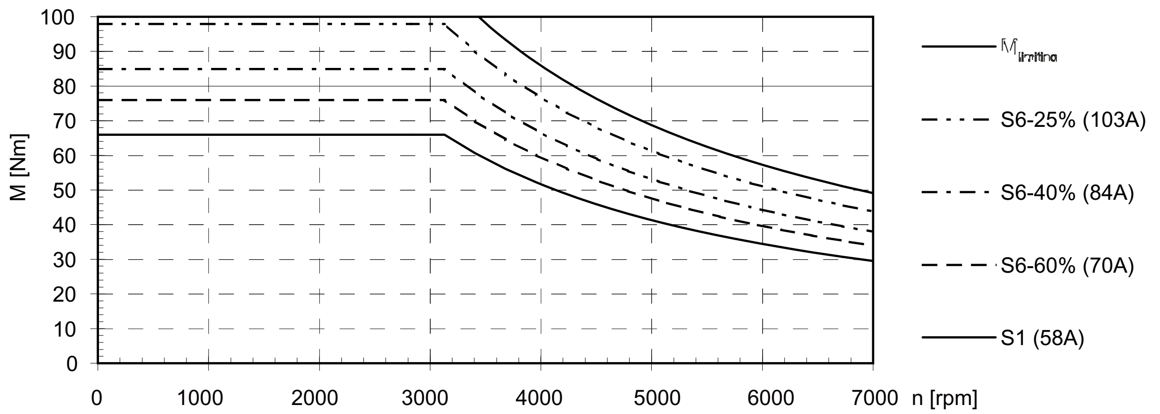


The data for duty type S6 are valid for a 5 min. duty cycle.

Table 4- 45 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1092-6WN□0

Rated power	P_N	kW	21,6
Rated speed	n_N	rpm	3130
Rated torque	M_N	Nm	66
Rated current	I_N	A	58
Maximum current	I_{max}	A	116
Maximum speed	n_{max}	rpm	7000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7000
Maximum torque	M_{max}	Nm	105
Moment of inertia	J_{rot}	kg m^2	0,01566
Voltage constant	k_E	V/1000 rpm	80
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	21
Rotor weight	m_{rot}	kg	see Table 1-3

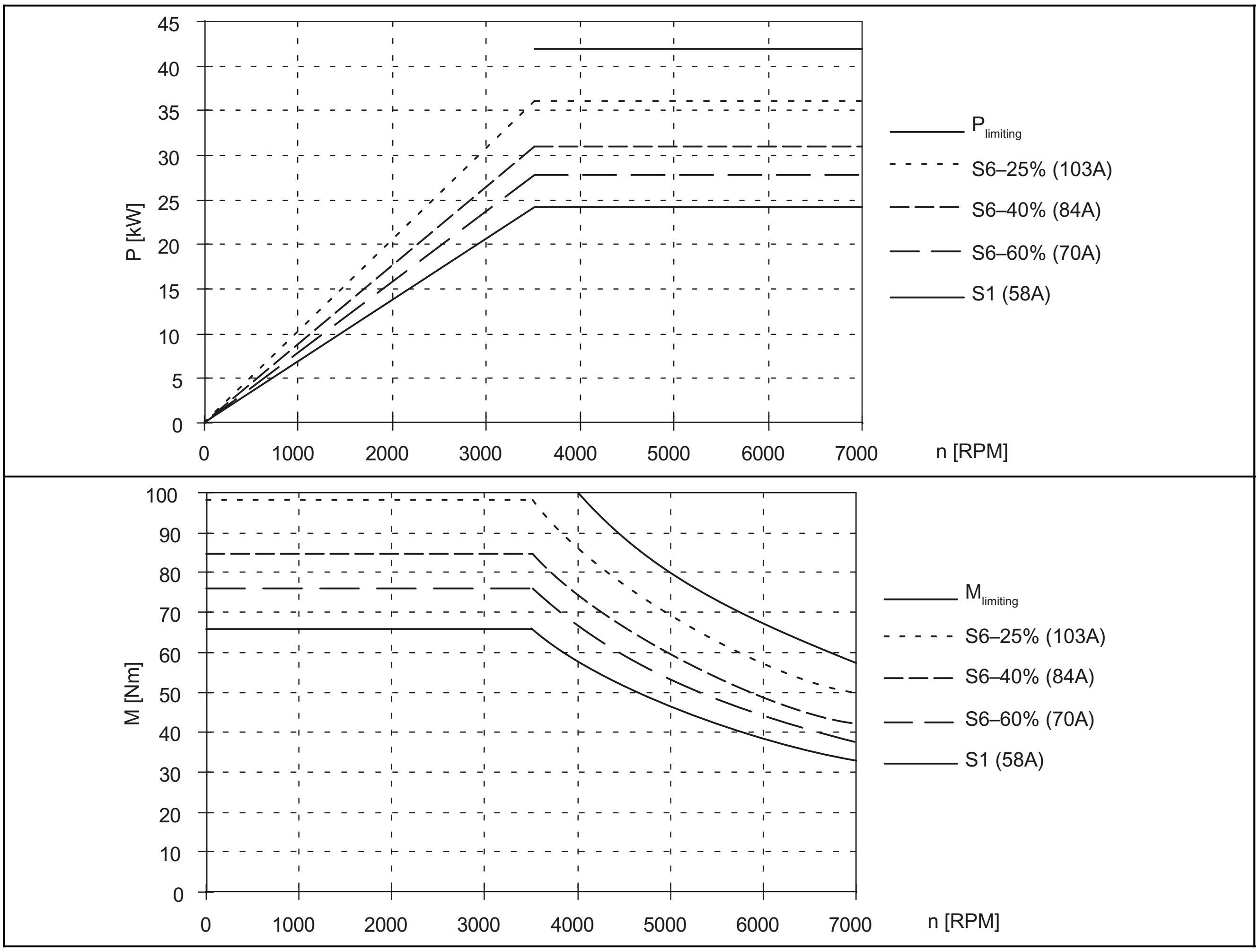




The data for duty type S6 are valid for a 2 min. duty cycle

Table 4- 46 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1092-6WN□0

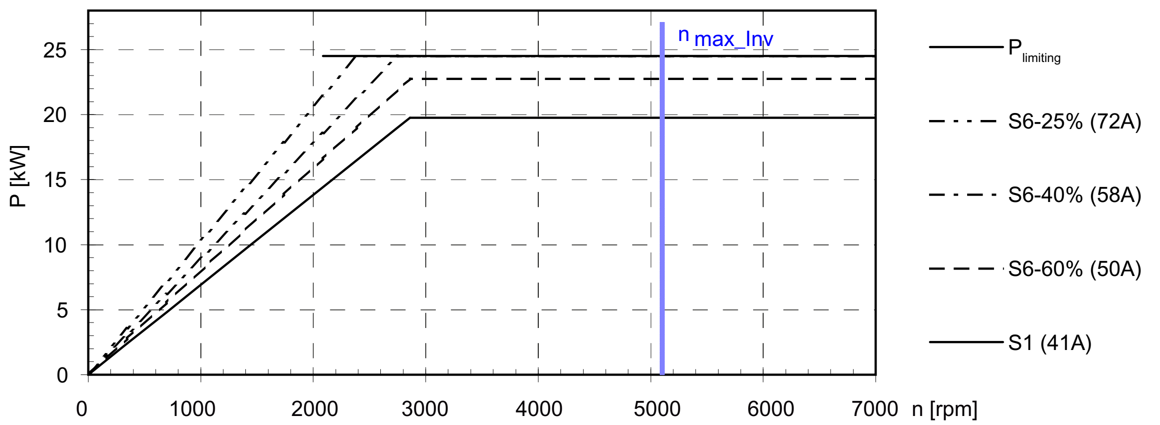
Rated power	P_N	kW	24,2
Rated speed	n_N	rpm	3500
Rated torque	M_N	Nm	66
Rated current	I_N	A	58
Maximum current	I_{max}	A	116
Maximum speed	n_{max}	rpm	7000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7000
Maximum torque	M_{max}	Nm	105
Moment of inertia	J_{rot}	kg m^2	0,01566
Voltage constant	k_E	V/1000 rpm	80
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	21
Rotor weight	m_{rot}	kg	see Table 1-3

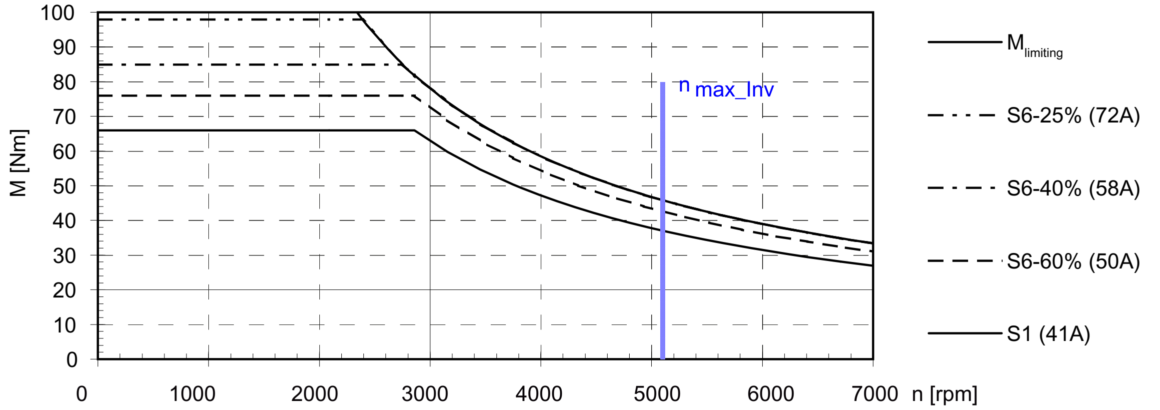


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 47 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1092-6WR□1

Rated power	P_N	kW	19,8
Rated speed	n_N	rpm	2860
Rated torque	M_N	Nm	66
Rated current	I_N	A	41
Maximum current	I_{max}	A	82
Maximum speed	n_{max}	rpm	7000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5100
Maximum torque	M_{max}	Nm	105
Moment of inertia	J_{rot}	kg m^2	0,01566
Voltage constant	k_E	V/1000 rpm	113
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	21
Rotor weight	m_{rot}	kg	see Table 1-3

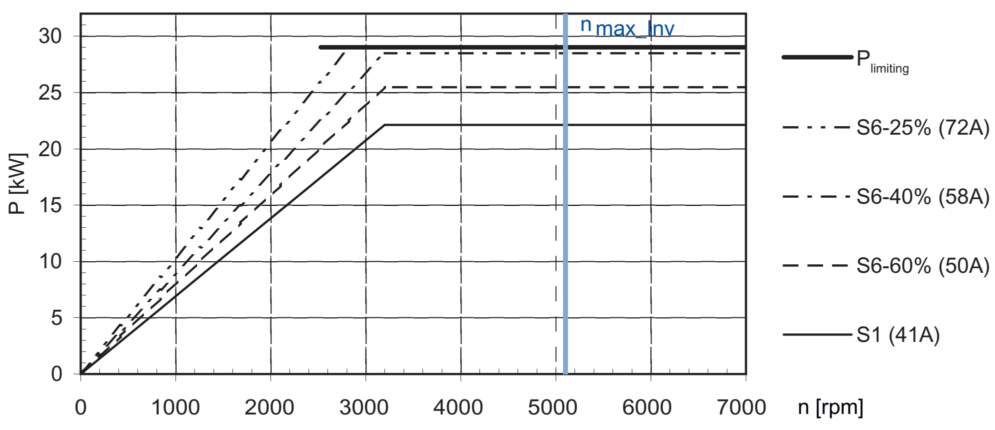


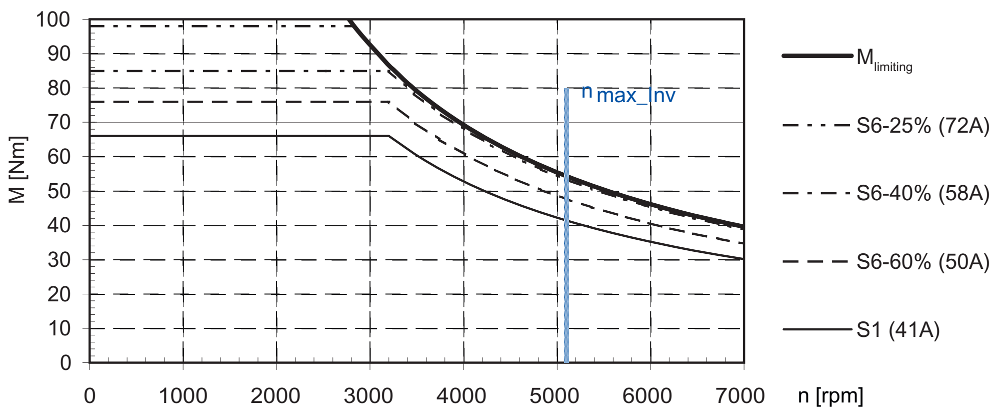


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 48 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1092-6WR□1

Rated power	P_N	kW	22
Rated speed	n_N	rpm	3200
Rated torque	M_N	Nm	66
Rated current	I_N	A	41
Maximum current	I_{max}	A	82
Maximum speed	n_{max}	rpm	7000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5100
Maximum torque	M_{max}	Nm	105
Moment of inertia	J_{rot}	kg m²	0,01566
Voltage constant	k_E	V/1000 rpm	113
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	21
Rotor weight	m_{rot}	kg	see Table 1-3

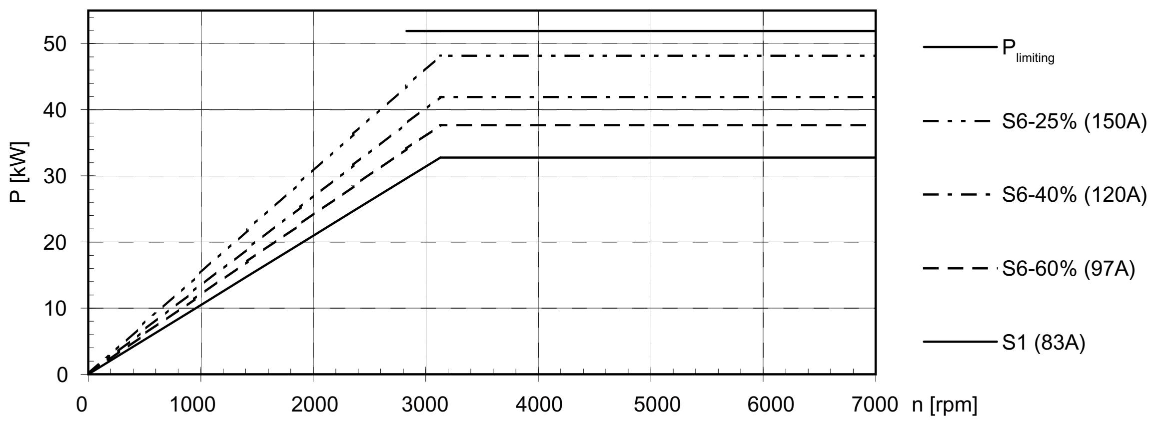


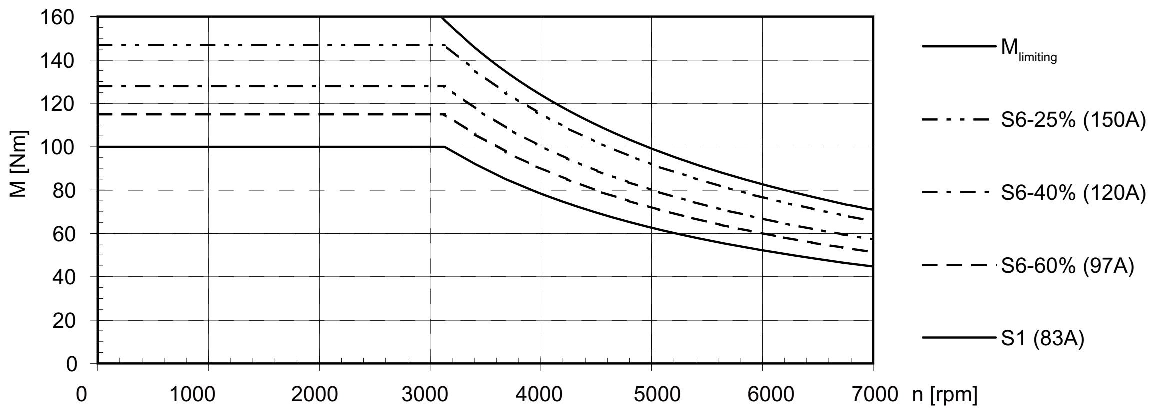


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 49 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1093-6WN□0

Rated power	P_N	kW	32,8
Rated speed	n_N	rpm	3130
Rated torque	M_N	Nm	100
Rated current	I_N	A	83
Maximum current	I_{max}	A	166
Maximum speed	n_{max}	rpm	7000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7000
Maximum torque	M_{max}	Nm	165
Moment of inertia	J_{rot}	kg m^2	0,02317
Voltage constant	k_E	V/1000 rpm	84
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	28
Rotor weight	m_{rot}	kg	see Table 1-3

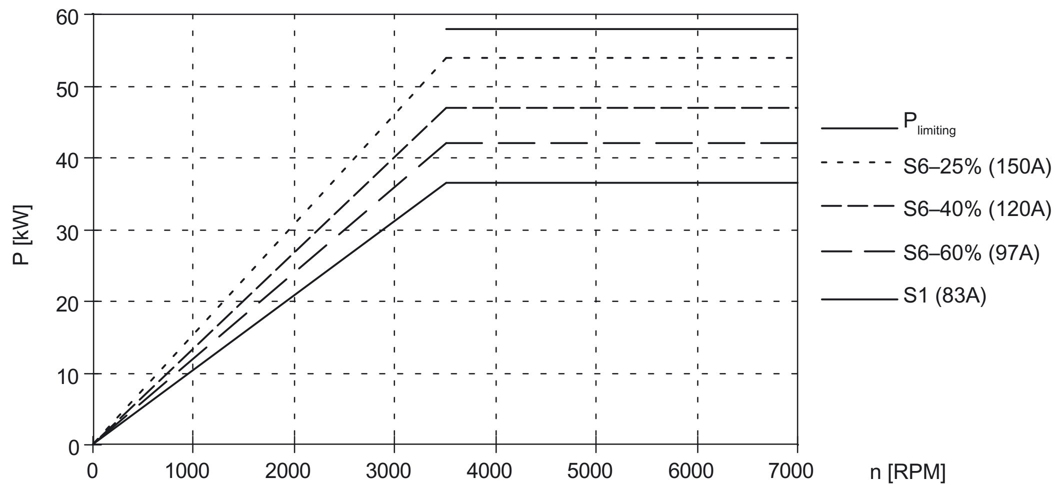


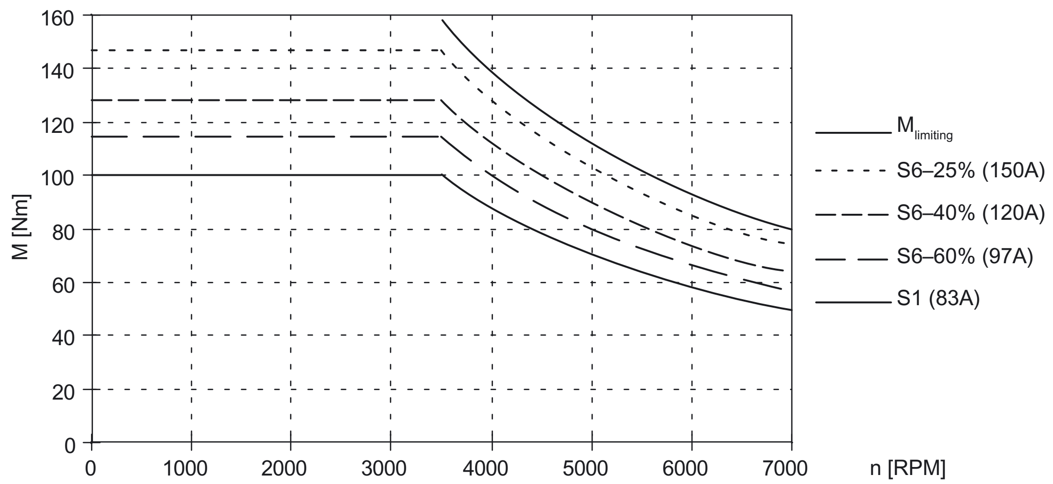


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 50 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1093-6WN□0

Rated power	P_N	kW	36,6
Rated speed	n_N	rpm	3500
Rated torque	M_N	Nm	100
Rated current	I_N	A	83
Maximum current	I_{max}	A	166
Maximum speed	n_{max}	rpm	7000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7000
Maximum torque	M_{max}	Nm	165
Moment of inertia	J_{rot}	kg m²	0,02317
Voltage constant	k_E	V/1000 rpm	84
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	28
Rotor weight	m_{rot}	kg	see Table 1-3

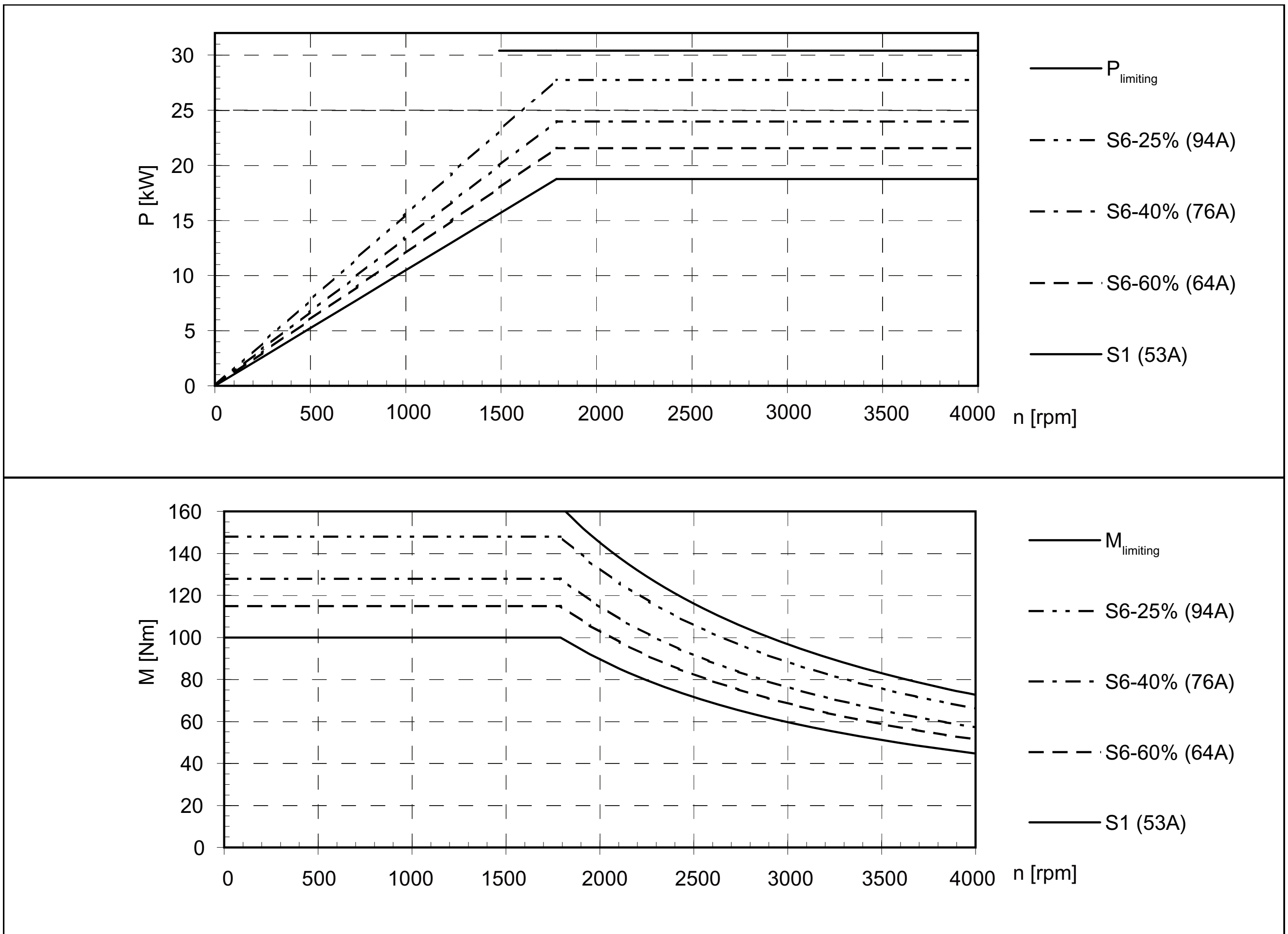




The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 51 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1093-6WS□0

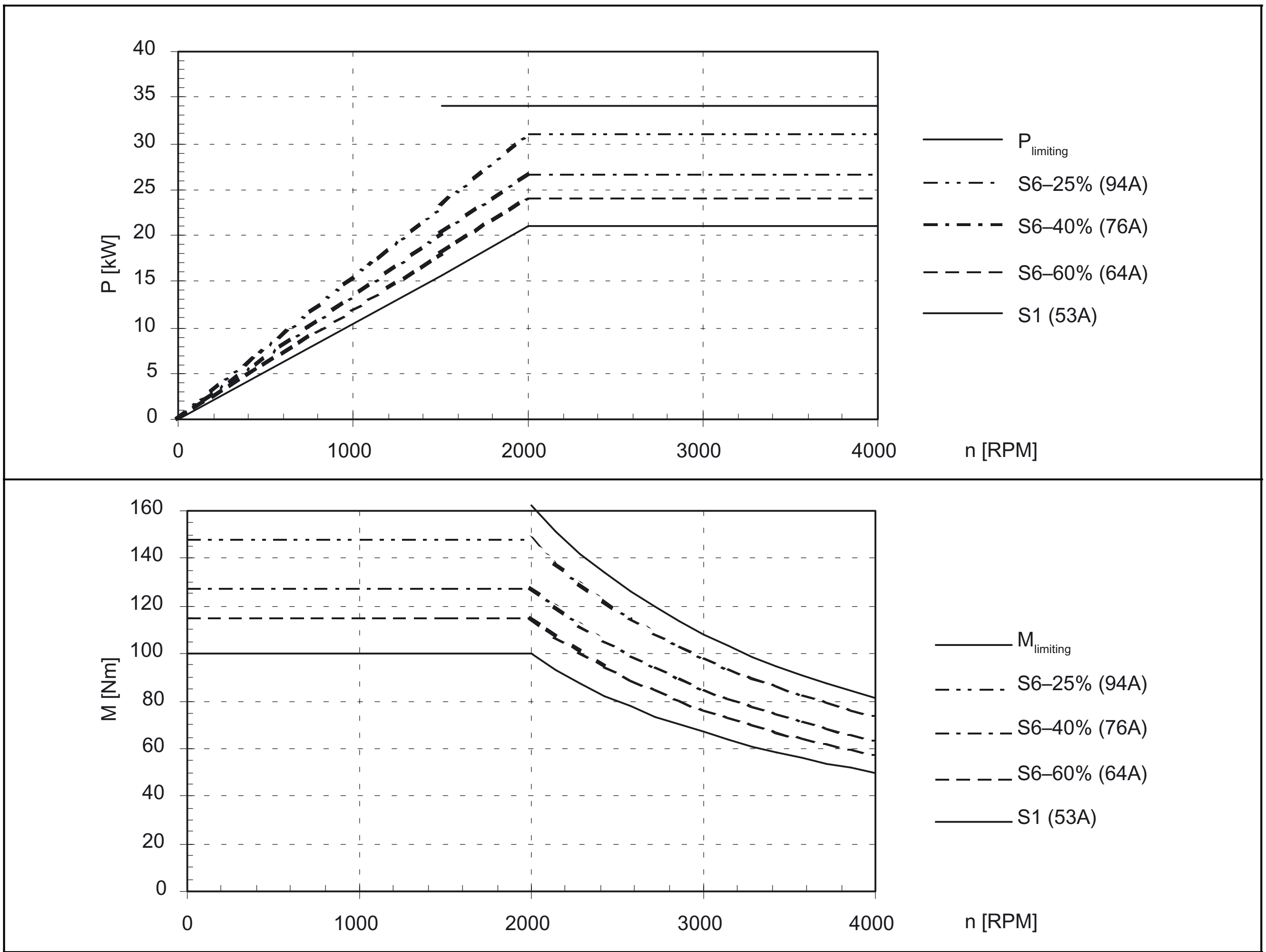
Rated power	P_N	kW	18,7
Rated speed	n_N	rpm	1790
Rated torque	M_N	Nm	100
Rated current	I_N	A	53
Maximum current	I_{max}	A	106
Maximum speed	n_{max}	rpm	4000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	4000
Maximum torque	M_{max}	Nm	165
Moment of inertia	J_{rot}	kg m^2	0,02317
Voltage constant	k_E	V/1000 rpm	133
Thermal time constant	T_{therm}	min	3,0
Stator weight with cooling jacket	m_{st}	kg	28
Rotor weight	m_{rot}	kg	see Table 1-3



The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 52 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1093-6WS□0

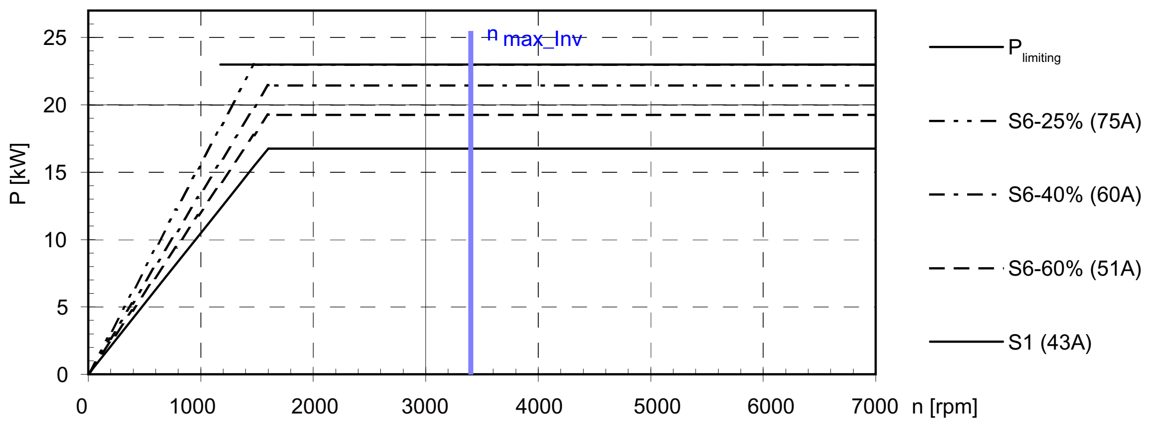
Rated power	P_N	kW	21
Rated speed	n_N	rpm	2000
Rated torque	M_N	Nm	100
Rated current	I_N	A	53
Maximum current	I_{max}	A	106
Maximum speed	n_{max}	rpm	4000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	4000
Maximum torque	M_{max}	Nm	165
Moment of inertia	J_{rot}	kg m^2	0,02317
Voltage constant	k_E	V/1000 rpm	133
Thermal time constant	T_{therm}	min	3,0
Stator weight with cooling jacket	m_{st}	kg	28
Rotor weight	m_{rot}	kg	see Table 1-3

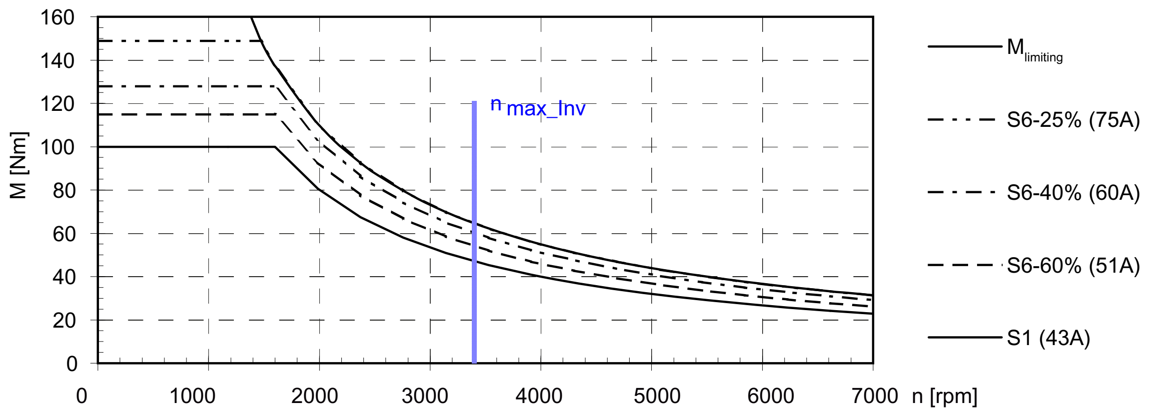


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 53 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1093-6WV□1

Rated power	P_N	kW	16,8
Rated speed	n_N	rpm	1600
Rated torque	M_N	Nm	100
Rated current	I_N	A	43
Maximum current	I_{max}	A	86
Maximum speed	n_{max}	rpm	7000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	3400
Maximum torque	M_{max}	Nm	165
Moment of inertia	J_{rot}	kg m²	0,02317
Voltage constant	k_E	V/1000 rpm	168
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	28
Rotor weight	m_{rot}	kg	see Table 1-3

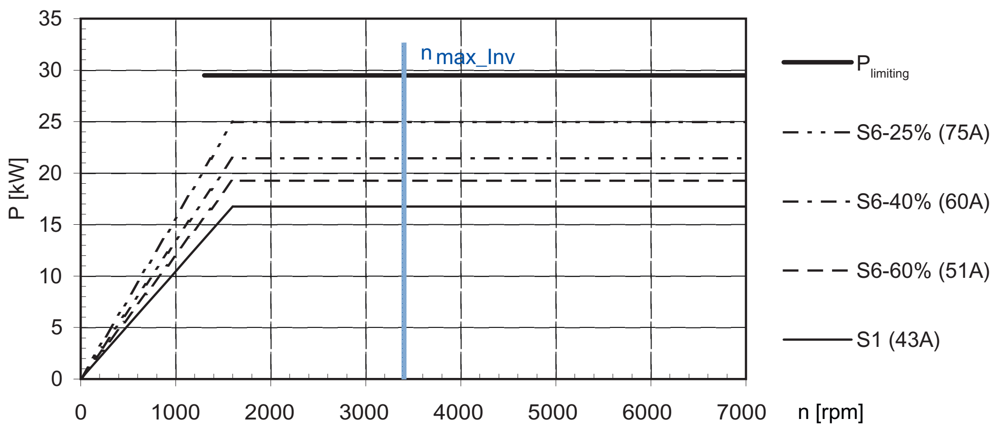


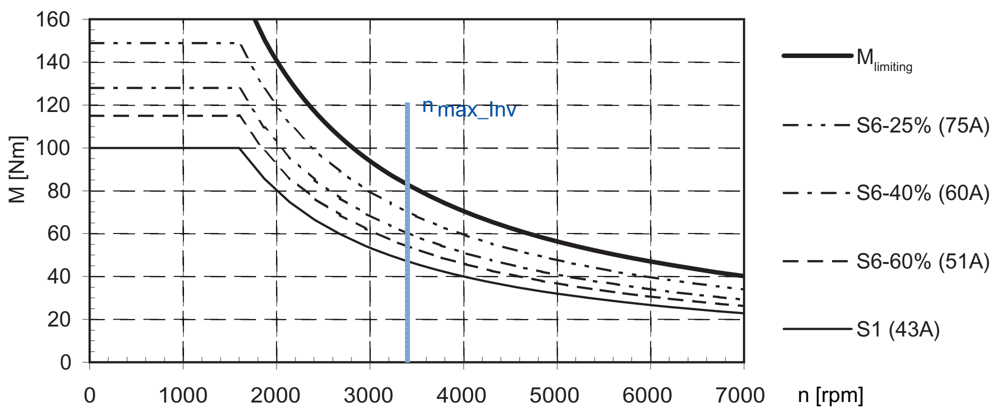


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 54 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1093-6WV□1

Rated power	P_N	kW	16,8
Rated speed	n_N	rpm	1600
Rated torque	M_N	Nm	100
Rated current	I_N	A	43
Maximum current	I_{max}	A	86
Maximum speed	n_{max}	rpm	7000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	3400
Maximum torque	M_{max}	Nm	165
Moment of inertia	J_{rot}	kg m^2	0,02317
Voltage constant	k_E	V/1000 rpm	168
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	28
Rotor weight	m_{rot}	kg	see Table 1-3

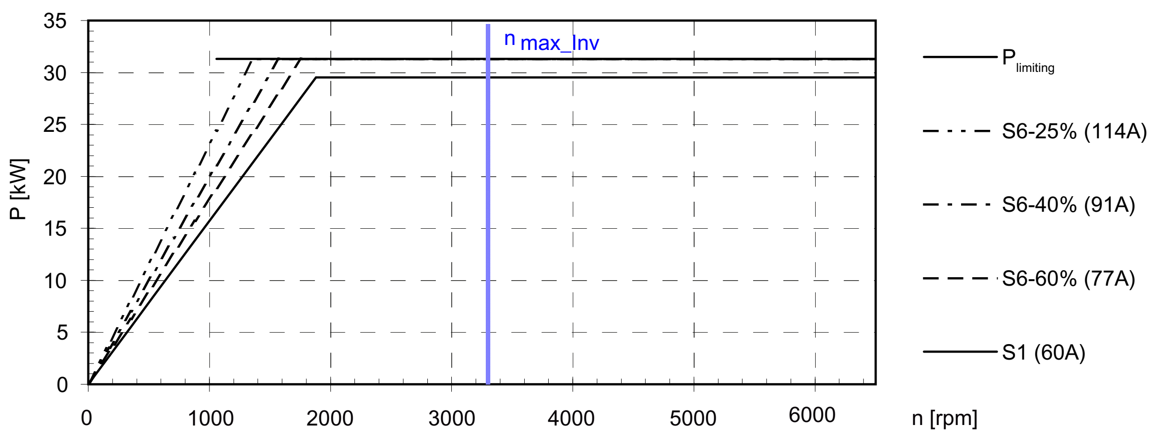


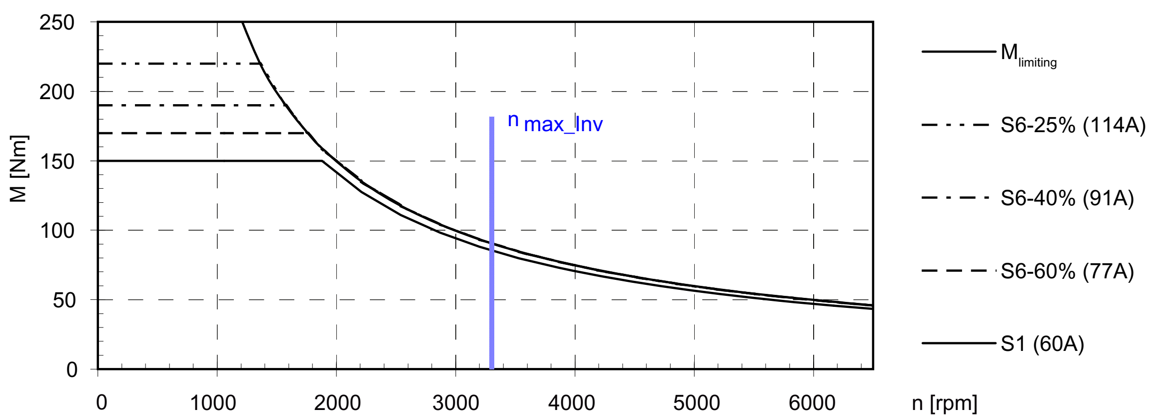


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 55 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1113-6WU□1

Rated power	P_N	kW	29,5
Rated speed	n_N	rpm	1880
Rated torque	M_N	Nm	150
Rated current	I_N	A	60
Maximum current	I_{max}	A	124
Maximum speed	n_{max}	rpm	6500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	3300
Maximum torque	M_{max}	Nm	248
Moment of inertia	J_{rot}	kg m²	0,047
Voltage constant	k_E	V/1000 rpm	175
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	43
Rotor weight	m_{rot}	kg	see Table 1-3

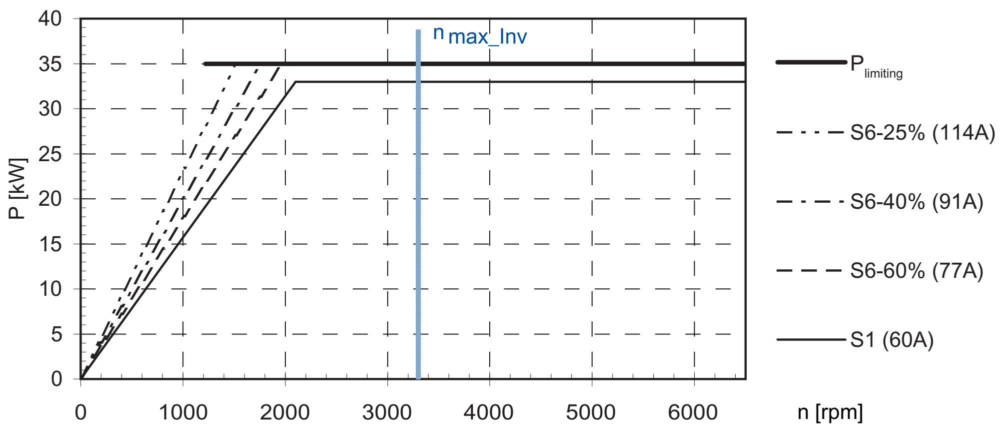


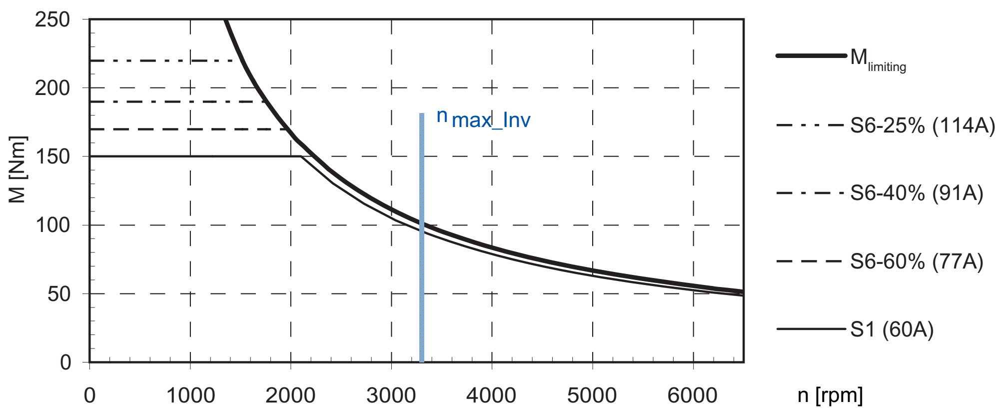


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 56 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1113-6WU□1

Rated power	P_N	kW	33
Rated speed	n_N	rpm	2100
Rated torque	M_N	Nm	150
Rated current	I_N	A	60
Maximum current	I_{max}	A	124
Maximum speed	n_{max}	rpm	6500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	3300
Maximum torque	M_{max}	Nm	248
Moment of inertia	J_{rot}	kg m²	0,047
Voltage constant	k_E	V/1000 rpm	175
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	43
Rotor weight	m_{rot}	kg	see Table 1-3

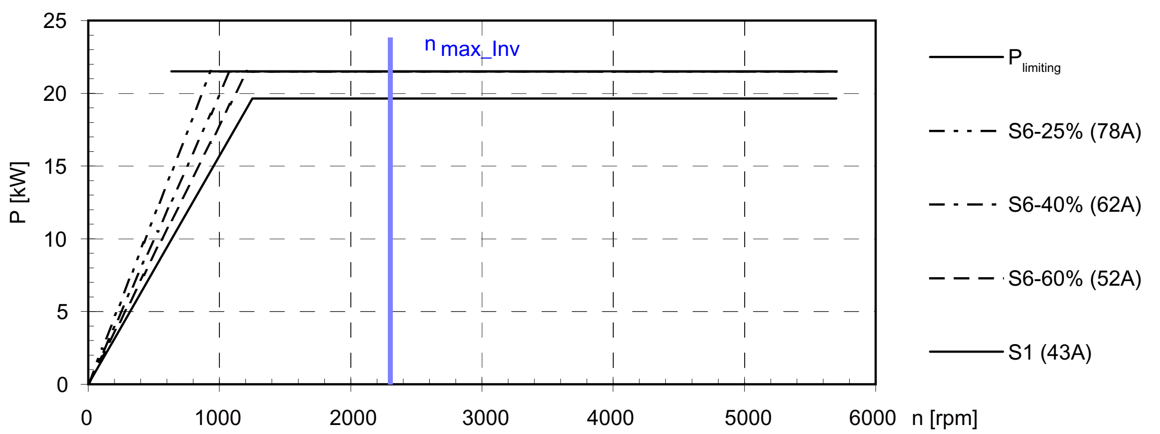


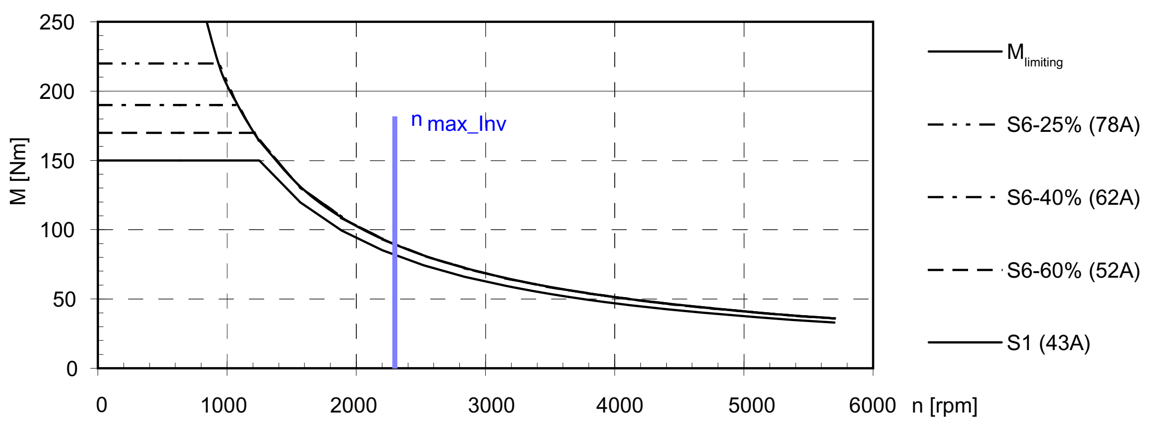


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 57 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1113-6WX□1

Rated power	P_N	kW	19,6
Rated speed	n_N	rpm	1250
Rated torque	M_N	Nm	150
Rated current	I_N	A	43
Maximum current	I_{max}	A	86
Maximum speed	n_{max}	rpm	5700
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2300
Maximum torque	M_{max}	Nm	248
Moment of inertia	J_{rot}	kg m^2	0,047
Voltage constant	k_E	V/1000 rpm	251
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	43
Rotor weight	m_{rot}	kg	see Table 1-3

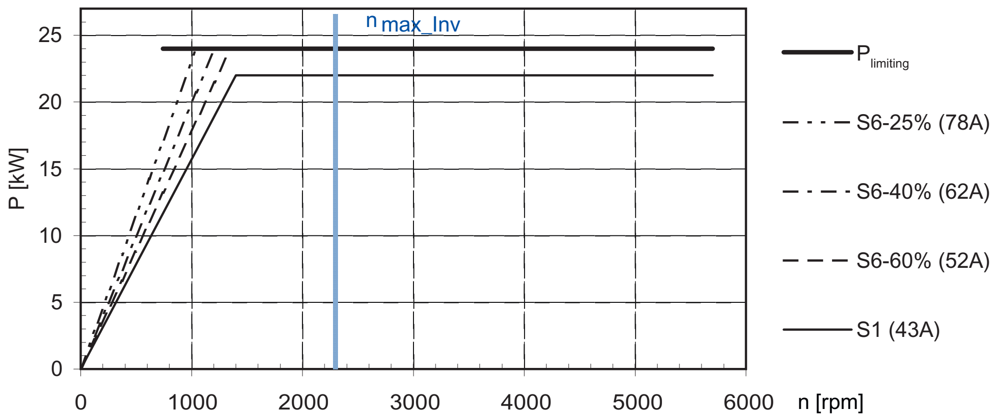


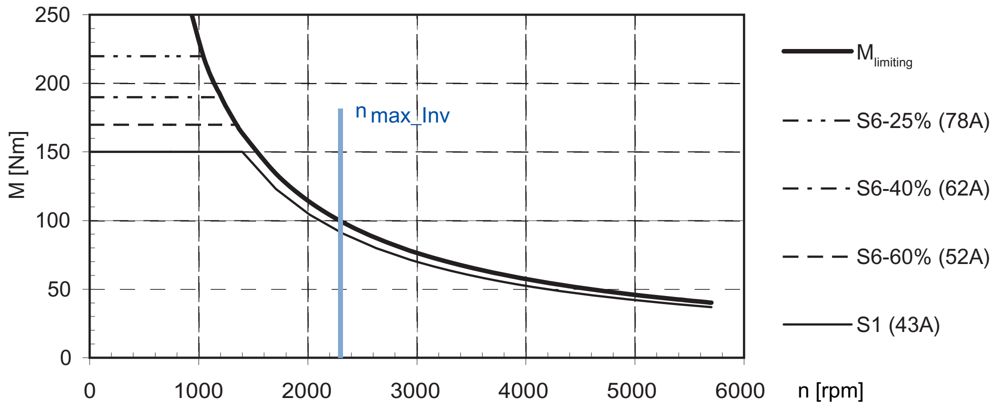


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 58 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1113-6WX□1

Rated power	P_N	kW	22
Rated speed	n_N	rpm	1400
Rated torque	M_N	Nm	150
Rated current	I_N	A	43
Maximum current	I_{max}	A	86
Maximum speed	n_{max}	rpm	5700
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2300
Maximum torque	M_{max}	Nm	248
Moment of inertia	J_{rot}	kg m²	0,047
Voltage constant	k_E	V/1000 rpm	251
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	43
Rotor weight	m_{rot}	kg	see Table 1-3

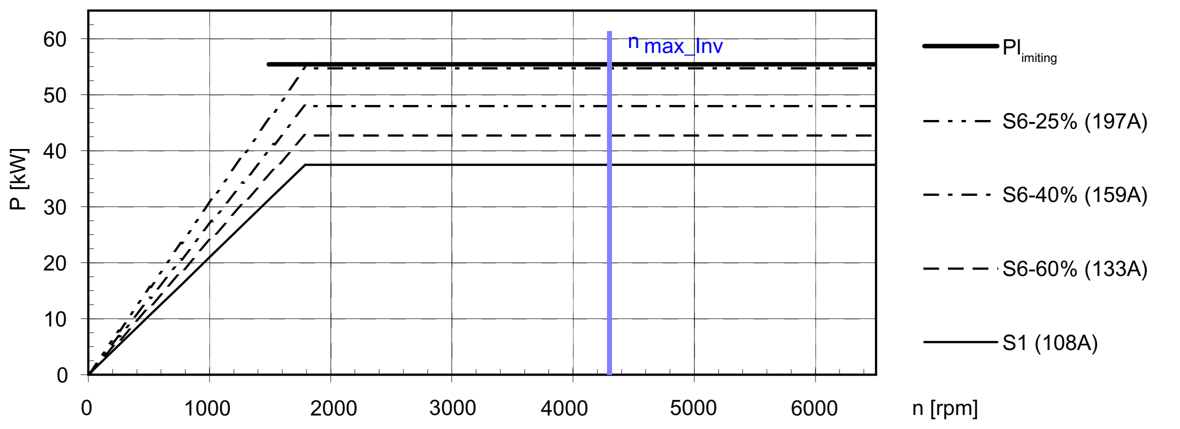


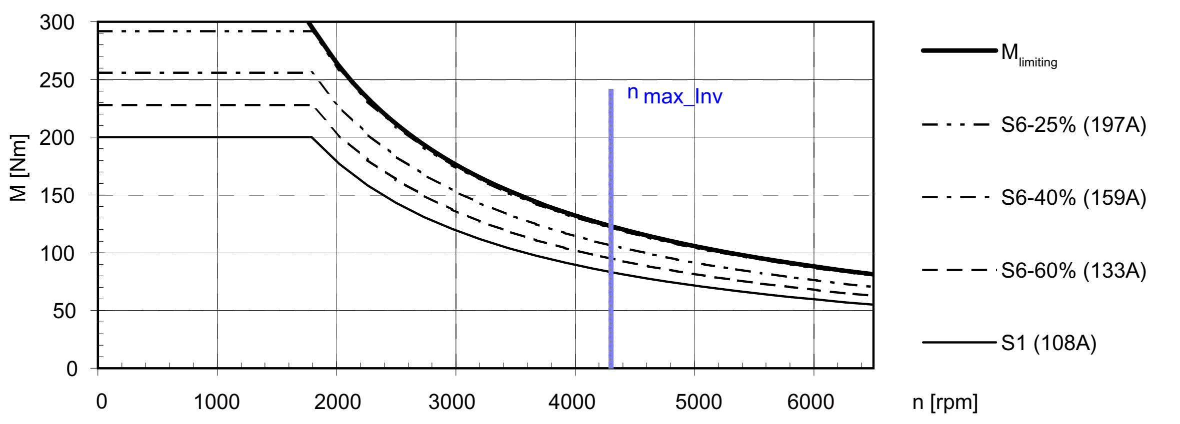


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 59 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1114-6WR□1

Rated power	P_N	kW	37,5
Rated speed	n_N	rpm	1790
Rated torque	M_N	Nm	200
Rated current	I_N	A	108
Maximum current	I_{max}	A	216
Maximum speed	n_{max}	rpm	6500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	4300
Maximum torque	M_{max}	Nm	330
Moment of inertia	J_{rot}	kg m²	0,06239
Voltage constant	k_E	V/1000 rpm	132
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	54
Rotor weight	m_{rot}	kg	see Table 1-3

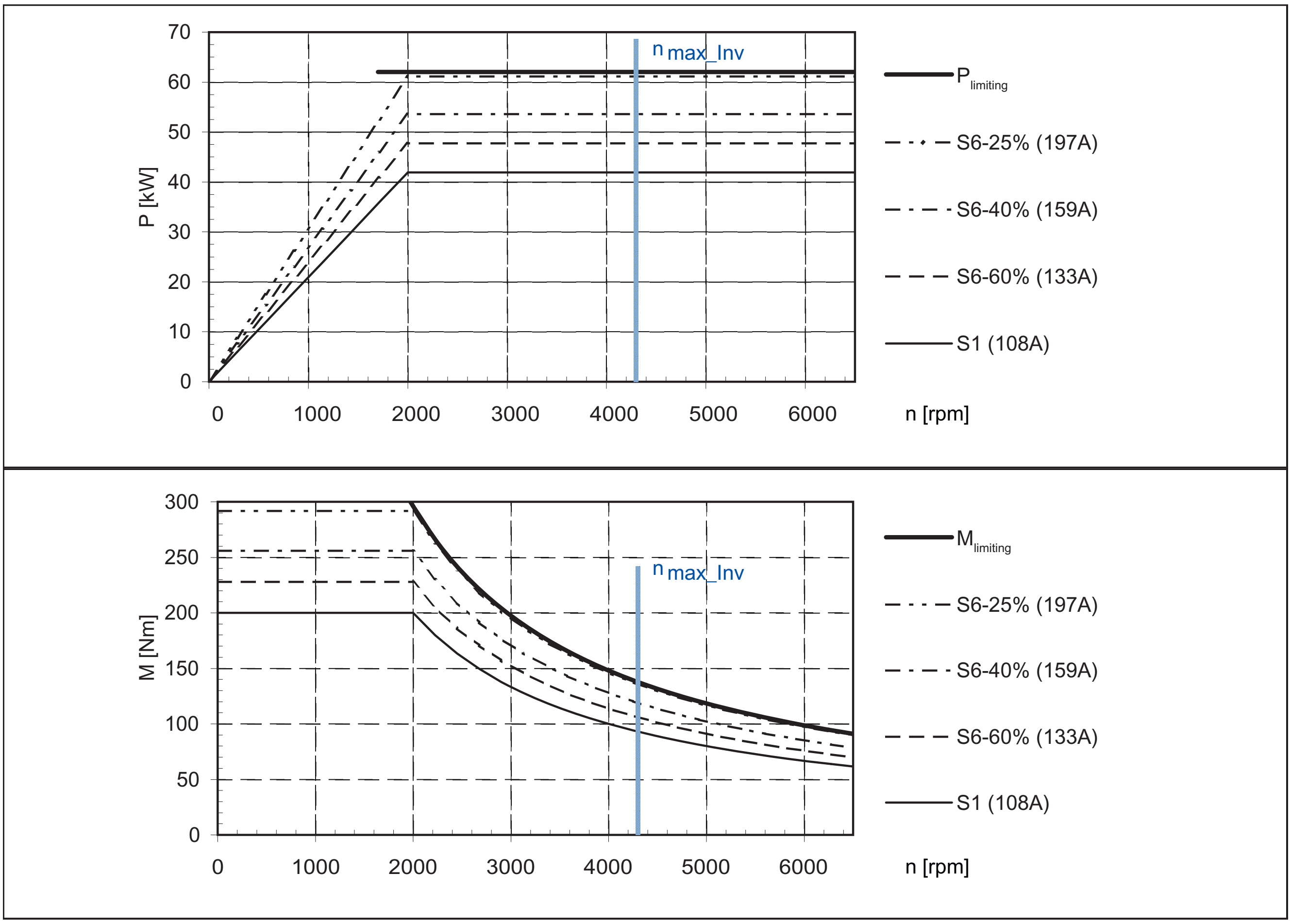




The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 60 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1114-6WR□1

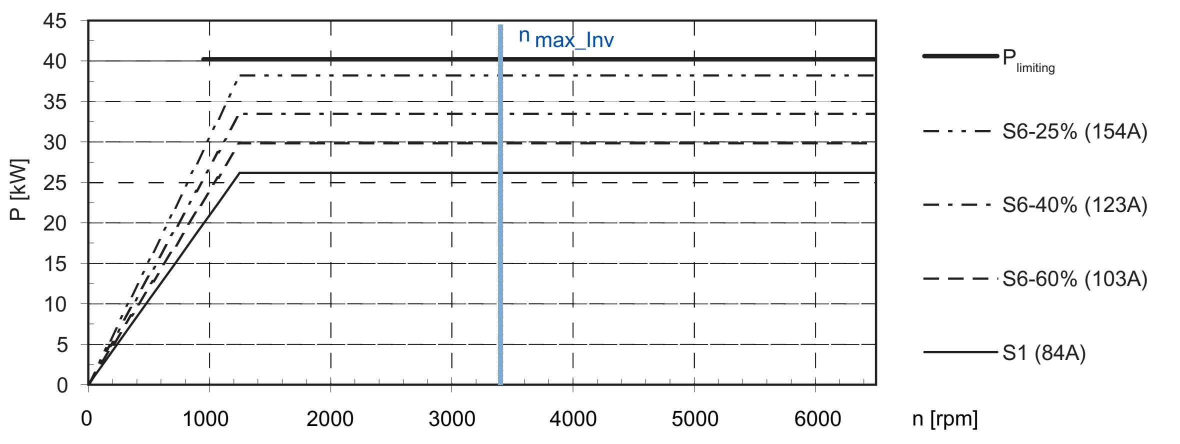
Rated power	P_N	kW	41,9
Rated speed	n_N	rpm	2000
Rated torque	M_N	Nm	200
Rated current	I_N	A	108
Maximum current	I_{max}	A	216
Maximum speed	n_{max}	rpm	6500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	4300
Maximum torque	M_{max}	Nm	330
Moment of inertia	J_{rot}	kg m^2	0,06239
Voltage constant	k_E	V/1000 rpm	132
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	54
Rotor weight	m_{rot}	kg	see Table 1-3

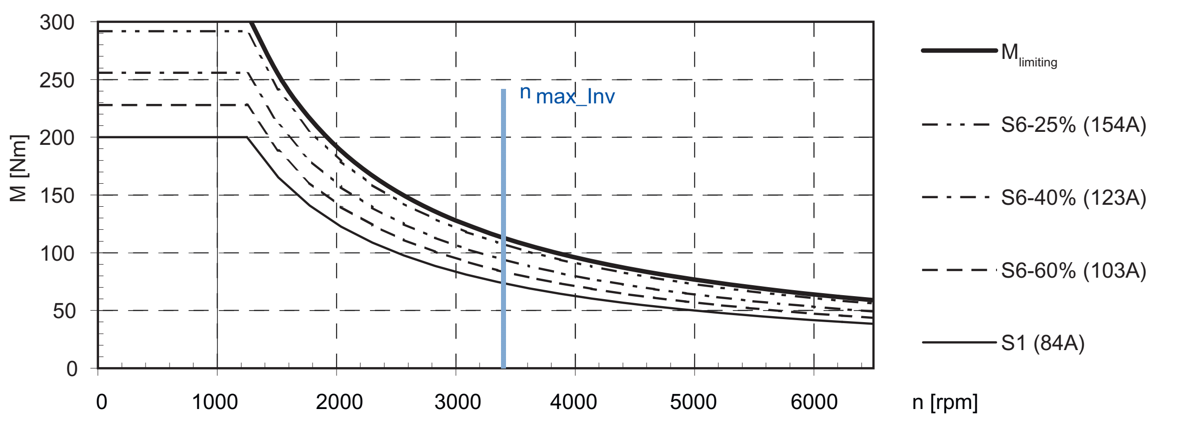


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 61 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1114-6WT□1

Rated power	P_N	kW	26,2
Rated speed	n_N	rpm	1250
Rated torque	M_N	Nm	200
Rated current	I_N	A	84
Maximum current	I_{max}	A	168
Maximum speed	n_{max}	rpm	6500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	3400
Maximum torque	M_{max}	Nm	330
Moment of inertia	J_{rot}	kg m²	0,06239
Voltage constant	k_E	V/1000 rpm	170
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	54
Rotor weight	m_{rot}	kg	see Table 1-3

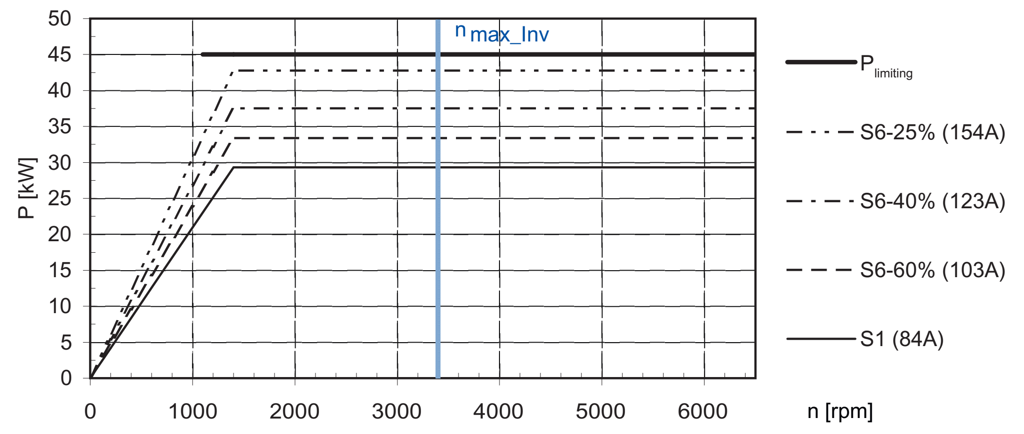


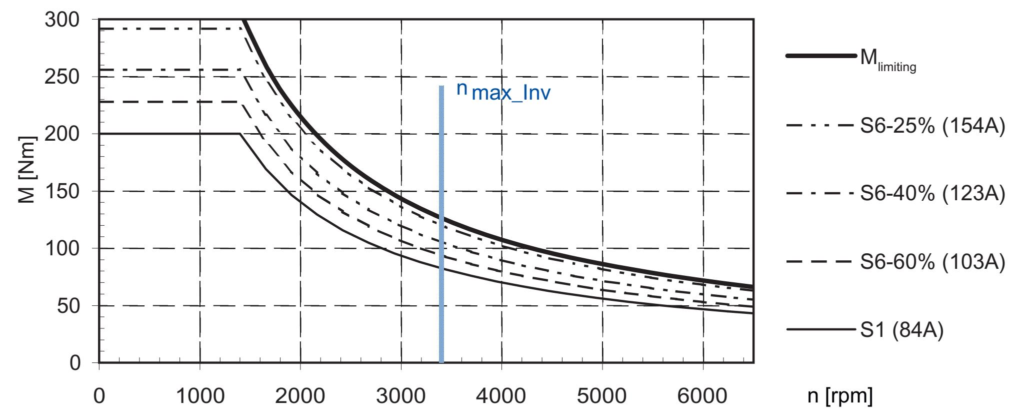


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 62 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1114-6WT□1

Rated power	P_N	kW	29,3
Rated speed	n_N	rpm	1400
Rated torque	M_N	Nm	200
Rated current	I_N	A	84
Maximum current	I_{max}	A	168
Maximum speed	n_{max}	rpm	6500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	3400
Maximum torque	M_{max}	Nm	330
Moment of inertia	J_{rot}	kg m²	0,06239
Voltage constant	k_E	V/1000 rpm	170
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	54
Rotor weight	m_{rot}	kg	see Table 1-3

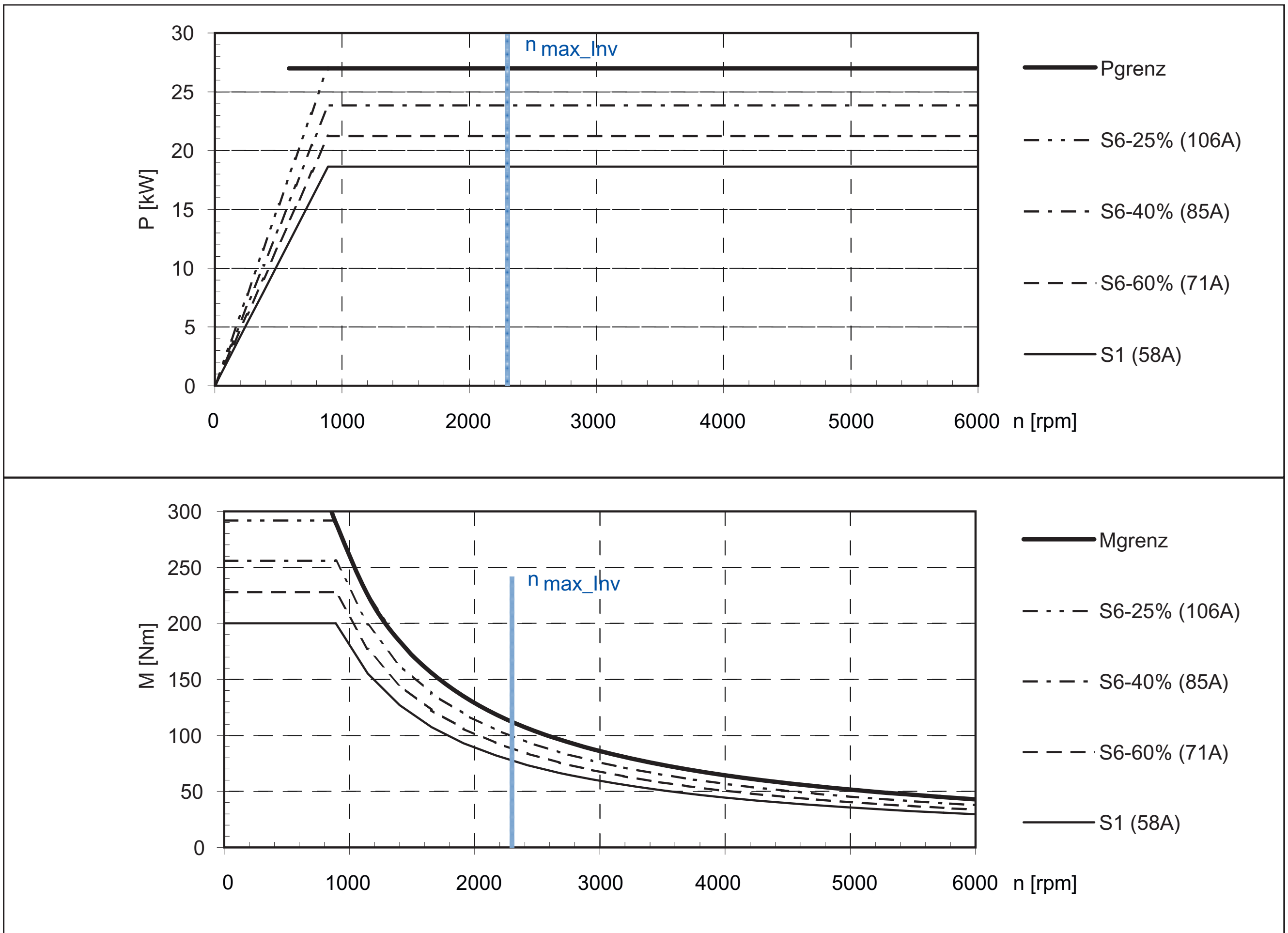




The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 63 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1114-6WW□1

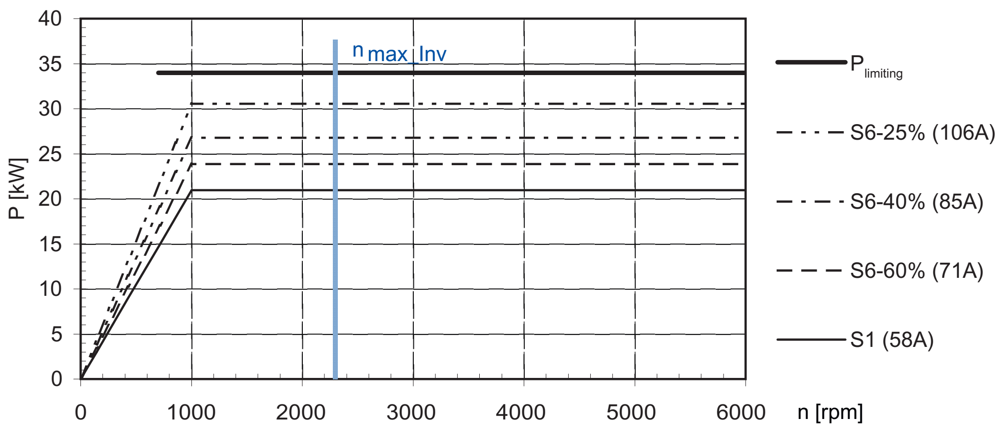
Rated power	P_N	kW	18,6
Rated speed	n_N	rpm	890
Rated torque	M_N	Nm	200
Rated current	I_N	A	58
Maximum current	I_{max}	A	116
Maximum speed	n_{max}	rpm	6000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2300
Maximum torque	M_{max}	Nm	330
Moment of inertia	J_{rot}	kg m²	0,06239
Voltage constant	k_E	V/1000 rpm	245
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	54
Rotor weight	m_{rot}	kg	see Table 1-3

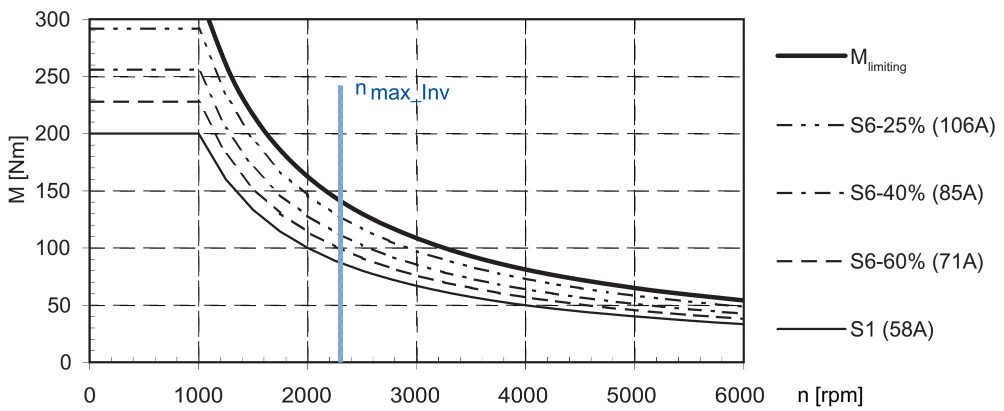


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 64 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1114-6WW□1

Rated power	P_N	kW	20,9
Rated speed	n_N	rpm	1000
Rated torque	M_N	Nm	200
Rated current	I_N	A	58
Maximum current	I_{max}	A	116
Maximum speed	n_{max}	rpm	6000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2300
Maximum torque	M_{max}	Nm	330
Moment of inertia	J_{rot}	kg m²	0,06239
Voltage constant	k_E	V/1000 rpm	245
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	54
Rotor weight	m_{rot}	kg	see Table 1-3

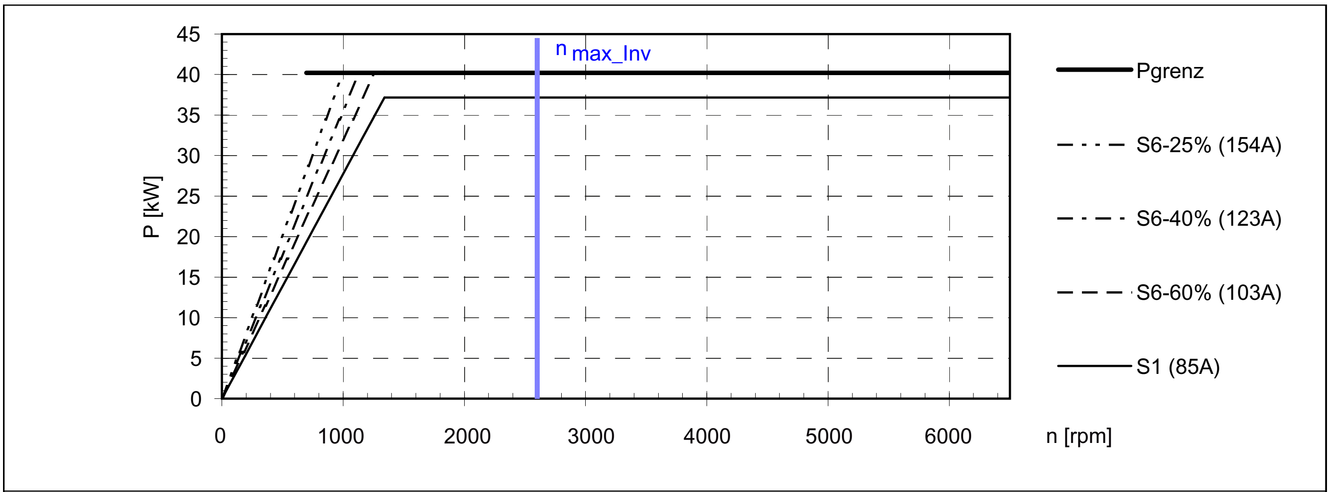


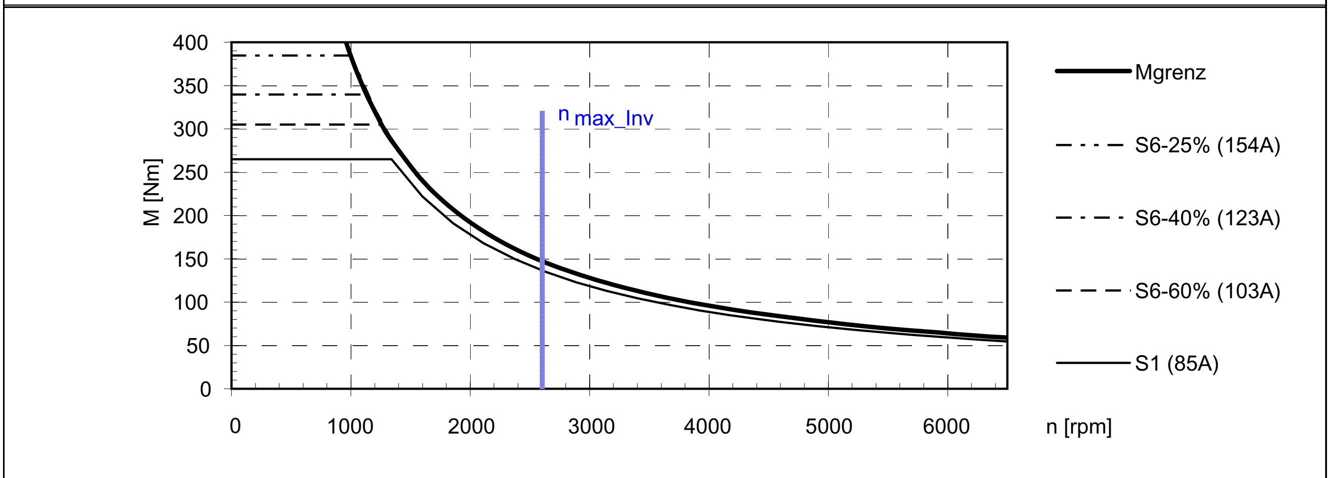


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 65 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1115-6WT□1

Rated power	P_N	kW	37,2
Rated speed	n_N	rpm	1340
Rated torque	M_N	Nm	265
Rated current	I_N	A	85
Maximum current	I_{max}	A	170
Maximum speed	n_{max}	rpm	6500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2600
Maximum torque	M_{max}	Nm	415
Moment of inertia [1)]	J_{rot}	kg m²	0,078
Voltage constant	k_E	V/1000 rpm	222
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	65
Rotor weight	m_{rot}	kg	see Table 1-3

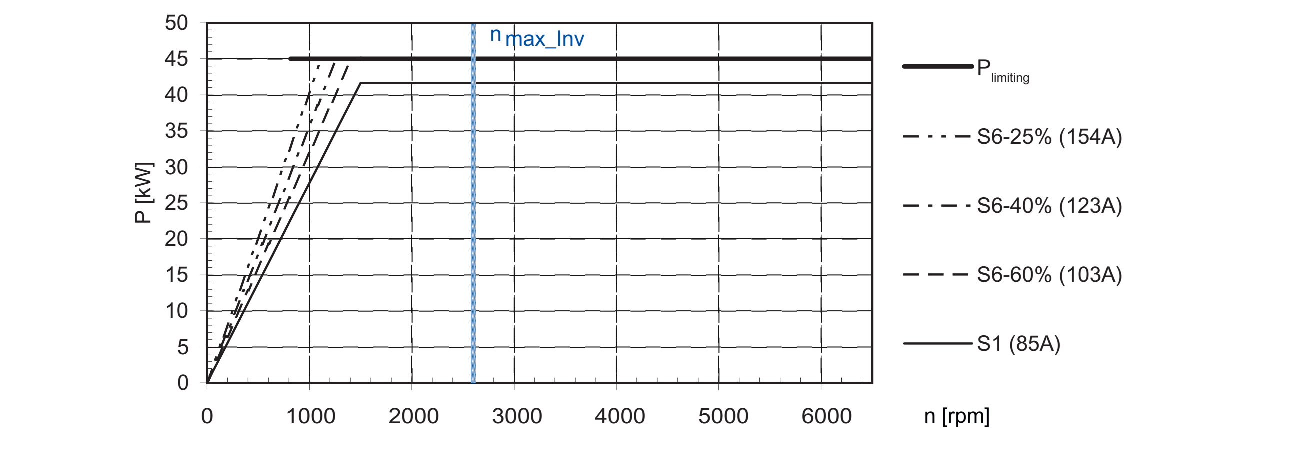


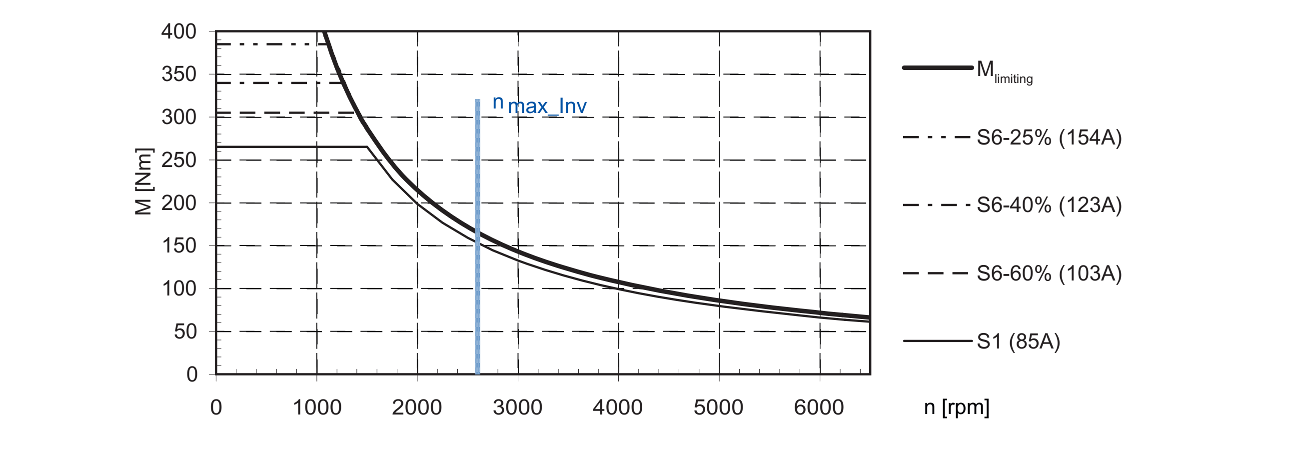


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 66 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1115-6WT□1

Rated power	P_N	kW	41,6
Rated speed	n_N	rpm	1500
Rated torque	M_N	Nm	265
Rated current	I_N	A	85
Maximum current	I_{max}	A	170
Maximum speed	n_{max}	rpm	6500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2600
Maximum torque	M_{max}	Nm	415
Moment of inertia [1)]	J_{rot}	kg m²	0,078
Voltage constant	k_E	V/1000 rpm	222
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	65
Rotor weight	m_{rot}	kg	see Table 1-3

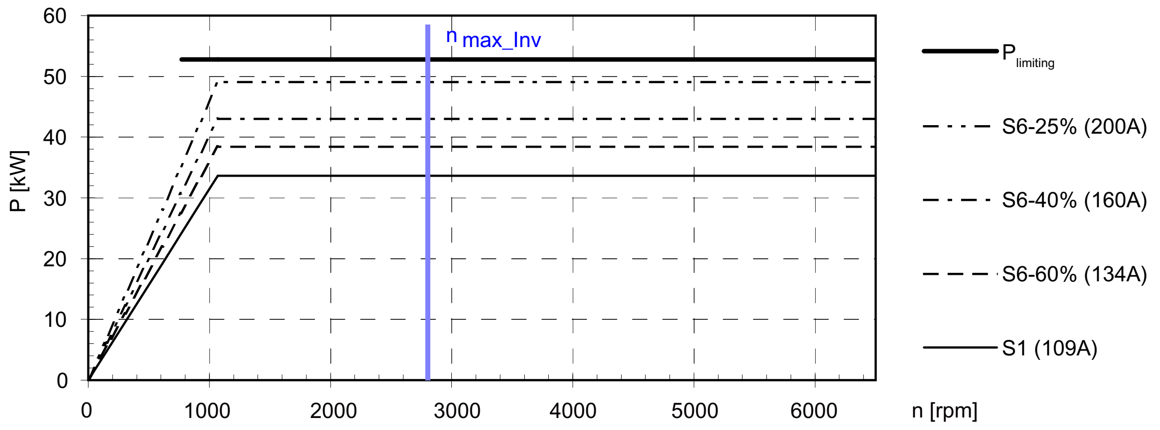


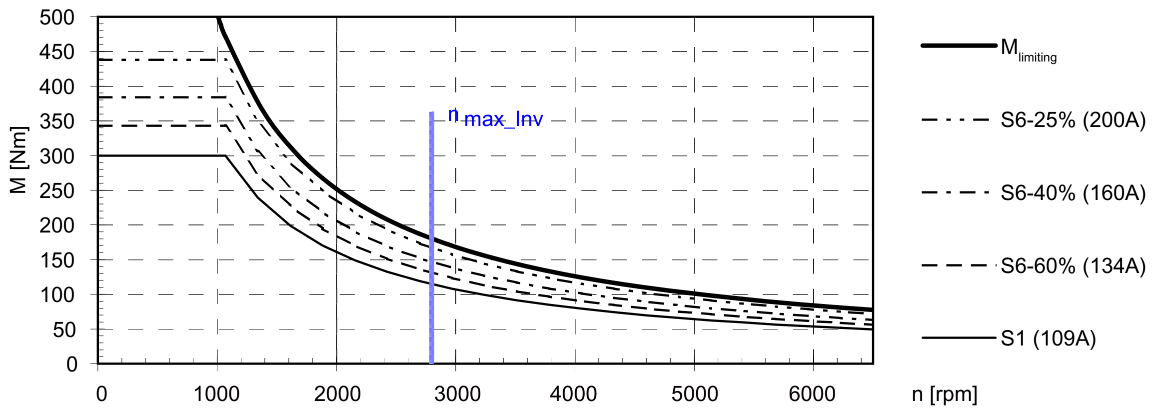


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 67 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1116-6WR□1

Rated power	P_N	kW	33,6
Rated speed	n_N	rpm	1070
Rated torque	M_N	Nm	300
Rated current	I_N	A	109
Maximum current	I_{max}	A	218
Maximum speed	n_{max}	rpm	6500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2800
Maximum torque	M_{max}	Nm	500
Moment of inertia	J_{rot}	kg m²	0,09285
Voltage constant	k_E	V/1000 rpm	200
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	73
Rotor weight	m_{rot}	kg	see Table 1-3

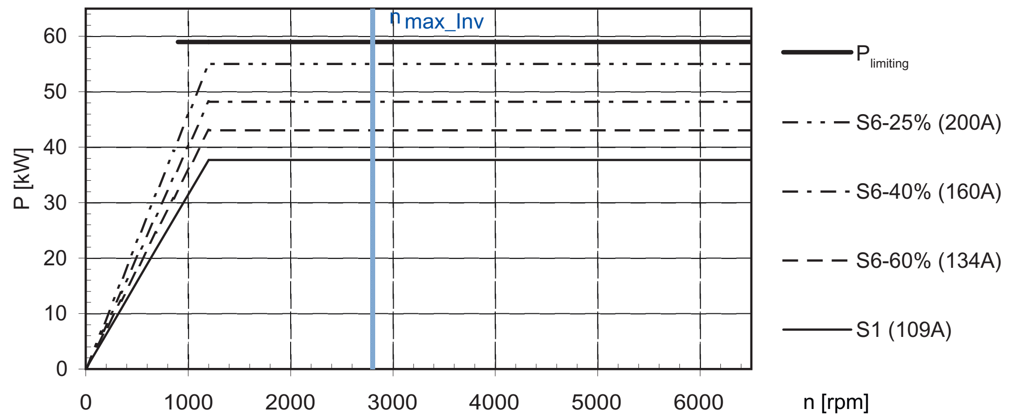


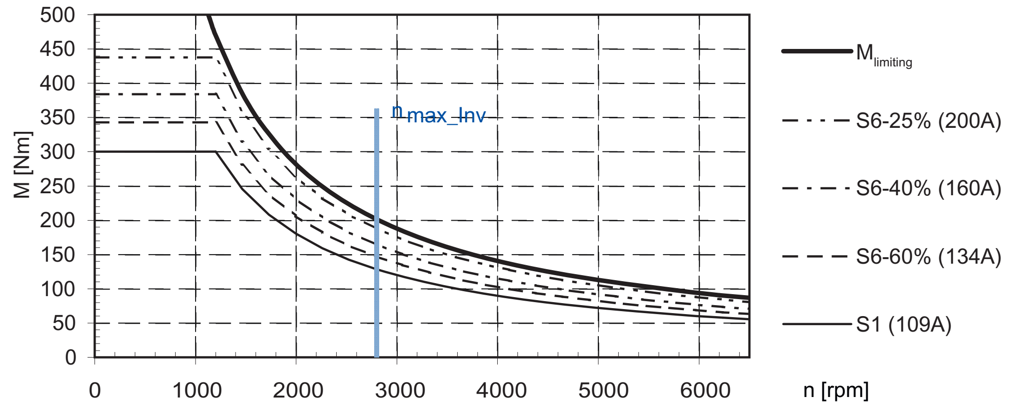


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 68 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1116-6WR□1

Rated power	P_N	kW	37,7
Rated speed	n_N	rpm	1200
Rated torque	M_N	Nm	300
Rated current	I_N	A	109
Maximum current	I_{max}	A	218
Maximum speed	n_{max}	rpm	6500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2800
Maximum torque	M_{max}	Nm	500
Moment of inertia	J_{rot}	kg m²	0,09285
Voltage constant	k_E	V/1000 rpm	200
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	73
Rotor weight	m_{rot}	kg	see Table 1-3

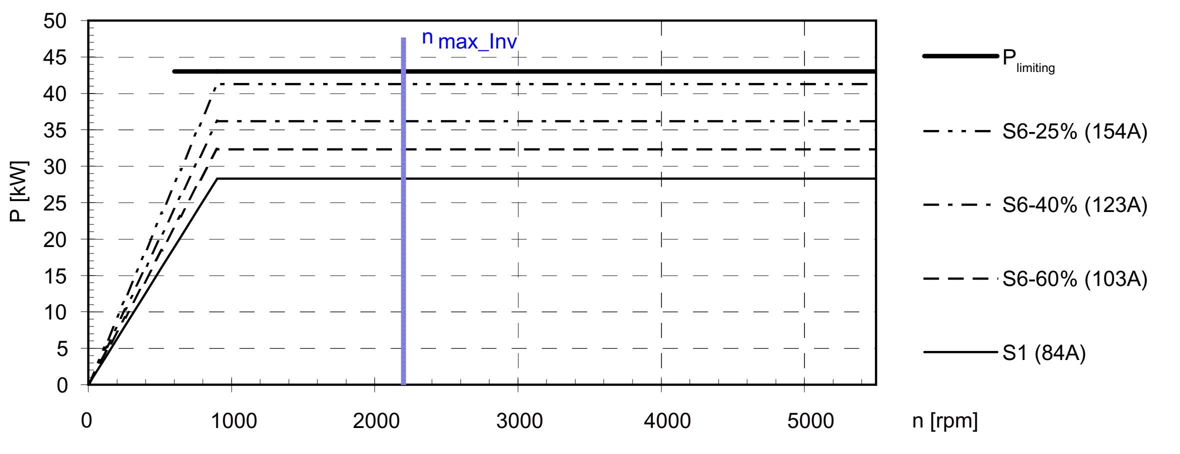


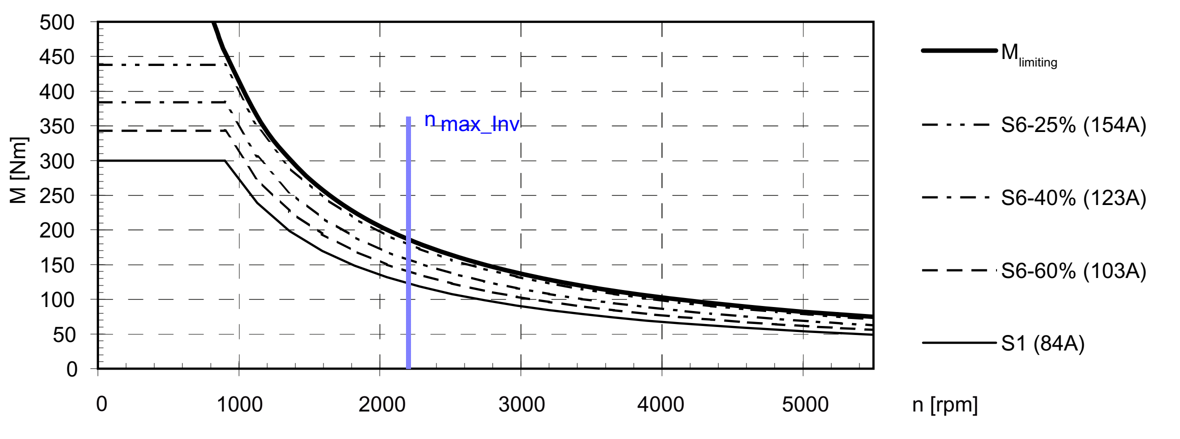


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 69 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1116-6WT□1

