Configuration Manual, 05/2007 Edition

Induction Motors 1PH7
SINAMICS S

for production machines

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SINAMICS S

Induction Motors 1PH7 (PM)

Configuration Manual

(APH7P), 05/2007

6SN1197-0AC71-0BP0

Safety Guidelines

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 device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:

⚠WARNING
This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

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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Automation and Drives
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GERMANY

Ordernumber: 6SN1197-0AC71-0BP0
℗05/2007

Foreword

Information on the documentation

You will find an overview of the documentation, which is updated on a monthly basis, in the available languages on the Internet under:

http://www.siemens.com/motioncontrol

Select the menu items "Support" → "Technical Documentation" → "Overview of Publications".

The Internet version of DOConCD (DOConWEB) is available at:

http://www.automation.siemens.com/doconweb

Information on the range of training courses and FAQs (frequently asked questions) are available on the Internet under:

http://www.siemens.com/motioncontrol under menu option "Support"

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.

Technical Support

If you have any technical questions, please contact our hotline:

	Europe / Africa	Asia / Australia	America
Phone	+49 (0) 180 5050 – 222	+86 1064 719 990	+1 423 262 2522
Fax	+49 (0) 180 5050 – 223	+86 1064 747 474	+1 423 262 2289
Internet	http://www.siemens.com/automation/support-request		
E-mail	mailto:adsupport@siemens.com		

Note

For technical support telephone numbers for different countries, go to:
http://www.siemens.com/automation/service&support

Questions about the documentation

If you have any questions (suggestions, corrections) regarding this documentation, please fax or e-mail us at:

Fax	+49 9131 98 63315
E-mail	E-mail to: docu.motioncontrol@siemens.com

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

Internet address for SINAMICS

http://www.siemens.com/sinamics

EC Declaration of Conformity

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

- in the Internet:

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

  under the Product/Order No. 15257461
- at the relevant regional office of the A&D MC Group of Siemens AG.

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

- in the Internet:

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

  under the Product/Order No. 22383669

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
- Not mixed with solvents, cold cleaning agents of remains of paint
- Components that are to be recycled should be separated according to:
  – Electronics waste (e.g. sensor electronics, sensor modules)
  – Iron to be recycled
  – Aluminum
  – Non-ferrous metal (gearwheels, motor windings)

Danger and warning information

⚠ DANGER

Start-up/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 specifications of Directive 98/37/EC.

Only appropriately qualified personnel may commission/start-up the SINAMICS units and the motors.

This personnel must carefully observe the technical customer documentation associated with this product and be knowledgeable about and carefully observe the danger and warning information.

Operational electrical equipment and motors have parts and components which are at hazardous voltage levels.

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

All of the work carried-out on the electrical machine or system must be carried-out with it in a no-voltage condition.

SINAMICS units are generally designed for operation on low-resistance, grounded power supply networks (TN systems). For additional information please refer to the appropriate documentation for the drive converter systems.

⚠ 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 notices in the technical customer documentation supplied, the applicable national, 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-up according to the operating instructions provided. They must not be connected directly to the three-phase supply because this will damage them.

SINAMICS drive units with motors are subject, as part of the routine test, to a voltage test in accordance with EN 50178. While the electrical equipment of industrial machines is being subject to a voltage test in accordance with EN60204-1, Section 19.4, all SINAMICS drive unit connections must be disconnected/withdrawn in order to avoid damaging the SINAMICS drive units.

CAUTION

The DRIVE-CLiQ interface contains motor and encoder-specific data as well as an electronic rating plate. This is the reason that this Sensor Module may only be operated on the original motor - and may not be mounted onto other motors or replaced by a sensor module from other motors.

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

Note

Under field conditions and in dry service areas, SINAMICS units with motors conform to Low-Voltage Directive 73/23/EEC.

In configurations specified in the associated EC Declaration of Conformity, SINAMICS units with motors conform to the EMC Directive 89/336/EEC.

ESDS instructions

⚠ 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).

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.

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 that can pose a risk to people with a pacemaker and/or implants if they are too close.
5. Emission of pollutants if components or packaging are not disposed of properly.

An assessment of the residual risks of PDS components (see points 1 to 5 above) established that these risks do not exceed the specified limit values (risk priority number to EN 60812 RPZ ≤ 125).

For more information about residual risks of the power drive system components, see the relevant chapters in the technical user documentation.

Table of contents

Motor description 1

1.1 Properties

Overview

The 1PH7 three-phase motors are compact, force-ventilated squirrel-cage induction motors with degree of protection IP55. The motors are ventilated, as standard, using a mounted separately-driven fan unit.

The motor can be ordered either with the air flow from the motor drive shaft end (DE) to the motor non-drive shaft end (NDE) - or vice versa.

They have been designed specifically for use in conjunction with converters. Depending on the control requirements, the appropriate encoder systems are available for the motors. These encoders are used to sense the motor speed and indirect position.

		
Shaft heights 100 to 160	Shaft heights 180 and 225	Shaft height 280

Benefits

- High power density with small motor envelope dimensions
- High degree of protection
- Wide speed control ranges
- Speed down to zero without reducing the torque
- Robustness
- Essentially maintenance-free
- High cantilever force loading
- High rotational accuracy, even at the lowest speeds
- Integrated encoder system to sense the motor speed, connected using a connector or DRIVE-CLiQ
- Terminal box to connect-up the power cable
- Motor temperature monitoring with KTY 84
- Variable versions of cooling system
- Basic external cooling using a pipe connection
- Optional bearing designs with re-lubrication device and insulated bearings (NDE)

Applications

Mounted in dry inside areas (no aggressive atmosphere).

Crane systems:

- Hoisting and closing gears for cranes
- Hoisting and traversing gears for high-bay racking vehicles

Printing industry:

- Single- and main drives for printing machines

Rubber, plastic, wire, and glass manufacturing:

- Drives for extruders, calenders, rubber injection machines, foil machines, fleece plants
- Wire-drawing machines, wire-stranding machines, etc.

General applications such as coilers and winder drives.

1.2 Technical features

Table 1-1 Technical features

Motor type	Induction motor		
Type of construction (acc. to EN 60034–7; IEC 60034–7)	IM B3 (refer to Table "Options", Chapter "Order designations" and Chapter "Permissible combinations mech. version")		
Degree of protection (acc. to EN 60034–5; IEC 60034–5)	IP55 (fan IP54)		
Cooling (acc. to EN 60034–6; IEC 60034–6)	Forced ventilation SH 100 to 225: Fan mounted axially at NDE SH 280: Fan mounted radially at the NDE (refer to Table "Options" and Chapter "Permissible combinations mech. version")		
Fan supply voltage (data, refer to Chapter "Electrical connections")	3-ph. 400 V AC, 50 Hz 3-ph. 400 V AC, 60 Hz 3-ph. 480 V AC, 60 Hz		
Winding insulation (acc. to EN 60034–1; IEC 60034–1)	Temperature class F for a coolant temperature up to +40 °C		
Temperature monitoring (acc. to EN 60034–11; IEC 60034–11)	KTY 84 temperature sensor in the stator winding For SH 280: Additional KTY 84 as reserve		
Motor voltage	3-ph. 400 V AC 3-ph. 480 V AC 3-ph. 690 V AC (only for SH 280)		
Sound pressure level at 50 Hz (acc. to ISO1680–1; EN 21680) Tolerance + 3 dB(A)	Shaft height	Airflow direction	Sound pressure level dB(A)
	100	NDE → DE	70
		DE → NDE	70
	132	NDE → DE	70
		DE → NDE	70
	160	NDE → DE	72
		DE → NDE	75
	180	NDE → DE	73
		DE → NDE	73
	225	NDE → DE	74
		DE → NDE	76
	280	NDE → DE	74
		DE → NDE	74
Connection type	Connector or DRIVE-CLiQ interface for signals (mating connector is not included in the scope of supply) Terminal box for power SH 100 to 225: Terminal box at top SH 280: Terminal box NDE right		

Speed encoder, integrated for motors without DRIVE-CLiQ interface	• without encoder • Absolute value encoder EnDat 2048 S/R • Incremental encoder HTL 1024 S/R or 2048 S/R • Incremental encoder sin/cos 1 Vpp 2048 S/R with C and D track • Incremental encoder sin/cos 1 Vpp 2048 S/R without C and D track • 2-pole resolver	
Speed encoder, integrated for motors with DRIVE-CLiQ interface	• Absolute encoder 22 bit single turn + 12 bit multiturn • Incremental encoder 22 bit with commutation position 11 bit • Incremental encoder 22 bit • Resolver 14 bit	
Balancing (acc. to IEC 60034–14)	Standard: Half-key balancing, Code: H at the shaft face refer to Table "Options"	
Shaft end (acc. to DIN 748–3; IEC 60072–1)	with keyway and key (refer to Table "Options", Chapter "Order designations" and Chapter "Permissible combinations mech. version")	
Bearing version DE (Standard)	SH 100 to 160 for belt coupling and coupling output:	Deep-groove ball bearings
	SH 180 to 280 for coupling output: for belt coupling or increased cantilever forces:	 Deep-groove ball bearings Cylindrical-roller bearings
Rotational accuracy, concentricity, and axial eccentricity (acc. to DIN 42955, (IEC 60072–1)	SH 100 to 160: SH 180 to 280:	Tolerance level R (reduced) Tolerance level N (normal)
Vibration severity level (acc. to EN 60034–14, IEC 60034–14)	SH 100 to 225: SH 280:	Level R (reduced) Level N (normal)
Paint finish	SH 100 to 160:	Without paint finish, Standard paint finish, anthracite RAL 7016
	SH 180 to 280:	Primed, Standard paint finish, anthracite RAL 7016
Documentation supplied with the motors	Operating Instructions (language: German and English)	
Options	refer to Table "Options", Chapter "Order designations" and Chapter "Permissible combinations mech. version" (Z options)	

S/R = Signals/Revolution

Options

Table 1-2 Codes and option description

Order code	Option description	For use with 1PH7 induction motors with shaft height		
		SH 100 SH 160	SH 180 SH 225	SH 280
	Standard paint finish in another color, RAL ...	○ 1)	■ 2)	■ 2)
	Special paint finish in another color, RAL ...	○	■ 3)	■ 3)
C30	Winding version 690 V	–	–	■
G14	Fan unit with air filter	–	■ 4)	■
G80	POG10 pulse encoder, mounting prepared	–	–	■
K08	Encoder connector mounted opposite	–	–	■
K16	Second standard shaft end (only possible without encoder)	–	–	■
K31	2. Rating plate supplied separately in terminal box	Standard	■	■
K40	Re-lubrication devices, DE and NDE	–	■	Standard
K45	230 V anti-condensation heating	–	_	■
K55	Cable entry plate, terminal box, customer-specific (plain text is required)	–	■	■
K83	The terminal box is rotated through +90° (basis is the standard)	–	–	■
K84	The terminal box is rotated through –90° (basis is the standard)	–	–	■
K85	The terminal box is rotated through +180° (basis is the standard)	–	–	■
L27	NDE bearing, insulated version		■	Standard
M03	Version for Zone 2 hazardous areas (according to EN 50021/IEC 60079-15)	■	–	–
M39	Version for Zone 22 hazardous areas (according to EN 50821/IEC 61241)	■	■	■
M83	Additional thread for a setting screw at the motor feet	–	–	■
Y55	Non-standard shaft end DE	○	○	○
Y80	Different rating plate data (plain text is required)	○	○	○
Y82	Additional rating plate with orderer's data	○	○	○

■ = option possible

○ = on request

– = not available

1) Order using a code (without plain text) e.g.
X01: RAL 9005 (matt black)
X02: RAL 9001 (cream)
X03: RAL 6011 (reseda green)
X04: RAL 7032 (pebble grey)
X05: RAL 5015 (sky blue)
X06: RAL 1015 (light ivory)

2) Ordering with code R1Y (it is necessary to specify the RAL color in plain text).

3) Ordering with code R2Y (it is necessary to specify the RAL color in plain text).

4) Only possible for cooling, NDE → DE

1.3 Selection and ordering data

Rated speed n_{rated} rpm	Shaft height SH	Rated power P_{rated} kW/HP	Rated torque M_{rated} Nm/lb_f-ft	Rated current I_{rated} A	Rated voltage V_{rated} V	Speed during field weakening [1] n_2 rpm	Max. permissible continuous speed [2] n_{S1} rpm	Max. speed [3] n_{max} rpm	1PH7 asynchronous motor Order No.
400 V 3 AC line voltage, Servo Control									
400	160	9.5/12.7	227/167.3	30	274	1940	3700 [9]	6500 [9]	1PH7163- ■■B■■-■...
		13/17.4	310/228.5	37	294	1540	3700 [9]	6500 [9]	1PH7167- ■■B■■-■...
1000	100	3.7/5.0	35/25.8	10	343	2250	5500 [9]	9000 [9]	1PH7103- ■■D■■-■...
		6.3/8.5	60/44.2	17.5	319	3560	5500 [9]	9000 [9]	1PH7107- ■■D■■-■...
	132	12/16.1	115/84.8	30	336	2500	4500	8000 [9]	1PH7133- ■■D■■-■...
		17/22.8	162/119.4	43	322	3390	4500	8000 [9]	1PH7137- ■■D■■-■...
	160	22/29.5	210/154.8	55	315	2750	3700	6500 [9]	1PH7163- ■■D■■-■...
		28/37.6	267/196.8	71	312	4090	3700	6500 [9]	1PH7167- ■■D■■-■...
1500	100	3.7/5.0	24/17.7	10	350	5360	5500	9000 [9]	1PH7101- ■■F■■-■...
		5.5/7.4	35/25.8	13	350	3000	5500	9000 [9]	1PH7103- ■■F■■-■...
		7.0/9.4	45/33.2	17.5	346	5110	5500	9000 [9]	1PH7105- ■■F■■-■...
		9.0/12.1	57/42	23.5	336	3500	5500	9000 [9]	1PH7107- ■■F■■-■...
	132	11/14.8	70/51.6	24	350	4310	4500	8000 [9]	1PH7131- ■■F■■-■...
		15/20.1	96/70.8	34	346	4400	4500	8000 [9]	1PH7133- ■■F■■-■...
		18.5/24.8	118/87	42	350	4920	4500	8000 [9]	1PH7135- ■■F■■-■...
		22/29.5	140/103.2	57	308	3750	4500	8000 [9]	1PH7137- ■■F■■-■...
	160	30/40.2	191/140.8	72	319	4000	3700	6500	1PH7163- ■■F■■-■...
		37/49.6	236/173.9	82	350	2750	3700	6500	1PH7167- ■■F■■-■...
2000	100	7/9.4	33/24.3	17.5	343	4630	5500	9000	1PH7103- ■■G■■-■...
		10.5/14.1	50/36.9	26	350	4000	5500	9000	1PH7107- ■■G■■-■...
	132	20/26.8	96/70.8	45	350	4000	4500	8000	1PH7133- ■■G■■-■...
		28/37.6	134/98.8	60	350	3750	4500	8000	1PH7137- ■■G■■-■...
	160	36/48.3	172/126.8	85	333	3000	3700	6500	1PH7163- ■■G■■-■...
		41/55.0	196/144.5	89	350	2750	3700	6500	1PH7167- ■■G■■-■...

Option	Version	Code
Fan:	External fan unit, heavy-gauge threaded cable entry in terminal box	2
	Without external fan unit, for pipe connection, heavy-gauge threaded cable entry in terminal box	6
	External fan unit, metric cable entry in terminal box	7
	Without external fan unit, for pipe connection, metric cable entry in terminal box	8
Encoder systems for motors without DRIVE-CLiQ interface:	Without encoder	A
	Absolute encoder EnDat 2048 pulses/revolution	E
	Incremental encoder HTL 1024 pulses/revolution	H
	Incremental encoder HTL 2048 pulses/revolution	J
	Incremental encoder sin/cos 1 V_{pp} with C and D tracks	M
	Incremental encoder sin/cos 1 V_{pp} without C and D tracks	N
	2-pole resolver	R
Encoder systems for motors with DRIVE-CLiQ interface:	Absolute encoder 22-bit Singleturn + 12-bit Multiturn	F
	Incremental encoder 22-bit with commutation position	D
	Incremental encoder 22-bit	Q
	Resolver 14-bit	P
Terminal box/ cable entry (view onto DE):	Top/from right	0
	Top/from NDE	2
	Top/from left	3
Type:	IM B3 (IM V5, IM V6)	0
	IM B5 (IM V1, IM V3) available only for shaft heights 100 and 132	2
	IM B35 (IM V15, IM V36)	3
Holding brake with emergency stop function [4]:	Without brake	0
	Brake supply voltage 230 V 1 AC, 50/60 Hz: With brake	1
	Brake supply voltage 230 V 1 AC, 50/60 Hz: With brake (includes microswitch)	2
	Brake supply voltage 230 V 1 AC, 50/60 Hz: With brake (includes manual release)	3
	Brake supply voltage 230 V 1 AC, 50/60 Hz: With brake (includes manual release and microswitch)	4
	Brake supply voltage 24 V DC: With brake	5
	Brake supply voltage 24 V DC: With brake (includes microswitch)	6
	Brake supply voltage 24 V DC: With brake (includes manual release)	7
	Brake supply voltage 24 V DC: With brake (includes manual release and microswitch)	8

Selection and ordering data

Power factor cos ?	Magnetizing current I_μ A	Efficiency η_{rated}	Rated frequency f_{rated} Hz	Moment of inertia of J kgm^2/ lb_f-in-s^2	Weight, approx. kg/lb	1PH7 asynchronous motor Order No.	SINAMICS S120 Motor Module Rated output current I_{rated} A	Order No.
400 V 3 AC line voltage, Servo Control								
0.88	11.5	0.809	14.3	0.185/1.637	175/385.9	1PH7163- . . B . . - . ■ ■ ■	30	6SL3120- 1 TE23-0AA 1
0.88	14.0	0.814	14.3	0.228/2.018	210/463	1PH7167- . . B . . - . ■ ■ ■	45	6SL3120- 1 TE24-5AA 1
0.82	4.8	0.794	35.6	0.017/0.15	40/88.2	1PH7103- . . D . . - . ■ ■ ■	9 [8]	6SL3120- ■TE21-0AA ■
0.81	9	0.822	35.3	0.029/0.257	65/143.33	1PH7107- . . D . . - . ■ ■ ■	18	6SL3120- ■TE21-8AA ■
0.86	13	0.865	34.8	0.076/0.673	90/198.5	1PH7133- . . D . . - . ■ ■ ■	30	6SL3120- 1 TE23-0AA 1
0.86	19	0.878	34.6	0.109/0.965	150/330.8	1PH7137- . . D . . - . ■ ■ ■	45	6SL3120- 1 TE24-5AA 1
0.85	24	0.899	34.2	0.185/1.637	175/385.9	1PH7163- . . D . . - . ■ ■ ■	60	6SL3120- 1 TE26-0AA 1
0.84	33	0.903	34.2	0.228/2.018	210/463	1PH7167- . . D . . - . ■ ■ ■	85	6SL3120- 1 TE28-5AA 1
0.74	5.9	0.847	51.6	0.017/0.15	40/88.2	1PH7101- . . F . . - . ■ ■ ■	9 [8]	6SL3120- ■TE21-0AA ■
0.84	5.4	0.832	52.7	0.017/0.15	40/88.2	1PH7103- . . F . . - . ■ ■ ■	18	6SL3120- ■TE21-8AA ■
0.78	9.4	0.866	51.7	0.029/0.257	65/143.33	1PH7105- . . F . . - . ■ ■ ■	18	6SL3120- ■TE21-8AA ■
0.80	11.0	0.859	52.0	0.029/0.257	65/143.33	1PH7107- . . F . . - . ■ ■ ■	30	6SL3120- 1 TE23-0AA 1
0.88	8.4	0.896	51.3	0.076/0.673	90/198.5	1PH7131- . . F . . - . ■ ■ ■	30	6SL3120- 1 TE23-0AA 1
0.85	14	0.895	51.3	0.076/0.673	90/198.5	1PH7133- . . F . . - . ■ ■ ■	45	6SL3120- 1 TE24-5AA 1
0.85	17	0.902	51.1	0.109/0.965	150/330.8	1PH7135- . . F . . - . ■ ■ ■	45	6SL3120- 1 TE24-5AA 1
0.85	23	0.900	51.2	0.109/0.965	150/330.8	1PH7137- . . F . . - . ■ ■ ■	60	6SL3120- 1 TE26-0AA 1
0.85	30	0.912	50.9	0.185/1.637	175/385.9	1PH7163- . . F . . - . ■ ■ ■	85	6SL3120- 1 TE28-5AA 1
0.86	32	0.916	50.8	0.228/2.018	210/463	1PH7167- . . F . . - . ■ ■ ■	85	6SL3120- 1 TE28-5AA 1
0.80	8.3	0.857	68.9	0.017/0.15	40/88.2	1PH7103- . . G . . - . ■ ■ ■	18	6SL3120- ■TE21-8AA ■
0.80	12	0.869	68.6	0.029/0.257	65/143.33	1PH7107- . . G . . - . ■ ■ ■	30	6SL3120- 1 TE23-0AA 1
0.86	18	0.898	68.0	0.076/0.673	90/198.5	1PH7133- . . G . . - . ■ ■ ■	45	6SL3120- 1 TE24-5AA 1
0.88	21	0.903	68.0	0.109/0.965	150/330.8	1PH7137- . . G . . - . ■ ■ ■	60	6SL3120- 1 TE26-0AA 1
0.84	37	0.906	67.5	0.185/1.637	175/385.9	1PH7163- . . G . . - . ■ ■ ■	85	6SL3120- 1 TE28-5AA 1
0.84	40	0.907	67.4	0.228/2.018	210/463	1PH7167- . . G . . - . ■ ■ ■	85 [8]	6SL3120- 1 TE28-5AA 1

Output type:	Vibration severity grade:	Shaft and flange accuracy:	Code
Coupling/belt	R	R	B
Coupling/belt	S	R	C
Coupling/belt	SR	R	D
Coupling/belt	N	N (with brake mounting)	K
Increased max. speed [5]	SR	R	L

Shaft extension (DE):	Balancing:	Direction of air flow (fan):	Code
Fitted key	Half-key	DE NDE	A
Fitted key	Half-key	NDE DE [7]	B
Fitted key	Full-key	DE NDE	C
Fitted key	Full-key	NDE DE [7]	D
Plain shaft	–	DE NDE	J
Plain shaft	–	NDE DE [7]	K

Seal:	Paint finish:	Code
–	None	0
Flange + shaft sealing ring [6]	None	2
–	Anthracite (RAL 7016), standard paint finish	3
Flange + shaft sealing ring [6]	Anthracite (RAL 7016), standard paint finish	5
–	Anthracite (RAL 7016), special paint finish	6
Flange + shaft sealing ring [6]	Anthracite (RAL 7016), special paint finish	8

Special versions:	Specify supplementary order code and plain text if applicable (see Options).	–Z

Motor Module:		Code (position 1)	Code (position 2)
	Single Motor Module	1	1
	Double Motor Module	2	0

1) n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

2) n_{S1}: Max. permissible speed that is continuously permitted without speed duty cycles.

3) n_{max}: Maximum speed which must not be exceeded.

4) Model with brake possible if: 12. Position "2" or "3", 14th position "K", 15th position "A", "B", "J" or "K", 16th position "0", "3" or "6".

5) Max. possible speed (see also selection guides): SH 100: 12000 rpm, SH 132: 10000 rpm, SH 160: 8000 rpm, with keyless shaft only (15th position "J" or "K" and 16th position "0", "3" or "6").

6) Only appropriate if oil spray/mist occasionally gets onto the sealing ring. A sealing ring is not possible for type IM B3 (IM V5, IM V6 and IM V36) or version with increased maximum speed.

7) Preferred air-flow direction in polluted environment.

8) The rated output current of the Motor Module is lower than the motor rated current.

9) Speed is limited to lower values in some cases. The following restriction applies: Max. output frequency < 5 × motor rated frequency.

Selection and ordering data

Rated speed	Shaft height SH	Rated power	Rated torque	Rated current	Rated voltage	Speed during field weakening [1]	Max. permissible continuous speed [2]	Max. speed [3]	1PH7 asynchronous motor
n_{rated} rpm		P_{rated} kW/HP	M_{rated} Nm/lb_f-ft	I_{rated} A	V_{rated} V	n_2 rpm	n_{S1} rpm	n_{max} rpm	Order No.
400 V 3 AC line voltage, Servo Control									
400	180	16.3/21.9	390/287.4	51	271	2100 [10]	3500 [4,10]	5000 [10]	1PH7184- ■■B ■■-■. . .
		21.2/28.4	505/372.2	67	268	2400 [10]	3500 [4,10]	5000 [10]	1PH7186- ■■B ■■-■. . .
	225	30.4/40.8	725/534.3	88	268	1900	3100 [4,10]	4500 [10]	1PH7224- ■■B ■■-■. . .
		39.2/52.6	935/689.1	114	264	2200 [10]	3100 [4,10]	4500 [10]	1PH7226- ■■B ■■-■. . .
		48/64.4	1145/843.9	136	272	2200 [10]	3100 [4,10]	4500 [4,10]	1PH7228- ■■B ■■-■. . .
1000	180	39/52.3	372/274.2	90	335	3300	3500 [4]	5000	1PH7184- ■■D ■■-■. . .
		51/68.4	485/357.4	116	340	3700	3500 [4]	5000	1PH7186- ■■D ■■-■. . .
	225	71/95.2	678/499.7	161	335	2900	3100 [4]	4500	1PH7224- ■■D ■■-■. . .
		92/123.4	880/649.1	198	340	2900	3100 [4]	4500	1PH7226- ■■D ■■-■. . .
		113/151.5	1080/796	240	340	2900	3100 [4]	4500 [4]	1PH7228- ■■D ■■-■. . .
1500	180	51/68.4	325/239.5	120	335	5000	3500 [4]	5000	1PH7184- ■■F ■■-■. . .
		74/99.2	471/347.1	170	330	5000	3500 [4]	5000	1PH7186- ■■F ■■-■. . .
	225	95/127.4	605/445.9	204	340	2900	3100 [4]	4500	1PH7224- ■■U ■■-■. . .
		130/174.3	828/610.2	278	340	2900	3100 [4]	4500	1PH7226- ■■F ■■-■. . .
		160/214.6	1019/751	350	340	2900	3100 [4]	4500 [4]	1PH7228- ■■F ■■-■. . .
2500	180	78/104.6	298/219.6	171	340	5000	3500 [4]	5000	1PH7184- ■■L ■■-■. . .
		106/142.2	405/298.5	235	335	5000	3500 [4]	5000	1PH7186- ■■L ■■-■. . .
	225	142/190.4	542/399.5	298	340	3500	3100 [4]	4500	1PH7224- ■■L ■■-■. . .
		168/225.3	642/473.2	362	335	3500	3100 [4]	4500	1PH7226- ■■L ■■-■. . .
		205/274.9	783/577.1	433	340	3500	3100 [4]	4500 [4]	1PH7228- ■■L ■■-■. . .

Option	Description	Remark	Code
Fan:	External fan unit, heavy-gauge threaded cable entry in terminal box		2
	Without external fan unit, for pipe connection, heavy-gauge threaded cable entry in terminal box		6
	External fan unit, metric cable entry in terminal box		7
	Without external fan unit, for pipe connection, metric cable entry in terminal box		8
Encoder systems for motors without DRIVE-CLiQ interface:	Without encoder		A
	Absolute encoder EnDat 2048 pulses/revolution		E
	Incremental encoder HTL 1024 pulses/revolution		H
	Incremental encoder HTL 2048 pulses/revolution		J
	Incremental encoder sin/cos 1 V_{pp} with C and D tracks [11]		M
	Incremental encoder sin/cos 1 V_{pp} without C and D tracks [11]		N
	2-pole resolver		R
Encoder systems for motors with DRIVE-CLiQ interface:	Absolute encoder 22 bit Singleturn + 12 bit Multiturn [11]		F
	Incremental encoder 22 bit with commutation position [11]		D
	Incremental encoder 22 bit		Q
	Resolver 14 bit		P
Terminal box/ cable entry (view onto DE):	Top/from right		0
	top/from DE		1
	top/from NDE		2
	top/from left		3
Type:	IM B3		0
	IM B5	Hoisting concept for other construction types (IM 6, IM B7, IM B8, IM V5, IM V6)	1
	IM B35 (only for 1PH7184 with flange A400/1PH7186 with flange A450/1PH7 with flange A550)		3
	IM B35 (only for 1PH7184 with flange A450)		4
	IM B35 (only for 1PH7184 with flange A450/1PH7186 with flange A450/1PH7 with flange A550)	Hoisting concept for other construction types (IM V15, IM V35)	5
	IM B35 (only for 1PH7184 with flange A450)	Hoisting concept for other construction types (IM V15, IM V35)	6
Holding brake with emergency stop function suitable for coupling output in construction type IM B3) [5]:	Without brake		0
	With brake	(includes emergency release screws and microswitch)	2
	With brake	(includes manual release and microswitch)	4

Selection and ordering data

Power factor cos ?	Magnetizing current I_{μ} A	Efficiency η_{rated}	Rated frequency f_{rated} Hz	Moment of inertia J kgm²/ lb$_f$-in-s²	Weight, approx. kg/lb	1PH7 asynchronous motor Order No.	SINAMICS S120 Motor Module Rated output current I_{rated} A	Order No.
400 V 3 AC line voltage, Servo Control								
0.84	26	0.830	14.2	0.503/4.452	370/815.85	1PH7184- . . B . . - . ■■■	60	6SL3120- 1 TE26-0AA 1
0.81	38.5	0.845	14.0	0.666/5.895	440/970.2	1PH7186- . . B . . - . ■■■	85	6SL3120- 1 TE28-5AA 1
0.87	36.5	0.864	14.0	1.479/13.09	630/1389.2	1PH7224- . . B . . - . ■■■	85 9)	6SL3120- 1 TE28-5AA 1
0.86	49	0.880	14.0	1.930/17.082	750/1653.8	1PH7226- . . B . . - . ■■■	132	6SL3120- 1 TE31-3AA 0
0.85	60.5	0.888	13.9	2.326/19.79	860/1896.3	1PH7228- . . B . . - . ■■■	132 9)	6SL3120- 1 TE31-3AA 0
0.83	44	0.913	34.2	0.503/4.452	370/815.85	1PH7184- . . D . . - . ■■■	85 9)	6SL3120- 1 TE28-5AA 1
0.81	58	0.918	34.1	0.666/5.895	440/970.2	1PH7186- . . D . . - . ■■■	132	6SL3120- 1 TE31-3AA 0
0.81	78.5	0.934	33.9	1.479/13.09	630/1389.2	1PH7224- . . D . . - . ■■■	200	6SL3120- 1 TE32-0AA 0
0.84	87.5	0.935	33.9	1.930/17.082	750/1653.8	1PH7226- . . D . . - . ■■■	200	6SL3120- 1 TE32-0AA 0
0.85	98	0.938	33.9	2.326/20.587	860/1896.3	1PH7228- . . D . . - . ■■■	260	6SL3120- 1 TE32-1AA 0
0.78	64	0.930	50.7	0.503/4.452	370/815.85	1PH7184- . . F . . - . ■■■	132	6SL3120- 1 TE31-3AA 0
0.81	84	0.937	50.7	0.666/5.895	440/970.2	1PH7186- . . F . . - . ■■■	200	6SL3120- 1 TE32-0AA 0
0.84	88.5	0.944	50.6	1.479/13.09	630/1389.2	1PH7224- . . U . . - . ■■■	200 9)	6SL3120- 1 TE32-0AA 0
0.84	120	0.945	50.6	1.930/17.082	750/1653.8	1PH7226- . . F . . - . ■■■	310	6SL3320- 1 TE33-1AA 0
0.82	169	0.949	50.5	2.326/19.79	860/1896.3	1PH7228- . . F . . - . ■■■	380	6SL3320- 1 TE33-8AA 0
0.82	77	0.937	84.1	0.503/4.452	370/815.85	1PH7184- . . L . . - . ■■■	200	6SL3120- 1 TE32-0AA 0
0.82	108	0.942	84.1	0.666/5.895	440/970.2	1PH7186- . . L . . - . ■■■	260	6SL3320- 1 TE32-1AA 0
0.84	115	0.948	84.0	1.479/13.09	630/1389.2	1PH7224- . . L . . - . ■■■	310	6SL3320- 1 TE33-1AA 0
0.84	154	0.950	84.0	1.930/17.082	750/1653.8	1PH7226- . . L . . - . ■■■	380	6SL3320- 1 TE33-8AA 0
0.84	185	0.950	83.9	2.326/19.798	860/1896.3	1PH7228- . . L . . - . ■■■	490	6SL3320- 1 TE35-0AA 0

Output type:	Vibration severity grade:	Shaft and flange accuracy:	
Coupling	R	N	A
Coupling	R	R	B
Coupling	S	R	C
Coupling	SR	R	D
Belt	R	N	E
Belt	R	R	F
Incr. cantilever forces	R	N	G
Incr. cantilever forces	R	R	H
Incr. max. speed 6)	S	R	J

Shaft extension (DE):	Balancing:	Direction of air flow (fan):	
Fitted key	Half-key	DE NDE	A
Fitted key	Half-key	NDE DE 8)	B
Fitted key	Full-key	DE NDE	C
Fitted key	Full-key	NDE DE 8)	D
Plain shaft	–	DE NDE	J
Plain shaft	–	NDE DE 8)	K

Seal:	Paint finish:	
–	Primed	0
Flange and shaft sealing ring 7)	Primed	2
–	Anthracite (RAL 7016), standard paint finish	3
Flange and shaft sealing ring 7)	Anthracite (RAL 7016), standard paint finish	5
–	Anthracite (RAL 7016), special paint finish	6
Flange and shaft sealing ring 7)	Anthracite (RAL 7016), special paint finish	8

Special versions:	Specify supplementary order code and plain text if applicable (see Options).	–Z

1) n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.
2) n_{S1}: Max. permissible speed that is continuously permitted without speed duty cycles.
3) n_{max}: Maximum speed which must not be exceeded.
4) Speed is reduced at higher cantilever forces, see selection guides.
5) Model with brake:
12th position "0"
14th position "A",
15th position "A" or "B",
16th position "0", "3" or "6".
6) For shaft height 180 n_{max} = 7000 rpm, 1PH7224: n_{max} = 5500 rpm coupling output only and 16th position "0", "3" or "6".
7) Only appropriate if oil spray/mist occasionally gets onto the sealing ring. A sealing ring is not possible for type IM B3 (IM V5, IM V6 and IM V36) version with increased maximum speed, version with belt drive or increased cantilever forces.
8) Preferred air-flow direction in polluted environment.
9) The rated output current of the Motor Module is lower than the motor rated current.
10) Speed is limited to lower values in some cases. The following restriction applies: Max. output frequency < 5 × motor rated frequency.
11) When ordering option L27 , please also select option M84 (insulated version of encoder).

Selection and ordering data

Rated speed n_{rated} rpm	Shaft height SH	Rated power P_{rated} kW/HP	Rated torque M_{rated} Nm/lb_f-ft	Rated current I_{rated} A	Rated voltage V_{rated} V	Speed during field weakening 1)9) n_2 rpm	Max. permissible continuous speed 2) n_{S1} rpm	Max. speed 3) n_{max} rpm	1PH7 asynchronous motor Order No.
400 V 3 AC line voltage, Vector Control									
400	160	9.5/12.7	227/167.3	30	274	2630 9)	3700 9)	6500 9)	1PH7163- ■■B■■-■. . .
		13.0/17.4	310/228.5	37	294	2140 9)	3700 9)	6500 9)	1PH7167- ■■B■■-■. . .
1150	100	4.3/5.8	36/26.5	10	391	2400	5500	9000 9)	1PH7103- ■■D■■-■. . .
		7.2/9.7	60/44.2	17.5	360	4170	5500	9000 9)	1PH7107- ■■D■■-■. . .
	132	13.5/18.1	112/82.5	29	381	3000	4500	8000 9)	1PH7133- ■■D■■-■. . .
		19.5/26.2	162/119.4	43	367	3930	4500	8000 9)	1PH7137- ■■D■■-■. . .
	160	25/33.5	208/153.3	55	364	3500	3700	6500 9)	1PH7163- ■■D■■-■. . .
		31/41.6	257/189.4	70	357	4840	3700	6500 9)	1PH7167- ■■D■■-■. . .

Option	Description		Code
Fan:	External fan unit, heavy-gauge threaded cable entry in terminal box		2
	Without external fan unit, for pipe connection, heavy-gauge threaded cable entry in terminal box		6
	External fan unit, metric cable entry in terminal box		7
	Without external fan unit, for pipe connection, metric cable entry in terminal box		8
Encoder systems for motors without DRIVE-CLiQ interface:	Without encoder		A
	Absolute encoder EnDat 2048 pulses/revolution		E
	Incremental encoder HTL 1024 pulses/revolution		H
	Incremental encoder HTL 2048 pulses/revolution		J
	Incremental encoder sin/cos 1 V_{pp} with C and D tracks		M
	Incremental encoder sin/cos 1 V_{pp} without C and D tracks		N
	2-pole resolver		R
Encoder systems for motors with DRIVE-CLiQ interface:	Absolute encoder 22 bit Singleturn + 12 bit Multiturn		F
	Incremental encoder 22 bit with commutation position		D
	Incremental encoder 22 bit		Q
	Resolver 14 bit		P
Terminal box/ cable entry (view onto DE):	Top/from right		0
	Top/from NDE		2
	Top/from left		3
Type:	IM B3 (IM V5, IM V6)		0
	IM B5 (IM V1, IM V3) available only for shaft heights 100 and 132		2
	IM B35 (IM V15, IM V36)		3
Holding brake with emergency stop function 4):	Without brake		0
	Brake supply voltage 230 V 1 AC, 50/60 Hz	With brake	1
		With brake (includes microswitch)	2
		With brake (includes manual release)	3
		With brake (includes manual release and microswitch)	4
	Brake supply voltage 24 V DC	With brake	5
		With brake (includes microswitch)	6
		With brake (includes manual release)	7
		With brake (includes manual release and microswitch)	8

Selection and ordering data

Power factor cos ?	Magnetiz-ing current I_{μ} A	Efficiency η_{rated}	Rated frequency f_{rated} Hz	Moment of inertia J kgm²/ lb_f-in-s²	Weight, approx. kg/lb	1PH7 asynchronous motor Order No.	SINAMICS S120 Motor Module Rated output current I_{rated} A	Order No.
400 V 3 AC line voltage, Vector Control								
0.88	11.5	0.809	14.3	0.185/1.637	175/385.88	1PH7163- . . B . . - . ■ ■ ■	30	6SL3120- 1 TE23-0AA 1
0.88	14.0	0.814	14.3	0.228/2.018	210/463.05	1PH7167- . . B . . - . ■ ■ ■	45	6SL3120- 1 TE24-5AA 1
0.81	5.0	0.813	40.6	0.017/0.15	40/88.2	1PH7103- . . D . . - . ■ ■ ■	9 [8)]	6SL3120- ■ TE21-0AA ■
0.81	8.8	0.838	40.3	0.029/0.257	65/143.33	1PH7107- . . D . . - . ■ ■ ■	18	6SL3120- ■ TE21-8AA ■
0.85	13	0.877	39.7	0.076/0.673	90/198.45	1PH7133- . . D . . - . ■ ■ ■	30	6SL3120- 1 TE23-0AA 1
0.86	19	0.887	39.6	0.109/0.965	150/330.75	1PH7137- . . D . . - . ■ ■ ■	45	6SL3120- 1 TE24-5AA 1
0.84	25	0.904	39.2	0.185/1.637	175/385.88	1PH7163- . . D . . - . ■ ■ ■	60	6SL3120- 1 TE26-0AA 1
0.83	34	0.909	39.1	0.228/2.018	210/463.05	1PH7167- . . D . . - . ■ ■ ■	85	6SL3120- 1 TE28-5AA 1

Output type:	Vibration severity grade:	Shaft and flange accuracy:	
Coupling/belt	R	R	B
Coupling/belt	S	R	C
Coupling/belt	SR	R	D
Coupling/belt	N	N (with brake mounting)	K
Increased max. speed [5)]	SR	R	L

Shaft extension (DE):	Balancing:	Direction of air flow (fan):	
Fitted key	Half-key	DE NDE	A
Fitted key	Half-key	NDE DE [7)]	B
Fitted key	Full-key	DE NDE	C
Fitted key	Full-key	NDE DE [7)]	D
Plain shaft	–	DE NDE	J
Plain shaft	–	NDE DE [7)]	K

Seal:	Paint finish:	
–	Without	0
Flange and shaft sealing ring [6)]	Without	2
–	Anthracite (RAL 7016), standard paint finish	3
Flange and shaft sealing ring [6)]	Anthracite (RAL 7016), standard paint finish	5
–	Anthracite (RAL 7016), special paint finish	6
Flange and shaft sealing ring [6)]	Anthracite (RAL 7016), special paint finish	8

Special versions:	Specify supplementary order code and plain text if applicable (see Options).	–Z

Motor Module:			
	Single Motor Module	1	1
	Double Motor Module	2	0

1) n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

2) n_{S1}: Max. permissible speed that is continuously permitted without speed duty cycles.

3) n_{max}: Maximum speed which must not be exceeded.

4) Model with brake possible if:
12th position “2” or “3”,
14th position “K”,
15th position “A”, “B”, “J” or “K”,
16th position “0”, “3” or “6”.

5) Max. possible speed (see also selection guides):
SH 100: 12000 rpm, SH 132: 10000 rpm, SH 160: 8000 rpm,
with keyless shaft only (15th position “J” or “K” and 16th position “0”, “3” or “6”).

6) Only appropriate if oil spray/mist occasionally gets onto the sealing ring. A sealing ring is not possible for type IM B3 (IM V5, IM V6 and IM V36) or version with increased maximum speed.

7) Preferred air-flow direction in polluted environment.

8) The rated output current of the Motor Module is lower than the motor rated current.

9) Speed is limited to lower values in some cases. The following restriction applies: Max. output frequency < 5 × motor rated frequency.

Selection and ordering data

Rated speed n_{rated} rpm	Shaft height SH	Rated power P_{rated} kW/HP	Rated torque M_{rated} Nm/lb$_f$-ft	Rated current I_{rated} A	Rated voltage V_{rated} V	Speed during field weakening [1)] n_2 rpm	Max. permissible continuous speed [2)] n_{S1} rpm	Max. speed [3)] n_{max} rpm	1PH7 asynchronous motor Order No.
400 V 3 AC line voltage, Vector Control									
1750	100	4.3/5.8	24/17.7	10	398	6130	5500	9000 [9)]	1PH7101- ■ ■ F ■ ■ - ■ . . .
		6.3/8.5	34/25.1	13	398	3500	5500	9000 [9)]	1PH7103- ■ ■ F ■ ■ - ■ . . .
		8/10.7	44/32.4	17.5	398	5940	5500	9000 [9)]	1PH7105- ■ ■ F ■ ■ - ■ . . .
		10/13.4	55/40.5	23	381	4500	5500	8750	1PH7107- ■ ■ F ■ ■ - ■ . . .
	132	13/17.4	71/52.3	24	398	4830	4500	8000	1PH7131- ■ ■ F ■ ■ - ■ . . .
		17.5/23.5	96/70.8	34	398	4990	4500	8000	1PH7133- ■ ■ F ■ ■ - ■ . . .
		21.5/28.8	117/86.2	42	398	5570	4500	8000	1PH7135- ■ ■ F ■ ■ - ■ . . .
		25/33.5	136/100.2	56	357	4000	4500	8000	1PH7137- ■ ■ F ■ ■ - ■ . . .
	160	34/45.6	186/137.1	72	364	4000	3700	6500	1PH7163- ■ ■ F ■ ■ - ■ . . .
		41/55.0	224/165.1	79	398	2750	3700	6500	1PH7167- ■ ■ F ■ ■ - ■ . . .
2300	100	7.5/10.1	31/22.8	17	388	6000	5500	9000	1PH7103- ■ ■ G ■ ■ - ■ . . .
		12/16.1	50/36.9	26	400	6000	5500	9000	1PH7107- ■ ■ G ■ ■ - ■ . . .
	132	22.5/30.2	93/68.5	45	398	4000	4500	8000	1PH7133- ■ ■ G ■ ■ - ■ . . .
		29/38.9	120/88.4	56	398	4000	4500	8000	1PH7137- ■ ■ G ■ ■ - ■ . . .
	160	38/51.0	158/116.4	82	398	3000	3700	6500	1PH7163- ■ ■ G ■ ■ - ■ . . .
		44/59.0	183/134.9	85	398	3000	3700	6500	1PH7167- ■ ■ G ■ ■ - ■ . . .

			Code
Fan:	External fan unit, heavy-gauge threaded cable entry in terminal box		2
	Without external fan unit, for pipe connection, heavy-gauge threaded cable entry in terminal box		6
	External fan unit, metric cable entry in terminal box		7
	Without external fan unit, for pipe connection, metric cable entry in terminal box		8
Encoder systems for motors without DRIVE-CLiQ interface:	Without encoder		A
	Absolute encoder EnDat 2048 pulses/revolution		E
	Incremental encoder HTL 1024 pulses/revolution		H
	Incremental encoder HTL 2048 pulses/revolution		J
	Incremental encoder sin/cos 1 V_{pp} with C and D tracks		M
	Incremental encoder sin/cos 1 V_{pp} without C and D tracks		N
	2-pole resolver		R
Encoder systems for motors with DRIVE-CLiQ interface:	Absolute encoder 22 bit Singleturn + 12 bit Multiturn		F
	Incremental encoder 22 bit with commutation position		D
	Incremental encoder 22 bit		Q
	Resolver 14 bit		P
Terminal box/ cable entry (view onto DE):	Top/from right		0
	Top/from NDE		2
	Top/from left		3
Type:	IM B3 (IM V5, IM V6)		0
	IM B5 (IM V1, IM V3) available only for shaft heights 100 and 132		2
	IM B35 (IM V15, IM V36)		3
Holding brake with emergency stop function [4)]:	Without brake		0
	Brake supply voltage 230 V 1 AC, 50/60 Hz	With brake	1
		With brake (includes microswitch)	2
		With brake (includes manual release)	3
		With brake (includes manual release and microswitch)	4
	Brake supply voltage 24 V DC	With brake	5
		With brake (includes microswitch)	6
		With brake (includes manual release)	7
		With brake (includes manual release and microswitch)	8

Selection and ordering data

Power factor	Magnetiz-ing current	Efficiency	Rated frequency	Moment of inertia of	Weight, approx.	1PH7 asynchronous motor	SINAMICS S120 Motor Module Rated output current	
	I_{μ}	η_{rated}	f_{rated}	J			I_{rated}	
cos ?	A		Hz	kgm^2/ lb_f-in-s^2	kg/lb	Order No.	A	Order No.
400 V 3 AC line voltage, Vector Control								
0.75	5.7	0.855	60.0	0.017/0.15	40/88.2	1PH7101- . . F . . - . ■■■	9 8)	6SL3120- ■TE21-0AA ■
0.84	5.3	0.849	61.0	0.017/0.15	40/88.2	1PH7103- . . F . . - . ■■■	18	6SL3120- ■TE21-8AA ■
0.77	9.3	0.875	60.0	0.029/0.257	65/143.33	1PH7105- . . F . . - . ■■■	18	6SL3120- ■TE21-8AA ■
0.80	10.6	0.870	60.3	0.029/0.257	65/143.33	1PH7107- . . F . . - . ■■■	30	6SL3120- 1 TE23-0AA 1
0.88	8.1	0.902	59.7	0.076/0.673	90/198.45	1PH7131- . . F . . - . ■■■	30	6SL3120- 1 TE23-0AA 1
0.85	14	0.900	59.7	0.076/0.673	90/198.45	1PH7133- . . F . . - . ■■■	45	6SL3120- 1 TE24-5AA 1
0.86	16	0.906	59.5	0.109/0.965	150/330.8	1PH7135- . . F . . - . ■■■	45	6SL3120- 1 TE24-5AA 1
0.85	23	0.902	59.5	0.109/0.965	150/330.8	1PH7137- . . F . . - . ■■■	60	6SL3120- 1 TE26-0AA 1
0.86	28	0.915	59.2	0.185/1.637	175/385.9	1PH7163- . . F . . - . ■■■	85	6SL3120- 1 TE28-5AA 1
0.86	30	0.920	59.2	0.228/2.018	210/463.1	1PH7167- . . F . . - . ■■■	85	6SL3120- 1 TE28-5AA 1
0.79	8.2	0.866	78.8	0.017/0.15	40/88.2	1PH7103- . . G . . - . ■■■	18	6SL3120- ■TE21-8AA ■
0.80	12	0.878	78.7	0.029/0.257	65/143.33	1PH7107- . . G . . - . ■■■	30	6SL3120- 1 TE23-0AA 1
0.86	17	0.900	78.0	0.076/0.673	90/198.45	1PH7133- . . G . . - . ■■■	45	6SL3120- 1 TE24-5AA 1
0.87	21	0.903	77.8	0.109/0.965	150/330.8	1PH7137- . . G . . - . ■■■	60	6SL3120- 1 TE26-0AA 1
0.83	43	0.900	77.3	0.185/1.637	175/385.9	1PH7163- . . G . . - . ■■■	85	6SL3120- 1 TE28-5AA 1
0.84	40	0.911	77.4	0.228/2.018	210/463.1	1PH7167- . . G . . - . ■■■	85	6SL3120- 1 TE28-5AA 1

Output type:	Vibration severity grade:	Shaft and flange accuracy:	
Coupling/belt	R	R	B
Coupling/belt	S	R	C
Coupling/belt	SR	R	D
Coupling/belt	N	N (with brake mounting)	K
Increased max. speed 5)	SR	R	L

Shaft extension (DE):	Balancing:	Direction of air flow (fan):	
Fitted key	Half-key	DE NDE	A
Fitted key	Half-key	NDE DE 7)	B
Fitted key	Full-key	DE NDE	C
Fitted key	Full-key	NDE DE 7)	D
Plain shaft	–	DE NDE	J
Plain shaft	–	NDE DE 7)	K

Seal:	Paint finish:	
–	Without	0
Flange and shaft sealing ring 6)	Without	2
–	Anthracite (RAL 7016), standard paint finish	3
Flange and shaft sealing ring 6)	Anthracite (RAL 7016), standard paint finish	5
–	Anthracite (RAL 7016), special paint finish	6
Flange and shaft sealing ring 6)	Anthracite (RAL 7016), special paint finish	8

Special versions:	Specify supplementary order code and plain text if applicable (see Options).	–Z		
Motor Module:	Single Motor Module		1	1
	Double Motor Module		2	0

1) n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

2) n_{S1}: Max. permissible speed that is continuously permitted without speed duty cycles.

3) n_{max}: Maximum speed which must not be exceeded.

4) Model with brake possible if:
12th position "2" or "3",
14th position "K",
15th position "A", "B", "J" or "K",
16th position "0", "3" or "6".

5) Max. possible speed (see also selection guides):
SH 100: 12000 rpm, SH 132: 10000 rpm, SH 160: 8000 rpm,
with keyless shaft only (15th position "J" or "K" and 16th position "0", "3" or "6").

6) Only appropriate if oil spray/mist occasionally gets onto the sealing ring. A sealing ring is not possible for type IM B3 (IM V5, IM V6 and IM V36), or version with increased maximum speed.

7) Preferred air-flow direction in polluted environment.

8) The rated output current of the Motor Module is lower than the motor rated current.

9) Speed is limited to lower values in some cases. The following restriction applies: Max. output frequency < 5 × motor rated frequency.

Selection and ordering data

Rated speed n_{rated} rpm	Shaft height SH	Rated power P_{rated} kW/HP	Rated torque M_{rated} Nm/lb_f-ft	Rated current I_{rated} A	Rated voltage V_{rated} V	Speed during field weakening [1] n_2 rpm	Max. perm. continuous speed [2] n_{S1} rpm	Max. speed [3] n_{max} rpm	1PH7 asynchronous motor Order No.
400 V 3 AC line voltage, Vector Control									
400	180	16.3/21.9	390/287.4	51	271	2900 [11]	3500 [4,11]	5000 [11]	1PH7184- ■ ■ B ■ ■ - ■ . . .
		21.2/28.4	505/372.2	67	268	3300 [11]	3500 [4,11]	5000 [11]	1PH7186- ■ ■ B ■ ■ - ■ . . .
	225	30.4/40.8	725/534.3	88	268	2700 [11]	3100 [4,11]	4500 [11]	1PH7224- ■ ■ B ■ ■ - ■ . . .
		39.2/52.6	935/689.1	114	264	2900 [11]	3100 [4,11]	4500 [11]	1PH7226- ■ ■ B ■ ■ - ■ . . .
		48/64.4	1145/843.9	136	272	2900 [11]	3100 [4,11]	4500 [4,11]	1PH7228- ■ ■ B ■ ■ - ■ . . .
1150	180	44/6	366/269.7	89	383	4200	3500 [4]	5000	1PH7184- ■ ■ D ■ ■ - ■ . . .
		58/77.8	482/355.2	116	390	4400	3500 [4]	5000	1PH7186- ■ ■ D ■ ■ - ■ . . .
	225	81/108.6	670/493.8	160	385	2900	3100 [4]	4500	1PH7224- ■ ■ D ■ ■ - ■ . . .
		105/140.8	870/641.2	197	390	2900	3100 [4]	4500	1PH7226- ■ ■ D ■ ■ - ■ . . .
		129/173.0	1070/788.6	238	390	2900	3100 [4]	4500 [4]	1PH7228- ■ ■ D ■ ■ - ■ . . .

Option	Description		Code
Fan:	External fan unit, PG cable entry in terminal box		2
	Without external fan unit, for pipe connection, PG cable entry in terminal box		6
	External fan unit, metric cable entry in terminal box		7
	Without external fan unit, for pipe connection, metric cable entry in terminal box		8
Encoder systems for motors without DRIVE-CLiQ interface:	Without encoder		A
	Absolute encoder EnDat 2048 pulses/revolution		E
	Incremental encoder HTL 1024 pulses/revolution		H
	Incremental encoder HTL 2048 pulses/revolution		J
	Incremental encoder sin/cos 1 V_{pp} with C and D tracks [10]		M
	Incremental encoder sin/cos 1 V_{pp} without C and D tracks [10]		N
	2-pole resolver		R
Encoder systems for motors with DRIVE-CLiQ interface:	Absolute encoder 22 bit Singleturn + 12 bit Multiturn		F
	Incremental encoder 22 bit with commutation position [10]		D
	Incremental encoder 22 bit [10]		Q
	Resolver 14 bit		P
Terminal box/ cable entry (view onto DE):	top/from right		0
	top/from DE		1
	top/from NDE		2
	top/from left		3
Type:	IM B3		0
	IM B3	Hoisting system for different construction types (IM B6, IM B7, IM B8, IM V5, IM V6)	1
	IM B35 (only for 1PH7184 with flange A 400, 1PH7186 with flange A 450, 1PH722. with flange A 550)		3
	IM B35 (only for 1PH7184 with flange A 450)		4
	IM B35 (only for 1PH7184 with flange A 400, 1PH7186 with flange A 450, 1PH722. with flange A 550)	Hoisting system for different construction types (IM V15, IM V36)	5
	IM B35 (only for 1PH7184 with flange A 450)	Hoisting system for different construction types (IM V15, IM V36)	6
Holding brake with emergency stop function (suitable for coupling output in construction type IM B3) [5]:	Without brake		0
	With brake (includes emergency release screws and microswitch)		2
	With brake (includes manual release and microswitch)		4

Selection and ordering data

Power factor	Magnetizing current	Efficiency	Rated frequency	Moment of inertia of	Weight, approx.	1PH7 asynchronous motor	SINAMICS S120 Motor Module Rated output current	
	I_{μ}	η_{rated}	f_{rated}	J			I_{rated}	
cos ?	A		Hz	kgm^2/ lb_f-in-s^2	kg/lb	Order No.	A	Order No.
400 V 3 AC line voltage, Vector Control								
0.84	26	0.830	14.2	0.503/4.452	370/815.9	1PH7184- . . B . . -. ■■■	60	6SL3120-1 T E26-0AA1
0.81	38.5	0.845	14.0	0.666/5.895	440/970.2	1PH7186- . . B . . -. ■■■	85	6SL3120-1 T E28-5AA1
0.87	36.5	0.864	14.0	1.479/13.09	630/1389.2	1PH7224- . . B . . -. ■■■	85 9)	6SL3120-1 T E28-5AA1
0.86	49	0.880	14.0	1.930/17.08	750/1653.8	1PH7226- . . B . . -. ■■■	132	6SL3120-1 T E31-3AA0
0.85	60.5	0.888	13.9	2.326/19.79	860/1896.3	1PH7228- . . B . . -. ■■■	132 9)	6SL3120-1 T E31-3AA0
0.82	42	0.920	39.2	0.503/4.452	370/815.9	1PH7184- . . D . . -. ■■■	85 9)	6SL3120-1 T E28-5AA1
0.81	58	0.925	39.1	0.666/5.895	440/970.2	1PH7186- . . D . . -. ■■■	132	6SL3120-1 T E31-3AA0
0.81	79	0.938	38.9	1.479/13.09	630/1389.2	1PH7224- . . D . . -. ■■■	200	6SL3120-1 T E32-0AA0
0.84	87.5	0.941	38.9	1.930/17.08	750/1653.8	1PH7226- . . D . . -. ■■■	200	6SL3120-1 T E32-0AA0
0.85	98	0.943	38.9	2.326/19.79	860/1896.3	1PH7228- . . D . . -. ■■■	260	6SL3320-1 T E32-6AA0

Output type:	Vibration severity grade:	Shaft and flange accuracy:	
Coupling	R	N	A
Coupling	R	R	B
Coupling	S	R	C
Coupling	SR	R	D
Belt	R	N	E
Belt	R	R	F
Incr. cantilever forces	R	N	G
Incr. cantilever forces	R	R	H
Increased max. speed 6)	S	R	J

Shaft extension (DE):	Balancing:	Direction of air flow (fan):	
Fitted key	Half-key	DE NDE	A
Fitted key	Half-key	NDE DE 8)	B
Fitted key	Full-key	DE NDE	C
Fitted key	Full-key	NDE DE 8)	D
Plain shaft	–	DE NDE	J
Plain shaft	–	NDE DE 8)	K

Seal:	Paint finish:	
–	Primed	0
Flange and shaft sealing ring 7)	Primed	2
–	Anthracite (RAL 7016), standard paint finish	3
Flange and shaft sealing ring 7)	Anthracite (RAL 7016), standard paint finish	5
–	Anthracite (RAL 7016), special paint finish	6
Flange and shaft sealing ring 7)	Anthracite (RAL 7016), special paint finish	8

Special versions:	Specify supplementary order code and plain text if applicable (see Options).	–Z

1) n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

2) n_{S1}: Max. permissible speed that is continuously permitted without speed duty cycles.

3) n_{max}: Maximum speed which must not be exceeded.

4) Speed is reduced with increased cantilever forces; see selection guides.

5) Model with brake: 12th position “0”, 14th position “A”, 15th position “A” or “B”, 16th position “0”, “3” or “6”.

6) For shaft height 180 n_{max} = 7000 rpm, 1PH7 224 n_{max} = 5500 rpm, only coupling output possible and 16th position “0”, “3” or “6”.

7) Only appropriate if oil spray/mist occasionally gets onto the sealing ring. A sealing ring is not possible for type IM B3 (IM V5, IM V6 and IM B36), version with increased maximum speed, version for belt output or increased cantilever forces.

8) Preferred air-flow direction in polluted environment.

9) The rated output current of the Motor Module is lower than the motor rated current.

10) When ordering option L27 , please also select option M84 (insulated version of encoder).

11) Speed is limited to lower values in some cases. The following restriction applies: Max. output frequency < 5 × motor rated frequency.

Selection and ordering data

Rated speed n_{rated} rpm	Shaft height SH	Rated power P_{rated} kW/HP	Rated torque M_{rated} Nm/lb_f-ft	Rated current I_{rated} A	Rated voltage V_{rated} V	Speed during field weakening 1) n_2 rpm	Max. perm. continuous speed 2) n_{S1} rpm	Max. speed 3) n_{max} rpm	1PH7 asynchronous motor Order No.
400 V 3 AC line voltage, Vector Control									
1750	180	60/80.5	327/241	120	388	5000	3500 4)	5000	1PH7184- ■ ■ F ■ ■ - ■ . . .
		85/114.0	465/342.7	169	385	5000	3500 4)	5000	1PH7186- ■ ■ F ■ ■ - ■ . . .
	225	110/147.5	600/442.2	203	395	2900	3100 4)	4500	1PH7224- ■ ■ U ■ ■ - ■ . . .
		135/181.0	737/543.2	254	395	2900	3100 4)	4500	1PH7226- ■ ■ F ■ ■ - ■ . . .
		179/240.0	975/718.6	342	395	2900	3100 4)	4500 4)	1PH7228- ■ ■ F ■ ■ - ■ . . .
2900	180	81/108.6	265/193.5	158	395	5000	3500 4)	5000	1PH7184- ■ ■ L ■ ■ - ■ . . .
		101/135.4	333/245.4	206	385	5000	3500 4)	5000	1PH7186- ■ ■ L ■ ■ - ■ . . .
	225	149/199.8	490/361.1	274	395	3500	3100 4)	4500	1PH7224- ■ ■ L ■ ■ - ■ . . .
		185/248.1	610/449.6	348	390	3500	3100 4)	4500	1PH7226- ■ ■ L ■ ■ - ■ . . .
		215/288.3	708/521.8	402	395	3500	3100 4)	4500 4)	1PH7228- ■ ■ L ■ ■ - ■ . . .

Option	Description		Code
Fan:	External fan unit, PG cable entry in terminal box		2
	Without external fan unit, for pipe connection, PG cable entry in terminal box		6
	External fan unit, metric cable entry in terminal box		7
	Without external fan unit, for pipe connection, metric cable entry in terminal box		8
Encoder systems for motors without DRIVE-CLiQ interface:	Without encoder		A
	Absolute encoder EnDat 2048 pulses/revolution		E
	Incremental encoder HTL 1024 pulses/revolution		H
	Incremental encoder HTL 2048 pulses/revolution		J
	Incremental encoder sin/cos 1 V_{pp} with C and D tracks 10)		M
	Incremental encoder sin/cos 1 V_{pp} without C and D tracks 10)		N
	2-pole resolver		R
Encoder systems for motors with DRIVE-CLiQ interface:	Absolute encoder 22 bit Singleturn + 12 bit Multiturn		F
	Incremental encoder 22 bit with commutation position 10)		D
	Incremental encoder 22 bit 10)		Q
	Resolver 14 bit		P
Terminal box/ cable entry (view onto DE):	top/from right		0
	top/from DE		1
	top/from NDE		2
	top/from left		3
Type:	IM B3		0
	IM B3	Hoisting system for different construction types (IM B6, IM B7, IM B8, IM V5, IM V6)	1
	IM B35 (only for 1PH7184 with flange A 400, 1PH7186 with flange A 450, 1PH722. with flange A 550)		3
	IM B35 (only for 1PH7184 with flange A 450)		4
	IM B35 (only for 1PH7184 with flange A 400, 1PH7186 with flange A 450, 1PH722. with flange A 550)	Hoisting system for different construction types (IM V15, IM V36)	5
	IM B35 (only for 1PH7184 with flange A 450)	Hoisting system for different construction types (IM V15, IM V36)	6
Holding brake with emergency stop function (suitable for coupling output in construction type IM B3) 5):	Without brake		0
	With brake (includes emergency release screws and microswitch)		2
	With brake (includes manual release and microswitch)		4

Selection and ordering data

Power factor cos ?	Magnetiz-ing current I_μ A	Efficiency η_{rated}	Rated frequency f_{rated} Hz	Moment of inertia of J kgm²/ lb$_f$-in-s²	Weight, approx. kg/lb	1PH7 asynchronous motor Order No.	SINAMICS S120 Motor Module Rated output current I_{rated} A	Order No.
400 V 3 AC line voltage, Vector Control								
0.78	64	0.934	59.0	0.503/4.452	370/815.85	1PH7184- . . F . . - . ■■■	132	6SL3120-1 T E31-3AA0
0.80	84	0.940	59.0	0.666/5.895	440/970.2	1PH7186- . . F . . - . ■■■	200	6SL3120-1 T E32-0AA0
0.84	88	0.944	58.9	1.479/13.09	630/1389.2	1PH7224- . . U . . - . ■■■	200 9)	6SL3120-1 T E32-0AA0
0.82	120	0.947	58.9	1.930/17.082	750/1653.8	1PH7226- . . F . . - . ■■■	260	6SL3320-1 T E32-6AA0
0.81	169	0.948	58.8	2.326/19.79	860/1896.3	1PH7228- . . F . . - . ■■■	380	6SL3320-1 T E33-8AA0
0.80	77	0.934	97.4	0.503/4.452	370/815.85	1PH7184- . . L . . - . ■■■	200	6SL3120-1 T E32-0AA0
0.78	107	0.936	97.3	0.666/5.895	440/970.2	1PH7186- . . L . . - . ■■■	200 9)	6SL3120-1 T E32-0AA0
0.84	115	0.946	97.3	1.479/13.09	630/1389.2	1PH7224- . . L . . - . ■■■	310	6SL3320-1 T E33-1AA0
0.83	154	0.946	97.2	1.930/17.082	750/1653.8	1PH7226- . . L . . - . ■■■	380	6SL3320-1 T E33-8AA0
0.82	186	0.946	97.2	2.326/19.79	860/1896.3	1PH7228- . . L . . - . ■■■	490	6SL3320-1 T E35-0AA0

Output type:	Vibration severity grade:	Shaft and flange accuracy:	
Coupling	R	N	A
Coupling	R	R	B
Coupling	S	R	C
Coupling	SR	R	D
Belt	R	N	E
Belt	R	R	F
Incr. cantilever forces	R	N	G
Incr. cantilever forces	R	R	H
Increased max. speed 6)	S	R	J

Shaft extension (DE):	Balancing:	Direction of air flow (fan):	
Fitted key	Half-key	DE NDE	A
Fitted key	Half-key	NDE DE 8)	B
Fitted key	Full-key	DE NDE	C
Fitted key	Full-key	NDE DE 8)	D
Plain shaft	–	DE NDE	J
Plain shaft	–	NDE DE 8)	K

Seal:	Paint finish:	
–	Primed	0
Flange and shaft sealing ring 7)	Primed	2
–	Anthracite (RAL 7016), standard paint finish	3
Flange and shaft sealing ring 7)	Anthracite (RAL 7016), standard paint finish	5
–	Anthracite (RAL 7016), special paint finish	6
Flange and shaft sealing ring 7)	Anthracite (RAL 7016), special paint finish	8

Special versions:	Specify supplementary order code and plain text if applicable (see Options).	–Z

1) n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

2) n_{S1}: Max. permissible speed that is continuously permitted without speed duty cycles.

3) n_{max}: Maximum speed which must not be exceeded.

4) Speed is reduced with increased cantilever forces; see selection guides.

5) Model with brake: 12th position "0", 14th position "A", 15th position "A" or "B", 16th position "0", "3" or "6".

6) For shaft height 180 n_{max} = 7000 rpm, 1PH7 224 n_{max} = 5500 rpm, only coupling output possible and 16th position "0", "3" or "6".

7) Only appropriate if oil spray/mist occasionally gets onto the sealing ring. A sealing ring is not possible for type IM B3 (IM V5, IM V6 and IM B36), version with increased maximum speed, version for belt output or increased cantilever forces.

8) Preferred air-flow direction in polluted environment.

9) The rated output current of the Motor Module is lower than the motor rated current.

10) When ordering option L27 , please also select option M84 (insulated version of encoder).

Selection and ordering data

Rated speed n_{rated} rpm	Shaft height SH	Rated power P_{rated} kW/HP	Rated torque M_{rated} Nm/lb$_f$-ft	Rated current I_{rated} A	Rated voltage V_{rated} V	Speed during field weakening [1)] n_2 rpm	Max. permissible continuous speed [2)] n_{S1} rpm	Max. speed [3)] n_{max} rpm	1PH7 asynchronous motor Order No.
400 V 3 AC line voltage, Vector Control									
500	280	80/107.3	1529/1126.9	144	400	1700	2200	3300 [7)]	1PH7 284- ■ ■ B ■ ■ - 0 . . .
		100/134.1	1909/1406.9	180	400	1800	2200	3300 [7)]	1PH7 286- ■ ■ B ■ ■ - 0 . . .
		130/174.3	2481/1828.5	233	400	1800	2200	3300 [7)]	1PH7 288- ■ ■ B ■ ■ - 0 . . .
800	280	125/167.6	1492/1099.6	220	400	2200	2200	3300	1PH7 284- ■ ■ C ■ ■ - 0 . . .
		155/207.9	1850/1363.5	285	385	2200	2200	3300	1PH7 286- ■ ■ C ■ ■ - 0 . . .
		190/254.8	2268/1671.5	365	370	2200	2200	3300	1PH7 288- ■ ■ C ■ ■ - 0 . . .
1150	280	170/228.0	1414/1042.1	314	400	2200	2200	3300	1PH7 284- ■ ■ D ■ ■ - 0 . . .
		210/281.6	1745/1286.1	414	380	2200	2200	3300	1PH7 286- ■ ■ D ■ ■ - 0 . . .
		260/348.7	2160/1591.9	497	385	2200	2200	3300	1PH7 288- ■ ■ D ■ ■ - 0 . . .
1750	280	225/301.7	1228/905	393	400	2200	2200	3300	1PH7 284- ■ ■ F ■ ■ - 0 . . .
		270/362.1	1474/1086.3	466	400	2200	2200	3300	1PH7 286- ■ ■ F ■ ■ - 0 . . .
		340/455.9	1856/1367.9	586	400	2200	2200	3300	1PH7 288- ■ ■ F ■ ■ - 0 . . .

Option	Description	Code
Fans [4)]:	External fan unit, NDE at top, air-flow direction NDE to DE	0
	External fan unit, NDE on right, air-flow direction NDE to DE	1
	External fan unit, NDE on left, air-flow direction NDE to DE	2
	External fan unit, DE at top, air-flow direction DE to NDE	3
	External fan unit, DE on right, air-flow direction DE to NDE	4
	External fan unit, DE on left, air-flow direction DE to NDE	5
	Without external fan unit, for single pipe connection at NDE on right	6
Encoder systems for motors without DRIVE-CLiQ interface:	Without encoder	A
	Absolute encoder EnDat 2048 pulses/revolution	E
	Incremental encoder HTL 1024 pulses/revolution	H
	Incremental encoder HTL 2048 pulses/revolution	J
	Incremental encoder sin/cos 1 V_{pp} with C and D tracks [6)]	M
	Incremental encoder sin/cos 1 V_{pp} without C and D tracks [6)]	N
	2-pole resolver	R
Encoder systems for motors with DRIVE-CLiQ interface:	Absolute encoder 22 bit Singleturn + 12 bit Multiturn	F
	Incremental encoder 22 bit with commutation position [6)]	D
	Incremental encoder 22 bit [6)]	Q
	Resolver 14 bit	P
Terminal box/ cable entry (view onto DE) [4)]:	NDE right/from below/encoder connector DE	0
	NDE left/from below/encoder connector DE	1
	NDE top/from right/encoder connector DE	2
	DE top/from right/encoder connector NDE	5
Type [4)]:	IM B3	0
	IM V5 (can be subsequently modified to IM V6)	1
	IM B35 (with flange A 660)	3
	IM V15 (with flange A 660, can be subsequently modified to IM V36)	5

Selection and ordering data

Power factor cos ?	Magnetiz-ing current I_{μ} A	Efficiency η_{rated}	Rated frequency f_{rated} Hz	Moment of inertia of J kgm²/ lb_f-in-s²	Weight, approx. kg/lb	1PH7 asynchronous motor Order No.	SINAMICS S120 Motor Module Rated output current I_{rated} A	 Order No.
400 V 3 AC line voltage, Vector Control								
0.87	60	0.922	17	4.2/37.17	1300/2866.5	1PH7284- . . B . . -0 ■ ■ ■	200	6SL3120-1 TE32-0AA0
0.86	78	0.930	17	5.2/46.02	1500/3307.5	1PH7286- . . B . . -0 ■ ■ ■	200	6SL3120-1 TE32-0AA0
0.87	100	0.933	17	6.3/55.76	1700/3748.5	1PH7288- . . B . . -0 ■ ■ ■	260	6SL3320-1 TE32-6AA0
0.86	95	0.944	27	4.2/37.17	1300/2866.5	1PH7284- . . C . . -0 ■ ■ ■	260	6SL3320-1 TE32-6AA0
0.85	135	0.948	27	5.2/46.02	1500/3307.5	1PH7286- . . C . . -0 ■ ■ ■	310	6SL3320-1 TE33-1AA0
0.84	170	0.951	27	6.3/55.76	1700/3748.5	1PH7288- . . C . . -0 ■ ■ ■	380	6SL3320-1 TE33-8AA0
0.82	158	0.956	38.6	4.2/37.17	1300/2866.5	1PH7284- . . D . . -0 ■ ■ ■	310 5)	6SL3320-1 TE33-1AA0
0.81	218	0.958	38.6	5.2/46.02	1500/3307.5	1PH7286- . . D . . -0 ■ ■ ■	490	6SL3320-1 TE35-0AA0
0.82	252	0.960	38.6	6.3/55.76	1700/3748.5	1PH7288- . . D . . -0 ■ ■ ■	490 5)	6SL3320-1 TE35-0AA0
0.86	163	0.962	58.7	4.2/37.17	1300/2866.5	1PH7284- . . F . . -0 ■ ■ ■	490	6SL3320-1 TE35-0AA0
0.87	184	0.963	58.7	5.2/46.02	1500/3307.5	1PH7286- . . F . . -0 ■ ■ ■	490	6SL3320-1 TE35-0AA0
0.87	234	0.965	58.7	6.3/55.76	1700/3748.5	1PH7288- . . F . . -0 ■ ■ ■	605	6SL3320-1 TE36-1AA0

Output type 4):	**Vibration severity grade:**	**Shaft and flange accuracy:**	Code
Coupling	N	N	A
Coupling	R	R	B
Belt/incr. cantilever forces	N	N	E
Belt/incr. cantilever forces	R	R	F

Shaft extension (DE):	**Balancing:**	Code
Fitted key	Half-key	A
Fitted key	Full-key	C
Plain shaft	–	J

Paint finish:	Code
Primed	0
Anthracite (RAL 7016), standard paint finish	3
Anthracite (RAL 7016), special paint finish	6

Special versions:	Specify supplementary order code and plain text if applicable (see Options).	–Z

1) n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

2) n_{S1}: Max. permissible speed that is continuously permitted without speed duty cycles.

3) n_{max}: Maximum speed which must not be exceeded.

4) See Table "Permissible combinations of mechanical designs".

5) The rated output current of the Motor Module is lower than the motor rated current.

6) When ordering option L27 , please also select option M84 (insulated version of encoder).

7) Speed is limited to lower values in some cases. The following restriction applies: Max. output frequency < 5 × motor rated frequency.

Selection and ordering data

Rated speed n_{rated} rpm	Shaft height SH	Rated power P_{rated} kW/HP	Rated torque M_{rated} Nm/lb$_f$-ft	Rated current I_{rated} A	Rated voltage V_{rated} V	Speed during field weakening [1)] n_2 rpm	Max. permissible continuous speed [2)] n_{S1} rpm	Max. speed [3)] n_{max} rpm	1PH7 asynchronous motor Order No.
480 V 3 AC line voltage, Servo/Vector Control									
500	160	12/16.1	230/169.5	30	340	2840 [8)]	3700 [8)]	6500 [8)]	1PH7163- ■ ■ B ■ ■-■ . . .
		16/21.5	306/225.5	35	350	2380 [8)]	3700 [8)]	6500 [8)]	1PH7167- ■ ■ B ■ ■-■ . . .
1350	100	4.7/6.3	33/24.3	9.5	433	3500	5500	9000 [8)]	1PH7103- ■ ■ D ■ ■-■ . . .
		8/10.7	57/42	17	405	5160	5500	9000 [8)]	1PH7107- ■ ■ D ■ ■-■ . . .
	132	15/20.1	106/78.1	30	433	3500	4500	8000 [8)]	1PH7133- ■ ■ D ■ ■-■ . . .
		22/29.5	156/115	42	416	4750	4500	8000 [8)]	1PH7137- ■ ■ D ■ ■-■ . . .
	160	28/37.6	198/145.9	53	413	4000	3700	6500	1PH7163- ■ ■ D ■ ■-■ . . .
		34/45.6	241/177.6	67	400	5900	3700	6500	1PH7167- ■ ■ D ■ ■-■ . . .

Option		Description	Code
Fans:		External fan unit, heavy-gauge threaded cable entry in terminal box	2
		Without external fan unit, for pipe connection, heavy-gauge threaded cable entry in terminal box	6
		External fan unit, metric cable entry in terminal box	7
		Without external fan unit, for pipe connection, metric cable entry in terminal box	8
Encoder systems for motors without DRIVE-CLiQ interface:		Without encoder	A
		Absolute encoder EnDat 2048 pulses/revolution	E
		Incremental encoder HTL 1024 pulses/revolution	H
		Incremental encoder HTL 2048 pulses/revolution	J
		Incremental encoder sin/cos 1 V_{pp} with C and D tracks	M
		Incremental encoder sin/cos 1 V_{pp} without C and D tracks	N
		2-pole resolver	R
Encoder systems for motors with DRIVE-CLiQ interface:		Absolute encoder 22 bit Singleturn + 12 bit Multiturn	F
		Incremental encoder 22 bit with commutation position	D
		Incremental encoder 22 bit	Q
		Resolver 14 bit	P
Terminal box/ cable entry (view onto DE):		Top/from right	0
		Top/from NDE	2
		Top/from left	3
Type:		IM B3 (IM V5, IM V6)	0
		IM B5 (IM V1, IM V3) available only for shaft heights 100 and 132	2
		IM B35 (IM V15, IM V36)	3
Holding brake with emergency stop function [4)]:		Without brake	0
	Brake supply voltage 230 V 1 AC, 50/60 Hz	With brake	1
		With brake (includes microswitch)	2
		With brake (includes manual release)	3
		With brake (includes manual release and microswitch)	4
	Brake supply voltage 24 V DC V	With brake	5
		With brake (includes microswitch)	6
		With brake (includes manual release)	7
		With brake (includes manual release and microswitch)	8

Selection and ordering data

Power factor cos ?	Magnetiz-ing current I_μ A	Efficiency η_{rated}	Rated frequency f_{rated} Hz	Moment of inertia of J kgm²/lb$_f$-in-s²	Weight, approx. kg/lb	1PH7 asynchronous motor Order No.	SINAMICS S120 Motor Module Rated output current I_{rated} A	Order No.
Netzspannung 3 AC 480 V, Servo/Vector Control								
0.86	13	0.841	17.6	0.185/1.637	175/385.9	1PH7163- . . B . . - . ■■■	30	6SL3120- 1 TE23-0AA 1
0.89	13	0.836	17.7	0.228/2.018	210/463.05	1PH7167- . . B . . - . ■■■	45	6SL3120- 1 TE24-5AA 1
0.81	4.5	0.830	47.1	0.017/0.15	40/88.2	1PH7103- . . D . . - . ■■■	18	6SL3120- ■TE21-8AA ■
0.80	8.1	0.853	47.0	0.029/0.257	65/143.33	1PH7107- . . D . . - . ■■■	18	6SL3120- ■TE21-8AA ■
0.84	12	0.887	46.4	0.076/0.673	90/198.45	1PH7133- . . D . . - . ■■■	30	6SL3120- 1 TE23-0AA 1
0.85	17	0.895	46.3	0.109/0.965	150/330.75	1PH7137- . . D . . - . ■■■	45	6SL3120- 1 TE24-5AA 1
0.83	24	0.911	45.8	0.185/1.637	175/385.9	1PH7163- . . D . . - . ■■■	60	6SL3120- 1 TE26-0AA 1
0.83	34	0.910	45.8	0.228/2.018	210/463.05	1PH7167- . . D . . - . ■■■	85	6SL3120- 1 TE28-5AA 1

Output type:	Vibration severity grade:	Shaft and flange accuracy:	
Coupling/belt	R	R	B
Coupling/belt	S	R	C
Coupling/belt	SR	R	D
Coupling/belt	N	N (with brake mounting)	K
Increased maximum speed 5)	SR	R	L

Shaft extension (DE):	Balancing:	Direction of air flow (fan):	
Fitted key	Half-key	DE NDE	A
Fitted key	Half-key	NDE DE 7)	B
Fitted key	Full-key	DE NDE	C
Fitted key	Full-key	NDE DE 7)	D
Plain shaft	–	DE NDE	J
Plain shaft	–	NDE DE 7)	K

Seal:	Paint finish:	
–	None	0
Flange and shaft sealing ring 6)	None	2
–	Anthracite (RAL 7016), standard paint finish	3
Flange and shaft sealing ring 6)	Anthracite (RAL 7016), standard paint finish	5
–	Anthracite (RAL 7016), special paint finish	6
Flange and shaft sealing ring 6)	Anthracite (RAL 7016), special paint finish	8

Special versions:	Specify supplementary order code and plain text if applicable (see Options).	–Z	
Motor Module:	Single Motor Module	1	1
	Double Motor Module	2	0

1) n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.
2) n_{S1}: Max. permissible speed that is continuously permitted without speed duty cycles.
3) n_{max}: Maximum speed which must not be exceeded.
4) Model with brake possible if:
12th position "2" or "3",
14th position "K",
15th position "A", "B", "J" or "K",
16th position "0", "3" or "6".
5) Max. possible speed (see also selection guides):
SH 100: 12000 rpm, SH 132: 10000 rpm, SH 160: 8000 rpm,
with keyless shaft only (15th position "J" or "K" and 16th position "0", "3" or "6").
6) Only appropriate if oil spray/mist occasionally gets onto the sealing ring. A sealing ring is not possible for type IM B3 (IM V5, IM V6 and IM V36), or version with increased maximum speed.
7) Preferred air-flow direction in polluted environment.
8) Speed is limited to lower values in some cases. The following restriction applies: Max. output frequency < 5 × motor rated frequency.

Selection and ordering data

Rated speed n_{rated} rpm	Shaft height SH	Rated power P_{rated} kW/HP	Rated torque M_{rated} Nm/lbf-ft	Rated current I_{rated} A	Rated voltage V_{rated} V	Speed during field weakening [1] n_2 rpm	Max. permissible continuous speed [2] n_{S1} rpm	Max. speed [3] n_{max} rpm	1PH7 asynchronous motor Order No.
480 V 3 AC line voltage, Servo/Vector Control									
2000	100	4.7/6	22/16.2	10	459	7580	5500	9000	1PH7101- ■■F ■■-■ . . .
		7/9.4	33/24.3	13	459	4100	5500	9000	1PH7103- ■■F ■■-■ . . .
		9/12.1	43/31.7	17.5	450	7160	5500	9000	1PH7105- ■■F ■■-■ . . .
		11/14.8	53/39.1	23	433	5500	5500	9000	1PH7107- ■■F ■■-■ . . .
	132	15/20.1	72/53.1	25	459	5660	4500	8000	1PH7131- ■■F ■■-■ . . .
		20/26.8	96/70.8	34	459	5910	4500	8000	1PH7133- ■■F ■■-■ . . .
		24/32.2	115/84.8	42	459	6730	4500	8000	1PH7135- ■■F ■■-■ . . .
		28/37.6	134/98.8	55	402	4000	4500	8000	1PH7137- ■■F ■■-■ . . .
	160	37/49.6	177/130.4	70	412	4000	3700	6500	1PH7163- ■■F ■■-■ . . .
		45/60.4	215/158.5	76	459	3250	3700	6500	1PH7167- ■■F ■■-■ . . .
2650	100	8/10.7	29/21.4	16.5	440	7500	5500	9000	1PH7103- ■■G ■■-■ . . .
		13/17.4	47/34.6	24.5	459	7500	5500	9000	1PH7107- ■■G ■■-■ . . .
	132	24/32.2	87/64.1	42	450	4000	4500	8000	1PH7133- ■■G ■■-■ . . .
		30/40.2	108/79.6	52	450	4250	4500	8000	1PH7137- ■■G ■■-■ . . .
	160	40/53.6	144/106.1	76	433	3500	3700	6500	1PH7163- ■■G ■■-■ . . .
		44/6	159/117.2	77	459	3250	3700	6500	1PH7167- ■■G ■■-■ . . .

Option	Description		Code
Fans:	External fan unit, heavy-gauge threaded cable entry in terminal box		2
	Without external fan unit, for pipe connection, heavy-gauge threaded cable entry in terminal box		6
	External fan unit, metric cable entry in terminal box		7
	Without external fan unit, for pipe connection, metric cable entry in terminal box		8
Encoder systems for motors without DRIVE-CLiQ interface:	Without encoder		A
	Absolute encoder EnDat 2048 pulses/revolution		E
	Incremental encoder HTL 1024 pulses/revolution		H
	Incremental encoder HTL 2048 pulses/revolution		J
	Incremental encoder sin/cos 1 V_{pp} with C and D tracks		M
	Incremental encoder sin/cos 1 V_{pp} without C and D tracks		N
	2-pole resolver		R
Encoder systems for motors with DRIVE-CLiQ interface:	Absolute encoder 22 bit Singleturn + 12 bit Multiturn		F
	Incremental encoder 22 bit with commutation position		D
	Incremental encoder 22 bit		Q
	Resolver 14 bit		P
Terminal box/ cable entry (view onto DE):	Top/from right		0
	Top/from NDE		2
	Top/from left		3
Type:	IM B3 (IM V5, IM V6)		0
	IM B5 (IM V1, IM V3) available only for shaft heights 100 and 132		2
	IM B35 (IM V15, IM V36)		3
Holding brake with emergency stop function [4]:	Without brake		0
	Brake supply voltage 230 V 1 AC, 50/60 Hz	With brake	1
		With brake (includes microswitch)	2
		With brake (includes manual release)	3
		With brake (includes manual release and microswitch)	4
	Brake supply voltage 24 V DC	With brake	5
		With brake (includes microswitch)	6
		With brake (includes manual release)	7
		With brake (includes manual release and microswitch)	8

Selection and ordering data

Power factor cos ?	Magnetiz-ing current I_μ A	Efficiency η_{rated}	Rated frequency f_{rated} Hz	Moment of inertia of J kgm²/lb$_f$-in-s²	Weight, approx. kg/lb	1PH7 asynchronous motor Order No.	SINAMICS S120 Motor Module Rated output current I_{rated} A	Order No.
480 V 3 AC line voltage, Servo/Vector Control								
0.72	6.0	0.862	68.2	0.017/0.15	40/88.2	1PH7101- . . F . . - . ■■■	18	6SL3120- ■TE21-8AA ■
0.82	5.6	0.860	69.1	0.017/0.15	40/88.2	1PH7103- . . F . . - . ■■■	18	6SL3120- ■TE21-8AA ■
0.78	9.3	0.878	68.3	0.029/0.257	65/143.33	1PH7105- . . F . . - . ■■■	18	6SL3120- ■TE21-8AA ■
0.79	10.8	0.876	68.6	0.029/0.257	65/143.33	1PH7107- . . F . . - . ■■■	30	6SL3120- 1 TE23-0AA 1
0.88	8.5	0.903	68.0	0.076/0.673	90/198.45	1PH7131- . . F . . - . ■■■	30	6SL3120- 1 TE23-0AA 1
0.84	15	0.900	68.0	0.076/0.673	90/198.45	1PH7133- . . F . . - . ■■■	45	6SL3120- 1 TE24-5AA 1
0.85	17	0.905	67.8	0.109/0.965	150/330.75	1PH7135- . . F . . - . ■■■	45	6SL3120- 1 TE24-5AA 1
0.85	23	0.900	67.9	0.109/0.965	150/330.75	1PH7137- . . F . . - . ■■■	60	6SL3120- 1 TE26-0AA 1
0.85	29	0.912	67.5	0.185/1.637	175/385.88	1PH7163- . . F . . - . ■■■	85	6SL3120- 1 TE28-5AA 1
0.84	32	0.916	67.4	0.228/2.018	210/463.05	1PH7167- . . F . . - . ■■■	85	6SL3120- 1 TE28-5AA 1
0.78	8.2	0.871	90.3	0.017/0.15	40/88.2	1PH7103- . . G . . - . ■■■	18	6SL3120- ■TE21-8AA ■
0.78	12	0.887	90.2	0.029/0.257	65/143.33	1PH7107- . . G . . - . ■■■	30	6SL3120- 1 TE23-0AA 1
0.85	17	0.898	89.6	0.076/0.673	90/198.45	1PH7133- . . G . . - . ■■■	45	6SL3120- 1 TE24-5AA 1
0.84	21	0.894	89.4	0.109/0.965	150/330.75	1PH7137- . . G . . - . ■■■	60	6SL3120- 1 TE26-0AA 1
0.82	37	0.895	89.0	0.185/1.637	175/385.88	1PH7163- . . G . . - . ■■■	85	6SL3120- 1 TE28-5AA 1
0.80	40	0.911	89.0	0.228/2.018	210/463.05	1PH7167- . . G . . - . ■■■	85	6SL3120- 1 TE28-5AA 1

Output type:	**Vibration severity grade:**	**Shaft and flange accuracy:**	Code
Coupling/belt	R	R	B
Coupling/belt	S	R	C
Coupling/belt	SR	R	D
Coupling/belt	N	N (with brake mounting)	K
Increased max. speed [5]	SR	R	L

Shaft extension (DE):	**Balancing:**	**Direction of air flow (fan):**	Code
Fitted key	Half-key	DE NDE	A
Fitted key	Half-key	NDE DE [7]	B
Fitted key	Full-key	DE NDE	C
Fitted key	Full-key	NDE DE [7]	D
Plain shaft	–	DE NDE	J
Plain shaft	–	NDE DE [7]	K

Seal:	**Paint finish:**	Code
–	None	0
Flange and shaft sealing ring [6]	None	2
–	Anthracite (RAL 7016), standard paint finish	3
Flange and shaft sealing ring [6]	Anthracite (RAL 7016), standard paint finish	5
–	Anthracite (RAL 7016), special paint finish	6
Flange and shaft sealing ring [6]	Anthracite (RAL 7016), special paint finish	8

Special versions:	Specify supplementary order code and plain text if applicable (see Options).	–Z

Motor Module:		12th position	16th position
	Single Motor Module	1	1
	Double Motor Module	2	0

[1] n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

[2] n_{S1}: Max. permissible speed that is continuously permitted without speed duty cycles.

[3] n_{max}: Maximum speed which must not be exceeded.

[4] Model with brake possible if:
12th position "2" or "3",
14th position "K",
15th position "A", "B", "J" or "K",
16th position "0", "3" or "6".

[5] Max. possible speed (see also selection guides):
SH 100: 12000 rpm, SH 132: 10000 rpm, SH 160: 8000 rpm,
with keyless shaft only (15th position "J" or "K" and 16th position "0", "3" or "6").

[6] Only appropriate if oil spray/mist occasionally gets onto the sealing ring. A sealing ring is not possible for type IM B3 (IM V5, IM V6 and IM V36), or version with increased maximum speed.

[7] Preferred air-flow direction in polluted environment.

Selection and ordering data

Rated speed n_{rated} rpm	Shaft height SH	Rated power P_{rated} kW/HP	Rated torque M_{rated} Nm/lb$_f$-ft	Rated current I_{rated} A	Rated voltage V_{rated} V	Speed during field weakening [1] n_2 rpm	Max. permissible continuous speed [2] n_{S1} rpm	Max. speed [3] n_{max} rpm	1PH7 asynchronous motor Order No.
480 V 3 AC line voltage, Servo/Vector Control									
500	180	20.5/27.5	392/288.9	51	335	3200 [11]	3500 [4)11]	5000 [11]	1PH7184- ■■B■■-■...
		26.5/35.5	506/372.9	67	335	3600 [11]	3500 [4)11]	5000 [11]	1PH7186- ■■B■■-■...
	225	38/51.0	725/534.3	86	335	2900 [11]	3100 [4)11]	4500 [11]	1PH7224- ■■B■■-■...
		49/65.7	935/689.1	112	330	3200 [11]	3100 [4)11]	4500 [11]	1PH7226- ■■B■■-■...
		60/80.5	1145/843.9	135	340	3200 [11]	3100 [4)11]	4500 [4)11]	1PH7228- ■■B■■-■...
1350	180	50/67.1	355/261.6	86	450	5000	3500 [4]	5000	1PH7184- ■■D■■-■...
		67/89.9	475/350.1	114	460	5000	3500 [4]	5000	1PH7186- ■■D■■-■...
	225	92/123.4	650/479.1	156	450	2900	3100 [4]	4500	1PH7224- ■■D■■-■...
		120/160.9	847/624.2	193	460	2900	3100 [4]	4500	1PH7226- ■■D■■-■...
		147/197.1	1043/768.7	232	460	2900	3100 [4]	4500 [4]	1PH7228- ■■D■■-■...
2000	180	68/91.2	325/239.5	120	450	5000	3500 [4]	5000	1PH7184- ■■F■■-■...
		94/126.1	450/331.7	165	445	5000	3500 [4]	5000	1PH7186- ■■F■■-■...
	225	124/166.3	590/434.8	200	460	2900	3100 [4]	4500	1PH7224- ■■U■■-■...
		153/205.2	730/538	254	450	2900	3100 [4]	4500	1PH7226- ■■F■■-■...
		196/262.8	936/689.8	332	450	3000	3100 [4]	4500 [4]	1PH7228- ■■F■■-■...
2900	180	81/108.6	267/196.8	158	395	5000	3500 [4]	5000	1PH7184- ■■L■■-■...
		101/135.4	333/245.4	206	385	5000	3500 [4]	5000	1PH7186- ■■L■■-■...
	225	149/199.8	490/361.1	274	395	3500	3100 [4]	4500	1PH7224- ■■L■■-■...
		185/248.1	610/449.6	348	390	3500	3100 [4]	4500	1PH7226- ■■L■■-■...
		215/288.3	708/521.8	402	395	3500	3100 [4]	4500 [4]	1PH7228- ■■L■■-■...

Option	Description	Note	Code
Fans:	External fan unit, heavy-gauge threaded cable entry in terminal box		2
	Without external fan unit, for pipe connection, heavy-gauge threaded cable entry in terminal box		6
	External fan unit, metric cable entry in terminal box		7
	Without external fan unit, for pipe connection, metric cable entry in terminal box		8
Encoder systems for motors without DRIVE-CLiQ interface:	Without encoder		A
	Absolute encoder EnDat 2048 pulses/revolution		E
	Incremental encoder HTL 1024 pulses/revolution		H
	Incremental encoder HTL 2048 pulses/revolution		J
	Incremental encoder sin/cos 1 V_{pp} with C and D tracks [10]		M
	Incremental encoder sin/cos 1 V_{pp} without C and D tracks [10]		N
	2-pole resolver		R
Encoder systems for motors with DRIVE-CLiQ interface:	Absolute encoder 22 bit Singleturn + 12 bit Multiturn		F
	Incremental encoder 22 bit with commutation position [10]		D
	Incremental encoder 22 bit [10]		Q
	Resolver 14 bit		P
Terminal box/ cable entry (view onto DE):	Top/from right		0
	Top/from DE		1
	Top/from NDE		2
	Top/from left		3
Type:	IM B3		0
	IM B3	Hoisting system for different construction types (IM B6, IM B7, IM B8, IM V5, IM V6)	1
	IM B35 (only for 1PH7184 with flange A 400, 1PH7186 with flange A 450, 1PH722. with flange A 550)		3
	IM B35 (only for 1PH7184 with flange A 450)		4
	IM B35 (only for 1PH7184 with flange A 400, 1PH7186 with flange A 450, 1PH722. with flange A 550)	Hoisting system for different construction types (IM V15, IM V36)	5
	IM B35 (only for 1PH7184 with flange A 450)	Hoisting system for different construction types (IM V15, IM V36)	6
Holding brake with emergency stop function (suitable for coupling output in construction type IM B3) [5]:	Without brake		0
	With brake (includes emergency release screws and microswitch)		2
	With brake (includes manual release and microswitch)		4

Selection and ordering data

Power factor cos ?	Magnetiz-ing current I_{μ} A	Efficiency η_{rated}	Rated frequency f_{rated} Hz	Moment of inertia of J kgm²/lb$_f$-in-s²	Weight, approx. kg/lb	1PH7 asynchronous motor Order No.	SINAMICS S120 Motor Module Rated output current I_{rated} A	Order No.
480 V 3 AC line voltage, Servo/Vector Control								
0.83	26	0.858	17.5	0.503/4.452	370/815.85	1PH7184- . . B . . - . ■■■	60	6SL3120-1 T E26-0AA1
0.79	39.5	0.870	17.3	0.666/5.895	440/970.2	1PH7186- . . B . . - . ■■■	85	6SL3120-1 T E28-5AA1
0.85	37.5	0.888	17.3	1.479/13.09	630/1389.2	1PH7224- . . B . . - . ■■■	85 [9]	6SL3120-1 T E28-5AA1
0.85	50	0.900	17.3	1.930/17.082	750/1653.8	1PH7226- . . B . . - . ■■■	132	6SL3120-1 T E31-3AA0
0.84	61.5	0.907	17.2	2.326/20.587	860/1896.3	1PH7228- . . B . . - . ■■■	132 [9]	6SL3120-1 T E31-3AA0
0.81	42	0.928	45.8	0.503/4.452	370/815.85	1PH7184- . . D . . - . ■■■	85 [9]	6SL3120-1 T E28-5AA1
0.79	59.5	0.930	45.7	0.666/5.895	440/970.2	1PH7186- . . D . . - . ■■■	132	6SL3120-1 T E31-3AA0
0.80	78.5	0.942	45.6	1.479/13.09	630/1389.2	1PH7224- . . D . . - . ■■■	200	6SL3120-1 T E32-0AA0
0.82	88.5	0.945	45.6	1.930/17.082	750/1653.8	1PH7226- . . D . . - . ■■■	200	6SL3120-1 T E32-0AA0
0.84	99.5	0.947	45.6	2.326/20.587	860/1896.3	1PH7228- . . D . . - . ■■■	260	6SL3320-1 T E32-6AA0
0.78	66	0.935	67.3	0.503/4.452	370/815.85	1PH7184- . . F . . - . ■■■	132	6SL3120-1 T E31-3AA0
0.78	87	0.941	67.3	0.666/5.895	440/970.2	1PH7186- . . F . . - . ■■■	200	6SL3120-1 T E32-0AA0
0.82	91	0.944	67.2	1.479/13.09	630/1389.2	1PH7224- . . U . . - . ■■■	200	6SL3120-1 T E32-0AA0
0.82	119	0.948	67.2	1.930/17.082	750/1653.8	1PH7226- . . F . . - . ■■■	260	6SL3320-1 T E32-6AA0
0.79	168	0.950	67.1	2.326/20.587	860/1896.3	1PH7228- . . F . . - . ■■■	380	6SL3320-1 T E33-8AA0
0.80	77	0.934	97.4	0.503/4.452	370/815.85	1PH7184- . . L . . - . ■■■	200	6SL3120-1 T E32-0AA0
0.78	107	0.936	97.3	0.666/5.895	440/970.2	1PH7186- . . L . . - . ■■■	210	6SL3320-1 T E32-1AA0
0.84	115	0.946	97.3	1.479/13.09	630/1389.2	1PH7224- . . L . . - . ■■■	310	6SL3320-1 T E33-1AA0
0.83	154	0.946	97.2	1.930/17.082	750/1653.8	1PH7226- . . L . . - . ■■■	380	6SL3320-1 T E33-8AA0
0.82	188	0.954	97.2	2.326/20.587	860/1896.3	1PH7228- . . L . . - . ■■■	490	6SL3320-1 T E35-0AA0

Output type:	Vibration severity grade:	Shaft and flange accuracy:	
Coupling	R	N	A
Coupling	R	R	B
Coupling	S	R	C
Coupling	SR	R	D
Belt	R	N	E
Belt	R	R	F
Incr. cantilever forces	R	N	G
Incr. cantilever forces	R	R	H
Increased max. speed [6]	S	R	J

Shaft extension (DE):	Balancing:	Direction of air flow (fan):	
Fitted key	Half-key	DE NDE	A
Fitted key	Half-key	NDE DE [8]	B
Fitted key	Full-key	DE NDE	C
Fitted key	Full-key	NDE DE [8]	D
Plain shaft	–	DE NDE	J
Plain shaft	–	NDE DE [8]	K

Seal:	Paint finish:	
–	Primed	0
Flange and shaft sealing ring [7]	Primed	2
–	Anthracite (RAL 7016), standard paint finish	3
Flange and shaft sealing ring [7]	Anthracite (RAL 7016), standard paint finish	5
–	Anthracite (RAL 7016), special paint finish	6
Flange and shaft sealing ring [7]	Anthracite (RAL 7016), special paint finish	8

Special versions:	Specify supplementary order code and plain text if applicable (see Options).	–Z

1) n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.
2) n_{S1}: Max. permissible speed that is continuously permitted without speed duty cycles.
3) n_{max}: Maximum speed which must not be exceeded.
4) Speed is reduced with increased cantilever forces, see selection guides.
5) Model with brake: 12th position "0", 14th position "A", 15th position "A" or "B", 16th position "0", "3" or "6".
6) For shaft height 180 n_{max} = 7000 rpm, 1PH7 224 n_{max} = 5500 rpm, only coupling output possible and 16th position "0", "3" or "6".
7) Only appropriate if oil spray/mist occasionally gets onto the sealing ring. A sealing ring is not possible for type IM B3 (IM V5, IM V6 and IM V36), or version with increased maximum speed, version for belt output or increased cantilever forces.
8) Preferred air-flow direction in polluted environment.
9) The rated output current of the Motor Module is lower than the motor rated current.
10) When ordering option L27 , please also select option M84 (insulated version of encoder).
11) Speed is limited to lower values in some cases. The following restriction applies: Max. output frequency < 5 × motor rated frequency.

Selection and ordering data

Rated speed n_{rated} rpm	Shaft height SH	Rated power P_{rated} kW/HP	Rated torque M_{rated} Nm/lb$_f$-ft	Rated current I_{rated} A	Rated voltage V_{rated} V	Speed during field weakening [1] n_2 rpm	Max. permissible continuous speed [2] n_{S1} rpm	Max. speed [3] n_{max} rpm	1PH7 asynchronous motor Order No.
480 V 3 AC line voltage, Servo/Vector Control									
600	280	95/127.4	1519/1119.5	144	480	2200	2200	3300 [7]	1PH7284- ■ ■ B ■ ■ - 0 . . .
		120/160.9	1916/1412.1	180	480	2200	2200	3300 [7]	1PH7286- ■ ■ B ■ ■ - 0 . . .
		155/207.9	2467/1818.2	233	480	2200	2200	3300 [7]	1PH7288- ■ ■ B ■ ■ - 0 . . .
1000	280	150/201.2	1433/1056.1	220	480	2200	2200	3300	1PH7284- ■ ■ C ■ ■ - 0 . . .
		185/248.1	1767/1302.3	285	480	2200	2200	3300	1PH7286- ■ ■ C ■ ■ - 0 . . .
		230/308.4	2197/1619.2	365	460	2200	2200	3300	1PH7288- ■ ■ C ■ ■ - 0 . . .
1350	280	200/268.2	1416/1043.6	314	470	2200	2200	3300	1PH7284- ■ ■ D ■ ■ - 0 . . .
		245/328.6	1733/1277.2	414	445	2200	2200	3300	1PH7286- ■ ■ D ■ ■ - 0 . . .
		305/409.0	2158/1590.4	497	450	2200	2200	3300	1PH7288- ■ ■ D ■ ■ - 0 . . .
2000	280	255/342.0	1218/897.7	393	455	2200	2200	3300	1PH7284- ■ ■ F ■ ■ - 0 . . .
		310/415.7	1481/1091.5	466	455	2200	2200	3300	1PH7286- ■ ■ F ■ ■ - 0 . . .
		385/516.3	1838/1354.6	586	455	2200	2200	3300	1PH7288- ■ ■ F ■ ■ - 0 . . .

Fans [4]:	External fan unit, NDE at top, air-flow direction NDE to DE	0
	External fan unit, NDE on right, air-flow direction NDE to DE	1
	External fan unit, NDE on left, air-flow direction NDE to DE	2
	External fan unit, DE at top, air-flow direction DE to NDE	3
	External fan unit, DE on right, air-flow direction DE to NDE	4
	External fan unit, DE on left, air-flow direction DE to NDE	5
	Without external fan unit, for single pipe connection at NDE on right	6
Encoder systems for motors without DRIVE-CLiQ interface:	Without encoder	A
	Absolute encoder EnDat 2048 pulses/revolution	E
	Incremental encoder HTL 1024 pulses/revolution	H
	Incremental encoder HTL 2048 pulses/revolution	J
	Incremental encoder sin/cos 1 V_{pp} with C and D tracks [6]	M
	Incremental encoder sin/cos 1 V_{pp} without C and D tracks [6]	N
	2-pole resolver	R
Encoder systems for motors with DRIVE-CLiQ interface:	Absolute encoder 22 bit Singleturn + 12 bit Multiturn	F
	Incremental encoder 22 bit with commutation position [6]	D
	Incremental encoder 22 bit [6]	Q
	Resolver 14 bit	P
Terminal box/ cable entry (view onto DE) [4]:	NDE right/from below/encoder connector DE	0
	NDE left/from below/encoder connector DE	1
	NDE top/from right/encoder connector DE	2
	DE top/from right/encoder connector NDE	5
Type [4]:	IM B3	0
	IM V5 (can be subsequently modified to IM V6)	1
	IM B35 (with flange A660)	3
	IM V15 (with flange A 660; can be subsequently modified to IM V36)	5

Selection and ordering data

Power factor cos ?	Magnetiz-ing current I_μ A	Efficiency η_{rated}	Rated frequency f_{rated} Hz	Moment of inertia of J kgm²/lbf-in-s²	Weight, approx. kg/lb	1PH7 asynchronous motor Order No.	SINAMICS S120 Motor Module Rated output current I_{rated} A	Order No.
480 V 3 AC line voltage, Servo/Vector Control								
0.86	61	0.932	20.3	4.2/37.173	1300/2866.5	1PH7284- . . B . . - 0 ■ ■ ■	200	6SL3120-1 T E32-0AA0
0.86	80	0.939	20.3	5.2/46.02	1500/3307.5	1PH7286- . . B . . - 0 ■ ■ ■	200	6SL3120-1 T E32-0AA0
0.86	102	0.941	20.3	6.3/55.76	1700/3748.5	1PH7288- . . B . . - 0 ■ ■ ■	260	6SL3320-1 T E32-6AA0
0.86	90	0.950	34	4.2/37.173	1300/2866.5	1PH7284- . . C . . - 0 ■ ■ ■	260	6SL3320-1 T E32-6AA0
0.84	135	0.954	34	5.2/46.02	1500/3307.5	1PH7286- . . C . . - 0 ■ ■ ■	310	6SL3320-1 T E33-1AA0
0.84	170	0.956	34	6.3/55.76	1700/3748.5	1PH7288- . . C . . - 0 ■ ■ ■	380	6SL3320-1 T E33-8AA0
0.82	159	0.958	45.3	4.2/37.173	1300/2866.5	1PH7284- . . D . . - 0 ■ ■ ■	310 5)	6SL3320-1 T E33-1AA0
0.80	217	0.960	45.3	5.2/46.02	1500/3307.5	1PH7286- . . D . . - 0 ■ ■ ■	490	6SL3320-1 T E35-0AA0
0.82	250	0.962	45.3	6.3/55.76	1700/3748.5	1PH7288- . . D . . - 0 ■ ■ ■	490 5)	6SL3320-1 T E35-0AA0
0.86	162	0.962	67	4.2/37.173	1300/2866.5	1PH7284- . . F . . - 0 ■ ■ ■	490	6SL3320-1 T E35-0AA0
0.87	182	0.964	67	5.2/46.02	1500/3307.5	1PH7286- . . F . . - 0 ■ ■ ■	490	6SL3320-1 T E35-0AA0
0.87	232	0.965	67	6.3/55.76	1700/3748.5	1PH7288- . . F . . - 0 ■ ■ ■	605	6SL3320-1 T E36-1AA0

Output type 4):	Vibration severity grade:	Shaft and flange accuracy:	Code
Coupling	N	N	A
Coupling	R	R	B
Belt/increased cantilever forces	N	N	E
Belt/increased cantilever forces	R	R	F

Shaft extension (DE):	Balancing:	Code
Fitted key	Half-key	A
Fitted key	Full-key	C
Plain shaft	–	J

Paint finish:	Code
Primed	0
Anthracite (RAL 7016), standard paint finish	3
Anthracite (RAL 7016), special paint finish	6

Special versions:	Specify supplementary order code and plain text if applicable (see Options).	–Z

1) n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

2) n_{S1}: Max. permissible speed that is continuously permitted without speed duty cycles.

3) n_{max}: Maximum speed which must not be exceeded.

4) See Table "Permissible combinations of mechanical designs".

5) The rated output current of the Motor Module is lower than the motor rated current.

6) Only in conjunction with option M84 (insulated version of encoder).

7) Speed is limited to lower values in some cases. The following restriction applies: Max. output frequency < 5 × motor rated frequency.

Selection and ordering data

Rated speed n_{rated} rpm	Shaft height SH	Rated power P_{rated} kW/HP	Rated torque M_{rated} Nm/lb$_f$-ft	Rated current I_{rated} A	Rated voltage V_{rated} V	Speed during field weakening 1) n_2 rpm	Max. permissible continuous speed 2) n_{S1} rpm	Max. speed 3) n_{max} rpm	Asynchronmotor 1PH7 Order No.
690 V 3 AC line voltage, Servo/Vector Control									
500	280	77/103.3	1471/1084.1	80	690	1700	2200	3300 7)	1PH7284- ■ ■ B ■ ■ - 0 . . .
		96/128.7	1834/1351.7	101	690	1800	2200	3300 7)	1PH7286- ■ ■ B ■ ■ - 0 . . .
		125/167.6	2388/1760	130	690	1900	2200	3300 7)	1PH7288- ■ ■ B ■ ■ - 0 . . .
800	280	115/154.2	1373/1011.9	120	690	2200	2200	3300	1PH7284- ■ ■ C ■ ■ - 0 . . .
		145/194.5	1731/1275.7	160	665	2200	2200	3300	1PH7286- ■ ■ C ■ ■ - 0 . . .
		185/248.1	2208/1627.3	210	640	2200	2200	3300	1PH7288- ■ ■ C ■ ■ - 0 . . .
1150	280	164/219.9	1362/1003.8	176	690	2200	2200	3300	1PH7284- ■ ■ D ■ ■ - 0 . . .
		203/272.2	1686/1242.6	233	655	2200	2200	3300	1PH7286- ■ ■ D ■ ■ - 0 . . .
		251/336.6	2084/1535.9	280	665	2200	2200	3300	1PH7288- ■ ■ D ■ ■ - 0 . . .
1750	280	217/291.0	1184/872.6	221	690	2200	2200	3300	1PH7284- ■ ■ F ■ ■ - 0 . . .
		261/350.0	1424/1049.5	262	690	2200	2200	3300	1PH7286- ■ ■ F ■ ■ - 0 . . .
		329/441.2	1795/1322.9	330	690	2200	2200	3300	1PH7288- ■ ■ F ■ ■ - 0 . . .

Option	Description	Code
Fans 4):	External fan unit, NDE at top, air-flow direction NDE to DE	0
	External fan unit, NDE on right, air-flow direction NDE to DE	1
	External fan unit, NDE on left, air-flow direction NDE to DE	2
	External fan unit, DE at top, air-flow direction DE to NDE	3
	External fan unit, DE on right, air-flow direction DE to NDE	4
	External fan unit, DE on left, air-flow direction DE to NDE	5
	Without external fan unit, for single pipe connection at NDE on right	6
Encoder systems for motors without DRIVE-CLiQ interface:	Without encoder	A
	Absolute encoder EnDat 2048 pulses/revolution	E
	Incremental encoder HTL 1024 pulses/revolution	H
	Incremental encoder HTL 2048 pulses/revolution	J
	Incremental encoder sin/cos 1 V_{pp} with C and D tracks 6)	M
	Incremental encoder sin/cos 1 V_{pp} without C and D tracks 6)	N
	2-pole resolver	R
Encoder systems for motors with DRIVE-CLiQ interface:	Absolute encoder 22 bit Singleturn + 12 bit Multiturn 6)	F
	Incremental encoder 22 bit with commutation position 6)	D
	Incremental encoder 22 bit 6)	Q
	Resolver 14 bit	P
Terminal box/ cable entry (view onto DE) 4):	NDE on right/from below/encoder connector DE	0
	NDE on left/from below/encoder connector DE	1
	NDE at top/from right/encoder connector DE	2
	DE at top/from right/encoder connector NDE	5
Type 4):	IM B3	0
	IM V5 (can be subsequently modified to IM V6)	1
	IM B35 (with flange A660)	3
	IM V15 (with flange A 660; can be subsequently modified to IM V36)	5

Selection and ordering data

Power factor $\cos \varphi$	Magnetizing current I_μ A	Efficiency η_{rated}	Rated frequency f_{rated} Hz	Moment of inertia of J kgm²/lbf-in-s²	Weight, approx. kg/lb	1PH7 asynchronous motor Order No.	SINAMICS S120 Motor Module Rated output current I_{rated} A	Order No.
690 V 3 AC line voltage, Servo/Vector Control								
0.87	34	0.923	17	4.2/37.173	1300/2866.5	1PH7284- . . B . . -0 ■■■	85	6SL3320-1 TH28-5AA0
0.86	45	0.927	17	5.2/46.02	1500/3307.5	1PH7286- . . B . . -0 ■■■	100 5)	6SL3320-1 TH31-0AA0
0.86	57	0.930	17	6.3/55.76	1700/3748.5	1PH7288- . . B . . -0 ■■■	150	6SL3320-1 TH31-5AA0
0.85	55	0.943	27	4.2/37.173	1300/2866.5	1PH7284- . . C . . -0 ■■■	120	6SL3320-1 TH31-2AA0
0.84	80	0.947	27	5.2/46.02	1500/3307.5	1PH7286- . . C . . -0 ■■■	175	6SL3320-1 TH31-8AA0
0.84	100	0.950	27	6.3/55.76	1700/3748.5	1PH7288- . . C . . -0 ■■■	215	6SL3320-1 TH32-2AA0
0.81	91	0.955	38.6	4.2/37.173	1300/2866.5	1PH7284- . . D . . -0 ■■■	175 5)	6SL3320-1 TH31-8AA0
0.80	125	0.957	38.6	5.2/46.02	1500/3307.5	1PH7286- . . D . . -0 ■■■	260	6SL3320-1 TH32-6AA0
0.81	145	0.959	38.6	6.3/55.76	1700/3748.5	1PH7288- . . D . . -0 ■■■	330	6SL3320-1 TH33-3AA0
0.86	94	0.961	58.7	4.2/37.173	1300/2866.5	1PH7284- . . F . . -0 ■■■	260	6SL3320-1 TH32-6AA0
0.87	105	0.963	58.7	5.2/46.02	1500/3307.5	1PH7286- . . F . . -0 ■■■	260 5)	6SL3320-1 TH32-6AA0
0.86	134	0.964	58.7	6.3/55.76	1700/3748.5	1PH7288- . . F . . -0 ■■■	330	6SL3320-1 TH33-3AA0

Output type 4):	Vibration severity grade:	Shaft and flange accuracy:	
Coupling	N	N	A
Coupling	R	R	B
Belt/incr. cantilever forces	N	N	E
Belt/incr. cantilever forces	R	R	F

Shaft extension:	Balancing:	
Fitted key	Half-key	A
Fitted key	Full-key	C
Plain shaft	–	J

Paint finish:	
Primed	0
Anthracite (RAL 7016), standard paint finish	3
Anthracite (RAL 7016), special paint finish	6

Special versions:	Specify supplementary order code and plain text if applicable (see Options). C30 absolutely essential	–Z

1) n_2: Max. permissible thermal speed at constant output or speed, which is at the voltage limit when $P = P_{rated}$.

2) n_{S1}: Max. permissible speed that is continuously permitted without speed duty cycles.

3) n_{max}: Maximum speed which must not be exceeded.

4) See Table "Permissible combinations of mechanical designs".

5) The rated output current is lower than the motor rated current.

6) Only in conjunction with option **M84** (insulated version of encoder).

7) Speed is limited to lower values in some cases. The following restriction applies: Max. output frequency < 5 × motor rated frequency.

1.4 Permissible combinations of mechanical versions for SH 280

MLFB: 1P.. 284 / 1P.. 286 / 1P.. 288 - 8 9 10 11 12 - 13 14 15 16

MLFB allocation possibilities: - 8 External fan; 11 Terminal box; 12 Type; 14 Drive type

MLFB	8 External fan: 0 B side on top, BS --> AS	1 B side right, BS --> AS	2 B side left, BS --> AS	3 A side on top, AS --> BS	4 A side rightS, AS --> BS	5 A side left, AS --> BS	6 Single tube connection BS right (Conversion possible later on BS left)	11 Terminal box: 0 B side right, cable entry at bottom, encoder connector AS	1 B side left, cable entry at bottom, encoder connector AS	2 B side on top, cable entry right, encoder connector AS	5 A side at bottom, cable entry right, encoder connector BS	12 Type: 0 Type IM B3	1 Type IM V5 (IM V6)	3 Type IM B35	5 Type IM V15 (IM V36)	14 Drive type: A Coupling N/N	B Coupling R/R	E Belt / increased cantilever forces N/N	F Belt / increased cantilever forces R/R
- . . . . . 0 - Type IM B3	S							S	X		X					S	X	X	X
		X							X	X	X					S	X	X	X
			X					S		X	X					S	X	X	X
				X						X						S	X	X	X
					X					X						S	X	X	X
						X				X						S	X	X	X
							X			X	X					S	X	X	X
- . . . . . 1 - Type IM V5 (conversion possible later in IM V6)	S							S	X		X					S	X		
		X							X	X	X					S	X		
			X					S		X	X					S	X		
				X				S	X	X						S	X		
					X			S	X	X						S	X		
						X		S	X	X						S	X		
							X			X	X					S	X		
- . . . . . 3 - Type IM B35	S							S	X							S	X	X	X
		X							X	X						S	X	X	X
			X					S		X						S	X	X	X
				X						X						S	X	X	X
					X					X						S	X	X	X
						X				X						S	X	X	X
							X			X						S	X	X	X
- . . . . . 5 - Type IM V15 (conversion possible later in IM V36)	S							S	X							S	X		
		X							X	X						S	X		
			X					S		X						S	X		
				X				S	X	X						S	X		
					X			S	X	X						S	X		
						X		S	X	X						S	X		
							X			X						S	X		
Z options																			
R1Y standard paint RAL ...	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
R2Y standard paint RAL ...	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
G14 with air filter	X	X	X	X	X	X													
K08 encoder connector mounting opposite								X	X	X									
K55 entry plate terminal box customer-specific (plain text necessary)								X	X	X	X								
K83 turning terminal box by +90 degrees (base is standard)								X	X	X									
K84 turning terminal box by -90 degrees (base is standard)								X	X	X	X								
K85 turning terminal box by 180 degrees (base is standard)								X	X	X	X								
K16 second normal shaft extension (possible only without encoder)												X		X		X	X		
K31 second rating plate	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
K45 anti-condensation heating 230V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
C30 type 690V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Y55 abnormal shaft extension AS																X	X	X	X
Y80 deviating rating plate data (plain text necessary)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Y82 additional plate with order details (plain text necessary)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
M83 additional back-off threads on motor feet												X		X					

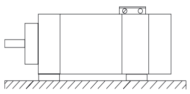
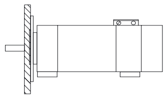
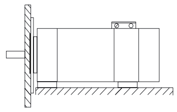
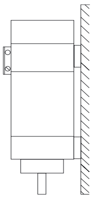
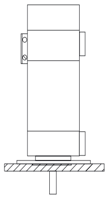
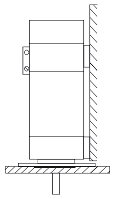
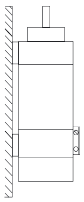
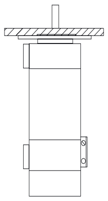
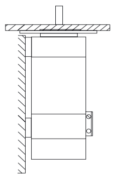
S = Standard (blue)
X = Additionally released variants (cream)

Application 2

2.1 Environment

2.1.1 Construction types

Table 2-1 The various types of construction

Type of construction	Designation	Type of construction	Designation	Type of construction	Designation
	IM B3		IM B5		IM B35
	IM V5		IM V1		IM V15
	IM V6		IM V3		IM V36

2.1.2 Natural frequency when mounted

The motor is a system which is capable of vibration at its natural frequency. For all motors, this resonant frequency lies above the specified maximum speed.

When the motor is mounted onto a machine, a new system, which is capable of vibration, is created with modified natural frequencies. These can lie within the motor speed range.

This can result in undesirable vibrations in the mechanical drive transmission.

NOTICE
Motors must be carefully mounted on adequately stiff foundations or bedplates. Additional elasticities of the foundation/bedplates can result in resonance effects of the natural frequency at the operating speed and therefore result in inadmissibly high vibration values.

The magnitude of the natural frequency when the motor is mounted depends on various factors and can be influenced by the following points:

- Mechanical transmission elements (gearboxes, belts, couplings, pinions, etc.)
- Stiffness of the machine design to which the motor is mounted
- Stiffness of the motor in the area around the foot or customer flange
- Motor weight
- Machine weight and the weight of the mechanical system in the vicinity of the motor
- Damping properties of the motor and the driven machine
- Mounting type, mounting position (IM B5, IM B3, IM B35, IM V1 etc.)
- Motor weight distribution, i.e. length, shaft height

After the motors have been mounted, the caps for the screw holes in the mounting feet must be re-located.

2.1.3 Mounting and mounting instructions

In order to ensure smooth, vibration-free motor operation, a stable foundation design is required, the motor must be precisely aligned, and the components that are to be mounted on the shaft end must be correctly balanced.

The following mounting instructions must be carefully observed:

- For high-speed machines, we recommend that the complete unit is dynamically balanced after couplings or belt pulleys have been mounted.
- Use suitable equipment when mounting drive elements. Use the thread at the shaft end.
- Do not apply any blows or axial pressure to the shaft end.
- Especially for high-speed motors with flange mounting, it is important that the mounting is stiff in order to locate any resonant frequency as high as possible so that it remains above the maximum rotational frequency.
- Thin sheets (shims) can be placed under the motor mounting feet to align the motor and to avoid mechanically stressing the motor. The number of shims used should be kept to a minimum.
- In order to securely mount the motors and reliably and safely transfer the drive torque, bolts with strength class 8.8 acc. to ISO 898-1 should be used.

Note

All flange-mounted motors must have a stable motor suspension assembly and for high field weakening speeds must be supported using the appropriate feet at the bearing endshield (foot/flange type of construction, also refer to Chapter "Vibration severity limit values").

Support using feet at the bearing endshield is not required if the following conditions are maintained:

- For flange-mounted motors, there is a stable motor suspension design

- The permissible vibration values acc. to DIN ISO 10816 are maintained

- The maximum speed is limited (refer to Table "Restricting the maximum speed")

Motors that are mounted, as a result of their type of construction, to the wall using the motor feet, must be retained in place using an adequately dimensioned positive form fit (e.g. using studs or mounting rails).

When commissioning the motors, it must be ensured that the permissible vibration values in accordance with DIN ISO 10816 are maintained.

Table 2-2 Limiting the maximum speed

Shaft height [mm]	Max. permissible speed [rpm]
160	3000
180	3000
225	2500
280	2000

⚠ CAUTION

Liquid must be prevented from collecting in the flange, both in the vertical as well as horizontal mounting positions. This would have a negative impact on the bearing and bearing grease.

After the motors have been mounted, the caps for the screw holes in the mounting feet must be re-located.

Note

1PH7 motors are force-ventilated. When mounting the motors, it must be ensured that the motor can be well ventilated. This is especially true when mounting the motors in enclosures. It is not permissible that the hot discharged air is drawn in again.

Mount air-cooled motors so that the cooling air can enter and be discharged without any restrictions (also refer to Section "Cooling").

2.1.4 Permissible induced vibrations

External vibrations are introduced into the motor through the motor foundation and/or the drive mechanical transmission through the motor frame and/or through the rotor. In order to ensure perfect functioning of the drive as well as a long motor lifetime, these types of vibrations, introduced into the drive system, should not exceed the specific limit values of the motor.

Vibrations caused by the rotor must be minimized by appropriately balancing the motor (refer to Chapter "Balancing process").

Table 2-3 Vibration values

Vibration frequency	Vibration values		
		Shaft heights 100 to 160	SH 180 and 280
< 6.3 Hz	Vibration travel s [mm]	≤ 0,16	≤ 0,25
6,3...63 Hz	Vibration velocity v_{aM} [mm/s]	≤ 4,5	≤ 7,1
> 63 Hz	Vibration acceleration a [m/s²]	≤ 2,55	≤ 4,0

2.1.5 Vibration severity limit values

High cantilever force loads cannot be handled at high speed and with high vibration quality. The reason for this is that the different applications require different bearings.

Motors up to and including SH 132 comply with level B acc. to EN 60034-14 up to the rated speed.

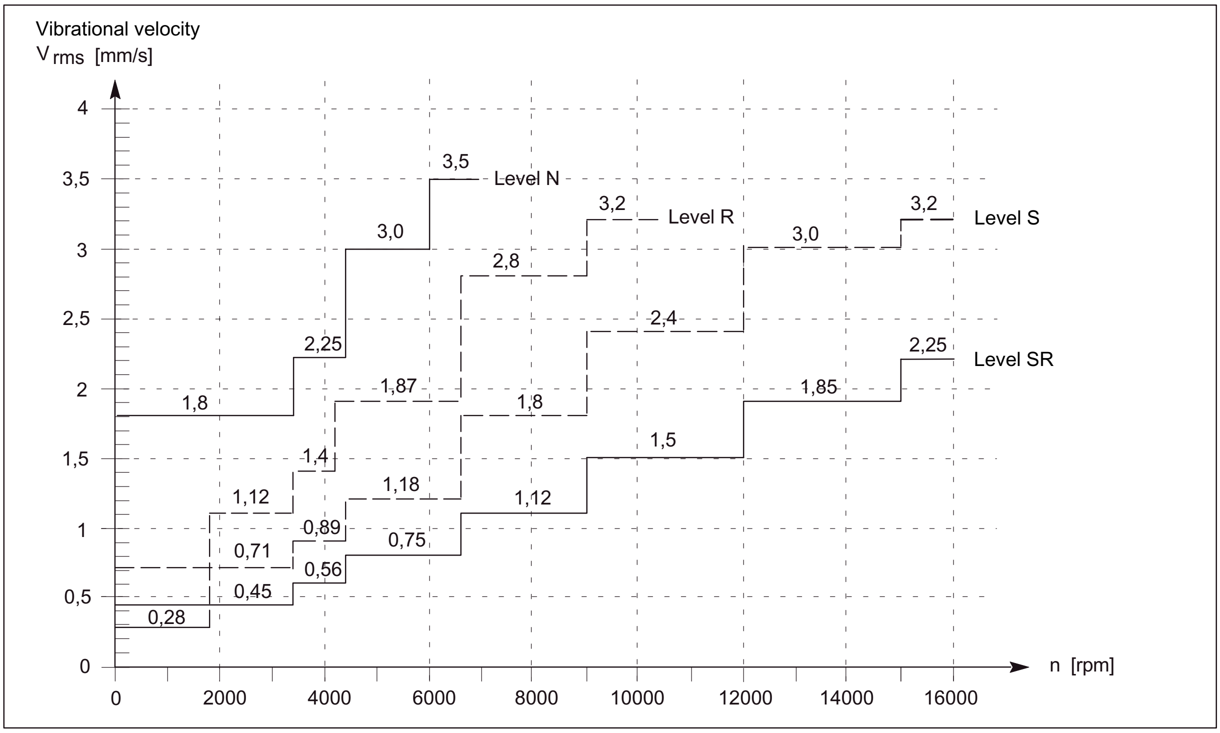


Figure 2-1 Vibration severity limit values for induction motors SH 100 to 132.

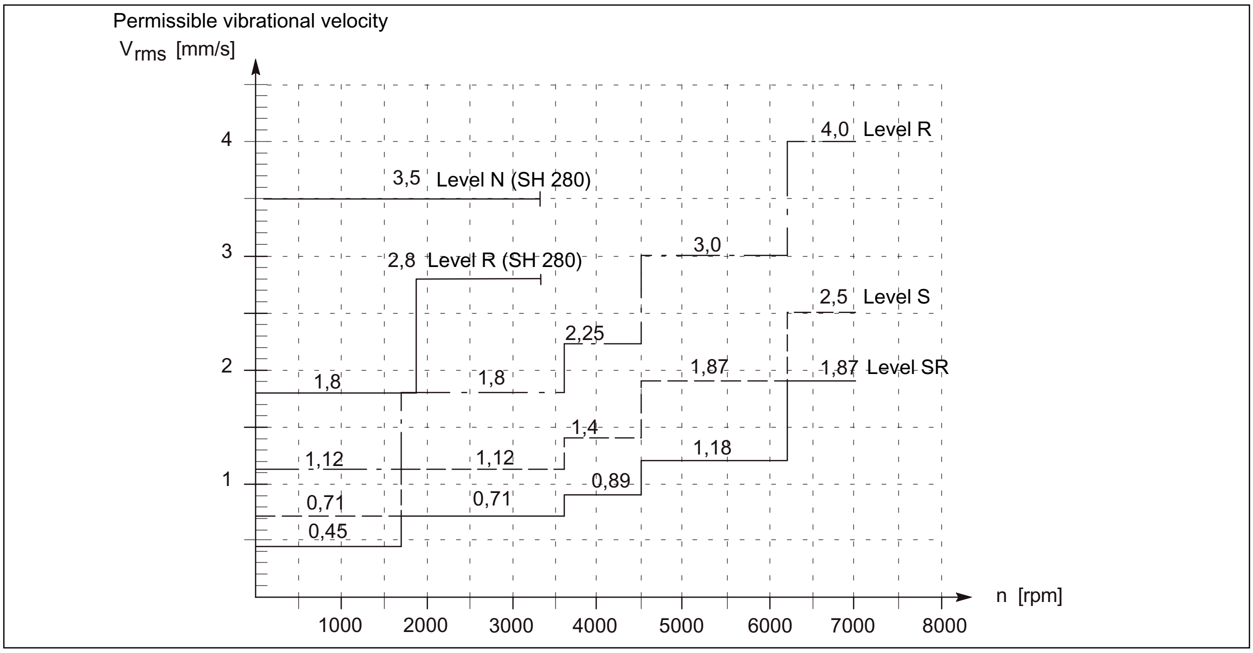


Figure 2-2 Vibration severity limit values for induction motors SH 160 to 280.

2.1.6 Cooling

Ambient/cooling medium temperature

Operation: T = -15 °C to +40 °C (without any restrictions)
Storage: T = -20 °C to +70 °C

For deviating conditions (ambient temperature > 40°C or installation altitude > 1000 m above sea level) the permissible torque/power must be defined from the following table. Ambient temperatures and installation altitudes are rounded-off to 5° C or 500 m respectively.

Table 2-4 Factors for reducing the torque/power acc. to EN 60034-6

Installation altitude above sea level	Ambient temperature in °C		
	40	45	50
1000	1,00	0,96	0,92
1500	0,97	0,93	0,89
2000	0,94	0,90	0,86
2500	0,90	0,86	0,83
3000	0,86	0,82	0,79
3500	0,82	0,79	0,75
4000	0,77	0,74	0,71

NOTICE
For ambient temperatures > 50 °C, please contact your local Siemens office.

Note

1PH7 motors are force-ventilated. When mounting the motor, it must be ensured that the motor can be well ventilated. This is especially true when mounting the motors in enclosures. It is not permissible that hot discharged air is drawn-in again; cooling air must be able to freely enter and exit. Accumulated dirt in the cooling ducts should be avoided as this can reduce the cooling airflow.

If necessary, the cooling ducts must be regularly cleaned depending on the degree of pollution at the location where the motor is installed (e.g. using dry, oil-free compressed air).

All catalog data refer to an ambient temperature of 40°C and an installation altitude up to 1000 m above sea level.

⚠ CAUTION
Temperatures of over 100°C can occur at the surface of the motor.

Mounting a fan and minimum clearance to the customers mounted parts and components

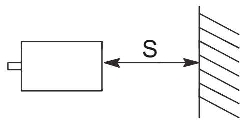
Table 2-5 Fan mounting

Shaft height [mm]	Fan mounting
100 to 225	NDE side, axial, can be rotated through 4 x 90°
280	NDE side radial, can be ordered differently from the mounting type

The minimum clearance to the customer's mounted parts and components and the air discharge opening as well as the minimum clearance S between the air intake and air discharge openings and adjacent components must be maintained.

Table 2-6 Minimum clearances

Shaft height [mm]	Minimum clearance to the customer's mounted parts and components [mm]	Minimum clearance S [mm]
100	30	30
132	60	60
160	80	80
180	100	80
225	100	80
280	170	120



Air flow rate, air flow direction and air discharge

Table 2-7 Air flow rate, air flow direction and air discharge

Shaft height [mm]	Air flow direction	Required air flow rate [m³/s]	Air discharge	Pressure drop (Δp) [Pa]
100	NDE - DE	0,04	Axial	on request
	DE - NDE	0,04	Axial	
132	NDE - DE	0,1	Axial	on request
	DE - NDE	0,1	Axial	
160	NDE - DE	0,15	Axial	on request
	DE - NDE	0,15	Axial	
180	NDE - DE	0,19	Axial	650
	DE - NDE	0,19	Radial	650
225	NDE - DE	0,36	Axial	900
	DE - NDE	0,36	Radial	
280	NDE - DE	0,42	Radial	600
	DE - NDE	0,42	Radial	

Note

If the ambient air is polluted by particles of dust or similar substances, then it is preferable if the air flow direction NDE -> DE is selected.

For motors with pipe/duct connection, the potential pressure drop within the motor is specified in the table.

Cleaning the cooling air passages

For air-cooled motors, the cooling ducts, through which the ambient air flows, must be regularly cleaned depending on the degree of pollution at the mounting location. These air ducts can be cleaned, e.g. using dry, oil-free compressed air.

Please refer to the Operating Instructions for details.

Cooling conditions for motors with pipe/duct connection

1PH7 motors that are configured to allow pipes to be connected and/or for operation with a separately driven fan must have pipes and a fan of suitable type and dimensioning mounted and connected to them.

2.1.7 Degree of protection acc. to EN 60034-5

Degree of protection of electric motors is specified by a code. This comprises 2 letters, 2 digits and if required, an additional letter. The motors are assigned to degrees of protection IP□□ after the test objects have been subject to a type test test.

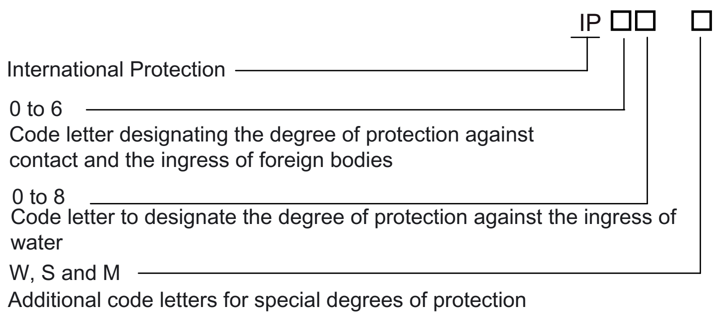


Table 2-8 Description of the various degrees of protection

Motor	Degree of protection	1. code number		2. code number
		Touch protection	Protection against ingress of solid foreign bodies	Protection against water
Internally cooled	IP23	Protection against finger contact	Protection against medium-sized, solid foreign bodies above 12 mm ∅	Protection against spray water up to 60 °C from the vertical
Sur-face cooled	IP 54	Complete protection against contact	Protection against damaging dust deposits	Spray water from every direction
	IP55			Jets of water from every direction
	IP64	Complete protection against contact	Protection against the ingress of dust	Spray water from every direction
	IP65 [1)]			Jets of water from every direction
	IP67[1)]			Motor immersed in water under specific pressure and time conditions
	IP68[1)]			Motor can be completely submersed in water under conditions that the manufacturer must specify

1) According to DIN VDE 0530 Part 5 or EN 60034 Part 5, for the 1st code number, there are only 5 degrees of protection and for the 2nd code number, 8 degrees of protection for rotating electrical machinery. However, IP6 is included in DIN 40050 which generally applies to electrical equipment.

When assigning motors to a specific degree of protection Class, a standardized, brief test procedure is applied. This can deviate significantly from the actual ambient conditions where the motor is installed.

> **NOTICE**
>
> Depending on these ambient conditions- such as the chemical properties of dusts or the cooling media used at the installation site - it is only conditionally possible to evaluate the suitability of the motor for the particular environment using the degree of protection (e.g. electrically conductive dusts or aggressive cooling medium vapors or liquids).
>
> In these cases, the motor must be additionally protected using the appropriate measures.

NOTICE
Even for versions with radial shaft sealing ring, liquids should be avoided from collecting.

Routing cables in a wet/moist environment

NOTICE
If the motor is mounted in a humid environment, the power and signal cables must be routed as shown in the following figure.

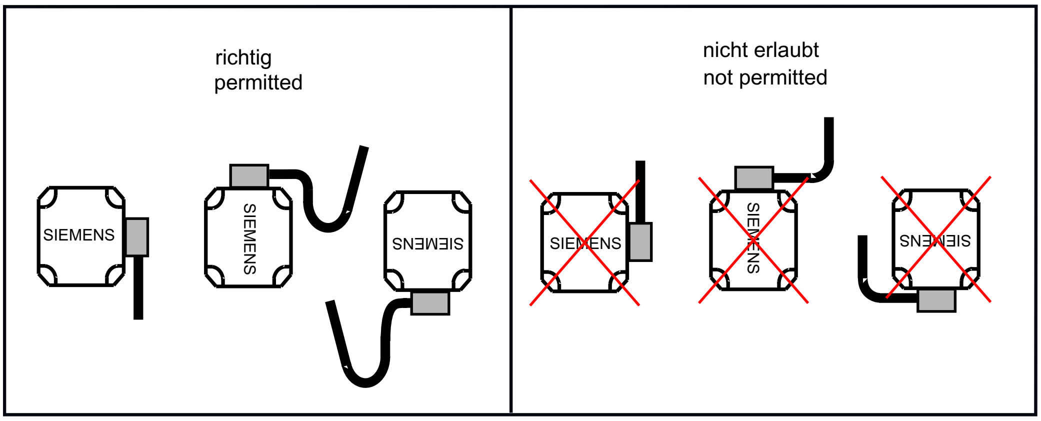


Figure 2-3 Routing cables in a wet/moist environment

2.1.8 Paint finish

1PH7 motors are supplied with the following paint finish:

- SH 100 to 160: Without paint finish, standard paint finish, anthracite RAL 7016
- SH 180 to 280: Primed, standard paint finish, anthracite RAL 7016

Other colors: Refer to the table "Technical features, options".

Note

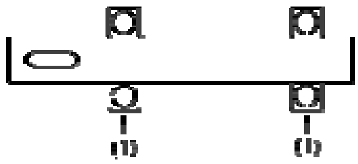
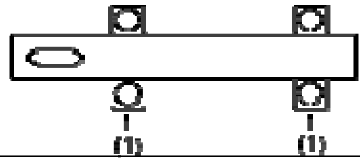
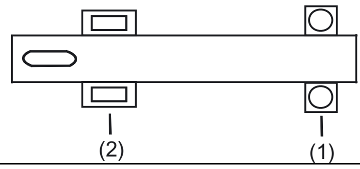
Use in sub-tropical countries

The motors should be ordered with a "worldwide" paint finish if they are to be used in sub-tropical regions or if they are to be transported by sea to prevent corrosion.

2.1.9 Drive output types and bearing versions

1PH7 induction motors are suitable for coupling output and belt coupling. The bearing versions and their applications are summarized in the following table.

Table 2-9 Drive output type with the appropriate bearing design

Application	Bearing version	
• Coupling output • Planetary gearboxes with low cantilever forces	Shaft heights 100 to 160  	Shaft heights 180 to 280 
• Belt coupling with normal cantilever force • Pinion output with straight teeth • Belt coupling with increased cantilever force		Shaft heights 180 to 280 

1) Deep-groove ball bearings (floating bearing)

2) Cylindrical-roller bearing

Bearing version, drive output type and maximum speed

Table 2-10 Bearing version, drive output type and maximum speeds

Shaft height	Bearing type/ drive output type	Bearing type motor side	Bearing designation	Max. continuous speed for S1 duty [rpm]		Max. speed limit 1) [rpm]	
				n_{s1}	n_{s1} 2)	n_{max}	n_{max} 2)
100	Deep-groove ball bearings for coupling output or belt coupling configurations	DE NDE	6308 C4 6208 C4	5500	10000	9000	12000
132	Deep-groove ball bearings for coupling output or belt coupling configurations	DE NDE	6310 C4 6210 C4	4500	8500	8000	10000
160	Deep-groove ball bearings for coupling output or belt coupling configurations	DE NDE	6312 C4 6212 C4	3700	7000	6500	8000
180	Deep-groove ball bearings for coupling output	DE NDE	6214 C3 6214 C3	3500	4500	5000	7000
180	Cylindrical roller bearings for belt coupling	DE NDE	NU2214E 6214 C3	3500	-	5000	-
180	Cylindrical roller bearings for increased cantilever forces	DE NDE	NU2214E 6214 C3	3000	-	5000	-
225	Deep-groove ball bearings for coupling output	DE NDE	6216 C3 6216 C3	3100	3600 (for 1PH7224)	4500	5500 (for 1PH7224)
225	Cylindrical roller bearings for belt coupling	DE NDE	NU2216E 6216 C3	3100	-	4500	-
224 226	Cylindrical roller bearings for increased cantilever forces	DE NDE	NU2216E 6216 C3	2700	-	4500	-
228	Cylindrical roller bearings for increased cantilever forces	DE NDE	NU2216E 6216 C3	2500	-	4000	-
280	Deep-groove ball bearings for coupling output	DE NDE	6220 C3 6220 C3	2200	-	3300	-
280	Cylindrical roller bearings for belt coupling	DE NDE	NU220E 6220 C3	2200	-	3300	-

1) For continuous operation (with 30 % n_{max}, 60 % 2/3 n_{max}, 10 % standstill) for a cycle duration of 10 min.

2) Version for increased maximum speeds

Continuous speed n_{S1}

The max. permissible continuous operating speed n_{S1} depends on the bearing version and the shaft height.

⚠ CAUTION

If the motor is operated at speeds between n_{s1} and n_{max}, then a speed duty cycle is assumed that has time components with low speed and standstill in order that the lubricant being used can re-generate.

2.1.10 Bearing lifetime

The bearing lifetime is limited by material fatigue (fatigue lifetime) or lubrication failure (grease lifetime). The fatigue lifetime (statistical bearing lifetime L_{10h}) is mainly dependent on the mechanical load. The inter-dependency is shown in the cantilever force/axial force diagrams. The values are determined according to DIN/ISO 281.

The grease lifetime is mainly dependent on the bearing size, speed, temperature as well as the vibrational load.

The grease lifetime can be extended by especially favorable operating conditions (low or average speed, low bearing temperatures, low cantilever force or vibration load).

A reduction of the grease lifetime can be expected for difficult operating conditions and when motors are mounted vertically.

Lifetime lubrication (without re-lubricating)

For lifetime lubrication, the grease lifetime is harmonized with the bearing lifetime L_{10h}.

Bearing change interval (t_{LW})

The recommended bearing change intervals are obtained from the inter-dependencies mentioned above for a specific operating point such as:

- Coupling output or belt coupling
- Horizontal mounting position
- Cooling-medium temperature up to max. +40 °C
- Complying with the permissible cantilever and axial forces (refer to Chapter "Cantilever and axial forces")
- Complying with the maximum permissible speeds (refer to Chapter "Technical data and characteristics")
- The bearing change intervals are reduced for unfavorable operating conditions, for example
  - Average speed > as specified in the following table
  - Vibration and shock load
  - Frequent reversing operation

Note

When replacing the motor bearings, we also recommend that motor encoders with their own bearings are also replaced.

Table 2-11 Recommended bearing change intervals (standard bearing design)

Shaft height	Drive output type	Average operating speed n_m[rpm]	Stat. bearing lifetime L_{10h} [h]	Recommended bearing change interval t_{Lw} [h]	
				Permanent lubrication	Re-greasing
100	Coupling output or belt coupling	≤ 3000 ≤ 2500	20000	20000	-
132	Coupling output or belt coupling	≤ 2500 ≤ 2000			
160	Coupling output or belt coupling	≤ 2000 ≤ 1500			
180	Coupling output	≤ 2000	40000	20000	40000
	Belt coupling	≤ 1500	24000	12000	24000
	increased cantilever forces		20000		20000
225	Coupling output	≤ 1750	40000 [1)]	20000	40000 [1)]
	Belt coupling	≤ 1400	24000	12000	24000
	increased cantilever forces		20000		20000
280	Coupling output	≤ 1500	40000 [2)]	20000	40000 [2)]
	Belt coupling [3)]	≤ 1300	24000	12000	24000

1) when vertically mounted 25000 [h]
2) when vertically mounted 24000 [h]
3) vertical mounting not permissible

Table 2-12 Recommended bearing change intervals for increased speeds (standard bearing design)

Shaft height	Average operating speed[1)] n_m [rpm]	Recommended bearing change interval t_{LW} [h]	Max. continuous speed for S1 duty n_{s1} [rpm]
100	2500 < n_m < 6000	8000	5500
132	2000 < n_m < 5500		4500
160	1500 < n_m < 4500		3700
180	1500 < n_m < 4000		3500 [2)]
225	1400 < n_m < 3500		3100 [3)]
280	1300 < n_m < 1800		2200

1) This assumes a speed example, also with low speeds and zero speed intervals
2) for increased cantilever forces ≤ 3000 [rpm]
3) for increased cantilever forces ≤ 2700 [rpm]

Table 2-13 Recommended bearing change intervals for bearing versions with increased maximum speed

Shaft height	Average operating speed [1) n_m [rpm]	Recommended bearing change interval t_{LW} [h]	Max. continuous speed for S1 duty n_{s1} [rpm]
100	$8000 \le n_m < 12000$	8000	10000
132	$6000 \le n_m < 10000$		8500
160	$5000 \le n_m < 8000$		7000
180	$1500 \le n_m < 7000$		4500 [2)
224	$1500 \le n_m < 5500$		3600 [2)

1) This assumes a speed example, also with low speeds and zero speed intervals
2) Only possible for coupling output

Re-greasing

For motors which can be re-lubricated at defined re-lubricating intervals, the bearing lifetime can be extended and/or unfavorable factors such as mounting conditions, speed, bearing size and mechanical load can be compensated (refer to the table "Recommended bearing change intervals (standard bearing design)").

Depending on the frame size, restrictions have to be taken into account - e.g. vertical mounting/shaft position.

For shaft height 280, it is possible to re-lubricate the bearings through a lubricating nipple.

It is possible to re-grease motors, shaft heights 180 and 225. A lubricating nipple is optionally provided, Code K40.

Regreasing intervals

Regreasing intervals are specified:

- on the lubrication plate of the induction motor
- in the table "Re-lubrication intervals"

NOTICE
If there are longer periods of time (e.g. greater than 1 re-lubrication interval) between the motor being supplied and commissioned, then the bearings must be lubricated. When re-lubricating, the shaft must be rotated in order to distribute the grease in the bearing (additional information and instruction, refer to the Operating Instructions).

The values specified in the following table are valid for the following conditions:

- Cooling medium temperature up to max. +40 ˚C
- Horizontal mounting position
- Average operating speed, refer to the table "Recommended bearing change intervals (standard bearing design)"
- Complying with the permissible cantilever and axial forces (refer to Chapter "Cantilever and axial forces")
- Complying with the maximum permissible speeds (refer to Chapter "Technical data and characteristics")

Table 2-14 Regreasing intervals

Shaft height	Bearing type/ drive output type	Bearing -type motor side	Bearing designation	Re-lubricating intervals in operating hours [h]	Quantity of grease for each re-lubrication operation 1) [g]	Grease chamber 2) [g]	Possible number of re-lubricating intervals 3)
180	Deep-groove ball bearings coupling output	DE NDE	6214 C3 6214 C3	8000	15	80	5
180	Cylindrical roller bearings Belt coupling, increased cantilever forces	DE NDE	NU2214E 6214 C3	6000	20	80	4
225	Deep-groove ball bearings coupling output	DE NDE	6216 C3 6216 C3	8000	25	160	6
225	Cylindrical roller bearings Belt coupling, increased cantilever forces	DE NDE	NU2216E 6216 C3	6000	40	160	4
280	Deep-groove ball bearings coupling output	DE NDE	6220 C3 6220 C3	4000	40	400	10
280	Cylindrical roller bearings Belt coupling, increased cantilever forces	DE NDE	NU220E 6220 C3	3000	40	400	10

1) Grease quantity for re-lubrication, normal conditions

2) Quantity of grease that can be injected into the grease chamber when precisely maintaining the quantity of grease for each re-lubrication interval.

3) Calculation number of re-lubricating intervals; the bearing lifetime is specified (refer to Chapter) according to statistical perspectives in accordance with the L_{10h} definition.

NOTICE
Unfavorable factors such as the effects of mounting, speed or mechanical load can also mean that the re-lubricating intervals must be modified. For cases such as these, it is necessary to make a specific investigation or calculation - this must be done together with the responsible motor factory, adhering to the appropriate secondary conditions and limitations.

2.1.11 NDE bearings, insulated version (option L27)

Relevant, additional bearing currents

When compared to a pure sinusoidal supply, the pulsed output voltage of a frequency converter results in additional motor bearing currents. The relevant additional bearing currents are:

- Circulating currents
- EDM currents
- Rotor ground currents

Factors that influence bearing currents

Above a certain magnitude, bearing currents result in localized melting at the bearing rings and rolling assemblies as well as lubricant wear. This reduces the bearing lifetime. Essential influencing factors include:

- Motor speed and associated operating time
- Pulse frequency of the frequency converter
- Grounding relationships between the motor and the connected load

Application for option L27

At speeds < 500 rpm, the load due to bearing currents increases significantly. Option L27 is always required if the motor is operated in the speed range between 0 ... 500 rpm for a longer period of time. Without option L27, the total operating time in the speed range 0 ... 500 rpm may be a maximum of 800 h (for an assumed bearing change interval (t_{LW}) of the bearings of 20,000 h.

Table 2-15 Measures that are required for operation in the speed range < 500 rpm

<table>
<tr><th>Shaft height</th><th>Bearing change interval (t_{LW}) for lifetime lubrication [h] 1)</th><th>Options that are required</th><th>Remarks</th></tr>
<tr><td>100 - 160</td><td rowspan="4">20000</td><td>-</td><td>Due to the experience from the field (in practice) no dangers have been identified due to bearing currents</td></tr>
<tr><td>180</td><td>L27</td><td>Insulated NDE bearings</td></tr>
<tr><td>225</td><td>_</td><td>Generally insulated NDE bearings</td></tr>
<tr><td>280</td><td>_</td><td>Generally insulated NDE bearings</td></tr>
</table>

1) Definition, refer to the table "Recommended bearing change intervals (standard bearing design)"

Motor grounding

In order to avoid rotor ground currents, the motor frame should be well grounded - e.g. by using shielded motor cables. The motor cable shield should be connected at both ends through the largest possible surface area.

For specific applications, the grounding of the motor Z_{hg} can be more unfavorable than the grounding of the connected loads Z_{rg}, e.g. for long motor cables and when the motor is mounted in an insulated fashion. In this case, the capacitive discharge (leakage) current of the motor flows from the motor frame through the motor shaft to the connected load and from there to ground.

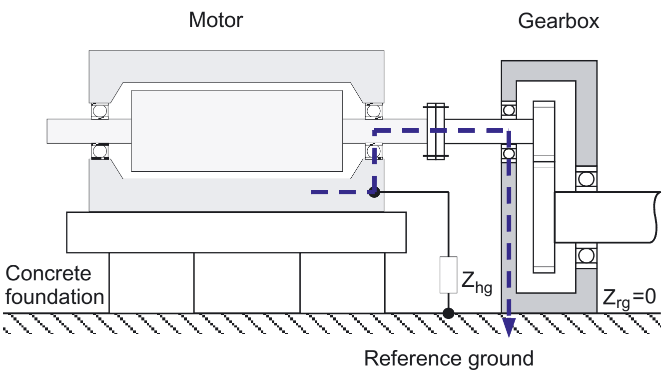


Figure 2-4 Bearing current due to the grounding situation (=rotor ground current)

The rotor ground current should be avoided by using an electrically insulating coupling. If such a coupling cannot be used for mechanical reasons, then the motor frame must be connected to the load through the largest possible surface area. The capacitive discharge (leakage) current then flows from the motor frame to the load and not through the bearings. The connection between the motor frame and load is only effective if it represents an extremely low impedance for the high-frequency discharge (leakage) current. To achieve this, use several flat straps, e.g. grounding straps, metal plates.

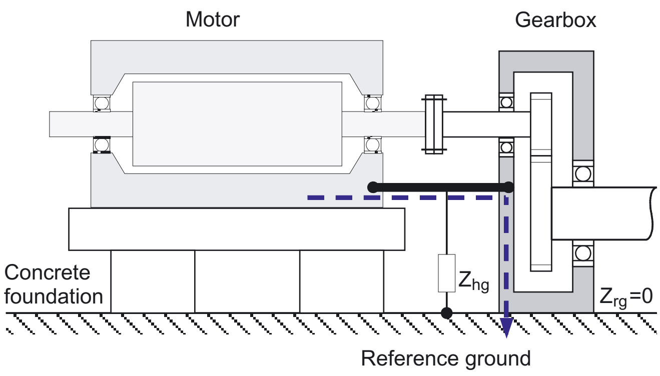


Figure 2-5 Connection between the motor frame and load to avoid rotor ground currents

2.1.12 Cantilever force

Specific cantilever forces may not be exceeded in order to guarantee perfect operation.

For various shaft heights, a minimum force may not be fallen below. This can be taken from the cantilever force diagrams.

The cantilever force diagrams in the motor sections specify the cantilever force F_Q

- at various operating speeds
- as a function of the bearing lifetime

The force diagrams and tables only apply for standard drive shaft ends. If smaller shaft diameters are used, only reduced cantilever forces may be transmitted or none at all.

For force levels going beyond these, please contact your local Siemens office.

⚠ CAUTION

For coupling output and belt coupling:
If you use force transmission elements which subject the shaft end to a cantilever force, then it must be ensured that the maximum limit values, specified in the cantilever force diagrams, are not exceeded.

Only for belt coupling (shaft heights 180 to 280):
For applications with an extremely low cantilever force load, it should be ensured that the motor shaft is subject to a minimum cantilever force load as specified in the diagrams. Low cantilever forces can cause the bearings to roll in an undefined fashion which results in increased bearing wear.

For applications with cantilever loads, which are less than the specified minimum cantilever forces (e.g. coupling output), then the bearings may not be used for belt couplings. For applications such as these, the induction motor must be ordered with bearings for coupling output.

CAUTION

Rotating forces

The motor bearings are designed for operation with cantilever force. Rotating forces from the process or imbalance > Q 2.5 can destroy the bearing seats and must therefore be avoided.

⚠ CAUTION

When using elements which increase the force/torque (e.g. gearboxes, brakes) then it must be ensured that the higher forces are not absorbed through the motor.

Note

The cantilever forces at the shaft end must be precisely dimensioned according to the guidelines laid-down by the belt manufacturer. The belt tension must be adjusted using the appropriate measuring equipment.

Calculating the total cantilever force F_Q for belt couplings

If the belt manufacturer hasn't provided accurate cantilever force data, then this can be appropriately determined using the following formula:

F_Q [N] = c • F_U F_U [N] = 2 • 10^7 • P / (n • D)

Table 2-16 Explanation of the formula abbreviations

Formula abbreviations	Units	Description
c	--	Pre-tensioning factor: The pre-tensioning factor is an experience value provided by the belt manufacturer. It can be assumed as follows: For V belts: c = 1.5 to 2.5 for special plastic belts (flat belts), depending on the load type and belt type c = 2.0 to 2.5
F_U	N	Circumferential force
P	kW	Motor output
n	rpm	Motor speed
D	mm	Diameter of belt pulley

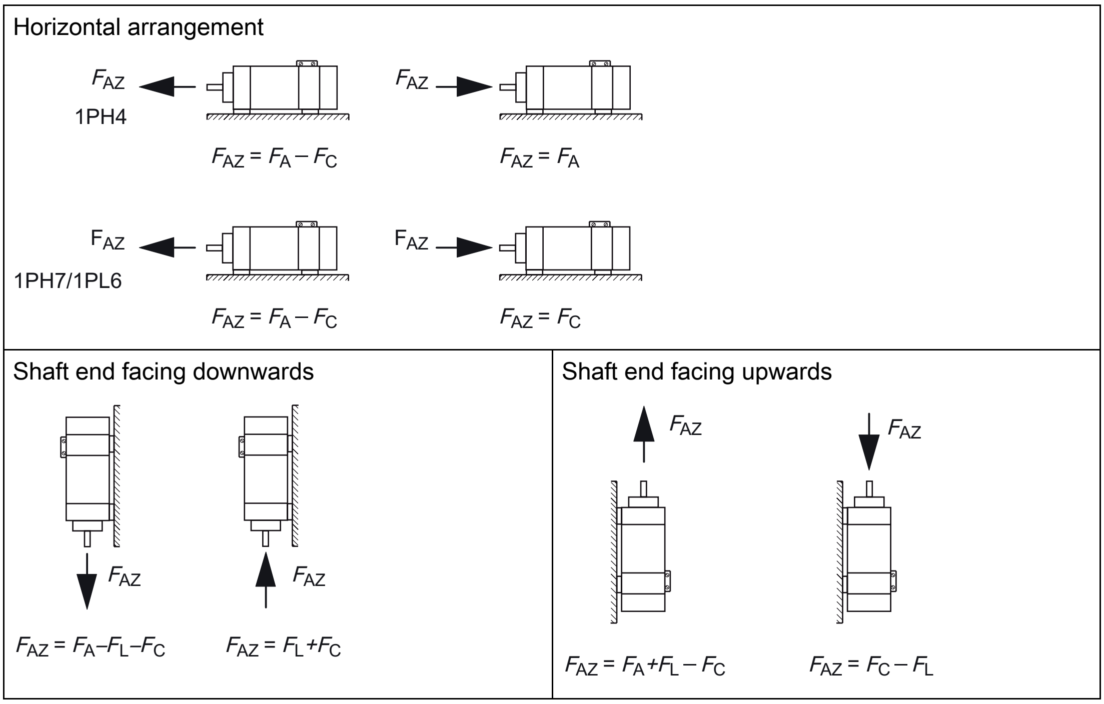
2.1.13 Axial force

The axial force acting on the locating bearings comprises an external axial force (e.g. gearbox with helical gearing, machining forces through the tool), a bearing pre-load force and possibly the force due to the weight of the rotor when the motor is vertically mounted. This results in a maximum axial force that is a function of the direction.

When using, for example, helical toothed wheels as drive element, in addition to the radial force, there is also an axial force on the motor bearings. For axial forces in the direction of the motor, the pre-loading of the bearing can be overcome. This must be prevented, as under certain circumstances, the bearing pre-loading is cancelled which means that the bearing lifetime could be reduced.

The permissible axial force F_{AZ} in operation depends on the motor mounting position.

Table 2-17 Permissible axial force for 1PH and 1PL motors



F_{AZ}	Permissible axial force in operation
F_A	Permissible axial force as a function of the average speed
F_C	Pre-loading force - refer to the appropriate motor documentation
F_L	Force due to the weight of the rotor - refer to the appropriate motor documentation

2.2 Electrical Connections

2.2.1 Overview of connections

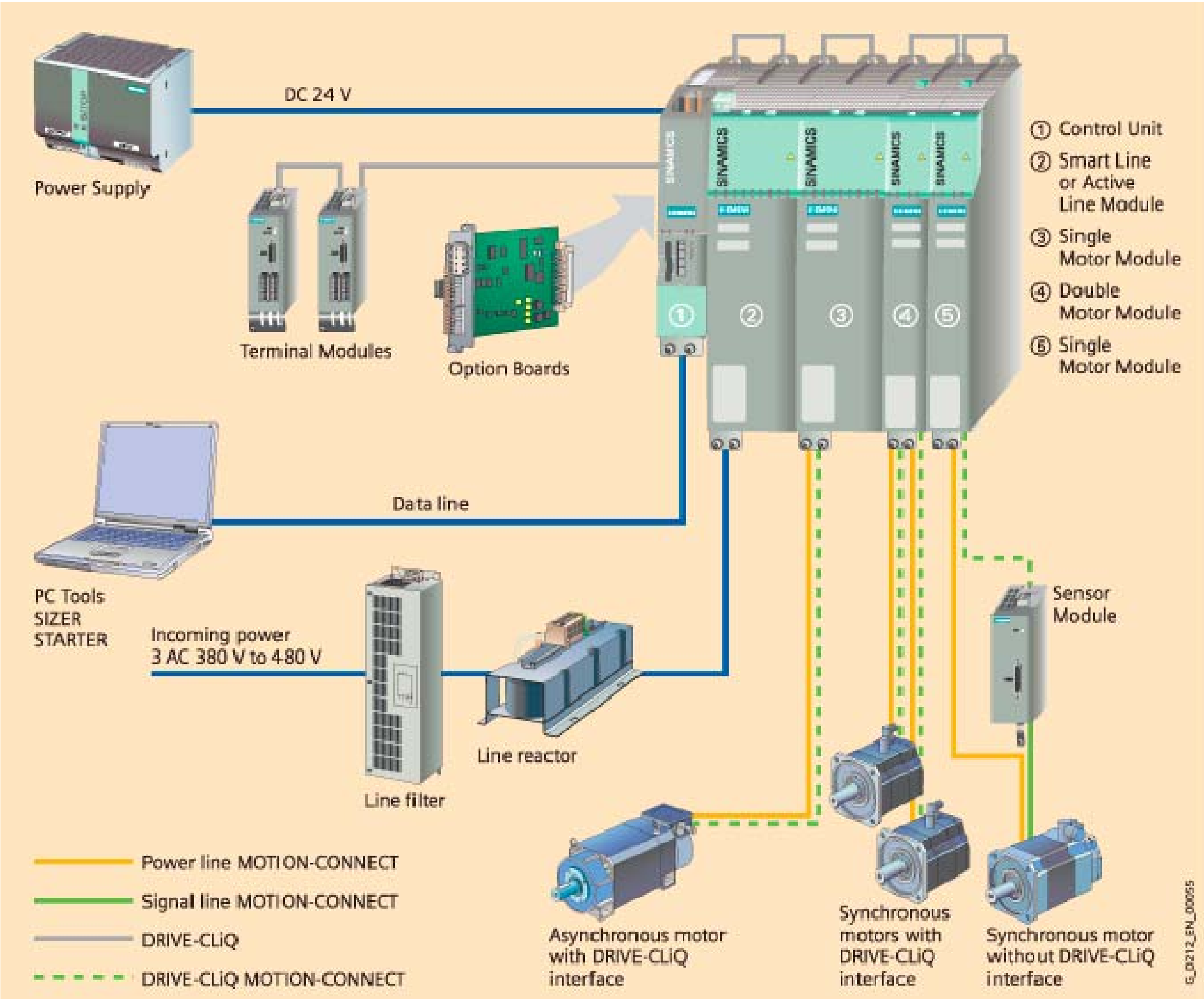


Figure 2-6 SINAMICS S120 system overview

2.2.2 Power connection

⚠ CAUTION
Carefully observe the current which the motor draws for your particular application! Adequately dimension the connecting cables according to IEC 60204-1.

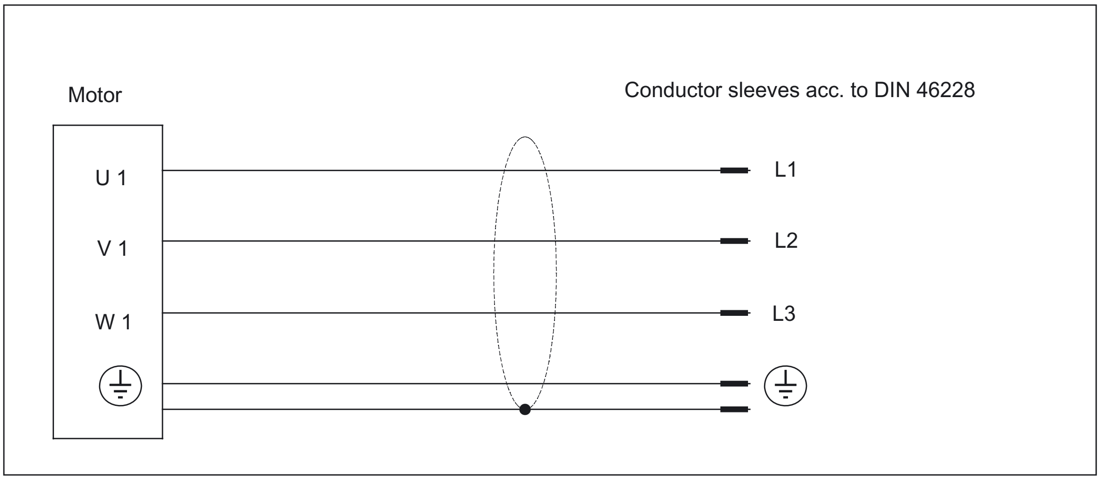


Figure 2-7 Power cable

Connection, terminal box

The designations of the mounted terminal box as well as the details on the power connection for the line supply cables can be taken from the following table. A circuit diagram to connect-up the motor winding is provided in the terminal box when the motor is supplied.

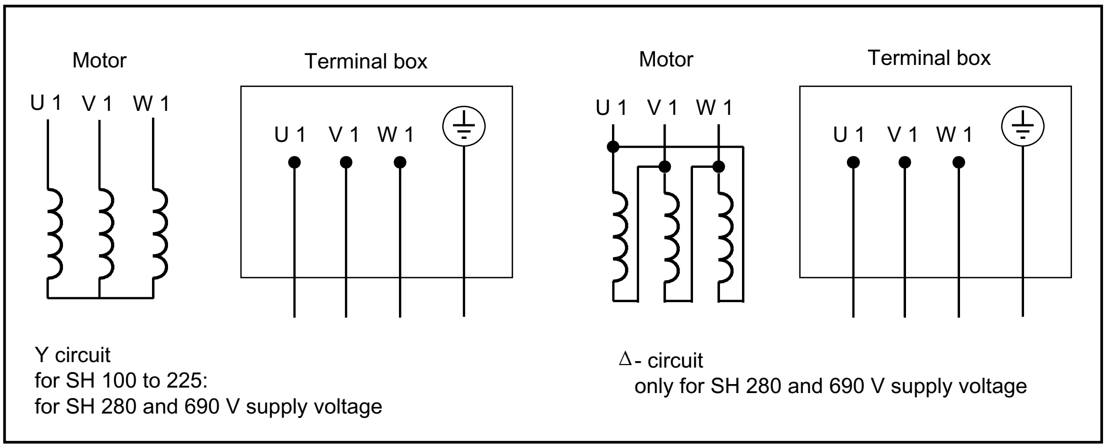


Figure 2-8 Circuit diagram

Cross-sections

When connecting cables to the terminal board, the connecting cables must be dimensioned corresponding to the rated current and the size of the cable lugs must match the dimensions of the terminal studs.

Table 2-18 Current load capability acc. to EN 60204-1 for PVC insulated cables with copper conductors for an ambient temperature of 40 °C and routing type C (cables and conductors routed along walls/panels and in cable ducts).

I_{rms} [A]	Cross-section required [mm²]	Comments
28	4	Correction factors regarding the ambient temperature and routing type must be applied in compliance with EN 60204-1.
36	6	
50	10	
66	16	
84	25	
104	35	
123	50	
155	70	
192	95	
221	120	
234	150	
267	185	
>267	Refer to VDE Standard 0298 Cross-sections up to 300 mm² are specified in this standard.	

Note

The cables are available in a UL version or for higher mechanical requirements up to a cross-section of 185 mm².

2.2.3 DRIVE-CLiQ

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

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

Motors with DRIVE-CLiQ

Motors with DRIVE-CLiQ interfaces can be directly connected to the corresponding motor module via the available MOTION-CONNECT DRIVE-CLiQ cables. This means that data are transferred directly to the control unit.

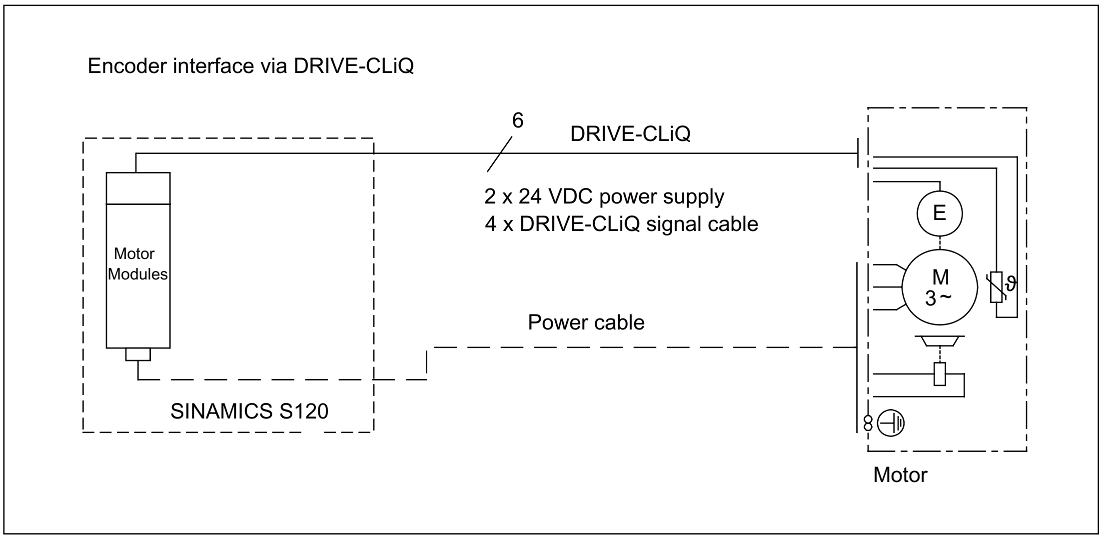


Figure 2-9 Encoder interface with DRIVE-CLiQ

Motors without DRIVE-CLiQ

Motors without DRIVE-CLiQ require a cabinet-mounted sensor module for operation with SINAMICS S120. The sensor modules evaluate the signals from the connected motor encoders or external encoders and convert them to DRIVE-CLiQ. In conjunction with motor encoders, the motor temperature can also be evaluated using sensor modules. For additional information, refer to the SINAMICS Manual.

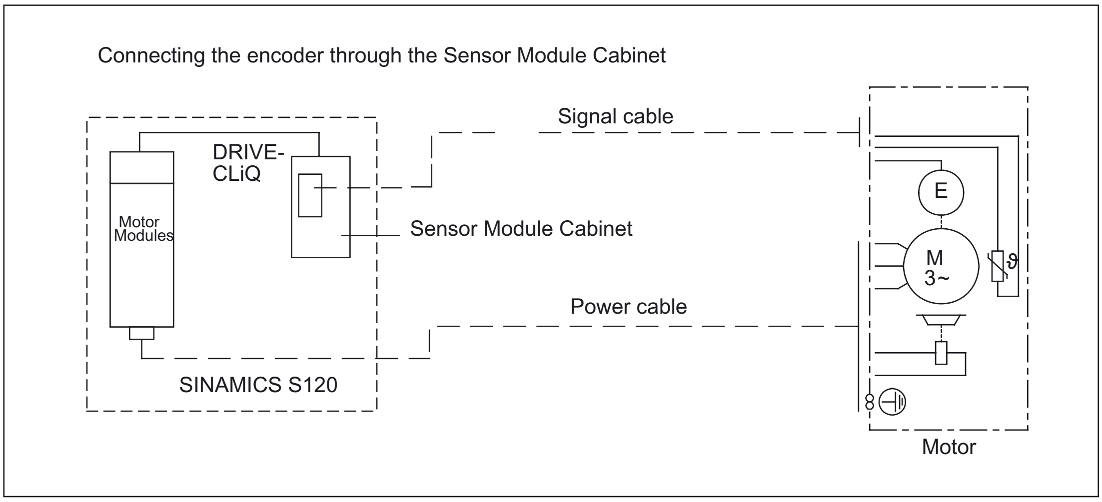


Figure 2-10 Encoder interface without DRIVE-CLiQ

2.2.4 Cable outlet NDE (integrated terminal box)

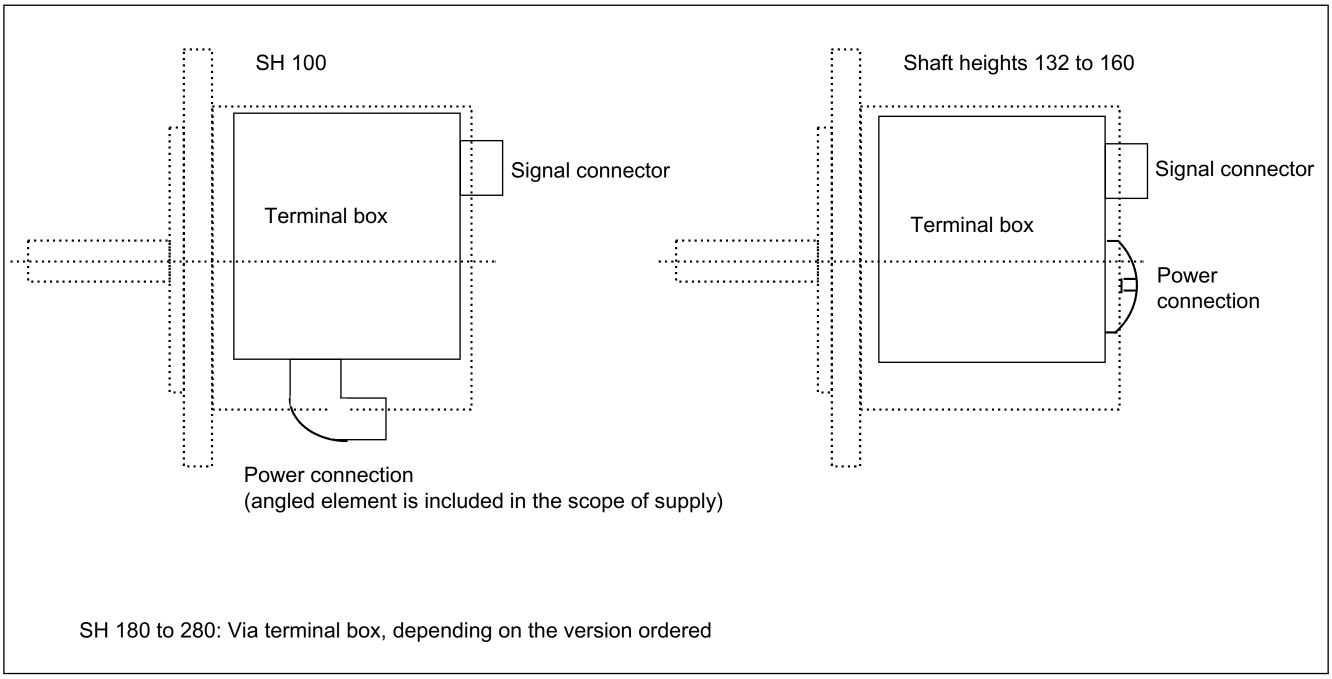


Figure 2-11 Cable outlet

Note

For SH 100, for a cable outlet at the NDE, the cable cannot be connected at the NDE because of the restricted space. In this case, the cable must be connected at the side using a 90° pipe connection element ("angled element").

2.2.5 Connecting-up information

Note

The system compatibility is only guaranteed if shielded power cables are used, the shield is connected to the metal motor terminal box through the largest possible surface area (using metal EMC cable glands).

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

Use EMC cable glands for fixed cable entries. The cable glands are screwed into the threaded holes of the cable entry plate that can be removed.

Openings that are not used must be closed using an appropriate metal cap.

⚠ WARNING

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

Please observe the rating plate data and circuit diagram in the terminal box.
Adequately dimension the connecting cables.

Internal potential bonding

The potential bonding between the ground terminal in the terminal box and the motor frame is established through the retaining bolts of the terminal box. The contact locations underneath the screw/bolt heads are bare and are protected against corrosion.

The standard screws that are used to connect the terminal box cover to the terminal box are sufficient as potential bonding between the terminal box cover and the terminal box enclosure.

Note

Connection studs are available at the frame or bearing endshield to connect an external protective conductor or potential bonding connector (this is only included as standard for SH 225 and SH 280).

If the motors are used in hazardous Zone 22 (option M39, refer to Chapter "Technical features" / Options), then the connections for an external protective conductor and potential bonding connector are always provided.

Motor and connecting cables

- Twisted or three-core cables with additional ground conductor should be used as motor feeder cables. The insulation should be removed from the ends of the conductors so that the remaining insulation extends up to the cable lug or terminal.
- The connecting cables should be freely arranged in the terminal box so that the protective conductor has an overlength and the cable conductor insulation cannot be damaged. Connecting cables should be appropriately strain relieved.
- Take special care that the required air clearances are actually maintained:
  - Up to SH 160, a minimum of 4.5 mm
  - From SH 180 and above, at least 10 mm

After connecting-up, the following should be checked/tested

- The inside of the terminal box must be clean and free of any cable pieces
- All of the terminal screws must be tight
- The minimum air distances must be maintained
- The cable glands must be reliably sealed
- Unused cable glands must be closed and the plugs must be tightly screwed in place
- All of the sealing surfaces must be in a perfect condition

Connect-up the ground conductor

The ground conductor cross-section must be in full conformance with the installation regulations, e.g. acc. to IEC/EN 60204-1.

For shaft heights 225 and 280, the ground conductor must be additionally connected to the motor bearing endshield. There is a terminal lug for the ground cable at the designated connection point. This is suitable for connecting multi-conductor cables with cable lugs or flat cables with the appropriately prepared conductor end.

