Planning Guide 12/2004 Edition

simovert masterdrives

SIMOVERT MASTERDRIVES VC/MC
Induction Motors 1PH7

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SIMOVERT
MASTERDRIVES VC/MC

Induction Motors
1PH7

Planning Guide

12.2004 Edition

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Designation of the documentation

Printing history

Brief details of this edition and previous editions are listed below.

The status of each edition is shown by the code in the ”Remarks” column.

Status code in the ”Remarks” column:

A . . . . . New documentation
B . . . . . Unrevised reprint with new Order No.
C . . . . . Revised edition with new status

Edition	Order No. for 1PH7 MASTERDRIVES	Remarks
12.04	6SN1197–0AC66–0BP0	**A**

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Foreword

Information on the documentation

This document is part of the Technical Customer Documentation which has been developed for the MASTERDRIVES drive converter system. All of the documents are available individually. The documentation list, which includes all Advertising Brochures, Catalogs, Overview, Short Descriptions, Operating Instructions and Technical Descriptions with order number, ordering address and price can be obtained from your local Siemens office.

This document does not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

We would also like to point–out that the contents of this document are neither part of nor modify any prior or existing agreement, commitment or contractual relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein neither create new warranties nor modify the existing warranty.

Structure of the documentation for 1PH and 1PL motors

The complete Planning Guides for 1PH and 1PL motors can be ordered in paper form.

Table 1-1 Planning Guide with General Section and 1PH and 1PL6 motors

Title	Order number (MLFB)	Language
Induction Motors, 1PH and 1PL6	6SN1197–0AC61–0**A**P0	German
Induction Motors, 1PH and 1PL6	6SN1197–0AC61–0**B**P0	English

The General Section and the individual motor series are also separately available.

Table 1-2 Planning Guide, individual sections

Title	Order number (MLFB)	Language
Induction Motors, General Section for SIMODRIVE and SIMOVERT MASTERDRIVES	6SN1197–0AC62–0AP0	German
Induction Motors, Motor Section 1PH2	6SN1197–0AC63–0AP0	German
Induction Motors, Motor Section 1PH4	6SN1197–0AC64–0AP0	German
Induction Motors, 1PH7 Motor Section for SIMODRIVE	6SN1197–0AC65–0AP0	German
Induction Motors, 1PH7 Motor Section for SIMOVERT MASTERDRIVES VC/MC	6SN1197–0AC66–0AP0	German
Induction Motors, 1PL6 Motor Section for SIMOVERT MASTERDRIVES VC/MC	6SN1197–0AC67–0AP0	German

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If you have any questions regarding the documentation (suggestions, corrections) then please send a fax to the following number:
+49 (9131) 98–2176

Fax form: Refer to the response sheet at the end of the document

Engineering software

The PATH Plus engineering software provides and user–friendly engineering software.

The program can be used to simply engineer AC converter drives from the SIMOVERT MASTERDRIVES Vector Control and Motion Control families thus saving considerable amounts of time.

PATH plus is a powerful engineering tool that supports the user in all of the engineering steps – from the supply to the motor.

Order No. for the full version of PATH Plus: 6SW1710–0JA00–2FC0.

Note

Not for CAT client systems! You can obtain the CAT client version of PATH Plus from your system administrator.

Definition of qualified personnel

For the purpose of this document and product labels, a qualified person is a person who is familiar with the installation, mounting, start–up and operation of the equipment and hazards involved. He or she must have the following qualifications:

- Trained and authorized to energize/de–energize, circuits and equipment in accordance with established safety procedures.
- Trained in the proper care and use of protective equipment in accordance with established safety procedures.
- First aid training.

Explanation of symbols

The following danger and warning concept is used in this document:

Danger

This symbol is always used if death, severe personal injury or substantial material damage **will** result if proper precautions are not taken.

Warning

This symbol is always used if death, severe personal injury or substantial material damage **can** result if proper precautions are not taken.

Caution

This symbol is always used if minor personal injury or material damage **can** result if proper precautions are not taken.

Caution

The warning note (without a warning triangle) means that material damage **can** occur if proper precautions are not taken.

Notice

This warning note indicates that an undesirable result or an undesirable status **can** occur if the appropriate information is not observed.

Note

In this document, it can be advantageous to observe the information provided in a Note.

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 SIMOVERT MASTERDRIVES units and induction motors.
- This personnel must carefully observe the technical customer documentation belonging to 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.
- Hazardous axis motion can occur when working with the equipment.
- All work must be undertaken with the system in a no–voltage condition (powered–down).
- SIMOVERT MASTERDRIVES drive units have been designed for operation on low–ohmic grounded line supplies (TN line supplies). For additional information please refer to the appropriate documentation for the drive converter systems.

Warning

- Perfect and safe operation of these units and motors assumes professional transport, storage, mounting and installation as well as careful operator control and servicing.
- The information provided in catalogs and quotations additionally applies to special versions of units and motors.
- In addition to the danger and warning information/instructions in the technical customer documentation supplied, the applicable domestic, local and plant–specific regulations and requirements must be carefully taken into account.

Caution

- The motors can have surface temperatures of over +100° C.
- This is the reason that temperature–sensitive components, e.g. cables or electronic components may neither be in contact nor be attached to the motor.
- When handling cables, please observe the following:
  - They may not be damaged,
  - they may not be stressed,
  - they cannot come into contact with rotating parts.

Caution

- Motors should be connected–up according to the circuit diagram provided. The motors may not be directly connected to the line supply.
- SIMOVERT MASTERDRIVES drive units with AC 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 SIMOVERT MASTERDRIVES drive unit connections must be disconnected/withdrawn in order to avoid damaging the SIMOVERT MASTERDRIVES drive units.

Notes

- SIMOVERT MASTERDRIVES units with AC motors fulfill, when operational and in dry operating rooms, the Low–Voltage Directive 73/23/EEC.
- SIMOVERT MASTERDRIVES units with AC motors fulfill, in the configuration specified in the associated EC Declaration of Conformity, the EMC Directive 89/336/EEC.

ESDS information and instructions

Caution

An **E**lectro**S**tatic **S**ensitive **D**evice (ESDS) is an individual component, integrated circuit, or module that can be damaged by electrostatic fields or discharges.

Handling ESDS boards:

- When handling components which can be destroyed by electrostatic discharge, it must be ensured that personnel, the workstation and packaging are well grounded!
- Electronic boards may only be touched by personnel in ESDS areas with conductive flooring if
  - they are grounded with an ESDS bracelet
  - they are 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 >10 cm).
- Measuring work may only be carried–out on the electronic boards, if
  - the measuring unit is grounded (e.g. via a protective conductor) or
  - when floating measuring equipment is used, the probe is briefly discharged before making measurements (e.g. a bare–metal control housing is touched).

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Motor Description

1

1.1 Features

Overview

The 1PH7 induction 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.

The motors were specifically developed for operation with SIMOVERT MASTERDRIVES Vector Control and Motion Control drive systems. 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.

Frame sizes 100 to 160

Frame sizes 180 to 225

Frame size 280 onwards

Fig. 1-1 1PH7 three–phase motors

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 cantilever force quality, even at the lowest speeds
- High smooth running characteristics, even at the lowest speeds
- Integrated encoder system to sense the motor speed, connected using a connector
- Terminal box to connect–up the power cable
- The motor temperature is monitored using a KTY 84
- Variable cooling versions
- 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 gears and closing gears for cranes
  - Hoisting and traversing gears for high–bay racking vehicles
- Printing industry
  - Single– and main drives for printing machines
- Manufacture of rubber, plastic, wire and glass
  - Drives for extruders, calenders, rubber injection machines, foil machines, assembly units, fleece plants
  - Wire–drawing machines, wire–stranding machines, etc.
- General applications such as coilers and winder drives

Standards, regulations

The appropriate standards, regulations are directly assigned to the functional requirements.

1.2 Technical design

Table 1-1 Design features

Technical features	Version
Motor type	Induction motor
Type of construction (acc. to EN 60034–7; IEC 60034–7)	IM B3 (options, refer to Chapter 1.4)
Degree of protection (acc. to EN 60034–5; IEC 60034–5)	IP55 (fan IP54)
Cooling (acc. to EN 60034–6; IEC 60034–6)	Force ventilation SH 100 to 225: Fan mounted axially at the NDE SH 280: Fan mounted radially at the NDE
Fan supply voltage (data, refer to Chapter 2.1.2)	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 rise class F for a cooling medium temperature of +40 °C
Temperature monitoring (acc. to EN 60034–11; IEC 60034–11)	KTY84 temperature sensor in the stator winding for SH 280: Additional KTY 84 as reserve
Motor voltage	SH 100 to 280: 3–ph. 400 V AC 3–ph. 480 V AC 3–ph. 690 V AC (SH 280)
Sound pressure level (acc. to ISO1680–1; EN 21680) tolerance + 3 dB	Shaft height — Air flow 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	Signal connectors (mating connector is not included in the scope of supply) Terminal box for power SH 100 to 225: Top–mounted terminal box SH 280: Terminal box, NDE right
Speed encoder, integrated	• Incremental encoder HTL 1024 pulses/revolution or 2048 pulses/revolution • Incremental encoder sin/cos 1 Vpp 2048 pulses/revolution • Absolute value encoder EnDat 2048 pulses/revolution • Resolver 2–pole
Balancing (acc. to IEC 60034–14)	Standard: Half–key balancing, Code: H at the shaft face refer to options

Table 1-1 Design features, continued

Technical features	Version
Shaft end (acc. to DIN 748–3; IEC 60072–1)	with keyway and key (option, refer to Chapter 1.4)
Bearing version DE (Standard)	SH 100 to 160: for belt and coupling out–drives: Deep–groove ball bearings SH 180 to 280 for coupling out–drive: Deep–groove ball bearings for belt out–drive or increased cantilever forces: Cylindrical–roller bearings
Radial eccentricity, concentricity and axial eccentricity (acc. to DIN 42955, IEC 60072–1)	SH 100 to 160: Tolerance stage R (reduced) SH 180 to 280: Tolerance stage N (normal)
Vibration severity level (acc. to EN 60034–14, IEC 60034–14)	SH 100 to 225: Stage R (reduced) SH 280: Stage N (normal)
Installation height above sea level (acc. to EN 60034–1, IEC 60034–1)	≤ 1000 m above sea level, otherwise power de–rating (refer to Chapter 1.6)
Paint finish	SH 100 to 160: Without paint finish, Standard paint finish, anthracite RAL 7016 SH 180 to 280: With primer, Standard paint finish, anthracite RAL 7016 Options, refer to Chapter 1.4
Documentation supplied with the motors	Operating instructions (German, English, French, Italian, Swedish, Spanish)
Options	Refer to the selection and ordering data, Z options (table, options)

Options

Code	Option description	In 1PH7 Asynchronous Servo Motor Type:		
		SH 100 to 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	690 V winding	–	–	■
G14	Fan group with air filter	–	●	■
G80	POG 10 pulse encoder, prepared attachment	–	–	■
K08	Encoder connector attachment facing	–	–	■
K16	Additional normal shaft end (only available with no encoder)	–	–	■
K31	2nd rating plate comes unattached in terminal box	Standard	■	■
K40	Relubrication, drive end and non-drive end	–	■	Standard
K45	230 V standstill heating	–	–	■
K55	Customer-specific entry plate for terminal box (plain text required)	–	■	■
K83	Terminal box rotation by + 90 degrees (from standard position)	–	–	■
K84	Terminal box rotation by - 90 degrees (from standard position)	–	–	■
K85	Terminal box rotation by +180 degrees (from standard position)	–	–	■
L27	Insulated non-drive end bearing	–	■	Standard
M03	Design for Zone 2 hazardous areas (in accordance with EN 50021/IEC 60079-15)	■	–	–
M39	Design for Zone 22 hazardous areas (in accordance with EN 50281/IEC 61241)	■	■	■
M83	Additional pulling thread on motor feet	–	–	■
Y55	Atypical shaft end, drive side	●	●	●
Y80	Different rating plate data (plain text required)	●	●	●
Y82	Additional plate with customer information	●	●	●

■ Option available
● On request
– Not available

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1) Ordered using a code (without plain text):
X01:RAL 9005 (jet 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).

1.3 Permissible combination of mechanical versions

Table 1-2 Matrix for options and assignments for shaft height 280

Order No. [MLFB]												**Possibilities of assigning the Order No. [MLFB]**																			
1P.. 284	**–**	**8**	**9**	**10**	**11**	**12**	**–**	**13**	**14**	**15**	**16**	–	**8** Separately–driven fan							**11** Terminal box				**12** Constr. type				**14** Drive type			
1P.. 286																															
1P.. 288													**0**	**1**	**2**	**3**	**4**	**5**	**6**	**0**	**1**	**2**	**5**	**0**	**1**	**3**	**5**	**A**	**B**	**E**	**F**
													B side, **top** NDE —>DE	**B** side, **right** NDE—> DE	**B** side, **left** NDE—> DE	**A** side, **top** DE —> NDE	**A** side, **right** DE—> NDE	**A** side, **left** DE —> NDE	**Single pipe connec. NDE right** (changeover on NDE left can be subsequently possible)	**B**side, **right** Cable gland bottom, Encoder connector DE	**B** side, **left** Cable gland bottom, Encoder connector DE	**B** side, **top** Cable glandright, Encoder connector DE	**A** side, **top** Cable gland right, Encoder connector NDE	Type of construction **IM B3**	Type of construction **IM V5** (IM V6)	Type of construction **IM B35**	Type of construc. **IM V15** (IM V36)	**Coupling N/N**	**Coupling R/R**	**Belts/incr. cantilever forces N/N**	**Belts/incr. cantilever forces R/R**
	–	.	.	.	.	0 🟦	–	IM B3 type of construction					🟦							🟦	🟧		🟧					🟦	🟧	🟧	🟧
						🟦								🟧							🟧	🟧	🟧					🟦	🟧	🟧	🟧
						🟦									🟧					🟦		🟧	🟧					🟦	🟧	🟧	🟧
						🟦										🟧						🟧						🟦	🟧	🟧	🟧
						🟦											🟧					🟧						🟦	🟧	🟧	🟧
						🟦												🟧				🟧						🟦	🟧	🟧	🟧
						🟦													🟧			🟧	🟧					🟦	🟧	🟧	🟧
	–	.	.	.	.	1 🟩	–	Type of construction IM V5					🟦							🟦	🟧		🟧					🟦	🟧		
						🟩		(can be subsequently changed–over						🟧							🟧	🟧	🟧					🟦	🟧		
						🟩		to IM V6)							🟧					🟦		🟧	🟧					🟦	🟧		
						🟩										🟧				🟦	🟧	🟧						🟦	🟧		
						🟩											🟧			🟦	🟧	🟧						🟦	🟧		
						🟩												🟧		🟦	🟧	🟧						🟦	🟧		
						🟩													🟧			🟧	🟧					🟦	🟧		
	–	.	.	.	.	3 🟩	–	IM B35 type of construction					🟦							🟦	🟧							🟦	🟧	🟧	🟧
						🟩								🟧							🟧	🟧						🟦	🟧	🟧	🟧
						🟩									🟧					🟦		🟧						🟦	🟧	🟧	🟧
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						🟩													🟧			🟧						🟦	🟧	🟧	🟧
	–	.	.	.	.	5 🟩	–	Type of construction IM V15					🟦							🟦	🟧							🟦	🟧		
						🟩		(can be subsequently changed–over						🟧							🟧	🟧						🟦	🟧		
						🟩		to IM V36)							🟧					🟦		🟧						🟦	🟧		
						🟩										🟧				🟦	🟧	🟧						🟦	🟧		
						🟩											🟧			🟦	🟧	🟧						🟦	🟧		
						🟩												🟧		🟦	🟧	🟧						🟦	🟧		
						🟩													🟧			🟧						🟦	🟧		
Z options																															
R1Y Normal paint finish RAL ...													🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧
R2Y Special paint finish RAL ...													🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧
G14 **with air filter**													🟧	🟧	🟧	🟧	🟧	🟧													
K08 **Encoder connector mounted opposite**																				🟧	🟧	🟧									
K55 **Cable entry plate, terminal box, customer–specific** (plain text is required)																				🟧	🟧	🟧	🟧								
K83 Terminal box rotated through + 90 degrees (basis is standard)																				🟧	🟧	🟧									
K84 Terminal box rotated through –90 degrees (basis is standard)																				🟧	🟧	🟧	🟧								
K85 Terminal box rotated through 180 degrees (basis is standard)																				🟧	🟧	🟧	🟧								
K16 Second standard shaft end (only possible if there is no encoder)																								🟧		🟧		🟧	🟧		
K31 Second rating plate													🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧
K45 230 V anti–condensation heating													🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧
C30 690 V version													🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧
Y55 Non–standard shaft end DE																												🟧	🟧	🟧	🟧
Y80 Different rating plate data (plain text is required)													🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧
Y81 Non–standard fan motor voltage													🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧
M83 Additional thread for a setting screw at the motor feet																								🟧		🟧					
													🟦	🟦		**Standard**															
													🟩	🟧		**Supplementary versions that have been released**															

1.4 Order number

Motor type, design features and additional data are coded in the Order number.

Order number for SH 100 to 160

1 P H 7 . . . – . . . . . – . . . .

Frame size

Separately–driven fan 3–ph. 400 V AC 50Hz/60 Hz or
3–ph. 480 V AC/60 Hz
2 = with separately–driven fan, PG cable gland
6 = without separately–driven fan for pipe connection, PG cable gland
7 = with separately–driven fan, metric cable gland acc. to EN 50262
8 = without separately–driven fan for pipe connection, metric cable gland acc. to EN50262

Encoder
A = without encoder
E = absolute value encoder (EnDat, 2048 pulses/rev)
H = incremental encoder HTL (1024 pulses/rev)
J = incremental encoder HTL (2048 pulses/rev)
M = incremental encoder sin/cos 1Vpp (with C and D tracks)
N = incremental encoder sin/cos 1Vpp (without C and D tracks)
R = resolver 2–pole

Rated speed

Cable entry direction (top of the terminal box, when view the DE)
0 = from the right,
2 = from NDE,
3 = from the left

Type of construction
0 = IM B3 (IM V5, IM V6)
2 = IM B5 (IM V1, IM V3) (only for SH 100 and SH 132)
3 = IM B35 (IM V5, IM V36)

Holding brake with Emergency Stop function (1)
0 = no brake

Brake supply voltage 230 V AC 50/60 Hz
1 = with brake
2 = with brake (brake has a micro–switch)
3 = with brake (brake has a manual release function)
4 = with brake (brake has a micro–switch and manual release function)

Brake supply voltage 24 V DC
5 = with brake
6 = with brake (brake has a micro–switch)
7 = with brake (brake has a manual release function)
8 = with brake (brake has a micro–switch and manual release function)

see next page

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1) Version with brake:
12th position ”2” or ”3”,
14th position ”K”,
15th position ”A”, ”B”, ”J” or ”K”,
16th position ”0”, ”3” or ”6”

Order number for SH 100 to 160, continued

1	P	H	7	.	.	.	–	.	.	.	.	.	–	.	.	.	.

	Drive type	Vibration severity level	Shaft and flange accuracy
B =	coupling and belt	R	R
C =	coupling and belt	S	R
D =	coupling and belt	SR	R
K =	coupling and belt	N	N (only for a mounted brake)
L =	increased maximum speed 1)	SR	R

Air flow direction		shaft end
A =	DE ” NDE	with key, half–key balancing
B =	NDE ” DE 2)	with key, half–key balancing
C =	DE ” NDE	with key, full–key balancing
D =	NDE ” DE 2)	with key, full–key balancing
J =	DE ” NDE	smooth
K =	NDE ” DE 2)	smooth

Pain finish
0 = with primer
2 = with primer, flange and radial shaft seal3)
3 = anthracite, standard paint finish
5 = anthracite, standard paint finish, flange with radial shaft seal 3)
6 = anthracite, special paint finish
8 = anthracite, special paint finish, flange with radial shaft seal 3)

Special versions
–Z = code or specify in plain text

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1) Maximum, possible speed
SH 100: 12000 RPM, SH 132: 10000 RPM, SH 160: 8000 RPM only with smooth shaft
(15th position = J or K)

2) Preferred air cooling in dirty environments

3) Version, prepared for ZF gearboxes:
12th position ”2” or ”3”, 13th position ”0”, 14th position ”B”, 15th position ”C” or ”D”,
16th position ”2”, ”5” or ”8”. It is not permissible that liquid collects at the shaft outlet.

Order number for SH 180 and 225

1 P H 7 . . . – . . . . . – . . . .

Frame size

Separately–driven fan
2 = with separately–driven fan
6 = without separately–driven fan for pipe connection
7 = with separately–driven fan, metric cable gland acc. to EN 50262
8 = without separately–driven fan for pipe connection, metric cable gland acc. to EN 50262

Encoder
A = without encoder
E = absolute value encoder (EnDat, 2048 pulses/rev)
H = incremental encoder HTL (1024 pulses/rev)
J = incremental encoder HTL (2048 pulses/rev)
M = incremental encoder sin/cos 1Vpp (with C and D tracks)
N = incremental encoder sin/cos 1Vpp (without C and D tracks)
R = resolver 2–pole

Rated speed

Cable entry direction (top of the terminal box, when viewing the DE)
0 = from the right,
1 = from DE,
2 = from NDE
3 = from the left

Type of construction
0 = IM B3
1 = IM B3 Lifting concept for different types of construction (IM B6, IM B7, IM B8, IM V5, IM V6)

3 = IM B35 (only for 1PH7184 with flange A400)
4 = IM B35 (only for 1PH7184 with flange A450)
3 = IM B35 (for 1PH7186 with flange A450 and 1PH722V with flange A550)
5 = IM B35 (only for 1PH7184 with flange A400)(2)
6 = IM B35 (only for1PH7184 with flange A450)(2)
5 = IM B35 (for 1PH7186 with flange A450 and 1PH722V with flange A550)(2)

Holding brake with emergency stop function (1)
(suitable for coupling out–drive with type of construction IM B3)
0 = no brake
2 = with brake (brake has a micro–switch)
4 = with brake (brake has a micro–switch and manual release function)

see next page

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1) Version with brake:
12th position ”0”,
14th and 15th position ”A”,
16th position ”0”, ”3” or ”6”

2) Lifting concept for different types of construction (IM V15, IM V 36)

Order number for SH 180 and 225, continued

1 P H 7 . . . – . . . . . – . . . .

Drive type		Vibration severity level	Shaft and flange accuracy
A =	Coupling	R	N
B =	Coupling	R	R
C =	Coupling	S	R
D =	Coupling	SR	R
E =	Belt	R	N
F =	Belt	R	R
G =	Increased cantilever forces	R	N
H =	Increased cantilever forces	R	R
J =	Increased maximum speed 1)	S	R

Air flow direction		shaft end
A =	DE ” NDE	with key, half–key balancing
B =	NDE ” DE 2)	with key, half–key balancing
C =	DE ” NDE	with key, full–key balancing
D =	NDE ” DE 2)	with key, full–key balancing
J =	DE ” NDE	smooth
K =	NDE ” DE 2)	smooth

Pain finish
0 = with primer
2 = with primer, suitable for mounting a ZF gearbox3)
3 = anthracite, standard paint finish
5 = anthracite, standard paint finish, suitable for mounting a ZF gearbox3)
6 = anthracite, special paint finish
8 = anthracite, special paint finish, suitable for mounting a ZF gearbox 3)

Special versions
–Z = code or specify in plain text

---

1) For frame size 180 n_{max} = 7000 RPM, 1PH7224 n_{max} = 5500 RPM, only coupling–out drive is possible

2) Preferred air cooling in dirty environments

3) Version prepared for mounting a ZF gearbox:
Only for types 1PH7 184, 186 and 224, 12th position ”3” or ”5”, 13th position ”0”, 14th position ”B”, 15th position ”C”, 16th position ”2”, ”5” or ”8”.
It is not permissible that liquid collects at the shaft outlet.

Order number for SH 280 and 225

1 P H 7 . . . – . . . . . – 0 . . .

Induction motor

Frame size

Separately–driven fan[1]
0 = with separately–driven fan, NDE at the top, air flow direction, NDE to DE
1 = with separately–driven fan, NDE at the right, air flow direction, NDE to DE
2 = with separately–driven fan, NDE at the left, air flow direction, NDE to DE
3 = with separately–driven fan, DE at the top, air flow direction, DE to NDE
4 = with separately–driven fan, DE at the right, air flow direction, DE to NDE
5 = with separately–driven fan, DE at the left, air flow direction, DE to NDE
6 = without separately–driven fan, for a single pipe connection at the NDE, right

Encoders
A = without encoder
E = absolute value encoder (EnDat, 2048 pulses/rev)
H = incremental encoder HTL (1024 pulses/rev)
J = incremental encoder HTL (2048 pulses/rev)
M = incremental encoder sin/cos 1Vpp (with C and D tracks)
N = incremental encoder sin/cos 1Vpp (without C and D tracks)

Terminal box/cable entry direction (when viewing the DE)[1]
0 = terminal box, NDE right/cable entry below/encoder connector DE
1 = terminal box NDE left/cable entry below/encoder connector DE
2 = terminal box NDE top/cable entry right/encoder connector DE
5 = terminal box, DE top/cable entry right/encoder connector NDE

Types of construction[1]
0 = IM B3
1 = IM V5 (can be subsequently changed–over to IM V6)
3 = IM B35 (with flange A660)
5 = IM V15 (with flange A 660; can be subsequently changed–over to IM V36)

Drive type[1]		Vibration severity level	Shaft and flange accuracy
A =	Coupling	N	N
B =	Coupling	R	R
E =	Belts/increased cantilever forces	N	N
F =	Belts/increased cantilever forces	R	R

Shaft ends
A = with key, half key balancing
C = with key, full key balancing
J = smooth shaft

Paint finishes
0 = with primer
3 = anthracite, standard paint finish (RAL 7016)
6 = anthracite, special paint finish (RAL 7016)

Special versions
–Z = code or specify in plain text

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1) For possible combinations, refer to Table 1-2

1.5 Rating plate data

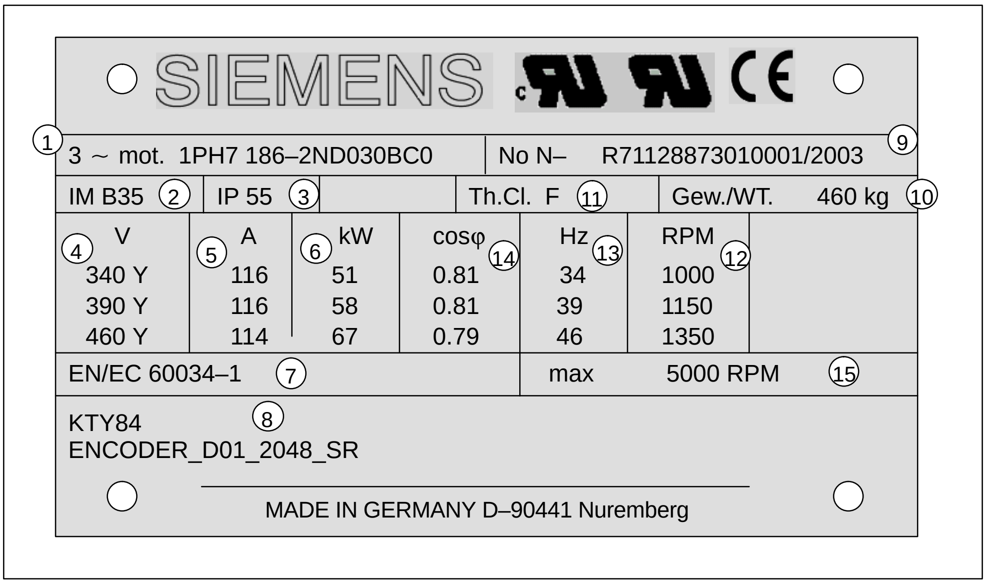

Fig. 1-2 Rating plate (example for 1PH7186)

Table 1-3 Description of the rating plate data

Item	Description/technical data
1	Motor type: Induction motor
2	Type of construction
3	Degree of protection
4	Rated voltage [V] and winding configuration
5	Rated current [A]
6	Rated power [kW]
7	Standards and regulations
8	Code, encoder type, temperature sensor
9	Ident. No., production number
10	Motor weight [kg]
11	Temperature rise class
12	Rated speed [RPM]
13	Rated frequency [Hz]
14	Power factor [cosφ]
15	Maximum speed [RPM]

1.6 Cooling

Note

1PH7 motors are forced–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 the hot discharged air is drawn in again.

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

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Caution

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

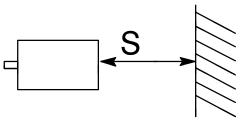
Mounting a fan and minimum clearance to the customers mounted parts and components

Table 1-4 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 observed and maintained (refer to Table 1-5).

Table 1-5 Minimum clearances

Shaft height [mm]	Clearance to the customer’s mounted parts and components [mm]	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 1-6 Air flow rate, air flow direction and air discharge

Shaft height [**mm**]	**Air flow direction**	**Air flow rate required** [$\mathbf{m^3/s}$]	**Air discharge**	**Pressure drop (△p) [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	

For air–cooled motors, the cooling ducts, through which the ambient air flows, should 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.

Note

If the ambient air has particles of dust or similar substances, then when the drive is selected, it is preferable if the air flow direction is NDE –> DE (refer to the Table 1-6)

Please refer to the Operating Instructions for details.

Cooling conditions for motors with pipe 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.

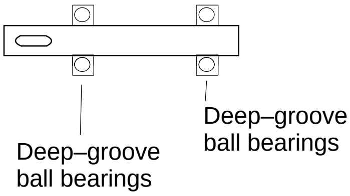
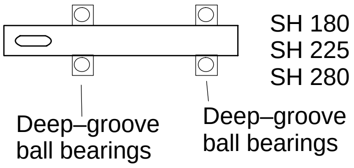
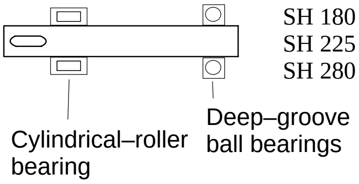
For motors with pipe/duct connection, the potential pressure drop within the motor is specified in Table 1-6.

1.7 Bearing design

Out–drive types and bearing versions

1PH7 induction motors are suitable for coupling and belt out–drives. The bearing versions and their applications are summarized in Table 1-7.

Table 1-7 Out–drive type with the appropriate bearing version

Applications	Bearing version	
• Coupling out–drive • Planetary gearboxes with low cantilever forces	SH 100 to SH 160 	
• Belt out–drive with normal cantilever force • Pinion out–drive with straight teeth • Belt out–drive with increased cantilever force		

Bearing version, drive type and maximum speed

Table 1-8 Bearing version, drive type and maximum speeds

Frame size/ motor type	**Bearing type/ drive type**	**Bear-ing type motor side**	**Bearing designa-tion**	**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 or belt out–drive configurations	DE NDE	6308 C4 6208 C4	5500	10000	9000	12000
132	Deep–groove ball bearings for coupling or belt out–drive configurations	DE NDE	6310 C4 6210 C4	4500	8500	8000	10000
160	Deep–groove ball bearings for coupling or belt out–drive configurations	DE NDE	6312 C4 6212 C4	3700	7000	6500	8000
180	Deep–groove ball bearings for coupling out–drive	DE NDE	6214 C3 6214 C3	3500	4500	5000	7000
180	Cylindrical roller bearings for belt out–drive	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 out–drive	DE NDE	6216 C3 6216 C3	3100	3600 (for 1PH7224)	4500	5500 (for 1PH7224)
225	Cylindrical roller bearings for belt out–drive	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 out–drive	DE NDE	6220 C3 6220 C3	2200	–	3300	–
280	Cylindrical roller bearings for belt out–drive	DE NDE	NU220E 6220 C3	2200	–	3300	–

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1) For continuous operation (with 30 % n_{max}, 60 % 2/3 n_{max}, 10 % standstill) for a duty 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 bearings and the shaft height.

1.7.1 Bearing lifetime

The bearing lifetime is limited by material fatigue (fatigue lifetime) or if the lubrication fails (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 average speed, low bearing temperatures, cantilever force or vibration load).

A reduction 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 (Tables 1-9 to 1-11) are obtained from the inter–dependencies mentioned above for a specific operating point such as:

- Coupling or belt out–drive
- Horizontal mounting
- Cooling medium temperature up to max. +40 °C
- Complying with the permissible cantilever and axial forces (refer to Chapter 5)
- The maximum permissible speeds are not exceeded (refer to Chapters 3 and 4)

Table 1-9 Recommended bearing change intervals t_{LW} [h] (standard bearing design)

Frame size	Out–drive type	Average operating speed n_m [RPM]	Stat. bearing lifetime L_{10h} [h]	Recommended bearing change interval$_{Lw}$ [h]	
				Permanent lubrication	Re–greasing
100	Coupling or belt out–drive	≤ 3000 ≤ 2500	20000	20000	–
132	Coupling or belt out–drive	≤ 2500 ≤ 2000			
160	Coupling or belt out–drive	≤ 2000 ≤ 1500			
180	Coupling out–drive	≤ 2000	40000	20000	40000
	Belt out–drive	≤ 1500	24000	12000	24000
	Increased cantilever forces		20000		20000
225	Coupling out–drive	≤ 1750	40000 1)	20000	40000 1)
	Belt out–drive	≤ 1400	24000	12000	24000
	Increased cantilever forces		20000		20000
280	Coupling out–drive	≤ 1500	40000 2)	20000	40000 2)
	Belt out–drive 3)	≤ 1300	24000	12000	24000

---

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

Table 1-10 Recommended bearing change intervals t_{LW} [h] for increased speeds (standard bearing design)

Frame size	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 force ≤3000 [RPM]
3) for increased cantilever force ≤2700 [RPM]

Table 1-11 Recommended bearing change intervals t_{LW} [h] for increased speeds (bearing design for increased speed)

Frame size	Average operating speed [1] n_m [RPM]	Recommended bearing change interval t_{LW} [h]	Max. continuous speed for S1 duty n_{s1} [RPM]
100	$8000 \leq n_m < 12000$	8000	10000
132	$6000 \leq n_m < 10000$		8500
160	$5000 \leq n_m < 8000$		7000
180	$1500 \leq n_m < 7000$		4500 [2]
1PH7224	$1400 \leq n_m < 5500$		3600 [2]

---

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

Re–greasing

For motors which can be re–greased at defined re–greasing 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 Table 1-9).

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.

Re–lubricating intervals

The re–lubricating intervals are specified on the lubricant plate of the induction motor (for technical data, refer to Table 1-12).

Note

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).

Table 1-12 Re–lubricating intervals

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

Important

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.

---

1) Grease quantity for re–lubrication, normal conditions
- Cooling medium temperature up to max. +40 °C
- Horizontal mounting
- Average operating speed (refer to Table 1-9)
- Complying with the permissible cantilever and axial forces (refer to Chapter 4)
- The maximum permissible speeds are not exceeded (refer to the characteristics)

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 1.7.1) according to statistical perspectives in accordance with the L_{10h} definition.

1.7.2 NDE bearings, insulated version (option L27)

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

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

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 1-13 applies for 1PH7 three–phase motors operated with Simovert MASTERDRIVES drive converters and inverters in the following control versions:

- – Vector Control (VC) with pulse frequencies of 2.5 kHz and 6 kHz
- – Motion Control (MC) with pulse frequencies of 5 kHz and 10 kHz

Table 1-13 Measures that are required for operation in the speed range < 500 RPM

Motor		**Bearing change interval (t_{LW}) for lifetime lubrication [h]*)**	**Options that are required**	**Comment**
1PH7	SH 100 – SH 160	20000	–	Due to the experience from the field (in practice) no dangers have been identified due to bearing currents
	SH 180		L27	Insulated NDE bearings
	SH 225		L27	Insulated NDE bearings
	SH 280		–	Generally insulated NDE bearings

*) Definition, refer to Table 1-9

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 (Fig. 1-3) 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.

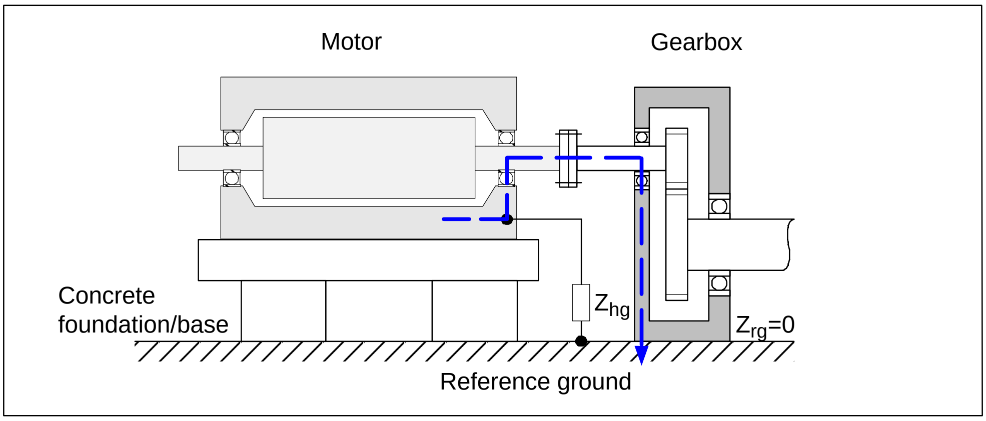

Fig. 1-3 Bearing current due to the grounding situation (=rotor ground current)

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 (Fig. 1-4). 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.

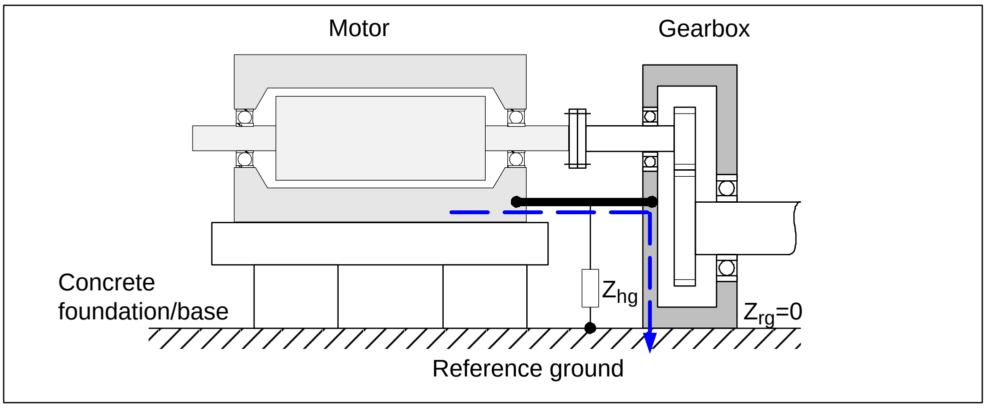

Fig. 1-4 Connection between the motor frame and load to avoid rotor ground currents

1.8 Vibration severity limit values

The diagrams are included in the Planning Guide, ”General Part for Induction Motors”.

Foot support

Note

A foot support is required for the following motors in order to maintain the vibration severity limit values:

SH 160 to SH 280 for type of construction IM B35.

For SH 160 to SH 280, a foot support can be eliminated by appropriately engineering the motor – refer to the engineering information and instructions in the Chapter ”Mounting”.

Permissible vibrations

Note

In order to ensure perfect functioning and a long lifetime, the vibration values specified according to ISO 10816 should not be exceeded at the motor.

Table 1-14 Permissible vibration values

Vibration velocity V_{rms} [mm/s]	Vibration frequency f [Hz]	Vibration acceleration a [m/s^2]
4.5	10	0.4
	250	10

Note

Deviating from this standard, motors may be loaded as following with restrictions regarding the lifetime and operated outside the natural mounting frequency

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Table 1-15 Vibration values where the lifetime is restricted

Axial	Radial
0.1g	1g

Note

The mounted parts and components (belt pulley, coupling components etc.) must be balanced according to ISO 1949. Balancing quality G 2.5

1.9 Mounting

Mounting instructions

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.

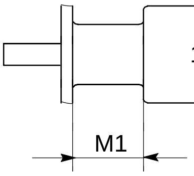
Warning

- 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 (refer to Table 1-16).

Table 1-16 Flange mounting with studs and nuts

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

Mounting and mounting instructions

In order to achieve smooth vibration–free operation a stable foundation is required, the motor must be precisely aligned and the parts to be mounted on the shaft end must be correctly balanced.

The following mounting instructions must be carefully observed:

- 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.

Notice

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 1.8).

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 carefully maintained
- The maximum speed is limited (refer to Table 1-17)

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 1-17 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.

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 1.6 ”Cooling”).

Natural frequency when mounted

The motor is a system which is capable of vibration at its natural frequency. For all 1PH7 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.

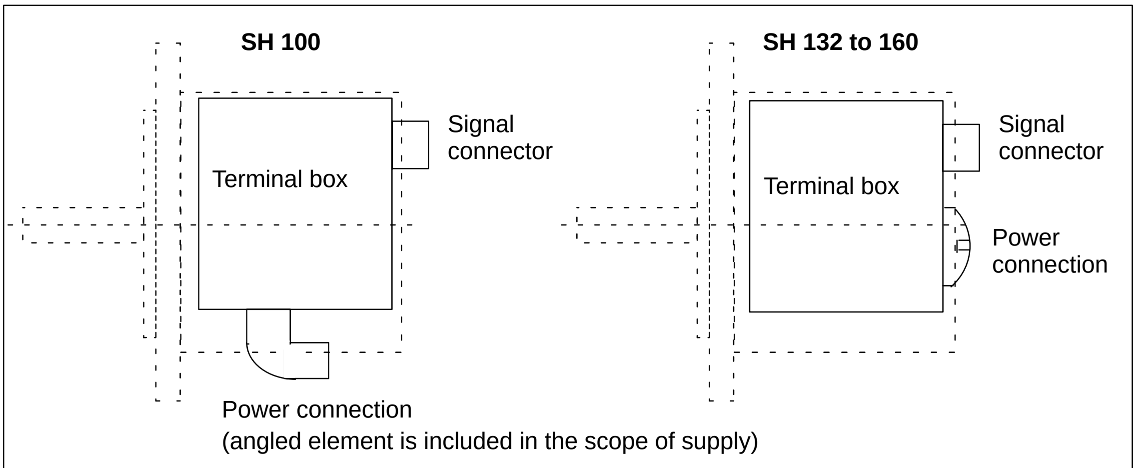
Note

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

Cable outlet NDE for SH 100 to 160 (integrated terminal box)



SH 180 to 280: Via terminal box, depending on the version ordered

Fig. 1-5 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 particular case, the power must be connected through an ”angled element” (90° pipe connection element) from the right (or left).

■

Electrical Connections

2

2.1 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.

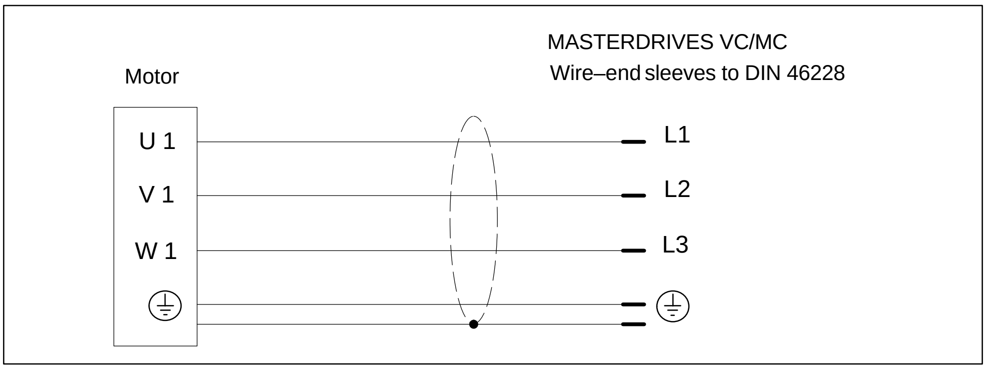
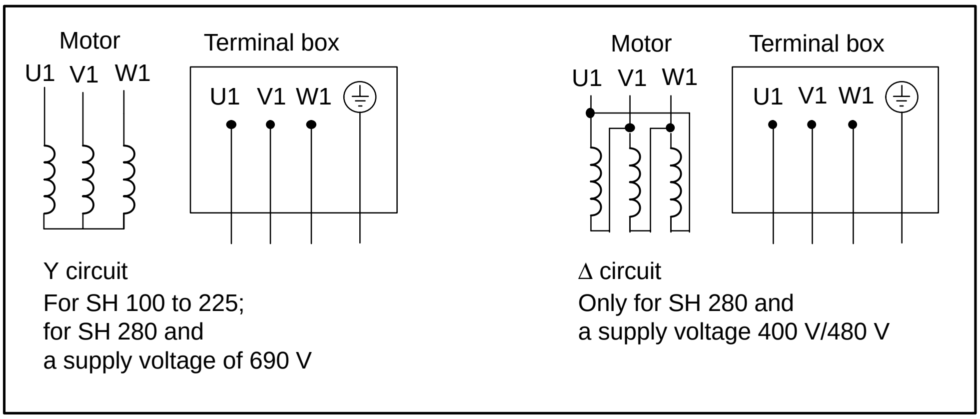


Fig. 2-1 Power cable

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 table 2-3. A circuit diagram to connect–up the motor winding is provided in the terminal box when the motor is supplied.



Y circuit
For SH 100 to 225;
for SH 280 and
a supply voltage of 690 V

Δ circuit
Only for SH 280 and
a supply voltage 400 V/480 V

Fig. 2-2 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 2-1 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]	Required cross–section [mm^2]	Comments
28	4	
36	6	Correction factors regarding the ambient temperature and routing type must be applied in compliance with EN 60204–1.
50	10	
66	16	
84	25	
104	35	
123	50	
155	70	
192	95	
221	120	
234	150	
267	185	
>267	Refer to the VDE Standard 0298 In this standard, cross–sections up to $300mm^2$ are specified	

Note

The cables are available in a UL version or for higher mechanical requirements up to a cross–section of 185 mm^2.

For technical data of the cables, refer to Catalog DA 65.3.

2.1.1 Connecting–up information

Note

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

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

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. Appropriately 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 cover retaining screws are sufficient as potential bonding between the terminal box cover and terminal box housing.

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 1.2/ 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 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 penetration depth and tightening torque for the terminal screw are maintained (refer to Table 2-2)

Table 2-2 Penetration depth and tightening torque

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

Assignment, terminal boxes and max. cross–sections

Table 2-3 Assignment, terminal boxes and max. cross–sections

Shaft height	**Motor type**	**Terminal box type**	**Cable gland**	**Max. possible outer cable diameter 2)**	**Cable gland**	**Max. possible outer cable diameter 2)**	**Number 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–□□D	1XB7712	3 x M63 x 1.5	53	–	–	(3+1)[4]x3xM16	3 x 95	450
	1PH7286–□□D	1XB7712	3 x M75 x 1.5	68	–	–	(3+1)[4]x3xM16	3x185	710
	1PH7288–□□D	1XB7712	3 x M75 x 1.5	68	–	–	(3+1)[4]x3xM16	3x185	710
	1PH728□–□□F	1XB7712	3 x M75 x 1.5	68	–	–	(3+1)[4]x3xM16	3x185	710

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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.

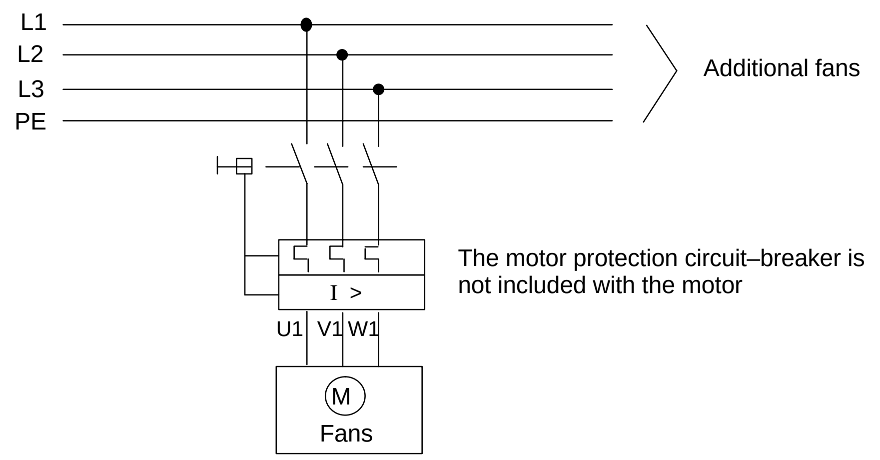
2.1.2 Supply data for separately–driven fans

Table 2-4 Supply data for separately–driven fans

Shaft height [mm]	**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.



The motor protection circuit–breaker is not included with the motor

Fig. 2-3 Recommended connection

■

Space for your notes

Technical Data and Characteristics for MASTERDRIVES VC

3

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 SIMOVERT MASTERDRIVES 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 stall 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 torque limit at every operating point. This safety margin is shown in the diagrams $P=f_{(n)}$.

In addition, the calculated stall torque $M=f_{(n)}$ (without 30 % safety margin) is specified in the diagrams.

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.

3.1 Technical data

For a description of the codes used in the table header, refer to Table 3-1.

Additional information on the order designation (MLFB), refer to Chapter 1.4 or Catalog.

Table 3-1 Explanation of the codes in alphabetical order

Abbreviation	Units	Description
f_n	Hz	Rated frequency
I_0	A	Magnetizing current
I_N	A	Rated current
J	kgm^2	Moment of inertia
M_N	Nm	Rated torque
n_1	RPM	Speed for field weakening with constant power
n_{max}	RPM	Maximum rotational speed
n_N	RPM	Rated speed
n_{S1}	RPM	Max. permissible continuous speed
P_N	kW	Rated power
T_{th}	min	Thermal time constant
U_N	V	Rated voltage

3.1.1 MASTERDRIVES VC, line supply voltage 3–ph. 400 V AC

Table 3-2 Technical data, MASTERDRIVES VC, line supply voltage 3–ph. 400 V AC

Order No.	n_N [RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	n_1 1) [RPM]	n_{max} 2) [RPM]	T_{th} [min]	J [kgm^2]	Weight [kg]
1PH7163–□□B□□	400	9.5	227	30	274	2000	2000	35	0.185	175
1PH7167–□□B□□	400	13	310	37	294	1600	2000	35	0.228	210
1PH7184–□□B□□	400	16.3	390	51	271	2000	2000	40	0.503	370
1PH7186–□□B□□	400	21.2	505	67	268	2000	2000	40	0.666	440
1PH7224–□□B□□	400	30.4	725	88	268	2000	2000	40	1.479	630
1PH7226–□□B□□	400	39.2	935	114	264	2000	2000	40	1.930	750
1PH7228–□□B□□	400	48	1145	136	272	2000	2000	40	2.326	860
1PH7284–□□B□□	500	80	1529	144	400	1150	2500	75	4.2	1300
1PH7286–□□B□□	500	100	1909	180	400	1300	2500	83	5.2	1500
1PH7288–□□B□□	500	130	2481	233	400	1400	2500	90	6.3	1700
1PH7284–□□C□□	800	125	1492	220	400	2200	3300	75	4.2	1300
1PH7286–□□C□□	800	155	1850	285	385	2200	3300	83	5.2	1500
1PH7288–□□C□□	800	190	2268	365	370	2200	3300	90	6.3	1700
1PH7103–□□D□□	1150	4.3	36	10	391	2200	5750	25	0.017	40
1PH7107–□□D□□	1150	7.2	60	17.5	360	3000	5750	25	0.029	65
1PH7133–□□D□□	1150	13.5	112	29	381	2500	5750	30	0.076	90
1PH7137–□□D□□	1150	19.5	162	43	367	2600	5750	30	0.109	150
1PH7163–□□D□□	1150	25	208	55	364	3400	5750	35	0.185	175
1PH7167–□□D□□	1150	31	257	70	357	3700	5750	35	0.228	210
1PH7184–□□D□□	1150	44	366	89	383	3100	5000	40	0.503	370
1PH7186–□□D□□	1150	58	482	116	390	3300	5000	40	0.666	440
1PH7224–□□D□□	1150	81	670	160	385	2900	4500	40	1.479	630
1PH7226–□□D□□	1150	105	870	197	390	2900	4500	40	1.930	750
1PH7228–□□D□□	1150	129	1070	238	390	2900	4500	40	2.326	860
1PH7284–□□D□□	1150	170	1414	314	400	2200	3300	75	4.2	1300
1PH7286–□□D□□	1150	210	1745	414	380	2200	3300	83	5.2	1500
1PH7288–□□D□□	1150	260	2160	497	385	2200	3300	90	6.3	1700
1PH7101–□□F□□	1750	4.3	24	10	398	4600	8750	25	0.017	40
1PH7103–□□F□□	1750	6.25	34	13.0	398	2600	8750	25	0.017	40
1PH7105–□□F□□	1750	8.0	44	17.5	398	4500	8750	25	0.029	65
1PH7107–□□F□□	1750	10.0	55	23	381	4200	8750	25	0.029	65
1PH7131–□□F□□	1750	13	71	24	398	3300	8000	30	0.076	90
1PH7133–□□F□□	1750	17.5	96	34	398	3400	8000	30	0.076	90
1PH7135–□□F□□	1750	21.5	117	42	398	3800	8000	30	0.109	150
1PH7137–□□F□□	1750	25	136	56	357	4000	8000	30	0.109	150
1PH7163–□□F□□	1750	34	186	72	364	4000	6500	35	0.185	175
1PH7167–□□F□□	1750	41	224	79	398	2800	6500	35	0.228	210
1PH7184–□□F□□	1750	60	327	120	388	5000	5000	40	0.503	370
1PH7186–□□F□□	1750	85	465	169	385	5000	5000	40	0.666	440

Table 3-2 Technical data, MASTERDRIVES VC, line supply voltage 3–ph. 400 V AC, continued

Order No.	n_N [RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	n_1 1) [RPM]	n_{max} 2) [RPM]	T_{th} [min]	J [kgm^2]	Weight [kg]
1PH7224–□□U□□	1750	110	600	203	395	2900	4500	40	1.479	630
1PH7226–□□F□□	1750	135	737	254	395	2900	4500	40	1.930	750
1PH7228–□□F□□	1750	179	975	342	395	2900	4500	40	2.326	860
1PH7284–□□F□□	1750	225	1228	393	400	2200	3300	75	4.2	1300
1PH7286–□□F□□	1750	270	1474	466	400	2200	3300	83	5.2	1500
1PH7288–□□F□□	1750	340	1856	586	400	2200	3300	90	6.3	1700
1PH7103–□□G□□	2300	7.5	31	17	388	5400	9000	25	0.017	40
1PH7107–□□G□□	2300	12	50	26	400	5400	9000	25	0.029	65
1PH7133–□□G□□	2300	22.5	93	45	398	4000	8000	30	0.076	90
1PH7137–□□G□□	2300	29	120	56	398	4000	8000	30	0.109	150
1PH7163–□□G□□	2300	38	158	80	374	3000	6500	35	0.185	175
1PH7167–□□G□□	2300	44	183	85	398	3000	6500	35	0.228	210
1PH7184–□□L□□	2900	81	265	158	395	5000	5000	40	0.503	370
1PH7186–□□L□□	2900	101	333	206	385	5000	5000	40	0.666	440
1PH7224–□□L□□	2900	149	490	274	395	3500	4500	40	1.479	630
1PH7226–□□L□□	2900	185	610	348	390	3500	4500	40	1.930	750
1PH7228–□□L□□	2900	215	708	402	395	3500	4500	40	2.326	860

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1) Max. field weakening speed at constant power or speed where at $P=P_N$ there is still 30 % power margin (safety margin) to the stall limit or the mechanical limiting speed is reached.

2) **Notice:** The max. speed in field–weakening operation is in some cases limited to lower values due to $f_{max} < 5 \bullet f_n$. For belt out–drives with increased cantilever forces, depending on the frame size, lower values apply (refer to the motor characteristics).

3.1.2 MASTERDRIVES VC, line supply voltage 3–ph. 480 V AC

Table 3-3 Technical data, MASTERDRIVES VC, line supply voltage 3–ph. 480 V AC

Order No.	n_N [RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	n_1 1) [RPM]	n_{max} 2) [RPM]	T_{th} [min]	J [kgm^2]	Weight [kg]
1PH7163–□□B□□	500	12	230	30	340	2100	2500	35	0.185	175
1PH7167–□□B□□	500	16	306	35	350	1700	2500	35	0.228	210
1PH7184–□□B□□	500	20.5	392	51	335	2500	2500	40	0.503	370
1PH7186–□□B□□	500	26.5	506	67	335	2500	2500	40	0.666	440
1PH7224–□□B□□	500	38	725	86	335	2200	2500	40	1.479	630
1PH7226–□□B□□	500	49	935	112	330	2500	2500	40	1.930	750
1PH7228–□□B□□	500	60	1145	135	340	2500	2500	40	2.326	860
1PH7284–□□B□□	600	95	1519	144	480	1650	3000	75	4.2	1300
1PH7286–□□B□□	600	120	1916	180	480	1750	3000	83	5.2	1500
1PH7288–□□B□□	600	155	2474	233	480	1850	3000	90	6.3	1700
1PH7224–□□C□□	1000	150	1433	220	480	2200	3300	75	4.2	1300
1PH7226–□□C□□	1000	185	1767	285	480	2200	3300	83	5.2	1500
1PH7228–□□C□□	1000	230	2197	365	460	2200	3300	90	6.3	1700
1PH7103–□□D□□	1350	4.7	33	9.5	433	3000	6750	25	0.017	40
1PH7107–□□D□□	1350	8.0	57	17	405	3800	6750	25	0.029	65
1PH7133–□□D□□	1350	15	106	30	433	3100	6750	30	0.076	90
1PH7137–□□D□□	1350	22	156	42	416	3200	6750	30	0.109	150
1PH7163–□□D□□	1350	28	198	53	413	4100	6500	35	0.185	175
1PH7167–□□D□□	1350	34	241	67	400	4600	6500	35	0.228	210
1PH7184–□□D□□	1350	50	375	86	450	3700	5000	40	0.503	370
1PH7186–□□D□□	1350	67	475	114	460	3800	5000	40	0.666	440
1PH7224–□□D□□	1350	92	650	156	450	2900	4500	40	1.479	630
1PH7226–□□D□□	1350	120	847	193	460	2900	4500	40	1.930	750
1PH7228–□□D□□	1350	147	1043	232	460	2900	4500	40	2.326	860
1PH7284–□□D□□	1350	200	1416	314	470	2200	3300	75	4.2	1300
1PH7286–□□D□□	1350	245	1733	414	445	2200	3300	83	5.2	1500
1PH7288–□□D□□	1350	305	2158	497	450	2200	3300	90	6.3	1700
1PH7101–□□F□□	2000	4.7	22	10	495	6000	9000	25	0.017	40
1PH7103–□□F□□	2000	7.0	33	13	459	3400	9000	25	0.017	40
1PH7105–□□F□□	2000	9.0	43	17.5	450	5000	9000	25	0.029	65
1PH7107–□□F□□	2000	11	53	23	433	5300	9000	25	0.029	65
1PH7131–□□F□□	2000	15	72	25	459	3900	8000	30	0.076	90
1PH7133–□□F□□	2000	20	96	34	459	4100	8000	30	0.076	90
1PH7135–□□F□□	2000	24	115	42	459	4700	8000	30	0.109	150
1PH7137–□□F□□	2000	28	134	55	402	4000	8000	30	0.109	150
1PH7163–□□F□□	2000	37	177	70	412	4000	6500	35	0.185	175
1PH7167–□□F□□	2000	45	215	76	459	3300	6500	35	0.228	210
1PH7184–□□F□□	2000	68	325	120	450	5000	5000	40	0.503	370
1PH7186–□□F□□	2000	94	450	165	445	5000	5000	40	0.666	440

Table 3-3 Technical data, MASTERDRIVES VC, line supply voltage 3–ph. 480 V AC, continued

Order No.	n_N [RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	n_1 1) [RPM]	n_{max} 2) [RPM]	T_{th} [min]	J [kgm^2]	Weight [kg]
1PH7224–□□U□□	2000	124	590	200	460	2900	4500	40	1.479	630
1PH7226–□□F□□	2000	153	730	254	450	2900	4500	40	1.930	750
1PH7228–□□F□□	2000	196	936	332	450	3000	4500	40	2.326	860
1PH7284–□□F□□	2000	255	1218	393	455	2200	3300	75	4.2	1300
1PH7286–□□F□□	2000	310	1481	466	455	2200	3300	83	5.2	1500
1PH7288–□□F□□	2000	385	1838	586	455	2200	3300	90	6.3	1700
1PH7103–□□G□□	2650	8.0	29	16.5	440	7000	9000	25	0.017	40
1PH7107–□□G□□	2650	13	47	24.5	459	6700	9000	25	0.029	65
1PH7133–□□G□□	2650	24	87	42	450	4000	8000	30	0.076	90
1PH7137–□□G□□	2650	30	108	52	450	4200	8000	30	0.109	150
1PH7163–□□G□□	2650	40	144	76	433	3500	6500	35	0.185	175
1PH7167–□□G□□	2650	44	159	77	459	3300	6500	35	0.228	210
1PH7184–□□L□□	2900	81	267	158	395	5000	5000	40	0.503	370
1PH7186–□□L□□	2900	101	333	206	385	5000	5000	40	0.666	440
1PH7224–□□L□□	2900	149	490	274	395	3500	4500	40	1.479	630
1PH7226–□□L□□	2900	185	610	348	390	3500	4500	40	1.930	750
1PH7228–□□L□□	2900	215	708	402	395	3500	4500	40	2.326	860

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1) Max. field weakening speed at constant power or speed where at $P=P_N$ there is still 30 % power margin (safety margin) to the stall limit or the mechanical limiting speed is reached.

2) **Notice:** The max. speed in field–weakening operation is in some cases limited to lower values due to $f_{max} < 5 \bullet f_n$. For belt out–drives with increased cantilever forces, depending on the frame size, lower values apply (refer to the motor characteristics).

3.1.3 MASTERDRIVES VC, line supply voltage 3–ph. 690 V AC

Table 3-4 Technical data, MASTERDRIVES VC, line supply voltage 3–ph. 690 V AC

Order No.	n_N [RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	n_1 1) [RPM]	n_{max} 2) [RPM]	T_{th} [min]	J [kgm^2]	Weight [kg]
1PH7284–□□B□□	500	77	1471	80	690	1150	2500	75	4.2	1300
1PH7286–□□B□□	500	96	1834	101	690	1300	2500	83	5.2	1500
1PH7288–□□B□□	500	125	2388	130	690	1400	2500	90	6.3	1700
1PH7284–□□C□□	800	115	1373	120	690	2200	3300	75	4.2	1300
1PH7286–□□C□□	800	145	1731	160	665	2200	3300	83	5.2	1500
1PH7288–□□C□□	800	185	2208	210	640	2200	3300	90	6.3	1700
1PH7284–□□D□□	1150	164	1362	176	690	2200	3300	75	4.2	1300
1PH7286–□□D□□	1150	203	1686	233	655	2200	3300	83	5.2	1500
1PH7288–□□D□□	1150	251	2084	280	665	2200	3300	90	6.3	1700
1PH7284–□□F□□	1750	217	1184	221	690	2200	3300	75	4.2	1300
1PH7286–□□F□□	1750	261	1424	262	690	2200	3300	83	5.2	1500
1PH7288–□□F□□	1750	329	1795	330	690	2200	3300	90	6.3	1700

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1) Max. field weakening speed at constant power or speed where at $P=P_N$ there is still 30 % power margin (safety margin) to the stall limit or the mechanical limiting speed is reached.

2) **Notice:** The max. speed in field–weakening operation is in some cases limited to lower values due to $f_{max} < 5 \bullet f_n$. For belt out–drives with increased cantilever forces, depending on the frame size, lower values apply (refer to the motor characteristics).

3.2 P/n and M/n diagrams for MASTERDRIVES VC

3.2.1 MASTERDRIVES VC 400 V

Table 3-5 MASTERDRIVES VC, 400 V, 1PH7163–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	9.5	227	30	274	14.3	2000	2000	2000	11.5

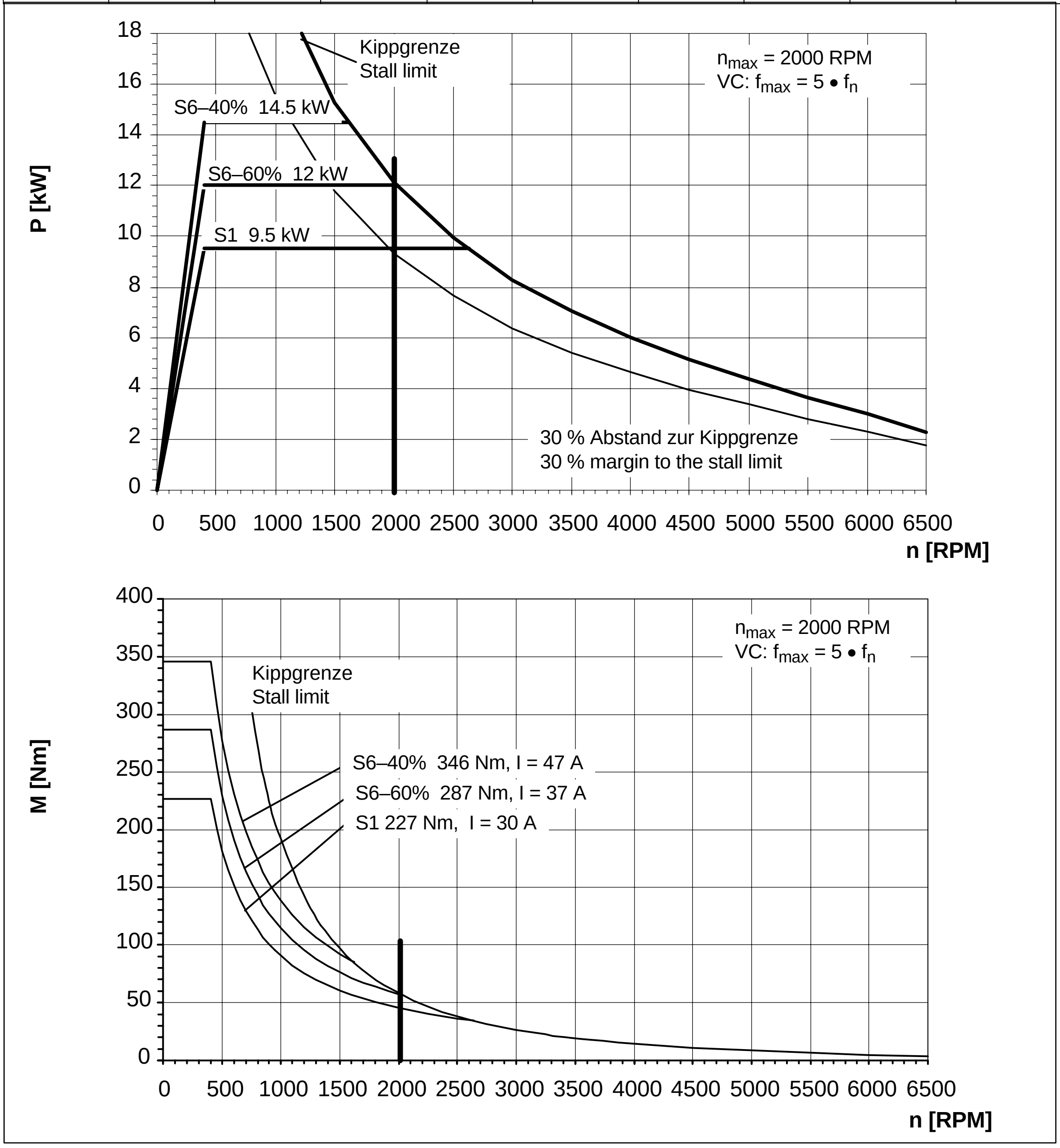


Fig. 3-1 MASTERDRIVES VC, 1PH7163–□□B□□

Table 3-6 MASTERDRIVES VC, 400 V, 1PH7167–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	13	310	37	294	14.3	1600	2000	2000	14

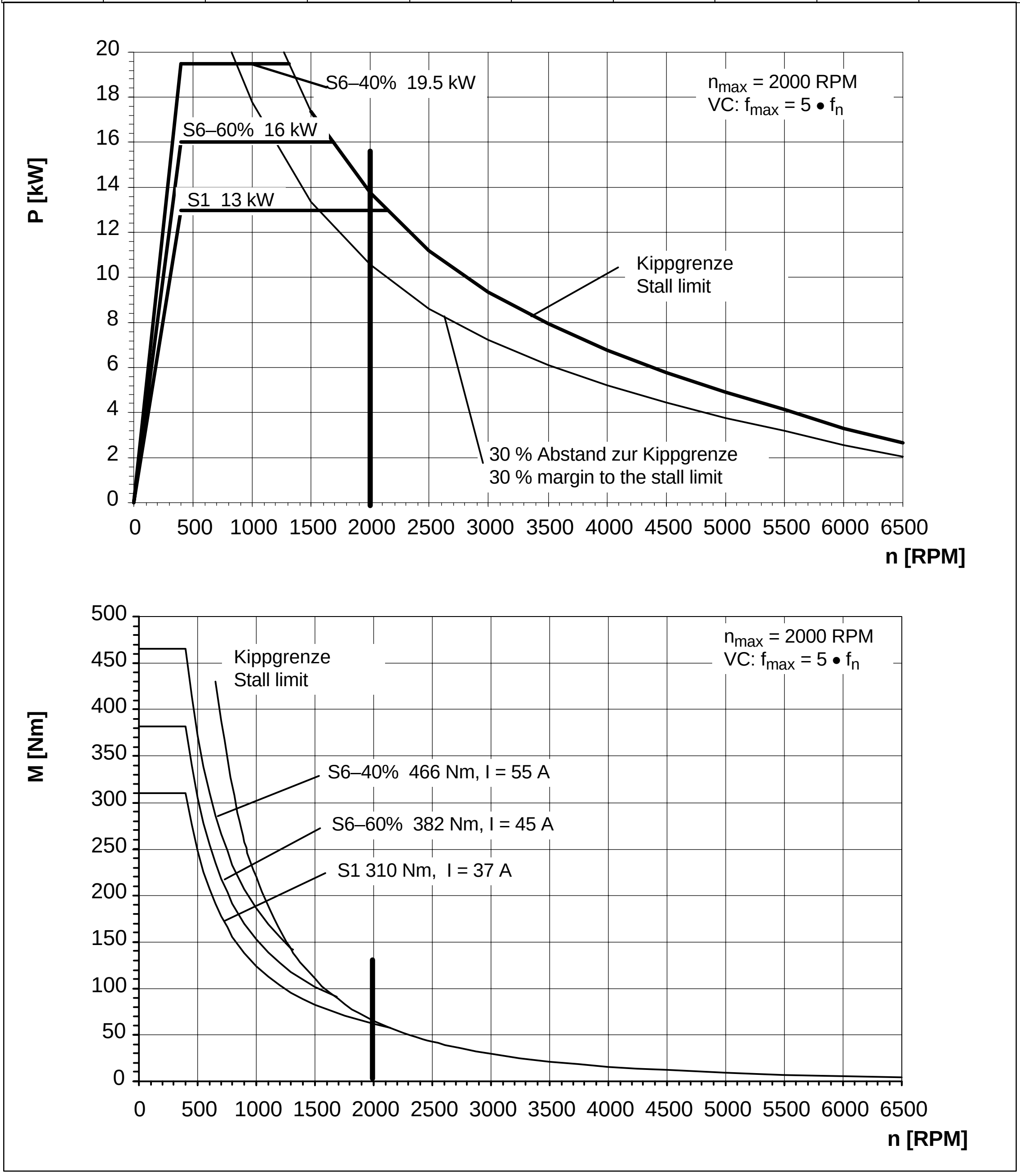
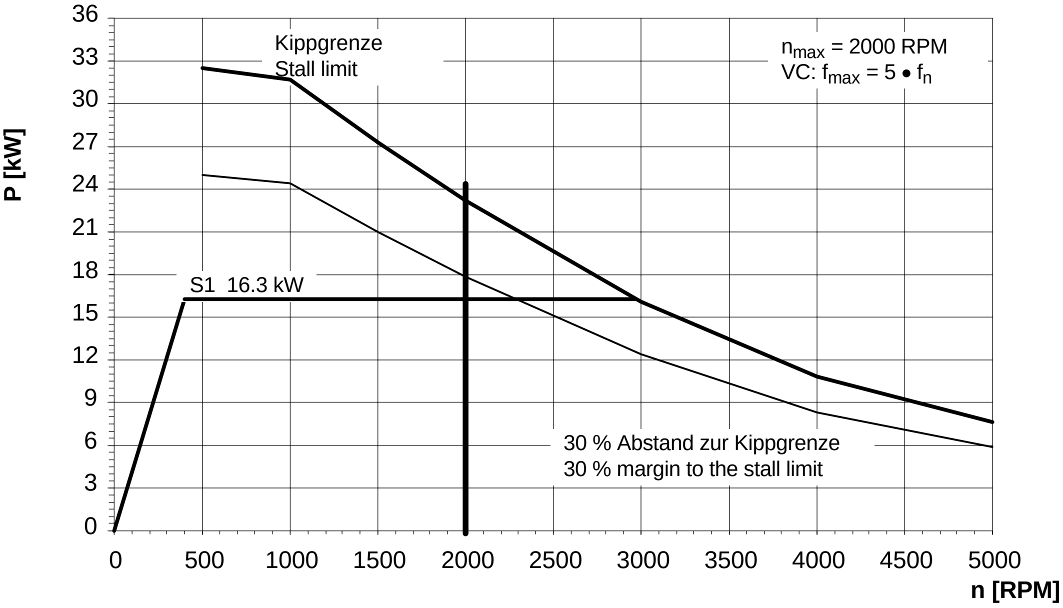


Fig. 3-2 MASTERDRIVES VC, 1PH7167–□□B□□

Table 3-7 MASTERDRIVES VC, 400 V, 1PH7184–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	16.3	390	51	271	14.2	2000	2000	2000	26



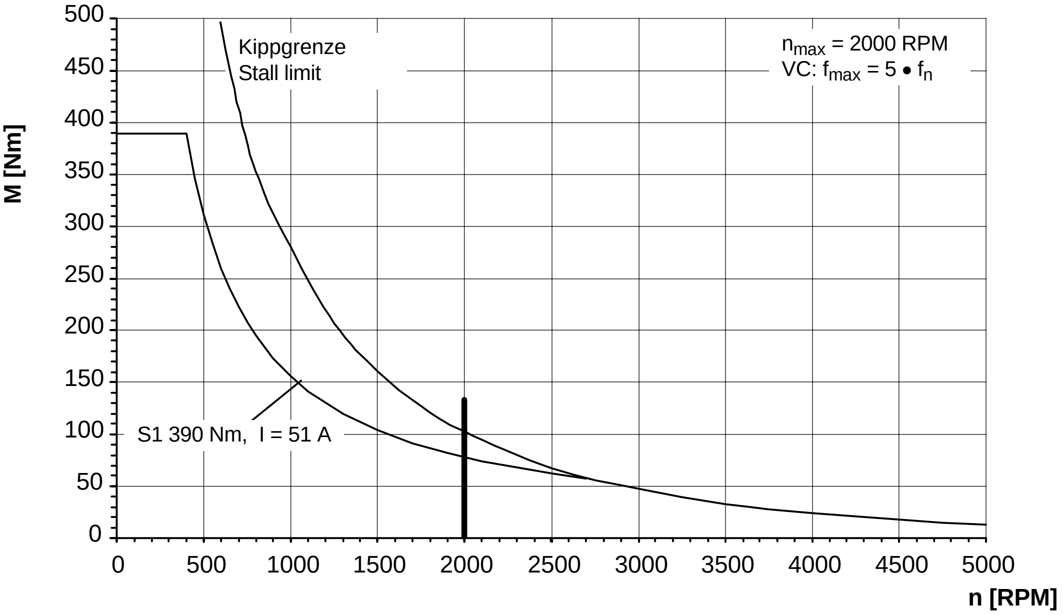


Fig. 3-3 MASTERDRIVES VC, 1PH7184–□□B□□

Table 3-8 MASTERDRIVES VC, 400 V, 1PH7186–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	21.2	505	67	268	14.0	2000	2000	2000	38.5

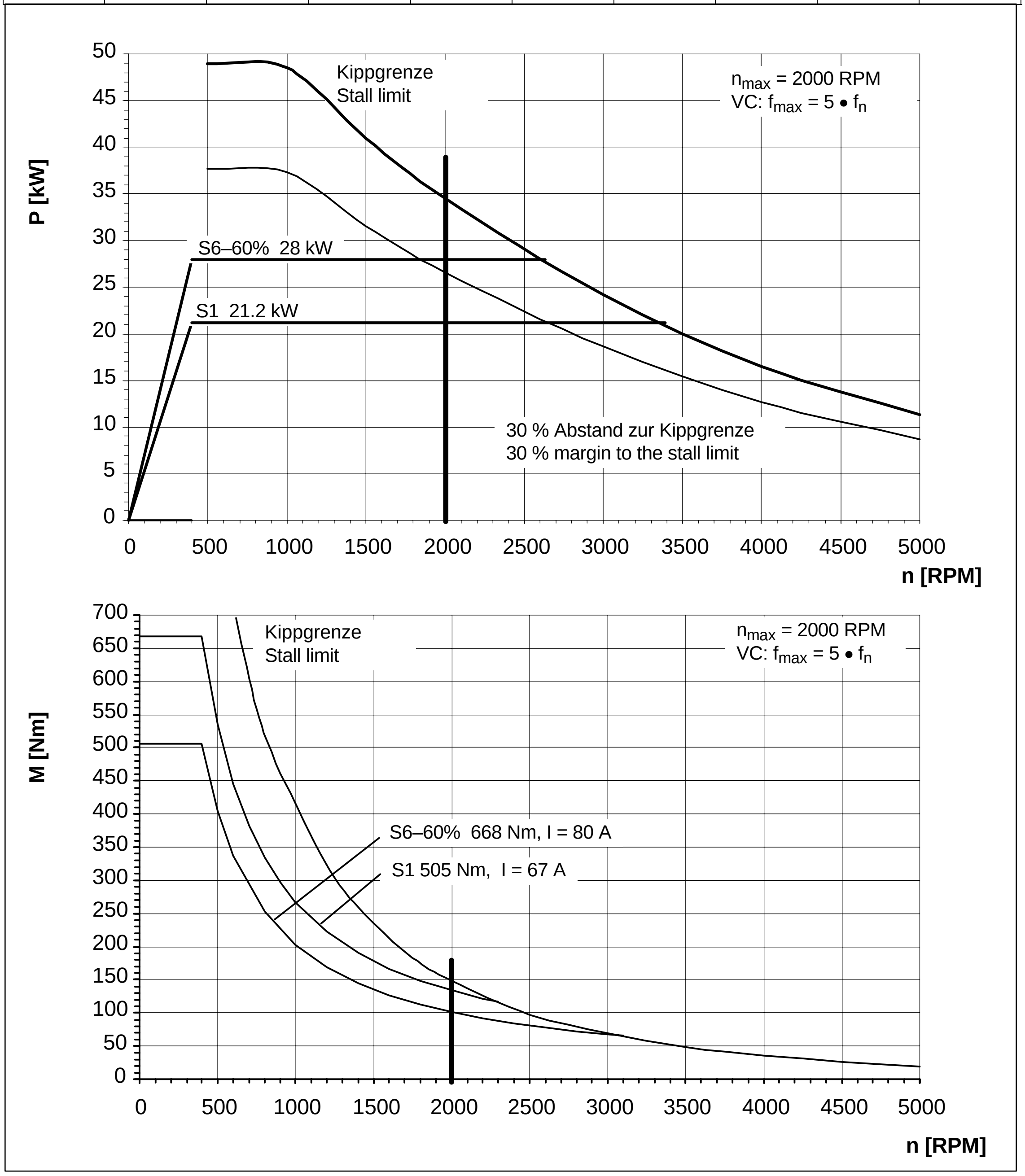
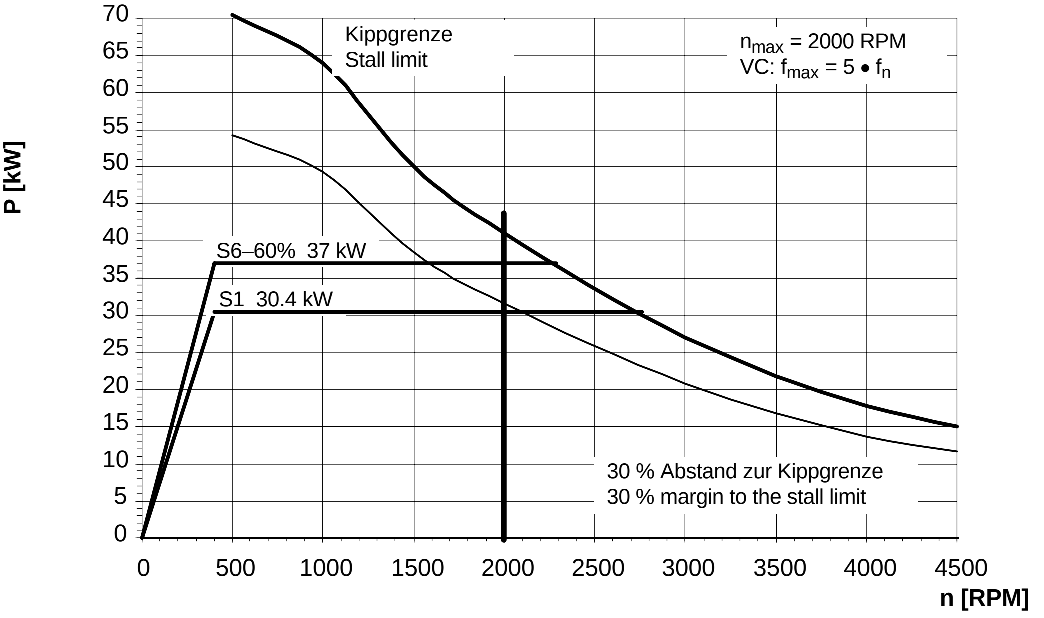


Fig. 3-4 MASTERDRIVES VC, 1PH7186–□□B□□

Table 3-9 MASTERDRIVES VC, 400 V, 1PH7224–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	30.4	725	88	268	14.0	2000	2000	2000	36.5



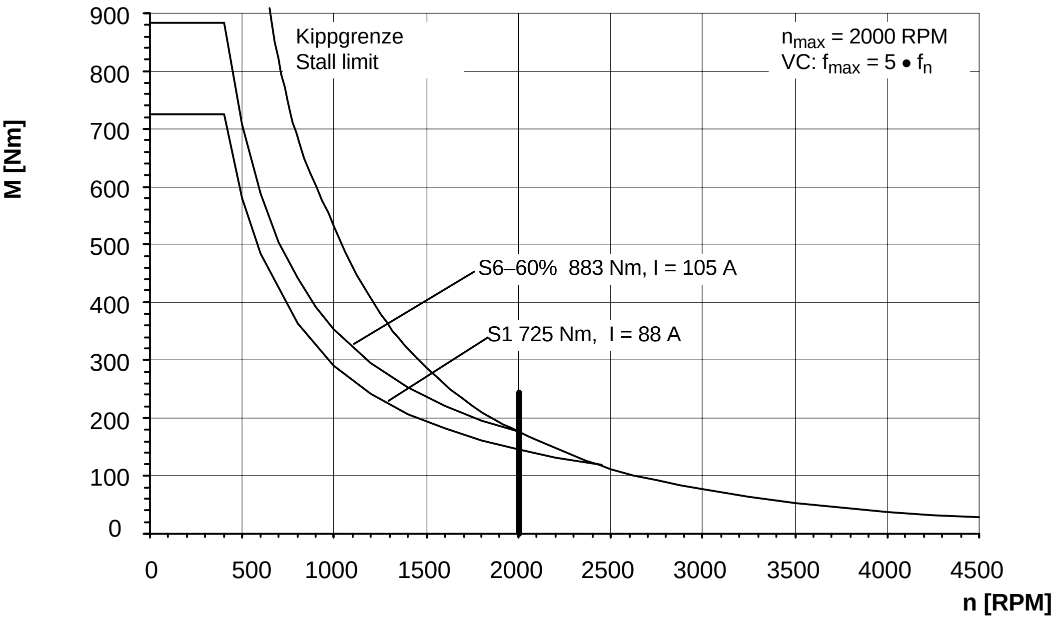


Fig. 3-5 MASTERDRIVES VC, 1PH7224–□□B□□

Table 3-10 MASTERDRIVES VC, 400 V, 1PH7226–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	39.2	935	114	264	14.0	2000	2000	2000	49

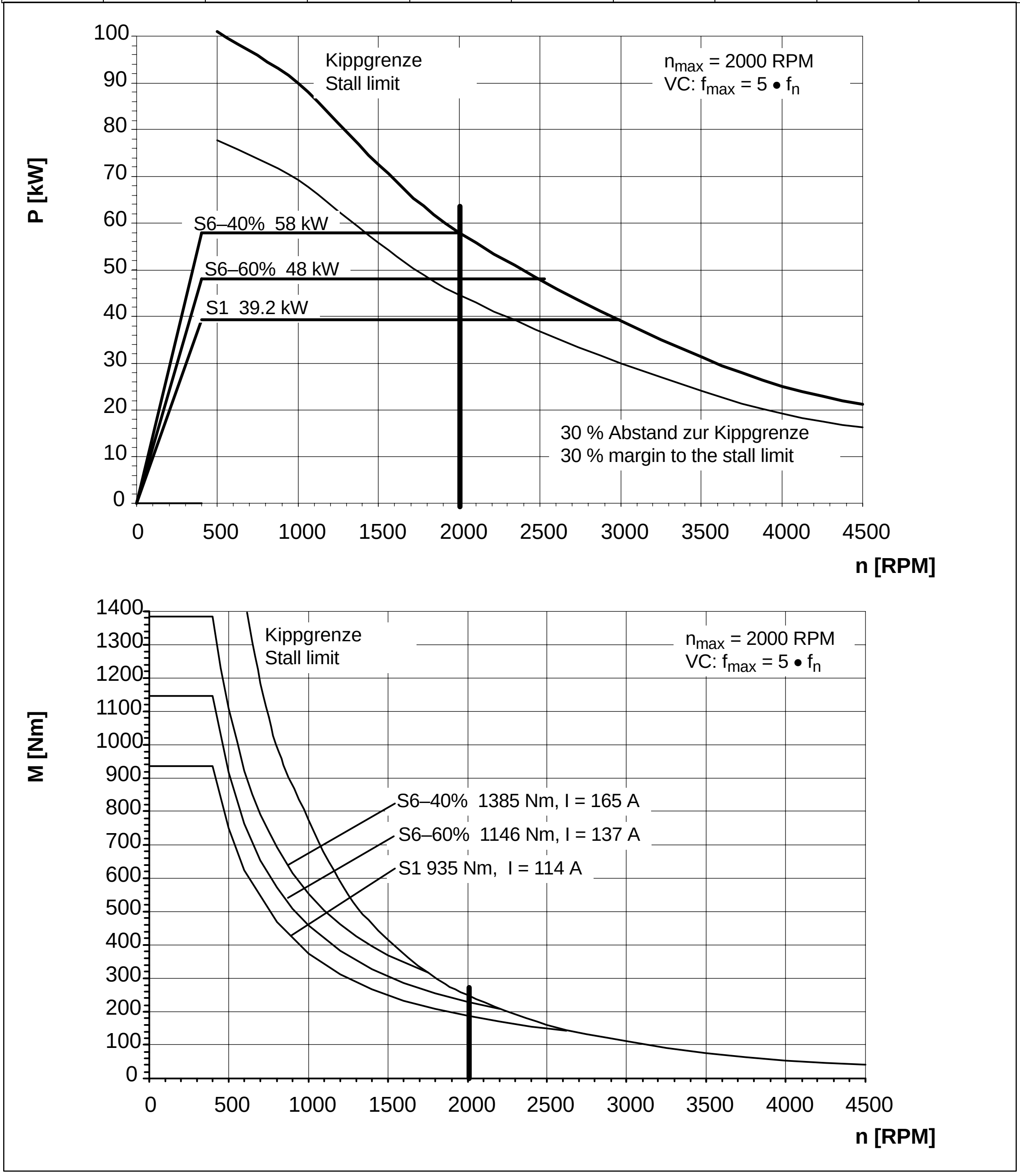


Fig. 3-6 MASTERDRIVES VC, 1PH7226–□□B□□

Table 3-11 MASTERDRIVES VC, 400 V, 1PH7228–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	48	1145	136	272	13.9	2000	2000	2000	60.5

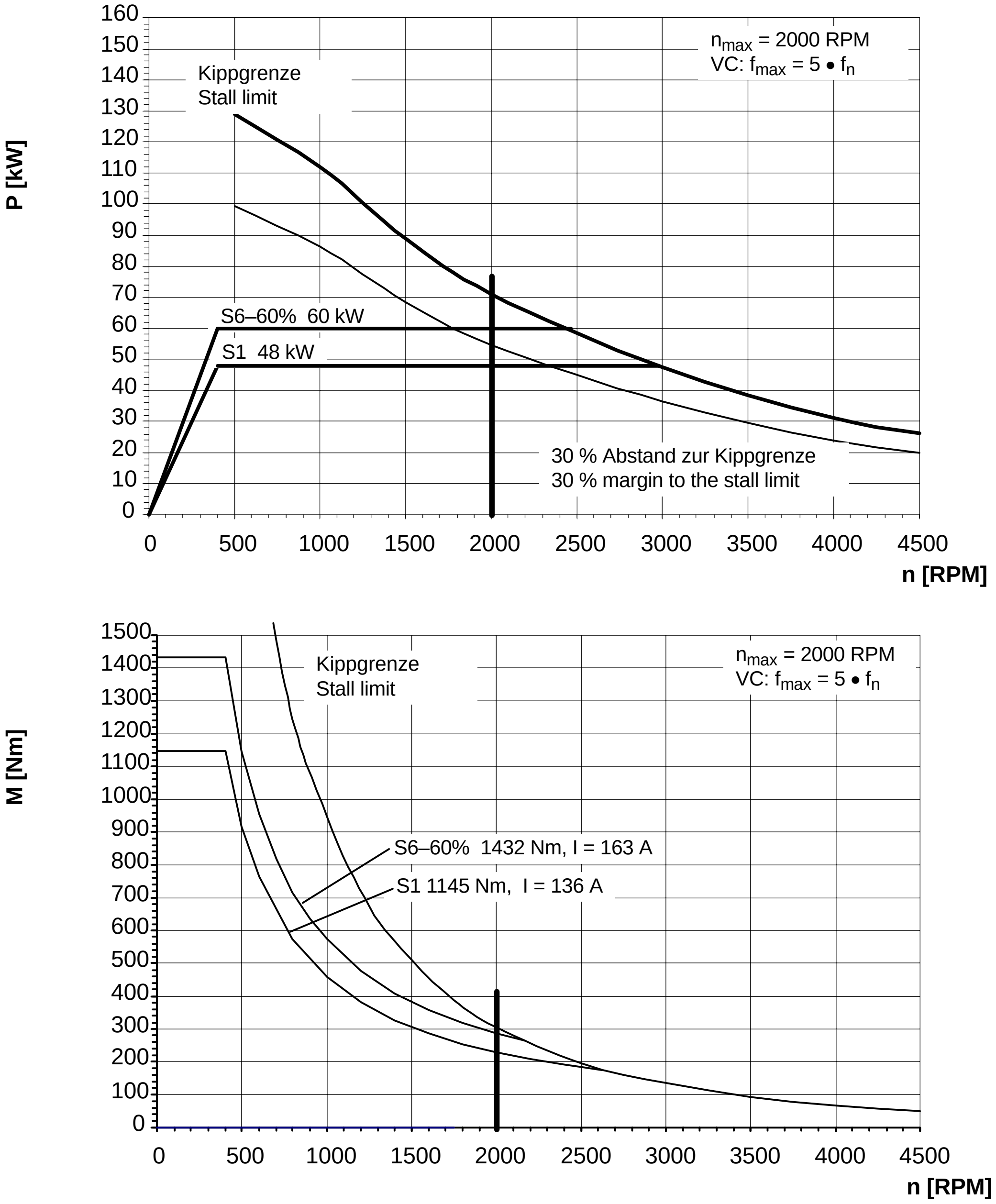
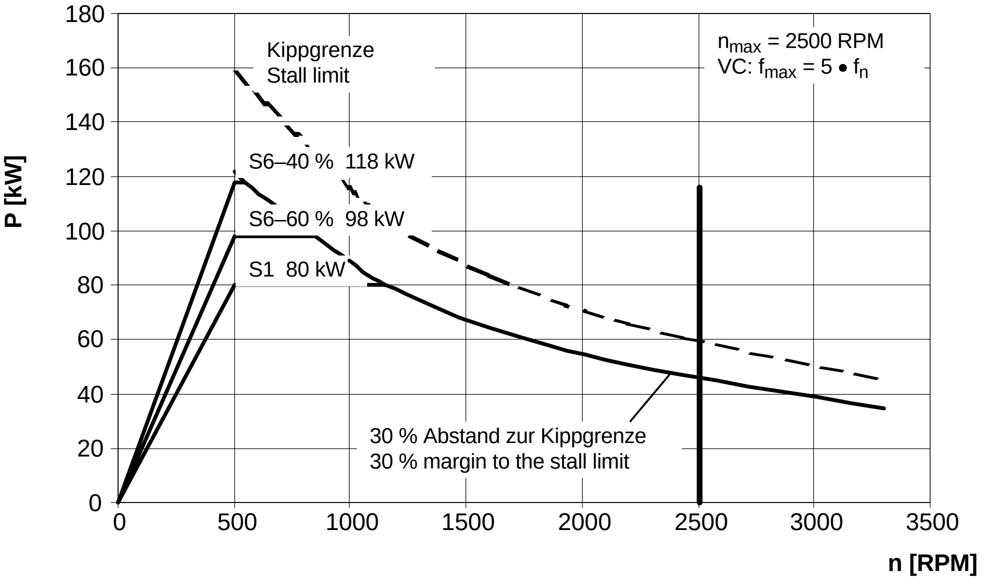


Fig. 3-7 MASTERDRIVES VC, 1PH7228–□□B□□

Table 3-12 MASTERDRIVES VC, 400 V, 1PH7284–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
500	80	1529	144	400	17.0	1150	2200	2500	60



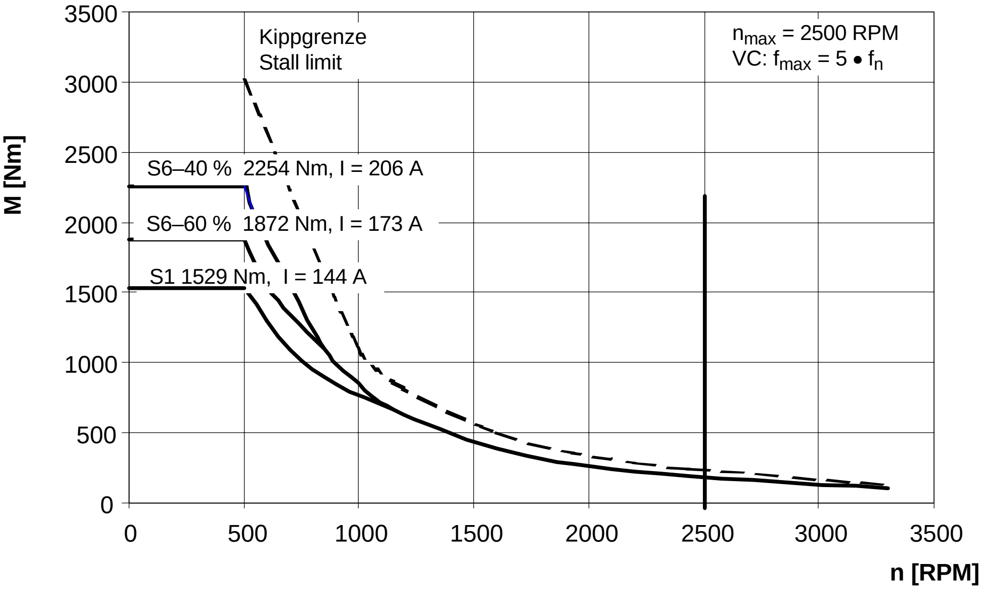


Fig. 3-8 MASTERDRIVES VC, 1PH7284–□□B□□

Table 3-13 MASTERDRIVES VC, 400 V, 1PH7286–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
500	100	1909	180	400	17.0	1300	2200	2500	78

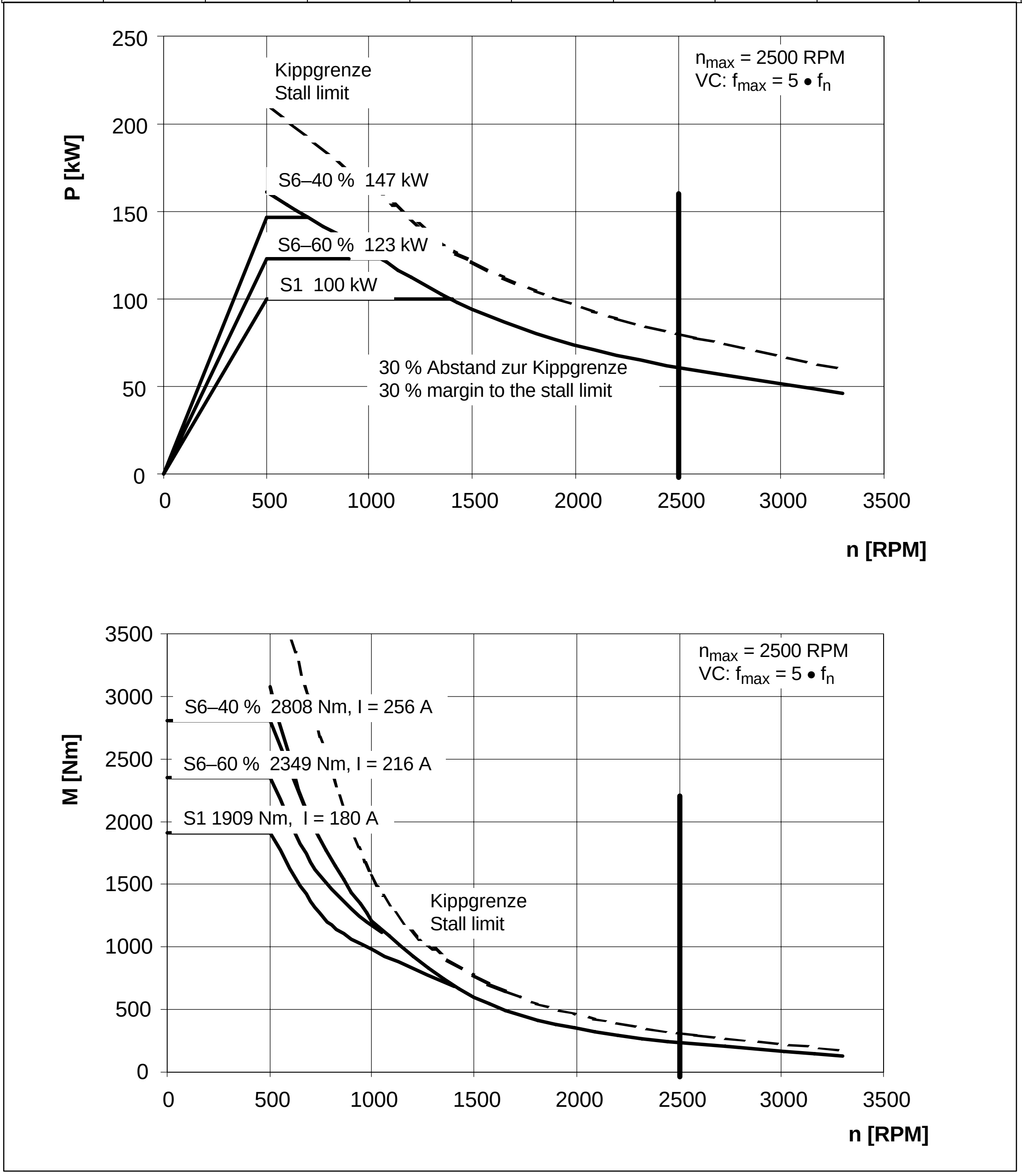


Fig. 3-9 MASTERDRIVES VC, 1PH7286–□□B□□

Table 3-14 MASTERDRIVES VC, 400 V, 1PH7288–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
500	130	2481	233	400	17.0	1400	2200	2500	100

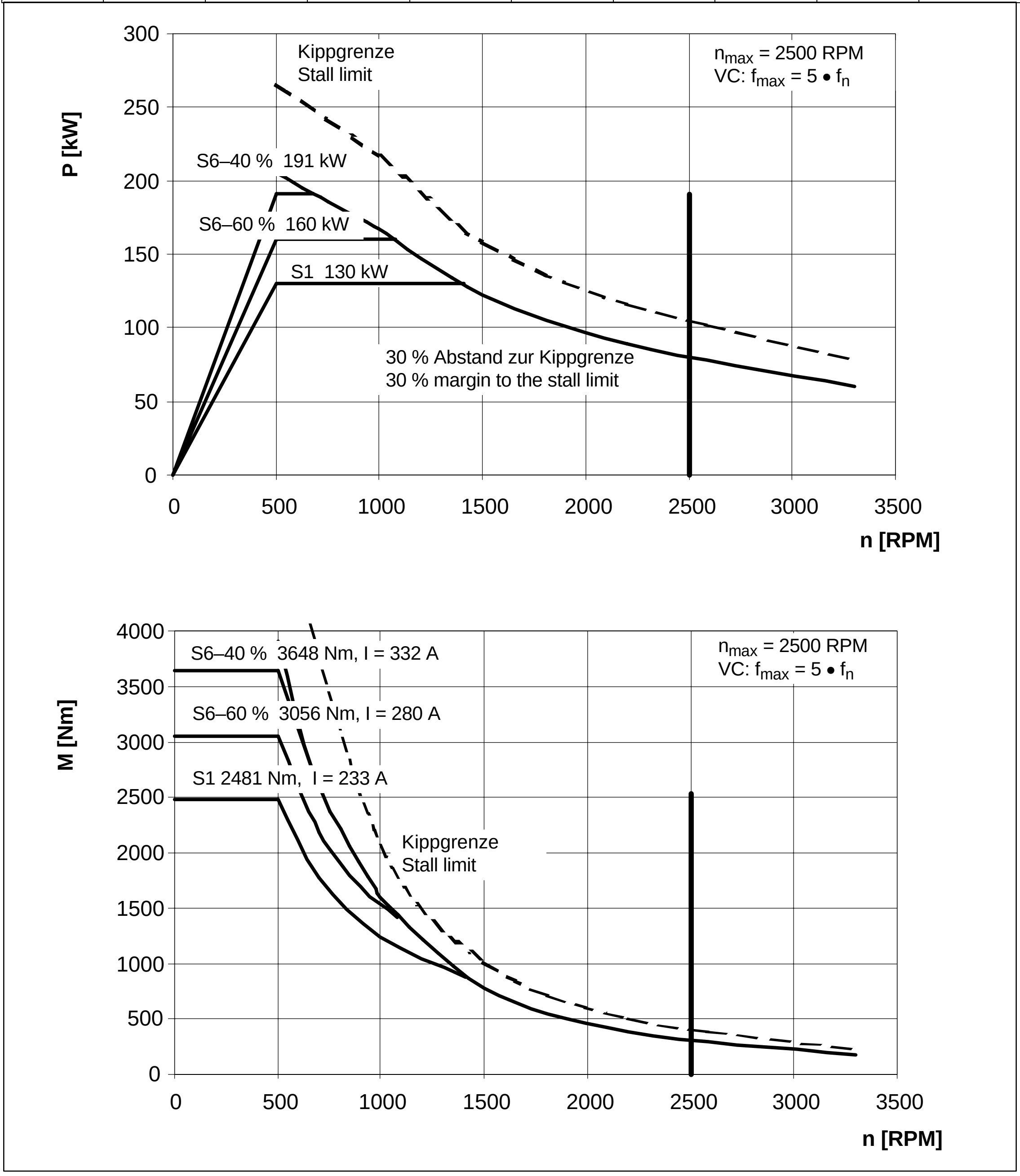


Fig. 3-10 MASTERDRIVES VC, 1PH7288–□□B□□

Table 3-15 MASTERDRIVES VC, 400 V, 1PH7284–□□C□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
800	125	1492	220	400	27	2200	2200	3300	95

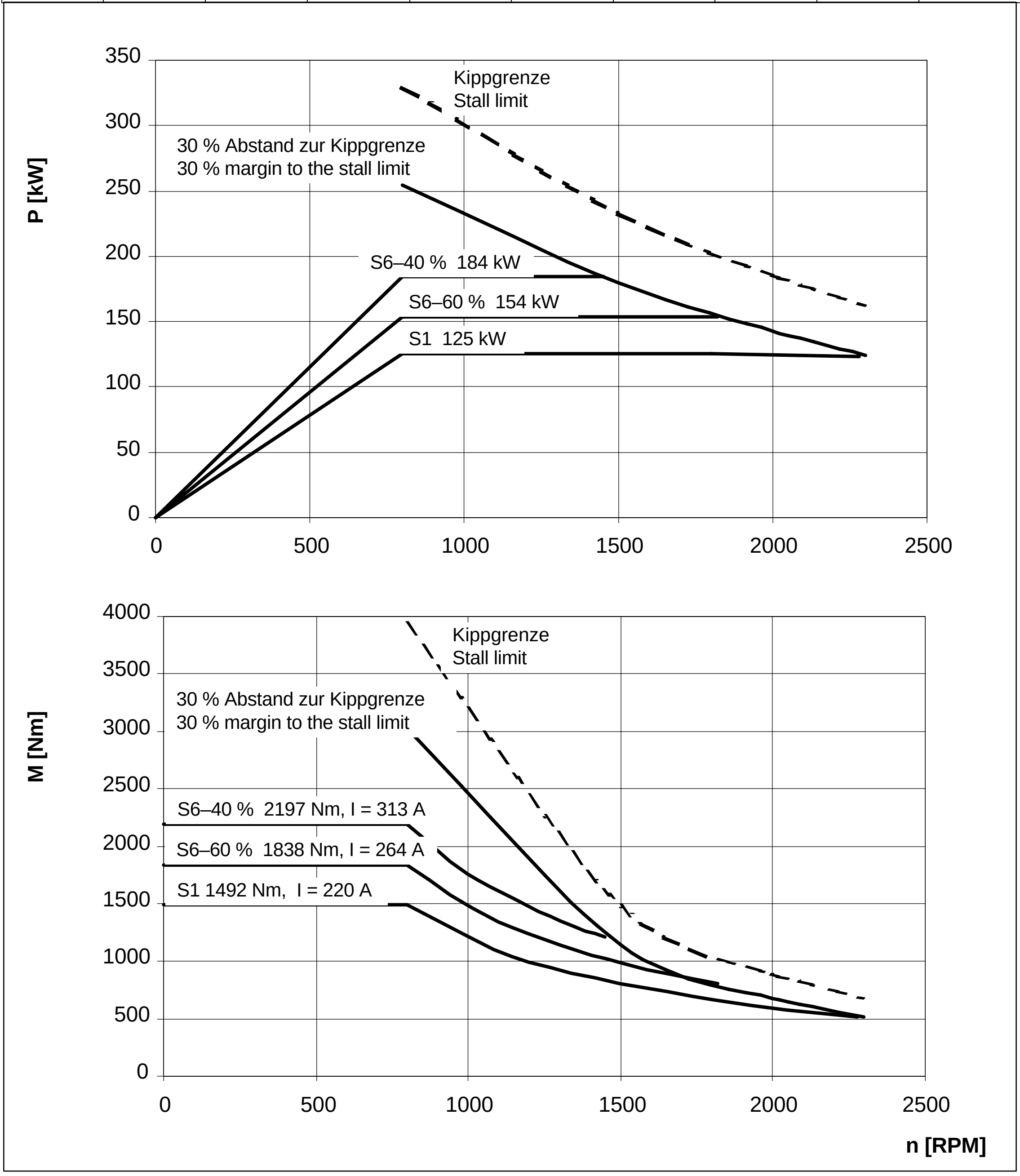


Fig. 3-11 MASTERDRIVES VC, 1PH7284–□□C□□

Table 3-16 MASTERDRIVES VC, 400 V, 1PH7286–□□C□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
800	155	1850	285	385	27	2200	2200	3300	135

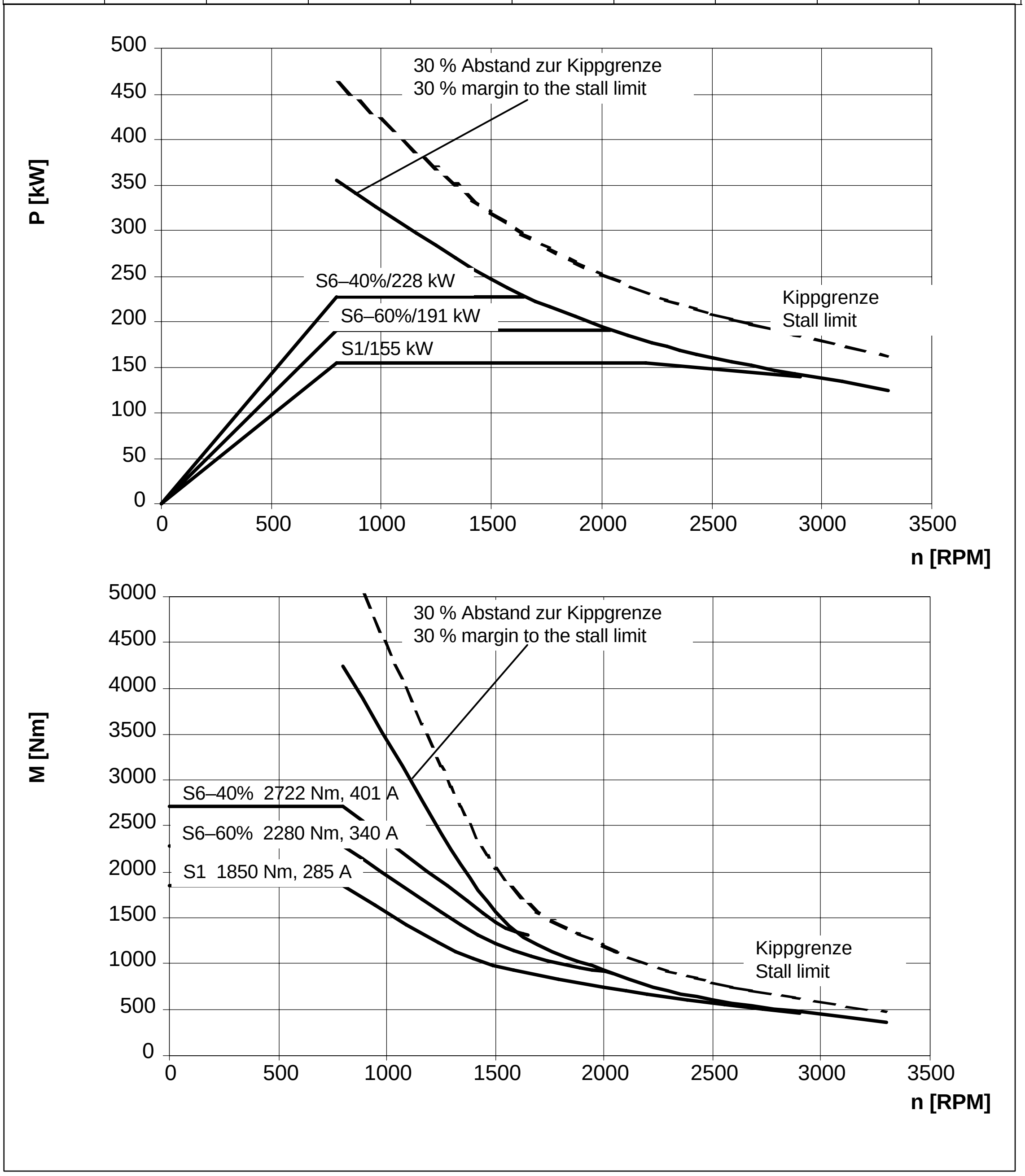


Fig. 3-12 MASTERDRIVES VC, 1PH7286–□□C□□

Table 3-17 MASTERDRIVES VC, 400 V, 1PH7288–□□C□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
800	190	2268	365	370	27	2200	2200	3300	170

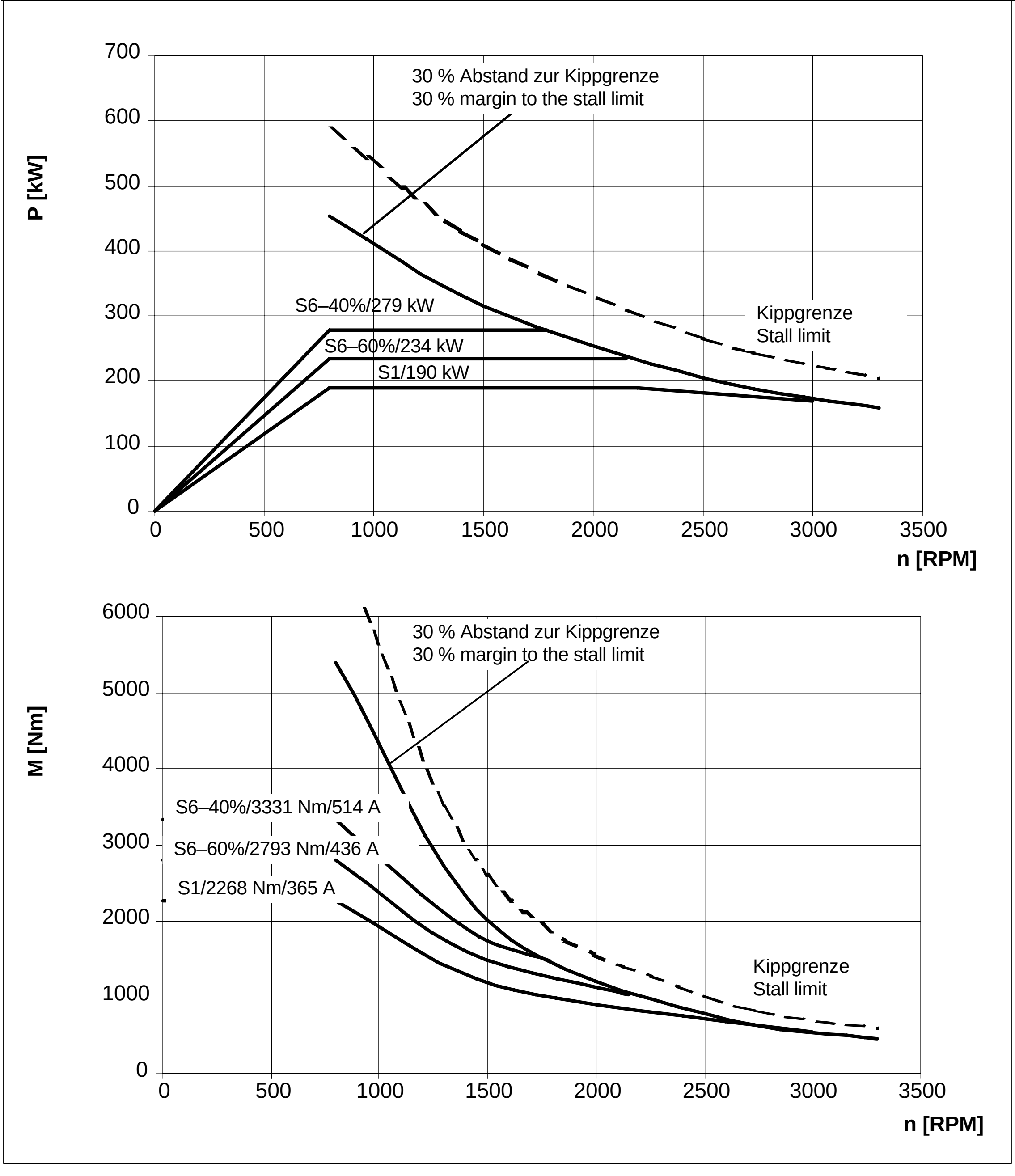


Fig. 3-13 MASTERDRIVES VC, 1PH7288–□□C□□

Table 3-18 MASTERDRIVES VC, 400 V, 1PH7103–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	4.3	36	10	391	40.6	2200	5500	5750	5.0

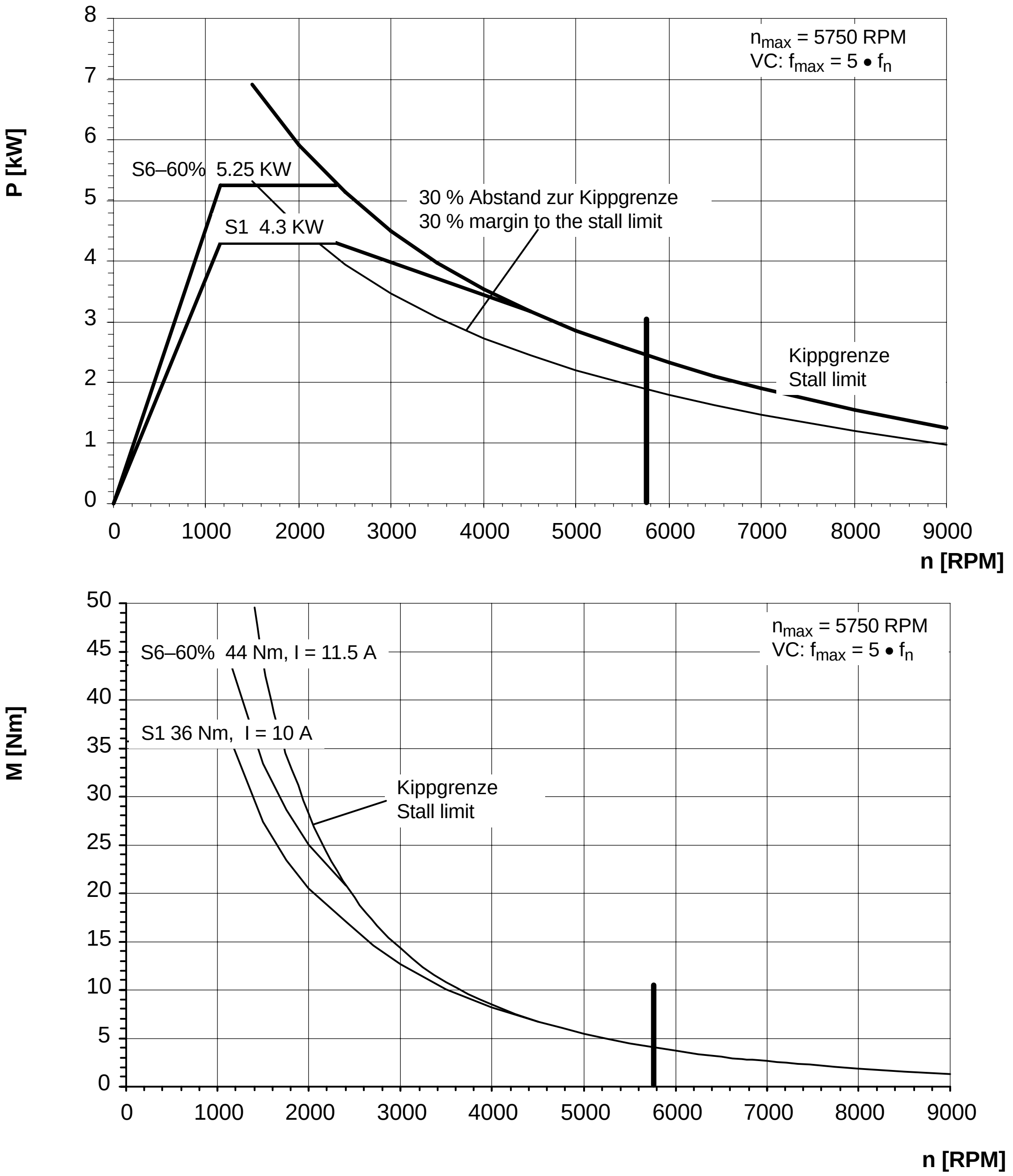


Fig. 3-14 MASTERDRIVES VC, 1PH7103–□□D□□

Kippgrenze
Stall limit

Table 3-19 MASTERDRIVES VC, 400 V, 1PH7107–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	7.2	60	17.5	360	40.3	3000	5500	5750	8.8

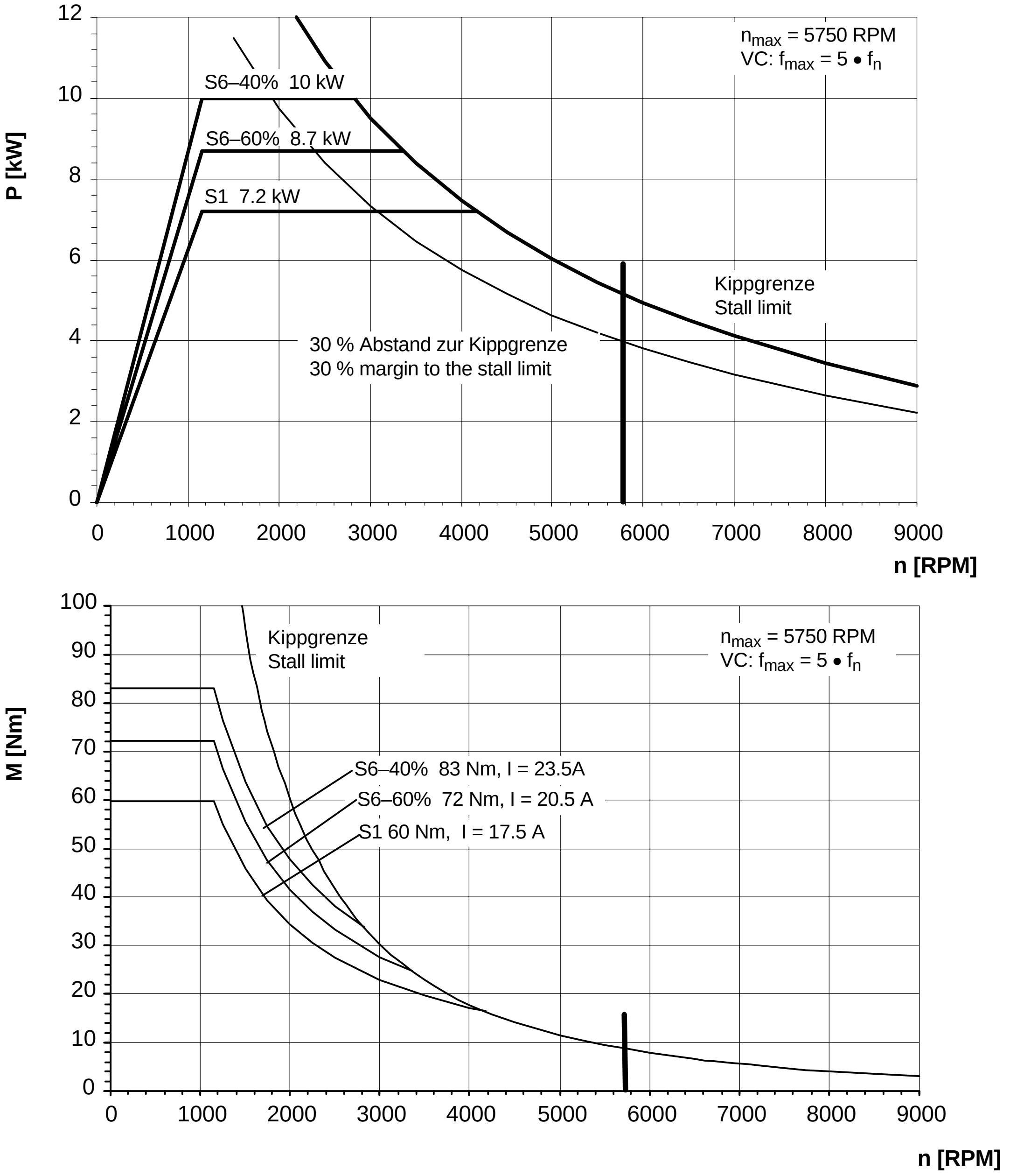


Fig. 3-15 MASTERDRIVES VC, 1PH7107–□□D□□

Table 3-20 MASTERDRIVES VC, 400 V, 1PH7133–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	13.5	112	29	381	39.7	2500	4500	5750	13

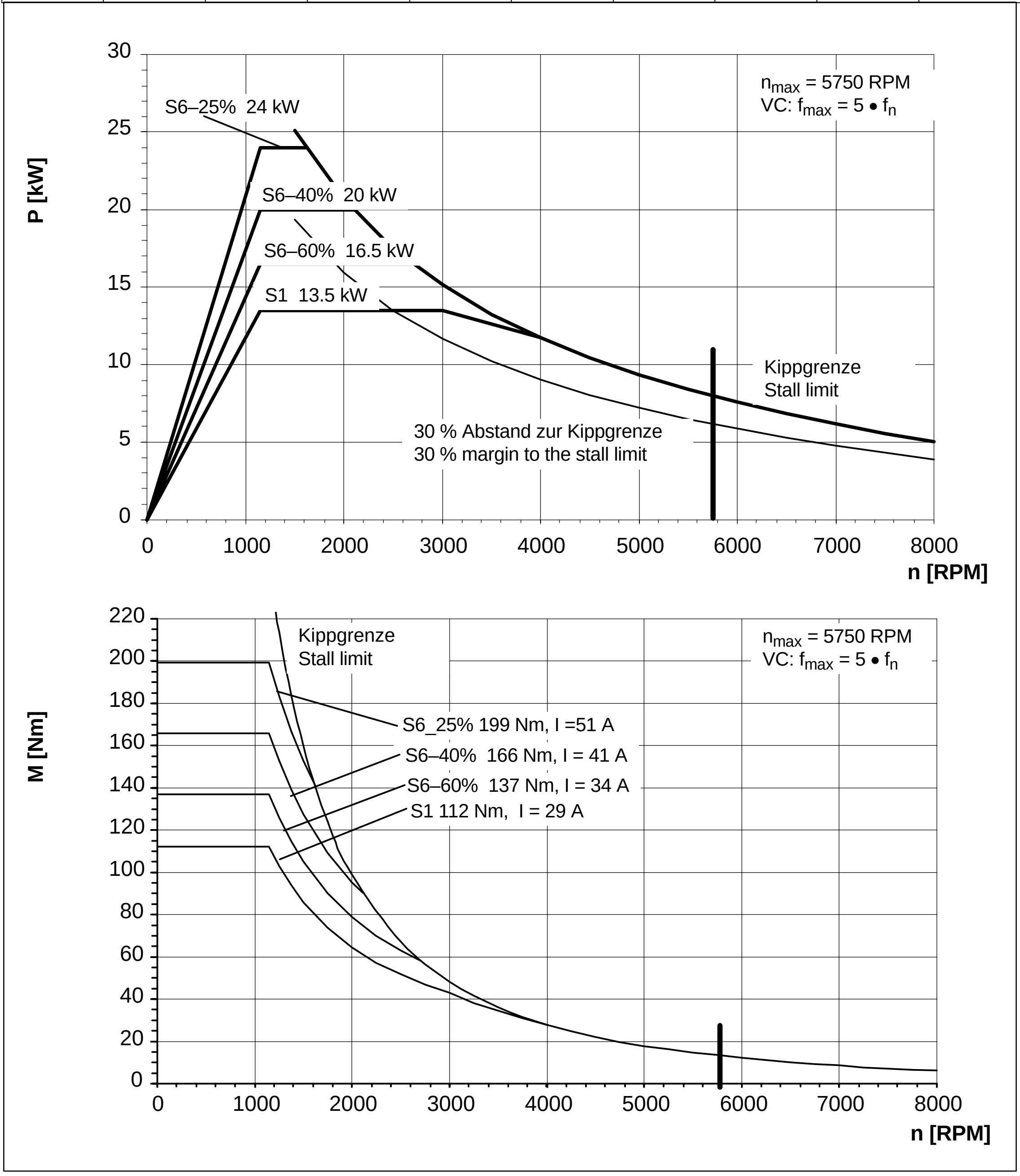


Fig. 3-16 MASTERDRIVES VC, 1PH7133–□□D□□

Table 3-21 MASTERDRIVES VC, 400 V, 1PH7137–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	19.5	162	43	367	39.6	2600	4500	5750	19

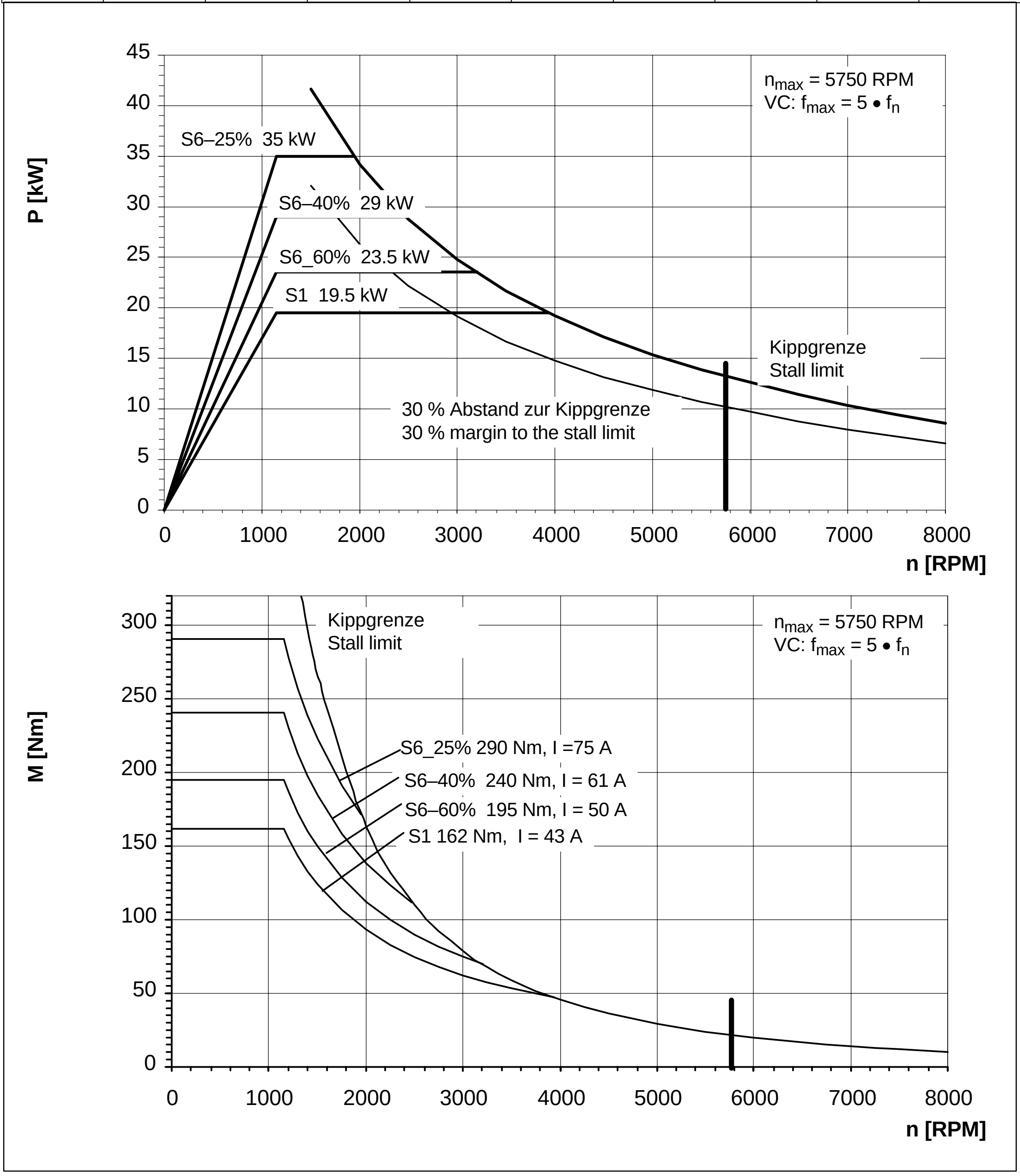


Fig. 3-17 MASTERDRIVES VC, 1PH7137–□□D□□

Table 3-22 MASTERDRIVES VC, 400 V, 1PH7163–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	25	208	55	364	39.2	3400	3700	5750	25

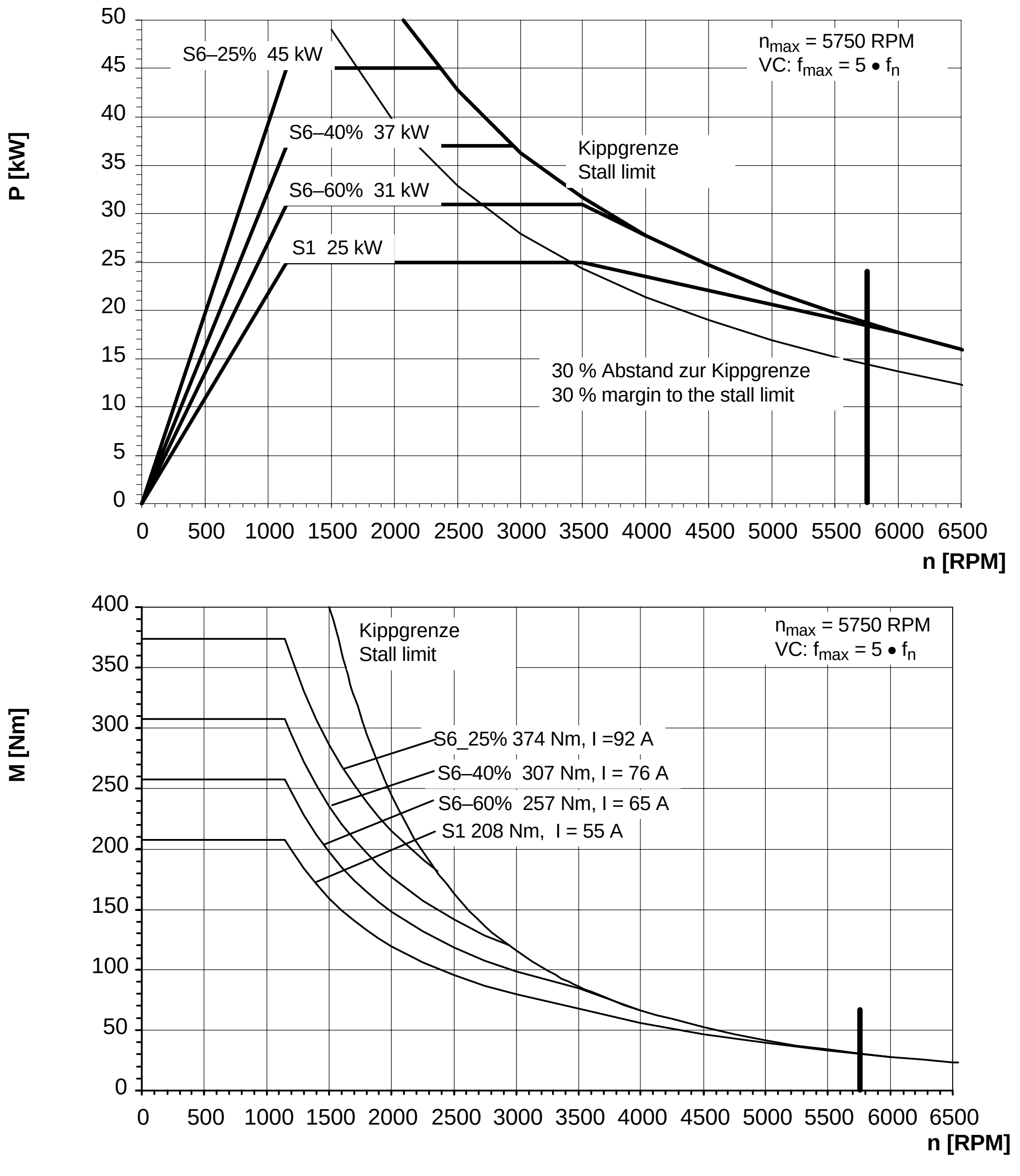


Fig. 3-18 MASTERDRIVES VC, 1PH7163–□□D□□

Table 3-23 MASTERDRIVES VC, 400 V, 1PH7167–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	31	257	70	357	39.1	3700	3700	5750	34

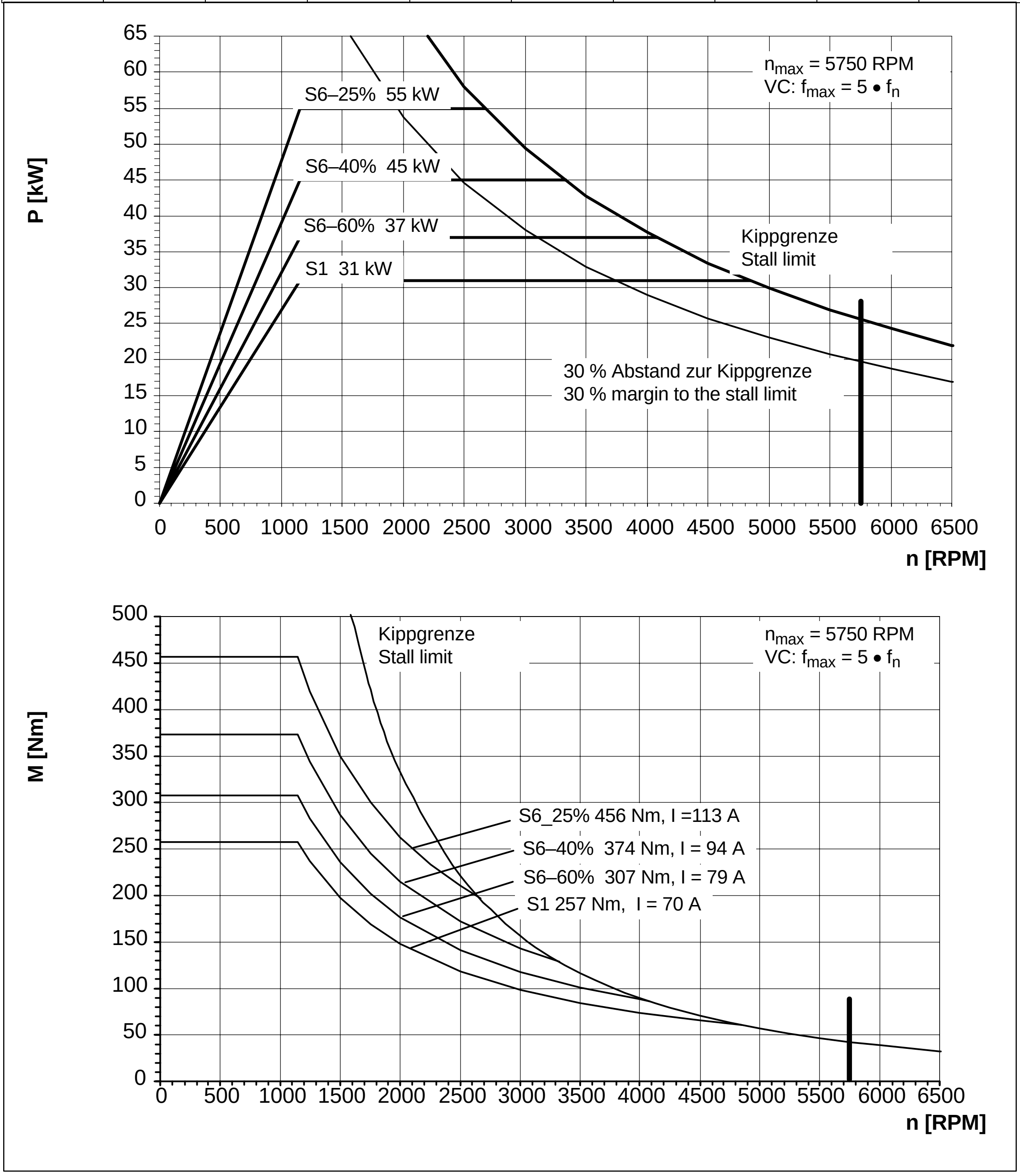


Fig. 3-19 MASTERDRIVES VC, 1PH7167–□□D□□

Table 3-24 MASTERDRIVES VC, 400 V, 1PH7184–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	44	366	89	383	39.2	3100	3500[1]	5000	42

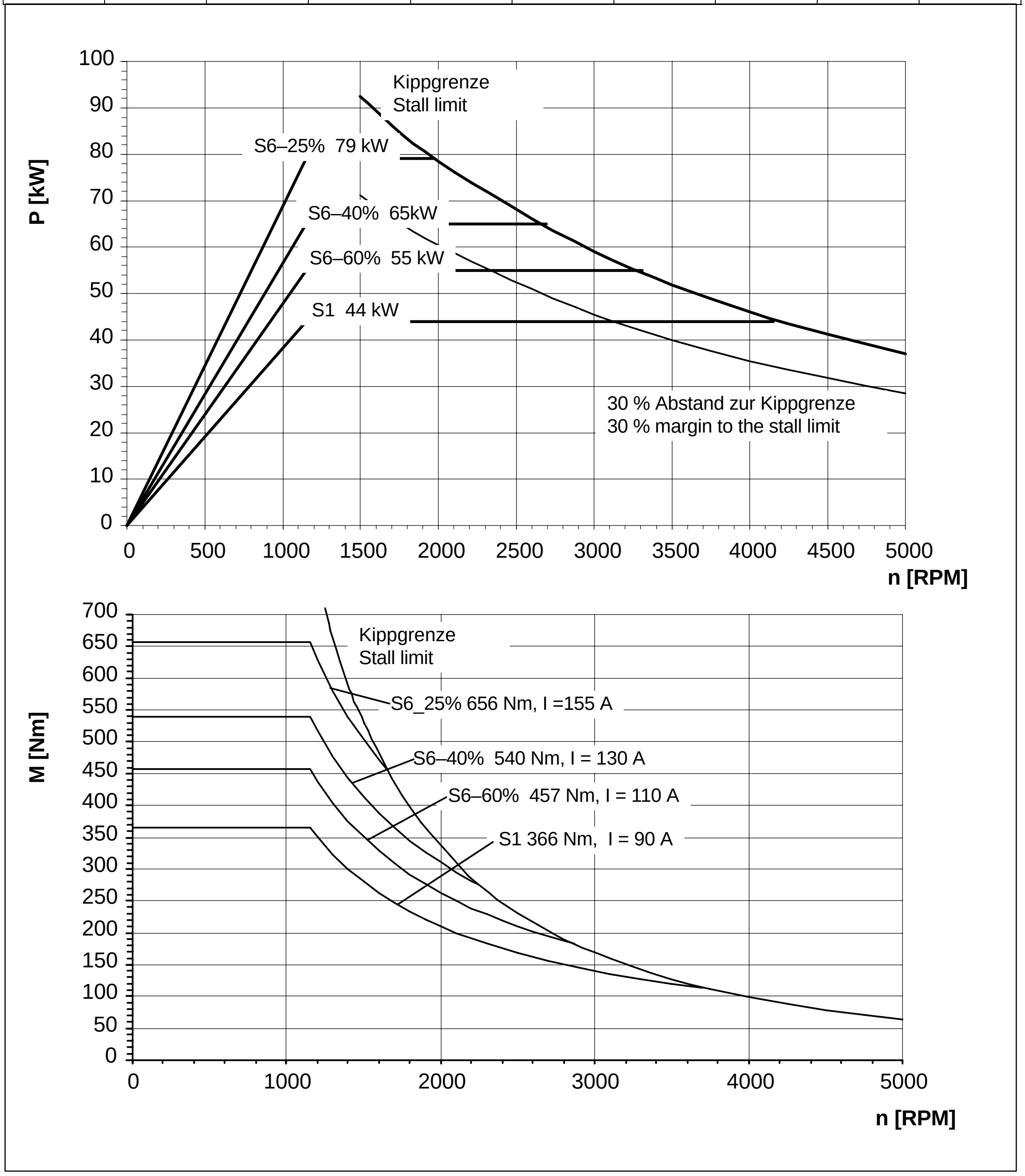


Fig. 3-20 MASTERDRIVES VC, 1PH7184–□□D□□

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1) 3000 RPM for increased cantilever forces

Table 3-25 MASTERDRIVES VC, 400 V, 1PH7186–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	58	482	116	390	39.1	3300	3500[1]	5000	58

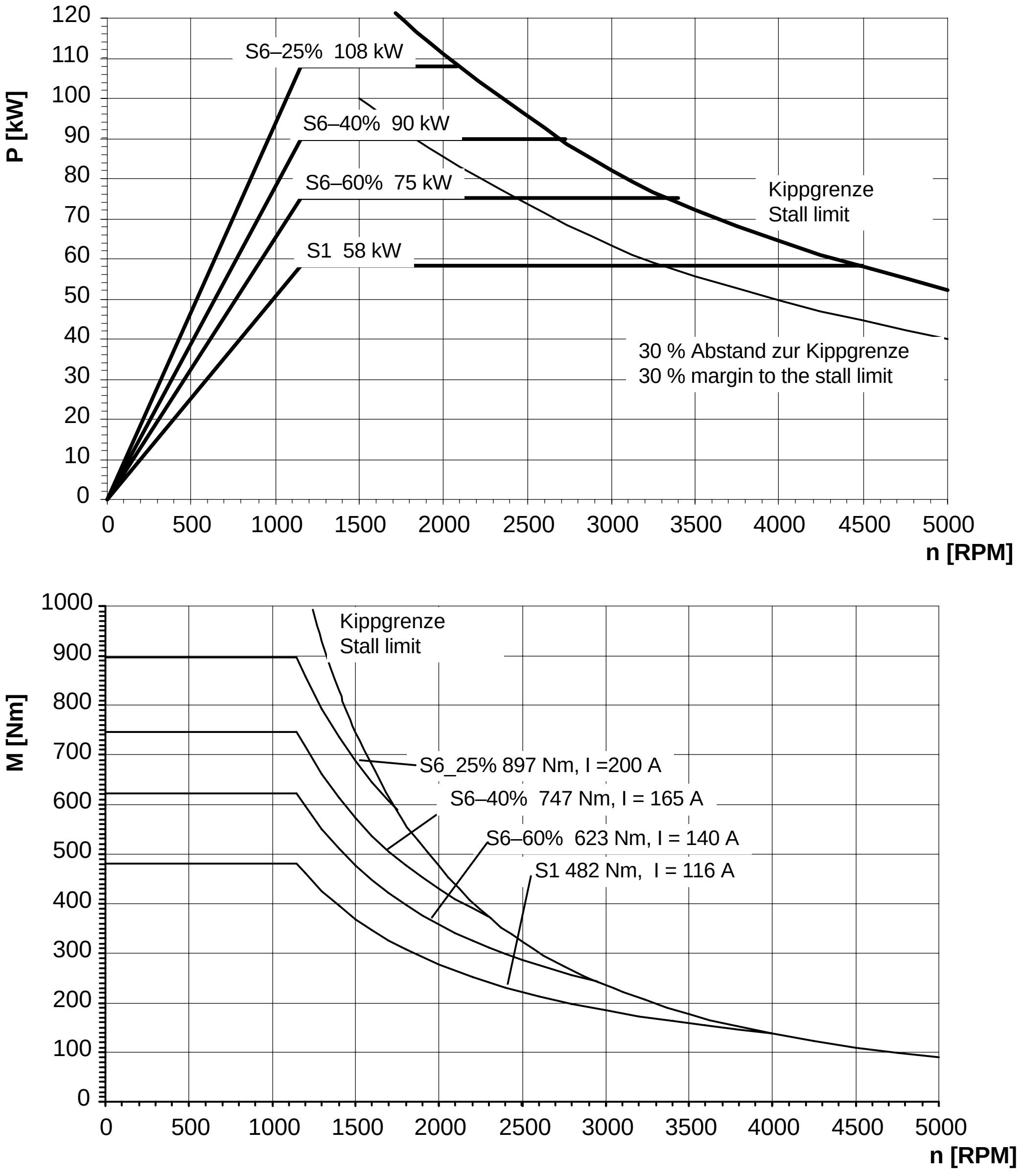

Fig. 3-21 MASTERDRIVES VC, 1PH7186–□□D□□

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1) 3000 RPM for increased cantilever forces

Table 3-26 MASTERDRIVES VC, 400 V, 1PH7224–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	81	670	160	385	38.9	2900	3100[1]	4500	79

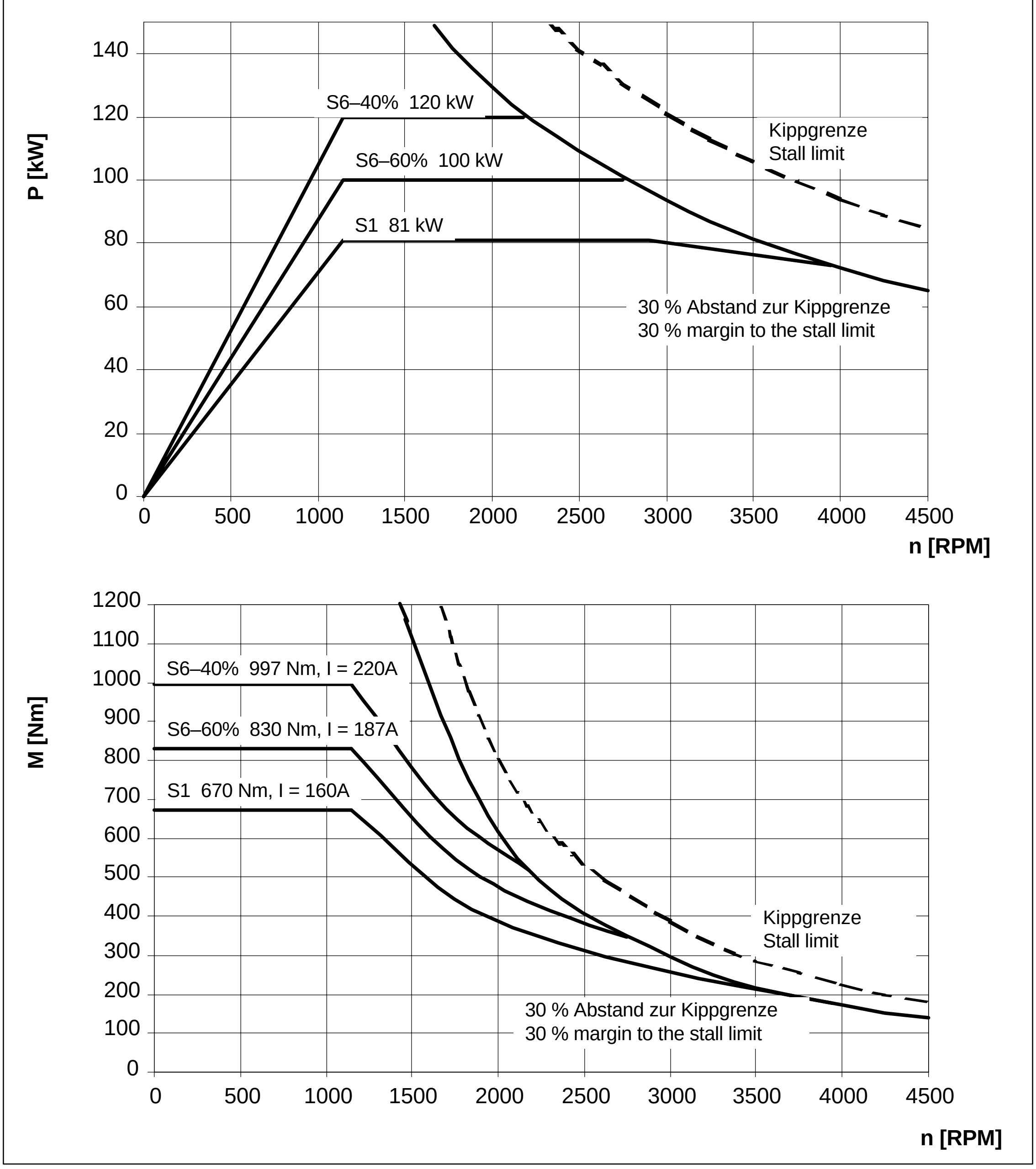

Fig. 3-22 MASTERDRIVES VC, 1PH7224–□□D□□

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[1] 2700 RPM for increased cantilever forces

Table 3-27 MASTERDRIVES VC, 400 V, 1PH7226–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	105	870	197	390	38.9	2900	3100[1]	4500	87.5

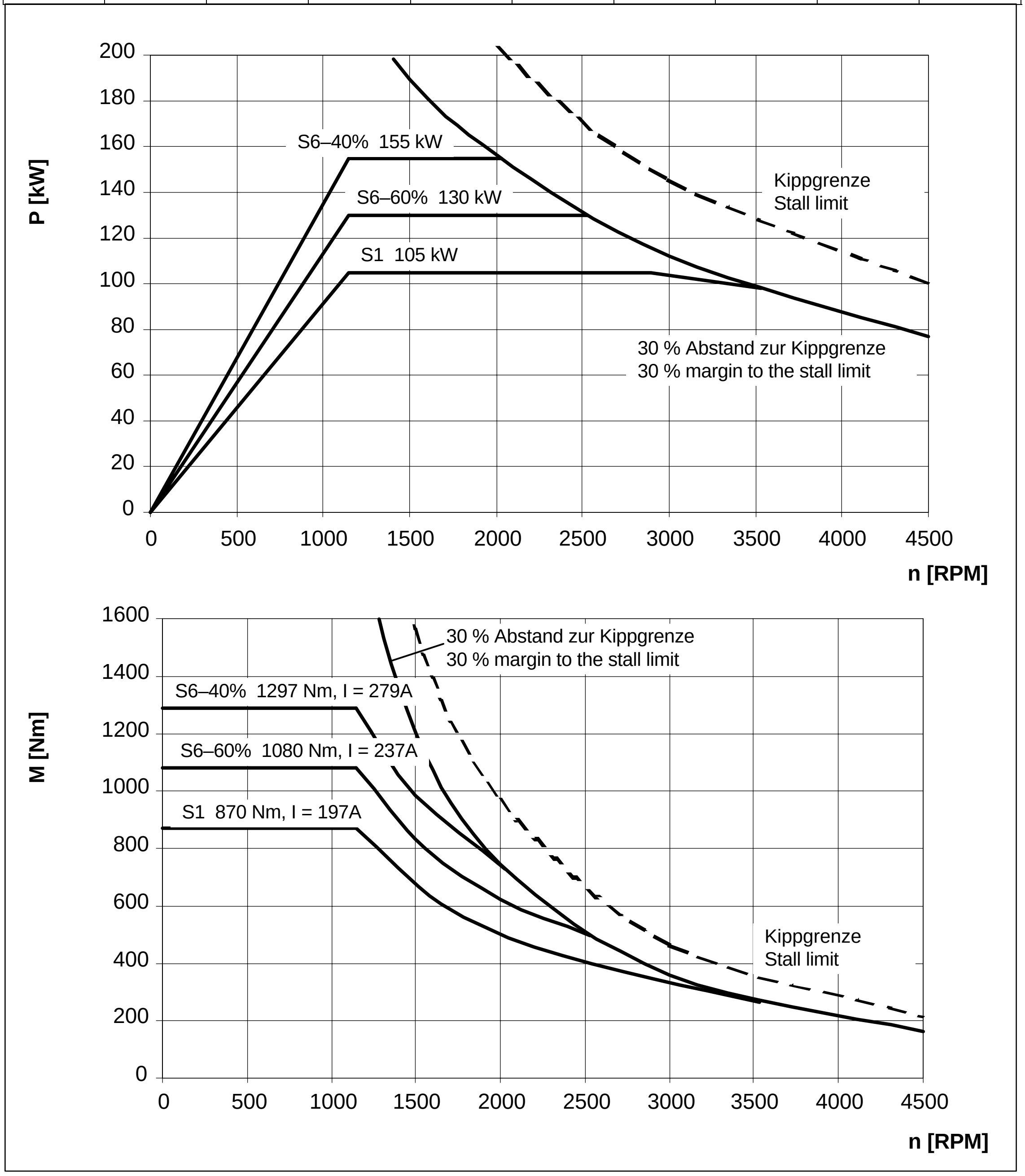

Fig. 3-23 MASTERDRIVES VC, 1PH7226–□□D□□

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[1] 2700 RPM for increased cantilever forces

Table 3-28 MASTERDRIVES VC, 400 V, 1PH7228–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	129	1070	238	390	38.9	2900	3100[1]	4500[2]	98

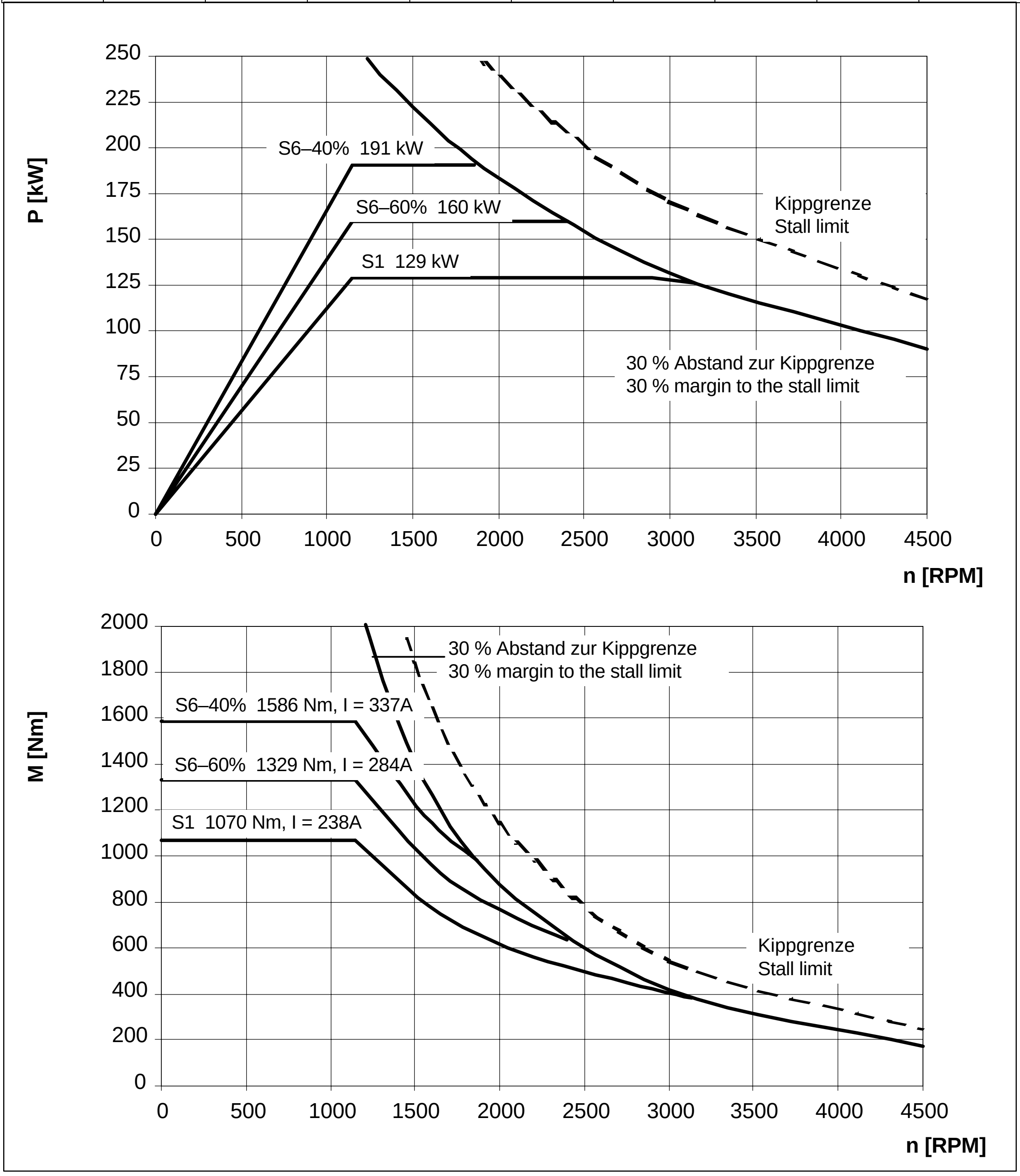

Fig. 3-24 MASTERDRIVES VC, 1PH7228–□□D□□

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1) 2500 RPM for increased cantilever forces

2) 4000 RPM for increased cantilever forces

Table 3-29 MASTERDRIVES VC, 400 V, 1PH7284–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	170	1414	314	400	38.6	2200	2200	3300	158

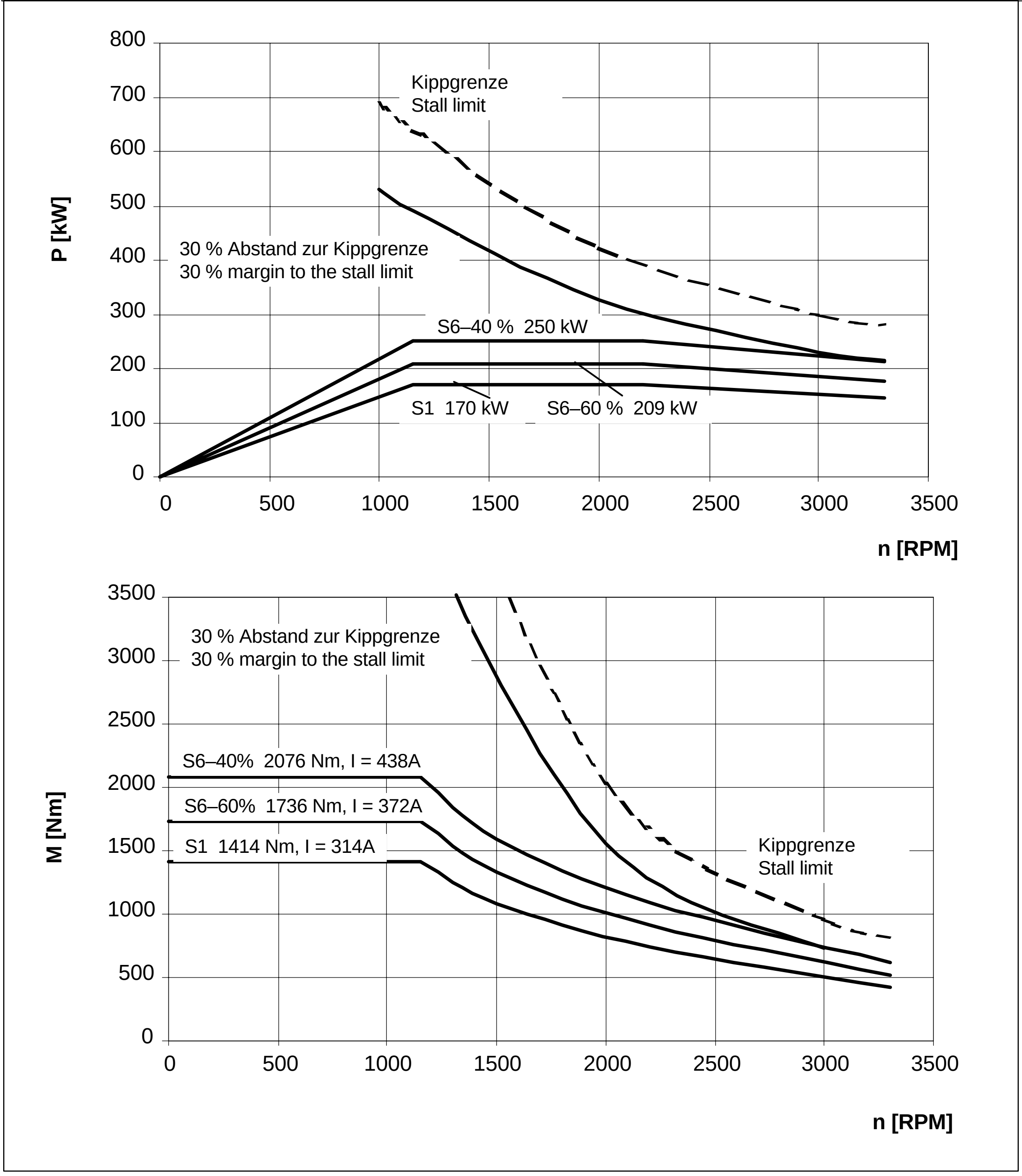
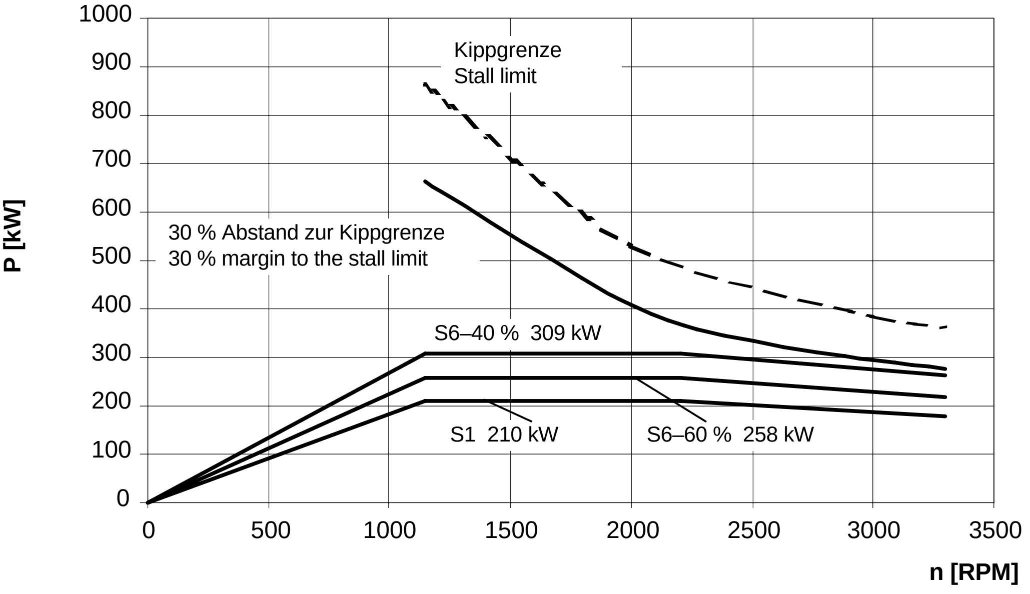


Fig. 3-25 MASTERDRIVES VC, 1PH7284–□□D□□

Table 3-30 MASTERDRIVES VC, 400 V, 1PH7286–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	210	1745	414	380	38.6	2200	2200	3300	218



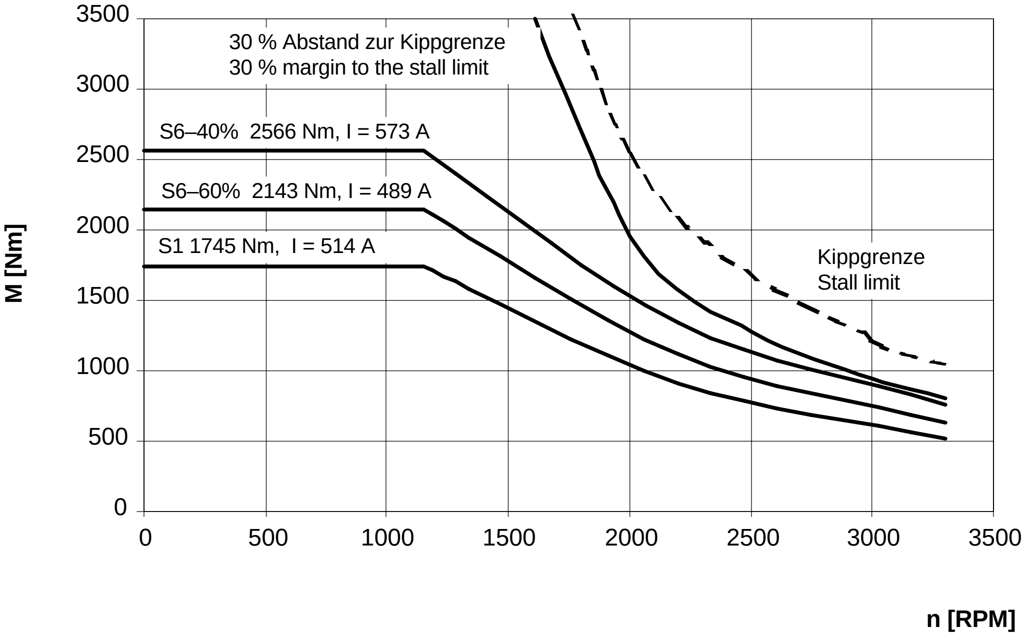


Fig. 3-26 MASTERDRIVES VC, 1PH7286–□□D□□

Table 3-31 MASTERDRIVES VC, 400 V, 1PH7288–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	260	2160	497	385	38.6	2200	2200	3300	252

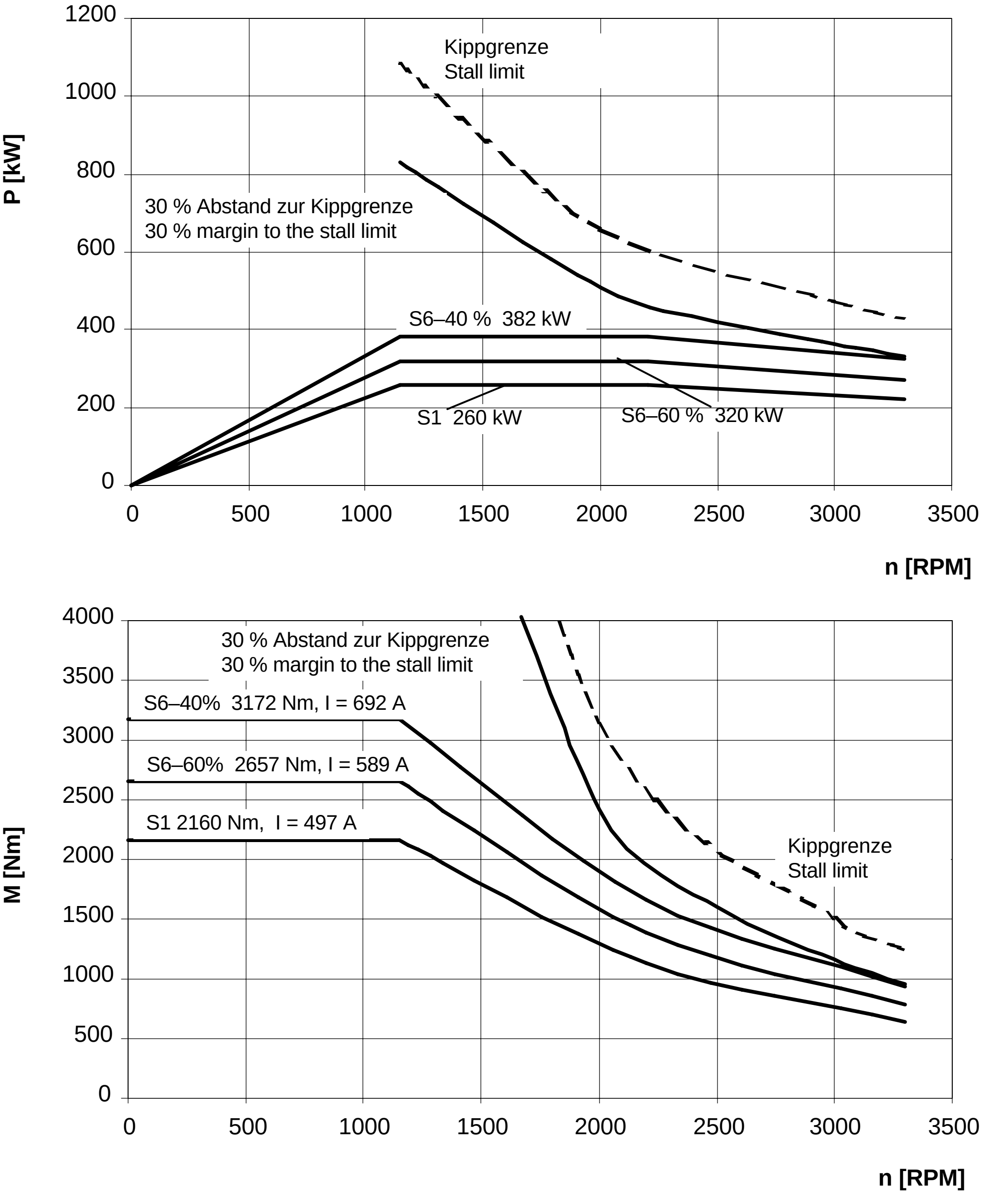


Fig. 3-27 MASTERDRIVES VC, 1PH7288–□□D□□

Table 3-32 MASTERDRIVES VC, 400 V, 1PH7101–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	4.3	24	10	398	60.0	4600	5500	8750	5.7