Rated power	P_N	kW	25,1
Rated speed	n_N	rpm	800
Rated torque	M_N	Nm	300
Rated current	I_N	A	84
Maximum current	I_{max}	A	168
Maximum speed	n_{max}	rpm	5500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2200
Maximum torque	M_{max}	Nm	500
Moment of inertia	J_{rot}	kg m²	0,09285
Voltage constant	k_E	V/1000 rpm	256
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	73
Rotor weight	m_{rot}	kg	see Table 1-3

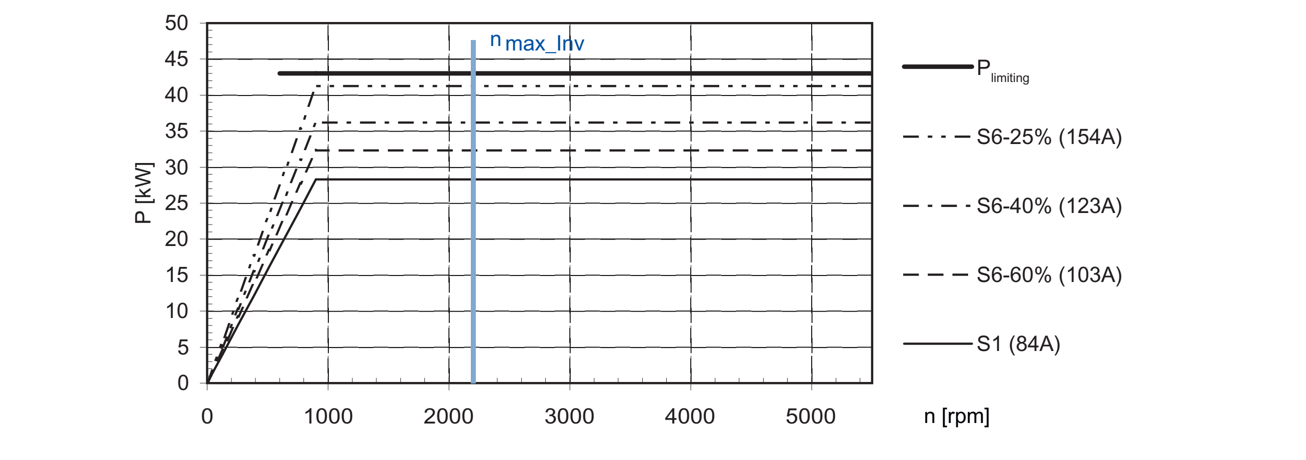


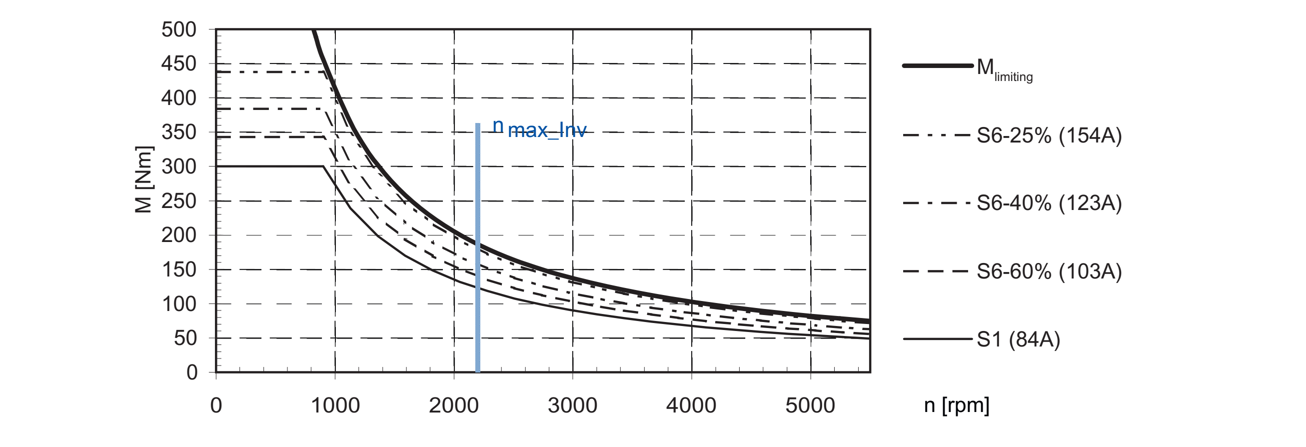


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 70 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1116-6WT□1

Rated power	P_N	kW	28,3
Rated speed	n_N	rpm	900
Rated torque	M_N	Nm	300
Rated current	I_N	A	84
Maximum current	I_{max}	A	168
Maximum speed	n_{max}	rpm	5500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2200
Maximum torque	M_{max}	Nm	500
Moment of inertia	J_{rot}	kg m^2	0,09285
Voltage constant	k_E	V/1000 rpm	256
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	73
Rotor weight	m_{rot}	kg	see Table 1-3

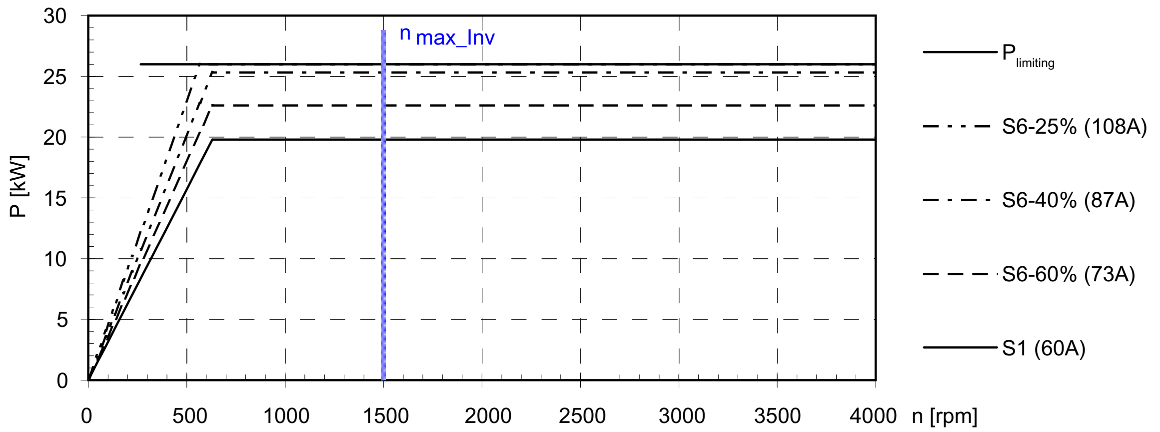


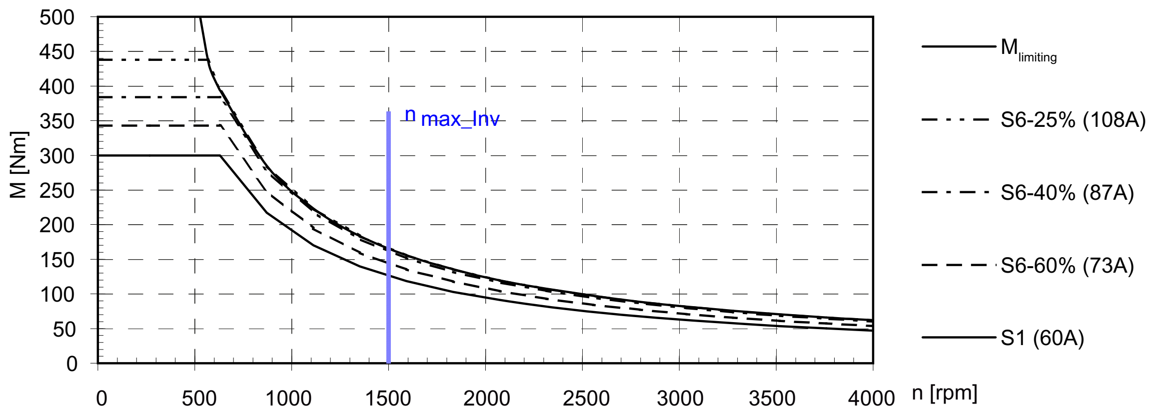


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 71 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1116-6WW□1

Rated power	P_N	kW	19,8
Rated speed	n_N	rpm	630
Rated torque	M_N	Nm	300
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	4000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	1500
Maximum torque	M_{max}	Nm	500
Moment of inertia	J_{rot}	kg m²	0,09185
Voltage constant	k_E	V/1000 rpm	368
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	73
Rotor weight	m_{rot}	kg	see Table 1-3

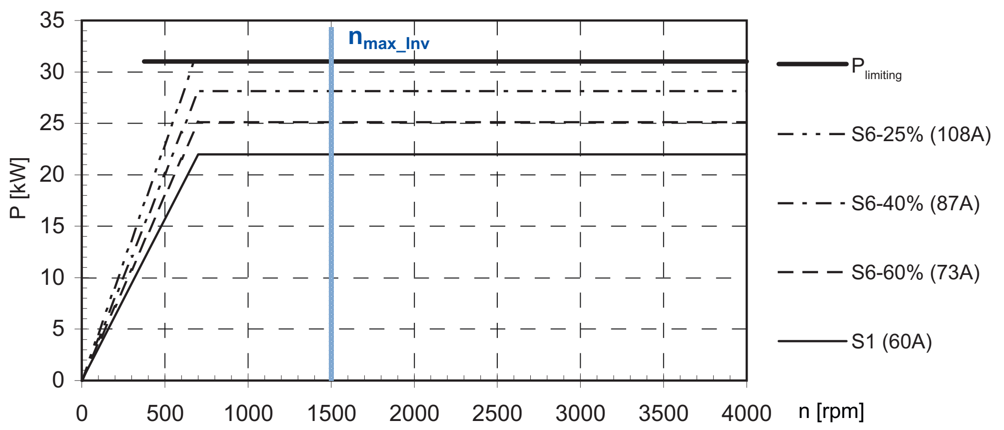


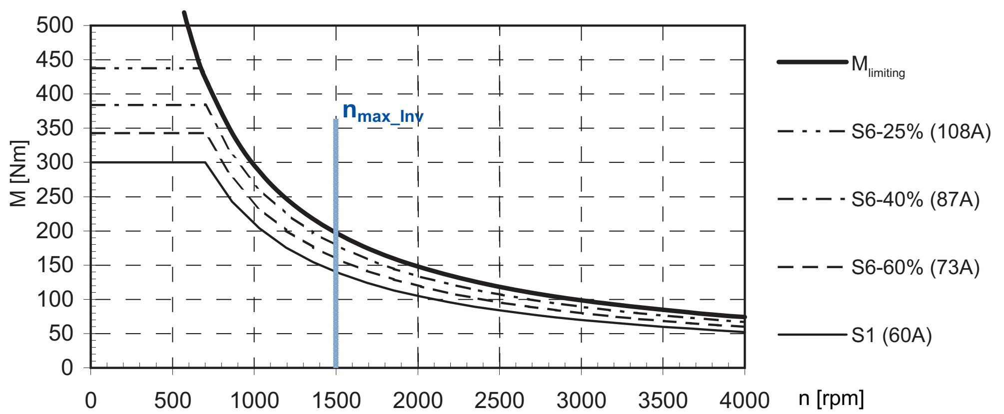


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 72 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1116-6WW□1

Rated power	P_N	kW	22
Rated speed	n_N	rpm	700
Rated torque	M_N	Nm	300
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	4000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	1500
Maximum torque	M_{max}	Nm	500
Moment of inertia	J_{rot}	kg m²	0,09285
Voltage constant	k_E	V/1000 rpm	368
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	73
Rotor weight	m_{rot}	kg	see Table 1-3



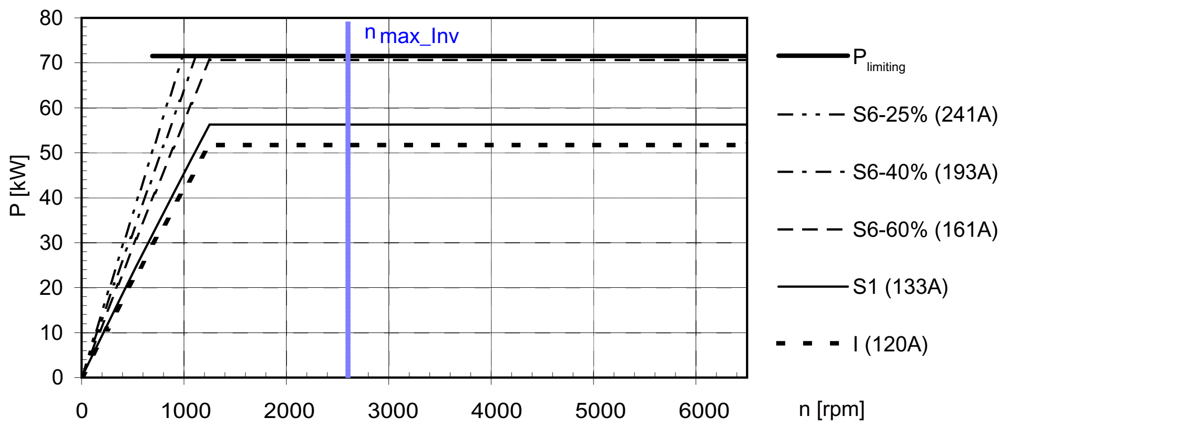


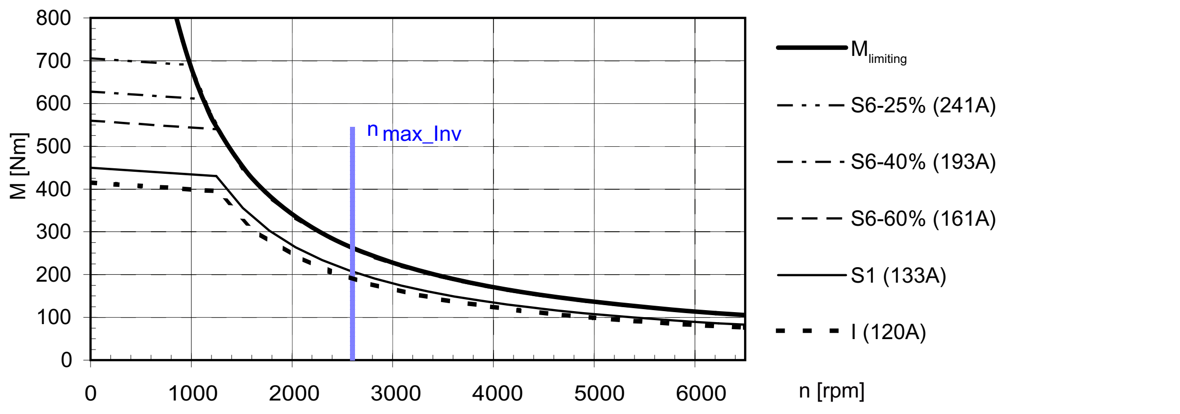
The data for duty type S6 are valid for a 2 min. duty cycle.

4.3 P/n and M/n diagrams for 8-pole built-in motors

Table 4- 73 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1144-8WL□1

Rated power	P_N	kW	56,3
Rated speed	n_N	rpm	1250
Rated torque	M_N	Nm	430
Rated current	I_N	A	133
Maximum current	I_{max}	A	266
Maximum speed	n_{max}	rpm	6500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2600
Maximum torque	M_{max}	Nm	735
Moment of inertia	J_{rot}	kg m²	0,1145
Voltage constant	k_E	V/1000 rpm	218
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	70
Rotor weight	m_{rot}	kg	see Table 1-3

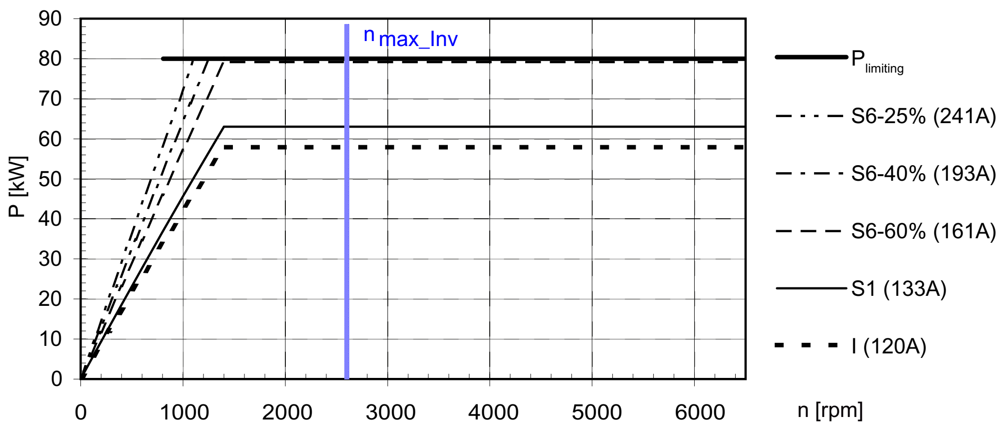


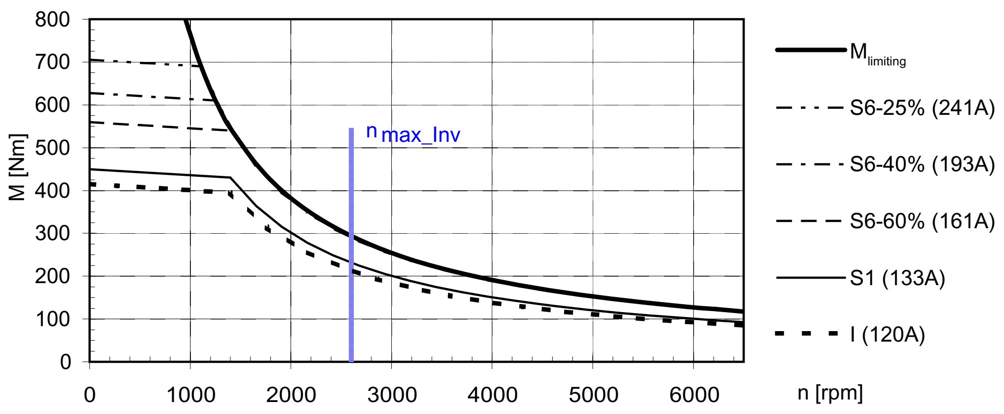


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 74 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1144-8WL□1

Rated power	P_N	kW	63
Rated speed	n_N	rpm	1400
Rated torque	M_N	Nm	430
Rated current	I_N	A	133
Maximum current	I_{max}	A	266
Maximum speed	n_{max}	rpm	6500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2600
Maximum torque	M_{max}	Nm	735
Moment of inertia	J_{rot}	kg m^2	0,1145
Voltage constant	k_E	V/1000 rpm	218
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	70
Rotor weight	m_{rot}	kg	see Table 1-3

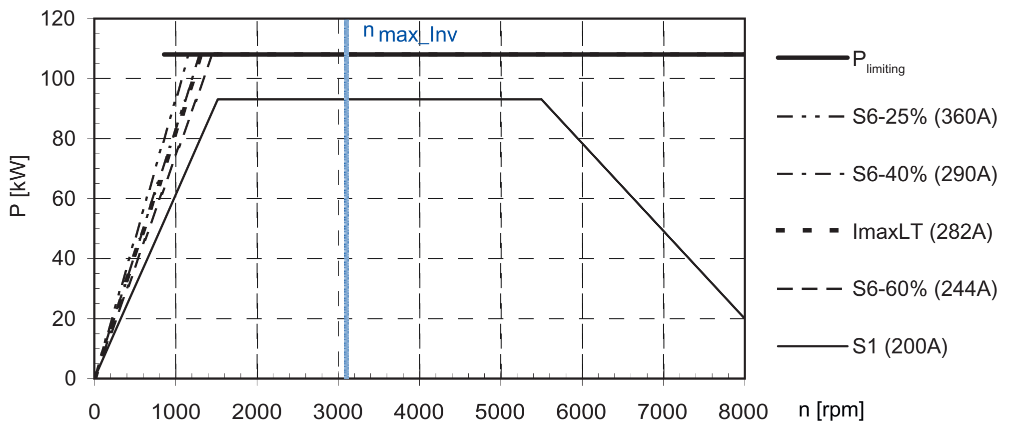


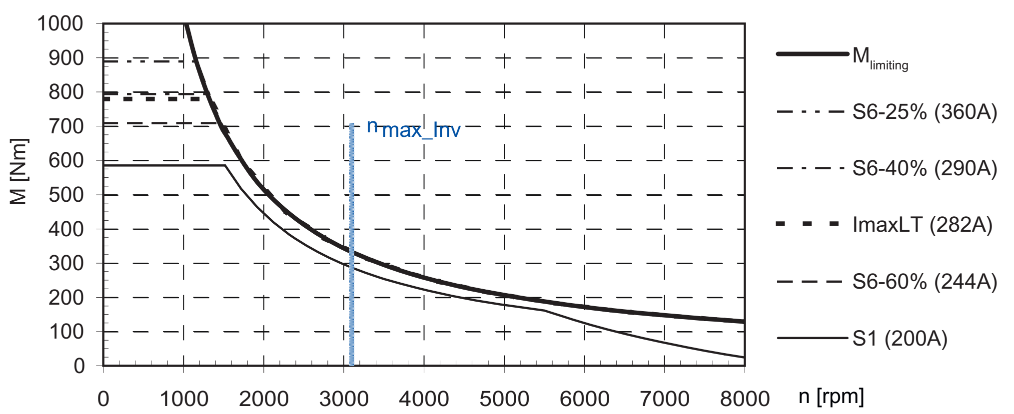


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 75 SINAMICS, 3-ph. 380 V AC Smart Line Module, (SLM), 1FE1145-8WN□1

Rated power	P_N	kW	93,1
Rated speed	n_N	rpm	1520
Rated torque	M_N	Nm	585
Rated current	I_N	A	200
Maximum current	I_{max}	A	400
Maximum speed	n_{max}	rpm	8000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	3100
Maximum torque	M_{max}	Nm	930
Moment of inertia	J_{rot}	kg m²	0,1572
Voltage constant	k_E	V/1000 rpm	187
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	88,5
Rotor weight	m_{rot}	kg	see Table 1-3

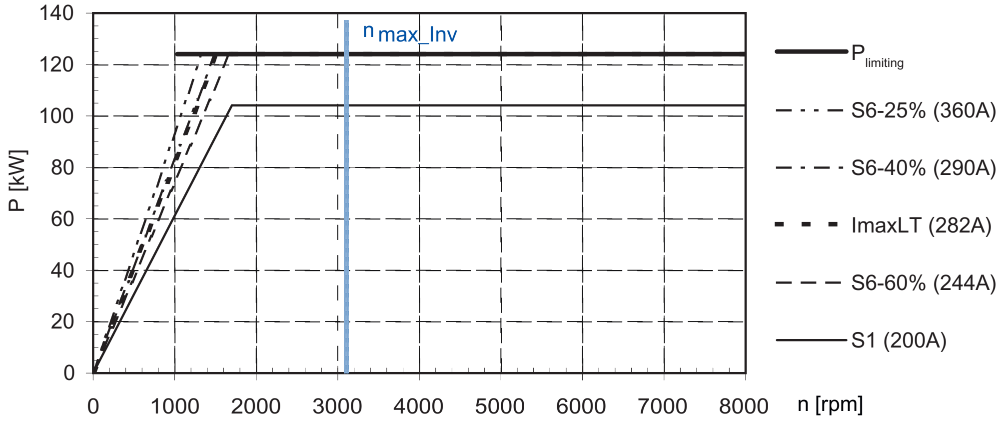


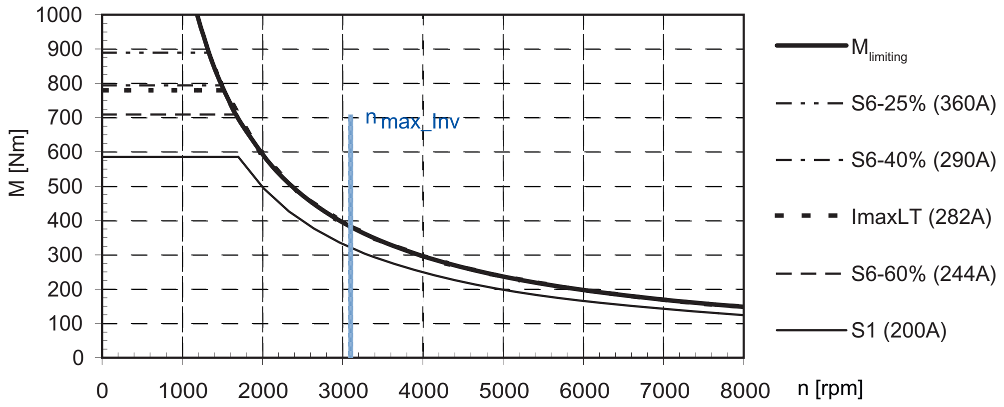


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 76 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1145-8WN□1

Rated power	P_N	kW	104
Rated speed	n_N	rpm	1700
Rated torque	M_N	Nm	585
Rated current	I_N	A	200
Maximum current	I_{max}	A	400
Maximum speed	n_{max}	rpm	8000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	3100
Maximum torque	M_{max}	Nm	930
Moment of inertia	J_{rot}	kg m²	0,1572
Voltage constant	k_E	V/1000 rpm	187
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	88,5
Rotor weight	m_{rot}	kg	see Table 1-3

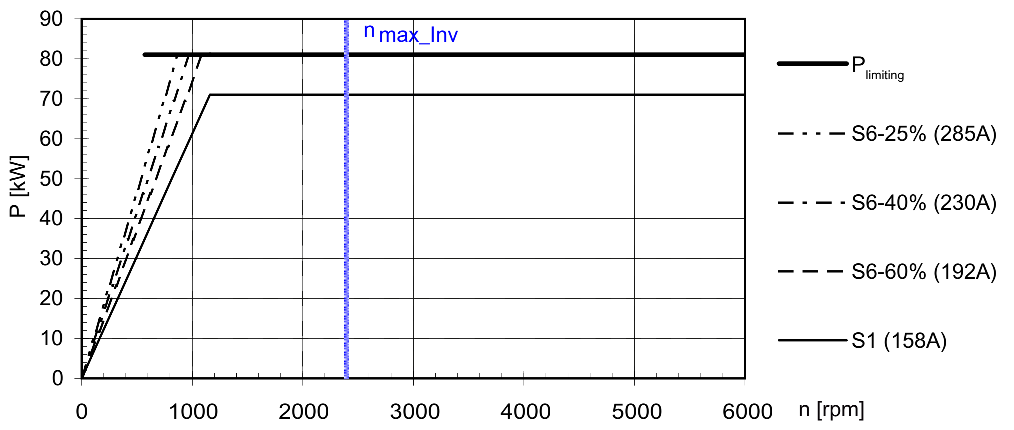


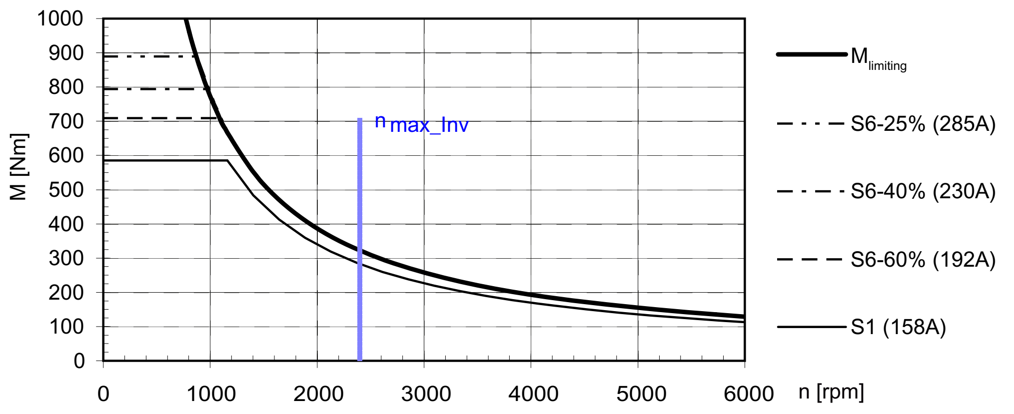


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 77 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1145-8WQ□1

Rated power	P_N	kW	71,1
Rated speed	n_N	rpm	1160
Rated torque	M_N	Nm	585
Rated current	I_N	A	158
Maximum current	I_{max}	A	316
Maximum speed	n_{max}	rpm	6000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2400
Maximum torque	M_{max}	Nm	930
Moment of inertia	J_{rot}	kg m²	0,1572
Voltage constant	k_E	V/1000 rpm	238
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	88,5
Rotor weight	m_{rot}	kg	see Table 1-3

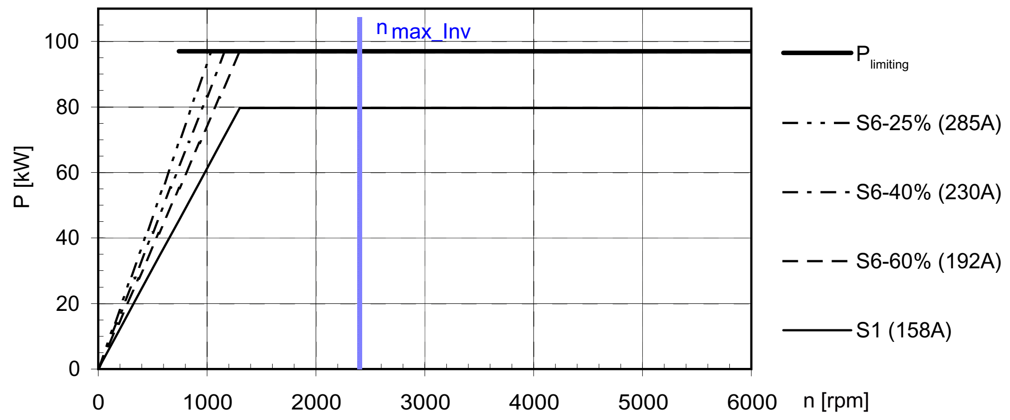


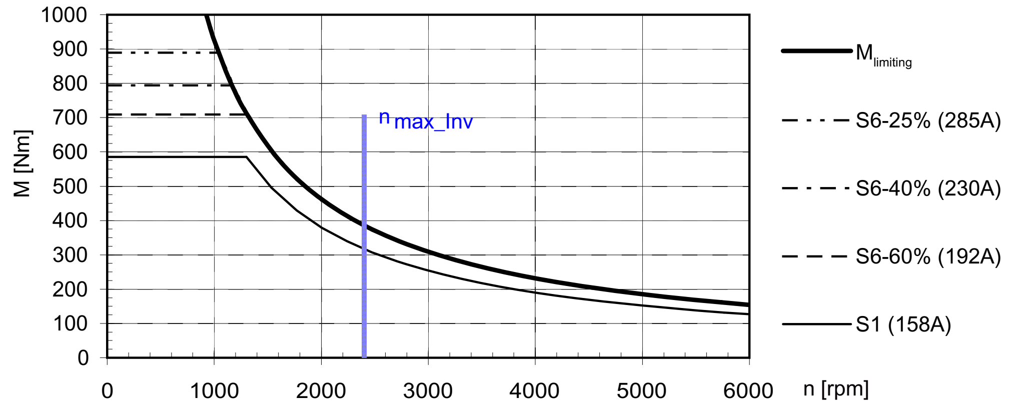


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 78 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1145-8WQ□1

Rated power	P_N	kW	79,6
Rated speed	n_N	rpm	1300
Rated torque	M_N	Nm	585
Rated current	I_N	A	158
Maximum current	I_{max}	A	316
Maximum speed	n_{max}	rpm	6000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2400
Maximum torque	M_{max}	Nm	930
Moment of inertia	J_{rot}	kg m²	0,1572
Voltage constant	k_E	V/1000 rpm	238
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	88,5
Rotor weight	m_{rot}	kg	see Table 1-3

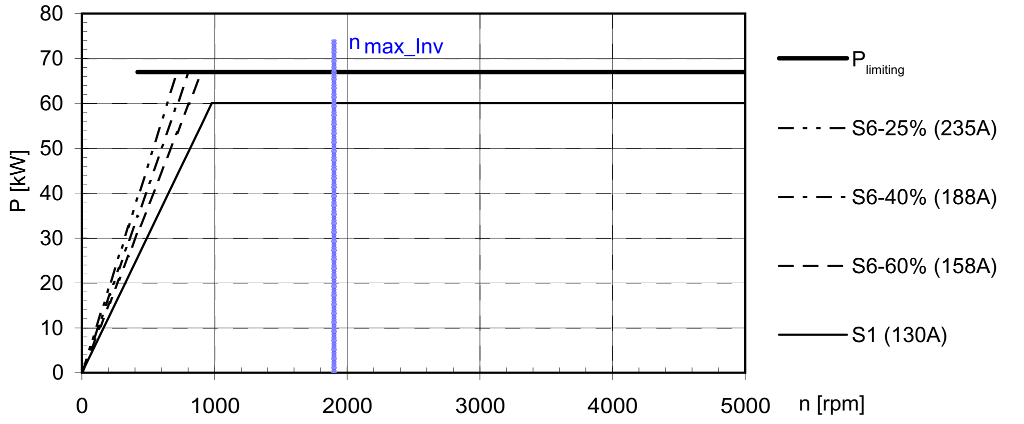


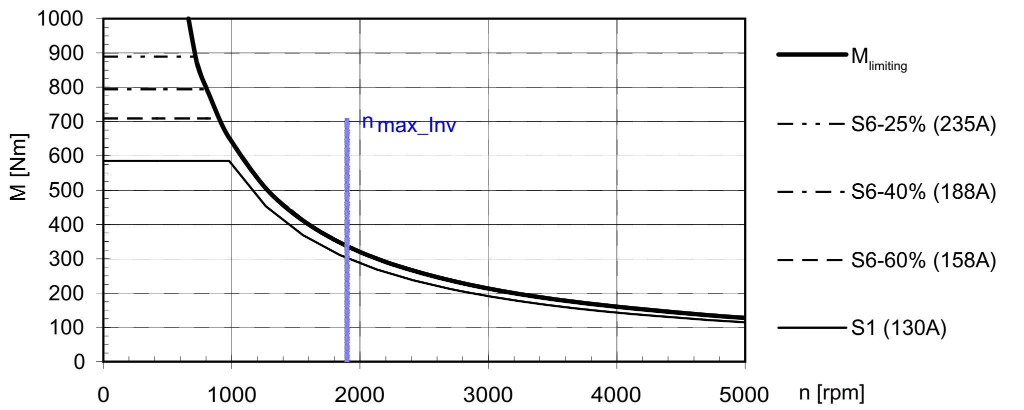


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 79 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1145-8WS□1

Rated power	P_N	kW	60
Rated speed	n_N	rpm	980
Rated torque	M_N	Nm	585
Rated current	I_N	A	130
Maximum current	I_{max}	A	260
Maximum speed	n_{max}	rpm	5000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	1900
Maximum torque	M_{max}	Nm	930
Moment of inertia	J_{rot}	kg m²	0,1572
Voltage constant	k_E	V/1000 rpm	290
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	88,5
Rotor weight	m_{rot}	kg	see Table 1-3

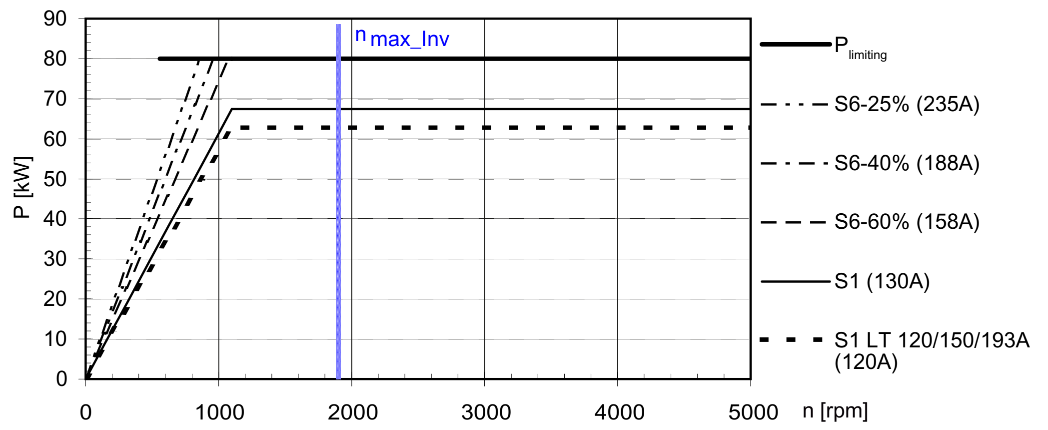


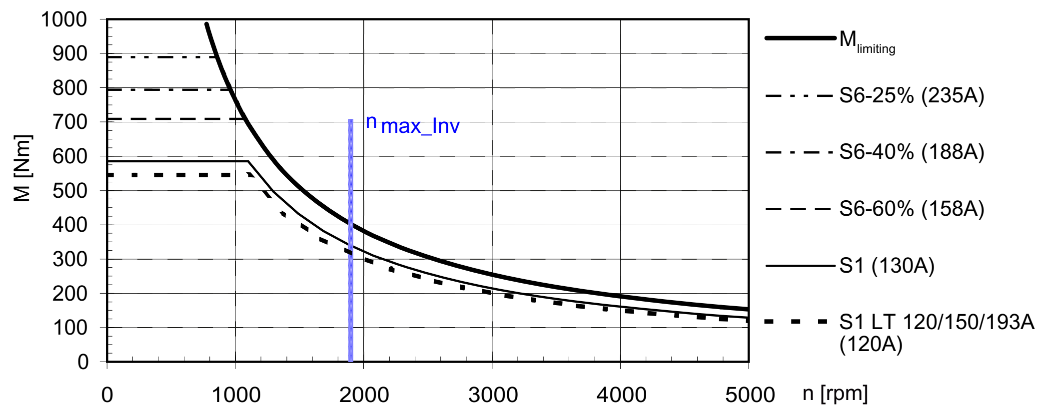


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 80 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1145-8WS□1

Rated power	P_N	kW	67,4
Rated speed	n_N	rpm	1100
Rated torque	M_N	Nm	585
Rated current	I_N	A	130
Maximum current	I_{max}	A	260
Maximum speed	n_{max}	rpm	5000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	1900
Maximum torque	M_{max}	Nm	930
Moment of inertia	J_{rot}	kg m²	0,1572
Voltage constant	k_E	V/1000 rpm	290
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	88,5
Rotor weight	m_{rot}	kg	see Table 1-3

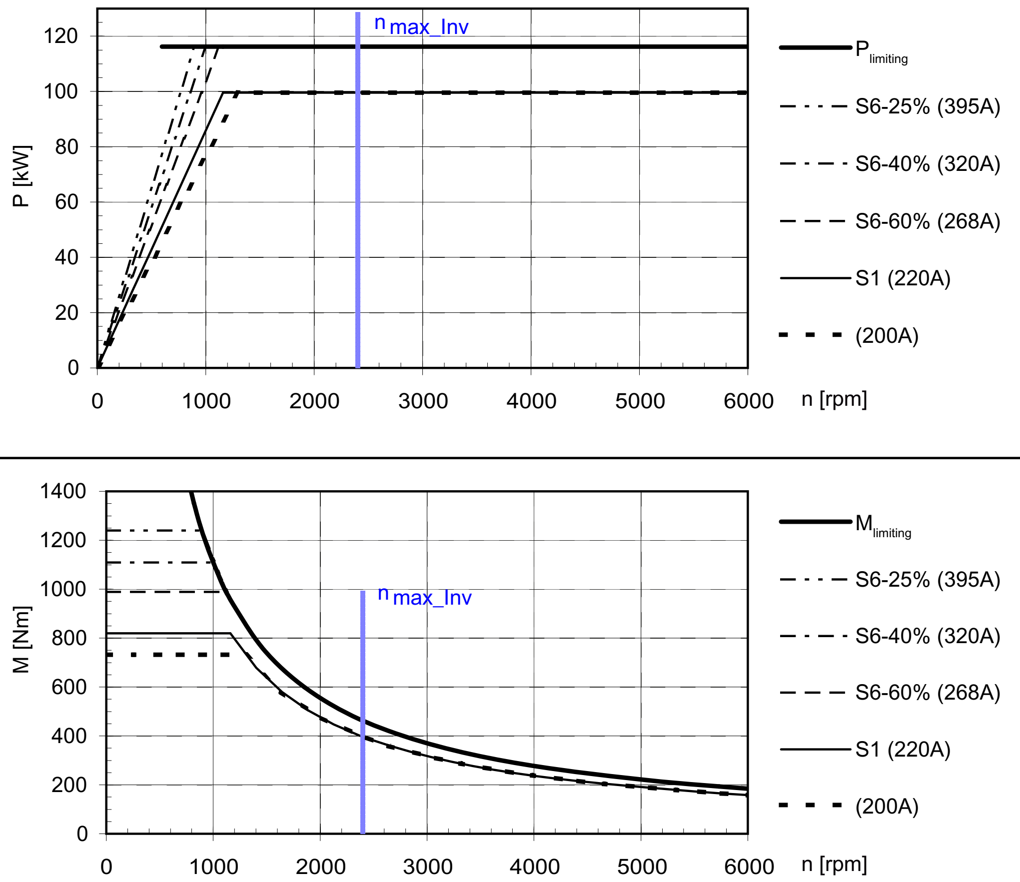




The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 81 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1147-8WM□1

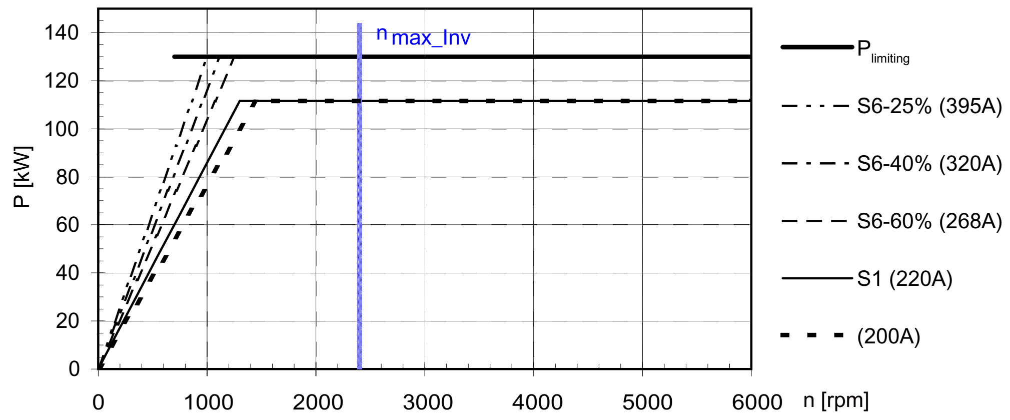
Rated power	P_N	kW	99,6
Rated speed	n_N	rpm	1160
Rated torque	M_N	Nm	820
Rated current	I_N	A	220
Maximum current	I_{max}	A	440
Maximum speed	n_{max}	rpm	6000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2400
Maximum torque	M_{max}	Nm	1300
Moment of inertia [1)]	J_{rot}	kg m²	0,2094
Voltage constant	k_E	V/1000 rpm	238
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	116
Rotor weight	m_{rot}	kg	see Table 1-3

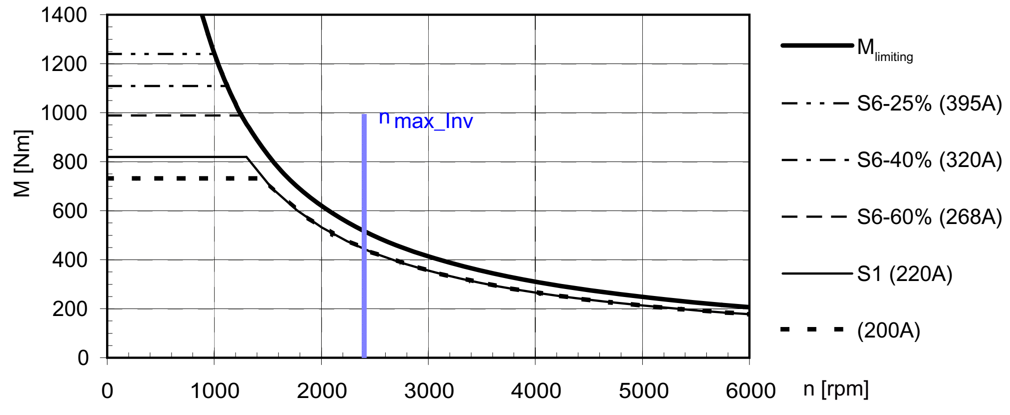


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 82 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1147-8WM□1

Rated power	P_N	kW	111,6
Rated speed	n_N	rpm	1300
Rated torque	M_N	Nm	820
Rated current	I_N	A	220
Maximum current	I_{max}	A	440
Maximum speed	n_{max}	rpm	6000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2400
Maximum torque	M_{max}	Nm	1300
Moment of inertia [1)]	J_{rot}	kg m²	0,2094
Voltage constant	k_E	V/1000 rpm	238
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	116
Rotor weight	m_{rot}	kg	see Table 1-3

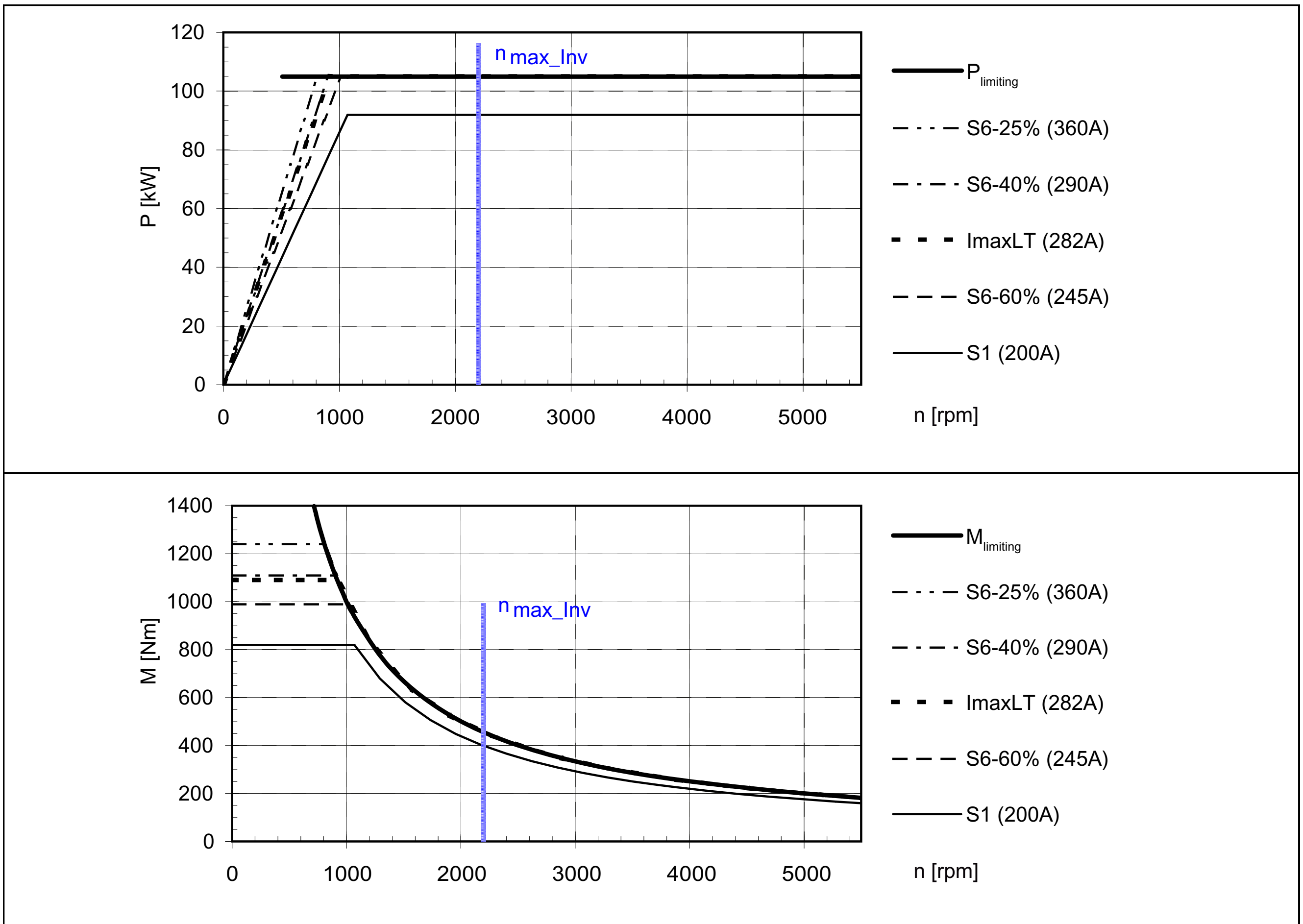




The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 83 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1147-8WN□1

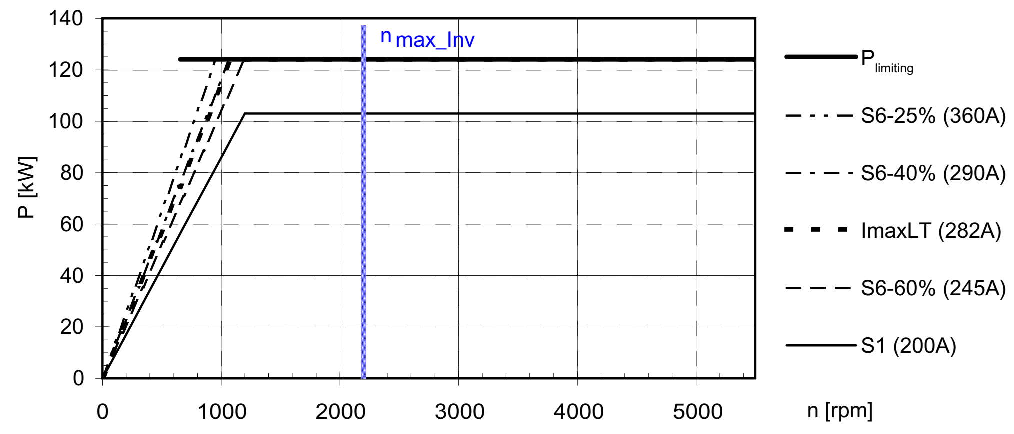
Rated power	P_N	kW	91,9
Rated speed	n_N	rpm	1070
Rated torque	M_N	Nm	820
Rated current	I_N	A	200
Maximum current	I_{max}	A	400
Maximum speed	n_{max}	rpm	5500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2200
Maximum torque	M_{max}	Nm	1300
Moment of inertia	J_{rot}	kg m^2	0,2094
Voltage constant	k_E	V/1000 rpm	262
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	116
Rotor weight	m_{rot}	kg	see Table 1-3

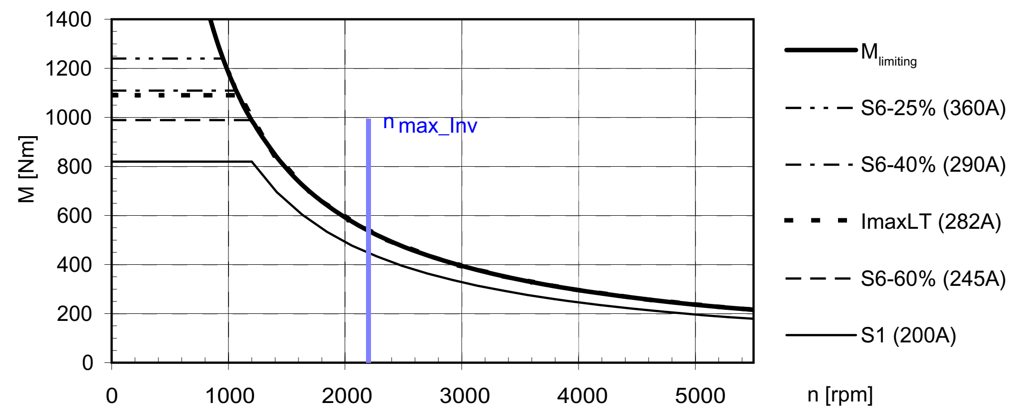


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 84 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1147-8WN□1

Rated power	P_N	kW	103
Rated speed	n_N	rpm	1200
Rated torque	M_N	Nm	820
Rated current	I_N	A	200
Maximum current	I_{max}	A	400
Maximum speed	n_{max}	rpm	5500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2200
Maximum torque	M_{max}	Nm	1300
Moment of inertia	J_{rot}	kg m²	0,2094
Voltage constant	k_E	V/1000 rpm	262
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	116
Rotor weight	m_{rot}	kg	see Table 1-3

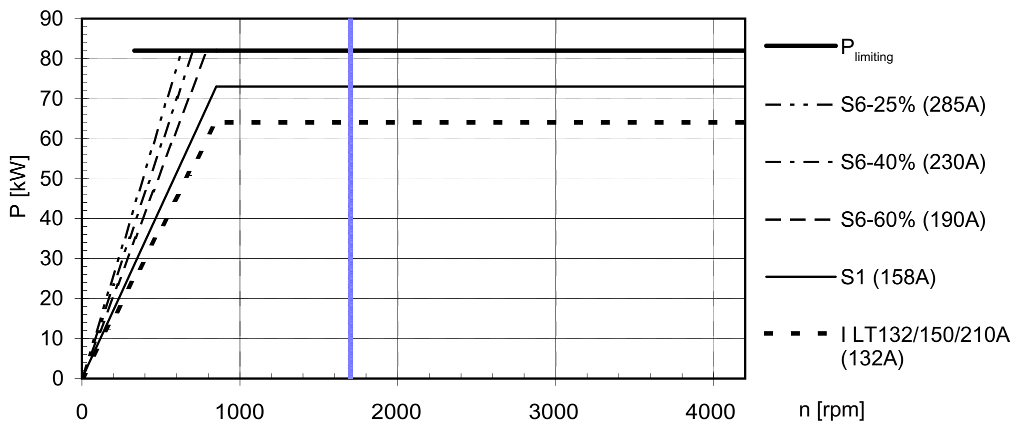


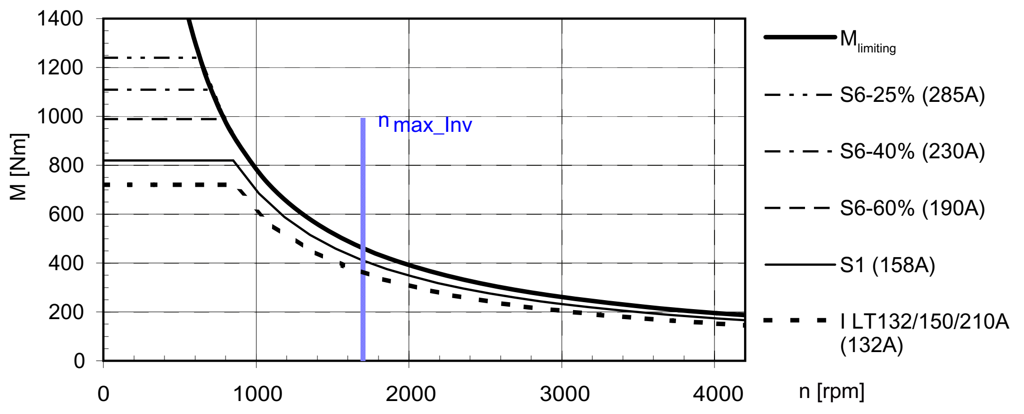


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 85 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1147-8WQ□1

Rated power	P_N	kW	73
Rated speed	n_N	rpm	850
Rated torque	M_N	Nm	820
Rated current	I_N	A	158
Maximum current	I_{max}	A	316
Maximum speed	n_{max}	rpm	4200
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	1700
Maximum torque	M_{max}	Nm	1300
Moment of inertia	J_{rot}	kg m^2	0,2094
Voltage constant	k_E	V/1000 rpm	355
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	116
Rotor weight	m_{rot}	kg	see Table 1-3

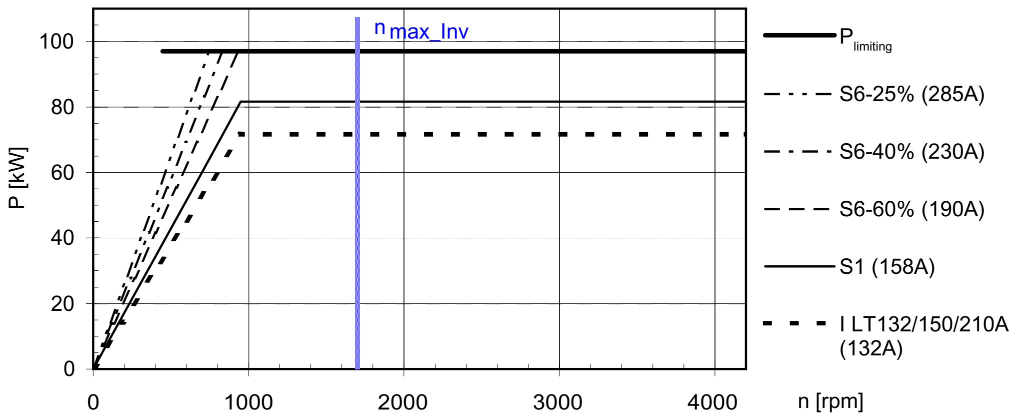


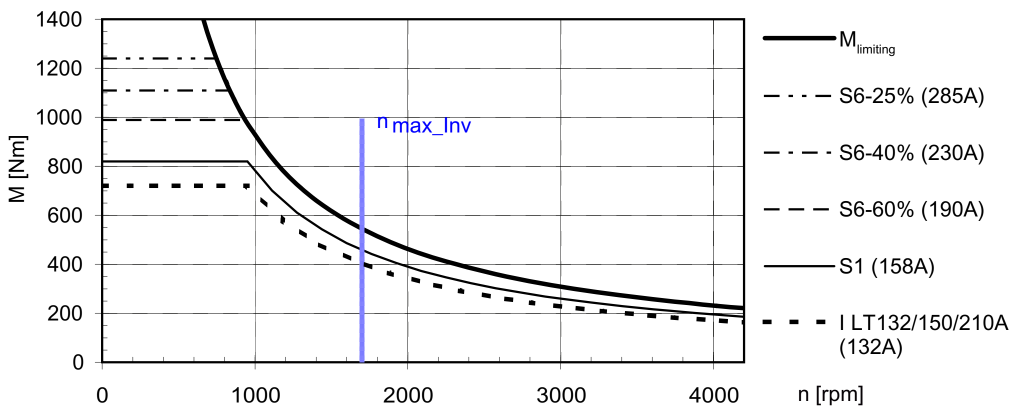


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 86 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1147-8WQ□1

Rated power	P_N	kW	81,6
Rated speed	n_N	rpm	950
Rated torque	M_N	Nm	820
Rated current	I_N	A	158
Maximum current	I_{max}	A	316
Maximum speed	n_{max}	rpm	4200
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	1700
Maximum torque	M_{max}	Nm	1300
Moment of inertia	J_{rot}	kg m²	0,2094
Voltage constant	k_E	V/1000 rpm	355
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	116
Rotor weight	m_{rot}	kg	see Table 1-3

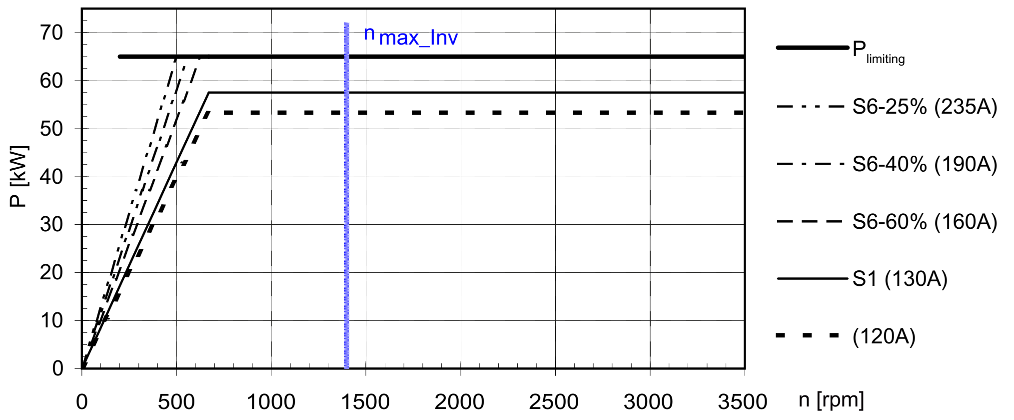


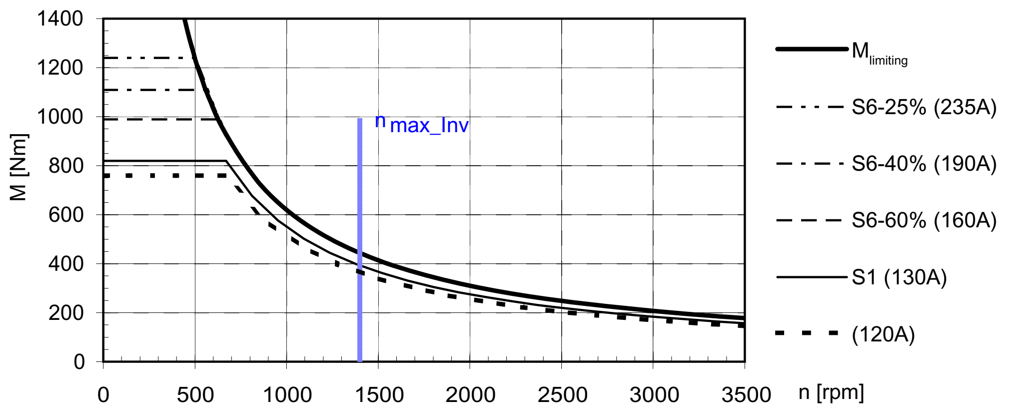


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 87 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1147-8WS□1

Rated power	P_N	kW	57,5
Rated speed	n_N	rpm	670
Rated torque	M_N	Nm	820
Rated current	I_N	A	130
Maximum current	I_{max}	A	260
Maximum speed	n_{max}	rpm	3500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	1400
Maximum torque	M_{max}	Nm	1300
Moment of inertia	J_{rot}	kg m²	0,2094
Voltage constant	k_E	V/1000 rpm	405
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	116
Rotor weight	m_{rot}	kg	see Table 1-3

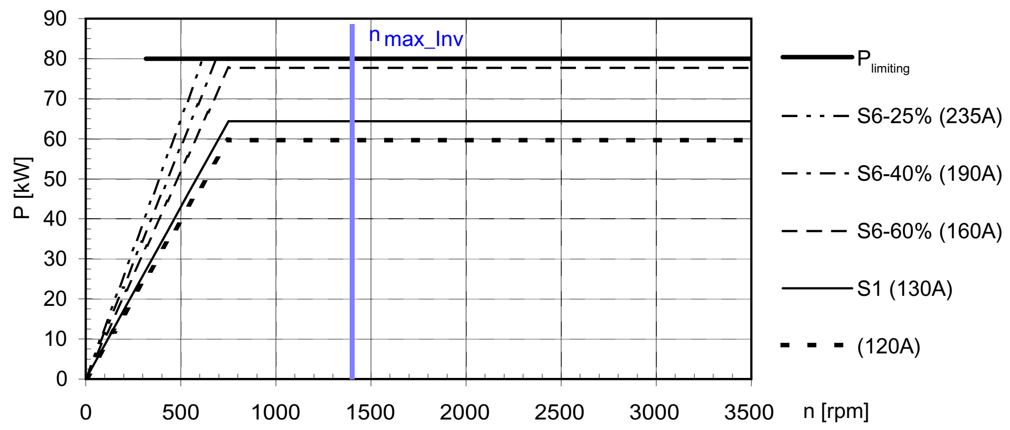


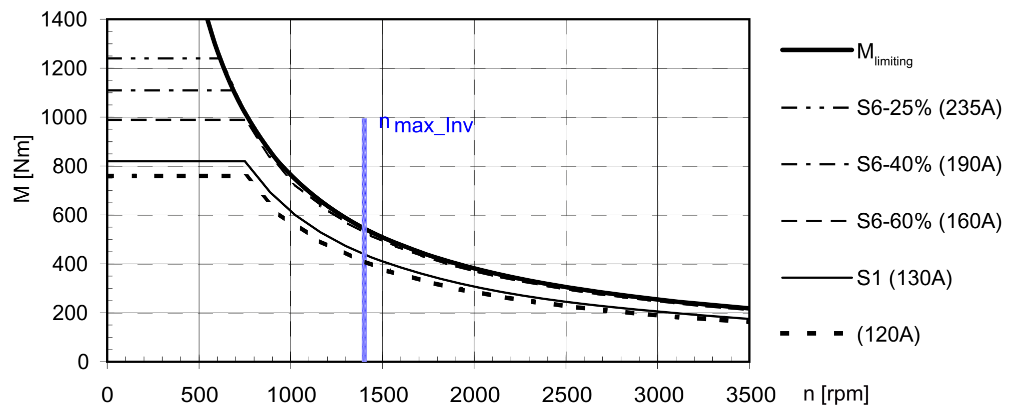


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 88 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1147-8WS□1

Rated power	P_N	kW	64,4
Rated speed	n_N	rpm	750
Rated torque	M_N	Nm	820
Rated current	I_N	A	130
Maximum current	I_{max}	A	260
Maximum speed	n_{max}	rpm	3500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	1400
Maximum torque	M_{max}	Nm	1300
Moment of inertia	J_{rot}	kg m^2	0,2094
Voltage constant	k_E	V/1000 rpm	405
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	116
Rotor weight	m_{rot}	kg	see Table 1-3



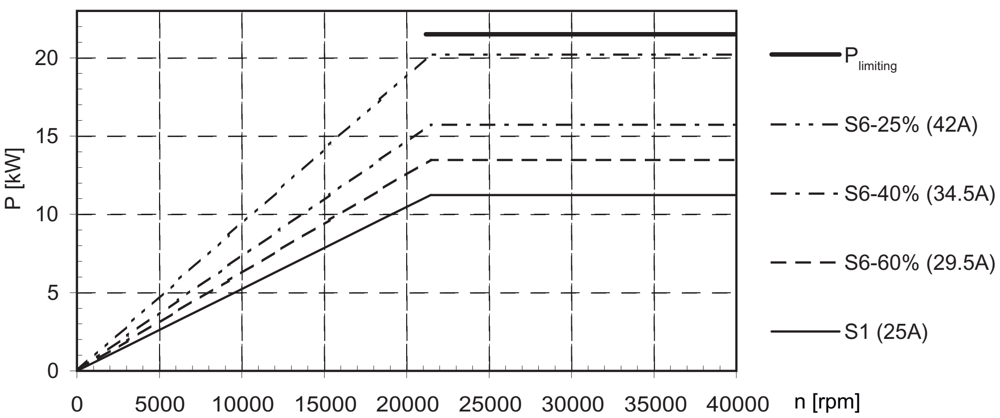


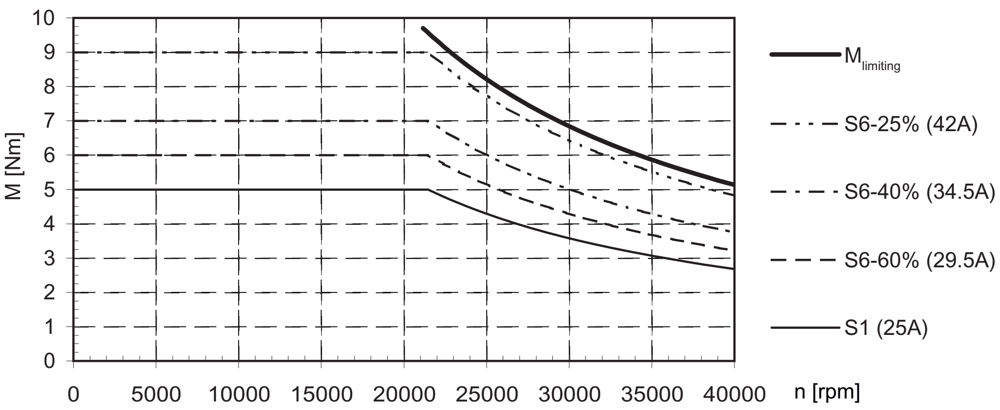
The data for duty type S6 are valid for a 2 min. duty cycle.

4.4 P/n and M/n diagrams for 4-pole built-in motors

Table 4- 89 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1051-4HC□0

Rated power	P_N	kW	11,2
Rated speed	n_N	rpm	21460
Rated torque	M_N	Nm	5
Rated current	I_N	A	25
Maximum current	I_{max}	A	50
Maximum speed	n_{max}	rpm	40000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	40000
Maximum torque	M_{max}	Nm	11
Moment of inertia	J_{rot}	kg m²	0,00045
Voltage constant	k_E	V/1000 rpm	15
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	3,5
Rotor weight	m_{rot}	kg	see Table 1-3

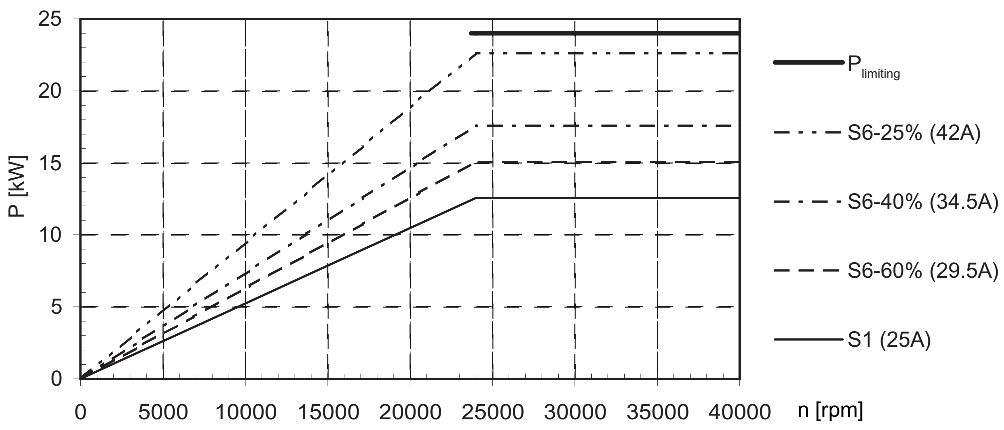


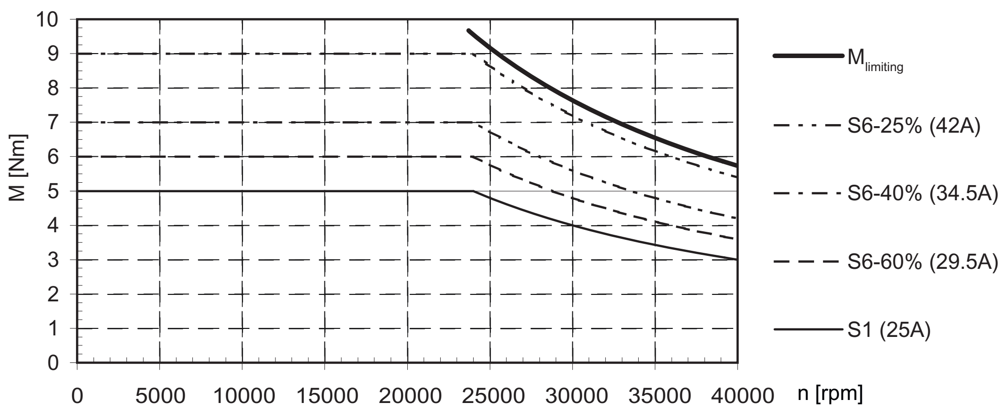


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 90 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1051-4HC□0

Rated power	P_N	kW	12,6
Rated speed	n_N	rpm	24000
Rated torque	M_N	Nm	5
Rated current	I_N	A	25
Maximum current	I_{max}	A	50
Maximum speed	n_{max}	rpm	40000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	40000
Maximum torque	M_{max}	Nm	11
Moment of inertia	J_{rot}	kg m^2	0,00045
Voltage constant	k_E	V/1000 rpm	15
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	3,5
Rotor weight	m_{rot}	kg	see Table 1-3

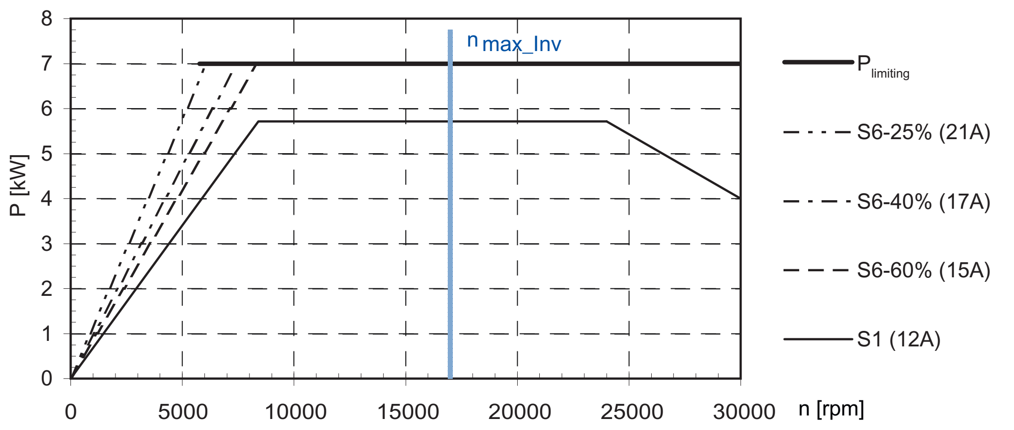


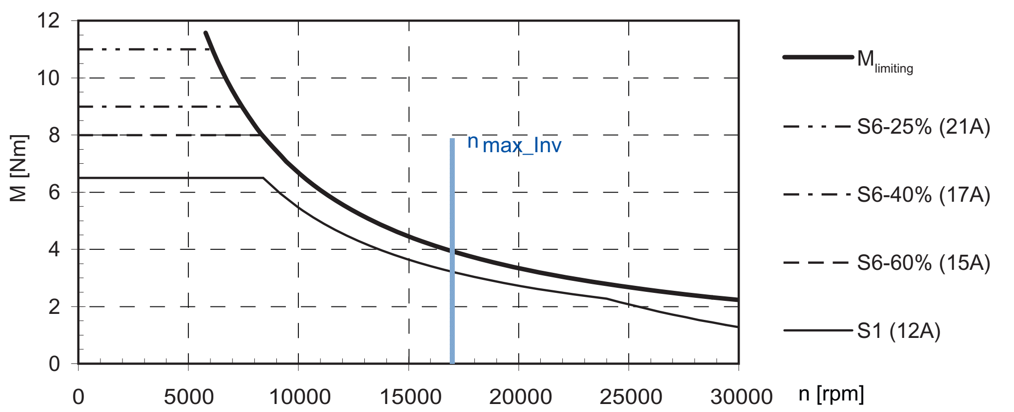


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 91 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1051-4WN□1

Rated power	P_N	kW	5,7
Rated speed	n_N	rpm	8400
Rated torque	M_N	Nm	6,5
Rated current	I_N	A	12
Maximum current	I_{max}	A	24
Maximum speed	n_{max}	rpm	30000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	17000
Maximum torque	M_{max}	Nm	13
Moment of inertia	J_{rot}	kg m²	0,00057
Voltage constant	k_E	V/1000 rpm	34
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	3,5
Rotor weight	m_{rot}	kg	see Table 1-3

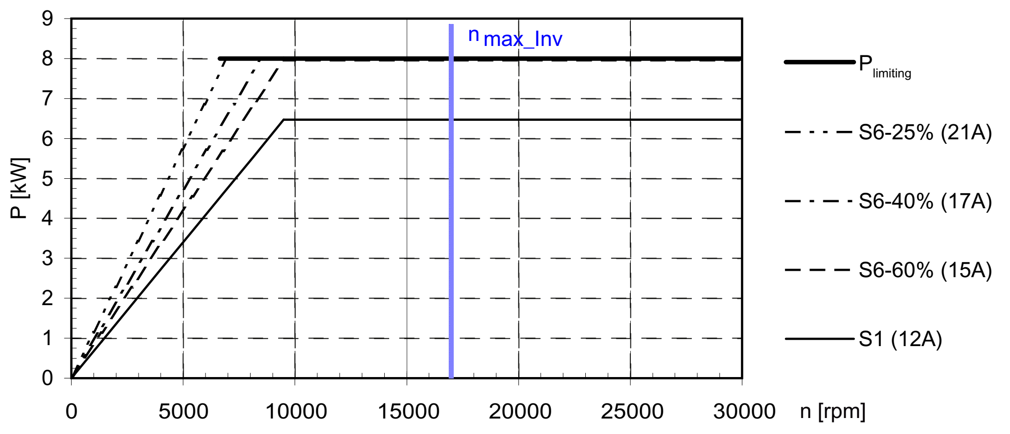


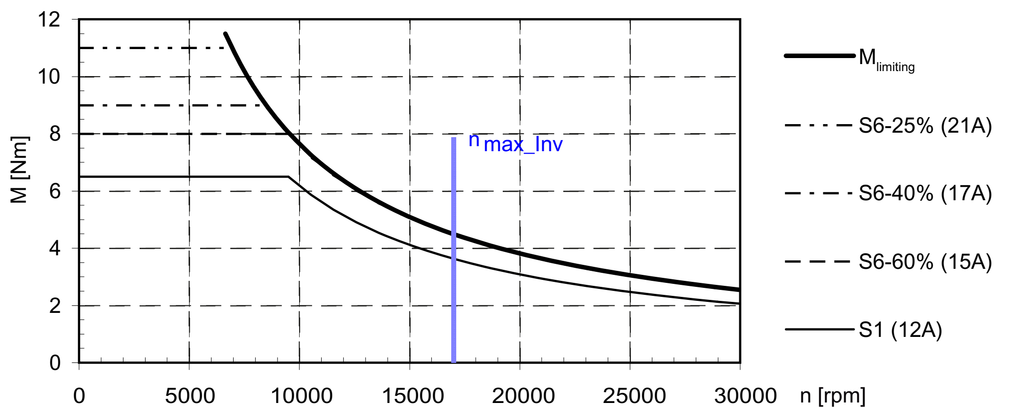


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 92 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1051-4WN□1

Rated power	P_N	kW	6,5
Rated speed	n_N	rpm	9500
Rated torque	M_N	Nm	6,5
Rated current	I_N	A	12
Maximum current	I_{max}	A	24
Maximum speed	n_{max}	rpm	30000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	17000
Maximum torque	M_{max}	Nm	13
Moment of inertia	J_{rot}	kg m²	0,00057
Voltage constant	k_E	V/1000 rpm	34
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	3,5
Rotor weight	m_{rot}	kg	see Table 1-3

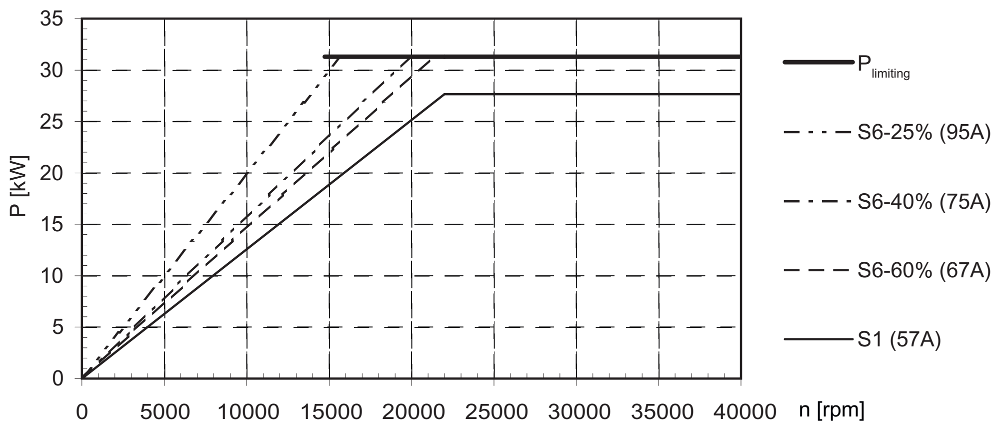


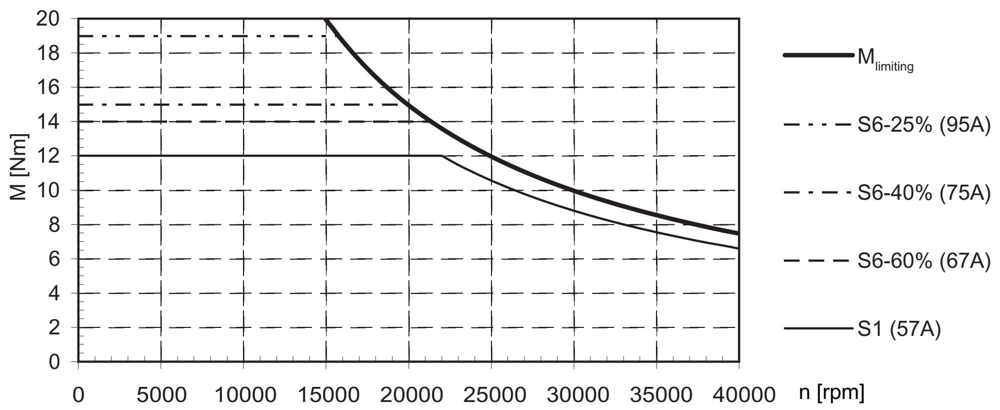


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 93 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1052-4HD□0

Rated power	P_N	kW	27,6
Rated speed	n_N	rpm	22000
Rated torque	M_N	Nm	12
Rated current	I_N	A	57
Maximum current	I_{max}	A	114
Maximum speed	n_{max}	rpm	40000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	40000
Maximum torque	M_{max}	Nm	24
Moment of inertia	J_{rot}	kg m^2	0,00087
Voltage constant	k_E	V/1000 rpm	14
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	6
Rotor weight	m_{rot}	kg	see Table 1-3

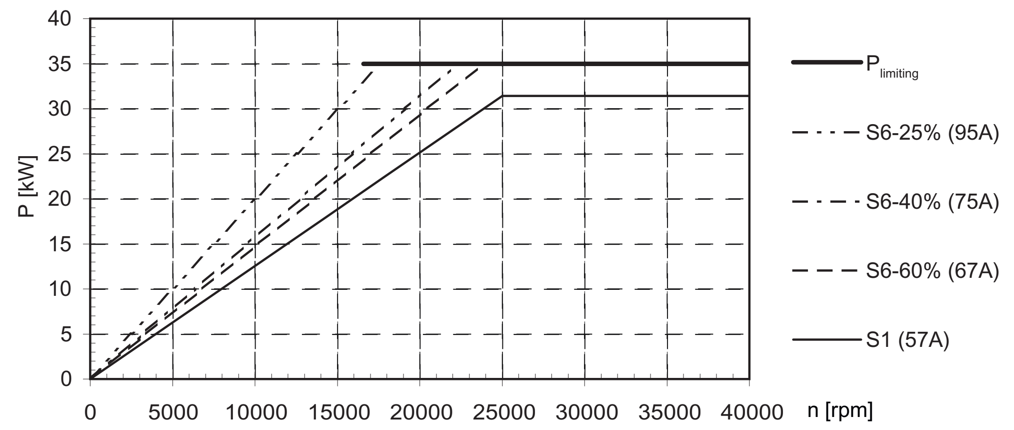


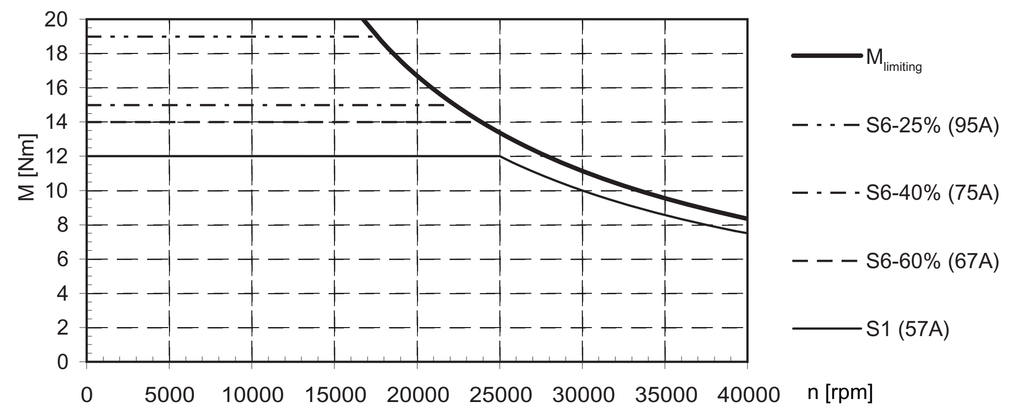


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 94 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1052-4HD□0

Rated power	P_N	kW	31,4
Rated speed	n_N	rpm	25000
Rated torque	M_N	Nm	12
Rated current	I_N	A	57
Maximum current	I_{max}	A	114
Maximum speed	n_{max}	rpm	40000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	40000
Maximum torque	M_{max}	Nm	24
Moment of inertia	J_{rot}	kg m²	0,0087
Voltage constant	k_E	V/1000 rpm	14
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	6
Rotor weight	m_{rot}	kg	see Table 1-3

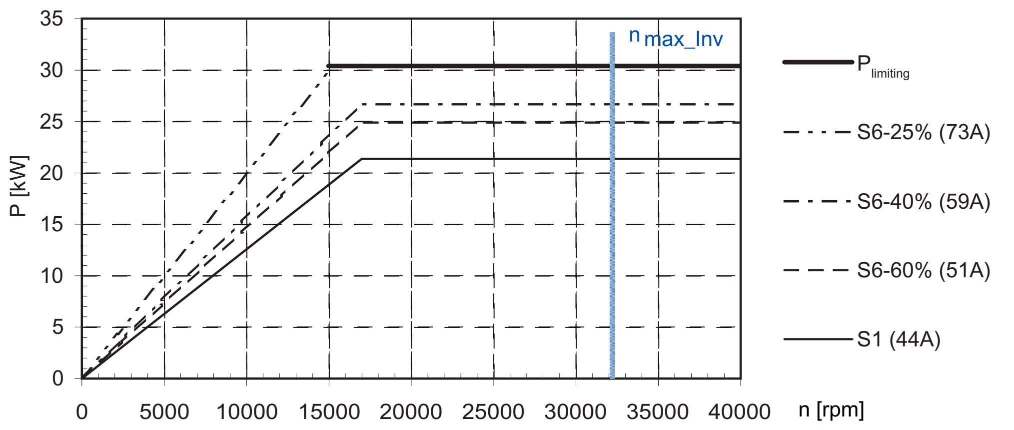


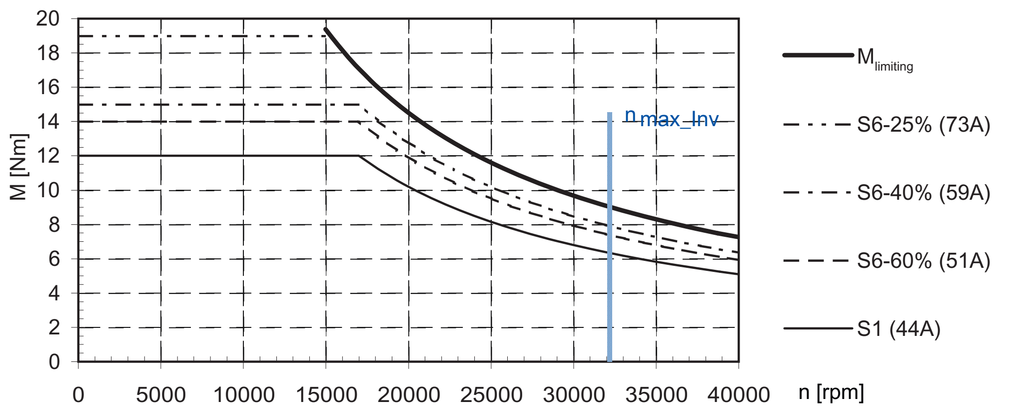


The data for duty type S6 are valid for a 1 min. duty cycle.
For safe and reliable operation, a series reactor is required: L_{series} = 0.23 mH;
Order number and information text on using the series reactor, see Chapter 1.4 and Catalog NC 61.

Table 4- 95 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1052-4HG□1

Rated power	P_N	kW	21,4
Rated speed	n_N	rpm	16990
Rated torque	M_N	Nm	12
Rated current	I_N	A	44
Maximum current	I_{max}	A	88
Maximum speed	n_{max}	rpm	40000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	32200
Maximum torque	M_{max}	Nm	24
Moment of inertia [1)]	J_{rot}	kg m²	0,0087
Voltage constant	k_E	V/1000 rpm	18
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	6
Rotor weight	m_{rot}	kg	see Table 1-3

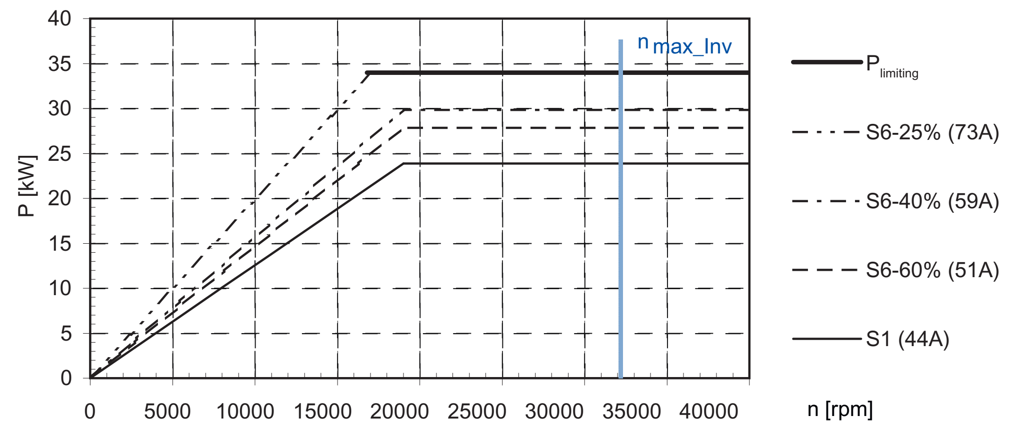


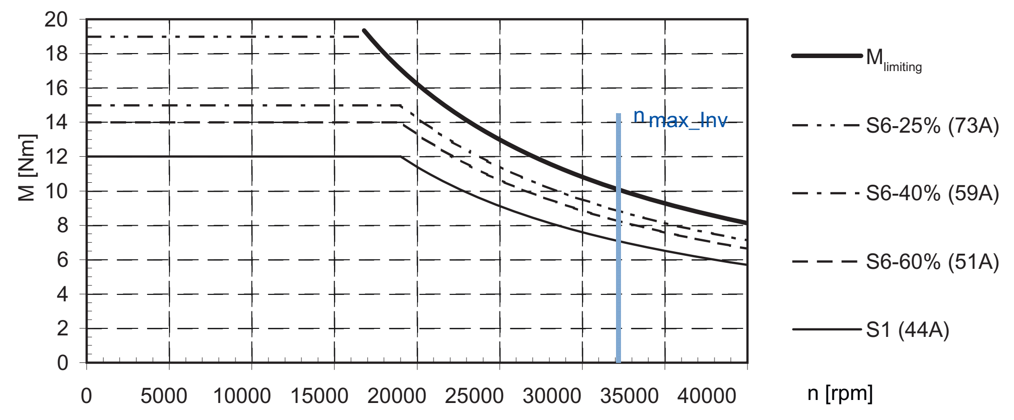


The data for duty type S6 are valid for a 1 min. duty cycle.
For safe and reliable operation, a series reactor is required: L_{series} = 0.23 mH;
Order number and information text on using the series reactor, see Chapter 1.4 and Catalog NC 61.