Please note the following when connecting-up:

- The connecting surface must be bare and must be protected against corrosion using a suitable medium, e.g. with acid-free Vaseline
- There is a spring washer and normal washer underneath the screw head
- The minimum necessary screw-in depth and the tightening torque for the clamping bolts must be maintained

Table 2-19 Screw-in depth and tightening torque

Screw	Penetration depth:	Tightening torque
M8 x 30	> 8 mm	20 Nm

Assignment, terminal boxes and max. cross-sections

Table 2-20 Assignment, terminal boxes and max. cross-sections

Shaft height	Motor type	Terminal box type	Cable entry	Max. possible outer cable diameter mm[2)]	Cable entry	Max. possible outer cable diameter mm[2)]	No. of main terminals	Max. connectable cross-section per terminal [mm^2]	Max. possible current for each terminal [1)] [A]
			Valid for the 8th position of the Order No. "2", "4", "6"		Valid for the 8th position of the Order No. "7", "8"[3)]				
100	1PH710□-□□□	Integrated	PG 29	28	M 32 x 1.5	21	6 x M 5	25	84
132	1PH713□-□□□	Integrated	PG 36	34	M 40 x 1.5	28	6 x M 6	35	104
160	1PH716□-□□□	Integrated	PG 40	40	M 50 x 1.5	38	6 x M 6	50	123
180	1PH7184-□□□	1XB7322	2 x PG 42	40	2 x M 50 x 1.5	38	3 x M 12	2 x 50	191
	1PH7186-□□B	1XB7322	2 x PG 42	40	2 x M 50 x 1.5	38	3 x M 12	2 x 50	191
	1PH7186-□□D	1XB7322	2 x PG 42	40	2 x M 50 x 1.5	38	3 x M 12	2 x 50	191
	1PH7186-□□F	1XB7422	2 x M 72 x 2	56	2 x M 63 x 1.5	53	3 x M 12	2 x 70	242
	1PH7186-□□L	1XB7422	2 x M 72 x 2	56	2 x M 63 x 1.5	53	3 x M 12	2 x 70	242
225	1PH7224-□□B	1XB7322	2 x PG 42	40	2 x M 50 x 1.5	38	3 x M 12	2 x 50	191
	1PH7224-□□D	1XB7322	2 x PG 42	40	2 x M 50 x 1.5	38	3 x M 12	2 x 50	191
	1PH7224-□□U	1XB7422	2 x M 72 x 2	56	2 x M 63 x 1.5	53	3 x M 12	2 x 70	242
	1PH7224-□□L	1XB7700	3 x M 72 x 2	56	3 x M 75 x 1.5	68	3 x 2 x M 12	3 x 150	583
	1PH7226-□□B	1XB7322	2 x PG 42	40	2 x M 50 x 1.5	38	3 x M 12	2 x 50	191
	1PH7226-□□D	1XB7422	2 x M 72 x 2	56	2 x M 63 x 1.5	53	3 x M 12	2 x 70	242
	1PH7226-□□F	1XB7700	3 x M 72 x 2	56	3 x M 75 x 1.5	68	3 x 2 x M 12	3 x 150	583
	1PH7226-□□L	1XB7700	3 x M 72 x 2	56	3 x M 75 x 1.5	68	3 x 2 x M 12	3 x 150	583
	1PH7228-□□B	1XB7322	2 x PG 42	40	2 x M 50 x 1.5	38	3 x M 12	2 x 50	191
	1PH7228-□□D	1XB7700	3 x M 72 x 2	56	3 x M 75 x 1.5	68	3 x 2 x M 12	3 x 150	583
	1PH7228-□□F	1XB7700	3 x M 72 x 2	56	3 x M 75 x 1.5	68	3 x 2 x M 12	3 x 150	583
	1PH7228-□□L	1XB7700	3 x M 72 x 2	56	3 x M 75 x 1.5	68	3 x 2 x M 12	3 x 150	583
280	1PH728□-□□B	1XB7712	3 x M63 x 1.5	53	-	-	(3+1)[4]x3xM16	3 x 95	450
	1PH7284-□□C	1XB7712	3 x M63 x 1.5	53	-	-	(3+1)[4]x3xM16	3 x 95	450
	1PH7284-□□D	1XB7712	3 x M63 x 1.5	53	-	-	(3+1)[4]x3xM16	3 x 95	450
	1PH7286-□□C	1XB7712	3 x M75 x 1.5	68	-	-	(3+1)[4]x3xM16	3 x 185	710
	1PH7286-□□D	1XB7712	3 x M75 x 1.5	68	-	-	(3+1)[4]x3xM16	3 x 185	710
	1PH7288-□□C	1XB7712	3 x M75 x 1.5	68	-	-	(3+1)[4]x3xM16	3 x 185	710
	1PH7288-□□D	1XB7712	3 x M75 x 1.5	68	-	-	(3+1)[4]x3xM16	3 x 185	710
	1PH728□-□□F	1XB7712	3 x M75 x 1.5	68	-	-	(3+1)[4]x3xM16	3 x 185	710

1) Current load capability based on IEC 60204-1, routing type C, Table 5.

2) Dependent on the design of the metric cable gland

3) Not for shaft height 280

4) Including grounding terminal

2.2.6 Supply data for separately-driven fans

Table 2-21 Supply data for separately-driven fans

Shaft height	Air flow direction	Max. current drain at		
		400 V / 50 Hz (±10%)	400 V / 60 Hz (±10%)	480 V / 60 Hz (±5%, -10%)
100	DE --> NDE	0,20	0,13	0,20
	NDE --> DE	0,19	0,13	0,18
132	DE --> NDE	0,37	0,24	0,33
	NDE --> DE	0,35	0,24	0,32
160	DE --> NDE	0,30	0,33	0,34
	NDE --> DE	0,29	0,31	0,33
180	DE --> NDE	0,8	1,1	1,1
	NDE --> DE	0,8	1,1	1,1
225	DE --> NDE	2,8	2,8	2,8
	NDE --> DE	1,9	2,2	2,2
280	DE --> NDE	2,55	2,6	2,6
	NDE --> DE	2,55	2,6	2,6

Recommended connection

The connection is realized through the terminal box or through the terminal box of the separately-driven fan. The fan should be operated through motor protection circuit-breakers.

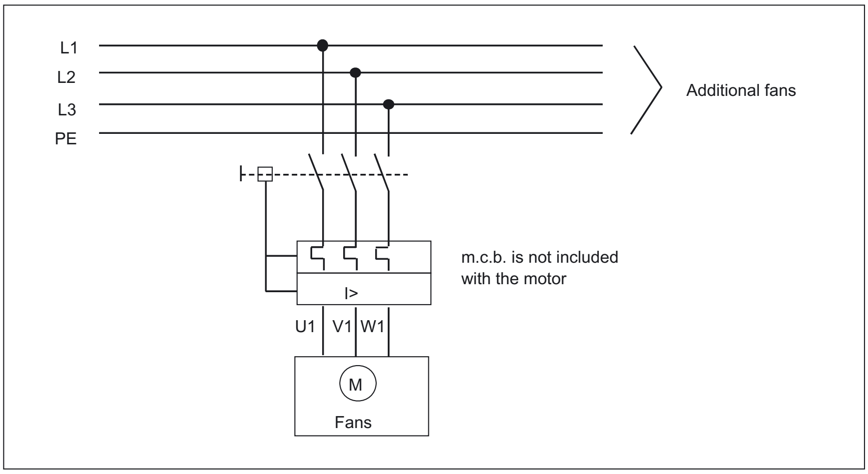


Figure 2-12 Recommended connection

2.3 Mounting

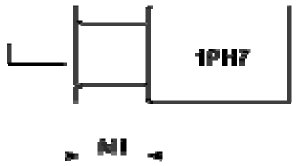
⚠ WARNING
These motors are electrically operated. When electrical equipment is operated, certain parts of these motors are at hazardous voltage levels. If this motor is not correctly handled/operated, this can result in death or severe bodily injury as well as significant material damage. Please carefully observe the warning information in this section an on the product itself. Only **qualified personnel** may carry-out service or repair work on this motor. Before starting any work, the motor must be disconnected from the line supply and grounded. Only spare parts, certified by the manufacturer, may be used. The specified service/maintenance intervals and measures as well as the procedures for repair and replacement must be carefully maintained and observed.

⚠ WARNING
When transporting the motors, use all of the hoisting lugs provided! A suitable crane/lifting device must be used. Incorrect execution, unsuitable or damaged equipment and resources can result in injury and material damage. The hoisting and transport equipment as well as the load suspension equipment must be in full compliance with the appropriate regulations. All work should be undertaken with the system in a no-voltage condition! Other information and instructions in the Operating Instructions must be carefully observed. The motor should be connected up according to the circuit diagram provided. In the terminal box it must be ensure that the connecting cables are insulated with respect to the terminal board cover. After the motor has been installed, the brake (if one is used) must be checked to ensure that it is functioning perfectly!

Note

For SH 180 to 280, flange mounting is only possible using studs and nuts. Clearance M1 for threading the nut between the motor flange and motor frame acc. to DIN 42948.

Table 2-22 Flange mounting with threaded studs and nuts

Shaft height	M1 [mm]	
100	44	
132	50	
160	65	
180	32	
225	91	
280	45	

Mechanical data 3

3.1 Balancing process

Requirements placed on the process when balancing mounted components - especially belt pulleys

In addition to the balance quality of the motor, the vibration quality of motors with mounted belt pulleys and coupling is essentially determined by the balance quality of the mounted component.

If the motor and mounted component are separately balanced before they are assembled, then the process used to balance the belt pulley or coupling must be adapted to the motor balancing type.

For induction motors, a differentiation should be made between the following balancing types:

- Half key balancing (an "H" is stamped on the shaft face)
- Full key balancing (an "F" is stamped on the shaft face)
- Smooth shaft end (no keyway)

The balancing type is coded in the order designation.

For the highest demands placed on the system balance quality, we recommend that motors with smooth shaft (without keyway) are used. For motors balanced with full key, we recommend belt pulleys with two keyways on opposite sides, however, with only one key in the shaft end.

Table 3-1 Requirements placed on the balancing process as a function of the motor balancing type

Balancing equipment/ Process step	Motor Half key balanced	Motor balanced with full key	Motor with plain shaft end
Auxiliary shaft to balance the mounted component	• Auxiliary shaft with keyway • Keyway with the same dimensions as in the motor shaft end • Auxiliary shaft half key balanced	• Auxiliary shaft with keyway • Slot design with the exception of the slot width (as the motor) can be freely selected • Auxiliary shaft full key balanced	• Auxiliary shaft without keyway • If required, use a tapered auxiliary shaft
	• Balance quality of the auxiliary shaft ≤ 10 % of the required balance quality of the component to be mounted to the motor		
Attaching the mounted component to the auxiliary shaft for balancing	• Attached using a key • Key design, dimensions and materials the same as at the motor shaft end	• Attached using a key • Key design, dimensions and material the same as used for the full key balancing of the auxiliary shaft	• Attach the component as far as possible without any play, e.g. using a light press fit on the tapered shaft
Position the mounted component on the auxiliary shaft	• Select a position between the mounted component and the key of the auxiliary shaft so that it is the same when mounted on the actual motor	• No special requirements	
Balance the mounted component	• Two-plane balancing is recommended - i.e. balancing in two planes at both sides of the mounted components at right angles to the axis of rotation		

Special requirements

If special requirements are placed on the smooth running operation of the machine, we recommend that the motor together with the output components is completely balanced. In this case, balancing should be carried-out in two planes of the output component.

3.2 Misalignment

In order to avoid misalignment or to keep it as low as possible, a compensating coupling should be used (refer to the diagram).

If possible, the motor should not be directly and rigidly coupled to an output transmission shaft which has its own bearings.

However, if a rigid coupling is absolutely necessary due to mechanical design reasons, misalignment deviations must be avoided. In this case, a careful check must be made by making the appropriate measurements.

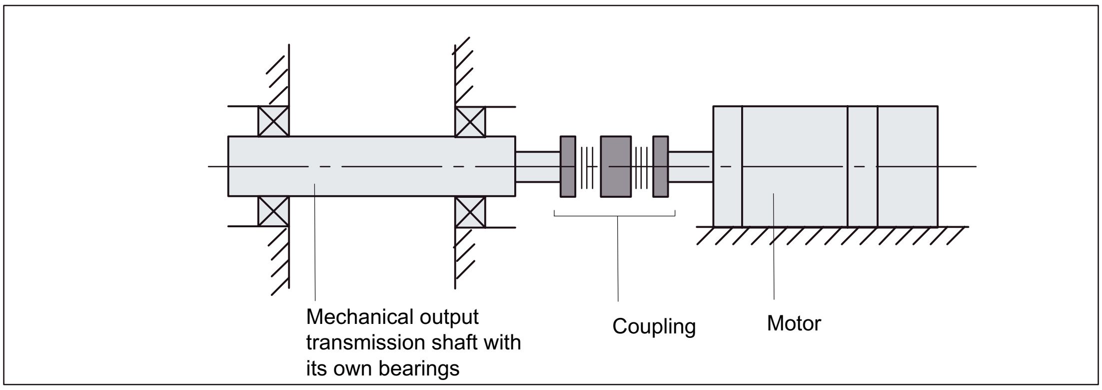


Figure 3-1 Mechanical output transmission shaft with its own bearings and compensating coupling

3.3 Flywheels

Flywheels with a high mass, which are rigidly mounted to the end of the motor shaft, modify the vibration characteristics of the motor and shift the critical rotational frequencies of the motor into the lower speed ranges.

The overall system should be precision balanced in order to minimize/avoid exciting vibration, when external masses are directly mounted onto the motor shaft.

Operation in the resonance range should be avoided.

3.4 Shaft and flange accuracy

The shaft and flange accuracies are checked according to DIN 42955, IEC 60072. Data, which deviate from these values, is entered into the dimension drawings (refer to the Planning Guide of the appropriate motor).

Table 3-2 Radial eccentricity tolerance of the shaft to the frame axis (referred to cylindrical shaft ends)

Shaft height	Tolerance level N	Tolerance level R
100	0,05	0,025
132	0,05	0,025
160	0,06	0,03
180	0,06	0,03
225	0,06	0,03
280	0,07	0,035

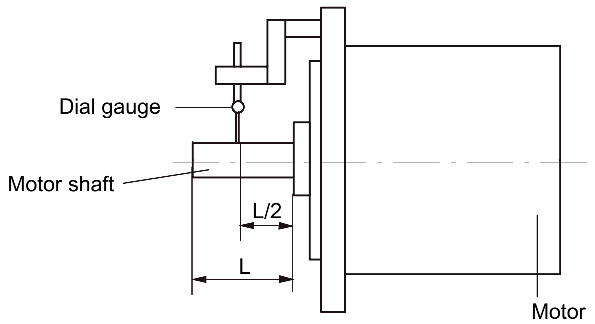


Figure 3-2 Checking the radial eccentricity

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

Shaft height	Tolerance level N	Tolerance level R
100	0,1	0,05
132	0,125	0,063
160	0,125	0,063
180	0,125	0,063
225	0,125	0,063
280	0,16	0,08

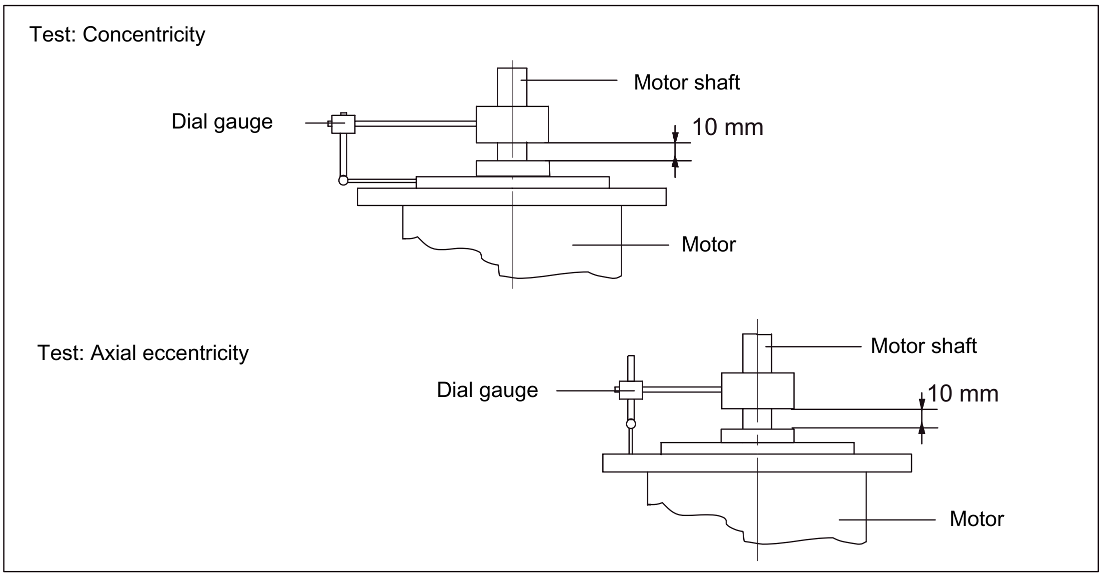


Figure 3-3 Checking the concentricity and axial eccentricity

4 Electrical data

4.1 Rating plate data

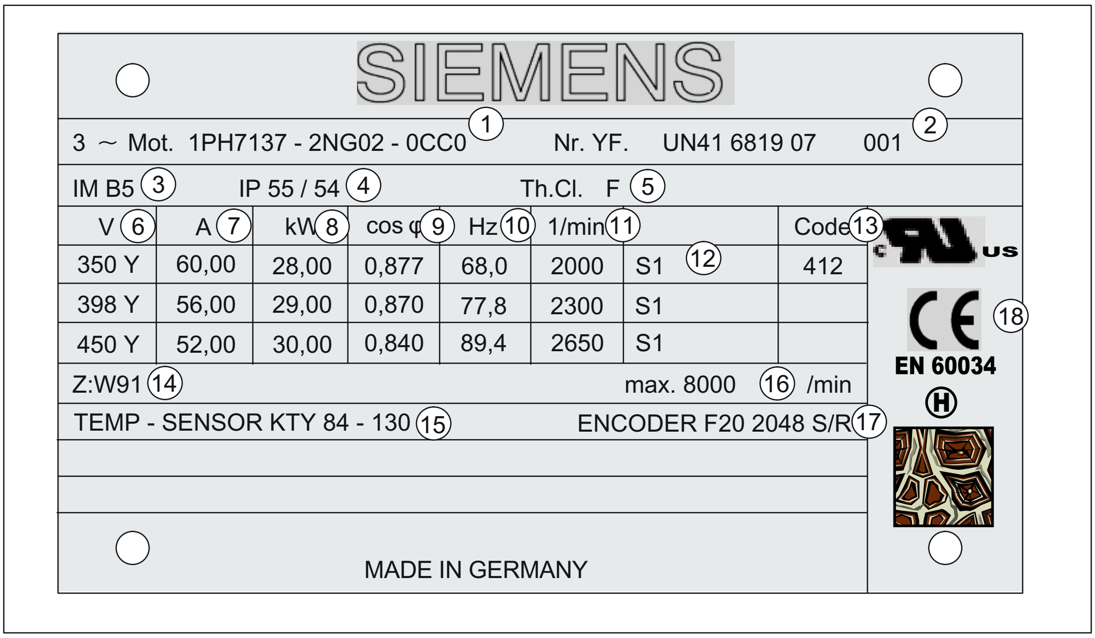


Figure 4-1 Rating plate (example for 1PH7)

Table 4-1 Description of the rating plate data

Position	Description/technical data
1	Motor type: Induction motor and Order No. [MLFB]
2	Ident. No., production number
3	Type of construction
4	Degree of protection
5	Temperature Class
6	Rated voltage [V] and winding configuration
7	Rated current [A]
8	Rated output [kW]
9	Power factor [cos φ]
10	Rated frequency [Hz]
11	Rated speed [rpm]

Position	Description/technical data
12	Duty type
13	Code No. for simplified converter parameterization
14	List of the ordered supplementary options
15	Temperature sensor marking
16	Maximum speed [rpm]
17	Designation of the encoder type
18	Standards and regulations

4.2 Mode of operation and power characteristics

Method

A constant torque M_N is available from standstill up to the rated operating point. The constant power range starts at the rated operating point (refer to the P/n characteristics in the Chapter "Technical data and characteristics").

At higher speeds, i.e. in the constant power range, the maximum available torque M_{max} at a specific speed n is approximated according to the following formula:

$$M_{max}\ [\mathrm{Nm}] < \frac{P_{max}\ [\mathrm{kW}] \bullet 9550}{n\ [\mathrm{rpm}]} \qquad P_{max}\ [\mathrm{kW}] = 2 \bullet P_N$$

Induction motors have a high overload capacity in the constant power range. For some induction motors, the overload capacity is reduced in the highest speed range (refer to Chapter "Technical data and characteristics").

The motor field remains constant over the base speed range up to the rated operating point of the motor. This is then followed by a wide constant power range.

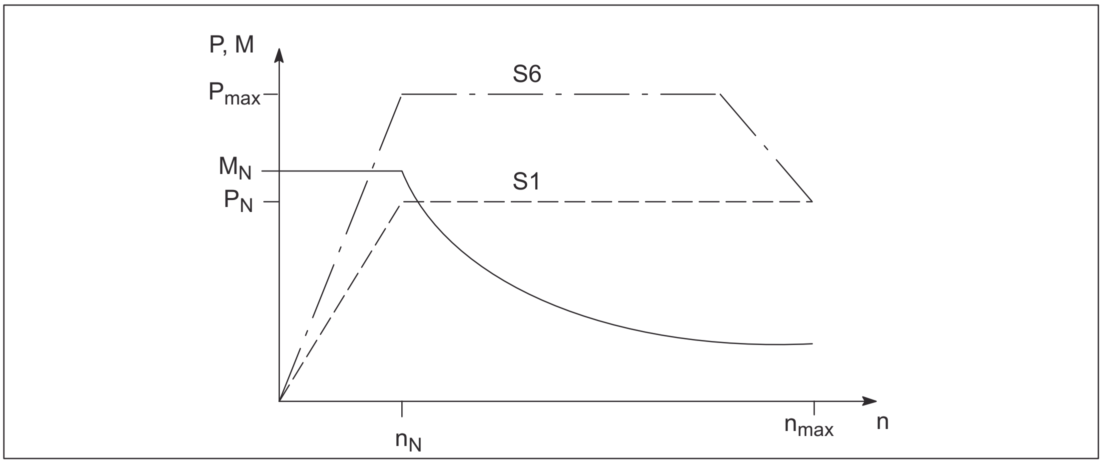


Figure 4-2 Principle characteristic of power P and torque M as a function of speed n (operating modes acc. to VDE 0530 Part 1)

Power characteristics

For main spindle applications, the constant power range used to machine a workpiece with constant cutting power is extremely important. The required drive converter power can be reduced by optimally utilizing the constant power range.

The following limits and characteristics apply as basis for all induction motors fed from drive converters.

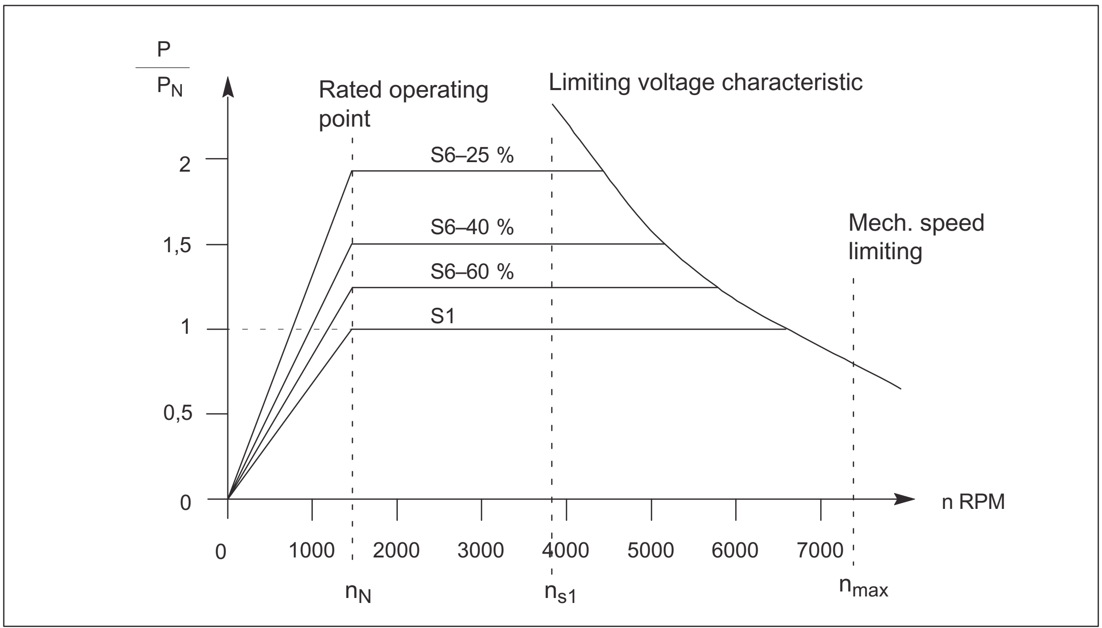


Figure 4-3 Power characteristics, limits and characteristics

Power ratings for duty types S1 and S6

The operating modes are defined in IEC 60034, Part 1. For duty types S1 and S6, acc. to IEC 60034, Part 1, a maximum duty cycle duration of 10 min. is defined as long as no other information exists.

All power rating data of induction motors refer to continuous operation and the appropriate duty type S1.

However, for many applications, duty type S1 does not apply, if e.g. the load varies as a function of time. For this particular case, an equivalent sequence can be specified which represents, as a minimum, the same load for the motor.

For shorter accelerating times, torque surges or drives which have to handle overload conditions, short-time or peak currents are available in a 60 second cycle. The magnitude of these currents and how the drive converter system is engineered can be taken from the documentation of the relevant drive converter power modules.

4.3 Motor limits

The speed and power of induction motors are limited for thermal and mechanical reasons (mechanical stress on the shaft end, bearing stress).

Thermal limiting

The characteristics for continuous duty S1 and intermittent operation S6-60 %, S6-40 % and S6-25 % describe the permissible power values for an ambient temperature of up to 40 °C. A winding temperature rise of approx. 105 K can occur.

Mechanical limiting

It is not permissible that the mechanical limit speed is exceeded. If this speed is exceeded, then this can result in damage to the bearings, short-circuit end rings, press fits etc. It should be ensured that higher speeds are not possible by appropriately designing the control or by activating the speed monitoring in the drive converter.

4.4 Definitions

Mechanical limit speed n_{max}

The max. permissible speed n_{max} is determined from the mechanical design (bearings, short-circuit ring of the squirrel cage etc.).

NOTICE
The mechanical limit speed n_{max} may **not** be exceeded and may not be continually used.

Maximum continuous speed n_{S1}

The maximum permissible speed that is continuously permitted without speed duty cycles.

Speed n_1

The maximum permissible speed at constant power in field weakening where for $P = P_N$ there is still a 30% power reserve up to the voltage limit.

Maximum torque M_{max}

Torque that is briefly available for dynamic operations (e.g. accelerating).
$M_{max} = 2 \cdot M_N$

S1 duty (continuous operation)

Operation with a constant load the duration of which is sufficient so that the machine goes into a thermal steady-state condition.

S6 duty (intermittent load)

S6 duty is operation with comprises a sequence of similar duty cycles; each of these duty cycles comprises a time with constant motor load and a no-load time. If not otherwise specified, then the power-on time refers to a duty cycle of 10 min.

e.g. S6 - 40 %	4 min load
	6 min no-load time

Thermal time constant T_{th}

The thermal time constant defines the temperature rise of the motor winding when the motor load is suddenly increased (step increase) up to the permissible S1 torque. After T_{th}, the motor has reached 63 % of its S1 final temperature.

5 Configuring

5.1 Engineering software

5.1.1 SIZER engineering tool

Overview

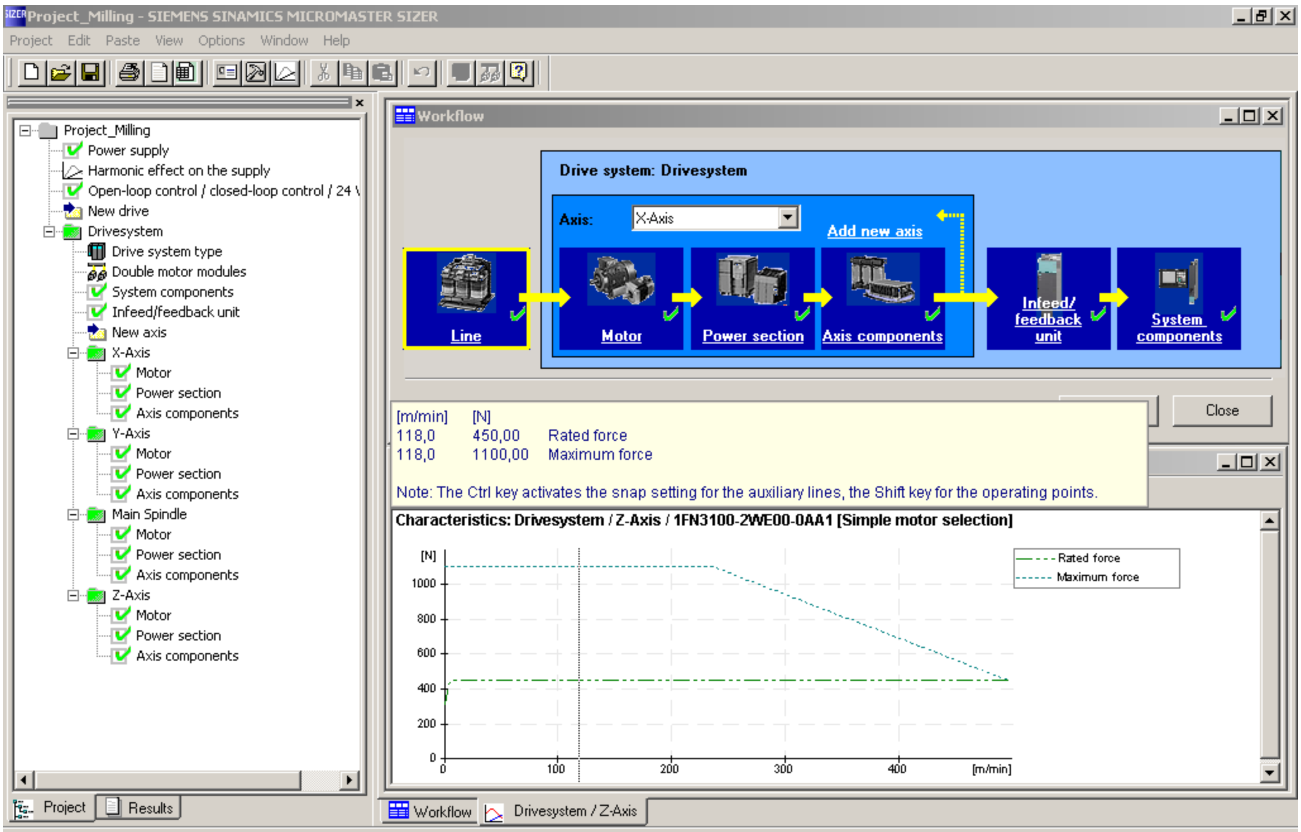


Figure 5-1 SIZER

The SIZER configuration tool provides an easy-to-use means of configuring the SINAMICS and MICROMASTER 4 drive families, as well as the SINUMERIK solution line CNC control and SIMOTION Motion Control system. It provides support when setting up the technologies involved in the hardware and firmware components required for a drive task. SIZER supports the configuration of the complete drive system, from simple individual drives to complex multi-axis applications.

SIZER supports all of the engineering steps in a workflow:

- Selection of the power supply
- Motor design as a result of load configuring
- Calculation of the drive components
- Compiling the required accessories
- Selection of the line-side and motor-side power options

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

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

The configuration process produces the following results:

- A parts list of the components required
- Technical data
- Characteristics
- Comments on system reaction
- Location diagram and dimension drawings

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

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

Minimum hardware and software requirements

- PG or PC with Pentium™ II 400 MHz (Windows™ 2000), Pentium™ III 500 MHz (Windows™ XP)
- 256 MB RAM (512 MB recommended)
- At least 1150 MB free hard disk space, additional 100 MB free hard disk space on Windows system drive
- Monitor resolution, 1024×768 pixels
- Windows™ 2000 SP2, XP Professional SP1, XP Home Edition SP1
- Microsoft Internet Explorer 5.5 SP2

Selection and ordering data

Title	Order No. (MLFB)
Engineering tool SINAMICS MICROMASTER SIZER German/English	6SL3070-0AA00-0AG0

5.1.2 STARTER drive/commissioning software

The easy-to-use STARTER drive/commissioning tool can be used for:

- Commissioning,
- Optimization, and
- Diagnostics

You will find a description in the Intranet under the following address:

http://mall.automation.siemens.com

Select the country and then in the menu bar "Products".

In the navigator, set "Drive Technology" → "Engineering software" → "STARTER drive/commissioning software"

Download, refer under http://support.automation.siemens.com

5.1.3 SinuCom commissioning tool

The commissioning software for PC/PG - that is simple to use - is utilized to optimally commission SINAMICS S120-based drives. You will find a description in the Intranet under the following address:

https:\\mall.automation.siemens.com

Select your country and then in the menu bar "Products".

In the navigator, select "Automation Systems" → "SINUMERIK CNC automation systems" → HMI software for CNC controls" → "Tools" → "SinuCom".

5.2 SINAMICS procedure when engineering

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

step	Description of the engineering activity	
1.	Clarification of the type of drive	Refer to the next Chapter
2.	Definition of the load, calculation of max. load torque	
3.	Specification of the motor	
4.	The SINAMICS Motor Module is selected	Refer to the converter catalog
5.	Steps 3 and 4 are repeated for additional axes	
6.	The required DC link power is calculated and the SINAMICS Line Module is selected	
7.	Specification of the required control performance and selection of the Control Unit, definition of component cabling	
8.	The line-side options (main switch, fuses, line filters, etc.) are selected	
9.	Additional system components are defined and selected	
10.	The current demand of the 24 V DC supply for the components is calculated and the power supplies (SITOP devices, control supply modules) specified	
11.	The components for the connection system are selected	
12.	The components of the drive group are configured to form a complete drive	
13.	Required cable cross sections for power supply and motor connections	
14.	Mandatory installation clearances	

Configuration begins with the mechanical interface to the machine. A suitable motor is selected according to the specified torques and speeds. A matching power unit is then also chosen. Depending on the requirements of the machine, the motor is supplied as a single drive via a Power Module or within a multi-motor drive group via a Motor Module. Once the basic components have been defined, the system components for matching to the electrical and mechanical interfaces are selected.

The SIZER configuring tool helps the user to select the correct components quickly and easily. The user enters the relevant torque and speed characteristics and SIZER then guides him confidently through the configuring process, identifying suitable motors and matching SINAMICS power units and other system components.

5.3 Selecting and dimensioning induction motors

5.3.1 Selecting induction motors

A differentiation must be made between 3 applications when selecting a suitable induction motor:

Case 1:	The motor essentially operates in continuous duty.
Case 2:	A periodic duty cycle determines how the drive is dimensioned.
Case 3:	A high field weakening range is required.

5.3.2 Motor operates continuously

A motor should be selected whose S1 power is the same or greater than the required drive output.

Using the power-speed characteristic, a check should be made as to whether the power is available over the required speed range. It may be necessary to select a larger motor.

5.3.3 Motor operates with a periodic duty cycle

The duty cycle determines how the drive is dimensioned.

It is assumed that the speeds during the duty cycle lie below the rated speed.

If the power is known, however, the torques during the duty cycle are unknown, then the power should be converted into a torque using the following equation:

$M = P \cdot 9550 / n$ M in [Nm], P in [kW], n in [rpm]

The torque to be generated by the motor comprises the frictional torque $M_{friction}$, the load torque of the driven machine M_{load} and the accelerating torque M_B:

$M = M_{friction} + M_{load} + M_B$

The accelerating torque M_B is calculated as follows:

$$M_B = \frac{\pi}{30} \cdot J_{Motor+load} \cdot \frac{\Delta n}{t_B} = \frac{J_{Motor + load} \cdot \Delta n}{9{,}55 \cdot t}$$

M_B	Acceleration torque in Nm referred to the motor shaft (on the motor side)
$J_{motor+load}$	Total moment of inertia in kgm^2 (on the motor side)
Δn	Speed range in rpm
t_B	Acceleration time, in s

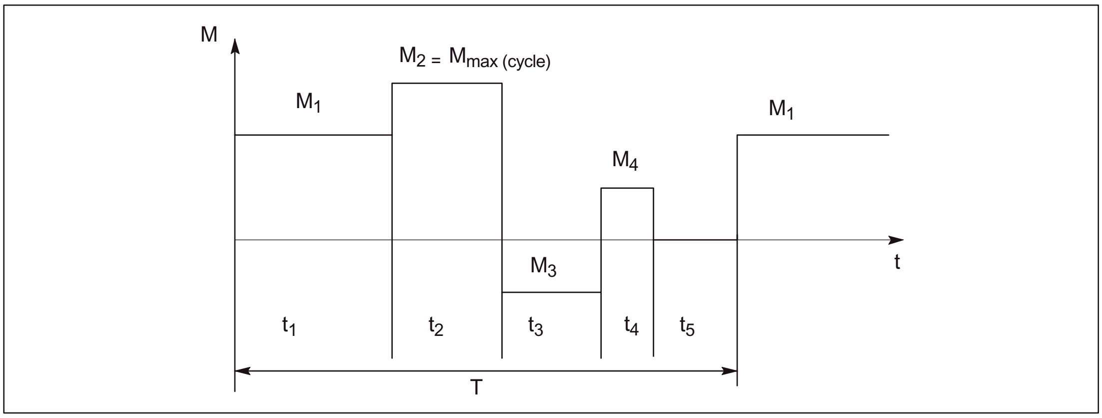


Figure 5-2 Duty cycle (example)

The M_{rms} torque must be calculated from the load cycle:

$$M_{rms} = \sqrt{\frac{M_1^2 * t_1 + M_2^2 * t_2 ...}{T}}$$

A differentiation should be made depending on the period T and the thermal time constant T_{th} that is dependent on the shaft height:

- $T/T_{th} \leq 0.1$ (for a cycle duration of 2 to 4 min)
- $0.1 \leq T/T_{th} \leq 0.1$ (for a cycle duration of 3 to 20 min)
- $T/T_{th} > 0.5$ (for a cycle duration of approx. 15 min)

Motor selection

Table 5-1 The motor is selected depending on the cycle duration and the thermal time constant

Cycle duration	Motor selection
$T/T_{th} \leq 0.1$ (cycle duration of 2 to 4 min)	A motor with the following rated torque M_N should be selected: $M_N > M_{rms}$ and $M_{max\,(cycle)} < 2\,M_N$
$0.1 \leq T/T_{th} \leq 0.5$ (cycle duration of approx. 3 to approx. 20 min)	A motor with the following rated torque M_N should be selected: $M_N > \frac{M_{rms}}{1{,}025 - 0{,}25 \bullet \frac{T}{T_{th}}}$ and $M_{max\,(cycle)} < 2M_N$
$T/T_{th} > 0.5$ (for a cycle duration of approx. 15 min)	If, for duty cycles, torques occur above M_N for longer than $0.5\,T_{th}$, then a motor with the following rated torque should be selected: $M_N > M_{max\,(cycle)}$.

Selecting a drive converter

The required currents for overload are specified in the power-speed characteristics (powers for S6-25 %, S6-40 %, S6-60 %). Intermediate values can be interpolated.

Example

Moment of inertia of the motor + load: J = 0.2 kgm², friction can be neglected.

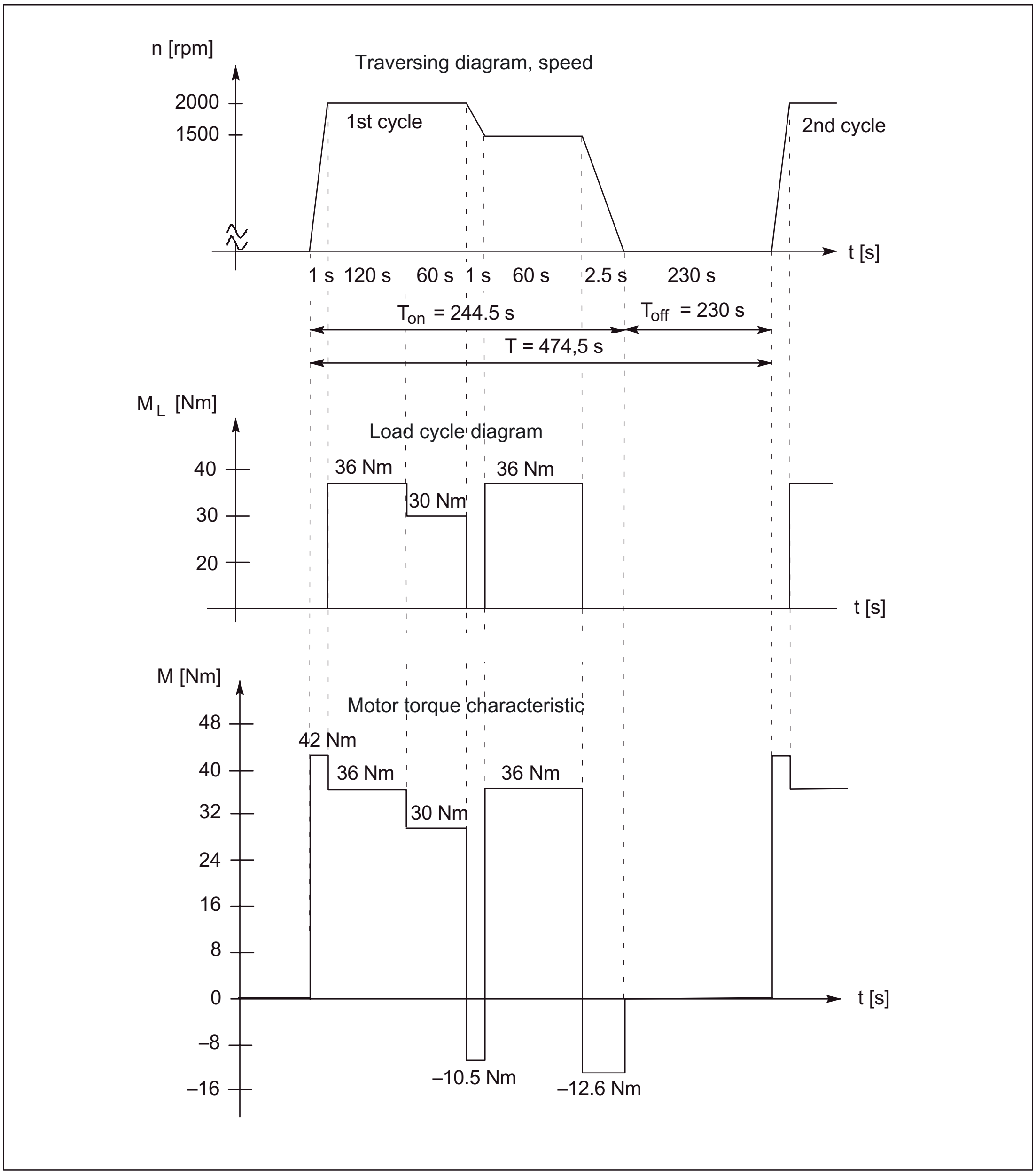


Figure 5-3 Duty cycle

Calculating the accelerating torques

$$M_B = \frac{J * \Delta n}{9,55 * t_a}$$

Acceleration for 1 s from 0 to 2000 rpm:

$$M_B = \frac{0,2 * 2000}{9,55 * 1} \text{ Nm} = 41.8 \text{ Nm} \approx 42 \text{ Nm}$$

Braking for 1 s from 2000 to 1500 rpm:

$$M_B = \frac{0,2 * (-500)}{9,55 * 1} = -10.5 \text{ Nm}$$

Braking for 2.5 s from 1500 to 0 rpm:

$$M_B = \frac{0,2 * (-1500)}{9,55 * 2,5} = -12.6 \text{ Nm}$$

Maximum torque M_{max}: 42 Nm for 1 s

Calculating the rms motor torque in the operating cycle

$$M_{eff} = \sqrt{\frac{M_1^2 * t_1 + M_2^2 * t_2 + ... + M_n^2 * t_n}{T}}$$

$$M_{eff} = \sqrt{\frac{42^2 * 1 + 36^2 * 120 + 30^2 * 60 + (-10,5)^2 1 * 1 + 36^2 * 60 + (-12,6)^2 * 2,5}{474,5}}$$

Moor and drive converter selection

Table 5-2 Moor and drive converter selection

	Proceed as follows	
Motor selection	Determined data: n_N = 2000 rpm, M_{max} = 42 Nm, M_{rms} = 25 Nm A motor with an n_N = 2000 rpm and $M_N \geq$ 25 Nm should be selected from the torque-speed characteristic.	
Selecting a drive converter	The power at the rated speed and M_{max} = 42 Nm should be entered in the power-speed characteristic. The current requirement should be determined from the characteristics.	

5.3.4 A high field weakening range is required

Proceed as follows for applications with a field-weakening range greater than for standard induction motors:

Starting from the max. speed n_{max} and the power P_{max} specified there, a motor should be selected which provides the required power P_{max} at this operating point (n_{max}, P_{max}).

Finally, a check should be made as to whether the motor can generate the torque or the power at the transition speed required by the application (n_n, P_n).

Example

A power of P_{max} = 8 kW is required at n_{max} = 5250 rpm.
The field weakening range should be 1 : 3.5.

This means that the required transition speed would be: 5250 / 3.5 rpm = 1500 rpm.

The power-speed characteristic indicates, as solution, a motor with e.g.
P_N = 9 kW, n_N = 1500 rpm, M_N = 57 Nm.

Motor components 6

6.1 Thermal motor protection

Table 6-1 Features and technical data

Type	KTY 84
Resistance when cold (20° C)	approx. 580 Ω
Resistance when hot (100° C)	approx. 1000 Ω
Connection	via signal cable
Response temperature	Prewarning< 150 °C Alarm/trip at max. 170 °C ± 5 °C

The resistance change is proportional to the winding temperature change. The temperature characteristic is taken into account in the closed-loop control.

The prewarning signal from the evaluation circuit in the SINAMICS drive converter can be externally evaluated.

High short-term overload conditions require additional protective measures as a result of the thermal coupling time of the sensor.

The conductors for the temperature sensor are routed in a cable together with the encoder conductors.

⚠ WARNING

If the user carries-out an additional high-voltage test, then the ends of the temperature sensor cables must be short-circuited before the test is carried-out! If the test voltage is connected to only one terminal of the temperature sensor, it will be destroyed.

⚠ WARNING

Sufficient protection is no longer provided for thermally critical load situations, e.g. for a high overload condition at motor standstill. In this case, other protective measures must be provided, e.g. a thermal overcurrent relay.

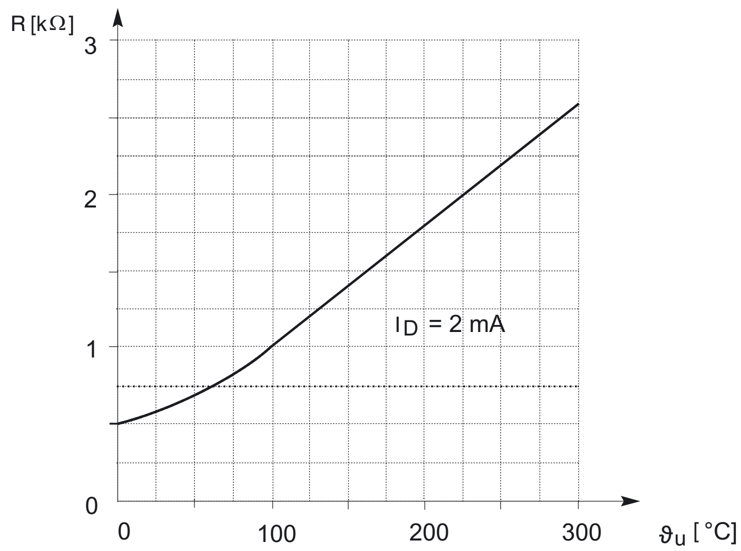


Figure 6-1 Resistance characteristic as a function of the KTY 84 thermistor temperature

6.2 Encoder (option)

6.2.1 Encoder overview

The encoder is selected in the motor Order No. (MLFB) using the appropriate letter at the 9th position.

Note

The letter ID at the 9th position of the Order No. (MLFB) differs for motors with and without DRIVE-CLiQ.

Table 6-2 Encoders for motors with and without DRIVE-CLiQ

Encoder type	9. Position of the Order No. (MLFB)	
	With DRIVE-CLiQ	Without DRIVE-CLiQ
Absolute encoder EnDat (A-2048)	F	E
Incremental encoder HTL (I-1024)	-	H
Incremental encoder HTL (I-2048)	-	J
Incremental encoder sin/cos 1 Vpp with C and D tracks	D	M
Incremental encoder sin/cos 1 Vpp without C and D tracks	Q	N
Resolver 2-pole	P	R
Without encoder	-	O

6.2.2 Encoder connection for motors with DRIVE-CLiQ

Motors with DRIVE-CLiQ have a sensor module that includes the encoder evaluation, the motor temperature sensing and an electronic rating plate.

This sensor module instead of the signal connector and has a 10-pin RJ45-plus socket.

> ⚠ **WARNING**
>
> The sensor module contains motor and encoder-specific data as well as an electronic rating plate. This is the reason that this sensor module may only be operated on the original motor - and may not be mounted onto other motors or replaced by a sensor module from other motors.
>
> The sensor module has direct contact to components that can be destroyed by electrostatic discharge (ESDS). Neither hands nor tools that could be electrostatically charged may come into contact with the connections.

6.2.3 Encoder connection for motors with DRIVE-CLiQ

Motors without DRIVE-CLiQ are connected using the 12 or 17-pin flange socket.

6.2.4 Incremental encoder HTL

Function:

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

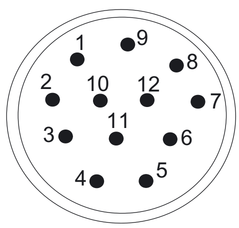
Table 6-3 Properties and technical data

Properties	Incremental encoder HTL
Coupling at the NDE	for SH 180 and 225, integrated in the motor for SH 280, mounted on the motor
Operating voltage	+10 ... +30 V
Current consumption	max. 150 mA
Incremental resolution (periods per revolution)	1024 (option: 2048)
Incremental signals	HTL Track A, track B Zero pulse and inverted signals
Angular error	±1'

Connection

Table 6-4 Connection assignment, 12-pin flange-mounted socket

PIN No.	Signal
1	B*
2	+1R1
3	R
4	R*
5	O
6	A*
7	CTRL TACH
8	B
9	not connected
10	M encoder
11	-1R2
12	P encoder



When viewing the plug-in side (pins)

Cables

Mating connector: 6FX2003-0CE12

Table 6-5 Pre-fabricated cable for SINAMICS:

6FX	□	002	-	2AH00	-	□□□	0
	↓ ↓ 5 MOTION-CONNECT®500 8 MOTION-CONNECT®800					↓ ↓ ↓ Length Max. cable lengths: without transfer of inverted signals,150 m with transfer of inverted signals, 300 m	

For other technical data and length code, refer to catalog, Chapter "MOTION-CONNECT connection system"

6.2.5 Incremental encoder sin/cos 1Vpp

Function:

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

Properties	Incremental encoder sin/cos 1Vpp
Coupling at the NDE	for SH 180 and 225, integrated in the motor for SH 280, mounted on the motor
Operating voltage	+5 V ±5 %
Current consumption	max. 150 mA
Incremental resolution (periods per revolution)	2048
Incremental signals	1 Vpp
Angular error	±40"

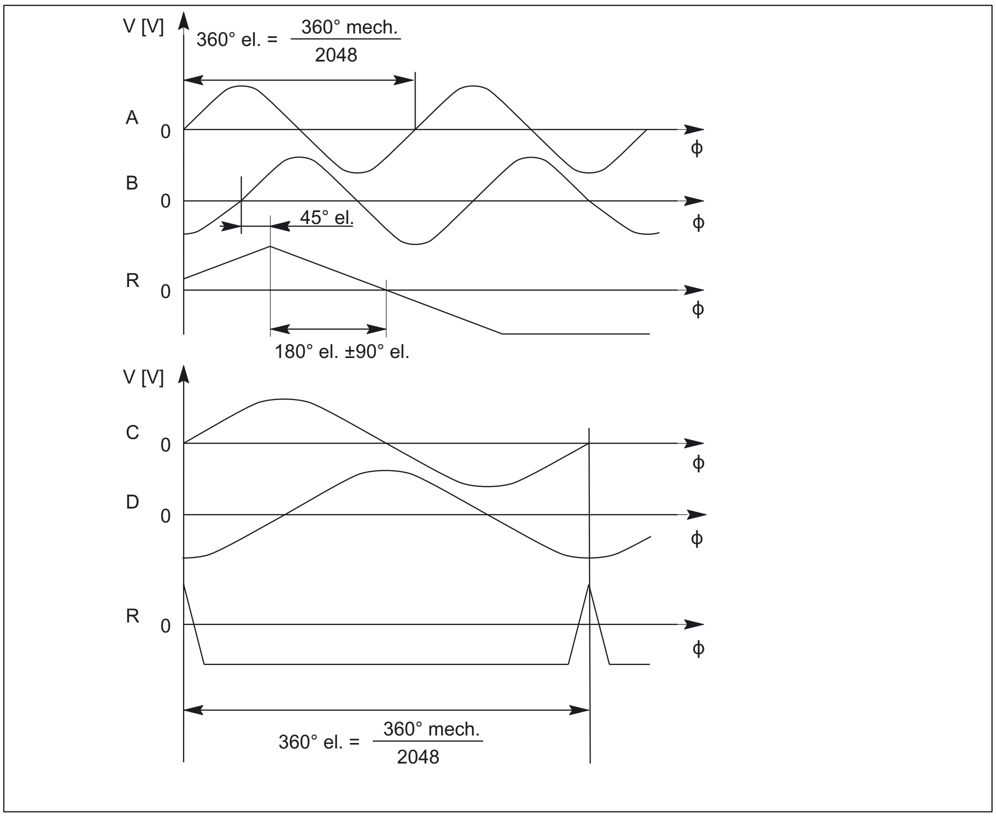
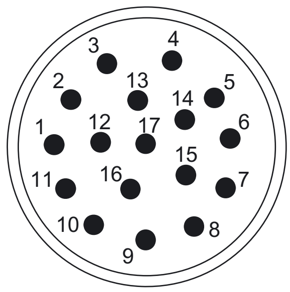


Figure 6-2 Signal sequence and assignment for a positive direction of rotation (clockwise direction rotation when viewing the drive end)

Connection

Table 6-6 Connection assignment, 17-pin flange-mounted socket

PIN No.	Signal	
1	O	
2	A*	
3	R	
4	D*	
5	C	
6	C*	
7	M encoder	
8	+1R1	
9	-1R2	
10	P encoder	
11	B	
12	B*	
13	R*	
14	D	
15	0 V sense	
16	5 V sense	
17	not connected	



When viewing the plug-in side (pins)

Cables

Mating connector: 6FX2003-0CE17

Table 6-7 Pre-fabricated cable for SINAMICS

6FX	□	002	-	2CA31	-	□□□	0
	↓					↓ ↓ ↓	
	↓					Length	
	5 MOTION-CONNECT®500					Max. cable length 100 m	
	8 MOTION-CONNECT®800						

For other technical data and length code, refer to catalog, Chapter "MOTION-CONNECT connection system"

6.2.6 Absolute encoder (EnDat)

Function:

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

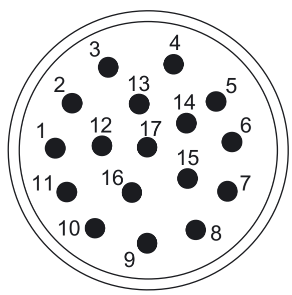
Table 6-8 Properties and technical data

Properties	Absolute encoder (EnDat)
Coupling at the NDE	for SH 180 and 225, integrated in the motor for SH 280, mounted on the motor
Operating voltage	+5 V ±5 %
Current consumption	max. 300 mA
Resolution, incremental (periods per revolution)	2048
Absolute resolution (coded revolution)	4096
Incremental signals	1 Vpp
Serial absolute position interface	EnDat
Angular error	±40"

Connection

Table 6-9 Connection assignment, 17-pin flange-mounted socket

PIN No.	Signal
1	O
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	0 V sense
16	5 V sense
17	not connected



When viewing the plug-in side (pins)

Cables

Mating connector: 6FX2003-0CE17

Table 6-10 Pre-fabricated cable for SINAMICS

6FX	□	002	-	2EQ10	-	□□□	0
	↓ ↓ 5 MOTION-CONNECT®500 8 MOTION-CONNECT®800					↓ ↓ ↓ Length Max. cable length 100 m	

For other technical data and length code, refer to catalog, Chapter "MOTION-CONNECT connection system"

6.2.7 2-pole resolver

Function:

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

Table 6-11 Properties and technical data

Properties	Resolver
Coupling at the NDE	for SH 180 and 225 integrated in the motor
Operating voltage/operating frequency	+5 V / 4 kHz
Current consumption	< 80 mA (rms)
Output signals	Ratio ü = 0.5 ± 5 % $V_{sine\ track} = ü \cdot V_{excitation} \cdot \sin\alpha$ $V_{cosine\ track} = ü \cdot V_{excitation} \cdot \cos\alpha$
Angular error (bandwidth)	< 14'

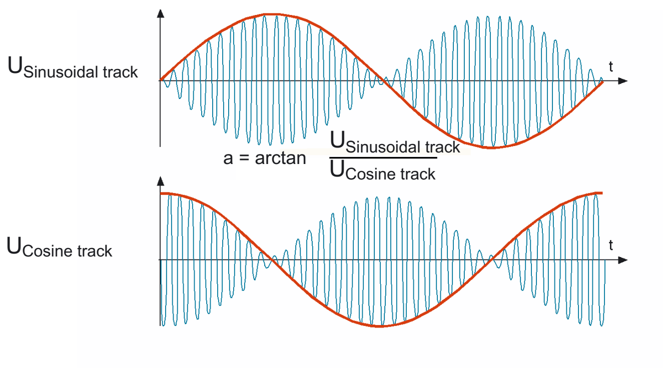
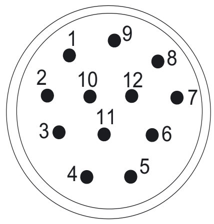


Figure 6-3 Output signals, resolver

Connection

Table 6-12 Connection assignment, 12-pin flange-mounted socket

PIN No.	Signal	
1	S2	 When viewing the plug-in side (pins)
2	S4	
3	not connected	
4	not connected	
5	not connected	
6	not connected	
7	R2	
8	+1R1	
9	-1R2	
10	R1	
11	S1	
12	S3	

Cables

Mating connector: 6FX2003-0CE12

Table 6-13 Pre-fabricated cable for SINAMICS

6FX	□	002	-	2CF02	-	□□□	0
	↓ ↓ 5 MOTION-CONNECT®500 8 MOTION-CONNECT®800					↓ ↓ ↓ Length Max. cable length 150 m	

For other technical data and length code, refer to catalog, Chapter "MOTION-CONNECT connection system"

6.3 Gearbox (option)

6.3.1 Overview

A gearbox must be mounted, if

- the drive torque is not sufficient at low speeds
- the constant power range is not sufficient in order to utilize the cutting power over the complete speed range.

In order to mount a gearbox, depending on the shaft height, various prerequisites must be fulfilled.

Prerequisites for mounting a gearbox for SH 100 to SH 160

- Type of construction IM B5, IM B35 or IM V15
- Shaft with key and full-key balancing

Prerequisites for mounting a gearbox for SH 180 and SH 225

- Type of construction IM B35
- Bearing design for coupling output
- Vibration severity level R
- Flange and shaft accuracy R
- Shaft with key and full-key balancing
- Degree of protection IP 55, prepared for mounting a ZF gearbox

For questions regarding gearboxes, please directly contact the following:

ZF Friedrichshafen AG

Antriebstechnik Maschinenbau
D-88038 Friedrichshafen
Telephone: (0 75 41) 77 - 0
Fax: (0 75 41) 77 - 34 70
Internet: http://www.ZF-Group.de

6.3.2 Properties

Gearbox properties

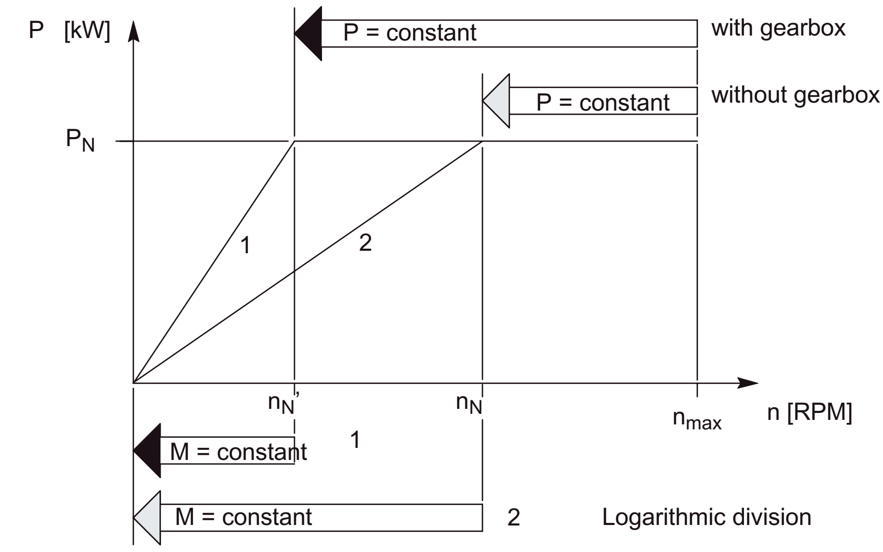
- Version as planetary gear
- Gearbox efficiency: above 95 %
- Gearboxes are available for motors, shaft heights 100 to 225
- Selector gearboxes are available up to a drive output of 100 kW
- Types of construction: IM B35 (IM V15) and IM B5 (IM V1) are possible

---

Note

1PH7 motors are only designed for stressing in accordance with the specifications (refer to the cantilever force diagram and maximum torque).

For drive units which, for example, are mounted to the gearbox flange or gearbox enclosure, the motors with type of construction IM B35 must be supported at the NDE without subjecting the motor frame to any stress.



n_N	Rated speed
nN’	Rated speed with two-stage selector gearbox
n_{max}	Maximum permissible speed
P_N	Rated power and also constant motor power in the speed range of n_n to n_{max} or n_N’ to n_{max}
M	Torque

Figure 6-4 Speed-power diagram when using a two-stage selector gearbox to extend the constant power speed range of main spindle drive motors

Examples

Motor without selector gearbox

For P = constant from n_N = 1500 rpm to n_{max} = 6300 rpm a constant power control range greater than 1:4 is possible.

Motor with selector gearbox

For gearbox stage i_1 = 4 and i_2 = 1 a constant power control range of greater than 1:16 is possible (n_N' = 375 rpm to n_{max} = 6300 rpm).

Vibration severity level

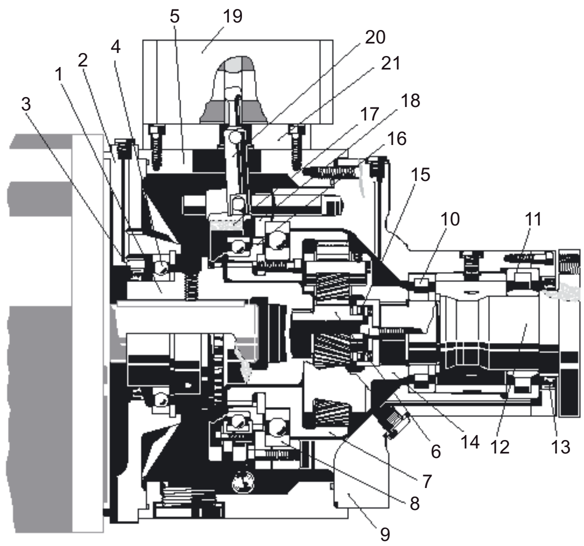
Motor + gearbox: Tolerance R (acc. to DIN ISO 2373)

This is also valid if motor tolerance level S is ordered.

Information regarding spindle applications

- The following advantages are obtained by locating the gearbox outside the spindle box:
- Gearbox vibration is not transferred.
- Separate lubricating systems for the main spindle (grease) and selector gearbox (oil).
- No noise and no temperature fluctuations caused by the gearbox pinion wheels in the spindle box.
- Instead of using belts, the drive power can also be transferred from the gearbox output using a pinion (on request) or co-axially through an compensating coupling.

6.3.3 Gearbox design



1 Drive hub
2 Adapter plate
3 Rotary shaft seal
4 Hub bearing arrangement
5 Gearbox enclosure
6 Sun gear
7 Internal gear
8 Internal gear bearing
9 Bearing housing
10 Drive output
11 Drive output
12 Drive shaft
13 Rotary shaft seal
14 Planetary-gear carrier
15 Axial bearing with disk spring
16 Sliding sleeve
17 Selector fork
18 Brake disk
19 Lifting solenoid
20 Selector shaft
21 Connecting plate

Figure 6-5 Gearbox design for 1PH7, SH 100 to 160

The following applies to selector gearboxes:	Switch position I:	i1 = 4
	Switch position II:	i2 = 1

Both gearbox ratios are electrically selected and the setting is monitored using limit switches.

The gearbox output shaft lies coaxially to the motor shaft.

Circumferential backlash (measured on gearbox output):
Standard: 30 angular minutes (for SH 100-160)

Belt pulley

- The belt pulley should be in the form of a cup wheel.
- The gearbox output shaft has a flange with outer centering and tapped holes to retain the belt pulley.
- The complete drive should be designed to be as stiff as possible using large belt cross-sections. This has a positive impact on the smooth running properties of the drive.

6.3.4 Technical Data

Table 6-14 Explanation of the connections

Type	Motor Shaft height	Order No.	Maximum speed n_{max}	Rated torque (S1 duty)			Maximum torque (S6 duty, 10 min cycle duration, max. 60% duty factor)			Weight	Output housing a10
				Drive input	Drive output		Drive input	Drive output			
ZF identifier	[mm]		[rpm]	[Nm]	i=1 [Nm]	i=4 [Nm]	[Nm]	i=1 [Nm]	i=4 [Nm]	[kg]	[mm]
2K120	100	2LG4312-...	8000 [2)] 9000 [3)]	120	120	480	140	140	560	30	100
2K250	132	2LG4315-...	6300 8000 [3)]	250	250	1000	400	400	1600	62	116
2K300	160	2LG4320-...	6300 8000 [3)]	300	300	1200	400	400	1600	70	140
2K800 [1)]	184	2LG4250 ...	4000	800	800	3200	900	900	3600	110	160
2K801 [1)]	186	2LG4260-...	4000	800	800	3200	900	900	3600	110	160
2K802	225	2LG4270-...	4000	800	800	3200	900	900	3600	110	160

1) Can be supplied with holding brake (option).

2) Higher maximum speed from 8000 ... 9000 rpm for more than 20% power-on duration is only possible with injection lubrication.

3) Permissible with gearbox oil cooling for gearbox stage i = 1.

Note

When designing the complete drive unit (motor with gear) the gearbox data is decisive.

For example, for the 1PH7167-2NB, the torque should be reduced to 300 Nm. For motors, shaft heights 100 and 132, the maximum motor speed should be limited to the permissible gearbox speed 2K120/2K250.

For other binding technical data and engineering information/instructions (e.g. lubrication, temperature rise, permissible cantilever forces and examples), please refer to Catalog 2K Gearboxes from ZF (Zahnradfabrik Friedrichshafen).

6.3.5 Electrical connection

Power supply for the selector unit: 24 V DC ±10 %
The mechanical selector unit requires a separate supply.

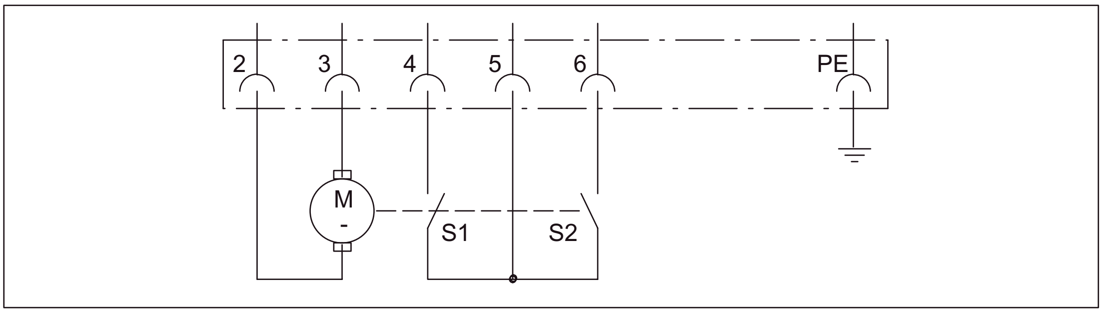


Figure 6-6 Circuit diagram

Connector (incl. in the scope of supply): Manufacturer, Harting; 7-pin + PE, type HAN 7D

Table 6-15 Explanation of the connections

Connector contact No.	Number and Designation	input	Output	Voltage	Current
2 and 3	1 selector unit	0	–	24 V DC	I_{max} = 5 A (inrush current)
4 and 6	2 limit switches	0	0	24 V DC U_{max} =42 V DC	I_{max} = 5 A

Table 6-16 Control sequence when selecting the gearbox stage

Gearbox stage selection	Connector contact No.			
	2	3	4/5 (S1)	5/6 (S2)
When changing the ratio from stage i_2 to i_1				
a Initial setting (f) b Selection sequence c Mechanical selection carried out up to endstop 1)	+24 V DC	0 V	0 0 L	L 0 0
When changing the ratio from stage i_1 to i_2				
d Initial setting (c) e Selection sequence f Mechanical selection carried out up to endstop 1)	0 V	+24 V DC	L 0 0	0 0 L

L Contact closed

0 Contact open

1) A limit switch (S1 or S2) sends a signal to the control after selection to switch out the selector unit.

6.3.6 Gearbox stage selection

When changing the gearbox stage, the following information must be carefully observed:

- Only change over the gearbox stage at standstill; e.g. while changing the tool.
- During selection, the direction of rotation should be changed approximately 5 times per second. The gears normally mesh at the first direction of rotation change so that selection times of between 300 and 400 ms can be achieved.
- The motor may only start to accelerate 200 ms after the changeover has been completed.
- The selection must be monitored using a time relay. After 2 s, the selection must be reversed, if the selection command was not able to be executed. A time limit of 10 s should be provided for approx. 4 to 5 additional selection operations.

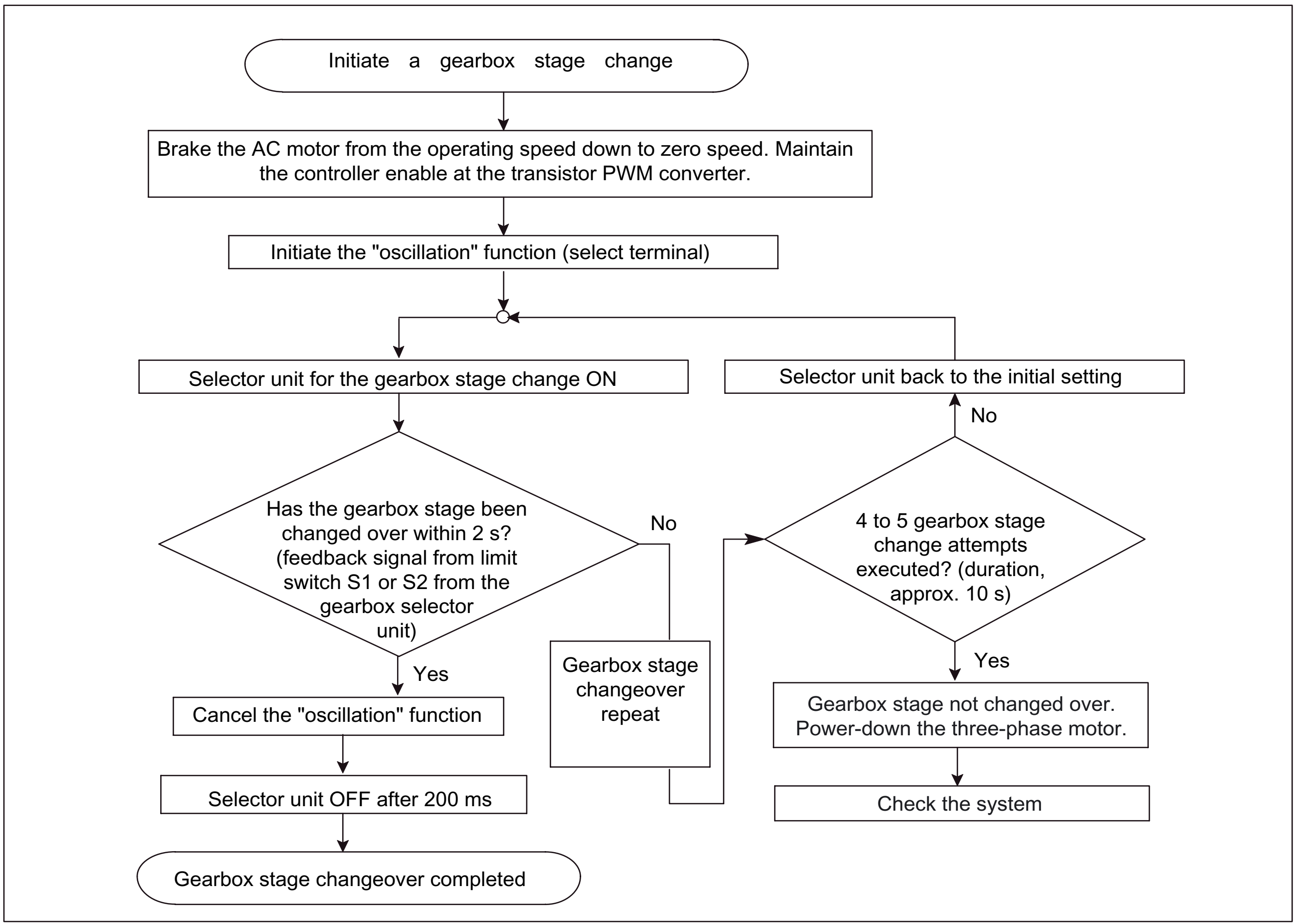


Figure 6-7 Function sequence when changing the gearbox stage

6.3.7 Lubrication

Splash lubrication

Oil level check:	Visually using a sight glass
The oil level depends on the mounting position:	
horizontally and vertically:	Middle of sight glass[1)]
For an inclined mounting position:	Mark on the angled oil level indicator (mount additionally)
Oils which can be used:	HLP 32 acc. to ISO-VG 68
Oil drain bolts:	on both sides

1) The oil volume data on the rating plate is only an approximate value

Circulating oil lubrication

Circulating oil lubrication is required for the following applications:

- for continuous operation
- for operation over a longer period of time in one gearbox stage
- for intermittent operation with short no-load intervals

The type of circulating oil lubrication depends on which operating temperature level is required in use. Several applications require a low operating temperature level. We recommend, in these cases, circulating oil lubrication. The oil intake quantity is between 1 and 1.5 l/min with an oil pressure of approx. 1.5 bar. The diagrams "selector gearbox with selector unit for size 100" and "Selector gearbox with selector unit for sizes 132 and 160" show the approximate positions of the oil intake and discharge locations at the gearbox. The precise dimensions can be taken from the relevant mounting drawings.

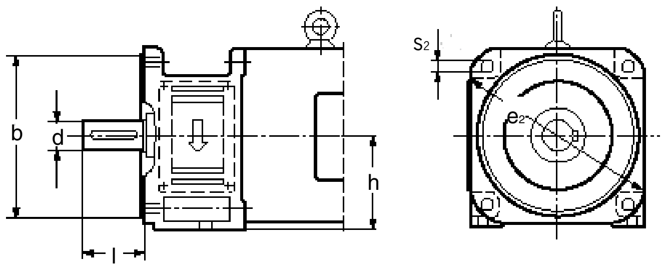
The following gearboxes must always be operated with circulating oil lubrication (also refer to the mounting drawings):

- Gearbox 2K800
- Gearbox 2K801
- Gearbox 2K802
- Gearbox 2K2100

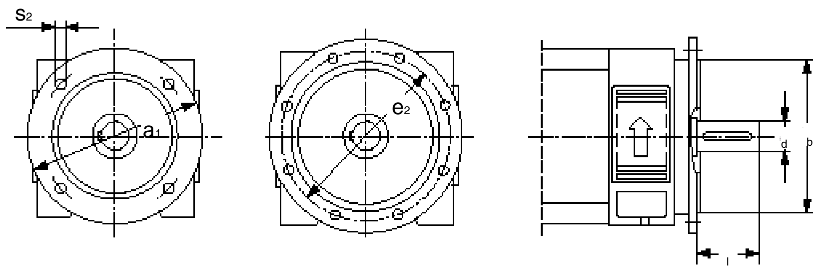
For the following gearboxes, circulating oil lubrication is required for V1 or V3 vertical mounting positions:

- Gearbox 2K120
- Gearbox 2K121
- Gearbox 2K250
- Gearbox 2K300

6.3.8 Flange dimensions



For selector gearboxes for motor frame sizes 100, 132 and 160



For selector gearboxes for motor frame sizes 180 and 225

Figure 6-8 Flange dimensions for motors

Table 6-17 Flange dimensions for motors

Two-stage Selector gearbox	Size	Standard motor companion dimensions						
		h	d	l	b_1	e_1	a_1	s_1
2K120	101, 103, 105, 107	100 $^{-0,5}$	38 k_6	80	180 j_6	215 $^{\pm 0,5}$	–	14 $^{\pm 0,2}$
2K250	131, 132, 133, 135, 137	132 $^{-0,5}$	42 k_6	110	250 h_6	300 $^{\pm 0,5}$	–	18 $^{\pm 0,2}$
2K300	163, 167	160 $^{-0,5}$	55 k_6	110	300 h_6	350 $^{\pm 0,5}$	–	18 $^{\pm 0,2}$
2K800	184	180 $^{-0,5}$	60 k_6	140	300 h_6	350 $^{\pm 0,5}$	400	19 $^{\pm 0,2}$
2K801	186	180 $^{-0,5}$	65 k_6	140	350 h_6	400 $^{\pm 0,5}$	450	19 $^{\pm 0,2}$
2K802	224	225 $^{-0,5}$	75 k_6	140	450 h_6	500 $^{\pm 0,5}$	550	19 $^{\pm 0,2}$

6.3.9 Connections, circulating oil lubrication, frame size 100

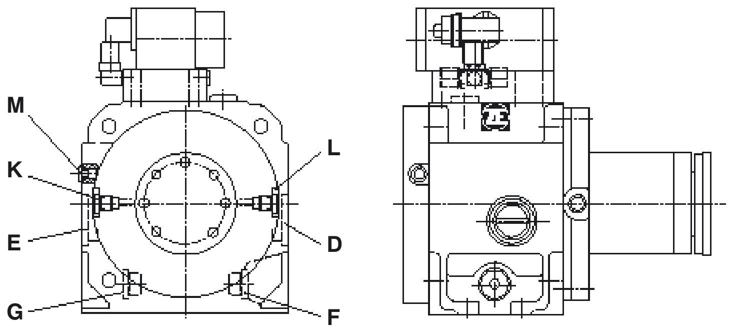


Figure 6-9 Selector gearbox with selector unit for frame size 100

Table 6-18 Connections for circulating oil lubrication

Max. pressure	Connection Oil return	Connection Oil inlet	Mounting position
0.2 bar 1.5 bar	**D** Main direction of rotation Clockwise[1)] **E** Main direction of rotation Counter-clockwise[1)]	**M** (0.5 dm^3/min) **K/L** (1.0 dm^3/min)	V1 (closed version)
1.5 bar			
1.5 bar		**G** (1.5 dm^3/min) Main direction of rotation clockwise **F** (1.5 dm^3/min) Main direction of rotation counter-clockwise	B5 V1
Note: Circulating oil lubrication is required for certain gearboxes and V1 or V3 vertical mounting positions (refer to Chapter "Lubrication")			

[1)] When viewing the gearbox drive from the motor

6.3.10 Connections, circulating oil lubrication, frame sizes 132 and 160

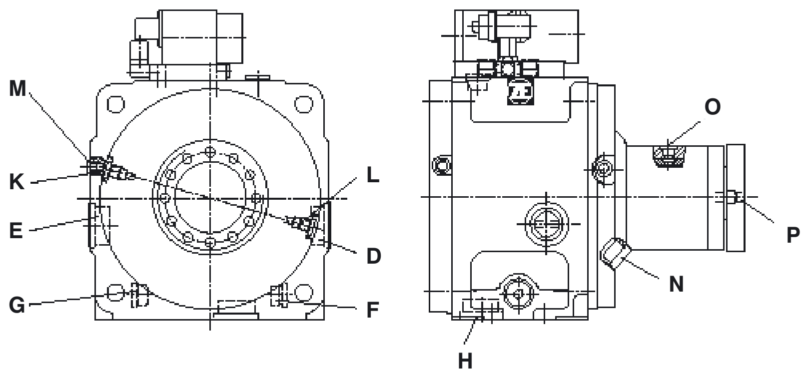


Figure 6-10 Selector gearbox with selector unit for frame sizes 132 and 160

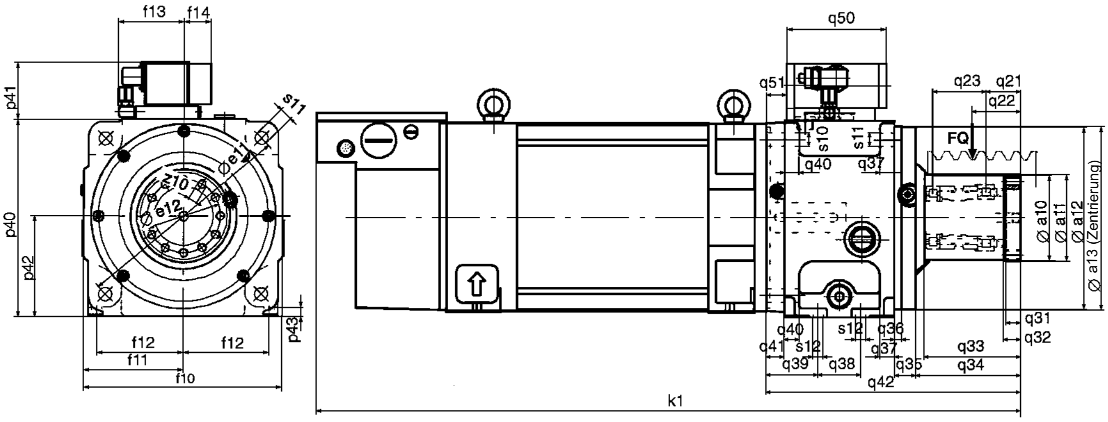
Table 6-19 Connections for circulating oil lubrication

<table>
<tr><th>Max. pressure</th><th>Connection
Oil return</th><th>Connection
Oil inlet</th><th>Mounting position</th></tr>
<tr><td>2 bar</td><td>H</td><td>P (1.5 dm^3/min)</td><td>V3</td></tr>
<tr><td>0,5 bar
1.5 bar</td><td rowspan="3">D
Main direction of rotation clockwise [1)]
E
Main direction of rotation counter-clockwise[1)]</td><td rowspan="2">M (0.5 dm^3/min)
N (1.5 dm^3/min)</td><td rowspan="2">V1
(closed version)</td></tr>
<tr><td>1.5 bar</td></tr>
<tr><td>1.5 bar</td><td>G (1.5 dm^3/min)
Main direction of rotation clockwise
F (1.5 dm^3/min)
Main direction of rotation counter-clockwise</td><td>B5
V1</td></tr>
<tr><td colspan="4">Note: Circulating oil lubrication is required for certain gearboxes and V1 or V3 vertical mounting positions (refer to Chapter "Lubrication")</td></tr>
<tr><td colspan="4">Connection O is additionally possible (0.5 dm^3/min)</td></tr>
</table>

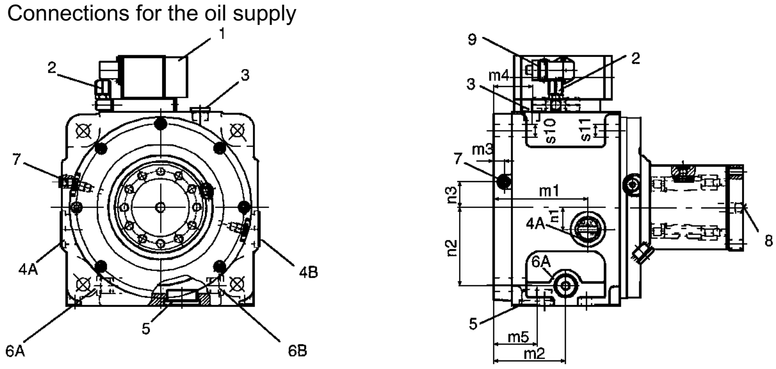
1) When viewing the gearbox drive from the motor

6.3.11 Gearbox dimensions

Gearbox dimensions



Connections for the oil supply



For selector gearbox for motor frame sizes 100 to 160

1 Switchgear unit (solenoid 24 V DC, 5 A)
2 Ventilation valve
2 Oil filler plug
4A Oil level inspection window or oil return for counter-clockwise rotation and greasing around the circumference
4B Oil level inspection window or oil return for clockwise rotation and greasing around the circumference
5 Oil drain bolt for type IM B35
6A Oil inlet for main direction of rotation clockwise and greasing around the circumference
6B Oil inlet for main direction of rotation counter-clockwise and greasing around the circumference
7 Oil inlet for type IM V15 (must be connected)
8 Oil inlet for type IM V36
9 Connector, manufacture: Harting, type HAN 8 U

Figure 6-11 Motor and gearbox dimensions

Table 6-20 Two-stage selector gearbox (dimensions, overview 1)

Motor		Dimensions [mm]										
Size	Type	a10 Output housing	a11 k6	a12	a13 g6	e11 0.2	e12	f10	f11	f12	f13	f14
100	1PH7 101 1PH7 103 1PH7 105 1PH7 107	100	100	188	190	215	80	208	104	92	86,6	42,4
132	1PH7 131 1PH7 133 1PH7 135 1PH7 137	116	118	249	250	300	100	270	135	117	89,5	39,5
160	1PH7 163 1PH7 167	140	130	249	250	350	100	326	163	145	89,5	39,5

Table 6-21 Two-stage selector gearbox (dimensions, overview 1)

Motor		Dimensions [mm]							
Size	Type	m1	m2	m3	m4	m5	n1	n2	n3
100	1PH7 101 1PH7 103 1PH7 105 1PH7 107	107	90,5	15	45	---	17	80	30
132	1PH7 131 1PH7 133 1PH7 135 1PH7 137	131	100	15	53	60	30	108	35
160	1PH7 163 1PH7 167	131	100	15	53	60	30	135	35

Table 6-22 Two-stage selector gearbox (dimensions, overview 2)

Motor		Dimensions [mm]												
Size	Type	p40	p41	p42	p43	q21	q22	q23	q31	q32	q33	q34	q35	q36
100	1PH7 101 1PH7 103 1PH7 105 1PH7 107	209	92	108	12	42	57–67	75	15	17,5	---	116	26	10
132	1PH7 131 1PH7 133 1PH7 135 1PH7 137	268	78	136	12	46,9	57–66	72,1	20	22,5	129,5	142,5	29	10
160	1PH7 163 1PH7 167	324	78	164	17	48,2	74–83	69,8	20	22,5	---	142,5	29	10

Table 6-23 Two-stage selector gearbox (dimensions, overview 3)

Motor		Dimensions [mm]							
Size	Type	q37	q38	q39	q40	q41	q42	q50	q51
100	1PH7 101 1PH7 103 1PH7 105 1PH7 107	18	55	63	18	25	298	136	12
132	1PH7 131 1PH7 133 1PH7 135 1PH7 137	20	58	71	20	25	346,5	136	28
160	1PH7 163 1PH7 167	20	58	71	23	25	346,5	136	28

Table 6-24 Two-stage selector gearbox (dimensions, overview 3)

Motor		Dimensions [mm]					
Size	Type	s10	s11	s12	z10 Thread	No. of tapped holes	Motor with gearbox Total length k1
100	1PH7 101 1PH7 103 1PH7 105 1PH7 107	14	14	14	M8	8 x 45°	709 709 804 804
132	1PH7 131 1PH7 133 1PH7 135 1PH7 137	18	18	14	M12	12 x 30°	885 885 970 970
160	1PH7 163 1PH7 167	18	18	14	M12	12 x 30°	987 1047

6.3.12 Permissible dimension deviations

Table 6-25 Permissible dimension deviations

Dim.	permissible deviations		
a, b	up to 250 mm from 250 mm to 500 mm from 500 mm to 750 mm		±0.75 mm ±1.0 mm ±1.5 mm
b_1	up to 230 mm over 230 mm	DIN 7160	j6 h6
d, d_1	up to 11 mm from 11 mm to 50 mm over 50 mm	DIN 7160	j6 k6 m6
e_1	up to 200 mm from 200 mm to 500 mm		±0.25 mm ±0.5 mm
h	from 50 mm to 250 mm DIN 747 from 250 mm to 500 mm		–0.5 mm –1.0 mm
i, i_1, i_2	up to 85 mm from 85 mm to 130 mm from 130 mm to 240 mm		±0.75 mm ±1.0 mm ±1.5 mm
u, t, u_1, t_1	acc. to DIN 6885 Sheet 1		

6.4 Radial sealing ring

When mounting ZF gears, optionally, a radial shaft sealing ring according to DIN 3760 is installed in the motor at the drive end (refer to Chapter "Order designation")

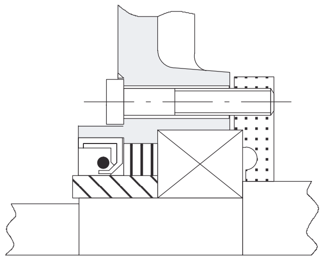


Figure 6-12 Radial sealing ring

The sealing lip must be adequately cooled and lubricated using the gearbox oil to guarantee reliable and safe functioning of the radial shaft sealing ring.

Note

Radial shaft sealing rings are seals that are in constant contact. This is the reason that they are subject to wear and generate heat due to friction.

Sealing ring wear can only be reduced using adequate lubrication and ensuring that the sealing location is clean. In this case, the lubricant also acts as a cooling medium and supports the dissipation of heat caused by friction from the sealing location.

If a radial shaft sealing ring runs dry, then this has a negative impact on the functionality and the lifetime.

Degree of protection

1PH7 motors with radial shaft sealing ring have, on the flange side, degree of protection IP65. This means that the sealing effect is only guaranteed when the appropriate liquid is sprayed onto it. Liquids that gather at the drive end or oil jets require a higher degree of protection or the appropriate measures and should therefore be avoided.

Note

The complex interaction between the sealing ring, shaft and liquid to be sealed as well as the application conditions (heat due to friction, accumulated dirt etc.) make it impossible to calculate the lifetime of the shaft sealing ring. Under unfavorable conditions, from experience, an increased probability of failure can occur after 2000 operating hours.

6.5 Holding brake (option)

6.5.1 Properties

Functional principle of the holding brake

A brake can be mounted at the DE side of 1PH7 motors, shaft heights 100, 132, 160, 180 and 225.

These brakes are electro-magnetic units for dry-running operation. An electro-magnetic field is used to release the brake which is applied using spring force. They function according to the closed-circuit principle, i.e. the spring-operated brake is triggered when the current is interrupted and holds the drive. When power is applied to the brake, it is released and the drive is free to rotate.

When the power fails or an Emergency Stop is issued, the drive is braked from its actual speed down to standstill. The holding torques and the number of emergency stop operations are listed n in the following table . The brakes have been designed to be operated with 230 V AC, 50 ... 60 Hz or 24 V DC (up to shaft height 160). These power supply voltages must be provided on the plant/system side.

NOTICE
The maximum speed of a motor with brake is limited to the maximum speed of the brake (refer to the following table).

Technical data of the holding brakes

Technical data of the mounted holding brakes with emergency stop function
(brake supply voltage 230 V AC, 50 ... 60 Hz/24 V DC +5 % –10%)

Shaft height	Motor type	Brake type	Holding torque (tolerance ±20 %)	Speed zahl $n_{Max.}$	Perm. individual switching work W_E	Lifetime dauer-switching work $W_{Max.}$	Number Emergency Stop operations until the brake pad has to be changed off at $n_{Max.}$ z	J	Coil current AC	Coil current DC	Flange dimension DIN 42 948	Shaft end dimension DIN 748 Ø	Shaft end length	Perm. cantilever force (3000 rpm^{-1}, $x_{Max.}$)	Moment of inertia of the brake	Weight of the brake se	Opening time	Closing time
			Nm	min^{-1}	kJ	MJ	–	kgm^2	A	A		mm	mm	N	kgm^2	kg	ms	ms
For 1PH7 motors with brake supply voltage 230 V AC, 50 ... 60 Hz																		
100	1PH710.	Frame size 19	60 ... 150	5500	25	90	8700	0,062	1,0	4,7	A250	38	80	2300	0,005	21	255	60
132	1PH713.	Frame size 24	140 ... 310	4500	40	226	9400	0,208	1,3	6,3	A350	42	110	2000	0,015	46	330	95
160	1PH716.	Frame size 29	280 ... 500	3700	60	401	11900	0,448	1,35	6,7	A400	55	110	6800	0,028	66	350	450
180	1PH7184	NFE 60	600	3500	69	154	2230	1,02	0,9	—		90	90	2800	0,027	55	400	160
	1PH7186	NFE 60/80	800		91	56	620	1,36							0,026			
225	1PH7224	NFE 100	1000	3100	158	153	970	3,0	1,3	—		100	100	2800	0,041	75	460	200
	1PH7226	NFE 100	1000		206	109	530	3,9							0,041			
	1PH7228	NFE 100/140	1400		248	32	130	4,7							0,041			

Explanation of terminology in the table

Holding torque [Nm]: For motors, shaft heights 100 ... 160, the holding torque can be continuously set in the specified value range using a setting ring. The dynamic braking torque is approximately 0.7 ... 0.8 x holding torque.

Speed n_{max} [rpm]: Maximum permissible speed where emergency stops are possible.

Perm. single switching energy W_E [kJ]: Perm. switching energy during an Emergency Stop, $W_E = J_{tot}. \times n^2/182.5 \times 10^{-3}$ (J in kgm^2, n in rpm)

Lifetime switching energy W_{max} [MJ]: Max. possible switching energy of the brake (for Emergency Stop) until the brake linings must be replaced, $W_{max} = W_E \times z$.

Number of Emergency Stops z: The specified number of Emergency Stops refer to the following conditions: Braking from speed n_{max}, $J_{tot} = 2 \times J_{mot}$. A conversion can be made for operation under different conditions: Number of Emergency Stops $z = W_{max}/W_E$

Coil current in A: Current in order to maintain the brake in a released condition. The following applies for NFE brakes: Release current = 2 x holding current.

Perm. cantilever force [N]: for shaft heights 100 to 160, coupling outputs and belt couplings are possible; for shaft heights 180 and 225, only coupling outputs are permissible.

Opening (release) time [ms]: Separating time until the brake opens (the specified values refer to the maximum braking torque).

Closing time [ms]: Interlocking time until the brake closes (the values refer to the maximum braking torque).

Holding brake versions

The rectifier is mounted in the brake terminal box. The degree of protection is IP55.

In the basic version, the brake has three emergency release screws (only for shaft heights 180 and 225); these are axially accessible from the front. The integrated or mounted micro-switch can be incorporated in a higher-level control system as either NC contact or NO contact. The fast switching rectifier is used to over-excite the coil to release the brake and to achieve short release times (release current = 2 x holding current).

All of the relevant technical data - e.g. holding torque, permissible speeds, number of emergency braking operations and brake currents are listed in the Table "Mounting a holding brake for 1PH7 motors". The Operating Instructions for the mounted holding brake are supplied together with the motor-brake unit.

Ordering example

1PH7186–2HF00–2AA3, type of construction IM B3, holding brake includes the micro-switch and emergency release screw (additional ordering options, refer to the Catalog).

Use for the intended purpose

The "single-disk spring-operated brake module" is designed to be mounted on induction motors and is intended for use in all types of industrial applications. It is prohibited to use the brake in hazardous areas and zones. The integrated single-disk spring-operated brake (electro-magnetically opening system) is designed as holding brake. Occasional Emergency Stop operations are possible.

CAUTION
It is absolutely imperative that the permissible number of switching operations/h and the max. switching work per switching operation are carefully observed - especially when commissioning/setting-up machines and plants (jog mode), according to the data sheet or Table "Mounting a holding brake for 1PH7 motors". If this data is not carefully observed, then the braking effect can be irreversibly reduced which could have a negative impact on the overall function. The brake module can be provided with a manual release function to release the holding torque.

CAUTION
Secure and protect against accidental operation and misuse. The manual release bar can be removed. Special regulations and legislation related to certain plants and systems - e.g.for cranes - should be carefully observed regarding the permissible use of a manual release. The rated operating conditions refer to DIN VDE 0580: 1994-10. The degree of protection refers to DIN VDE 0470 Part 1. If deviations exist, then possible special measures must be harmonized and coordinated with the manufacturer. The braking module is designed for an ambient temperature of -5 °C to +40 °C. At temperatures below -5 °C and longer periods without power being applied to the brake, then it cannot be excluded that the brake disk freezes. In this case, special measures must be applied after first contacting the manufacturer.

⚠ CAUTION
The braking module is not a safety brake and therefore, depending on the particular application, the appropriate accident prevention regulations must be carefully observed.

CAUTION
Whenever reference is made to special measures and discussions with the manufacturer then these must be carried-out while the plant or system is being engineered.

6.5.2 Mounted holding brake for SH 100 to SH 160

Properties

The holding brakes for motors, shaft heights 100, 132, and 160 are braking modules (manufactured by Binder) with their own bearings, flange and shaft end. The dimensions of the flange and shaft end of the braking module are identical with those of the motor. If a motor is to be equipped with a brake, then a motor version with a flange-type of construction and a smooth shaft (without keyway and key) is used. The shaft of the braking module can then be shrunk onto the motor shaft (thermal technique). It can be released using pressurized oil. The braking module is bolted to the motor flange.

Either couplings or belt pulleys can be used as output. The permissible cantilever forces can be taken from the appropriate cantilever force diagrams.

Technical design

1PH7 motors (shaft heights 100, 132) are available with type of construction IM B5; further, motors, shaft heights 100, 132 and 160 are also available with type of construction IM B 35 (it is also possible to provide motors with a foot mounting type of construction - IM B 3). A manual release function can be optionally mounted on the braking module. This means that the brake can be manually released when either the power fails or the motor is at a standstill. If the manual release lever is released then it automatically returns to the braking state. A mounted micro-switch is available as an additional option. This micro-switch can be incorporated in a higher-level control as either NC contact or NO contact. The micro-switch is connected using a cable that is separately brought-out. The braking module has degree of protection IP55. Motors with mounted braking module are only available with vibration severity level N and with shaft and flange precision N.

Order No. code for SH 100, 132 and 160 for a mounted holding brake with Emergency Stop function

1 P H 7 . . . – . . . . . – ■ K . .

No brake	0
Brake supply voltage: 230 V AC, 50 – 60 Hz	
with brake (brake supply voltage: 230 V AC, 50/60 Hz	1
With brake (brake has a microswitch)	2
With brake (brake has manual release function)	3
With brake (brake has a microswitch and manual release)	4
Brake supply voltage: 24 V DC	
with brake (brake supply voltage: 24 V DC)	5
With brake (brake has a microswitch)	6
With brake (brake has manual release function)	7
With brake (brake has a microswitch and manual release)	8

Options

Brake versions are only possible in the following combination:

- Vibration severity level N, shaft and flange accuracy N ("K" at the 14th position)
- Shaft end at the braking module with key and half-key balancing (an "A" or"B" at the 15th position) or smooth shaft end (a "J" or "K" at the 15th position)
- Type of construction IM B 5 (only for sizes 100 and 132, a "2" at the 12th position) or IM B 35 (a "3" at the 12th position, can be mounted/installed with foot type of construction IM B 3)
- a "0", "3" or "6" at the 16th position.

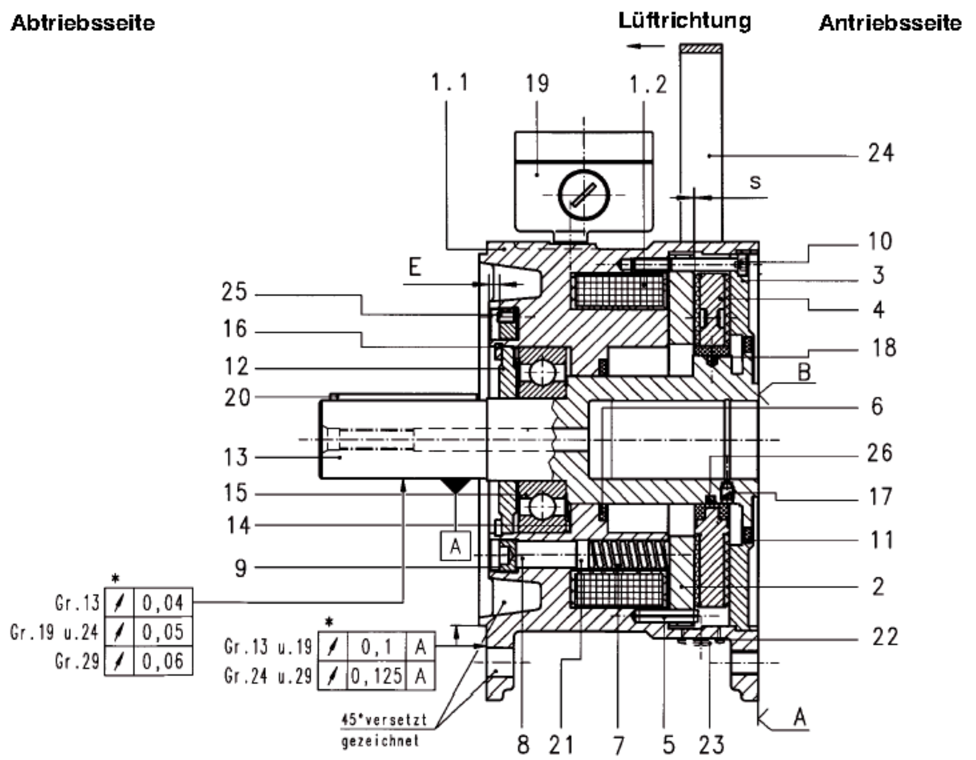
Design and mode of operation

The solenoid housing (1.1) with the cast excitation winding (1.2) is used to accommodate the armature (2), the brake disk (4) and the flange (3) - that is retained using cylinder head screws (10). Pressure is applied in an axial direction to the brake disk (4) supported by the flange (3) using the springs (7) guided in the solenoid housing (1.1) that are supported on one side via the thrust bolts (8) and/or (21) at the setting ring (9). This in turn generates a braking effect (torque).

When current flows through the excitation winding (1.2) an electromagnetic force pulls-in the armature (2) against the force of the springs (7). This voltage (DC voltage system) is generated using a single-phase or bridge-type rectifier. When the armature is drawn-in, the brake disk (4) is released and there is no longer any braking effect.

All internal forces are absorbed by the brake housing. This means that no additional mechanical assemblies are required - e.g. reinforcements or supports.

For brake sizes 19 and 24, the braking effect of the brake disk (2), that can axially move, is transferred to the clutch shaft (13) through a form-locked connection at the hollow square profile to the clutch shaft (13) stiffly connected to the motor shaft. For brake size 29, the brake disk is connected to the clutch shaft through a toothed connection. The ball bearings (15) located between the solenoid housing (.1) and the clutch shaft (13) have the function, when the brake is mounted to the motor flange, to align to the clutch shaft and therefore to the motor shaft - and also permit a radial load on the output side of the clutch shaft. The ball bearings have sealing rings at both ends. The sealing ring (6) is used to provide additional protection against the accumulation of dirt and to prevent grease from penetrating if the ball bearings sealing ring is defective. The sealing ring (11) is intended to prevent dirt entering from the outside and also to prevent abrasive dust from the brake disk from escaping.



1.1 Solenoid housing
1.2 Excitation winding
2 Armature
3 Flange
4 Friction disk
5 Clamping pin
6 Sealing ring
7 Spring
8 Pressure stud
9 Adjusting ring
10 Cylinder-head screw
11 Sealing ring
12 Washer
13 Coupling shaft
14 Spring lock washer ** (left or right from the bearing corresponds to the motor ball bearing pre-load)
15 Ball bearing
16 Retaining ring **
17 Screwed plug (with Loctite Type 243, secured) **
18 Rubber studs (only sizes 19 and 24, size 13 in the friction disk)
19 Terminal enclosure
20 Key
21 Pressure studs (only size 13)
22 Sealing disk
23 Cap 2 x 180 ° (if no manual release)
24 Manual release (accessory)
25 Stud (secured with Loctite type 243)
26 O ring (only size 28)
A = Mounting surface, motor side
B = Mounting surface, coupling shaft
E = Adjusting ring clearance
S = Air gap (with power connected to the brake) Microswitch, refer under 07

* Radial and axial eccentricity tolerance measured acc. to DIN 42955 when the mounting/installation specifications are maintained

** Ball bearing set

Figure 6-13 Design and mode of operation

Micro-switch

The micro-switch, incorporated in the motor control circuit, is intended to prevent the motor starting against a brake that has still not been released (opened). This is an NO contact. When the armature has pulled-in - i.e. when the brake is released - this contact is closed. Recommended circuit, refer to Fig. "Recommended circuit to incorporate the micro-switch in the control circuit"

CAUTION
When using the micro-switch, carefully observe special rules and regulations that may exist e.g. for crane-type applications.

When the brake is ordered, the micro-switch can be ordered as option. It is not possible to subsequently mount a micro-switch. When the braking module is supplied, the micro-switch is adjusted in the factory. The micro-switch should be re-adjusted after maintenance or repair work.

⚠ CAUTION
The motor circuit should be carefully designed so that when the micro-switch closes, the motor cannot accidentally start.

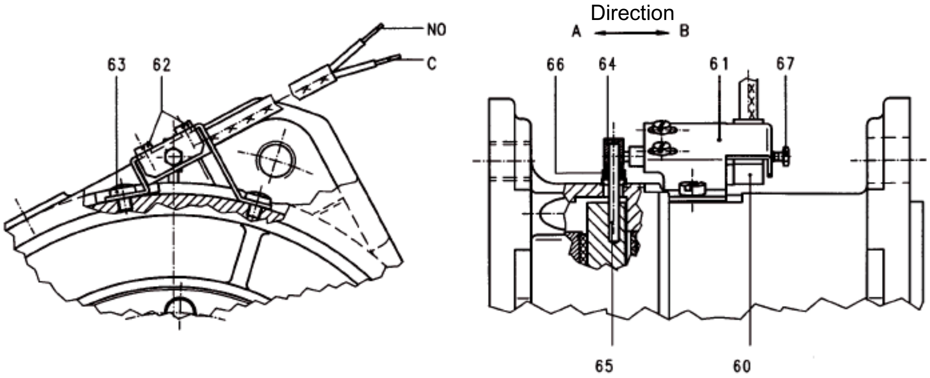
Adjusting the micro-switch

In order to adjust the micro-switch, the brake should be electrically released and the screws (62) slightly released. The "open" or "closed" switch position should then be determined using a continuity tester connected at No and C. For the "closed" position, the micro-switch should be pushed back towards B past the switching point. For the "open" position, the micro-switch should then be shifted to the switching point in direction A by screwing-in screw (67). This is indicated by the continuity tester. Screw (67) should now be screwed-in an additional length L according to Table "Screw-in depth, screw (67)" - and should be positioned by tightening one of the screws (62). The other screw should be secured using Loctite, type 241 and then tightened. Proceed in the same same with the 2nd screw and remove screw (67).

Table 6-26 Screw-in depth for screw (67)

Size of the braking module	Length [L]	Screw-in angle
19	0.15 mm	120 °
24	0.20 mm	160 °
29	0.20 mm	160 °

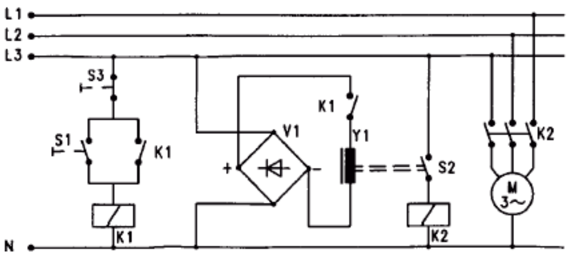
The micro-switch function should then be checked by switching-in and switching-out the brake.



60 Microswitch
61 Bracket
62 Cylindrical head screw (2x)
63 L screw (2x)
64 Bolts
65 Clamping pin
66 Bellows
67 Hexagon head bolt M 2.5 x 8 (not included)

Figure 6-14 Brake with micro-switch, degree of protection of the micro-switch, IP 65

C (common) = common contact; NO (normally open) = NO contact



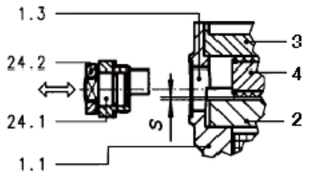
K1 Contactor
K2 Motor contactor
S1 On button
S2 Microswitch
S3 Off button
V1 Rectifier
Y1 Solenoid coil

Figure 6-15 Recommended circuit to incorporate the micro-switch in the control circuit

Manual release

The braking module can also be provided with a manual release function to manually release the brake. The manual release function can also be retrofitted. The manual release is actuated using the bar (24.2) in only one direction. After being actuated, the bar should be returned to the initial position and removed. This prevents a negative impact on the brake function as a result of the weight of the bar or the acceleration that occurs at the bar via the cams (24.1) when the brake is applied. Also refer to Fig. "Manual release and checking the air gap" and data sheet for the release forces and the release direction. If it is not desirable by the bar is removed, then it should be positioned vertically with the bar facing downwards.

CAUTION
The plant/system-related regulations must be carefully observed when using manual release functions and devices.

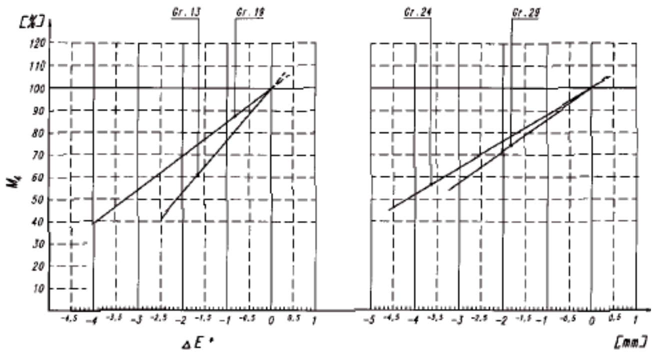


1.3 Bore to measure the air gap (remove the cam with accessories or the cap)
1.1 Solenoid housing
24.1 Cam with accessories
24.2 Bracket

Figure 6-16 Manual release and checking the air gap

Setting the torque

When supplied from the factory, the braking module is set to the torque M_4 that can be transmitted corresponding to the standard value as listed in Table "Mounting a holding brake for 1PH7 motors". The selected torque M_4 should be taken from the rating plate. Setting ring (9) is used to adjust the torque; after the appropriate setting has been made, it should be secured so that it cannot rotate using stud (25). The setting ring clearance "E" as shown in Fig. "Design and mode of operation" is stamped at the base of the solenoid housing pocket close to the stud. The torque setting can be changed, after releasing the stud (25), by changing the setting ring clearance "E" within the limits corresponding to the diagram M_4 = f (ΔE) Fig. "Torque that can be transmitted M4 = f (Δsetting ring clearance)" using an appropriate socket wrench. After the torque has been changed, the new clearance "E" should be stamped and secured using stud (25). The stud may not be located in the area around the thrust bolts. The stud must be secured using, e,g, Loctite, type 243. The interlocking times t_1 only change insignificantly when the torque is changed. On the other hand, the separating time t_2 decreases approximately linearly with the reduction in the torque.



* Δ Adjusting ring clearance is a nominal value to M_4 starting from the factory setting of 100% M_4.
Deviations of ± 15% are possible

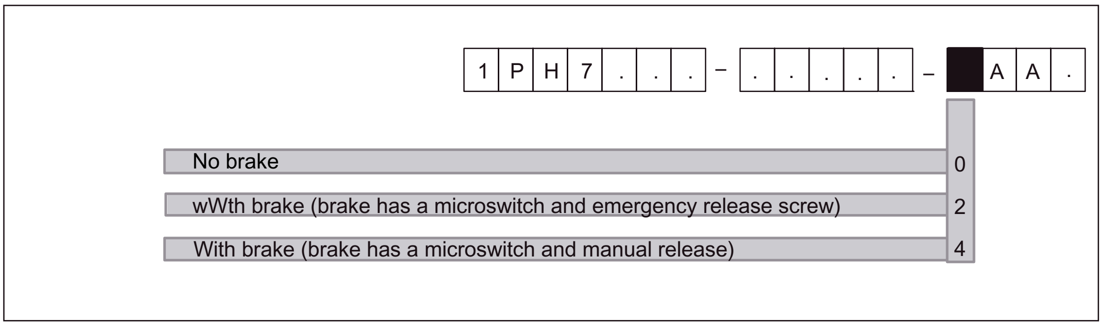
Figure 6-17 Torque that can be transmitted M4 = f (Δsetting ring clearance)

6.5.3 Mounted holding brake for SH 180 and SH 225

Properties

For these motors, the brake (manufactured by Stromag) is mounted at the DE bearing endshield. In this case, the motor shaft is extended using a shrunk-on stub shaft. The torque is transmitted through a key according to DIN 6885/1. The stub shaft can in addition be axially secured using a spring washer and a central screw (M20). The holding brake does not have its own bearings. The output forces are therefore absorbed by the motor bearings. Belt pulleys cannot be mounted due to space reasons and also due to the high associated cantilever forces. When selecting the coupling to couple to the motor - brake combination - it should be carefully noted that the shaft end diameter is larger than the diameter of the motor shaft end. VREVOLEX bolt-type couplings 2LF6337 for shaft height 180 and 2LF6338 for shaft height 225 should be preferably used. Ordering data and dimensions, refer to Catalog M 11 or D 81.1.

Order No. code for 1PH7, shaft heights 180 and 225 for a mounted holding brake with Emergency Stop function



Options

Versions 2 and 4 are only available in type of construction IM B3, i.e.:

- at the 12th position, only "0"
- at the 14th position, only "A"
- at the 15th position "A" or "B"
- and at the 16th position "0", "3" or "6" are possible.

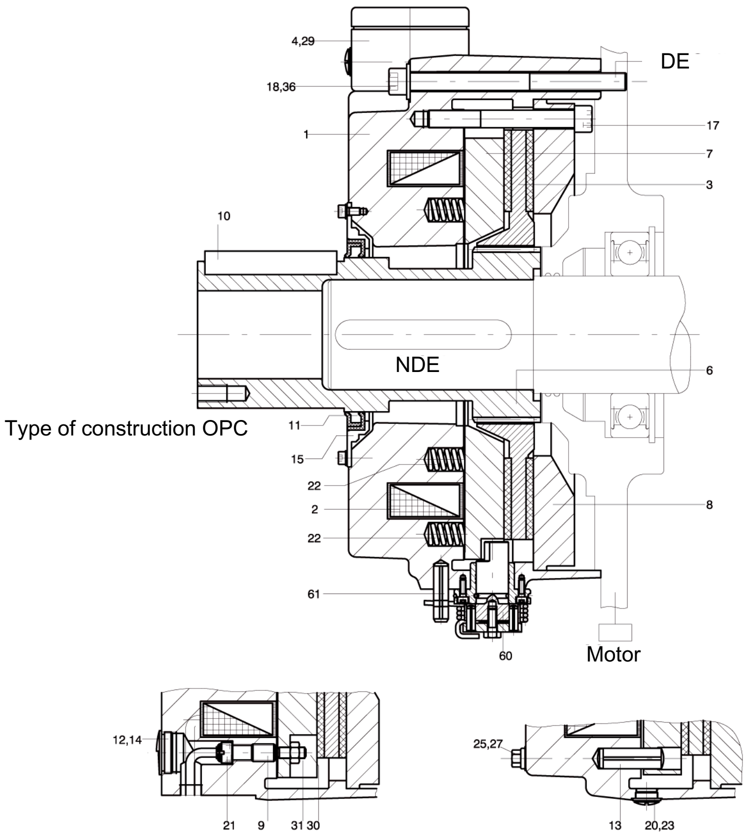
Design and mode of operation

If the coil (2) is in a no-current condition, then the springs (22) actually press the armature disk (7) against the carrier assembly with brake pad (3). This is tensioned between the armature disk (7) and flange (8) thus preventing it from rotating. The braking effect is transferred from the carrier assembly with brake pad (3) to the shaft through the hollow shaft (6). As soon as the rated voltage is connected to the coil (2) the armature disk (7) is drawn, as a result of electromagnetic force, to the solenoid assembly (1) against the spring pressure. The carrier assembly with brake pad (3) is therefore free to move and the brake has been released. When the brake is released, the armature disk (7) actuates a micro-switch (9). This micro-switch monitors the switching state of the brake.

The brake coil (2) only operates with DC current. The coil (2) has been designed to be connected to a fast switching unit and a 100% relative power-on duration. A fast-switching rectifier block (29) is installed in the terminal box (4). This block is connected to 230 V/AC. After the brake has been released, the block automatically switches from bridge rectification to half-wave rectification (holding voltage). The terminal assignment diagram is shown in the terminal box cover and also in Fig. "Circuit configurations". The fast-switching block is provided with the appropriate integrated protection to afford protection against inadmissibly high inductive voltages when powering-down and to quench arcs.

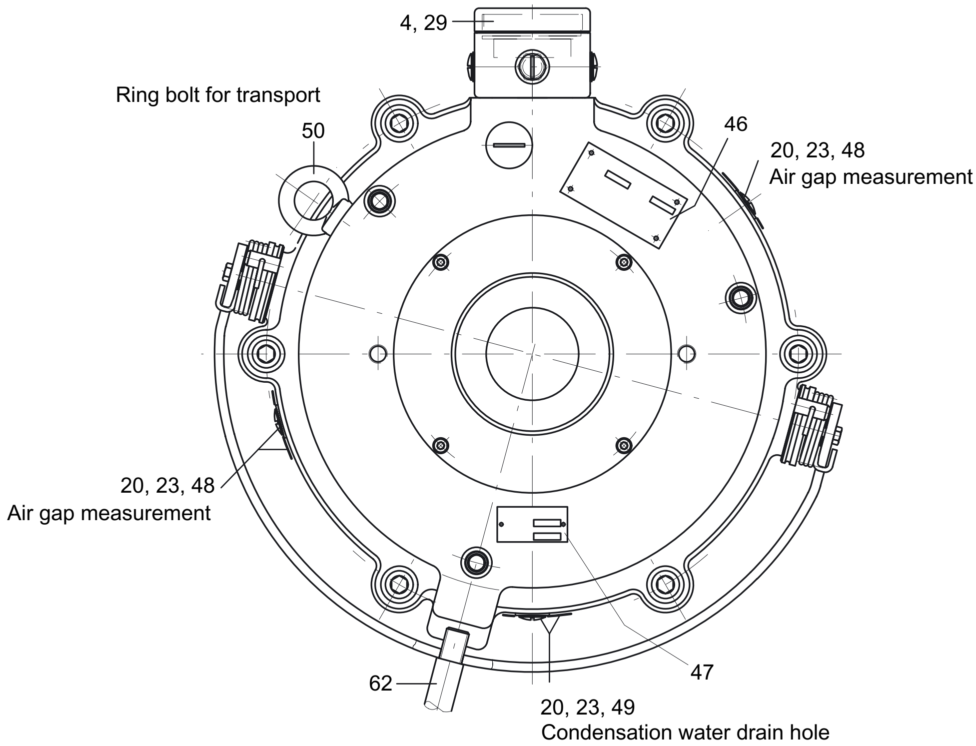
- Varistor and RC element as line supply protection
- Overvoltage protection for the DC switch and arc quenching element
- Integrated coil protection

If even shorter switching times are required, then the block must be connected to the DC current source. For high switching frequencies, the user should provide the DC switch with the appropriate protection against arcing.



1 Coil assembly
2 Coil
3 Carrier plate with friction pad
4 Terminal box
6 Hollow shaft
7 Armature disk
8 Flange
9 Microswitch
10 Key
11 VR seal
12 Locking screw
13 Cylindrical pin
14 Sealing ring
15 Cover
17 Cylinder-head screw
18 Cylindrical head screw (supplied loose)
20 Locking screw
21 Threaded ring
22 Compression spring
23 Sealing ring
25 Locking screw
27 Sealing ring
29 Fast-switching rectifier module
30 Threaded stud
31 Hexagon nut
36 Washer (supplied loose)
60 Manual lever assembly
61 Bolts

Figure 6-18 Design and mode of operation



4	Terminal box	47	Label, emergency release
20	Locking screw	48	Label, measure air gap
23	Sealing ring	49	Label, drain screw
29	Fast-switching rectifier module	50	Ring bolt for transport
46	Rating plate	62	Release bar

Figure 6-19 Side view

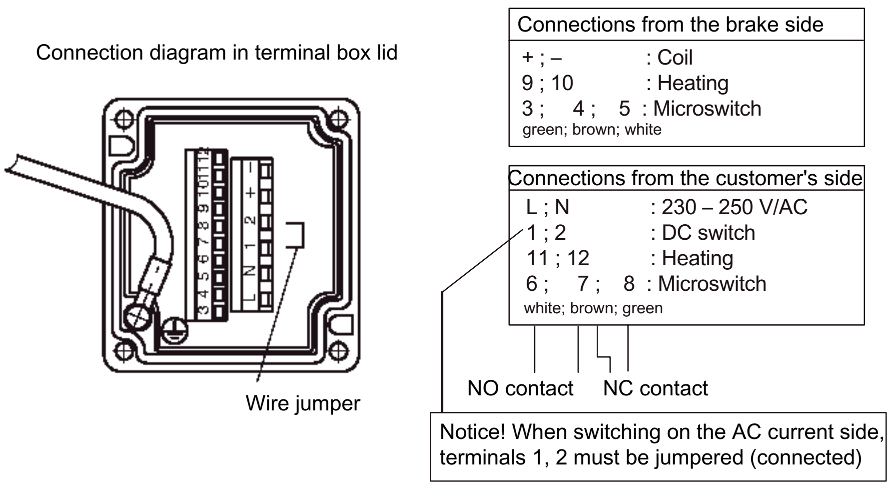


Figure 6-20 Circuit configurations

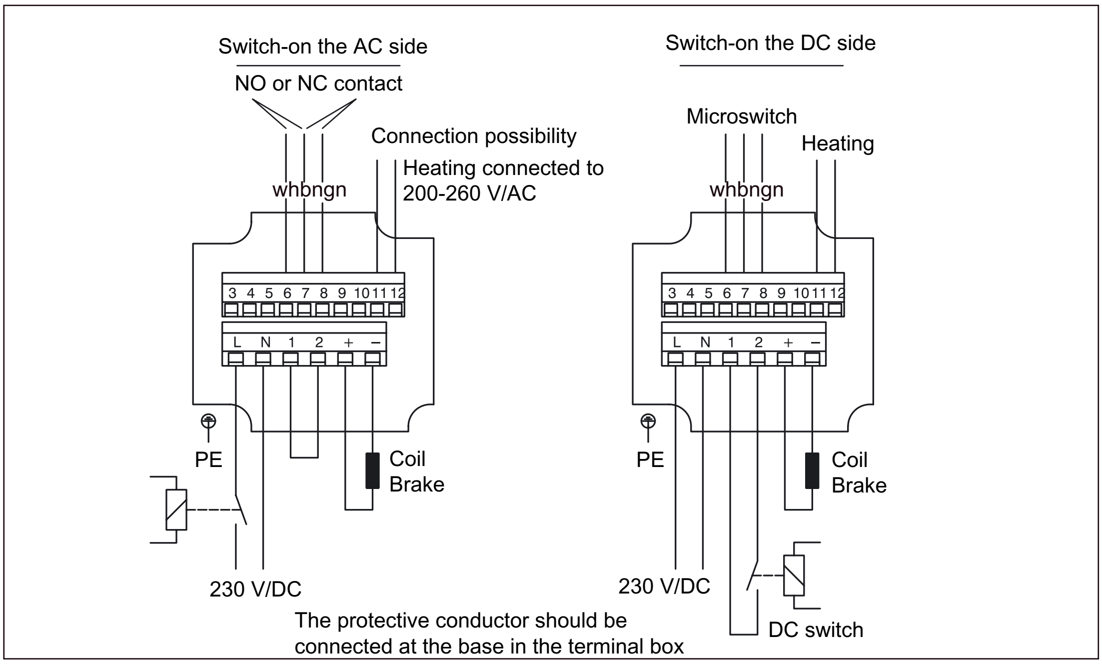


Figure 6-21 Circuit configurations

Micro-switch

If the armature disk (7) is moved towards the solenoid assembly (1) either by the electro-magnetic force of the coil (2) or by actuating the manual emergency release lever, then it actuates a micro-switch (9) via a threaded pin (stud). The micro-switch (9) can be switched as either NC contact or NO contact in the control circuit of the motor contactor. This prevents the electric motor starting before the brake is released. The micro-switch (9) is connected in the terminal box (4) according to Fig. "Circuit configurations" through the terminal strip. A data sheet can be requested listing the data associated with the permissible contact load capability and design of the micro-switch.

Manual release

The brake can be optionally equipped with a manual release (refer to Fig. "Manual release"). This involves a non-latching manual emergency release lever. This can be used to release the brake in an emergency situation, e.g. if the power fails. This is realized by simply moving the release bar (62) through approx. 30° into the release position. The brake is only released as long as the release bar is kept in the release position. The release bar then automatically swings back into the quiescent position for normal operation. The release bar can be unscrewed and withdrawn.

⚠ WARNING

The manual emergency release lever is only intended for emergencies, e.g. lowering a load suspended from a hook when the power fails. Under no circumstances may it be used to maintain provisional operation (emergency operation). The hazardous area must be appropriately and carefully secured while the manual emergency release is actuated.

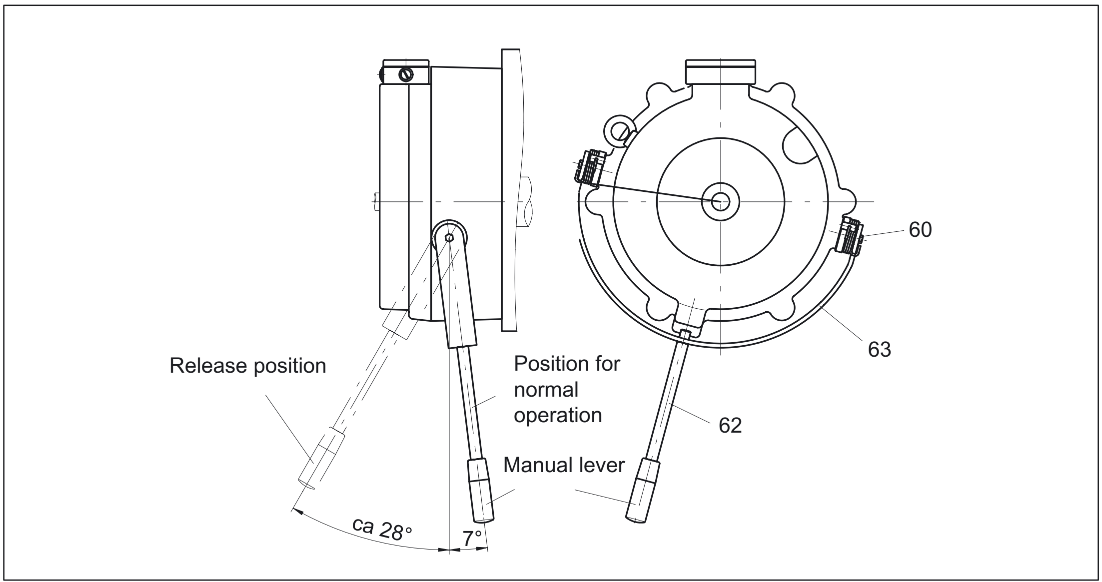


Figure 6-22 Manual release

6.5.4 Mounted holding brake for SH 280

For these motors, the holding brake (manufactured by Stromag) is mounted at the NDE bearing endshield. The precise design as well as the associated data are available on request.

7 Technical data and characteristic curves

The induction motors must be continually cooled in operation independent of the operating mode.

The speed-power diagrams P = f(n) and the speed-torque diagrams M = f(n) for operation with the SINAMICS converter system are described in the motor characteristics.

Constant-torque operation is possible from standstill up to the rated operating point n_N. The field and therefore the motor torque remain constant in this base speed range. This is the reason that the power increases linearly with the speed.

This is then followed by a constant-power range where the field is weakened. The field-weakening range is limited by the voltage limit. In order that safe, reliable operation is guaranteed even when the line supply voltage fluctuates and the motor parameters vary, a safety margin of 30% should always be maintained to the voltage limit at every operating point.

In addition to the S1 characteristics, the S6 characteristics are also shown. The S6 power values for a relative power-on duration of 25 %, 40 % and 60 % are specified, where technically possible. In addition, the required motor current is specified that is used as a basis to select a suitable drive converter.

Table 7-1 Explanation of the codes used

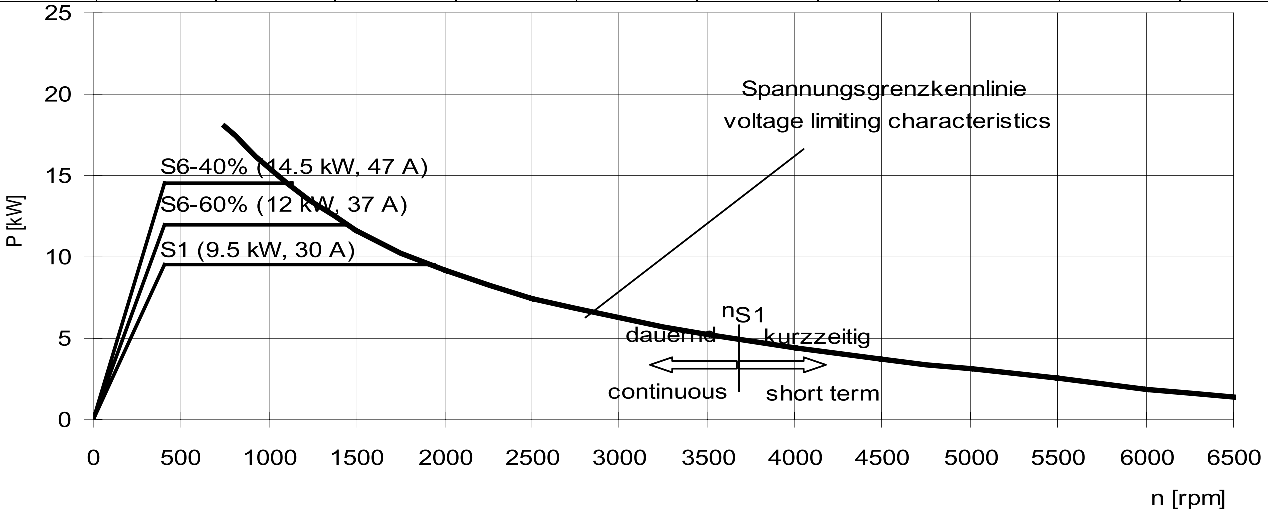
Abbreviation	Units	Description
n_N	1/min (rpm)	Rated speed
P_N	kW	Rated power
M_N	Nm	Rated torque
I_N	O	Rated current
V_N	V	Rated voltage
f_N	Hz	Rated frequency
n_2	1/min (rpm)	Speed for field weakening with constant power
n_{max}	1/min (rpm)	Maximum speed
T_{th}	min	Thermal time constant
I_μ	O	No-load current
I_{max}	O	Maximum current
n_{S1}	1/min (rpm)	Max. continuous speed for field weakening

7.1 SINAMICS 3-ph. 400 V AC Servo Control (SC)

7.1.1 Smart Line Module (SLM)

Table 7-2 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7163-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
400	9,5	227	30	274	14,3	1943	6500	35	11,5	51



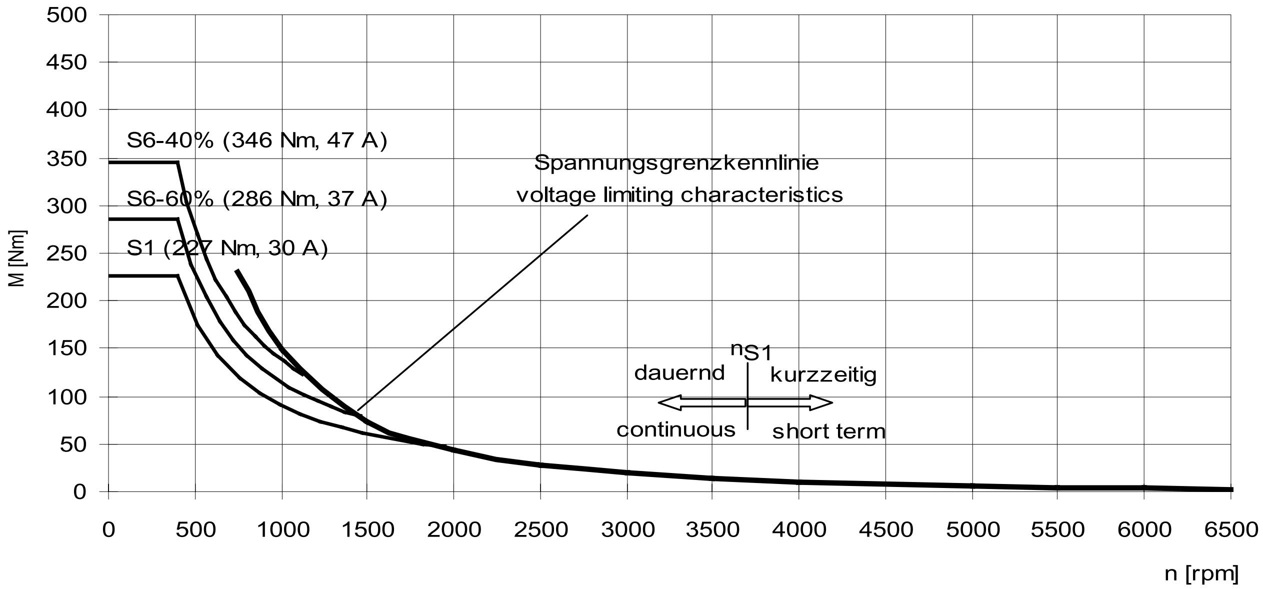
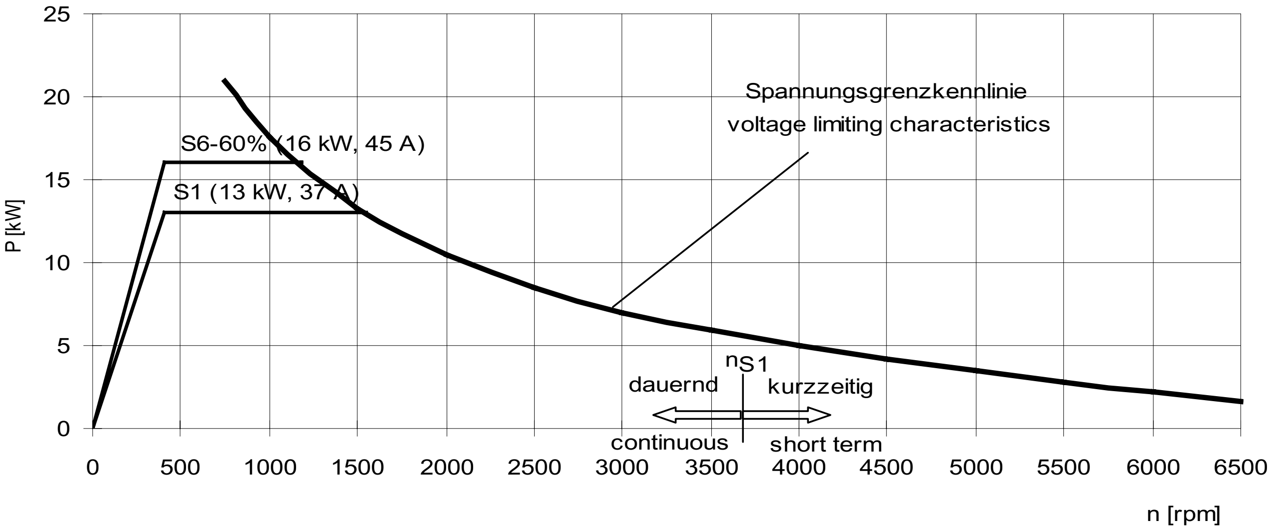


Table 7-3 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7167-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
400	13,0	310	37	294	14,3	1545	6500	35	14,0	70



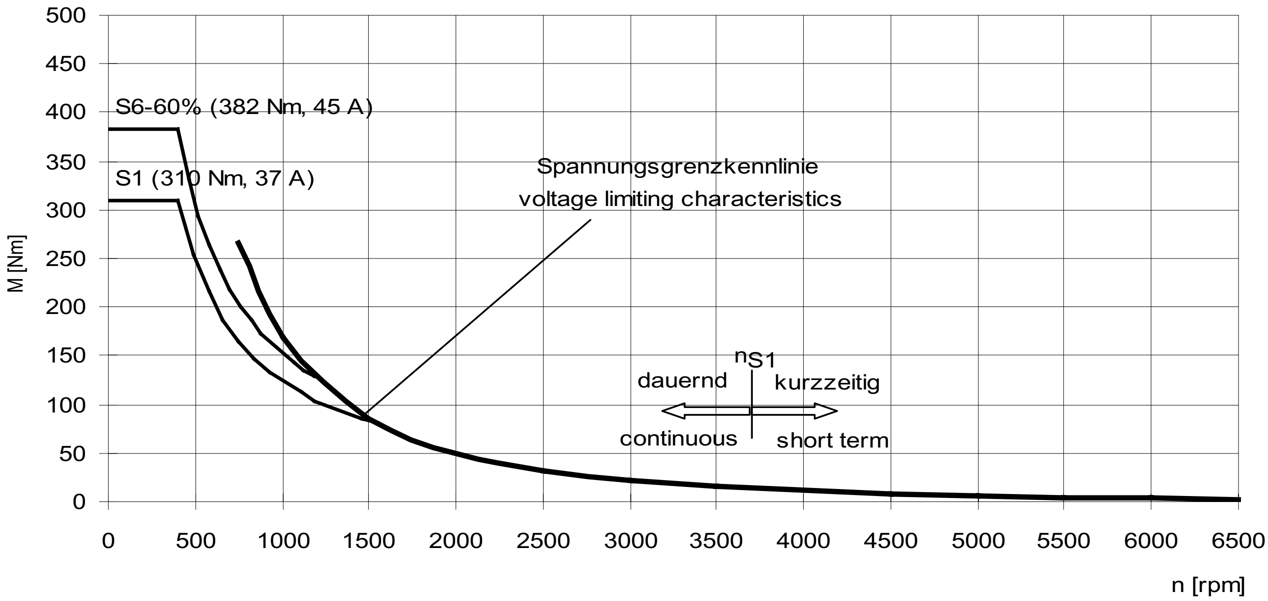
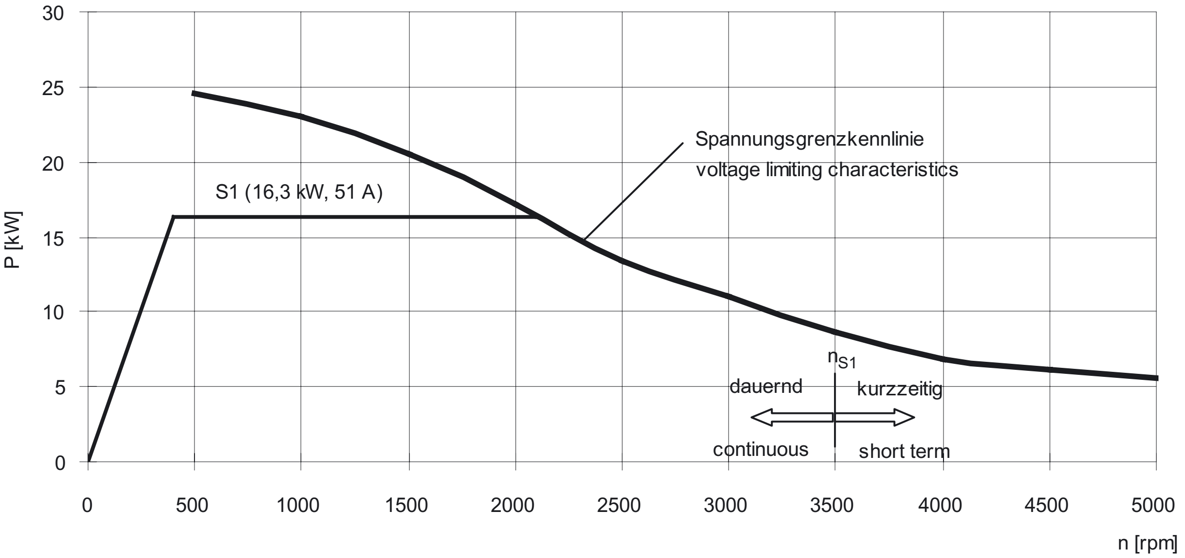


Table 7-4 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7184-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
400	16,3	390	51	271	14,2	2100	5000	40	26,0	80



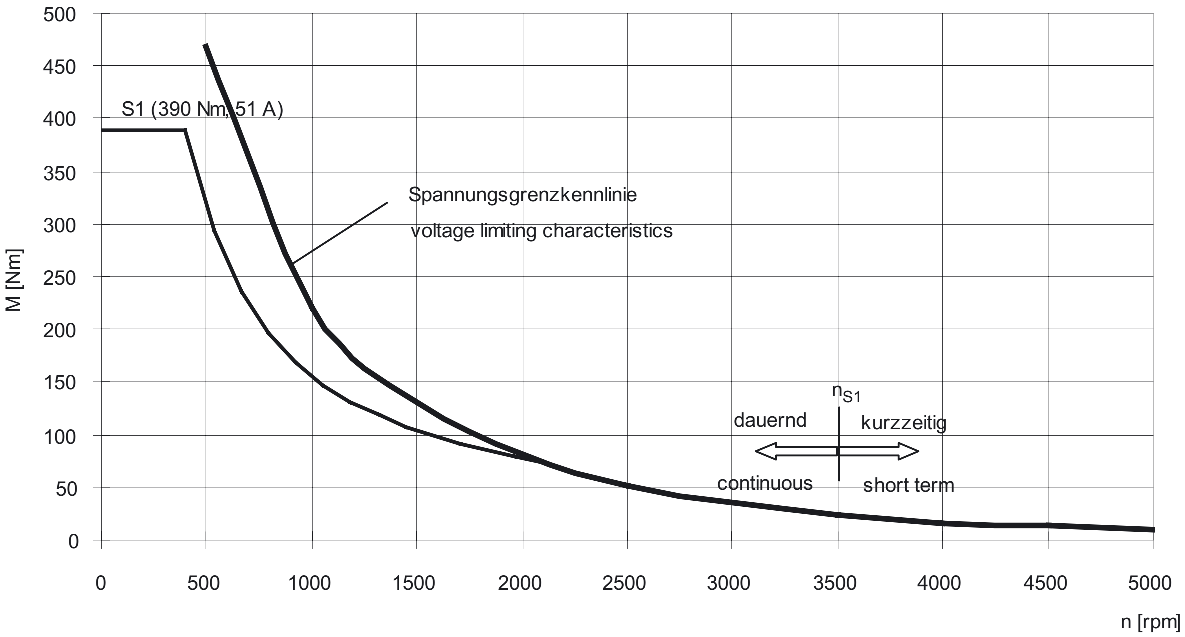
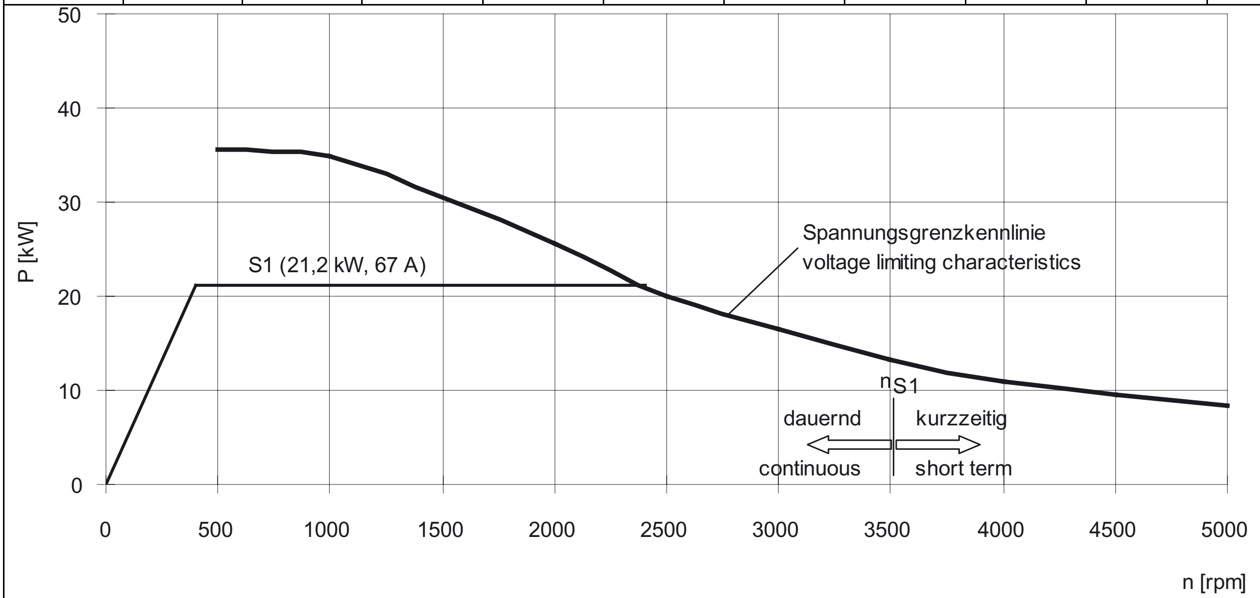


Table 7-5 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7186-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
400	21,2	505	67	268	14,0	2400	5000	40	38,5	109



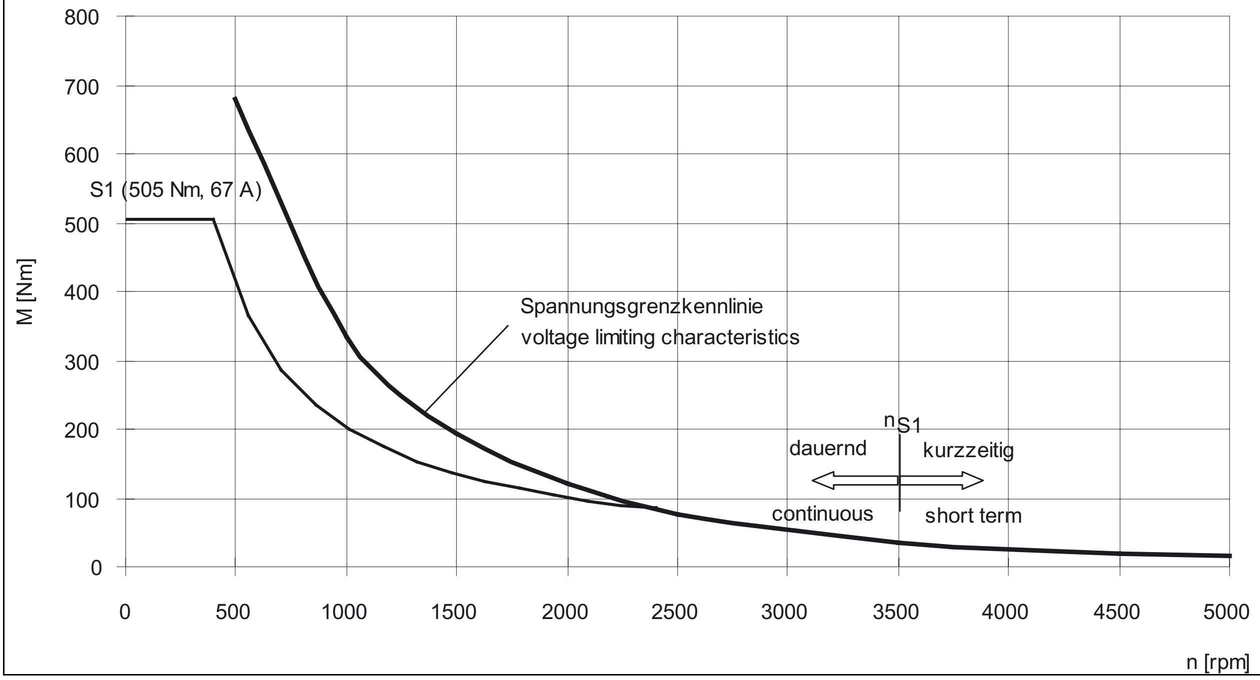
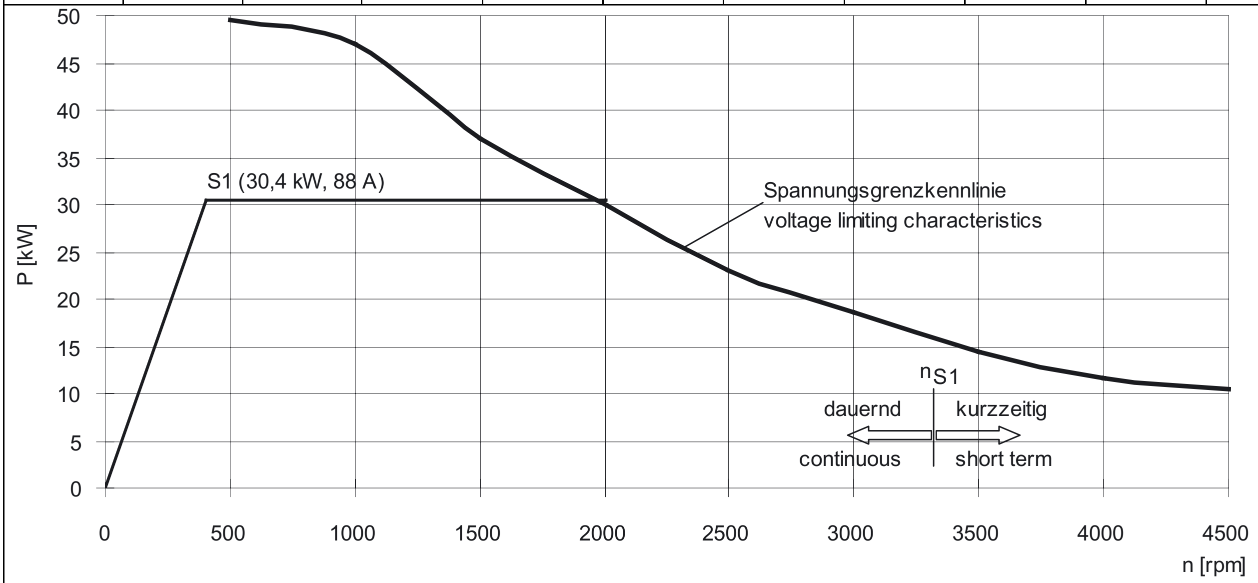


Table 7-6 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7224-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_{μ} [A]	I_{max} [A]
400	30,4	725	88	268	14,0	1900	4500	40	36,5	160



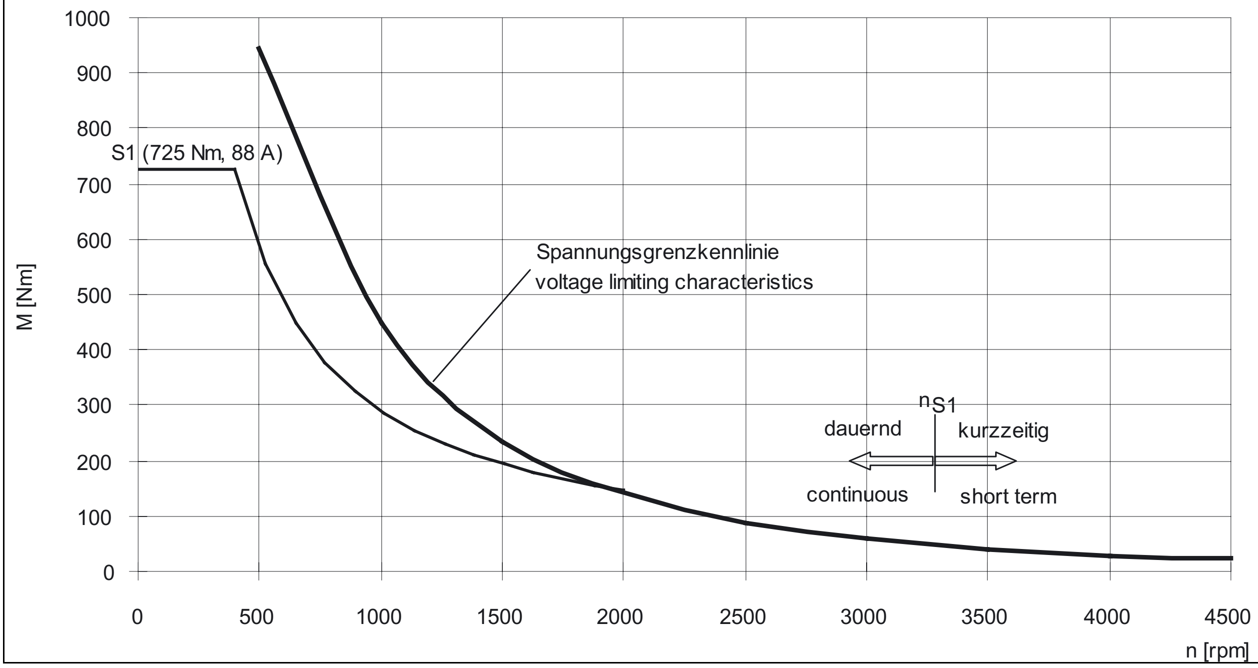
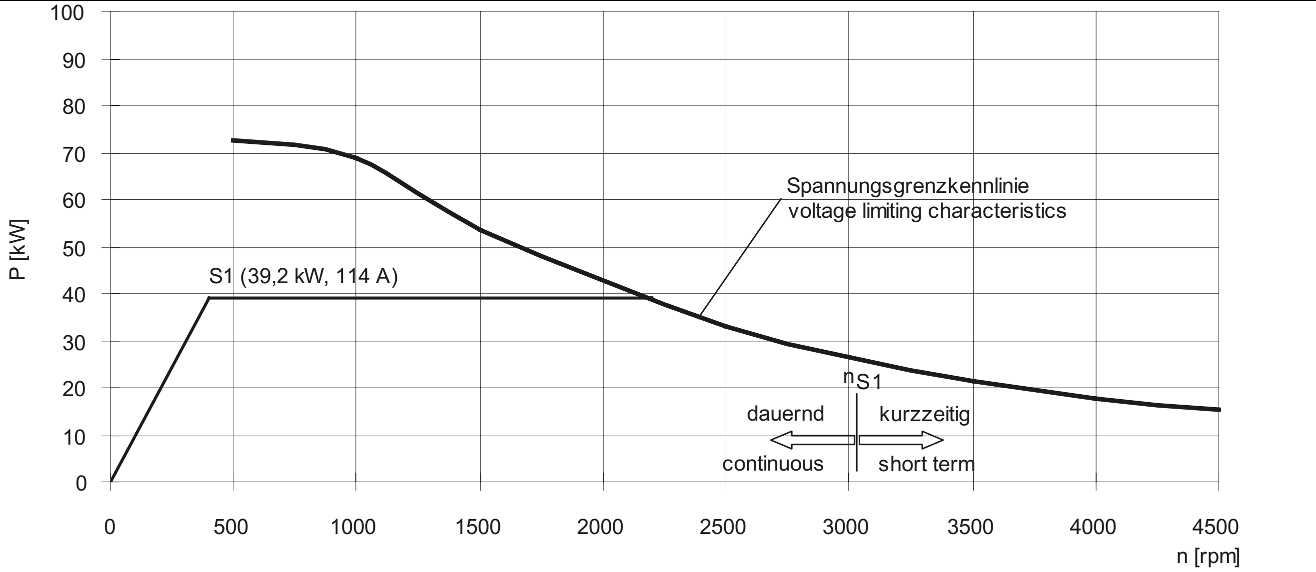


Table 7-7 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7226-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
400	39,2	935	114	264	14,0	2200	4500	40	49,0	250



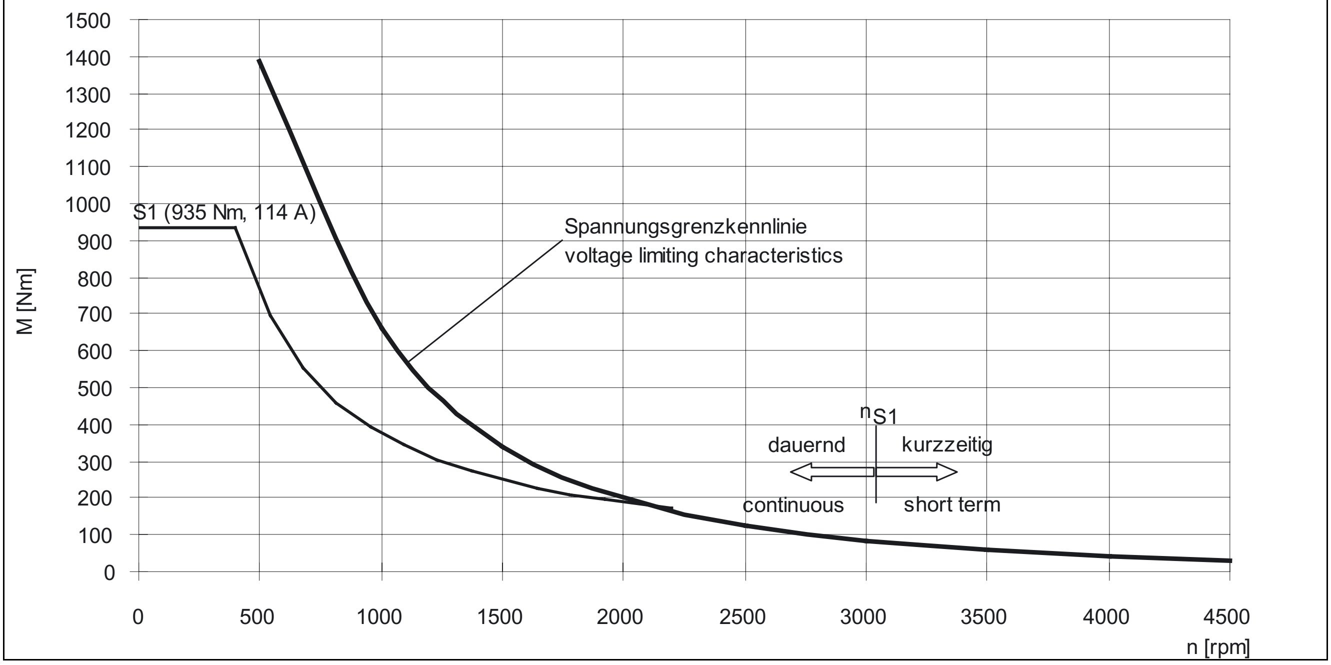
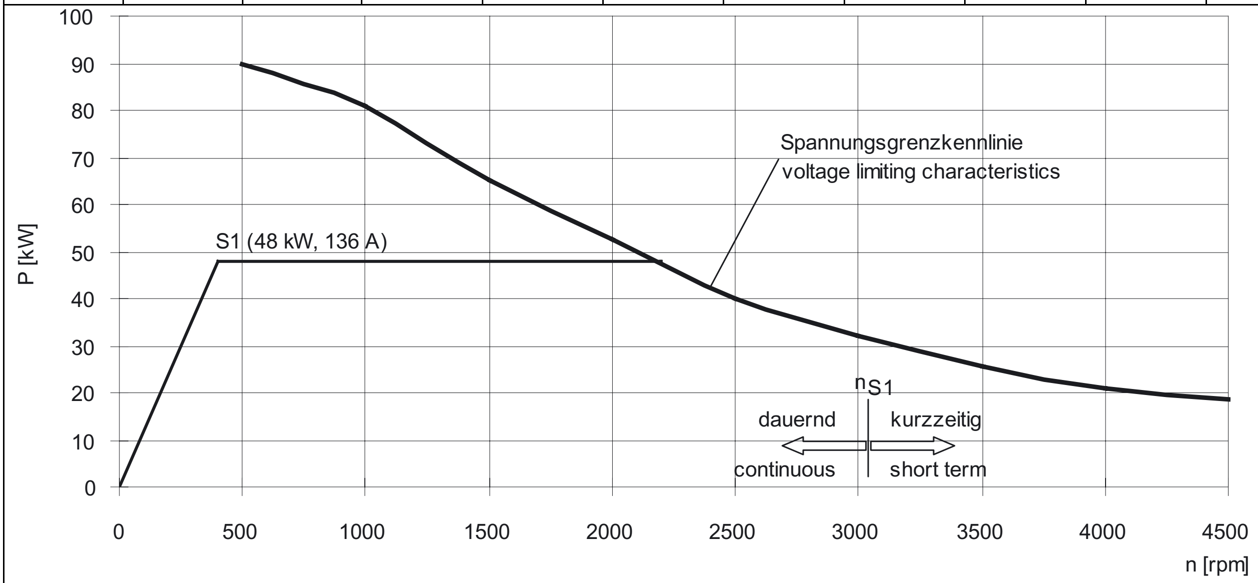
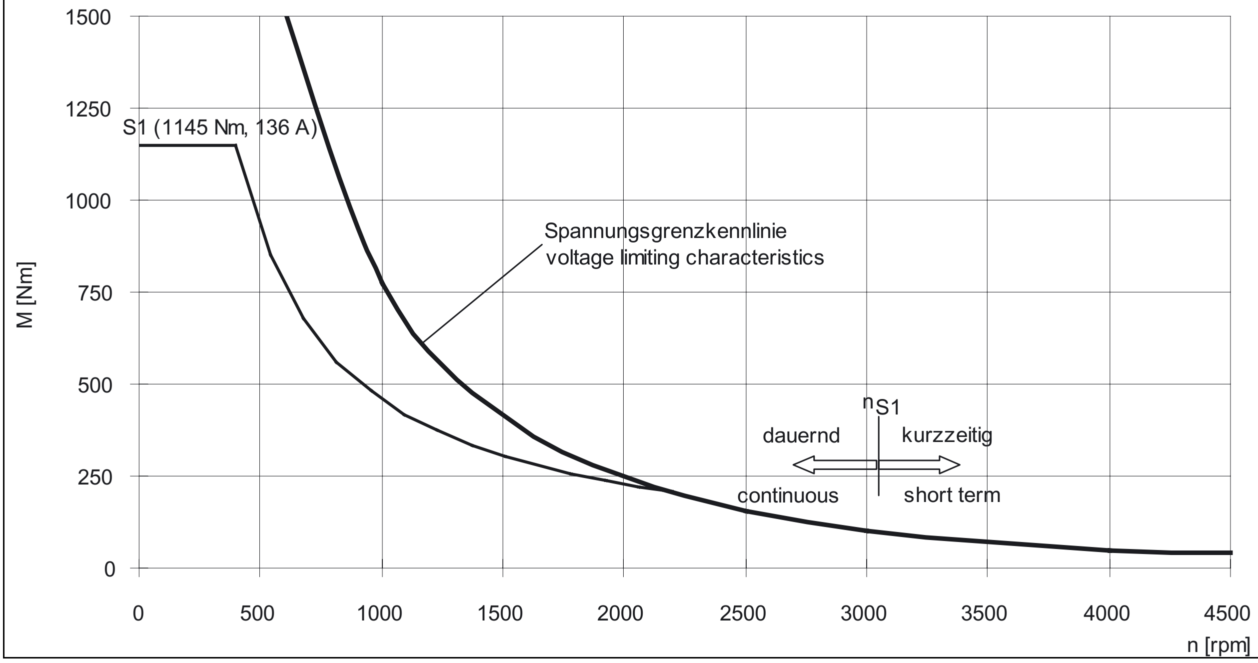


Table 7-8 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7228-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
400	48	1145	136	272	13,9	2200	4500 1)	40	60,5	260

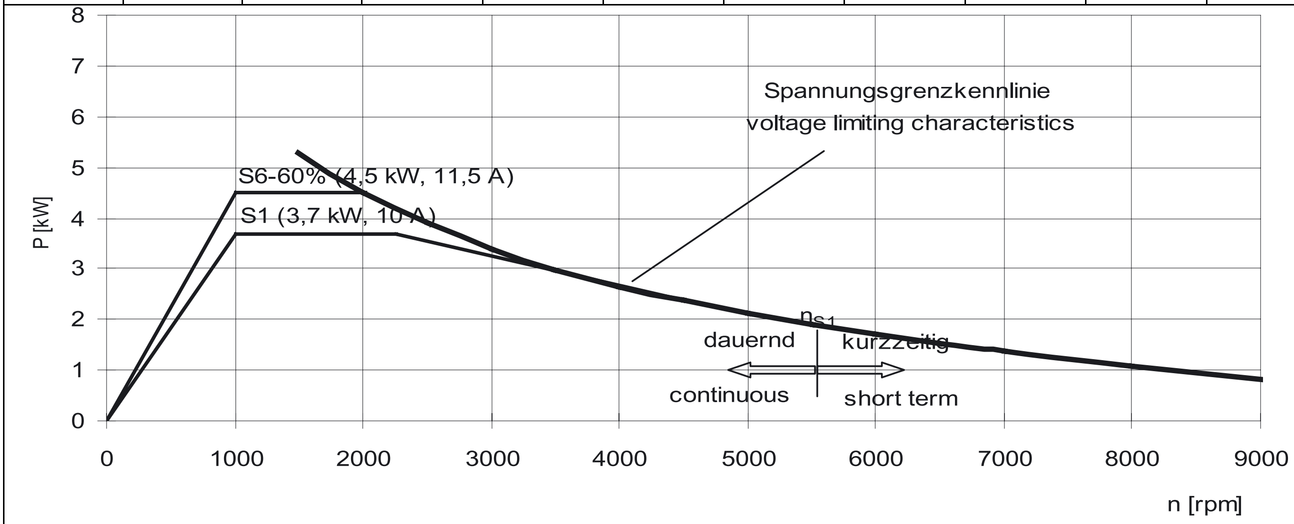




1) 4000 rpm for increased cantilever forces

Table 7-9 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7103-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	3,7	35,3	10,0	343	35,6	2250	9000	20	4,8	16,0



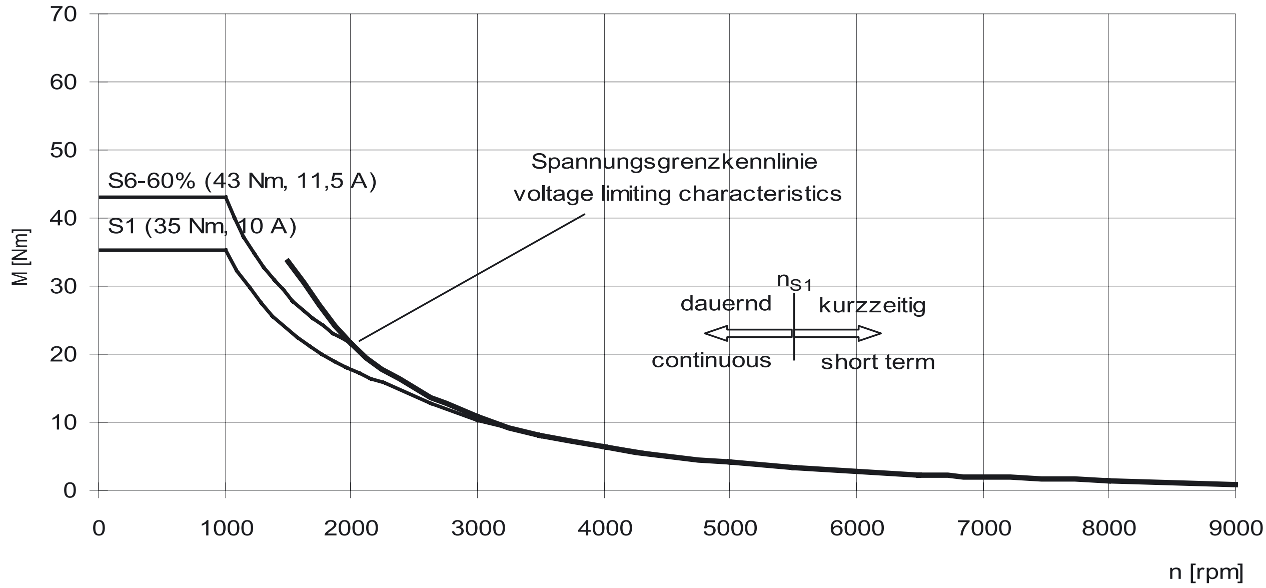
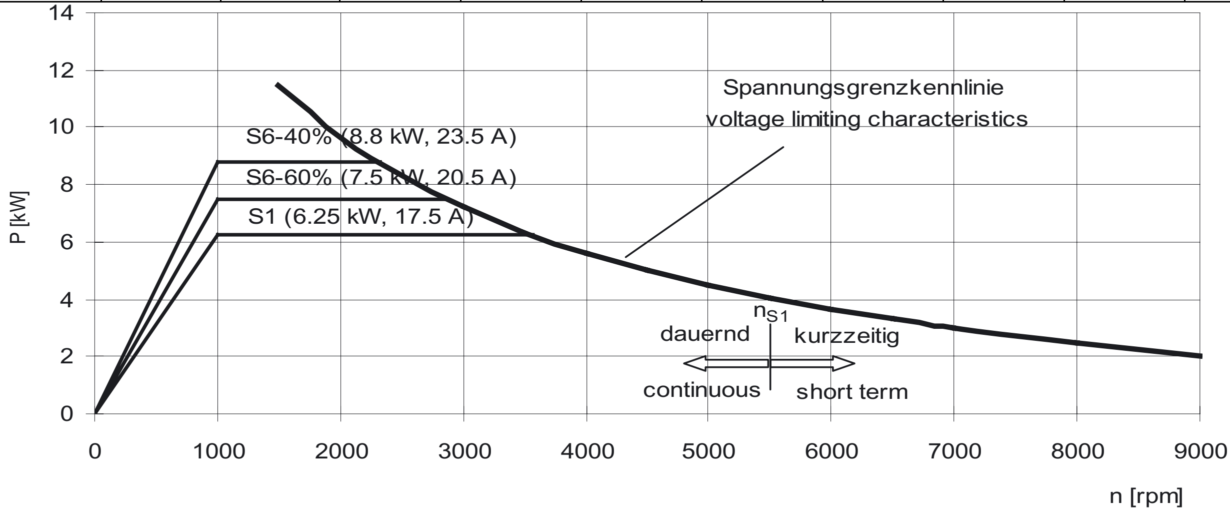


Table 7-10 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7107-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	6,3	59,7	17,5	319	35,3	3566	9000	20	8,9	35,0



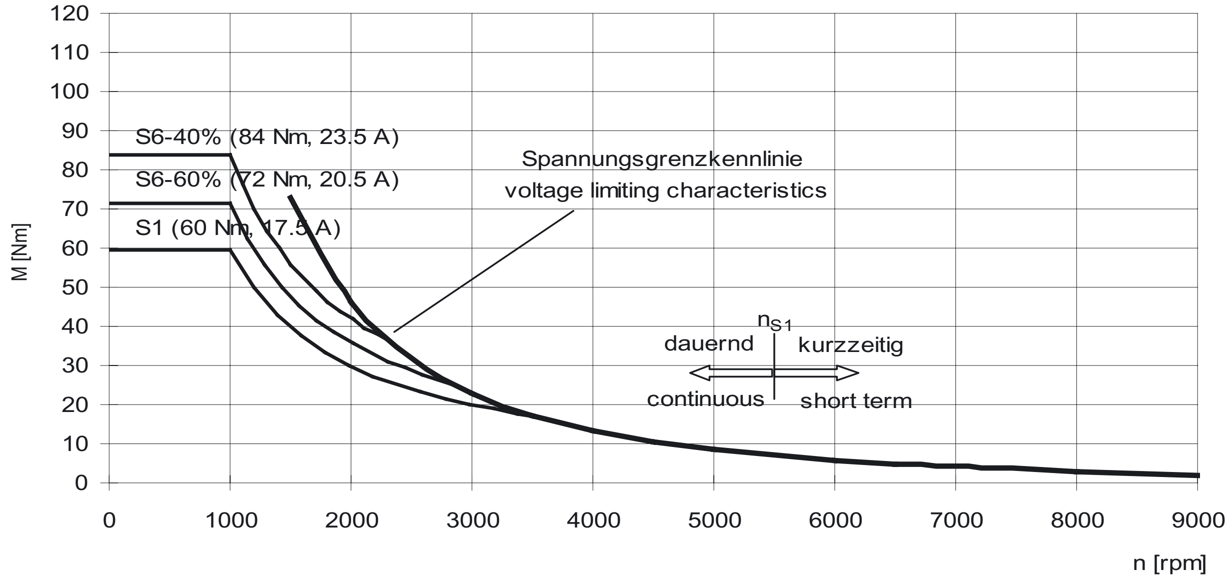
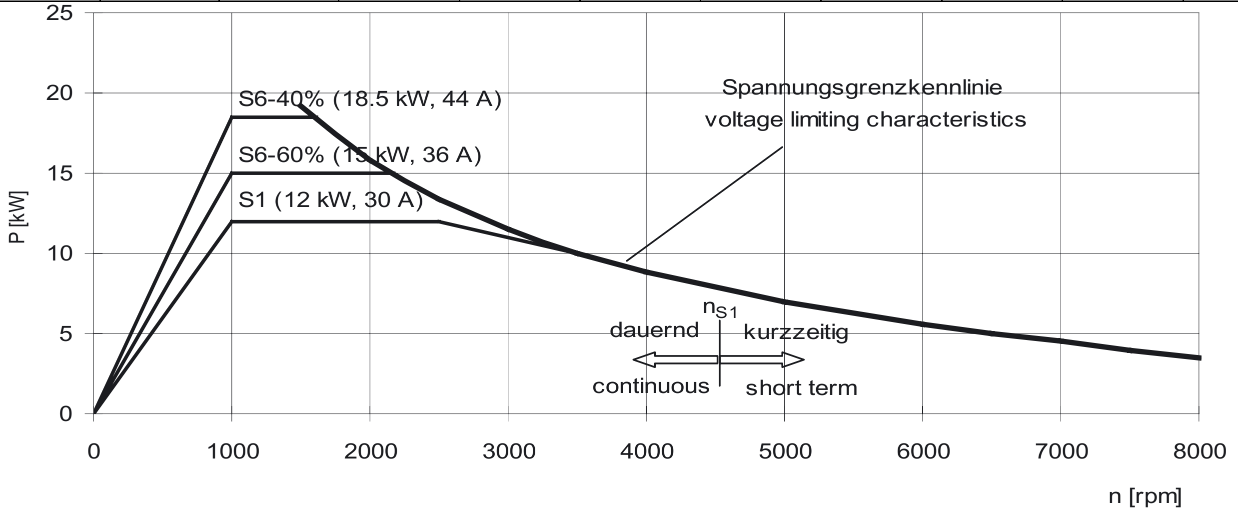


Table 7-11 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7133-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	12,0	115	30	336	34,8	2500	8000	30	13,0	60



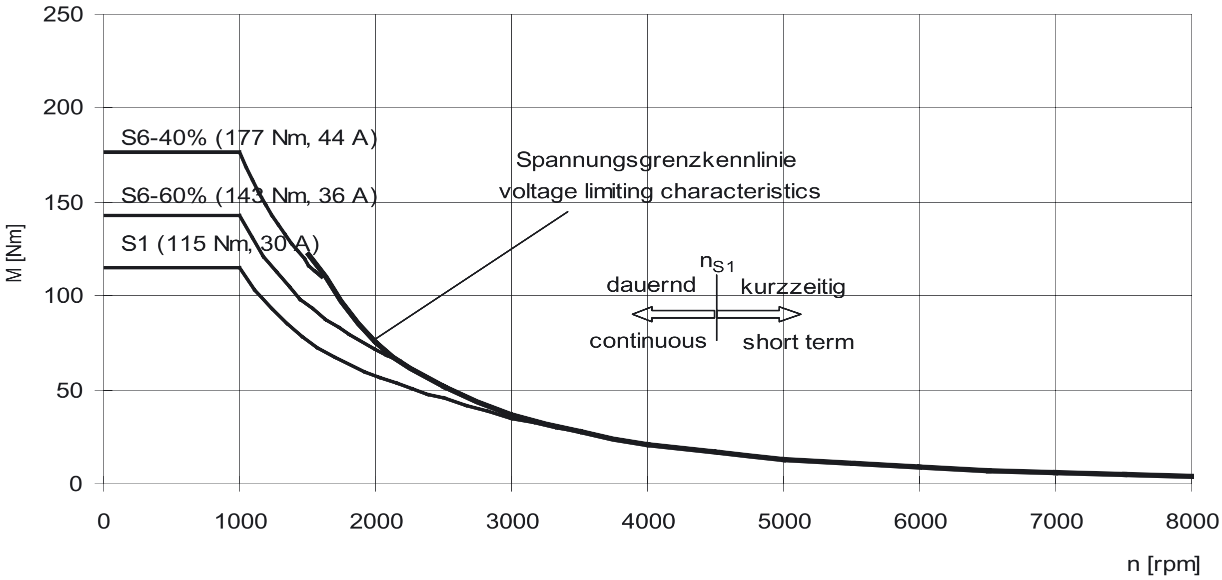
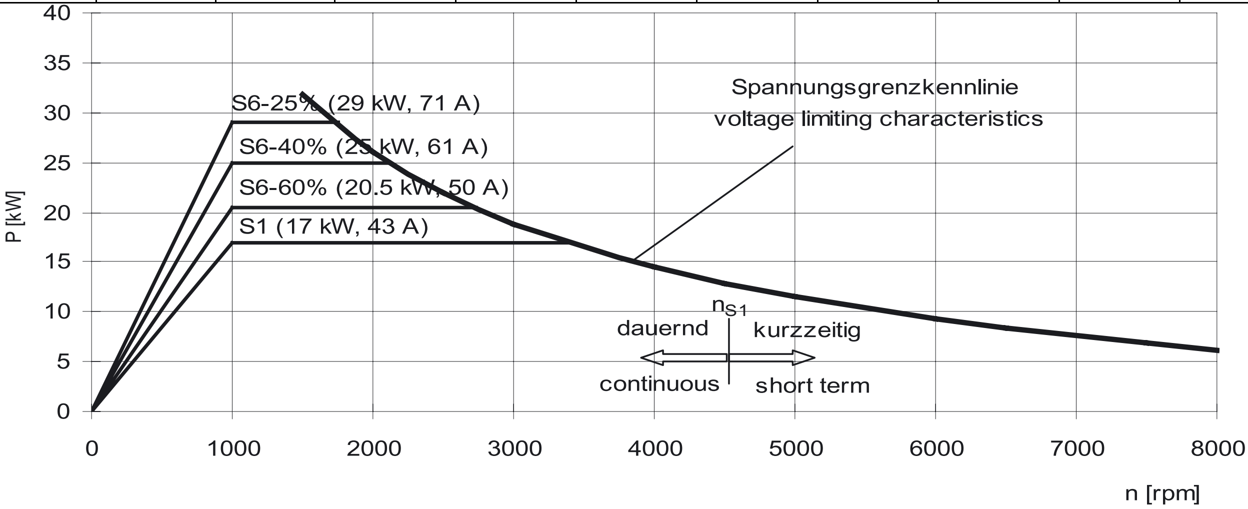


Table 7-12 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7137-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	17,0	162	43	322	34,6	3392	8000	30	19,0	86