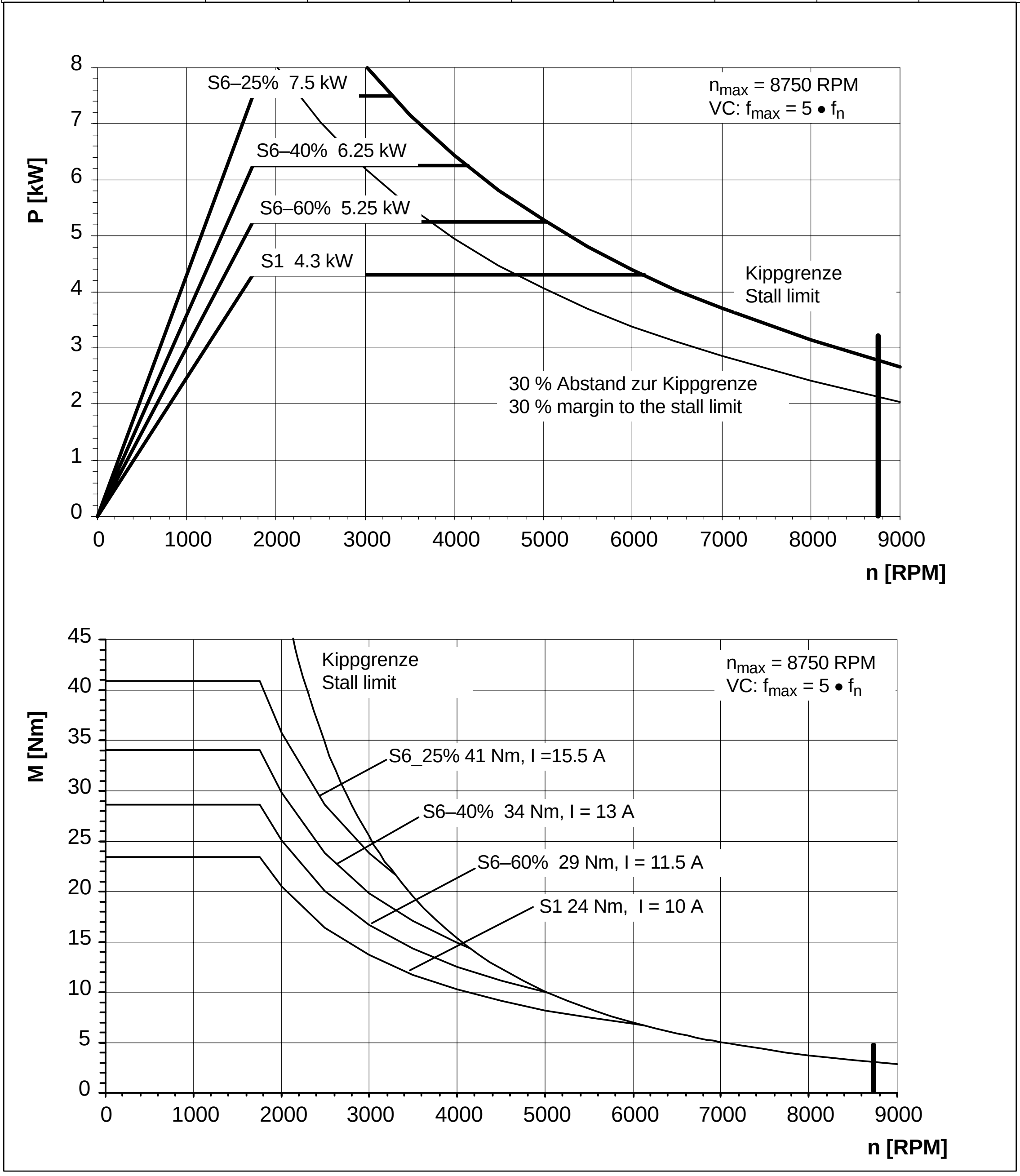


Fig. 3-28 MASTERDRIVES VC, 1PH7101–□□F□□

Table 3-33 MASTERDRIVES VC, 400 V, 1PH7103–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	6.25	34	13	398	61.0	2600	5500	8750	5.3

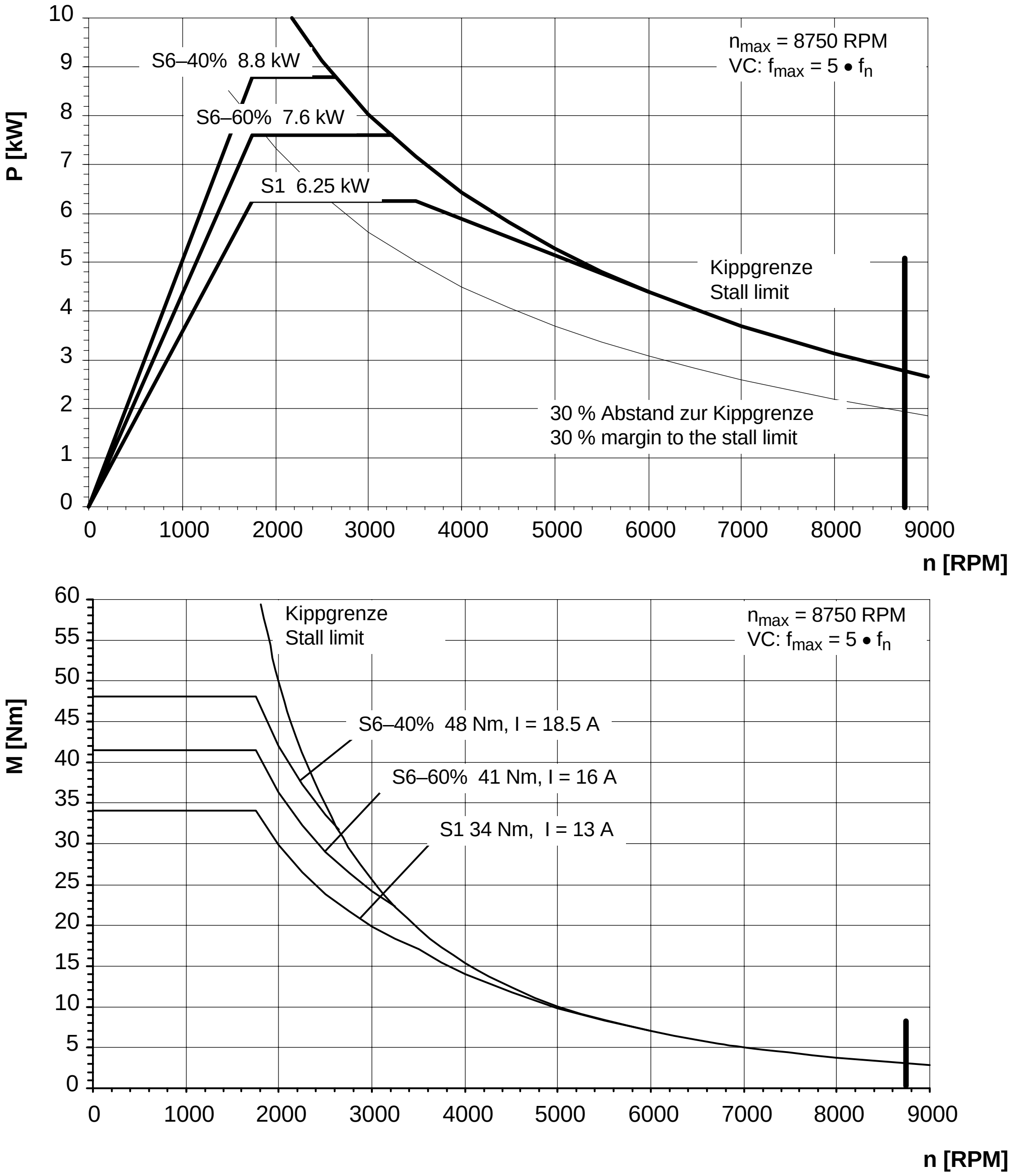


Fig. 3-29 MASTERDRIVES VC, 1PH7103–□□F□□

Table 3-34 MASTERDRIVES VC, 400 V, 1PH7105–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	8.0	44	17.5	398	60.0	4500	5500	8750	9.3

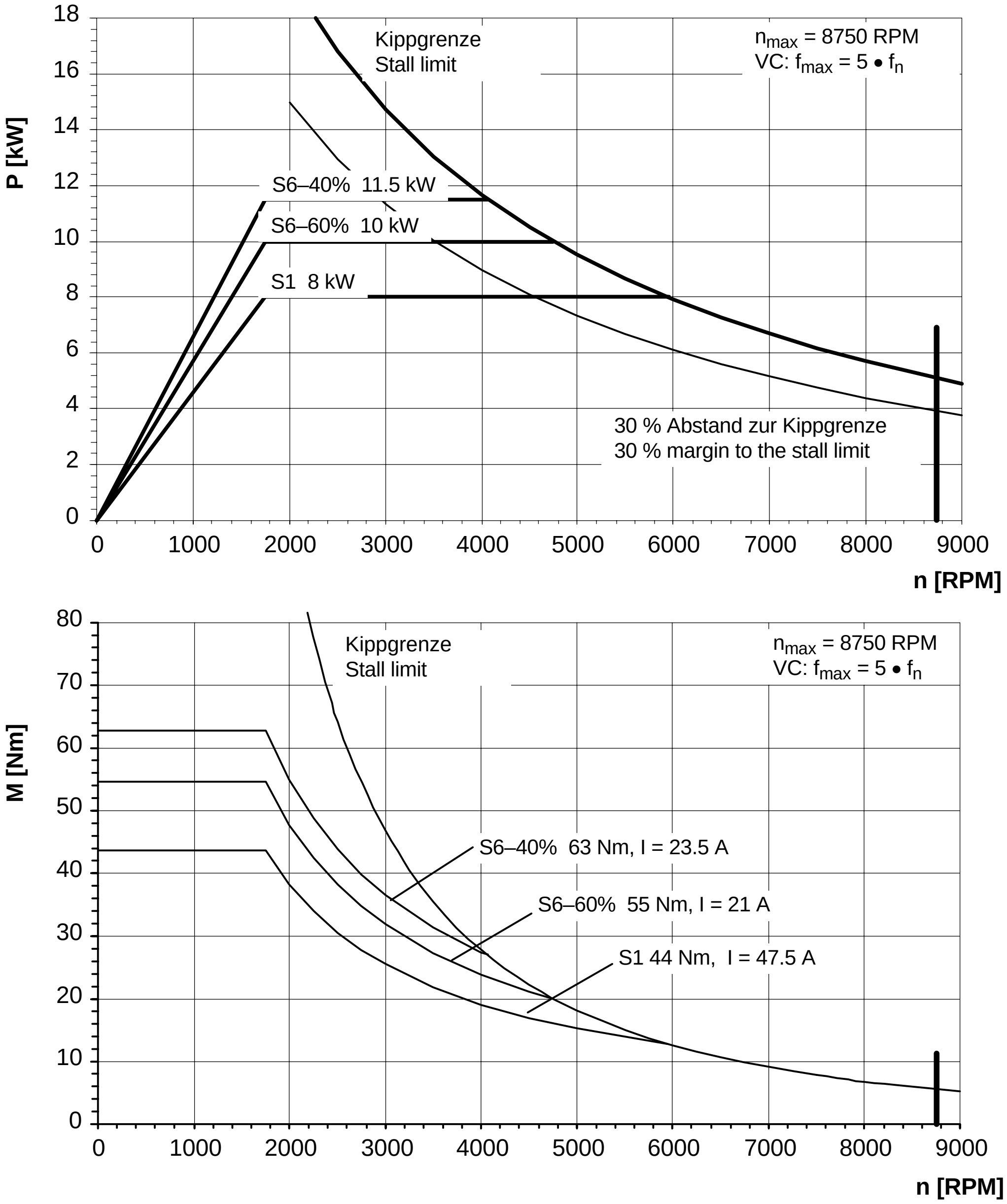


Fig. 3-30 MASTERDRIVES VC, 1PH7105–□□F□□

Table 3-35 MASTERDRIVES VC, 400 V, 1PH7107–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	10	55	23	381	60.3	4200	5500	8750	10.6

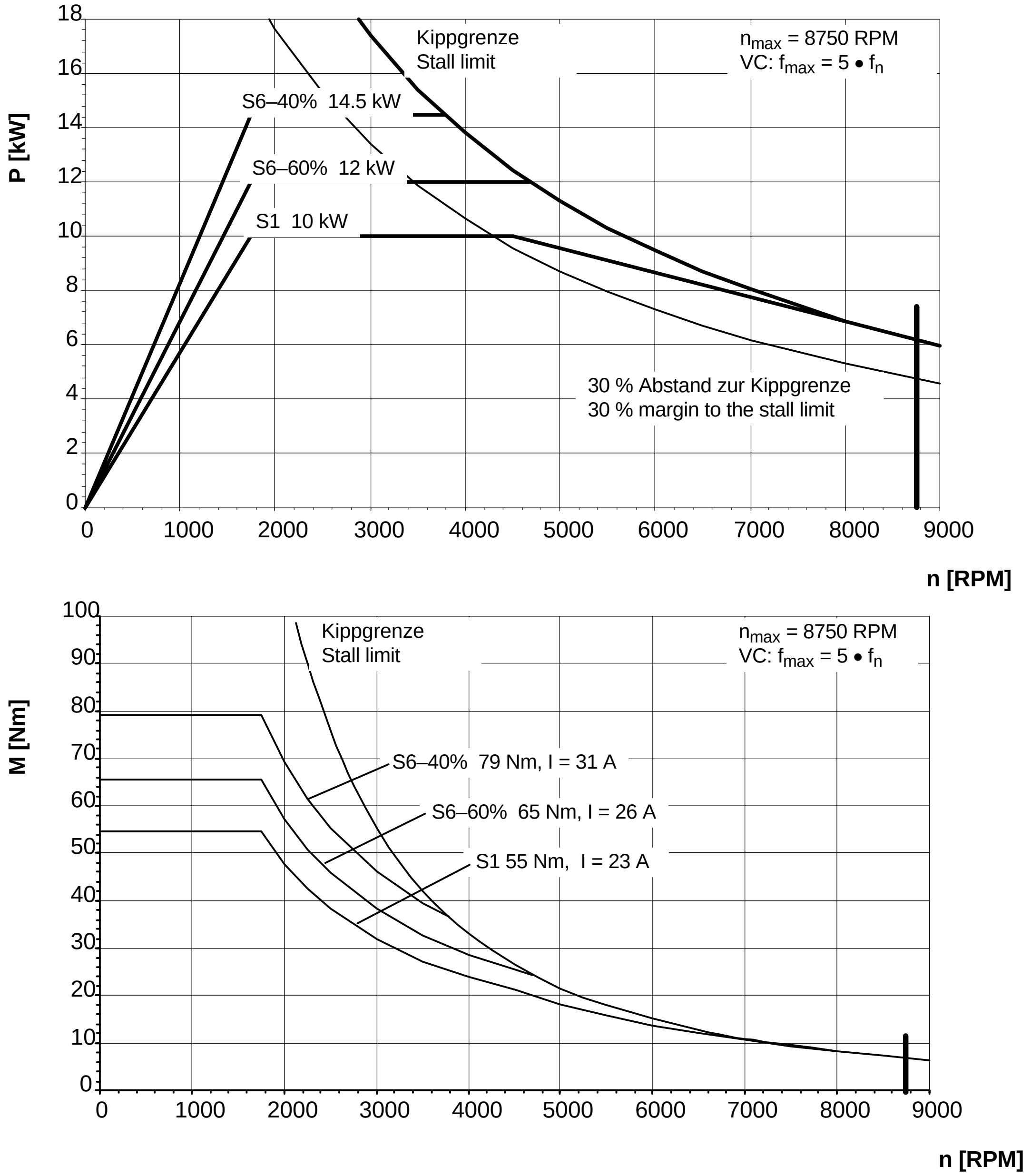


Fig. 3-31 MASTERDRIVES VC, 1PH7107–□□F□□

Table 3-36 MASTERDRIVES VC, 400 V, 1PH7131–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	13	71	24	398	59.7	3300	4500	8000	8.1

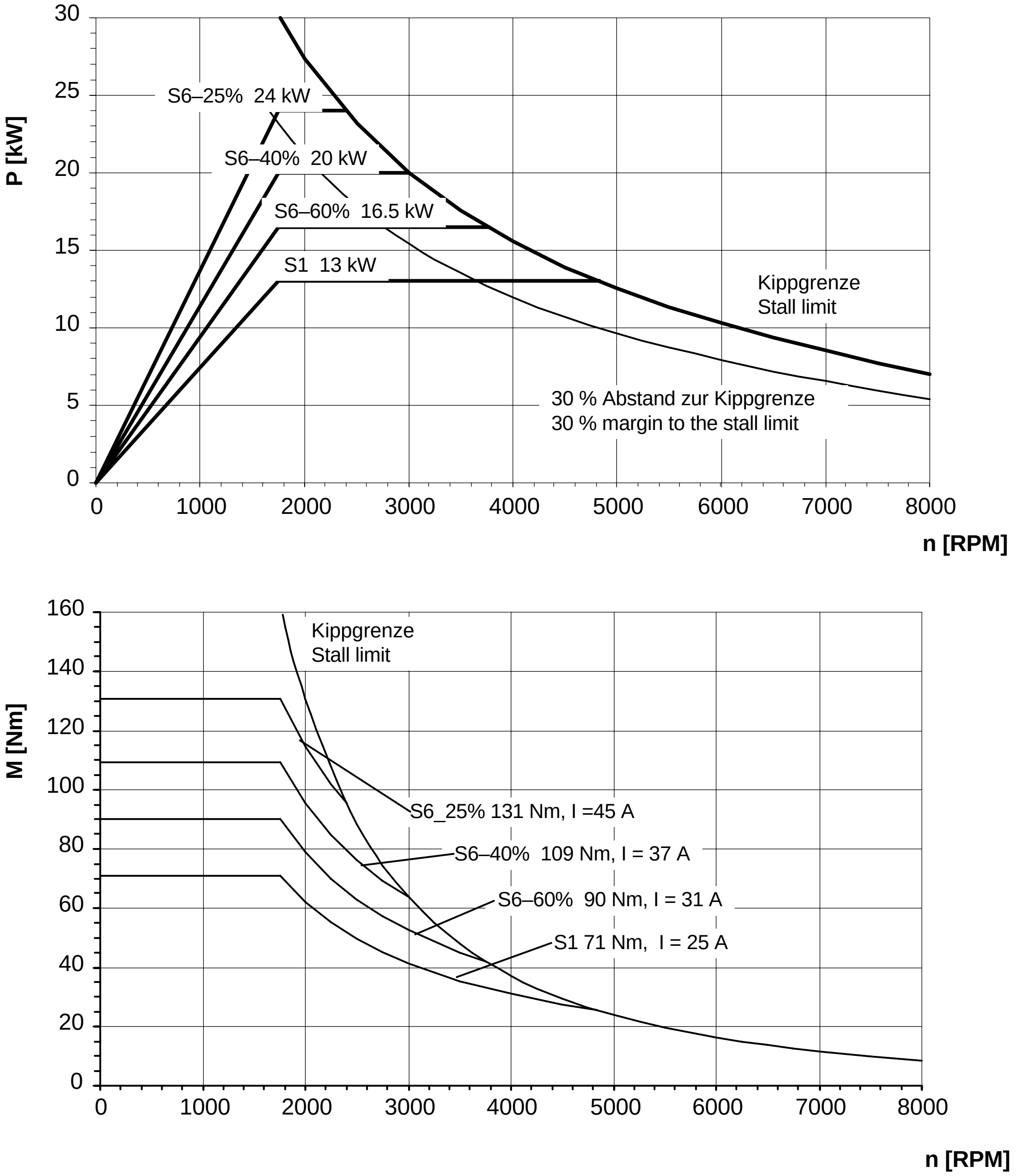


Fig. 3-32 MASTERDRIVES VC, 1PH7131–□□F□□

Table 3-37 MASTERDRIVES VC, 400 V, 1PH7133–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	17.5	96	34	398	59.7	3400	4500	8000	14

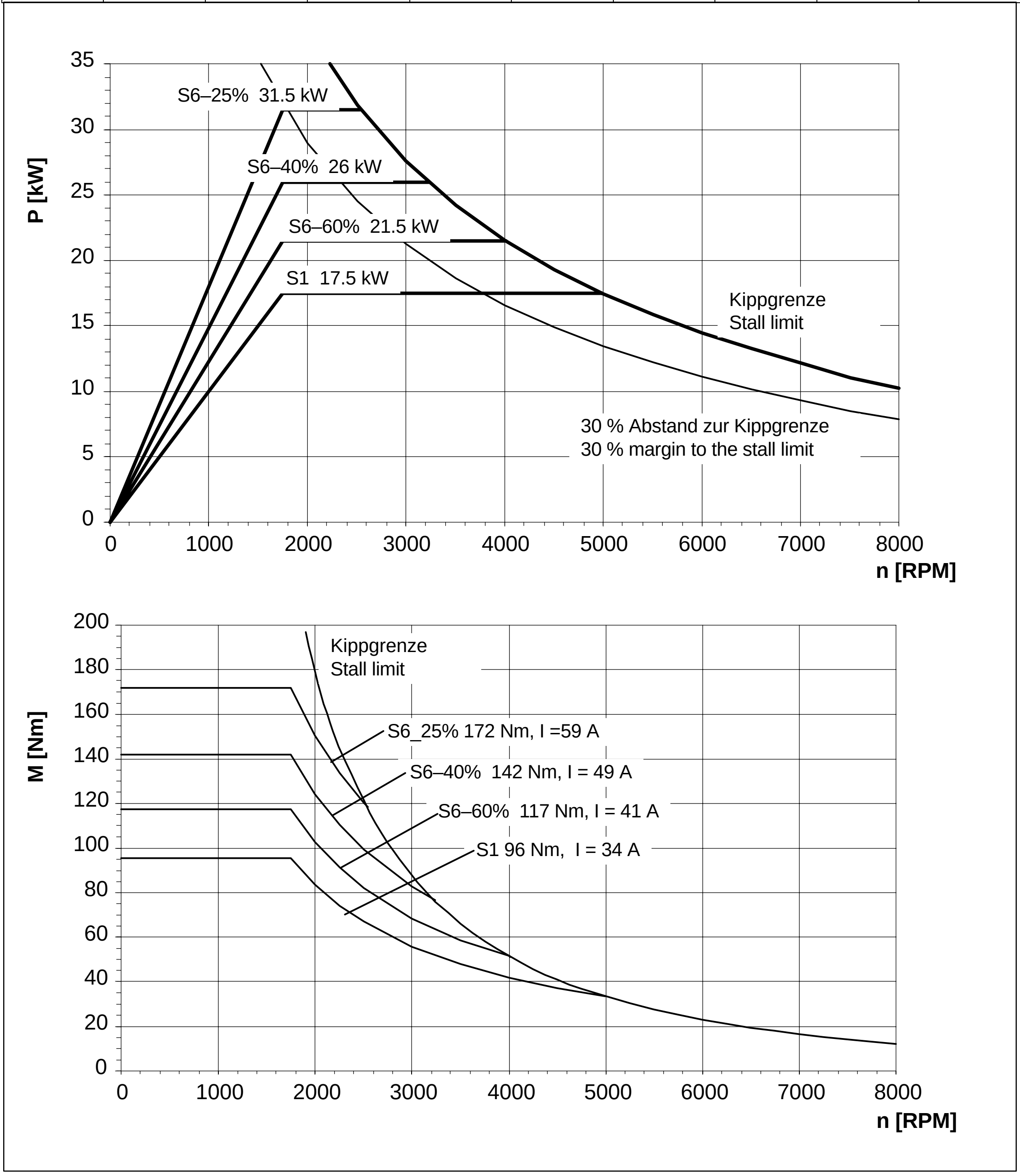


Fig. 3-33 MASTERDRIVES VC, 1PH7133–□□F□□

Table 3-38 MASTERDRIVES VC, 400 V, 1PH7135–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	21.5	117	42	398	59.5	3800	4500	8000	16

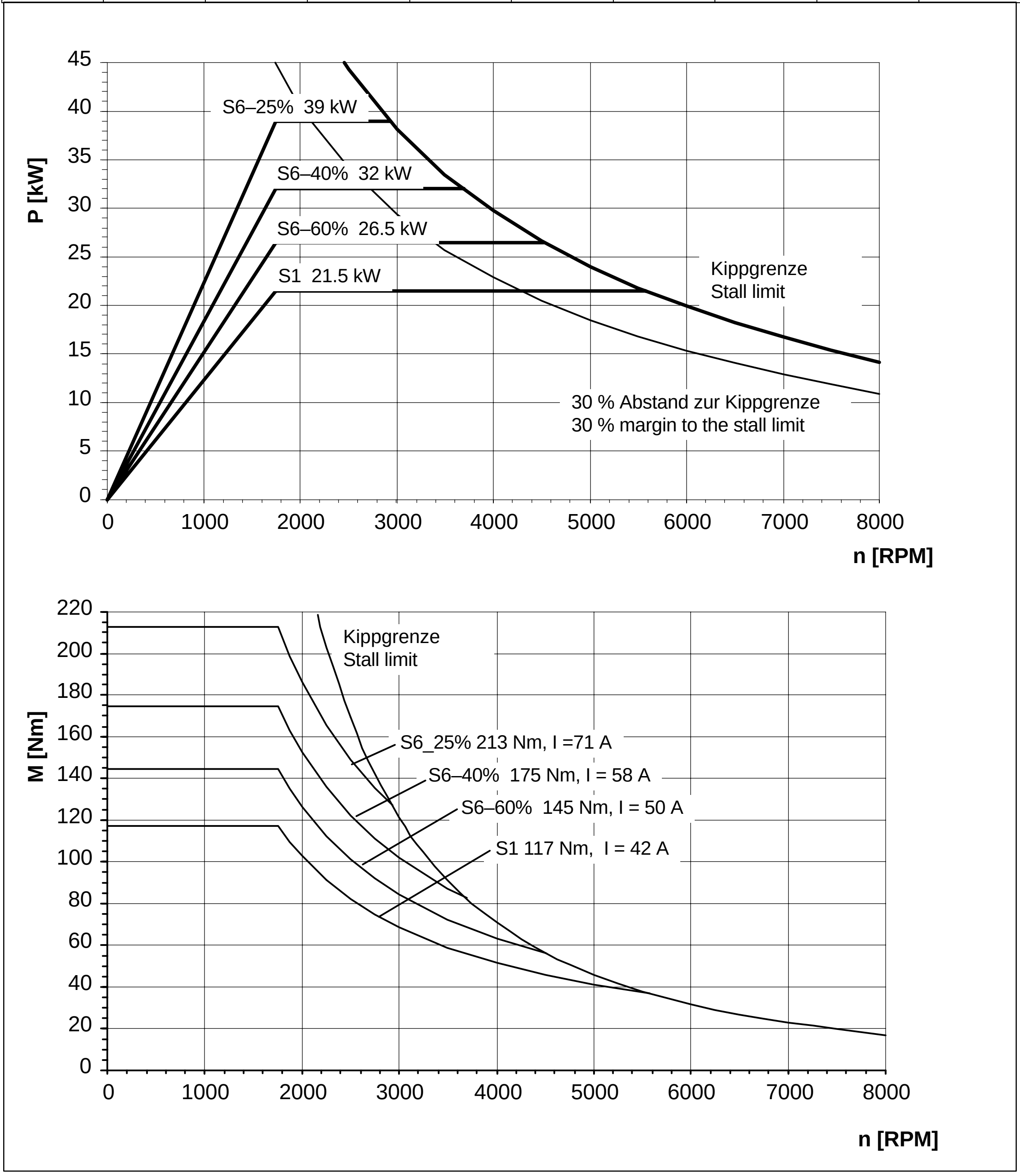


Fig. 3-34 MASTERDRIVES VC, 1PH7135–□□F□□

Table 3-39 MASTERDRIVES VC, 400 V, 1PH7137–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	25	136	56	357	59.5	4000	4500	8000	23

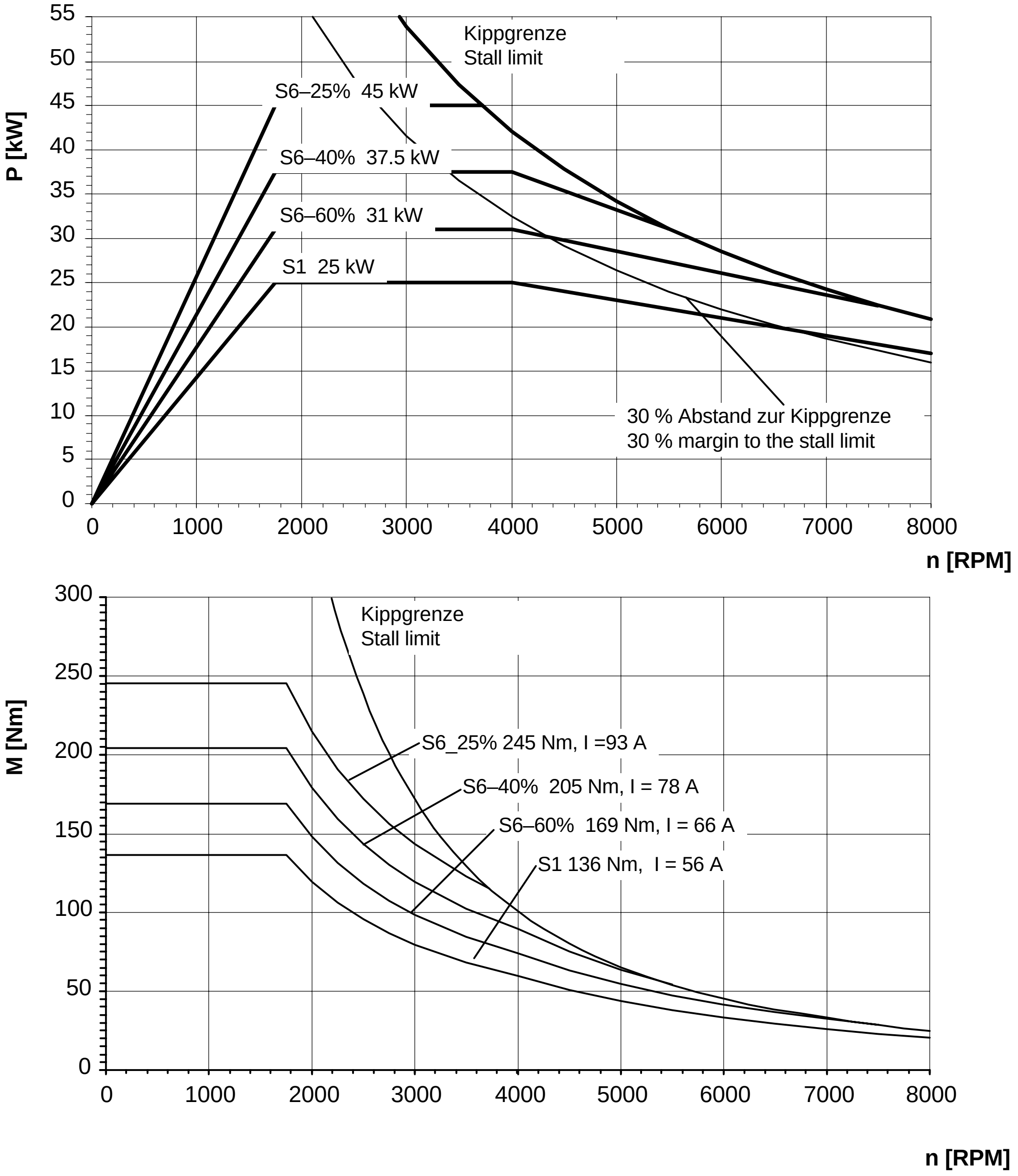


Fig. 3-35 MASTERDRIVES VC, 1PH7137–□□F□□

Table 3-40 MASTERDRIVES VC, 400 V, 1PH7163–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	34	186	72	364	59.2	4000	3700	6500	28

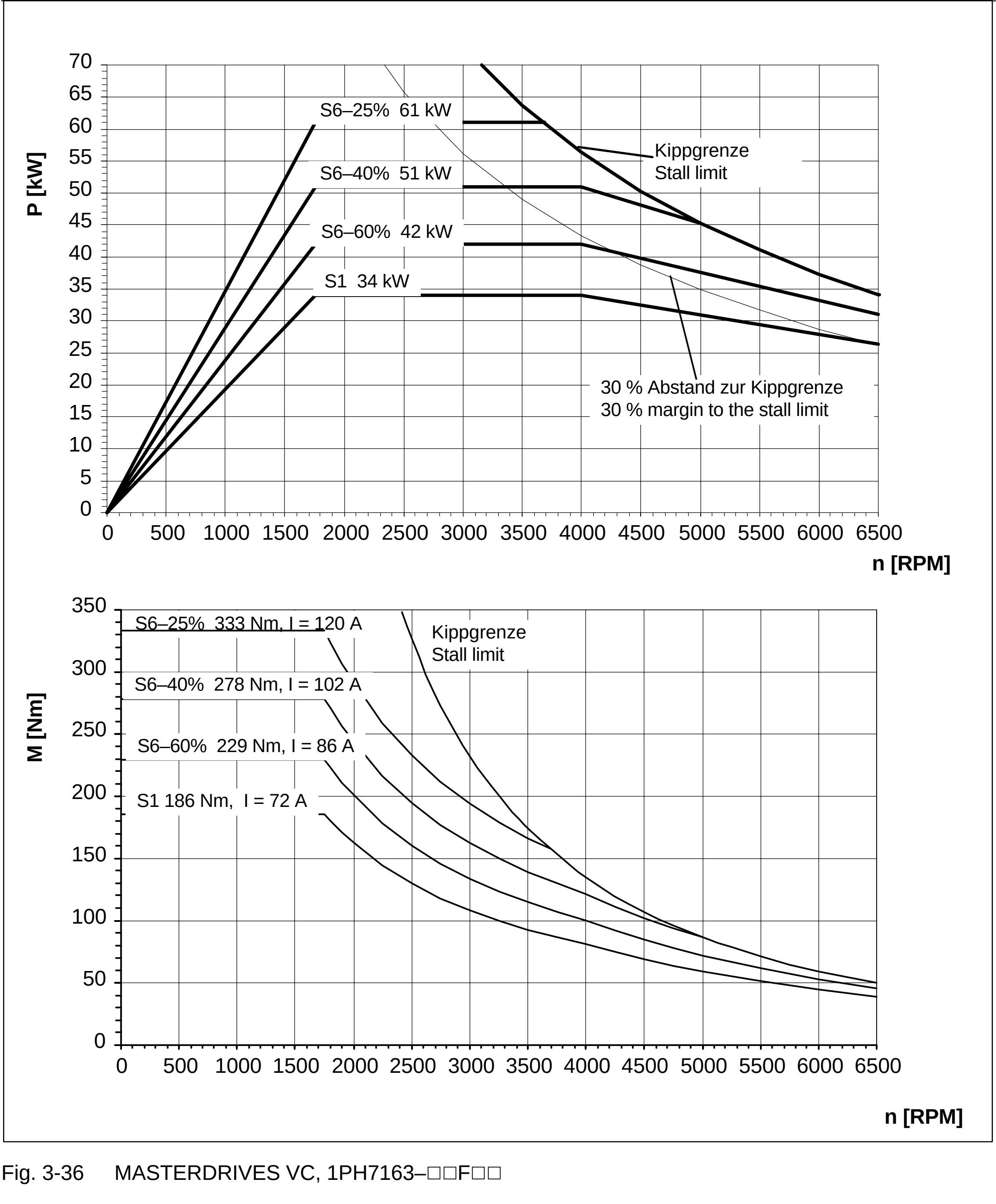


Fig. 3-36 MASTERDRIVES VC, 1PH7163–□□F□□

Table 3-41 MASTERDRIVES VC, 400 V, 1PH7167–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	41	224	79	398	59.2	2800	3700	6500	30

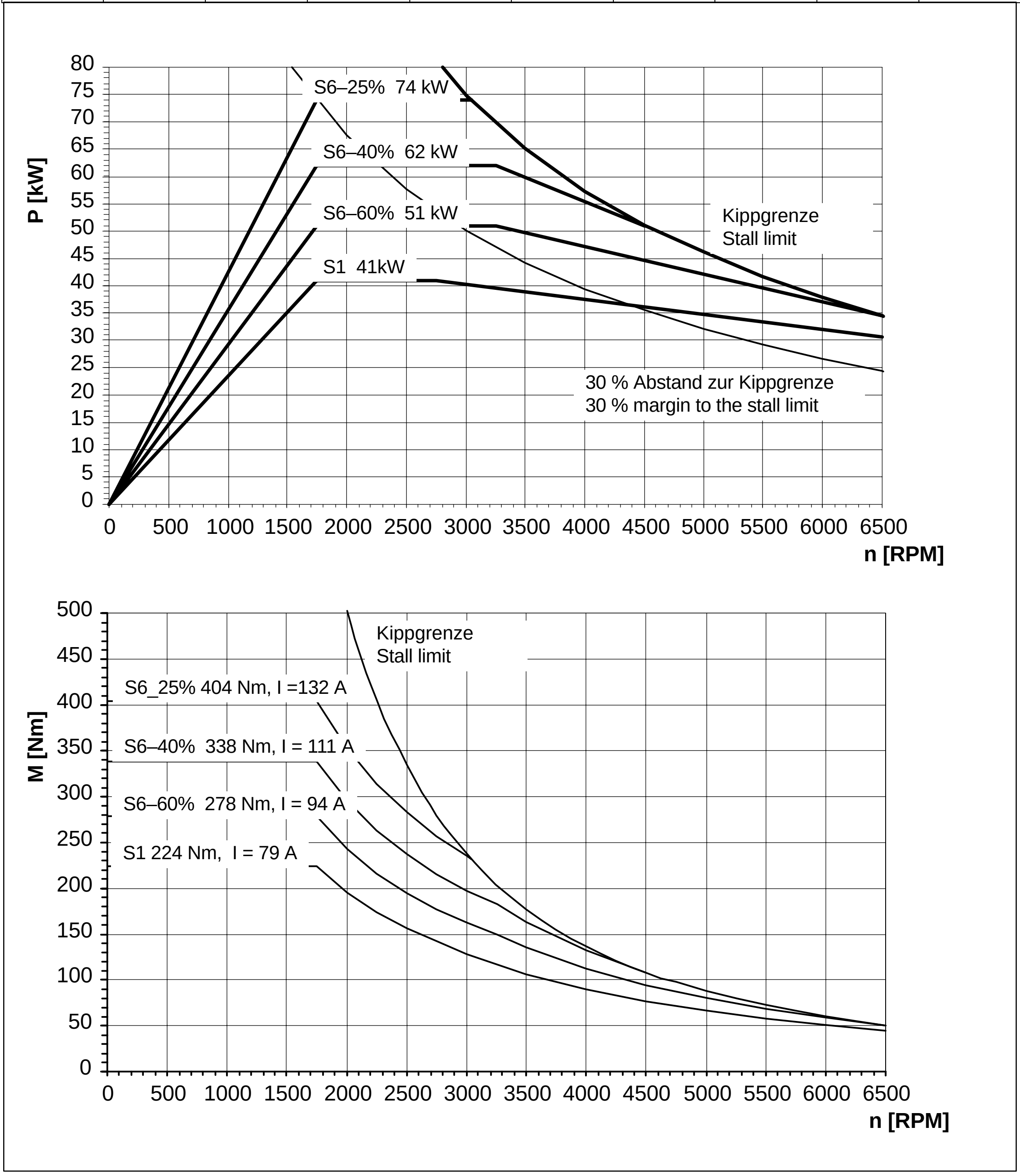


Fig. 3-37 MASTERDRIVES VC, 1PH7167–□□F□□

Table 3-42 MASTERDRIVES VC, 400 V, 1PH7184–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	60	327	120	388	59.0	5000	3500[1]	5000	64

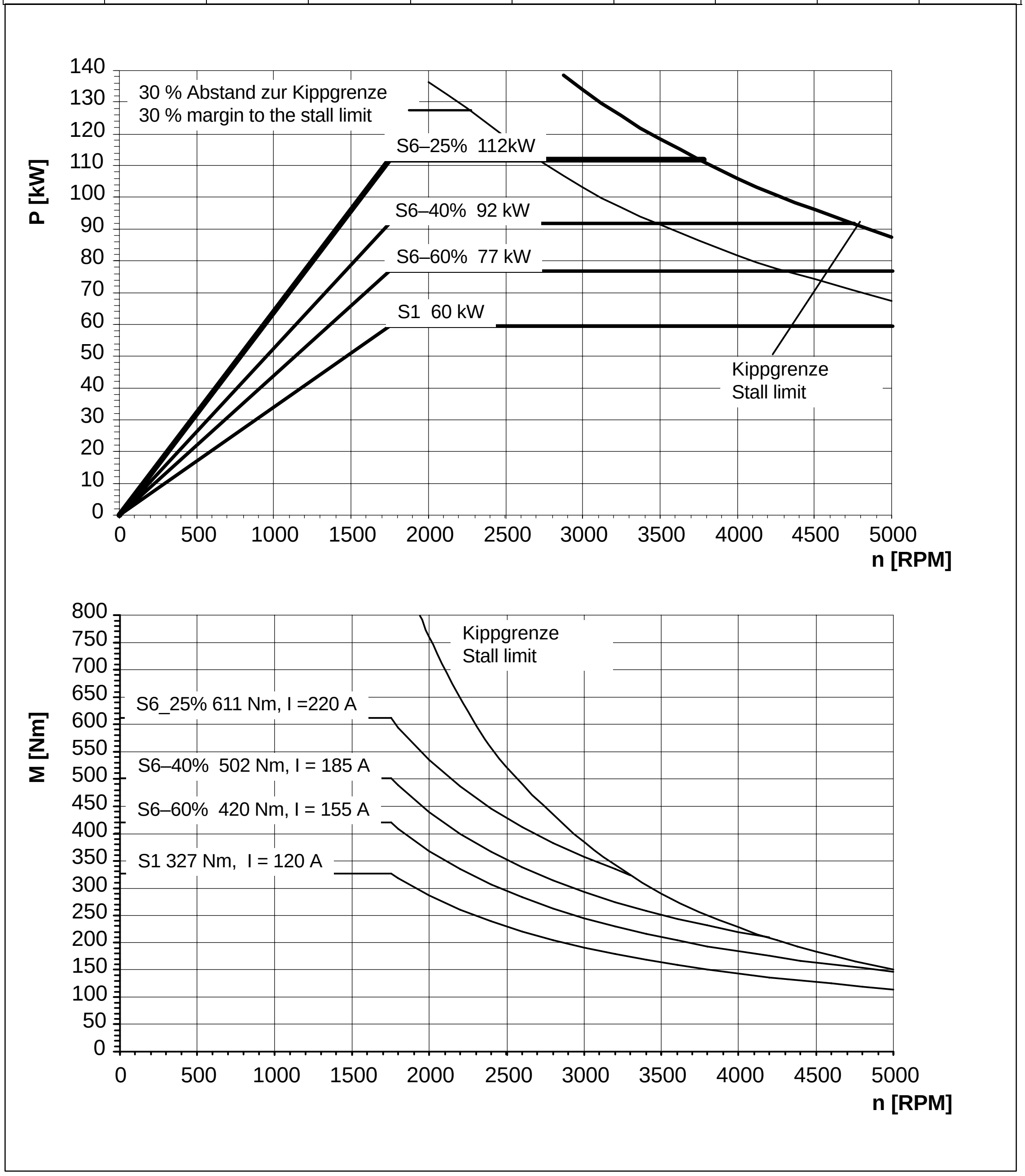


Fig. 3-38 MASTERDRIVES VC, 1PH7184–□□F□□

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1) 3000 RPM for increased cantilever forces

Table 3-43 MASTERDRIVES VC, 400 V, 1PH7186–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	85	465	169	385	59.0	5000	3500[1]	5000	84

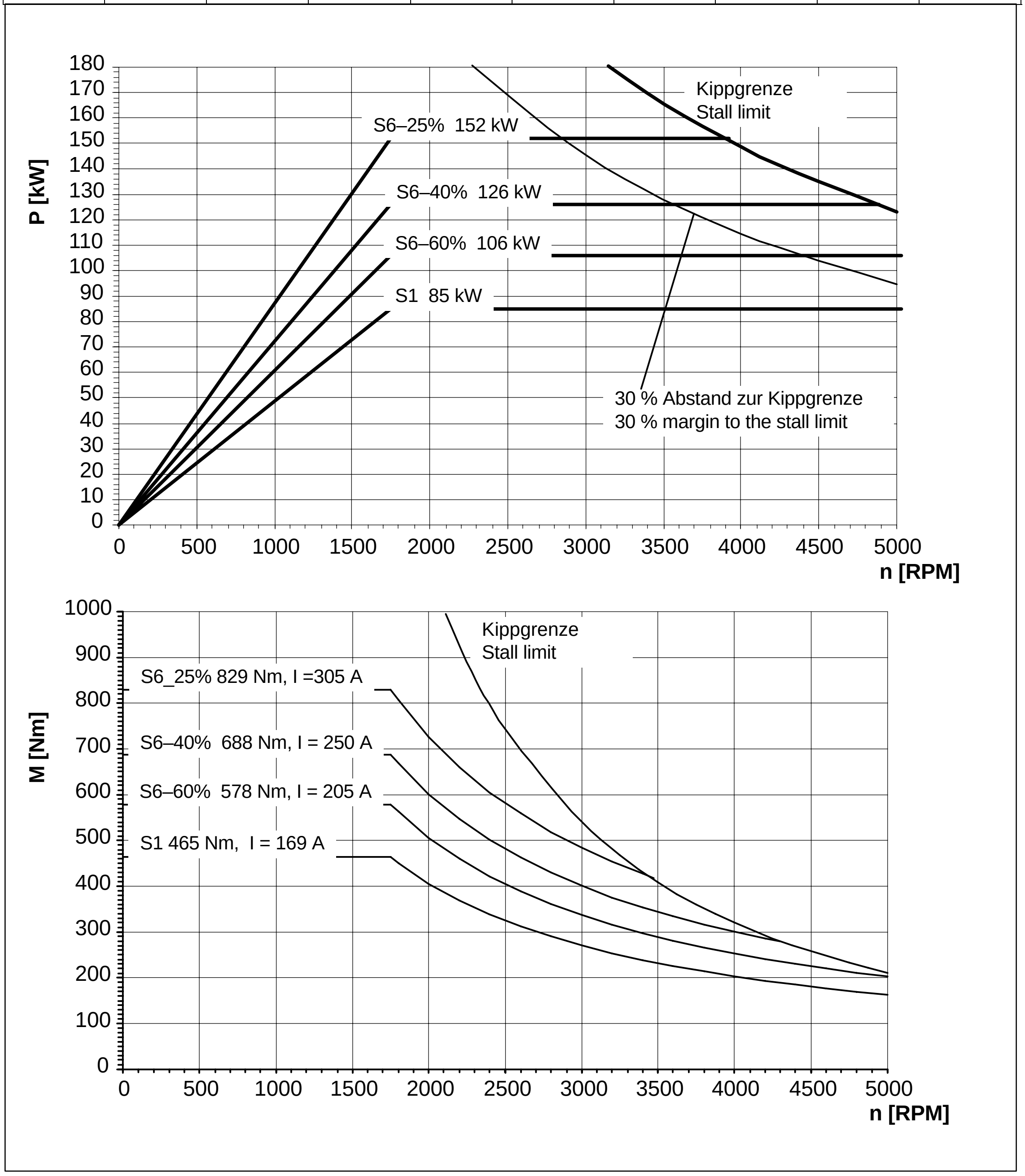

Fig. 3-39 MASTERDRIVES VC, 1PH7186–□□F□□

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[1] 3000 RPM for increased cantilever forces

Table 3-44 MASTERDRIVES VC, 400 V, 1PH7224–□□U□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	110	600	203	395	58.9	2900	3100[1]	4500	88

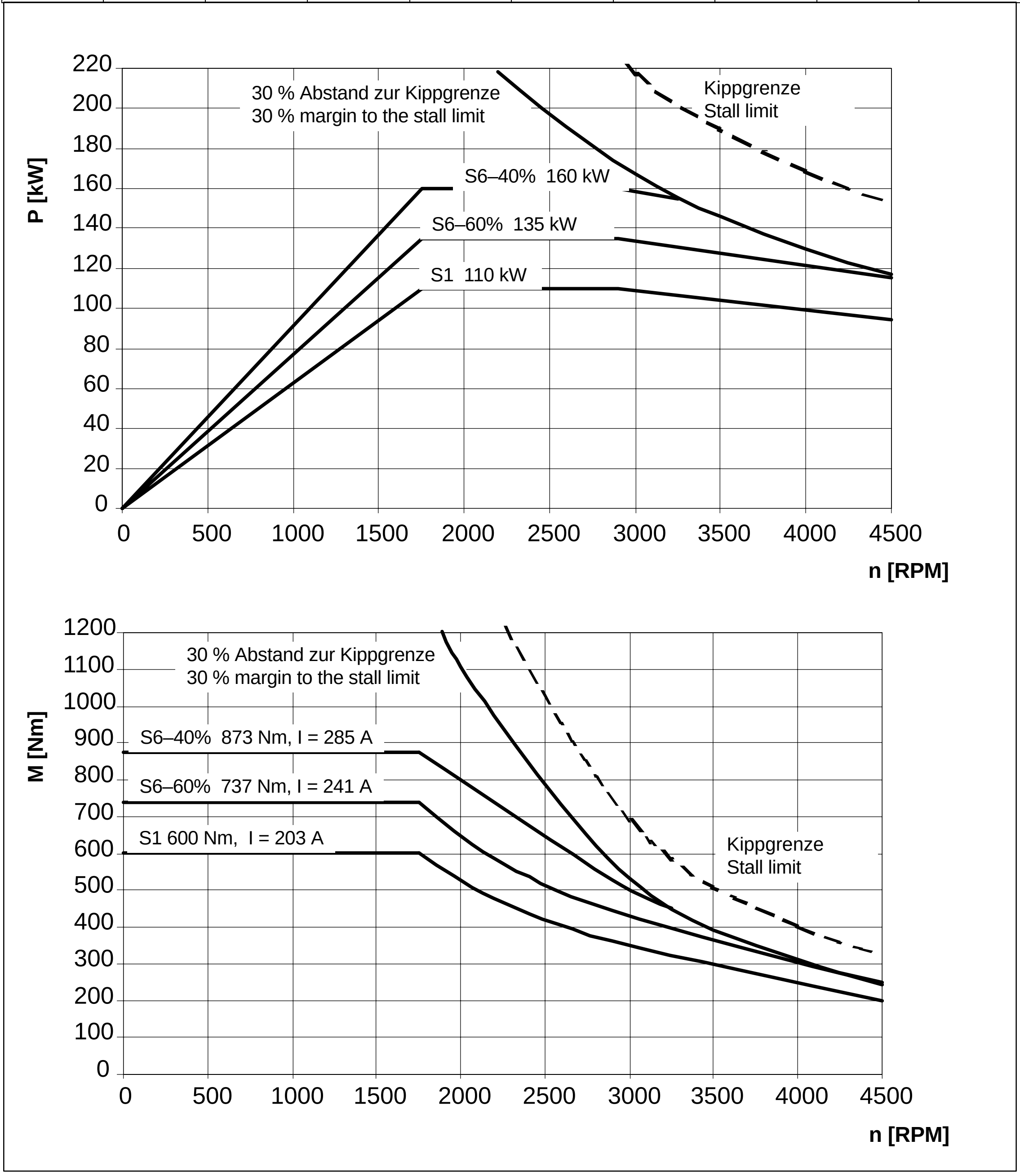

Fig. 3-40 MASTERDRIVES VC, 1PH7224–□□U□□

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1) 2700 RPM for increased cantilever forces

Table 3-45 MASTERDRIVES VC, 400 V, 1PH7226–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	135	737	254	395	58.9	2900	3100[1]	4500	120

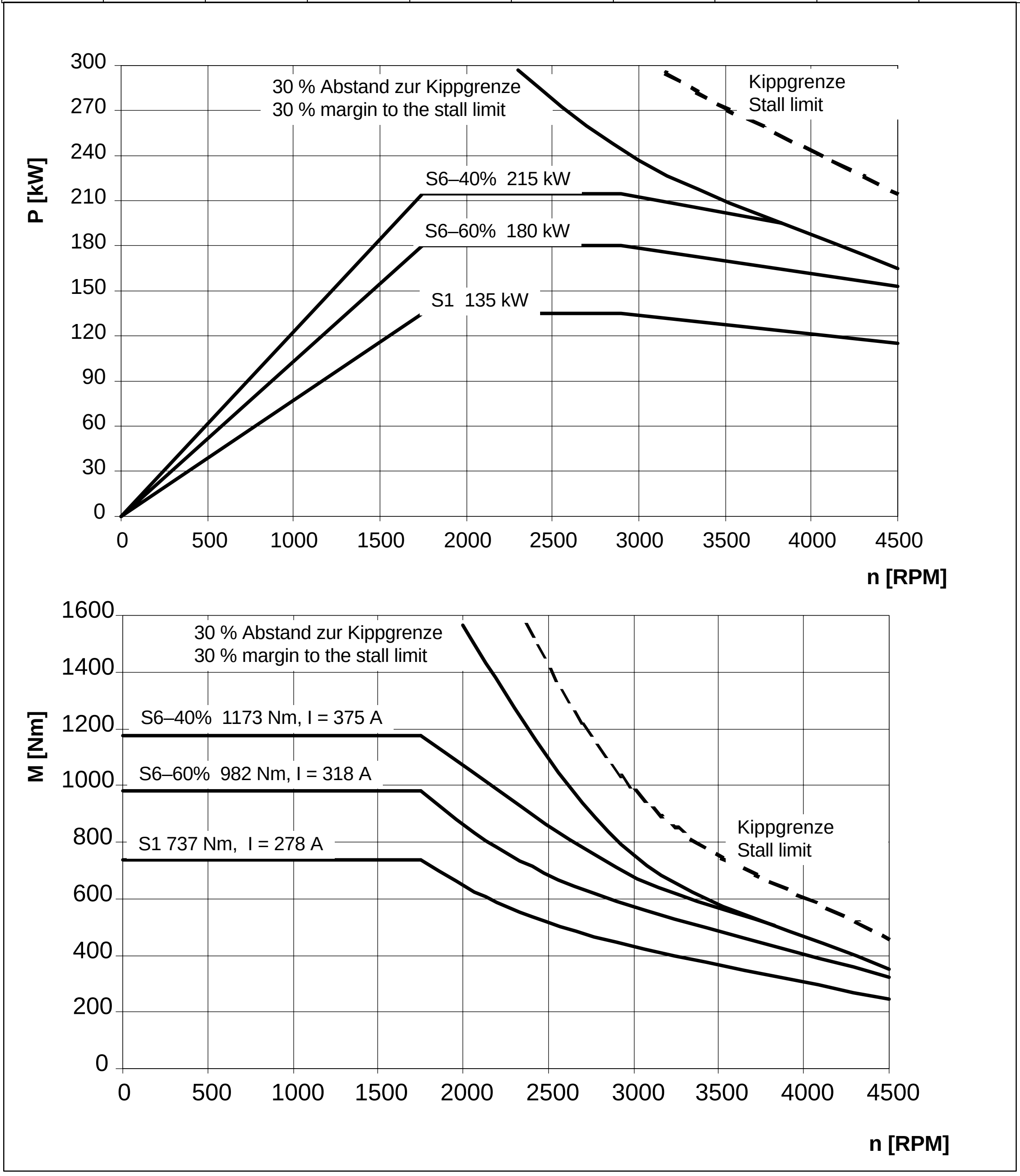

Fig. 3-41 MASTERDRIVES VC, 1PH7226–□□F□□

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1) 2700 RPM for increased cantilever forces

Table 3-46 MASTERDRIVES VC, 400 V, 1PH7228–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	179	975	342	395	58.8	2900	3100[1]	4500[2]	169

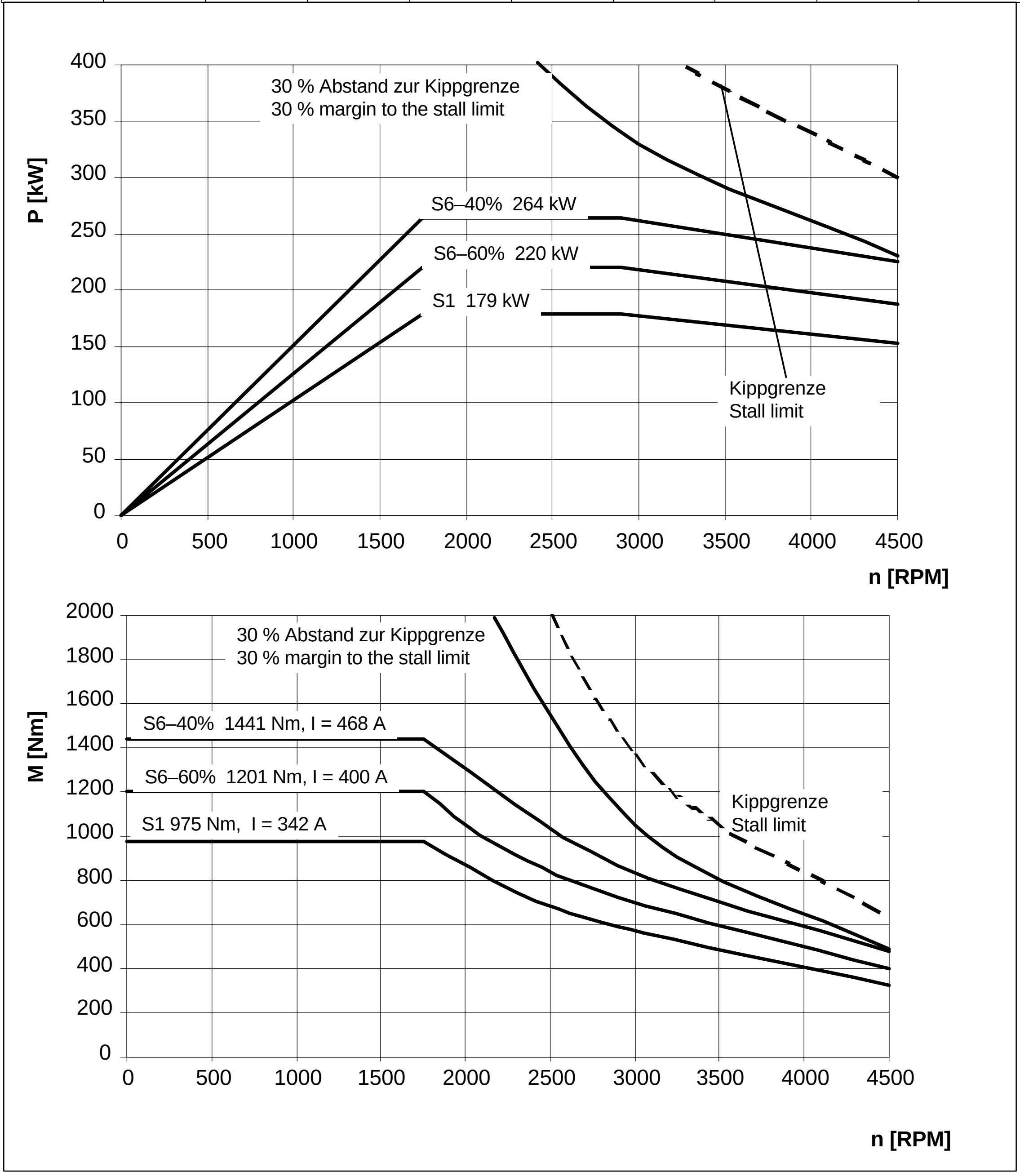

Fig. 3-42 MASTERDRIVES VC, 1PH7228–□□F□□

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1) 2500 RPM for increased cantilever forces

2) 4000 RPM for increased cantilever forces

Table 3-47 MASTERDRIVES VC, 400 V, 1PH7284–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	225	1228	393	400	58.7	2200	2200	3300	163

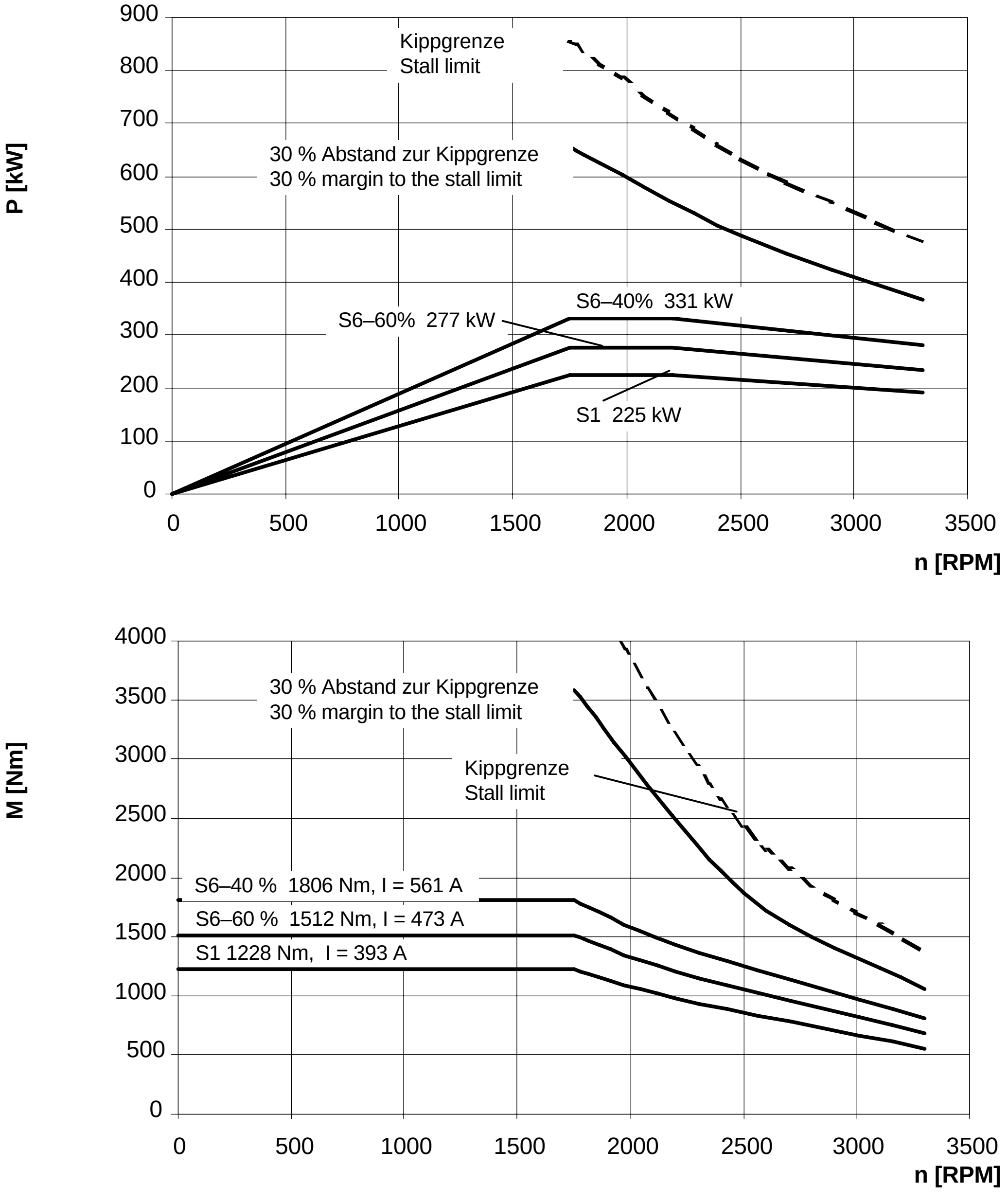


Fig. 3-43 MASTERDRIVES VC, 1PH7284–□□F□□

Table 3-48 MASTERDRIVES VC, 400 V, 1PH7286–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	270	1474	466	400	58.7	2200	2200	3300	184

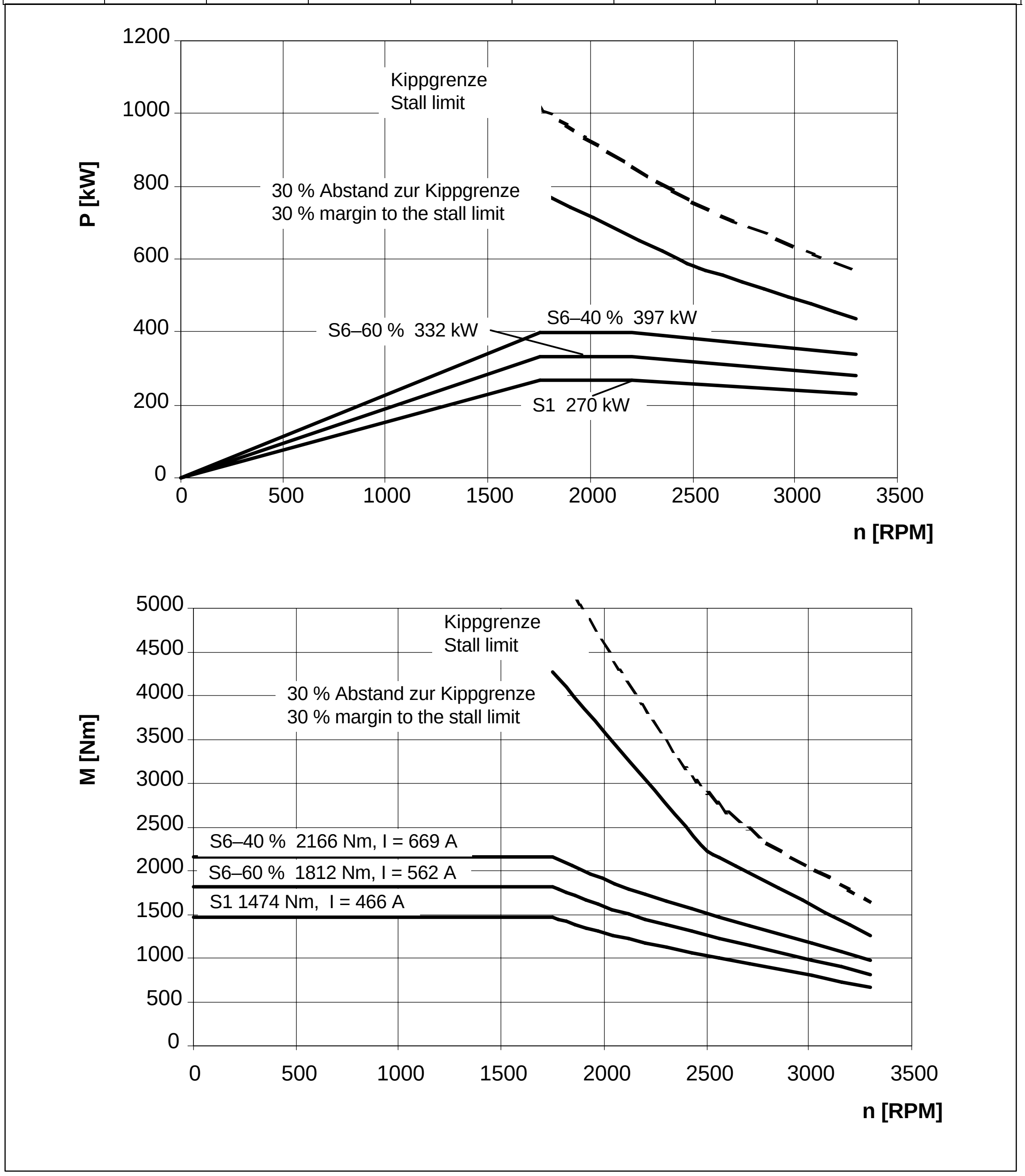
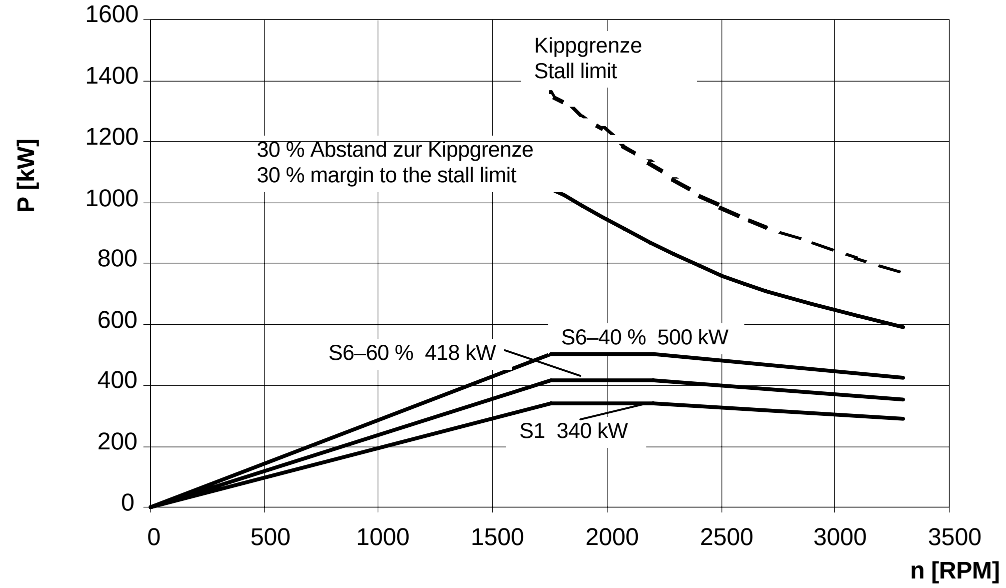


Fig. 3-44 MASTERDRIVES VC, 1PH7286–□□F□□

Table 3-49 MASTERDRIVES VC, 400 V, 1PH7288–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	340	1856	586	400	58.7	2200	2200	3300	234



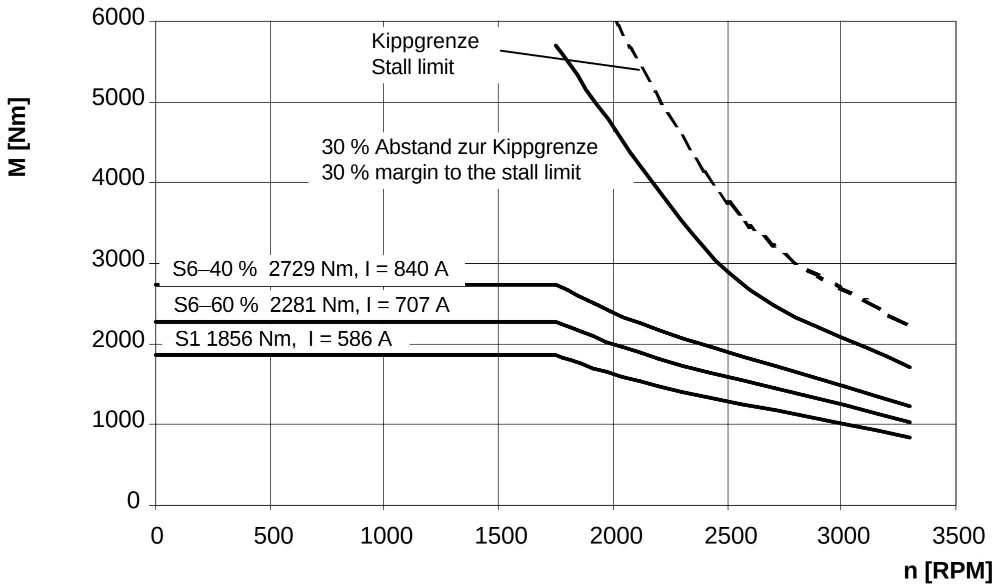


Fig. 3-45 MASTERDRIVES VC, 1PH7288–□□F□□

Table 3-50 MASTERDRIVES VC, 400 V, 1PH7103–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2300	7.5	31	17	388	78.8	5400	5500	9000	8.2

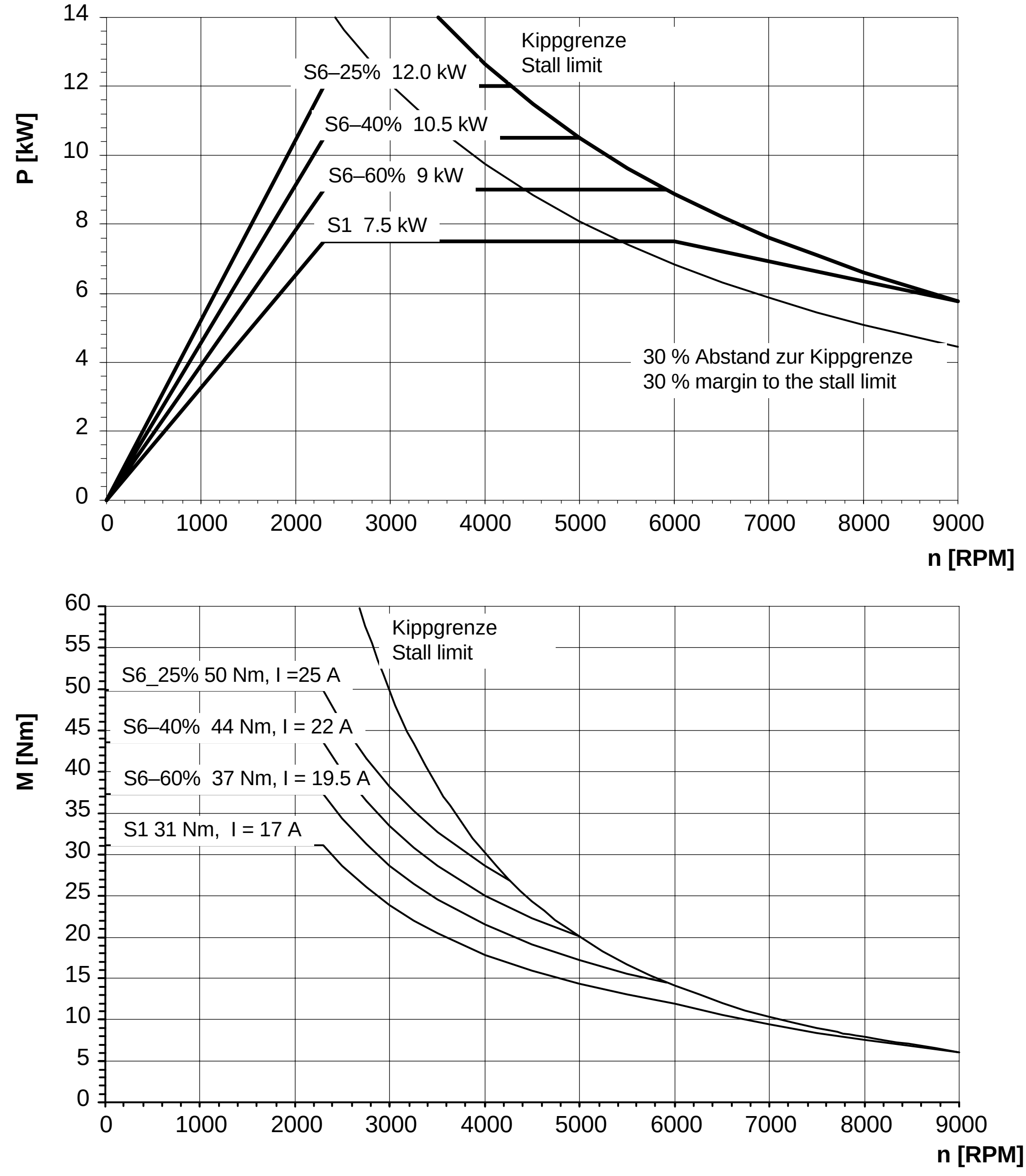


Fig. 3-46 MASTERDRIVES VC, 1PH7103–□□G□□

Table 3-51 MASTERDRIVES VC, 400 V, 1PH7107–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2300	12	50	26	400	78.7	5400	5500	9000	12

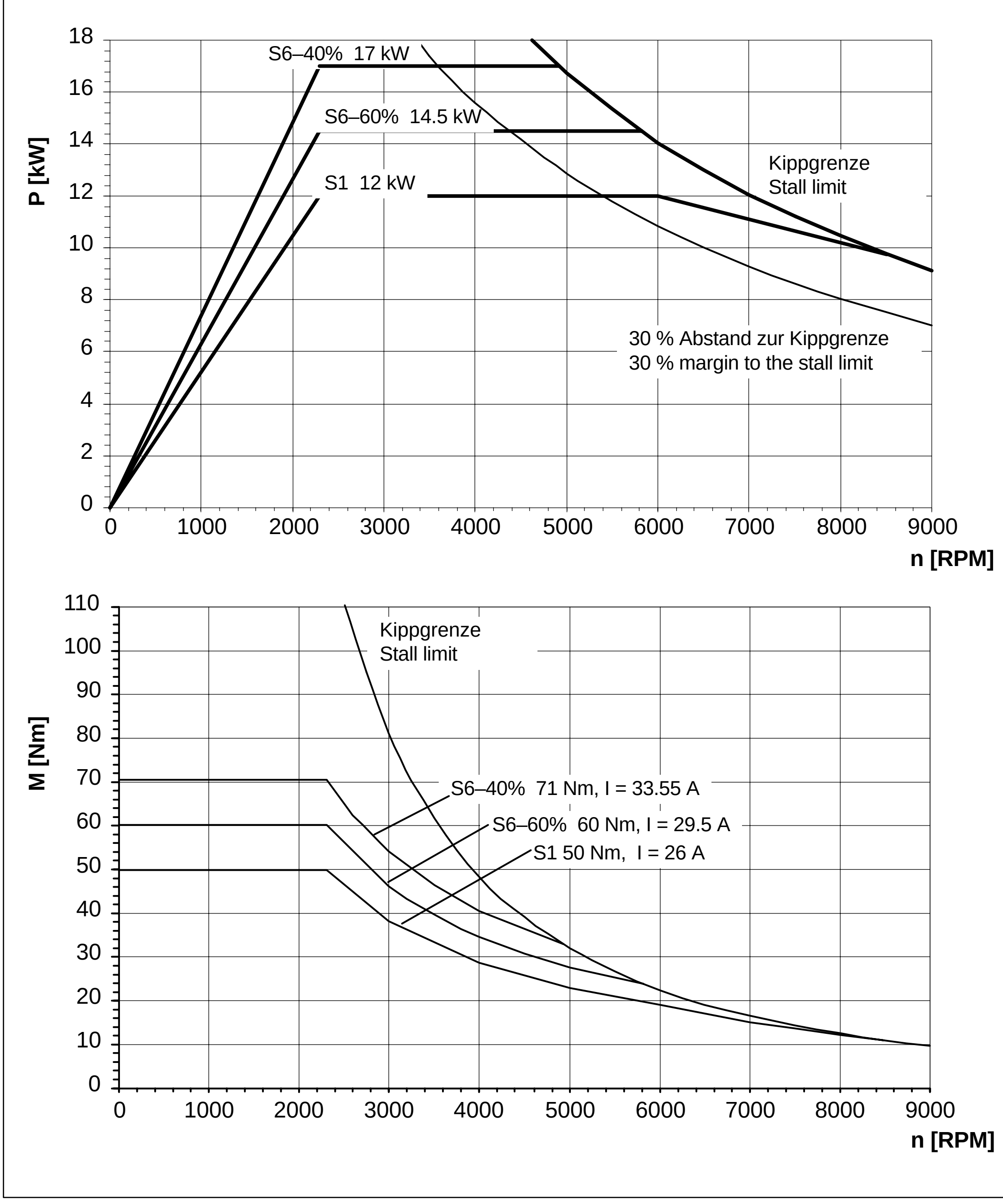


Fig. 3-47 MASTERDRIVES VC, 1PH7107–□□G□□

Table 3-52 MASTERDRIVES VC, 400 V, 1PH7133–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2300	22.5	93	45	398	78.0	4000	4500	8000	17

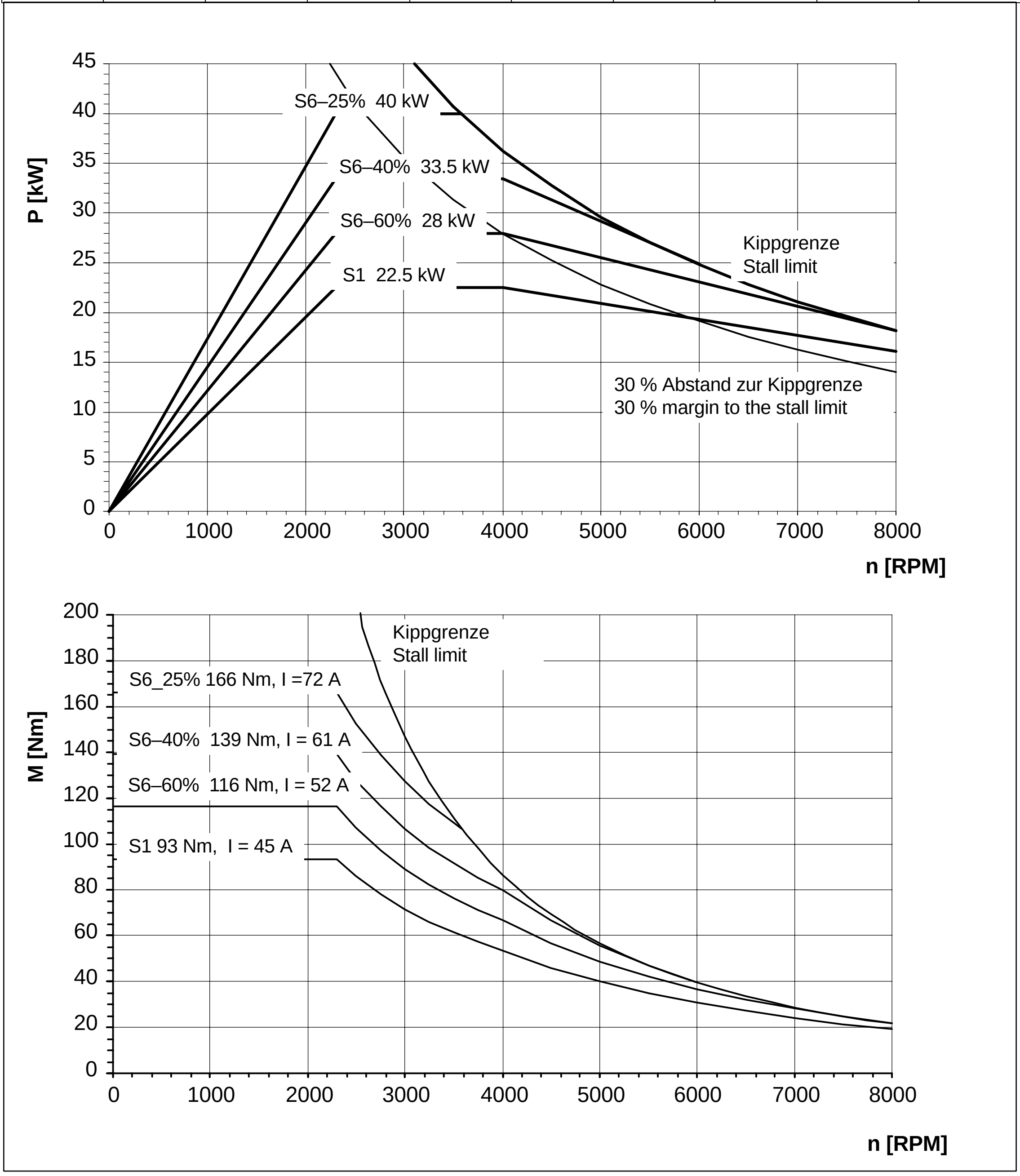


Fig. 3-48 MASTERDRIVES VC, 1PH7133–□□G□□

Table 3-53 MASTERDRIVES VC, 400 V, 1PH7137–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2300	29	120	56	398	77.8	4000	4500	8000	21

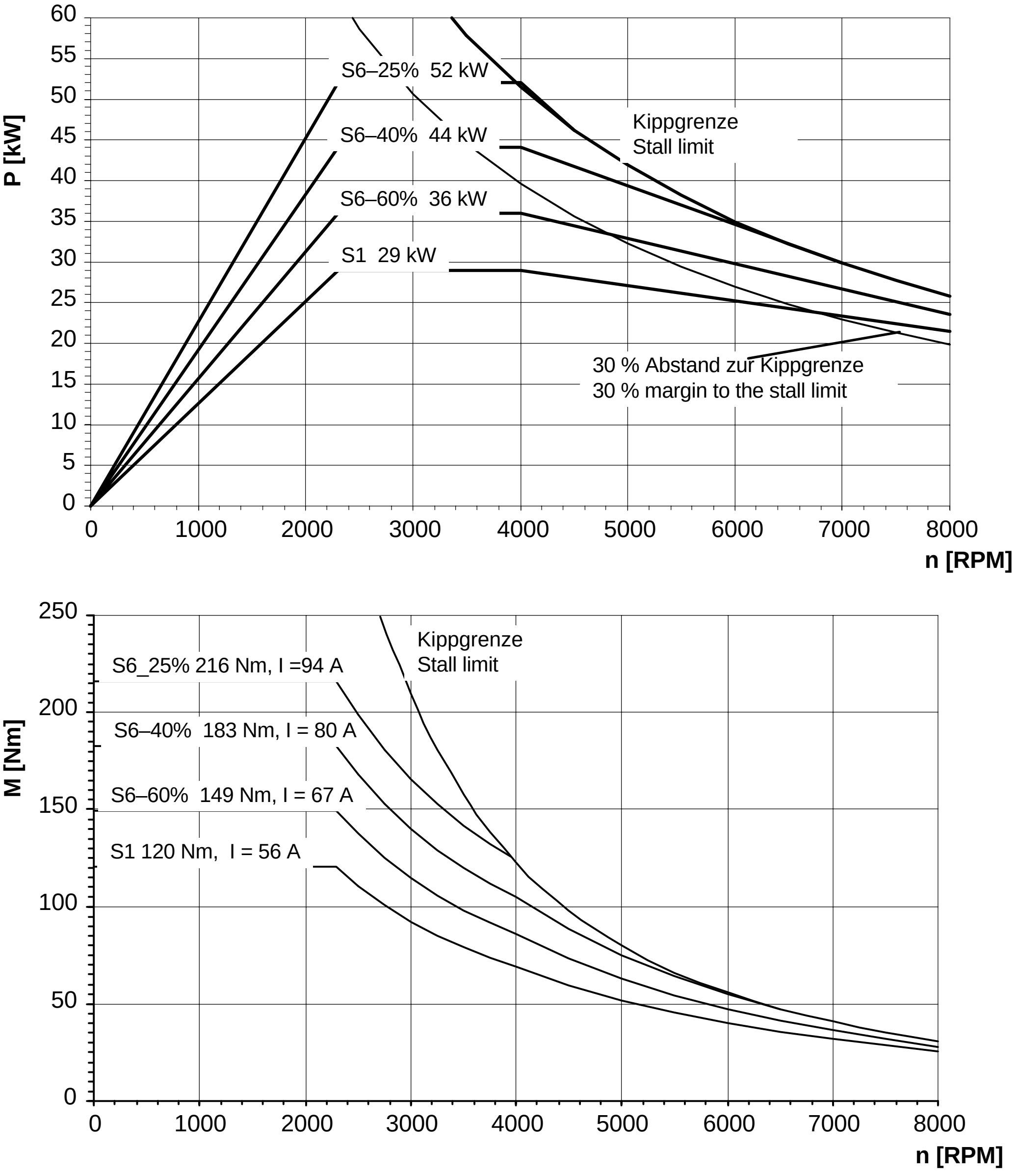


Fig. 3-49 MASTERDRIVES VC, 1PH7137–□□G□□

Table 3-54 MASTERDRIVES VC, 400 V, 1PH7163–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2300	38	158	80	374	77.3	3000	3700	6500	36

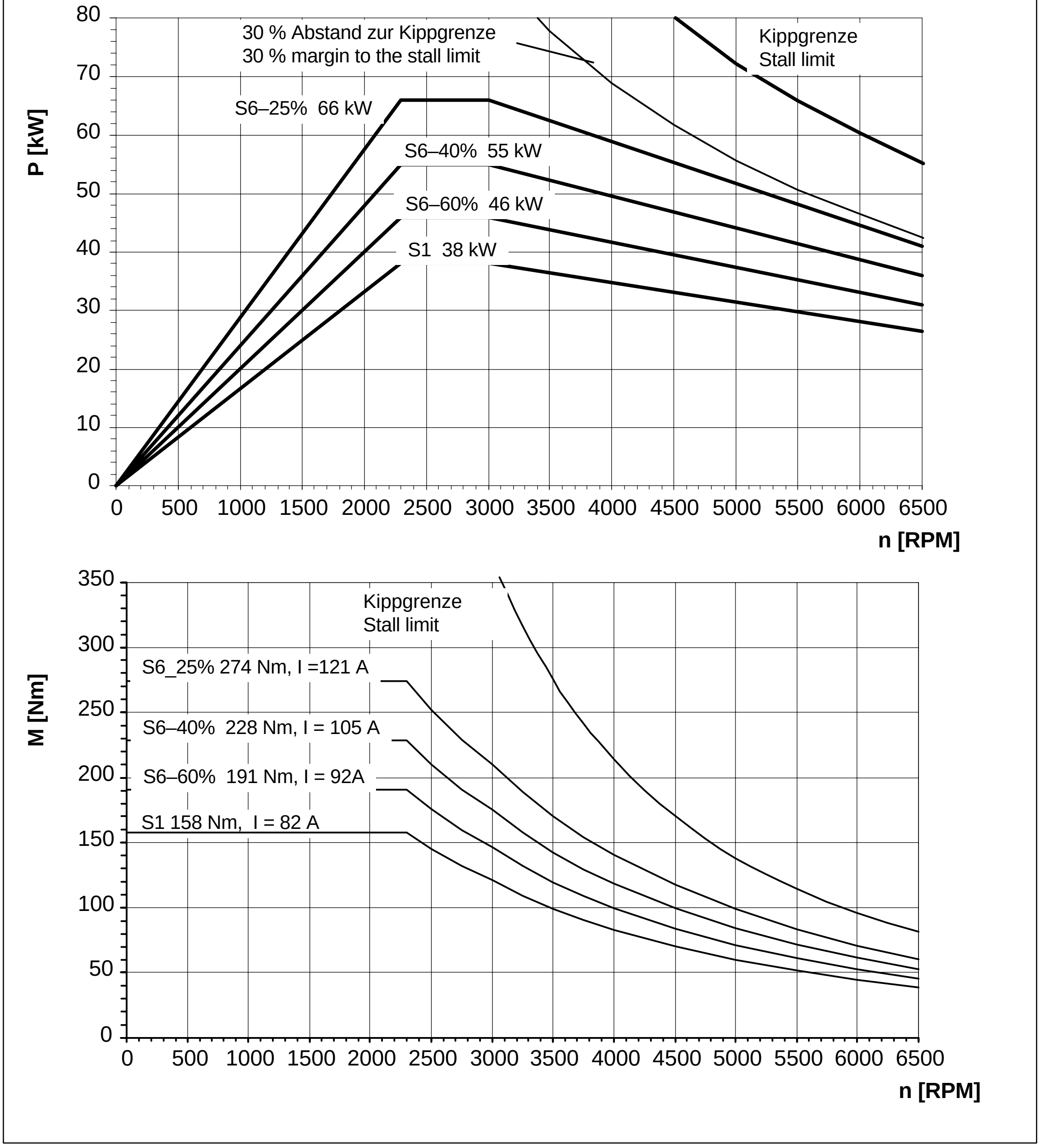


Fig. 3-50 MASTERDRIVES VC, 1PH7163–□□G□□

Table 3-55 MASTERDRIVES VC, 400 V, 1PH7167–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2300	44	183	85	398	77.4	3000	3700	6500	40

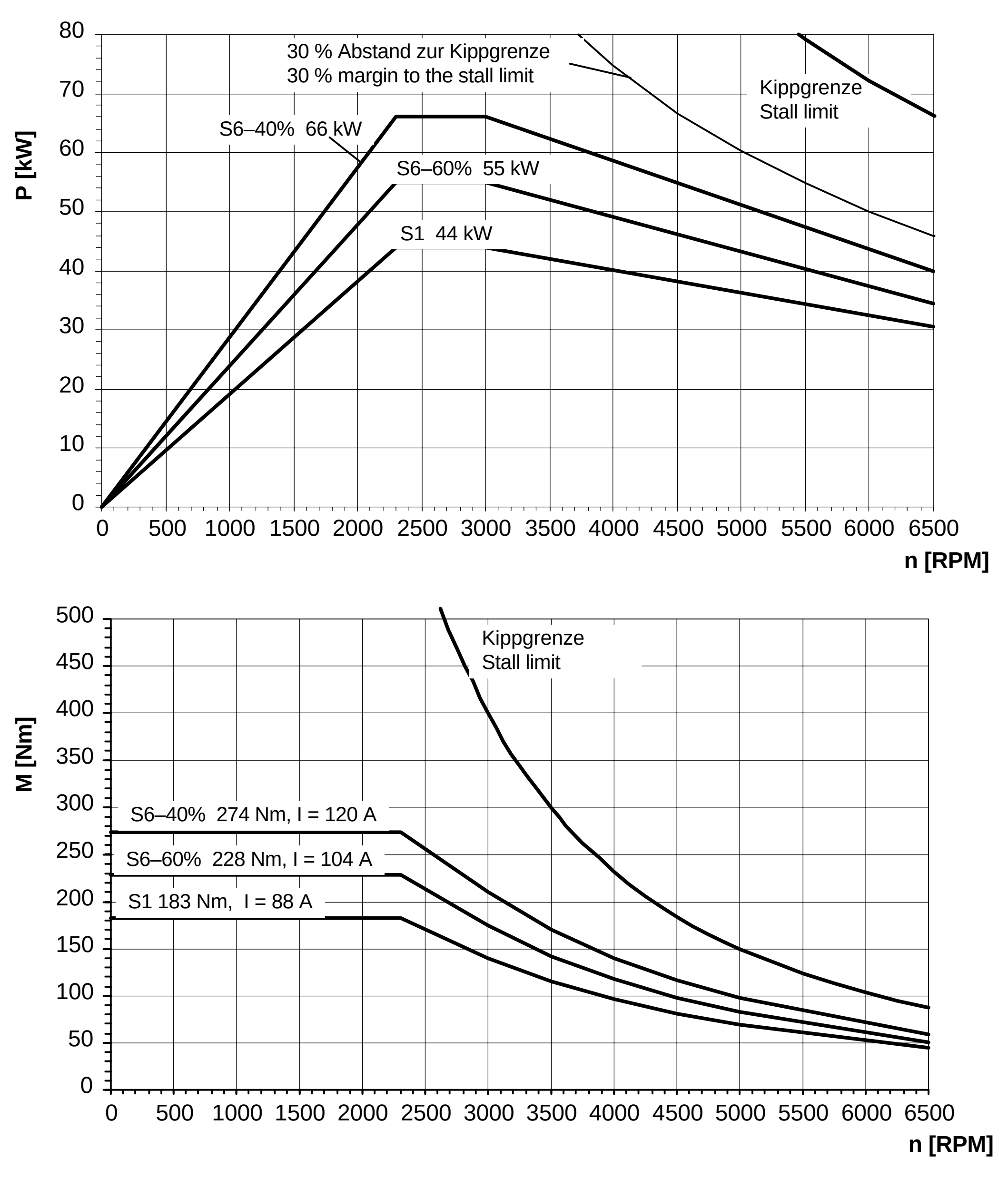


Fig. 3-51 MASTERDRIVES VC, 1PH7167–□□G□□

Table 3-56 MASTERDRIVES VC, 400 V, 1PH7184–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2900	81	265	158	395	97.4	5000	3500[1]	5000	77

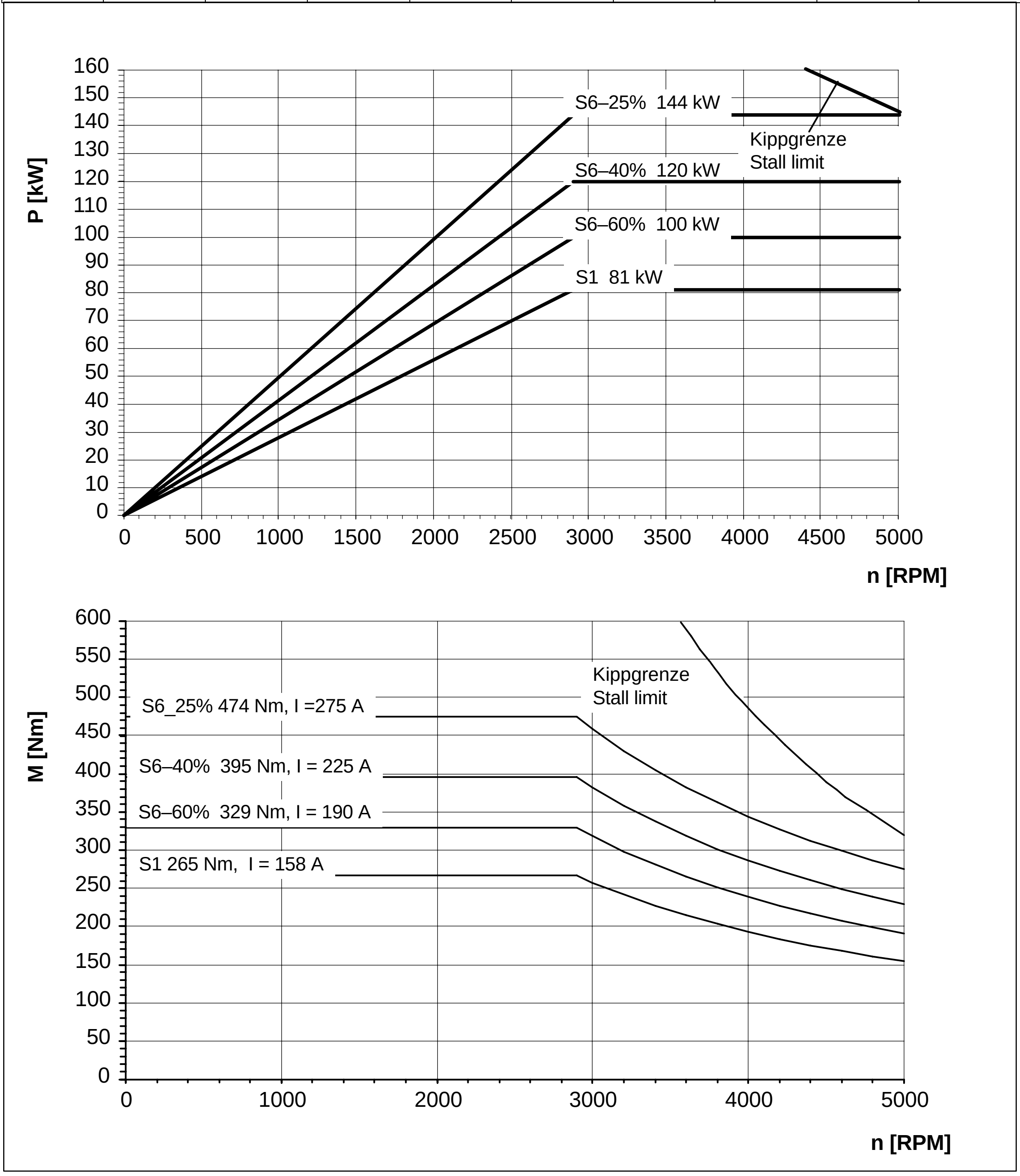


Fig. 3-52 MASTERDRIVES VC, 1PH7184–□□L□□

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1) 3000 RPM for increased cantilever forces

Table 3-57 MASTERDRIVES VC, 400 V, 1PH7186–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2900	101	333	206	385	97.3	5000	3500[1]	5000	107

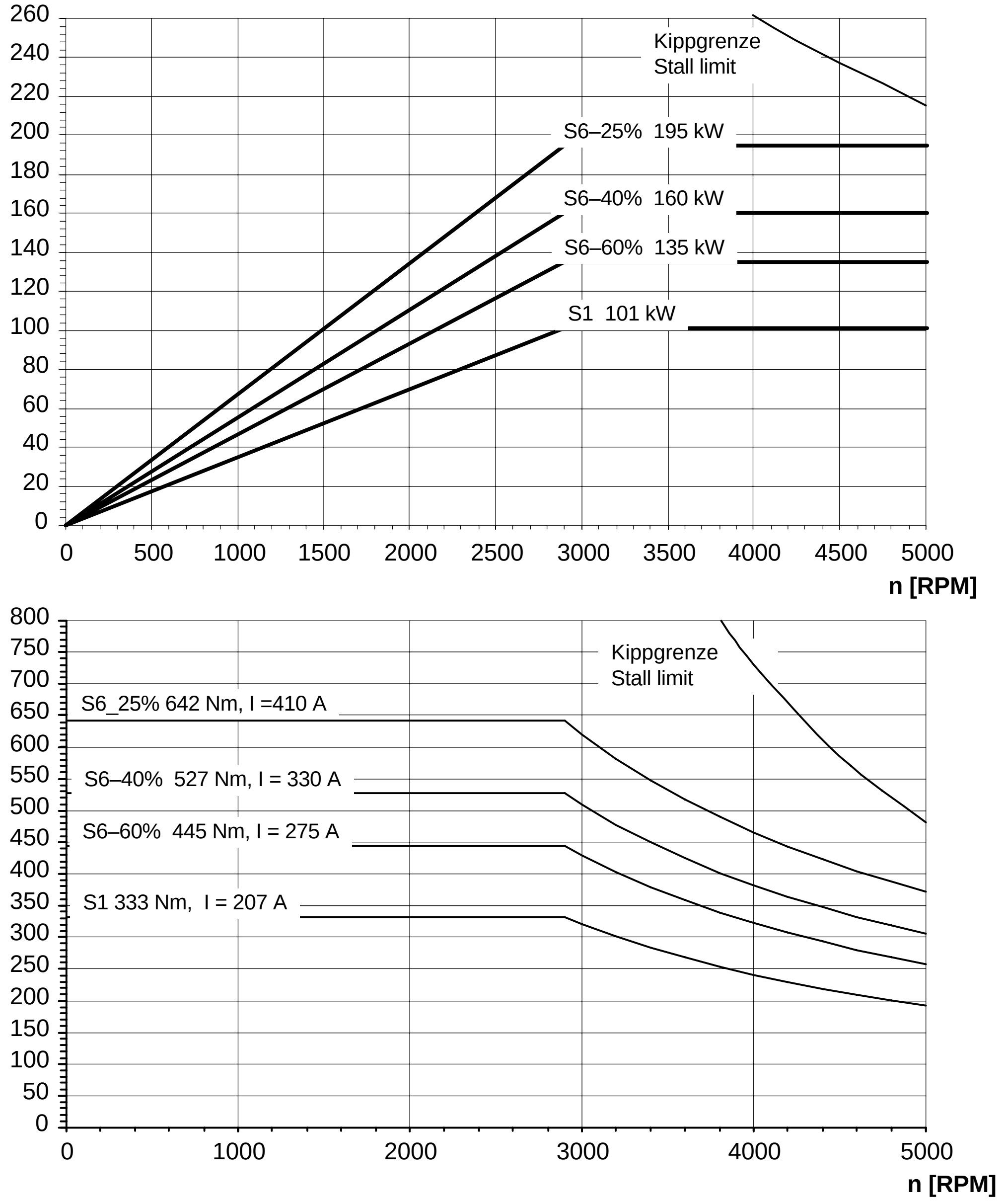

Fig. 3-53 MASTERDRIVES VC, 1PH7186–□□L□□

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[1] 3000 RPM for increased cantilever forces

Table 3-58 MASTERDRIVES VC, 400 V, 1PH7224–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2900	149	490	274	395	97.3	3500	3100[1]	4500	115

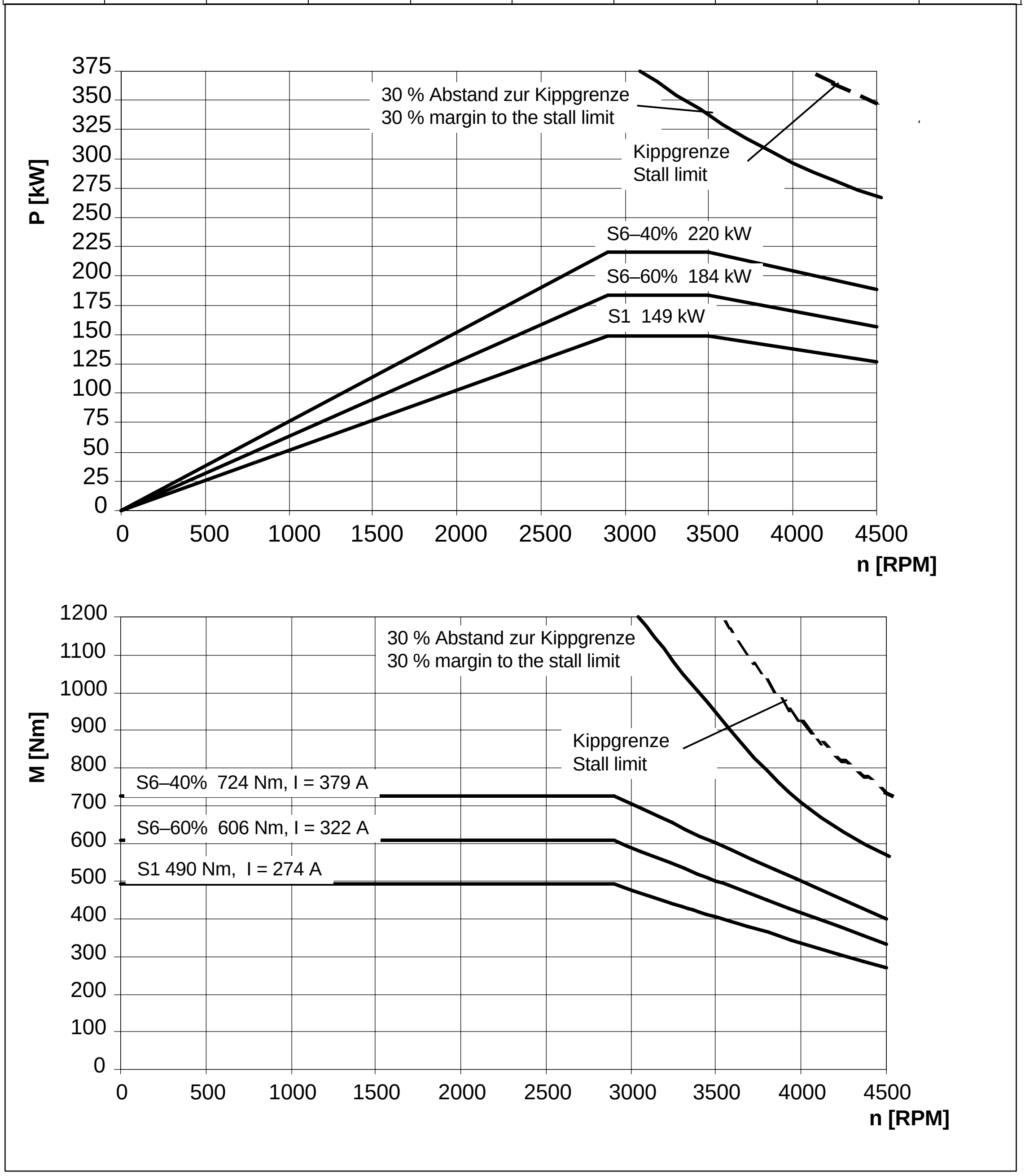

Fig. 3-54 MASTERDRIVES VC, 1PH7224–□□L□□

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1) 2700 RPM for increased cantilever forces

Table 3-59 MASTERDRIVES VC, 400 V, 1PH7226–☐☐L☐☐

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2900	185	610	348	390	97.2	3500	3100[1]	4500	154

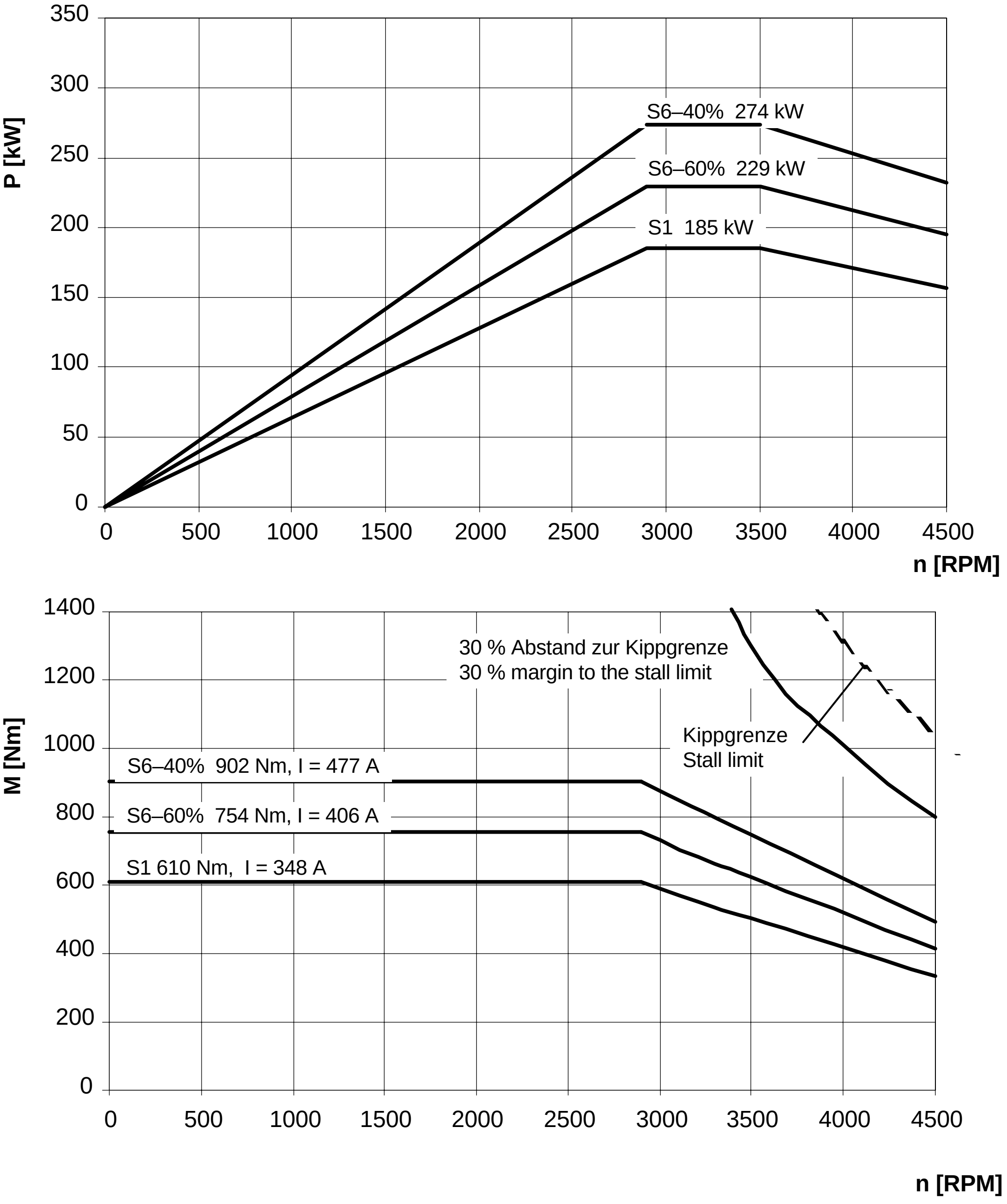

Fig. 3-55 MASTERDRIVES VC, 1PH7226–☐☐L☐☐

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[1] 2700 RPM for increased cantilever forces

Table 3-60 MASTERDRIVES VC, 400 V, 1PH7228–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2900	215	708	402	395	97.2	3500	3100[1]	4500[2]	186

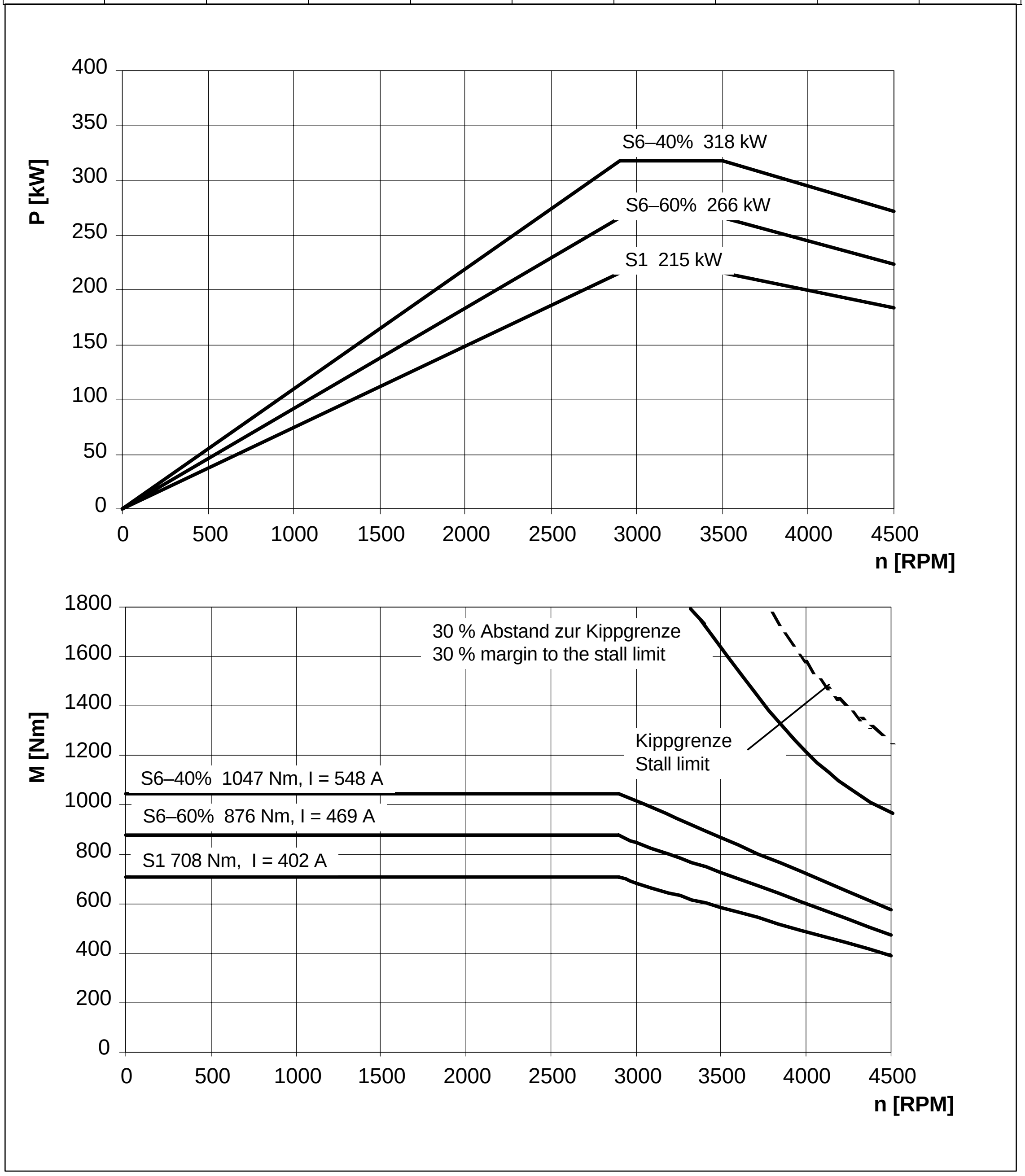

Fig. 3-56 MASTERDRIVES VC, 1PH7228–□□L□□

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1) 2500 RPM for increased cantilever forces

2) 4000 RPM for increased cantilever forces

3.2.2 MASTERDRIVES VC 480 V

Table 3-61 MASTERDRIVES VC, 480 V, 1PH7163–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
500	12	230	30	340	17.6	2100	2500	2500	13

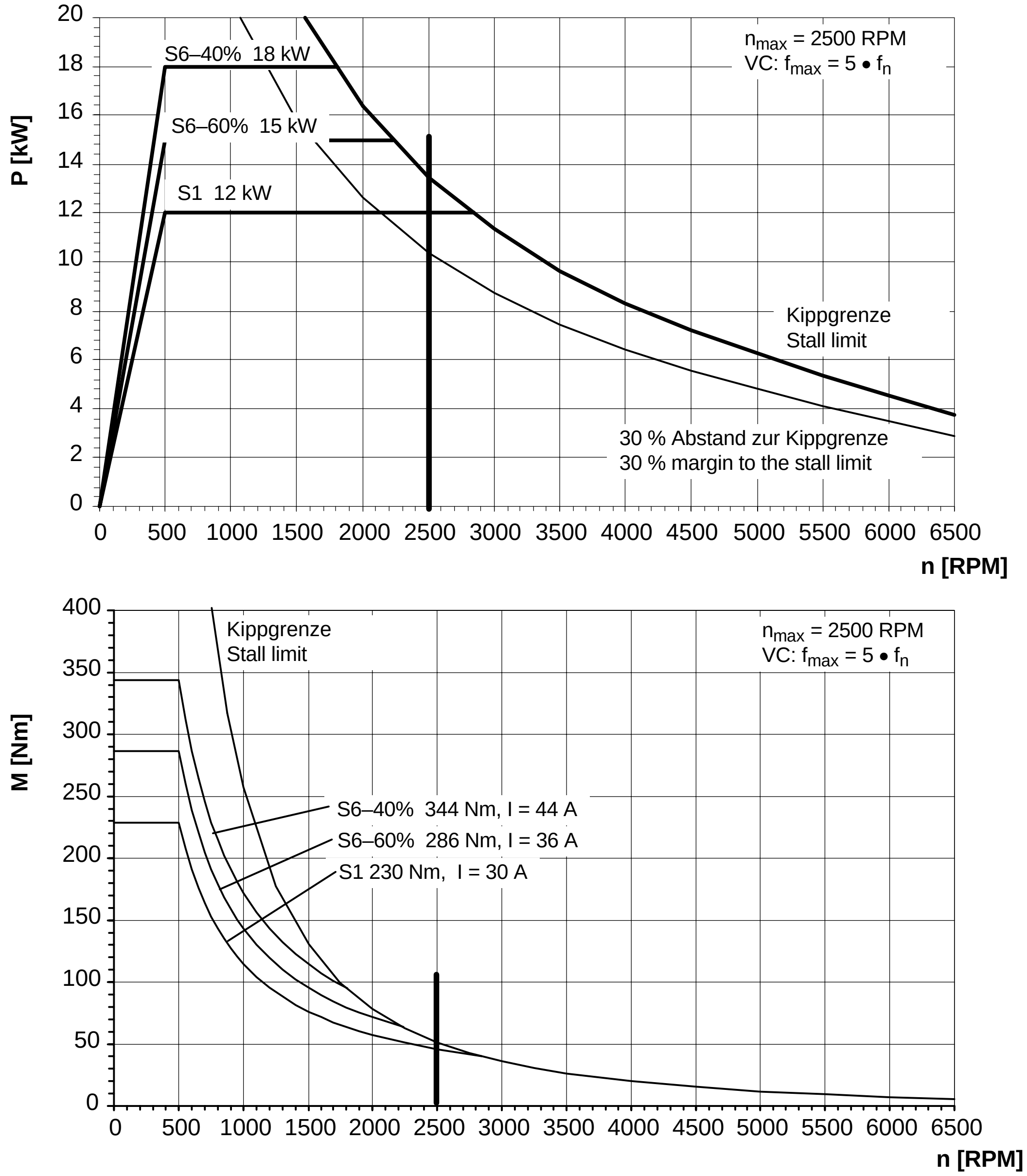


Fig. 3-57 MASTERDRIVES VC, 1PH7163–□□B□□

Table 3-62 MASTERDRIVES VC, 480 V, 1PH7167–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
500	16	306	35	350	17.7	1700	2500	2500	13

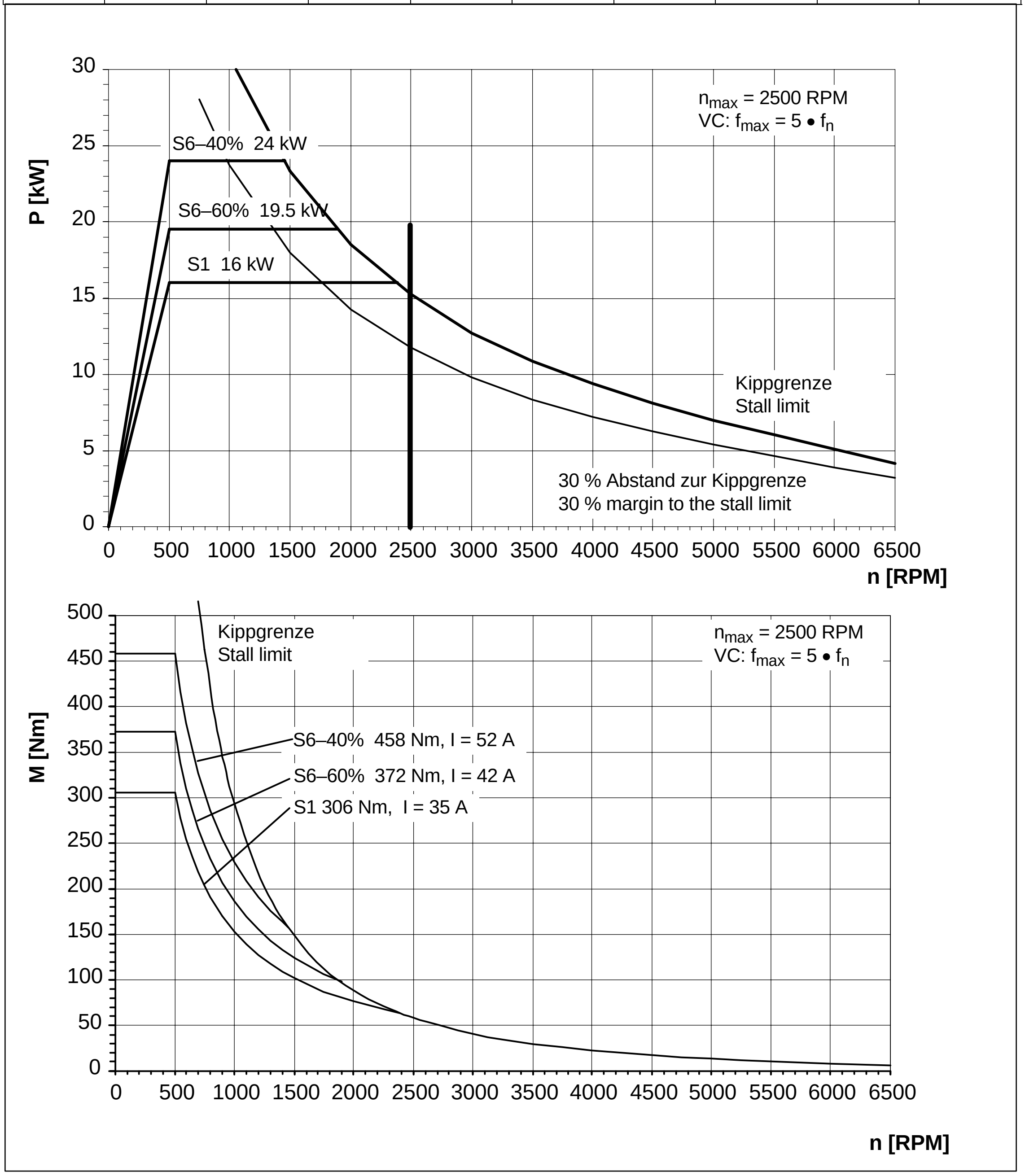


Fig. 3-58 MASTERDRIVES VC, 1PH7167–□□B□□

Table 3-63 MASTERDRIVES VC, 480 V, 1PH7184–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
500	20.5	392	51	335	17.5	2500	2500	2500	26

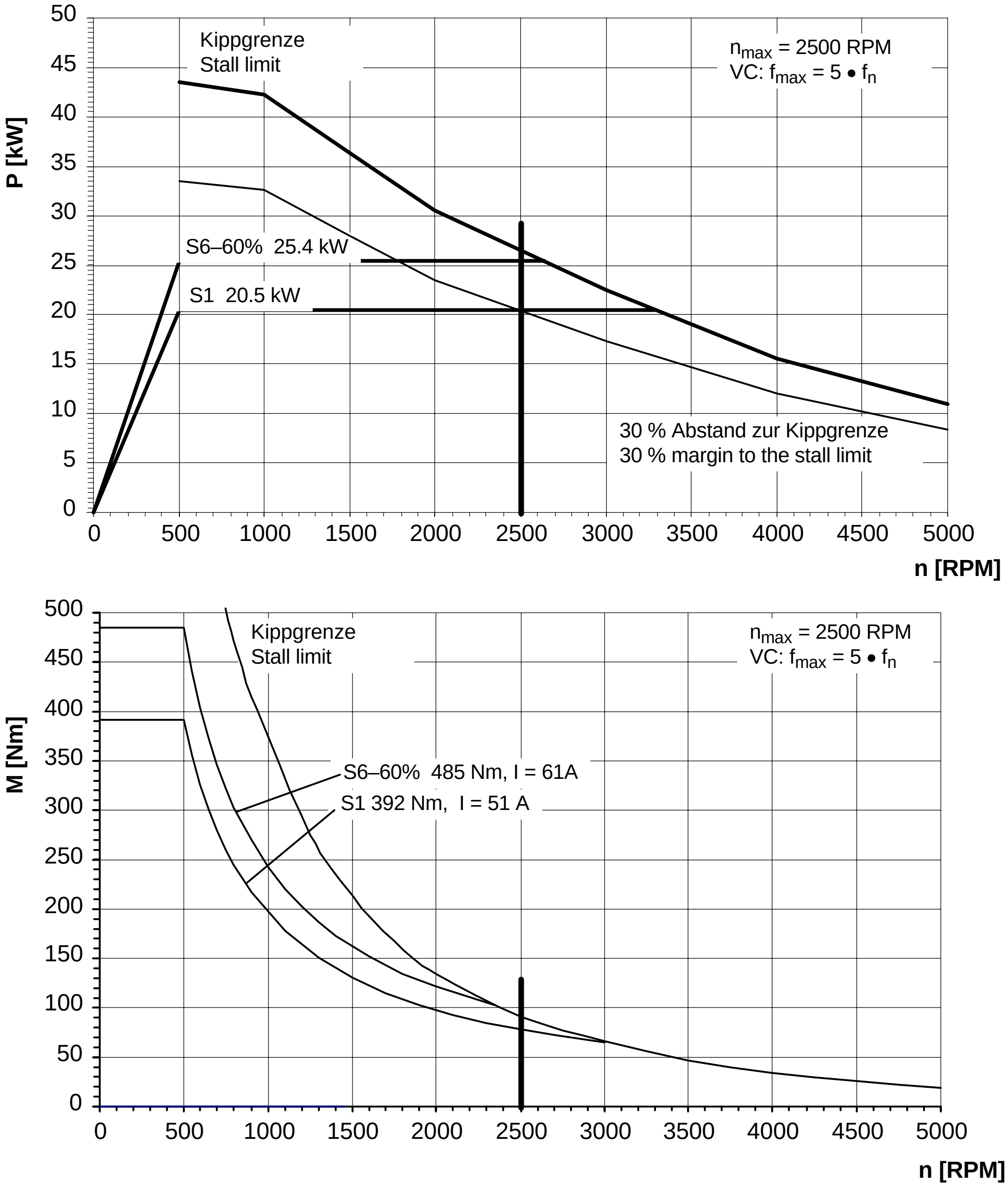


Fig. 3-59 MASTERDRIVES VC, 1PH7184–□□B□□

Table 3-64 MASTERDRIVES VC, 480 V, 1PH7186–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
500	26.5	506	67	335	17.3	2500	2500	2500	39.5

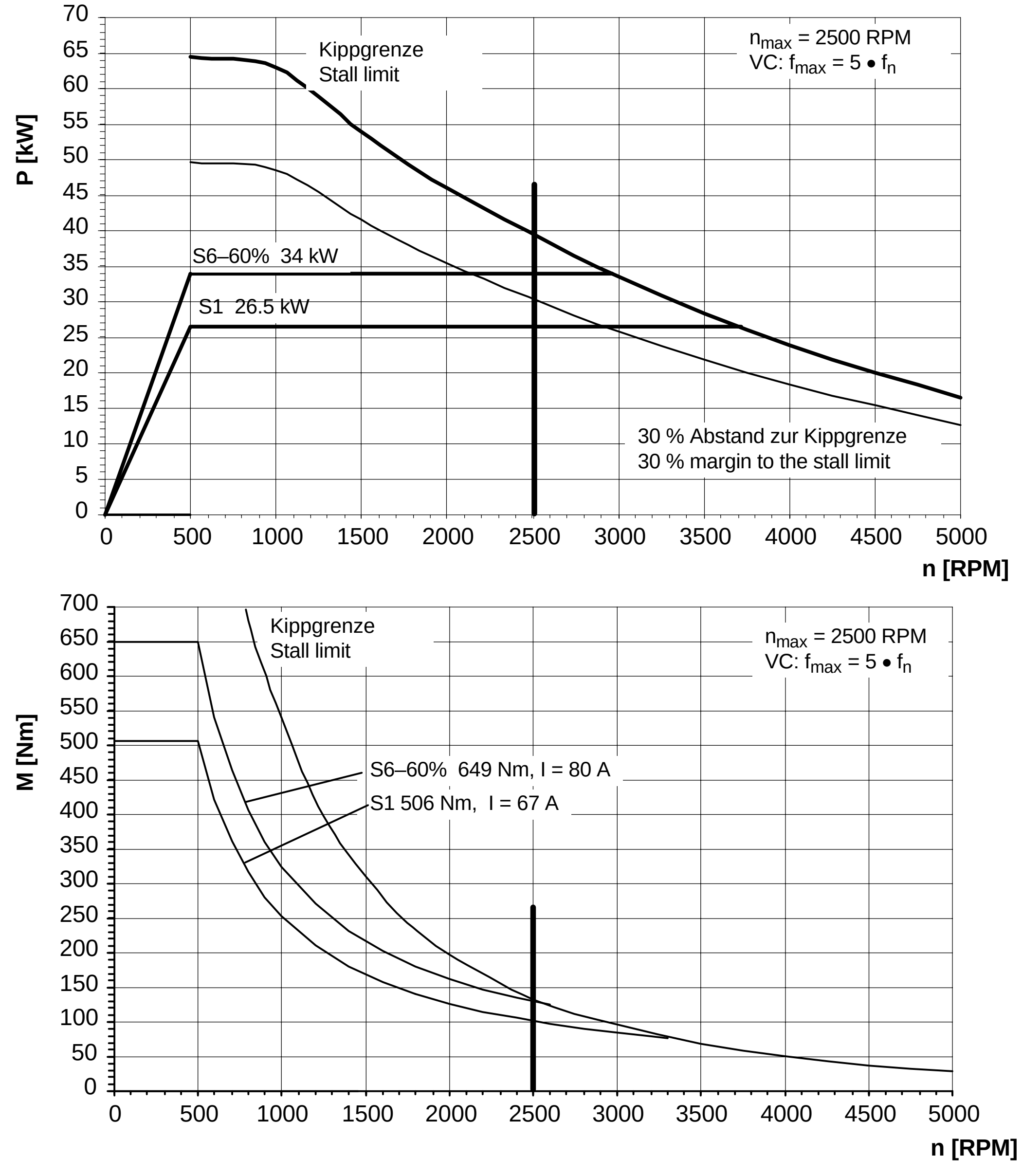


Fig. 3-60 MASTERDRIVES VC, 1PH7186–□□B□□

Table 3-65 MASTERDRIVES VC, 480 V, 1PH7224–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
500	38	725	86	335	17.3	2200	2500	2500	37.5

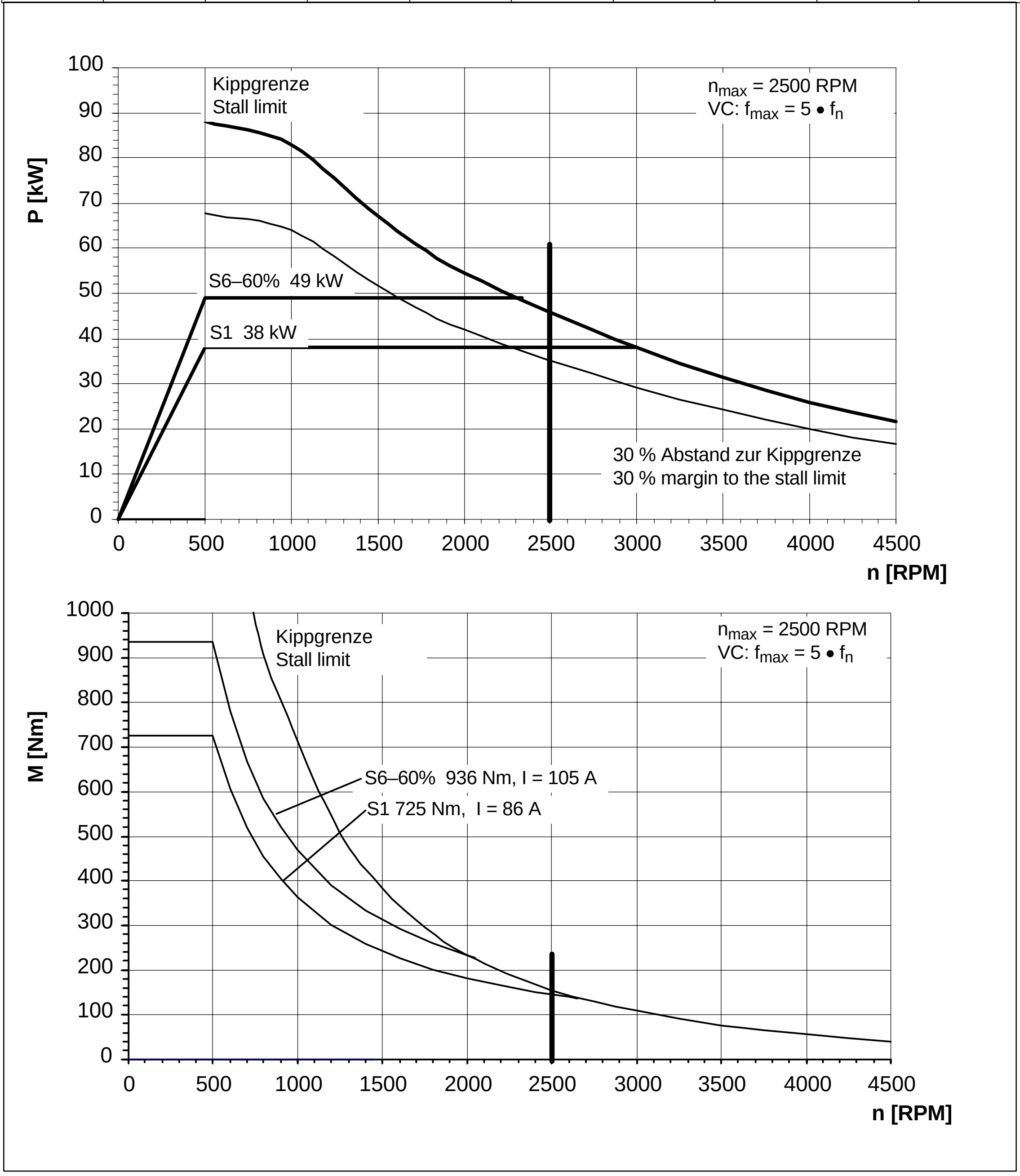


Fig. 3-61 MASTERDRIVES VC, 1PH7224–□□B□□

Table 3-66 MASTERDRIVES VC, 480 V, 1PH7226–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
500	49	935	112	330	17.3	2500	2500	2500	50

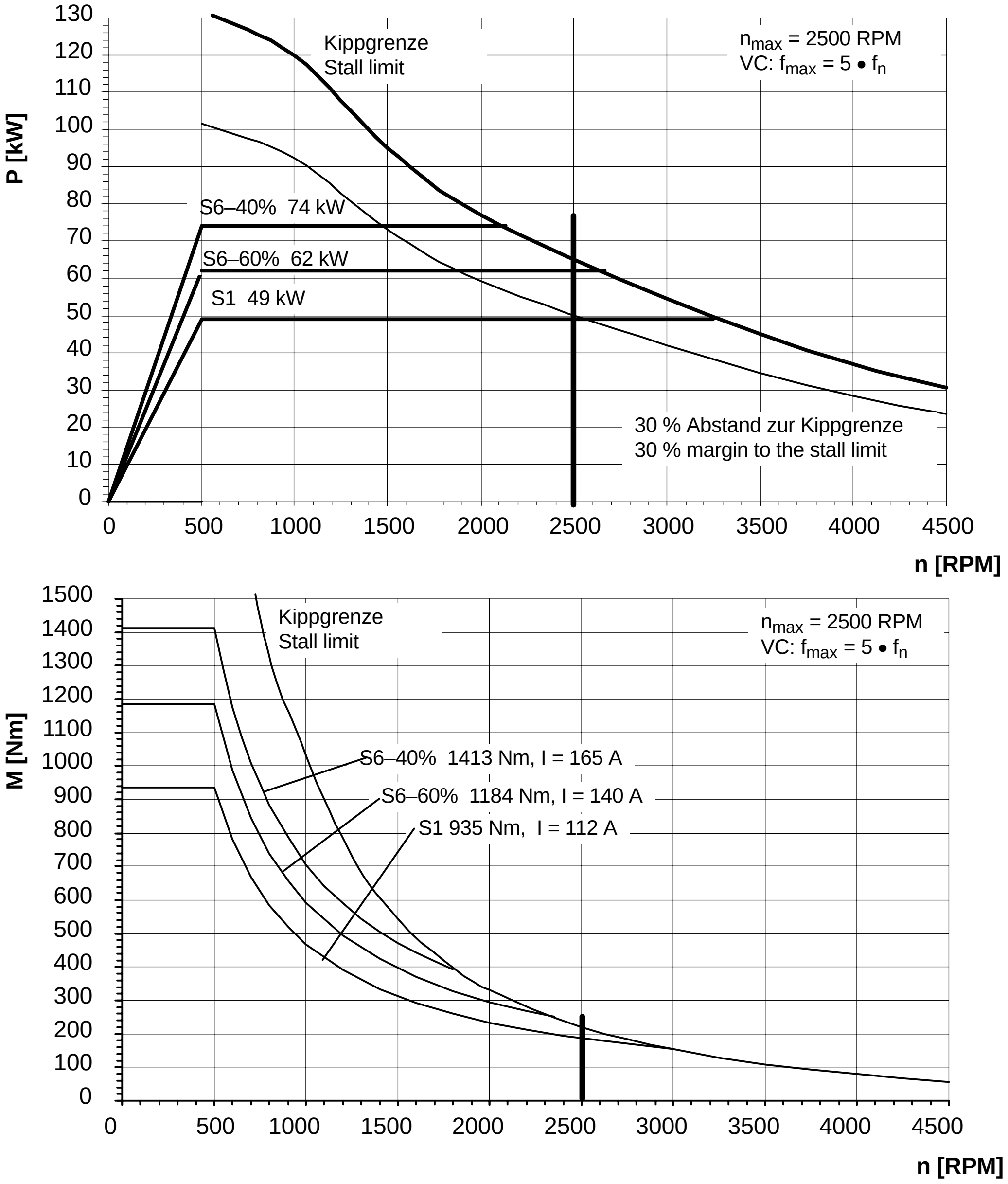


Fig. 3-62 MASTERDRIVES VC, 1PH7226–□□B□□

Table 3-67 MASTERDRIVES VC, 480 V, 1PH7228–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
500	60	1145	135	340	17.2	2500	2500	2500	61.5

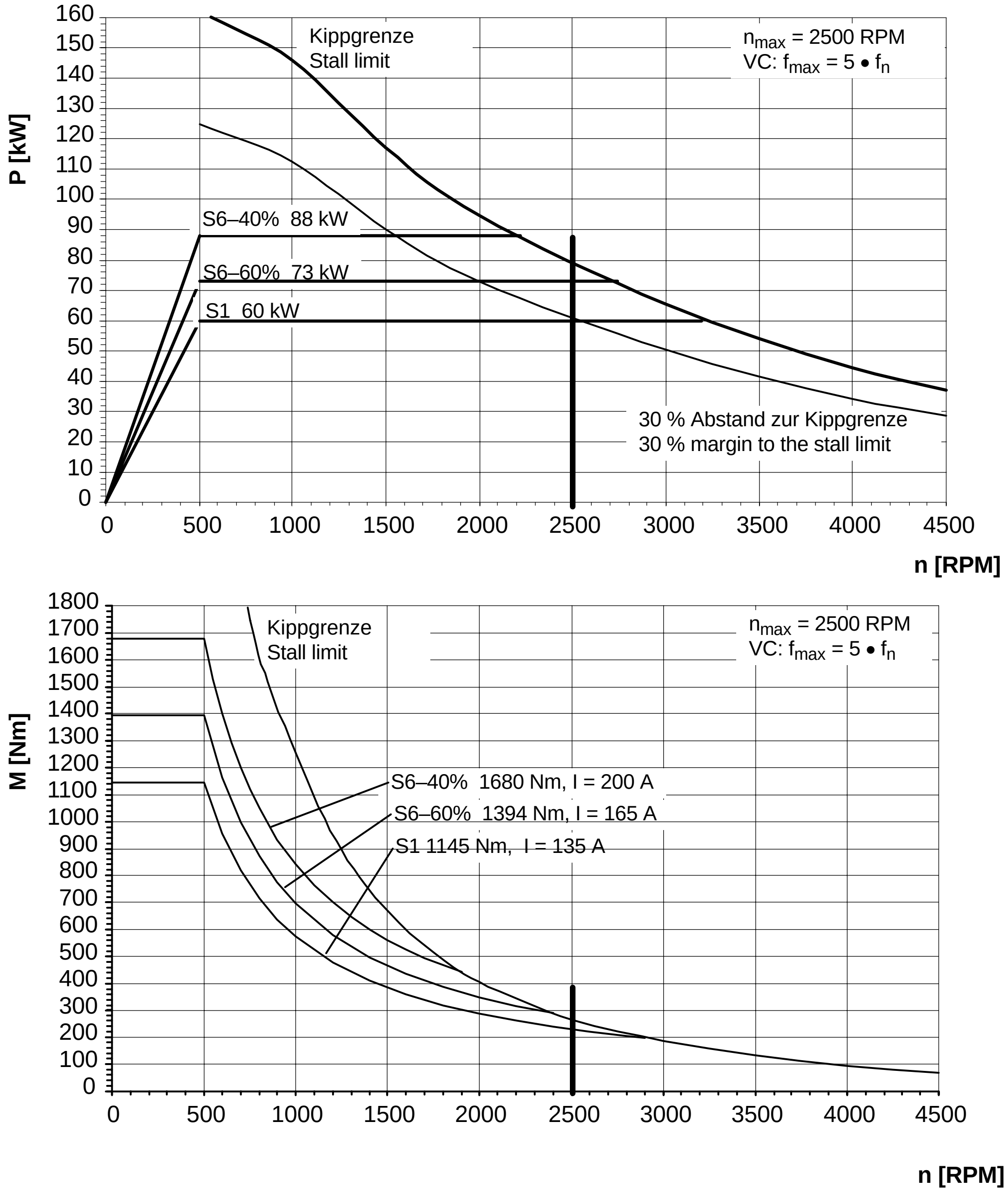
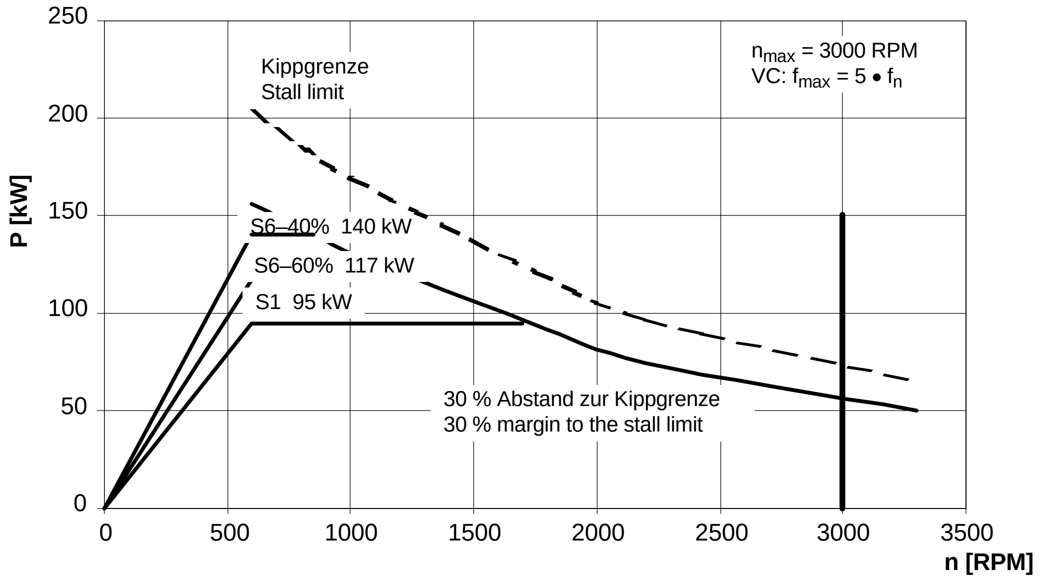


Fig. 3-63 MASTERDRIVES VC, 1PH7228–□□B□□

Table 3-68 MASTERDRIVES VC, 480 V, 1PH7284–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
600	95	1519	144	480	20.3	1650	2200	3000	61



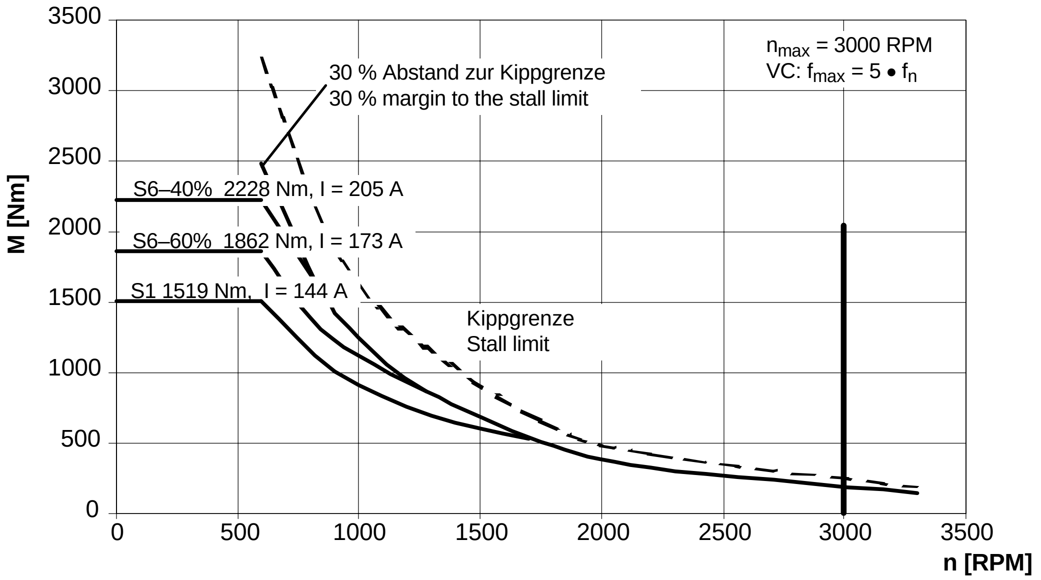


Fig. 3-64 MASTERDRIVES VC, 1PH7284–□□B□□

Table 3-69 MASTERDRIVES VC, 480 V, 1PH7286–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
600	120	1916	180	480	20.3	1750	2200	3000	80

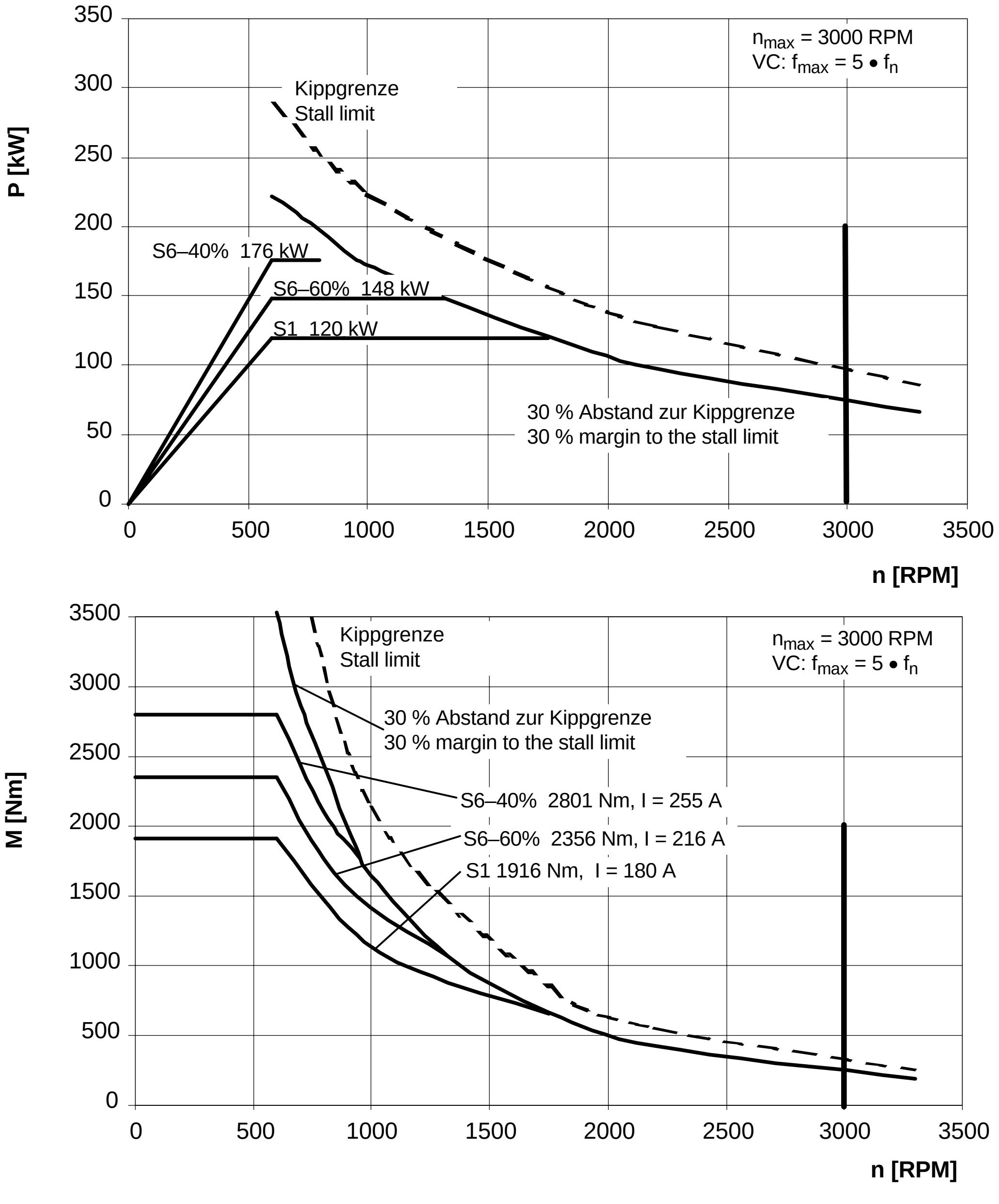


Fig. 3-65 MASTERDRIVES VC, 1PH7286–□□B□□

Table 3-70 MASTERDRIVES VC, 480 V, 1PH7288–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
600	155	2474	233	480	20.3	1850	2200	3000	102

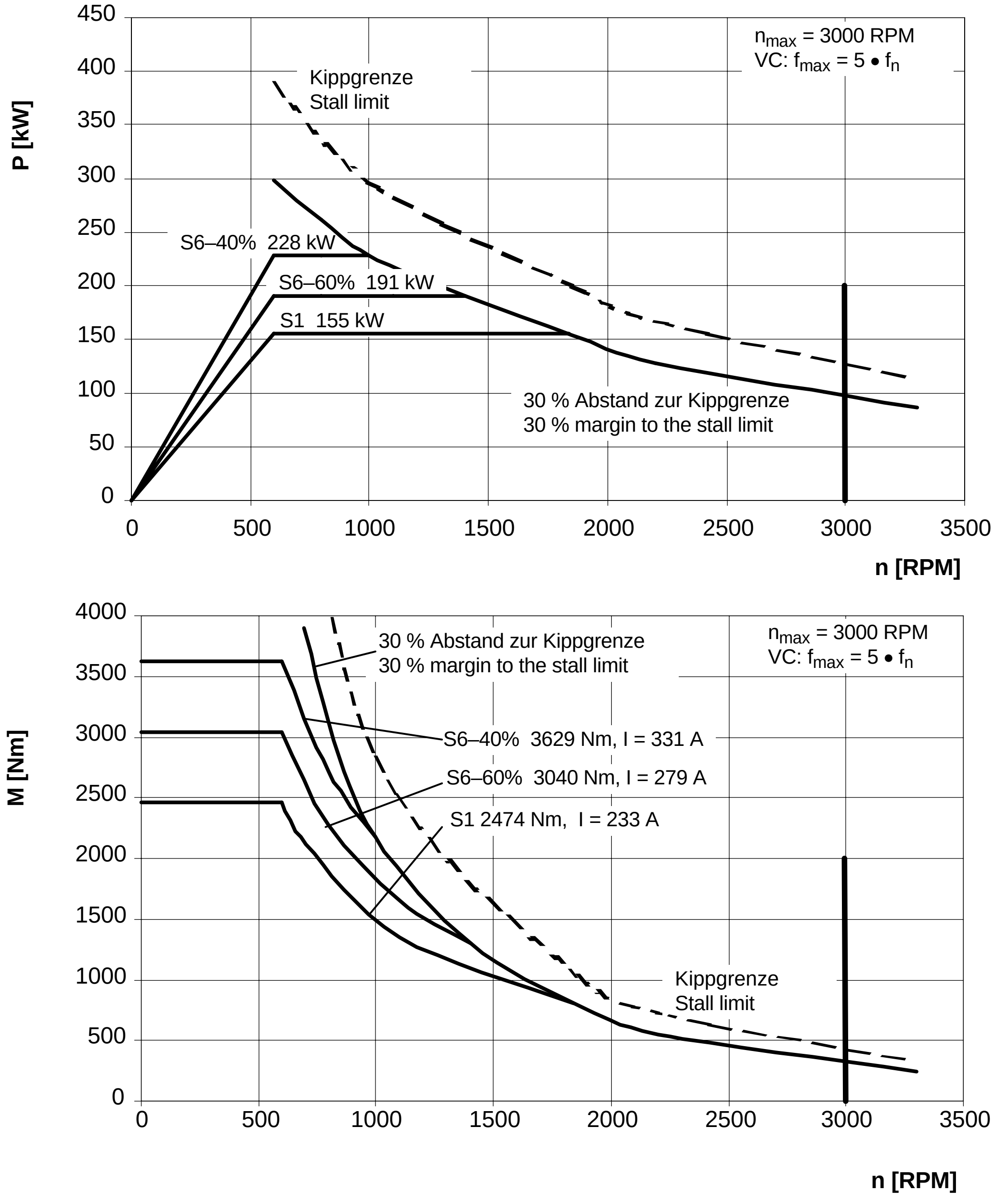


Fig. 3-66 MASTERDRIVES VC, 1PH7288–□□B□□

Table 3-71 MASTERDRIVES VC, 480 V, 1PH7284–□□C□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1000	150	1433	220	480	34.0	2200	2200	3300	90

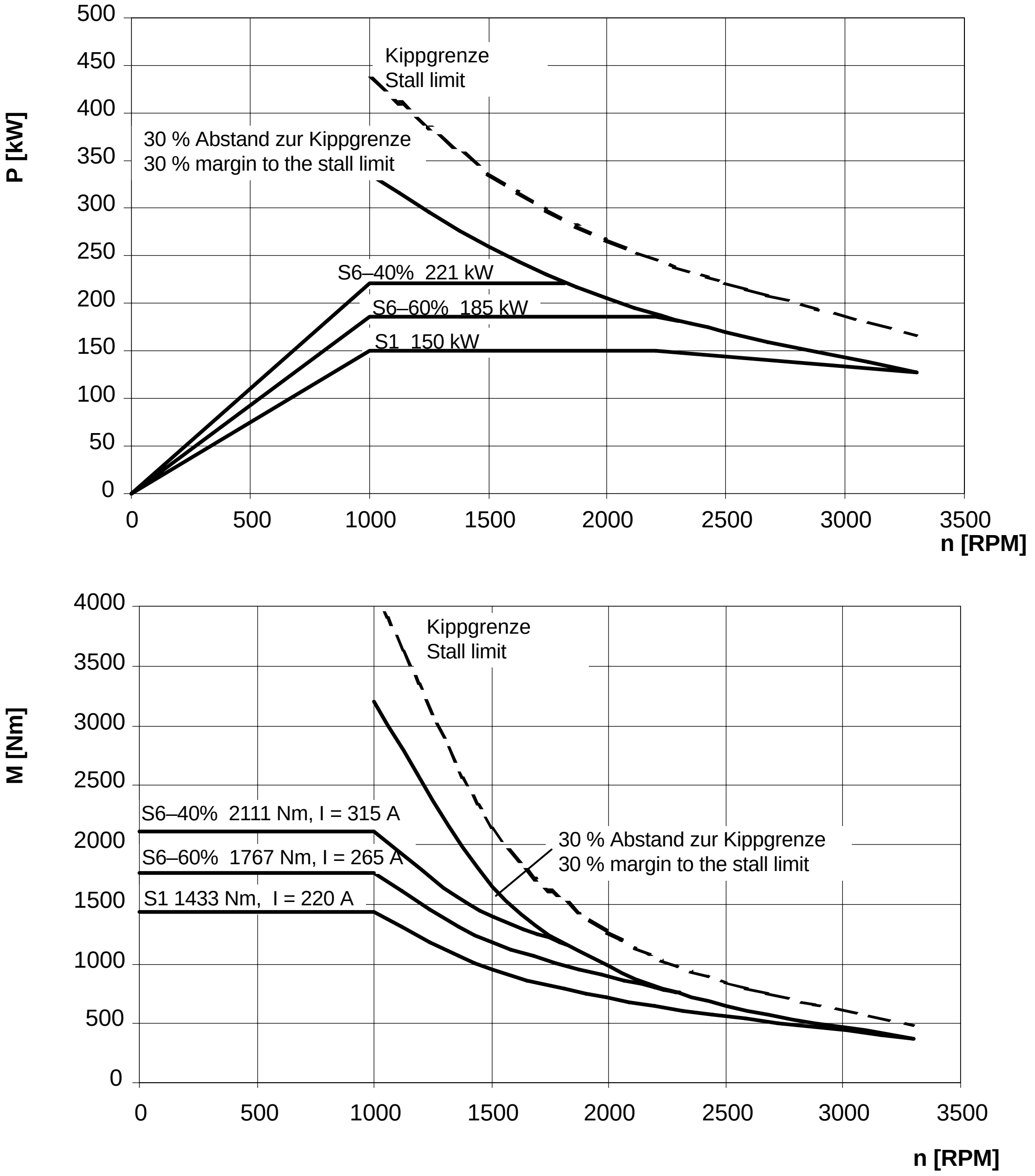


Fig. 3-67 MASTERDRIVES VC, 1PH7284–□□C□□

Table 3-72 MASTERDRIVES VC, 480 V, 1PH7286–□□C□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1000	185	1767	285	480	34.0	2200	2200	3300	135

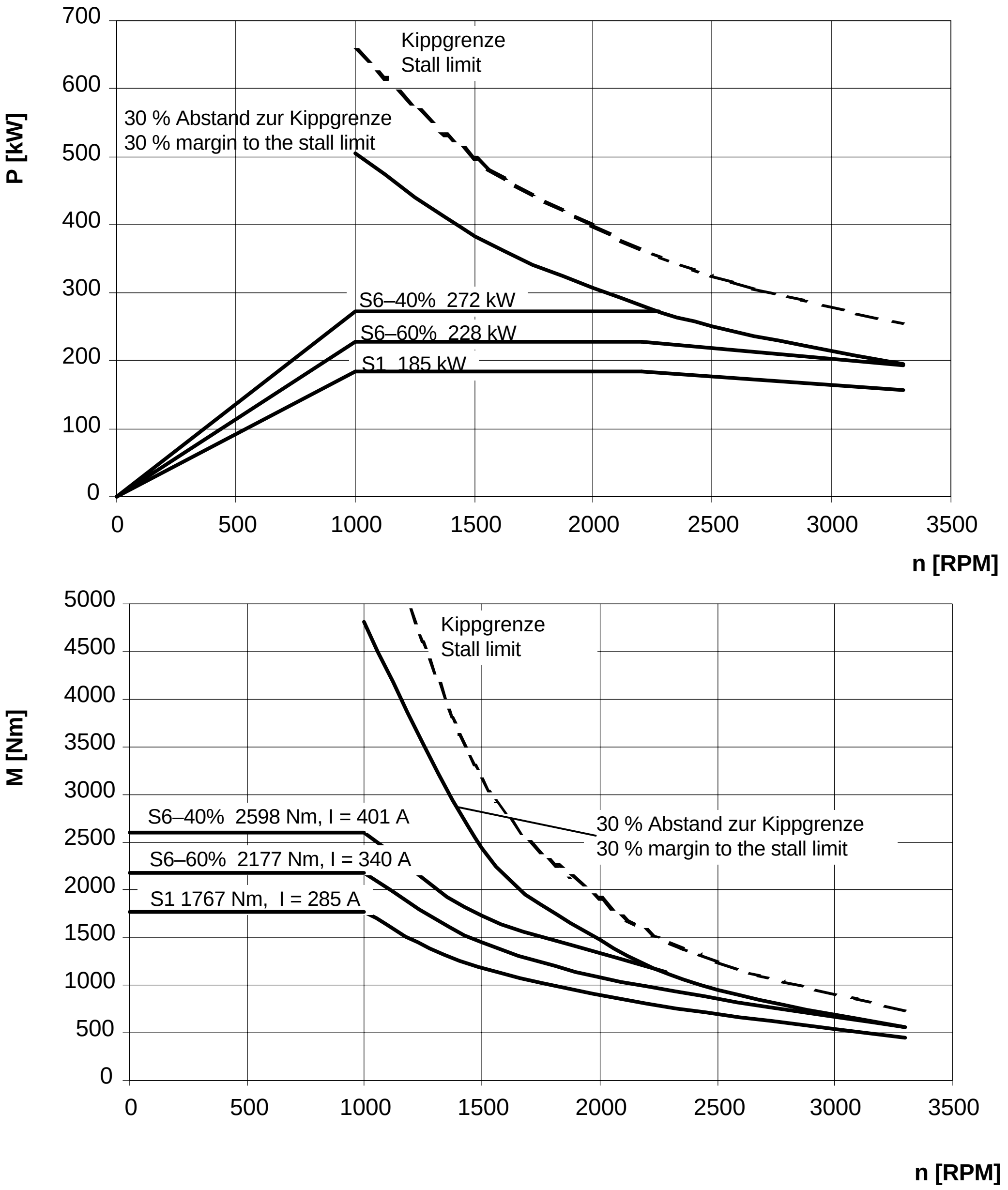


Fig. 3-68 MASTERDRIVES VC, 1PH7286–□□C□□

Table 3-73 MASTERDRIVES VC, 480 V, 1PH7288–□□C□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1000	230	2197	365	460	34.0	2200	2200	3300	170

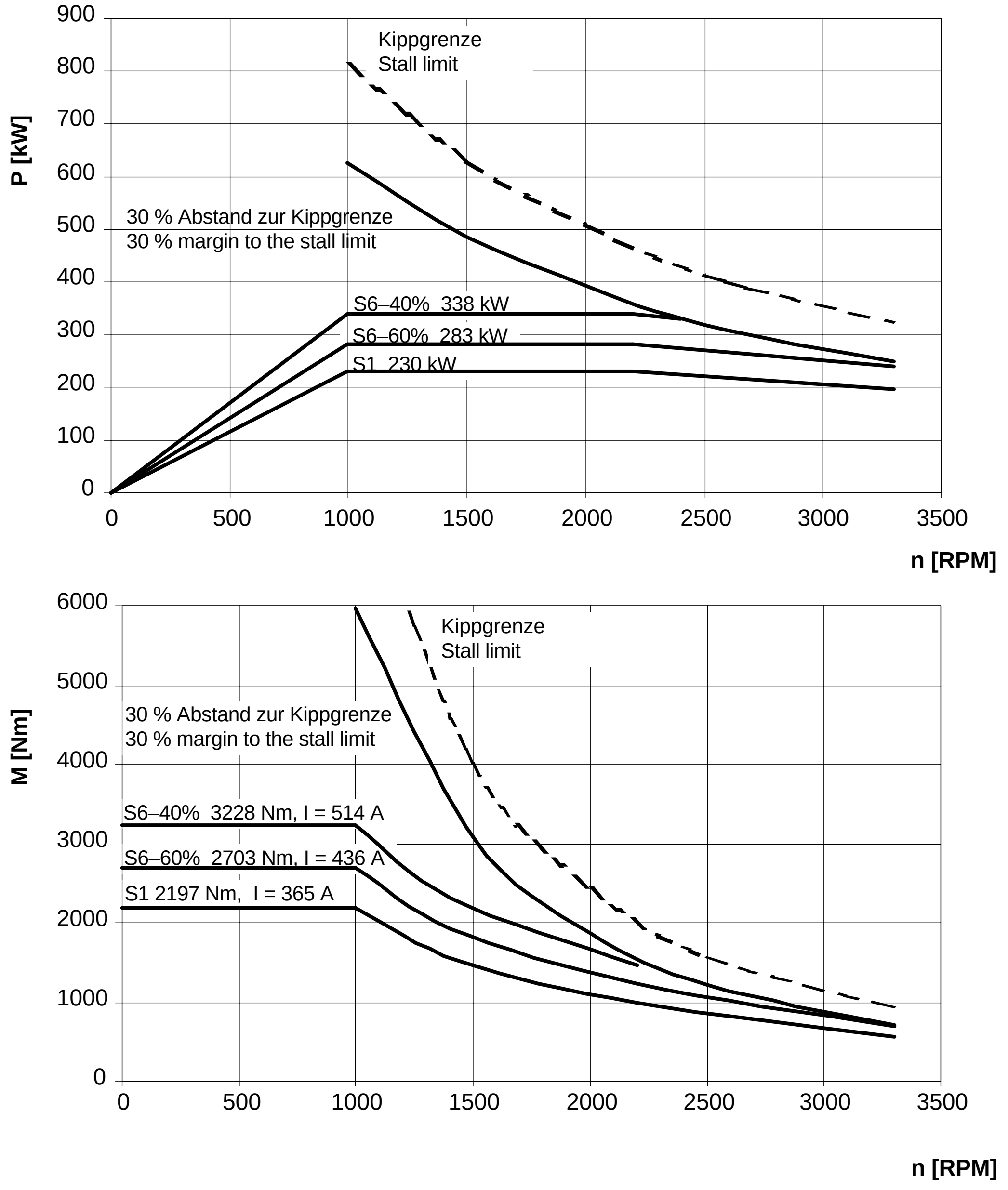


Fig. 3-69 MASTERDRIVES VC, 1PH7288–□□C□□

Table 3-74 MASTERDRIVES VC, 480 V, 1PH7103–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1350	4.7	33	9.5	433	47.1	3000	5500	6750	4.5

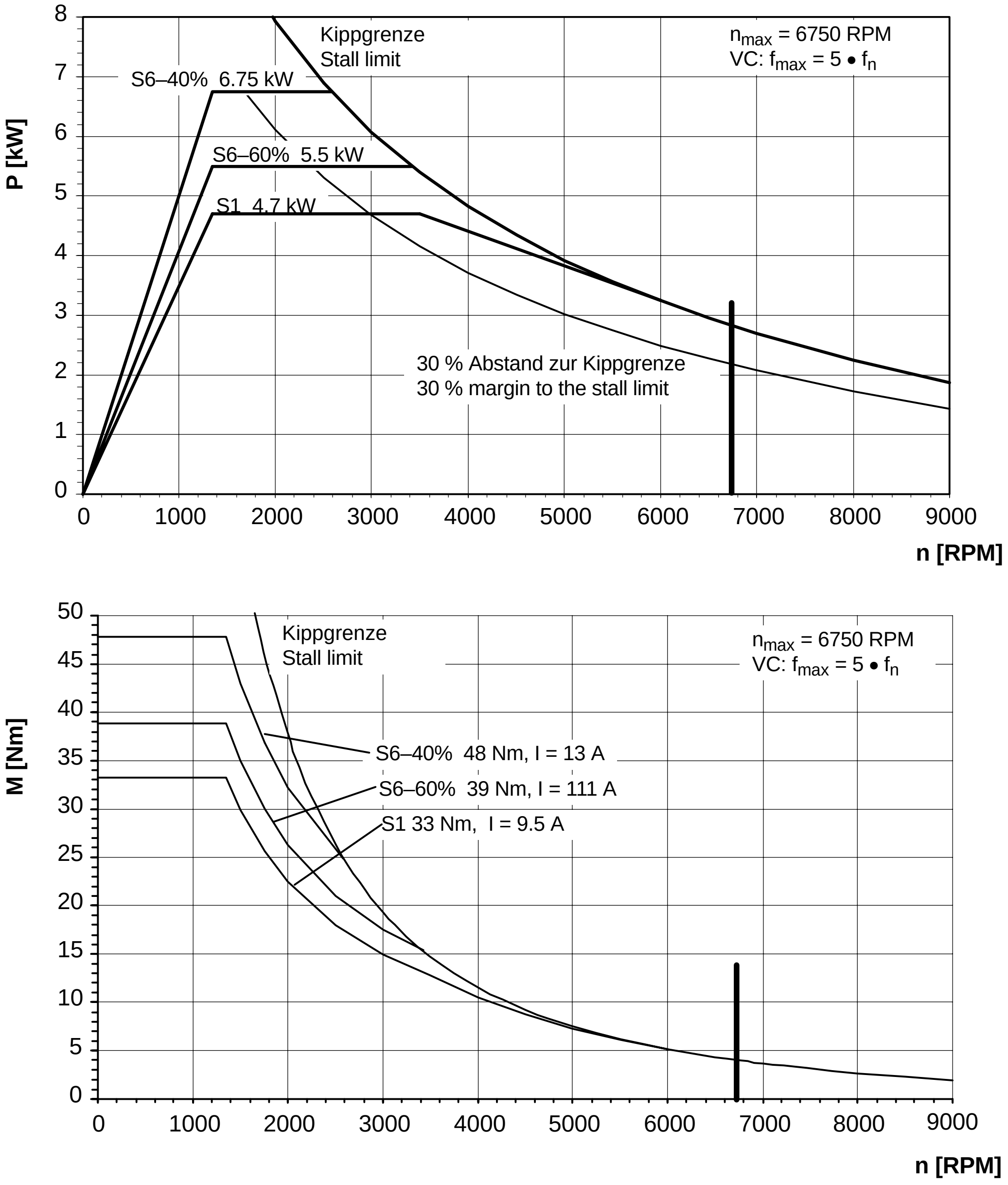


Fig. 3-70 MASTERDRIVES VC, 1PH7103–□□D□□

Table 3-75 MASTERDRIVES VC, 480 V, 1PH7107–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1350	8.0	57	17	405	47.0	3800	5500	6750	8.1