Table 4- 96 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1052-4HG□1

Rated power	P_N	kW	23,9
Rated speed	n_N	rpm	19000
Rated torque	M_N	Nm	12
Rated current	I_N	A	44
Maximum current	I_{max}	A	88
Maximum speed	n_{max}	rpm	40000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	32200
Maximum torque	M_{max}	Nm	24
Moment of inertia [1)]	J_{rot}	kg m^2	0,0087
Voltage constant	k_E	V/1000 rpm	18
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	6
Rotor weight	m_{rot}	kg	see Table 1-3

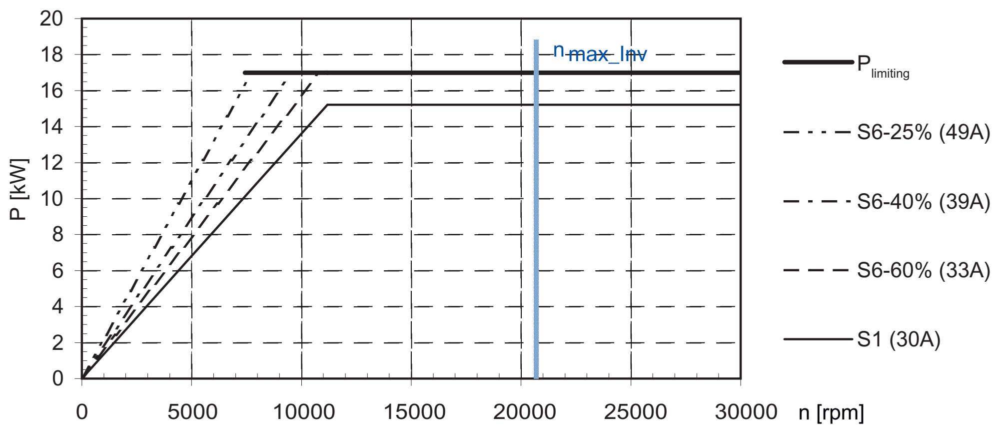


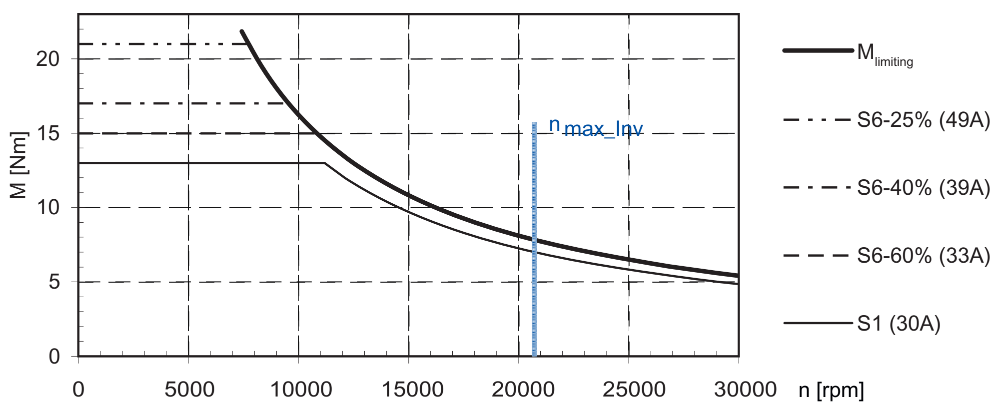


The data for duty type S6 are valid for a 1 min. duty cycle.
For safe and reliable operation, a series reactor is required: L_{series} = 0.23 mH;
Order number and information text on using the series reactor, see Chapter 1.4 and Catalog NC 61.

Table 4- 97 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1052-4WK□1

Rated power	P_N	kW	15,2
Rated speed	n_N	rpm	11180
Rated torque	M_N	Nm	13
Rated current	I_N	A	30
Maximum current	I_{max}	A	60
Maximum speed	n_{max}	rpm	30000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	20700
Maximum torque	M_{max}	Nm	26
Moment of inertia	J_{rot}	kg m²	0,0011
Voltage constant	k_E	V/1000 rpm	28
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	6
Rotor weight	m_{rot}	kg	see Table 1-3

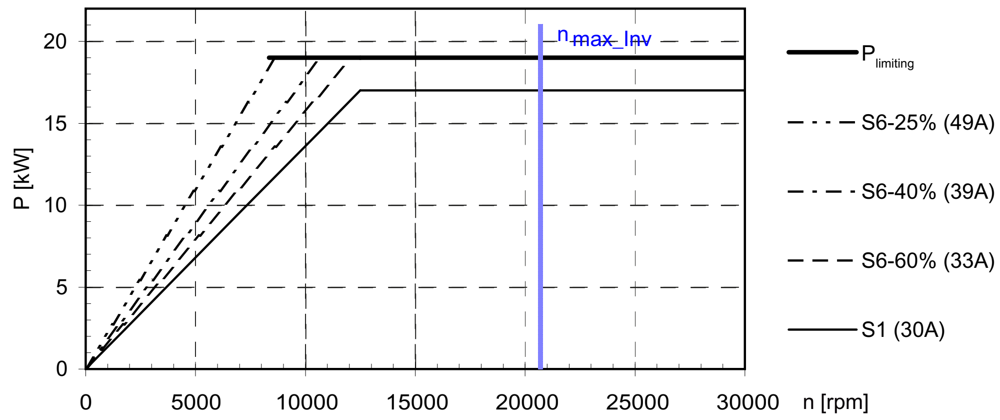


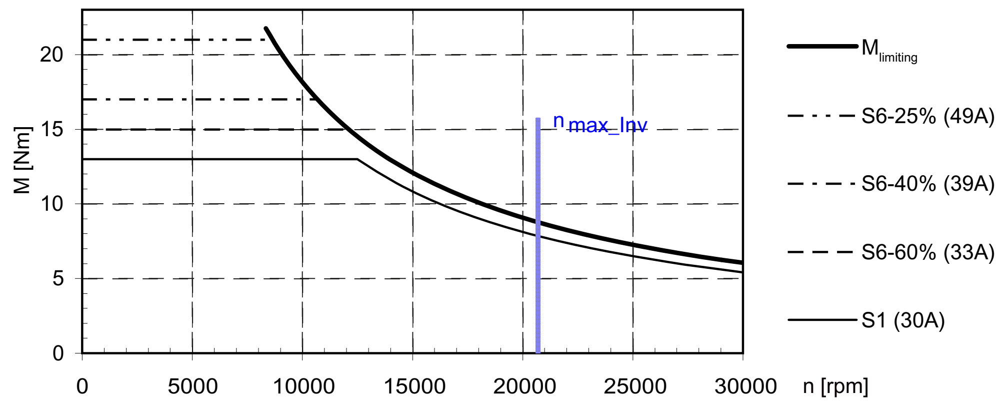


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 98 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1052-4WK□1

Rated power	P_N	kW	17,5
Rated speed	n_N	rpm	12500
Rated torque	M_N	Nm	13
Rated current	I_N	A	30
Maximum current	I_{max}	A	60
Maximum speed	n_{max}	rpm	30000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	20700
Maximum torque	M_{max}	Nm	26
Moment of inertia	J_{rot}	kg m²	0,0011
Voltage constant	k_E	V/1000 rpm	28,4
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	6
Rotor weight	m_{rot}	kg	see Table 1-3

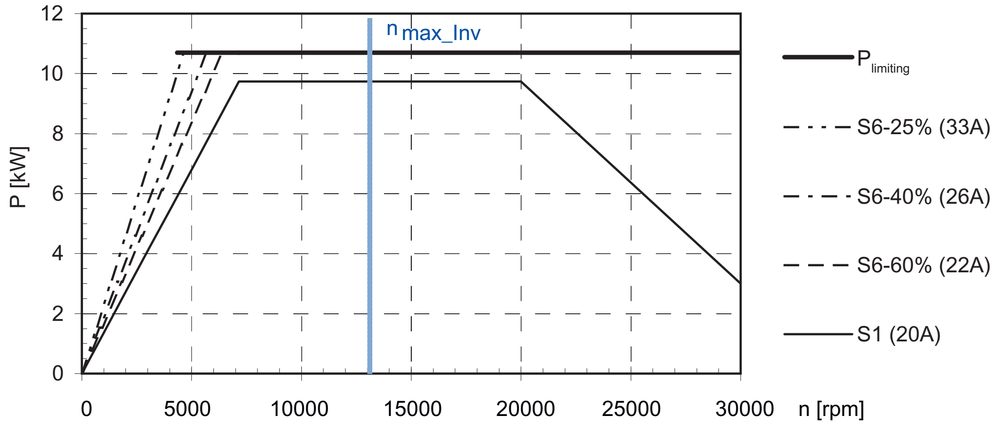


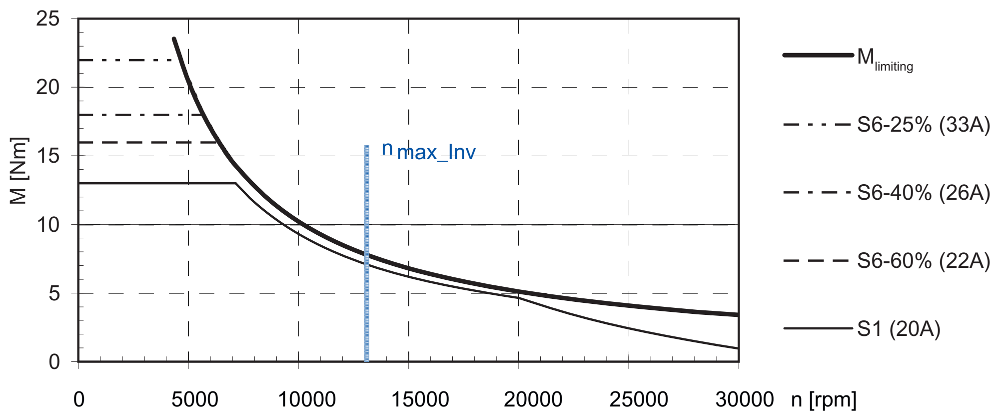


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 99 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1052-4WN□1

Rated power	P_N	kW	9,7
Rated speed	n_N	rpm	7150
Rated torque	M_N	Nm	13
Rated current	I_N	A	20
Maximum current	I_{max}	A	40
Maximum speed	n_{max}	rpm	30000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	13100
Maximum torque	M_{max}	Nm	26
Moment of inertia	J_{rot}	kg m^2	0,0011
Voltage constant	k_E	V/1000 rpm	44
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	6
Rotor weight	m_{rot}	kg	see Table 1-3

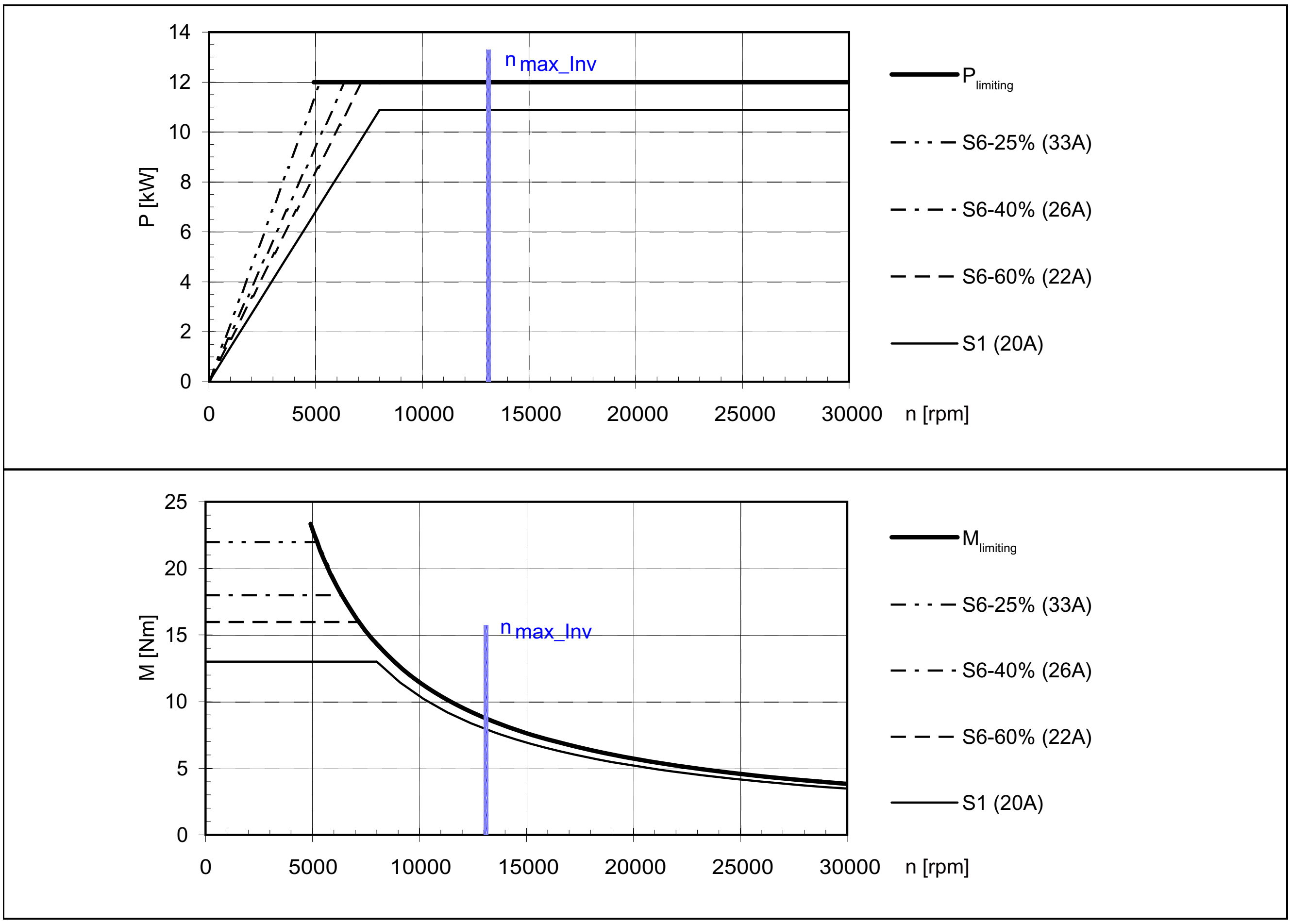




The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 100 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1052-4WN□1

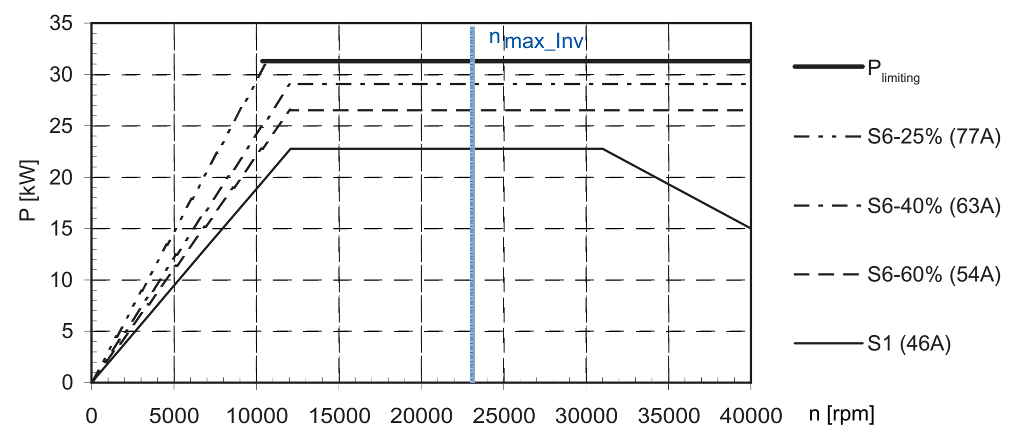
Rated power	P_N	kW	11
Rated speed	n_N	rpm	8000
Rated torque	M_N	Nm	13
Rated current	I_N	A	20
Maximum current	I_{max}	A	40
Maximum speed	n_{max}	rpm	30000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	13100
Maximum torque	M_{max}	Nm	26
Moment of inertia	J_{rot}	kg m^2	0,0011
Voltage constant	k_E	V/1000 rpm	44
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	6
Rotor weight	m_{rot}	kg	see Table 1-3

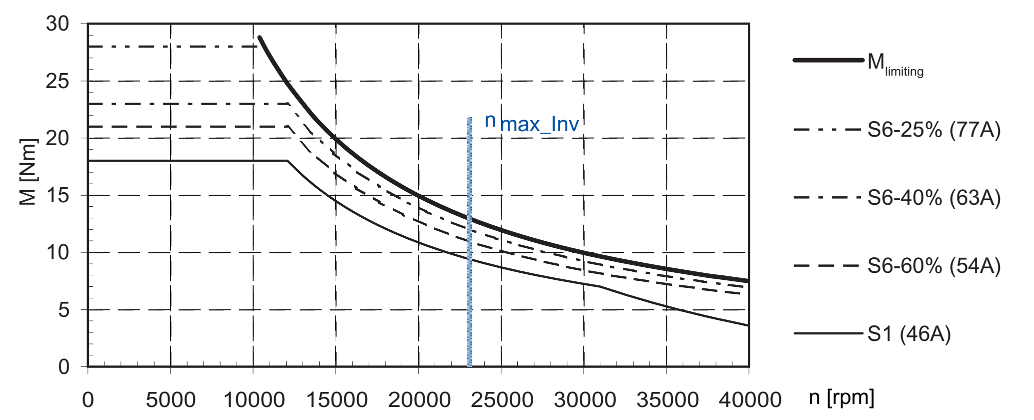


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 101 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1053-4HH□1

Rated power	P_N	kW	22,8
Rated speed	n_N	rpm	12070
Rated torque	M_N	Nm	18
Rated current	I_N	A	46
Maximum current	I_{max}	A	92
Maximum speed	n_{max}	rpm	40000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	23100
Maximum torque	M_{max}	Nm	36
Moment of inertia	J_{rot}	kg m²	0,00128
Voltage constant	k_E	V/1000 rpm	25
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	8,5
Rotor weight	m_{rot}	kg	see Table 1-3

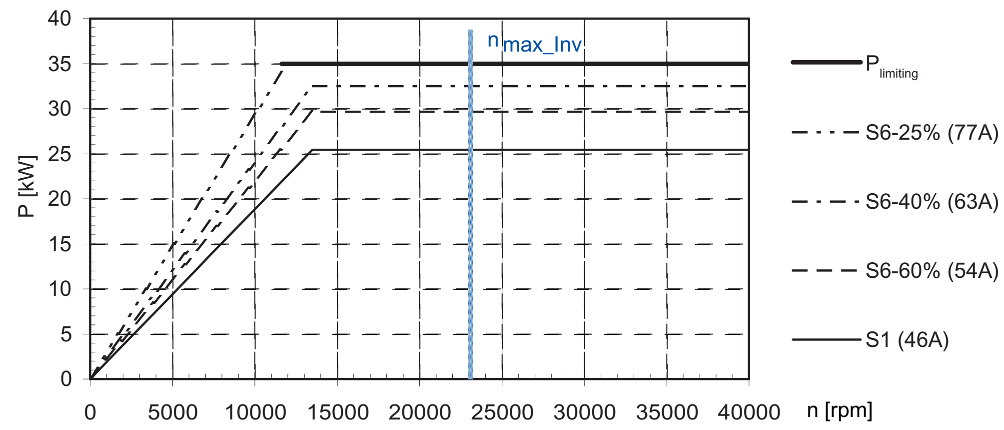


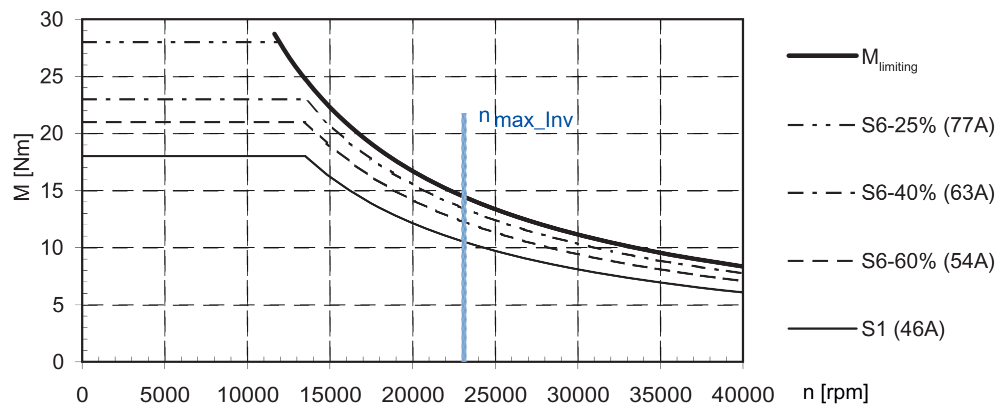


The data for duty type S6 are valid for a 1 min. duty cycle.
For safe and reliable operation, a series reactor is required: L_{series} = 0.32 mH;
Order number and information text on using the series reactor, see Chapter 1.4 and Catalog NC 61.

Table 4- 102 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1053-4HH□1

Rated power	P_N	kW	25,5
Rated speed	n_N	rpm	13500
Rated torque	M_N	Nm	18
Rated current	I_N	A	46
Maximum current	I_{max}	A	92
Maximum speed	n_{max}	rpm	40000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	23100
Maximum torque	M_{max}	Nm	36
Moment of inertia	J_{rot}	kg m^2	0,00128
Voltage constant	k_E	V/1000 rpm	25
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	8,5
Rotor weight	m_{rot}	kg	see Table 1-3

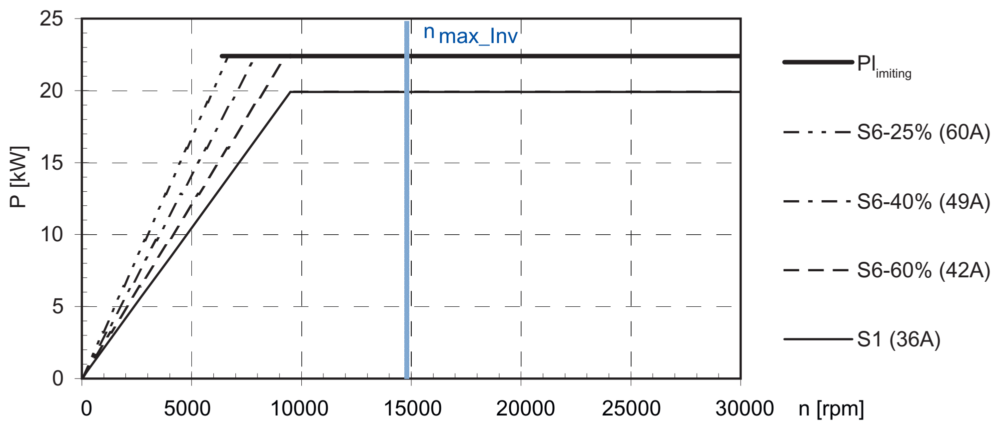


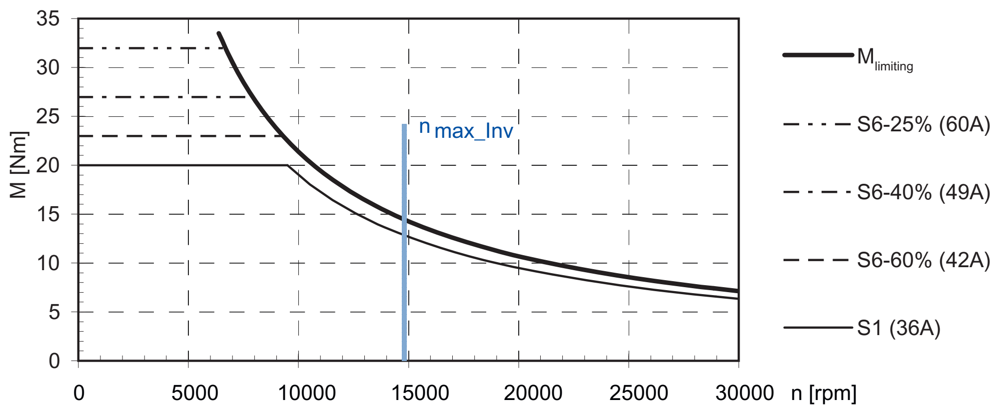


The data for duty type S6 are valid for a 1 min. duty cycle.
For safe and reliable operation, a series reactor is required: L_{series} = 0.32 mH;
Order number and information text on using the series reactor, see Chapter 1.4 and Catalog NC 61.

Table 4- 103 SINAMICS, 3-ph. 380 V AC, Smart Line Module, SLM), 1FE1053-4WJ□1

Rated power	P_N	kW	19,9
Rated speed	n_N	rpm	9500
Rated torque	M_N	Nm	20
Rated current	I_N	A	36
Maximum current	I_{max}	A	72
Maximum speed	n_{max}	rpm	30000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	14800
Maximum torque	M_{max}	Nm	39
Moment of inertia [1)]	J_{rot}	kg m²	0,00163
Voltage constant	k_E	V/1000 rpm	39
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	8,5
Rotor weight	m_{rot}	kg	see Table 1-3

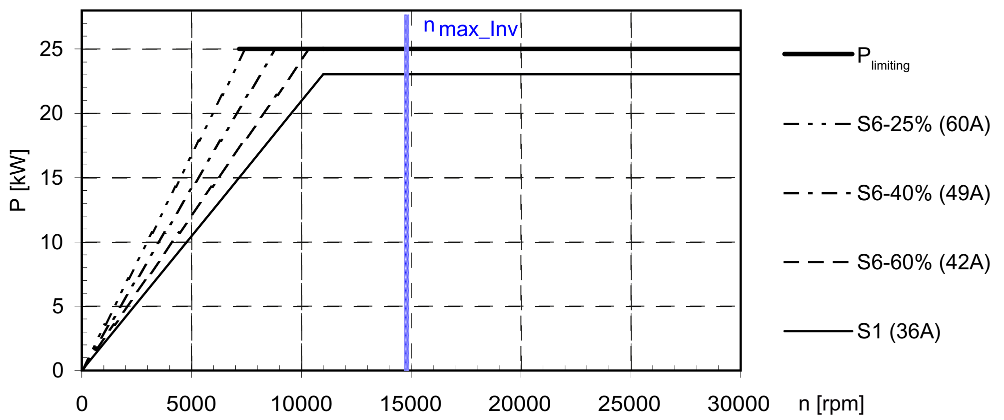


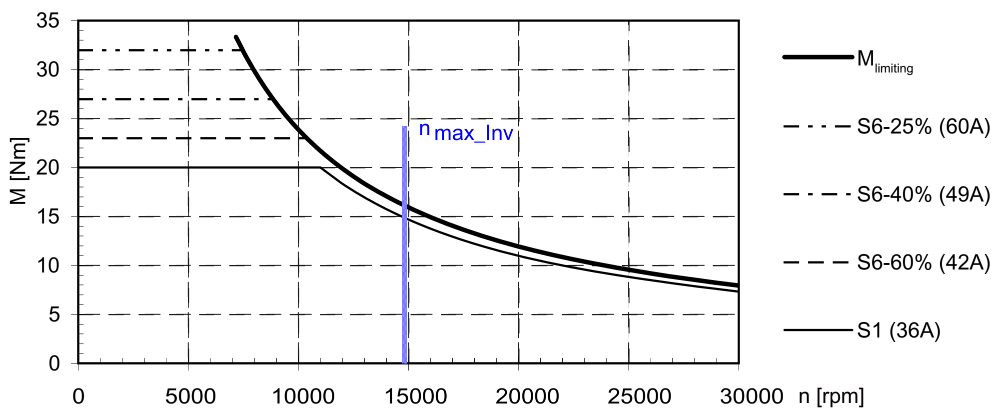


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 104 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1053-4WJ□1

Rated power	P_N	kW	23
Rated speed	n_N	rpm	11000
Rated torque	M_N	Nm	20
Rated current	I_N	A	36
Maximum current	I_{max}	A	72
Maximum speed	n_{max}	rpm	30000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	14800
Maximum torque	M_{max}	Nm	39
Moment of inertia [1)]	J_{rot}	kg m²	0,00163
Voltage constant	k_E	V/1000 rpm	39
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	8,5
Rotor weight	m_{rot}	kg	see Table 1-3

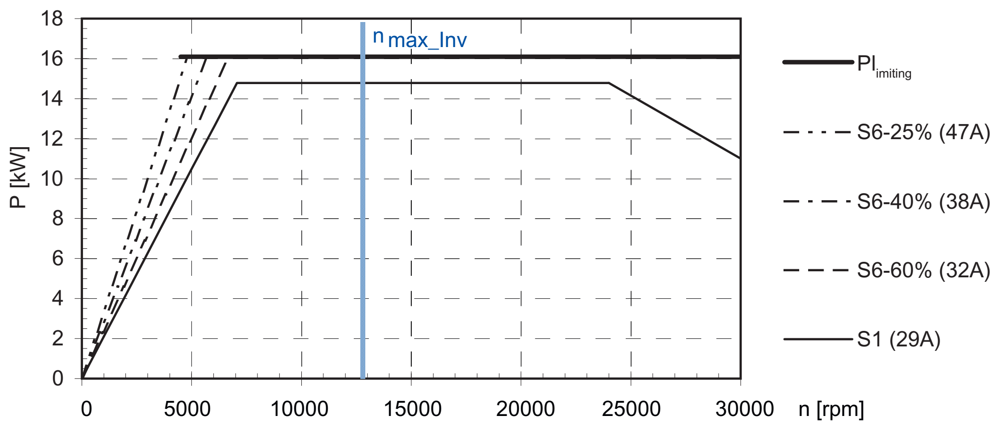


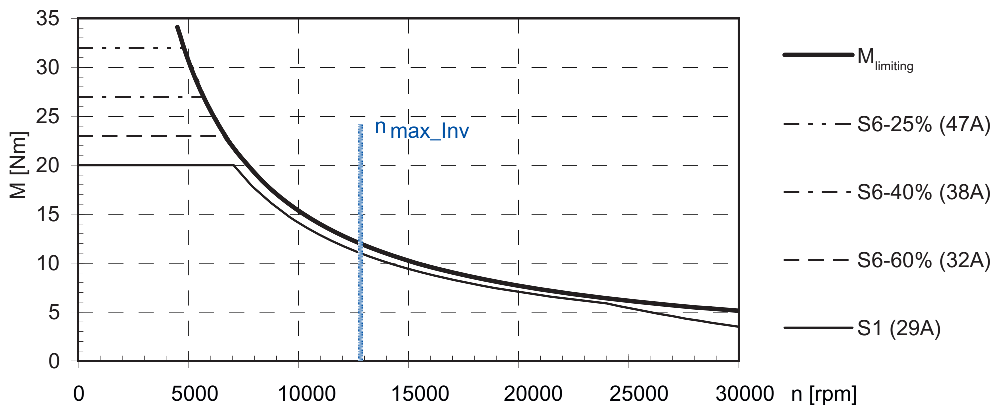


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 105 SINAMICS, 3-ph. 3800 V AC, Smart Line Module, (SLM), 1FE1053-4WN□1

Rated power	P_N	kW	14,8
Rated speed	n_N	rpm	7060
Rated torque	M_N	Nm	20
Rated current	I_N	A	29
Maximum current	I_{max}	A	58
Maximum speed	n_{max}	rpm	30000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	12800
Maximum torque	M_{max}	Nm	39
Moment of inertia	J_{rot}	kg m²	0,00163
Voltage constant	k_E	V/1000 rpm	45
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	8,5
Rotor weight	m_{rot}	kg	see Table 1-3

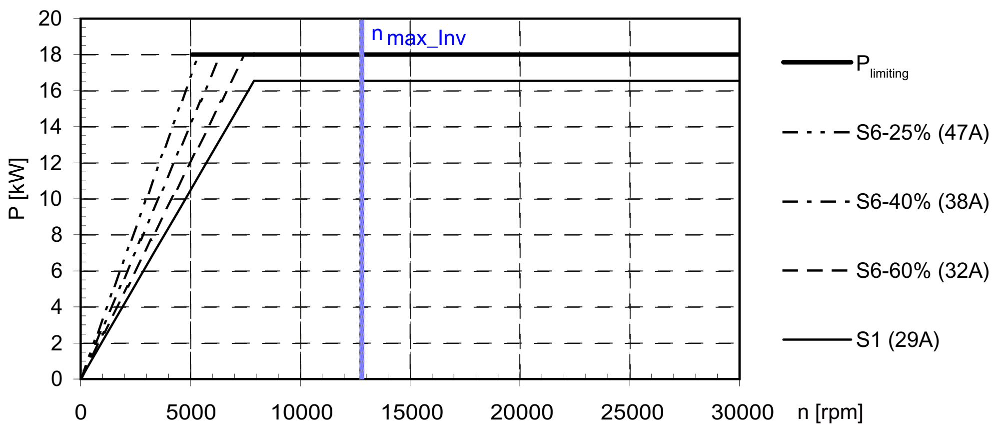


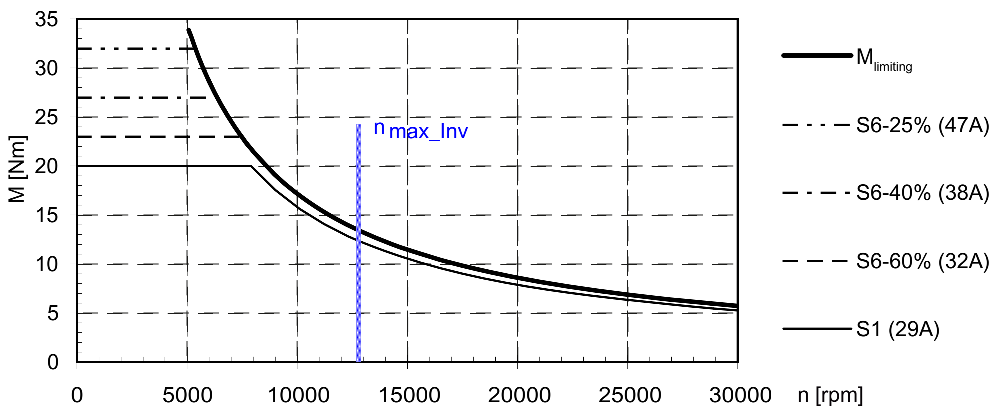


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 106 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1053-4WN□1

Rated power	P_N	kW	16,5
Rated speed	n_N	rpm	7900
Rated torque	M_N	Nm	20
Rated current	I_N	A	29
Maximum current	I_{max}	A	58
Maximum speed	n_{max}	rpm	30000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	12800
Maximum torque	M_{max}	Nm	39
Moment of inertia	J_{rot}	kg m²	0,00163
Voltage constant	k_E	V/1000 rpm	45
Thermal time constant	T_{therm}	min	1
Stator weight with cooling jacket	m_{st}	kg	8,5
Rotor weight	m_{rot}	kg	see Table 1-3

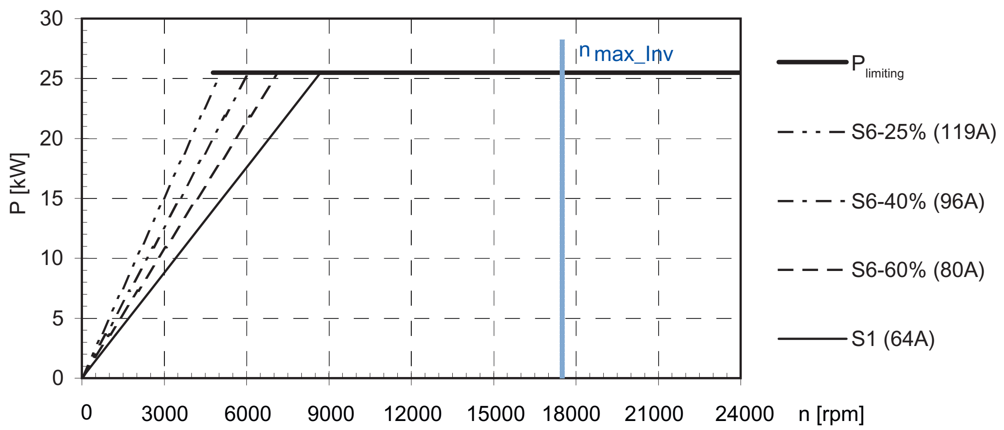


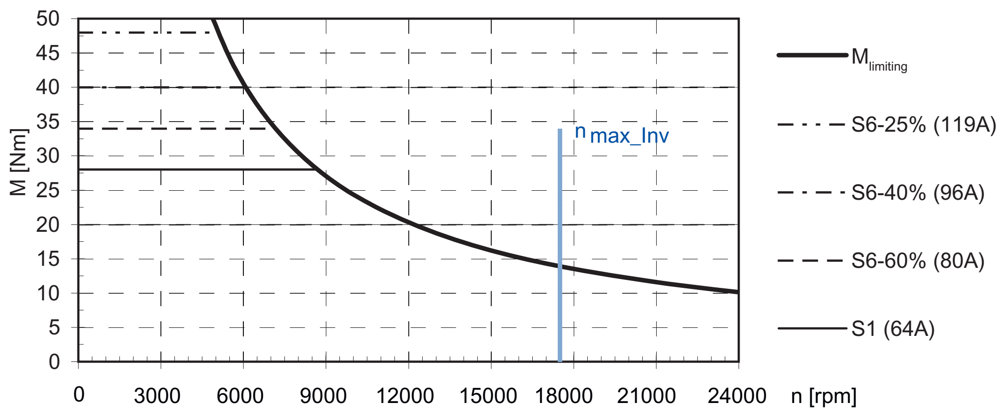


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 107 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1072-4WH□1

Rated power	P_N	kW	25,4
Rated speed	n_N	rpm	8670
Rated torque	M_N	Nm	28
Rated current	I_N	A	64
Maximum current	I_{max}	A	128
Maximum speed	n_{max}	rpm	24000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	17500
Maximum torque	M_{max}	Nm	53
Moment of inertia	J_{rot}	kg m²	0,00287
Voltage constant	k_E	V/1000 rpm	33
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	9
Rotor weight	m_{rot}	kg	see Table 1-3

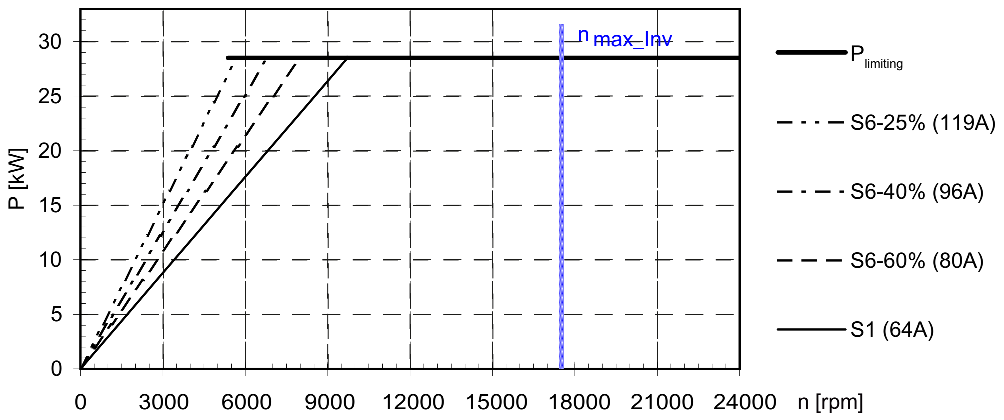


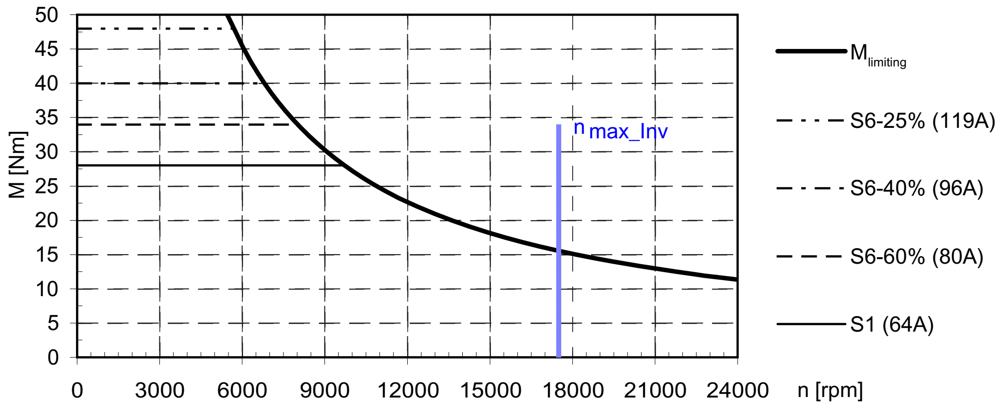


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 108 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1072-4WH□1

Rated power	P_N	kW	28,5
Rated speed	n_N	rpm	9700
Rated torque	M_N	Nm	28
Rated current	I_N	A	64
Maximum current	I_{max}	A	128
Maximum speed	n_{max}	rpm	24000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	17500
Maximum torque	M_{max}	Nm	53
Moment of inertia	J_{rot}	kg m^2	0,00287
Voltage constant	k_E	V/1000 rpm	33
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	9
Rotor weight	m_{rot}	kg	see Table 1-3

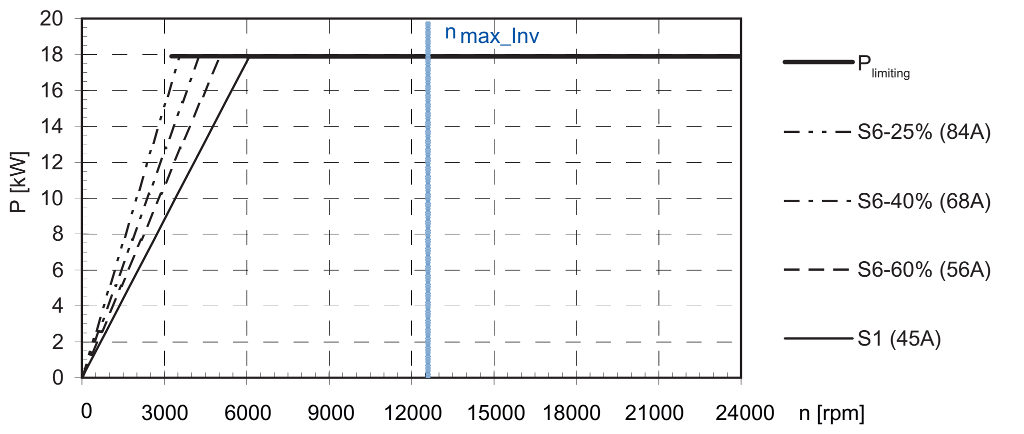


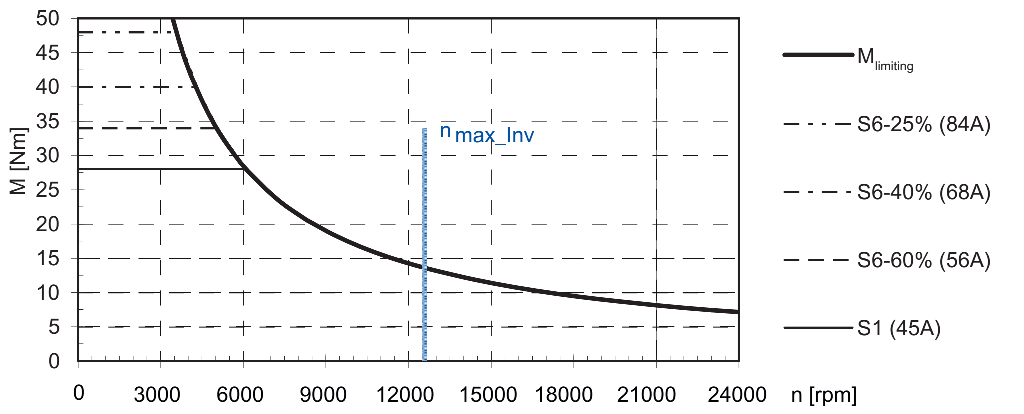


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 109 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1072-4WL□1

Rated power	P_N	kW	17,8
Rated speed	n_N	rpm	6080
Rated torque	M_N	Nm	28
Rated current	I_N	A	45
Maximum current	I_{max}	A	90
Maximum speed	n_{max}	rpm	24000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	12600
Maximum torque	M_{max}	Nm	53
Moment of inertia	J_{rot}	kg m²	0,00287
Voltage constant	k_E	V/1000 rpm	46
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	9
Rotor weight	m_{rot}	kg	see Table 1-3

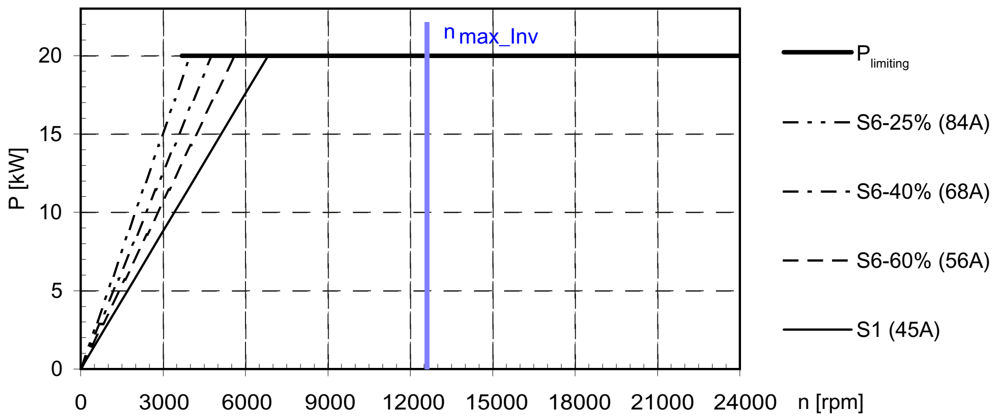


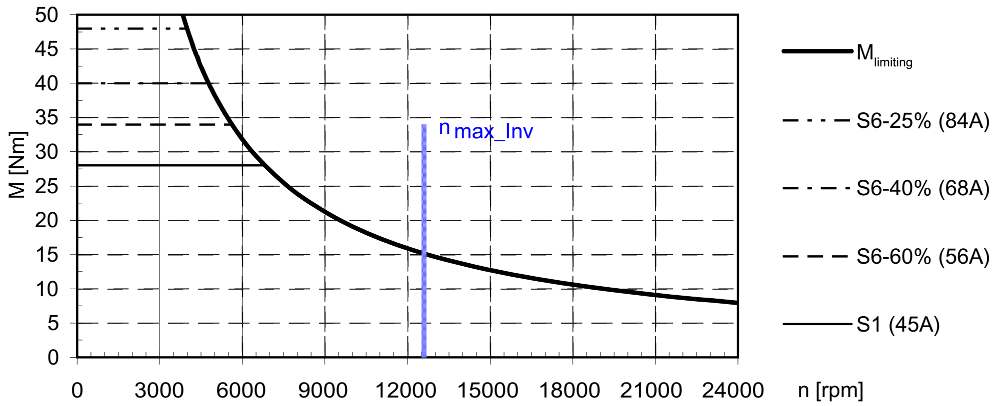


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 110 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1072-4WL□1

Rated power	P_N	kW	20
Rated speed	n_N	rpm	6800
Rated torque	M_N	Nm	28
Rated current	I_N	A	45
Maximum current	I_{max}	A	90
Maximum speed	n_{max}	rpm	24000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	12600
Maximum torque	M_{max}	Nm	53
Moment of inertia	J_{rot}	kg m²	0,00287
Voltage constant	k_E	V/1000 rpm	46
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	9
Rotor weight	m_{rot}	kg	see Table 1-3

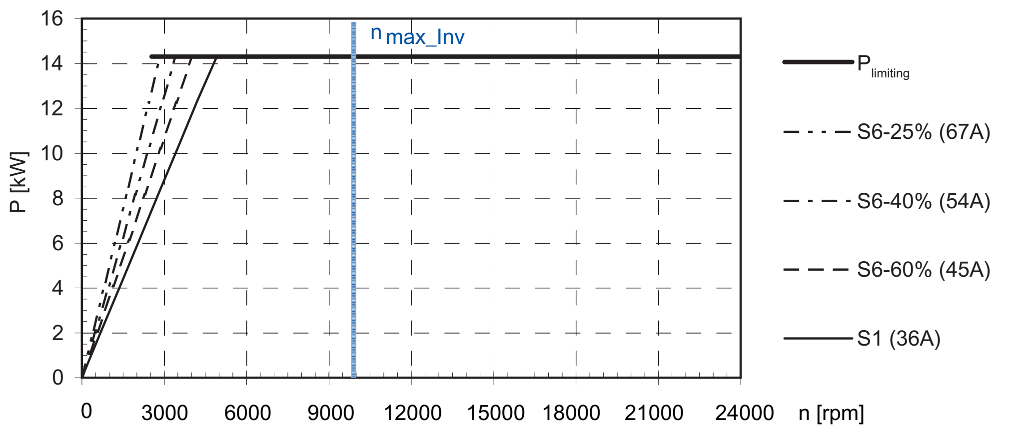


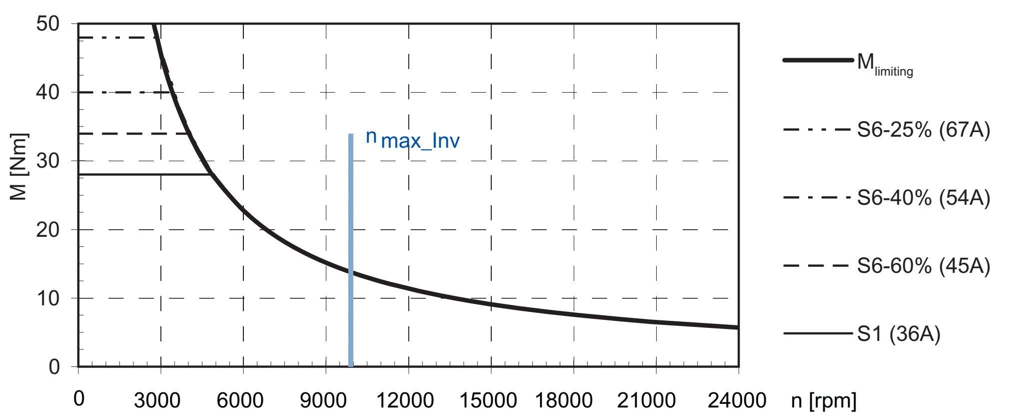


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 111 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1072-4WN□1

Rated power	P_N	kW	14,4
Rated speed	n_N	rpm	4920
Rated torque	M_N	Nm	28
Rated current	I_N	A	36
Maximum current	I_{max}	A	72
Maximum speed	n_{max}	rpm	24000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	9900
Maximum torque	M_{max}	Nm	53
Moment of inertia	J_{rot}	kg m²	0,00287
Voltage constant	k_E	V/1000 rpm	58
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	9
Rotor weight	m_{rot}	kg	see Table 1-3

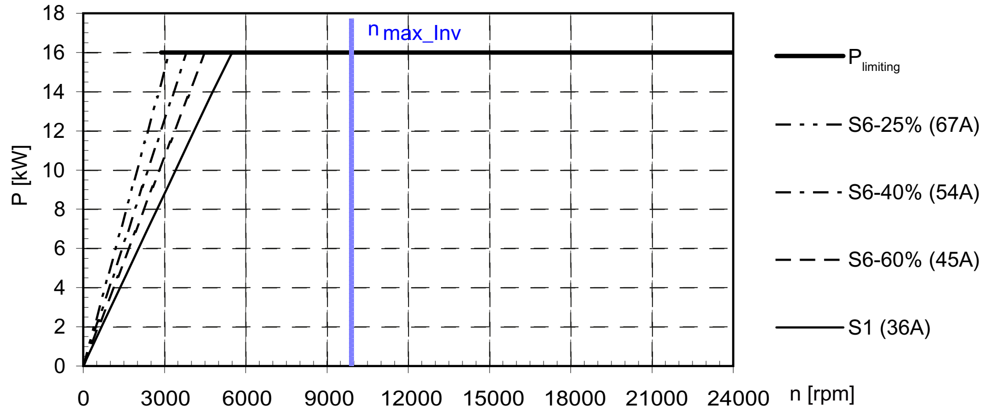


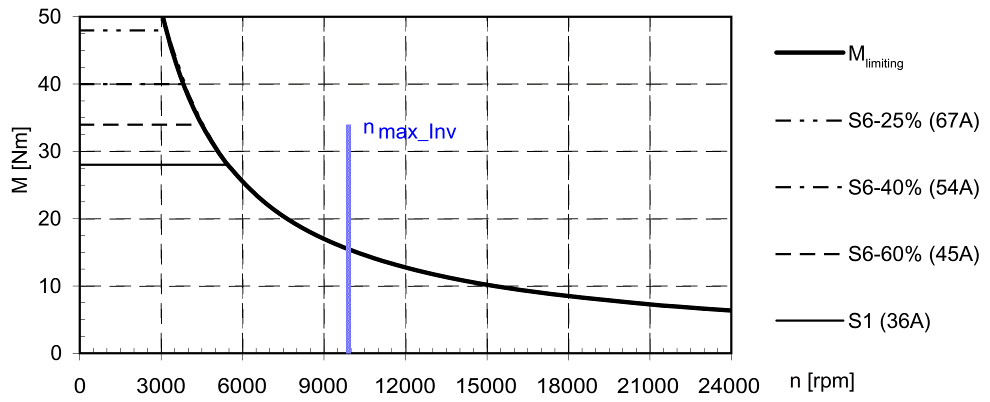


The data for duty type S6 are valid for a 1 min. duty cycle

Table 4- 112 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1072-4WN□1

Rated power	P_N	kW	16
Rated speed	n_N	rpm	5500
Rated torque	M_N	Nm	28
Rated current	I_N	A	36
Maximum current	I_{max}	A	72
Maximum speed	n_{max}	rpm	24000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	9900
Maximum torque	M_{max}	Nm	53
Moment of inertia	J_{rot}	kg m²	0,00287
Voltage constant	k_E	V/1000 rpm	58
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	9
Rotor weight	m_{rot}	kg	see Table 1-3





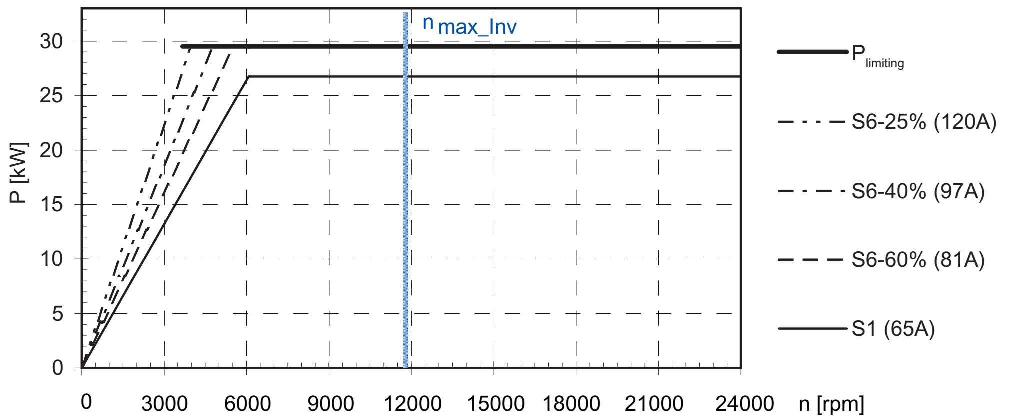
The data for duty type S6 are valid for a 1 min. duty cycle.

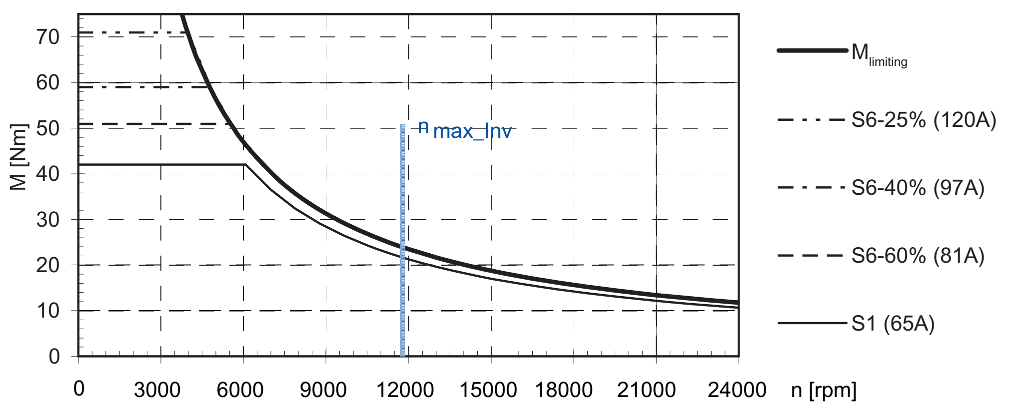
See also

Technical data (Page 27)

Table 4- 113 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1073-4WN□1

Rated power	P_N	kW	26,7
Rated speed	n_N	rpm	6080
Rated torque	M_N	Nm	42
Rated current	I_N	A	65
Maximum current	I_{max}	A	130
Maximum speed	n_{max}	rpm	24000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	11800
Maximum torque	M_{max}	Nm	80
Moment of inertia	J_{rot}	kg m²	0,0043
Voltage constant	k_E	V/1000 rpm	49
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	12,5
Rotor weight	m_{rot}	kg	see Table 1-3

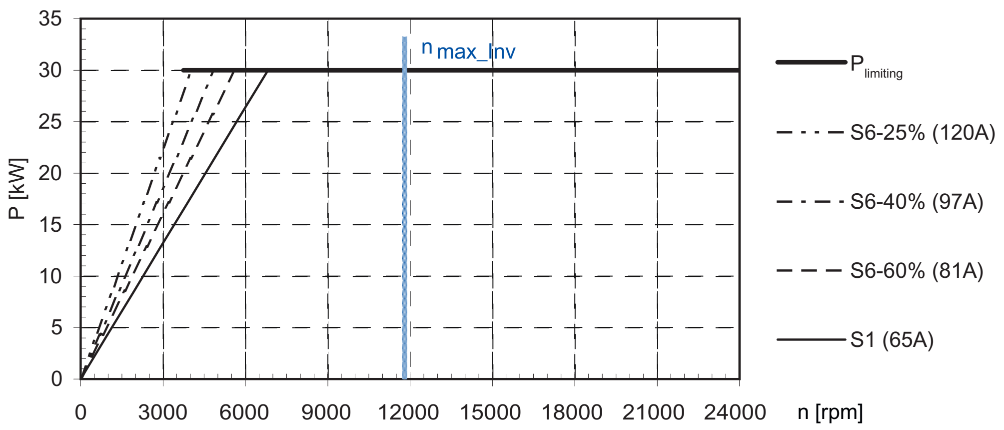


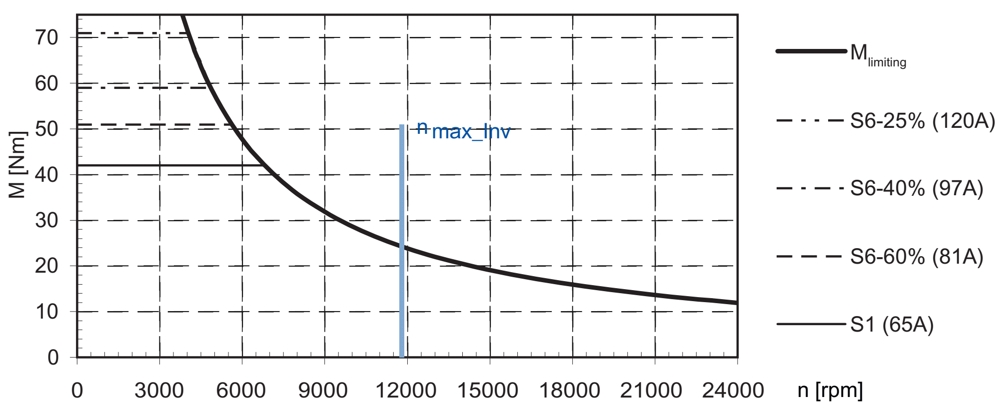


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 114 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1073-4WN□1

Rated power	P_N	kW	30
Rated speed	n_N	rpm	6800
Rated torque	M_N	Nm	42
Rated current	I_N	A	65
Maximum current	I_{max}	A	130
Maximum speed	n_{max}	rpm	24000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	11800
Maximum torque	M_{max}	Nm	80
Moment of inertia	J_{rot}	kg m²	0,0043
Voltage constant	k_E	V/1000 rpm	49
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	12,5
Rotor weight	m_{rot}	kg	see Table 1-3

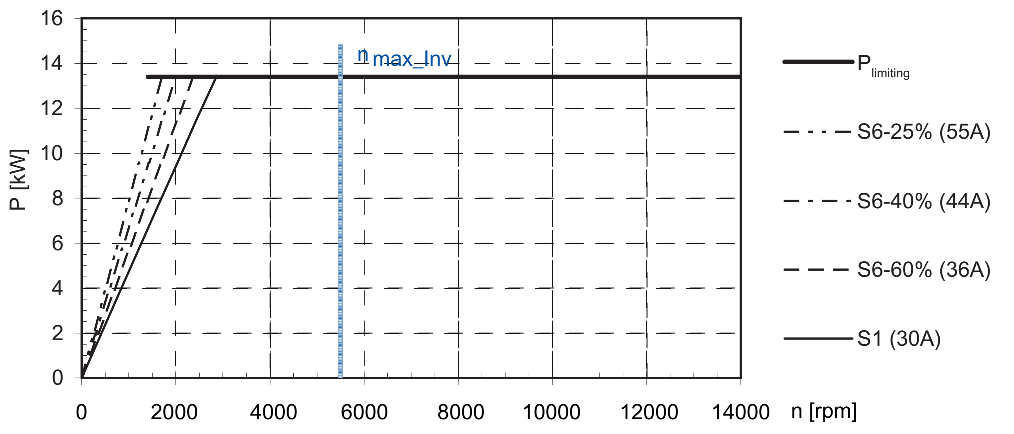


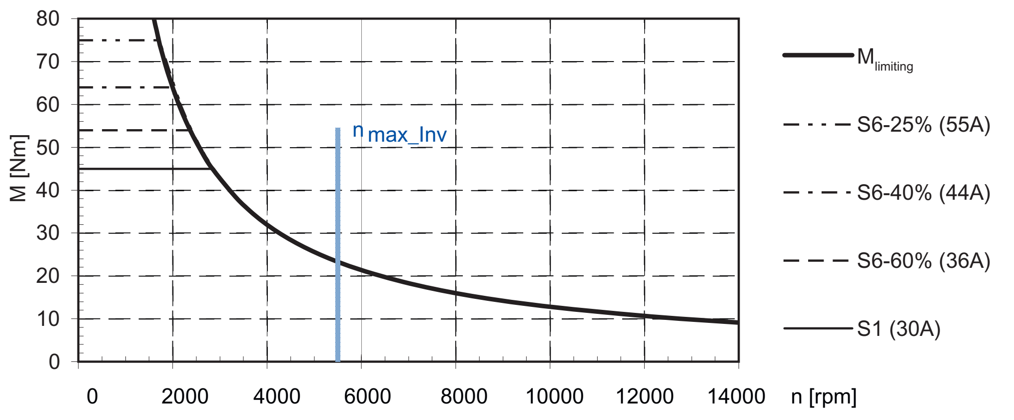


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 115 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1073-4WT□1

Rated power	P_N	kW	13,5
Rated speed	n_N	rpm	2860
Rated torque	M_N	Nm	45
Rated current	I_N	A	30
Maximum current	I_{max}	A	60
Maximum speed	n_{max}	rpm	14000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5500
Maximum torque	M_{max}	Nm	80
Moment of inertia	J_{rot}	kg m^2	0,0043
Voltage constant	k_E	V/1000 rpm	104
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	12,5
Rotor weight	m_{rot}	kg	see Table 1-3

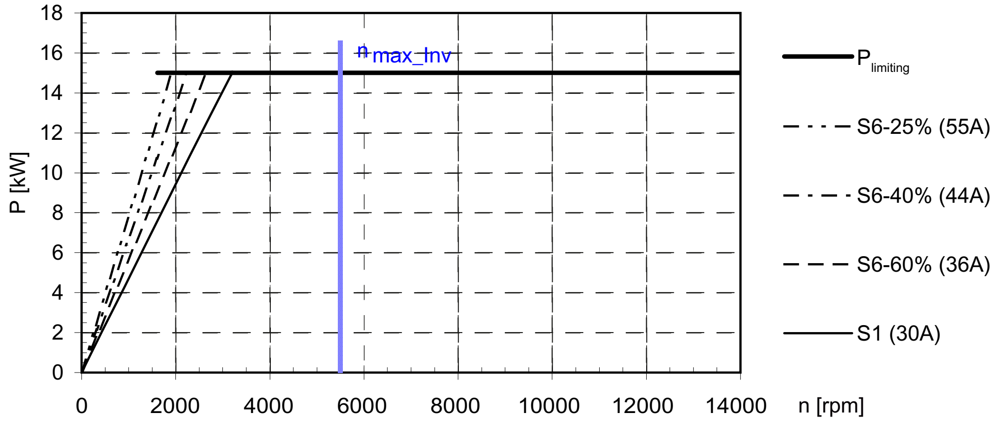


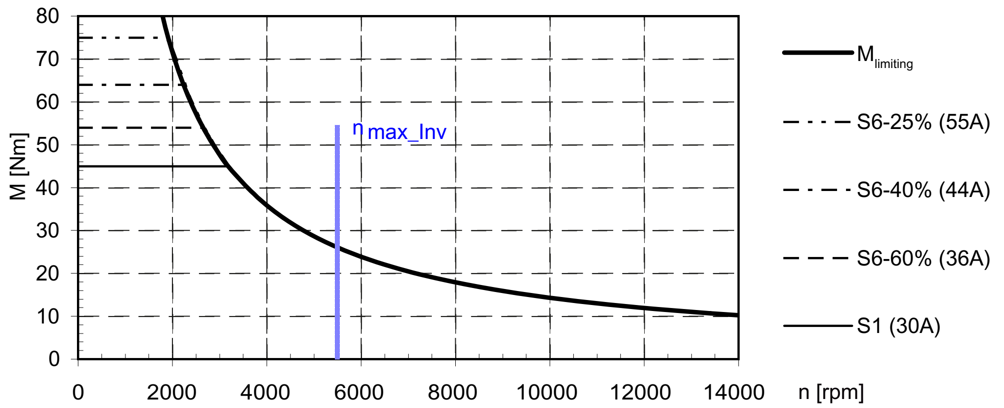


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 116 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1073-4WT□1

Rated power	P_N	kW	15
Rated speed	n_N	rpm	3200
Rated torque	M_N	Nm	45
Rated current	I_N	A	30
Maximum current	I_{max}	A	60
Maximum speed	n_{max}	rpm	14000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5500
Maximum torque	M_{max}	Nm	80
Moment of inertia	J_{rot}	kg m²	0,0043
Voltage constant	k_E	V/1000 rpm	104
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	12,5
Rotor weight	m_{rot}	kg	see Table 1-3

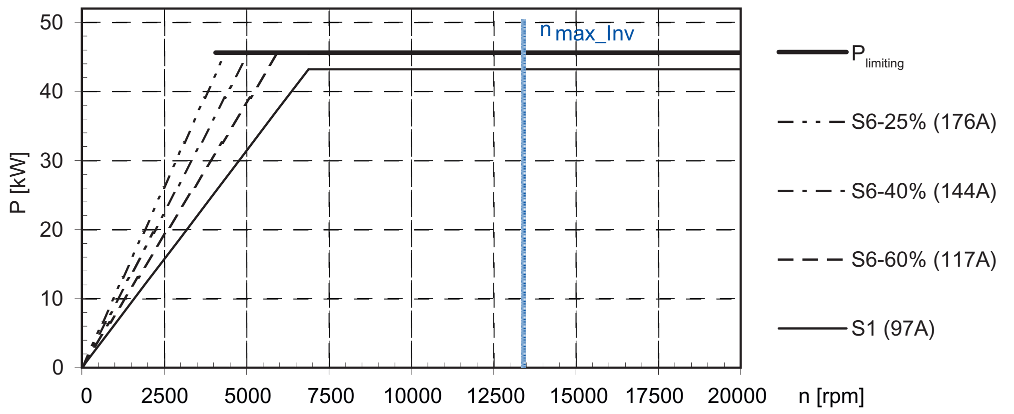


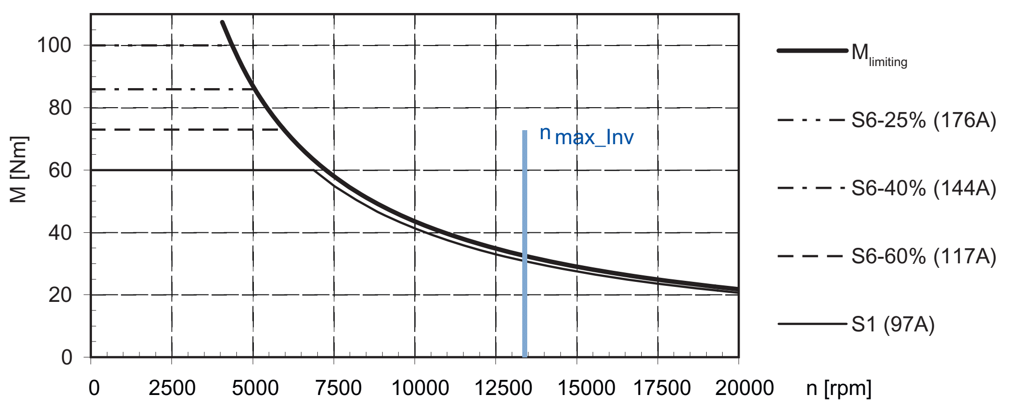


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 117 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1074-4WM□1

Rated power	P_N	kW	43,2
Rated speed	n_N	rpm	6880
Rated torque	M_N	Nm	60
Rated current	I_N	A	97
Maximum current	I_{max}	A	194
Maximum speed	n_{max}	rpm	20000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	13400
Maximum torque	M_{max}	Nm	107
Moment of inertia	J_{rot}	kg m^2	0,00573
Voltage constant	k_E	V/1000 rpm	43
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	16,5
Rotor weight	m_{rot}	kg	see Table 1-3

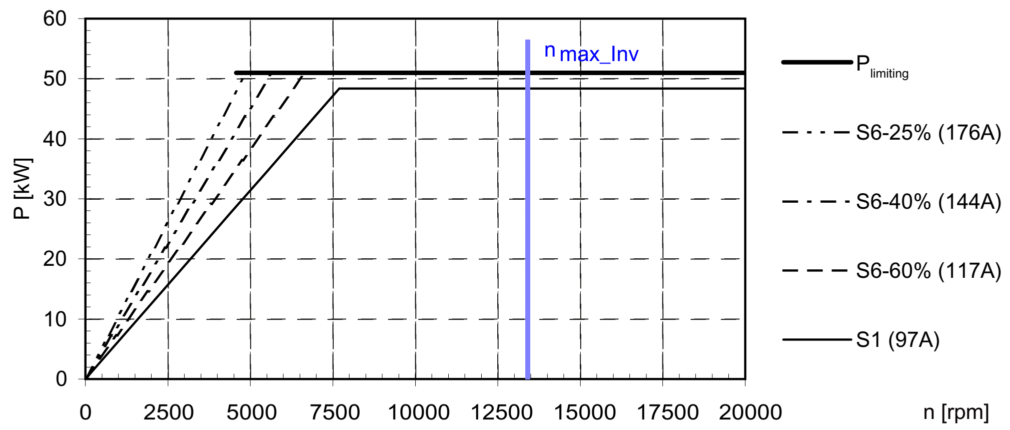


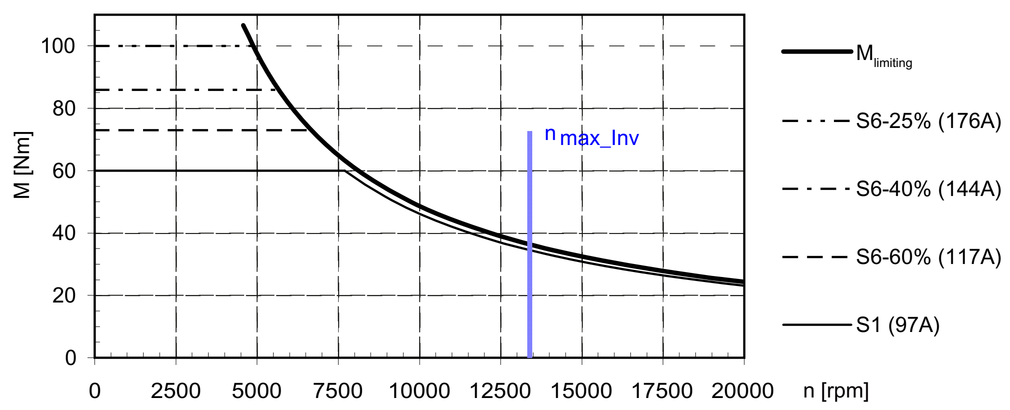


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 118 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1074-4WM□1

Rated power	P_N	kW	48
Rated speed	n_N	rpm	7700
Rated torque	M_N	Nm	60
Rated current	I_N	A	97
Maximum current	I_{max}	A	194
Maximum speed	n_{max}	rpm	20000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	13400
Maximum torque	M_{max}	Nm	107
Moment of inertia	J_{rot}	kg m²	0,00573
Voltage constant	k_E	V/1000 rpm	43
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	16,5
Rotor weight	m_{rot}	kg	see Table 1-3

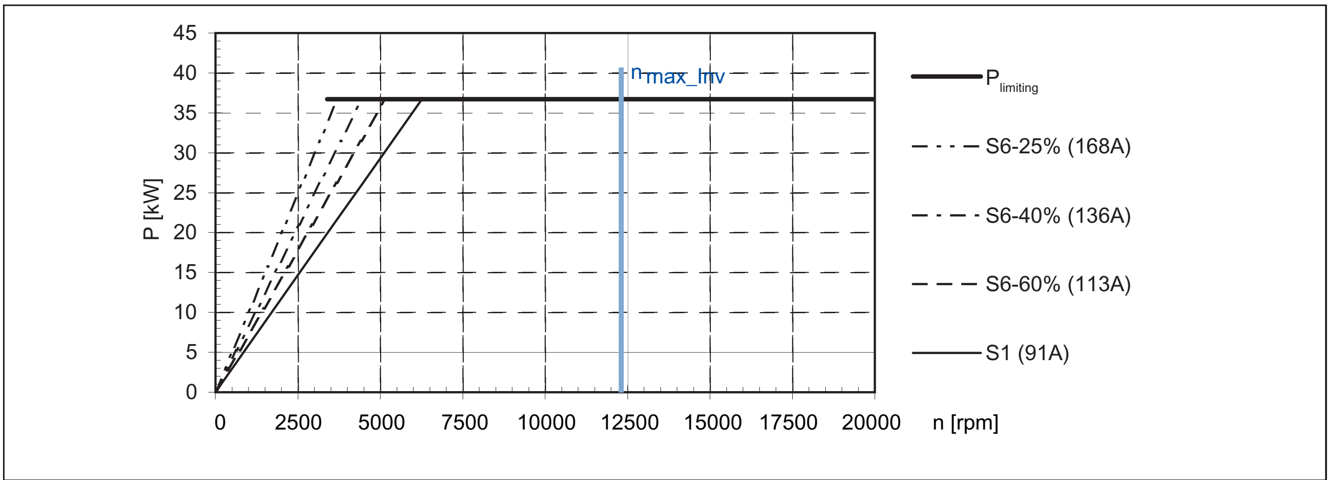


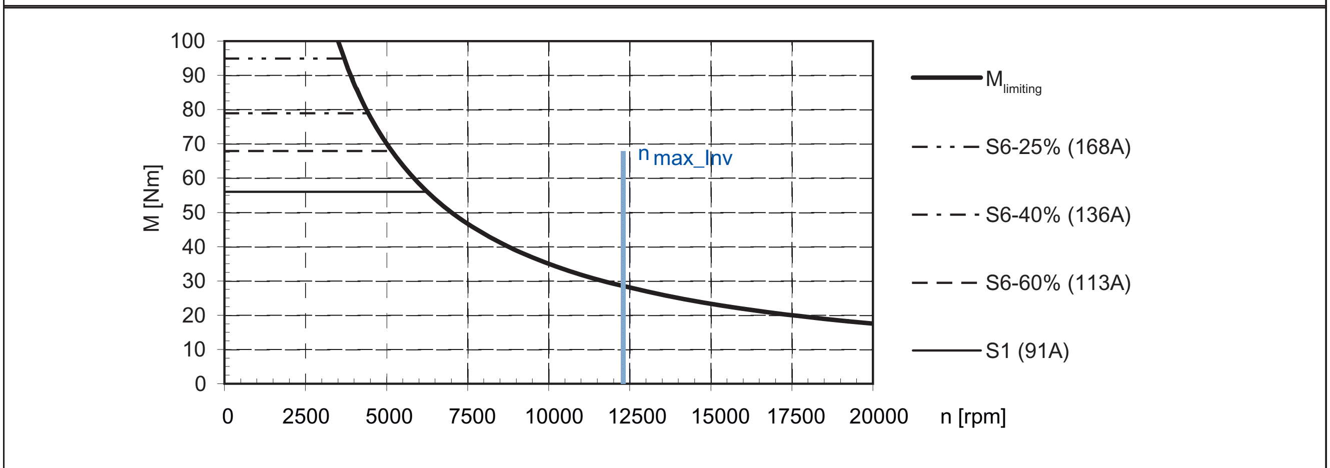


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 119 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1074-4WN□1

Rated power	P_N	kW	36,7
Rated speed	n_N	rpm	6260
Rated torque	M_N	Nm	56
Rated current	I_N	A	91
Maximum current	I_{max}	A	182
Maximum speed	n_{max}	rpm	20000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	12300
Maximum torque	M_{max}	Nm	107
Moment of inertia	J_{rot}	kg m²	0,00573
Voltage constant	k_E	V/1000 rpm	47
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	16,5
Rotor weight	m_{rot}	kg	see Table 1-3

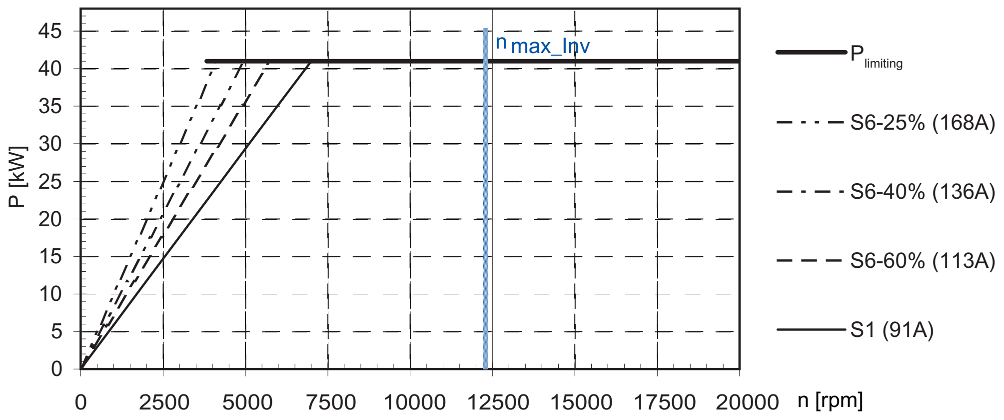


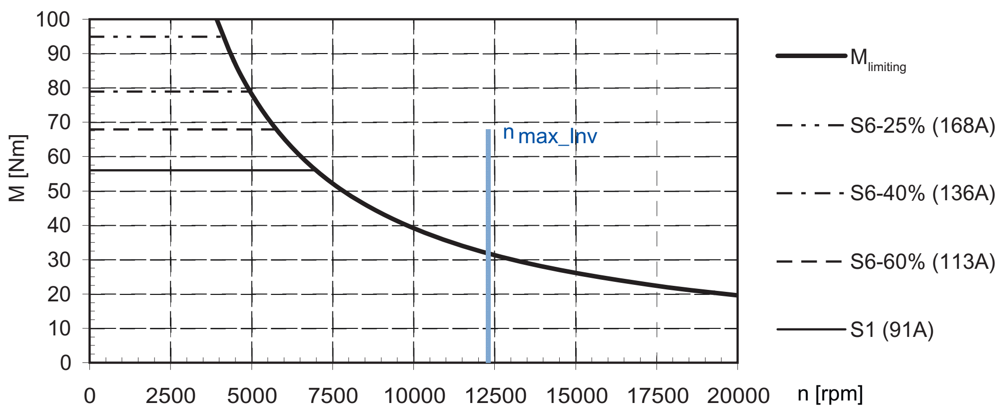


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 120 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1074-4WN□1

Rated power	P_N	kW	41
Rated speed	n_N	rpm	7000
Rated torque	M_N	Nm	56
Rated current	I_N	A	91
Maximum current	I_{max}	A	182
Maximum speed	n_{max}	rpm	20000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	12300
Maximum torque	M_{max}	Nm	107
Moment of inertia	J_{rot}	kg m²	0,00573
Voltage constant	k_E	V/1000 rpm	47
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	16,5
Rotor weight	m_{rot}	kg	see Table 1-3

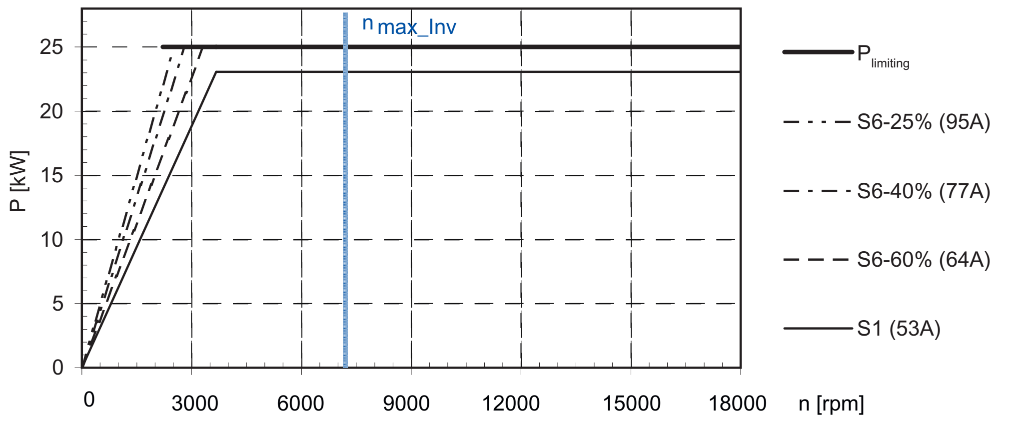


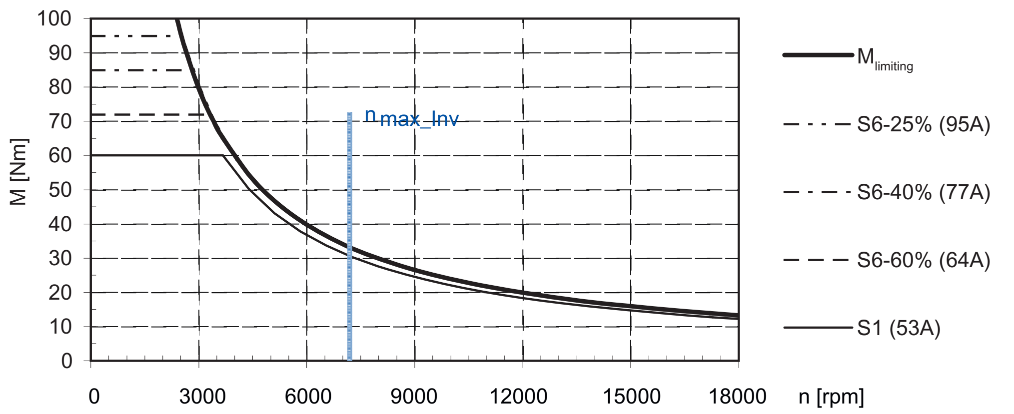


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 121 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1074-4WT□1

Rated power	P_N	kW	23,1
Rated speed	n_N	rpm	3670
Rated torque	M_N	Nm	60
Rated current	I_N	A	53
Maximum current	I_{max}	A	106
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7200
Maximum torque	M_{max}	Nm	107
Moment of inertia	J_{rot}	kg m²	0,00573
Voltage constant	k_E	V/1000 rpm	80
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	16,5
Rotor weight	m_{rot}	kg	see Table 1-3

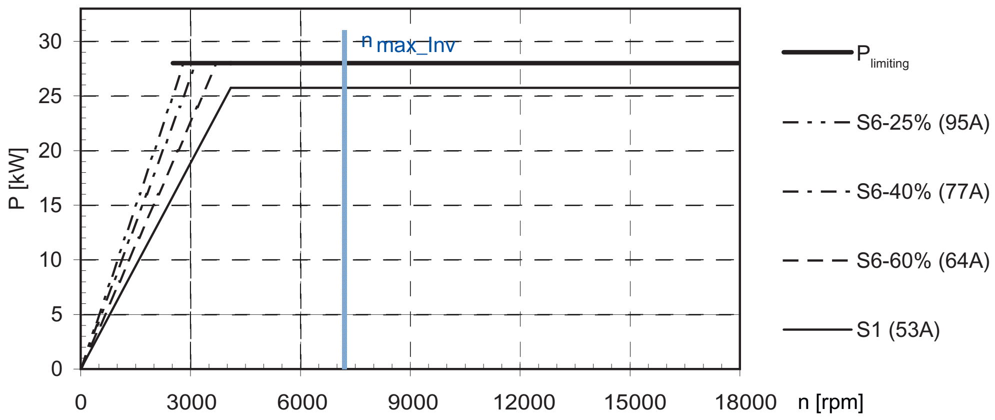


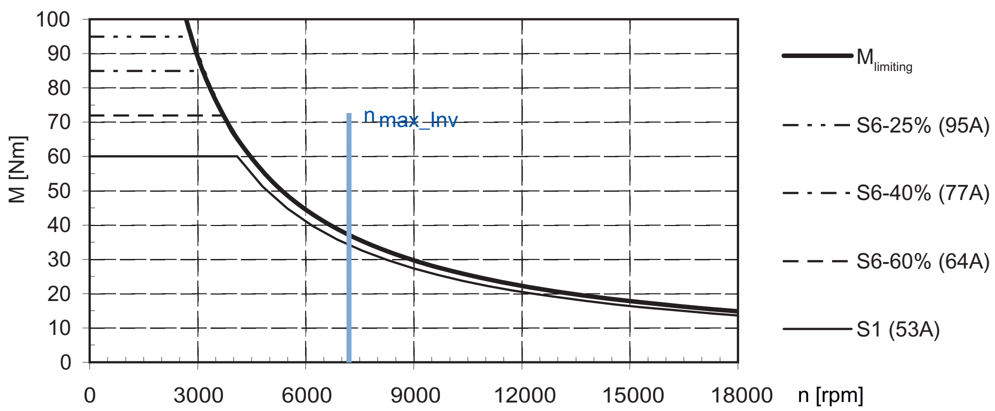


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 122 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1074-4WT□1

Rated power	P_N	kW	25,8
Rated speed	n_N	rpm	4100
Rated torque	M_N	Nm	60
Rated current	I_N	A	53
Maximum current	I_{max}	A	106
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7200
Maximum torque	M_{max}	Nm	107
Moment of inertia	J_{rot}	kg m²	0,00573
Voltage constant	k_E	V/1000 rpm	80
Thermal time constant	T_{therm}	min	2,5
Stator weight with cooling jacket	m_{st}	kg	16,5
Rotor weight	m_{rot}	kg	see Table 1-3

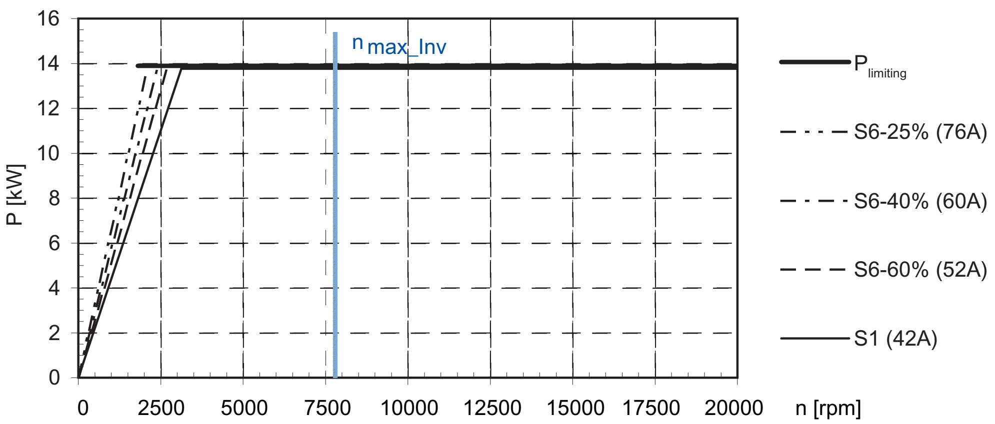


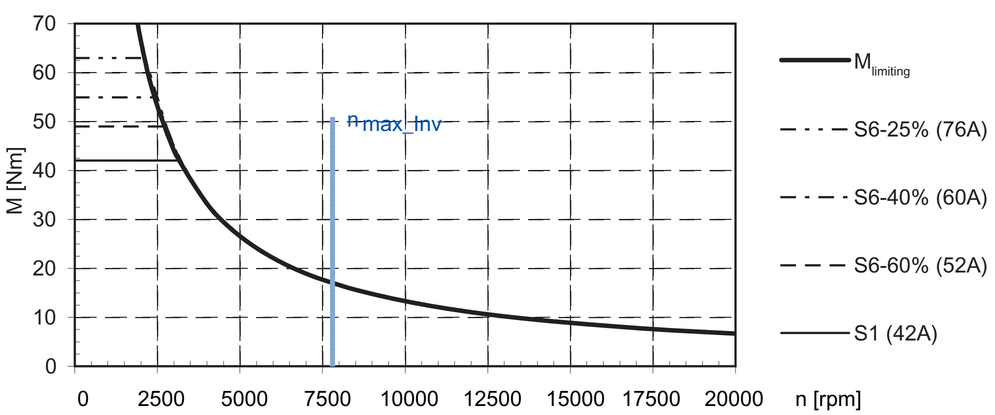


The data for duty type S6 are valid for a 1 min. duty cycle.