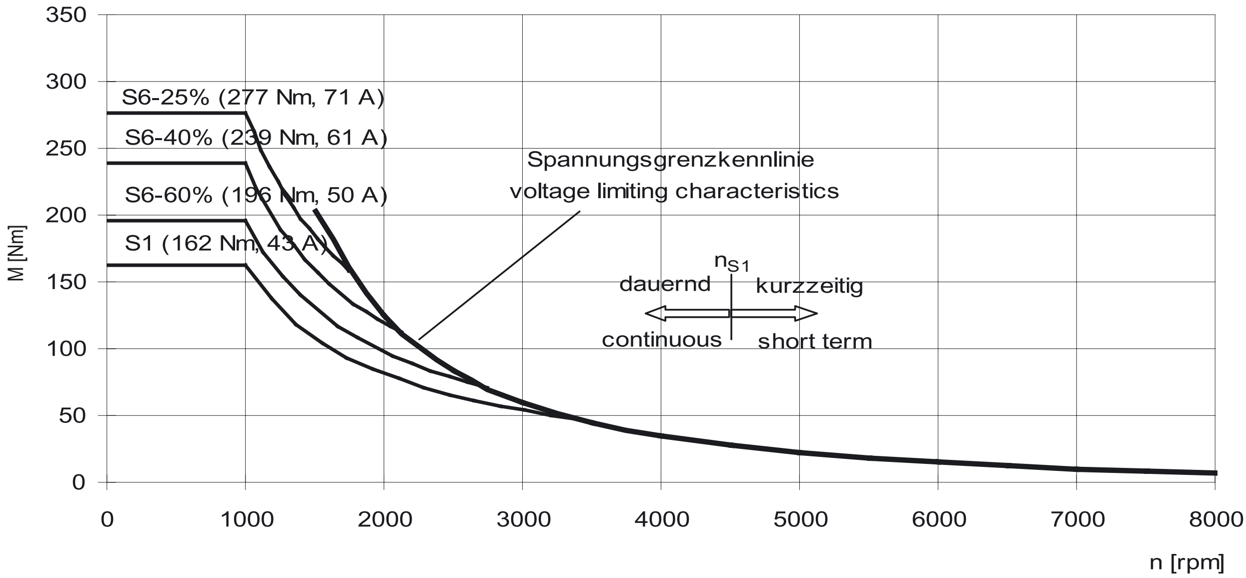


Table 7-13 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7163-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	22,0	210	55	315	34,2	2750	6500	35	24,0	110

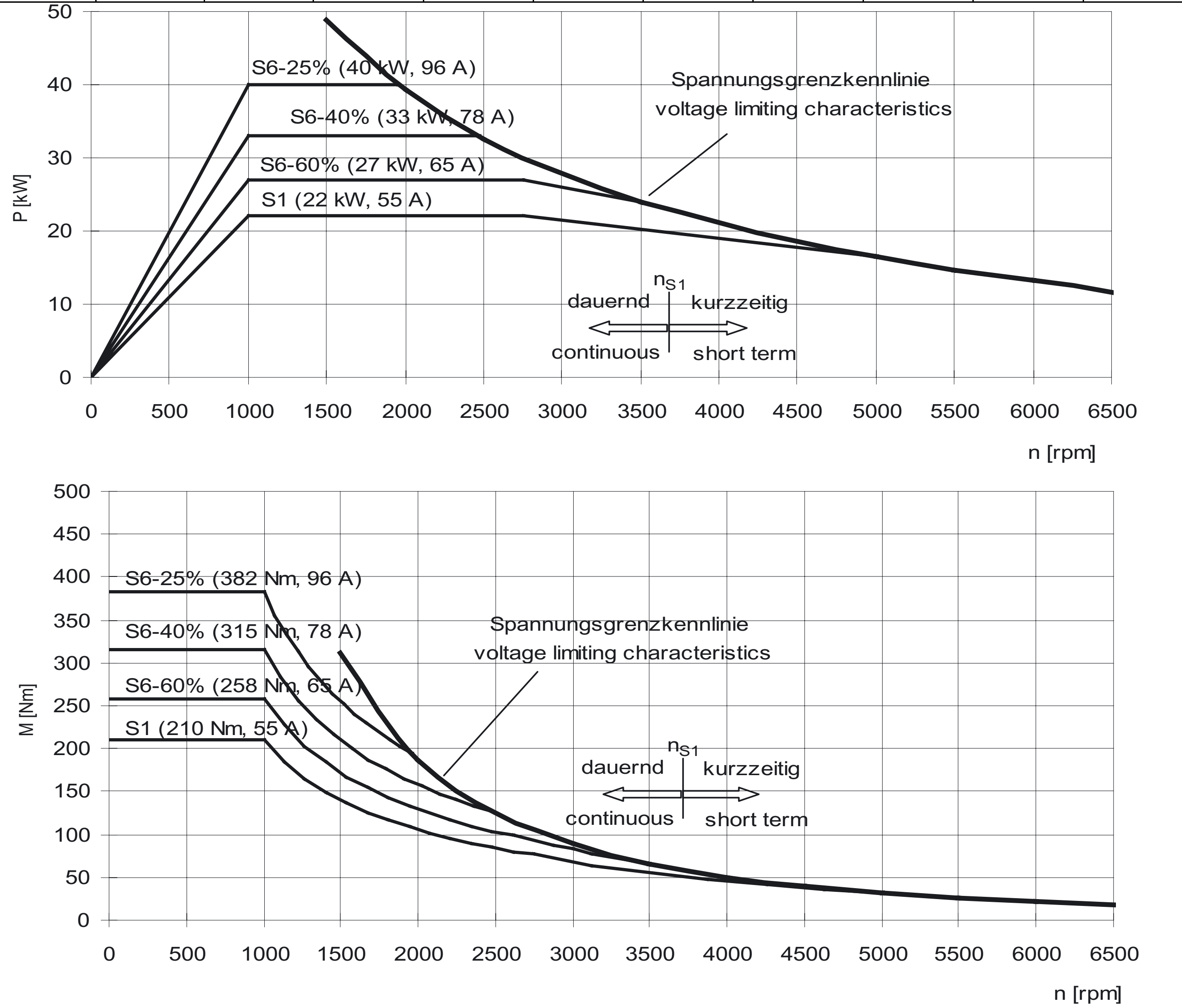
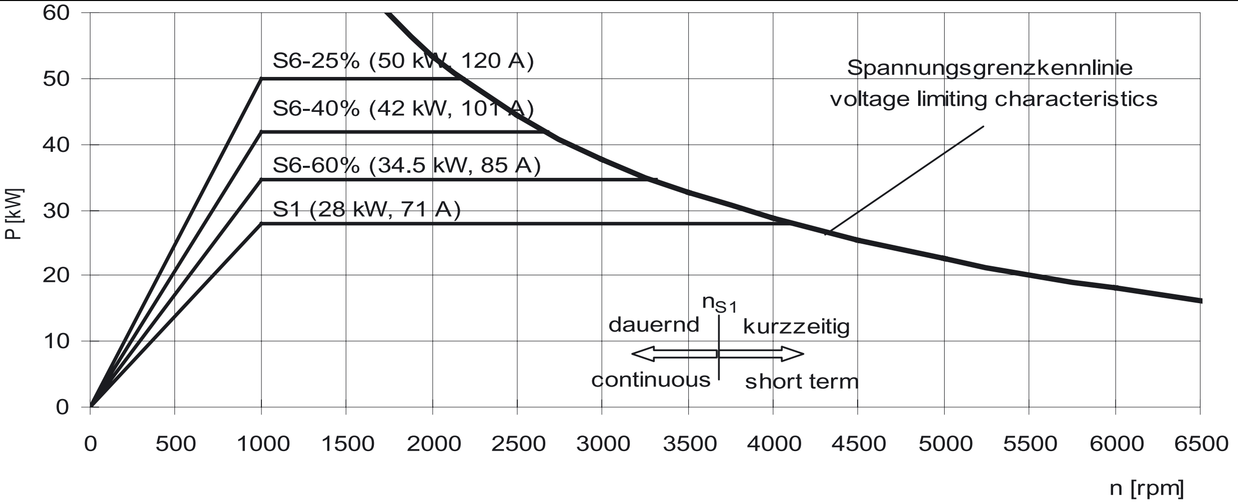


Table 7-14 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7167-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	28,0	267	71	312	34,2	4098	6500	35	33,0	142



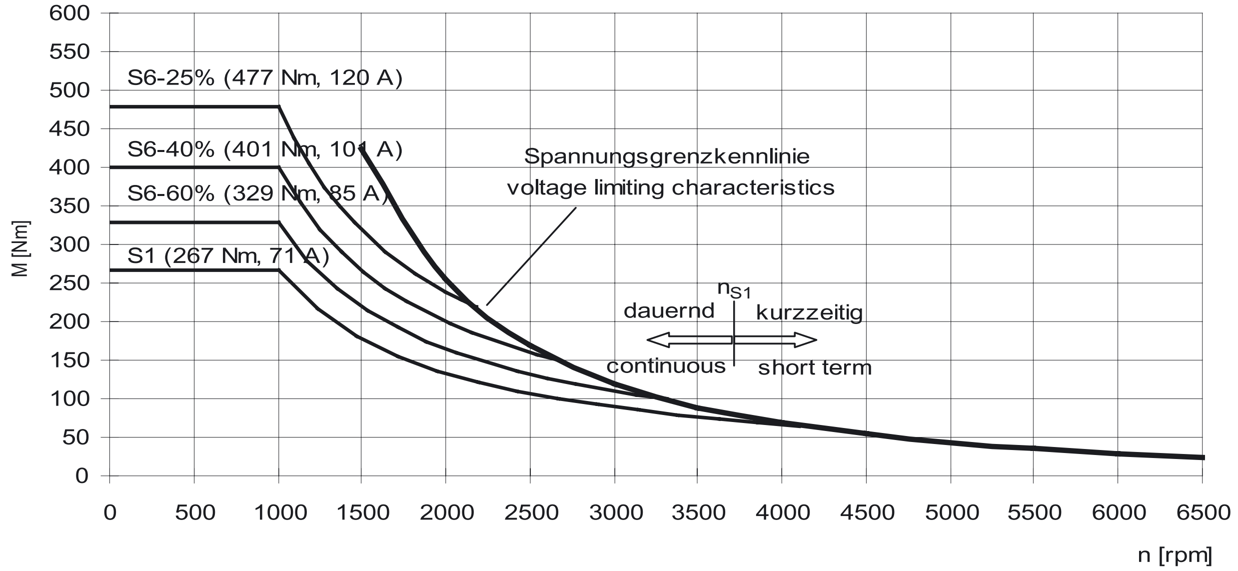
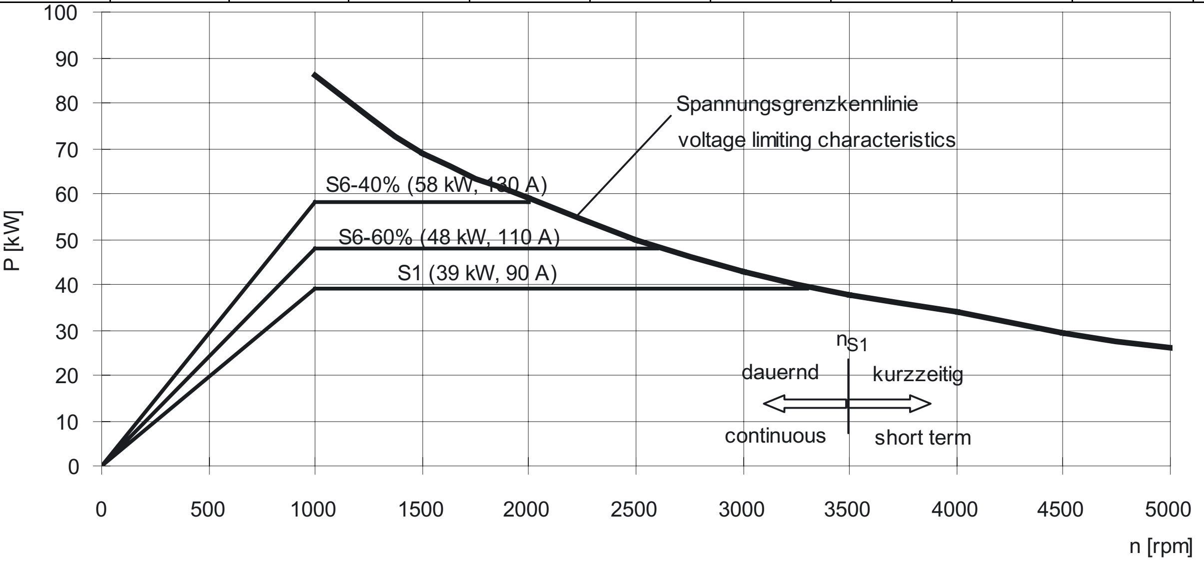


Table 7-15 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7184-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
1000	39	372	90	335	34,2	3300	5000	40	44	180



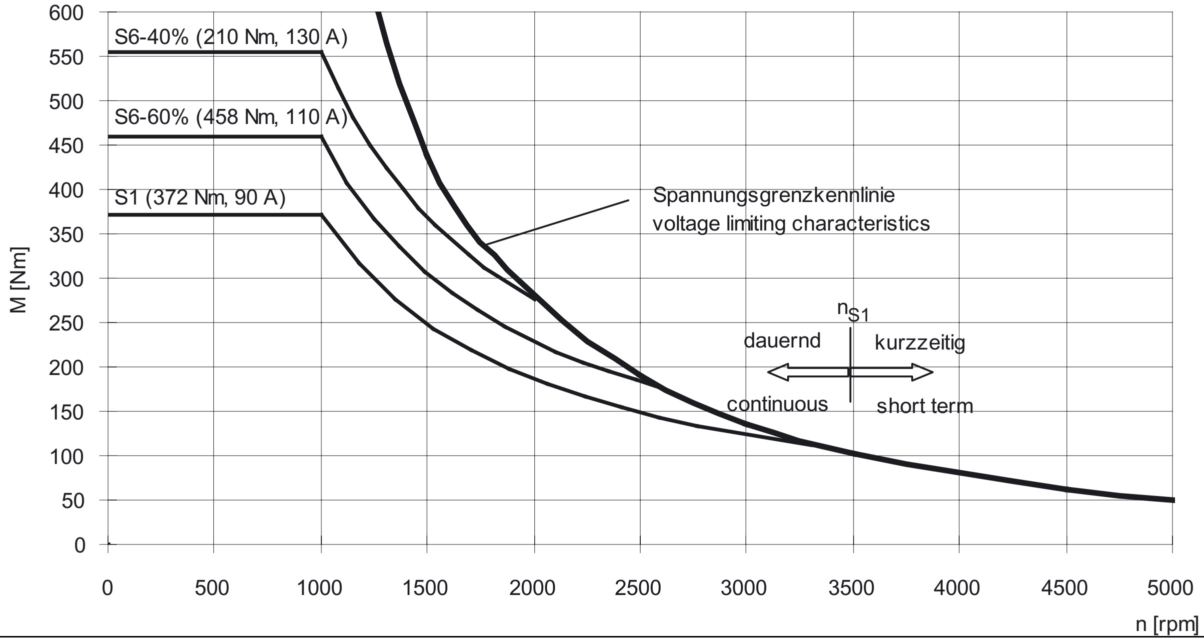
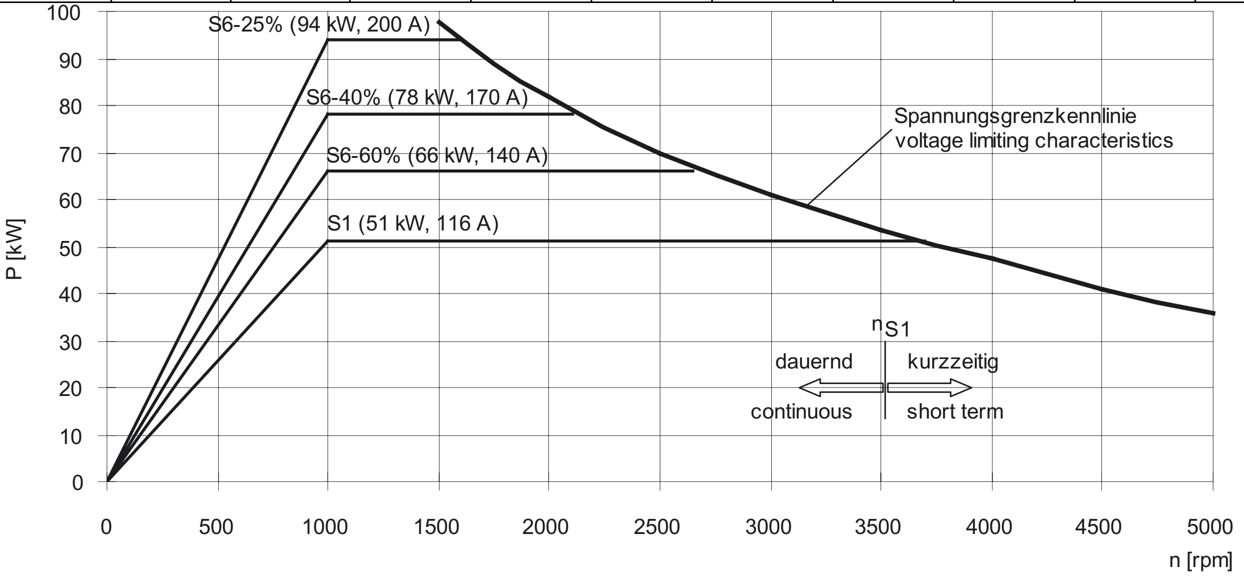


Table 7-16 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7186-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	51	485	116	340	34,1	3700	5000	40	58	232



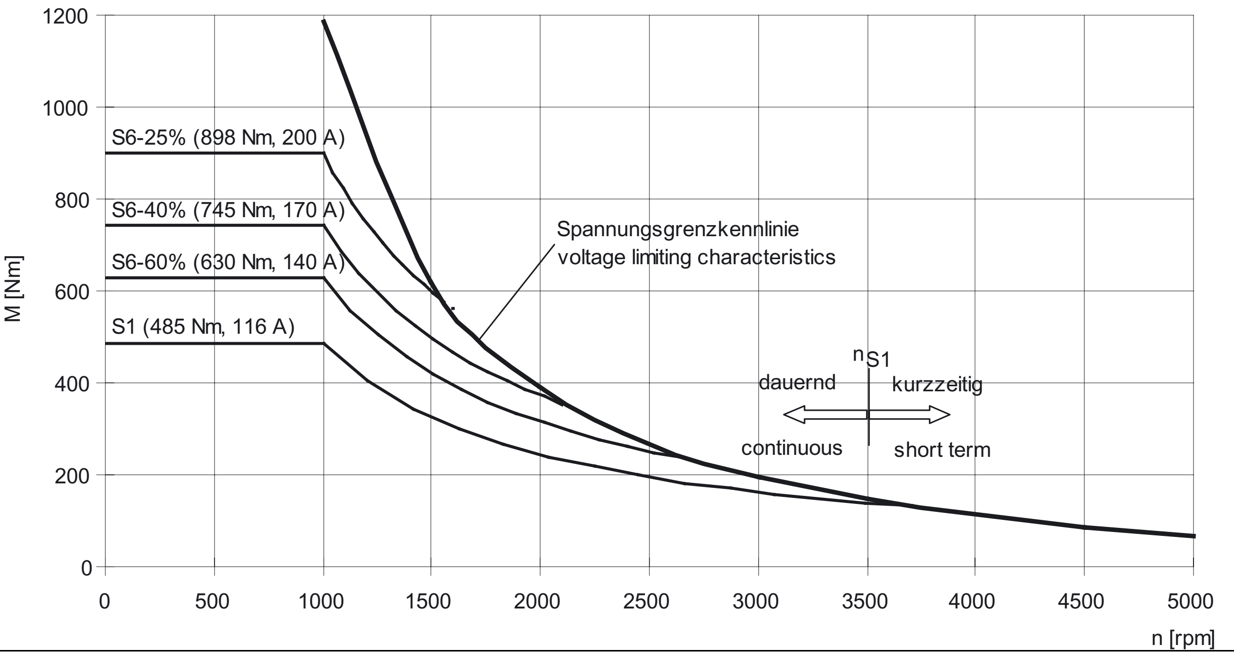
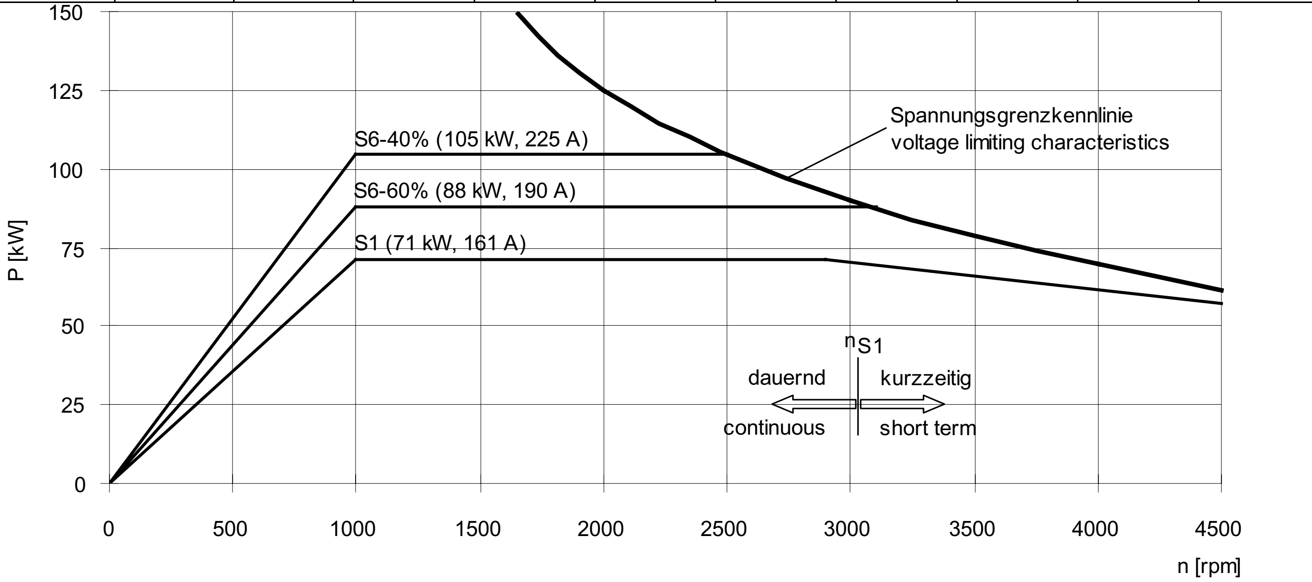


Table 7-17 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7224-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	71	678	161	335	33,9	2900	4500	40	78,5	320



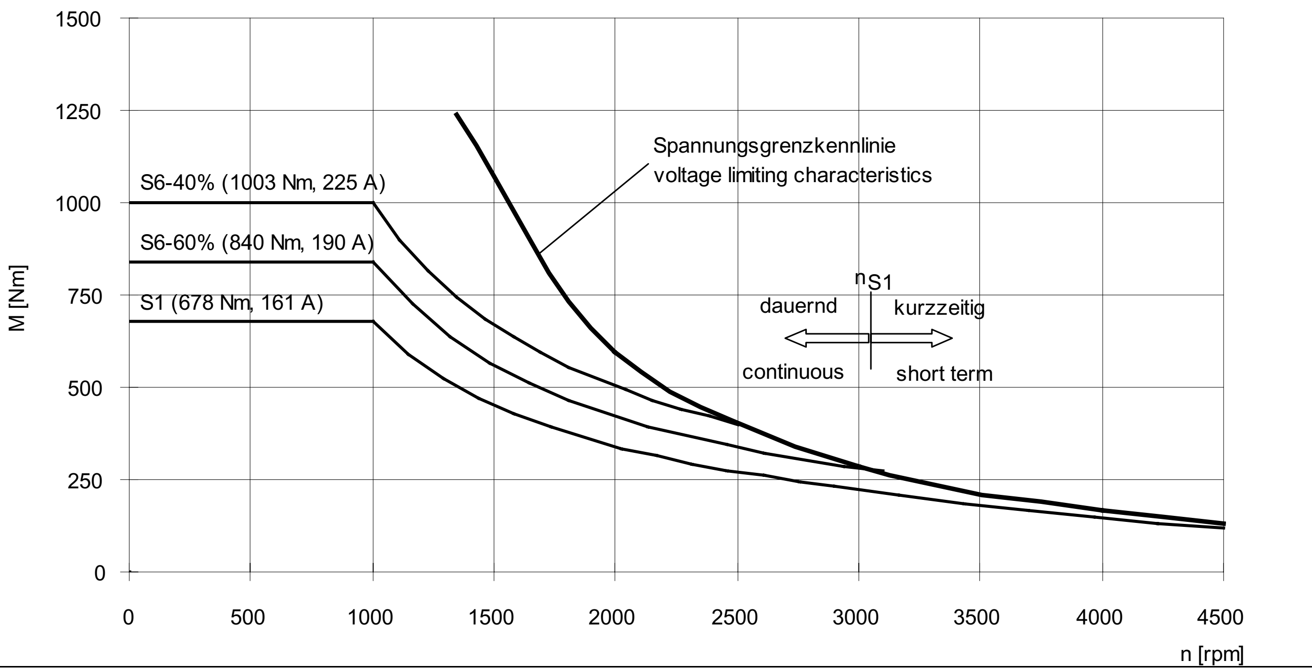
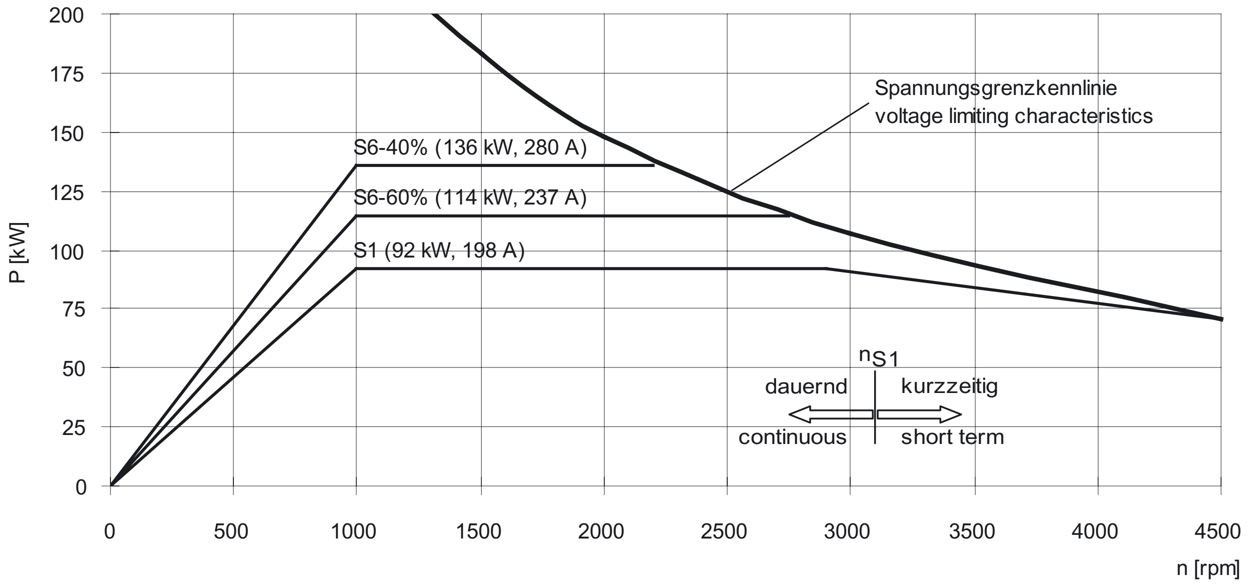


Table 7-18 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7226-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	92	880	198	340	33,9	2900	4500	40	87,5	400



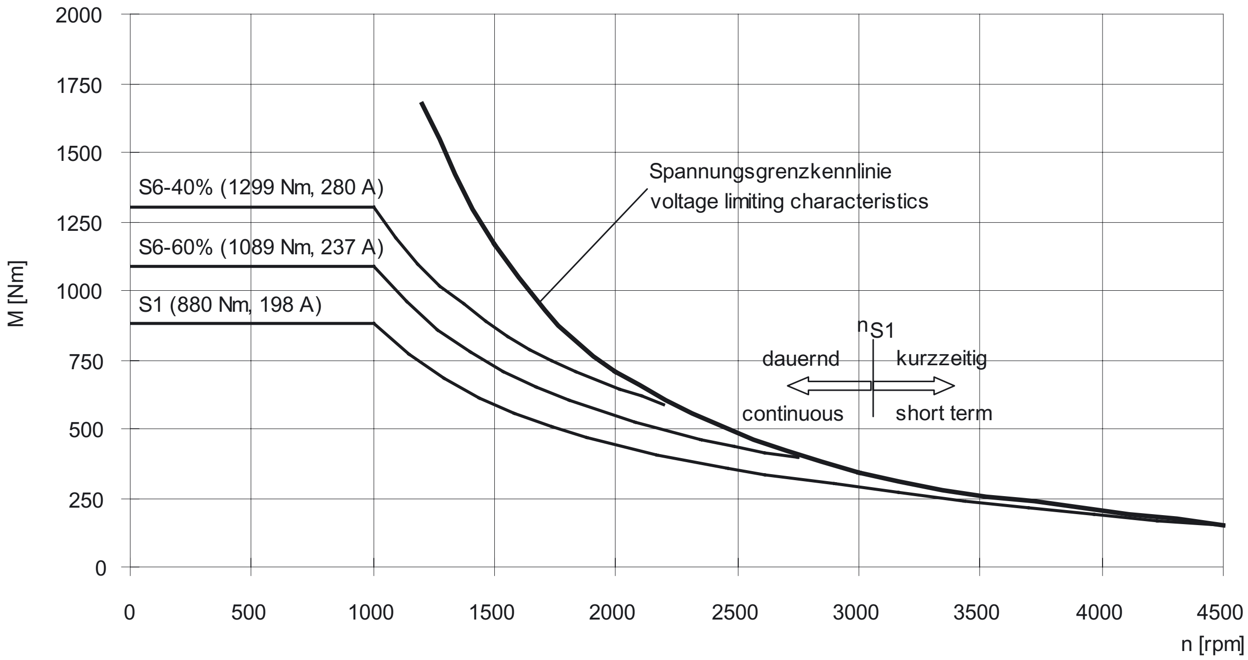
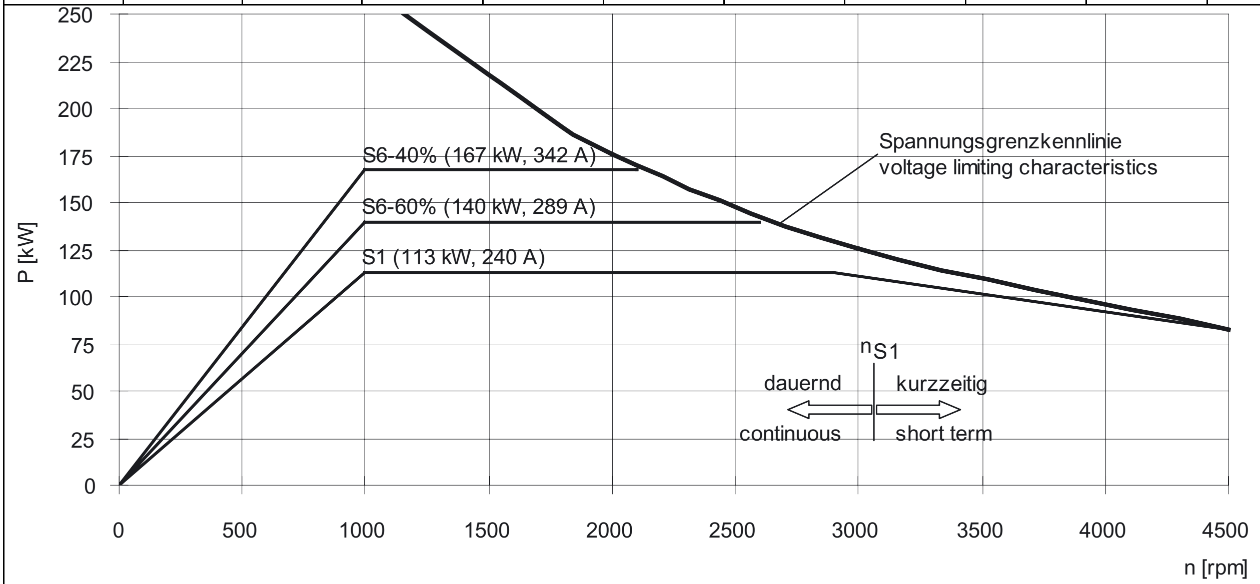
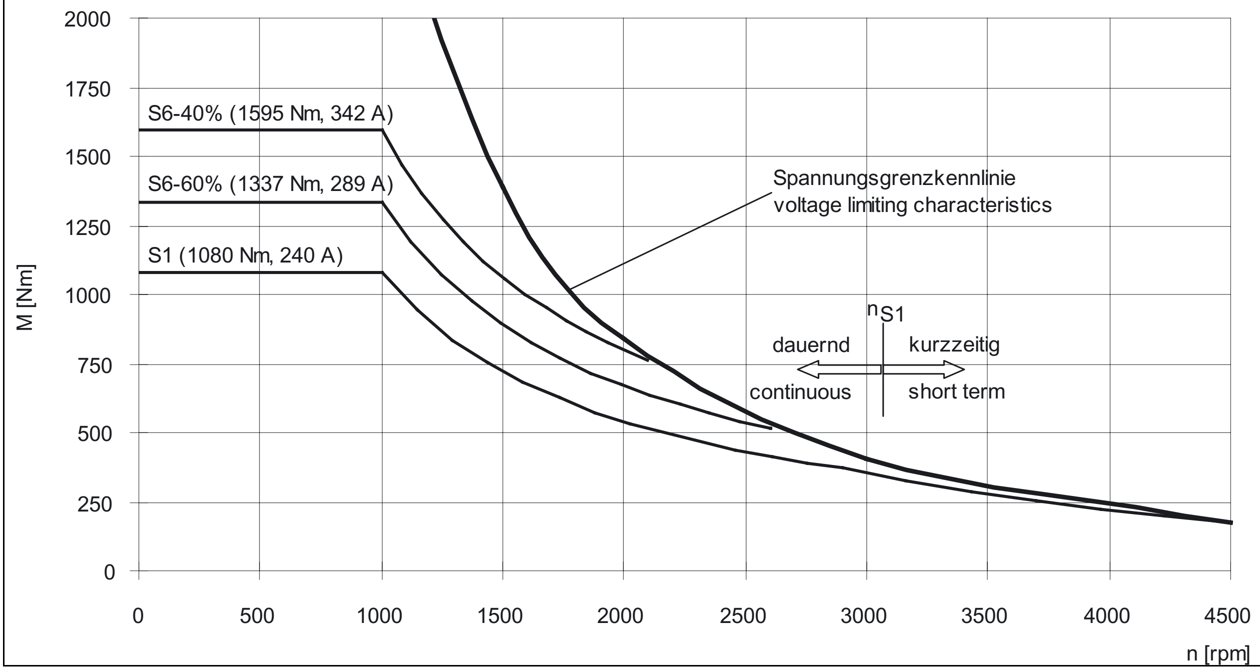


Table 7-19 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7228-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	113	1080	240	340	33,9	2900	4500 1)	40	98,0	480





1) 4000 rpm for increased cantilever forces

Table 7-20 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7101-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	3,7	23,6	10,0	350	51,6	5362	9000	20	5,9	20,0

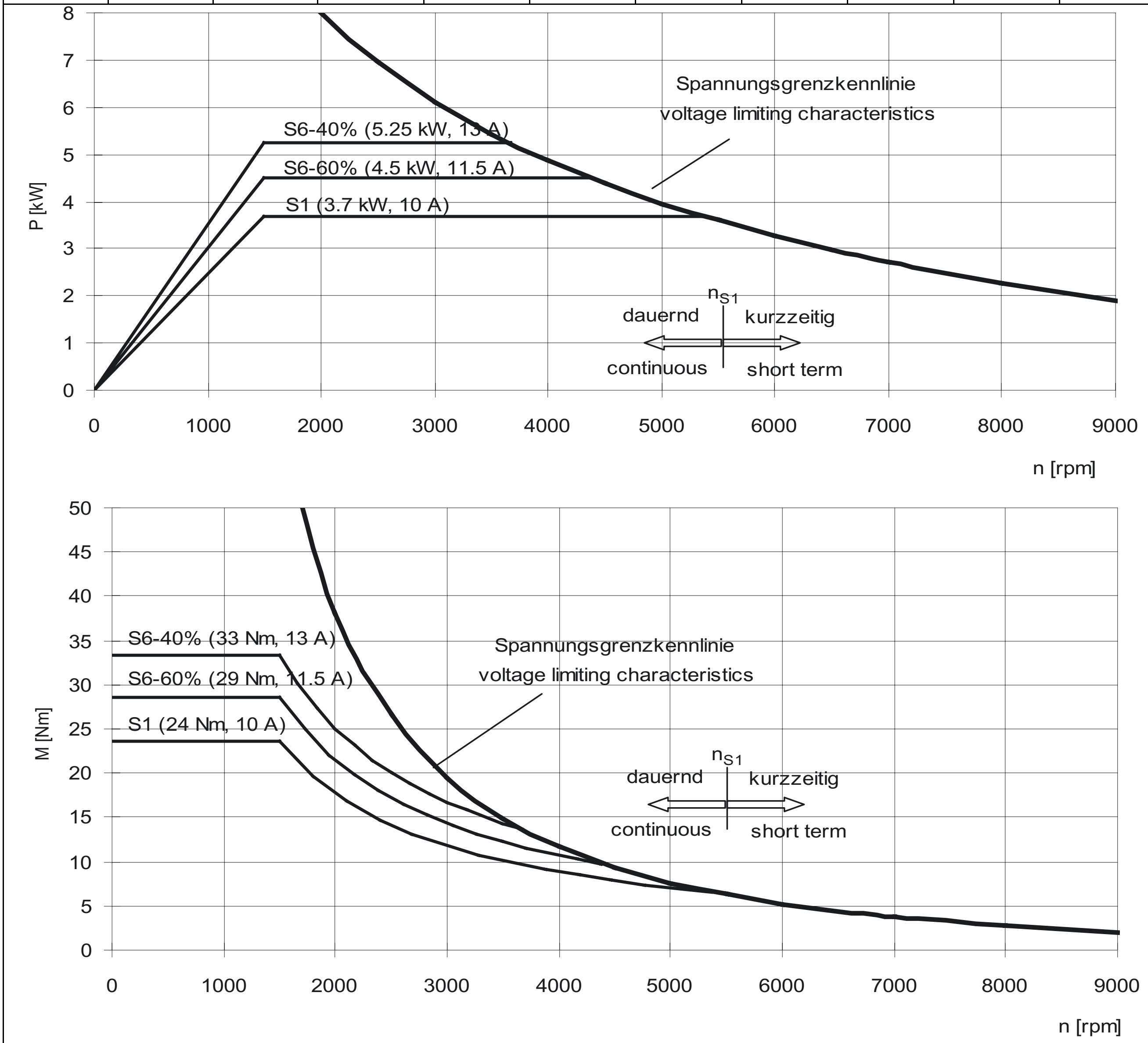
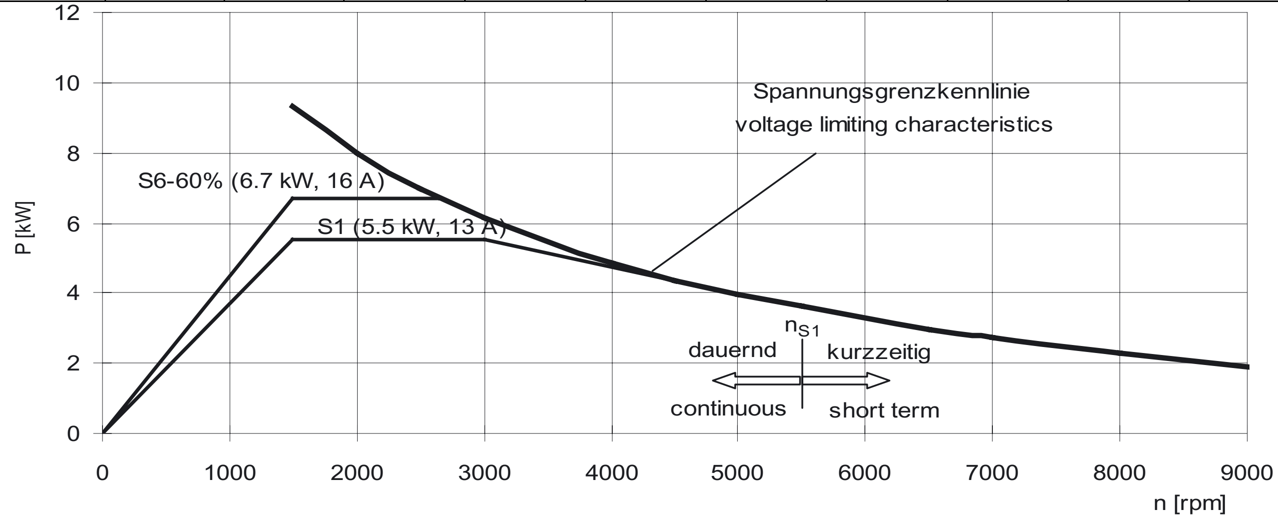


Table 7-21 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7103-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	5,5	35,0	13,0	350	51,7	3000	9000	20	5,4	16,0



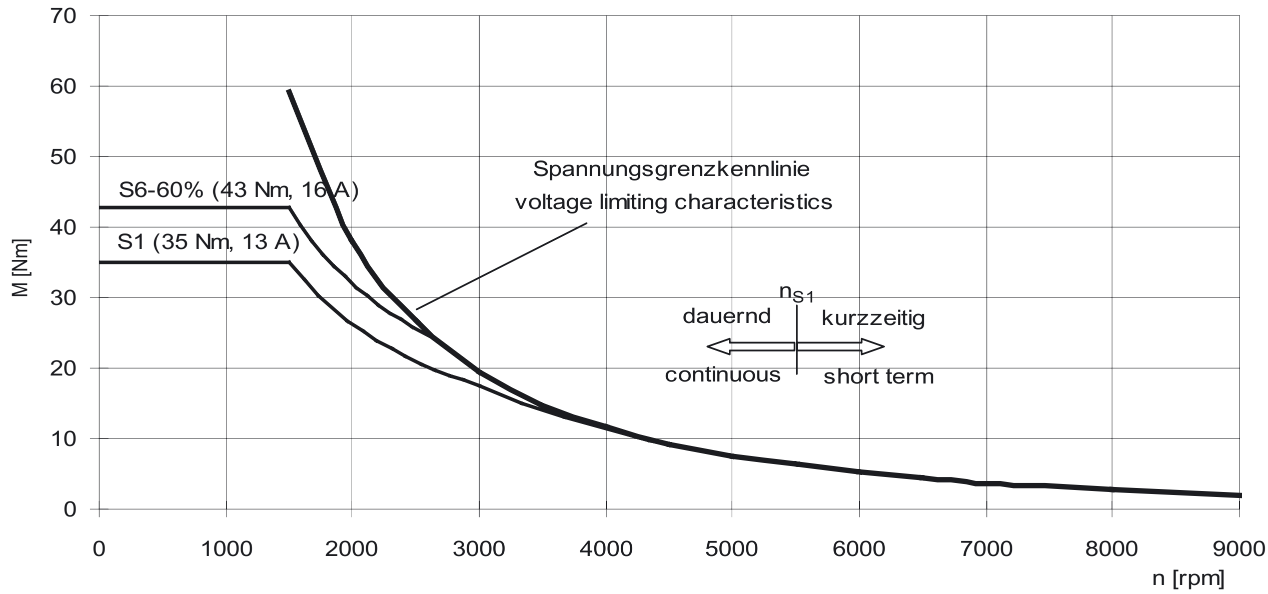


Table 7-22 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7105-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	7,0	44,6	17,5	346	51,7	5117	9000	20	9,4	35,0

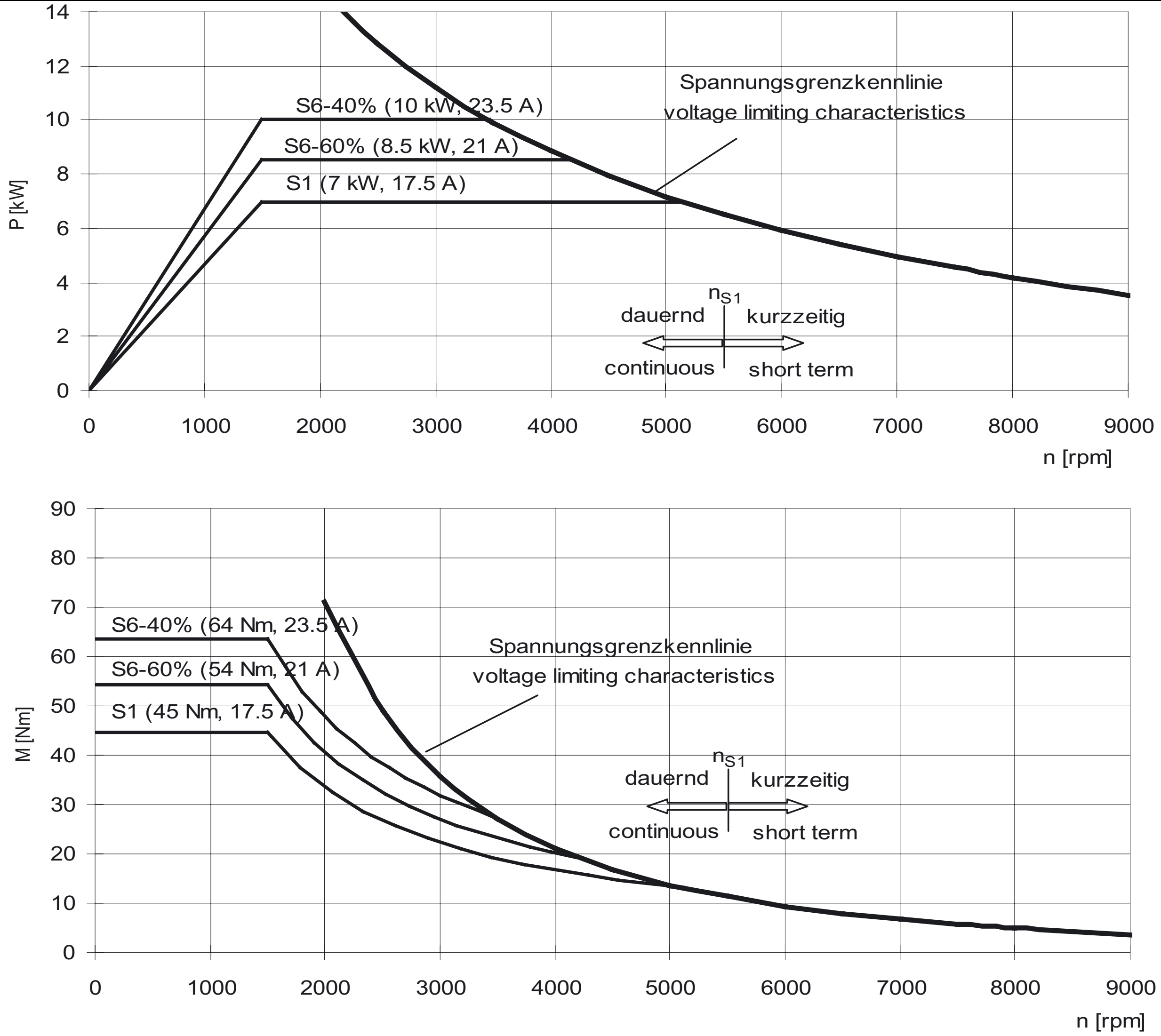
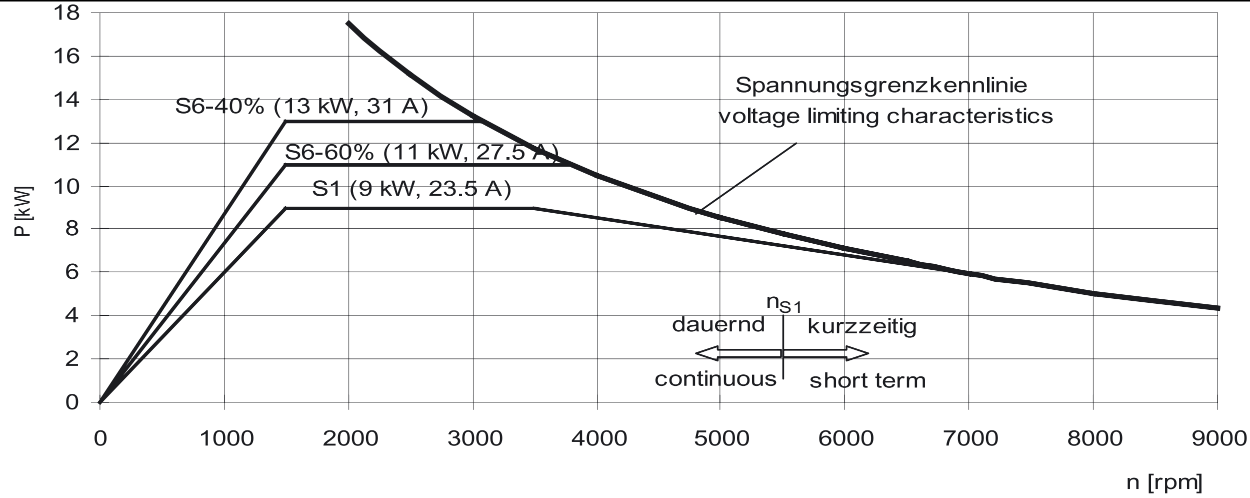


Table 7-23 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7107-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	9,0	57,3	23,5	336	52,0	3500	9000	20	11,0	47,0



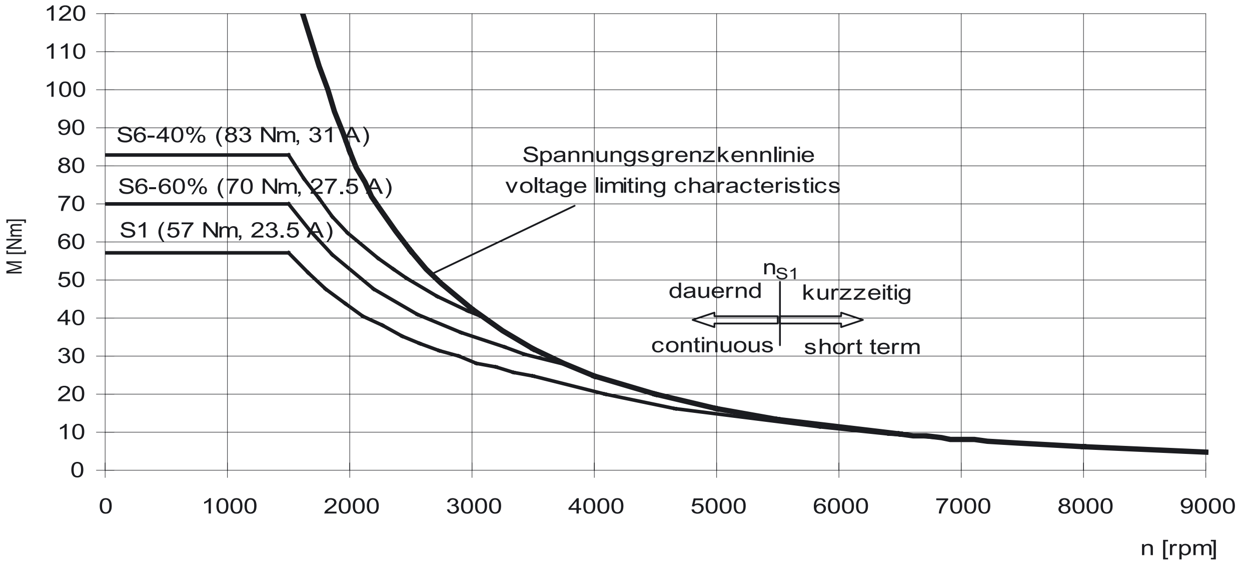
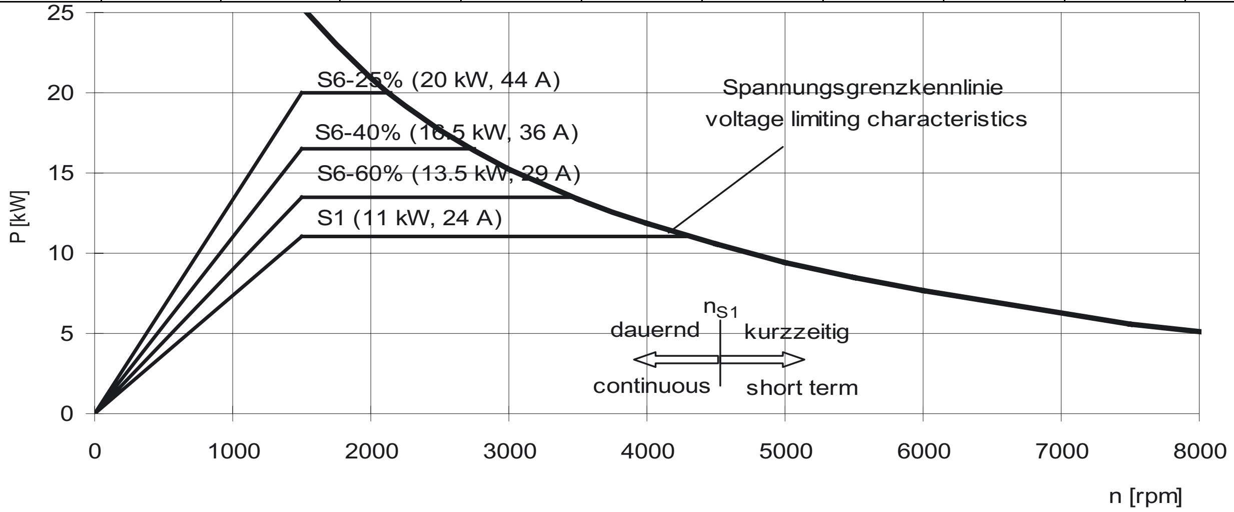


Table 7-24 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7131-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	11,0	70,0	24,0	350	51,3	4317	8000	30	8,4	48,0



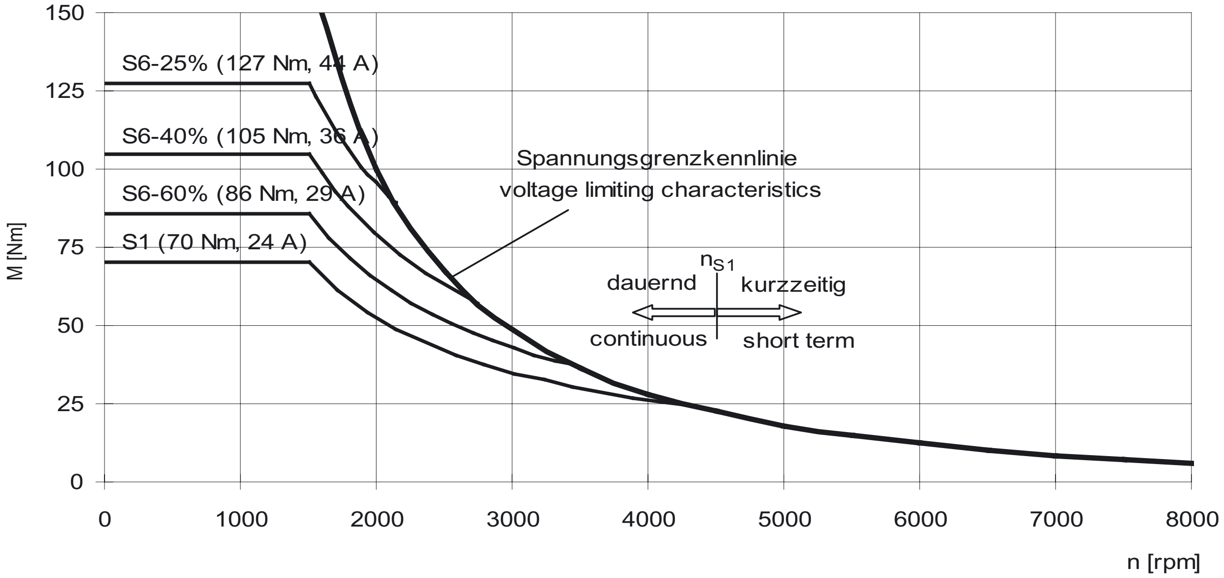


Table 7-25 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7133-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
1500	15,0	95	34	346	51,3	4407	8000	30	14,0	68

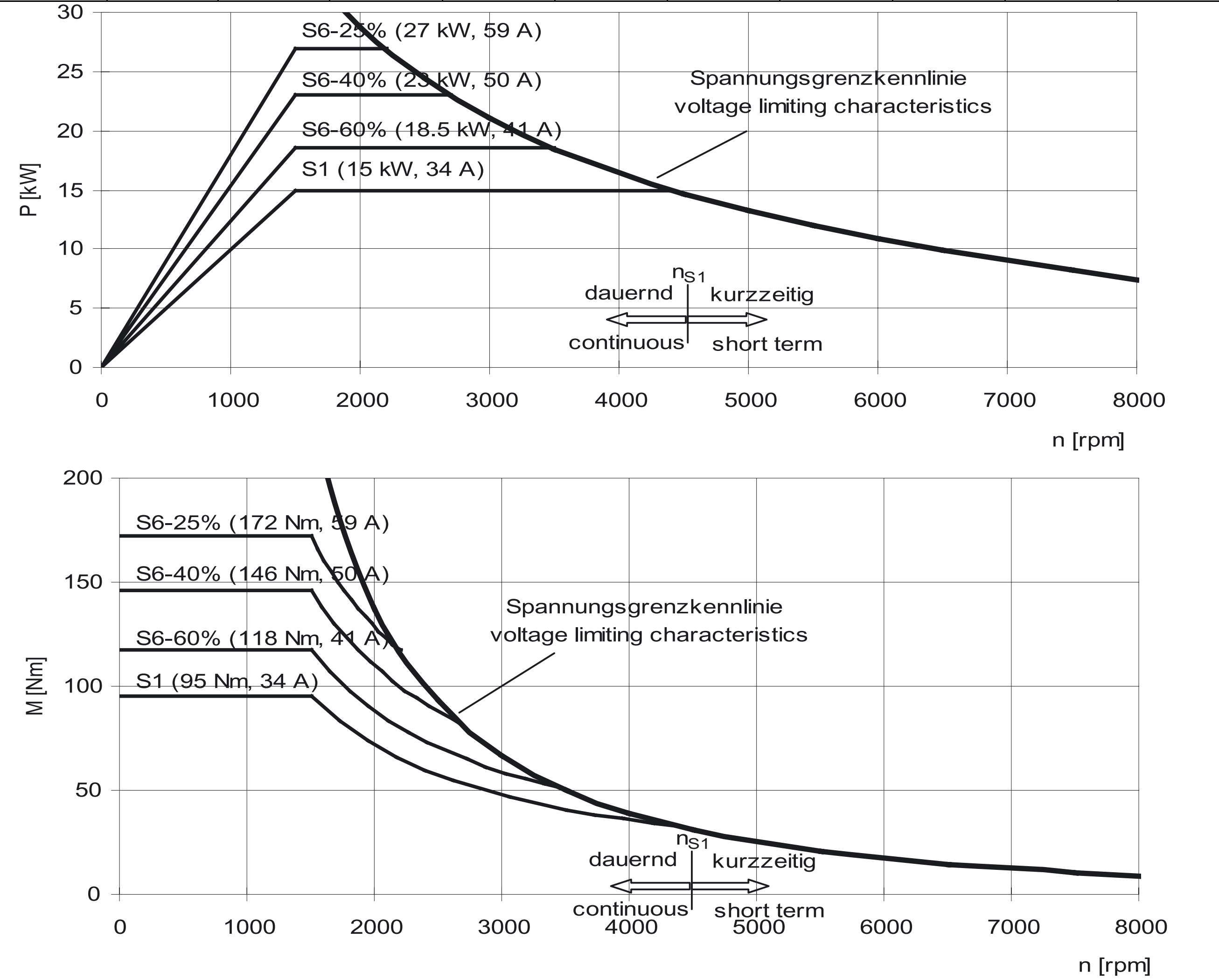
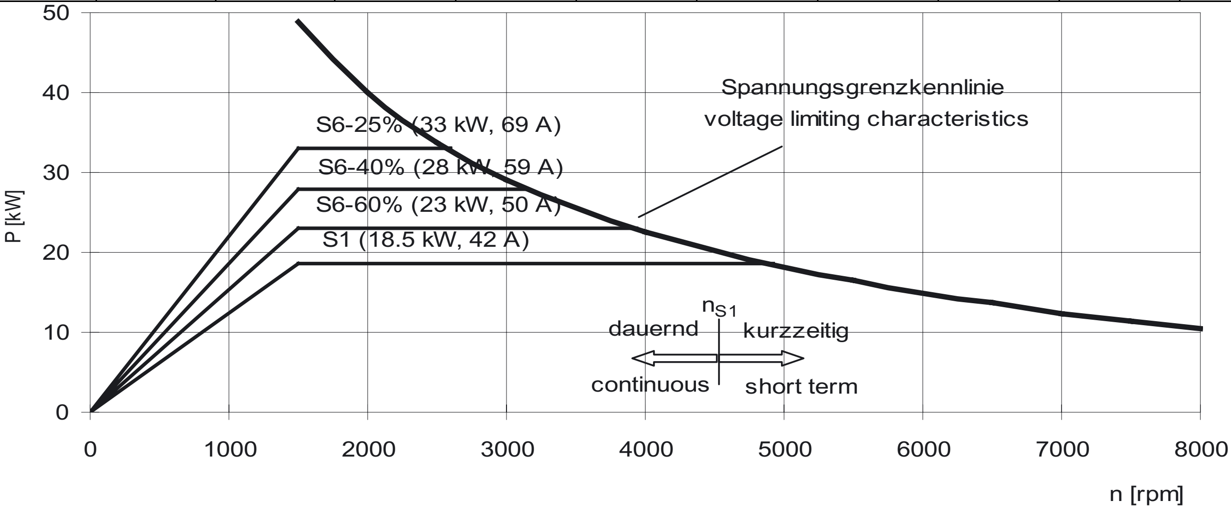


Table 7-26 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7135-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	18,5	118	42	350	51,1	4925	8000	30	17,0	84



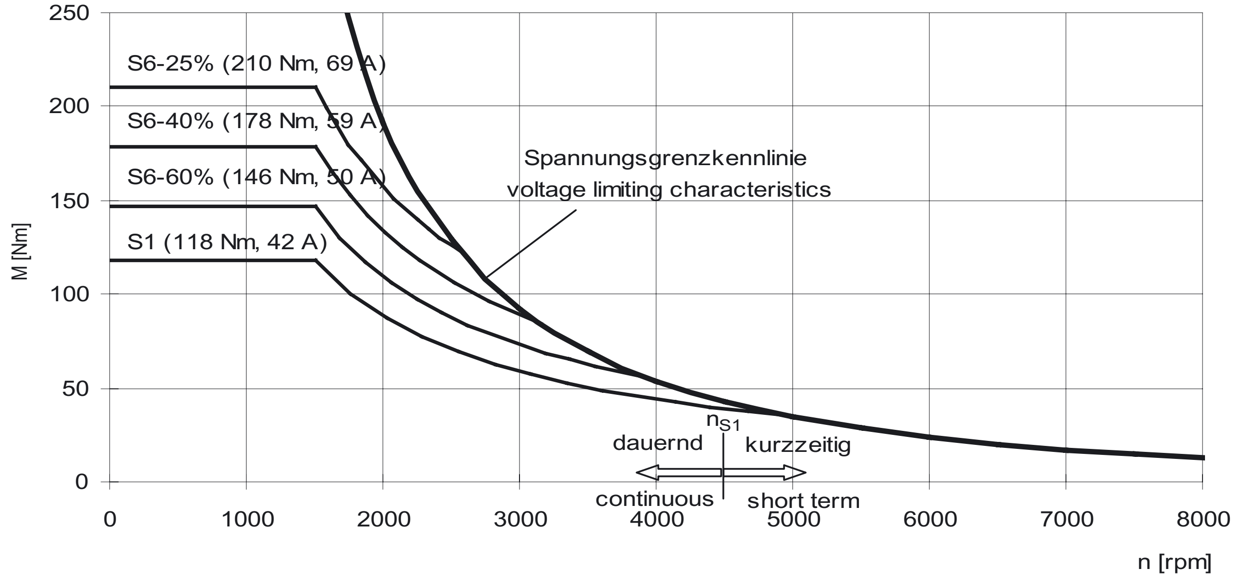
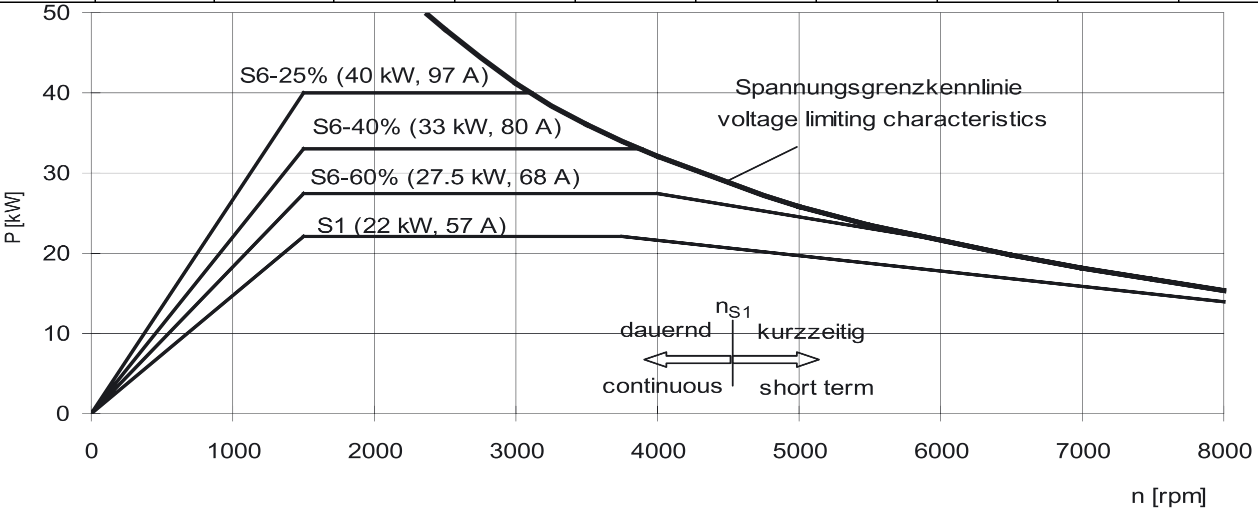


Table 7-27 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7137-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	22,0	140	57	308	51,2	3750	8000	30	22,8	112



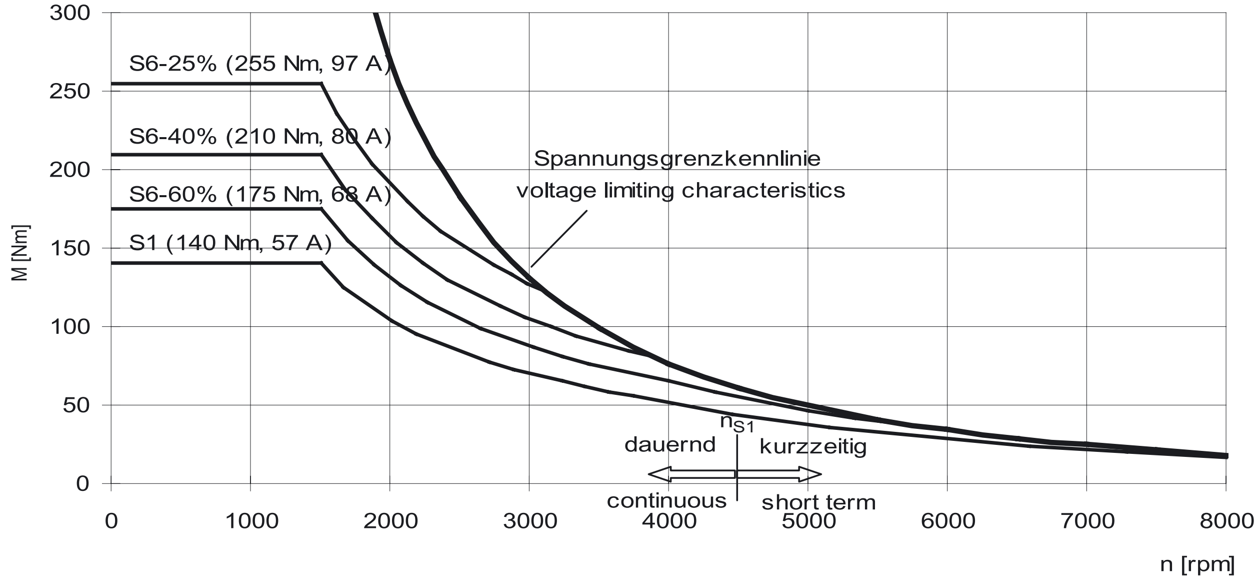
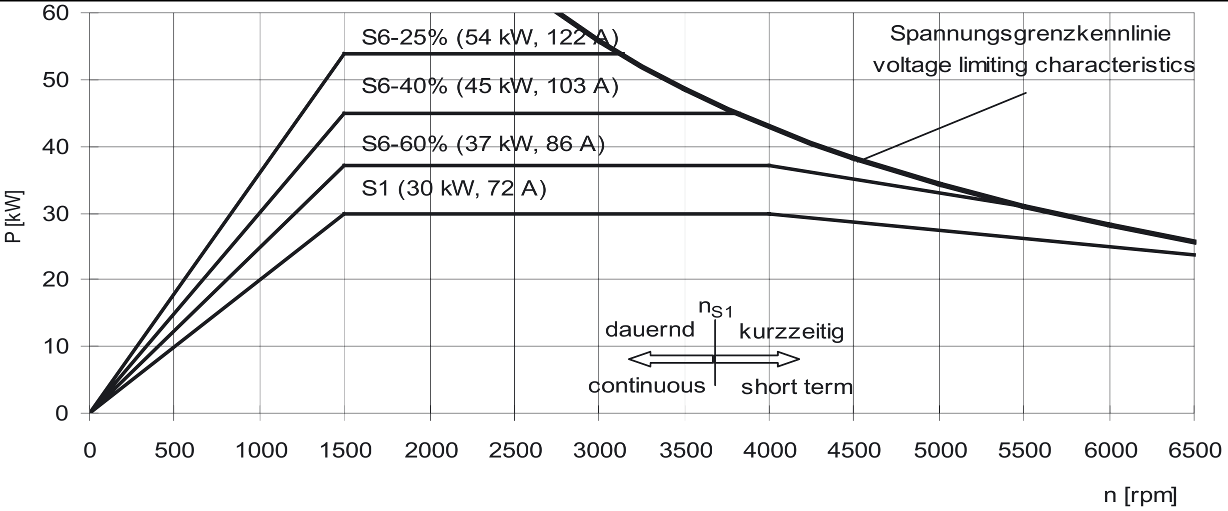


Table 7-28 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7163-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	30,0	191	72	319	50,9	4000	6500	35	30,0	144



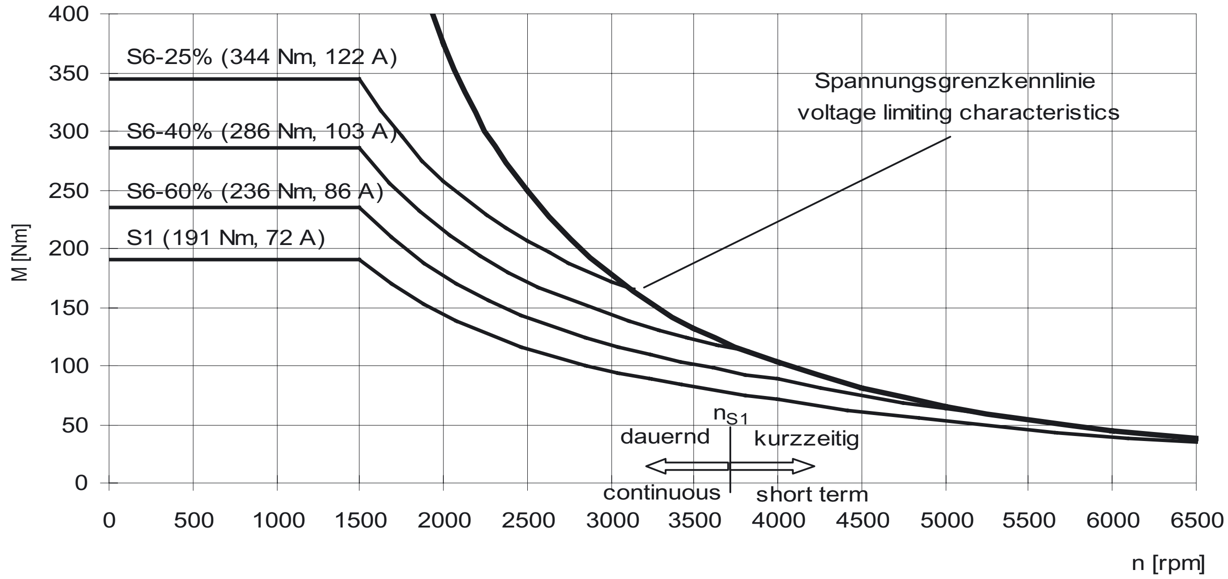
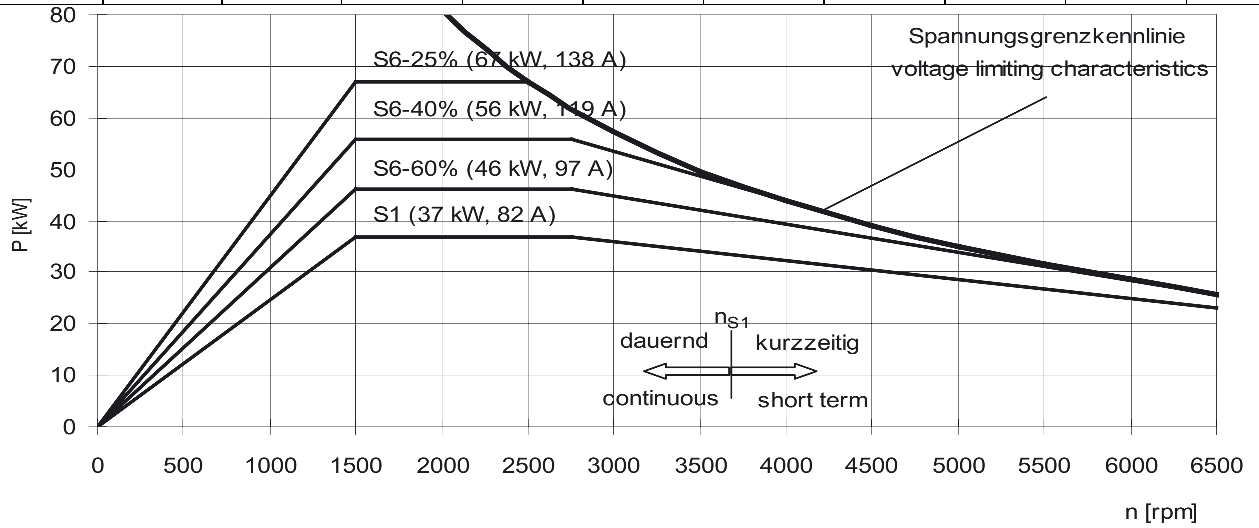


Table 7-29 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7167-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	37,0	236	82	350	50,8	2750	6500	35	32,0	164



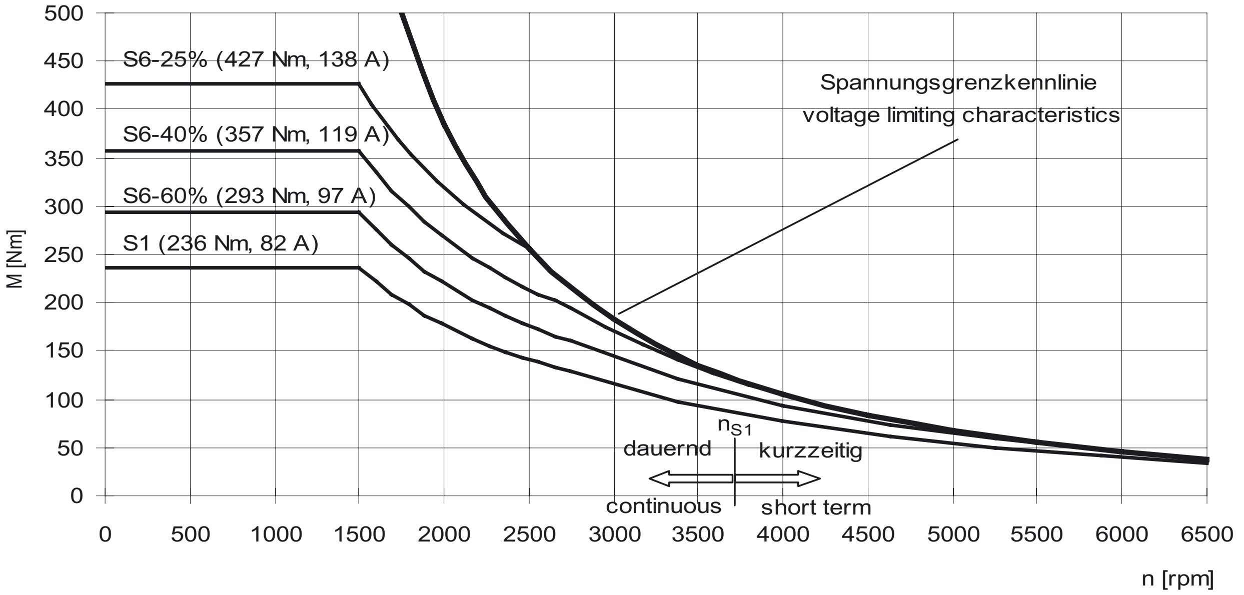
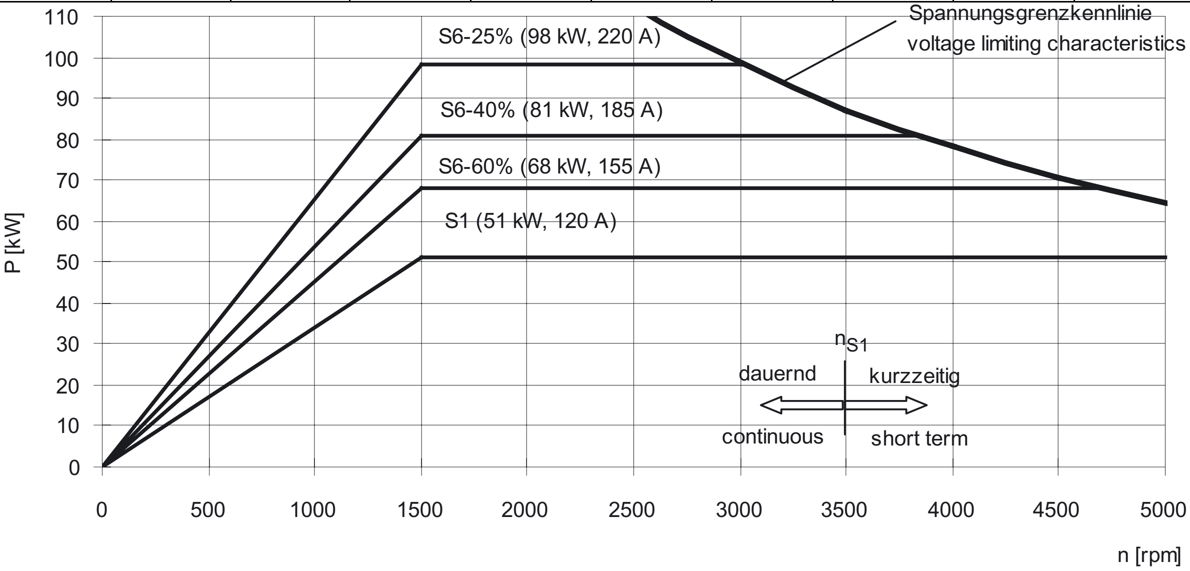


Table 7-30 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7184-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	51	325	120	335	50,7	5000	5000	40	64	240



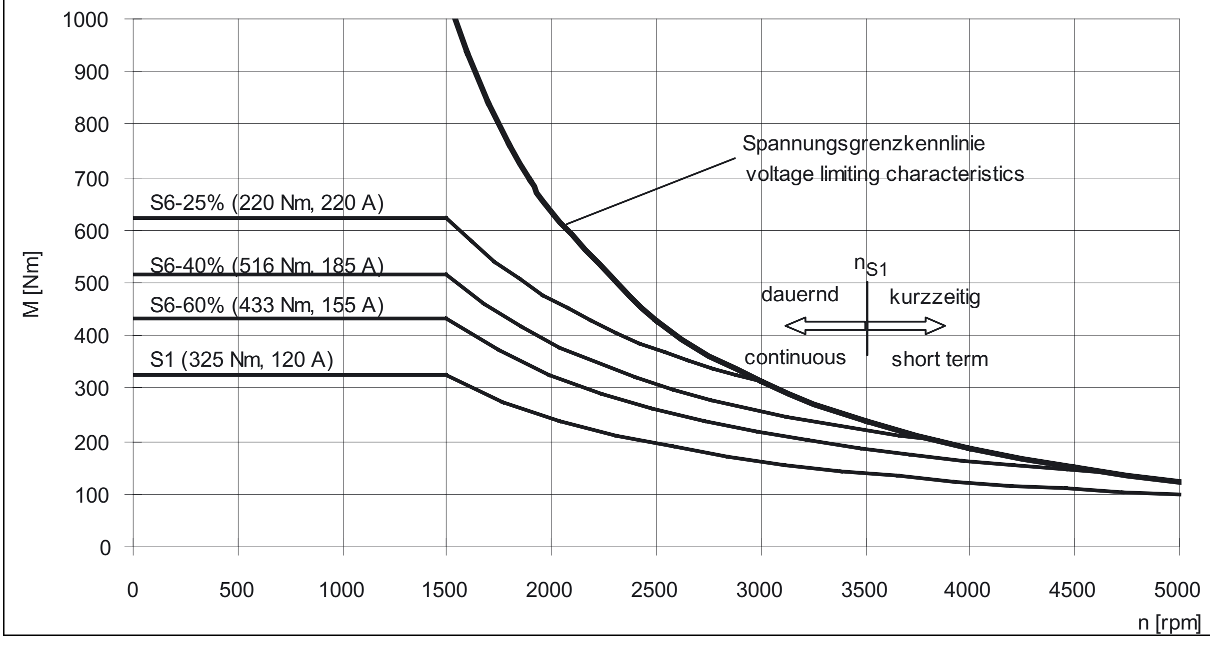
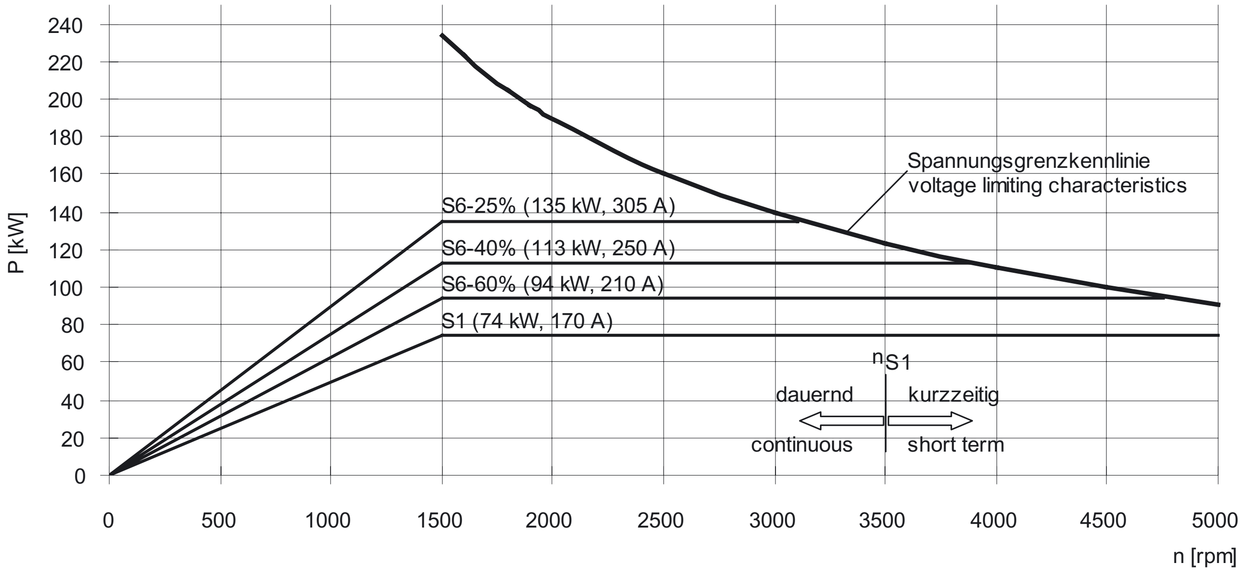


Table 7-31 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7186-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	74	471	170	330	50,7	5000	5000	40	84	325



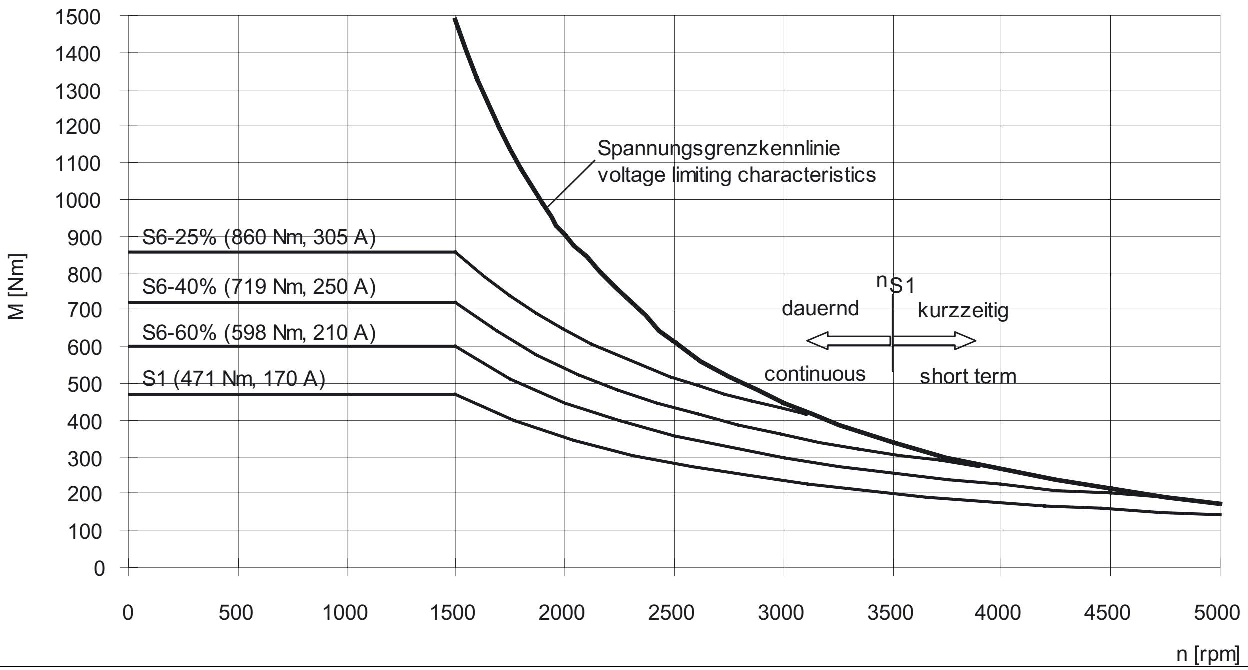
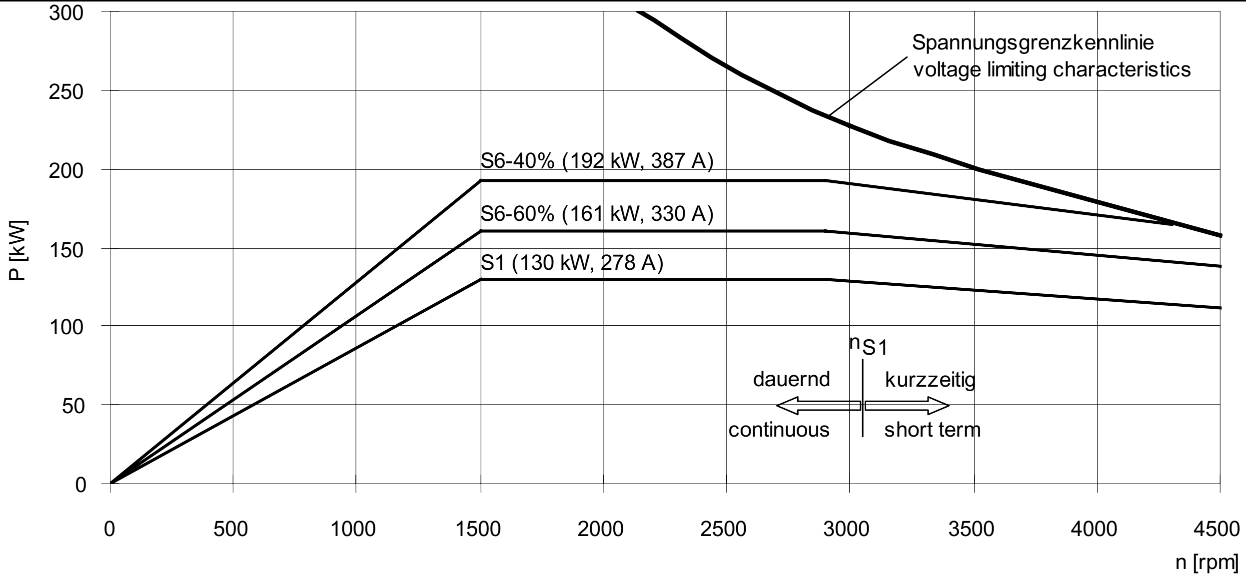


Table 7-32 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7226-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	130	828	278	340	50,6	2900	4500	40	120	560



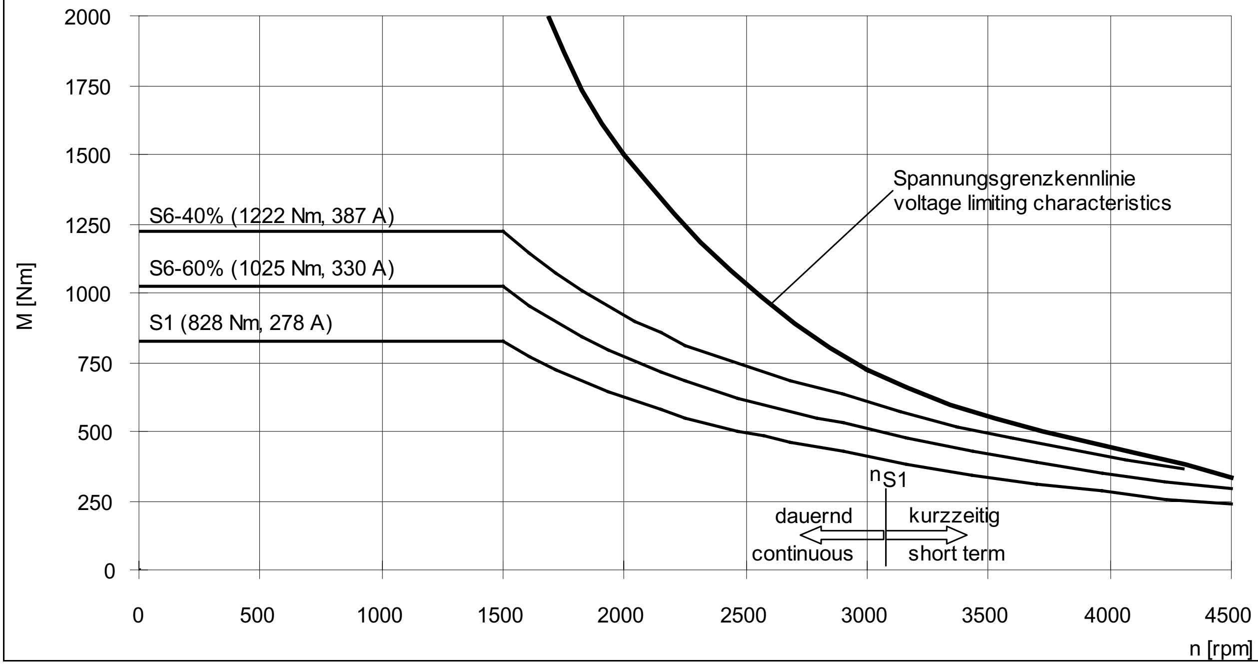
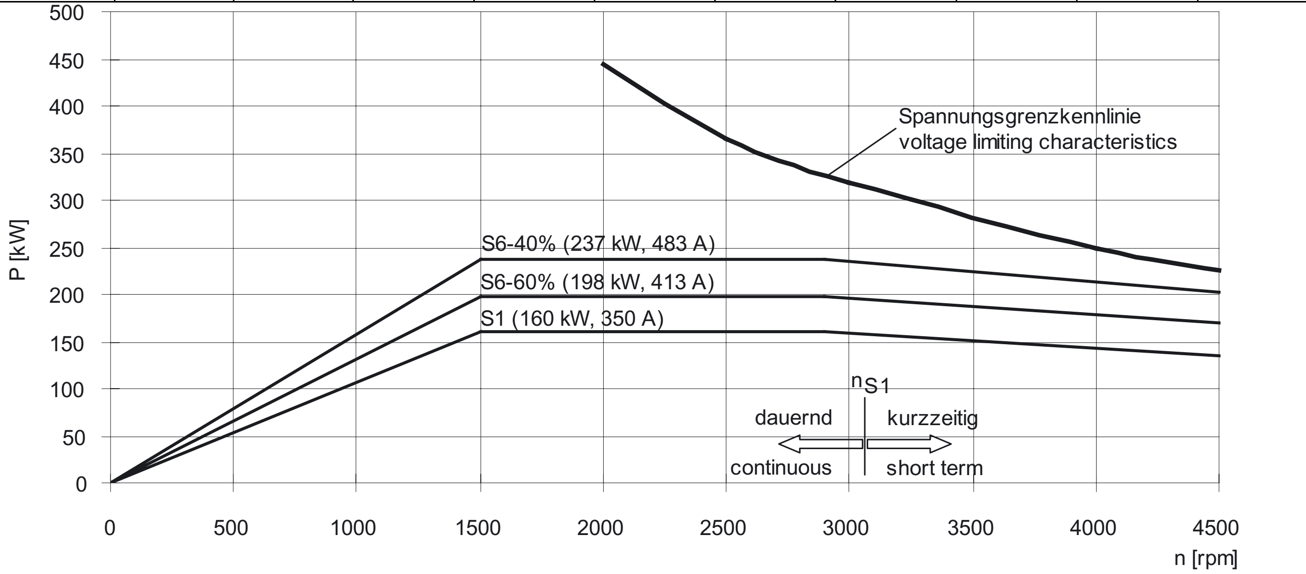
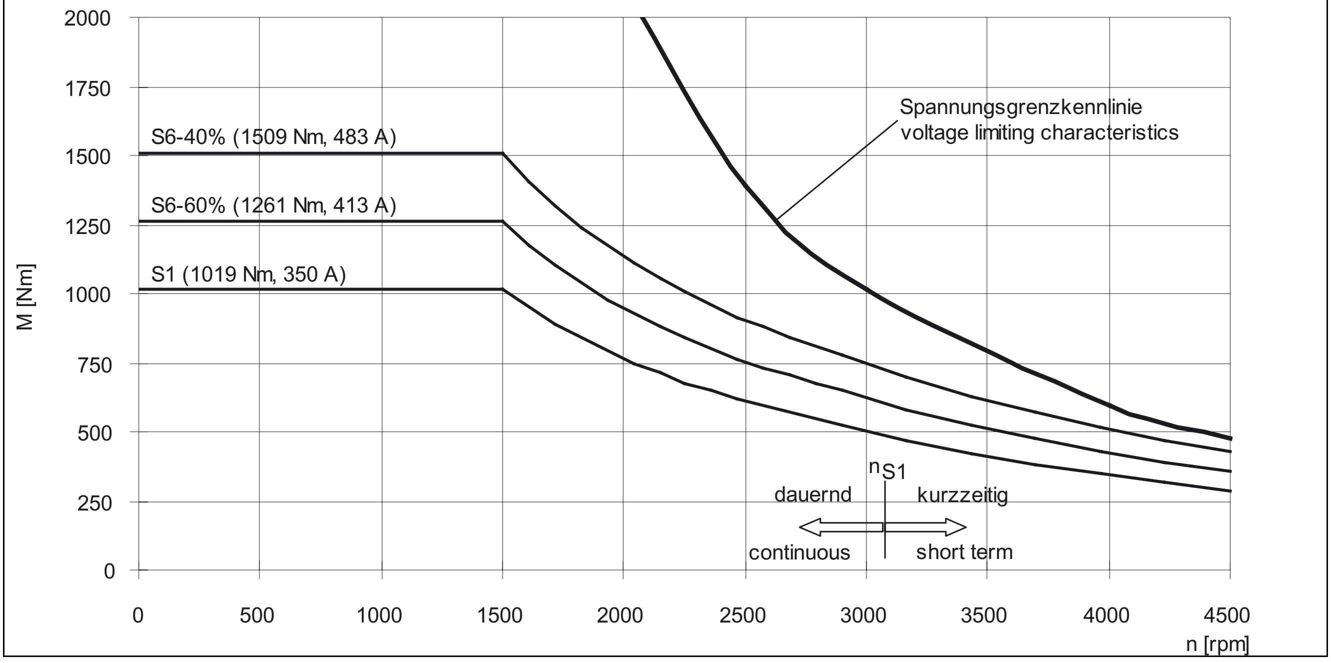


Table 7-33 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7228-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
1500	160	1019	350	340	50,5	2900	4500 1)	40	169	700

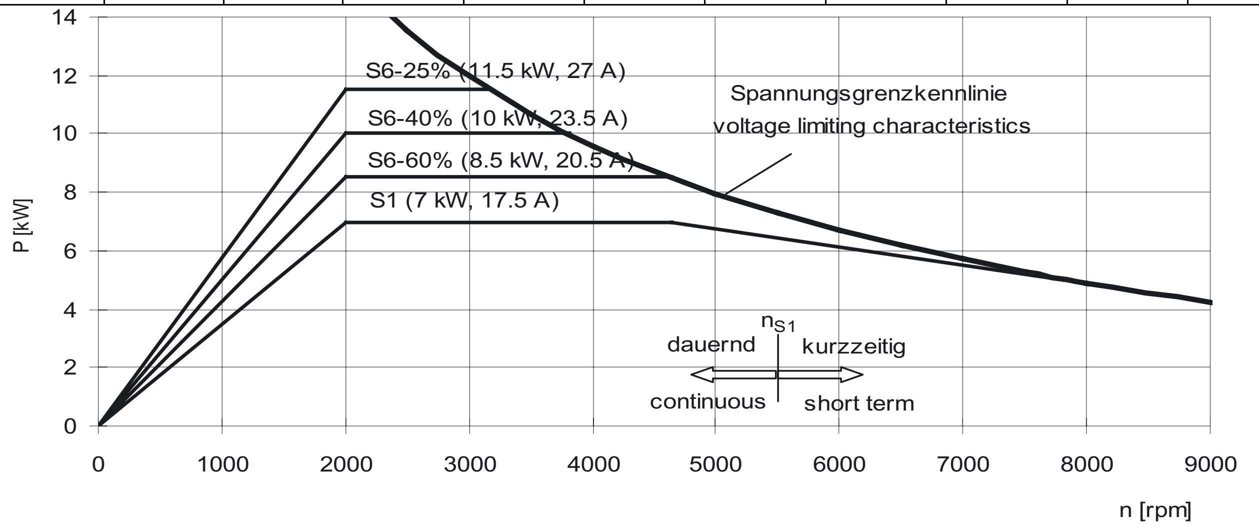




1) 4000 rpm for increased cantilever forces

Table 7-34 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7103-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	7,0	33,4	17,5	343	68,9	4635	9000	20	8,3	35,0



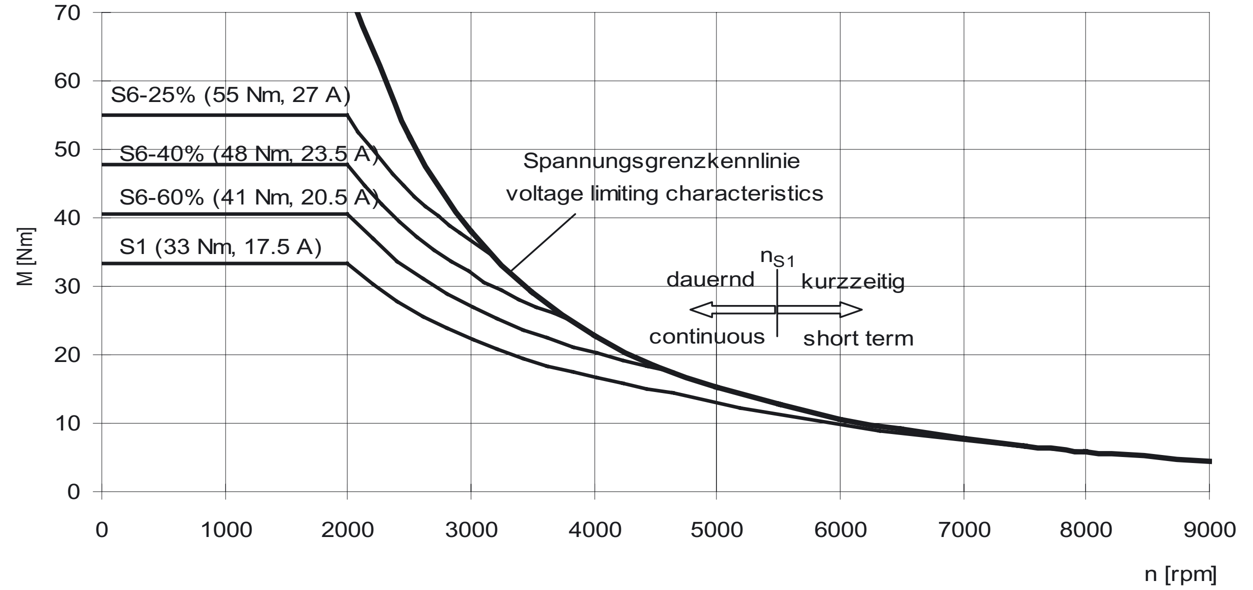


Table 7-35 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7107-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	10,5	50,1	26,0	350	68,6	4000	9000	20	12,0	52,0

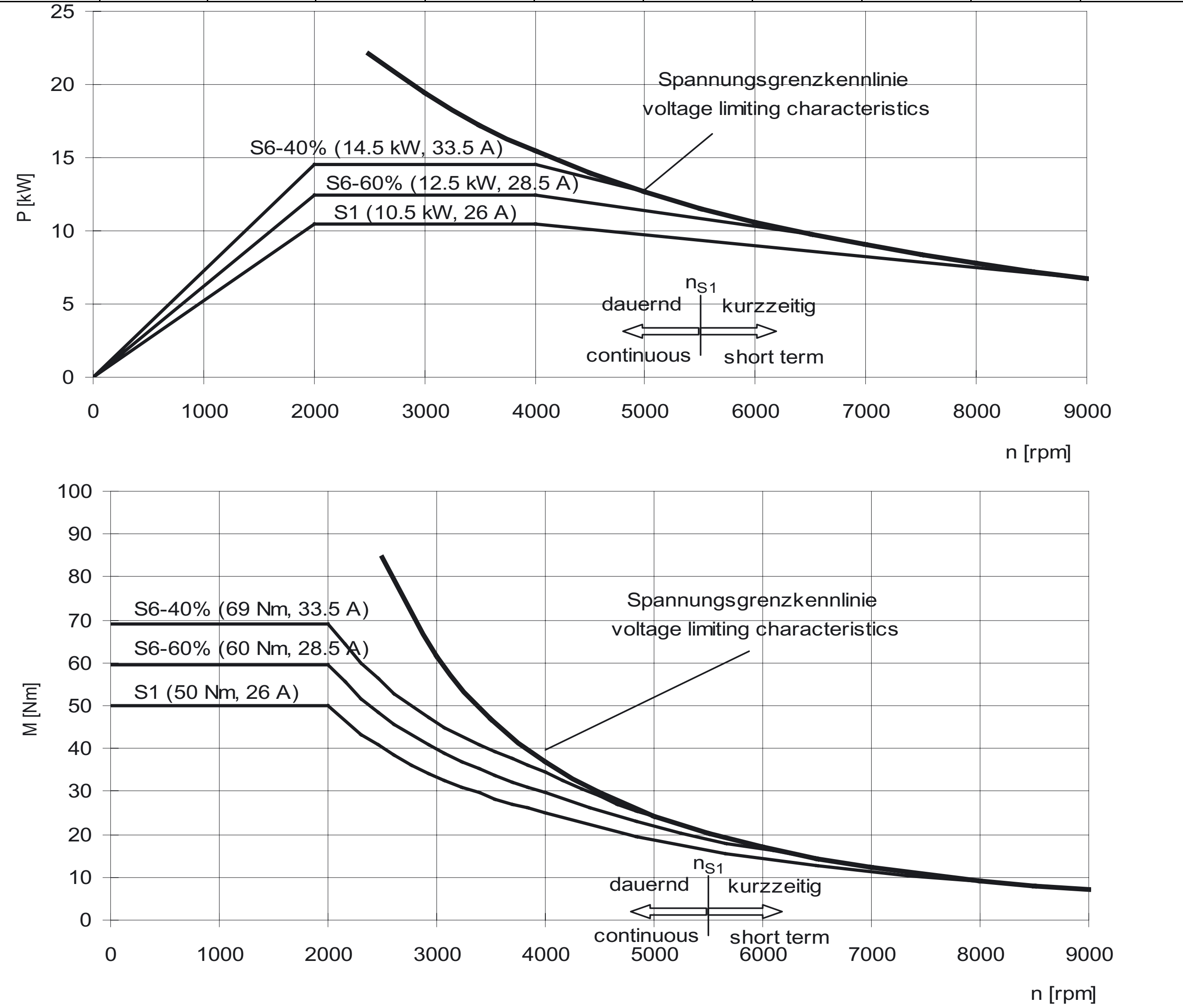
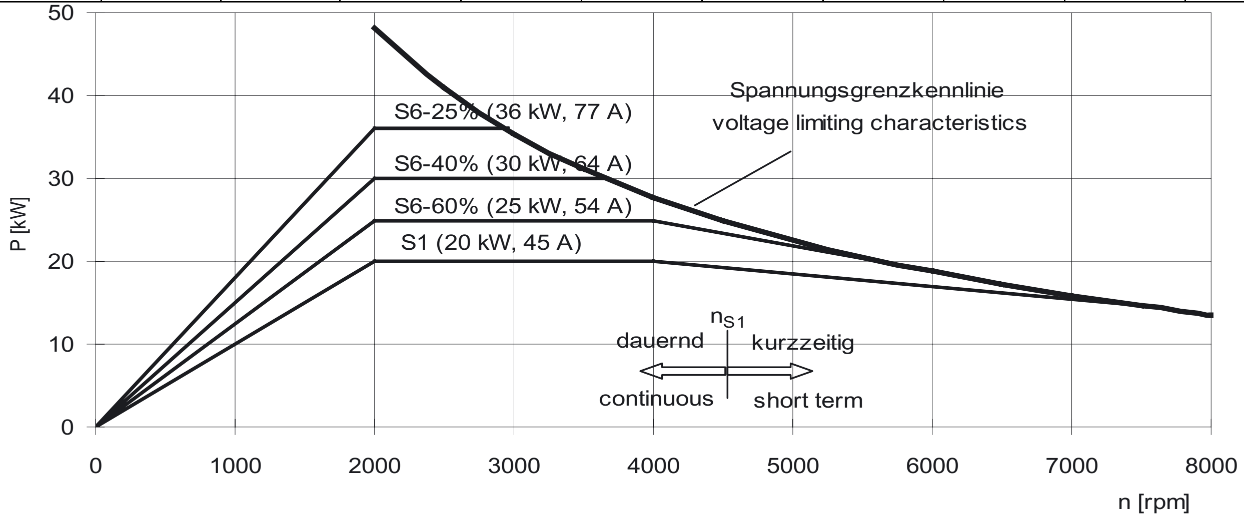


Table 7-36 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7133-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	20,0	95	45	350	68,0	4000	8000	30	18,0	90



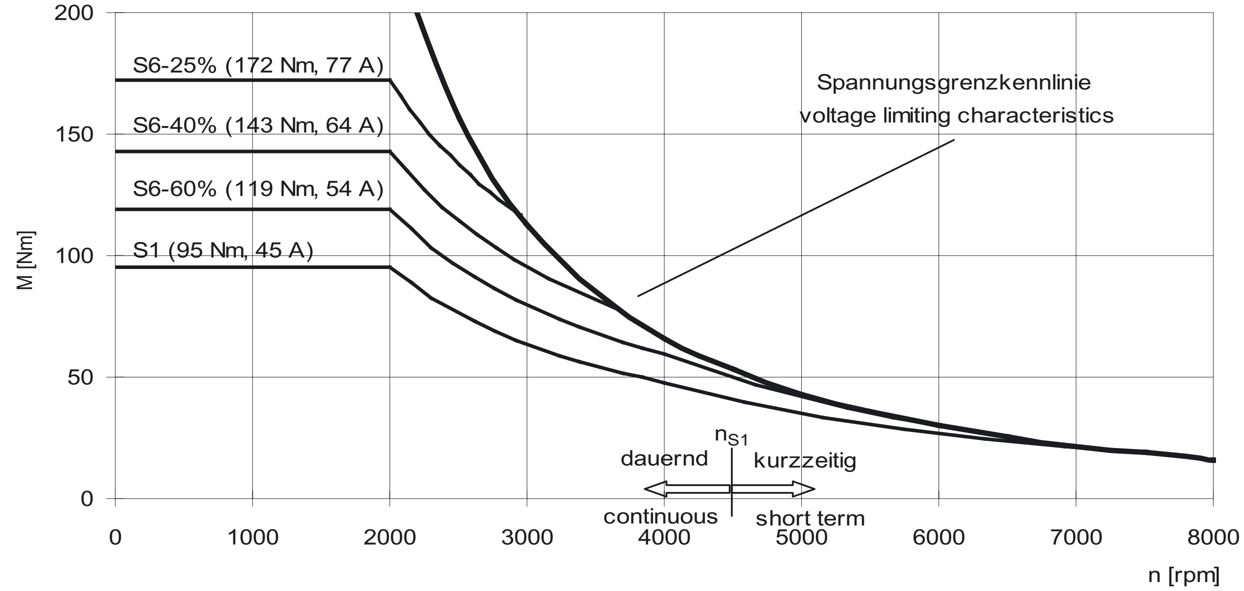
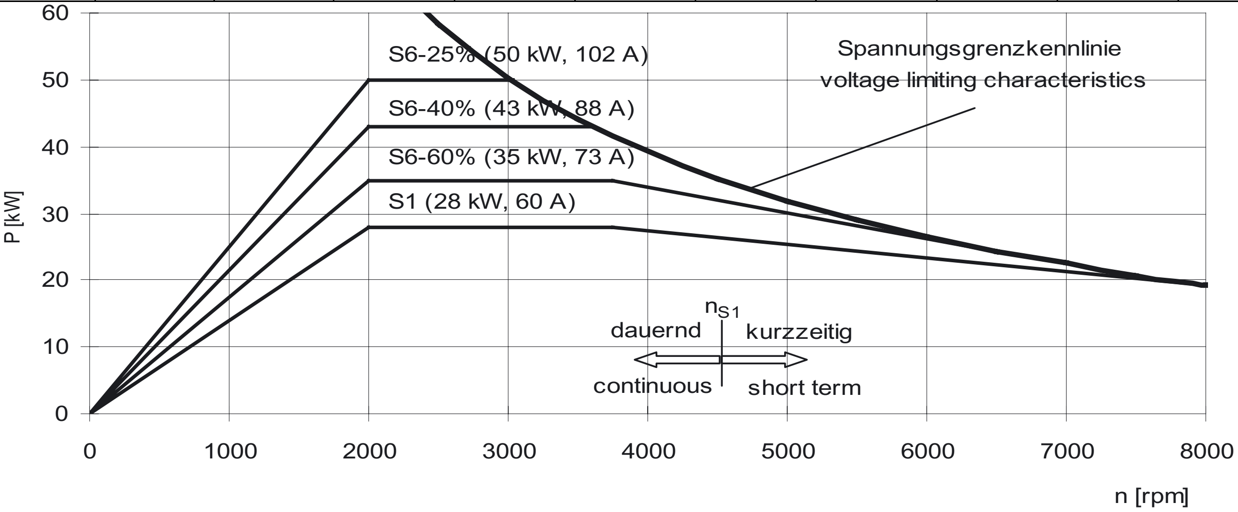


Table 7-37 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7137-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	28,0	134	60	350	68,0	3750	8000	30	21,0	120



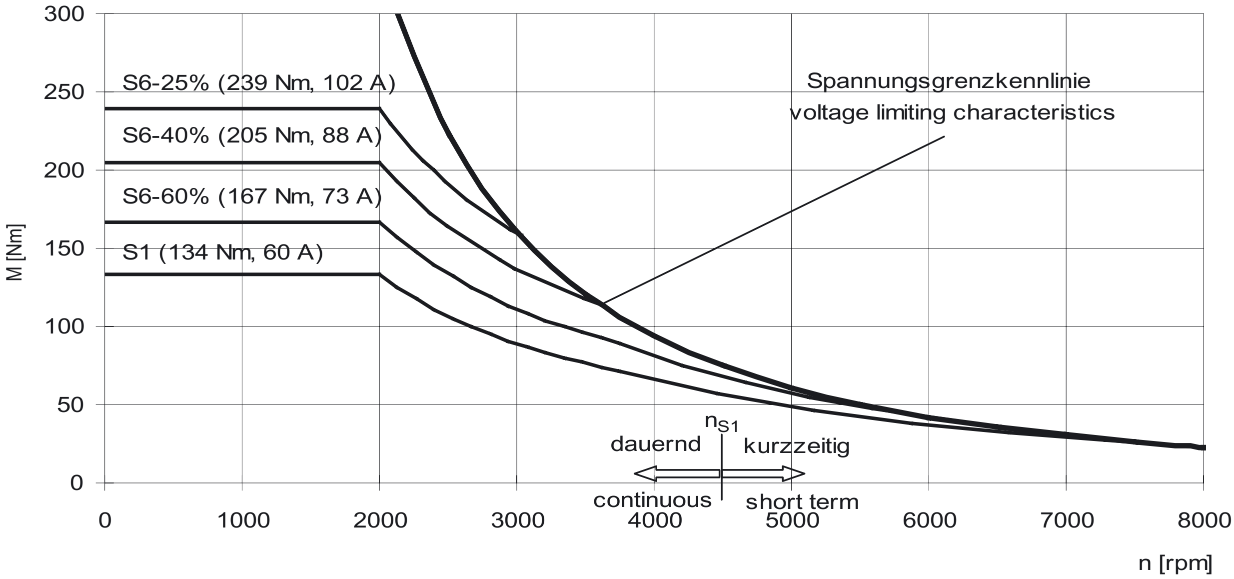


Table 7-38 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7163-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
2000	36,0	172	85	333	67,5	3000	6500	35	37,0	170

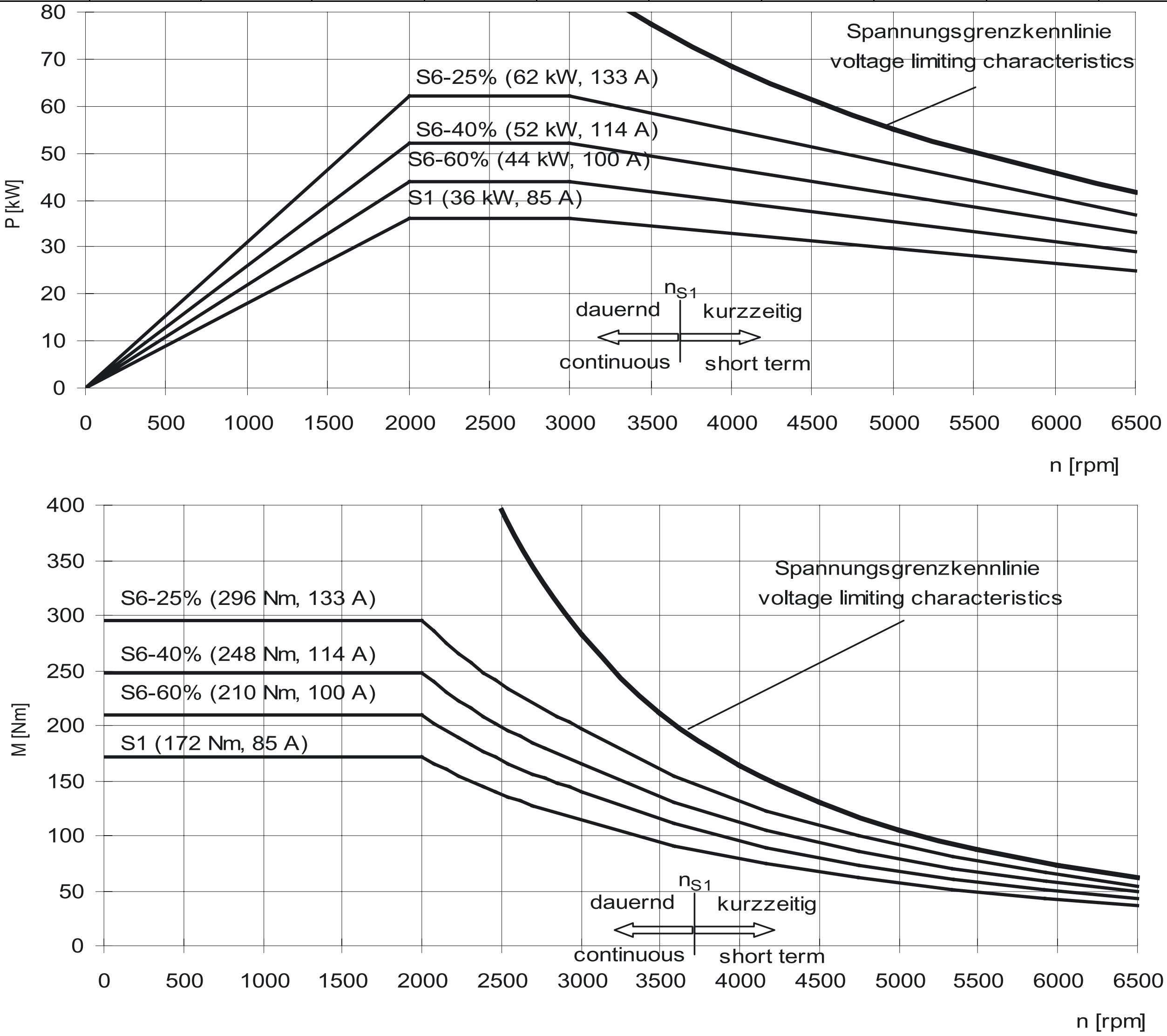
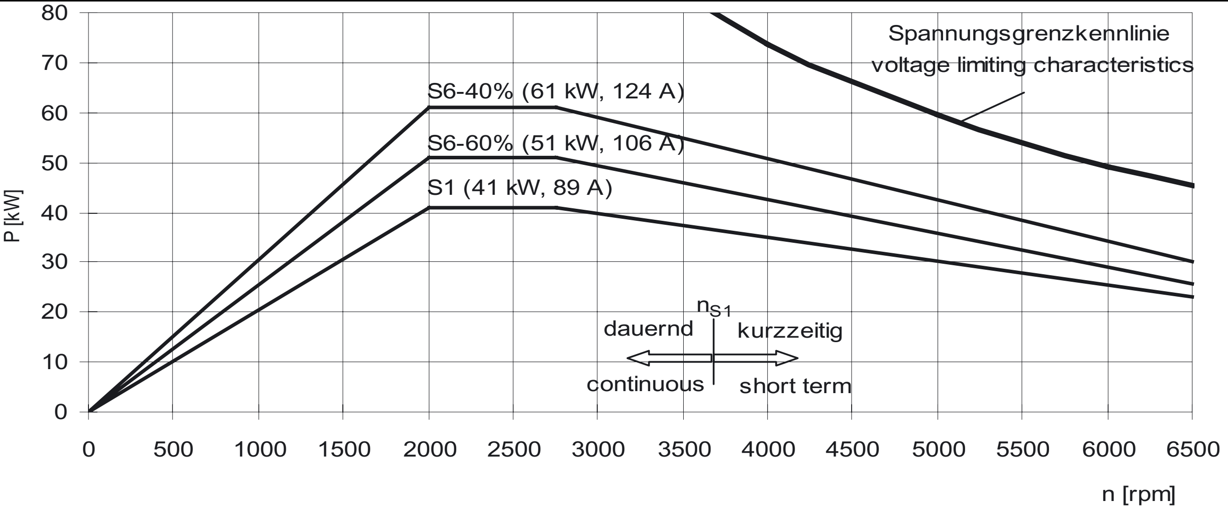


Table 7-39 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7167-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
2000	41,0	196	89	350	67,4	2750	6500	35	40,0	178



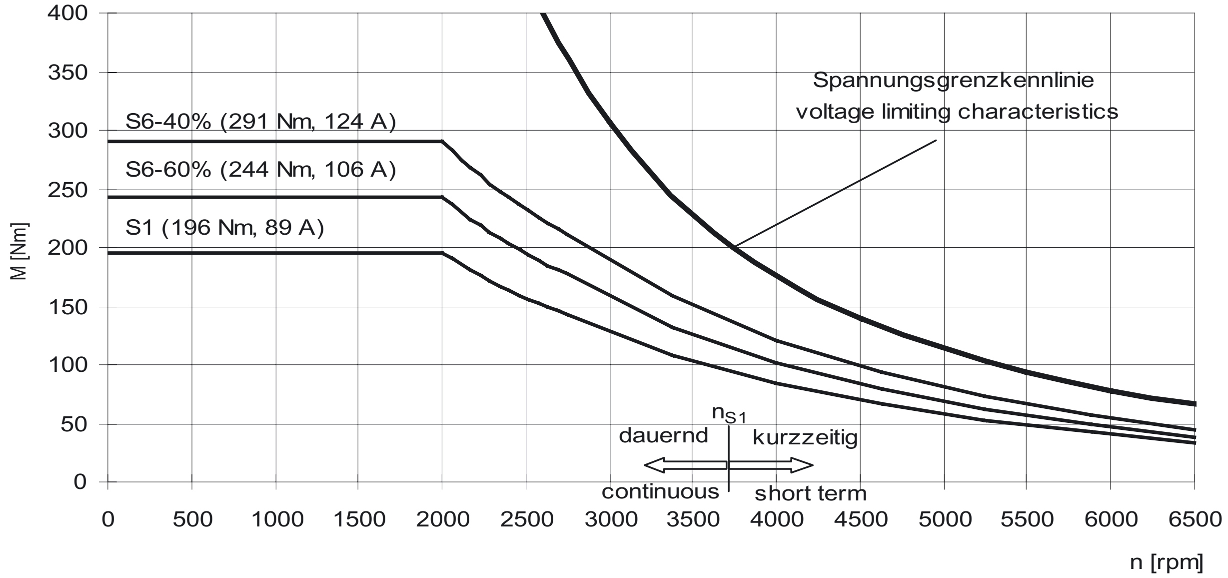
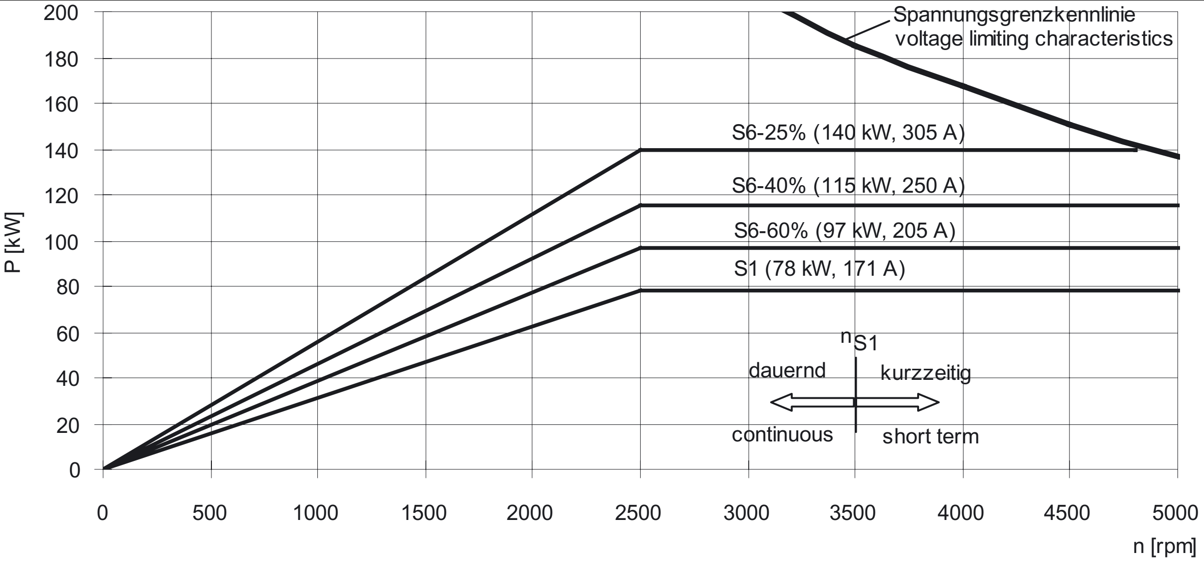


Table 7-40 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7184-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2500	78	298	171	340	84,1	5000	5000	40	77	342



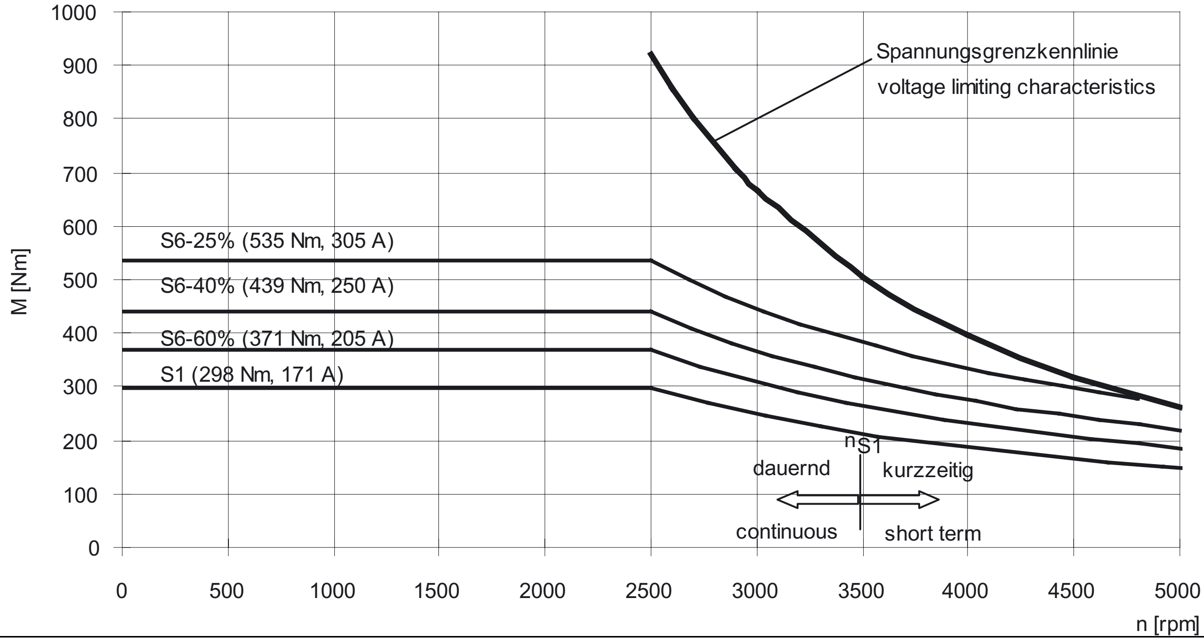
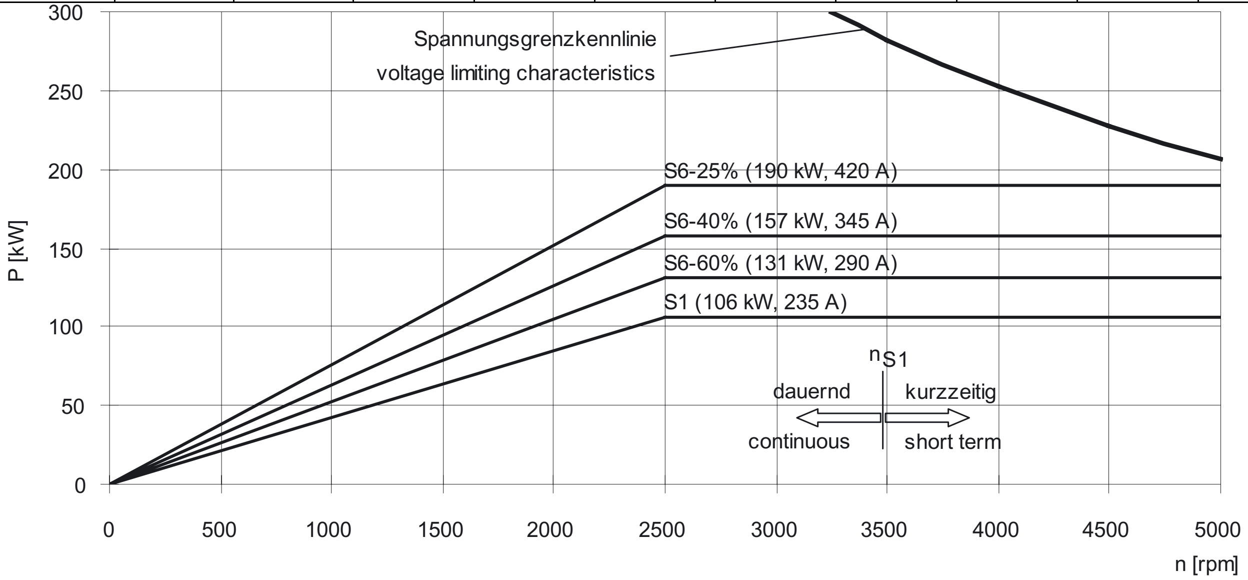


Table 7-41 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7186-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
2500	106	405	235	335	84,1	5000	5000	40	108	470



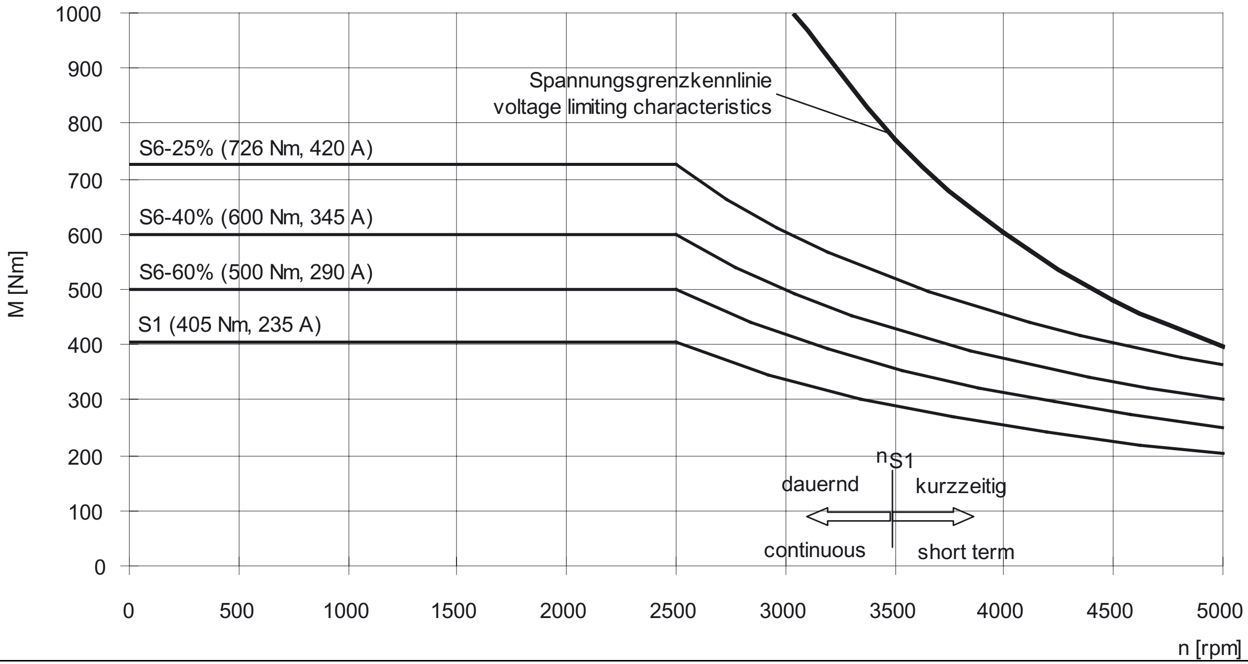
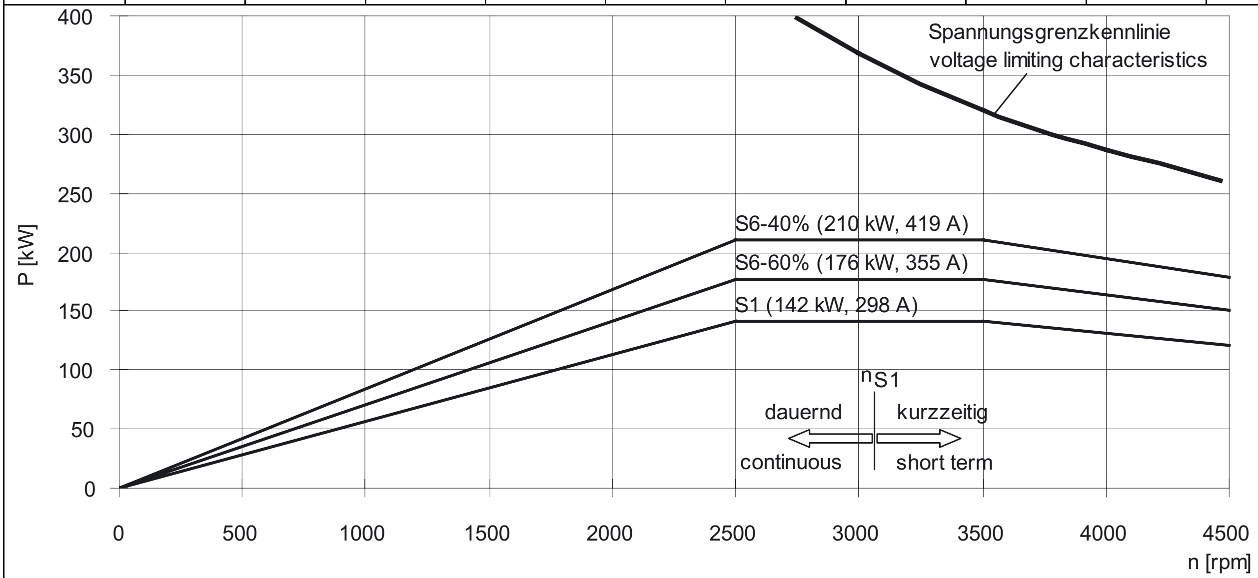


Table 7-42 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7224-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2500	142	542	298	340	84,0	3500	4500	40	115	600



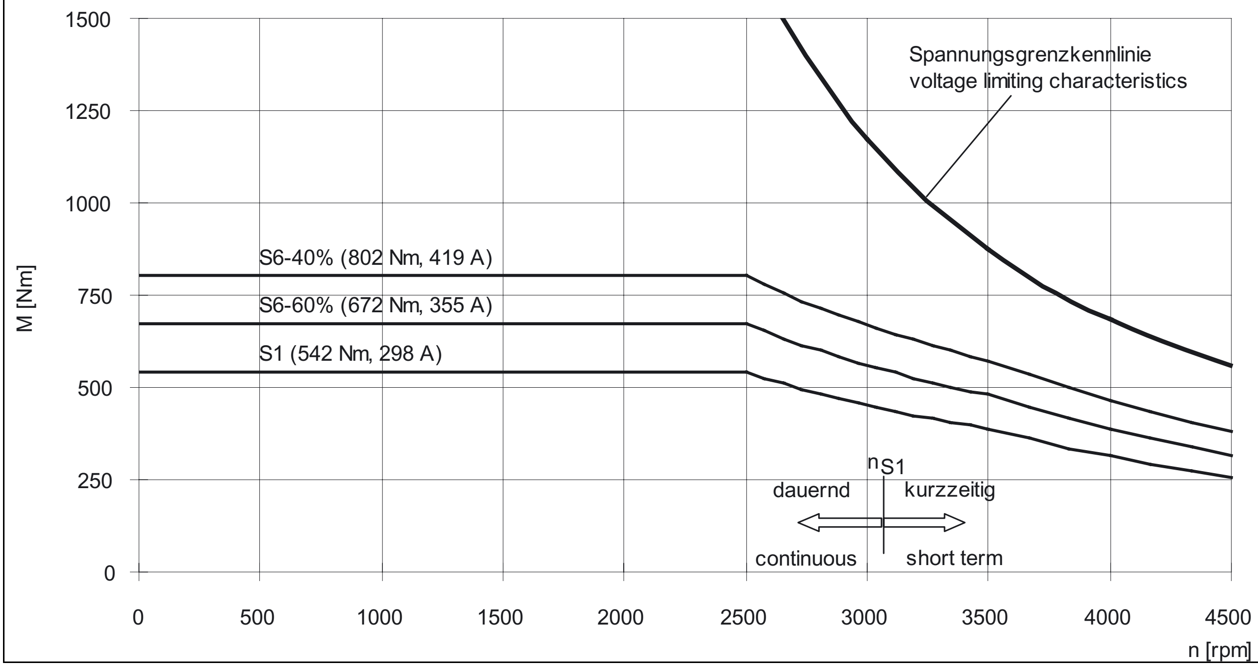
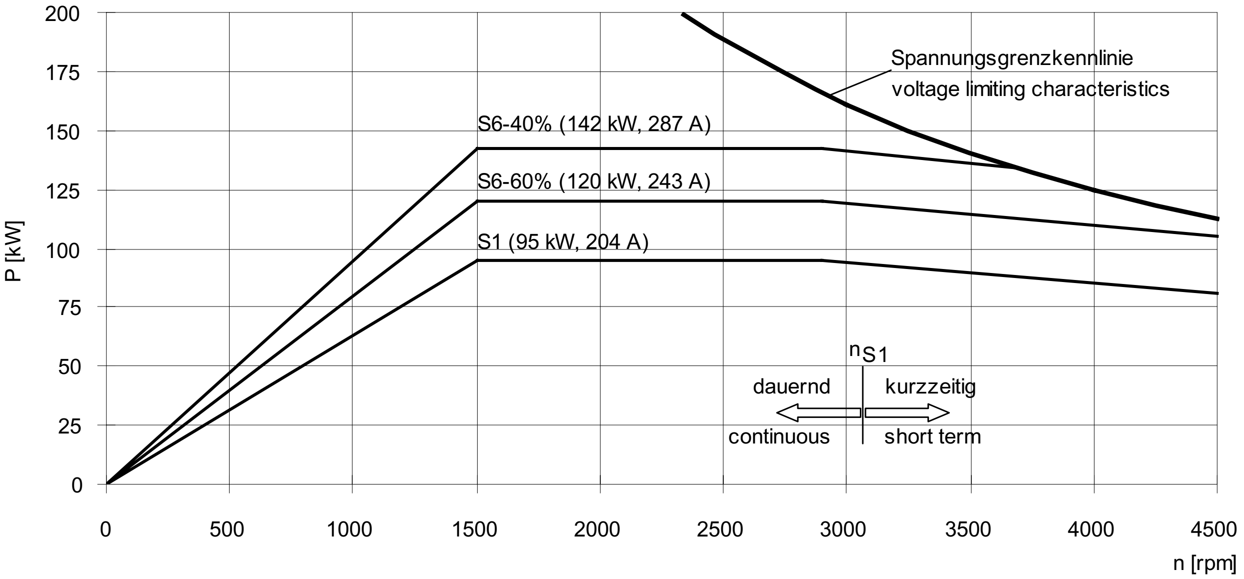


Table 7-43 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7224-□□U□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	95	605	204	340	50,6	2900	4500	40	88,5	410



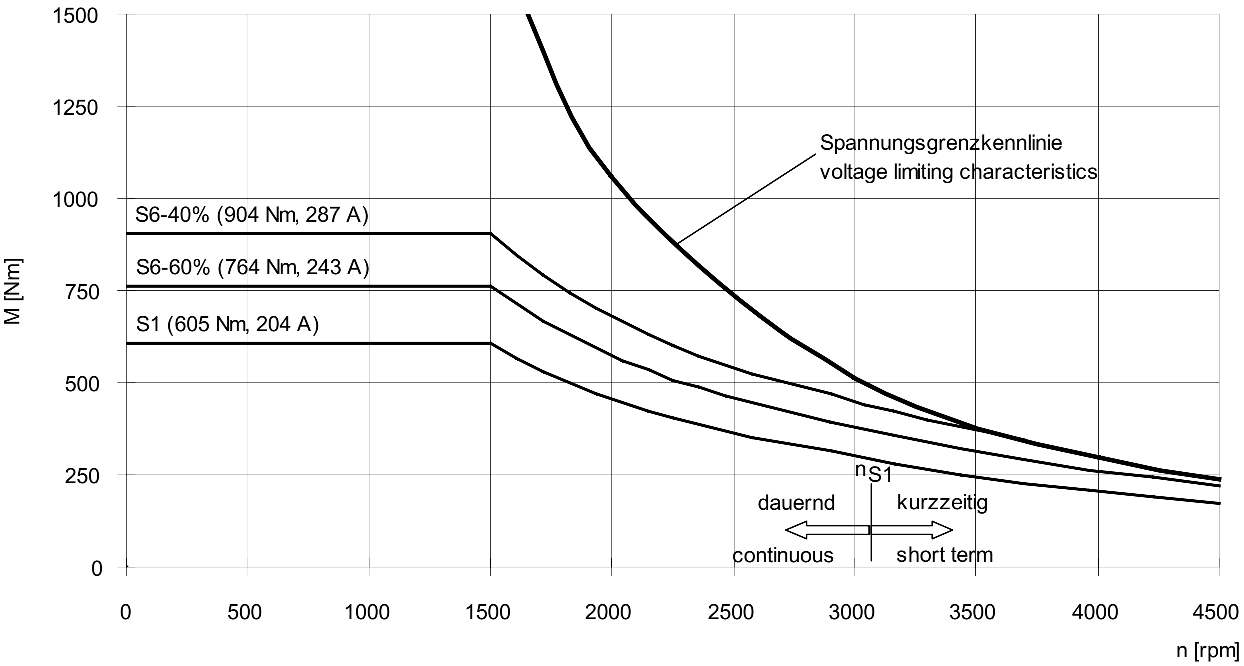
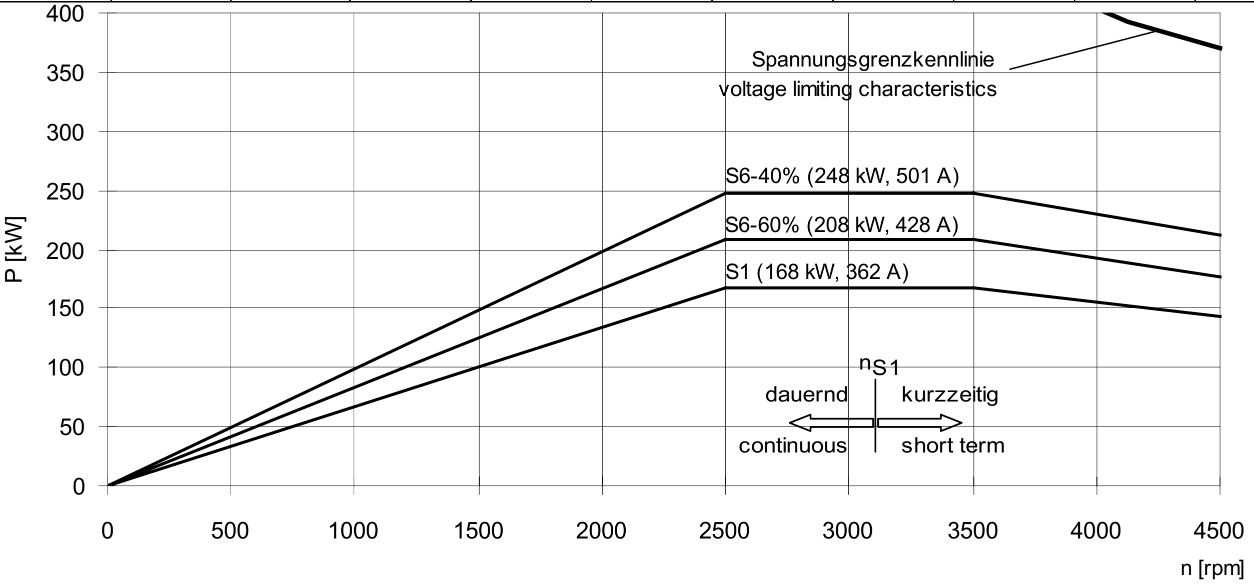


Table 7-44 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7226-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
2500	168	642	362	335	84,0	3500	4500	40	154	725



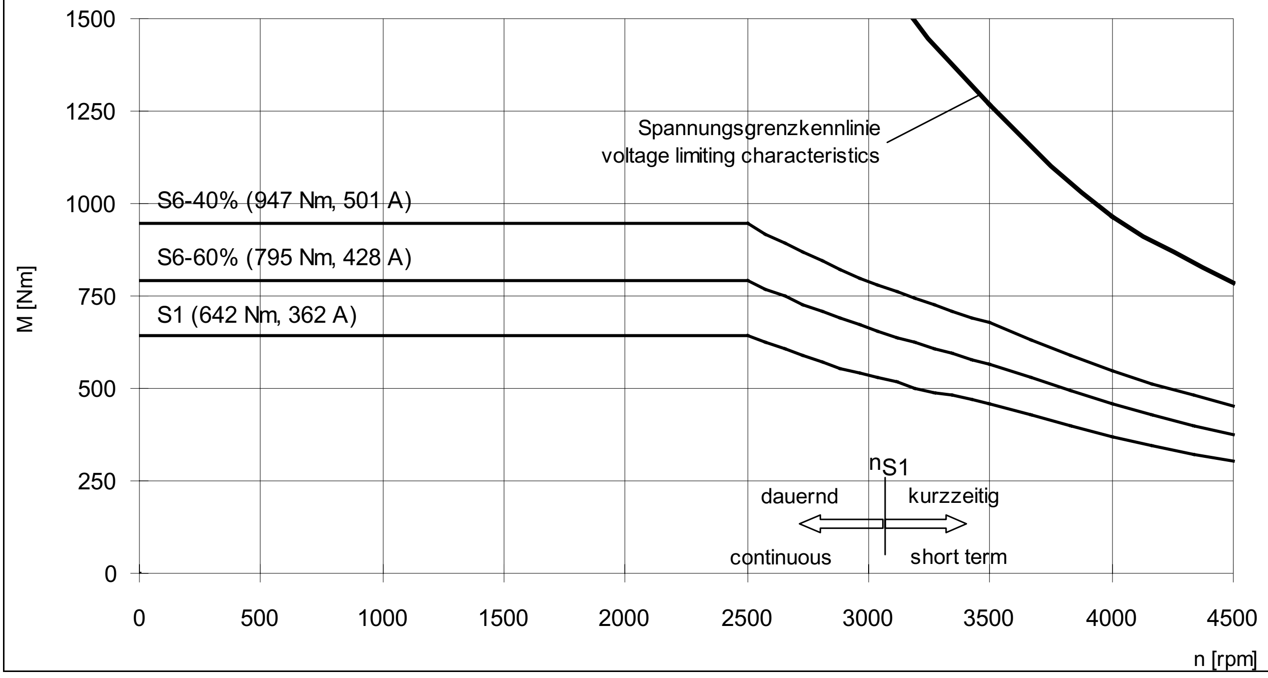
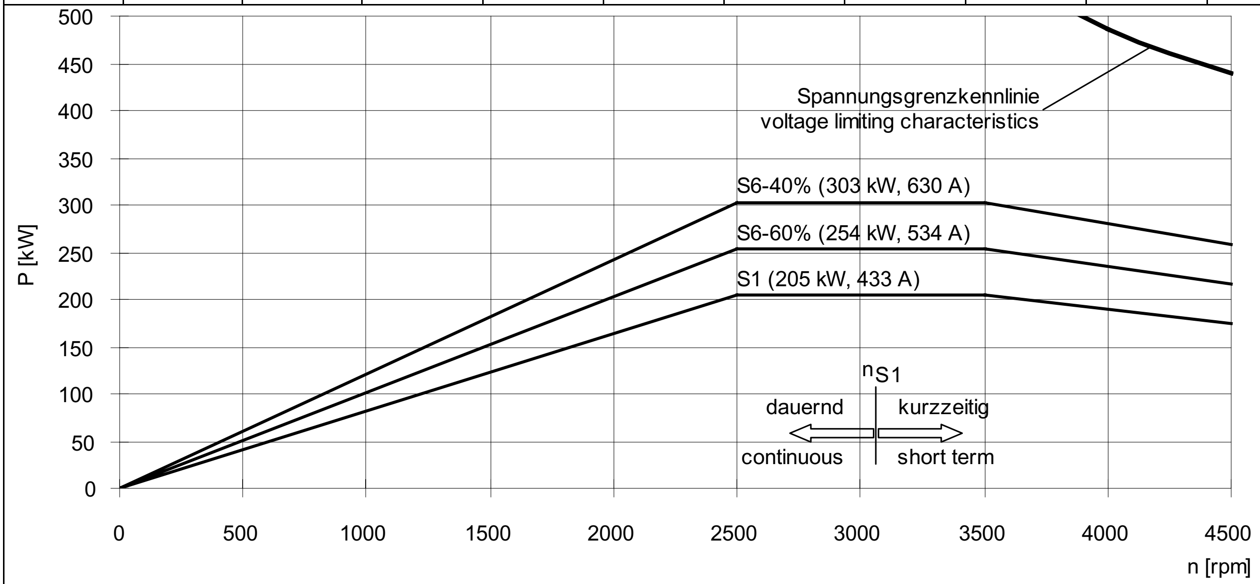
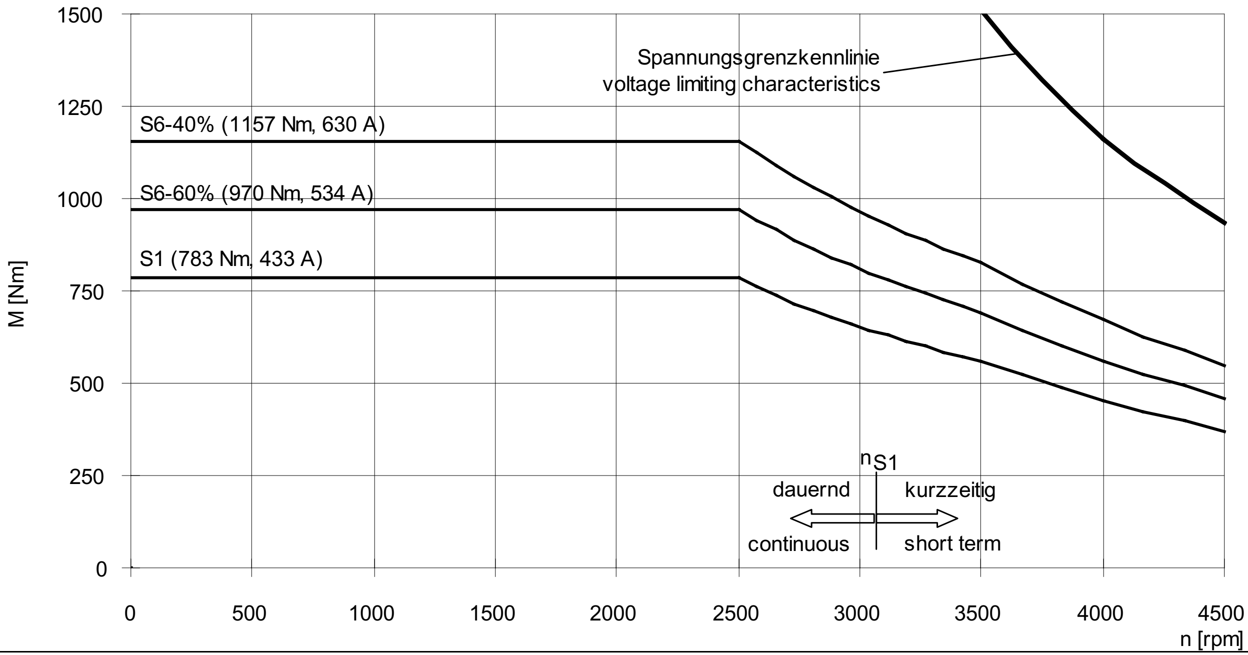


Table 7-45 SINAMICS, 3-ph. 400 V AC, Servo Control (SLM), 1PH7228-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2500	205	783	433	340	83,9	3500	4500 1)	40	185	870





1) 4000 rpm for increased speed

7.1.2 Active Line Module (ALM)

Table 7-46 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7163-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
400	9,5	227	30	274	14,3	1943	6500	35	11,5	51

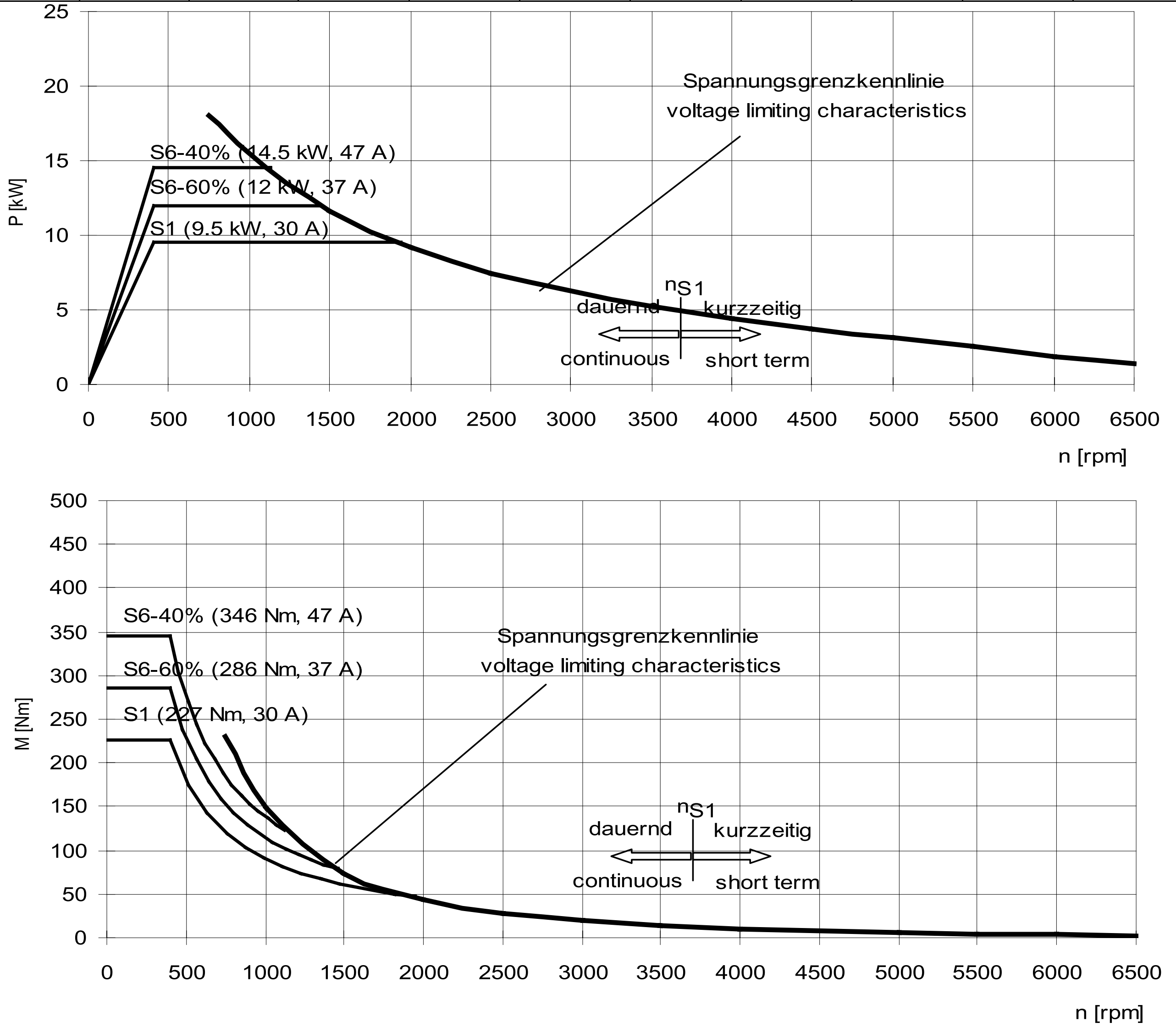


Table 7-47 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7167-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
400	13,0	310	37	294	14,3	1545	6500	35	14,0	70

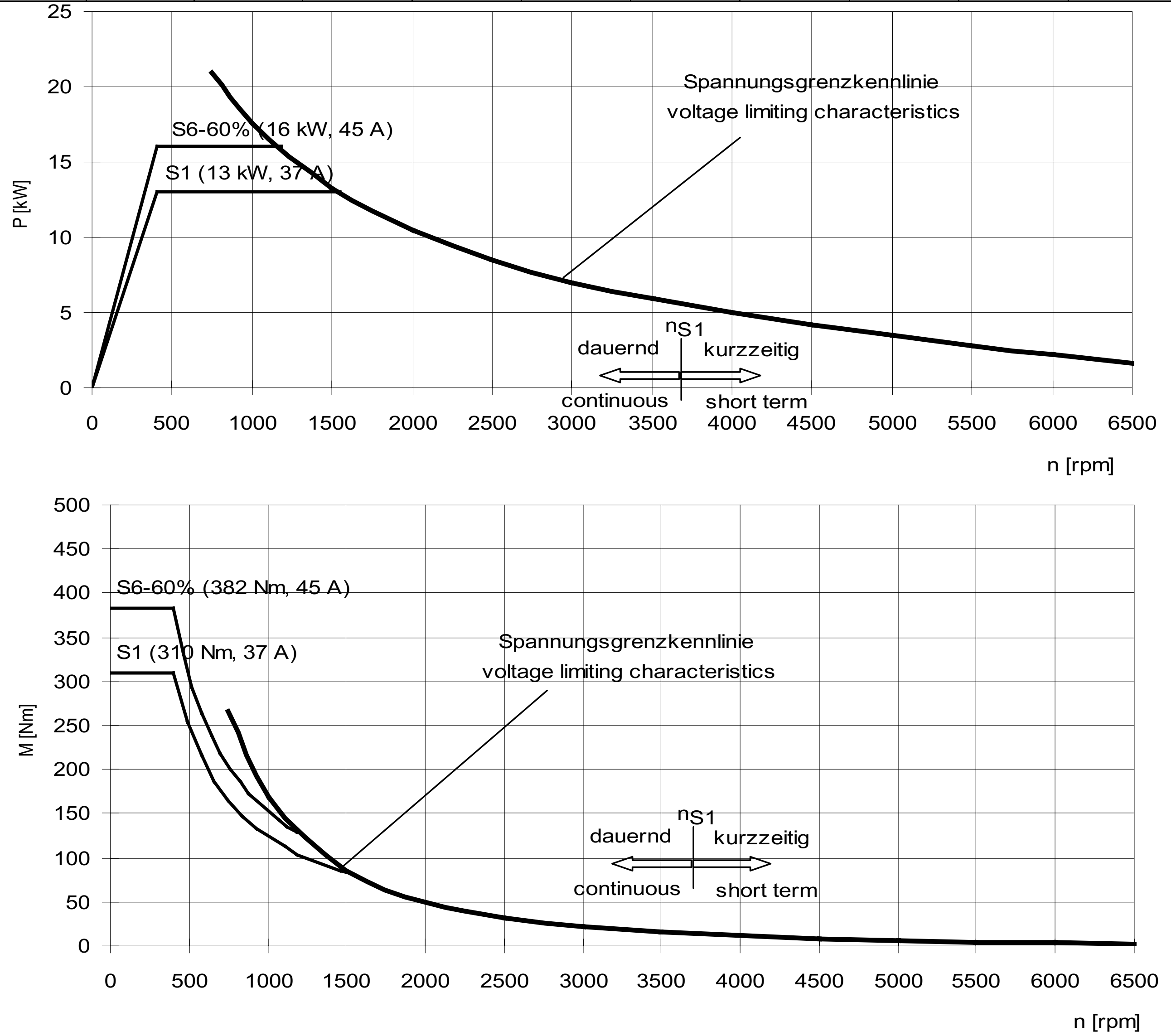
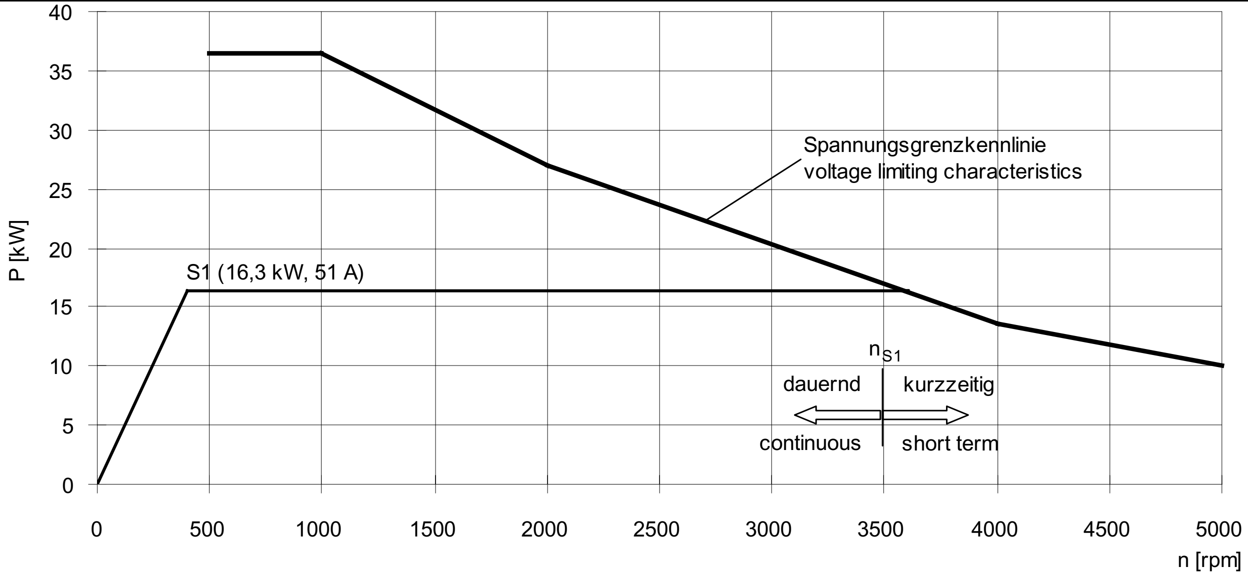


Table 7-48 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7184-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
400	16,3	390	51	271	14,2	3600	5000	40	26	80



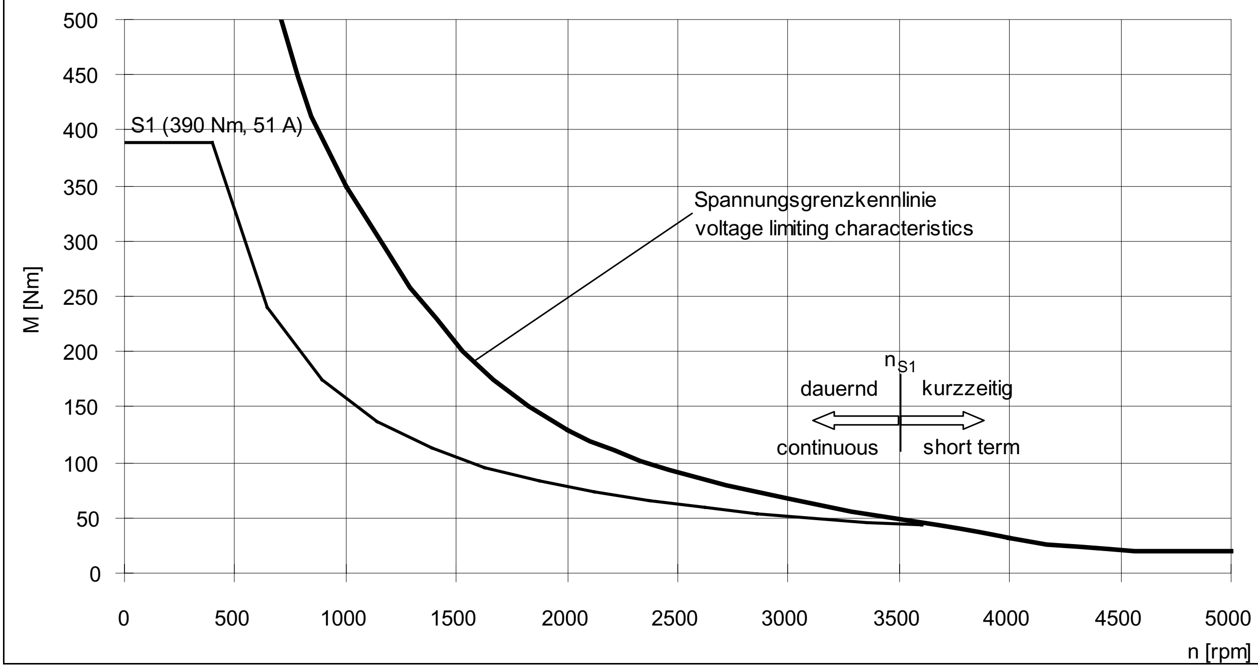
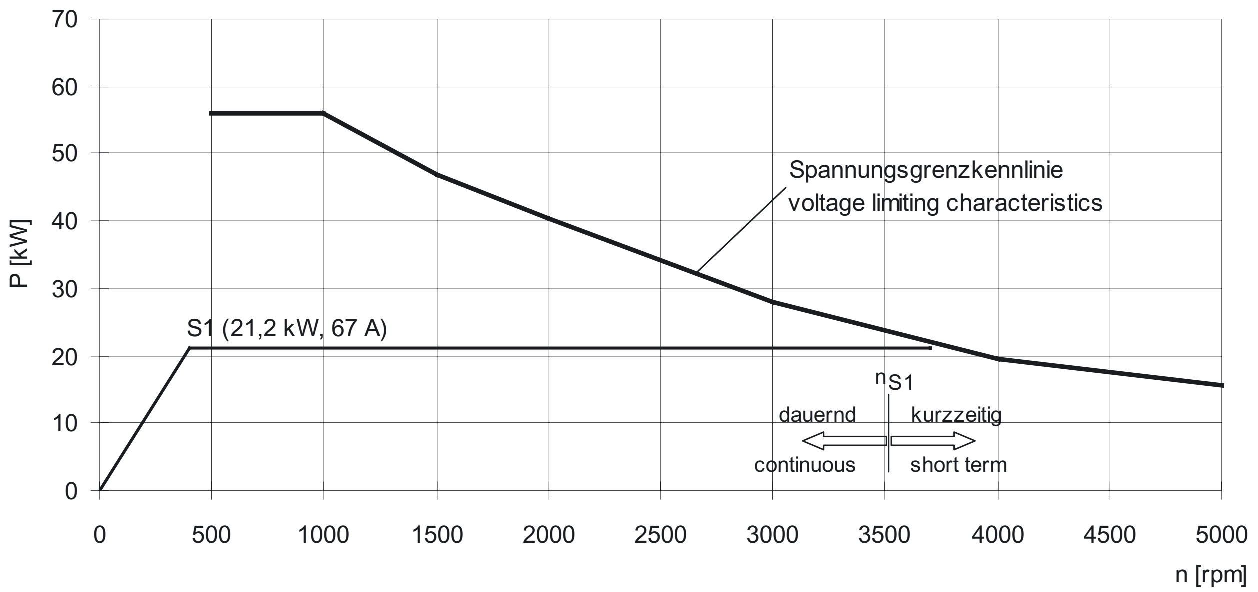


Table 7-49 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7186-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
400	21,2	505	67	268	14,0	3700	5000	40	38,5	109



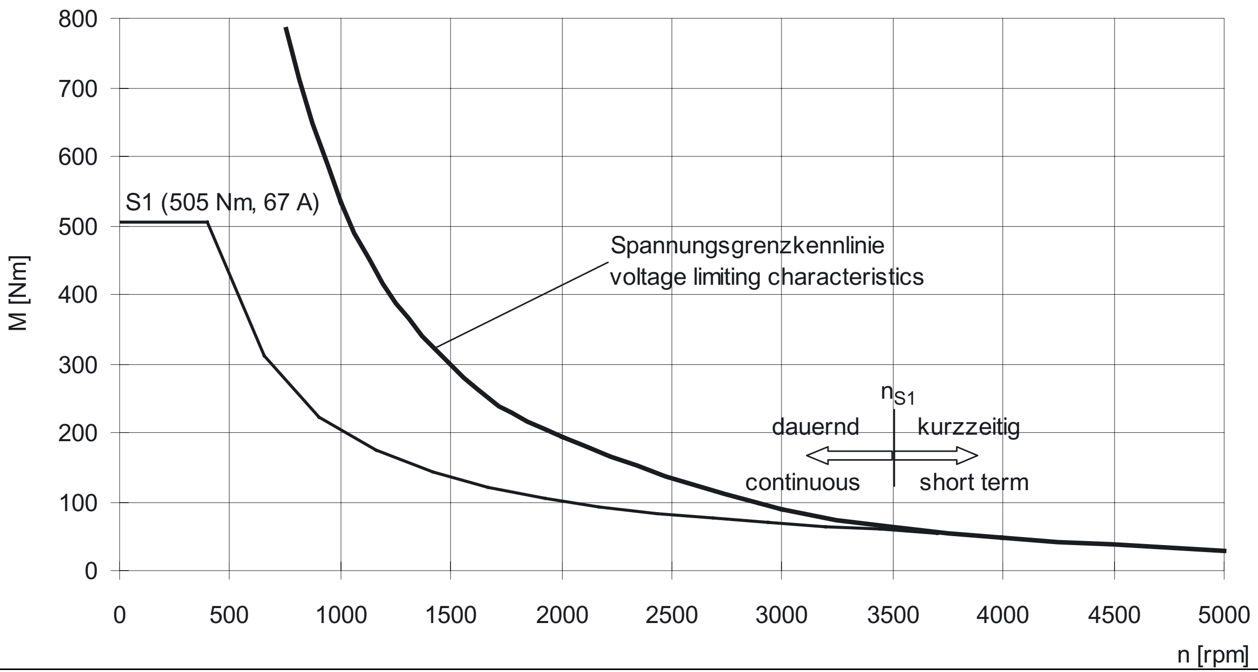
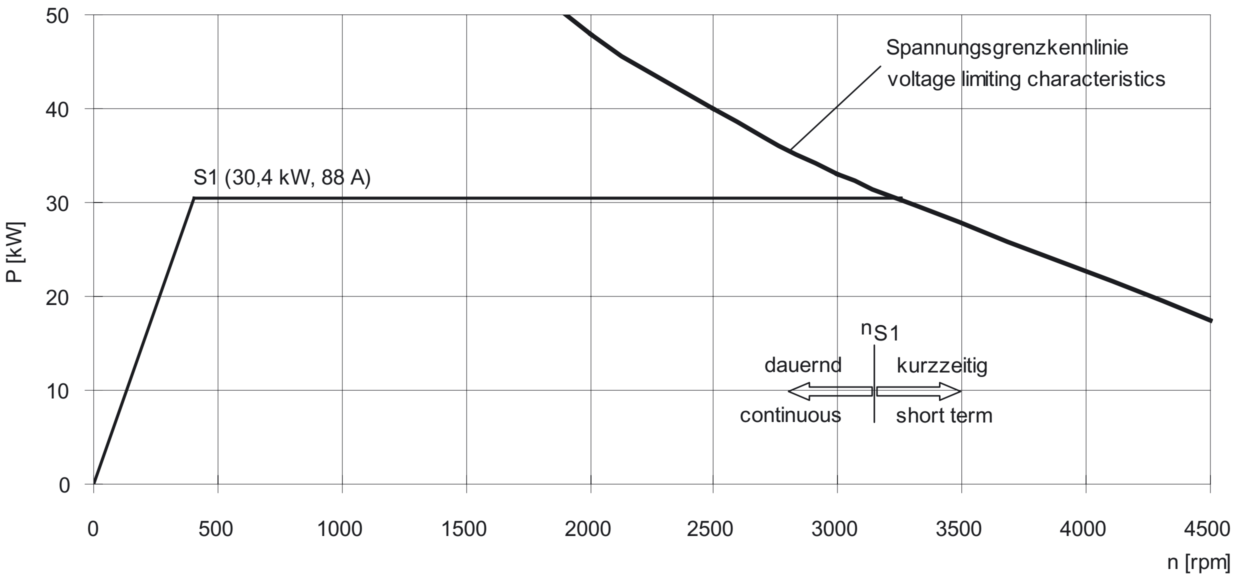


Table 7-50 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7224-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
400	30,4	725	88	268	14,0	3250	4500	40	36,5	160



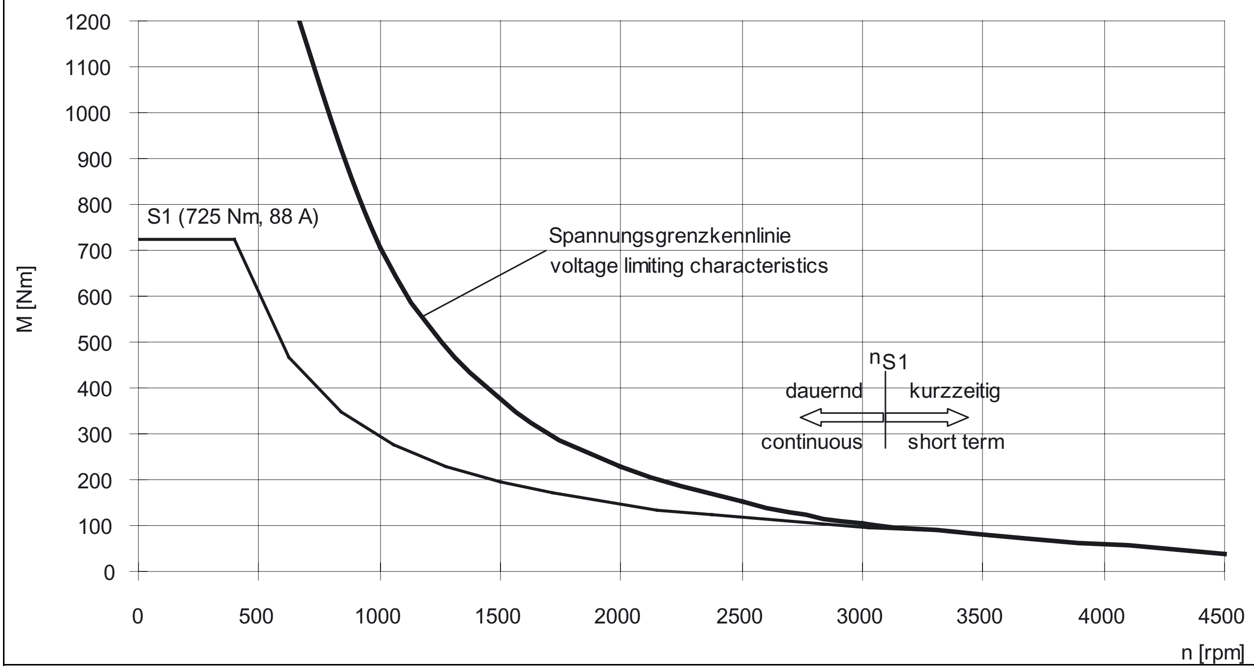
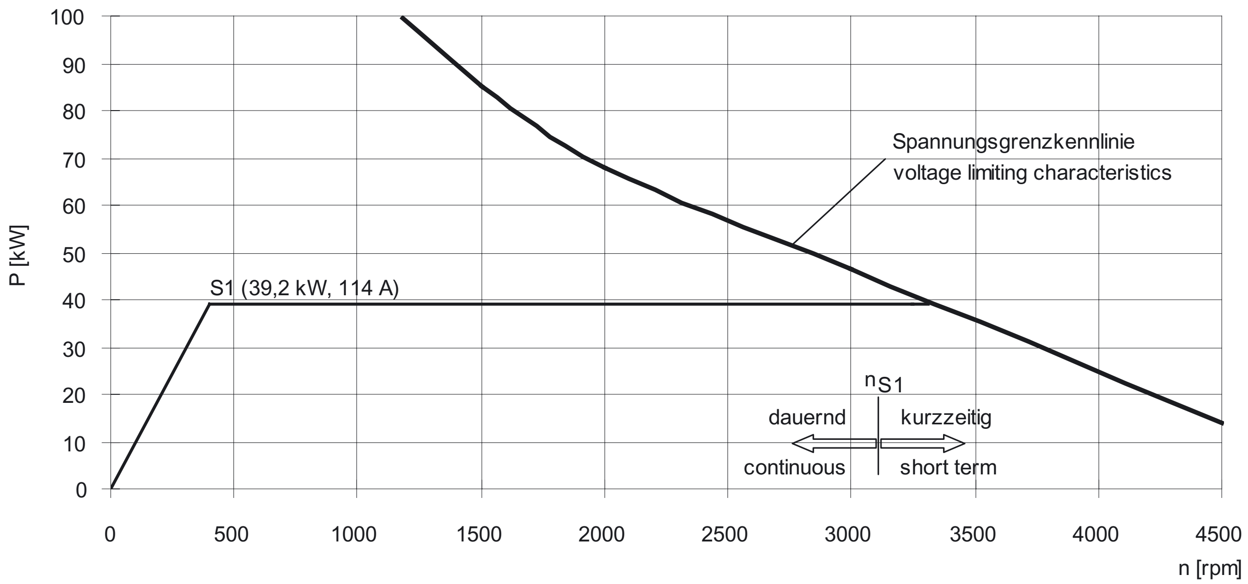


Table 7-51 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7226-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
400	39,2	935	114	264	14,0	3250	4500	40	49	250