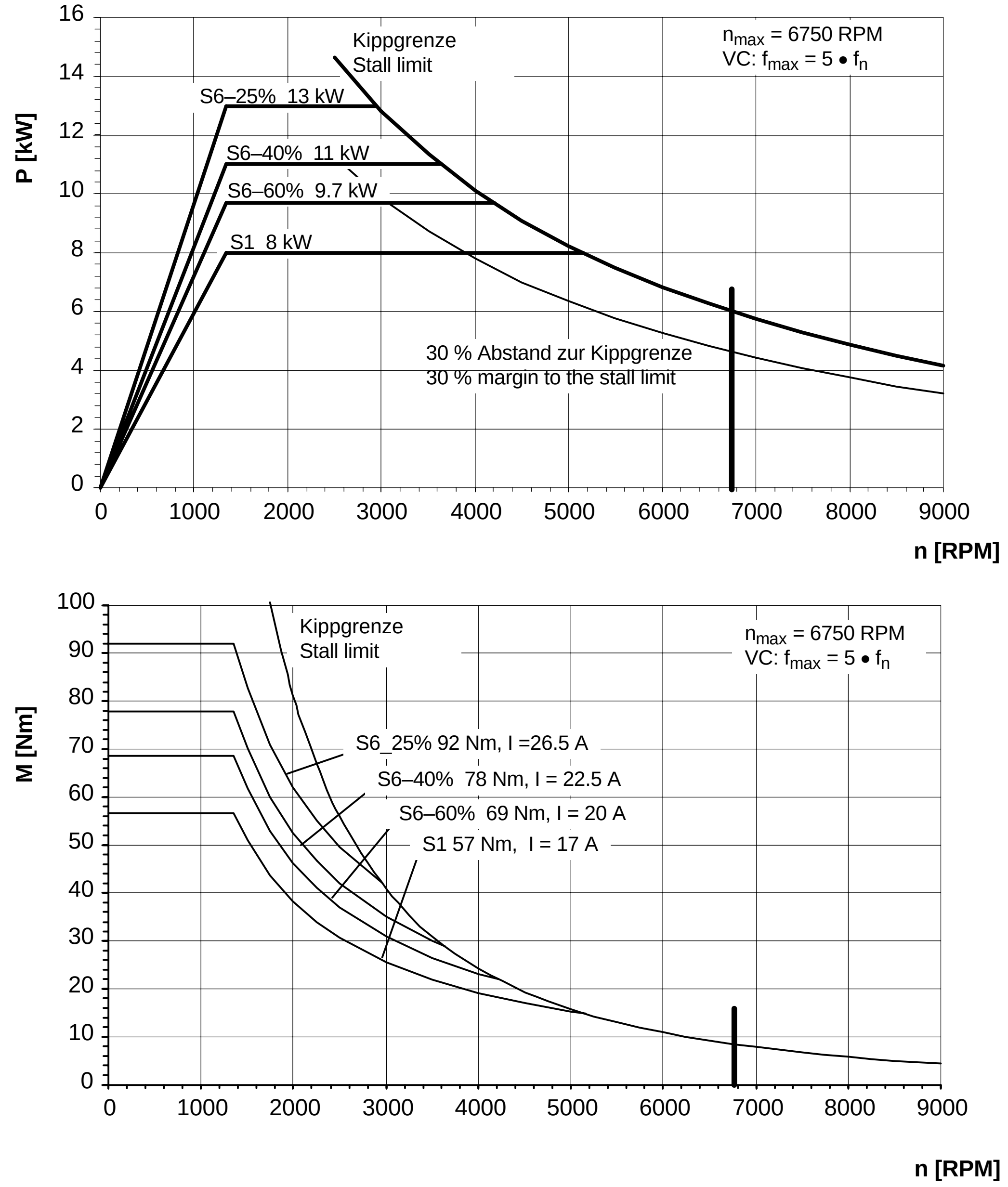


Fig. 3-71 MASTERDRIVES VC, 1PH7107–□□D□□

Table 3-76 MASTERDRIVES VC, 480 V, 1PH7133–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1350	15	106	30	433	46.4	3100	4500	6750	12

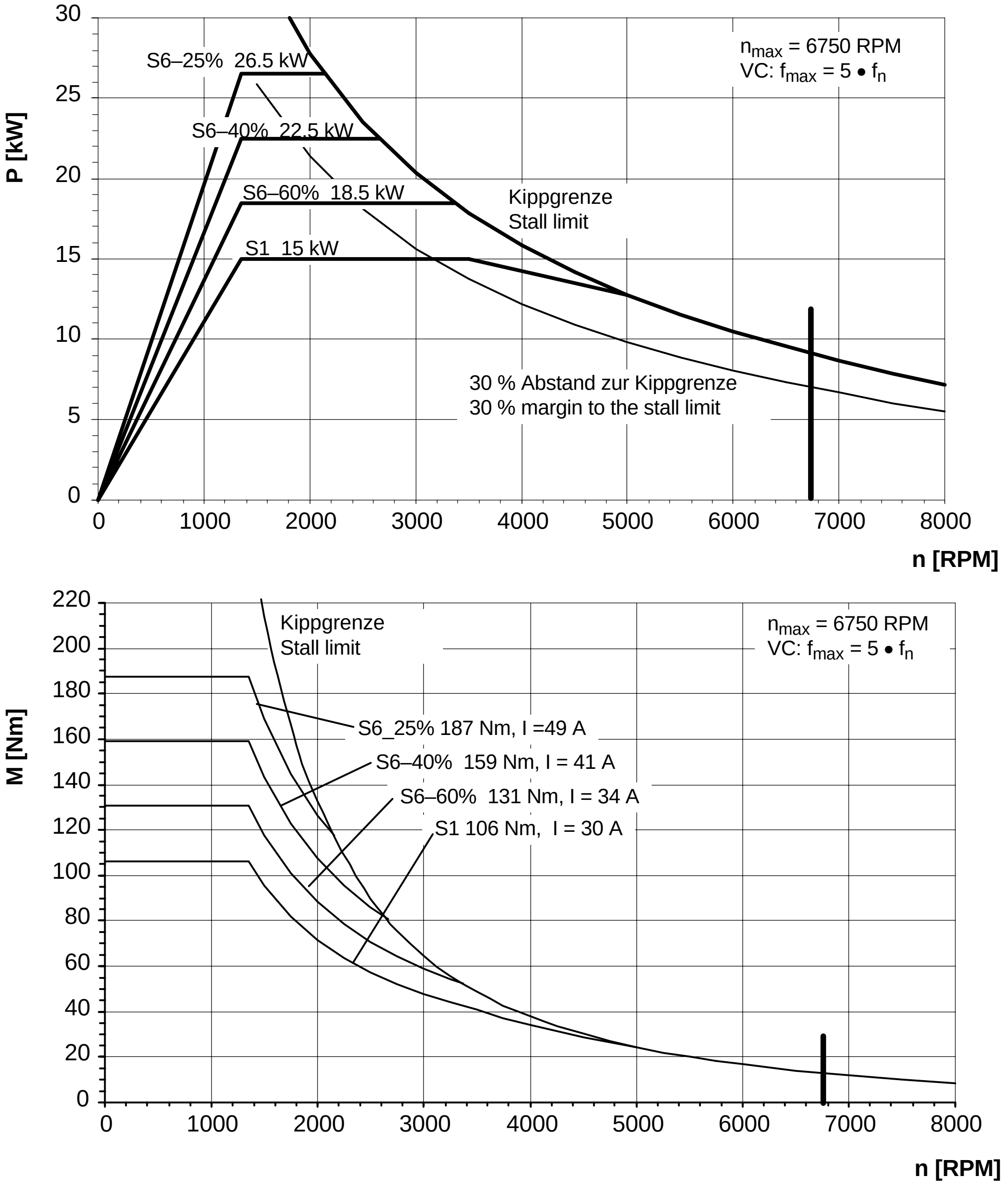


Fig. 3-72 MASTERDRIVES VC, 1PH7133–□□D□□

Table 3-77 MASTERDRIVES VC, 480 V, 1PH7137–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1350	22	156	42	416	46.3	3200	4500	6750	17

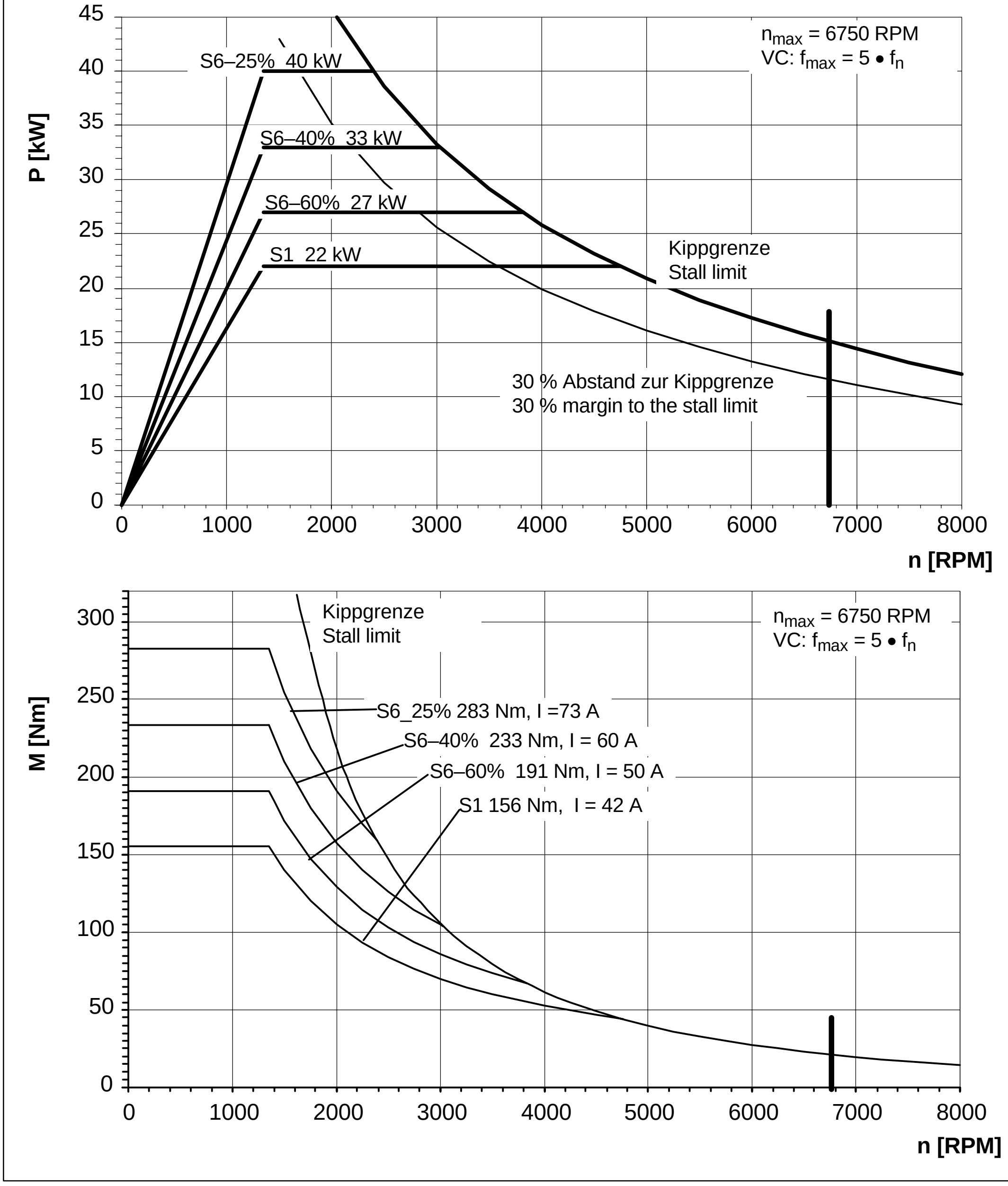


Fig. 3-73 MASTERDRIVES VC, 1PH7137–□□D□□

Table 3-78 MASTERDRIVES VC, 480 V, 1PH7163–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1350	28	198	53	413	45.8	4100	3750	6500	24

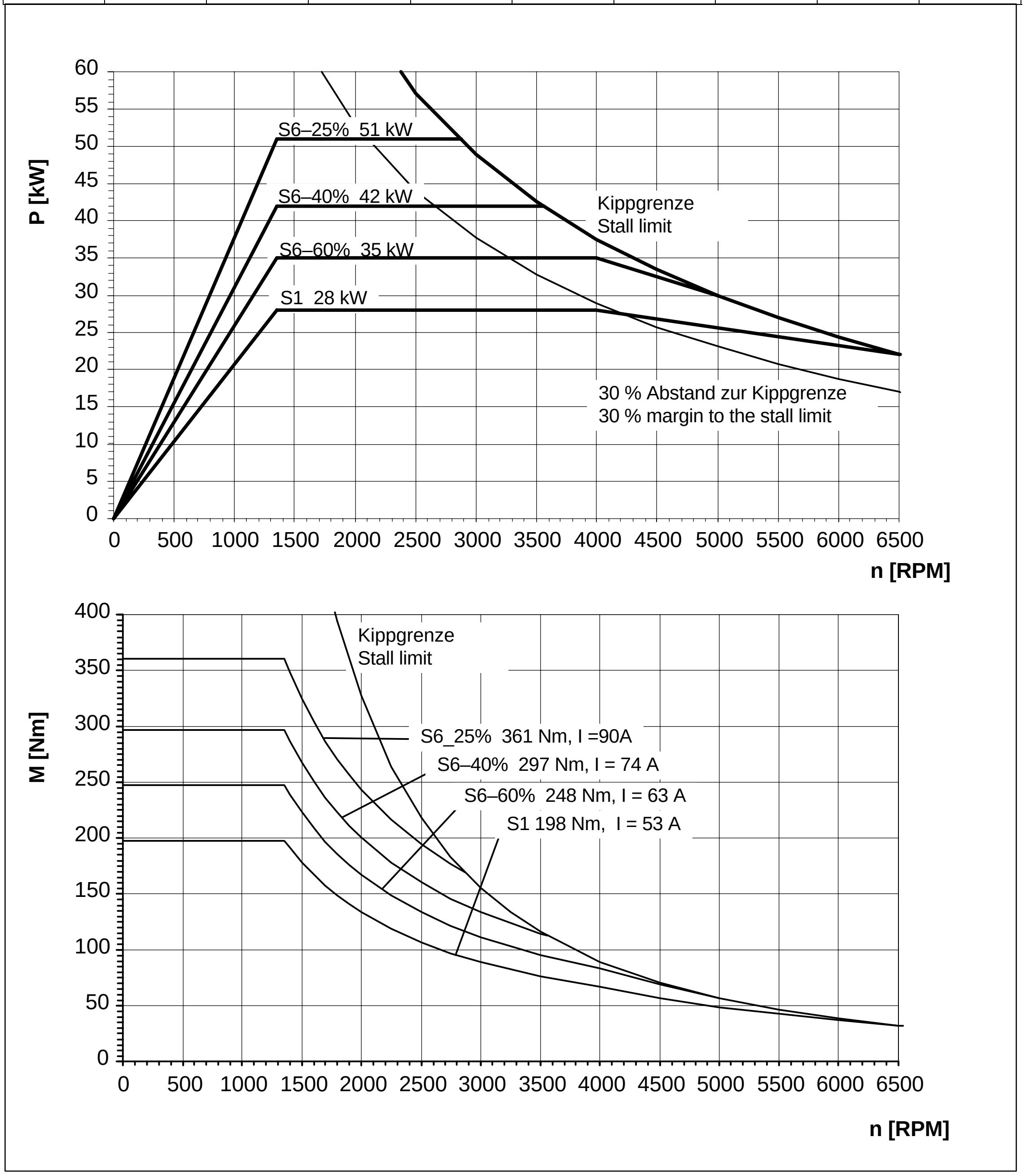


Fig. 3-74 MASTERDRIVES VC, 1PH7163–□□D□□

Table 3-79 MASTERDRIVES VC, 480 V, 1PH7167–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1350	34	241	67	400	45.8	4600	3700	6500	34

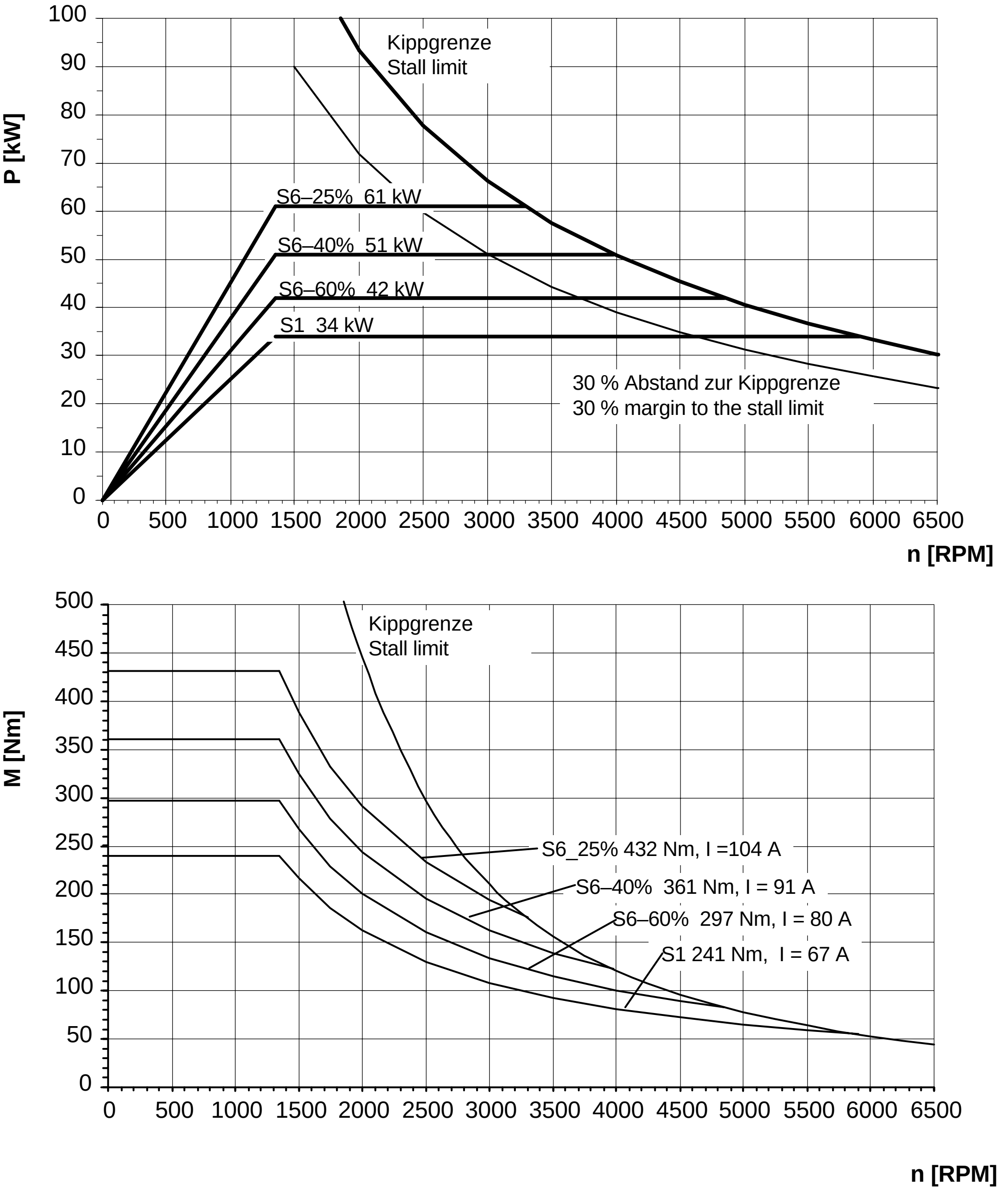


Fig. 3-75 MASTERDRIVES VC, 1PH7167–□□D□□

Table 3-80 MASTERDRIVES VC, 480 V, 1PH7184–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1350	50	355	86	450	45.8	3700	3500[1]	5000	42

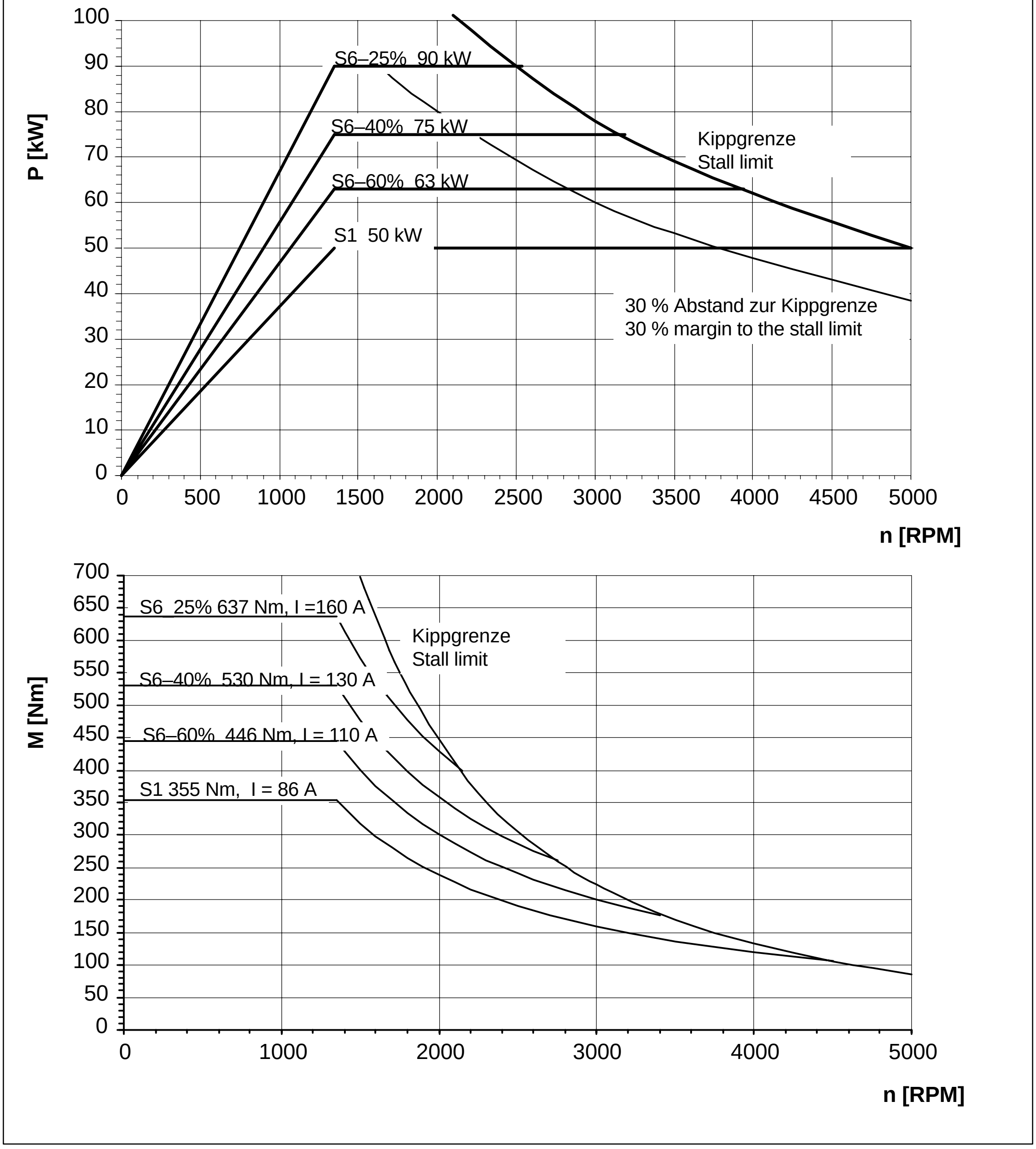


Fig. 3-76 MASTERDRIVES VC, 1PH7184–□□D□□

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[1] 3000 RPM for increased cantilever forces

Table 3-81 MASTERDRIVES VC, 480 V, 1PH7186–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1350	67	475	114	460	45.7	3800	3500[1]	5000	59.5

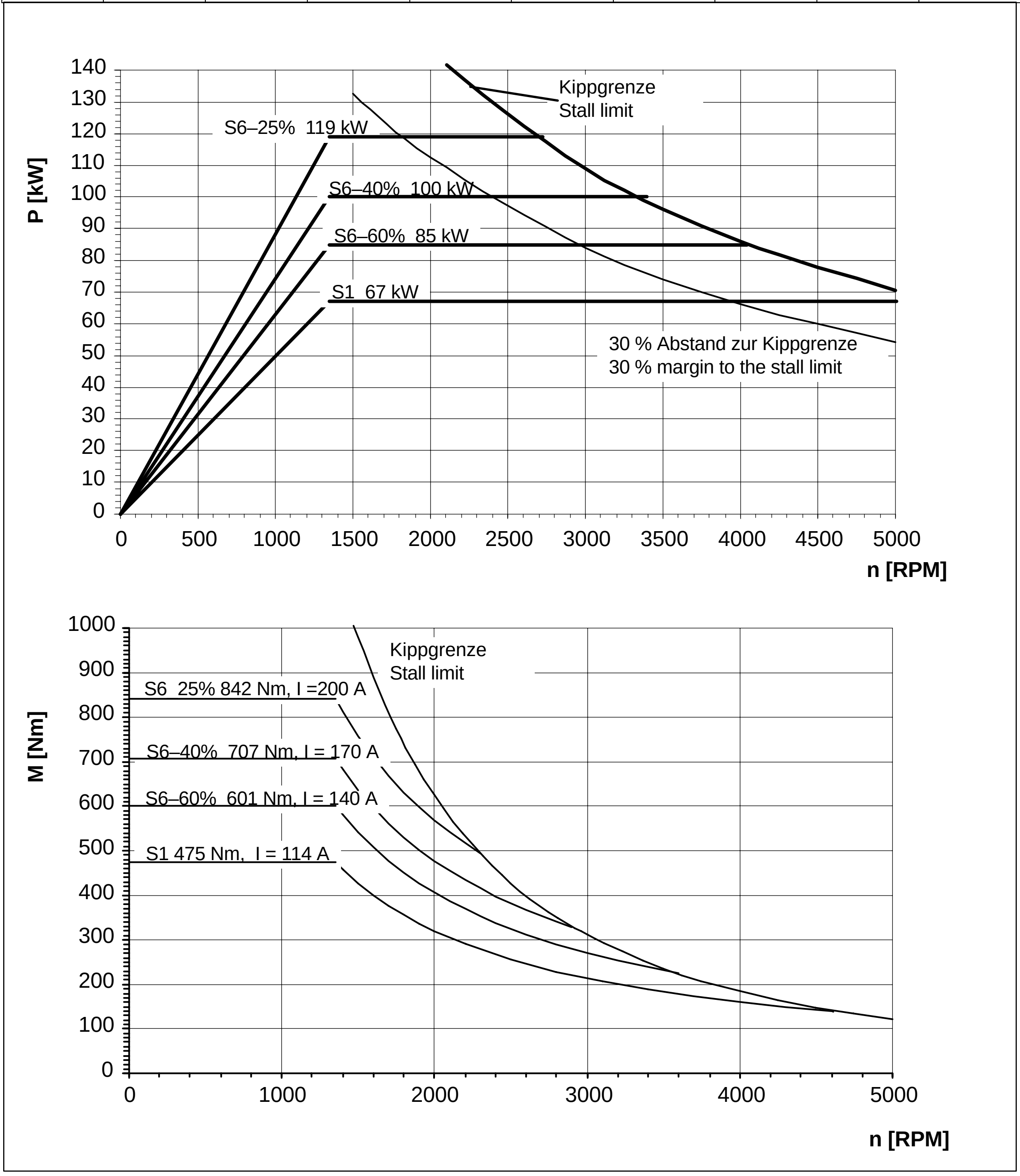

Fig. 3-77 MASTERDRIVES VC, 1PH7186–□□D□□

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1) 3000 RPM for increased cantilever forces

Table 3-82 MASTERDRIVES VC, 480 V, 1PH7224–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1350	92	650	156	450	45.6	2900	3100[1]	4500	78.5

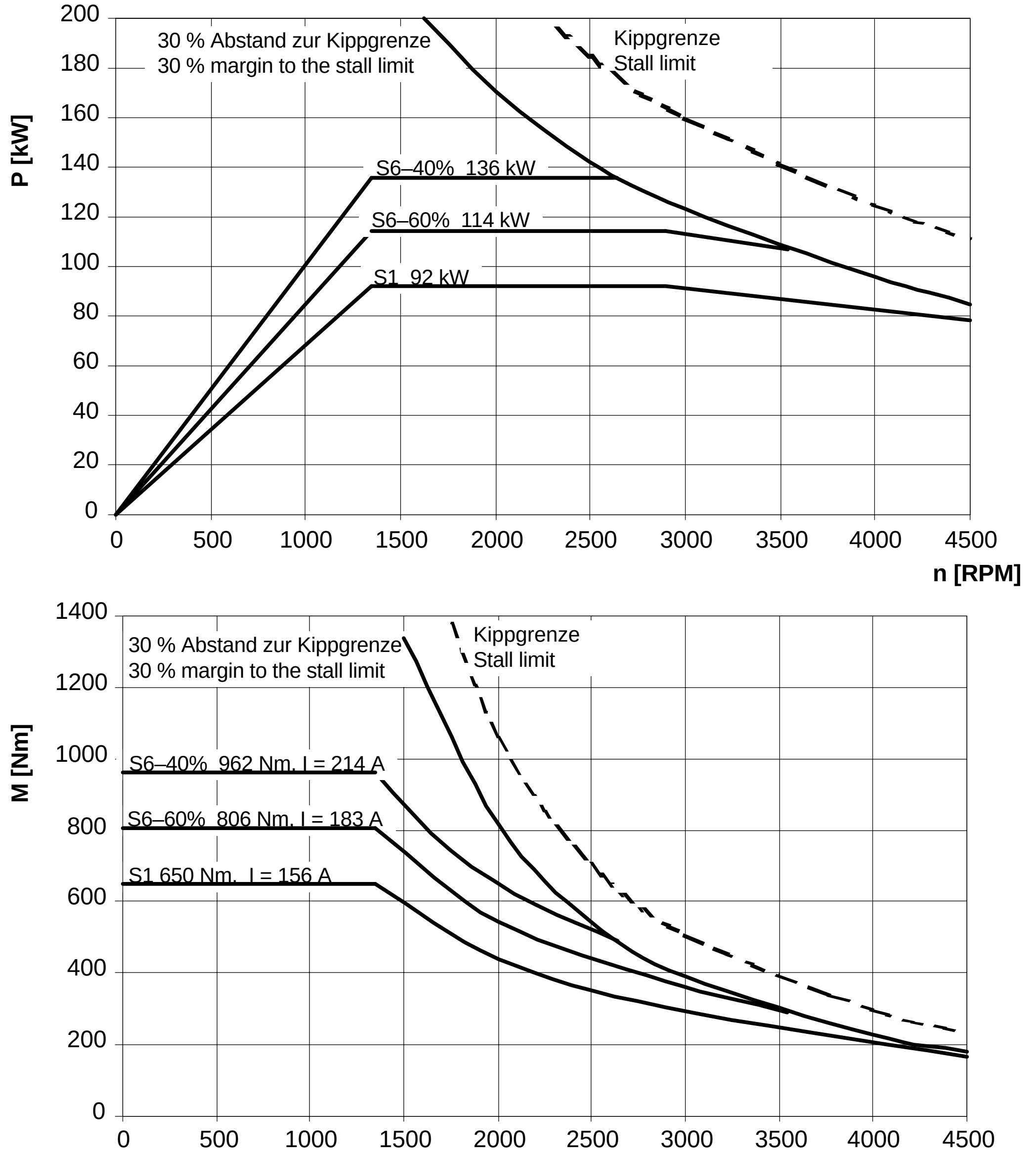

Fig. 3-78 MASTERDRIVES VC, 1PH7224–□□D□□

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[1] 2700 RPM for increased cantilever forces

Table 3-83 MASTERDRIVES VC, 480 V, 1PH7226–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1350	120	847	193	460	45.6	2900	3100[1]	4500	88.5

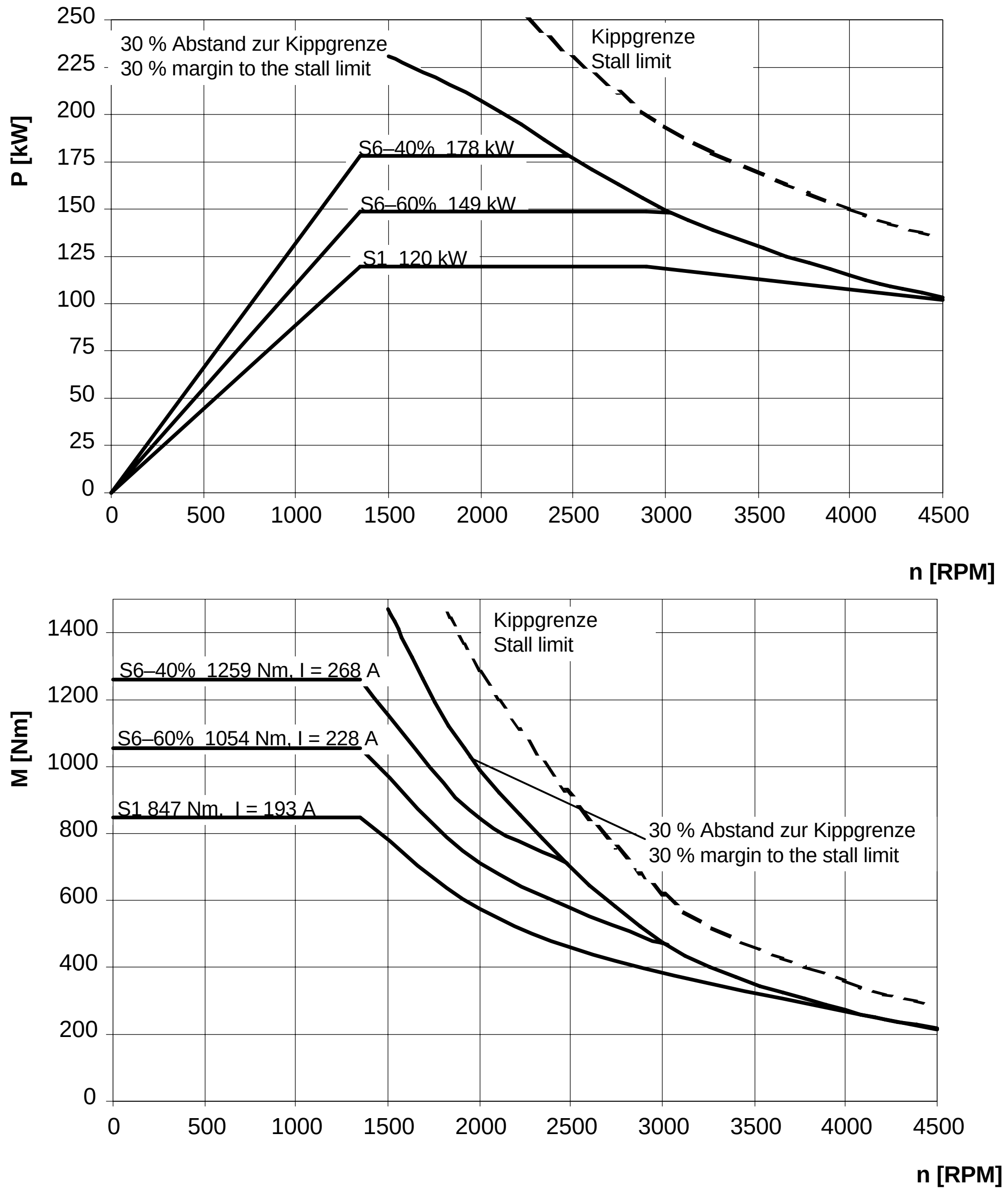

Fig. 3-79 MASTERDRIVES VC, 1PH7226–□□D□□

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1) 2700 RPM for increased cantilever forces

Table 3-84 MASTERDRIVES VC, 480 V, 1PH7228–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1350	147	1043	232	460	45.6	2900	3100[1]	4500[2]	99.5

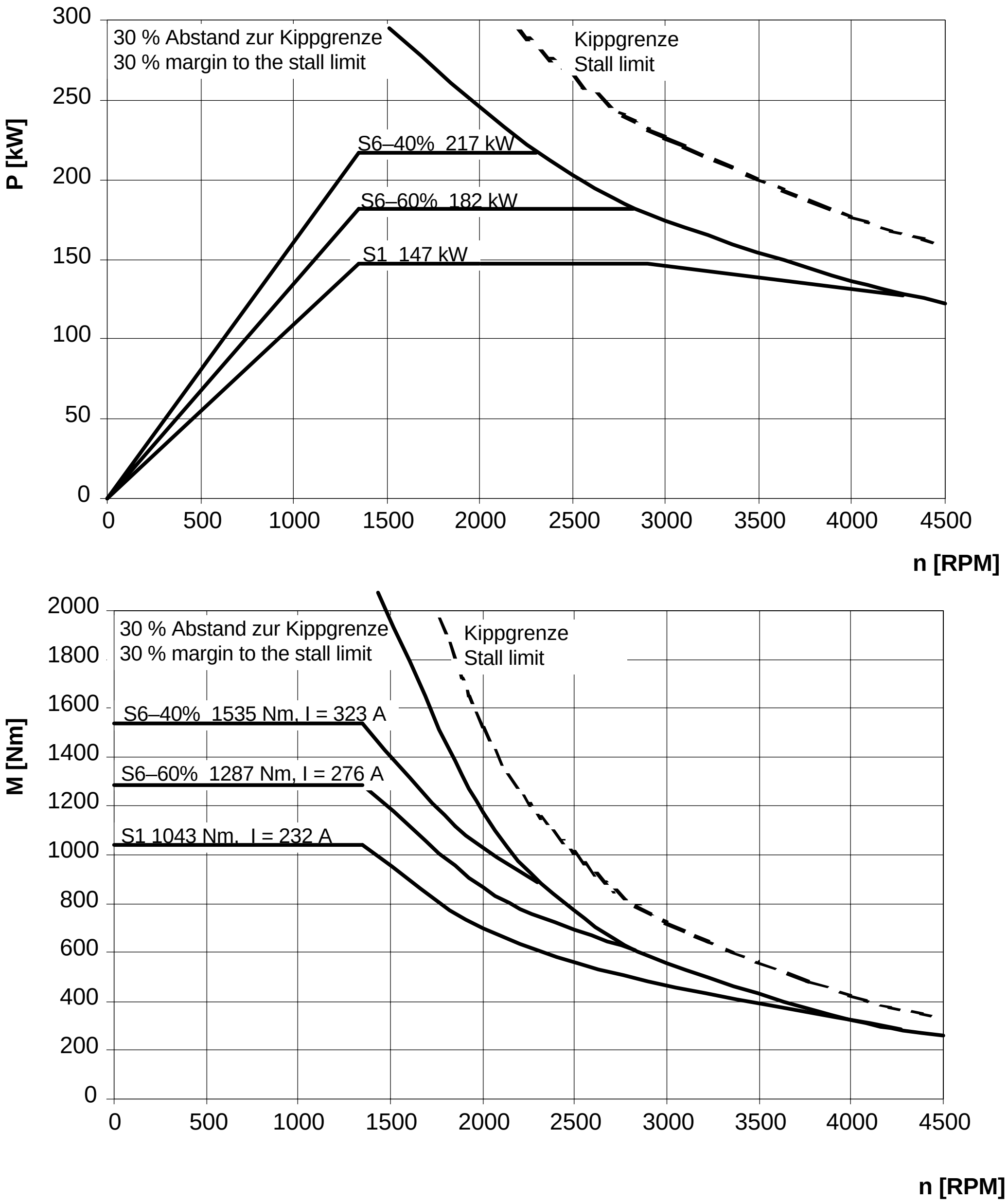

Fig. 3-80 MASTERDRIVES VC, 1PH7228–□□D□□

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1) 2500 RPM for increased cantilever forces

2) 4000 RPM for increased cantilever forces

Table 3-85 MASTERDRIVES VC, 480 V, 1PH7284–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1350	200	1416	314	470	45.3	2200	2200	3300	159

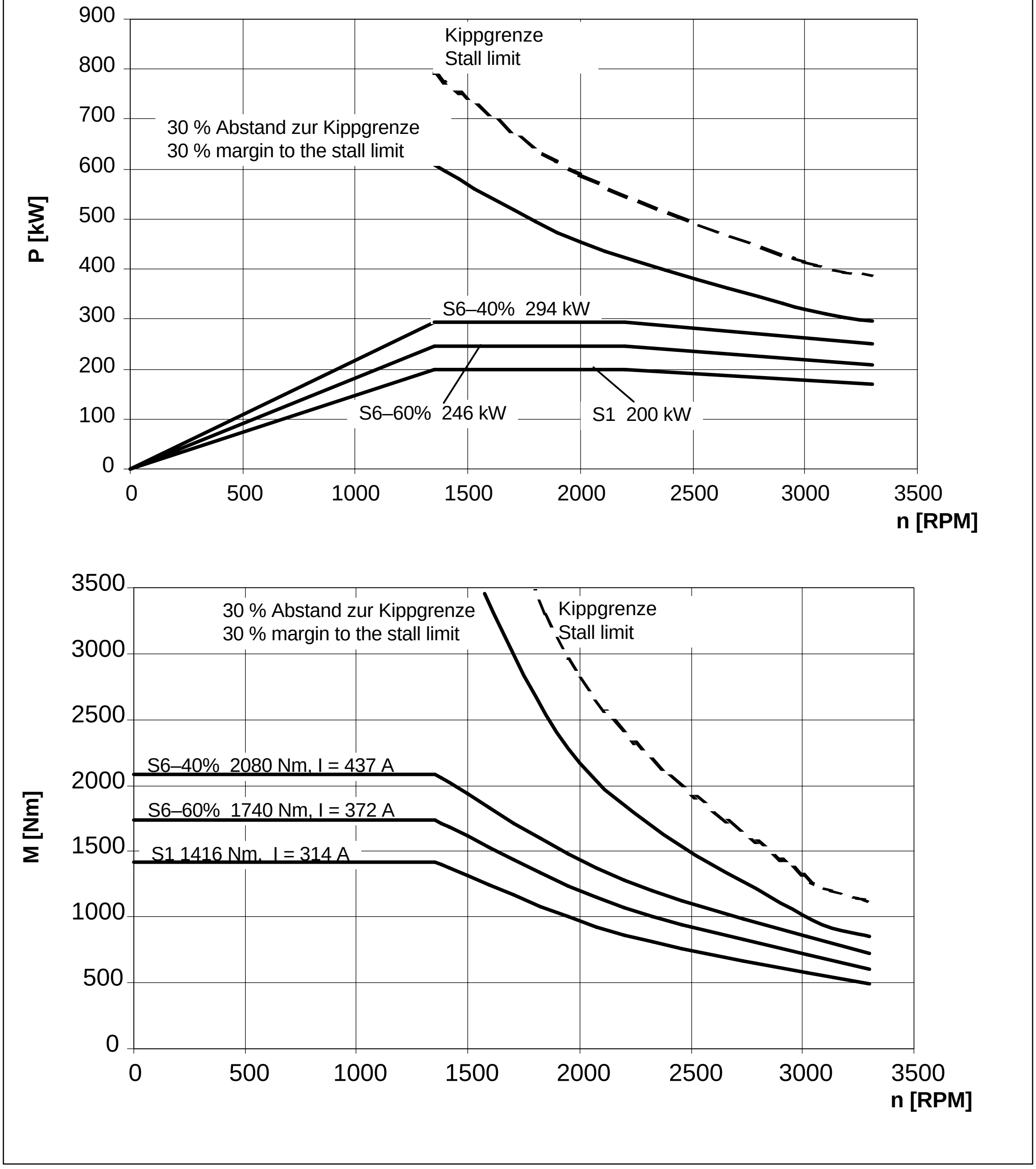
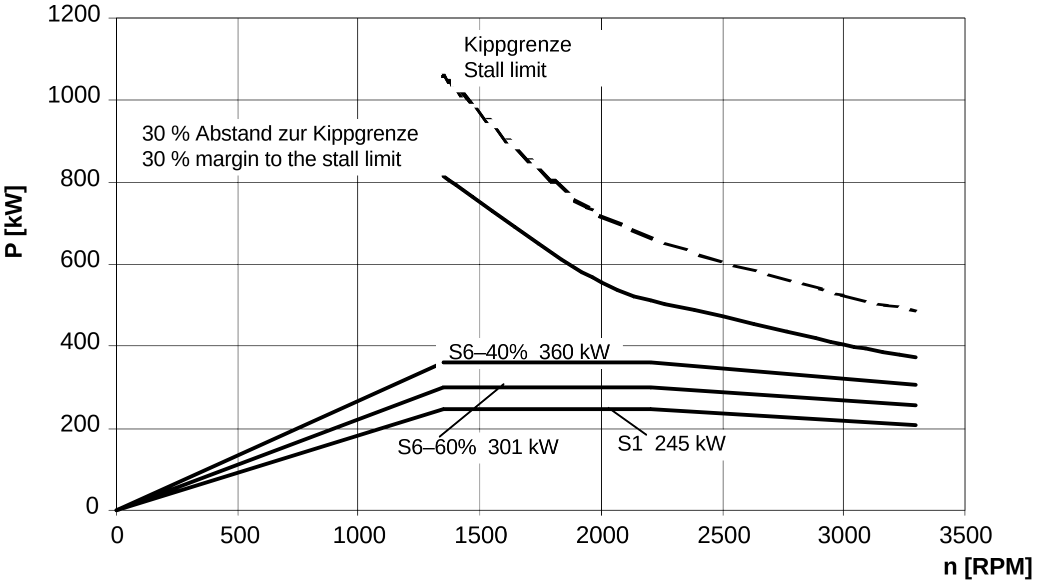


Fig. 3-81 MASTERDRIVES VC, 1PH7284–□□D□□

Table 3-86 MASTERDRIVES VC, 480 V, 1PH7286–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1350	245	1733	414	445	45.3	2200	2200	3300	217



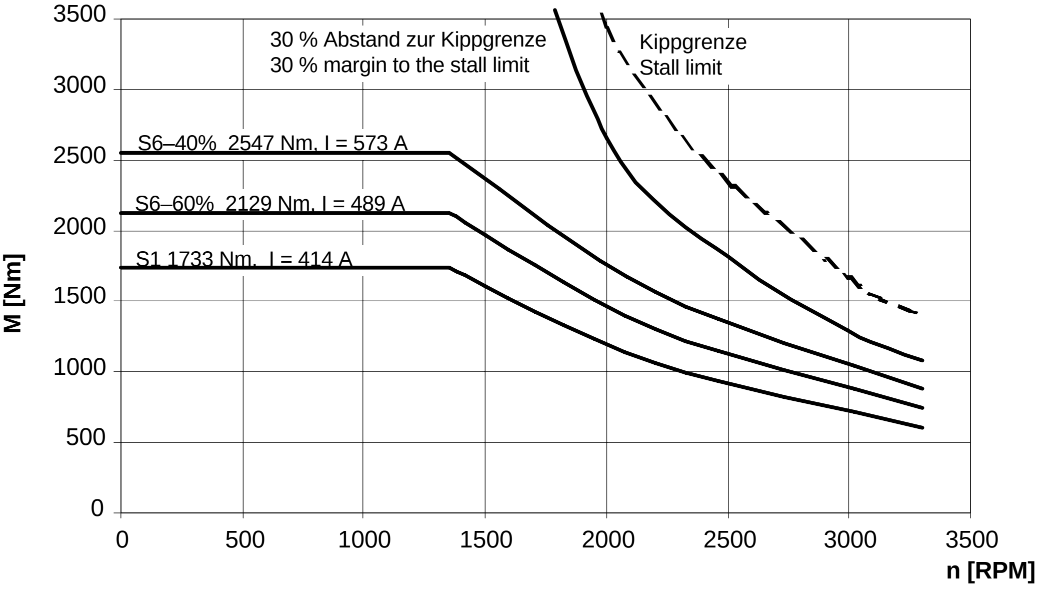


Fig. 3-82 MASTERDRIVES VC, 1PH7286–□□D□□

Table 3-87 MASTERDRIVES VC, 480 V, 1PH7288–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1350	305	2158	497	450	45.3	2200	2200	3300	250

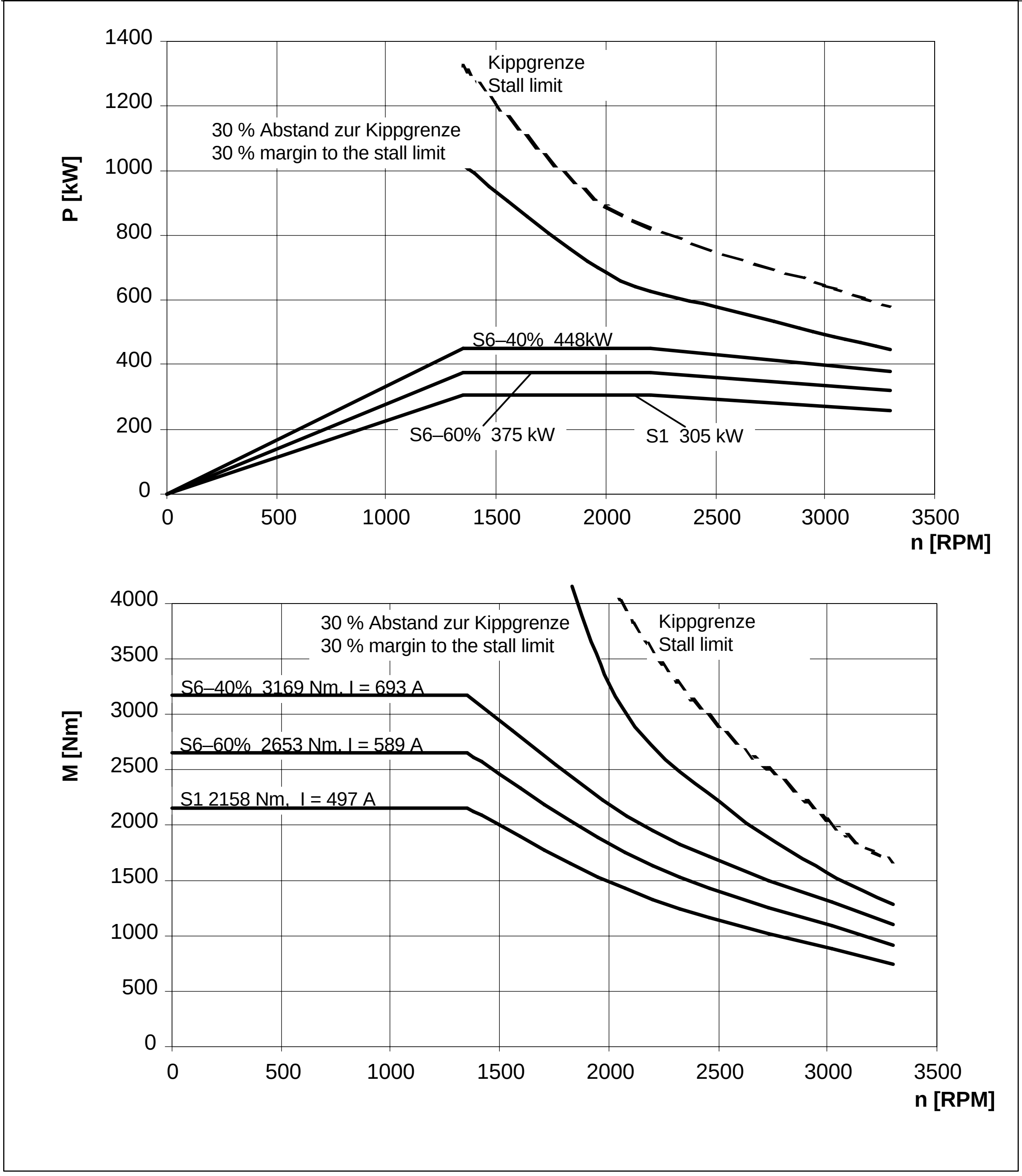


Fig. 3-83 MASTERDRIVES VC, 1PH7288–□□D□□

Table 3-88 MASTERDRIVES VC, 480 V, 1PH7101–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	4.7	22	10	459	68.2	6000	5500	9000	6.0

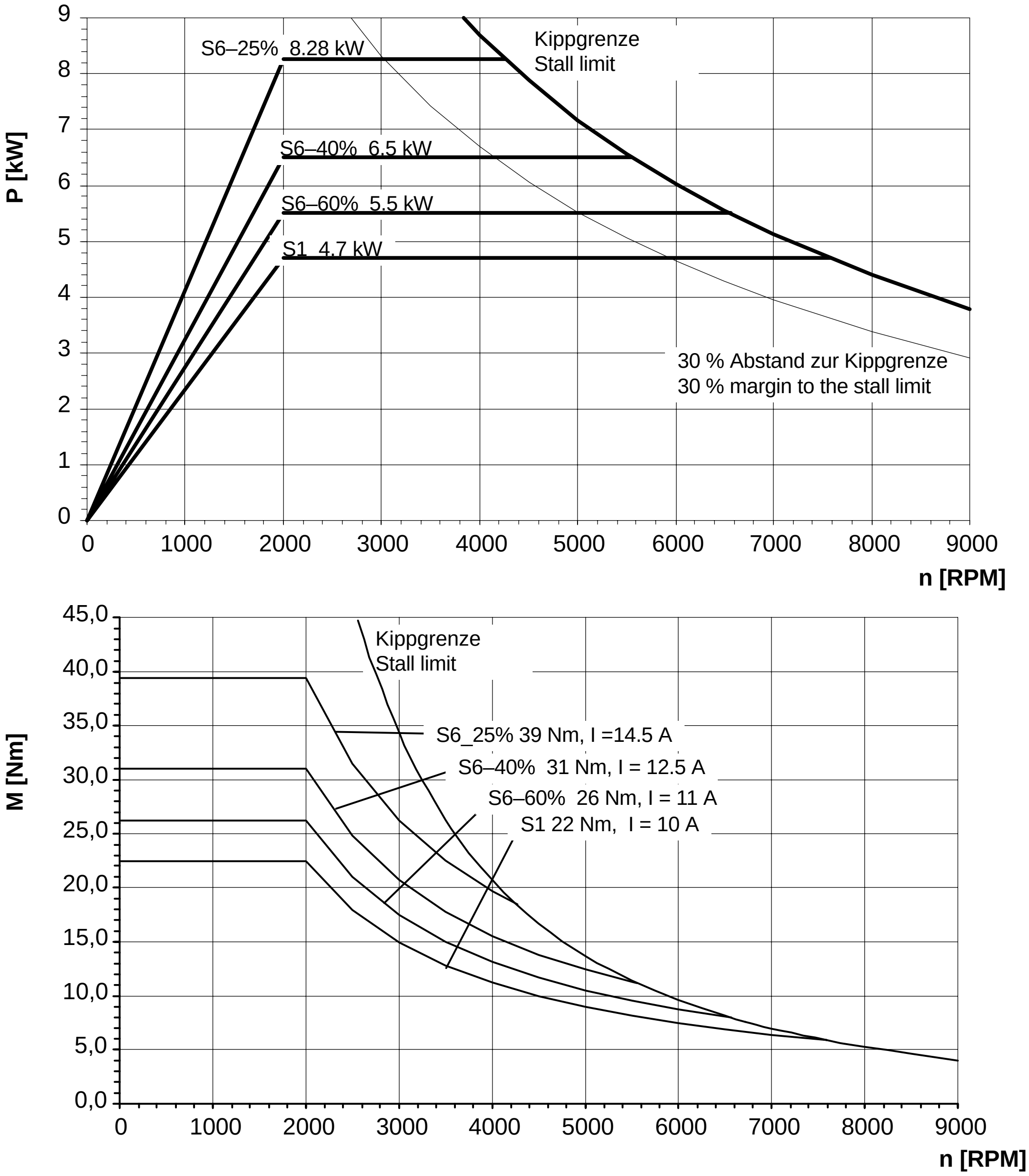


Fig. 3-84 MASTERDRIVES VC, 1PH7101–□□F□□

Table 3-89 MASTERDRIVES VC, 480 V, 1PH7103–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	7.0	33	13	459	69.1	3400	5500	9000	5.6

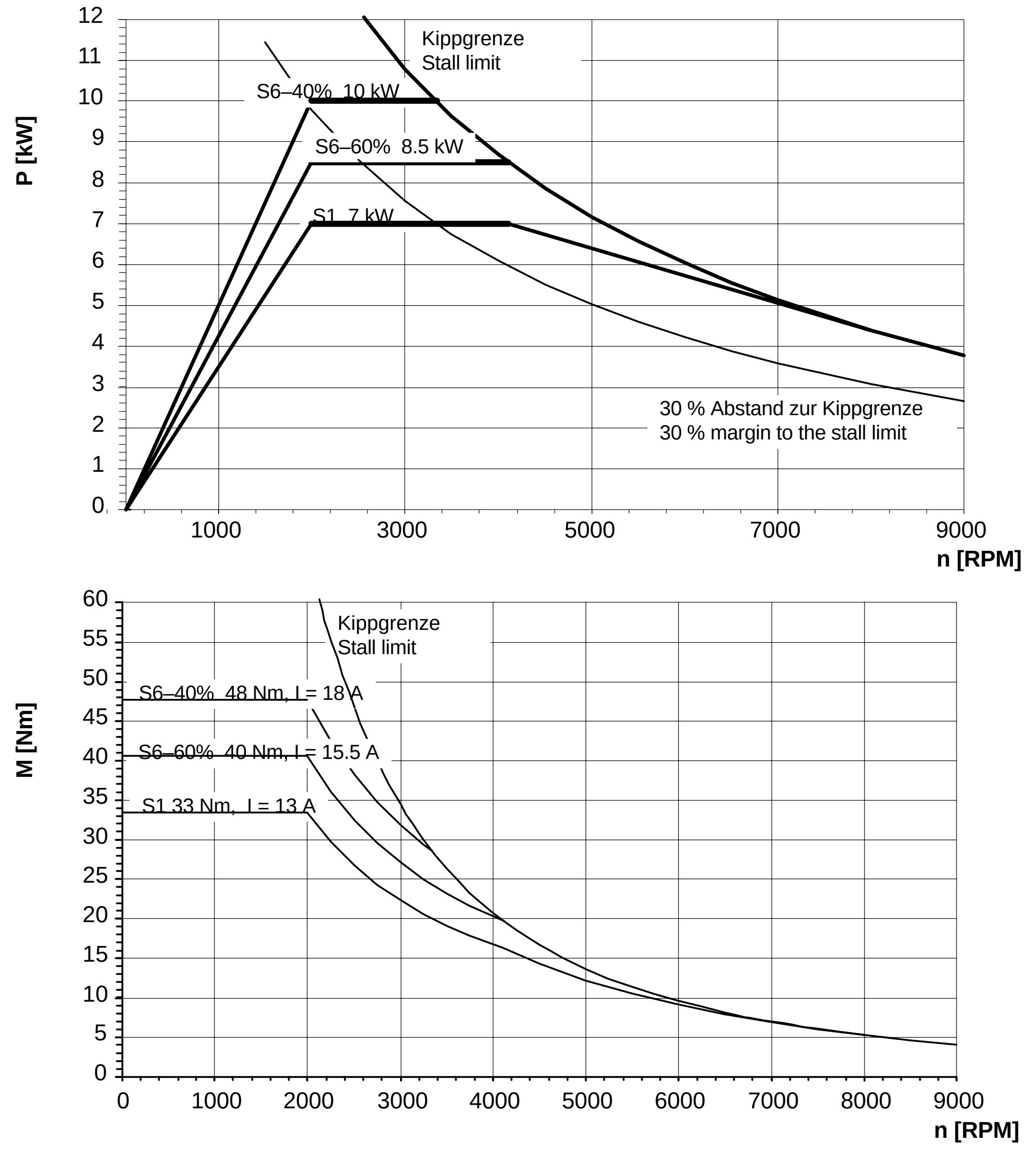


Fig. 3-85 MASTERDRIVES VC, 1PH7103–□□F□□

Table 3-90 MASTERDRIVES VC, 480 V, 1PH7105–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	9.0	43	17.5	450	68.3	5000	5500	9000	9.3

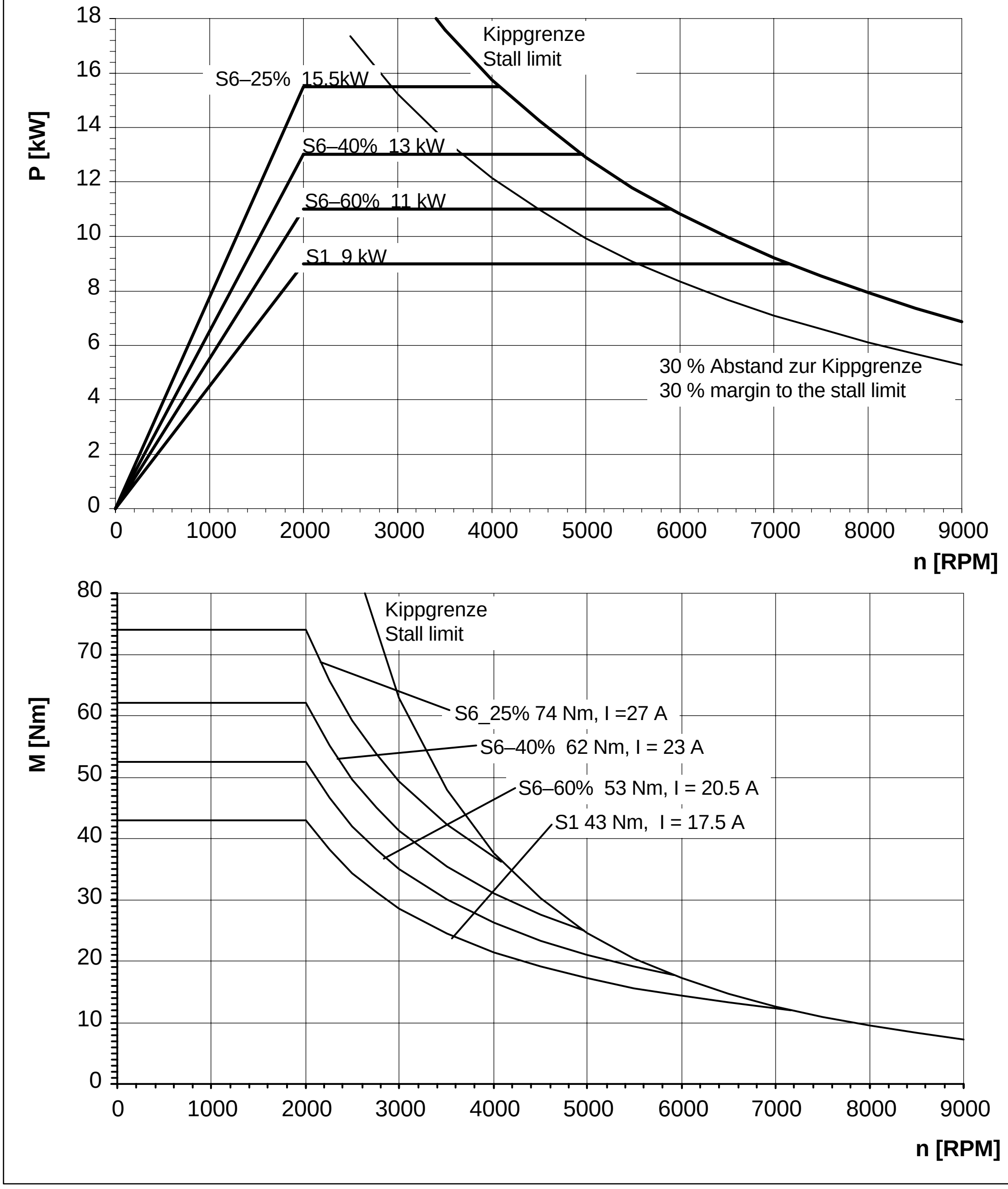


Fig. 3-86 MASTERDRIVES VC, 1PH7105–□□F□□

Table 3-91 MASTERDRIVES VC, 480 V, 1PH7107–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	11	53	23	433	68.6	5300	5500	9000	10.8

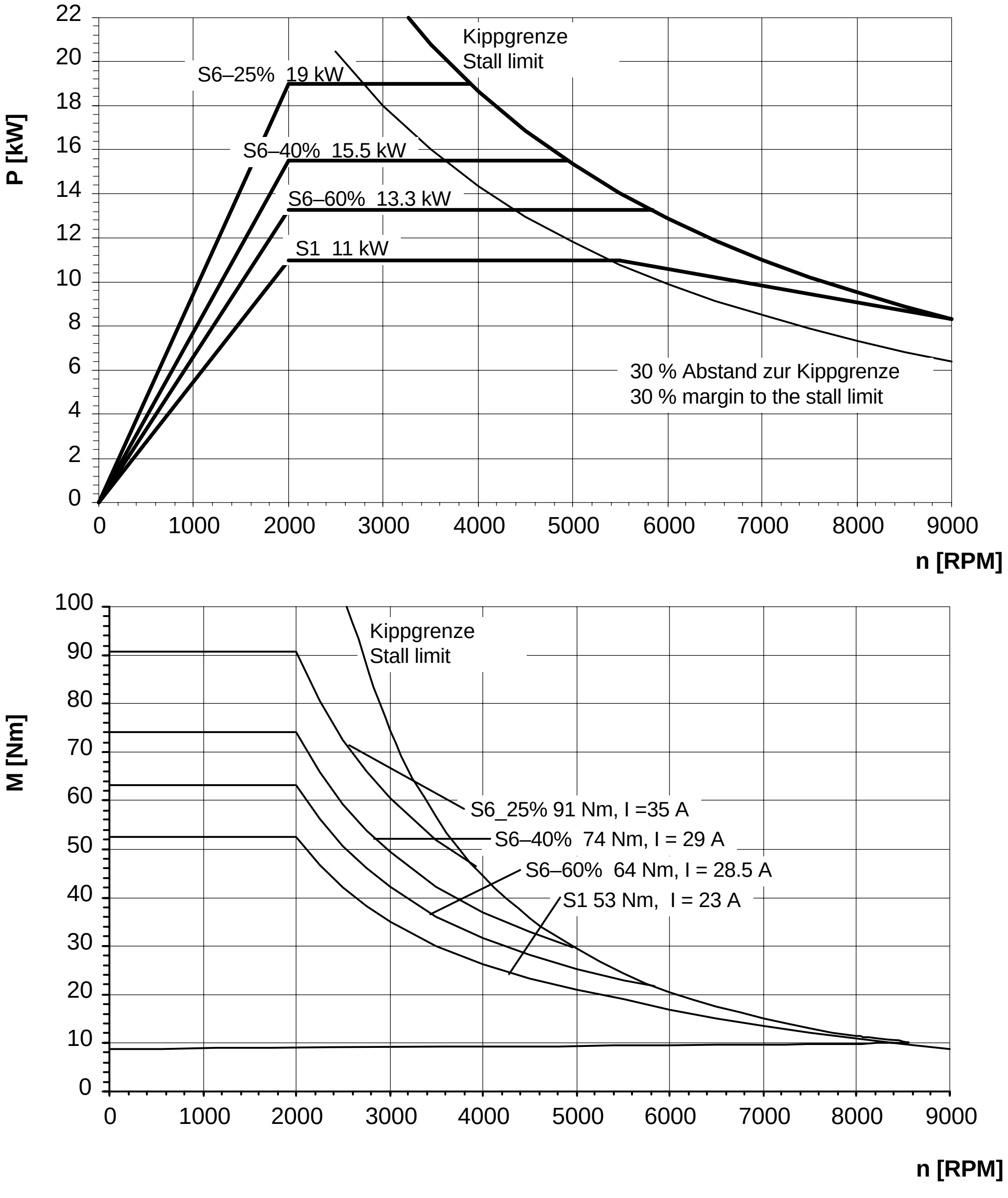


Fig. 3-87 MASTERDRIVES VC, 1PH7107–□□F□□

Table 3-92 MASTERDRIVES VC, 480 V, 1PH7131–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	15	72	25	459	68.0	3900	4500	8000	8.5

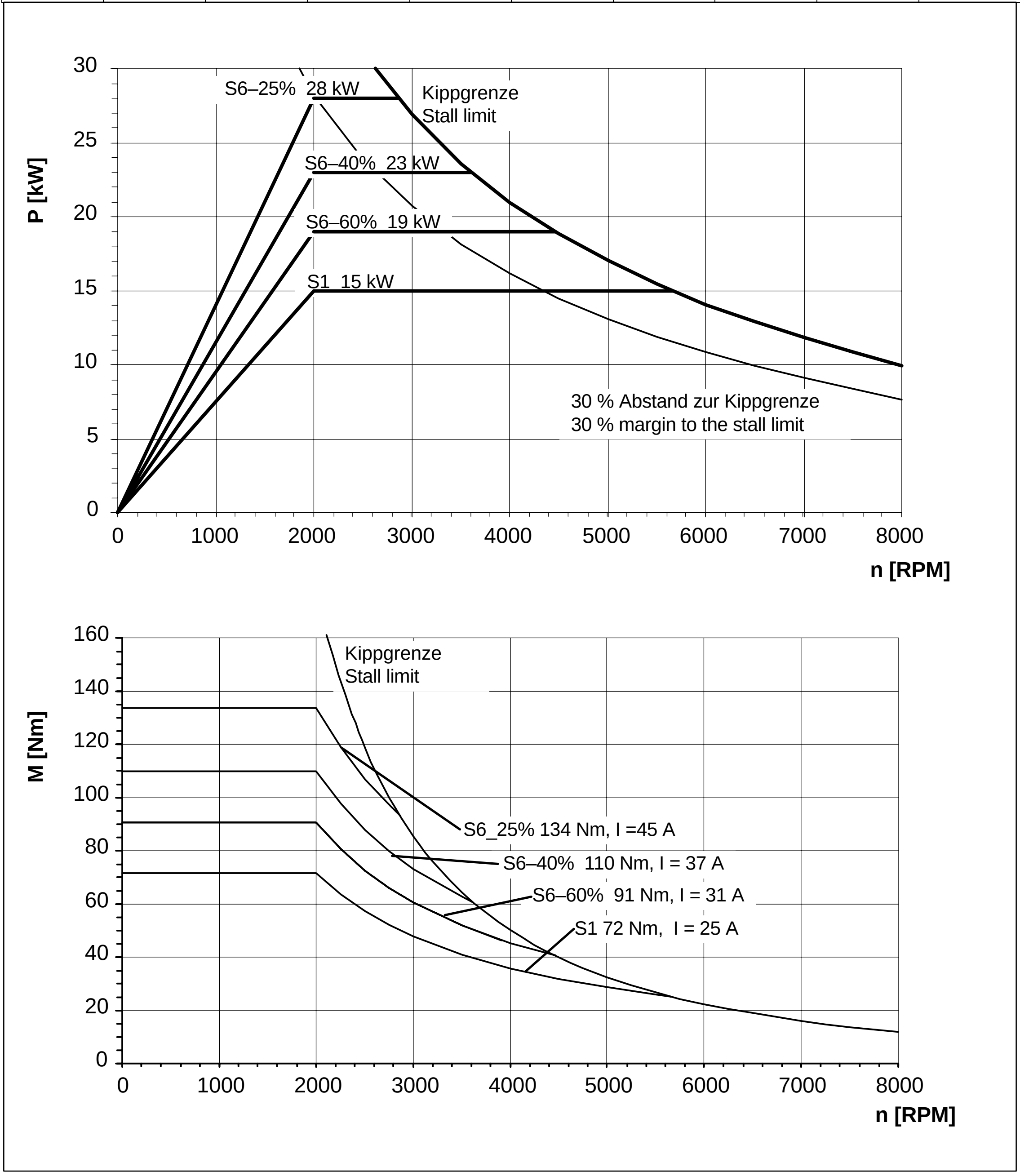


Fig. 3-88 MASTERDRIVES VC, 1PH7131–□□F□□

Table 3-93 MASTERDRIVES VC, 480 V, 1PH7133–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	20	96	34	459	68.0	4100	4500	8000	15

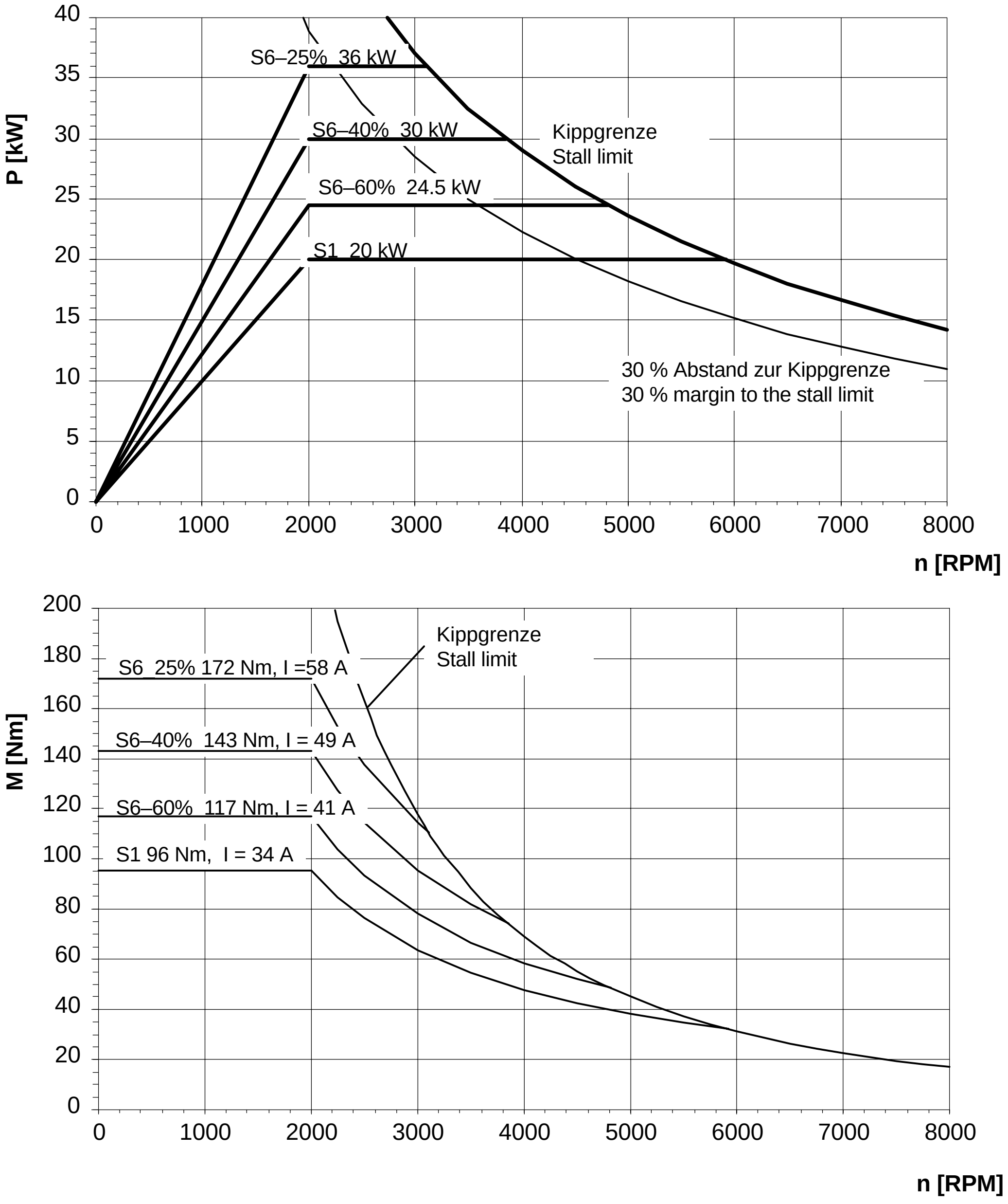


Fig. 3-89 MASTERDRIVES VC, 1PH7133–□□F□□

Table 3-94 MASTERDRIVES VC, 480 V, 1PH7135–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	24	115	42	459	67.8	4700	4500	8000	17

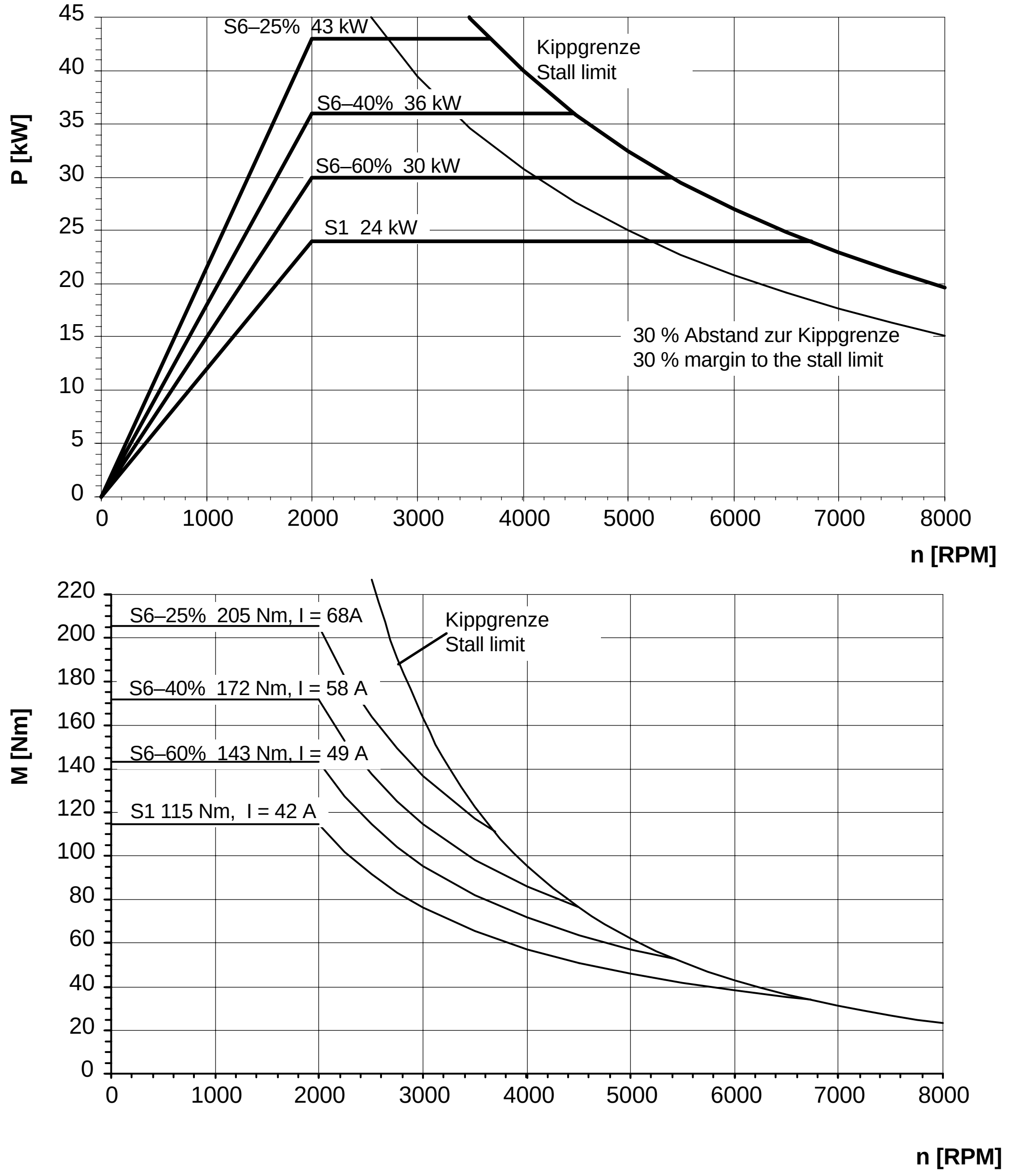


Fig. 3-90 MASTERDRIVES VC, 1PH7135–□□F□□

Table 3-95 MASTERDRIVES VC, 480 V, 1PH7137–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	28	134	55	402	67.9	4000	4500	8000	23

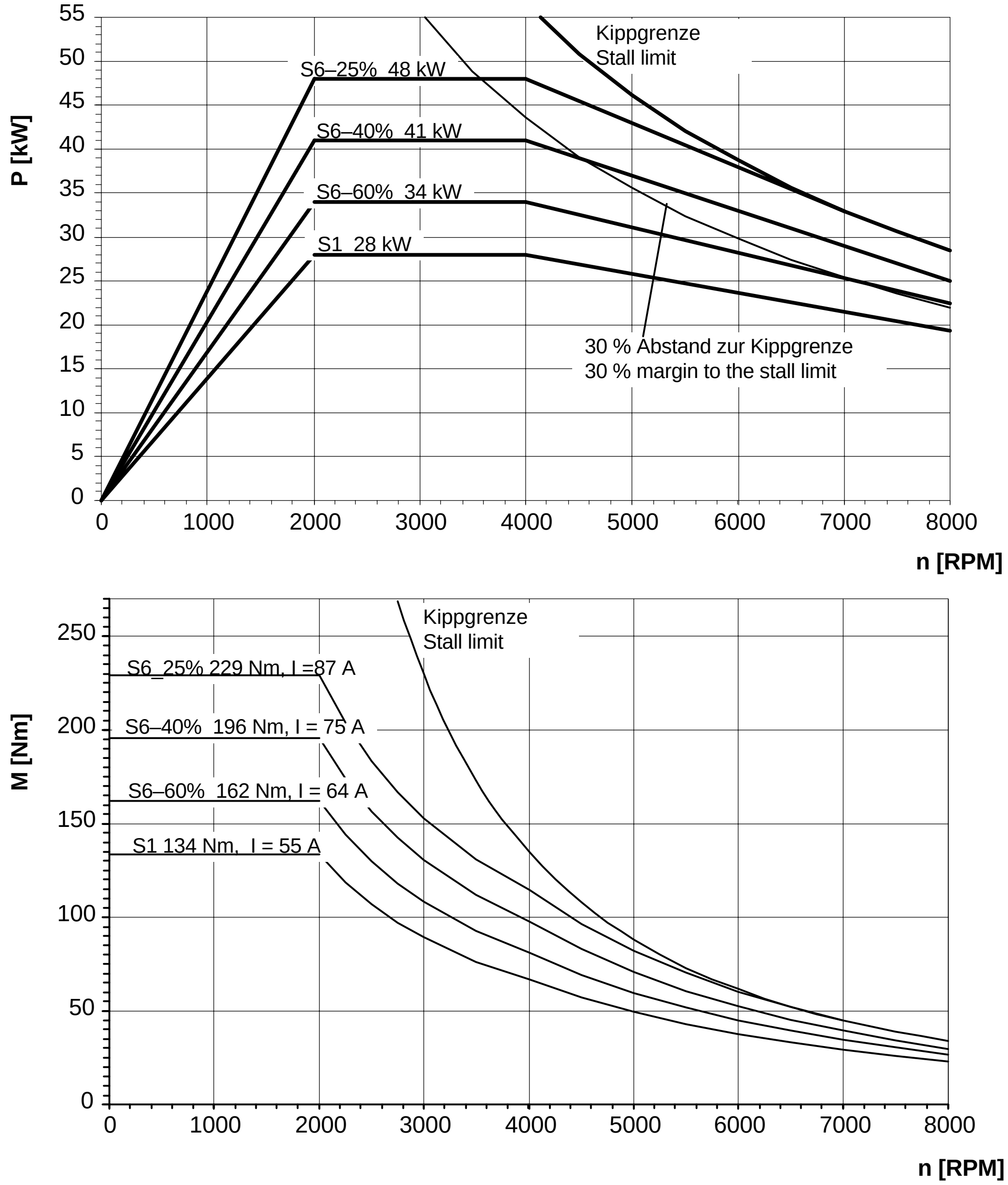


Fig. 3-91 MASTERDRIVES VC, 1PH7137–□□F□□

Table 3-96 MASTERDRIVES VC, 480 V, 1PH7163–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	37	177	70	412	67.5	4000	3700	6500	29

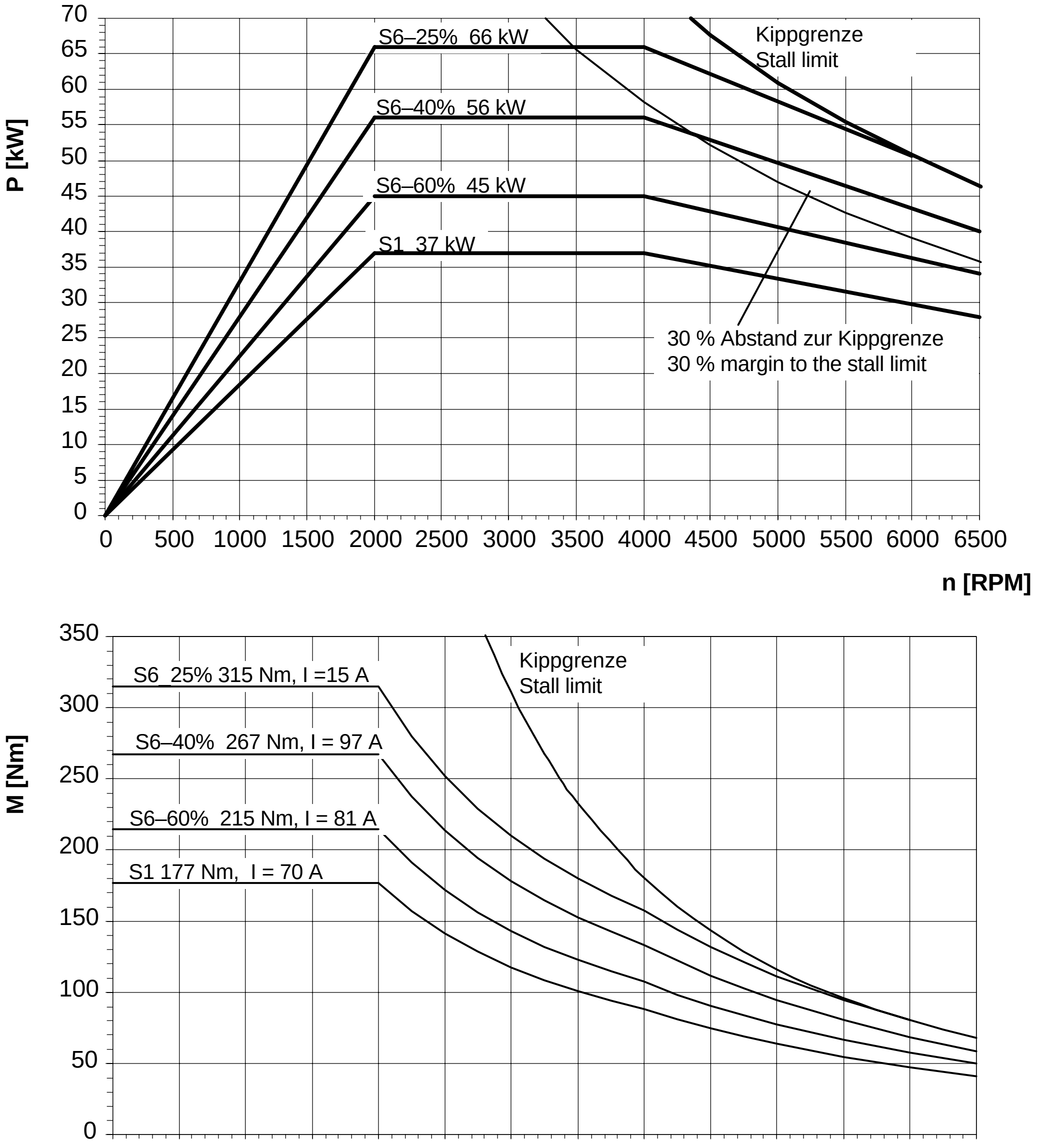


Fig. 3-92 MASTERDRIVES VC, 1PH7163–□□F□□

Table 3-97 MASTERDRIVES VC, 480 V, 1PH7167–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	45	215	76	459	67.4	3300	3700	6500	32

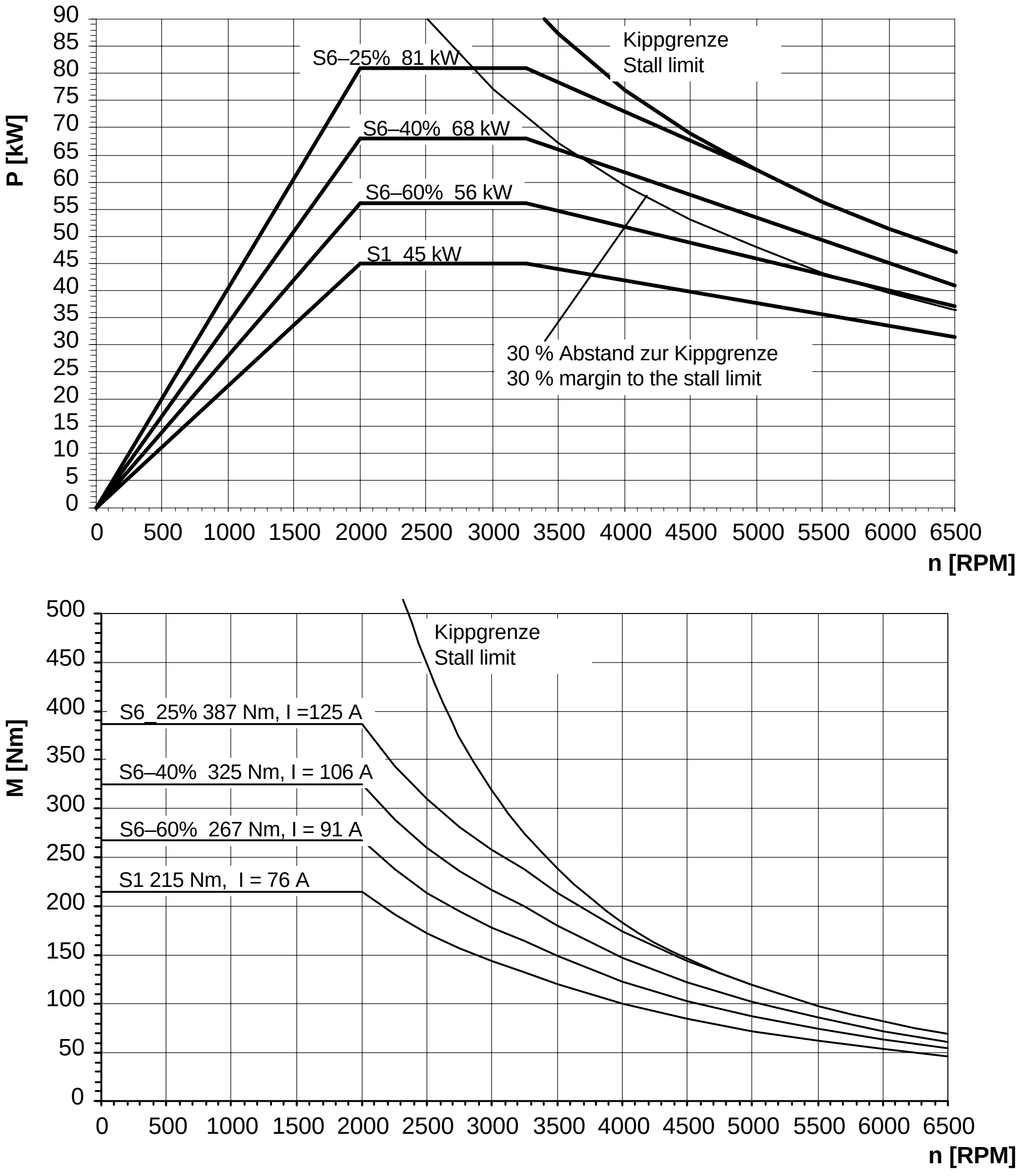


Fig. 3-93 MASTERDRIVES VC, 1PH7167–□□F□□

Table 3-98 MASTERDRIVES VC, 480 V, 1PH7184–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	68	325	120	450	67.3	5000	3500[1]	5000	66

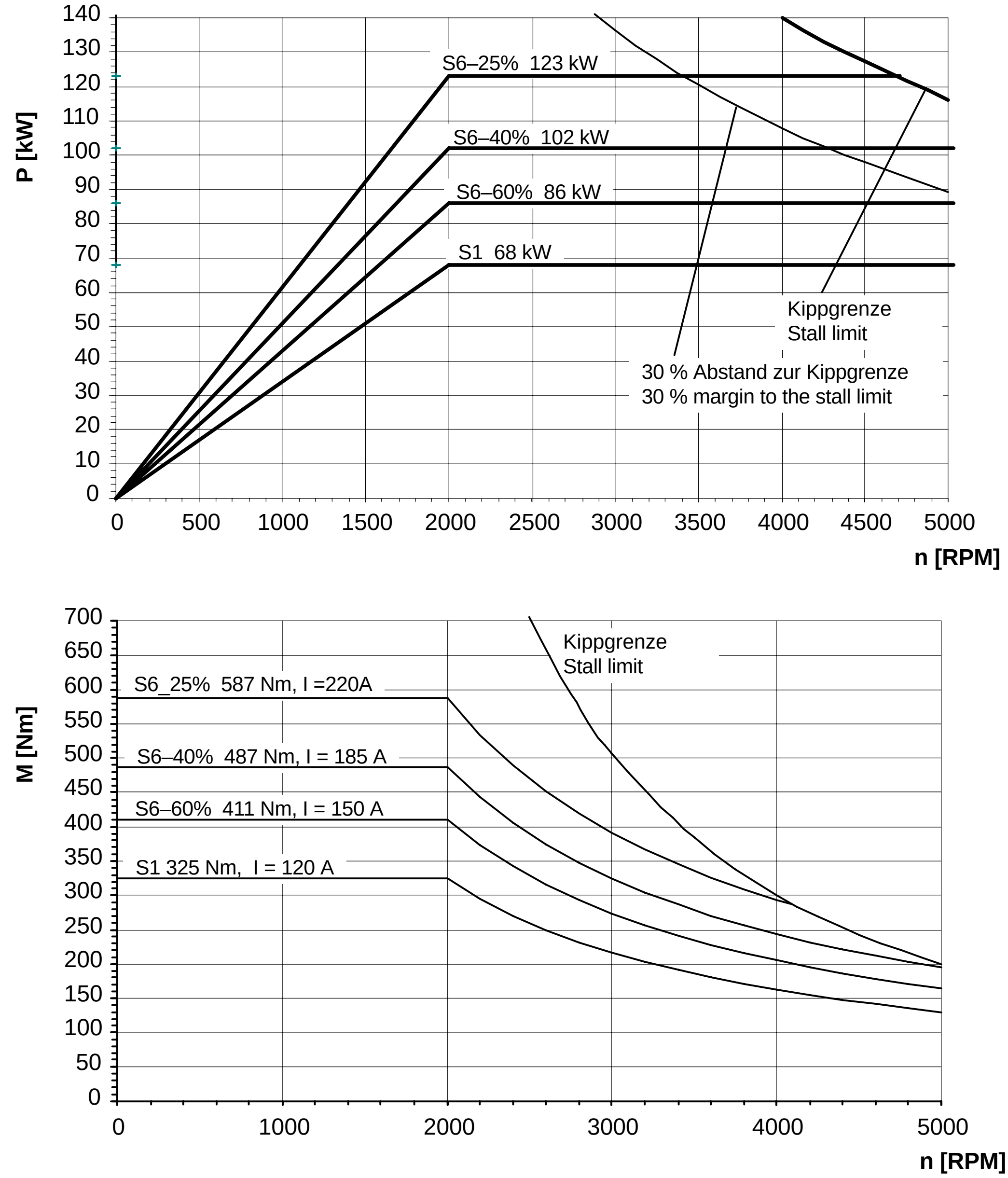


Fig. 3-94 MASTERDRIVES VC, 1PH7184–□□F□□

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[1] 3000 RPM for increased cantilever forces

Table 3-99 MASTERDRIVES VC, 480 V, 1PH7186–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	94	450	165	445	67.3	5000	3500[1]	5000	87

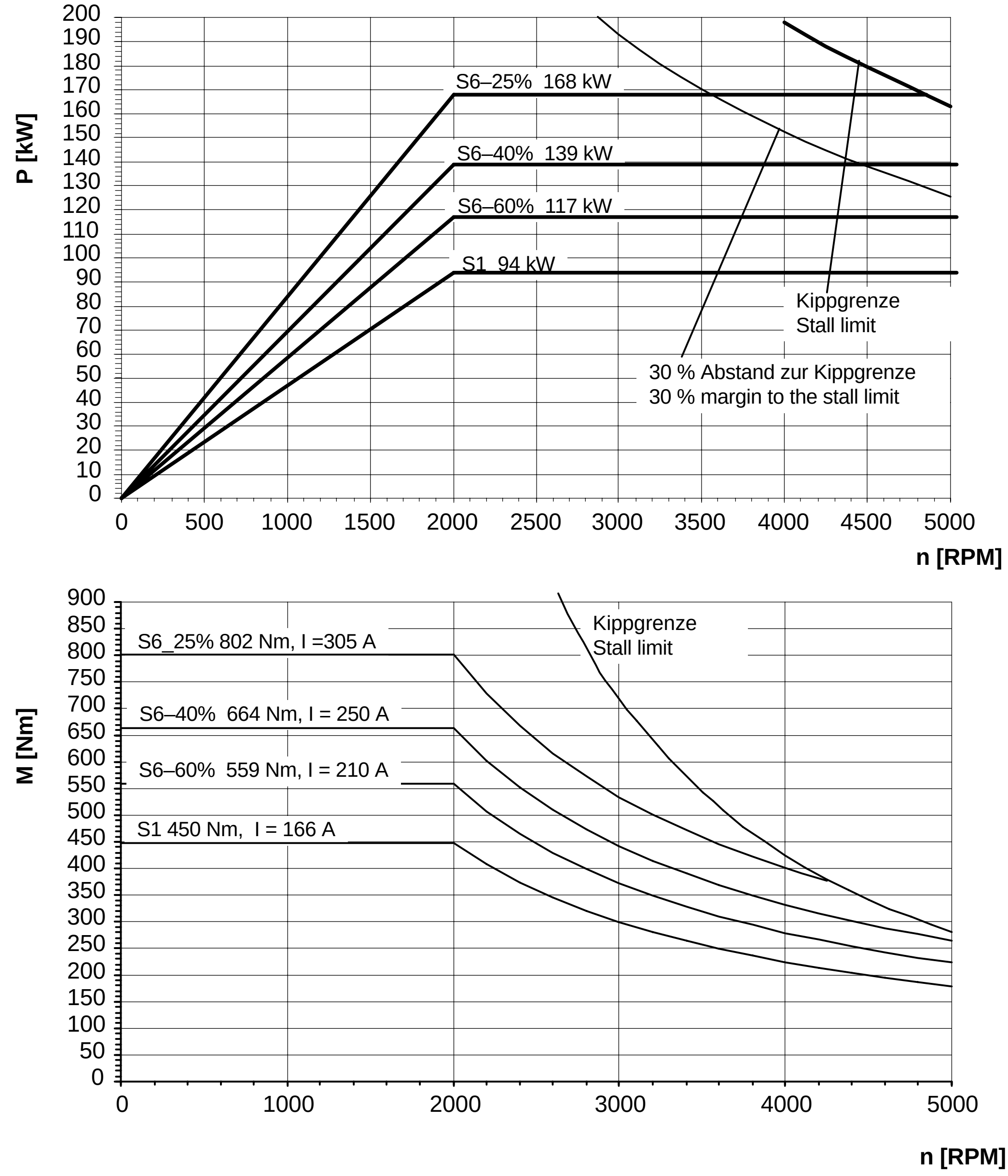

Fig. 3-95 MASTERDRIVES VC, 1PH7186–□□F□□

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[1] 3000 RPM for increased cantilever forces

Table 3-100 MASTERDRIVES VC, 480 V, 1PH7224–□□U□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	124	590	200	460	67.2	2900	3100[1]	4500	91

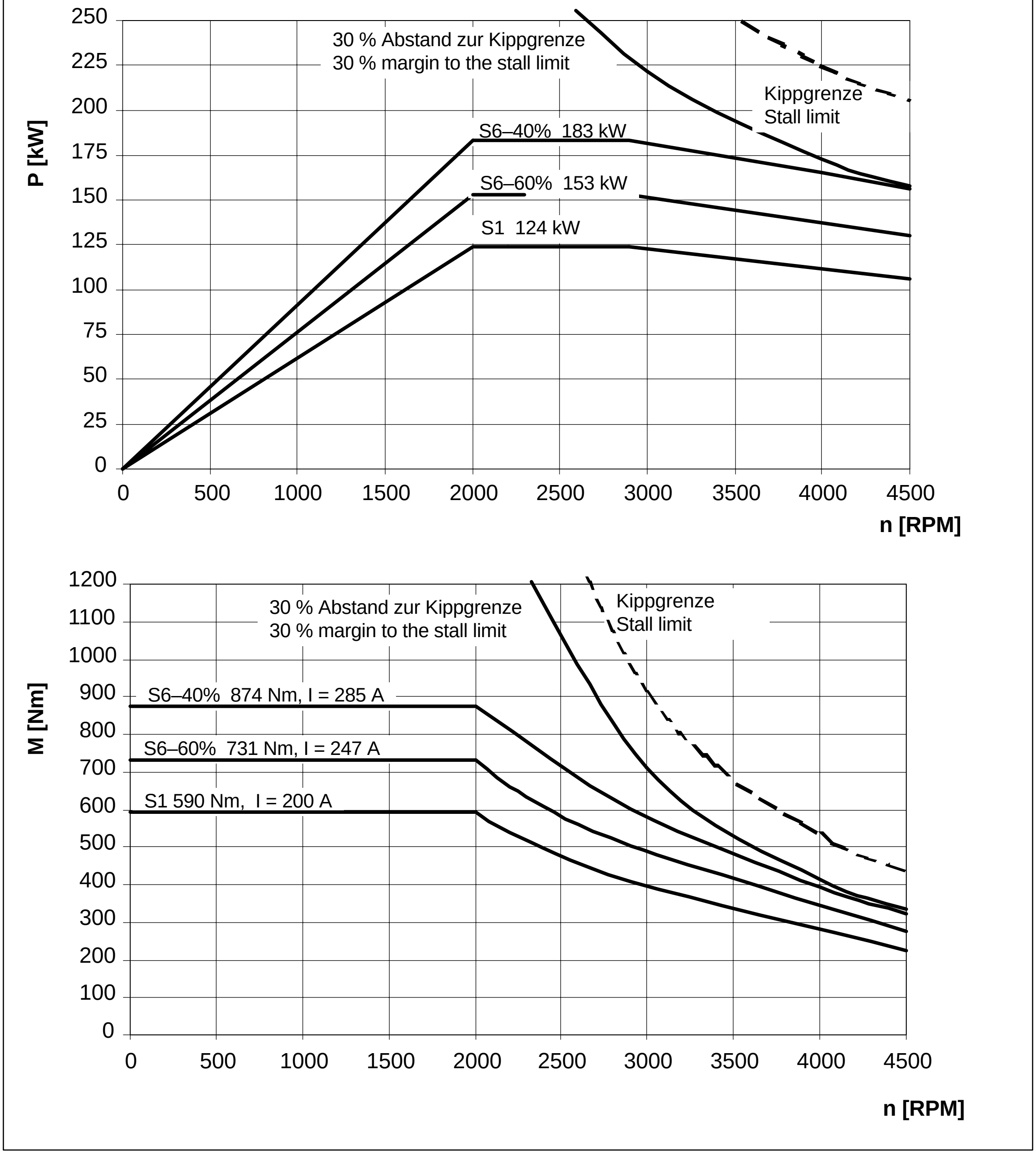

Fig. 3-96 MASTERDRIVES VC, 1PH7224–□□U□□

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1) 2700 RPM for increased cantilever forces

Table 3-101 MASTERDRIVES VC, 480 V, 1PH7226–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	153	730	254	450	67.2	2900	3100[1]	4500	119

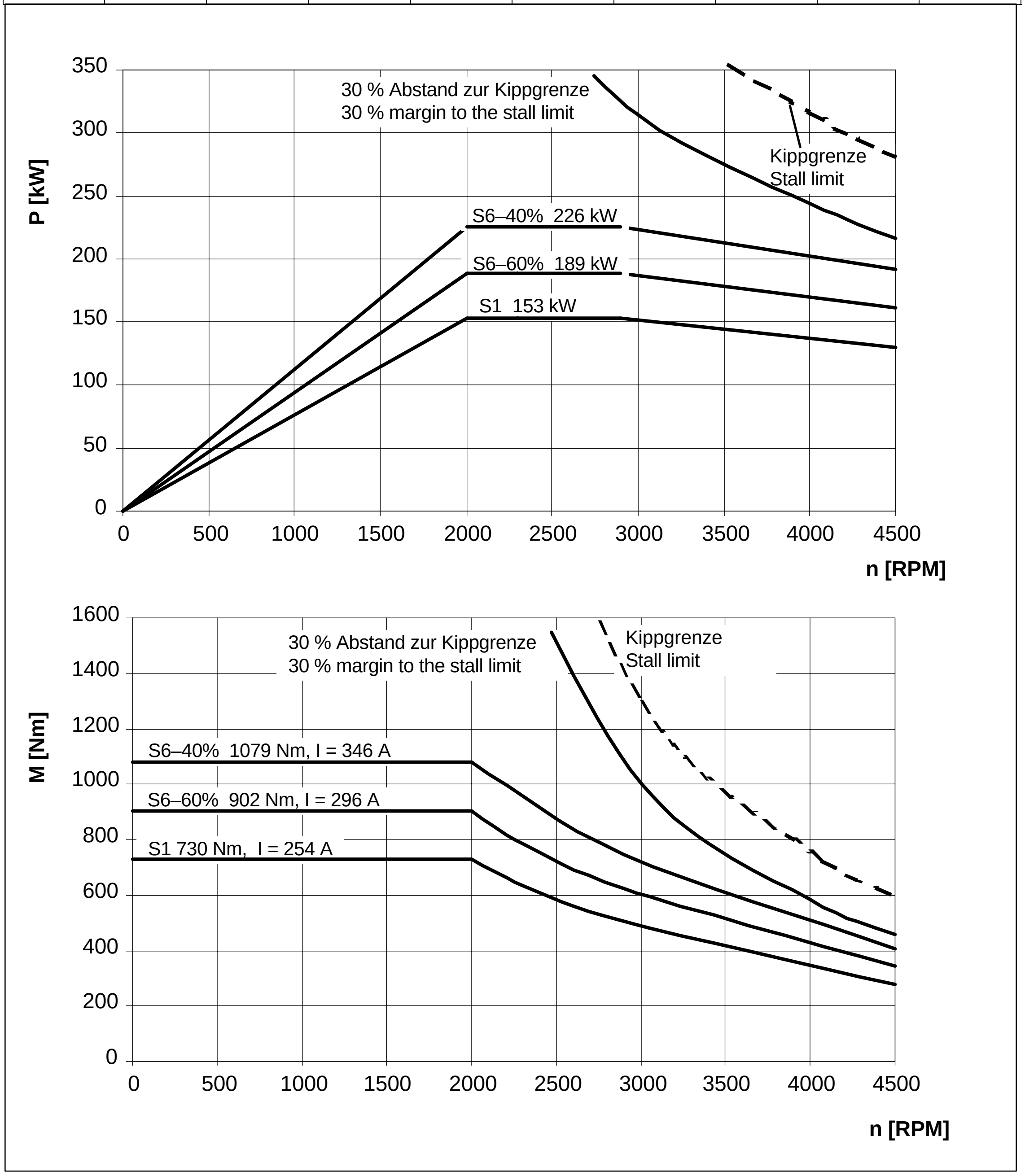

Fig. 3-97 MASTERDRIVES VC, 1PH7226–□□F□□

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1) 2700 RPM for increased cantilever forces

Table 3-102 MASTERDRIVES VC, 480 V, 1PH7228–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	196	936	332	450	67.1	3000	3100[1]	4500[2]	168

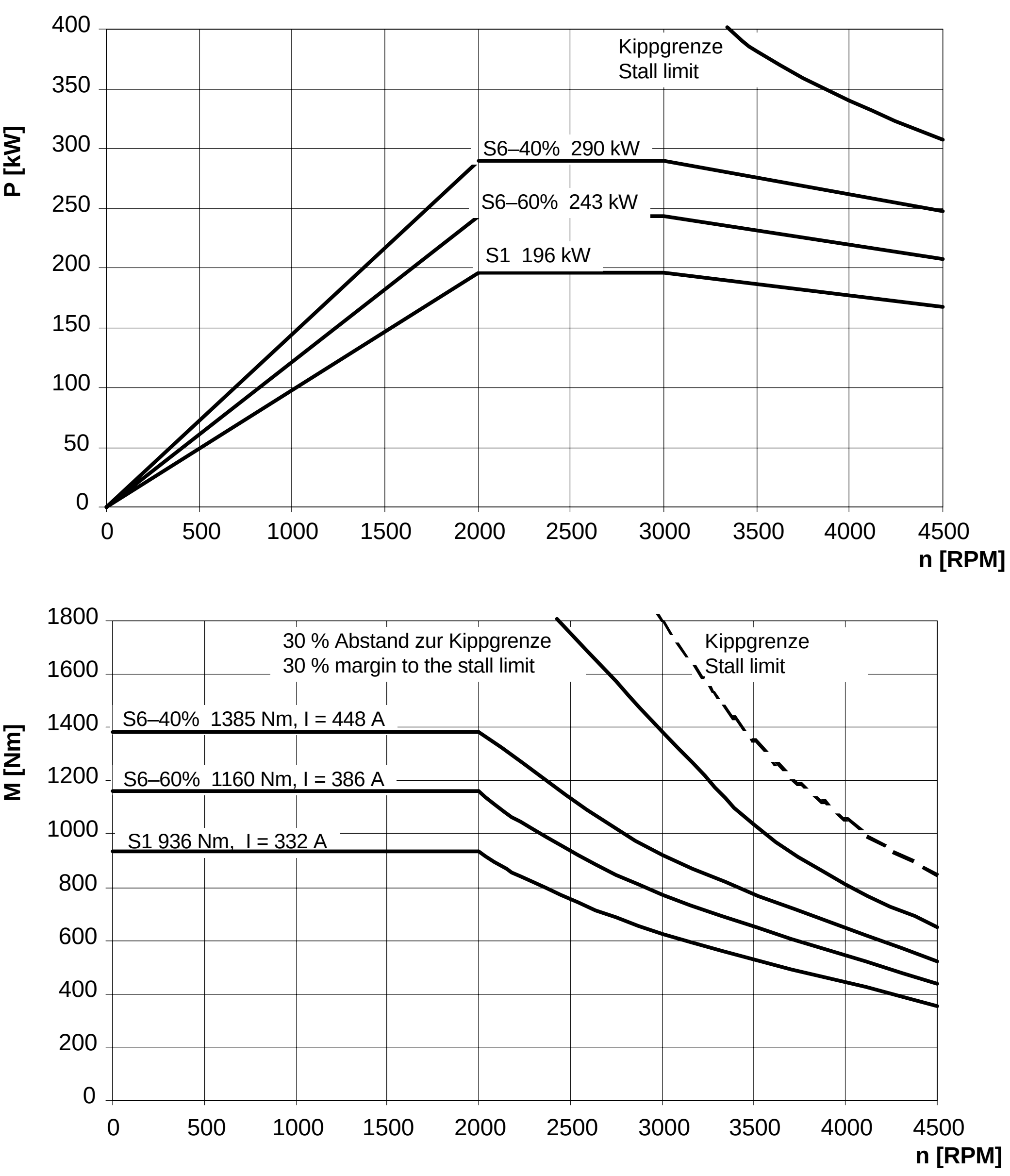

Fig. 3-98 MASTERDRIVES VC, 1PH7228–□□F□□

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1) 2700 RPM for increased cantilever forces

2) 4000 RPM for increased cantilever forces

Table 3-103 MASTERDRIVES VC, 480 V, 1PH7284–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	255	1218	393	455	67.0	2200	2200	3300	162

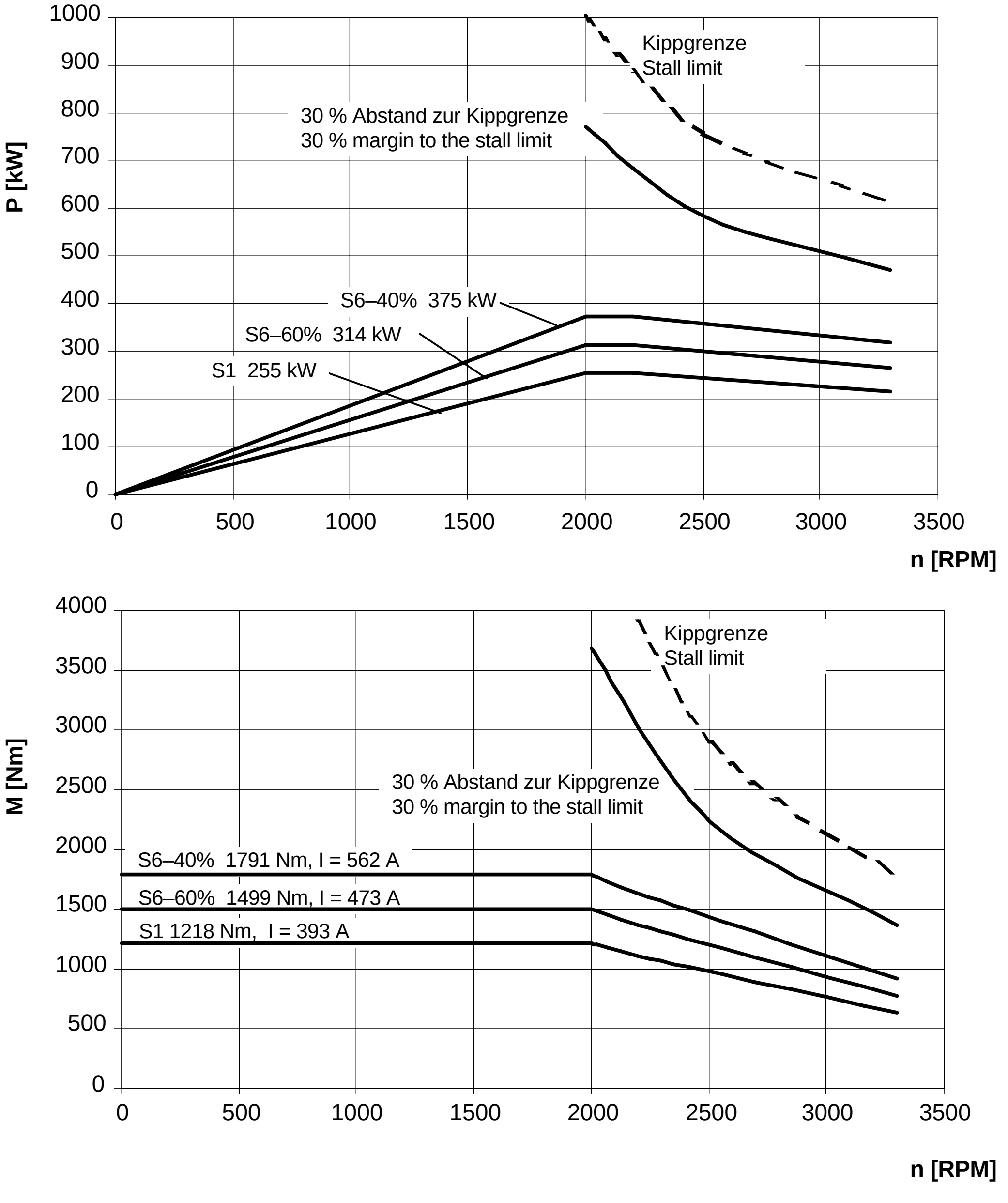


Fig. 3-99 MASTERDRIVES VC, 1PH7284–□□F□□

Table 3-104 MASTERDRIVES VC, 480 V, 1PH7286–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	310	1481	466	455	67.0	2200	2200	3300	182

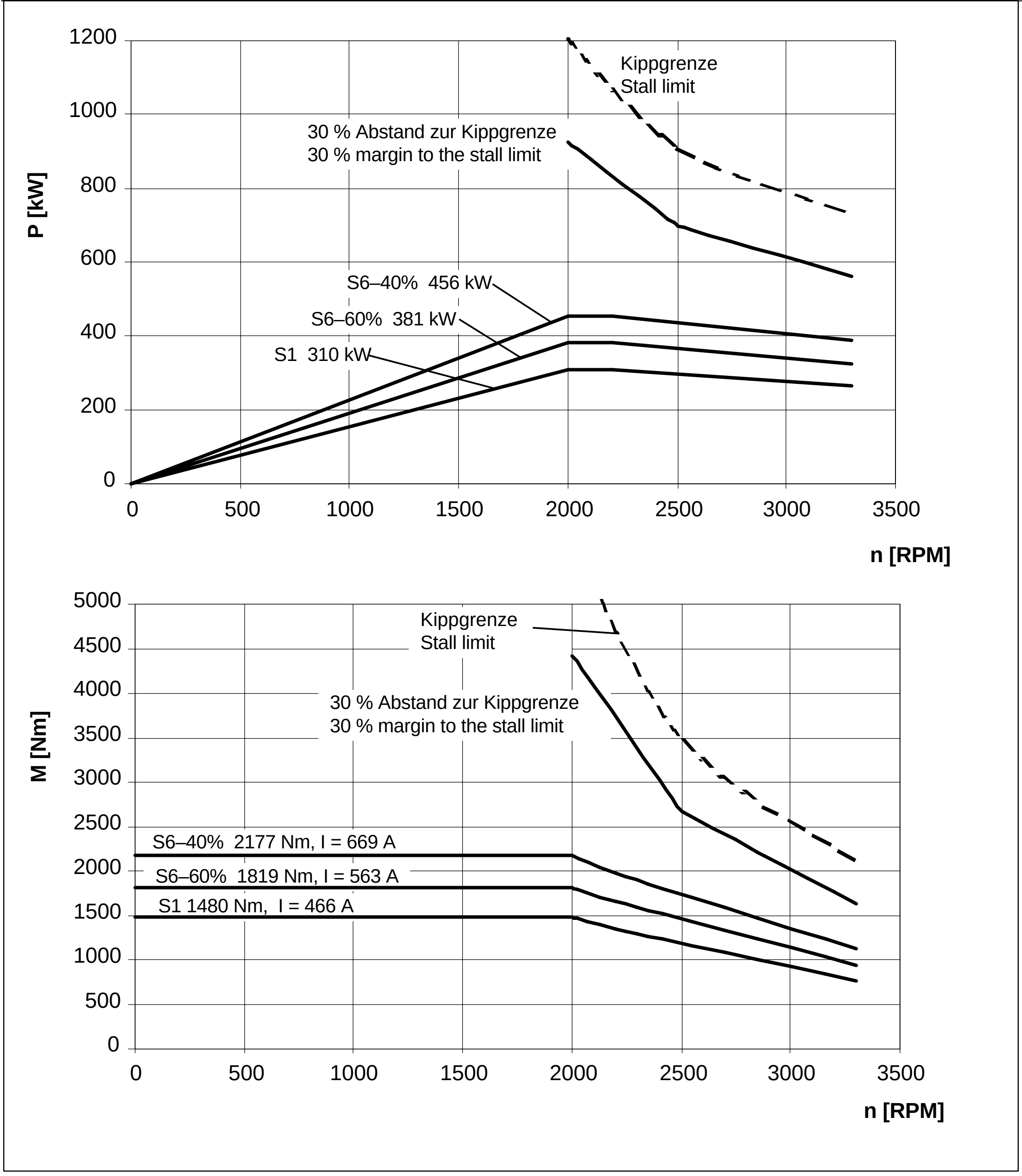


Fig. 3-100 MASTERDRIVES VC, 1PH7286–□□F□□

Table 3-105 MASTERDRIVES VC, 480 V, 1PH7288–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	385	1838	586	455	67.0	2200	2200	3300	232

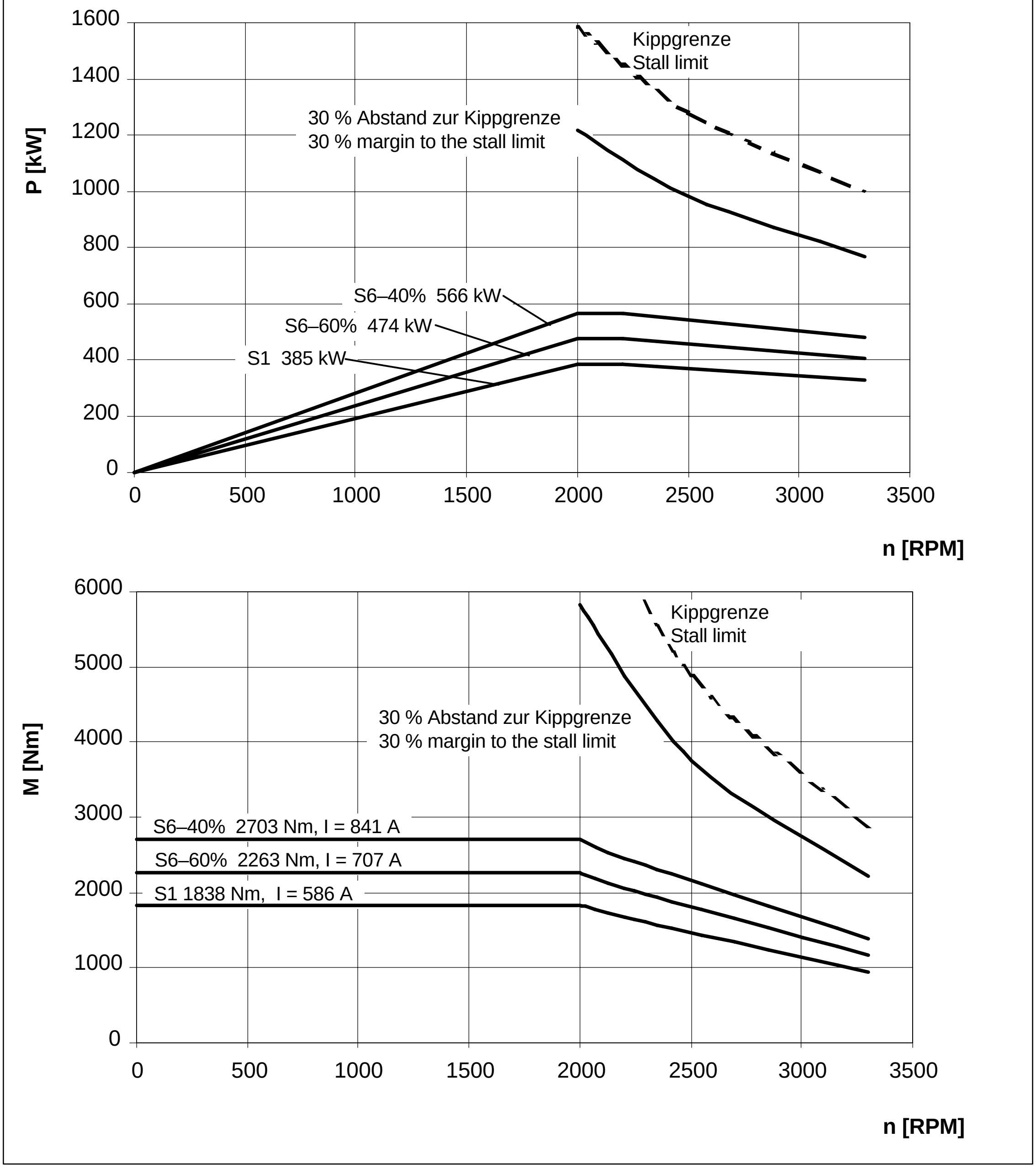


Fig. 3-101 MASTERDRIVES VC, 1PH7288–□□F□□

Table 3-106 MASTERDRIVES VC, 480 V, 1PH7103–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2650	8.0	29	16.5	440	90.3	7000	5500	9000	8.2

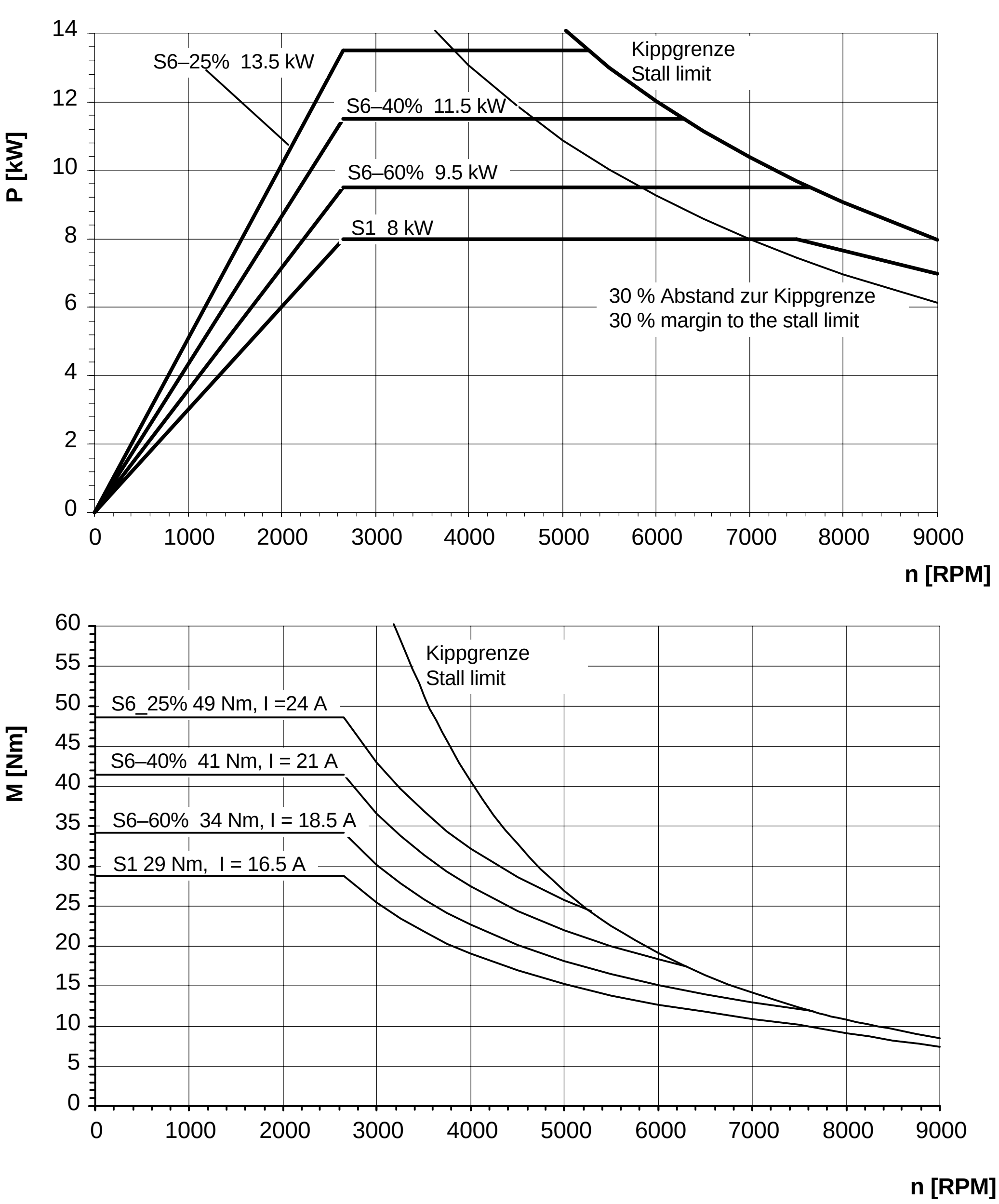


Fig. 3-102 MASTERDRIVES VC, 1PH7103–□□G□□

Table 3-107 MASTERDRIVES VC, 480 V, 1PH7107–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2650	13	47	24.5	459	90.2	6700	5500	9000	12

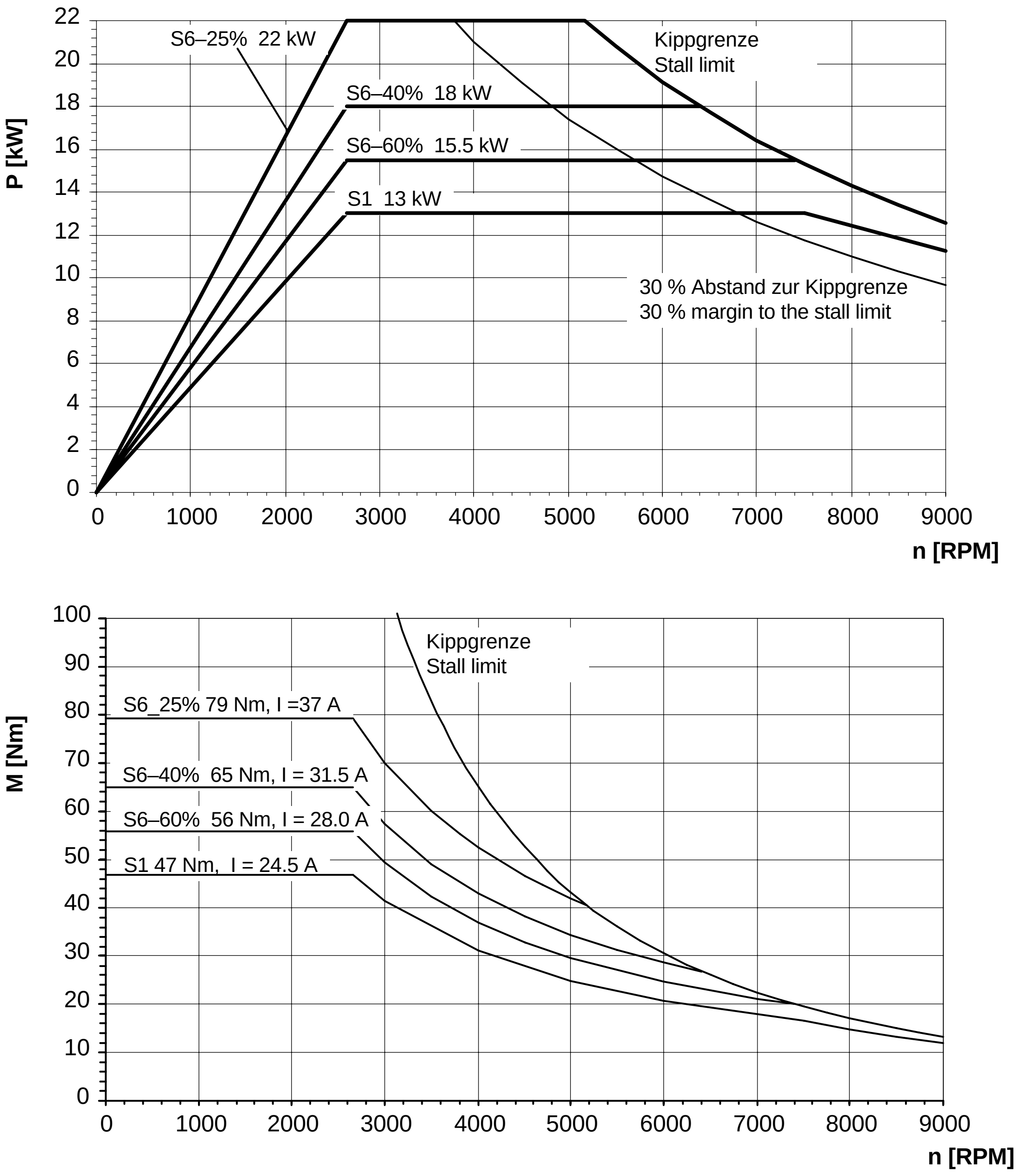


Fig. 3-103 MASTERDRIVES VC, 1PH7107–□□G□□

Table 3-108 MASTERDRIVES VC, 480 V, 1PH7133–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2650	24	87	42	450	89.6	4000	4500	8000	17

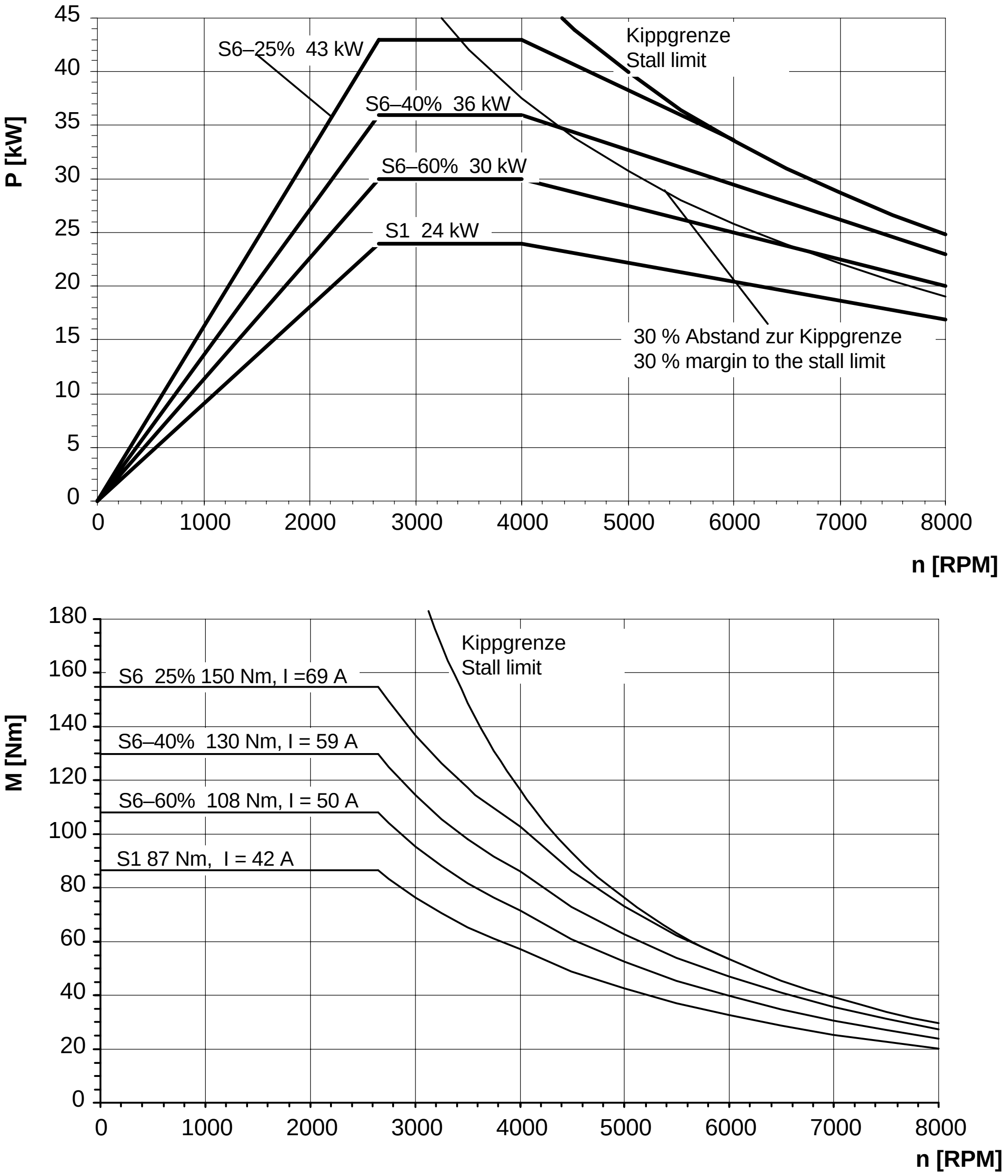
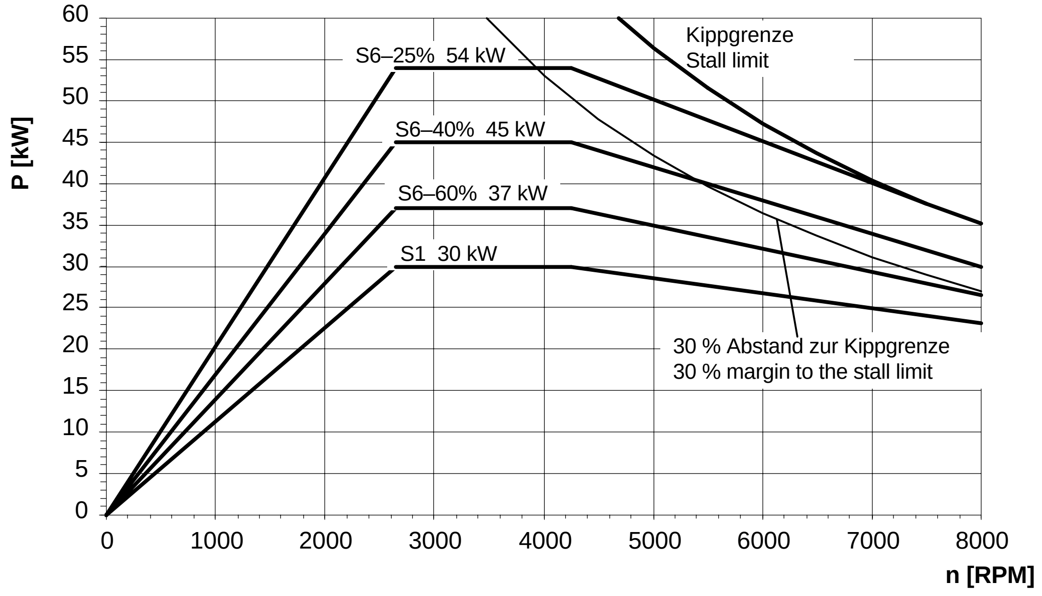


Fig. 3-104 MASTERDRIVES VC, 1PH7133–□□G□□

Table 3-109 MASTERDRIVES VC, 480 V, 1PH7137–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2650	30	108	52	450	89.4	4200	4500	8000	21



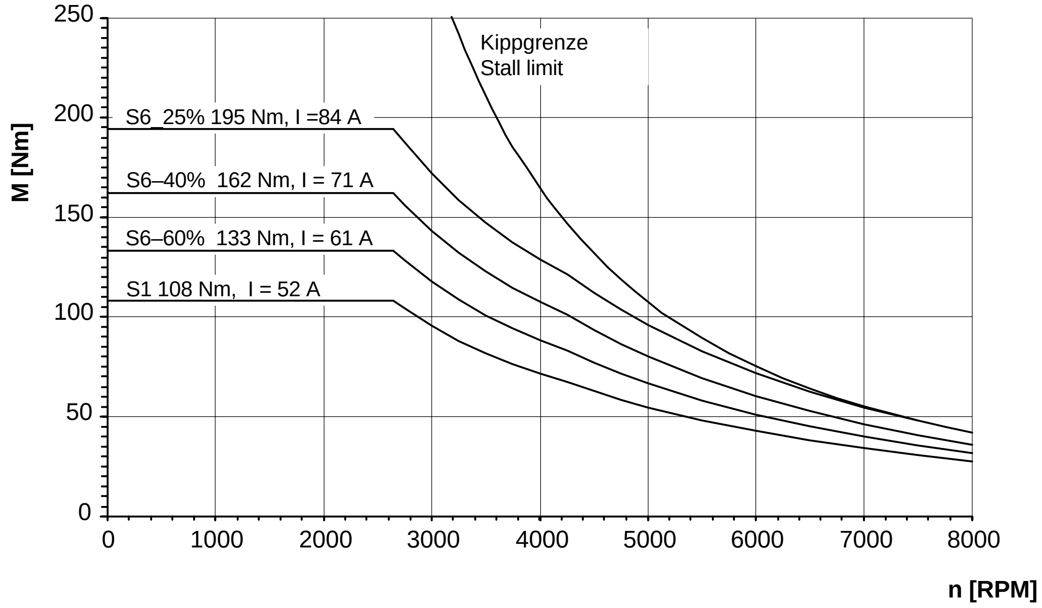


Fig. 3-105 MASTERDRIVES VC, 1PH7137–□□G□□

Table 3-110 MASTERDRIVES VC, 480 V, 1PH7163–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2650	40	144	76	433	89.0	3500	3700	6500	37

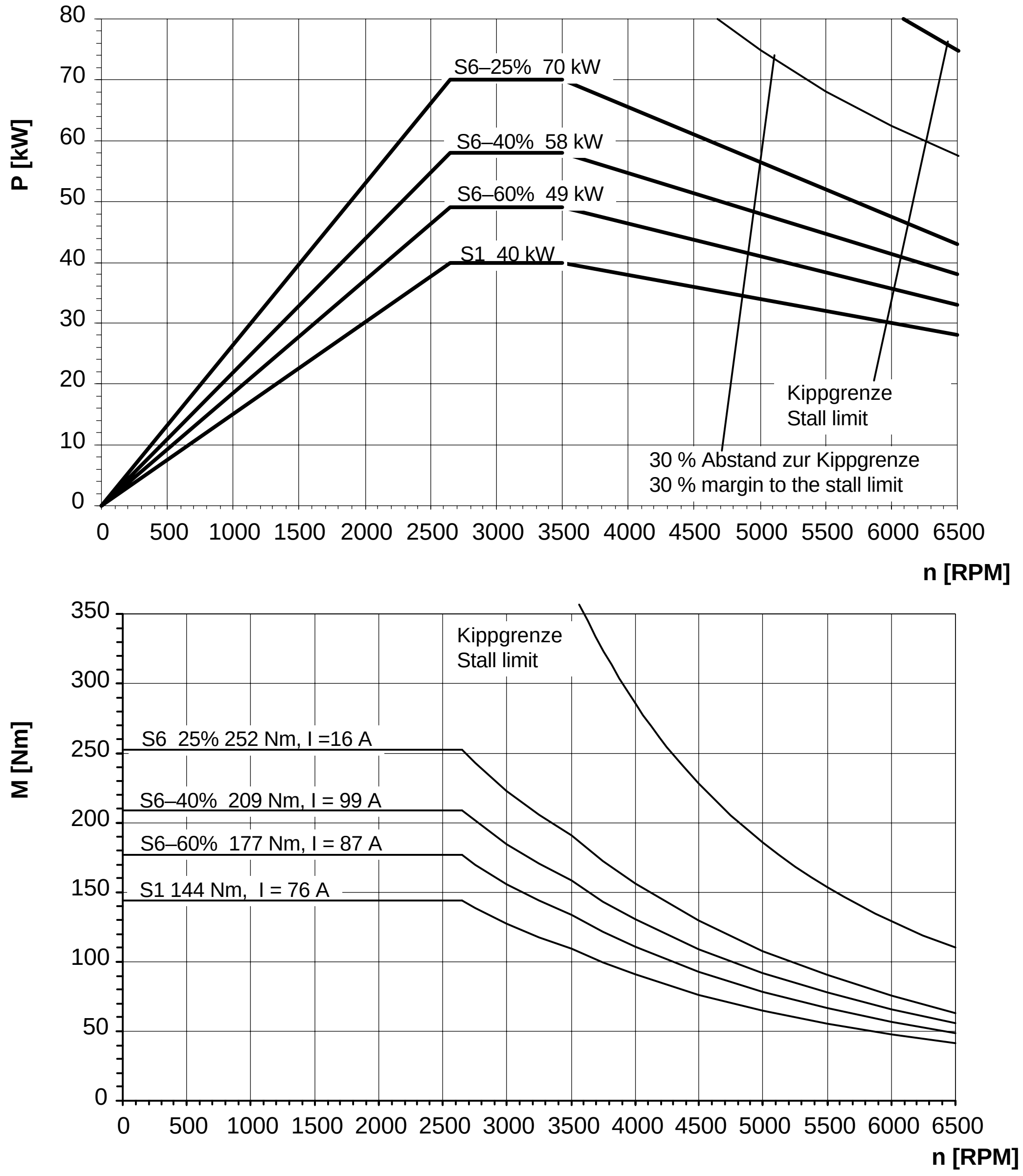
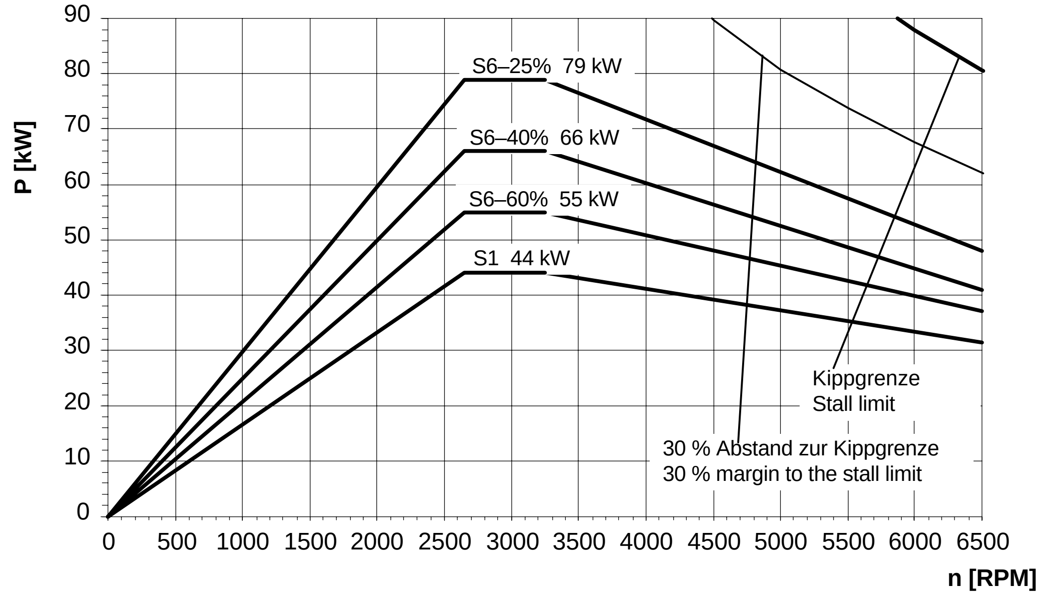


Fig. 3-106 MASTERDRIVES VC, 1PH7163–□□G□□

Table 3-111 MASTERDRIVES VC, 480 V, 1PH7167–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2650	44	159	77	459	89.0	3300	3700	6500	40



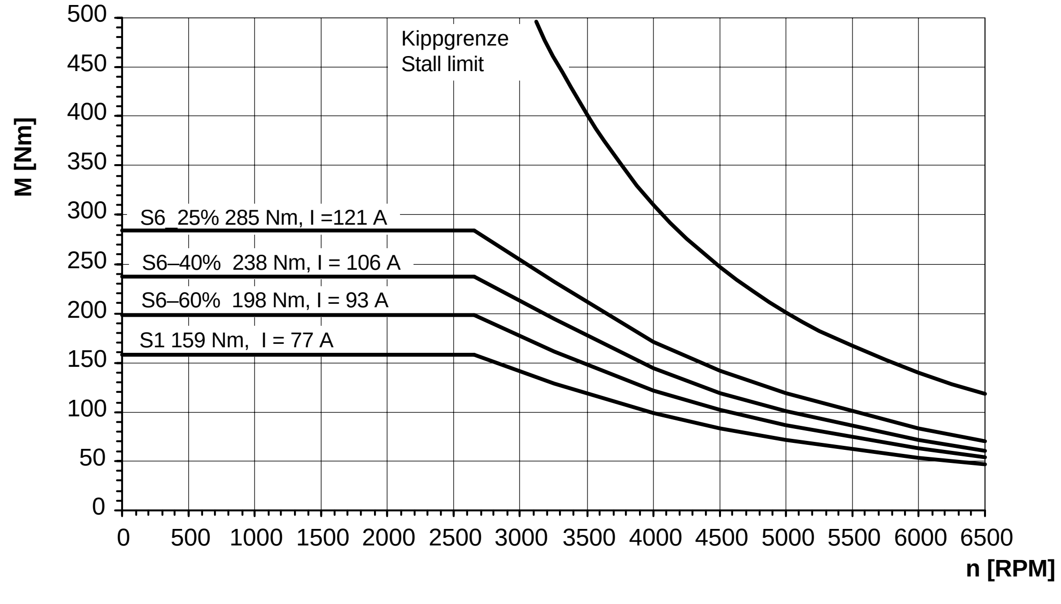


Fig. 3-107 MASTERDRIVES VC, 1PH7167–□□G□□

Table 3-112 MASTERDRIVES VC, 480 V, 1PH7184–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2900	81	267	158	395	97.4	5000	3500[1]	5000	77

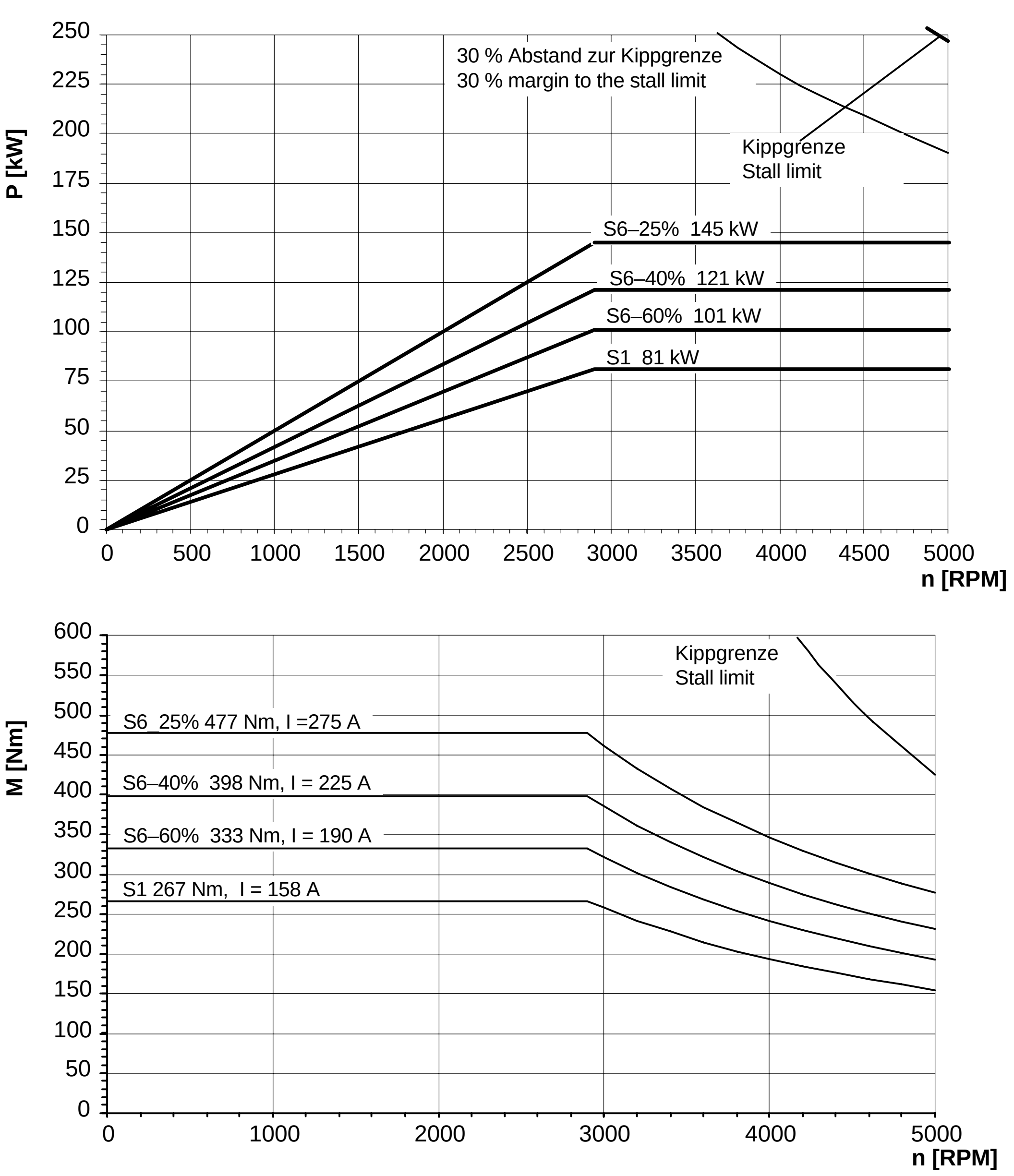


Fig. 3-108 MASTERDRIVES VC, 1PH7184–□□L□□

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1) 3000 RPM for increased cantilever forces

Table 3-113 MASTERDRIVES VC, 480 V, 1PH7186–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2900	101	333	206	385	97.3	5000	3500[1]	5000	107

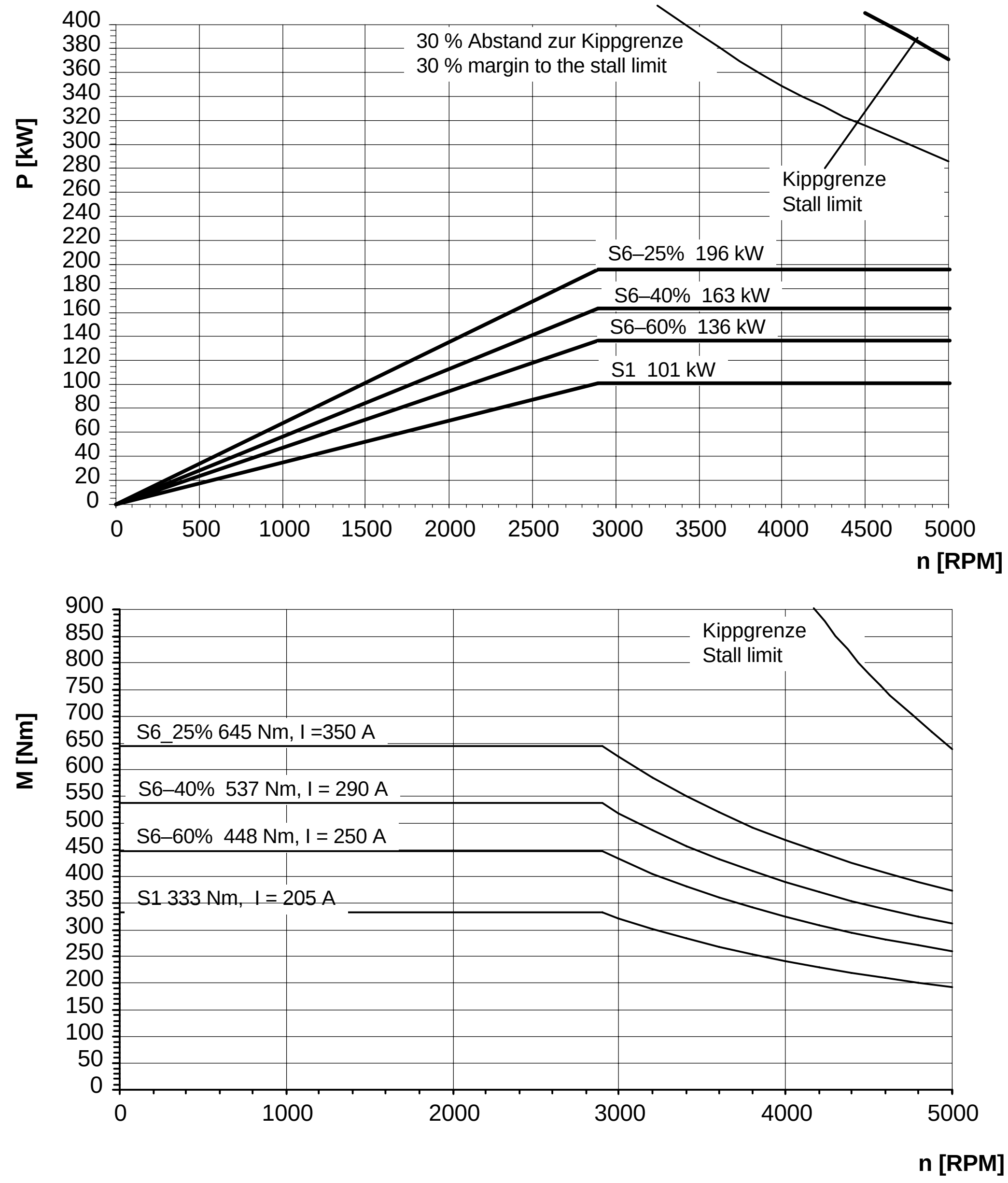

Fig. 3-109 MASTERDRIVES VC, 1PH7186–□□L□□

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[1] 3000 RPM for increased cantilever forces

Table 3-114 MASTERDRIVES VC, 480 V, 1PH7224–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2900	149	490	274	395	97.3	3500	3100[1]	4500	115

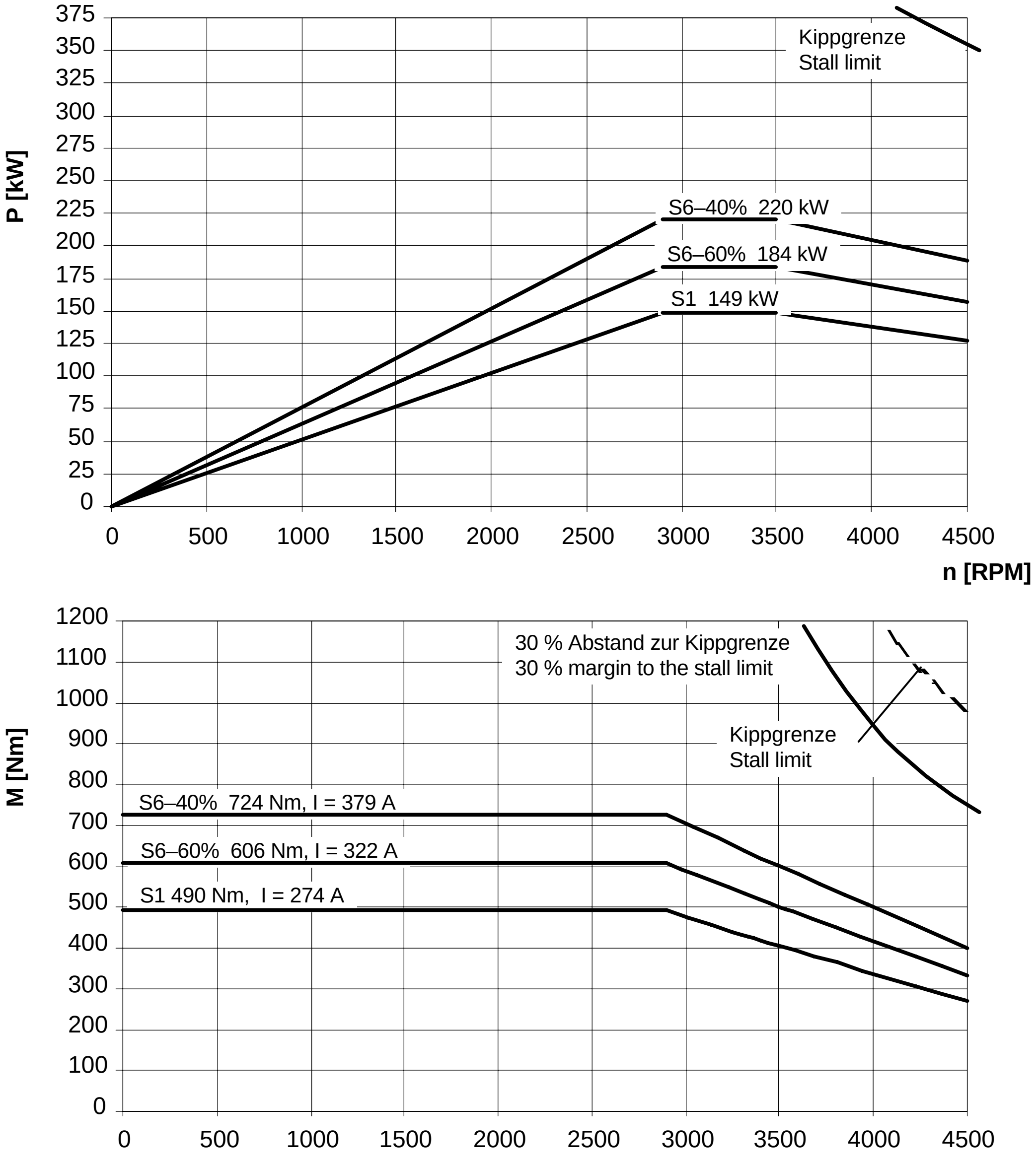

Fig. 3-110 MASTERDRIVES VC, 1PH7224–□□L□□

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[1] 2700 RPM for increased cantilever forces

Table 3-115 MASTERDRIVES VC, 480 V, 1PH7226–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2900	185	610	348	390	97.2	3500	3100[1]	4500	154

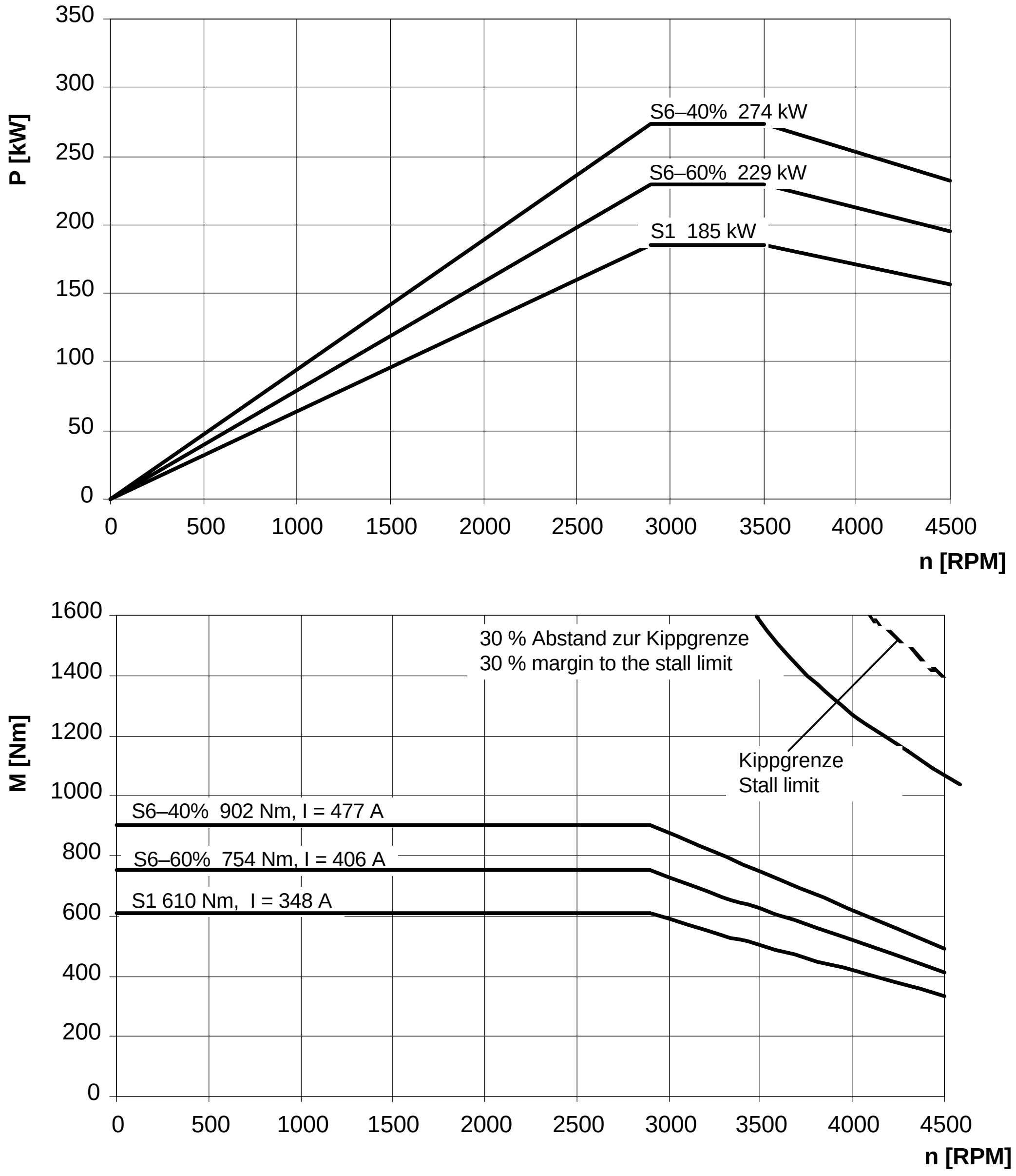

Fig. 3-111 MASTERDRIVES VC, 1PH7226–□□L□□

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1) 2700 RPM for increased cantilever forces

Table 3-116 MASTERDRIVES VC, 480 V, 1PH7228–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2900	215	708	402	395	97.2	3500	3100[1]	4500[2]	188

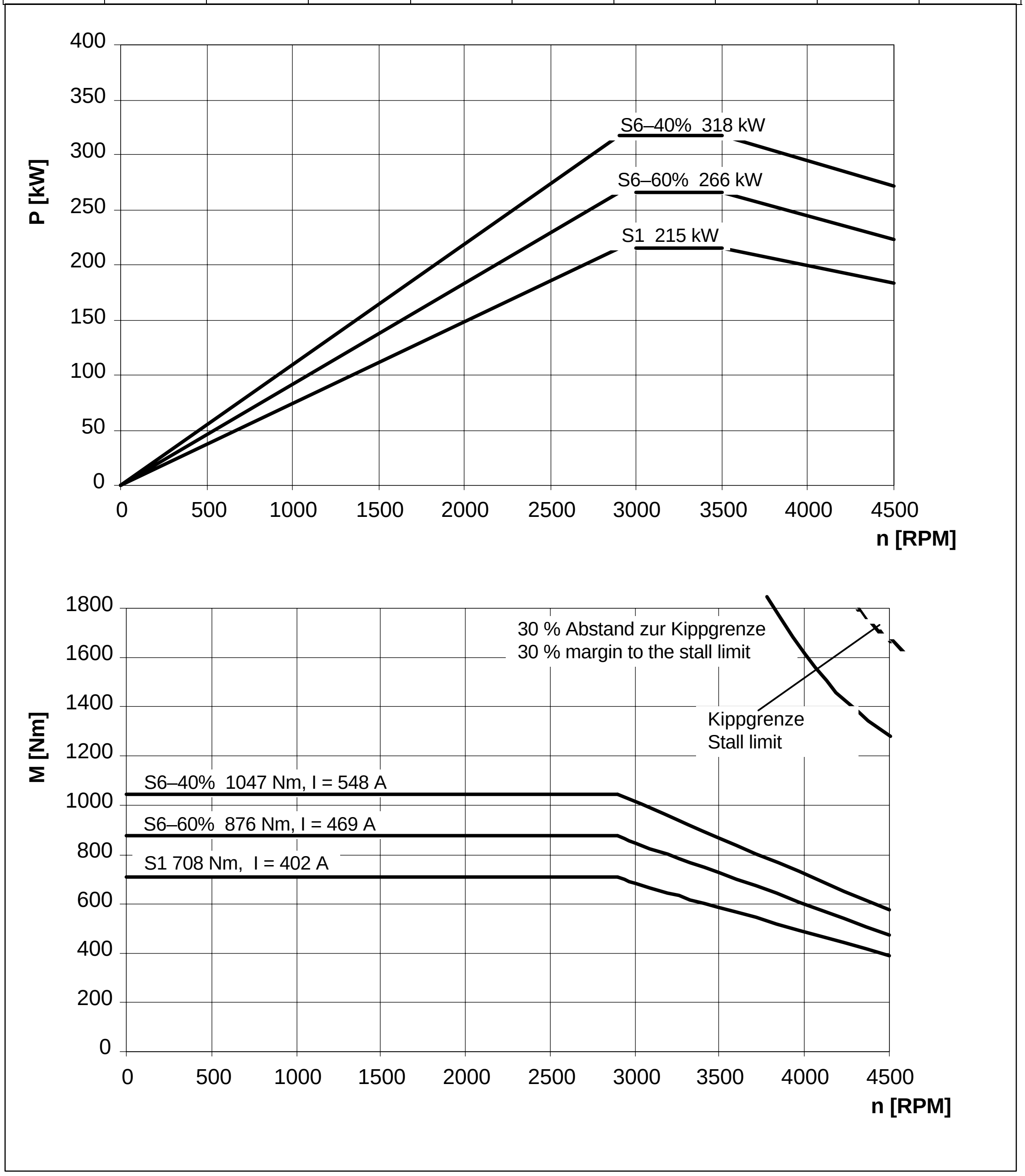

Fig. 3-112 MASTERDRIVES VC, 1PH7228–□□L□□

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1) 2500 RPM for increased cantilever forces

2) 4000 RPM for increased cantilever forces

3.2.3 MASTERDRIVES VC 690 V

Table 3-117 MASTERDRIVES VC, 690 V, 1PH7284–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
500	77	1471	80	690	17.0	1150	2200	2500	34

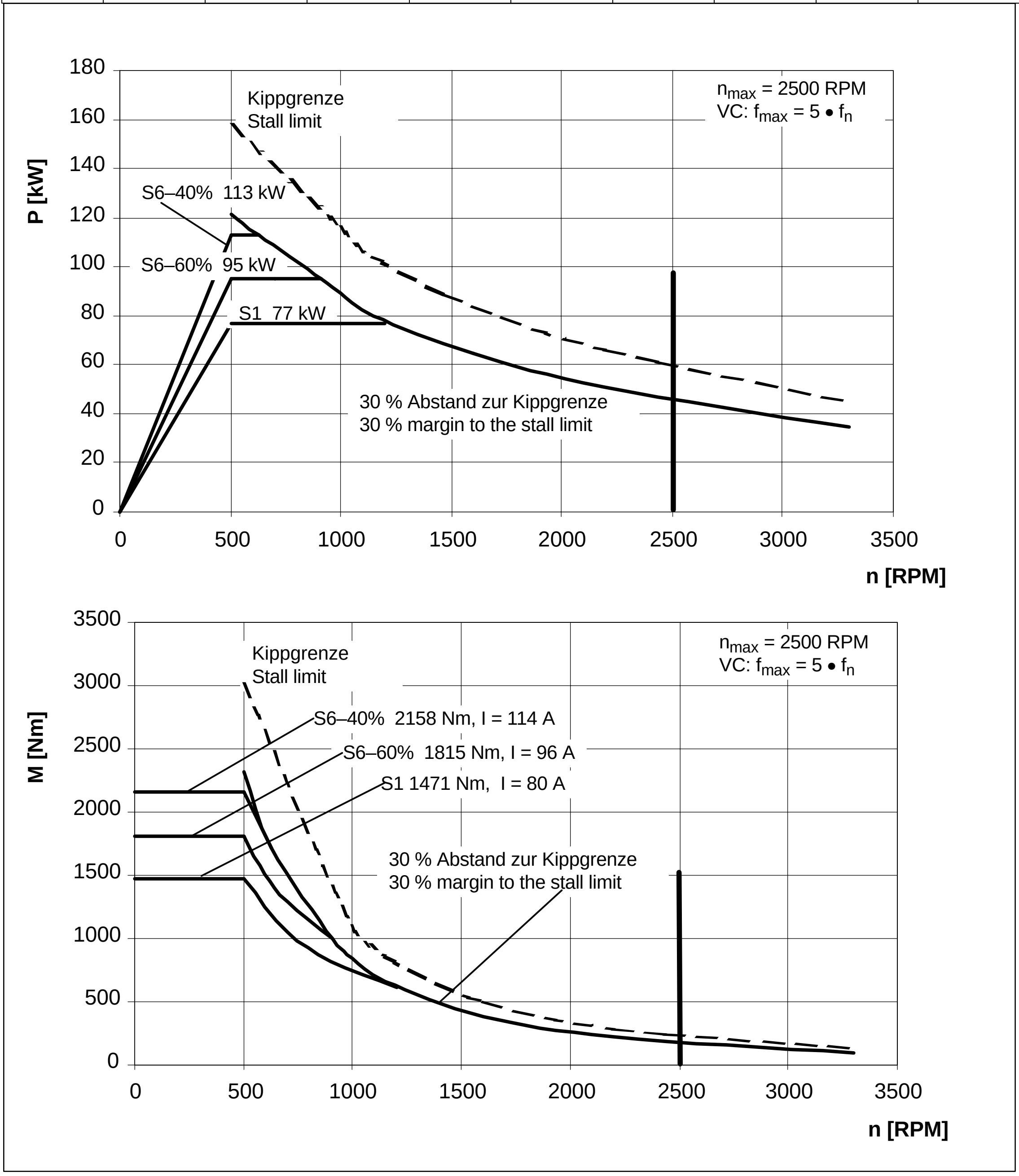

Fig. 3-113 MASTERDRIVES VC, 1PH7284–□□B□□

Table 3-118 MASTERDRIVES VC, 690 V, 1PH7286–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
500	96	1834	101	690	17.0	1300	2200	2500	45