Table 4- 123 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1082-4WN□1

Rated power	P_N	kW	13,8
Rated speed	n_N	rpm	3130
Rated torque	M_N	Nm	42
Rated current	I_N	A	42
Maximum current	I_{max}	A	84
Maximum speed	n_{max}	rpm	20000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7800
Maximum torque	M_{max}	Nm	68
Moment of inertia	J_{rot}	kg m²	0,00559
Voltage constant	k_E	V/1000 rpm	74
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	12
Rotor weight	m_{rot}	kg	see Table 1-3

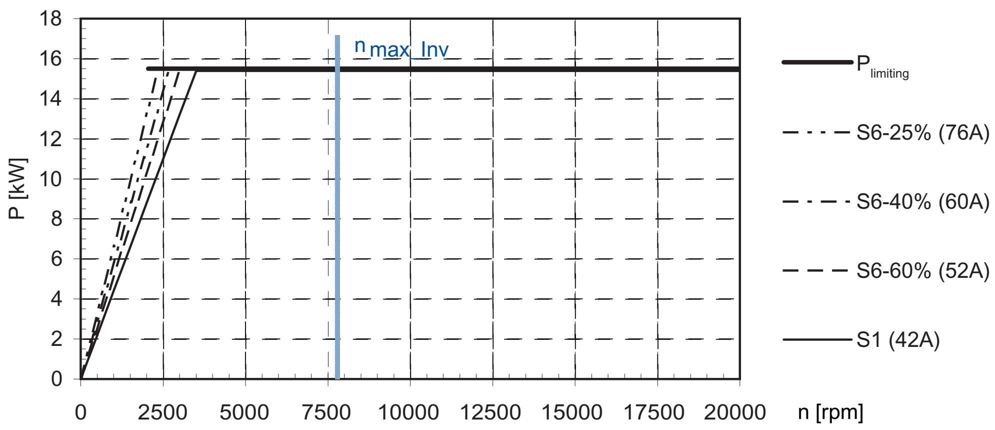


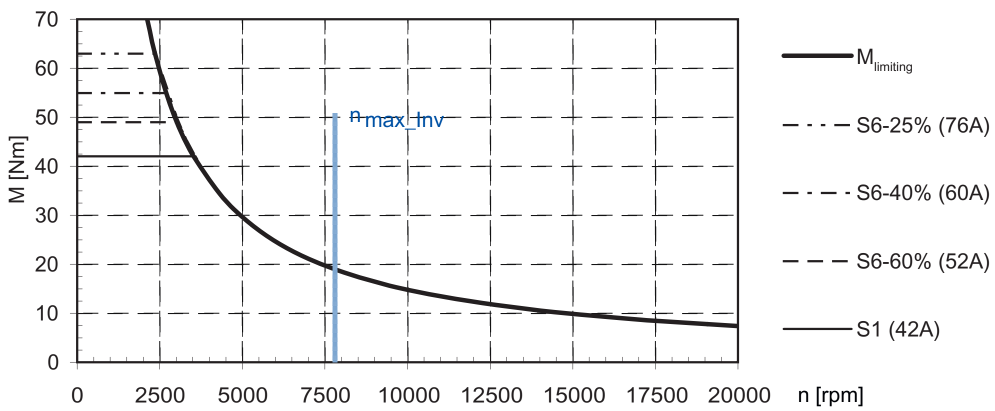


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 124 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1082-4WN□1

Rated power	P_N	kW	15,5
Rated speed	n_N	rpm	3500
Rated torque	M_N	Nm	42
Rated current	I_N	A	42
Maximum current	I_{max}	A	84
Maximum speed	n_{max}	rpm	20000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7800
Maximum torque	M_{max}	Nm	68
Moment of inertia	J_{rot}	kg m²	0,00559
Voltage constant	k_E	V/1000 rpm	74
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	12
Rotor weight	m_{rot}	kg	see Table 1-3

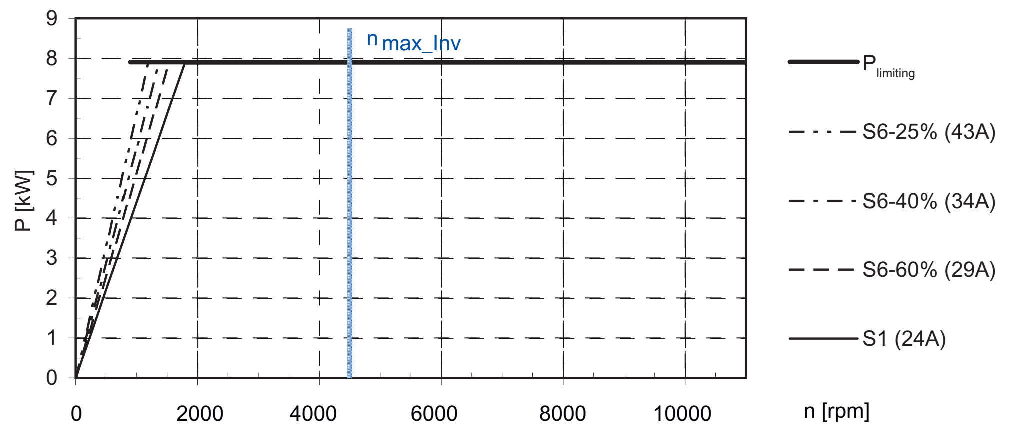


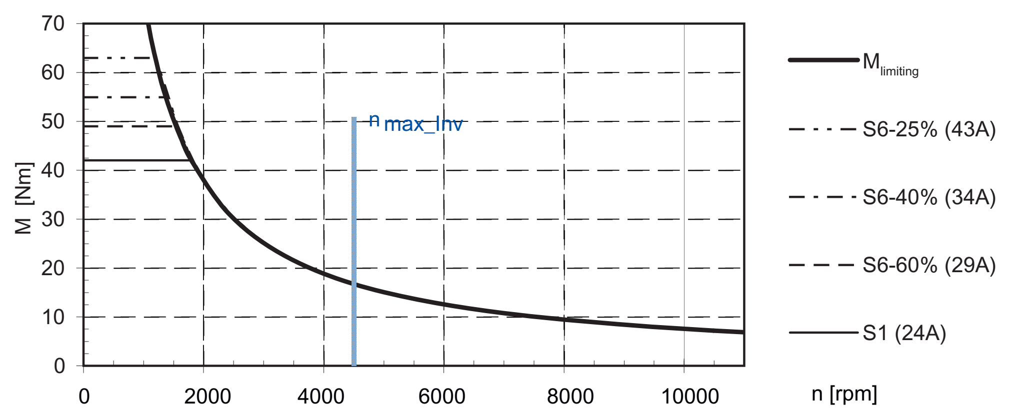


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 125 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1082-4WR□1

Rated power	P_N	kW	7,9
Rated speed	n_N	rpm	1790
Rated torque	M_N	Nm	42
Rated current	I_N	A	24
Maximum current	I_{max}	A	48
Maximum speed	n_{max}	rpm	11000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	4500
Maximum torque	M_{max}	Nm	68
Moment of inertia	J_{rot}	kg m²	0,00559
Voltage constant	k_E	V/1000 rpm	128
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	12
Rotor weight	m_{rot}	kg	see Table 1-3

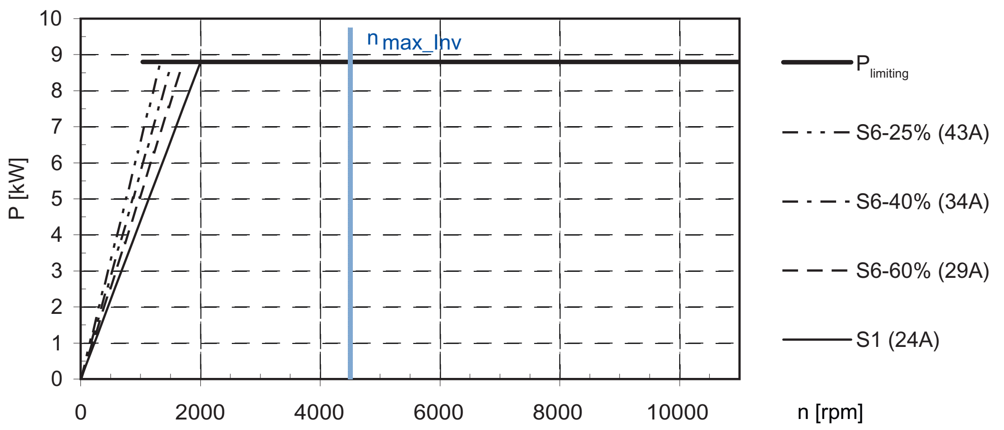


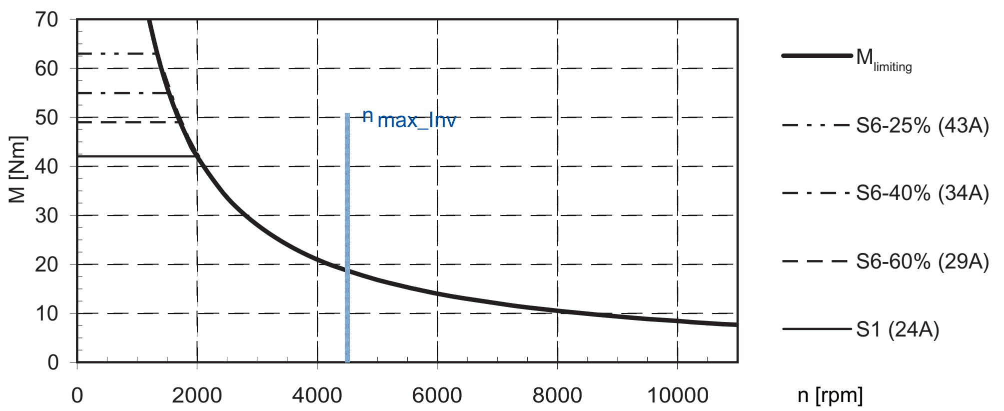


The data for duty type S6 are valid for a 2 min. duty cycle

Table 4- 126 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1082-4WR□1

Rated power	P_N	kW	8,8
Rated speed	n_N	rpm	2000
Rated torque	M_N	Nm	42
Rated current	I_N	A	24
Maximum current	I_{max}	A	48
Maximum speed	n_{max}	rpm	11000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	4500
Maximum torque	M_{max}	Nm	68
Moment of inertia	J_{rot}	kg m²	0,00559
Voltage constant	k_E	V/1000 rpm	128
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	12
Rotor weight	m_{rot}	kg	see Table 1-3

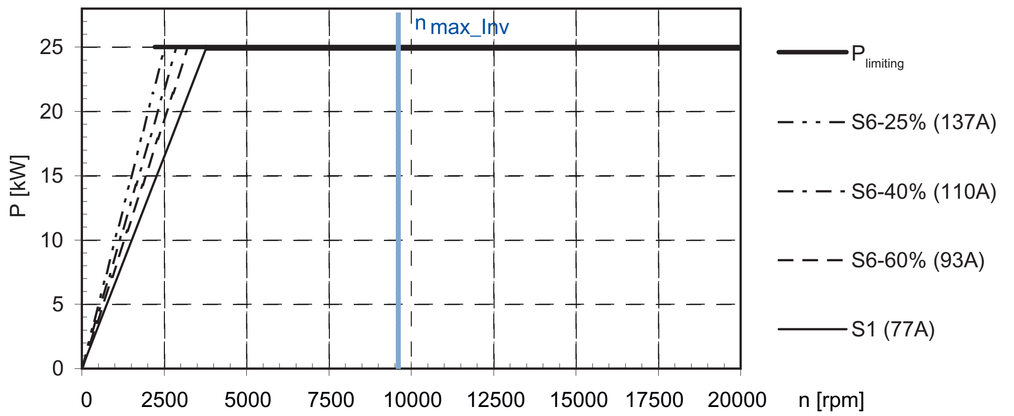


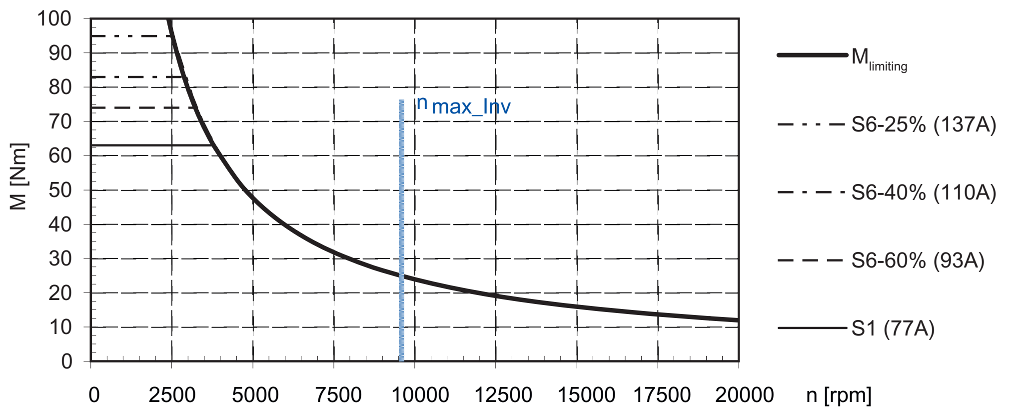


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 127 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1083-4WN□1

Rated power	P_N	kW	24,8
Rated speed	n_N	rpm	3760
Rated torque	M_N	Nm	63
Rated current	I_N	A	77
Maximum current	I_{max}	A	154
Maximum speed	n_{max}	rpm	20000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	9600
Maximum torque	M_{max}	Nm	105
Moment of inertia	J_{rot}	kg m^2	0,00847
Voltage constant	k_E	V/1000 rpm	60
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	17
Rotor weight	m_{rot}	kg	see Table 1-3

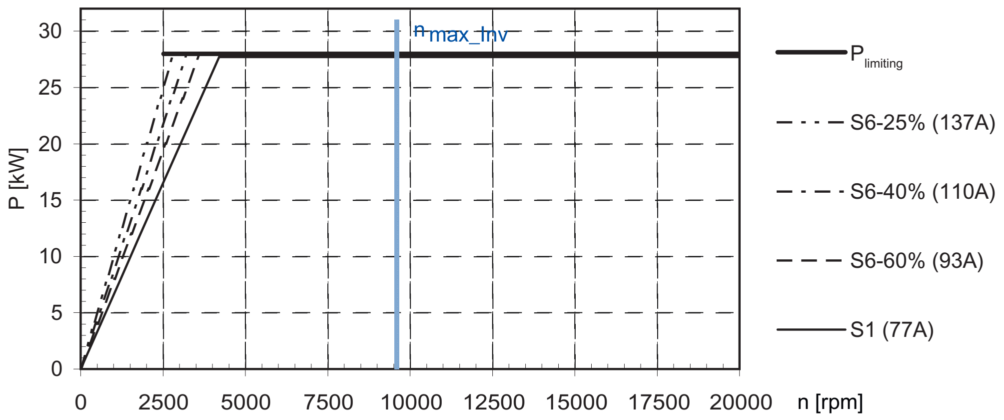


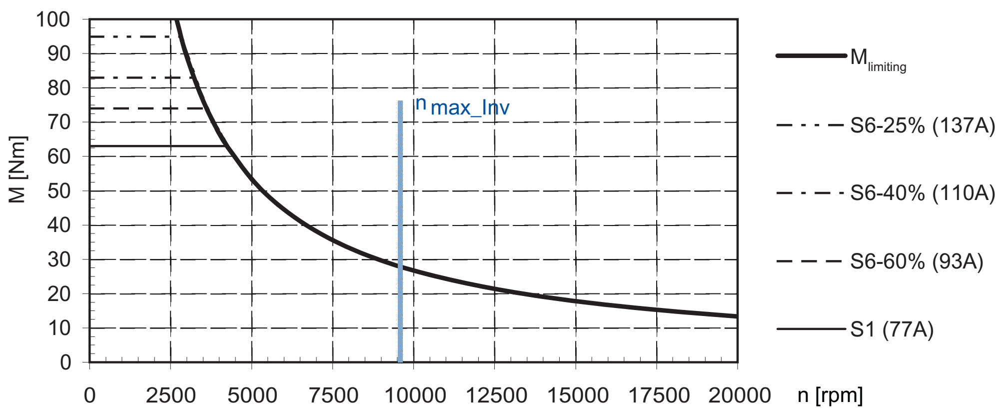


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 128 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1083-4WN□1

Rated power	P_N	kW	28
Rated speed	n_N	rpm	4200
Rated torque	M_N	Nm	63
Rated current	I_N	A	77
Maximum current	I_{max}	A	154
Maximum speed	n_{max}	rpm	20000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	9600
Maximum torque	M_{max}	Nm	105
Moment of inertia	J_{rot}	kg m^2	0,00847
Voltage constant	k_E	V/1000 rpm	60
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	17
Rotor weight	m_{rot}	kg	see Table 1-3

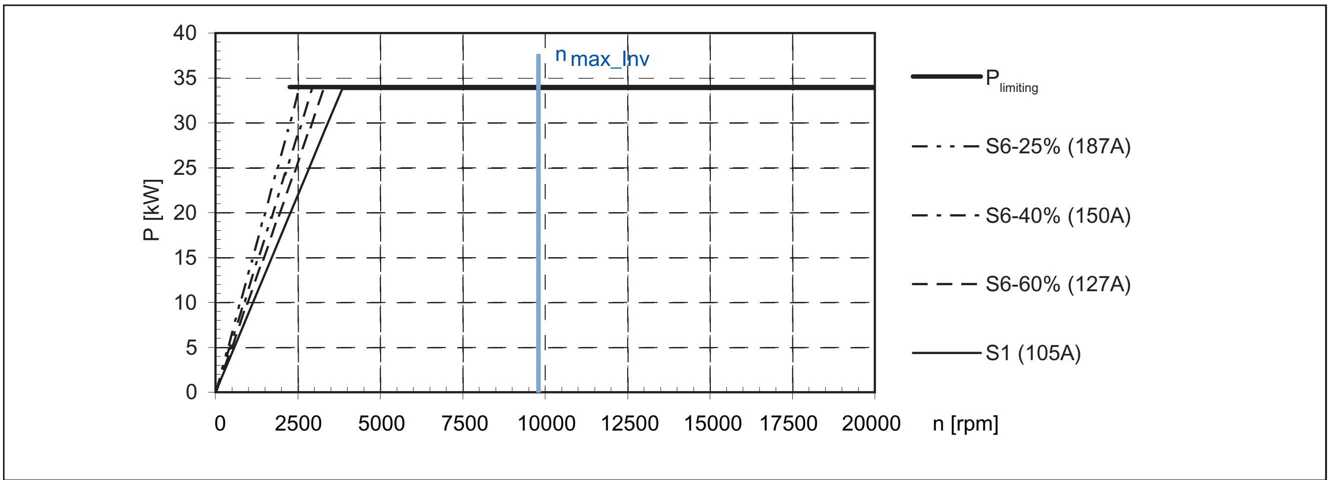


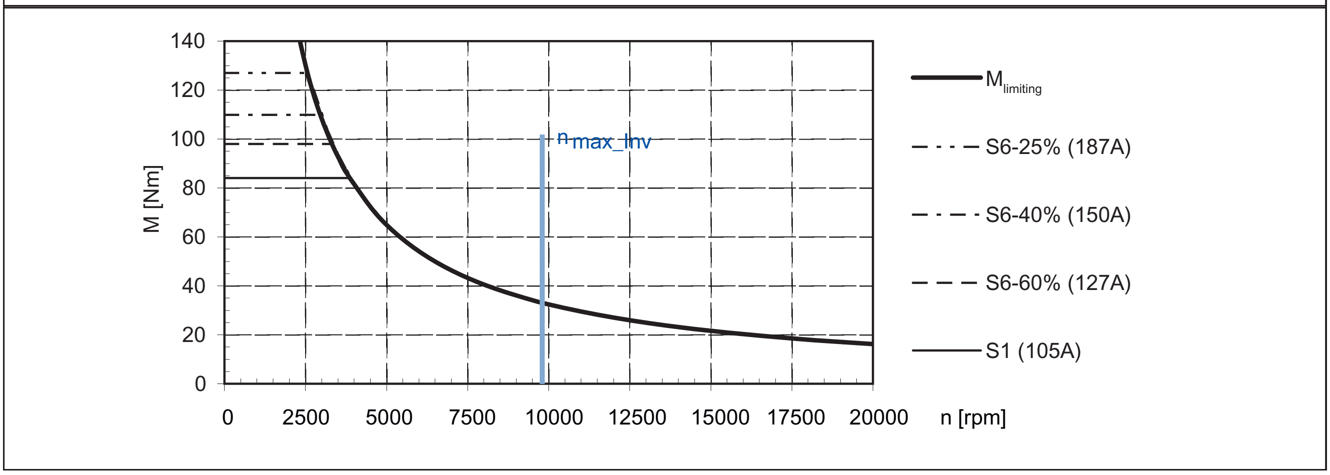


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 129 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1084-4WN□1

Rated power	P_N	kW	33,8
Rated speed	n_N	rpm	3840
Rated torque	M_N	Nm	84
Rated current	I_N	A	105
Maximum current	I_{max}	A	210
Maximum speed	n_{max}	rpm	20000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	9800
Maximum torque	M_{max}	Nm	140
Moment of inertia	J_{rot}	kg m²	0,01118
Voltage constant	k_E	V/1000 rpm	59
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	22
Rotor weight	m_{rot}	kg	see Table 1-3

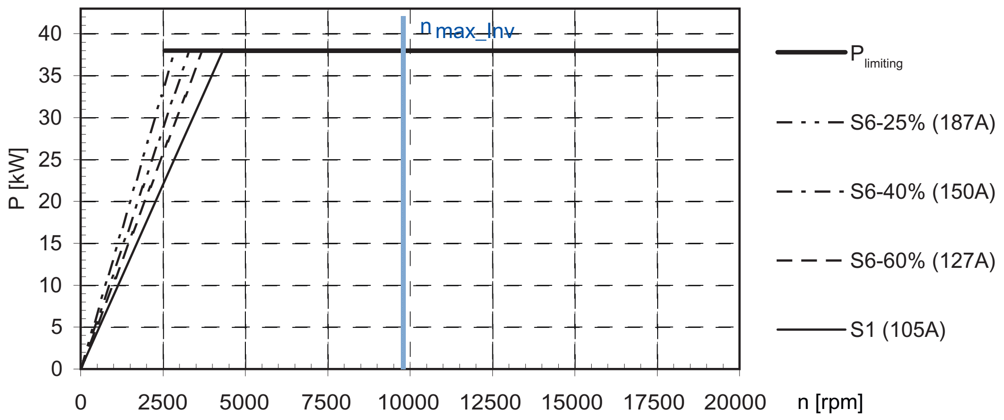


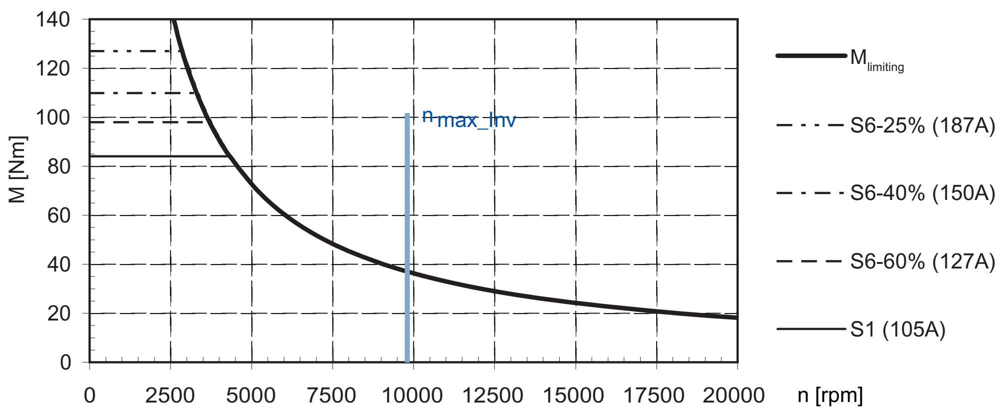


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 130 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1084-4WN□1

Rated power	P_N	kW	38
Rated speed	n_N	rpm	4300
Rated torque	M_N	Nm	84
Rated current	I_N	A	105
Maximum current	I_{max}	A	210
Maximum speed	n_{max}	rpm	20000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	9800
Maximum torque	M_{max}	Nm	140
Moment of inertia	J_{rot}	kg m²	0,01118
Voltage constant	k_E	V/1000 rpm	59
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	22
Rotor weight	m_{rot}	kg	see Table 1-3

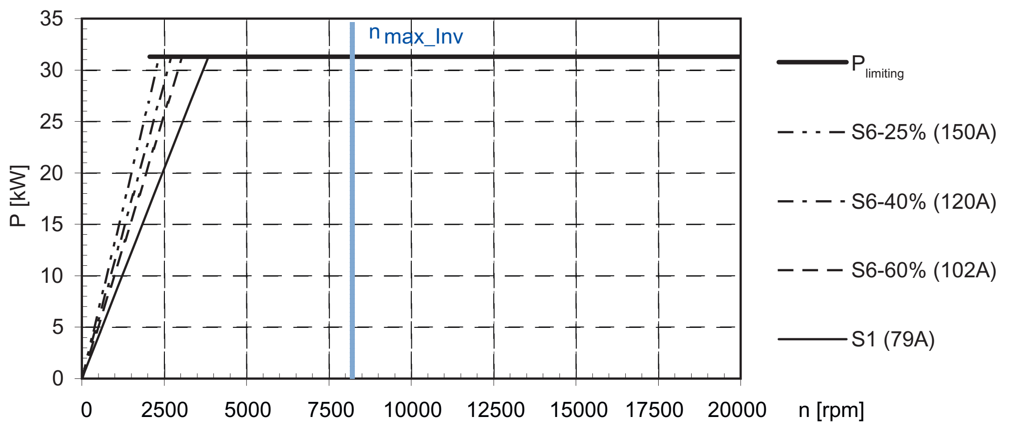


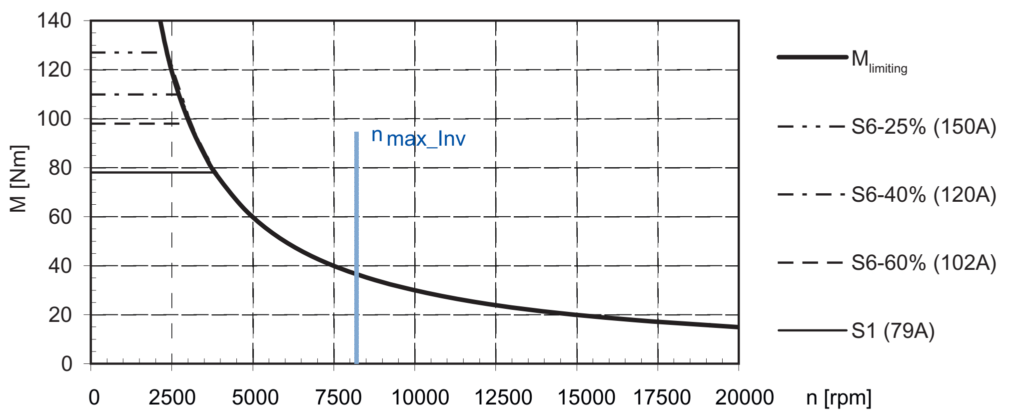


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 131 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1084-4WP□1

Rated power	P_N	kW	31,4
Rated speed	n_N	rpm	3840
Rated torque	M_N	Nm	78
Rated current	I_N	A	79
Maximum current	I_{max}	A	160
Maximum speed	n_{max}	rpm	20000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	8200
Maximum torque	M_{max}	Nm	140
Moment of inertia	J_{rot}	kg m²	0,01118
Voltage constant	k_E	V/1000 rpm	70
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	22
Rotor weight	m_{rot}	kg	see Table 1-3

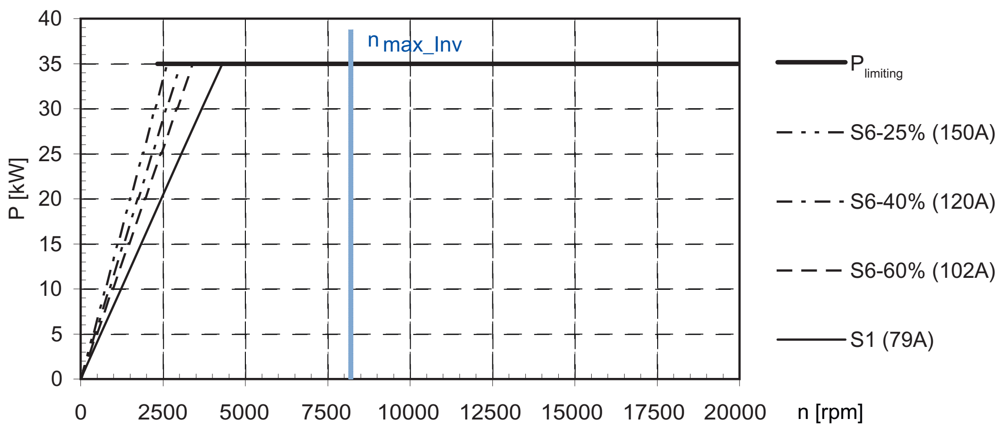


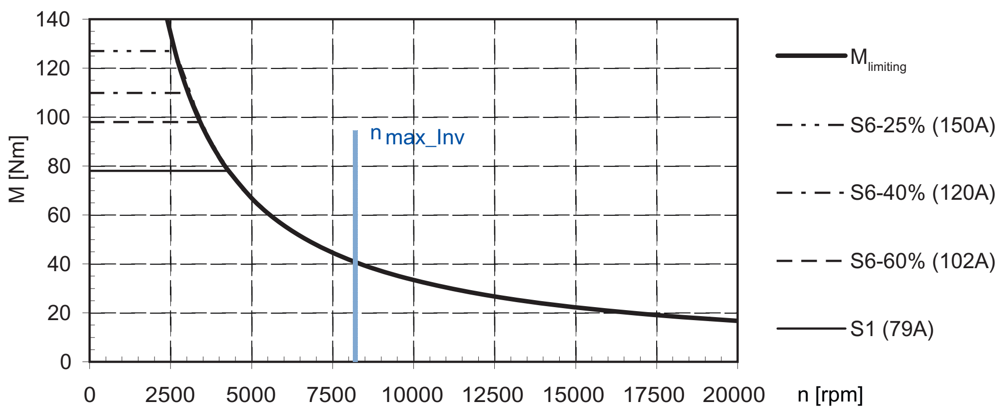


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 132 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1084-4WP□1

Rated power	P_N	kW	35
Rated speed	n_N	rpm	4300
Rated torque	M_N	Nm	78
Rated current	I_N	A	79
Maximum current	I_{max}	A	160
Maximum speed	n_{max}	rpm	20000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	8200
Maximum torque	M_{max}	Nm	140
Moment of inertia	J_{rot}	kg m²	0,01118
Voltage constant	k_E	V/1000 rpm	70
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	22
Rotor weight	m_{rot}	kg	see Table 1-3

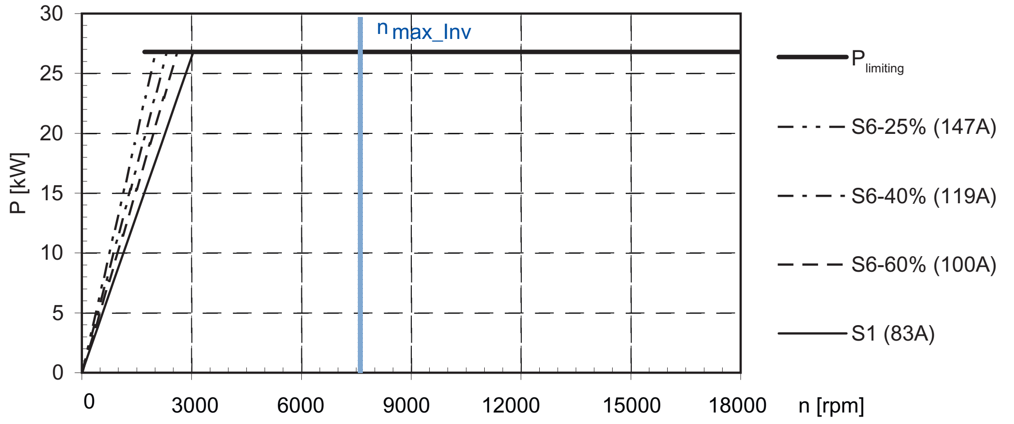


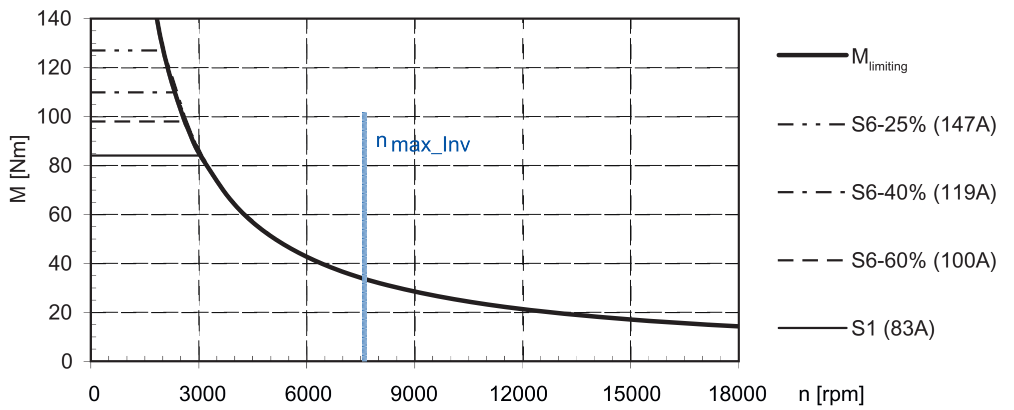


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 133 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1084-4WQ□1

Rated power	P_N	kW	26,7
Rated speed	n_N	rpm	3040
Rated torque	M_N	Nm	84
Rated current	I_N	A	83
Maximum current	I_{max}	A	166
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7600
Maximum torque	M_{max}	Nm	140
Moment of inertia	J_{rot}	kg m²	0,01118
Voltage constant	k_E	V/1000 rpm	76
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	22
Rotor weight	m_{rot}	kg	see Table 1-3

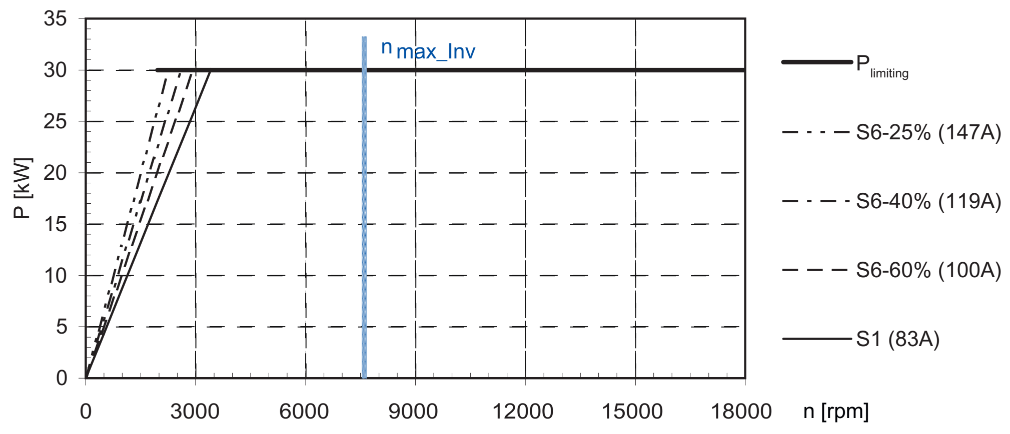


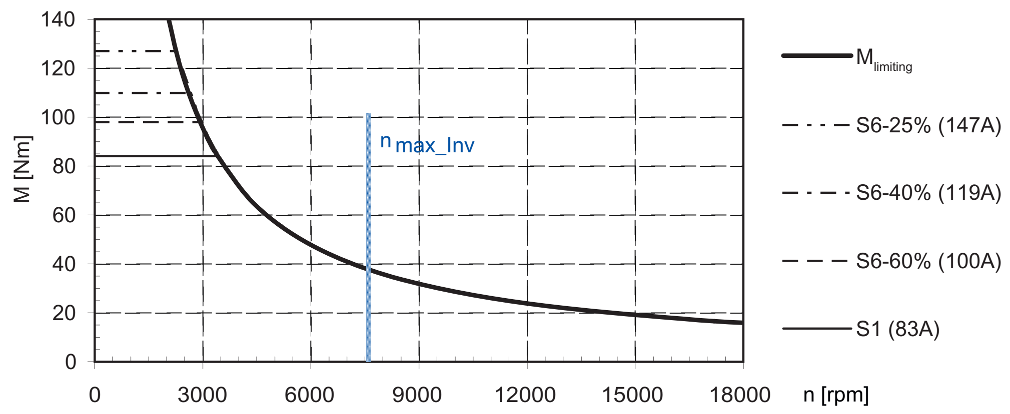


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 134 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1084-4WQ□1

Rated power	P_N	kW	30
Rated speed	n_N	rpm	3400
Rated torque	M_N	Nm	84
Rated current	I_N	A	83
Maximum current	I_{max}	A	166
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7600
Maximum torque	M_{max}	Nm	140
Moment of inertia	J_{rot}	kg m^2	0,01118
Voltage constant	k_E	V/1000 rpm	76
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	22
Rotor weight	m_{rot}	kg	see Table 1-3

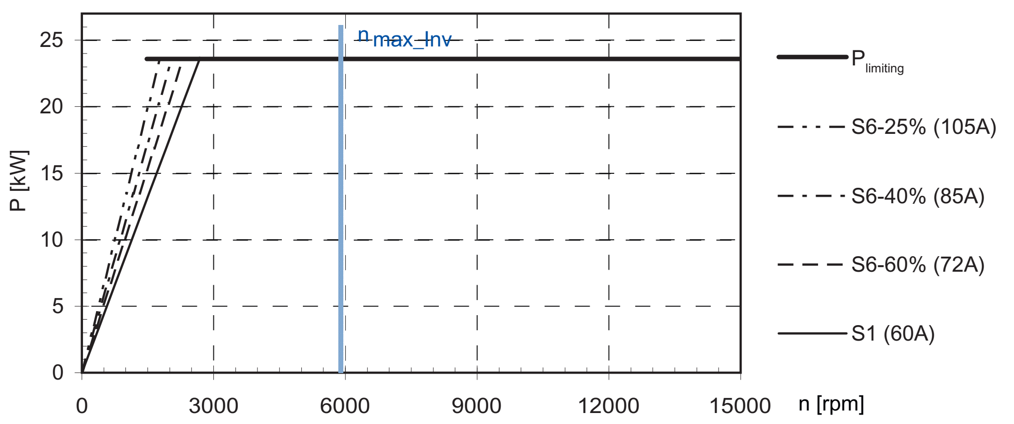


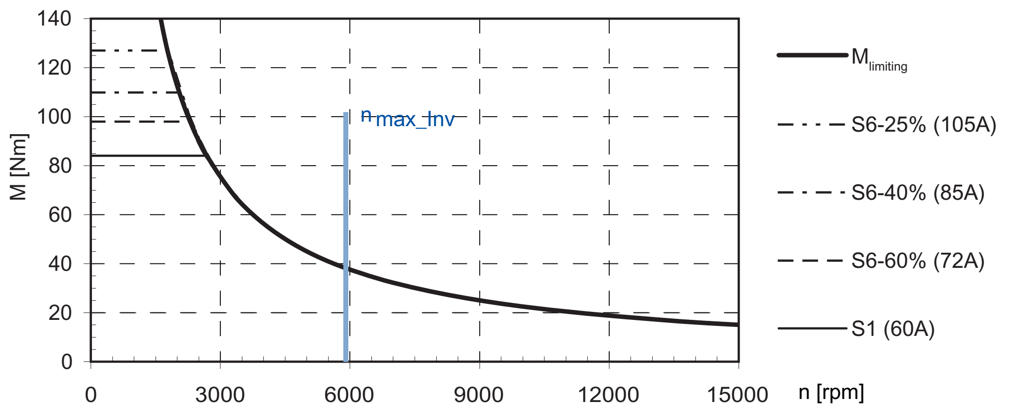


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 135 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1084-4WT□1

Rated power	P_N	kW	23,6
Rated speed	n_N	rpm	2680
Rated torque	M_N	Nm	84
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	15000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5900
Maximum torque	M_{max}	Nm	140
Moment of inertia	J_{rot}	kg m²	0,0118
Voltage constant	k_E	V/1000 rpm	97
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	22
Rotor weight	m_{rot}	kg	see Table 1-3

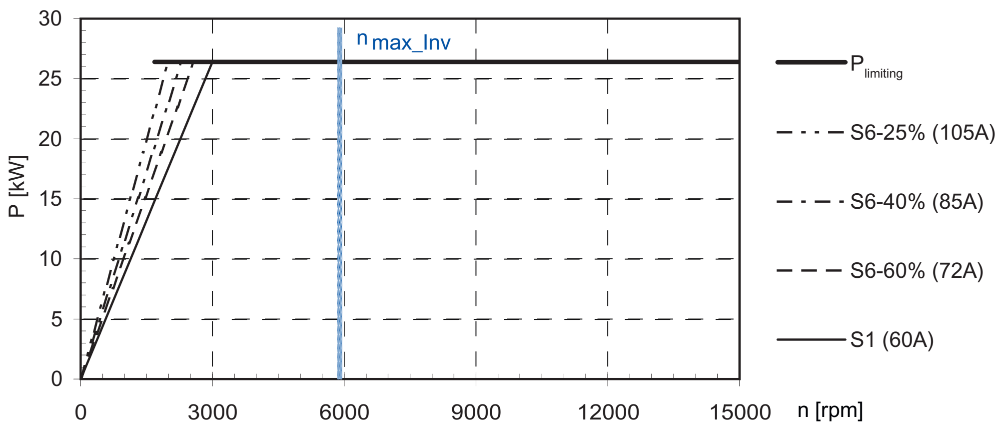


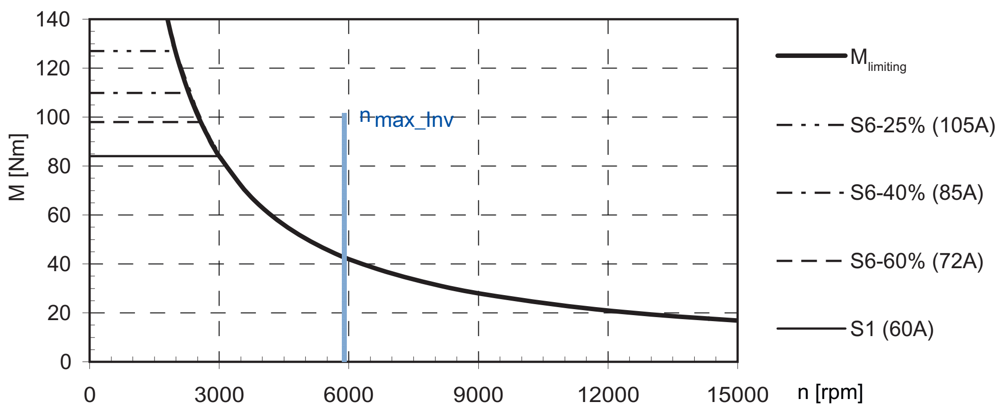


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 136 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1084-4WT□1

Rated power	P_N	kW	26,4
Rated speed	n_N	rpm	3000
Rated torque	M_N	Nm	84
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	15000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5900
Maximum torque	M_{max}	Nm	140
Moment of inertia	J_{rot}	kg m²	0,01118
Voltage constant	k_E	V/1000 rpm	97
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	22
Rotor weight	m_{rot}	kg	see Table 1-3

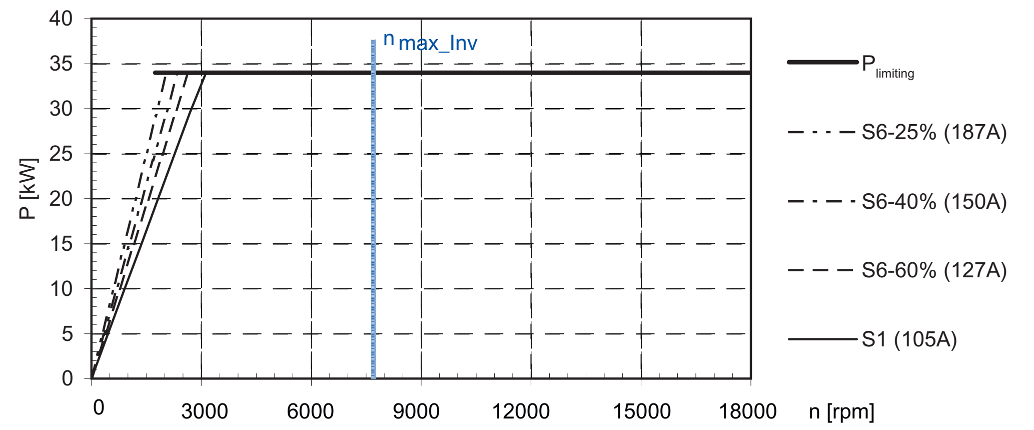


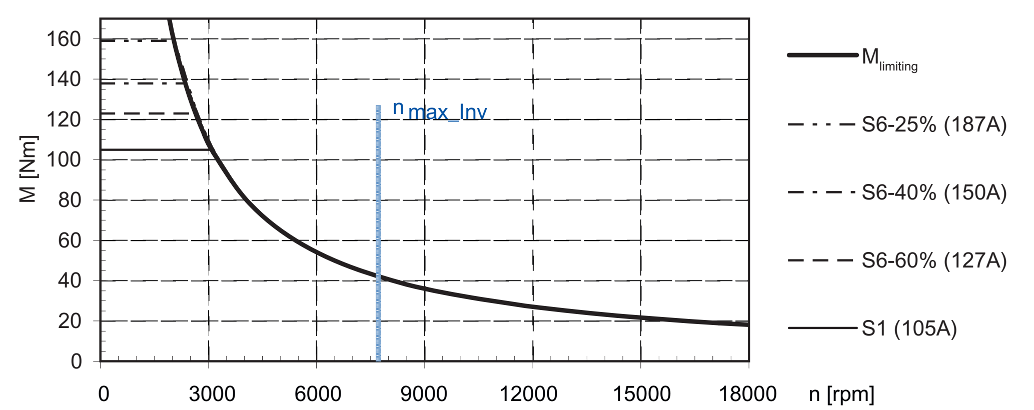


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 137 SINAMICS, 3-ph. 380 V AC Smart Line Module, (SLM), 1FE1085-4WN□1

Rated power	P_N	kW	34,4
Rated speed	n_N	rpm	3130
Rated torque	M_N	Nm	105
Rated current	I_N	A	105
Maximum current	I_{max}	A	210
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7700
Maximum torque	M_{max}	Nm	175
Moment of inertia	J_{rot}	kg m²	0,01388
Voltage constant	k_E	V/1000 rpm	75
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	27
Rotor weight	m_{rot}	kg	see Table 1-3

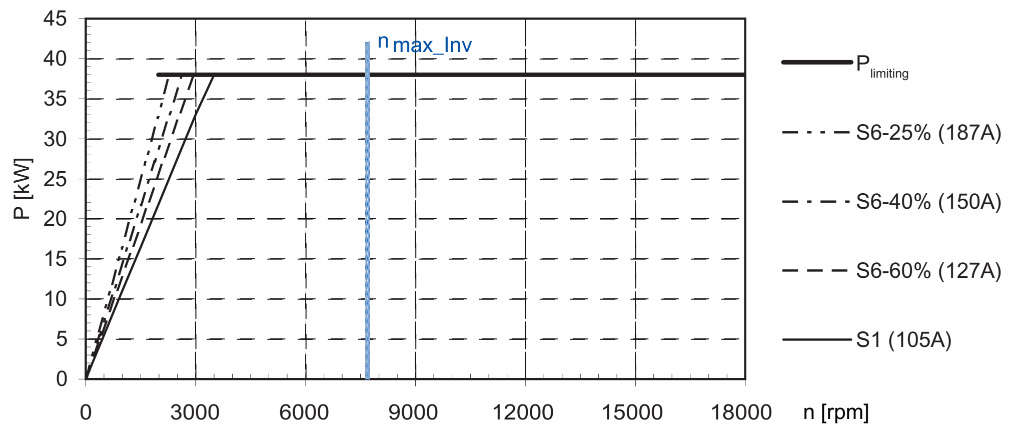


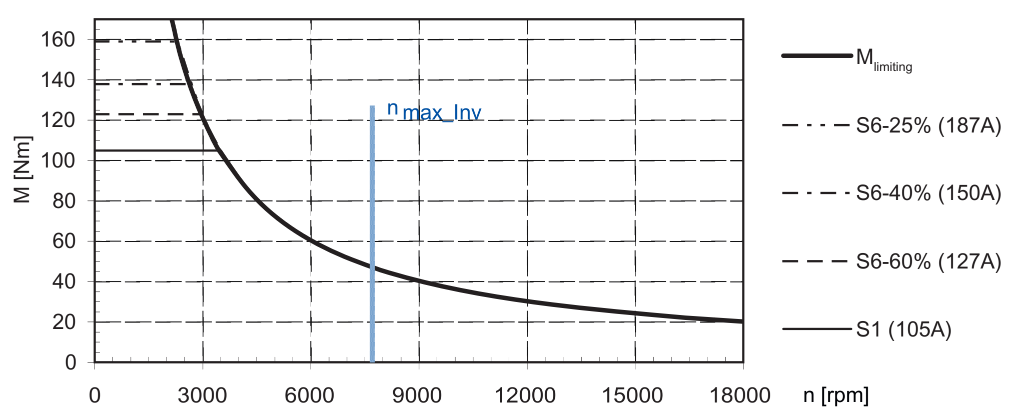


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 138 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1085-4WN□1

Rated power	P_N	kW	38
Rated speed	n_N	rpm	3500
Rated torque	M_N	Nm	105
Rated current	I_N	A	105
Maximum current	I_{max}	A	210
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7700
Maximum torque	M_{max}	Nm	175
Moment of inertia	J_{rot}	kg m^2	0,01388
Voltage constant	k_E	V/1000 rpm	75
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	27
Rotor weight	m_{rot}	kg	see Table 1-3

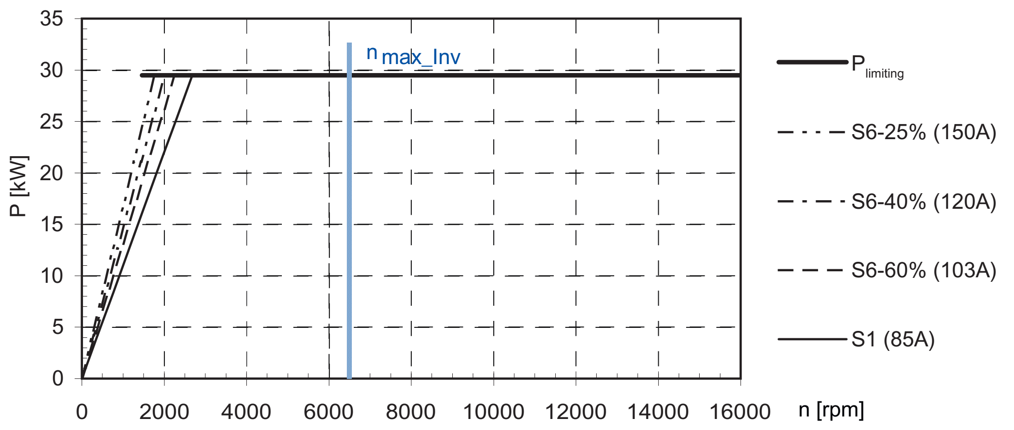


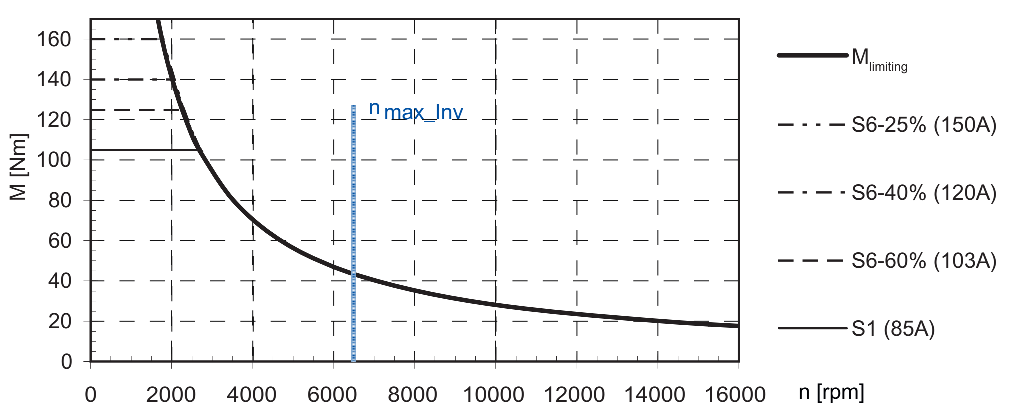


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 139 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1085-4WQ□1

Rated power	P_N	kW	29,5
Rated speed	n_N	rpm	2680
Rated torque	M_N	Nm	105
Rated current	I_N	A	85
Maximum current	I_{max}	A	170
Maximum speed	n_{max}	rpm	16000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6500
Maximum torque	M_{max}	Nm	175
Moment of inertia	J_{rot}	kg m²	0,01388
Voltage constant	k_E	V/1000 rpm	88
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	27
Rotor weight	m_{rot}	kg	see Table 1-3

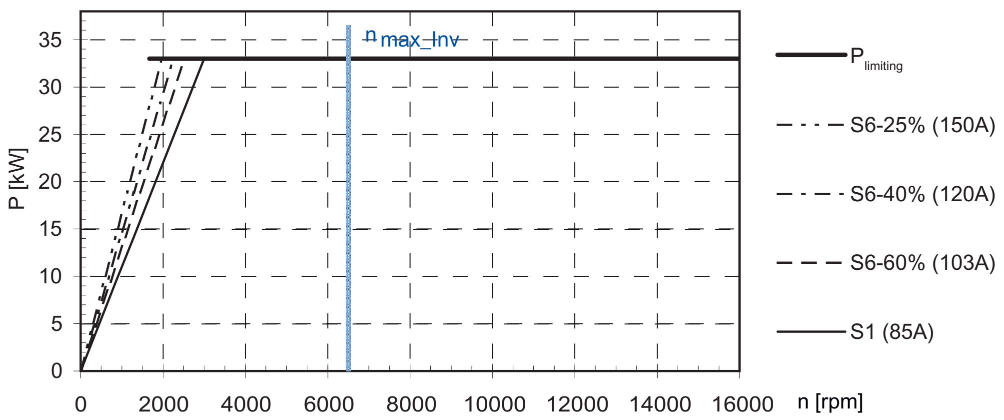


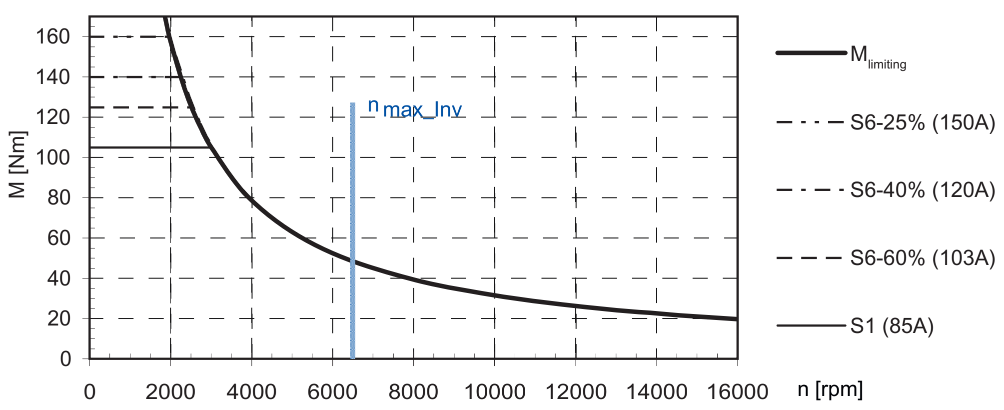


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 140 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1085-4WQ□1

Rated power	P_N	kW	33
Rated speed	n_N	rpm	3000
Rated torque	M_N	Nm	105
Rated current	I_N	A	85
Maximum current	I_{max}	A	170
Maximum speed	n_{max}	rpm	16000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6500
Maximum torque	M_{max}	Nm	175
Moment of inertia	J_{rot}	kg m²	0,01388
Voltage constant	k_E	V/1000 rpm	88
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	27
Rotor weight	m_{rot}	kg	see Table 1-3

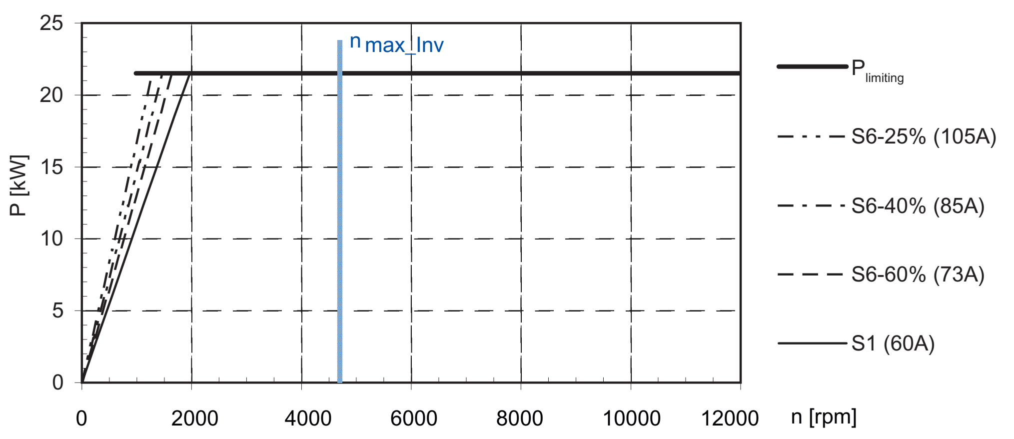


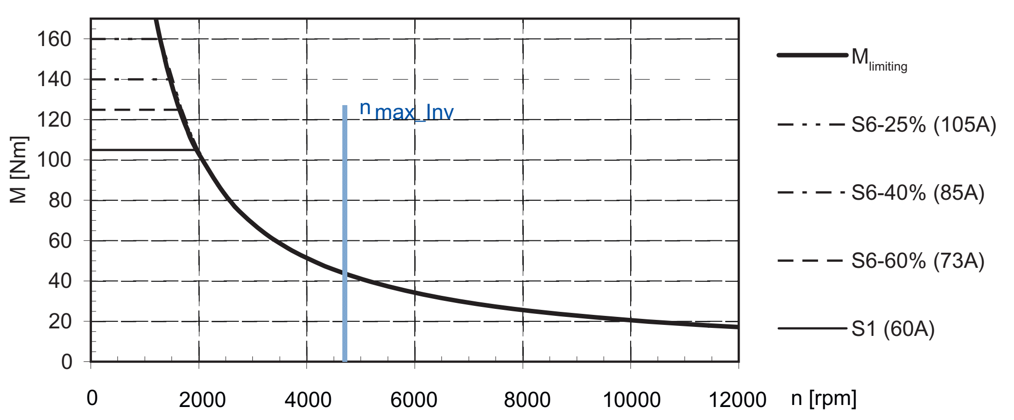


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 141 SINAMICS, 3-ph. 380 V AC, SmartLine Module, (SLM), 1FE1085-4WT□1

Rated power	P_N	kW	21,7
Rated speed	n_N	rpm	1970
Rated torque	M_N	Nm	105
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	12000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	4700
Maximum torque	M_{max}	Nm	175
Moment of inertia	J_{rot}	kg m²	0,01388
Voltage constant	k_E	V/1000 rpm	122
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	27
Rotor weight	m_{rot}	kg	see Table 1-3

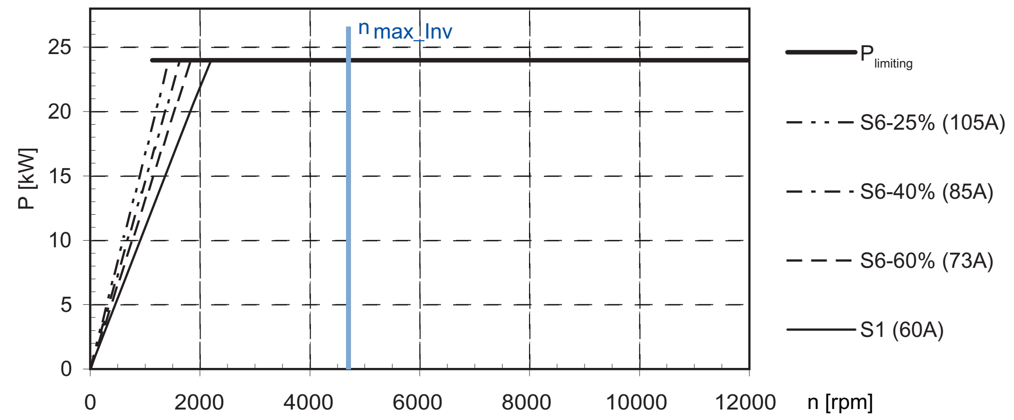


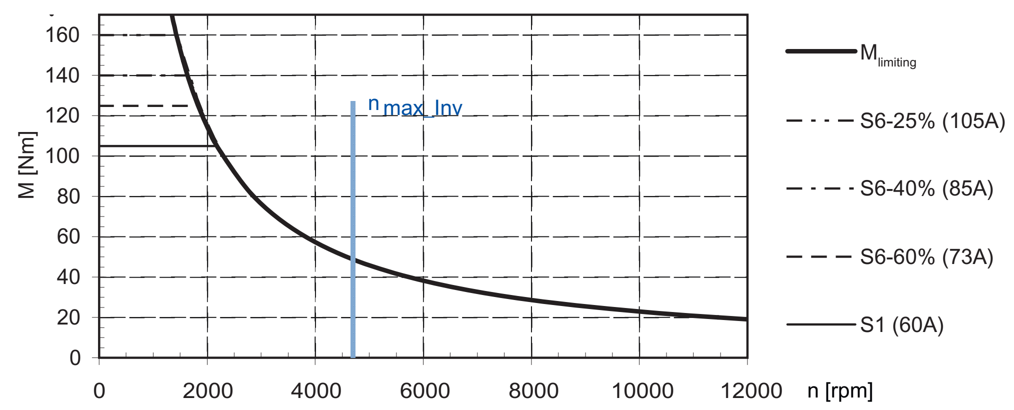


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 142 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1085-4WT□1

Rated power	P_N	kW	24
Rated speed	n_N	rpm	2200
Rated torque	M_N	Nm	105
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	12000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	4700
Maximum torque	M_{max}	Nm	175
Moment of inertia	J_{rot}	kg m²	0,01388
Voltage constant	k_E	V/1000 rpm	122
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	27
Rotor weight	m_{rot}	kg	see Table 1-3

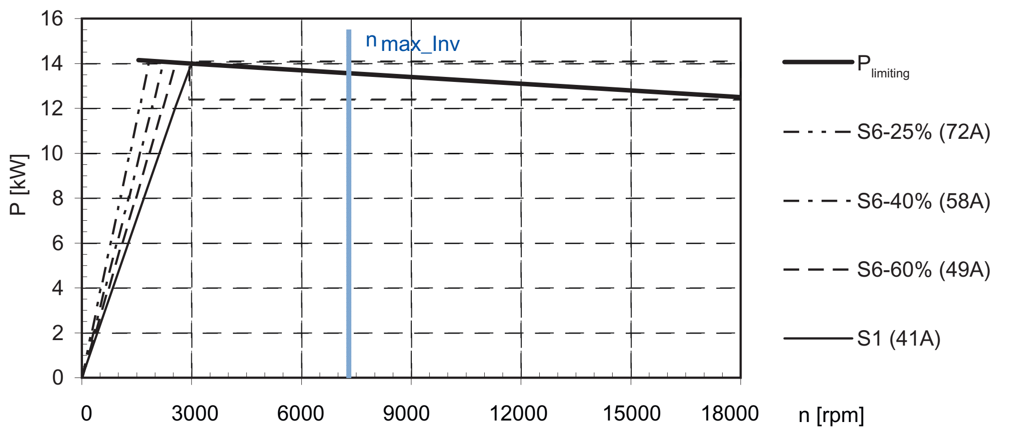


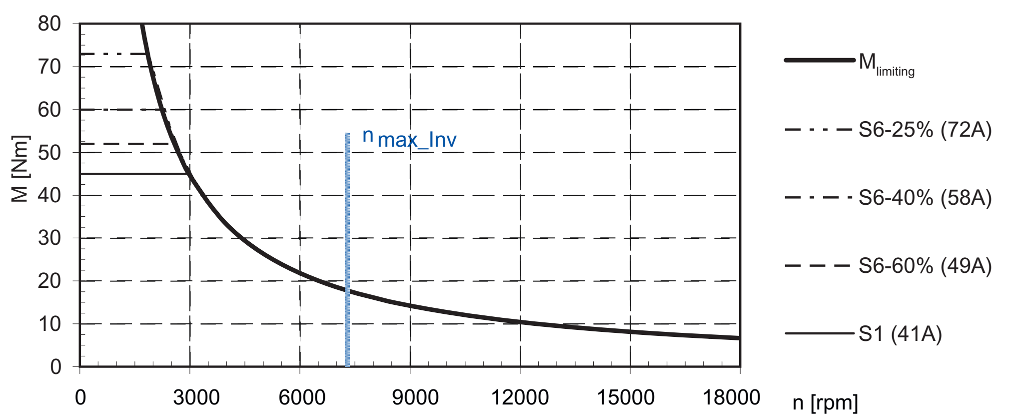


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 143 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1092-4WP□1

Rated power	P_N	kW	14,1
Rated speed	n_N	rpm	3000
Rated torque	M_N	Nm	45
Rated current	I_N	A	41
Maximum current	I_{max}	A	82
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7300
Maximum torque	M_{max}	Nm	80
Moment of inertia	J_{rot}	kg m²	0,012
Voltage constant	k_E	V/1000 rpm	79
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	26
Rotor weight	m_{rot}	kg	see Table 1-3

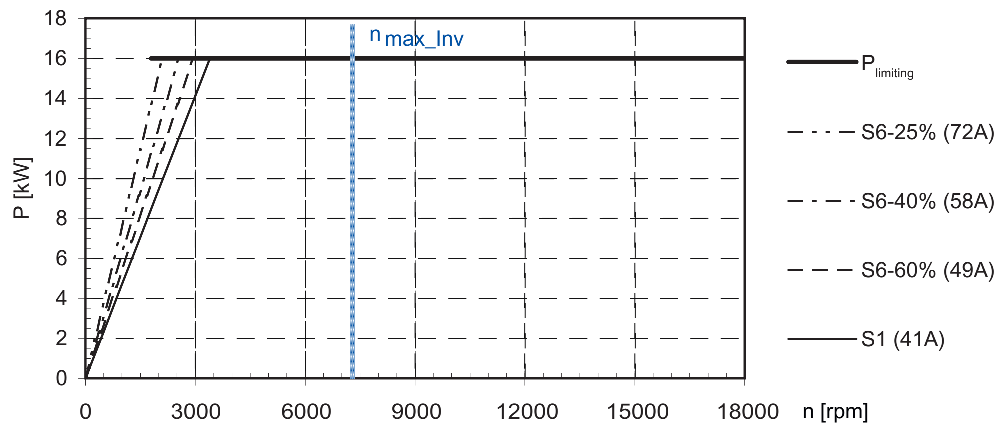


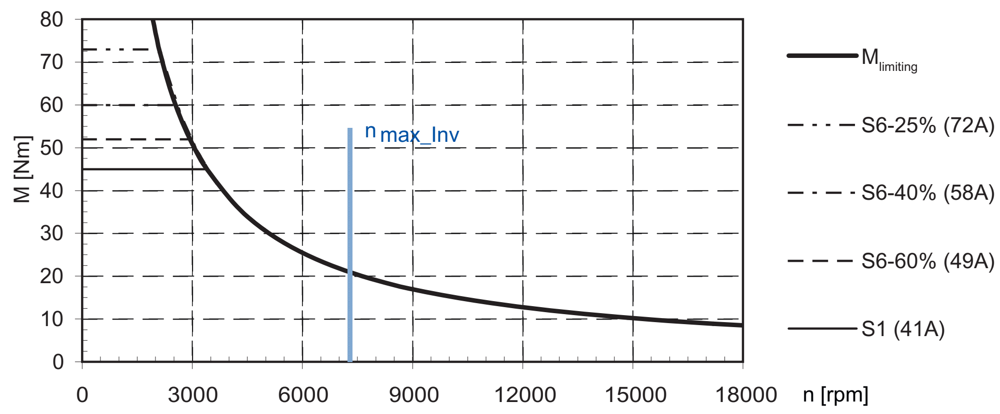


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 144 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1092-4WP□1

Rated power	P_N	kW	16
Rated speed	n_N	rpm	3400
Rated torque	M_N	Nm	45
Rated current	I_N	A	41
Maximum current	I_{max}	A	82
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7300
Maximum torque	M_{max}	Nm	80
Moment of inertia	J_{rot}	kg m²	0,012
Voltage constant	k_E	V/1000 rpm	79
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	26
Rotor weight	m_{rot}	kg	see Table 1-3

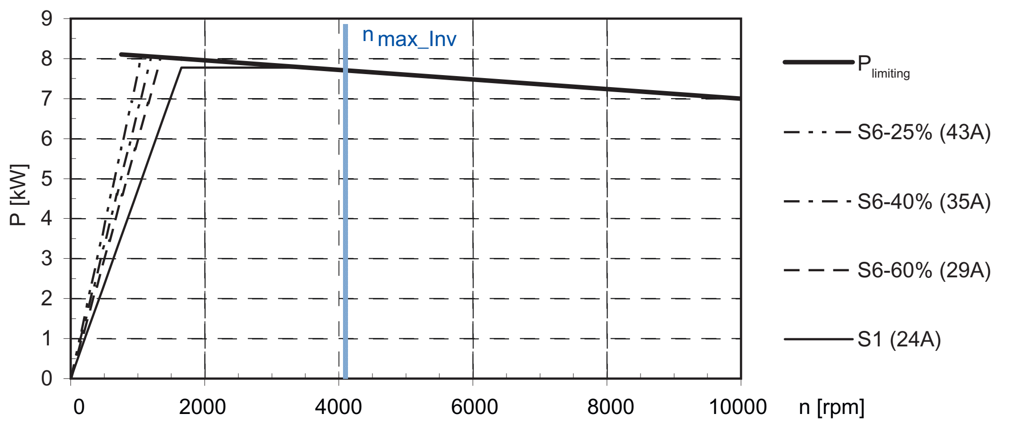


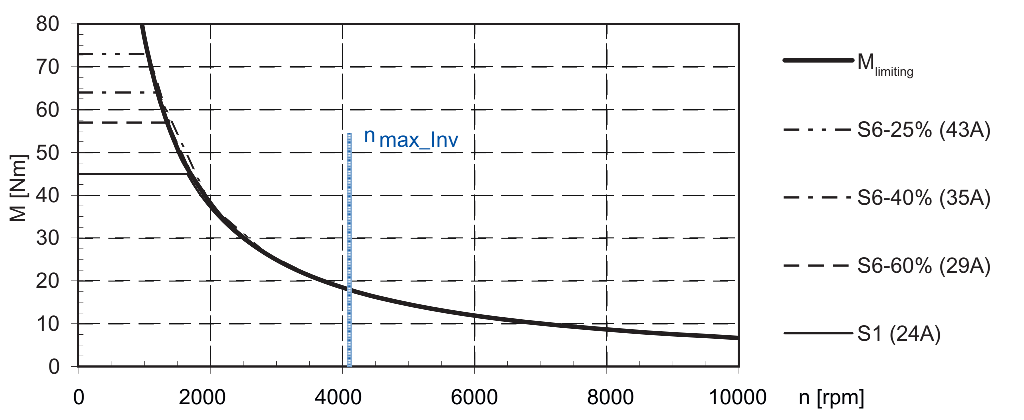


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 145 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1092-4WV□1

Rated power	P_N	kW	7,8
Rated speed	n_N	rpm	1650
Rated torque	M_N	Nm	50
Rated current	I_N	A	24
Maximum current	I_{max}	A	48
Maximum speed	n_{max}	rpm	10000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	4100
Maximum torque	M_{max}	Nm	80
Moment of inertia	J_{rot}	kg m²	0,012
Voltage constant	k_E	V/1000 rpm	140
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	26
Rotor weight	m_{rot}	kg	see Table 1-3

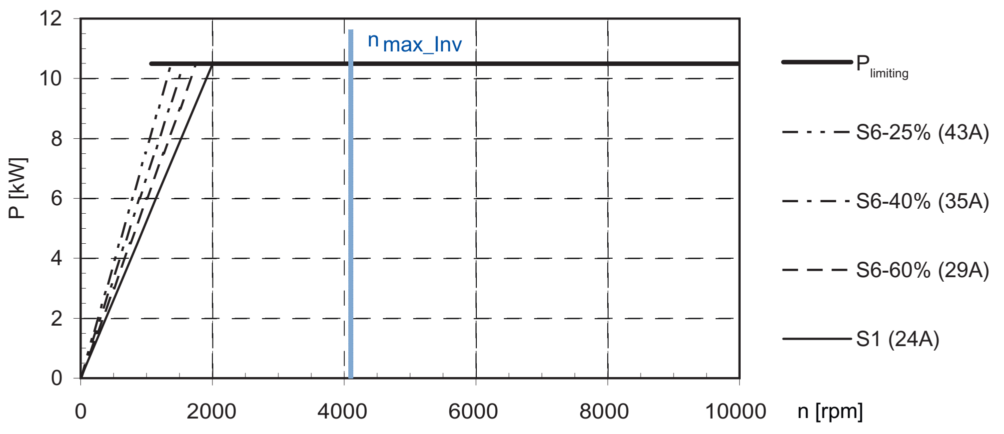


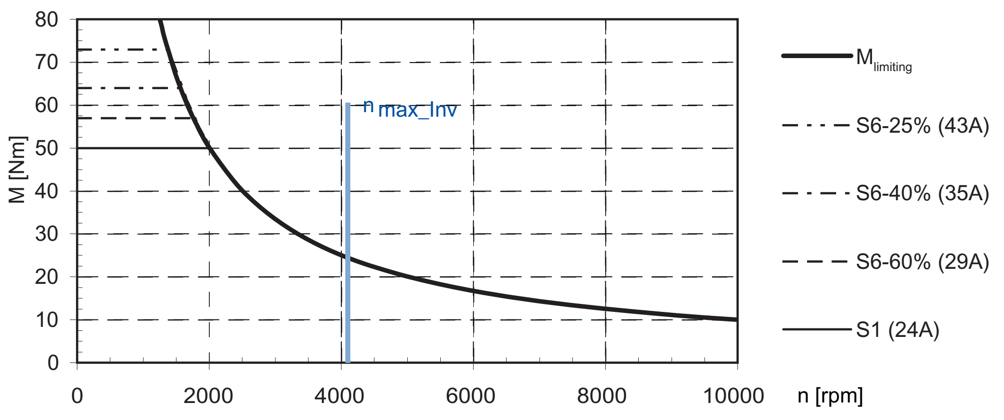


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 146 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1092-4WV□1

Rated power	P_N	kW	10,5
Rated speed	n_N	rpm	2000
Rated torque	M_N	Nm	50
Rated current	I_N	A	24
Maximum current	I_{max}	A	48
Maximum speed	n_{max}	rpm	10000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	4100
Maximum torque	M_{max}	Nm	80
Moment of inertia	J_{rot}	kg m²	0,012
Voltage constant	k_E	V/1000 rpm	140
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	26
Rotor weight	m_{rot}	kg	see Table 1-3

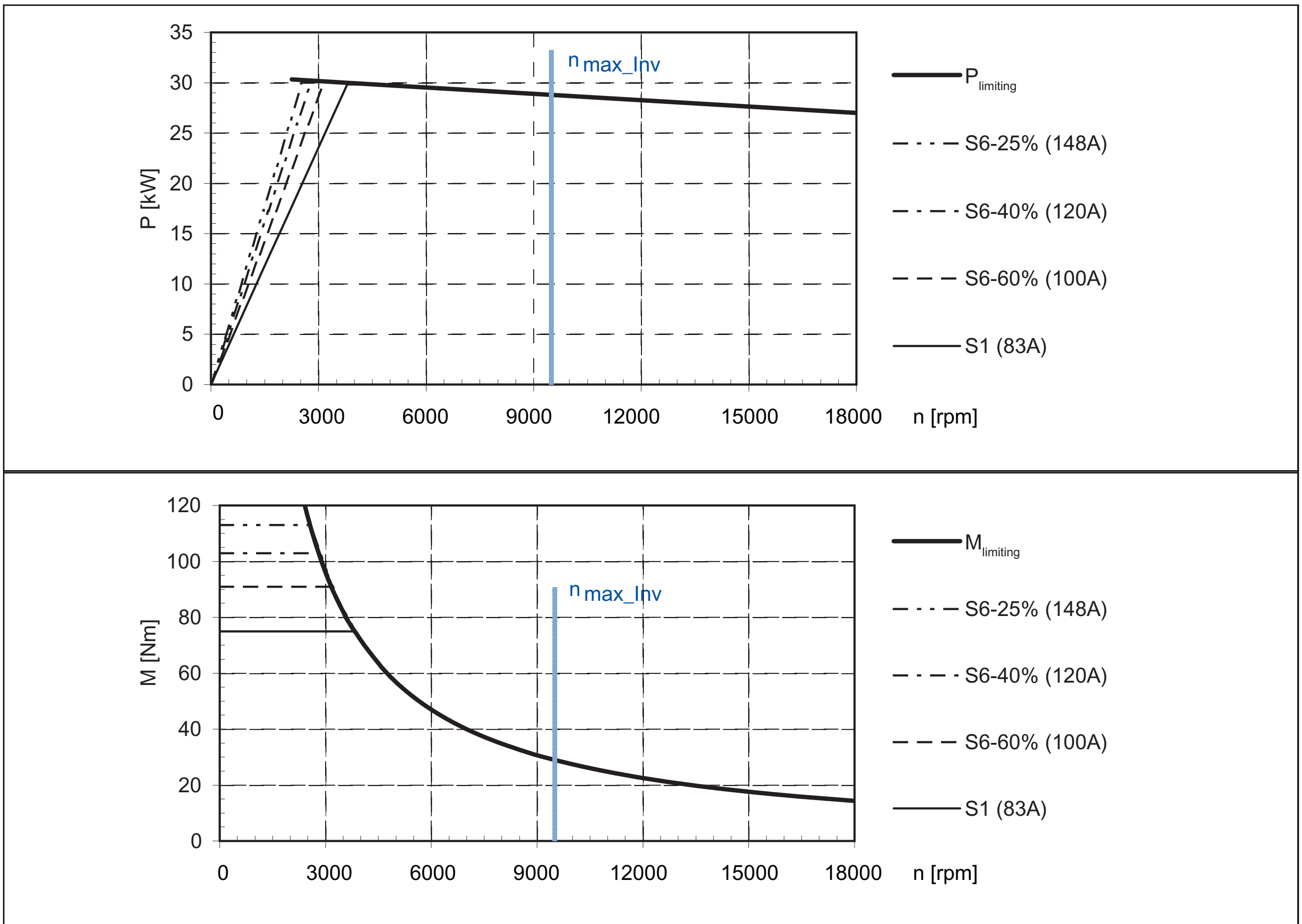




The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 147 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1093-4WH□1

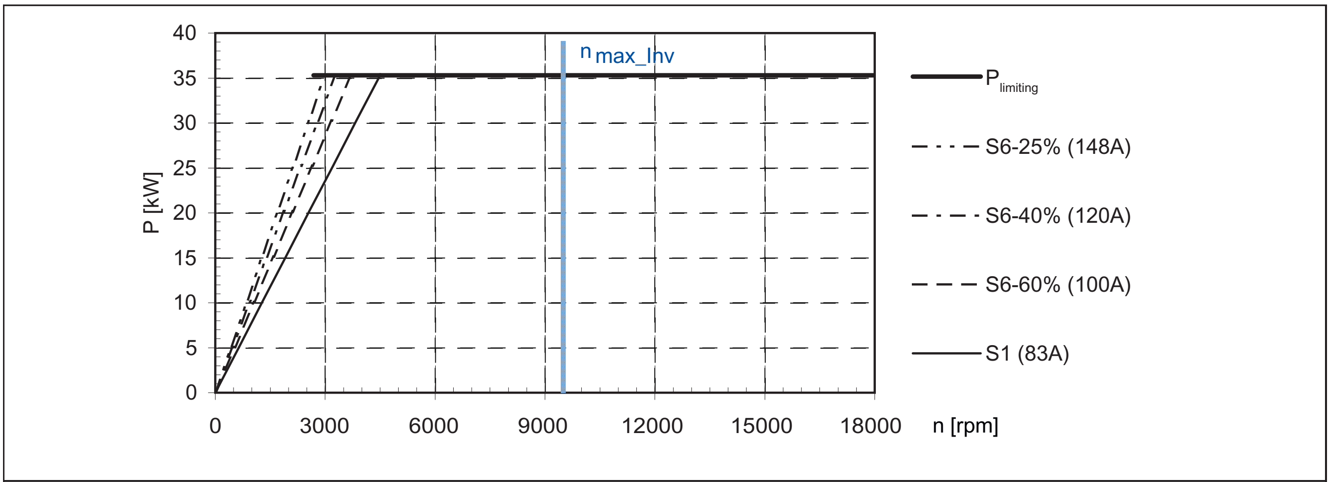
Rated power	P_N	kW	29,8
Rated speed	n_N	rpm	3800
Rated torque	M_N	Nm	75
Rated current	I_N	A	83
Maximum current	I_{max}	A	166
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	9500
Maximum torque	M_{max}	Nm	120
Moment of inertia	J_{rot}	kg m²	0,01694
Voltage constant	k_E	V/1000 rpm	61
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	36
Rotor weight	m_{rot}	kg	see Table 1-3

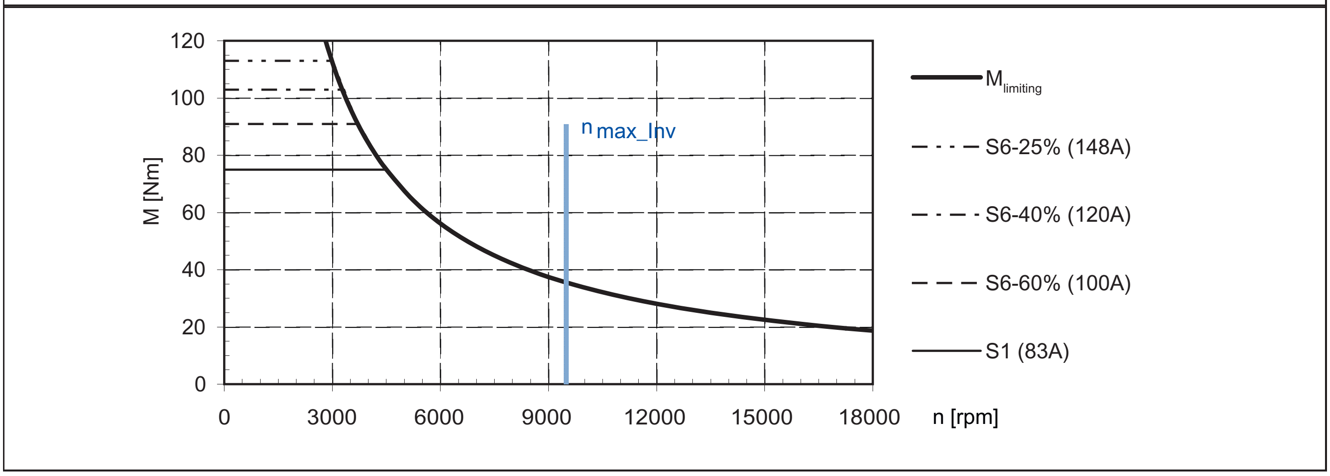


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 148 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1093-4WH□1

Rated power	P_N	kW	35,3
Rated speed	n_N	rpm	4500
Rated torque	M_N	Nm	75
Rated current	I_N	A	83
Maximum current	I_{max}	A	166
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	9500
Maximum torque	M_{max}	Nm	120
Moment of inertia	J_{rot}	kg m²	0,01694
Voltage constant	k_E	V/1000 rpm	61
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	36
Rotor weight	m_{rot}	kg	see Table 1-3

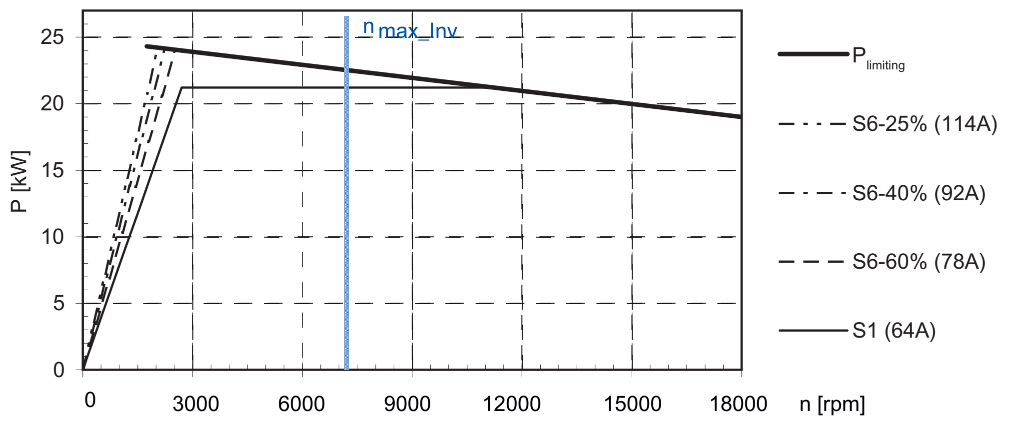


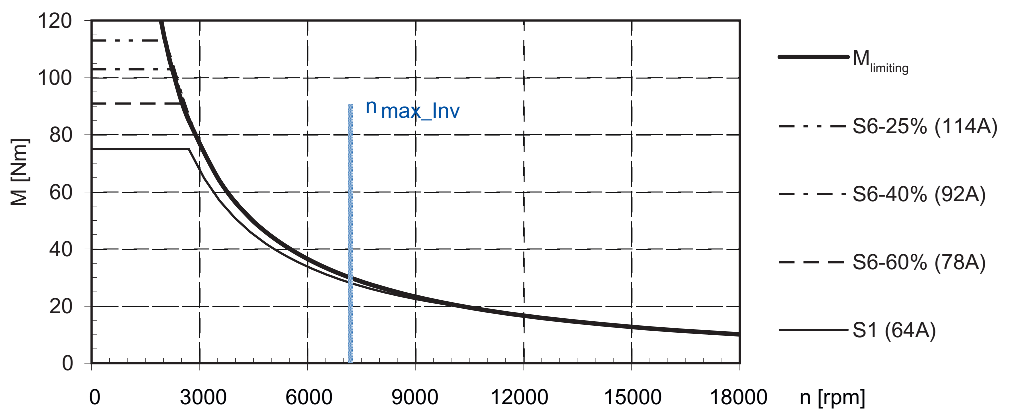


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 149 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1093-4WM□1

Rated power	P_N	kW	21,2
Rated speed	n_N	rpm	2700
Rated torque	M_N	Nm	75
Rated current	I_N	A	64
Maximum current	I_{max}	A	128
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7200
Maximum torque	M_{max}	Nm	120
Moment of inertia	J_{rot}	kg m^2	0,01694
Voltage constant	k_E	V/1000 rpm	80
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	36
Rotor weight	m_{rot}	kg	see Table 1-3

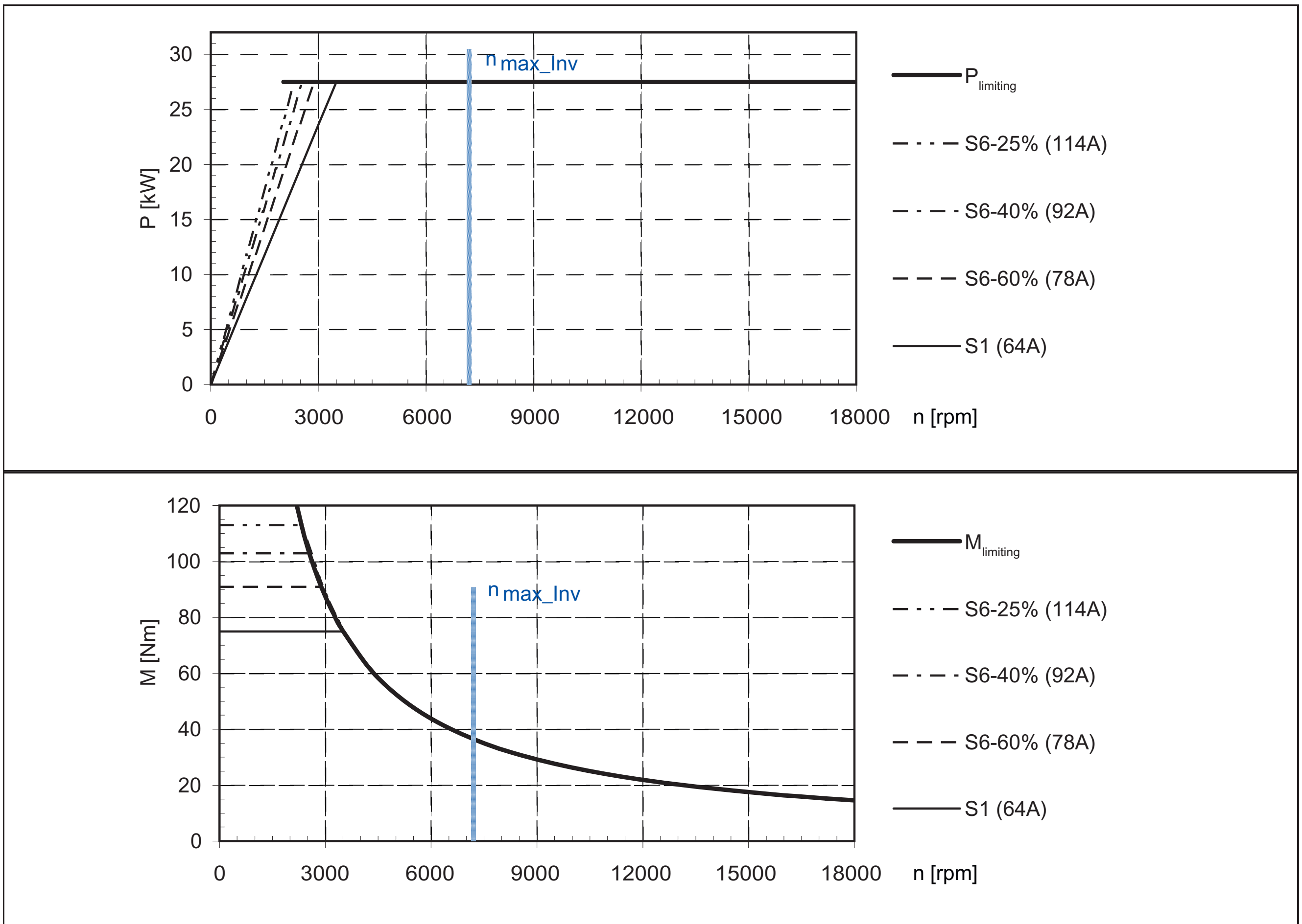




The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 150 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1093-4WM□1

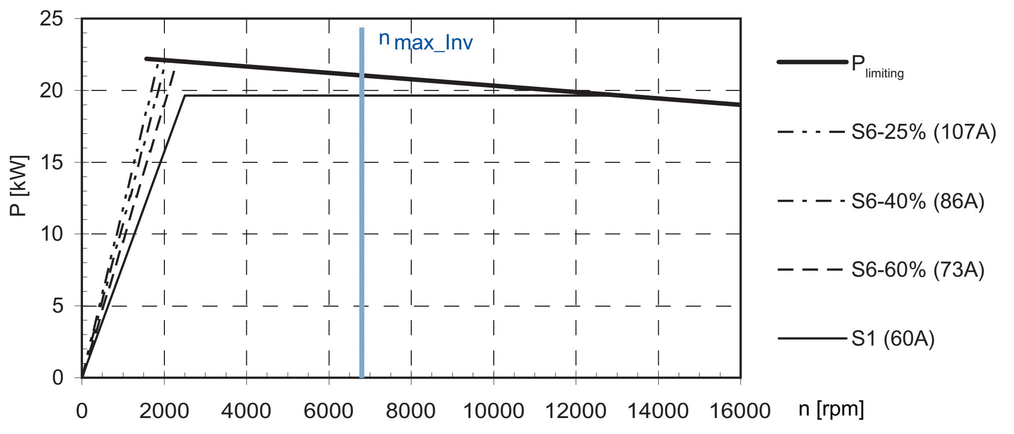
Rated power	P_N	kW	27,5
Rated speed	n_N	rpm	3500
Rated torque	M_N	Nm	75
Rated current	I_N	A	64
Maximum current	I_{max}	A	128
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7200
Maximum torque	M_{max}	Nm	120
Moment of inertia	J_{rot}	kg m²	0,01694
Voltage constant	k_E	V/1000 rpm	80
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	36
Rotor weight	m_{rot}	kg	see Table 1-3

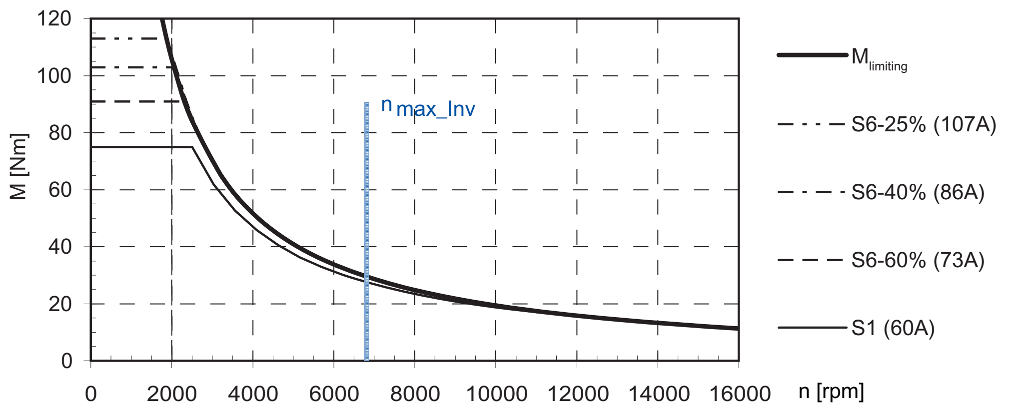


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 151 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1093-4WN□1