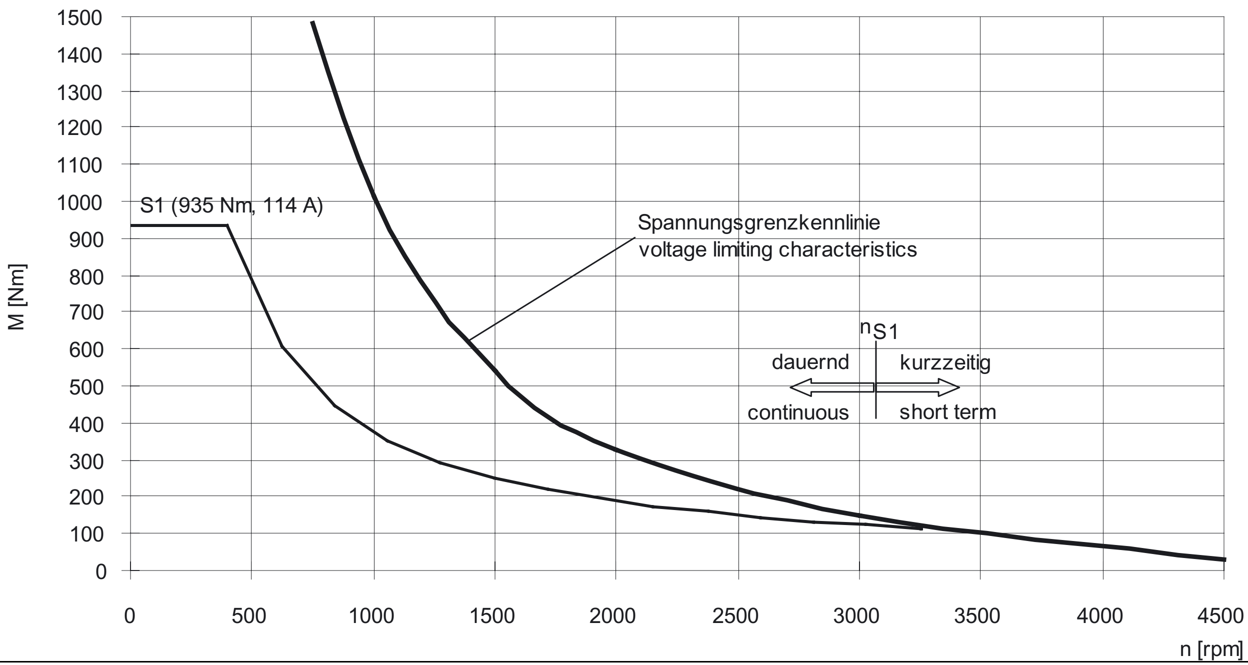
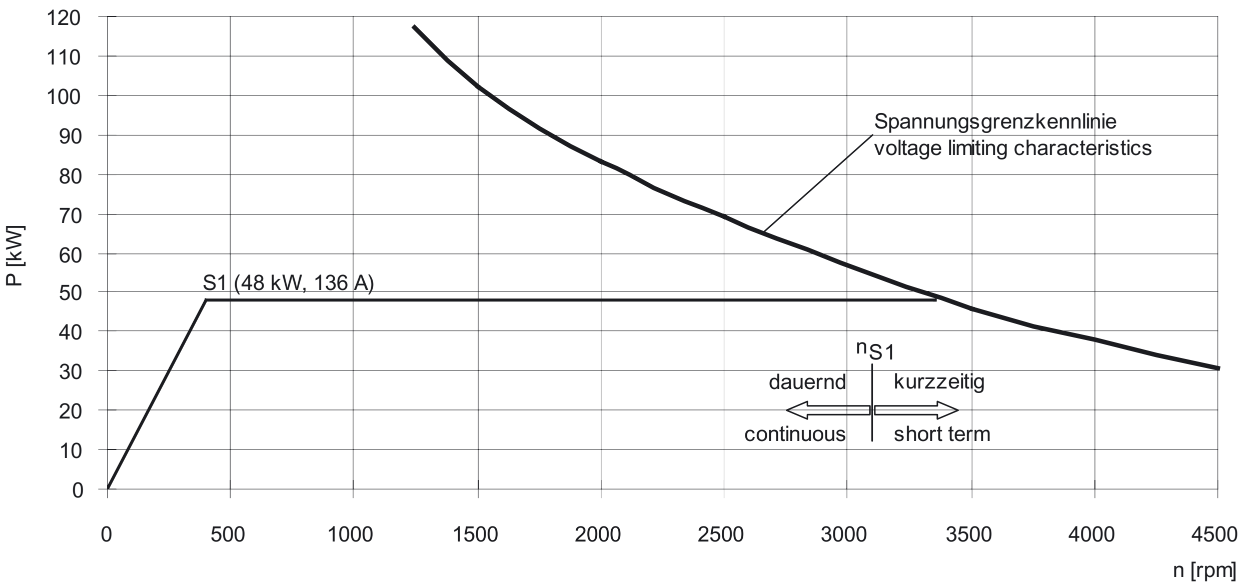


Table 7-52 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7228-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
400	48	1145	136	272	13,9	2200	4500	40	60,5	260



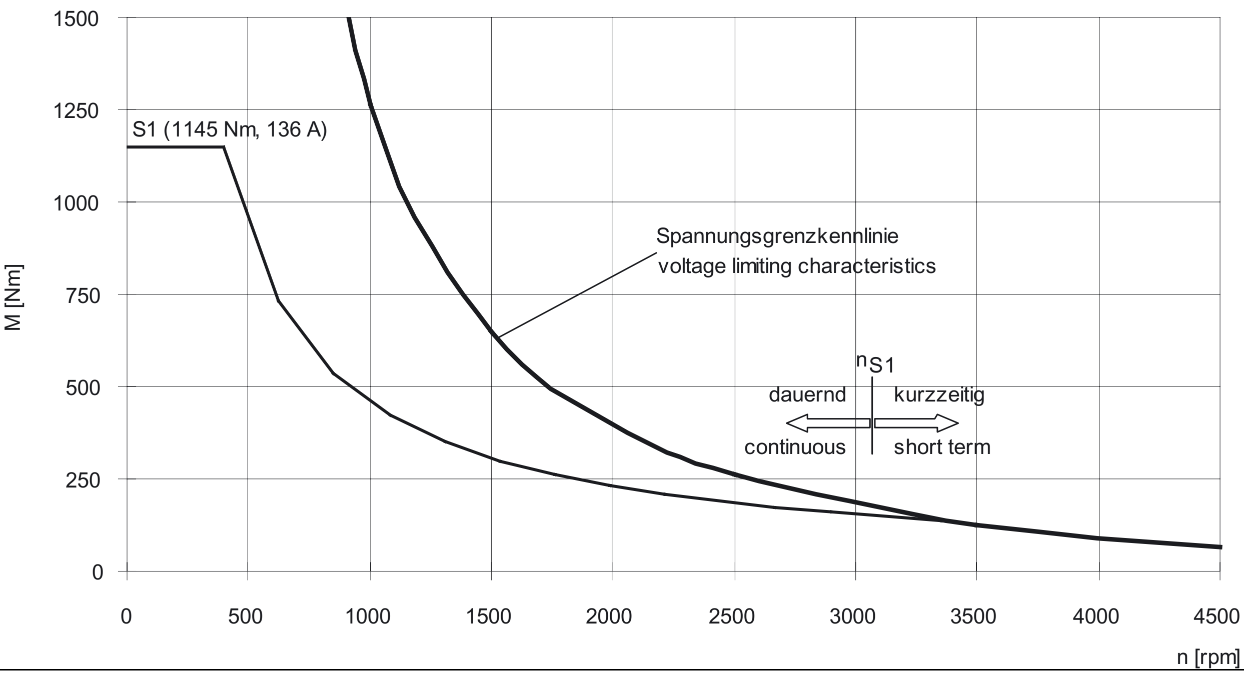
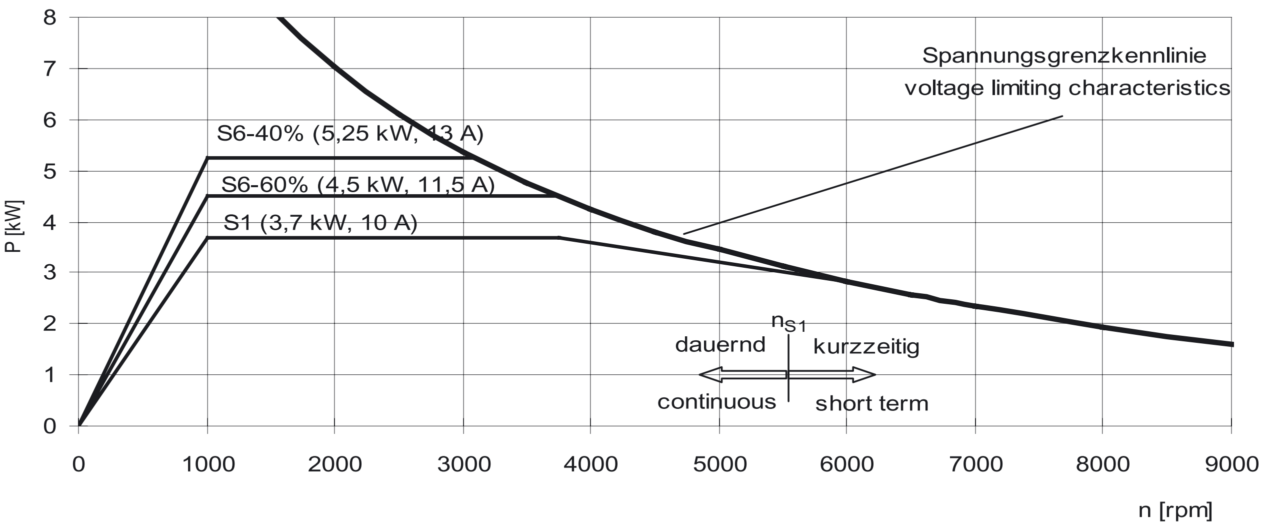


Table 7-53 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7103-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	3,7	35,3	10,0	343	35,6	3750	9000	20	4,8	20,0



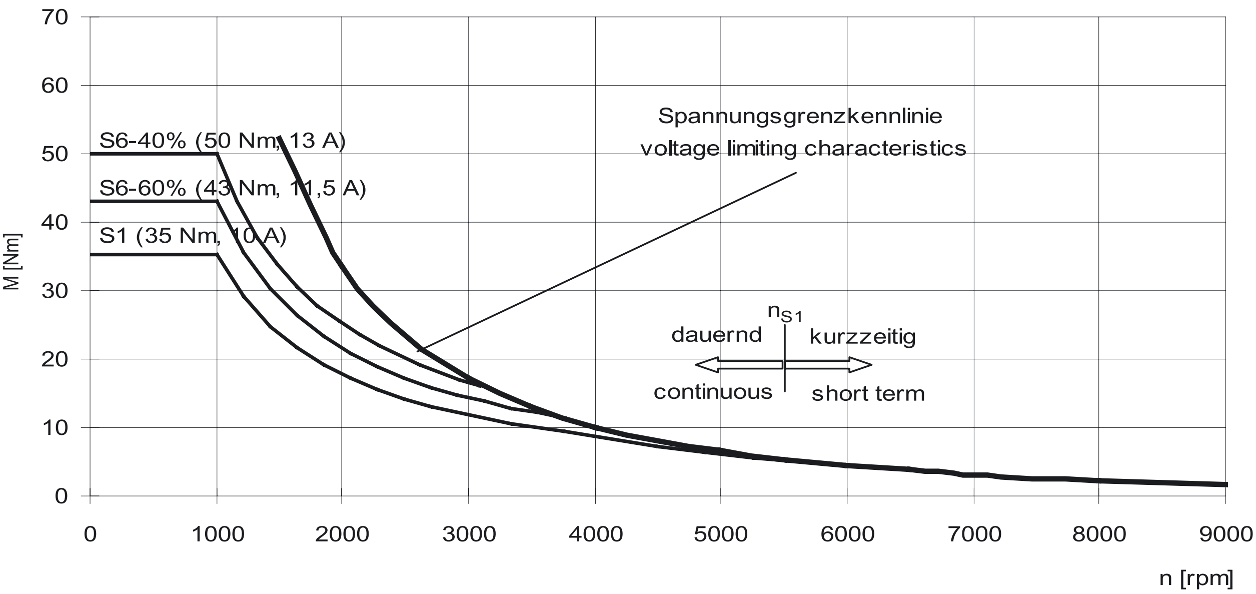
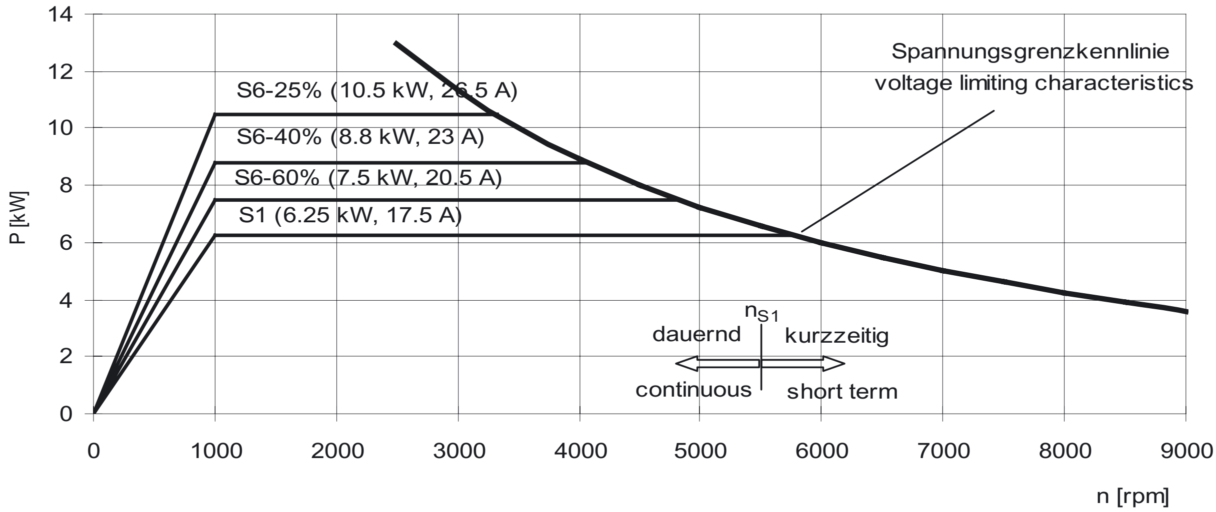


Table 7-54 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7107-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	6,3	59,7	17,5	319	35,3	5783	9000	20	8,9	35,0



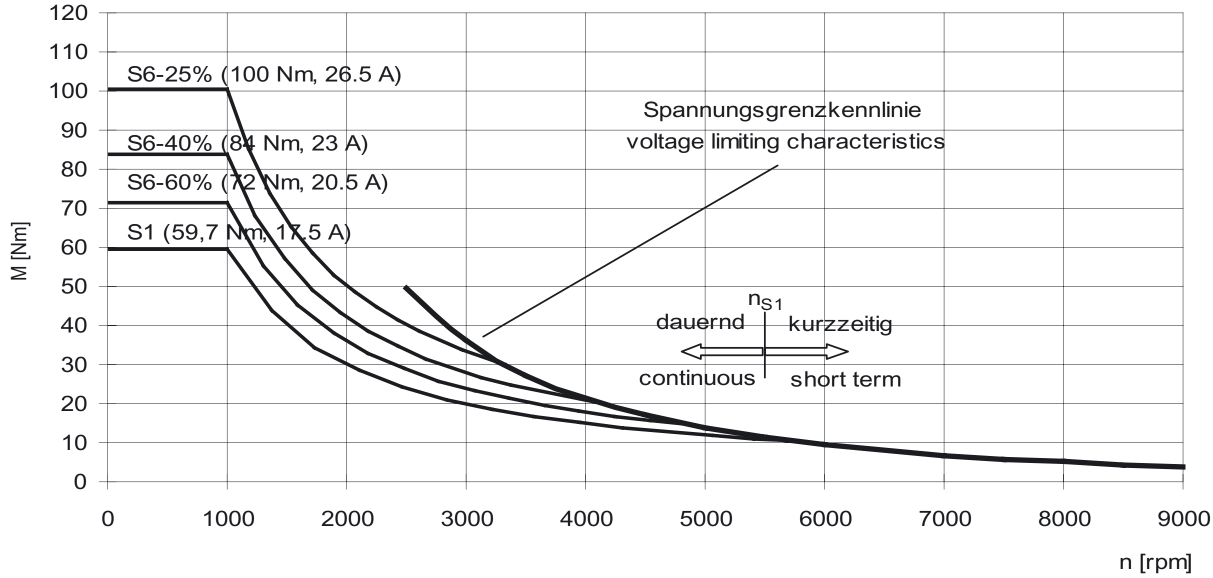
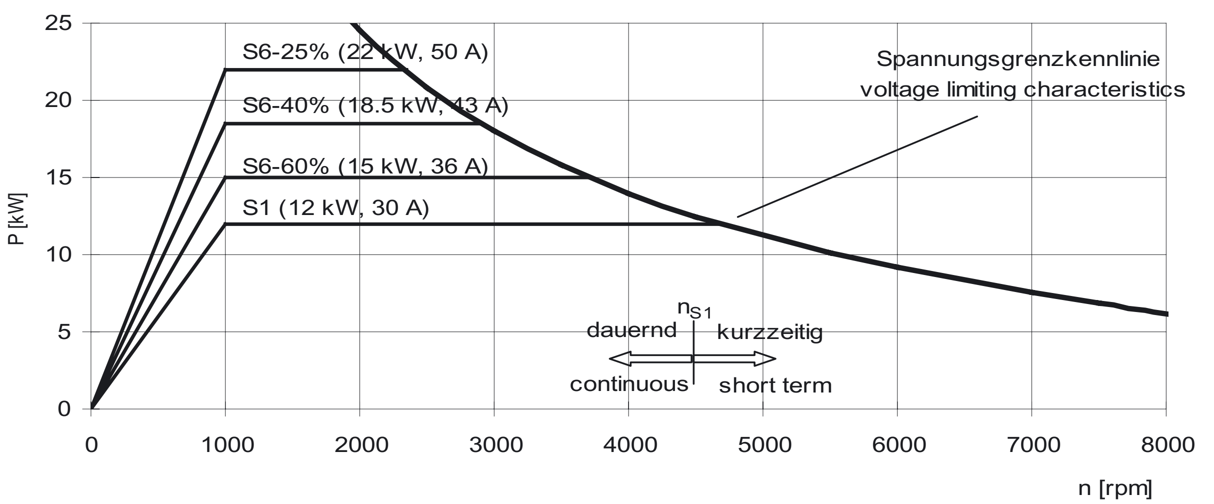


Table 7-55 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7133-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	12,0	115	30	336	34,8	4695	8000	30	13,0	60



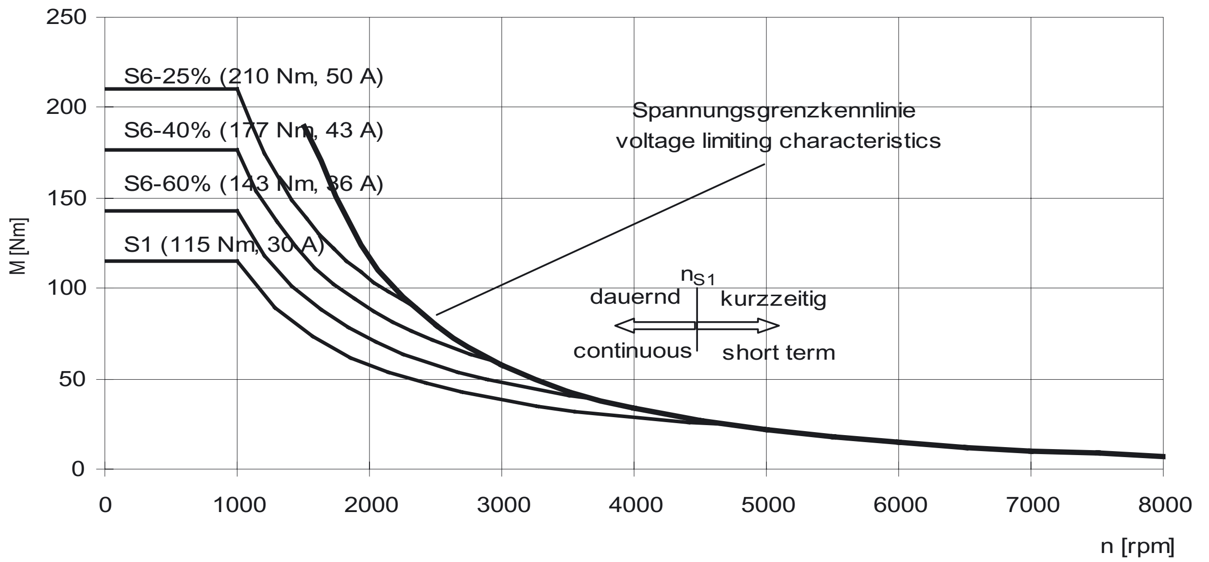
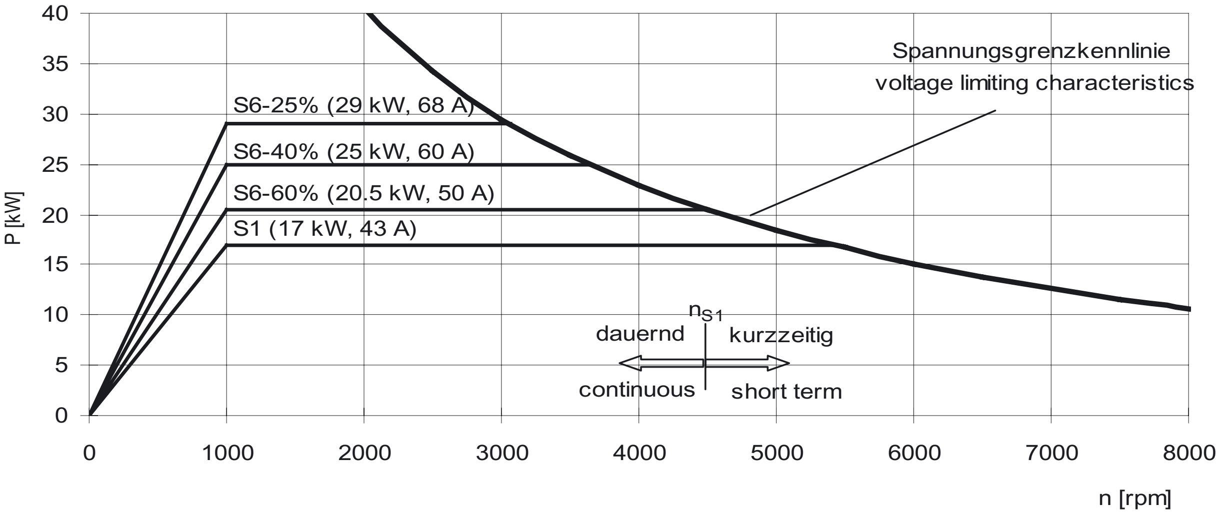


Table 7-56 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7137-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	17,0	162	43	322	34,6	5403	8000	30	19,0	86



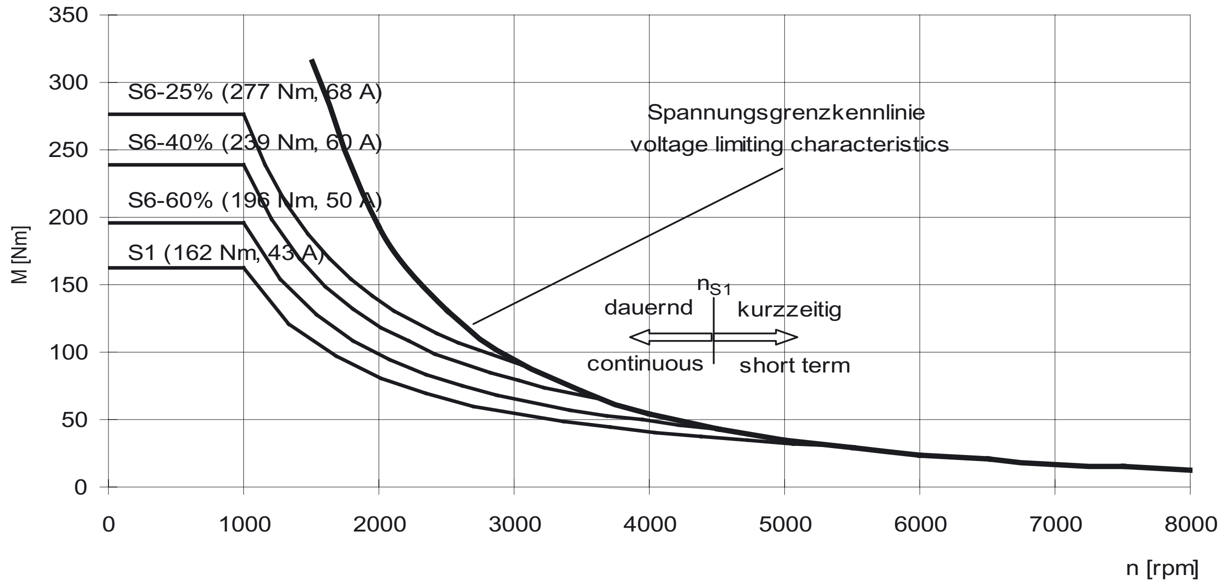
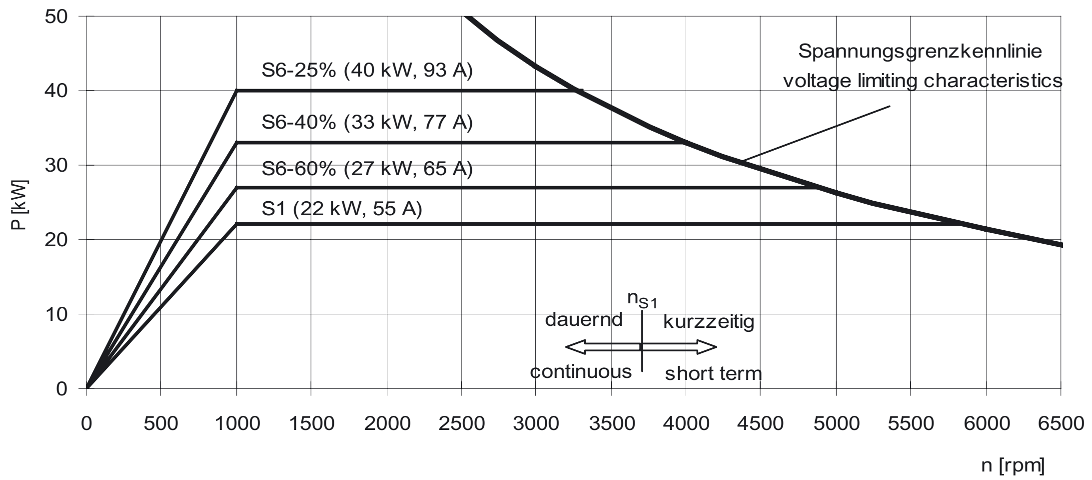


Table 7-57 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7163-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
1000	22,0	210	55	315	34,2	5871	6500	35	24,0	110



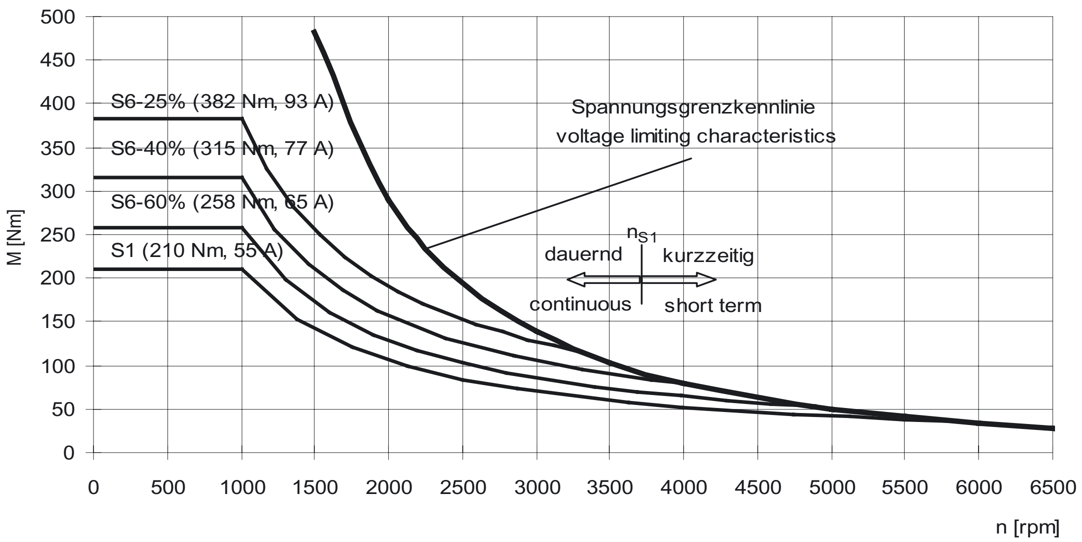
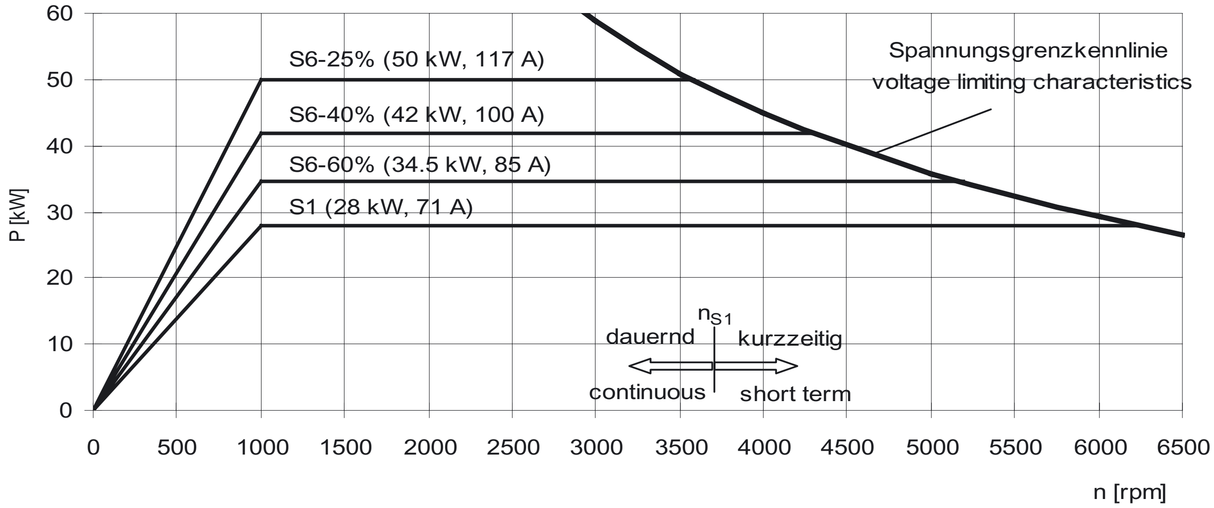


Table 7-58 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7167-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	28,0	267	71	312	34,2	6239	6500	35	33,0	142



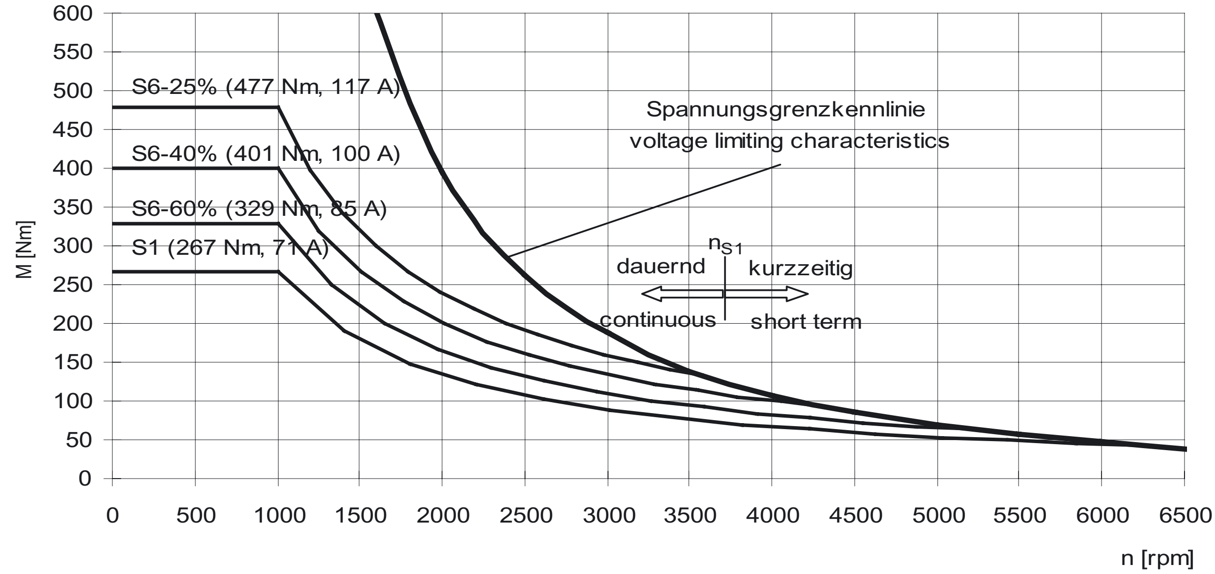
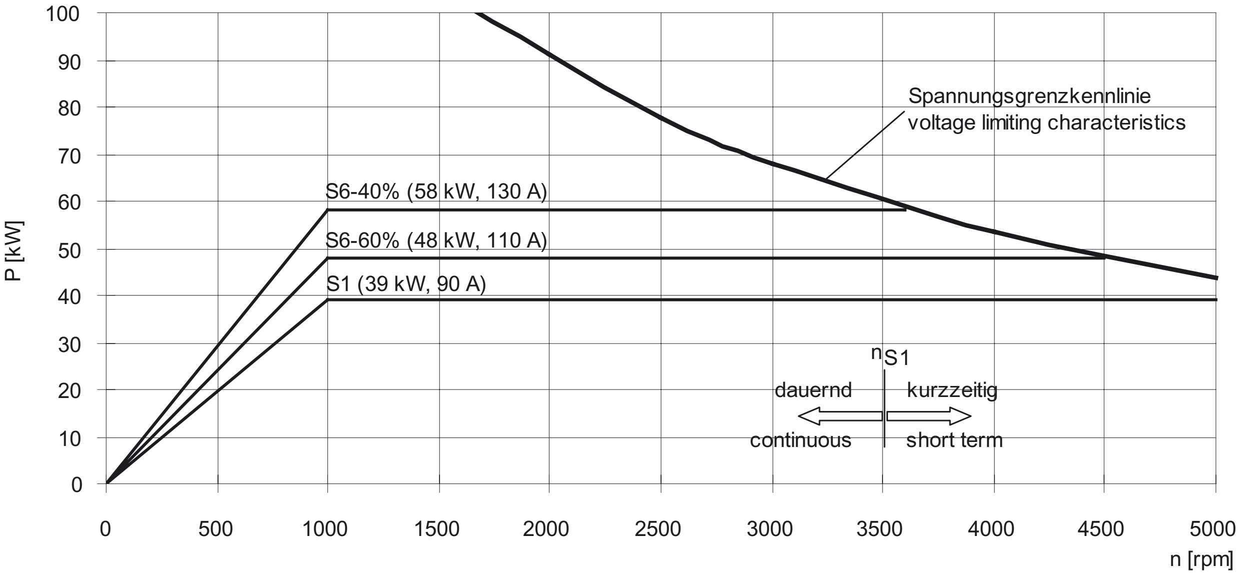


Table 7-59 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7184-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	39	372	90	335	34,2	5000	5000	40	44	180



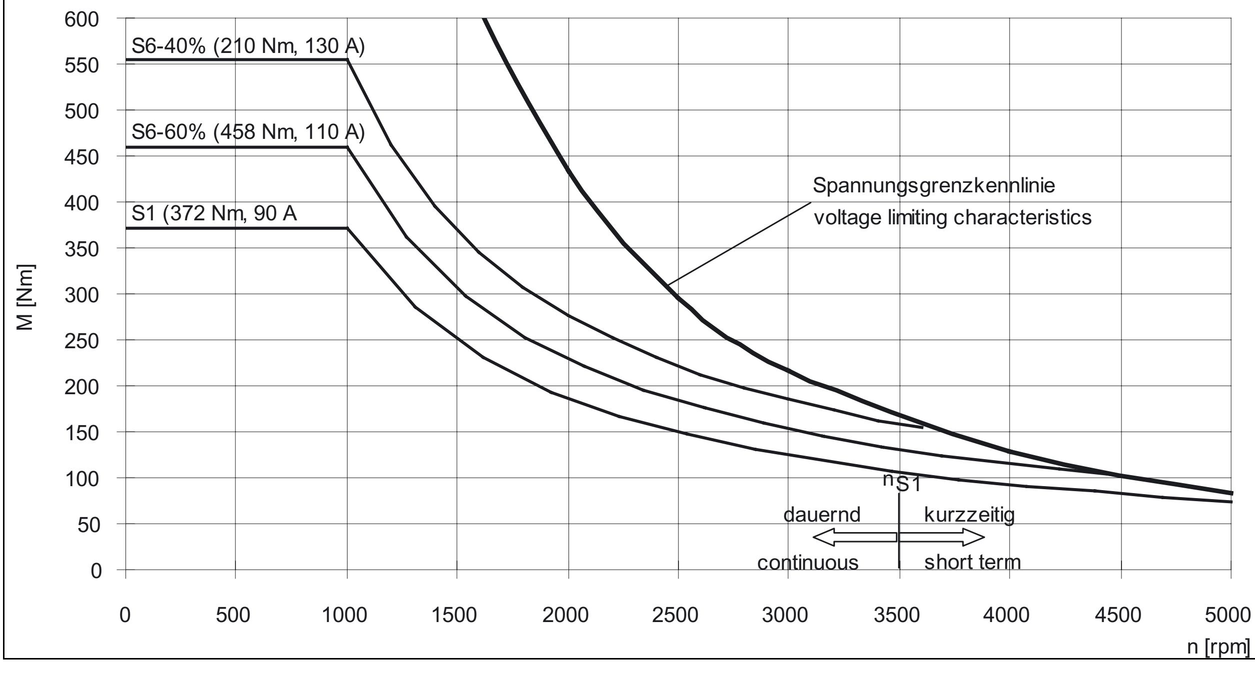
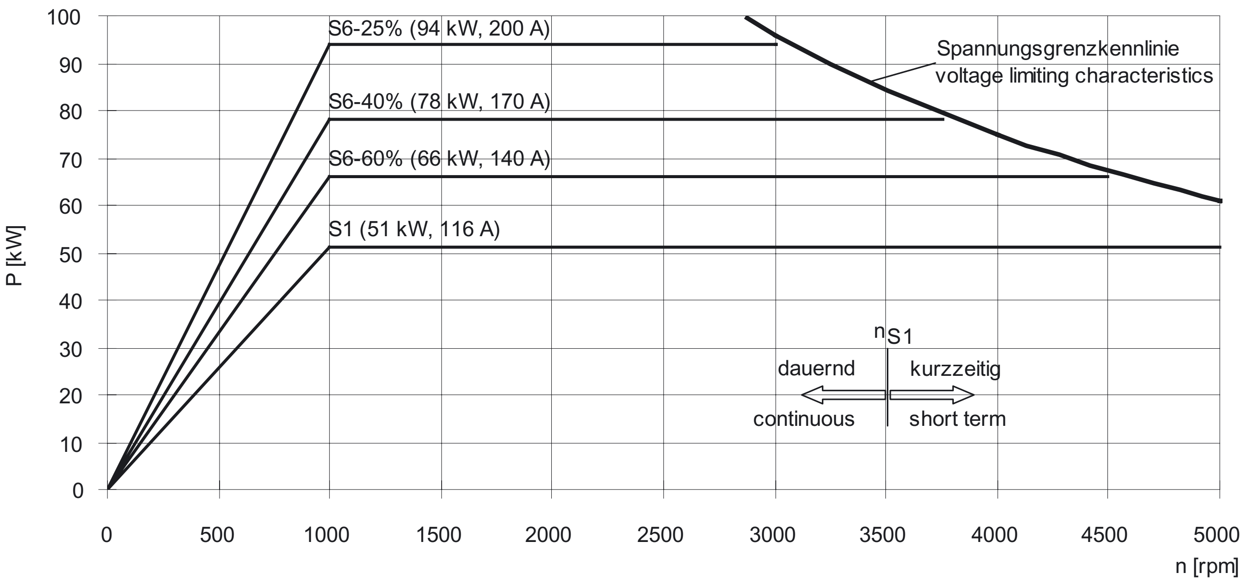


Table 7-60 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7186-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	51	485	116	340	34,1	5000	5000	40	58	232



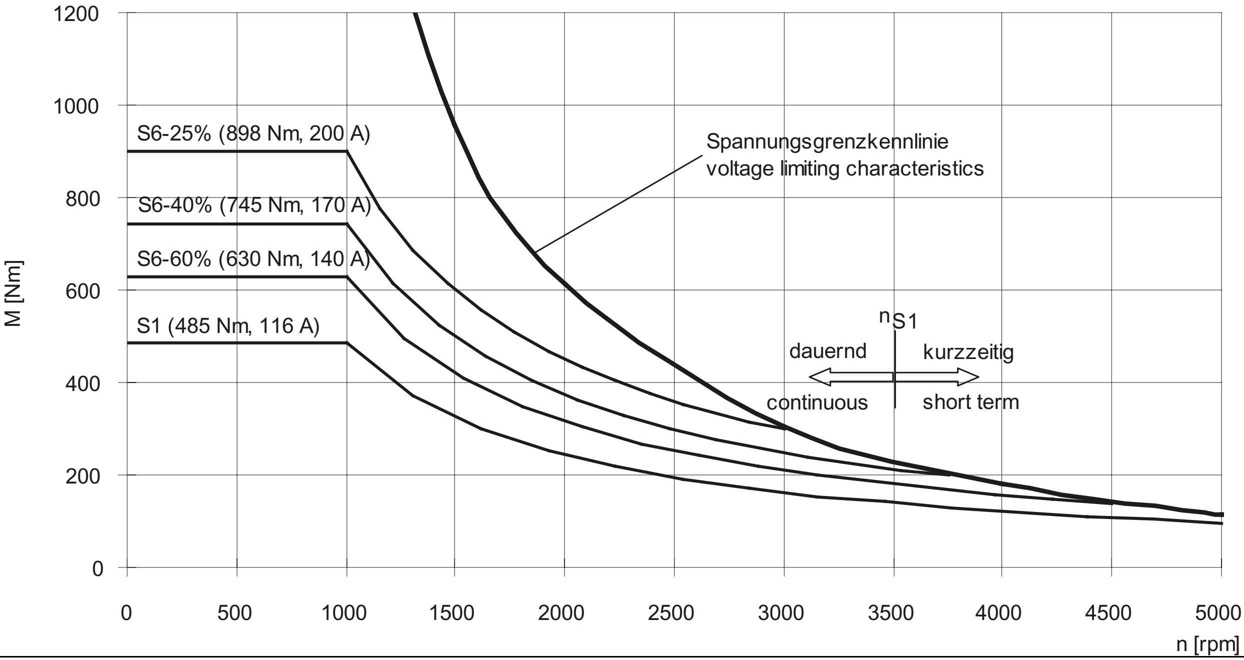
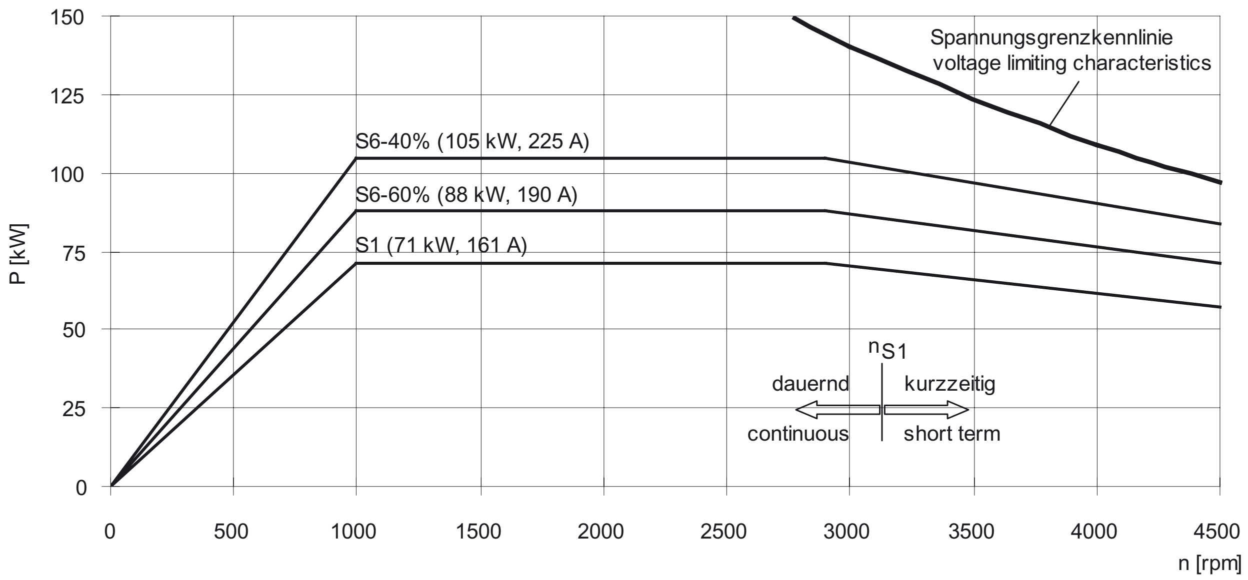


Table 7-61 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7224-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	71	678	161	335	33,9	2900	4500	40	78,5	320



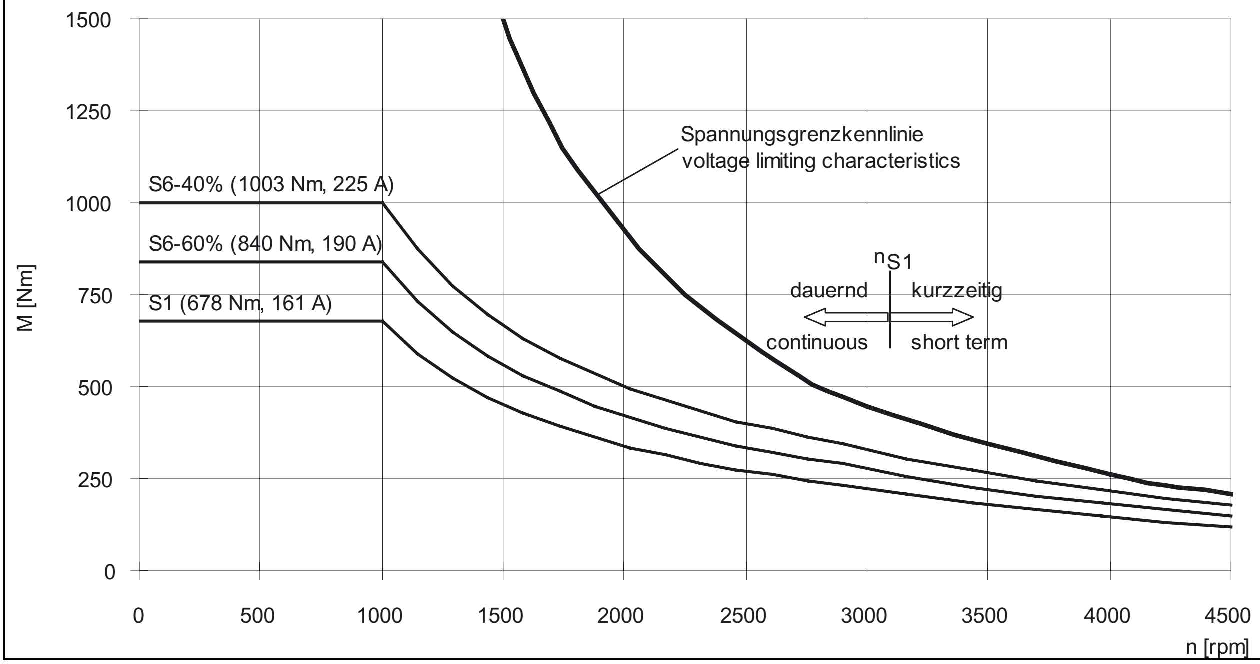
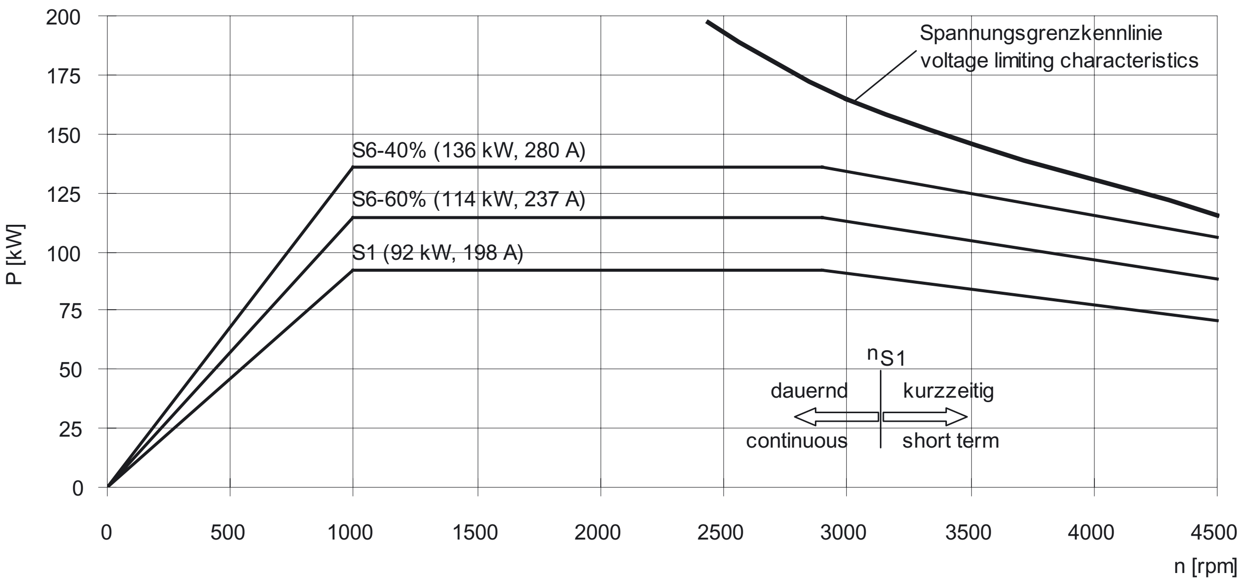


Table 7-62 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7226-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	92	880	198	340	33,9	2900	4500	40	87,5	400



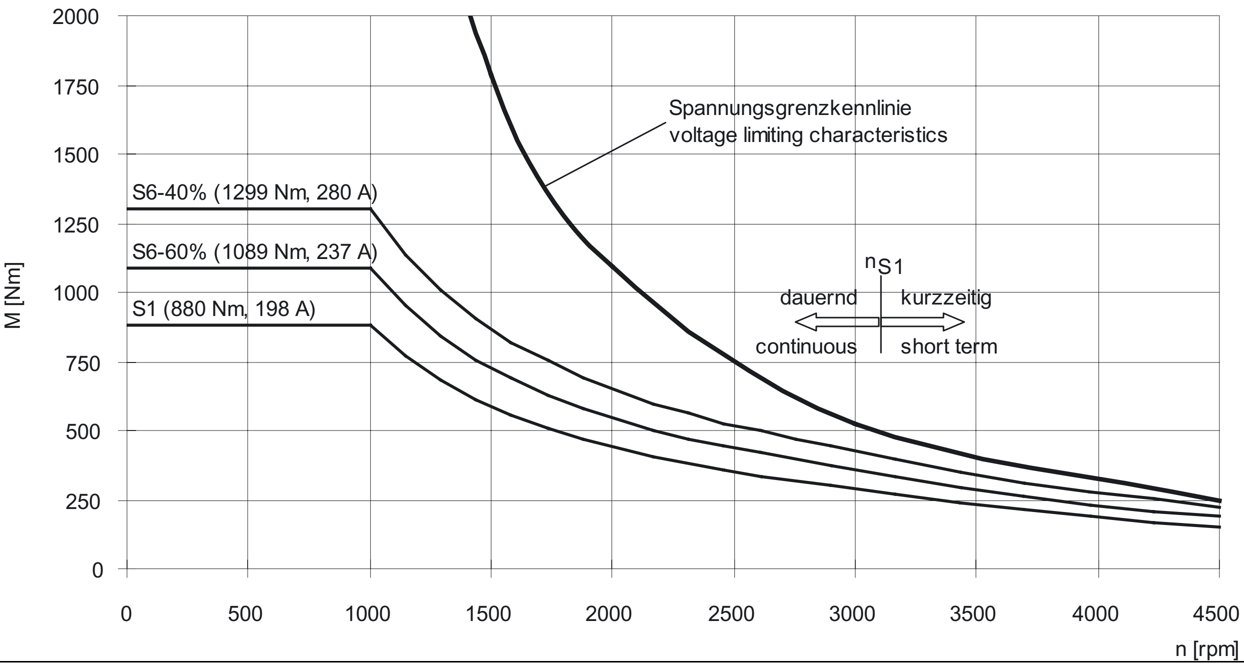
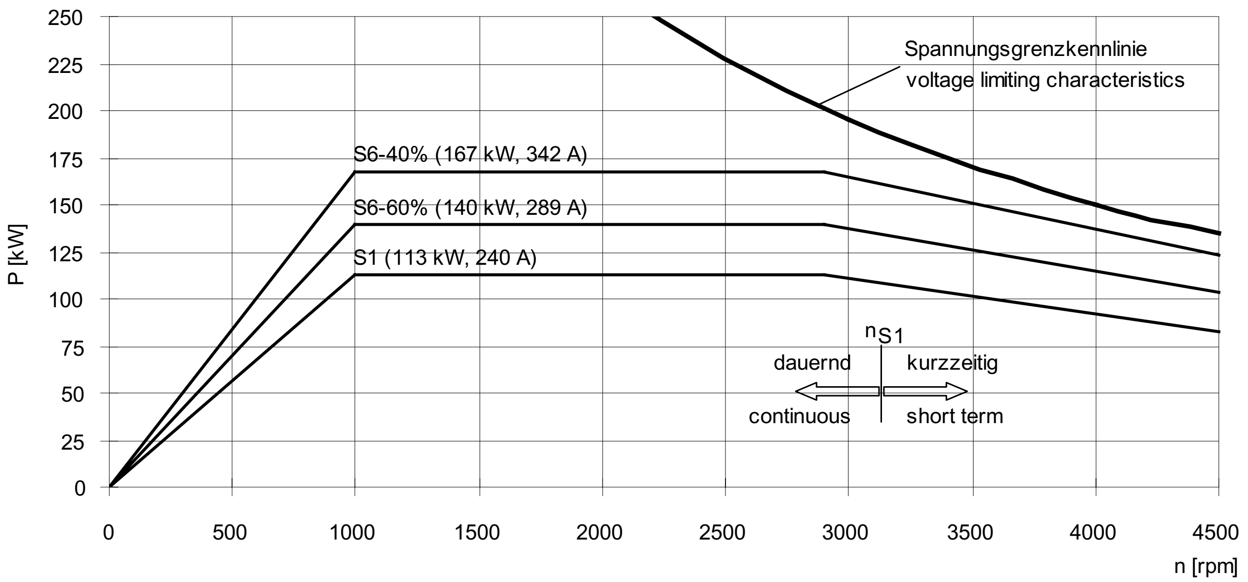
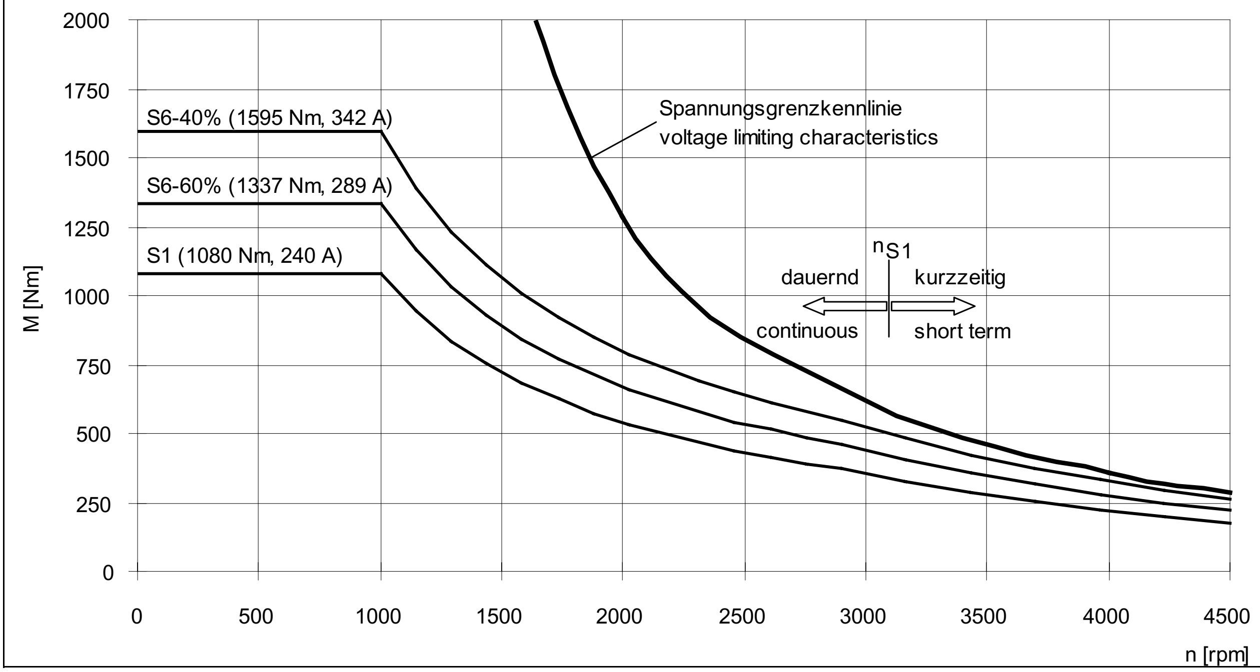


Table 7-63 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7228-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	113	1080	240	340	33,9	2900	4500 1)	40	98	480

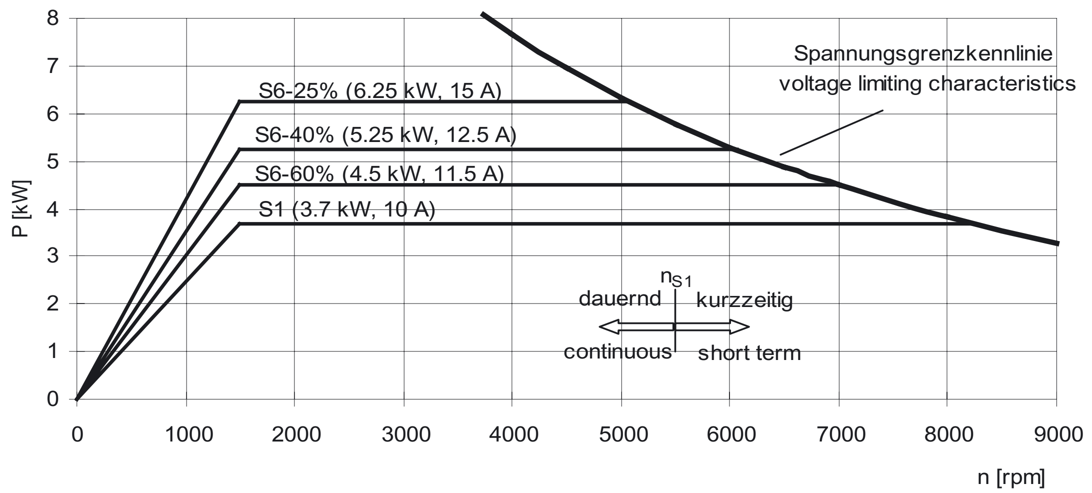




1) 4000 rpm for increased cantilever forces

Table 7-64 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7101-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	3,7	23,6	10,0	350	51,6	8234	9000	20	5,9	20,0



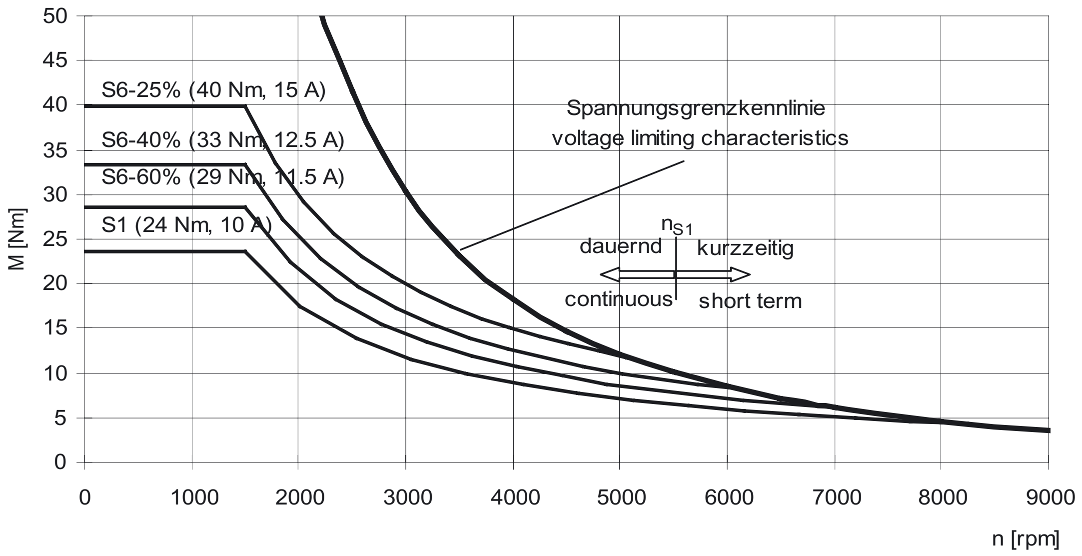
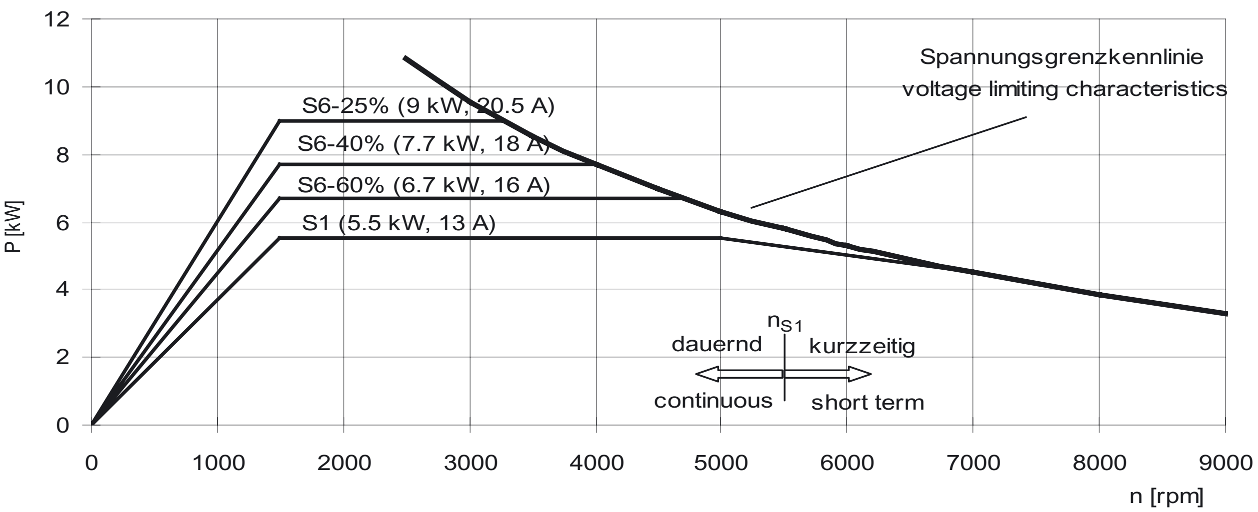


Table 7-65 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7103-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	5,5	35,0	13,0	350	52,7	5000	9000	20	5,4	26,0



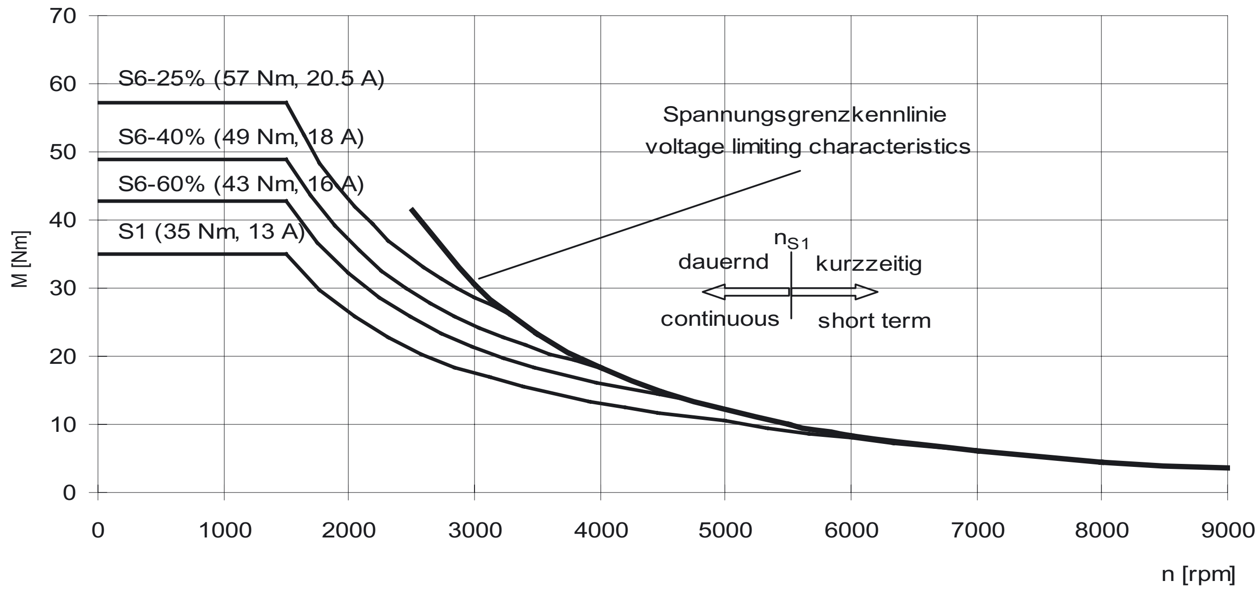
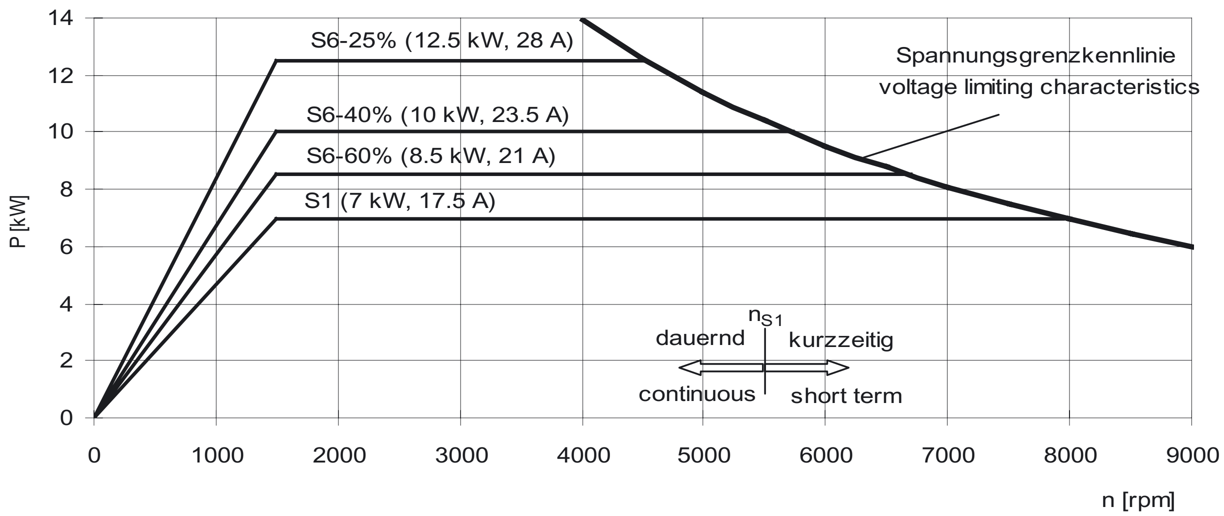


Table 7-66 SINAMICS Active Line Module SC, 400 V, 1PH7105-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	7,0	44,6	17,5	346	51,7	7941	9000	20	9,4	35,0



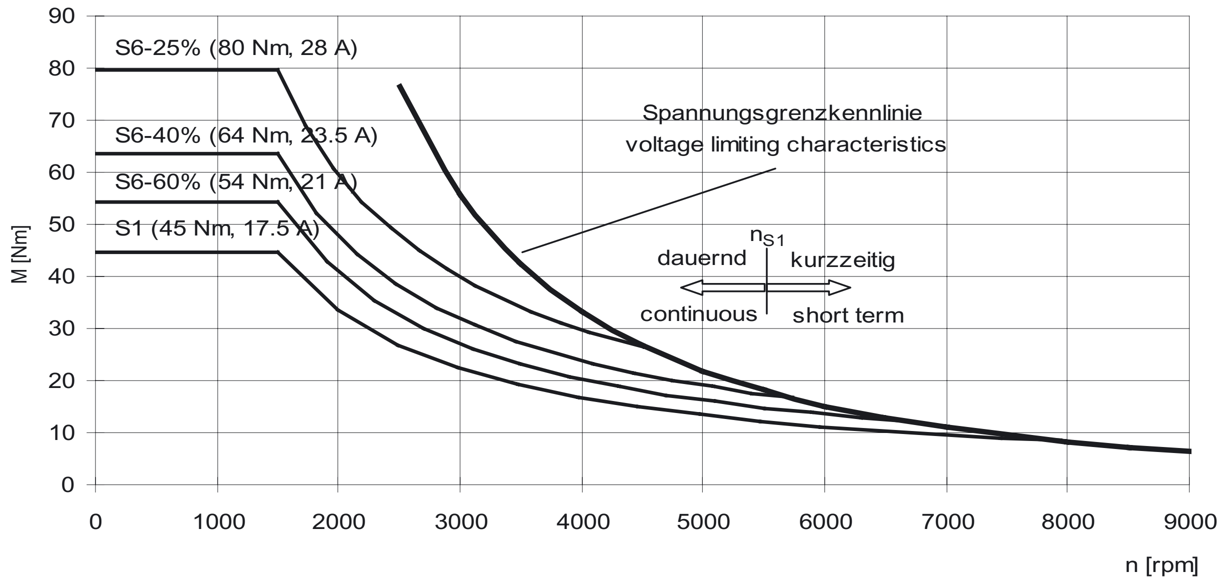
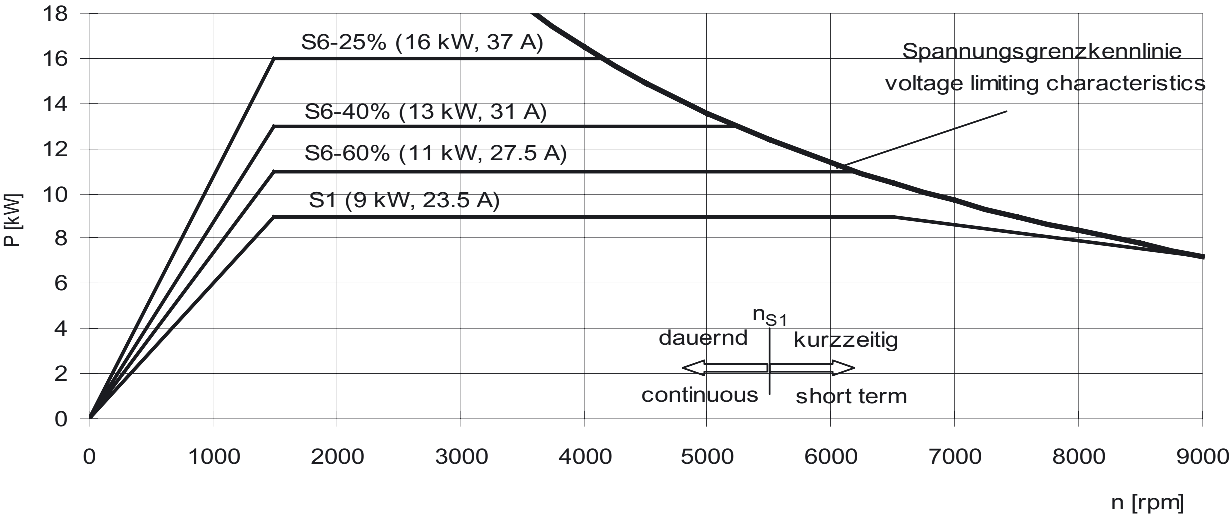


Table 7-67 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7107-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	9,0	57,3	23,5	336	52,0	6500	9000	20	11,0	47,0



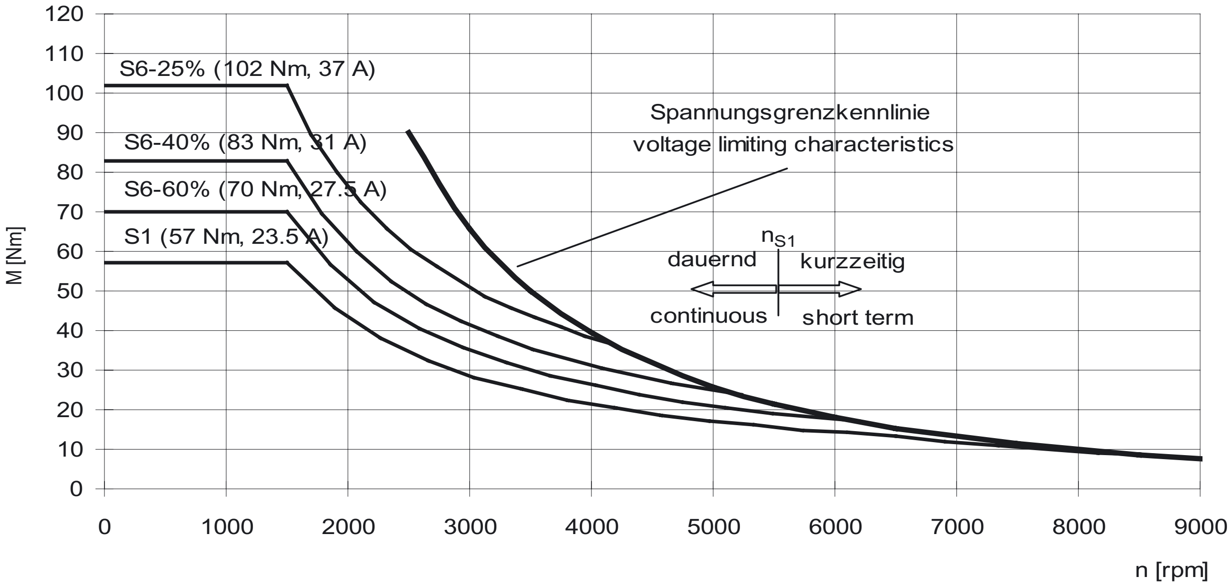
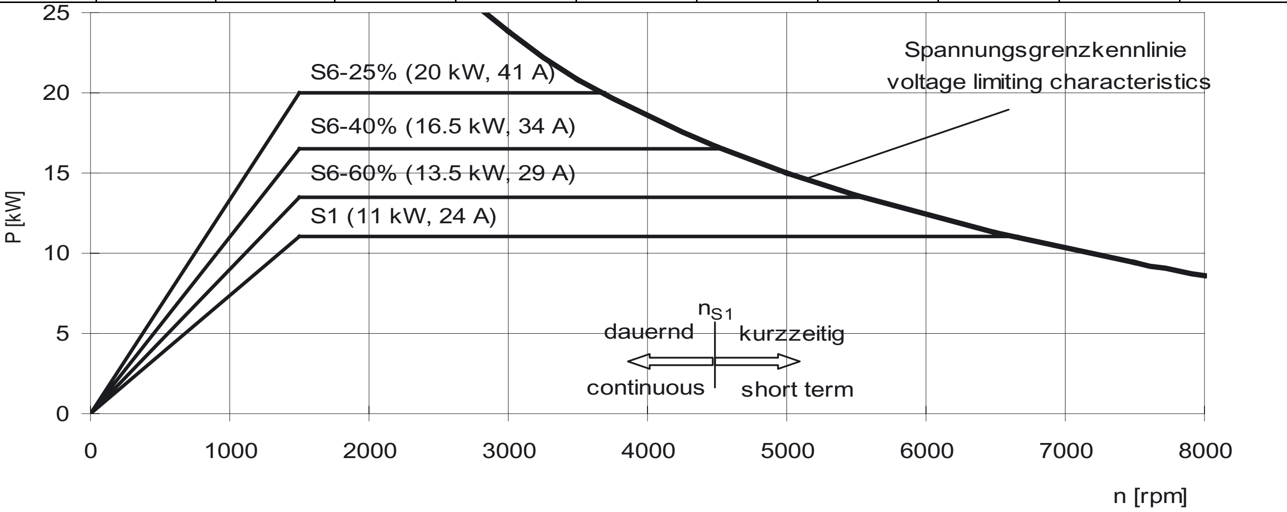


Table 7-68 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7131-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	11,0	70,0	24,0	350	51,3	6660	8000	30	8,4	48,0



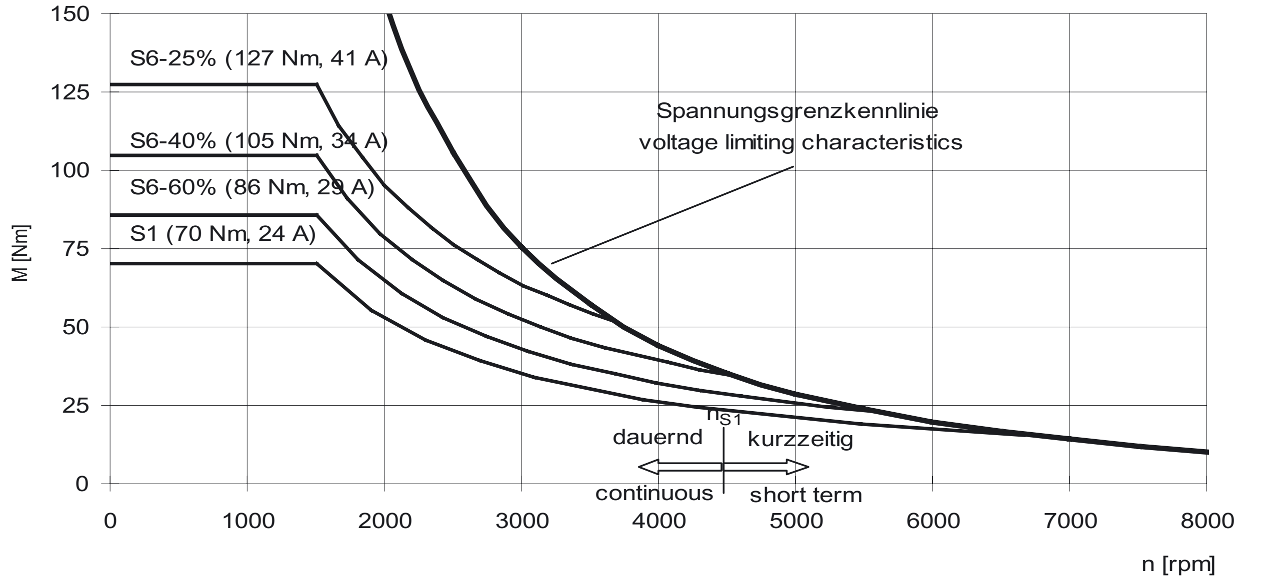
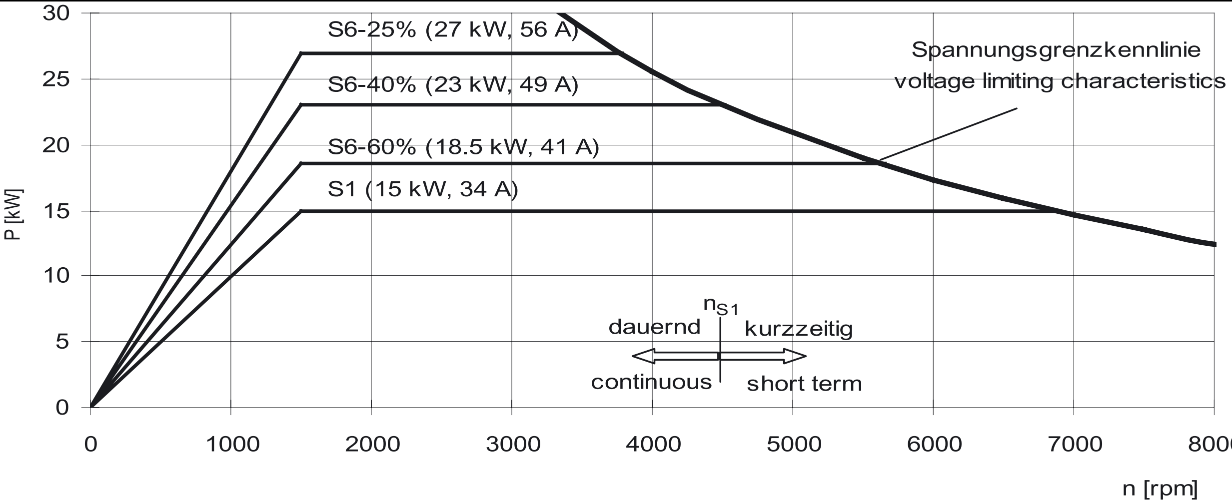


Table 7-69 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7133-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	15,0	95	34	346	51,3	6854	8000	30	14,0	68



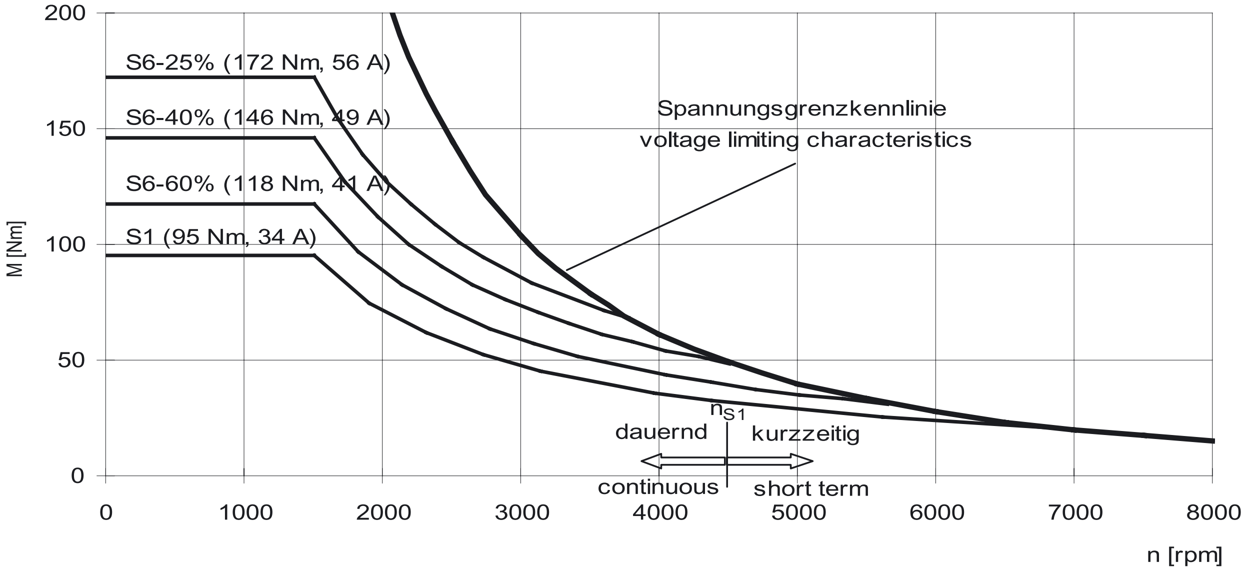
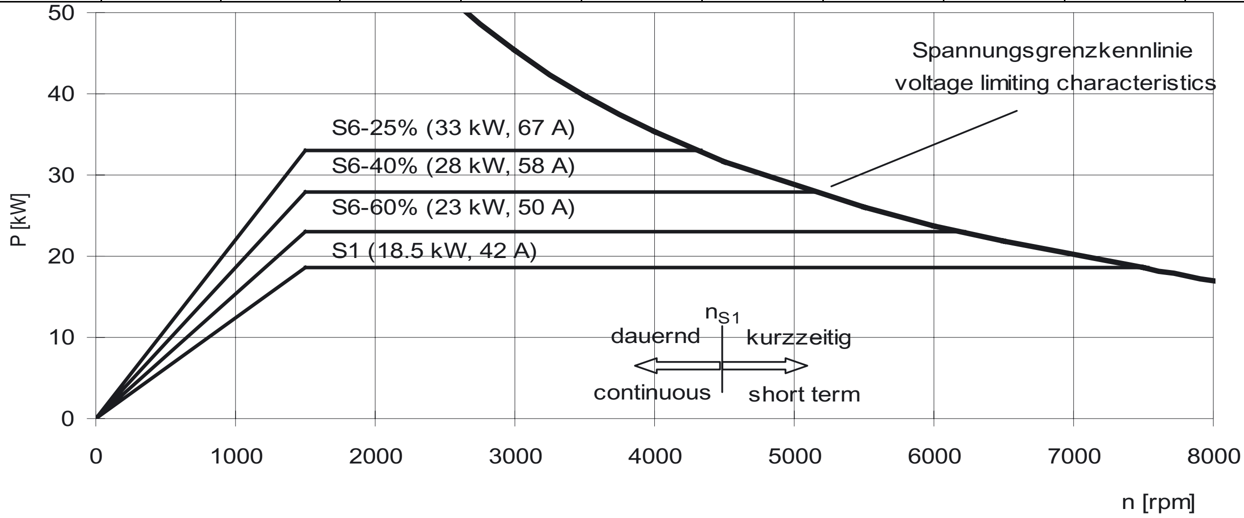


Table 7-70 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7135-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	18,5	118	42	350	51,1	7537	8000	30	17,0	84



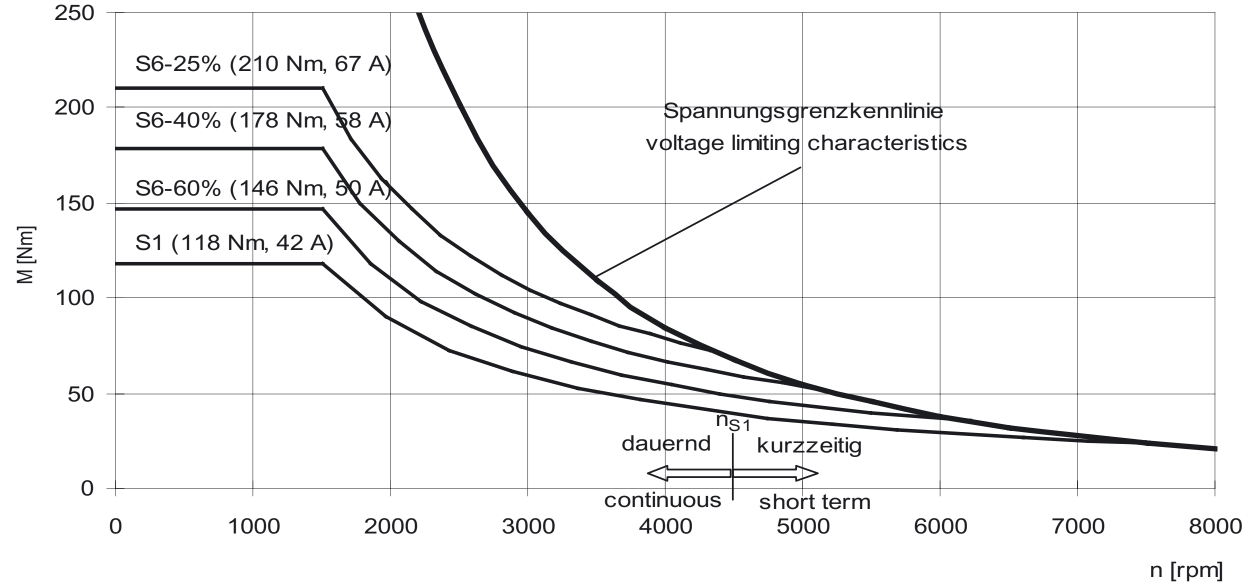


Table 7-71 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7137-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	22,0	140	57	308	51,2	7000	8000	30	22,8	112

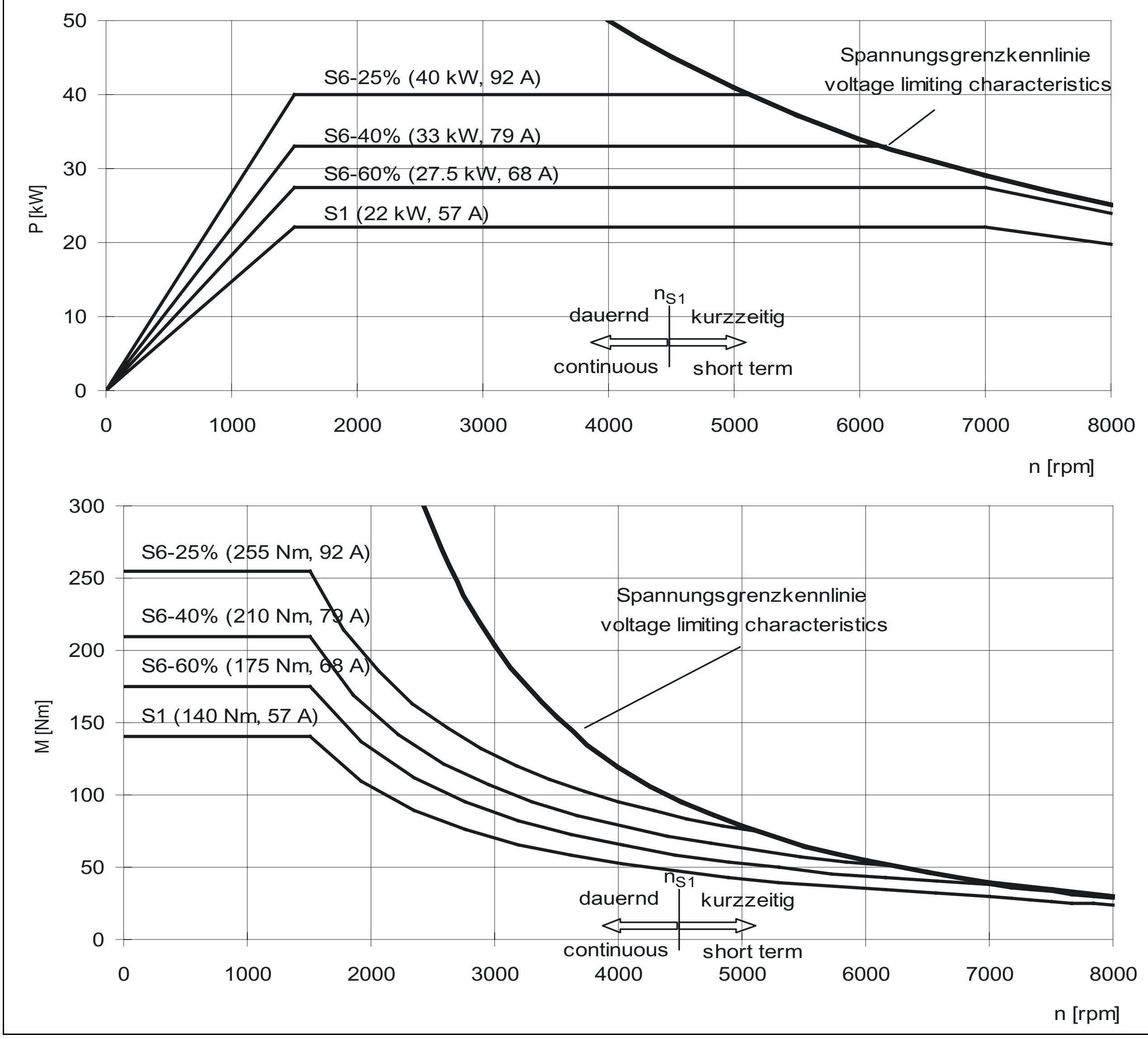


Table 7-72 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7163-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	30,0	191	72	319	50,9	5500	6500	35	30,0	144

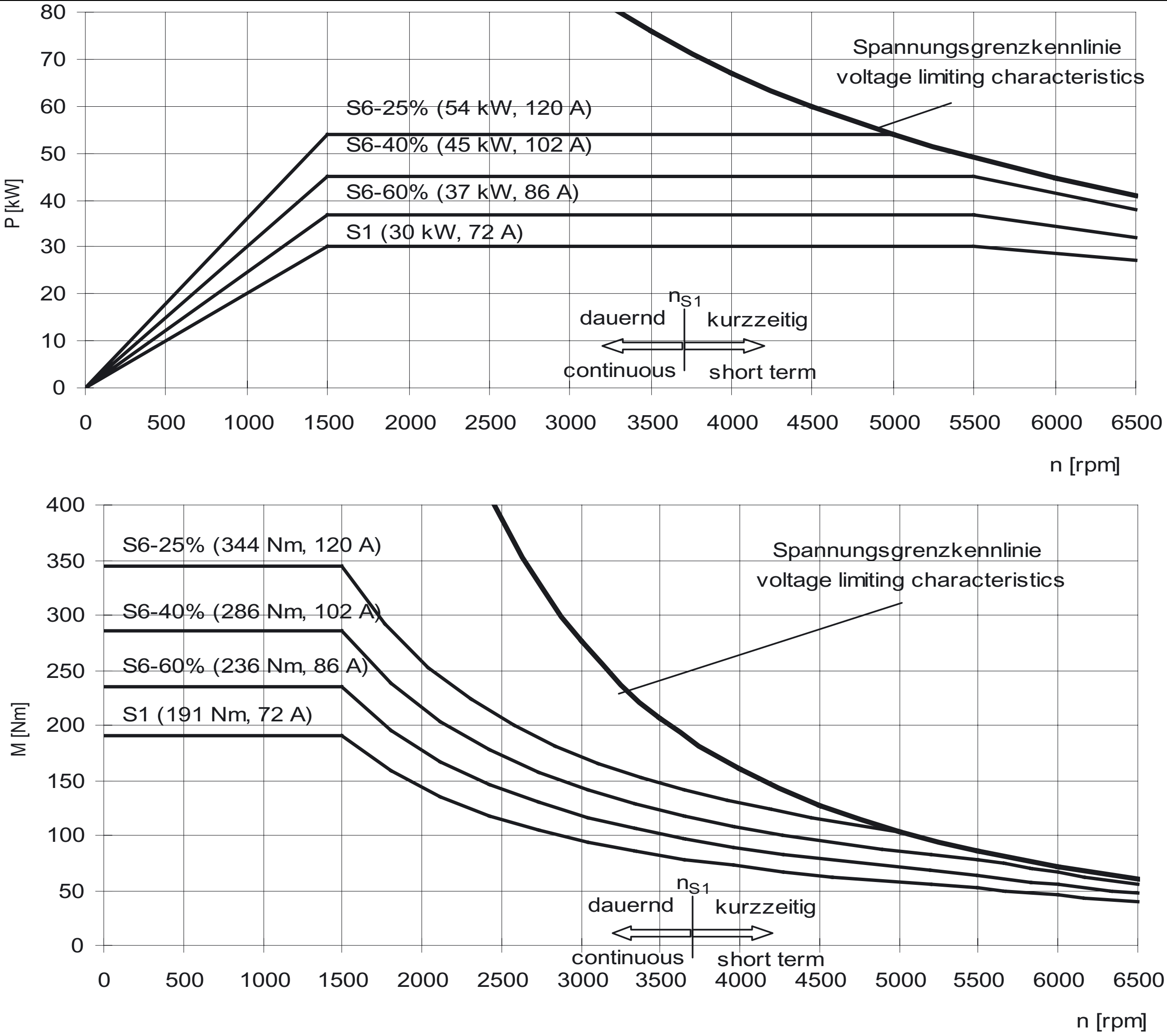
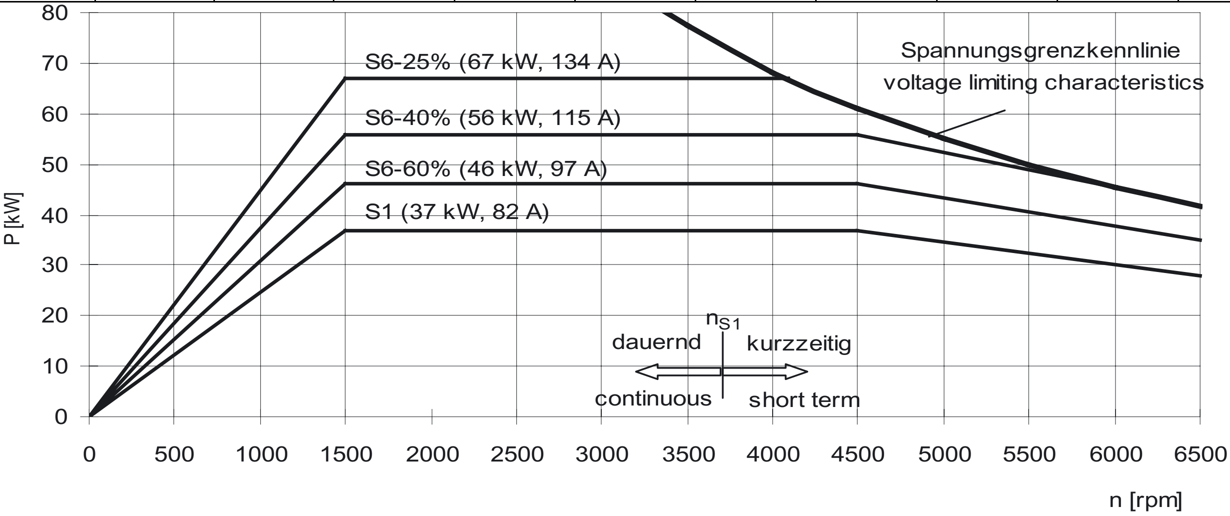


Table 7-73 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7167-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	37,0	236	82	350	50,8	4500	6500	35	32,0	164



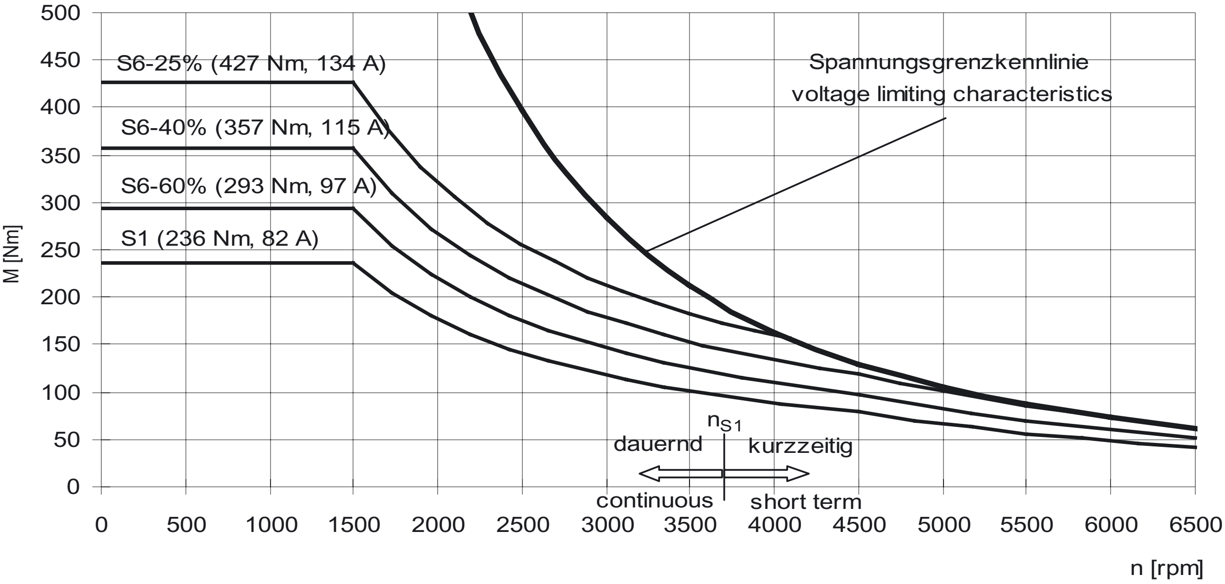
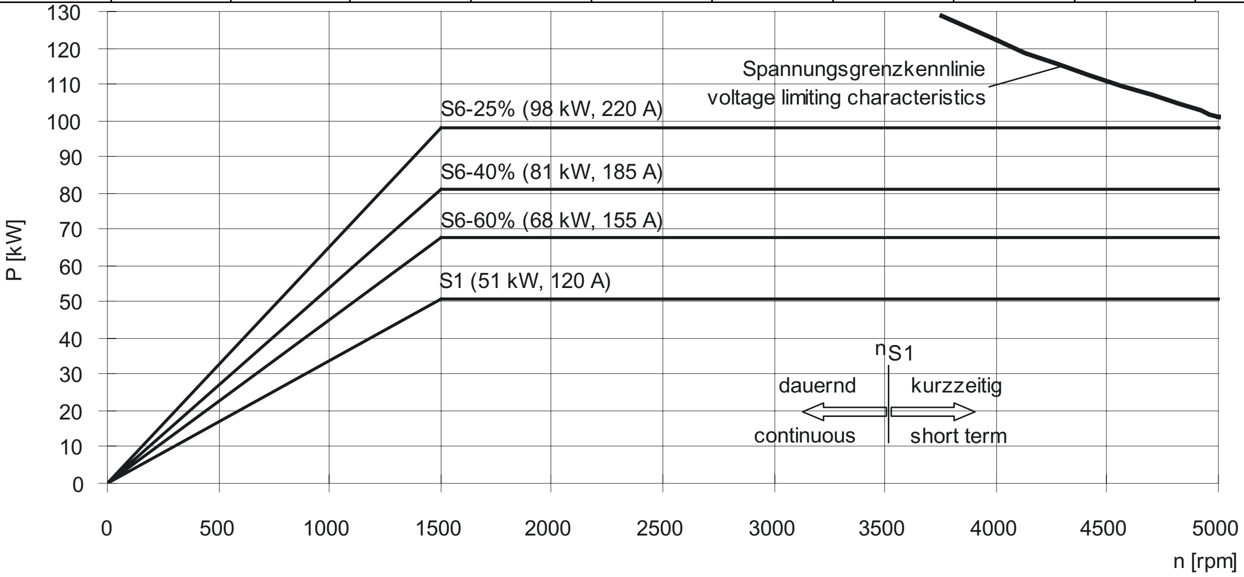


Table 7-74 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7184-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	51	325	120	335	50.7	5000	5000	40	64	240



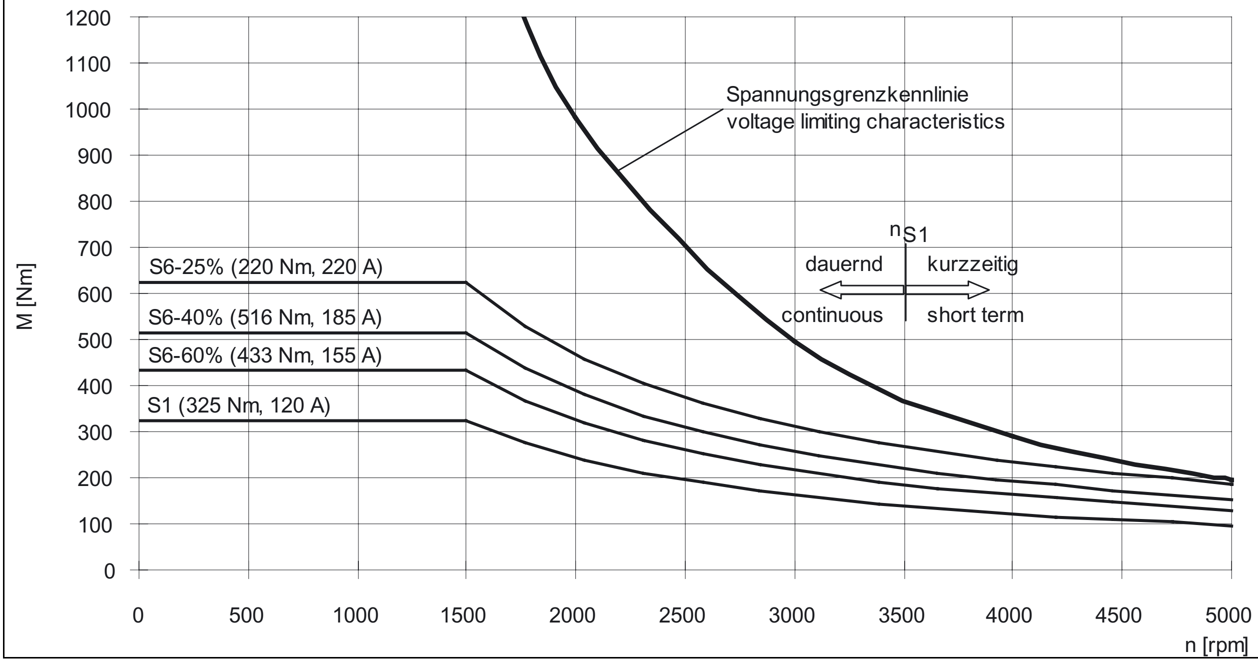
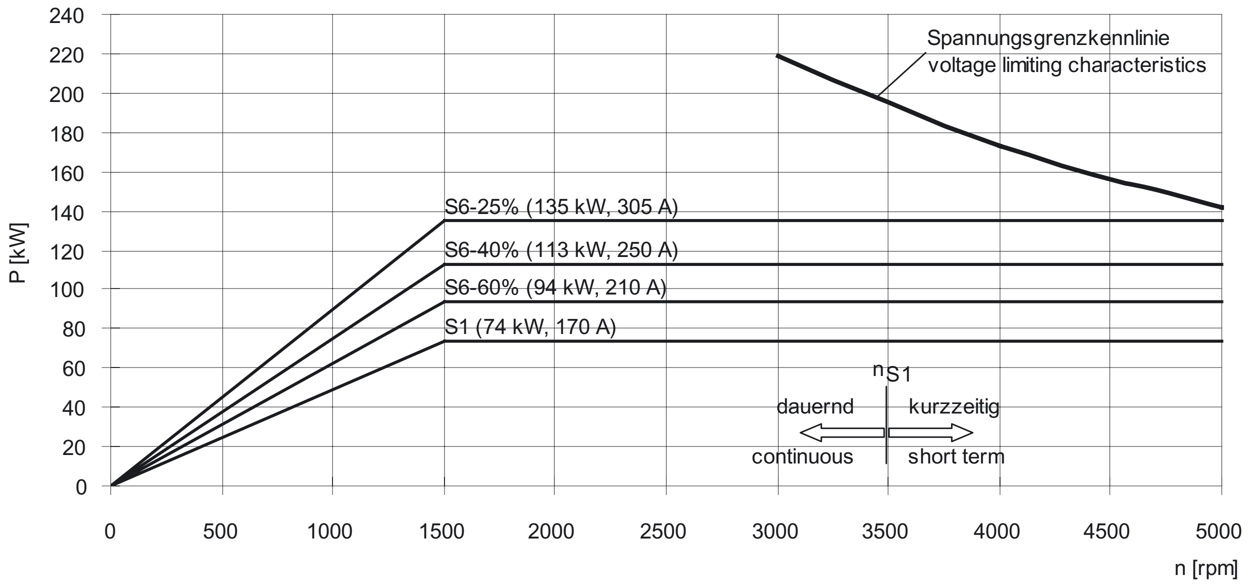


Table 7-75 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7186-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	74	471	170	330	50,7	5000	5000	40	84	325



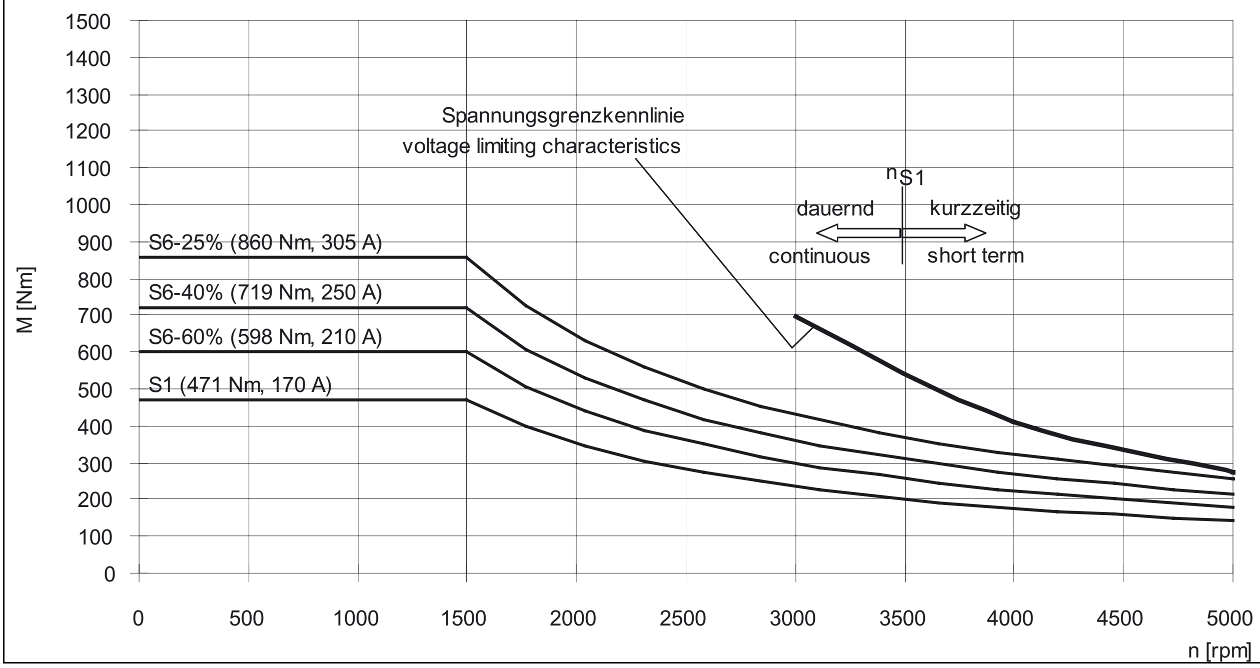
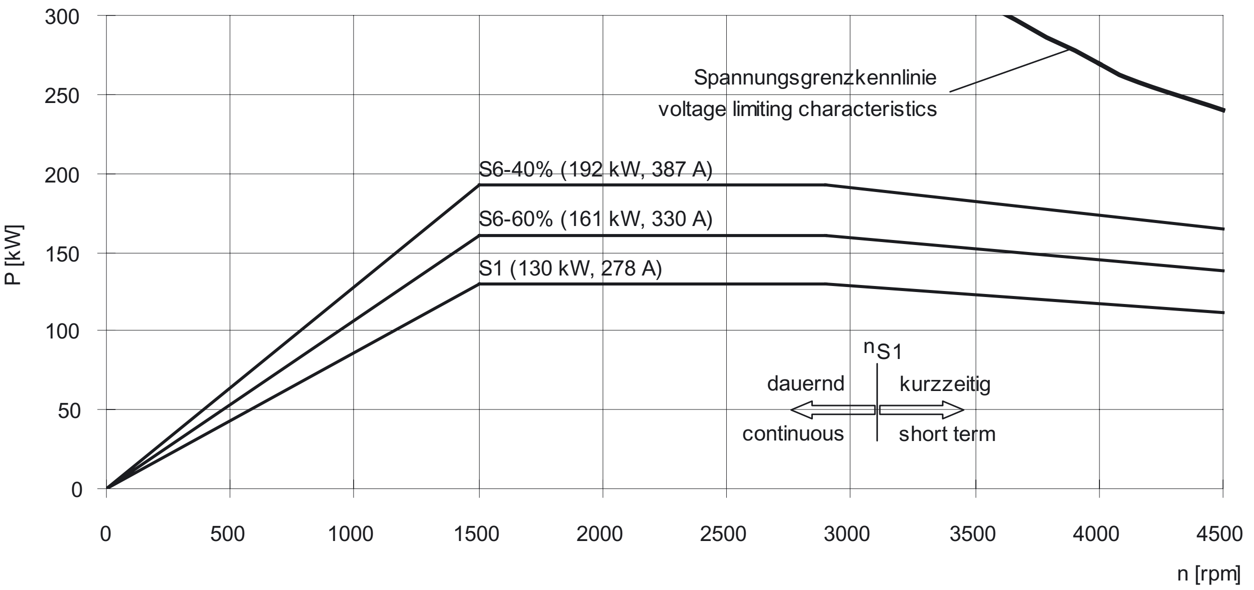


Table 7-76 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7226-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	130	828	278	340	50,6	2900	4500	40	120	560



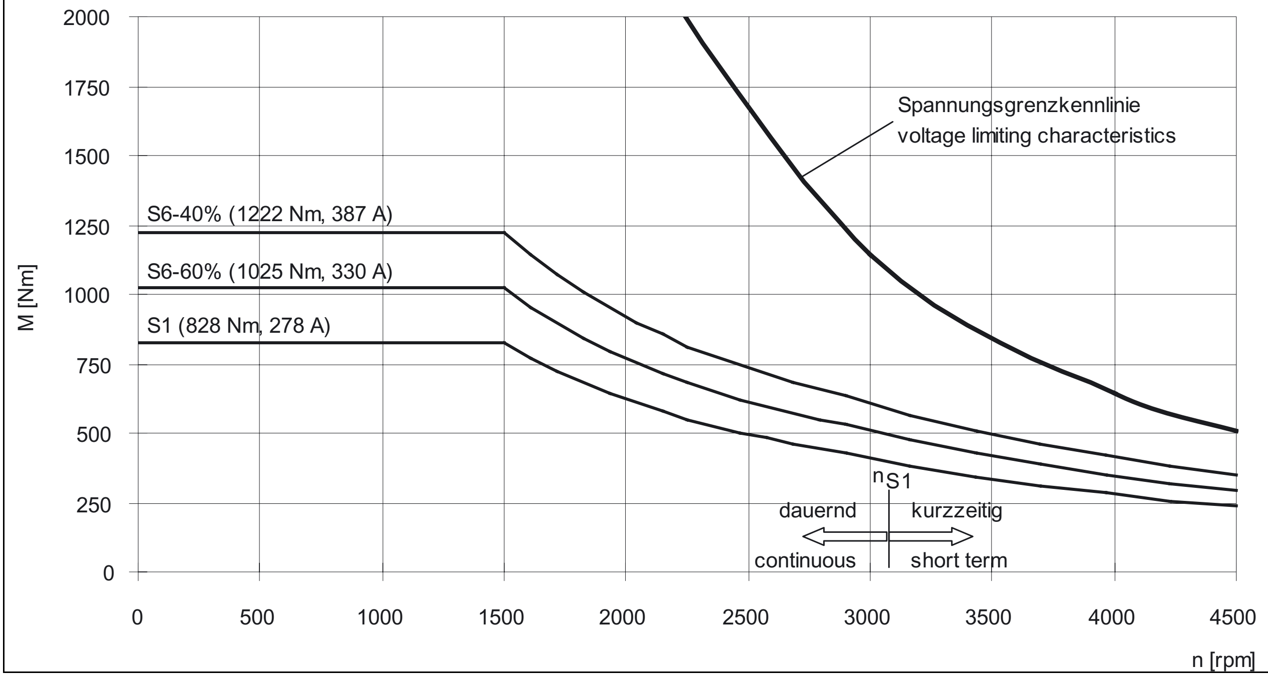
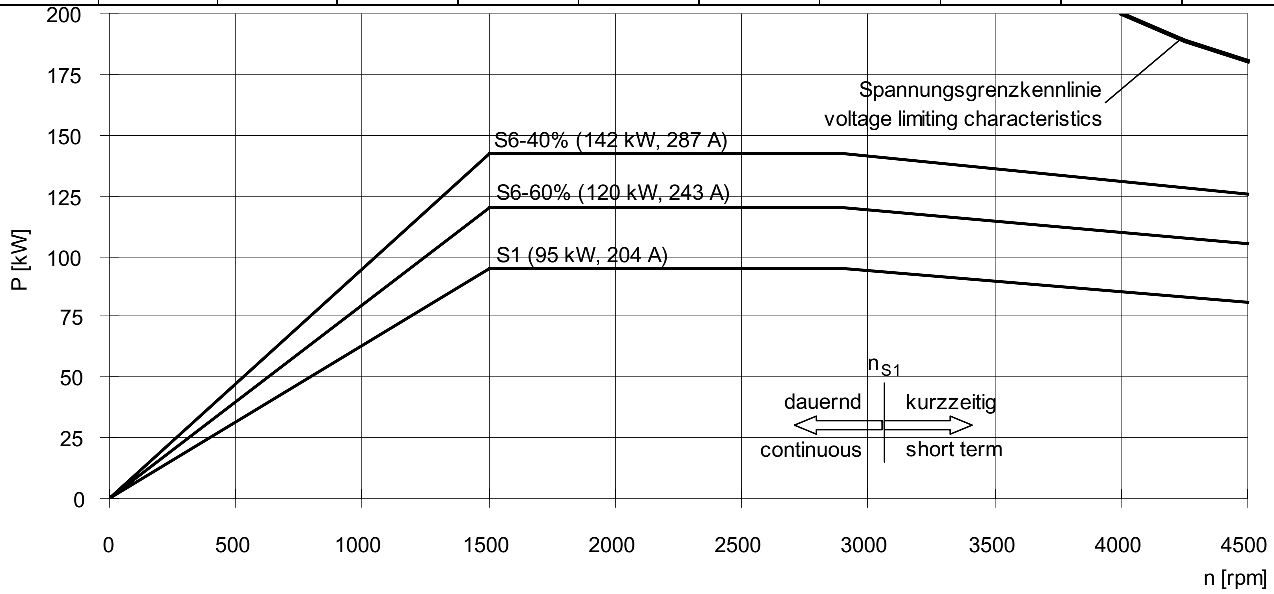


Table 7-77 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7224-□□U□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	95	605	204	340	50,6	2900	4500	40	88,5	410



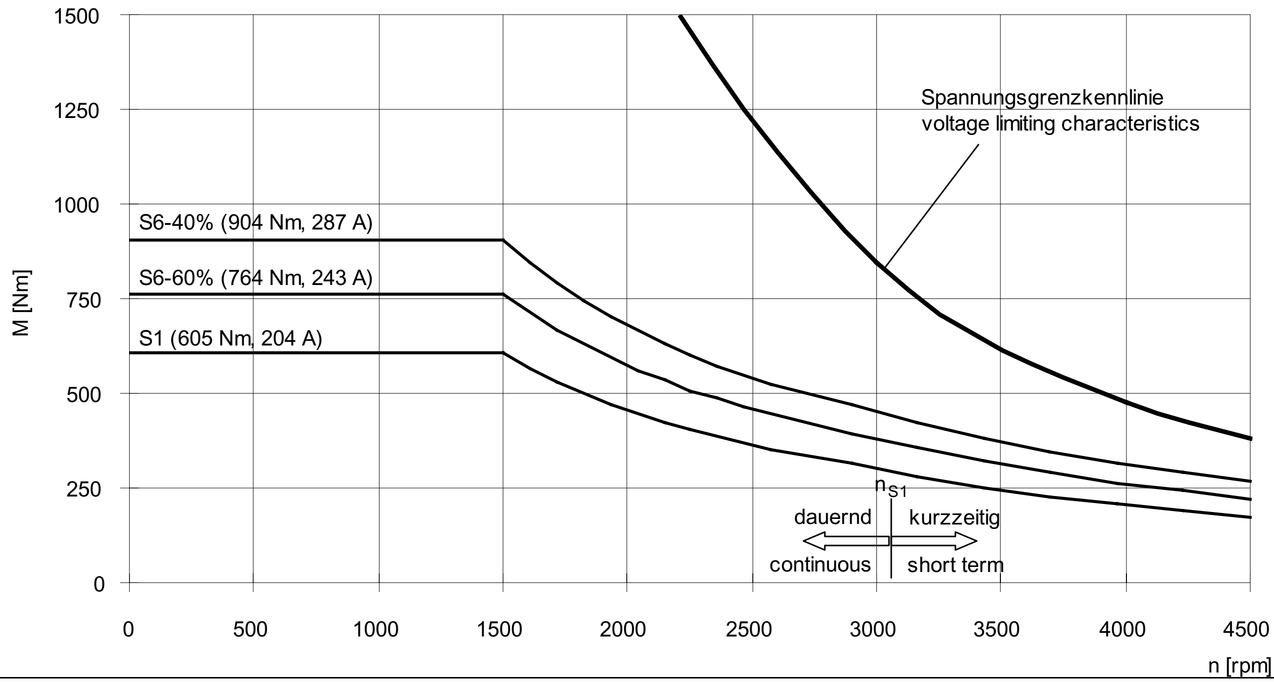
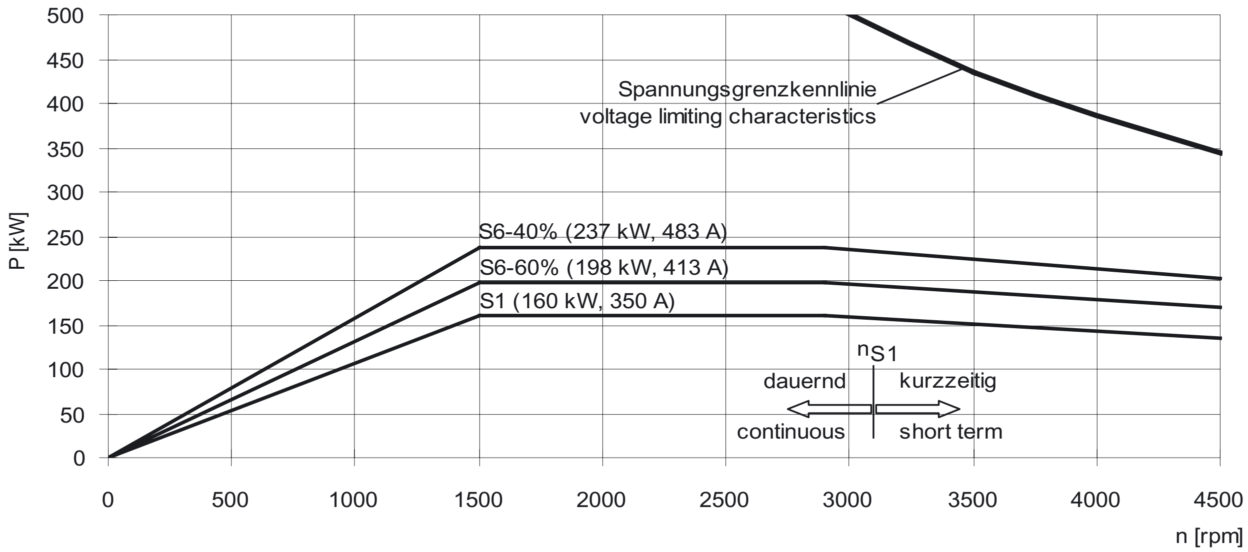
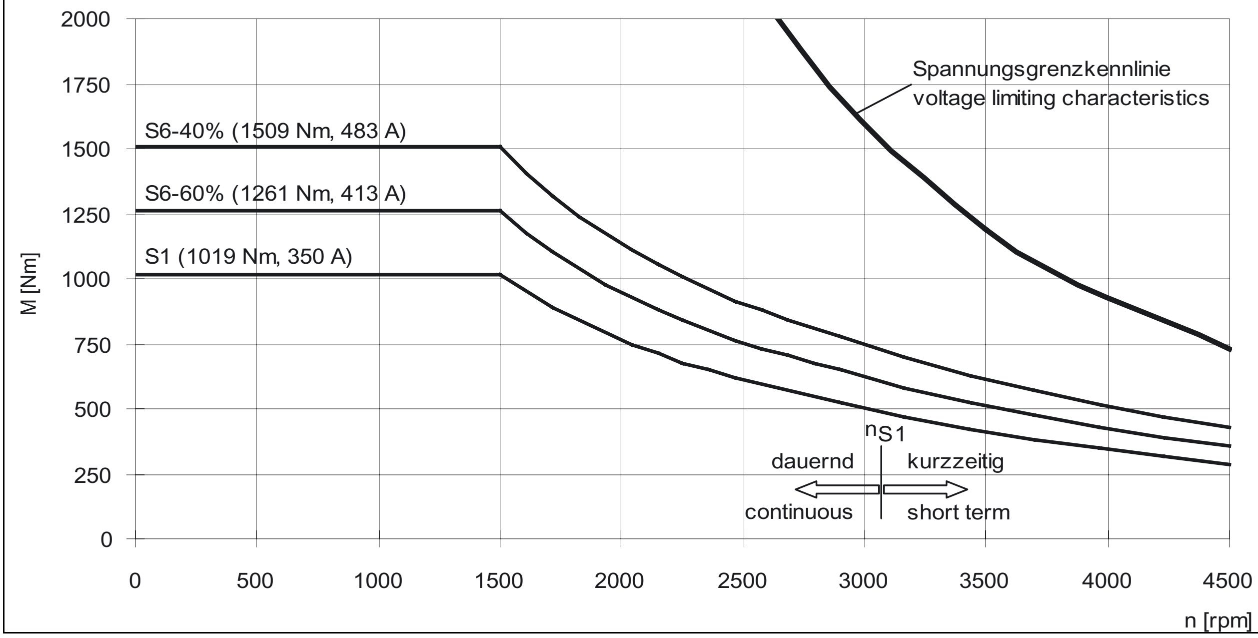


Table 7-78 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7228-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1500	160	1019	350	340	50,5	2900	4500 [1)]	40	169	700

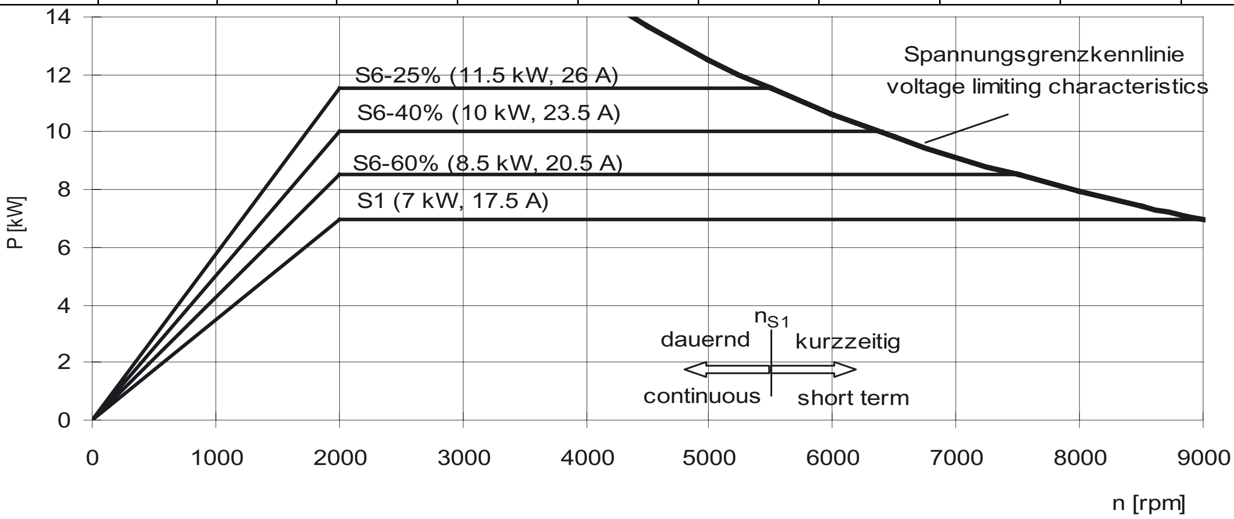




1) 4000 rpm for increased cantilever forces

Table 7-79 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7103-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	7,0	33,4	17,5	343	68,9	9000	9000	20	8,3	35,0



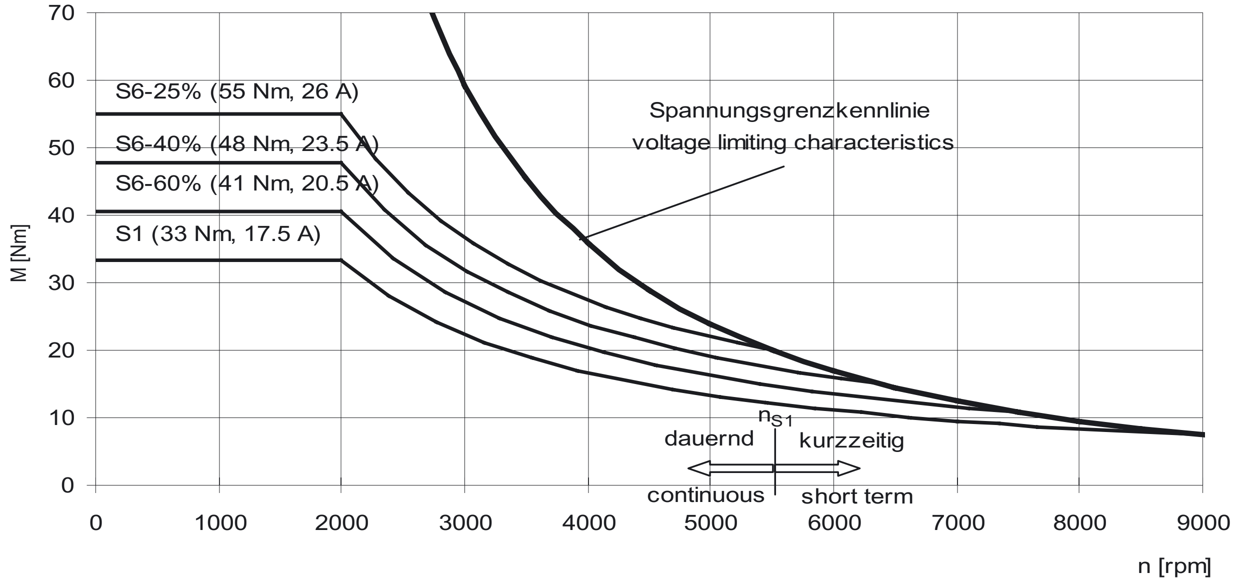
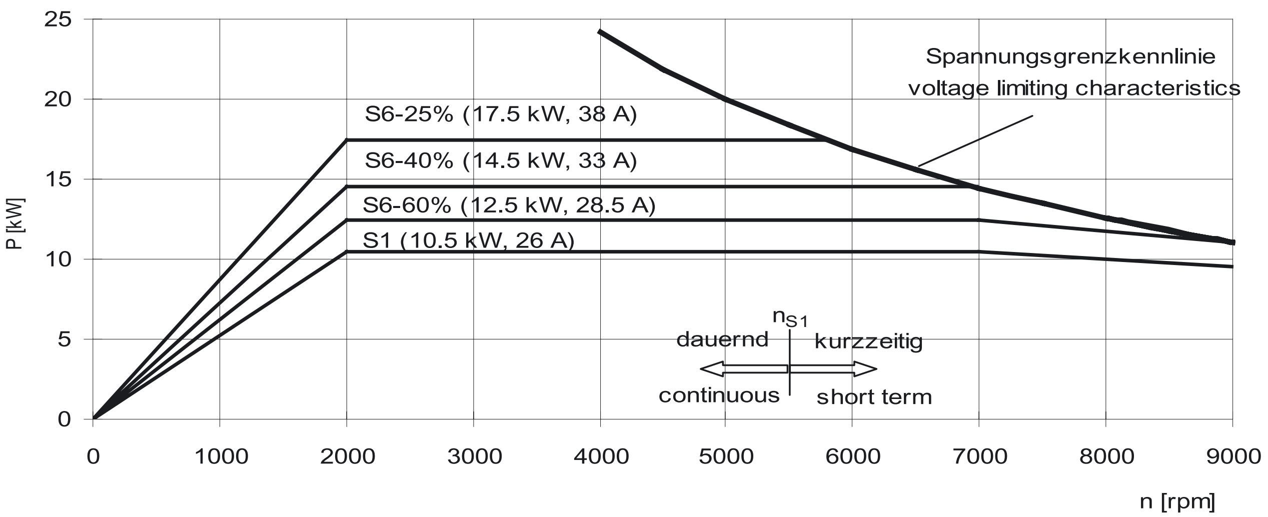


Table 7-80 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7107-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	10,5	50,1	26,0	350	68,6	7000	9000	20	12,0	52,0



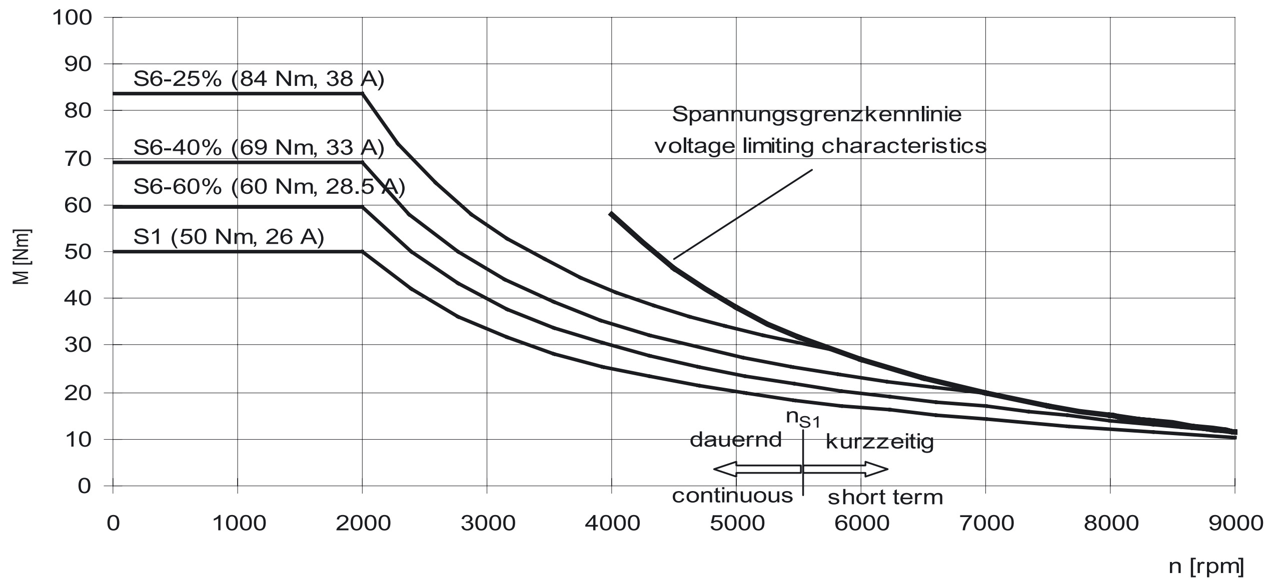
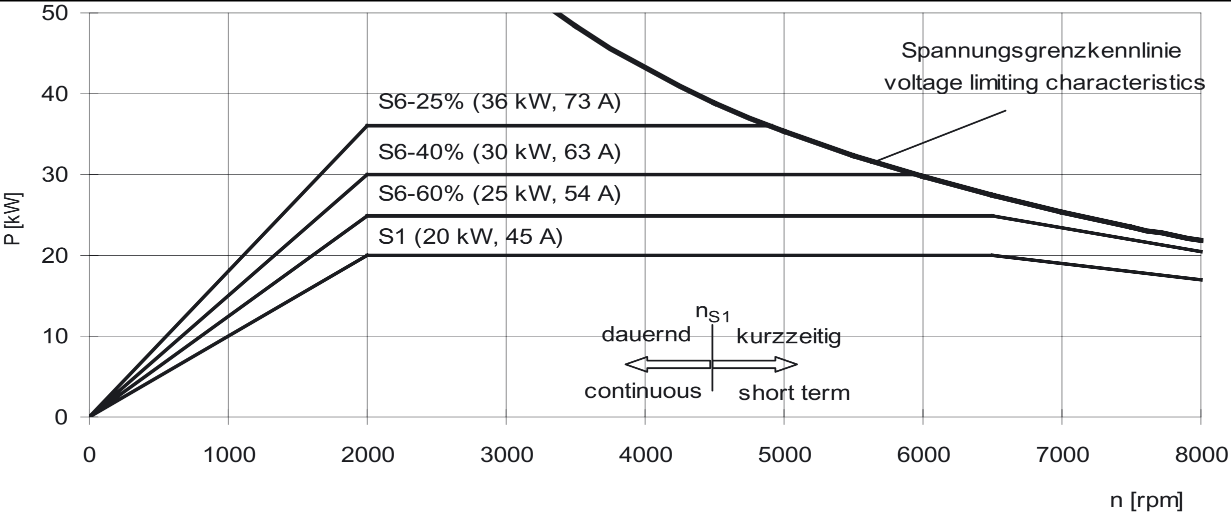


Table 7-81 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7133-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
2000	20,0	95	45	350	68,0	6500	8000	30	18,0	90



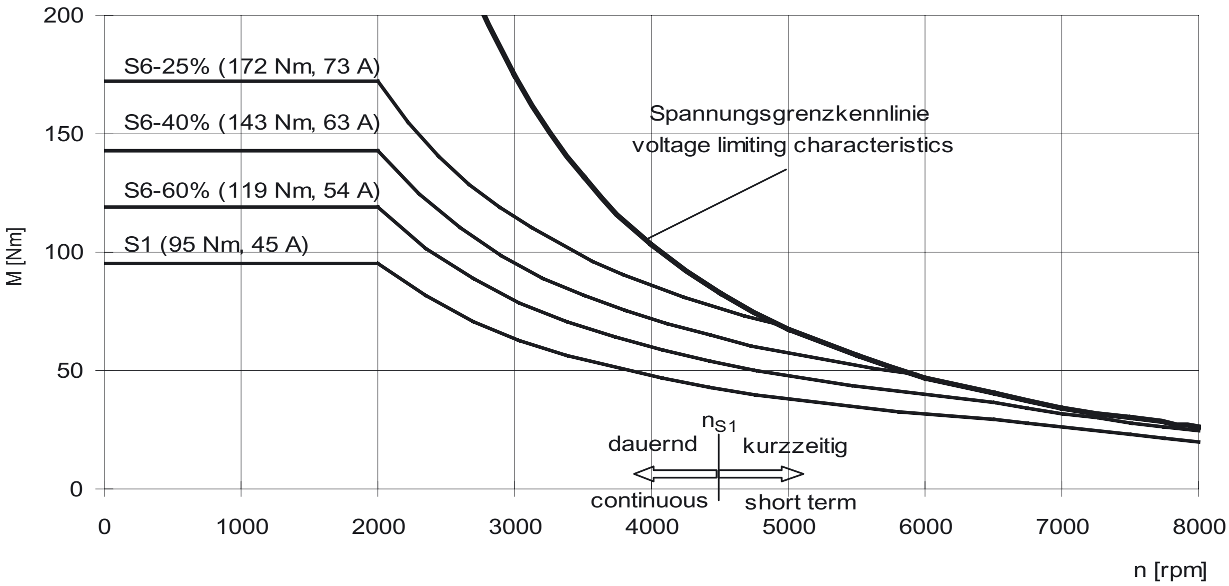
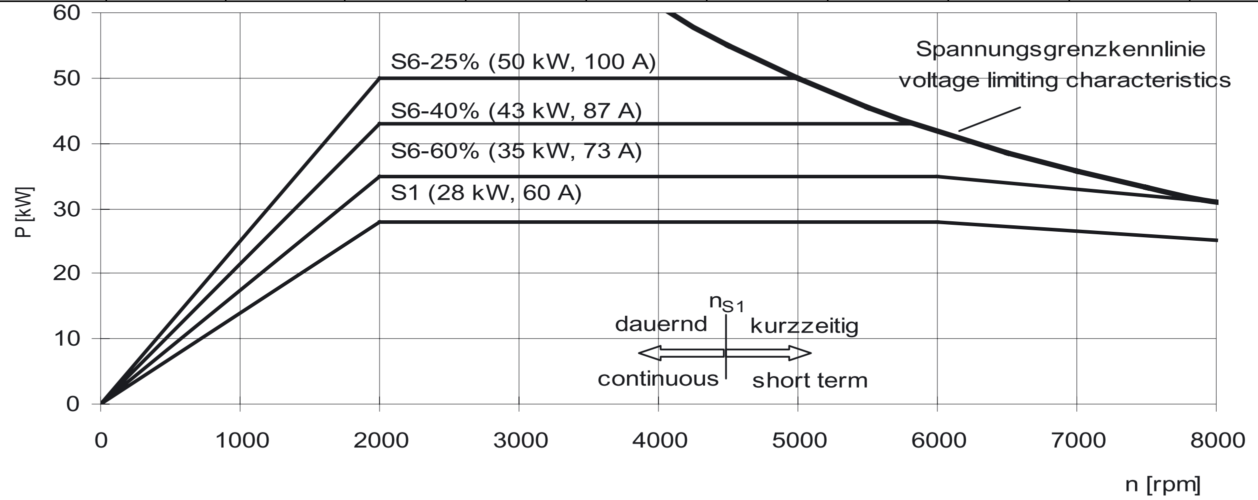


Table 7-82 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7137-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	28,0	134	60	350	68,0	6000	8000	30	21,0	120



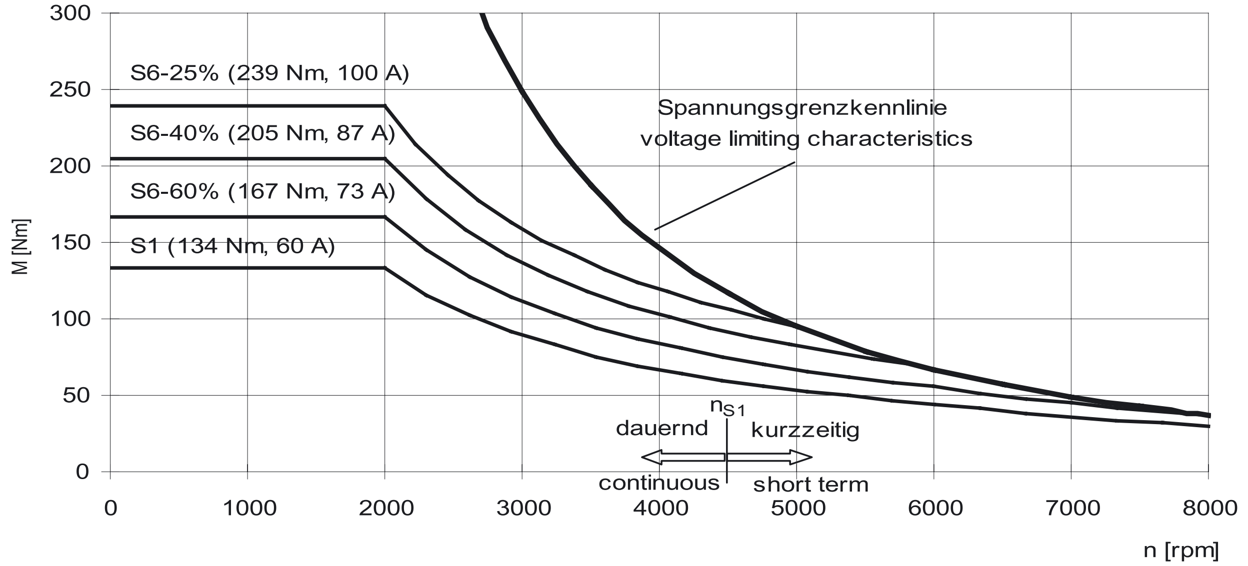
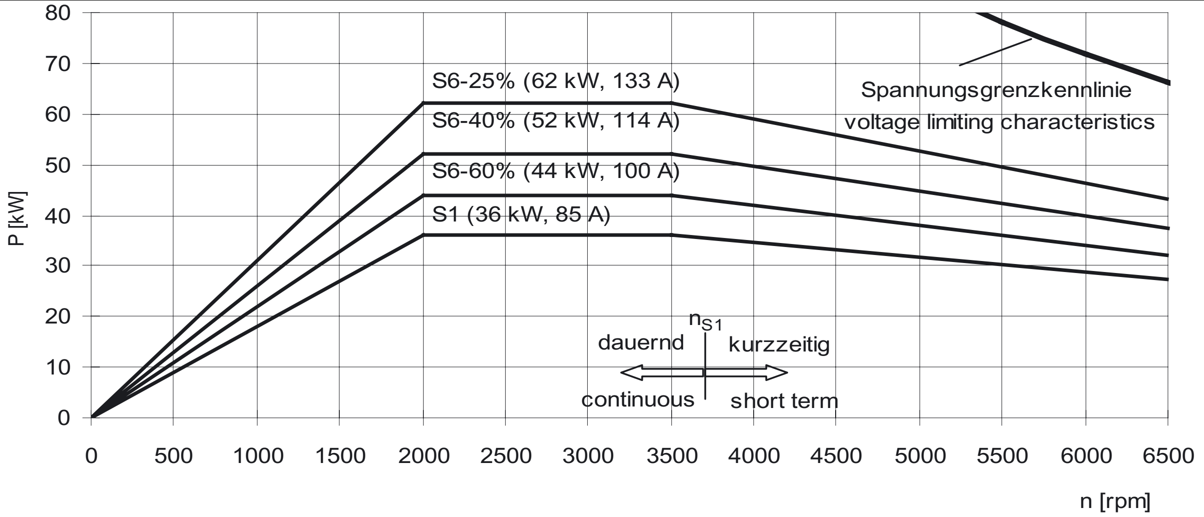


Table 7-83 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7163-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
2000	36,0	172	85	333	67,5	3500	6500	35	37,0	170



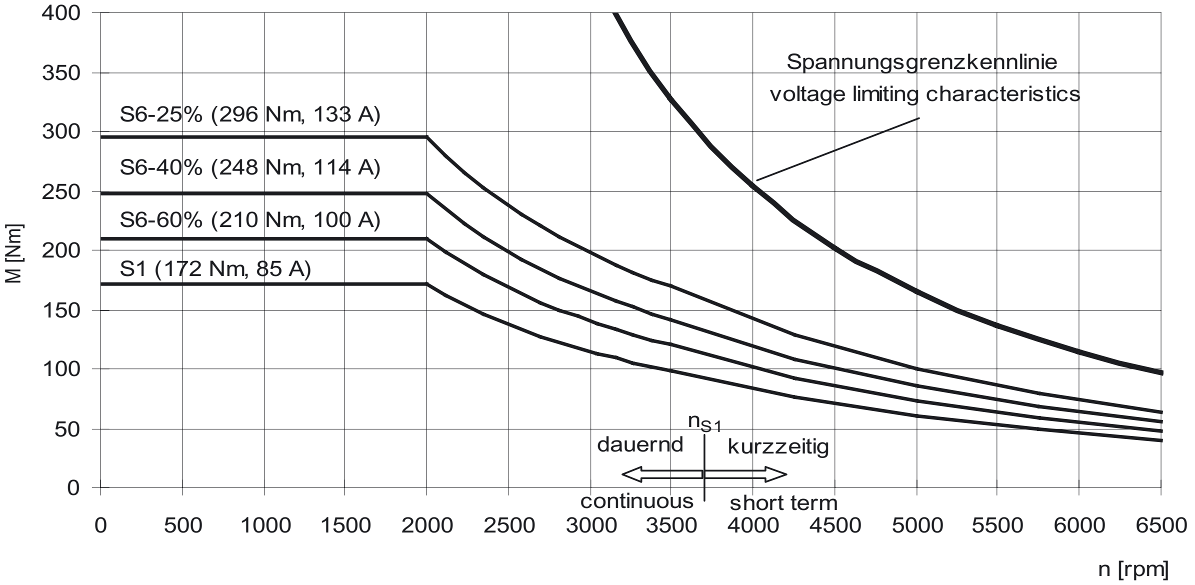
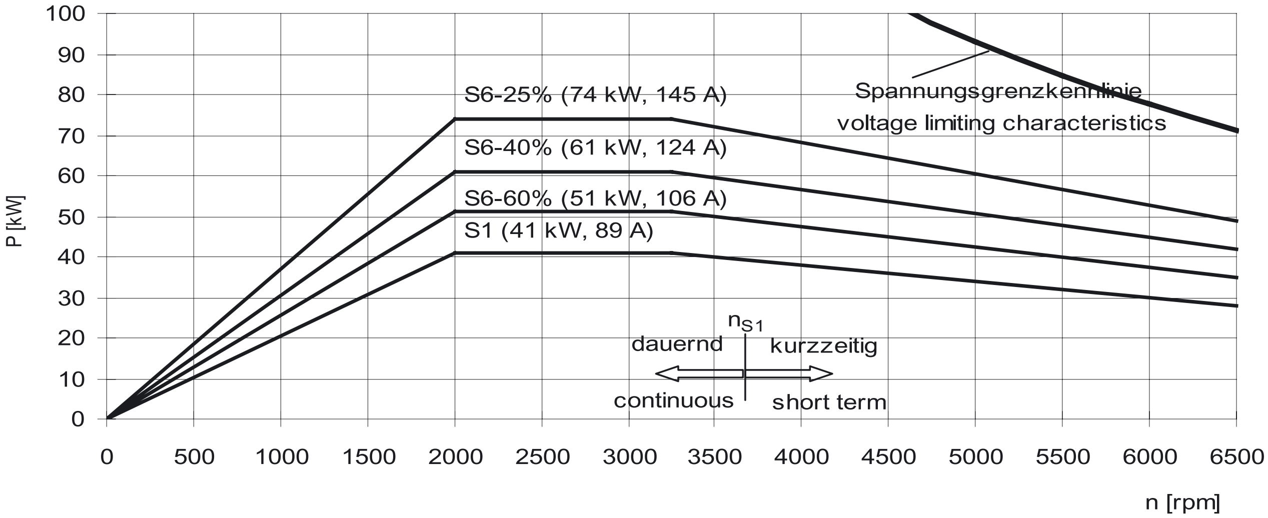


Table 7-84 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7167-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	41,0	196	89	350	67,4	3250	6500	35	40,0	178



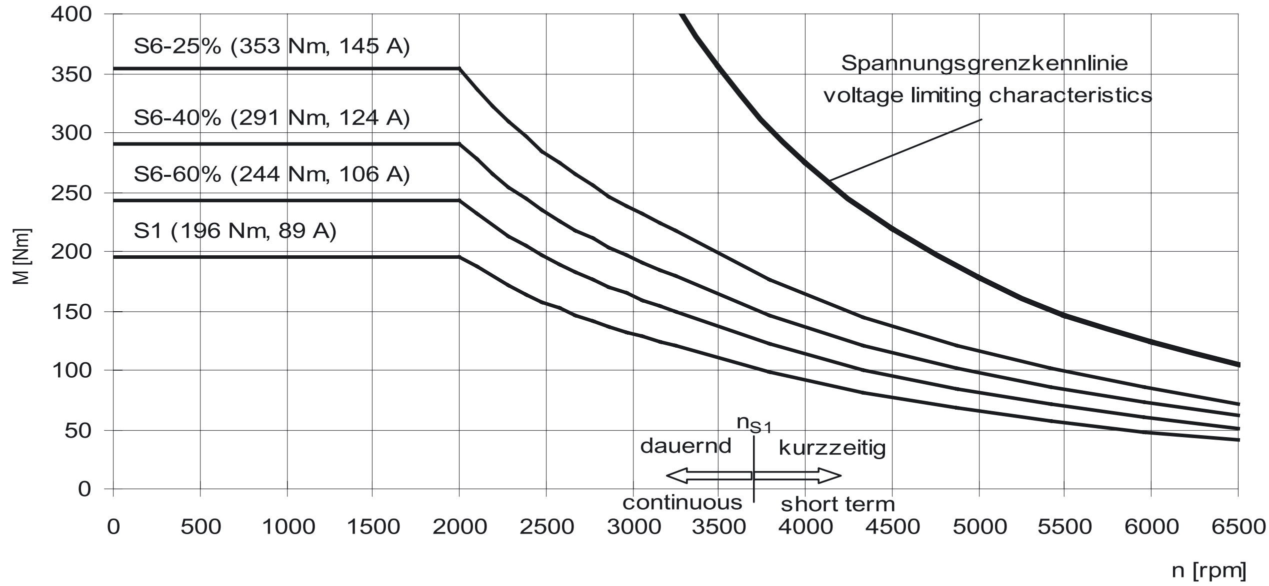
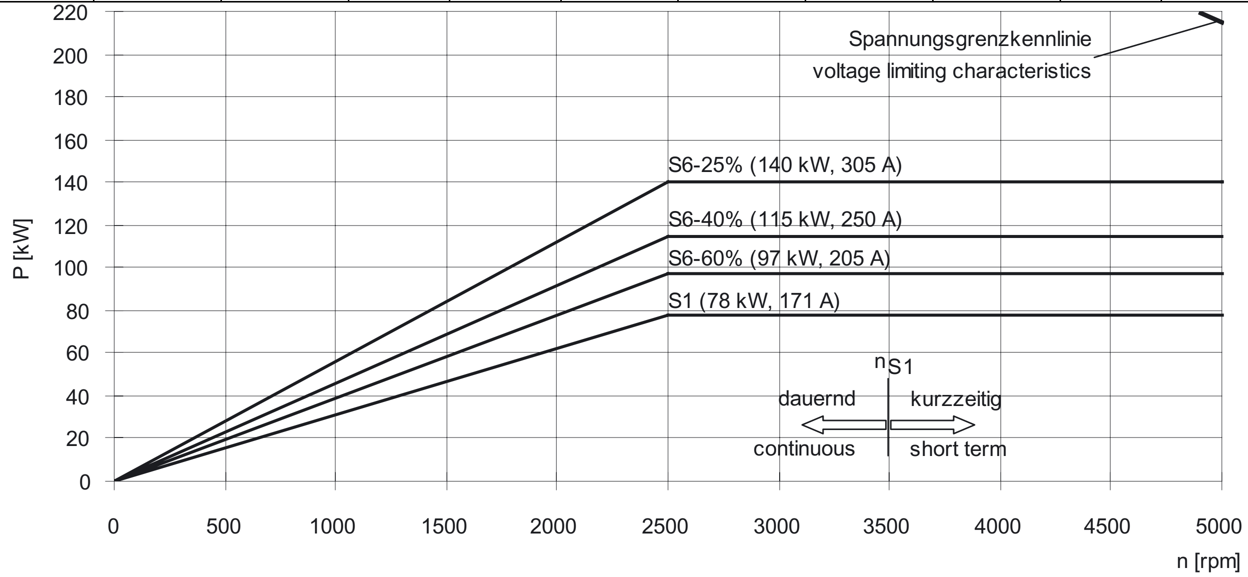
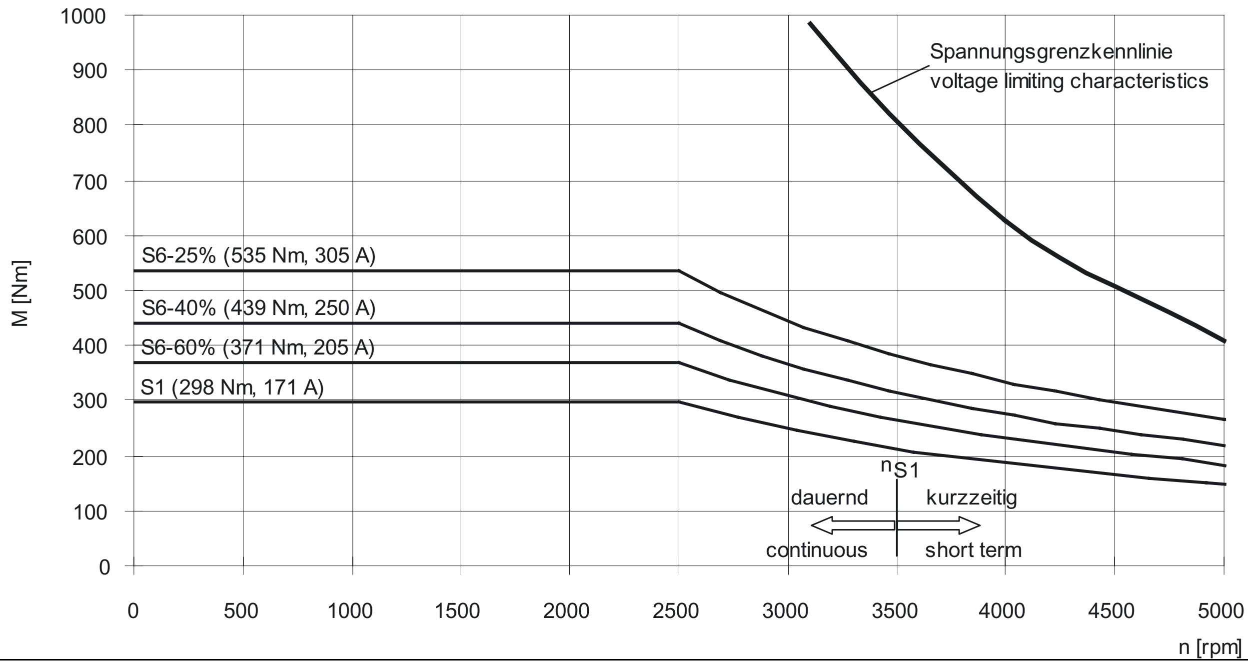


Table 7-85 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7184-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2500	78	298	171	340	84,1	5000	5000 [1)]	40	77	342

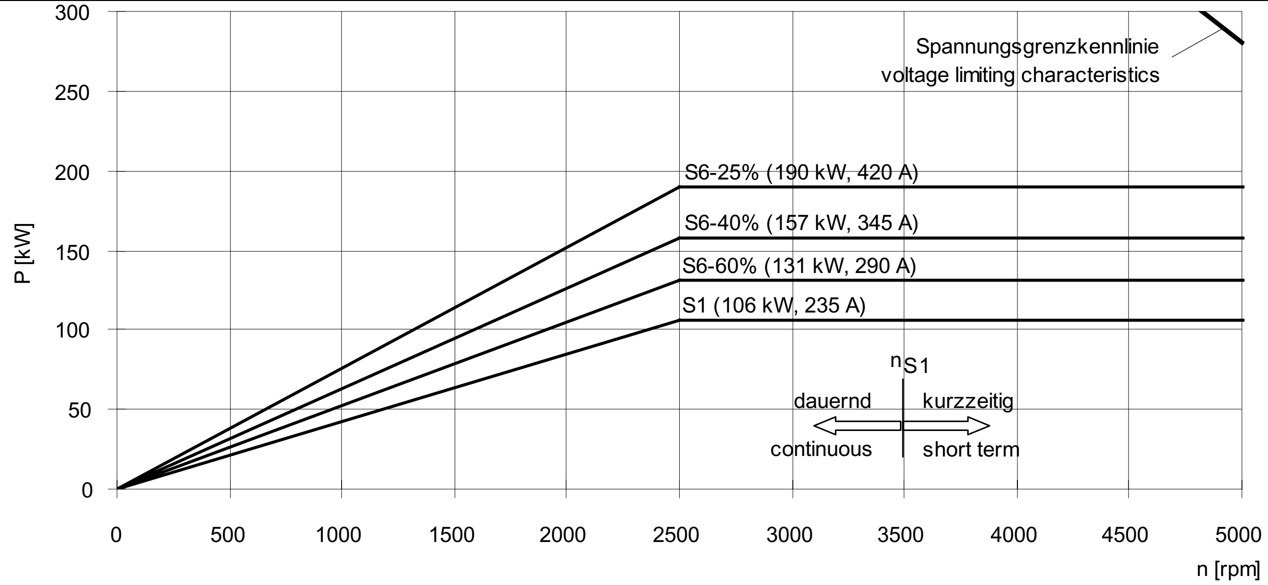




1) 3000 rpm for increased cantilever forces

Table 7-86 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7186-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2500	106	405	235	335	84,1	5000	5000	40	108	470



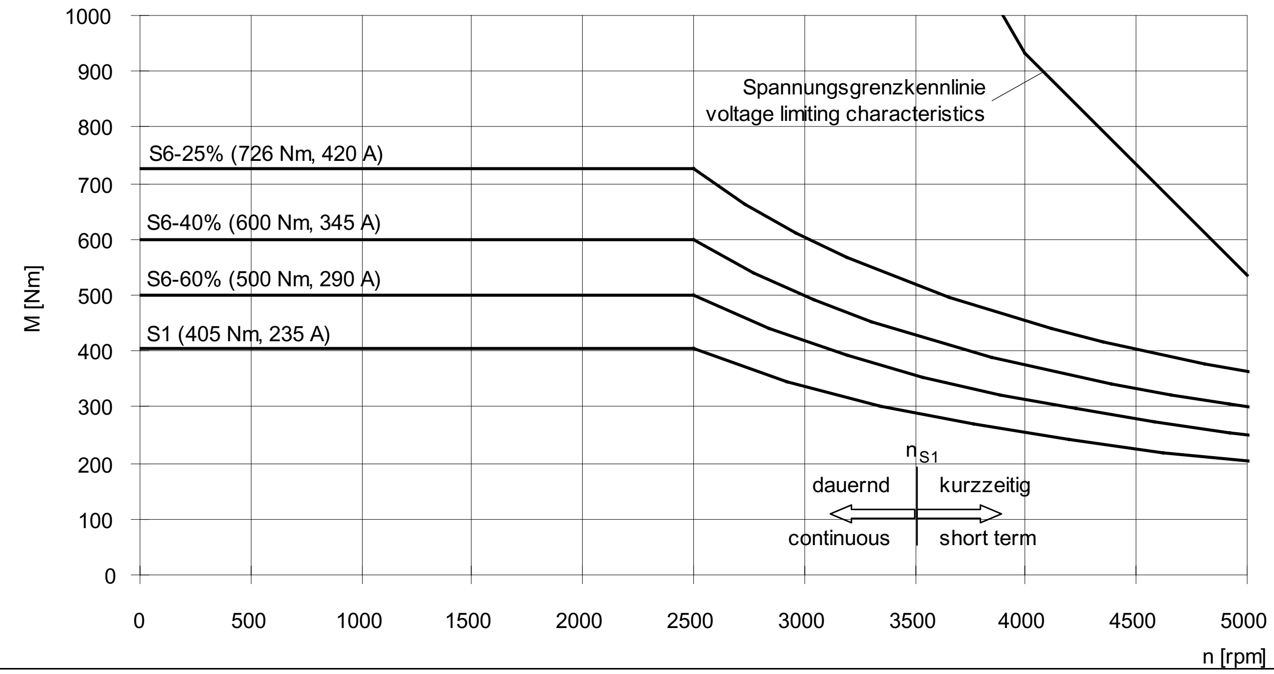
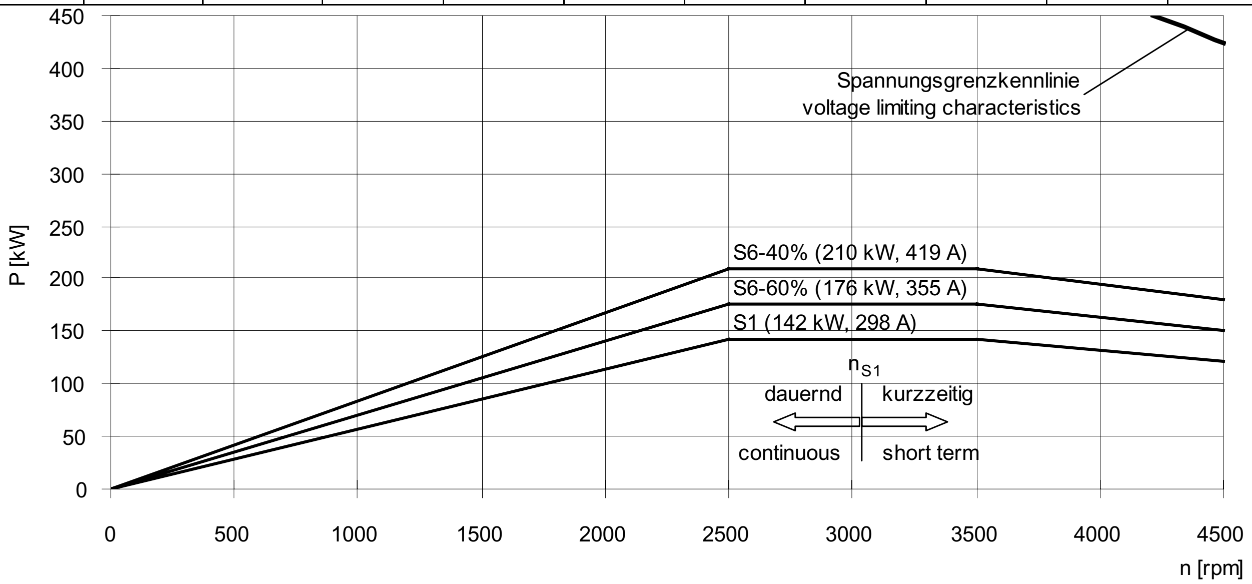


Table 7-87 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7224-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
2500	142	542	298	340	84,0	3500	4500	40	115	600



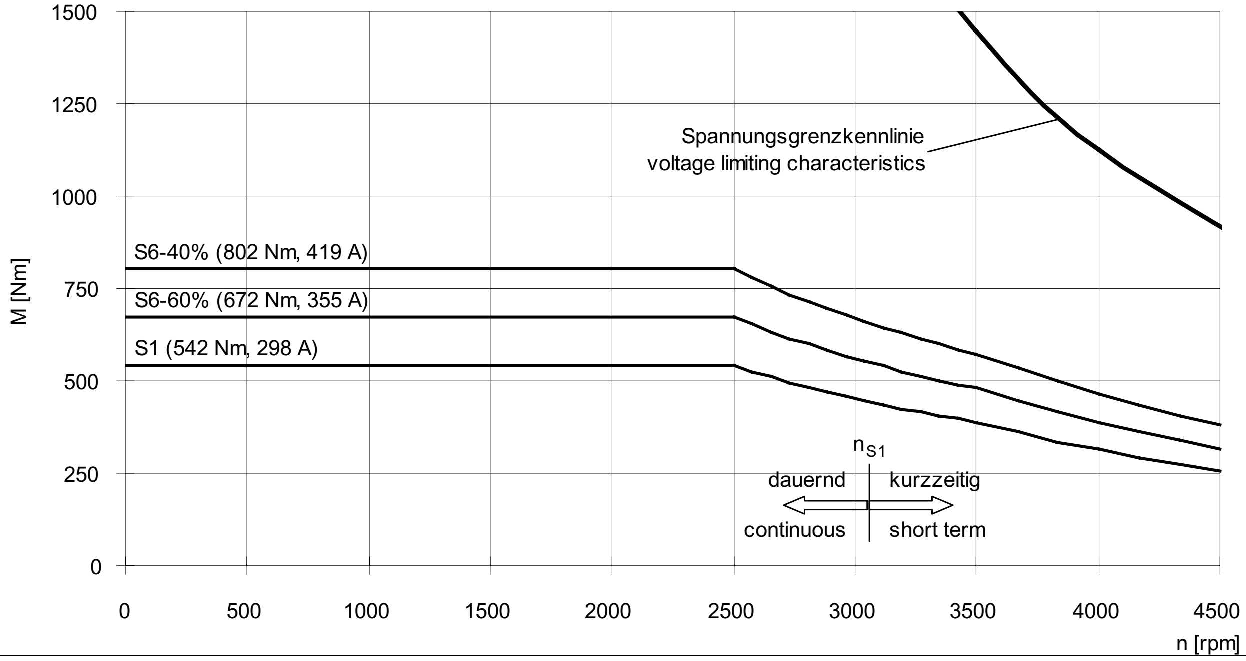


Table 7-88 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7226-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2500	168	642	362	335	84,0	3500	4500	40	154	725

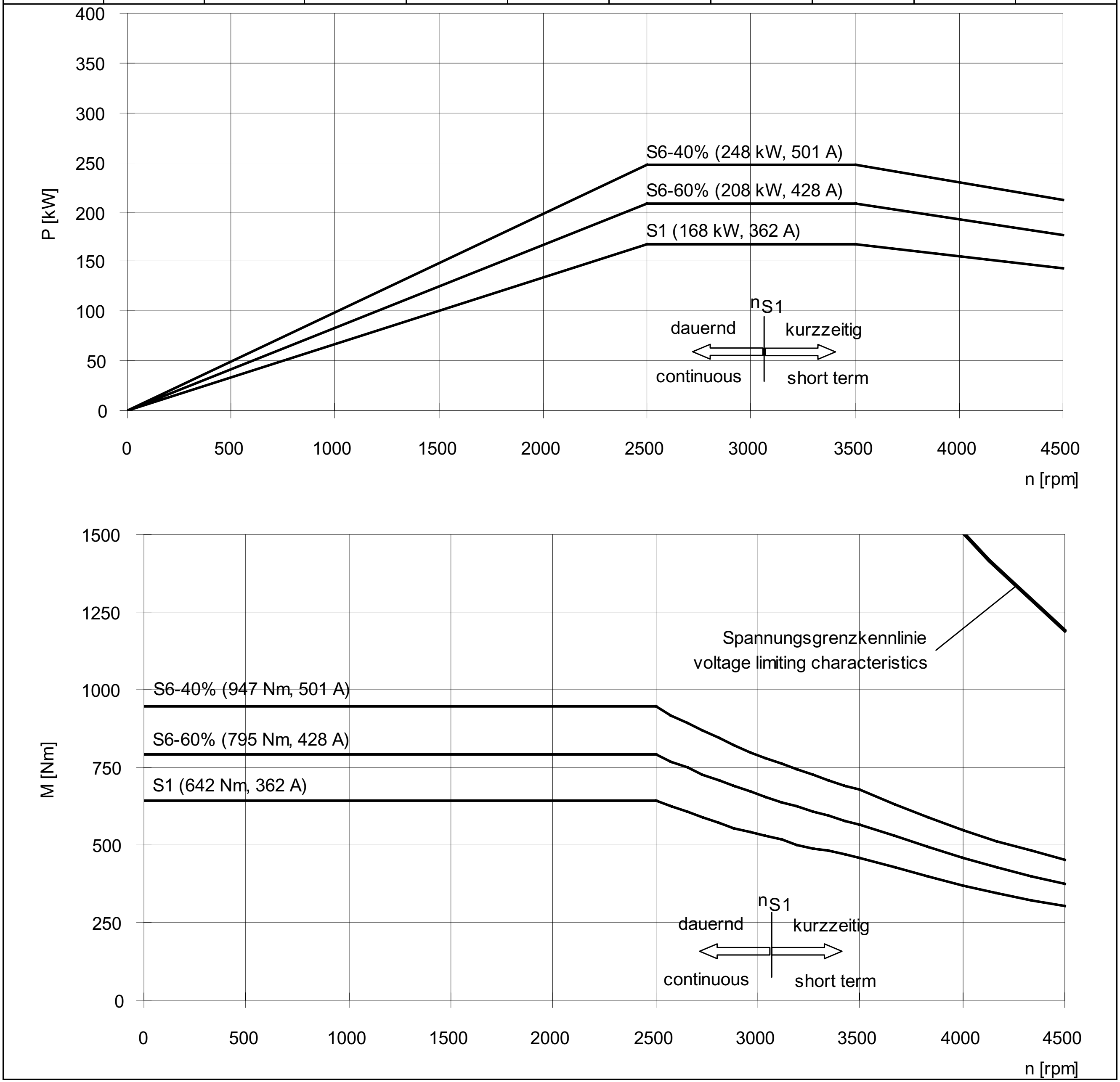
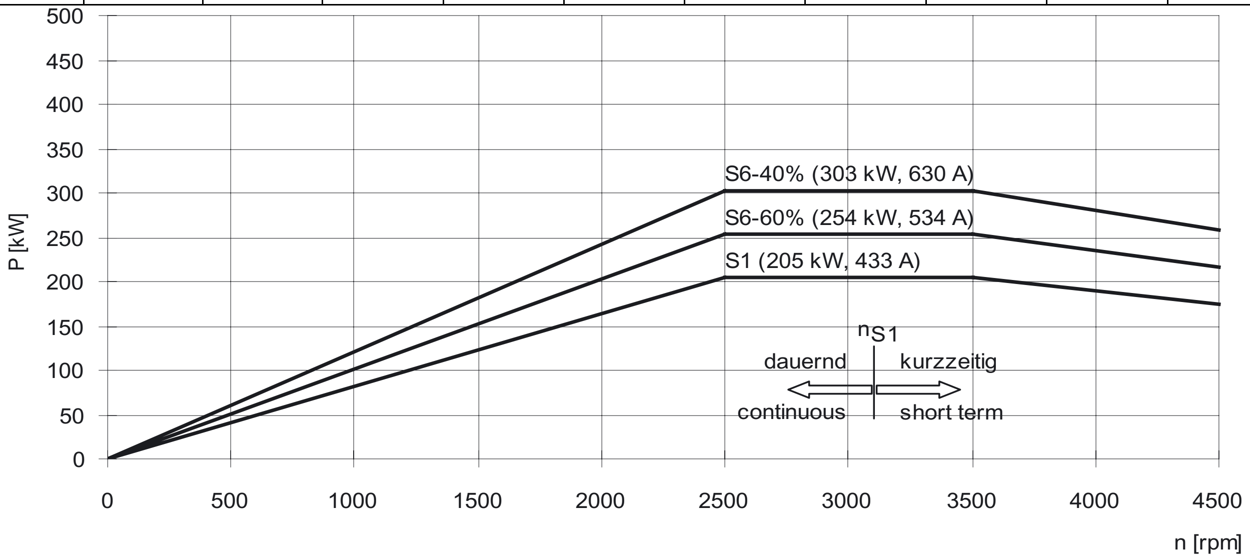
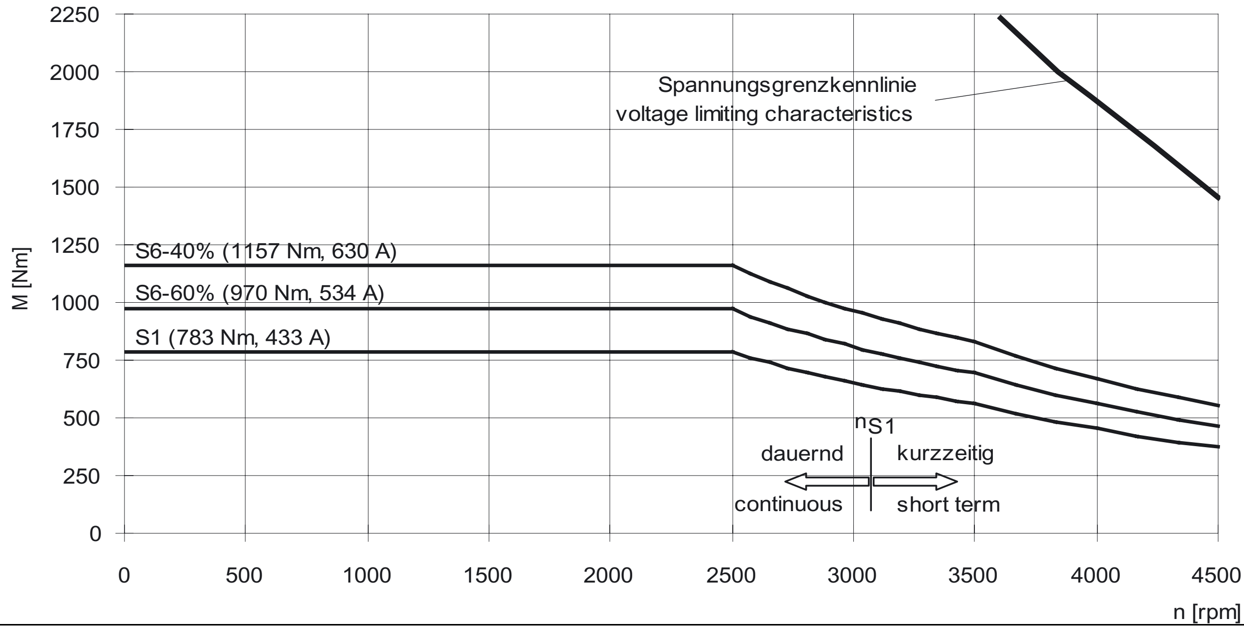


Table 7-89 SINAMICS, 3-ph. 400 V AC, Servo Control (ALM), 1PH7228-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2500	205	783	433	340	83,9	3500	4500 1)	40	185	870



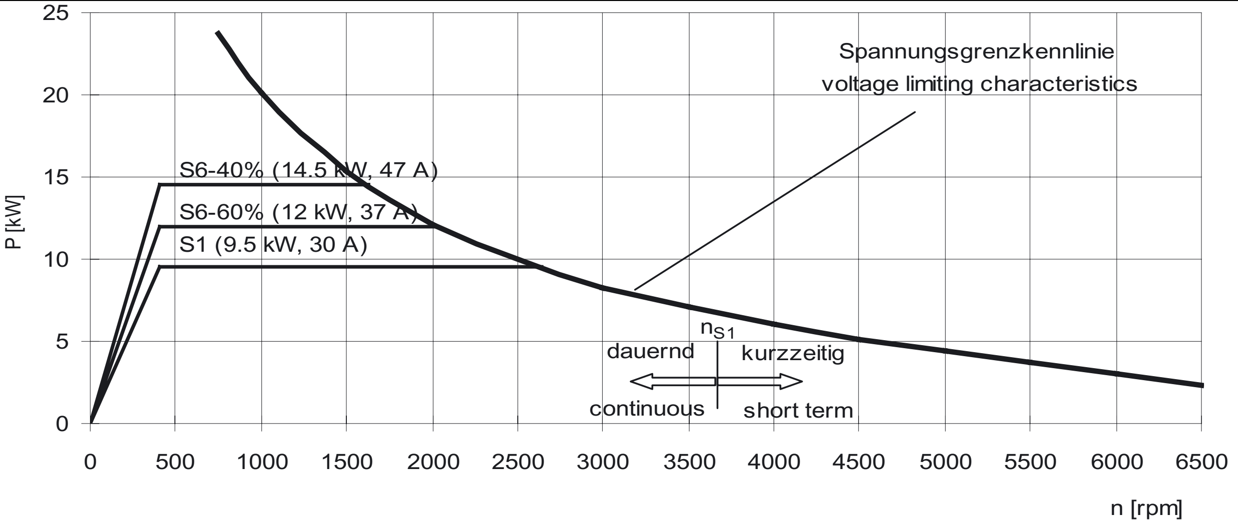


1) 4000 rpm for increased cantilever forces

7.2 SINAMICS 3-ph. 400 V AC, Vector Control (VC)

Table 7-90 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7163-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
400	9,5	227	30	274	14,3	2637	6500	35	11,5	51



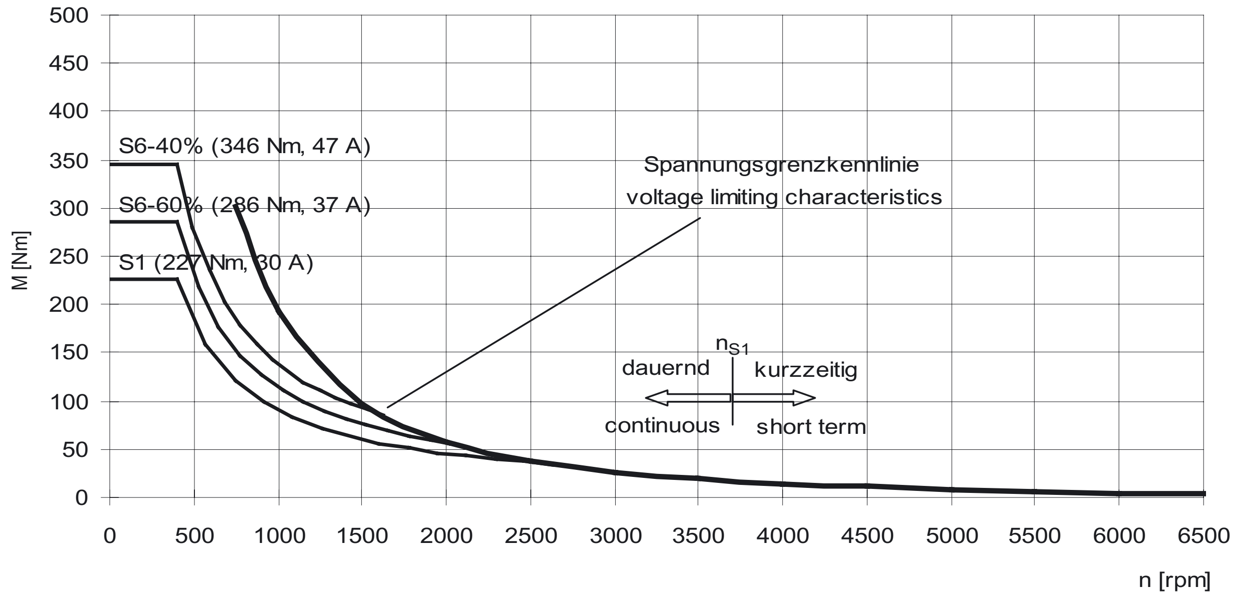
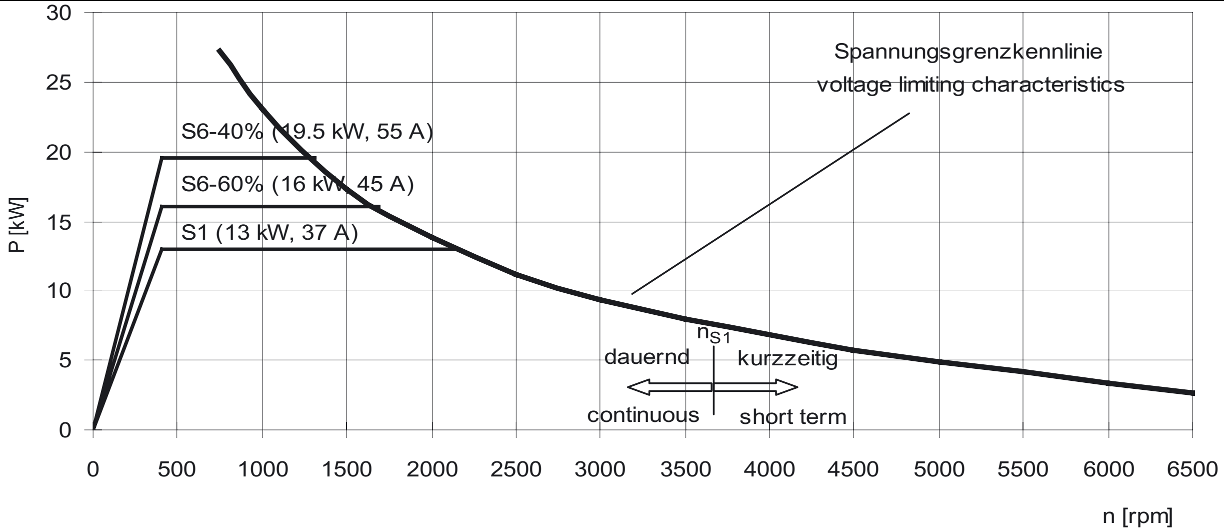