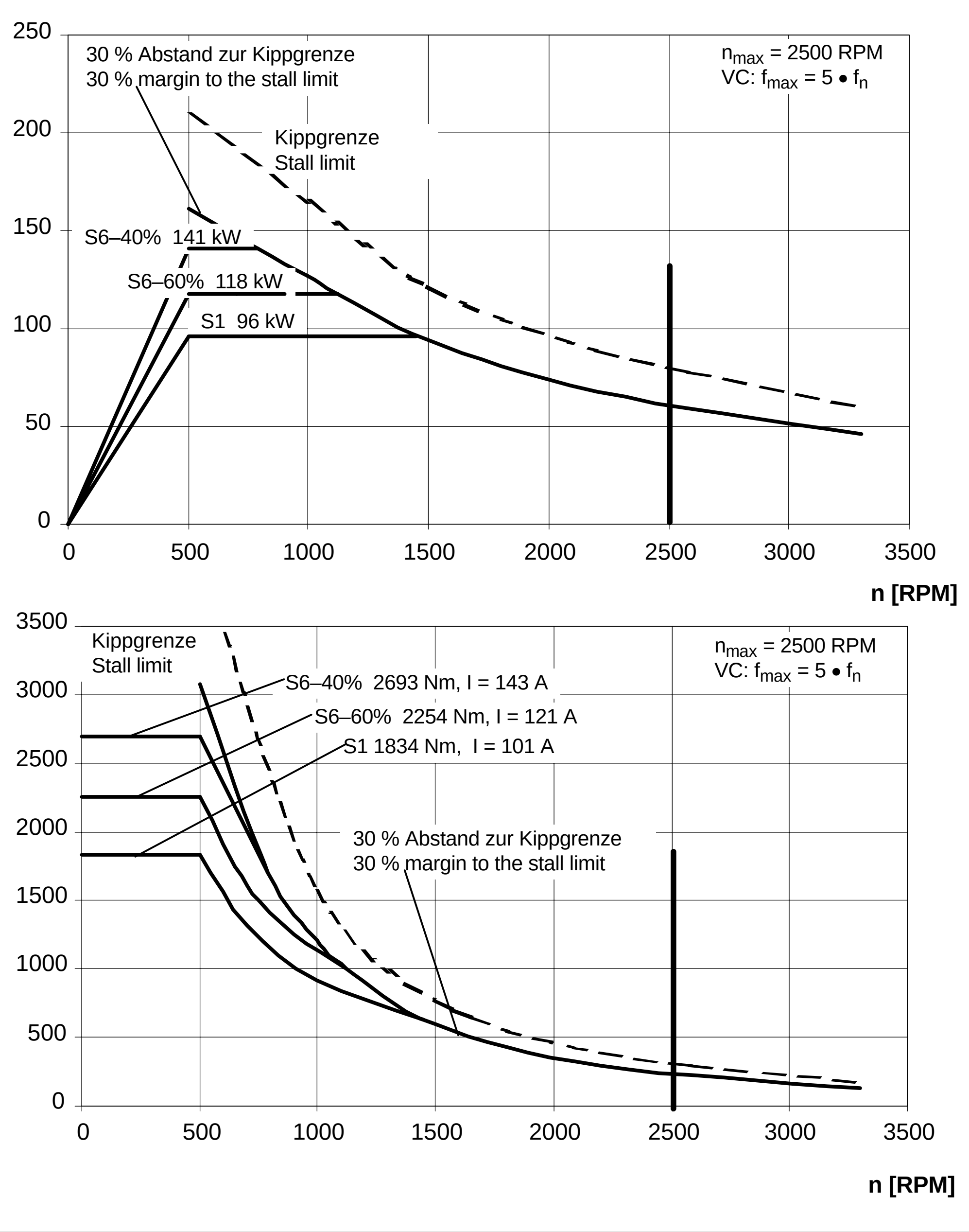

Fig. 3-114 MASTERDRIVES VC, 1PH7286–□□B□□

Table 3-119 MASTERDRIVES VC, 690 V, 1PH7288–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
500	125	2388	130	690	17.0	1400	2200	2500	57

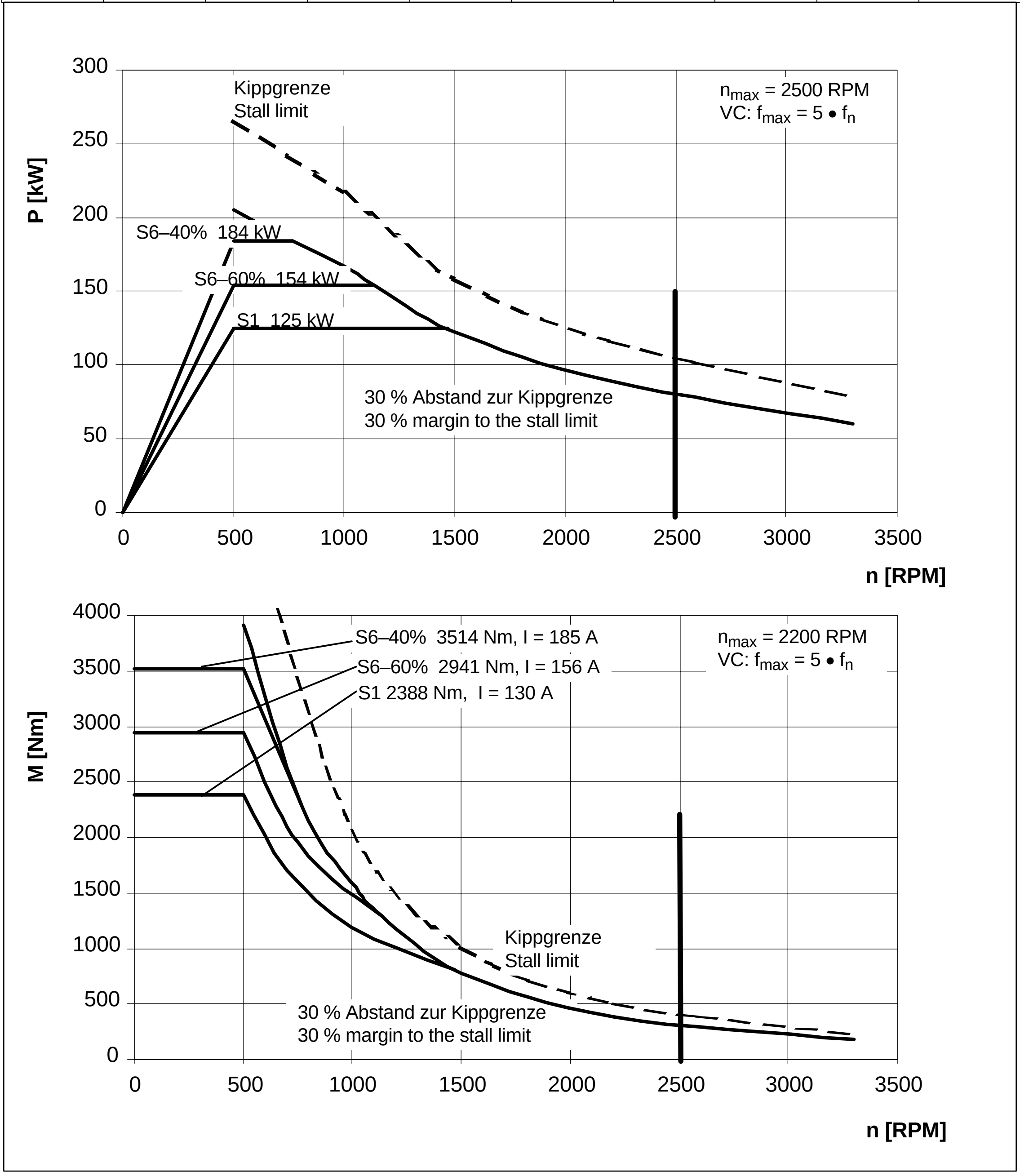

Fig. 3-115 MASTERDRIVES VC, 1PH7288–□□B□□

Table 3-120 MASTERDRIVES VC, 690 V, 1PH7284–□□C□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
800	115	1373	120	690	27.0	2200	2200	3300	55

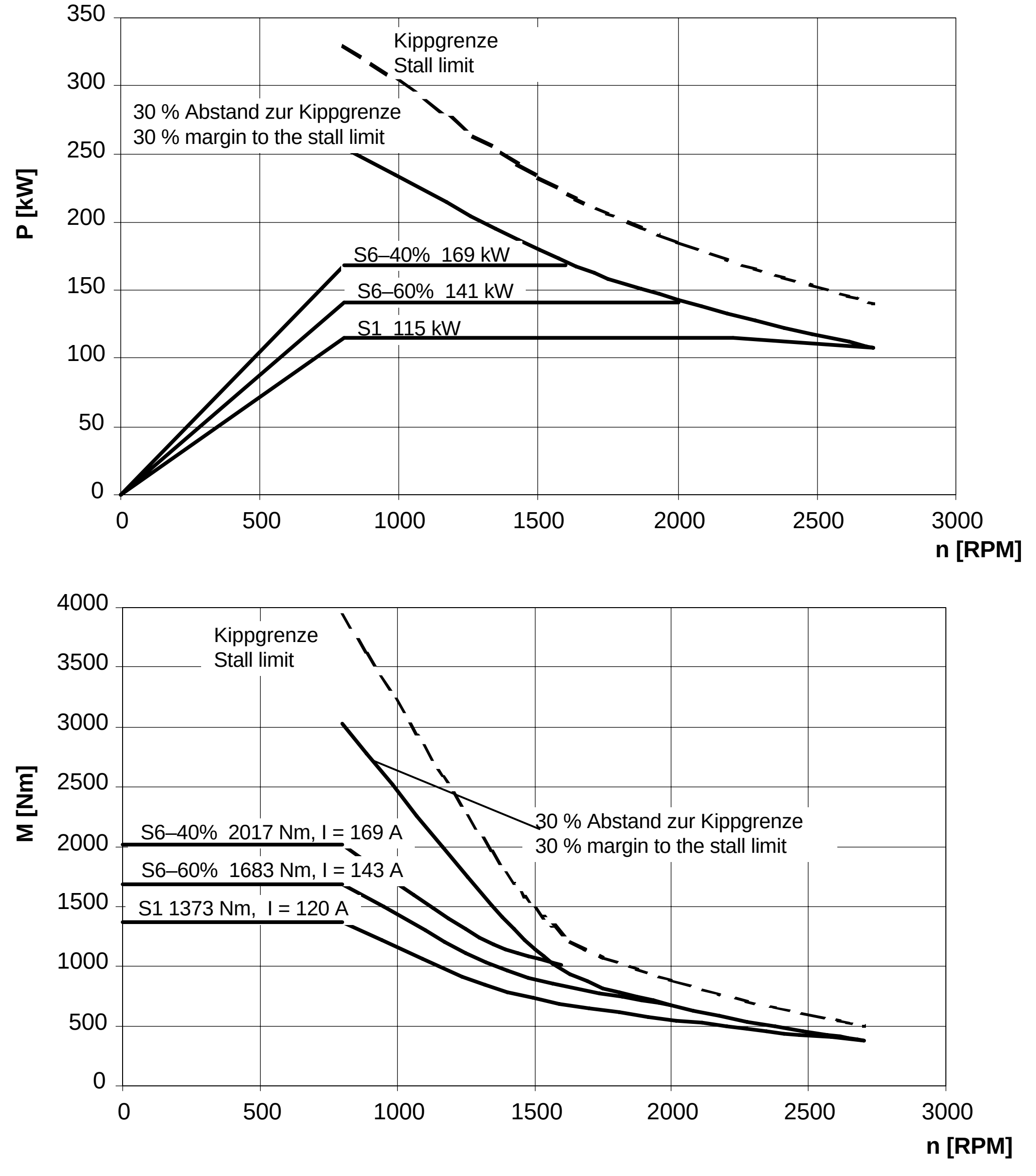

Fig. 3-116 MASTERDRIVES VC, 1PH7284–□□C□□

Table 3-121 MASTERDRIVES VC, 690 V, 1PH7286–□□C□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
800	145	1731	160	665	27.0	2200	2200	3300	80

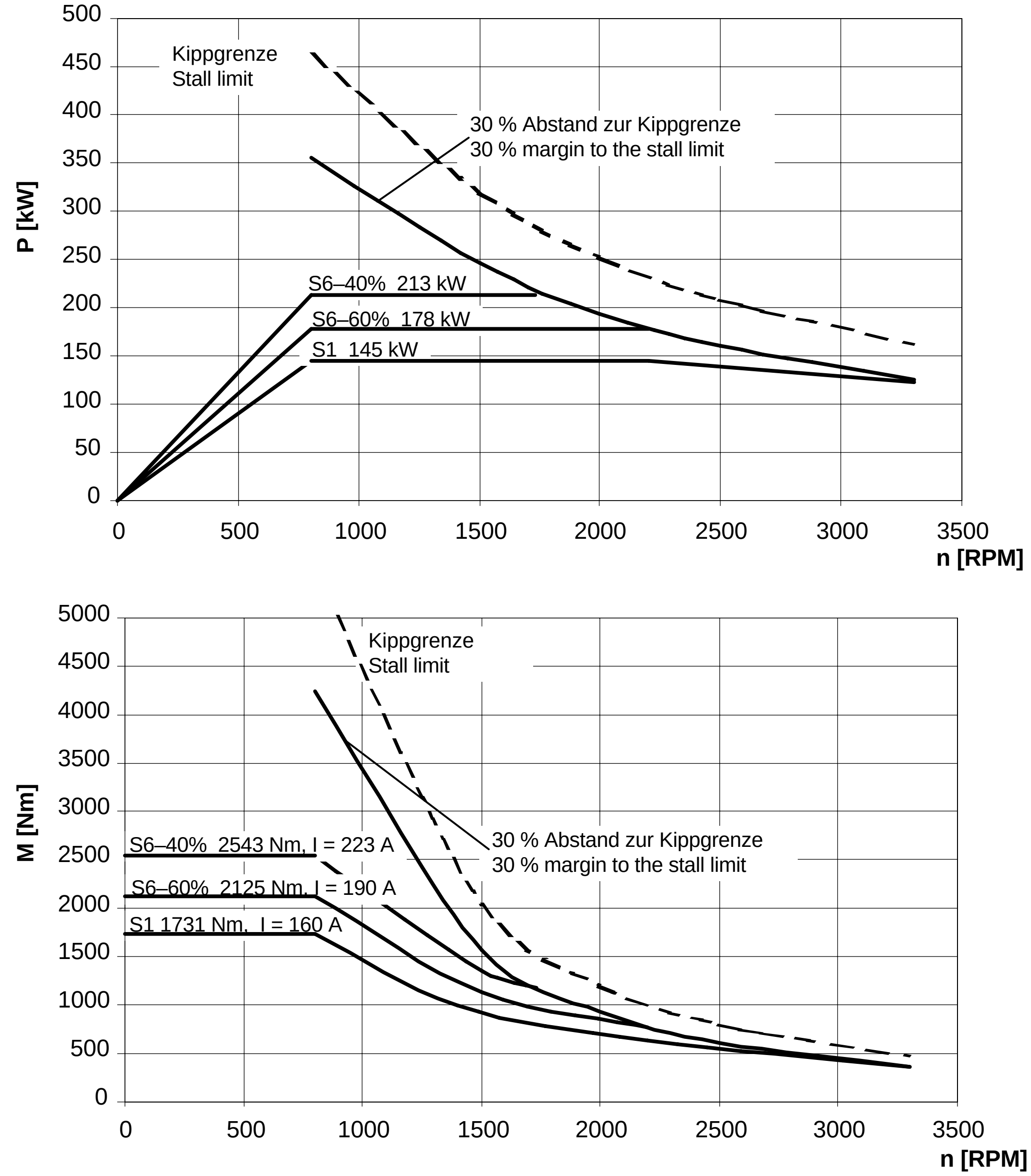

Fig. 3-117 MASTERDRIVES VC, 1PH7286–□□C□□

Table 3-122 MASTERDRIVES VC, 690 V, 1PH7288–□□C□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
800	185	2208	210	640	27.0	2200	2200	3300	100

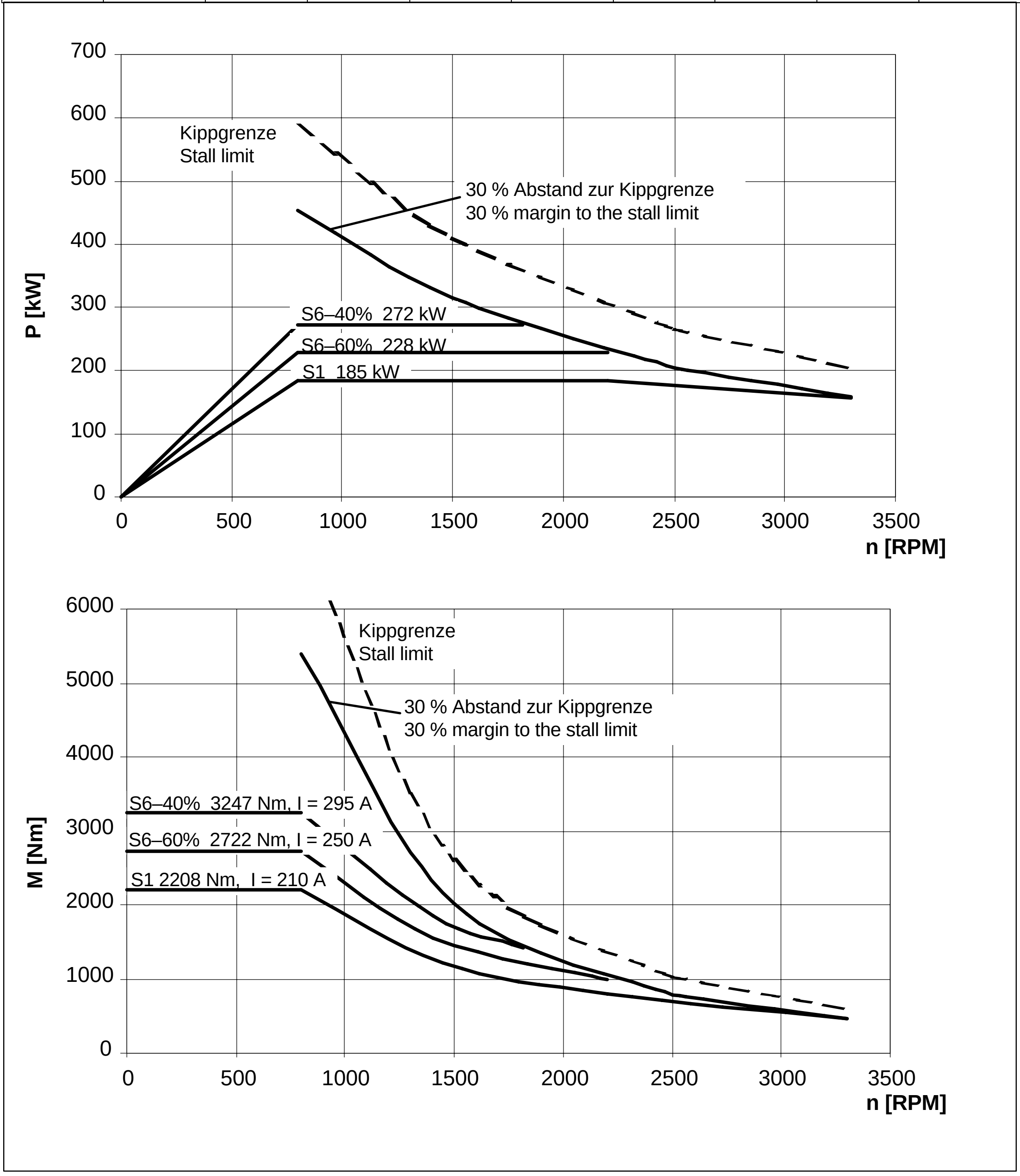

Fig. 3-118 MASTERDRIVES VC, 1PH7288–□□C□□

Table 3-123 MASTERDRIVES VC, 690 V, 1PH7284–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	164	1362	176	690	38.6	2200	2200	3300	91

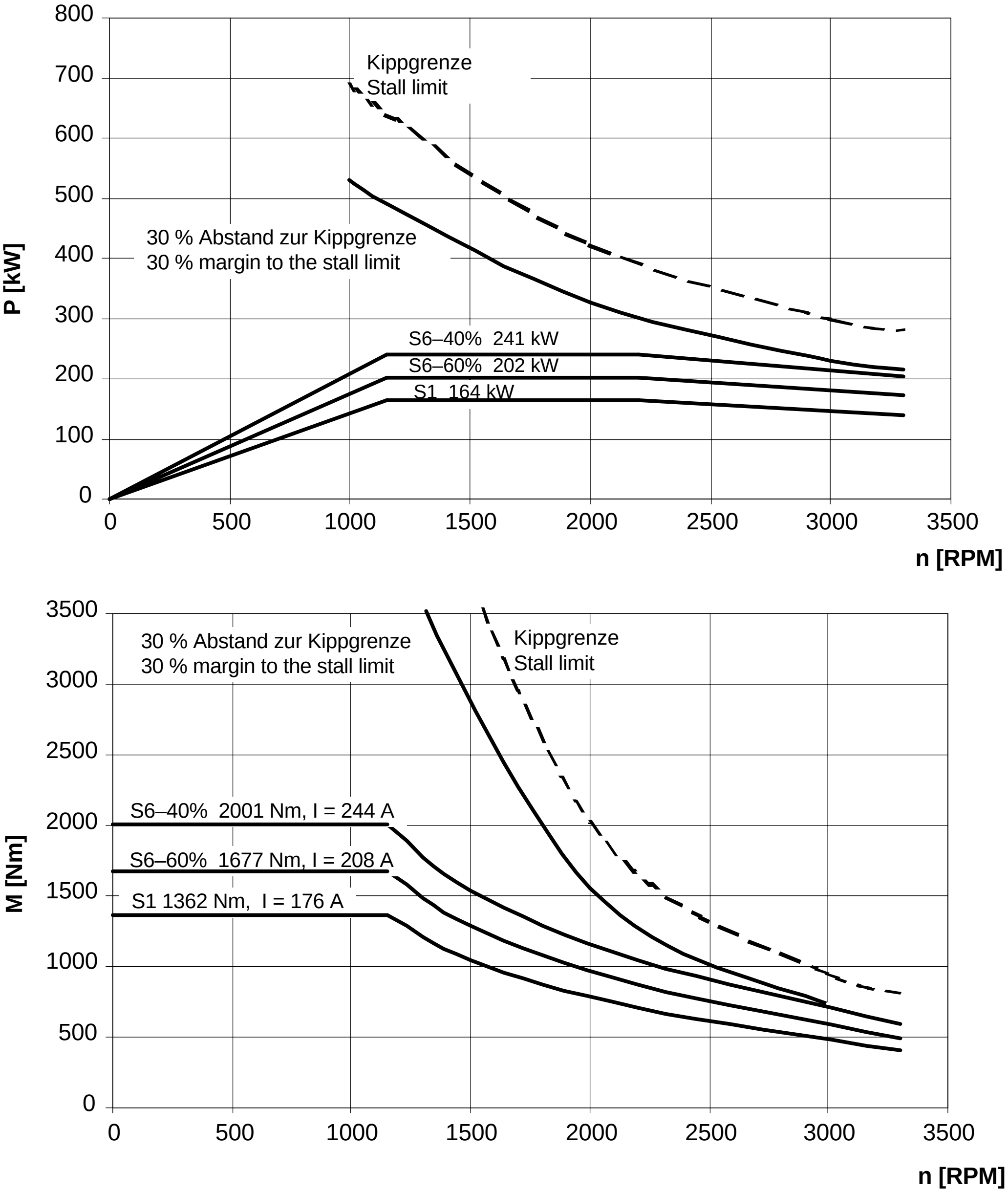

Fig. 3-119 MASTERDRIVES VC, 1PH7284–□□D□□

Table 3-124 MASTERDRIVES VC, 690 V, 1PH7286–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	203	1686	233	655	38.6	2200	2200	3300	125

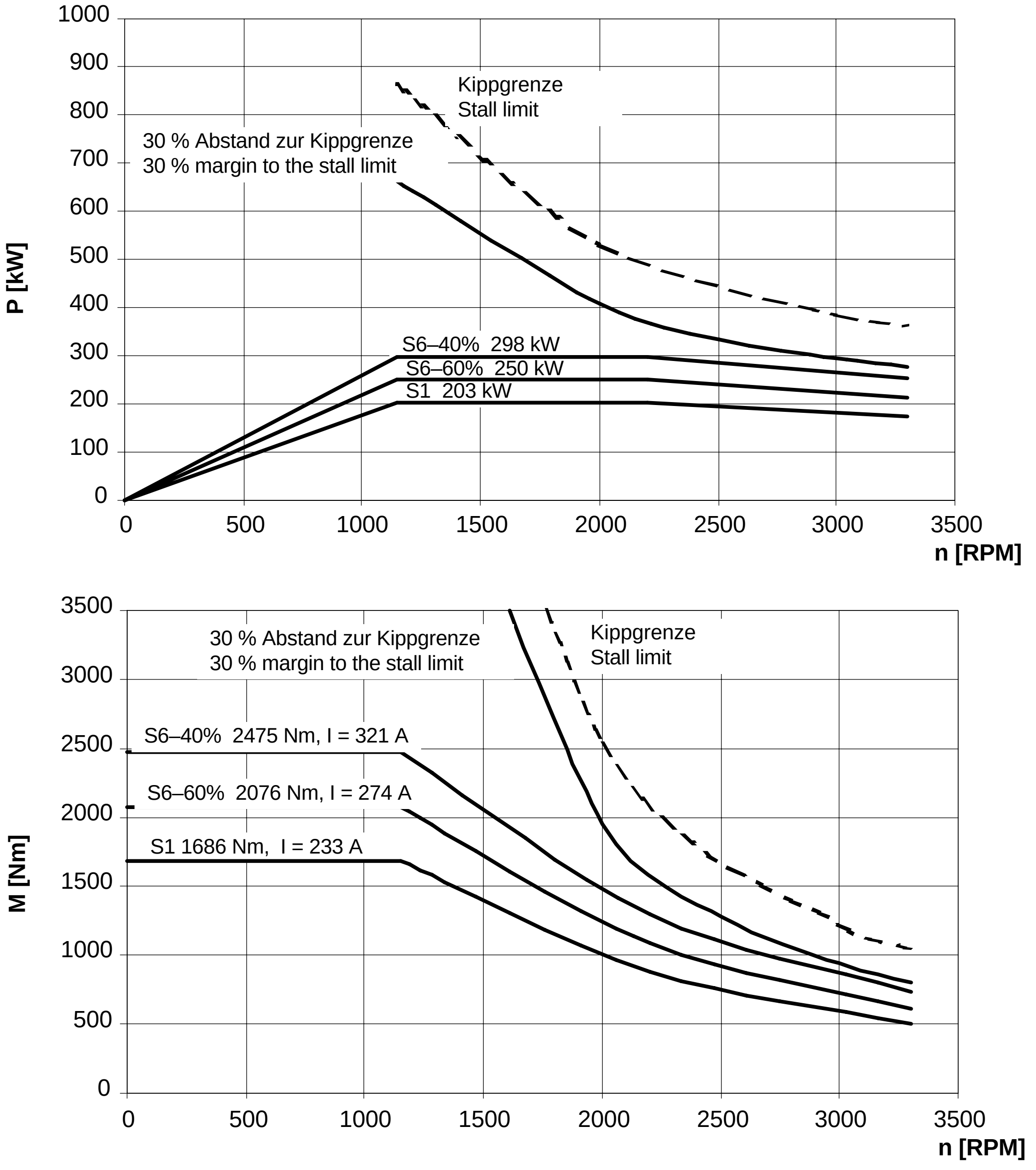

Fig. 3-120 MASTERDRIVES VC, 1PH7286–□□D□□

Table 3-125 MASTERDRIVES VC, 690 V, 1PH7288–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	251	2084	280	655	38.6	2200	2200	3300	145

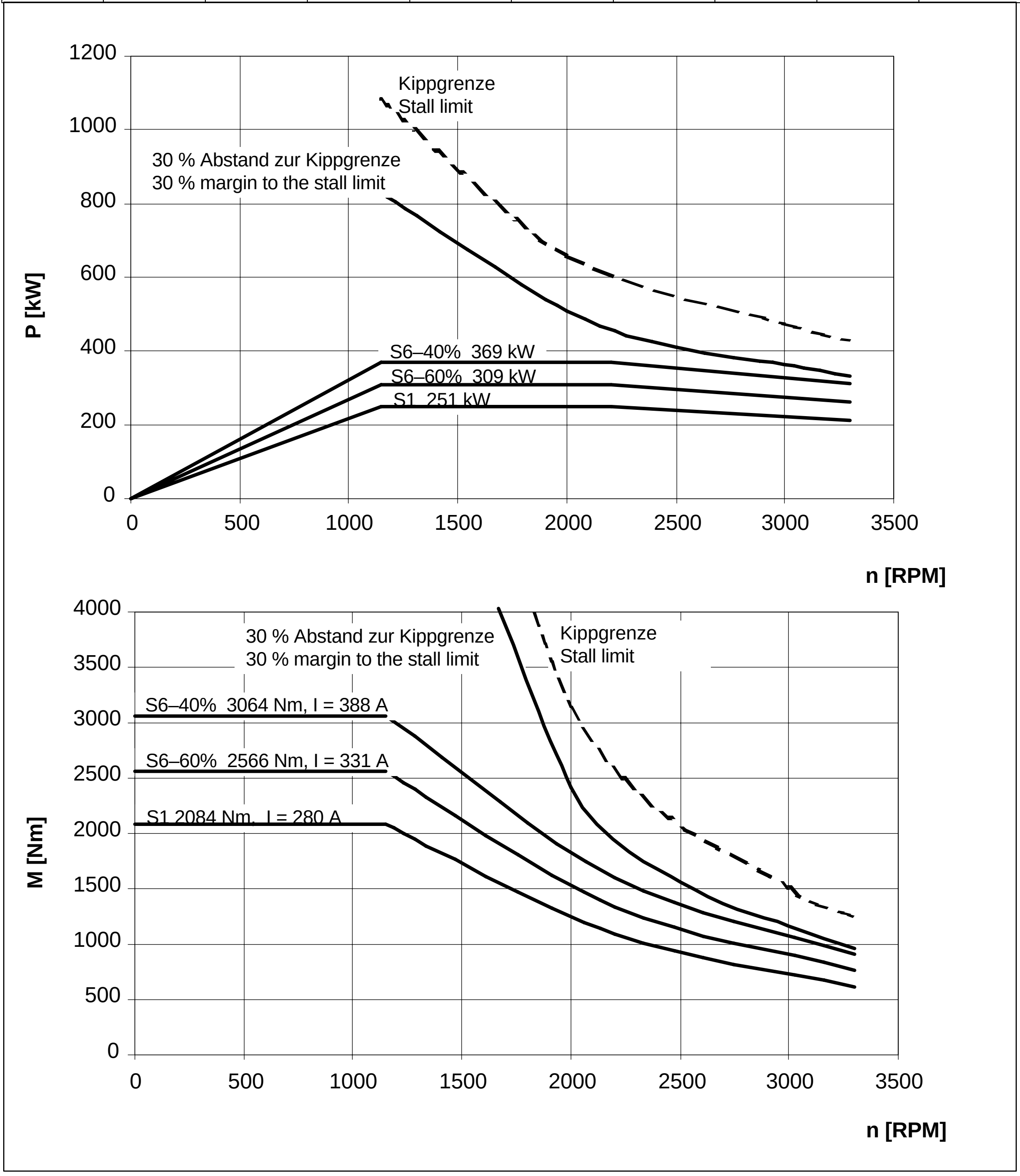

Fig. 3-121 MASTERDRIVES VC, 1PH7288–□□D□□

Table 3-126 MASTERDRIVES VC, 690 V, 1PH7284–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	217	1184	221	690	58.7	2200	2200	3300	94

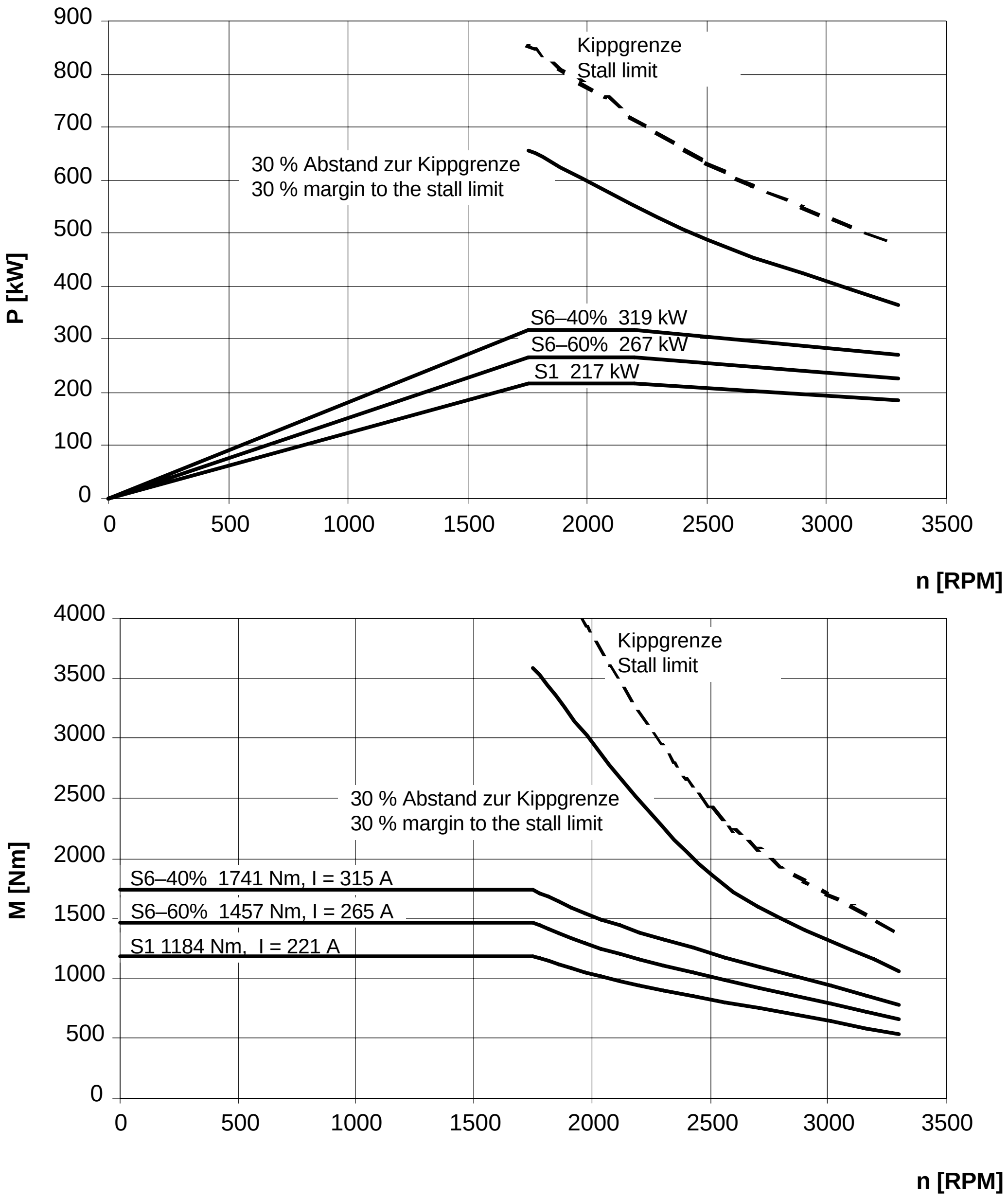

Fig. 3-122 MASTERDRIVES VC, 1PH7284–□□F□□

Table 3-127 MASTERDRIVES VC, 690 V, 1PH7286–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	261	1424	262	690	58.7	2200	2200	3300	105

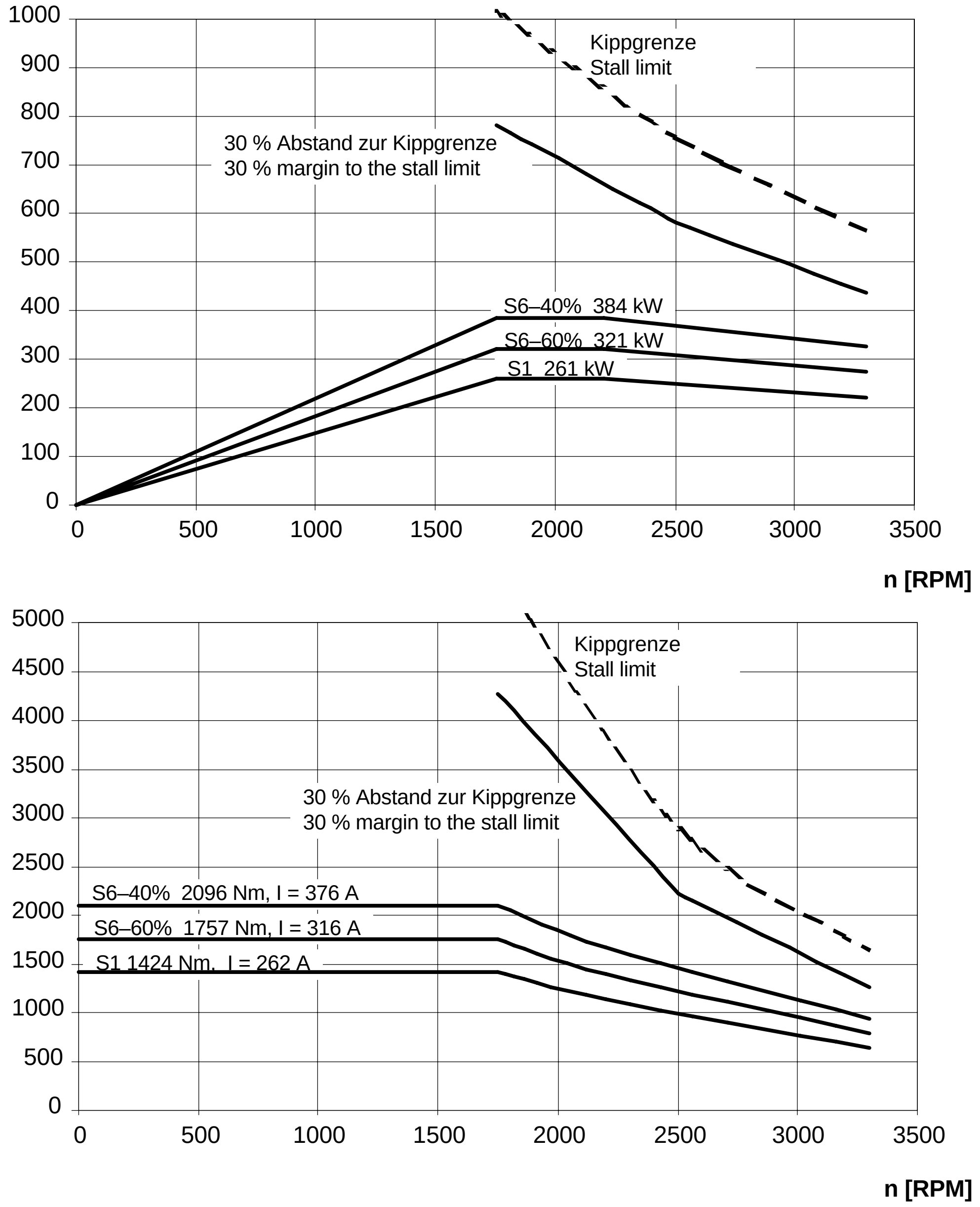

Fig. 3-123 MASTERDRIVES VC, 1PH7286–□□F□□

Table 3-128 MASTERDRIVES VC, 690 V, 1PH7288–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	329	1795	330	690	58.7	2200	2200	3300	134

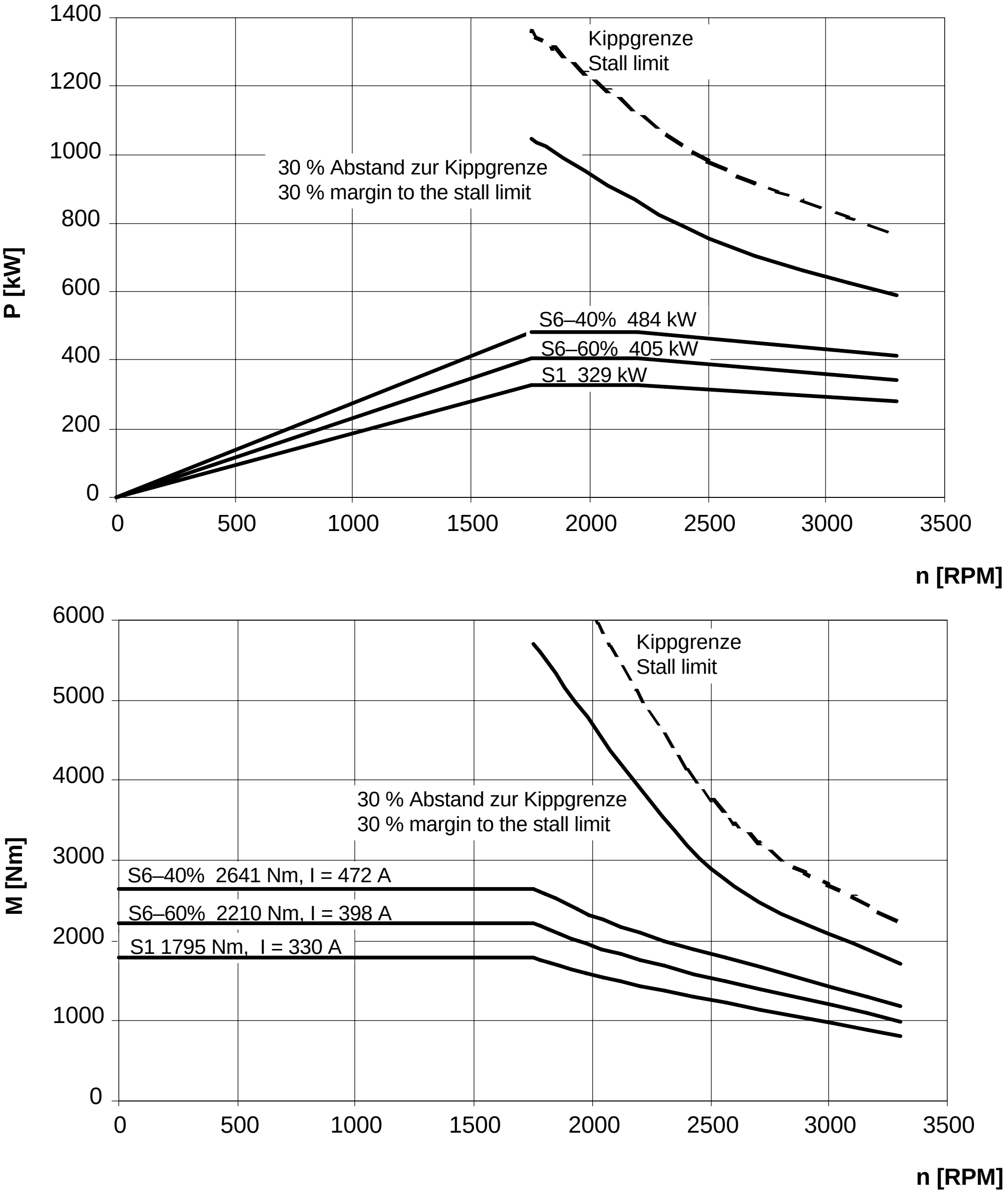

Fig. 3-124 MASTERDRIVES VC, 1PH7288–□□F□□

■

Space for your notes

Technical Data and Characteristics for MASTERDRIVES MC

4

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 SIMOVERT MASTERDRIVES 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 stall 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 torque limit at every operating point. This safety margin is shown in the diagrams $P=f_{(n)}$.

In addition, the calculated stall torque $M=f_{(n)}$ (without 30 % safety margin) is specified in the diagrams.

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.

4.1 Technical data

For a description of the codes used in the table header, refer to Table 4-1. Motors with a gray background are core types.

Additional information on the order designation (MLFB), refer to Chapter 1.4 or Catalog.

Table 4-1 Explanation of the codes in alphabetical order

Abbreviation	Units	Description
f_n	Hz	Rated frequency
I_0	A	Magnetizing current
I_N	A	Rated current
J	kgm^2	Moment of inertia
M_N	Nm	Rated torque
n_1	RPM	Speed for field weakening with constant power
n_{max}	RPM	Maximum rotational speed
n_N	RPM	Rated speed
n_{S1}	RPM	Max. permissible continuous speed
P_N	kW	Rated power
T_{th}	min	Thermal time constant
U_N	V	Rated voltage

4.1.1 MASTERDRIVES MC, line supply voltage 3–ph. 400 V AC

Table 4-2 Technical data, MASTERDRIVES MC, line supply voltage 3–ph. 400 V AC

Order No.	n_N [RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	n_1 1) [RPM]	n_{max} 2) [RPM]	T_{th} [min]	J [kgm^2]	Weight [kg]
1PH7163–□□B□□	400	9.5	227	30	274	800	800	35	0.185	175
1PH7167–□□B□□	400	13	310	37	294	800	800	35	0.228	210
1PH7184–□□B□□	400	16.3	390	51	271	800	800	40	0.503	370
1PH7186–□□B□□	400	21.2	505	67	268	800	800	40	0.666	440
1PH7224–□□B□□	400	30.4	725	88	268	800	800	40	1.479	630
1PH7226–□□B□□	400	39.2	935	114	264	800	800	40	1.930	750
1PH7228–□□B□□	400	48	1145	136	272	800	800	40	2.326	860
1PH7103–□□D□□	1000	3.7	35	10	343	2000	2000	25	0.017	40
1PH7107–□□D□□	1000	6.25	60	17.5	319	2000	2000	25	0.029	65
1PH7133–□□D□□	1000	12	115	30	336	2000	2000	30	0.076	90
1PH7137–□□D□□	1000	17	162	43	322	2000	2000	30	0.109	150
1PH7163–□□D□□	1000	22	210	55	315	2000	2000	35	0.185	175
1PH7167–□□D□□	1000	28	267	71	312	2000	2000	35	0.228	210
1PH7184–□□D□□	1000	39	372	90	335	2000	2000	40	0.503	370
1PH7186–□□D□□	1000	51	485	116	340	2000	2000	40	0.666	440
1PH7224–□□D□□	1000	71	678	161	335	2000	2000	40	1.479	630
1PH7226–□□D□□	1000	92	880	198	340	2000	2000	40	1.930	750
1PH7228–□□D□□	1000	113	1080	240	340	2000	2000	40	2.326	860
1PH7101–□□F□□	1500	3.7	24	10	350	3000	3000	25	0.017	40
1PH7103–□□F□□	1500	5.5	35	13.0	350	2100	3000	25	0.017	40
1PH7105–□□F□□	1500	7.0	45	17.5	346	3000	3000	25	0.029	65
1PH7107–□□F□□	1500	9.0	57	23.5	336	3000	3000	25	0.029	65
1PH7131–□□F□□	1500	11	70	24	350	3000	3000	30	0.076	90
1PH7133–□□F□□	1500	15	96	34	346	3000	3000	30	0.076	90
1PH7135–□□F□□	1500	18.5	118	42	350	3000	3000	30	0.109	150
1PH7137–□□F□□	1500	22	140	57	308	3000	3000	30	0.109	150
1PH7163–□□F□□	1500	30	191	72	319	3000	3000	35	0.185	175
1PH7167–□□F□□	1500	37	236	82	350	3000	3000	35	0.228	210
1PH7184–□□F□□	1500	51	325	120	335	3000	3000 2)	40	0.503	370
1PH7186–□□F□□	1500	74	471	170	330	3000	3000	40	0.666	440
1PH7224–□□U□□	1500	95	605	204	340	2900	3000	40	1.479	630
1PH7226–□□F□□	1500	130	828	278	340	2900	3000	40	1.930	750
1PH7228–□□F□□	1500	160	1019	350	340	2900	3000	40	2.326	860
1PH7103–□□G□□	2000	7	33	17.5	343	4000	4000	25	0.017	40
1PH7107–□□G□□	2000	10.5	50	26	350	4000	4000	25	0.029	65
1PH7133–□□G□□	2000	20	96	45	350	4000	3900	30	0.076	90
1PH7137–□□G□□	2000	28	134	60	350	3800	4000	30	0.109	150
1PH7163–□□G□□	2000	36	172	85	333	3000	4000	35	0.185	175
1PH7167–□□G□□	2000	41	196	89	350	2800	4000	35	0.228	210

Table 4-2 Technical data, MASTERDRIVES MC, line supply voltage 3–ph. 400 V AC, continued

Order No.	n_N [RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	n_1 1) [RPM]	n_{max} 2) [RPM]	T_{th} [min]	J [kgm^2]	Weight [kg]
1PH7184–□□L□□	2500	78	298	171	340	5000	5000	40	0.503	370
1PH7186–□□L□□	2500	106	405	235	335	5000	5000	40	0.666	440
1PH7224–□□L□□	2500	142	542	298	340	3500	4500	40	1.479	630
1PH7226–□□L□□	2500	168	642	362	335	3500	4500	40	1.930	750
1PH7228–□□L□□	2500	205	783	433	340	3100	4500	40	2.326	860

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1) Max. field weakening speed at constant power or speed where at $P=P_N$ there is still 30 % power margin (safety margin) to the stall limit or the mechanical limiting speed is reached.

2) **Notice:** The max. speed in field–weakening operation is in some cases limited to lower values due to $f_{max} < 2 \bullet f_n$. For belt out–drives with increased cantilever forces, depending on the frame size, lower values apply (refer to the motor characteristics).

4.1.2 MASTERDRIVES MC, line supply voltage 3–ph. 480 V AC

Table 4-3 Technical data, MASTERDRIVES MC, line supply voltage 3–ph. 480 V AC

Order No.	n_N [RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	n_1 1) [RPM]	n_{max} 2) [RPM]	T_{th} [min]	J [kgm^2]	Weight [kg]
1PH7163–□□B□□	400	9.5	227	30	274	800	800	35	0.185	175
1PH7167–□□B□□	400	13	310	37	294	800	800	35	0.228	210
1PH7184–□□B□□	400	16.3	390	51	271	800	800	40	0.503	370
1PH7186–□□B□□	400	21.2	505	67	268	800	800	40	0.666	440
1PH7224–□□B□□	400	30.4	725	88	268	800	800	40	1.479	630
1PH7226–□□B□□	400	39.2	935	114	264	800	800	40	1.930	750
1PH7228–□□B□□	400	48	1145	136	272	800	800	40	2.326	860
1PH7103–□□D□□	1150	4.3	36	10	391	2200	2300	25	0.017	40
1PH7107–□□D□□	1150	7.2	60	17.5	360	2300	2300	25	0.029	65
1PH7133–□□D□□	1150	13.5	112	29	381	2300	2300	30	0.076	90
1PH7137–□□D□□	1150	19.5	162	43	367	2300	2300	30	0.109	150
1PH7163–□□D□□	1150	25	208	55	364	2300	2300	35	0.185	175
1PH7167–□□D□□	1150	31	257	70	357	2300	2300	35	0.228	210
1PH7184–□□D□□	1150	44	366	89	383	2300	2300	40	0.503	370
1PH7186–□□D□□	1150	58	482	116	390	2300	2300	40	0.666	440
1PH7224–□□D□□	1150	81	670	160	385	2300	2300	40	1.479	630
1PH7226–□□D□□	1150	105	870	197	390	2300	2300	40	1.930	750
1PH7228–□□D□□	1150	129	1070	238	390	2300	2300	40	2.326	860
1PH7101–□□F□□	1750	4.3	24	10	398	3500	3500	25	0.017	40
1PH7103–□□F□□	1750	6.25	34	13.0	398	2600	3500	25	0.017	40
1PH7105–□□F□□	1750	8.0	44	17.5	398	3500	3500	25	0.029	65
1PH7107–□□F□□	1750	10	55	23	381	3500	3500	25	0.029	65
1PH7131–□□F□□	1750	13	71	24	398	3500	3500	30	0.076	90
1PH7133–□□F□□	1750	17.5	96	34	398	3500	3500	30	0.076	90
1PH7135–□□F□□	1750	21.5	117	42	398	3500	3500	30	0.109	150
1PH7137–□□F□□	1750	25	136	56	357	3500	3500	30	0.109	150
1PH7163–□□F□□	1750	34	186	72	364	3500	3500	35	0.185	175
1PH7167–□□F□□	1750	41	224	79	398	3300	3500	35	0.228	210
1PH7184–□□F□□	1750	60	327	120	388	3500	3500	40	0.503	370
1PH7186–□□F□□	1750	85	465	169	385	3500	3500	40	0.666	440
1PH7224–□□U□□	1750	110	600	203	395	2900	3500	40	1.479	630
1PH7226–□□F□□	1750	135	737	254	395	2900	3500	40	1.930	750
1PH7228–□□F□□	1750	179	975	342	395	2900	3500	40	2.326	860
1PH7103–□□G□□	2300	7.5	31	17	388	4600	4600	25	0.017	40
1PH7107–□□G□□	2300	12	50	26	400	4600	4600	25	0.029	65
1PH7133–□□G□□	2300	22.5	93	45	398	4000	4600	30	0.076	90
1PH7137–□□G□□	2300	29	120	56	398	4000	4600	30	0.109	150
1PH7163–□□G□□	2300	38	158	80	374	3000	4600	35	0.185	175
1PH7167–□□G□□	2300	44	183	85	398	3000	4600	35	0.228	210

Table 4-3 Technical data, MASTERDRIVES MC, line supply voltage 3–ph. 480 V AC, continued

Order No.	n_N [RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	n_1 1) [RPM]	n_{max} 2) [RPM]	T_{th} [min]	J [kgm^2]	Weight [kg]
1PH7184–□□L□□	2900	81	265	158	395	5000	5000	40	0.503	370
1PH7186–□□L□□	2900	101	333	206	385	5000	5000	40	0.666	440
1PH7224–□□L□□	2900	149	490	274	395	3500	4500	40	1.479	630
1PH7226–□□L□□	2900	185	610	348	390	3500	4500	40	1.930	750
1PH7228–□□L□□	2900	215	708	402	395	3500	4500	40	2.326	860

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1) Max. field weakening speed at constant power or speed where at $P=P_N$ there is still 30 % power margin (safety margin) to the stall limit or the mechanical limiting speed is reached.

2) **Notice:** The max. speed in field–weakening operation is in some cases limited to lower values due to $f_{max} < 2 \bullet f_n$. For belt out–drives with increased cantilever forces, depending on the frame size, lower values apply (refer to the motor characteristics).

4.2 P/n and M/n diagrams for MASTERDRIVES MC

4.2.1 MASTERDRIVES MC 400 V

Table 4-4 MASTERDRIVES MC, 400 V, 1PH7163–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	9.5	227	30	274	14.3	800	800	800	11.5

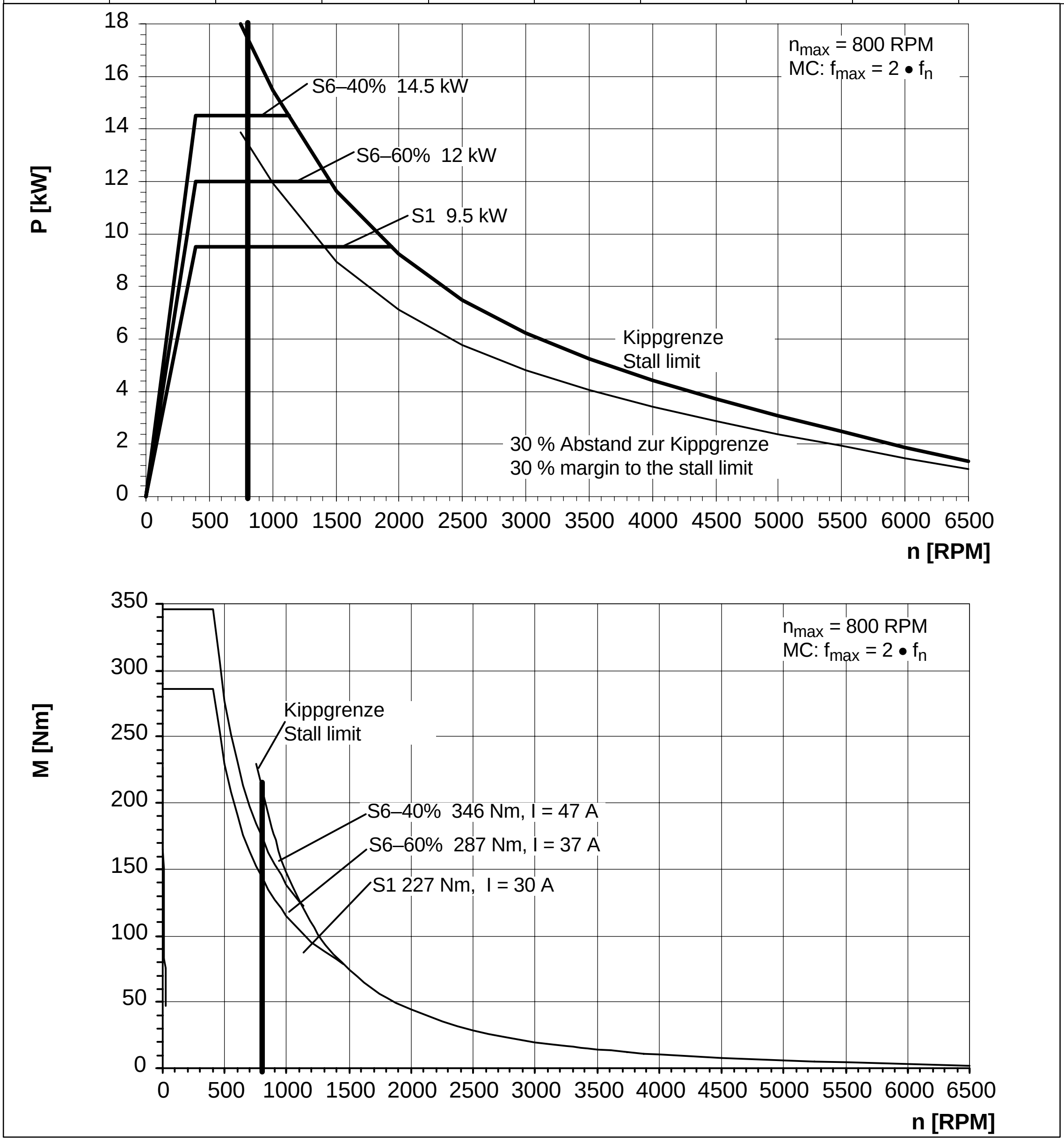

Fig. 4-1 MASTERDRIVES MC, 1PH7163–□□B□□

Table 4-5 MASTERDRIVES MC, 400 V, 1PH7167–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	13	310	37	294	14.3	800	800	800	14

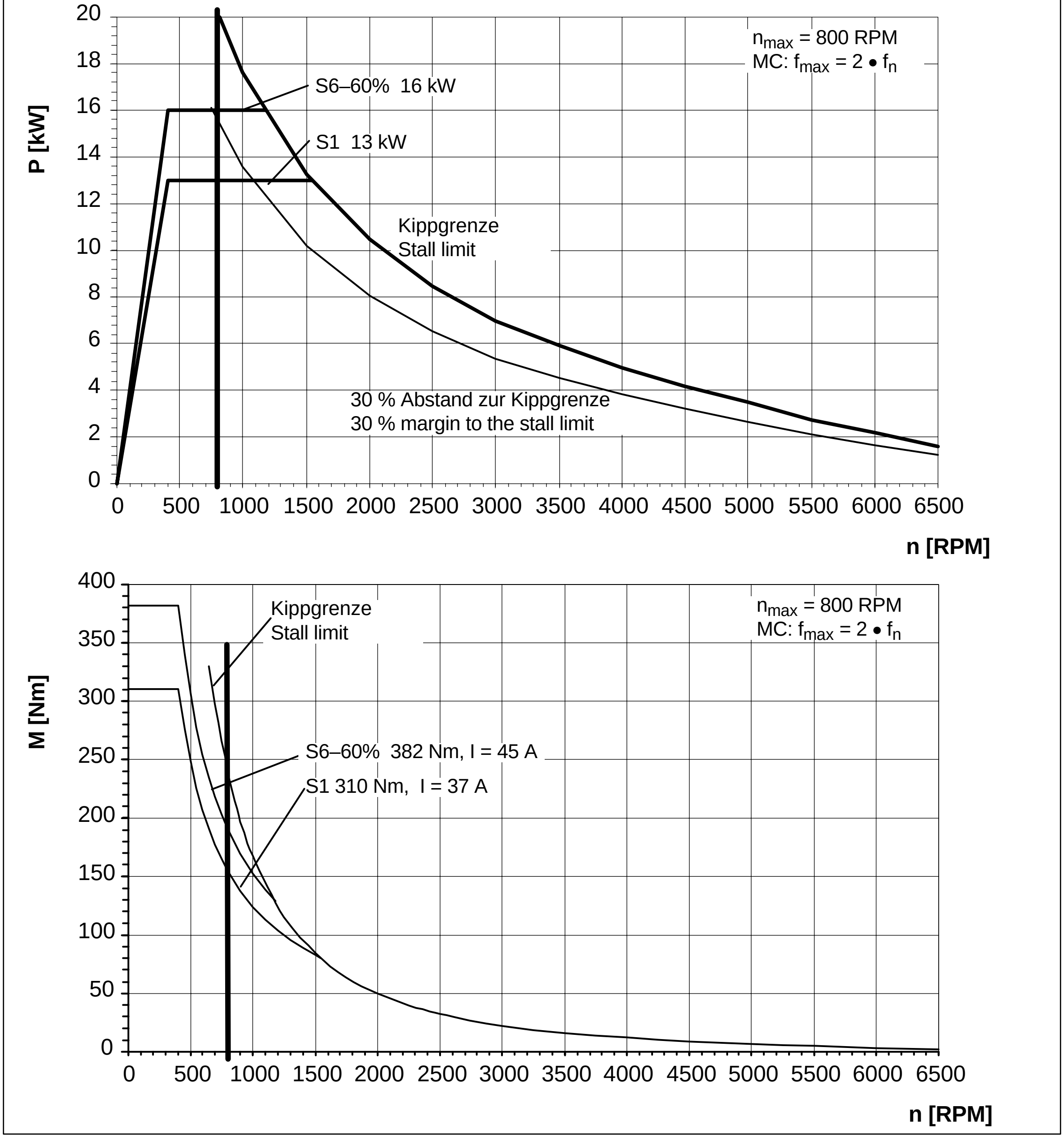

Fig. 4-2 MASTERDRIVES MC, 1PH7167–□□B□□

Table 4-6 MASTERDRIVES MC, 400 V, 1PH7184–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	16.3	390	51	271	14.2	800	800	800	26

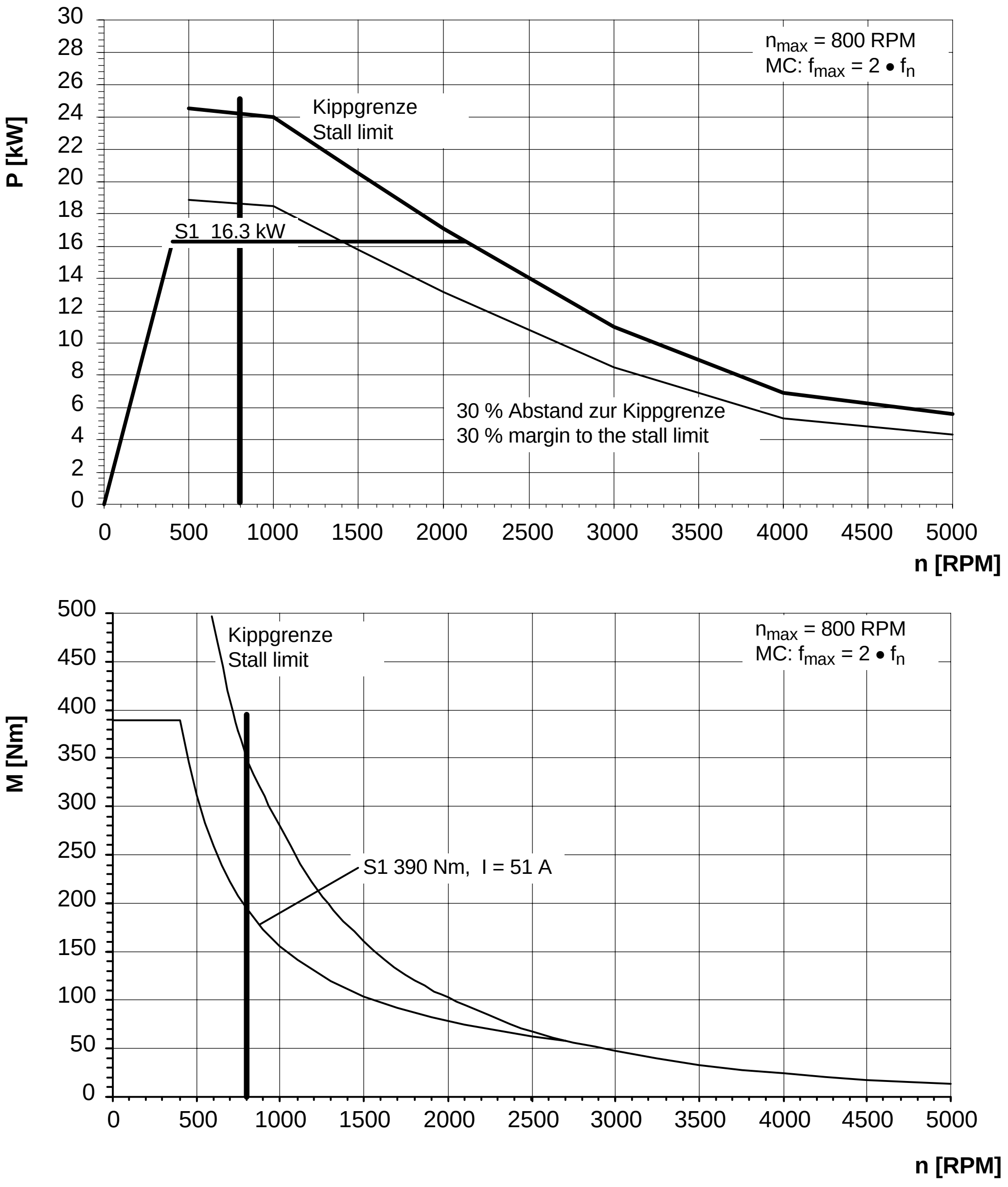

Fig. 4-3 MASTERDRIVES MC, 1PH7184–□□B□□

Table 4-7 MASTERDRIVES MC, 400 V, 1PH7186–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	21.2	505	67	268	14.0	800	800	800	38.5

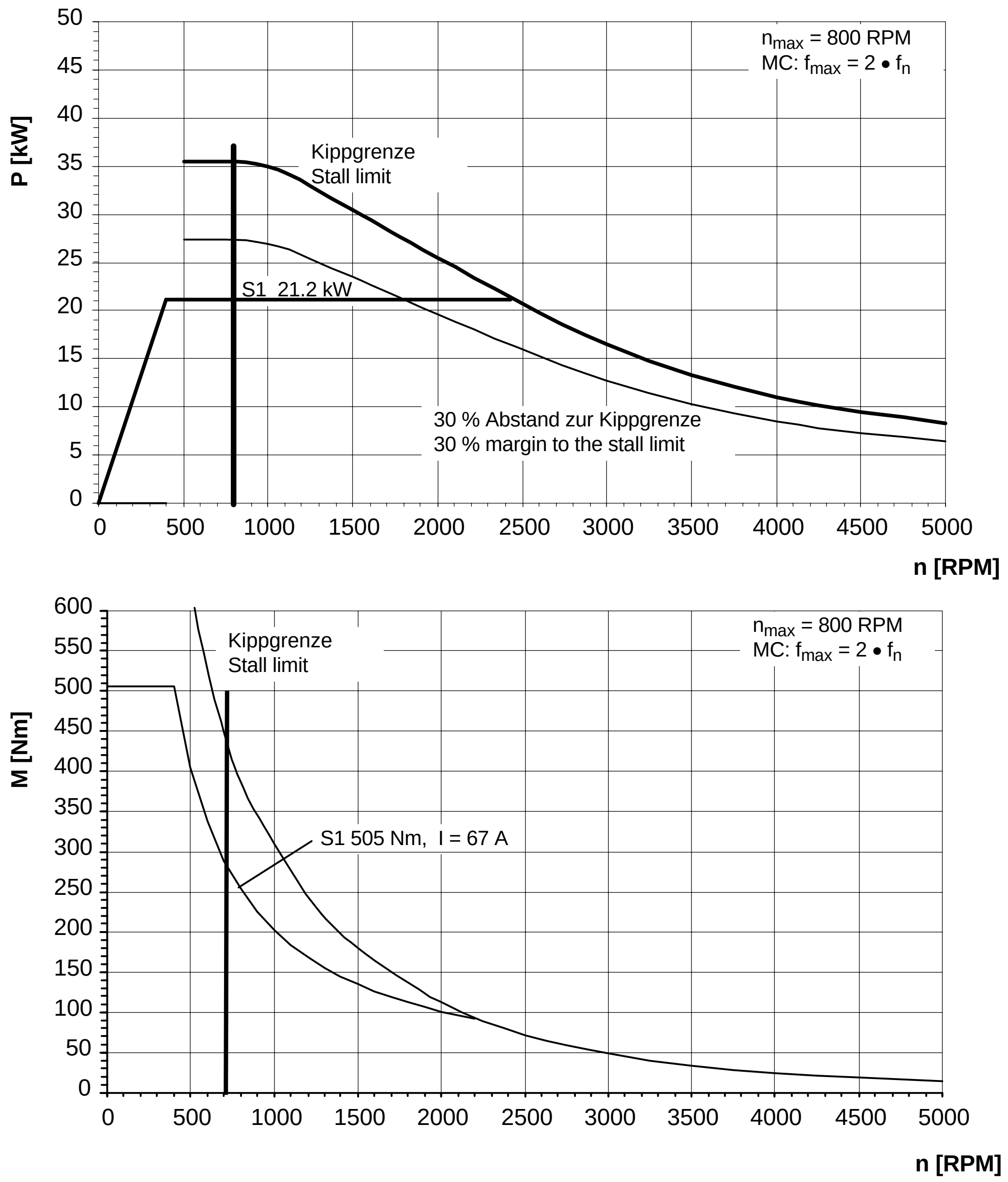

Fig. 4-4 MASTERDRIVES MC, 1PH7186–□□B□□

Table 4-8 MASTERDRIVES MC, 400 V, 1PH7224–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	30.4	725	88	268	14.0	800	800	800	36.5

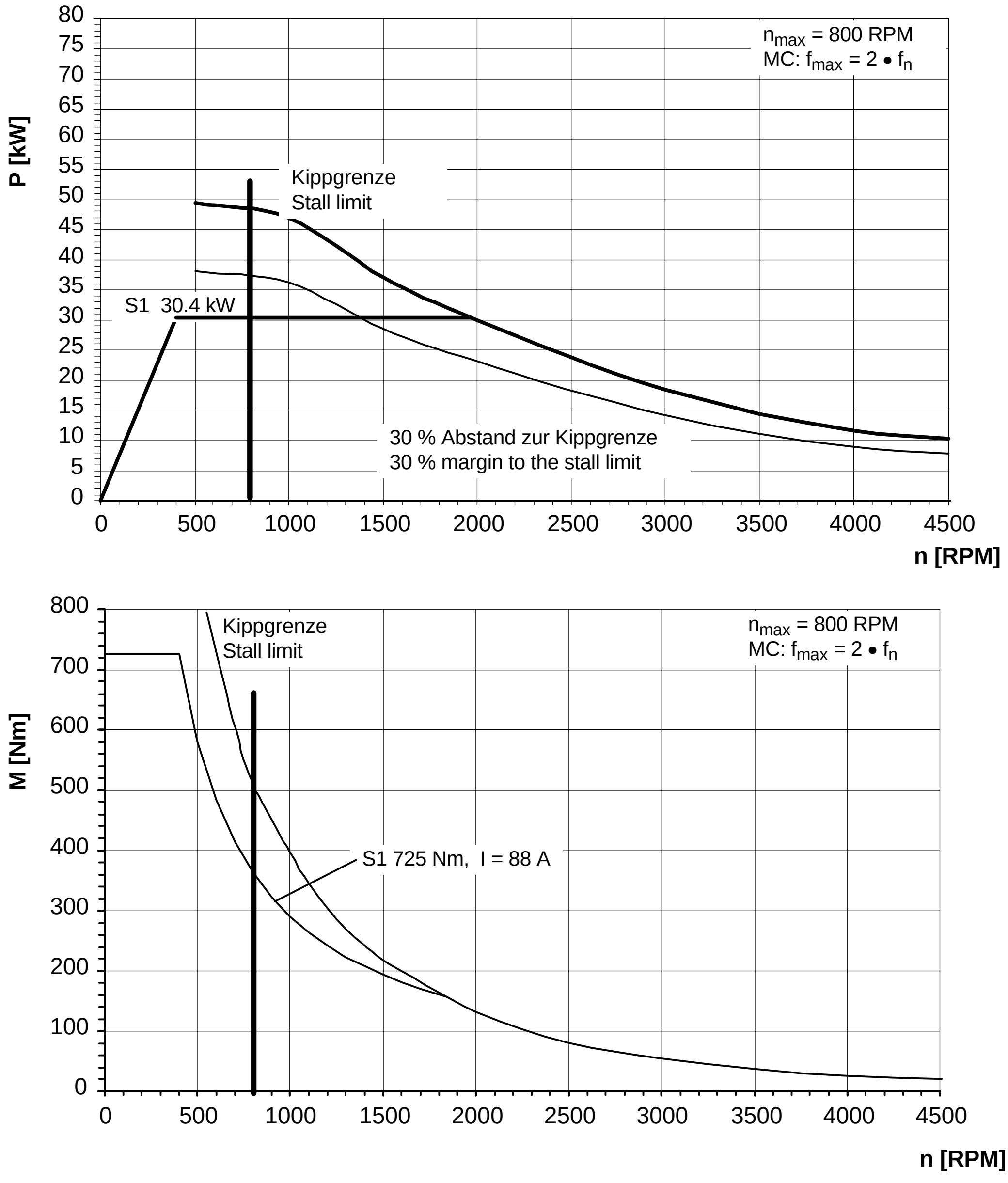

Fig. 4-5 MASTERDRIVES MC, 1PH7224–□□B□□

Table 4-9 MASTERDRIVES MC, 400 V, 1PH7226–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	39.2	935	114	264	14.0	800	800	800	49

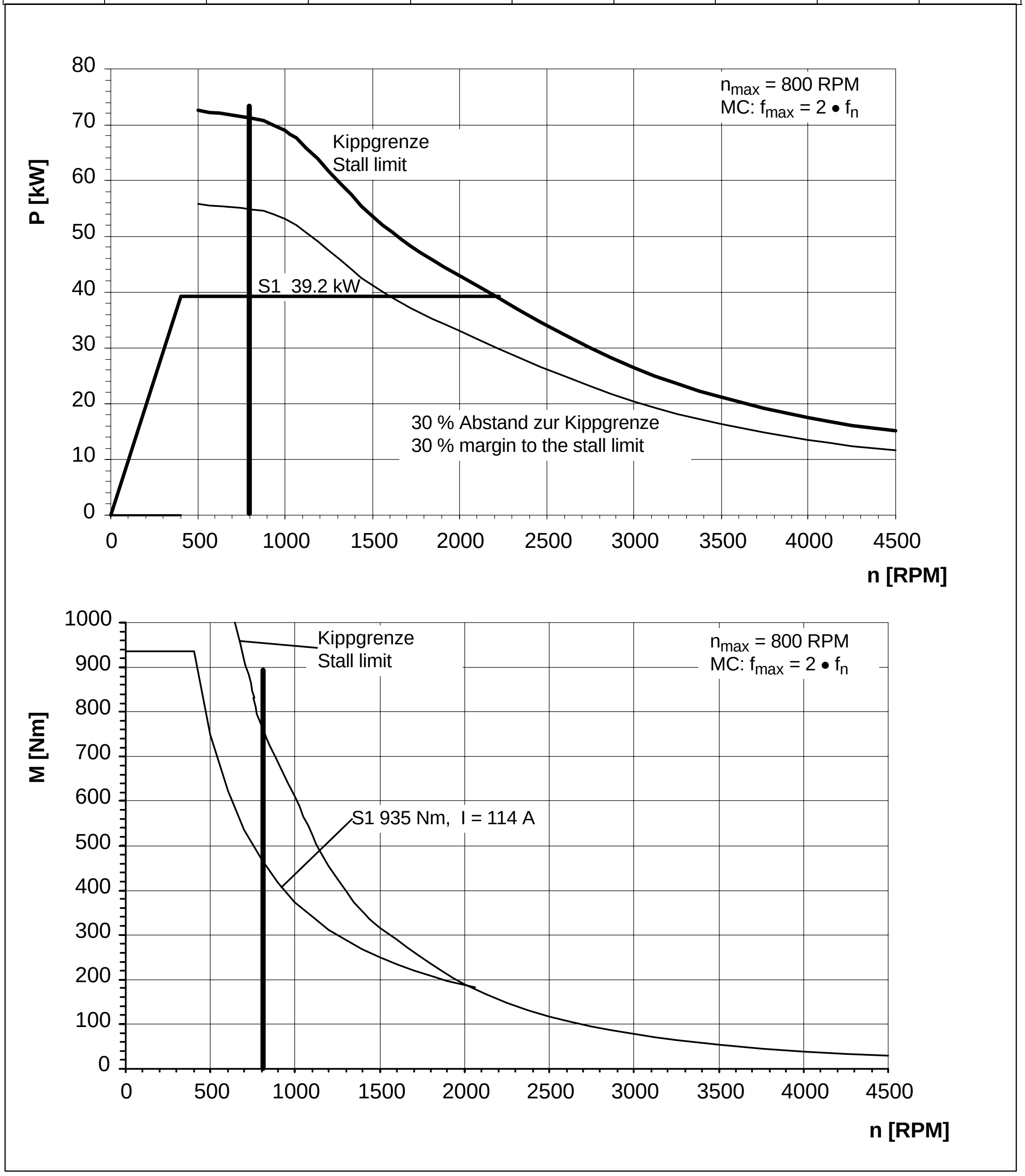

Fig. 4-6 MASTERDRIVES MC, 1PH7226–□□B□□

Table 4-10 MASTERDRIVES MC, 400 V, 1PH7228–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	48	1145	136	272	13.9	800	800	800	60.5

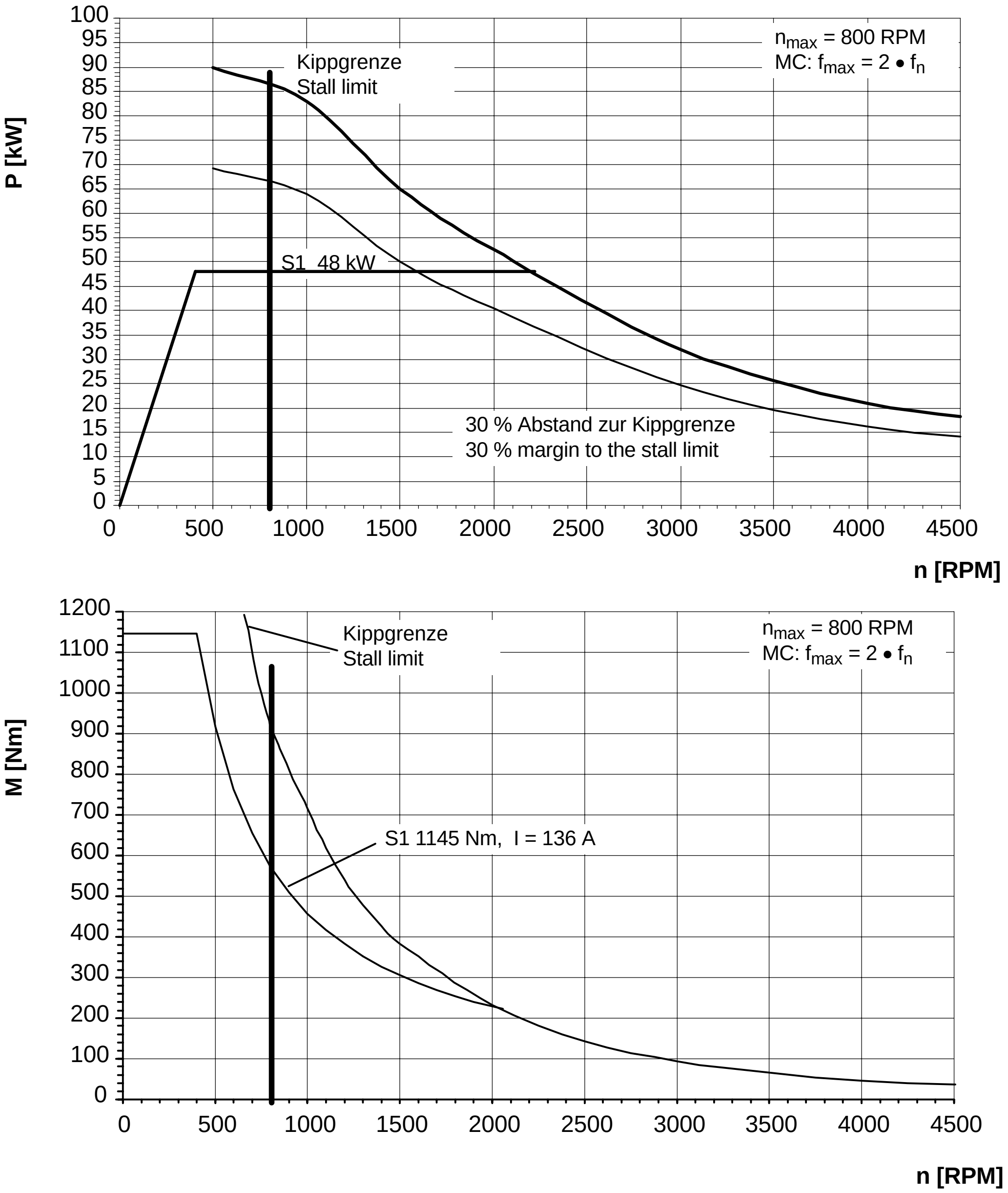

Fig. 4-7 MASTERDRIVES MC, 1PH7228–□□B□□

Table 4-11 MASTERDRIVES MC, 400 V, 1PH7103–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1000	3.7	35	10	343	35.6	2000	2000	2000	4.8

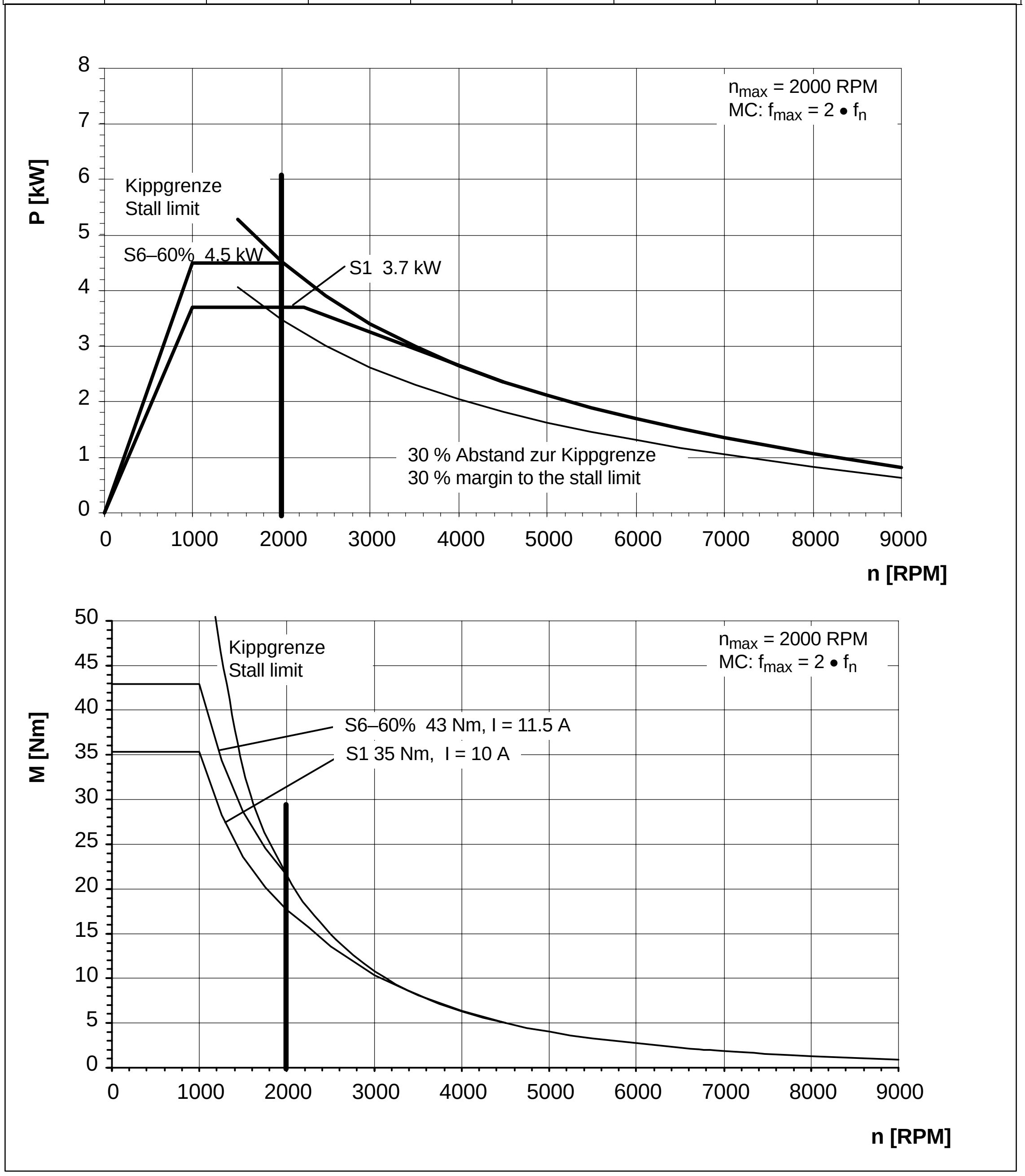

Fig. 4-8 MASTERDRIVES MC, 1PH7103–□□D□□

Table 4-12 MASTERDRIVES MC, 400 V, 1PH7107–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1000	6.25	60	17.5	319	35.3	2000	2000	2000	8.9

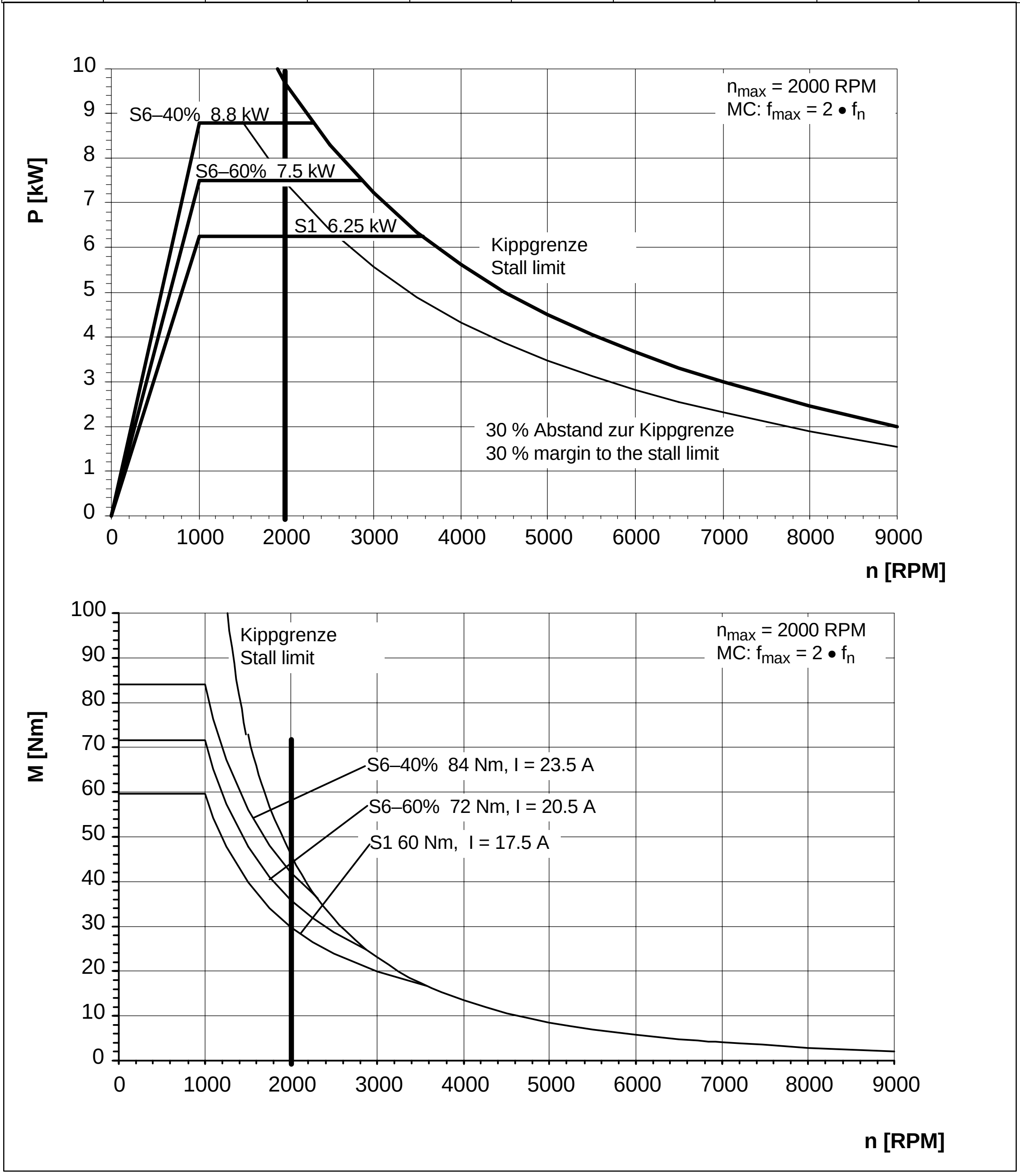

Fig. 4-9 MASTERDRIVES MC, 1PH7107–□□D□□

Table 4-13 MASTERDRIVES MC, 400 V, 1PH7133–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1000	12	115	30	336	34.8	2000	2000	2000	13

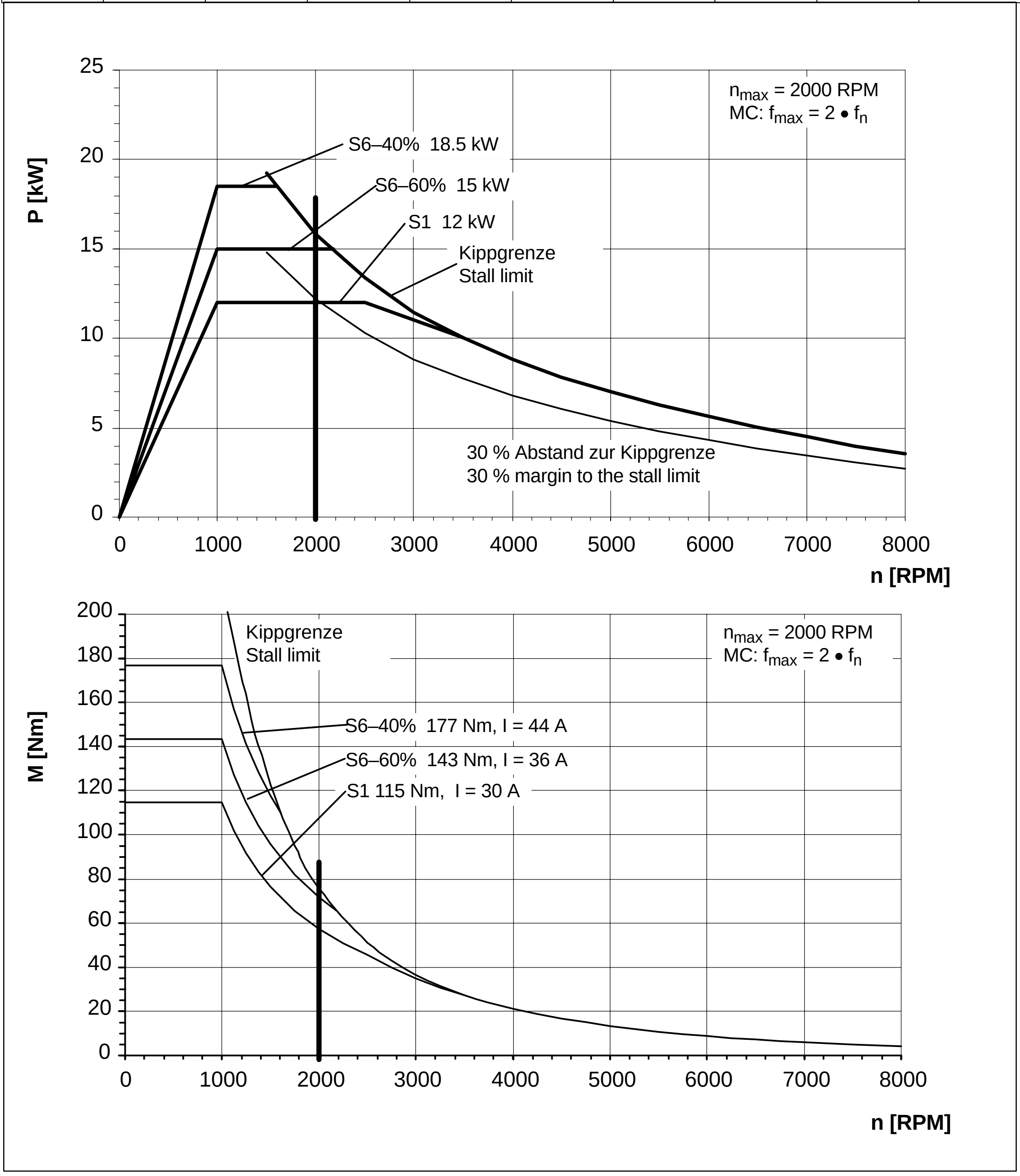

Fig. 4-10 MASTERDRIVES MC, 1PH7133–□□D□□

Table 4-14 MASTERDRIVES MC, 400 V, 1PH7137–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1000	17	162	43	322	34.6	2000	2000	2000	19

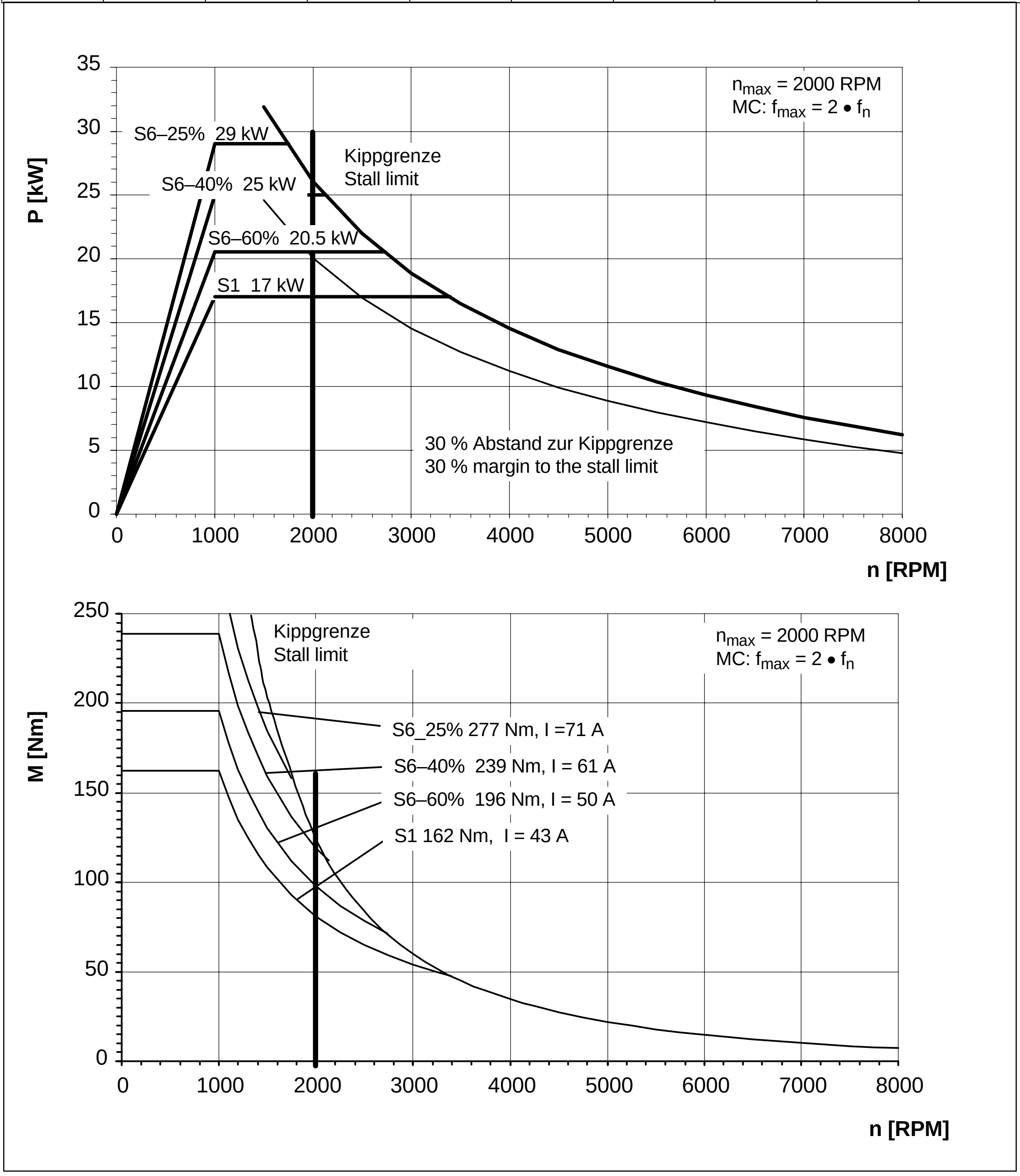

Fig. 4-11 MASTERDRIVES MC, 1PH7137–□□D□□

Table 4-15 MASTERDRIVES MC, 400 V, 1PH7163–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1000	22	210	55	315	34.2	2000	2000	2000	24

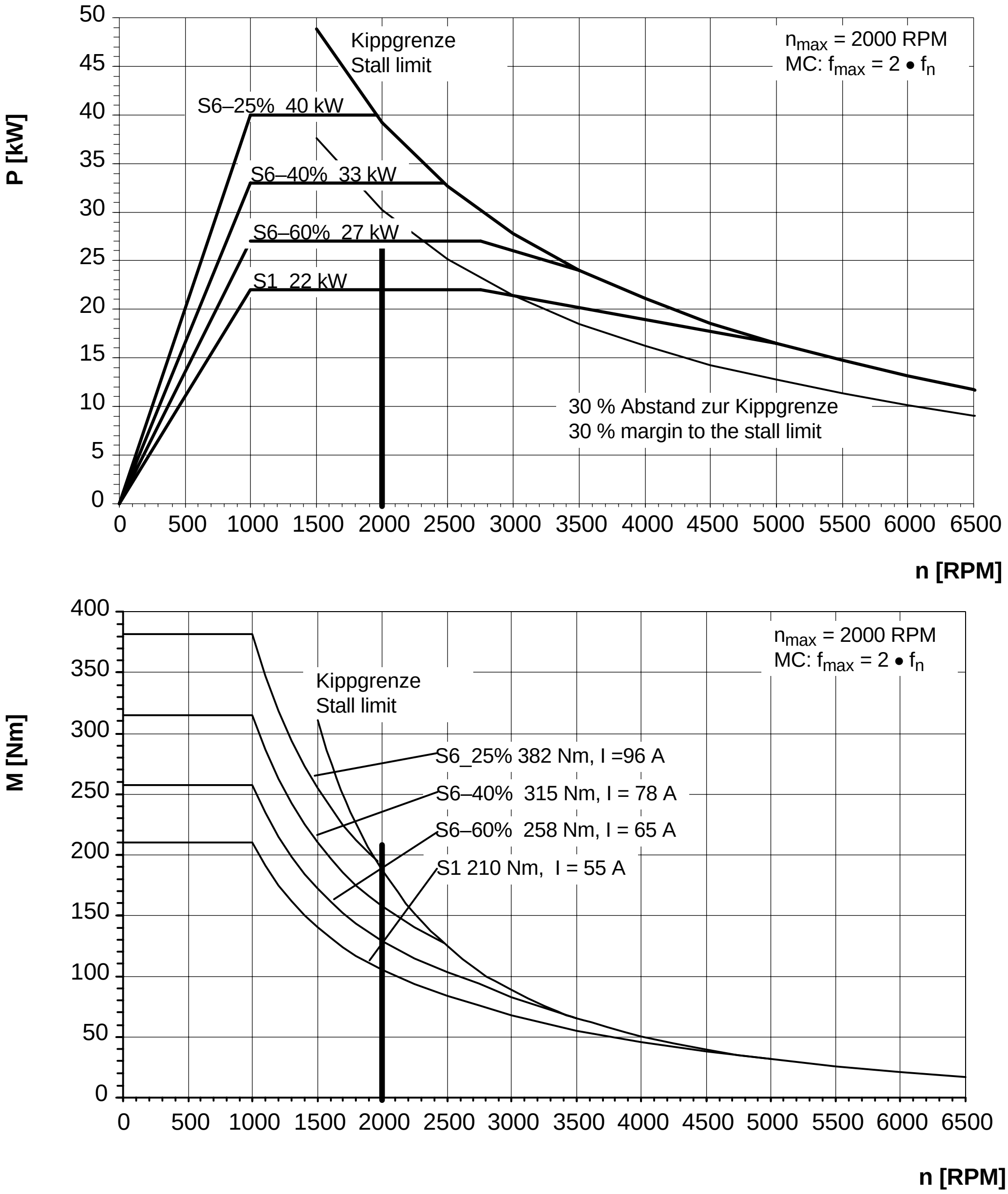

Fig. 4-12 MASTERDRIVES MC, 1PH7163–□□D□□

Table 4-16 MASTERDRIVES MC, 400 V, 1PH7167–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1000	28	267	71	312	34.2	2000	2000	2000	33

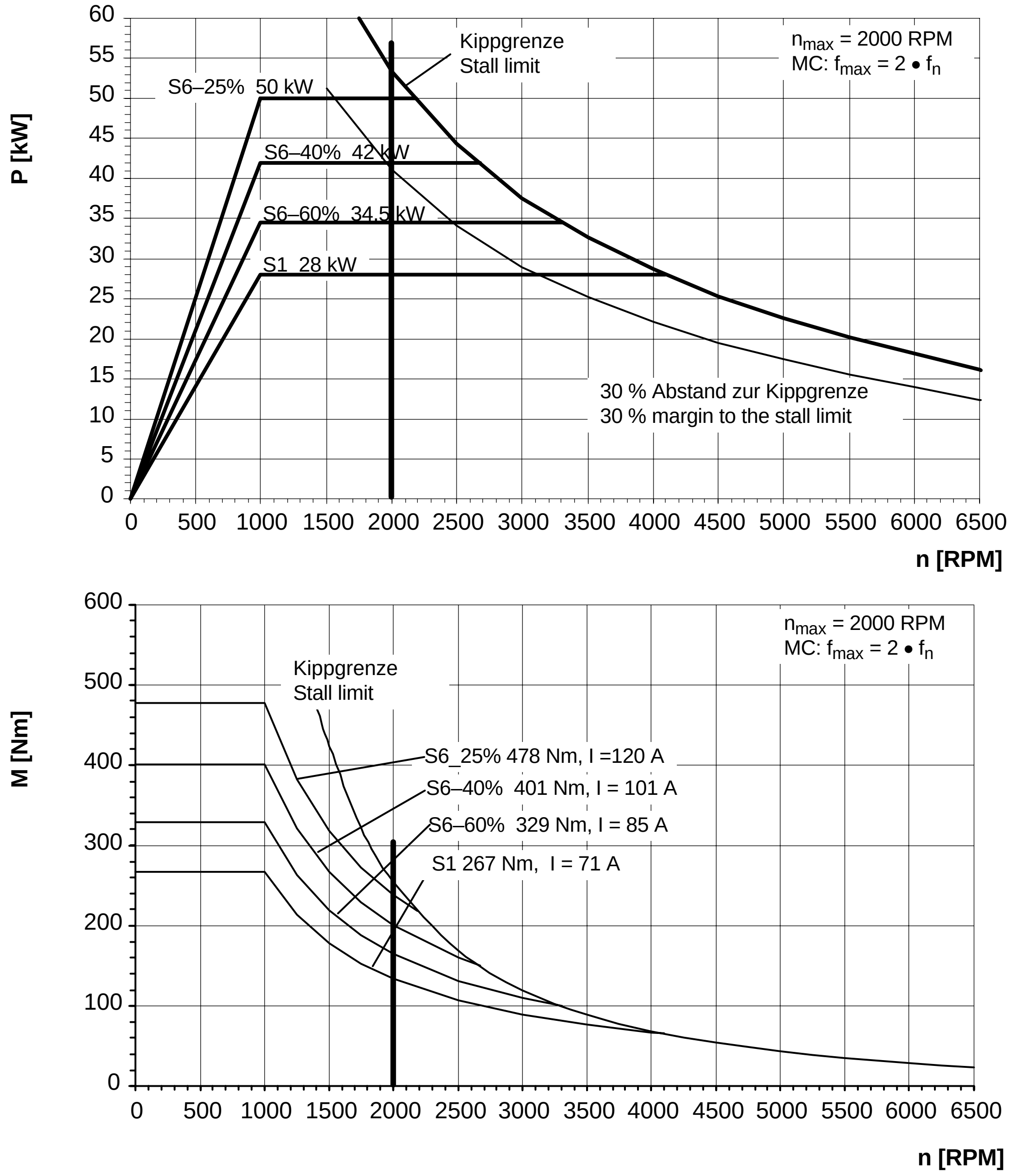

Fig. 4-13 MASTERDRIVES MC, 1PH7167–□□D□□

Table 4-17 MASTERDRIVES MC, 400 V, 1PH7184–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1000	39	372	90	335	34.2	2000	2000	2000	44

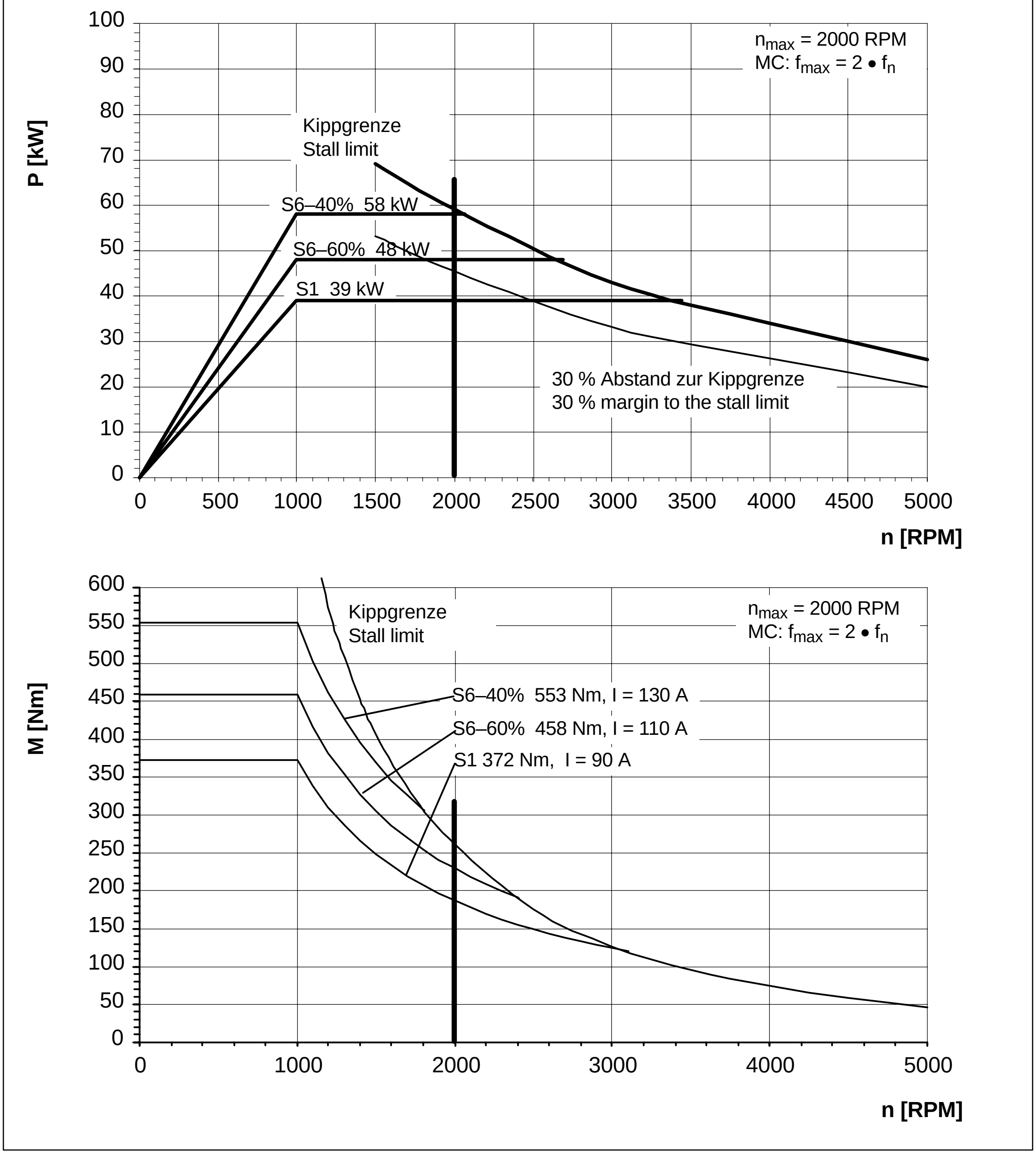

Fig. 4-14 MASTERDRIVES MC, 1PH7184–□□D□□

Table 4-18 MASTERDRIVES MC, 400 V, 1PH7186–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1000	51	485	116	340	34.1	2000	2000	2000	58

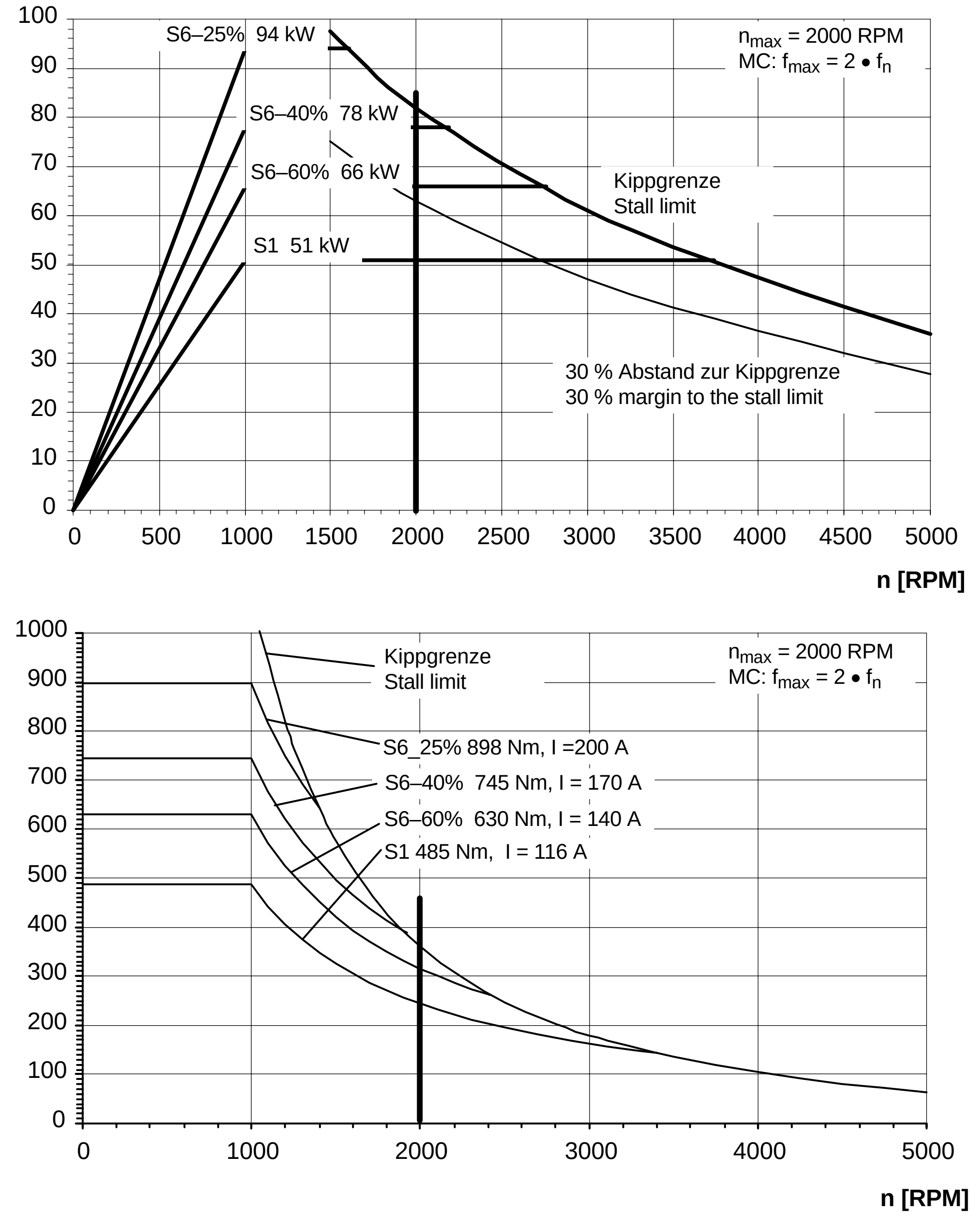

Fig. 4-15 MASTERDRIVES MC, 1PH7186–□□D□□

Table 4-19 MASTERDRIVES MC, 400 V, 1PH7224–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1000	71	678	161	335	33.9	2000	2000	2000	78.5

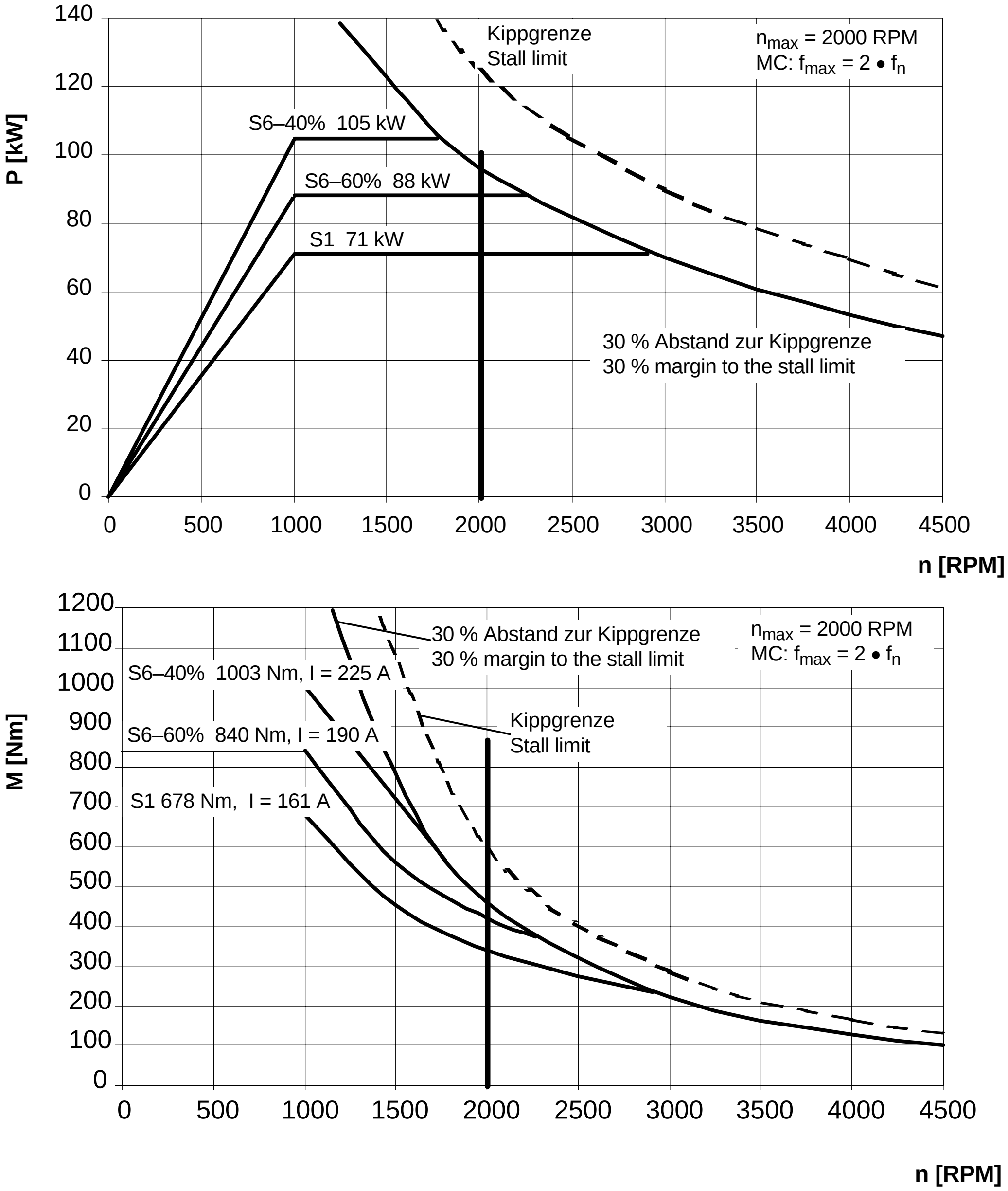

Fig. 4-16 MASTERDRIVES MC, 1PH7224–□□D□□

Table 4-20 MASTERDRIVES MC, 400 V, 1PH7226–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1000	92	880	198	340	33.9	2000	2000	4500	87.5

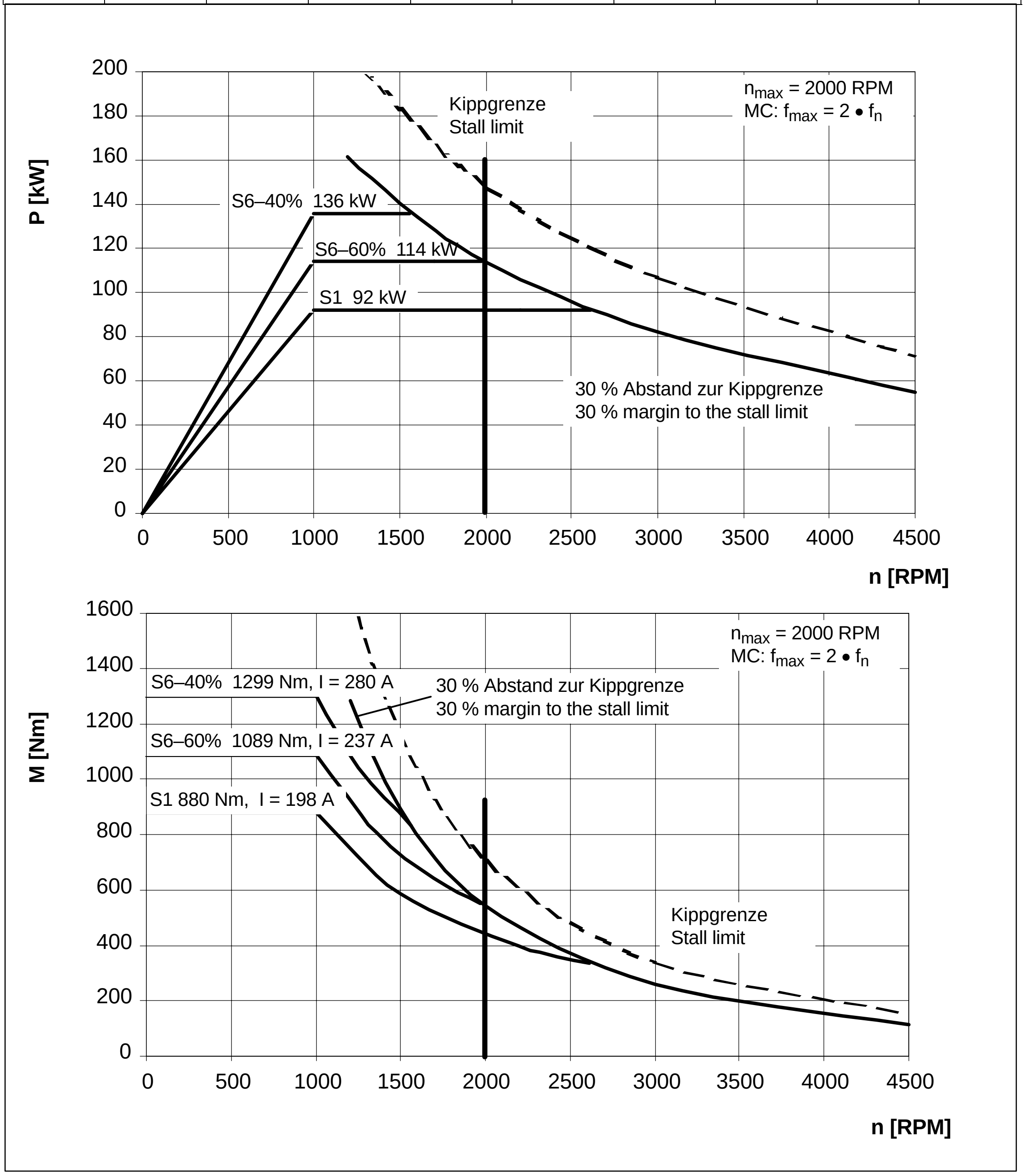

Fig. 4-17 MASTERDRIVES MC, 1PH7226–□□D□□

Table 4-21 MASTERDRIVES MC, 400 V, 1PH7228–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1000	113	1080	240	340	33.9	2000	2000	2000	98

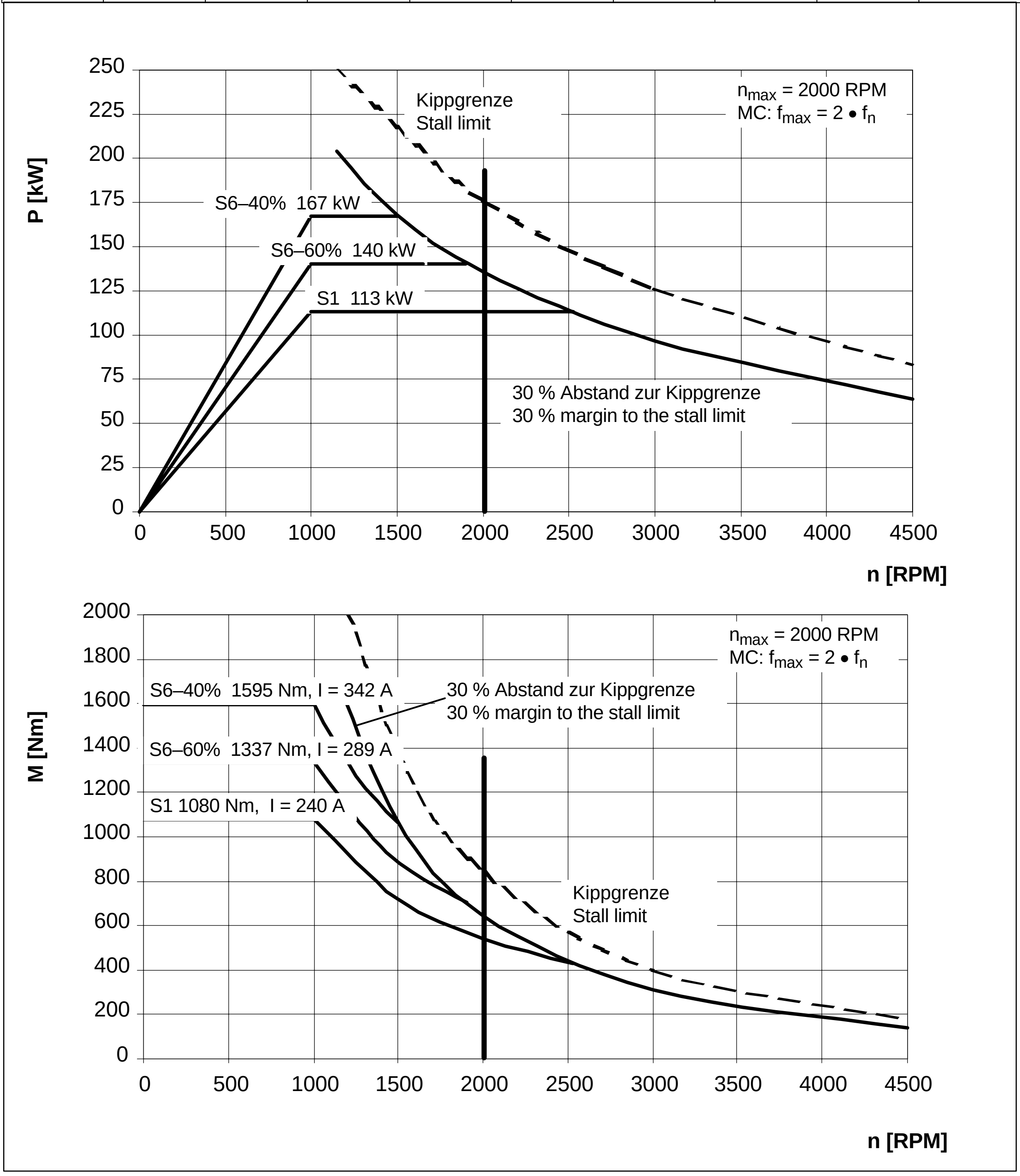

Fig. 4-18 MASTERDRIVES MC, 1PH7228–□□D□□

Table 4-22 MASTERDRIVES MC, 400 V, 1PH7101–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1500	3.7	24	10	350	51.6	3000	3000	3000	5.9

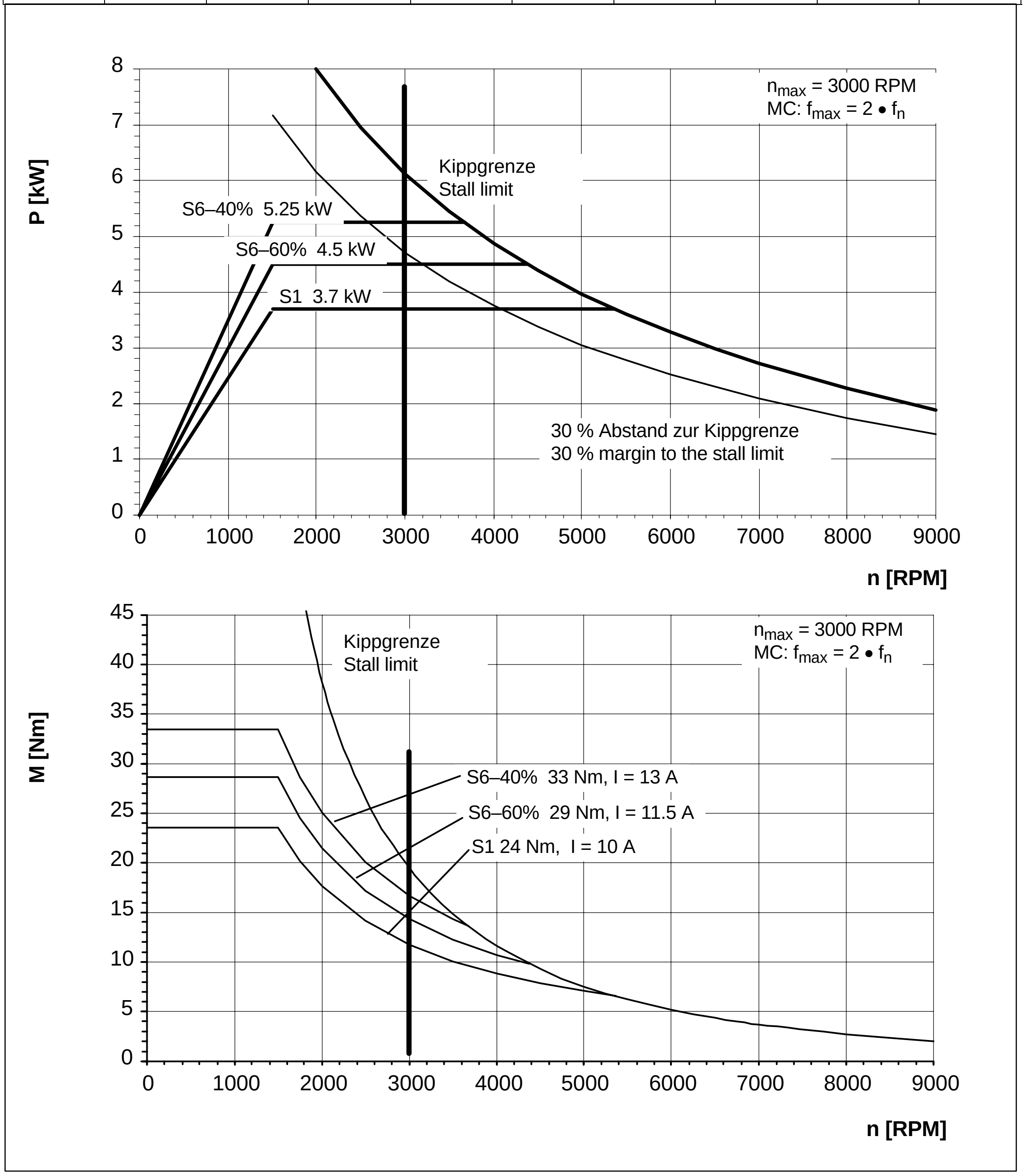

Fig. 4-19 MASTERDRIVES MC, 1PH7101–□□F□□

Table 4-23 MASTERDRIVES MC, 400 V, 1PH7103–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1500	5.5	35	13	350	52.7	2100	3000	3000	5.4

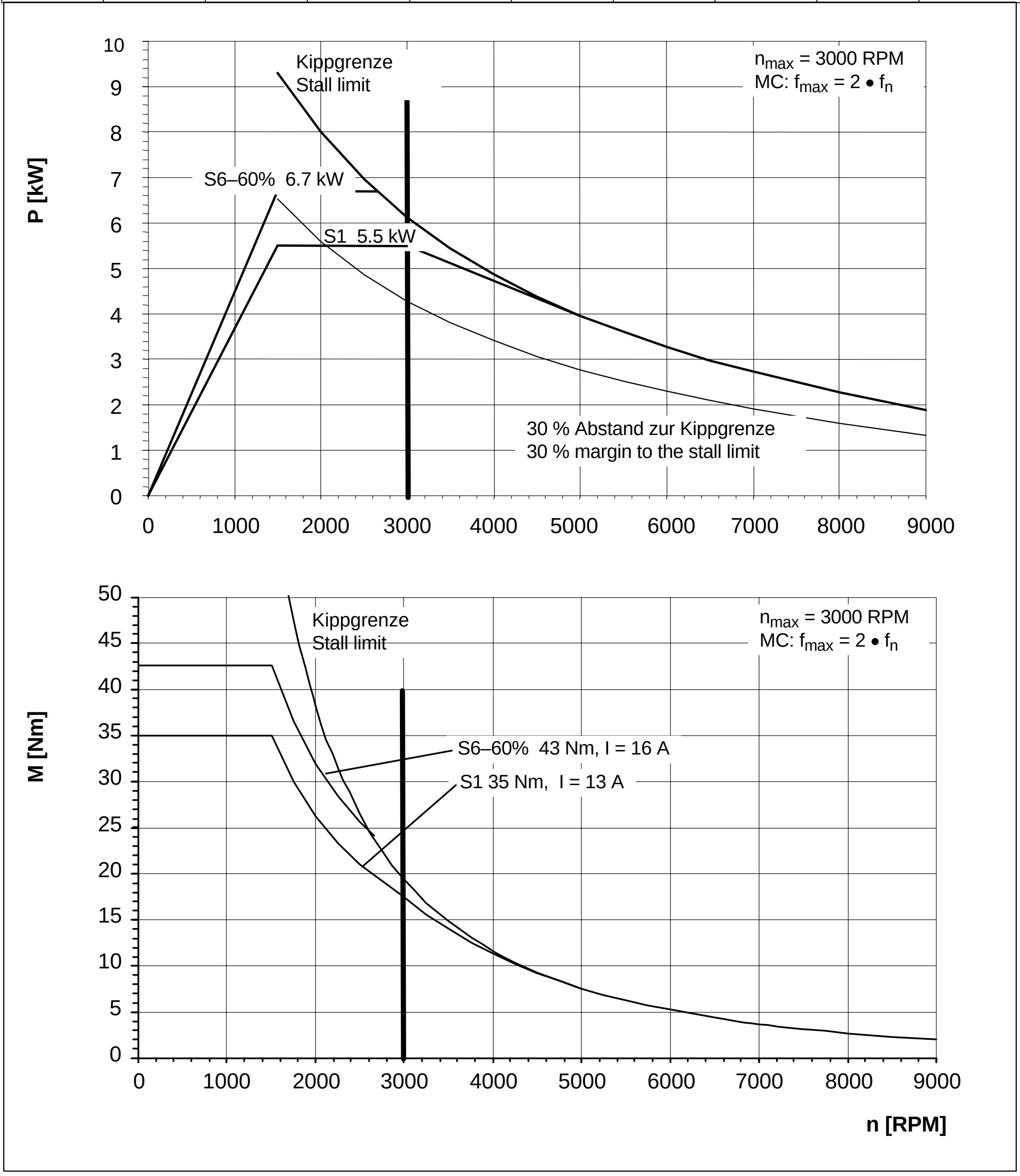

Fig. 4-20 MASTERDRIVES MC, 1PH7103–□□F□□

Table 4-24 MASTERDRIVES MC, 400 V, 1PH7105–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1500	7.0	45	17.5	346	51.7	3000	3000	3000	9.4

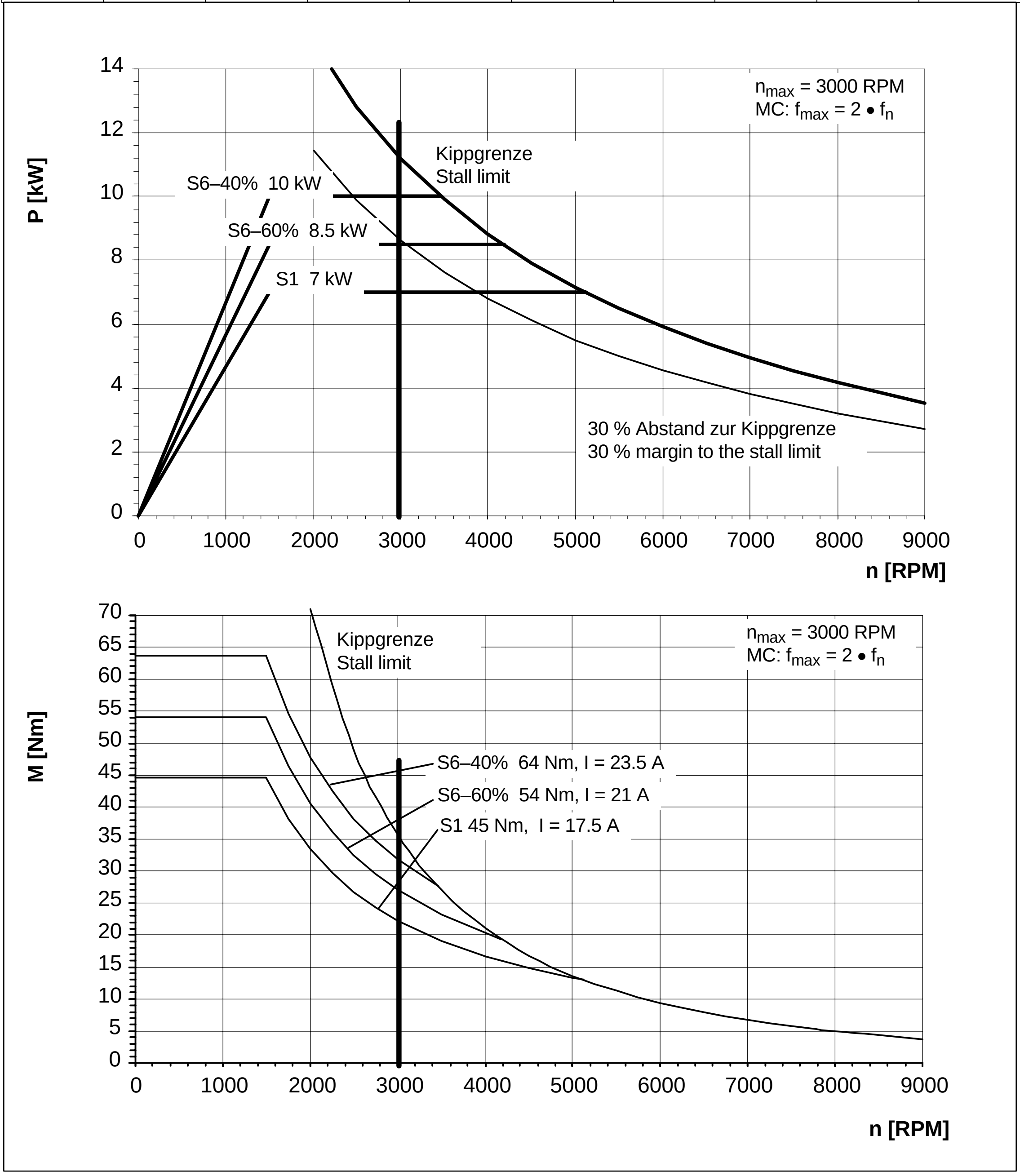

Fig. 4-21 MASTERDRIVES MC, 1PH7105–□□F□□

Table 4-25 MASTERDRIVES MC, 400 V, 1PH7107–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1500	9.0	57	23.5	336	52.0	3000	3000	3000	11

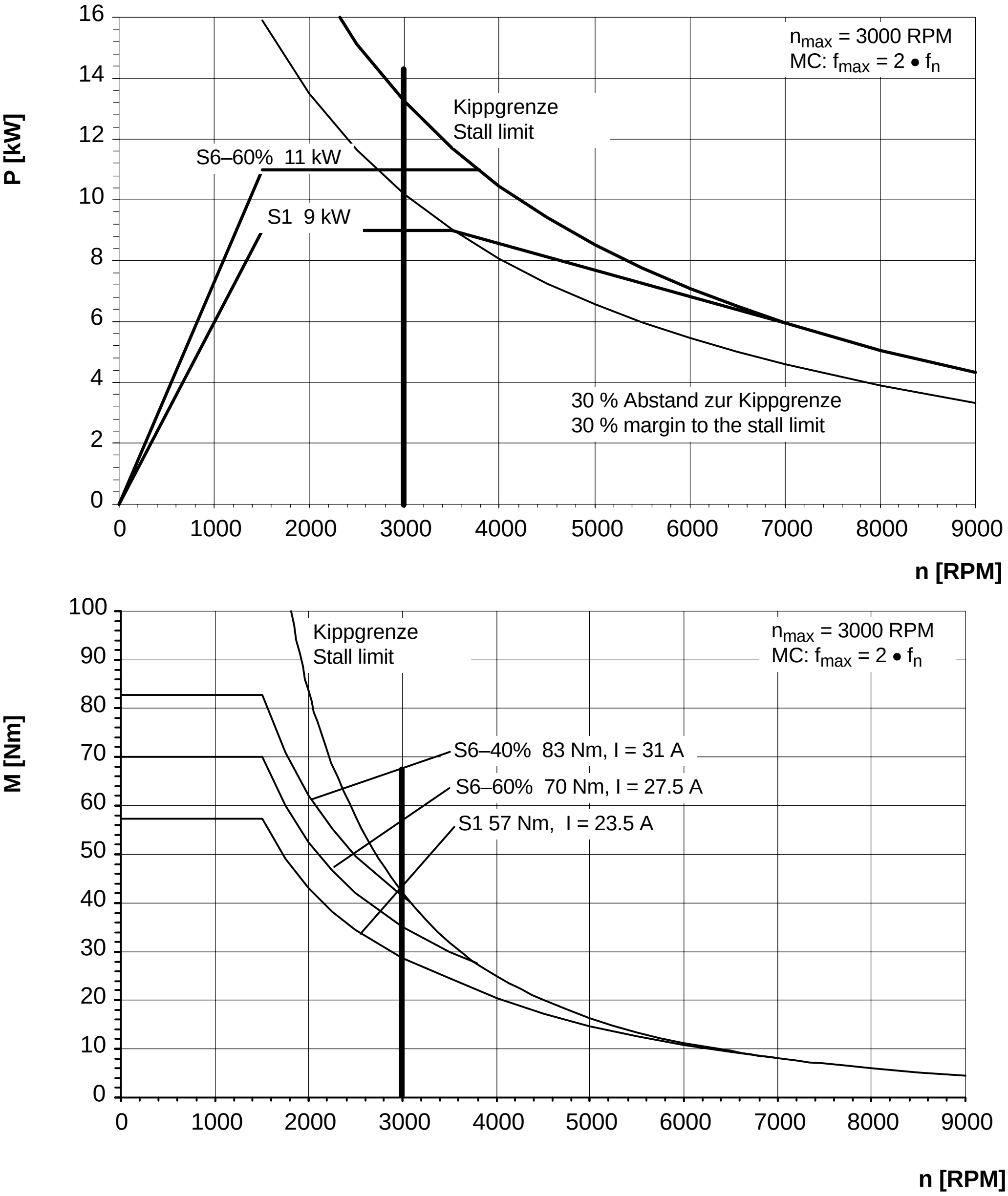

Fig. 4-22 MASTERDRIVES MC, 1PH7107–□□F□□

Table 4-26 MASTERDRIVES MC, 400 V, 1PH7131–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1500	11	70	24	350	51.3	3000	3000	3000	8.4

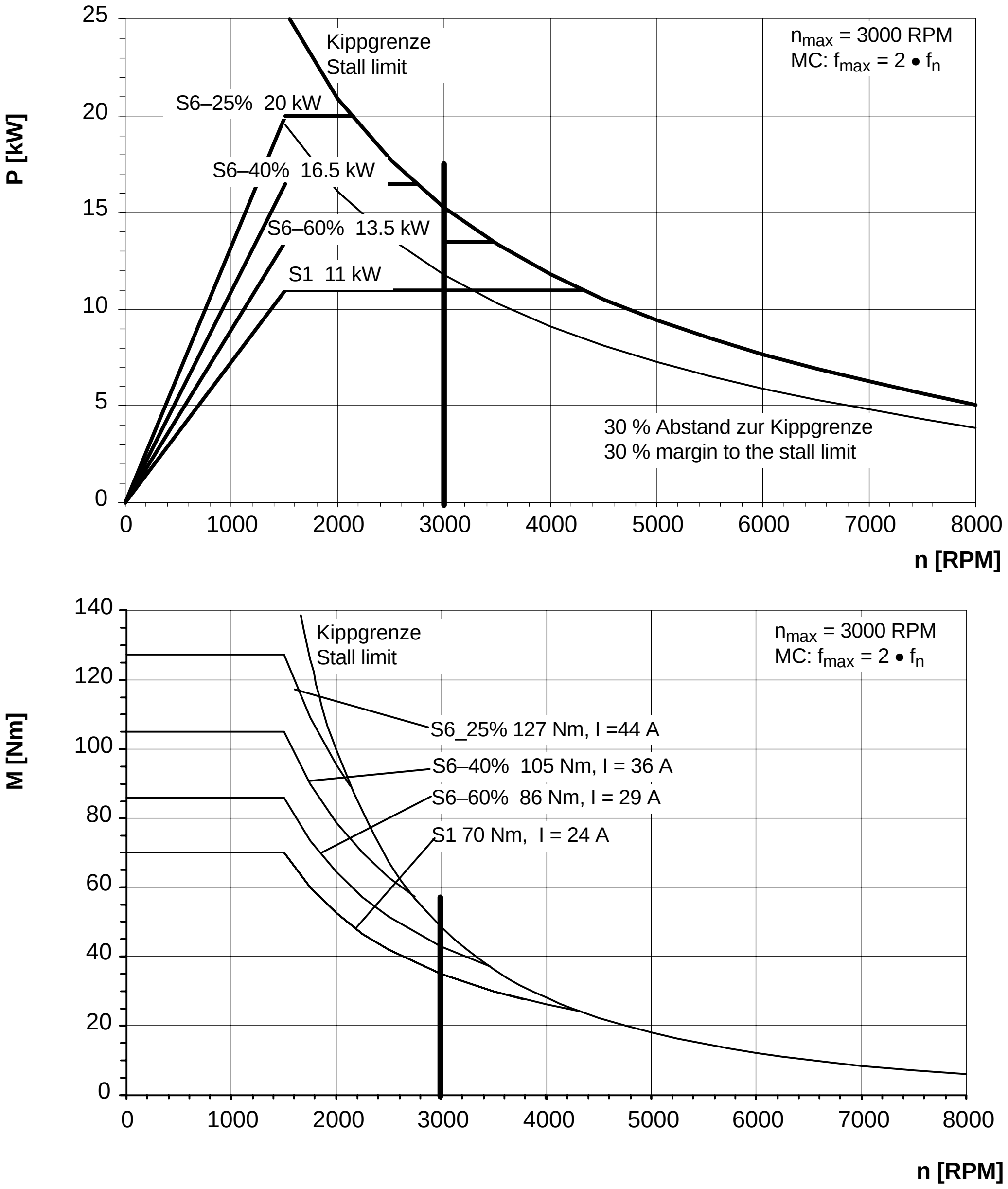

Fig. 4-23 MASTERDRIVES MC, 1PH7131–□□F□□

Table 4-27 MASTERDRIVES MC, 400 V, 1PH7133–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1500	15	96	34	346	51.3	3000	3000	3000	14

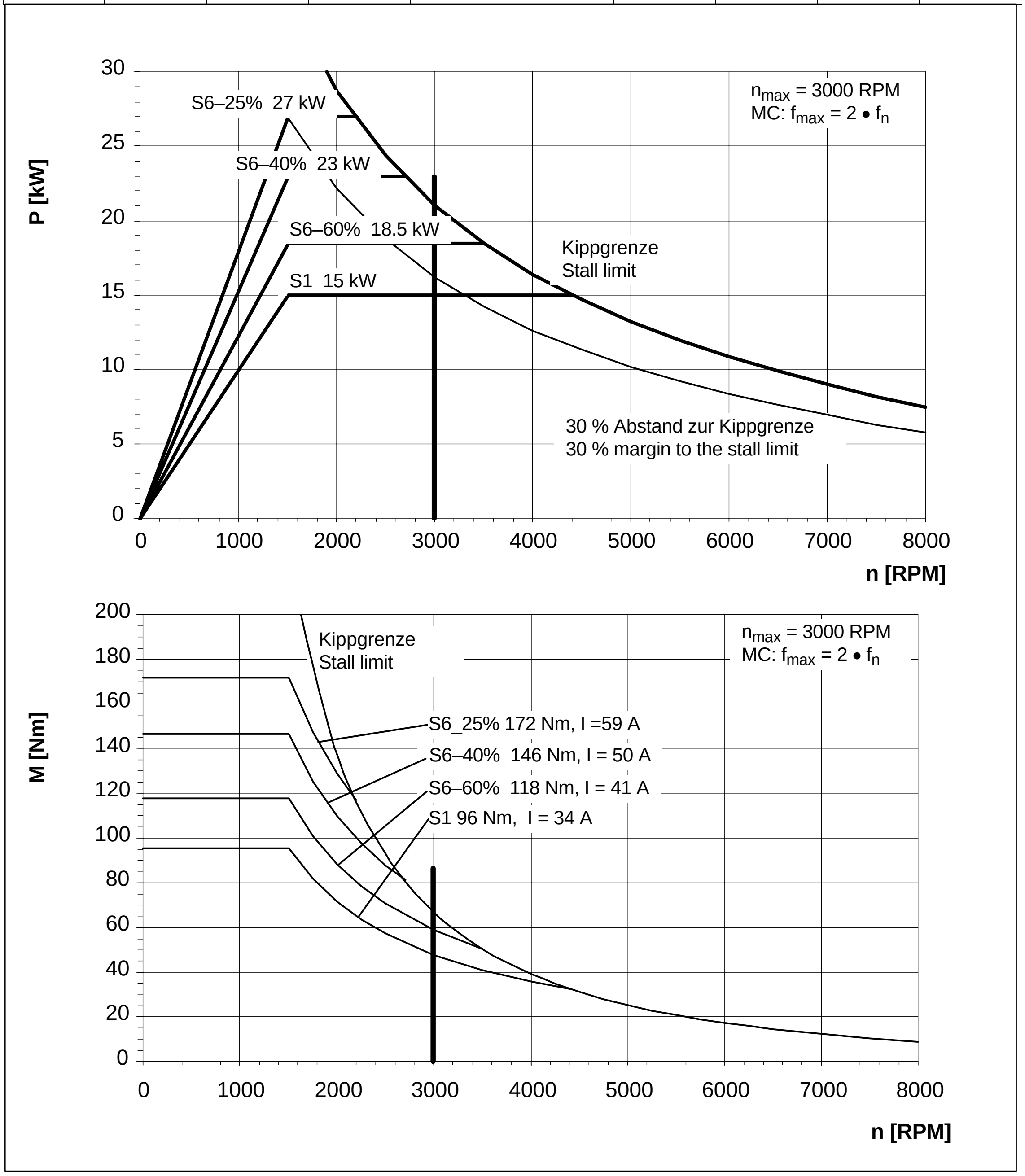

Fig. 4-24 MASTERDRIVES MC, 1PH7133–□□F□□

Table 4-28 MASTERDRIVES MC, 400 V, 1PH7135–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1500	18.5	118	42	350	51.1	3000	3000	3000	17

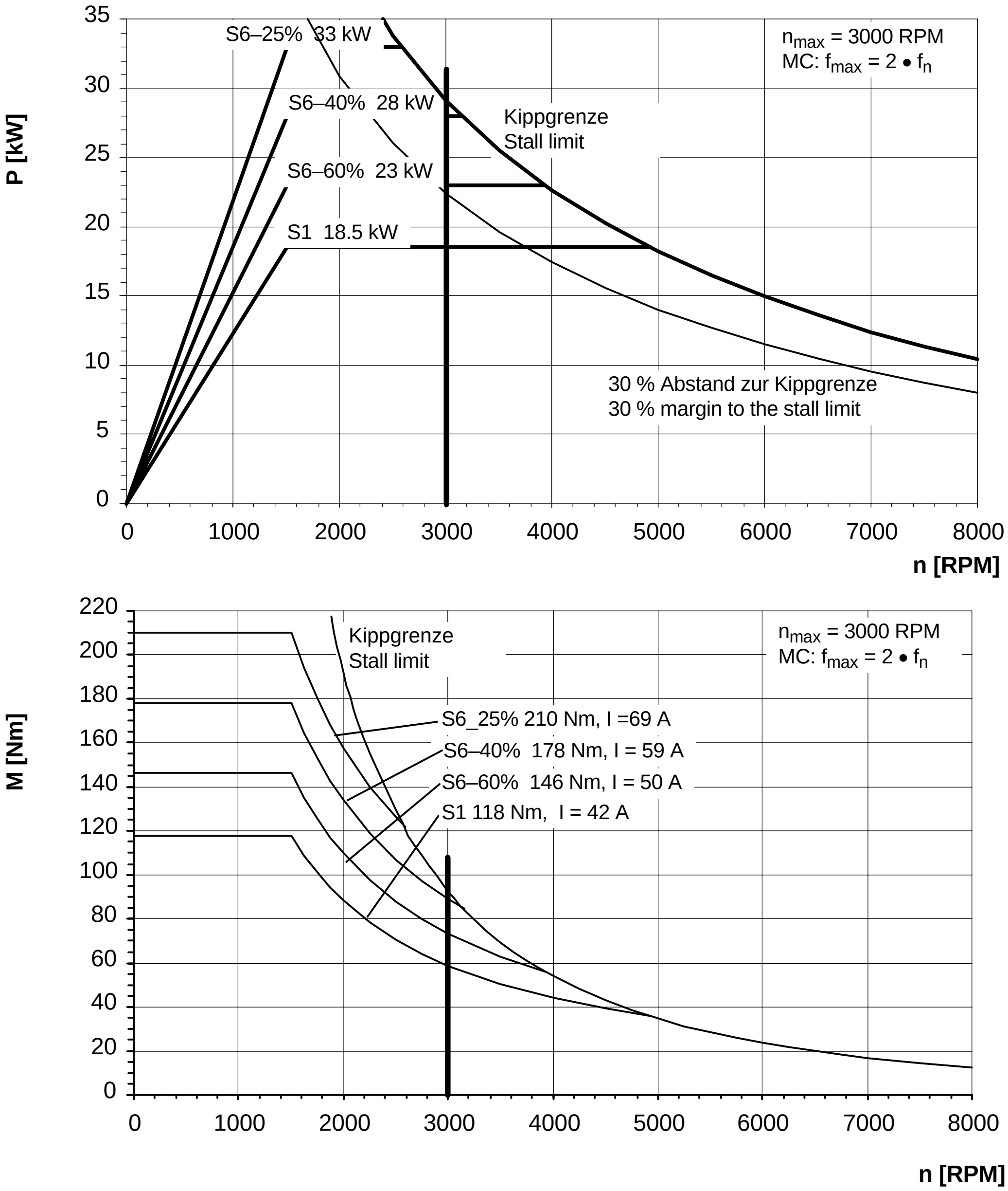

Fig. 4-25 MASTERDRIVES MC, 1PH7135–□□F□□

Table 4-29 MASTERDRIVES MC, 400 V, 1PH7137–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1500	22	140	57	308	51.2	3000	3000	3000	23

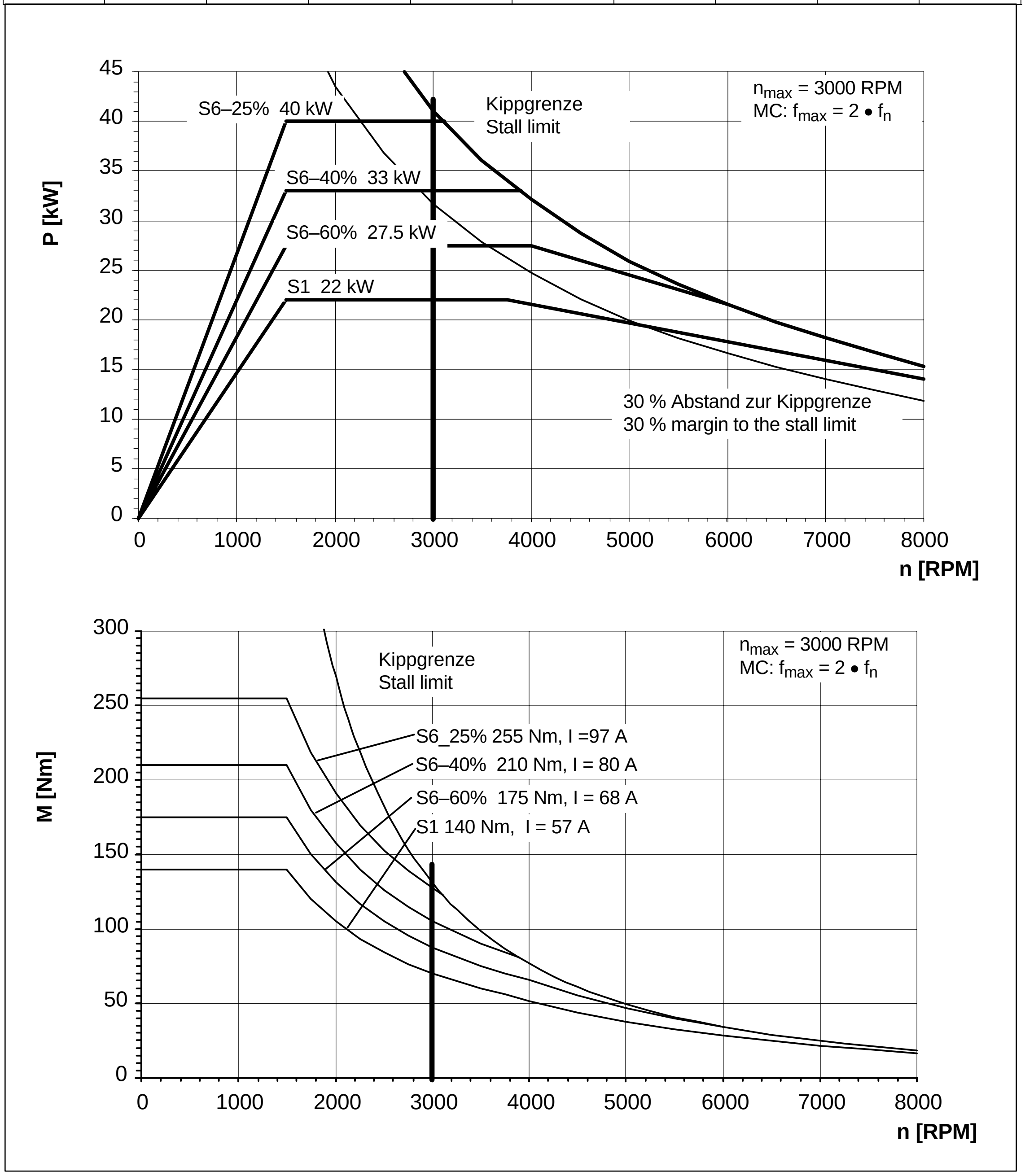

Fig. 4-26 MASTERDRIVES MC, 1PH7137–□□F□□

Table 4-30 MASTERDRIVES MC, 400 V, 1PH7163–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1500	30	191	72	319	50.9	3000	3000	3000	30

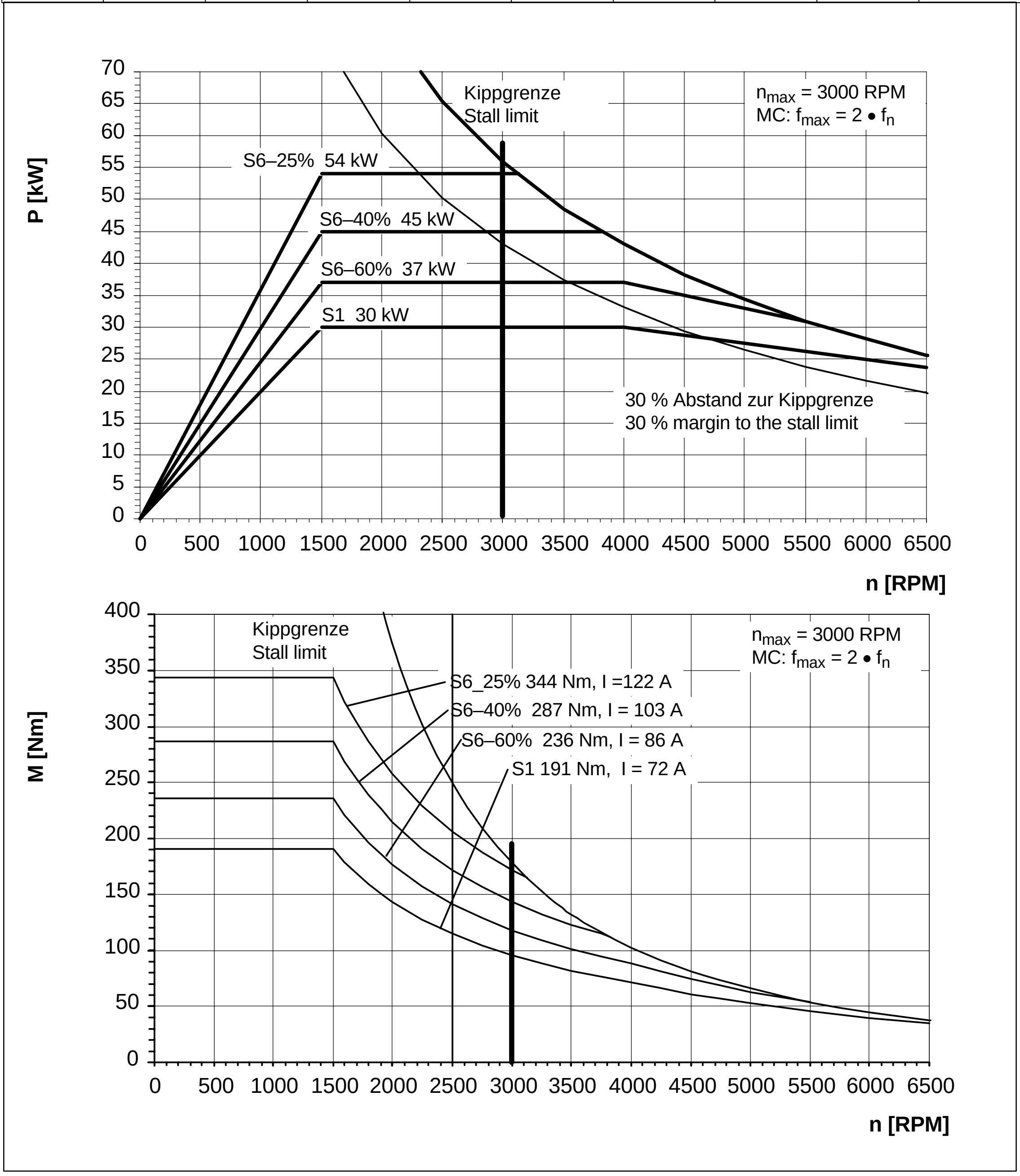

Fig. 4-27 MASTERDRIVES MC, 1PH7163–□□F□□

Table 4-31 MASTERDRIVES MC, 400 V, 1PH7167–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1500	37	236	82	350	50.8	2800	3000	3000	32

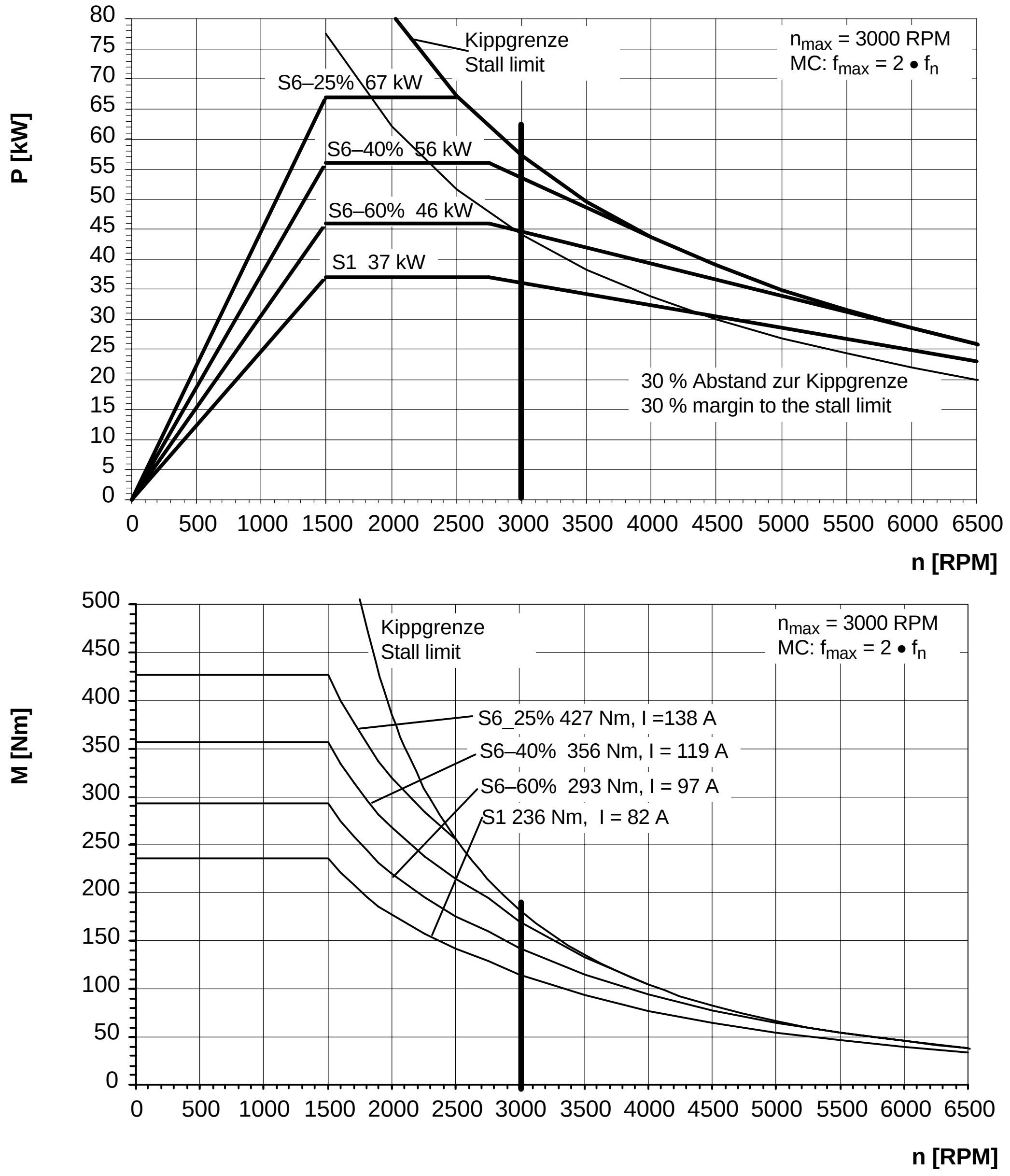

Fig. 4-28 MASTERDRIVES MC, 1PH7167–□□F□□

Table 4-32 MASTERDRIVES MC, 400 V, 1PH7184–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1500	51	325	120	335	50.7	3000	3000	3000	64

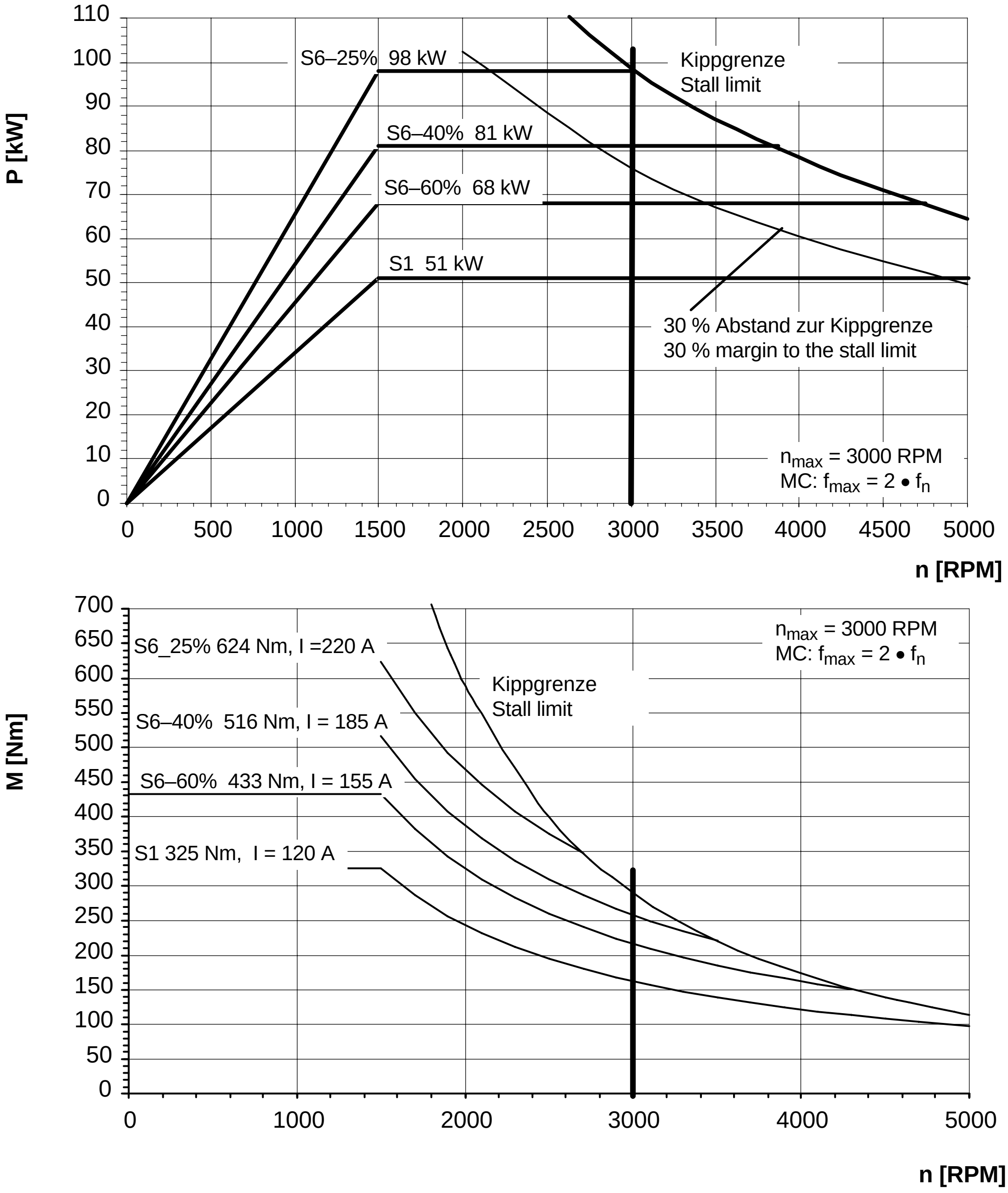

Fig. 4-29 MASTERDRIVES MC, 1PH7184–□□F□□

Table 4-33 MASTERDRIVES MC, 400 V, 1PH7186–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1500	74	471	170	330	50.7	3000	3000	3000	84

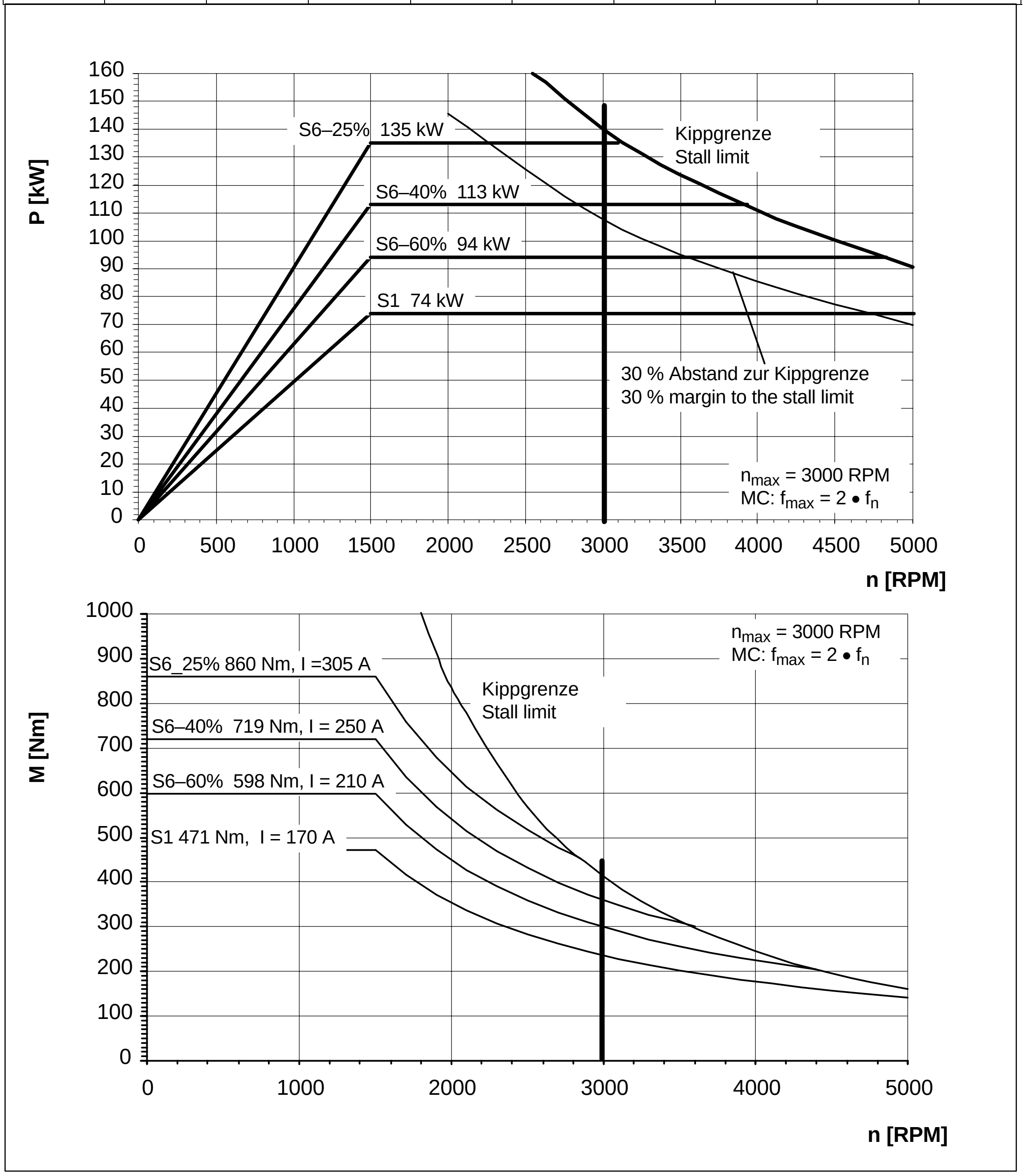

Fig. 4-30 MASTERDRIVES MC, 1PH7186–□□F□□

Table 4-34 MASTERDRIVES MC, 400 V, 1PH7224–□□U□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1500	95	605	204	340	50.6	2900	3000 [1]	3000	88.5