Rated power	P_N	kW	19,6
Rated speed	n_N	rpm	2500
Rated torque	M_N	Nm	75
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	16000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6800
Maximum torque	M_{max}	Nm	120
Moment of inertia	J_{rot}	kg m²	0,01694
Voltage constant	k_E	V/1000 rpm	85
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	36
Rotor weight	m_{rot}	kg	see Table 1-3

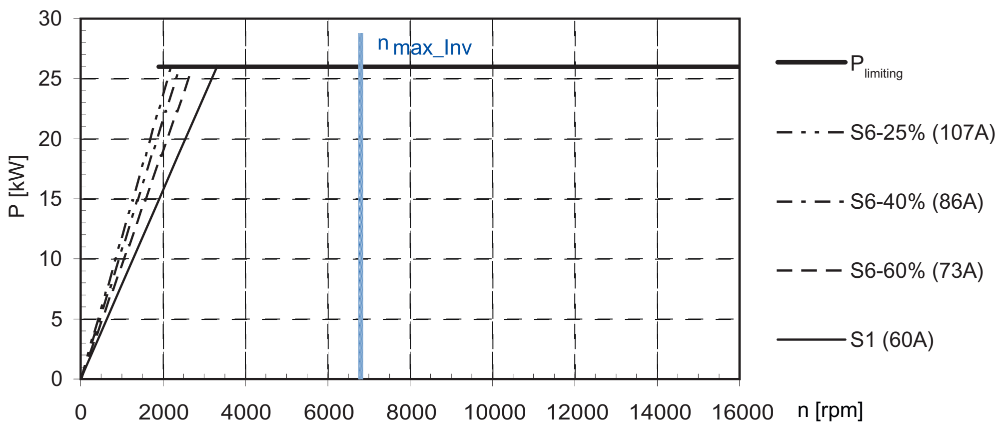


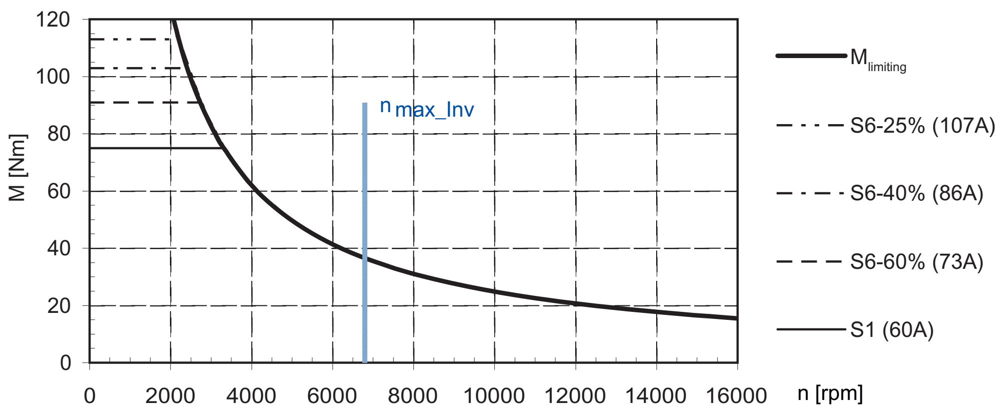


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 152 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1093-4WN□1

Rated power	P_N	kW	26
Rated speed	n_N	rpm	3300
Rated torque	M_N	Nm	75
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	16000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6800
Maximum torque	M_{max}	Nm	120
Moment of inertia	J_{rot}	kg m²	0,01694
Voltage constant	k_E	V/1000 rpm	85
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	36
Rotor weight	m_{rot}	kg	see Table 1-3

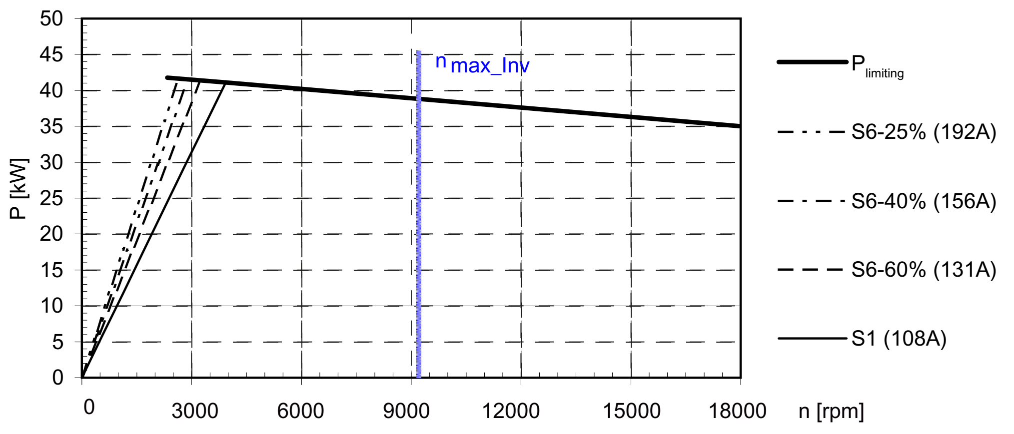


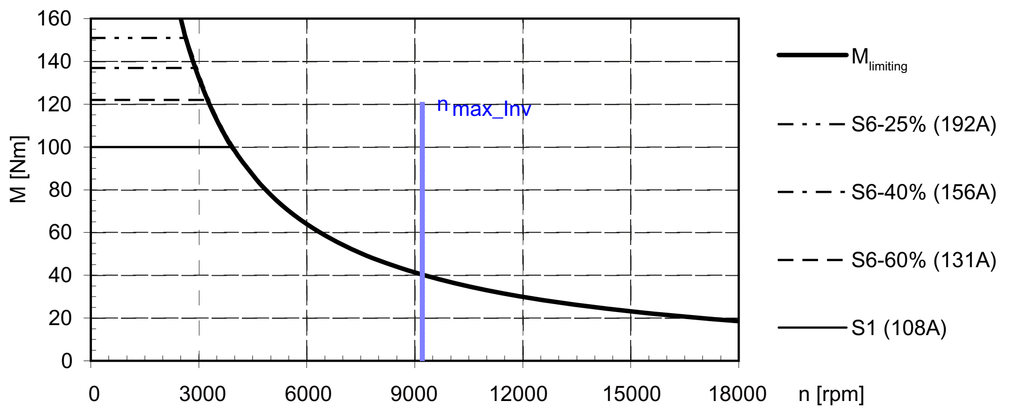


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 153 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1094-4WK□1

Rated power	P_N	kW	41,2
Rated speed	n_N	rpm	3930
Rated torque	M_N	Nm	100
Rated current	I_N	A	108
Maximum current	I_{max}	A	216
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	9200
Maximum torque	M_{max}	Nm	160
Moment of inertia	J_{rot}	kg m^2	0,02168
Voltage constant	k_E	V/1000 rpm	63
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	41
Rotor weight	m_{rot}	kg	see Table 1-3

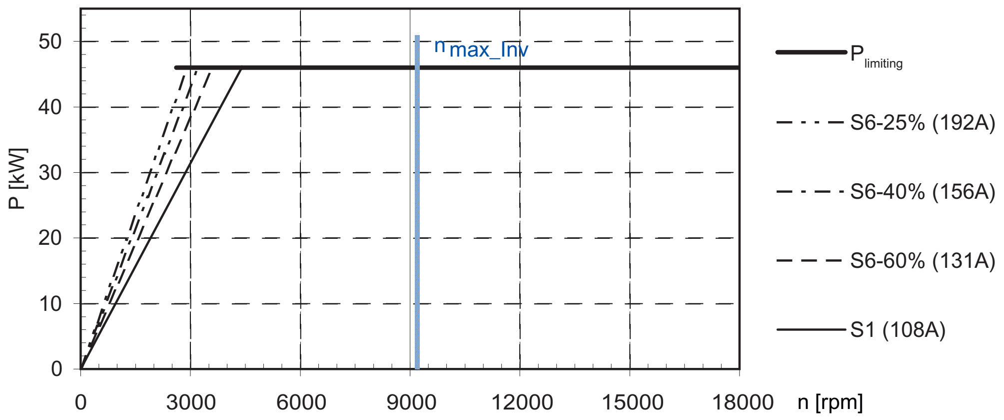


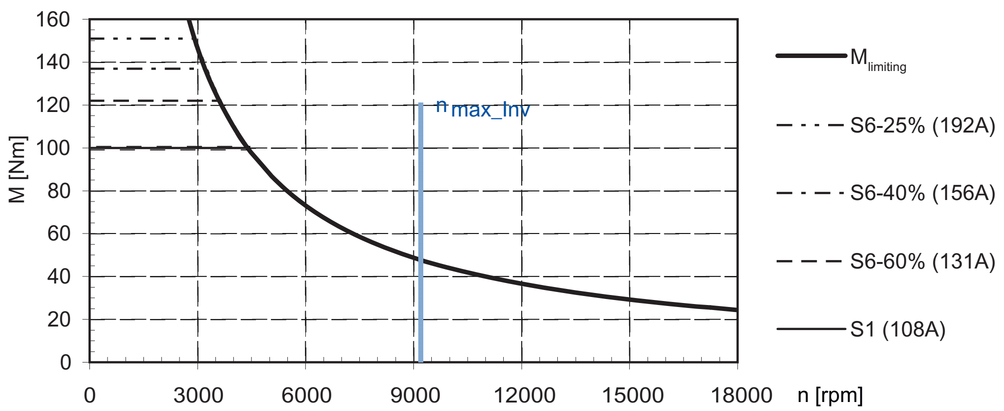


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 154 SINAMICS, 3-ph. 400 V AC Active Line Module, (ALM), 1FE1094-4WK□1

Rated power	P_N	kW	46
Rated speed	n_N	rpm	4400
Rated torque	M_N	Nm	100
Rated current	I_N	A	108
Maximum current	I_{max}	A	216
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	9200
Maximum torque	M_{max}	Nm	160
Moment of inertia	J_{rot}	kg m²	0,02168
Voltage constant	k_E	V/1000 rpm	63
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	41
Rotor weight	m_{rot}	kg	see Table 1-3

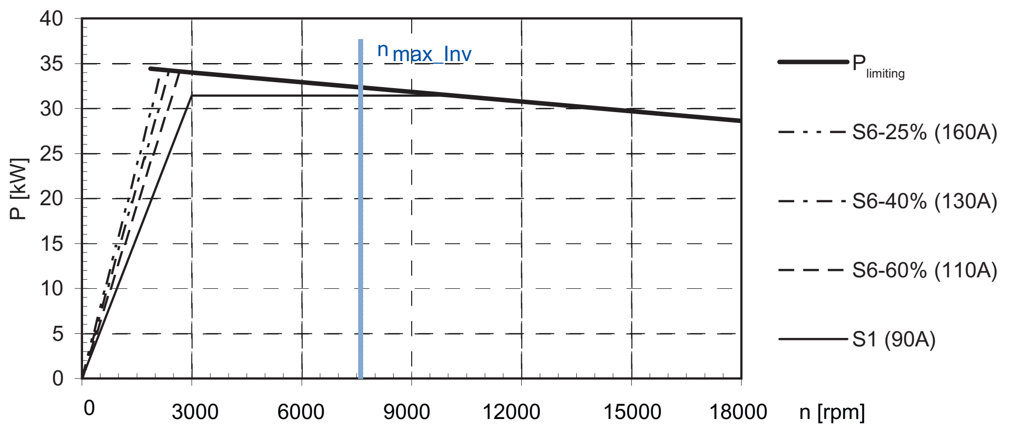


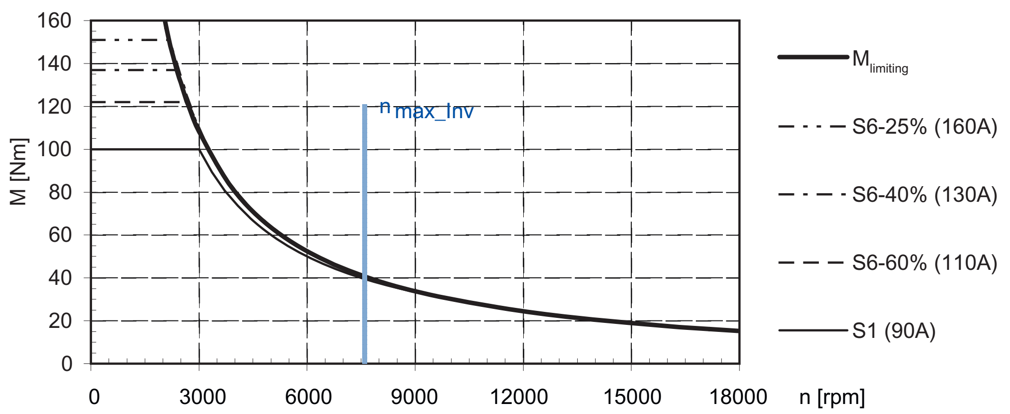


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 155 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1094-4WL□1

Rated power	P_N	kW	31,4
Rated speed	n_N	rpm	3000
Rated torque	M_N	Nm	100
Rated current	I_N	A	90
Maximum current	I_{max}	A	180
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7600
Maximum torque	M_{max}	Nm	160
Moment of inertia	J_{rot}	kg m^2	0,02168
Voltage constant	k_E	V/1000 rpm	76
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	41
Rotor weight	m_{rot}	kg	see Table 1-3

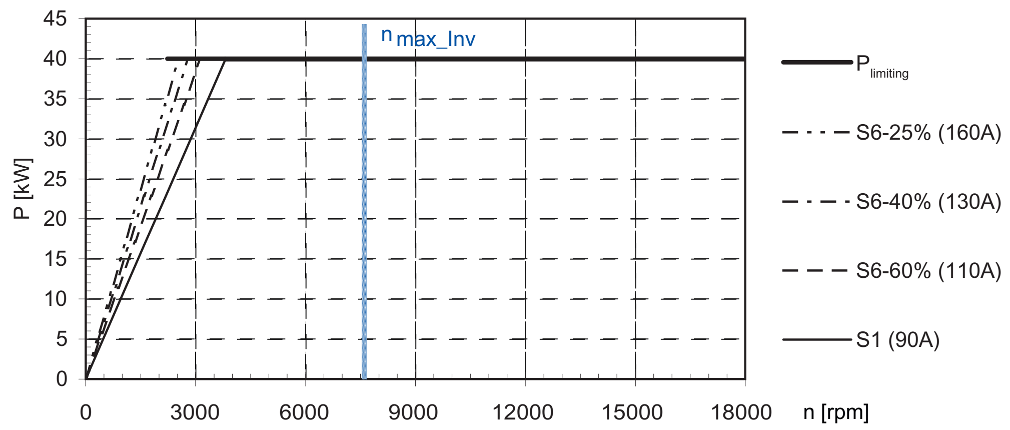


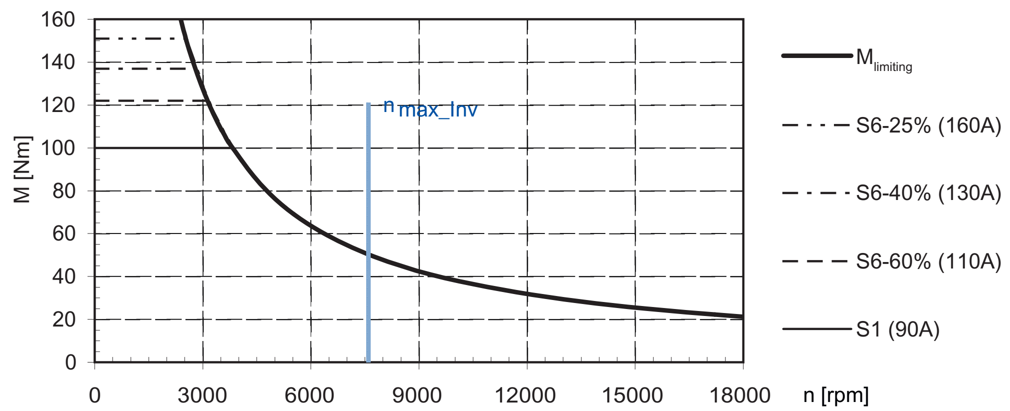


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 156 SINAMICS, 3-ph. 400 V AC Active Line Module, (ALM), 1FE1094-4WL□1

Rated power	P_N	kW	40
Rated speed	n_N	rpm	3800
Rated torque	M_N	Nm	100
Rated current	I_N	A	90
Maximum current	I_{max}	A	180
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7600
Maximum torque	M_{max}	Nm	160
Moment of inertia	J_{rot}	kg m²	0,02168
Voltage constant	k_E	V/1000 rpm	76
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	41
Rotor weight	m_{rot}	kg	see Table 1-3

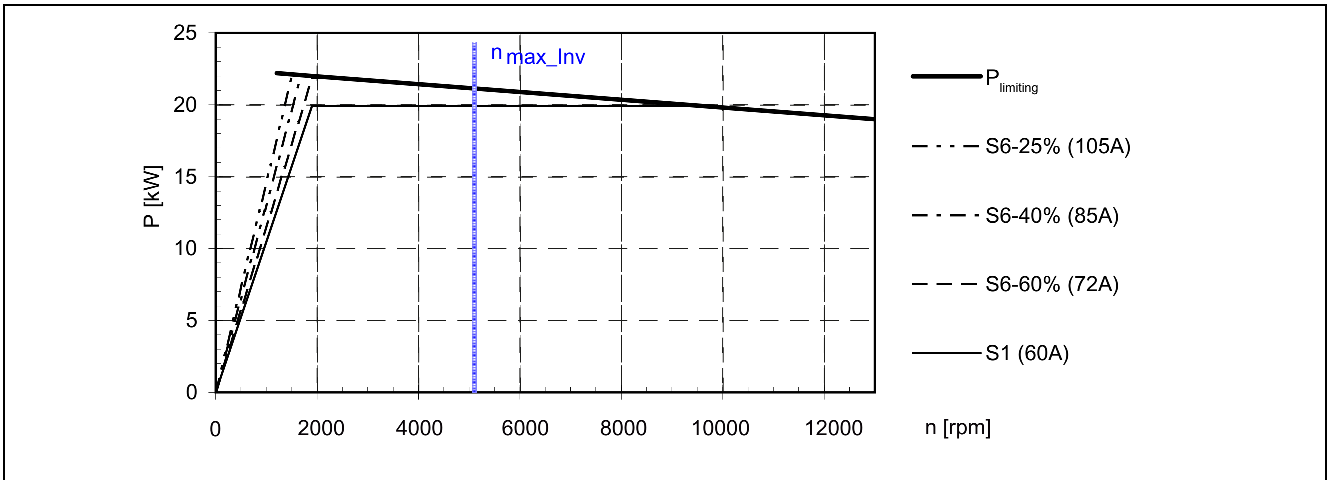


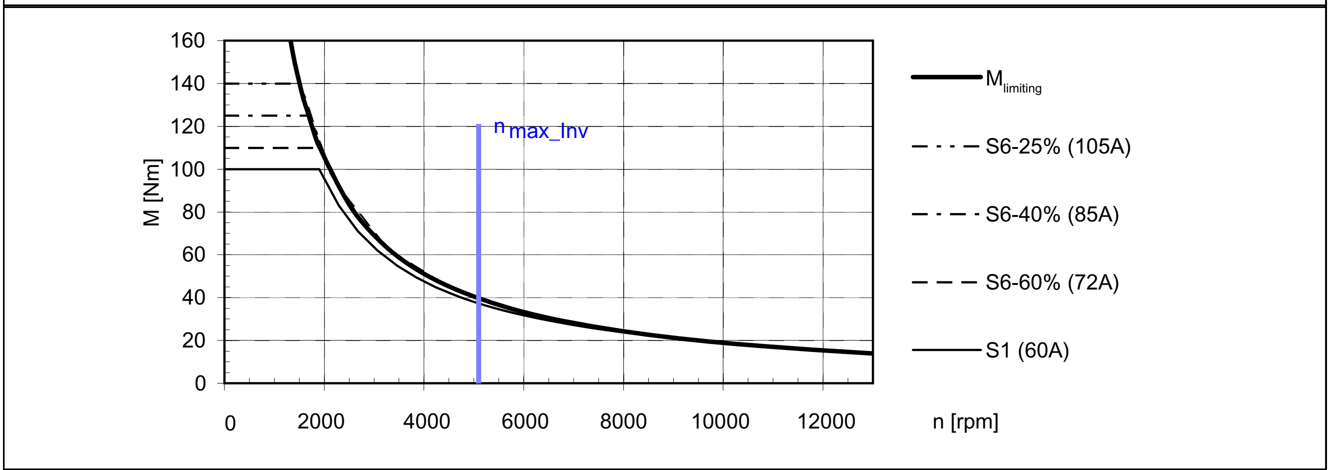


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 157 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1094-4WS□1

Rated power	P_N	kW	19,9
Rated speed	n_N	rpm	1900
Rated torque	M_N	Nm	100
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	13000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5100
Maximum torque	M_{max}	Nm	160
Moment of inertia	J_{rot}	kg m²	0,02168
Voltage constant	k_E	V/1000 rpm	113
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	41
Rotor weight	m_{rot}	kg	see Table 1-3

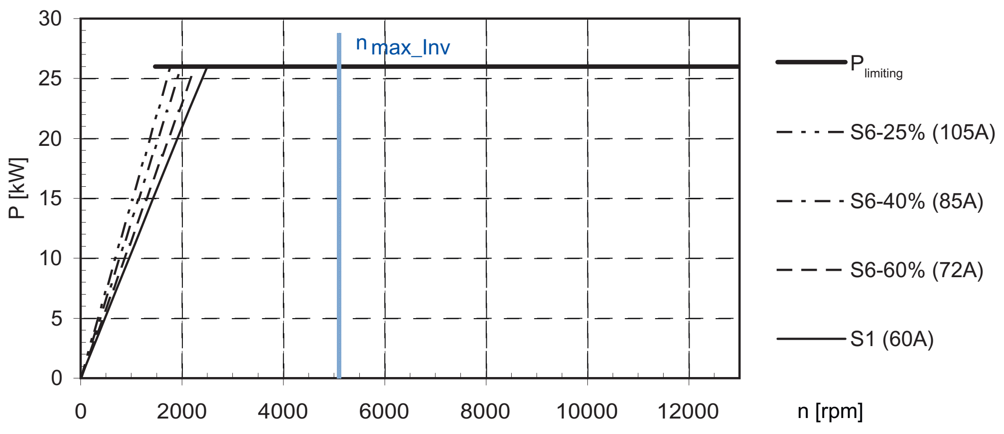


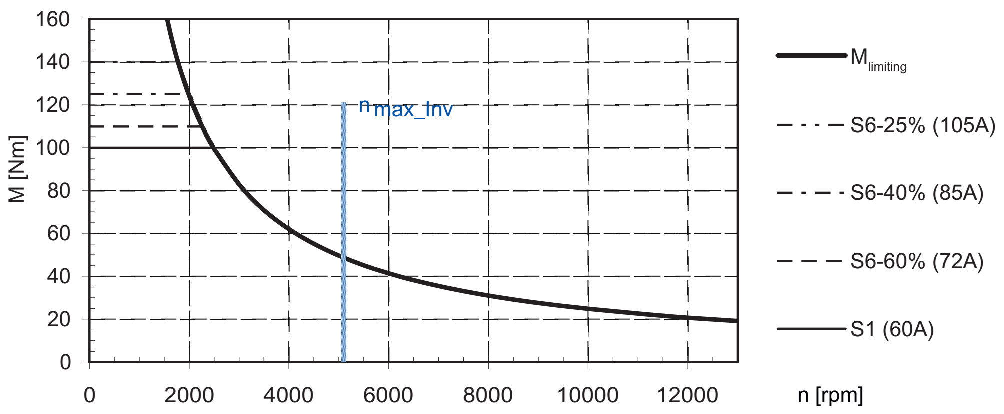


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 158 SINAMICS, 3-ph. 400 V AC Active Line Module, (ALM), 1FE1094-4WS□1

Rated power	P_N	kW	26
Rated speed	n_N	rpm	2500
Rated torque	M_N	Nm	100
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	13000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5100
Maximum torque	M_{max}	Nm	160
Moment of inertia	J_{rot}	kg m²	0,02168
Voltage constant	k_E	V/1000 rpm	113
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	41
Rotor weight	m_{rot}	kg	see Table 1-3

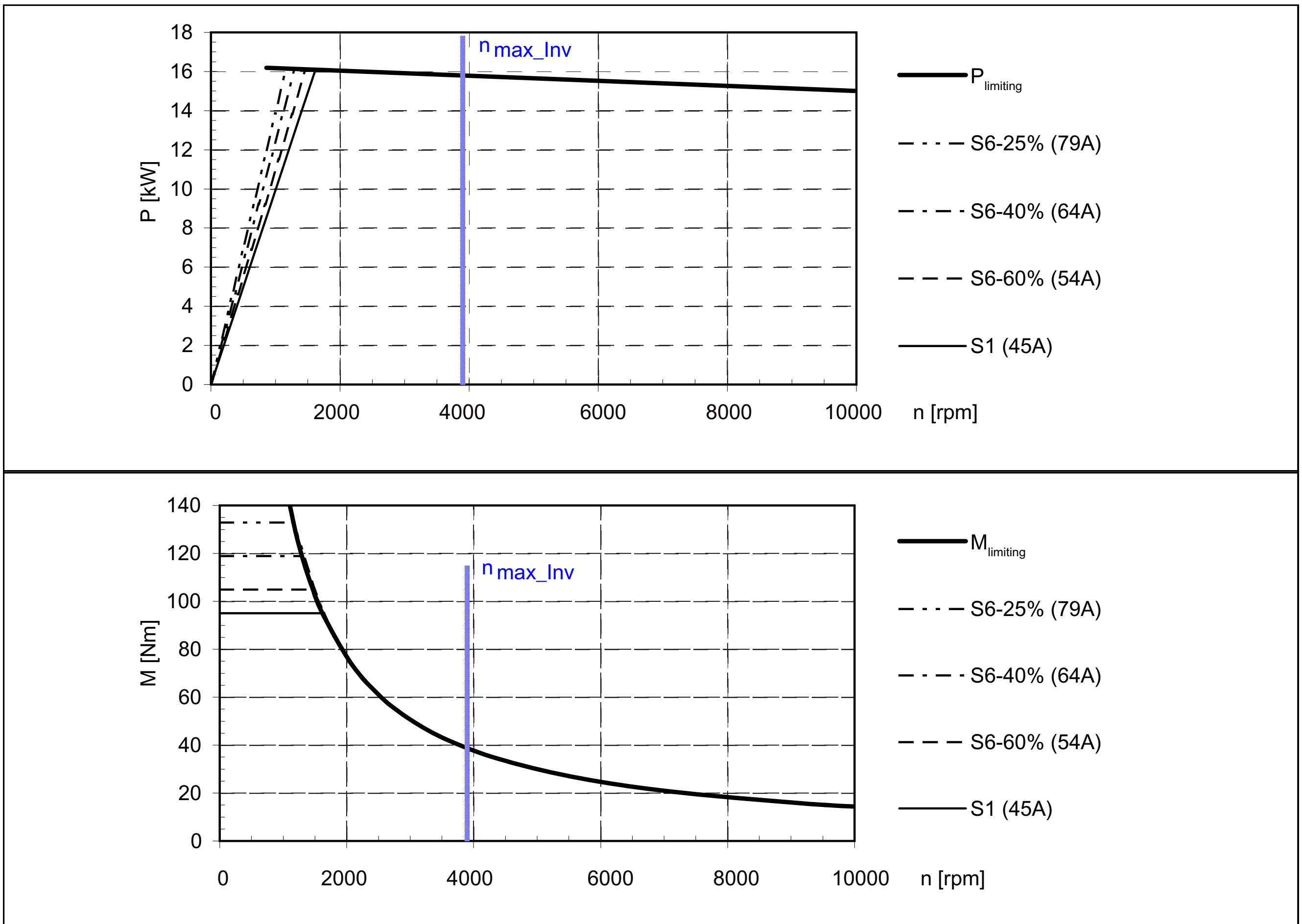




The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 159 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1094-4WU□1

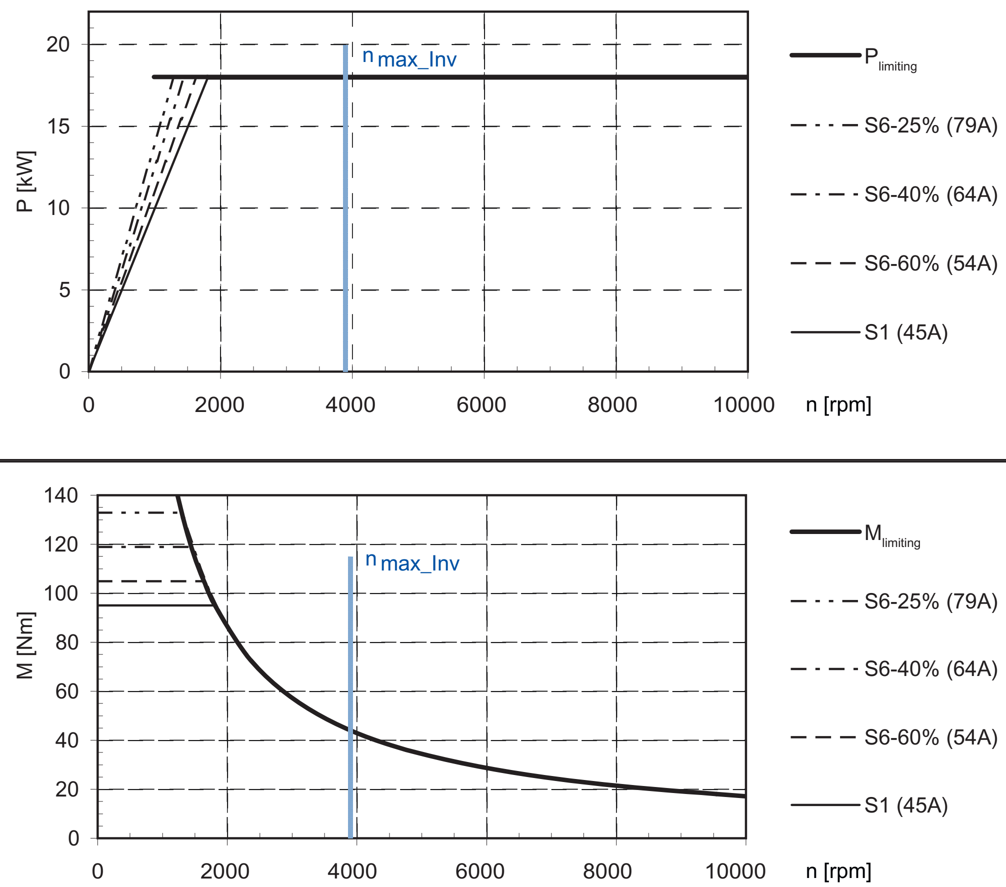
Rated power	P_N	kW	16
Rated speed	n_N	rpm	1610
Rated torque	M_N	Nm	95
Rated current	I_N	A	45
Maximum current	I_{max}	A	90
Maximum speed	n_{max}	M1/in	10000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	3900
Maximum torque	M_{max}	Nm	160
Moment of inertia	J_{rot}	kg m²	0,02168
Voltage constant	k_E	V/1000 rpm	145
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	41
Rotor weight	m_{rot}	kg	see Table 1-3



The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 160 SINAMICS, 3-ph. 400 V AC Active Line Module, (ALM), 1FE1094-4WU□1

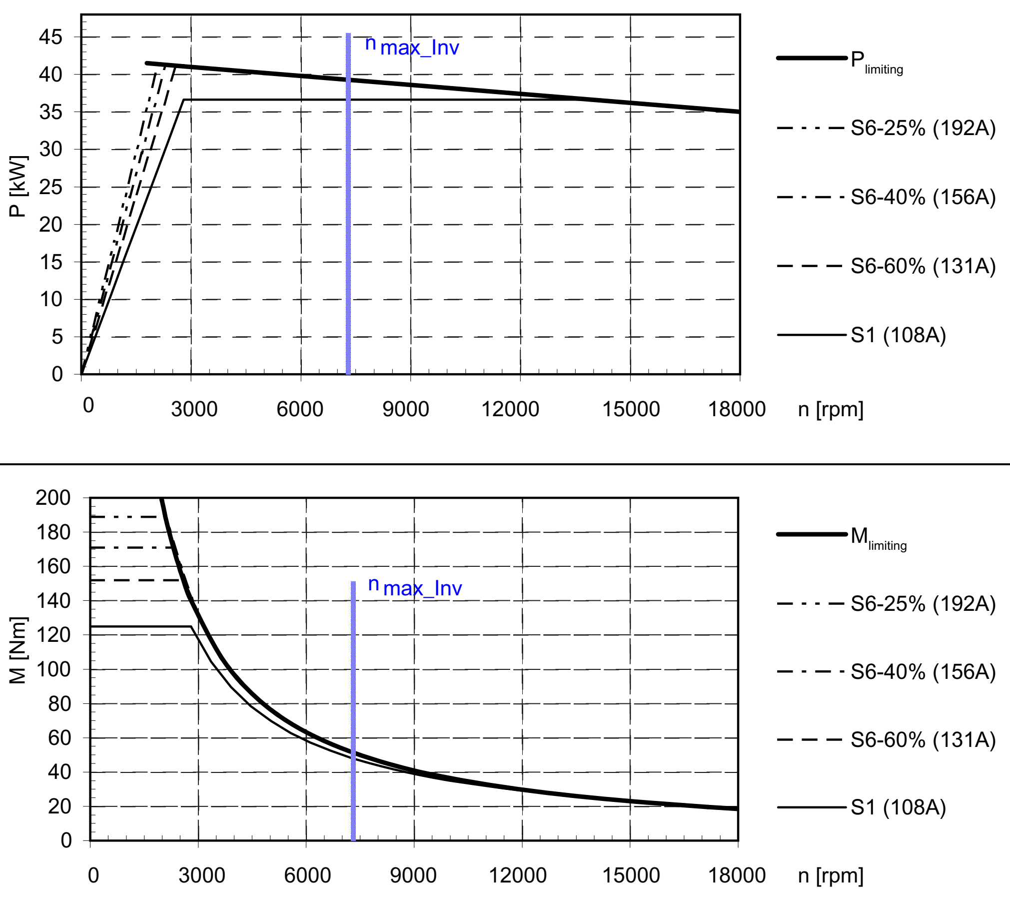
Rated power	P_N	kW	18
Rated speed	n_N	rpm	1800
Rated torque	M_N	Nm	95
Rated current	I_N	A	45
Maximum current	I_{max}	A	90
Maximum speed	n_{max}	M1/in	10000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	3900
Maximum torque	M_{max}	Nm	160
Moment of inertia	J_{rot}	kg m²	0,02168
Voltage constant	k_E	V/1000 rpm	145
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	41
Rotor weight	m_{rot}	kg	see Table 1-3



The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 161 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1095-4WN□1

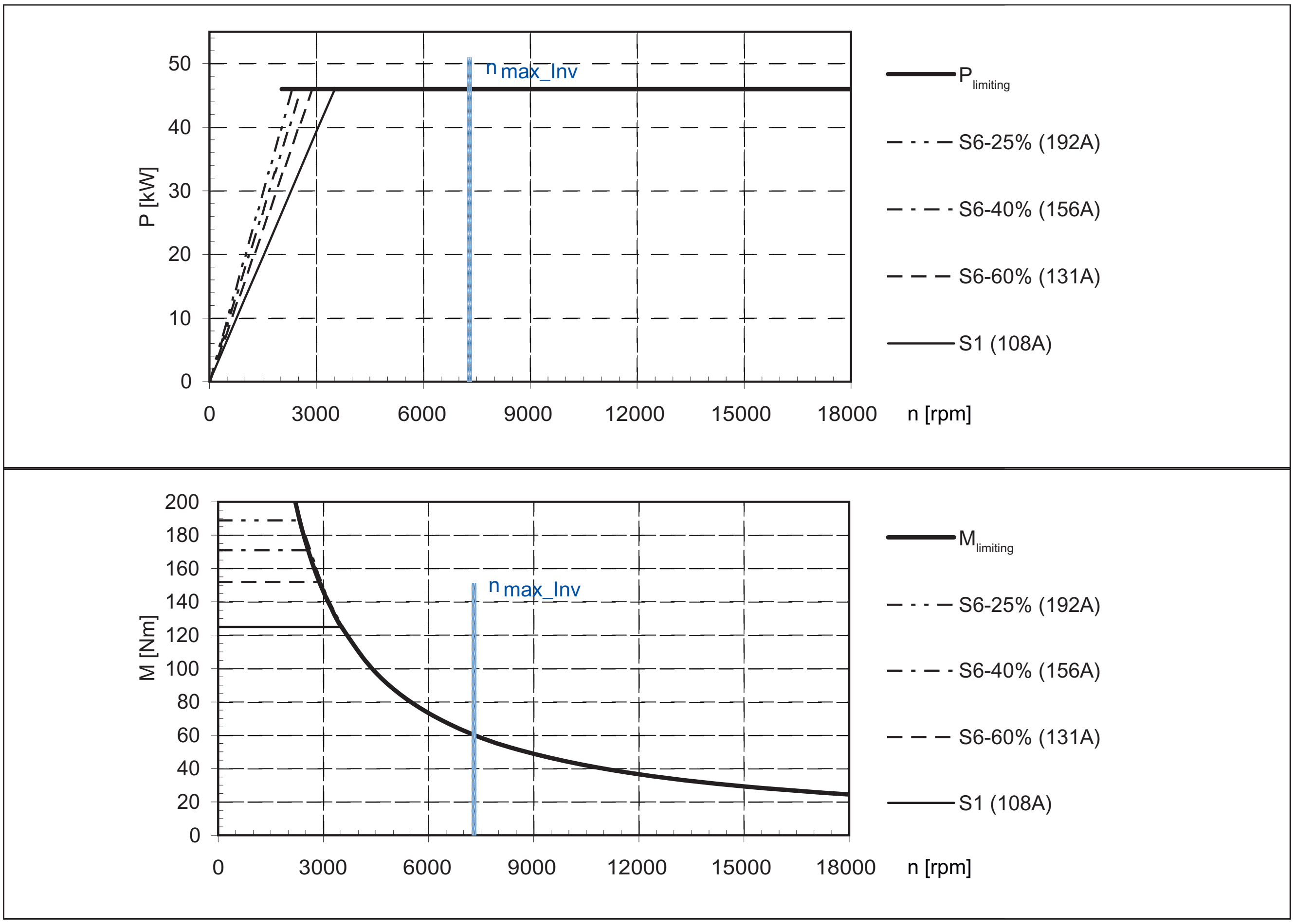
Rated power	P_N	kW	36,7
Rated speed	n_N	rpm	2800
Rated torque	M_N	Nm	125
Rated current	I_N	A	108
Maximum current	I_{max}	A	216
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7300
Maximum torque	M_{max}	Nm	200
Moment of inertia	J_{rot}	kg m²	0,02642
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	47,5
Rotor weight	m_{rot}	kg	see Table 1-3



The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 162 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1095-4WN□1

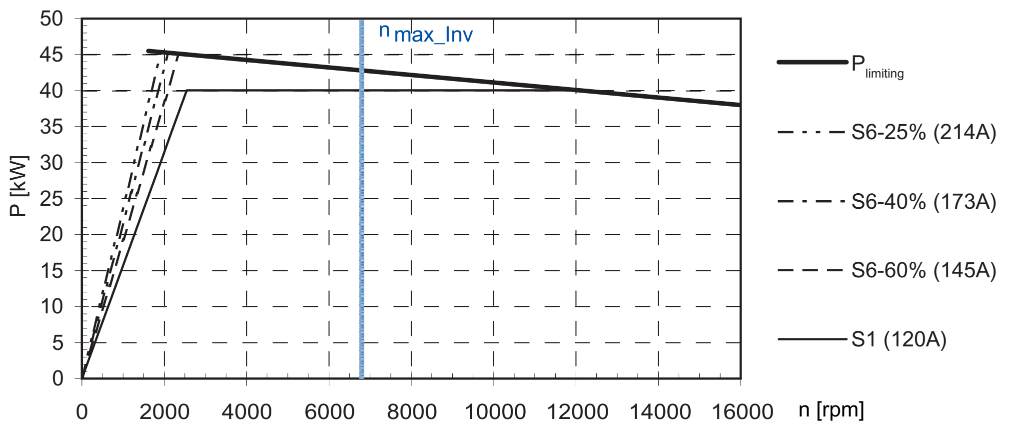
Rated power	P_N	kW	46
Rated speed	n_N	rpm	3500
Rated torque	M_N	Nm	125
Rated current	I_N	A	108
Maximum current	I_{max}	A	216
Maximum speed	n_{max}	rpm	18000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7300
Maximum torque	M_{max}	Nm	200
Moment of inertia	J_{rot}	kg m²	0,02642
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	47,5
Rotor weight	m_{rot}	kg	see Table 1-3

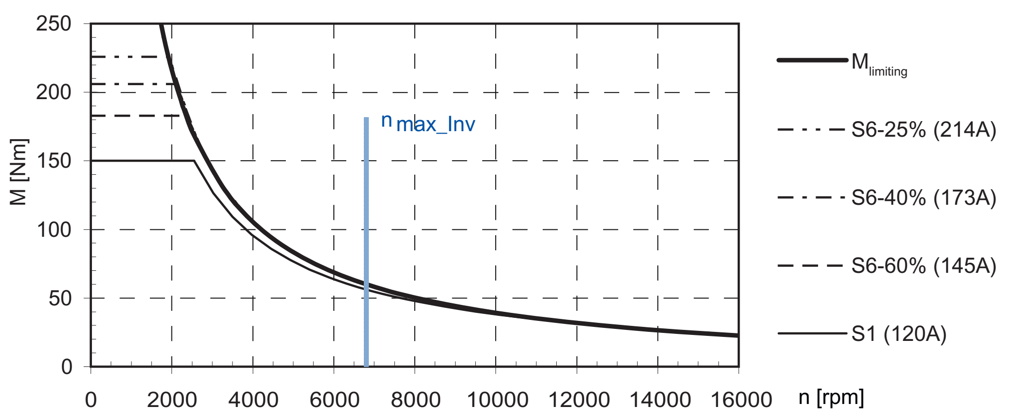


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 163 SINAMICS, 3-ph. 380 V AC Smart Line Module, (SLM), 1FE1096-4WN□1

Rated power	P_N	kW	40,1
Rated speed	n_N	rpm	2550
Rated torque	M_N	Nm	150
Rated current	I_N	A	120
Maximum current	I_{max}	A	240
Maximum speed	n_{max}	rpm	16000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6800
Maximum torque	M_{max}	Nm	240
Moment of inertia	J_{rot}	kg m²	0,03139
Voltage constant	k_E	V/1000 rpm	85
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	53
Rotor weight	m_{rot}	kg	see Table 1-3

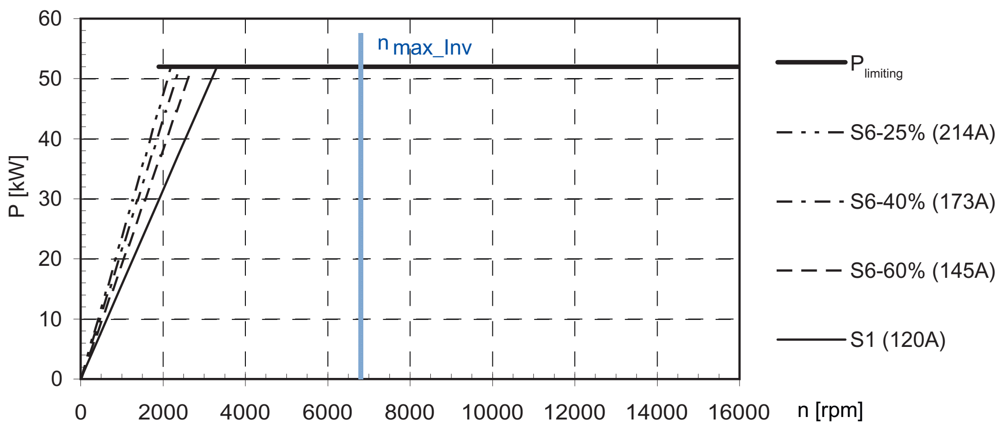


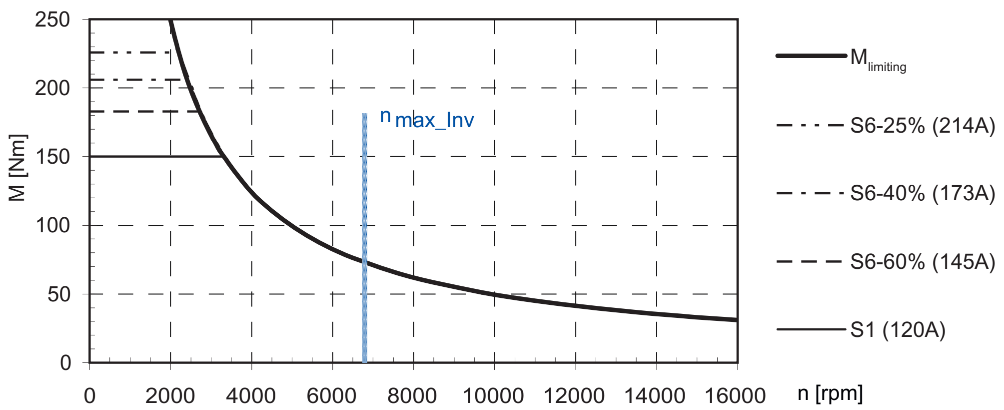


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 164 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1096-4WN□1

Rated power	P_N	kW	52
Rated speed	n_N	rpm	3300
Rated torque	M_N	Nm	150
Rated current	I_N	A	120
Maximum current	I_{max}	A	240
Maximum speed	n_{max}	rpm	16000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6800
Maximum torque	M_{max}	Nm	240
Moment of inertia	J_{rot}	kg m²	0,03139
Voltage constant	k_E	V/1000 rpm	85
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	53
Rotor weight	m_{rot}	kg	see Table 1-3

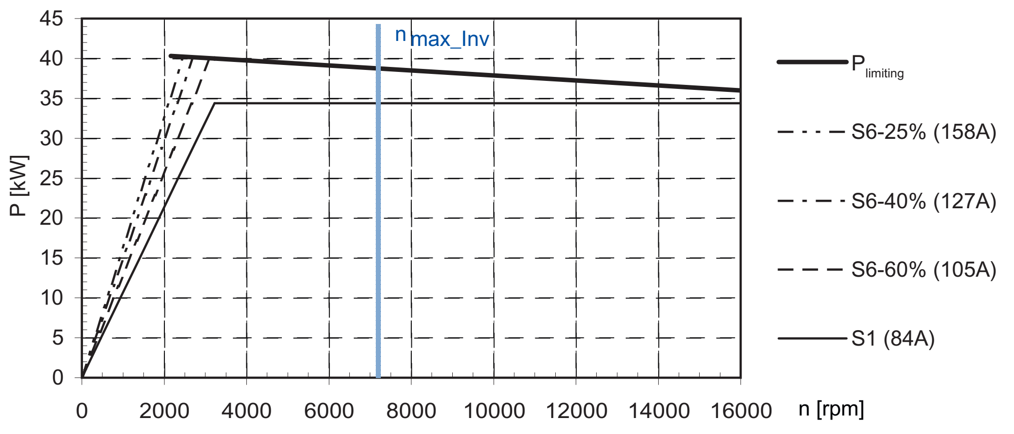


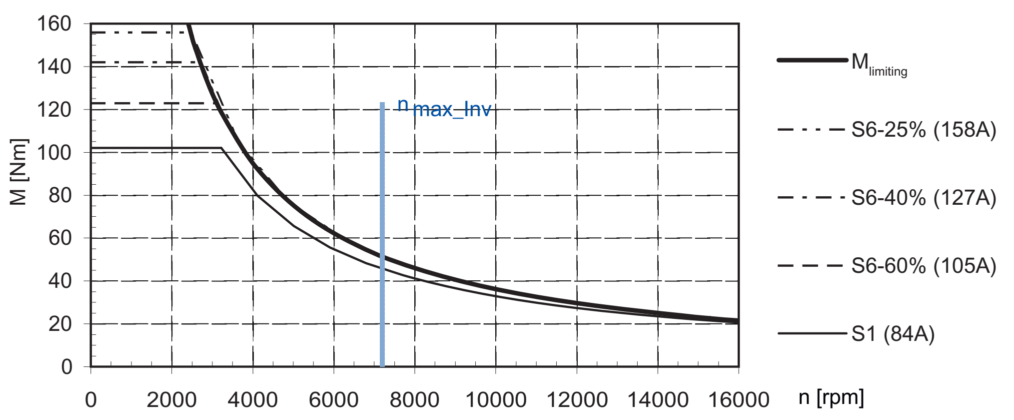


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 165 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1103-4WN□1

Rated power	P_N	kW	34,4
Rated speed	n_N	rpm	3220
Rated torque	M_N	Nm	102
Rated current	I_N	A	84
Maximum current	I_{max}	A	168
Maximum speed	n_{max}	rpm	16000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7200
Maximum torque	M_{max}	Nm	158
Moment of inertia	J_{rot}	kg m²	0,01589
Voltage constant	k_E	V/1000 rpm	80
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	28,5
Rotor weight	m_{rot}	kg	see Table 1-3

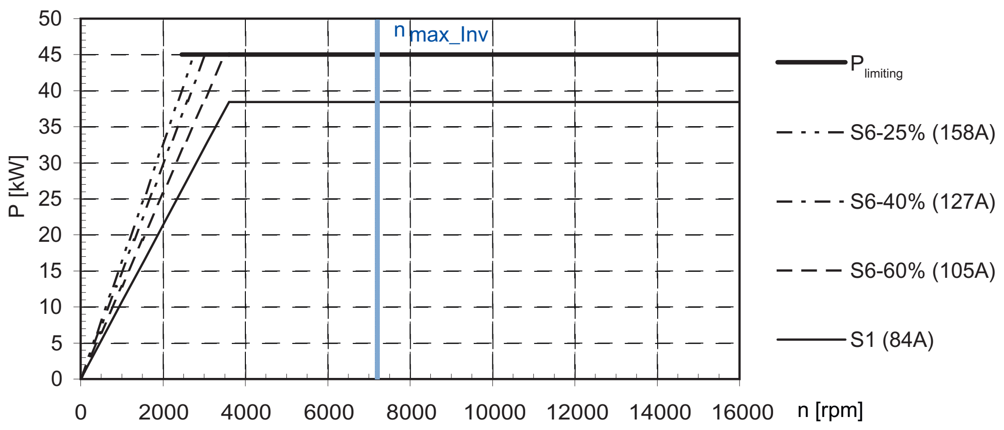


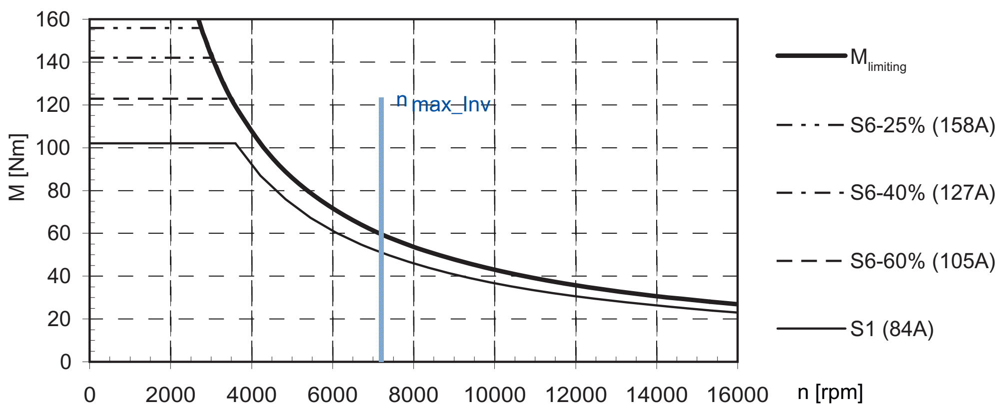


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 166 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1103-4WN□1

Rated power	P_N	kW	38,5
Rated speed	n_N	rpm	3600
Rated torque	M_N	Nm	102
Rated current	I_N	A	84
Maximum current	I_{max}	A	168
Maximum speed	n_{max}	rpm	16000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7200
Maximum torque	M_{max}	Nm	158
Moment of inertia	J_{rot}	kg m^2	0,01589
Voltage constant	k_E	V/1000 rpm	80
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	28,5
Rotor weight	m_{rot}	kg	see Table 1-3

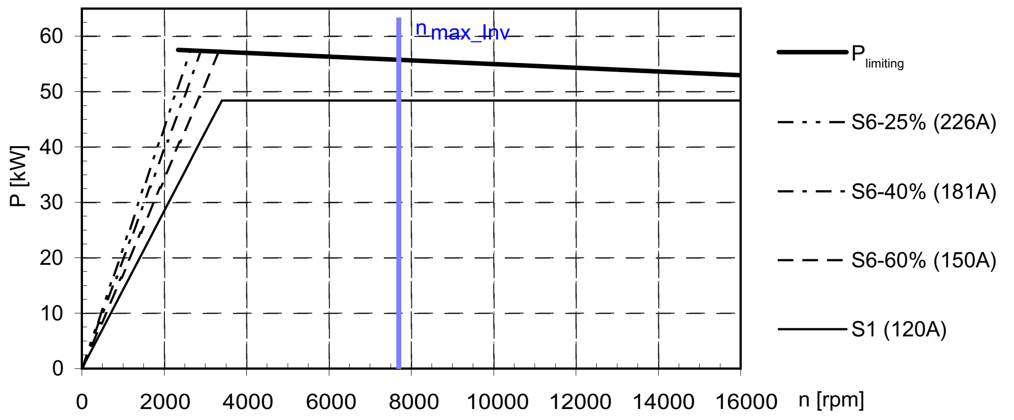


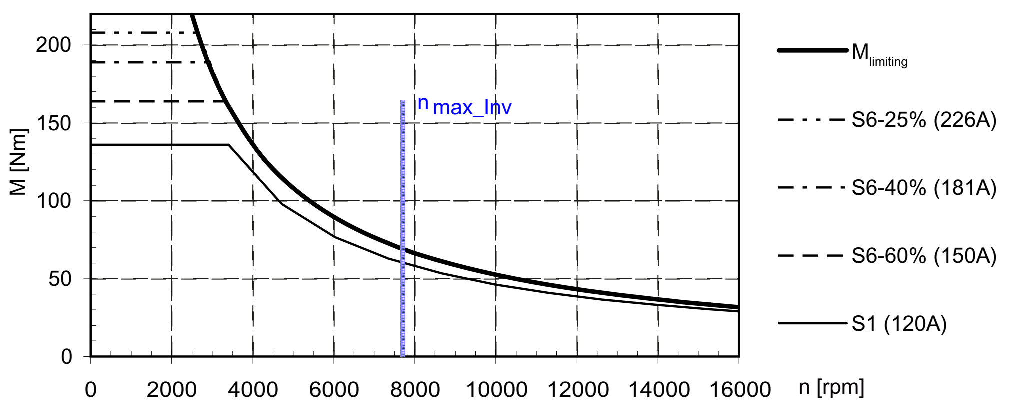


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 167 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1104-4WN□1

Rated power	P_N	kW	48,4
Rated speed	n_N	rpm	3400
Rated torque	M_N	Nm	136
Rated current	I_N	A	120
Maximum current	I_{max}	A	240
Maximum speed	n_{max}	rpm	16000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7700
Maximum torque	M_{max}	Nm	210
Moment of inertia	J_{rot}	kg m²	0,02098
Voltage constant	k_E	V/1000 rpm	75
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	35,5
Rotor weight	m_{rot}	kg	see Table 1-3

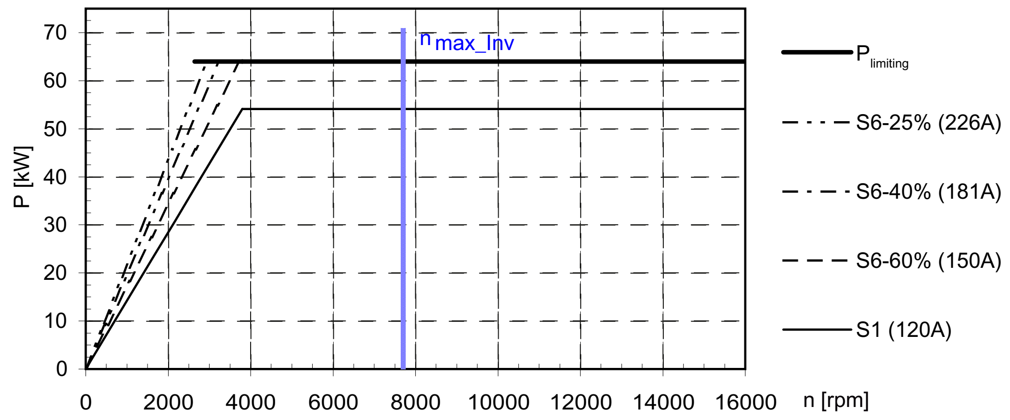


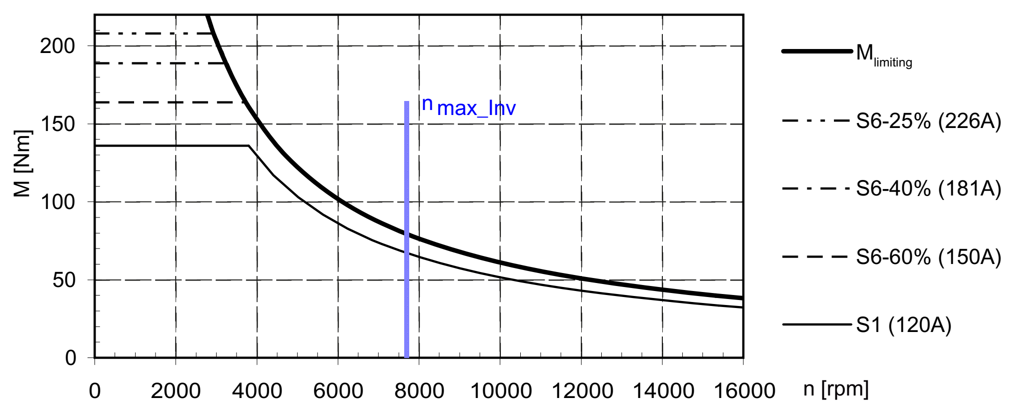


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 168 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1104-4WN□1

Rated power	P_N	kW	54
Rated speed	n_N	rpm	3800
Rated torque	M_N	Nm	136
Rated current	I_N	A	120
Maximum current	I_{max}	A	240
Maximum speed	n_{max}	rpm	16000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	7700
Maximum torque	M_{max}	Nm	210
Moment of inertia	J_{rot}	kg m²	0,02098
Voltage constant	k_E	V/1000 rpm	75
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	35,5
Rotor weight	m_{rot}	kg	see Table 1-3

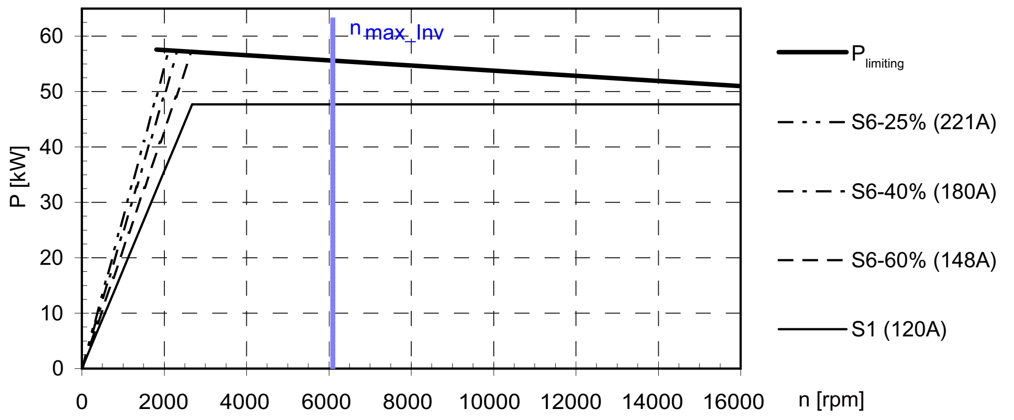


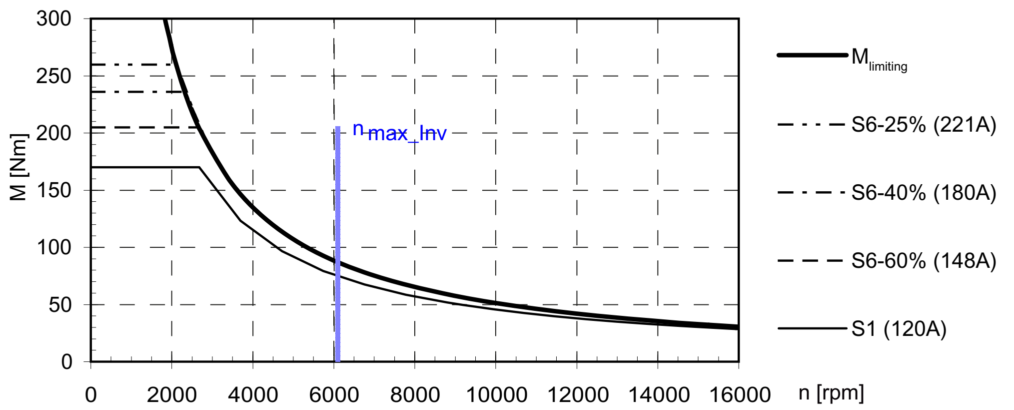


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 169 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1105-4WN□1

Rated power	P_N	kW	47,7
Rated speed	n_N	rpm	2680
Rated torque	M_N	Nm	170
Rated current	I_N	A	120
Maximum current	I_{max}	A	240
Maximum speed	n_{max}	rpm	16000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6100
Maximum torque	M_{max}	Nm	265
Moment of inertia	J_{rot}	kg m²	0,02608
Voltage constant	k_E	V/1000 rpm	94
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	43
Rotor weight	m_{rot}	kg	see Table 1-3

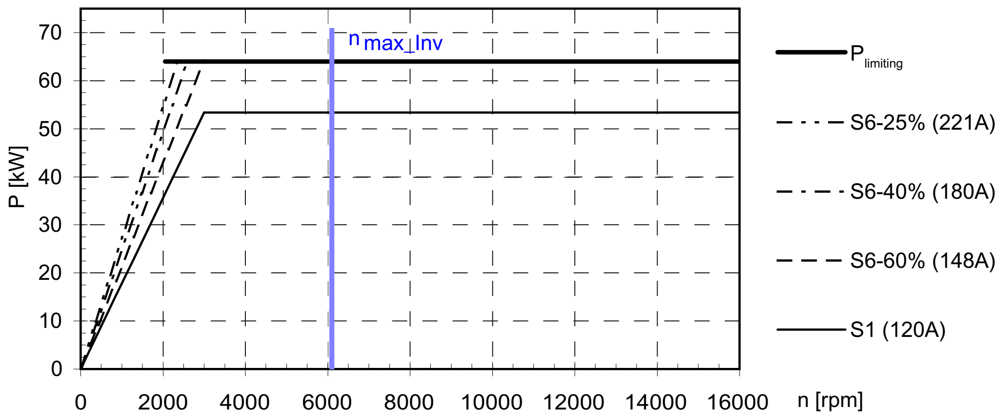


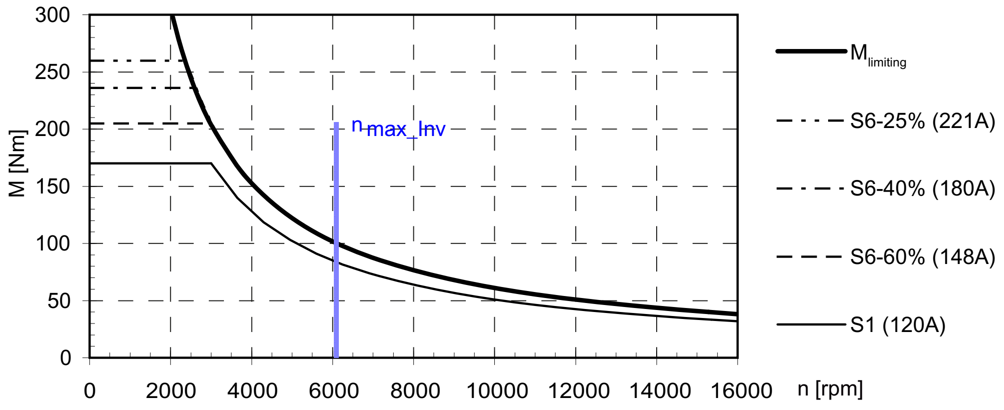


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 170 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1105-4WN□1

Rated power	P_N	kW	53,4
Rated speed	n_N	rpm	3000
Rated torque	M_N	Nm	170
Rated current	I_N	A	120
Maximum current	I_{max}	A	240
Maximum speed	n_{max}	rpm	16000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6100
Maximum torque	M_{max}	Nm	265
Moment of inertia	J_{rot}	kg m²	0,02608
Voltage constant	k_E	V/1000 rpm	94
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	43
Rotor weight	m_{rot}	kg	see Table 1-3

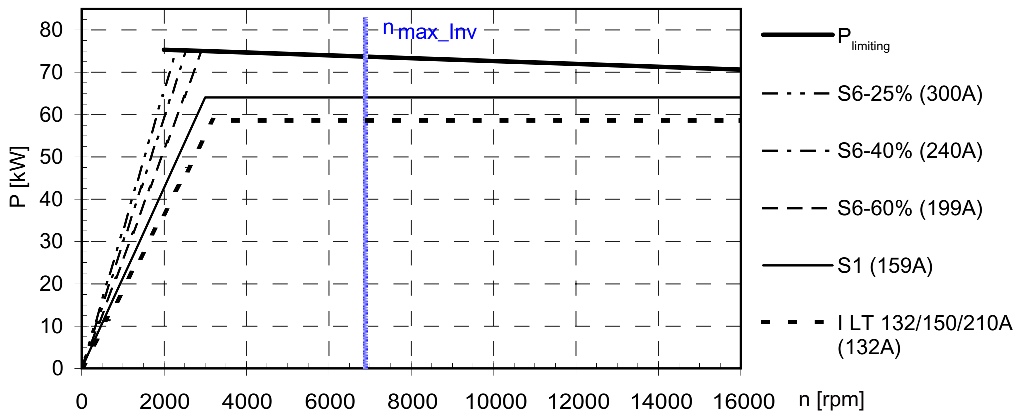


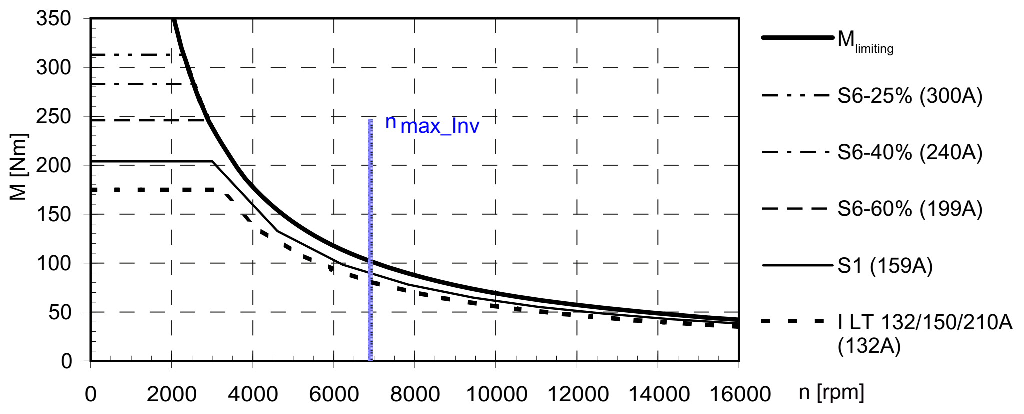


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 171 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM) 1FE1106-4WN□1

Rated power	P_N	kW	64,1
Rated speed	n_N	rpm	3000
Rated torque	M_N	Nm	204
Rated current	I_N	A	159
Maximum current	I_{max}	A	318
Maximum speed	n_{maxInv}	rpm	16000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6900
Maximum torque	M_{max}	Nm	318
Moment of inertia	J_{rot}	kg m²	0,03147
Voltage constant	k_E	V/1000 rpm	84
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	51
Rotor weight	m_{rot}	kg	see Table 1-3

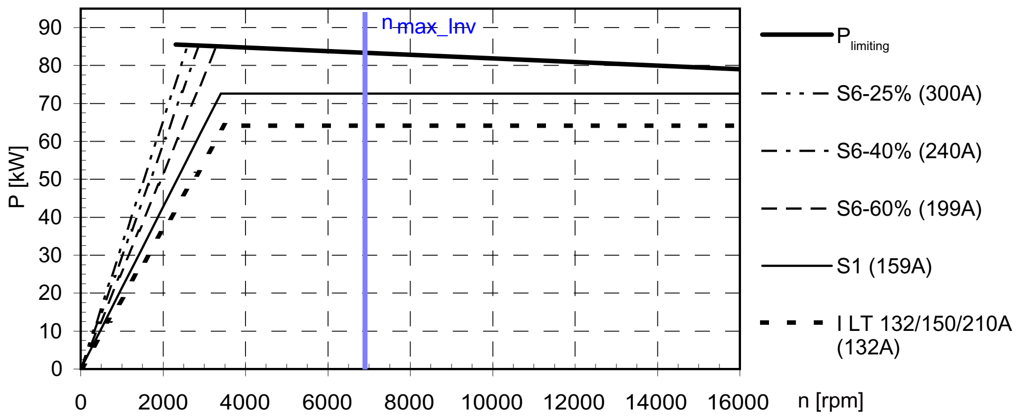


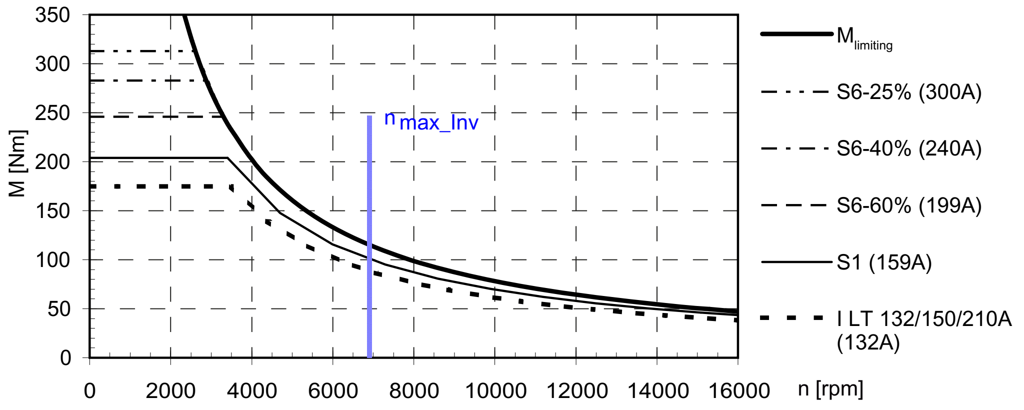


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 172 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM) 1FE1106-4WN□1

Rated power	P_N	kW	72,6
Rated speed	n_N	rpm	3400
Rated torque	M_N	Nm	204
Rated current	I_N	A	159
Maximum current	I_{max}	A	318
Maximum speed	n_{max}	rpm	16000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6900
Maximum torque	M_{max}	Nm	318
Moment of inertia	J_{rot}	kg m²	0,03147
Voltage constant	k_E	V/1000 rpm	84
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	51
Rotor weight	m_{rot}	kg	see Table 1-3

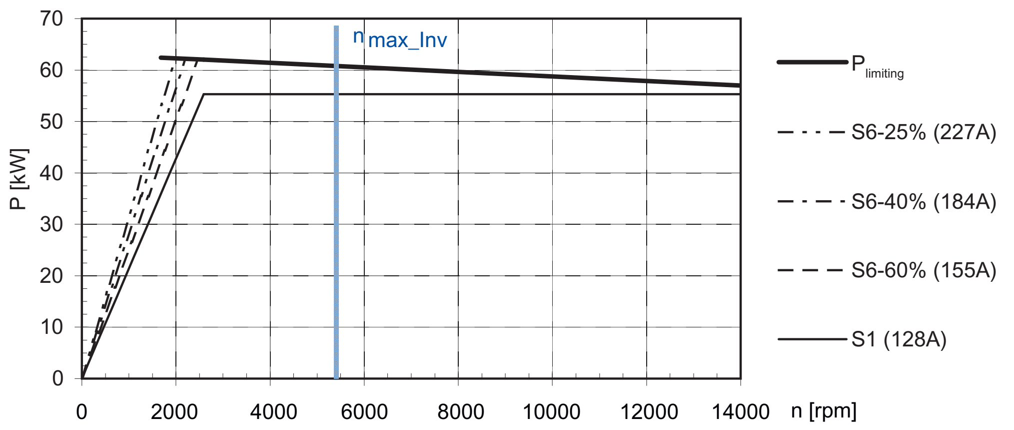


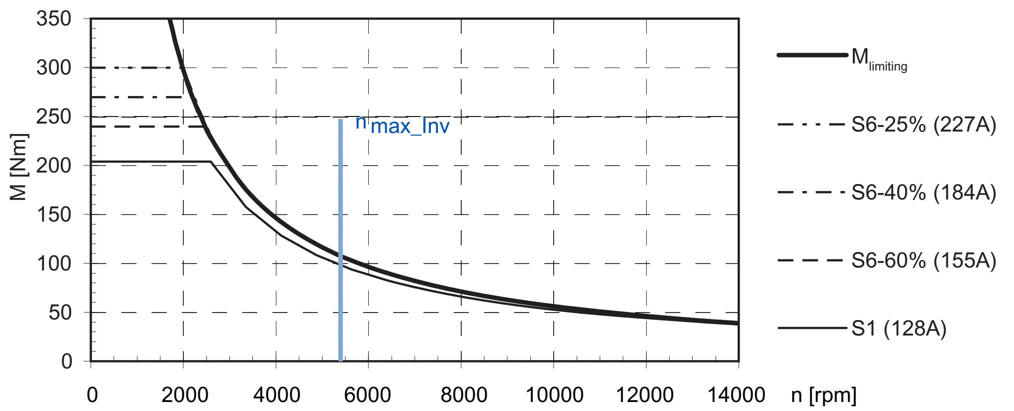


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 173 SINAMICS, 3-ph. 400 V AC, Smart Line Module, (SLM), FE1106-4WR□1

Rated power	P_N	kW	55,3
Rated speed	n_N	rpm	2900
Rated torque	M_N	Nm	204
Rated current	I_N	A	128
Maximum current	I_{max}	A	260
Maximum speed	n_{max}	rpm	14000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5400
Maximum torque	M_{max}	Nm	318
Moment of inertia	J_{rot}	kg m^2	0,03147
Voltage constant	k_E	V/1000 rpm	106
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	51
Rotor weight	m_{rot}	kg	see Table 1-3

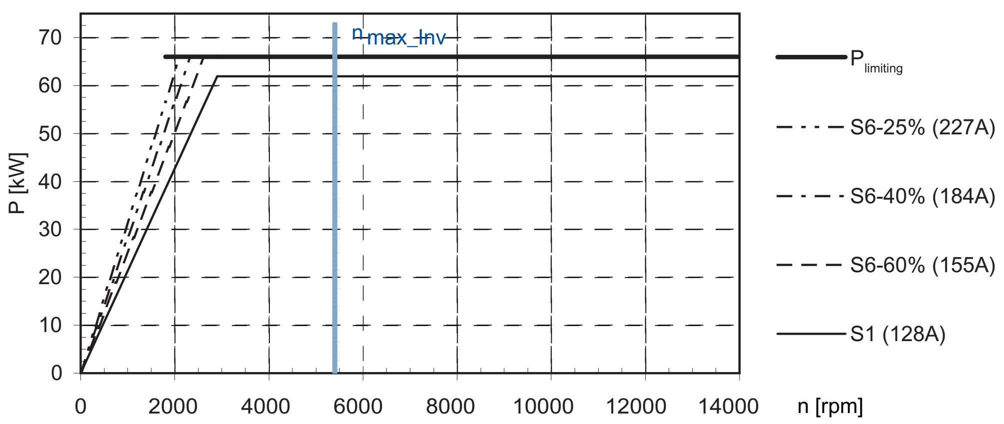


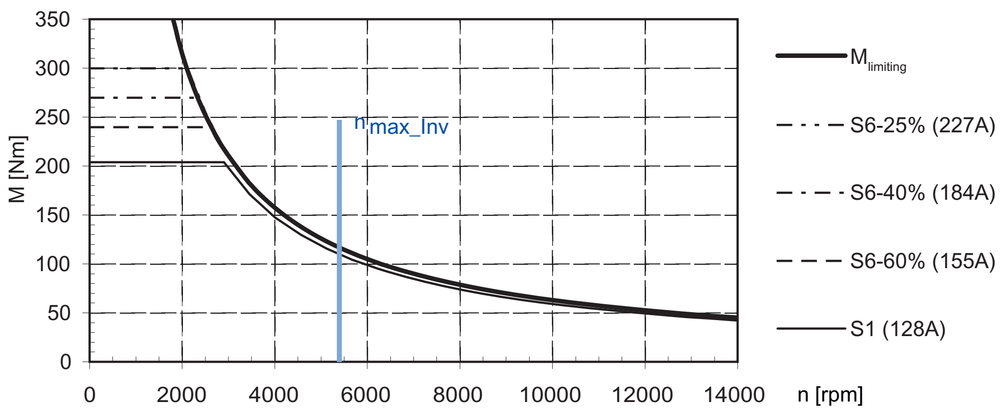


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 174 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), FE1106-4WR□1

Rated power	P_N	kW	62
Rated speed	n_N	rpm	2900
Rated torque	M_N	Nm	204
Rated current	I_N	A	128
Maximum current	I_{max}	A	260
Maximum speed	n_{max}	rpm	14000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5400
Maximum torque	M_{max}	Nm	318
Moment of inertia	J_{rot}	kg m²	0,03147
Voltage constant	k_E	V/1000 rpm	106
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	51
Rotor weight	m_{rot}	kg	see Table 1-3

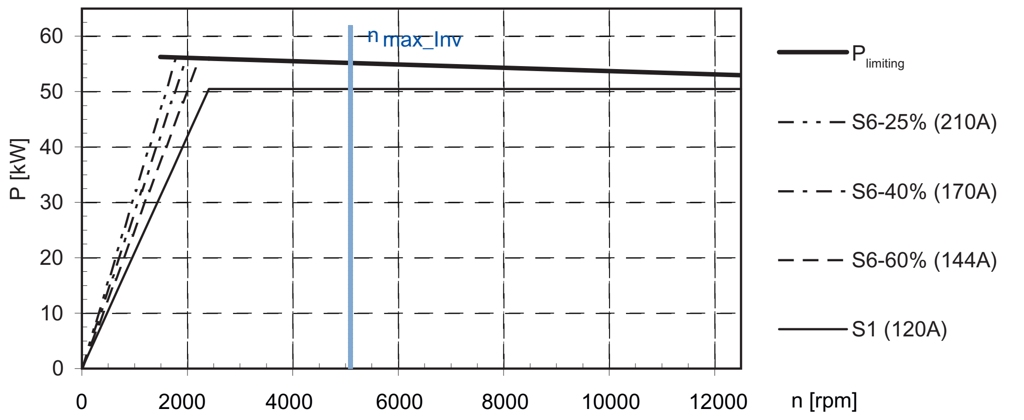


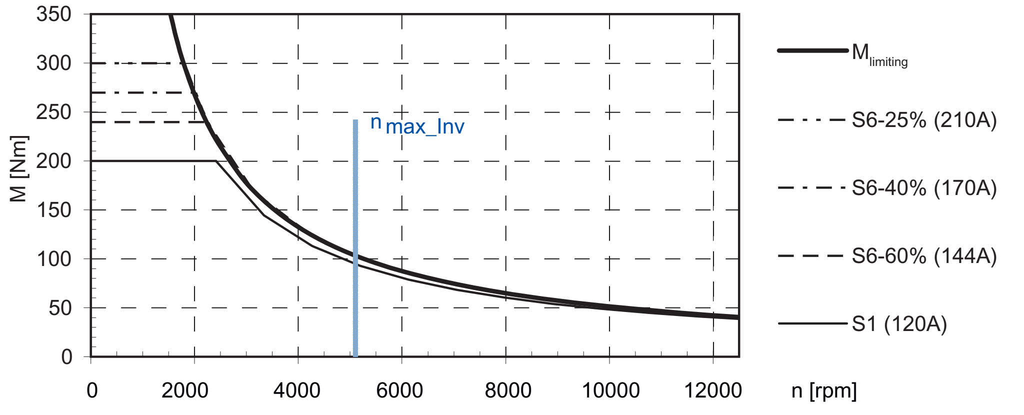


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 175 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1106-4WS□1

Rated power	P_N	kW	50,5
Rated speed	n_N	rpm	2410
Rated torque	M_N	Nm	200
Rated current	I_N	A	120
Maximum current	I_{max}	A	240
Maximum speed	n_{max}	rpm	12500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5100
Maximum torque	M_{max}	Nm	318
Moment of inertia	J_{rot}	kg m²	0,03147
Voltage constant	k_E	V/1000 rpm	112
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	51
Rotor weight	m_{rot}	kg	see Table 1-3

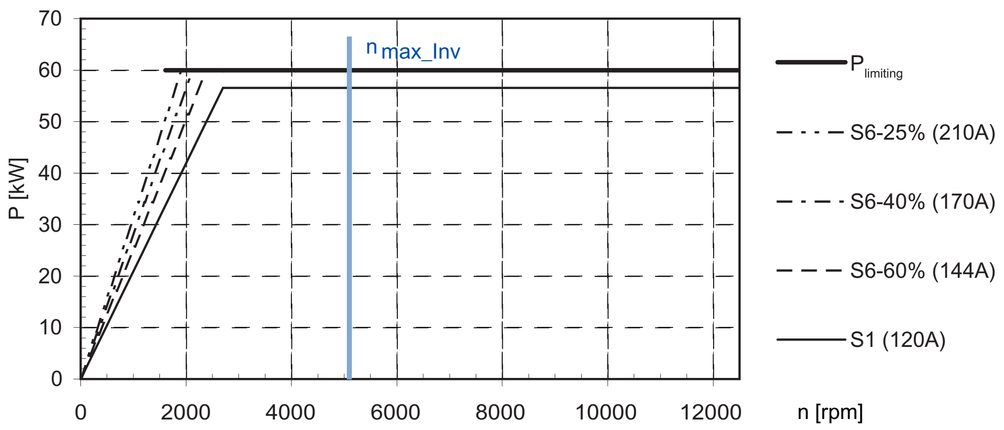


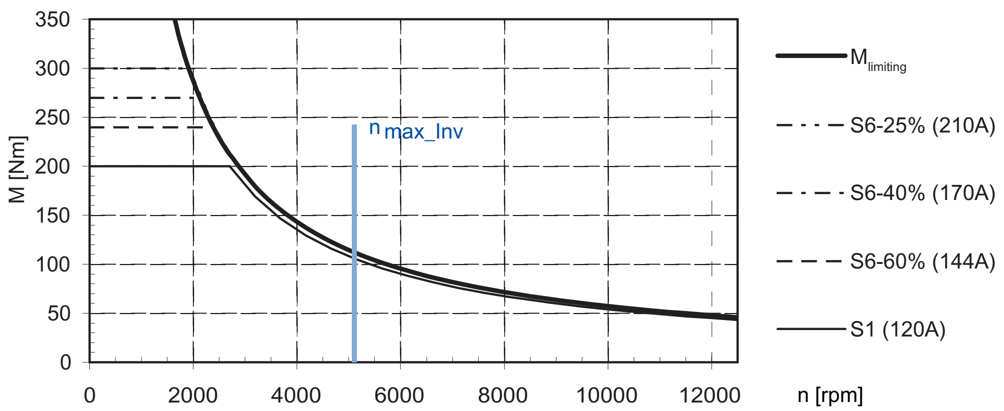


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 176 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1106-4WS□1

Rated power	P_N	kW	56,5
Rated speed	n_N	rpm	2700
Rated torque	M_N	Nm	200
Rated current	I_N	A	120
Maximum current	I_{max}	A	240
Maximum speed	n_{max}	rpm	12500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5100
Maximum torque	M_{max}	Nm	318
Moment of inertia	J_{rot}	kg m²	0,03147
Voltage constant	k_E	V/1000 rpm	112
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	51
Rotor weight	m_{rot}	kg	see Table 1-3

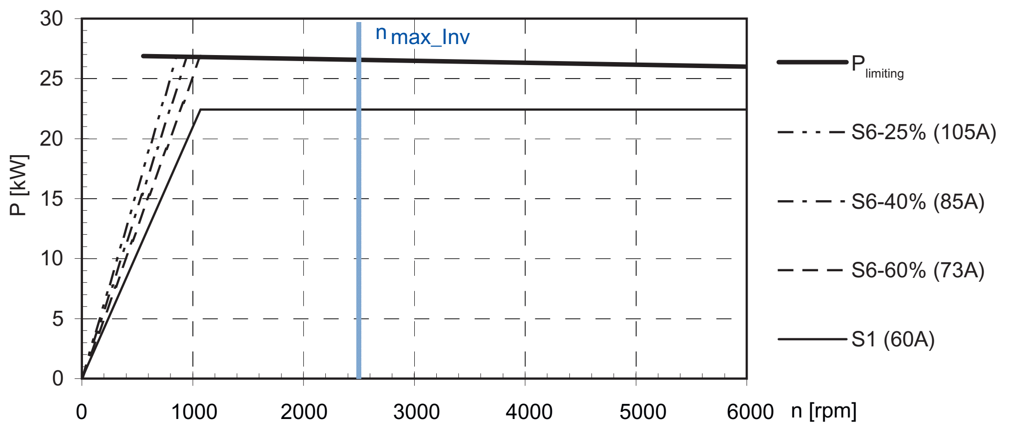


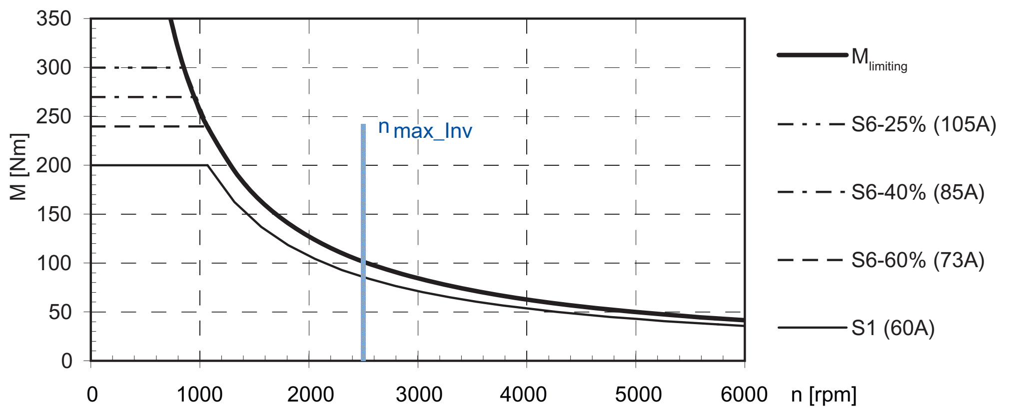


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 177 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1106-4WY□1

Rated power	P_N	kW	22,4
Rated speed	n_N	rpm	1070
Rated torque	M_N	Nm	200
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	6000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2500
Maximum torque	M_{max}	Nm	318
Moment of inertia	J_{rot}	kg m²	0,03147
Voltage constant	k_E	V/1000 rpm	225
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	51
Rotor weight	m_{rot}	kg	see Table 1-3

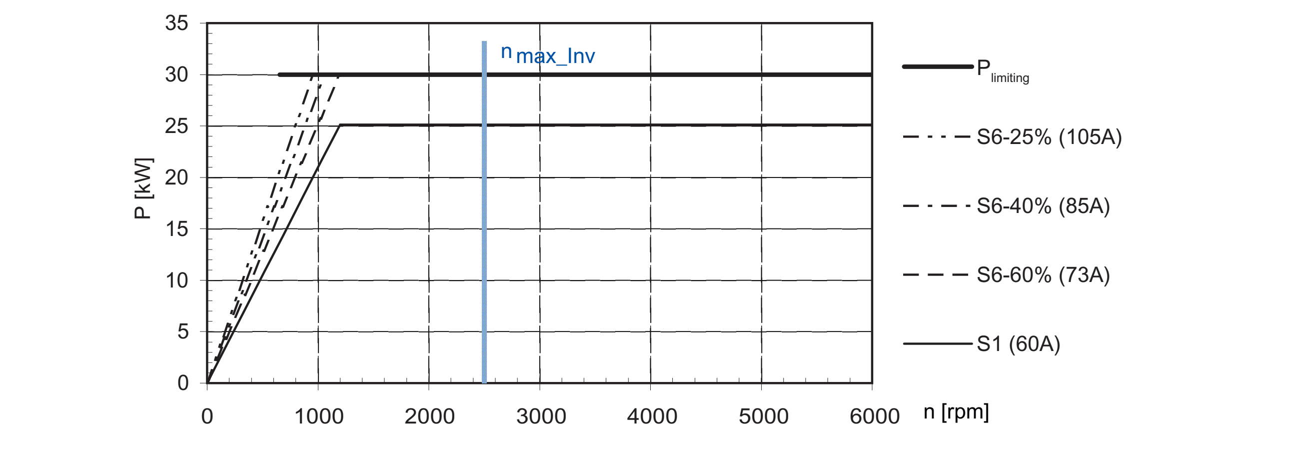


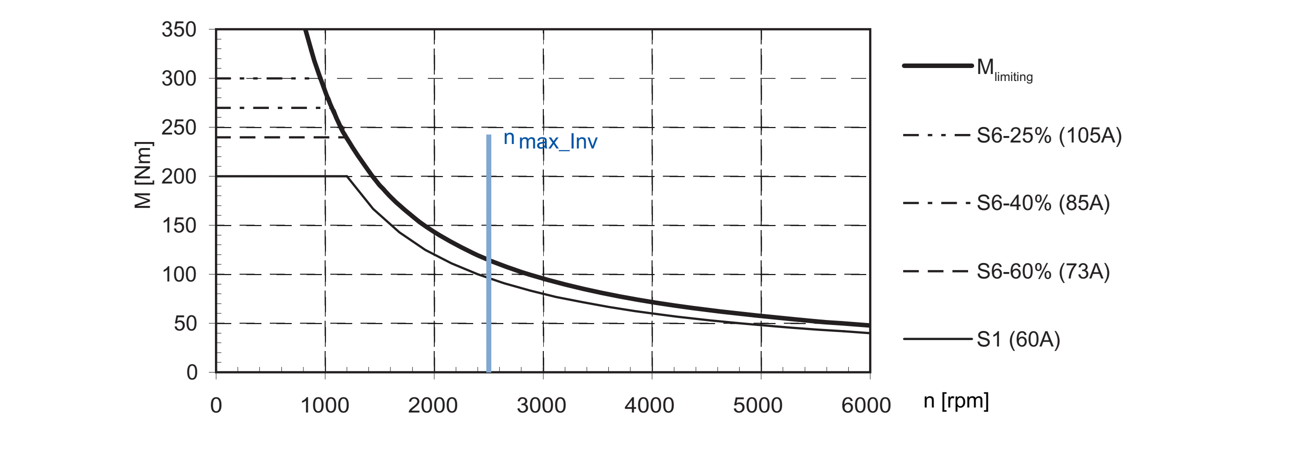


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 178 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1106-4WY□1