Table 7-91 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7167-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
400	13,0	310	37	294	14,3	2147	6500	35	14,0	70



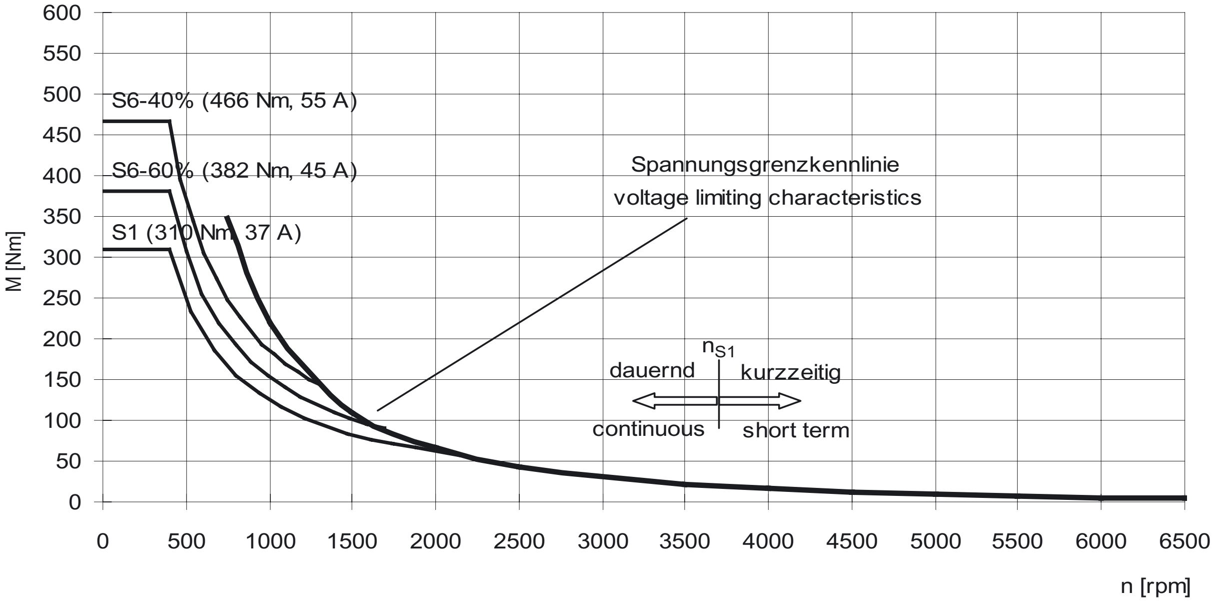
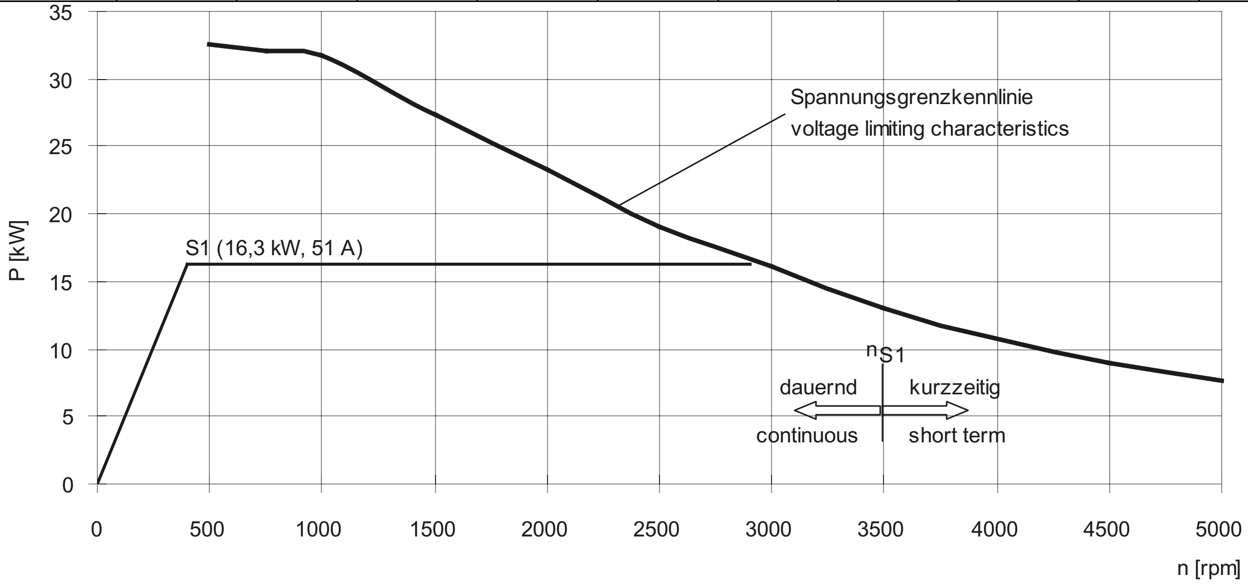


Table 7-92 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7184-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
400	16,3	390	51	271	14,2	2900	5000	40	26	80



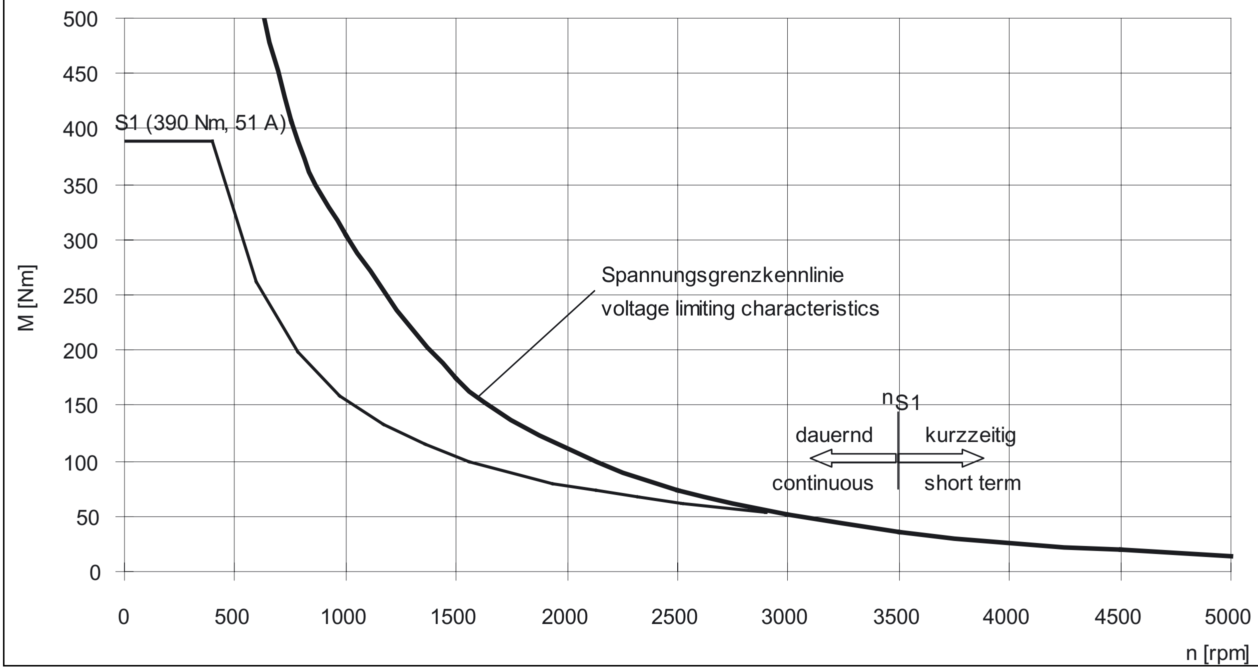
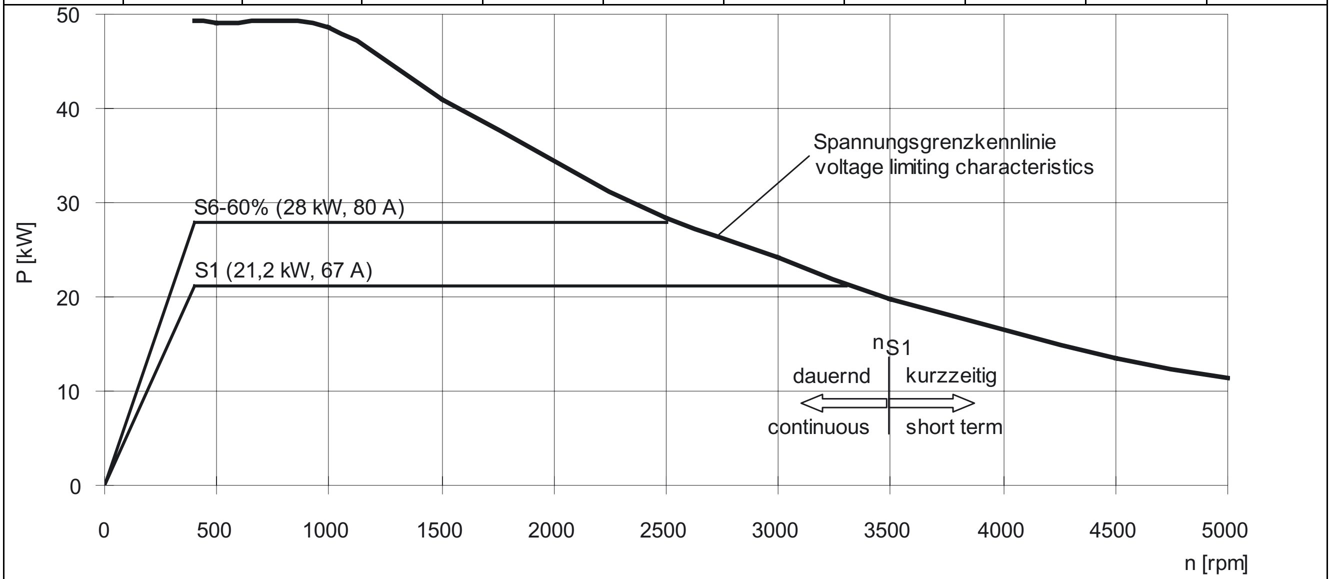


Table 7-93 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7186-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
400	21,2	505	67	268	14,0	3300	5000	40	38,5	109



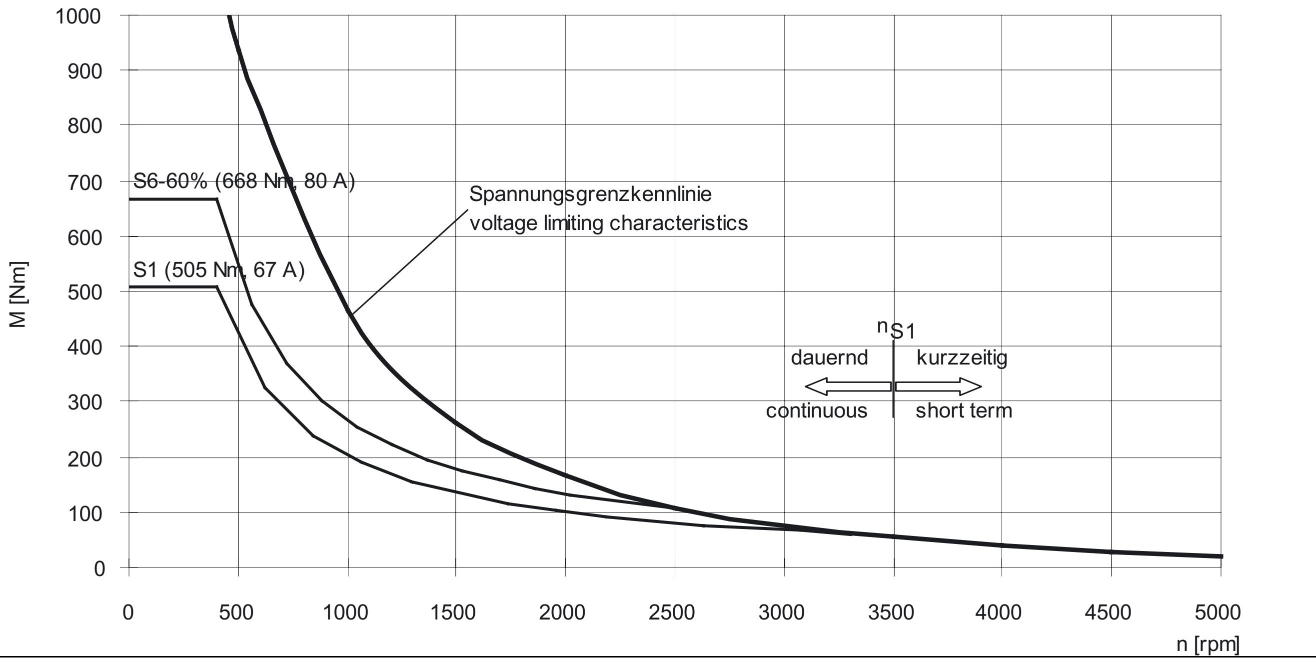
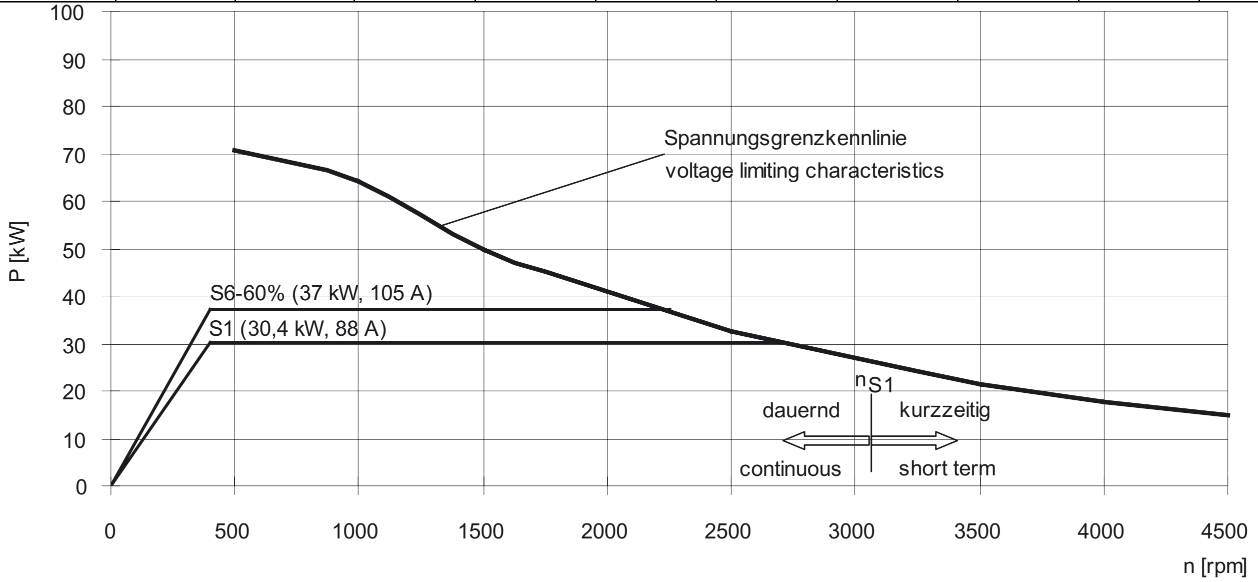


Table 7-94 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7224-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
400	30,4	725	88	268	14,0	2700	4500	40	36,5	160



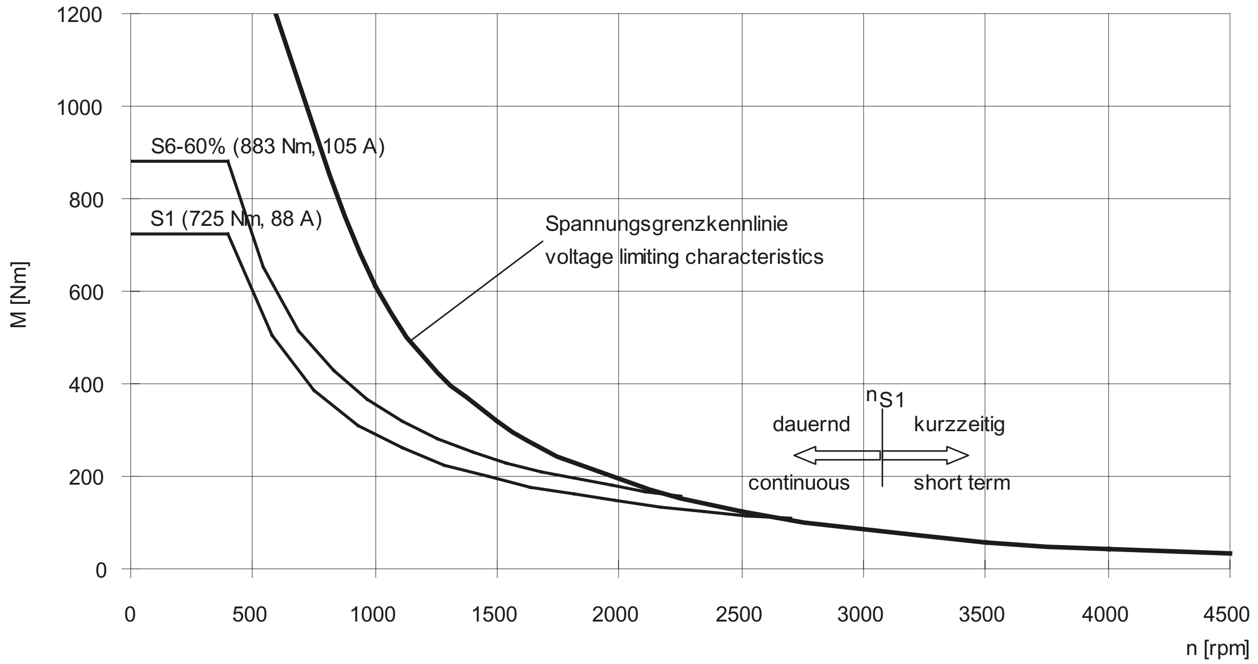
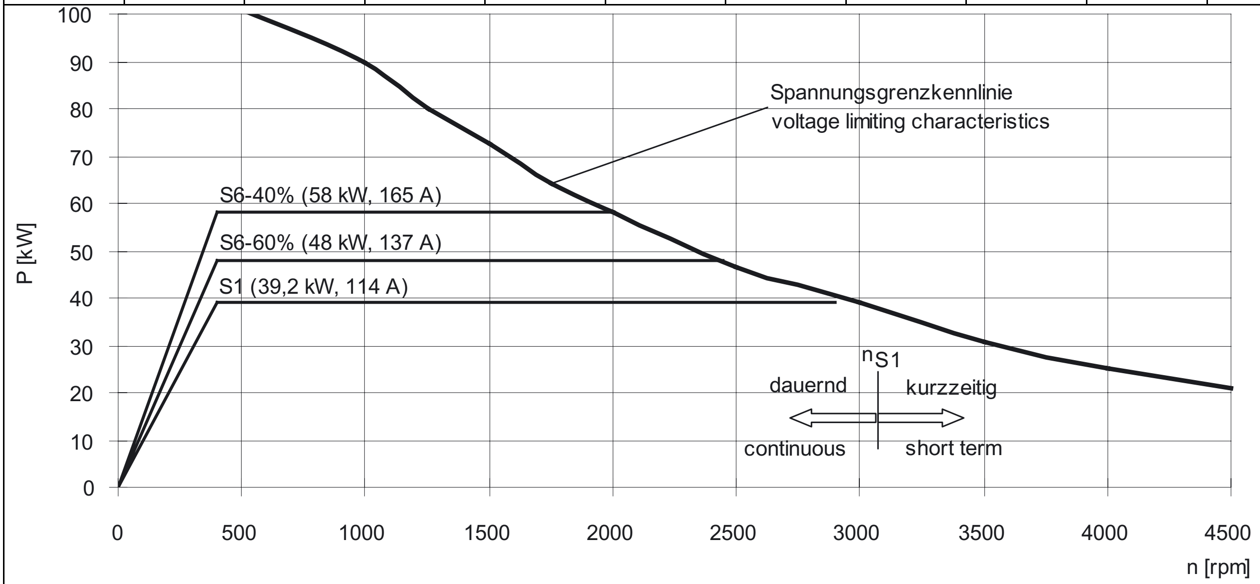


Table 7-95 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7226-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
400	39,2	935	114	264	14,0	2900	4500	40	49	250



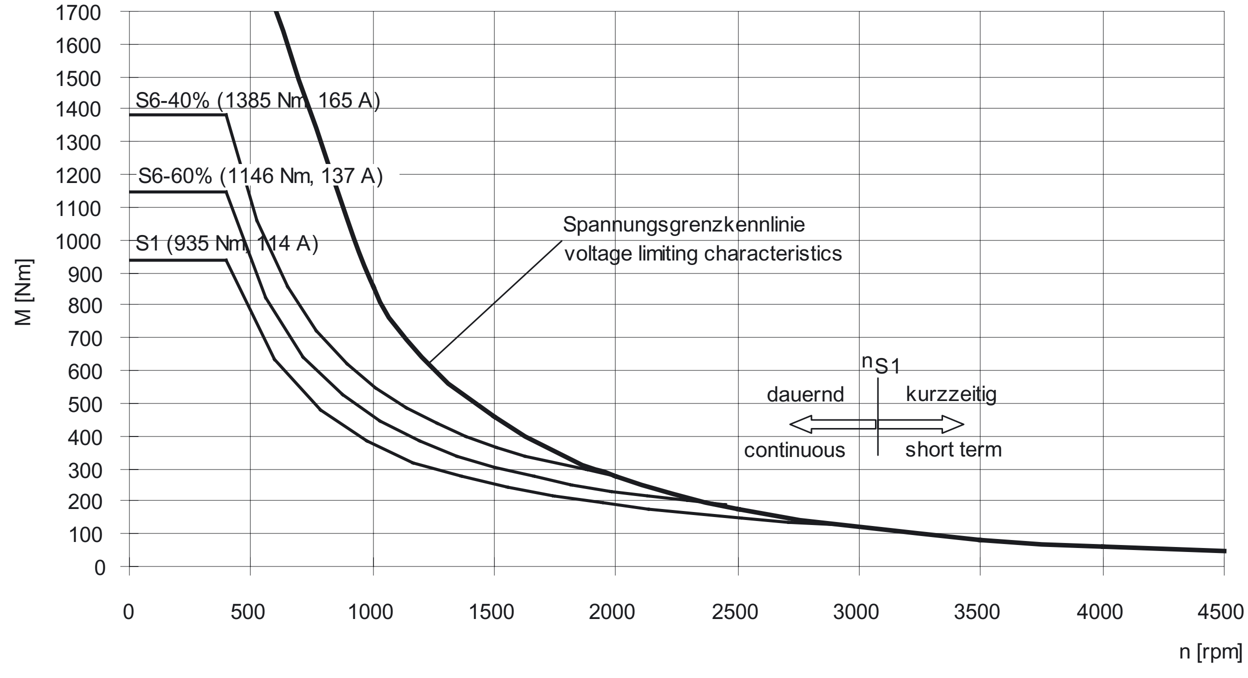
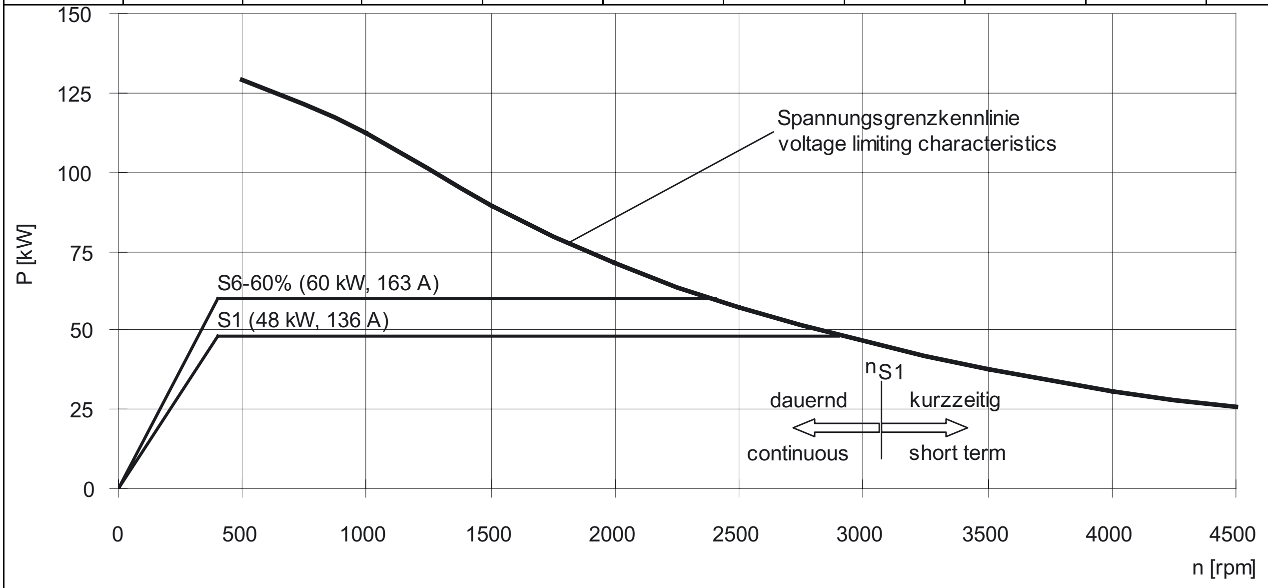
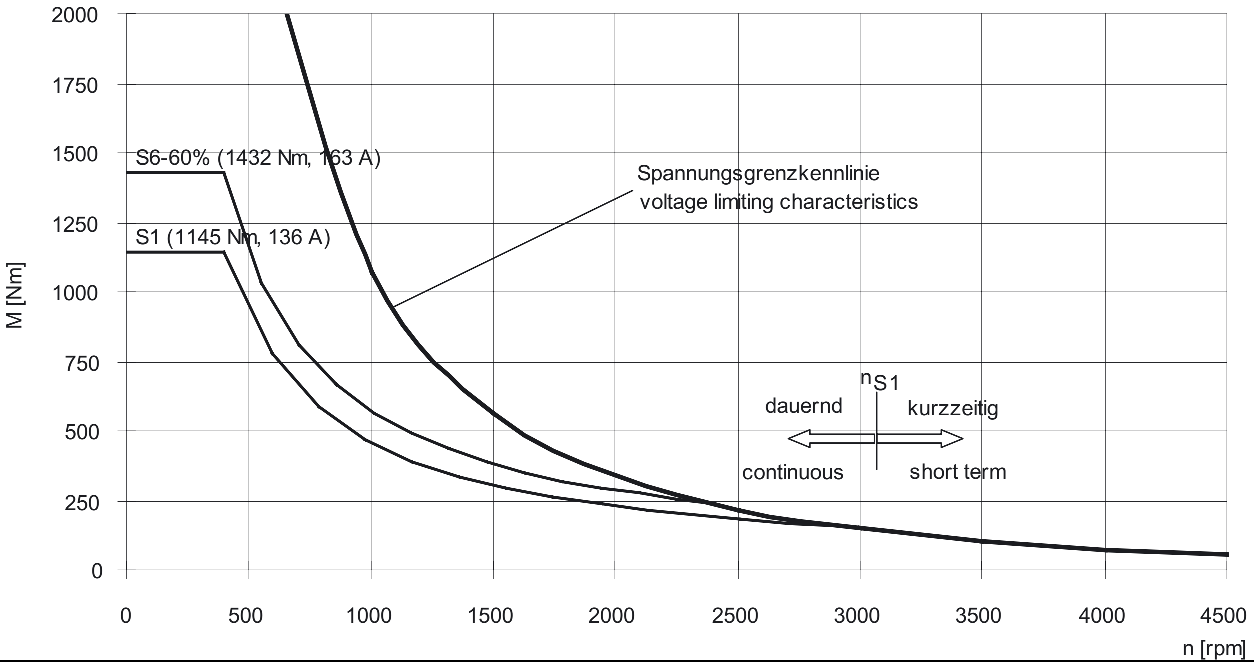


Table 7-96 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7228-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
400	48	1145	136	272	13,9	2900	4500 1)	40	60,5	260

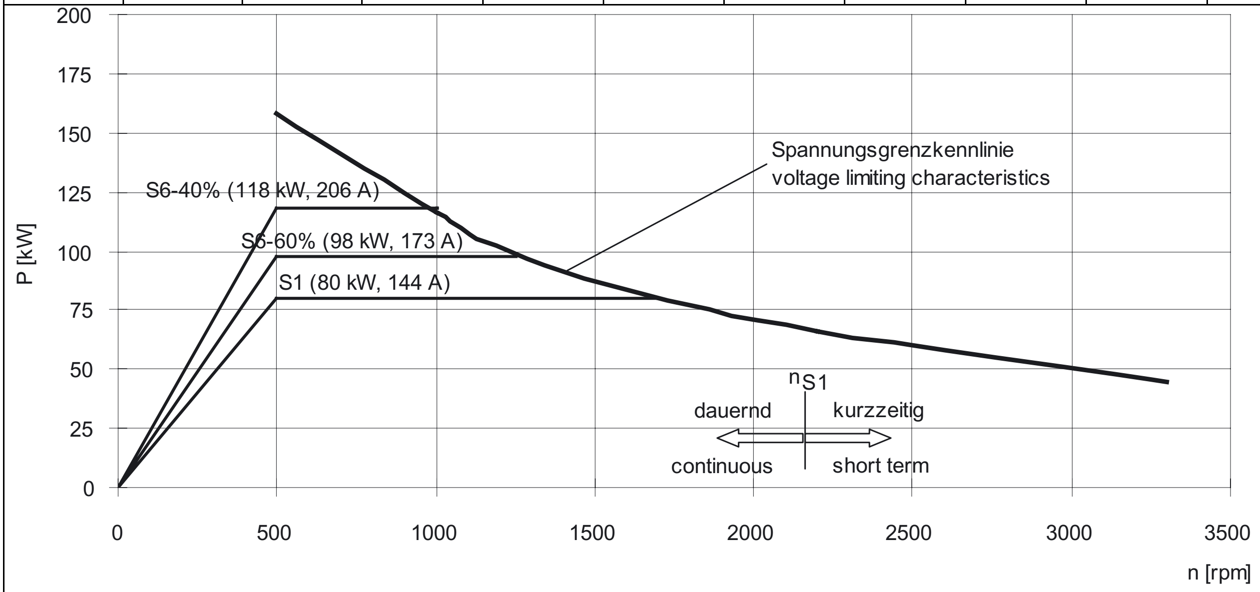




1) 4000 rpm for increased cantilever forces

Table 7-97 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7284-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
500	80	1529	144	400	17	1700	3300	75	60	295



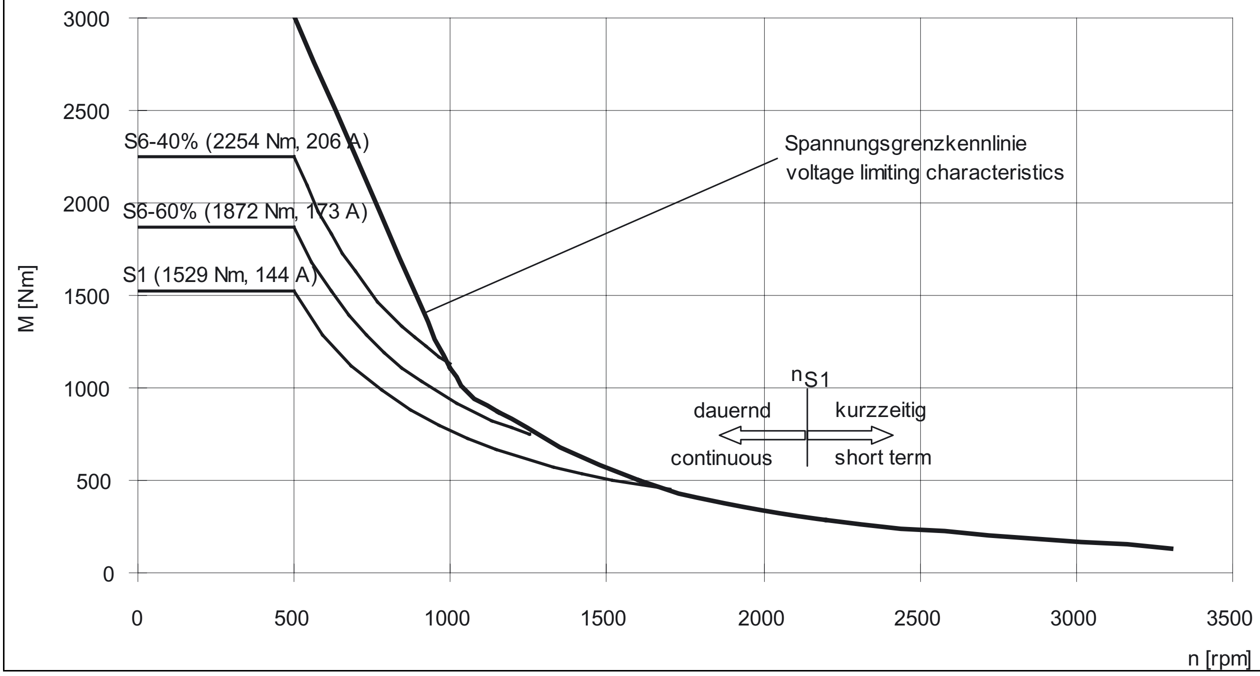
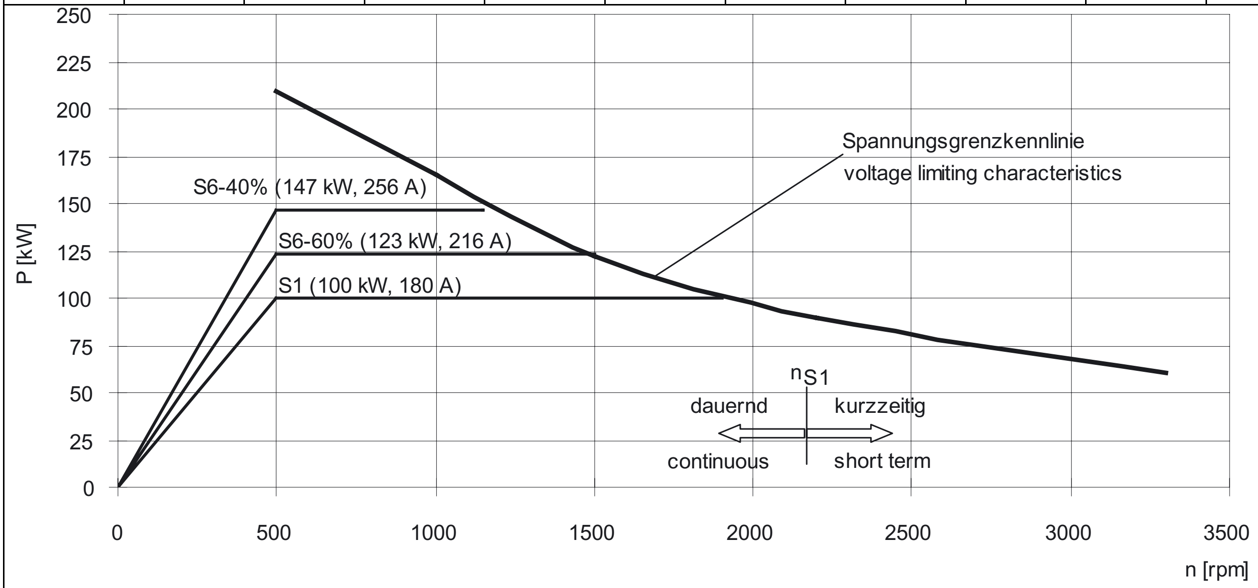


Table 7-98 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7286-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
500	100	1909	180	400	17	1800	3300	83	78	360



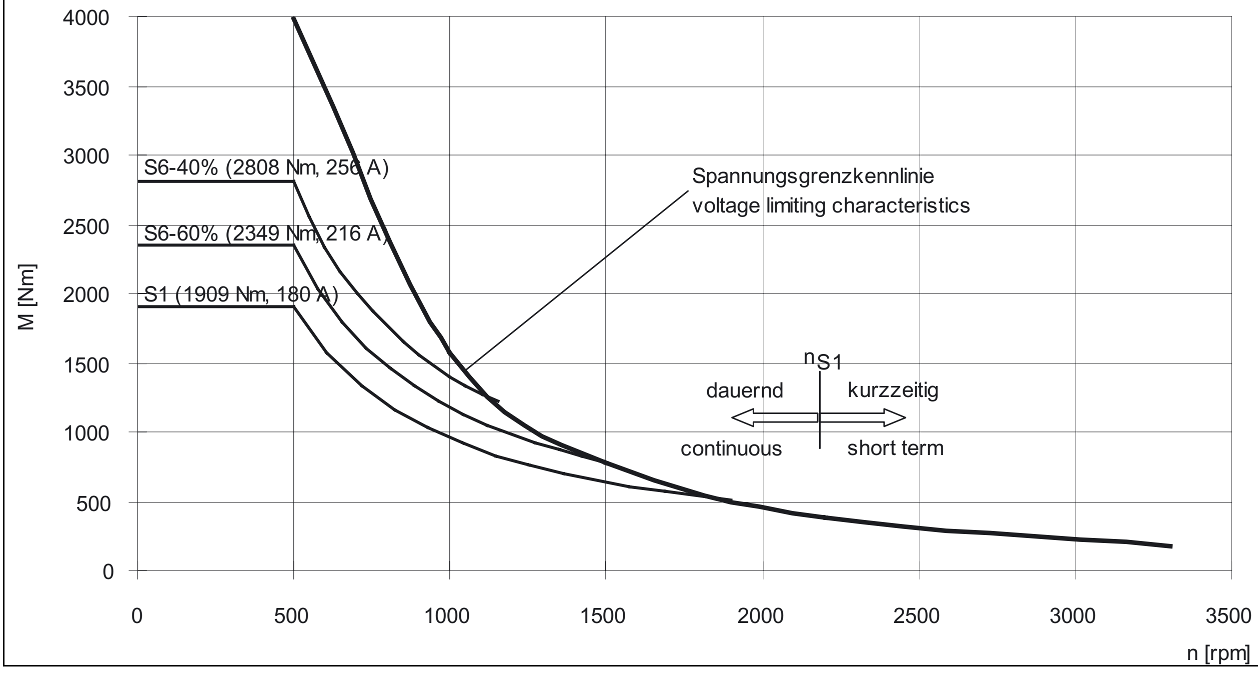
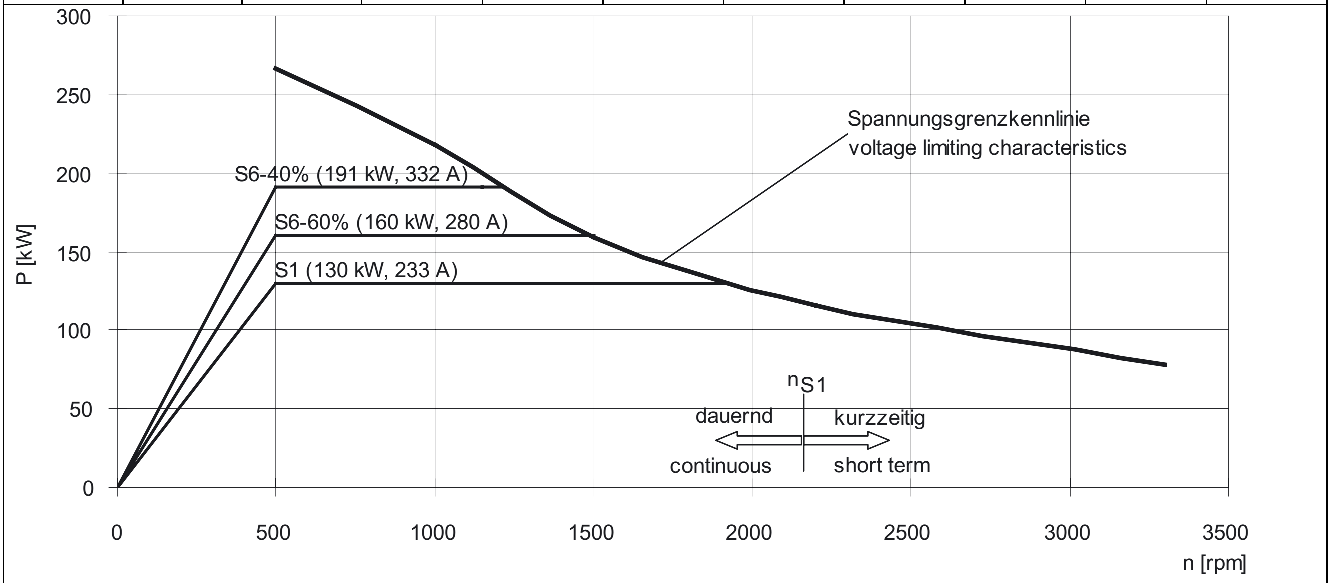


Table 7-99 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7288-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
500	130	2481	233	400	17	1800	3300	90	100	465



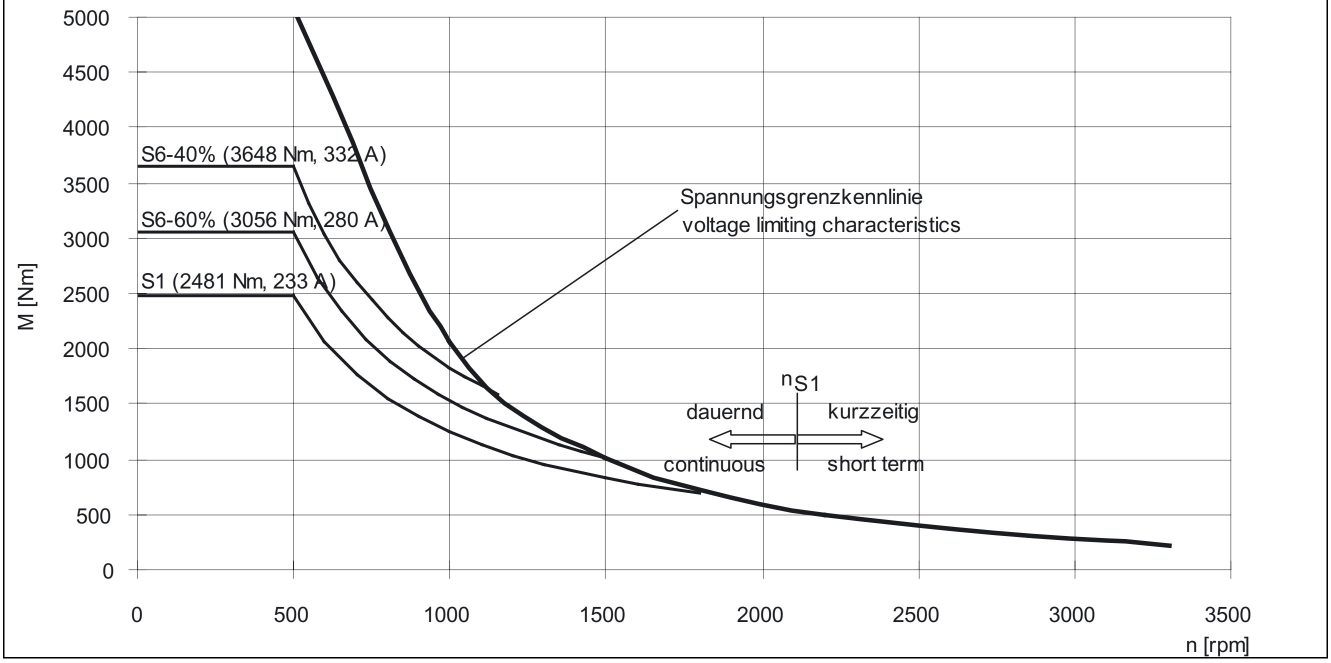
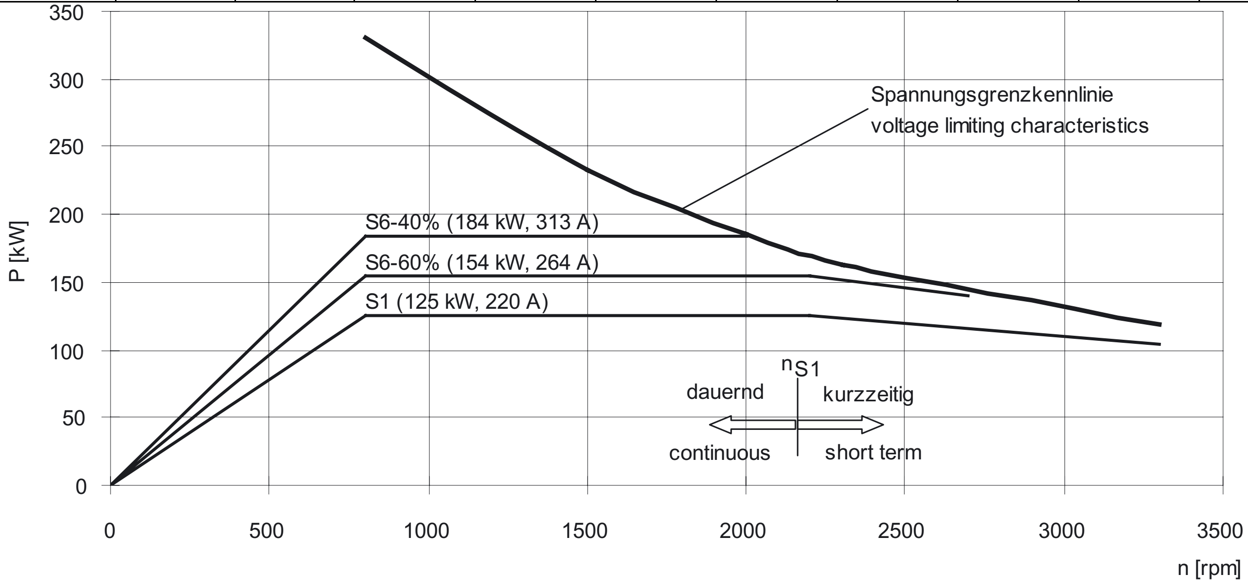


Table 7-100 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7284-□□C□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
800	125	1492	220	400	27	2200	3300	75	95	430



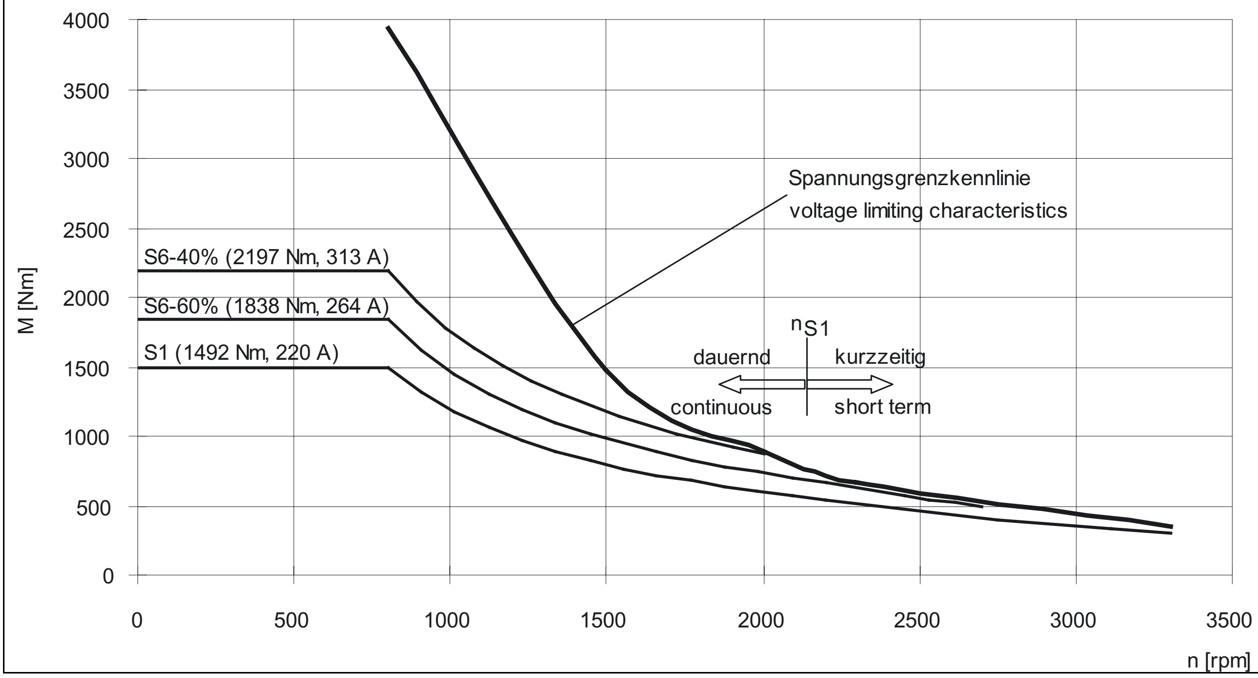
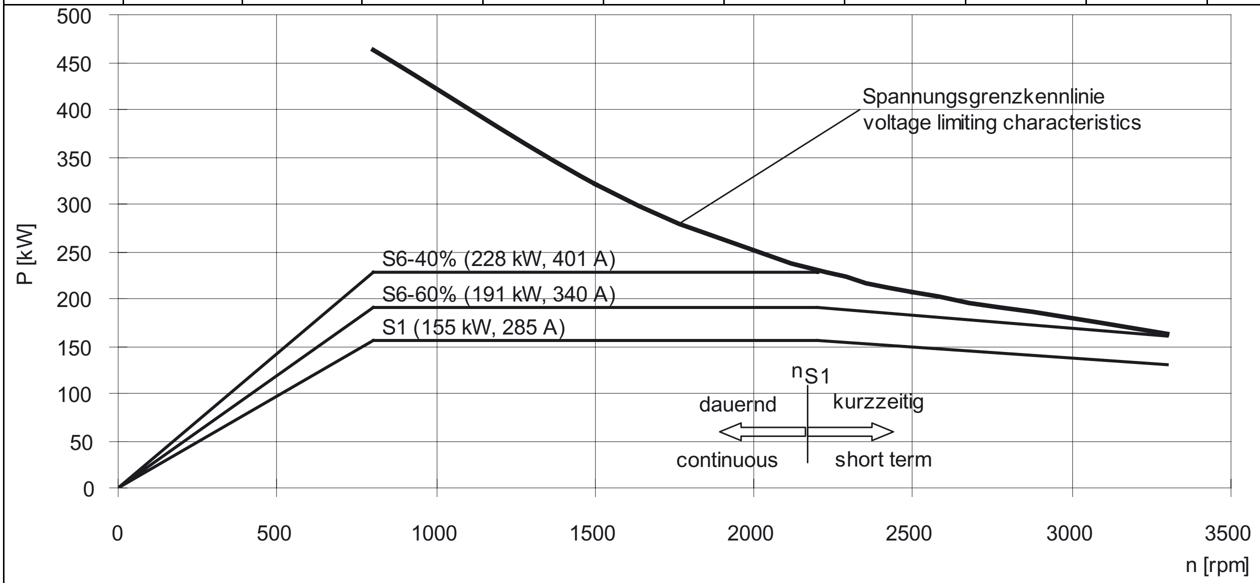


Table 7-101 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7286-□□C□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
800	155	1850	285	385	27	2200	3300	83	135	555



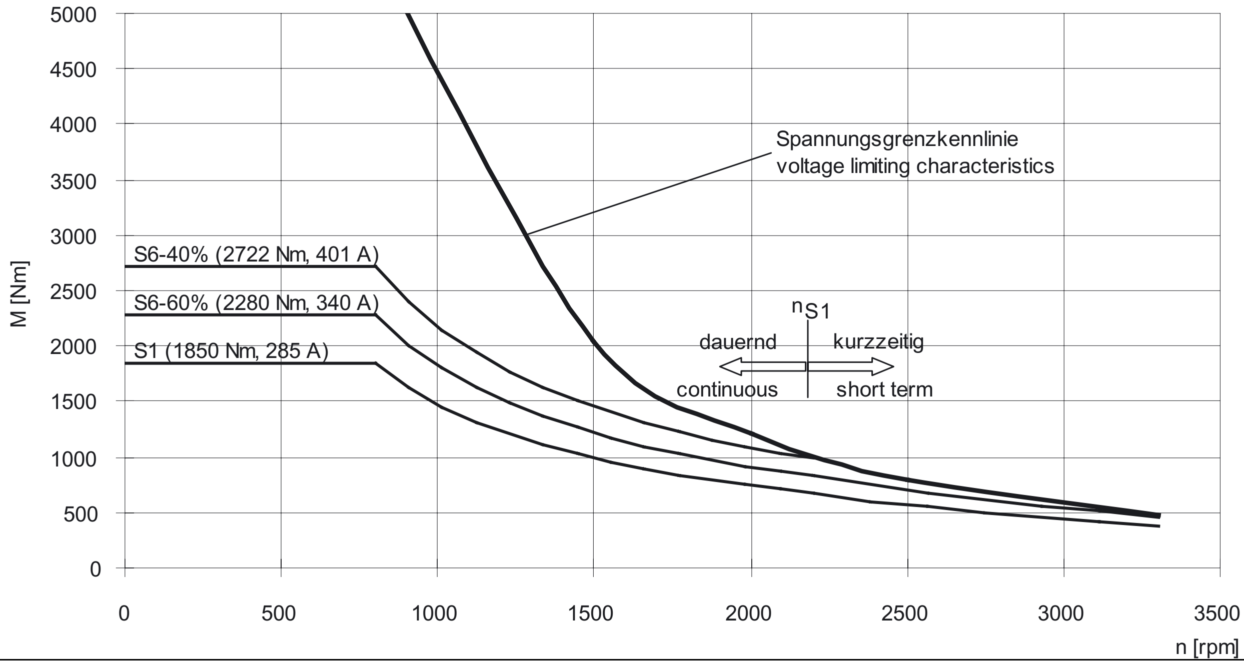
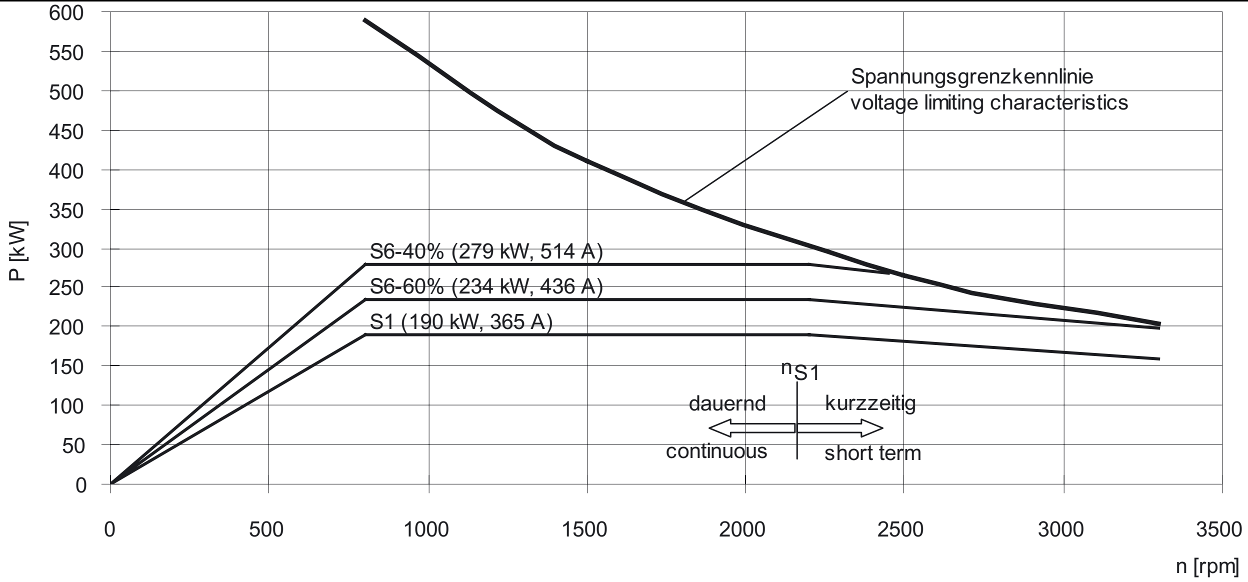


Table 7-102 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7288-□□C□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
800	190	2268	365	370	27	2200	3300	90	170	700



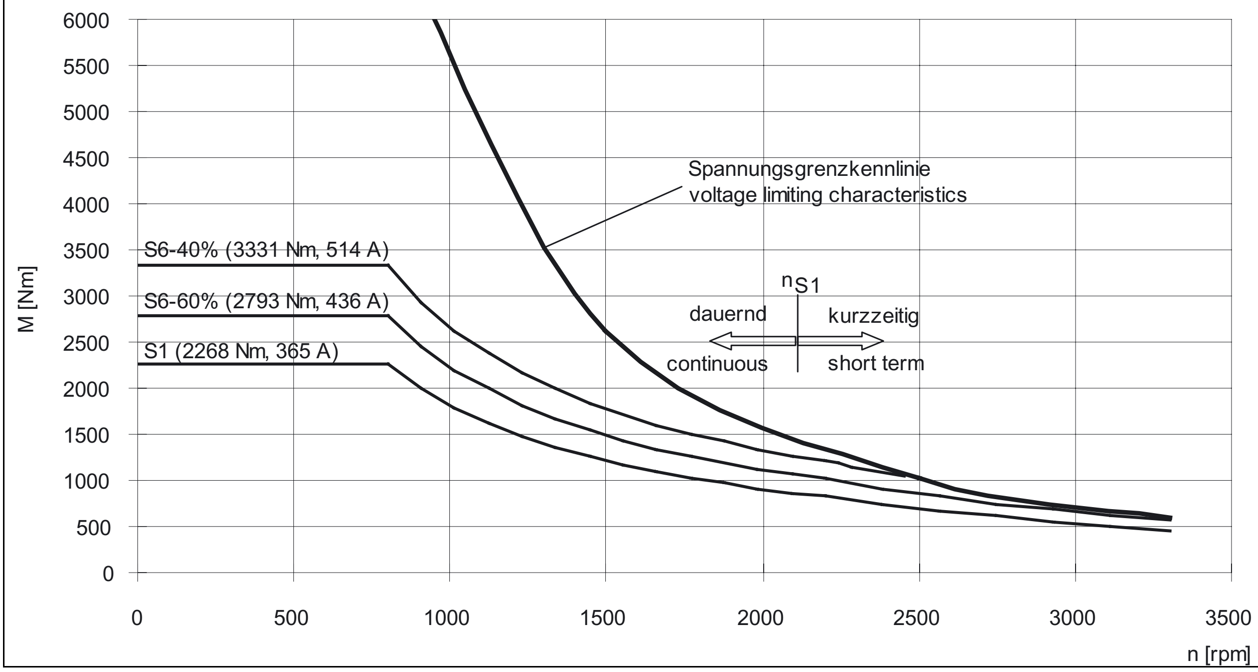
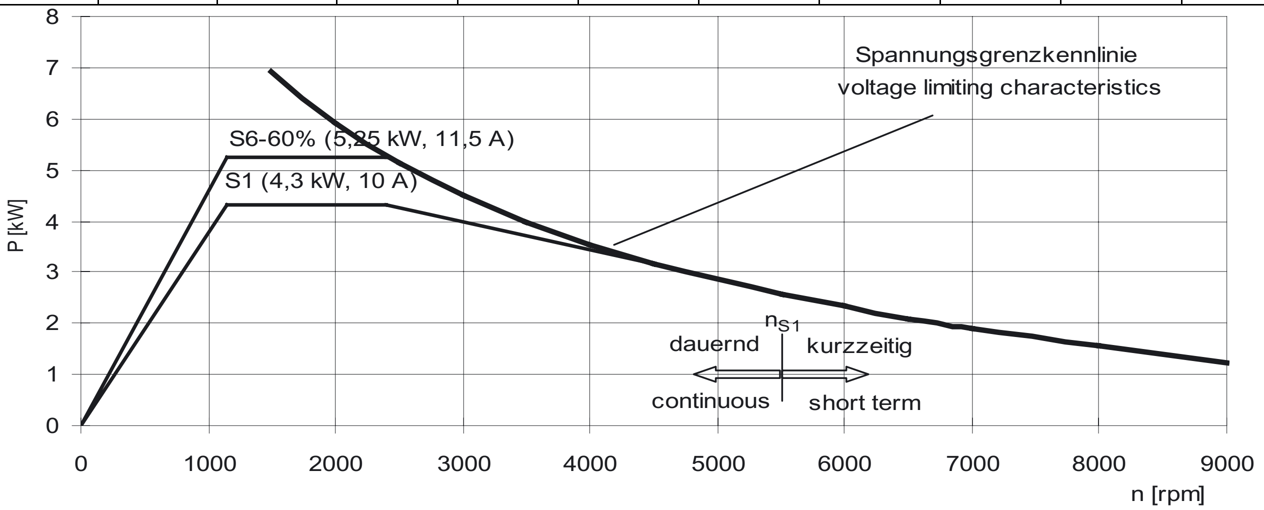


Table 7-103 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7103-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1150	4,3	35,7	10,0	391	40,6	2400	9000	20	5,0	18,0



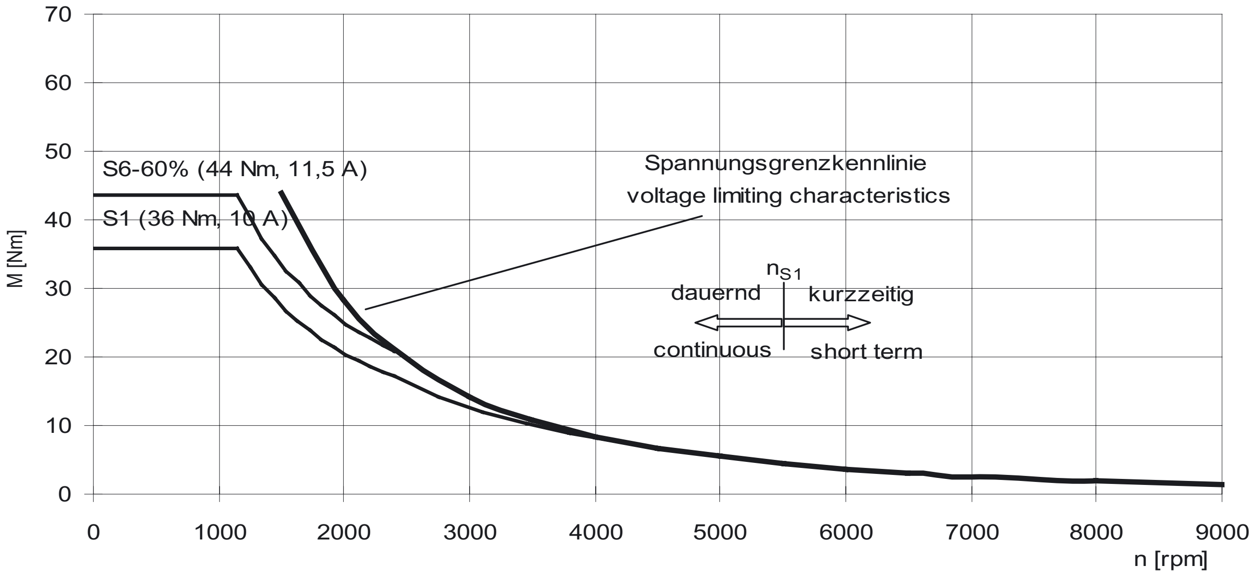
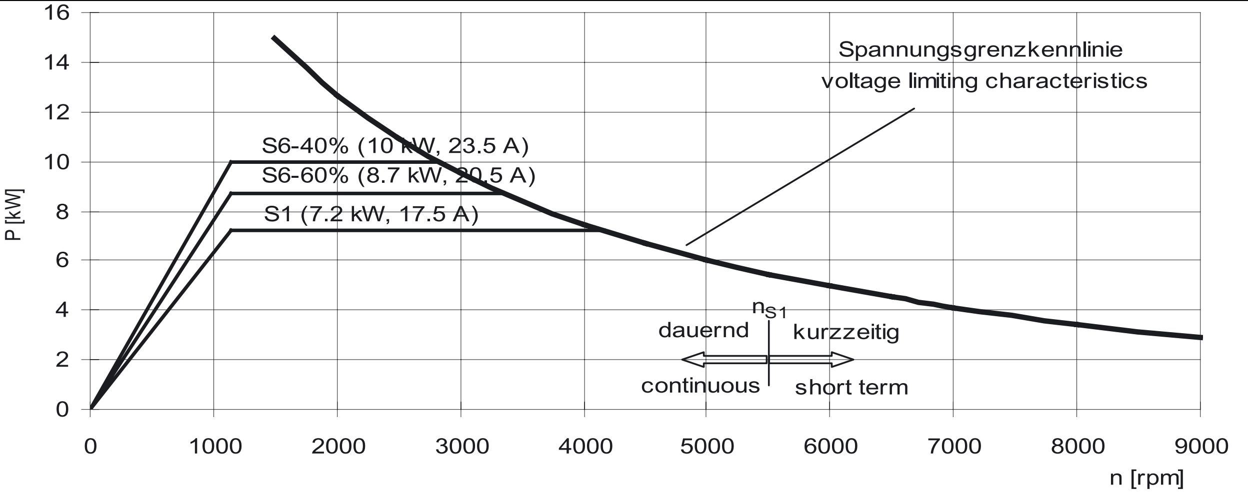


Table 7-104 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7107-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1150	7,2	59,8	17,5	360	40,3	4171	9000	20	8,8	35,0



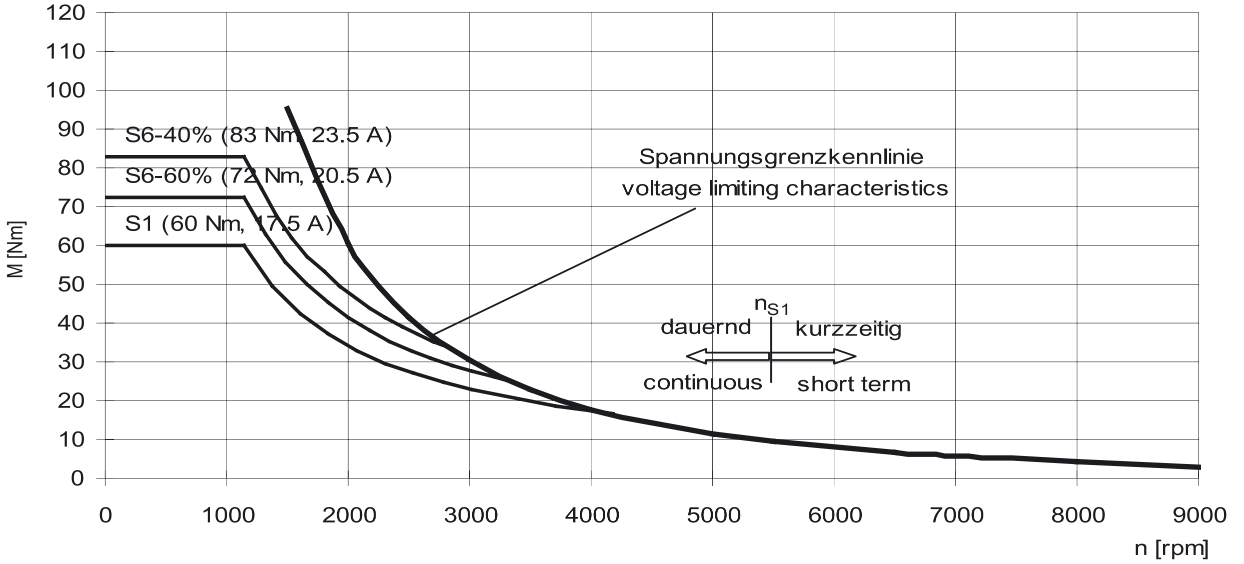
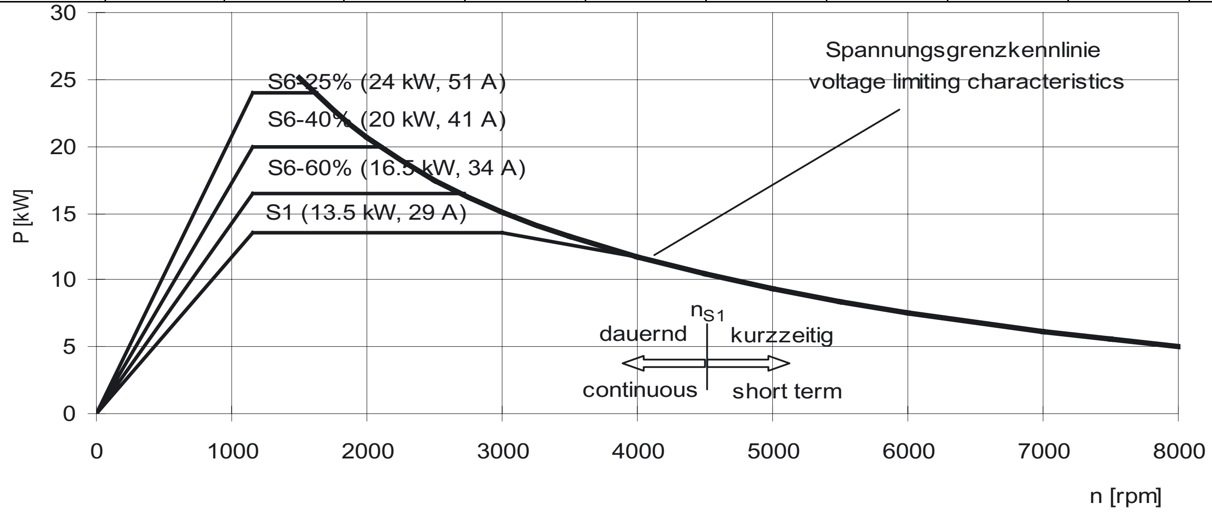


Table 7-105 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7133-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1150	13,5	112	29	381	39,7	3000	8000	30	13,0	58



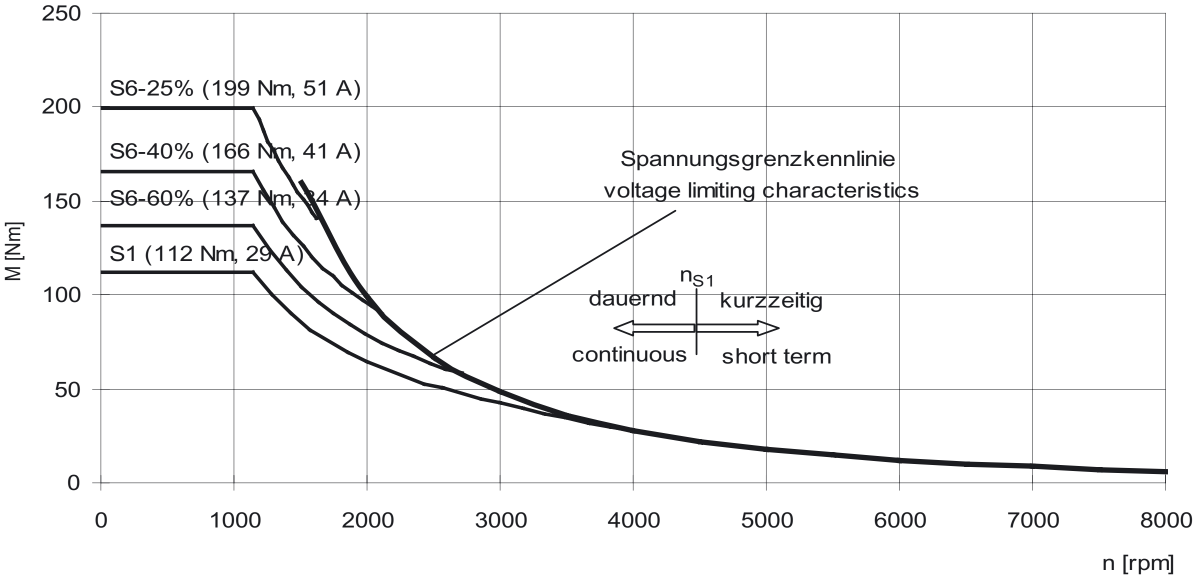
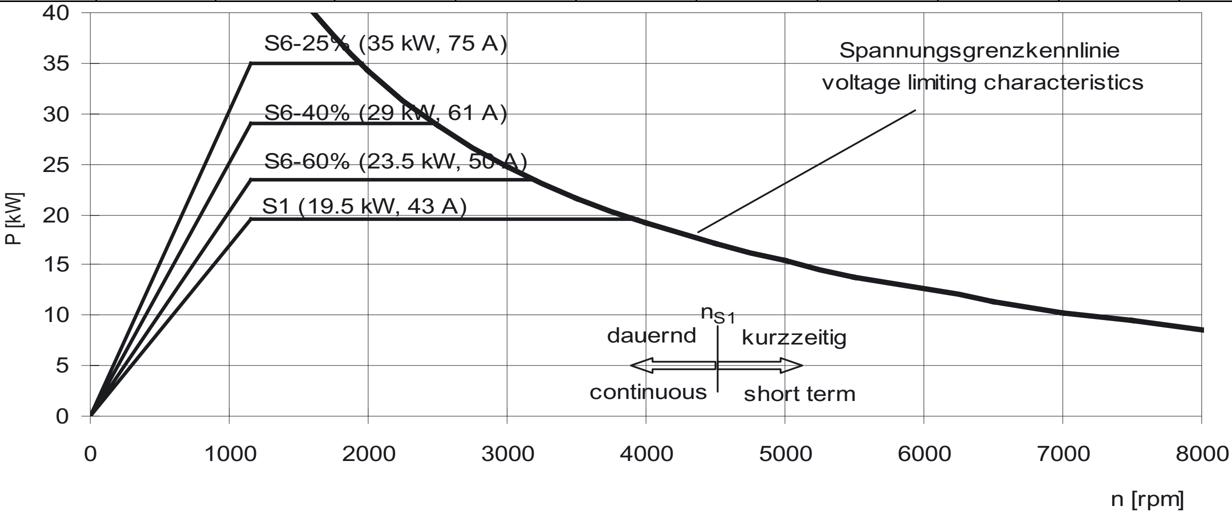


Table 7-106 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7137-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1150	19,5	162	43	367	39,6	3935	8000	30	19,0	86



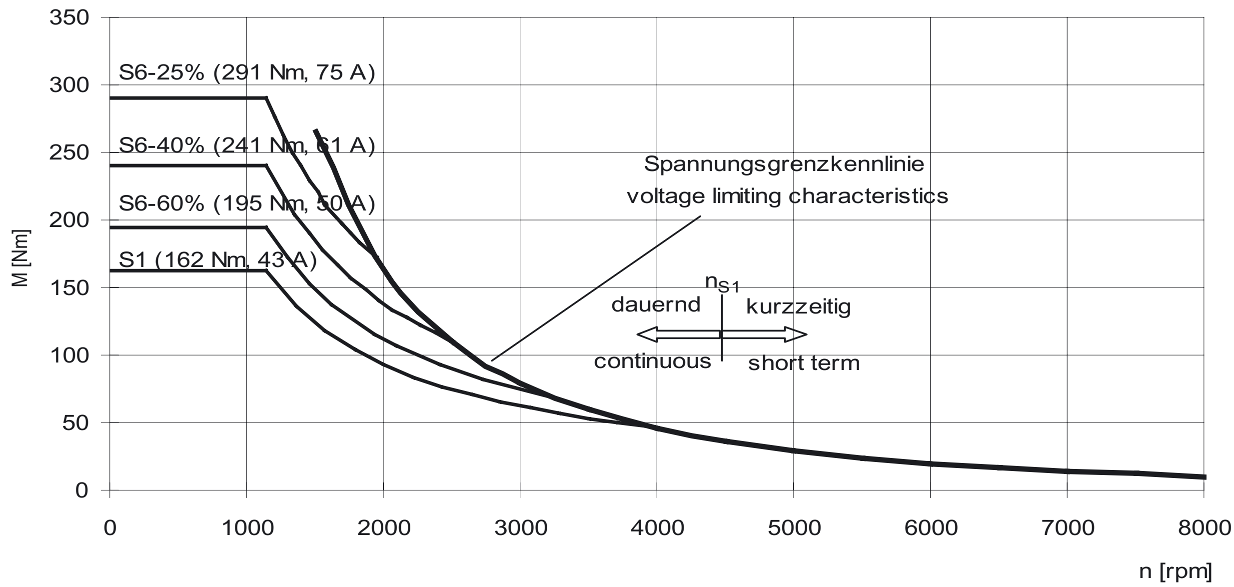
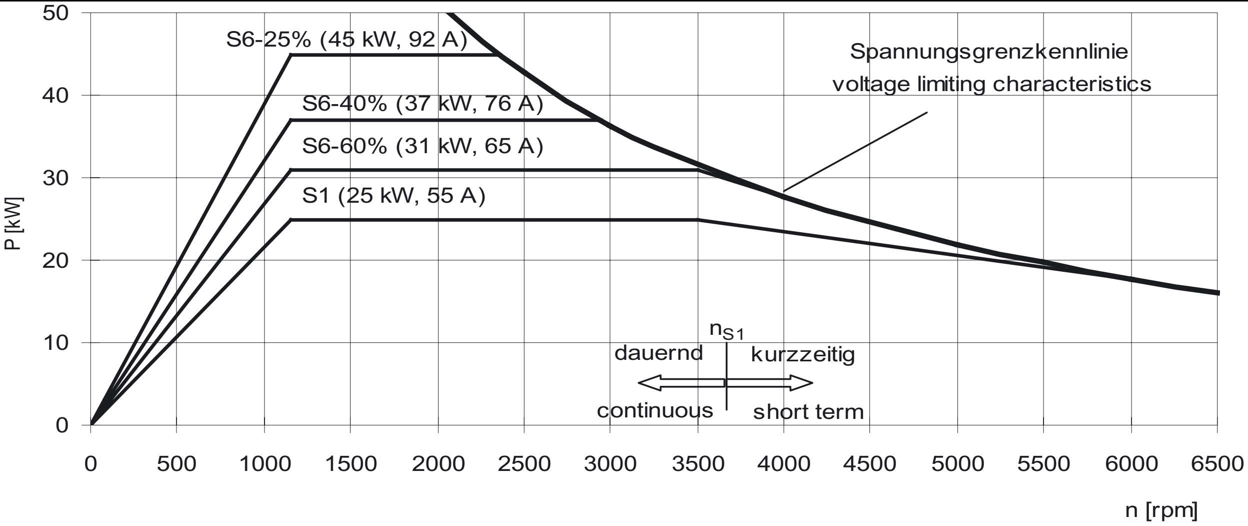


Table 7-107 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7163-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1150	25,0	208	55	364	39,2	3500	6500	35	25,0	110



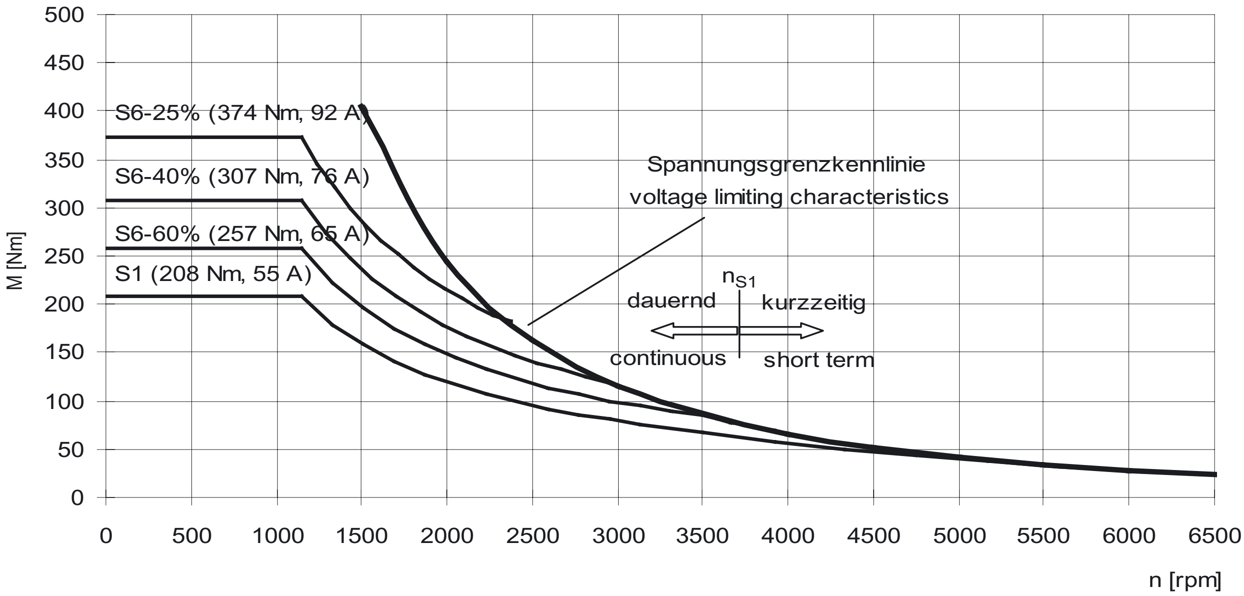
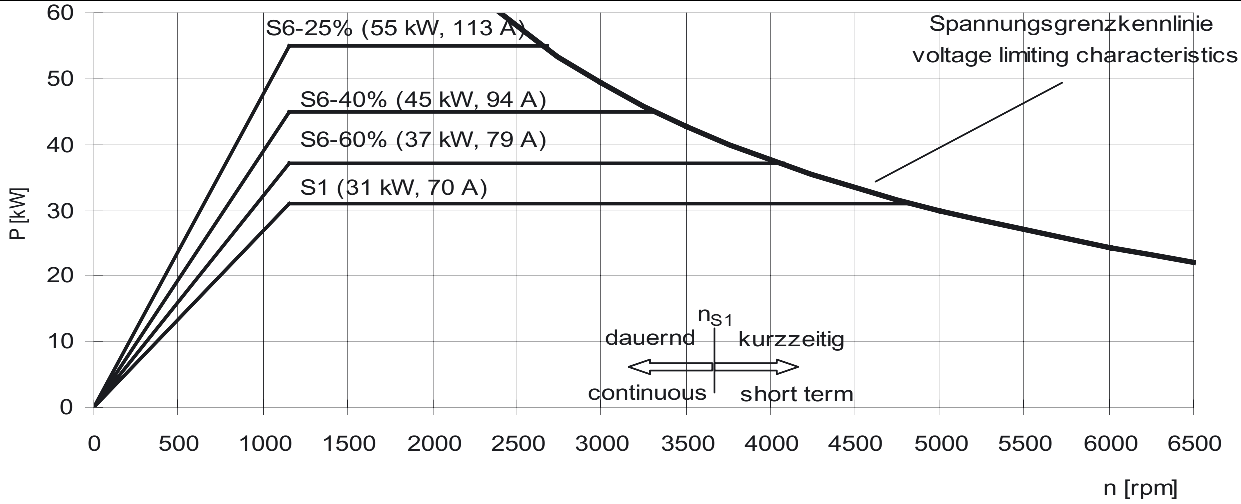


Table 7-108 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7167-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1150	31,0	257	70	357	39,1	4844	6500	35	34,0	140



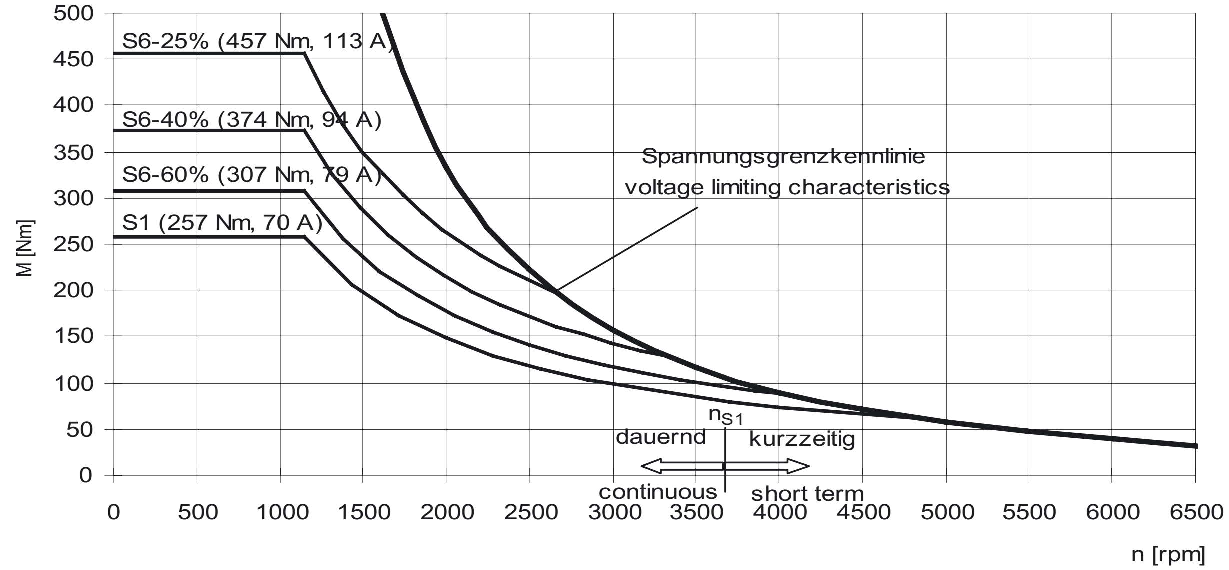
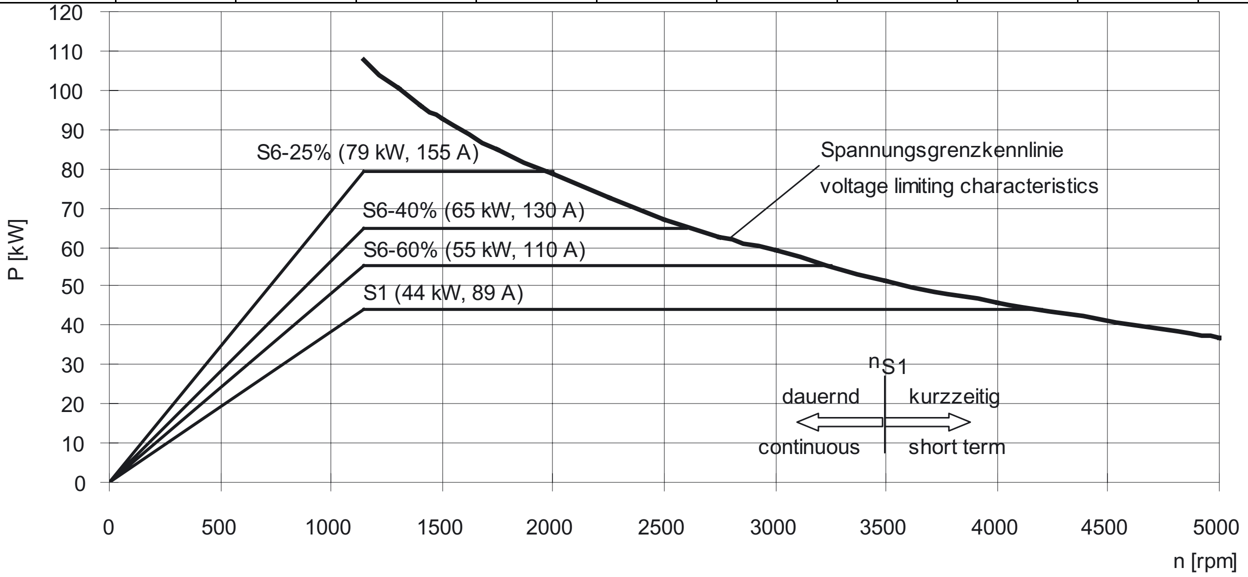


Table 7-109 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7184-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1150	44	366	89	383	39,2	4200	5000	40	42	170



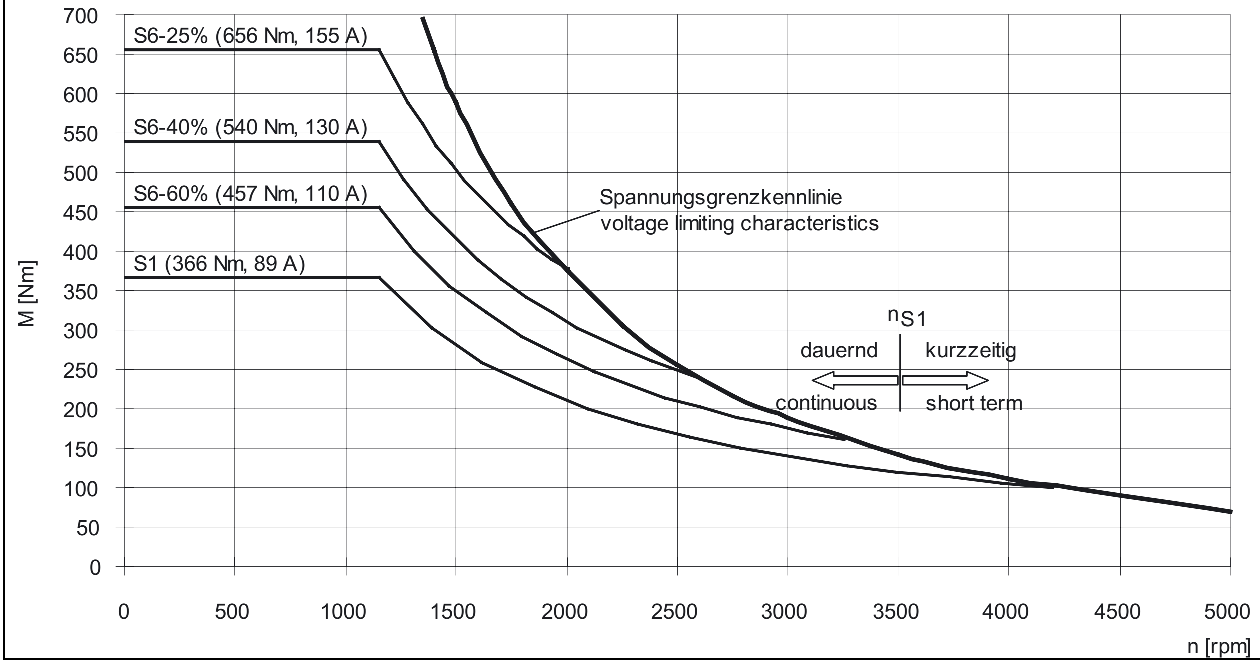
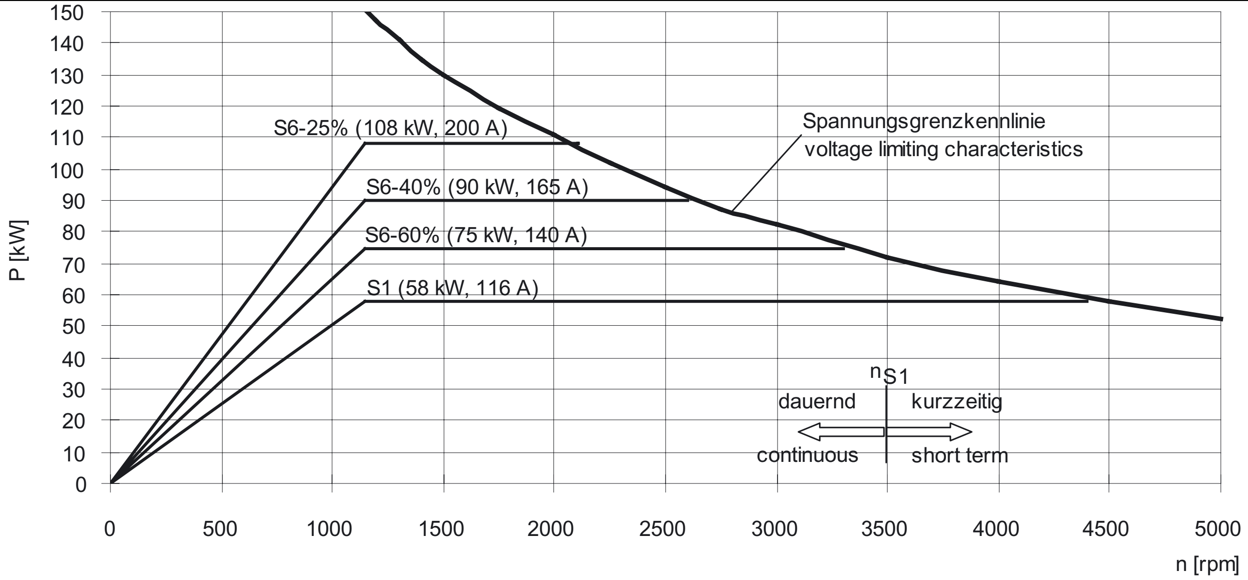


Table 7-110 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7186-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
1150	58	482	116	390	39,1	4400	5000	40	58	216



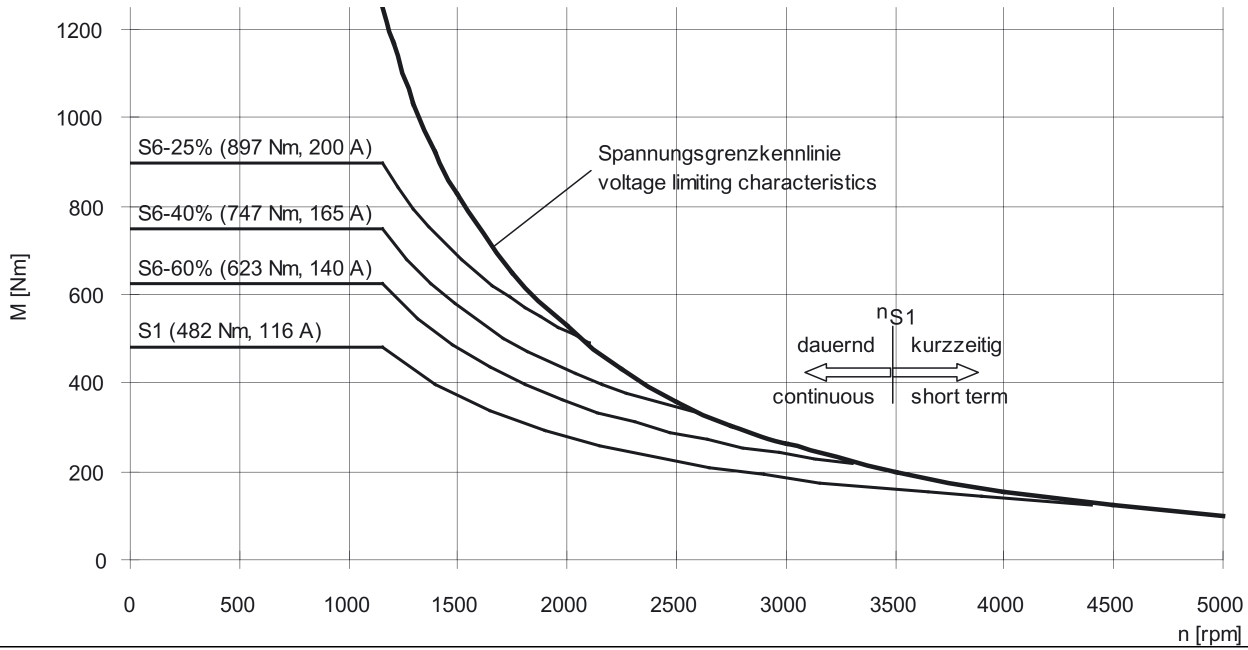


Table 7-111 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7224-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
1150	81	670	160	385	38,9	2900	4500	40	79	298

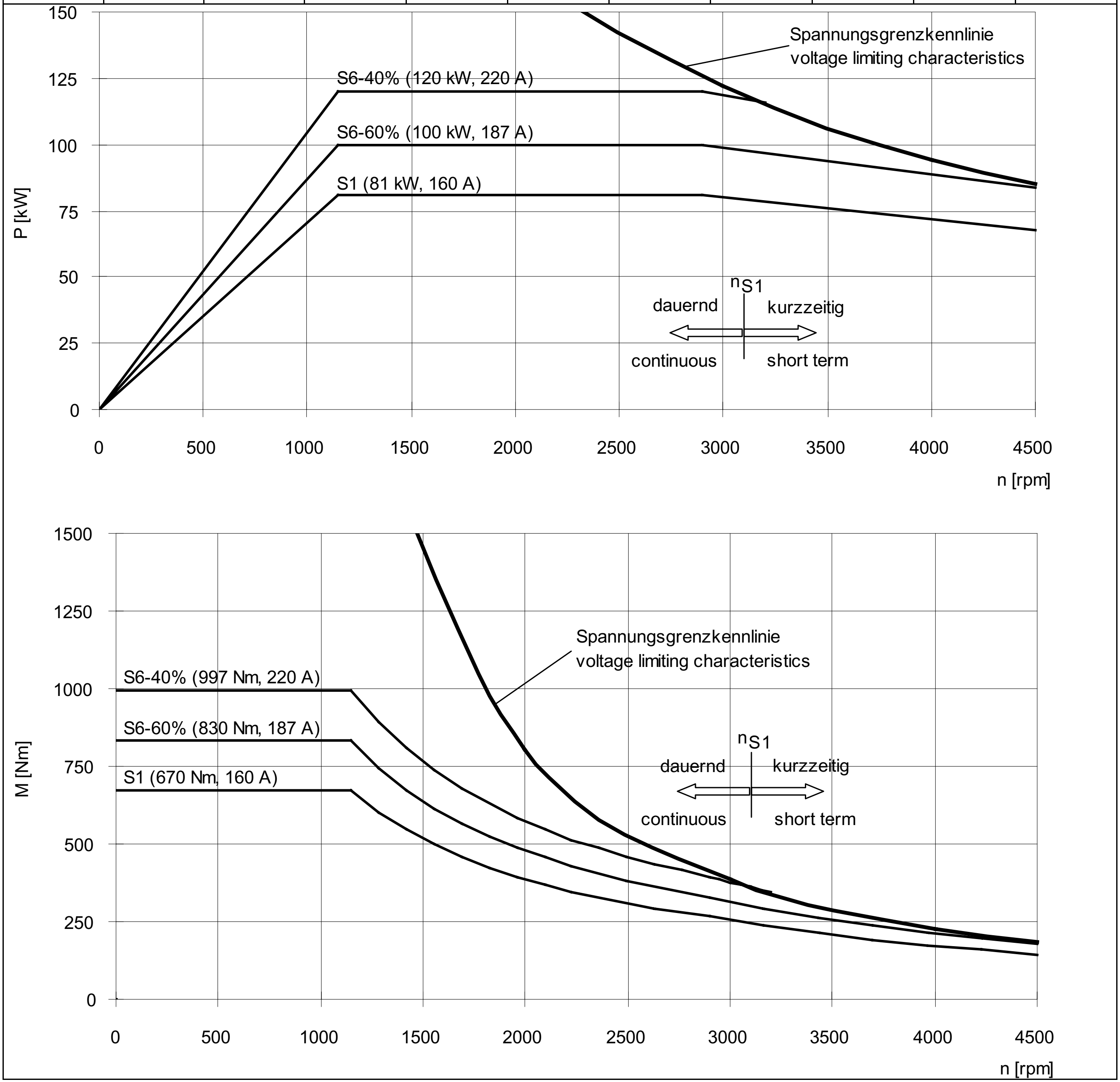
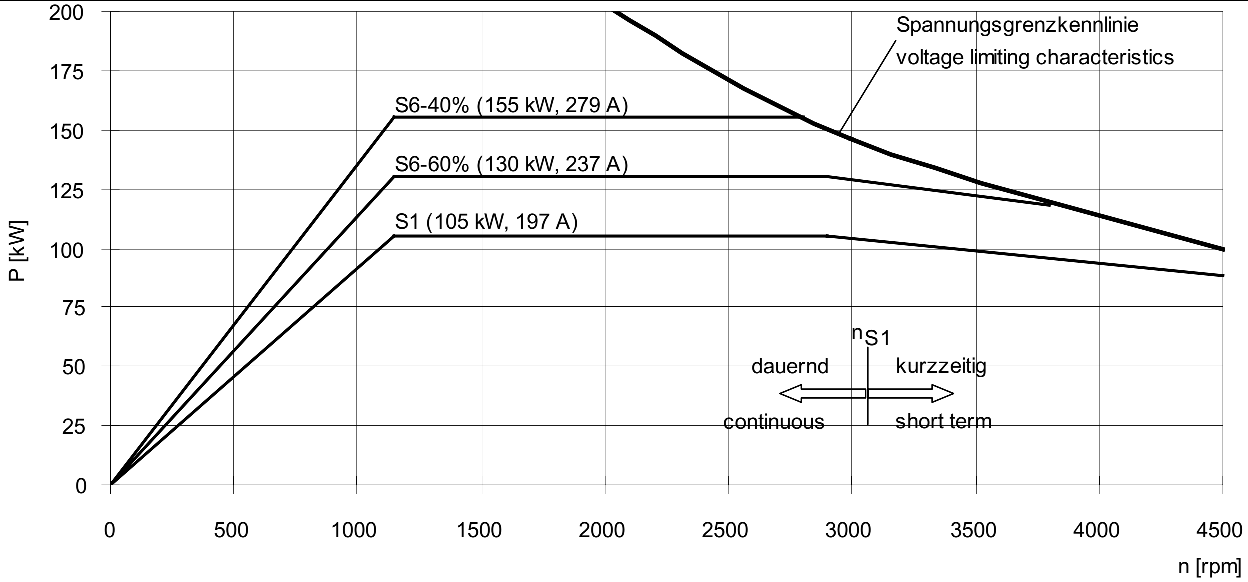


Table 7-112 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7226-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1150	105	870	197	390	38,9	2900	4500	40	87,5	380



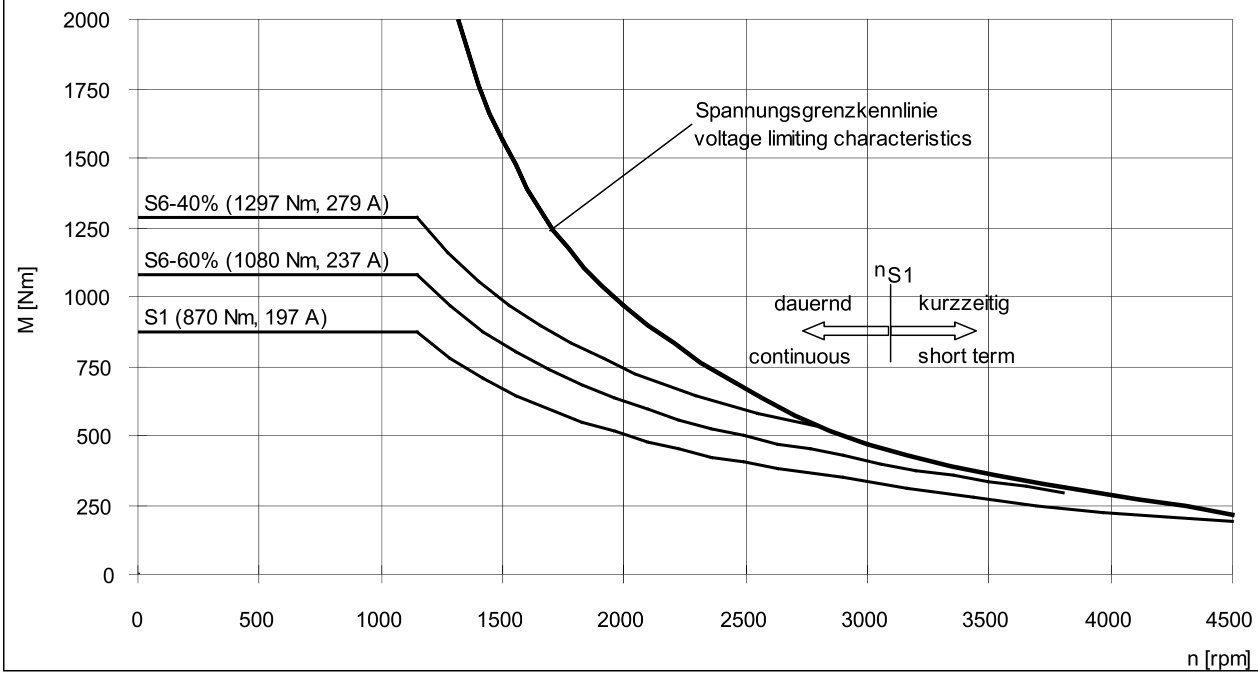
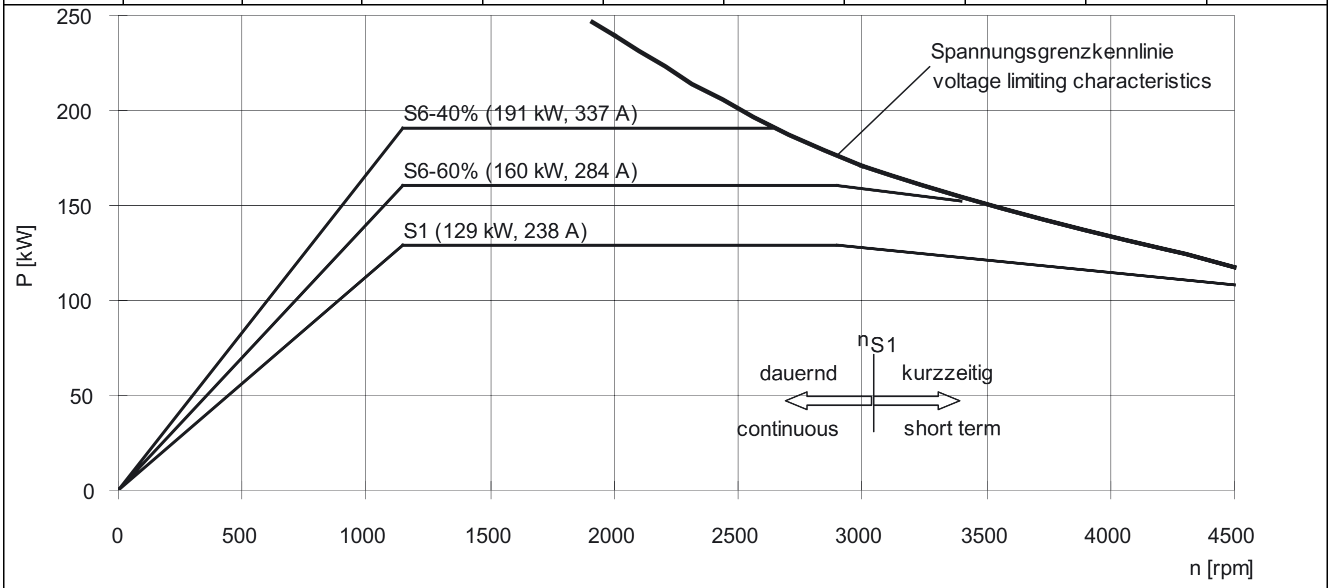
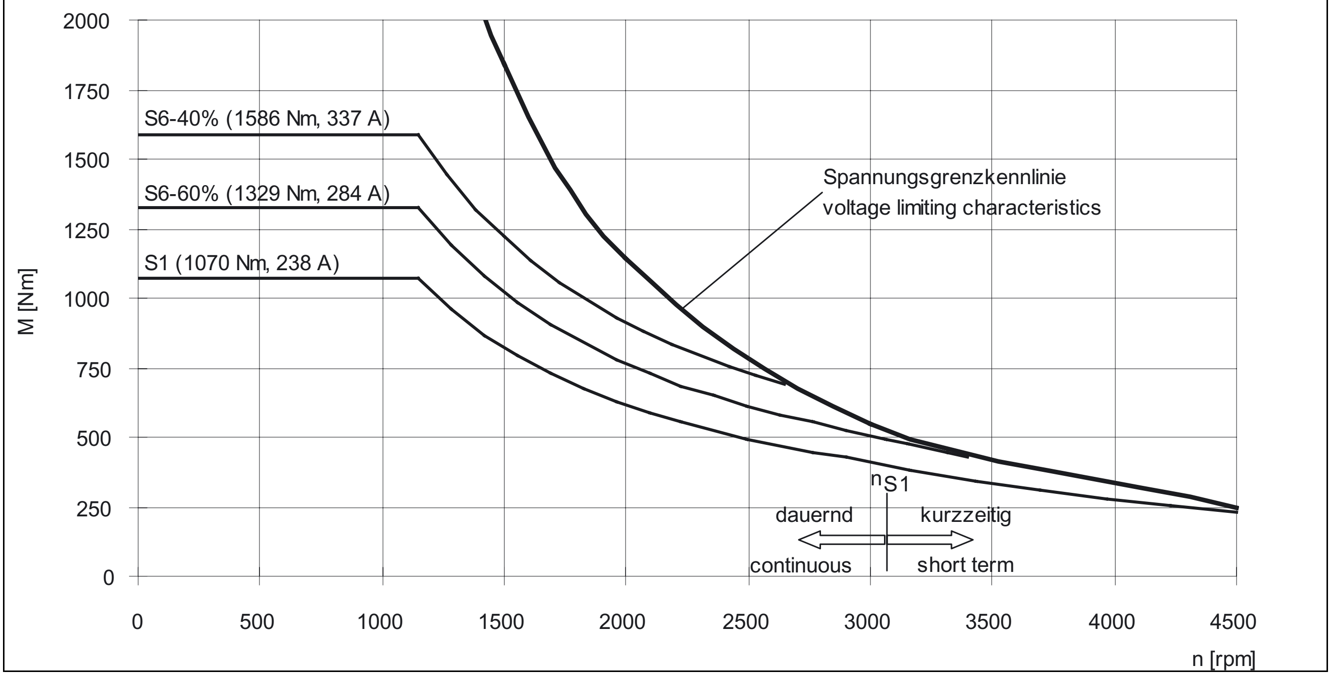


Table 7-113 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7228-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1150	129	1070	238	390	38,9	2900	4500 1)	40	98	460

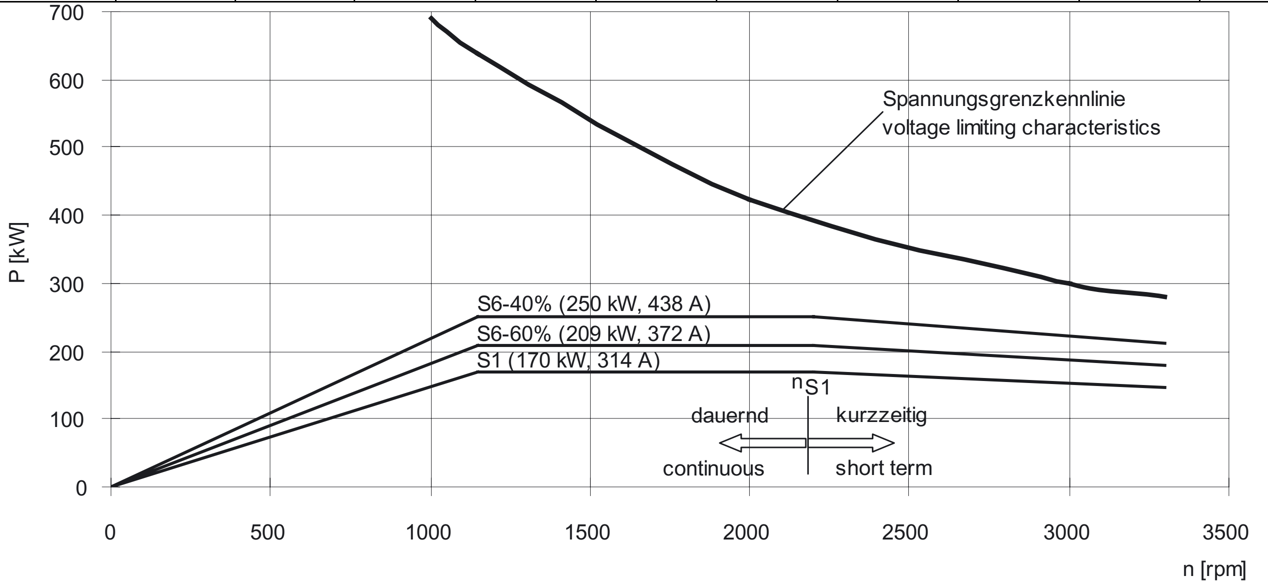




1) 4000 rpm for increased cantilever forces

Table 7-114 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7284-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1150	170	1414	314	400	38,6	2200	3300	75	158	580



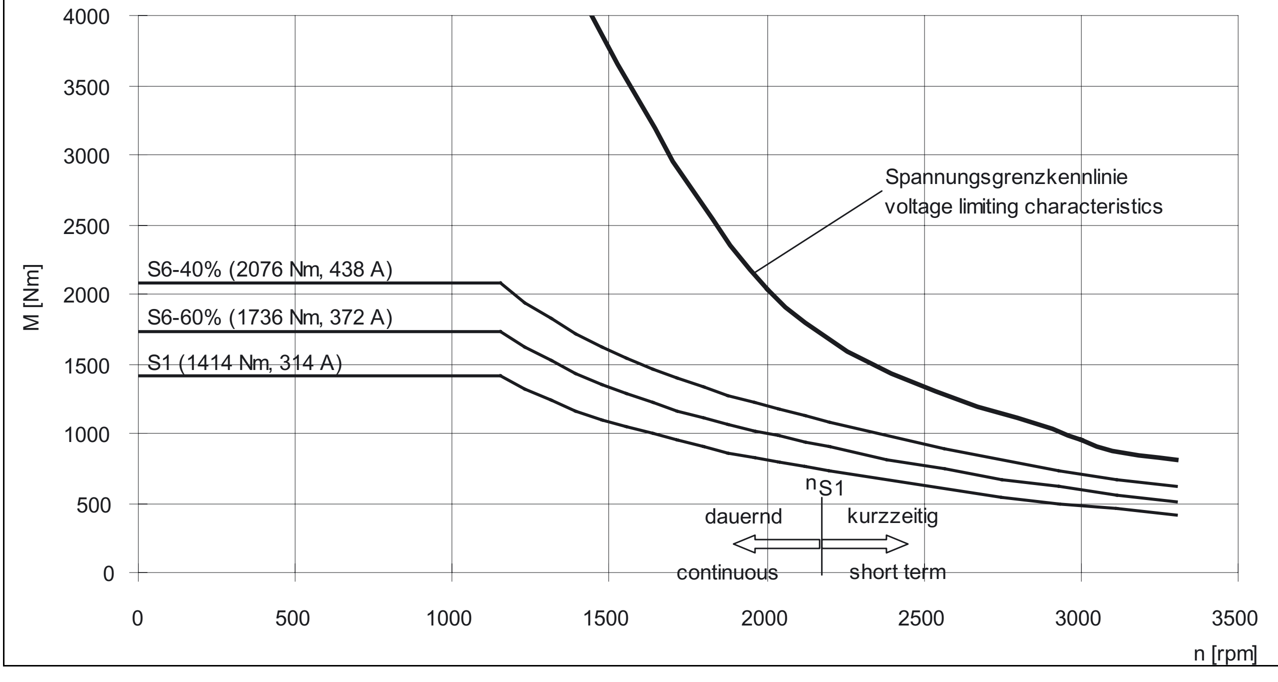
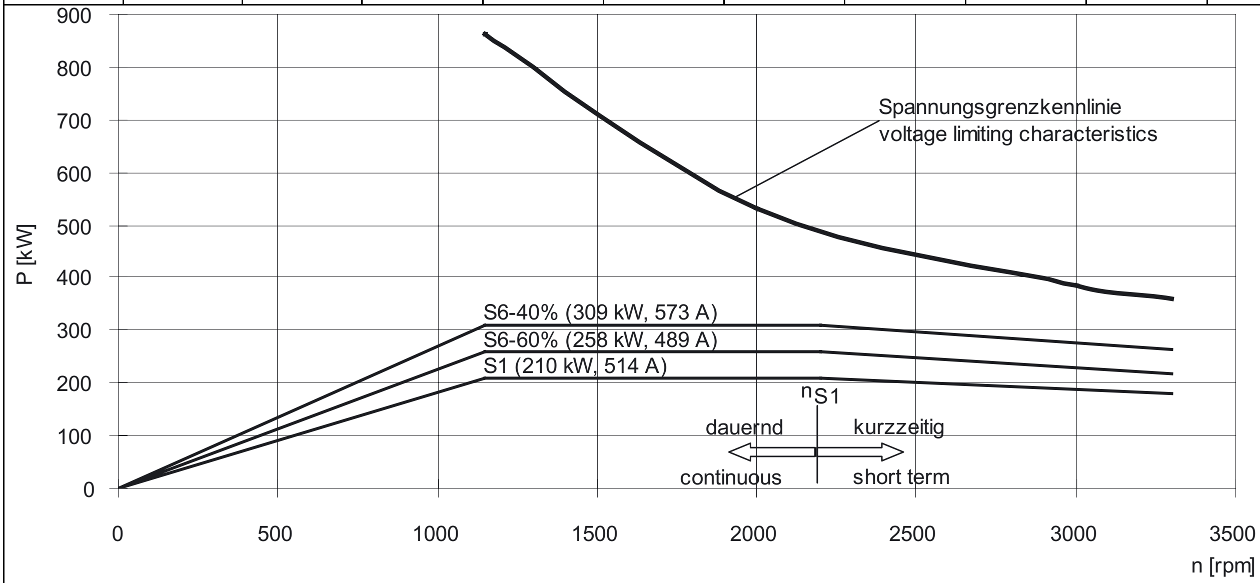


Table 7-115 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7286-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1150	210	1745	414	380	38,6	2200	3300	83	218	750



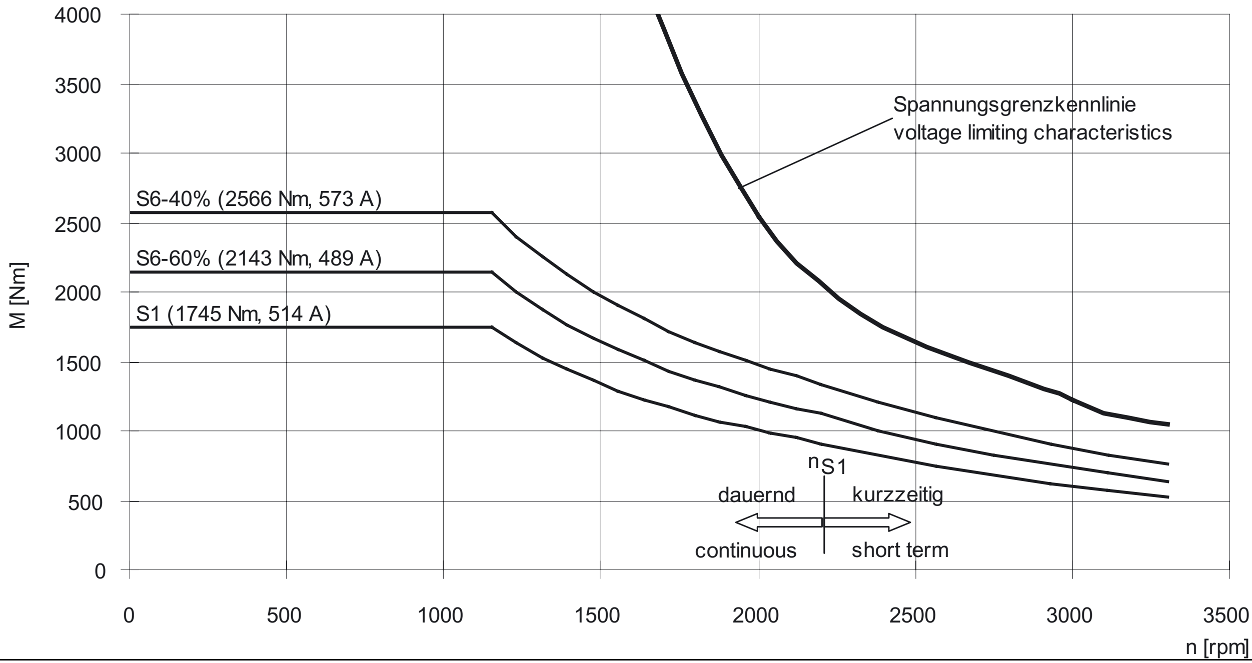
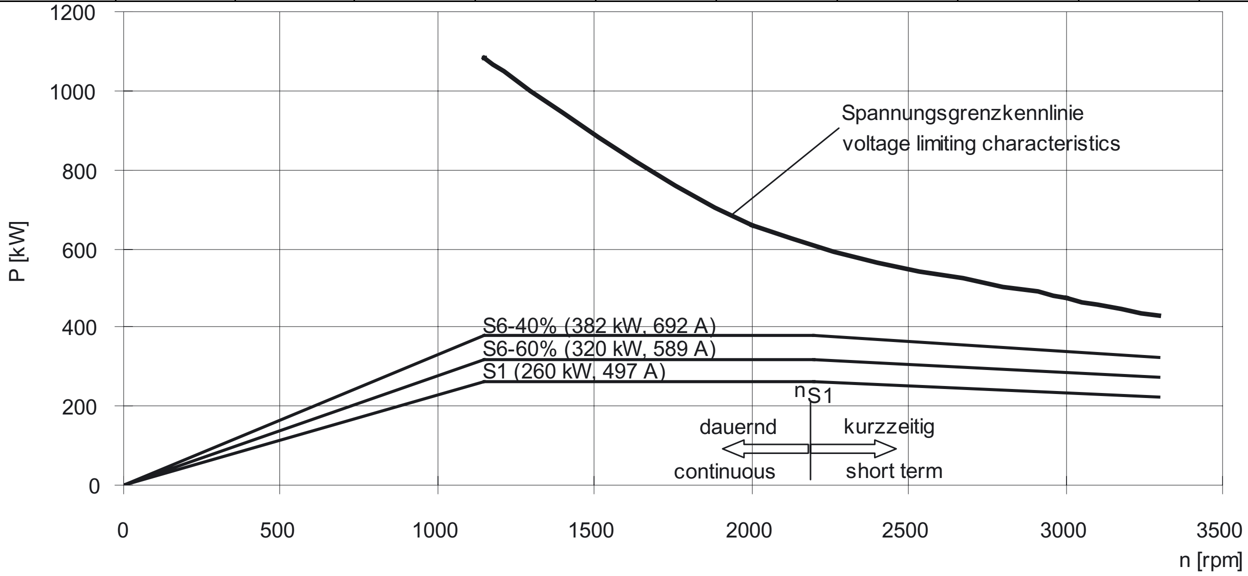


Table 7-116 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7288-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1150	260	2160	497	385	38,6	2200	3300	90	252	910



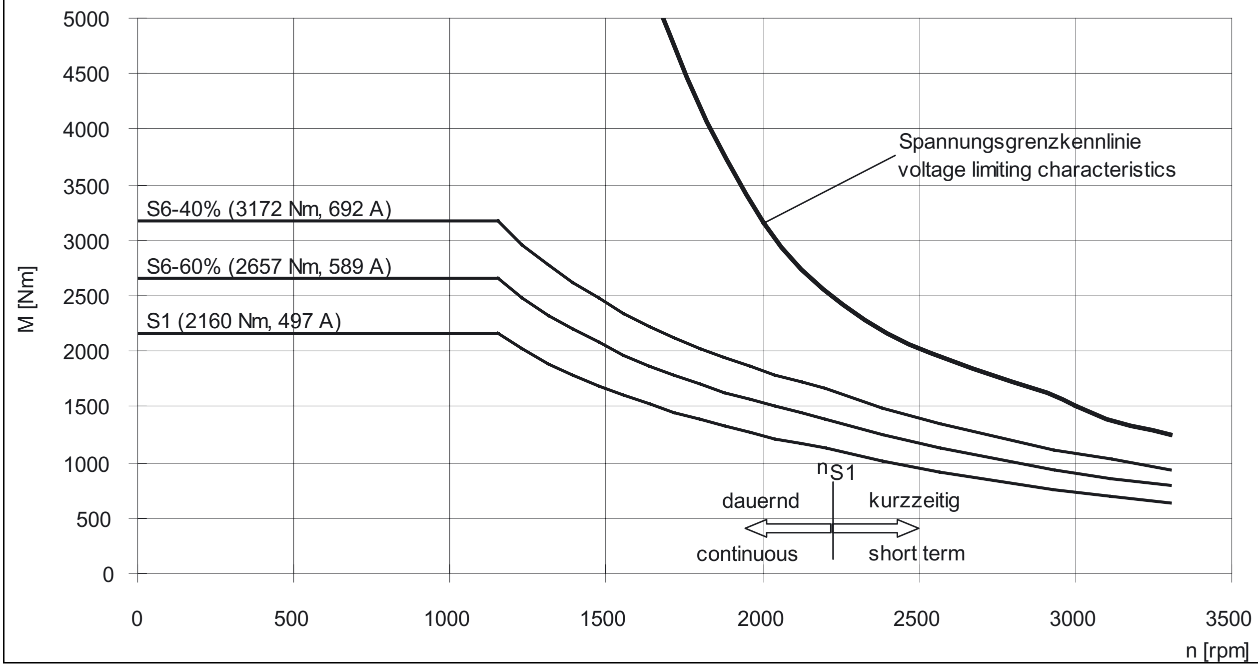
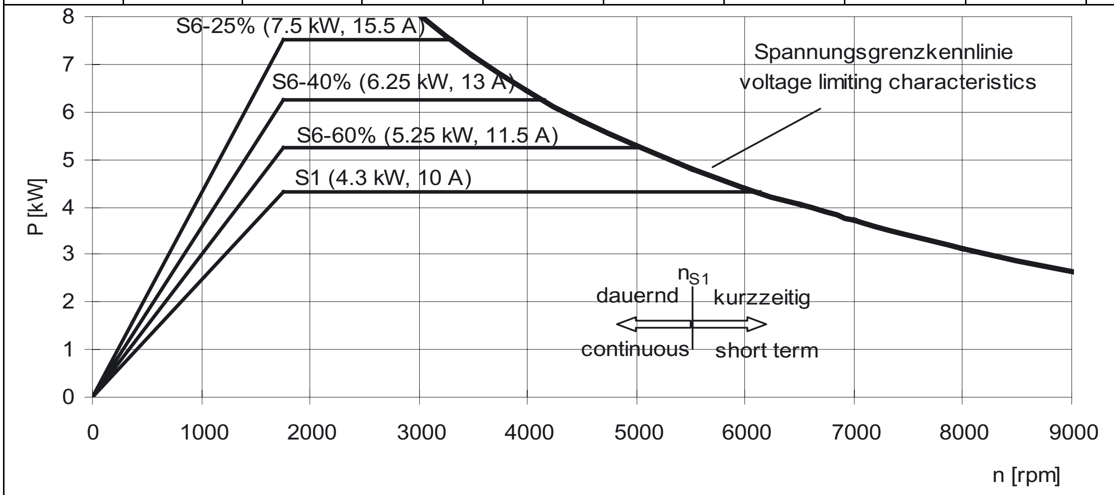


Table 7-117 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7101-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1750	4,3	23,5	10,0	398	60,0	6136	9000	20	5,7	20,0



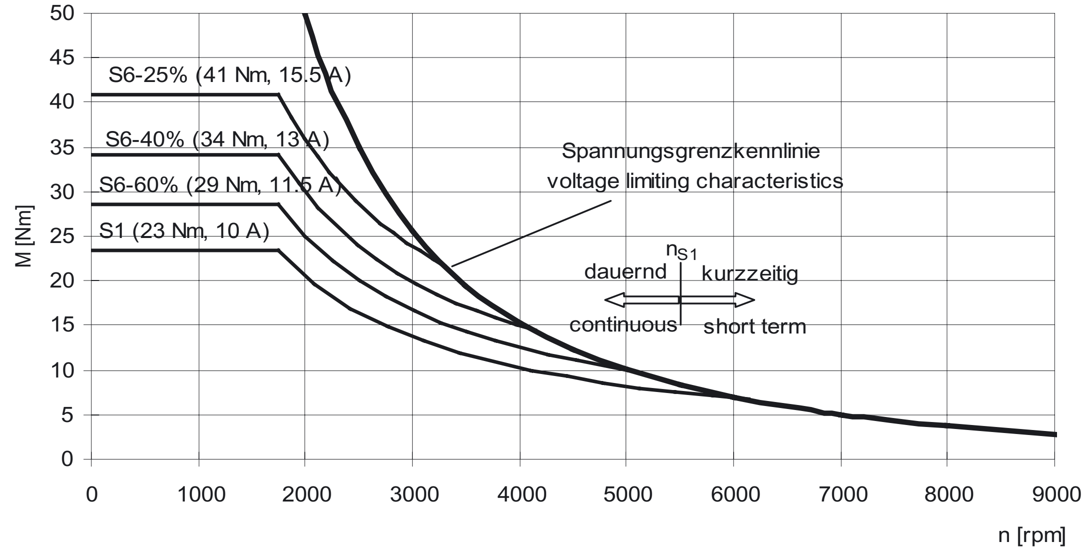
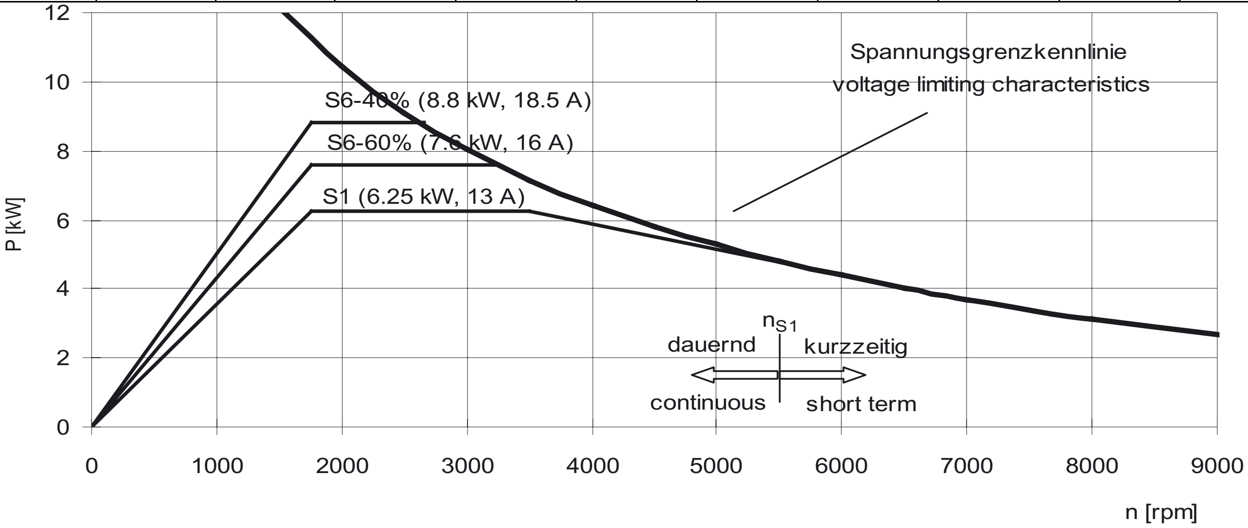


Table 7-118 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7103-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1750	6,3	34,1	13,0	398	61,0	3500	9000	20	5,3	17,0



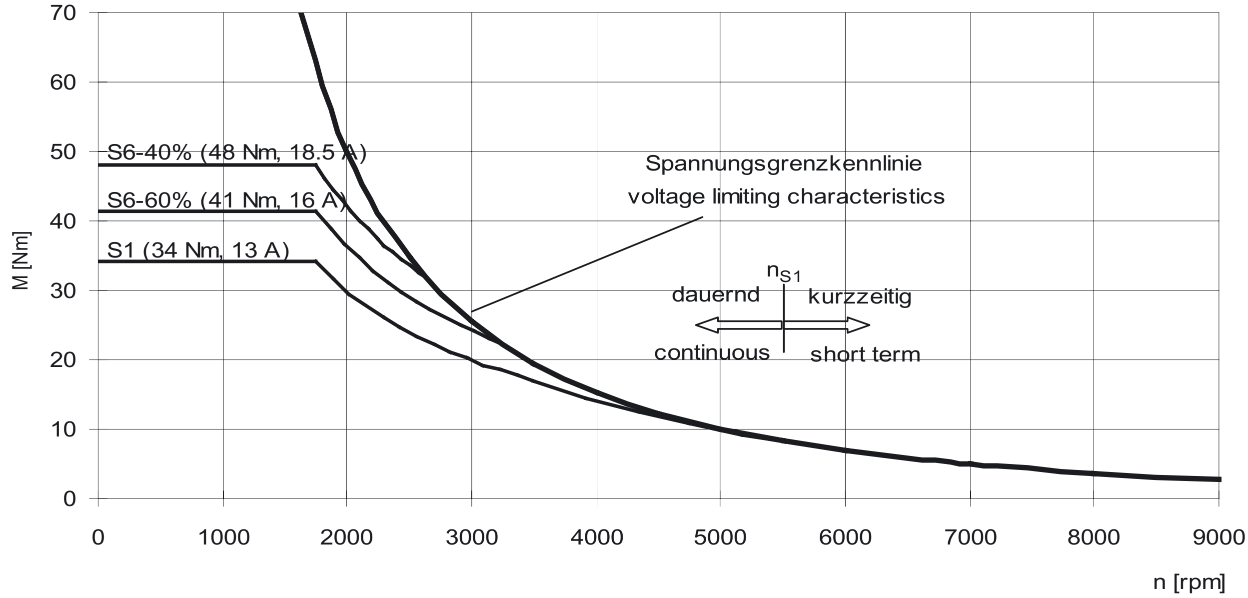
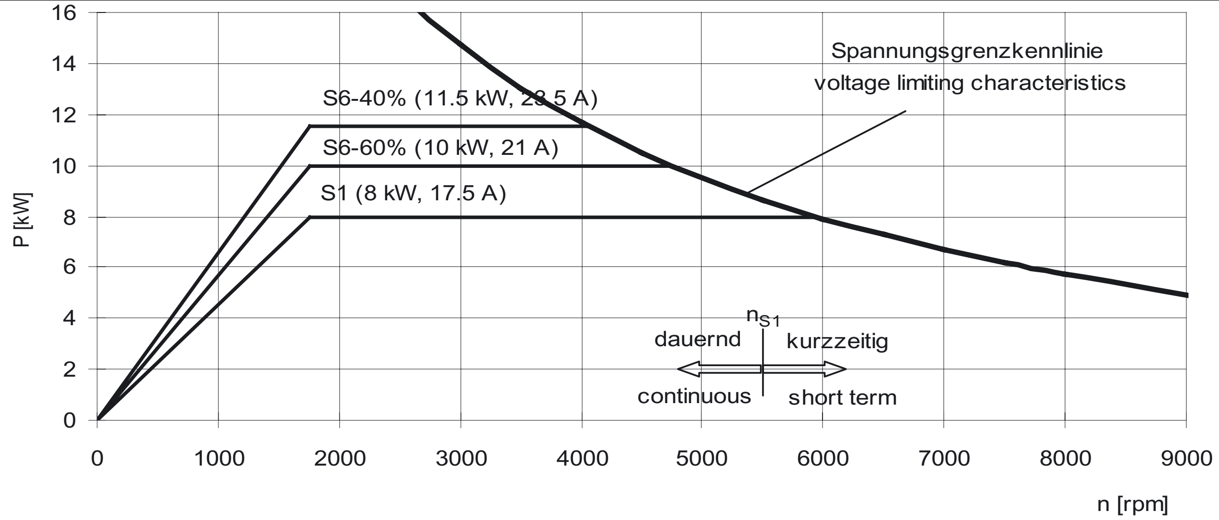


Table 7-119 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7105-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1750	8,0	43,7	17,5	398	60,0	5948	9000	20	9,3	35,0



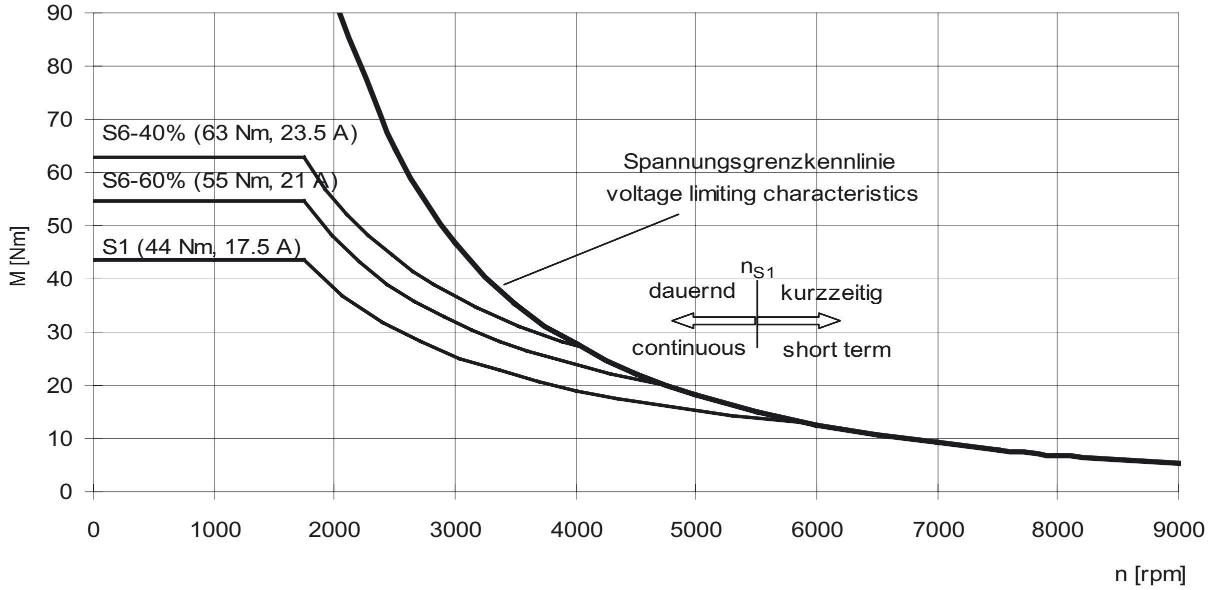
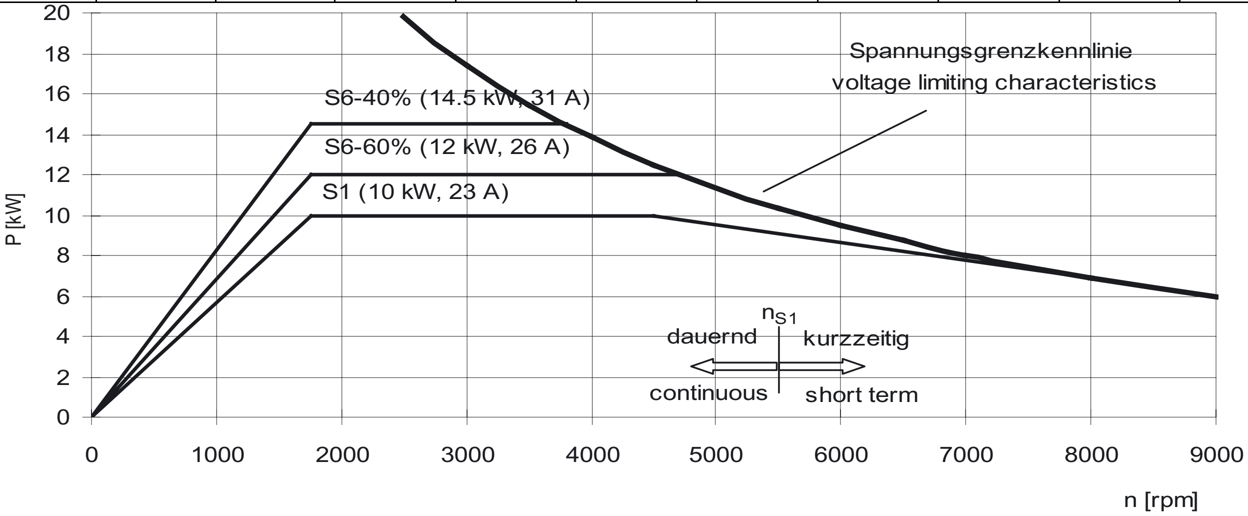


Table 7-120 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7107-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1750	10,0	54,6	23,0	381	60,3	4500	9000	20	10,6	46,0



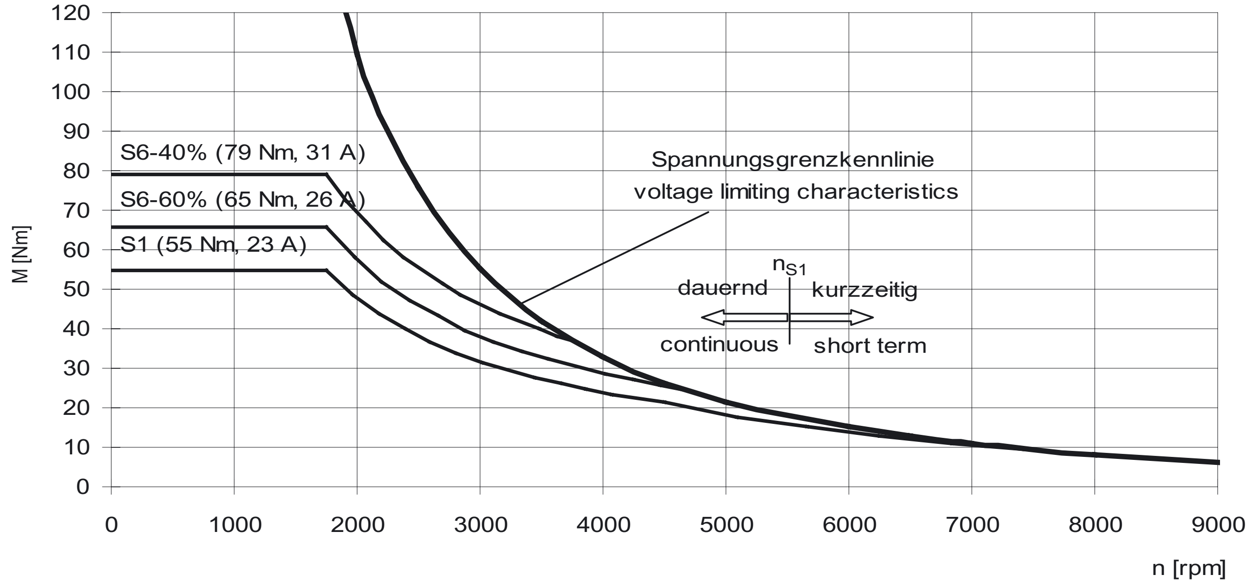
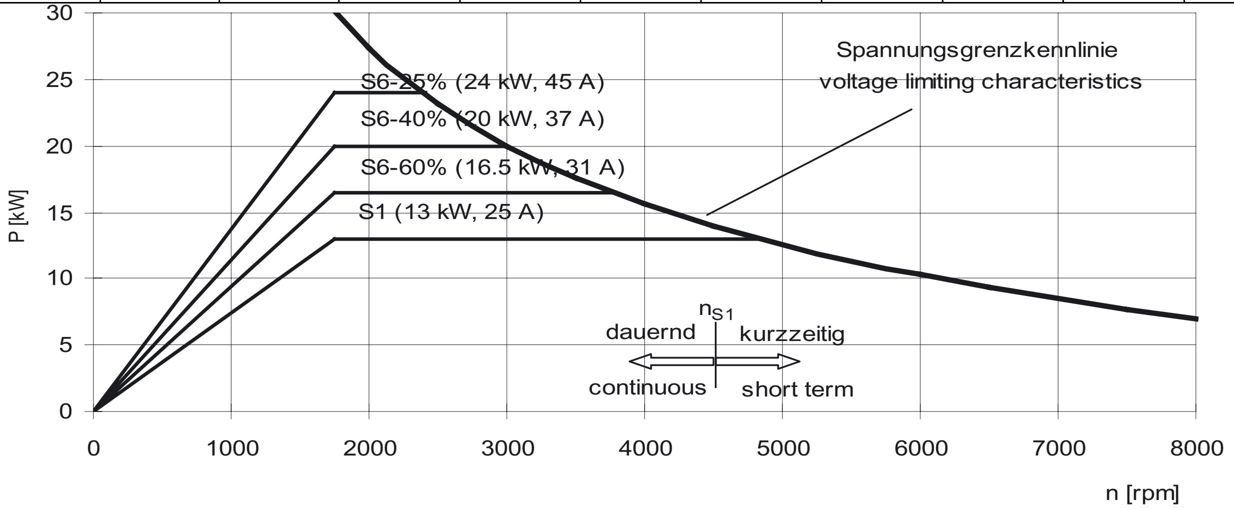


Table 7-121 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7131-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
1750	13,0	70,9	25,0	398	59,7	4834	8000	30	8,1	50,0



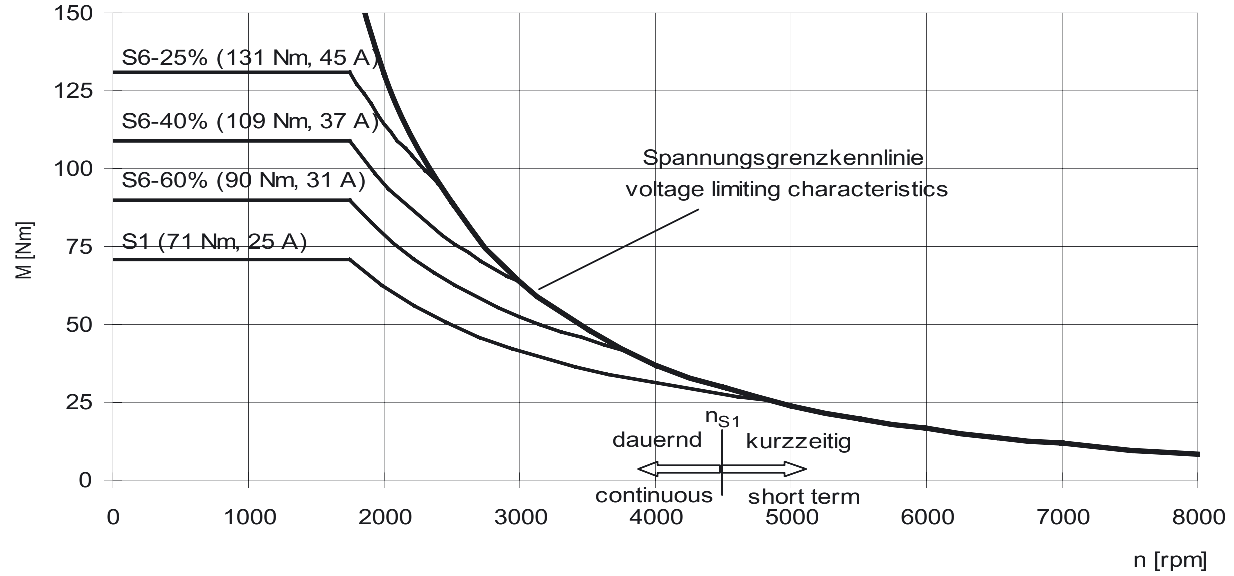
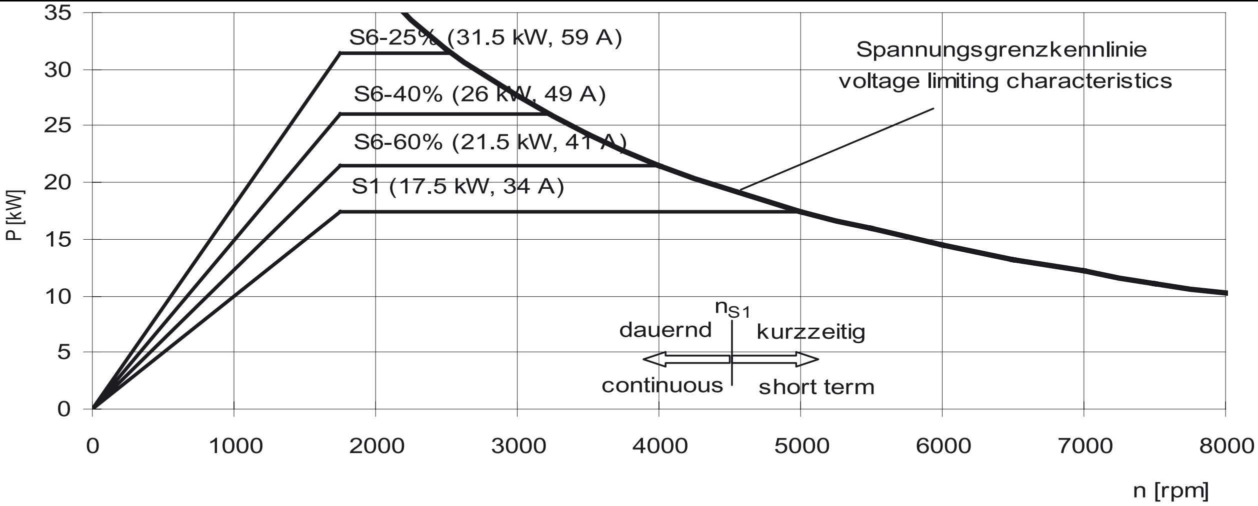


Table 7-122 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7133-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1750	17,5	95	34	398	59,7	4990	8000	30	14,0	68



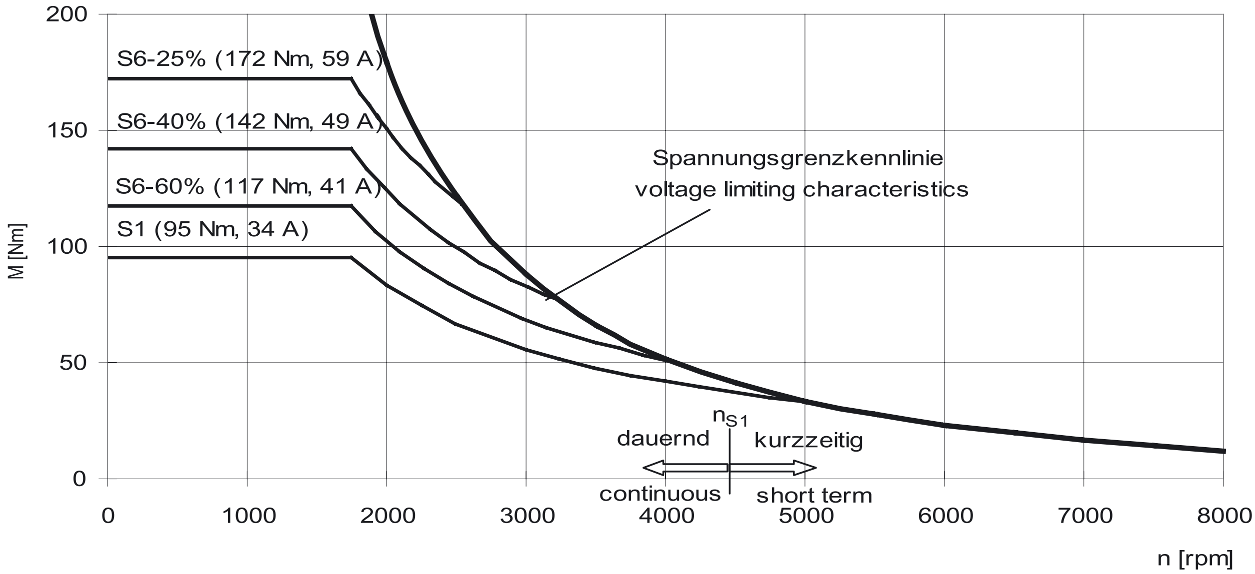
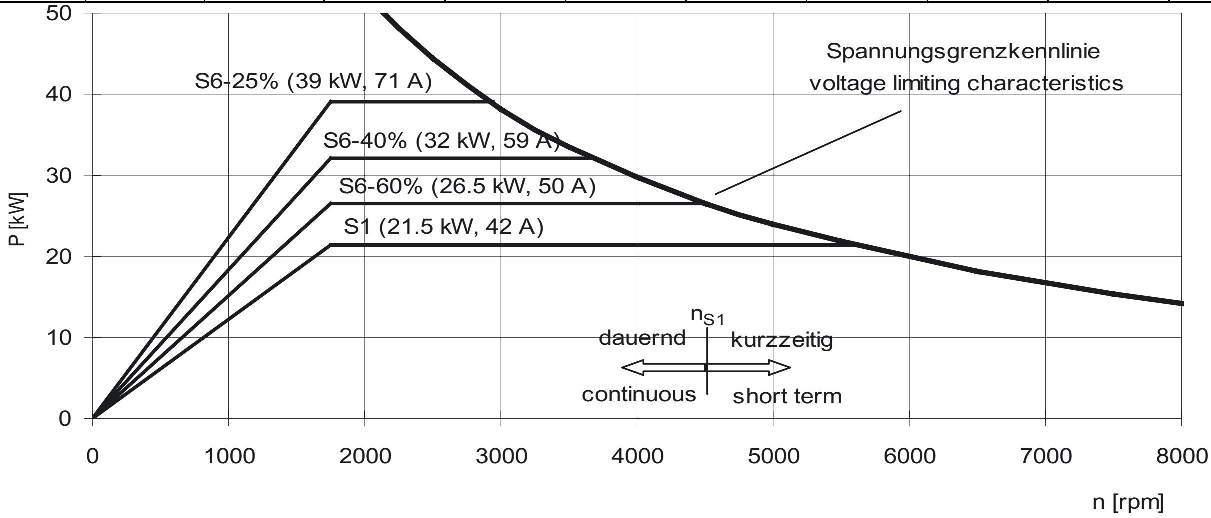


Table 7-123 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7135-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1750	21,5	117	42	398	59,5	5573	8000	30	16,0	84



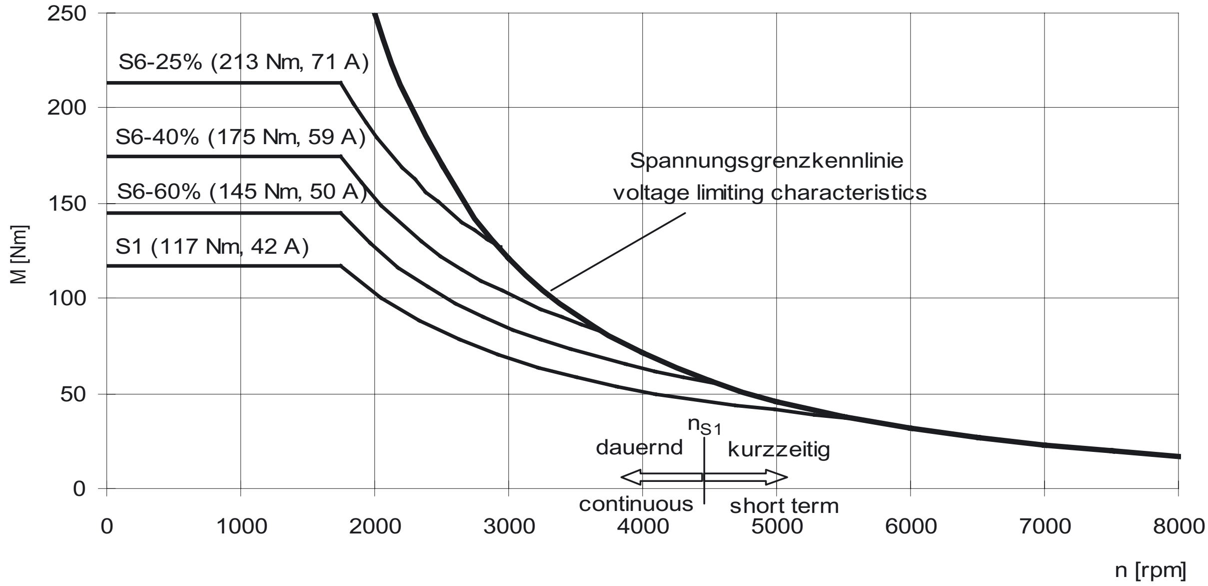
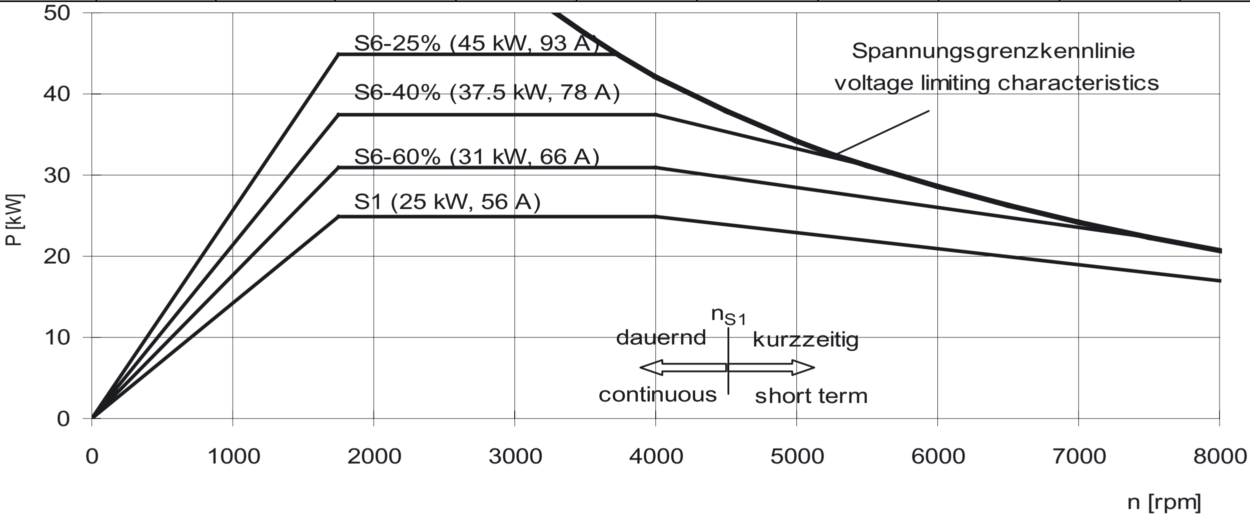


Table 7-124 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7137-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
1750	25,0	136	56	357	59,5	4000	8000	30	22,9	112



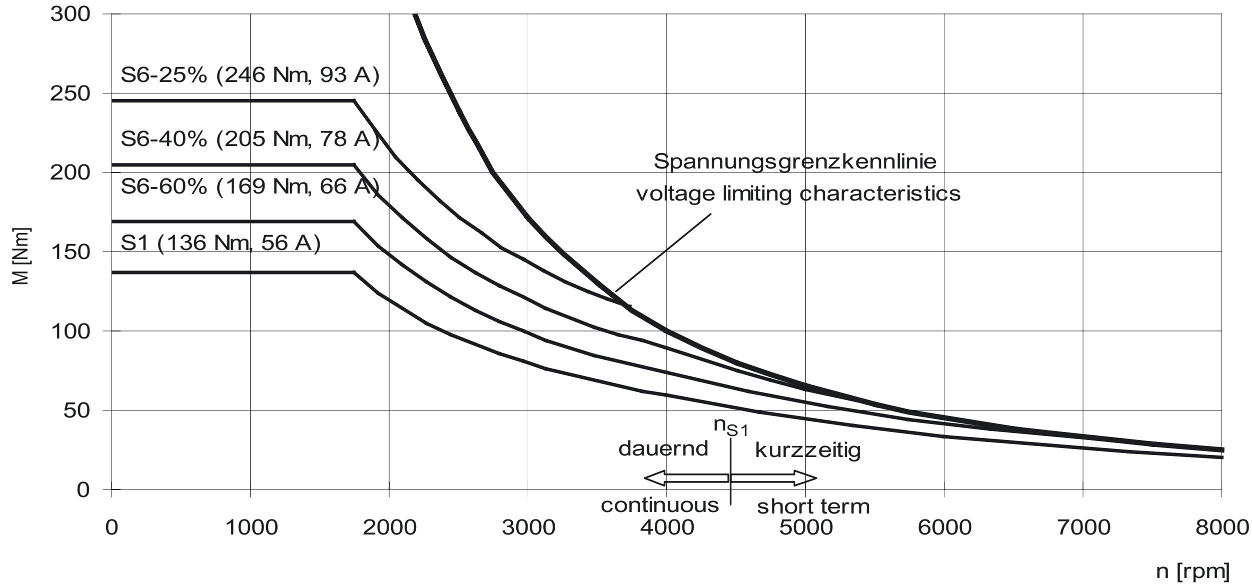
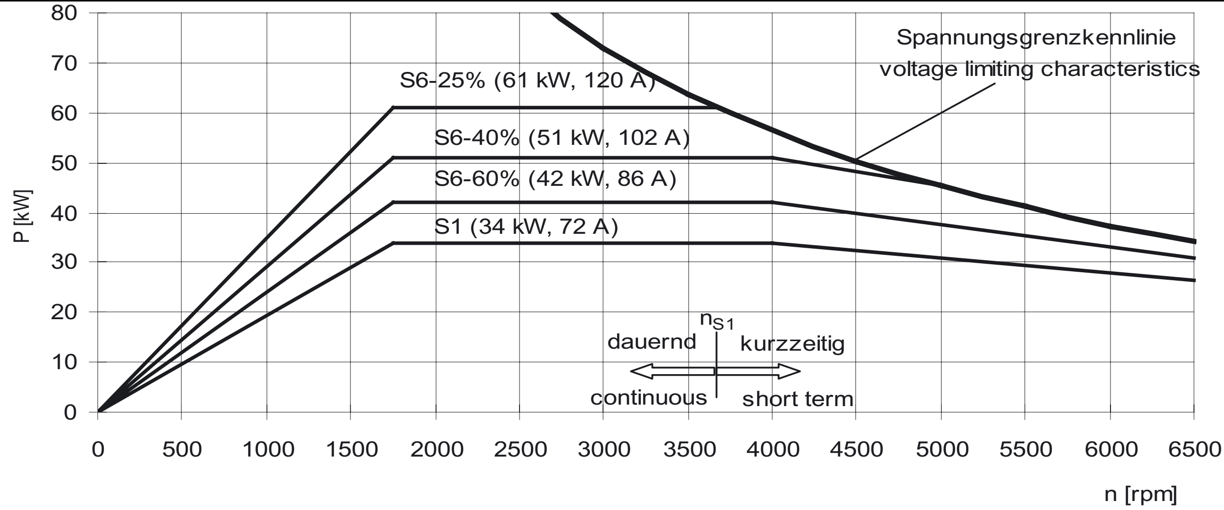


Table 7-125 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7163-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1750	34,0	186	72	364	59,2	4000	6500	35	28,0	144



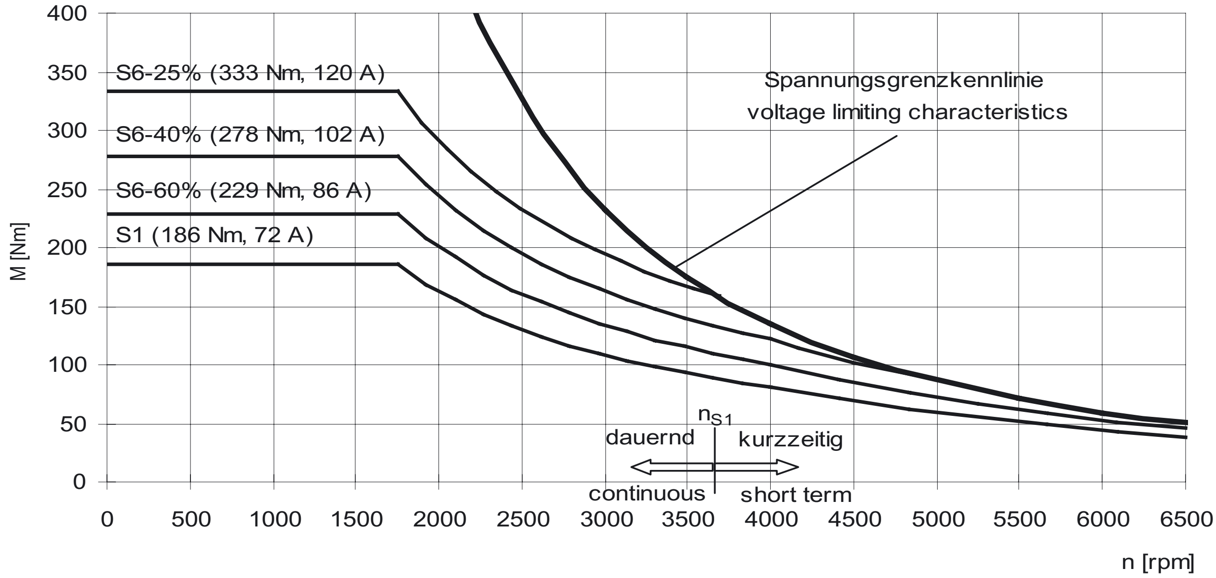
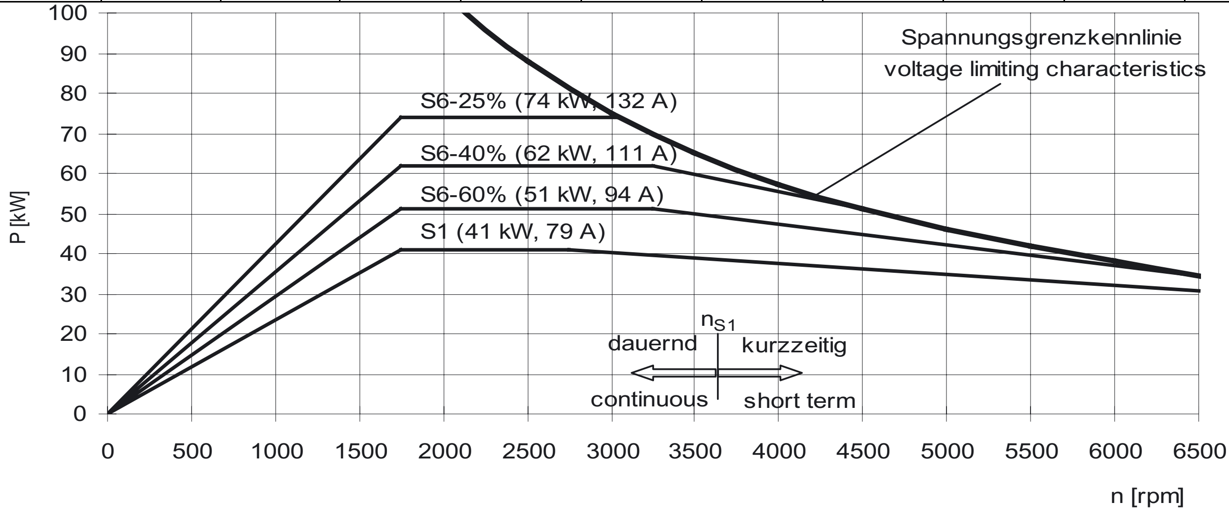


Table 7-126 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7167-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1750	41,0	224	79	398	59,2	2750	6500	35	30,0	158



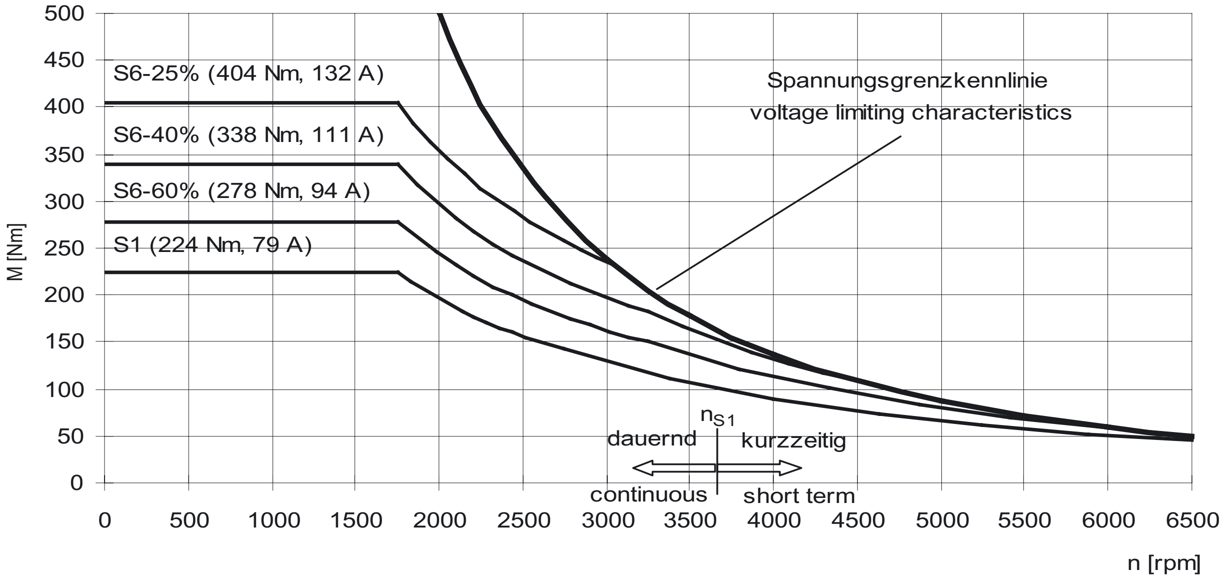
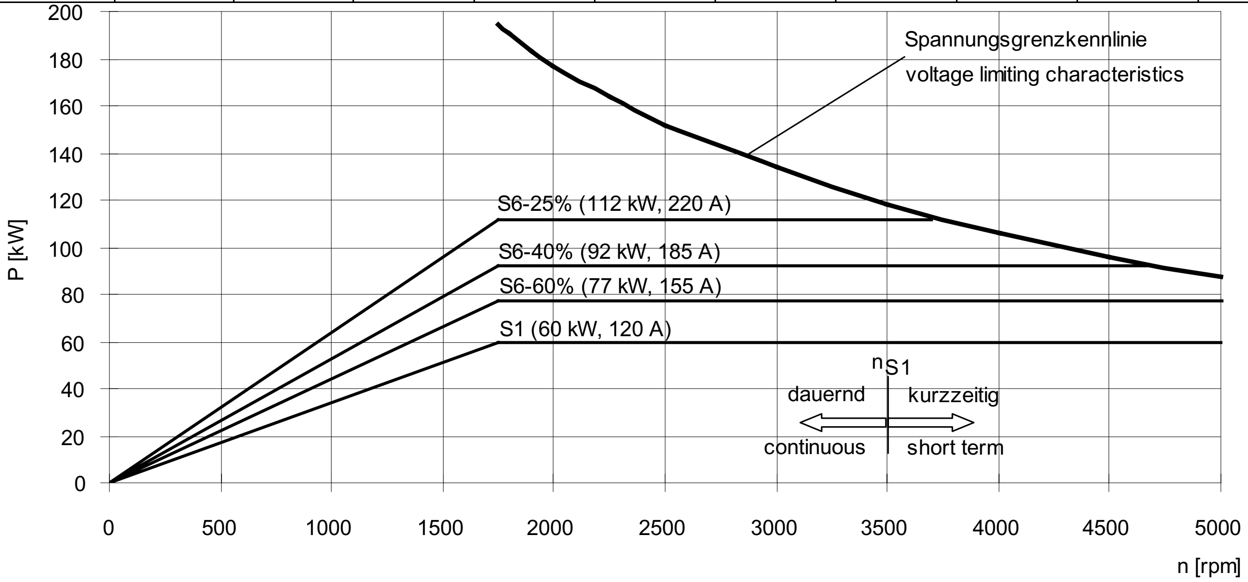


Table 7-127 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7184-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1750	60	327	120	388	59,0	5000	5000	40	64	220



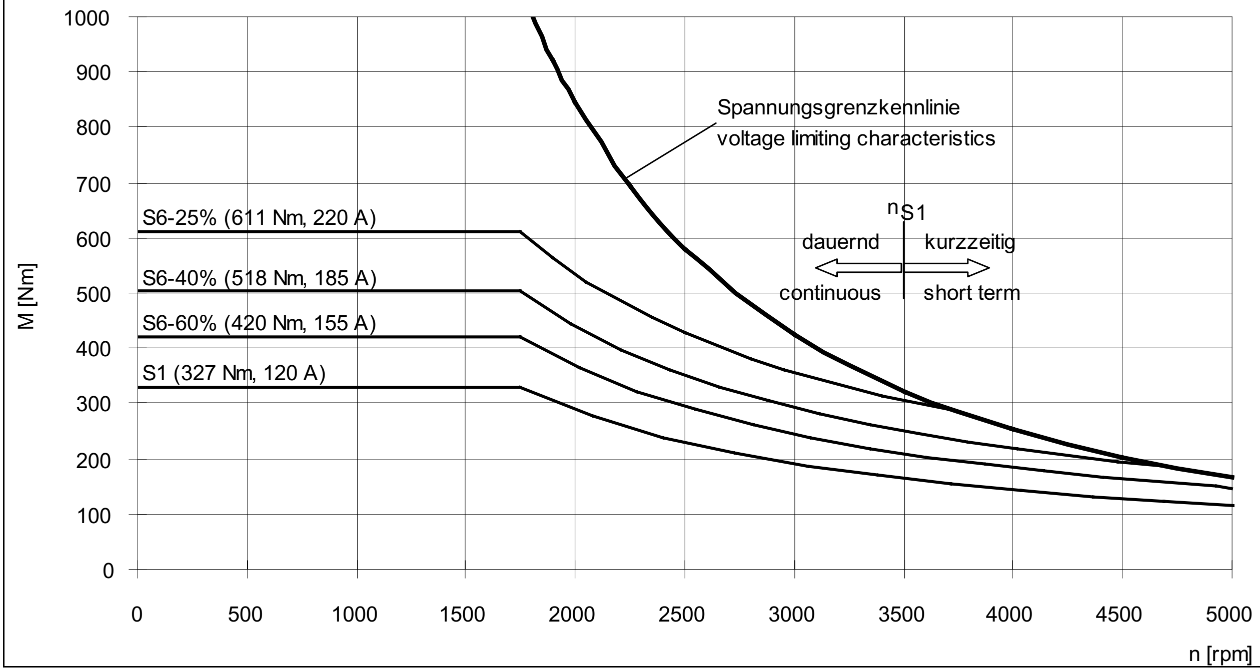
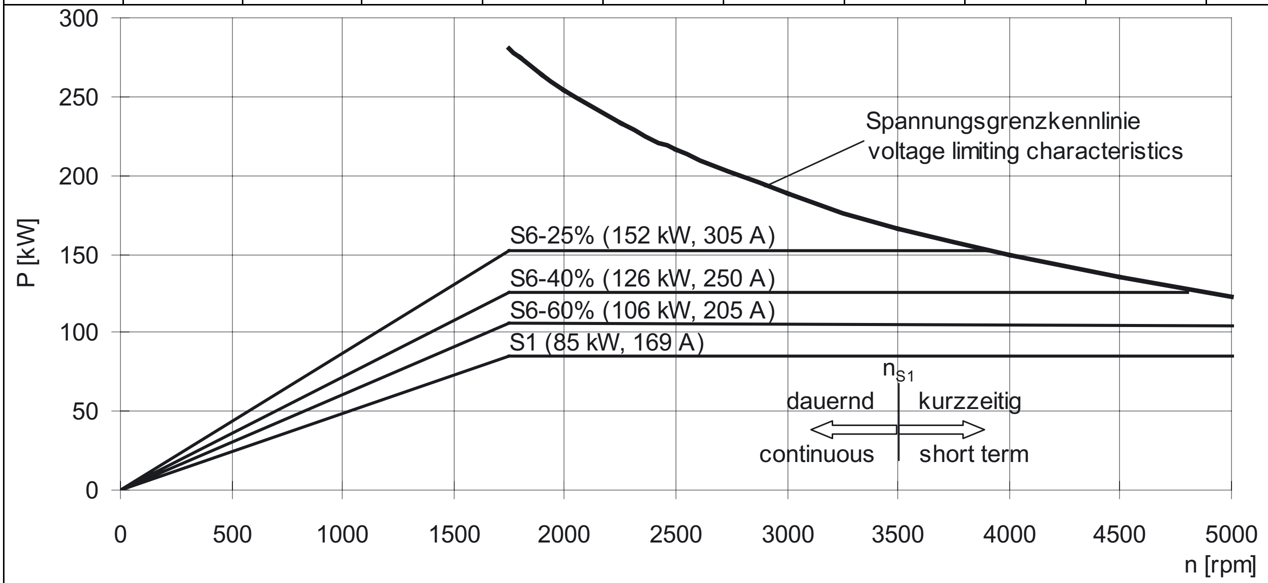


Table 7-128 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7186-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1750	85	465	169	385	59,0	5000	5000	40	84	310