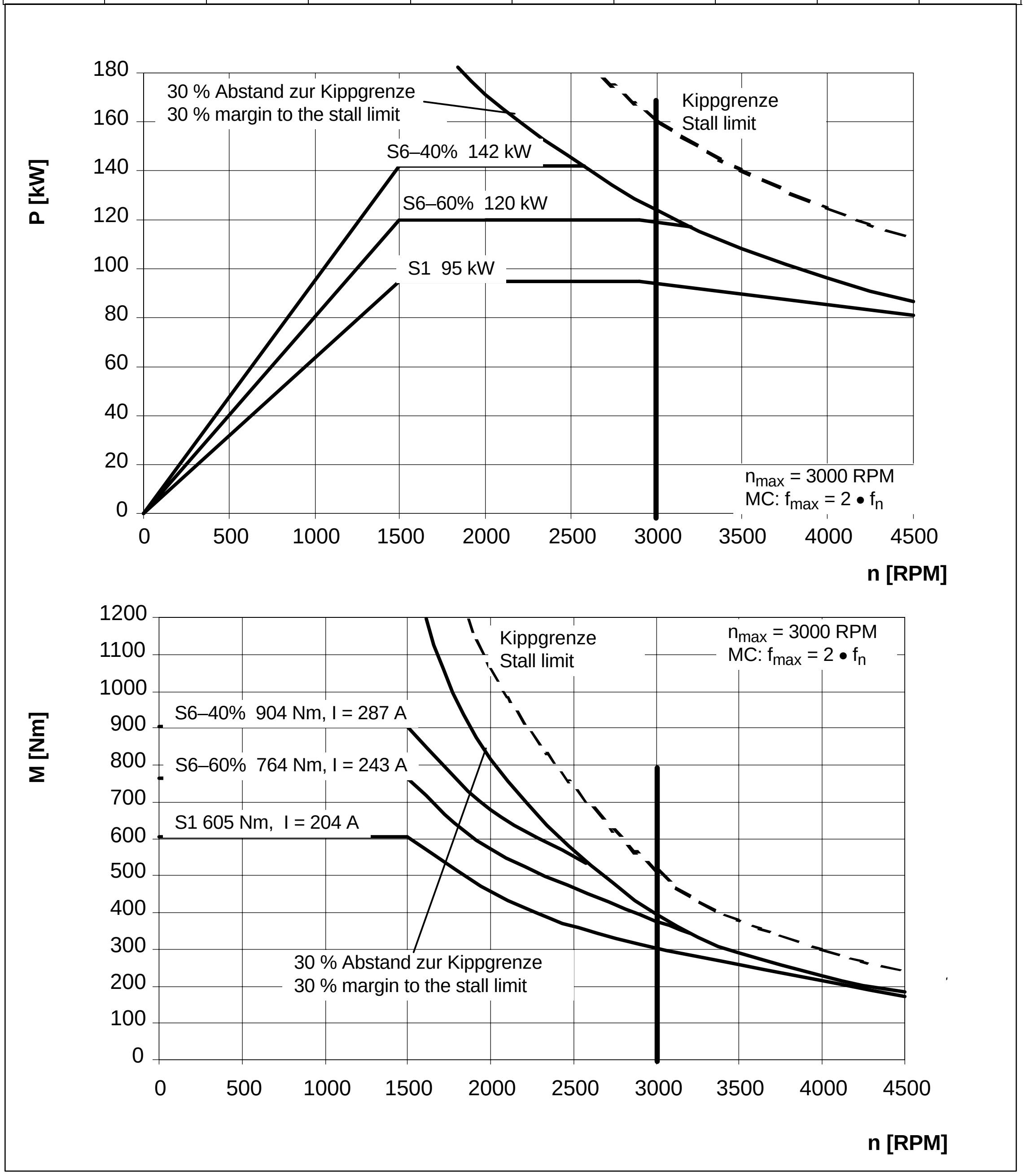

Fig. 4-31 MASTERDRIVES MC, 1PH7224–□□U□□

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[1] 2700 RPM for increased cantilever forces

Table 4-35 MASTERDRIVES MC, 400 V, 1PH7226–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1500	130	828	278	340	50.6	2900	3000 [1]	3000	120

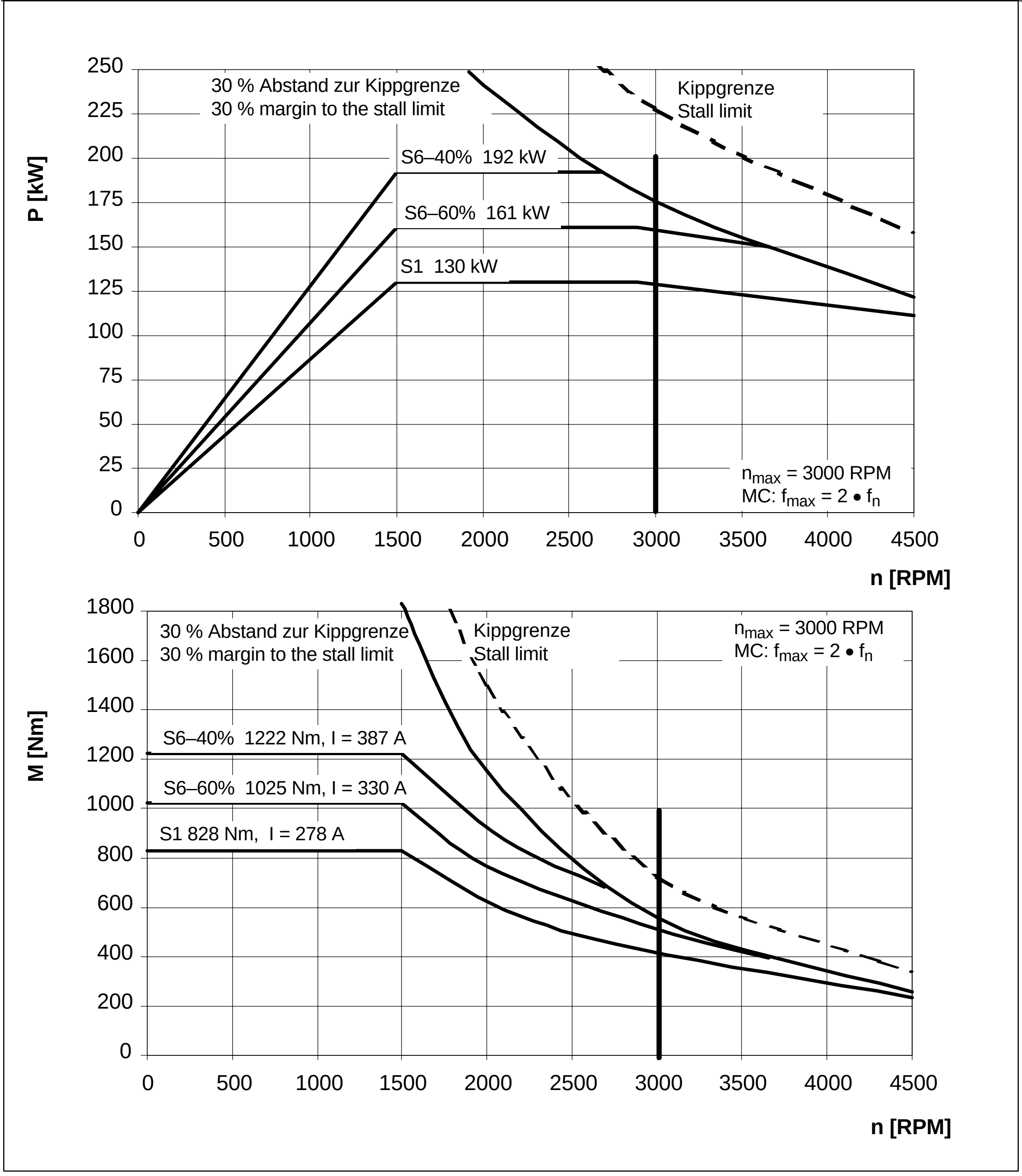

Fig. 4-32 MASTERDRIVES MC, 1PH7226–□□F□□

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[1] 2700 RPM for increased cantilever forces

Table 4-36 MASTERDRIVES MC, 400 V, 1PH7228–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1500	160	1019	350	340	50.5	2900	3000 [1]	3000	169

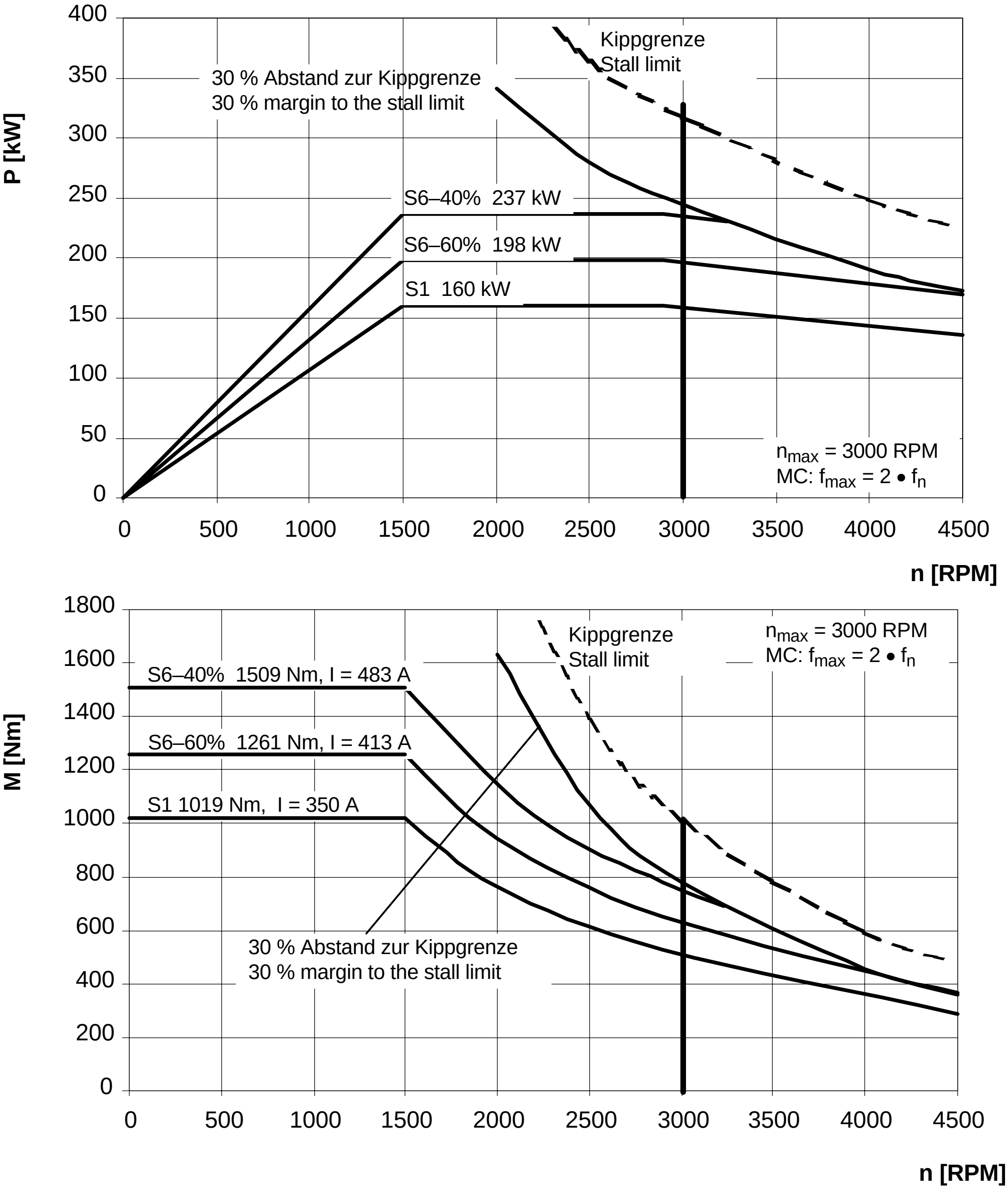

Fig. 4-33 MASTERDRIVES MC, 1PH7228–□□F□□

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[1] 2500 RPM for increased cantilever forces

Table 4-37 MASTERDRIVES MC, 400 V, 1PH7103–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	7	33	17.5	343	68.9	4000	4000	4000	8.3

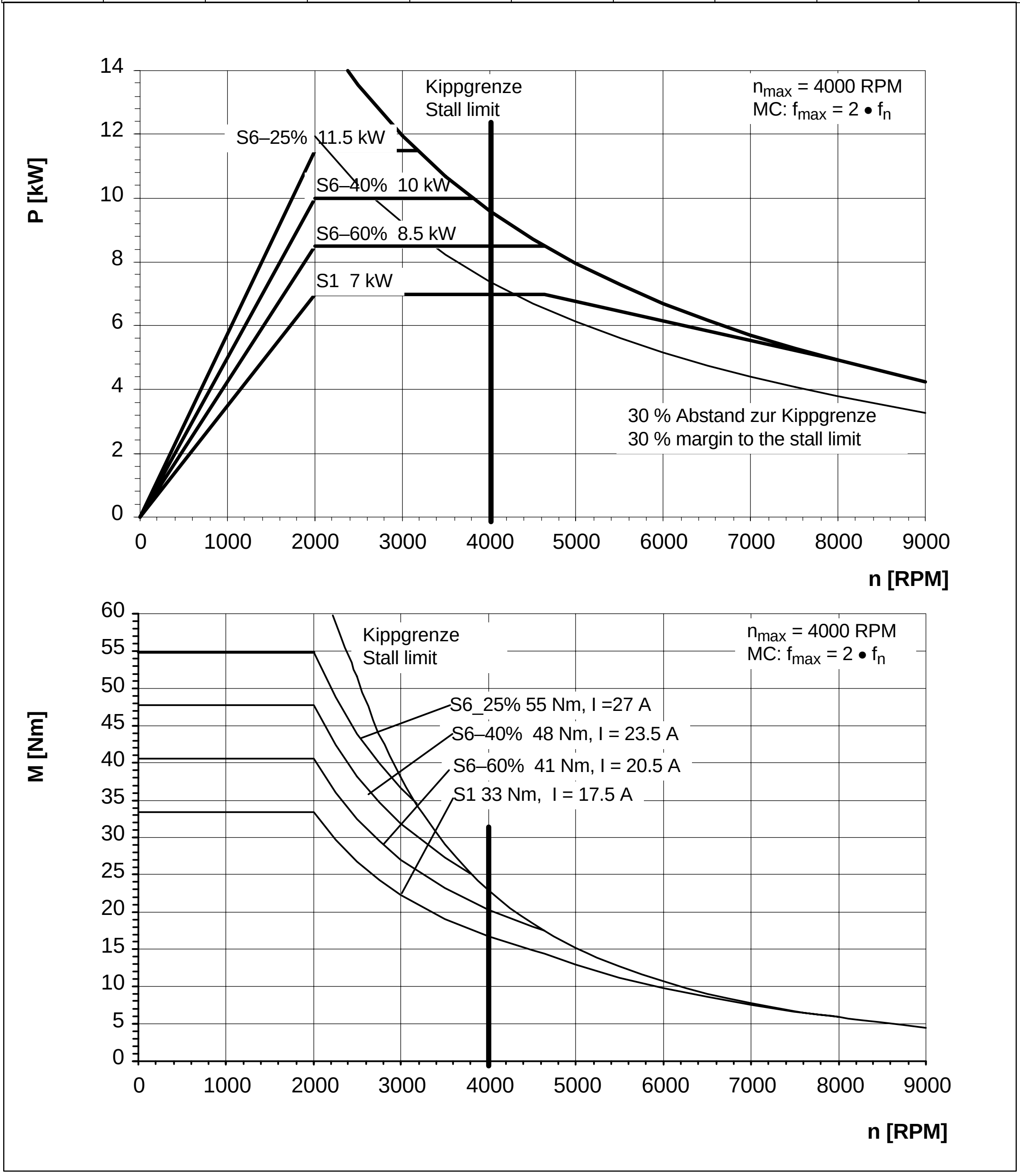

Fig. 4-34 MASTERDRIVES MC, 1PH7103–□□G□□

Table 4-38 MASTERDRIVES MC, 400 V, 1PH7107–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	10.5	50	26	350	68.6	4000	4000	4000	12

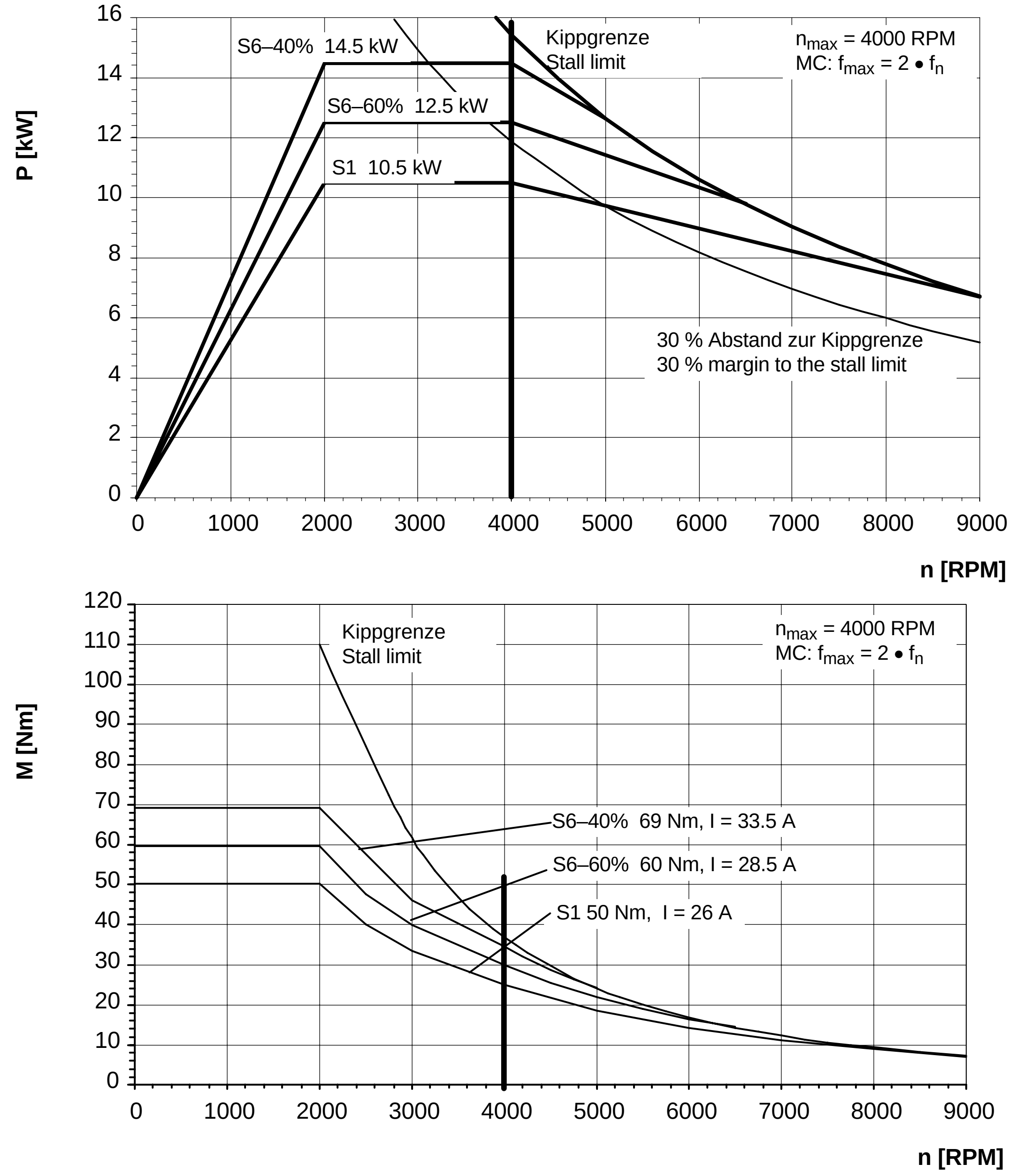

Fig. 4-35 MASTERDRIVES MC, 1PH7107–□□G□□

Table 4-39 MASTERDRIVES MC, 400 V, 1PH7133–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	20	96	45	350	68.0	3900	4000	4000	18

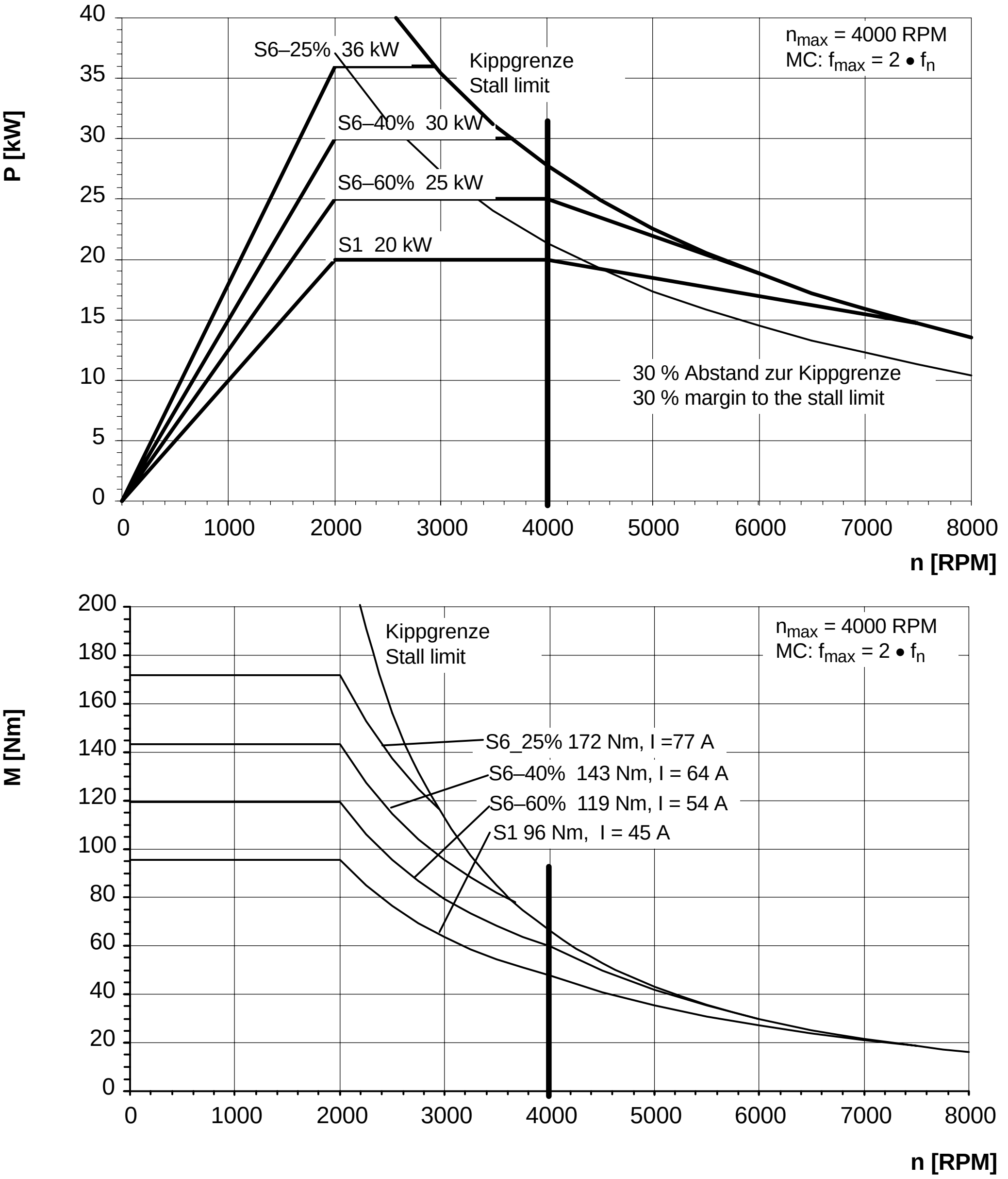

Fig. 4-36 MASTERDRIVES MC, 1PH7133–□□G□□

Table 4-40 MASTERDRIVES MC, 400 V, 1PH7137–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	28	134	60	350	68.0	3800	4000	4000	21

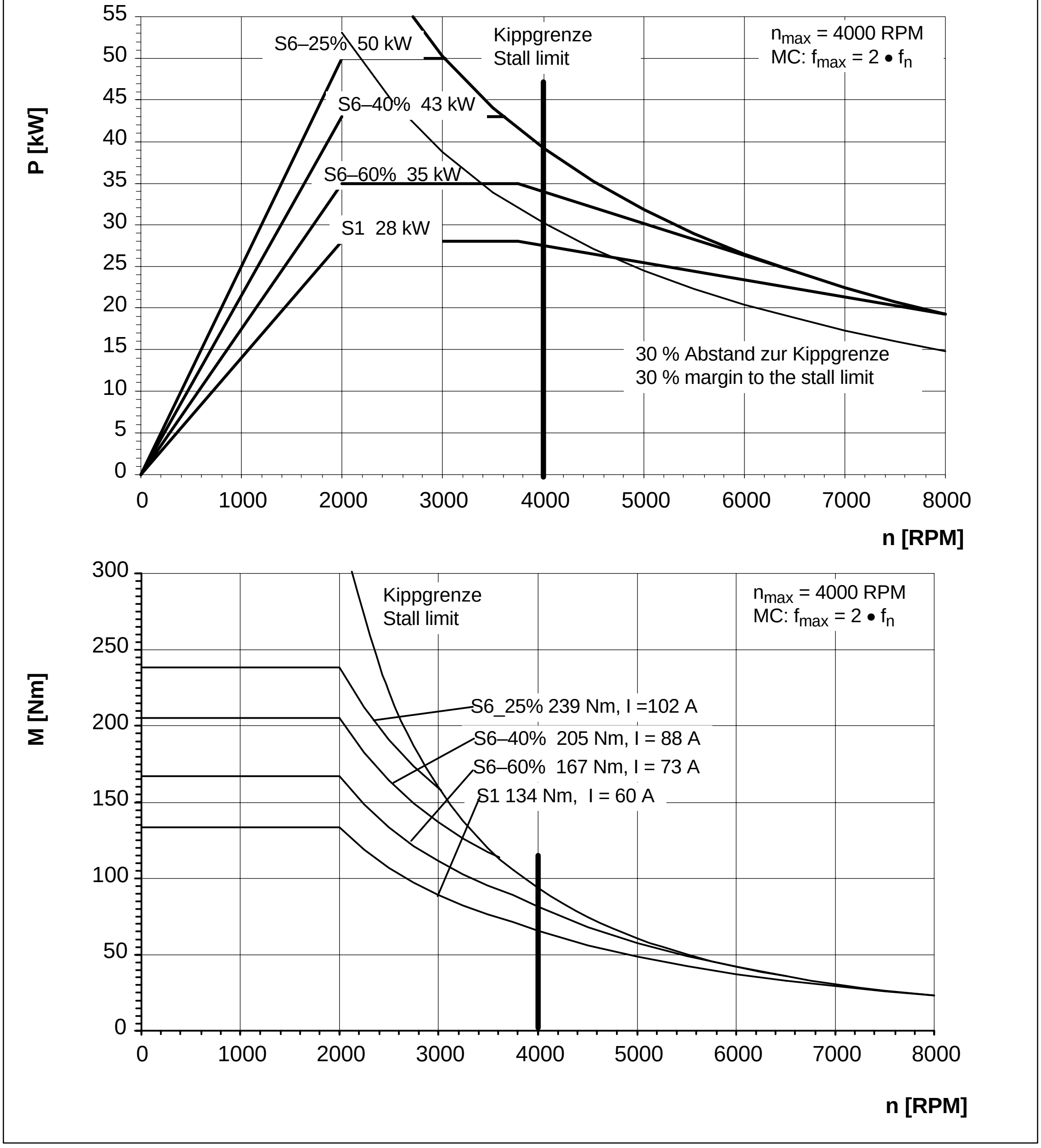

Fig. 4-37 MASTERDRIVES MC, 1PH7137–□□G□□

Table 4-41 MASTERDRIVES MC, 400 V, 1PH7163–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	36	172	85	333	67.5	3000	3700	4000	37

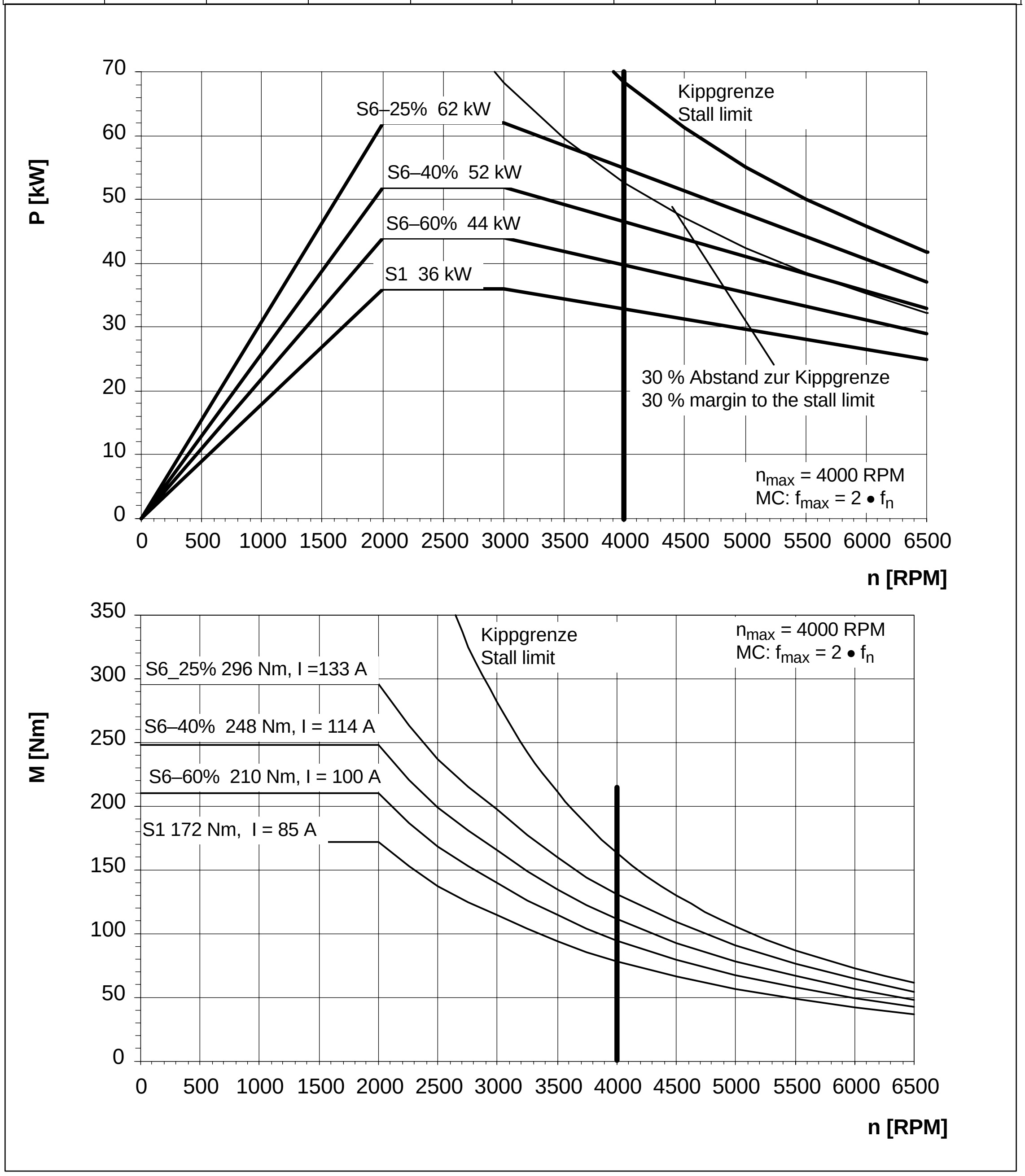

Fig. 4-38 MASTERDRIVES MC, 1PH7163–□□G□□

Table 4-42 MASTERDRIVES MC, 400 V, 1PH7167–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2000	41	196	89	350	67.4	2800	3700	4000	40

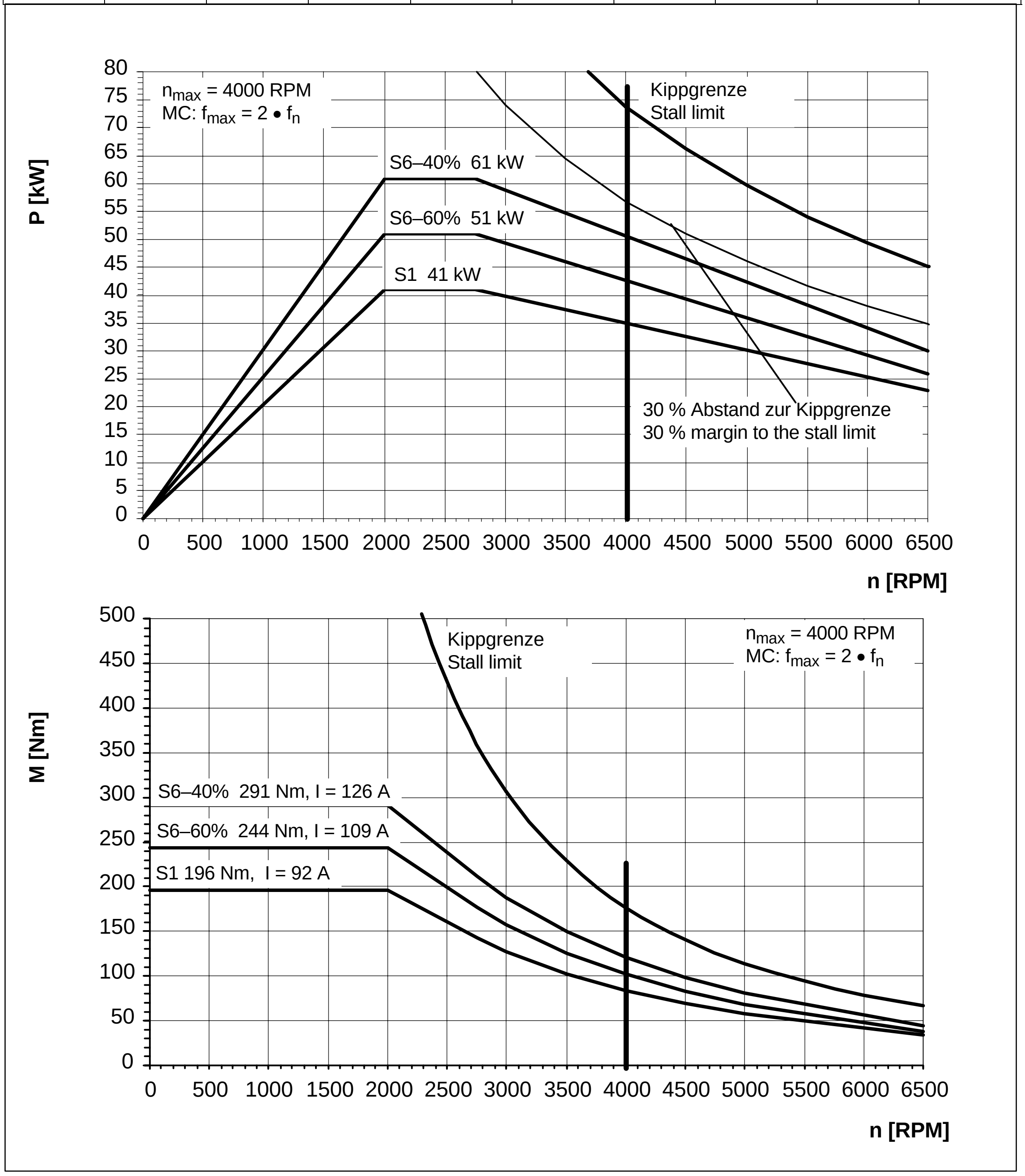

Fig. 4-39 MASTERDRIVES MC, 1PH7167–□□G□□

Table 4-43 MASTERDRIVES MC, 400 V, 1PH7184–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2500	78	298	171	340	84.1	5000	3500 1)	5000	77

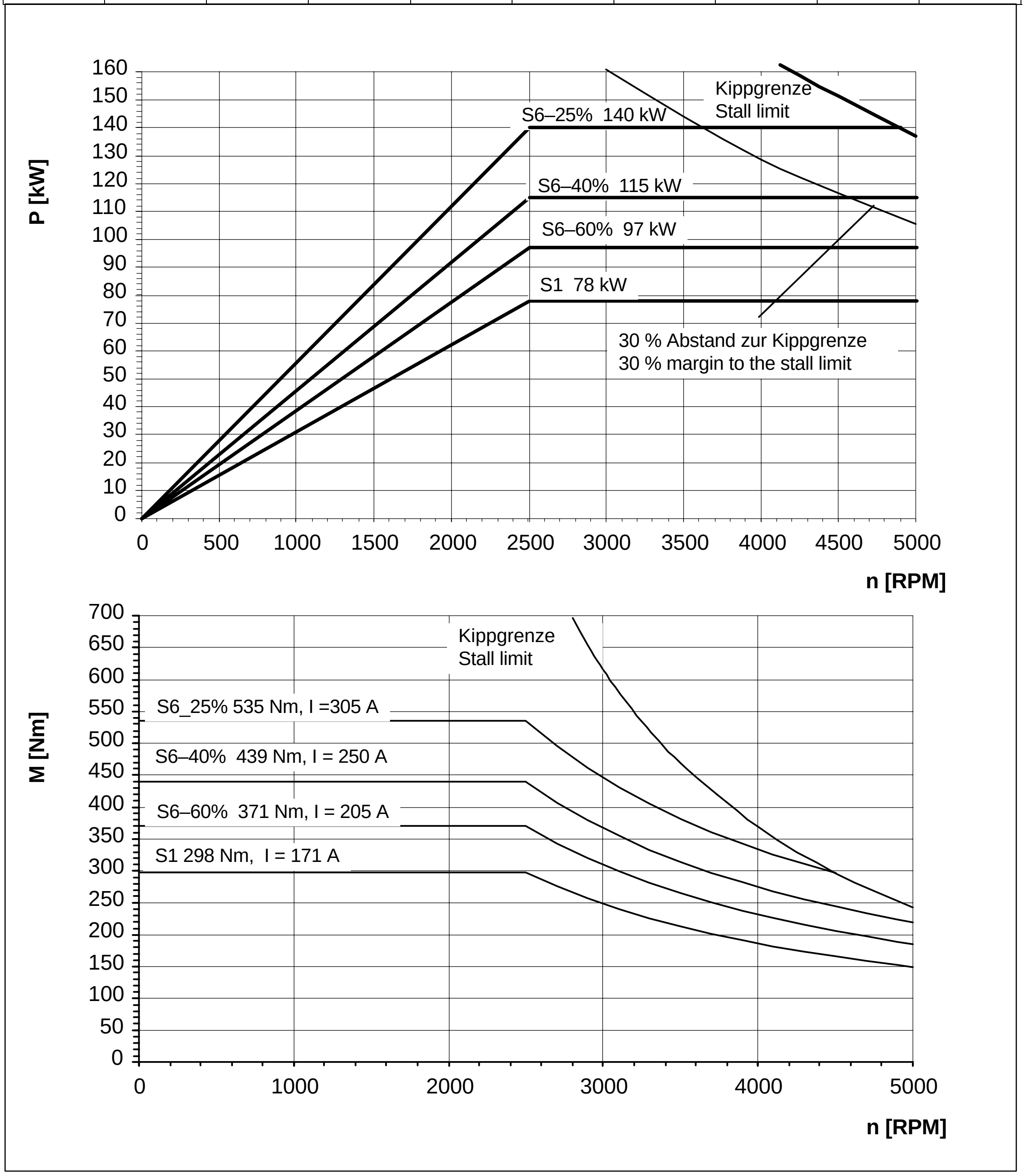

Fig. 4-40 MASTERDRIVES MC, 1PH7184–□□L□□

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1) 3000 RPM for increased cantilever forces

Table 4-44 MASTERDRIVES MC, 400 V, 1PH7186–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2500	106	405	235	335	84.1	5000	3500 [1]	5000	108

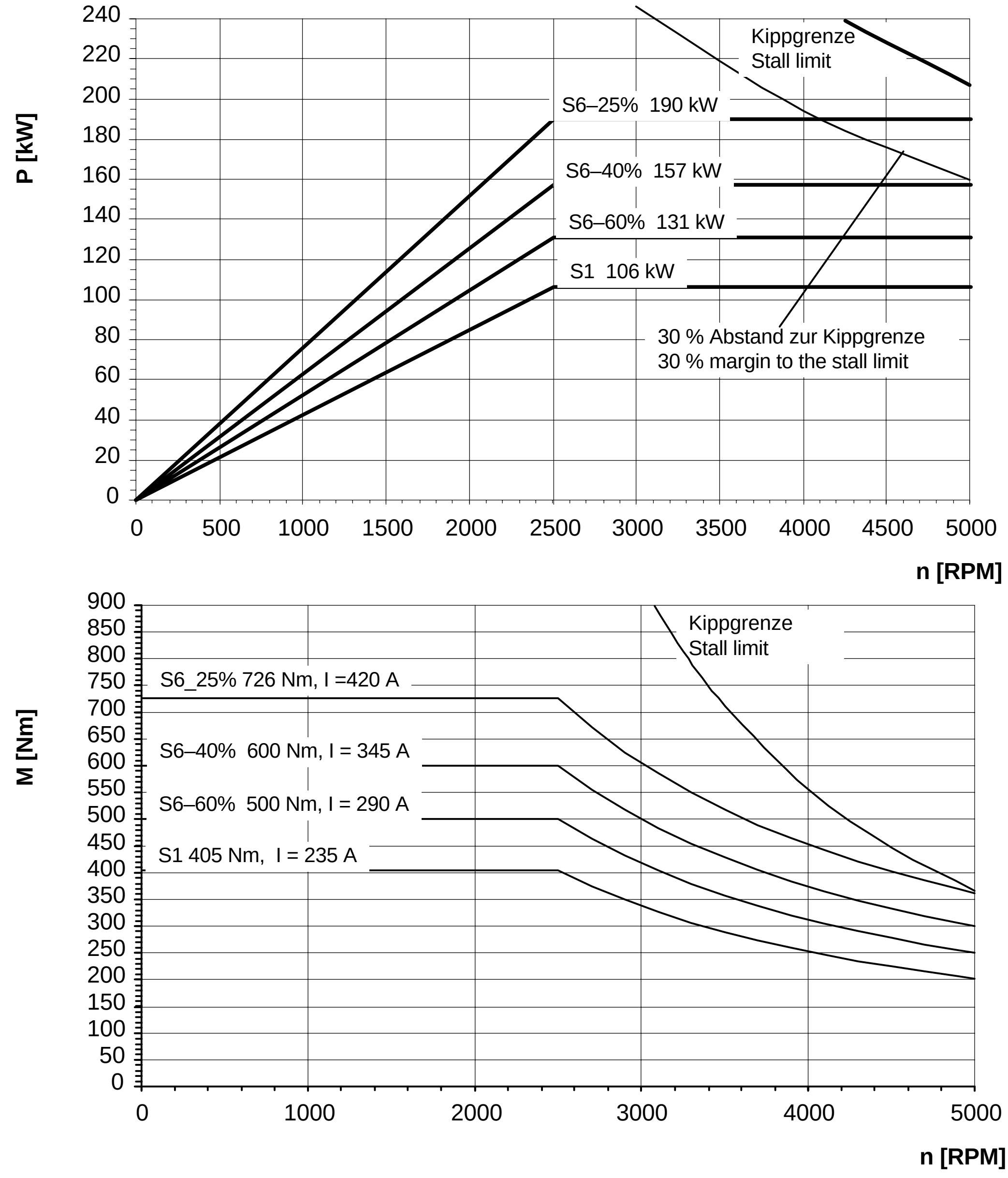

Fig. 4-41 MASTERDRIVES MC, 1PH7186–□□L□□

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[1] 3000 RPM for increased cantilever forces

Table 4-45 MASTERDRIVES MC, 400 V, 1PH7224–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2500	142	542	298	340	84.0	3500	3100 1)	4500	115

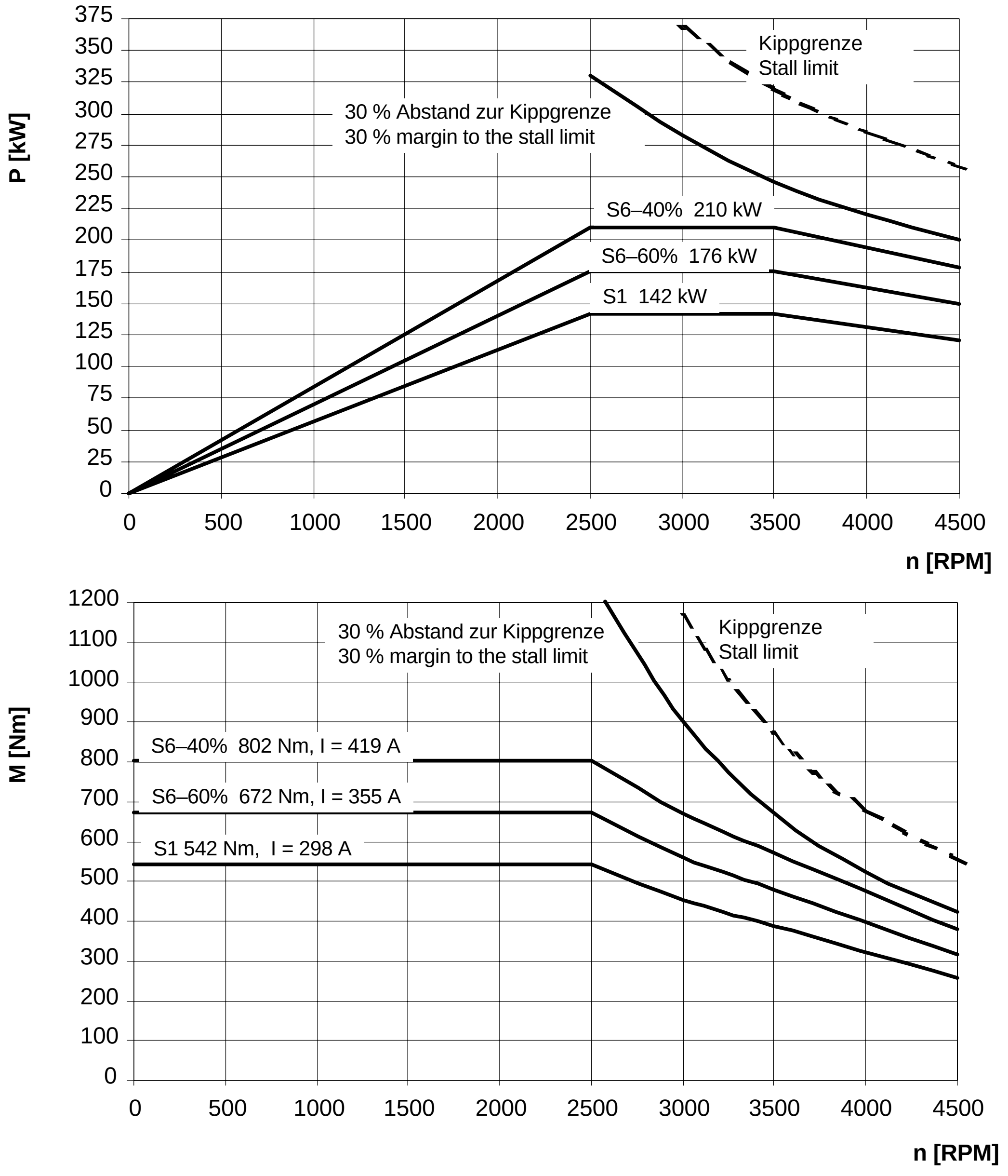

Fig. 4-42 MASTERDRIVES MC, 1PH7224–□□L□□

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1) 2700 RPM for increased cantilever forces

Table 4-46 MASTERDRIVES MC, 400 V, 1PH7226–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2500	168	642	362	335	84.0	3500	3100 1)	4500	154

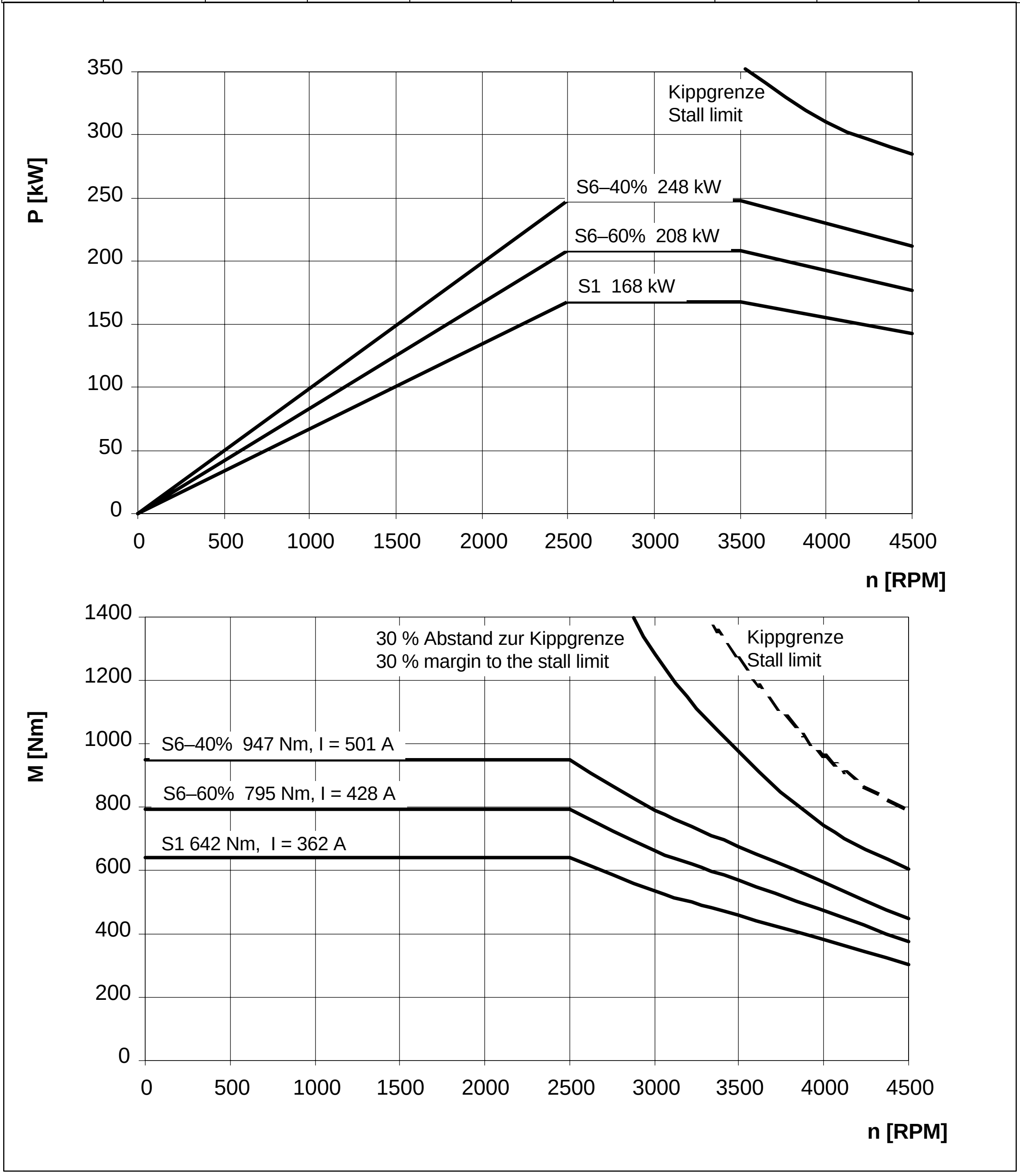

Fig. 4-43 MASTERDRIVES MC, 1PH7226–□□L□□

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1) 2700 RPM for increased cantilever forces

Table 4-47 MASTERDRIVES MC, 400 V, 1PH7228–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2500	205	783	433	340	83.9	3500	3100 $^{1)}$	4500 $^{2)}$	185

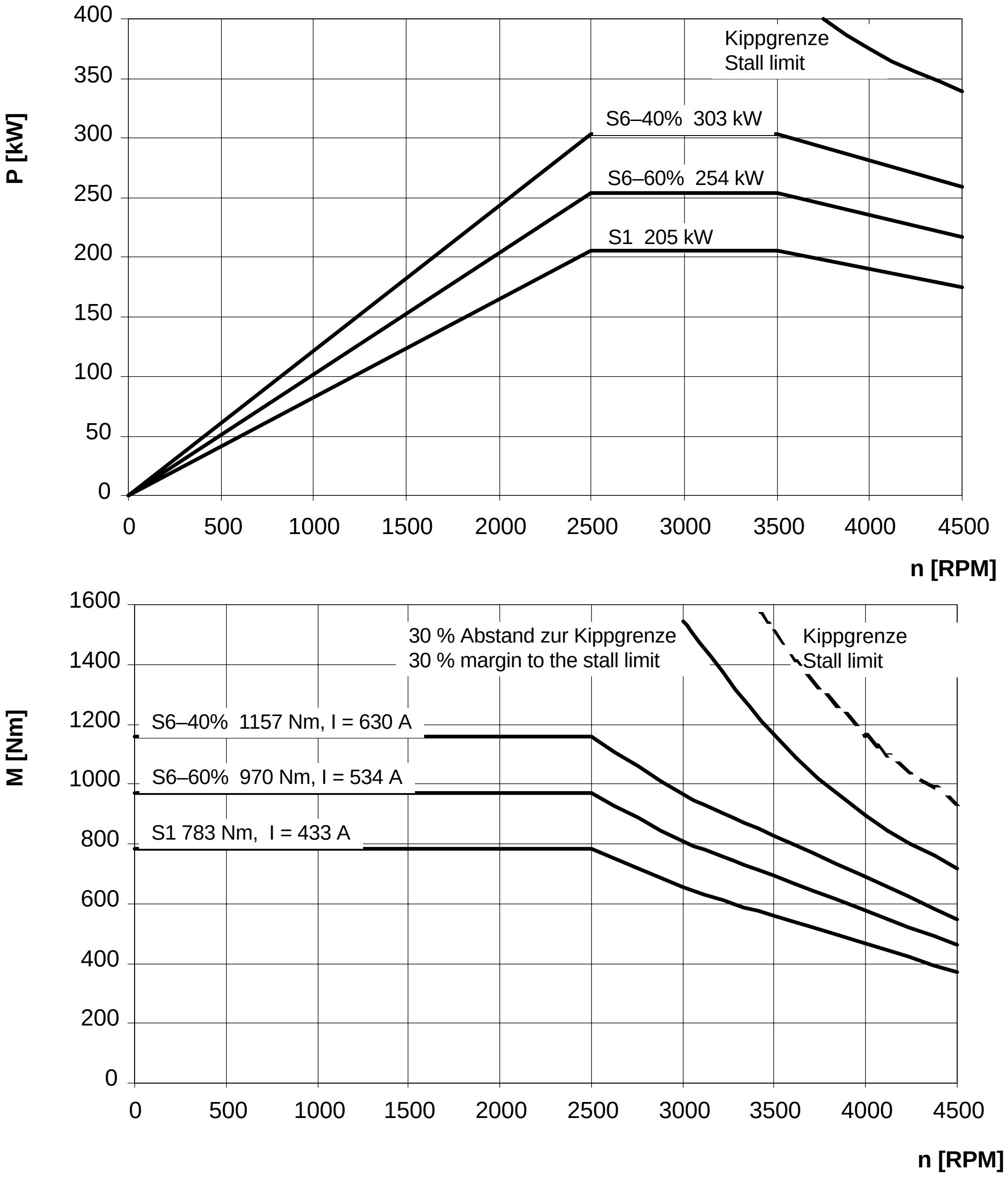

Fig. 4-44 MASTERDRIVES MC, 1PH7228–□□L□□

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1) 2500 RPM for increased cantilever forces

2) 4000 RPM for increased cantilever forces

4.2.2 MASTERDRIVES MC 480 V

Table 4-48 MASTERDRIVES MC, 480 V, 1PH7163–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	9.5	227	30	274	14.3	800	800	8000	11.5

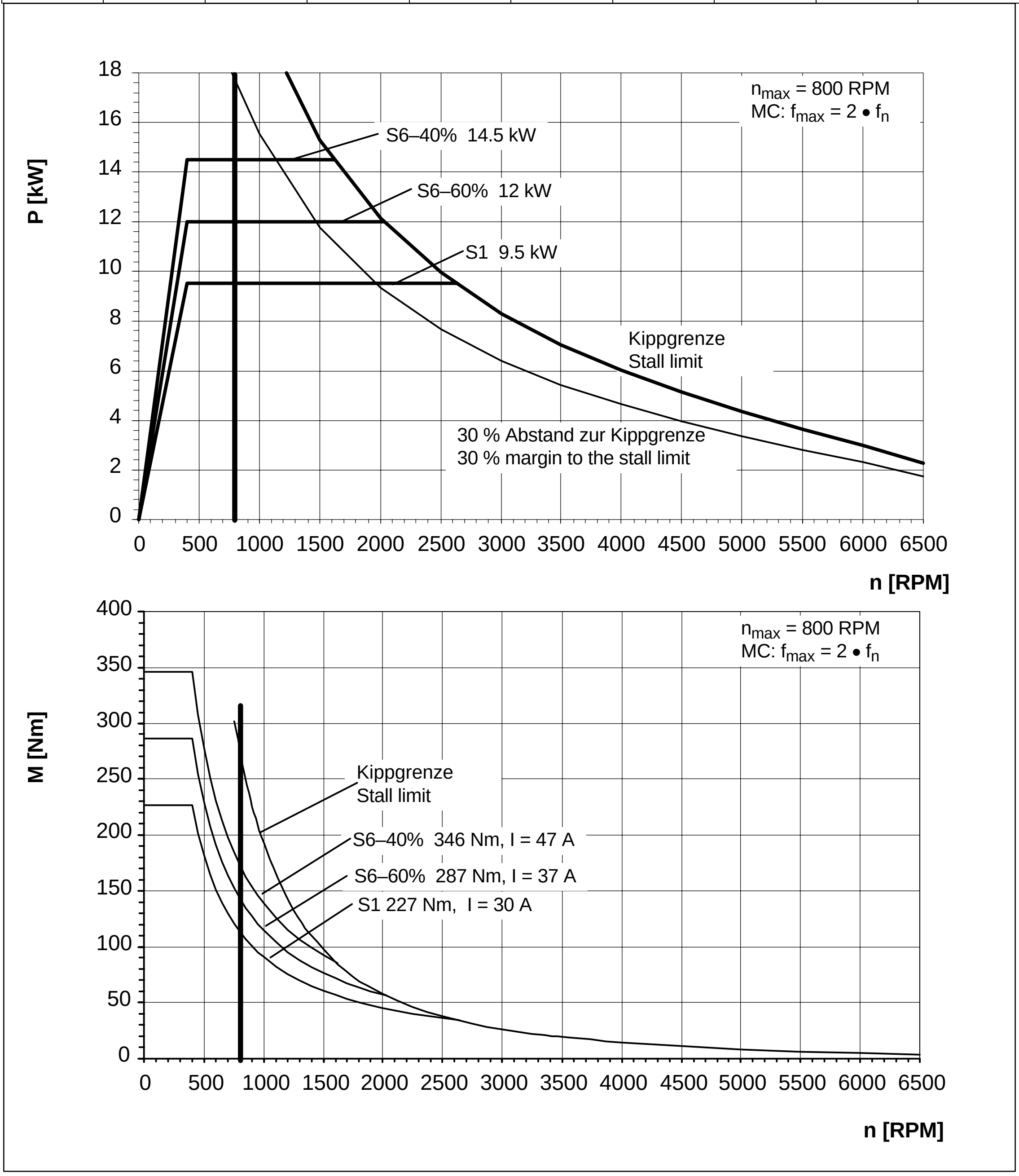

Fig. 4-45 MASTERDRIVES MC, 1PH7163–□□B□□

Table 4-49 MASTERDRIVES MC, 480 V, 1PH7167–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	13	310	37	294	14.3	800	800	800	14

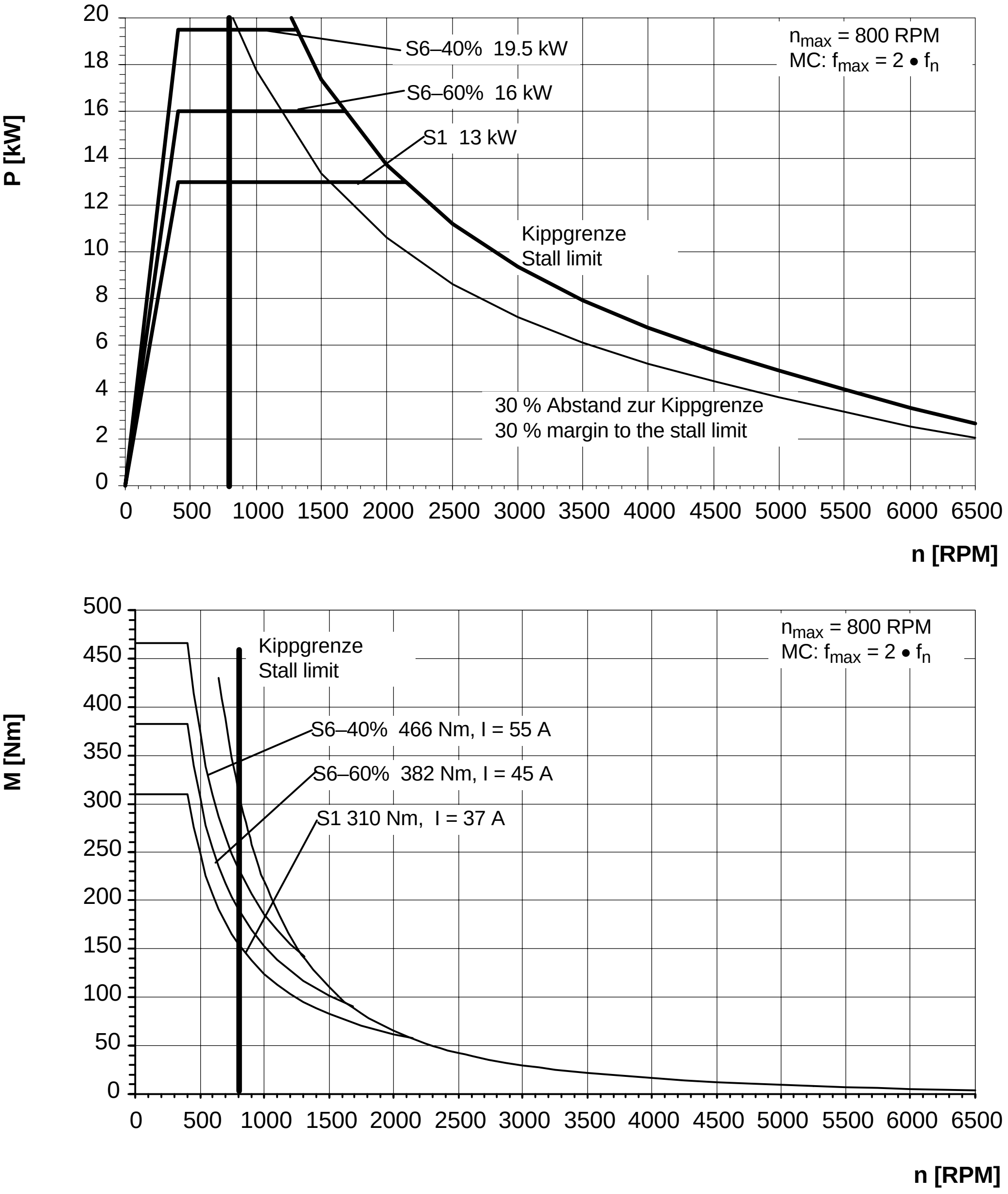

Fig. 4-46 MASTERDRIVES MC, 1PH7167–□□B□□

Table 4-50 MASTERDRIVES MC, 480 V, 1PH7184–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	16.3	390	51	271	14.2	800	800	800	26

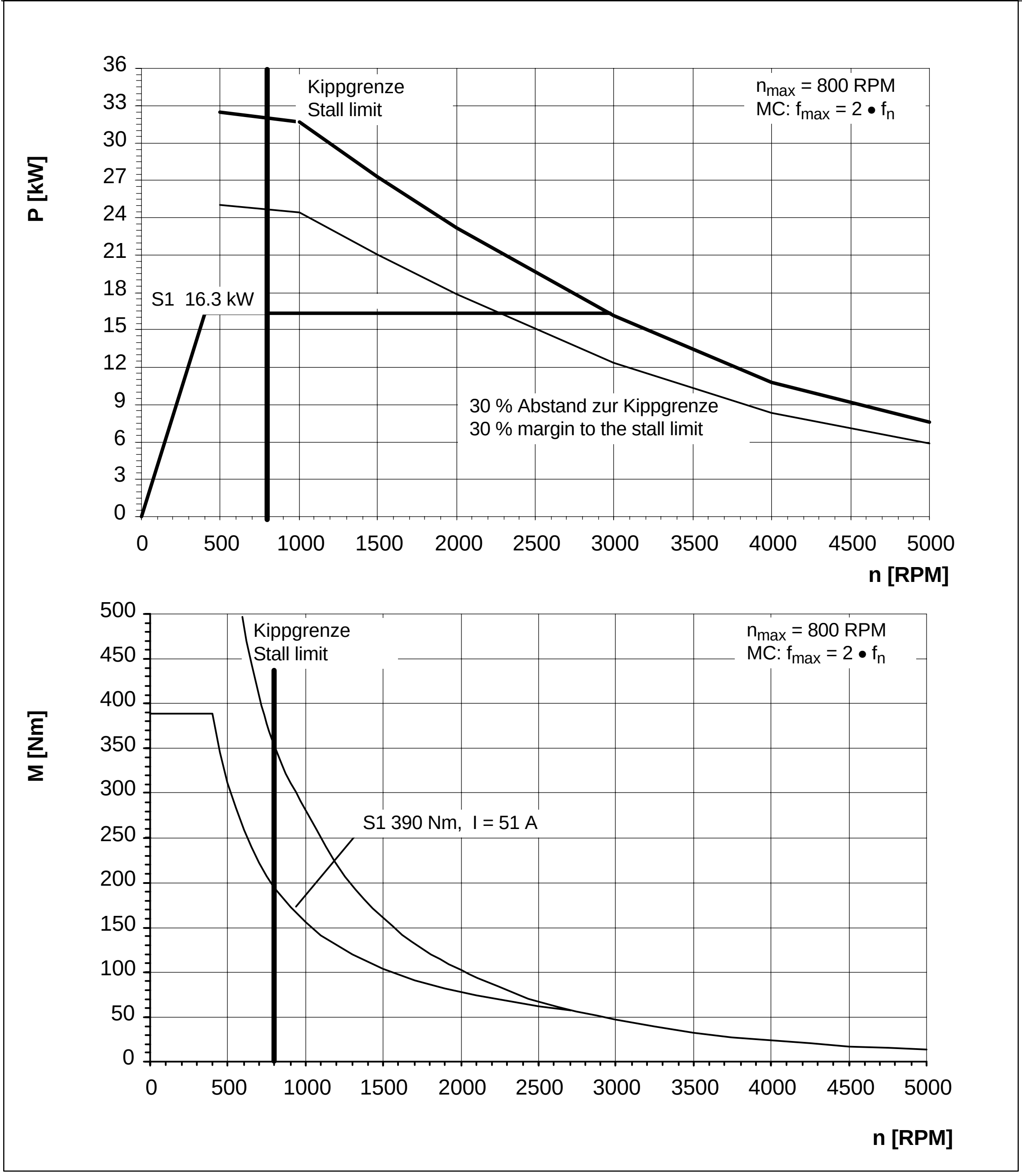

Fig. 4-47 MASTERDRIVES MC, 1PH7184–□□B□□

Table 4-51 MASTERDRIVES MC, 480 V, 1PH7186–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	21.2	505	67	268	14.0	800	800	800	38.5

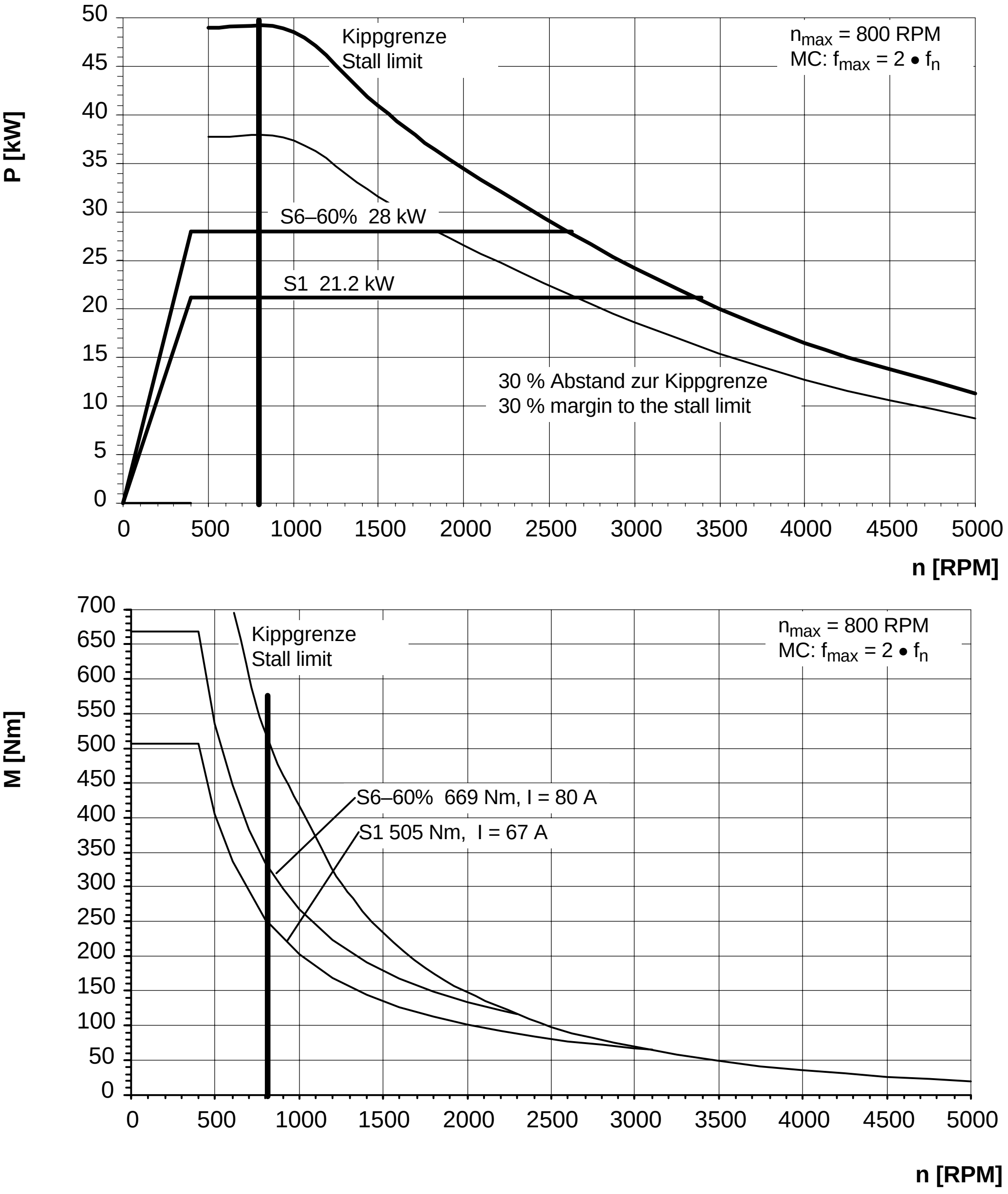

Fig. 4-48 MASTERDRIVES MC, 1PH7186–□□B□□

Table 4-52 MASTERDRIVES MC, 480 V, 1PH7224–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	30.4	725	88	268	14.0	800	800	800	36.5

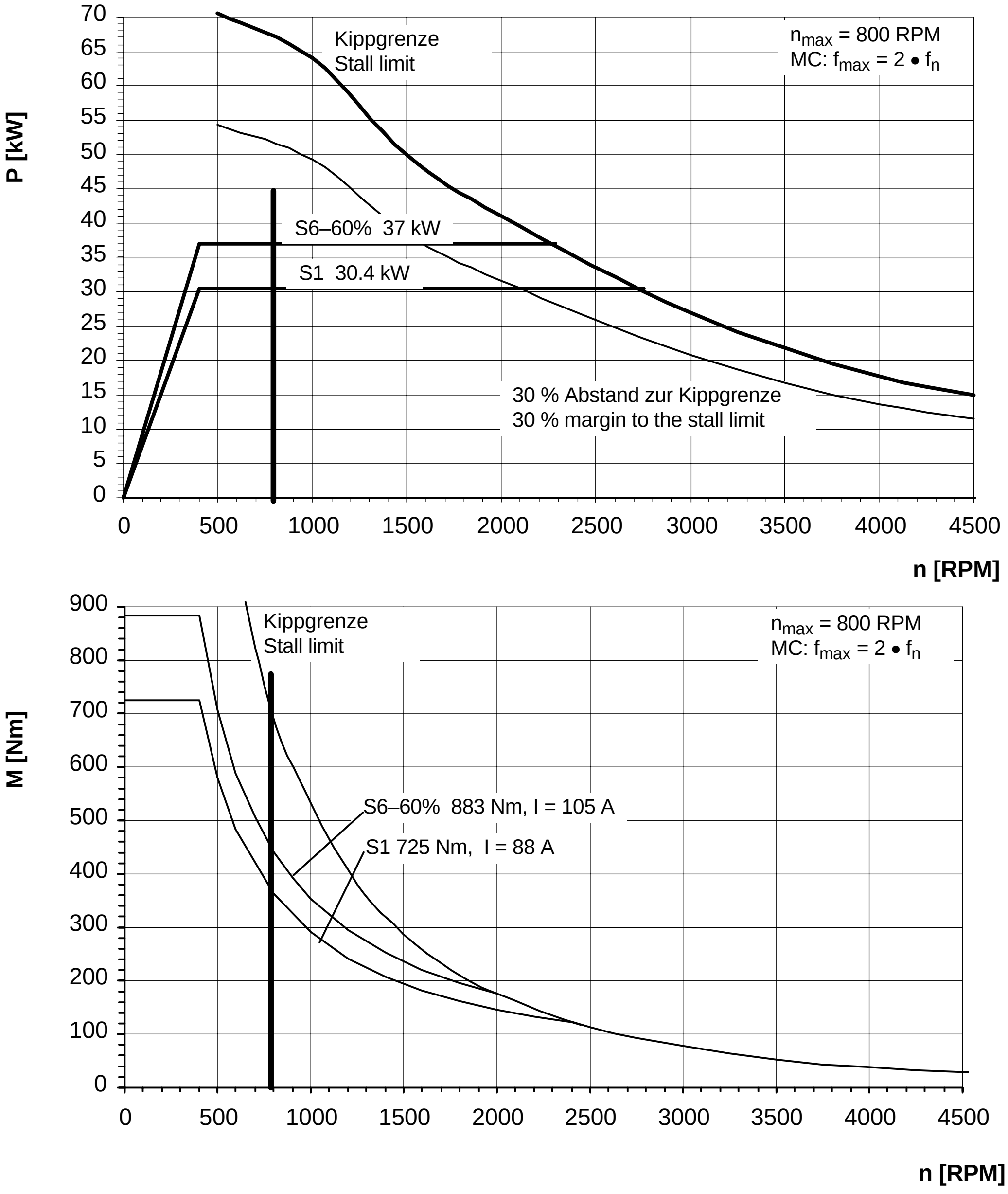

Fig. 4-49 MASTERDRIVES MC, 1PH7224–□□B□□

Table 4-53 MASTERDRIVES MC, 480 V, 1PH7226–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	39.2	935	114	264	14.0	800	800	800	49

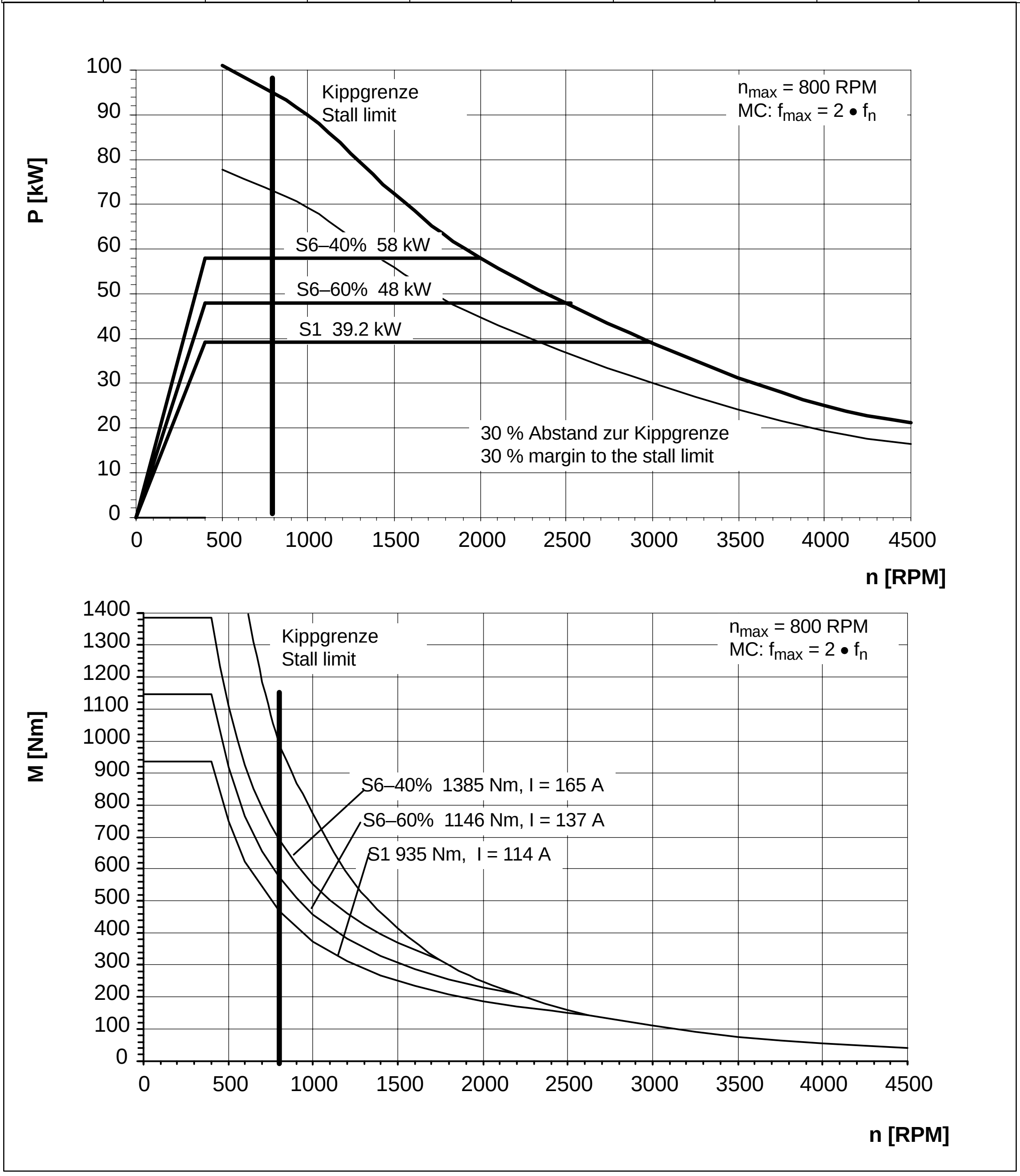

Fig. 4-50 MASTERDRIVES MC, 1PH7226–□□B□□

Table 4-54 MASTERDRIVES MC, 480 V, 1PH7228–□□B□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
400	48	1145	136	272	13.9	800	800	800	60.5

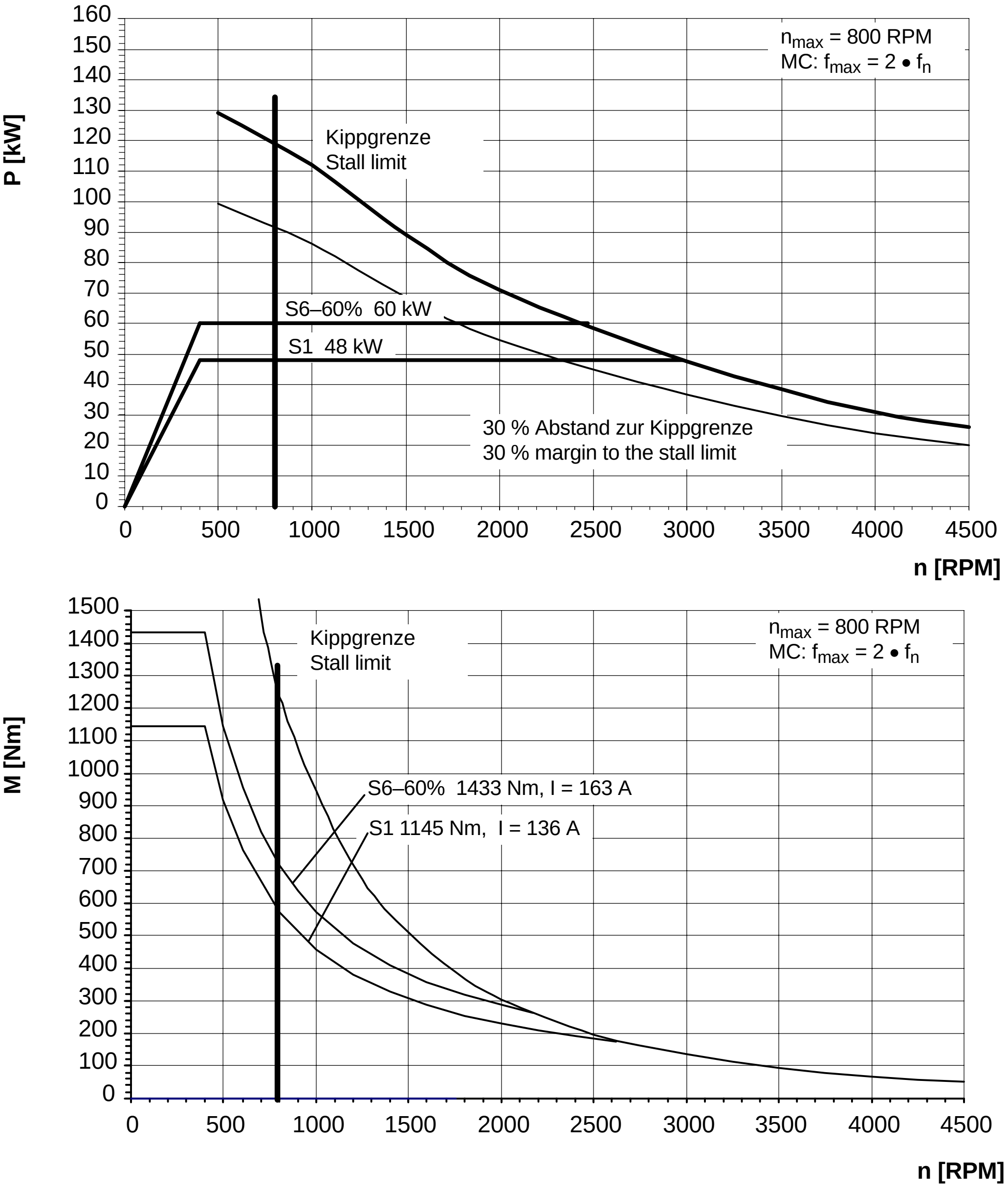

Fig. 4-51 MASTERDRIVES MC, 1PH7228–□□B□□

Table 4-55 MASTERDRIVES MC, 480 V, 1PH7103–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	4.3	36	10	391	40.6	2200	2300	2300	5.0

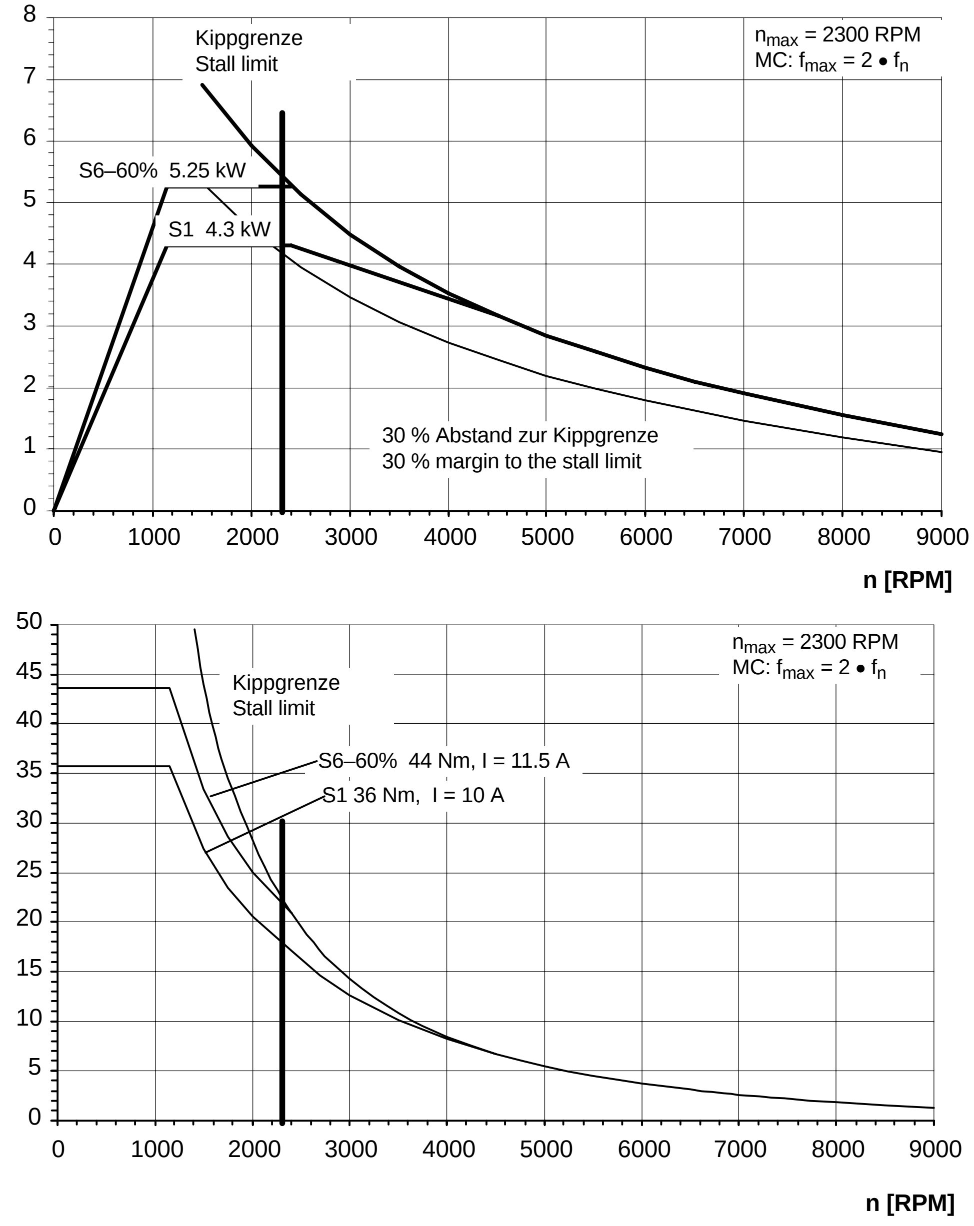

Fig. 4-52 MASTERDRIVES MC, 1PH7103–□□D□□

Table 4-56 MASTERDRIVES MC, 480 V, 1PH7107–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	7.2	60	17.5	360	40.3	2300	2300	2300	8.8

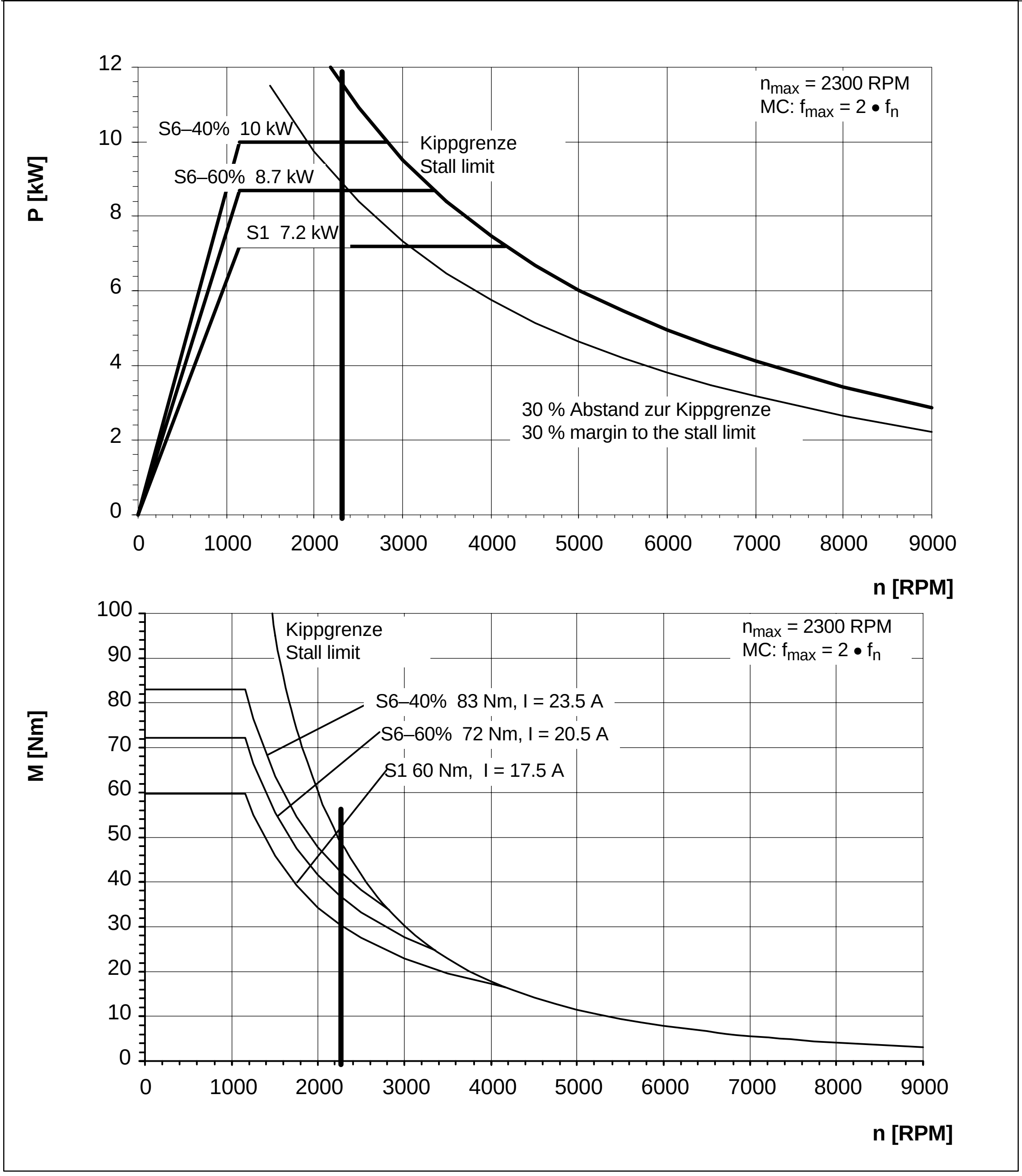

Fig. 4-53 MASTERDRIVES MC, 1PH7107–□□D□□

Table 4-57 MASTERDRIVES MC, 480 V, 1PH7133–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	13.5	112	29	381	39.7	2300	2300	2300	13

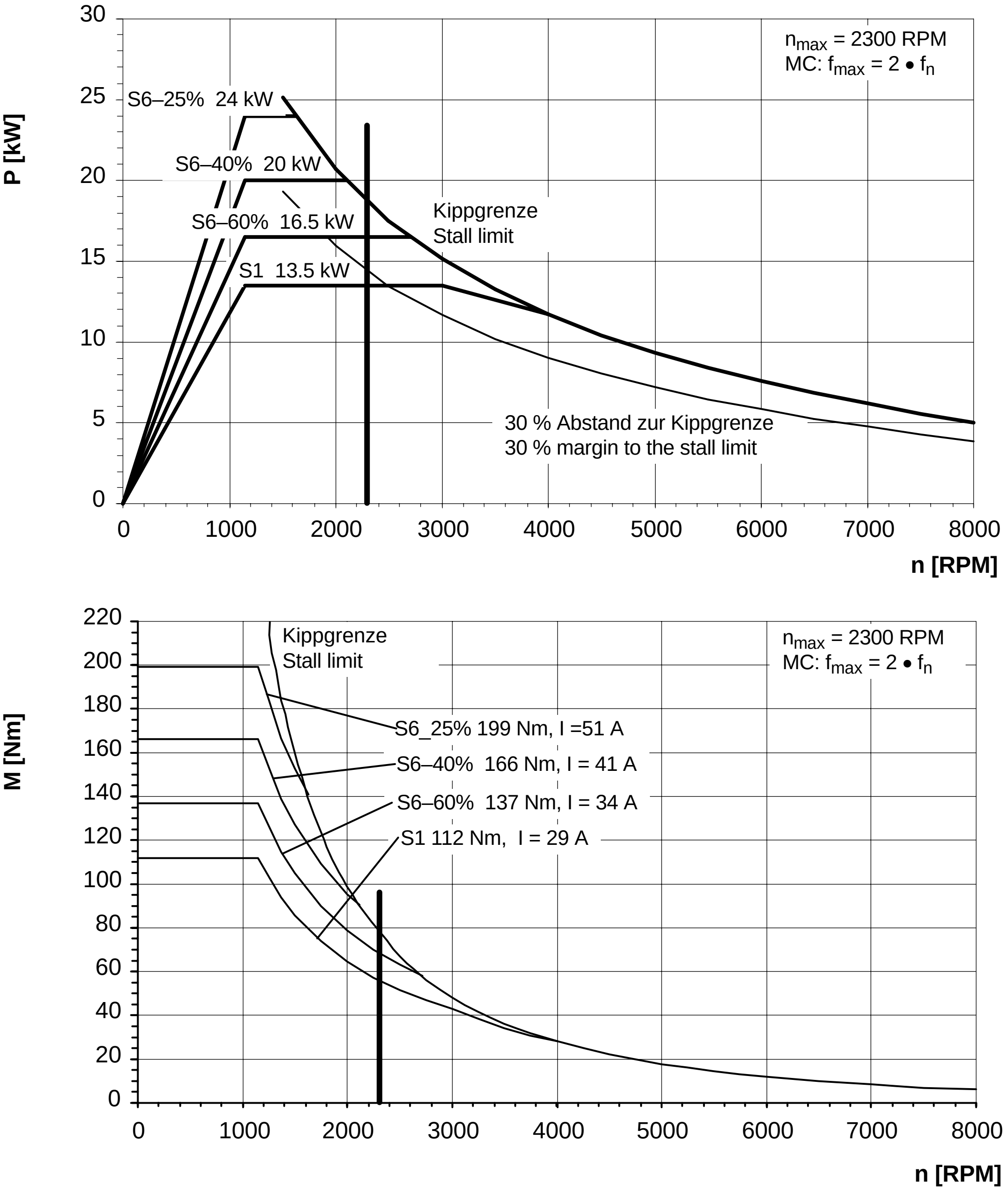

Fig. 4-54 MASTERDRIVES MC, 1PH7133–□□D□□

Table 4-58 MASTERDRIVES MC, 480 V, 1PH7137–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	19.5	162	43	367	39.6	2300	2300	2300	19

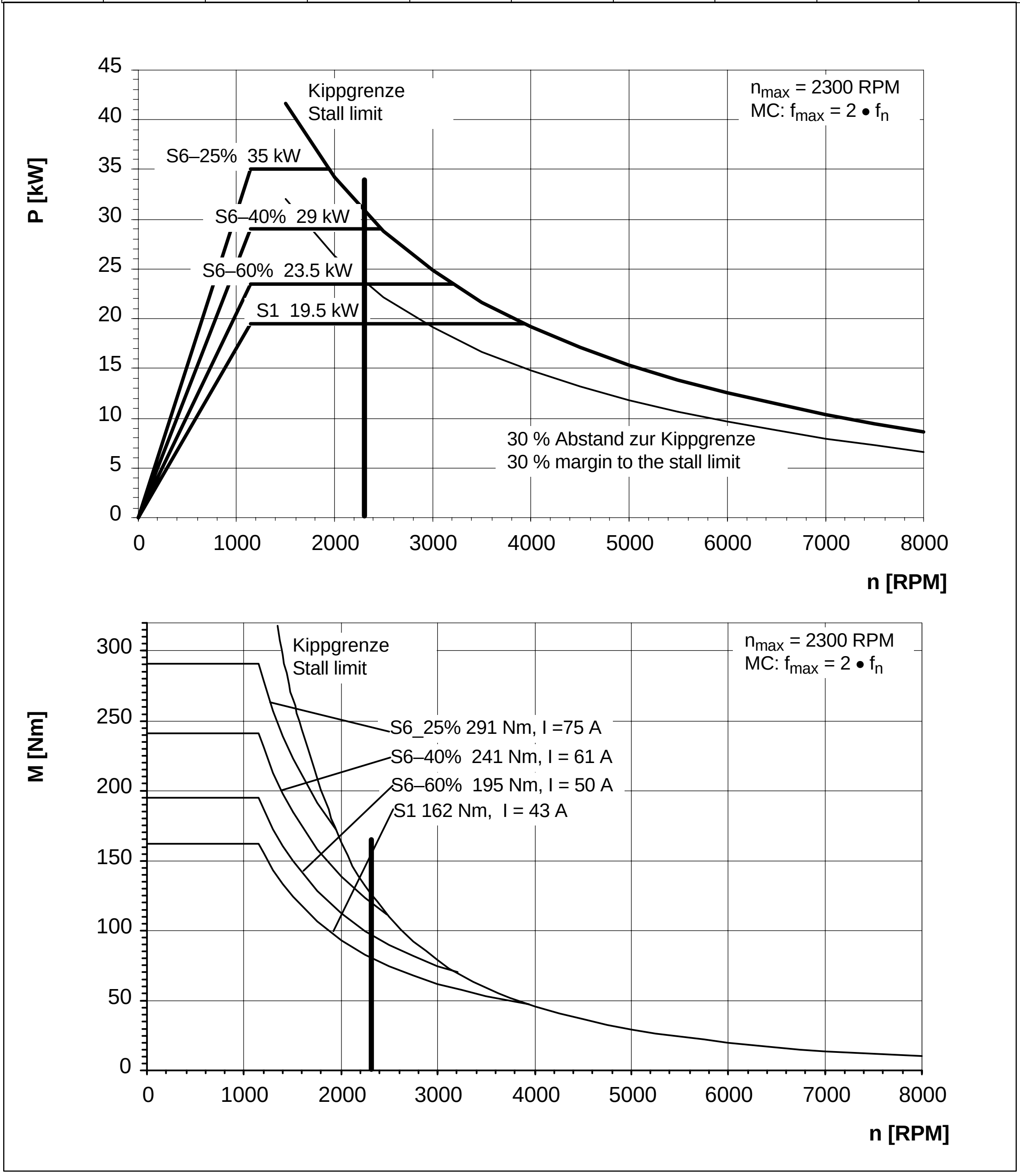

Fig. 4-55 MASTERDRIVES MC, 1PH7137–□□D□□

Table 4-59 MASTERDRIVES MC, 480 V, 1PH7163–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	25	208	55	364	39.2	2300	2300	2300	25

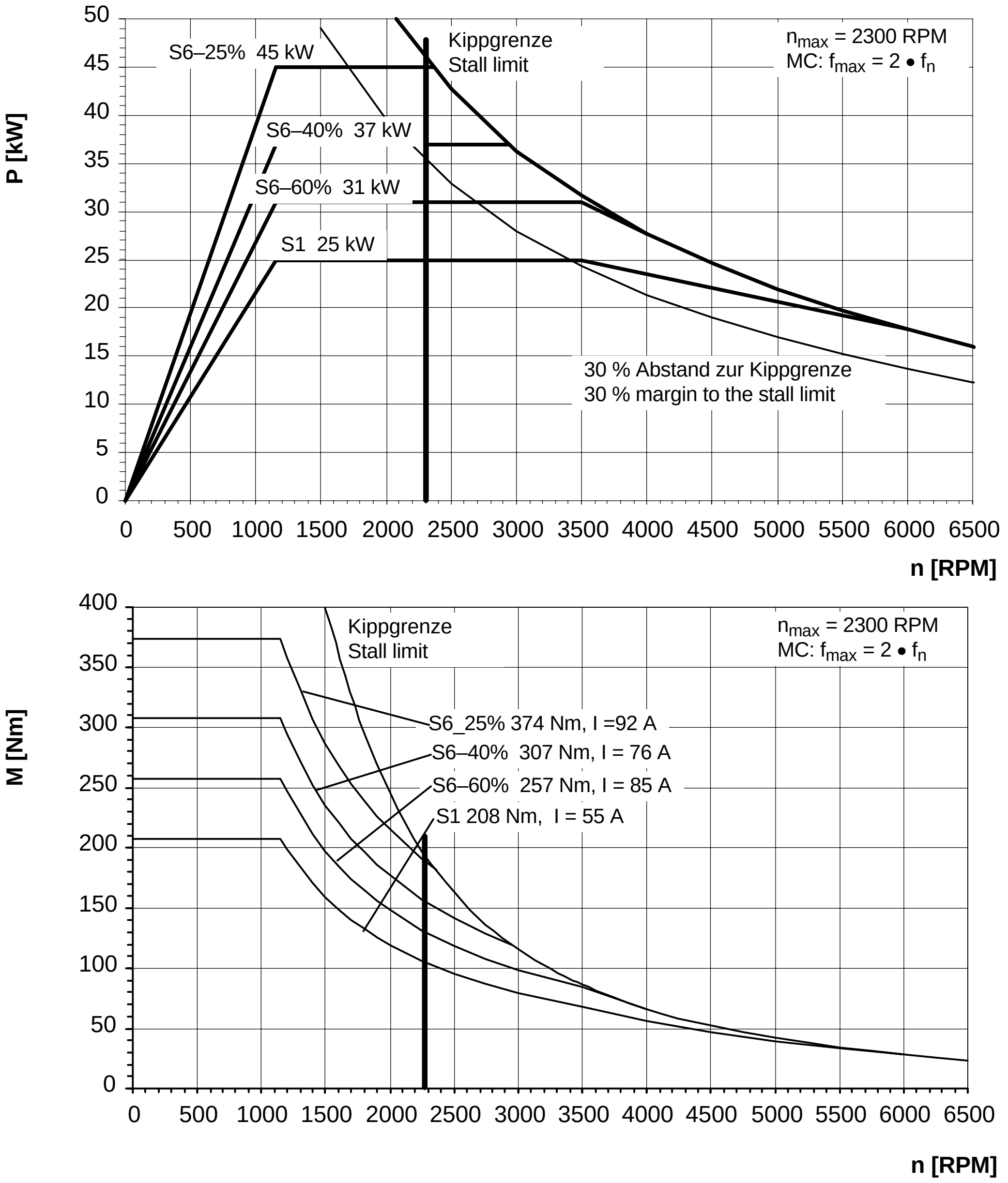

Fig. 4-56 MASTERDRIVES MC, 1PH7163–□□D□□

Table 4-60 MASTERDRIVES MC, 480 V, 1PH7167–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	31	257	70	357	39.1	2300	2300	2300	34

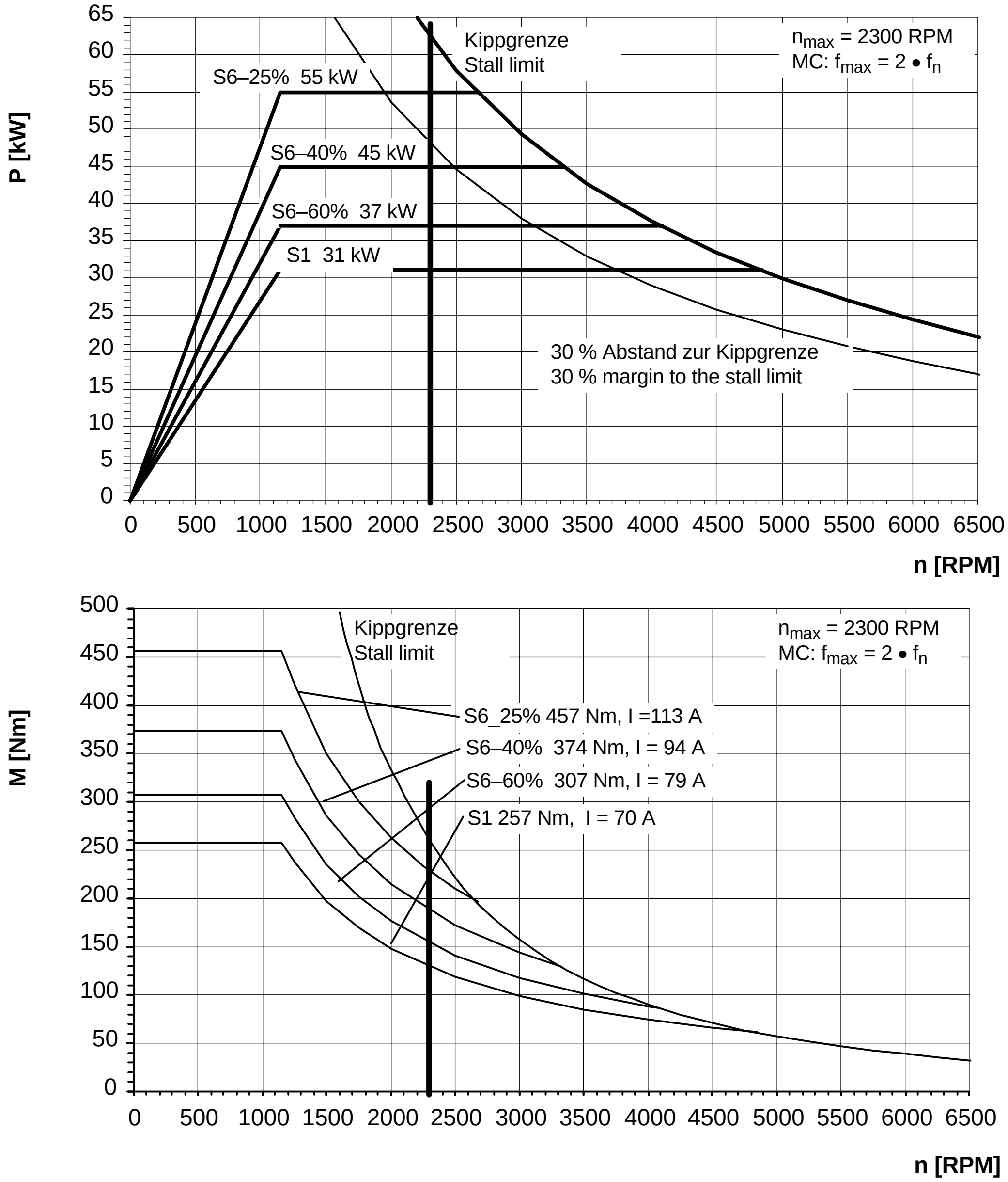

Fig. 4-57 MASTERDRIVES MC, 1PH7167–□□D□□

Table 4-61 MASTERDRIVES MC, 480 V, 1PH7184–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	44	366	89	383	39.2	2300	2300	2300	42

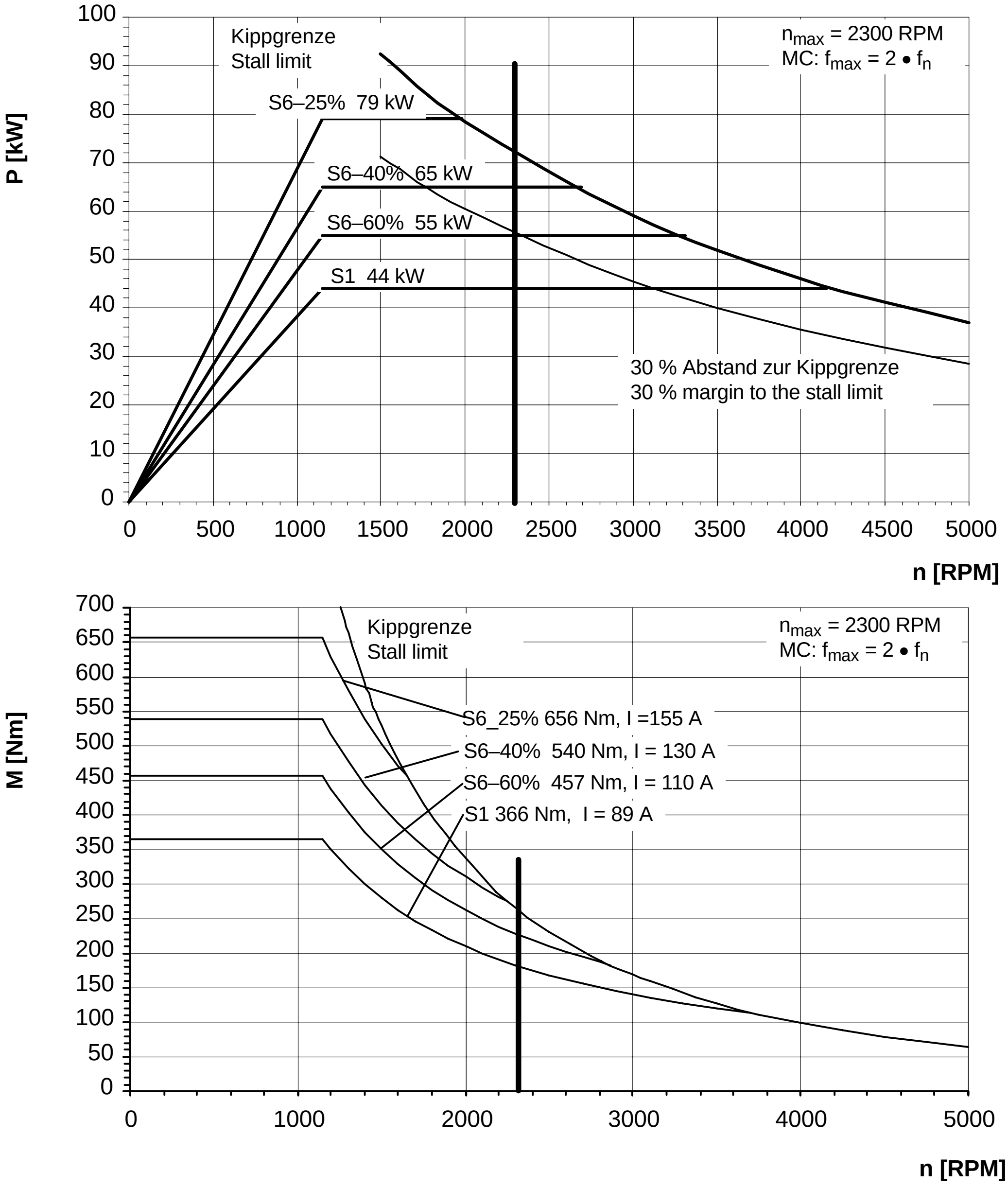

Fig. 4-58 MASTERDRIVES MC, 1PH7184–□□D□□

Table 4-62 MASTERDRIVES MC, 480 V, 1PH7186–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	58	482	116	390	39.1	2300	2300	2300	58

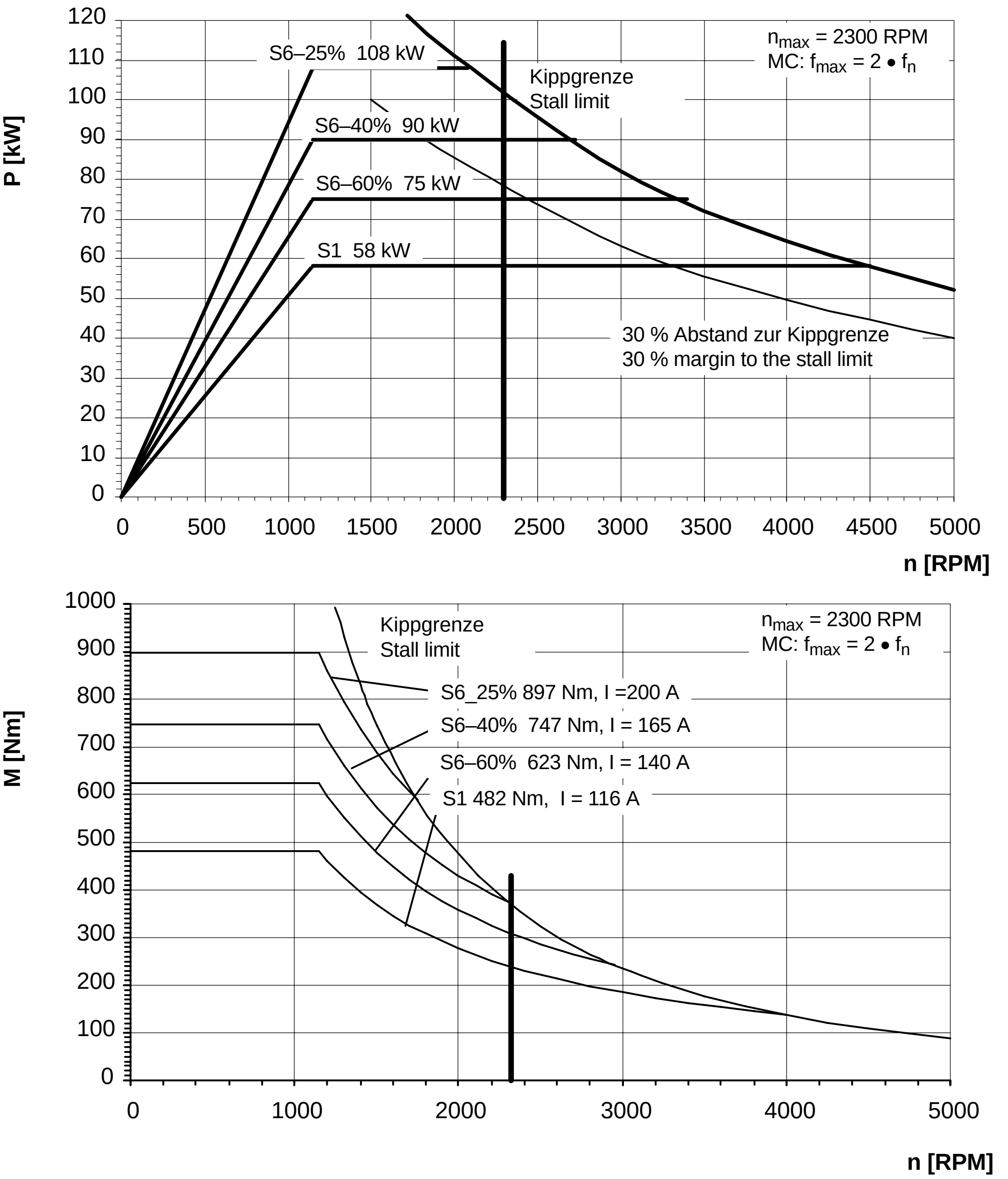

Fig. 4-59 MASTERDRIVES MC, 1PH7186–□□D□□

Table 4-63 MASTERDRIVES MC, 480 V, 1PH7224–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	81	670	160	385	38.9	2300	2300	2300	79

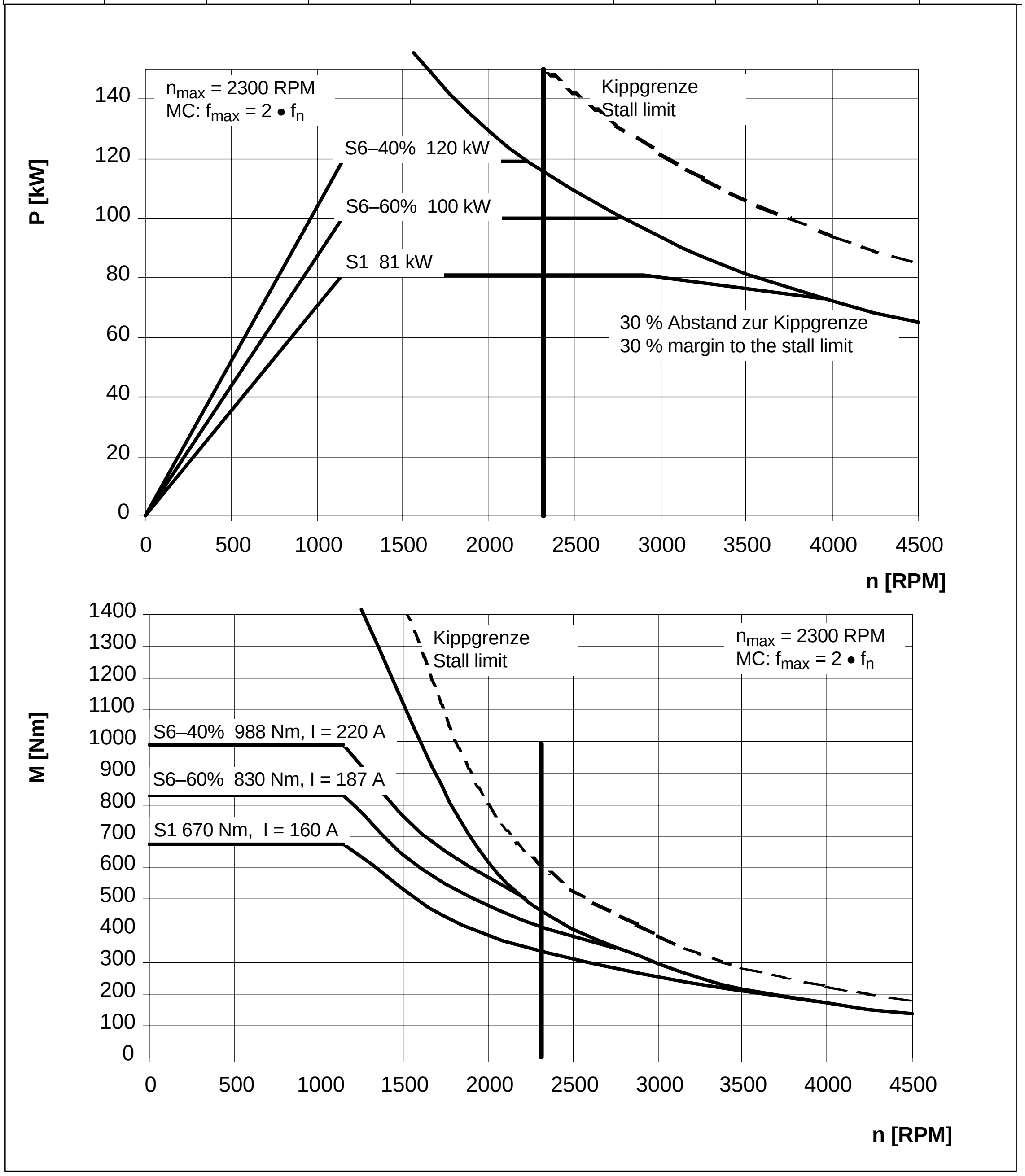

Fig. 4-60 MASTERDRIVES MC, 1PH7224–□□D□□

Table 4-64 MASTERDRIVES MC, 480 V, 1PH7226–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	105	870	197	390	38.9	2300	2300	2300	87.5

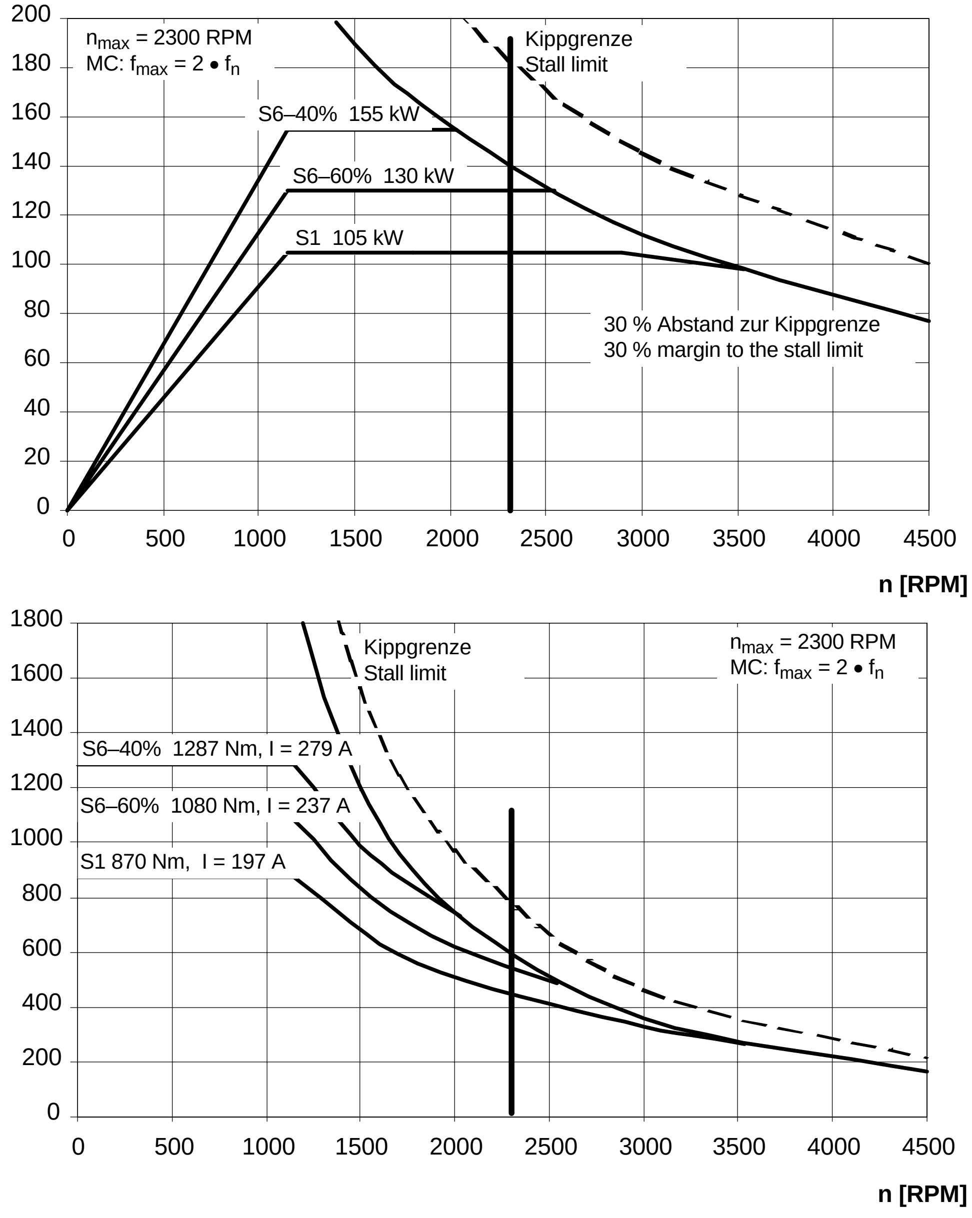

Fig. 4-61 MASTERDRIVES MC, 1PH7226–□□D□□

Table 4-65 MASTERDRIVES MC, 480 V, 1PH7228–□□D□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1150	129	1070	238	390	38.9	2300	2300	2300	98

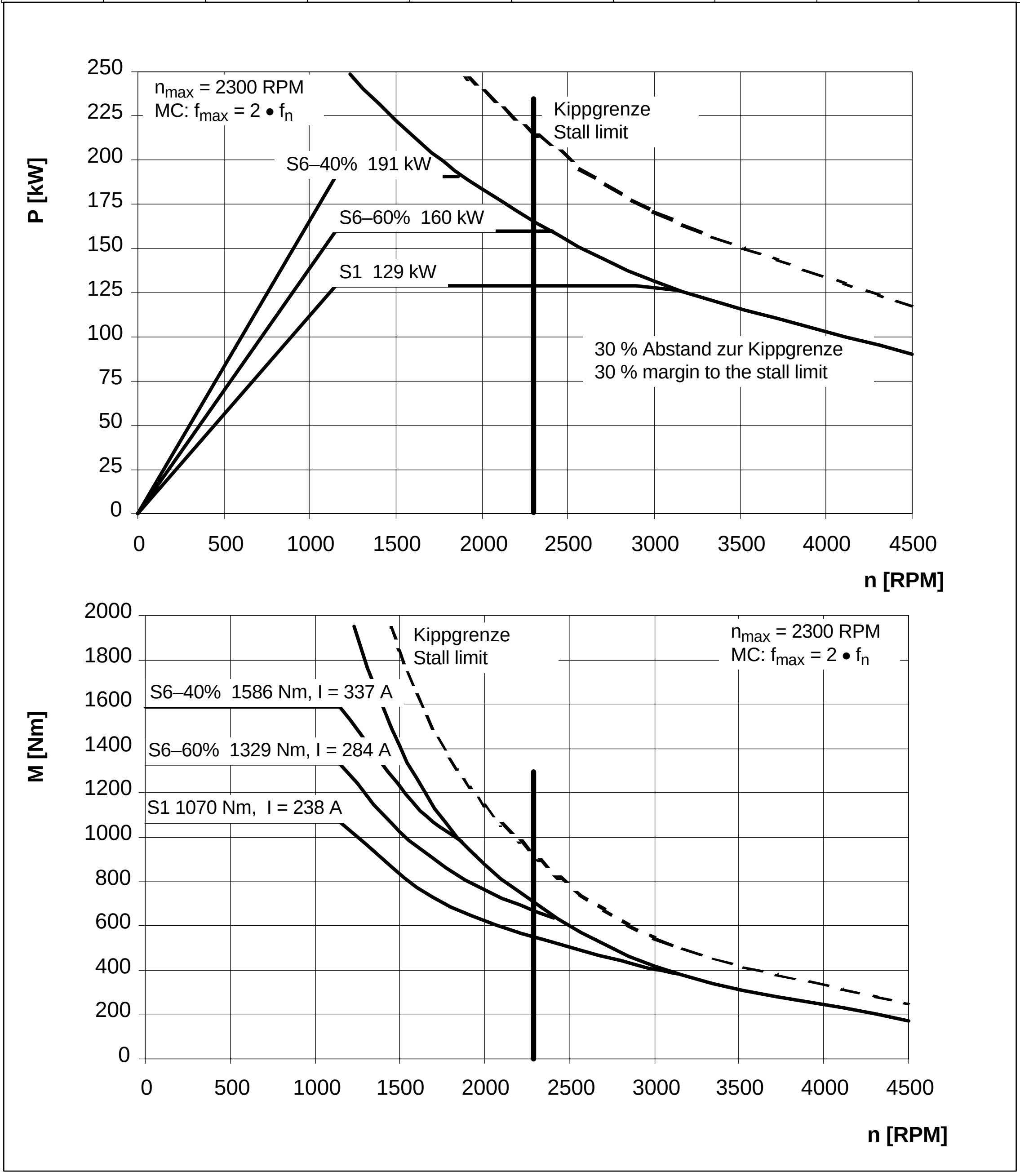

Fig. 4-62 MASTERDRIVES MC, 1PH7228–□□D□□

Table 4-66 MASTERDRIVES MC, 480 V, 1PH7101–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	4.3	24	10	398	60.0	3500	3500	3500	5.7

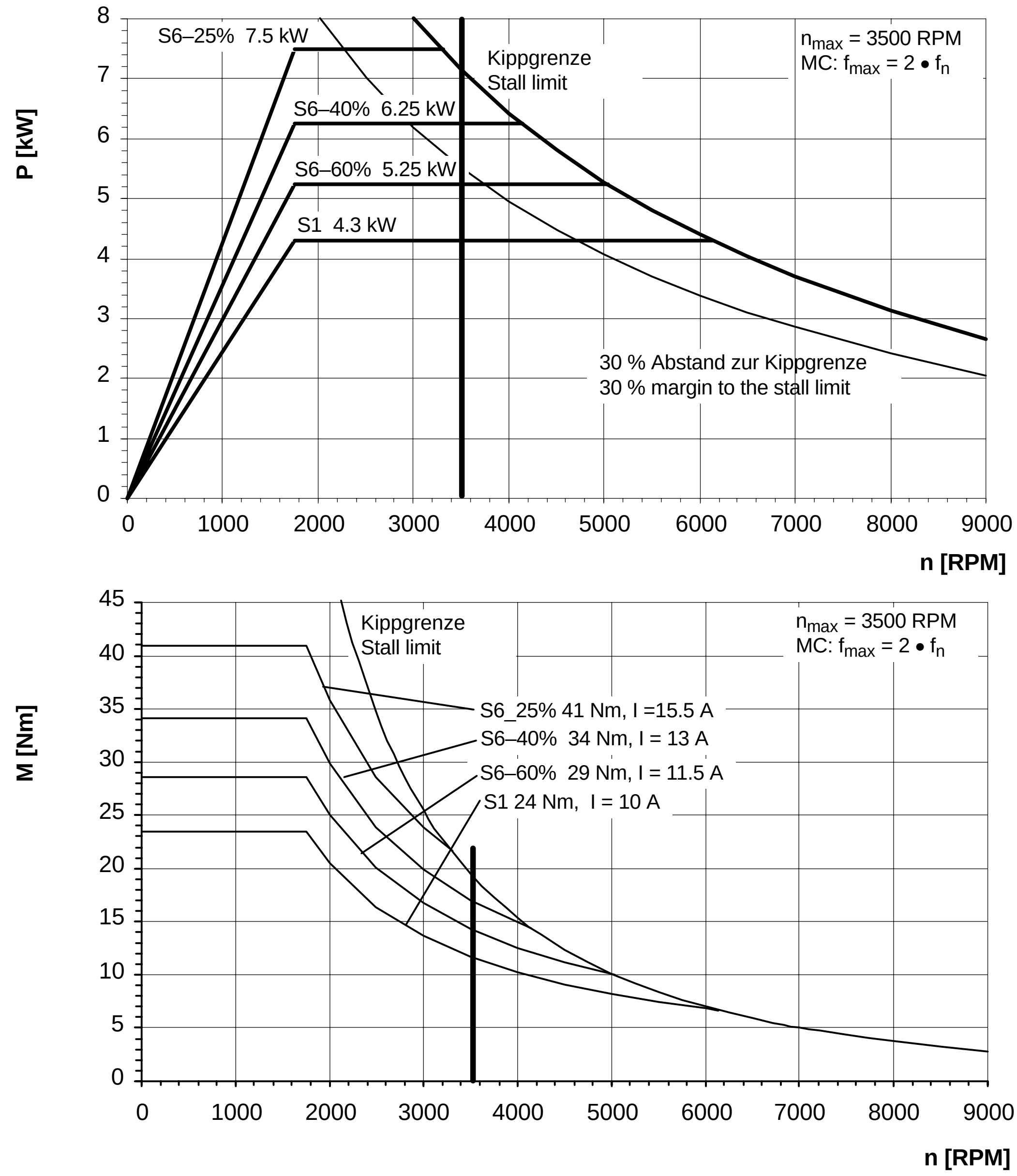

Fig. 4-63 MASTERDRIVES MC, 1PH7101–□□F□□

Table 4-67 MASTERDRIVES MC, 480 V, 1PH7103–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	6.25	34	13	398	61.0	2600	3500	3500	5.3

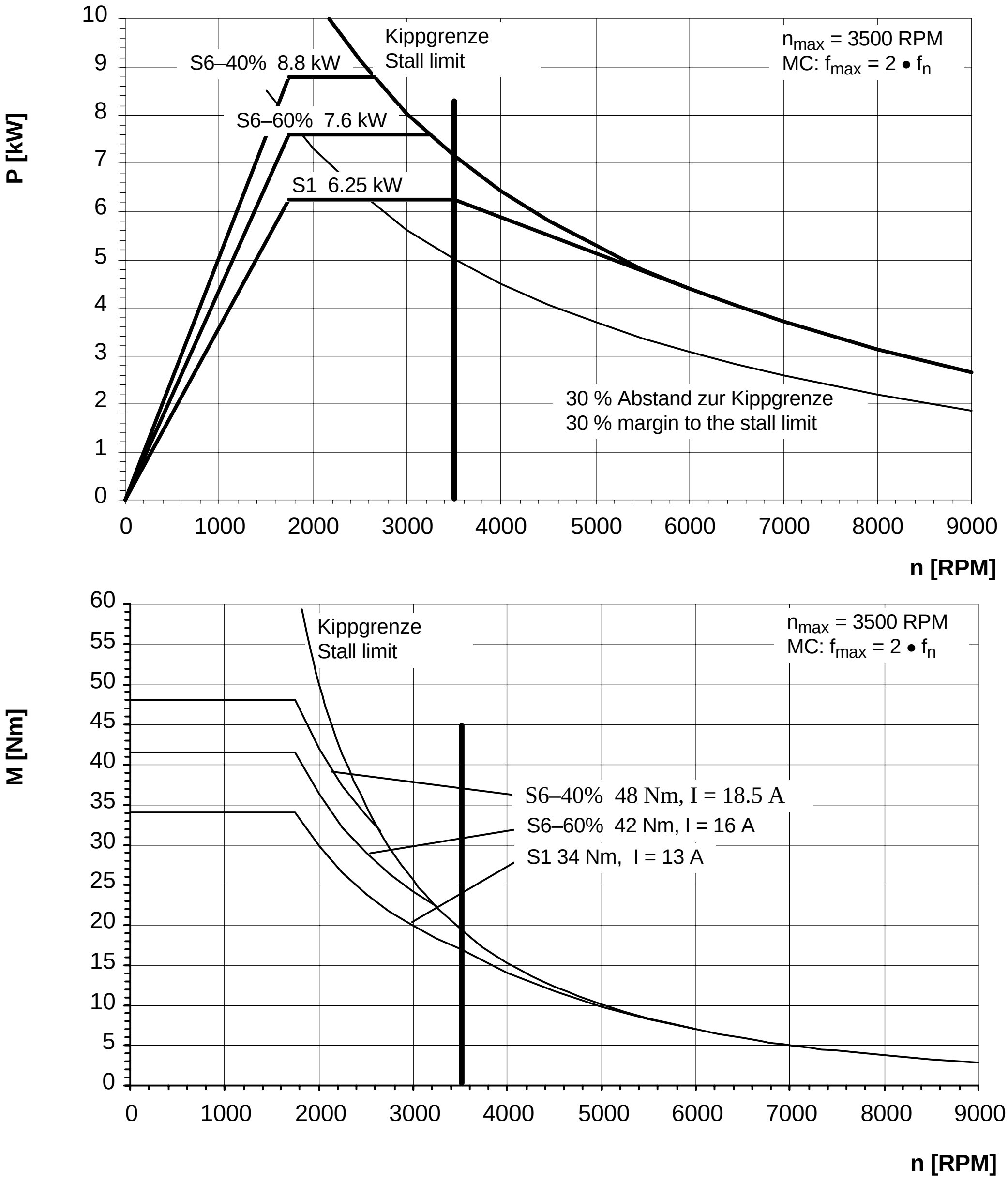

Fig. 4-64 MASTERDRIVES MC, 1PH7103–□□F□□

Table 4-68 MASTERDRIVES MC, 480 V, 1PH7105–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	8.0	44	17.5	398	60.0	3500	3500	3500	9.3

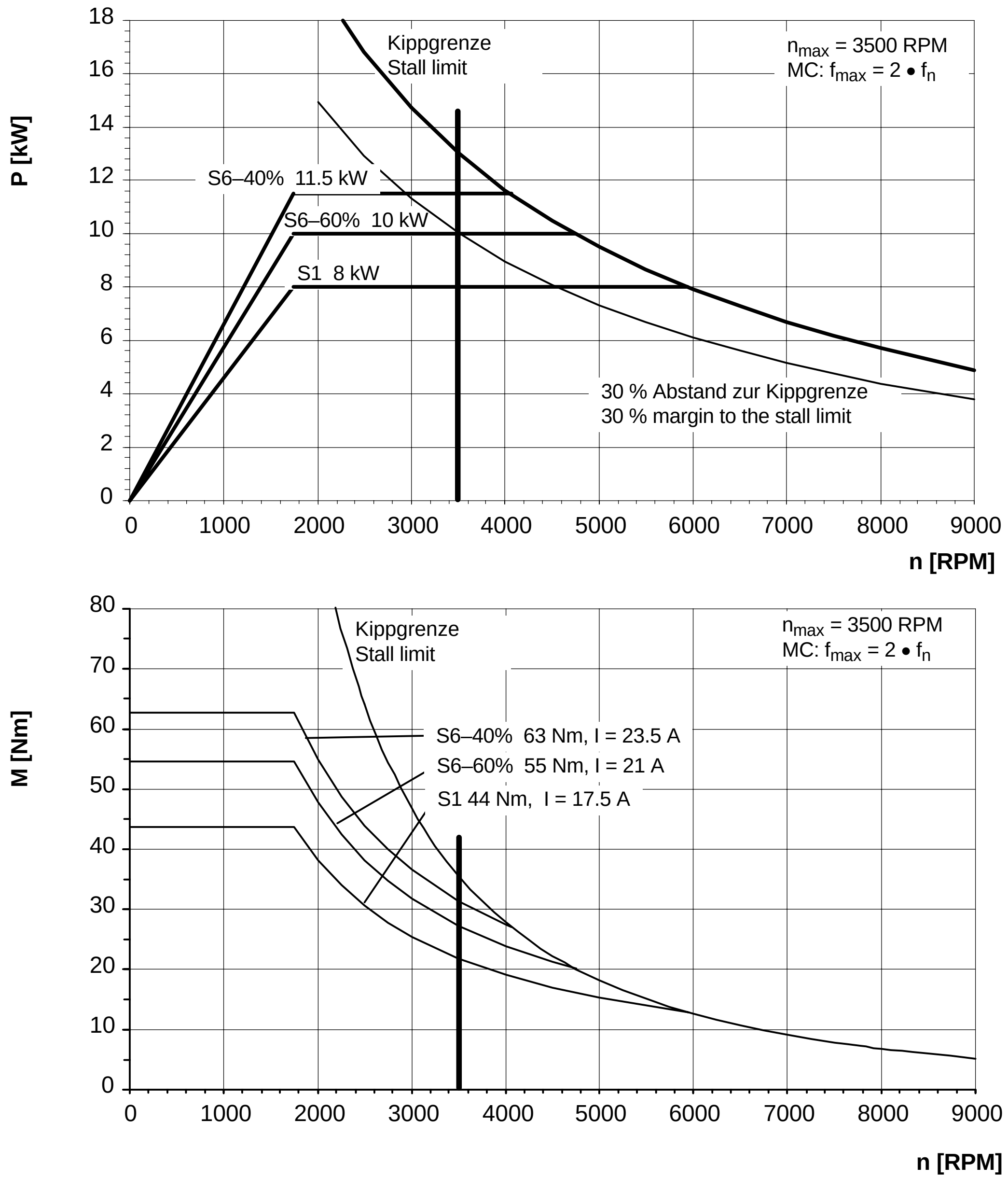

Fig. 4-65 MASTERDRIVES MC, 1PH7105–□□F□□

Table 4-69 MASTERDRIVES MC, 480 V, 1PH7107–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	10	55	23	381	60.3	3500	3500	3500	10.6

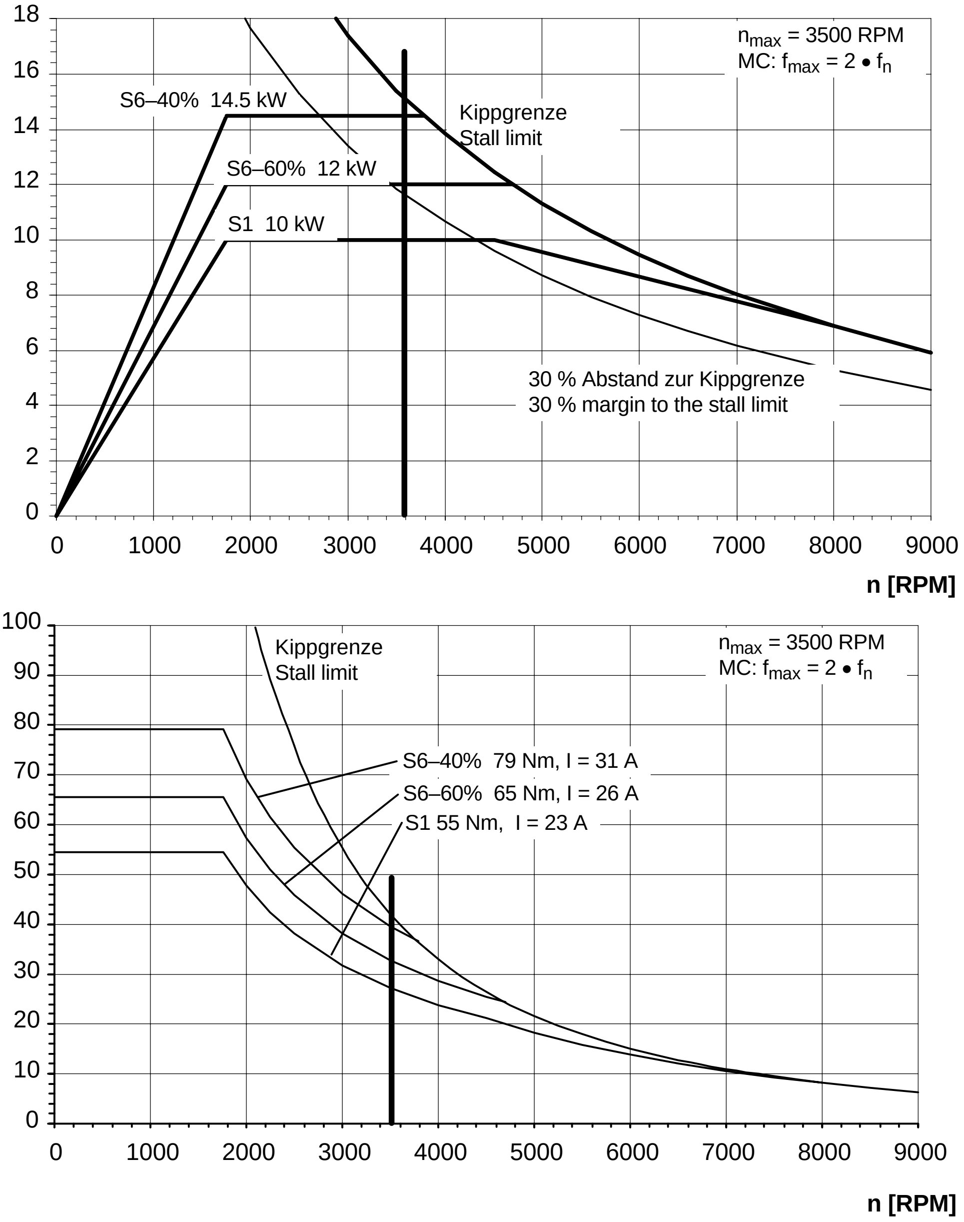

Fig. 4-66 MASTERDRIVES MC, 1PH7107–□□F□□

Table 4-70 MASTERDRIVES MC, 480 V, 1PH7131–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	13	71	24	398	59.7	3500	3500	3500	8.1

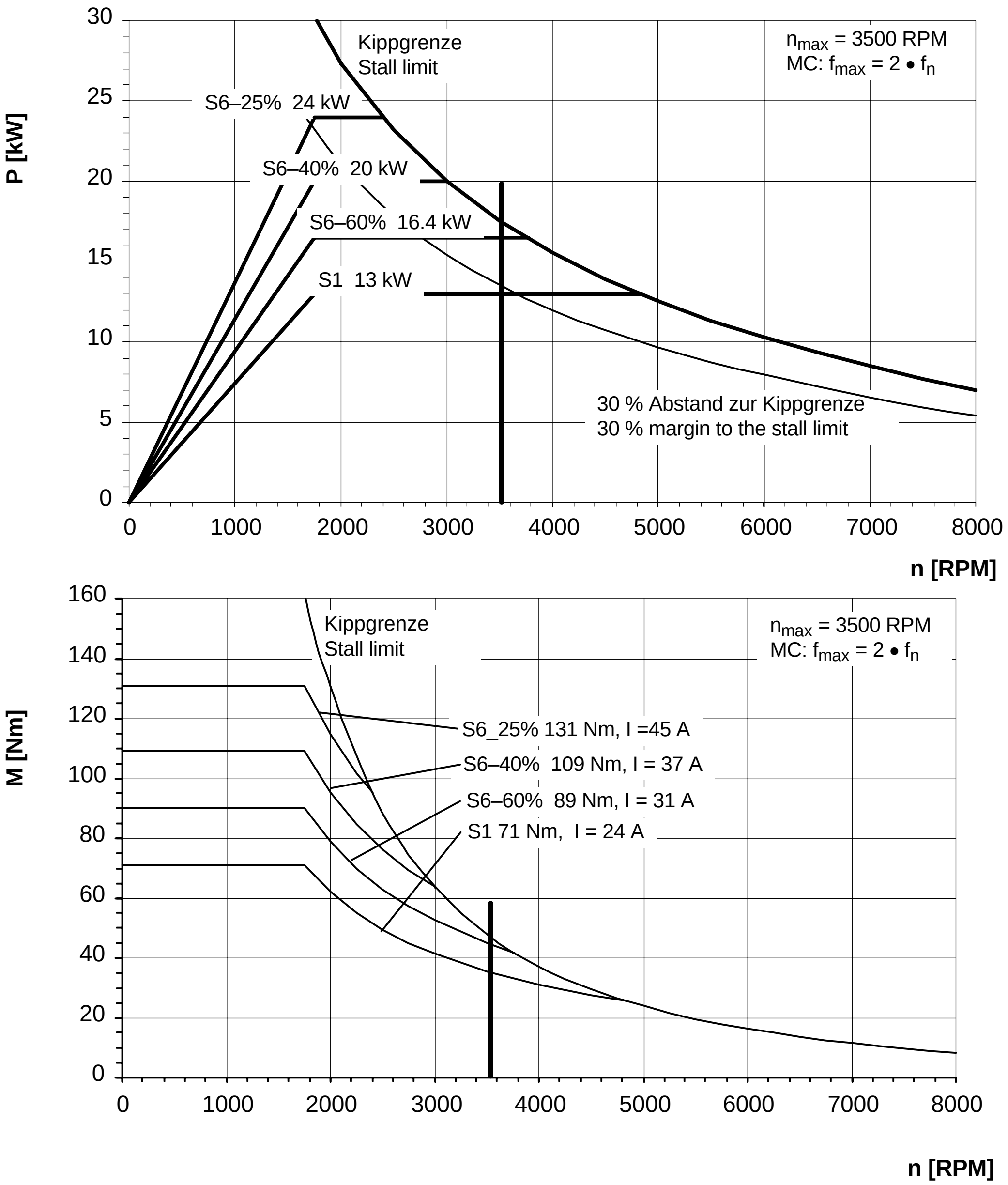

Fig. 4-67 MASTERDRIVES MC, 1PH7131–□□F□□

Table 4-71 MASTERDRIVES MC, 480 V, 1PH7133–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	17.5	96	34	398	59.7	3500	3500	3500	14

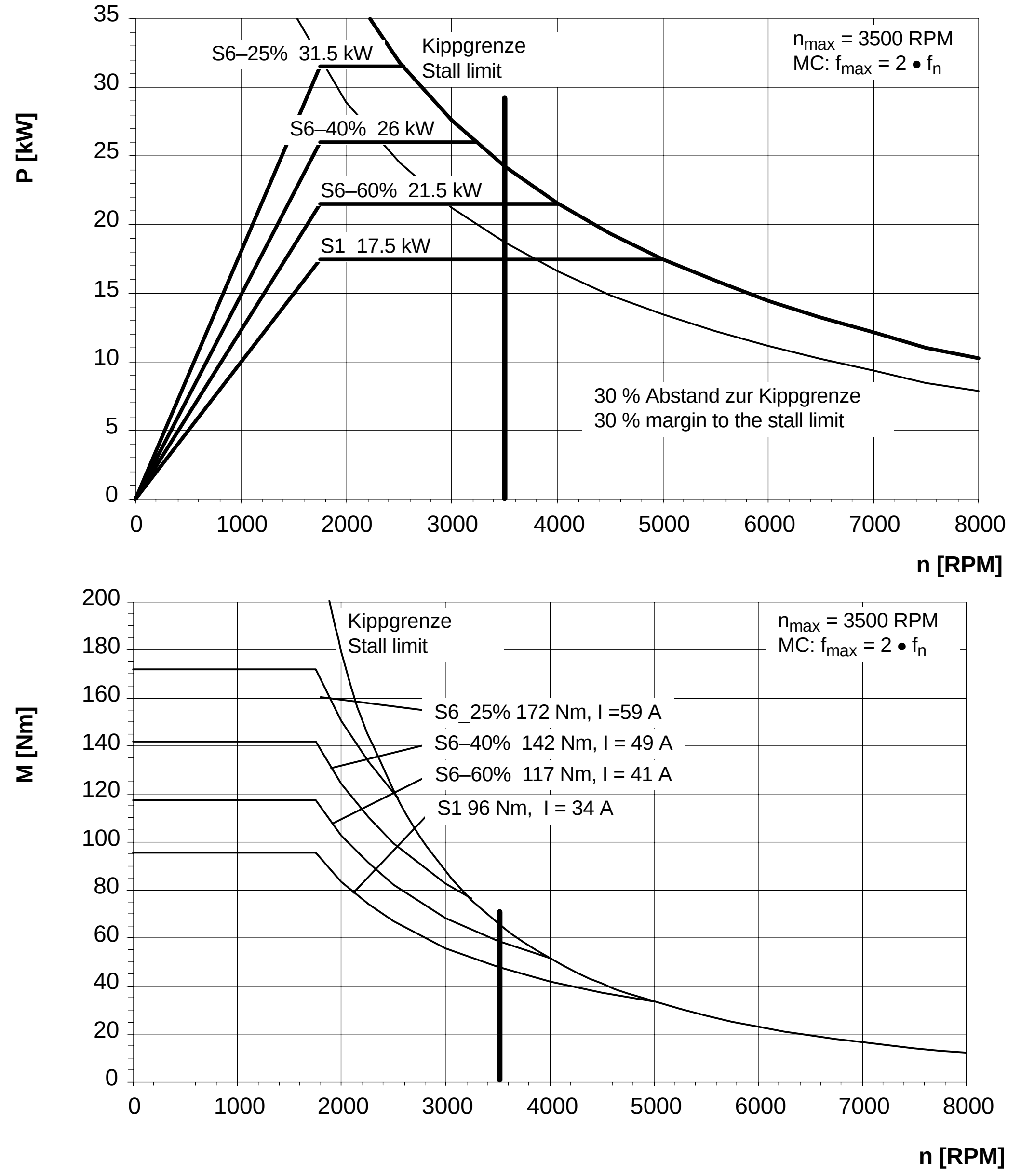

Fig. 4-68 MASTERDRIVES MC, 1PH7133–□□F□□

Table 4-72 MASTERDRIVES MC, 480 V, 1PH7135–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	21.5	117	42	398	59.5	3500	3500	3500	16

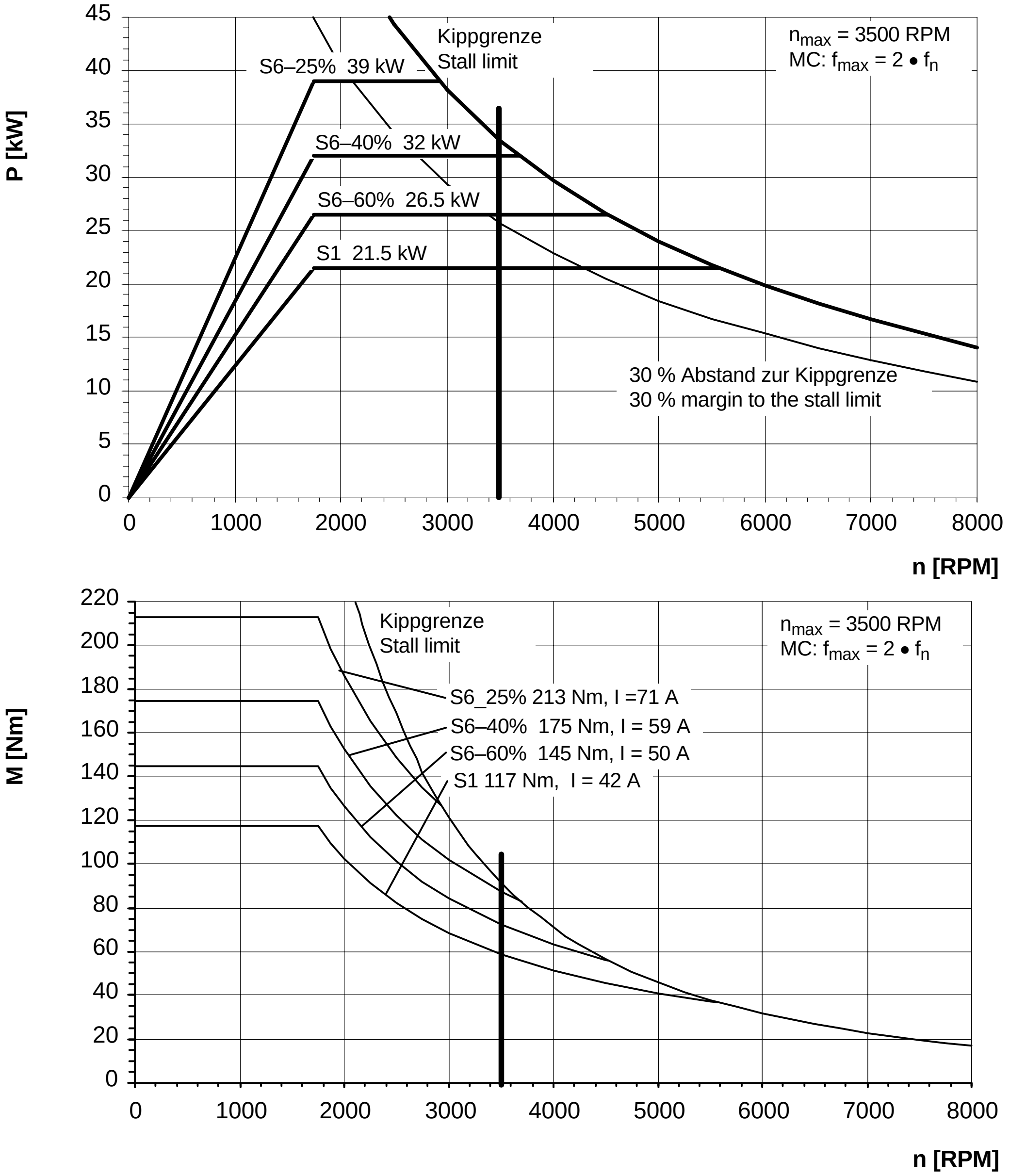

Fig. 4-69 MASTERDRIVES MC, 1PH7135–□□F□□

Table 4-73 MASTERDRIVES MC, 480 V, 1PH7137–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	25	136	56	357	59.5	3500	3500	3500	23

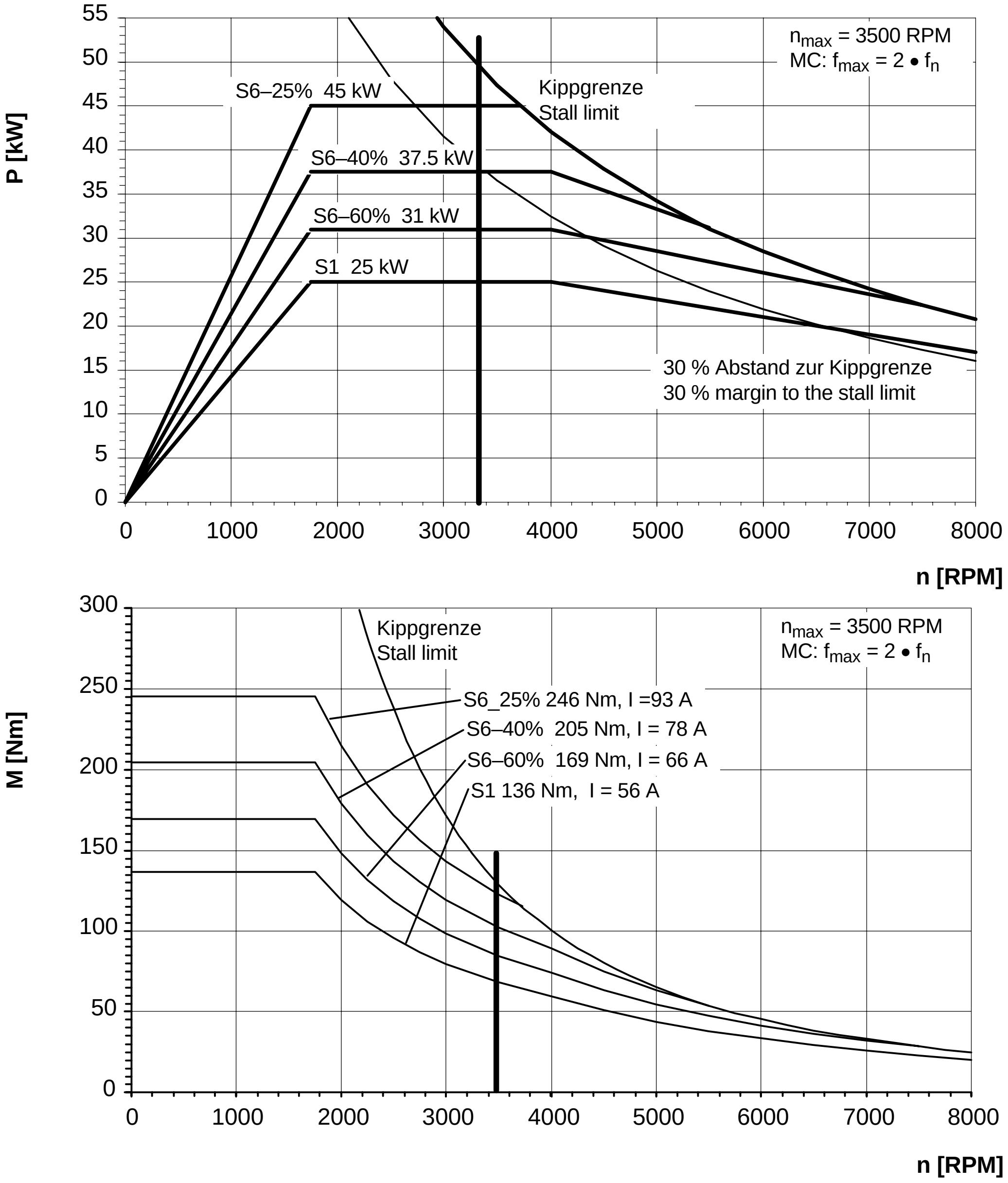

Fig. 4-70 MASTERDRIVES MC, 1PH7137–□□F□□

Table 4-74 MASTERDRIVES MC, 480 V, 1PH7163–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	34	186	72	364	59.2	3500	3500	3500	28

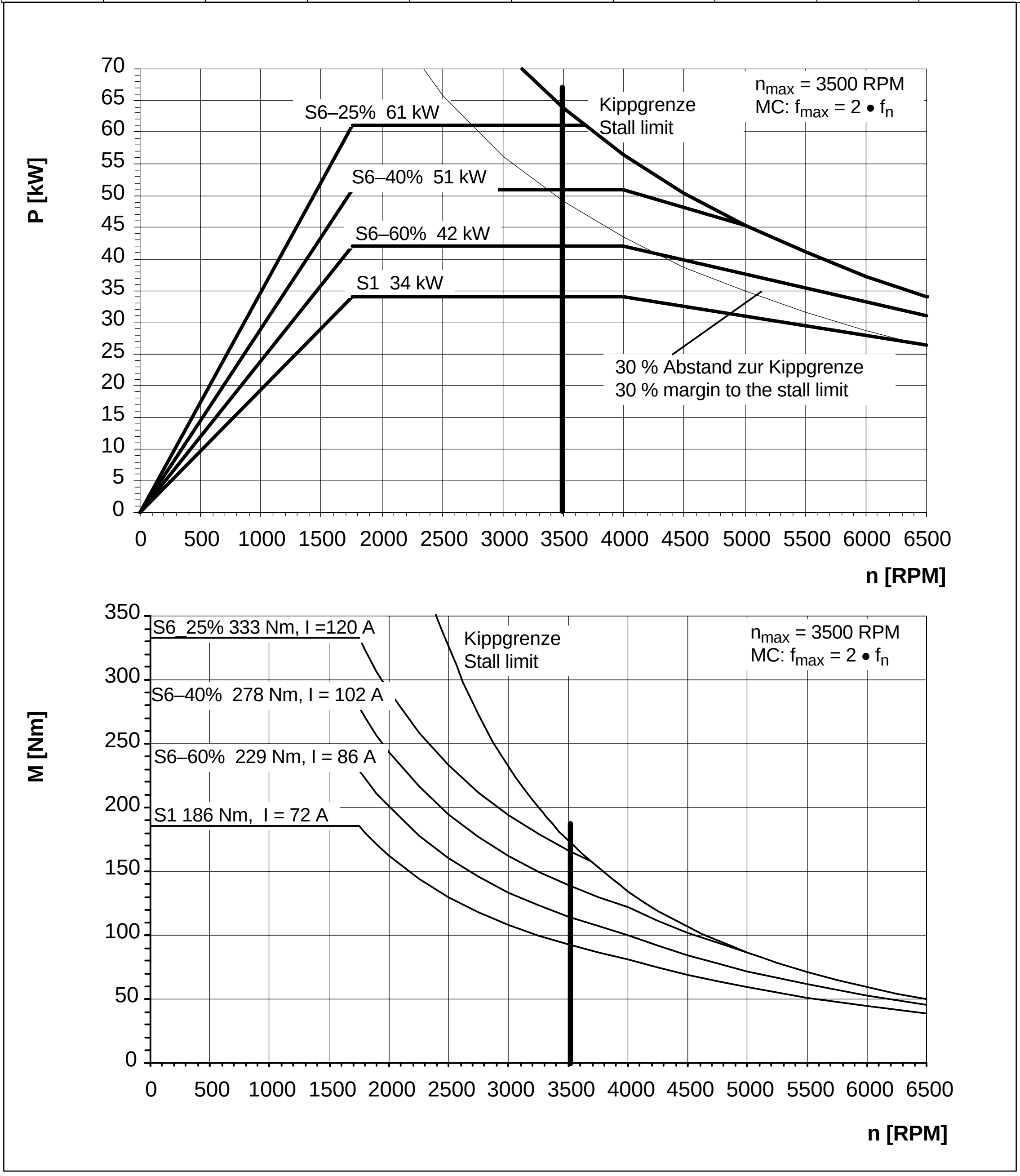

Fig. 4-71 MASTERDRIVES MC, 1PH7163–□□F□□

Table 4-75 MASTERDRIVES MC, 480 V, 1PH7167–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	41	224	79	398	59.2	3300	3500	3500	30

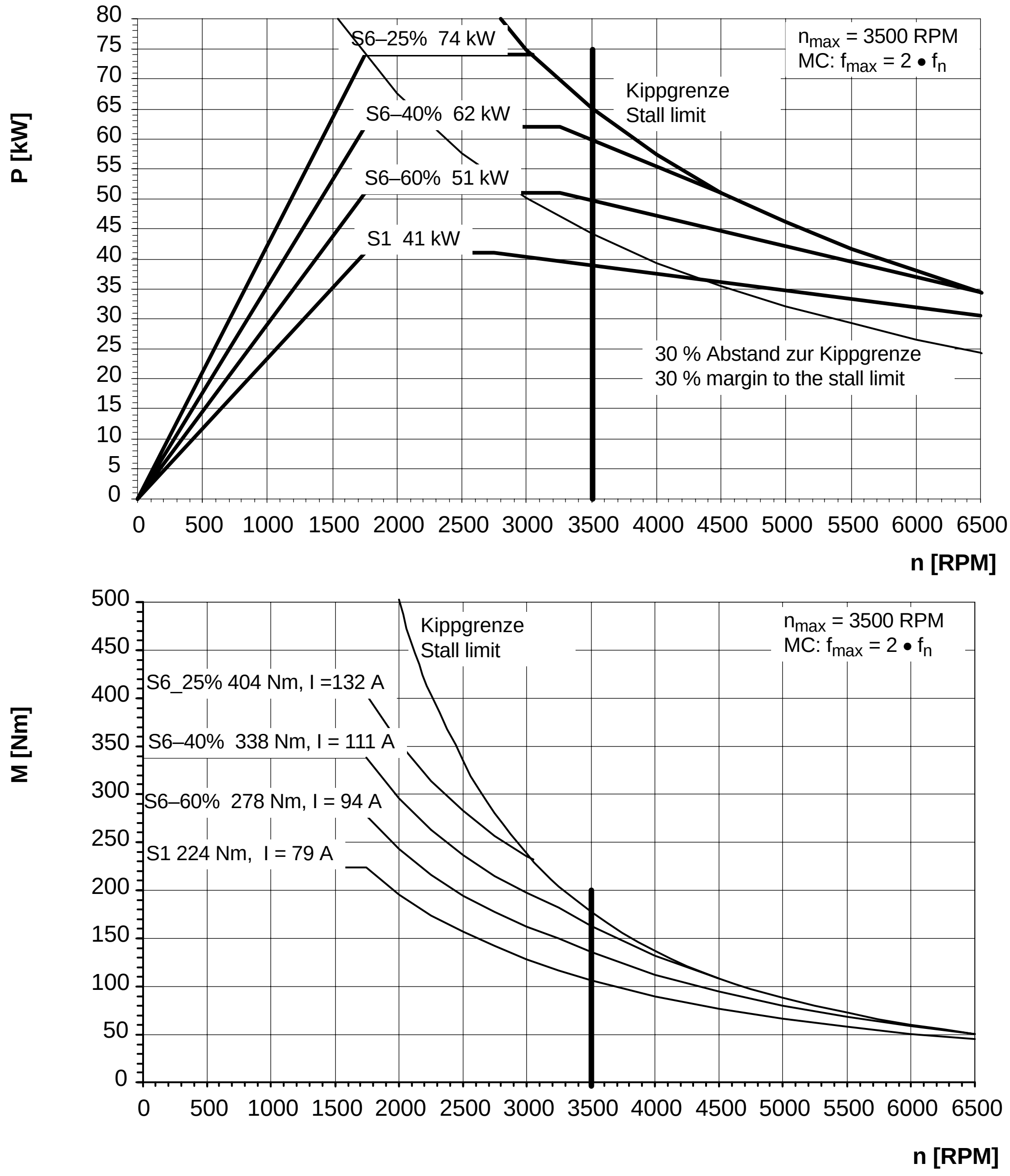

Fig. 4-72 MASTERDRIVES MC, 1PH7167–□□F□□

Table 4-76 MASTERDRIVES MC, 480 V, 1PH7184–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	60	327	120	388	59.0	3500	3500 [1]	3500	64

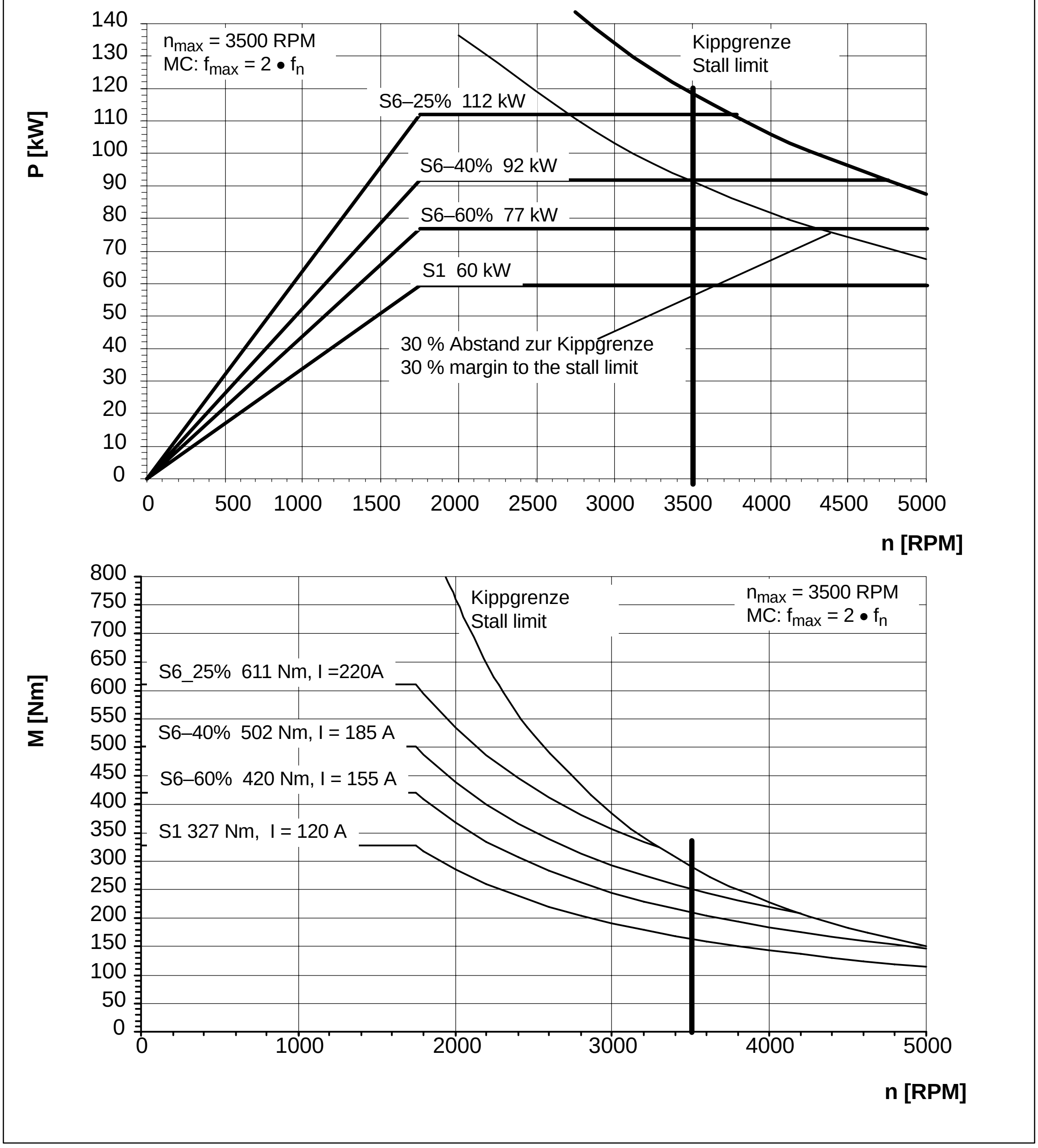

Fig. 4-73 MASTERDRIVES MC, 1PH7184–□□F□□

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[1] 3000 RPM for increased cantilever forces

Table 4-77 MASTERDRIVES MC, 480 V, 1PH7186–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	85	465	169	385	59.0	3500	3500 [1]	3500	84