Rated power	P_N	kW	25
Rated speed	n_N	rpm	1200
Rated torque	M_N	Nm	200
Rated current	I_N	A	60
Maximum current	I_{max}	A	120
Maximum speed	n_{max}	rpm	6000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	2500
Maximum torque	M_{max}	Nm	318
Moment of inertia	J_{rot}	kg m^2	0,03147
Voltage constant	k_E	V/1000 rpm	225
Thermal time constant	T_{therm}	min	3
Stator weight with cooling jacket	m_{st}	kg	51
Rotor weight	m_{rot}	kg	see Table 1-3

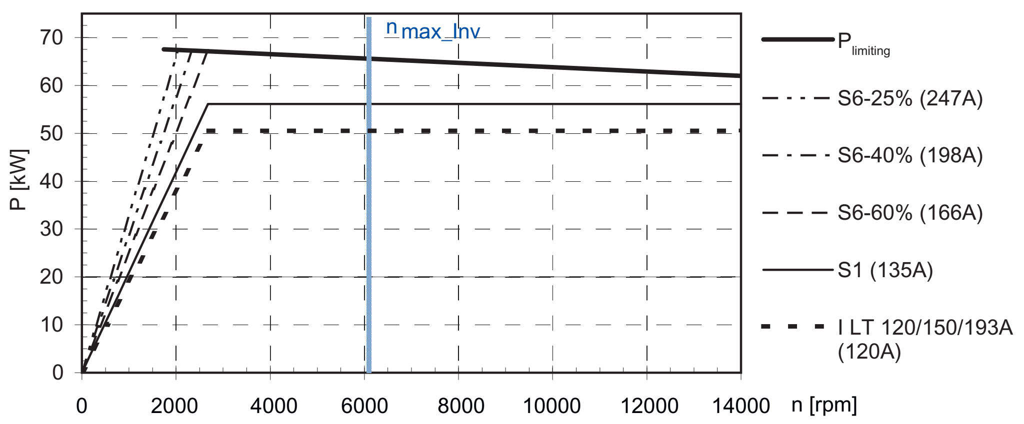


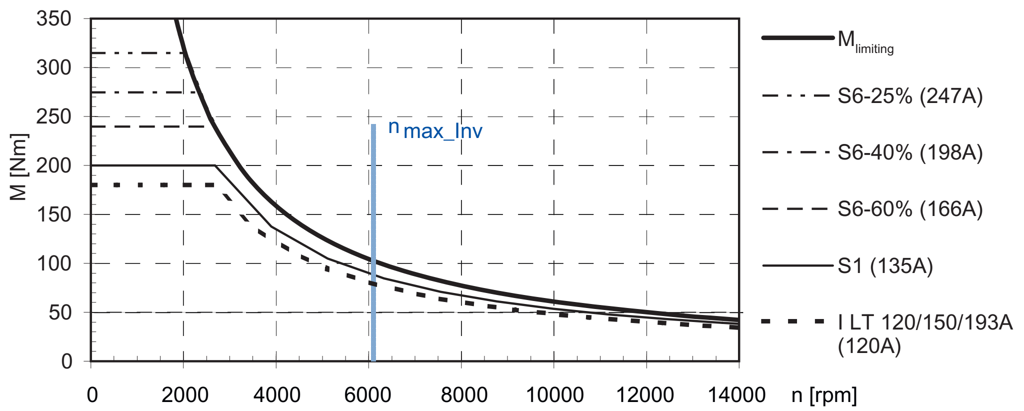


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 179 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1124-4WN□1

Rated power	P_N	kW	56,1
Rated speed	n_N	rpm	2680
Rated torque	M_N	Nm	200
Rated current	I_N	A	135
Maximum current	I_{max}	A	270
Maximum speed	n_{max}	rpm	14000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6100
Maximum torque	M_{max}	Nm	335
Moment of inertia	J_{rot}	kg m^2	0,05112
Voltage constant	k_E	V/1000 rpm	95
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	50,5
Rotor weight	m_{rot}	kg	see Table 1-3

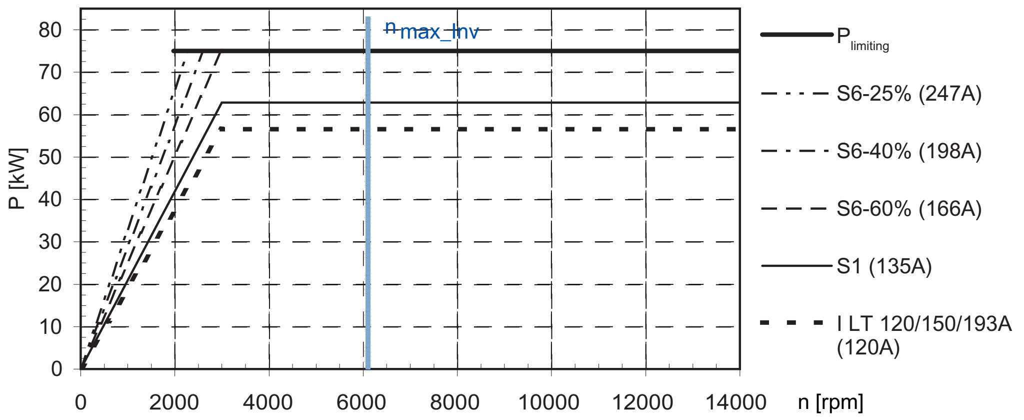


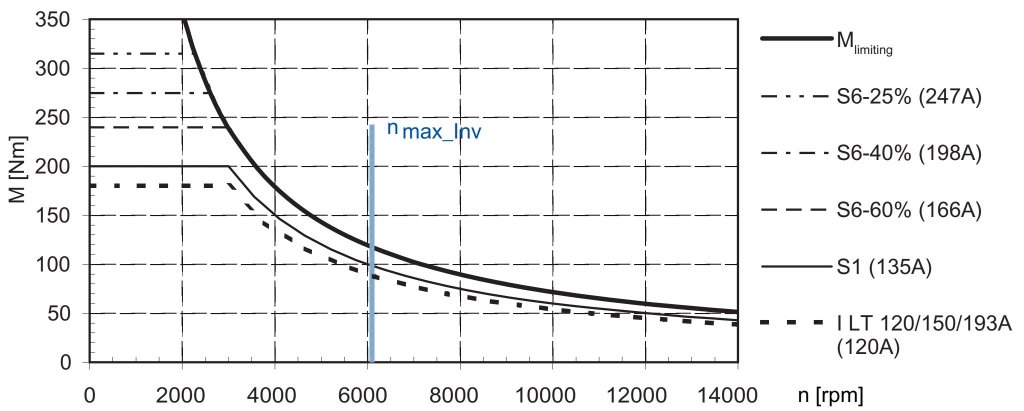


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 180 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1124-4WN□1

Rated power	P_N	kW	63
Rated speed	n_N	rpm	3000
Rated torque	M_N	Nm	200
Rated current	I_N	A	135
Maximum current	I_{max}	A	270
Maximum speed	n_{max}	rpm	14000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6100
Maximum torque	M_{max}	Nm	335
Moment of inertia	J_{rot}	kg m²	0,05112
Voltage constant	k_E	V/1000 rpm	95
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	50,5
Rotor weight	m_{rot}	kg	see Table 1-3

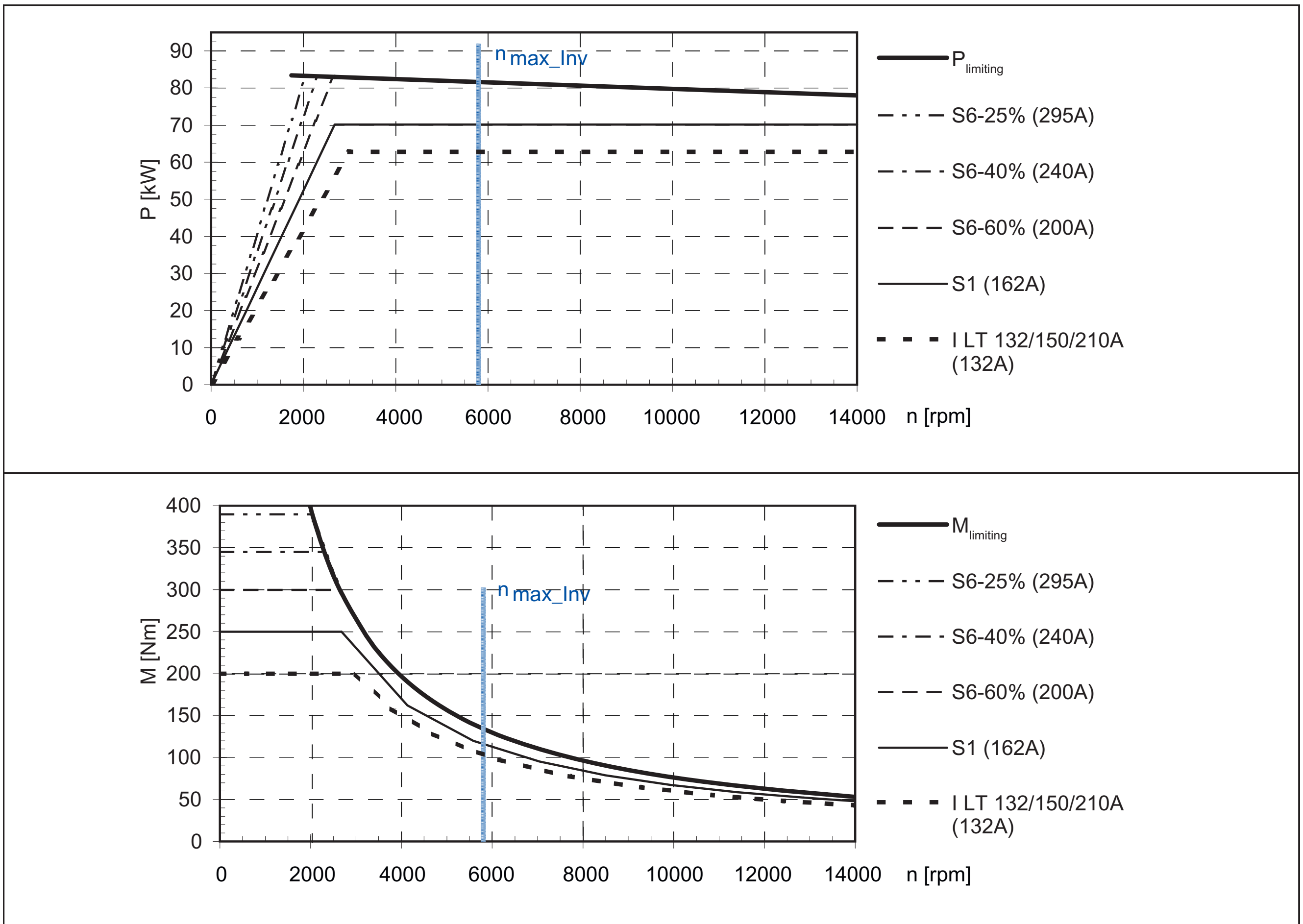




The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 181 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1125-4WN□1

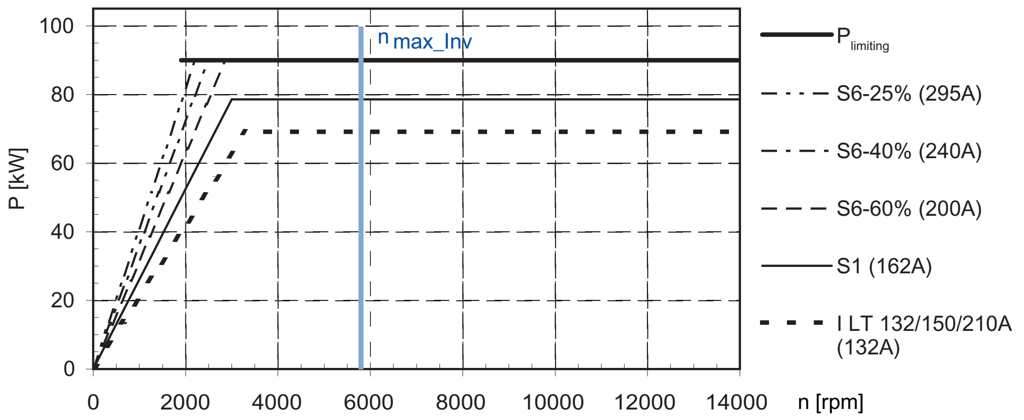
Rated power	P_N	kW	70,2
Rated speed	n_N	rpm	2680
Rated torque	M_N	Nm	250
Rated current	I_N	A	162
Maximum current	I_{max}	A	324
Maximum speed	n_{max}	rpm	14000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5800
Maximum torque	M_{max}	Nm	415
Moment of inertia	J_{rot}	kg m²	0,06337
Voltage constant	k_E	V/1000 rpm	99
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	61
Rotor weight	m_{rot}	kg	see Table 1-3

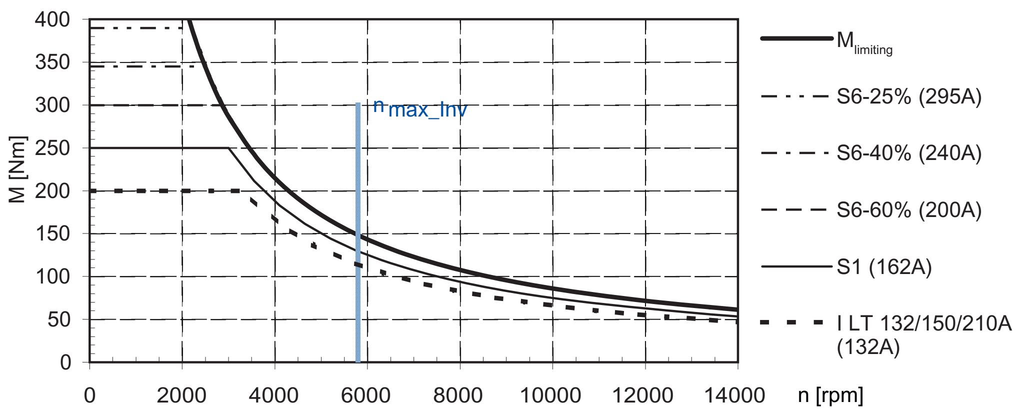


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 182 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1125-4WN□1

Rated power	P_N	kW	78,5
Rated speed	n_N	rpm	3000
Rated torque	M_N	Nm	250
Rated current	I_N	A	162
Maximum current	I_{max}	A	324
Maximum speed	n_{max}	rpm	14000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5800
Maximum torque	M_{max}	Nm	415
Moment of inertia	J_{rot}	kg m²	0,06337
Voltage constant	k_E	V/1000 rpm	99
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	61
Rotor weight	m_{rot}	kg	see Table 1-3

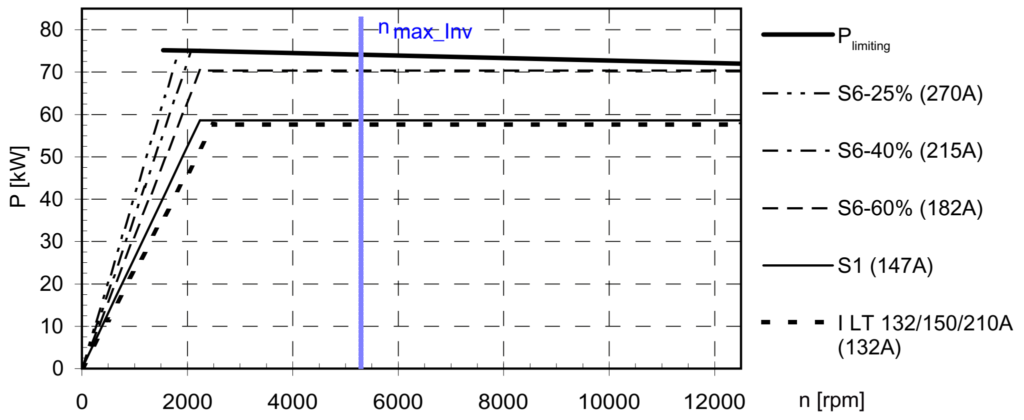


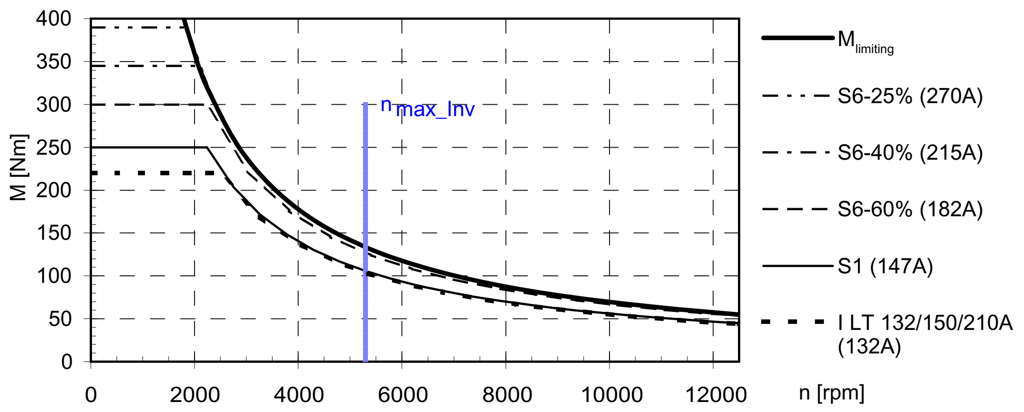


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 183 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1125-4WP□1

Rated power	P_N	kW	58,6
Rated speed	n_N	rpm	2240
Rated torque	M_N	Nm	250
Rated current	I_N	A	147
Maximum current	I_{max}	A	294
Maximum speed	n_{max}	rpm	12500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5300
Maximum torque	M_{max}	Nm	415
Moment of inertia	J_{rot}	kg m²	0,06337
Voltage constant	k_E	V/1000 rpm	109
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	61
Rotor weight	m_{rot}	kg	see Table 1-3

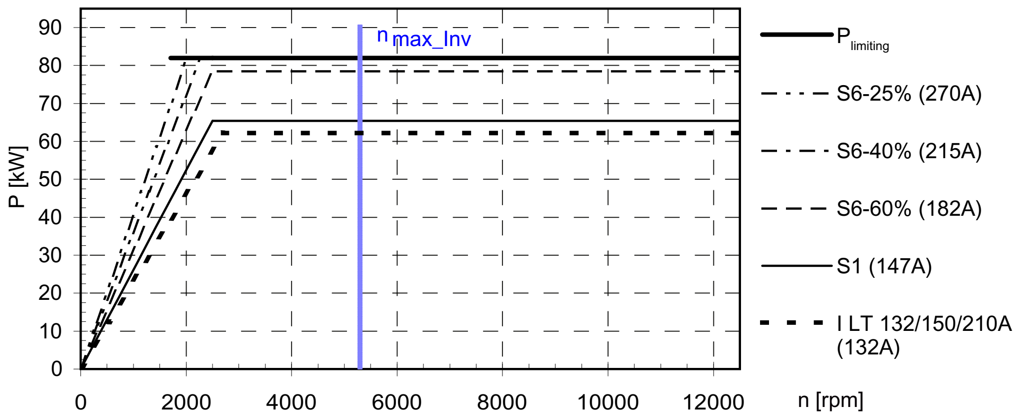


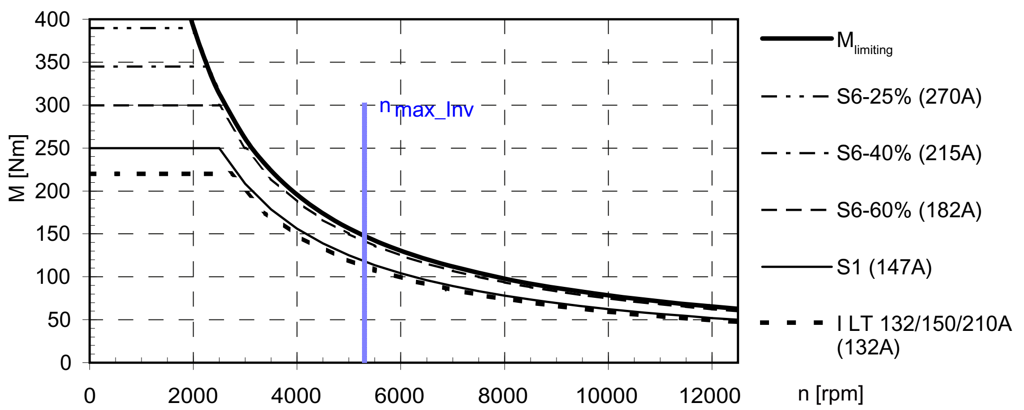


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 184 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1125-4WP□1

Rated power	P_N	kW	65,5
Rated speed	n_N	rpm	2500
Rated torque	M_N	Nm	250
Rated current	I_N	A	147
Maximum current	I_{max}	A	294
Maximum speed	n_{max}	rpm	12500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5300
Maximum torque	M_{max}	Nm	415
Moment of inertia	J_{rot}	kg m^2	0,06337
Voltage constant	k_E	V/1000 rpm	109
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	61
Rotor weight	m_{rot}	kg	see Table 1-3

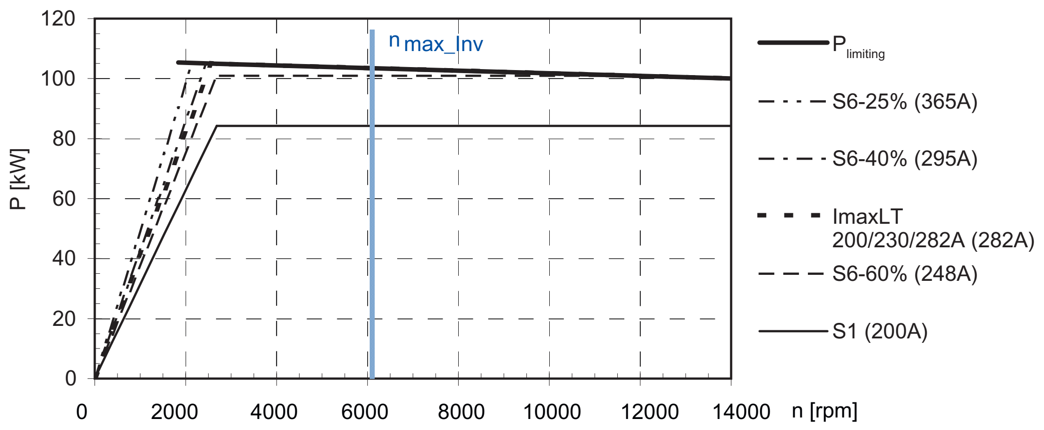


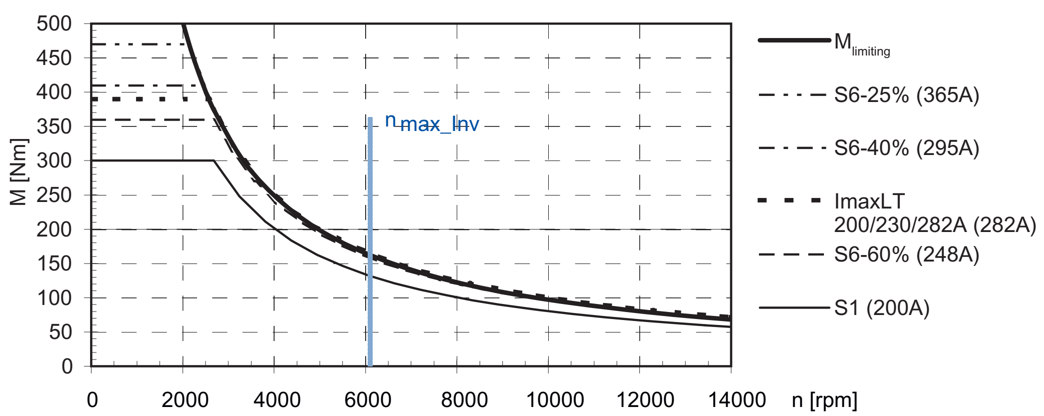


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 185 SINAMICS, 3-ph. 380 V AC, SMART Line Module, (SLM), 1FE1126-4WN□1

Rated power	P_N	kW	84,2
Rated speed	n_N	rpm	2680
Rated torque	M_N	Nm	300
Rated current	I_N	A	200
Maximum current	I_{max}	A	400
Maximum speed	n_{max}	rpm	14000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6100
Maximum torque	M_{max}	Nm	500
Moment of inertia	J_{rot}	kg m²	0,07604
Voltage constant	k_E	V/1000 rpm	95
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	72
Rotor weight	m_{rot}	kg	see Table 1-3

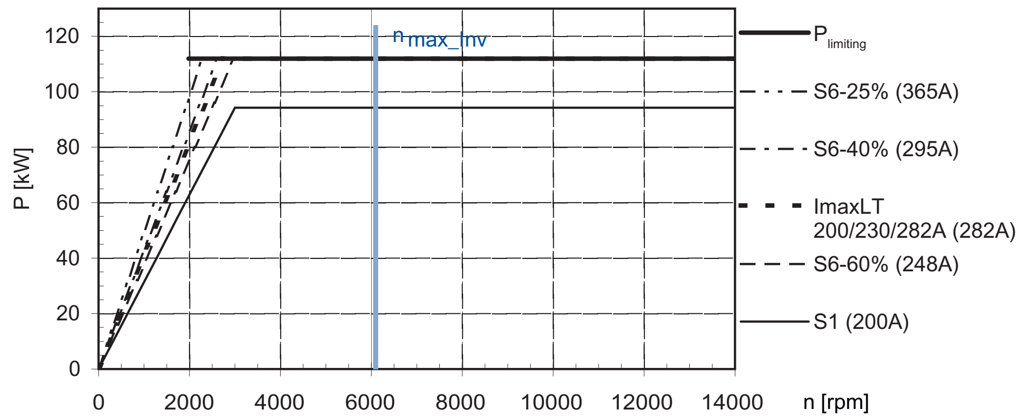


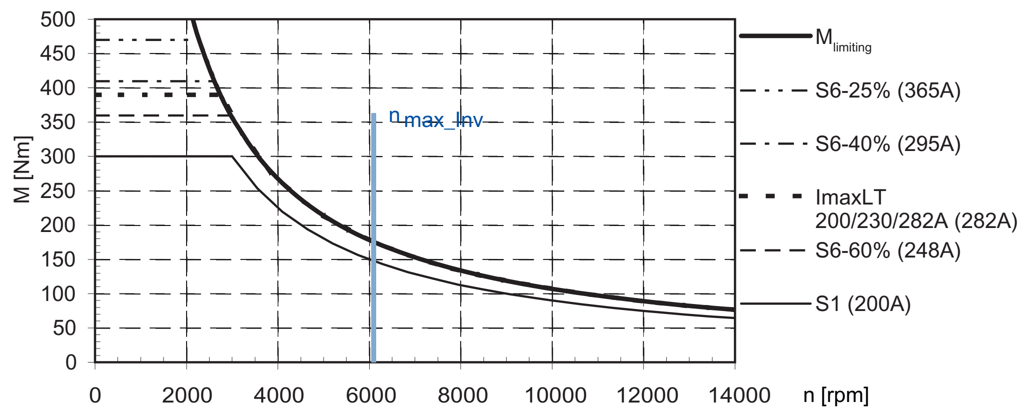


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 186 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1126-4WN□1

Rated power	P_N	kW	94
Rated speed	n_N	rpm	3000
Rated torque	M_N	Nm	300
Rated current	I_N	A	200
Maximum current	I_{max}	A	400
Maximum speed	n_{max}	rpm	14000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	6100
Maximum torque	M_{max}	Nm	500
Moment of inertia	J_{rot}	kg m^2	0,07604
Voltage constant	k_E	V/1000 rpm	95
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	72
Rotor weight	m_{rot}	kg	see Table 1-3

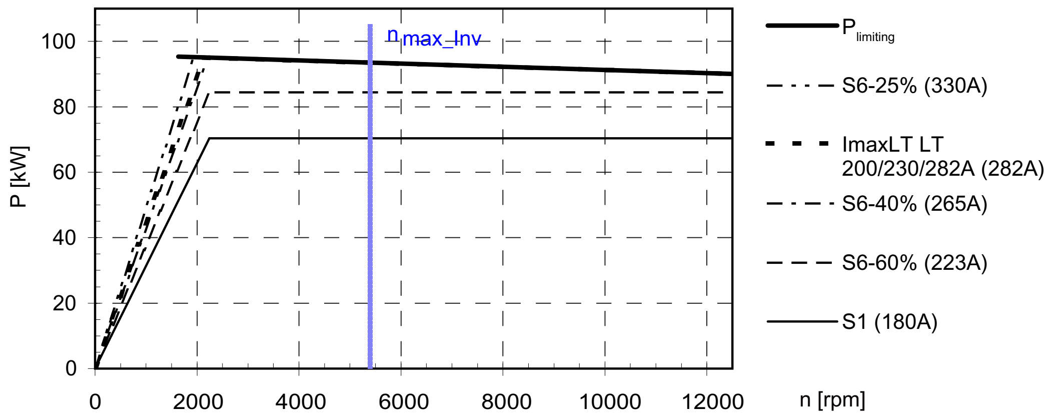


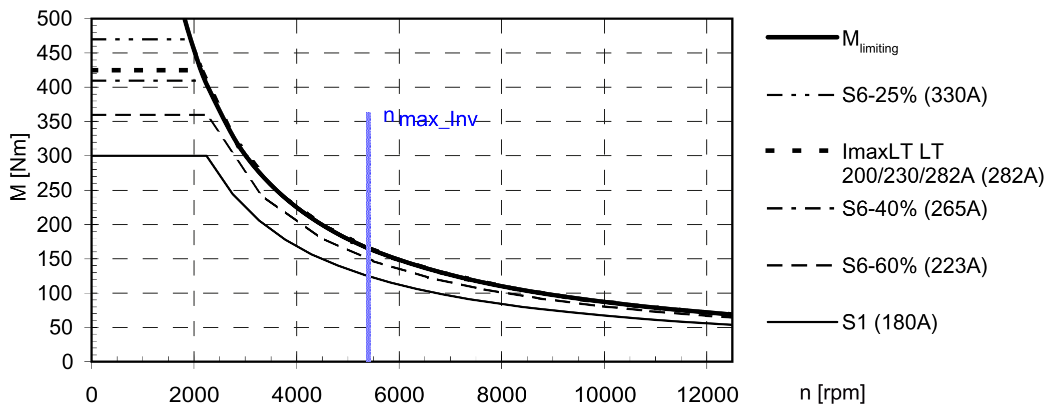


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 187 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1126-4WP□1

Rated power	P_N	kW	70,4
Rated speed	n_N	rpm	2240
Rated torque	M_N	Nm	300
Rated current	I_N	A	180
Maximum current	I_{max}	A	360
Maximum speed	n_{max}	rpm	12500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5400
Maximum torque	M_{max}	Nm	500
Moment of inertia	J_{rot}	kg m²	0,07604
Voltage constant	k_E	V/1000 rpm	107
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	72
Rotor weight	m_{rot}	kg	see Table 1-3

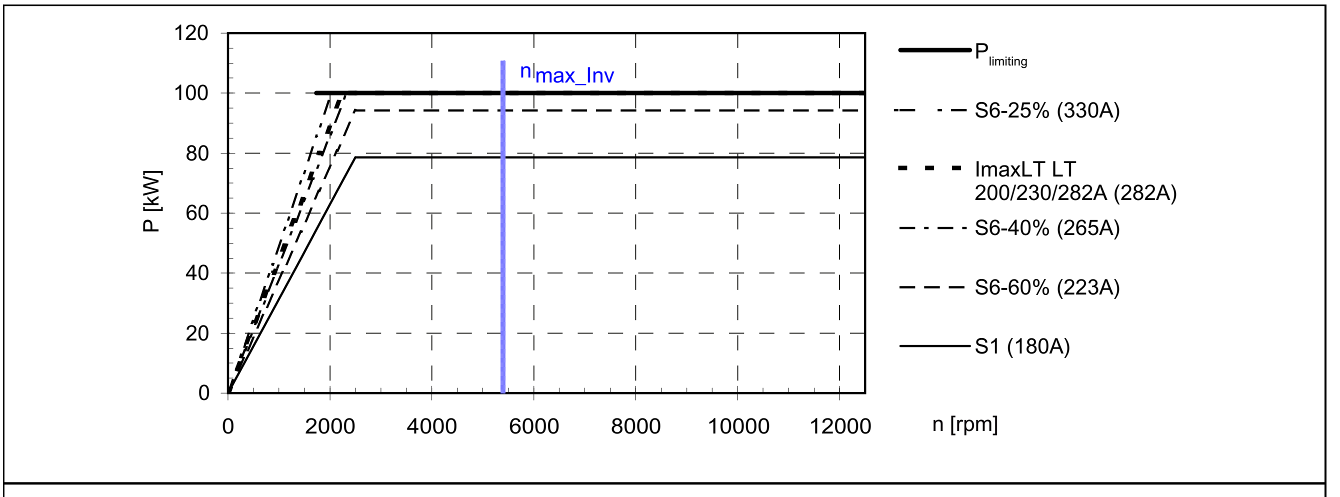


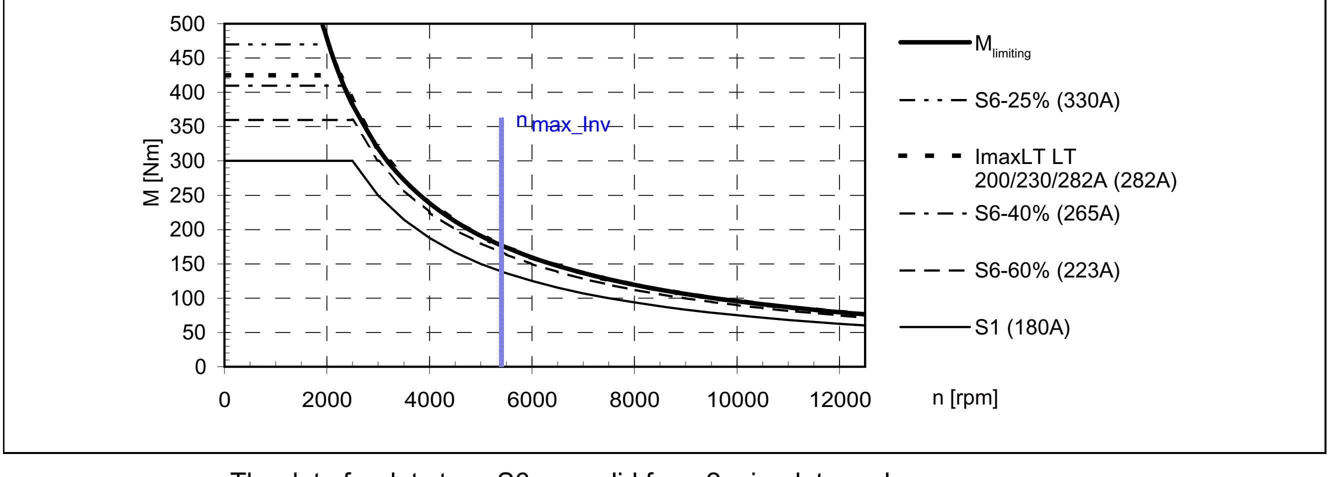


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 188 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1126-4WP□1

Rated power	P_N	kW	78,5
Rated speed	n_N	rpm	2500
Rated torque	M_N	Nm	300
Rated current	I_N	A	180
Maximum current	I_{max}	A	360
Maximum speed	n_{max}	rpm	12500
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	5400
Maximum torque	M_{max}	Nm	500
Moment of inertia	J_{rot}	kg m²	0,07604
Voltage constant	k_E	V/1000 rpm	107
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	72
Rotor weight	m_{rot}	kg	see Table 1-3

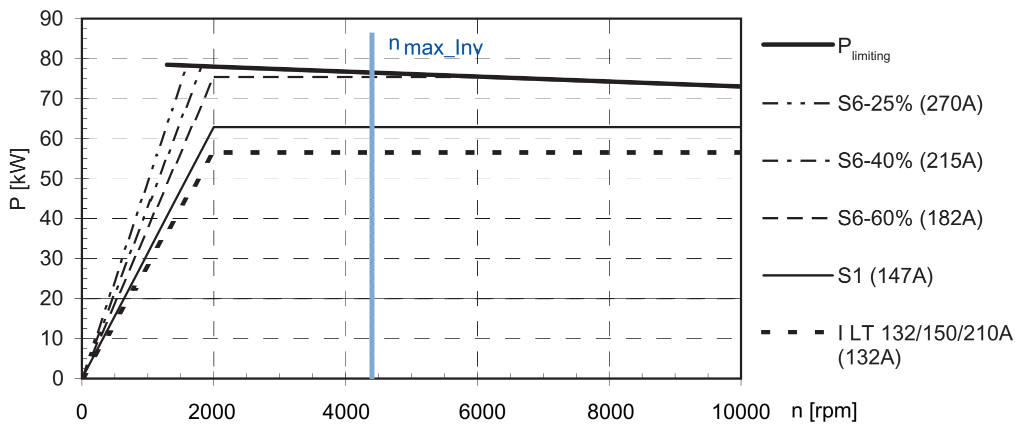


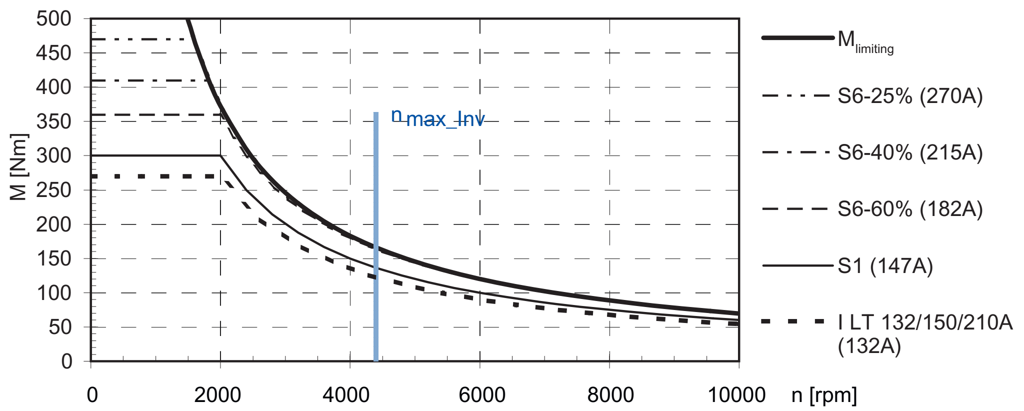


The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 189 SINAMICS, 3-ph. 380 V AC, Smart Line Module, (SLM), 1FE1126-4WQ□1

Rated power	P_N	kW	62,8
Rated speed	n_N	rpm	2000
Rated torque	M_N	Nm	300
Rated current	I_N	A	147
Maximum current	I_{max}	A	294
Maximum speed	n_{max}	rpm	10000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	4400
Maximum torque	M_{max}	Nm	500
Moment of inertia	J_{rot}	kg m²	0,07604
Voltage constant	k_E	V/1000 rpm	130
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	72
Rotor weight	m_{rot}	kg	see Table 1-3

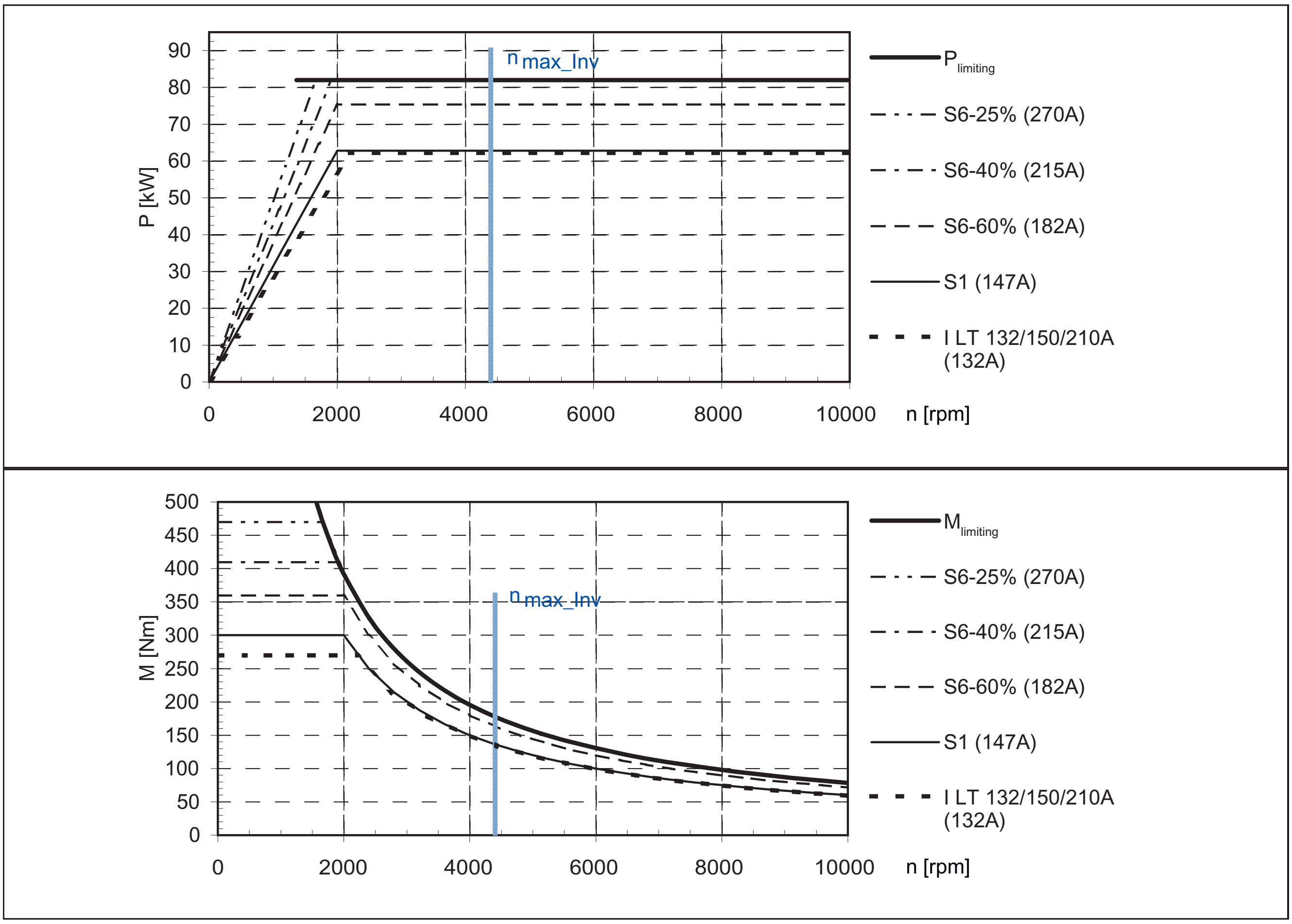




The data for duty type S6 are valid for a 2 min. duty cycle.

Table 4- 190 SINAMICS, 3-ph. 400 V AC, Active Line Module, (ALM), 1FE1126-4WQ□1

Rated power	P_N	kW	63
Rated speed	n_N	rpm	2000
Rated torque	M_N	Nm	300
Rated current	I_N	A	147
Maximum current	I_{max}	A	294
Maximum speed	n_{max}	rpm	10000
Max. permissible speed without VPM/IVP	$n_{max\ Inv}$	rpm	4400
Maximum torque	M_{max}	Nm	500
Moment of inertia	J_{rot}	kg m²	0,07604
Voltage constant	k_E	V/1000 rpm	130
Thermal time constant	T_{therm}	min	4
Stator weight with cooling jacket	m_{st}	kg	72
Rotor weight	m_{rot}	kg	see Table 1-3



The data for duty type S6 are valid for a 2 min. duty cycle.

Dimension drawings 5

CAD CREATOR

CAD CREATOR allows you to quickly find the following as a result of its easy to understand user interface

- dimension drawings
- 2D/3D CAD models

and provides support when generating plant/system documentation regarding project-specific information.

Data for motors, drives and CNC controls are currently available in the online version.

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

Motors

- 1FK7, 1FT7, 1FT6, 1FE1 synchronous motors
- 1FW3 torque motors
- 1FK7, 1FK7 DYA, 1FT7, 1FT6 geared motors
- 1PH8 synchronous/induction motors
- 1PH7, 1PH4, 1PL6 induction motors
- 1PM4, 1PM6 induction motors
- 2SP1 spindle 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
- Encoder system connection
- MOTION-CONNECT® connection system

SINUMERIK

- CNC controls
- 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.

Note

Siemens AG reserves the right to change the motor dimensions as part of design improvements without prior notification. The dimension drawings, provided in this documentation, can go out-of-date.

Current dimension drawings are available in the Intranet under: Products & Solutions, Drive Technology, Synchronous Built-in Motors 1FE1, Dimension Drawings.

The individual dimension drawings for the required motors can be found as follows in the Chapter "Index":

→ refer under the index entry "Dimension drawings"

Dimension drawings with cooling jacket 1FE1□□□-□□□□□-□B□□

As standard, stators with cooling jacket and cast winding overhang are supplied. Here, the technical data in Chapter Technical data (Page 27) and the characteristics in Chapter P/n and M/n diagrams (Page 87) apply.

Dimension drawings without cooling jacket 1FE1□□□-□□□□□-□A□□

Stators without cooling jackets are supplied without cast winding overhang, however, with impregnated winding. The technical data listed in Chapter Technical data (Page 27) are reached up to approx. 80 to 85%. More precise characteristics are available on request.

The following built-in motors can be supplied without cooling jacket on request:

1FE105□-6W□□□, 1FE1061-6W□□□, 1FE1084-6W□□□, 1FE109□-6W□□□, 1FE111□-6W□□□, 1FE107□-4W□□□, 1FE108□-4W□□□, 1FE109□-4W□□□, 1FE110□-4W□□□.

All other frame sizes are on request.

NOTICE
For the installation instructions "rotor companion dimension" a magnetic, conductive shaft material (steel) with a coefficient of expansion of 11 • 10^{-6}/K is used as a basis for the recommended fit.

5.1 Dimensions

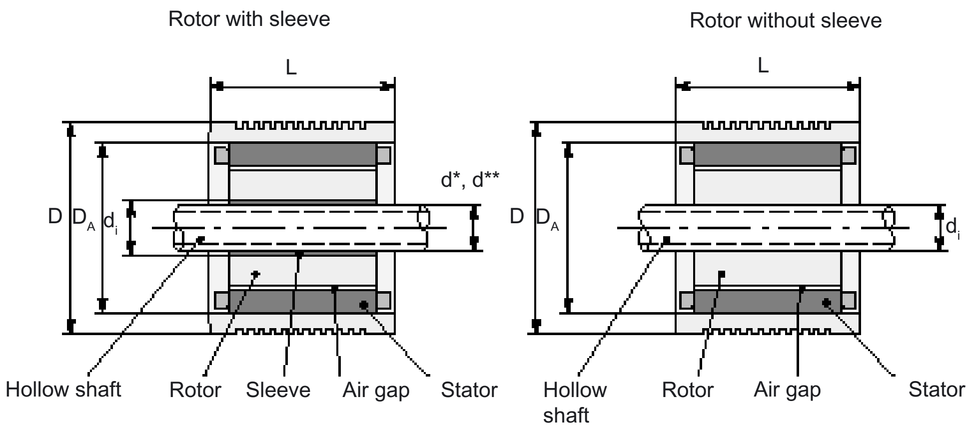


Figure 5-1 Dimensions of built-in motors (see the following tables)

Table 5- 1 Dimensions of built-in motors, 6-pole

Motor type	L	D	D_A	d_i -.A□.	d* -.B□.	d** -.C□.	d** -.D□.	d** -.E□.	d** -.B□.	d** -.C□.	d** -.D□.	d** -.E□.
	all dimensions in [mm]											
			Standard rotor sleeves, inner diameter, balanced					Special rotor sleeves, inner diameter, unbalanced (on request)				
1FE1041-6W□□□-1BA□	107	95	85	44	-	-	-	-	-	-	-	-
1FE1042-6W□□□-1BA□	157	95	85	44	-	-	-	-	-	-	-	-
1FE1051-6W□□□-1B□□	170	115	103,5	42	-	33	-	-	-	-	-	-
1FE1052-6W□□□-1B□□	220	115	103,5	42	-	33	-	-	-	-	-	-
1FE1054-6W□□□-1BA□	320	115	103,5	42	-	-	-	-	-	-	-	-
1FE1061-6W□□□-1B□□	130	130	118	58	48	-	-	-	-	-	-	-
1FE1064-6W□□□-1BA□	280	130	118	58	-	-	-	-	-	-	-	-
1FE1082-6W□□□-1B□□	195	190	170	93	67	74	80	-	-	-	-	-
1FE1084-6W□□□-1B□□	295	190	170	93	67	74	-	-	-	-	-	-
1FE1091-6W□□□-1B□□	150	205	180	92	67	80	-	-	-	-	-	-
1FE1092-6W□□□-1B□□	200	205	180	92	67	80	-	-	74 (T37)	-	-	-
1FE1093-6W□□□-1B□□	250	205	180	92	67	80	-	-	-	80,1 (T06)		
1FE1113-6W□□□-1B□□	260	250	220	120	-	-	80	105,2	-	-	-	-
1FE1114-6W□□□-1B□□	310	250	220	120	82	102	-	-	92 (T46)	98 (T49)	105 (T52)	110 (T55)
1FE1115-6W□□□-1BC□	360	250	220	-	-	102	-	-	-	-	-	-
1FE1116-6W□□□-1B□□	410	250	220	120	82	102	-	-	-	-	-	-

15. Position of the MLFB = A → without rotor sleeve
15. Position of the MLFB = B → with rotor sleeve, dimensions see column d*
15. Position of the MLFB = C → with rotor sleeve, dimensions see column d**-.C□
15. Position of the MLFB = D → with rotor sleeve, dimensions see column d**-.D□
15. Position of the MLFB = E → with rotor sleeve, dimensions see column d**-.E□

Table 5- 2 Dimensions of built-in motors, 8-pole

Motor type	L	D	D_A	d_i -.A□.	d^{*} -.B□.	d^{**} -.C□.	d^{**} -.D□.	d^{**} -.E□.	d^{**} -.B□.	d^{**} -.C□.	d^{**} -.D□.	d^{**} -.E□.
	all dimensions in [mm]											
			Standard rotor sleeves, inner diameter, balanced						Special rotor sleeves, inner diameter, unbalanced (on request)			
1FE1144-8W□□□-1B□□	340	310	280	166,7	-	150,3	-	-	-	-	-	-
1FE1145-8W□□□-1B□□	390	310	280	-	-	150,3	140,3	125	-	140.3 (T70)	-	-
1FE1147-8W□□□-1B□□	490	310	280	-	-	150,3	140,3	-	-	-	-	-

15. Position of the MLFB = A → without rotor sleeve
15. Position of the MLFB = B → with rotor sleeve, dimensions see column d^{*}
15. Position of the MLFB = C → with rotor sleeve, dimensions see column d^{**}-.C□
15. Position of the MLFB = D → with rotor sleeve, dimensions see column d^{**}-.D□
15. Position of the MLFB = E → with rotor sleeve, dimensions see column d^{**}-.E□

Table 5- 3 Dimensions of built-in motors, 4-pole

Motor type	L [mm]	D [mm]	D_A [mm]	d_i -1BA□ [mm]	d_i -1BR□ [mm]
1FE1051-4H□□□-1BA□	130	120	106	46	-
1FE1051-4W□□□-1BA□	130	120	106	46	-
1FE1052-4H□□□-1BA□	180	120	106	46	-
1FE1052-4W□□□-1BA□	180	120	106	46	-
1FE1053-4H□□□-1BA□	230	120	106	46	-
1FE1053-4W□□□-1BA□	230	120	106	46	-
1FE1072-4W□□□-1BA□	185	155	135	58	-
1FE1073-4W□□□-1BA□	235	155	135	58	-
1FE1074-4W□□□-1BA□	285	155	135	58	-
1FE1082-4W□□□-1BA□	190	180	160	68	-
1FE1083-4W□□□-1BA□	240	180	160	68	-
1FE1084-4W□□□-1BA□	290	180	160	68	-
1FE1085-4W□□□-1BA□	340	180	160	68	-
1FE1092-4W□□□-1BR□	200	205	180	-	80
1FE1093-4W□□□-1BR□	250	205	180	-	80
1FE1093-4W□□□-1BA□	250	205	180	72	-
1FE1094-4W□□□-1BR□	300	205	180	-	80
1FE1094-4W□□□-1BA□	300	205	180	72	-
1FE1095-4W□□□-1BR□	350	205	180	-	80
1FE1095-4W□□□-1BA□	350	205	180	72	-
1FE1096-4W□□□-1BR□	400	205	180	-	80
1FE1096-4W□□□-1BA□	400	205	180	72	-
1FE1103-4W□□□-1BA□	265	230	200	96	-
1FE1104-4W□□□-1BA□	315	230	200	96	-
1FE1105-4W□□□-1BA□	365	230	200	96	-
1FE1106-4W□□□-1BA□	415	230	200	96	-
1FE1124-4W□□□-1BA□	315	270	240	110	-

Motor type	L [mm]	D [mm]	D_A [mm]	d_i -1BA□ [mm]	d_i -1BR□ [mm]
1FE1125-4W□□□-1BA□	365	270	240	110	-
1FE1126-4W□□□-1BA□	415	270	240	110	-

15. Position of the MLFB = A → without rotor sleeve, dimensions see column d_i -.A□

15. Position of the MLFB = R → without rotor sleeve, dimensions see column d_i-.R□

5.2 1FE104.-6

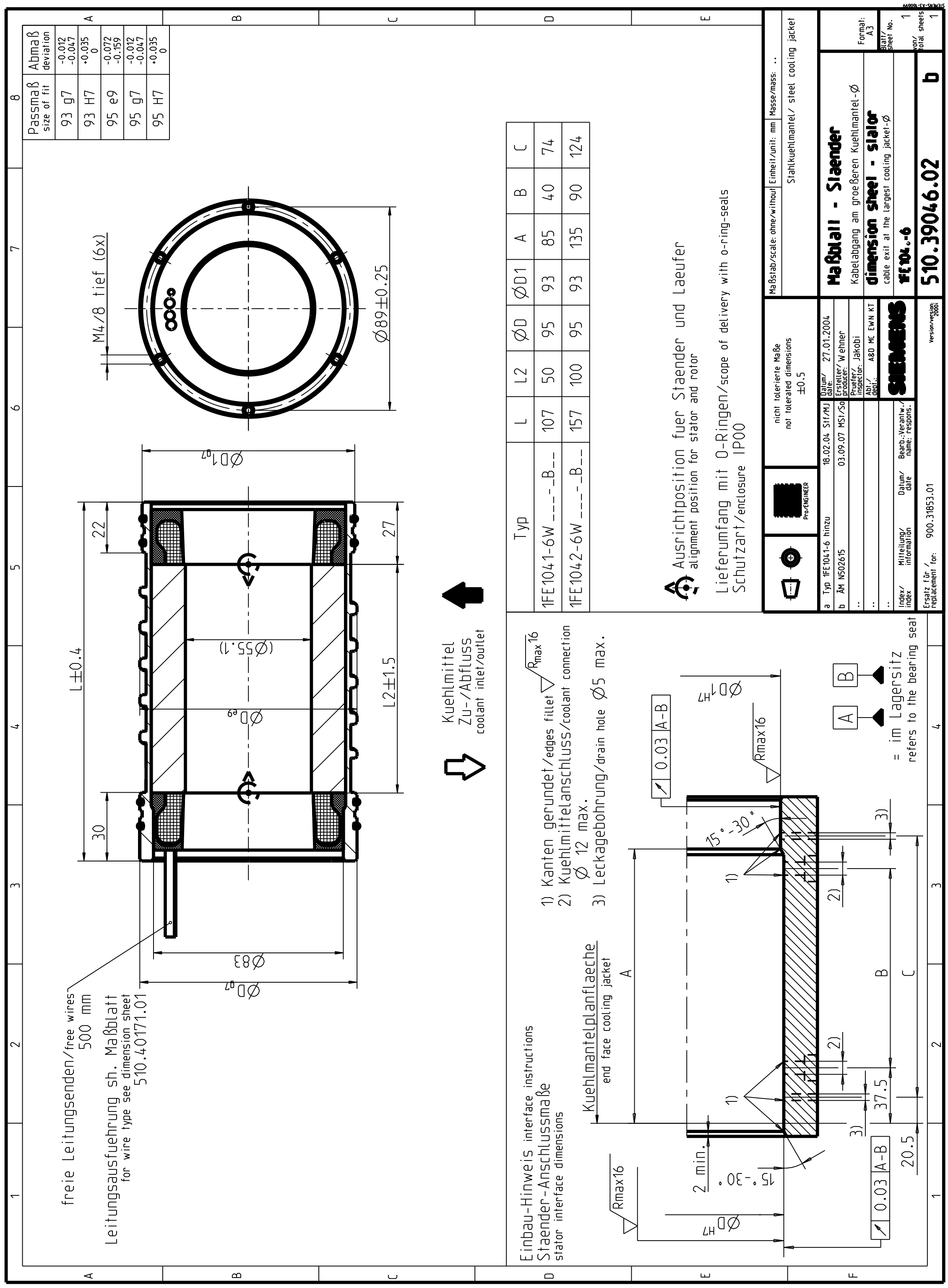


Figure 5-2 1FE104□-6, stator with cooling jacket, cable outlet at the larger cooling jacket diameter

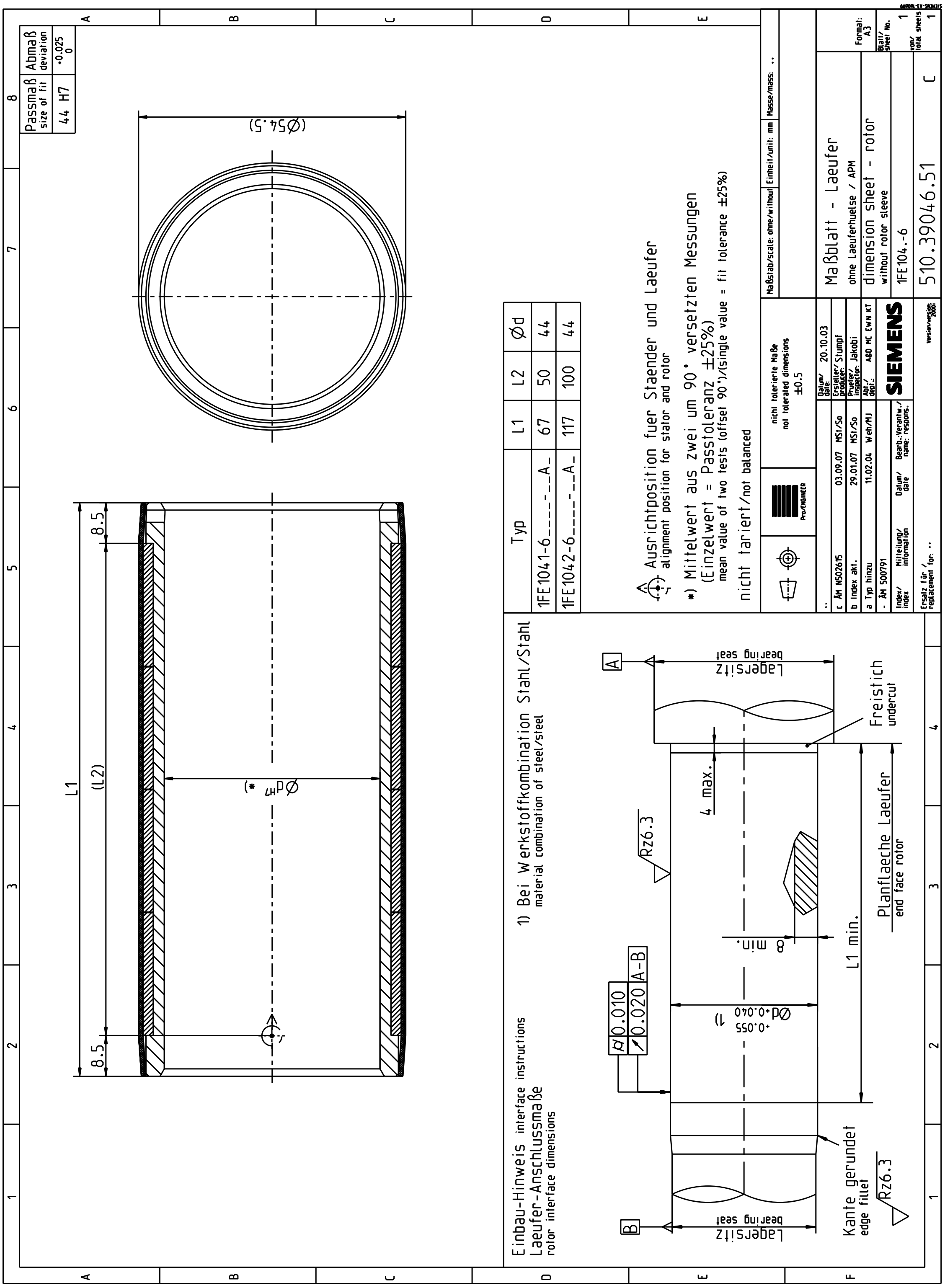


Figure 5-3 1FE104□-6, built-in motor without rotor sleeve

5.3 1FE105.-6

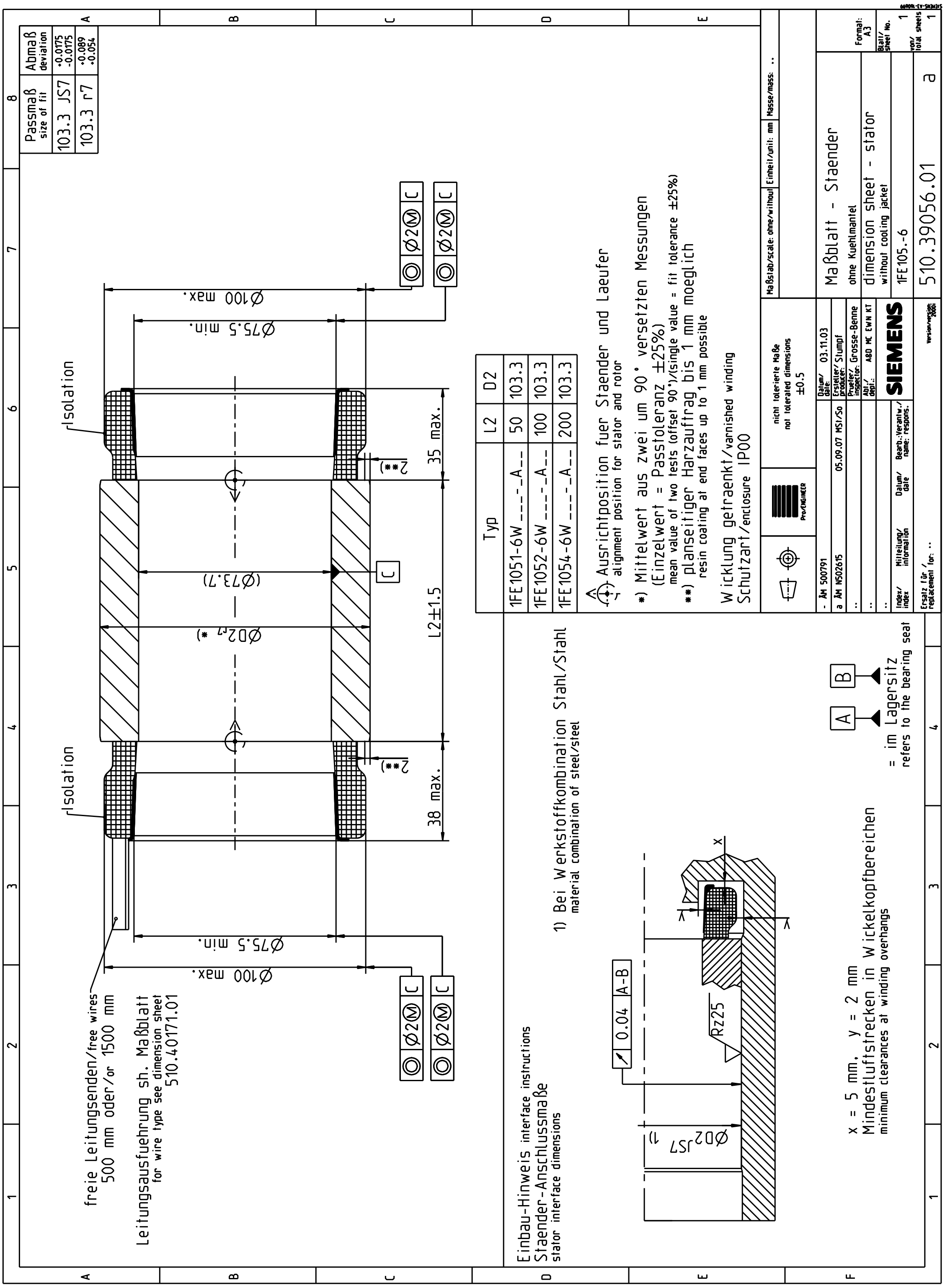


Figure 5-4 1FE105□-6, stator without cooling jacket

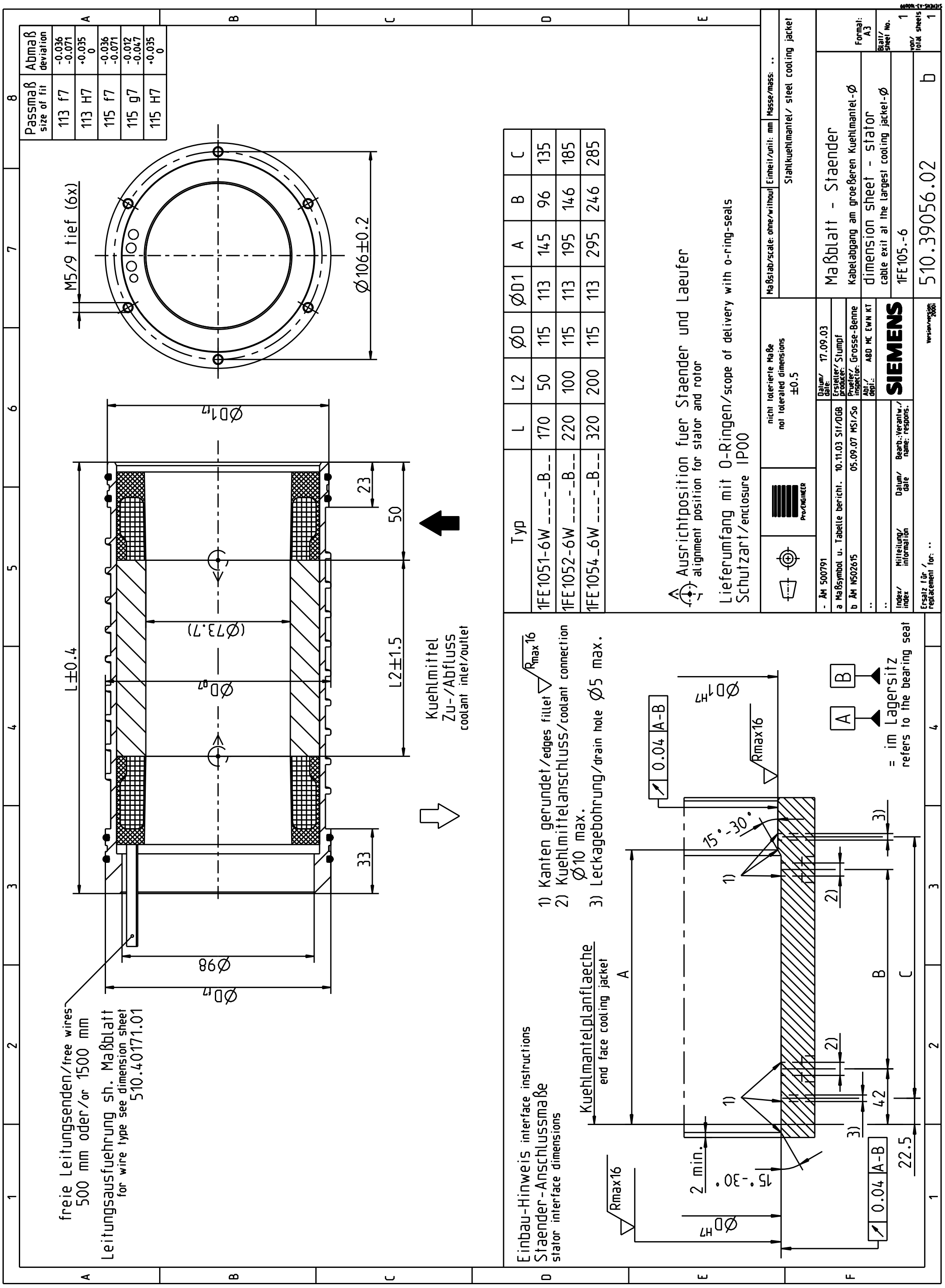


Figure 5-5 1FE105□-6, stator with cooling jacket, cable outlet at the larger cooling jacket diameter

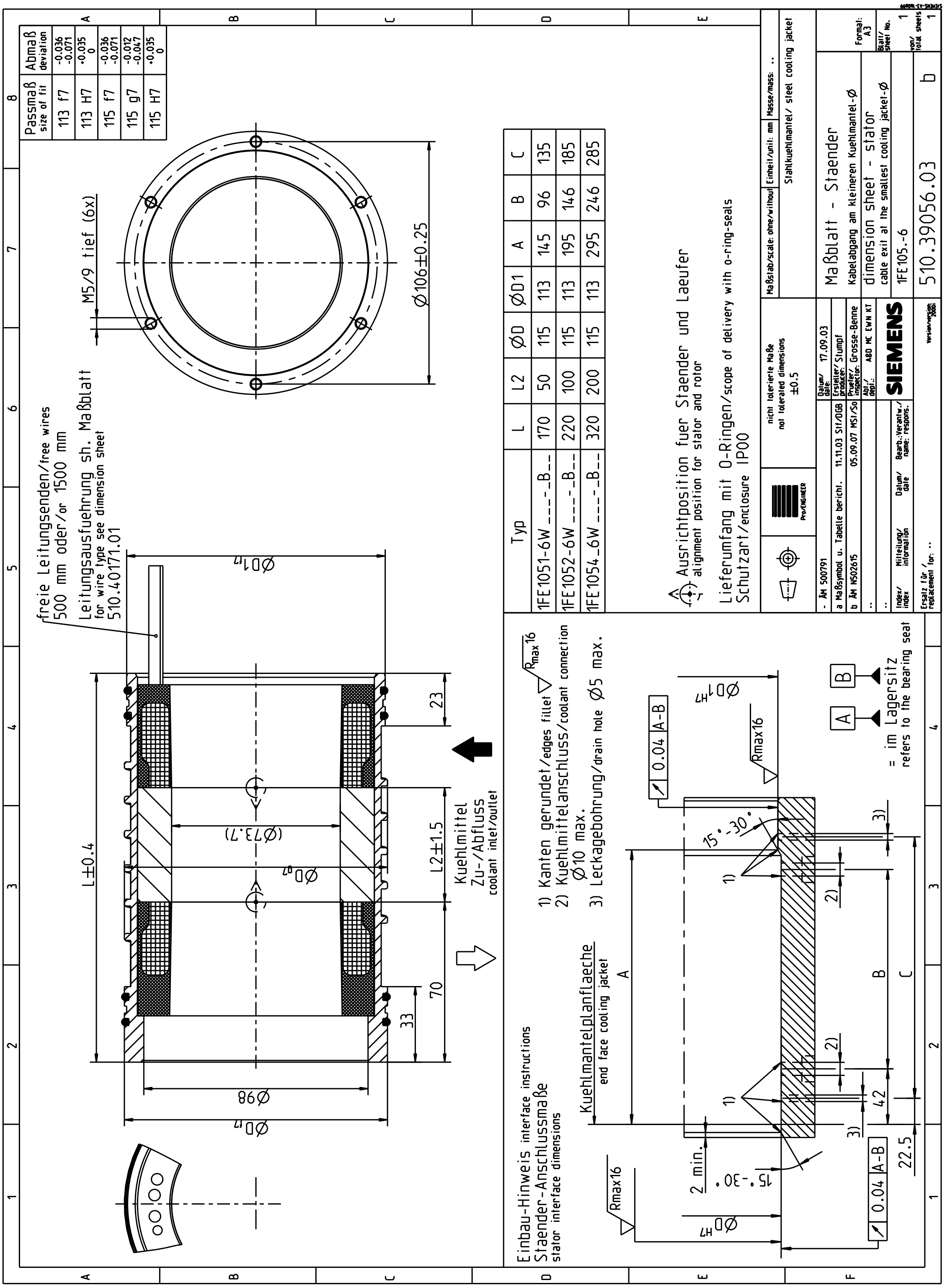


Figure 5-6 1FE105□-5, stator with cooling jacket, cable outlet at the smaller cooling jacket diameter

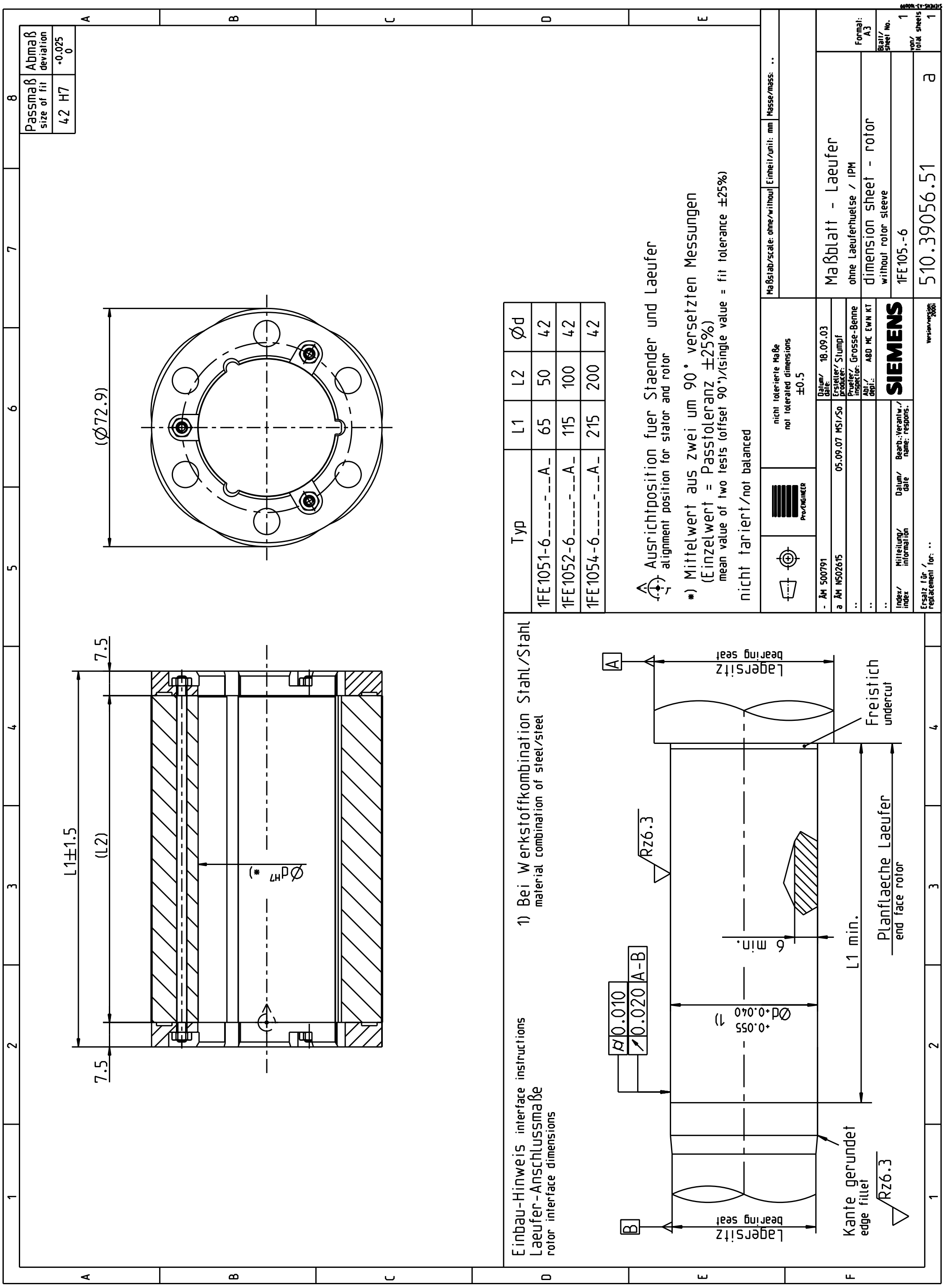


Figure 5-7 1FE105□-6, rotor without sleeve

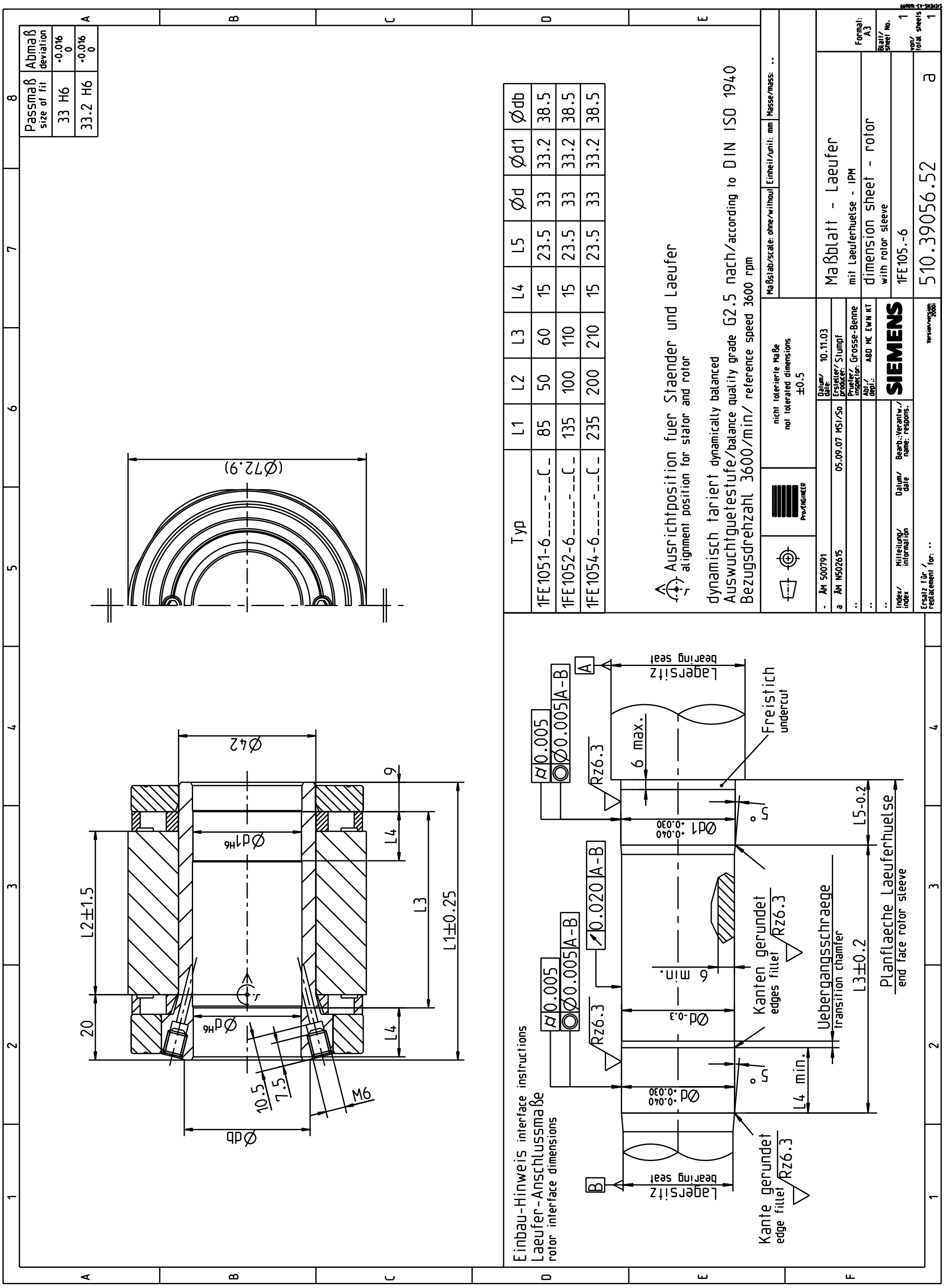


Figure 5-8 1FE105□-6, rotor with sleeve

5.4 1FE106.-6

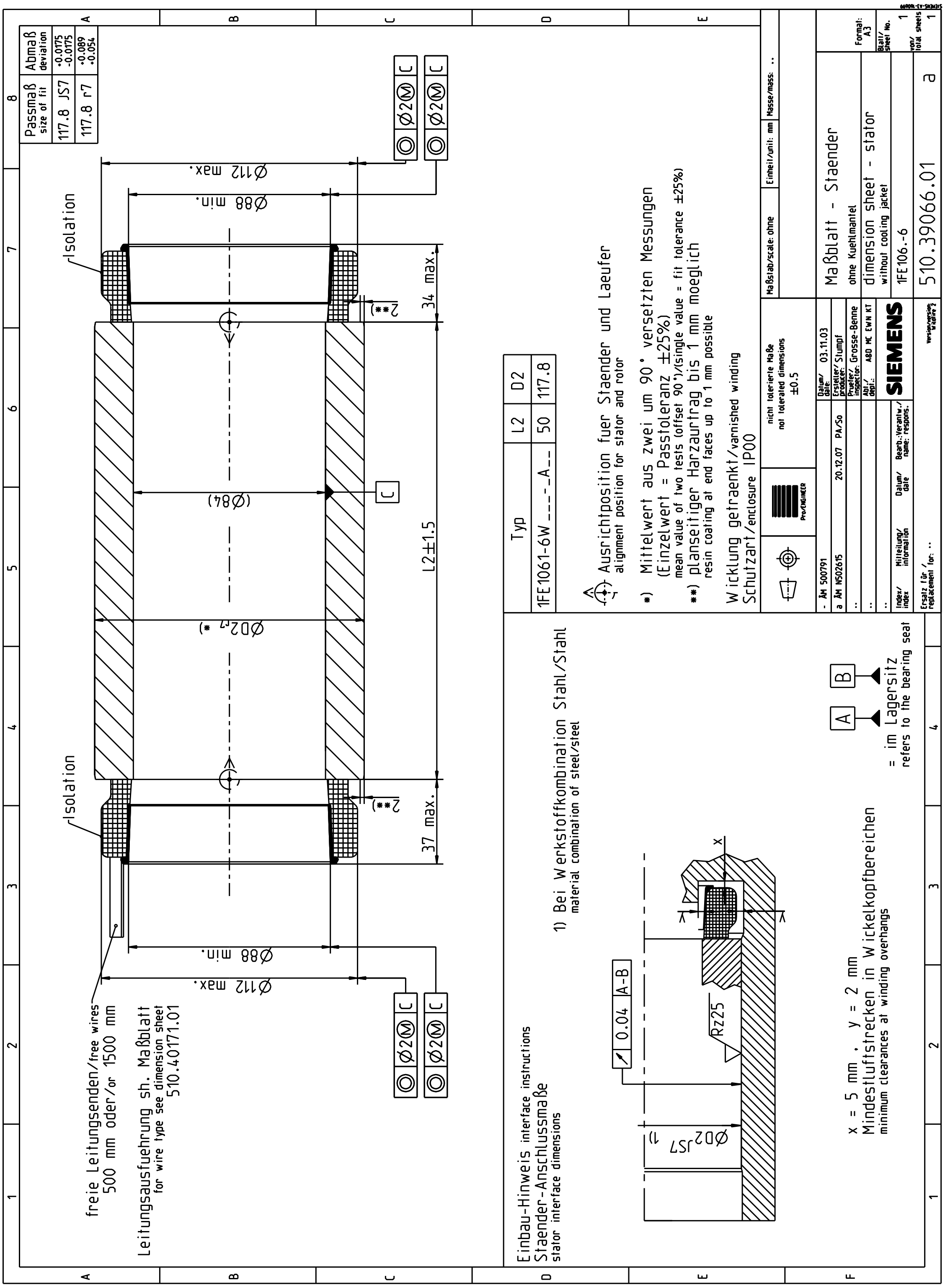


Figure 5-9 1FE106□-6, stator without cooling jacket

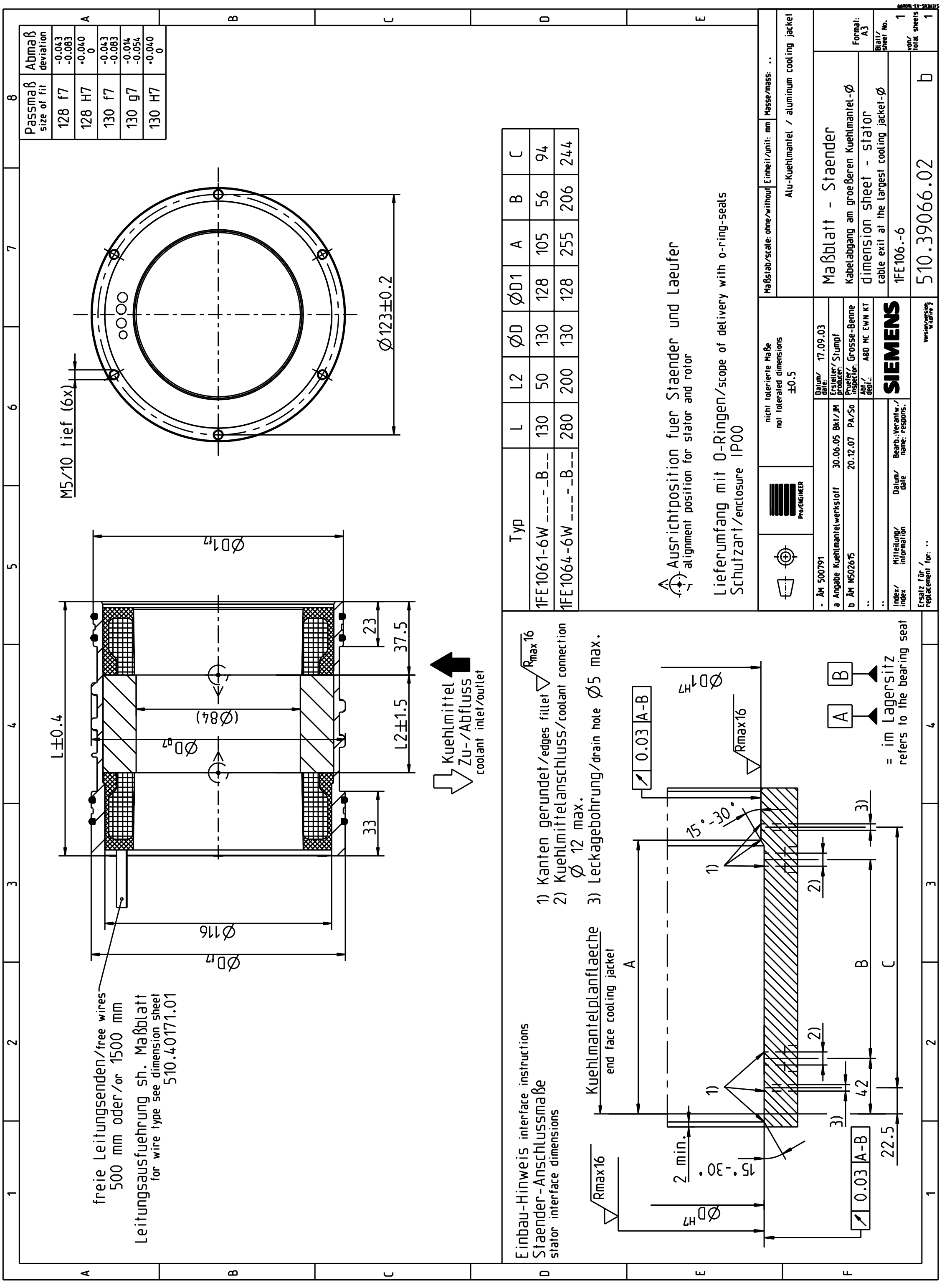


Figure 5-10 1FE106□-6, stator with cooling jacket, cable outlet at the larger cooling jacket diameter

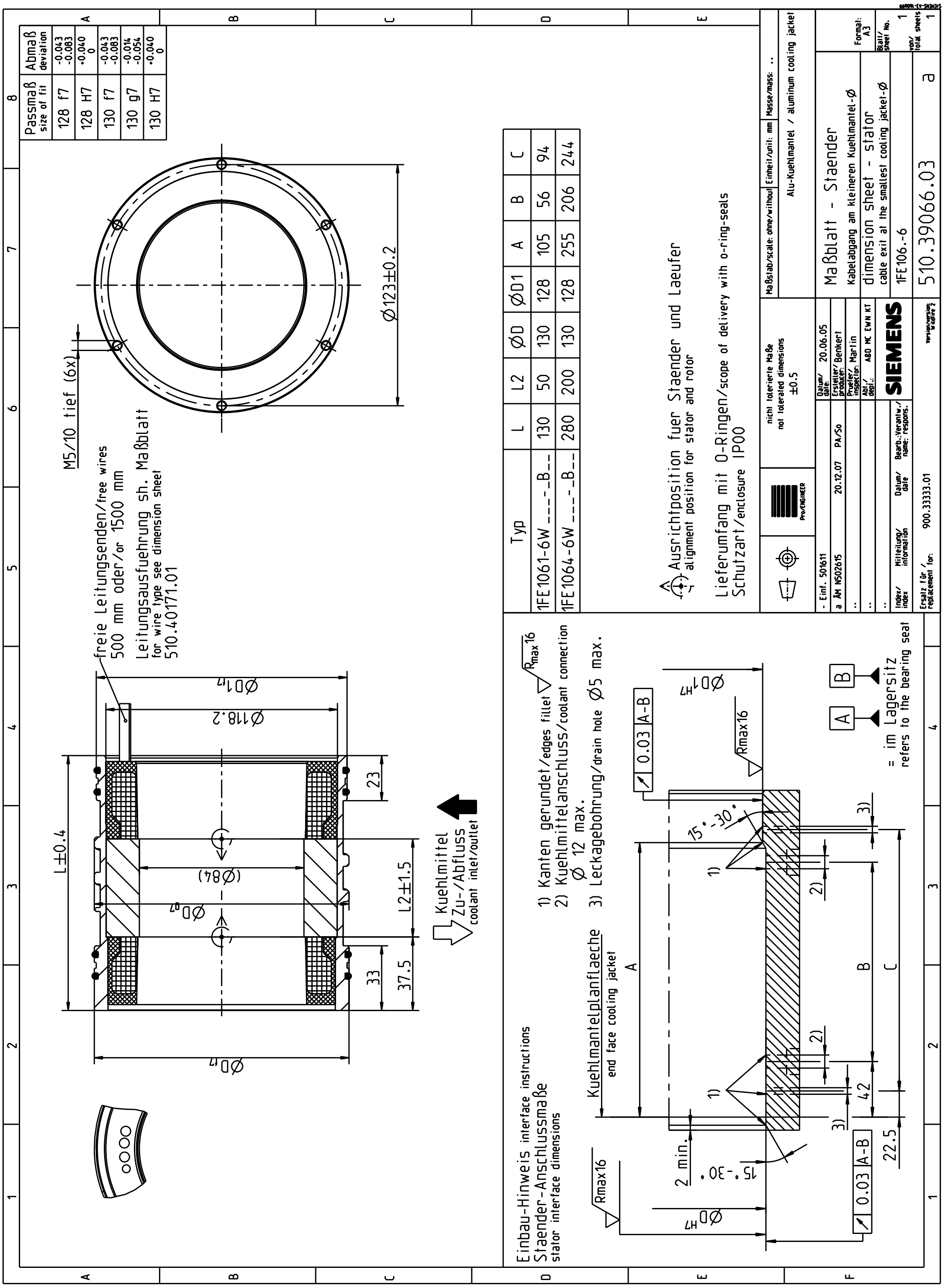


Figure 5-11 1FE106-6, stator with cooling jacket, cable outlet at the smaller cooling jacket diameter