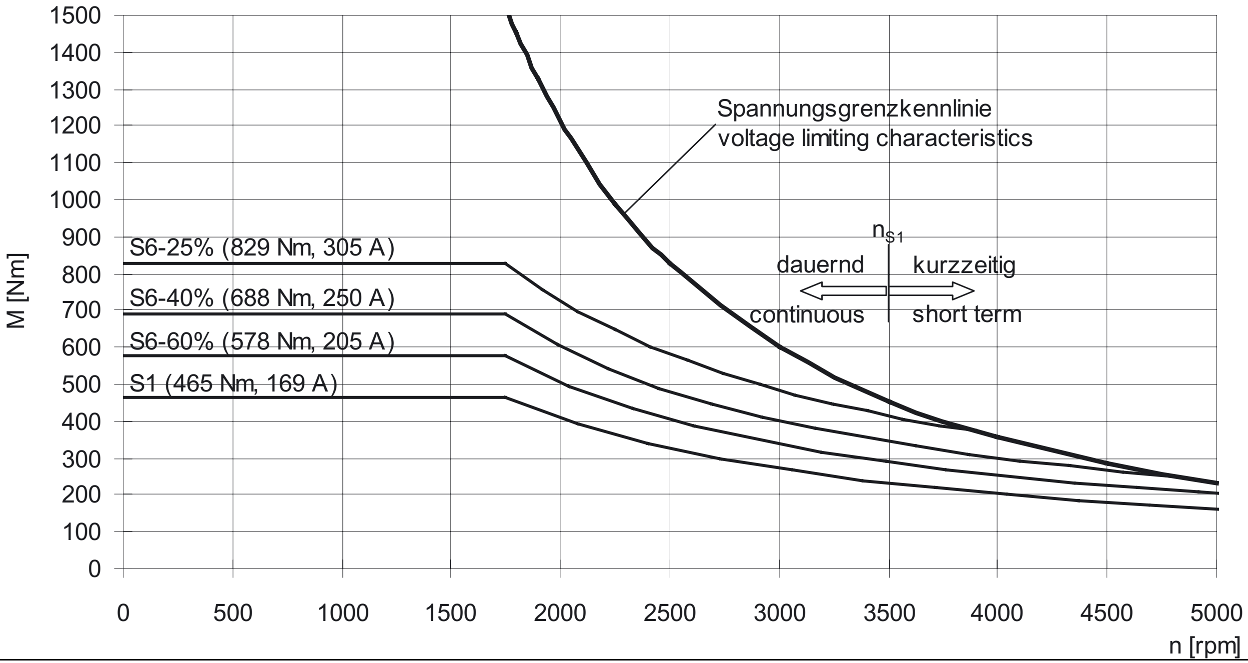
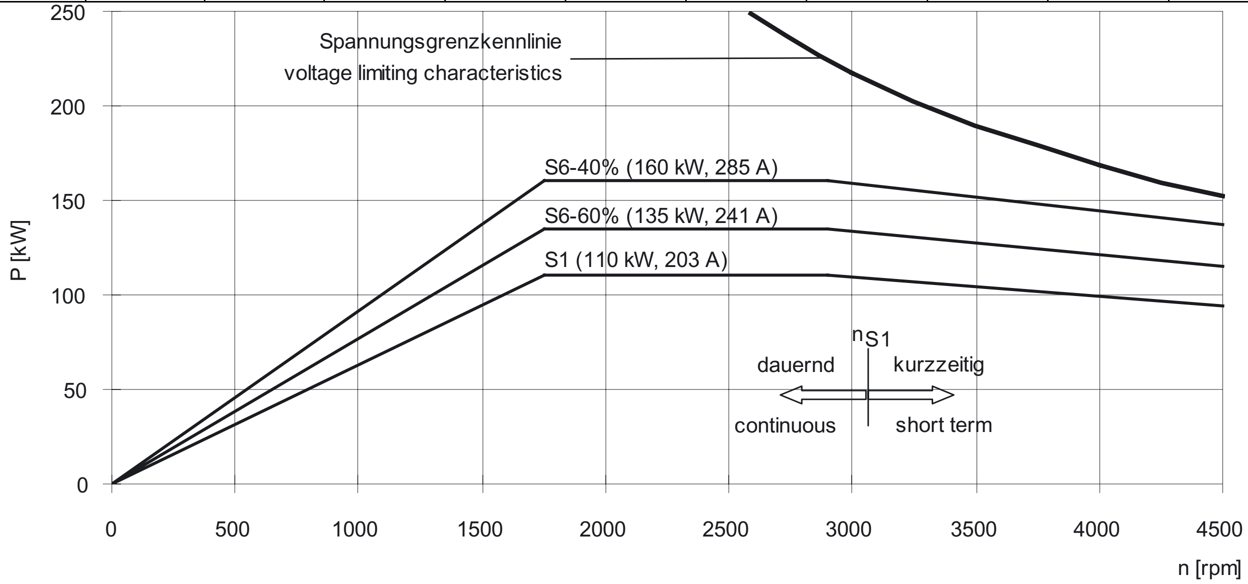


Table 7-129 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7224-□□U□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1750	110	600	203	395	58,9	2900	4500	40	88	385



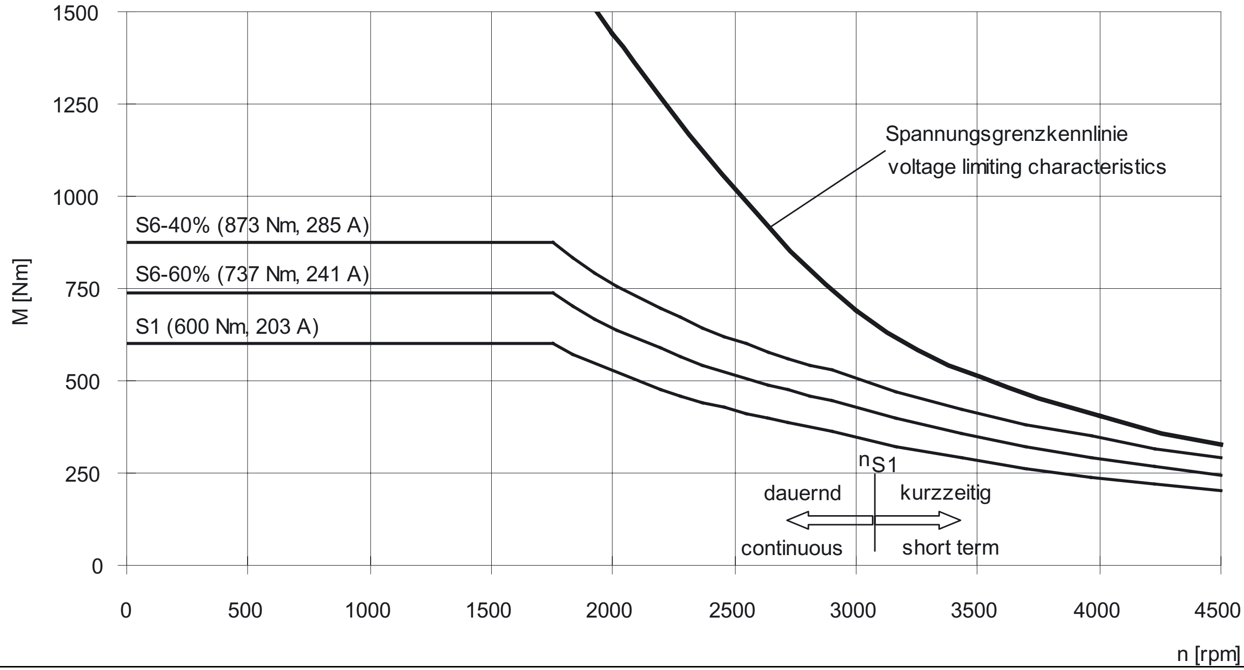
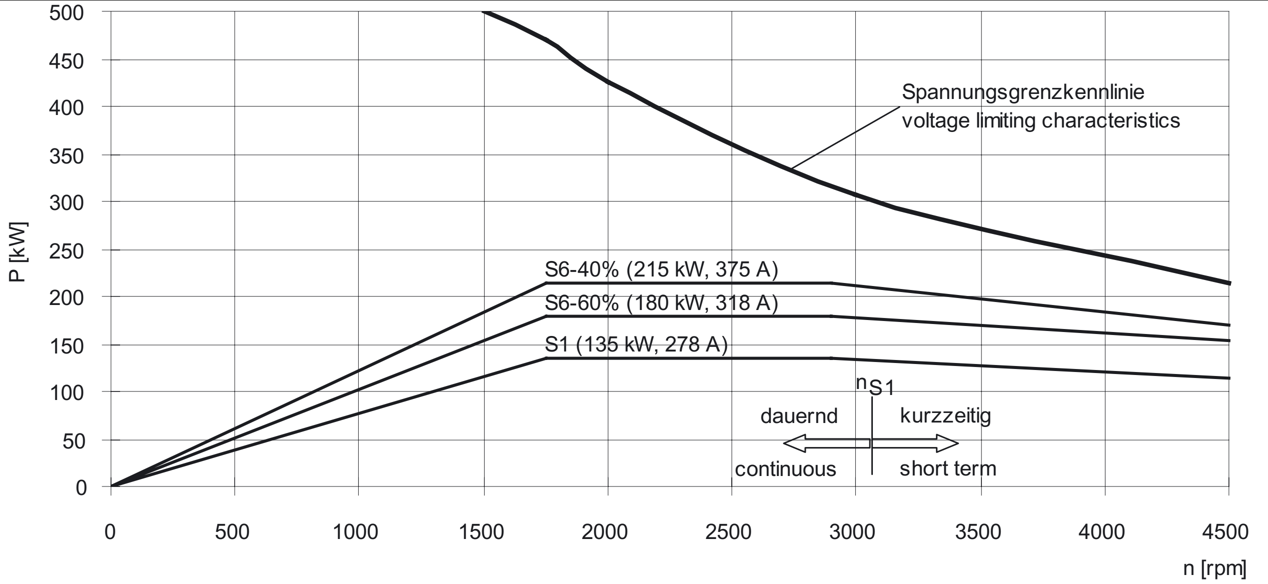


Table 7-130 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7226-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1750	135	737	254	395	58,9	2900	4500	40	120	465



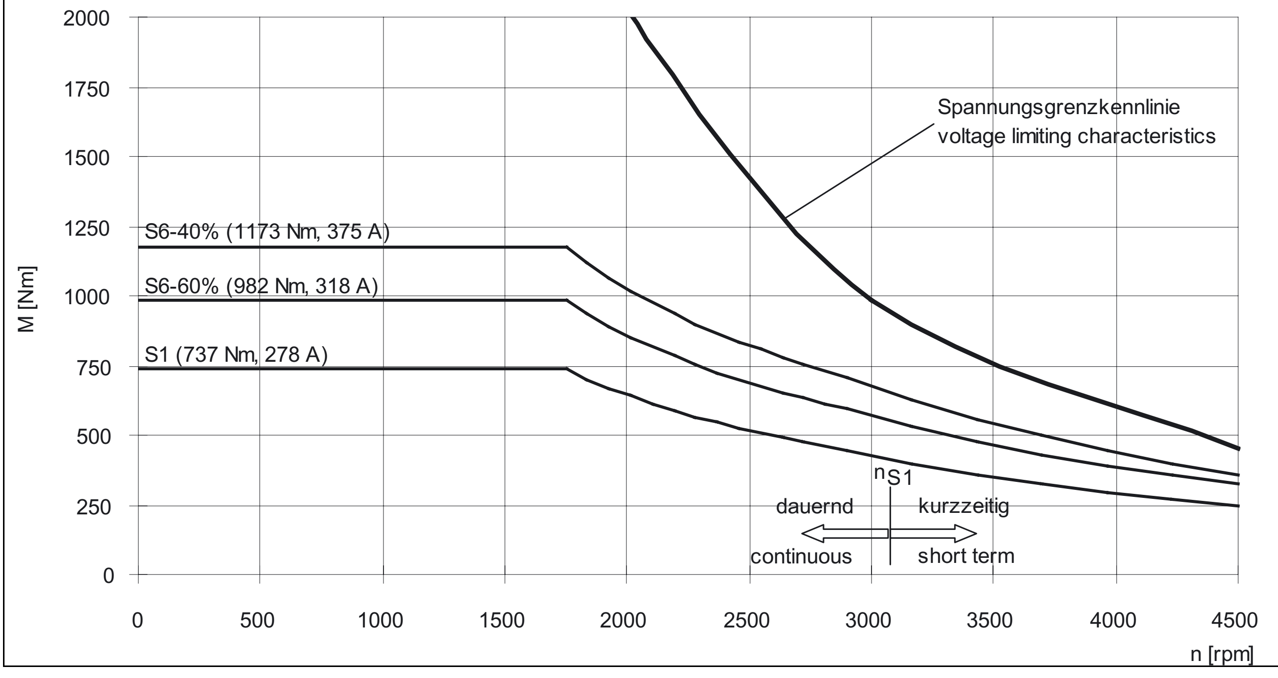
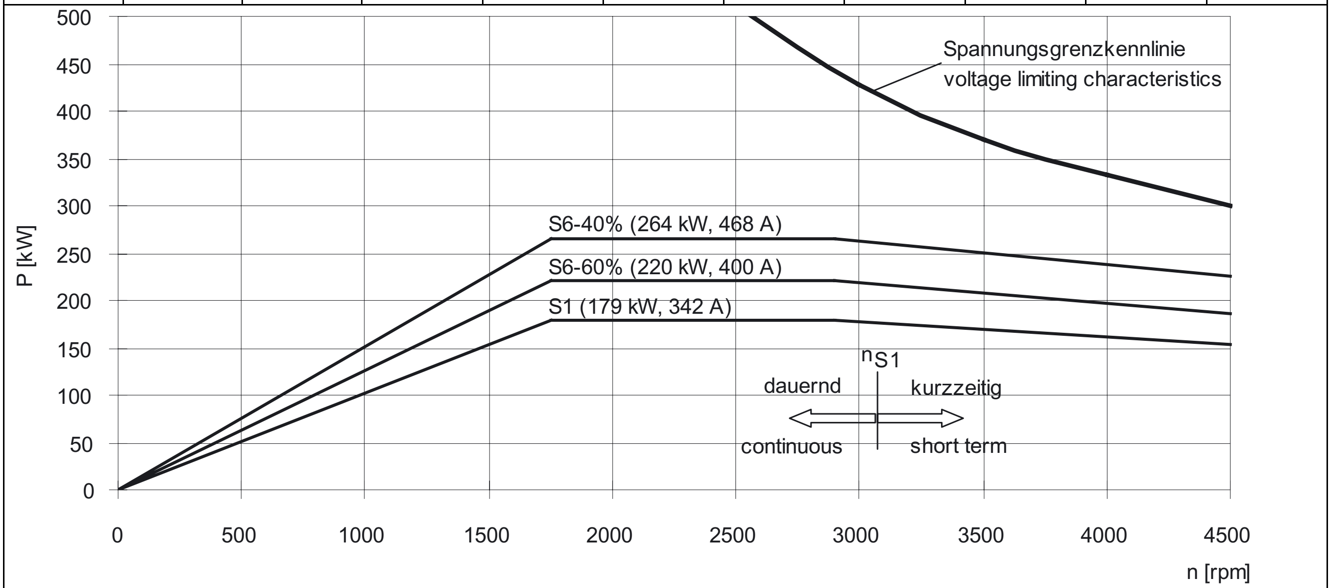
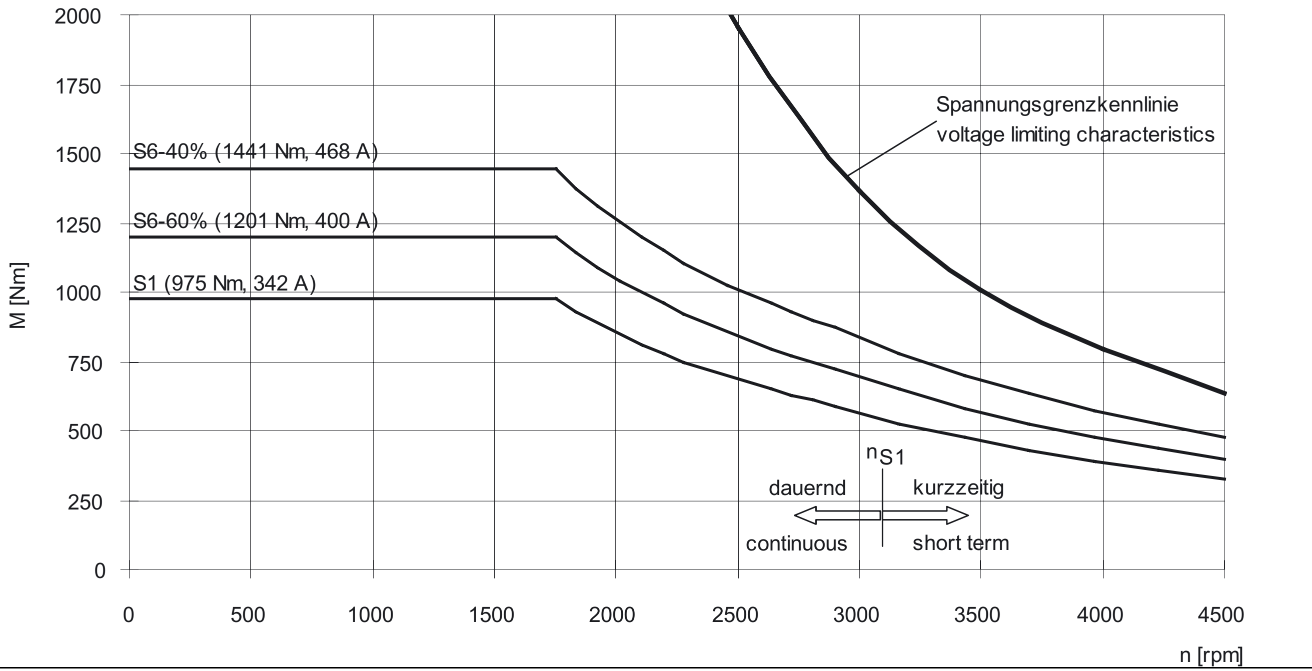


Table 7-131 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7228-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1750	179	975	342	395	58,8	2900	4500 1)	40	169	620

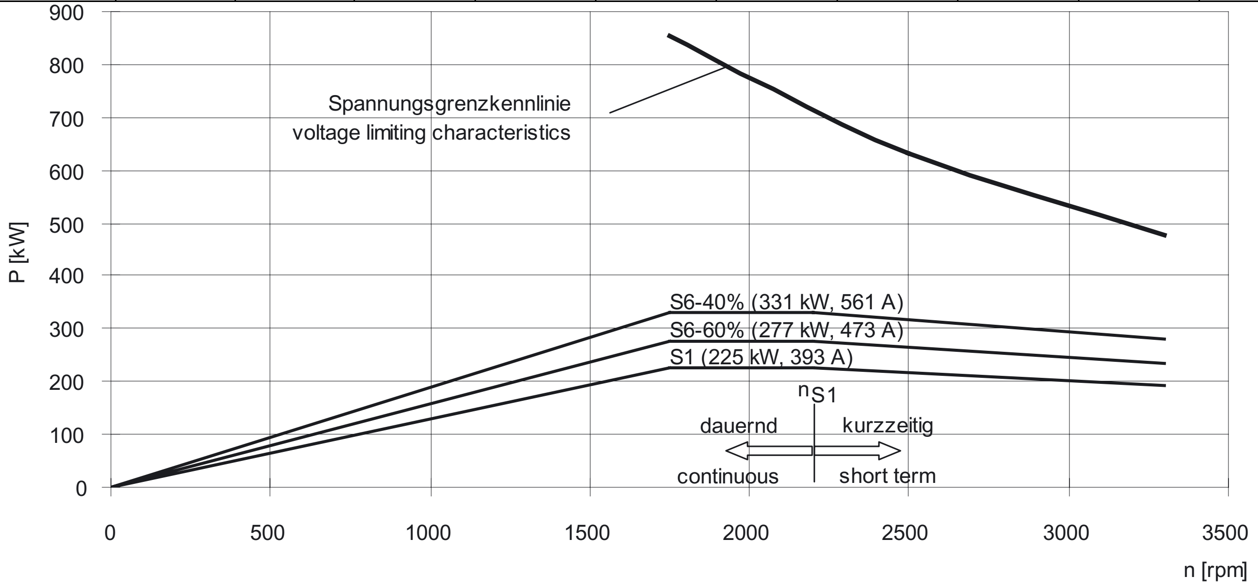




1) 4000 rpm for increased cantilever forces

Table 7-132 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7284-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1750	225	1228	393	400	58,7	2200	3300	75	163	750



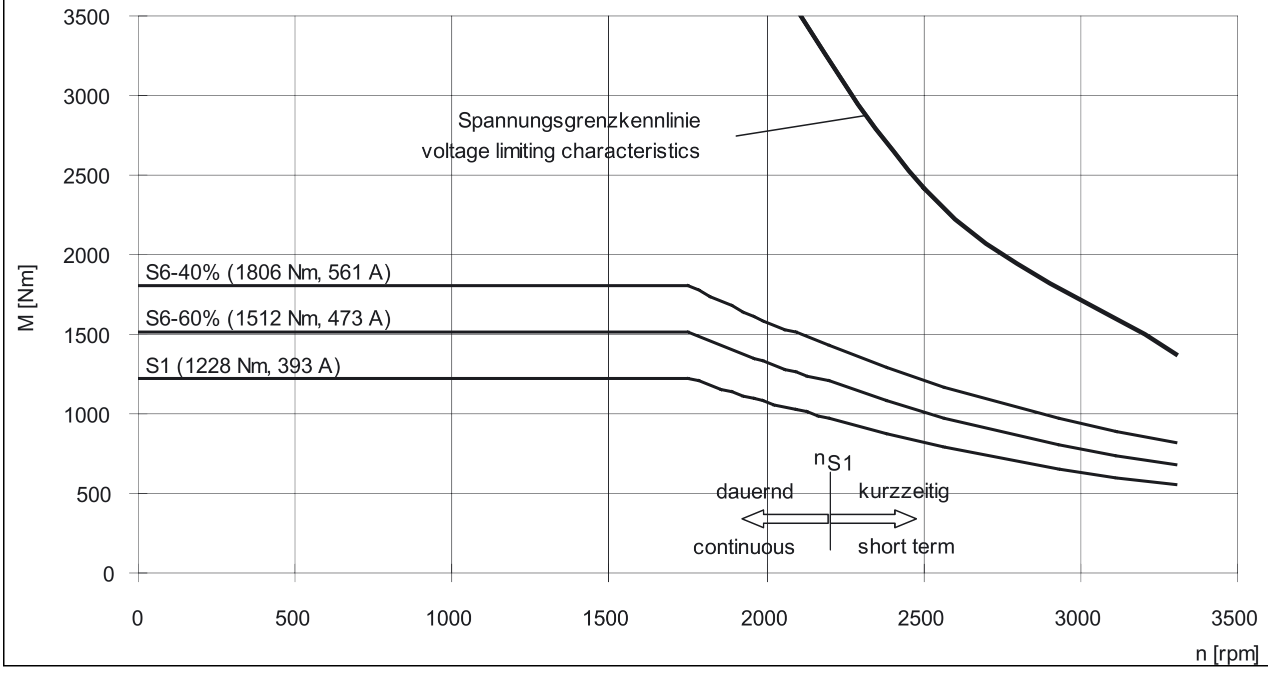
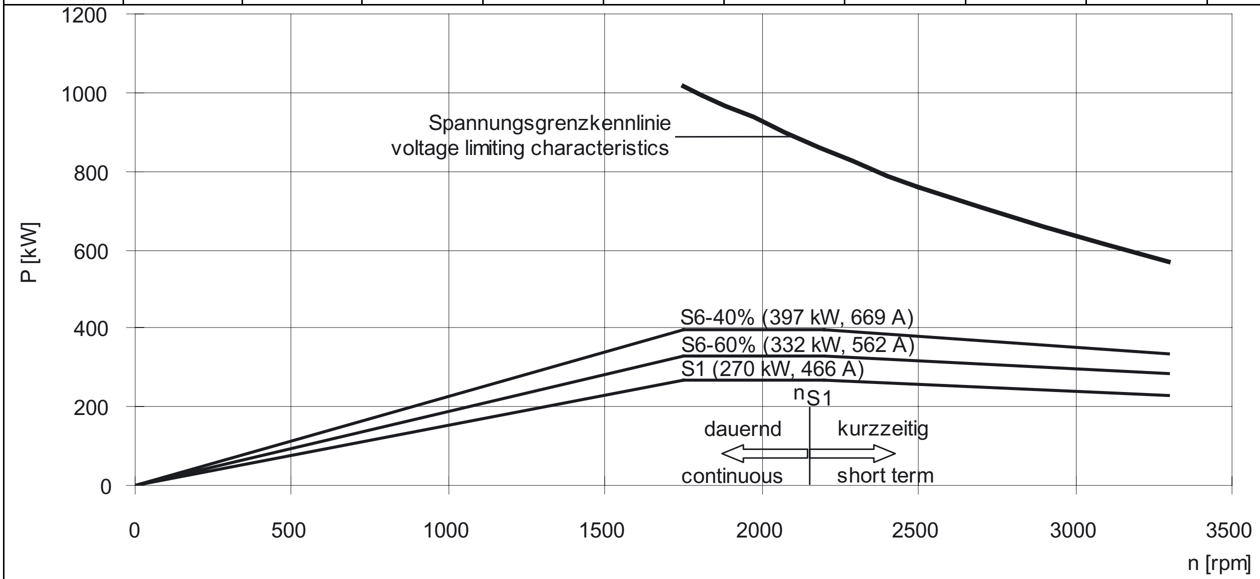


Table 7-133 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7286-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
17500	270	1474	466	400	58,7	2200	3300	83	184	895



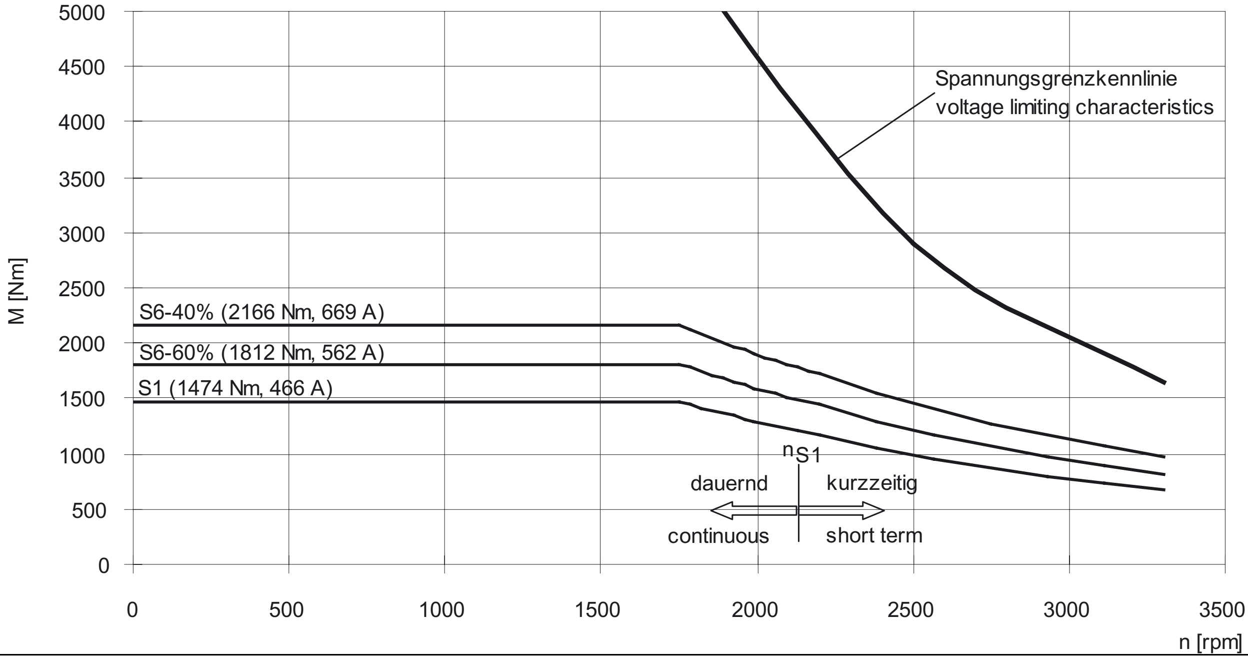
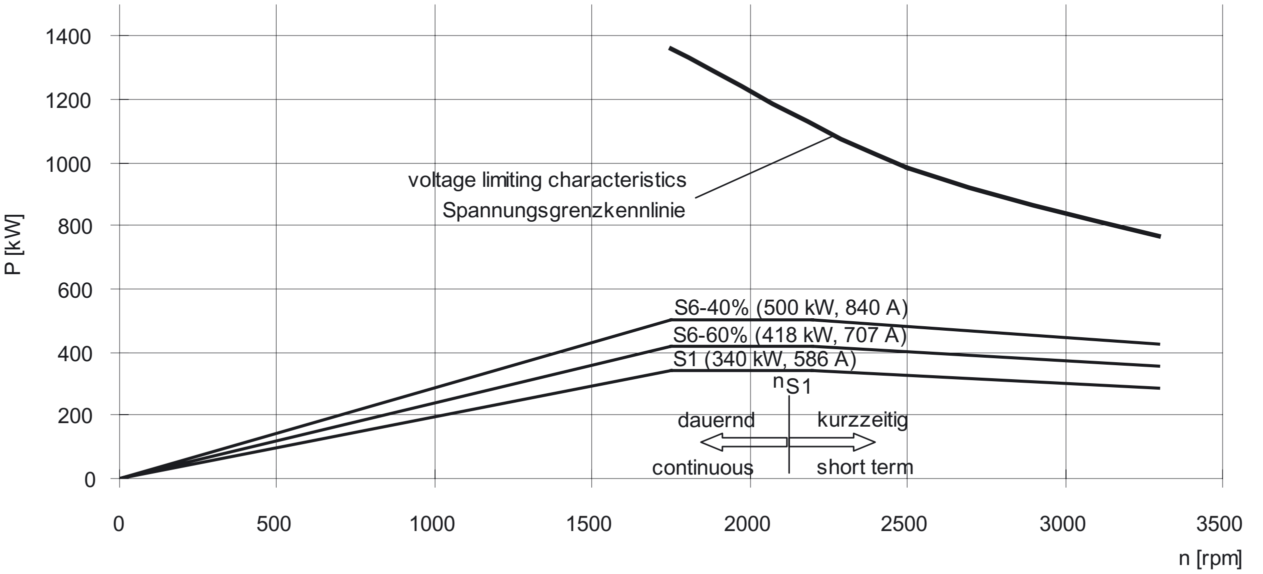


Table 7-134 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7288-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1750	340	1856	586	400	58,7	2200	3300	90	234	1125



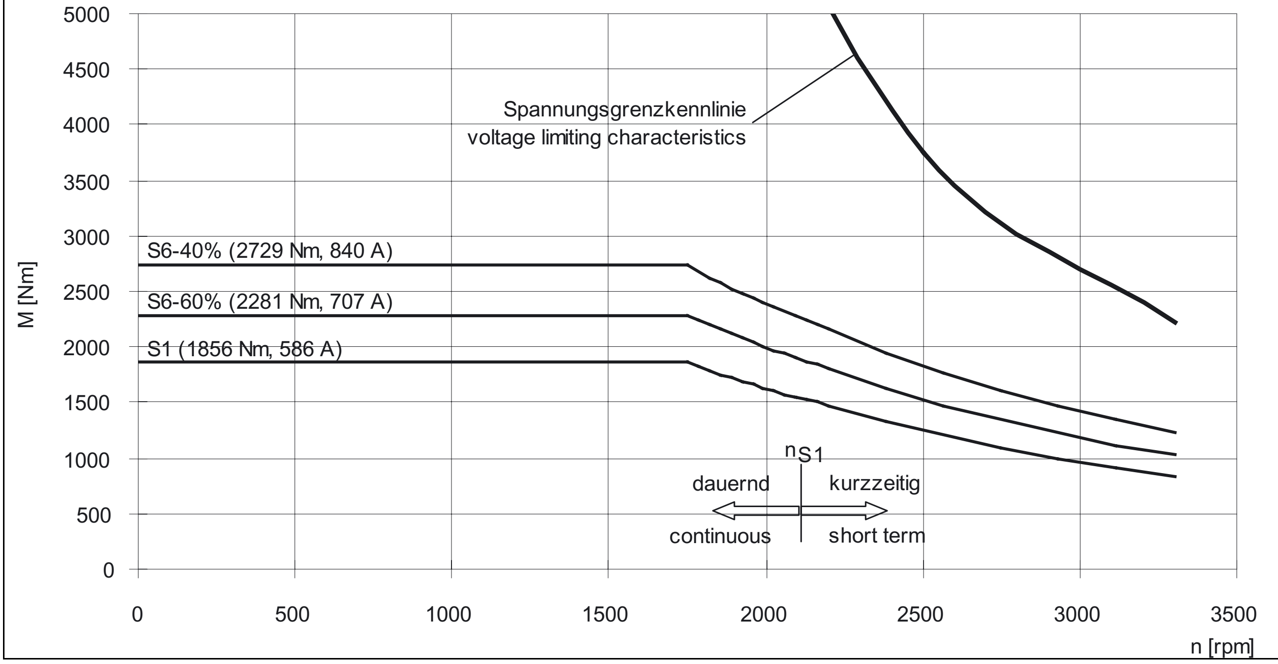


Table 7-135 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7103-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2300	7,5	31,1	17,0	388	78,8	6000	9000	20	8,2	34,0

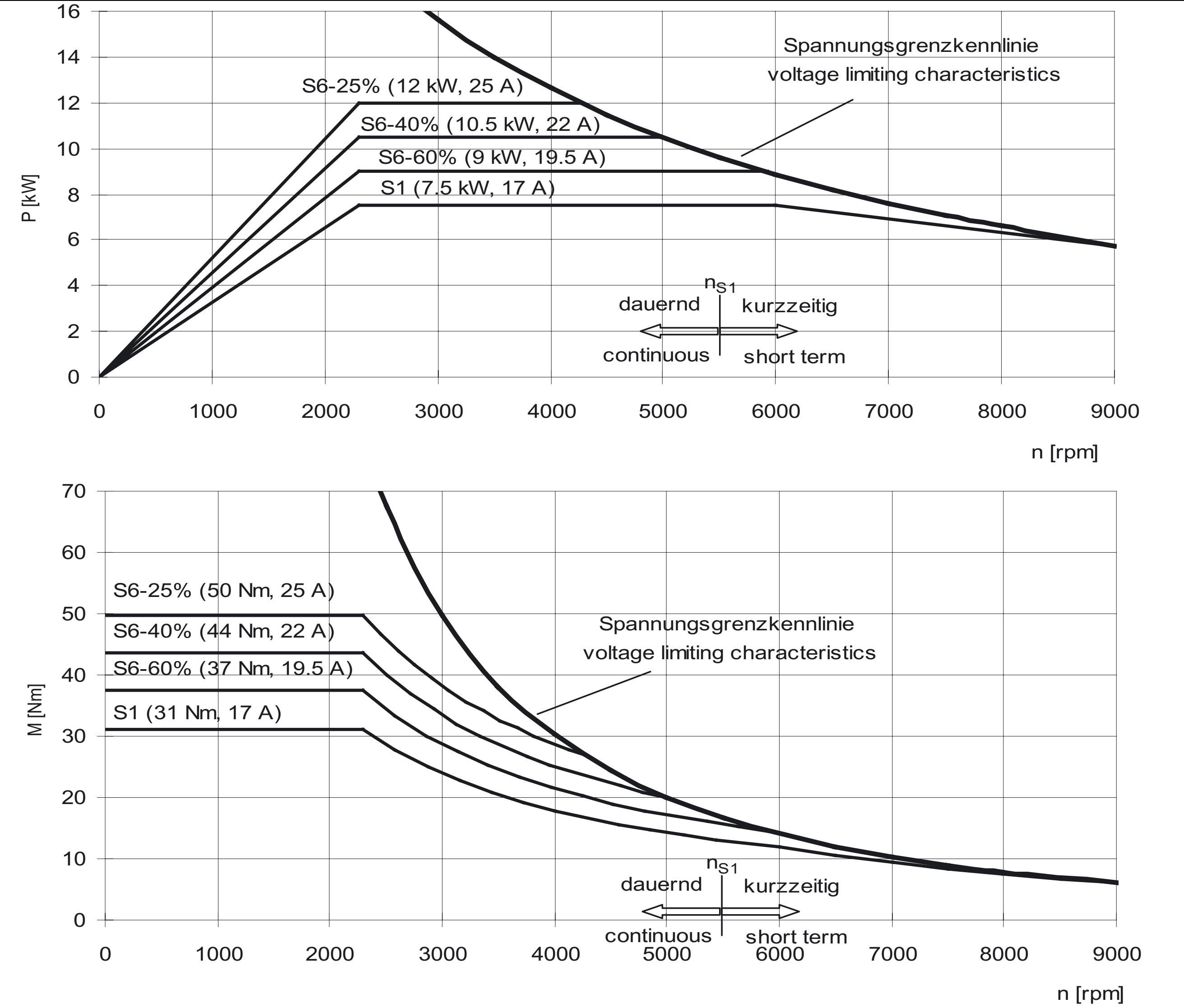


Table 7-136 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7107-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2300	12,0	49,8	26,0	400	78,7	6000	9000	20	12,0	52,0

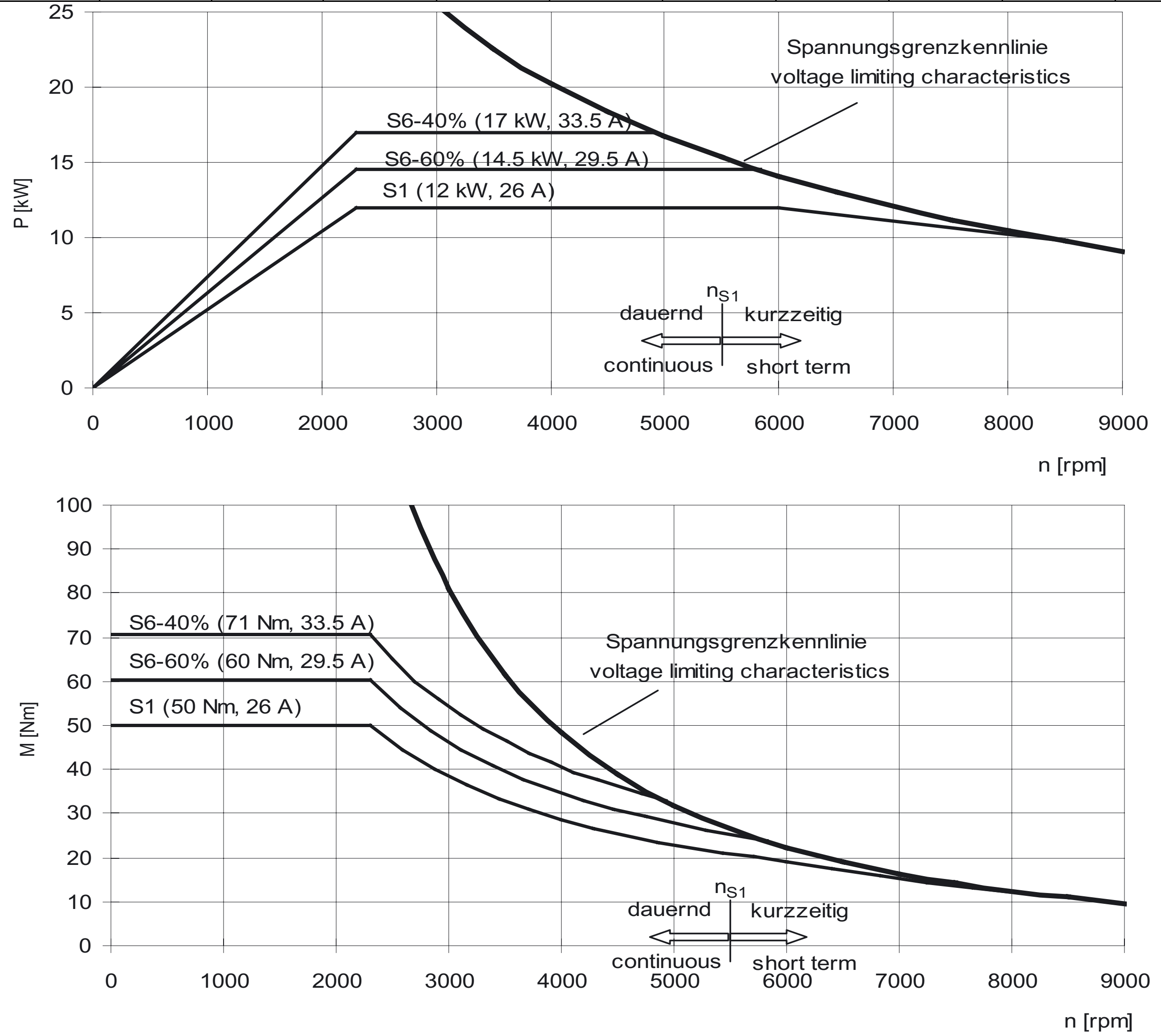
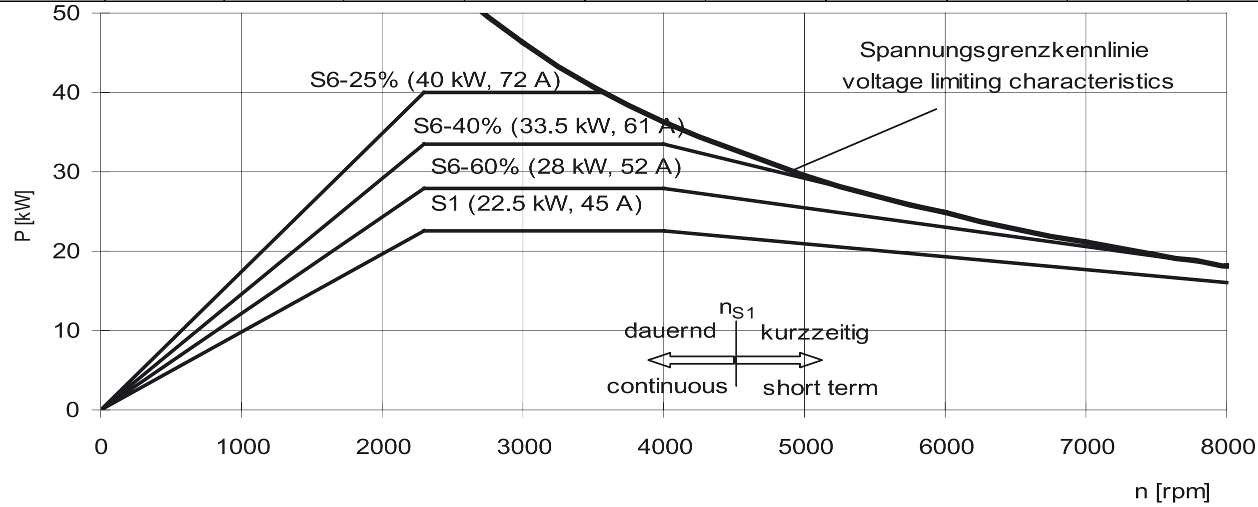


Table 7-137 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7133-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
2300	22,5	93	45	398	78,0	4000	8000	30	17,0	90



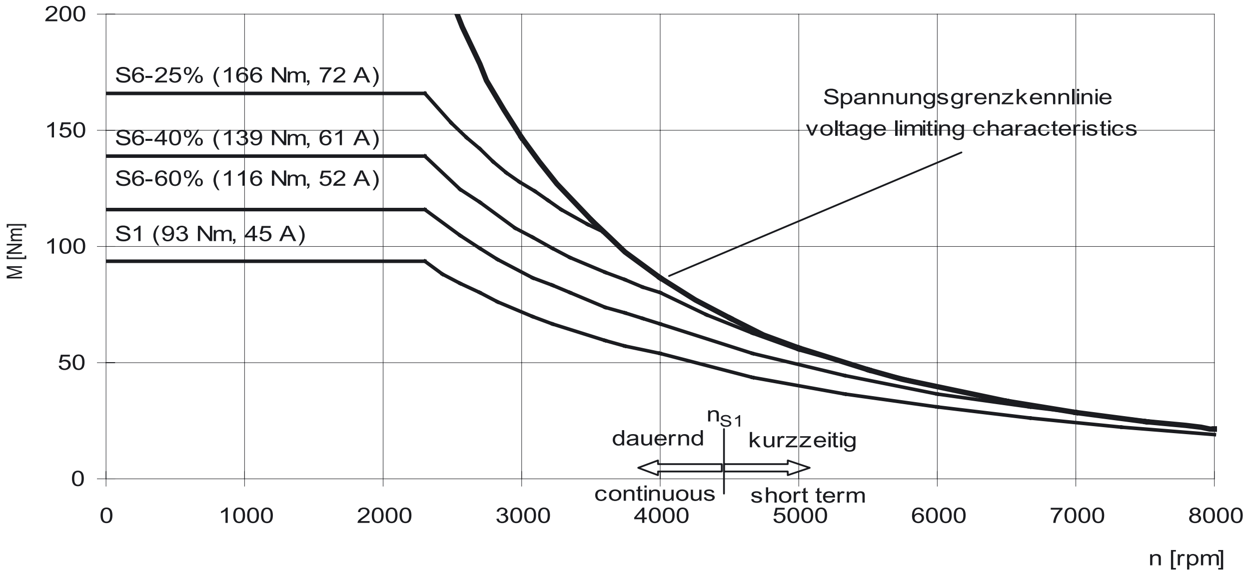
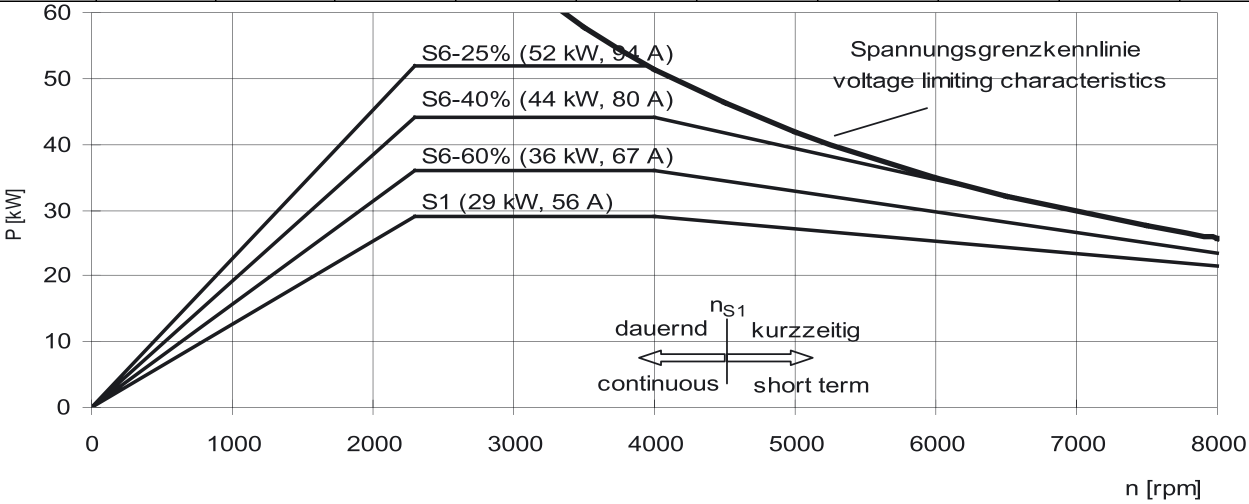


Table 7-138 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7137-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2300	29,0	120	56	398	77,8	4000	8000	30	21,0	112



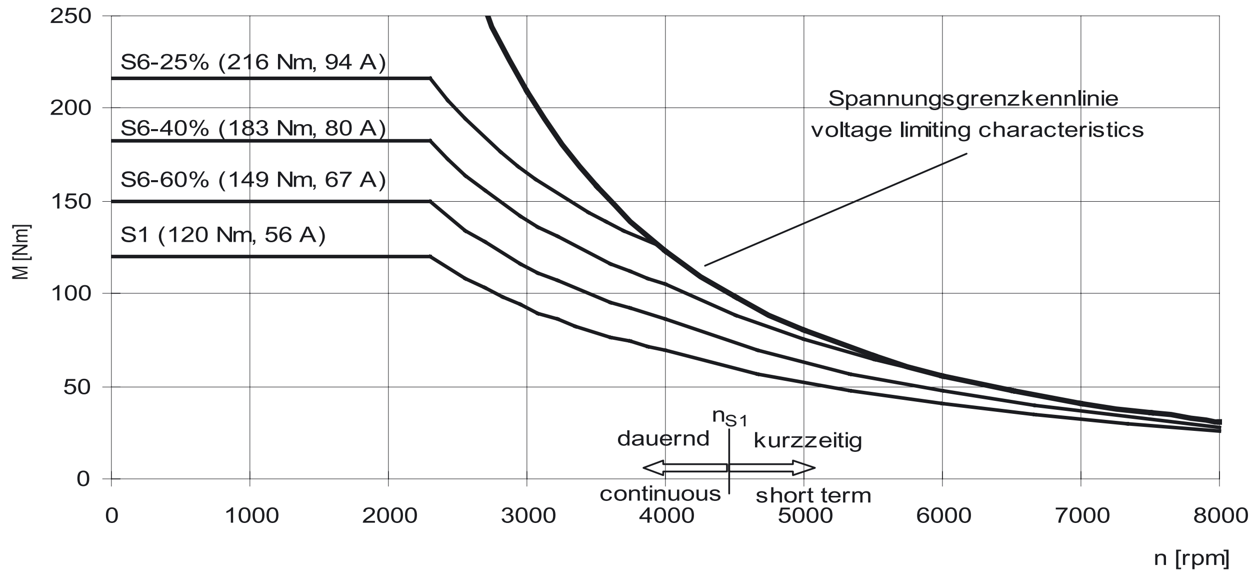
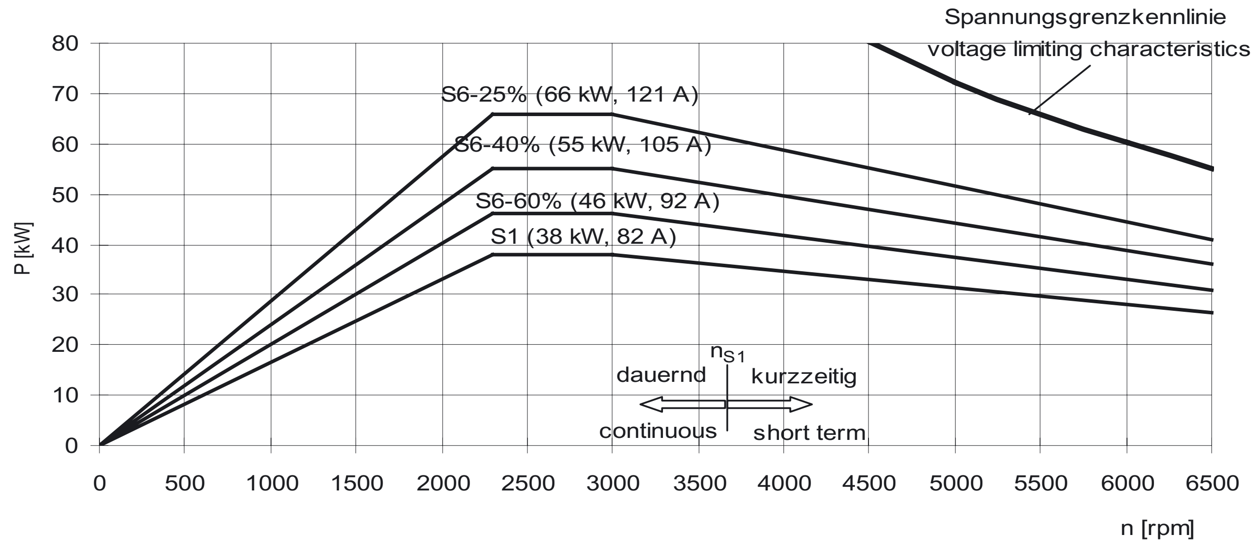


Table 7-139 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7163-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
2300	38,0	158	82	398	77,3	3000	6500	35	43,0	164



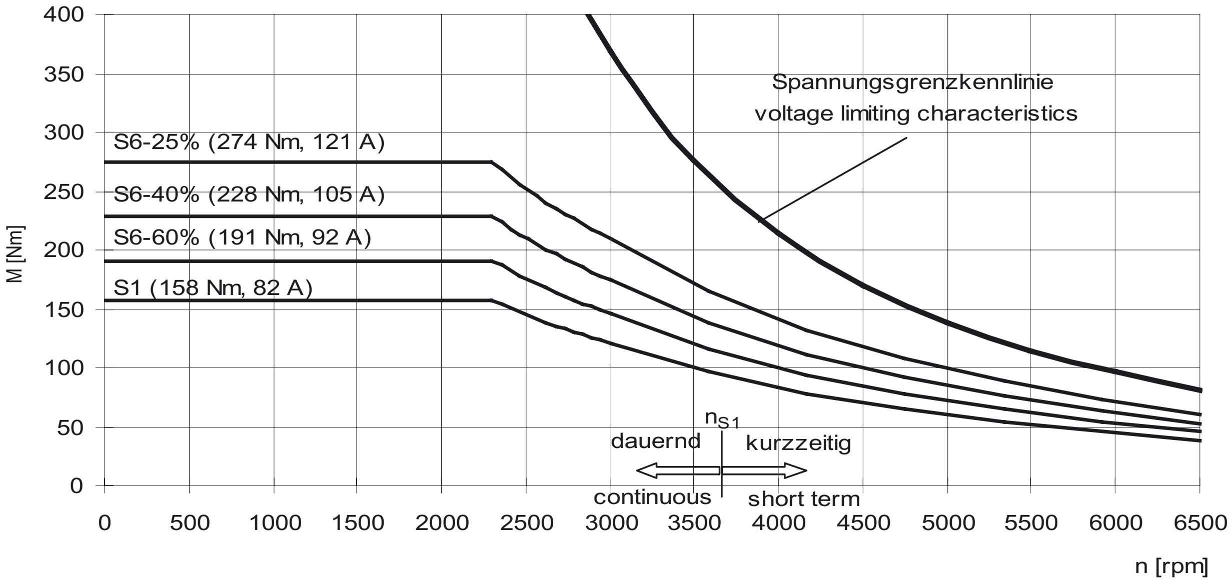
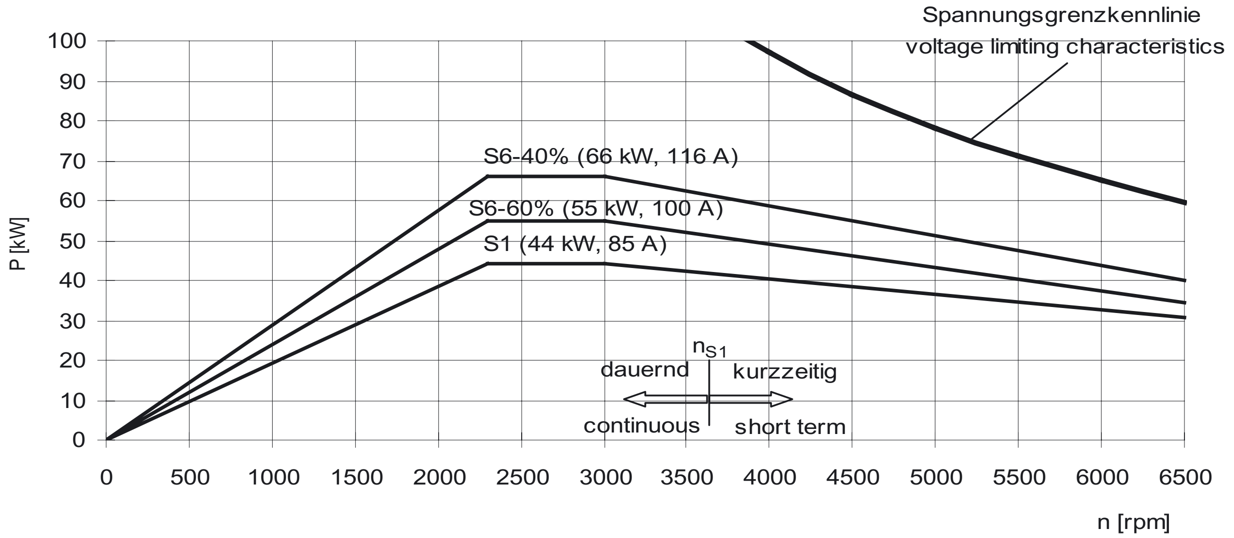


Table 7-140 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7167-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2300	44,0	183	85	398	77,4	3000	6500	35	40,0	170



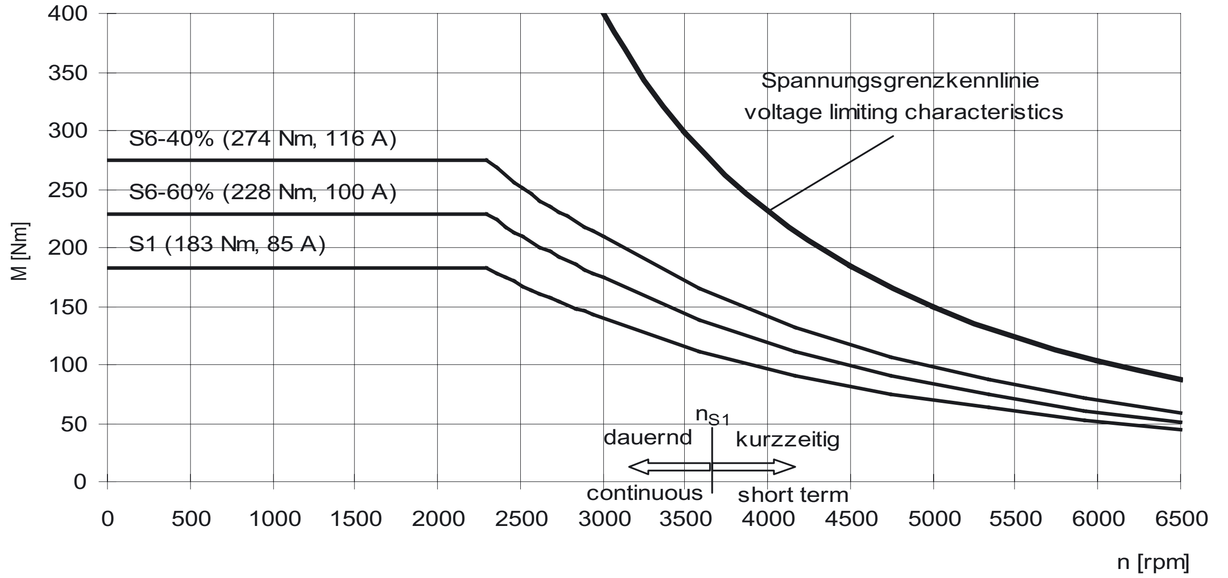
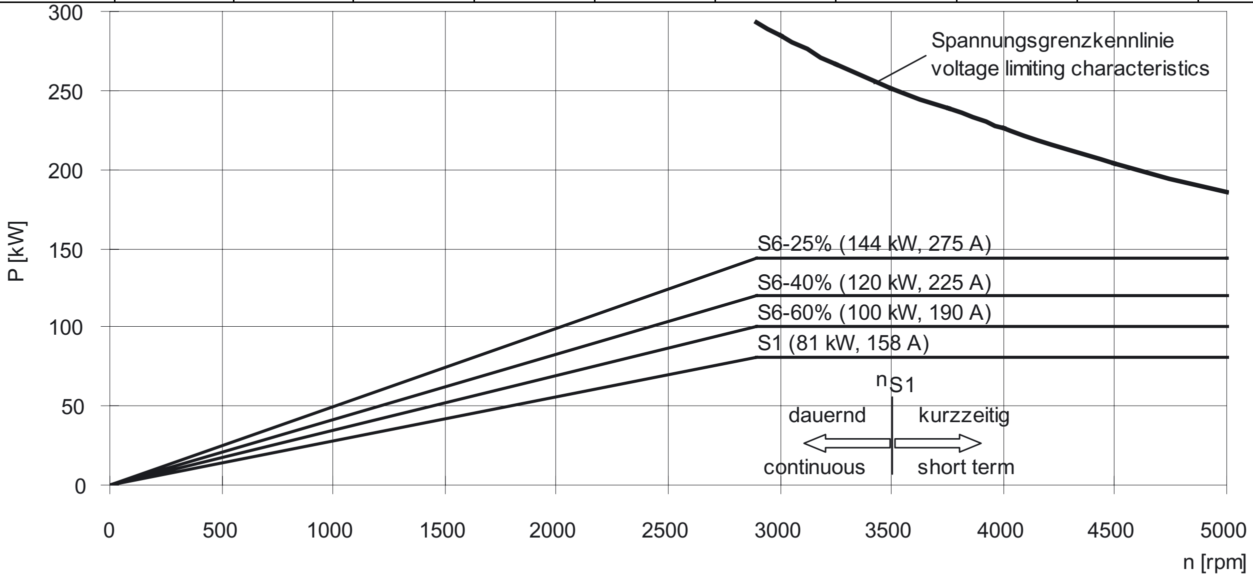


Table 7-141 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7184-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2900	81	265	158	395	97,4	5000	5000	40	77	285



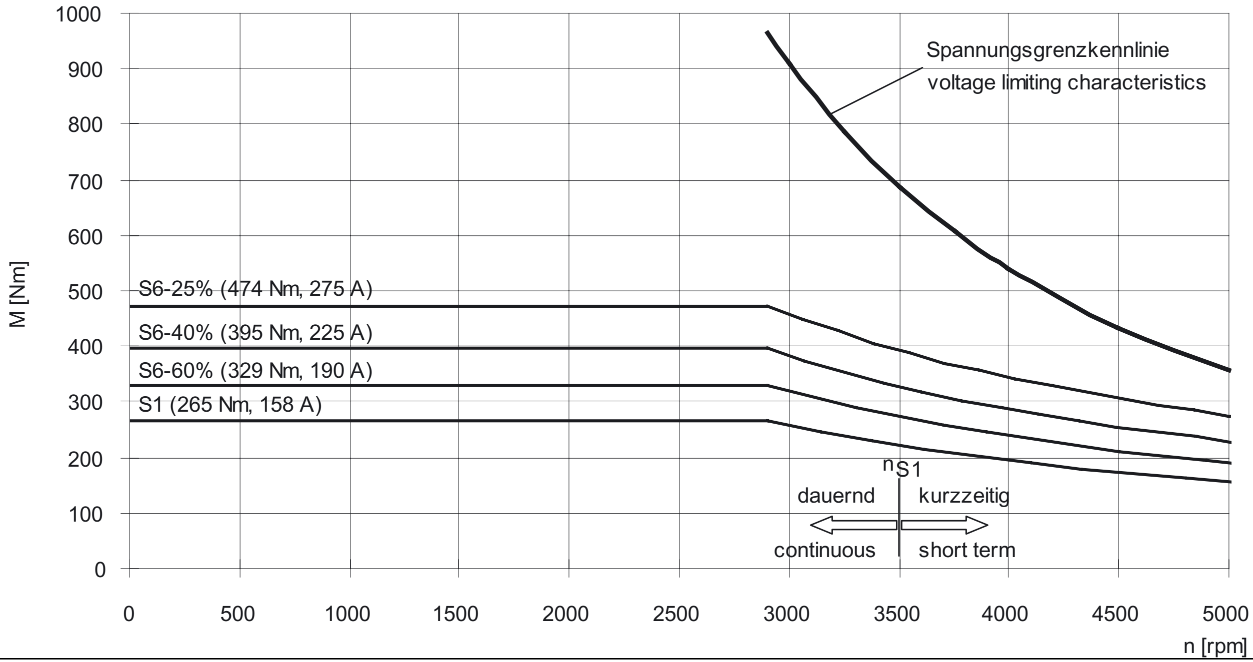
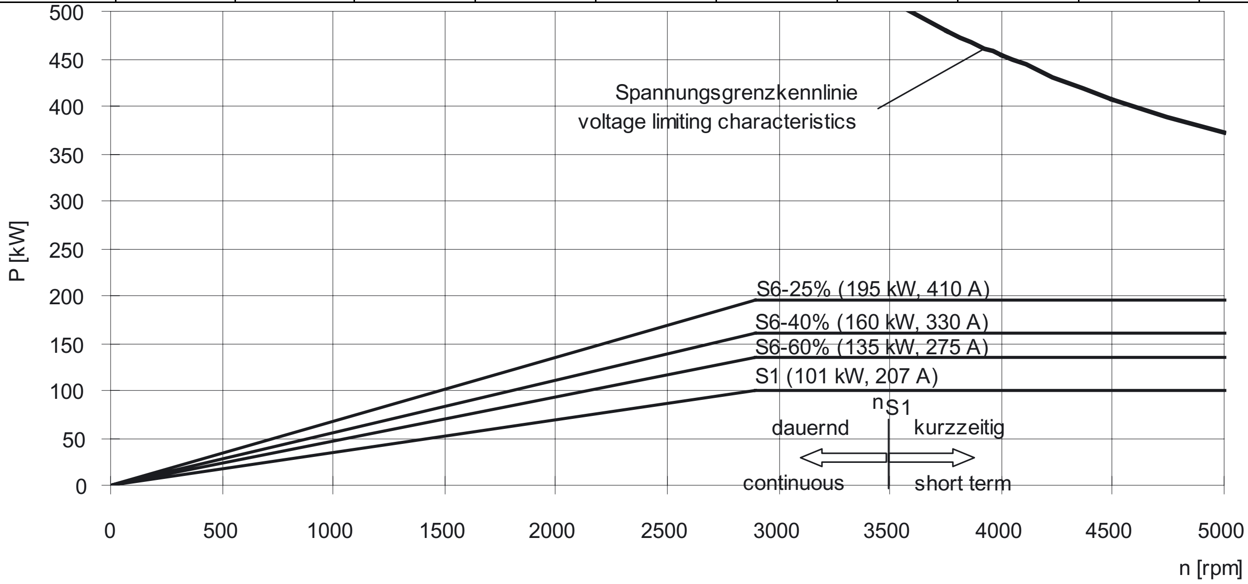


Table 7-142 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7186-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2900	101	333	206	385	97,3	5000	5000	40	107	360



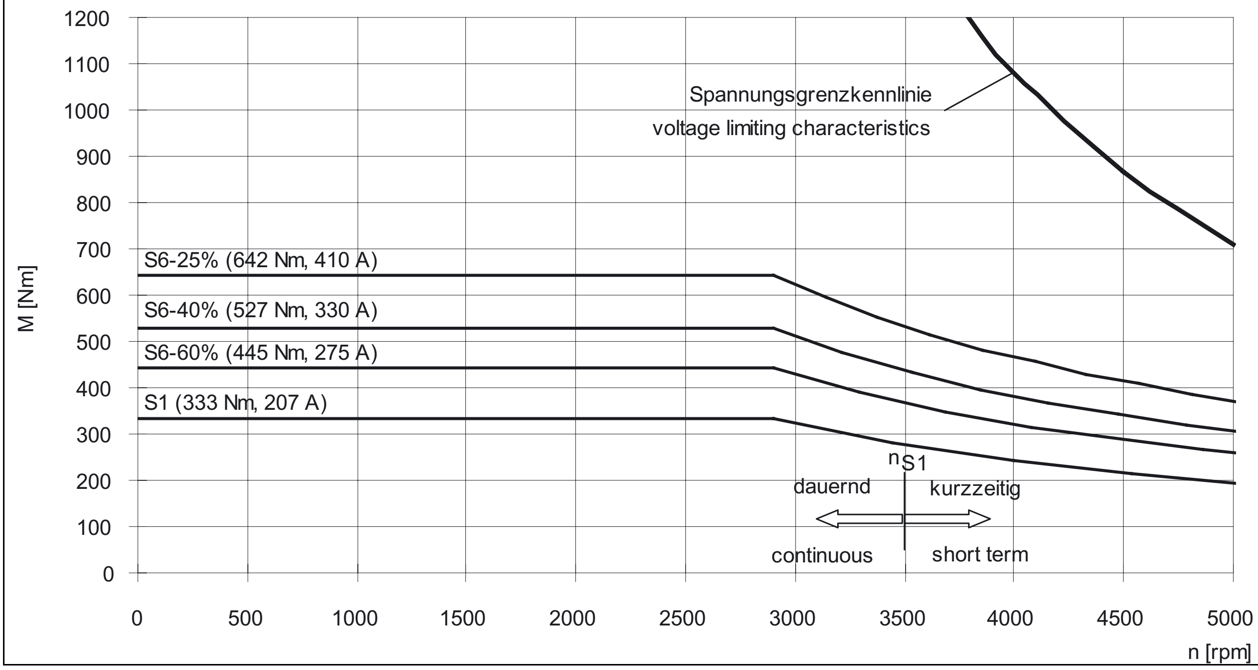


Table 7-143 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7224-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
2900	149	490	274	395	97,3	3500	4500	40	115	510

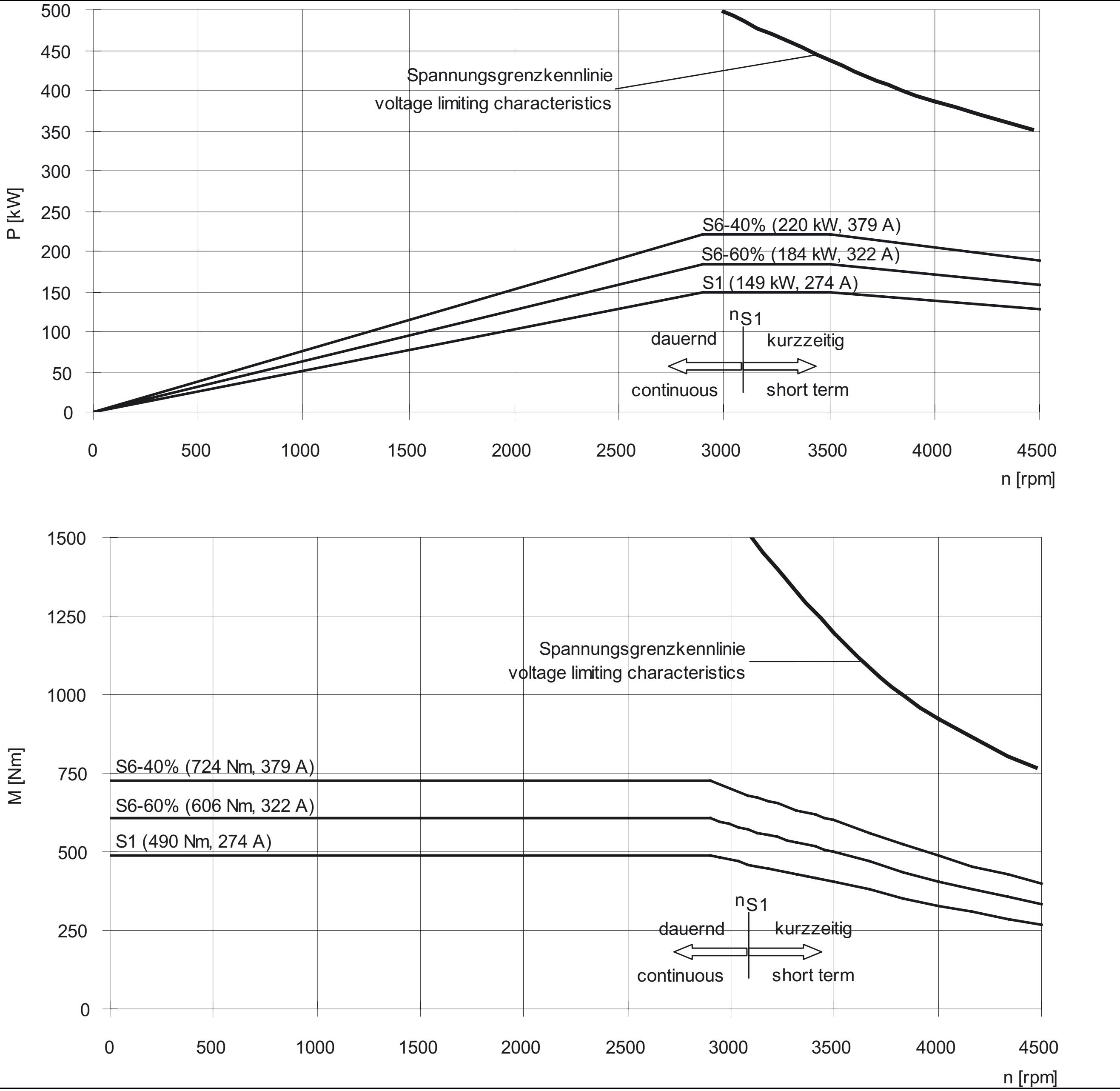
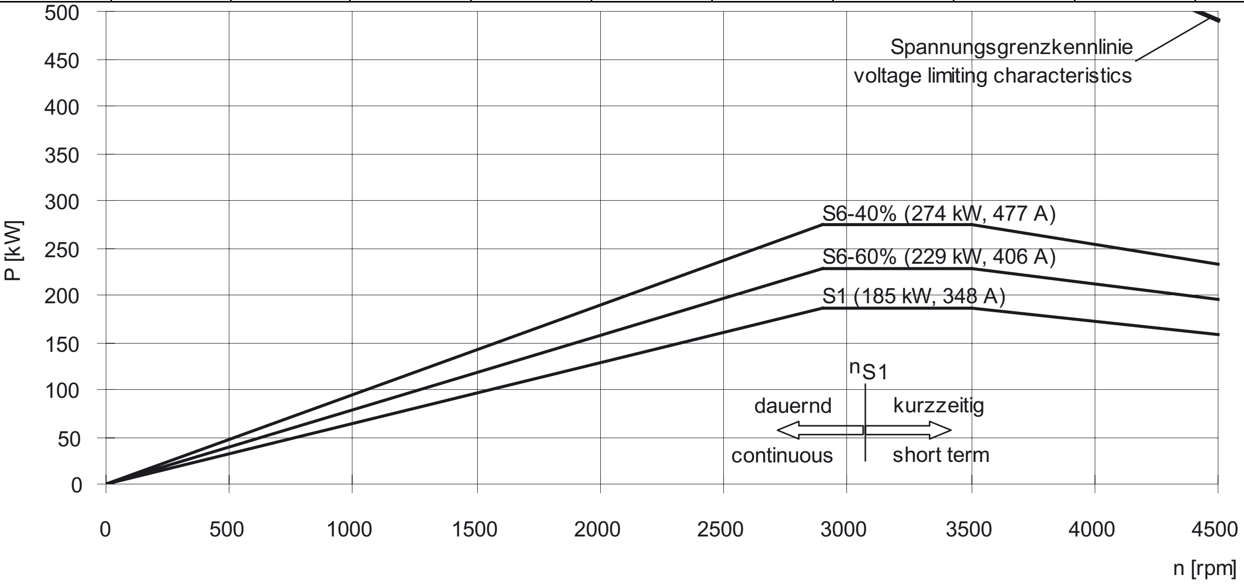


Table 7-144 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7226-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2900	185	610	348	390	97,2	3500	4500	40	154	635



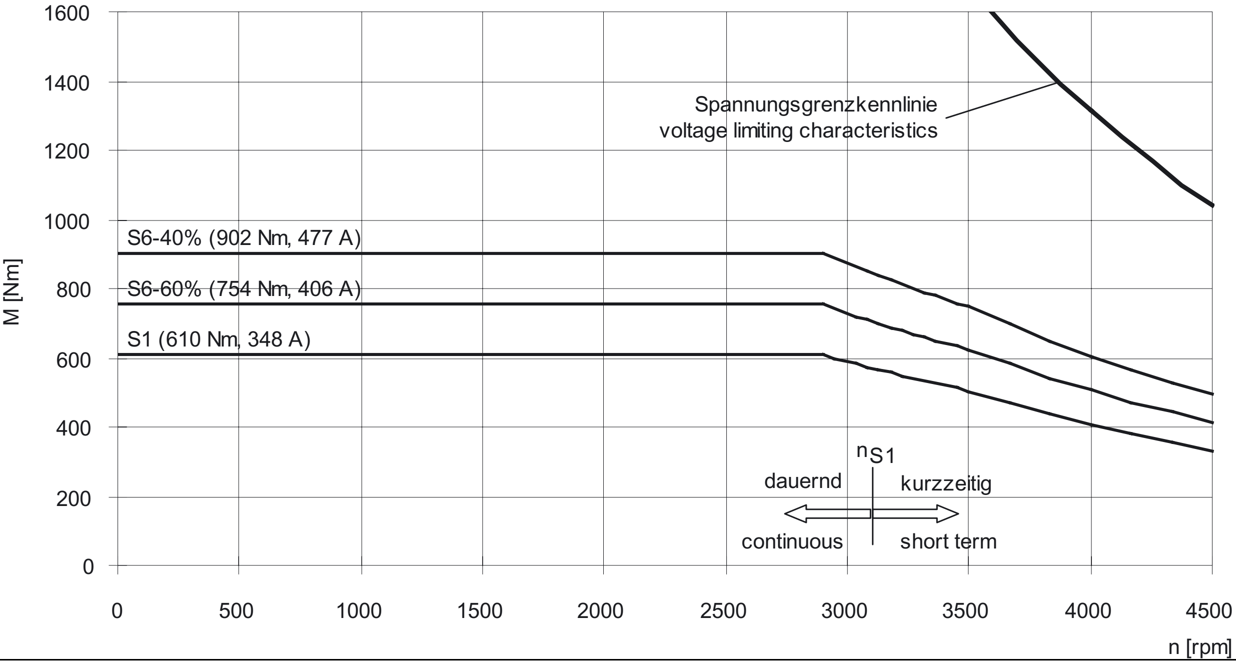
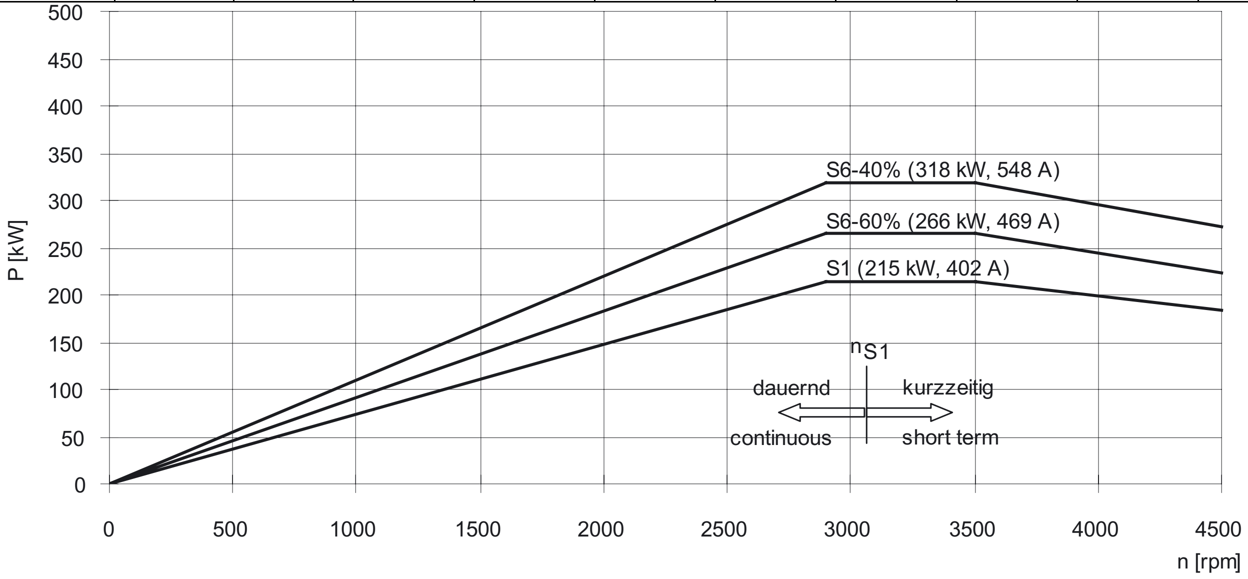
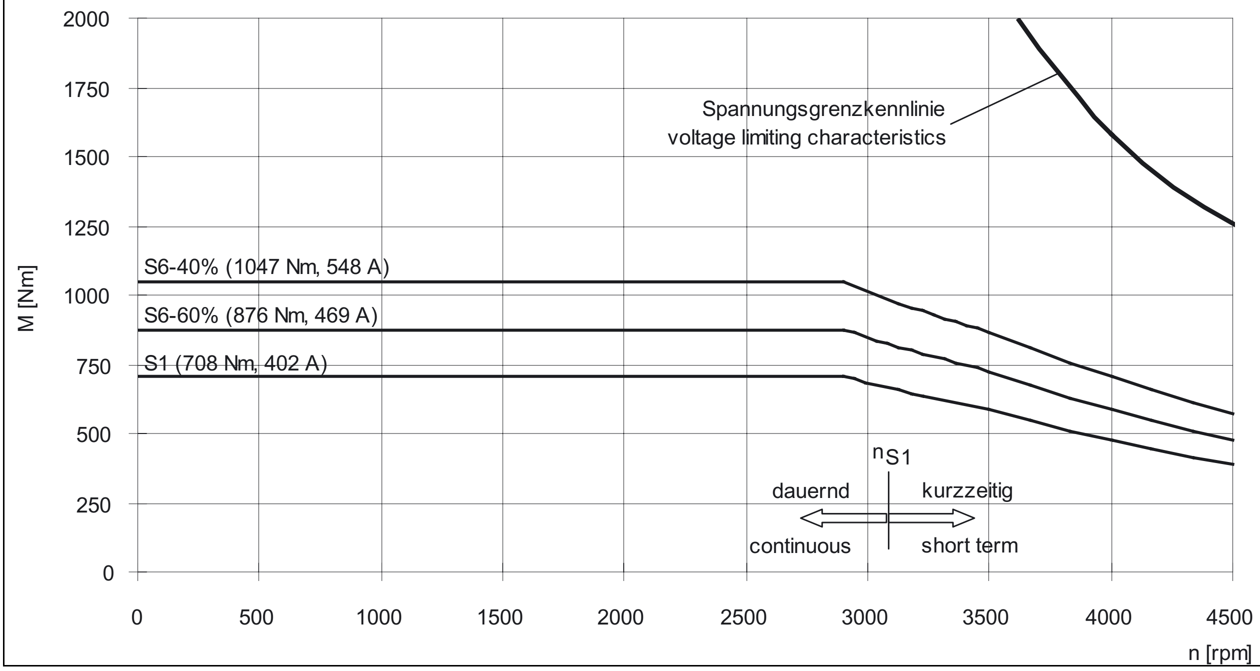


Table 7-145 SINAMICS, 3-ph. 400 V AC, Vector Control, 1PH7228-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2900	215	708	402	395	97,2	3500	4500 1)	40	186	730



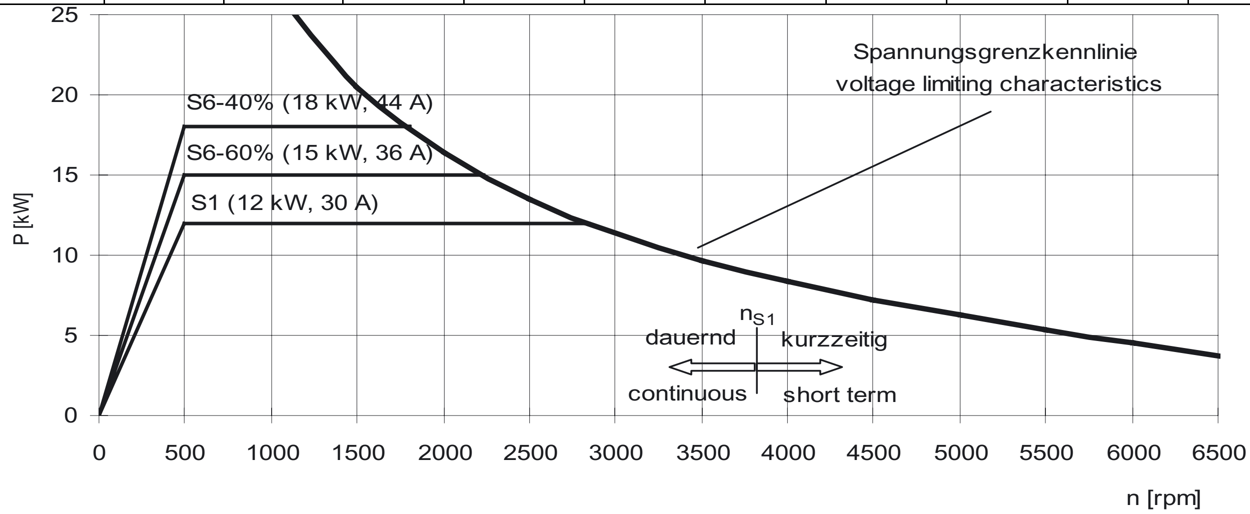


1) 4000 rpm for increased cantilever forces

7.3 SINAMICS 3-ph. 480 V AC, Servo/Vector Control (SC/VC)

Table 7-146 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7163-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
500	12,0	229	30	340	17,6	2845	6500	35	13,0	54



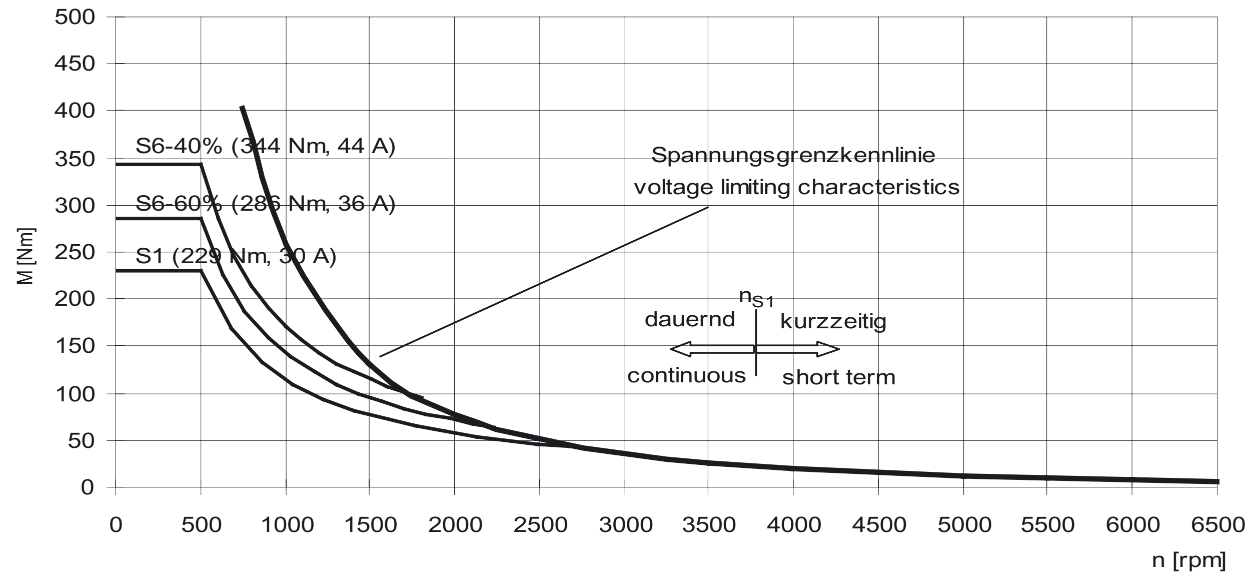
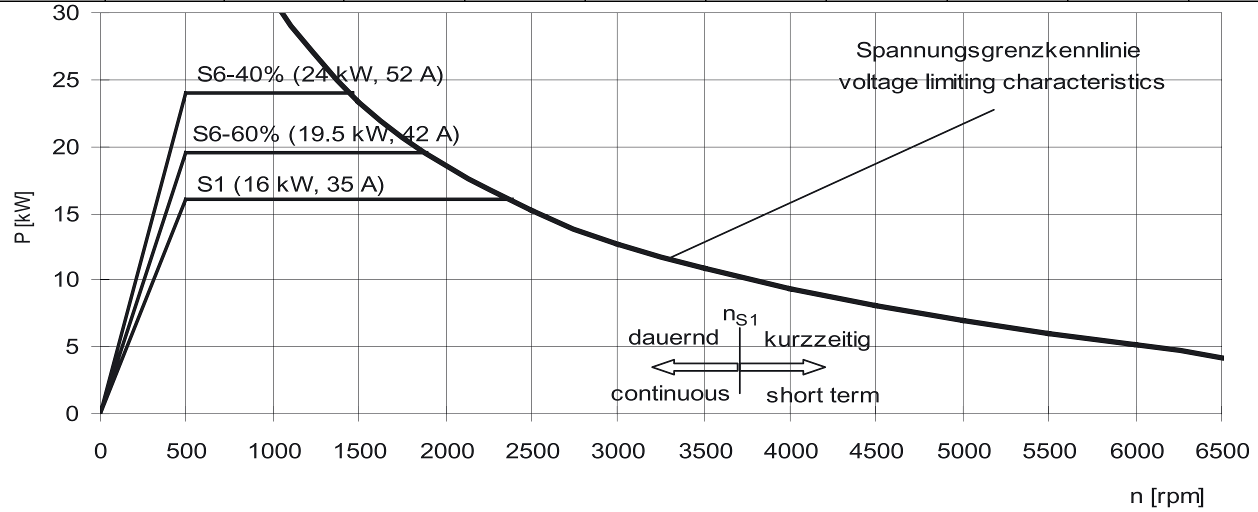


Table 7-147 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7167-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
500	16,0	306	35	350	17,7	2386	6500	35	13,0	81



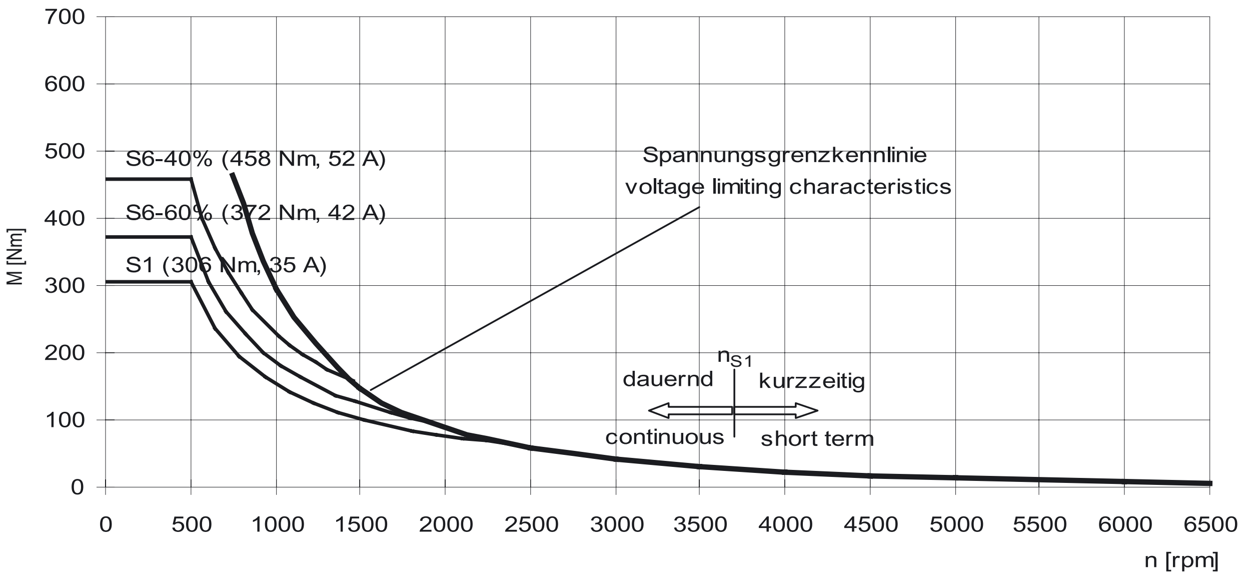
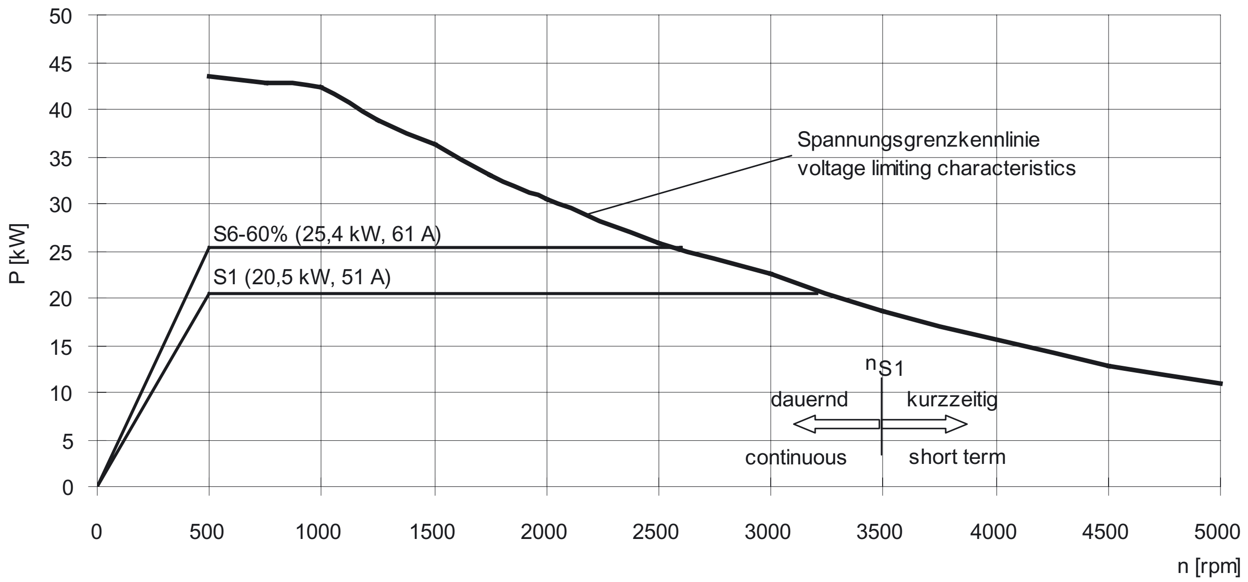


Table 7-148 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7184-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
500	20,5	392	51	335	17,5	3200	5000	40	26	110



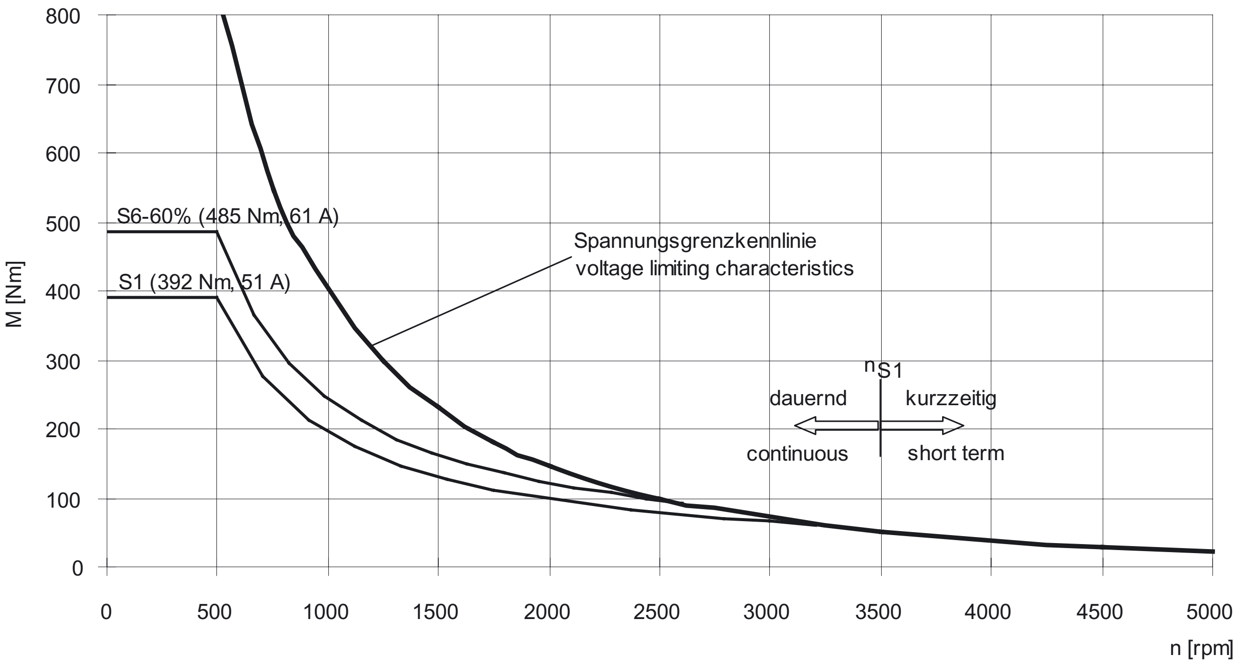
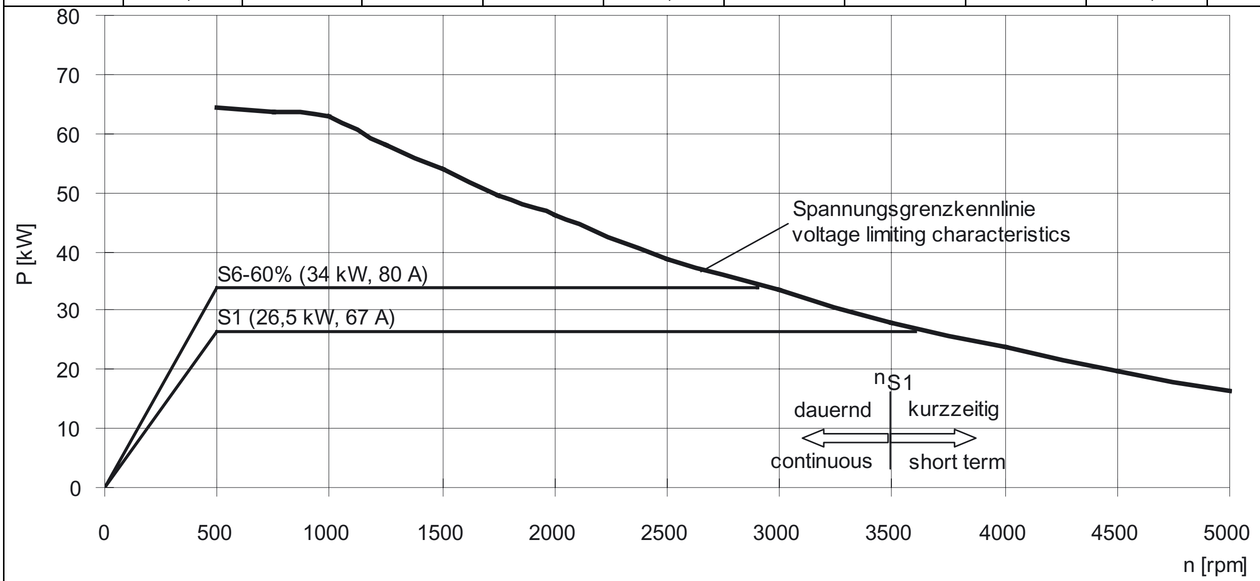


Table 7-149 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7186-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
500	26,5	506	67	335	17,3	3600	5000	40	39,5	130



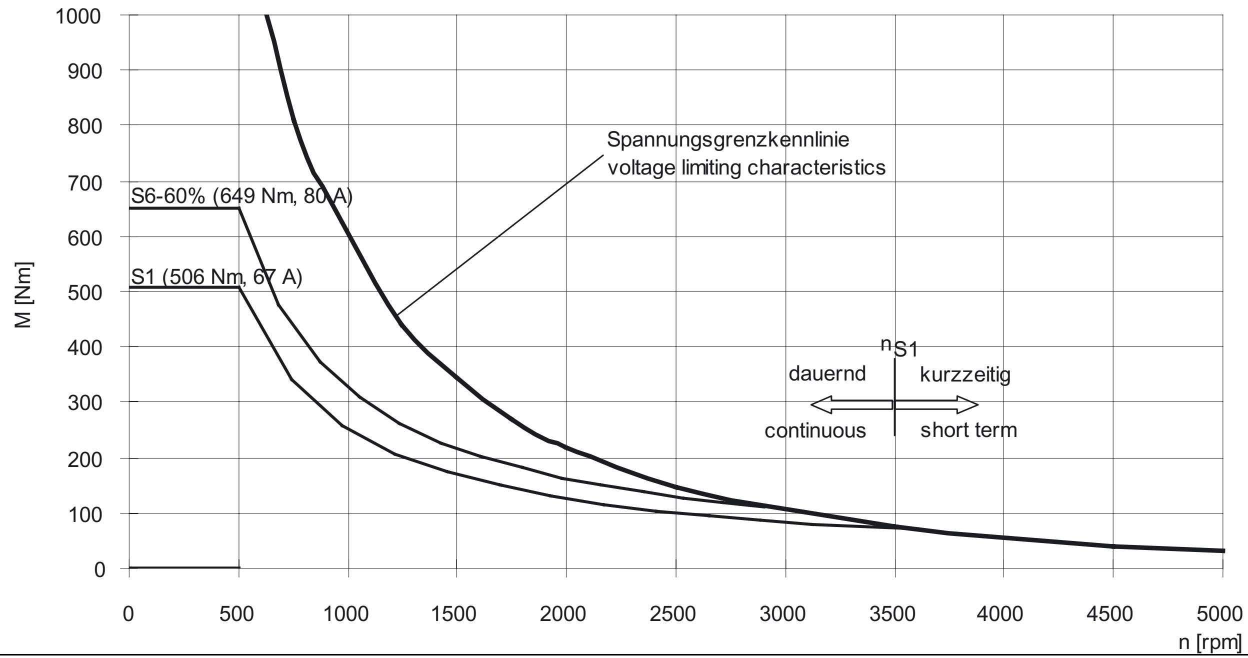
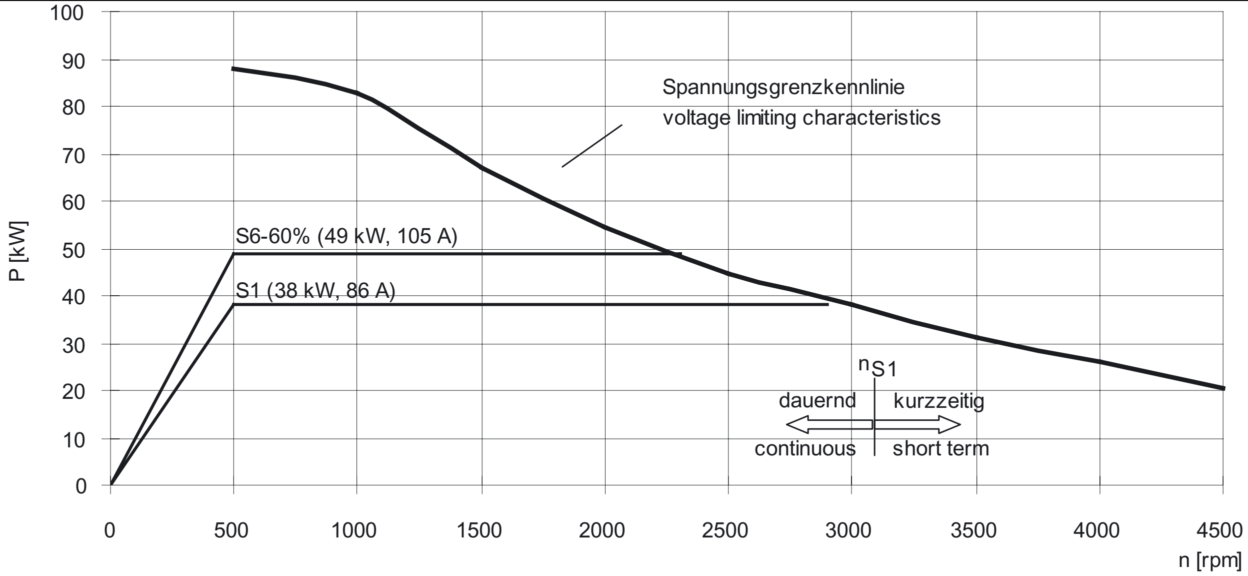


Table 7-150 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7224-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
500	38	725	86	335	17,3	2900	4500	40	37,5	185



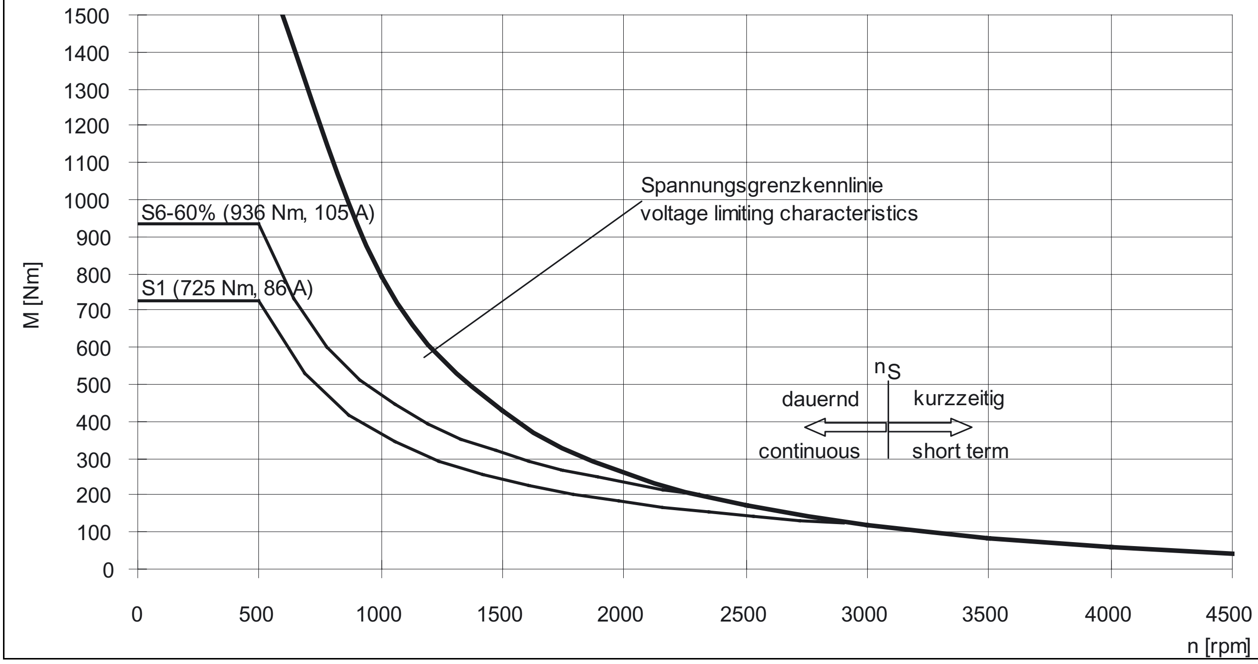
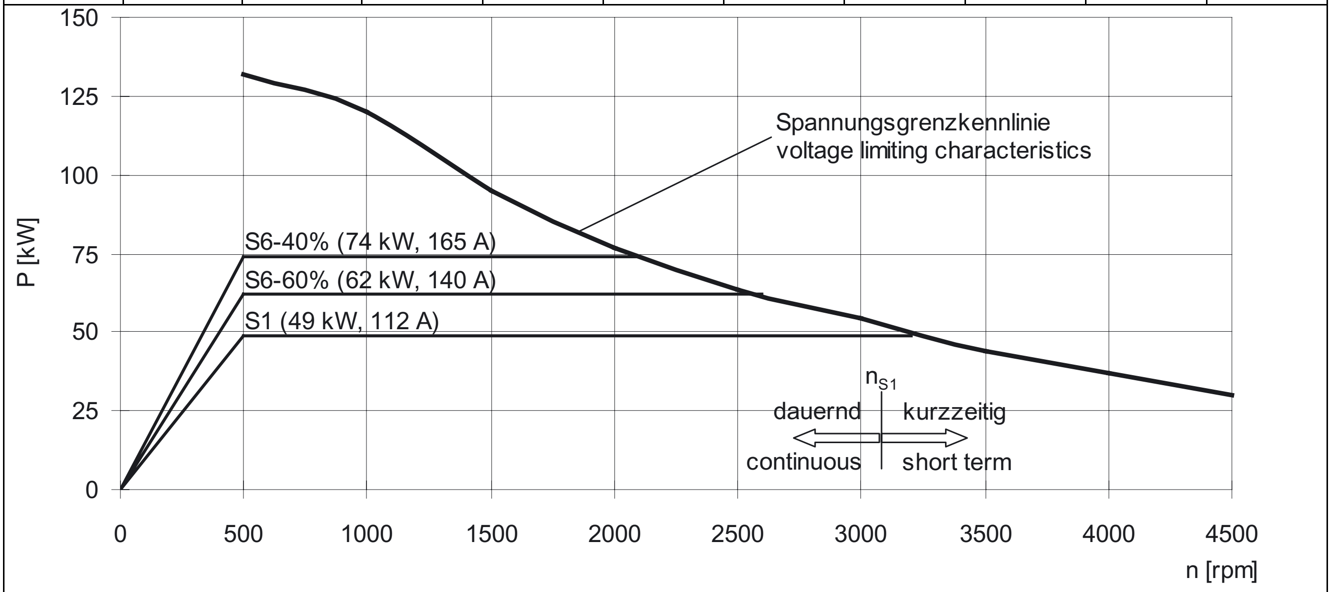


Table 7-151 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7226-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
500	49	935	112	330	17,3	3200	4500	40	50	232



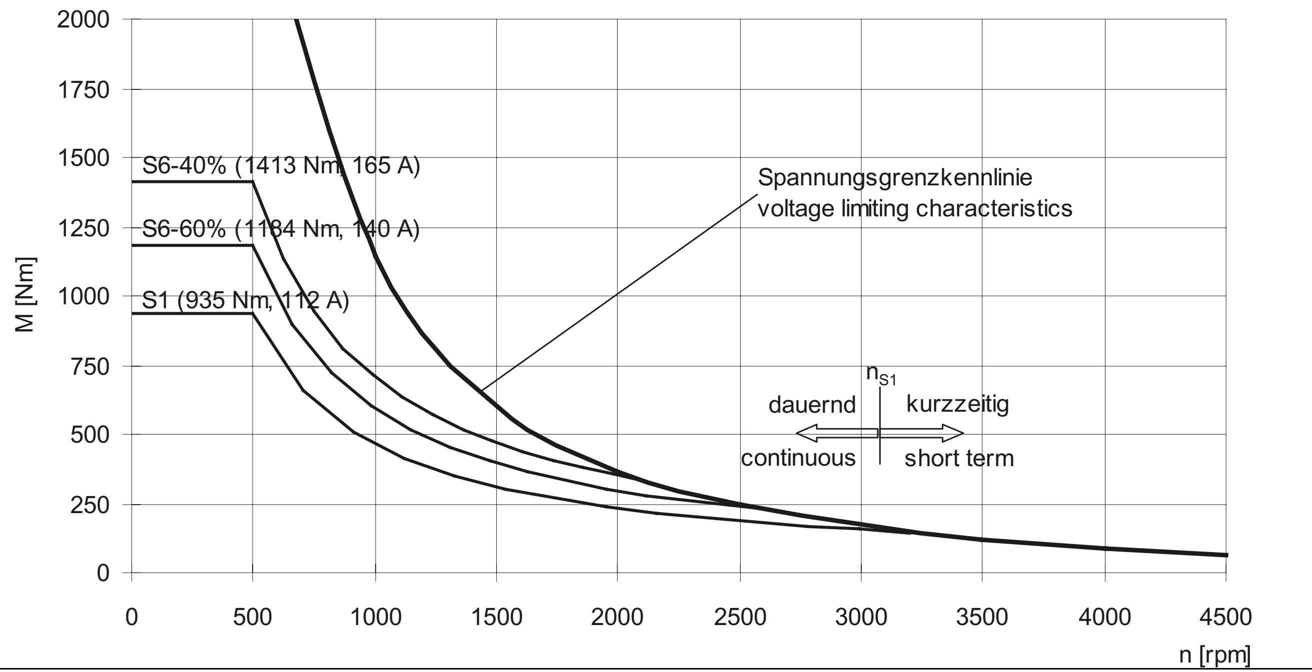
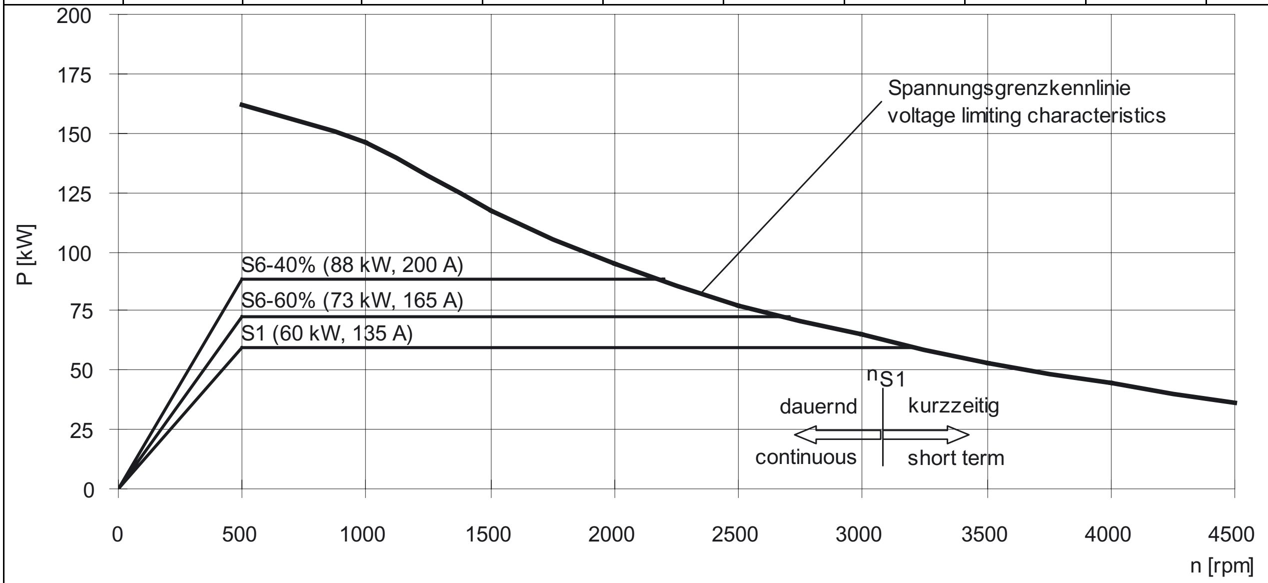
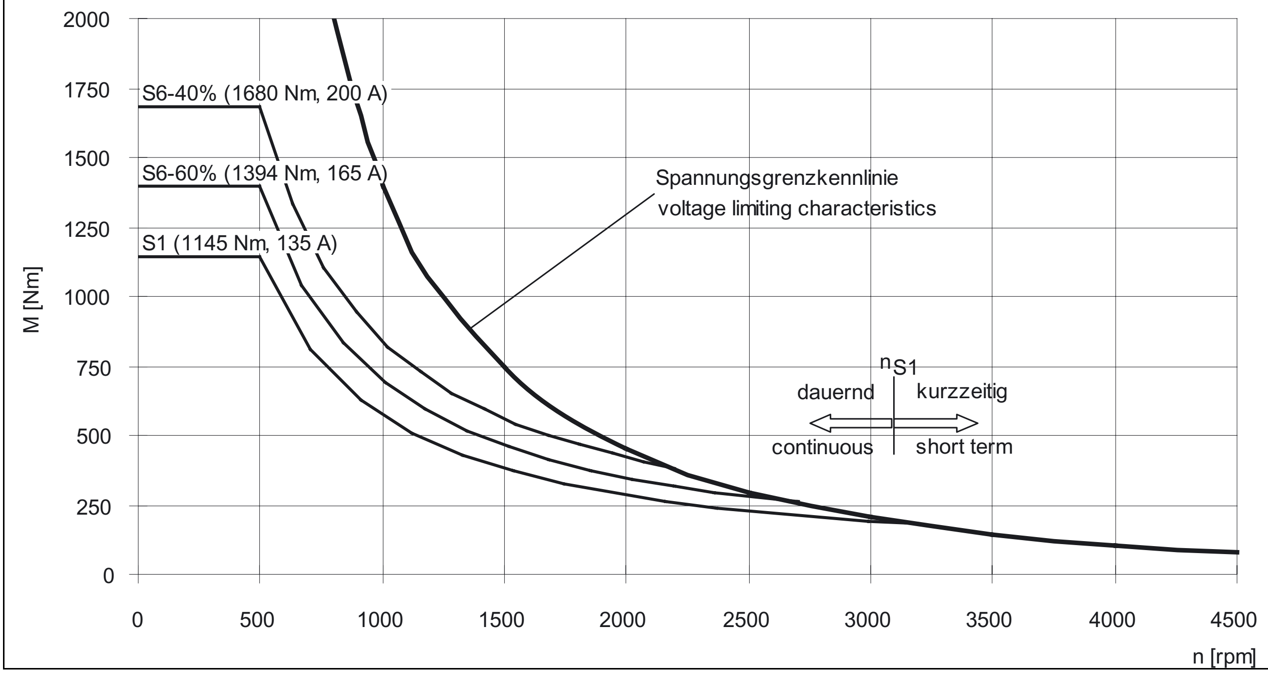


Table 7-152 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7228-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
500	60	1145	135	340	17,2	3200	4500[1)]	40	61,5	268

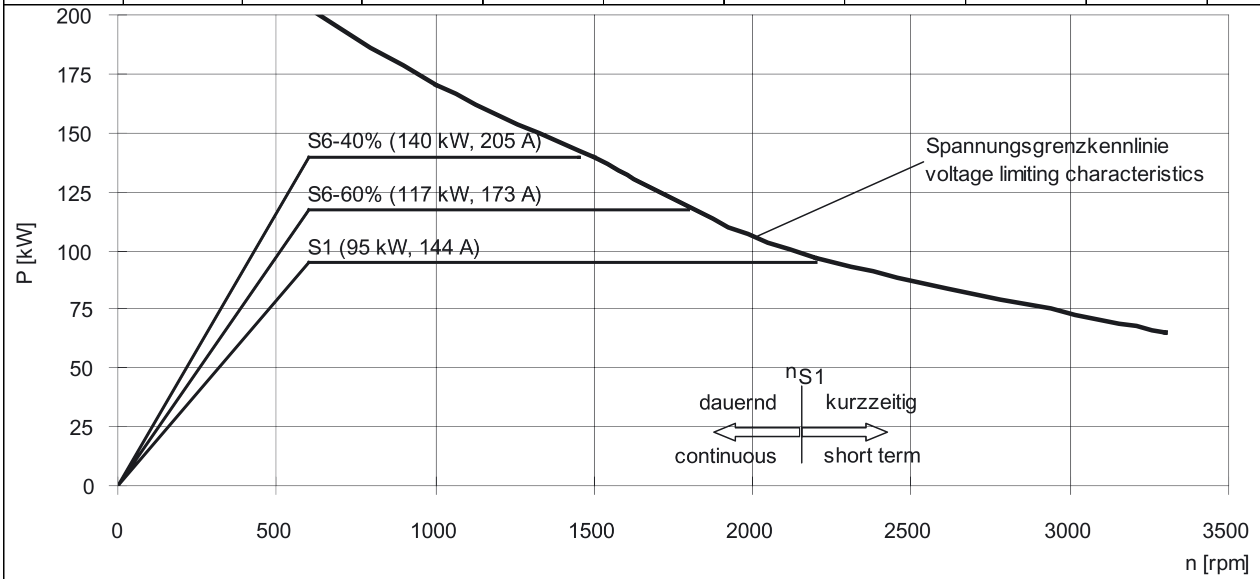




1) 4000 rpm for increased cantilever forces

Table 7-153 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7284-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
600	95	1519	144	480	20,3	2200	3300	75	61	284



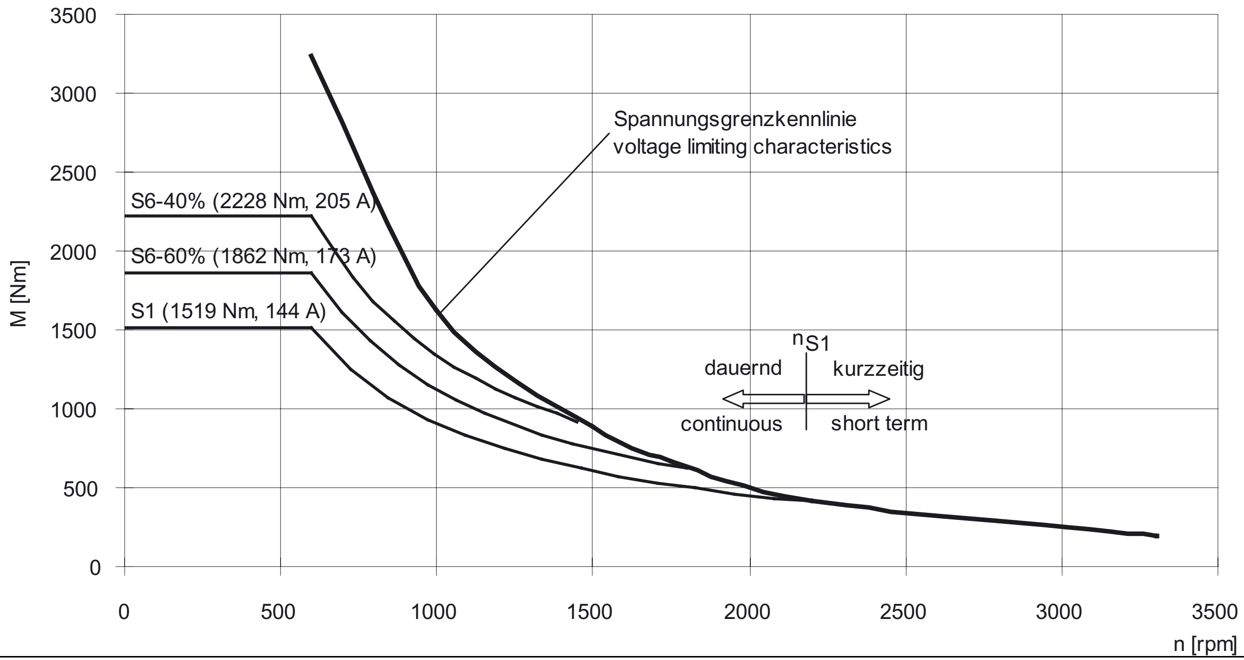
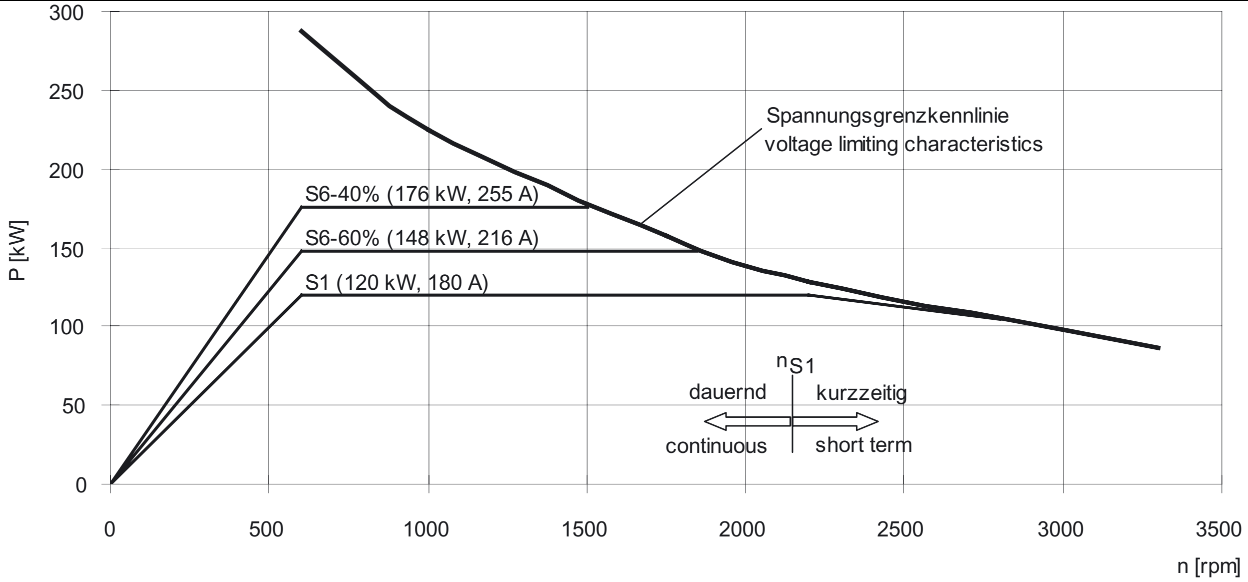


Table 7-154 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7286-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
600	120	1916	180	480	20,3	2200	3300	83	80	352



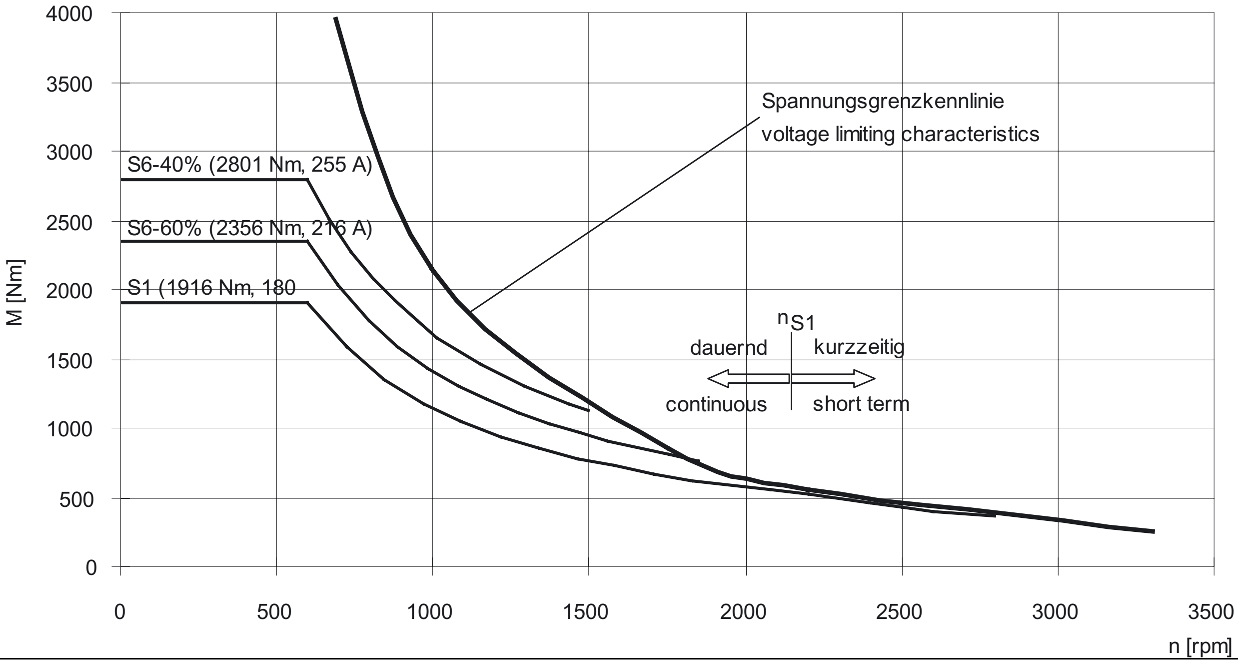
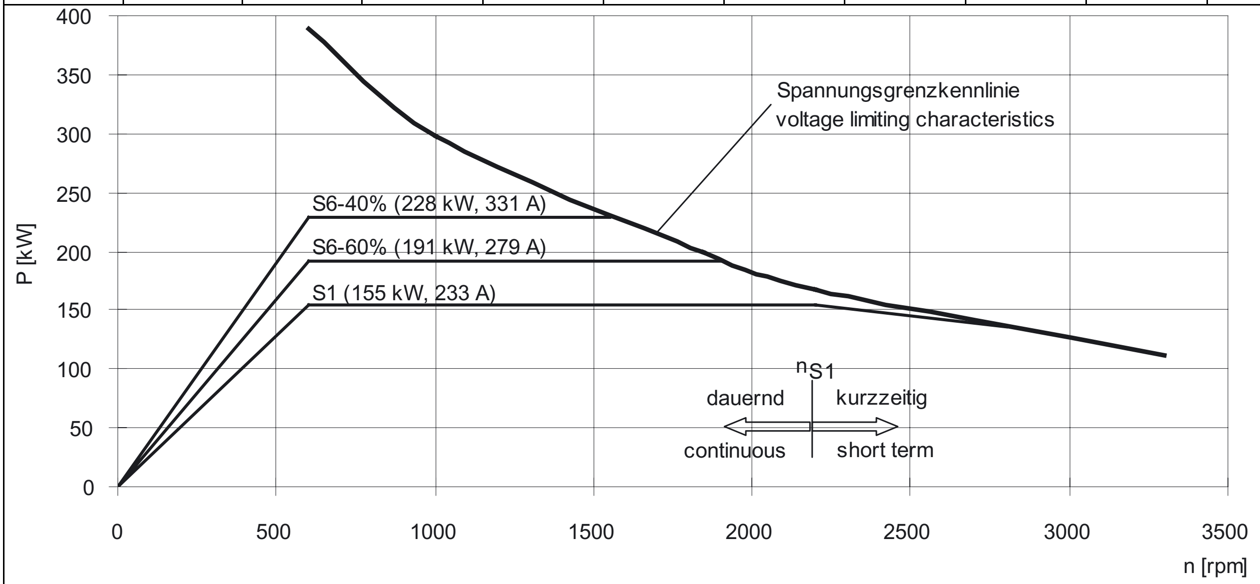


Table 7-155 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7288-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
600	155	2474	233	480	20,3	2200	3300	90	102	452



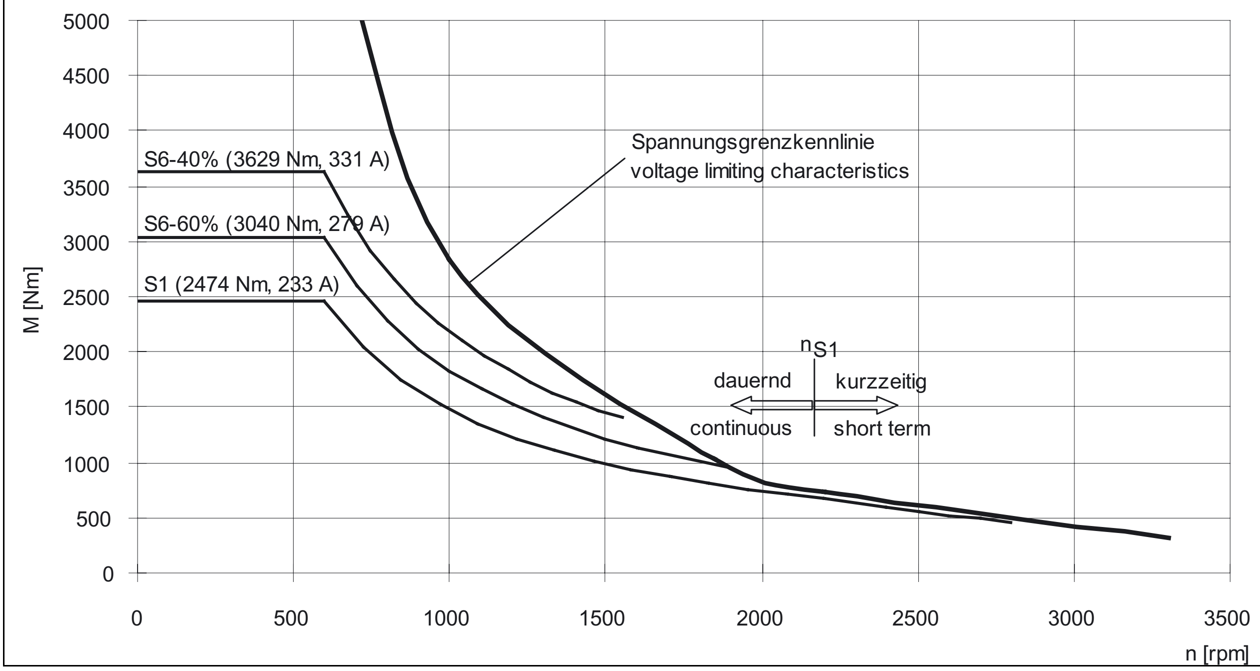
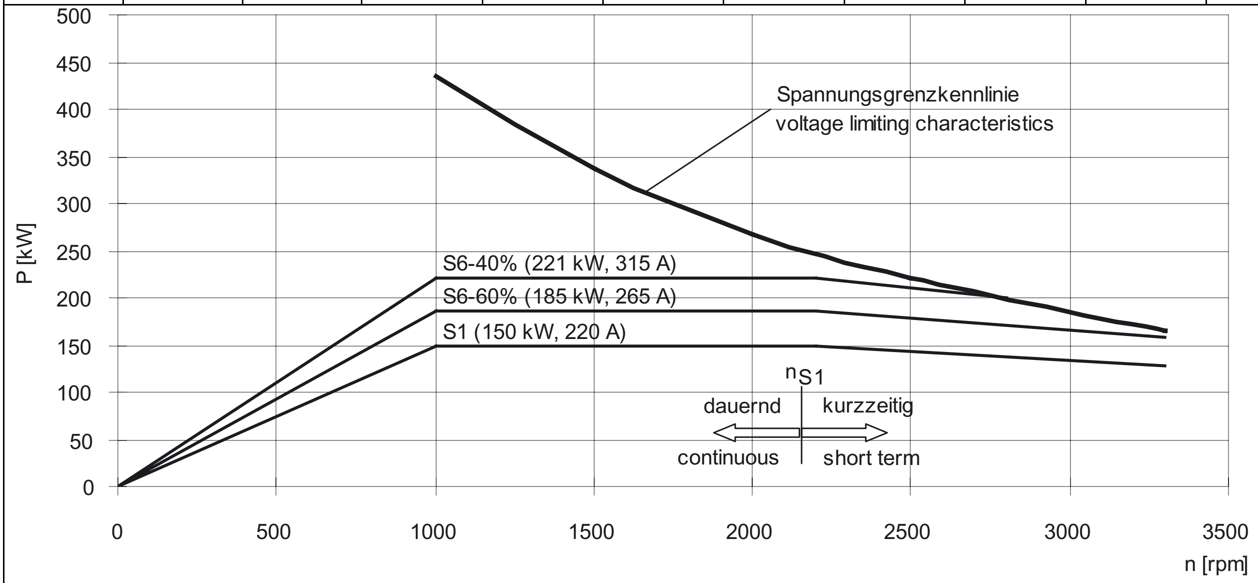


Table 7-156 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7284-□□C□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	150	1433	220	480	34,0	2200	3300	75	90	430



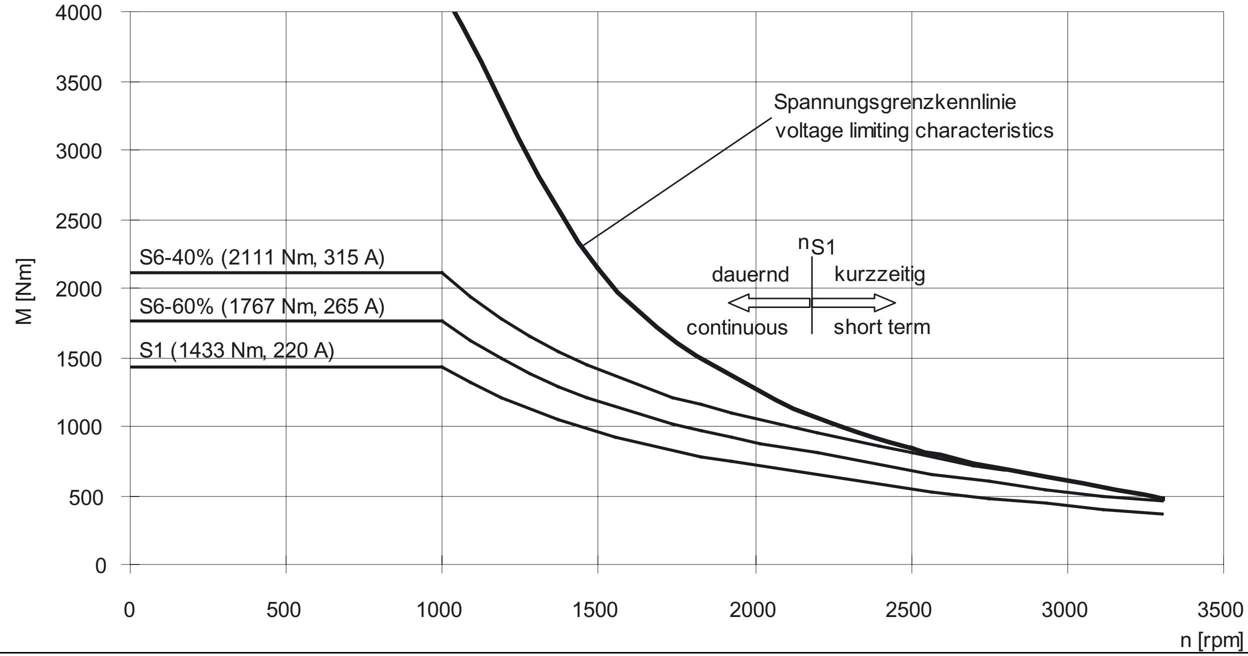
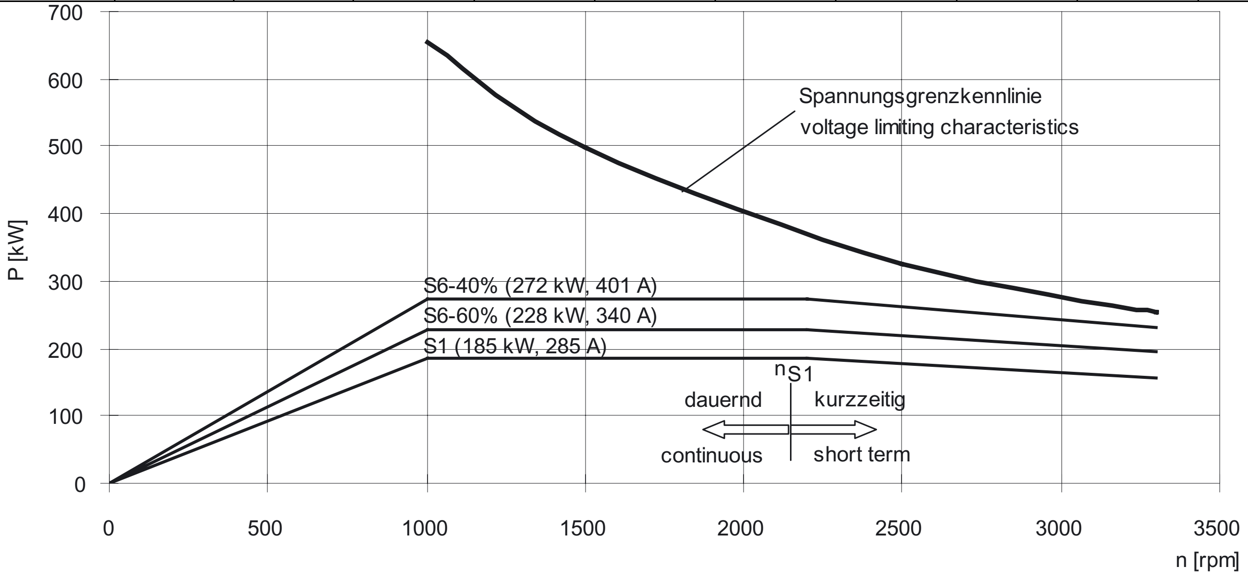


Table 7-157 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7286-□□C□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	185	1767	285	480	34,0	2200	3300	83	135	524



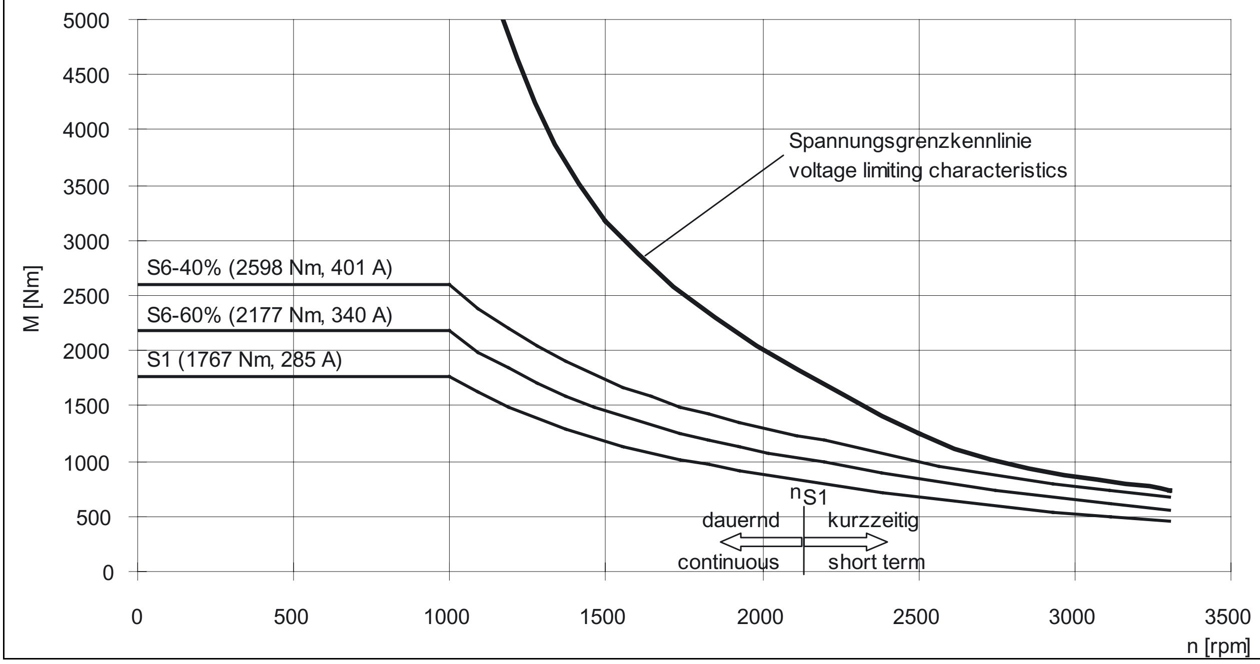
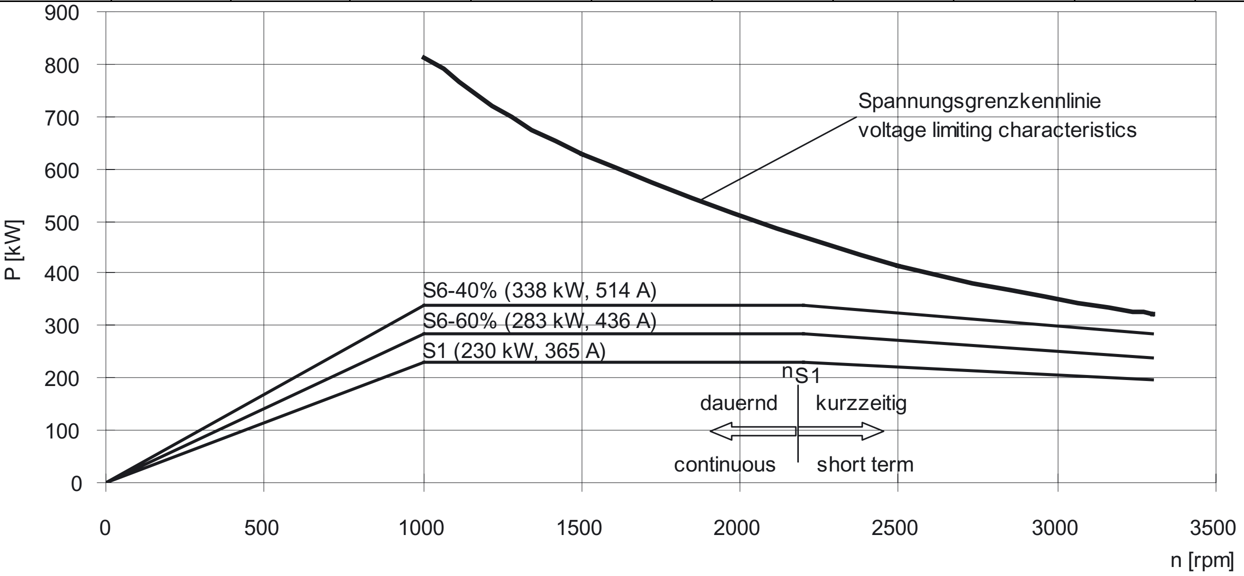


Table 7-158 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7288-□□C□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1000	230	2197	365	460	34,0	2200	3300	90	170	676



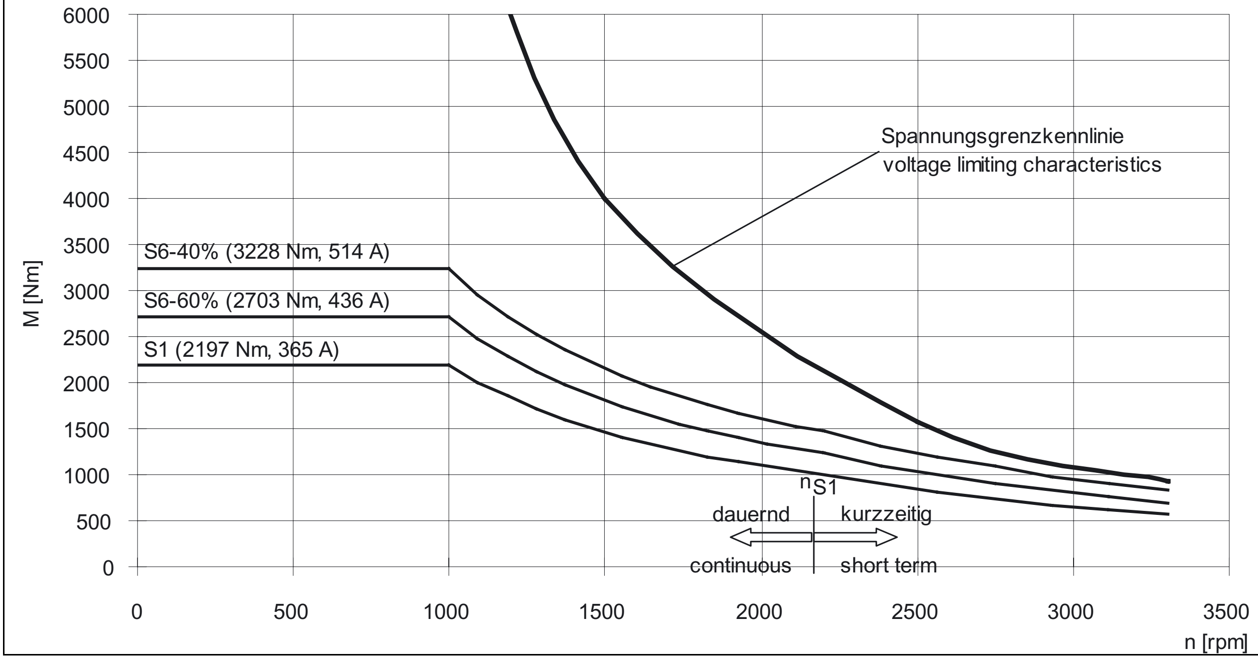
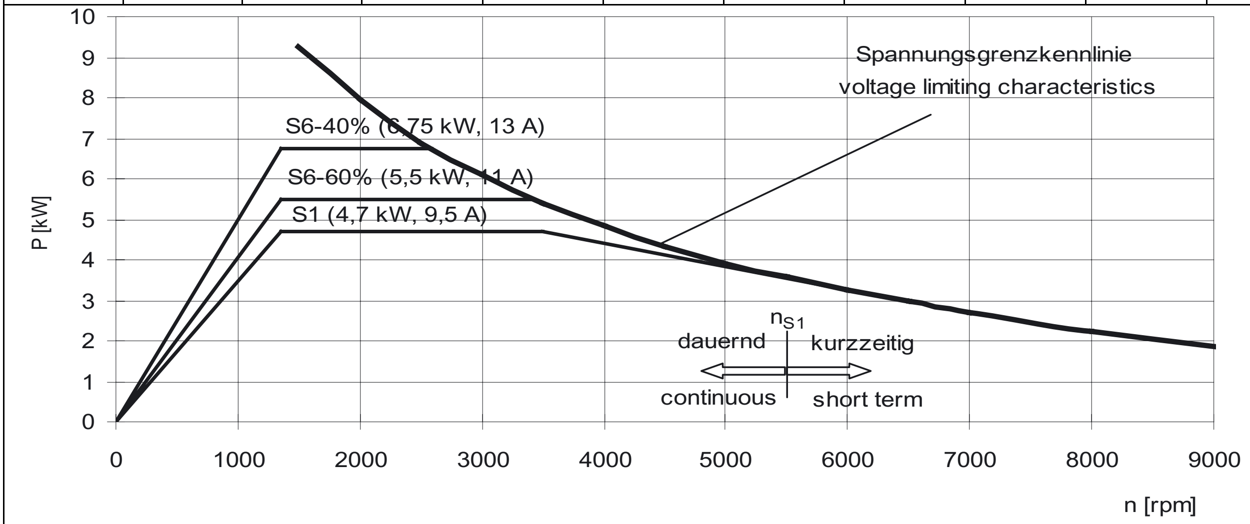


Table 7-159 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7103-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1350	4,7	33,2	9,5	433	47,1	3500	9000	20	4,5	19,0



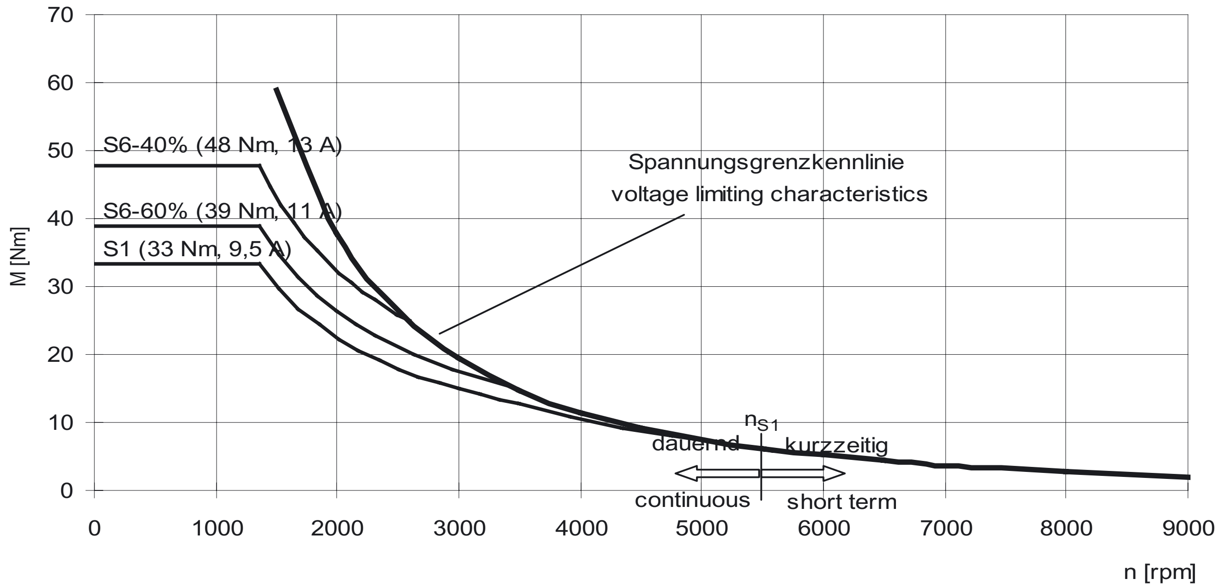
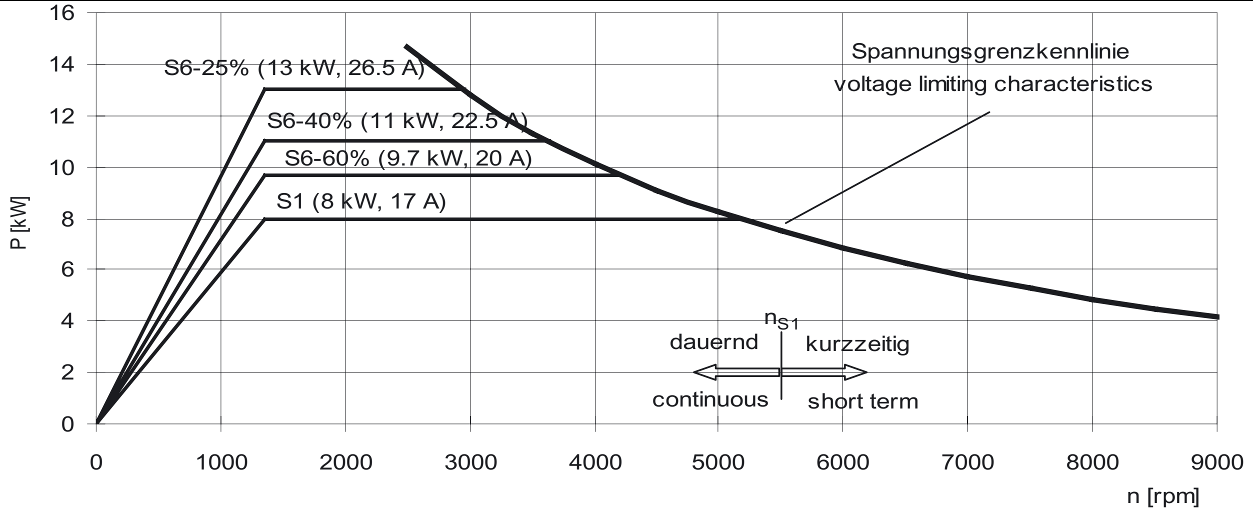


Table 7-160 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7107-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1350	8,0	56,6	17,0	405	47,0	5160	9000	20	8,1	34,0



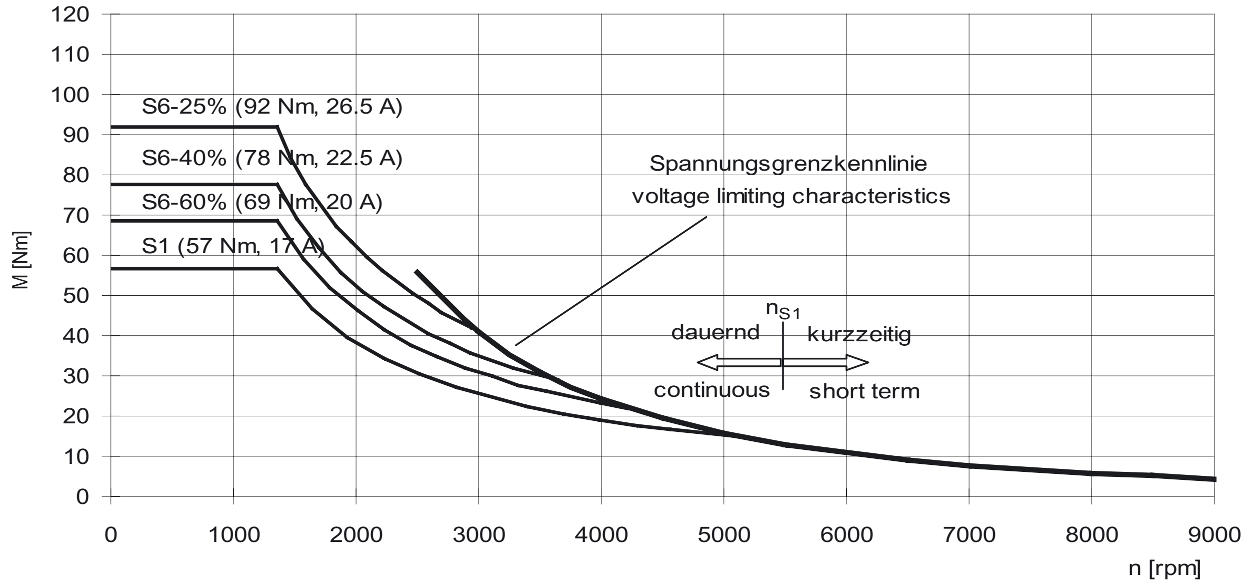


Table 7-161 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7133-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1350	15,0	106	30	433	46,4	3500	8000	30	12,0	60

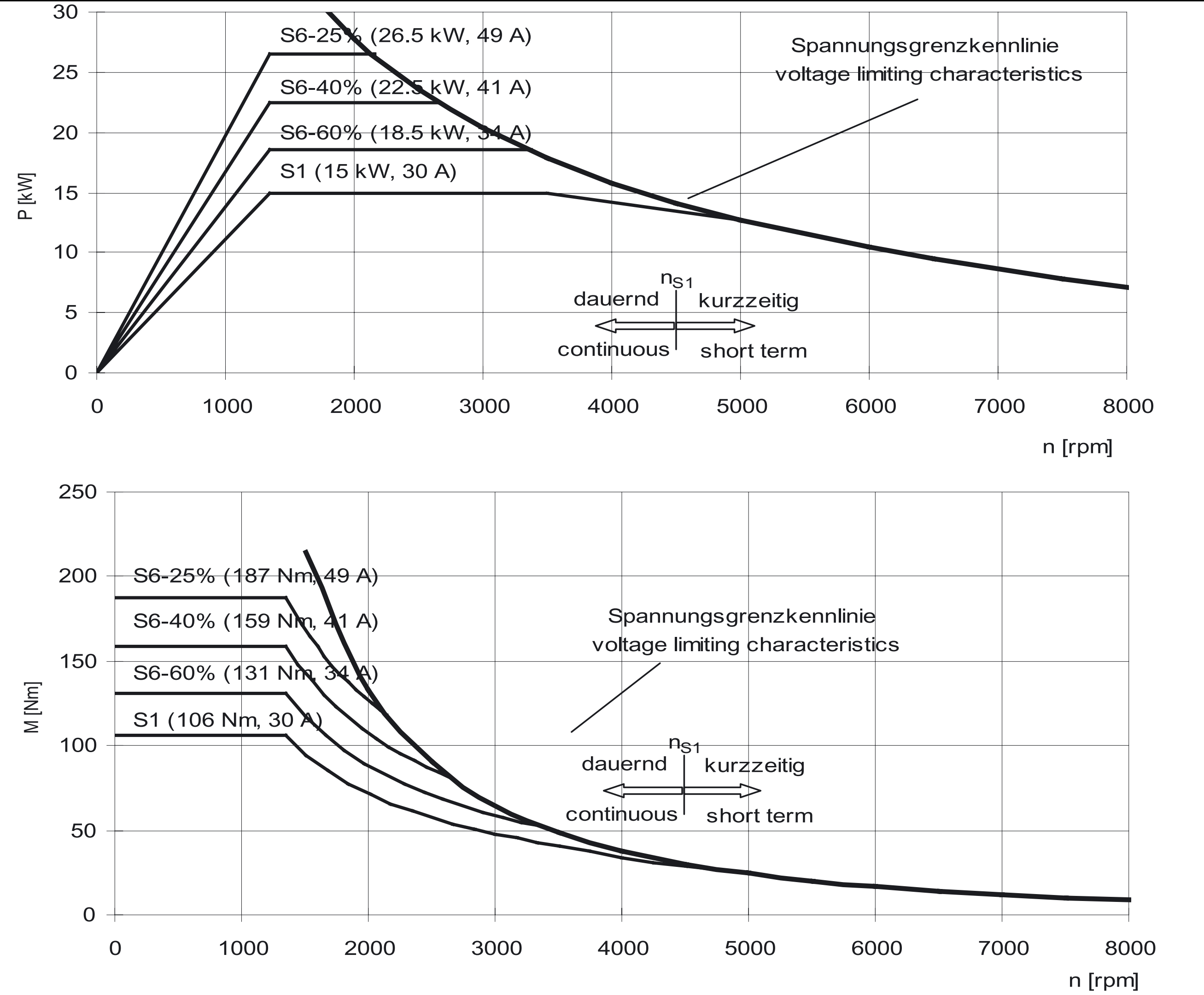
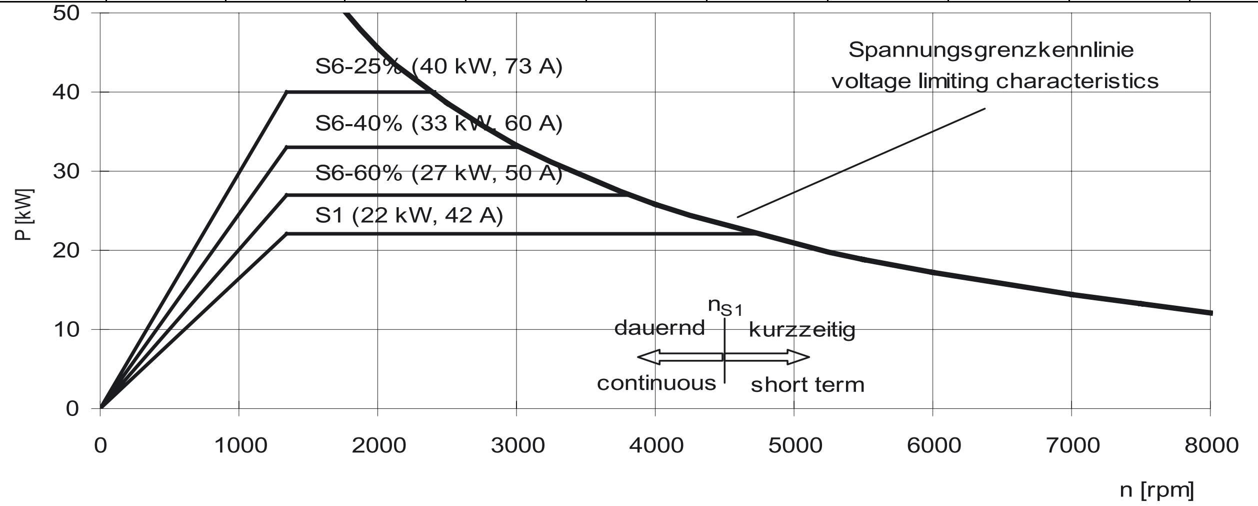


Table 7-162 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7137-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1350	22,0	156	42	416	46,3	4754	8000	30	17,0	84



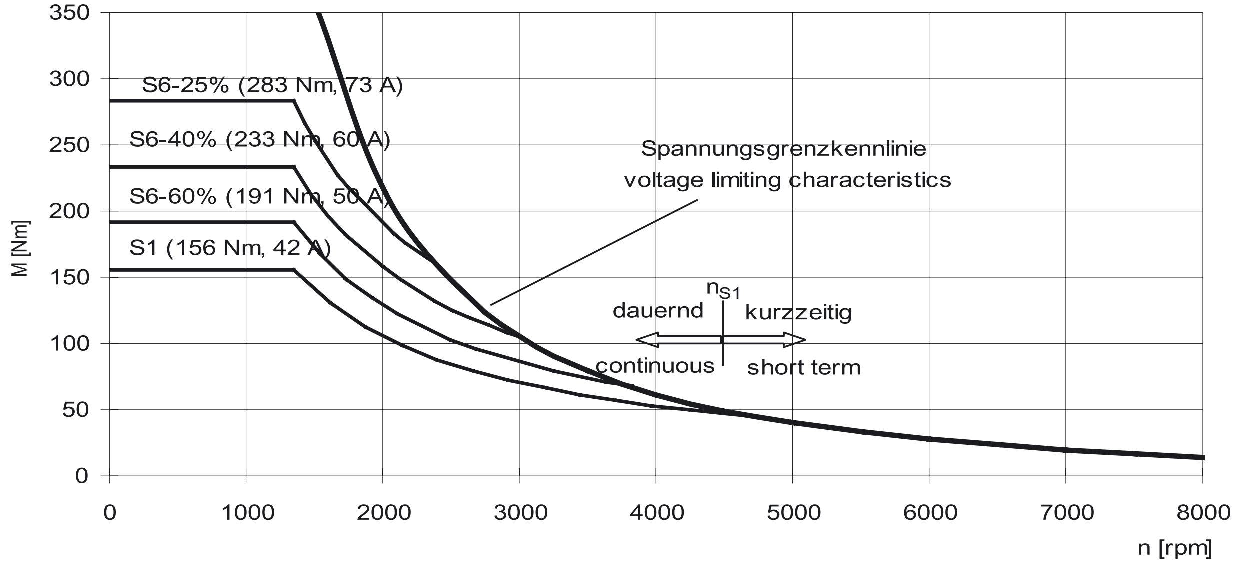
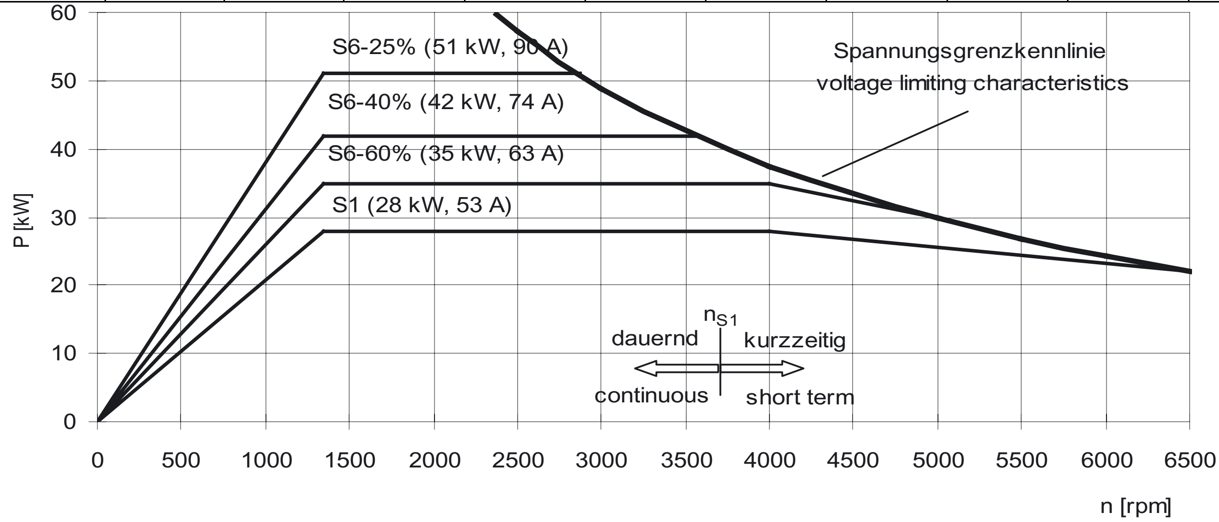


Table 7-163 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7163-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1350	28,0	198	53	413	45,8	4000	6500	35	24,0	106



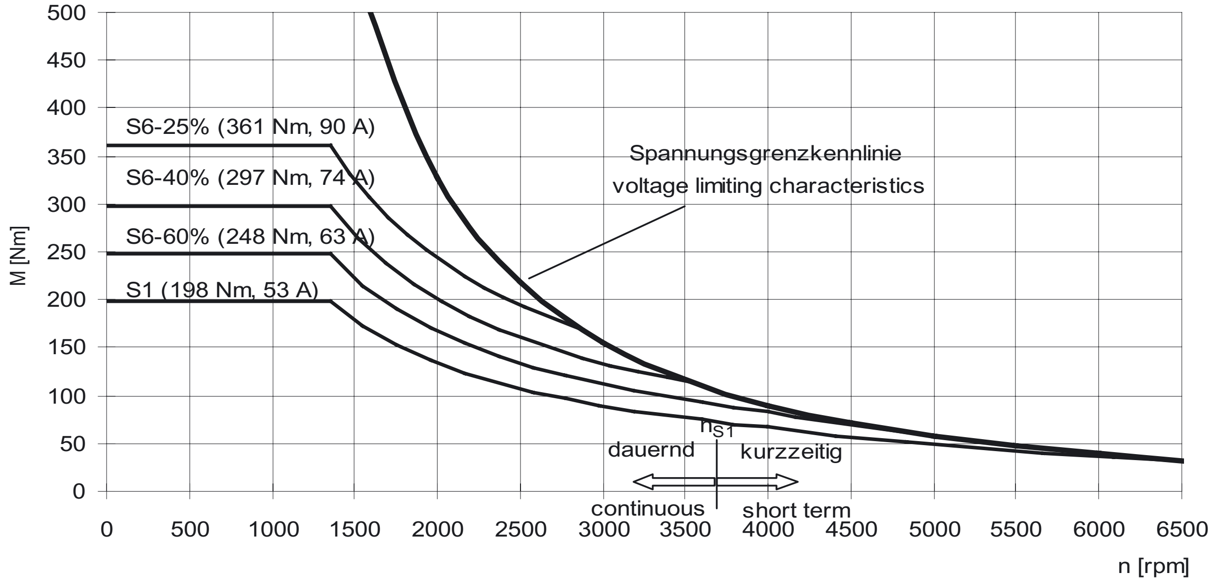


Table 7-164 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7167-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1350	34,0	241	67	400	45,8	5898	6500	35	34,0	134

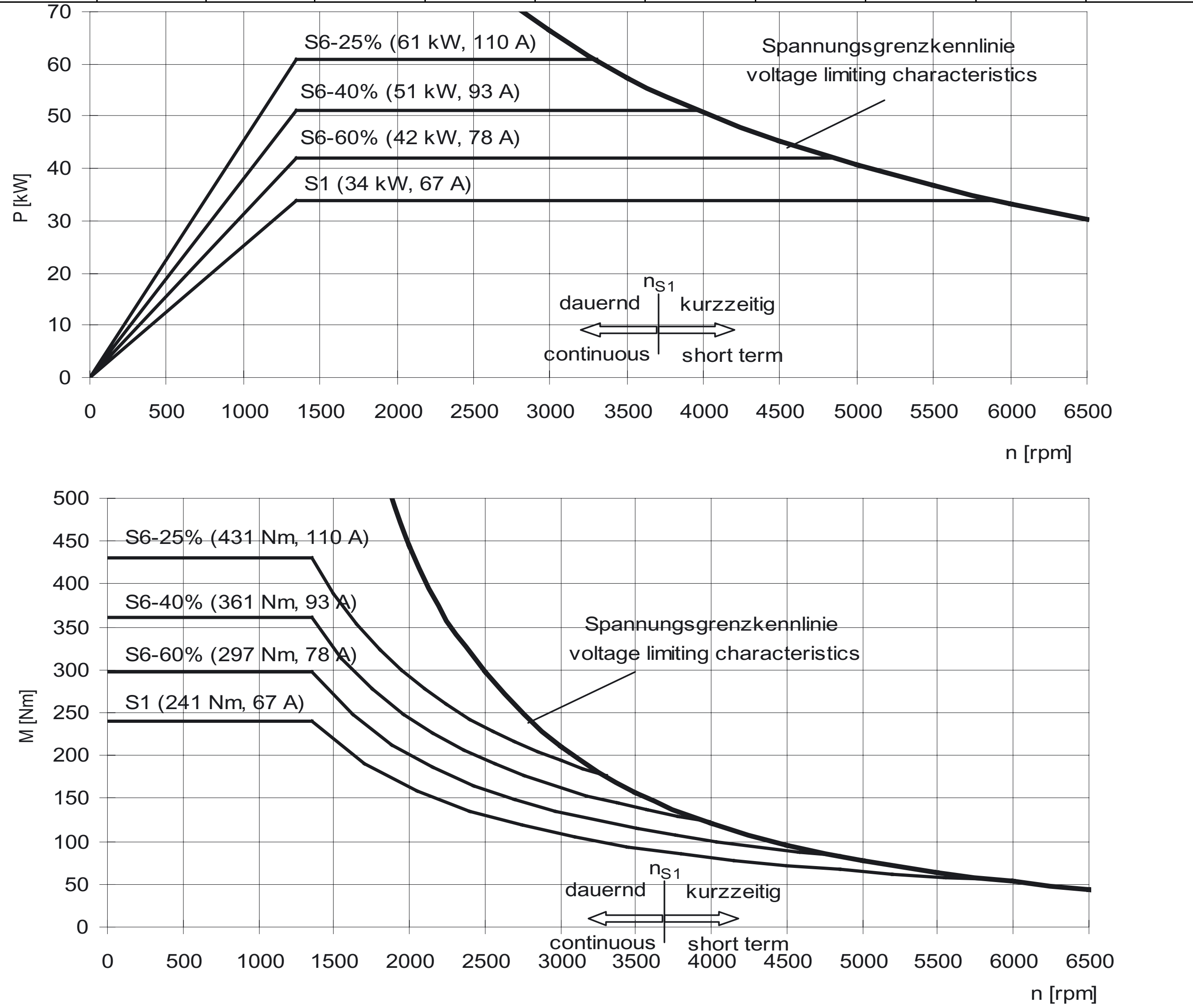
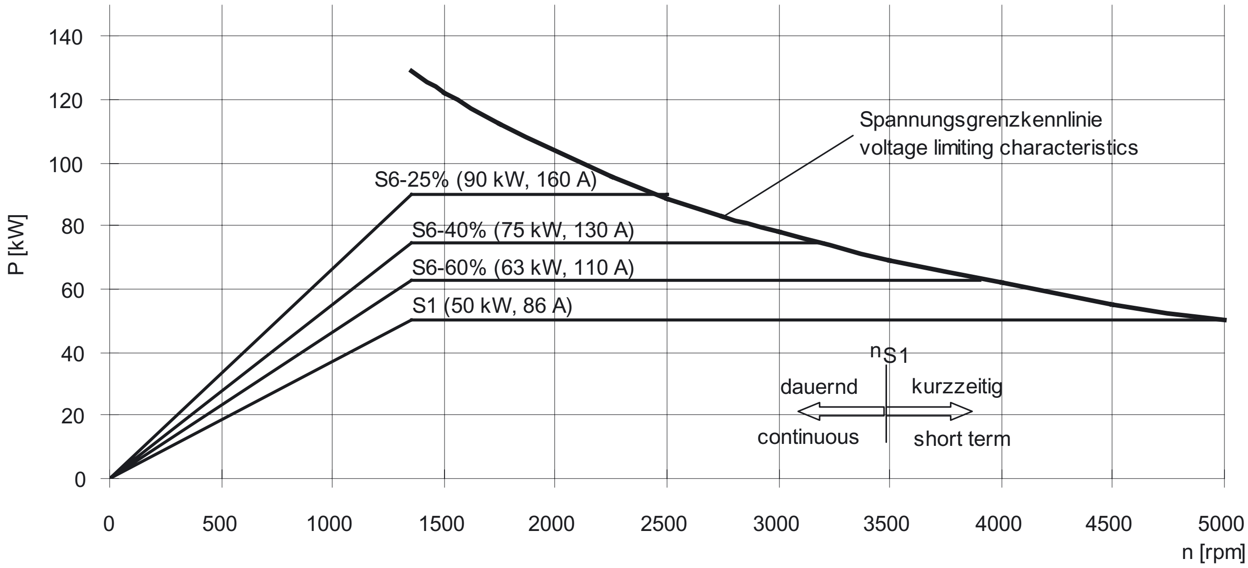


Table 7-165 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7184-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1350	50	355	86	450	45,8	5000	5000	40	42	160



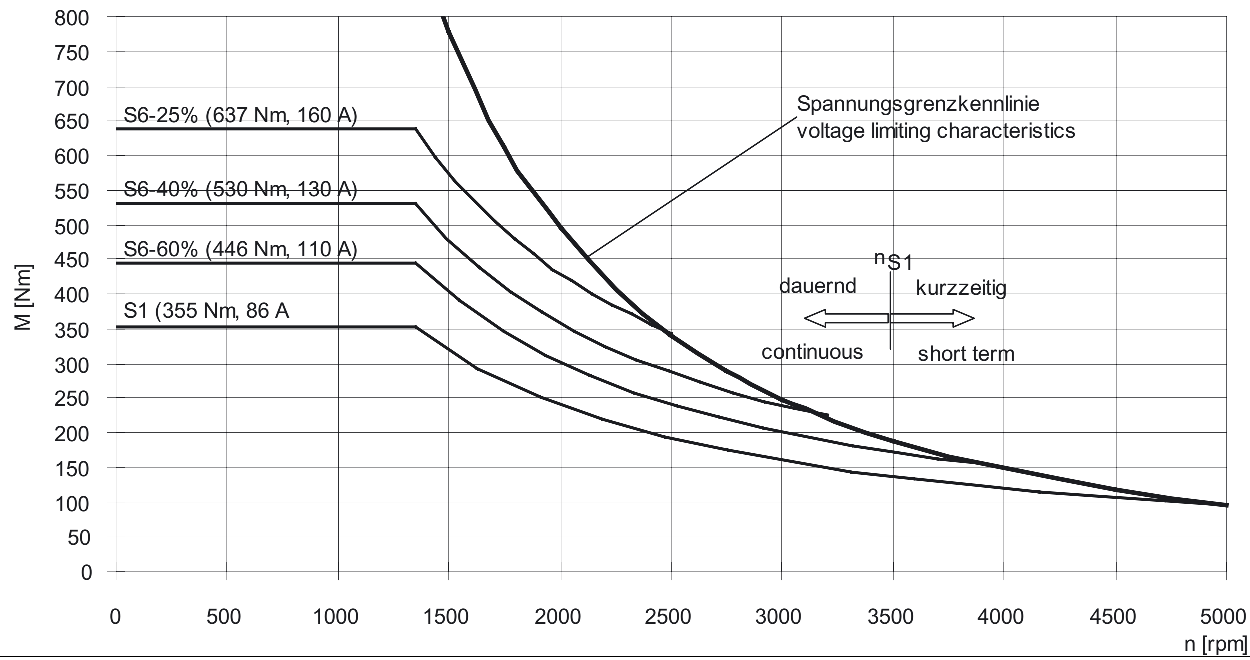
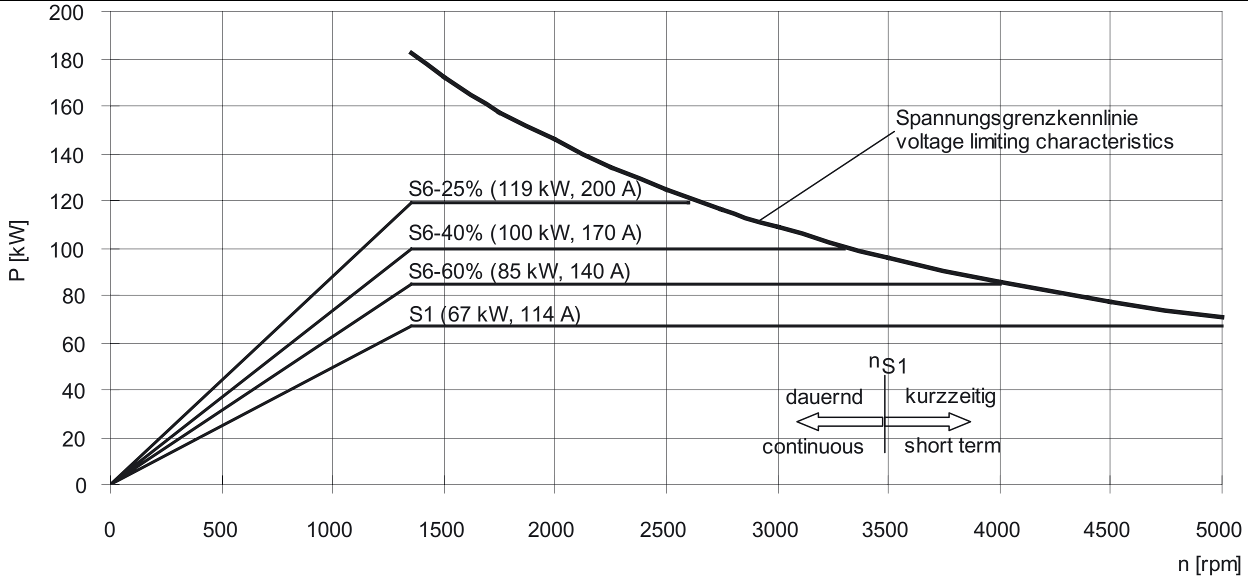


Table 7-166 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7186-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1350	67	475	114	460	45,7	5000	5000	40	59,5	208