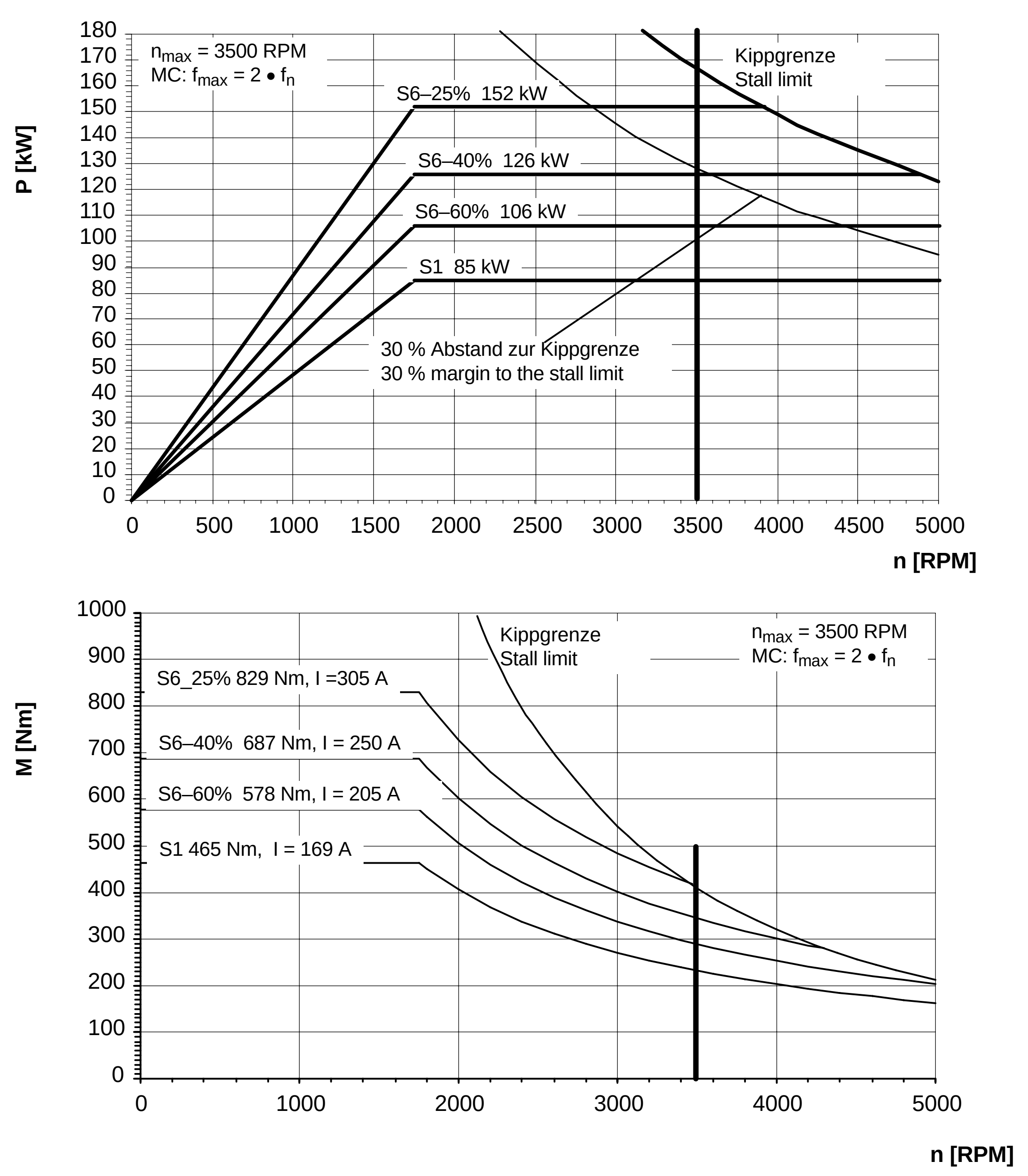

Fig. 4-74 MASTERDRIVES MC, 1PH7186–□□F□□

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[1] 3000 RPM for increased cantilever forces

Table 4-78 MASTERDRIVES MC, 480 V, 1PH7224–□□U□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	110	600	203	395	58.9	2900	3100 [1]	3500	88

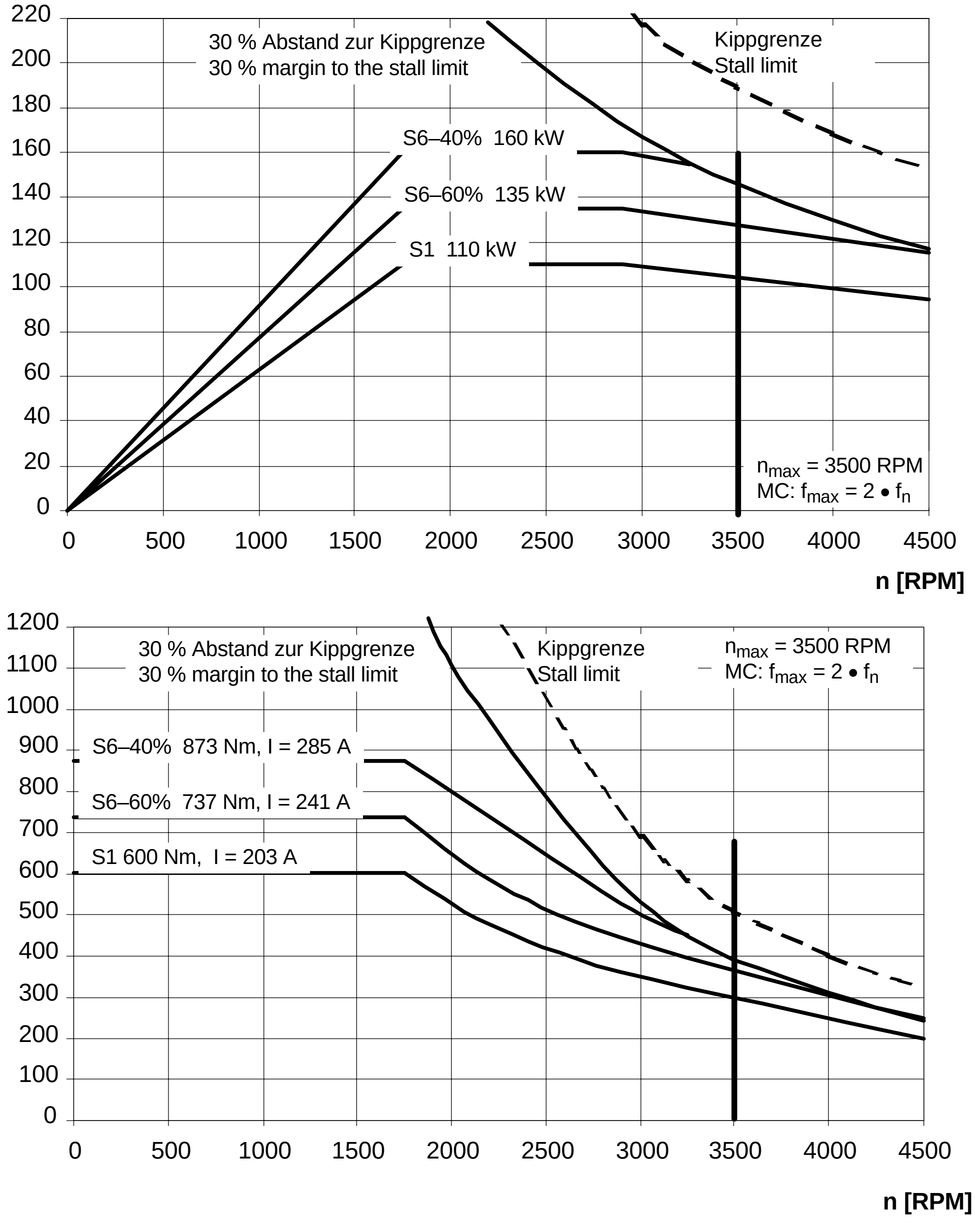

Fig. 4-75 MASTERDRIVES MC, 1PH7224–□□U□□

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[1] 2700 RPM for increased cantilever forces

Table 4-79 MASTERDRIVES MC, 480 V, 1PH7226–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	135	737	254	395	58.9	2900	3100 [1]	3500	120

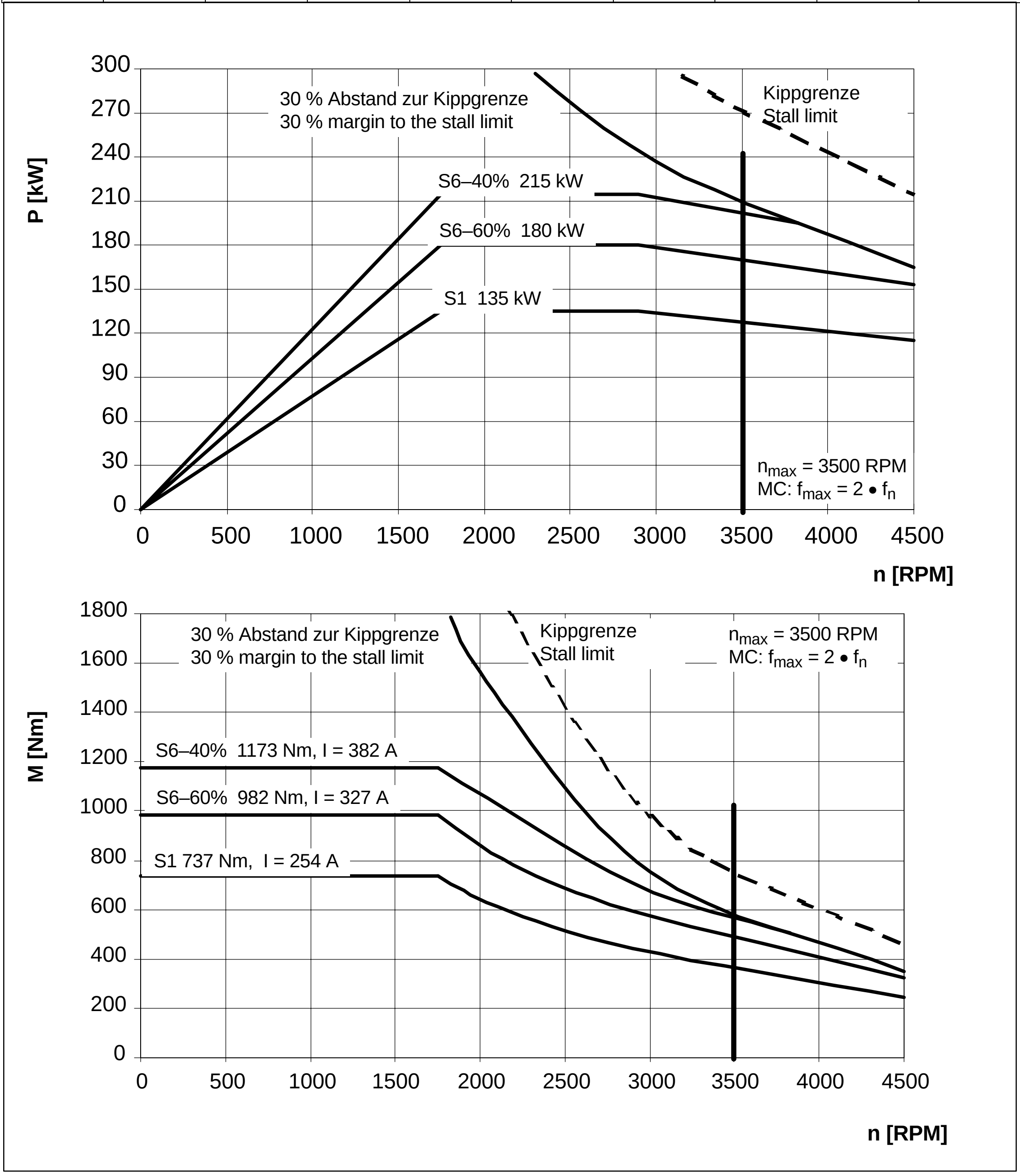

Fig. 4-76 MASTERDRIVES MC, 1PH7226–□□F□□

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[1] 2700 RPM for increased cantilever forces

Table 4-80 MASTERDRIVES MC, 480 V, 1PH7228–□□F□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
1750	179	975	342	395	58.8	2900	3100 [1]	3500	169

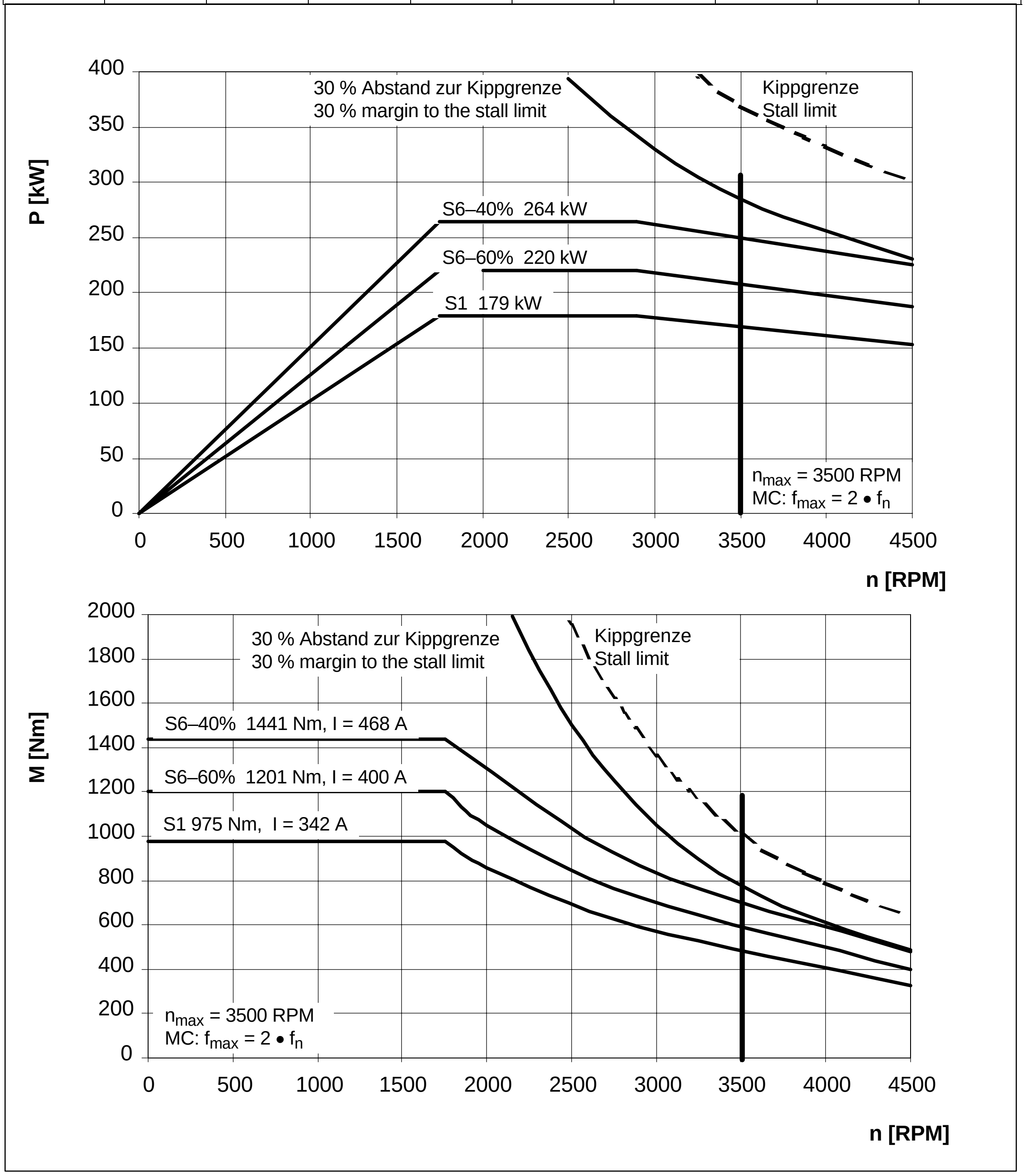

Fig. 4-77 MASTERDRIVES MC, 1PH7228–□□F□□

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[1] 2500 RPM for increased cantilever forces

Table 4-81 MASTERDRIVES MC, 480 V, 1PH7103–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2300	7.5	31	17	388	78.8	4600	4600	4600	8.2

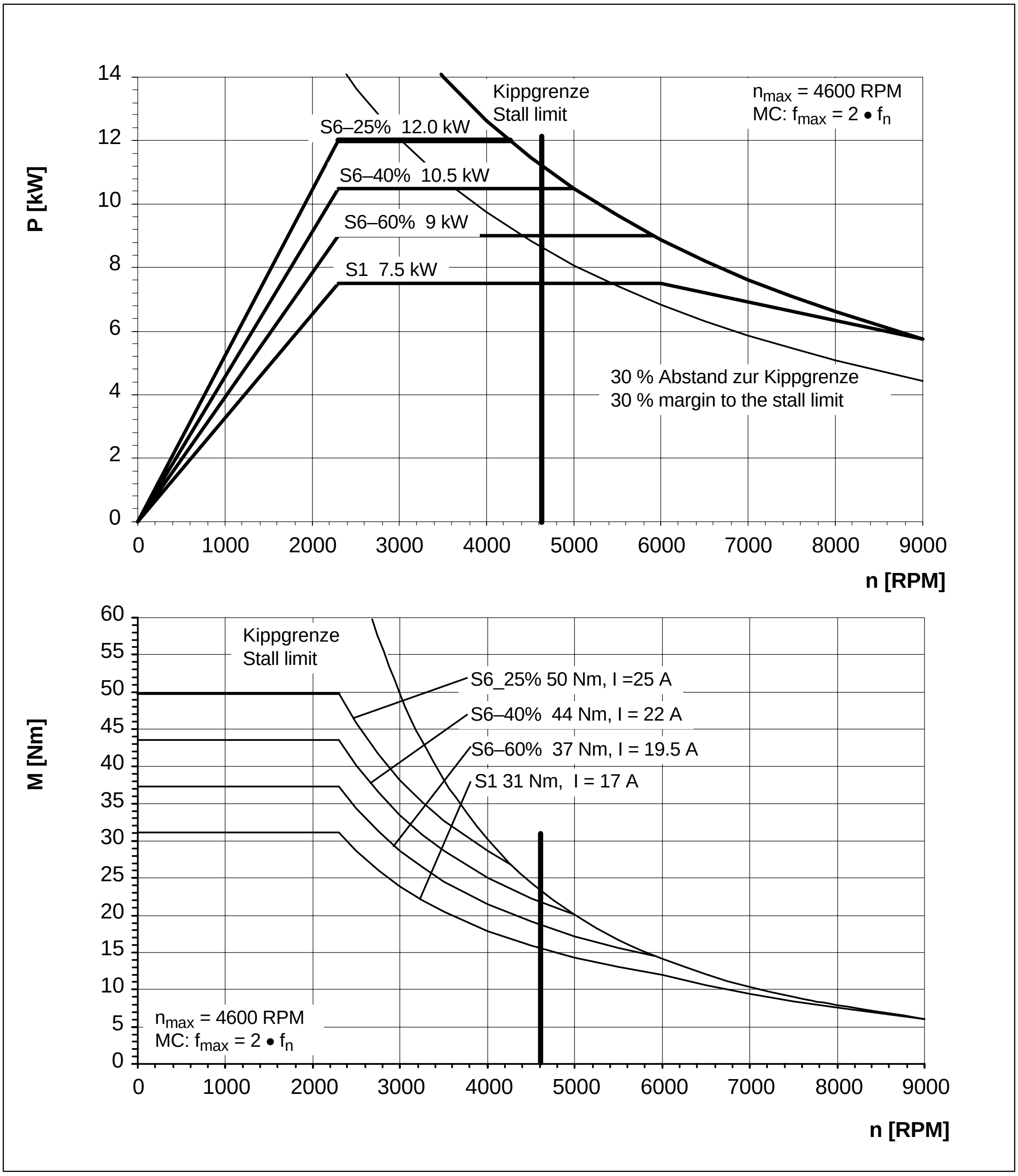

Fig. 4-78 MASTERDRIVES MC, 1PH7103–□□G□□

Table 4-82 MASTERDRIVES MC, 480 V, 1PH7107–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2300	12	50	26	400	78.7	4600	4600	4600	12

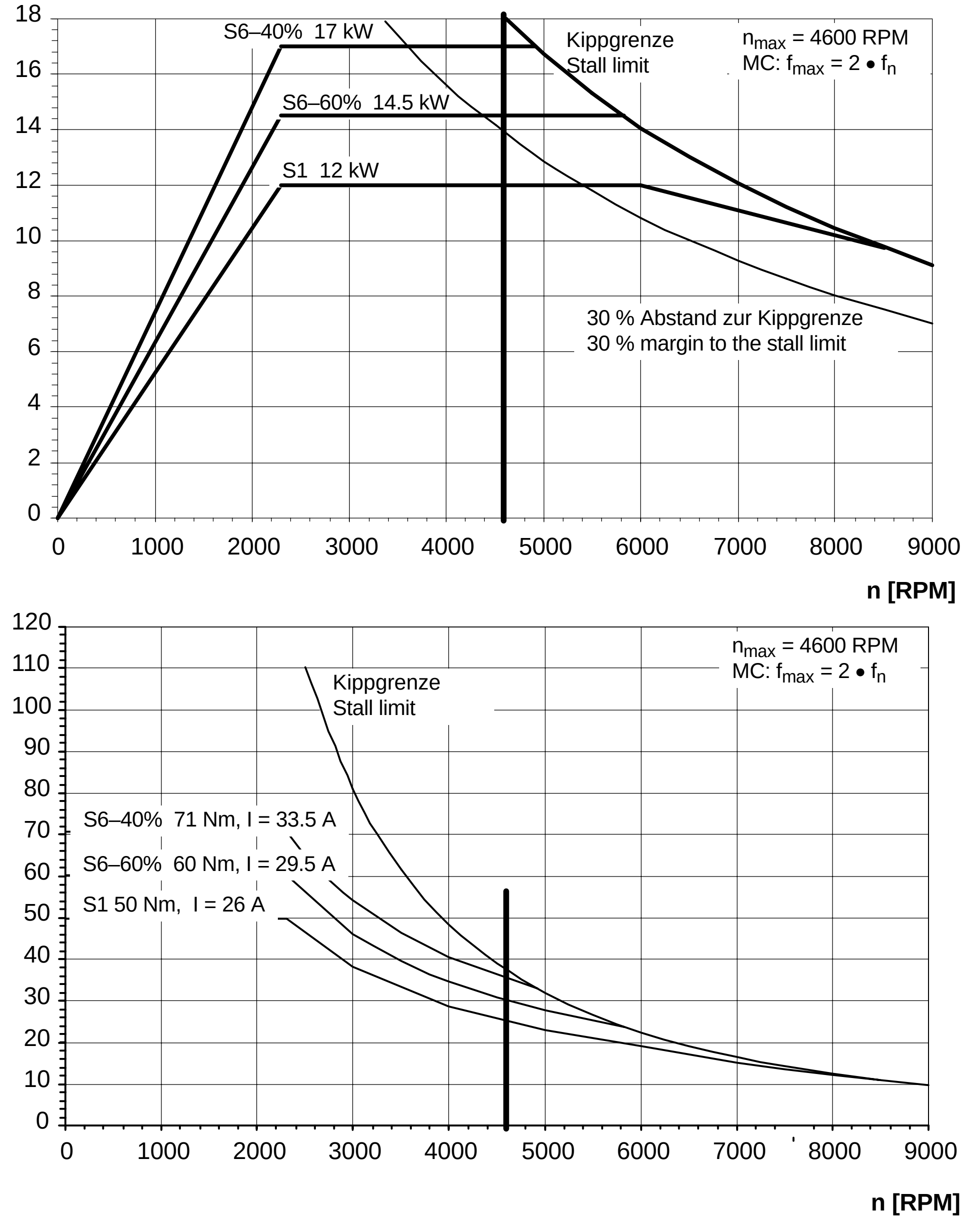

Fig. 4-79 MASTERDRIVES MC, 1PH7107–□□G□□

Table 4-83 MASTERDRIVES MC, 480 V, 1PH7133–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2300	22.5	93	45	398	78.0	4000	4500	4600	17

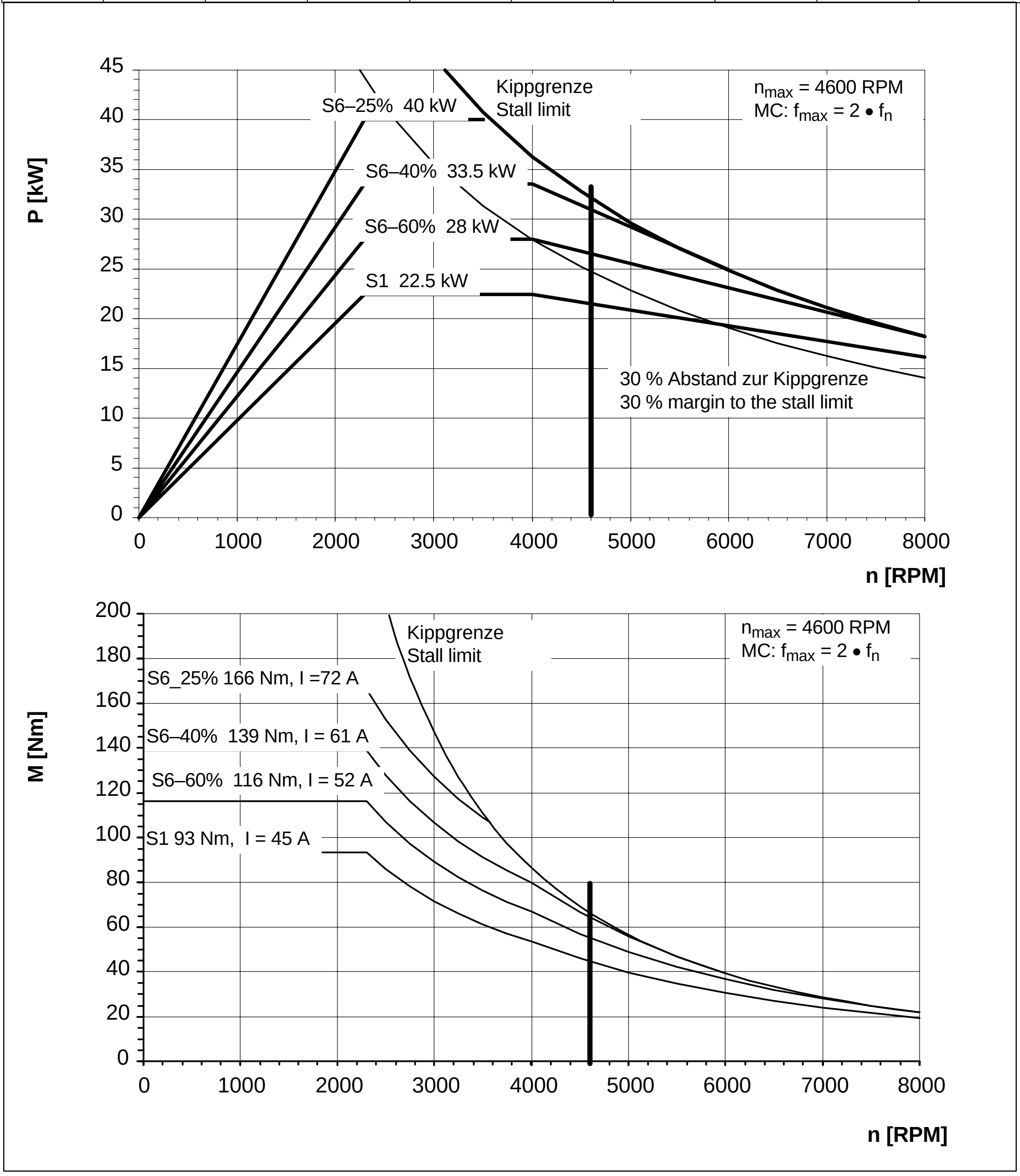

Fig. 4-80 MASTERDRIVES MC, 1PH7133–□□G□□

Table 4-84 MASTERDRIVES MC, 480 V, 1PH7137–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2300	29	120	56	398	77.8	4000	4500	4600	21

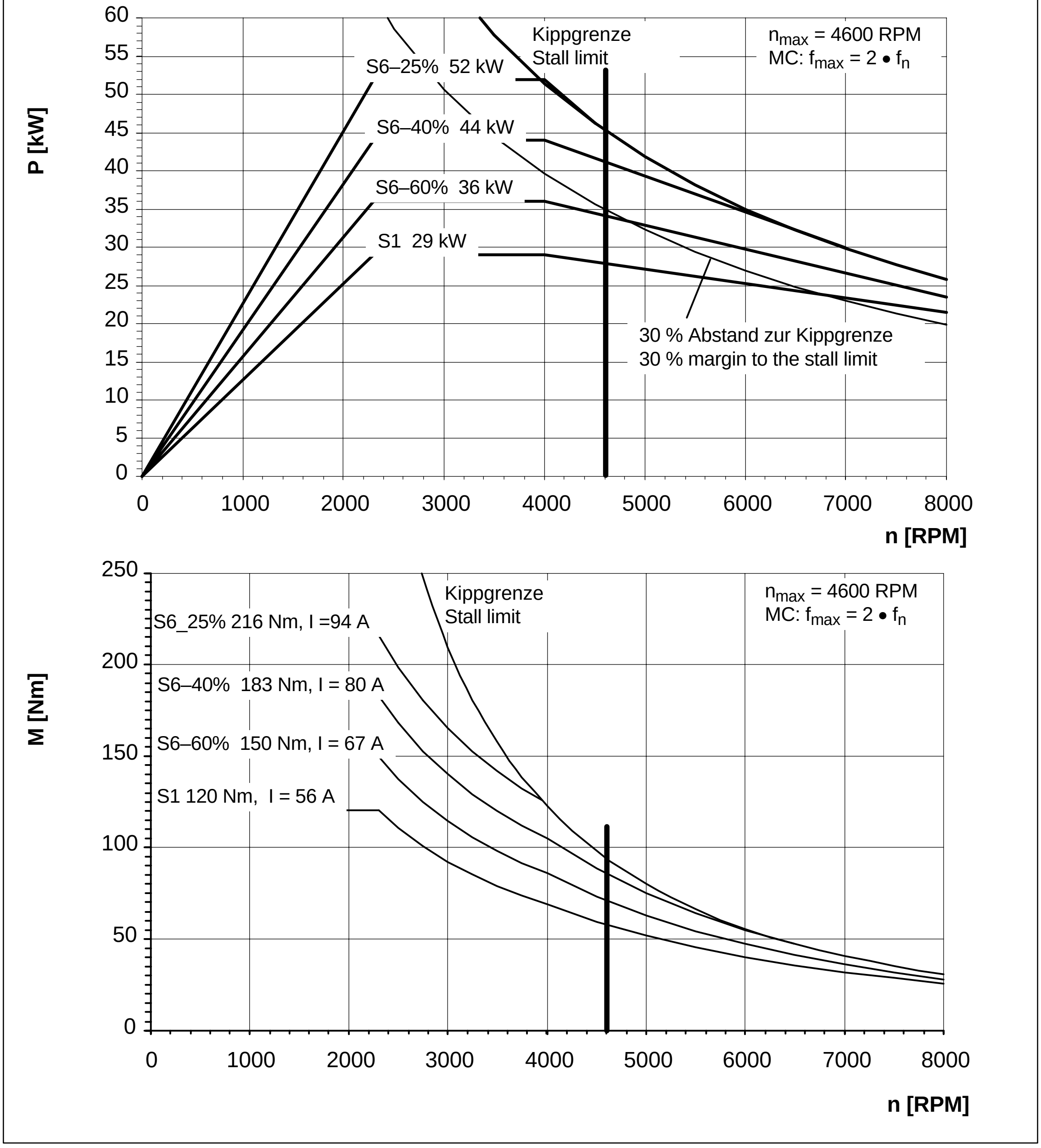

Fig. 4-81 MASTERDRIVES MC, 1PH7137–□□G□□

Table 4-85 MASTERDRIVES MC, 480 V, 1PH7163–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2300	38	158	80	374	77.3	3000	3700	4600	36

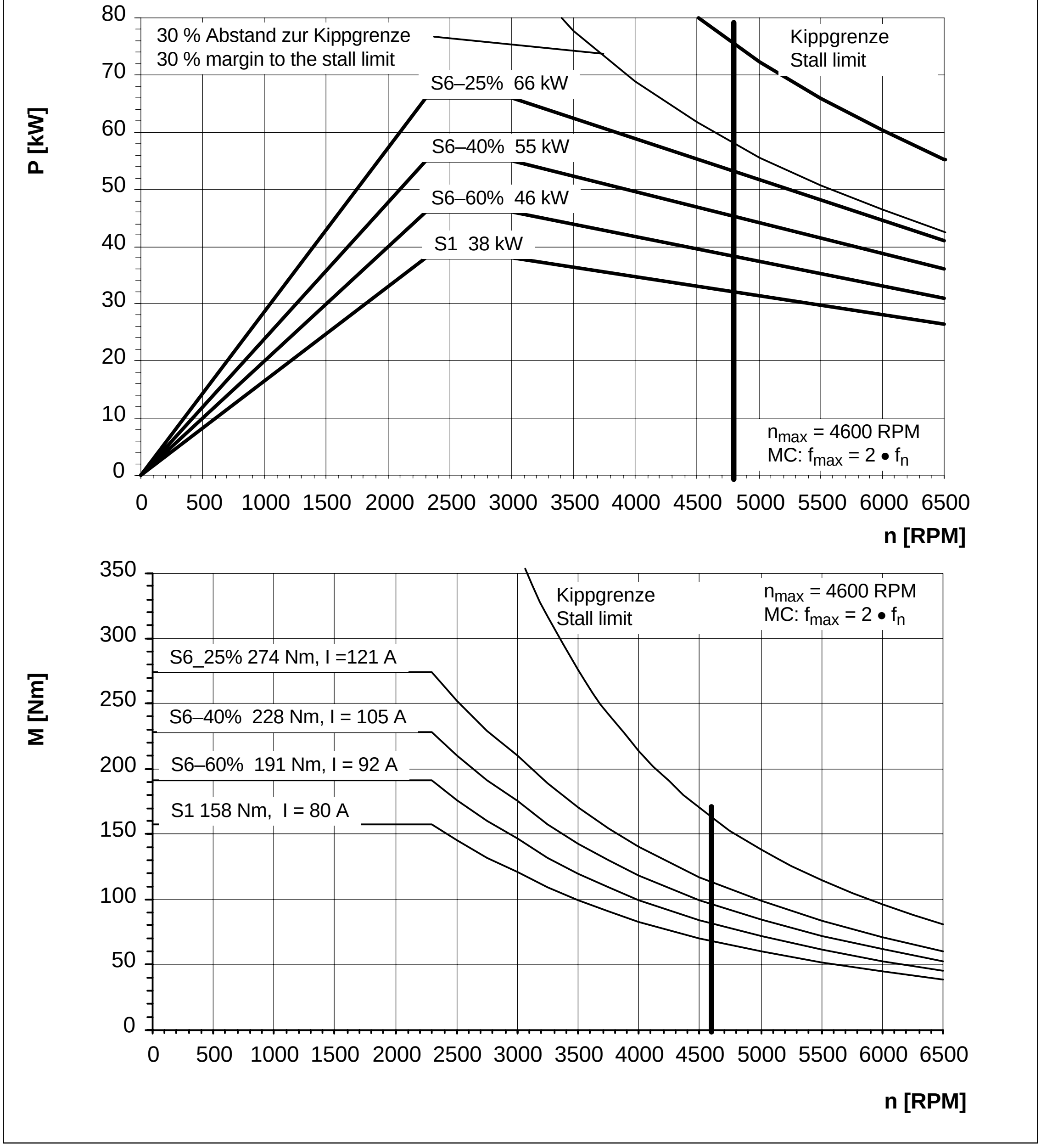

Fig. 4-82 MASTERDRIVES MC, 1PH7163–□□G□□

Table 4-86 MASTERDRIVES MC, 480 V, 1PH7167–□□G□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2300	44	183	85	398	77.4	3000	3700	4600	40

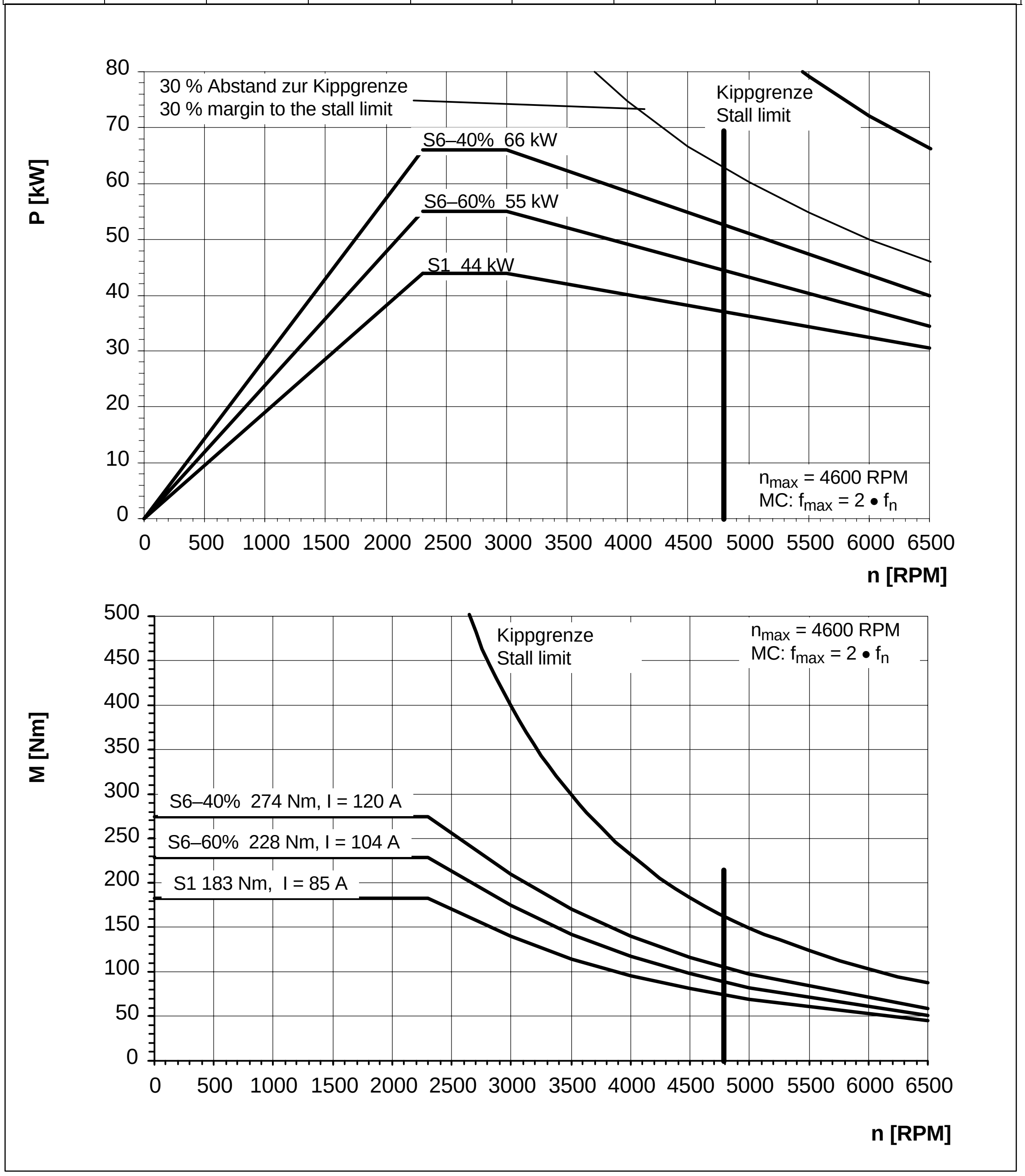

Fig. 4-83 MASTERDRIVES MC, 1PH7167–□□G□□

Table 4-87 MASTERDRIVES MC, 480 V, 1PH7184–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2900	81	265	158	395	97.4	5000	3500 [1]	5000	77

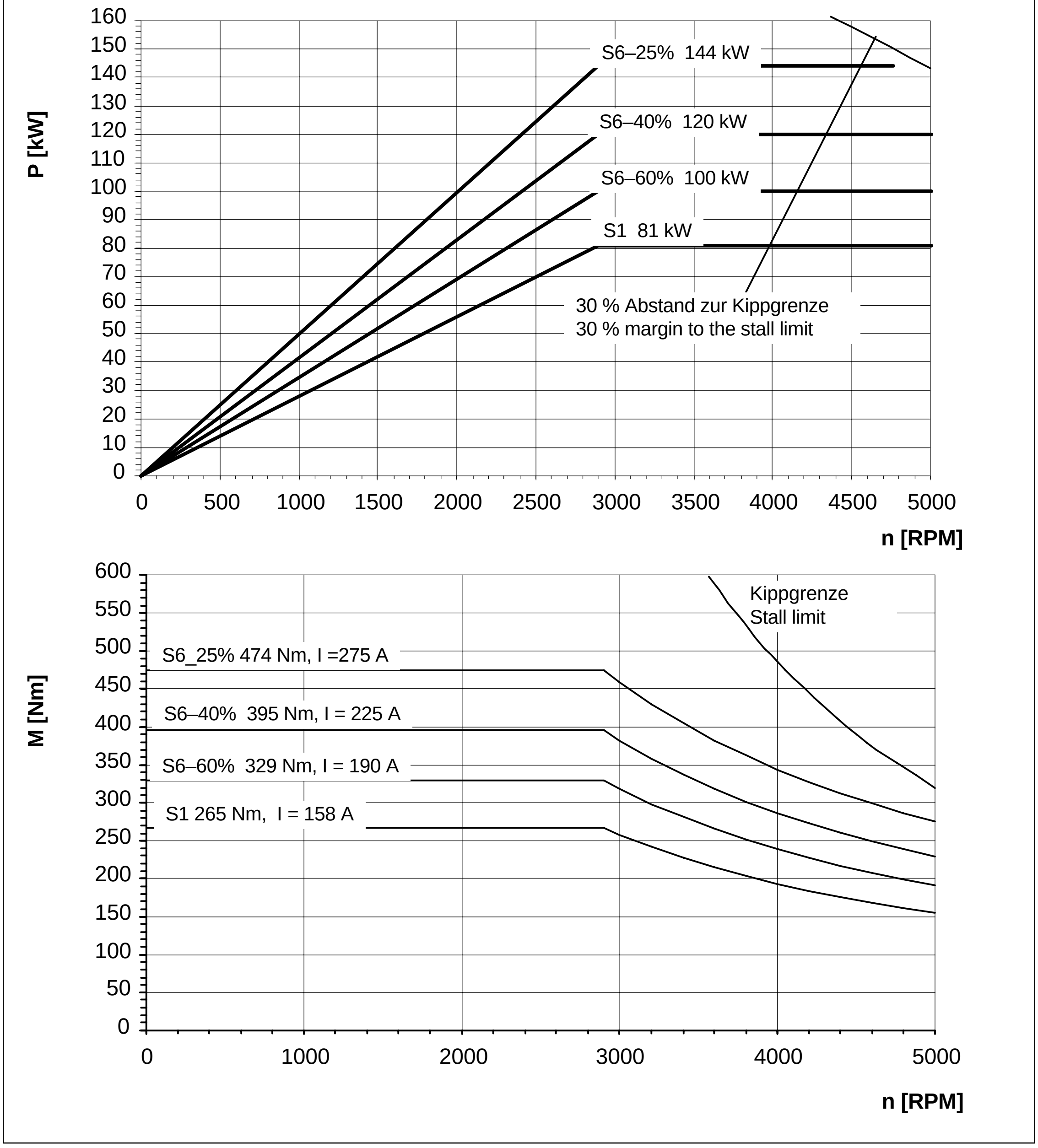

Fig. 4-84 MASTERDRIVES MC, 1PH7184–□□L□□

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[1] 3000 RPM for increased cantilever forces

Table 4-88 MASTERDRIVES MC, 480 V, 1PH7186–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2900	101	333	206	385	97.3	5000	3500 [1]	5000	107

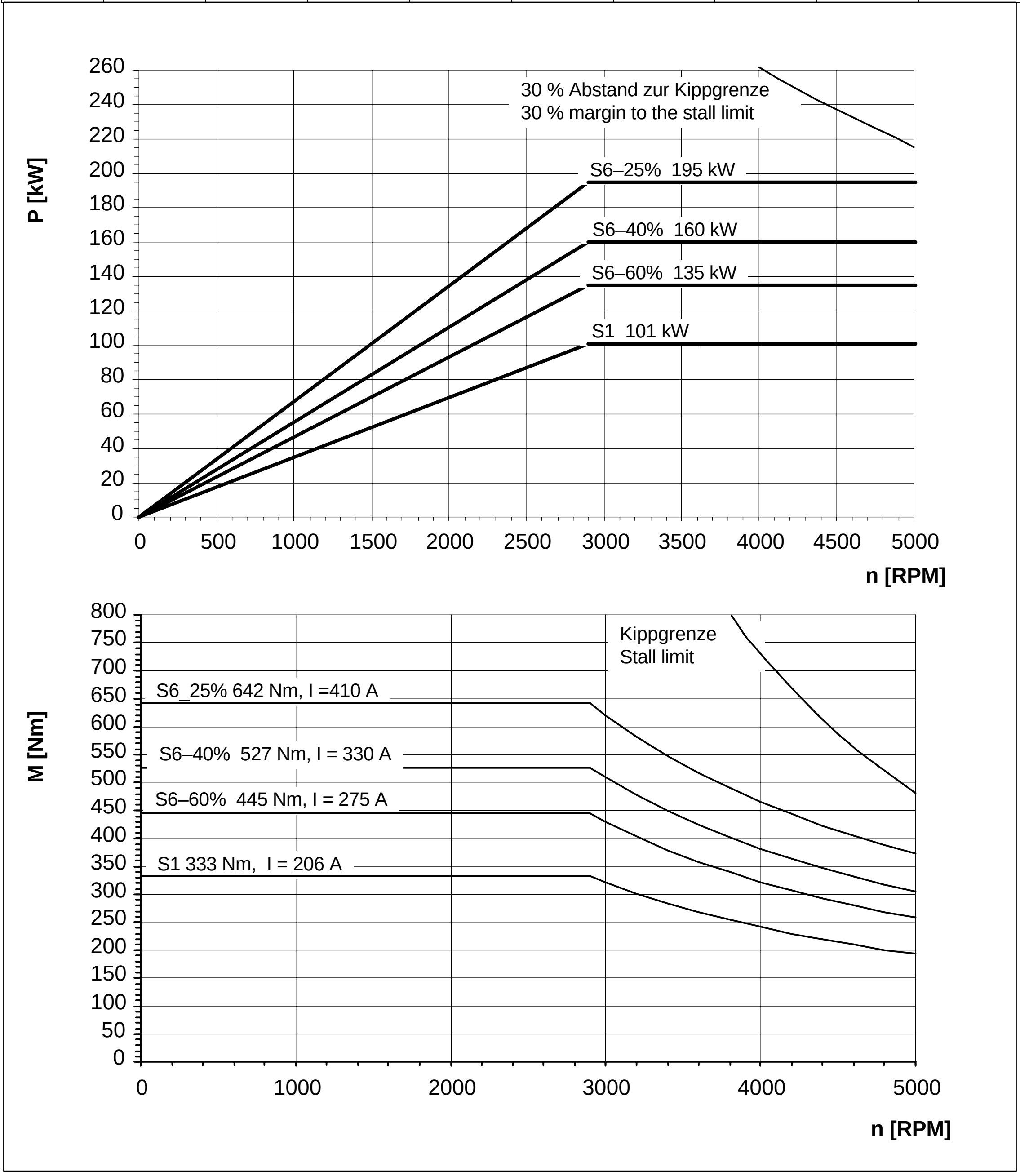

Fig. 4-85 MASTERDRIVES MC, 1PH7186–□□L□□

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[1] 3000 RPM for increased cantilever forces

Table 4-89 MASTERDRIVES MC, 480 V, 1PH7224–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2900	149	490	274	395	97.3	3500	3100 1)	4500	115

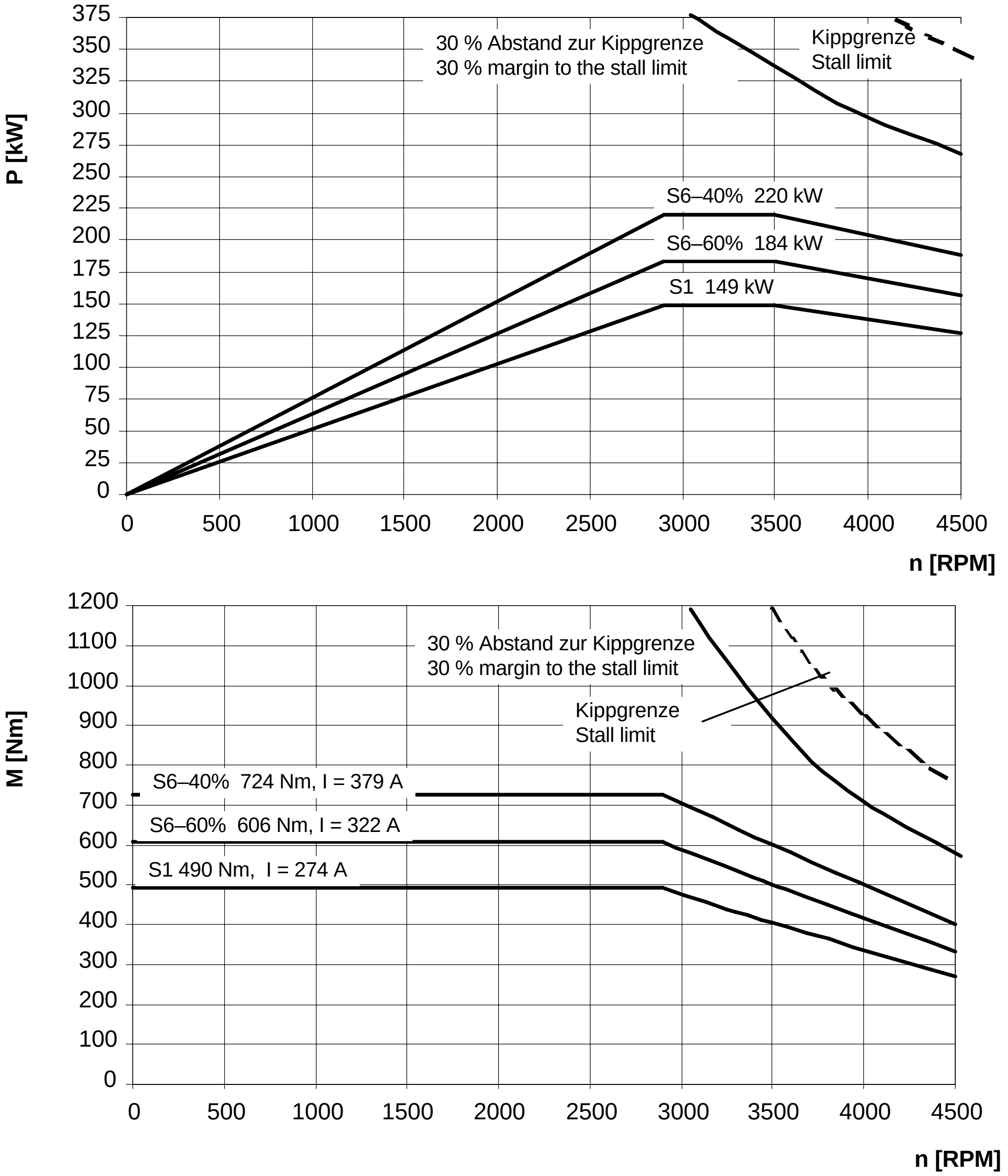

Fig. 4-86 MASTERDRIVES MC, 1PH7224–□□L□□

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1) 2700 RPM for increased cantilever forces

Table 4-90 MASTERDRIVES MC, 480 V, 1PH7226–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2900	185	610	348	390	97.2	3500	3100 [1]	4500	154

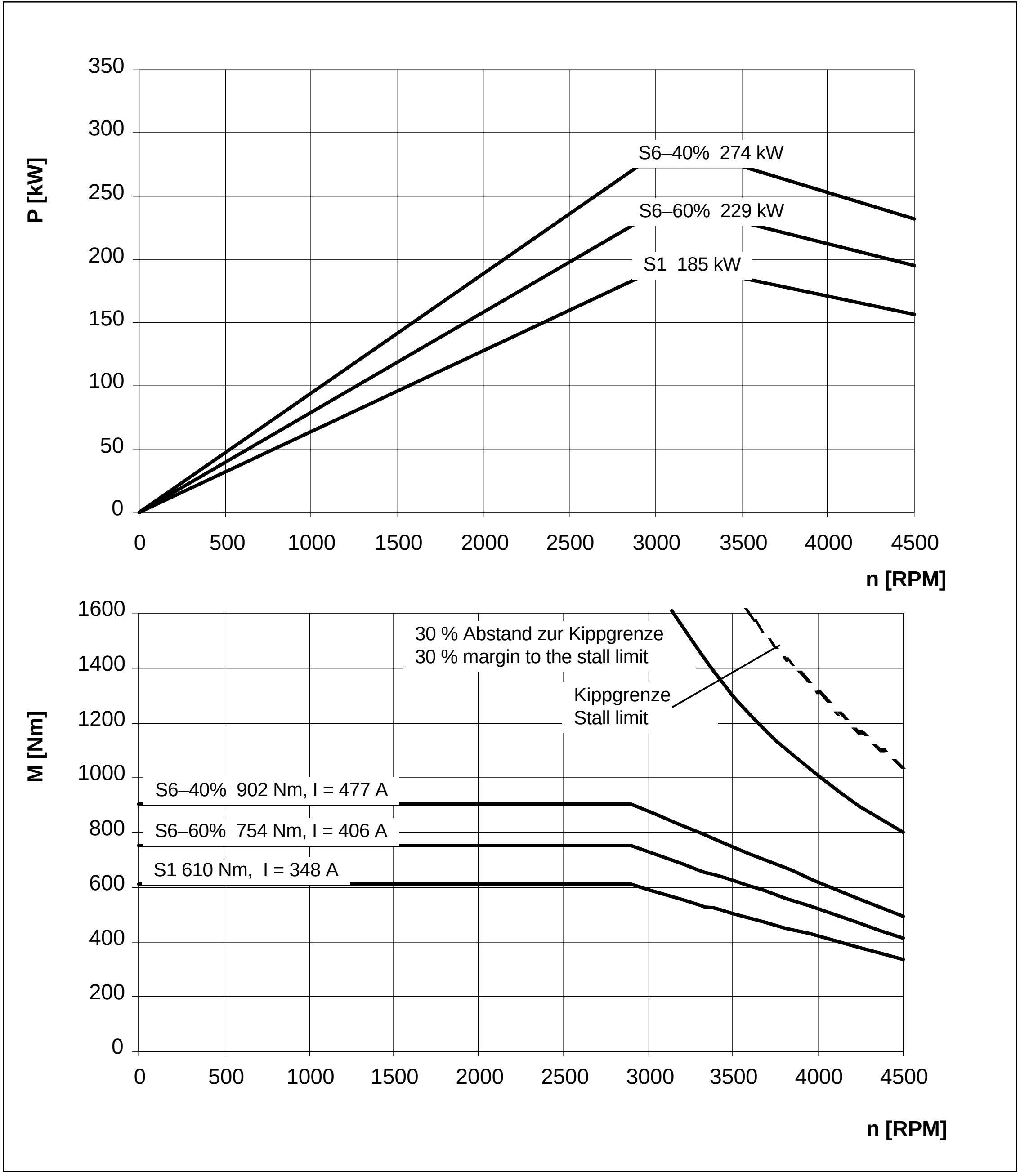

Fig. 4-87 MASTERDRIVES MC, 1PH7226–□□L□□

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[1] 2700 RPM for increased cantilever forces

Table 4-91 MASTERDRIVES MC, 480 V, 1PH7228–□□L□□

n_N[RPM]	P_N [kW]	M_N [Nm]	I_N [A]	U_N [V]	f_n [Hz]	n_1 [RPM]	n_{s1} [RPM]	n_{max} [RPM]	I_0 [A]
2900	215	708	402	395	97.2	3500	3100 1)	4500 2)	186

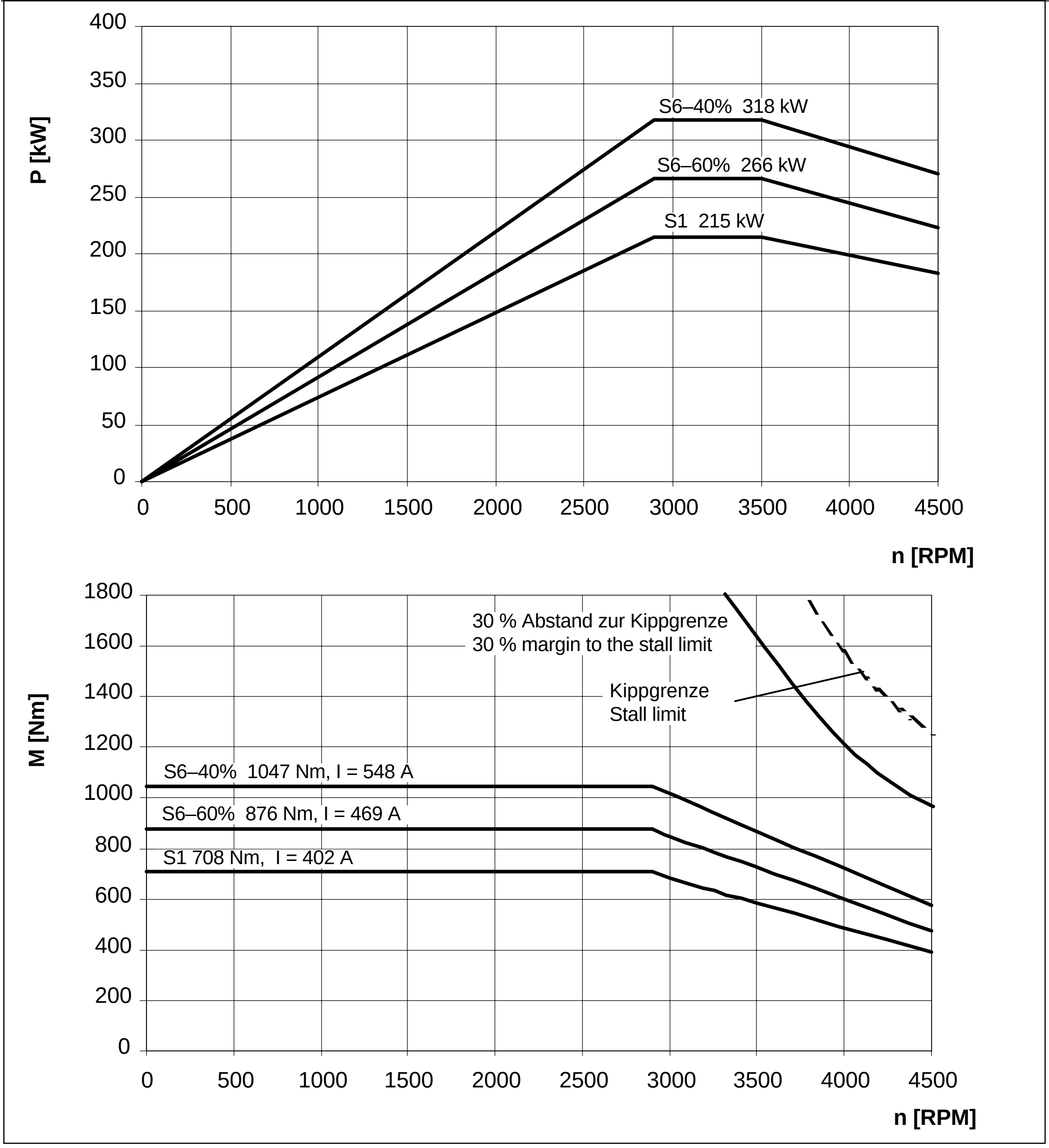

Fig. 4-88 MASTERDRIVES MC, 1PH7228–□□L□□

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1) 2500 RPM for increased cantilever forces

2) 4000 RPM for increased cantilever forces

■

Cantilever and Axial Force

5

5.1 Cantilever force

For a general description, please refer to the Planning Guide ”General Section for Induction Motors”.

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**.

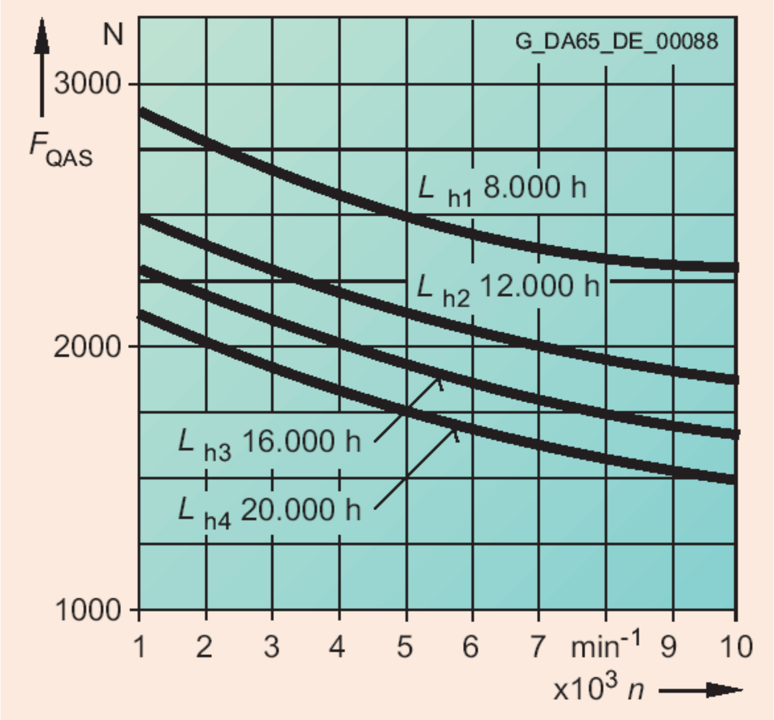
Note

SH 180 to SH 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**. 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 out–drive should be selected.

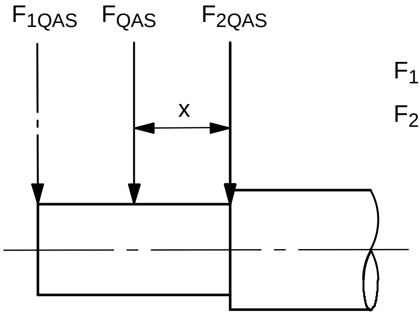
The maximum permissible and the minimum required cantilever forces are shown in the following diagrams.

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

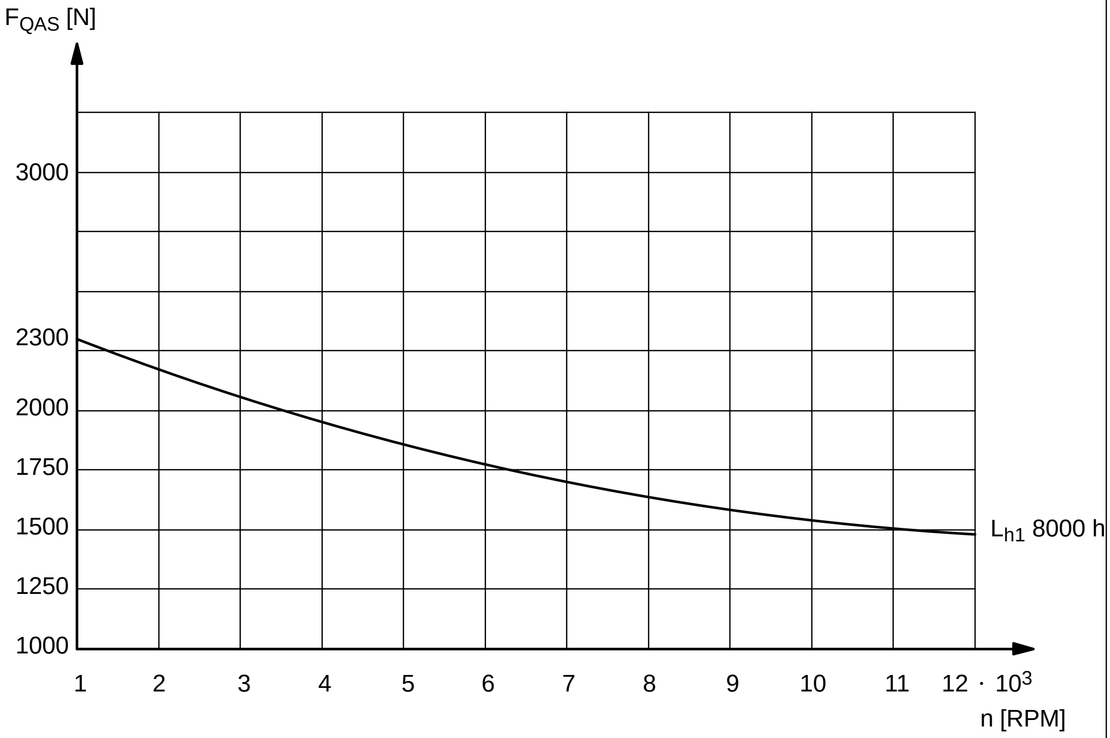
Estimated bearing lifetime under different operating conditions (F_{QAS}; n)

$$L_{h\ tot} = \frac{100}{\frac{q_1}{L_{h1}} + \frac{q_2}{L_{h2}} + \frac{q_3}{L_{h3}} + \frac{q_4}{L_{h4}}}$$

q = Duration [%] under constant conditions

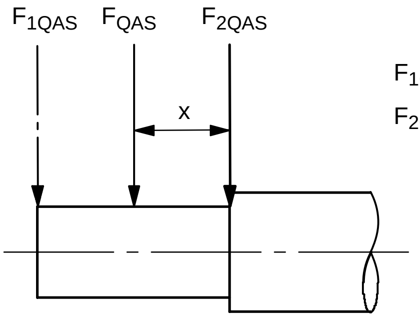
Fig. 5-1 Cantilever force diagram, shaft height 100 for standard bearing designs

SH 100, permissible cantilever forces for increased max. speed



Bearings, DE: 6208 C4

Bearings, NDE: 6208 C4



$F_{1QAS} = 0.9\ F_{QAS}$

$F_{2QAS} = 1.1\ F_{QAS}$

x = 40 mm

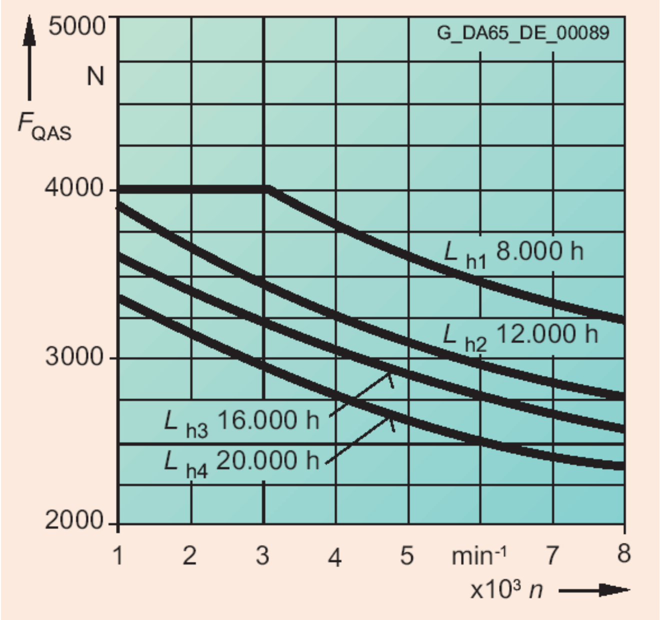
Estimated bearing lifetime under different operating conditions (F_{QAS}; n)

$$L_{h\ tot} = \frac{100}{\frac{q_1}{L_{h1}} + \frac{q_2}{L_{h2}} + \frac{q_3}{L_{h3}} + \frac{q_4}{L_{h4}}}$$

q = Duration [%] under constant conditions

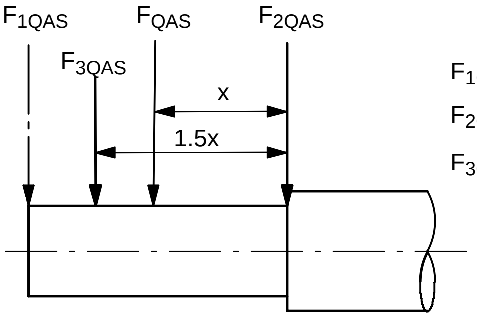
Fig. 5-2 Cantilever force diagram, shaft height 100 for increased max. speed

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

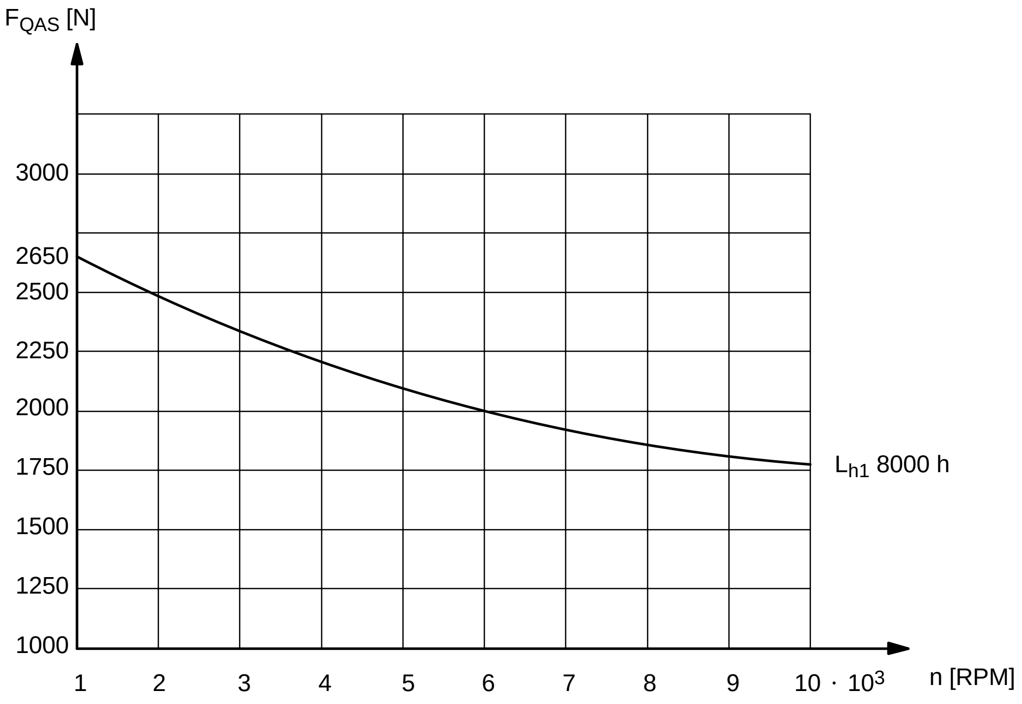
Estimated bearing lifetime under different operating conditions (F_{QAS}; n)

$$L_{h\ tot} = \frac{100}{\frac{q_1}{L_{h1}} + \frac{q_2}{L_{h2}} + \frac{q_3}{L_{h3}} + \frac{q4}{L_{h3}}}$$

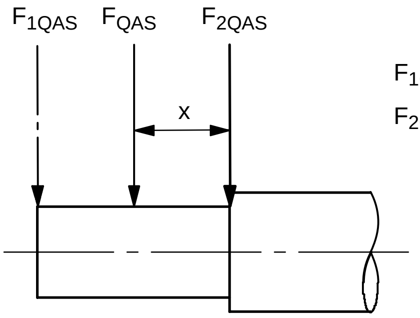
q = Duration [%] under constant conditions

Fig. 5-3 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

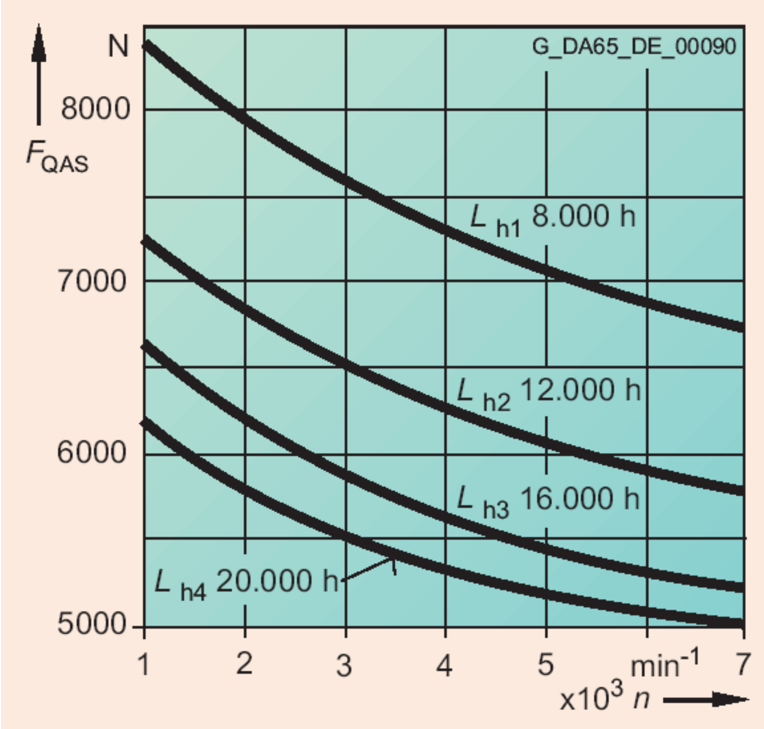
Estimated bearing lifetime under different operating conditions (F_{QAS}; n)

$$L_{h\ tot} = \frac{100}{\frac{q_1}{L_{h1}} + \frac{q_2}{L_{h2}} + \frac{q_3}{L_{h3}} + \frac{q_4}{L_{h4}}}$$

q = Duration [%] under constant conditions

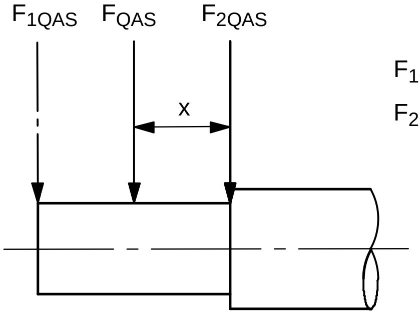
Fig. 5-4 Cantilever force diagram, shaft height 132 for increased max. speed

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

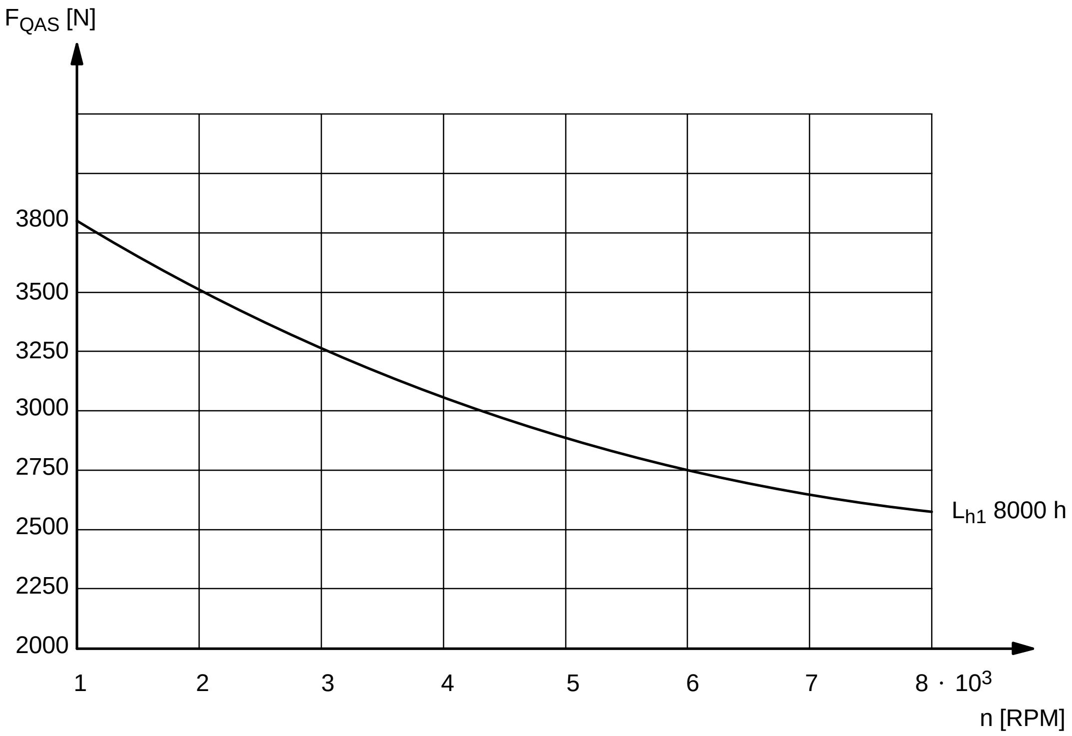
Estimated bearing lifetime under different operating conditions (F_{QAS}; n)

$$L_{h\ tot} = \frac{100}{\frac{q_1}{L_{h1}} + \frac{q_2}{L_{h2}} + \frac{q_3}{L_{h3}} + \frac{q_4}{L_{h4}}}$$

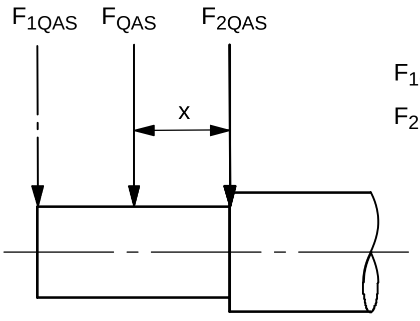
q = Duration [%] under constant conditions

Fig. 5-5 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

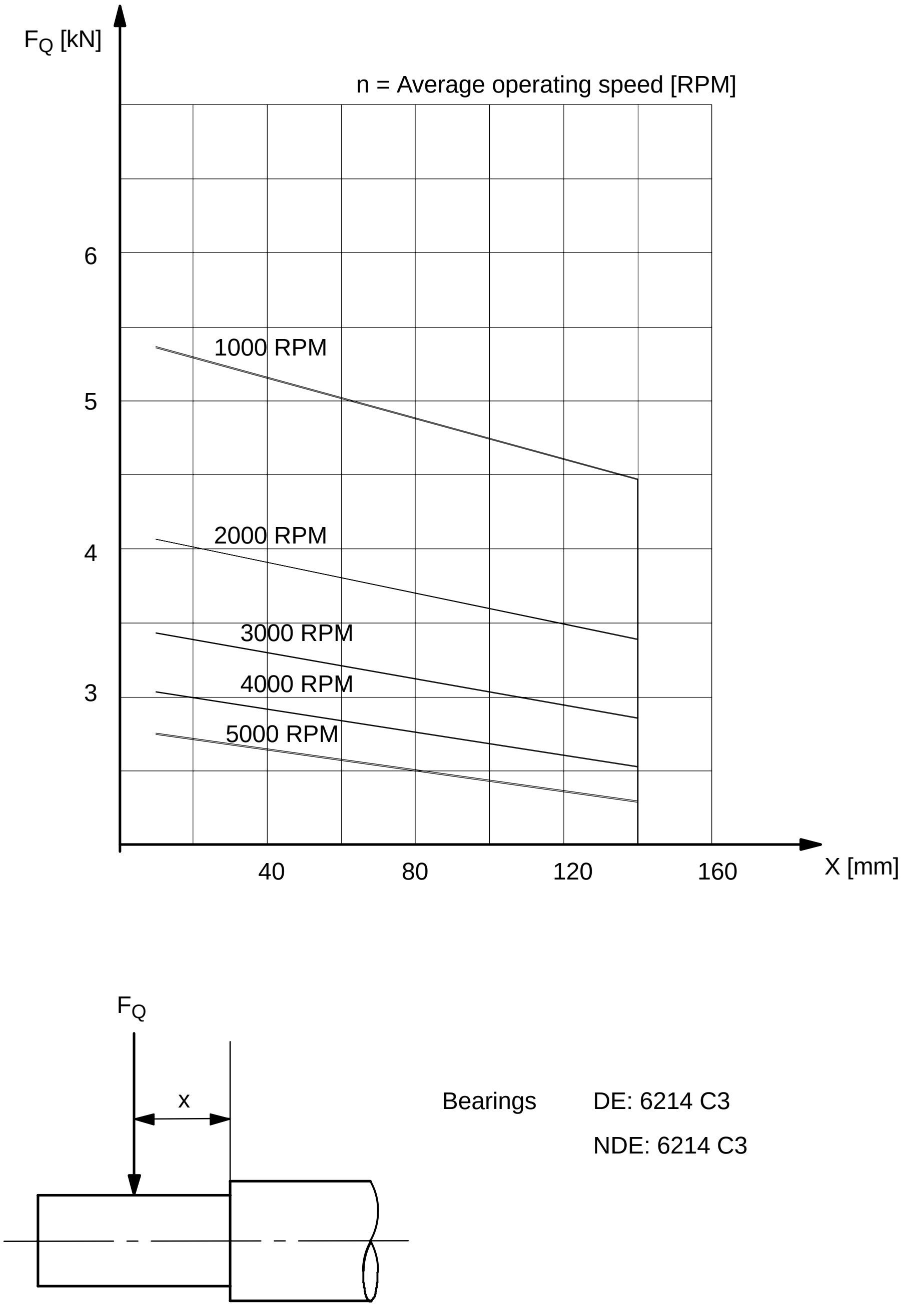
Estimated bearing lifetime under different operating conditions (F_{QAS}; n)

$$L_{h\ tot} = \frac{100}{\frac{q_1}{L_{h1}} + \frac{q_2}{L_{h2}} + \frac{q_3}{L_{h3}} + \frac{q_4}{L_{h4}}}$$

q = Duration [%] under constant conditions

Fig. 5-6 Cantilever force diagram, shaft height 160 for increased max. speed

SH 180, permissible cantilever forces for a coupling out–drive

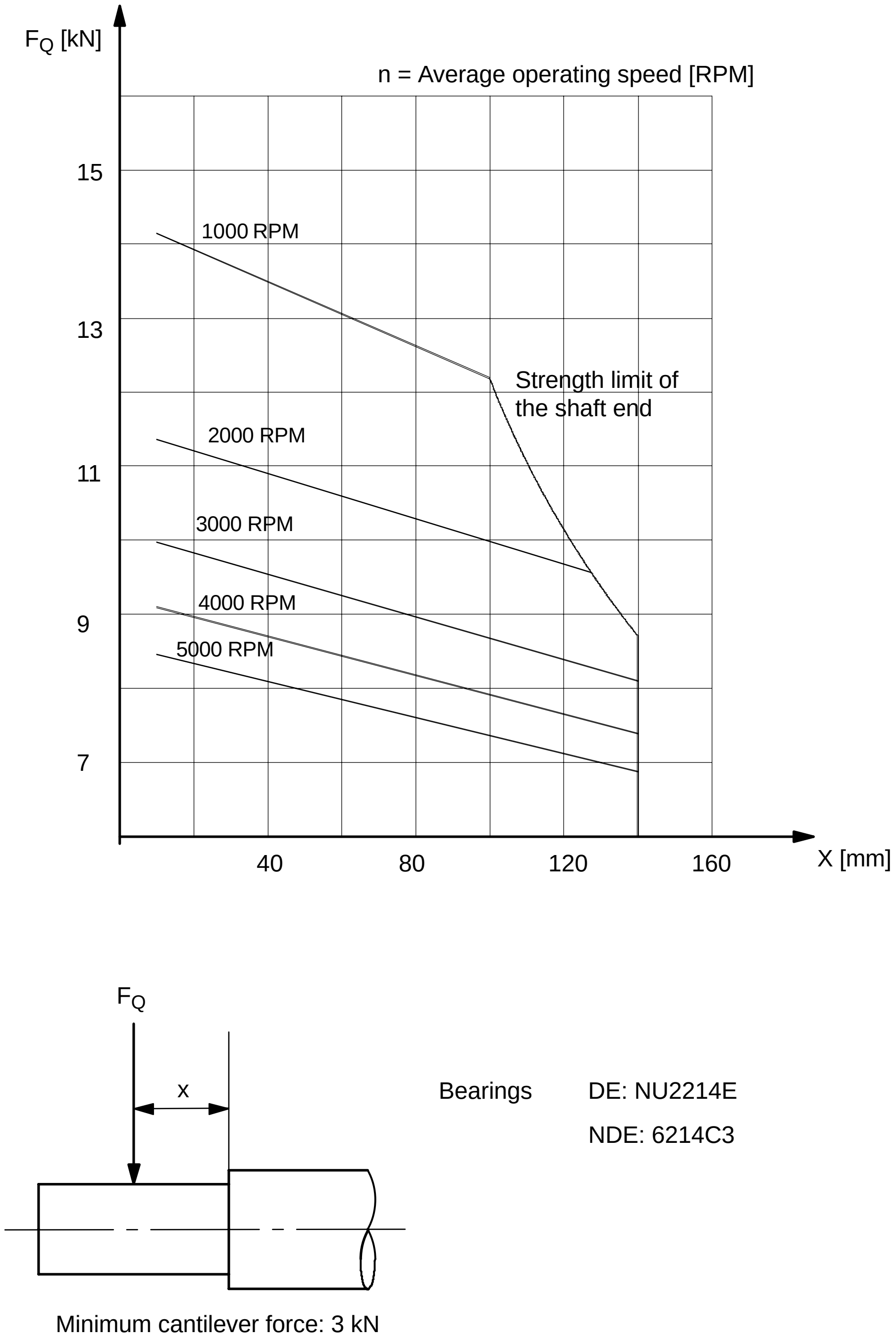


Bearings DE: 6214 C3

NDE: 6214 C3

Fig. 5-7 Cantilever force diagram, shaft height 180 for coupling outdrive

SH 180, permissible cantilever forces for belt out–drives

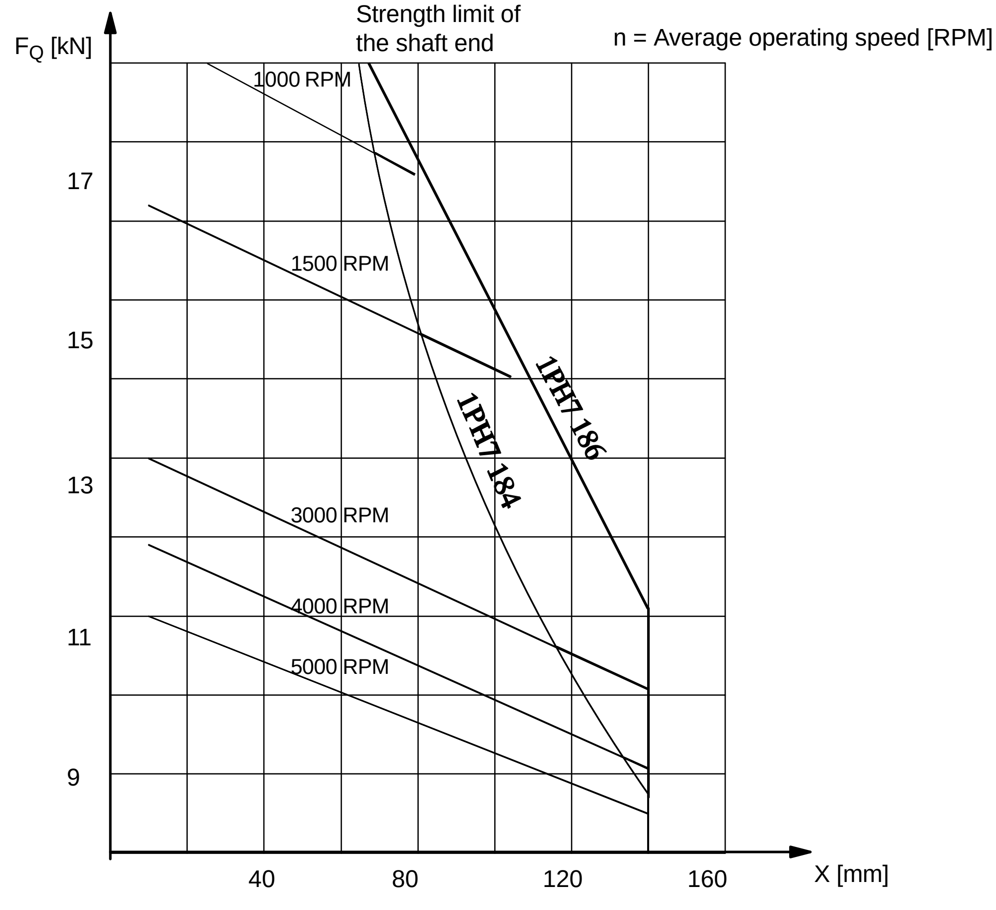


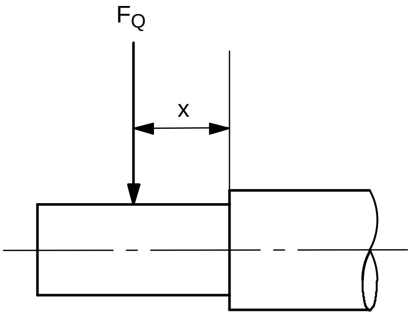
Bearings DE: NU2214E
NDE: 6214C3

Minimum cantilever force: 3 kN

Fig. 5-8 Cantilever force diagram, shaft height 180 for belt out–drive

SH 180, permissible increased cantilever forces for belt out–drives





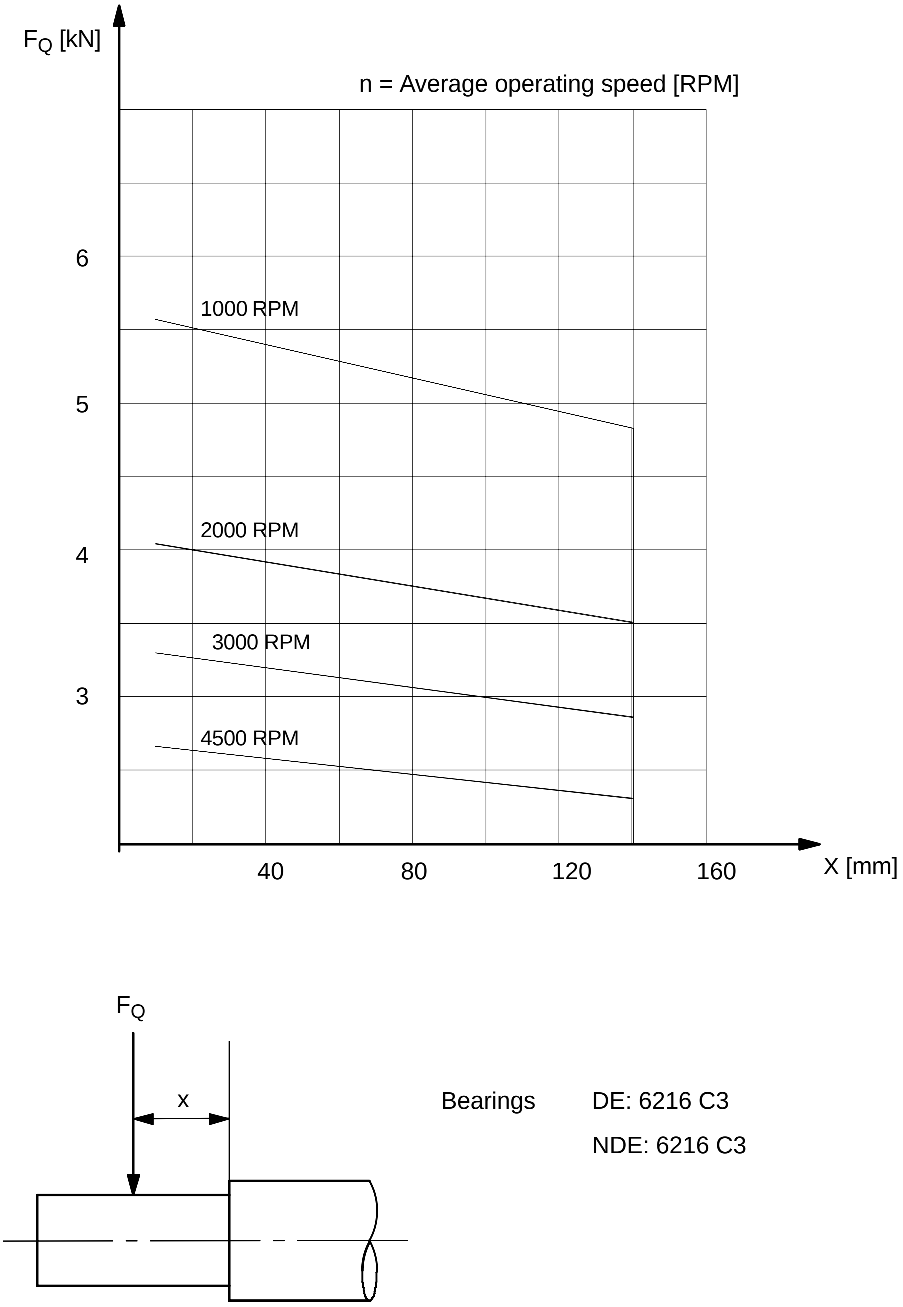
Bearings DE: NU2214E

NDE: 6214 C3

Minimum cantilever force: 4 kN

Fig. 5-9 Cantilever force diagram, shaft height 180 for belt out–drives (increased cantilever forces)

SH 225, permissible cantilever forces for a coupling out–drive

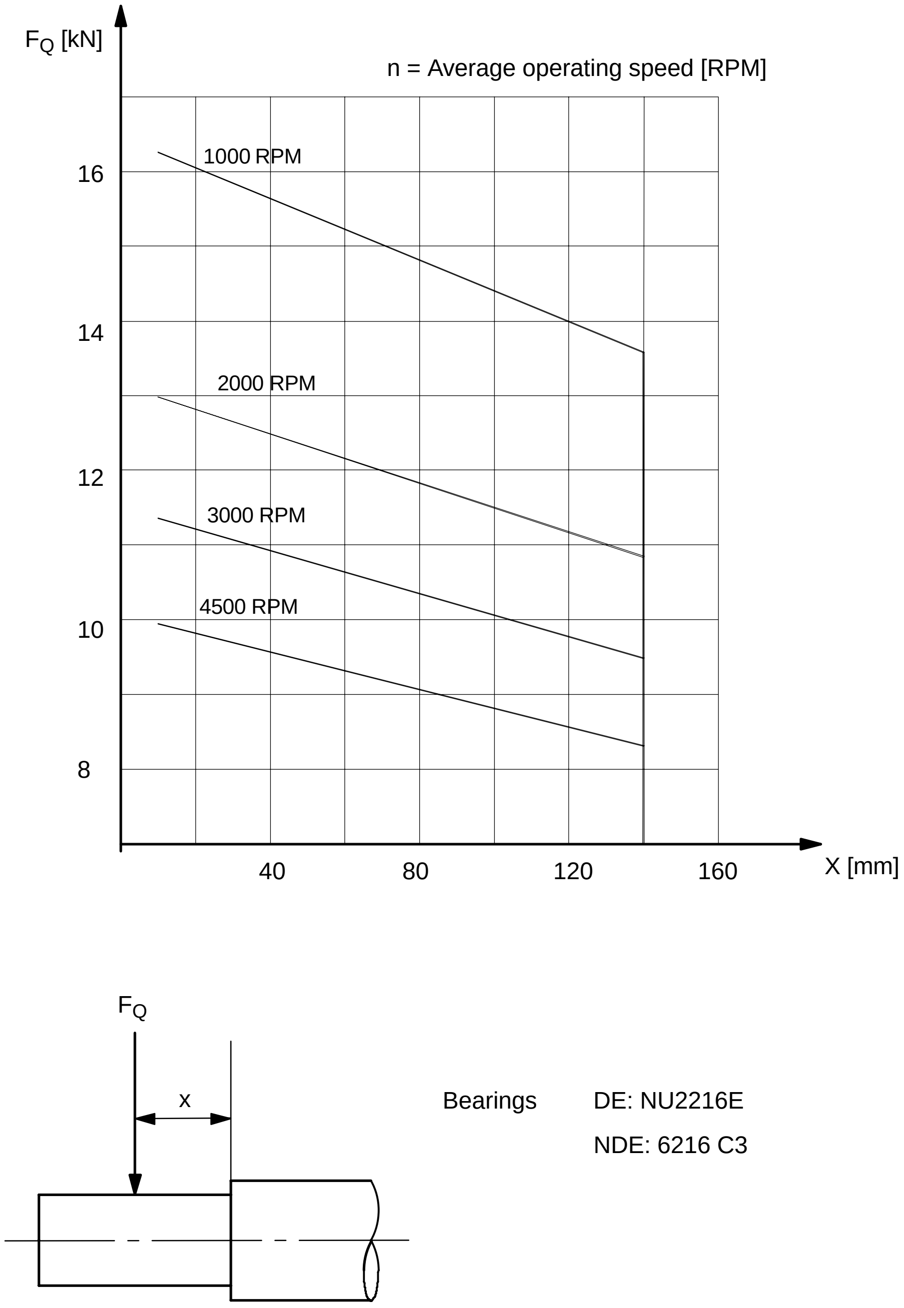


Bearings DE: 6216 C3

NDE: 6216 C3

Fig. 5-10 Cantilever force diagram, shaft height 225 for coupling outdrive

SH 225, permissible cantilever forces for belt out–drives



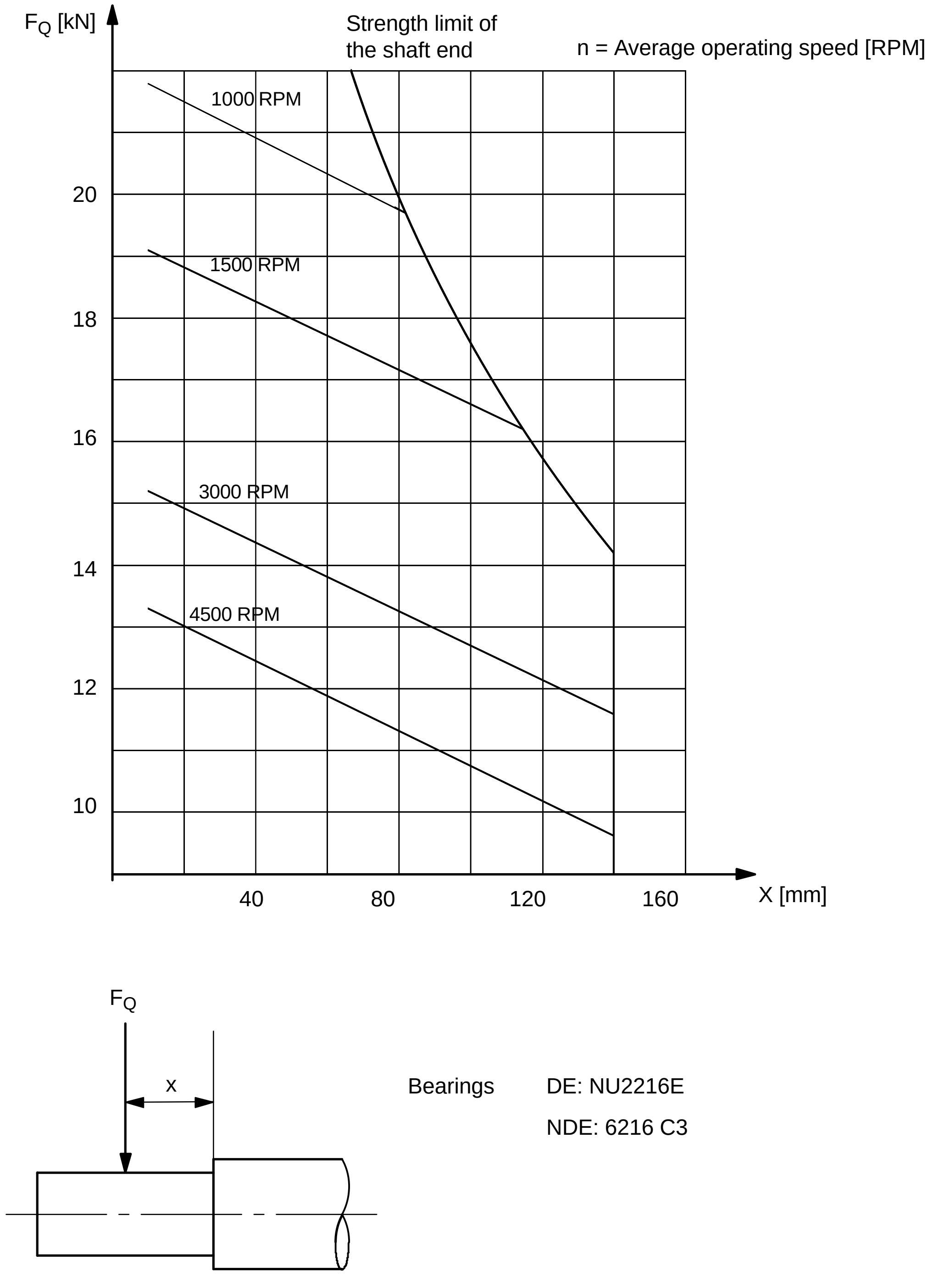
Bearings DE: NU2216E

NDE: 6216 C3

Minimum cantilever force: 4 kN

Fig. 5-11 Cantilever force diagram, shaft height 225 for belt out–drive

SH 225, permissible increased cantilever forces for belt out–drives



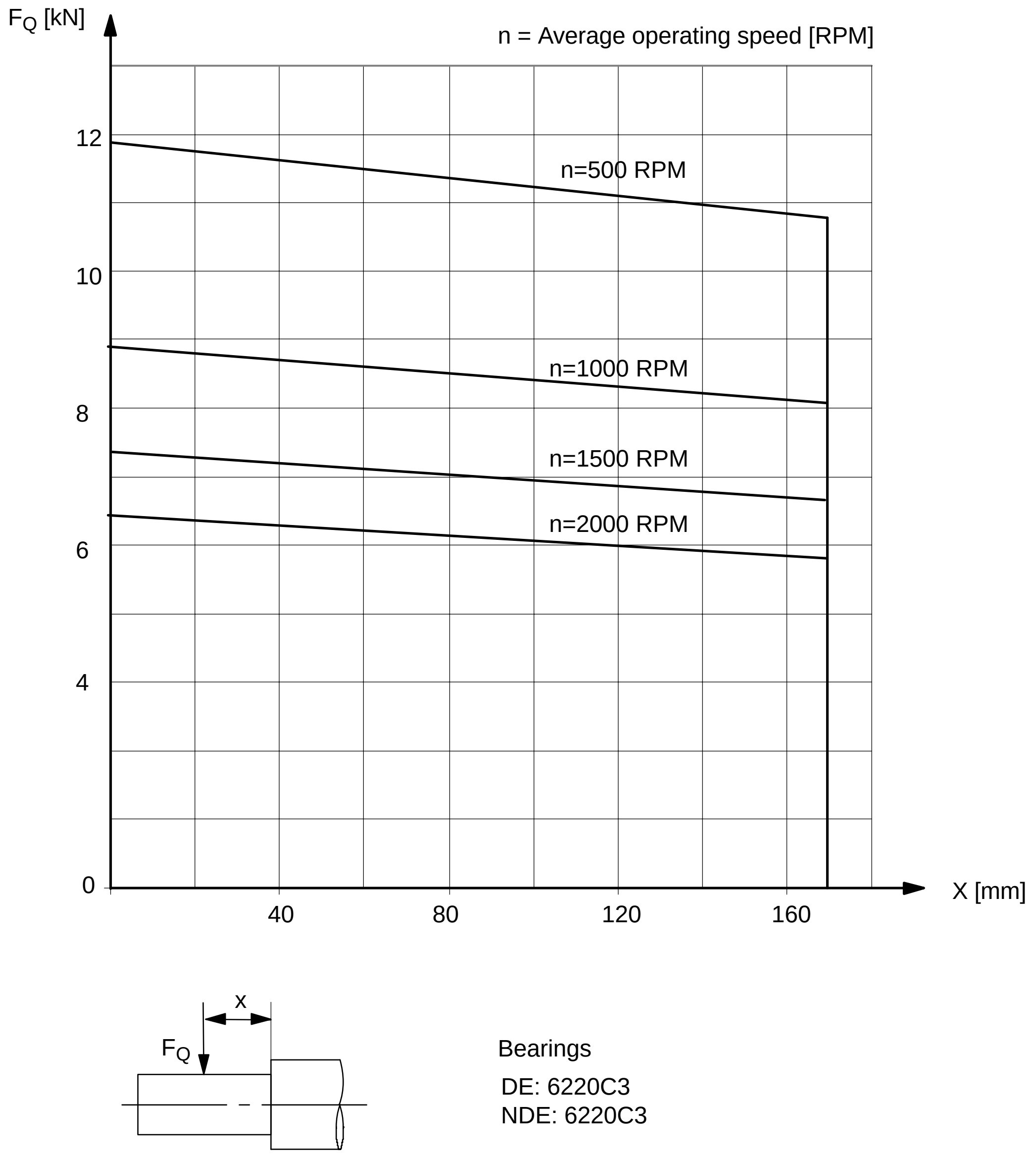
Bearings DE: NU2216E

NDE: 6216 C3

Minimum cantilever force: 5 kN

Fig. 5-12 Cantilever force diagram, shaft height 225 for belt out–drives (increased cantilever forces)

SH 280, permissible cantilever forces for a coupling out–drive

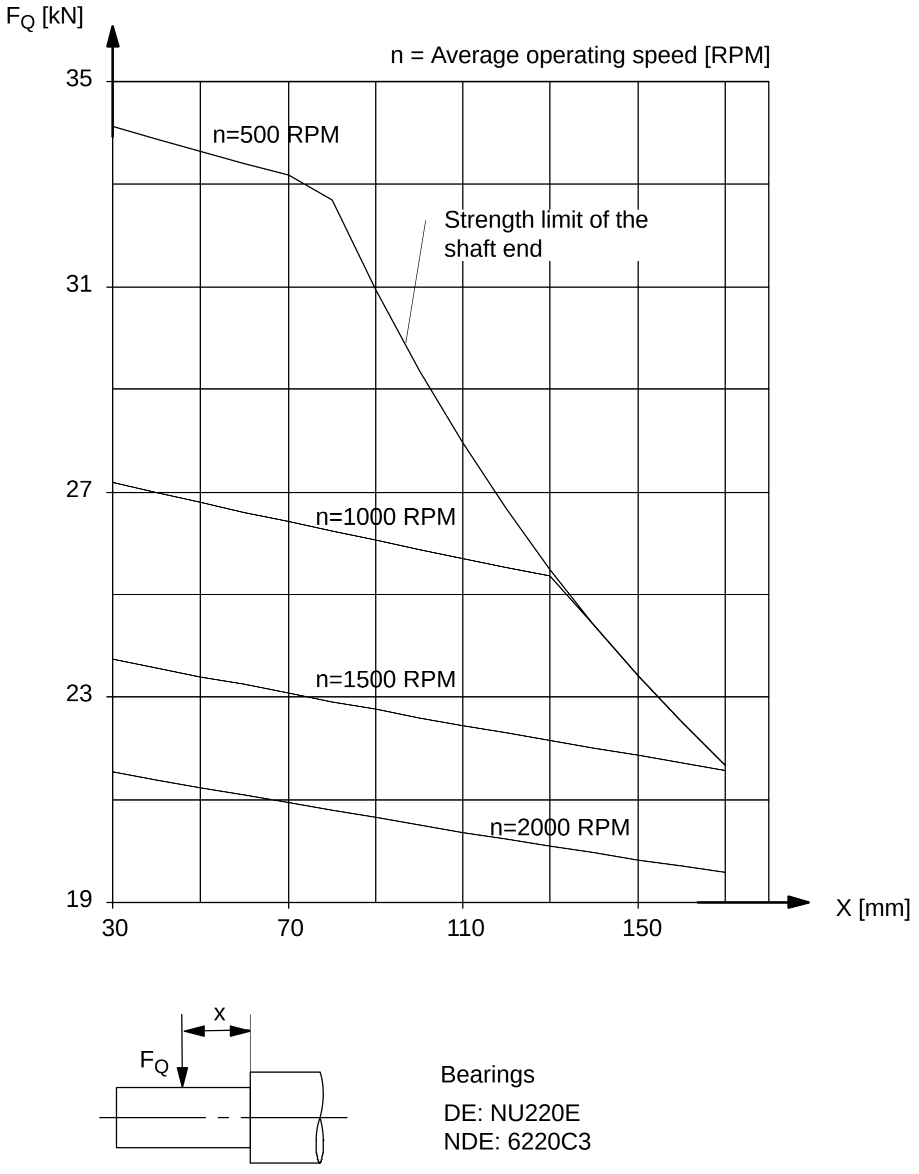


Bearings

DE: 6220C3
NDE: 6220C3

Fig. 5-13 Cantilever force diagram, shaft height 280 for coupling outdrive

SH 280, permissible cantilever forces for belt out–drives



Bearings
DE: NU220E
NDE: 6220C3

Minimum cantilever force: 9 kN

Fig. 5-14 Cantilever force diagram, shaft height 280 for belt out–drive

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 F_{AZ} are determined depending on the particular application (mounting, direction of force) as described in the Chapter Axial Force ”General Part for Induction Motors”.

SH 180 to SH 280

For coupling, belt or pinion out–drives 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 drive–out element 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 out–drives with helical gearing, please contact your local Siemens office.

To determine the axial force, please refer to the documentation ”General Section for Induction Motors”.

Forces due to the rotor weight and alignment forces

Table 5-1 Force due to weight F_L and alignment force F_C of the rotor

Motor type	F_L [N]	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 out–drive

SH 100, permissible axial force

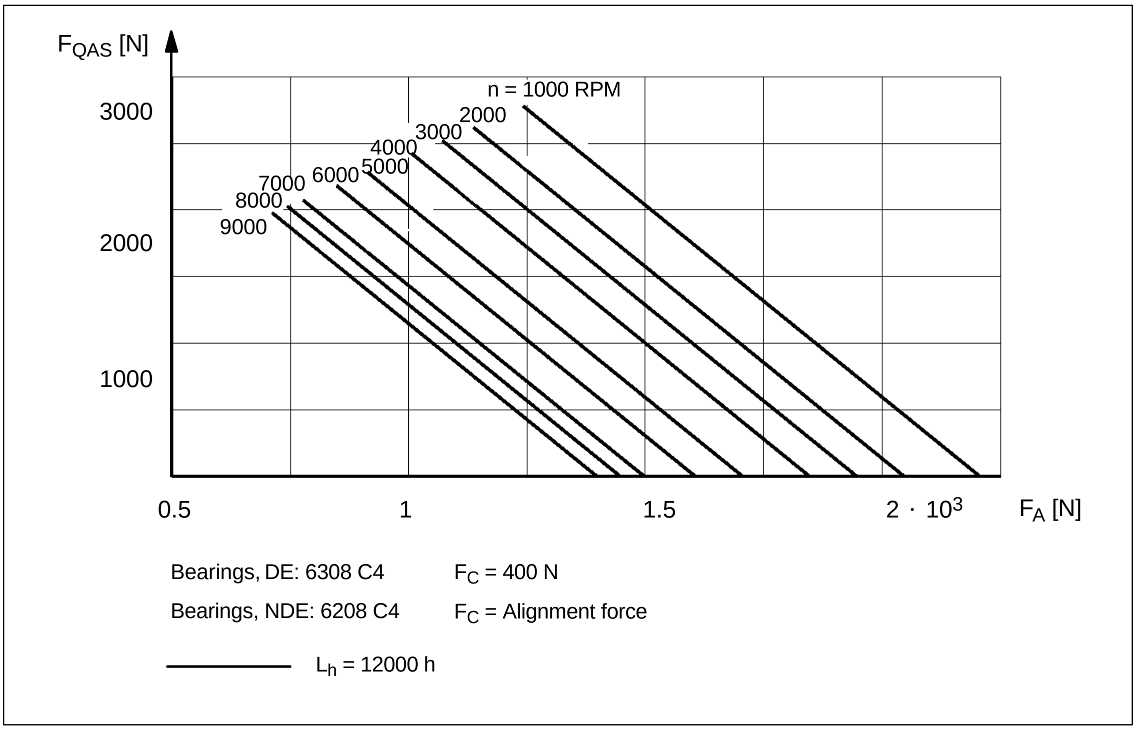


Fig. 5-15 Axial force diagram, SH 100

SH 132, permissible axial force

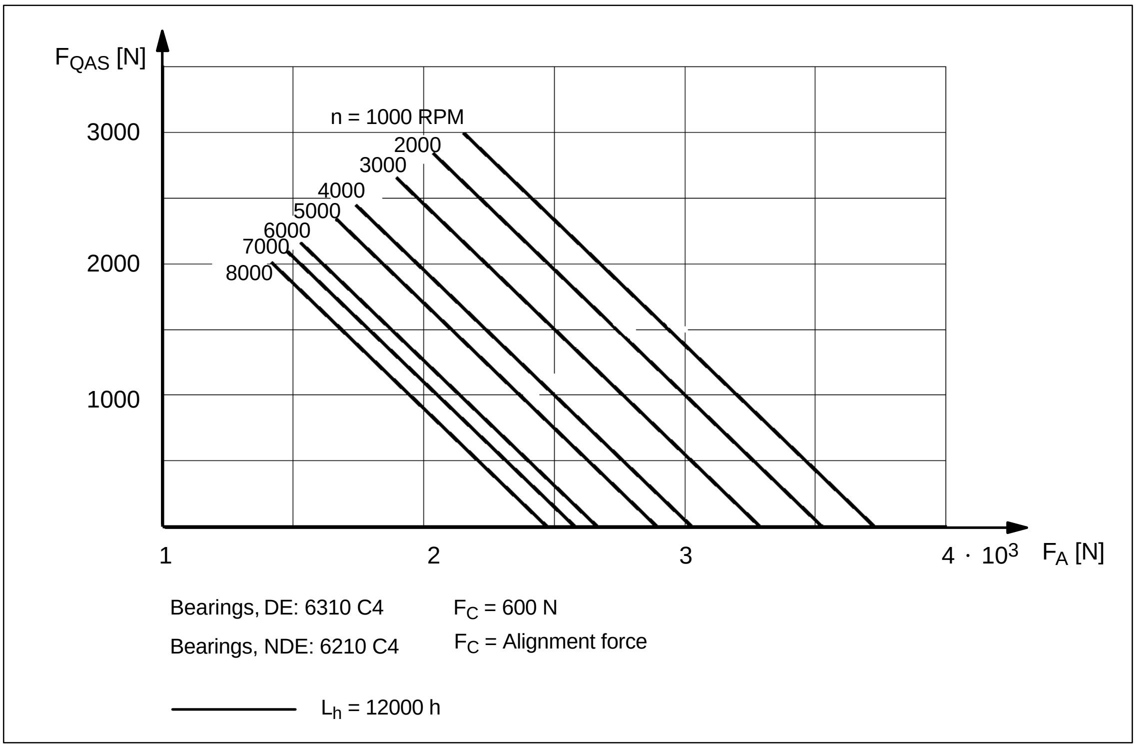


Fig. 5-16 Axial force diagram, SH 132

SH 160, permissible axial force

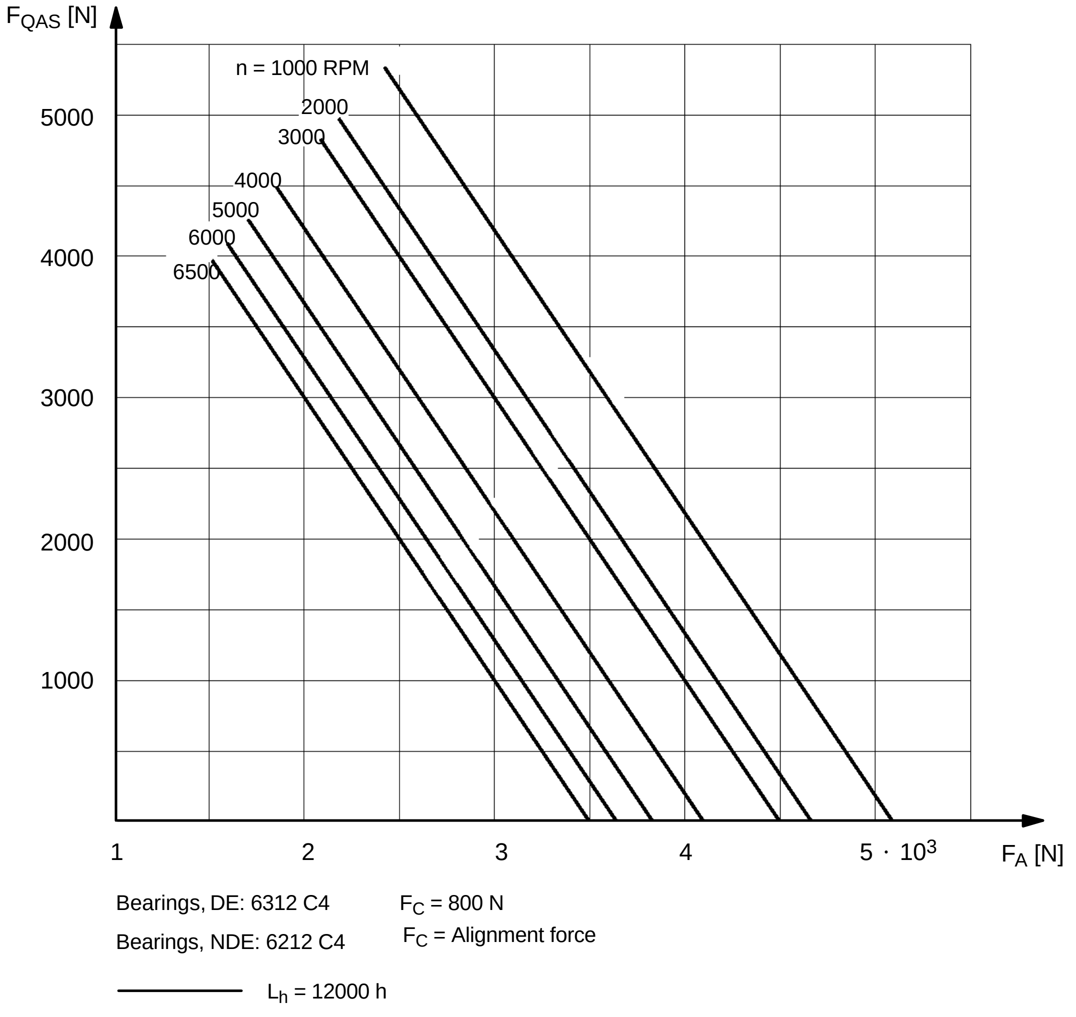


Fig. 5-17 Axial force diagram, SH 160

SH 100, permissible axial force for the option, increased max. speed

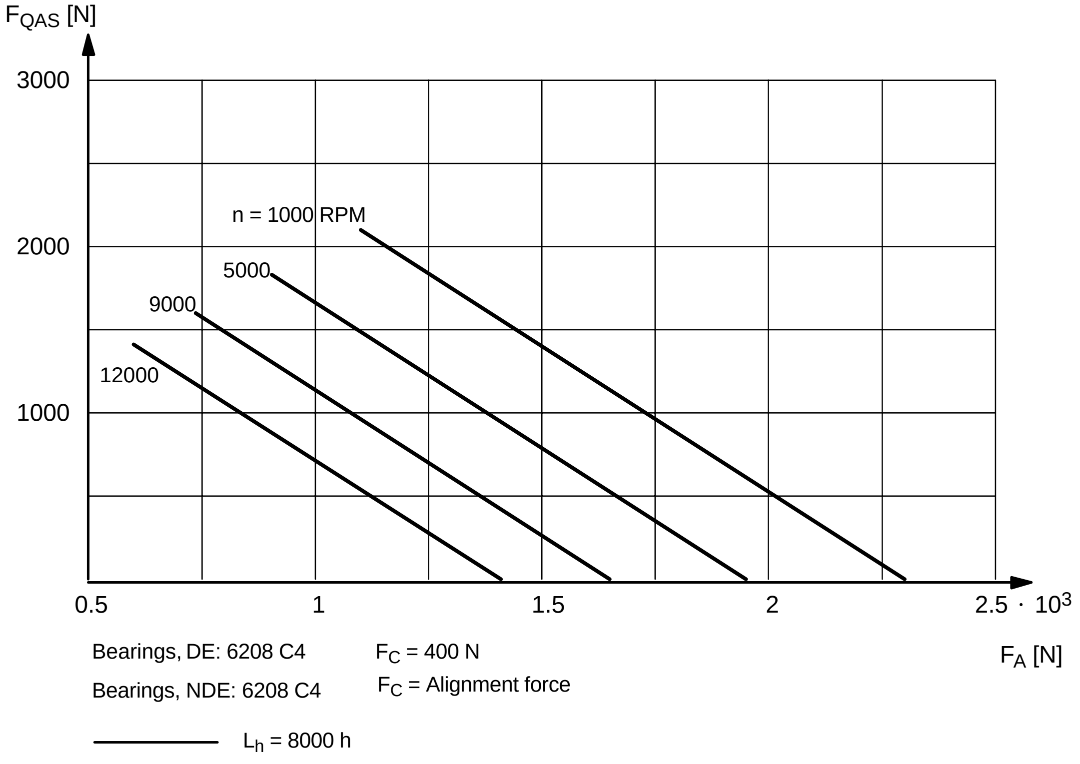


Fig. 5-18 Cantilever force diagram, SH 100 (increased max. speed)

SH 132, permissible axial force for the option, increased max. speed

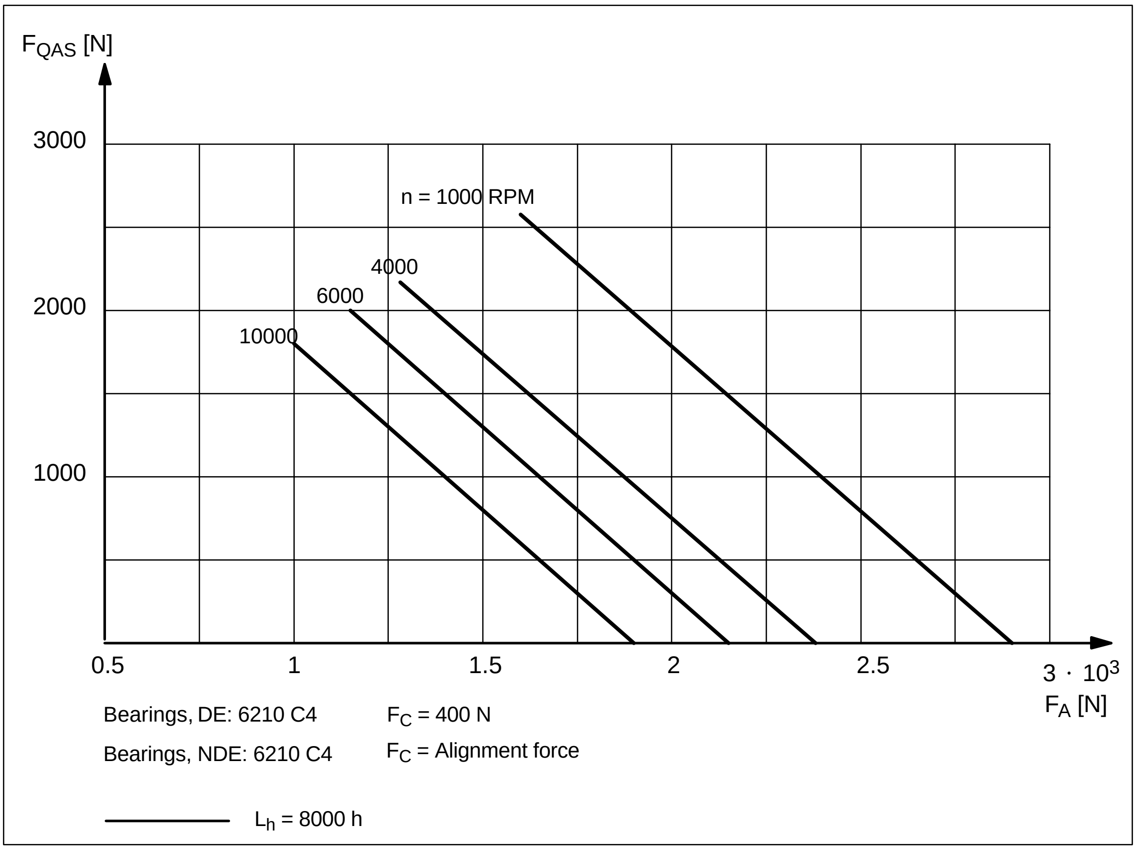
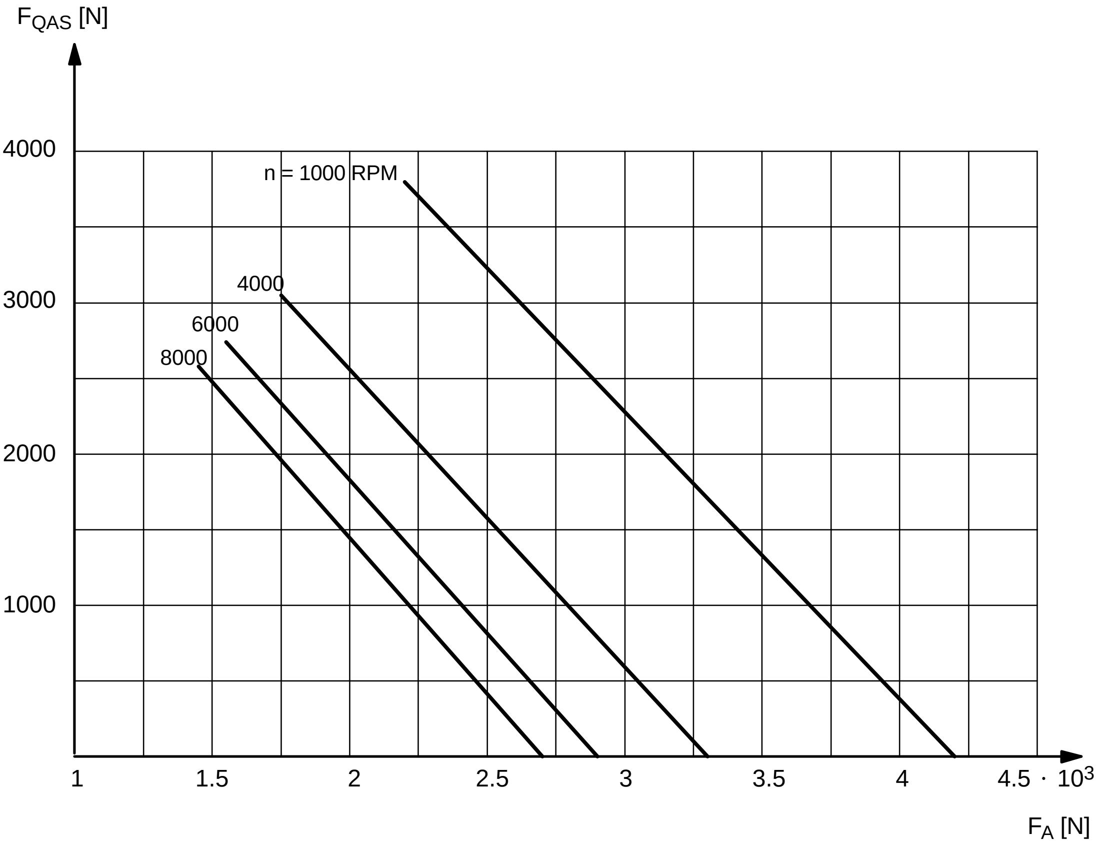


Fig. 5-19 Cantilever force diagram, SH 132 (increased max. speed)

SH 160, permissible axial force for the option, increased max. speed



Bearings, DE: 6212 C4
Bearings, NDE: 6212 C4

F_C = 400 N
F_C = Alignment force

——— L_h = 8000 h

Fig. 5-20 Cantilever force diagram, SH 160 (increased max. speed)

■

Space for your notes

6

Motor Components

6.1 Thermal motor protection

Table 6-1 Features and technical data

Type	KTY 84–130
Resistance when cold (20 °C)	Approx. 580 Ohm
Resistance when hot (100 °C):	Approx. 1000 Ohm
Connecting	Using the encoder cable
Response temperature	Pre–warning < 145 °C ± 5 °C Alarm/shutdown at max. 150 °C ± 5 °C

The resistance change is proportional to the winding temperature change. For 1PH7 motors, the temperature characteristic is taken into account in the closed–loop control.

For SIMOVERT MASTERDRIVES drive converters, the response temperature for pre–warning and trip can be set using the following parameters:

- MASTERDRIVES VC: P131 = 0 (KTY 84 – 130; factory setting)
- MASTERDRIVES MC: P131 = 1 (KTY 84 – 130; factory setting)
- MASTERDRIVES VC/MC: P380 (pre–warning) and P381 (alarm/trip)

High short–time overload conditions require additional protective measures. This is due to the thermal coupling time of the sensor.

The cables for the temperature sensors are included in the pre–assembled encoder cable.

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.

If they exist, reduced data for standstill are specified.

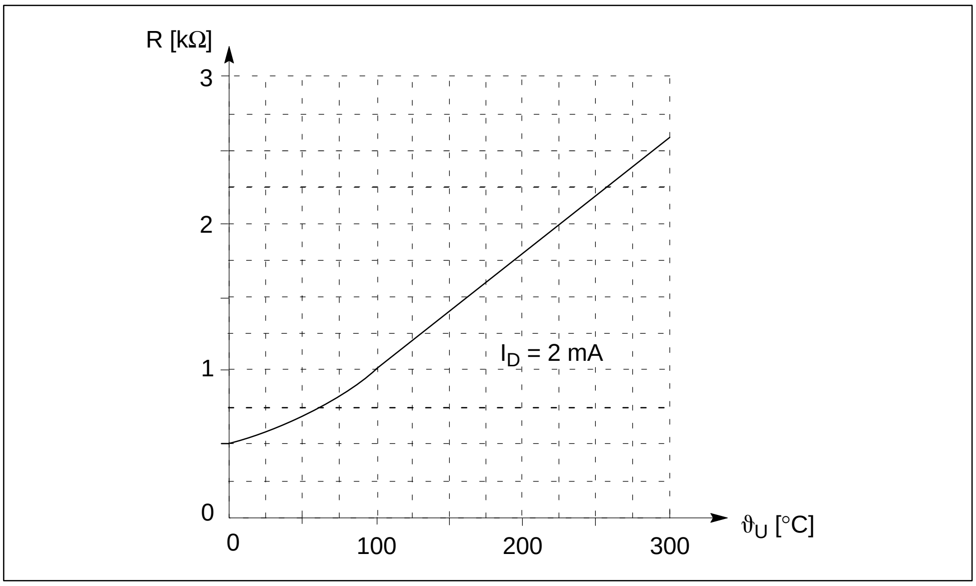


Fig. 6-1 Resistance characteristic as a function of the KTY 84 thermistor temperature

6.2 Encoders

6.2.1 Incremental encoder HTL

Table 6-2 Features and technical data

Version	Optical encoder system
Application	Tachometer for speed actual value sensing
Coupling	at the NDE: for SH 100 to 225, integrated in the motor for SH 280, mounted onto the motor
Output signals	• Incremental track • Reference signal
Connecting	Connector
Max. possible connecting cable length • without transfer of the inverted signals • with transfer of the inverted signals	 150 m 300 m
Operating voltage	+ 10 ... 30 V
Pulse number	1024 (option: 2048)
Incremental signals	HTL Track A, track B Zero pulse and inverted signals
Accuracy	± 1’

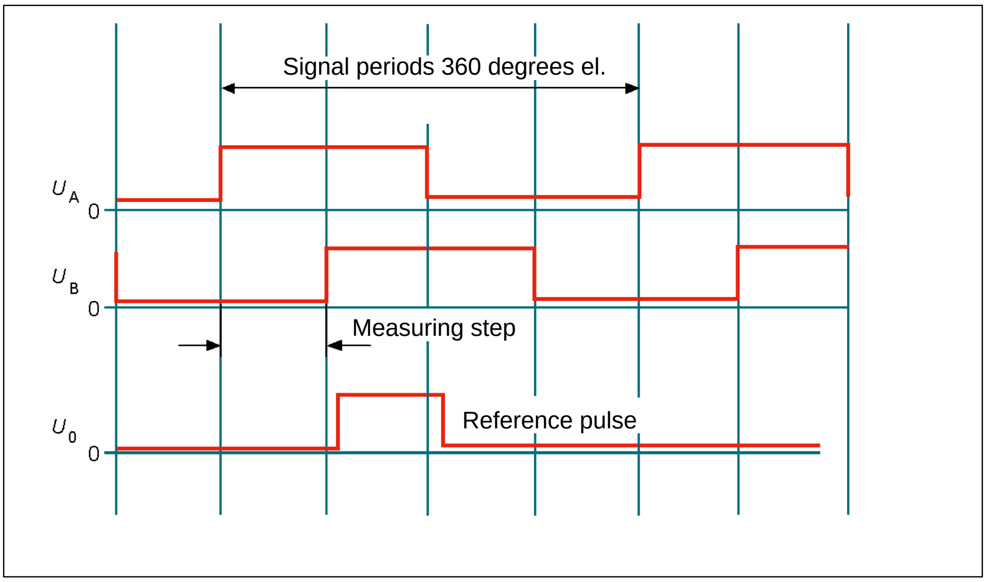
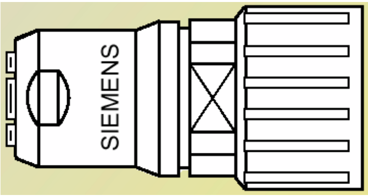
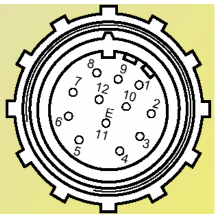


Fig. 6-2 Output signals

Connecting

Table 6-3 Connection assignment, 12–pin flange–mounted socket

Signal name	PIN	Connector type
*B	1	6FX2003–0CE12  
KTY84+	2	
ZERO TRACK	3	
*ZERO TRACK	4	
A	5	
*A	6	
CTRL TACH	7	
B	8	
Free	9	
0 V	10	
KTY84–	11	
15 V	12	
Outer shield at the connector housing	yes	

Pre–assembled cable for MASTERDRIVES VC:

6FX□002–2AH00–□□□0

Length (refer to Catalog DA 65.3)

5 = MOTION–CONNECT 500
8 = MOTION–CONNECT 800

6.2.2 Incremental encoder, sin/cos 1 Vpp

Table 6-4 Features and technical data

Version	Optical encoder system
Application	• Tachometer for speed act. value sensing • Indirect measuring system for the position control loop
Coupling	at the NDE: for SH 100 to 225, integrated in the motor for SH 280, mounted onto the motor
Output signals (refer to Fig. 6-3)	• Incremental track, sinusoidal • Reference signal
Connecting	Connector
Max. possible connecting cable length	100 m
Operating voltage	+ 5 V ± 5 %
Pulse number	2048
Output signals	1 Vpp
Accuracy	± 40”

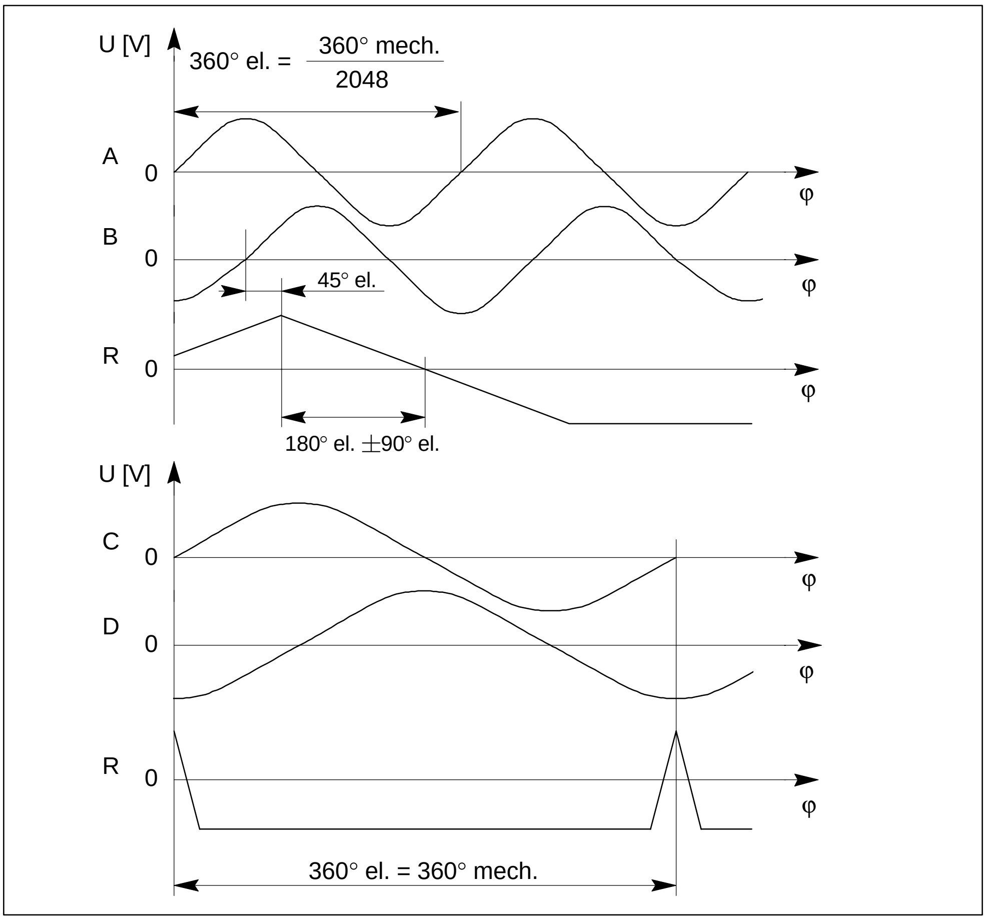
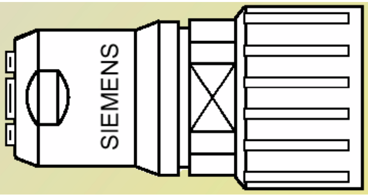
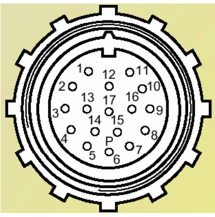


Fig. 6-3 Signal sequence and assignment for a positive direction of rotation (clockwise direction of rotation when viewing the drive end)

Connecting

Table 6-5 Connection assignment, 17–pin flange–mounted socket

Signal name	PIN	Connector type
Ua1	1	6FX2003–0CE17  
*Ua1	2	
Inner shield	17	
Ua2	11	
*Ua2	12	
Inner shield	17	
Ua0	3	
*Ua0	13	
Inner shield	17	
Ua3	5	
*Ua3	6	
Ua4	14	
*Ua4	4	
+Temp	8	
–Temp	9	
P encoder	10	
5 V sense	16	
M encoder	7	
0 V sense	15	
Outer shield at the connector housing	yes	

Pre–assembled cable for MASTERDRIVES MC:

6FX□002–2CA31–□□□0

Length (refer to Catalog DA 65.3)

5 = MOTION–CONNECT 500
8 = MOTION–CONNECT 800

6.2.3 Absolute value encoder (EnDat)

Table 6-6 Features and technical data

Version	Optical encoder system
Application	• Tachometer for speed act. value sensing • Meas. system for the position control loop
Coupling	at the NDE: for SH 100 to 225, integrated in the motor for SH 280, mounted onto the motor
Output signals	Serial interface
Connecting	Connector
Max. possible connecting cable length	100 m
Operating voltage	+ 5 V ± 5 %
Pulse number	2048
Output signals	1 Vpp
Accuracy	± 40”
Code signals	Synchronous–serial EnDat interface Binary code, 4096 coded revolutions

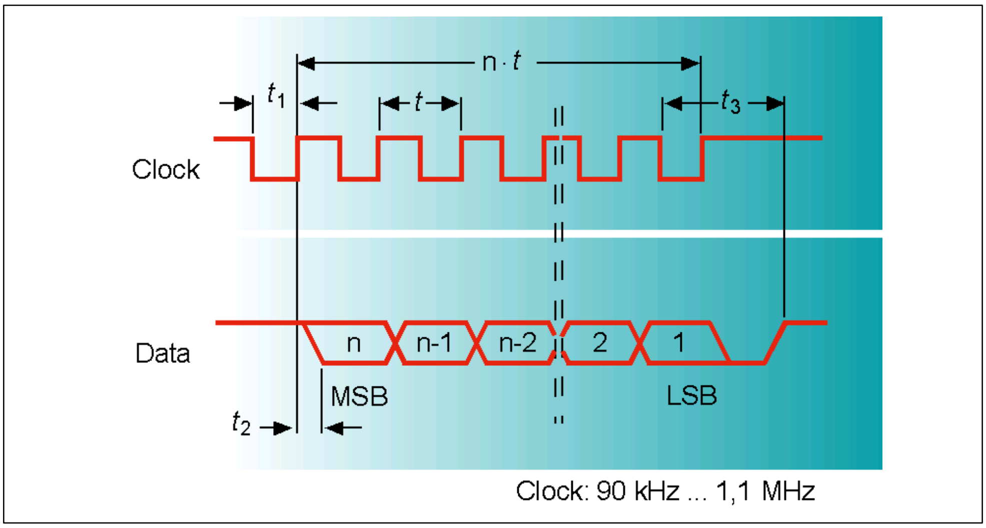
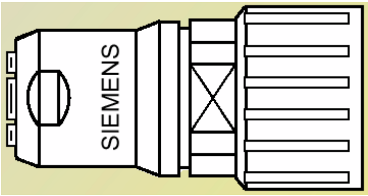
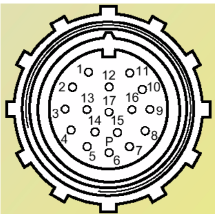


Fig. 6-4 Output signals

Connecting

Table 6-7 Connection assignment, 17–pin flange–mounted socket

Signal name	PIN	Connector type
Ua1	1	6FX2003–0CE17  
*Ua1	2	
Inner shield	17	
Ua2	11	
*Ua2	12	
Inner shield	17	
Data	3	
*Data	13	
Inner shield	17	
Clock cycle	5	
*Clock cycle	14	
+Temp	8	
–Temp	9	
P encoder	10	
	16	
5 V sense	16	
M encoder	7	
	15	
0 V sense	15	
Outer shield at the connector housing	yes	

Pre–assembled cable for MASTERDRIVES MC:

6FX□002–2EQ10–□□□0

Length (refer to Catalog DA 65.3)

5 = MOTION–CONNECT 500
8 = MOTION–CONNECT 800

6.2.4 Resolver 2–pole

Table 6-8 Features and technical data

Version	Inductive encoder system
Application	Tachometer for speed actual value sensing
Coupling	at the NDE: for SH 100 to 225, integrated in the motor
Output signals	Sinusoidal and cosinusoidal tracks
Connecting	Connector
Max. possible connecting cable length	150 m
Operating voltage/frequency	+ 5 V / 4 kHz
Output signals	Ratio, ü = 0.5 ± 5 % $V_{\text{sinusoidal track}} = \text{ü} \bullet V_{\text{excitation}} \bullet \text{sine}\ \alpha$ $V_{\text{cosine track}} = \text{ü} \bullet V_{\text{excitation}} \bullet \cos\alpha$
Width of the angular error	< 14’ (2–pole)

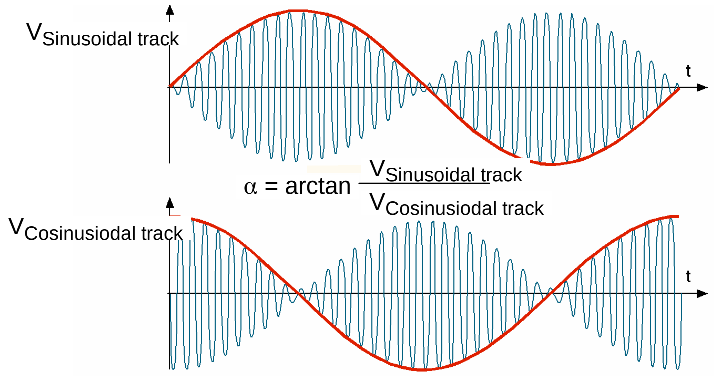
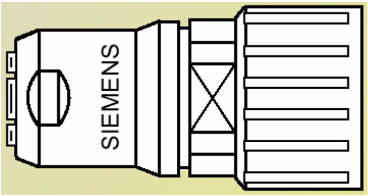
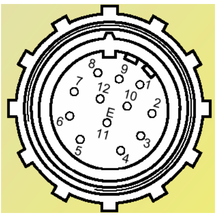


Fig. 6-5 Output signals

Connecting

Table 6-9 Connection assignment, 12–pin flange–mounted socket

Signal name	PIN	Connector type
SIN	1	6FX2003–0CE12  
*SIN	2	
Inner shield	3	
COS	11	
*COS	12	
Inner shield	5	
+Temp	8	
–Temp	9	
Inner shield	4	
+Vpp	10	
–Vpp	7	
Outer shield at the connector housing	yes	

Pre–assembled cable for MASTERDRIVES MC:

6FX□002–2CF02–□□□0

Length (refer to Catalog DA 65.3)

5 = MOTION–CONNECT 500
8 = MOTION–CONNECT 800

6.3 Gearboxes

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 field–weakening 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

- IM B35 type of construction
- Bearing design for coupling out–drive
- 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: +49 (75 41) 77 – 0
Telefax: +49 (75 41) 77 – 34 70
Internet: http://www.ZF–Group.de

6.3.1 Features

Gearbox features

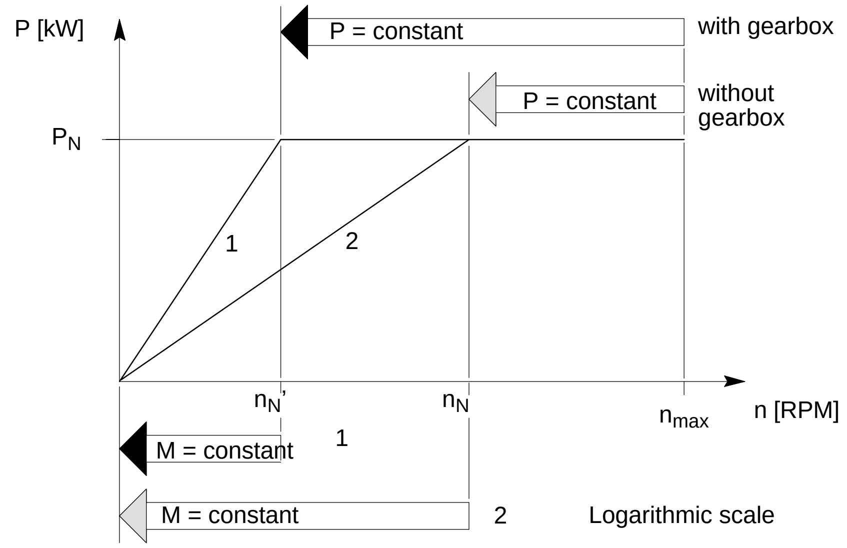
- Version as planetary gear
- Gearbox efficiency: above 95 %
- Gearboxes are available for motors, shaft heights 100 to 225
- Selector gearboxes are available up to a drive output of 100 kW
- Types of construction: IM B35 (IM V15) and IM B5 (IM V1) are possible

---

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 where, for example, they are mounted to the gearbox flange or gearbox enclosure, then for motors with type of construction IM B35, they 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}	Max. permissible speed
P_N	Rated power and also constant power of the induction motor in the speed range from n_n to n_{max} or n_N' to n_{max}
M	Torque

Fig. 6-6 Speed–power diagram when using a two–stage selector gearbox to extend the speed range at constant power

Examples

Induction 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.

Induction 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.

6.3.2 Gearbox design

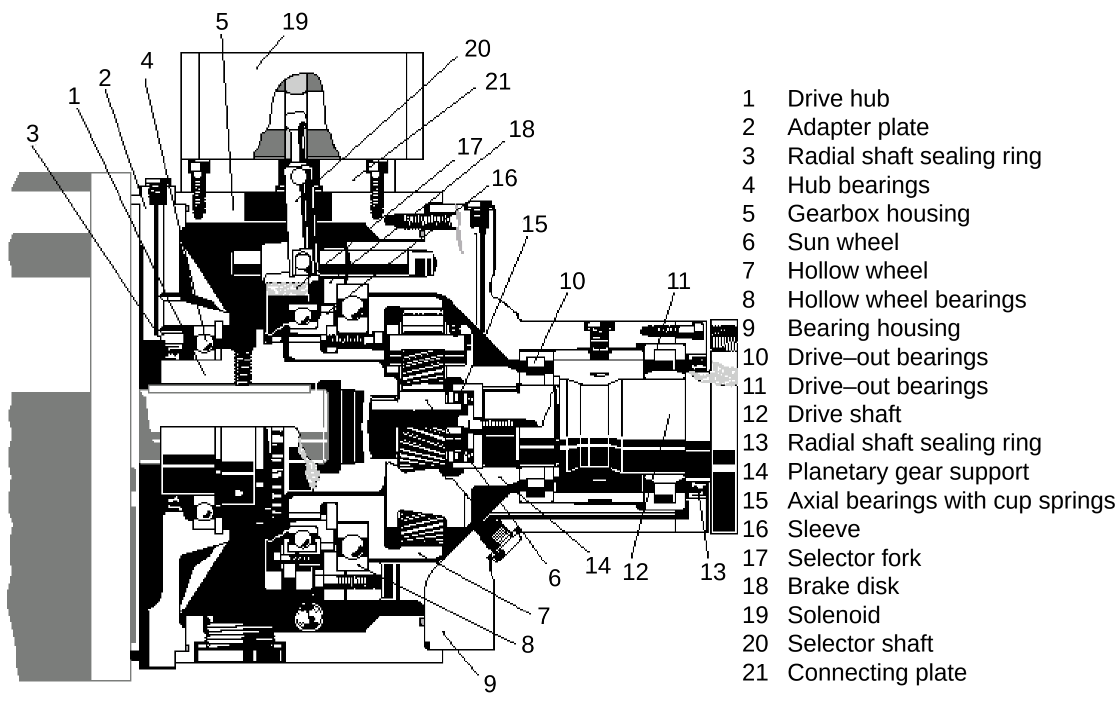


Fig. 6-7 Gearbox design for 1PH7, SH 100 to 160

For selector gearboxes, the following applies:

Selector position I: $i_1 = 4$

Selector position II: $i_2 = 1$

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

The gearbox output shaft lies coaxially to the motor shaft.

Torsional play (measured at the gearbox output shaft):
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.

6.3.3 Technical data

Table 6-10 Explanation of the connections

Type	**Motor shaft height**	**Order No.**	**Max. speed n_{max}**	**Rated torque (S1 duty)**			**Max. torque (S6 duty, 10 min. duty cycle, max. 60% power–on duration)**			**Weight**	**Drive–out housing a10**
				Drive	**Drive out**		**Drive**	**Drive out**			
ZF desig.	[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	2LG4312–...	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

Important

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

For the 1PH7167–2NB motor, for example, 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 2K 120/2K 250.

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).

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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.

6.3.4 Electrical connections

Power supply for the selector unit: 24 V DC ±10 %

The mechanical selector unit requires a separate supply.

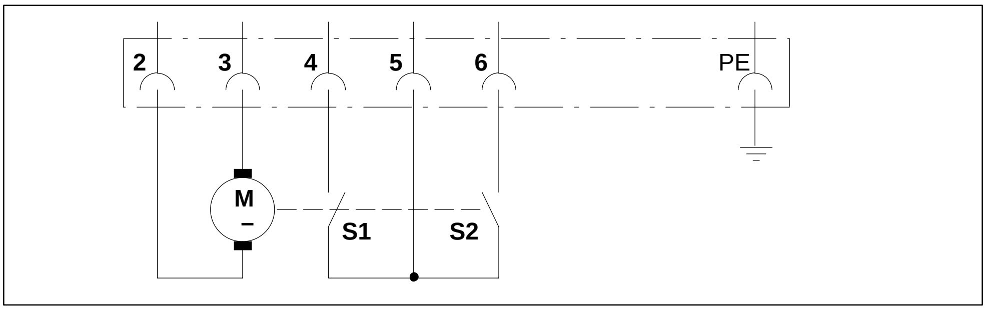

Fig. 6-8 Circuit diagram

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

Table 6-11 Explanation of the connections

Connector contact No.	Number and designation	In–put	Out–put	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 6-12 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.

6.3.5 Gearbox stage selection

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

- Only change over the gearbox stage at standstill
- 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.

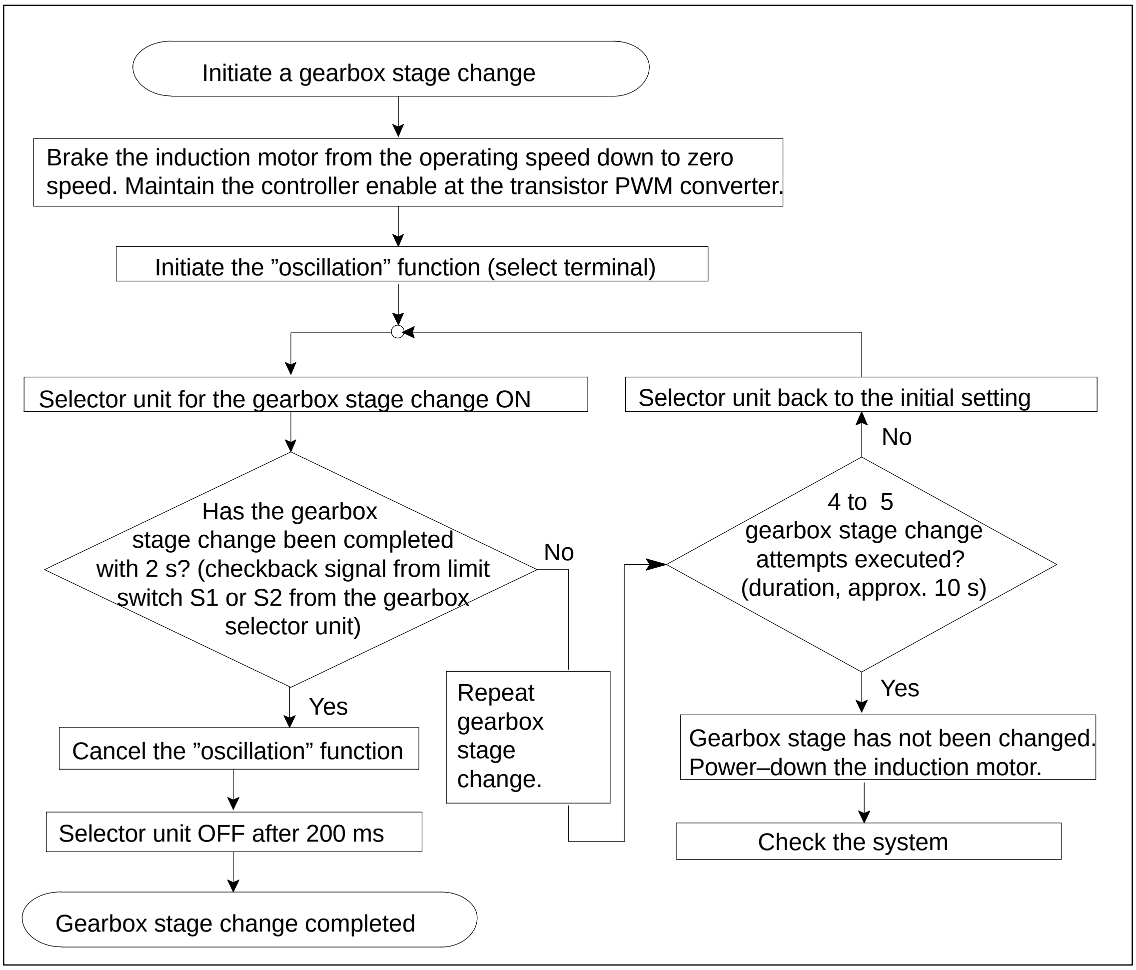

Fig. 6-9 Function sequence when changing the gearbox stage

6.3.6 Lubrication

Splash lubrication

Oil level check:	Visually using a sight glass

The oil level depends on the mounting position:

Horizontal and vertical:	Center of the sight glass[1]
For an inclined mounting position:	Mark on the angled oil level indicator (additionally mount)
Oils which can be used:	HLP 32 acc. to ISO–VG 68
Oil drain plugs:	Provided at both sides

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 6-11 and 6-12 indicate the approximate oil intake and outlet positions on 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

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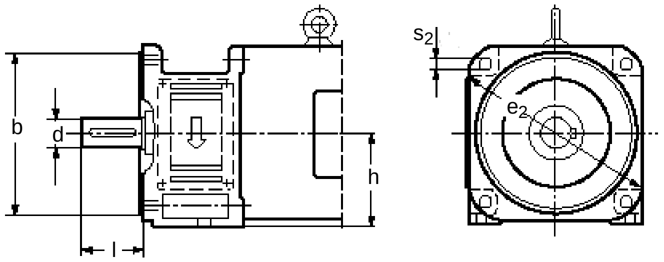
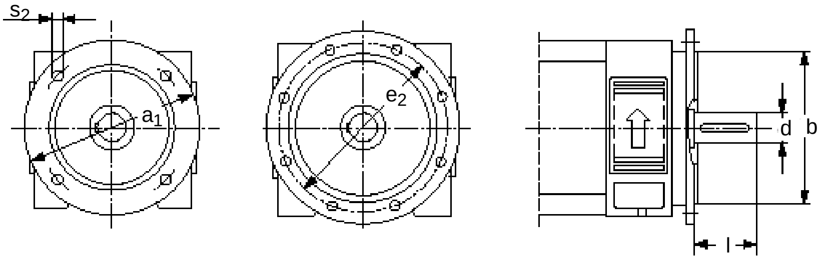
1) The oil volume data on the rating plate is only an approximate value

6.3.7 Flange dimensions



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



For selector gearboxes for motor frame sizes 180 and 225

Fig. 6-10 Flange dimensions for an induction motor (dimensions refer to Table 6-13)

Table 6-13 Flange dimensions for induction motors

Two–stage selector gearbox	**Motor frame size**	**Standard motor companion dimensions**						
		h	**d**	**l**	**b_1**	**e_1**	**a_1**	**s_1**
2 K 120	101, 103, 105, 107	100–0.5	38 k_6	80	180 j_6	215 ± 0.5	–	14 ± 0.2
2 K 250	131, 132, 133, 135, 137	132–0.5	42 k_6	110	250 h_6	300 ± 0.5	–	18 ± 0.2
2 K 300	163, 167	160–0.5	55 k_6	110	300 h_6	350 ± 0.5	–	18 ± 0.2
2 K 800	184	180–0.5	60 k_6	140	300 h_6	350 ± 0.5	400	19 ± 0.2
2 K 801	186	180–0.5	65 k_6	140	350 h_6	400 ± 0.5	450	19 ± 0.2
2 K 802	224	225–0.5	75 k_6	140	450 h_6	500 ± 0.5	550	19 ± 0.2

6.3.8 Connections, circulating lubrication, size 100

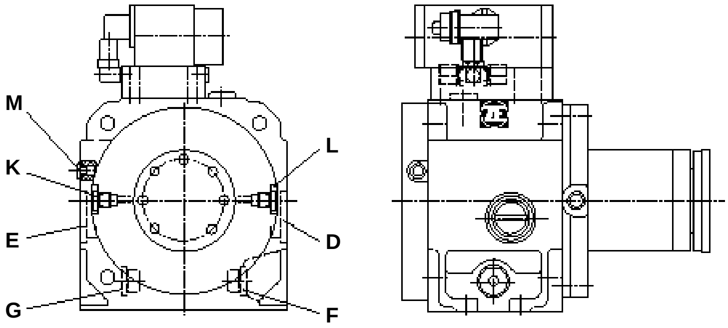


Fig. 6-11 Selector gearbox with selector unit for frame size 100

Table 6-14 Connections for circulating oil lubrication

Max. pressure	**Connection, oil return**	**Connection, oil intake**	**Mounting position**
0.2 bar 1.5 bar	**D** Main direction of rotation, clockwise 1) **E** Main direction of rotation, counter–clockwise1)	**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 6.3.6)			

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1) When viewing the gearbox drive from the motor

6.3.9 Connections, circulating lubrication sizes 132 and 160

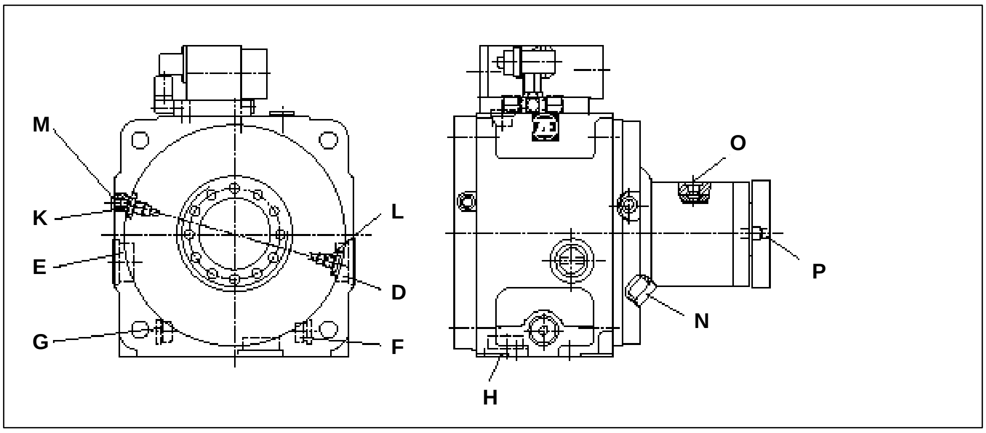

Fig. 6-12 Selector gearbox with selector unit for frame sizes 132 and 160

Table 6-15 Connections for circulating oil lubrication

Max. pressure	**Connection, oil return**	**Connection, oil intake**	**Mounting position**
2 bar	**H**	**P** (1.5 dm^3/min)	V3
0.5 bar 1.5 bar	**D** Main direction of rotation, clockwise 1) **E** Main direction of rotation, counter–clockwise1)	**M** (0.5 dm^3/min) **N** (1.5 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 6.3.6)			
Connection O is additionally possible (0.5 dm^3/min)			

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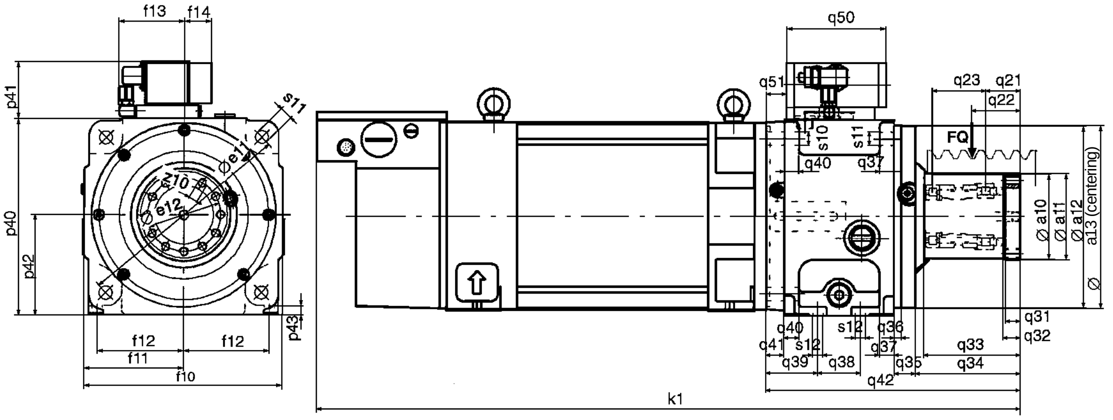
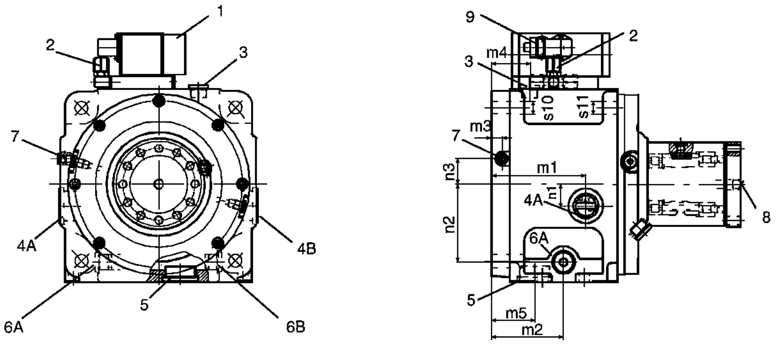
1) When viewing the gearbox drive from the motor

6.3.10 Gearbox dimensions

Gearbox dimensions



Connections for the oil supply



For selector gearbox for motor frame sizes 100 to 160

1 Selector unit (24 V DC, 5 A solenoid)
2 Vent valve
2 Oil filling screw
4A Oil sight glass or oil return for the main direction of rotation, counter–clockwise and circulating oil lubrication
4B Oil sight glass or oil return for the main direction of rotation, clockw. and circulating oil lubrication
5 Oil drain plug for type of construction IM B35
6A Oil intake for the main direction of rotation, clockwise and circulating oil lubrication
6B Oil intake for the main direction of rotation, counter–clockwise and circulating oil lubrication
7 Oil intake for type of construction IM V15 (this must be connected–up)
8 Oil intake for type of construction IM V36
9 Connector, Harting type HAN 8 U

Fig. 6-13 Induction motor and gearbox dimensions

Table 6-16 Two–stage selector gearbox (dimensions, overview 1)

Motor		**Dimensions in mm**																
Frame size	**Type**	∅ **a10** **Drive–out hous-ing**	∅ **a11** **k6**	∅ **a12**	∅ **a13** **g6**	∅ **e11** ±0.2	∅ **e12**	**f10**	**f11**	**f12**	**f13**	**f14**	**h** **Shaft height**	**m1**	**m2**	**m3**	**m4**	**m5**
100	1PH7 101	100	100	188	190	215	80	208	104	92	86.6	42.4	100	107	90.5	15	45	–
	1PH7 103																	
	1PH7 105																	
	1PH7 107																	
132	1PH7 131	116	118	249	250	300	100	270	135	117	89.5	39.5	132	131	100	15	53	60
	1PH7 133																	
	1PH7 135																	
	1PH7 137																	
160	1PH7 163	140	130	249	250	350	100	326	163	145	89.5	39.5	160	131	100	15	53	60
	1PH7 167																	

Table 6-17 Two–stage selector gearbox (dimensions, overview 2)

Motor		**Dimensions in mm**														
Frame size	**Type**	**n1**	**n2**	**n3**	**p40**	**p41**	**p42**	**p43**	**q21**	**q22**	**q23**	**q31**	**q32**	**q33**	**q34**	**q35**	**q36**
100	1PH7 101	17	80	30	209	92	108	12	42	57–67	75	15	17.5	–	116	26	10
	1PH7 103																
	1PH7 105																
	1PH7 107																
132	1PH7 131	30	108	35	268	78	136	12	46.9	57–66	72.1	20	22.5	129,5	142.5	29	10
	1PH7 133																
	1PH7 135																
	1PH7 137																
160	1PH7 163	30	135	35	324	78	164	17	48.2	74–83	69.8	20	22.5	–	142.5	29	10
	1PH7 167																

Table 6-18 Two–stage selector gearbox (dimensions, overview 3)

Motor		**Dimensions in mm**													
Frame size	**Type**	**q37**	**q38**	**q39**	**q40**	**q41**	**q42**	**q50**	**q51**	**s10**	**s11**	**s12**	**z10 Thread**	**No. of tapped holes**	**Motor with gearbox, total length k1**
100	1PH7 101	18	55	63	18	25	298	136	12	14	14	14	M8	8x45°	709
	1PH7 103														709
	1PH7 105														804
	1PH7 107														804
132	1PH7 131	20	58	71	20	25	346.5	136	28	18	18	14	M12	12x30°	885
	1PH7 133														885
	1PH7 135														970
	1PH7 137														970
160	1PH7 163	20	58	71	23	25	346.5	136	28	18	18	14	M12	12x30°	987
	1PH7 167														1047

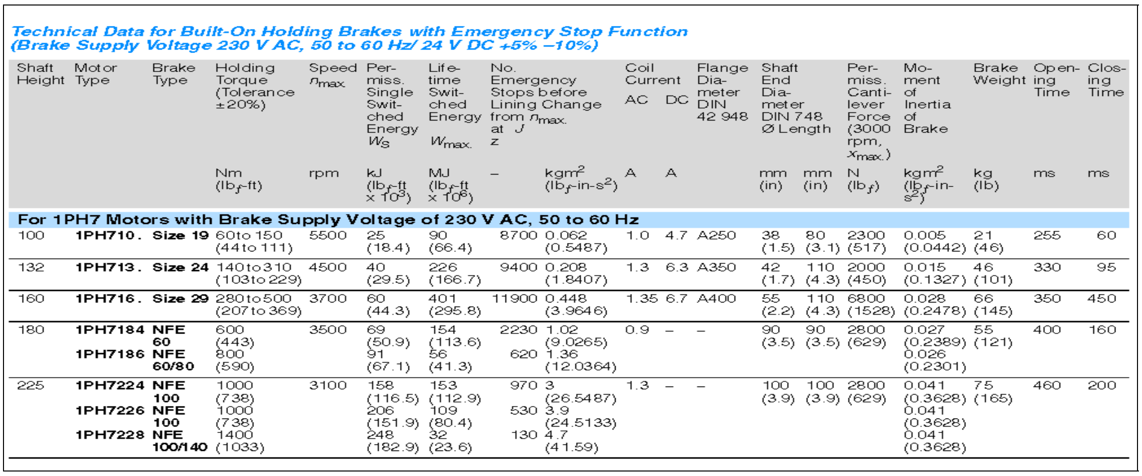
6.4 Holding brakes

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. It operates according to the closed–loop circuit principle. This means that when power is not applied to the brake, the spring–operated brake is applied 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 can be taken from Table 6-19. The brakes have been designed to be operated with 230 V AC, 50 ... 60 Hz or 24 V DC (only up to size 160). These power supply voltages must be provided on the plant/system side.

Table 6-19 Mounted holding brakes for 1PH7 motors



Technical Data for Built-On Holding Brakes with Emergency Stop Function
(Brake Supply Voltage 230 V AC, 50 to 60 Hz/ 24 V DC +5% –10%)

Shaft Height	Motor Type	Brake Type	Holding Torque (Tolerance ±20%)	Speed n_{max}	Per-miss. Single Swit-ched Energy W_S	Life-time Swit-ched Energy $W_{max.}$	No. Emergency Stops before Lining Change from $n_{max.}$ at J z		Coil Current		Flange Dia-meter DIN 42 948	Shaft End Dia-meter DIN 748		Per-miss. Canti-lever Force (3000 rpm, $x_{max.}$)	Mo-ment of Inertia of Brake	Brake Weight	Open-ing Time	Clos-ing Time
									AC	DC		Ø	Length					
			Nm (lb$_f$-ft)	rpm	kJ (lb$_f$-ft x 10^3)	MJ (lb$_f$-ft x 10^6)	–	kgm^2 (lb$_f$-in-s^2)	A	A		mm (in)	mm (in)	N (lb$_f$)	kgm^2 (lb$_f$-in-s^2)	kg (lb)	ms	ms
For 1PH7 Motors with Brake Supply Voltage of 230 V AC, 50 to 60 Hz																		
100	**1PH710.**	**Size 19**	60to 150 (44to 111)	5500	25 (18.4)	90 (66.4)	8700	0.062 (0.5487)	1.0	4.7	A250	38 (1.5)	80 (3.1)	2300 (517)	0.005 (0.0442)	21 (46)	255	60
132	**1PH713.**	**Size 24**	140to310 (103to 229)	4500	40 (29.5)	226 (166.7)	9400	0.208 (1.8407)	1.3	6.3	A350	42 (1.7)	110 (4.3)	2000 (450)	0.015 (0.1327)	46 (101)	330	95
160	**1PH716.**	**Size 29**	280to500 (207to 369)	3700	60 (44.3)	401 (295.8)	11900	0.448 (3.9646)	1.35	6.7	A400	55 (2.2)	110 (4.3)	6800 (1528)	0.028 (0.2478)	66 (145)	350	450
180	**1PH7184** **1PH7186**	**NFE 60** **NFE 60/80**	600 (443) 800 (590)	3500	69 (50.9) 91 (67.1)	154 (113.6) 56 (41.3)	2230 620	1.02 (9.0265) 1.36 (12.0364)	0.9	–	–	90 (3.5)	90 (3.5)	2800 (629)	0.027 (0.2389) 0.026 (0.2301)	55 (121)	400	160
225	**1PH7224** **1PH7226** **1PH7228**	**NFE 100** **NFE 100** **NFE 100/140**	1000 (738) 1000 (738) 1400 (1033)	3100	158 (116.5) 206 (151.9) 248 (182.9)	153 (112.9) 109 (80.4) 32 (23.6)	970 530 130	3 (26.5487) 3.9 (24.5133) 4.7 (41.59)	1.3	–	–	100 (3.9)	100 (3.9)	2800 (629)	0.041 (0.3628) 0.041 (0.3628) 0.041 (0.3628)	75 (165)	460	200

Holding torque in 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, nmax.: Max. permissible speed where emergency stops are possible.

Permissible single switching energy WE in kJ: Permissible switching energy for an Emergency Stop, WE = Jtot. x n^2/182.5 x 10^{-3} (J in kgm2, n in RMP)

Continuous lifetime switching energy Wmax. in MJ: Max. possible switching energy of the brake (for Emergency Stops) until the brake pads must be replaced, Wmax. = WE x z.