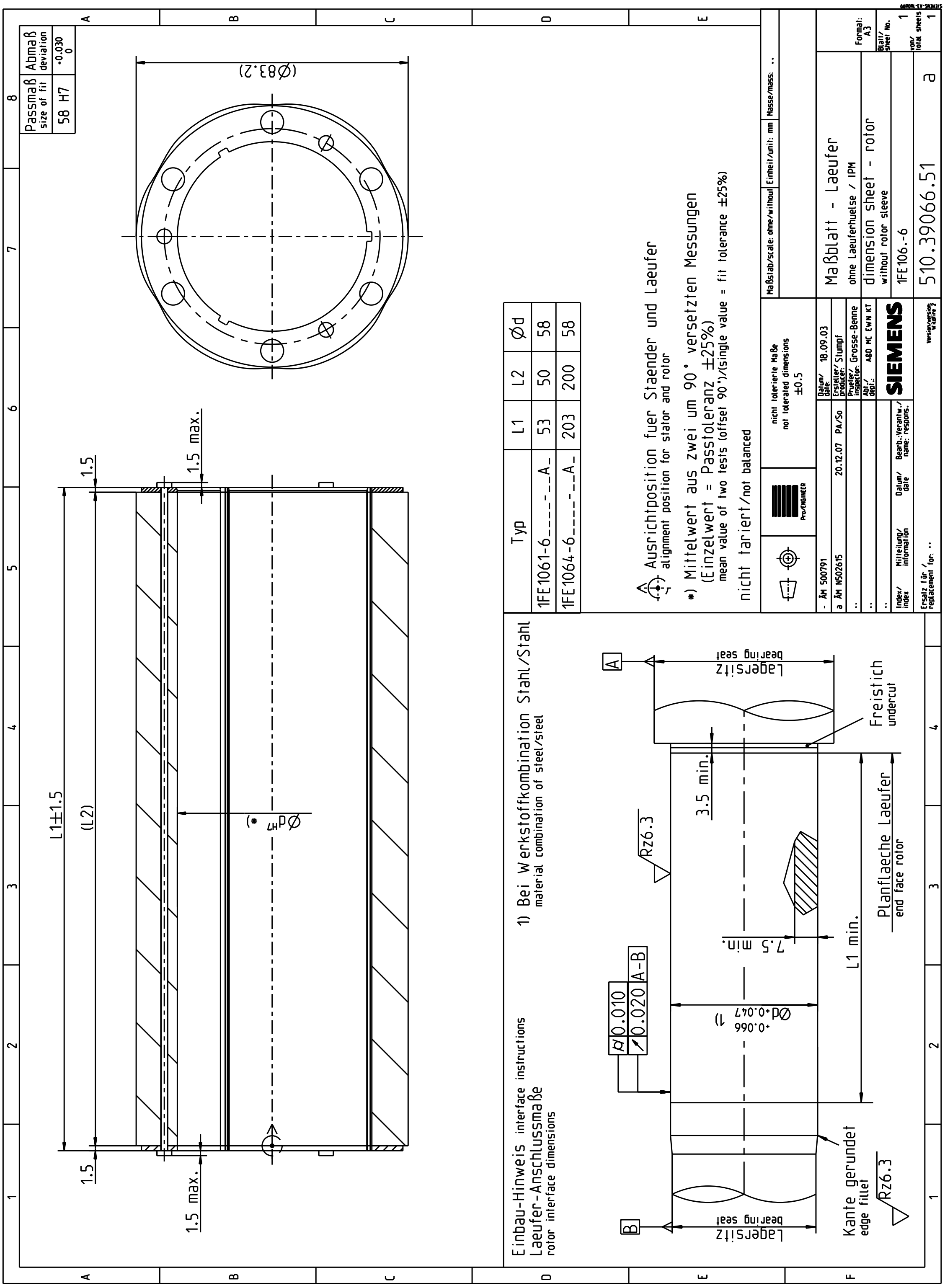


Figure 5-12 1FE106□-6, rotor without sleeve

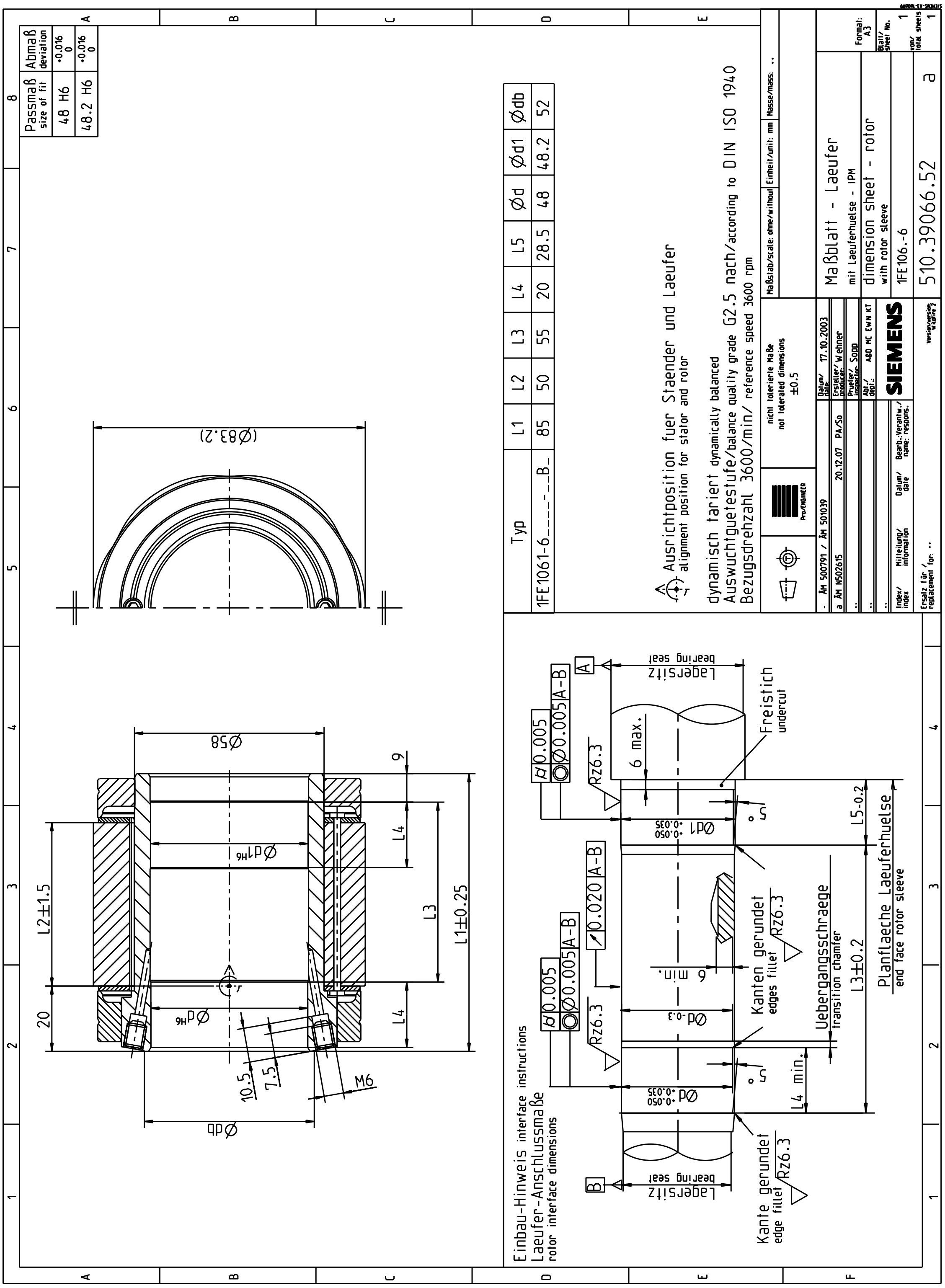


Figure 5-13 1FE106□-6, rotor with sleeve

5.5 1FE108.-6

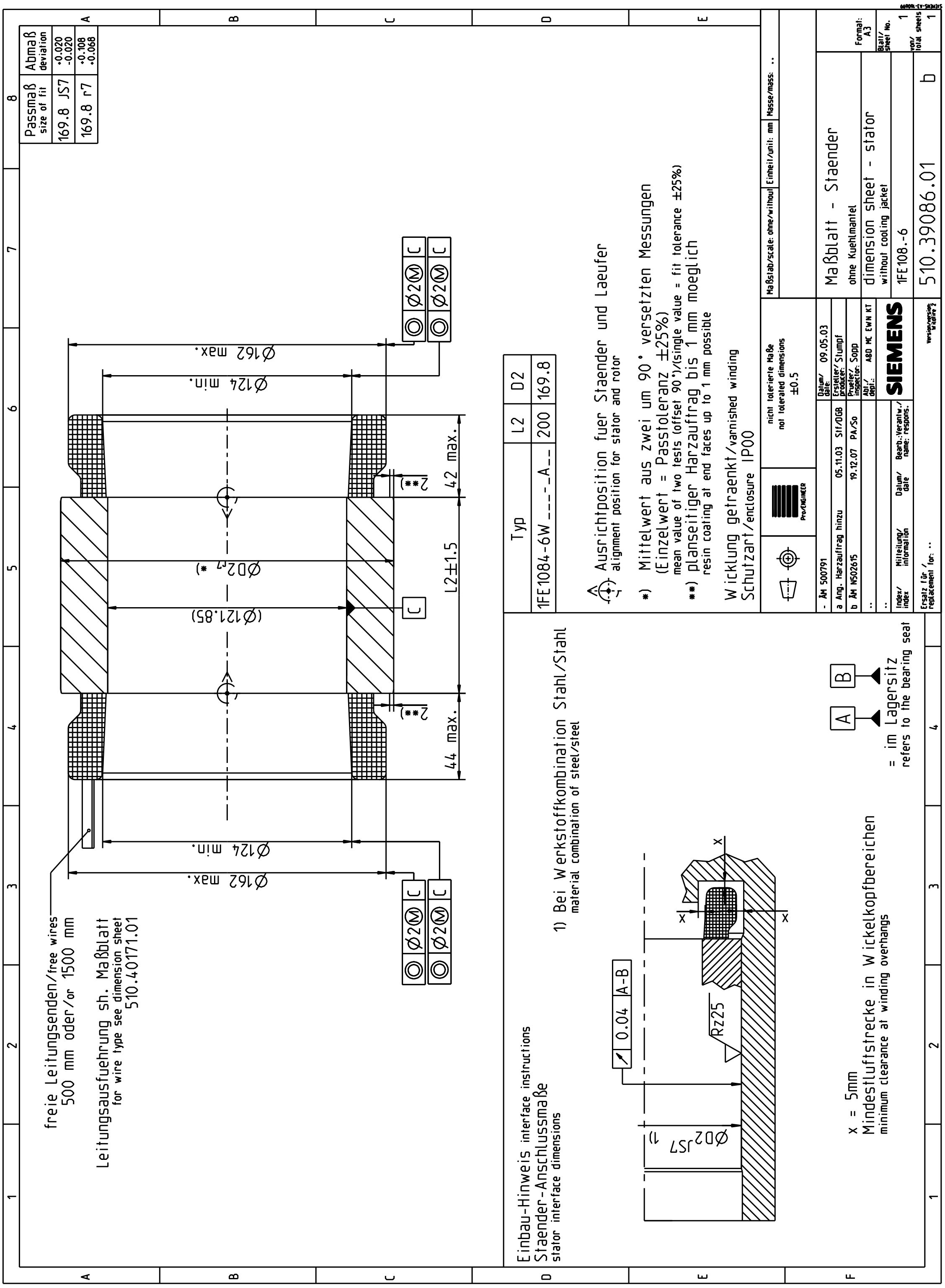


Figure 5-14 1FE108□-6, stator without cooling jacket

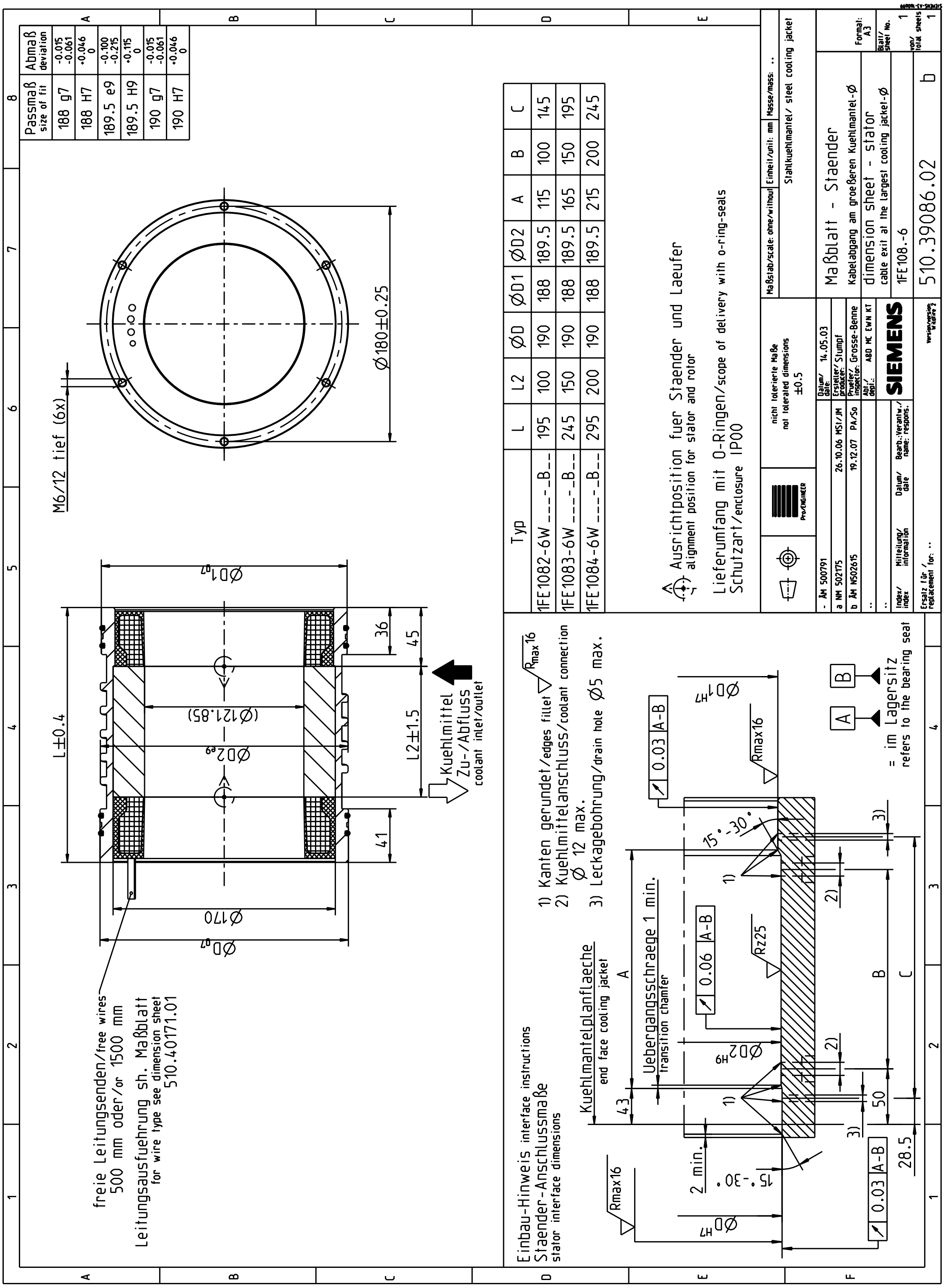


Figure 5-15 1FE108□-6, stator with cooling jacket, cable outlet at the larger cooling jacket diameter

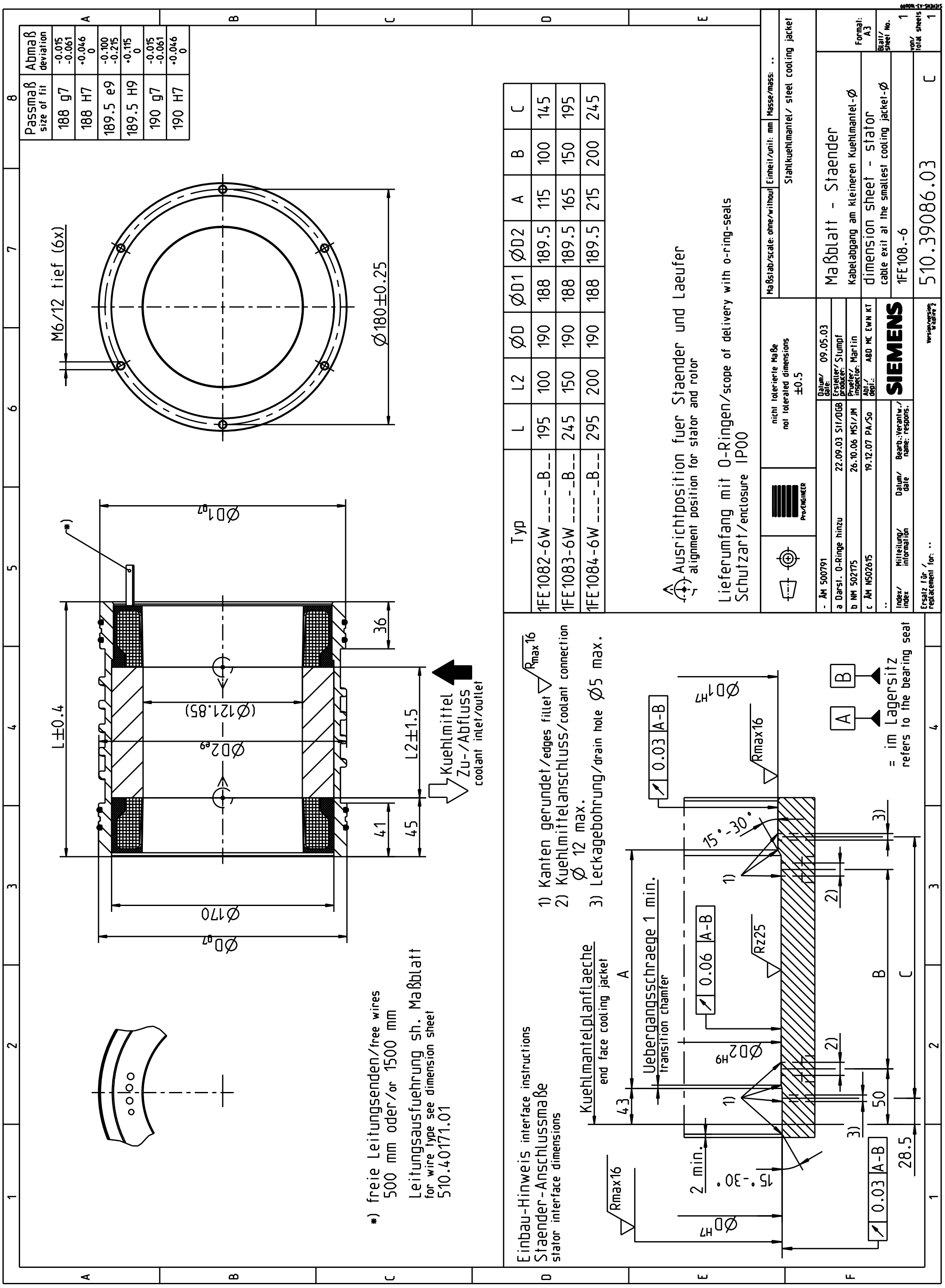


Figure 5-16 1FE108□-6, stator with cooling jacket, cable outlet at the smaller cooling jacket diameter

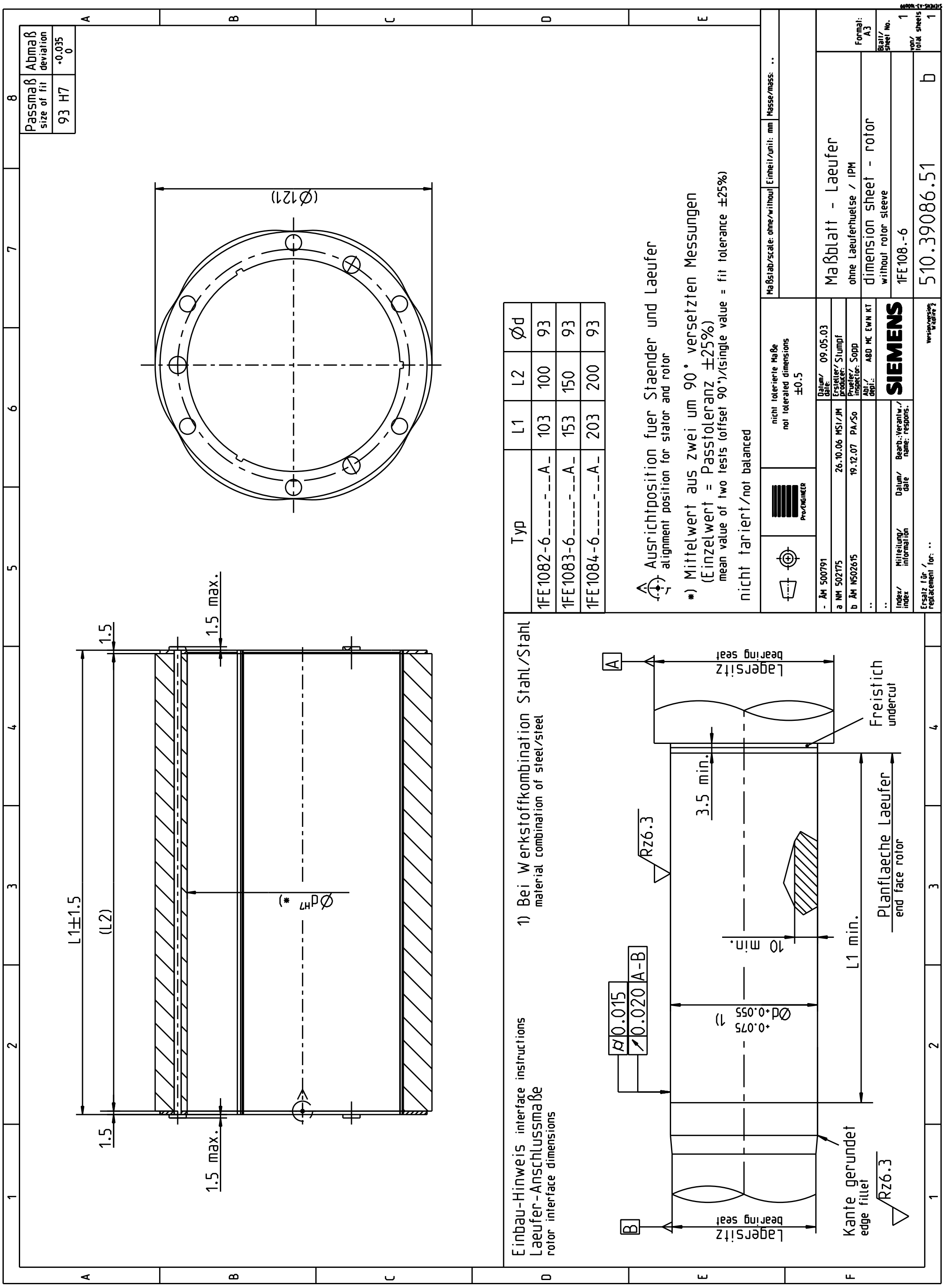


Figure 5-17 1FE108□-6, rotor without sleeve

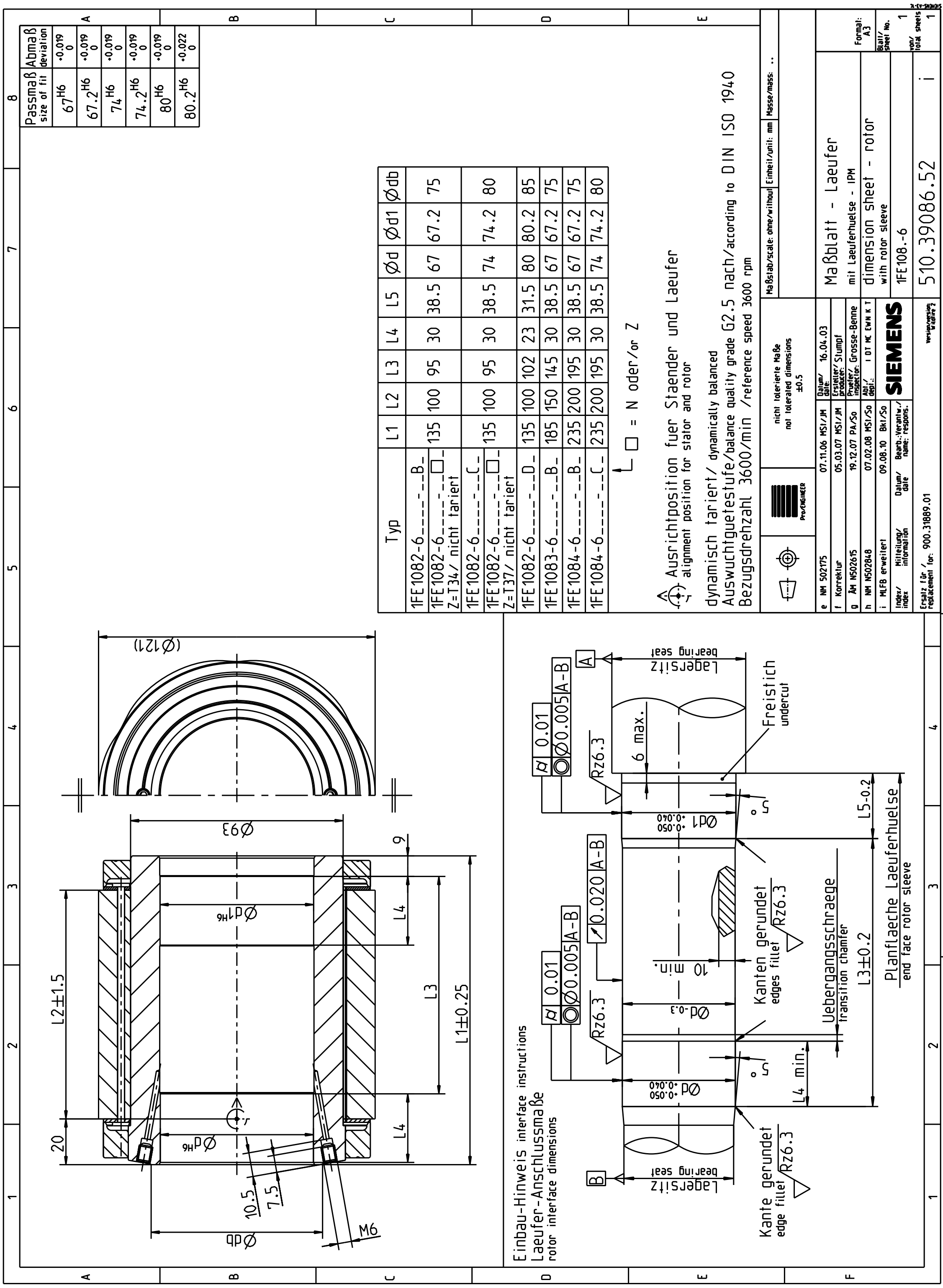


Figure 5-18 1FE108□-6, rotor with sleeve

5.6 1FE109.-6

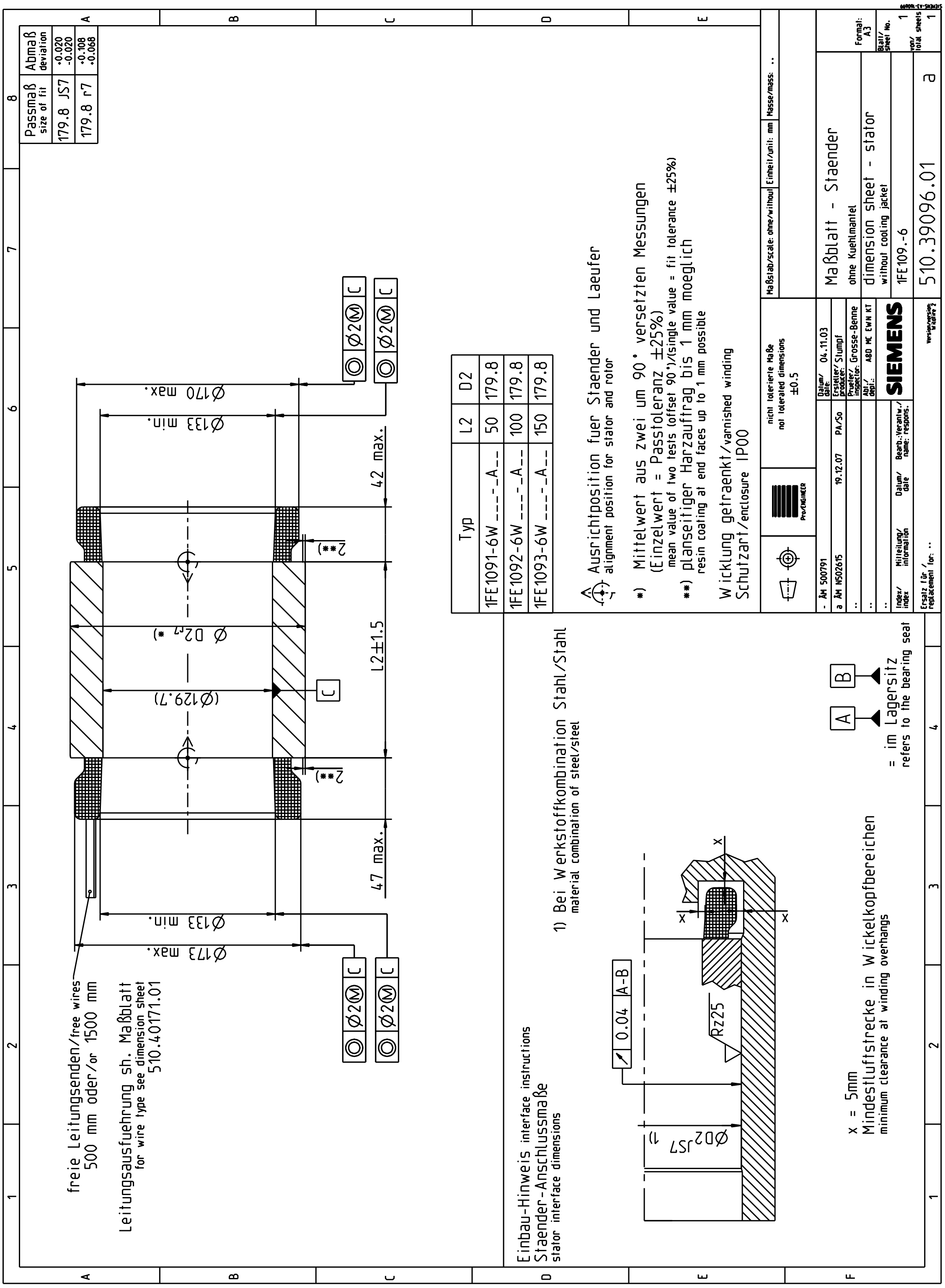


Figure 5-19 1FE109□-6, stator without cooling jacket

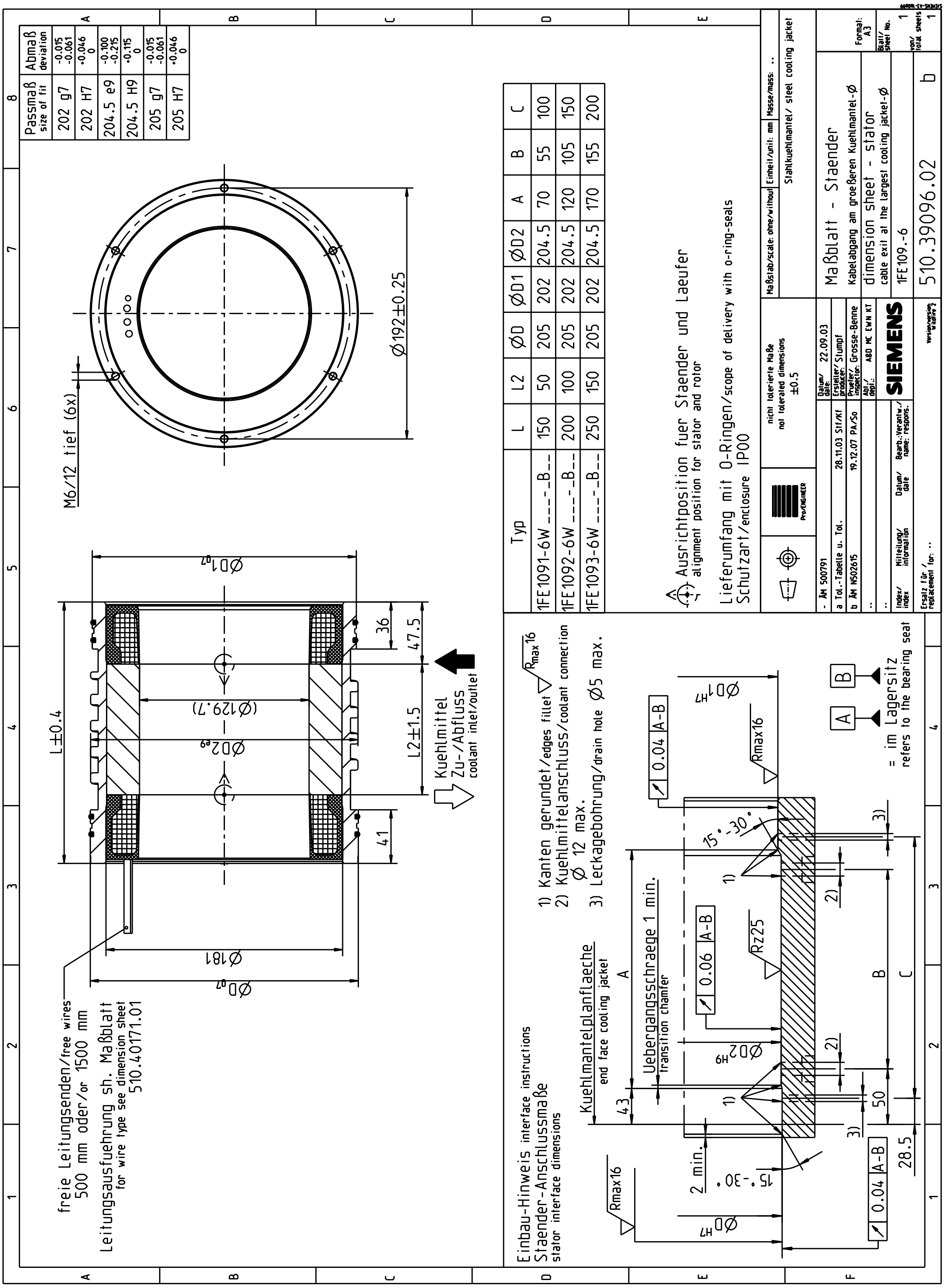


Figure 5-20 1FE109□-6, stator with cooling jacket, cable outlet at the larger cooling jacket diameter

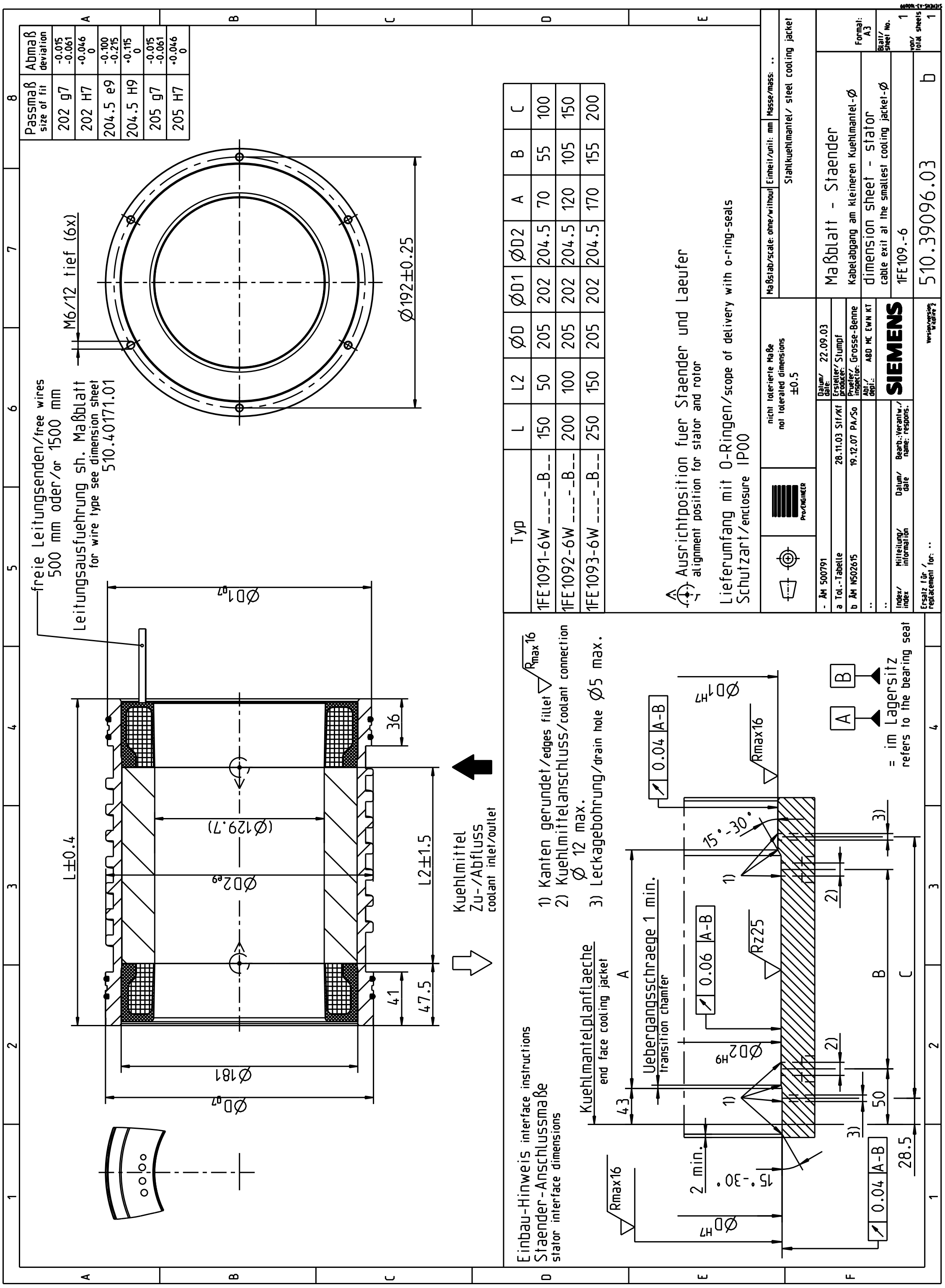


Figure 5-21 1FE109□-6, stator with cooling jacket, cable outlet at the smaller cooling jacket diameter

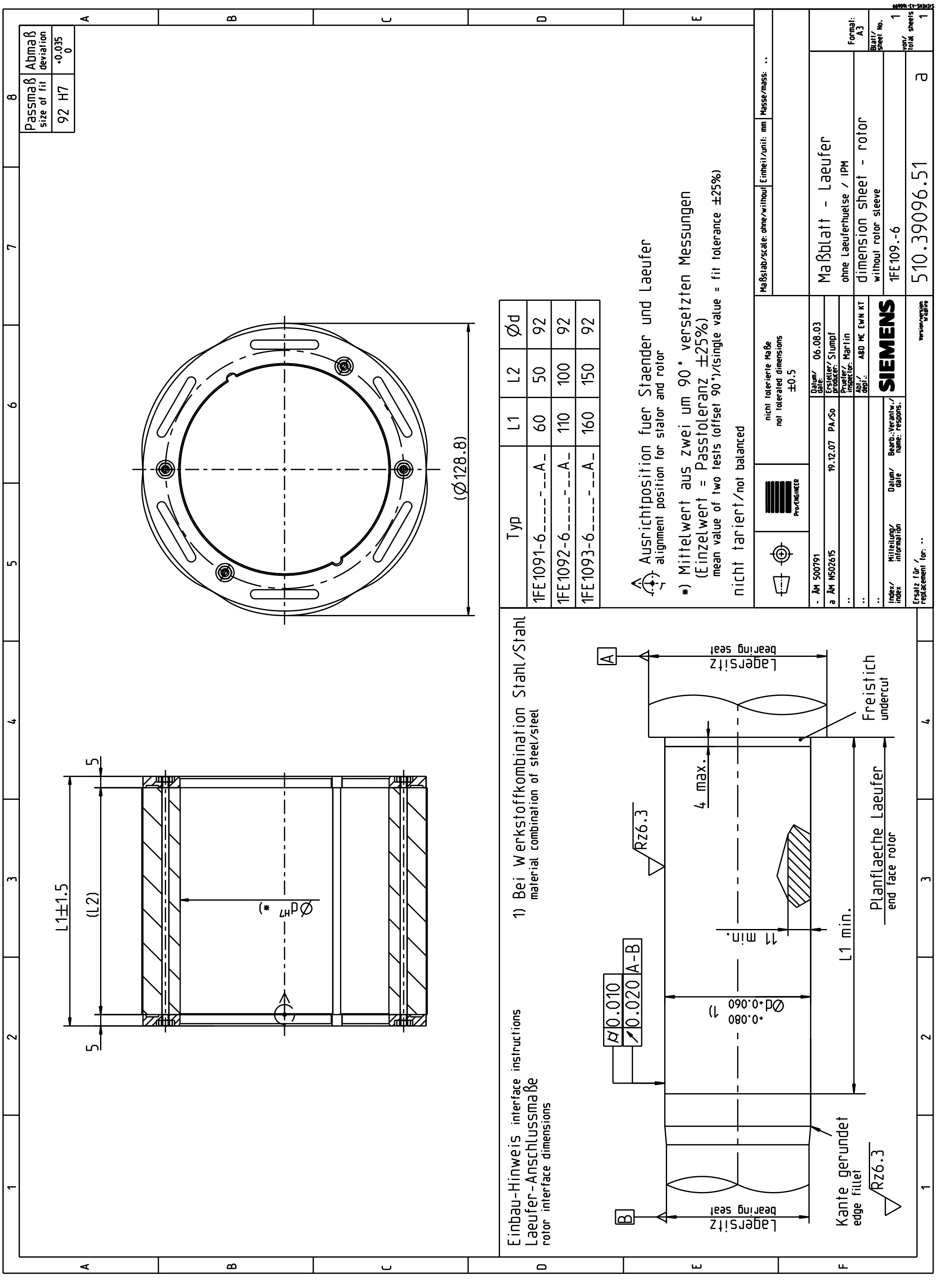


Figure 5-22 1FE109□-6, rotor without sleeve

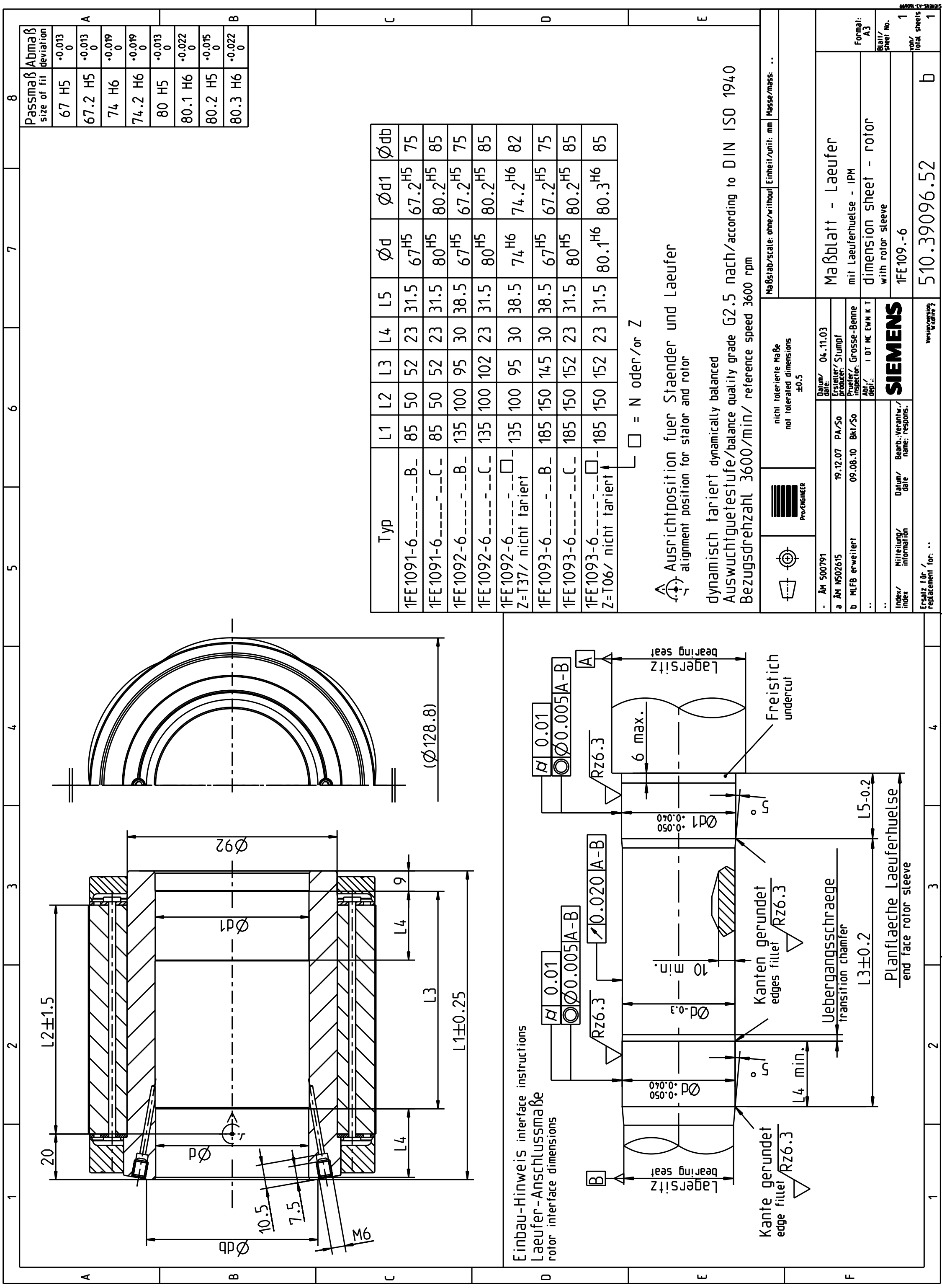


Figure 5-23 1FE109□-6, rotor with sleeve

5.7 1FE111.-6

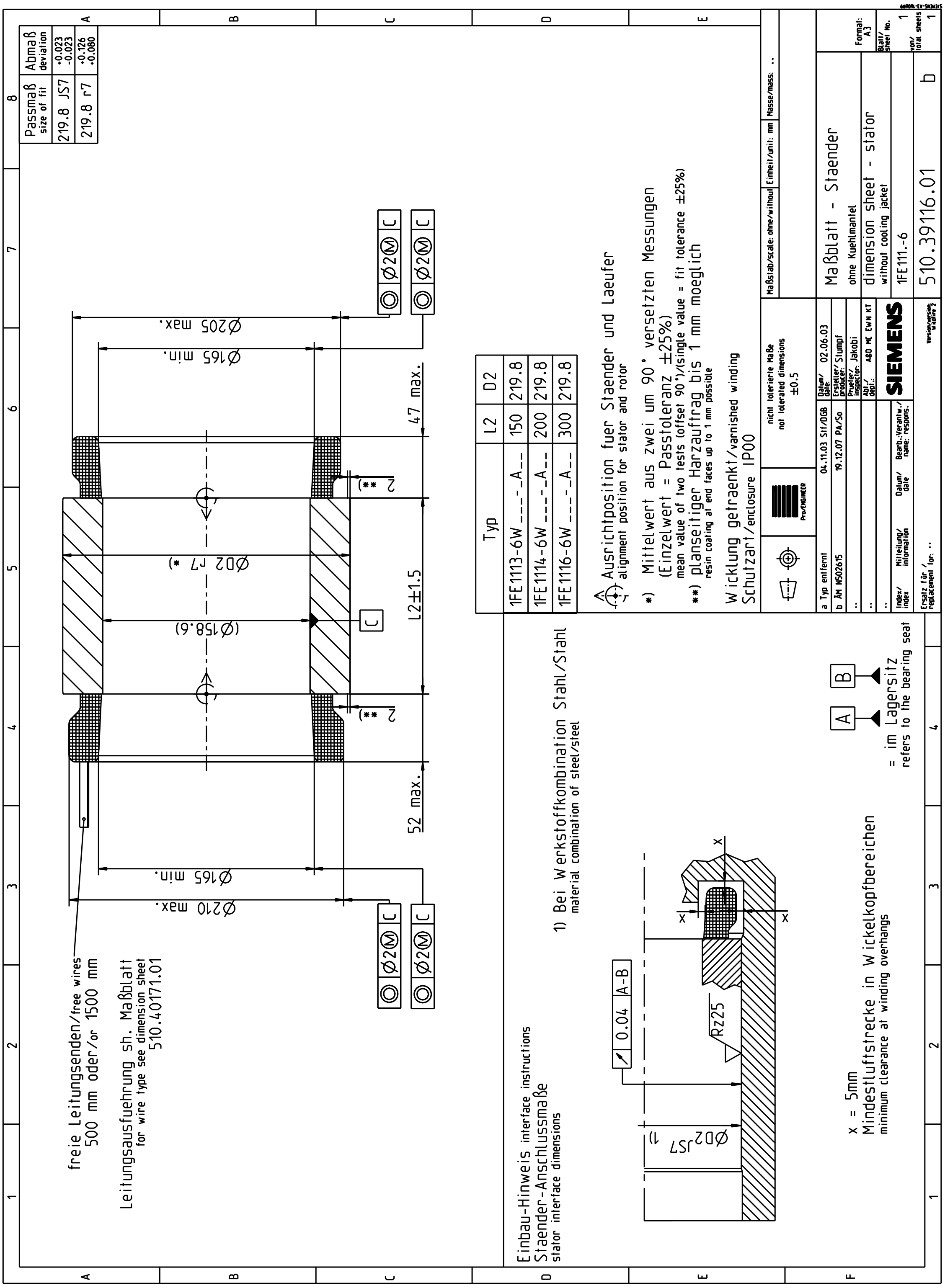


Figure 5-24 1FE111□-6, stator without cooling jacket

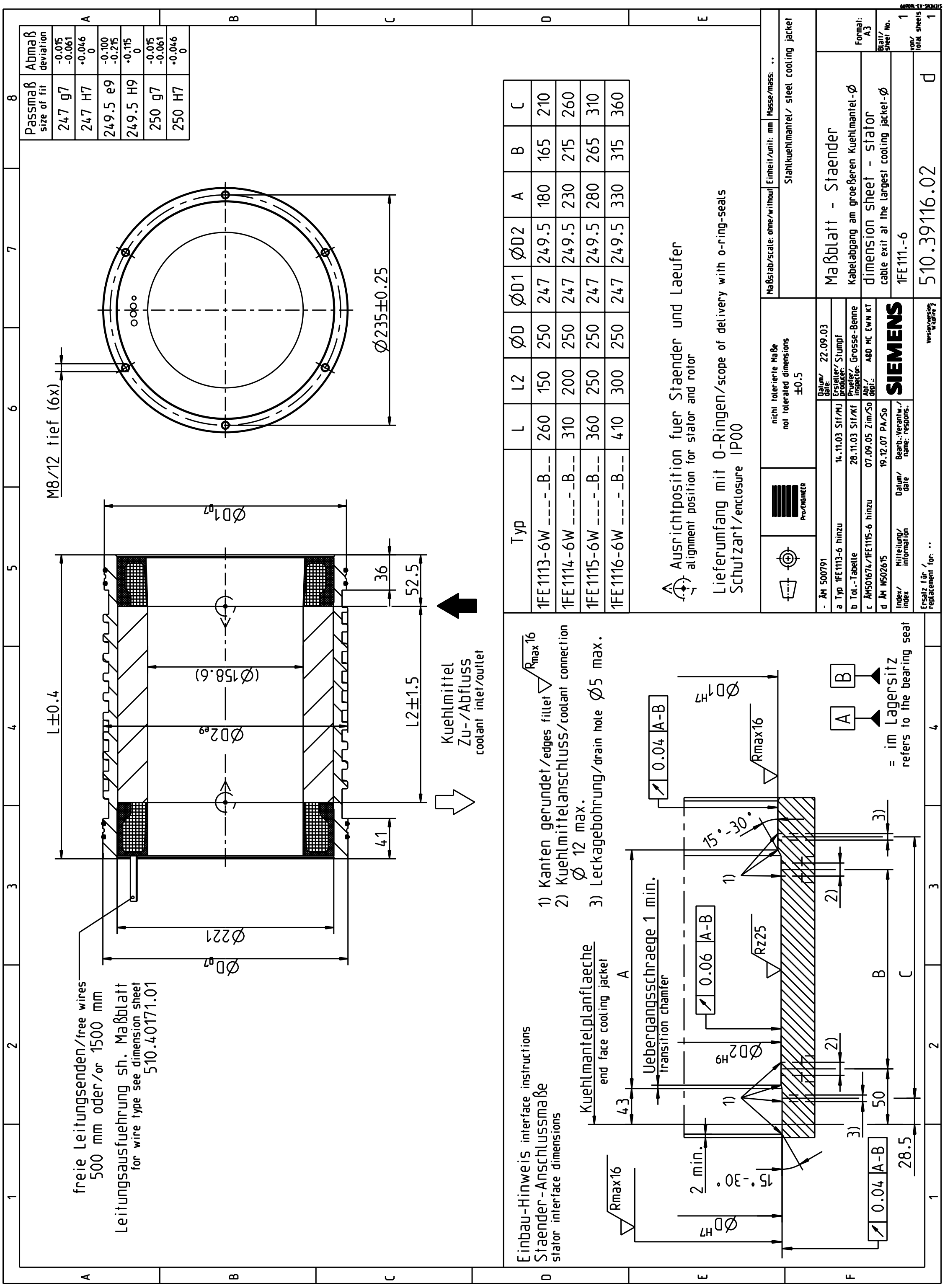


Figure 5-25 1FE111□-6, stator with cooling jacket, cable outlet at the larger cooling jacket diameter

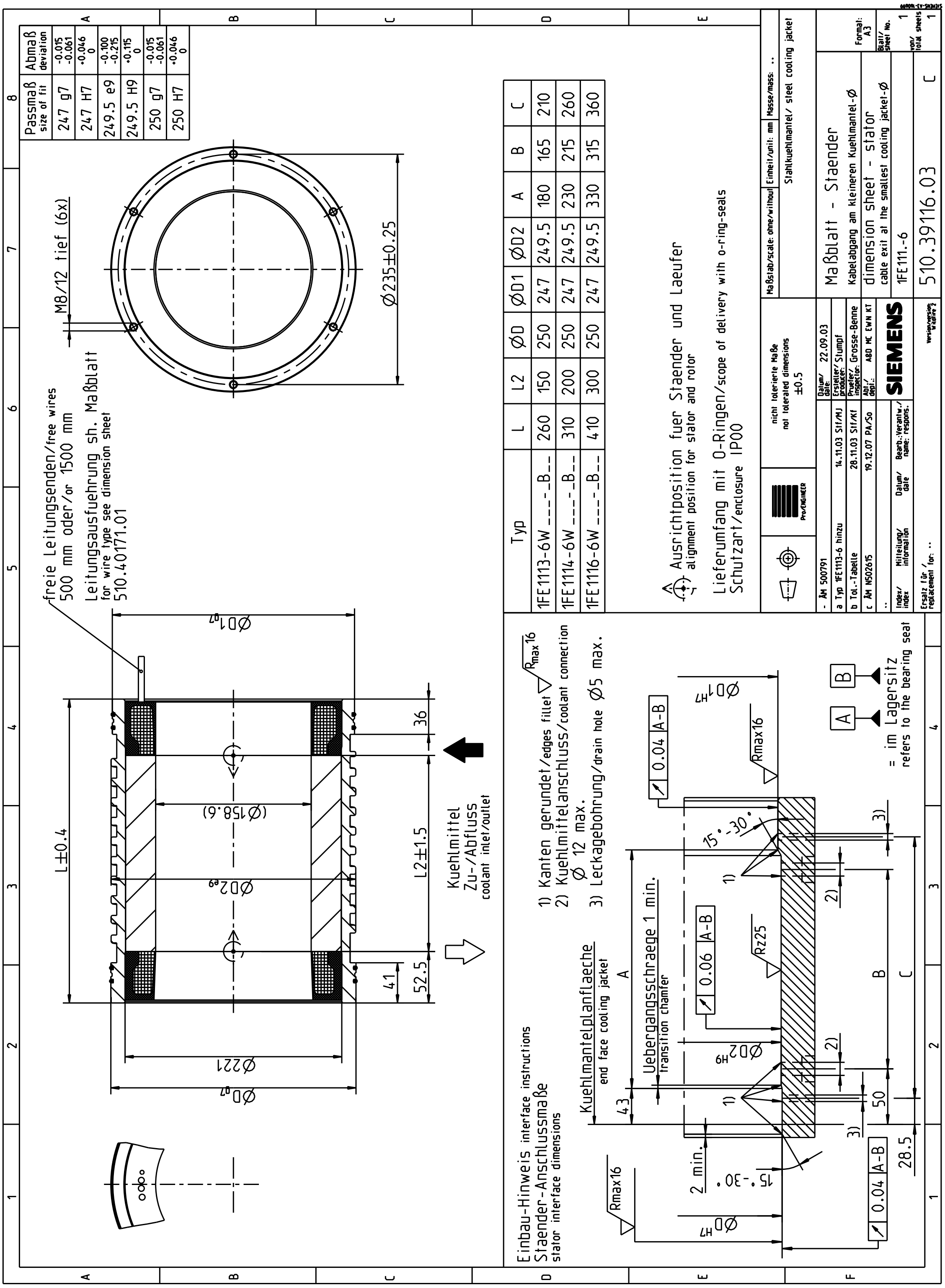


Figure 5-26 1FE111□-6, stator with cooling jacket, cable outlet at the smaller cooling jacket diameter

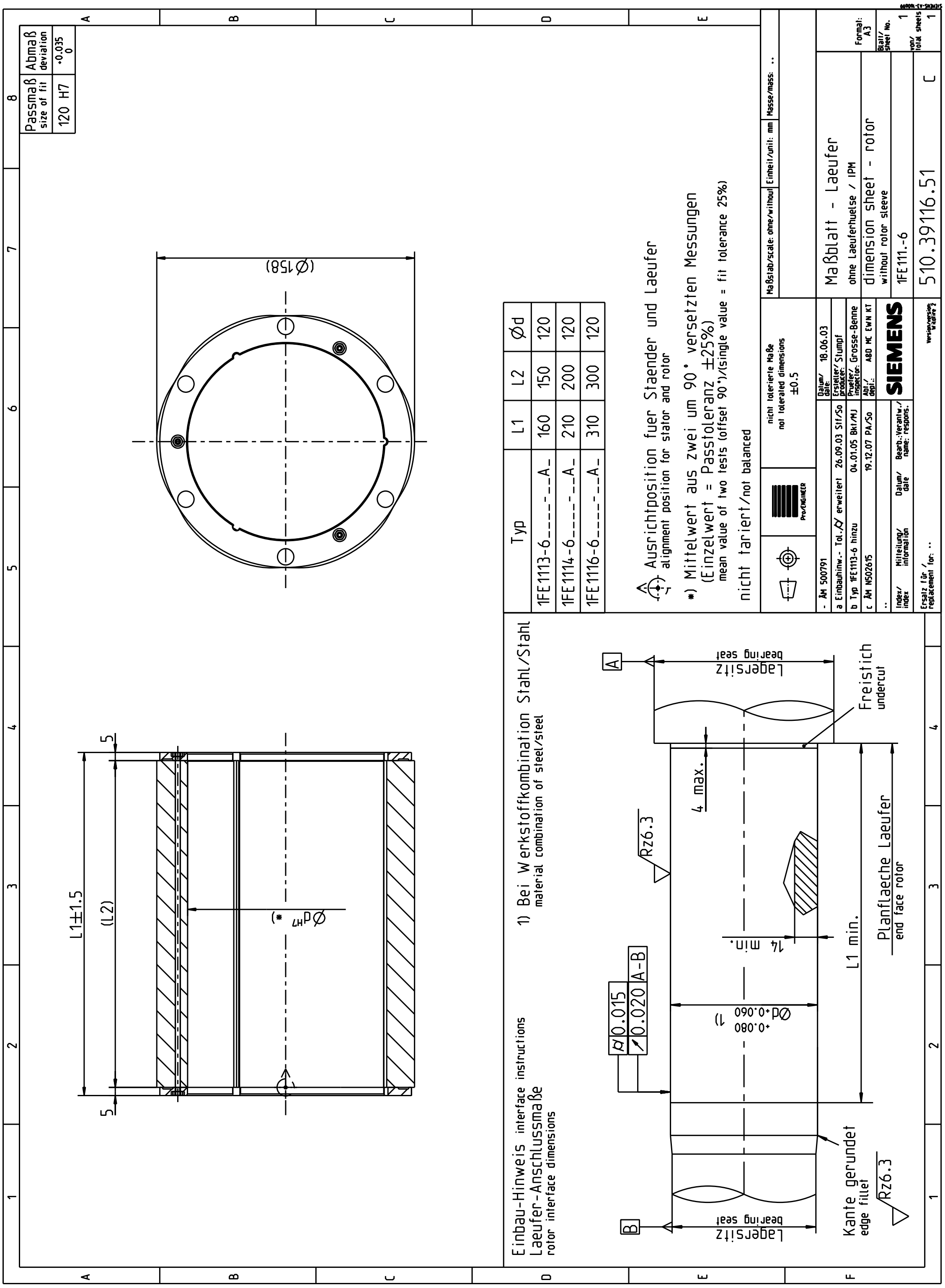
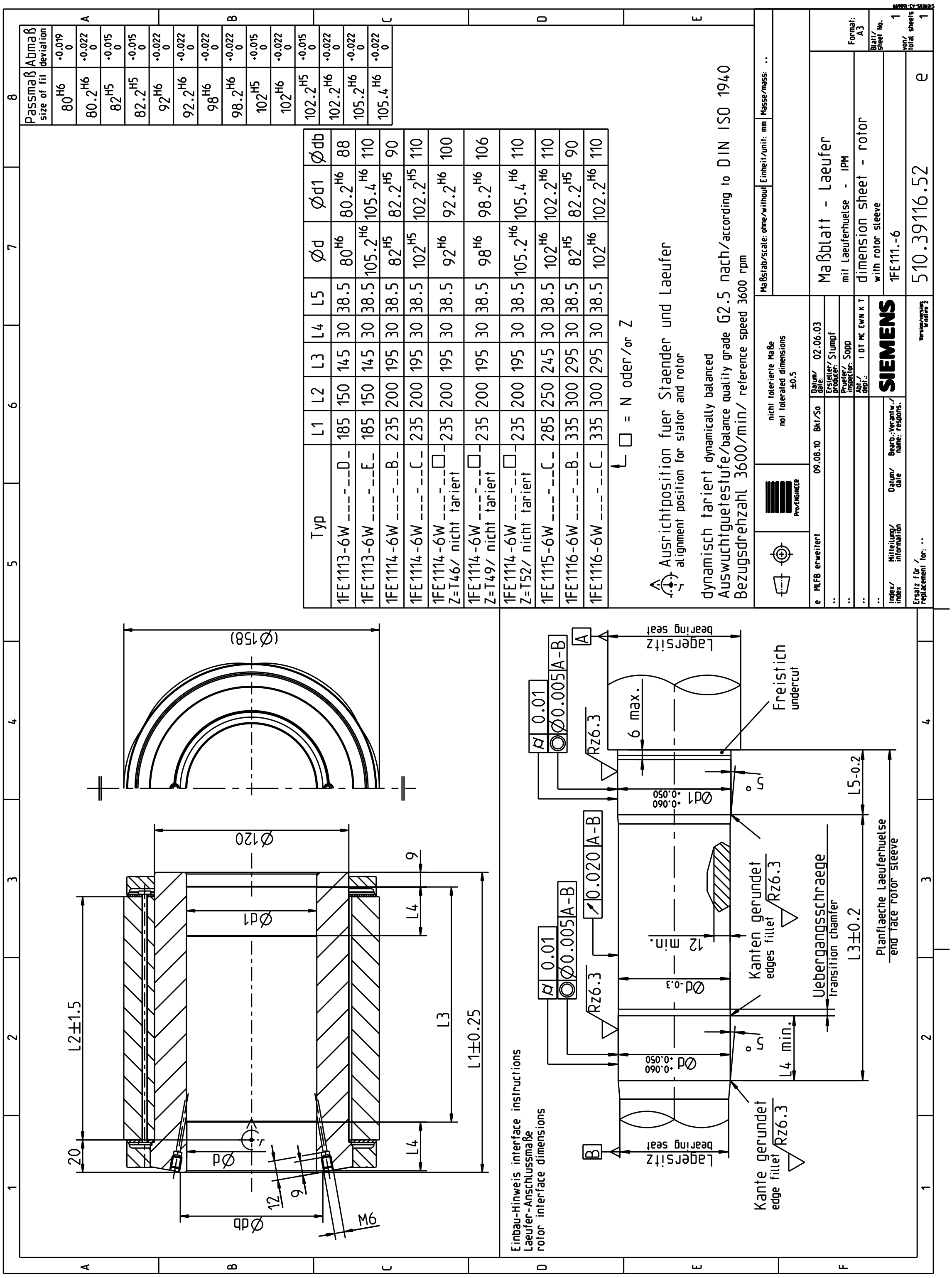


Figure 5-27 1FE111□-6, rotor without sleeve



Typ	L1	L2	L3	L4	L5	Ød	Ød1	Ødb
1FE1113-6W ___-__D_	185	150	145	30	38.5	80^{H6}	80.2^{H6}	88
1FE1113-6W ___-__E_	185	150	145	30	38.5	105.2^{H6}	105.4^{H6}	110
1FE1114-6W ___-__B_	235	200	195	30	38.5	82^{H5}	82.2^{H5}	90
1FE1114-6W ___-__C_	235	200	195	30	38.5	102^{H5}	102.2^{H5}	110
1FE1114-6W ___-__□_ Z=T46/ nicht tariert	235	200	195	30	38.5	92^{H6}	92.2^{H6}	100
1FE1114-6W ___-__□_ Z=T49/ nicht tariert	235	200	195	30	38.5	98^{H6}	98.2^{H6}	106
1FE1114-6W ___-__□_ Z=T52/ nicht tariert	235	200	195	30	38.5	105.2^{H6}	105.4^{H6}	110
1FE1115-6W ___-__C_	285	250	245	30	38.5	102^{H6}	102.2^{H6}	110
1FE1116-6W ___-__B_	335	300	295	30	38.5	82^{H5}	82.2^{H5}	90
1FE1116-6W ___-__C_	335	300	295	30	38.5	102^{H6}	102.2^{H6}	110

Passmaß size of fit	Abmaß deviation
80^{H6}	$^{+0.019}_{0}$
80.2^{H6}	$^{+0.022}_{0}$
82^{H5}	$^{+0.015}_{0}$
82.2^{H5}	$^{+0.015}_{0}$
92^{H6}	$^{+0.022}_{0}$
92.2^{H6}	$^{+0.022}_{0}$
98^{H6}	$^{+0.022}_{0}$
98.2^{H6}	$^{+0.022}_{0}$
102^{H5}	$^{+0.015}_{0}$
102^{H6}	$^{+0.022}_{0}$
102.2^{H5}	$^{+0.015}_{0}$
102.2^{H6}	$^{+0.022}_{0}$
105.2^{H6}	$^{+0.022}_{0}$
105.4^{H6}	$^{+0.022}_{0}$

Figure 5-28 1FE111□-6, rotor with sleeve

5.8 1FE114.-8

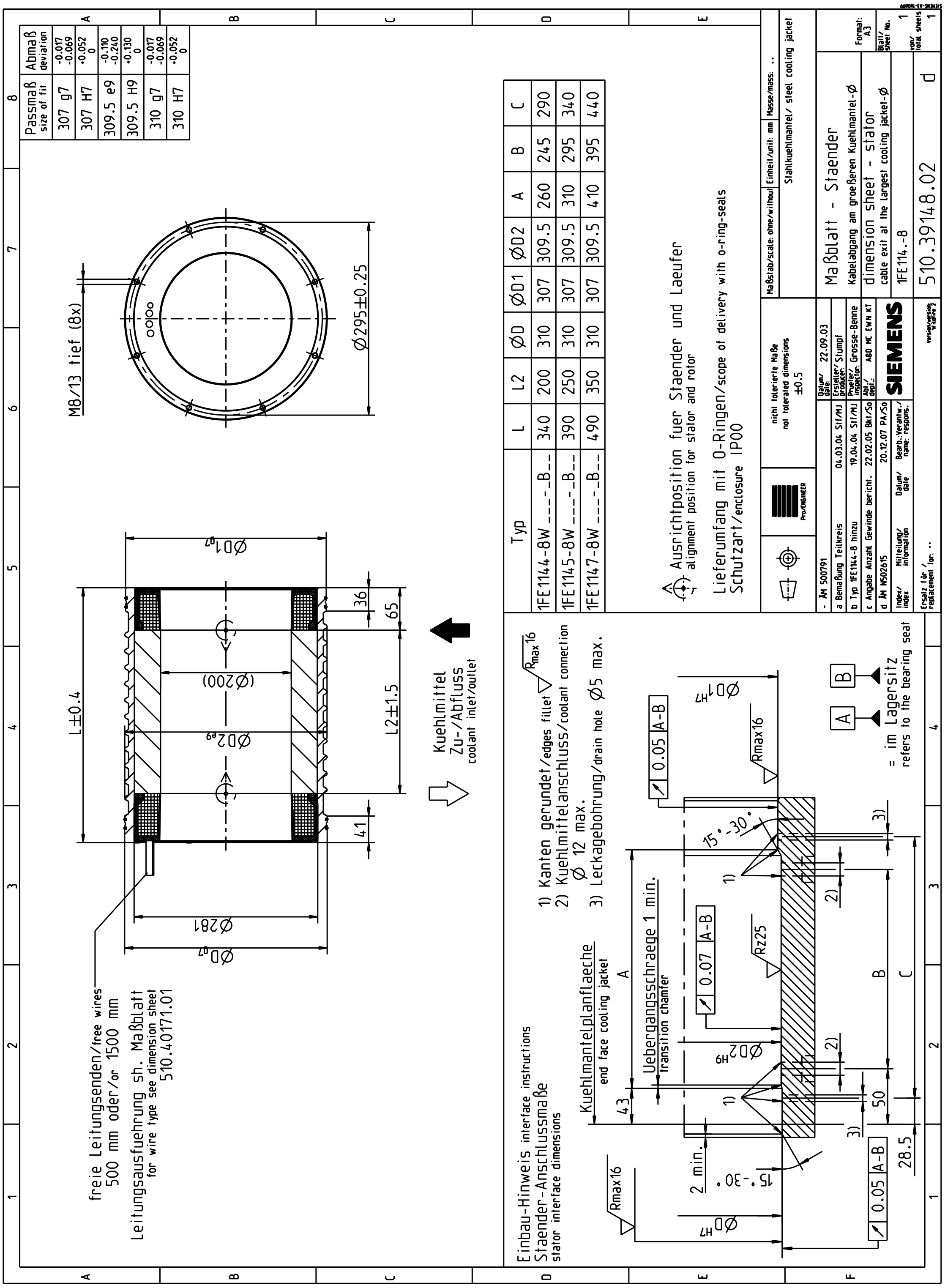


Figure 5-29 1FE114□-8, stator with cooling jacket, cable outlet at the larger cooling jacket diameter

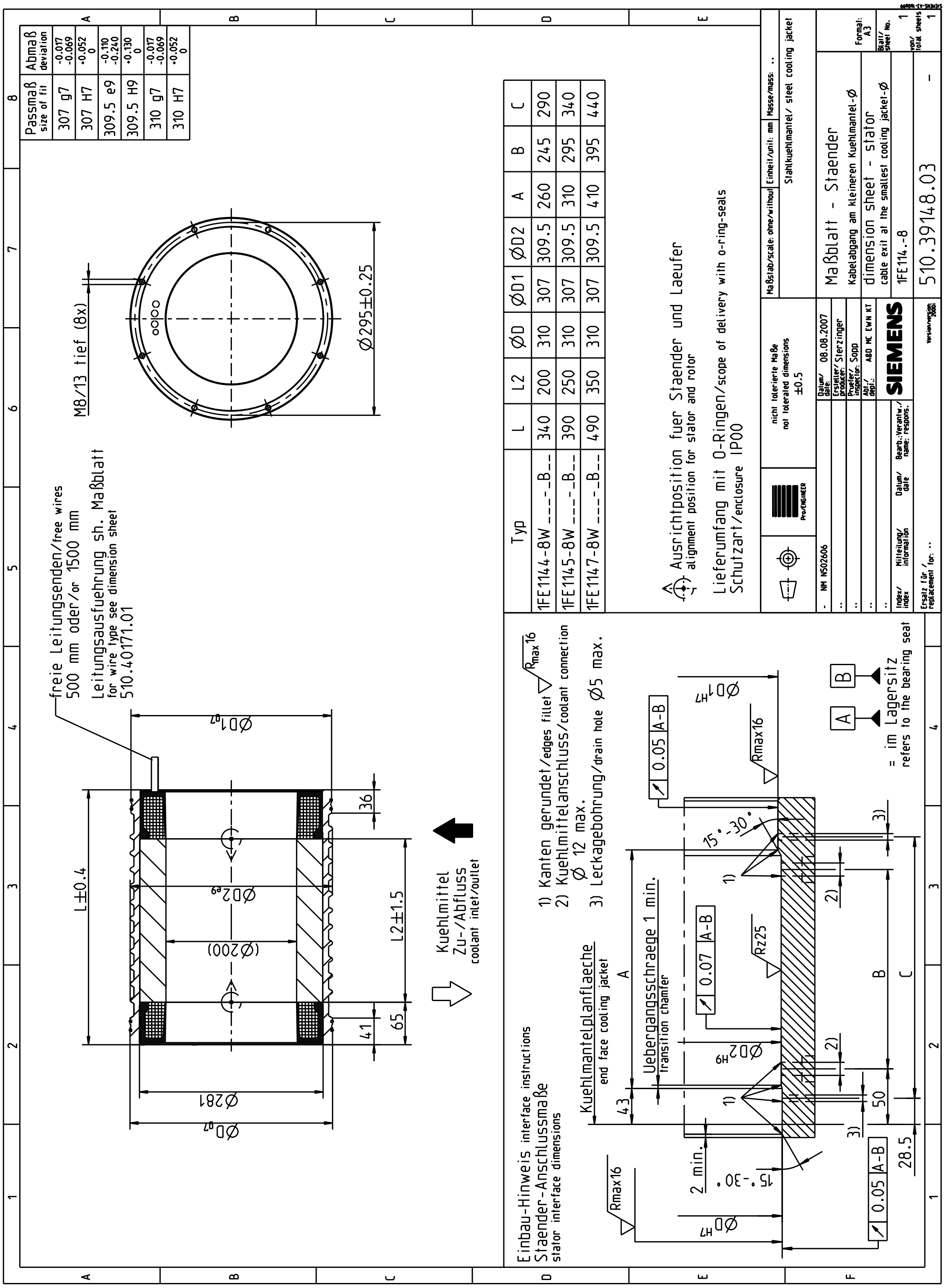


Figure 5-30 1FE114-8, stator with cooling jacket, cable outlet at the smaller cooling jacket diameter

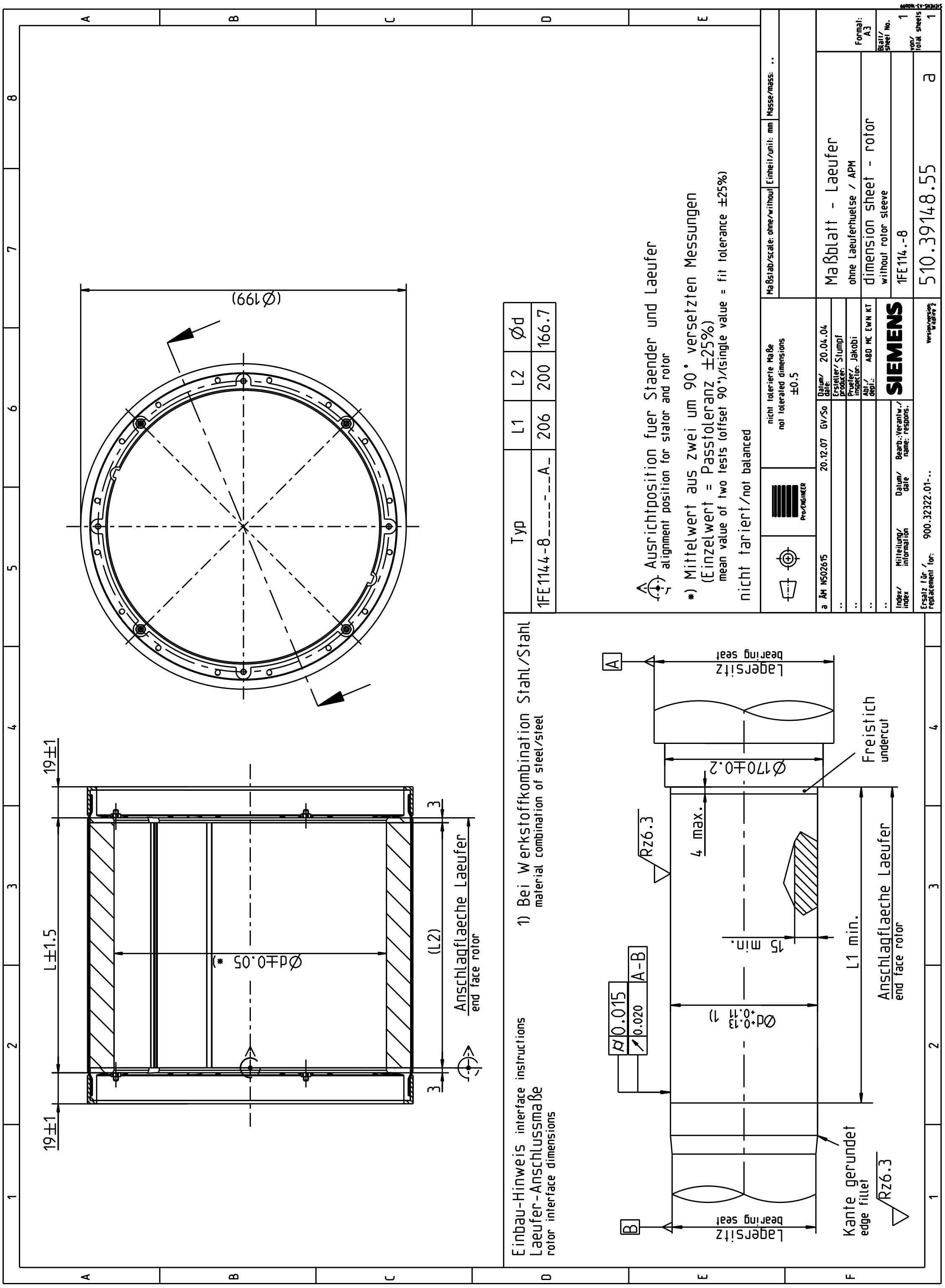


Figure 5-31 1FE114-8, rotor without sleeve

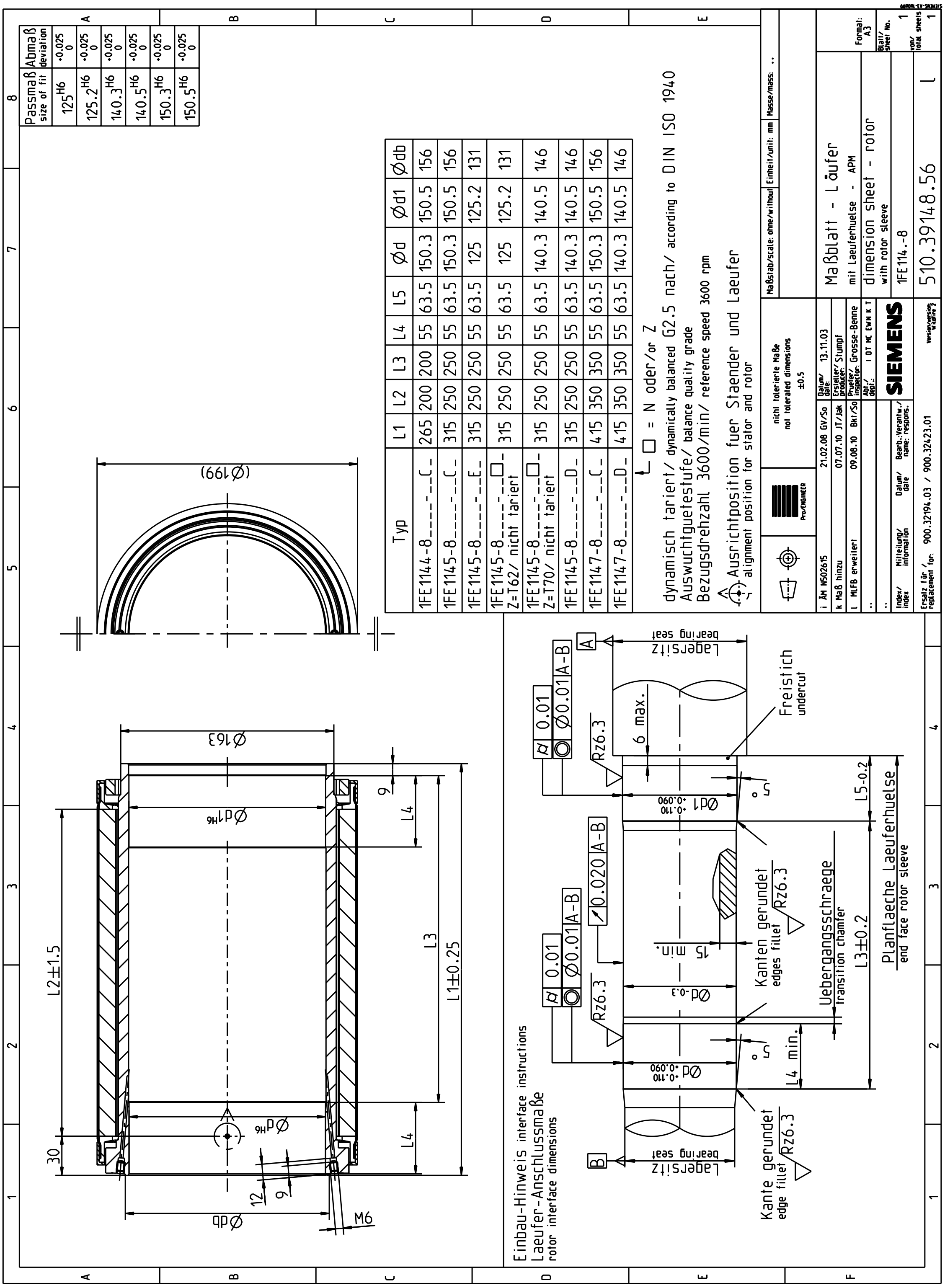


Figure 5-32 1FE114□-8, rotor with sleeve

5.9 1FE105.-4

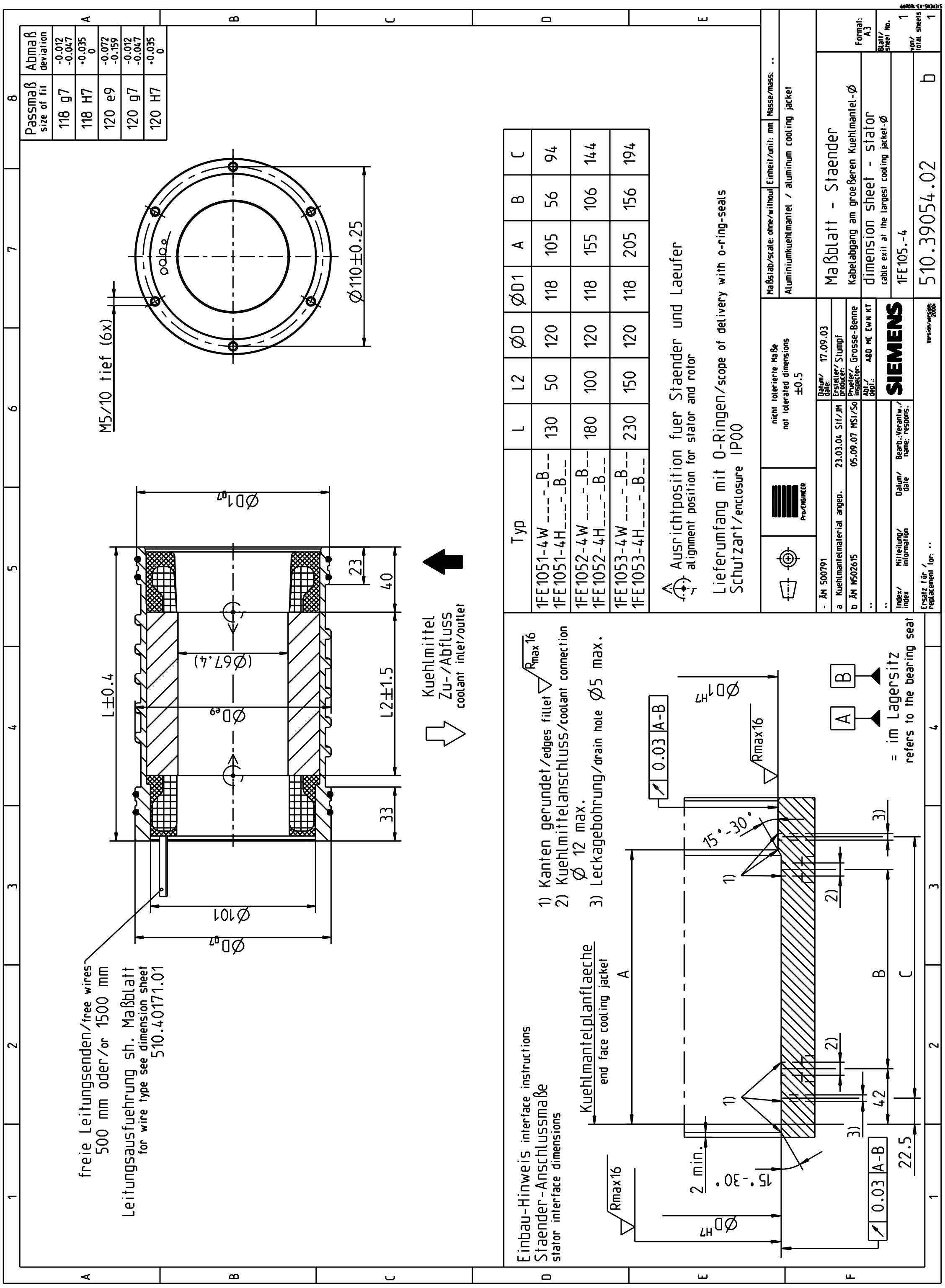


Figure 5-33 1FE105□-4, stator with cooling jacket, cable outlet at the larger cooling jacket diameter

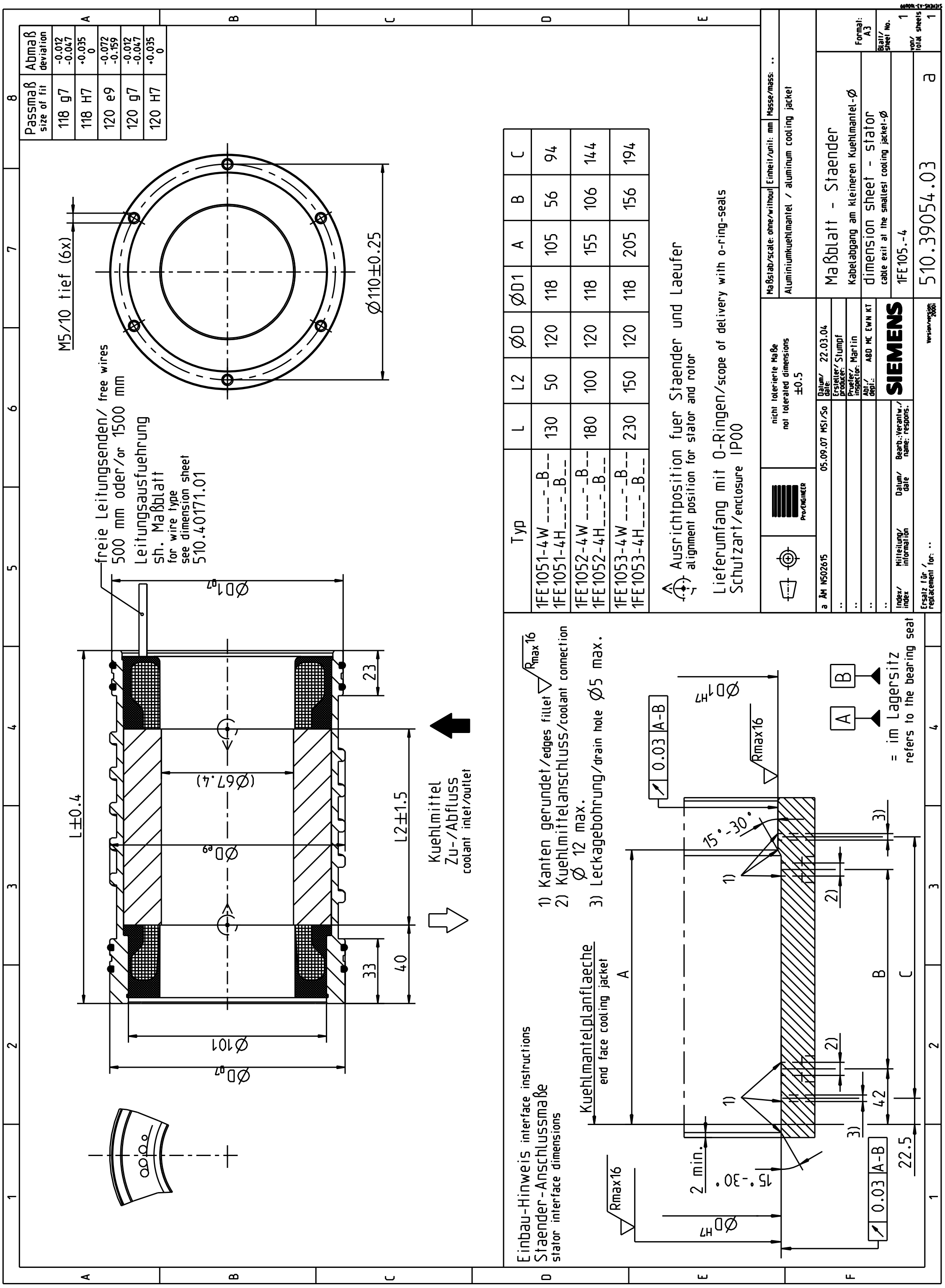


Figure 5-34 1FE105-4, stator with cooling jacket, cable outlet at the smaller cooling jacket diameter