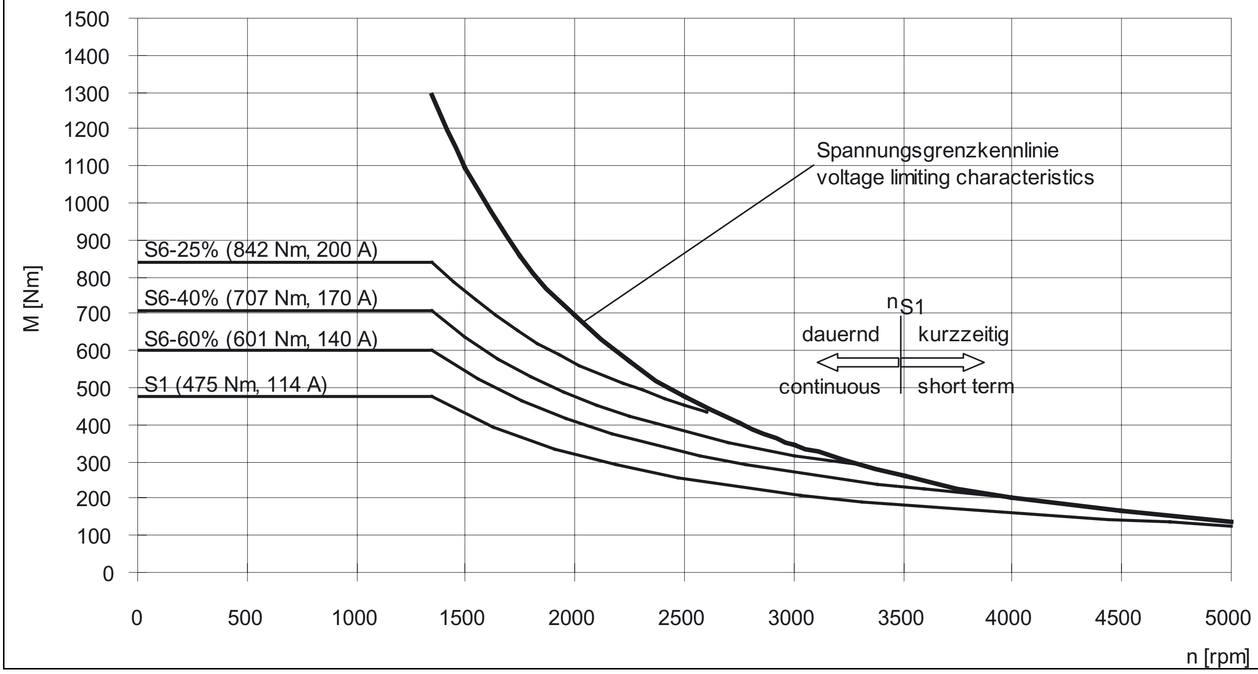
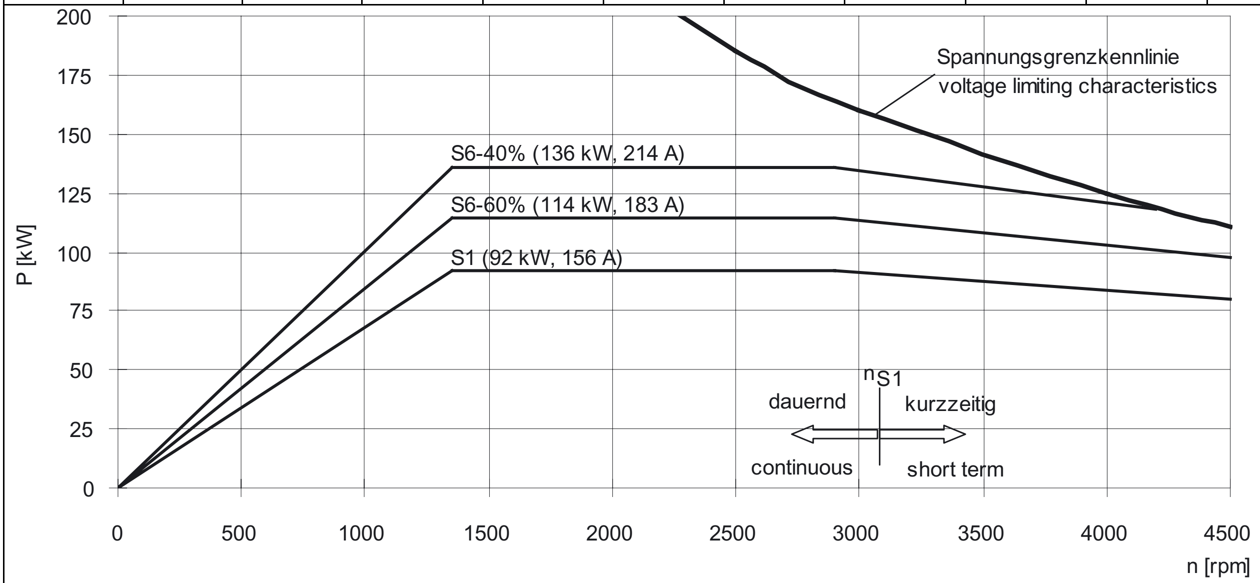


Table 7-167 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7224-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1350	92	650	156	450	45,6	2900	4500	40	78,5	286



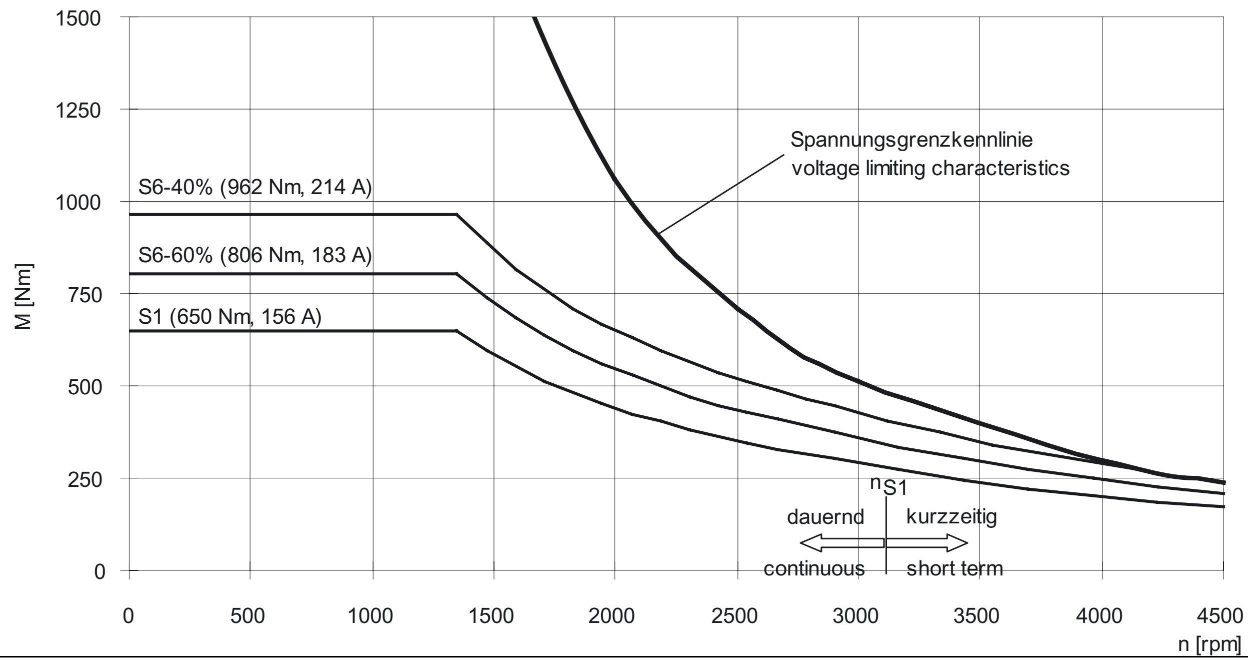
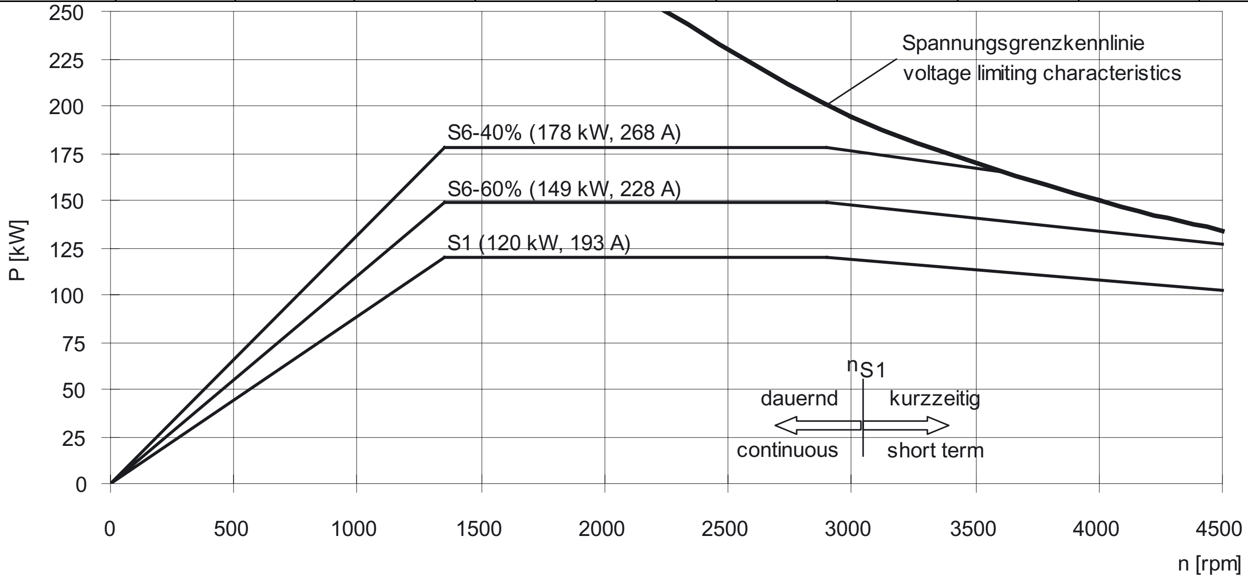


Table 7-168 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7226-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1350	120	847	193	460	45,6	2900	4500	40	88,5	360



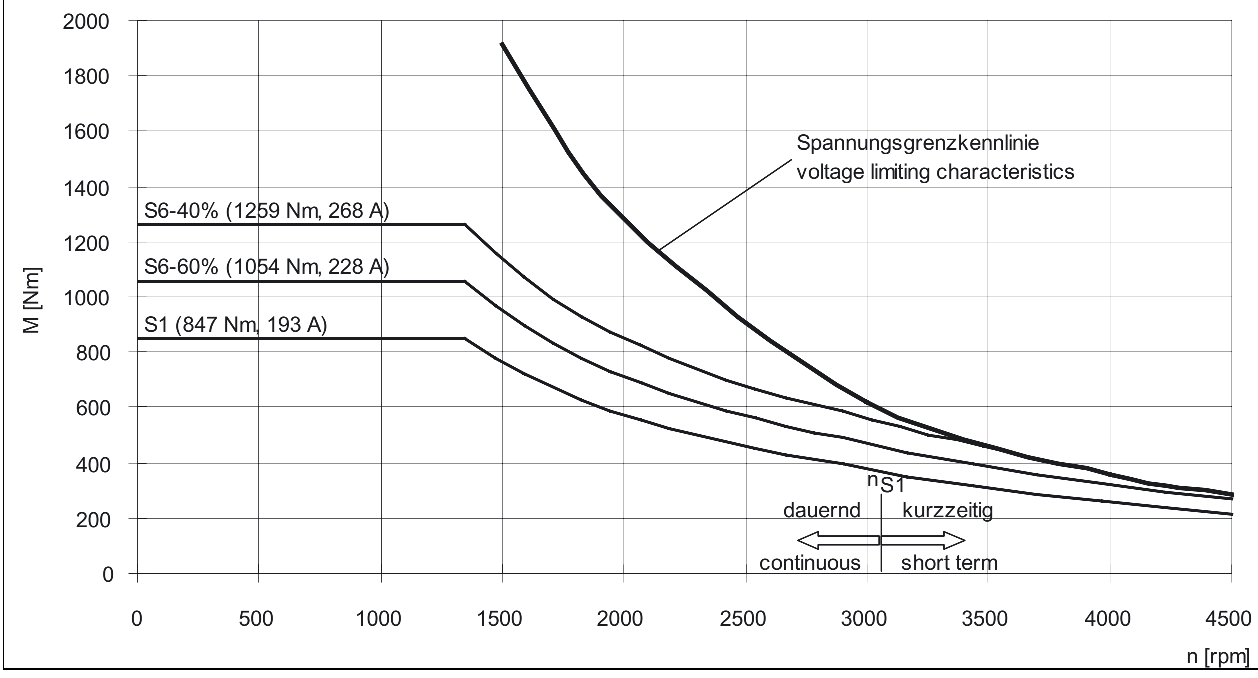
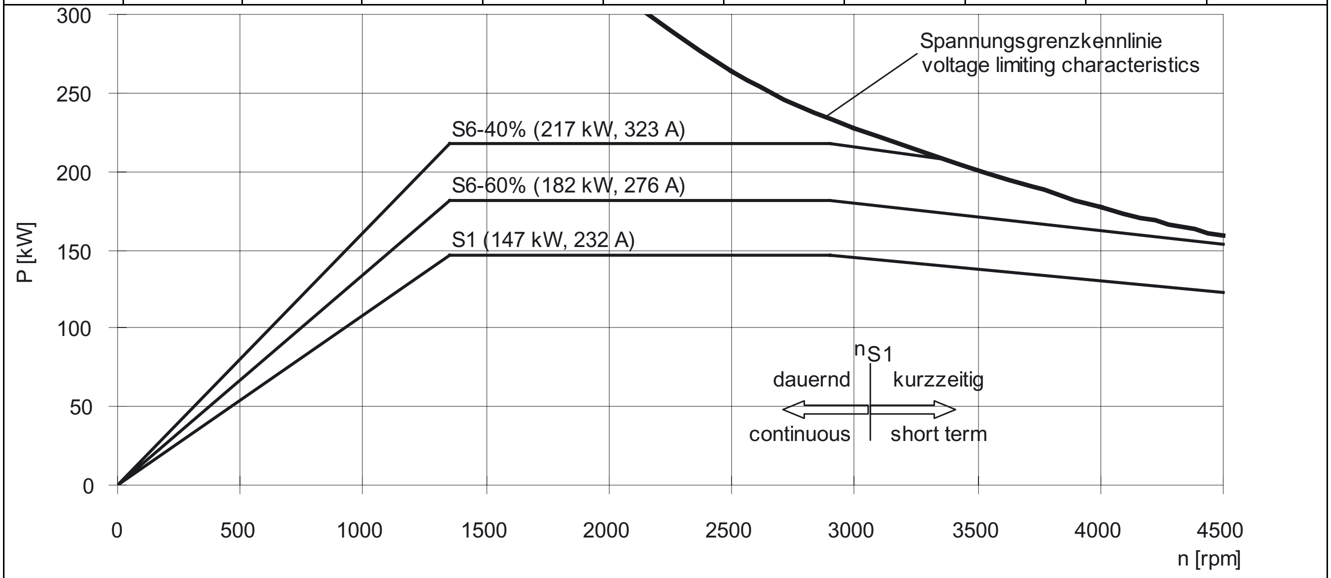
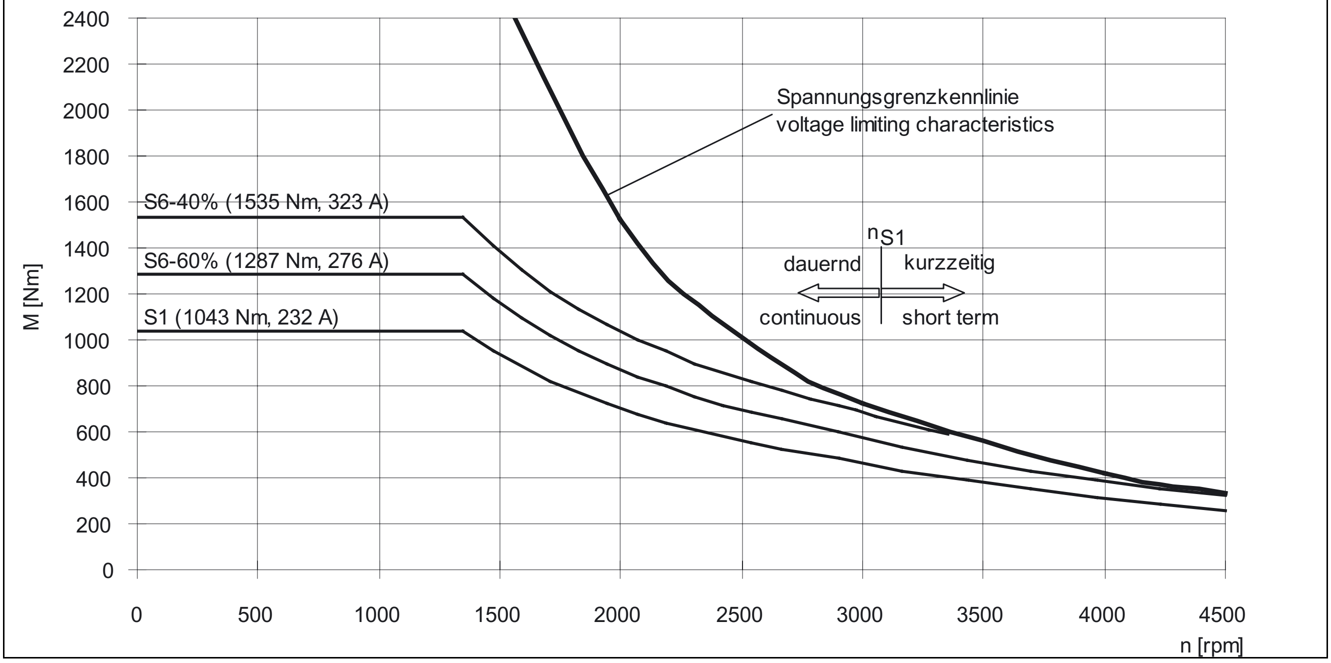


Table 7-169 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7228-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1350	147	1043	232	460	45,6	2900	4500 1)	40	99,5	440

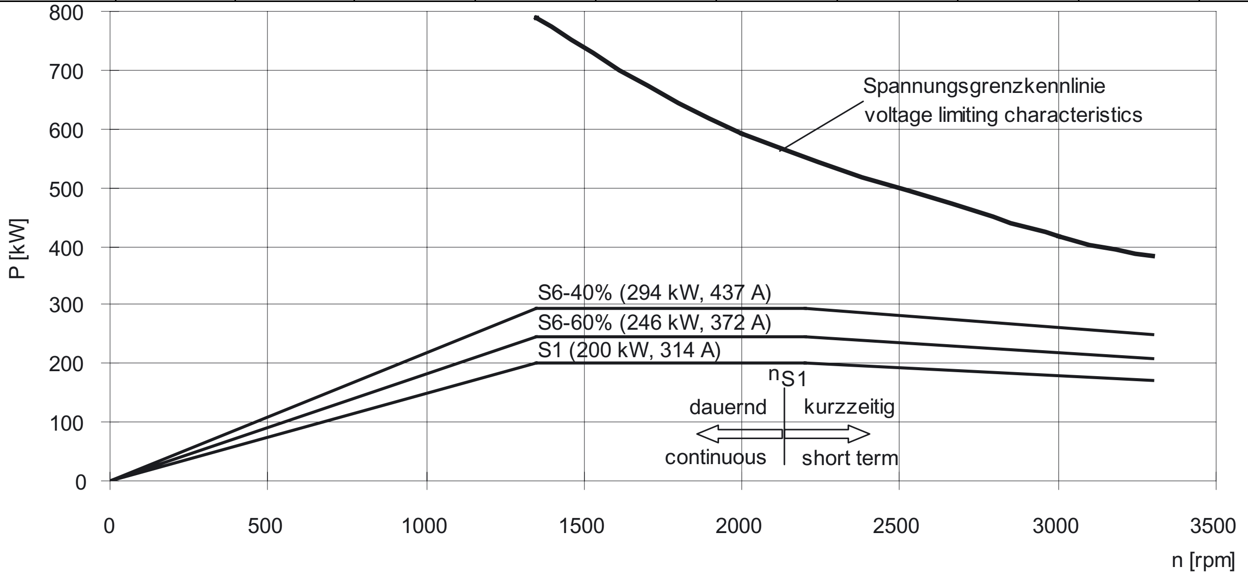




1) 4000 rpm for increased cantilever forces

Table 7-170 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7284-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1350	200	1416	314	470	45,3	2200	3300	75	159	576



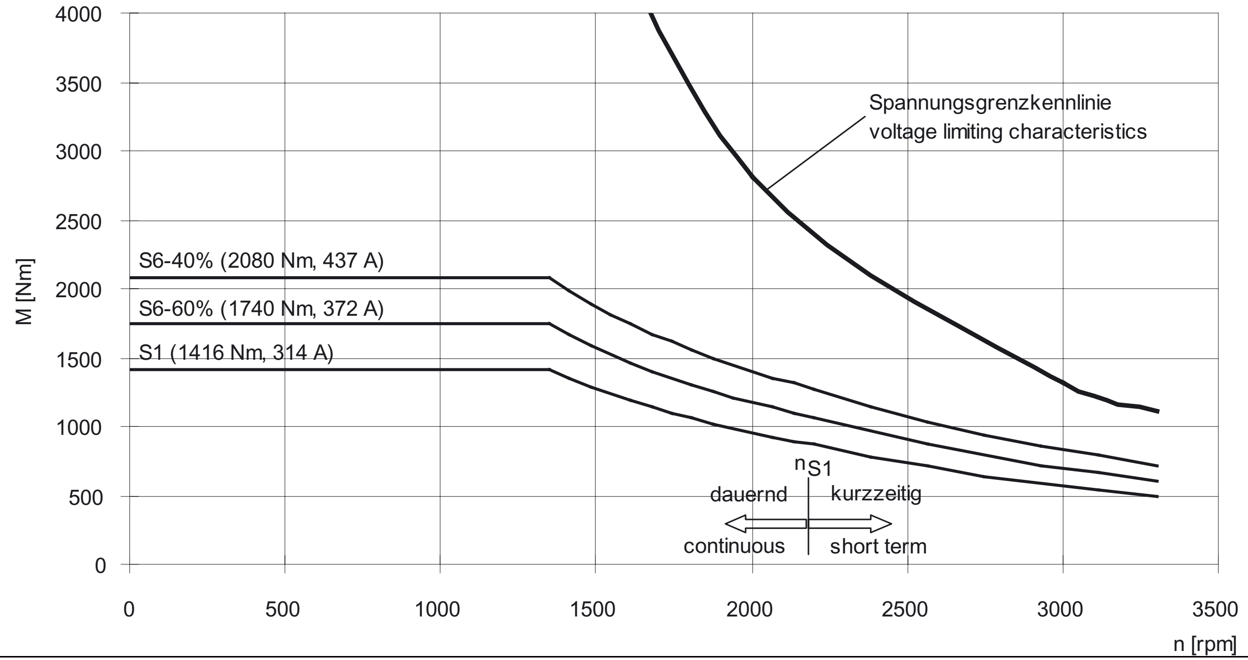
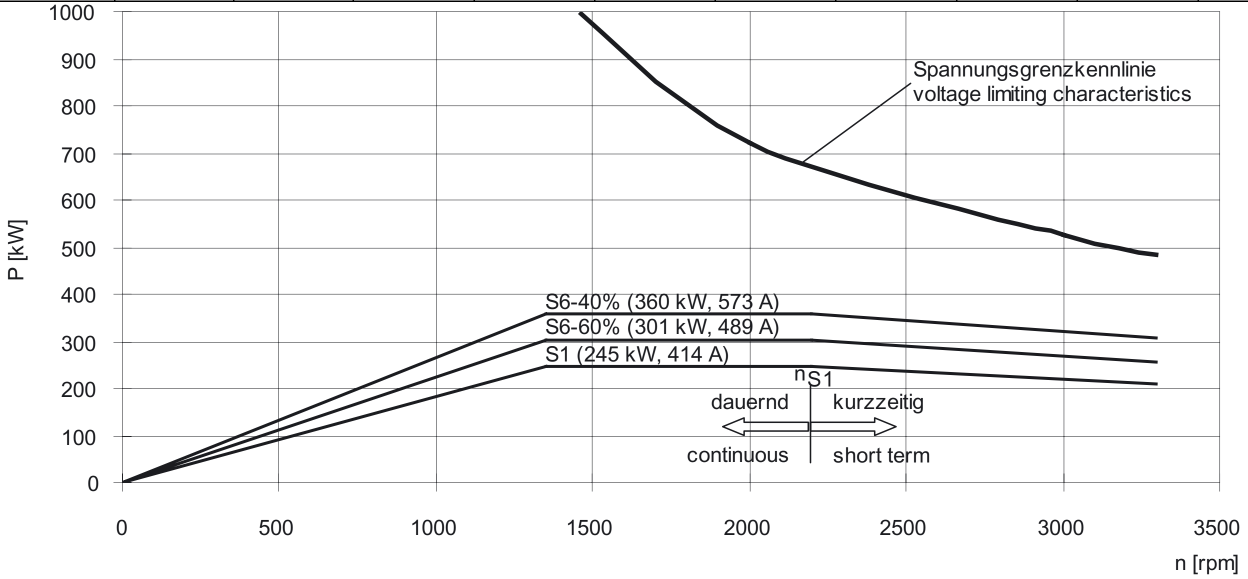


Table 7-171 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7286-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1350	245	1733	414	445	45,3	2200	3300	83	217	744



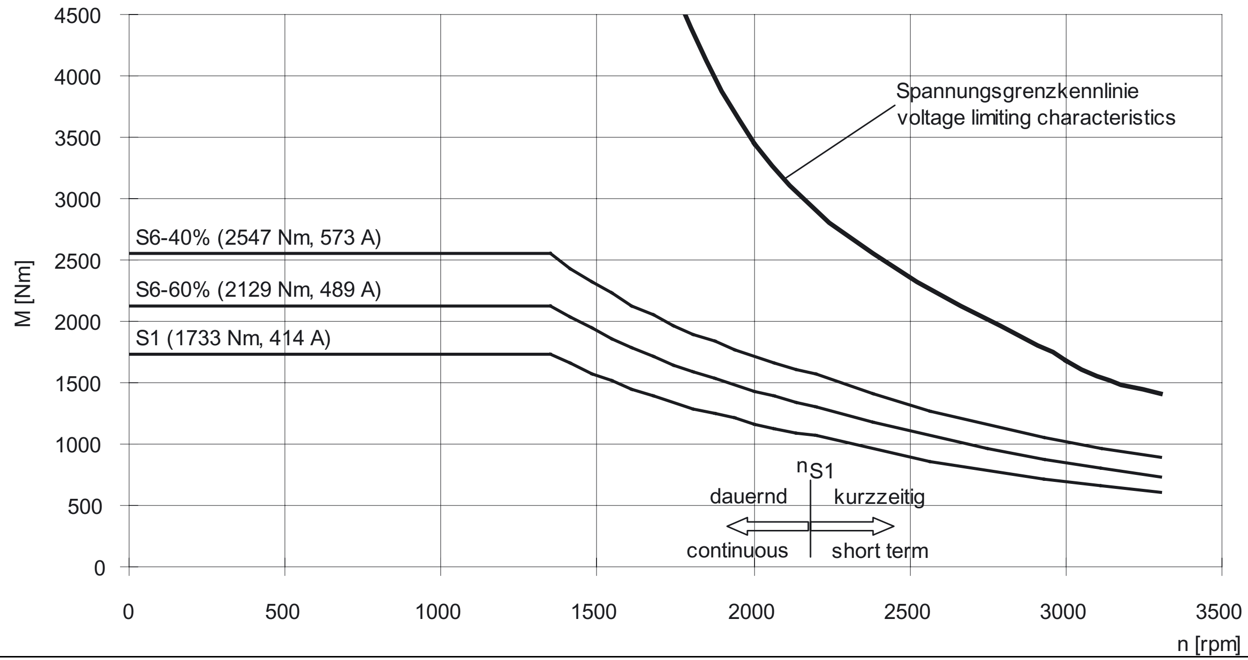
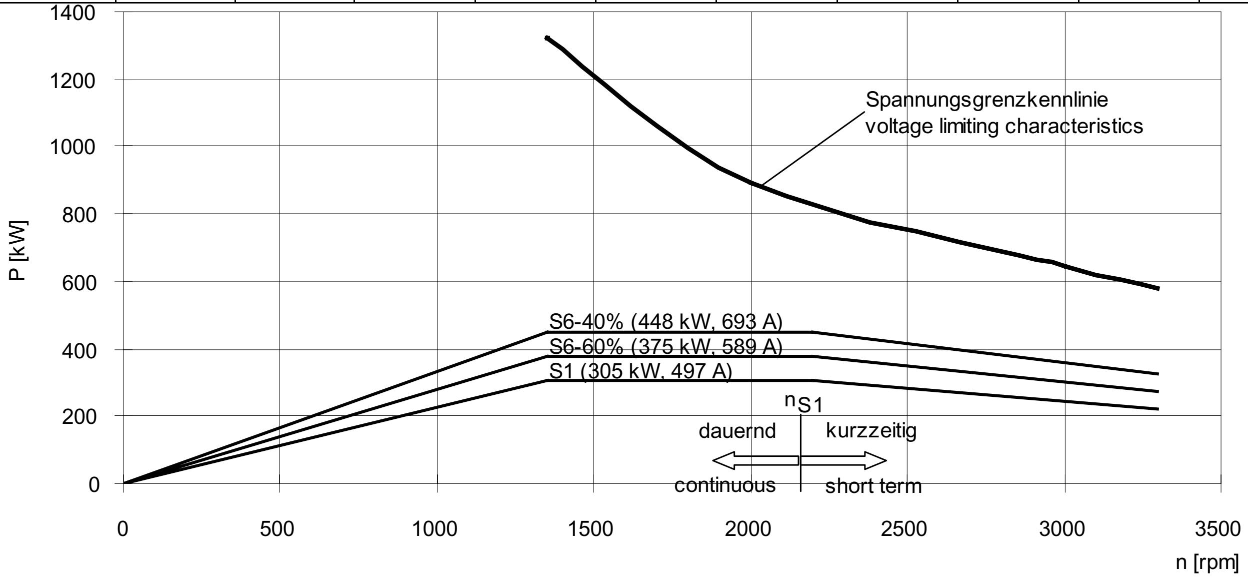


Table 7-172 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7288-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
1350	305	2158	497	450	45,3	2200	3300	90	250	910



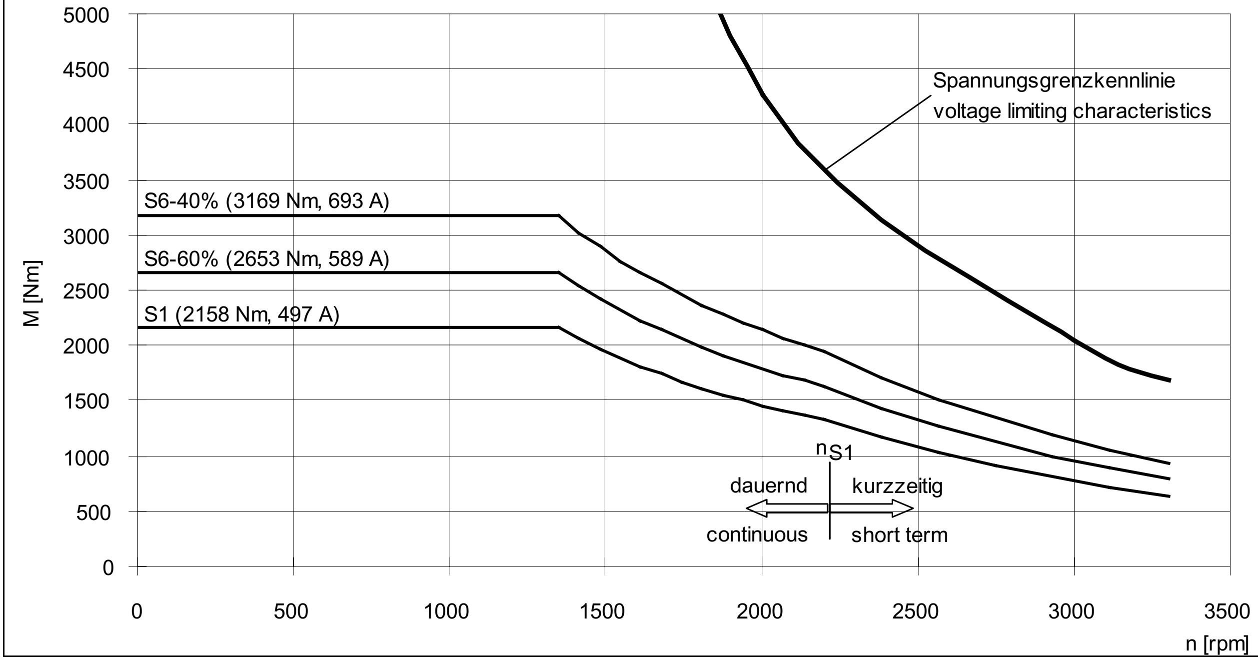
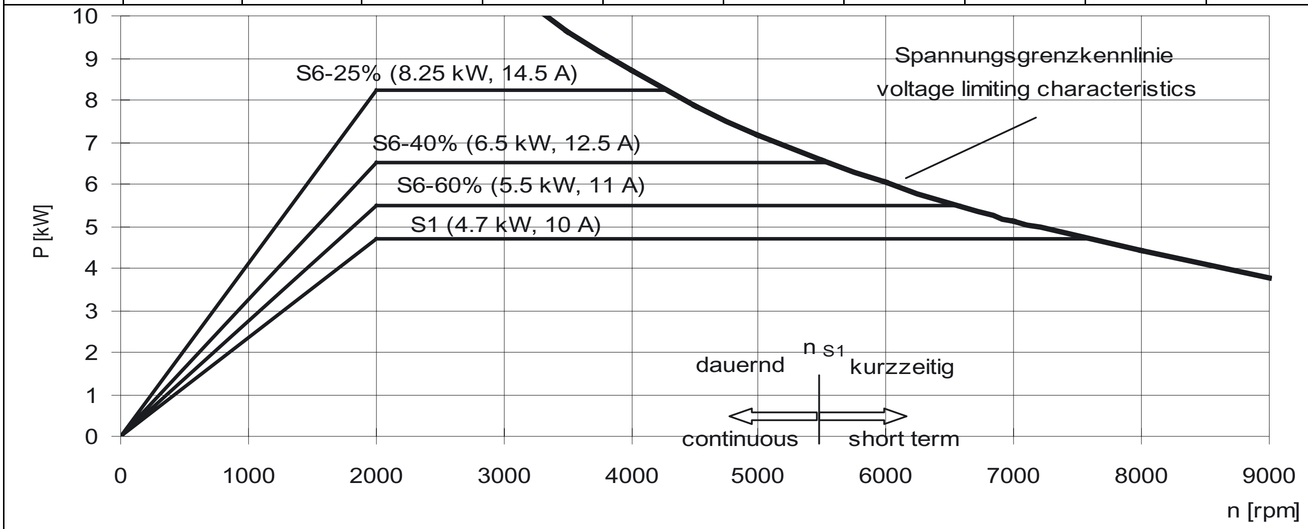


Table 7-173 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7101-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	4,7	22,4	10,0	459	68,2	7588	9000	20	6,0	20,0



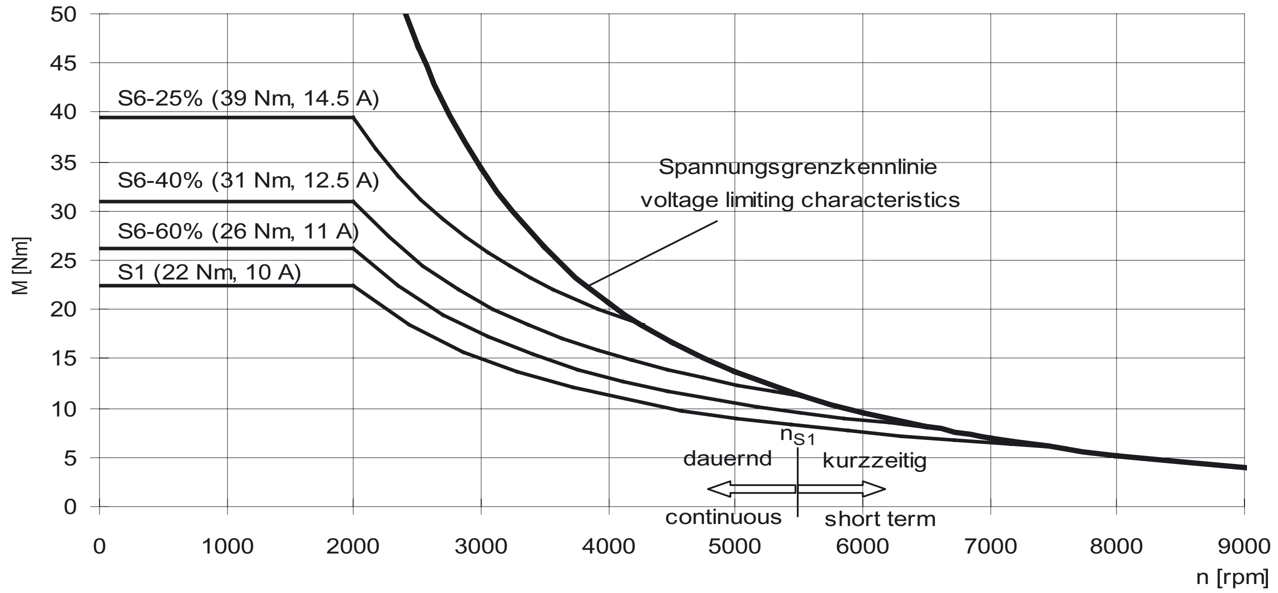
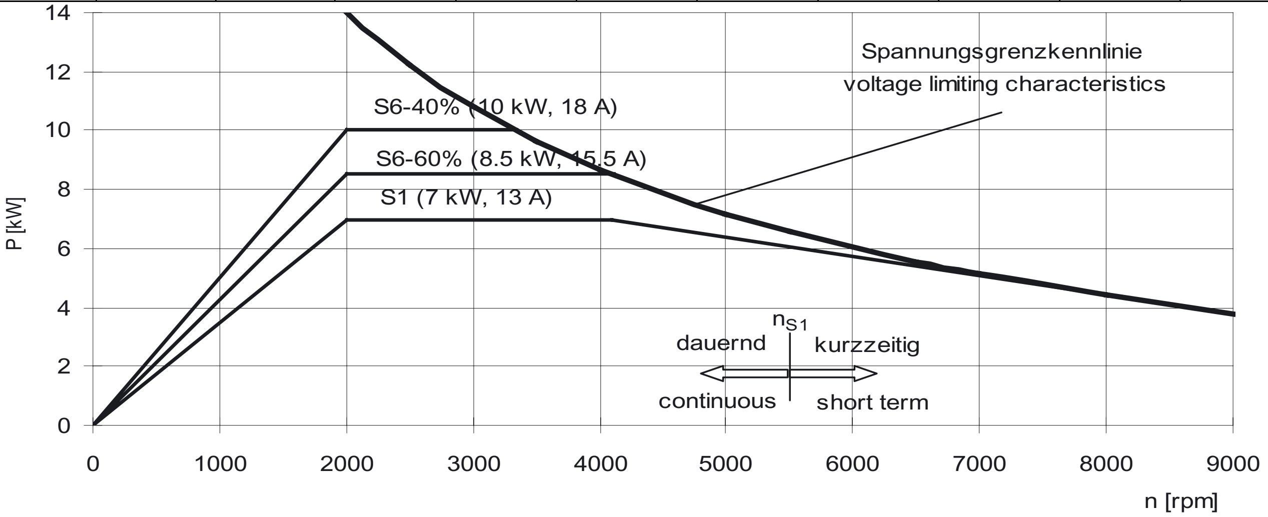


Table 7-174 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7103-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	7,0	33,4	13,0	459	69,1	4100	9000	20	5,6	26,0



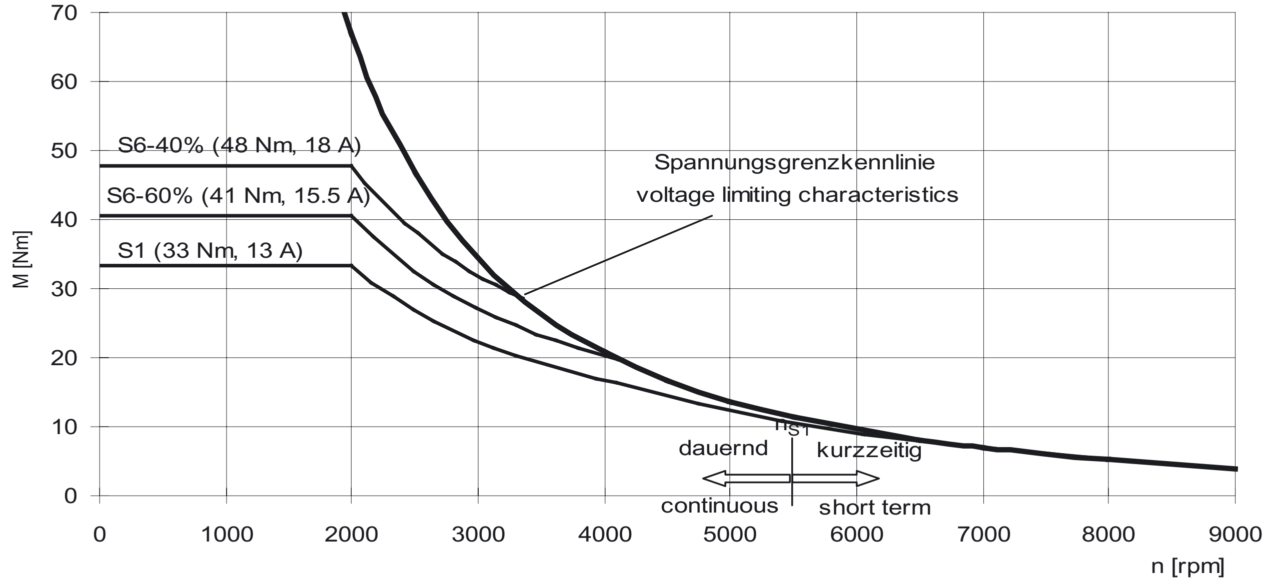
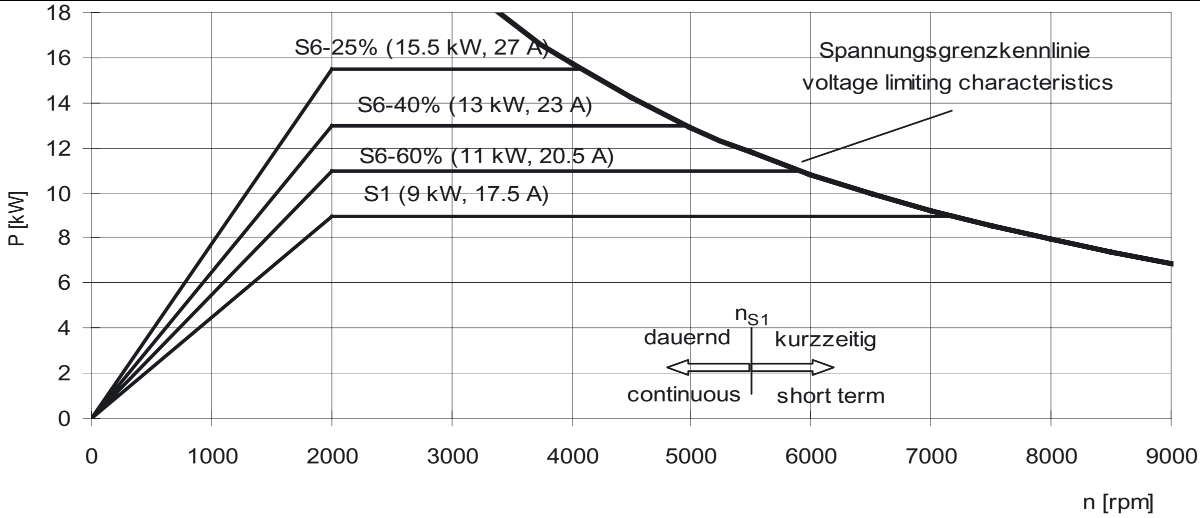


Table 7-175 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7105-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	9,0	43,0	17,5	450	68,3	7166	9000	20	9,3	35,0



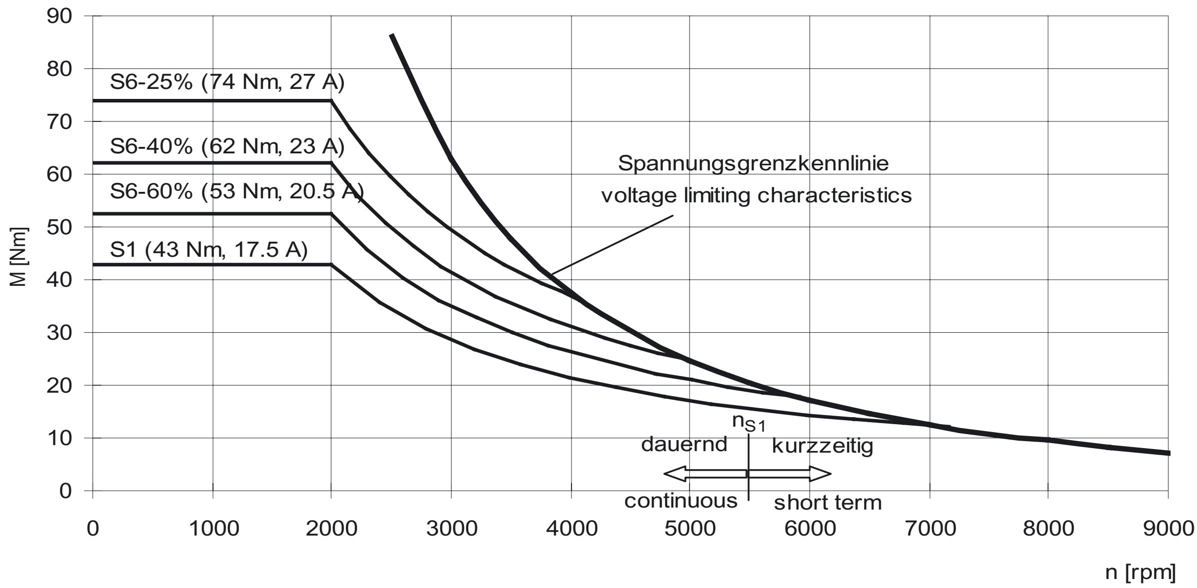
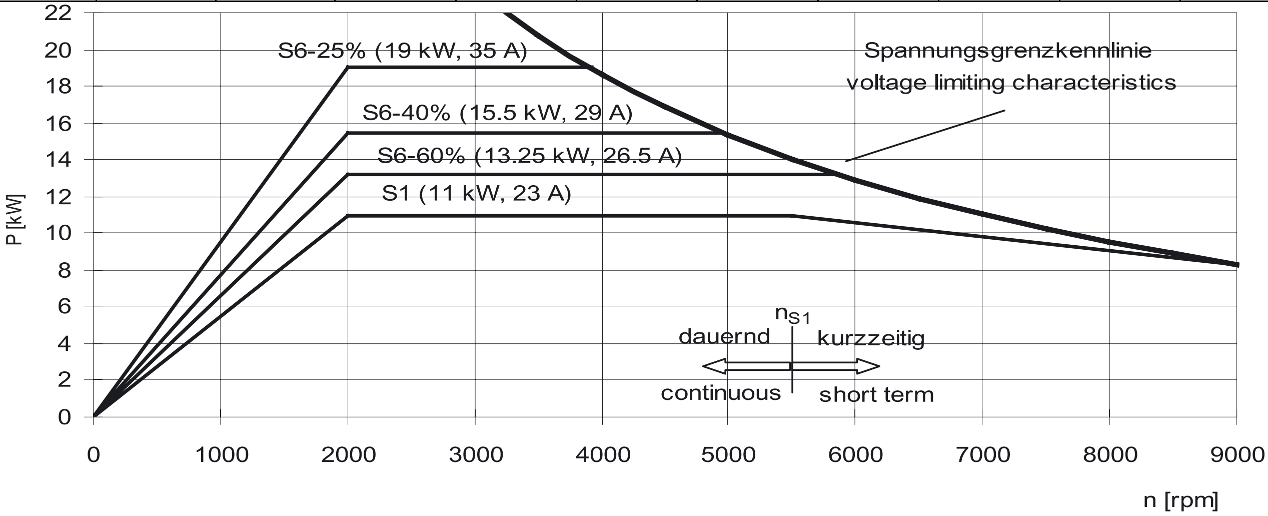


Table 7-176 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7107-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	11,0	52,5	23,0	433	68,6	5500	9000	20	10,8	46,0



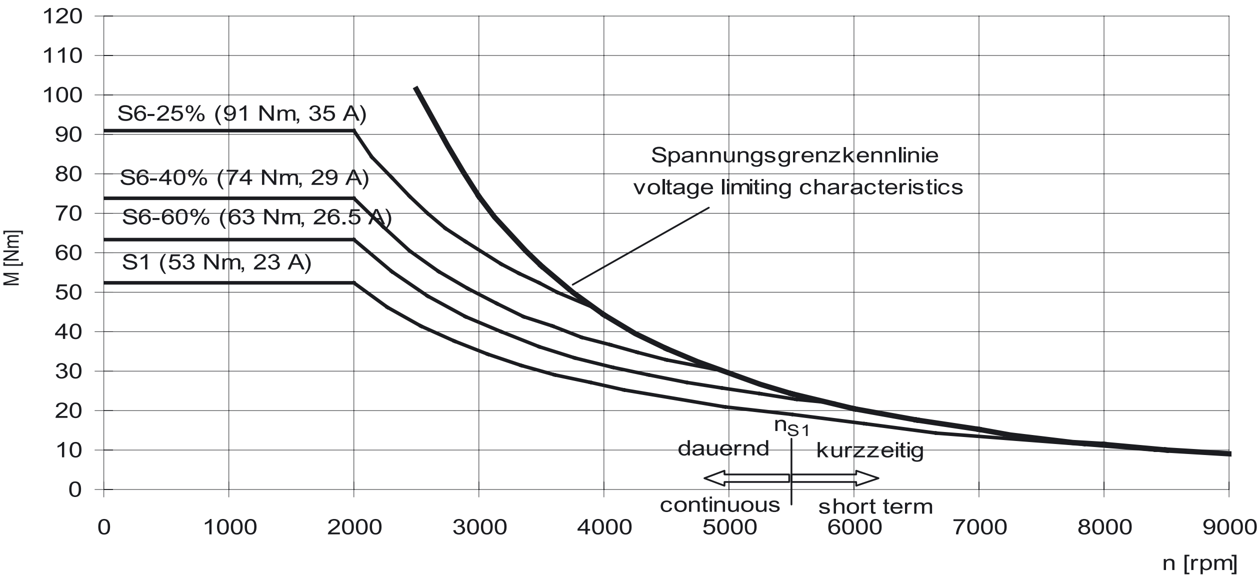
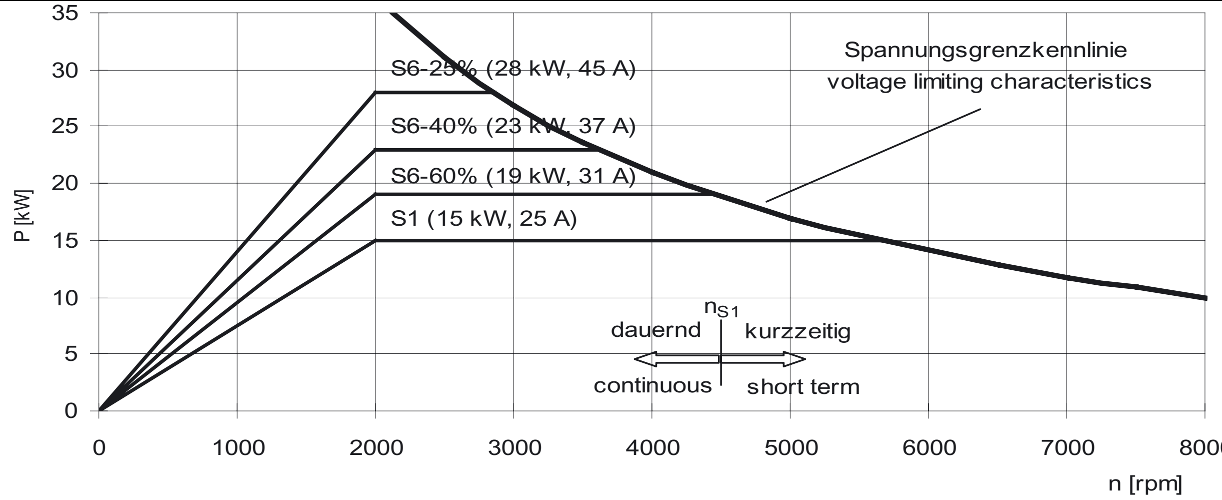


Table 7-177 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7131-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
2000	15,0	71,6	25,0	459	68,0	5663	8000	30	8,5	50,0



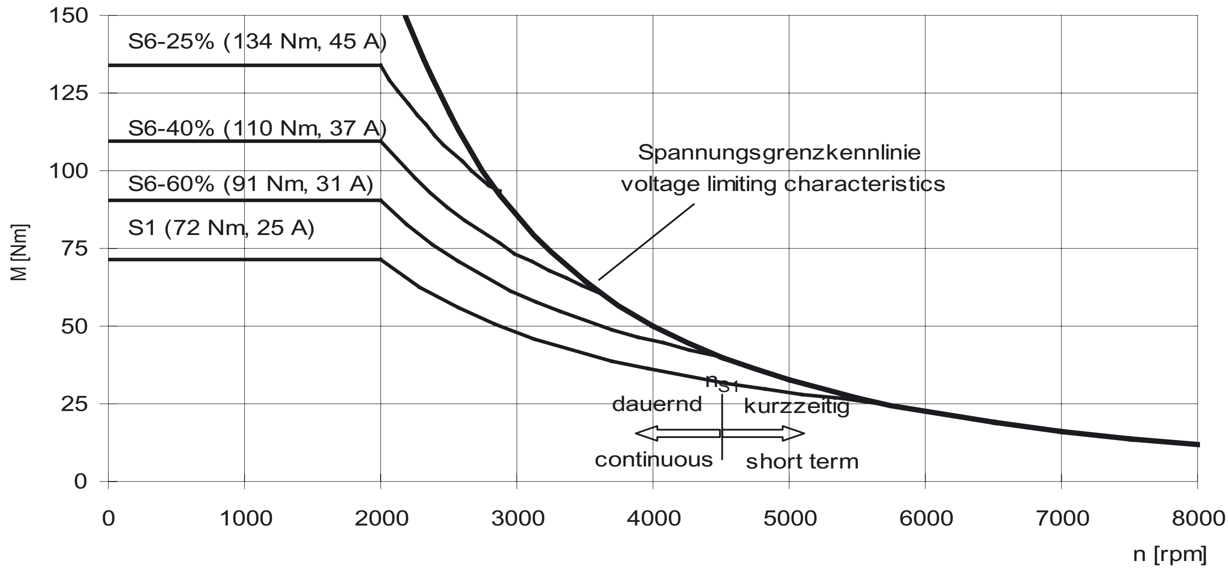
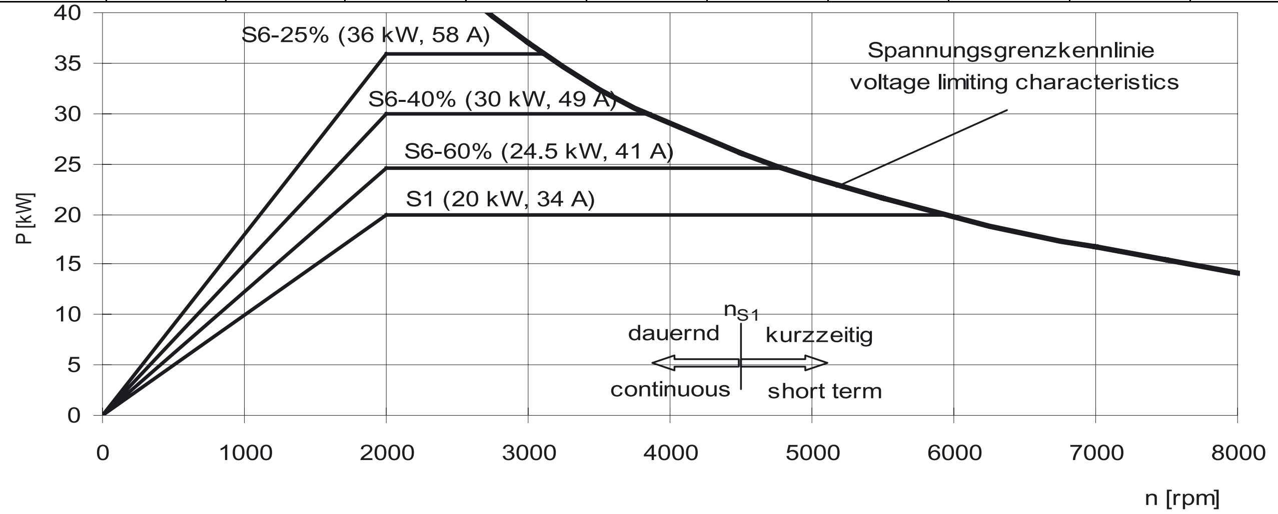


Table 7-178 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7133-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	20,0	95	34	459	68,0	5915	8000	30	15,0	68



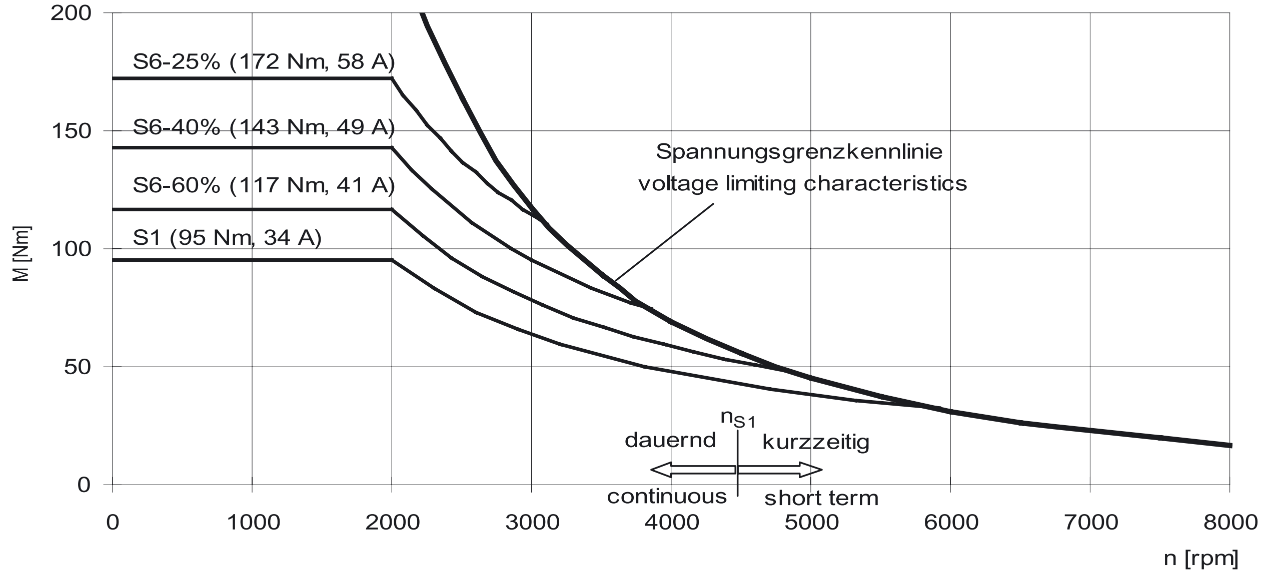
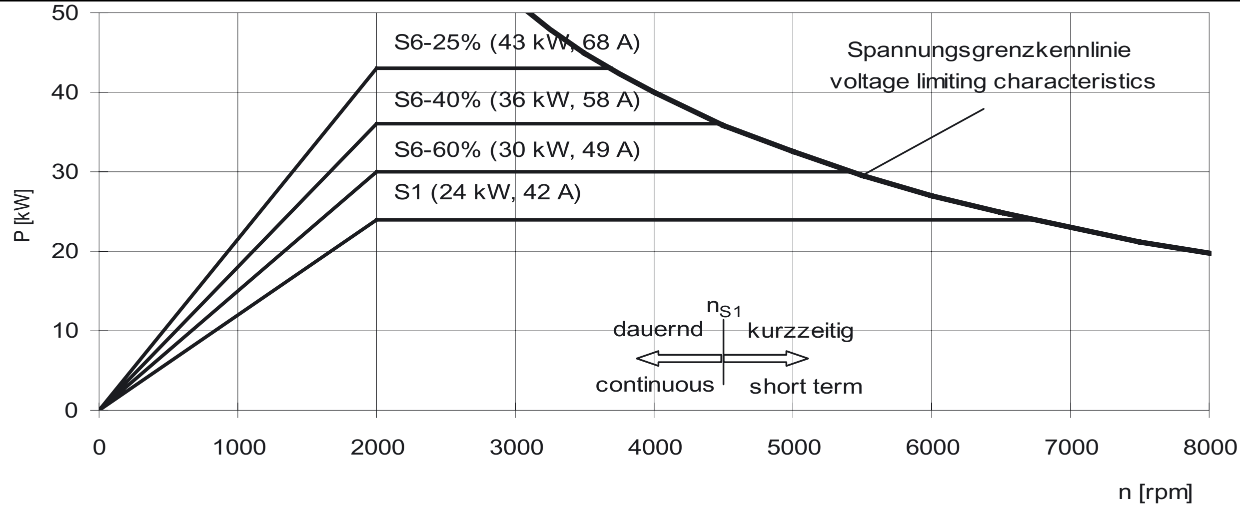


Table 7-179 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7135-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	24,0	115	42	459	67,8	6731	8000	30	17,0	84



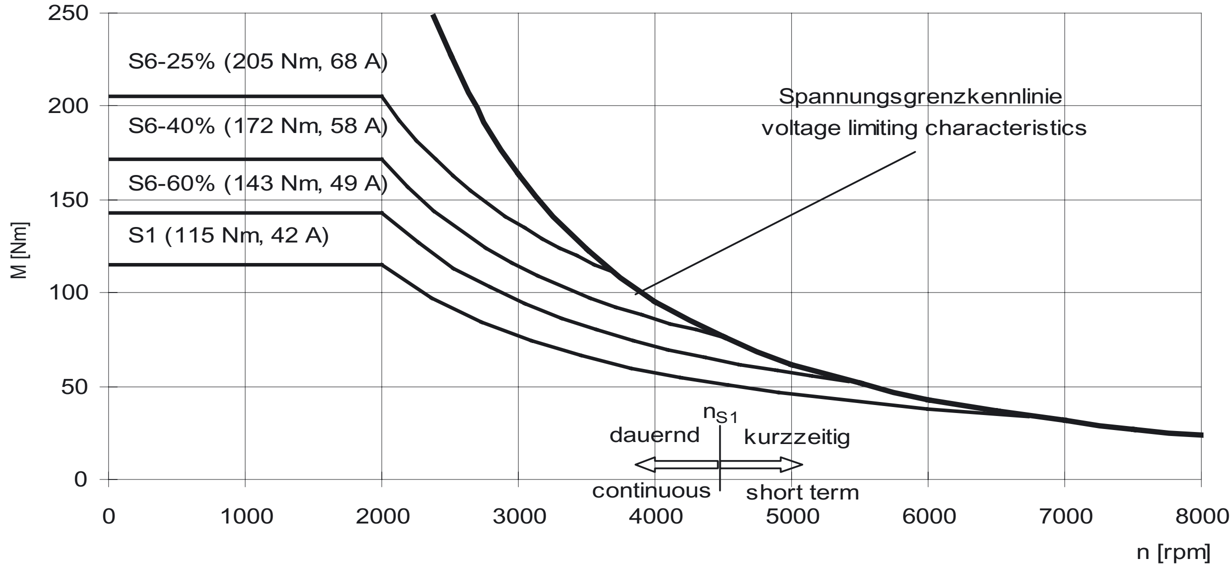


Table 7-180 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7137-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
2000	28,0	134	55	402	67,9	4000	8000	30	23,0	112

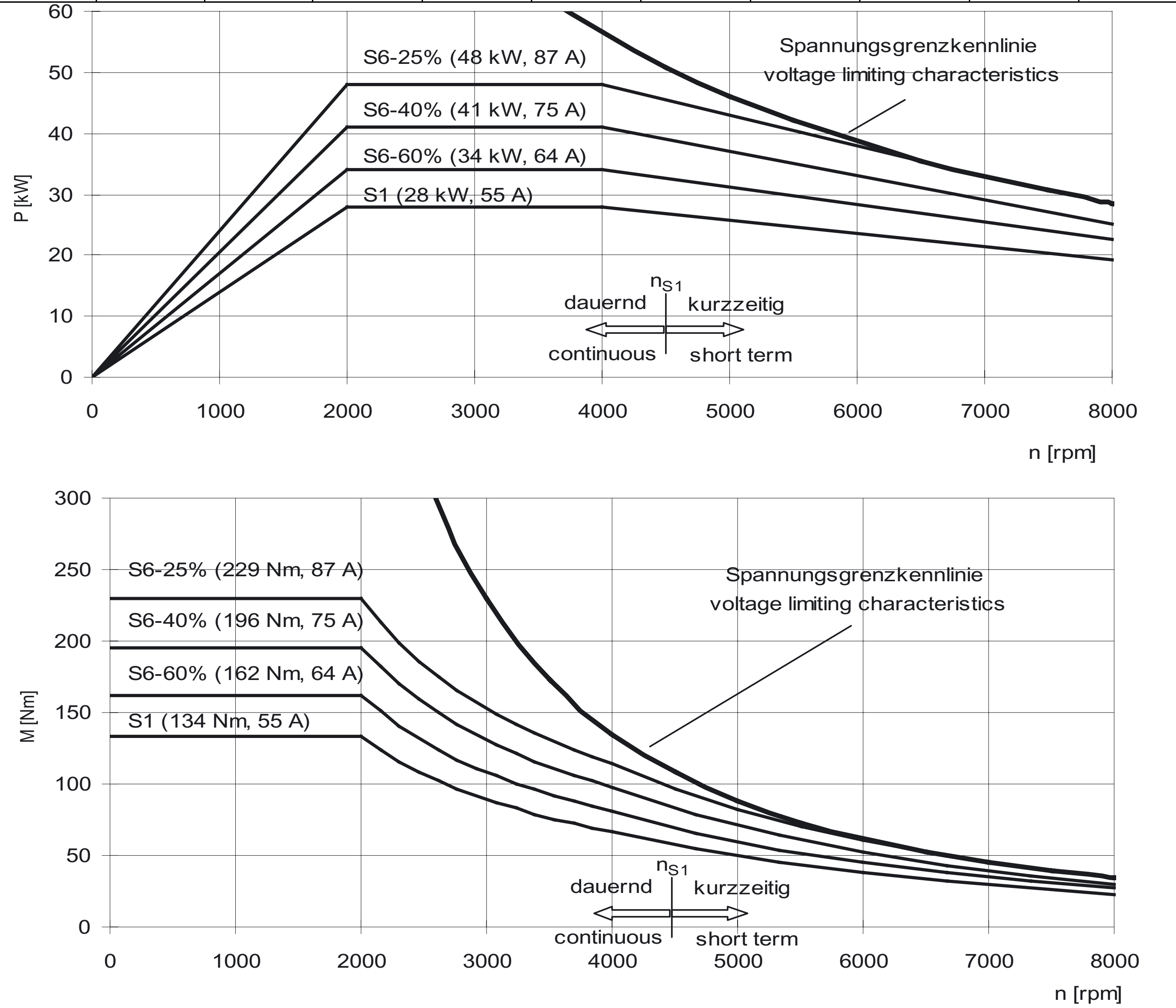
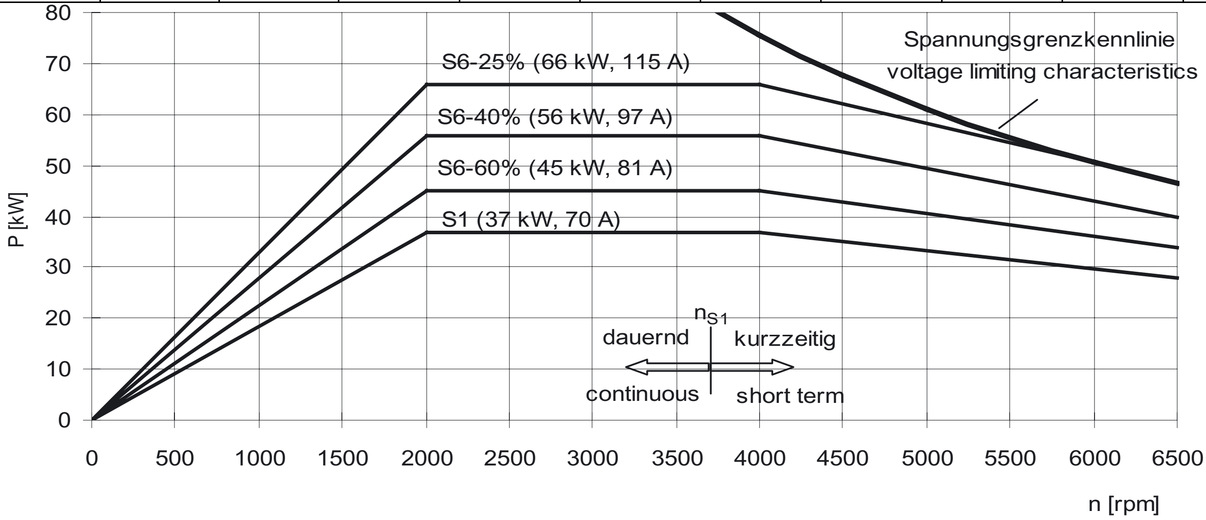


Table 7-181 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7163-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	37,0	177	70	412	67,5	4000	6500	35	29,0	140



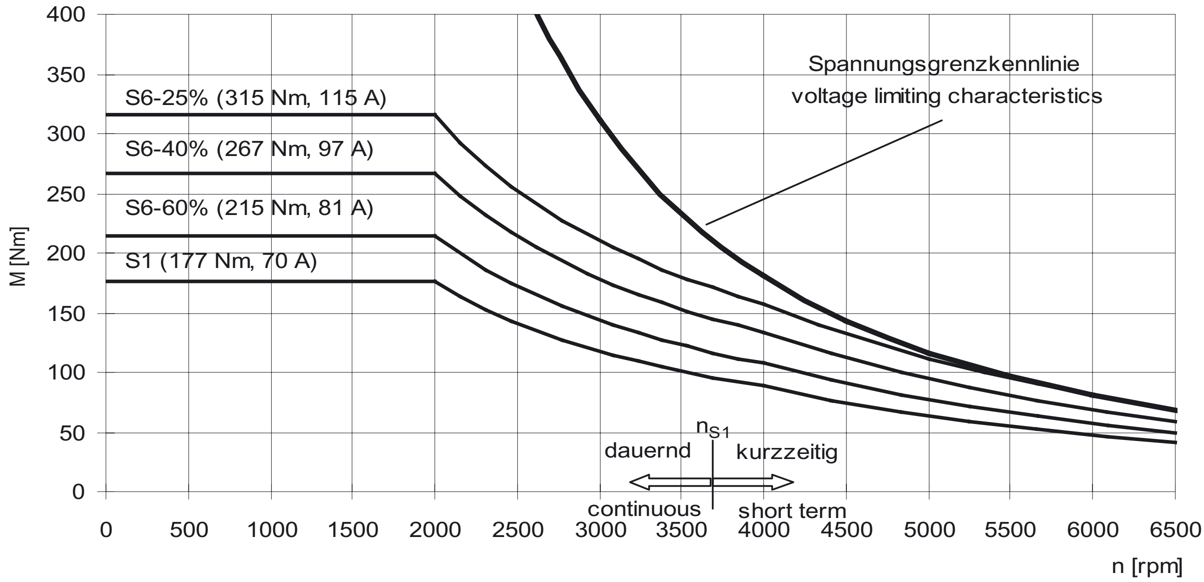
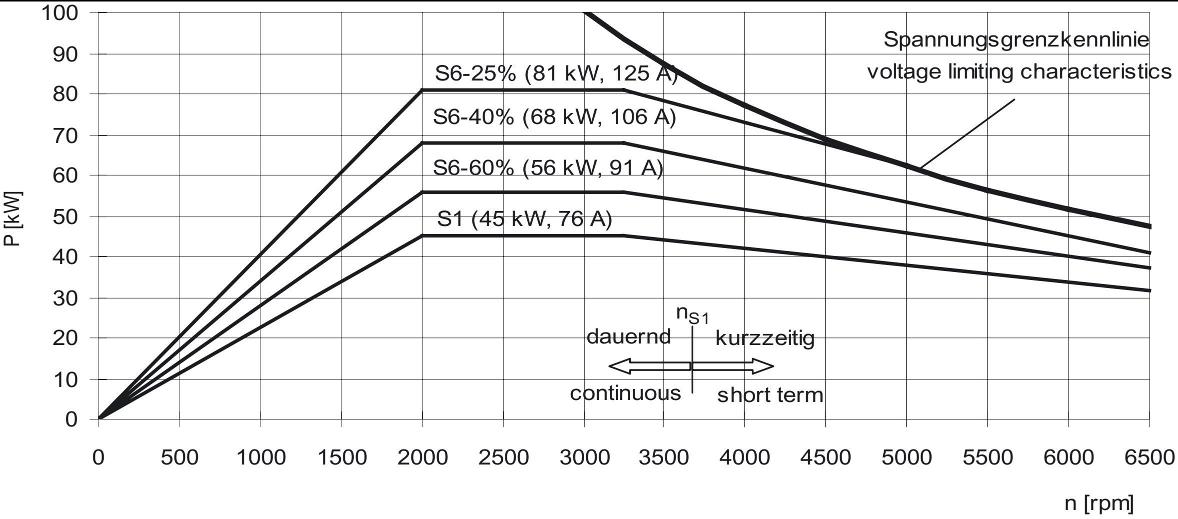


Table 7-182 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7167-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	45,0	215	76	459	67,4	3250	6500	35	32,0	152



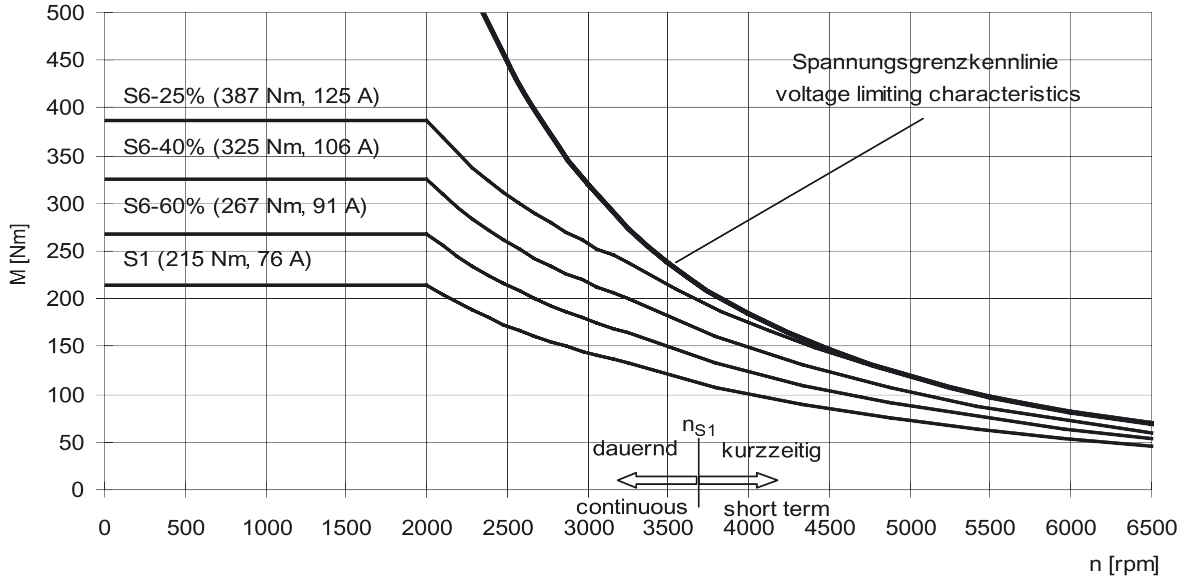
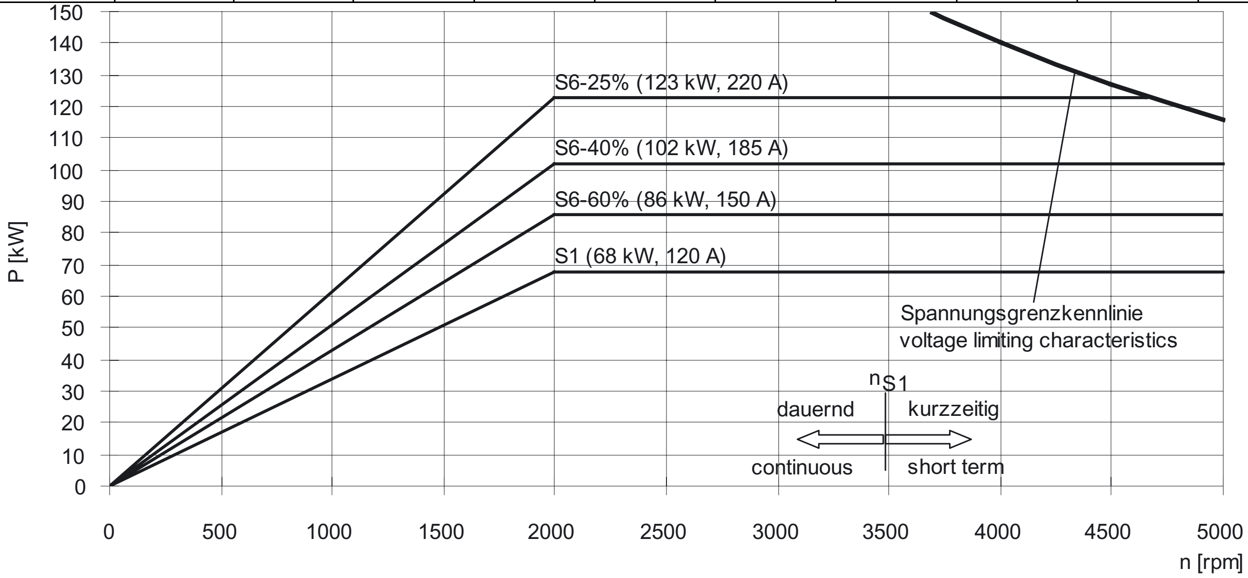


Table 7-183 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7184-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	68	325	120	450	67,3	5000	5000	40	66	215



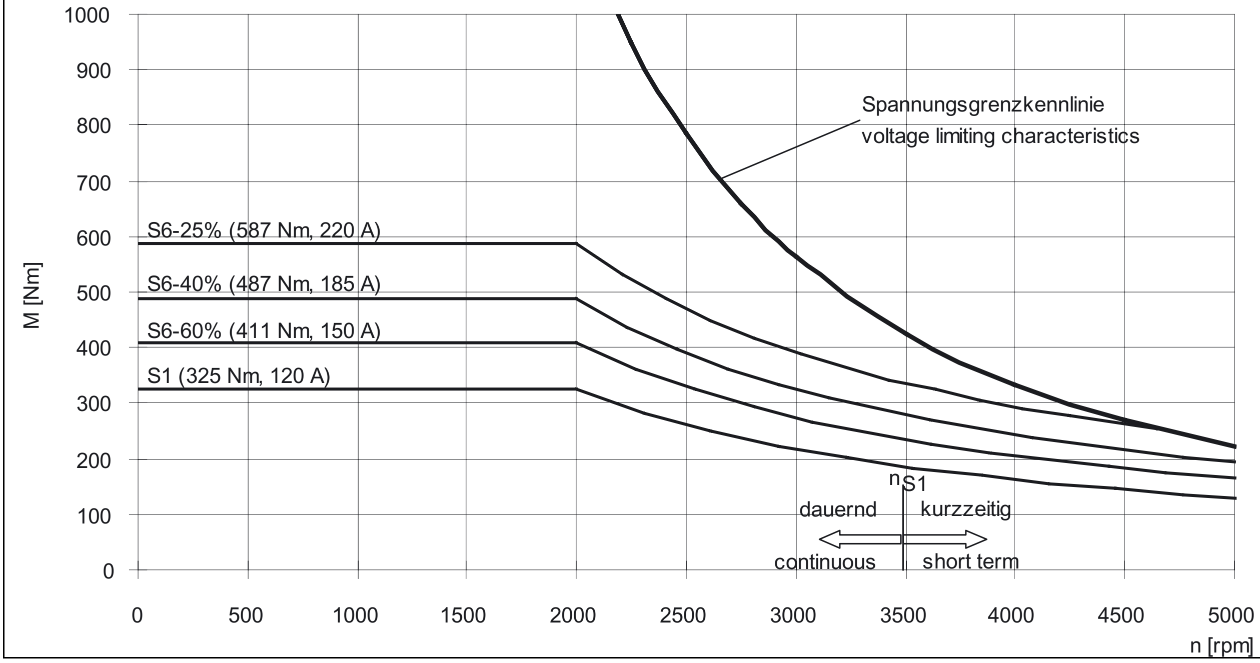
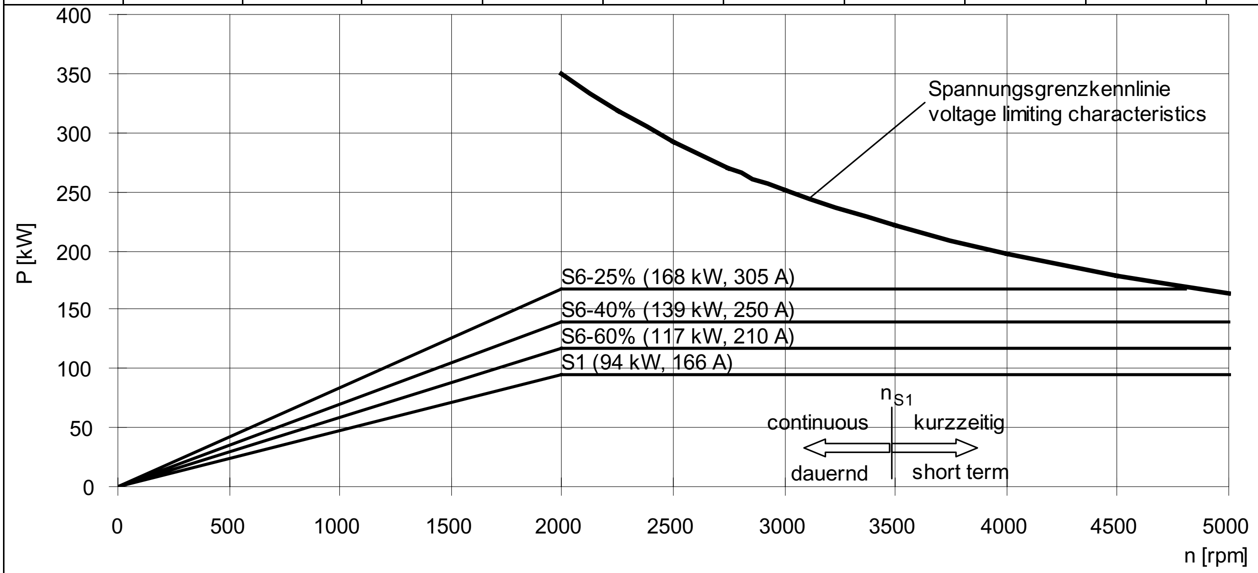


Table 7-184 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7186-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	94	450	165	445	67,3	5000	5000	40	87	295



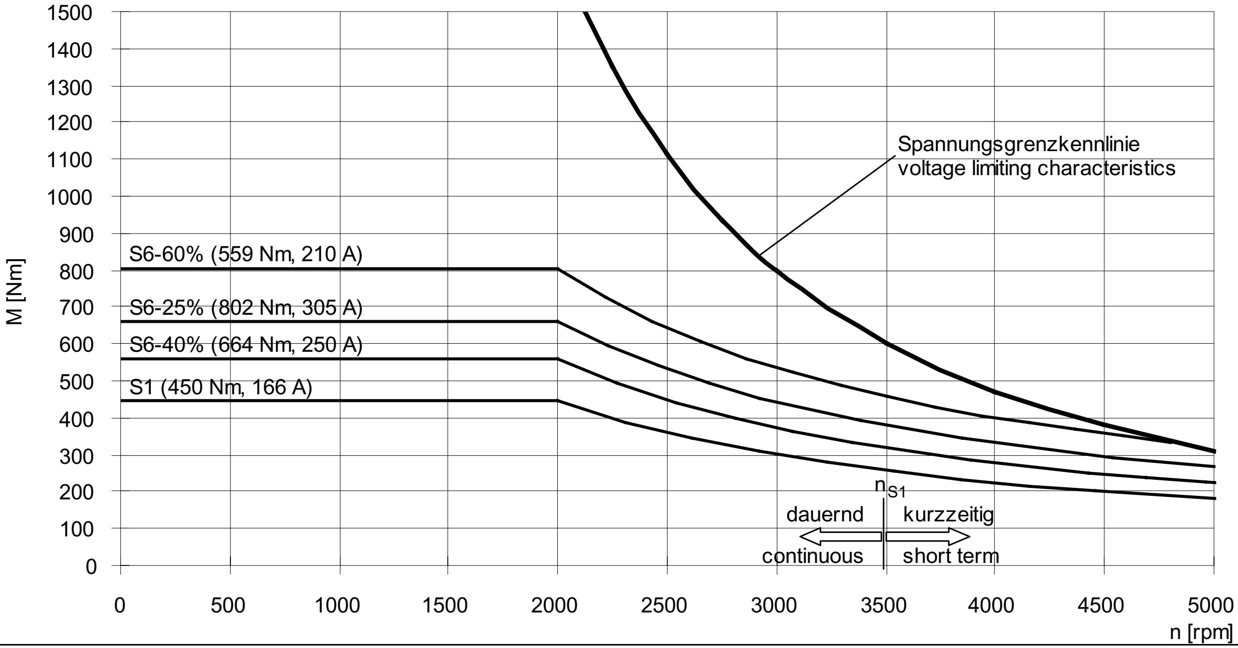
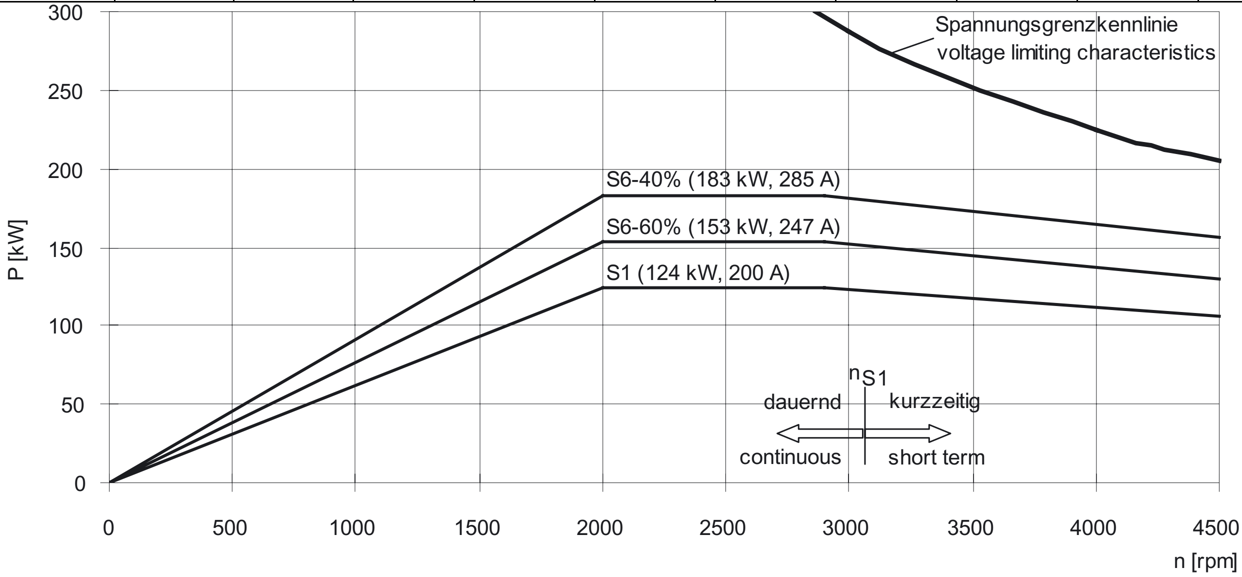


Table 7-185 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7224-□□U□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	124	590	200	460	67,2	2900	4500	40	91	370



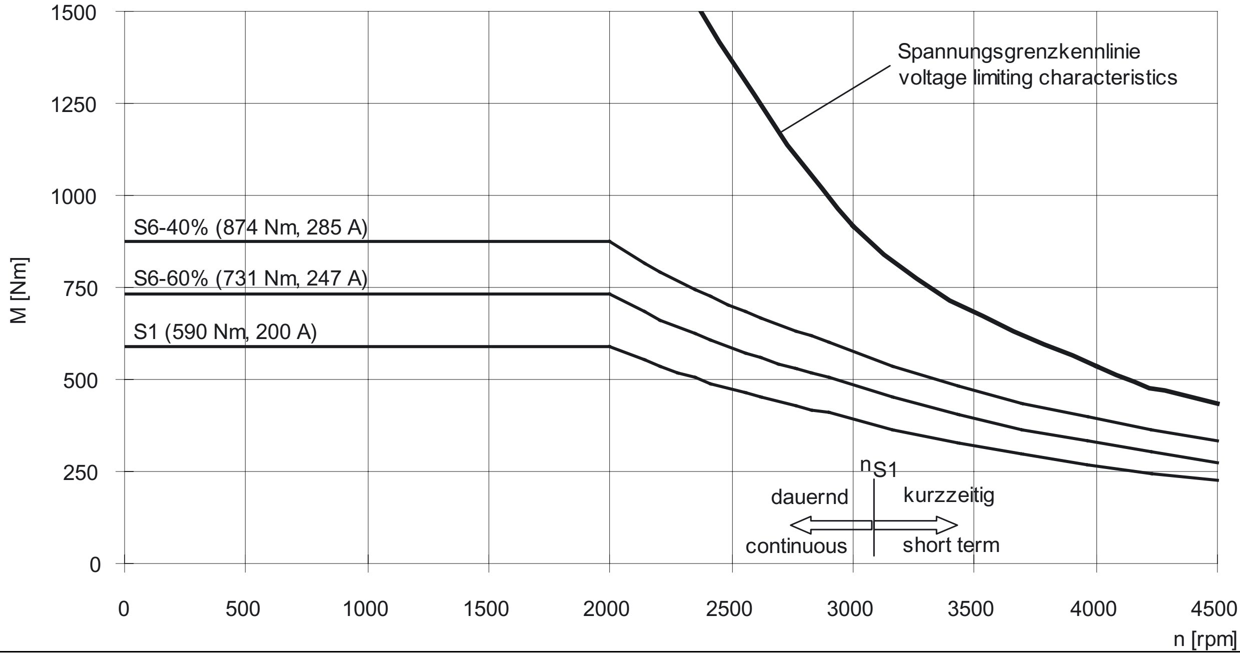
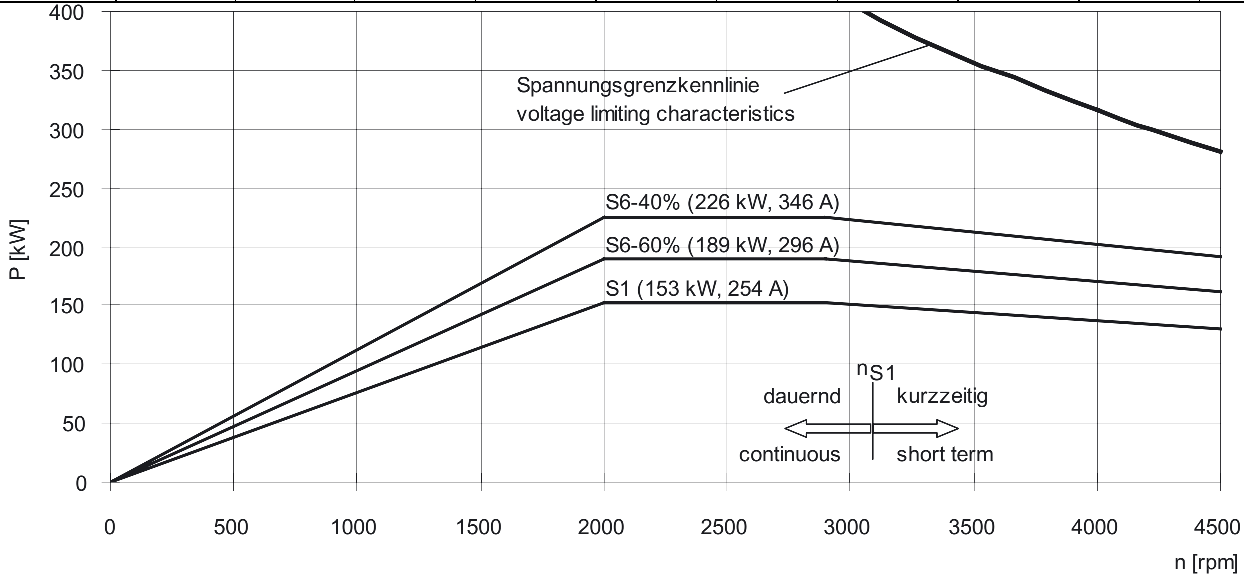


Table 7-186 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7226-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	153	730	254	450	67,2	2900	4500	40	119	460



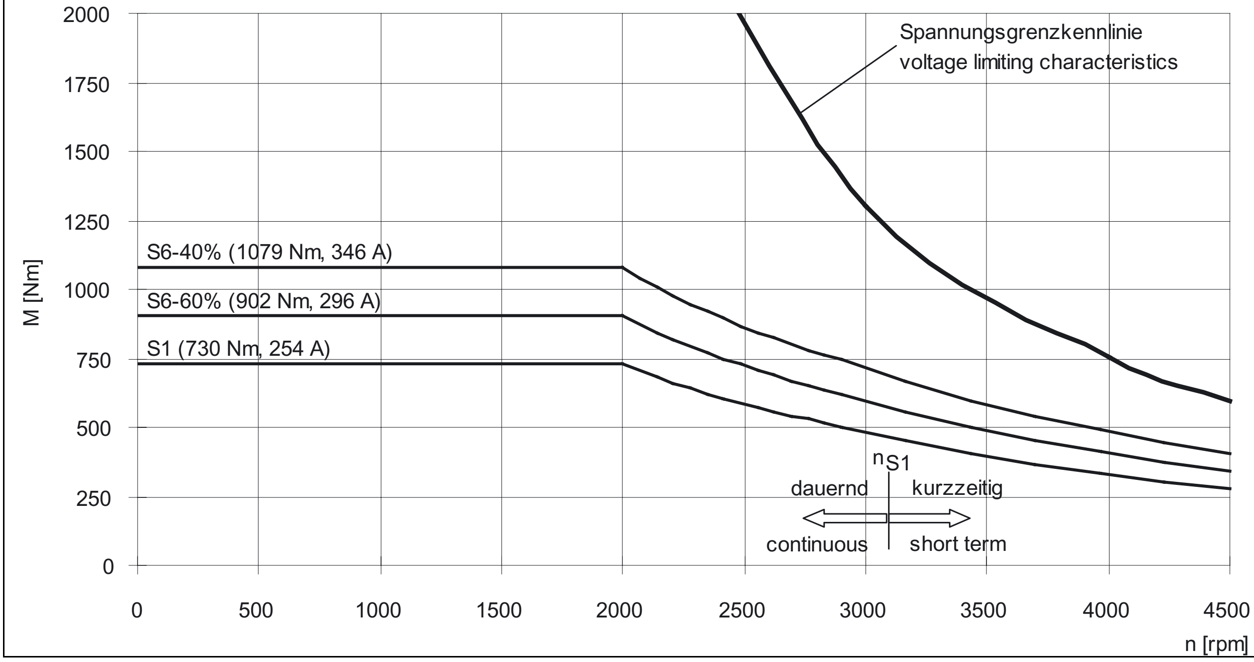
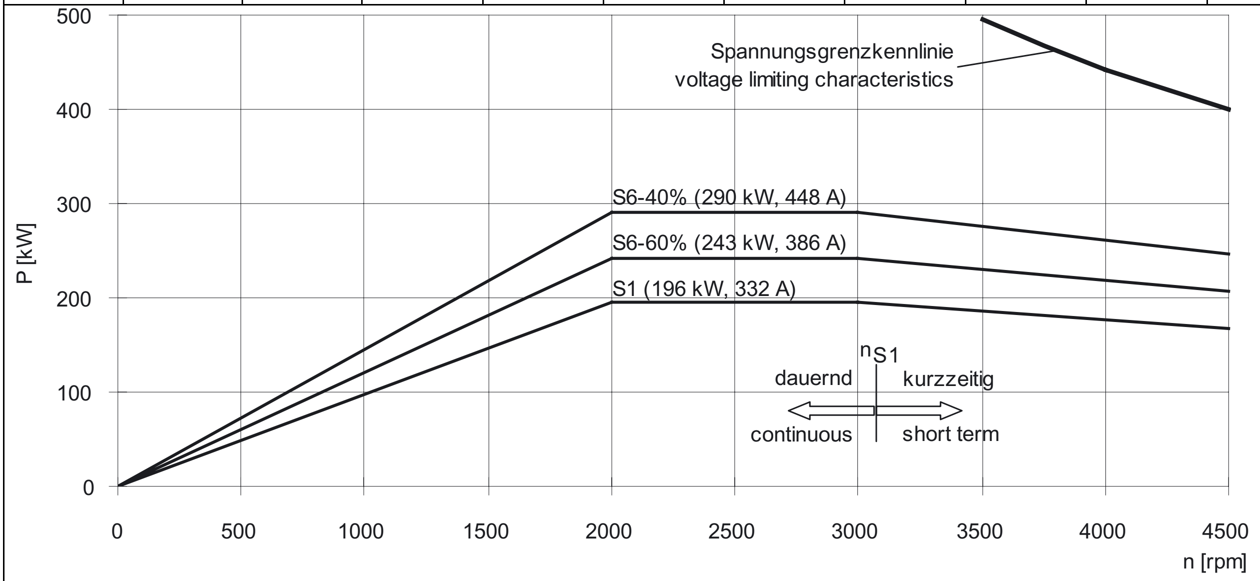
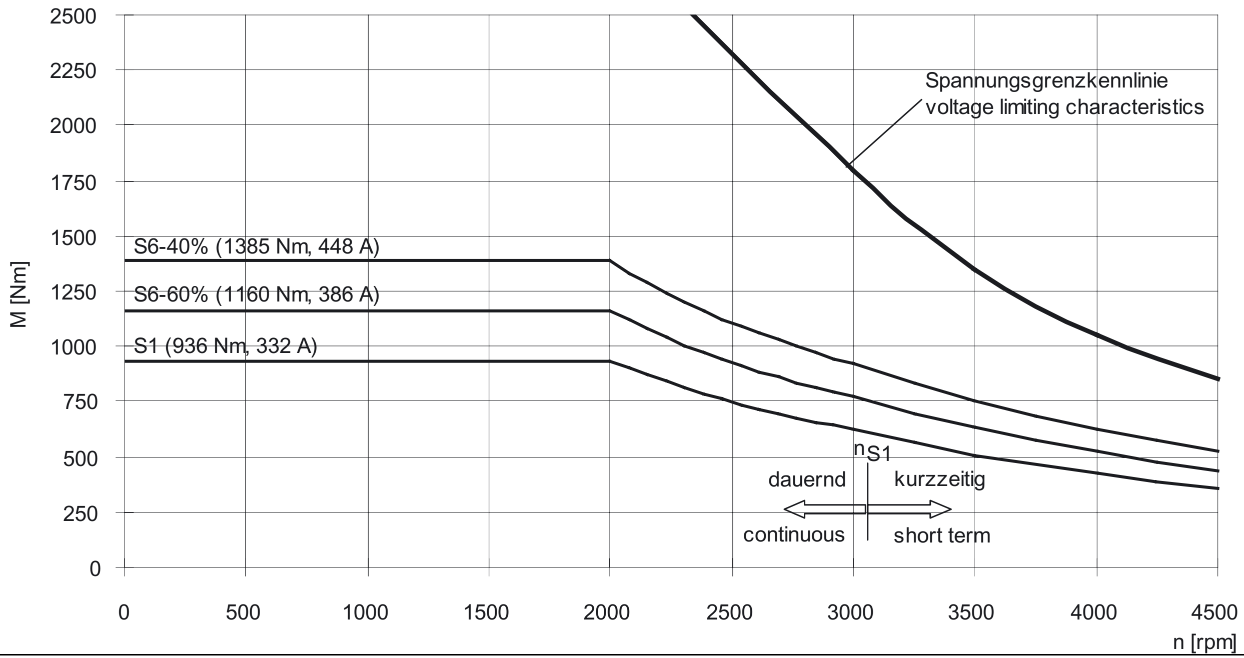


Table 7-187 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7228-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	196	936	332	450	67,1	3000	4500 1)	40	168	590

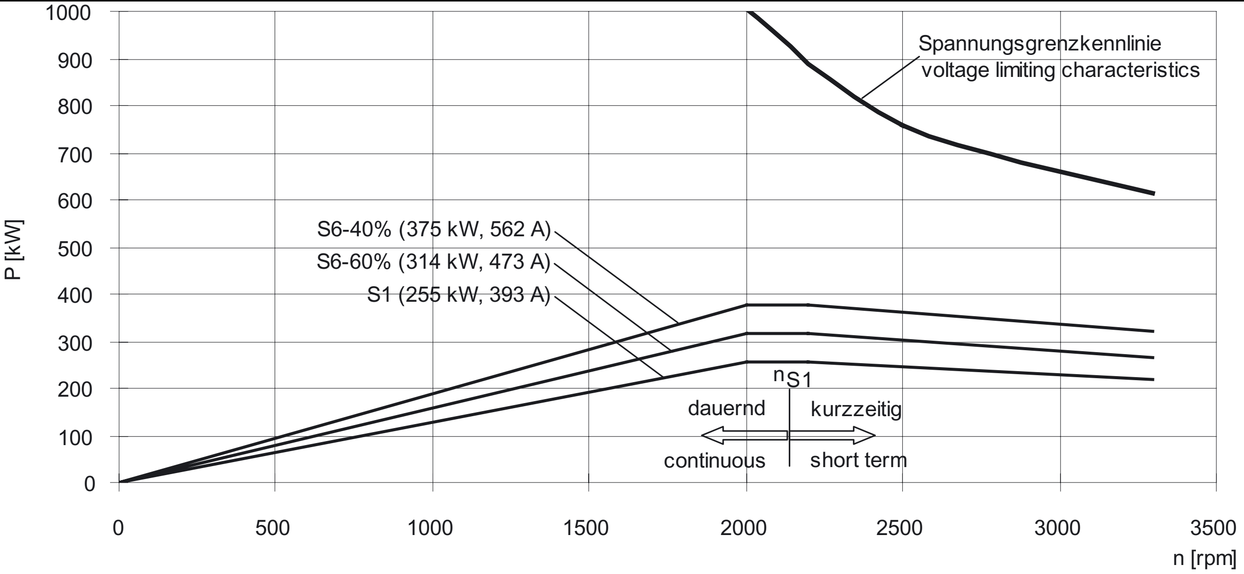




1) 4000 rpm for increased cantilever forces

Table 7-188 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7284-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	255	1218	393	455	67,0	2200	3300	75	162	744



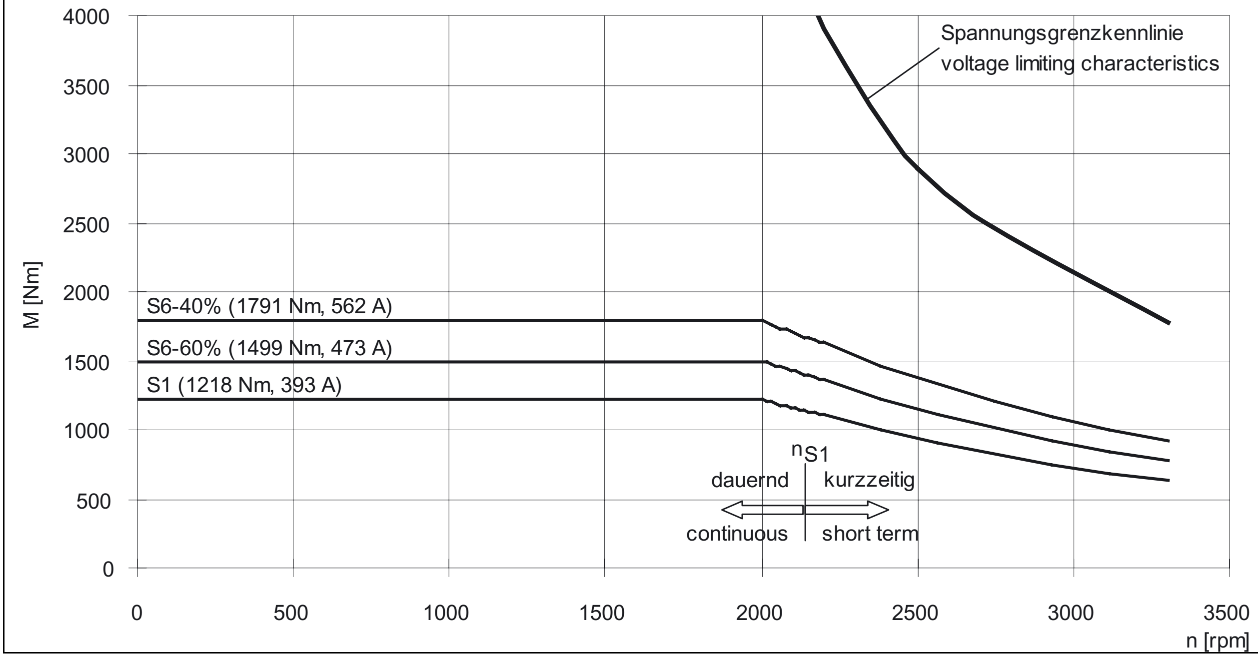
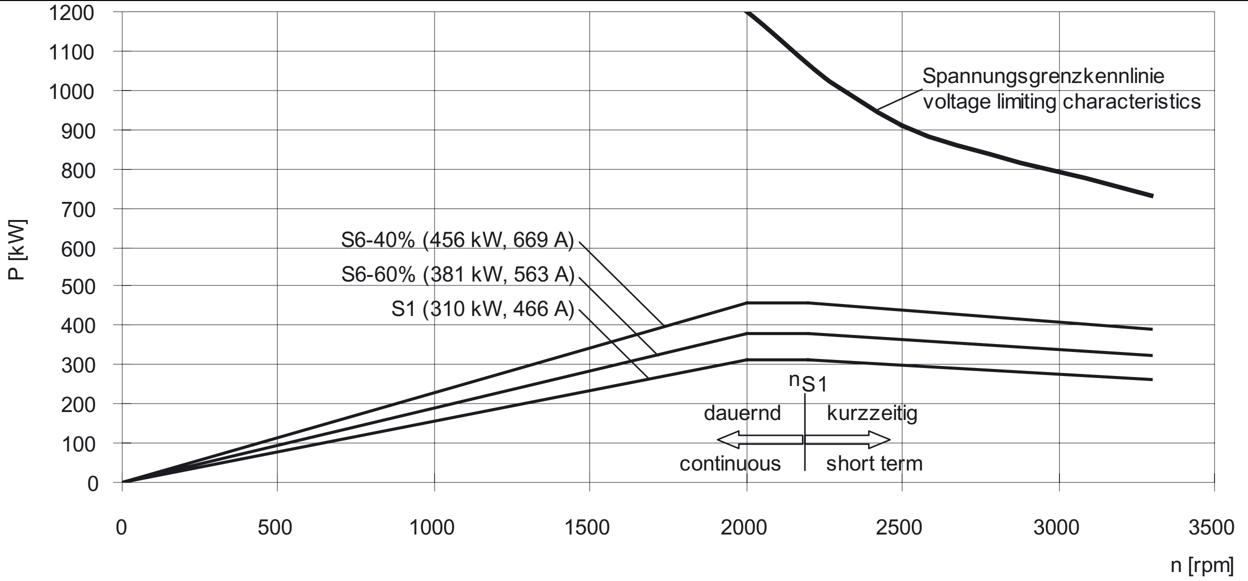


Table 7-189 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7286-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	310	1481	466	455	67,0	2200	3300	83	182	900



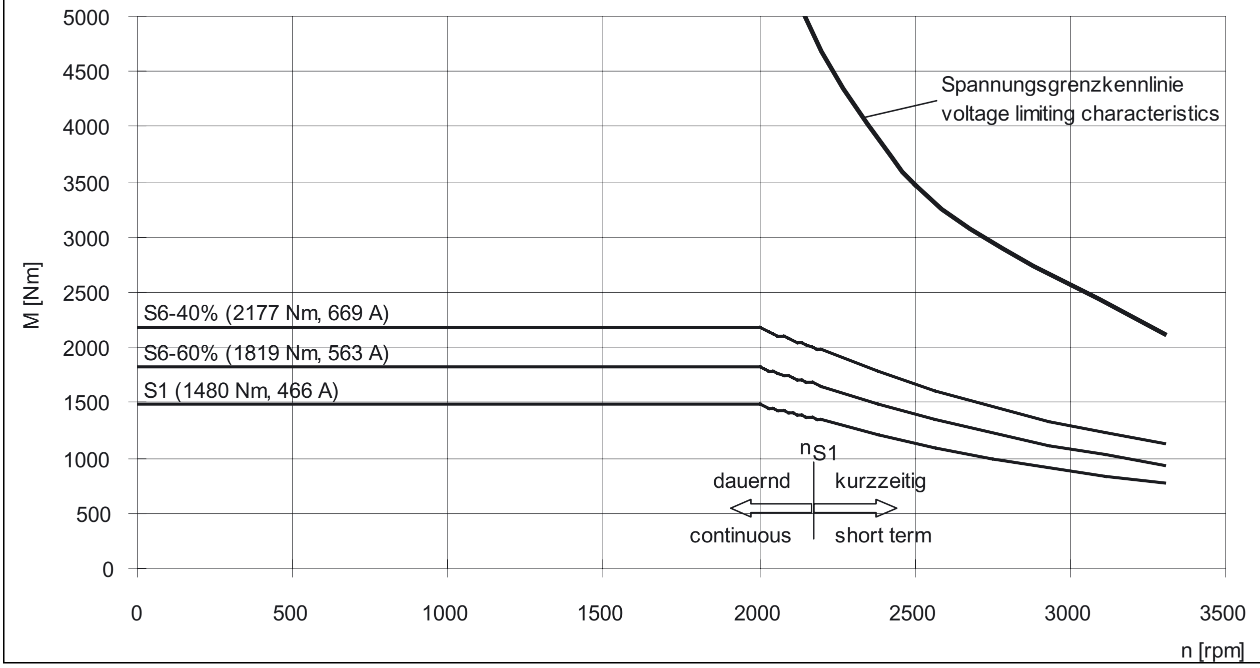
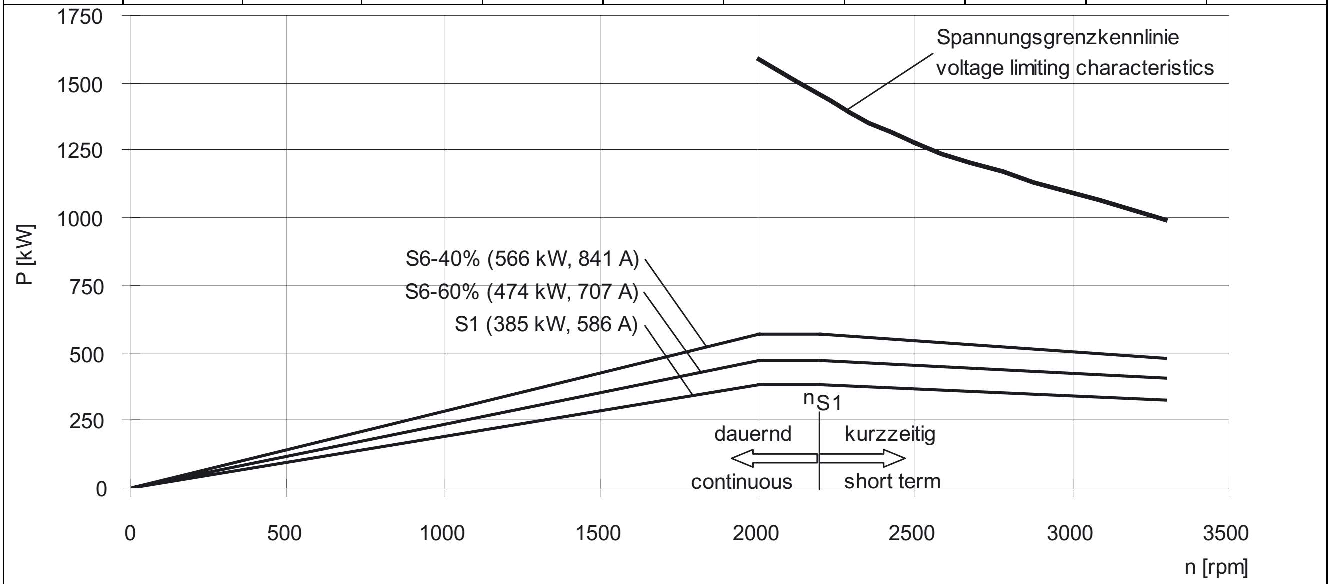


Table 7-190 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7288-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2000	385	1838	586	455	67,0	2200	3300	90	232	1114



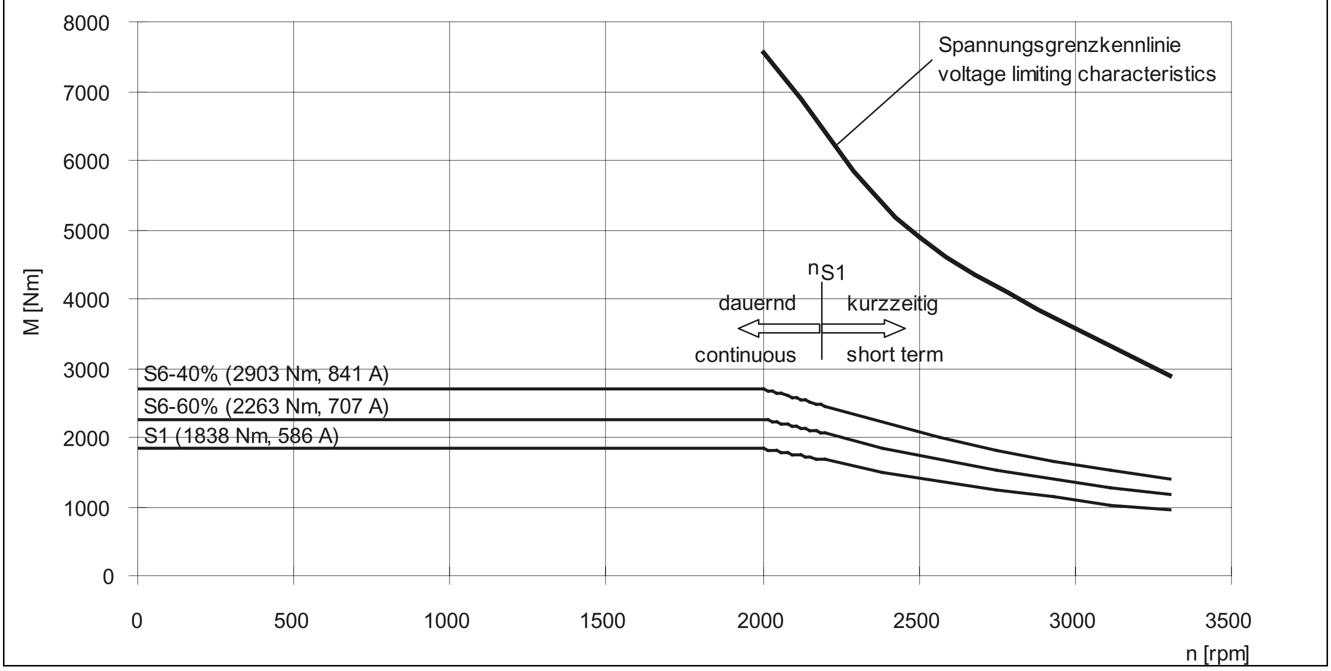


Table 7-191 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7103-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2650	8,0	28,8	16,5	440	90,3	7500	9000	20	8,2	33,0

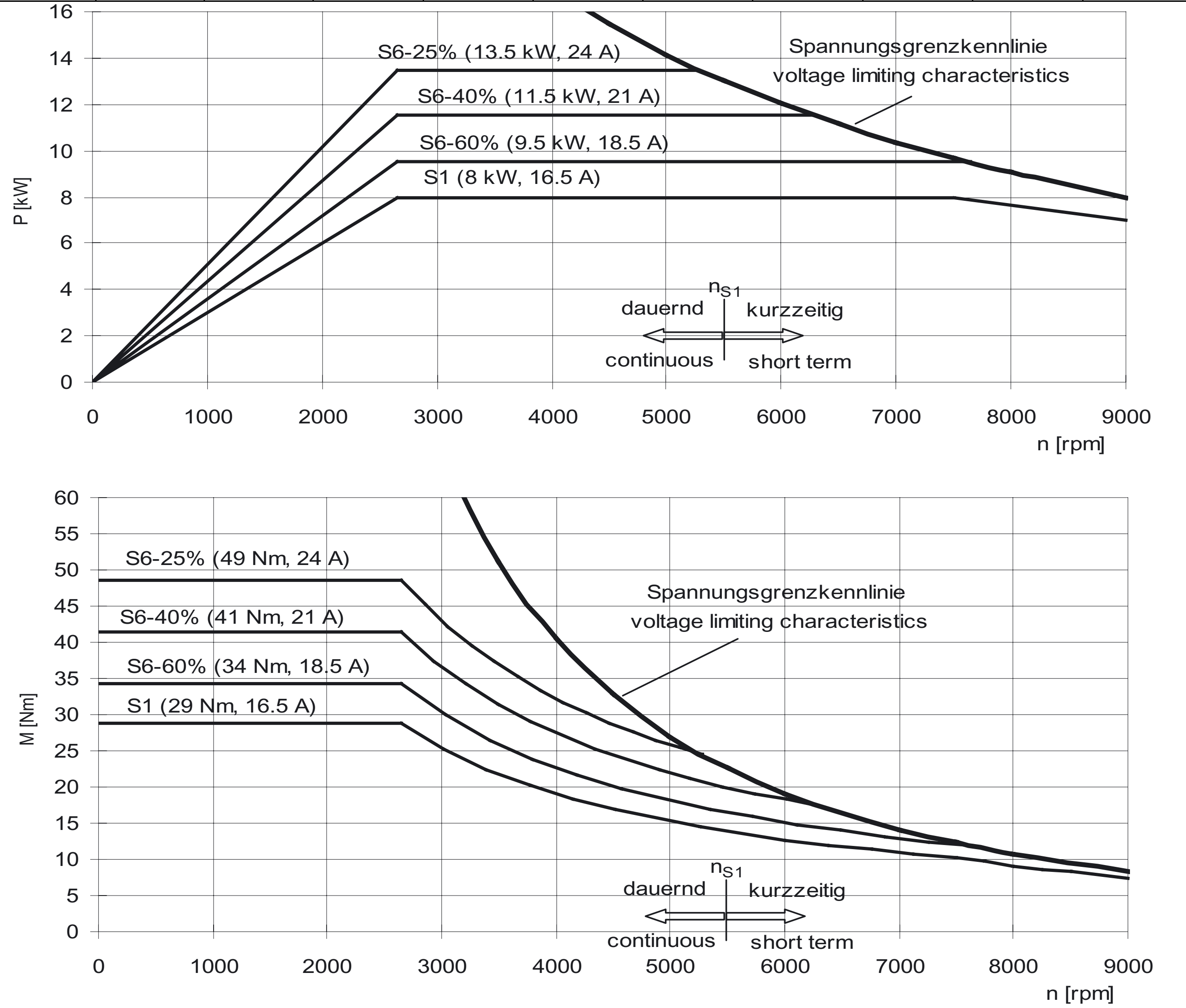


Table 7-192 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7107-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2650	13,0	46,8	24,5	459	90,2	7500	9000	20	12,0	49,0

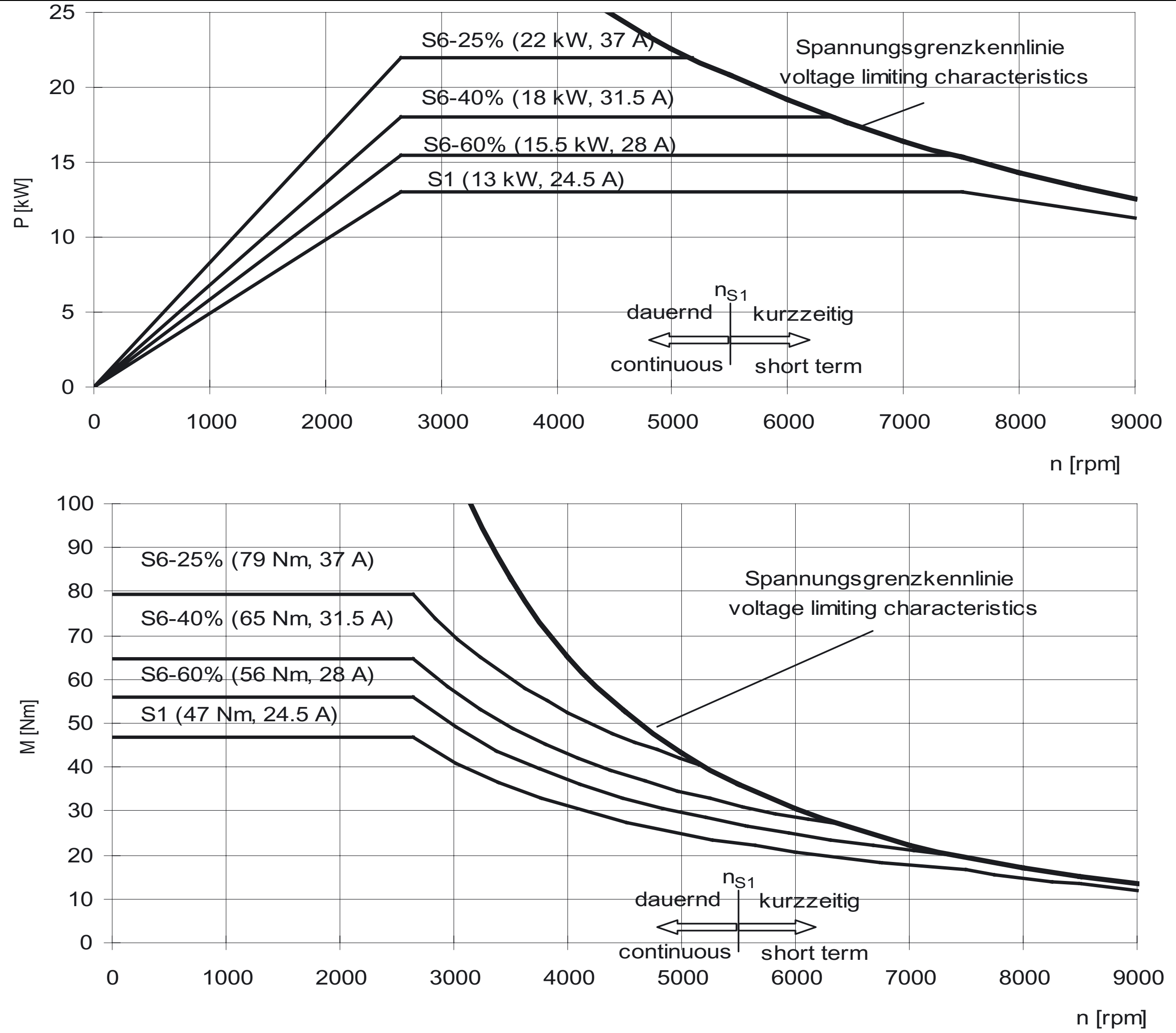
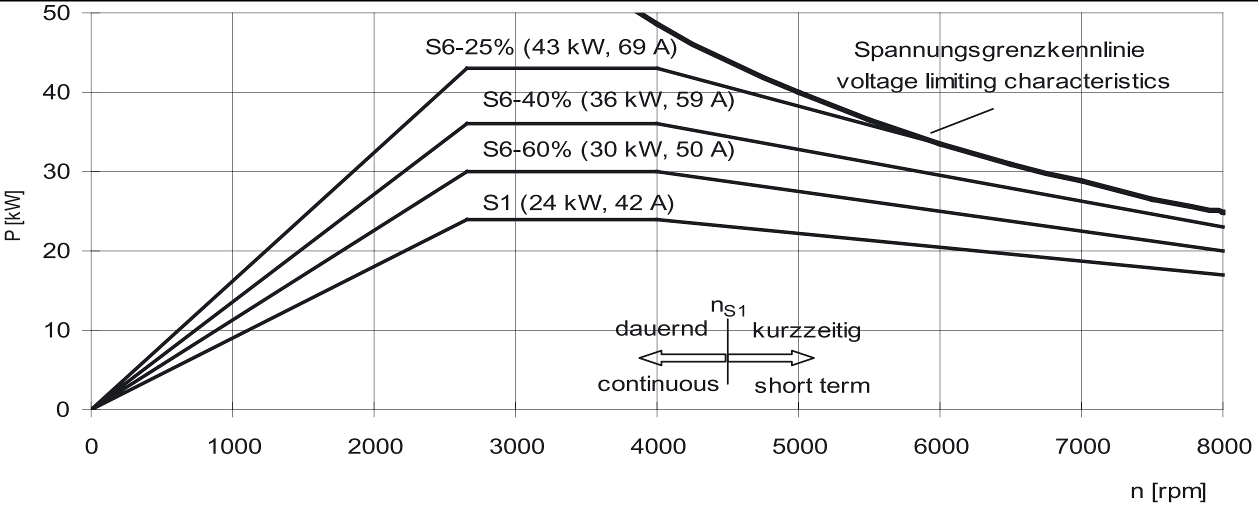


Table 7-193 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7133-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
2650	24,0	86	42	450	89,6	4000	8000	30	17,0	84



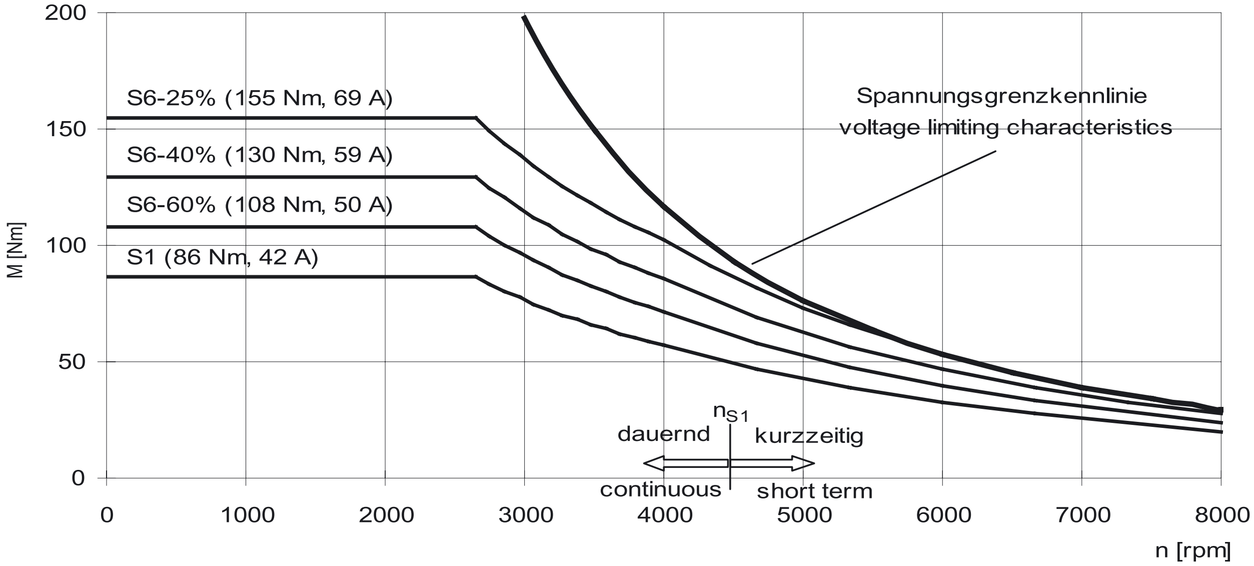
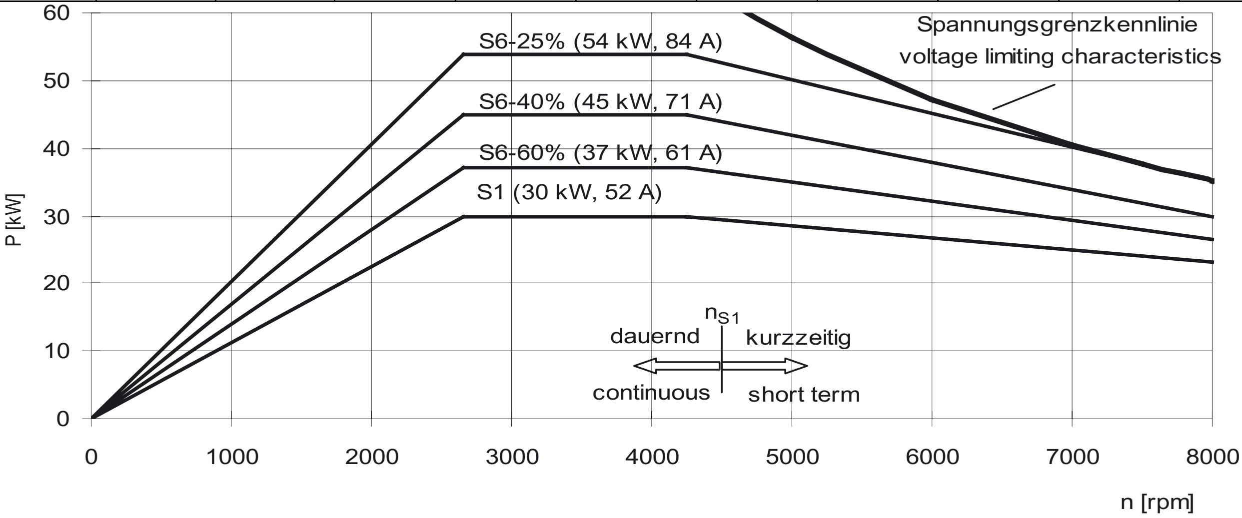


Table 7-194 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7137-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2650	30,0	108	52	450	89,4	4250	8000	30	21,0	104



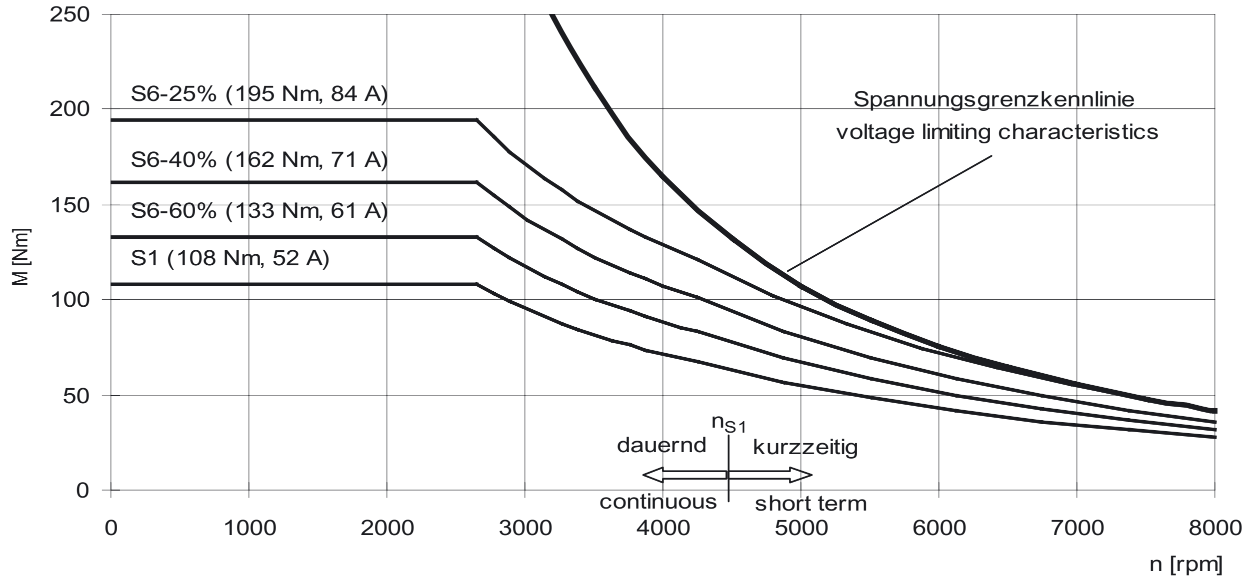
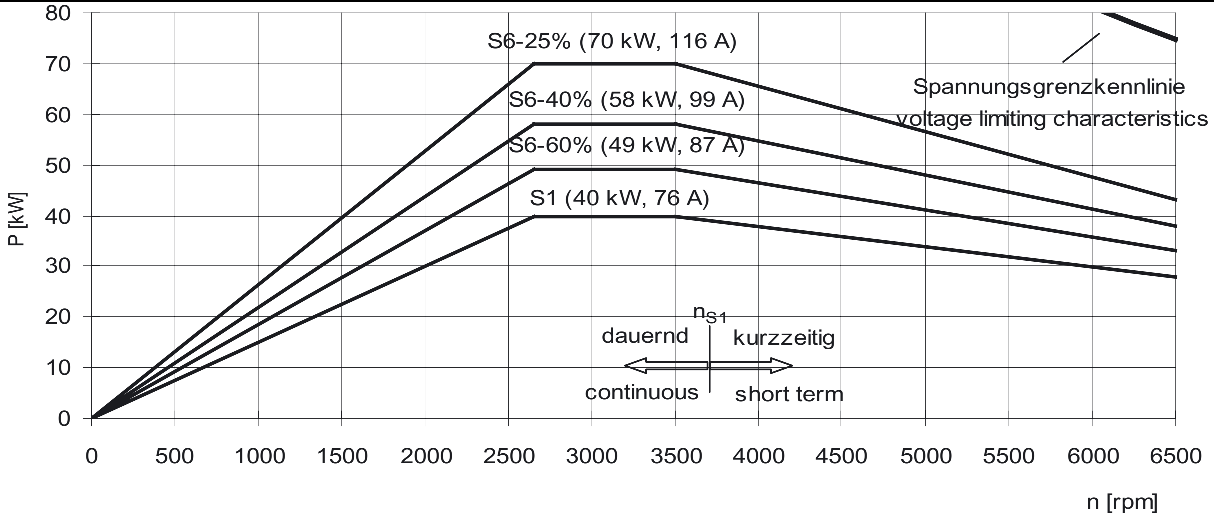


Table 7-195 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7163-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2650	40,0	144	76	433	89,0	3500	6500	35	37,0	152



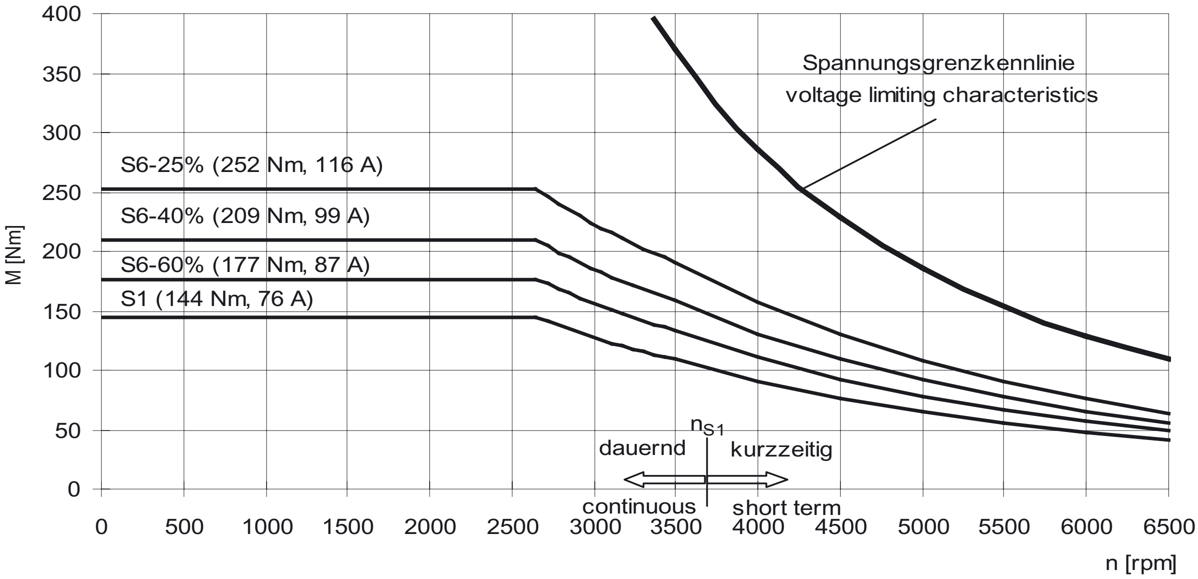
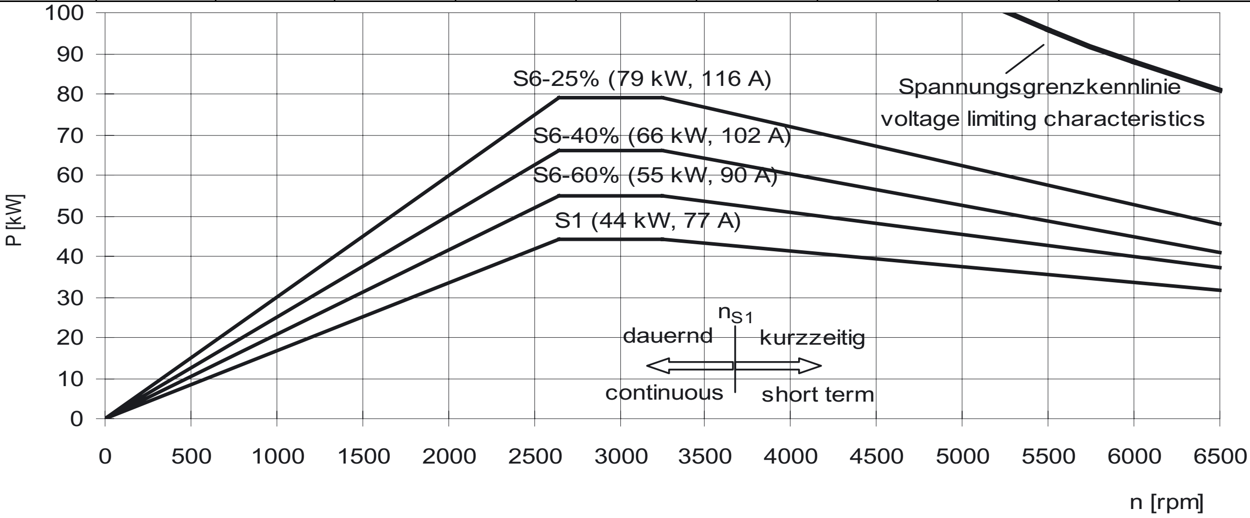


Table 7-196 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7167-□□G□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
2650	44,0	159	77	459	89,0	3250	6500	35	40,0	154



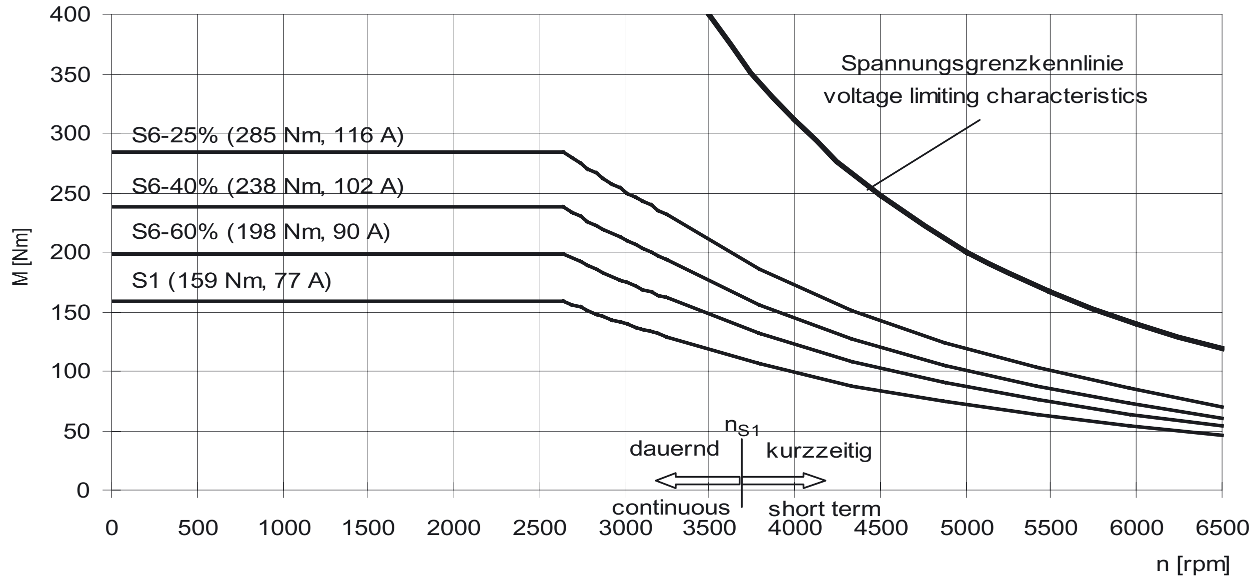
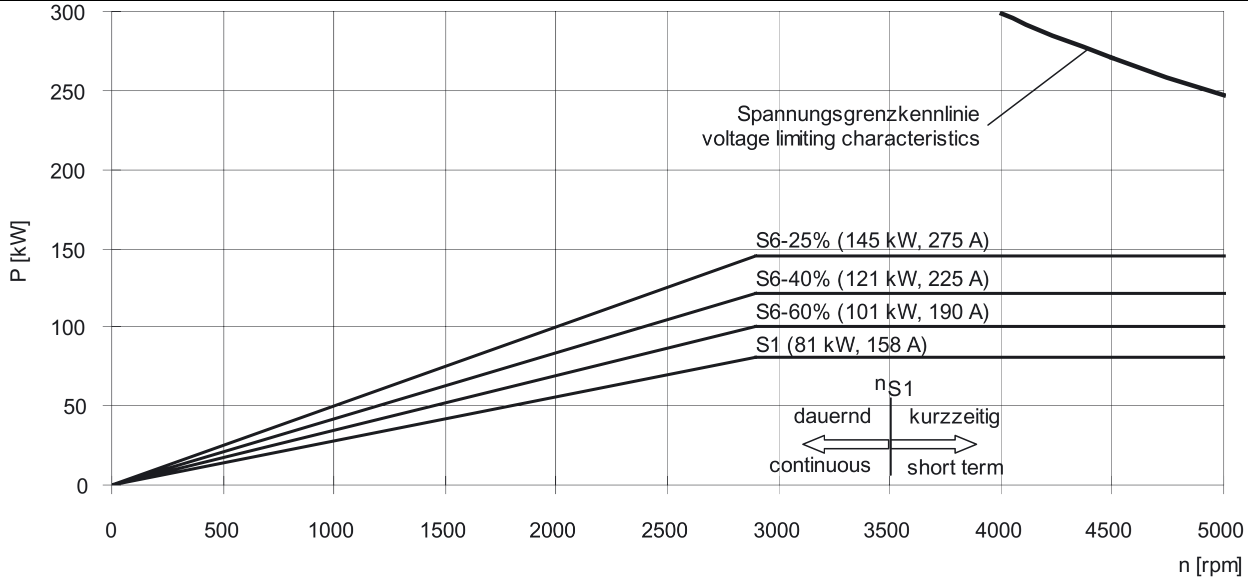


Table 7-197 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7184-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	Tth [min]	I_μ [A]	I_{max} [A]
2900	81	267	158	395	97,4	5000	5000	40	77	284



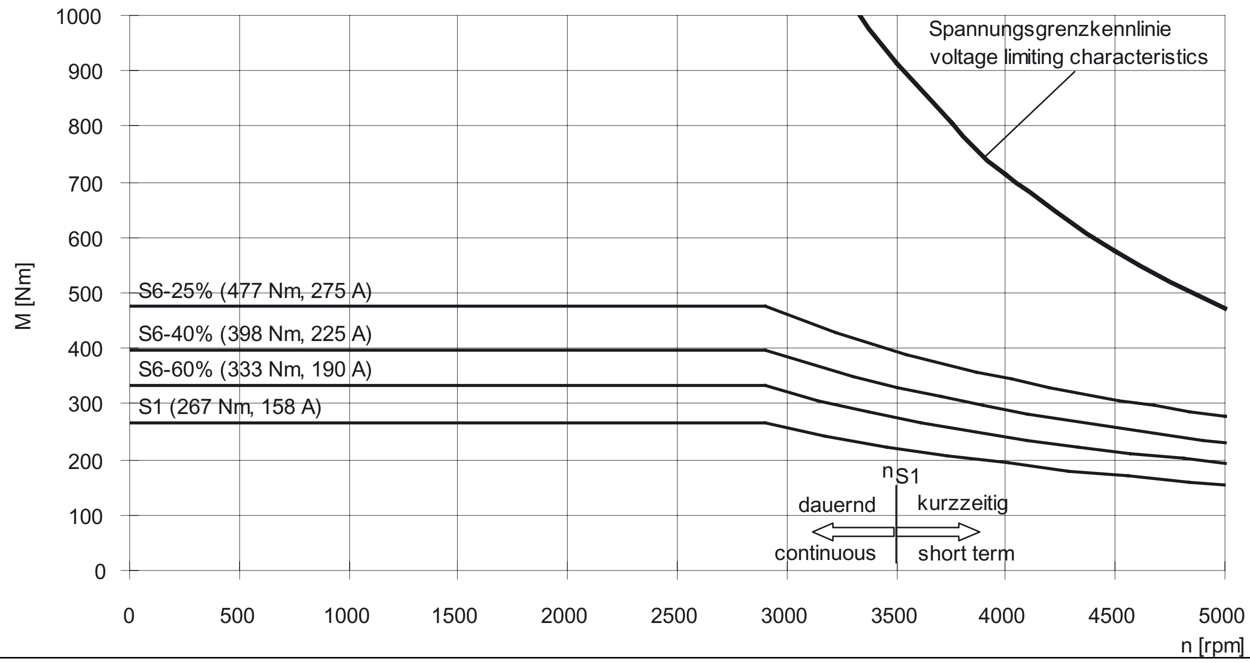
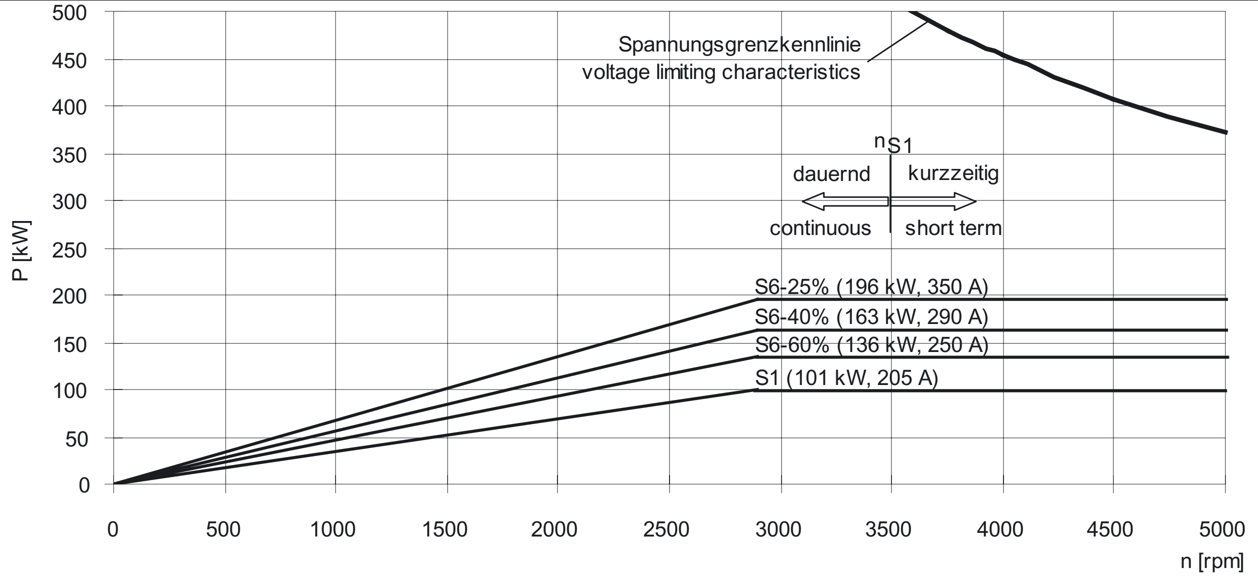


Table 7-198 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7186-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	Tth [min]	I_μ [A]	I_{max} [A]
2900	101	333	206	385	97,3	5000	5000	40	107	360



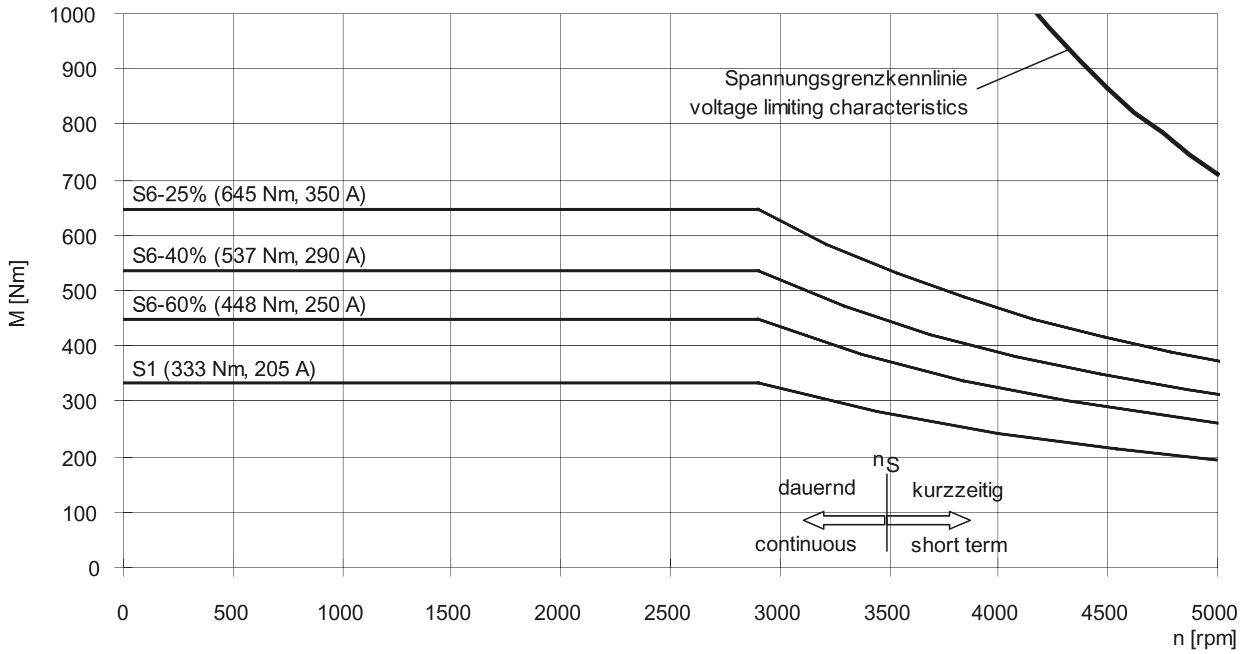
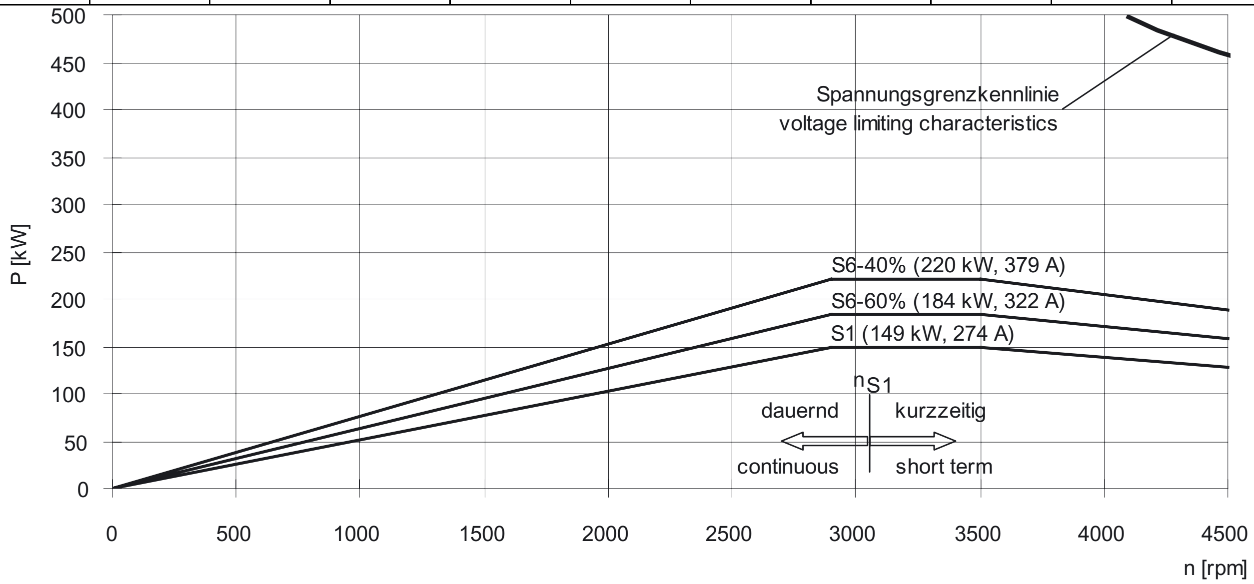


Table 7-199 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7224-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	Tth [min]	I_μ [A]	I_{max} [A]
2900	149	490	274	395	97,3	3500	4500	40	115	510



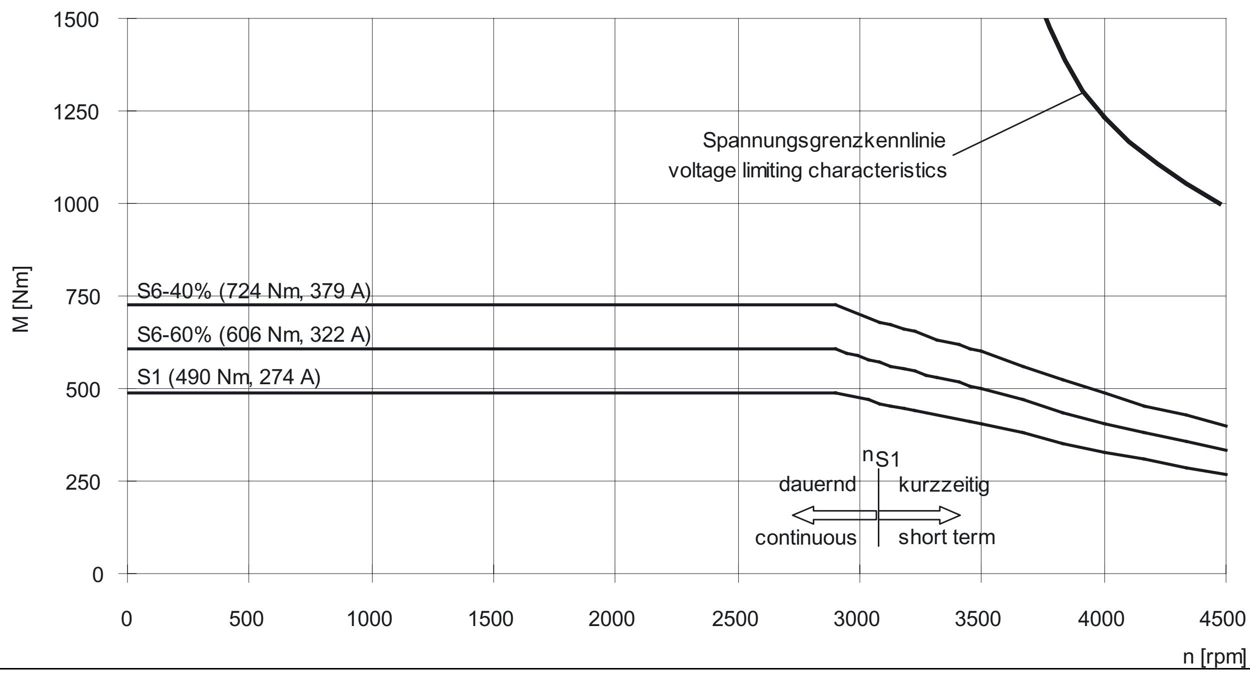
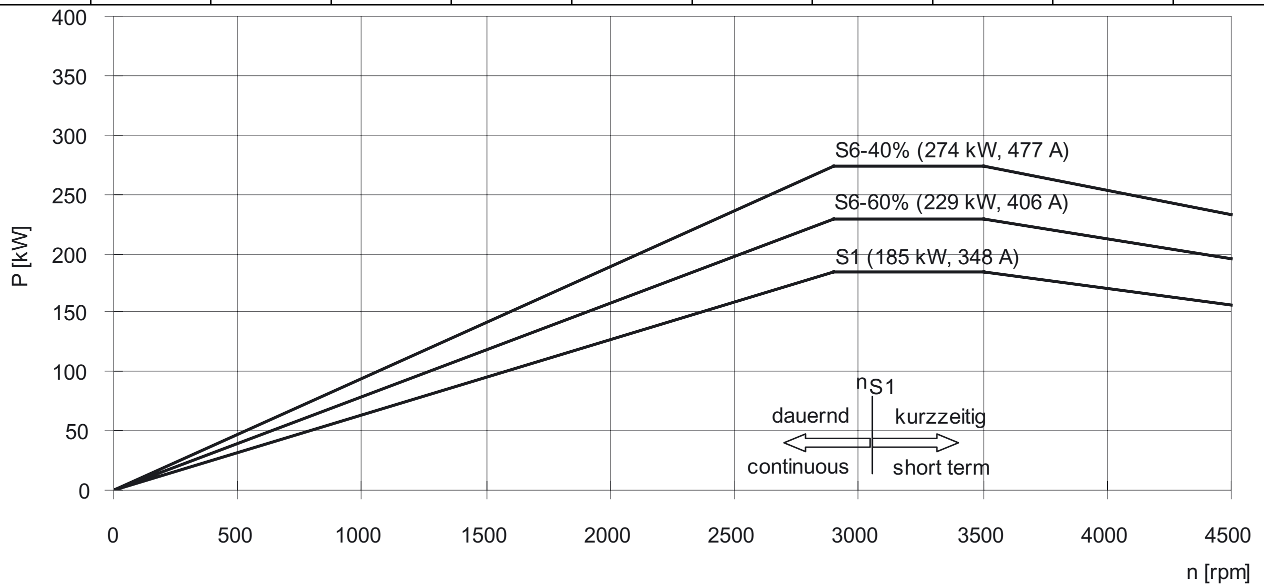


Table 7-200 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7226-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	Tth [min]	I_μ [A]	I_{max} [A]
2900	185	610	348	390	97,2	3500	4500	40	154	636



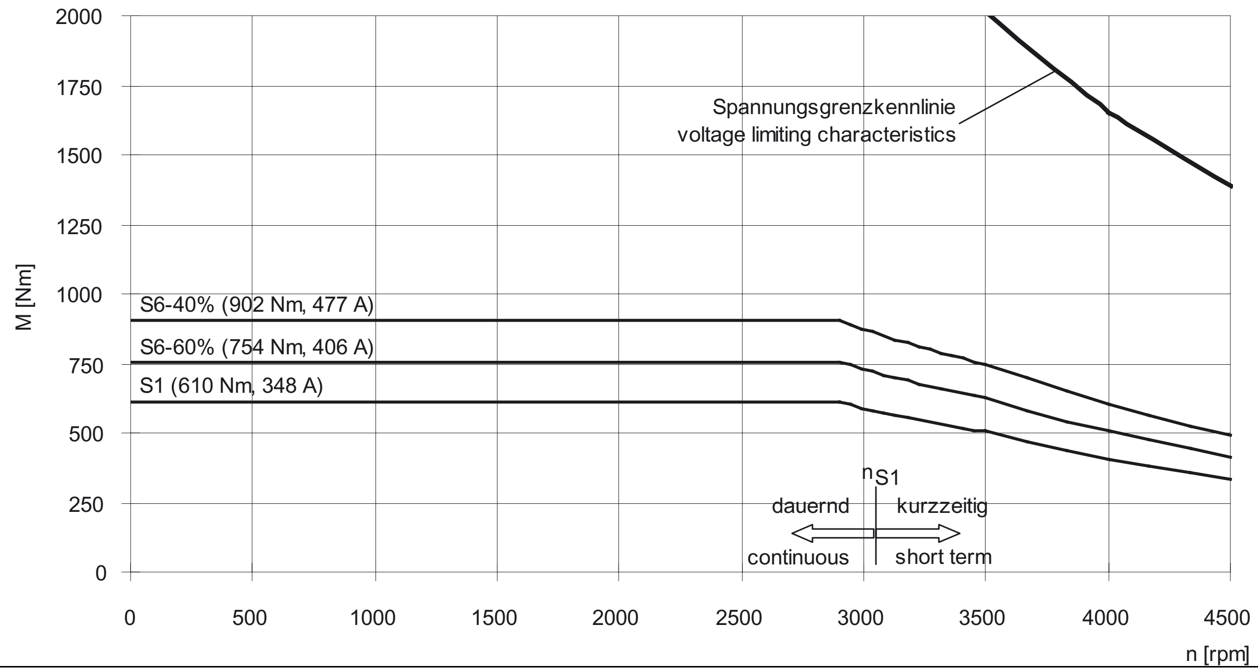
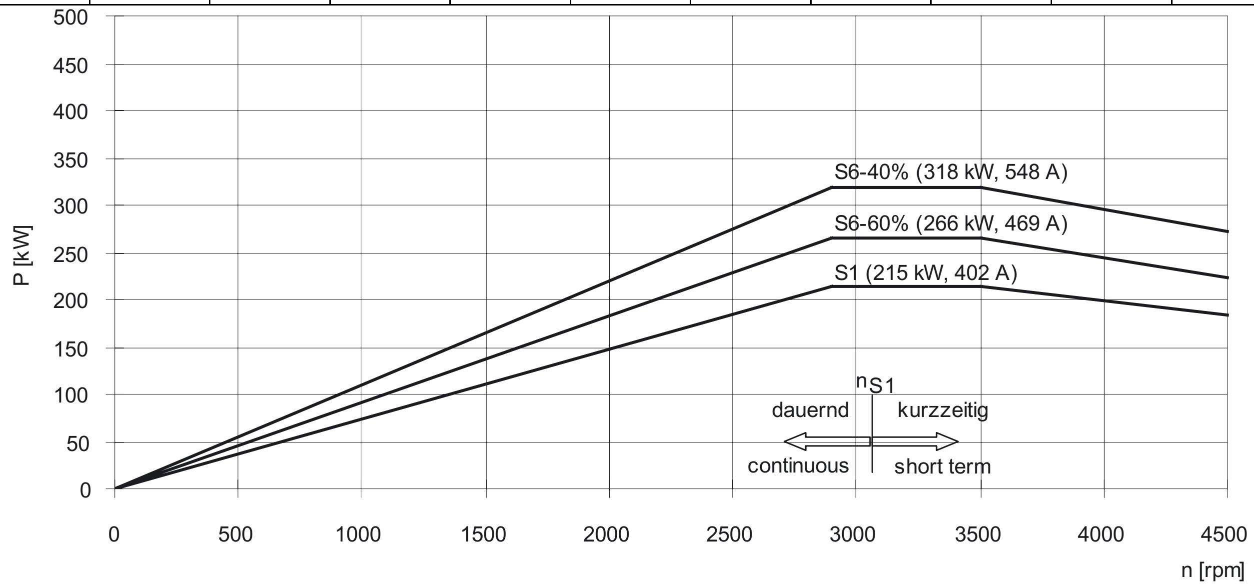
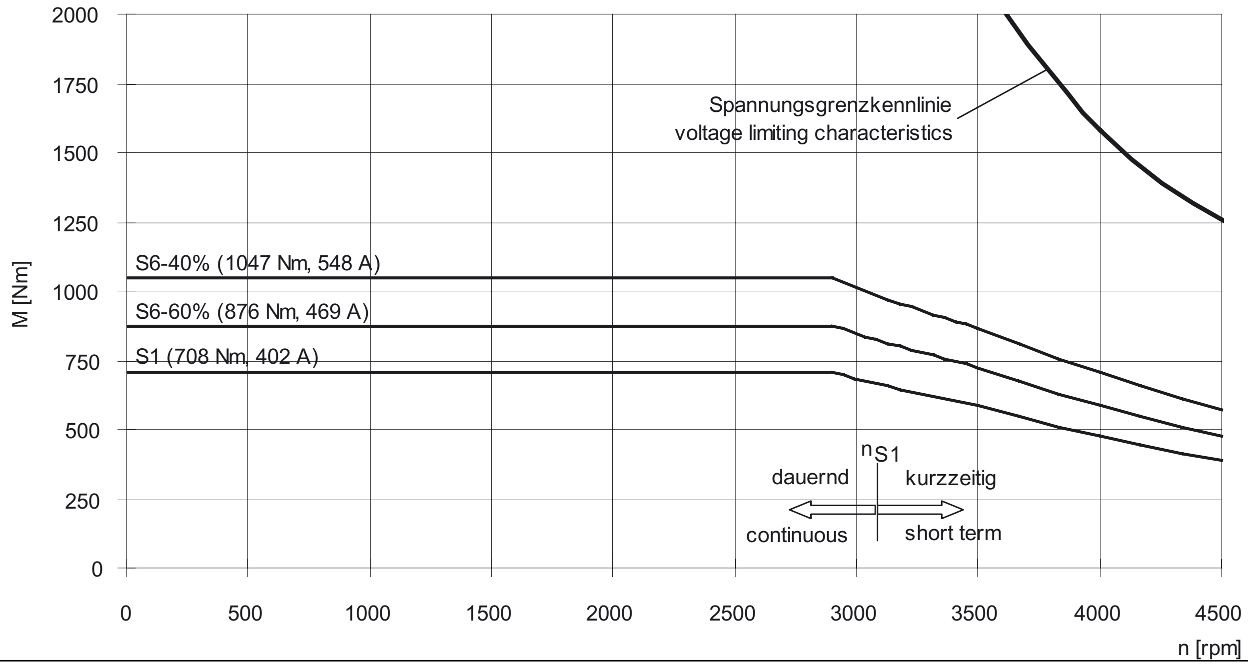


Table 7-201 SINAMICS, 3-ph. 480 V AC, Servo/Vector Control, 1PH7228-□□L□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	Tth [min]	I_μ [A]	I_{max} [A]
2900	215	708	402	395	97,2	3500	4500 [1)]	40	188	728



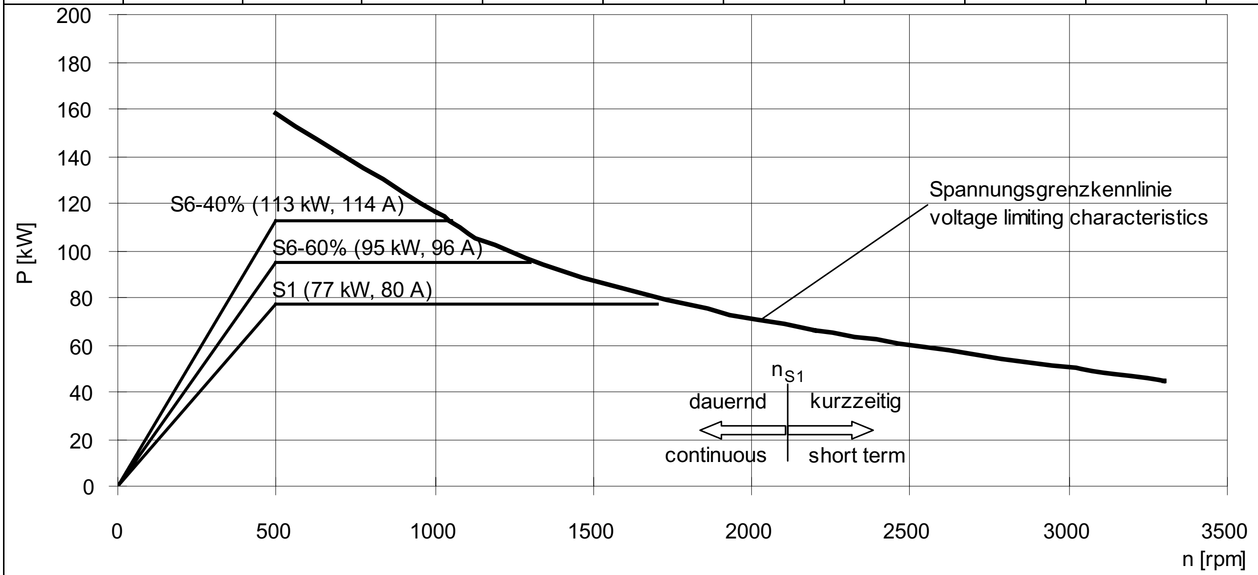


1) 4000 rpm for increased cantilever forces

7.4 SINAMICS 3-ph. 690 V AC, Servo/Vector Control (SC/VC)

Table 7-202 SINAMICS, 3-ph. 690 V AC, Servo/Vector Control, 1PH7284-□□B

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
500	77	1471	80	690	17,0	1700	3300	75	34	163



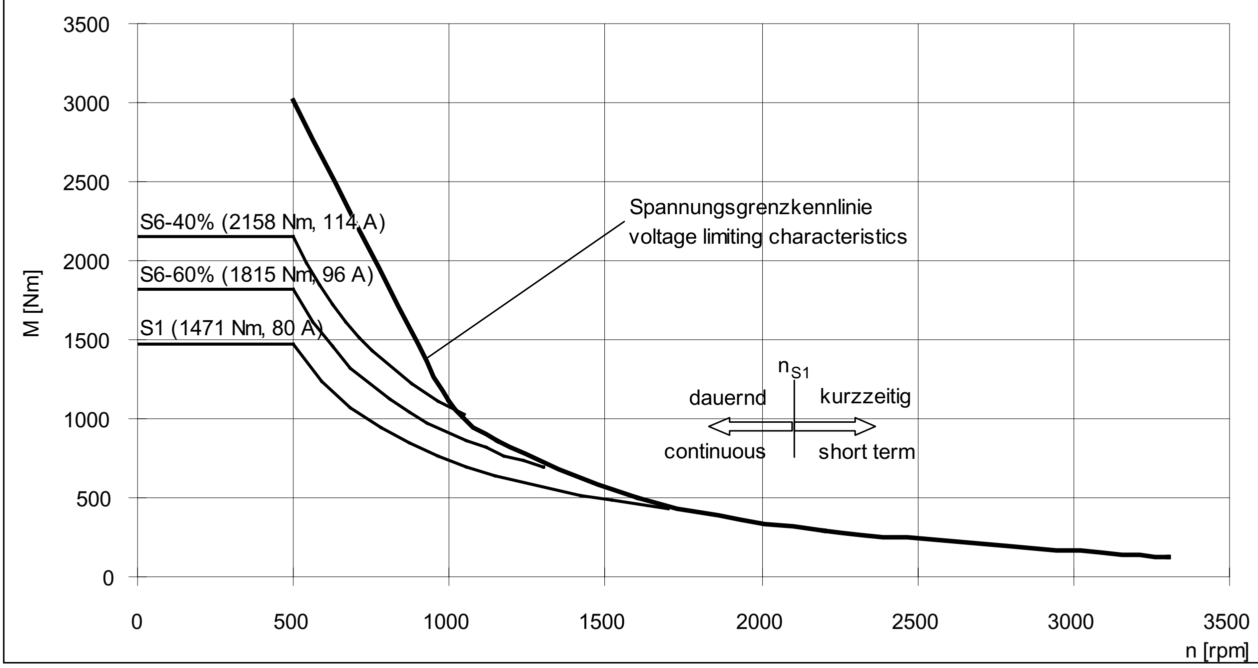
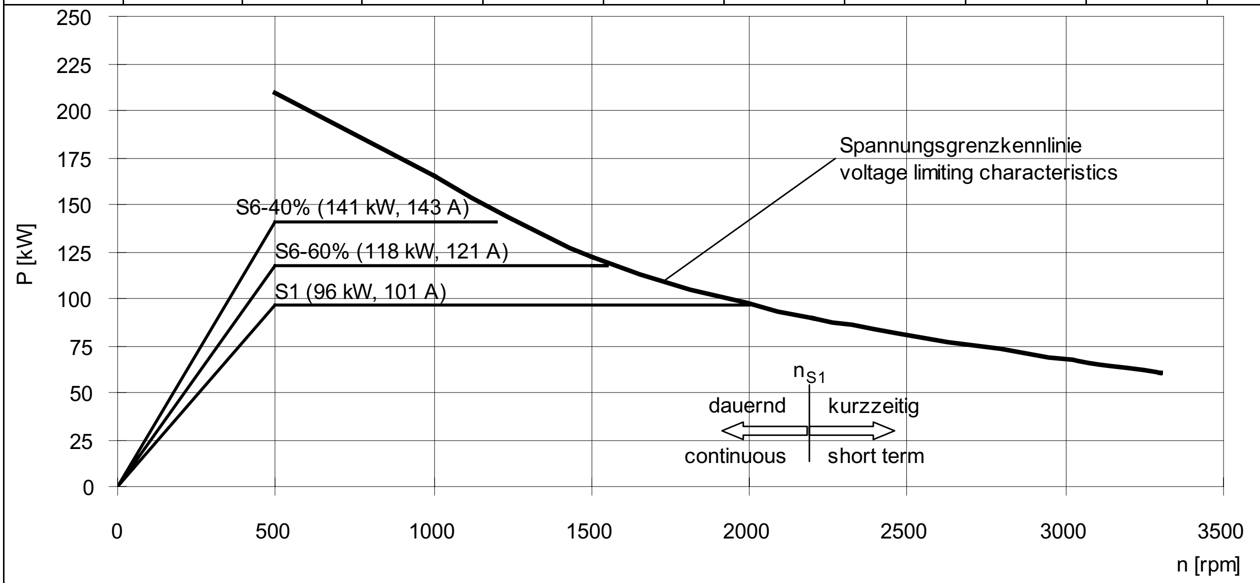


Table 7-203 SINAMICS, 3-ph. 690 V AC, Servo/Vector Control, 1PH7286-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
500	96	1834	101	690	17,0	1800	3300	83	45	200



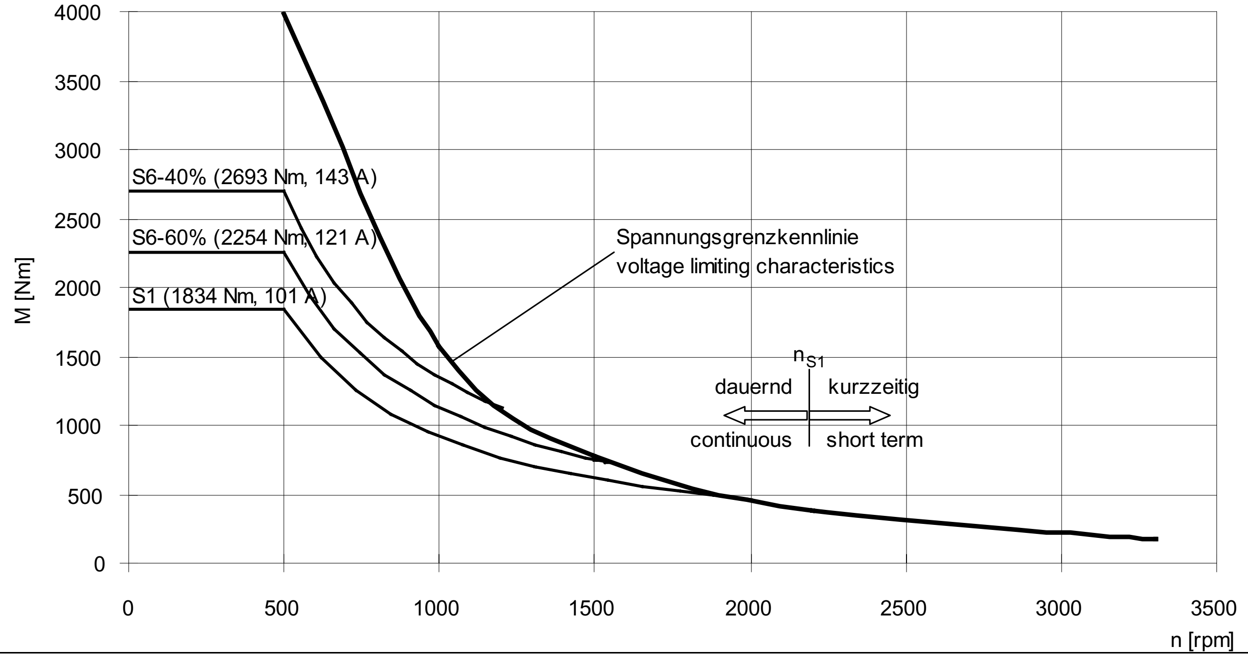
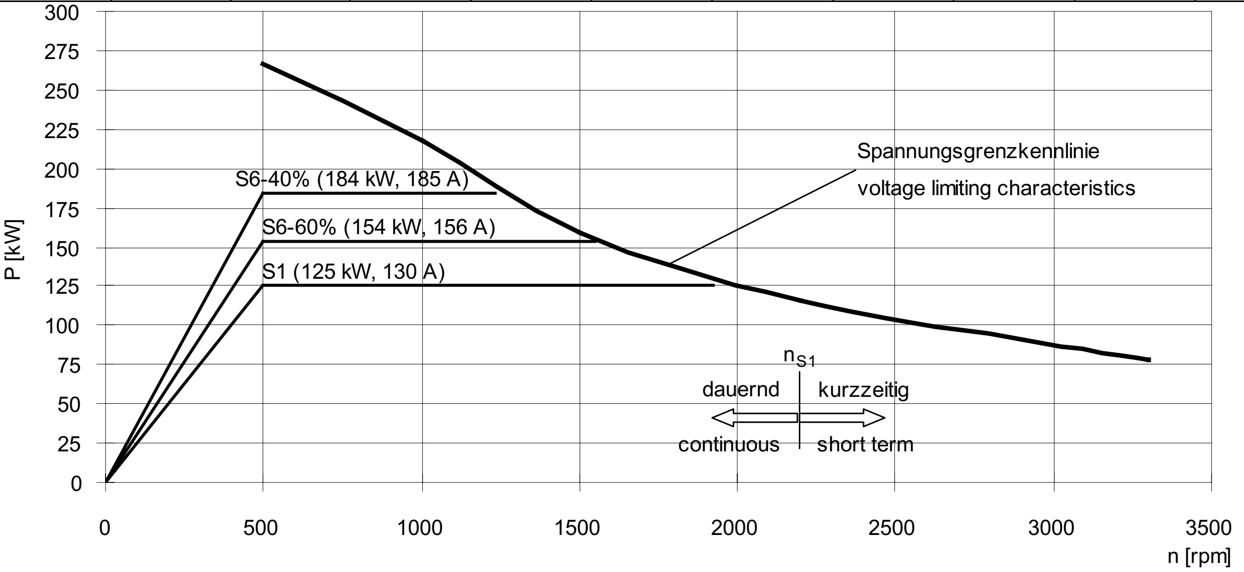


Table 7-204 SINAMICS, 3-ph. 690 V AC, Servo/Vector Control, 1PH7288-□□B□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
500	125	2388	130	690	17,0	1900	3300	90	57	260