Number of Emergency Stops z: The specified number of Emergency Stops refer to the following conditions: Braking from speed nmax., Jtot. = 2 x Jmot. A conversion can be made for operation under different conditions: Number of Emergency Stop operations, z = Wmax./WE

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 in N: For motors, shaft heights 100 ... 160, coupling and belt out–drives are possible; for shaft heights 180 and 225, only coupling out–drives are permissible.

Opening (release) time in ms: Separating time until the brake opens (the specified values refer to the max. braking torque).

Closing time in ms: Interlocking time until the brake closes (the values refer to the max. braking torque).

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 Table 6-19. The Operating Instructions for the mounted holding brake are supplied together with the motor–brake unit.

Ordering example: 1PH7 186–2HF00–2AA3, type of construction IM B 3, holding brake includes the micro–switch and emergency release screw (additional ordering options, refer to Catalog DA 65.3.

Intended use

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 6-19. 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. 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.

6.4.1 Mounted holding brake for motors, SH 100 to SH 160

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. The permissible cantilever forces can be taken from the appropriate cantilever force diagrams.

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 1PH7 shaft heights 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 micro–switch	2
with brake (brake has a manual release function	3
with brake (brake has a micro–switch and manual release function)	4
Brake supply voltage: 24 V DC	
with brake (brake supply voltage: 24 V DC)	5
with brake (brake has a micro–switch	6
with brake (brake has a manual release function	7
with brake (brake has a micro–switch and manual release function)	8

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.

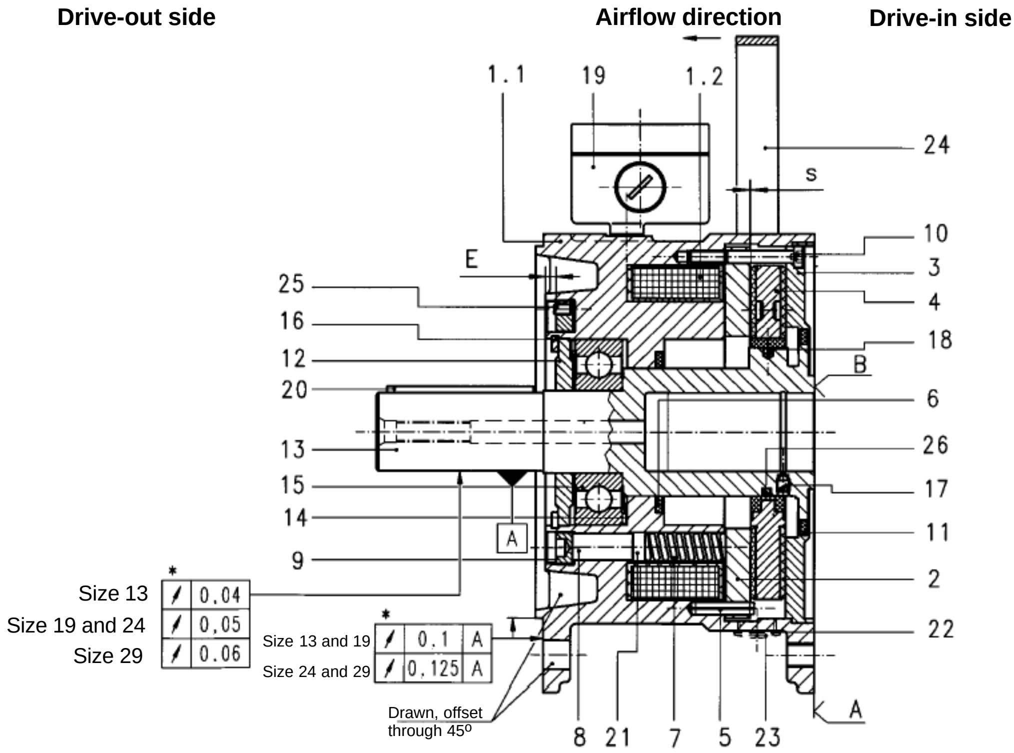
Design and mode of operation

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.

The braking module is an autonomous system which means that no forces are released externally.

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 drive–out 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 The motor
5 Tensioning pin
6 Sealing ring
7 Spring
8 Thrust bolts
9 Setting ring
10 Cylinder head screw
11 Sealing ring
** ball bearing set

12 Disk
13 Clutch shaft
14 Spring disk**
(left or right from the bearings corresp. to ball bearing position)
15 Ball bearings
16 Locking ring**
17 Cap screw (sec. with Loctite, type 243)**
18 Rubber bolts (only size 19 and 24, size 13 in the brake disk)
19 Connection housing
20 Key
21 Thrust botls (only size 13)

22 Sealing ring
23 Plug 2 x 180° (if without manual release)
24 Manual release (accessory)
25 stud (secured with Loctite, type 243)
26 O ring (only size 29)
E= Setting ring clearance
A = Mounting surface, motor side
B= mounting surface, clutch shaft
S = air gap
(when power is applied to the brake)
Micro–switch, refer under 07
***** Radial eccentricity and axial eccentricity tolerance measured acc. to Din42955 when the mounting instructions are complied with

Fig. 6-14 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. 6-16.

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

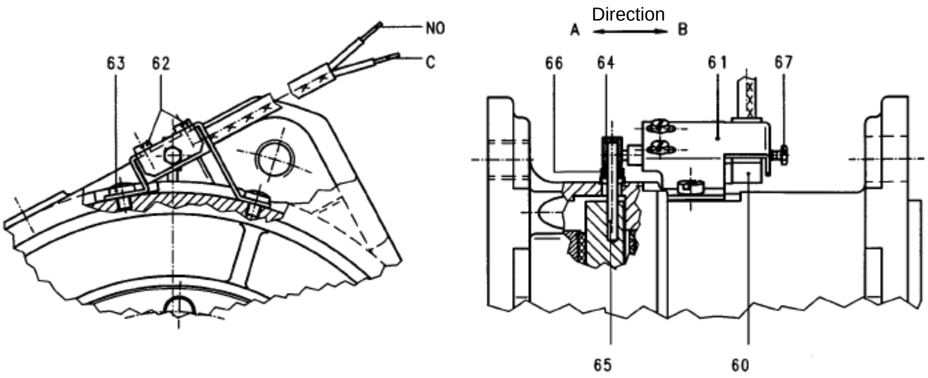
The motor circuit should be carefully designed so that when the micro–switch closes, the motor cannot accidentally start.

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. IFor 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 6-20 – 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 6-20 Screw–in depth for screw (67)

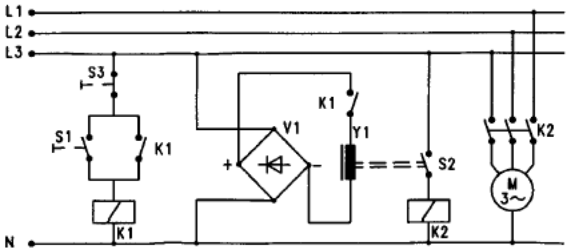
Size of the braking module	Length [**L**]	Screw–in angle
19	0.15 mm	120 °
24	0.20 mm	160 °
29	0.20 mm	160 °

The micro–switch function should then be checked by switching–in and switching–out the brake.
C (common) = common contact; NO (normally open) = NO contact



60 Micro–switch
61 Bar
62 Cylinder head screw (2x)
63 L screw (2x)
64 Bolts
65 Tensioning pin
66 Bellows
67 Hexagonal–head screw M 2.5 x 8 (not included with the equipment)

Fig. 6-15 Brake with micro–switch, degree of protection of the micro–switch, IP 65



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

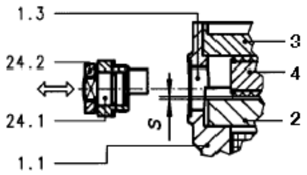
Fig. 6-16 Recommended circuit to incorporate the micro–switch in the control circuit

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. 6-17 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.

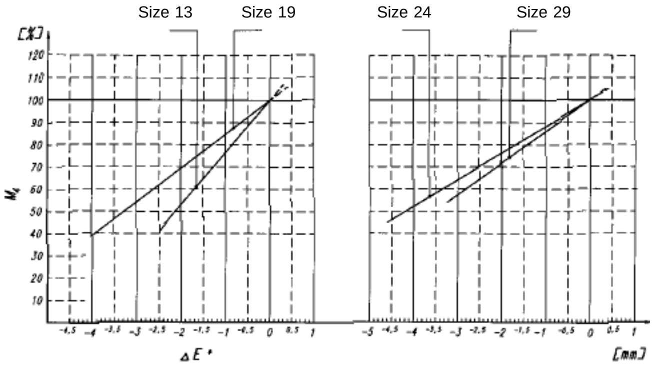


1.3 Bore to measure the air gap (remove the cam with accessories or the cap)
1.1 Solenoid housing
24.1 Cam with accessories
24.2 Bar

Fig. 6-17 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 6-19. 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. 6-14 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. 6-18 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 Setting ring clearance represents an approximate value to M_4 starting from the factory setting 100% M_4. Deviations of ± 15 % are possible

Fig. 6-18 Torque that can be transferred M_4 = f (Δsetting ring clearance)

6.4.2 Mounted holding brake for 1PH7 motors, SH 180 and SH 225

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 drive–out 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.

Order No. code for 1PH7, shaft heights 100 and 225 for a mounted holding brake with emergency stop function

1 P H 7 . . . – . . . . . – ■ A A .

no brake	**0**
with brake (brake has a micro–switch and emergency release screw)	**2**
with brake (brake has a micro–switch and manual release)	**4**

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.

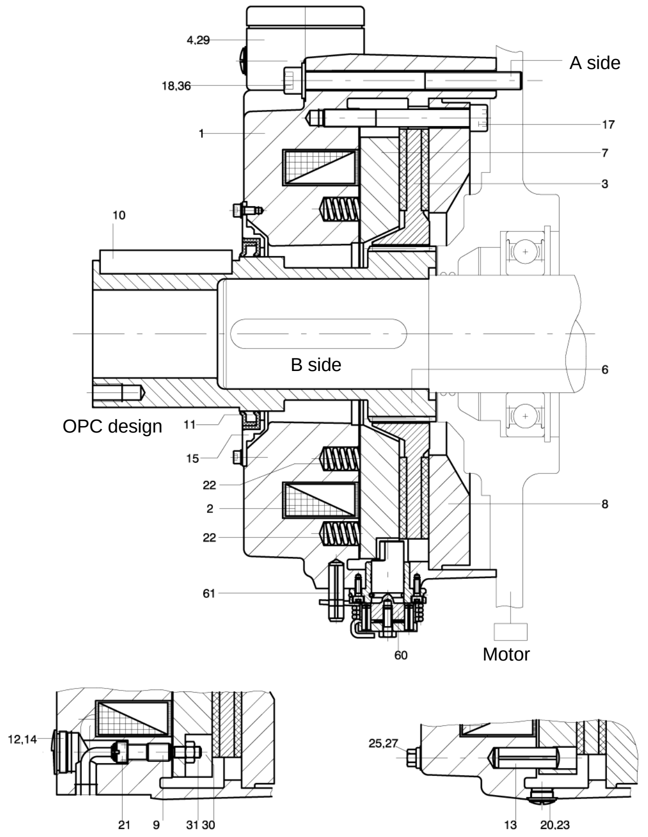
Design and mode of operation

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. 5. 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

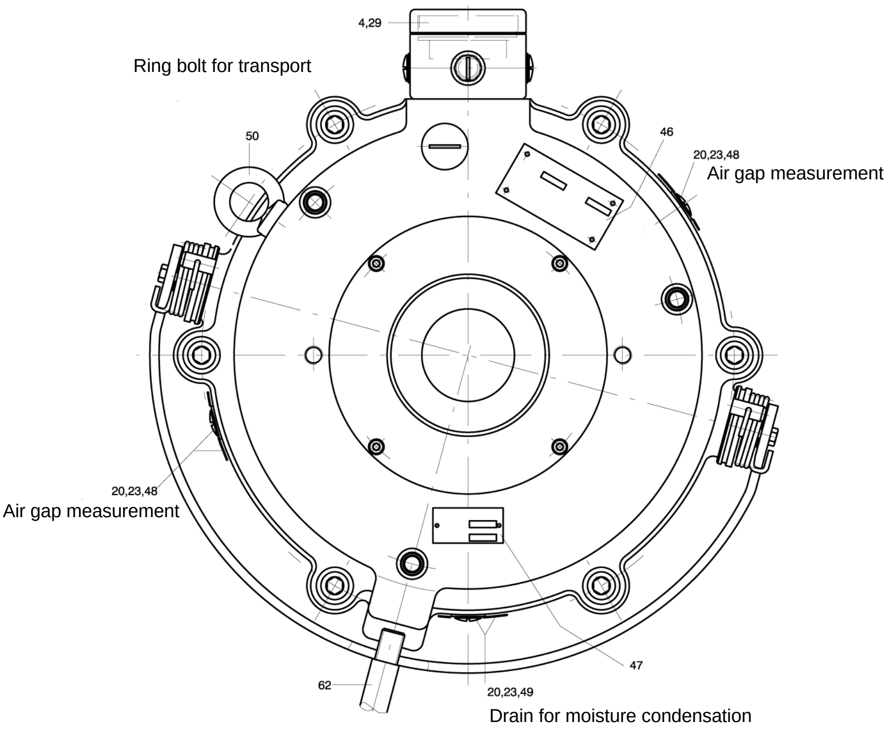
If even shorter switching times are required, then the block must be connected to the DC current source. For high switching frequencies, the user should provide the DC switch with the appropriate protection against arcing.



1 Solenoid assembly
2 Coil
3 Carrier assembly with brake pad
4 Terminal box
6 Hollow shaft
7 Armature disk
8 Flange
9 Micro–switch
10 Key
11 VR seal
12 Screw cap
13 Cylindrical pin
14 Sealing ring
15 Cover

17 Cylinder head screw
18 Cylinder head screw (supplied loose)
20 Screw cap
21 Threaded ring
22 Spring
23 Sealing ring
25 Screw cap
27 Sealing ring
29 Fast–switching rectifier block
30 Stud
31 Hexagonal head nut
36 Washer (supplied loose)
60 Manual lever group
61 Bolts

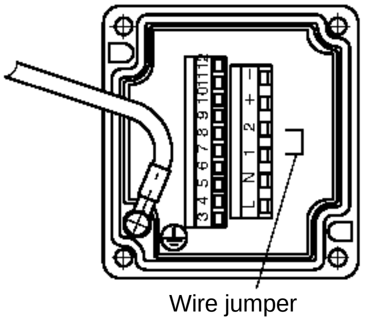
Fig. 6-19 Design and mode of operation



4 Terminal box
20 Screw cap
23 Sealing ring
29 Fast–switching rectifier block
46 Rating plate
47 Plate, emergency release
48 Plate, measure air gap
49 Plate, drain screw
50 Ring bolt for transport
62 Release bar

Fig. 6-20 Side view

Connection diagram in the terminal box cover



Connections from the brake side
+ ; – : Coil
9 ; 10 : Anti–condensation heating
3 ; 4 ; 5 : Micro–switch
green; brown; white

Connections from the customer's side
L ; N : 230 – 250 V/AC
1 ; 2 : DC switch
11 ; 12 : Anti–condensation heating
6 ; 7 ; 8 : Micro–switch
white; brown; green

NO contact, NC contact

Notice!When switching on the AC current side, terminals 1, 2 must be jumpered (connected)

Fig. 6-21 Circuit configurations

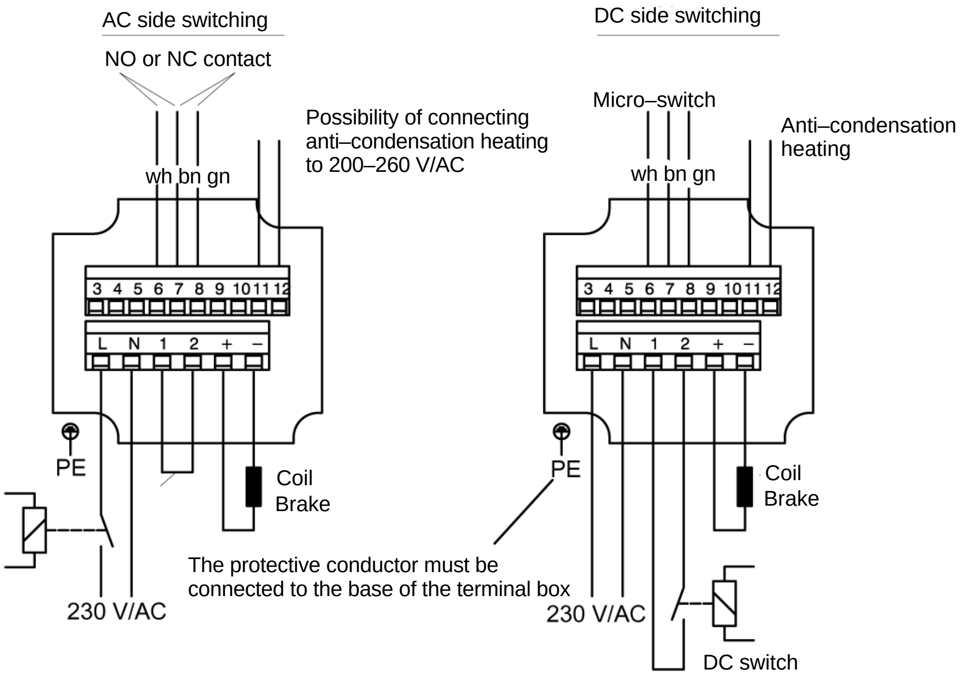


Fig. 6-22 Circuit configurations

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. 6-21 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. 6-23). 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.

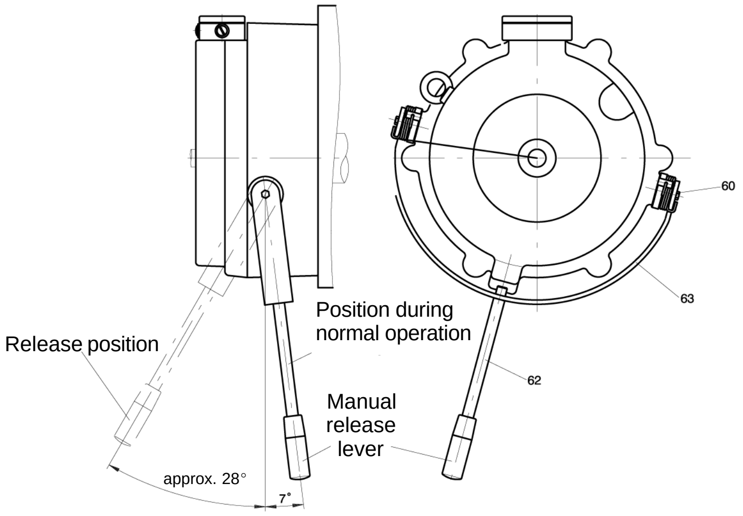


Fig. 6-23

6.4.3 Mounted holding brake for 1PH7 motors, 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.

6.5 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 1.4 Order designation)

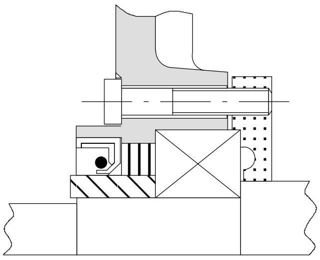


Fig. 6-24 Radial sealing ring

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.

1PH67 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/fluids that gather at the drive end 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.

■

Space for your notes

Dimension Drawings, Type of Construction IM B3

7

For 1PH7 motors, for the dimensions, specified in the following table, the subsequent deviations are permissible.

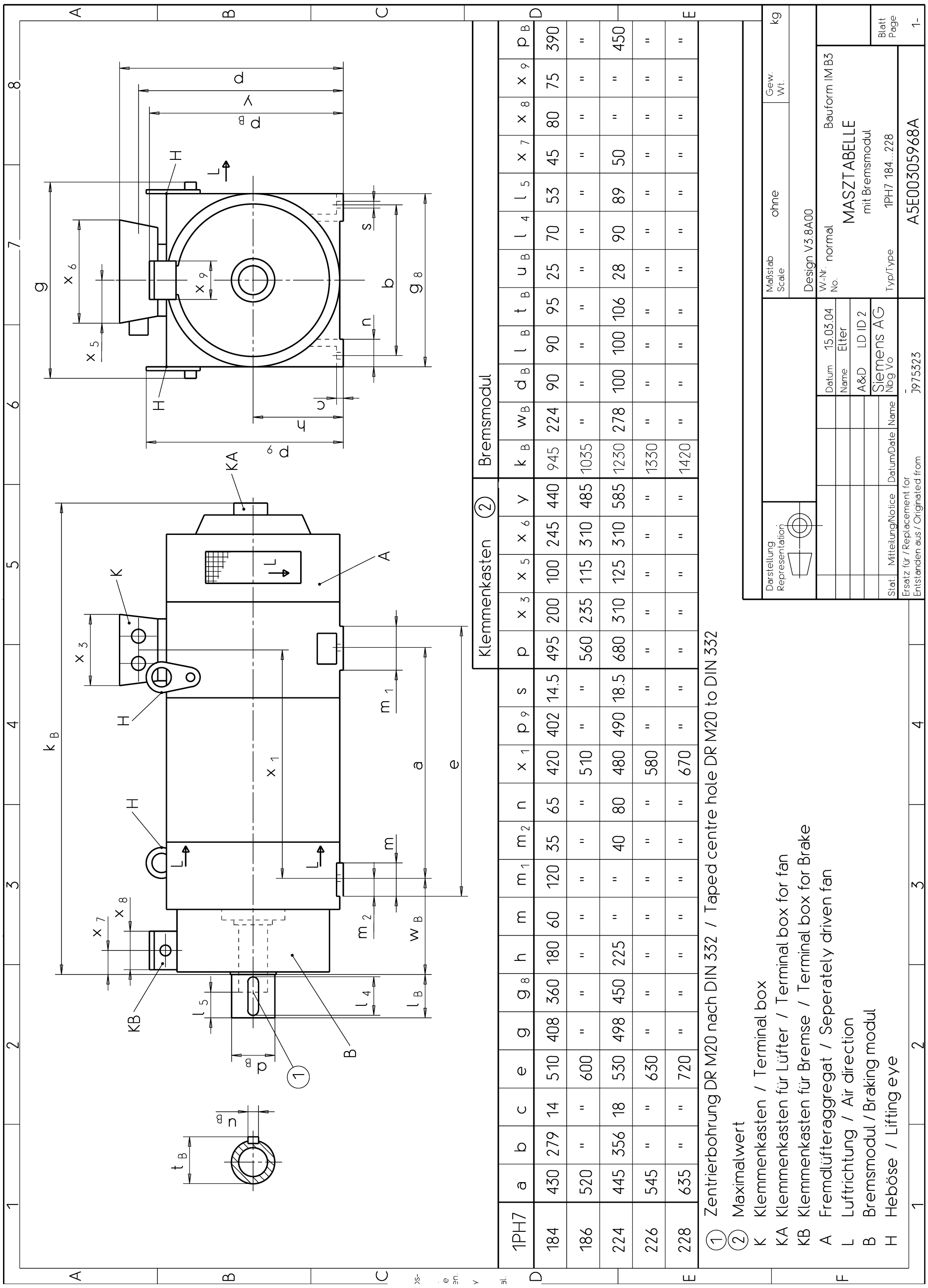
Table 7-1 Permissible dimension deviations

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

Note

Siemens AG reserves the right to change the dimensions of motors without prior notice as part of ongoing improvements to the mechanical design. Dimension drawings can go out–of–date. Updated dimension drawings can be requested at no charge.

7.1 Type of construction IM B3 with brake



														Klemmenkasten ②					Bremsmodul											
1PH7	a	b	c	e	g	g_8	h	m	m_1	m_2	n	x_1	p_9	s	p	x_3	x_5	x_6	y	k_B	w_B	d_B	l_B	t_B	u_B	l_4	l_5	x_7	x_8	x_9	p_B
184	430	279	14	510	408	360	180	60	120	35	65	420	402	14.5	495	200	100	245	440	945	224	90	90	95	25	70	53	45	80	75	390
186	520	"	"	600	"	"	"	"	"	"	"	510	"	"	560	235	115	310	485	1035	"	"	"	"	"	"	"	"	"	"	"
224	445	356	18	530	498	450	225	"	"	40	80	480	490	18.5	680	310	125	310	585	1230	278	100	100	106	28	90	89	50	"	"	450
226	545	"	"	630	"	"	"	"	"	"	"	580	"	"	"	"	"	"	"	1330	"	"	"	"	"	"	"	"	"	"	"
228	635	"	"	720	"	"	"	"	"	"	"	670	"	"	"	"	"	"	"	1420	"	"	"	"	"	"	"	"	"	"	"

① Zentrierbohrung DR M20 nach DIN 332 / Taped centre hole DR M20 to DIN 332
② Maximalwert
K Klemmenkasten / Terminal box
KA Klemmenkasten für Lüfter / Terminal box for fan
KB Klemmenkasten für Bremse / Terminal box for Brake
A Fremdlüfteraggregat / Seperately driven fan
L Luftrichtung / Air direction
B Bremsmodul / Braking modul
H Heböse / Lifting eye

Fig. 7-1 1PH7184 to 1PH7228, IM B3 with brake

7.2 Type of construction IM B3 with separately–driven fan

7.2.1 Air flow direction, DE – NDE or NDE – DE

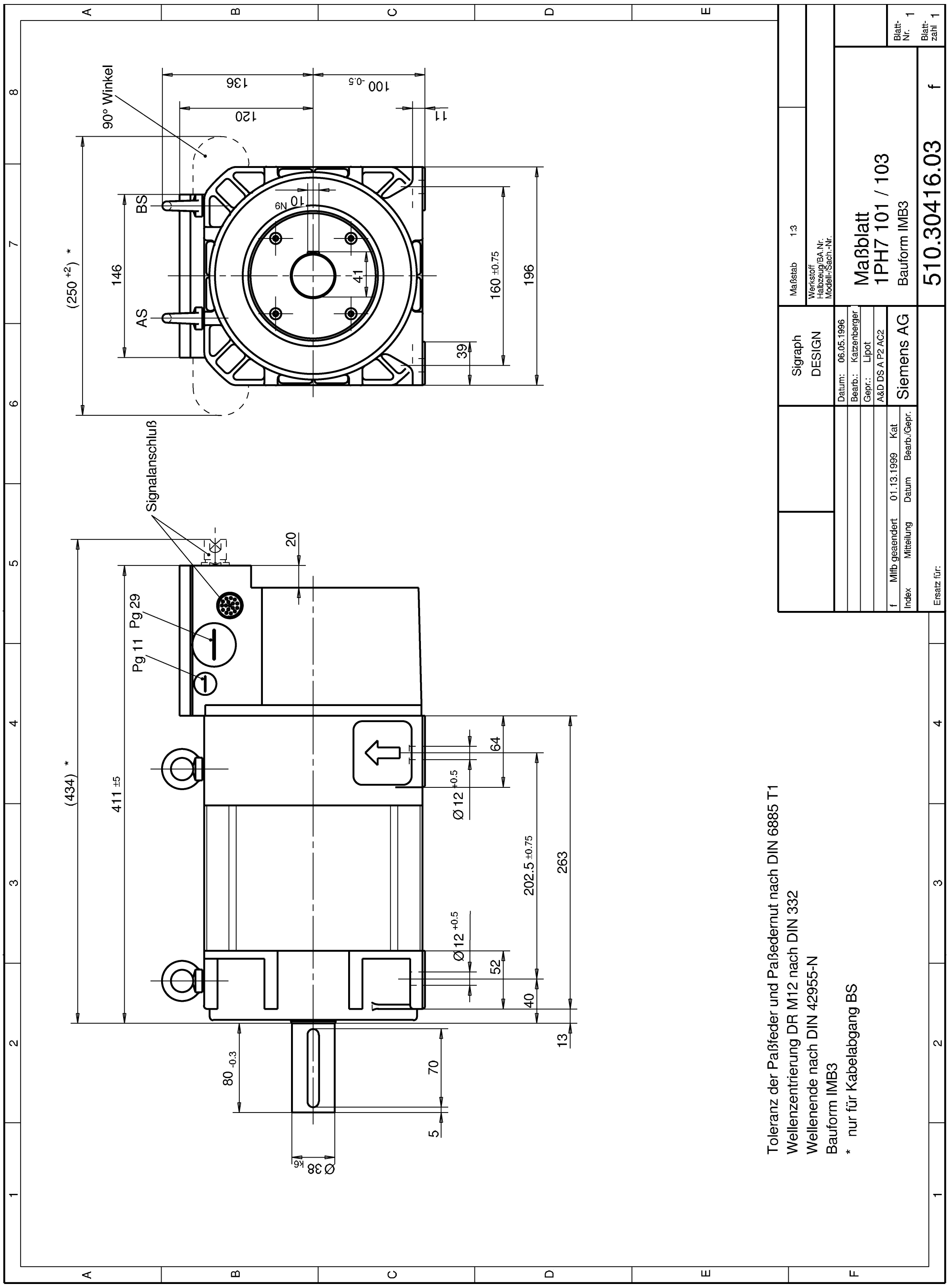


Fig. 7-2 1PH7101 to 1PH7103, IM B3, air flow direction, DE – NDE or NDE – DE

7.2 Type of construction IM B3 with separately–driven fan

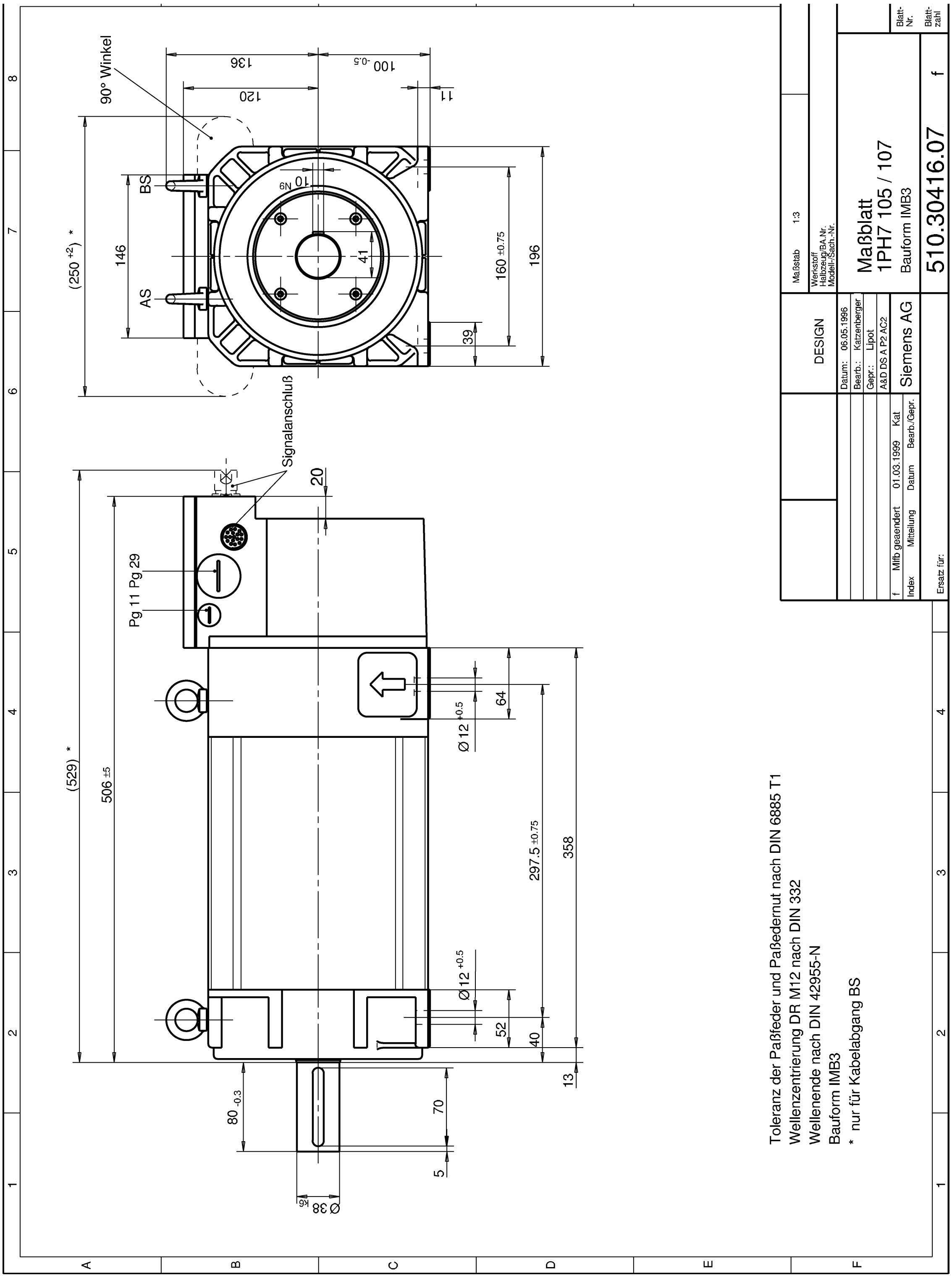


Fig. 7-3 1PH7105 to 1PH7107, IM B3, air flow direction DE – NDE or NDE – DE

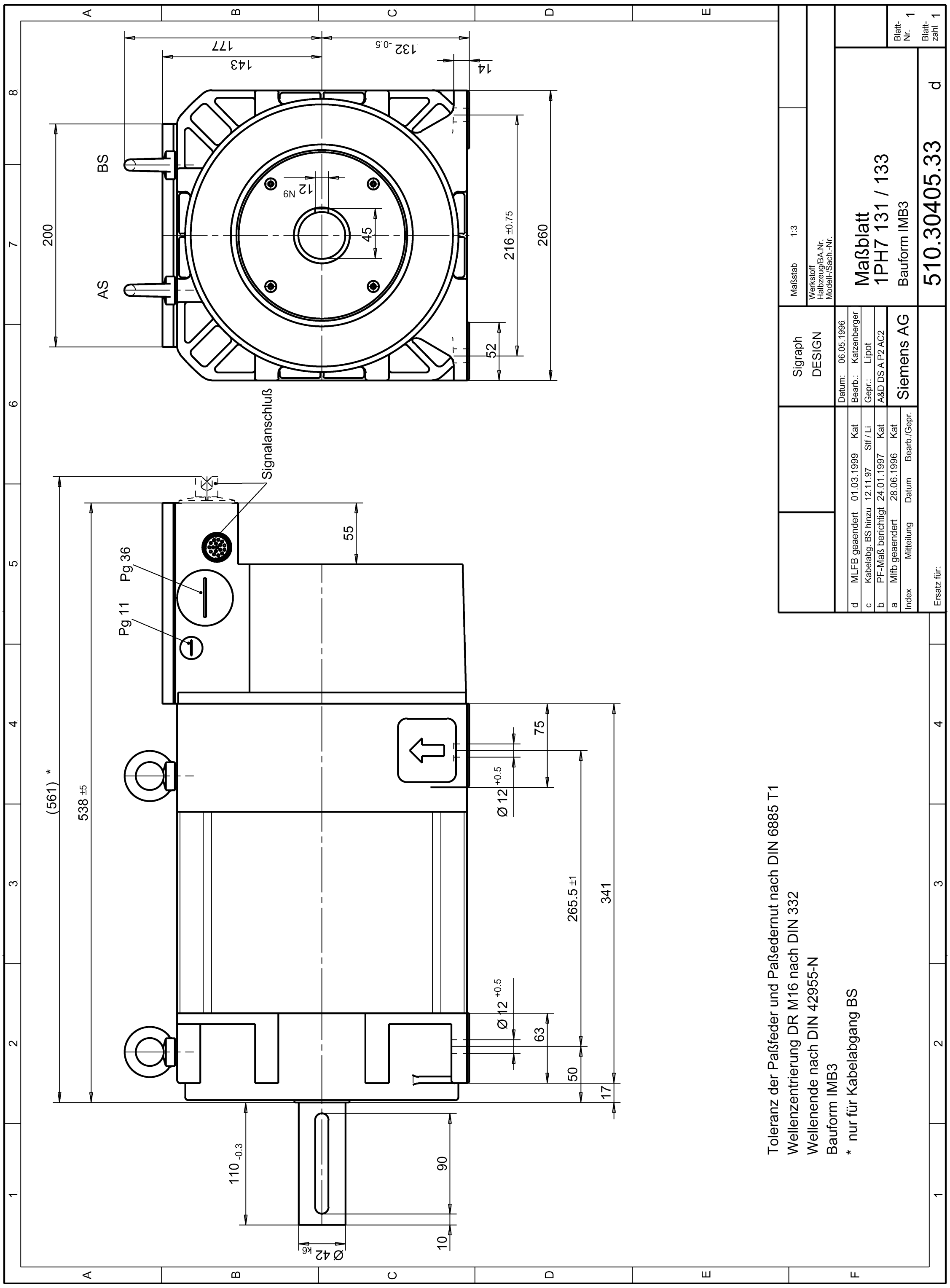


Fig. 7-4 1PH7131 to 1PH7133, IM B3, air flow direction DE – NDE or NDE – DE

7.2 Type of construction IM B3 with separately–driven fan

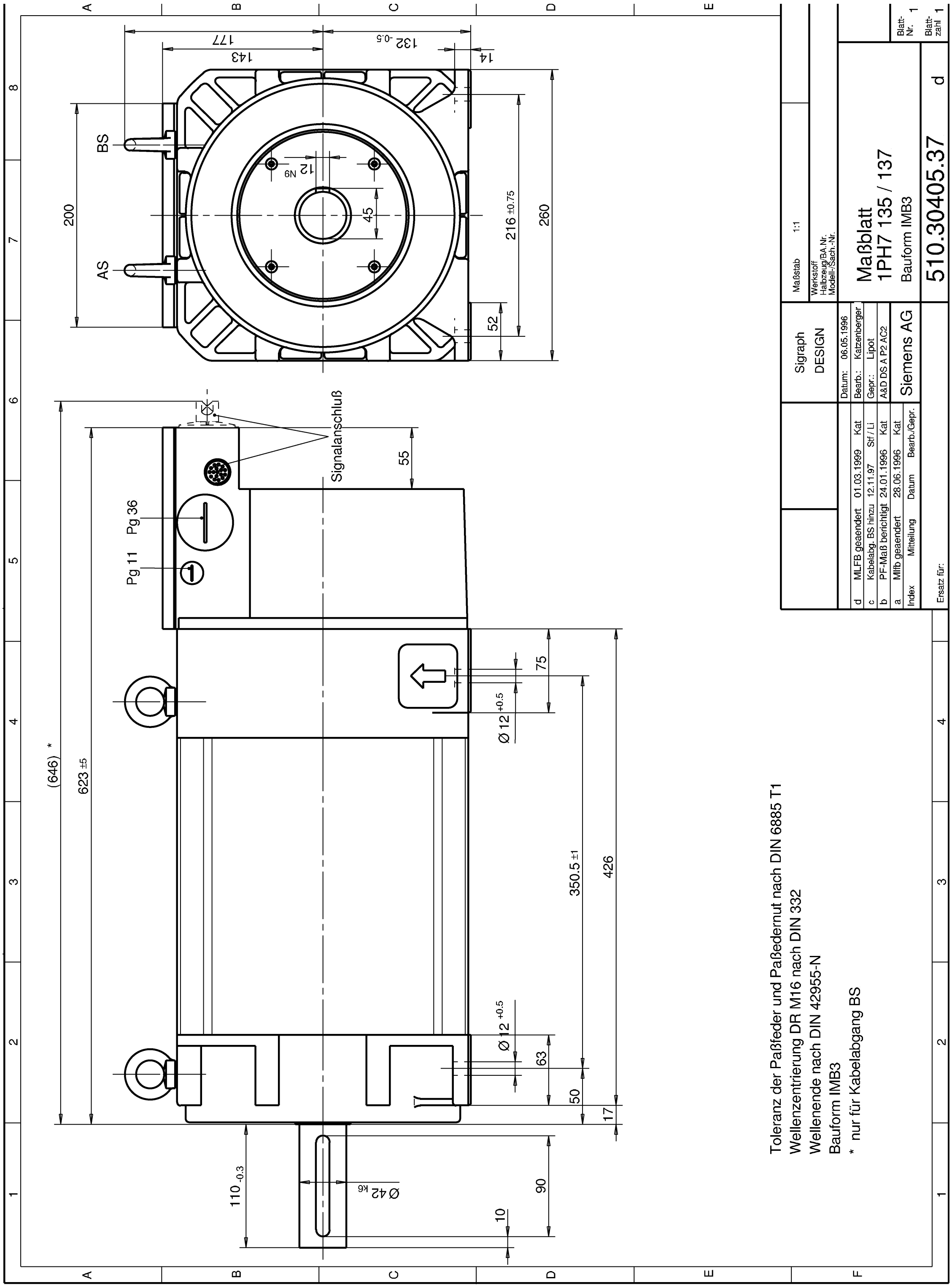


Fig. 7-5 1PH7135 to 1PH7137, IM B3, air flow direction DE – NDE or NDE – DE

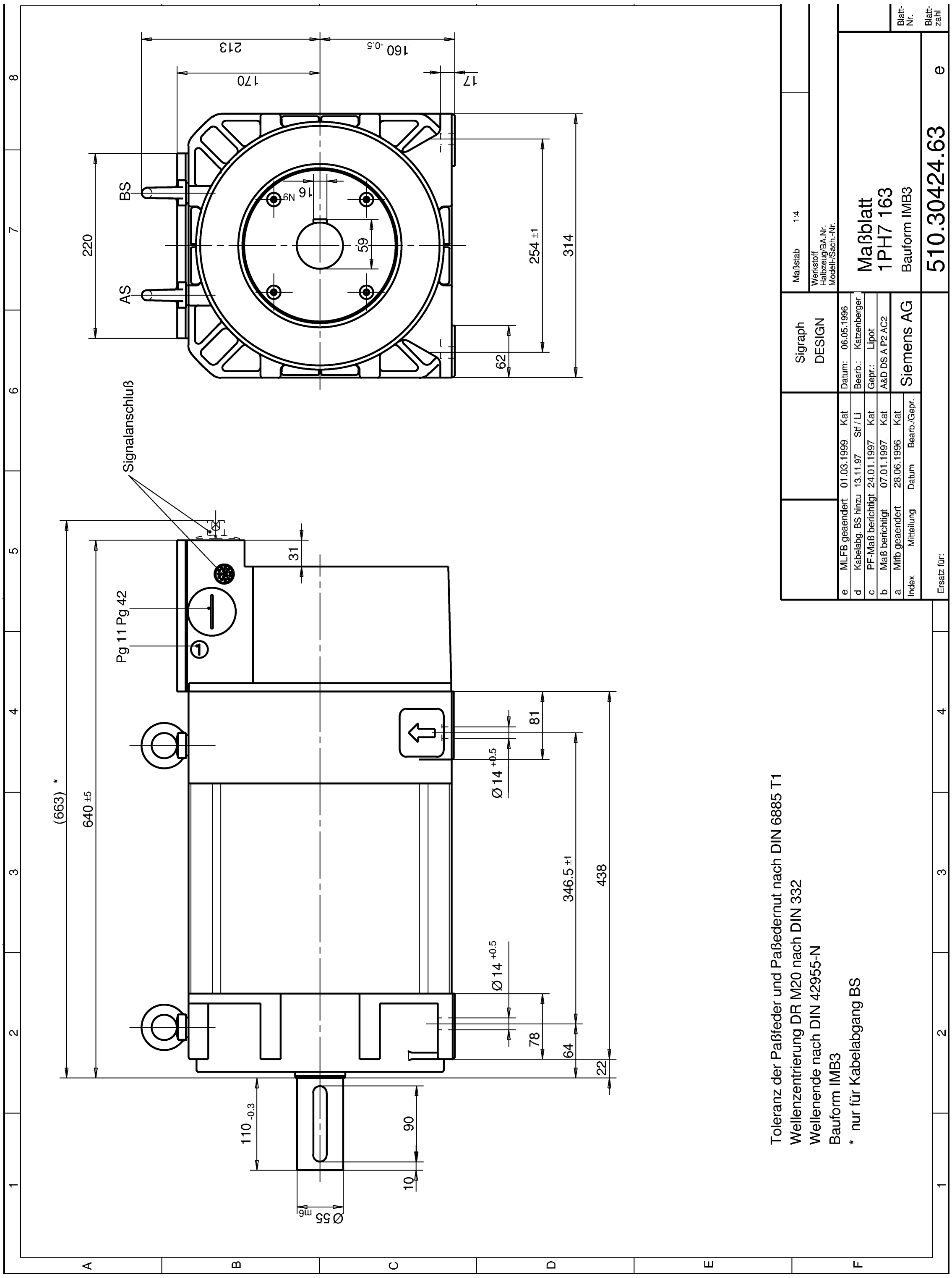


Fig. 7-6 1PH7163, IM B3, air flow direction DE – NDE or NDE – DE

7.2 Type of construction IM B3 with separately–driven fan

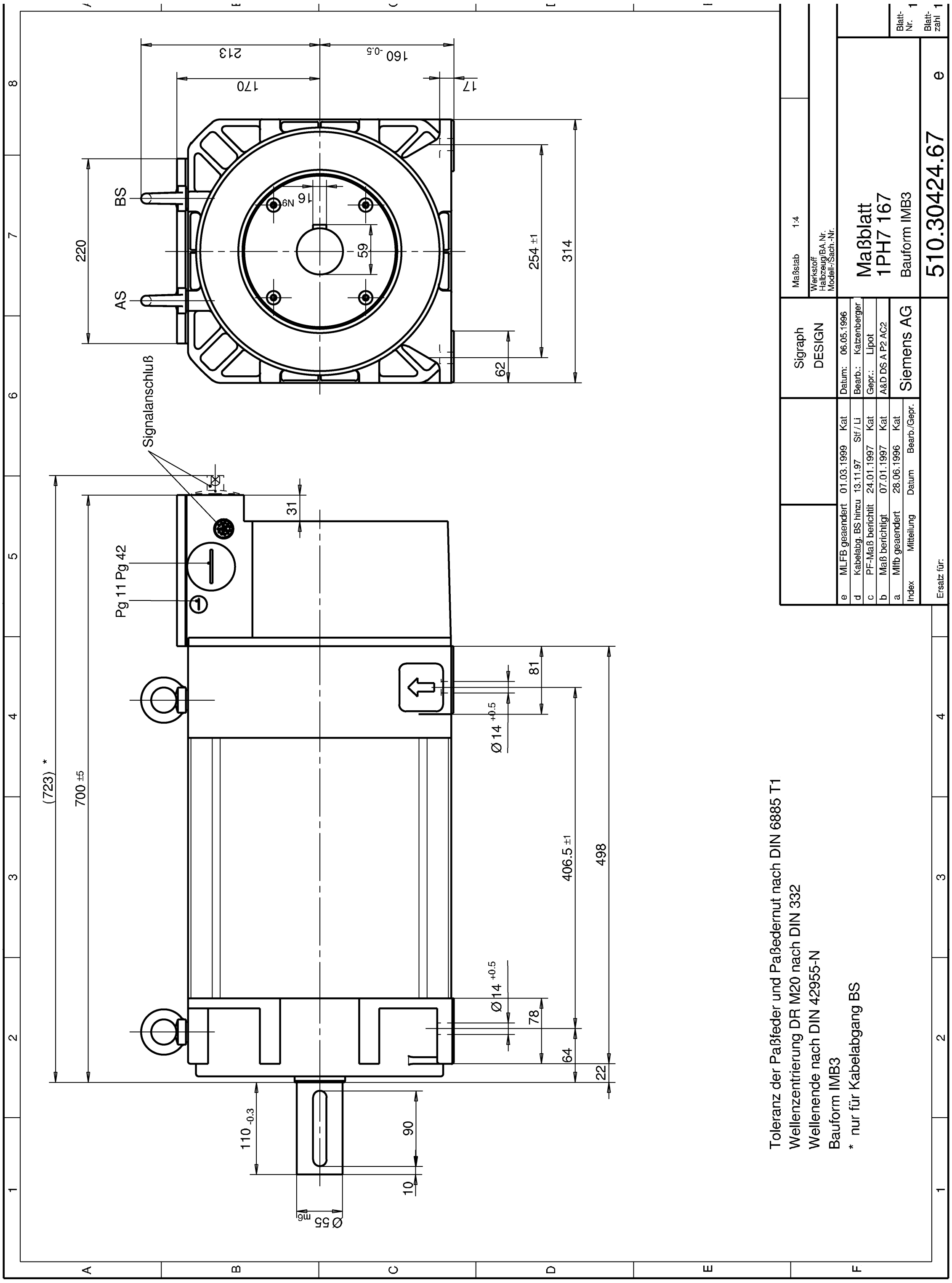


Fig. 7-7 1PH7167, IM B3, air flow direction DE – NDE or NDE – DE

7.2.2 Air flow direction DE – NDE

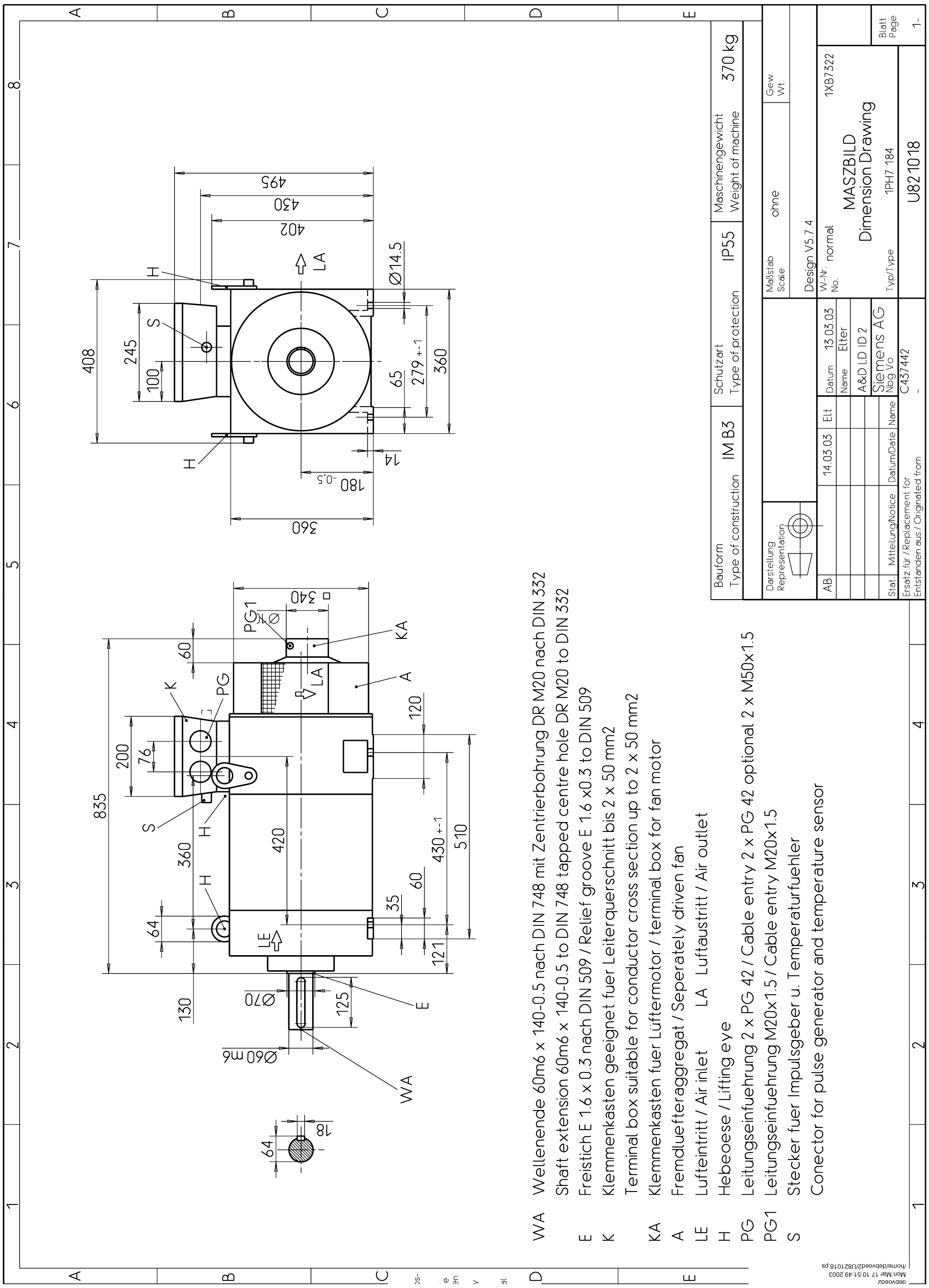


Fig. 7-8 1PH7184, IM B3, air flow direction DE – NDE

7.2 Type of construction IM B3 with separately–driven fan

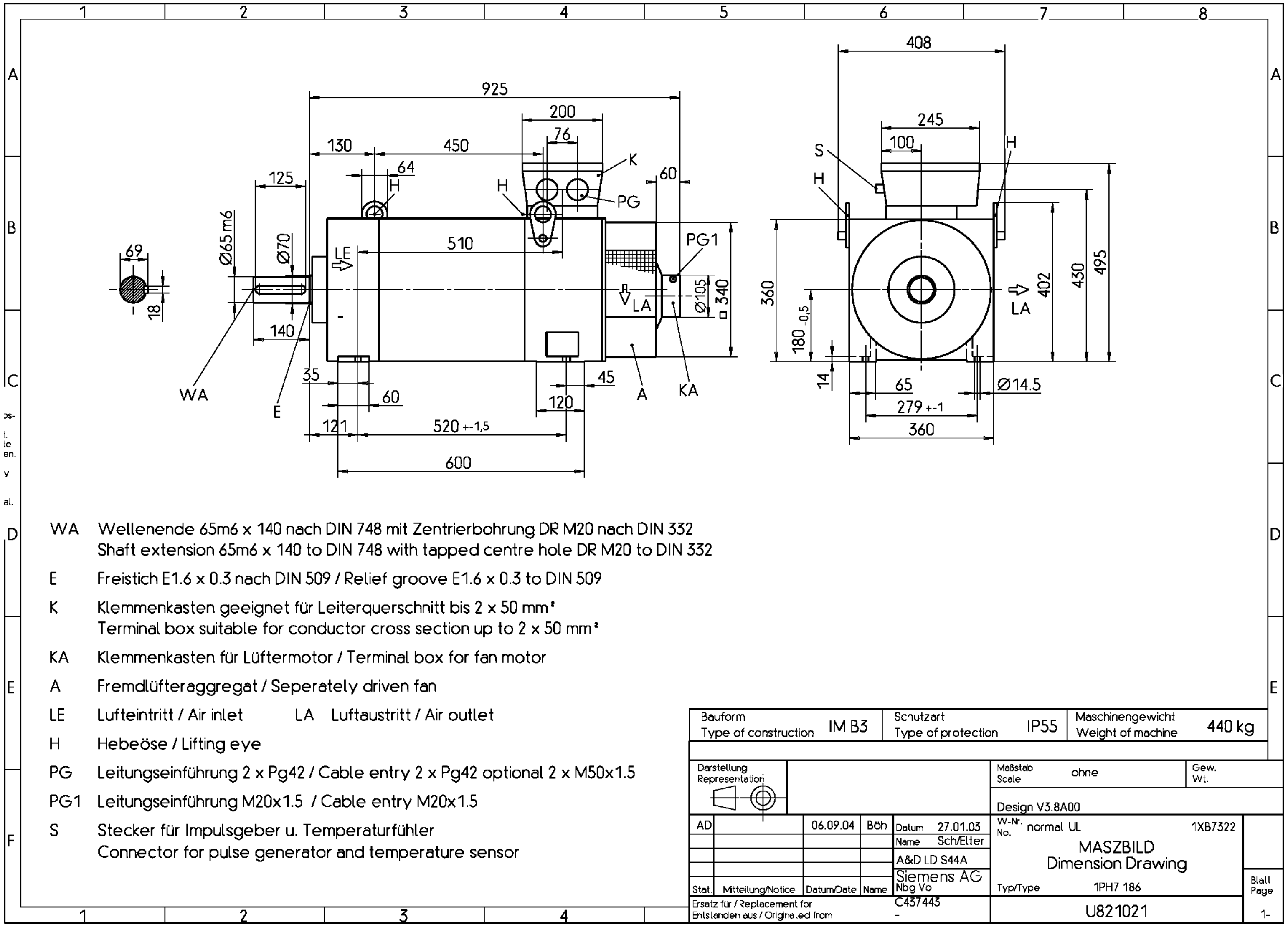


Fig. 7-9 1PH7186, IM B3, air flow direction DE – NDE

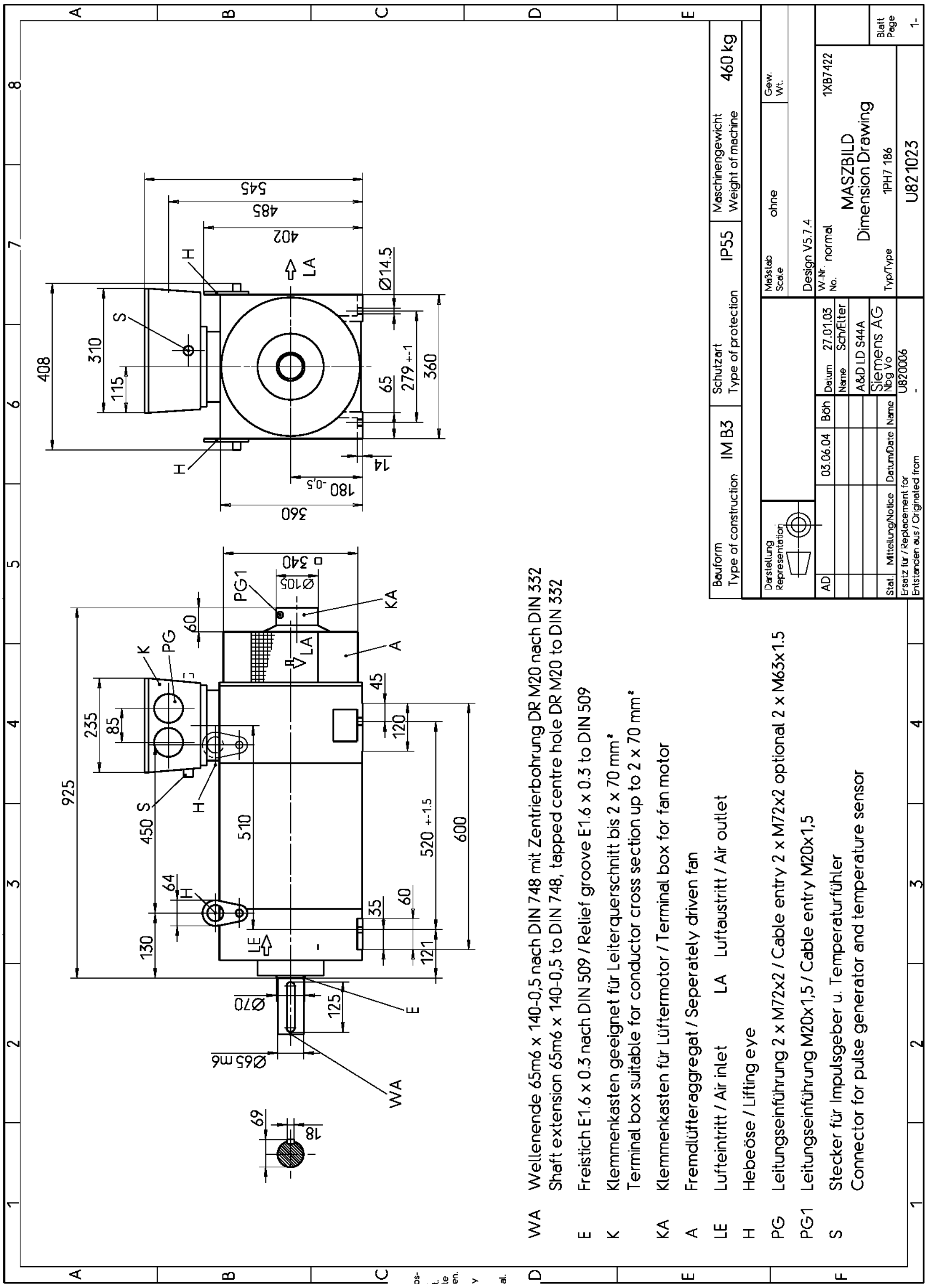


Fig. 7-10 1PH7186–F–L, IM B3, air flow direction DE – NDE

7.2 Type of construction IM B3 with separately–driven fan

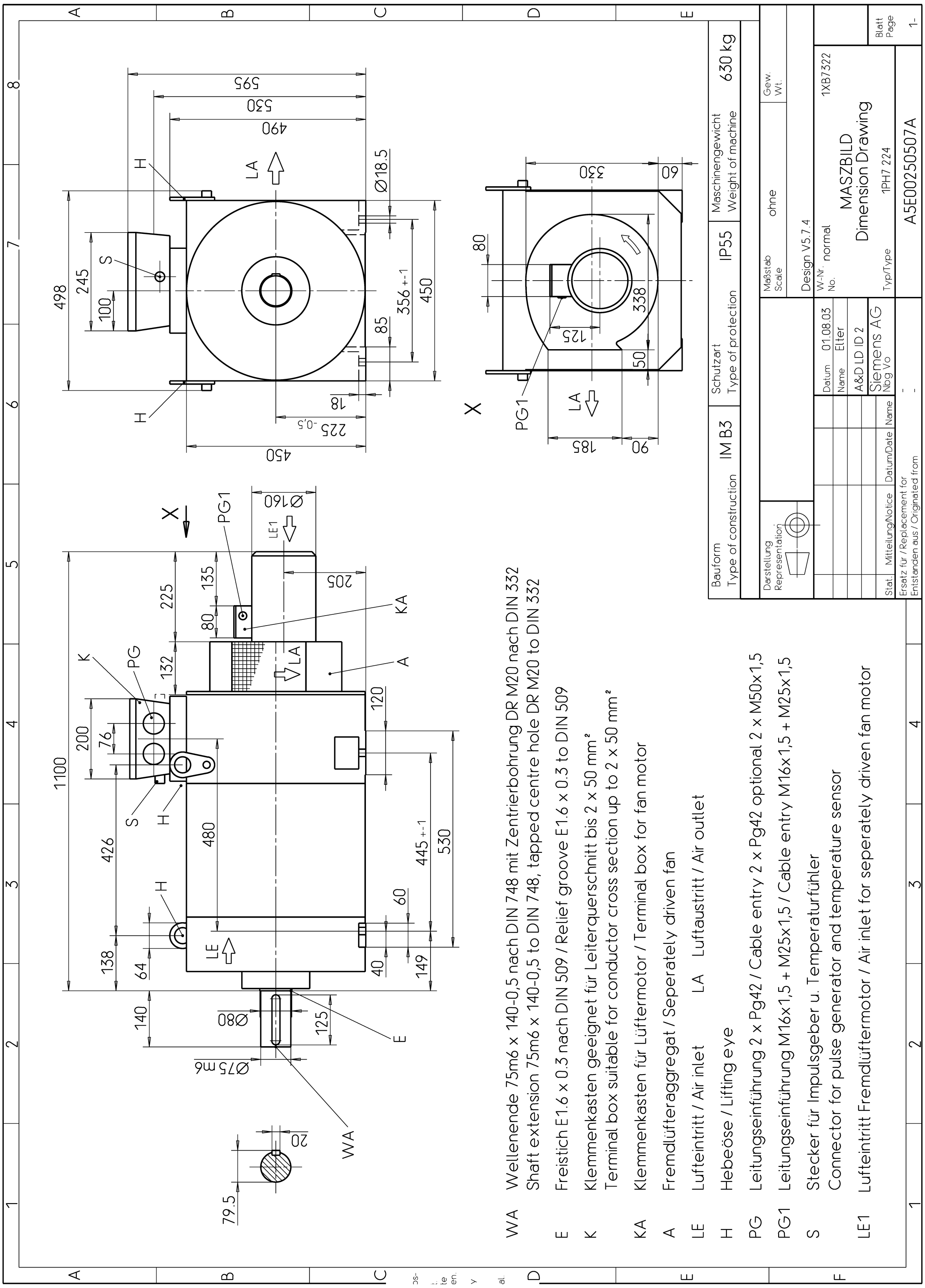


Fig. 7-11 1PH7224–B–D, IM B3, air flow direction DE – NDE

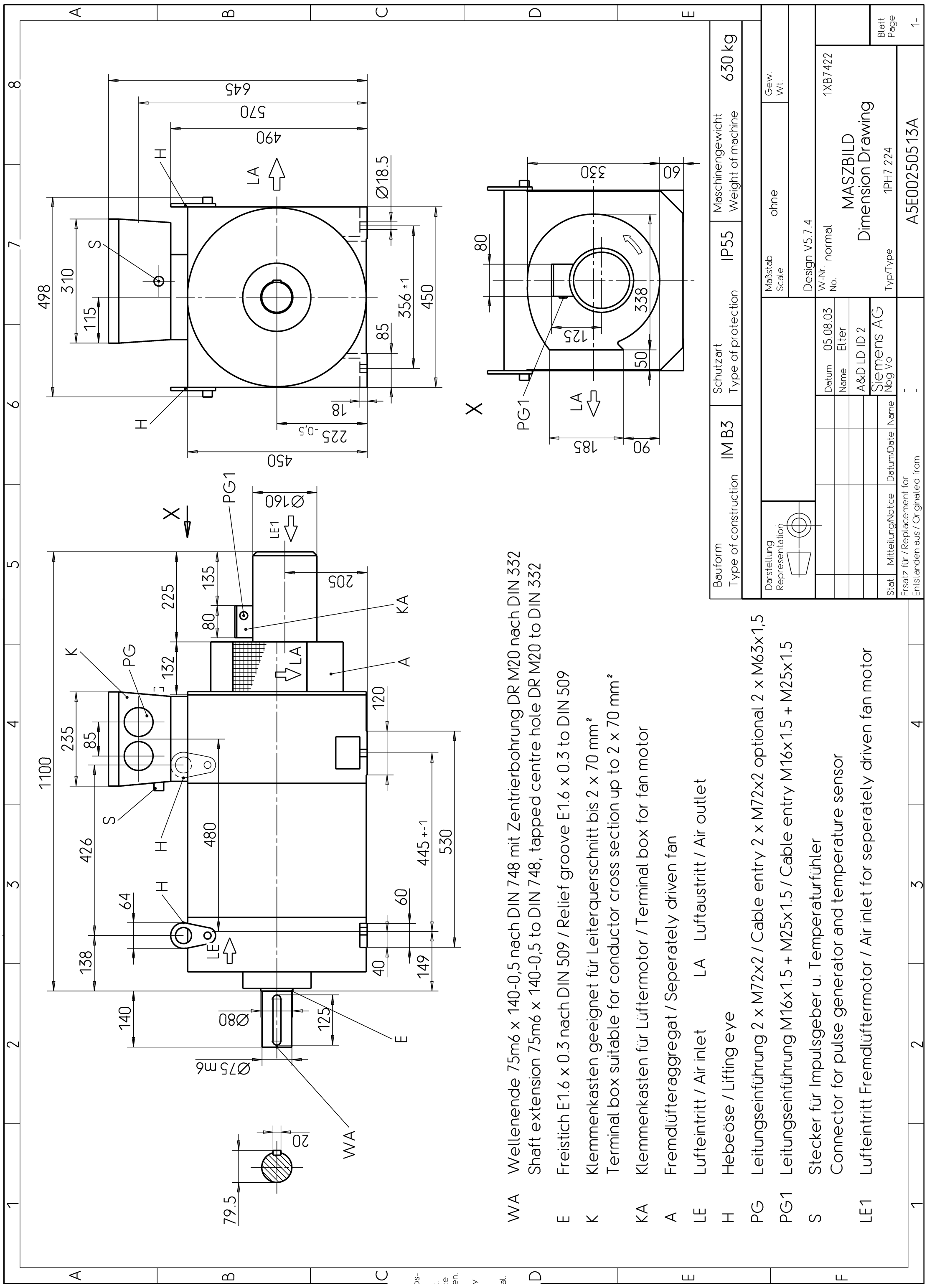


Fig. 7-12 1PH7224–U, IM B3, air flow direction DE – NDE

7.2 Type of construction IM B3 with separately–driven fan

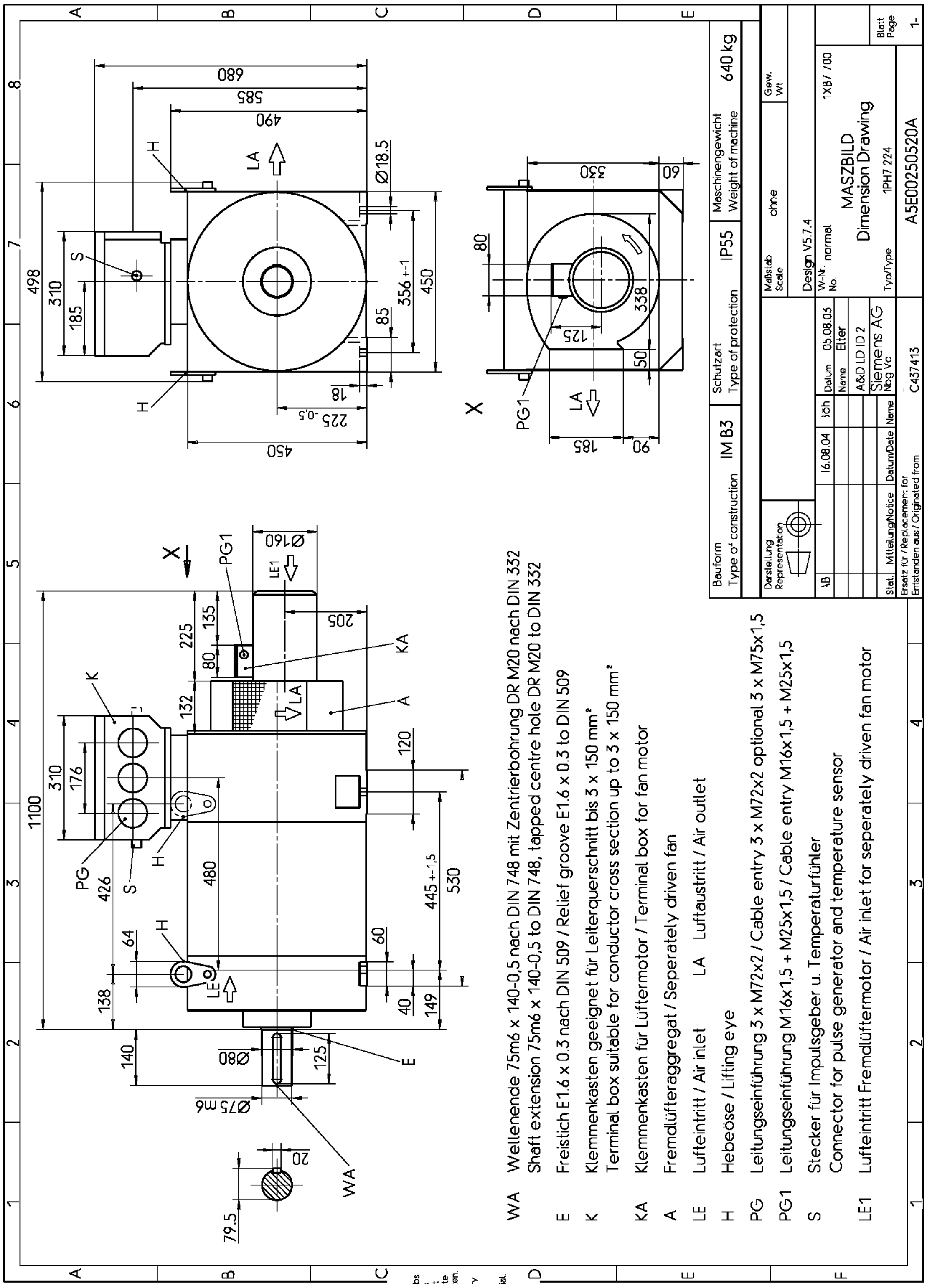
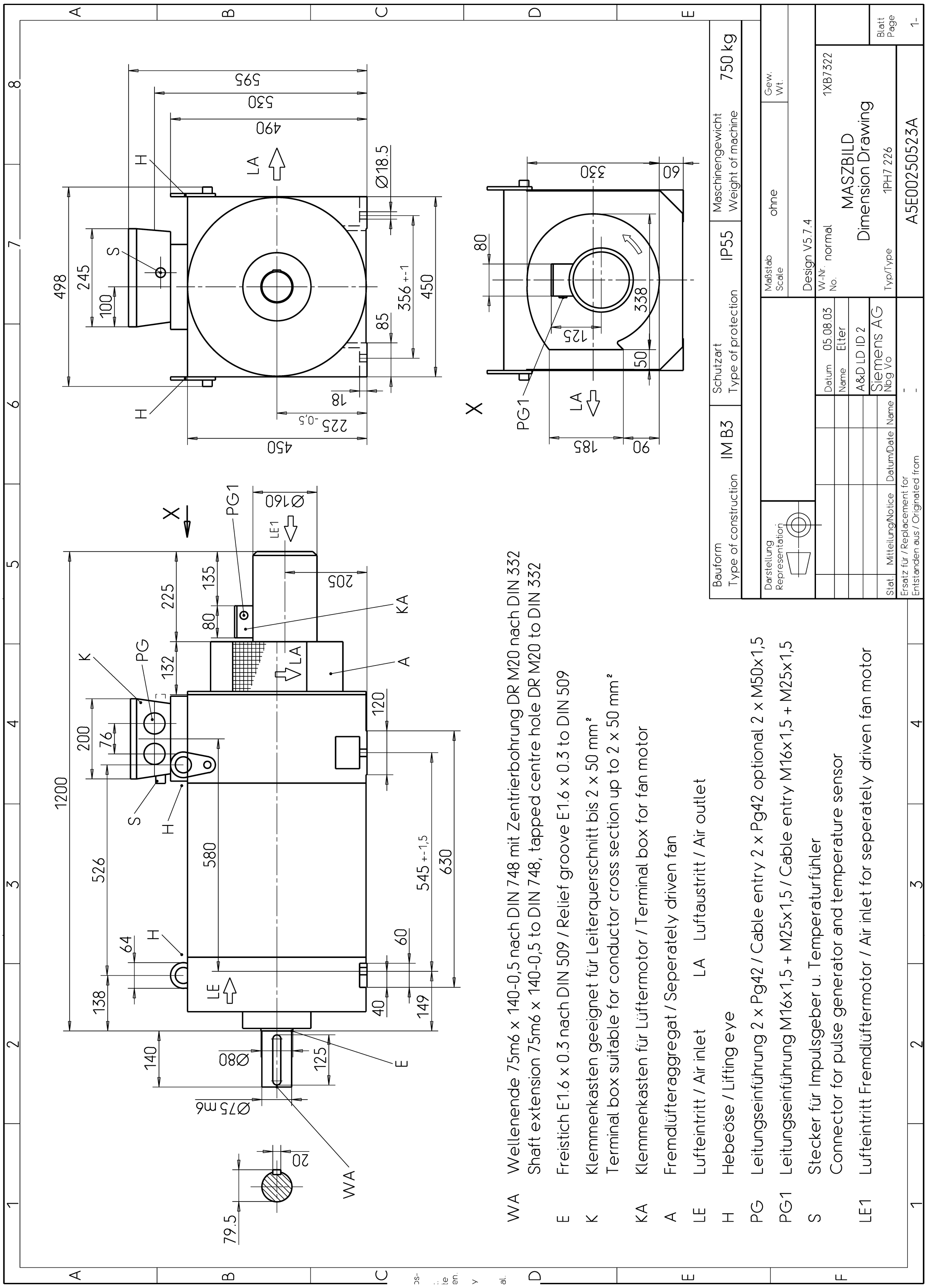


Fig. 7-13 1PH7224–L, IM B3, air flow direction DE – NDE



WA Wellenende 75m6 x 140-0,5 nach DIN 748 mit Zentrierbohrung DR M20 nach DIN 332
Shaft extension 75m6 x 140-0,5 to DIN 748, tapped centre hole DR M20 to DIN 332

E Freistich E1.6 x 0.3 nach DIN 509 / Relief groove E1.6 x 0.3 to DIN 509

K Klemmenkasten geeignet für Leiterquerschnitt bis 2 x 50 mm²
Terminal box suitable for conductor cross section up to 2 x 50 mm²

KA Klemmenkasten für Lüftermotor / Terminal box for fan motor

A Fremdlüfteraggregat / Seperately driven fan

LE Lufteintritt / Air inlet LA Luftaustritt / Air outlet

H Hebeöse / Lifting eye

PG Leitungseinführung 2 x Pg42 / Cable entry 2 x Pg42 optional 2 x M50x1,5

PG1 Leitungseinführung M16x1,5 + M25x1,5 / Cable entry M16x1,5 + M25x1,5

S Stecker für Impulsgeber u. Temperaturfühler
Connector for pulse generator and temperature sensor

LE1 Lufteintritt Fremdlüftermotor / Air inlet for seperately driven fan motor

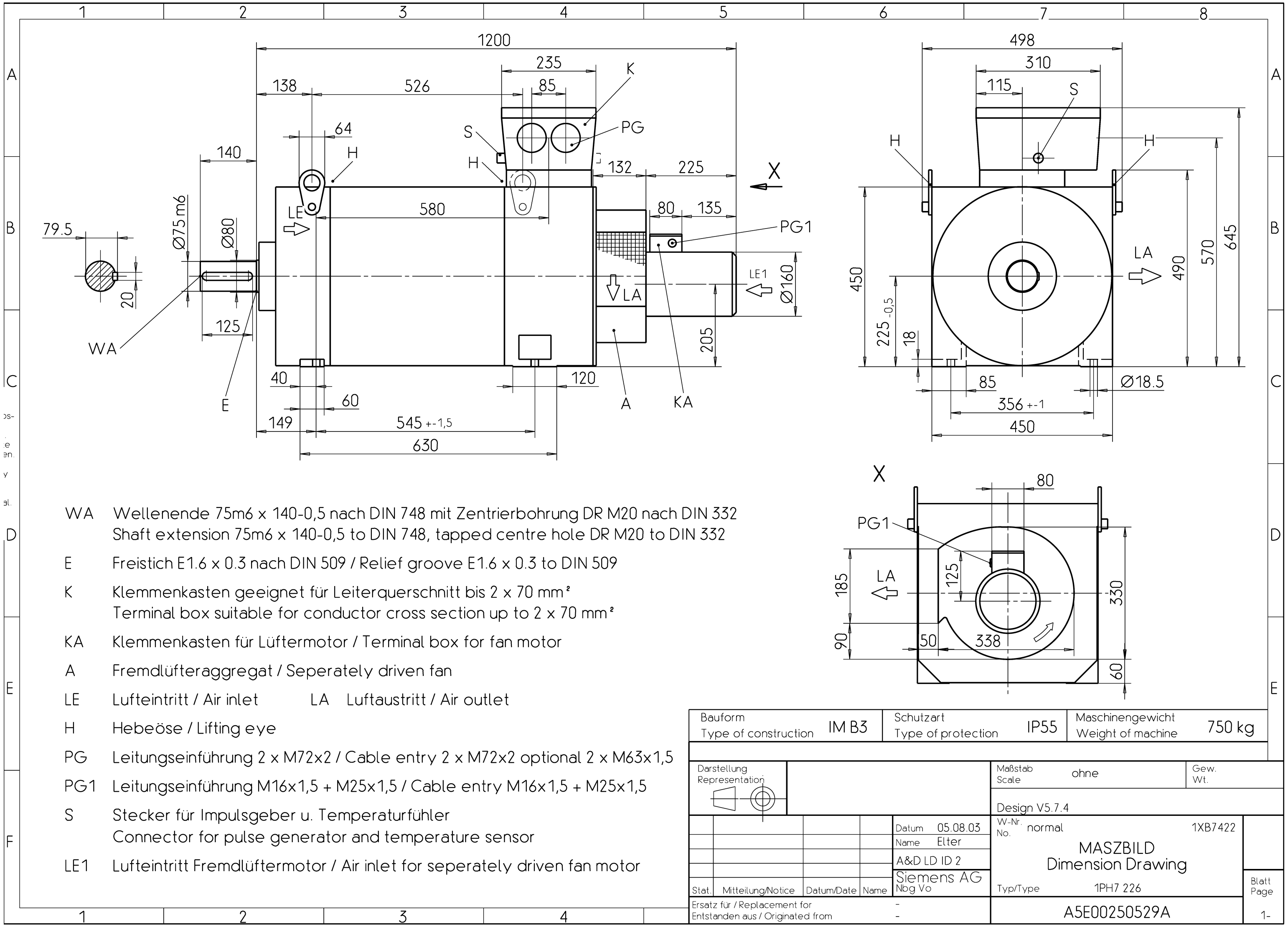
Bauform
Type of construction IM B3
Schutzart
Type of protection IP55
Maschinengewicht
Weight of machine 750 kg

Darstellung
Representation
Maßstab
Scale ohne
Gew.
Wt.
Design V5.7.4
W-Nr. normal
No.
1XB7322
MASZBILD
Dimension Drawing
1PH7 226
Typ/Type
A5E00250523A
Blatt
Page 1-

Datum 05.08.03
Name Elter
A&D LD ID 2
Siemens AG
Nog Vo
Stat Mitteilung/Notice Datum/Date Name
Ersatz für / Replacement for -
Entstanden aus / Originated from -

Fig. 7-14 1PH7226–B, IM B3, air flow direction DE – NDE

7.2 Type of construction IM B3 with separately–driven fan



WA Wellenende 75m6 x 140-0,5 nach DIN 748 mit Zentrierbohrung DR M20 nach DIN 332
Shaft extension 75m6 x 140-0,5 to DIN 748, tapped centre hole DR M20 to DIN 332

E Freistich E1.6 x 0.3 nach DIN 509 / Relief groove E1.6 x 0.3 to DIN 509

K Klemmenkasten geeignet für Leiterquerschnitt bis 2 x 70 mm²
Terminal box suitable for conductor cross section up to 2 x 70 mm²

KA Klemmenkasten für Lüftermotor / Terminal box for fan motor

A Fremdlüfteraggregat / Seperately driven fan

LE Lufteintritt / Air inlet LA Luftaustritt / Air outlet

H Hebeöse / Lifting eye

PG Leitungseinführung 2 x M72x2 / Cable entry 2 x M72x2 optional 2 x M63x1,5

PG1 Leitungseinführung M16x1,5 + M25x1,5 / Cable entry M16x1,5 + M25x1,5

S Stecker für Impulsgeber u. Temperaturfühler
Connector for pulse generator and temperature sensor

LE1 Lufteintritt Fremdlüftermotor / Air inlet for seperately driven fan motor

Fig. 7-15 1PH7226–D, IM B3, air flow direction DE – NDE

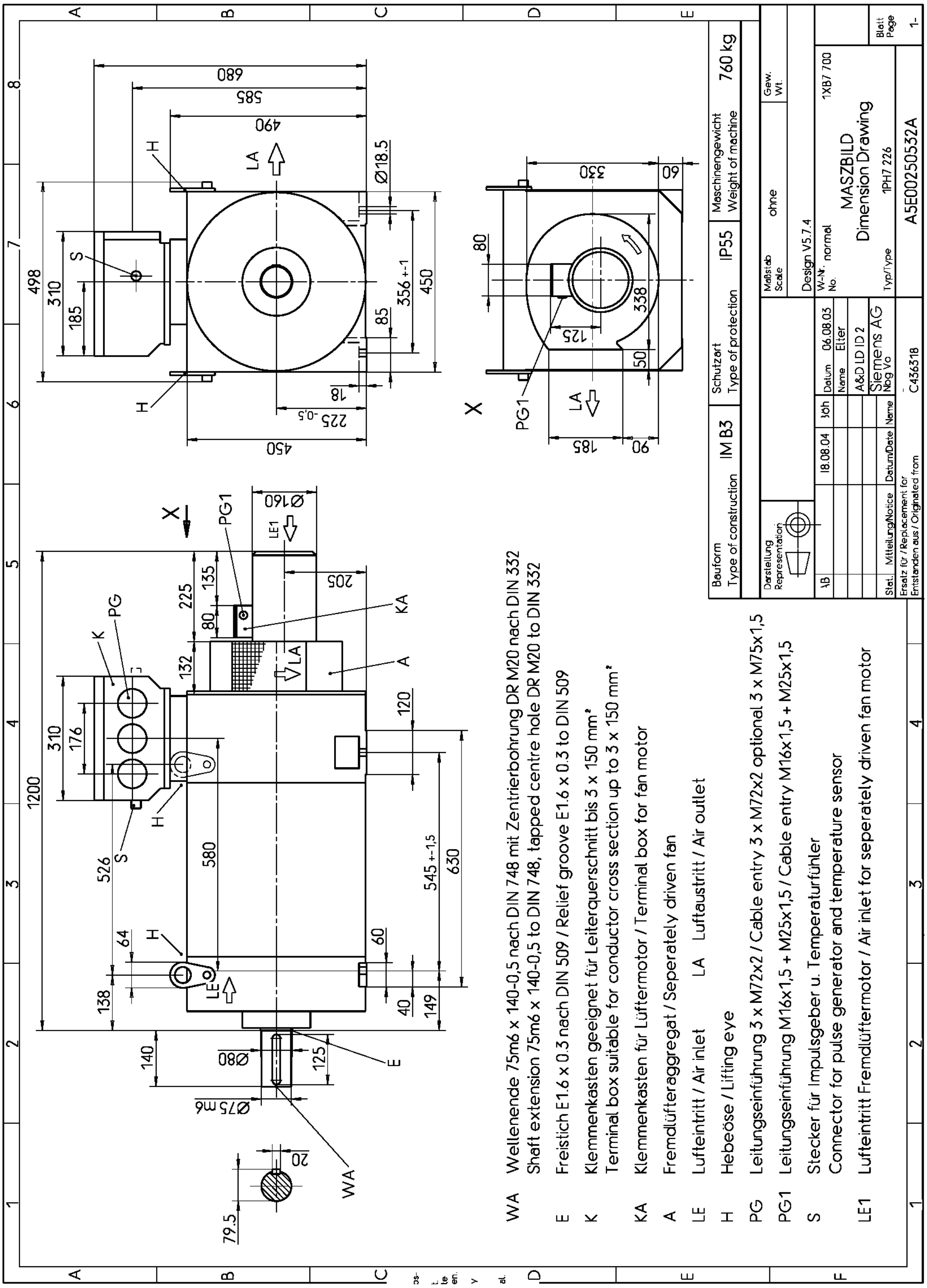


Fig. 7-16 1PH7226–F–L, IM B3, air flow direction DE – NDE

7.2 Type of construction IM B3 with separately–driven fan

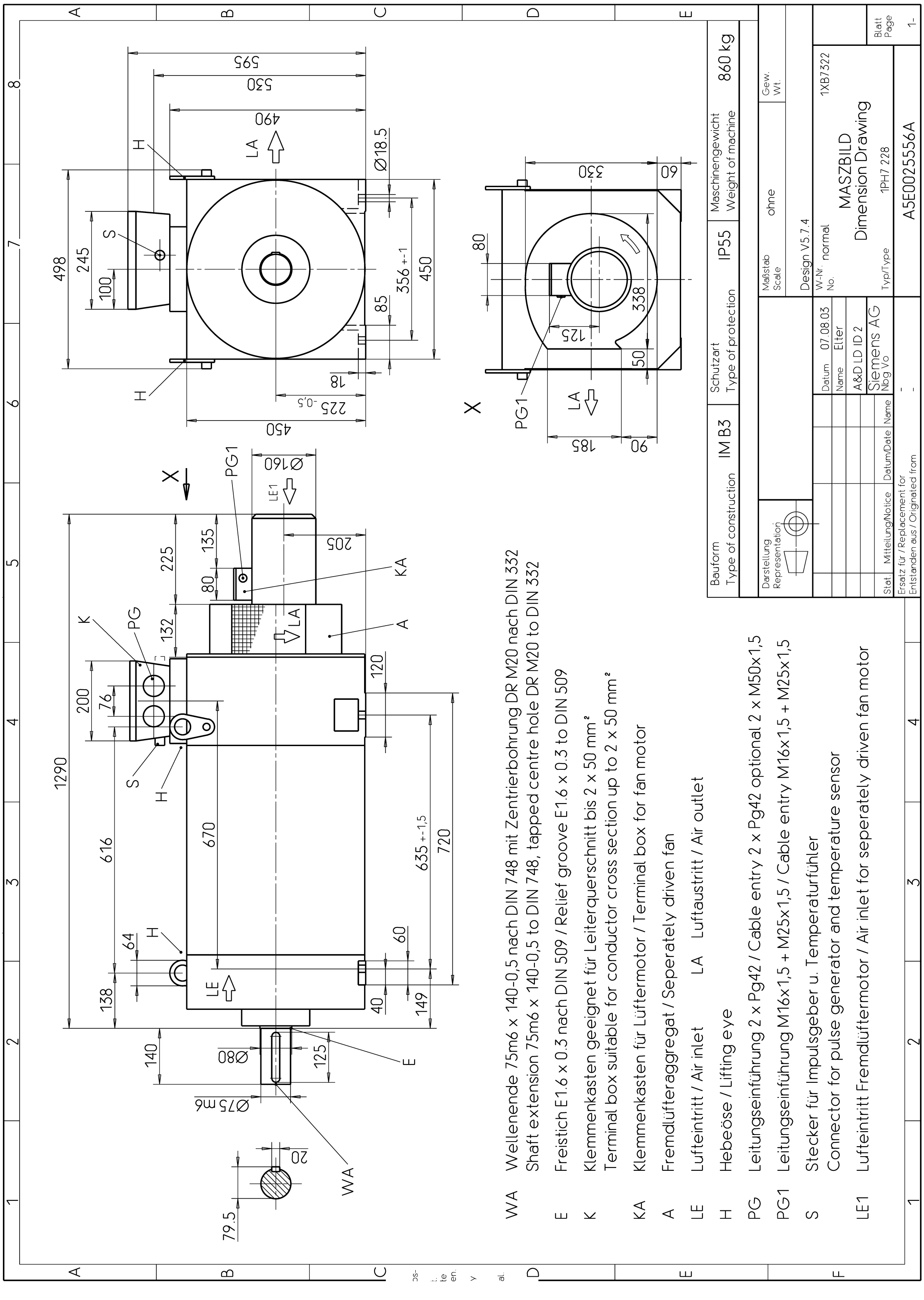


Fig. 7-17 1PH7228–B, IM B3, air flow direction DE – NDE

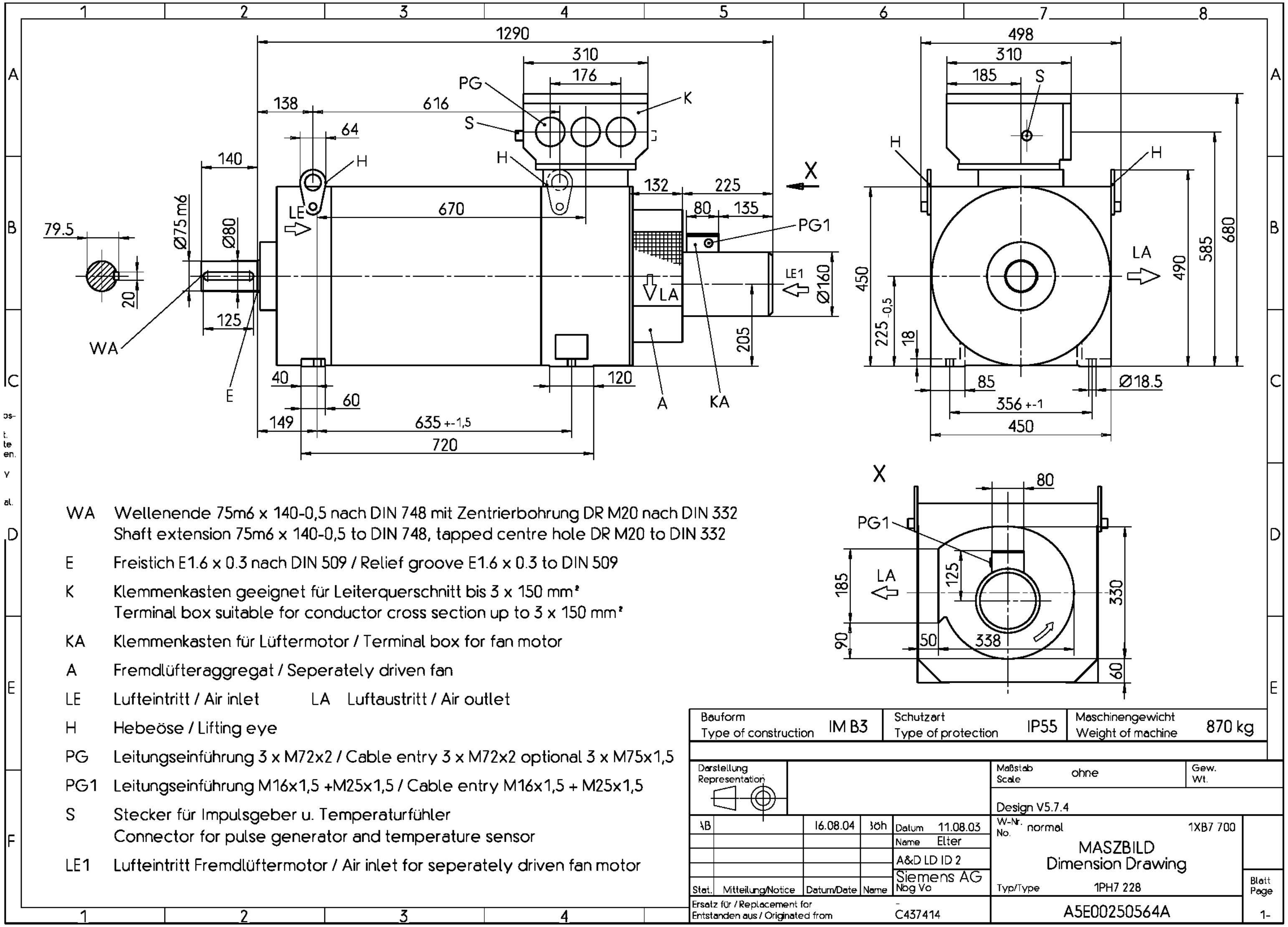


Fig. 7-18 1PH7228–D–L, IM B3, air flow direction DE – NDE

7.2.3 Air flow direction NDE – DE

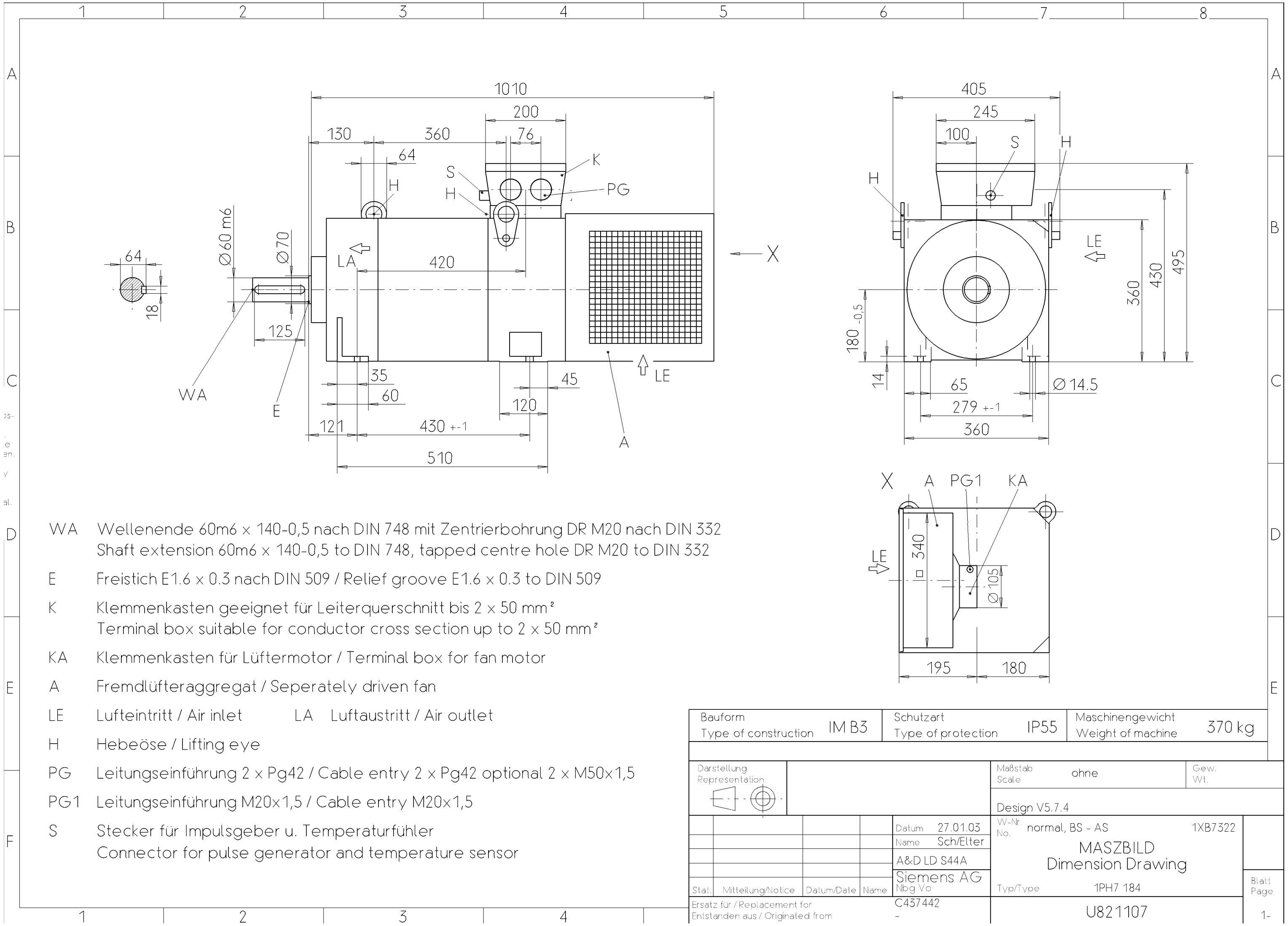


Fig. 7-19 1PH7184, IM B3, air flow direction NDE – DE

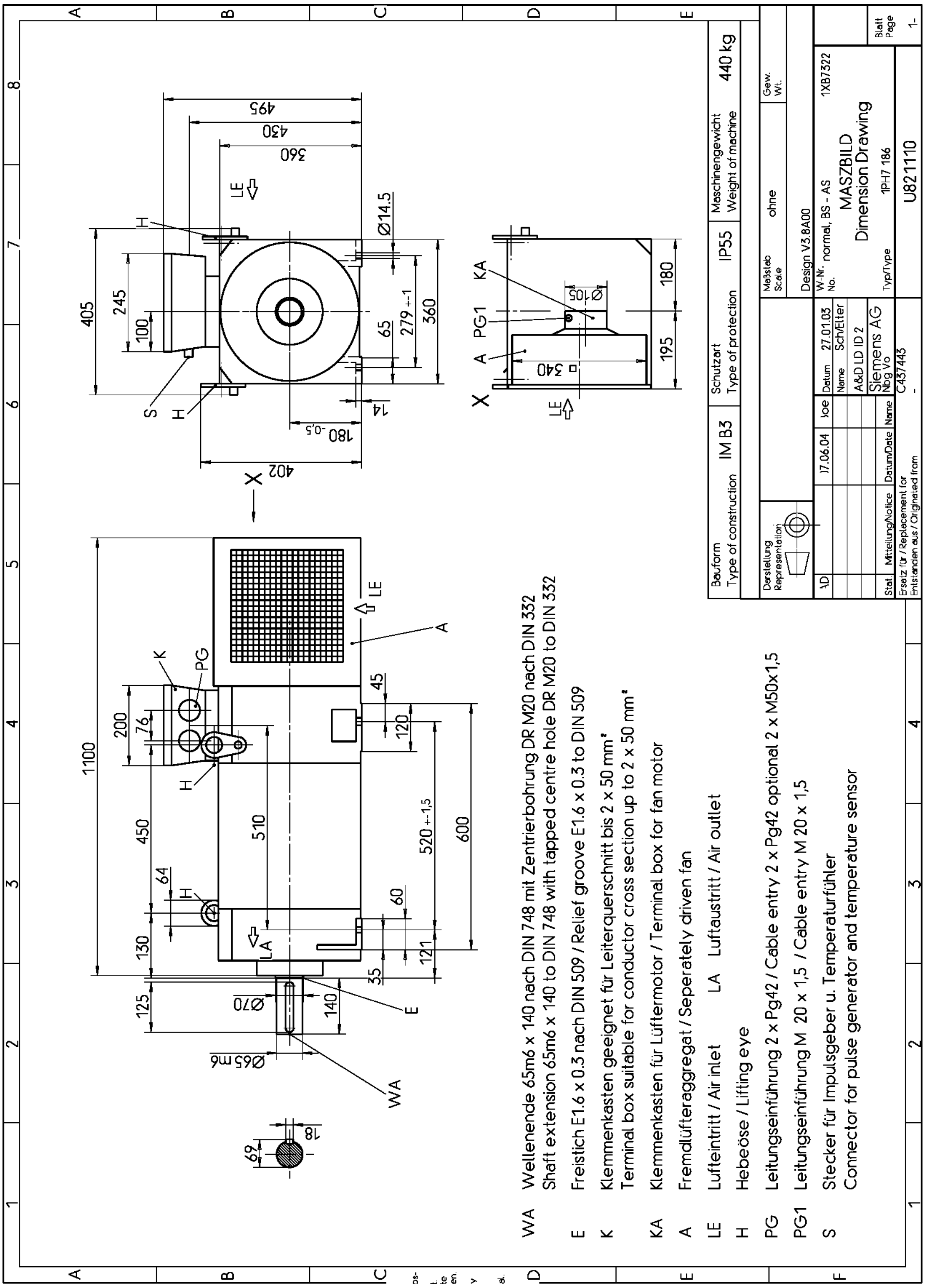
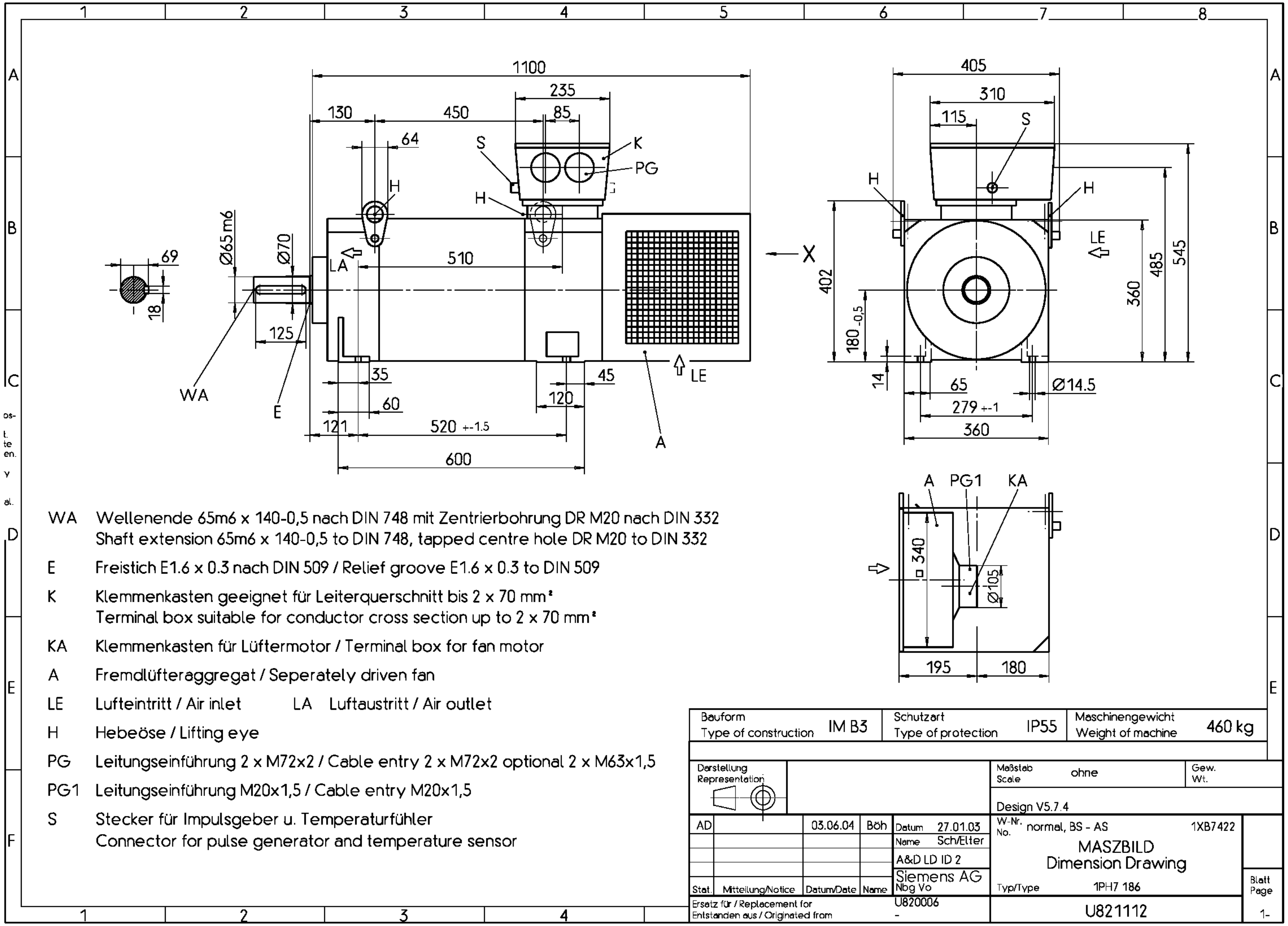


Fig. 7-20 1PH7186, IM B3, air flow direction NDE – DE

7.2 Type of construction IM B3 with separately–driven fan



WA	Wellenende 65m6 x 140-0,5 nach DIN 748 mit Zentrierbohrung DR M20 nach DIN 332 Shaft extension 65m6 x 140-0,5 to DIN 748, tapped centre hole DR M20 to DIN 332
E	Freistich E1.6 x 0.3 nach DIN 509 / Relief groove E1.6 x 0.3 to DIN 509
K	Klemmenkasten geeignet für Leiterquerschnitt bis 2 x 70 mm² Terminal box suitable for conductor cross section up to 2 x 70 mm²
KA	Klemmenkasten für Lüftermotor / Terminal box for fan motor
A	Fremdlüfteraggregat / Seperately driven fan
LE	Lufteintritt / Air inlet LA Luftaustritt / Air outlet
H	Hebeöse / Lifting eye
PG	Leitungseinführung 2 x M72x2 / Cable entry 2 x M72x2 optional 2 x M63x1,5
PG1	Leitungseinführung M20x1,5 / Cable entry M20x1,5
S	Stecker für Impulsgeber u. Temperaturfühler Connector for pulse generator and temperature sensor

Fig. 7-21 1PH7186–F–L, IM B3, air flow direction NDE – DE

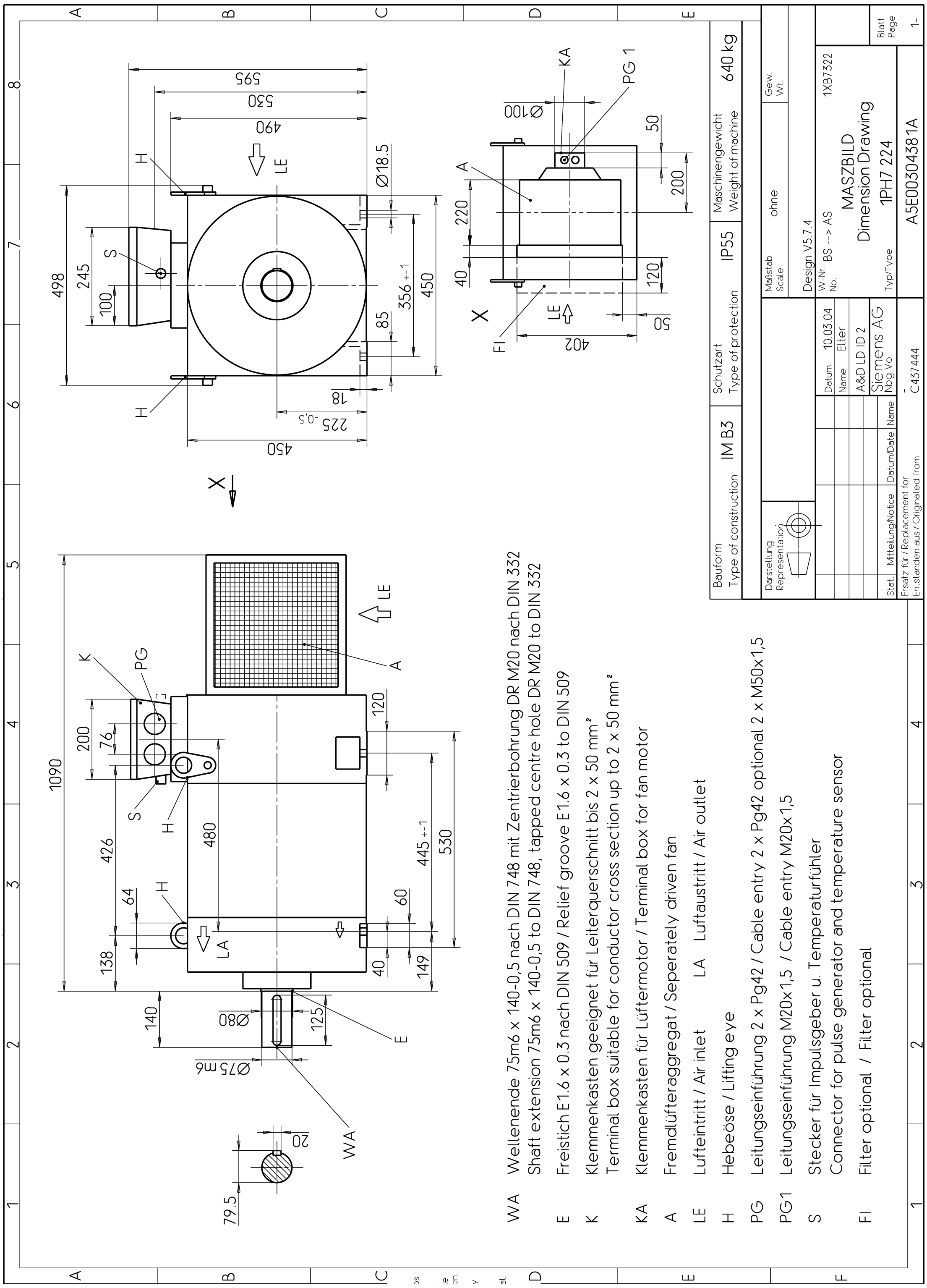


Fig. 7-22 1PH7224–B–F, IM B3, air flow direction NDE – DE

7.2 Type of construction IM B3 with separately–driven fan

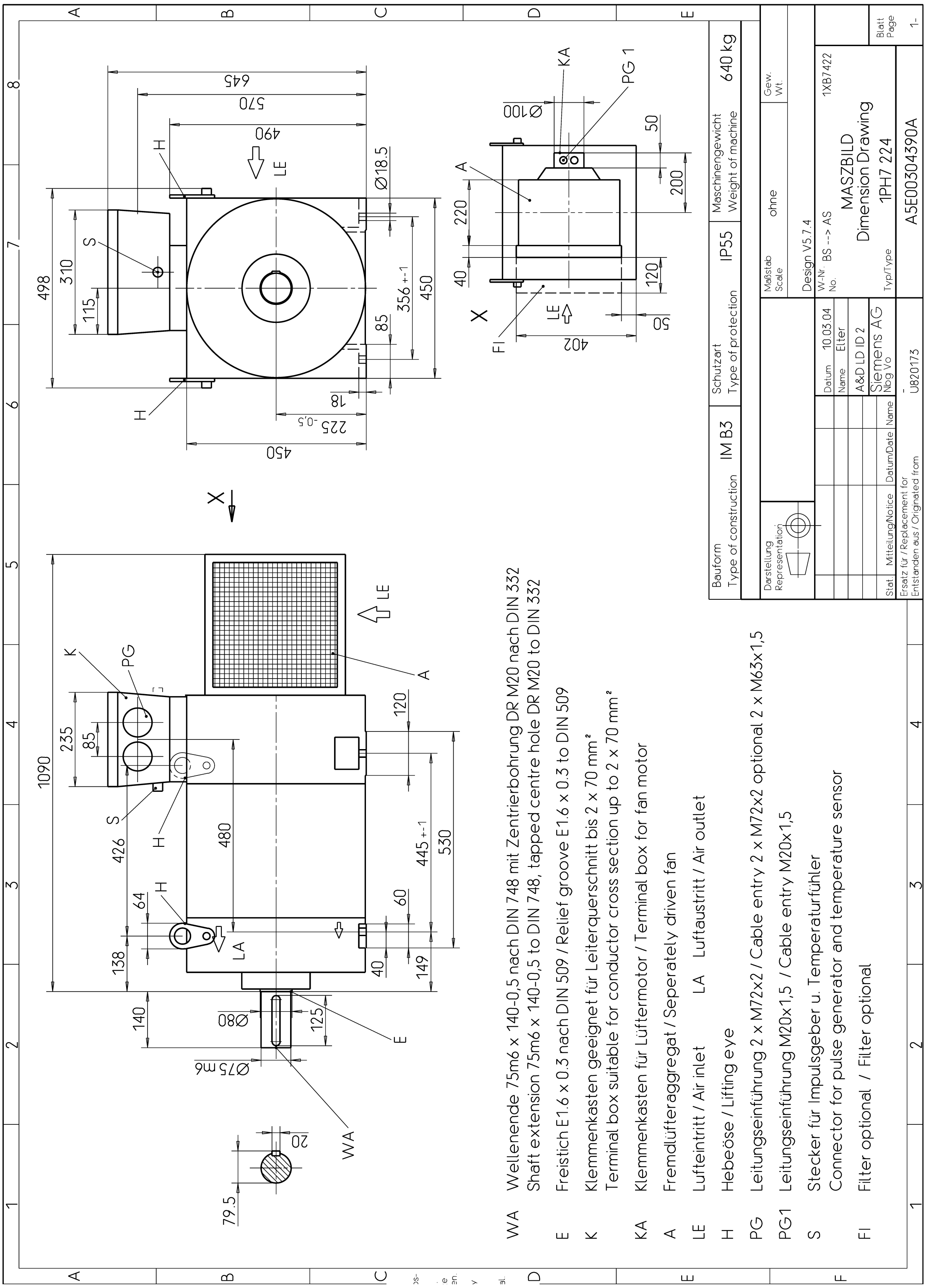


Fig. 7-23 1PH7224–U, IM B3, air flow direction NDE – DE

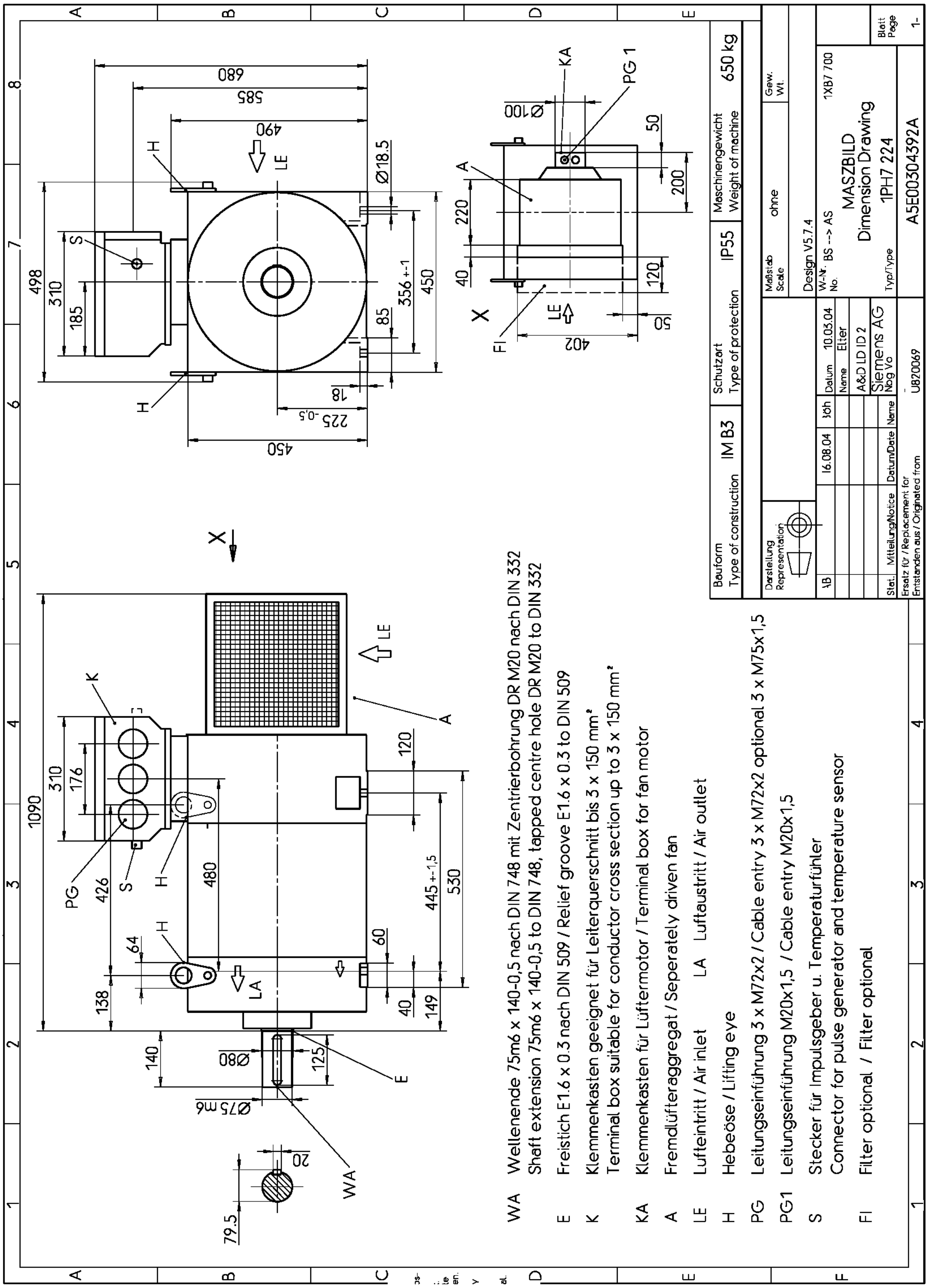


Fig. 7-24 1PH7224–L, IM B3, air flow direction NDE – DE

7.2 Type of construction IM B3 with separately–driven fan

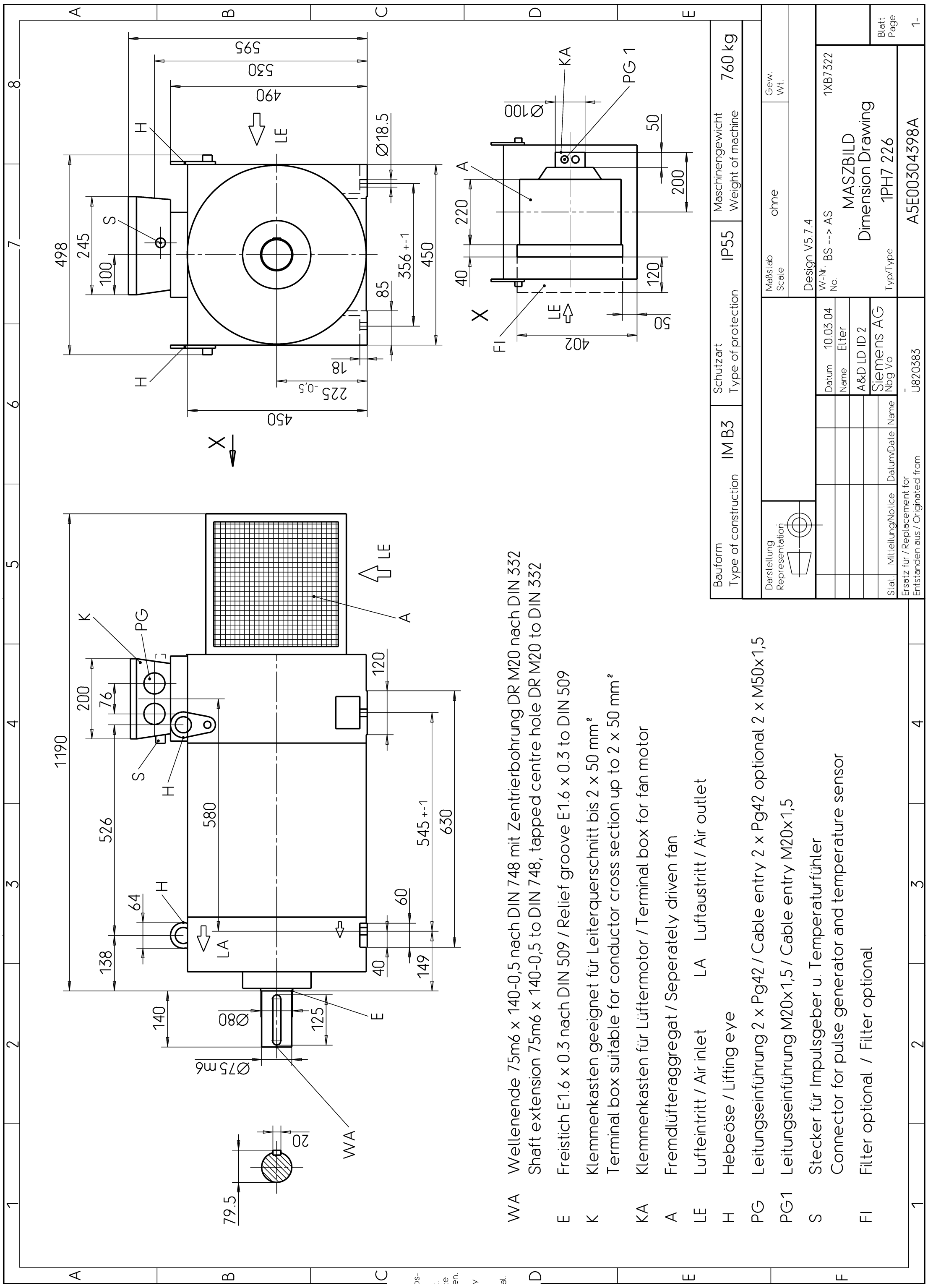


Fig. 7-25 1PH7226–B, IM B3, air flow direction NDE – DE

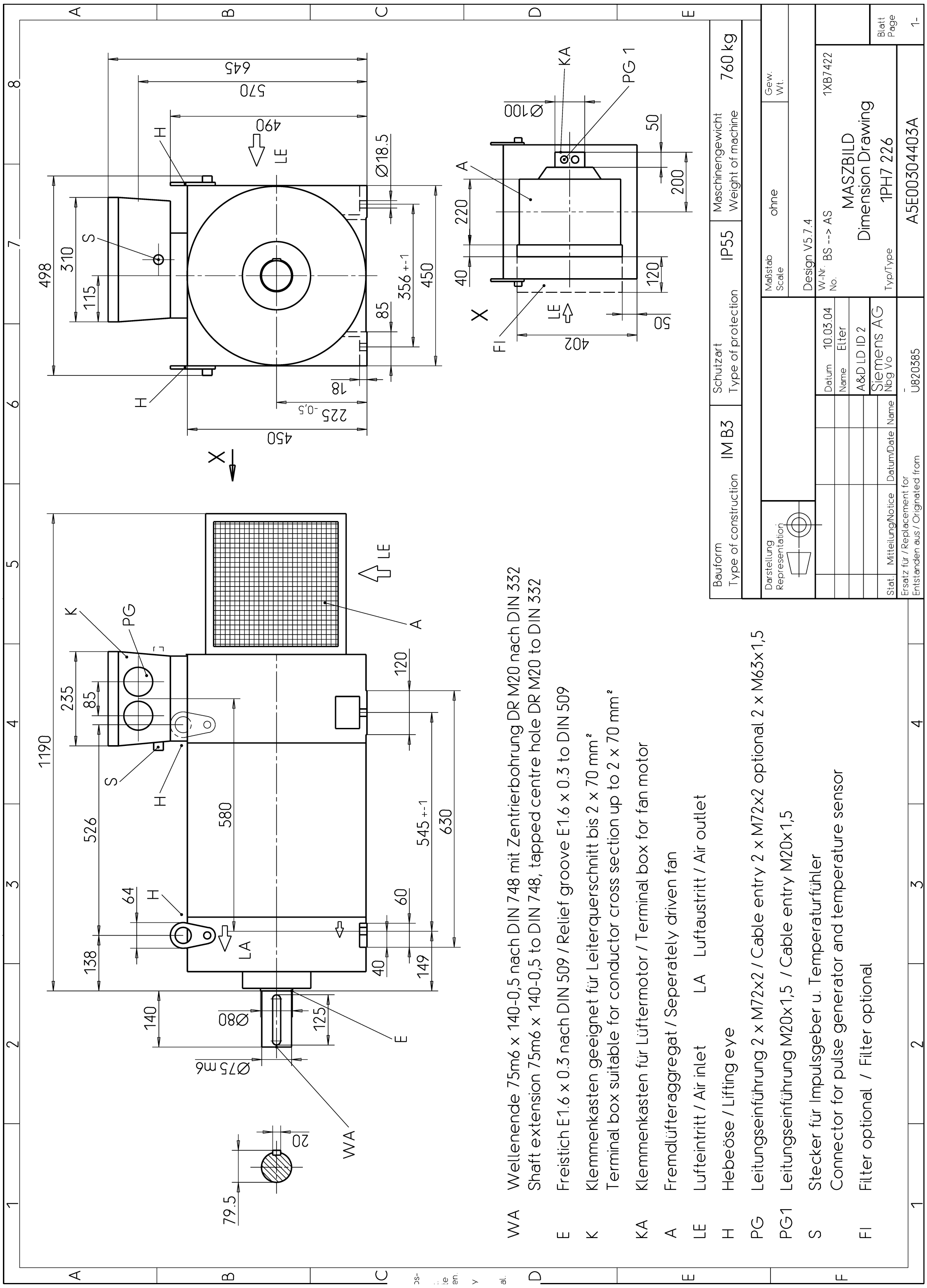


Fig. 7-26 1PH7226–D, IM B3, air flow direction NDE – DE

7.2 Type of construction IM B3 with separately–driven fan

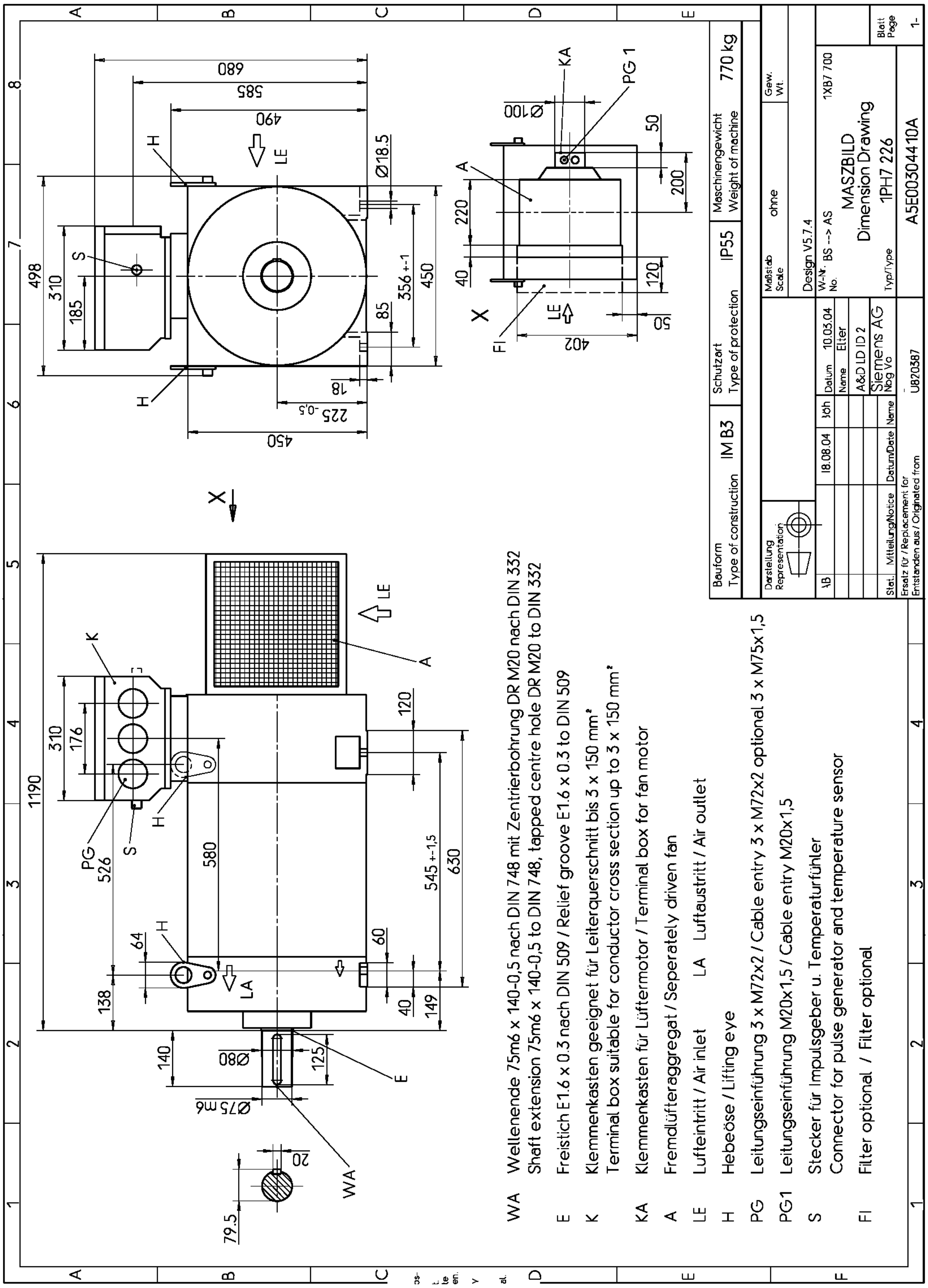
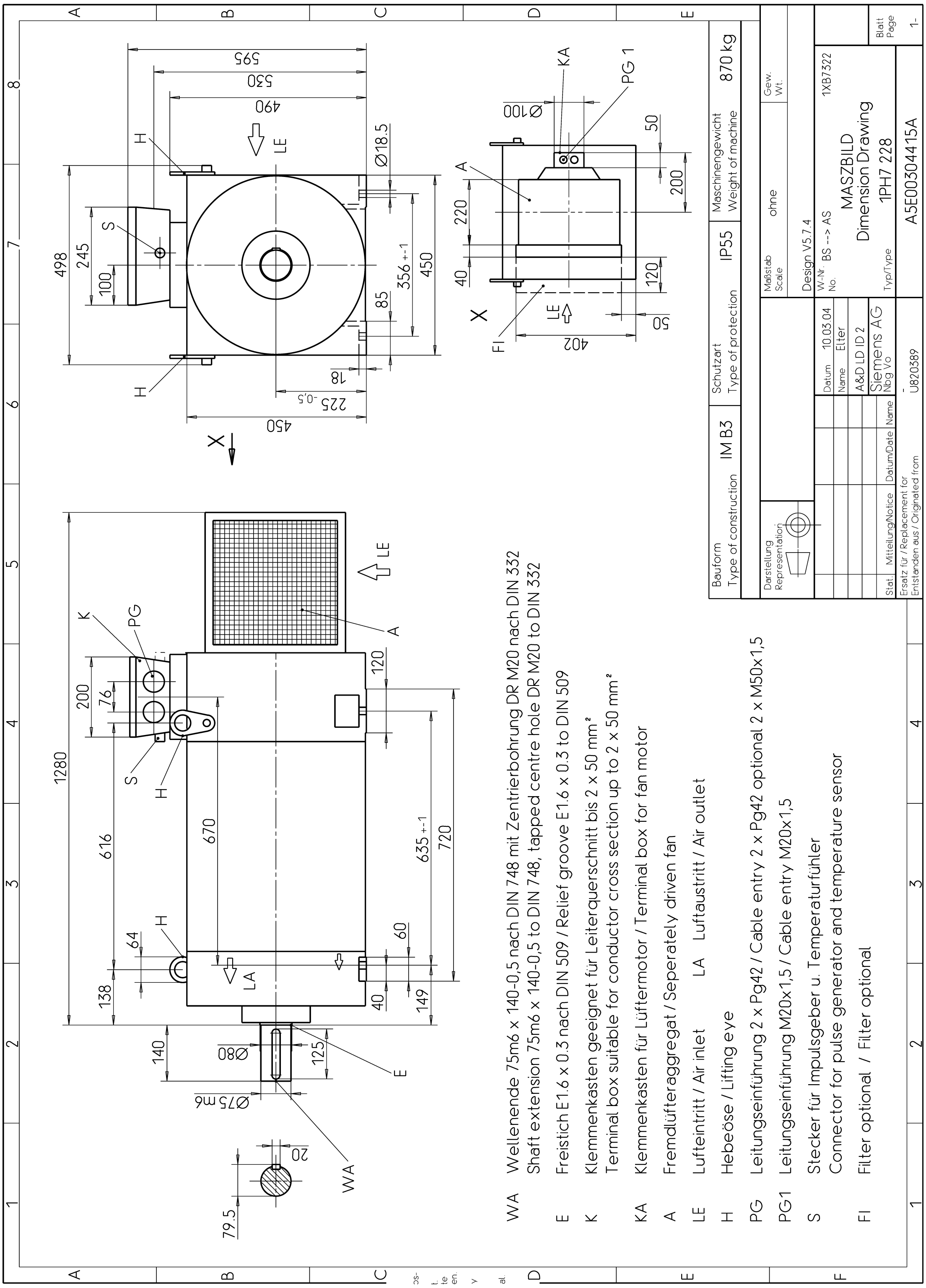


Fig. 7-27 1PH7226–F–L, IM B3, air flow direction NDE – DE



WA	Wellenende 75m6 x 140-0,5 nach DIN 748 mit Zentrierbohrung DR M20 nach DIN 332 Shaft extension 75m6 x 140-0,5 to DIN 748, tapped centre hole DR M20 to DIN 332
E	Freistich E1.6 x 0.3 nach DIN 509 / Relief groove E1.6 x 0.3 to DIN 509
K	Klemmenkasten geeignet für Leiterquerschnitt bis 2 x 50 mm² Terminal box suitable for conductor cross section up to 2 x 50 mm²
KA	Klemmenkasten für Lüftermotor / Terminal box for fan motor
A	Fremdlüfteraggregat / Seperately driven fan
LE	Lufteintritt / Air inlet LA Luftaustritt / Air outlet
H	Hebeöse / Lifting eye
PG	Leitungseinführung 2 x Pg42 / Cable entry 2 x Pg42 optional 2 x M50x1,5
PG1	Leitungseinführung M20x1,5 / Cable entry M20x1,5
S	Stecker für Impulsgeber u. Temperaturfühler Connector for pulse generator and temperature sensor
FI	Filter optional / Filter optional

Fig. 7-28 1PH7228–B, IM B3, air flow direction NDE – DE

7.2 Type of construction IM B3 with separately–driven fan

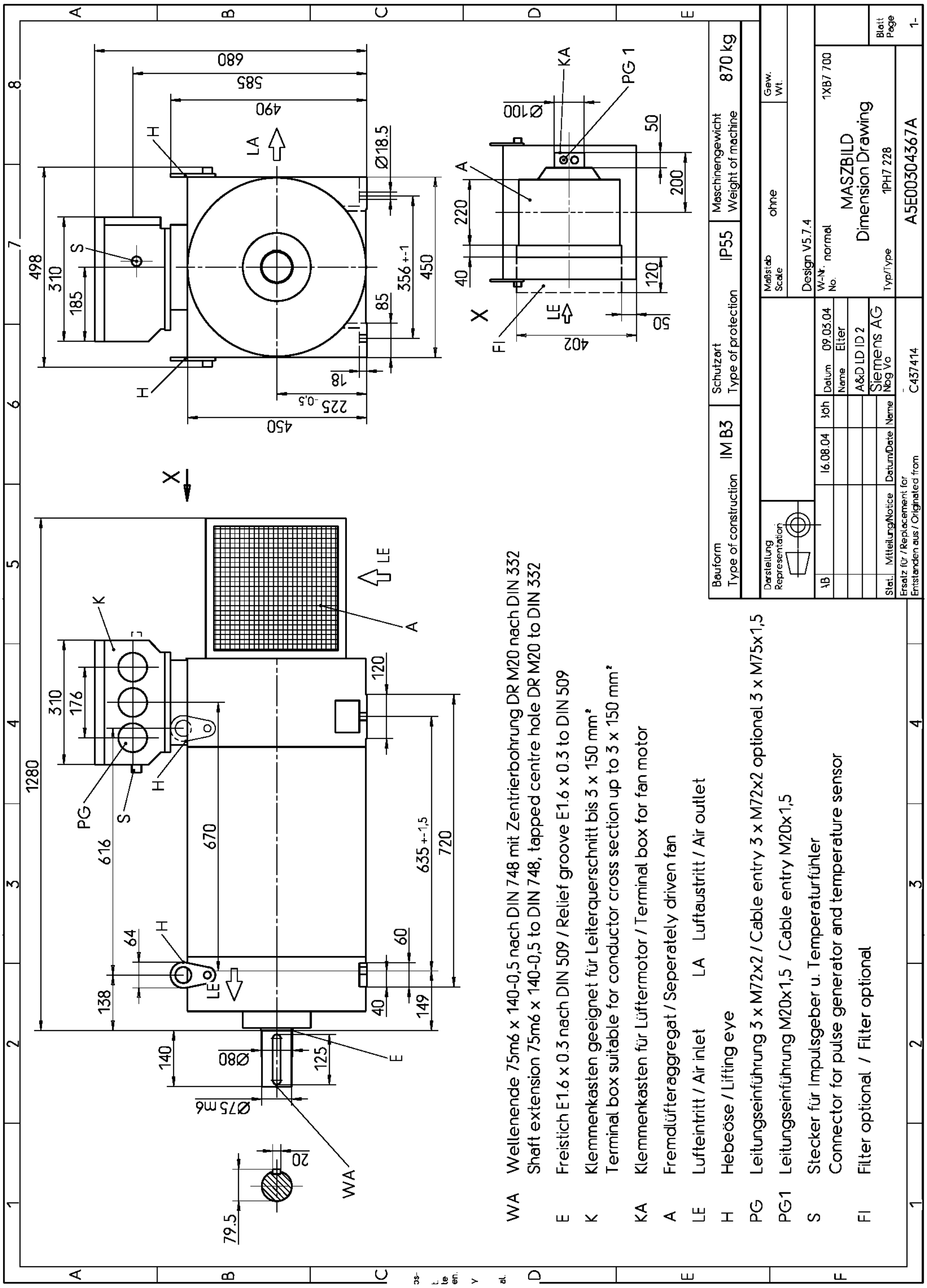
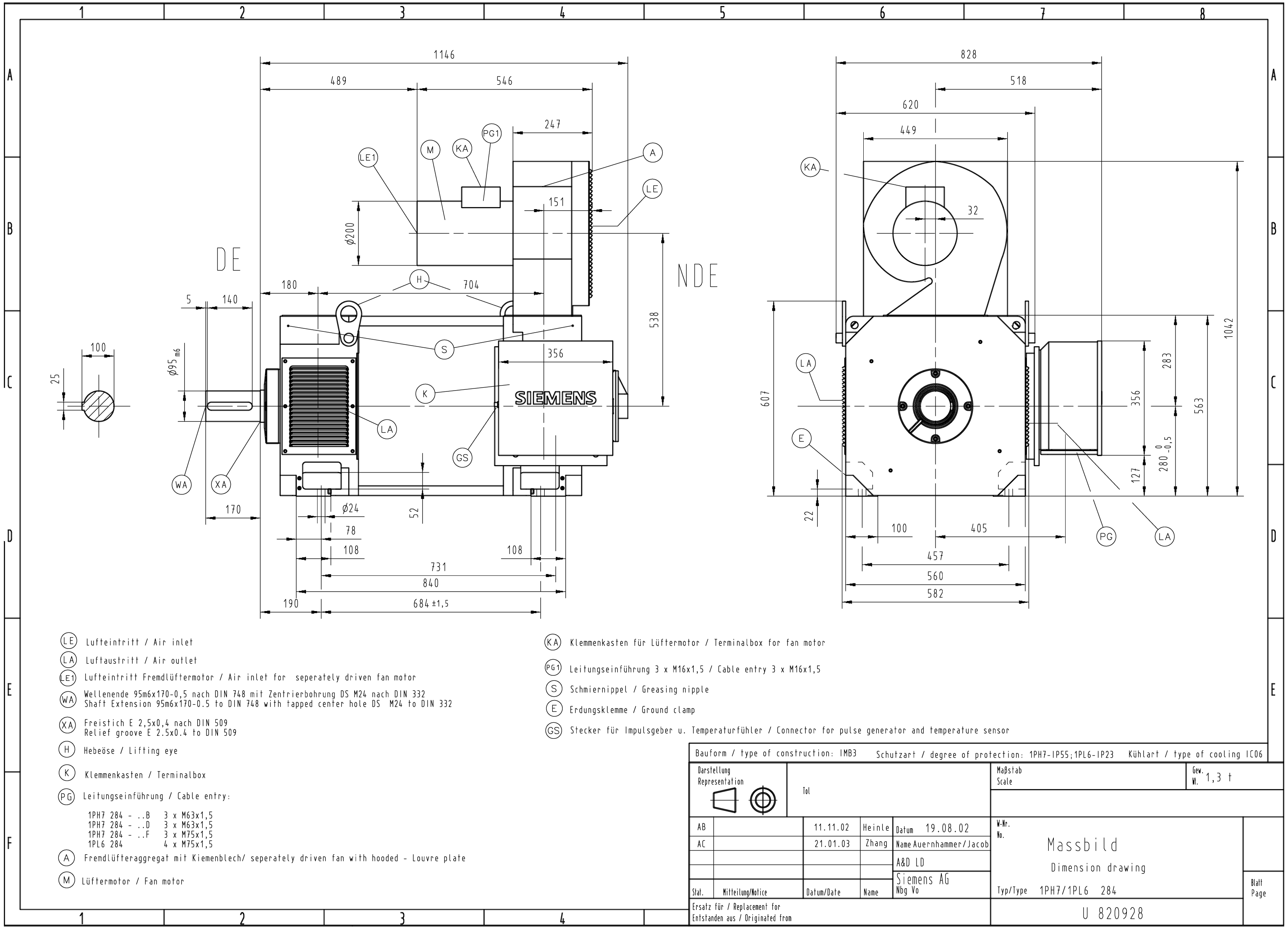


Fig. 7-29 1PH7228–D–L, IM B3, air flow direction NDE – DE



(LE) Lufteintritt / Air inlet

(LA) Luftaustritt / Air outlet

(LE1) Lufteintritt Fremdlüftermotor / Air inlet for seperately driven fan motor

(WA) Wellenende 95m6x170-0,5 nach DIN 748 mit Zentrierbohrung DS M24 nach DIN 332
Shaft Extension 95m6x170-0.5 to DIN 748 with tapped center hole DS M24 to DIN 332

(XA) Freistich E 2,5x0,4 nach DIN 509
Relief groove E 2.5x0.4 to DIN 509

(H) Hebeöse / Lifting eye

(K) Klemmenkasten / Terminalbox

(PG) Leitungseinführung / Cable entry:

1PH7 284 - ..B	3 x M63x1,5
1PH7 284 - ..D	3 x M63x1,5
1PH7 284 - ..F	3 x M75x1,5
1PL6 284	4 x M75x1,5

(A) Fremdlüfteraggregat mit Kiemenblech/ seperately driven fan with hooded - Louvre plate

(M) Lüftermotor / Fan motor

(KA) Klemmenkasten für Lüftermotor / Terminalbox for fan motor

(PG1) Leitungseinführung 3 x M16x1,5 / Cable entry 3 x M16x1,5

(S) Schmiernippel / Greasing nipple

(E) Erdungsklemme / Ground clamp

(GS) Stecker für Impulsgeber u. Temperaturfühler / Connector for pulse generator and temperature sensor

Bauform / type of construction: IMB3 Schutzart / degree of protection: 1PH7-IP55;1PL6-IP23 Kühlart / type of cooling IC06

Darstellung
Representation

Tol

Maßstab
Scale

Gew.
Wt. 1,3 t

Stat.	Mitteilung/Notice	Datum/Date	Name
AB		11.11.02	Heinle
AC		21.01.03	Zhang

Datum 19.08.02
Name Auernhammer/Jacob
A&D LD
Siemens AG
Nbg Vo

W-Nr.
No.

Massbild
Dimension drawing

Typ/Type 1PH7/1PL6 284

U 820928

Blatt
Page

Ersatz für / Replacement for
Entstanden aus / Originated from

Fig. 7-30 1PH7284, IM B3, air flow direction NDE – DE

7.2 Type of construction IM B3 with separately–driven fan

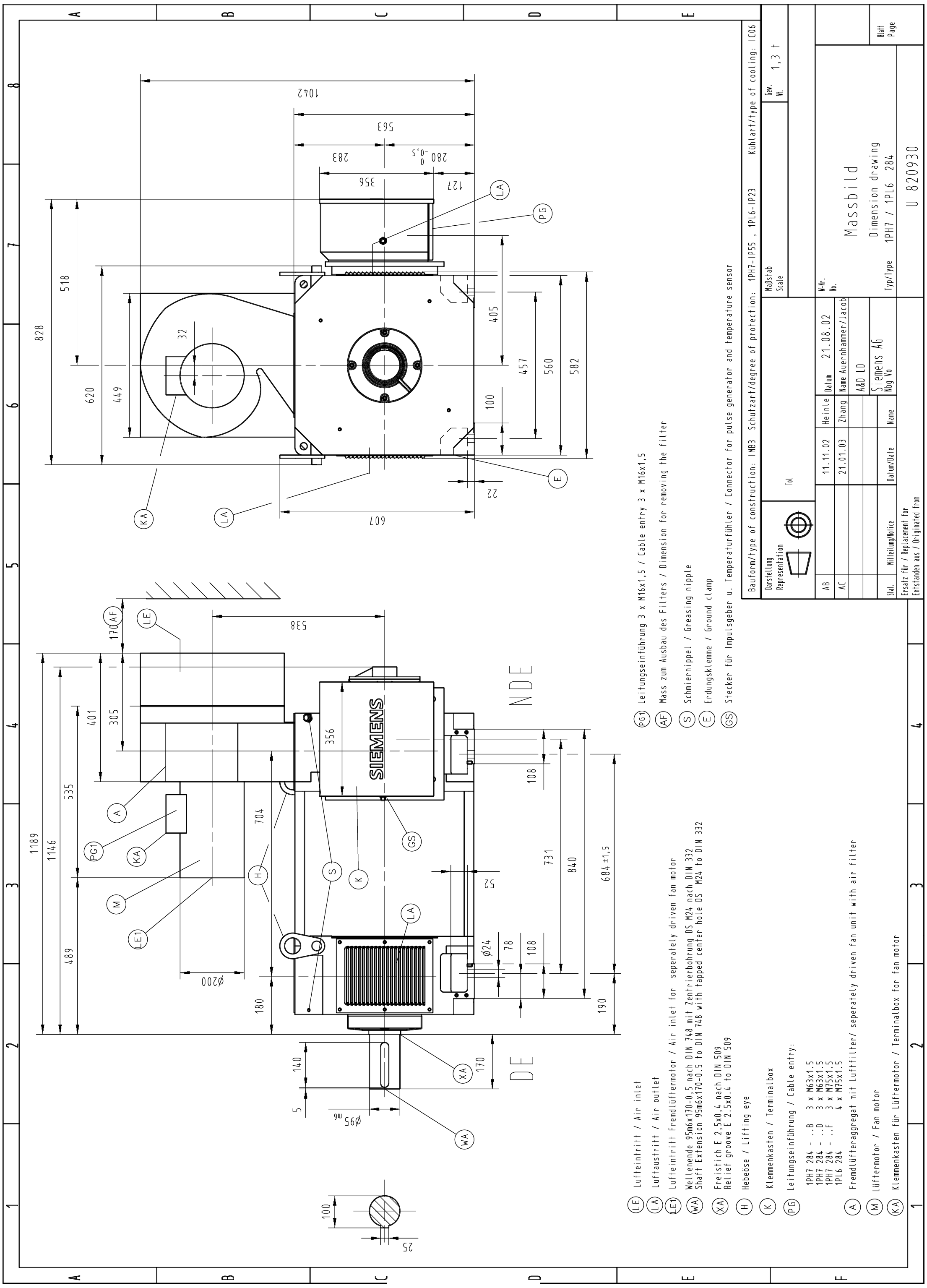


Fig. 7-31 1PH7284 with filter, IM B3, air flow direction NDE – DE

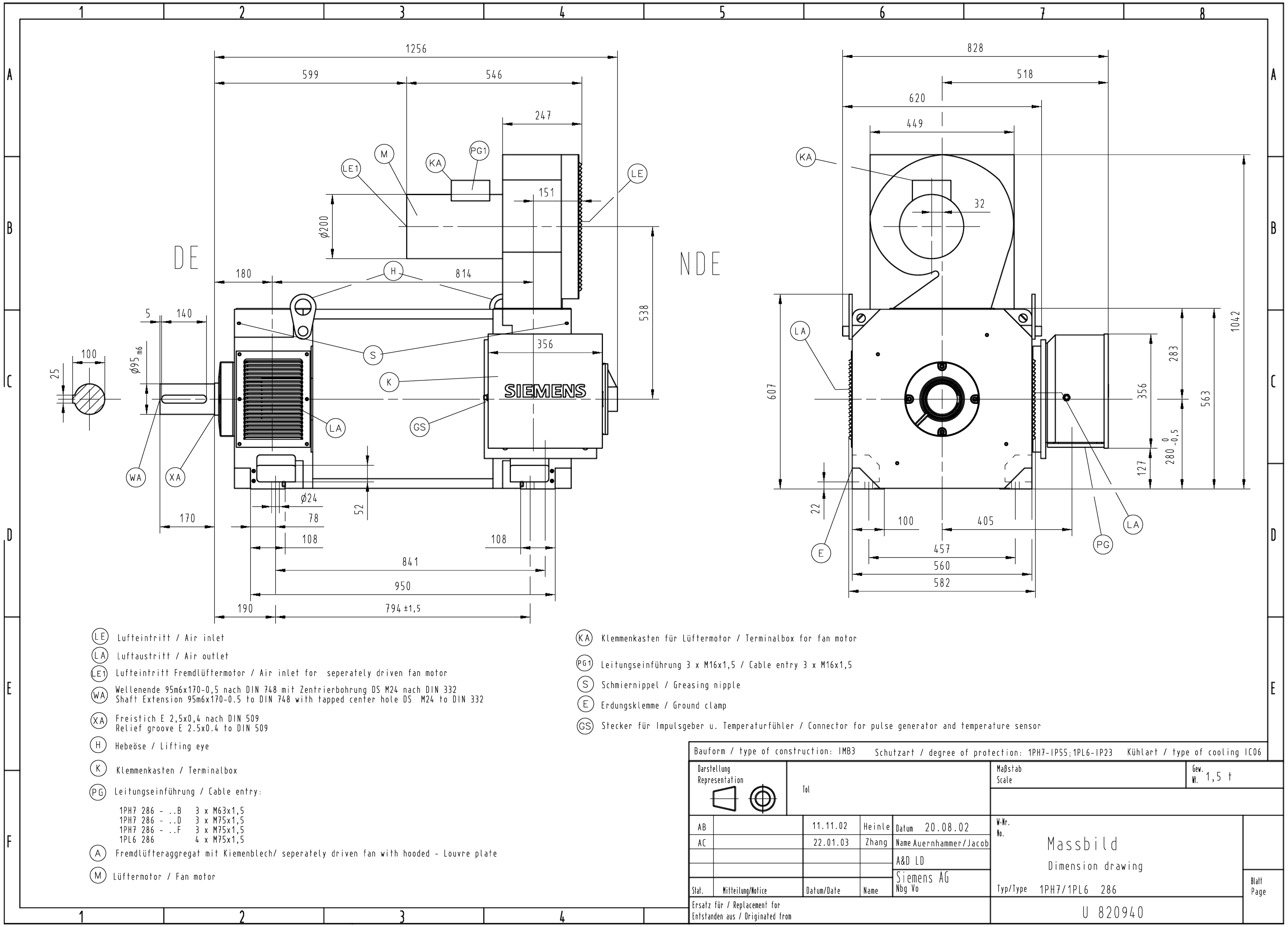


Fig. 7-32 1PH7286, IM B3, air flow direction NDE – DE

7.2 Type of construction IM B3 with separately–driven fan

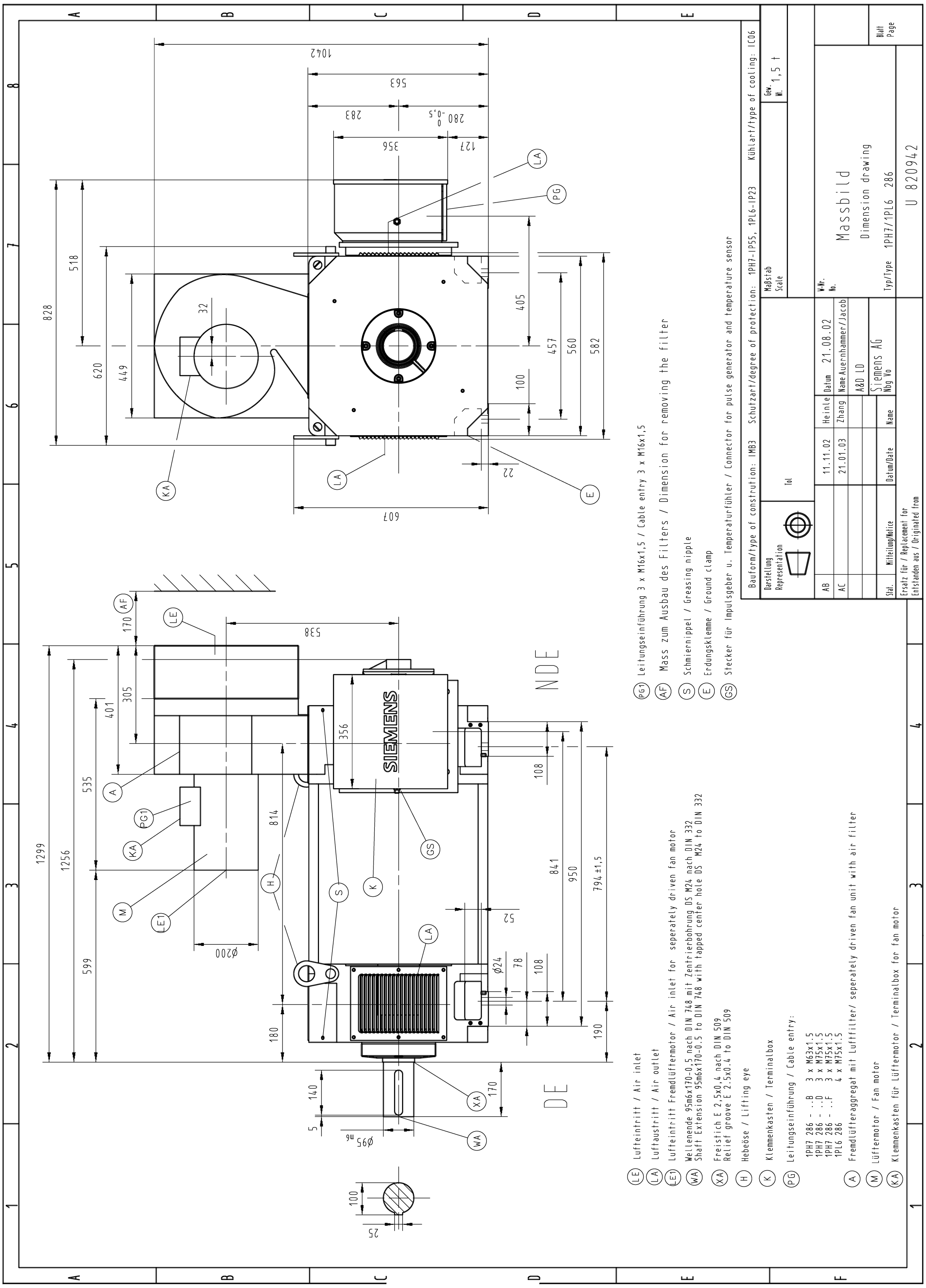


Fig. 7-33 1PH7286 with filter, IM B3, air flow direction NDE – DE

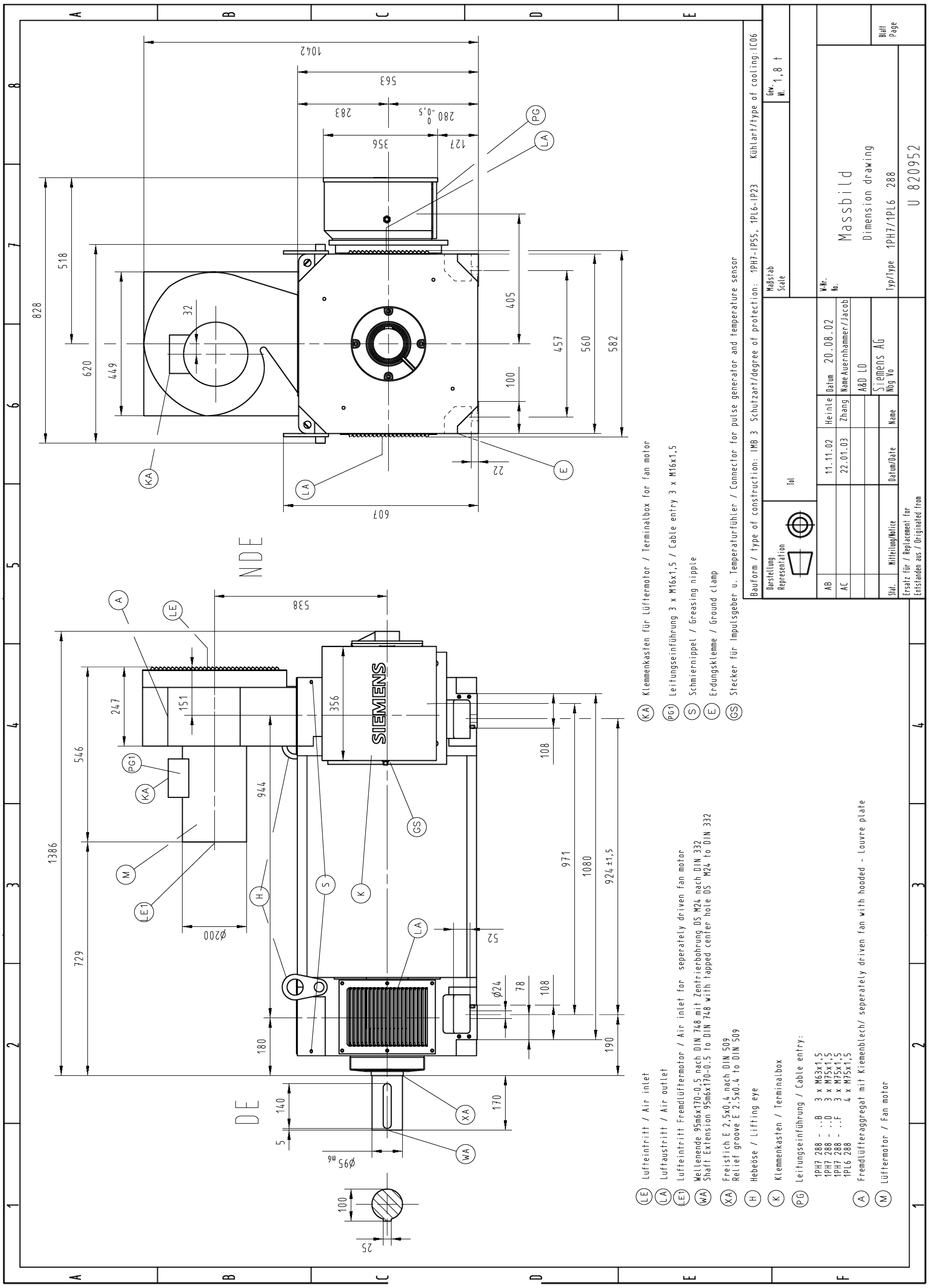


Fig. 7-34 1PH7288, IM B3, air flow direction NDE – DE

7.2 Type of construction IM B3 with separately–driven fan

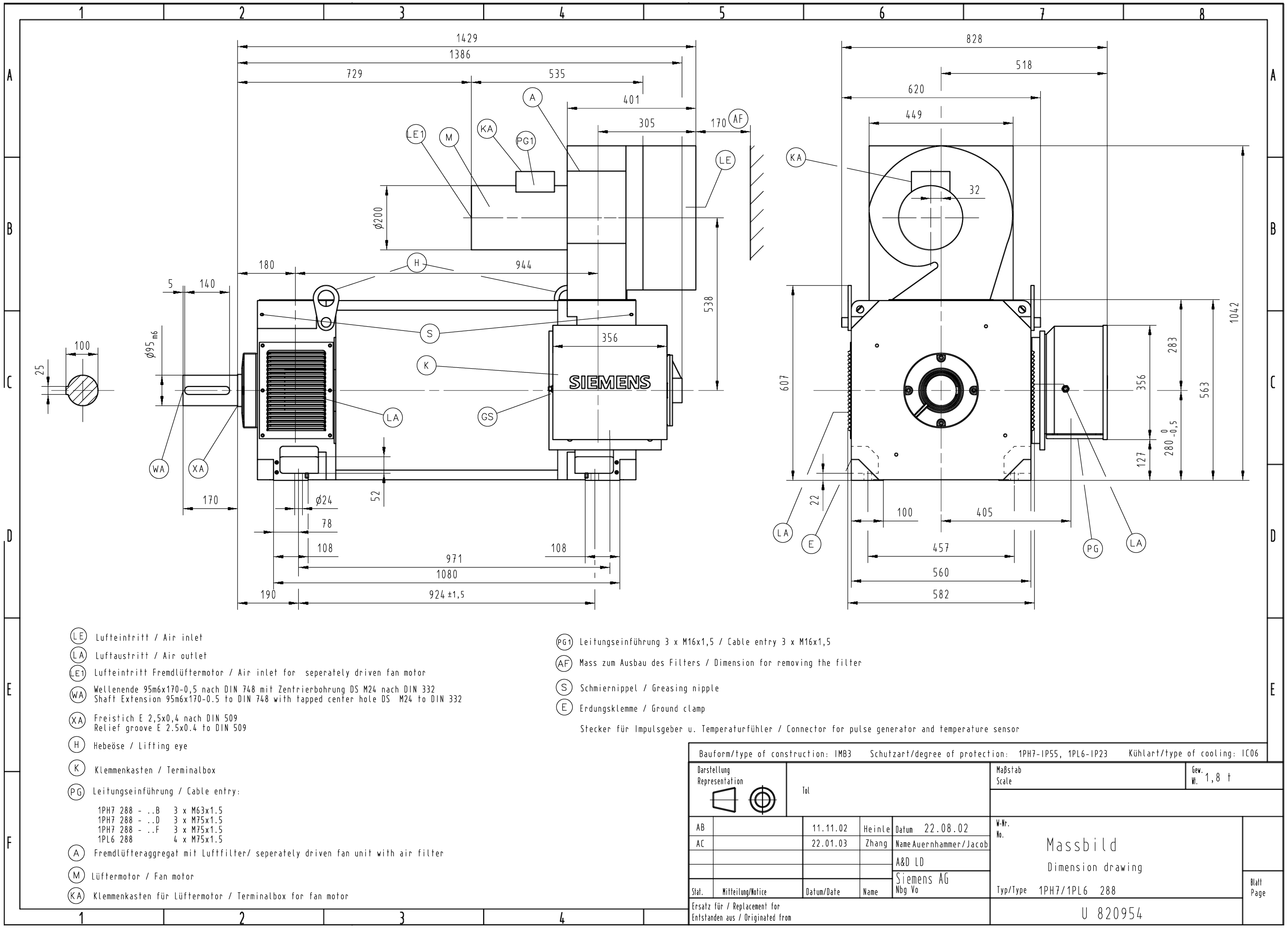
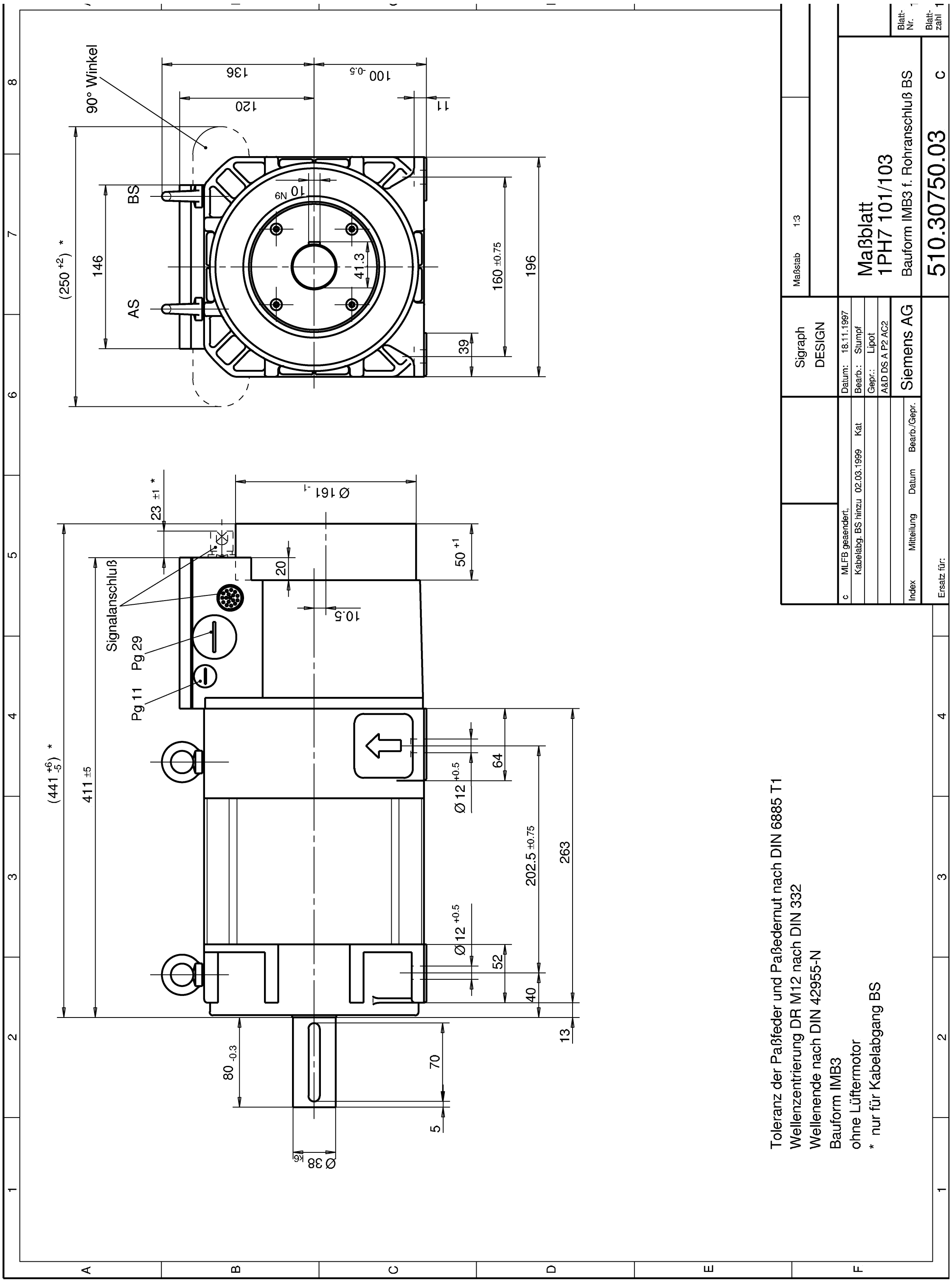


Fig. 7-35 1PH7288 with filter, IM B3, air flow direction NDE – DE

7.3 Type of construction IM B3 with pipe connection



Toleranz der Paßfeder und Paßedernut nach DIN 6885 T1
Wellenzentrierung DR M12 nach DIN 332
Wellenende nach DIN 42955-N
Bauform IMB3
ohne Lüftermotor
* nur für Kabelabgang BS