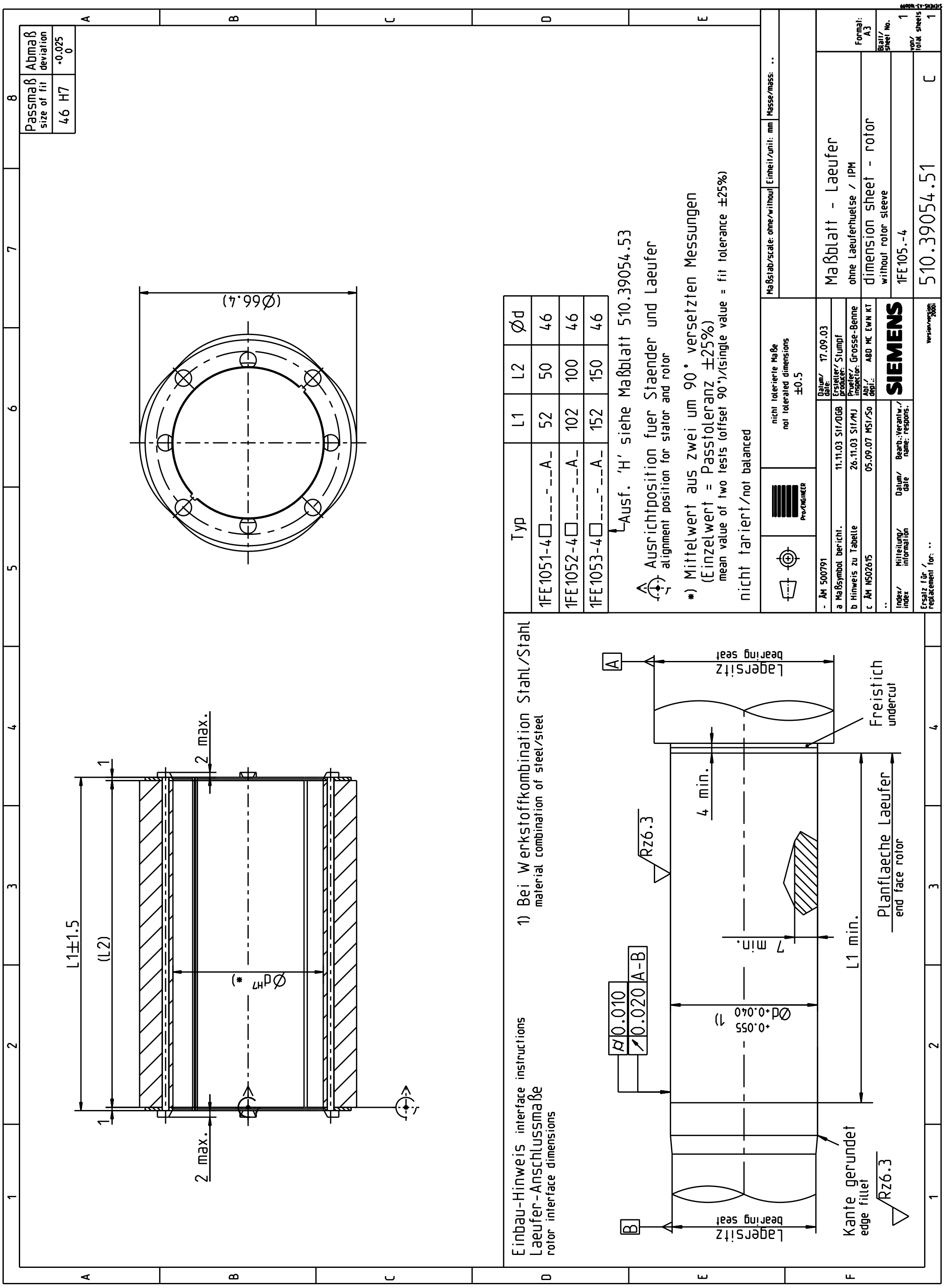


Figure 5-35 1FE105□-4, rotor without sleeve

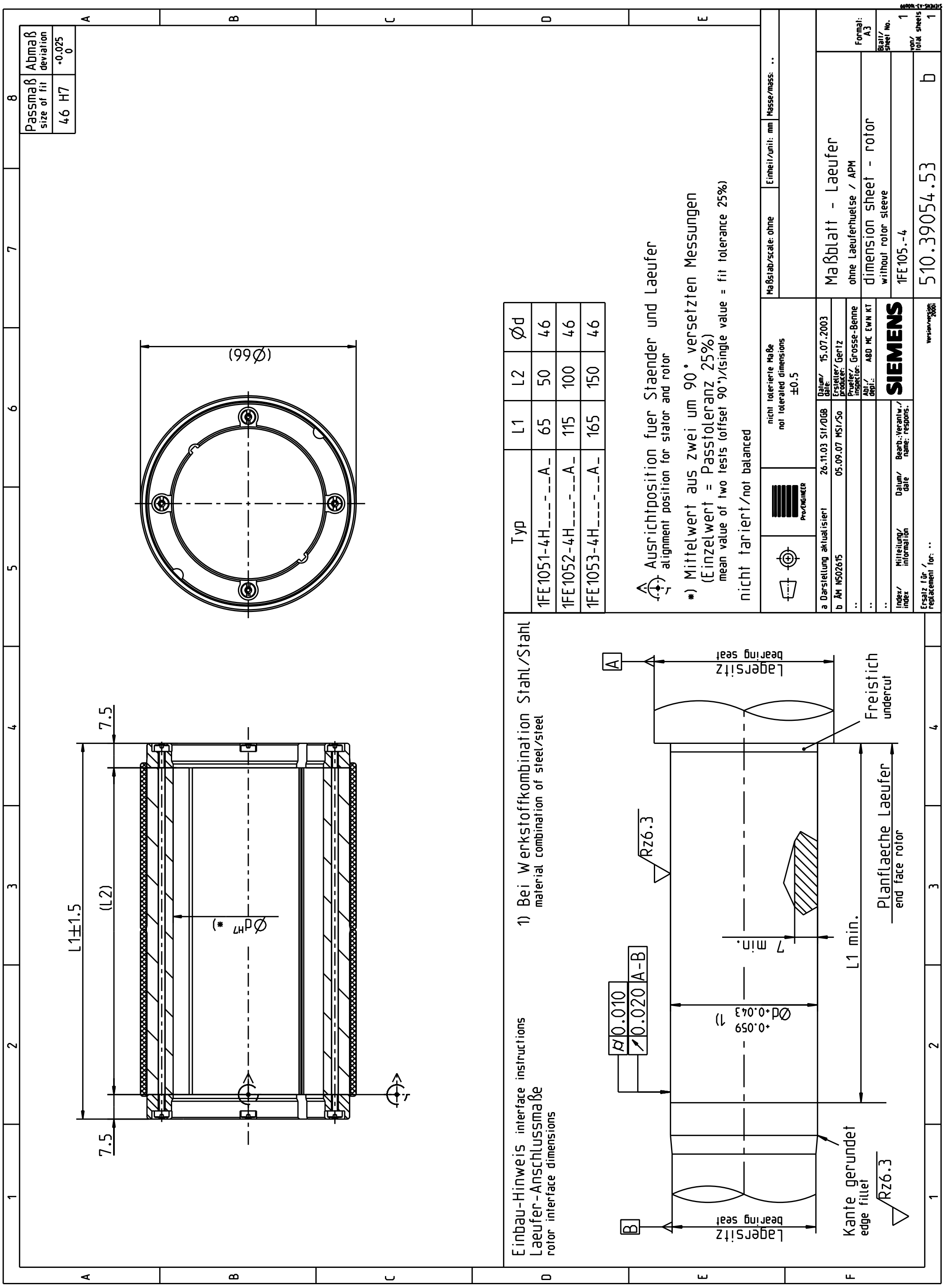


Figure 5-36 1FE105□-4, rotor without sleeve High Speed 2

5.10 1FE107.-4

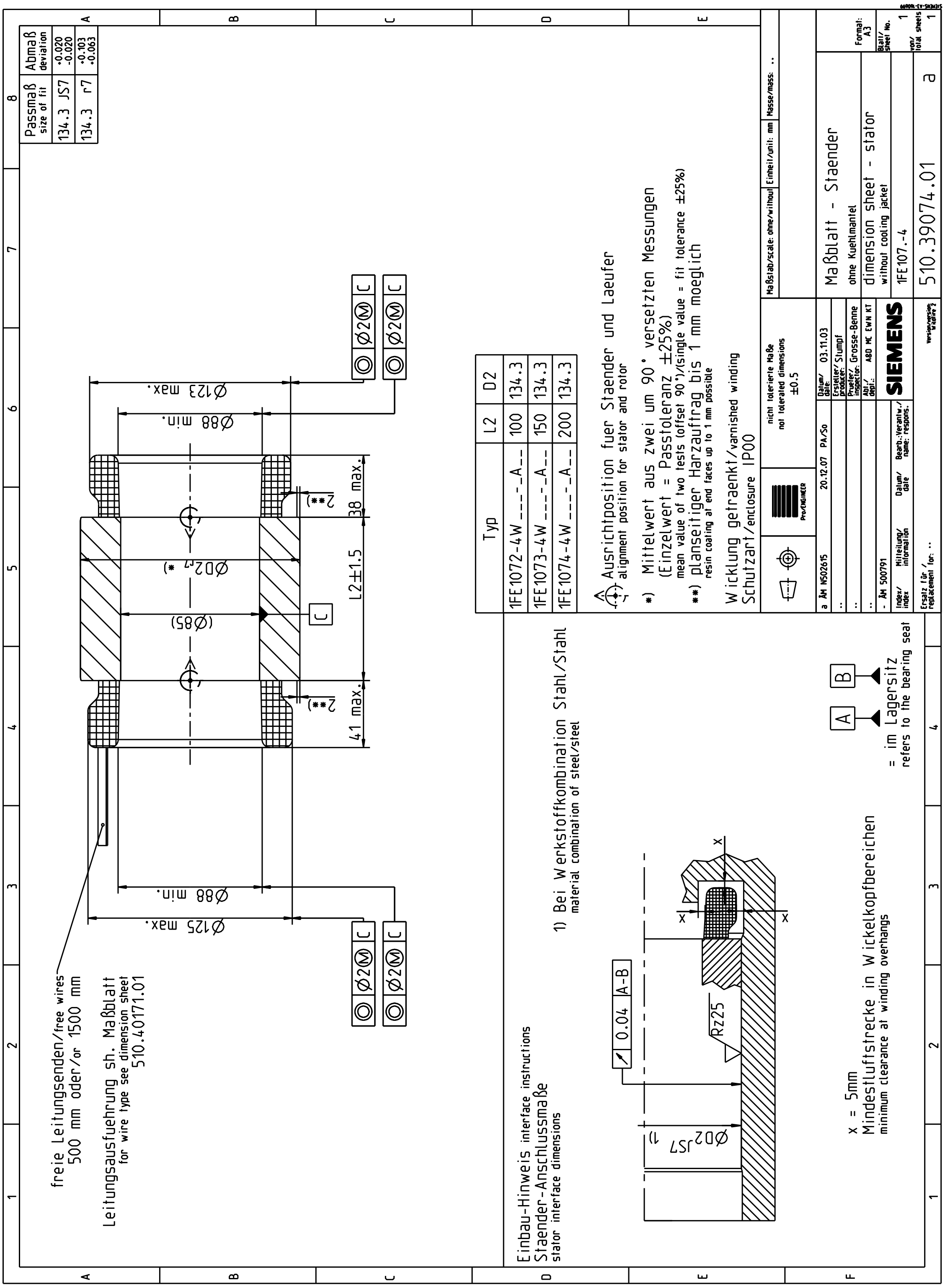


Figure 5-37 1FE107□-4, stator without cooling jacket

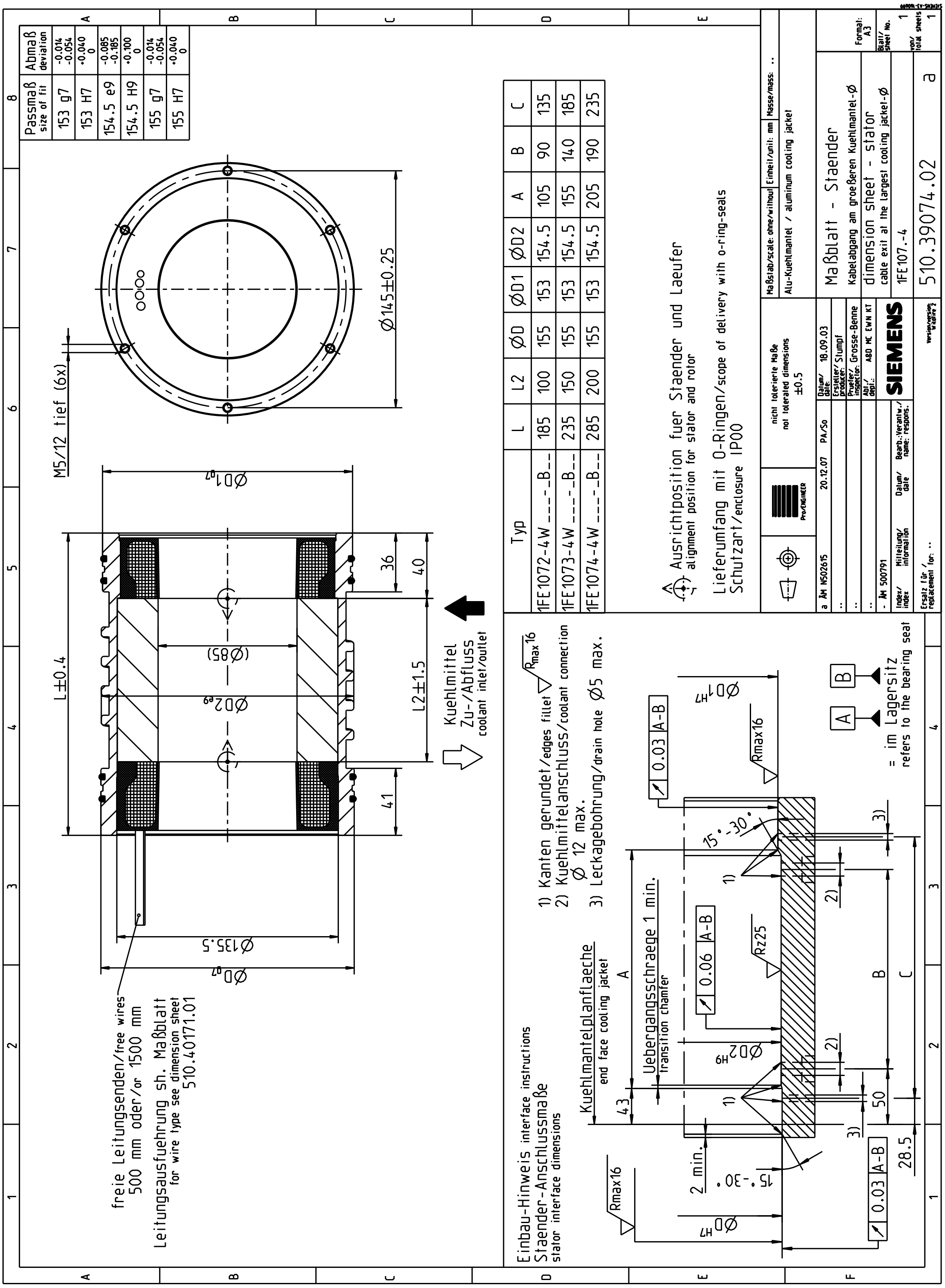


Figure 5-38 1FE107□-4, stator with cooling jacket, cable outlet at the larger cooling jacket diameter

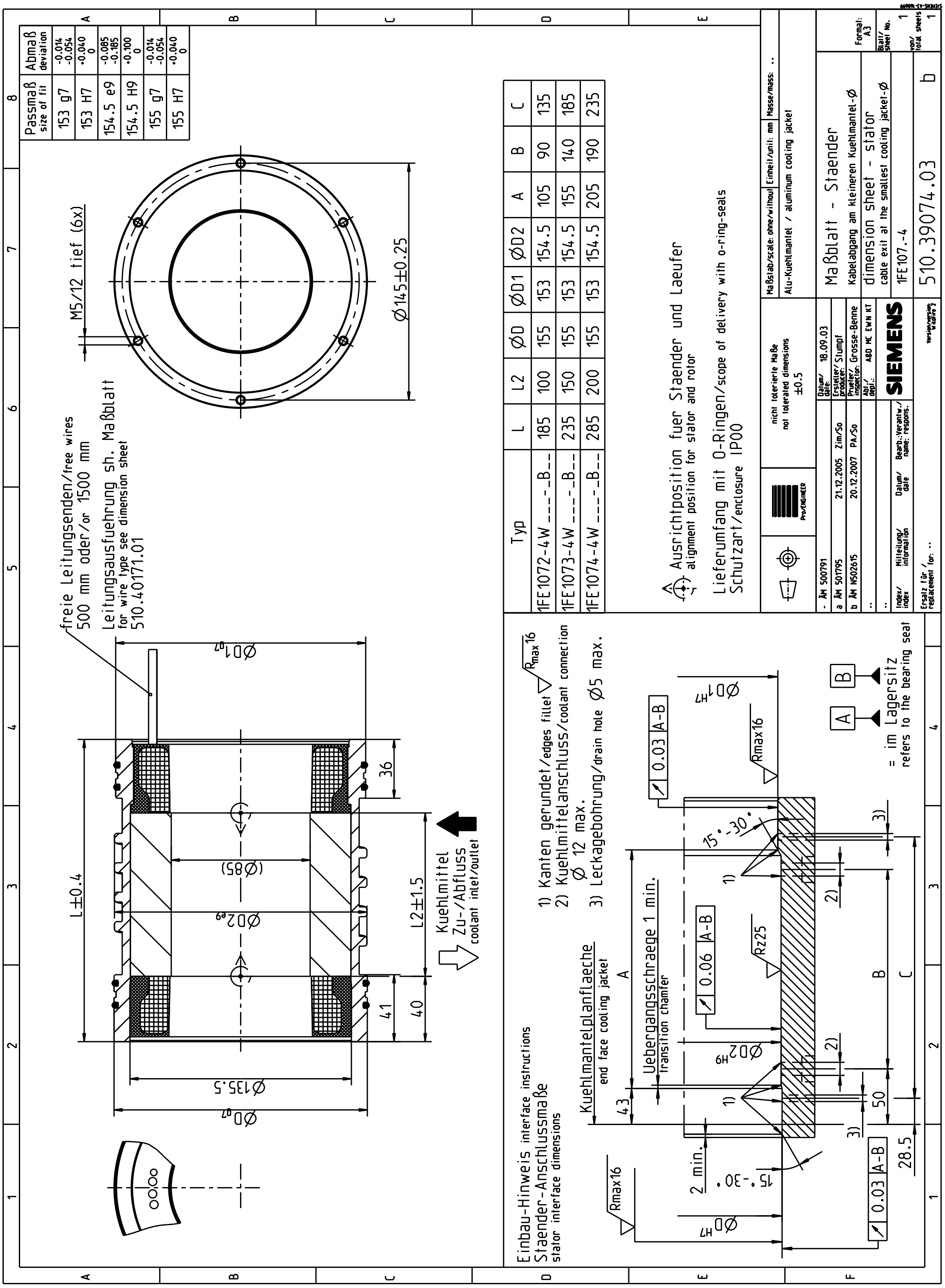


Figure 5-39 1FE107□-4, stator with cooling jacket, cable outlet at the smaller cooling jacket diameter

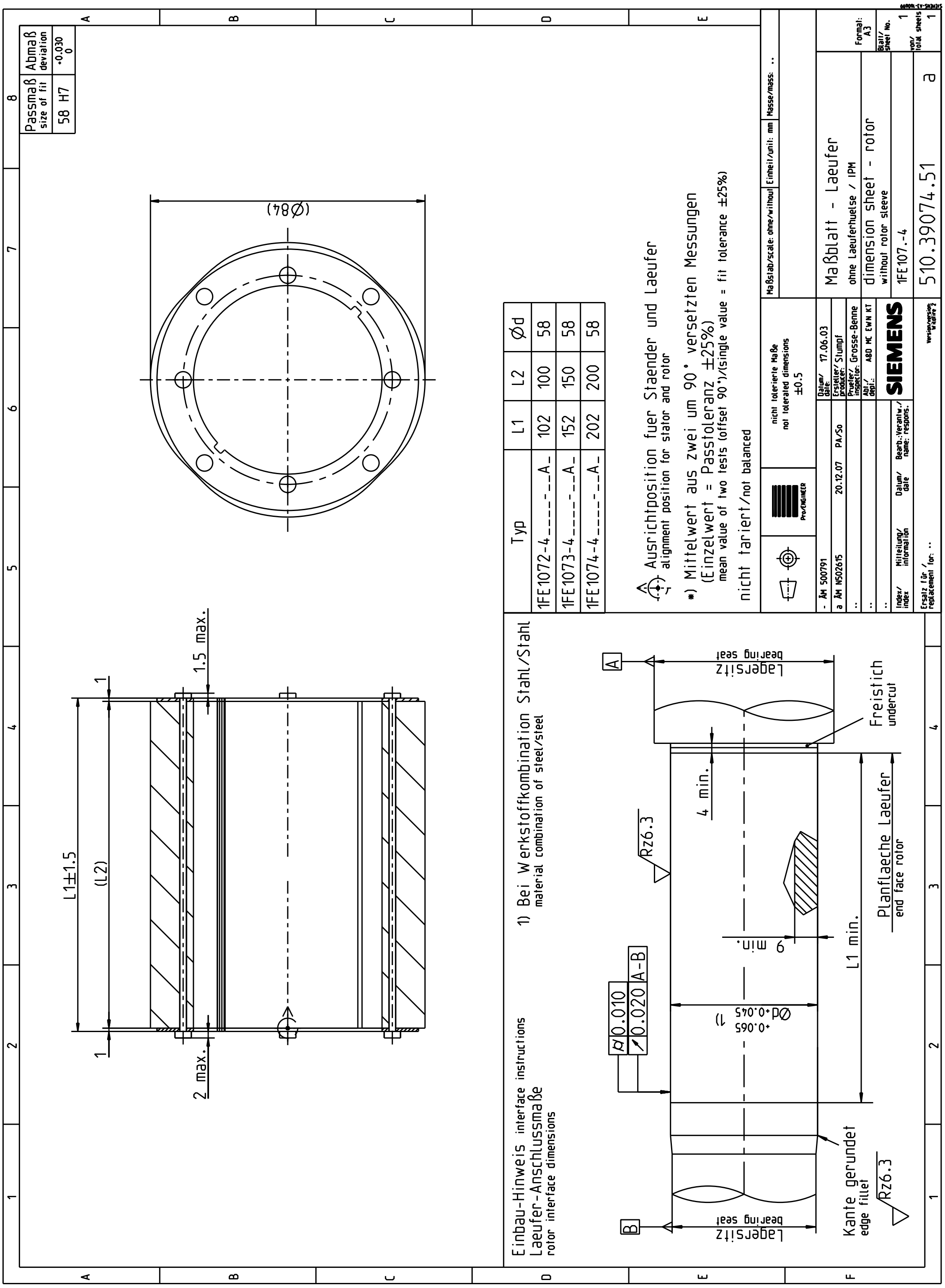


Figure 5-40 1FE107□-4, rotor without sleeve

5.11 1FE108.-4

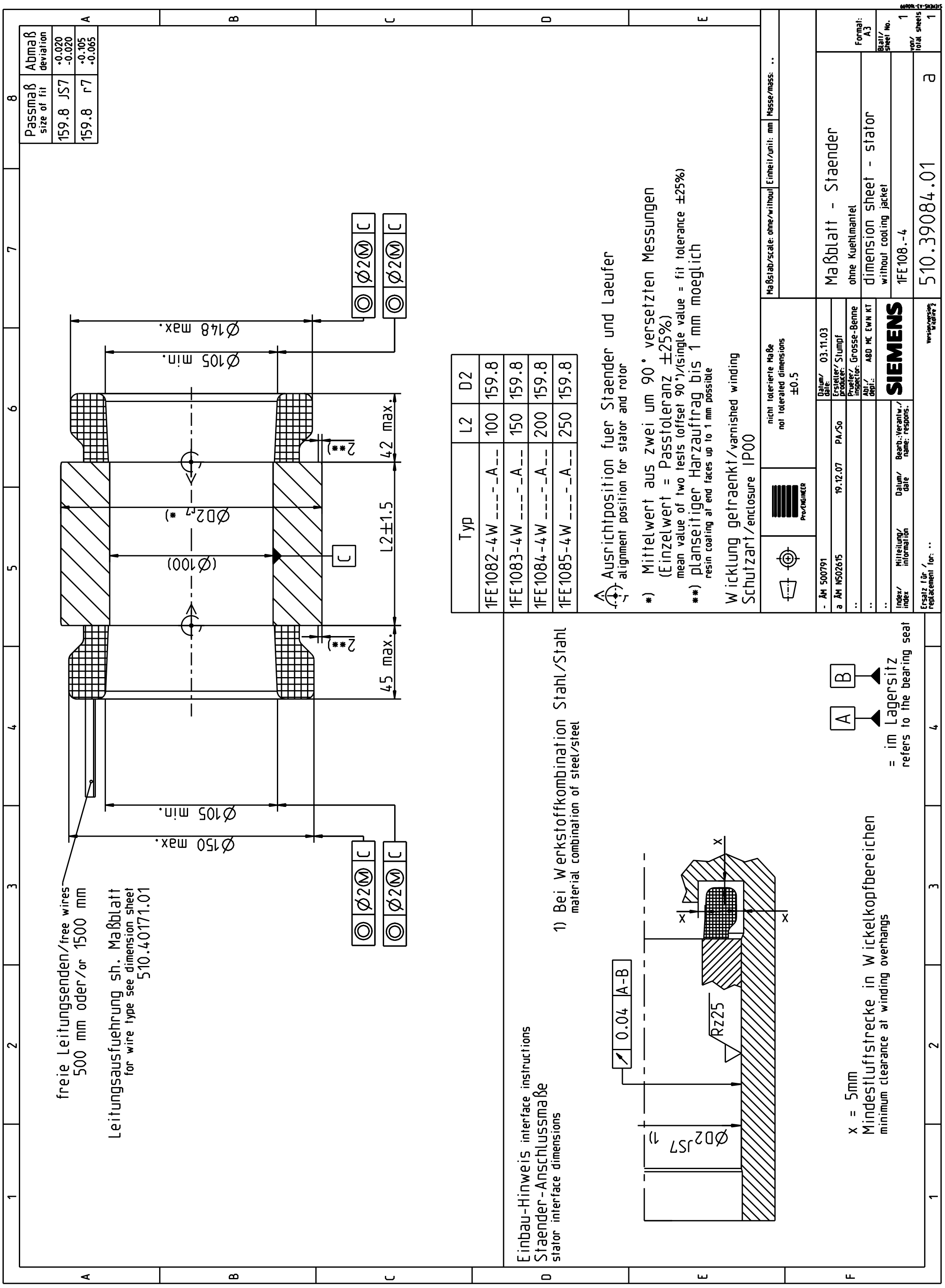


Figure 5-41 1FE108□-4, stator without cooling jacket

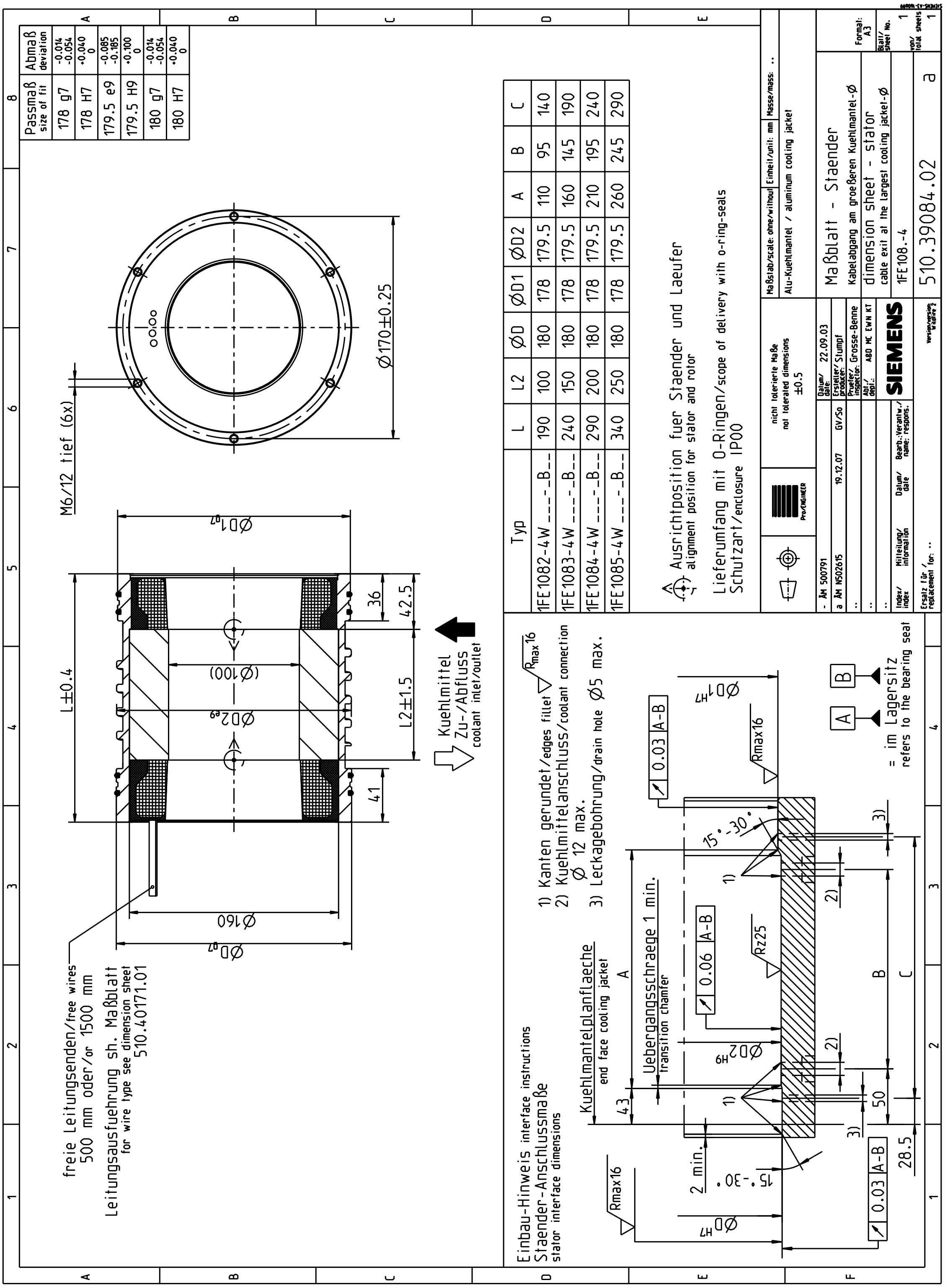


Figure 5-42 1FE108□-4, stator with cooling jacket, cable outlet at the larger cooling jacket diameter

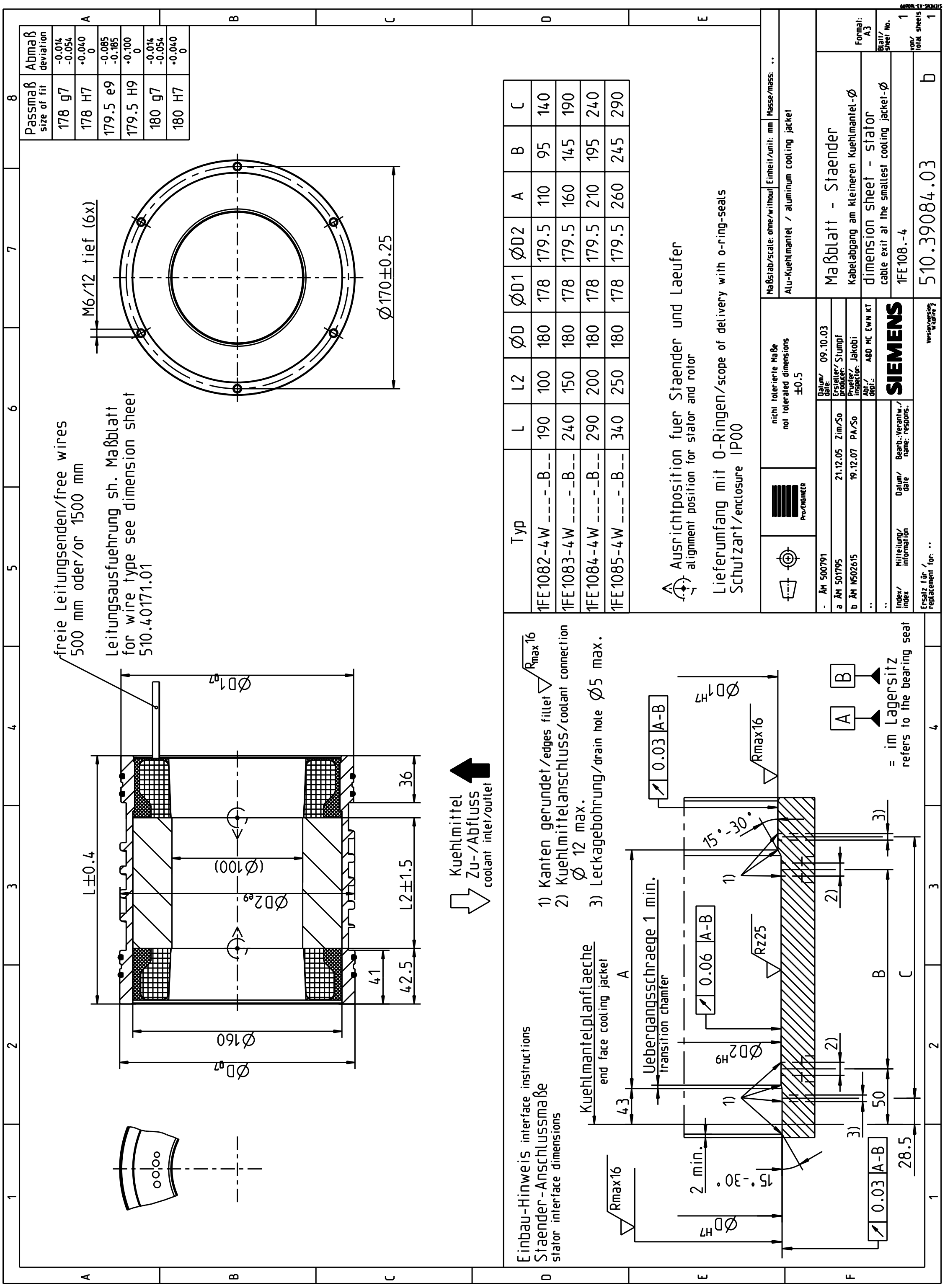


Figure 5-43 1FE108□-4, stator with cooling jacket, cable outlet at the smaller cooling jacket diameter

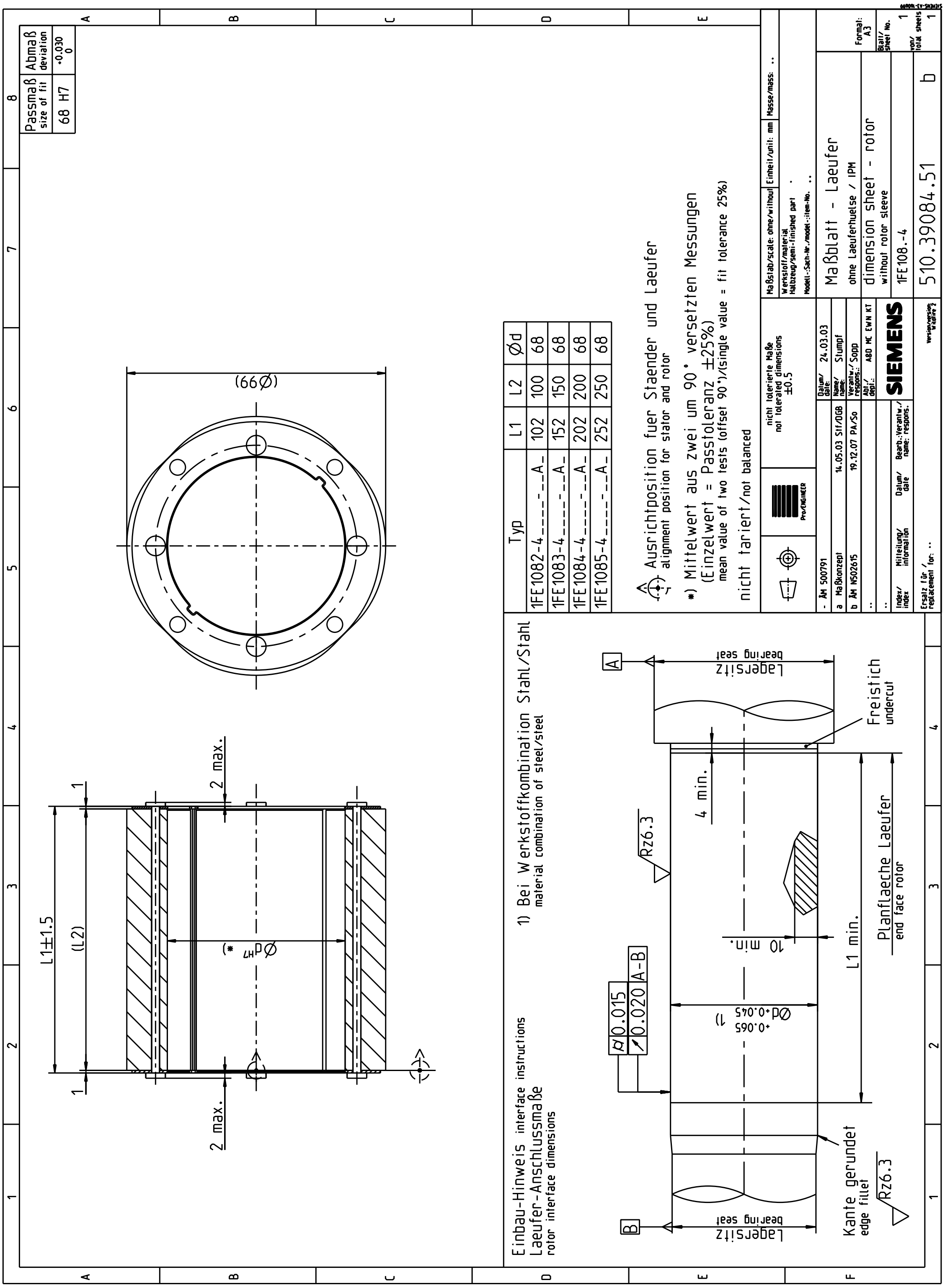


Figure 5-44 1FE108□-4, rotor without sleeve

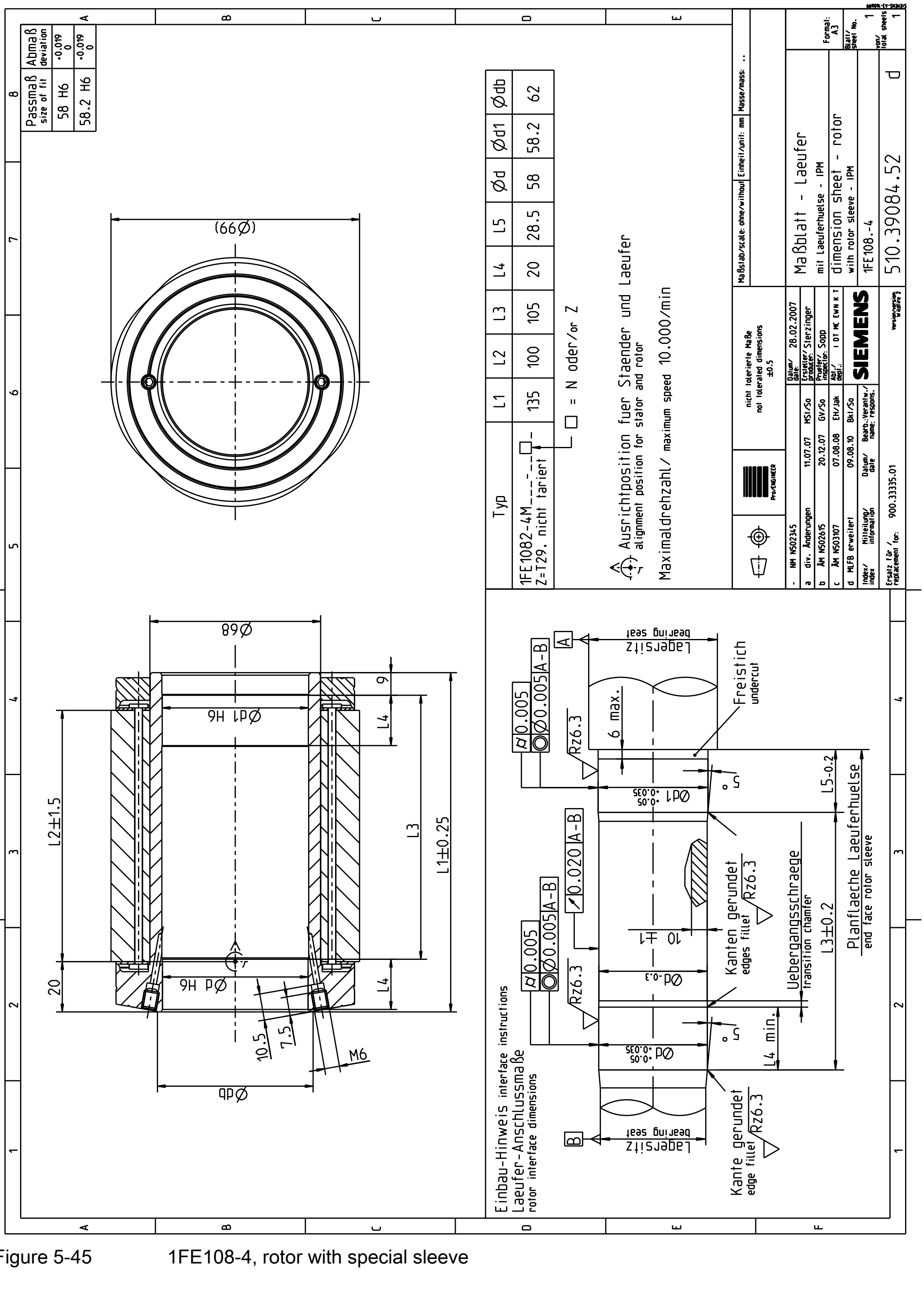


Figure 5-45 1FE108-4, rotor with special sleeve

5.12 1FE109.-4

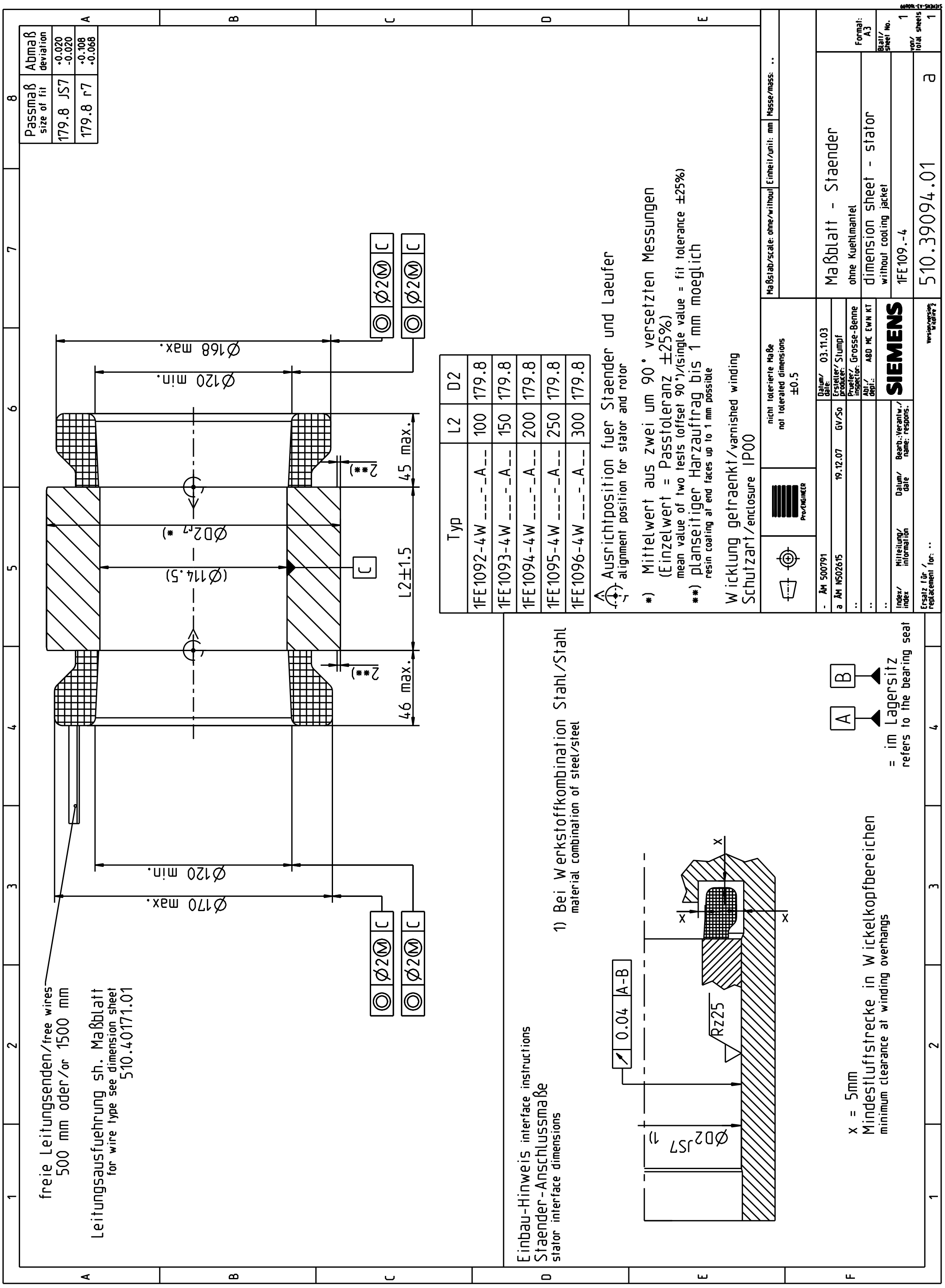


Figure 5-46 1FE109□-4, stator without cooling jacket

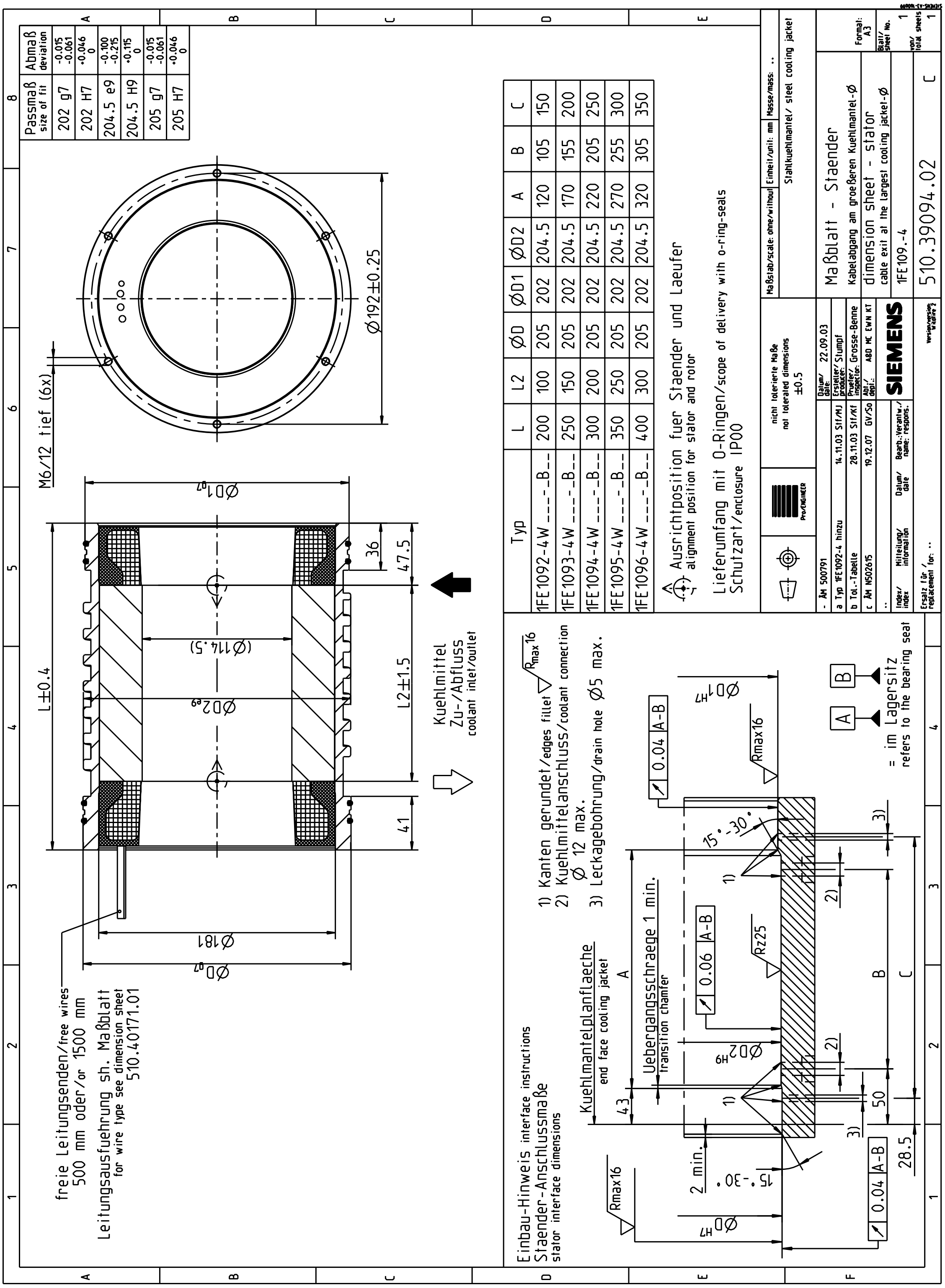


Figure 5-47   1FE109□-4, stator with cooling jacket, cable outlet at the larger cooling jacket diameter

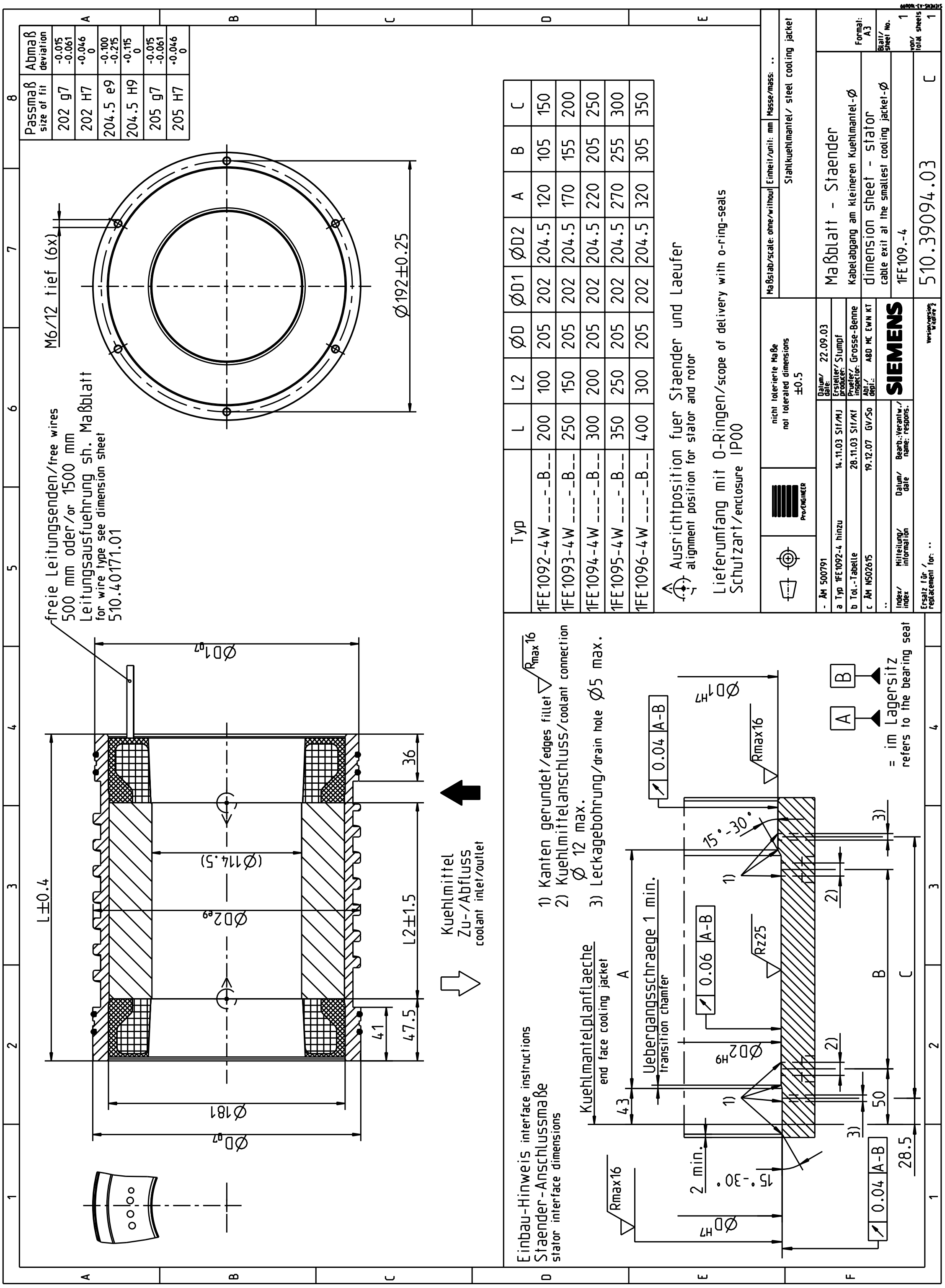
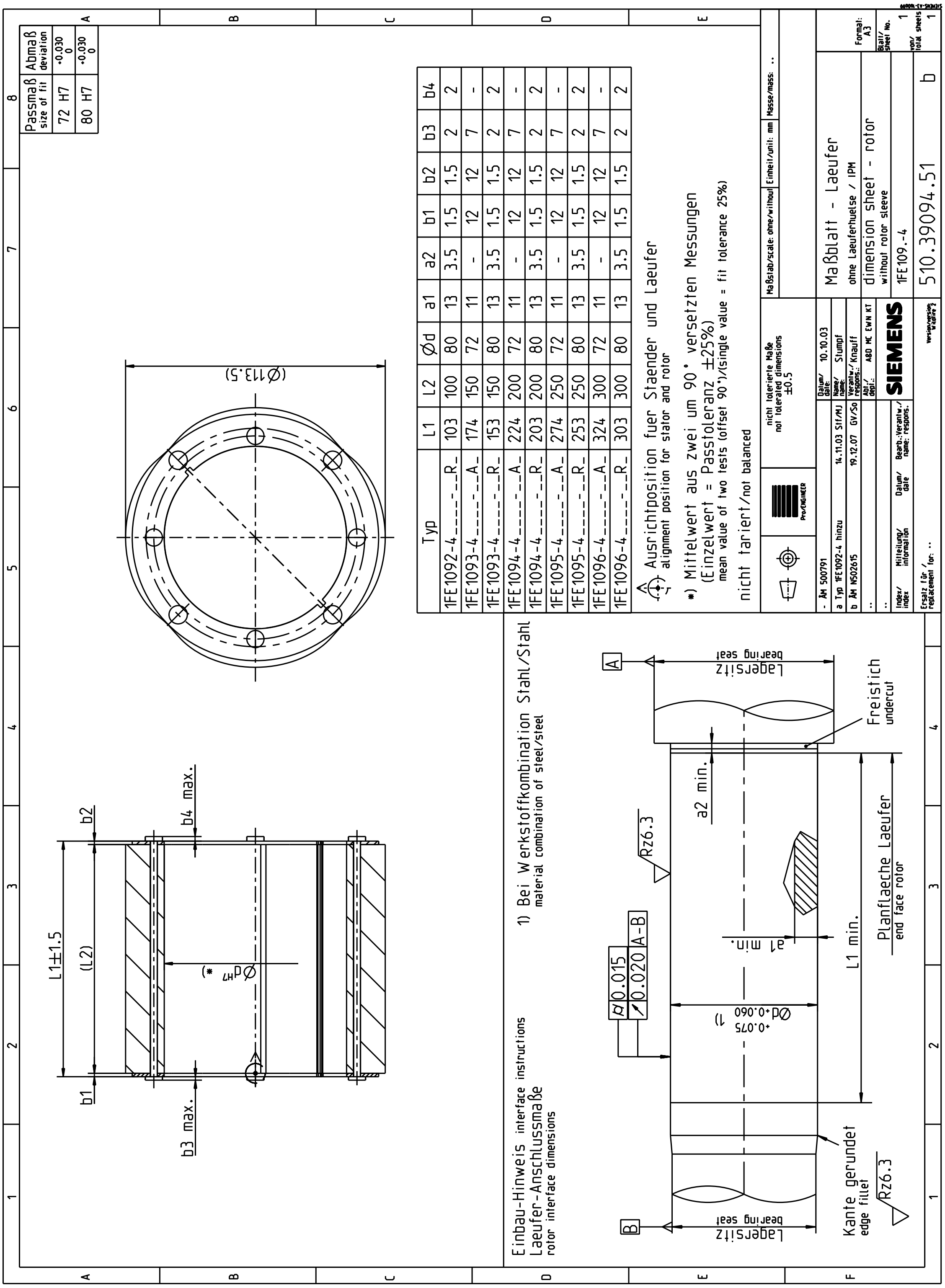


Figure 5-48 1FE109□-4, stator with cooling jacket, cable outlet at the smaller cooling jacket diameter



Typ	L1	L2	Ød	a1	a2	b1	b2	b3	b4
1FE1092-4____-__R_	103	100	80	13	3.5	1.5	1.5	2	2
1FE1093-4____-__A_	174	150	72	11	-	12	12	7	-
1FE1093-4____-__R_	153	150	80	13	3.5	1.5	1.5	2	2
1FE1094-4____-__A_	224	200	72	11	-	12	12	7	-
1FE1094-4____-__R_	203	200	80	13	3.5	1.5	1.5	2	2
1FE1095-4____-__A_	274	250	72	11	-	12	12	7	-
1FE1095-4____-__R_	253	250	80	13	3.5	1.5	1.5	2	2
1FE1096-4____-__A_	324	300	72	11	-	12	12	7	-
1FE1096-4____-__R_	303	300	80	13	3.5	1.5	1.5	2	2

Figure 5-49 1FE109□-4, rotor without sleeve

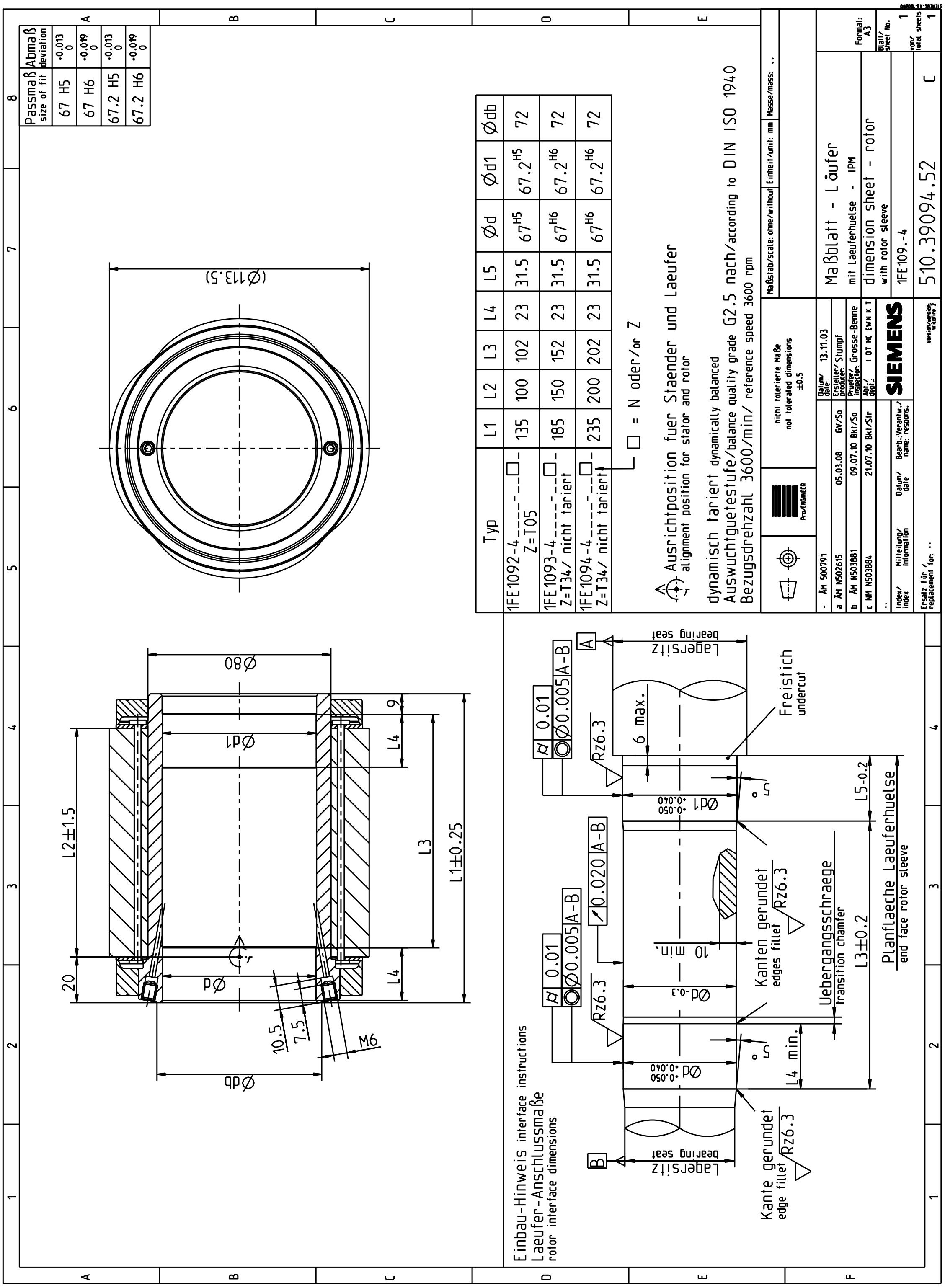


Figure 5-50 1FE109□-4, rotor with sleeve

5.13 1FE110.-4

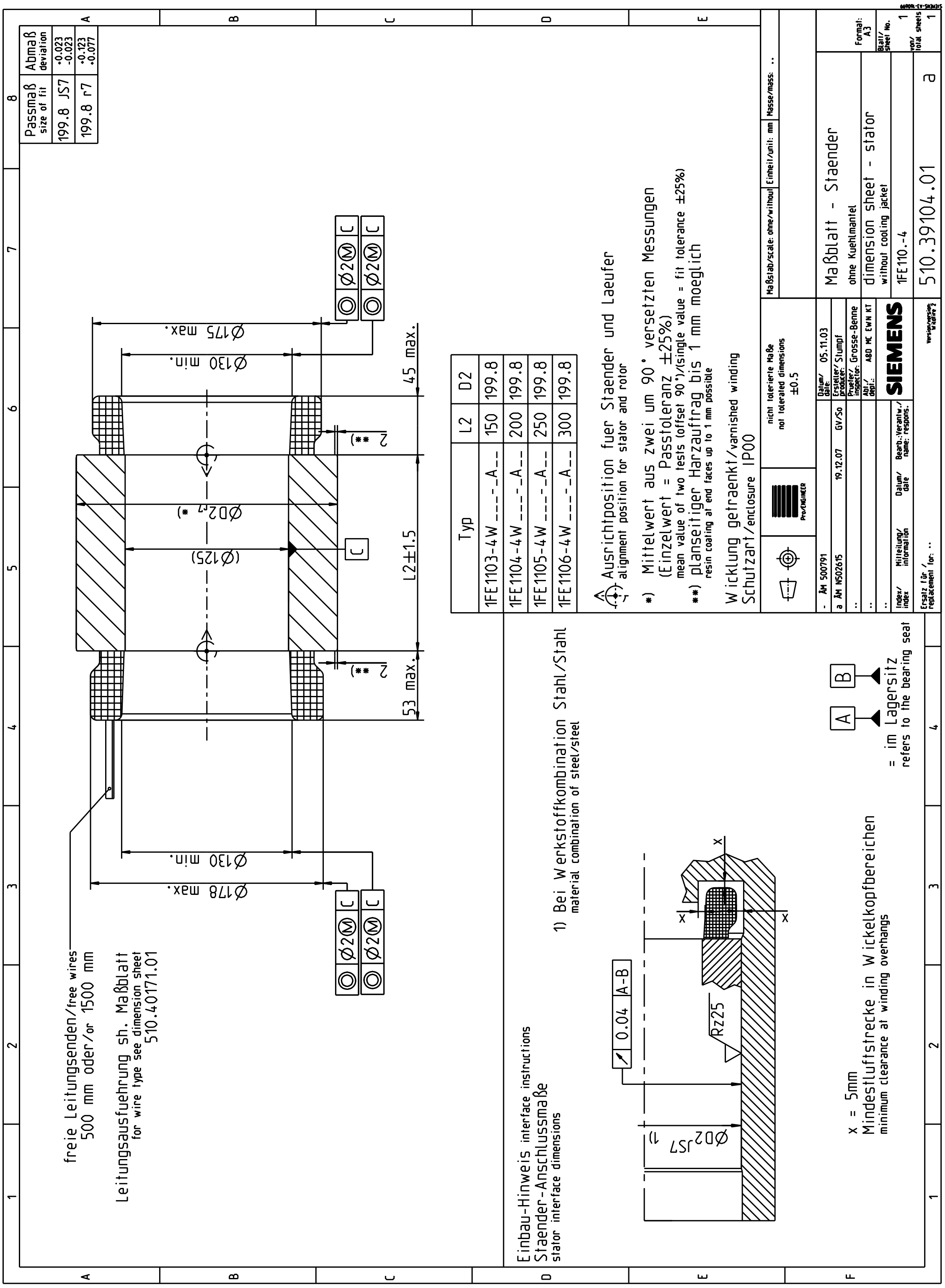


Figure 5-51 1FE110□-4, stator without cooling jacket

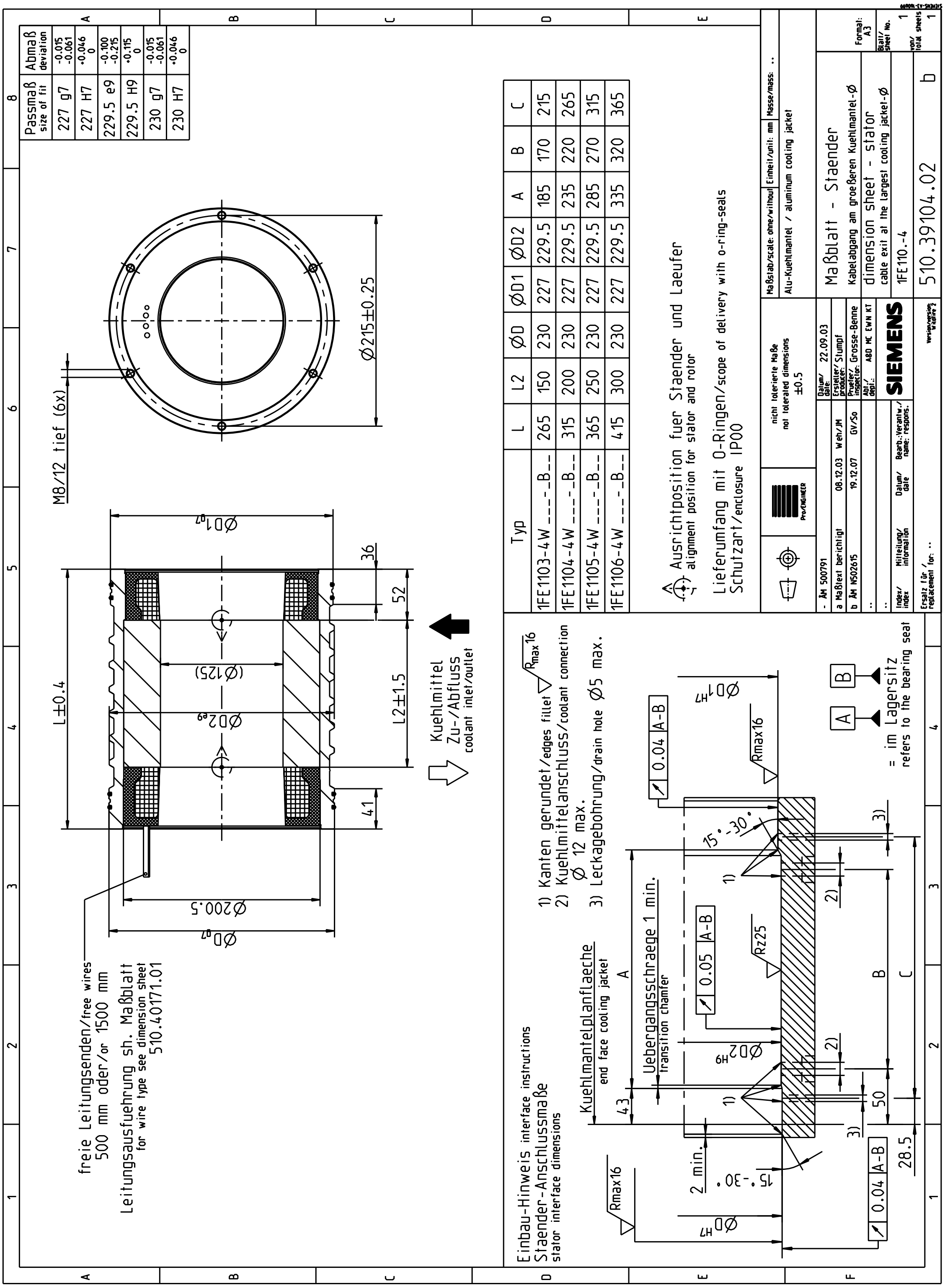


Figure 5-52 1FE110□-4, stator with cooling jacket, cable outlet at the larger cooling jacket diameter

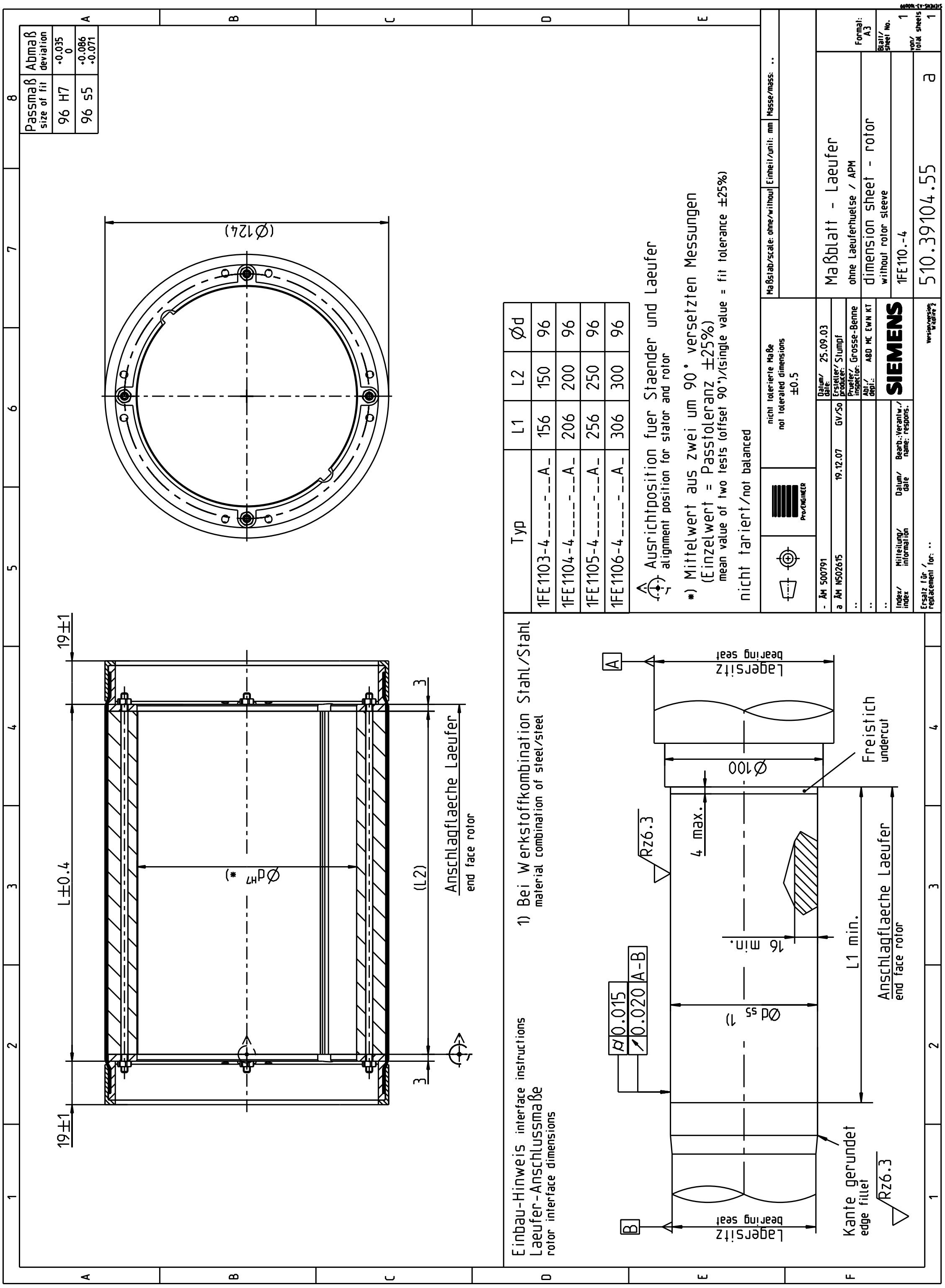


Figure 5-53 1FE110□-4, rotor without sleeve

5.14 1FE112.-4

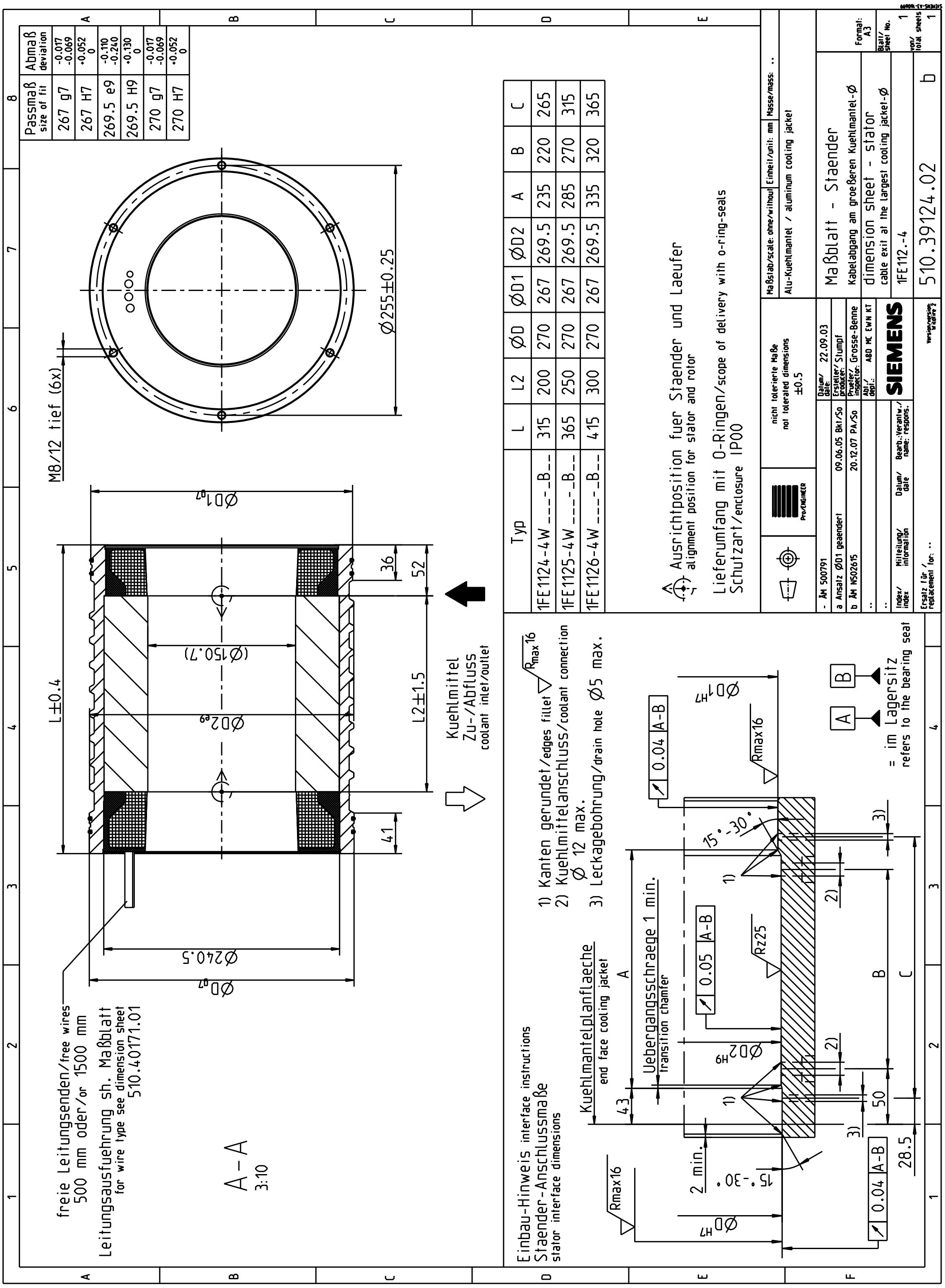


Figure 5-54 1FE112□-4, stator with cooling jacket, cable outlet at the larger cooling jacket diameter

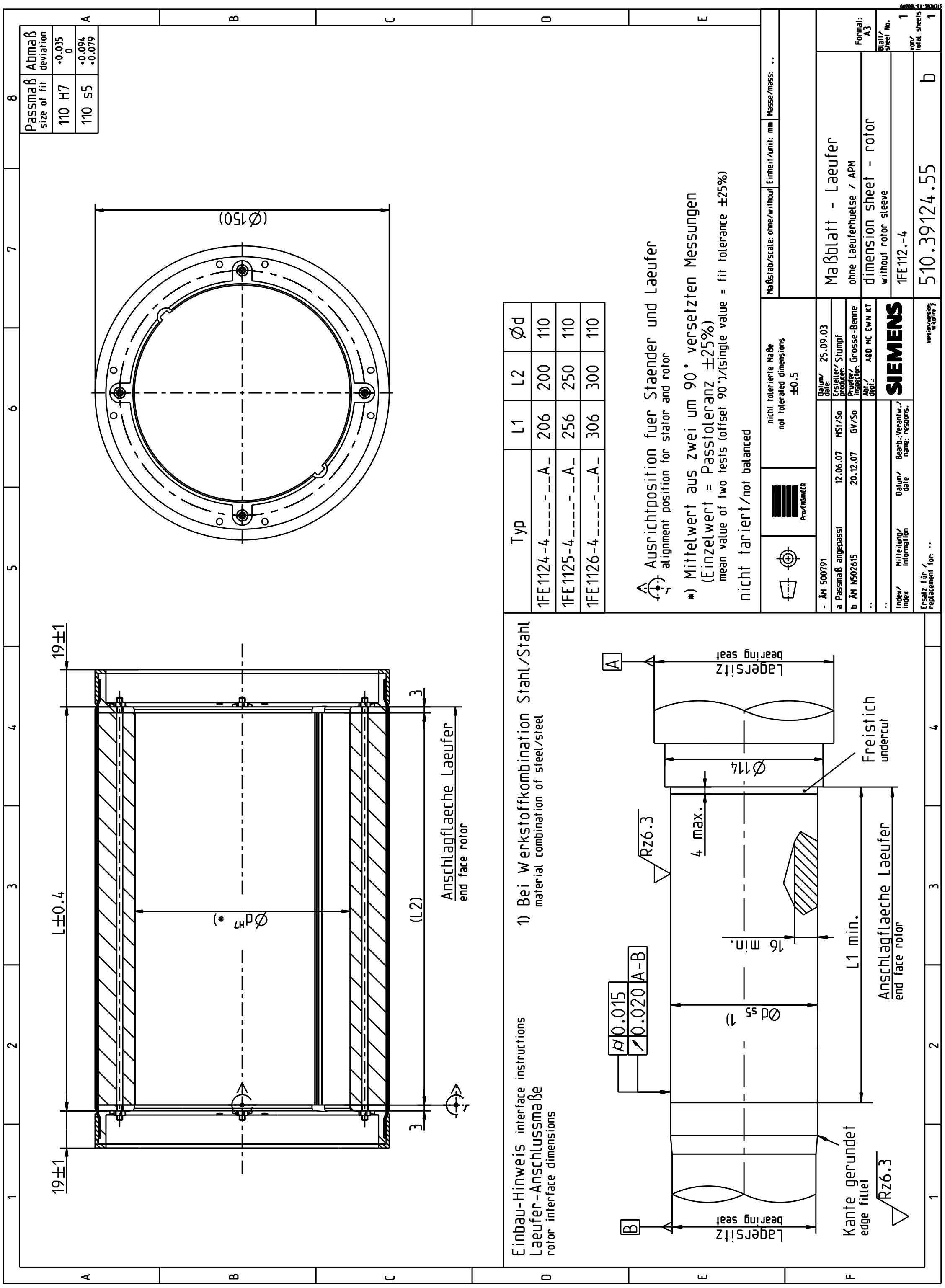


Figure 5-55 1FE112□-4, rotor without sleeve

5.15 Dimensioning drawings VPM

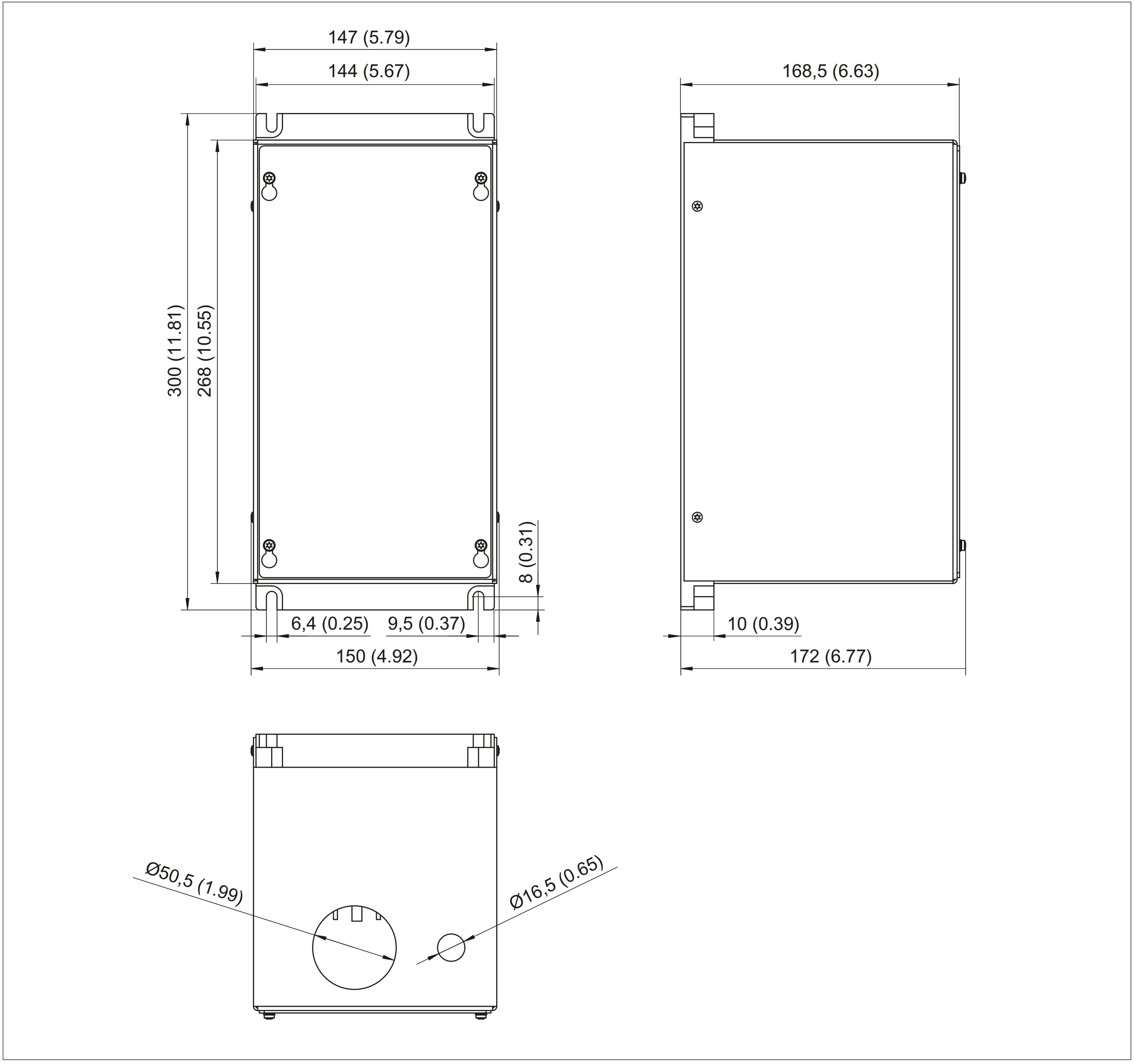


Figure 5-56 Dimension drawing for VPM 120, all dimensions in mm and (inches)

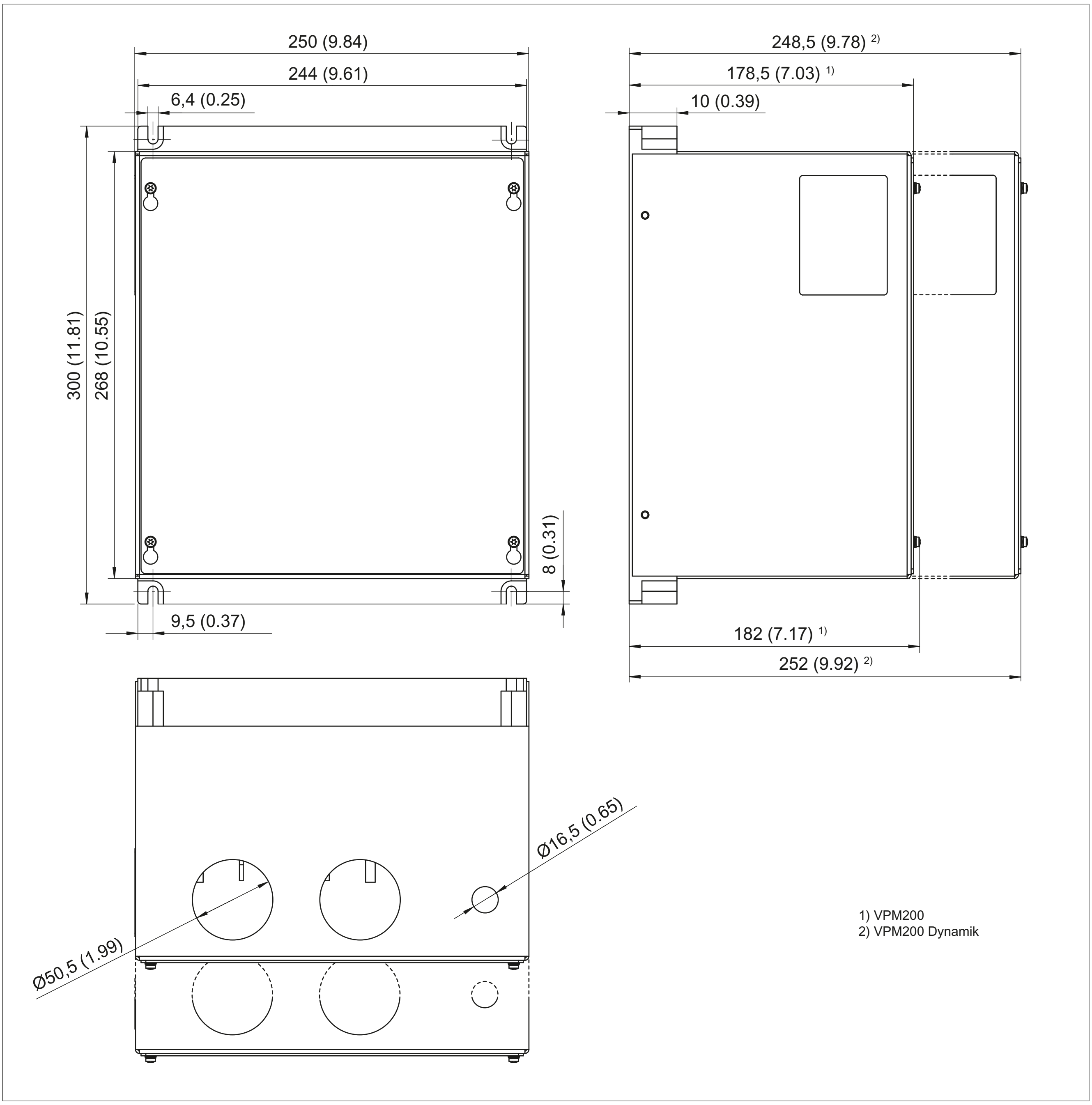


Figure 5-57 Dimension drawing for VPM 200 and VPM 200 DYNAMIC, all dimensions in mm and (inches)

Appendix A

A

A.1 Description of terms

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.

DE

Drive end = Drive end of the motor

Electrical time constant T_{el}

Quotient obtained from the rotating field inductance and winding resistance. $T_{el} = L_D/R_{Str}$

Maximum converter current $I_{max\ conv}$

RMS converter output current (per phase) that can be supplied temporarily by the recommended motor module.

Max. current $I_{max,\ RMS}$

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 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).

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. If the current is increased, then the rotor will be de-magnetized.

Maximum torque (limited by converter) $M_{max\ conv}$

The maximum torque that can be applied (temporarily) for operation on the recommended motor module.

Moment of inertia J_{mot}

Moment of inertia of rotating motor parts.

NDE

Non-drive end = Non-drive end of the motor

Number of poles 2p

Number of magnetic north and south poles on the rotor. p is the number of pole pairs.

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 selected such that $I_{N\ conv}$ is greater than the stall current $I_{0\ (100K)}$.

Rated current I_N

RMS motor phase current for generating the particular rated torque. Specification of the RMS value of a sinusoidal current.

Rated speed n_N

The characteristic speed range for the motor is defined in the speed-torque diagram by the rated speed.

Rated torque M_N

Thermally permissible continuous torque in S1 duty at the rated motor speed.

Stall current I_0

Motor phase current for generating the particular static torque. Specification of the RMS value of a sinusoidal current.

Static torque M_0

Thermal limit torque at motor standstill corresponding to a utilization according to 100 K or 60 K. This can be output for an unlimited time when n = 0. M_0 is always greater than the rated torque M_N.

Torque constant k_T (value for a 100 K average winding temperature rise)

It is the measured value at 1.5 x the rated current and 90° pole position angle in the cold state.

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.

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.

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 References

Overview of publications of planning manuals

An updated overview of publications is available in a number of languages on the Internet at:
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A.3 Suggestions/corrections

Should you come across any printing errors when reading this publication, please notify us on this sheet. We would also be grateful for any suggestions and recommendations for improvement.

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Suggestions and/or corrections

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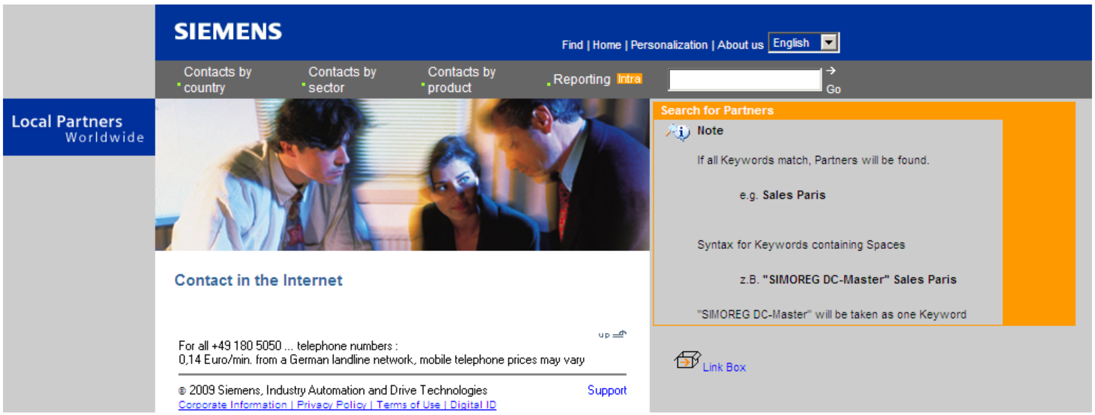

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