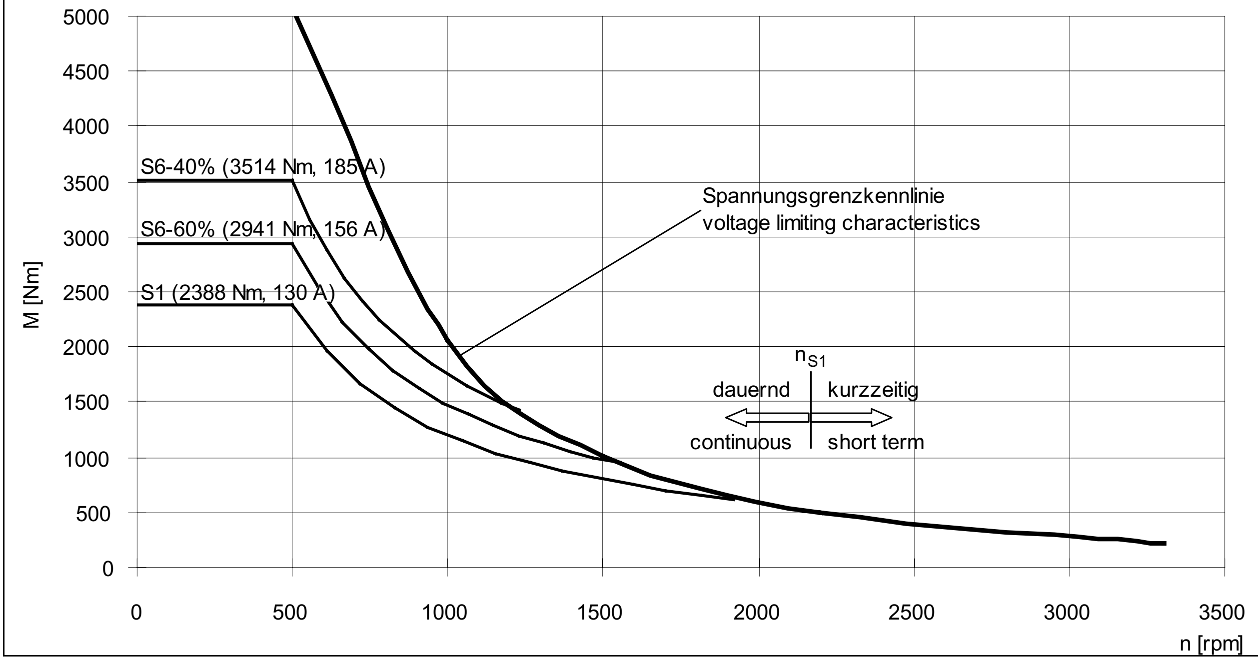
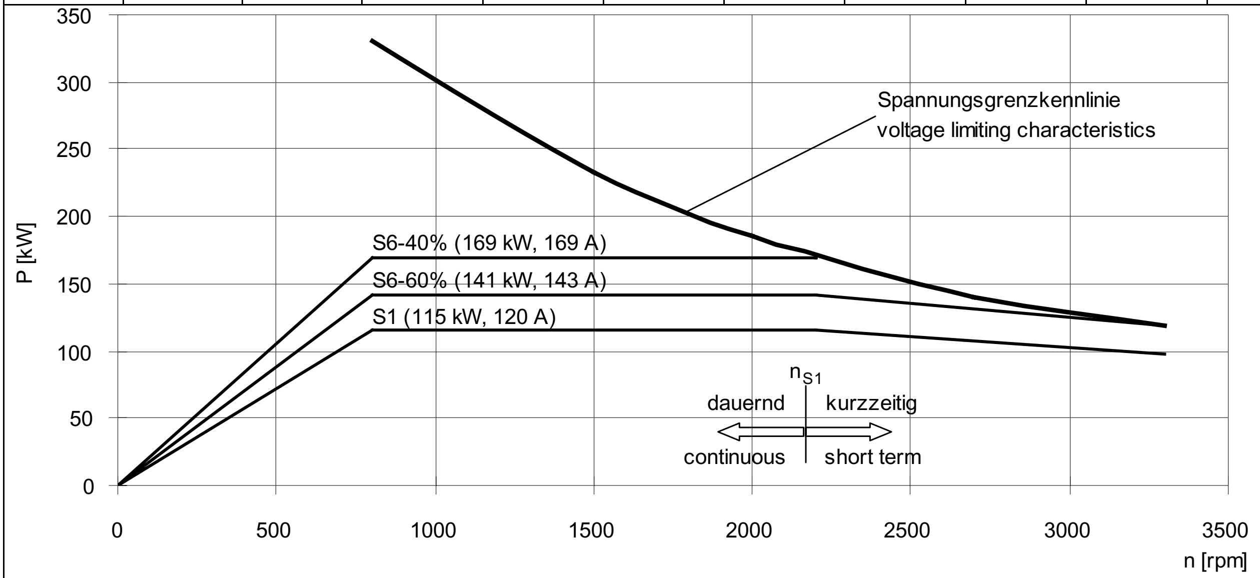


Table 7-205 SINAMICS, 3-ph. 690 V AC, Servo/Vector Control, 1PH7284-□□C□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
800	115	1373	120	690	27,0	2200	3300	75	55	232



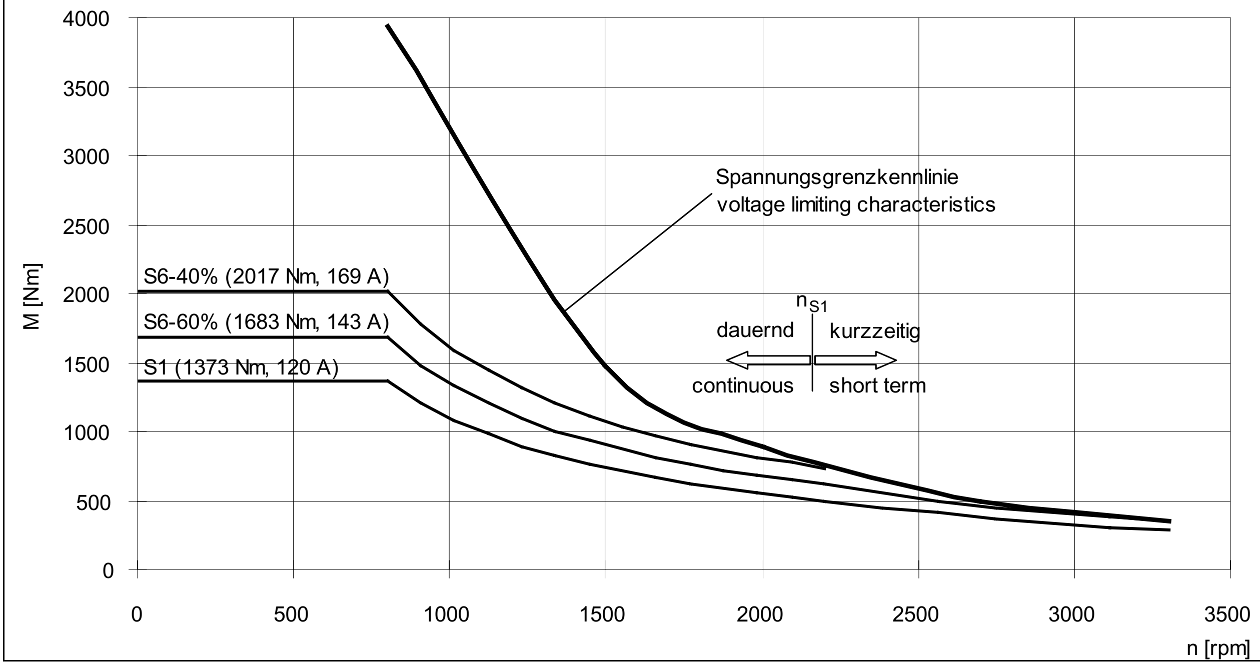
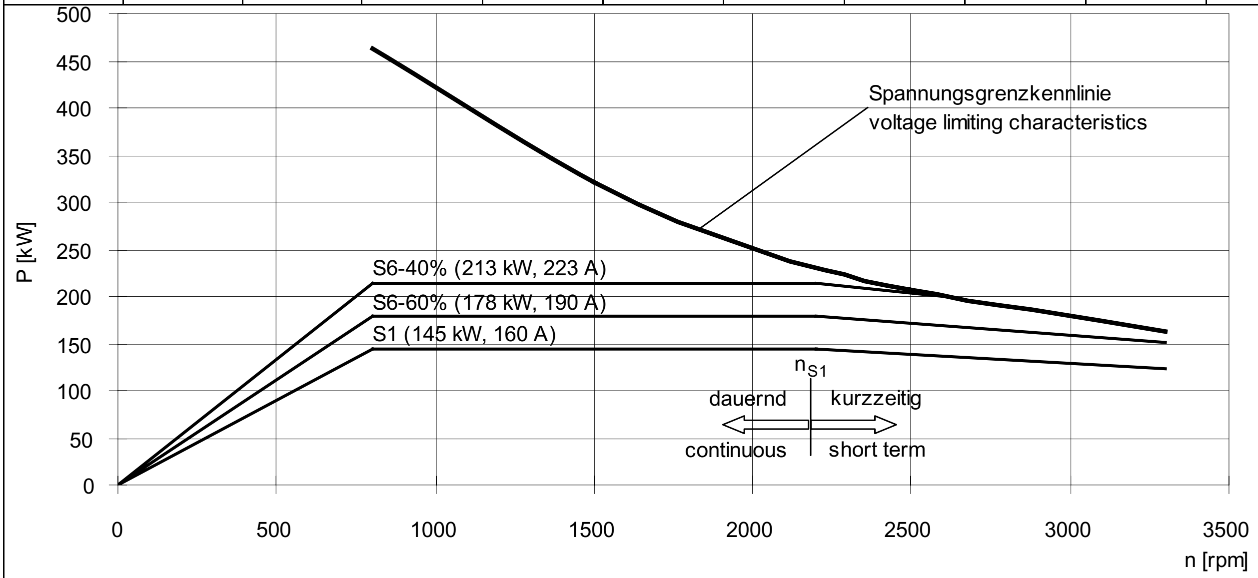


Table 7-206 SINAMICS, 3-ph. 690 V AC, Servo/Vector Control, 1PH7286-□□C□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
800	145	1731	160	665	27,0	2200	3300	83	80	300



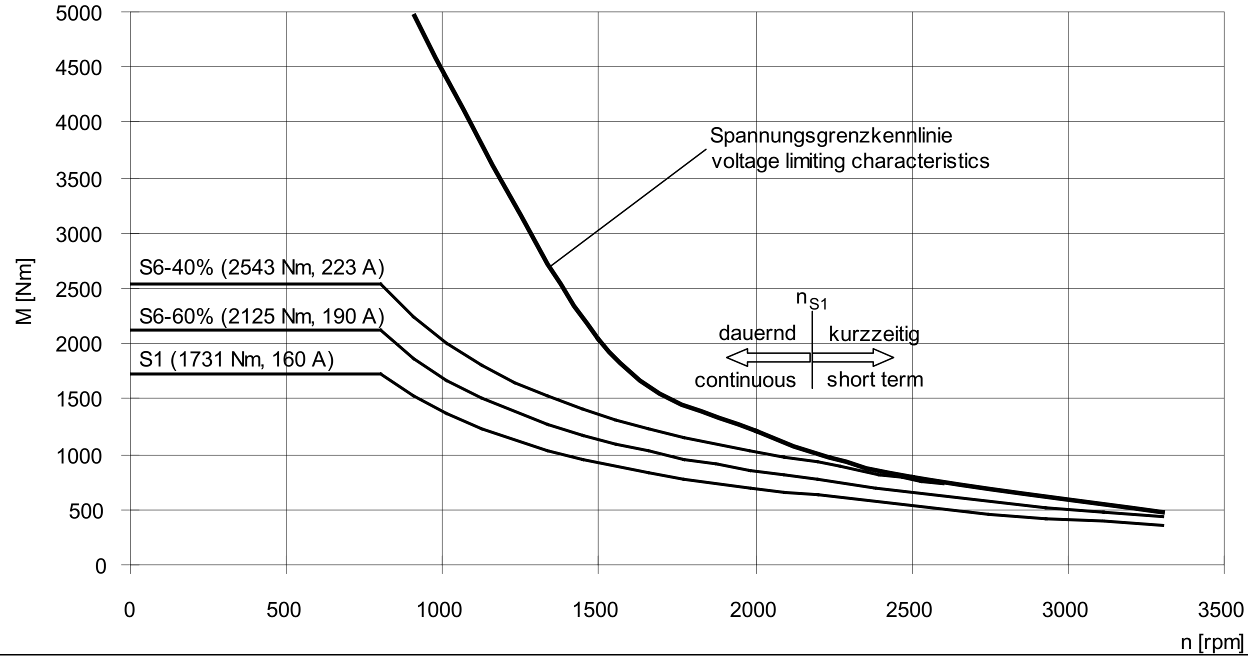
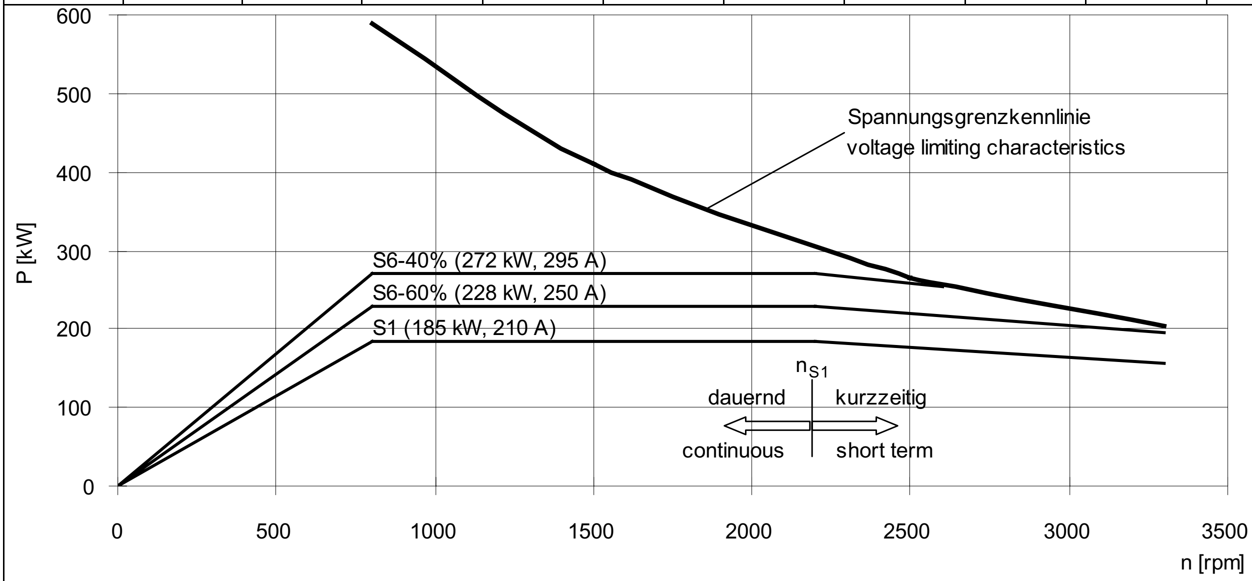


Table 7-207 SINAMICS, 3-ph. 690 V AC, Servo/Vector Control, 1PH7288-□□C□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
800	185	2208	210	640	27,0	2200	3300	90	100	396



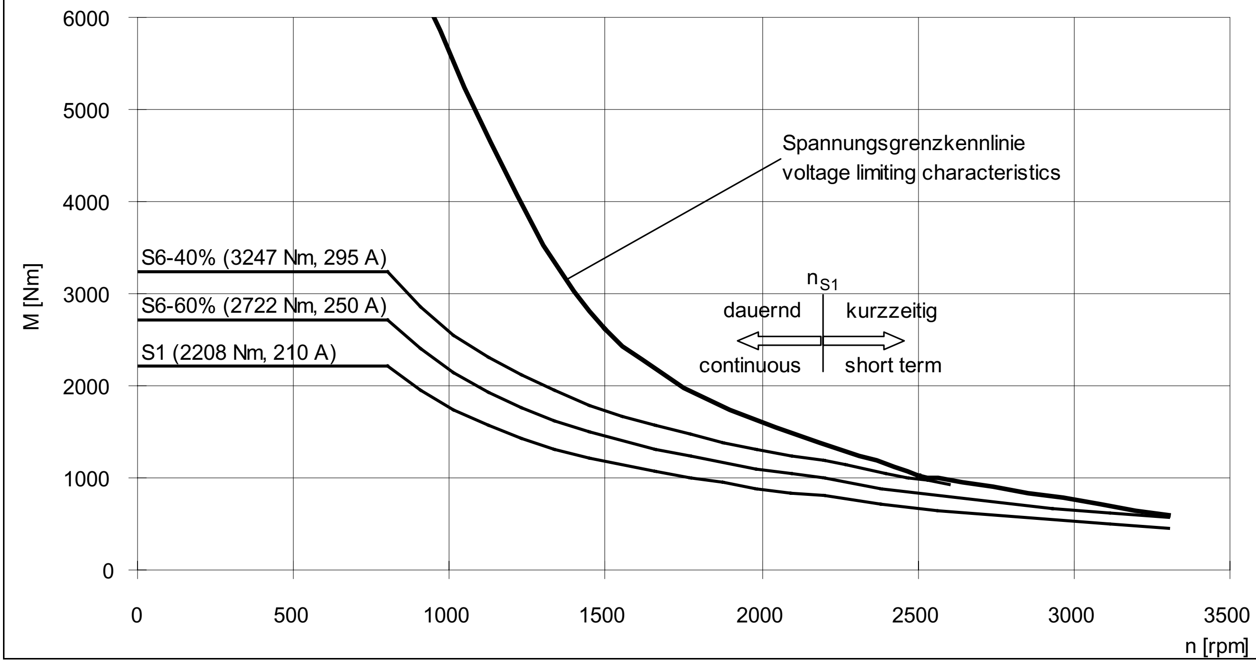
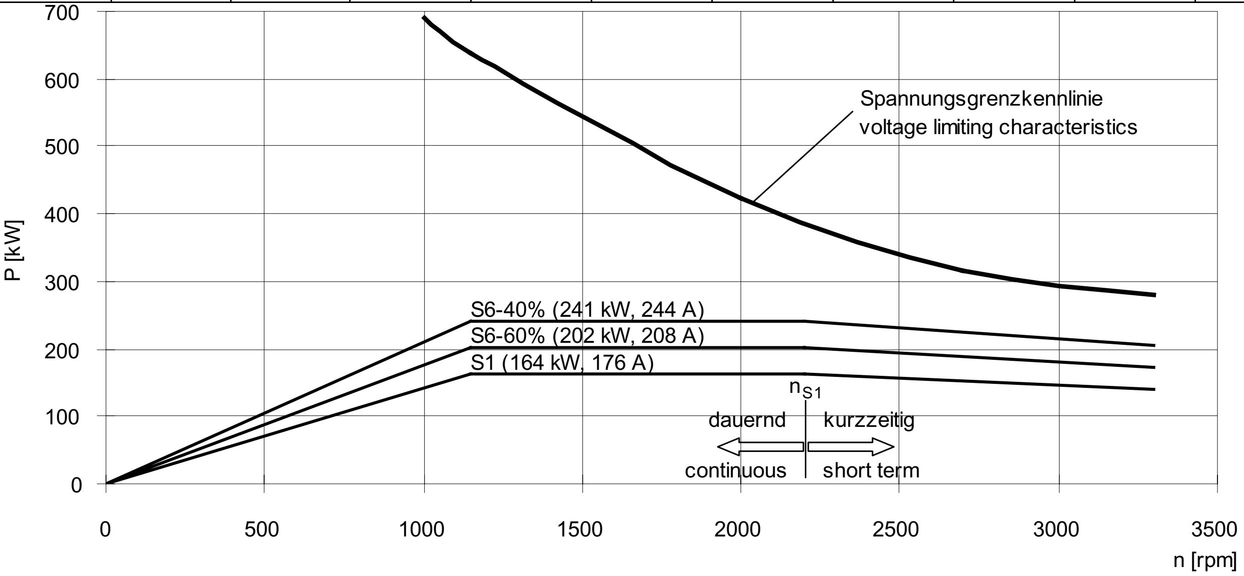


Table 7-208 SINAMICS, 3-ph. 690 V AC, Servo/Vector Control, 1PH7284-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1150	164	1362	176	690	38,6	2200	3300	75	91	324



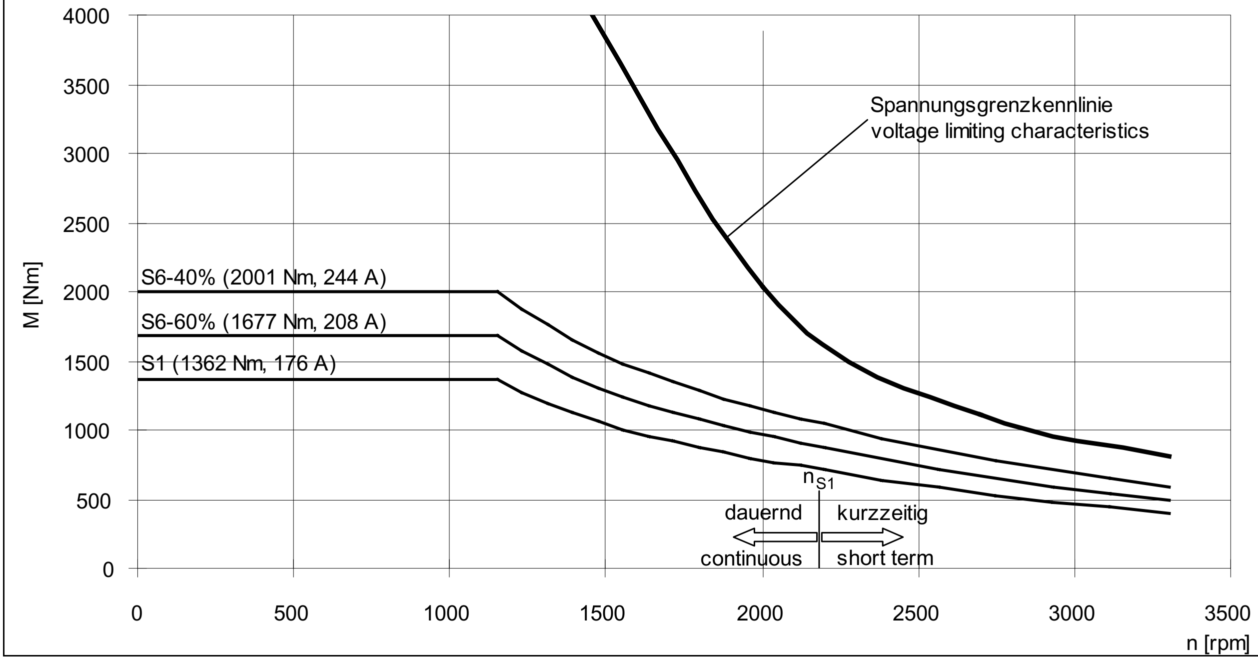
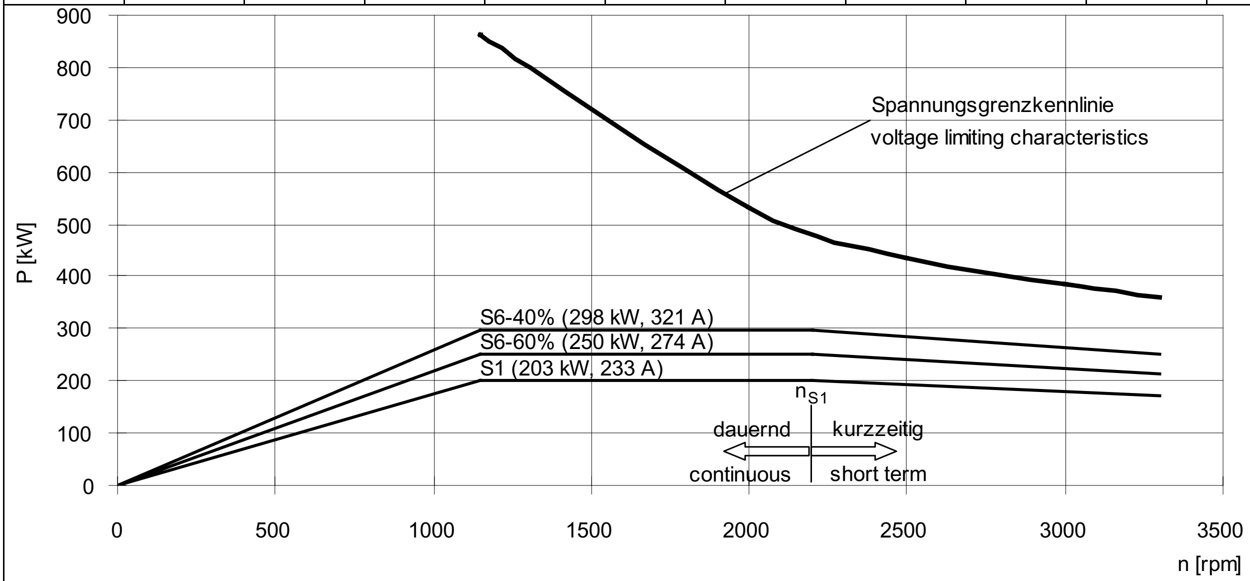


Table 7-209 SINAMICS, 3-ph. 690 V AC, Servo/Vector Control, 1PH7286-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1150	203	1686	233	655	38,6	2200	3300	83	125	422



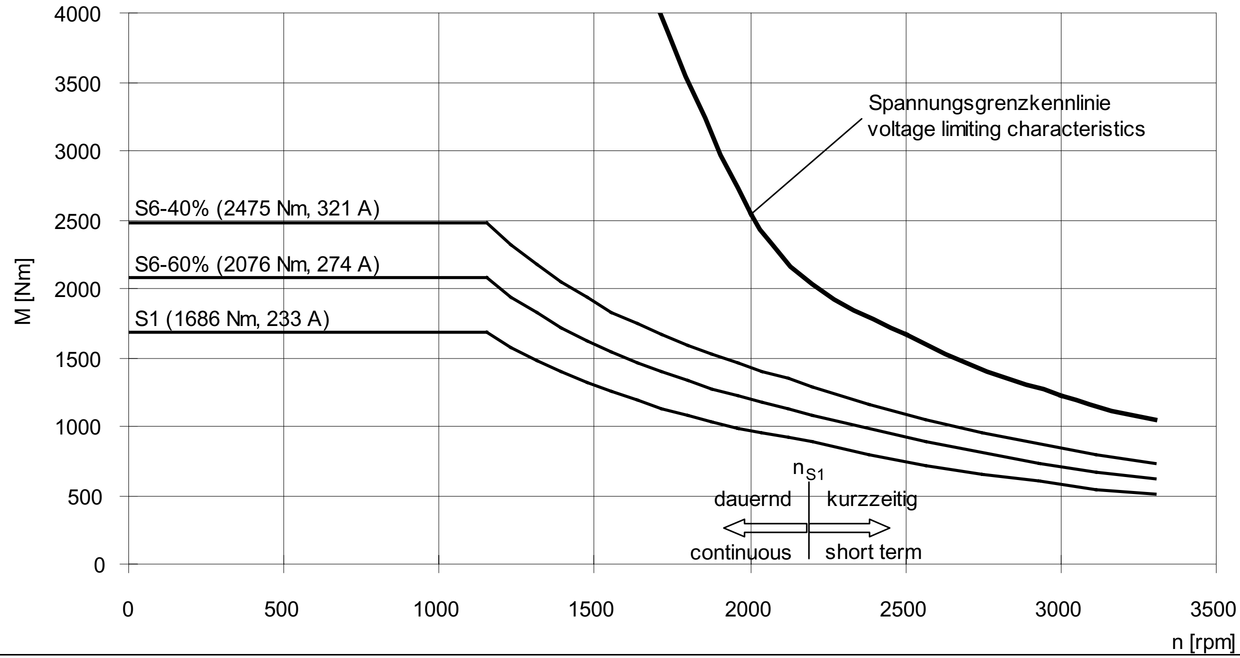
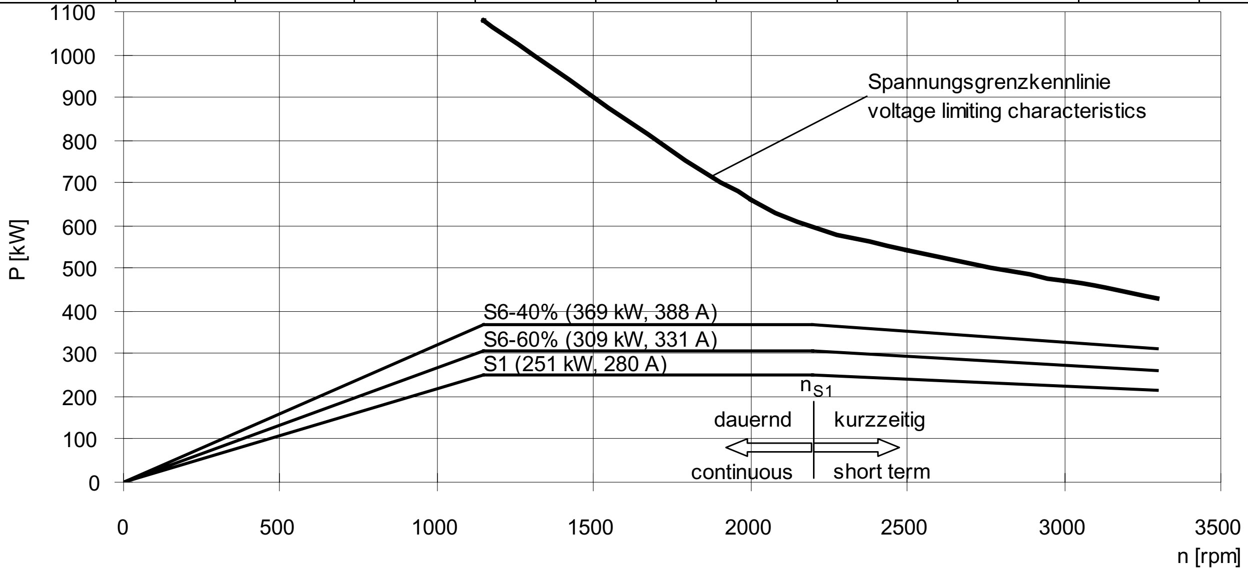


Table 7-210 SINAMICS, 3-ph. 690 V AC, Servo/Vector Control, 1PH7288-□□D□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1150	251	2084	280	655	38,6	2200	3300	90	145	510



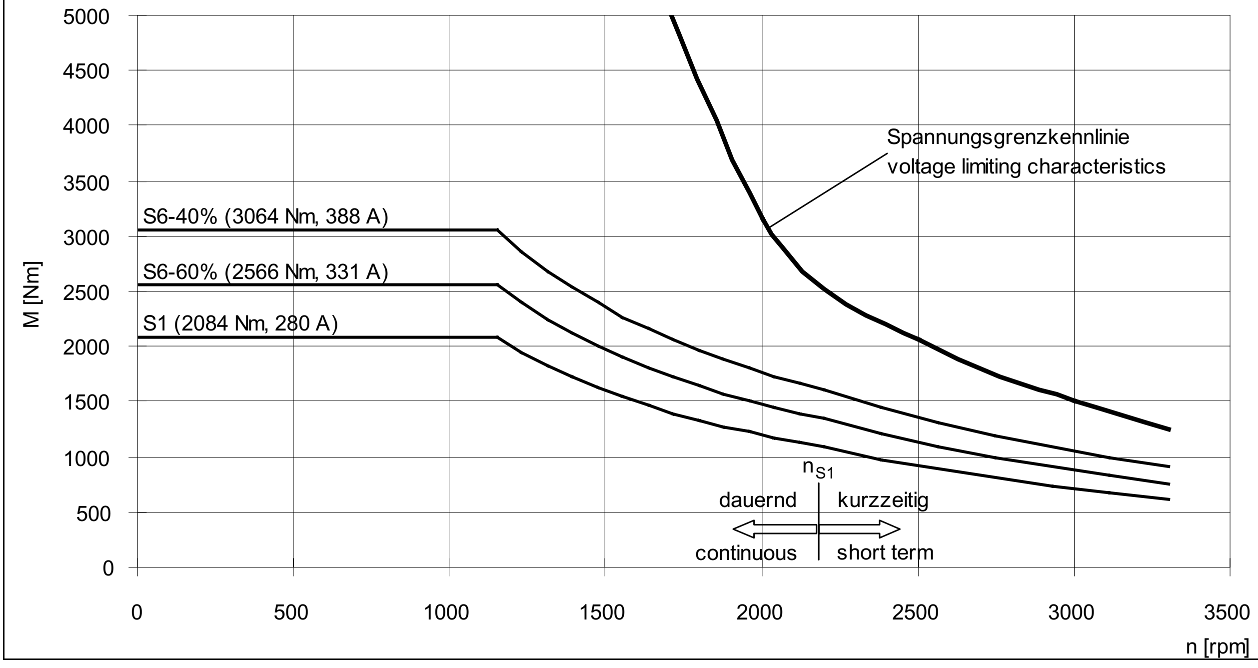
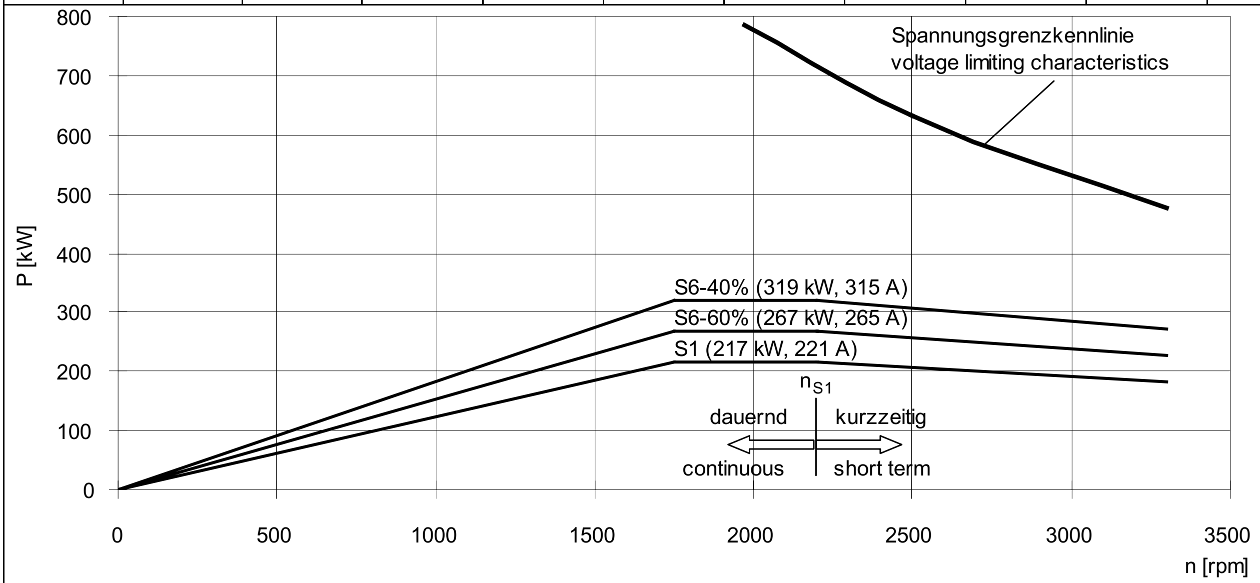


Table 7-211 SINAMICS, 3-ph. 690 V AC, Servo/Vector Control, 1PH7284-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	$I_μ$ [A]	I_{max} [A]
1750	217	1184	221	690	58,7	2200	3300	75	94	425



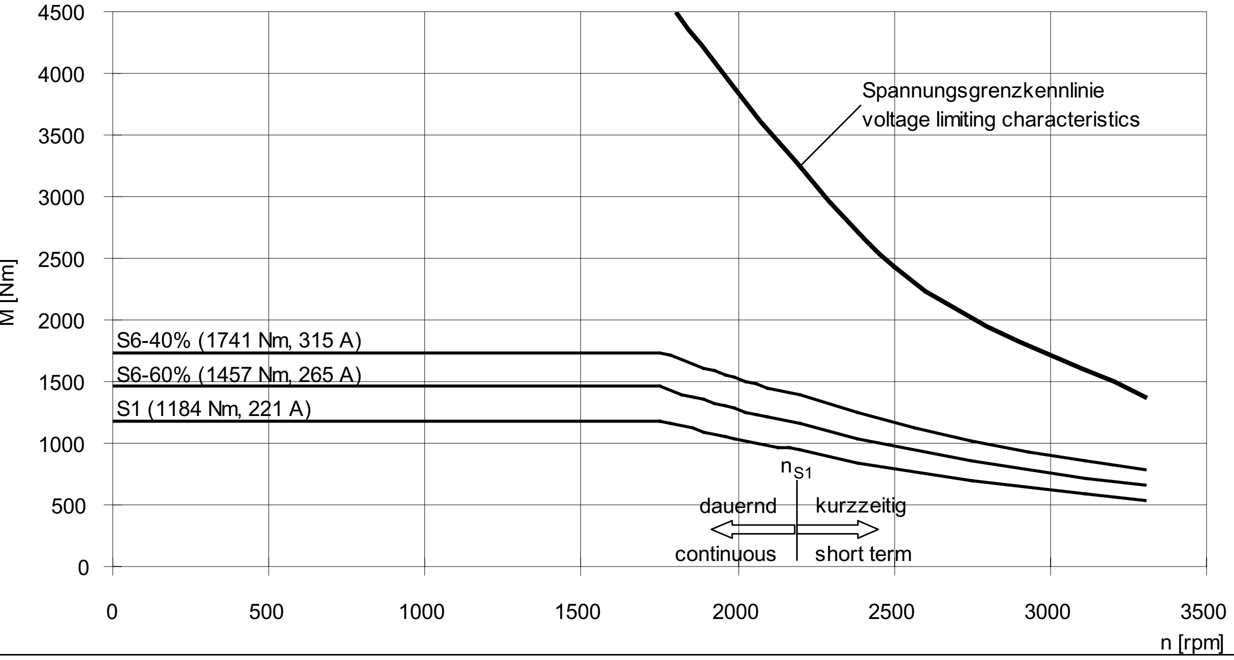
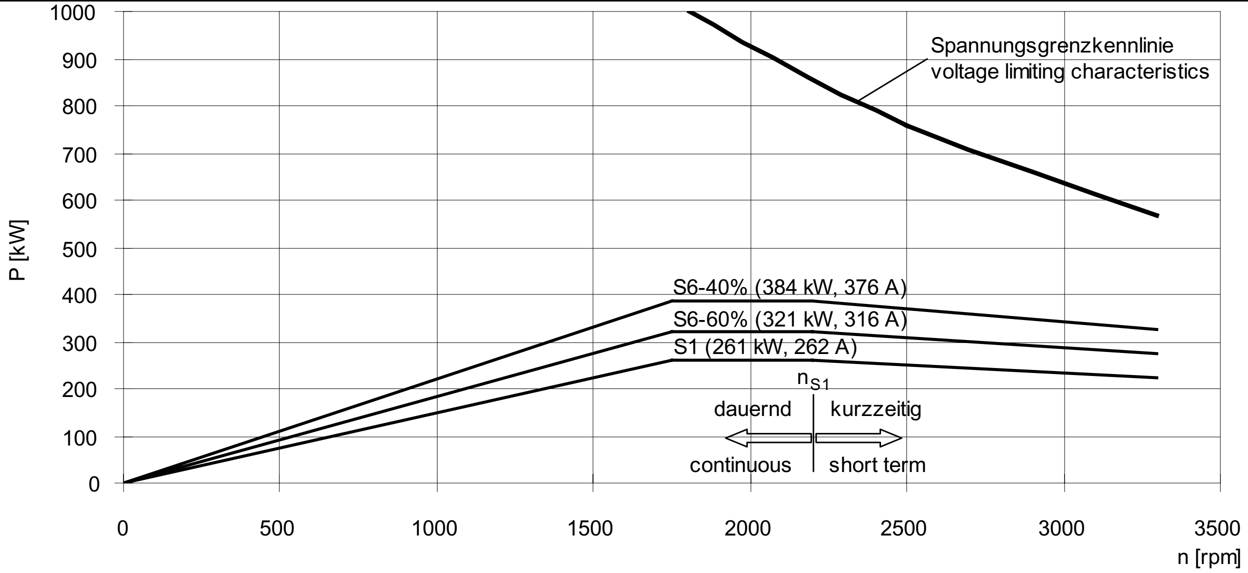


Table 7-212 SINAMICS, 3-ph. 690 V AC, Servo/Vector Control, 1PH7286-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1750	261	1424	262	690	58,7	2200	3300	83	105	406



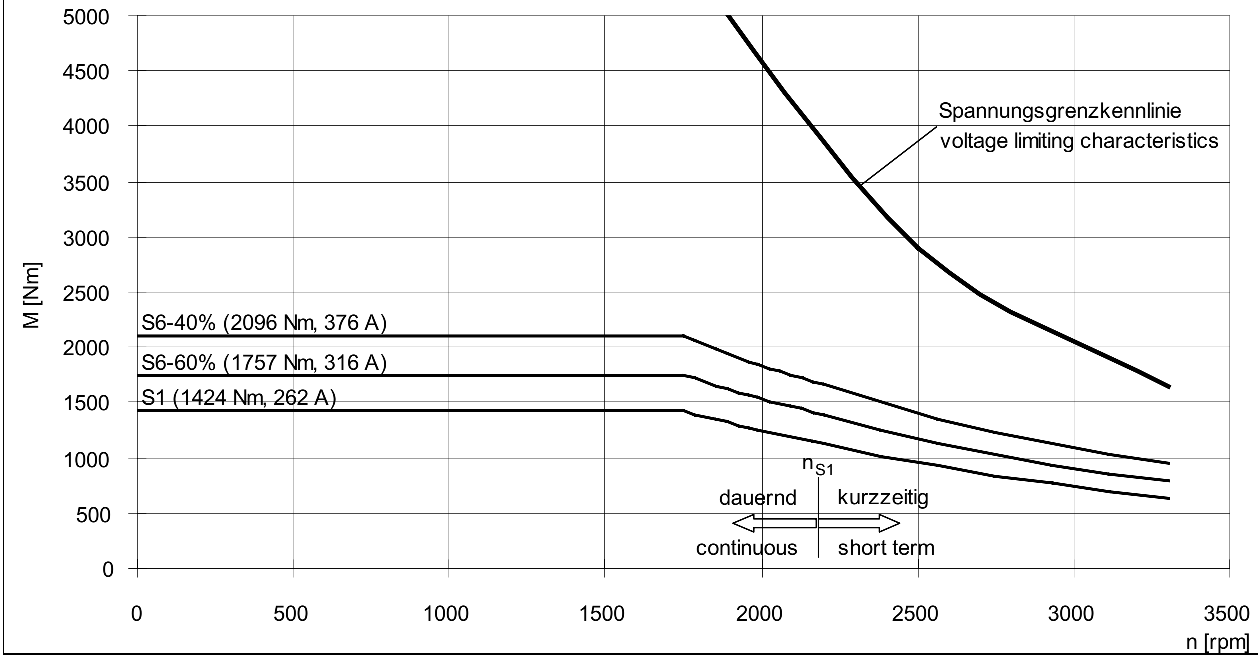
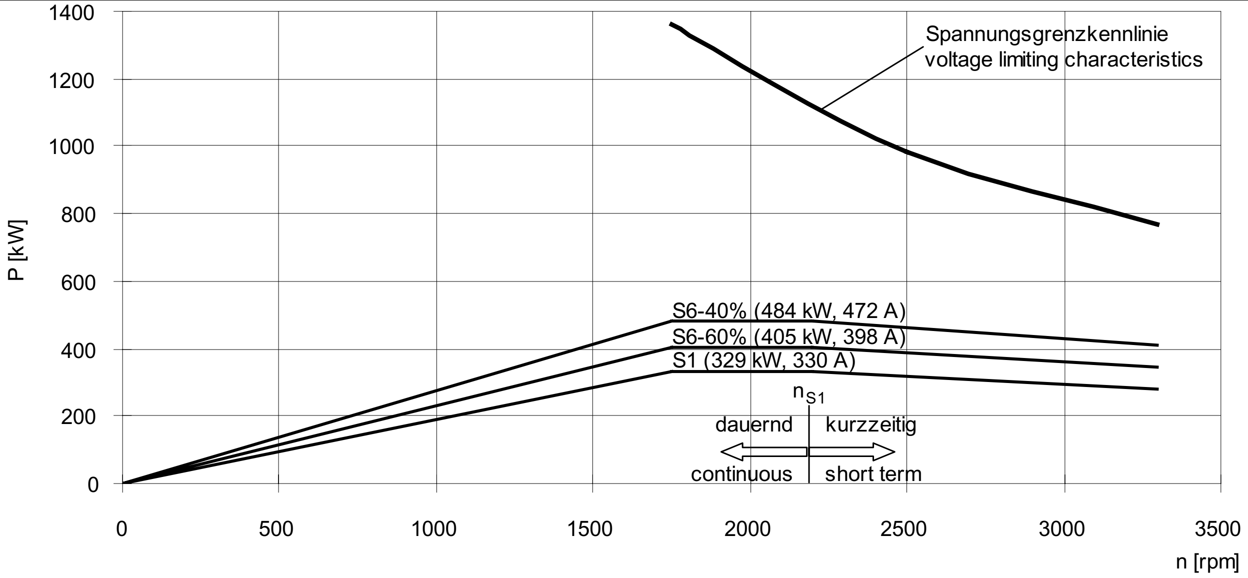
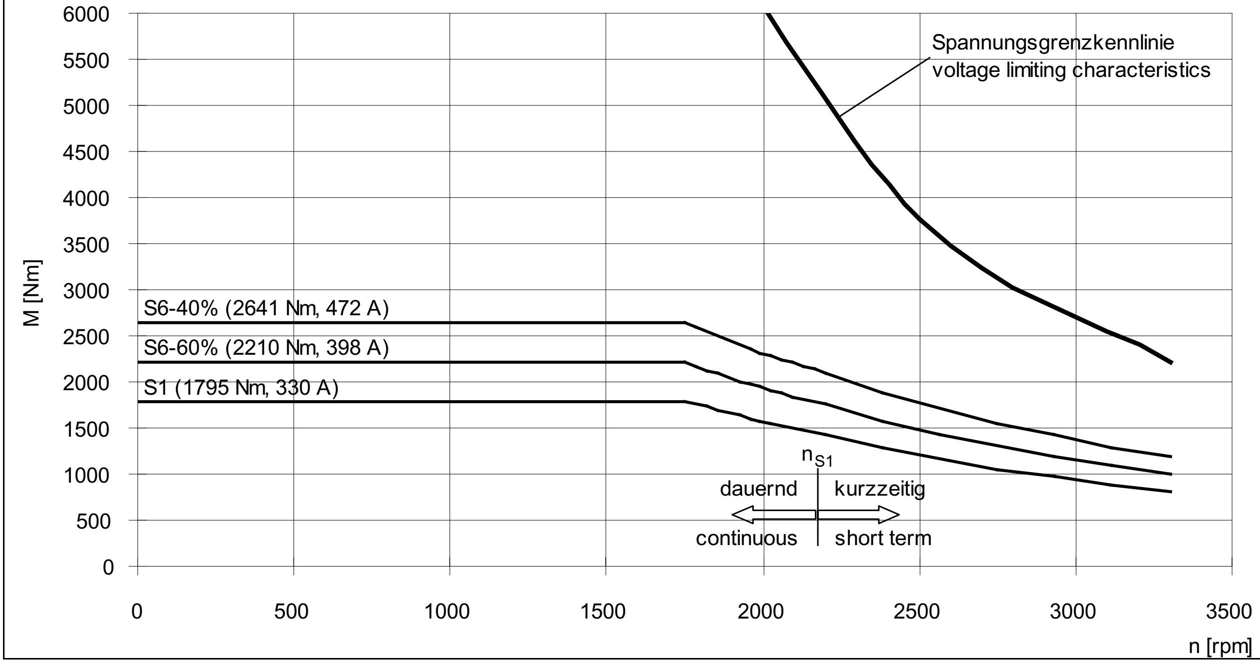


Table 7-213 SINAMICS, 3-ph. 690 V AC, Servo/Vector Control, 1PH7288-□□F□□

n_N [rpm]	P_N [kW]	M_N [Nm]	I_N [A]	V_N [V]	f_N [Hz]	n_2 [rpm]	n_{max} [rpm]	T_{th} [min]	I_μ [A]	I_{max} [A]
1750	329	1795	330	690	58,7	2200	3300	90	134	630





7.5 Cantilever and axial force diagrams

7.5.1 Cantilever force

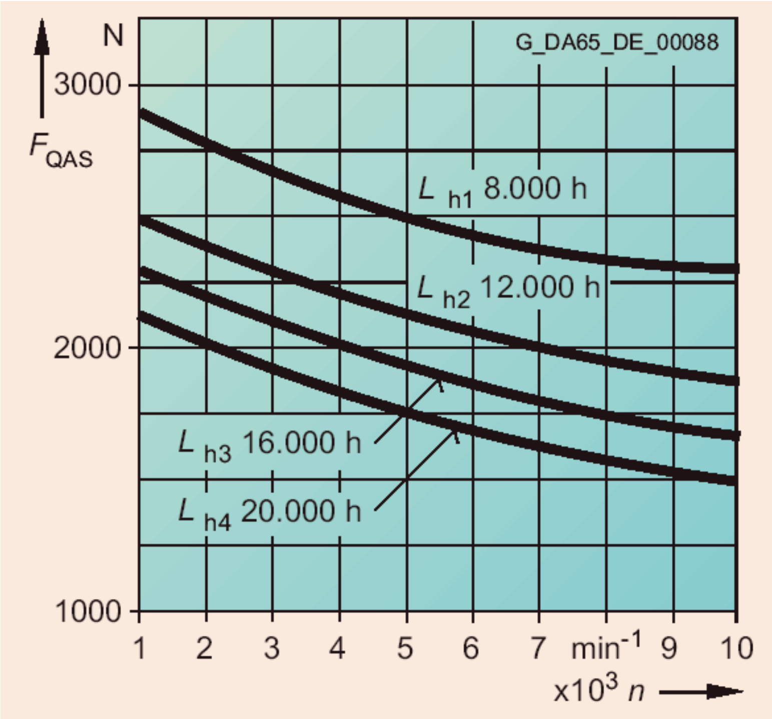
⚠ CAUTION
When using mechanical transmission elements, which subject the shaft end to a cantilever force, it should be ensured that the **maximum limit values, specified in the cantilever force diagrams, are not exceeded**.

Note

From SH 180
For applications with an extremely low cantilever force load, it should be ensured that the motor shaft is subject to a **minimum cantilever force load as specified in the diagrams**. Lower cantilever forces can cause the cylindrical bearings to roll in an undefined fashion. This results in increased bearing wear and higher noise. For these applications, bearing designs for a coupling output should be selected.

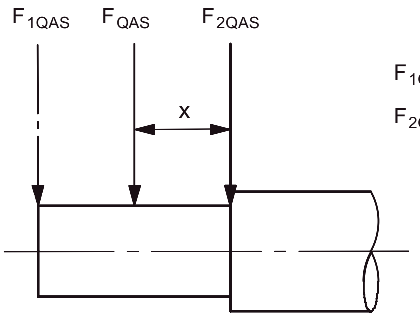
The maximum permissible and the minimum required cantilever forces are shown in the following diagrams.

SH 100, permissible cantilever forces for a standard bearing design



Bearings, DE: 6308 C4

Bearings, NDE: 6208 C4



$F_{1QAS} = 0.9\ F_{QAS}$

$F_{2QAS} = 1.1\ F_{QAS}$

x = 40 mm

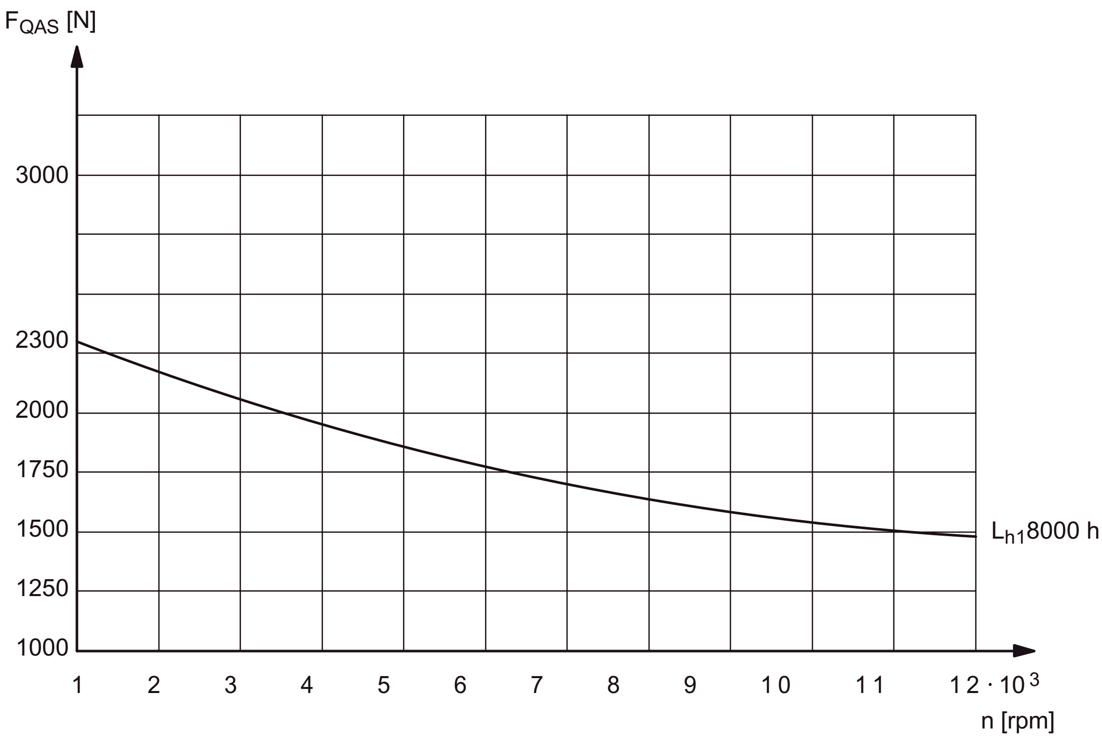
Estimated bearing lifetime under different operating conditions (F_{QAS} ; n)

$$L_{htot} = \frac{100}{\frac{q_1}{L_{h1}} + \frac{q_2}{L_{h2}} + \frac{q_3}{L_{h3}} + \frac{q_4}{L_{h4}}}$$

q =Duration [%] with constant conditions

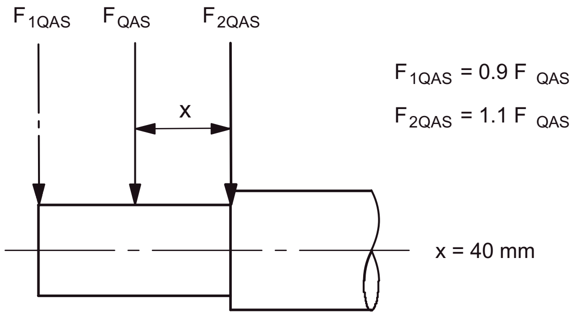
Figure 7-1 Cantilever force diagram, shaft height 100 for standard bearing designs

SH 100, permissible cantilever forces for increased max. speed



Bearings, DE: 6208 C4

Bearings, NDE: 6208 C4



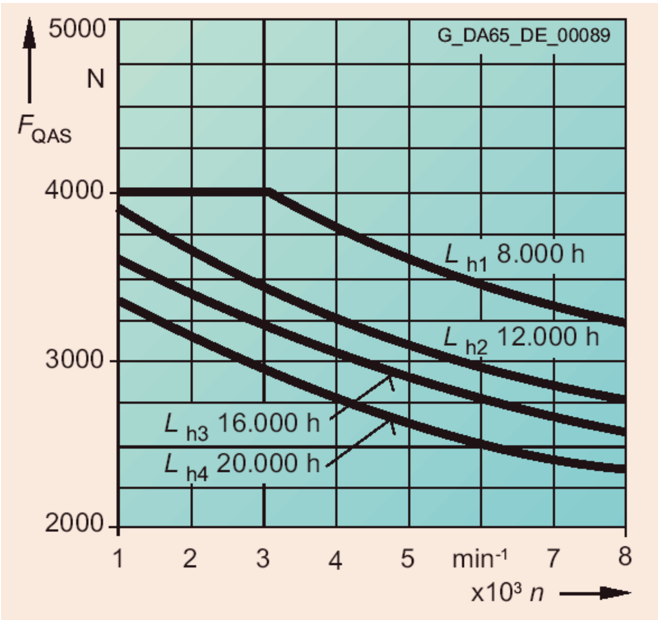
Estimated bearing lifetime under different operating conditions (F_{QAS} ; n)

$$L_{htot} = \frac{100}{\frac{q_1}{L_{h1}} + \frac{q_2}{L_{h2}} + \frac{q_3}{L_{h3}} + \frac{q_4}{L_{h4}}}$$

q =Duration [%] with constant conditions

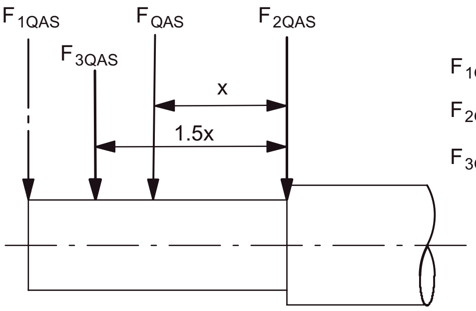
Figure 7-2 Cantilever force diagram, shaft height 100 for increased max. speed

SH 132, permissible cantilever forces for a standard bearing design



Bearings, DE: 6310 C4

Bearings, NDE: 6210 C4



F_{1QAS} = max. 2000 N

F_{2QAS} = 1.1 F_{QAS}

F_{3QAS} = max. 2500 N

x = 55 mm

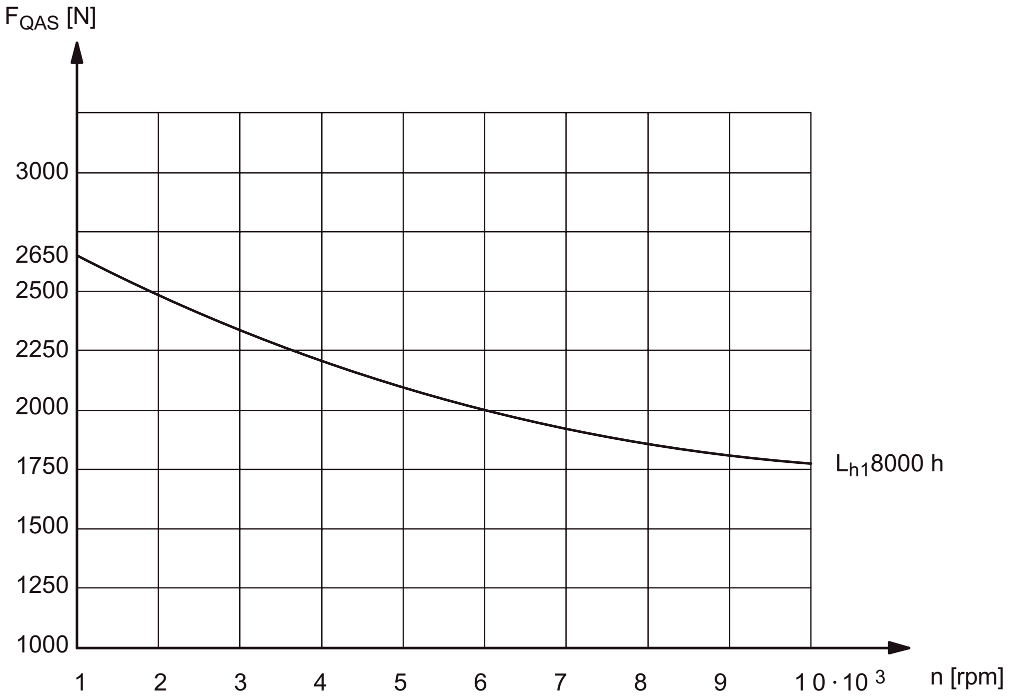
Estimated bearing lifetime under different operating conditions (F_{QAS} ; n)

$$L_{htot} = \frac{100}{\frac{q_1}{L_{h1}} + \frac{q_2}{L_{h2}} + \frac{q_3}{L_{h3}} + \frac{q_4}{L_{h3}}}$$

q =Duration [%] with
constant conditions

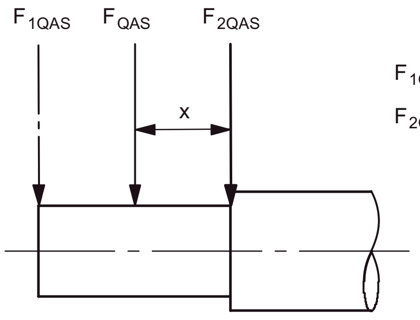
Figure 7-3 Cantilever force diagram, shaft height 132 for standard bearing designs

SH 132, permissible cantilever forces for increased max. speed



Bearings, DE: 6210 C4

Bearings, NDE: 6210 C4



$F_{1QAS} = 0.9\ F_{QAS}$

$F_{2QAS} = 1.1\ F_{QAS}$

x = 55 mm

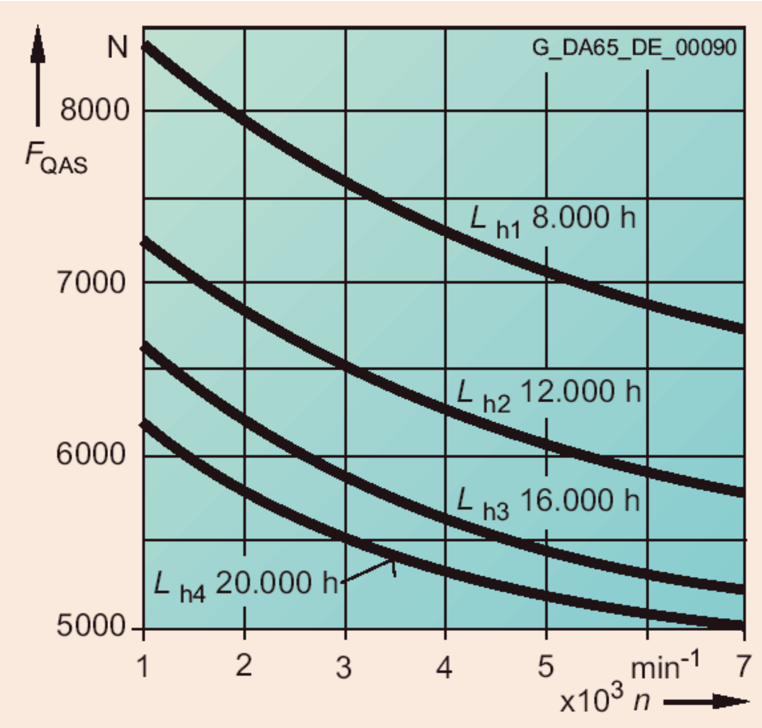
Estimated bearing lifetime under different operating conditions (F_{QAS} ; n)

$$L_{htot} = \frac{100}{\frac{q_1}{L_{h1}} + \frac{q_2}{L_{h2}} + \frac{q_3}{L_{h3}} + \frac{q_4}{L_{h4}}}$$

q =Duration [%] with constant conditions

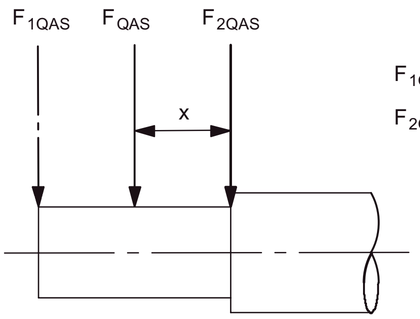
Figure 7-4 Cantilever force diagram, shaft height 132 for increased max. speed

SH 160, permissible cantilever forces for a standard bearing design



Bearings, DE: 6312 C4

Bearings, NDE: 6212 C4



$F_{1QAS} = 0,9\ F_{QAS}$

$F_{2QAS} = 1.1\ F_{QAS}$

x = 55 mm

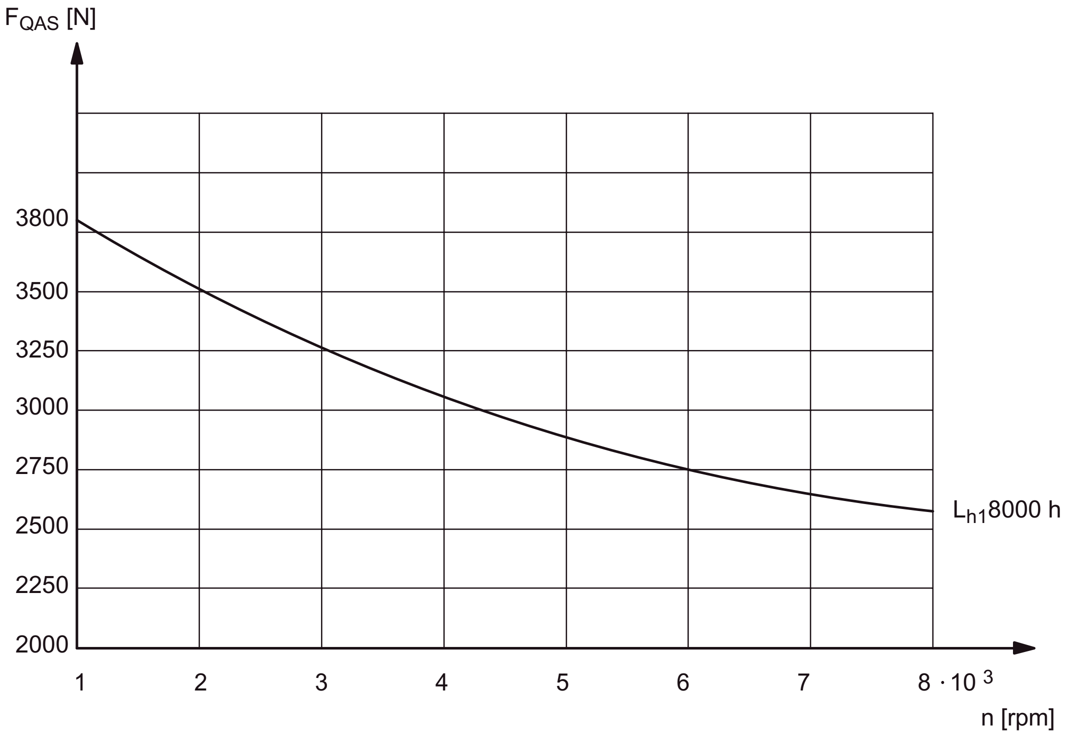
Estimated bearing lifetime under different operating conditions (F_{QAS} ; n)

$$L_{htot} = \frac{100}{\frac{q_1}{L_{h1}} + \frac{q_2}{L_{h2}} + \frac{q_3}{L_{h3}} + \frac{q_4}{L_{h4}}}$$

q =Duration [%] with
constant conditions

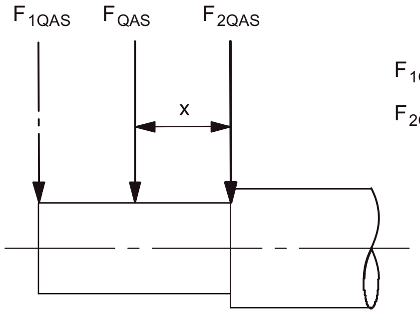
Figure 7-5 Cantilever force diagram, shaft height 160 for standard bearing designs

SH 160, permissible cantilever forces for increased max. speed



Bearings, DE: 6312 C4

Bearings, NDE: 6212 C4



$F_{1QAS} = 0{,}9\ F_{QAS}$

$F_{2QAS} = 1.1\ F_{QAS}$

x = 55 mm

Estimated bearing lifetime under different operating conditions (F_{QAS} ; n)

$$L_{htot} = \frac{100}{\frac{q_1}{L_{h1}} + \frac{q_2}{L_{h2}} + \frac{q_3}{L_{h3}} + \frac{q_4}{L_{h4}}}$$

q =Duration [%] with constant conditions

Figure 7-6 Cantilever force diagram, shaft height 160 for increased max. speed

SH 180, permissible cantilever forces for a coupling output

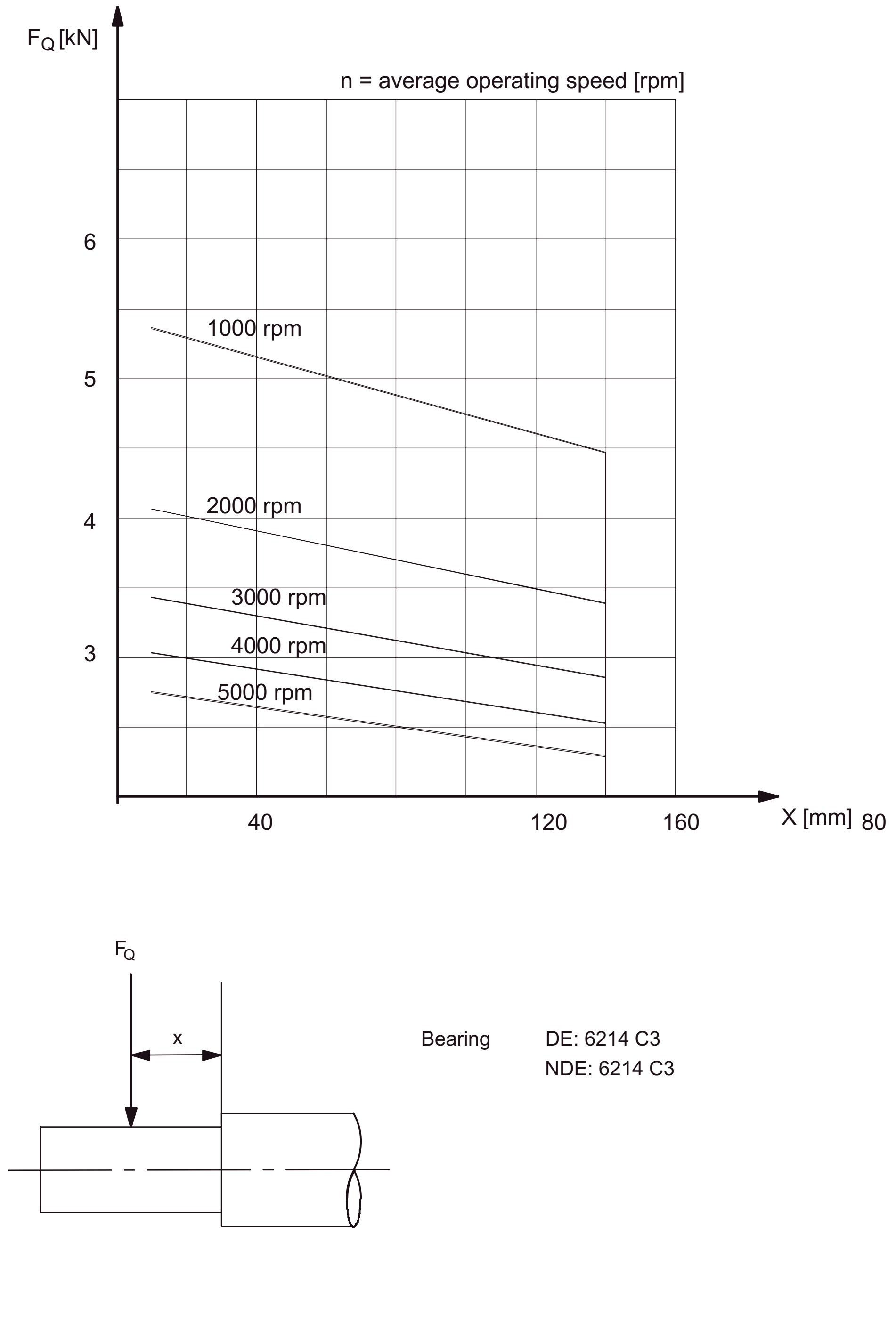
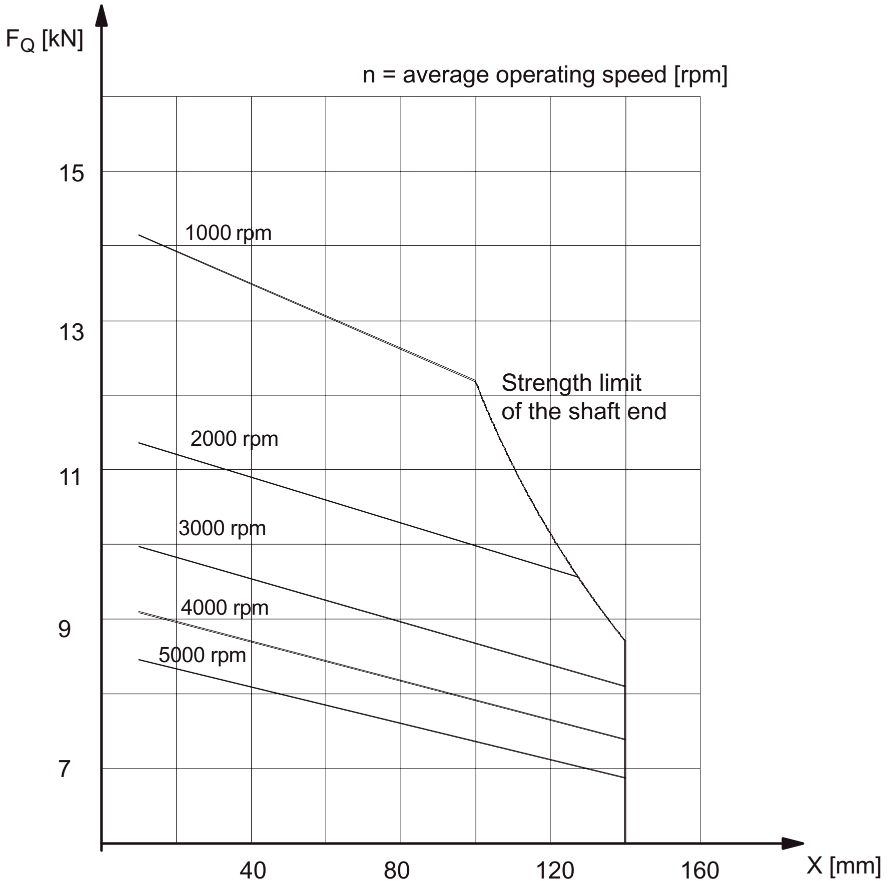
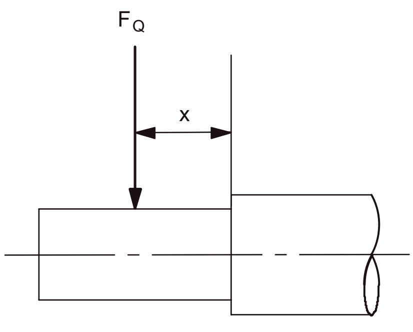


Figure 7-7 Cantilever force diagram, shaft height 180 for coupling output

SH 180, permissible cantilever forces for belt couplings





Bearing AS: NU2214E
BS: 6214C3

Figure 7-8 Cantilever force diagram, shaft height 180 for belt couplings

SH 180, permissible increased cantilever forces for belt couplings

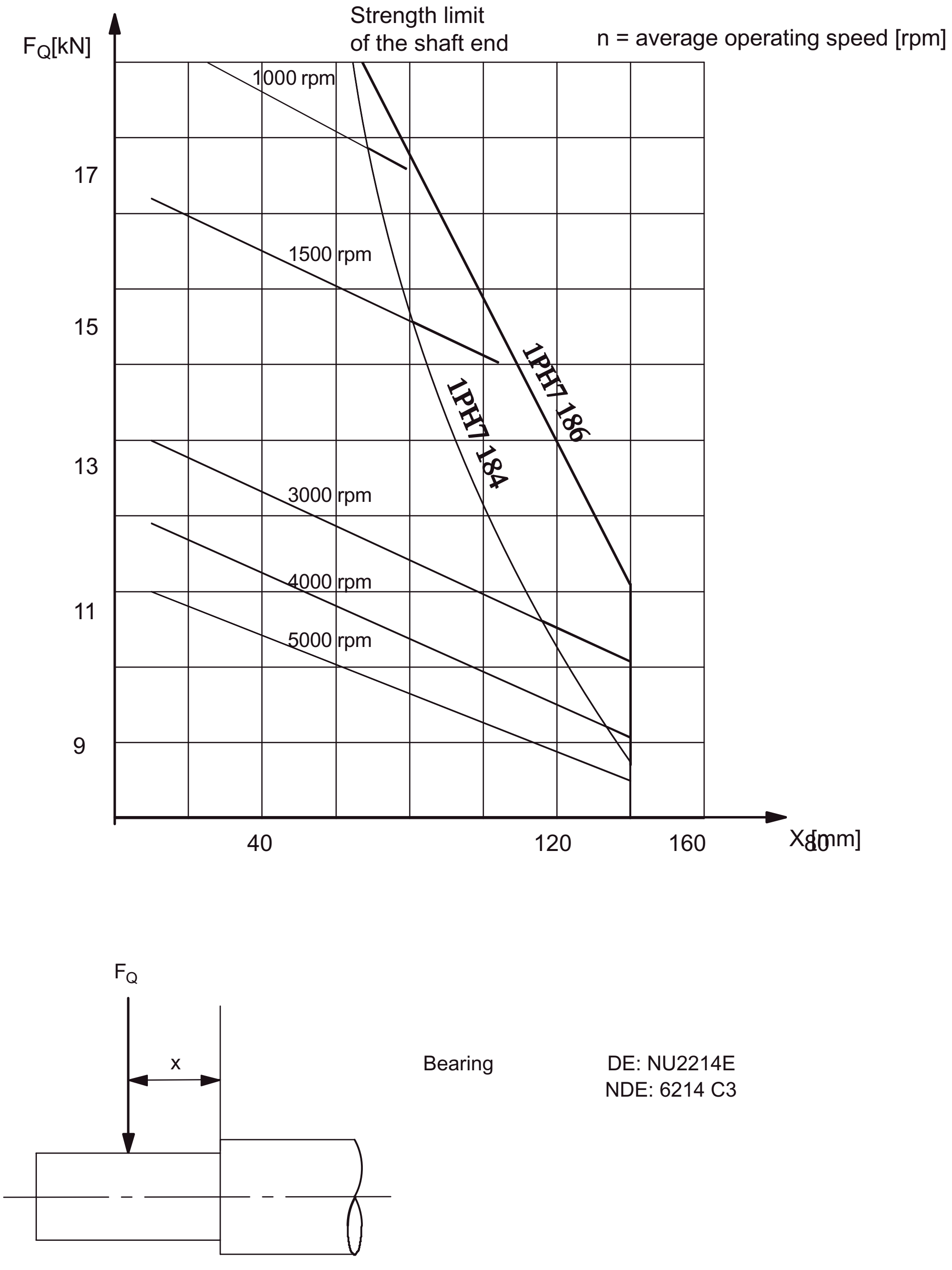


Figure 7-9 Cantilever force diagram, shaft height 180 for belt couplings (increased cantilever forces)

SH 225, permissible cantilever forces for a coupling output

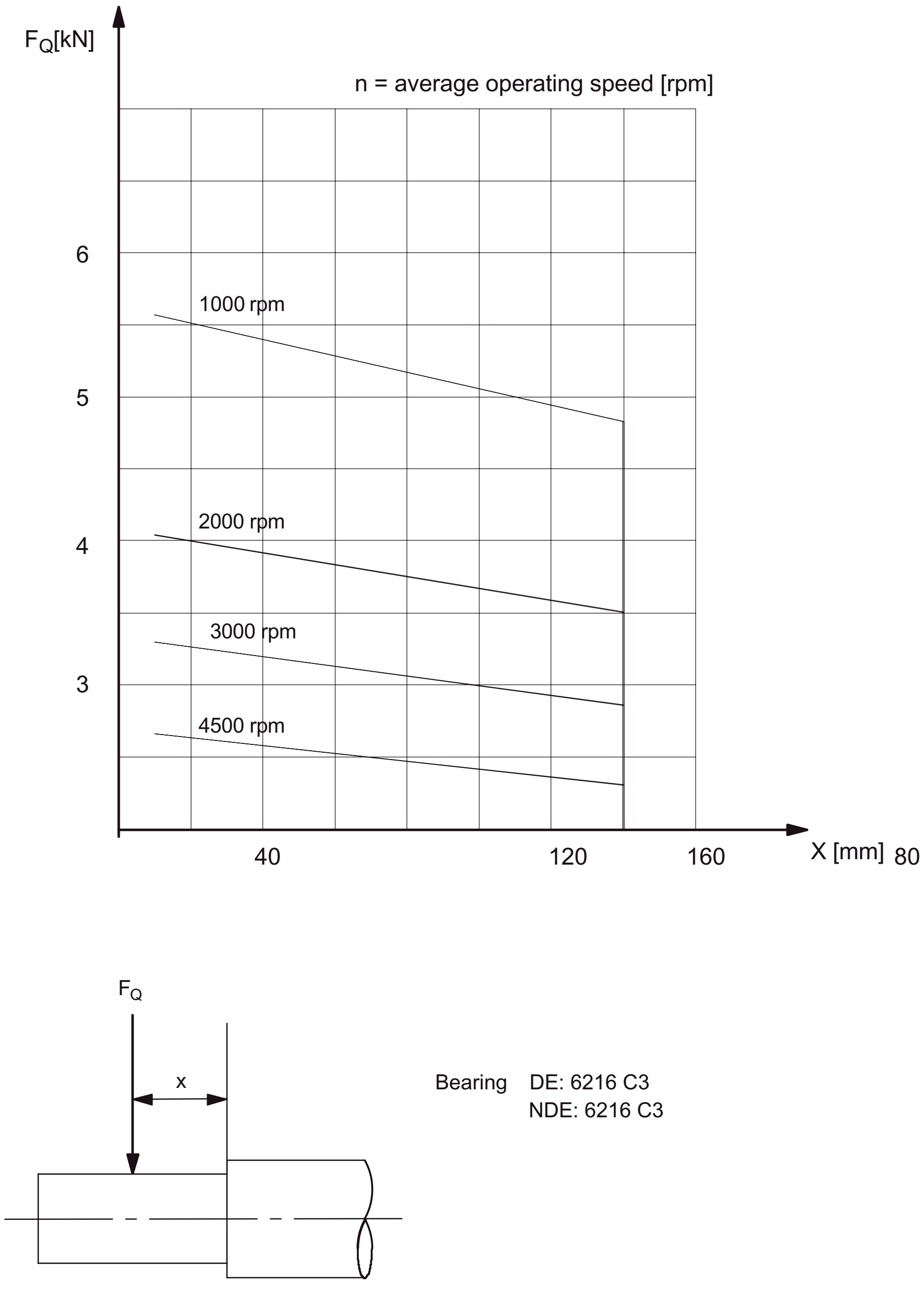
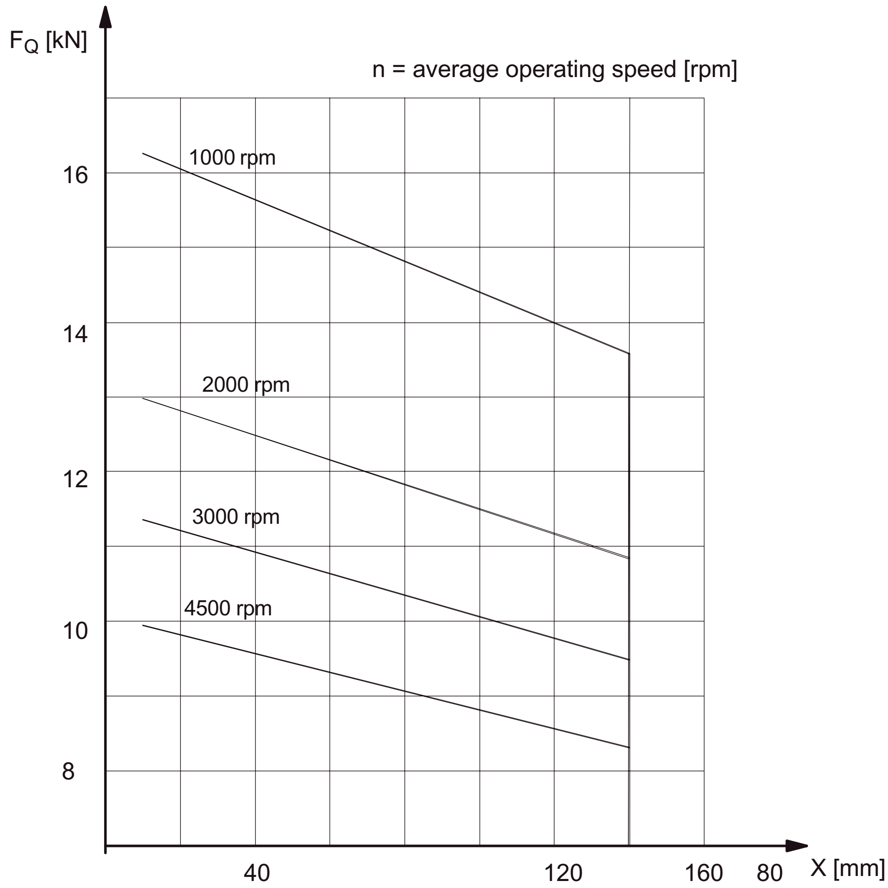
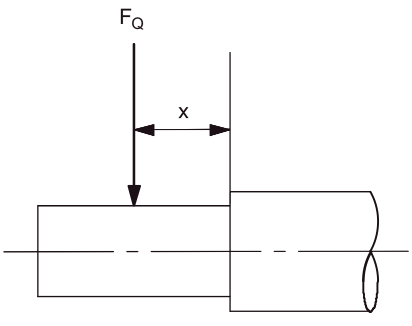


Figure 7-10 Cantilever force diagram, shaft height 225 for coupling output

SH 225, permissible cantilever forces for belt couplings





Bearing DE: NU2214E
NDE: 6214 C3

Minimum cantilever force: 4 kN

Figure 7-11 Cantilever force diagram, shaft height 225 for belt couplings

SH 225, permissible increased cantilever forces for belt couplings

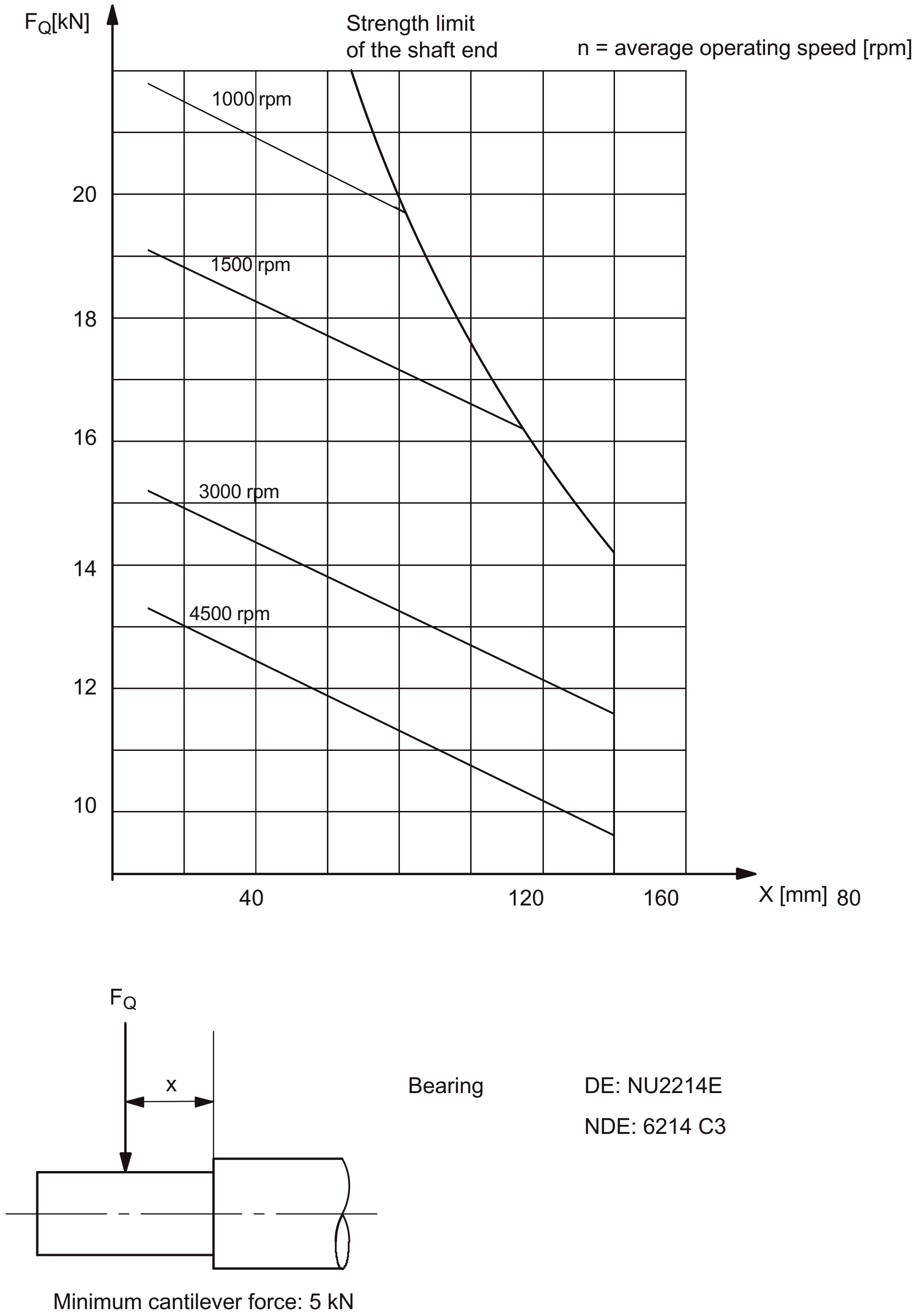


Figure 7-12 Cantilever force diagram, shaft height 225 for belt couplings (increased cantilever forces)

SH 280, permissible cantilever forces for a coupling output

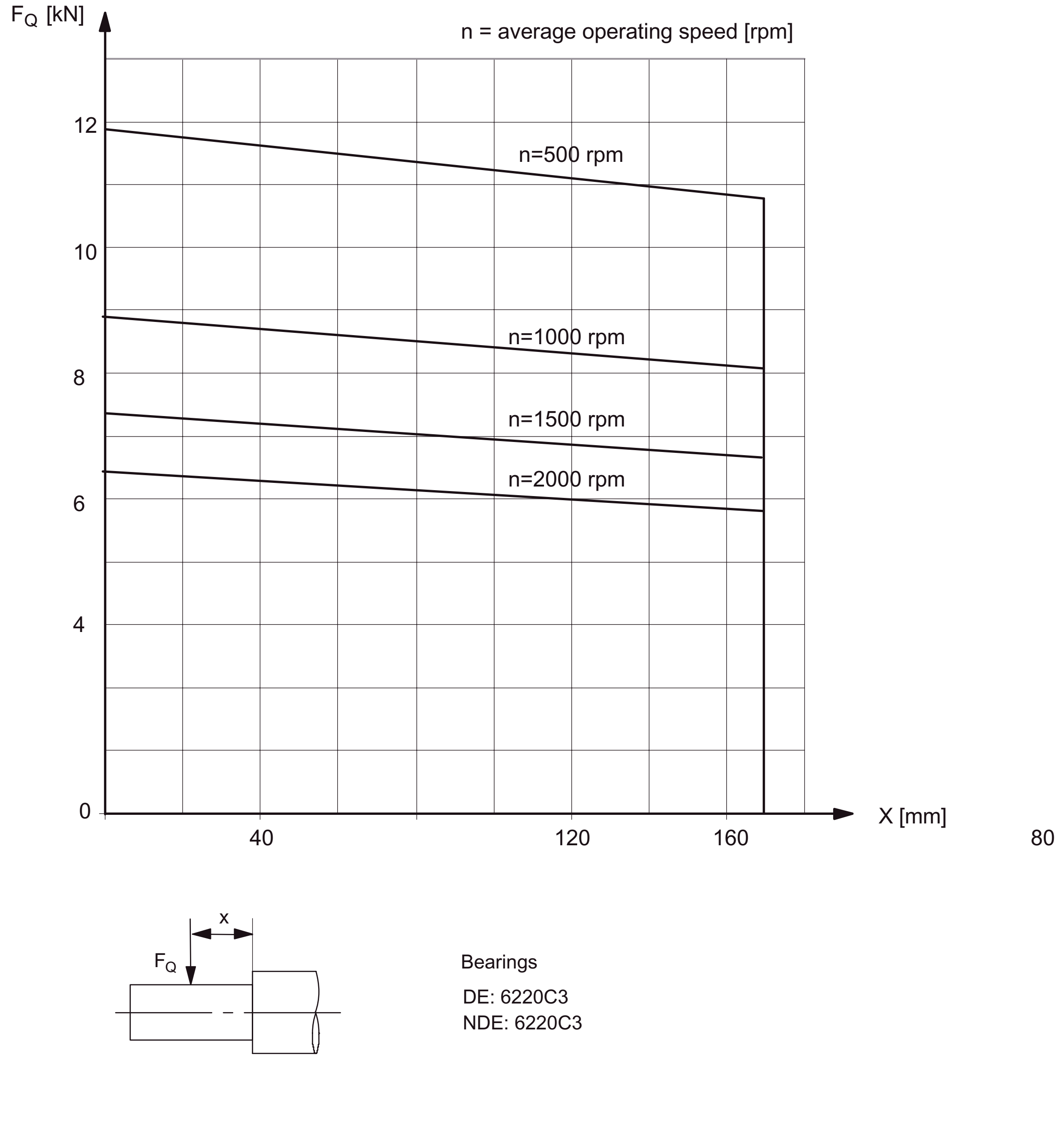


Figure 7-13 Cantilever force diagram, shaft height 280 for coupling output

SH 280, permissible cantilever forces for belt couplings

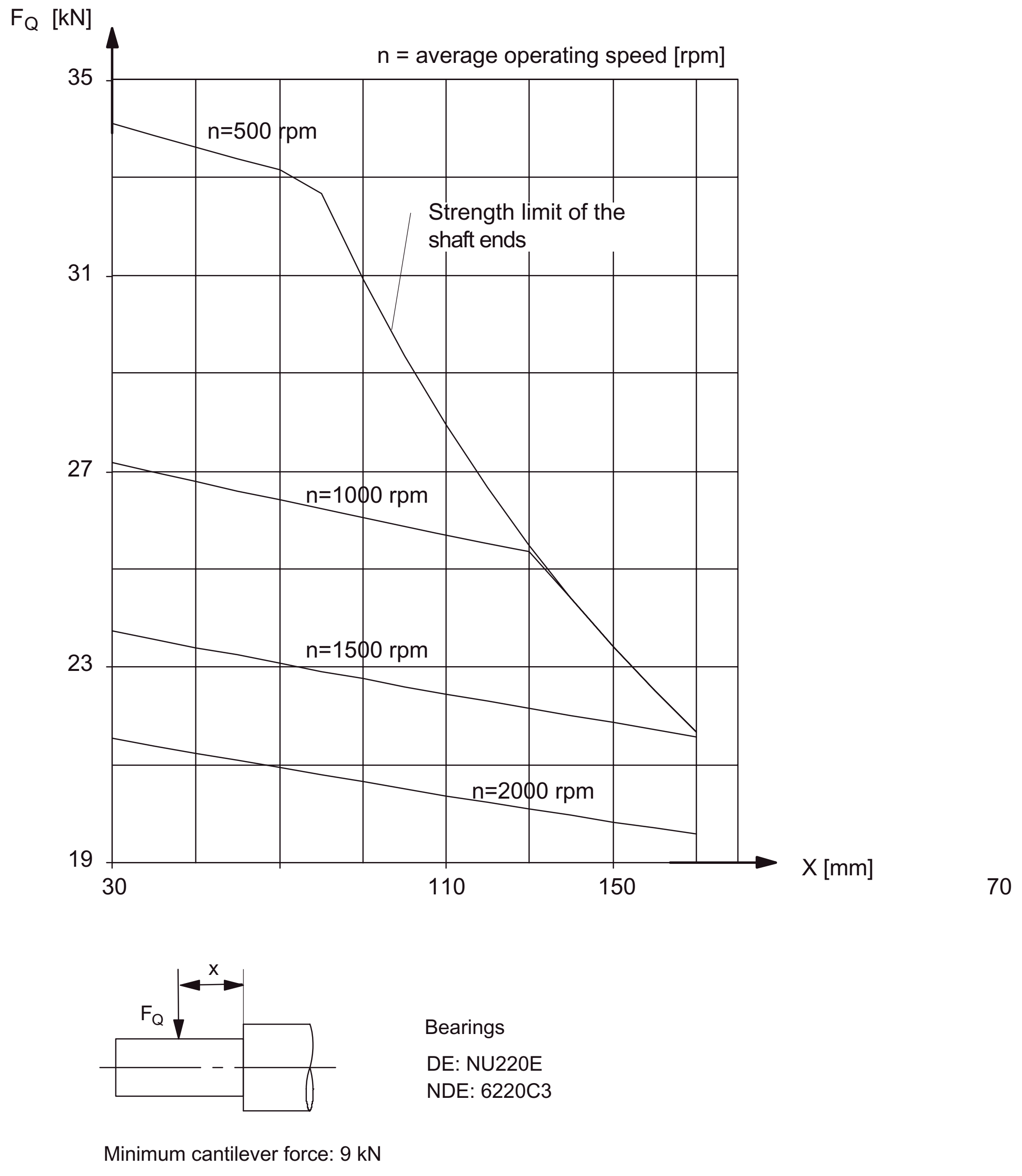


Figure 7-14 Cantilever force diagram, shaft height 280 for belt couplings

7.5.2 Axial force

Deep-groove ball bearings can accept both radial as well as axial forces.

The maximum axial forces F_A as a function of the cantilever-force are shown in the following force diagrams.

The permissible bearing forces are specified without taking into account the force due to spring-loaded bearings, the rotor weight for vertical mounting as well as the direction of the force.

Note

The permissible axial forces at the shaft end FAZ are determined depending on the particular application (mounting, direction of force) and must be determined, refer to the documentation "General Part for Induction Motors", Chapter "Axial force".

SH 180 to SH 280

For coupling outputs, belt couplings or pinion outputs with straight teeth, generally, only low axial forces occur. The locating bearing is adequately dimensioned so that these forces can be accepted in all mounting positions.

The following forces due to the weight of the output component are permissible at the shaft end in order to ensure perfect vibration characteristics (i.e. low vibration):

- SH 180: max. 500 N
- SH 225: max. 600 N
- SH 280: max. 900 N

For pinion outputs with helical gearing, please contact your local Siemens office.

Forces due to the rotor weight and alignment forces

Table 7-214 Force due to weight of the rotor and the rotor alignment force

Motor type	Force due to weight F_L [N]	Alignment force F_C [N]
1PH7101	125	400
1PH7103	125	400
1PH7105	200	400
1PH7107	200	400
1PH7133	290	600
1PH7135	410	600
1PH7137	410	600
1PH7163	520	800
1PH7167	630	800
1PH7184	980	500 [1)]
1PH7186	1220	500 [1)]
1PH7224	1720	550 [1)]
1PH7226	2100	550 [1)]
1PH7228	2500	550 [1)]
1PH7284	3200	600 [1)]
1PH7286	4000	600 [1)]
1PH7288	4600	600 [1)]

1) only for coupling output

SH 100, permissible axial force

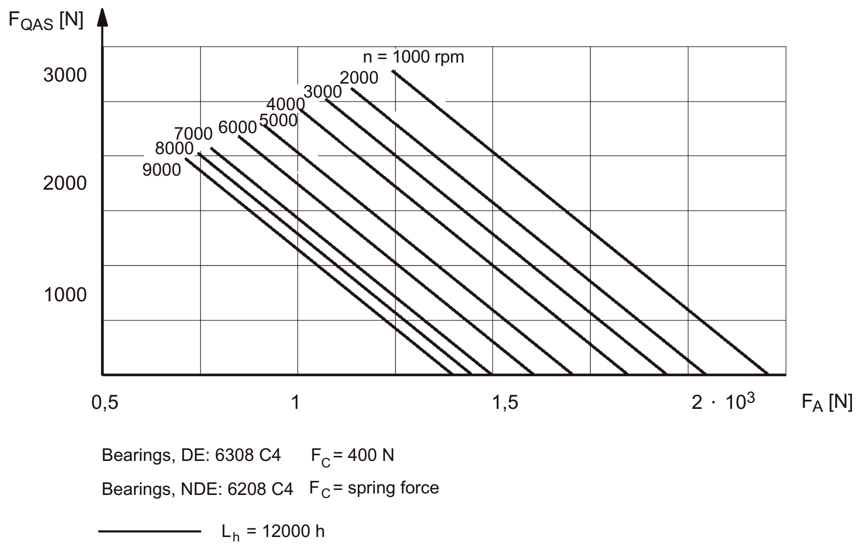


Figure 7-15 Axial force diagram, SH 100

SH 132, permissible axial force

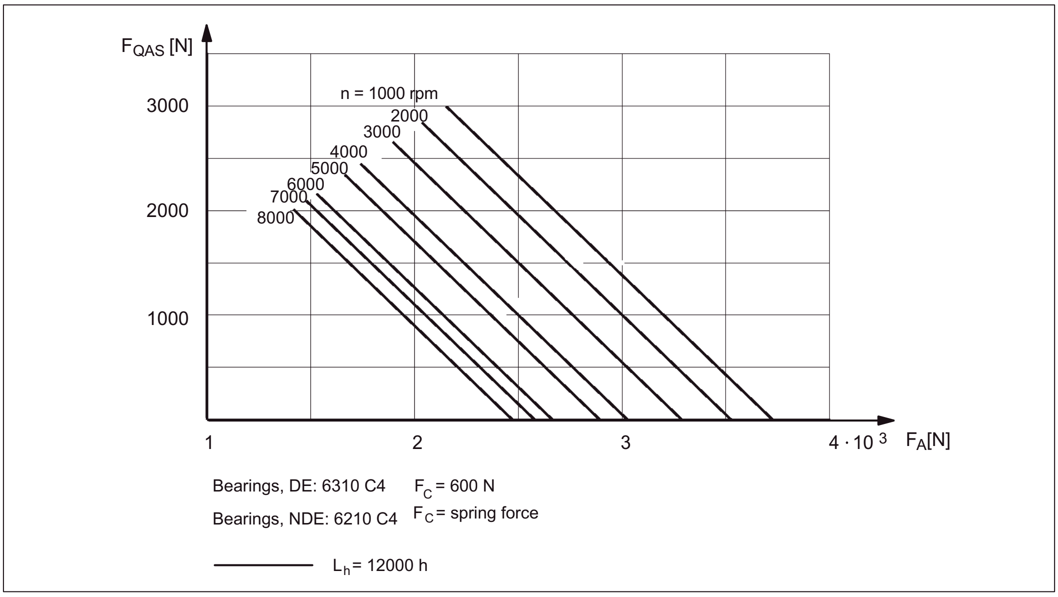


Figure 7-16 Axial force diagram, SH 132

SH 160, permissible axial force

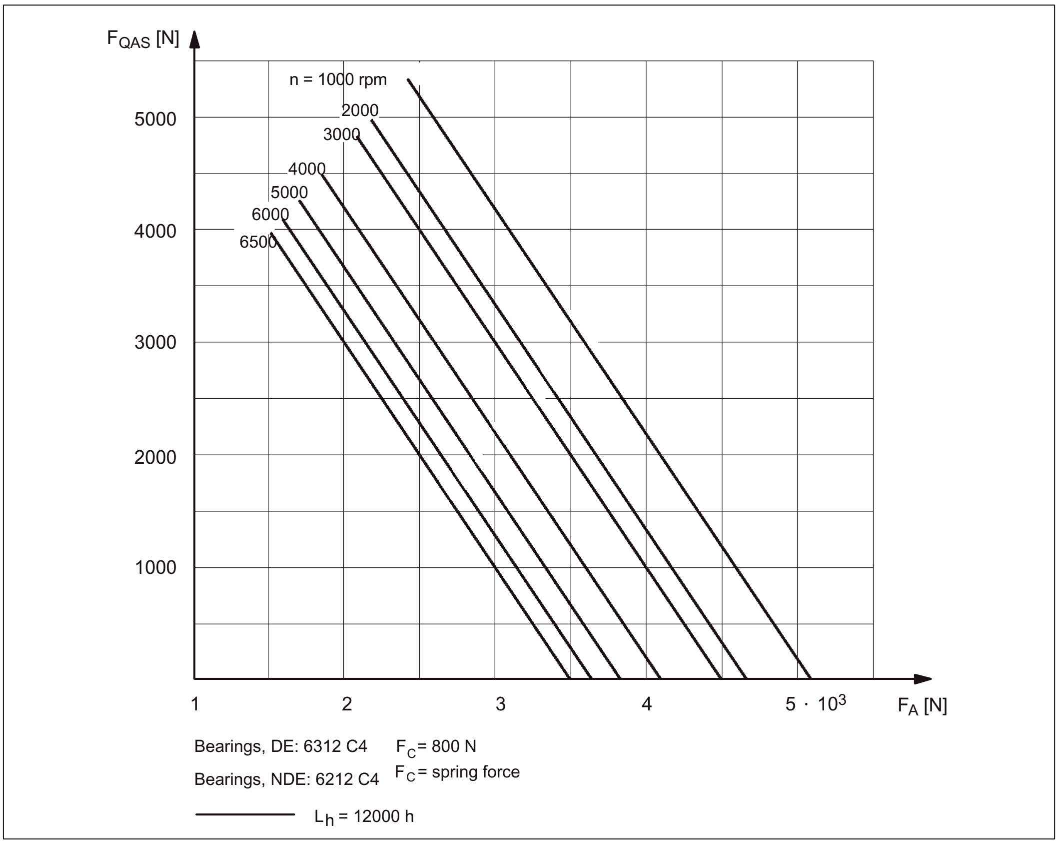


Figure 7-17 Axial force diagram, SH 160

SH 100, permissible axial force for the option, increased max. speed

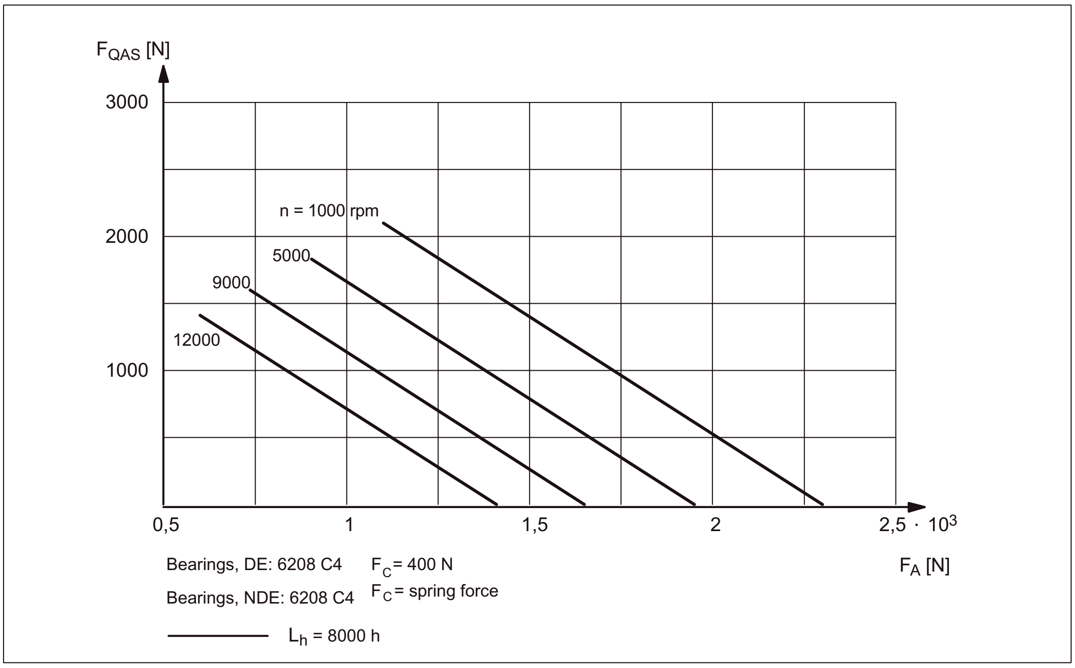


Figure 7-18 Cantilever force diagram, SH 100 (increased max. speed)

SH 132, permissible axial force for the option, increased max. speed

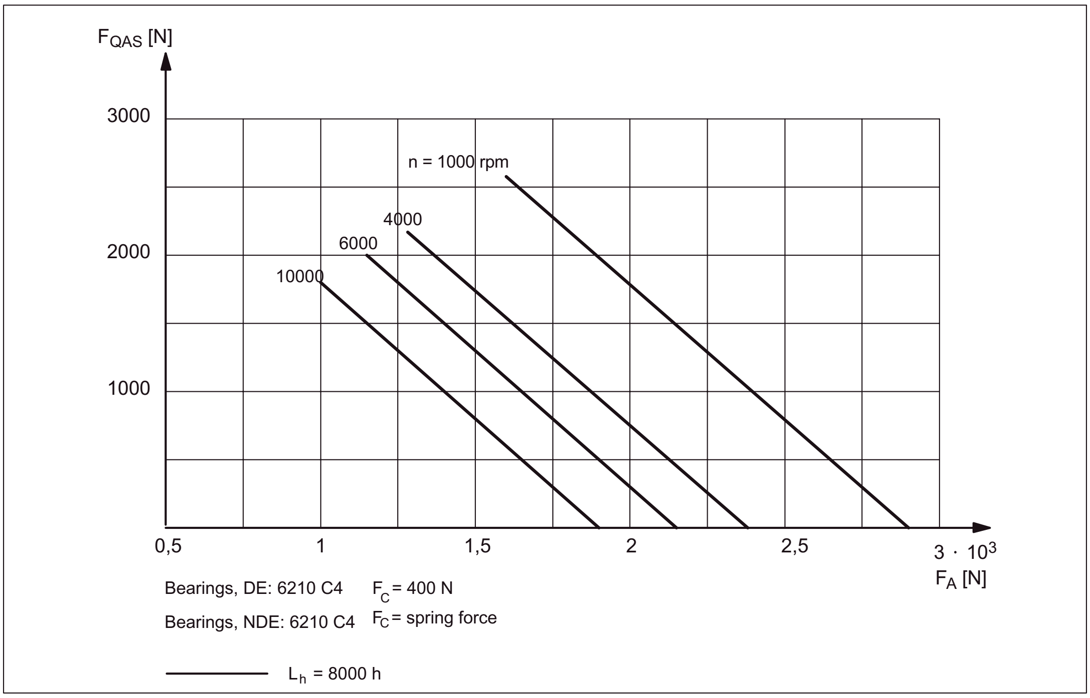


Figure 7-19 Cantilever force diagram, SH 132 (increased max. speed)

SH 160, permissible axial force for the option, increased max. speed

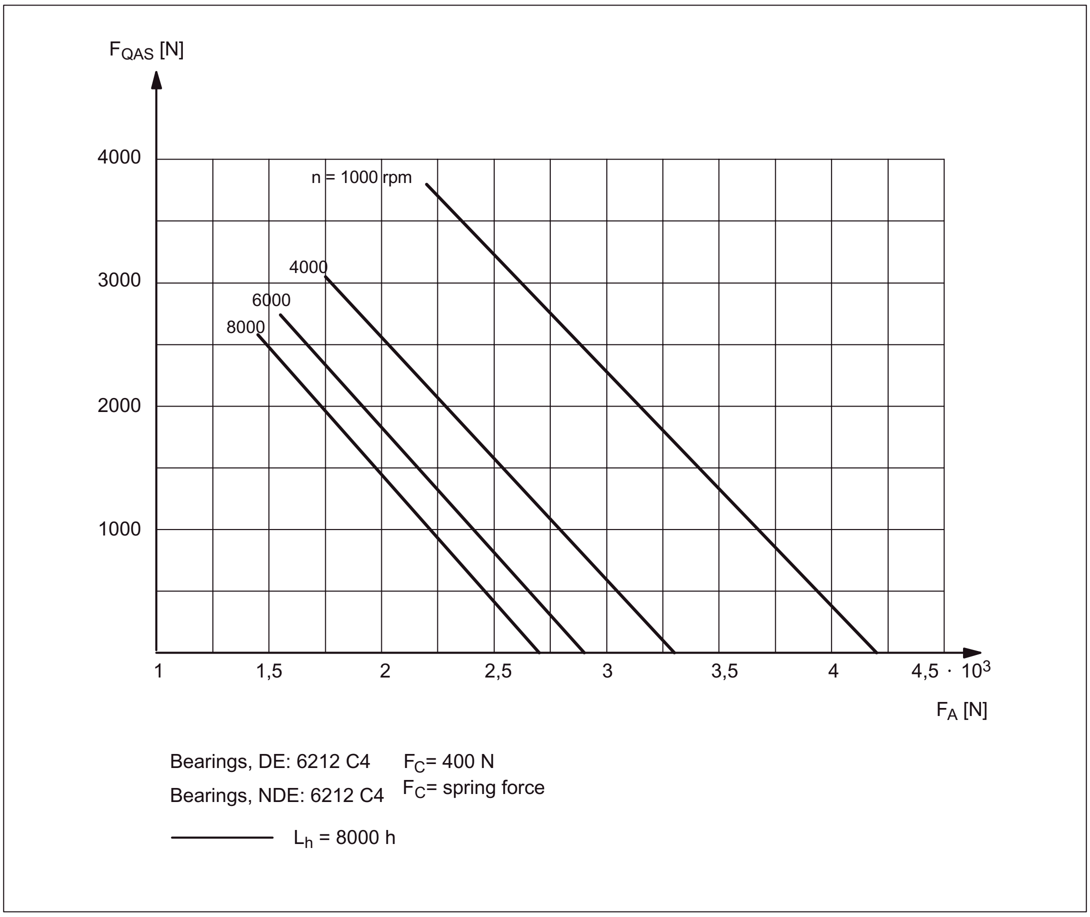


Figure 7-20 Cantilever force diagram, SH 160 (increased max. speed)

8 Dimension drawings

CAD CREATOR

The CAD CREATOR provides a user-friendly interface which helps you to find product-specific data quickly and supports you in generating plant documentation containing project-specific information.

Benefits

- Multilingual operator interface in English, French, German, Italian and Spanish included
- Dimension sheets with measurements in mm or inches
- Dimension sheets and 2D/3D CAD data for
  - 1FT7 Compact / 1FT6 / 1FK7 synchronous motors
  - 1PH7/1PH4/1PM4/1PM6 asynchronous motors
  - 1FT6/1FK7/1FK7-DYA geared motors
  - 1FW3 torque motors
  - 1FE1 built-in motors

The CAD CREATOR provides you with various options to begin with product configuration:

- Order number
- Order number search
- Geometric data

Once a product is successfully configured, the product-specific information, such as dimension drawing and 2D/3D CAD data are displayed and made available for storing in various formats, e.g.: *.pdf, *.dxf, *.stp oder *.igs.

The CAD CREATOR is available on CD-ROM and as an Internet application.

Additional information is available in the Internet under:

http://www.siemens.com/cad-creator

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.

1PH7, type of construction IM B3

For motor		Dimensions in mm (in)																
Shaft height	Type	DIN IEC	a B	b A	c LA	e M	f AB	h H	k LB	k_1 –	m BA	m_1 –	m_2 –	n AA	p HD	s K	s_3 –	w_1 C
1PH7, type IM B3, forced ventilation																		
100	1PH7101		202.5 (7.97)	160 (6.30)	11 (0.43)	263 (10.35)	196 (7.72)	100 (3.94)	411 (16.18)	434 (17.09)	52 (2.05)	64 (2.52)	27 (1.06)	39 (1.54)	220 (8.66)	12 (0.47)	Pg 29	40 (1.57)
	1PH7103																	
	1PH7105		297.5 (11.71)			358 (14.09)			506 (19.92)	529 (20.83)								
	1PH7107																	
132	1PH7131		265.5 (10.45)	216 (8.50)	14 (0.55)	341 (13.43)	260 (10.24)	132 (5.20)	538 (21.18)	561 (22.09)	63 (2.48)	75 (2.95)	33 (1.30)	52 (2.05)	275 (10.83)	12 (0.47)	Pg 36	50 (1.97)
	1PH7133																	
	1PH7135		350.5 (13.80)			426 (16.77)			623 (24.53)	646 (25.43)								
	1PH7137																	
160	1PH7163		346.5 (13.64)	254 (10.00)	17 (0.67)	438 (17.24)	314 (12.36)	160 (6.30)	640 (25.20)	663 (26.10)	78 (3.07)	81 (3.19)	42 (1.65)	62 (2.44)	330 (12.99)	14 (0.55)	Pg 42	64 (2.52)
	1PH7167		406.5 (16.00)			498 (19.61)			700 (27.56)	723 (28.46)								

			DE shaft extension				
Shaft height	Type	DIN IEC	d D	d_6 –	l E	t GA	u F
100	1PH7101		38 (1.50)	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1PH7103						
	1PH7105						
	1PH7107						
132	1PH7131		42 (1.65)	M16	110 (4.33)	45 (1.77)	12 (0.47)
	1PH7133						
	1PH7135						
	1PH7137						
160	1PH7163		55 (2.17)	M20	110 (4.33)	59 (2.32)	16 (0.63)
	1PH7167						

For deviating and additional dimensions for 1PH7 motors with DRIVE-CLiQ, see "1PH7 motors with DRIVE-CLiQ".

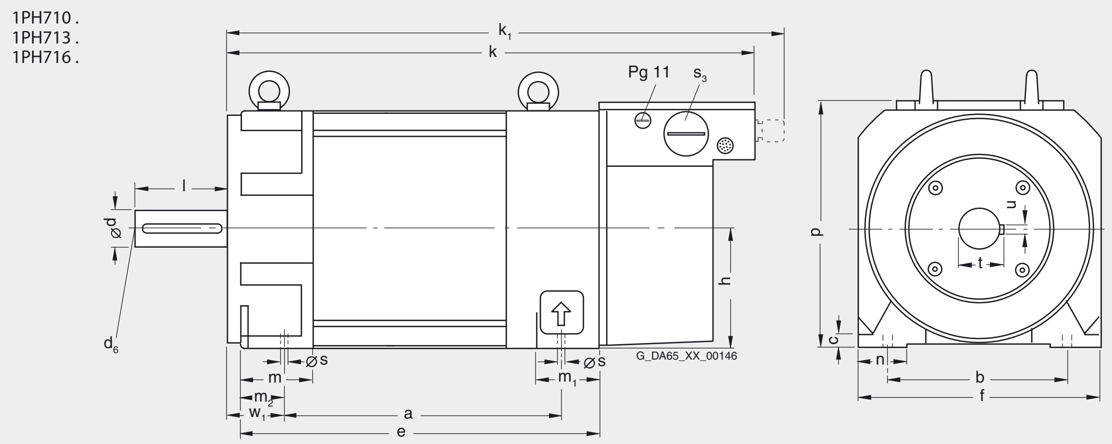
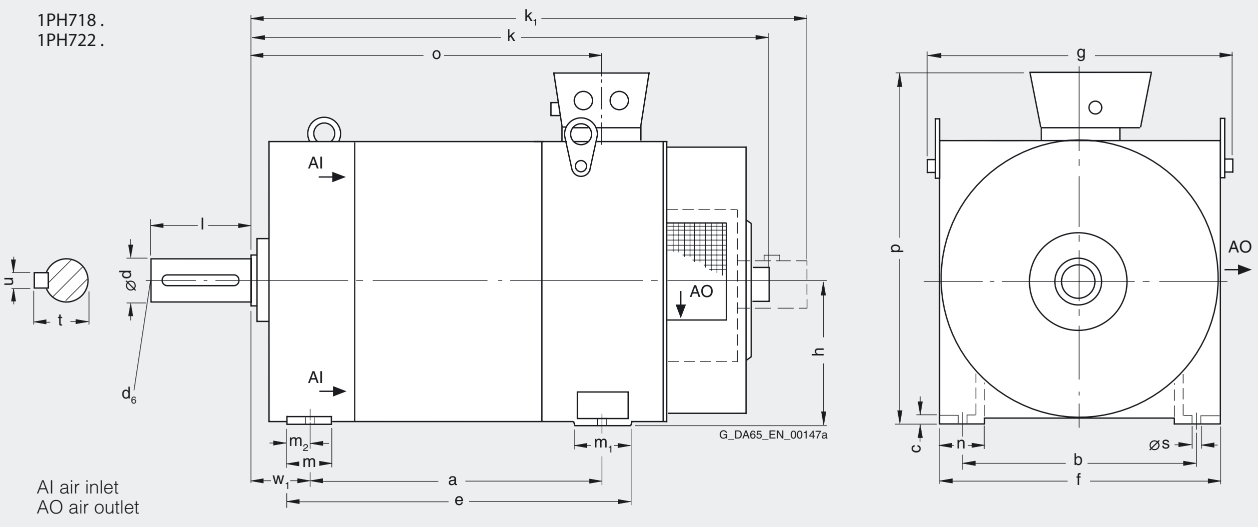


Figure 8-1 1PH7, type of construction IM B3, forced ventilation

For motor		Dimensions in mm (in)													
Shaft height	Type	DIN IEC	a B	b A	c LA	e M	f AB	g AC	h H	k LB	k_1 –	m BA	m_1 –	m_2 –	n AA	o –
1PH7, type IM B3, forced ventilation, air-flow direction DE to NDE																
180	1PH7184		430 (16.93)	279 (10.98)	14 (0.55)	510 (20.08)	360 (14.17)	408 (16.09)	180 (7.09)	835 (32.87)	–	60 (2.36)	120 (4.72)	35 (1.38)	65 (2.56)	541 (21.30)
	1PH7186		520 (20.47)			600 (23.62)				925 (36.42)						631 (24.84)
225	1PH7224		445 (17.52)	356 (14.02)	18 (0.71)	530 (20.87)	450 (17.72)	498 (19.61)	225 (8.86)	–	1100 (43.31)	60 (2.36)	120 (4.72)	40 (1.57)	85 (3.35)	629 (24.76)
	1PH7226		545 (21.46)			630 (24.80)					1200 (47.24)					729 (28.70)
	1PH7228		635 (25.00)			720 (28.35)					1290 (50.79)					819 (32.24)

			Terminal box type 1XB7...			DE shaft extension						
			...322	...422	...700							
Shaft height	Type	DIN IEC	p[1)] HD	p[1)] HD	p[1)] HD	s K	w_1 C	**d** **D**	d_6 –	l E	t GA	u F
180	1PH7184		495 (19.49)	–	–	14.5 (0.57)	121 (4.76)	**60 (2.36)**	M20	140 (5.51)	64 (2.52)	18 (0.72)
	1PH7186			545 (21.46)	–			**65 (2.56)**			69 (2.72)	
225	1PH7224		595 (23.43)	645 (25.39)	680 (26.77)	18.5 (0.73)	149 (5.87)	**75 (2.95)**	M20	140 (5.51)	79.5 (3.13)	20 (0.79)
	1PH7226											
	1PH7228			–								



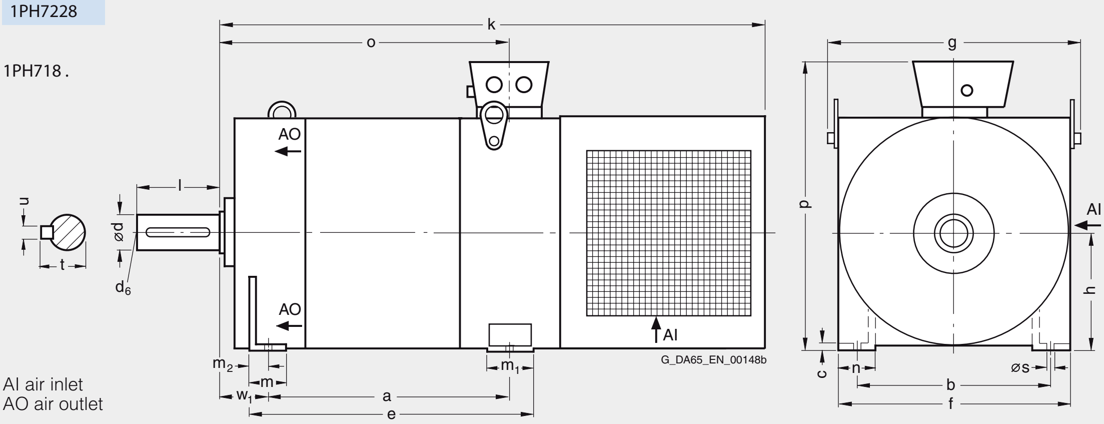
[1)] Maximum dimensions, depending on electrical version (terminal box type).

Figure 8-2 1PH7, type of construction IM B3, forced ventilation, direction of air flow DE-NDE

For motor		Dimensions in mm (in)														Terminal box type 1XB7...		
																...322	...422	...700
Shaft height	Type	DIN IEC	a B	b A	c LA	e M	f AB	g AC	h H	k LB	m BA	m_1 –	m_2 –	n AA	o –	p[1)] HD	p[1)] HD	p[1)] HD
1PH7, type IM B3, forced ventilation, air-flow direction NDE to DE																		
180	1PH7184		430 (16.93)	279 (10.98)	14 (0.55)	510 (20.08)	360 (14.17)	405 (15.94)	180 (7.09)	1010 (39.76)	60 (2.36)	120 (4.72)	35 (1.38)	65 (2.56)	541 (21.30)	495 (19.49)	–	–
	1PH7186		520 (20.47)			600 (23.62)				1100 (43.31)					631 (24.84)		560 (22.05)	–
225	1PH7224		445 (17.52)	356 (14.02)	18 (0.71)	530 (20.87)	450 (17.72)	498 (19.61)	225 (8.86)	1090 (42.91)	60 (2.36)	120 (4.72)	40 (1.57)	85 (3.35)	629 (24.76)	595 (23.43)	645 (25.39)	680 (26.77)
	1PH7226		545 (21.46)			630 (24.80)				1190 (46.85)					729 (28.70)			
	1PH7228		635 (25.00)			720 (28.35)				1280 (50.39)					819 (32.24)		–	

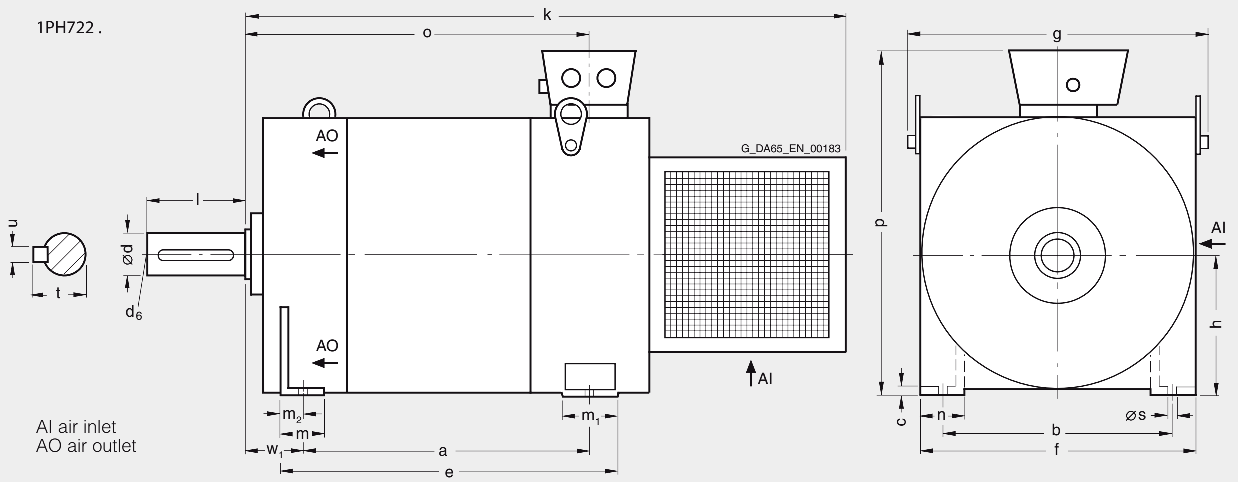
For motor			DE shaft extension						
Shaft height	Type	DIN IEC	s K	w_1 C	d D	d_6 –	l E	t GA	u F
180	1PH7184		14.5 (0.57)	121 (4.76)	60 (2.36)	M20	140 (5.51)	64 (2.52)	18 (0.71)
	1PH7186				65 (2.56)			69 (2.72)	
225	1PH7224		18.5 (0.73)	149 (5.87)	75 (2.95)	M20	140 (5.51)	79.5 (3.13)	20 (0.79)
	1PH7226 1PH7228								

1PH718 .



AI air inlet
AO air outlet

1PH722 .



AI air inlet
AO air outlet

1) Maximum dimensions, depending on electrical version (terminal box type).

Figure 8-3 1PH7, type of construction IM B3, forced ventilation, direction of air flow DE-NDE

For motor		Dimensions in mm (in)															
Shaft height	Type	DIN IEC	a B	b A	c HA	e BB	f AB	g_2 AD	g_4 –	h H	k LB	k_1 –	k_2 –	m_1 –	m_2 –	n AA	o –
Type IM B3, with external fan unit, air-flow direction NDE to DE																	
280	1PH7284		684 (26.93)	457 (17.99)	22 (0.87)	840 (33.07)	560 (22.05)	518 (20.39)	449 (17.68)	280 (11.02)	1146 (45.12)	489 (19.25)	546 (21.50)	108 (4.25)	78 (3.07)	100 (3.94)	731 (28.78)
	1PH7286		794 (31.26)			950 (37.40)					1256 (49.45)	599 (23.58)					841 (33.11)
	1PH7288		924 (36.38)			1080 (42.52)					1386 (54.57)	729 (28.70)					971 (38.23)

						DE shaft extension			
Shaft height	Type	DIN IEC	p_2 –	s K	w_1 C	d D	l E	t GA	u FA
280	1PH7284 1PH7286 1PH7288		1042 (41.02)	24 (0.94)	190 (7.48)	95 (3.74)	170 (6.69)	100 (3.94)	25 (0.98)

1PH728 .

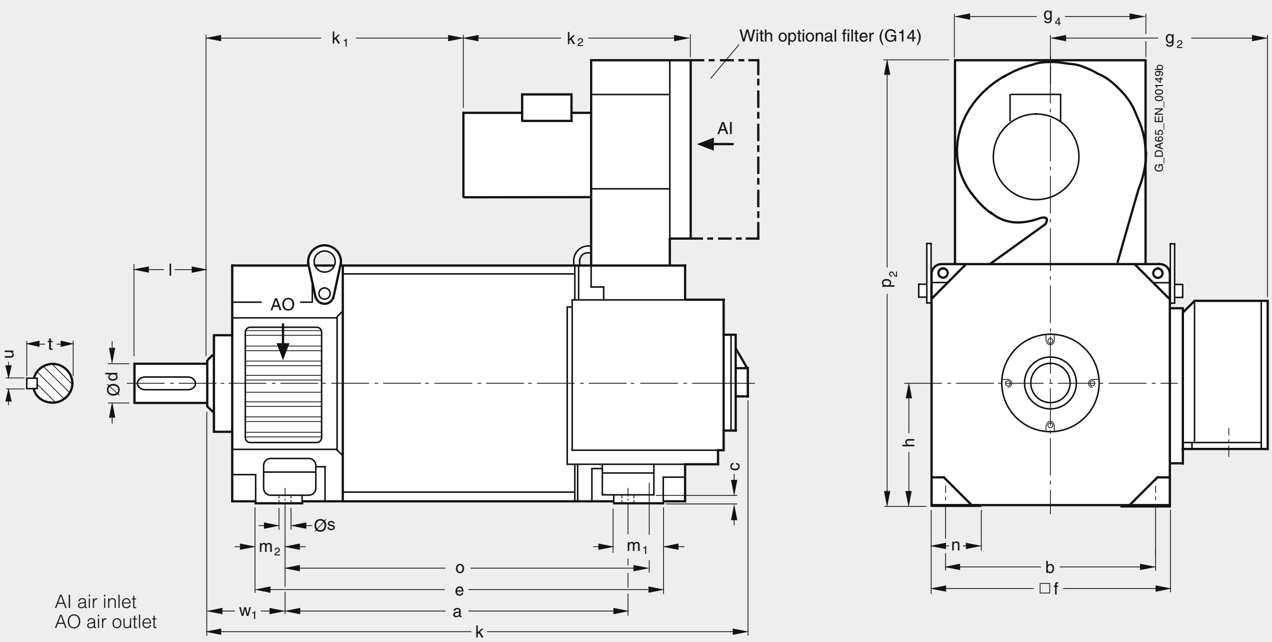


Figure 8-4 1PH7, type of construction IM B3, forced ventilation, direction of air flow NDE-DE

For motor		Dimensions in mm (in)														
Shaft height	Type	DIN IEC	a B	b A	c LA	e M	f AB	h H	k LB	k_1 –	m BA	m_1 –	m_2 –	n AA	o –	p HD
Type IM B3, with external fan unit, with pipe connection at NDE																
100	1PH7101 1PH7103		202.5 (7.97)	160 (6.30)	11 (0.43)	263 (10.35)	196 (7.72)	100 (3.94)	441 (17.36)	411 (16.18)	52 (2.05)	64 (2.52)	25 (0.98)	39 (1.54)	161 (6.34)	220 (8.66)
	1PH7105 1PH7107		297.5 (11.71)			358 (14.09)			536 (21.10)	506 (19.92)						
132	1PH7131 1PH7133		265.5 (10.45)	216 (8.50)	14 (0.55)	341 (13.43)	260 (10.24)	132 (5.20)	573 (22.56)	538 (21.18)	63 (2.48)	75 (2.95)	30 (1.18)	52 (2.05)	211.5 (8.33)	275 (10.83)
	1PH7135 1PH7137		350.5 (13.80)			426 (16.77)			658 (25.91)	623 (24.53)						
160	1PH7163		346.5 (13.64)	254 (10.00)	17 (0.67)	438 (17.24)	314 (12.36)	160 (6.30)	674 (26.54)	640 (25.20)	78 (3.07)	81 (3.19)	36 (1.42)	62 (2.44)	253 (9.96)	330 (12.99)
	1PH7167		406.5 (16.00)			498 (19.61)			734 (28.90)	700 (27.56)						

						DE shaft extension			
Shaft height	Type	DIN IEC	s K	s_3 –	v –	w_1 C	d D	d_6 –	l E	t GA	u F
100	1PH710 .		12 (0.47)	Pg 29	10.5 (0.41)	40 (1.57)	**38** **(1.50)**	M12	80 (3.15)	41.3 (1.63)	10 (0.39)
132	1PH713 .		12 (0.47)	Pg 36	17 (0.67)	50 (1.97)	**42** **(1.65)**	M16	110 (4.33)	45.3 (1.78)	12 (0.47)
160	1PH716 .		14 (0.55)	Pg 42	17 (0.67)	64 (2.52)	**55** **(2.17)**	M20	110 (4.33)	56.3 (2.22)	16 (0.63)

For deviating and additional dimensions for 1PH7 motors with DRIVE-CLiQ, see "1PH7 motors with DRIVE-CLiQ".

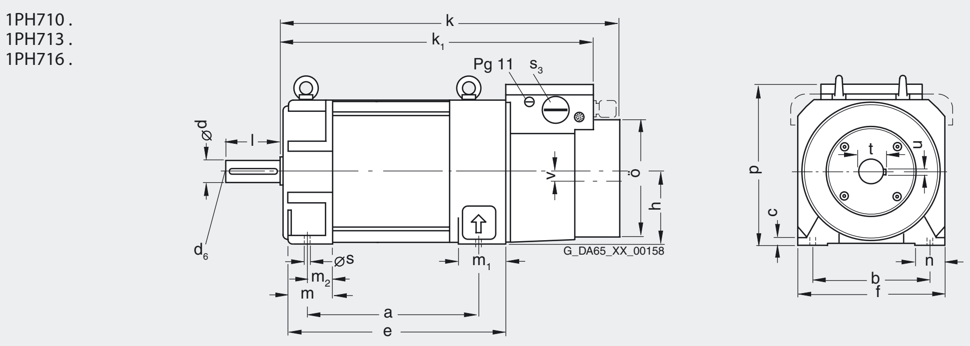
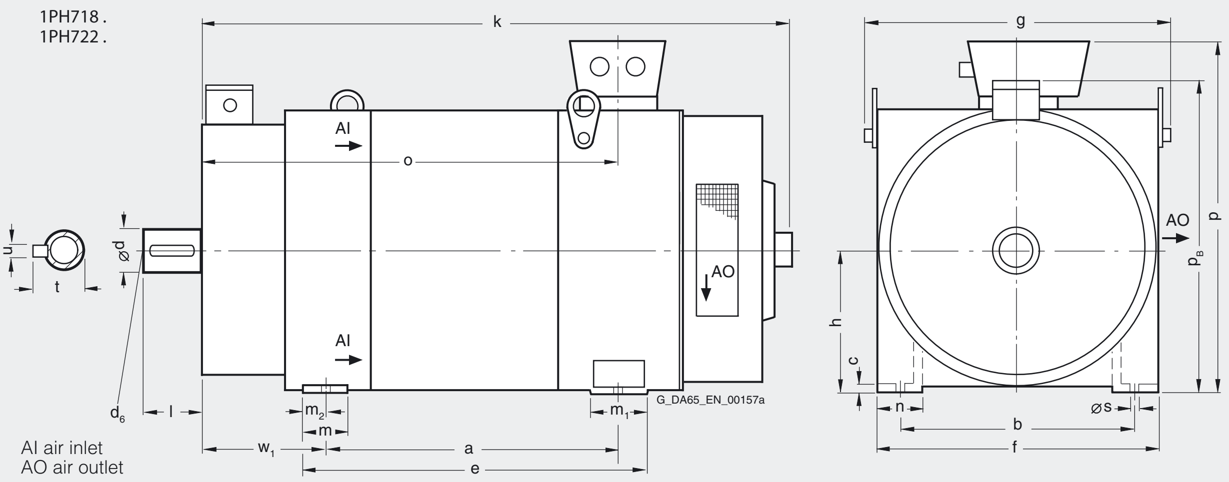


Figure 8-5 1PH7, type of construction IM B3, forced ventilation, with pipe connection, NDE

For motor		Dimensions in mm (in)															Terminal box type 1XB7...		
																	...322	...422	...700
Shaft height	Type	DIN IEC	a B	b A	c LA	e M	f AB	g AC	h H	k LB	m BA	m_1 –	m_2 –	n AA	o –	p[1)] HD	p[1)] HD	p[1)] HD
Type IM B3, with external fan unit, with brake module, air-flow direction DE to NDE																		
180	1PH7184		430 (16.93)	279 (10.98)	14 (0.55)	510 (20.08)	360 (14.17)	408 (16.06)	180 (7.09)	945 (37.20)	60 (2.36)	120 (4.72)	35 (1.38)	65 (2.56)	644 (25.35)	495 (19.49)	–	–
	1PH7186		520 (20.47)			600 (23.62)				1035 (40.75)					734 (28.90)		560 (22.05)	–
225	1PH7224		445 (17.52)	356 (14.02)	18 (0.71)	530 (20.87)	450 (17.72)	498 (19.61)	225 (8.86)	1230 (48.43)	60 (2.36)	120 (4.72)	40 (1.57)	80 (3.15)	758 (29.84)	595 (23.43)	645 (25.39)	680 (26.77)
	1PH7226		545 (21.46)			630 (24.80)				1330 (52.36)					858 (33.78)			
	1PH7228		635 (25.00)			720 (28.35)				1420 (55.91)					948 (37.32)		–	

						DE shaft extension				
Shaft height	Type	DIN IEC	p_B –	s K	w_1 C	d D	d_6 –	l E	t GA	u F
180	1PH7184 1PH7186		390 (15.35)	14.5 (0.57)	224 (8.82)	90 (3.54)	M20	90 (3.54)	95 (3.74)	25 (0.98)
225	1PH7224 1PH7226 1PH7228		450 (17.72)	18.5 (0.73)	278 (10.94)	100 (3.94)	M20	100 (3.94)	106 (4.17)	28 (1.10)

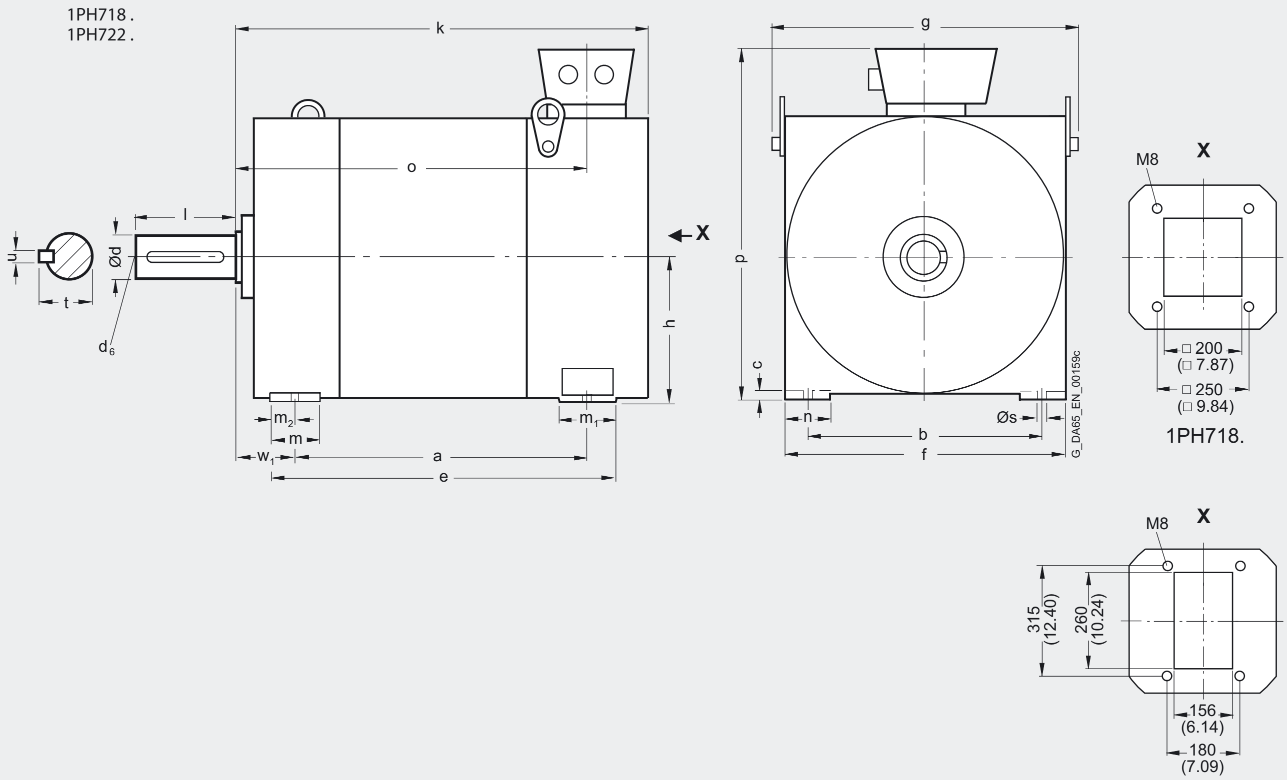


1) Maximum dimensions, depending on electrical version (terminal box type).

Figure 8-6 1PH7, type of construction IM B3, forced ventilation, with braking module, air flow DE-NDE

For motor			Dimensions in mm (in)												
Shaft height	Type	DIN IEC	a B	b A	c LA	e M	f AB	g AC	h H	k LB	m BA	m_1 –	m_2 –	n AA	o –
Type IM B3, with external fan unit, with pipe connection at NDE															
180	1PH7184		430 (16.93)	279 (10.98)	14 (0.55)	510 (20.08)	360 (14.17)	408 (16.06)	180 (7.09)	830 (32.68)	60 (2.36)	120 (4.72)	35 (1.38)	65 (2.56)	541 (21.30)
	1PH7186		520 (20.47)			600 (23.62)				920 (36.22)					631 (24.84)
225	1PH7224		445 (17.52)	356 (14.02)	18 (0.71)	530 (20.78)	450 (17.72)	498 (19.61)	225 (8.86)	950 (37.40)	60 (2.36)	120 (4.72)	40 (1.57)	80 (3.15)	629 (24.76)
	1PH7226		545 (21.46)			630 (24.80)				1050 (41.34)					729 (28.70)
	1PH7228		635 (25.00)			720 (28.35)				1140 (44.88)					819 (32.24)

			Terminal box type 1XB7...					DE shaft extension				
			...322	...422	...700							
Shaft height	Type	DIN IEC	p[1)] HD	p[1)] HD	p[1)] HD	s K	w_1 C	d D	d_6 –	l E	t GA	u F
180	1PH7184		495 (19.49)	–	–	14.5 (0.57)	121 (4.76)	**60** **(2.36)**	M20	140 (5.51)	64 (2.52)	18 (0.71)
	1PH7186			560 (22.05)	–			**65** **(2.56)**			69 (2.72)	
225	1PH7224		595 (23.43)	645 (25.39)	680 (26.77)	18.5 (0.73)	149 (5.87)	**75** **(2.95)**	M20	140 (5.51)	79.5 (3.13)	20 (0.79)
	1PH7226											
	1PH7228			–								



1) Maximum dimensions, depending on electrical version (terminal box type).

Figure 8-7 1PH7, type of construction IM B3, forced ventilation, with pipe connection, NDE

1PH7, type of construction IM B5

For motor		Dimensions in mm (in)													DE shaft extension				
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	i_2 –	k LB	k_1 –	p HD	s_2 S	s_3 –	d D	d_6 –	l E	t GA	u F
1PH7, type IM B5, forced ventilation																			
100	1PH7101		250 (9.84)	180 (7.09)	10 (0.39)	215 (8.46)	196 (7.72)	4 (0.16)	80 (3.15)	411 (16.18)	434 (17.09)	218 (8.58)	14 (0.55)	Pg 29	38 (1.50)	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1PH7103																		
	1PH7105									506 (19.92)	529 (20.83)								
	1PH7107																		
132	1PH7131		350 (13.78)	250 (9.84)	16 (0.63)	300 (11.81)	260 (10.24)	5 (0.20)	110 (4.33)	538 (21.18)	561 (22.09)	273 (10.75)	18 (0.71)	Pg 36	42 (1.65)	M16	110 (4.33)	45 (1.77)	12 (0.47)
	1PH7133																		
	1PH7135									623 (24.53)	646 (25.43)								
	1PH7137																		

For deviating and additional dimensions for 1PH7 motors with DRIVE-CLiQ, see "1PH7 motors with DRIVE-CLiQ".

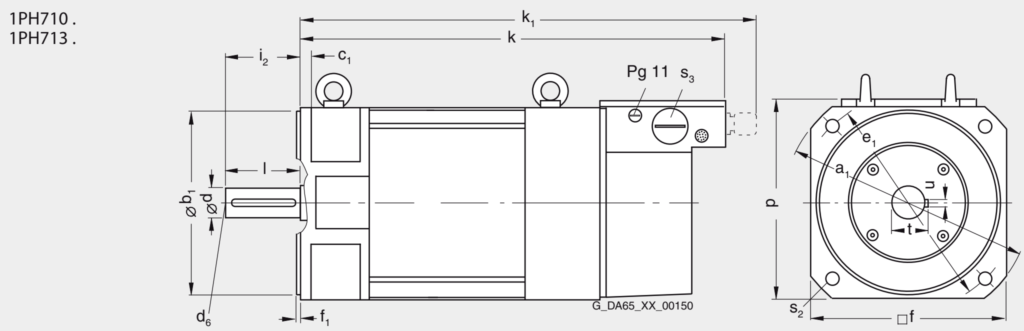


Figure 8-8 1PH7, type of construction IM B5, forced ventilation

For motor			Dimensions in mm (in)													
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	i_2 –	k LB	k_1 –	o –	p HD	s_2 S	s_3 –	v –
Type IM B5, with external fan unit, with pipe connection at NDE																
100	1PH7101		250 (9.84)	180 (7.09)	10 (0.39)	215 (8.46)	196 (7.72)	4 (0.16)	80 (3.15)	441 (17.36)	411 (16.18)	161 (6.34)	120 (4.72)	14 (0.55)	Pg 29	10.5 (0.41)
	1PH7103															
	1PH7105									536 (21.10)	506 (19.92)					
	1PH7107															
132	1PH7131		350 (13.78)	250 (9.84)	16 (0.63)	300 (11.81)	260 (10.24)	5 (0.20)	110 (4.33)	573 (22.56)	538 (21.18)	211.5 (8.33)	143 (5.63)	18 (0.71)	Pg 36	17 (0.67)
	1PH7133															
	1PH7135									658 (25.91)	623 (24.53)					
	1PH7137															

			DE shaft extension				
Shaft height	Type	DIN IEC	d D	d_6 –	l E	t GA	u F
100	1PH7101		38 (1.50)	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1PH7103						
	1PH7105						
	1PH7107						
132	1PH7131		42 (1.65)	M16	110 (4.33)	45 (1.77)	12 (0.47)
	1PH7133						
	1PH7135						
	1PH7137						

For deviating and additional dimensions for 1PH7 motors with DRIVE-CLiQ, see "1PH7 motors with DRIVE-CLiQ".

1PH710 .
1PH713 .

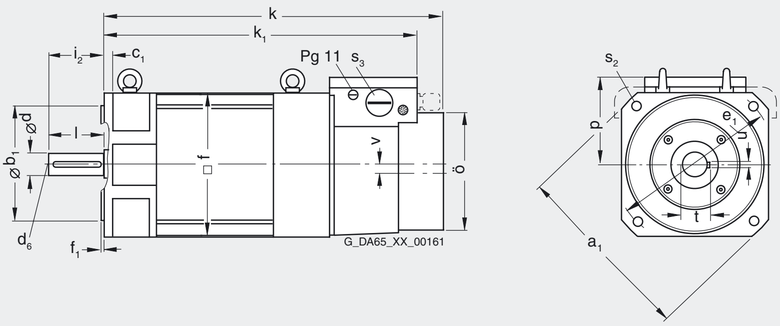


Figure 8-9 1PH7, type of construction IM B5, forced ventilation, with pipe connection, NDE

For motor		Dimensions in mm (in)																
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	f_2 –	g_2 AB	g_3 T	i_2 –	k LB	k_1 –	p HD	s_2 S	s_3 S
Type IM B 5, with external fan unit, with brake module																		
100	1PH7101		250 (9.84)	180 (7.09)	13 (0.51)	215 (8.46)	196 (7.72)	4 (0.16)	220 (8.66)	149 (5.87)	224 (8.82)	80 (3.15)	541 (21.30)	564 (22.20)	120 (4.72)	14 (0.55)	Pg 29
	1PH7103																
	1PH7105												636 (25.04)	659 (25.94)			
	1PH7107																
132	1PH7131		–	250 (9.84)	18 (0.71)	300 (11.81)	260 (10.24)	5 (0.20)	278 (10.94)	174 (6.85)	269 (10.59)	110 (4.33)	700 (27.56)	723 (28.46)	143 (5.63)	18 (0.71)	Pg 36
	1PH7133																
	1PH7135												785 (30.91)	808 (31.81)			
	1PH7137																

		DE shaft extension					
Shaft height	Type	DIN IEC	d D	d_6 –	l E	t GA	u F
100	1PH7101		38 (1.50)	M12	80 (3.15)	1.61 (41)	0.39 (10)
	1PH7103						
	1PH7105						
	1PH7107						
132	1PH7131		42 (1.65)	M16	110 (4.33)	45 (1.77)	12 (0.47)
	1PH7133						
	1PH7135						
	1PH7137						

For deviating and additional dimensions for 1PH7 motors with DRIVE-CLiQ, see "1PH7 motors with DRIVE-CLiQ".

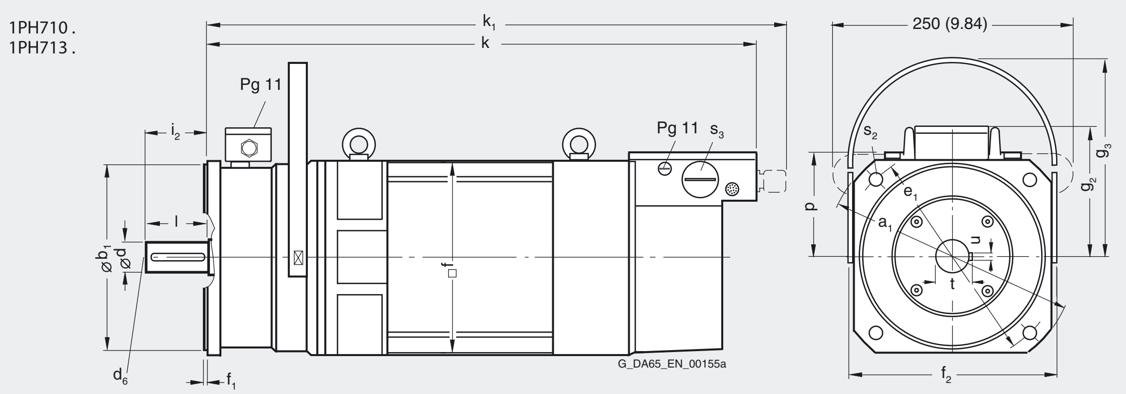


Figure 8-10 1PH7, type of construction IM B5, forced ventilation, with braking module

1PH7, type of construction IM B35

For motor		Dimensions in mm (in)																		
Shaft height	Type	DIN IEC	a B	a_1 P	b A	b_1 N	c LA	e_1 M	f AB	f_1 T	h H	i_2 –	k LB	k_1 –	m BA	m_1 –	m_2 –	n AA	p HD
1PH7, type IM B35, forced ventilation																			
100	1PH7101		202.5 (7.97)	250 (9.84)	160 (6.30)	180 (7.09)	11 (0.43)	215 (8.46)	196 (7.72)	4 (0.16)	100 (3.94)	80 (3.15)	411 (16.18)	435 (17.13)	52 (2.05)	64 (2.52)	27 (1.06)	39 (1.54)	220 (8.66)
	1PH7103																		
	1PH7105		297.5 (11.71)										506 (19.92)	529 (20.83)					
	1PH7107																		
132	1PH7131		265.5 (10.45)	350 (13.78)	216 (8.50)	250 (9.84)	14 (0.55)	300 (11.81)	260 (10.24)	5 (0.20)	132 (5.20)	110 (4.33)	538 (21.18)	561 (22.09)	63 (2.48)	75 (2.95)	33 (1.30)	52 (2.05)	275 (10.83)
	1PH7133																		
	1PH7135		350.5 (13.80)										623 (24.53)	646 (25.43)					
	1PH7137																		
160	1PH7163		346.5 (13.64)	400 (15.75)	254 (10.00)	300 (11.81)	17 (0.67)	350 (13.78)	314 (12.36)	5 (0.20)	160 (6.30)	110 (4.33)	640 (25.20)	663 (26.10)	78 (3.07)	81 (3.19)	42 (1.65)	62 (2.44)	330 (12.99)
	1PH7167		406.5 (16.00)										700 (27.56)	723 (28.46)					

								DE shaft extension				
Shaft height	Type	DIN IEC	n AA	p HD	s K	s_2 S	s_3 –	w_1 C	d D	d_6 –	l E	t GA	u F
100	1PH7101 1PH7103 1PH7105 1PH7107		39 (1.54)	220 (8.66)	12 (0.47)	14 (0.55)	Pg 29	40 (1.57)	**38 (1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
132	1PH7131 1PH7133 1PH7135 1PH7137		52 (2.05)	275 (10.83)	12 (0.47)	18 (0.71)	Pg 36	50 (1.97)	**42 (1.65)**	M16	110 (4.33)	45 (1.77)	12 (0.47)
160	1PH7163 1PH7167		62 (2.44)	330 (12.99)	14 (0.47)	18 (0.71)	Pg 42	64 (2.52)	**55 (2.17)**	M20	110 (4.33)	59 (2.32)	16 (0.63)

For deviating and additional dimensions for 1PH7 motors with DRIVE-CLiQ, see "1PH7 motors with DRIVE-CLiQ".

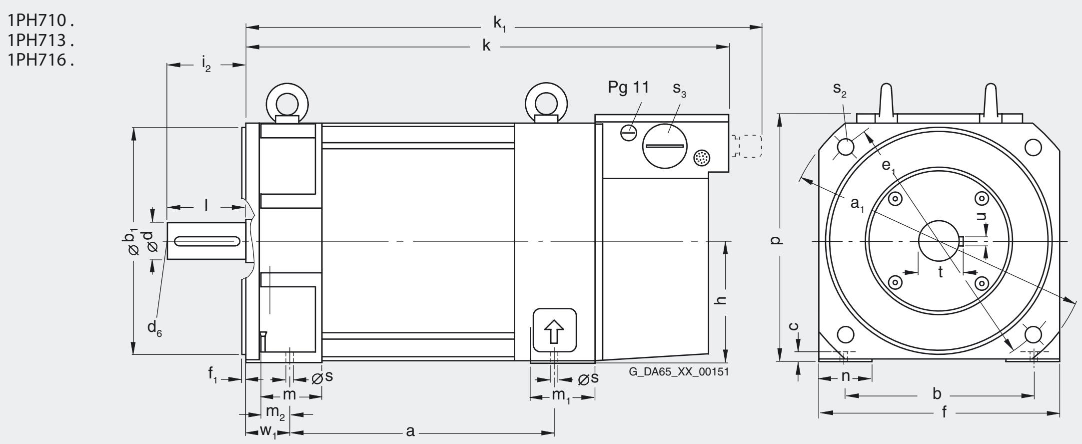
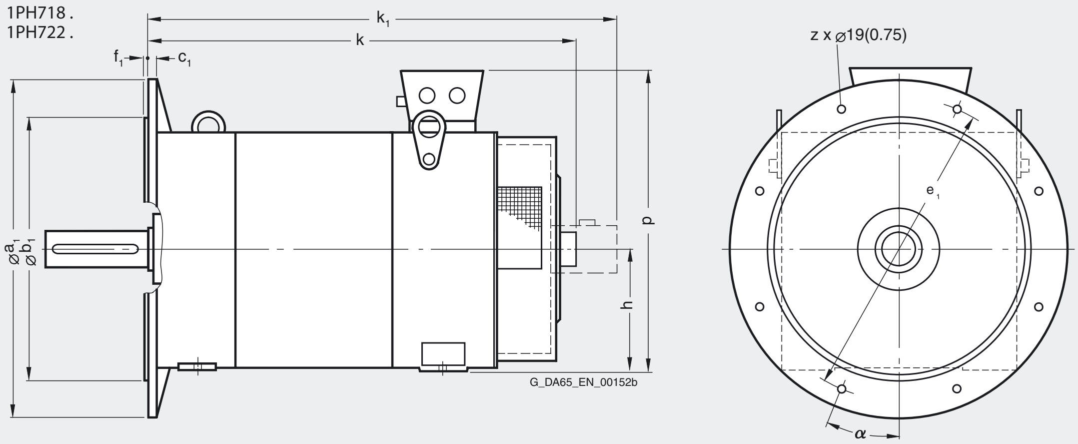


Figure 8-11 1PH7, type of construction IM B35, forced ventilation

For motor		Dimensions in mm (in)									For dimensions of the shaft and terminal box foot installation, see dimension drawing of 1PH718. and 1PH722. motors type IM B3. Terminal box type 1XB7...				
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f_1 T	h H	k LB	k_1 –	...322 p [1)]	...422 p [1)]	...700 p [1)]	z –	α –
1PH7, type IM B35, forced ventilation, air-flow direction DE to NDE															
180	1PH7184 [2)]		400 (15.75)	300 (11.81)	15 (0.59)	350 (13.78)	5 (0.20)	180 (7.09)	835 (32.87)	–	495 (19.49)	–	–	4	45°
	1PH7184 [2)]		450 (17.72)	350 (13.78)	16 (0.63)	400 (15.75)			835 (32.87)			–	–	8	22.5°
	1PH7186								925 (36.42)			560 (22.05)	–		
225	1PH7224		550 (21.65)	450 (17.72)	18 (0.71)	500 (19.69)	5 (0.20)	225 (8.86)	–	1100 (43.31)	595 (23.43)	645 (25.39)	680 (26.77)	8	22.5°
	1PH7226									1200 (47.24)					
	1PH7228									1290 (50.79)		–			

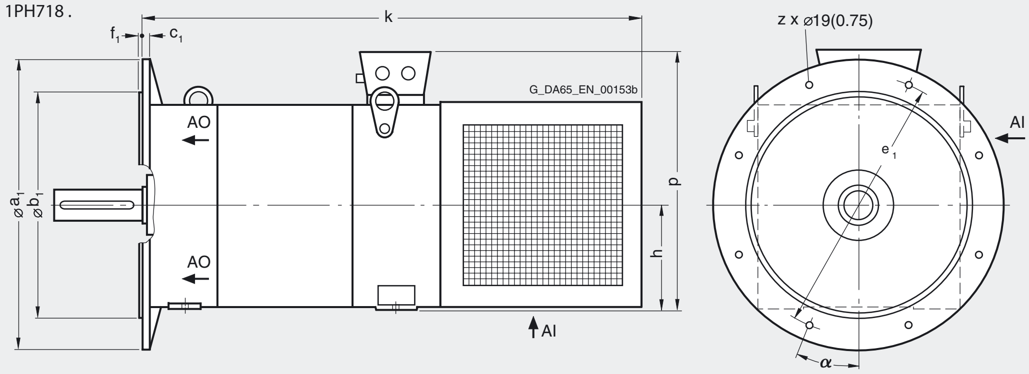


1) Maximum dimensions, depending on electrical version (terminal box type).

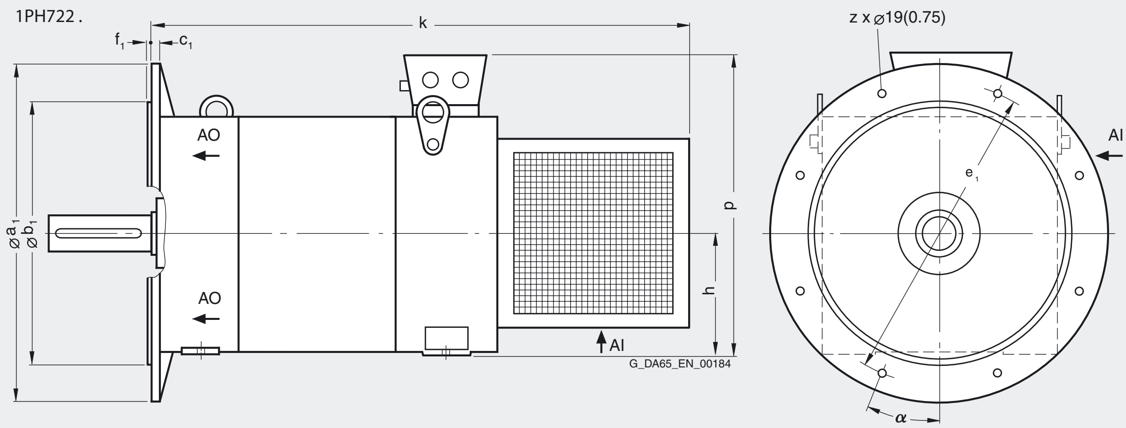
2) See Order No. supplement for shaft heights 180 and 225.

Figure 8-12 1PH7, type of construction IM B35, forced ventilation, direction of air flow DE-NDE

For motor		Dimensions in mm (in)								For dimensions of the shaft and terminal box foot installation, see dimension drawing of 1PH718. and 1PH722. motors type IM B3. Terminal box type 1XB7...				
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f_1 T	h H	k LB	...322 p [1]	...422 p [1]	...700 p [1]	z –	α –
1PH7, type IM B35, forced ventilation, air-flow direction NDE to DE														
180	1PH7184 [2]		400 (15.75)	300 (11.81)	15 (0.59)	350 (13.78)	5 (0.20)	180 (7.09)	1010 (39.76)	495 (19.49)	–	–	4	45°
	1PH7184 [2]		450 (17.72)	350 (13.78)	16 (0.63)	400 (15.75)			1010 (39.76)		–	–	8	22.5°
	1PH7186								1100 (43.31)		560 (22.05)	–		
225	1PH7224		550 (21.65)	450 (17.72)	18 (0.71)	500 (19.69)	5 (0.20)	225 (8.86)	1090 (42.91)	595 (23.43)	645 (25.39)	680 (26.77)	8	22.5°
	1PH7226								1190 (46.85)					
	1PH7228								1280 (50.39)		–			



AI air inlet
AO air outlet

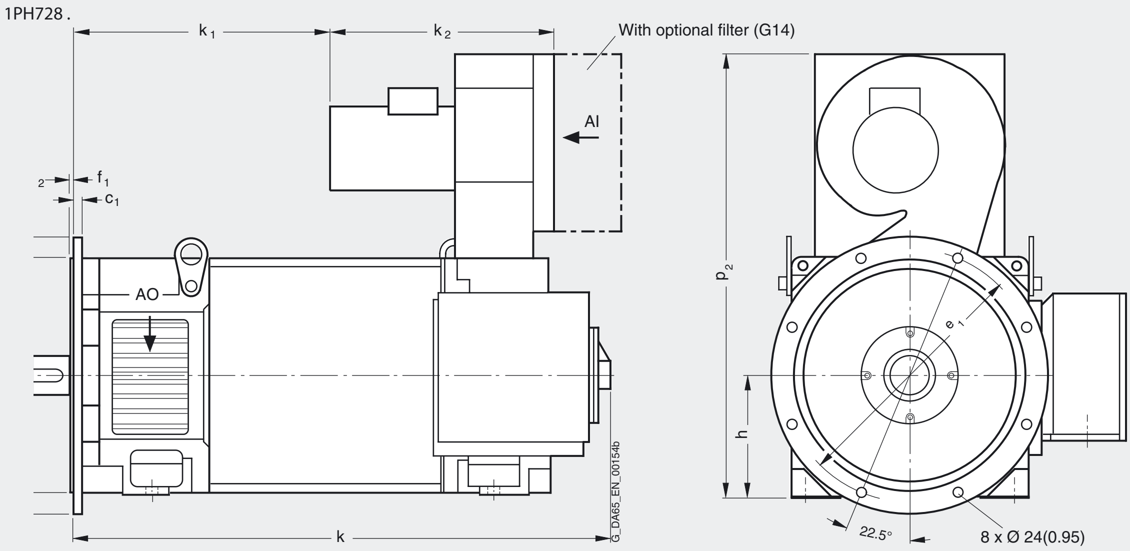


AI air inlet
AO air outlet

1) Maximum dimensions, depending on electrical version (terminal box type).
2) See Order No. supplement for shaft heights 180 and 225.

Figure 8-13 1PH7, type of construction IM B35, forced ventilation, direction of air flow NDE-DE

For motor		Dimensions in mm (in)									For dimensions of the shaft and terminal box foot installation, see dimension drawing of 1PH728. motors type IM B 3.		
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f_1 T	h H	i_2 –	k LB	k_1 –	k_2 –	p_2 –
Type IM B 35, with external fan unit, air-flow direction NDE to DE													
280	1PH7284		660 (25.98)	550 (21.65)	24 (0.94)	600 (23.62)	6 (0.24)	280 (11.02)	170 (6.69)	1146 (45.12)	489 (19.25)	546 (21.50)	1042 (41.02)
	1PH7286									1256 (49.45)	599 (23.58)		
	1PH7288									1386 (54.57)	729 (28.70)		



AI air inlet
AO air outlet

Figure 8-14 1PH7, type of construction IM B35, forced ventilation, direction of air flow NDE-DE

For motor		Dimensions in mm (in)															
Shaft height	Type	DIN IEC	a B	a_1 P	b A	b_1 N	c LA	c_1 –	e_1 –	f AB	f_1 T	h H	k LB	k_1 –	m BA	m_1 –	m_2 –
Type IM B35, with external fan unit, with pipe connection at NDE																	
100	1PH7101 1PH7103		202.5 (7.97)	250 (9.84)	160 (6.30)	180 (7.09)	11 (0.43)	13 (0.51)	215 (8.46)	196 (7.72)	4 (0.16)	100 (3.94)	441 (17.36)	411 (16.18)	52 (2.05)	64 (2.52)	25 (0.98)
	1PH7105 1PH7107		297.5 (11.71)										536 (21.10)	506 (19.92)			
132	1PH7131 1PH7133		265.5 (10.45)	350 (13.78)	216 (8.50)	250 (9.84)	14 (0.55)	17 (0.67)	300 (11.81)	260 (10.24)	5 (0.20)	132 (5.20)	573 (22.56)	538 (21.18)	63 (2.48)	75 (2.95)	30 (1.18)
	1PH7135 1PH7137		350.5 (13.80)										658 (25.91)	623 (24.53)			
160	1PH7163		346.5 (13.64)	400 (15.75)	254 (10.00)	300 (11.81)	17 (0.67)	22 (0.87)	350 (13.78)	314 (12.36)	5 (0.20)	160 (6.30)	674 (26.54)	640 (25.20)	78 (3.07)	81 (3.19)	36 (1.42)
	1PH7167		406.5 (16.00)										734 (28.90)	700 (27.56)			

										DE shaft extension				
Shaft height	Type	DIN IEC	n AA	o –	p HD	s K	s_2 K	s_3 –	v –	w_1 C	d D	d_6 –	l E	t GA	u F
100	1PH710 .		39 (1.54)	161 (6.34)	220 (8.66)	12 (0.47)	14 (0.55)	Pg 29	10.5 (0.41)	40 (1.57)	38 (1.50)	M12	80 (3.15)	41 (1.61)	10 (0.39)
132	1PH713 .		52 (2.05)	211.5 (8.33)	275 (10.83)	12 (0.47)	18 (0.71)	Pg 36	17 (0.67)	50 (1.97)	42 (1.65)	M16	110 (4.33)	45 (1.77)	12 (0.47)
160	1PH716 .		62 (2.44)	253 (9.96)	330 (12.99)	14 (0.55)	18 (0.71)	Pg 42	17 (0.67)	64 (2.52)	55 (2.17)	M20	110 (4.33)	59 (2.32)	16 (0.63)

For deviating and additional dimensions for 1PH7 motors with DRIVE-CLiQ, see “1PH7 motors with DRIVE-CLiQ”.

1PH710 .
1PH713 .
1PH716 .

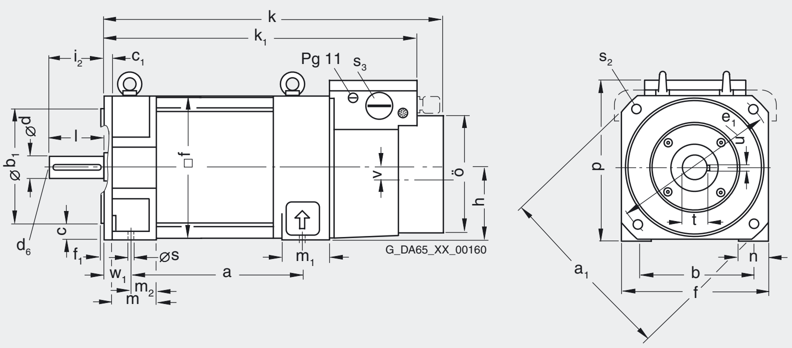


Figure 8-15 1PH7, type of construction IM B35, forced ventilation, with pipe connection, NDE

For motor		Dimensions in mm (in)															
Shaft height	Type	DIN IEC	a B	a_1 P	b A	b_1 N	c LA	e_1 M	f AB	f_1 T	f_2 –	g_2 –	g_3 –	h H	i_2 –	k LB	k_1 –
Type IM B 35, with external fan unit, with brake module																	
100	1PH7101		202.5 (7.97)	250 (9.84)	160 (6.30)	180 (7.09)	11 (0.43)	215 (8.46)	196 (7.72)	4 (0.16)	220 (8.66)	149 (5.87)	224 (8.82)	100 (3.94)	80 (3.15)	541 (21.30)	564 (22.20)
	1PH7103																
	1PH7105		297.5 (11.71)													636 (25.04)	659 (25.94)
	1PH7107																
132	1PH7131		265.5 (10.45)	–	216 (8.50)	250 (9.84)	14 (0.55)	300 (11.81)	260 (10.24)	5 (0.20)	278 (10.94)	174 (6.85)	269 (10.59)	132 (5.20)	110 (4.33)	700 (27.56)	723 (28.46)
	1PH7133																
	1PH7135		350.5 (13.80)													785 (30.91)	808 (31.81)
	1PH7137																
160	1PH7163		346.5 (13.64)	400 (15.75)	254 (10.00)	300 (11.81)	17 (0.67)	350 (13.78)	314 (12.36)	5 (0.20)	327 (12.87)	199 (7.83)	328 (12.91)	160 (6.30)	110 (4.33)	808 (31.81)	831 (32.72)
	1PH7167		406.5 (16.00)													868 (34.17)	891 (35.08)

											DE shaft extension				
Shaft height	Type	DIN IEC	m BA	m_1 –	m_2 –	n AA	p –	s K	s_2 –	s_3 –	w_1 C	d D	d_6 –	l E	t GA	u F
100	1PH7101		52 (2.05)	64 (2.52)	27 (1.06)	39 (1.54)	220 (8.66)	12 (0.47)	14 (0.55)	Pg 29	170 (6.69)	**38 (1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1PH7103 1PH7105 1PH7107															
132	1PH7131		63 (2.48)	75 (2.95)	33 (1.30)	52 (2.05)	275 (10.83)	12 (0.47)	18 (0.71)	Pg 36	212 (8.35)	**42 (1.65)**	M16	110 (4.33)	45 (1.77)	12 (0.47)
	1PH7133 1PH7135 1PH7137															
160	1PH7163		78 (3.07)	81 (3.19)	42 (1.65)	62 (2.44)	330 (12.99)	14 (0.55)	18 (0.71)	Pg 42	232 (9.13)	**55 (2.17)**	M20	110 (4.33)	59 (2.32)	16 (0.63)
	1PH7167															

For deviating and additional dimensions for 1PH7 motors with DRIVE-CLiQ, see "1PH7 motors with DRIVE-CLiQ".

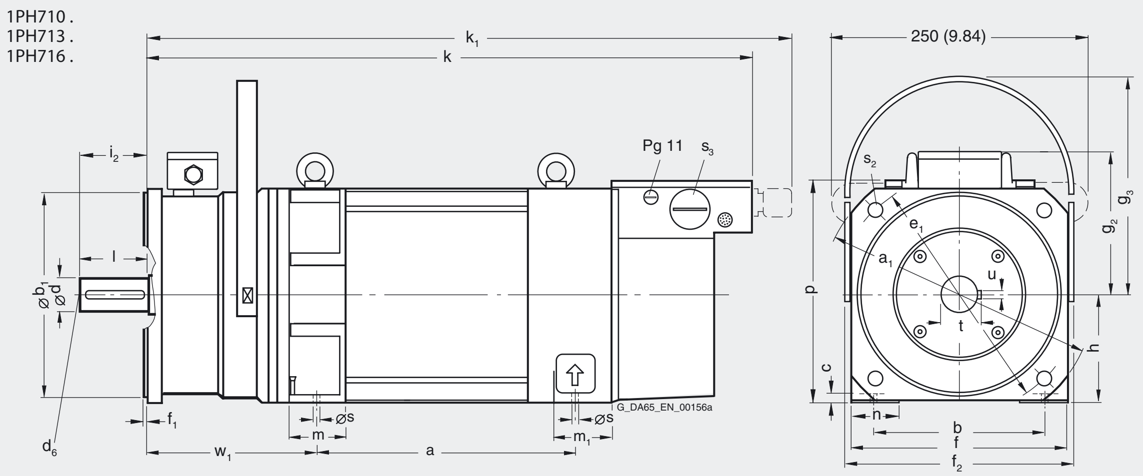


Figure 8-16 1PH7, type of construction IM B35, forced ventilation, with braking module

For motor		Dimensions in mm (in)					
Shaft height	Type	DIN IEC	k LB	k_1 –	p_1 –	x –	y –
Deviating and additional dimensions for 1PH7 motors with DRIVE-CLiQ to those given in dimension tables 1PH7, forced ventilation							
100	1PH7101 1PH7103		411 (16.18)	453 (17.83)	81 (3.19)	52.5 (2.07)	63.5 (2.50)
	1PH7105 1PH7107		506 (19.92)	548 (21.57)			
132	1PH7131 1PH7133		538 (21.18)	580 (22.83)	103.5 (4.07)	66 (2.60)	63.5 (2.50)
	1PH7135 1PH7137		623 (24.53)	665 (26.18)			
160	1PH7163		640 (25.20)	682 (26.85)	127 (5.00)	75 (2.95)	63.5 (2.50)
	1PH7167		700 (27.56)	742 (29.21)			

1PH710 .
1PH713 .
1PH716 .

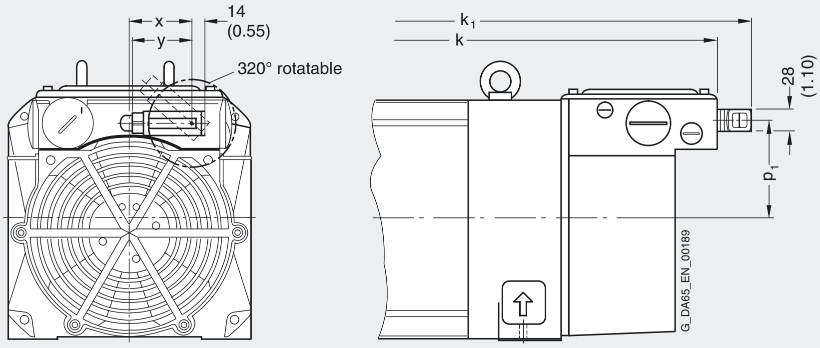


Figure 8-17 Deviating and additional dimensions for 1PH7 motors with DRIVE-CLiQ to those given in dimension tables 1PH7, forced ventilation

Appendix A

A.1 References

An overview of publications that is updated monthly is provided in a number of languages in the Internet at:

<http://www.siemens.com/motioncontrol>
through "Support", "Technical Documentation", "Documentation Overview"

General Documentation

/D 21.1/ **SINAMICS S120 Catalog**
Built-in converter units
0.12 kW to 1200 kW

/NC 60/ **SINUMERIK and SIMODRIVE Catalog**
Automation Systems for Machine Tools

/NC 61/ **SINUMERIK and SINAMICS Catalog**
Automation Systems for Machine Tools

/DA65.3/ **SIMOVERT MASTERDRIVES Catalog**
Synchronous and Induction Motors for SIMOVERT MASTERDRIVES

Electronic Documentation

/CD1/ **DOC ON CD**
The SINUMERIK System
(includes all SINUMERIK 840D/810D and SIMODRIVE 611D)

/CD2/ **DOC ON CD**
The SINAMICS System

Manufacturer/Service Documentation

/PJAL/ **Configuration Manual, Synchronous Motors**
SIMODRIVE 611, SIMOVERT MASTERDRIVES MC
Synchronous Motors General Section

/PFK7S/ **Configuration Manual, Synchronous Motors**
SINAMICS S120
1FK7 Synchronous Motors

/PFT6S/ **Configuration Manual, Synchronous Motors**
SINAMICS S120
1FT6 Synchronous Motors

/PMH2/ **Configuration Manual, Hollow-Shaft Measuring System**
SINAMICS S120, SIMODRIVE 611, SIMOVERT MASTERDRIVES,
SIMAG H2 Hollow-Shaft Measuring System

/PFK7/ **Configuration Manual, Synchronous Motors**
SIMODRIVE 611, SIMOVERT MASTERDRIVES
1FK7 Synchronous Motors

/PFT6/ **Configuration Manual, Synchronous Motors**
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/ASAL/ **Configuration Manual, Induction Motors**
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1PH2 Induction Motors

/APH4/ **Configuration Manual, Asynchronous Motors**
SIMODRIVE 611
1PH4 Induction Motors

/APH7/ **Configuration Manual, Asynchronous Motors**
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Hollow Shaft Motors for Main Spindle Drives
1PM6 and 1PM4

/PJFE/ **Configuration Manual, Synchronous Build-in Motors**
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1FE1 Synchronous Build-in Motors

/PJTM/ **Configuration Manual, Build-in Torque Motors**
SIMODRIVE 611
Build-in Torque Motors 1FW6

/PJLM/ **Configuration Manual, Linear Motors**
SIMODRIVE 611
Linear Motors 1FN1 and 1FN3

/PMS/ **Configuration Manual, ECS Motor Spindle**
SIMODRIVE 611
ECS Motor Spindle 2SP1

/APL6/ **Configuration Manual, Asynchronous Motors**
SIMOVERT MASTERDRIVES VC/MC
Induction Motors 1PL6

/APH7M/ **Configuration Manual, Asynchronous Motors**
SIMOVERT MASTERDRIVES VC/MC
Induction Motors 1PH7

/PKTM/ **Configuration Manual, Complete Torque Motors**
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