Fig. 7-36 1PH7101 to 1PH7103, IM B3 with pipe connection

7.3 Type of construction IM B3 with pipe connection

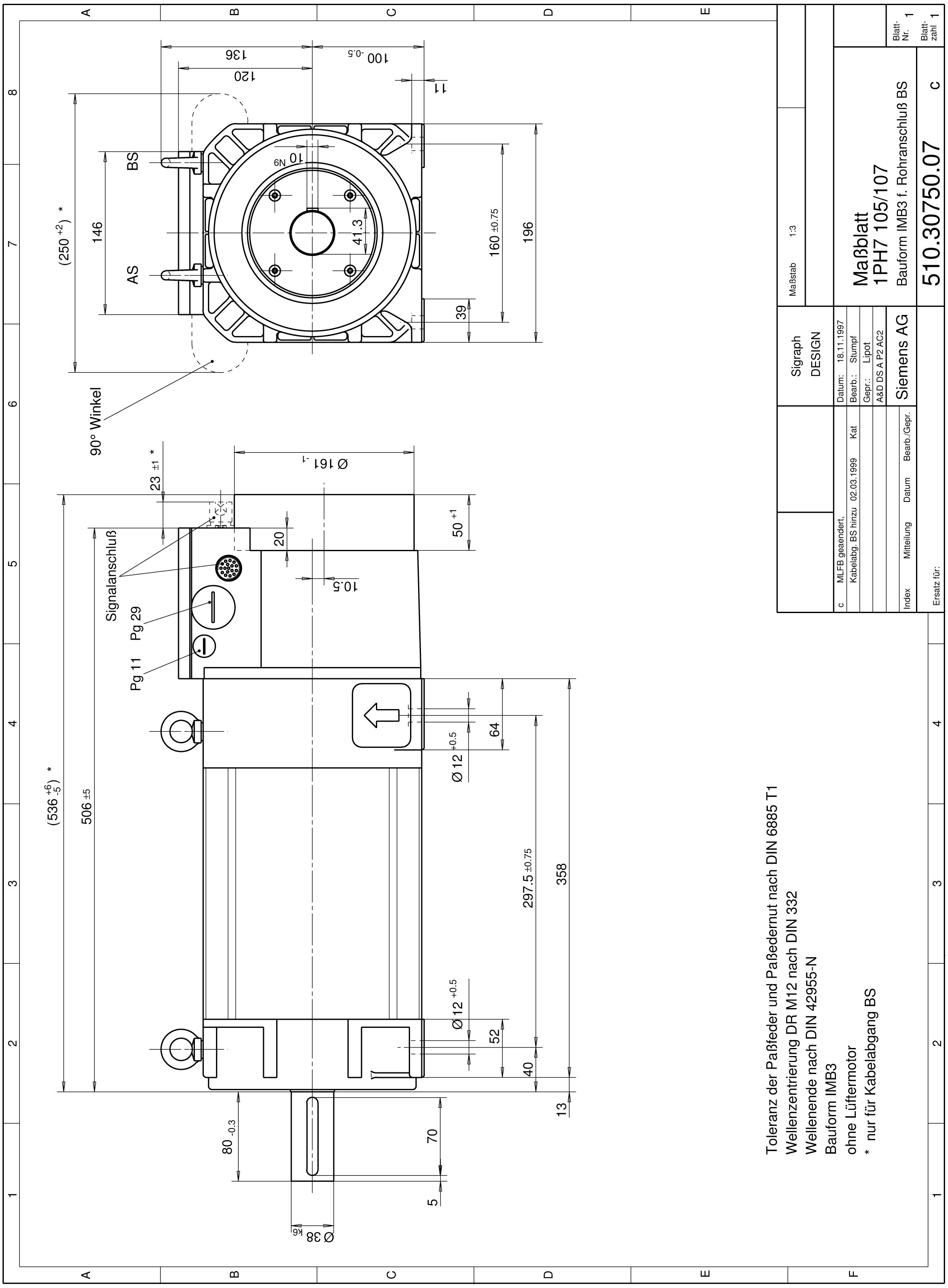


Fig. 7-37 1PH7105 to 1PH7107, IM B3 with pipe connection

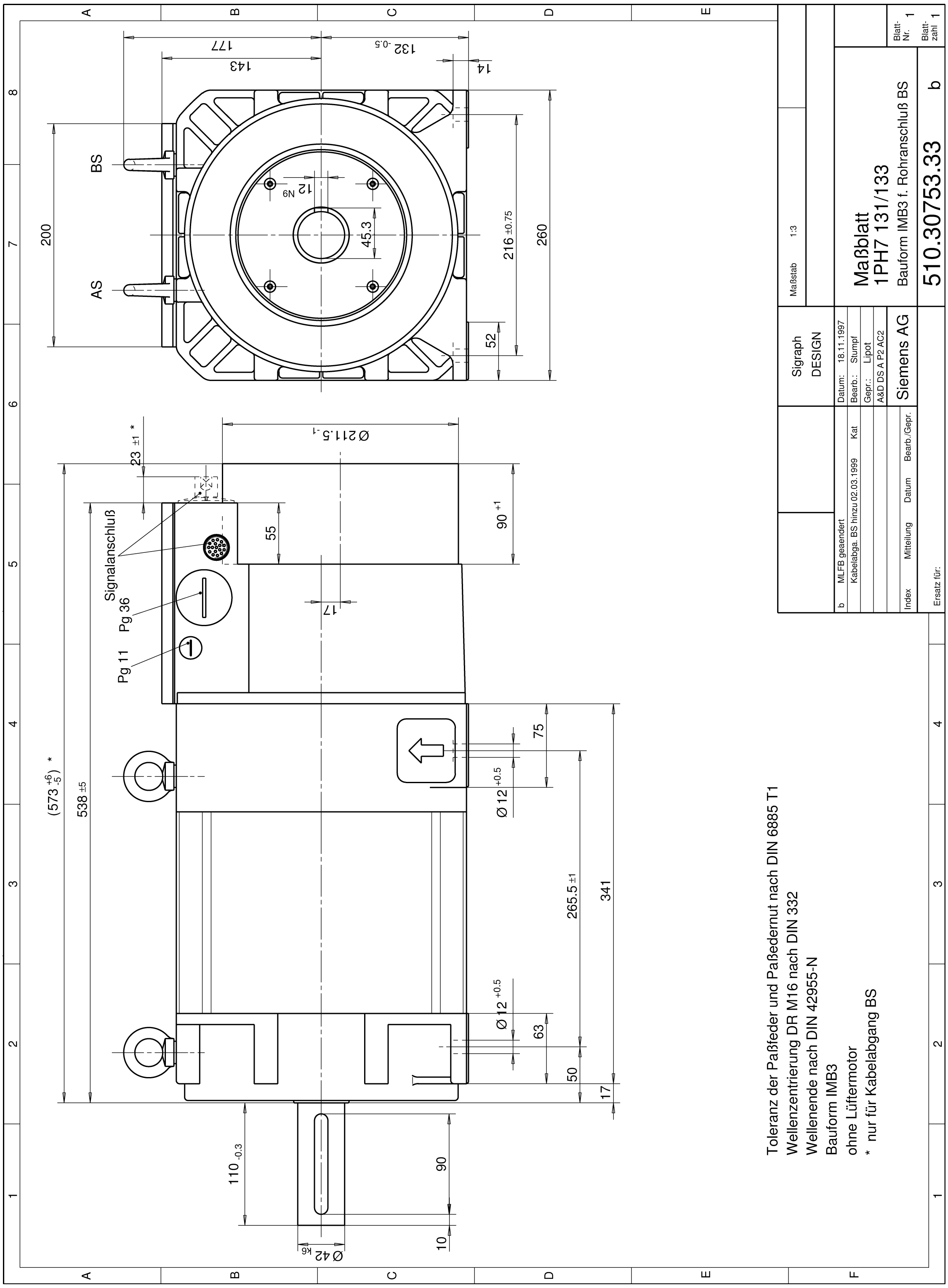


Fig. 7-38 1PH7131 to 1PH7133, IM B3 with pipe connection

7.3 Type of construction IM B3 with pipe connection

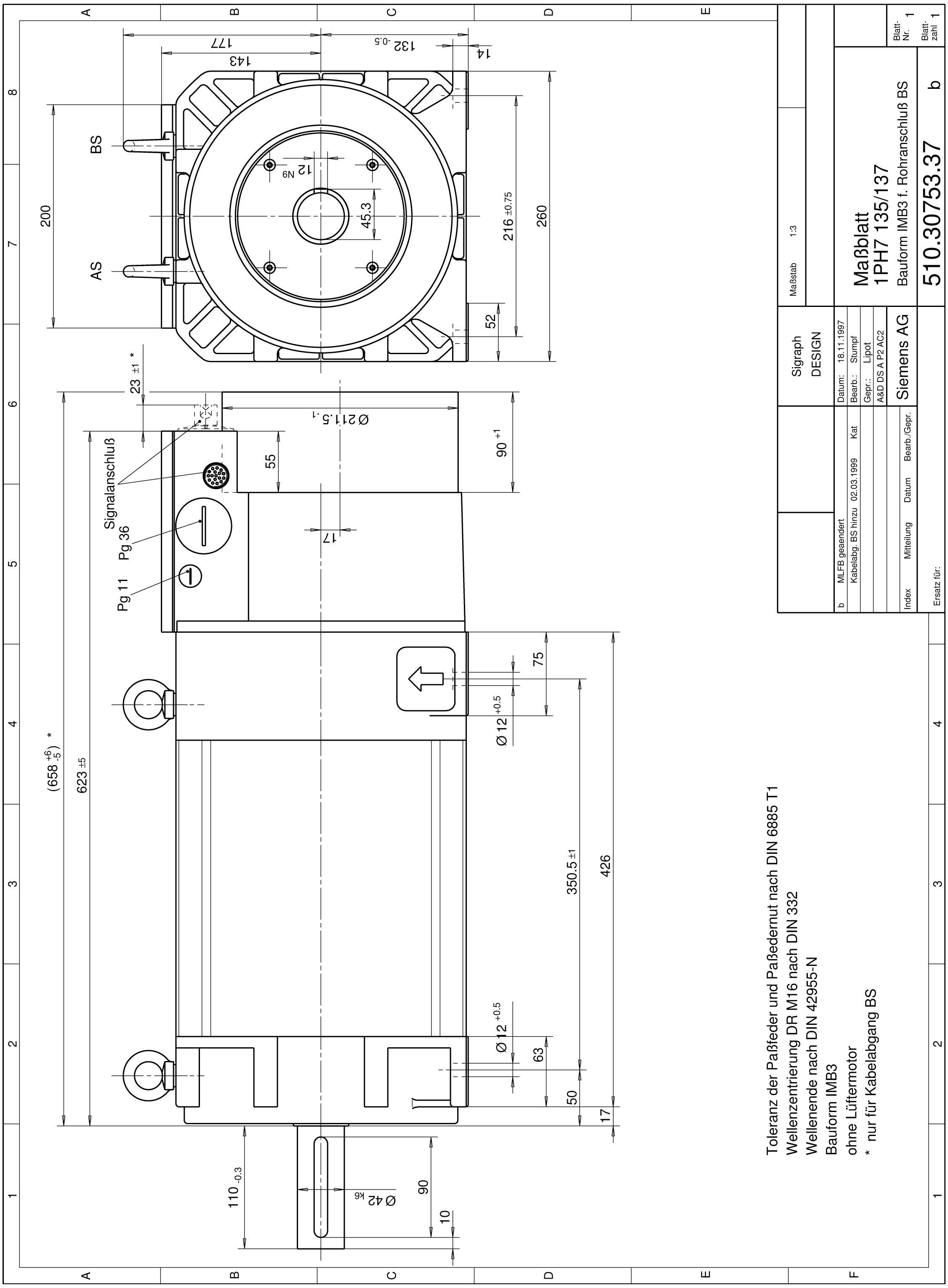


Fig. 7-39 1PH7135 to 1PH7137, IM B3 with pipe connection

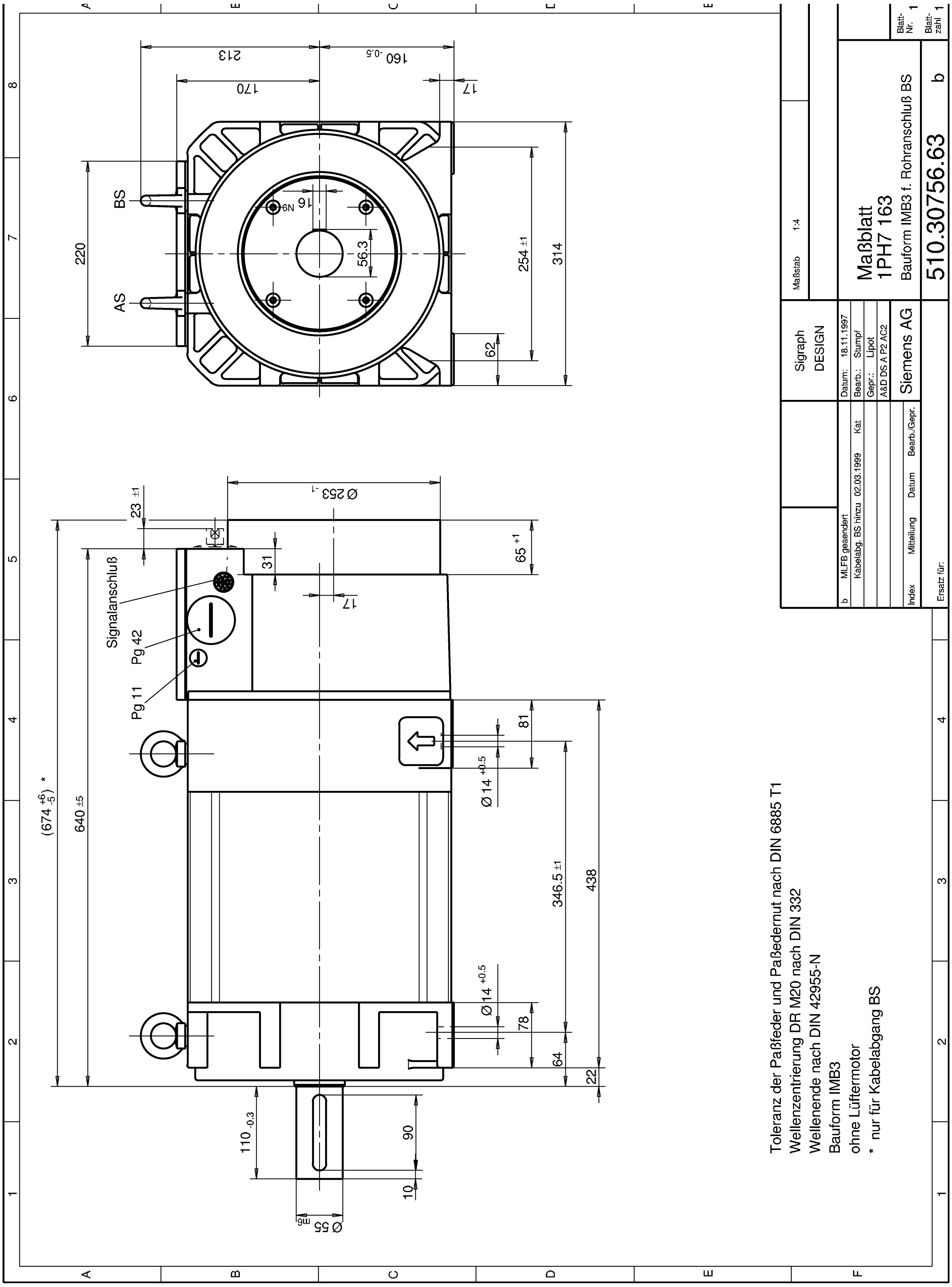


Fig. 7-40 1PH7163, IM B3 with pipe connection

7.3 Type of construction IM B3 with pipe connection

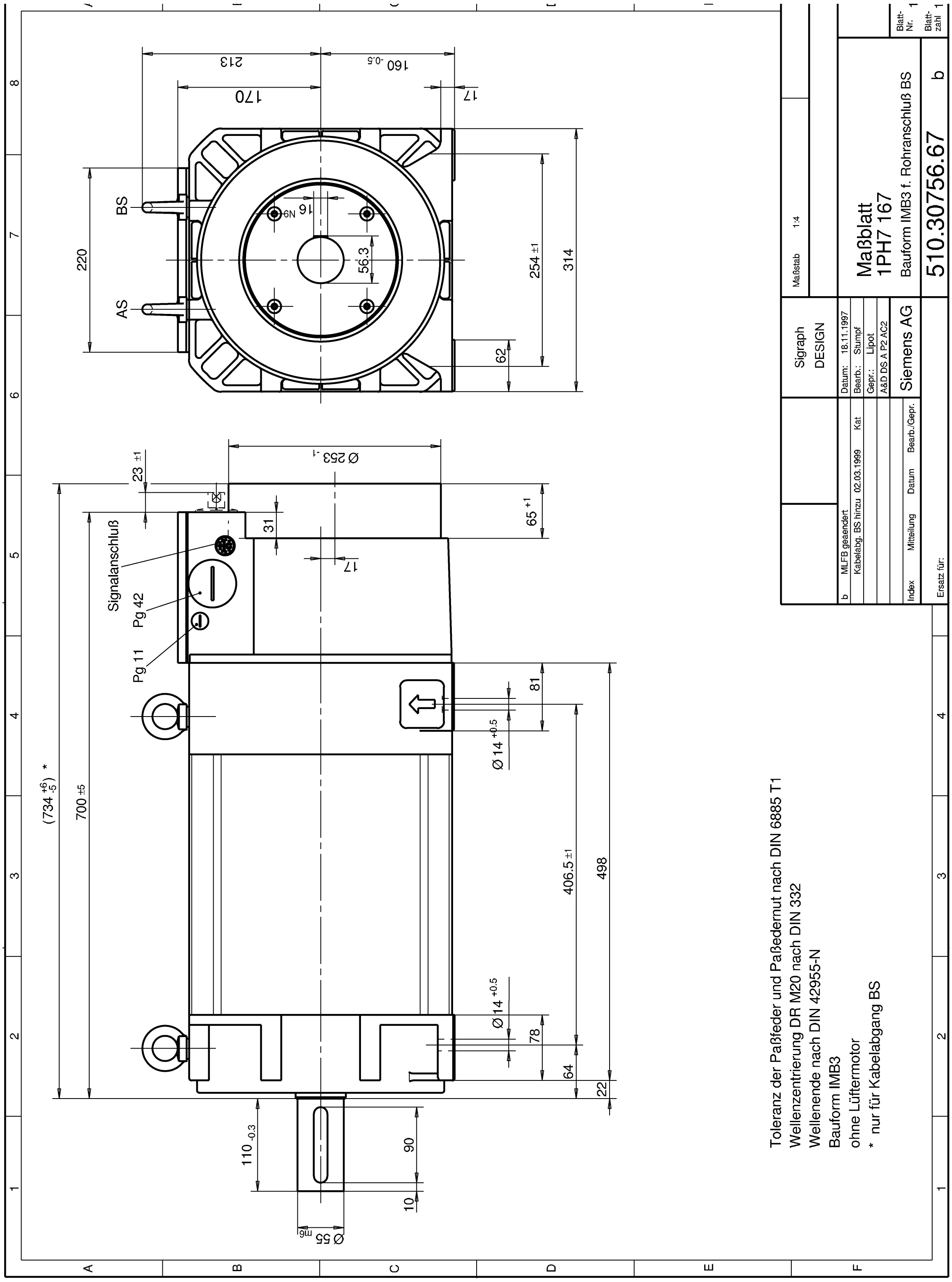
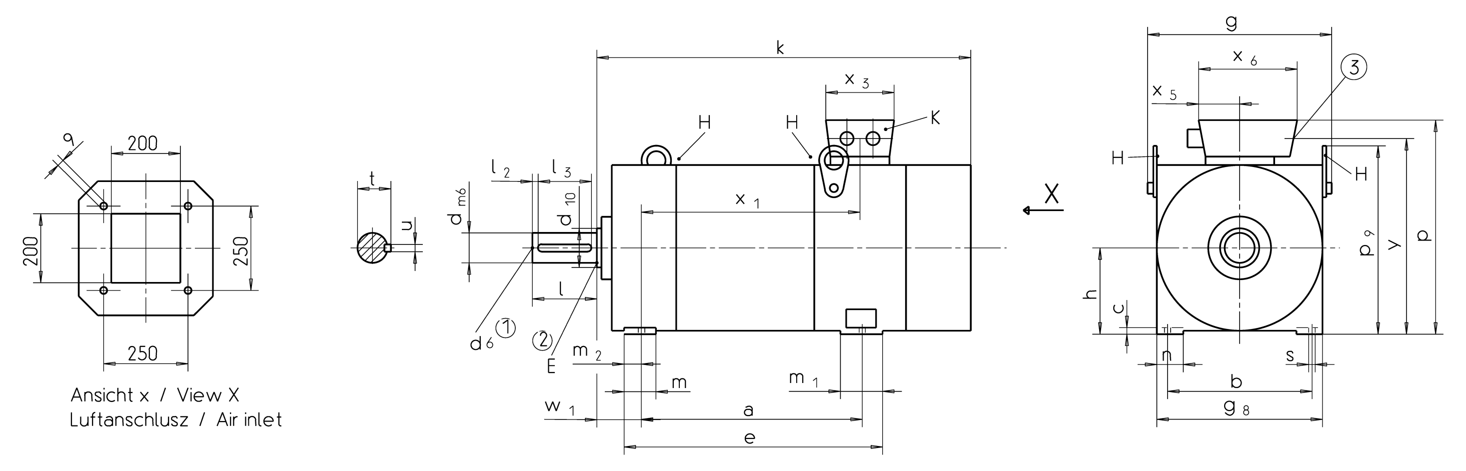


Fig. 7-41 1PH7167, IM B3 with pipe connection

7.3 Type of construction IM B3 with pipe connection



																	Klemmenkasten ③					Wellenende								
1PH7	a	b	c	e	g	g_8	h	k	m	m_1	m_2	n	x_1	p_9	s	w_1	p	x_3	x_5	x_6	y	d	l	t	u	d_6	d_{10}	l_2	l_3	E
184	430	279	14	510	408	360	180	830	60	120	35	65	420	402	14.5	121	495	200	100	245	440	60	140	64	18	M20	70	5	125	1.6x0.3
186	520	"	"	600	"	"	"	920	"	"	"	"	510	"	"	"	560	235	115	310	485	65	"	69	"	"	"	"	"	"
224	445	356	18	530	498	450	225	950	"	"	40	80	480	490	18.5	149	680	310	125	"	585	75	"	79.5	20	"	80	"	"	"
226	545	"	"	630	"	"	"	1050	"	"	"	"	580	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
228	635	"	"	720	"	"	"	1140	"	"	"	"	670	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"

① Zentrierbohrung DR M20 nach DIN 332 / Taped centre hole DR M20 to DIN 332
② Freistich E1.6x0.3 nach DIN 509 / Relief groove E1.6x0.3 to DIN 509
③ Maximalwert
K Klemmenkasten / Terminal box
H Hebeoese / Lifting eye

	1PH7 18.	1PH7 22.
Luftvolumenstrom / Air flow	0.19 m³/s	0.36 m³/s
Druckabfall im Motor / Pressure drop in motor	650 Pa	900 Pa

Darstellung
Representation
Maßstab
Scale ohne
Gew.
Wt. kg
Design V3.8A00
Datum 15.03.04
Name elter
A&D LD ID 2
Siemens AG
Nbg Vo
W-Nr.
No. Rohranschlusz Bauform IM B3
Masztabelle
Typ/Type 1PH7 184 . . . 228
Stat. Mitteilung/Notice Datum/Date Name
Ersatz für / Replacement for J847674
Entstanden aus / Originated from -
A5E00305714A
Blatt
Page 1-

Fig. 7-42 1PH7184 to 1PH7228, IM B3 with pipe connection

7.4 Type of construction IM B3 with second shaft end

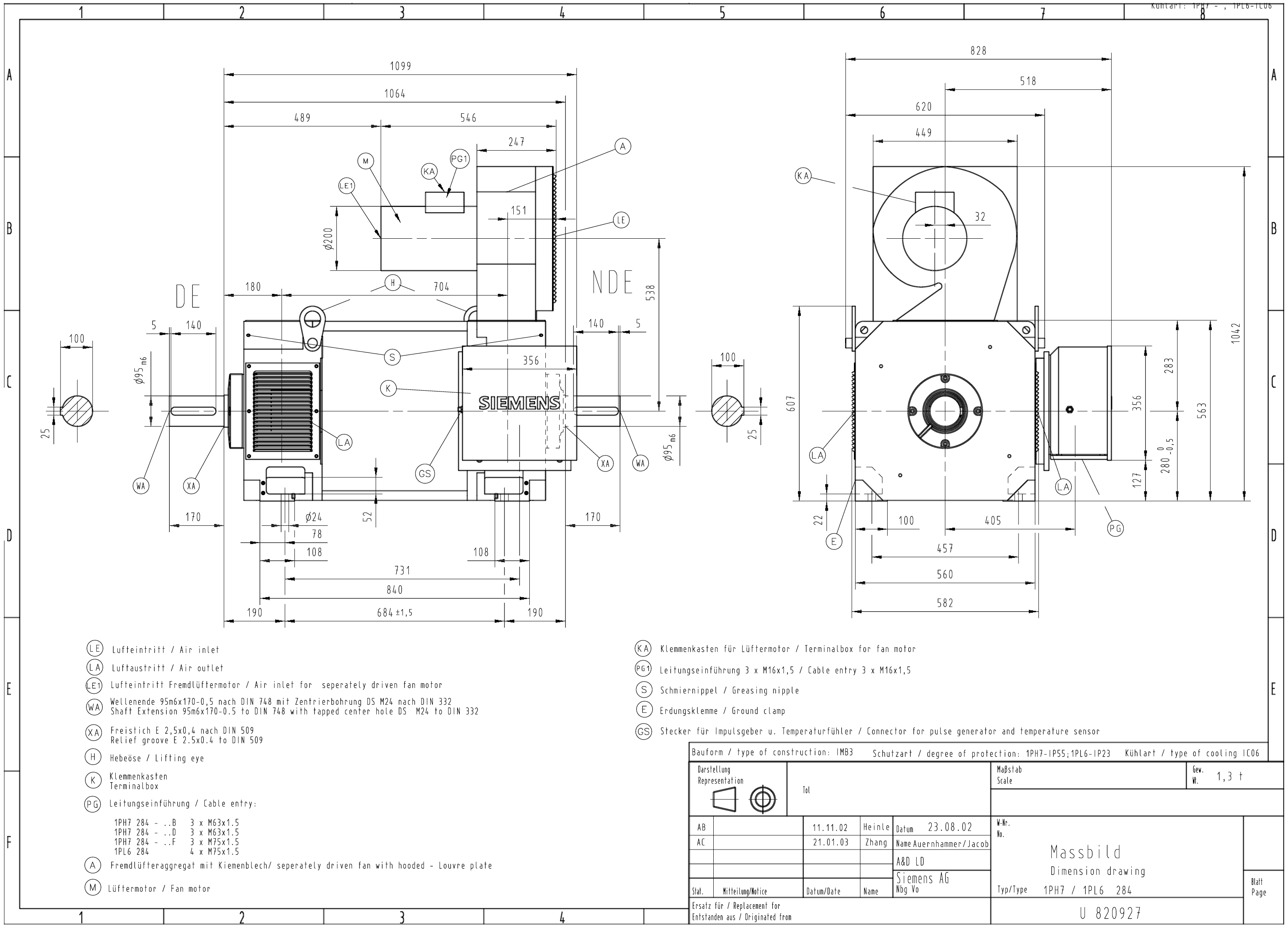


Fig. 7-43 1PH7284, IM B3 with second shaft end, K16, air flow direction NDE – DE

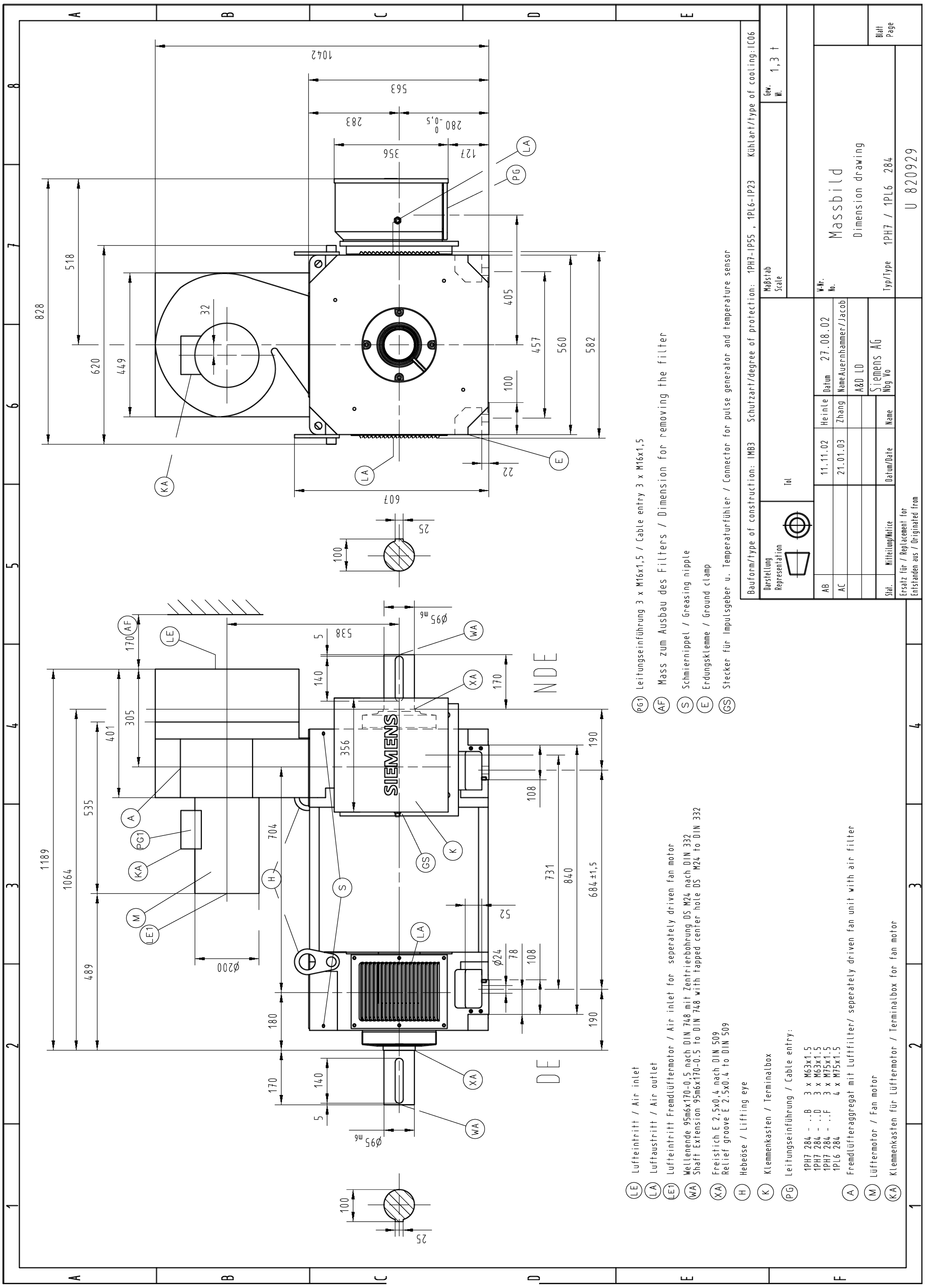


Fig. 7-44 1PH7284, filter, IM B3 with second shaft end, K16, air flow direction NDE – DE

7.4 Type of construction IM B3 with second shaft end

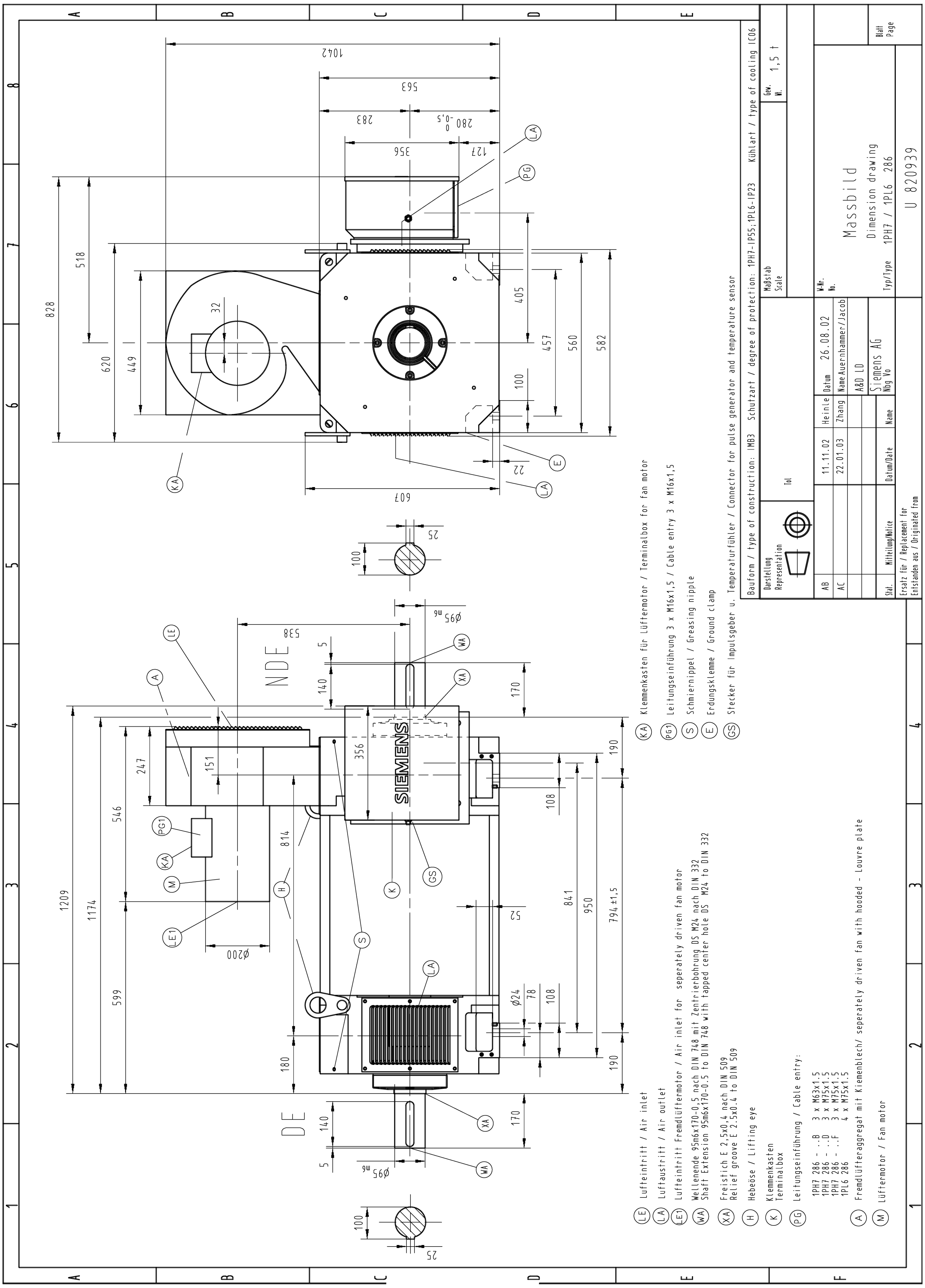


Fig. 7-45 1PH7286, IM B3 with second shaft end, K16, air flow direction NDE – DE

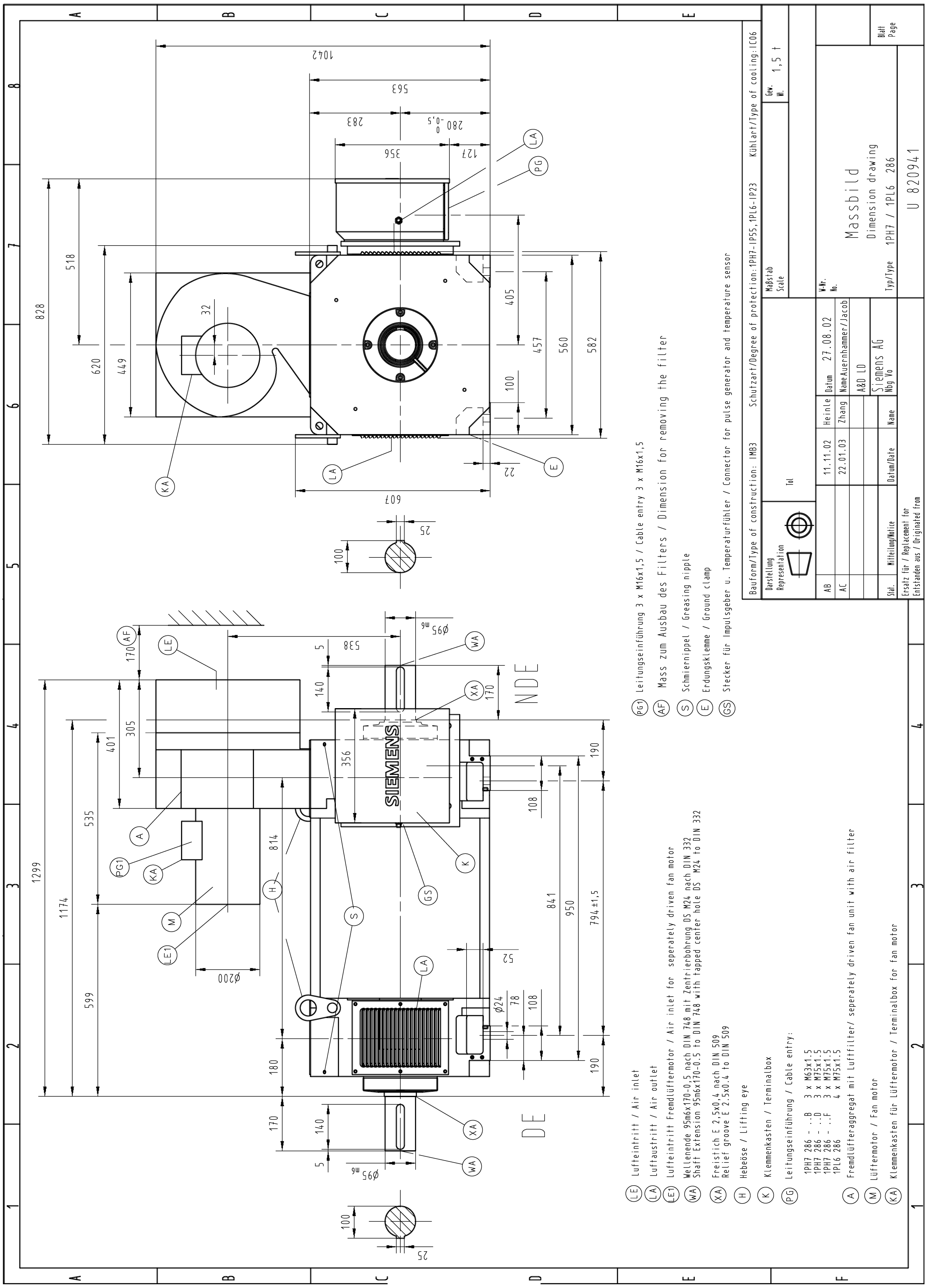


Fig. 7-46 1PH7286, filter, IM B3 with second shaft end, K16, air flow direction NDE – DE

7.4 Type of construction IM B3 with second shaft end

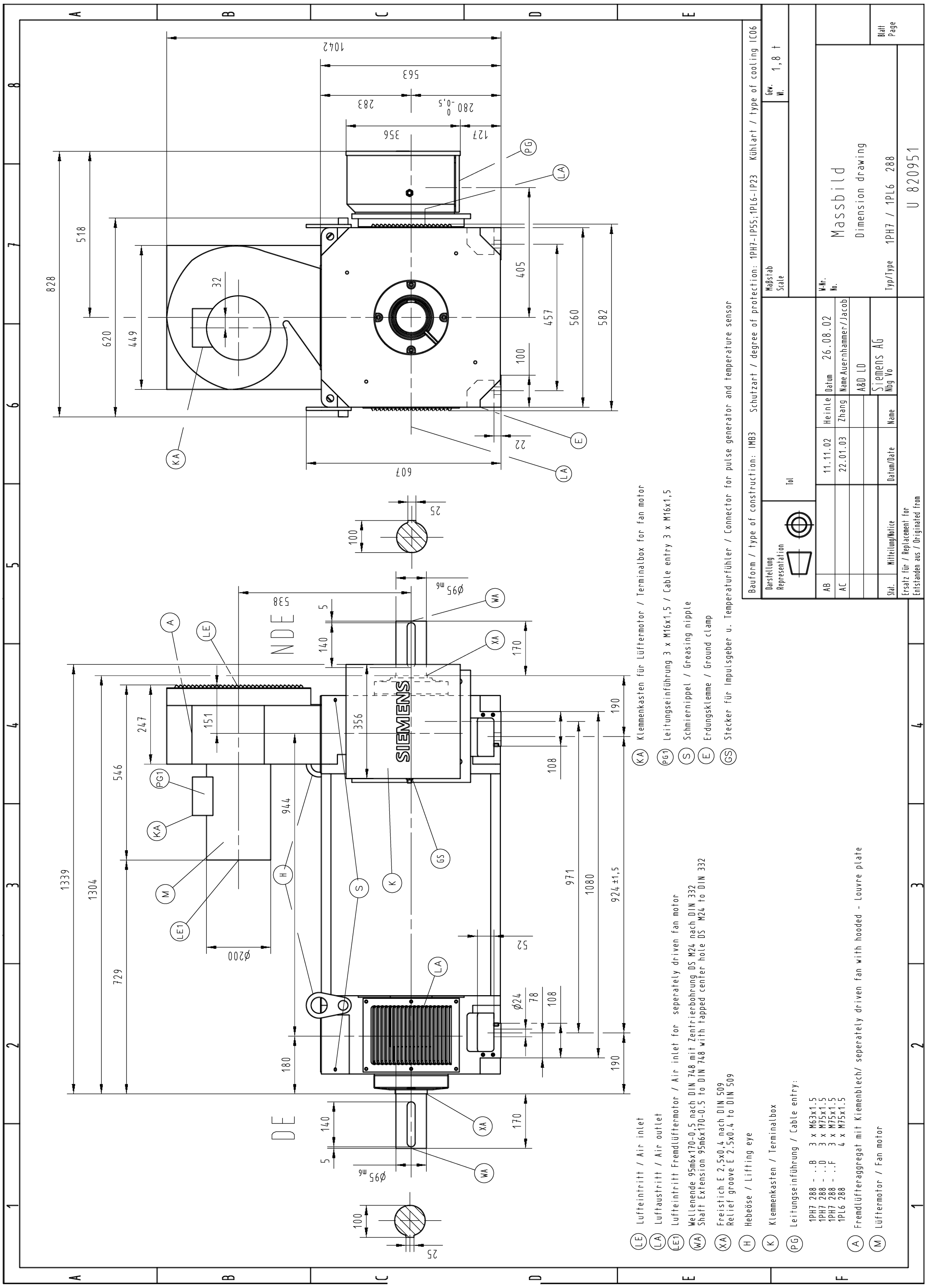


Fig. 7-47 1PH7288, IM B3 with second shaft end, K16, air flow direction NDE – DE

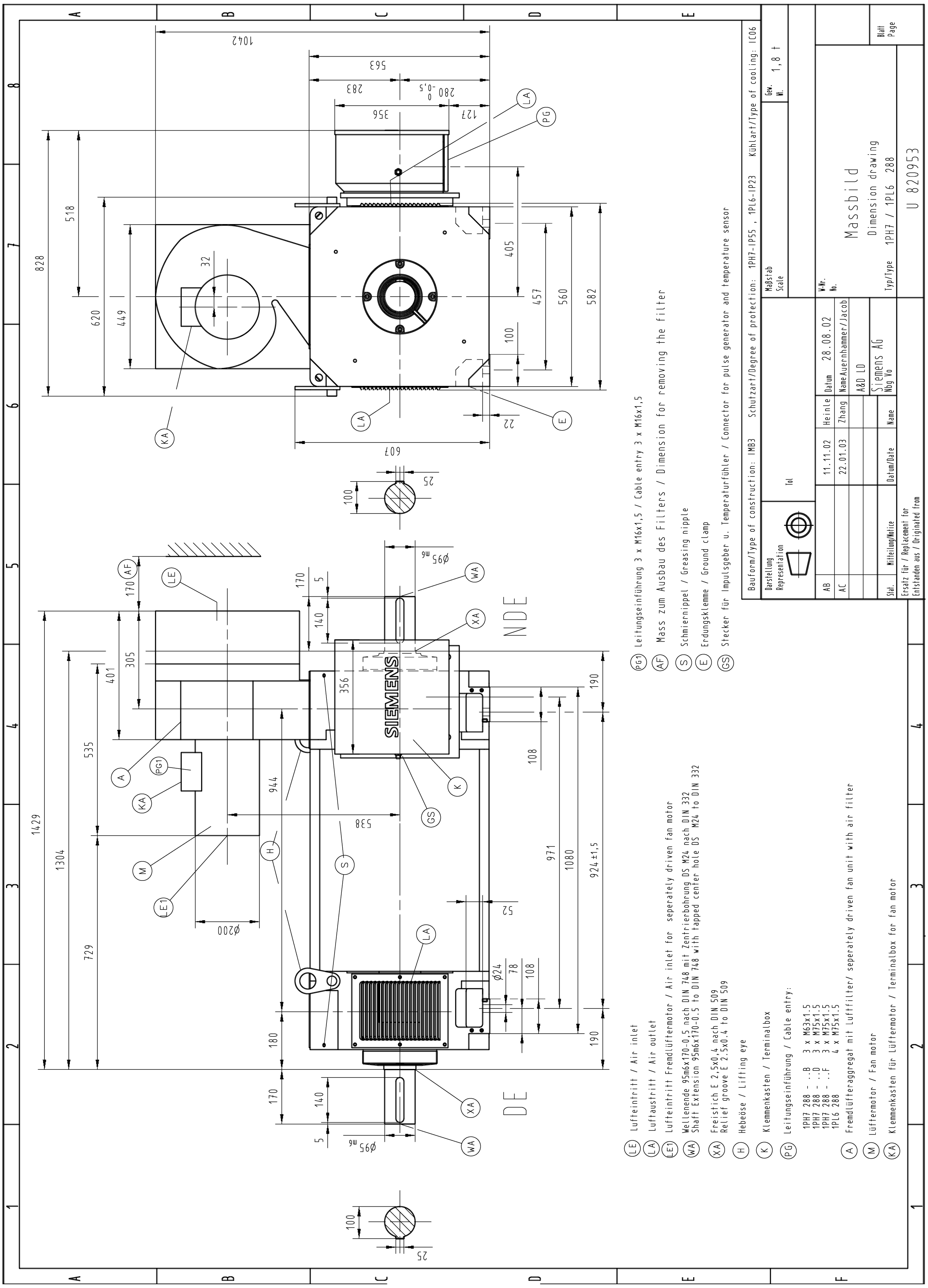


Fig. 7-48 1PH7288, filter, IM B3 with second shaft end, K16, air flow direction NDE – DE

■

Space for your notes

Dimension Drawings, Type of Construction IM B5

8

For 1PH7 motors, for the dimensions, specified in the following table, the subsequent deviations are permissible.

Table 8-1 Permissible dimension deviations

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

Note

Siemens AG reserves the right to change the dimensions of motors without prior notice as part of ongoing improvements to the mechanical design. Dimension drawings can go out–of–date. Updated dimension drawings can be requested at no charge.

8.1 Type of construction IM B5 with brake

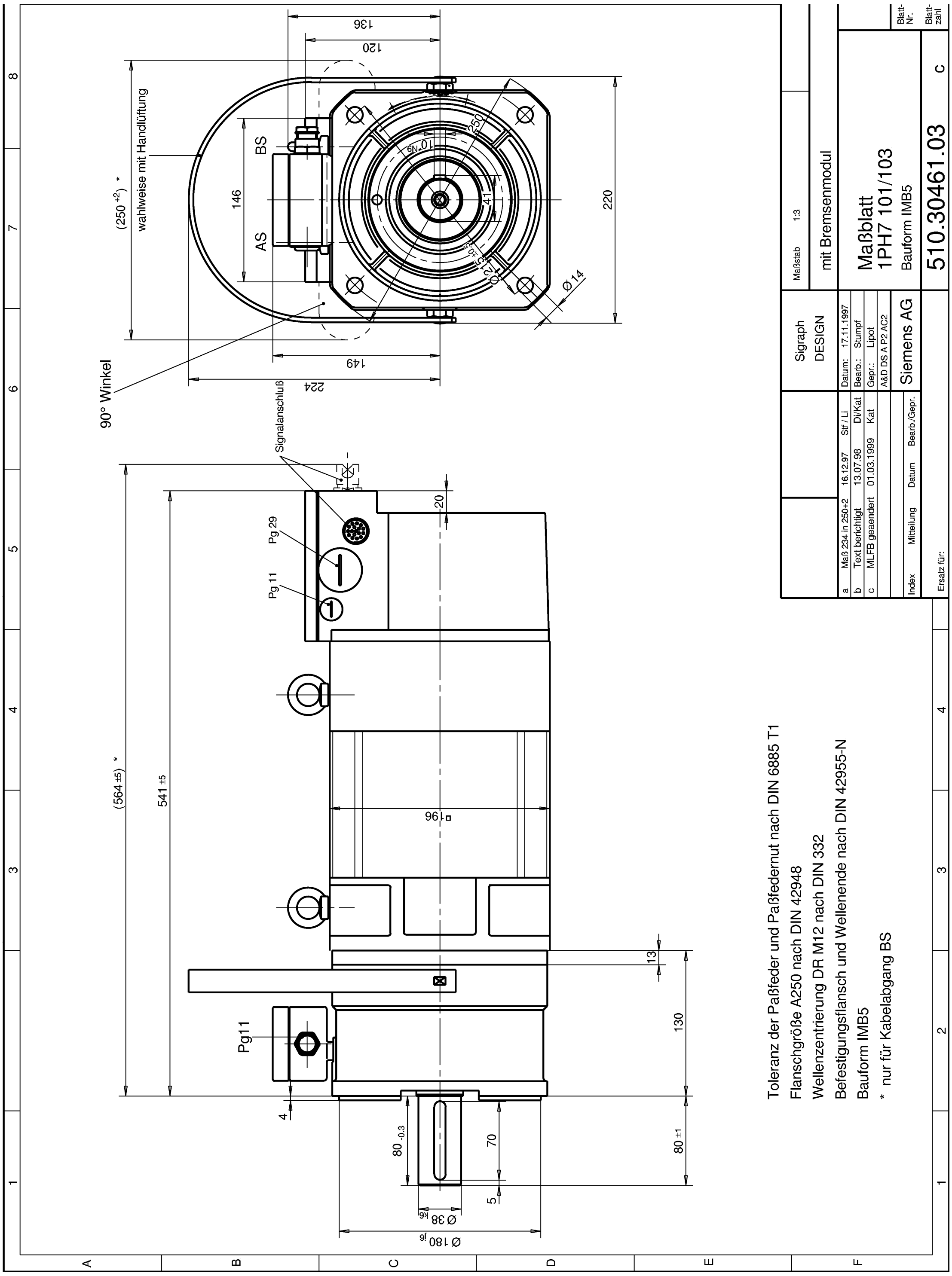


Fig. 8-1 1PH7101 to 1PH7103, IM B5 with brake

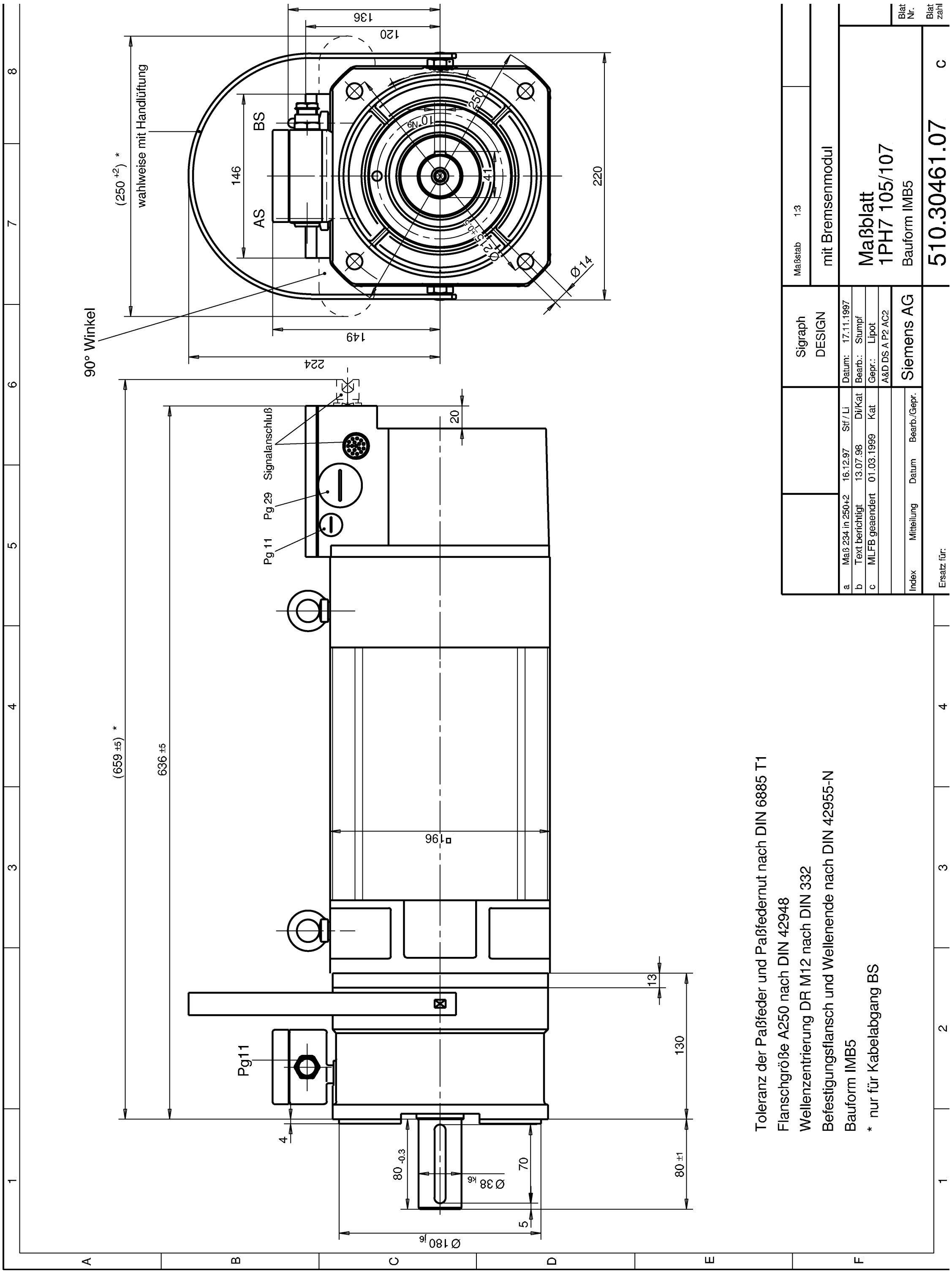


Fig. 8-2 1PH7105 to 1PH7107, IM B5 with brake

8.1 Type of construction IM B5 with brake

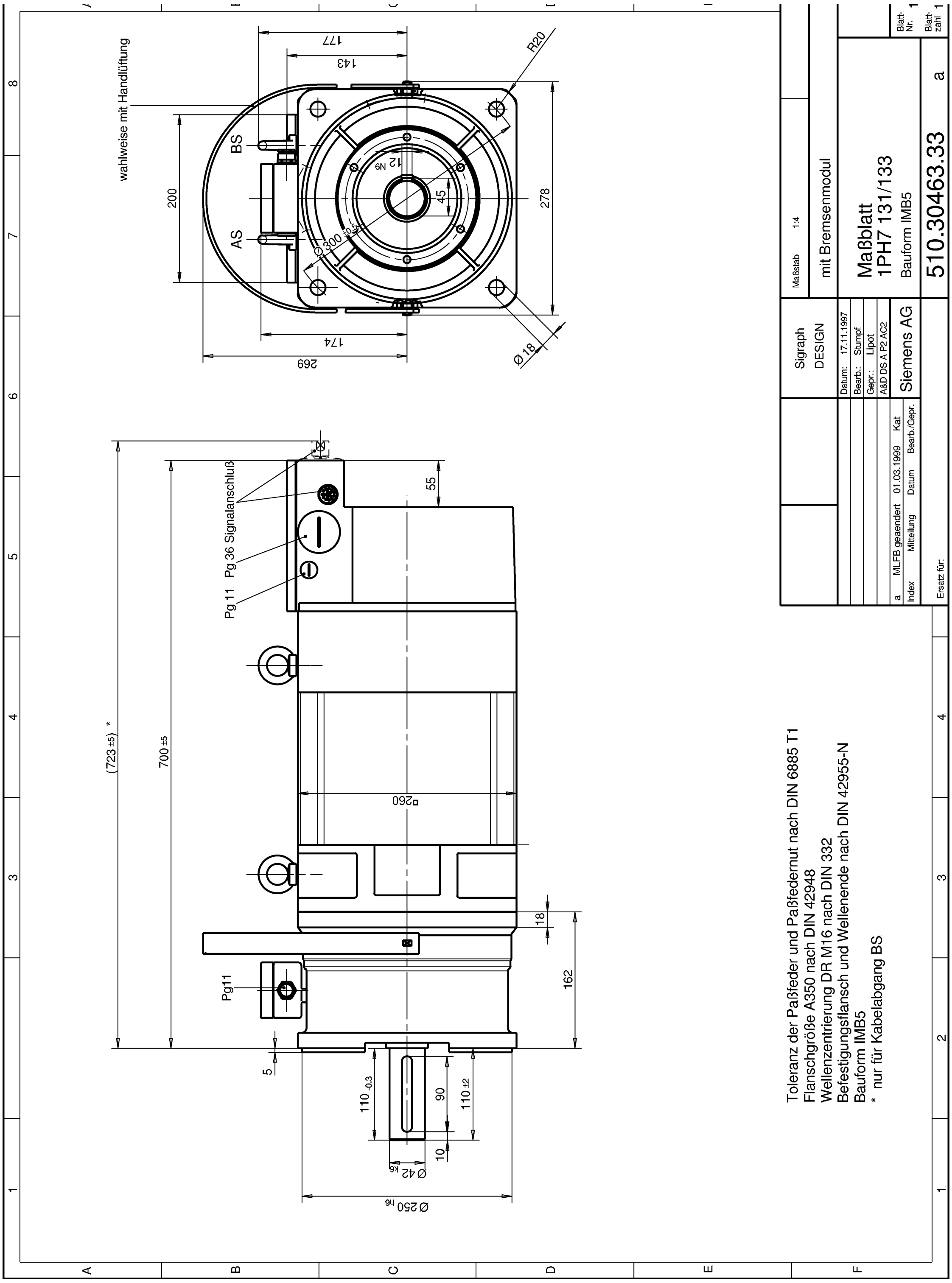


Fig. 8-3 1PH7131 to 1PH7133, IM B5 with brake

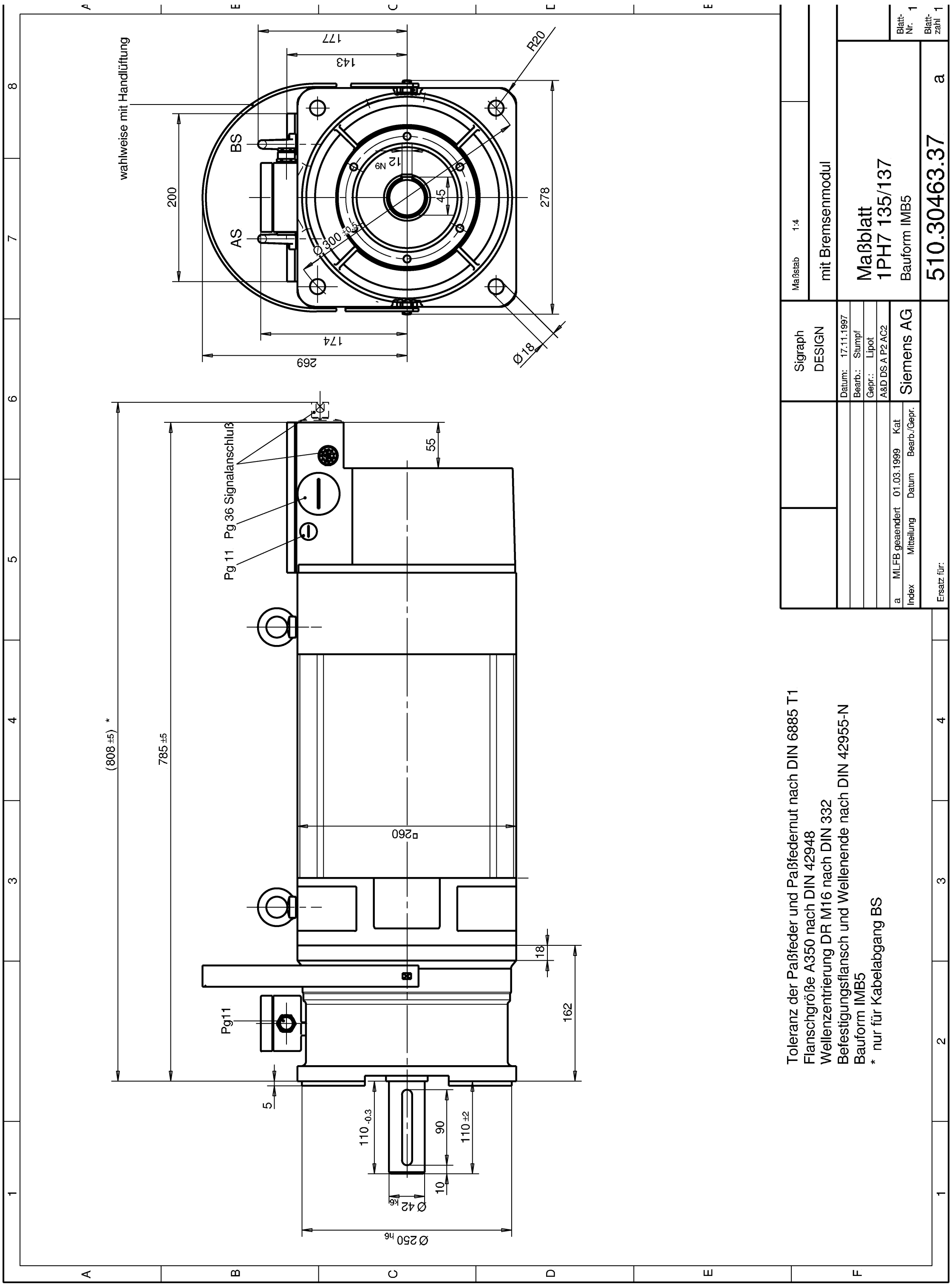


Fig. 8-4 1PH7135 to 1PH7137, IM B5 with brake

8.2 Type of construction IM B5 with separately–driven fan

8.2.1 Air flow direction, DE – NDE or NDE – DE

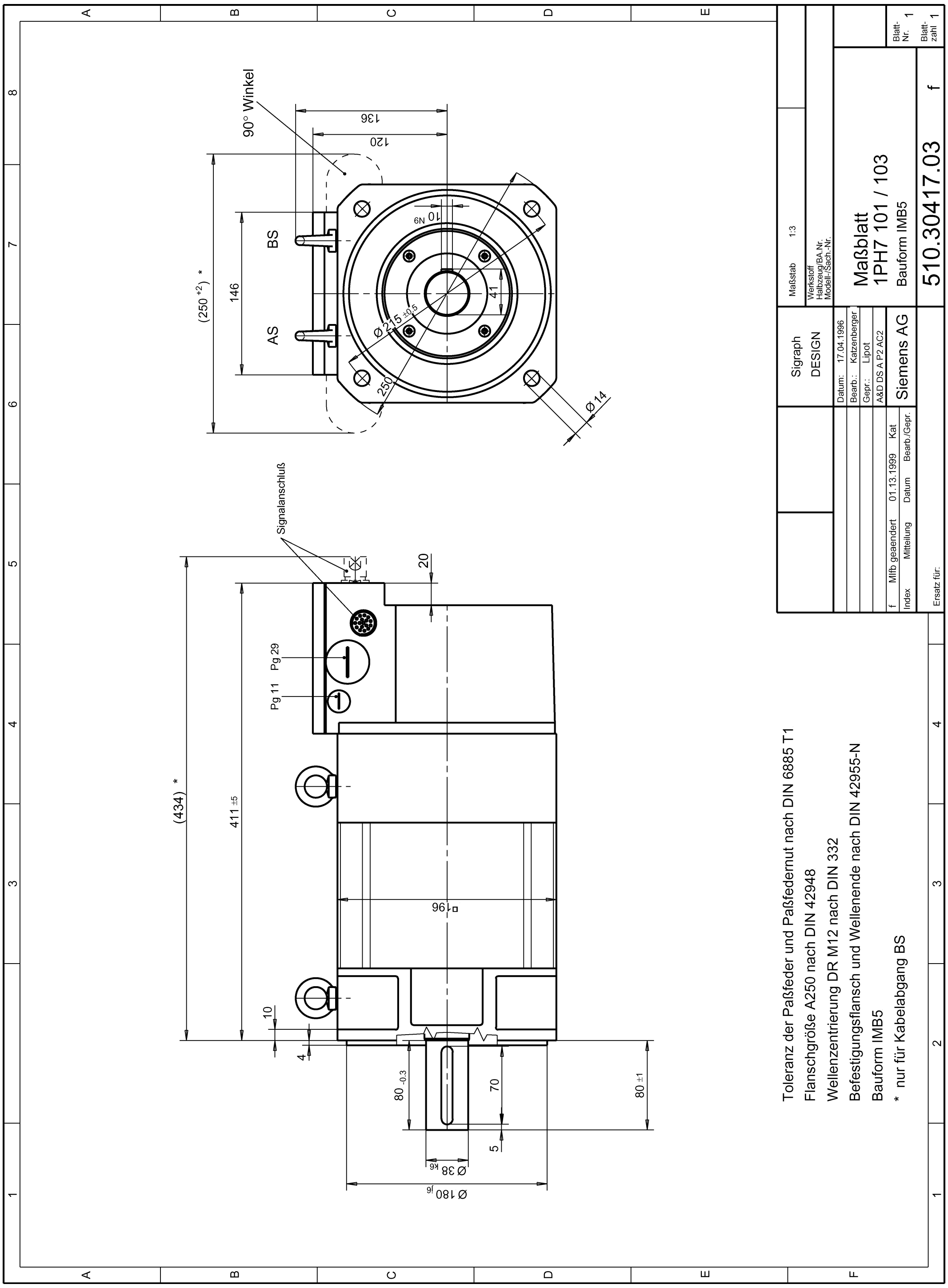


Fig. 8-5 1PH7101 to 1PH7103, IM B5, air flow direction, DE – NDE or NDE – DE

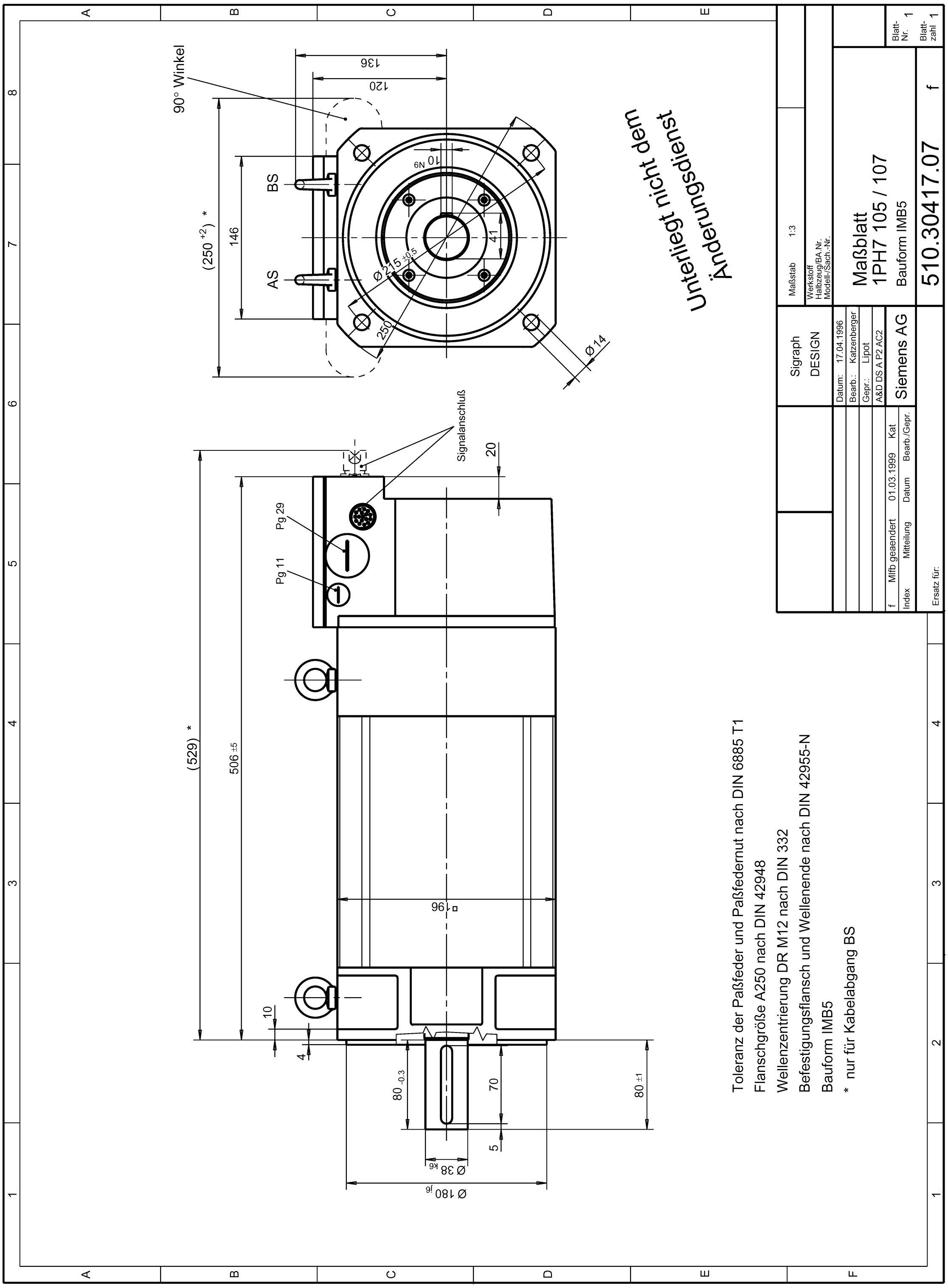


Fig. 8-6 1PH7105 to 1PH7107, IM B5, air flow direction DE – NDE or NDE – DE

8.2 Type of construction IM B5 with separately–driven fan

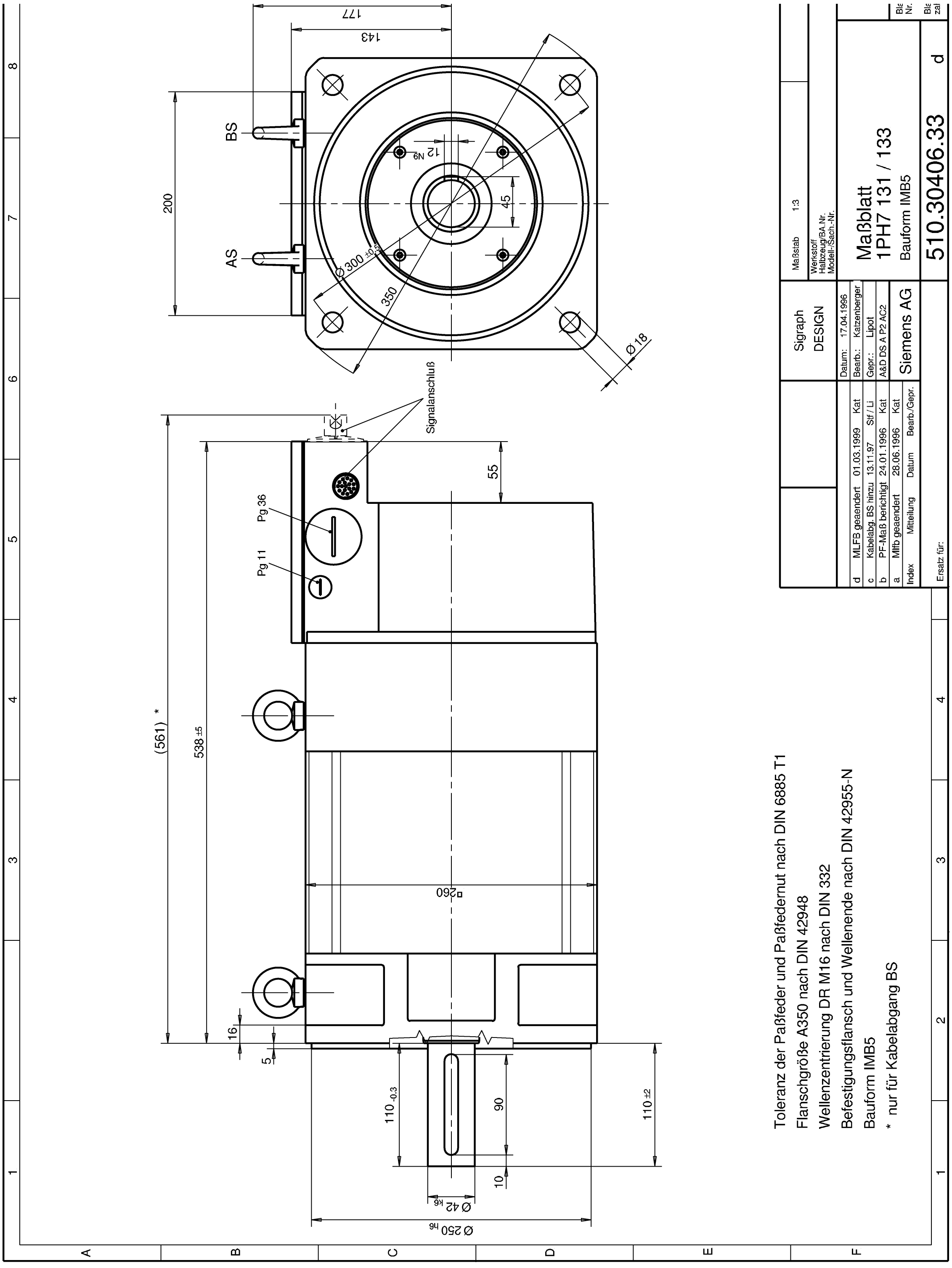


Fig. 8-7 1PH7131 to 1PH7133, IM B3, air flow direction DE – NDE or NDE – DE

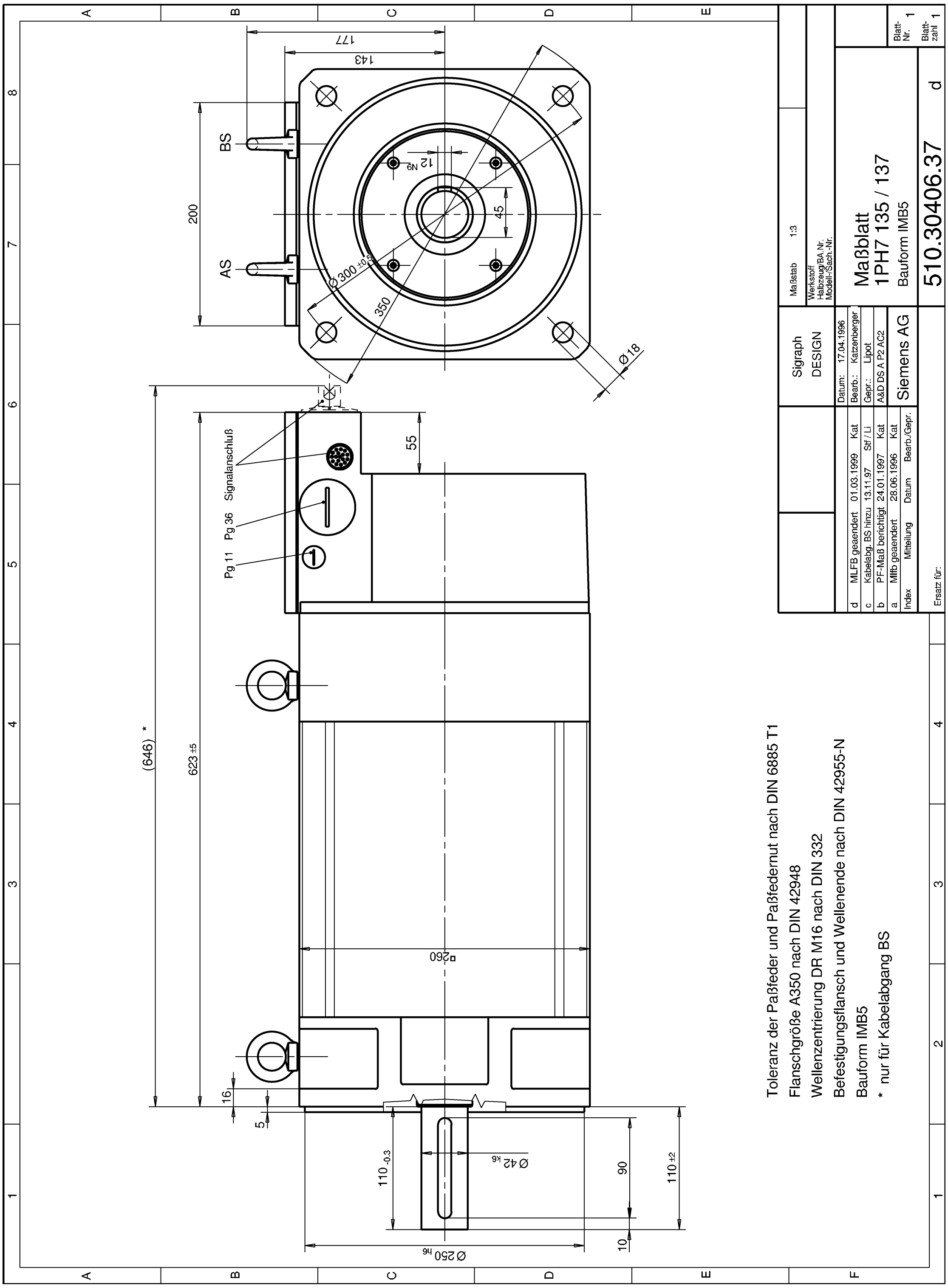


Fig. 8-8 1PH7135 to 1PH7137, IM B3, air flow direction DE – NDE or NDE – DE

8.3 Type of construction IM B5 with pipe connection

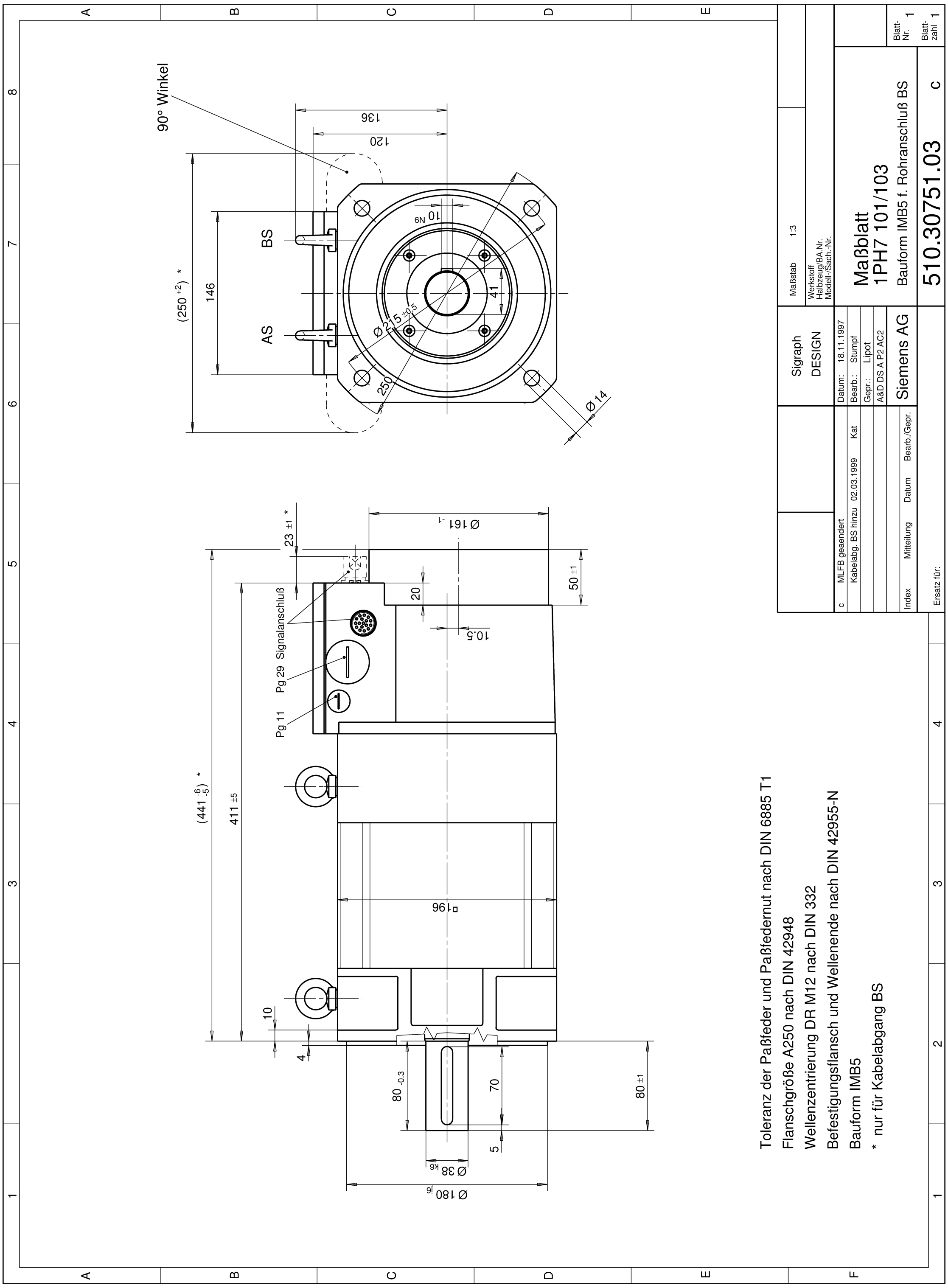


Fig. 8-9 1PH7101 to 1PH7103, IM B5 with pipe connection

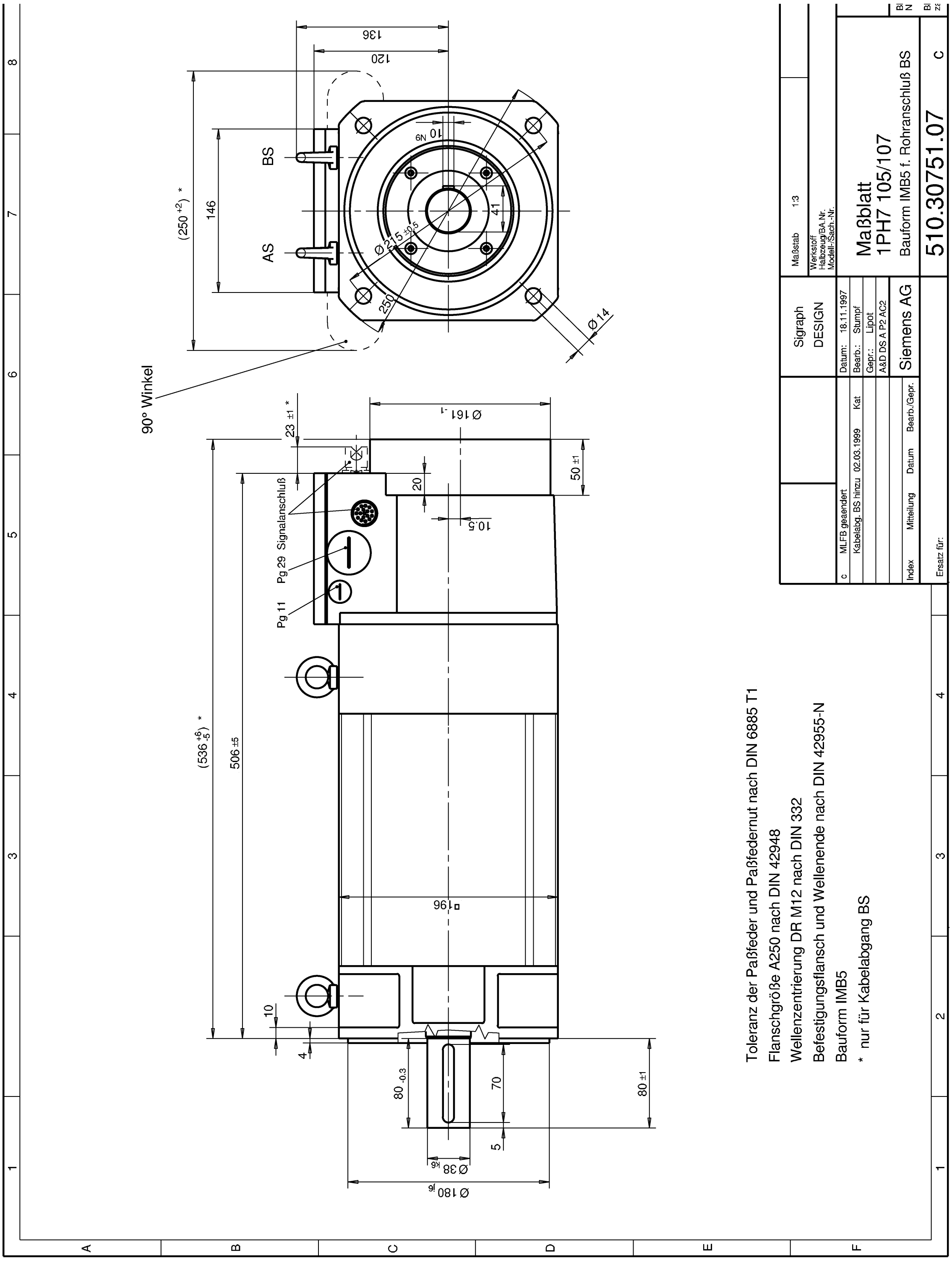


Fig. 8-10 1PH7105 to 1PH7107, IM B5 with pipe connection

8.3 Type of construction IM B5 with pipe connection

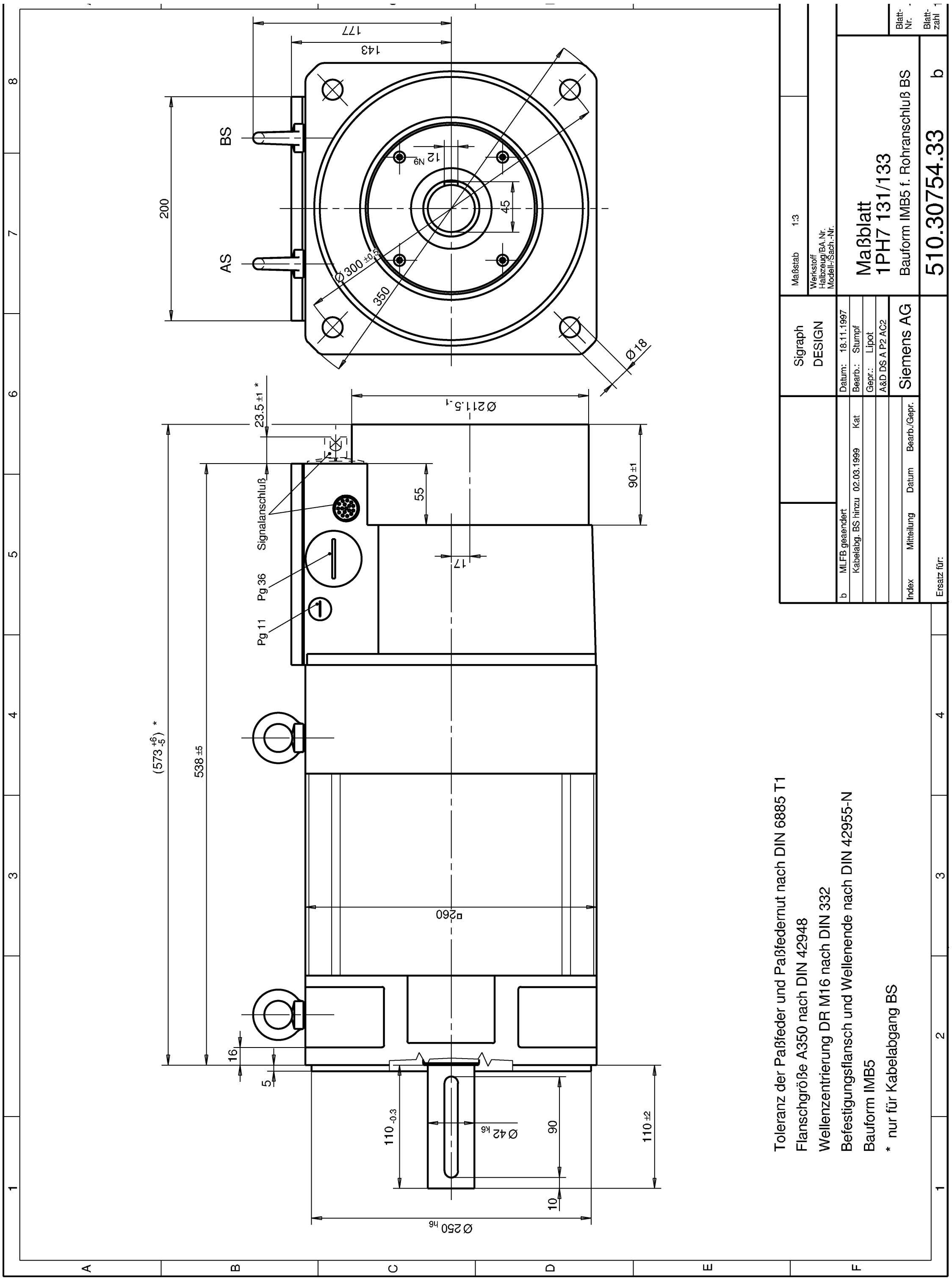


Fig. 8-11 1PH7131 to 1PH7133, IM B5 with pipe connection

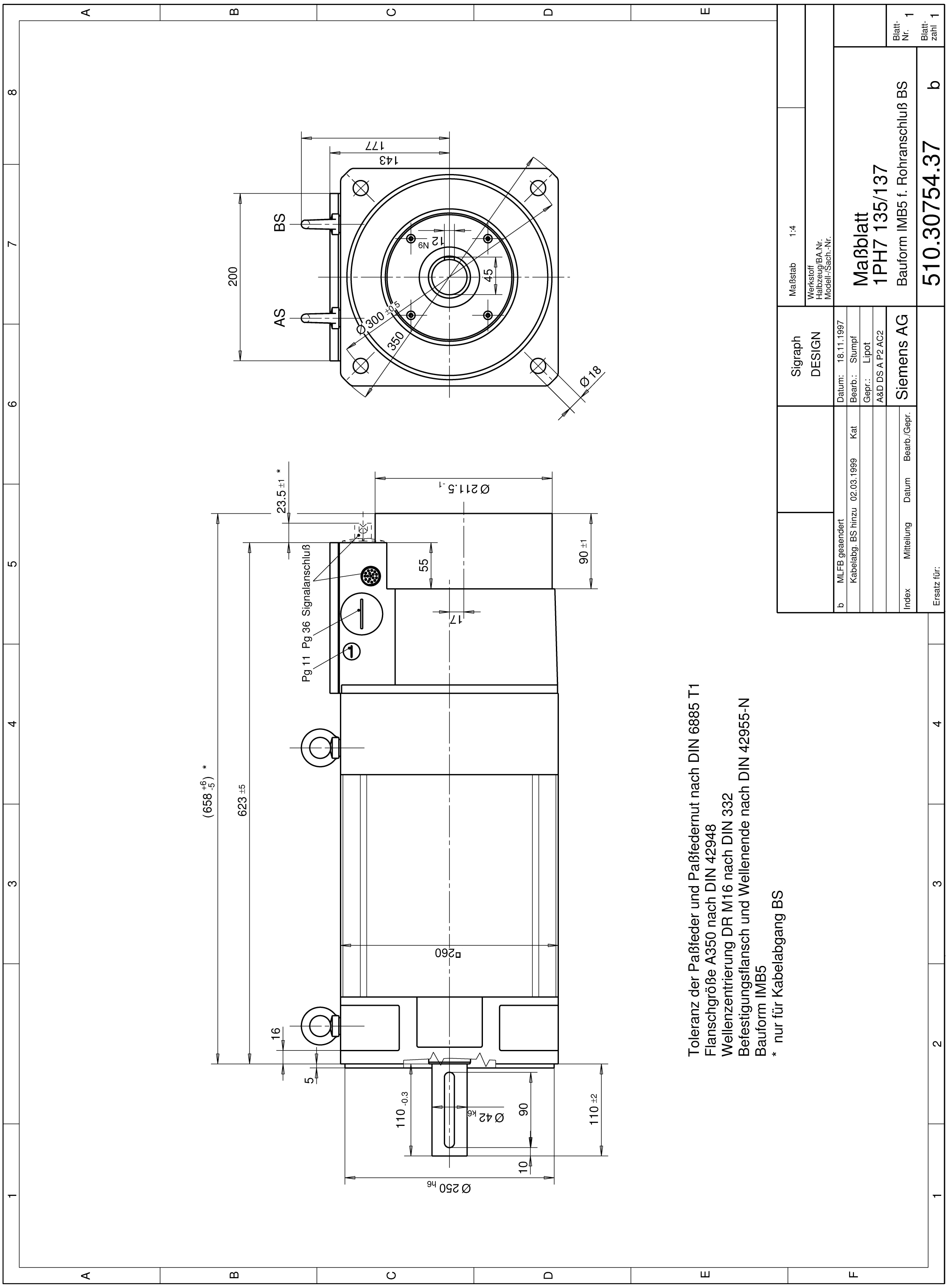


Fig. 8-12 1PH7135 to 1PH7137, IM B5 with pipe connection

■

Space for your notes

Dimension Drawings, Type of Construction IM B35

9

For 1PH7 motors, for the dimensions, specified in the following table, the subsequent deviations are permissible.

Table 9-1 Permissible dimension deviations

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

Note

Siemens AG reserves the right to change the dimensions of motors without prior notice as part of ongoing improvements to the mechanical design. Dimension drawings can go out–of–date. Updated dimension drawings can be requested at no charge.

9.1 Type of construction IM B35 with brake

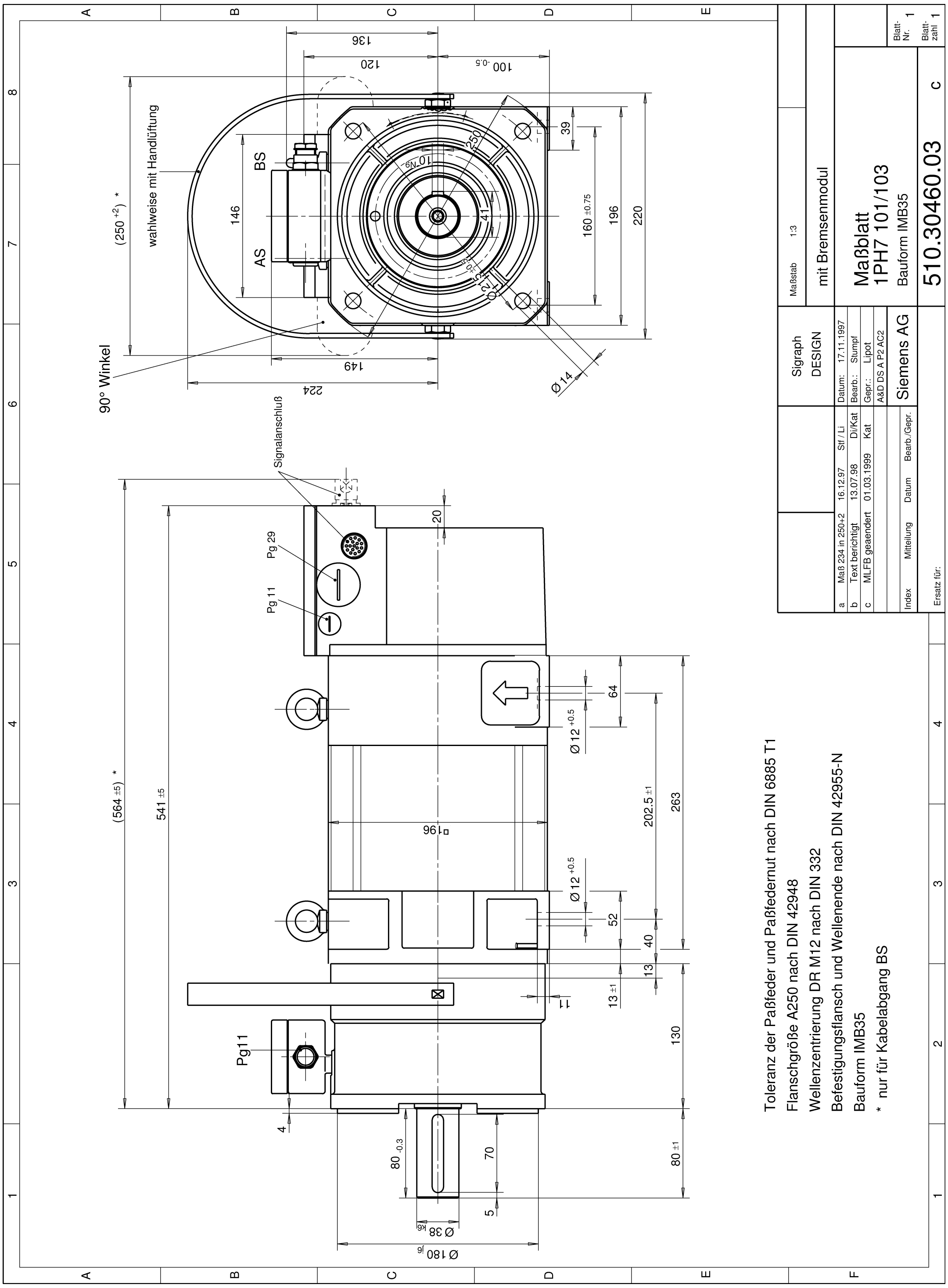


Fig. 9-1 1PH7101 to 1PH7103, IM B35 with brake

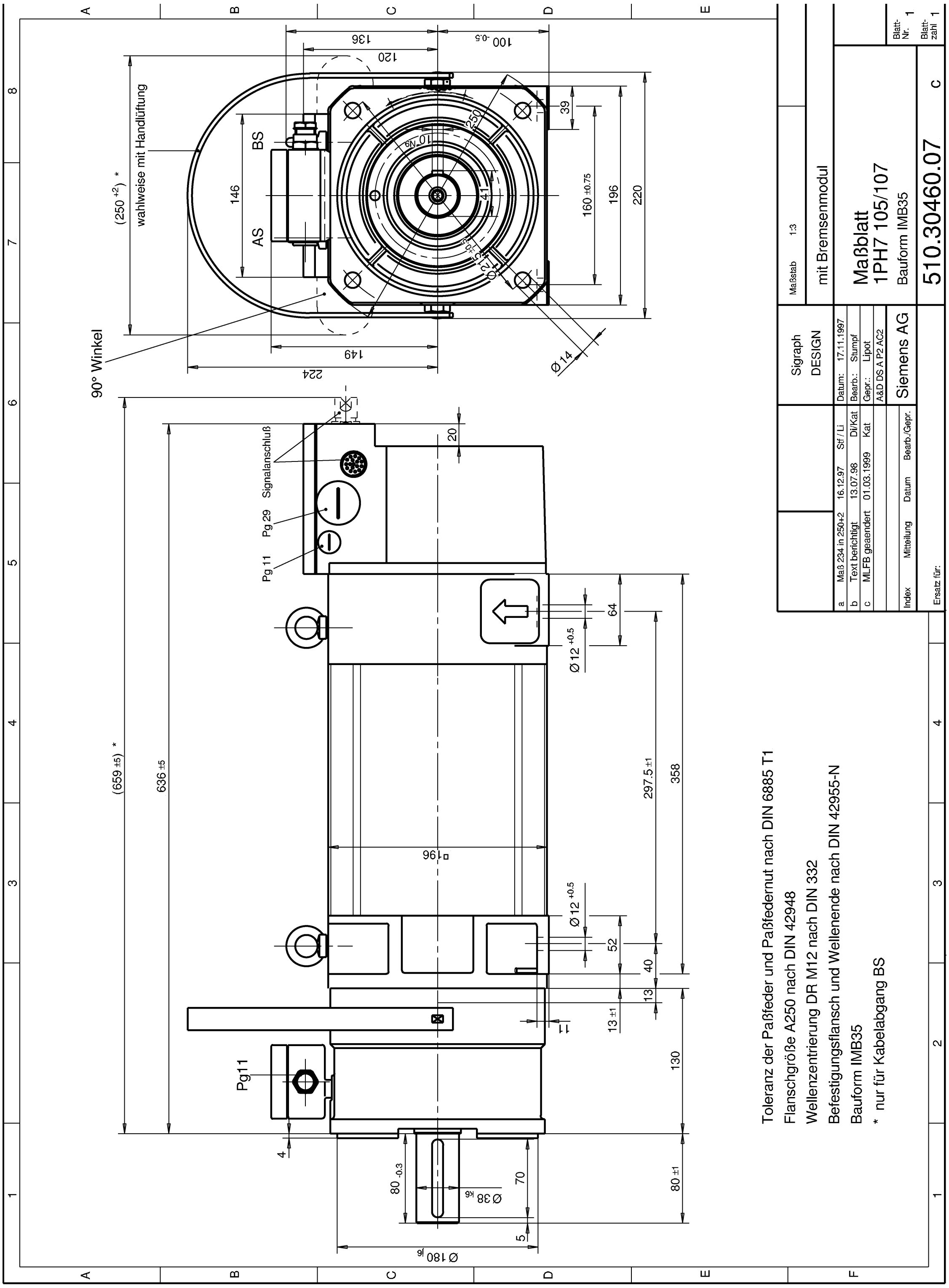


Fig. 9-2 1PH7105 to 1PH7107, IM B35, with brake

9.1 Type of construction IM B35 with brake

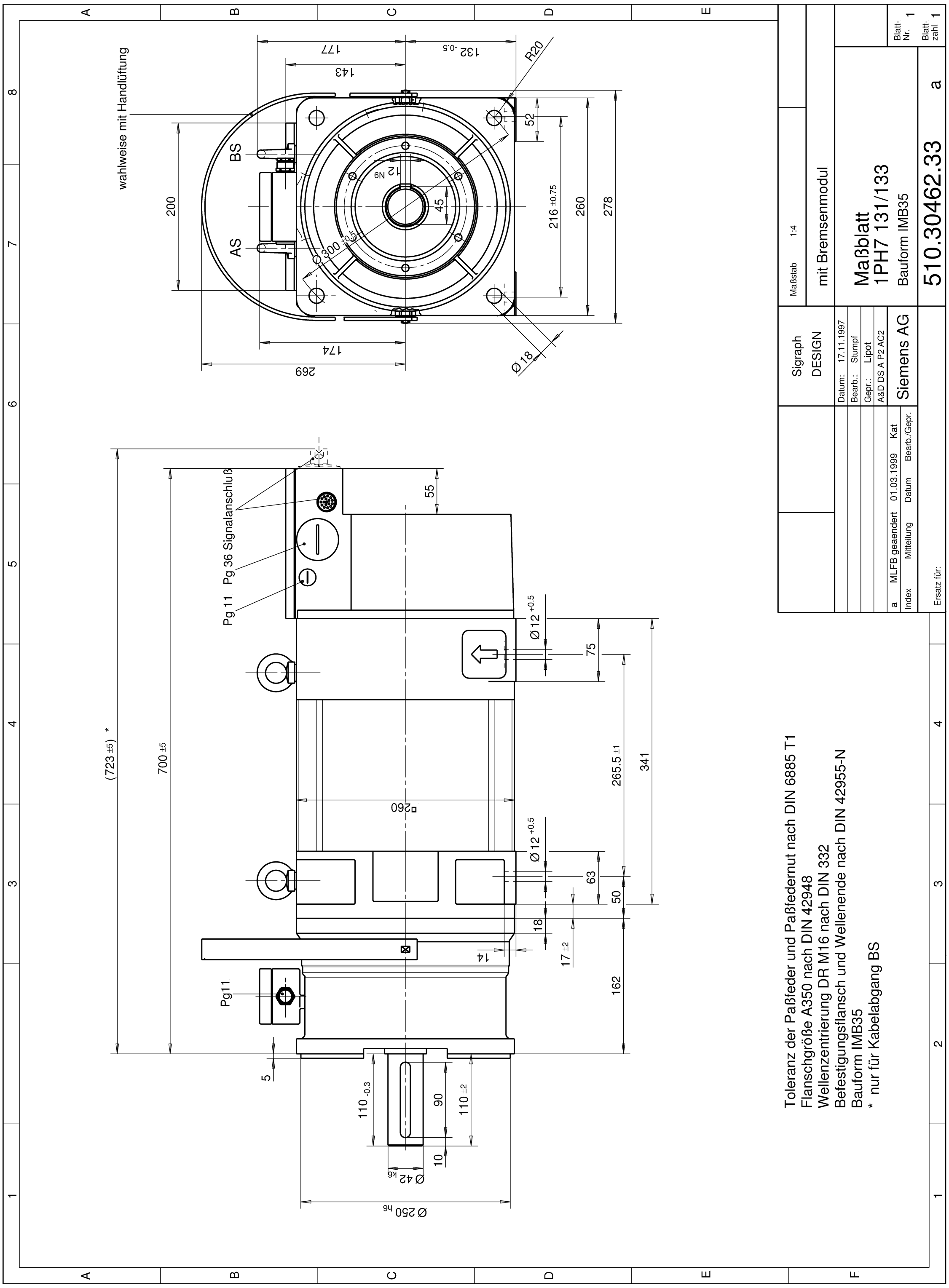


Fig. 9-3 1PH7131 to 1PH7133, IM B35, with brake

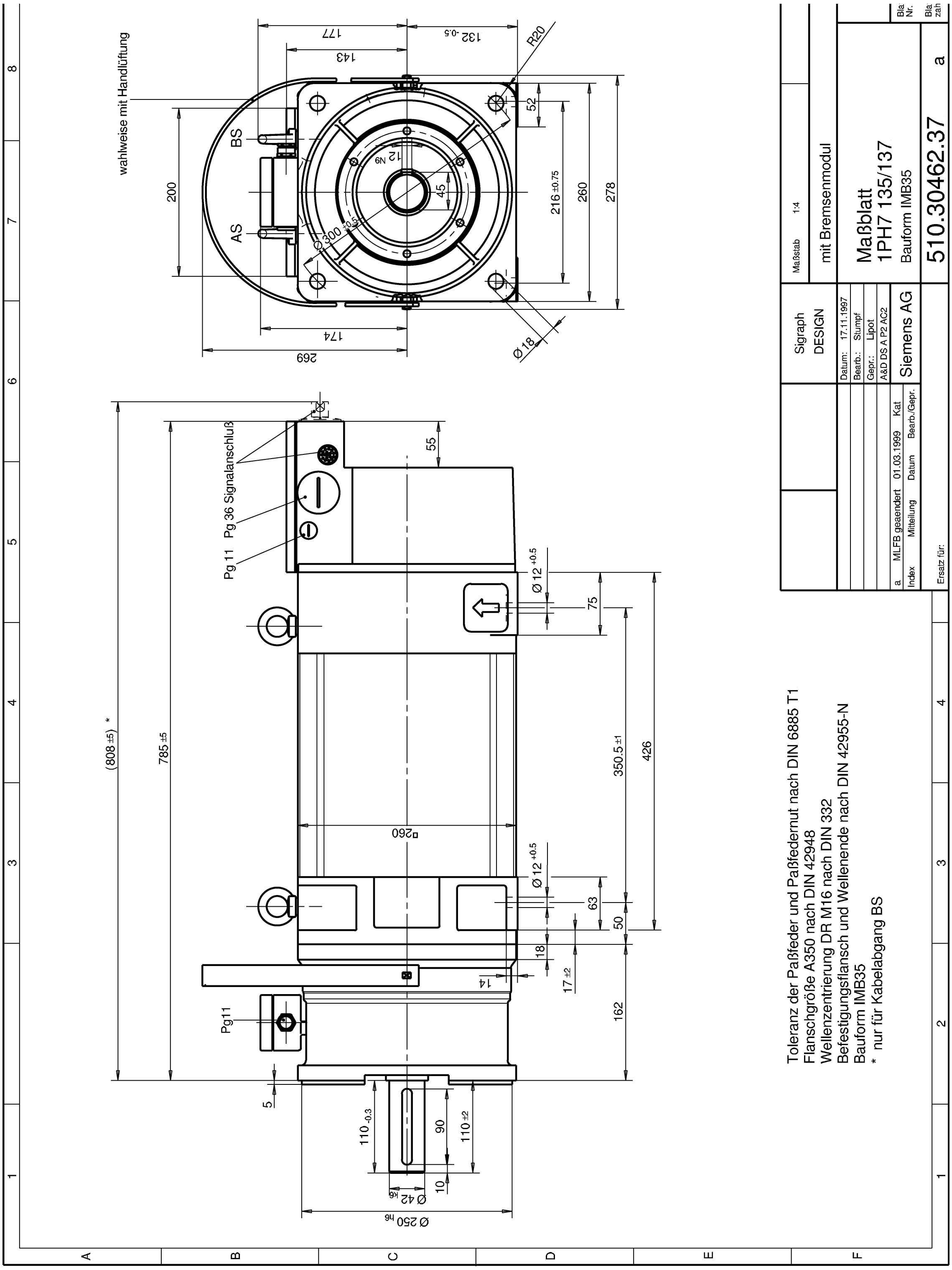


Fig. 9-4 1PH7135 to 1PH7137, IM B35, with brake

9.1 Type of construction IM B35 with brake

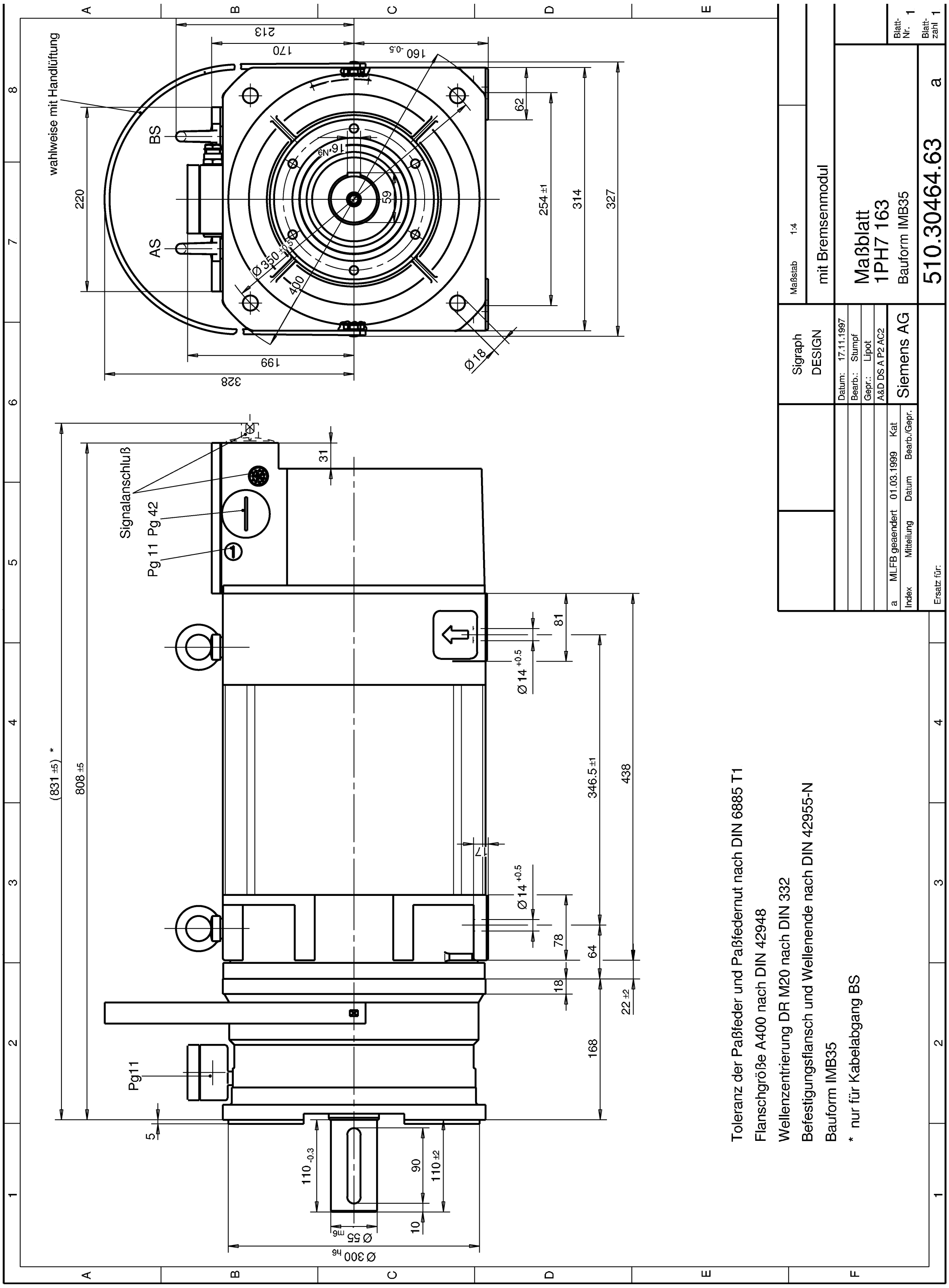


Fig. 9-5 1PH7163, IM B35, with brake

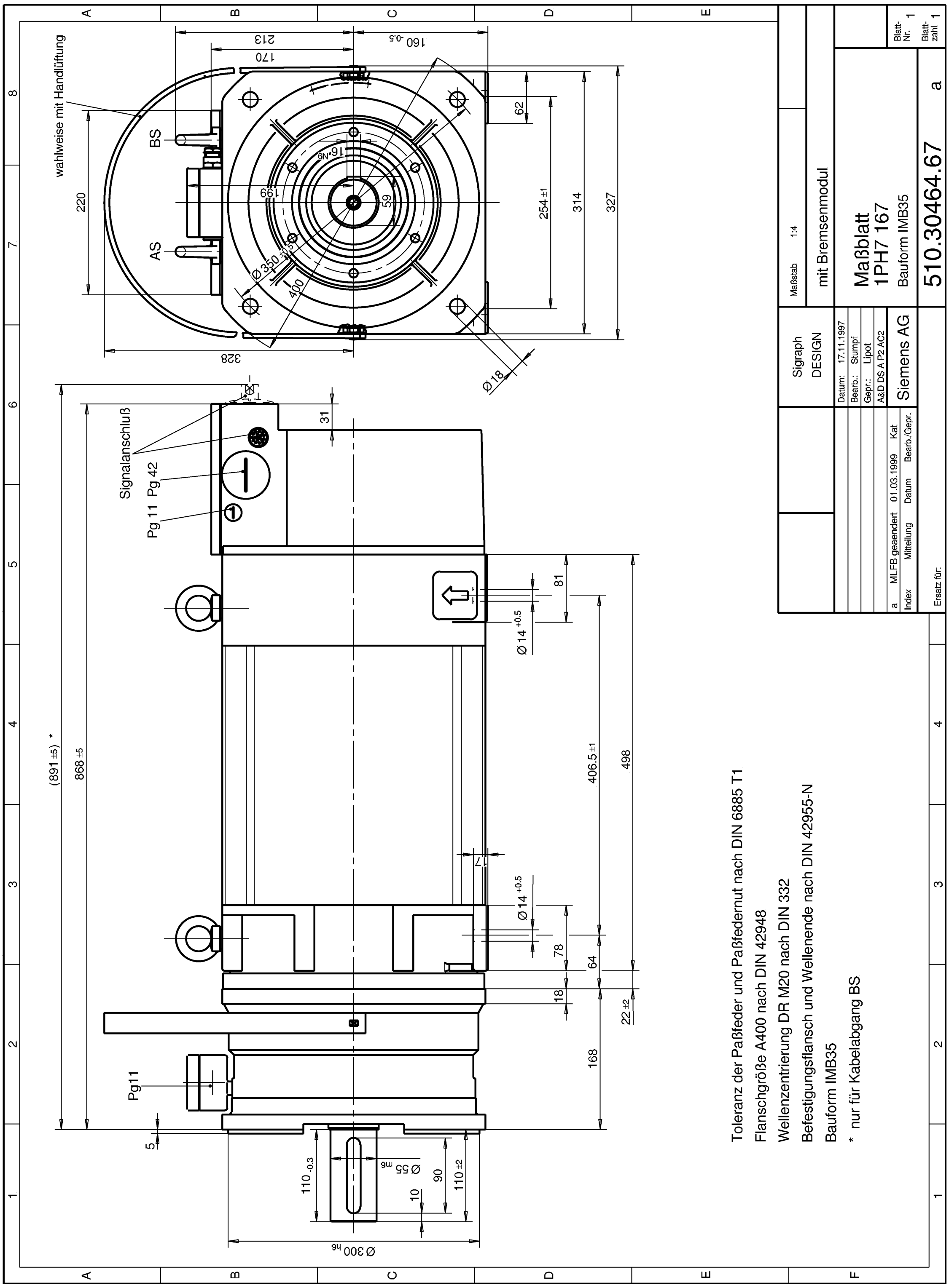


Fig. 9-6 1PH7167, IM B35, with brake

9.2 Type of construction IM B35 with separately–driven fan

9.2.1 Air flow direction, DE – NDE or NDE – DE

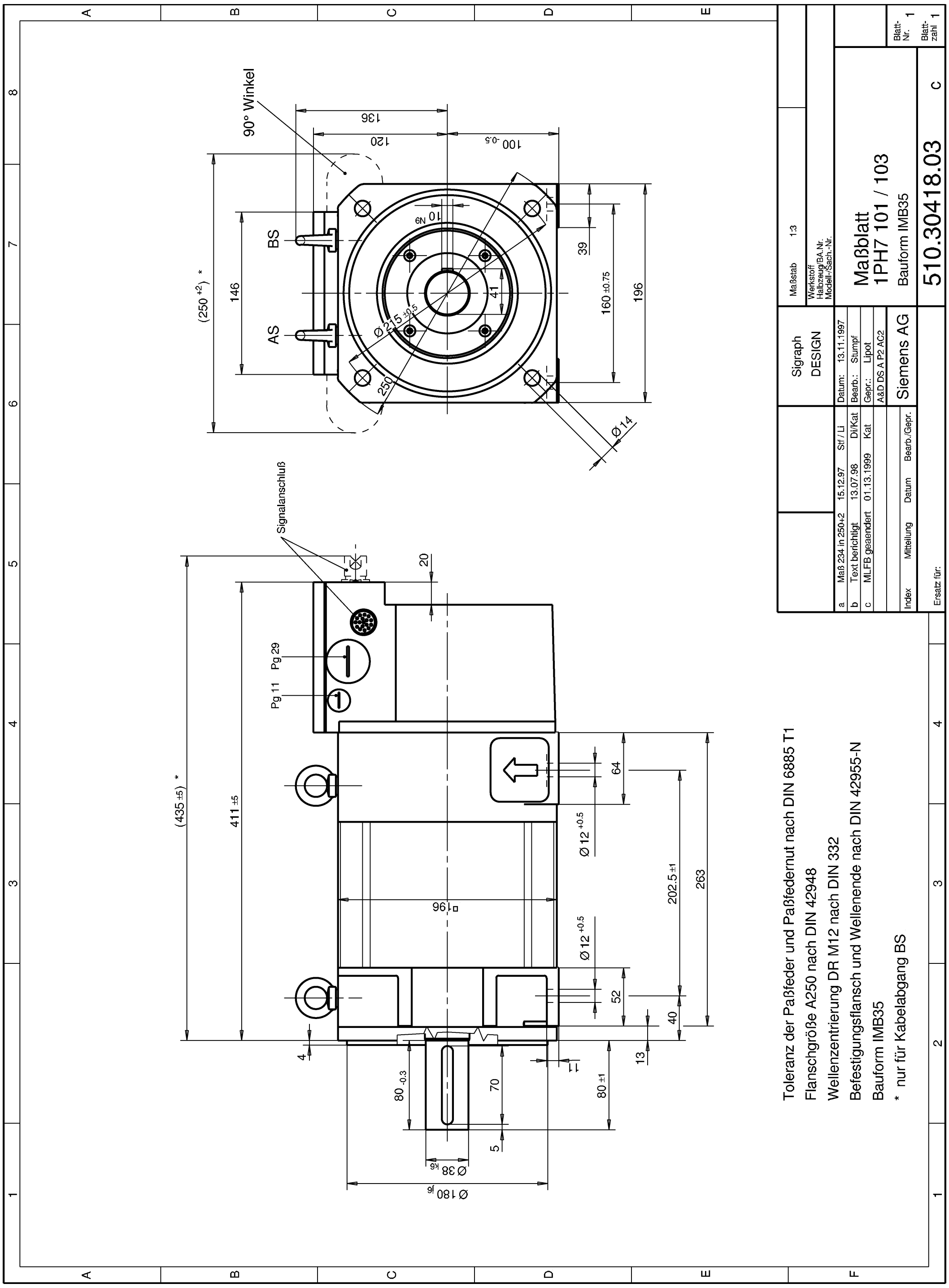


Fig. 9-7 1PH7101 to 1PH7103, IM B35, air flow direction, DE – NDE or NDE – DE

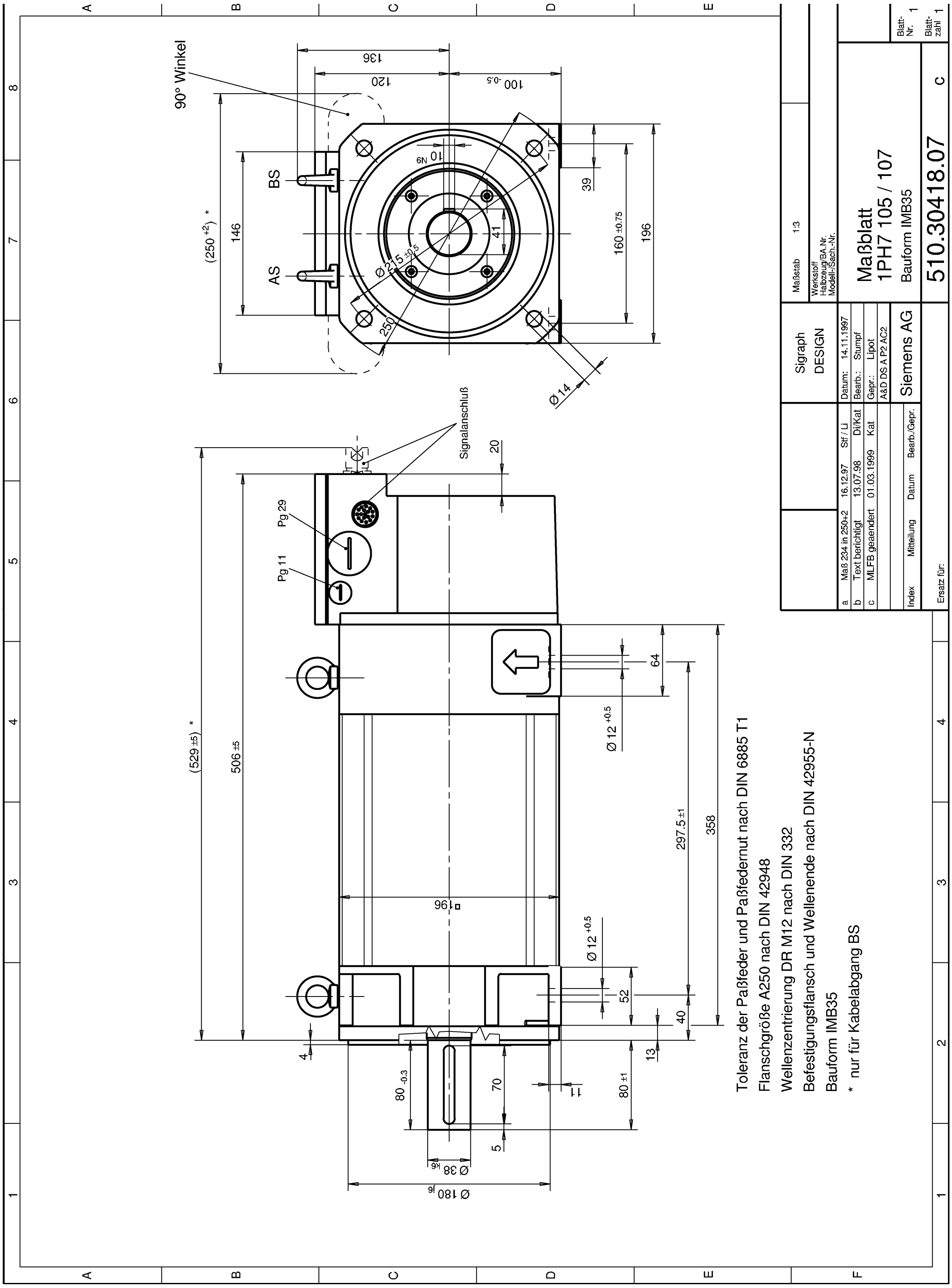


Fig. 9-8 1PH7105 to 1PH7107, IM B35, air flow direction DE – NDE or NDE – DE

9.2 Type of construction IM B35 with separately–driven fan

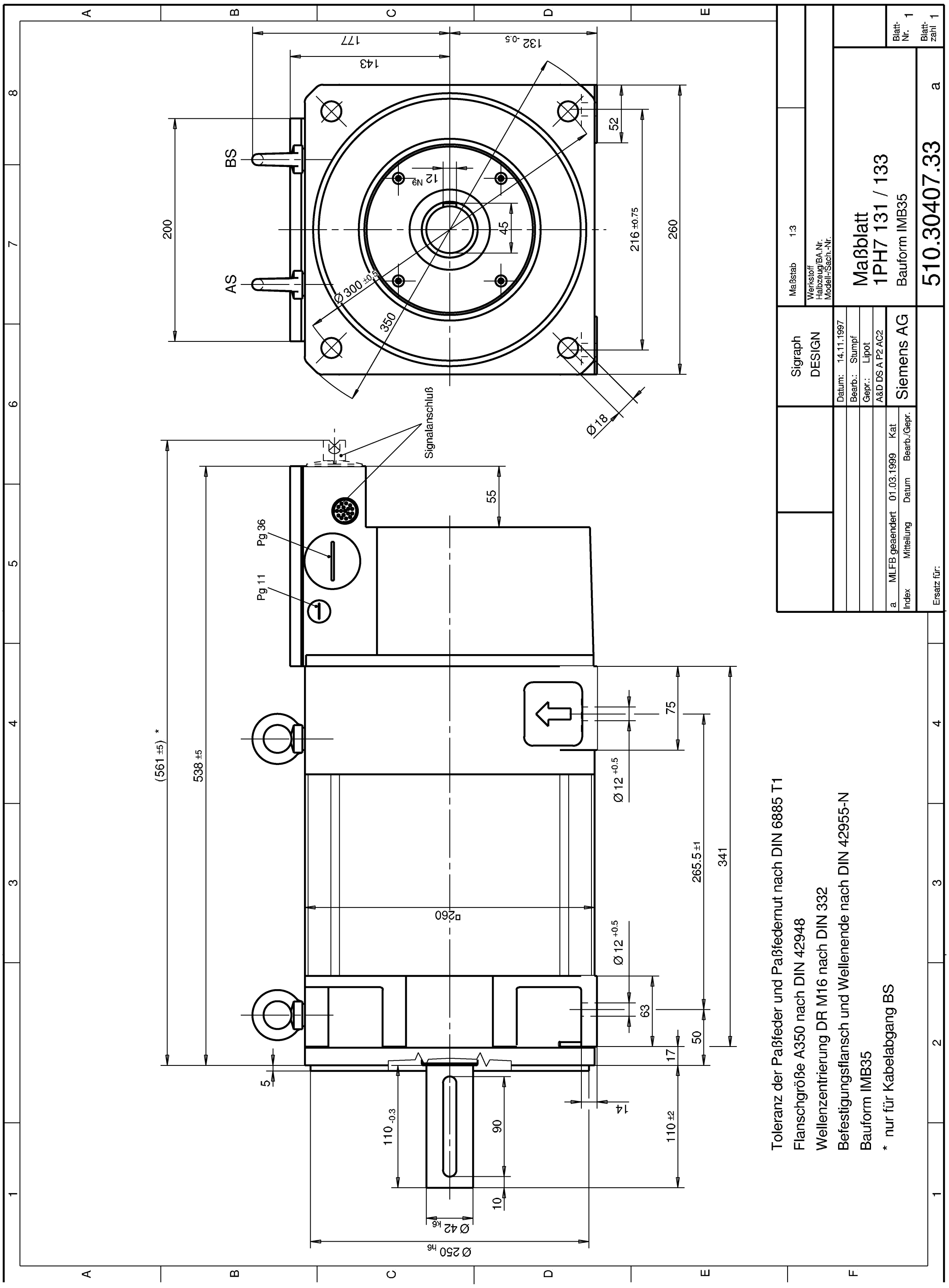


Fig. 9-9 1PH7131 to 1PH7133, IM B35, air flow direction DE – NDE or NDE – DE

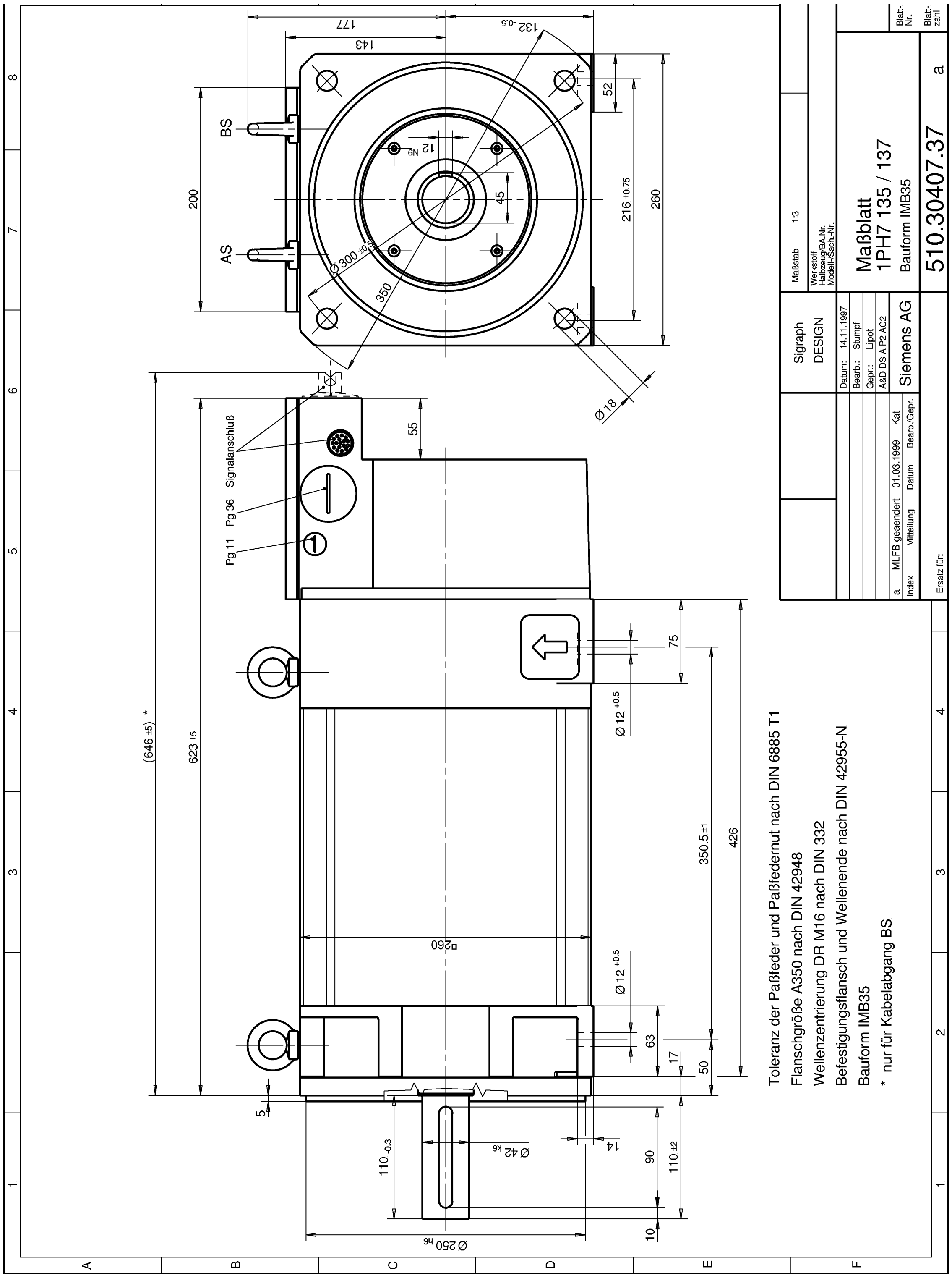


Fig. 9-10 1PH7135 to 1PH7137, IM B35, air flow direction DE – NDE or NDE – DE

9.2 Type of construction IM B35 with separately–driven fan

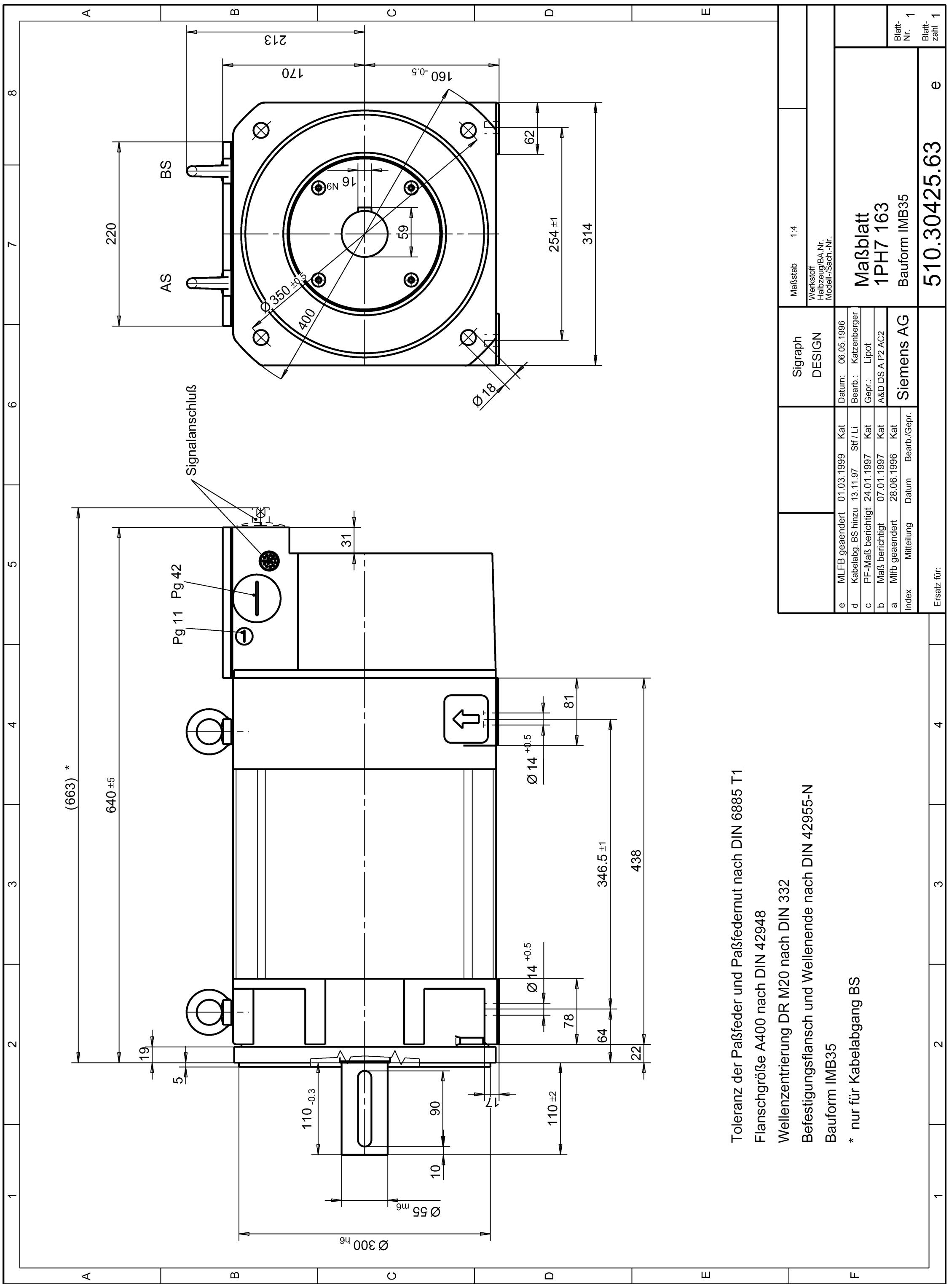


Fig. 9-11 1PH7163, IM B35, air flow direction DE – NDE or NDE – DE

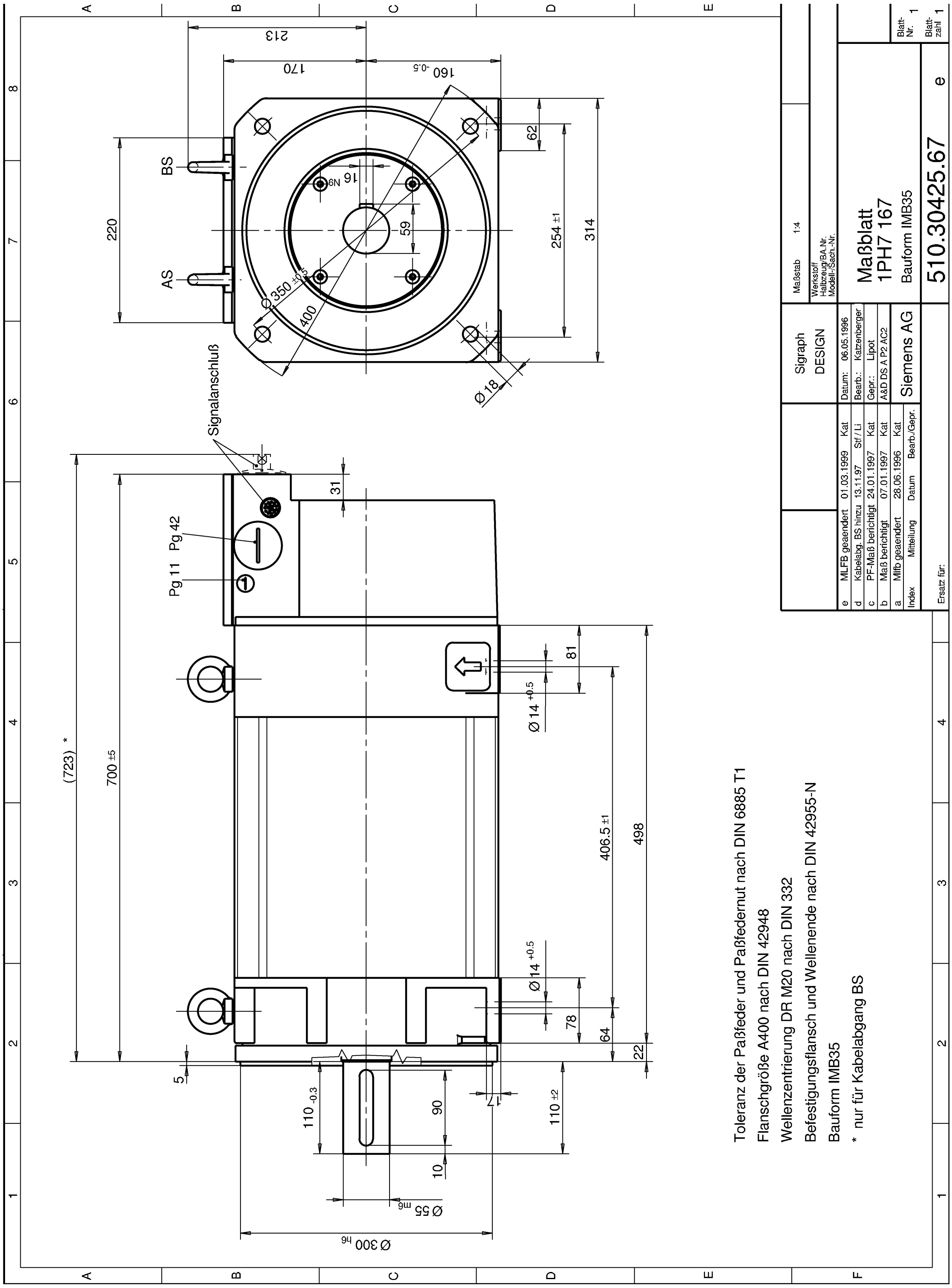


Fig. 9-12 1PH7167, IM B35, air flow direction DE – NDE or NDE – DE

9.2.2 Air flow direction DE – NDE

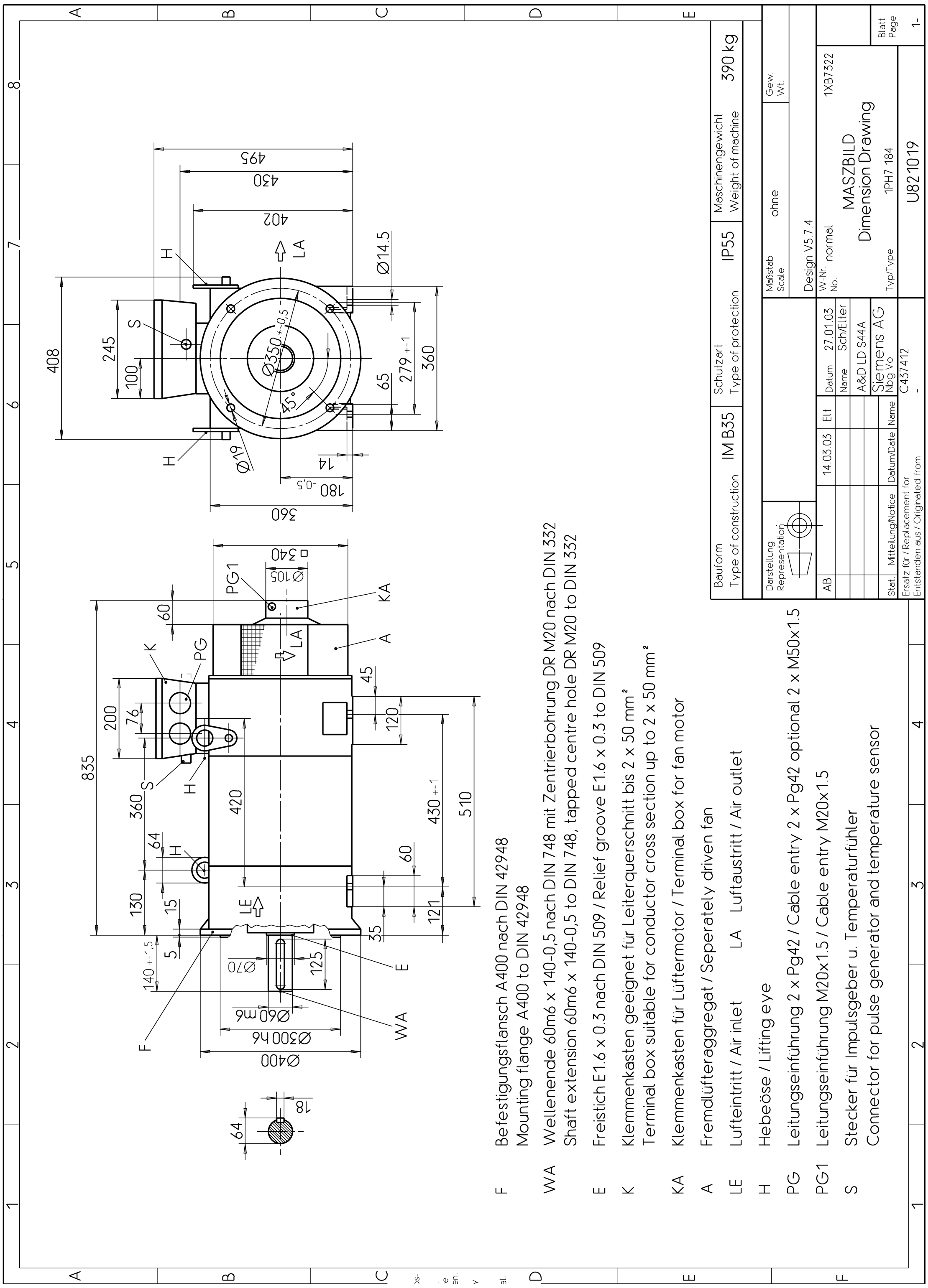


Fig. 9-13 1PH7184, IM B35, air flow direction DE – NDE, A400

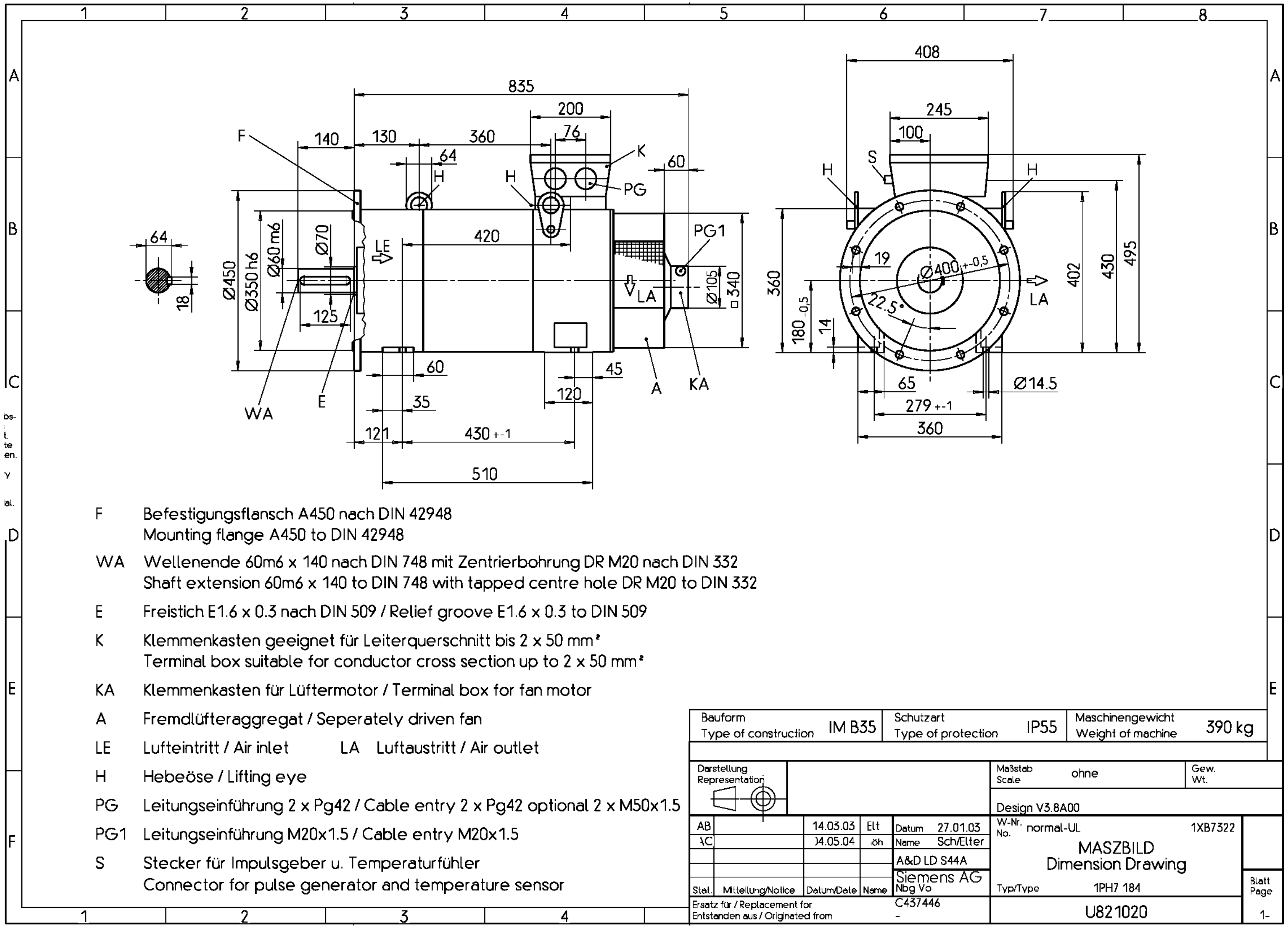


Fig. 9-14 1PH7184, IM B35, air flow direction DE – NDE, A450

9.2 Type of construction IM B35 with separately–driven fan

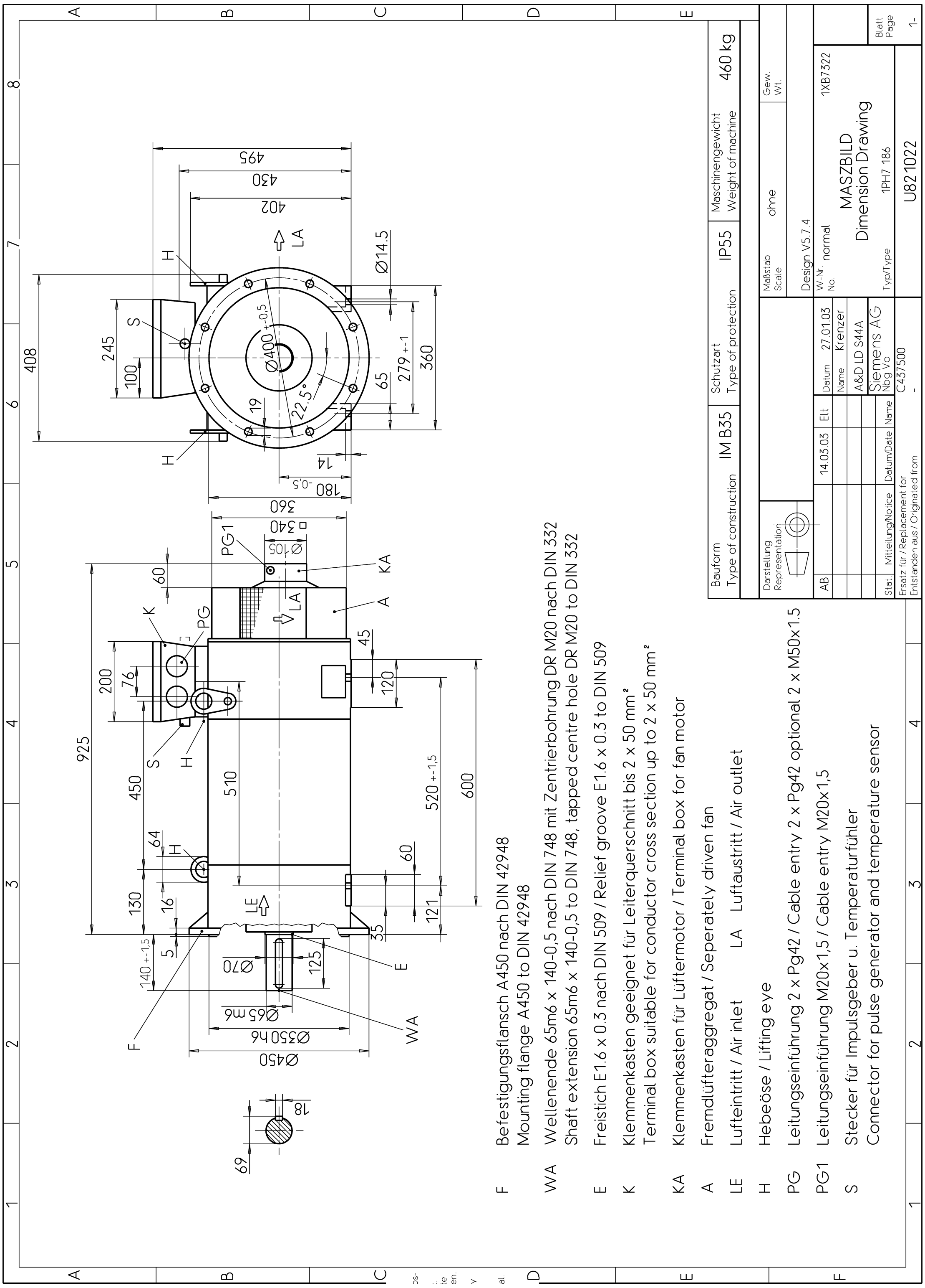


Fig. 9-15 1PH7186, IM B35, air flow direction DE – NDE, A450

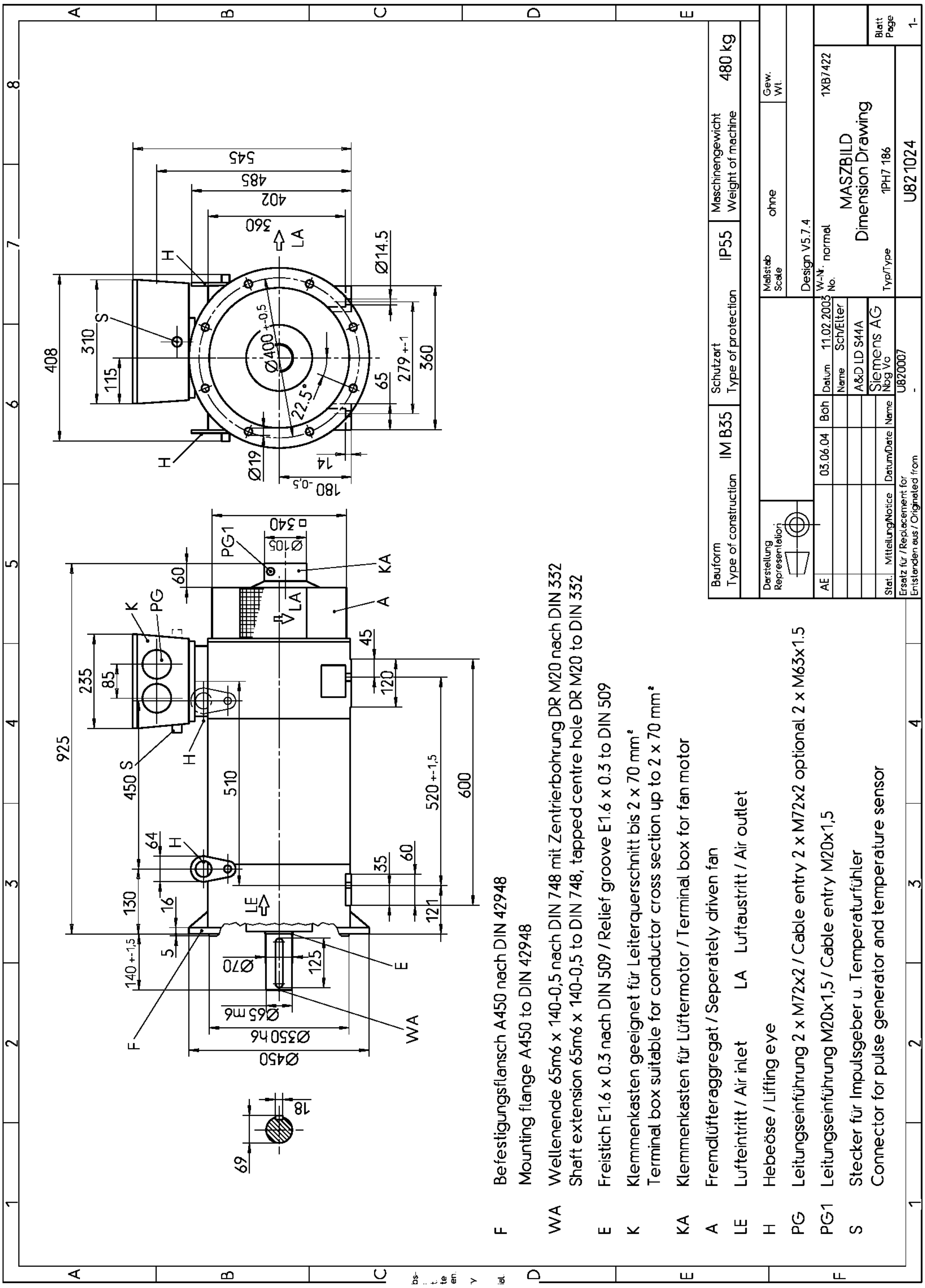


Fig. 9-16 1PH7186–F–L, IM B35, air flow direction DE – NDE, A450

9.2 Type of construction IM B35 with separately–driven fan

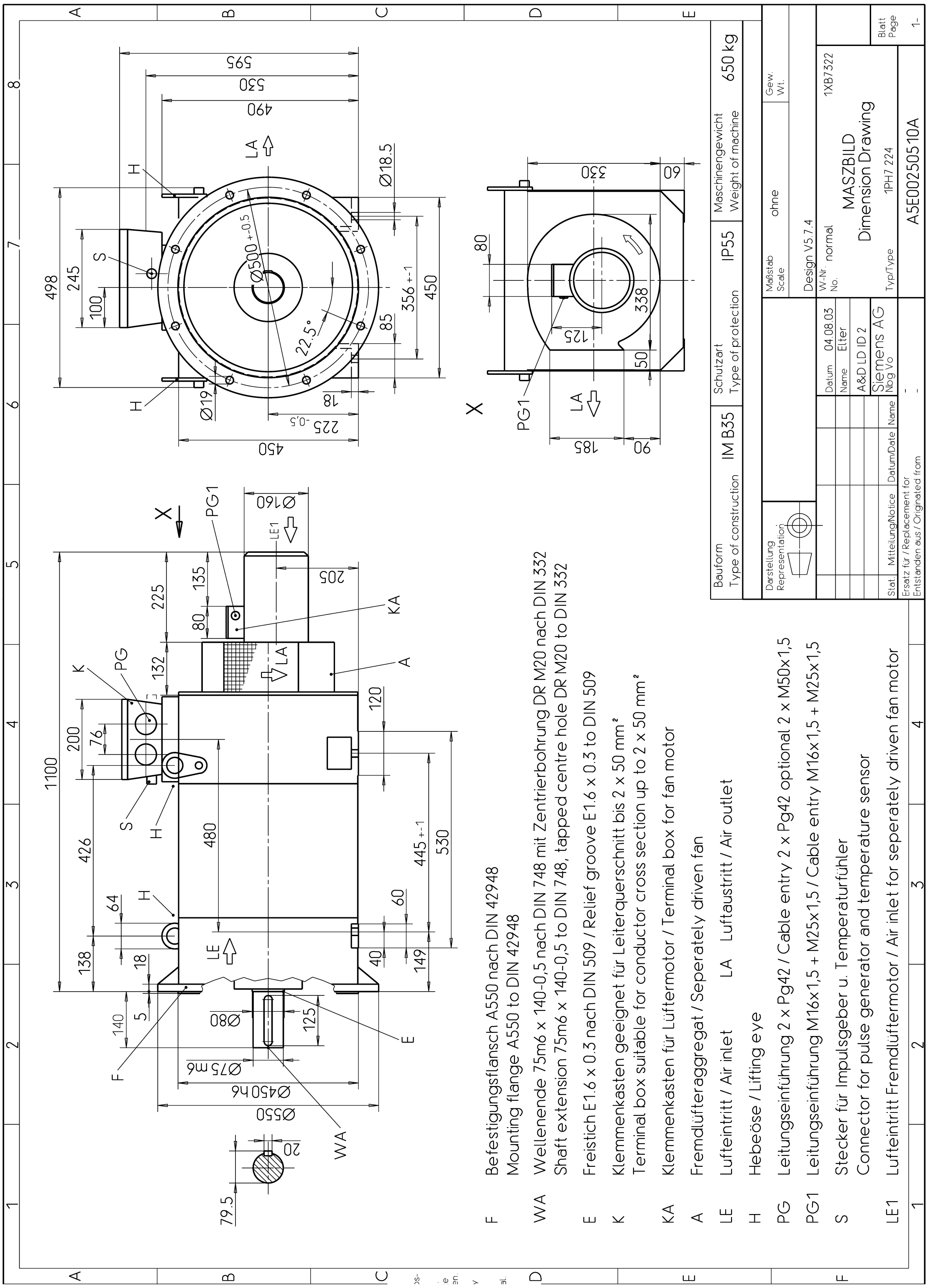


Fig. 9-17 1PH7224–B–D, IM B35, air flow direction DE – NDE

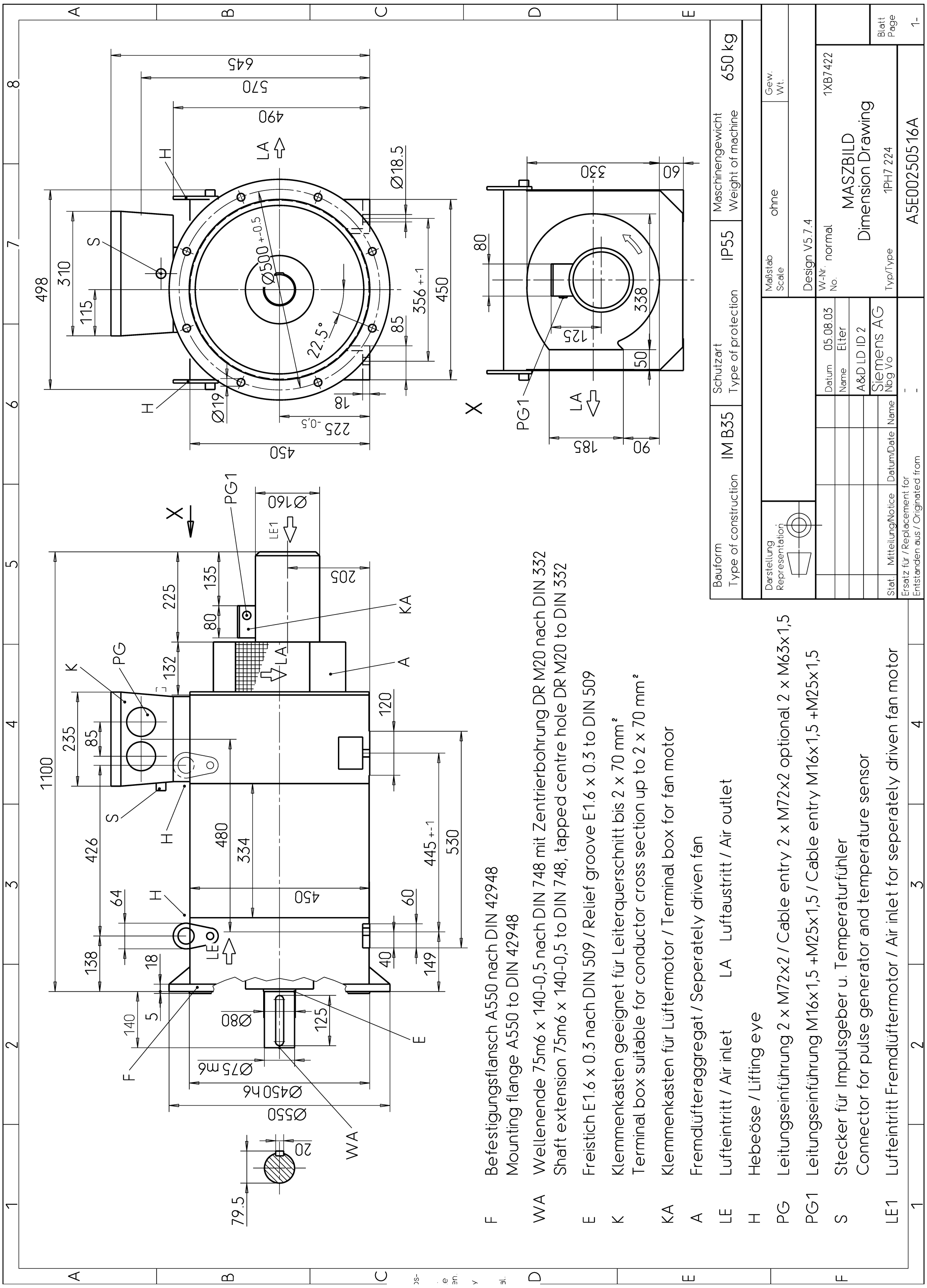


Fig. 9-18 1PH7224–U, IM B35, air flow direction DE – NDE

9.2 Type of construction IM B35 with separately–driven fan

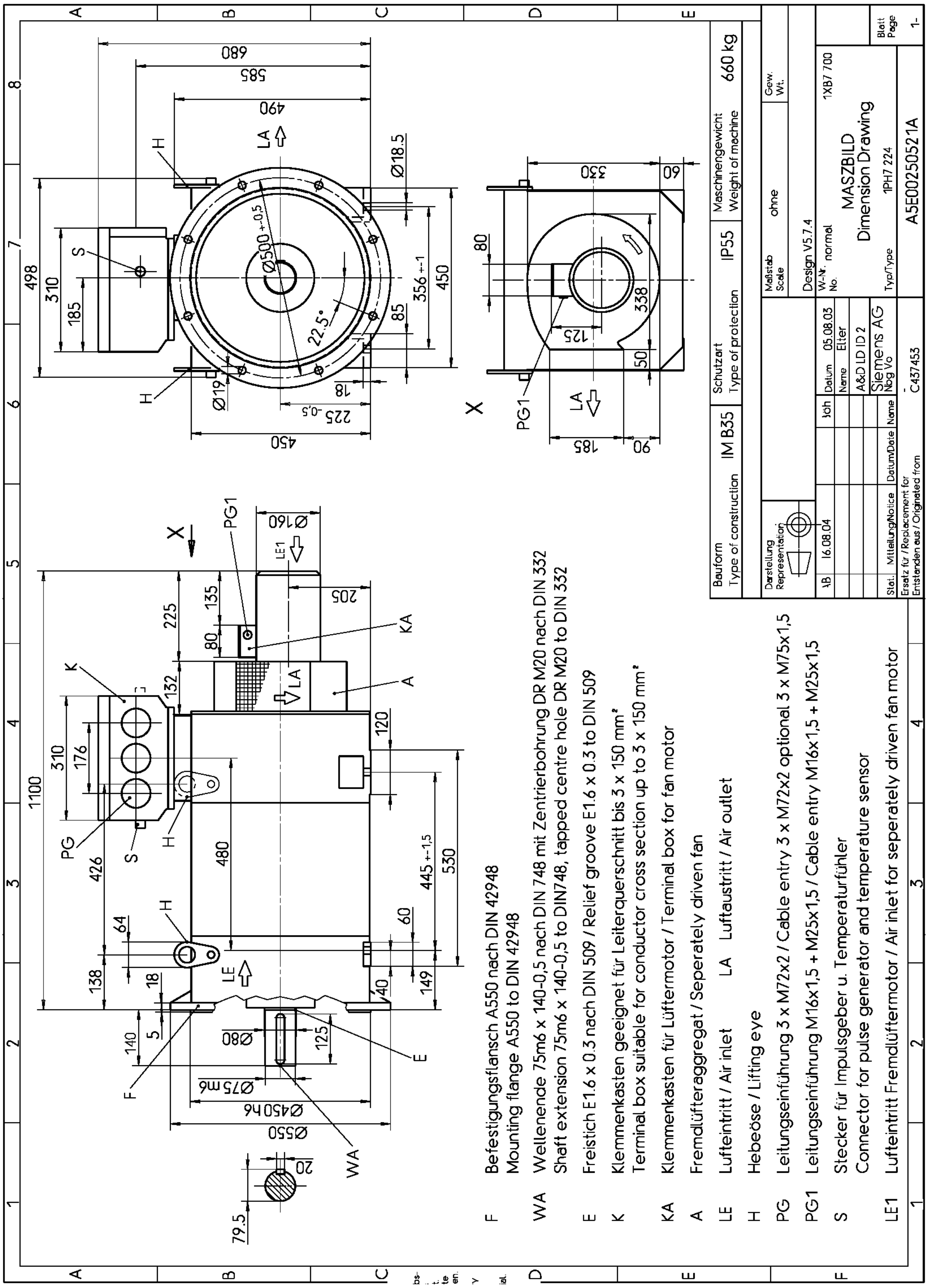


Fig. 9-19 1PH7224–L, IM B35, air flow direction DE – NDE

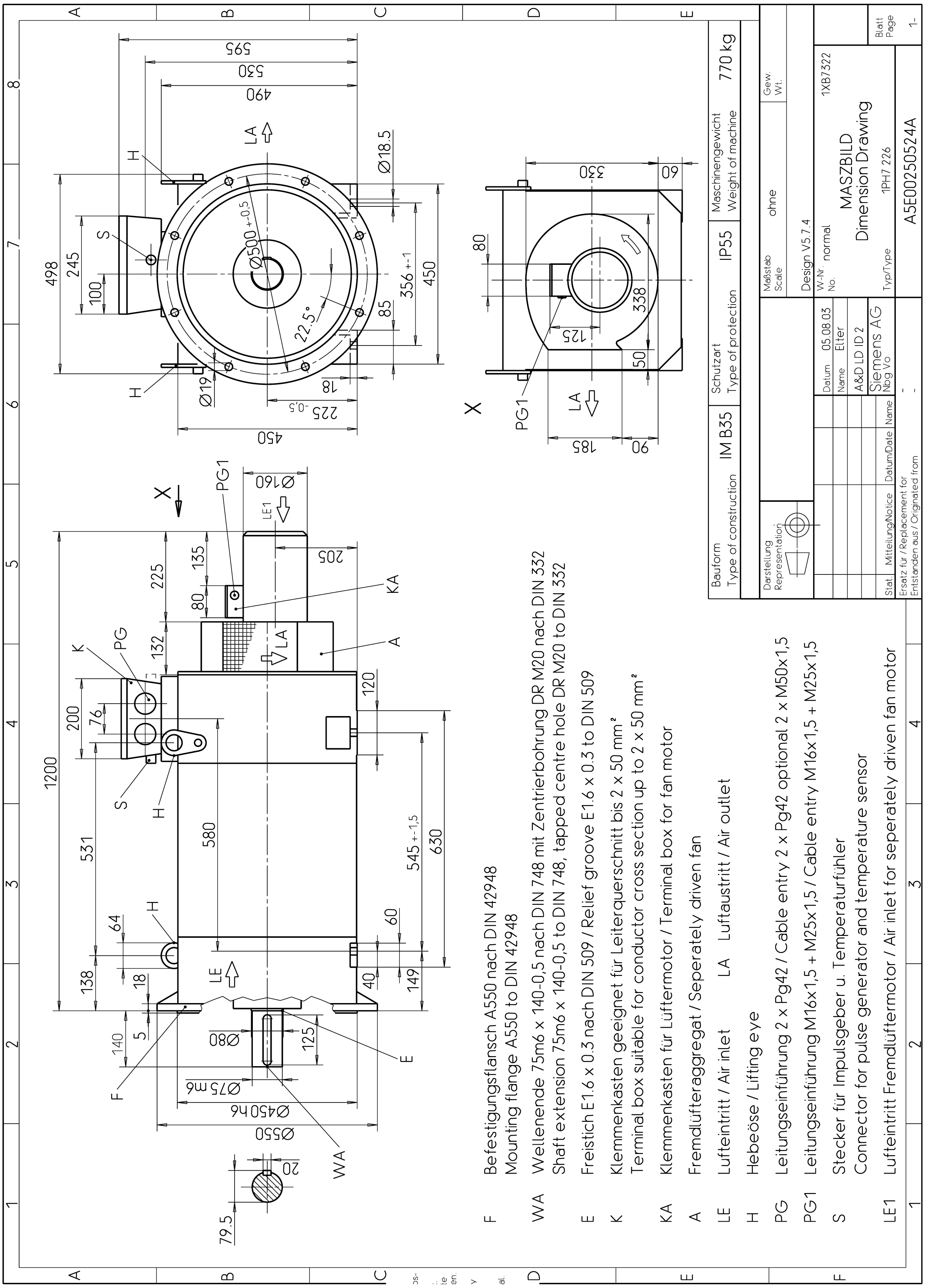


Fig. 9-20 1PH7226–B, IM B35, air flow direction DE – NDE

9.2 Type of construction IM B35 with separately–driven fan

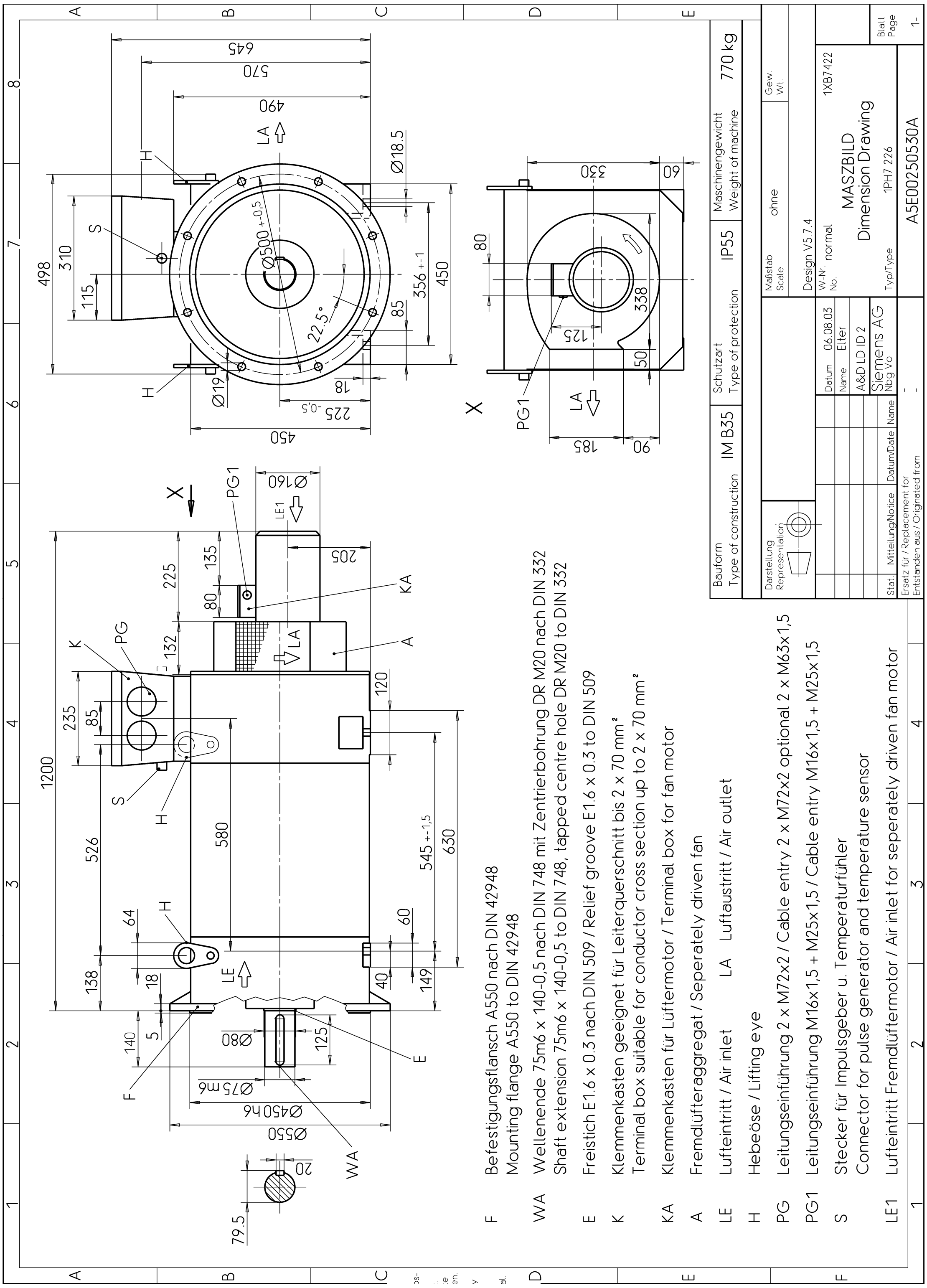
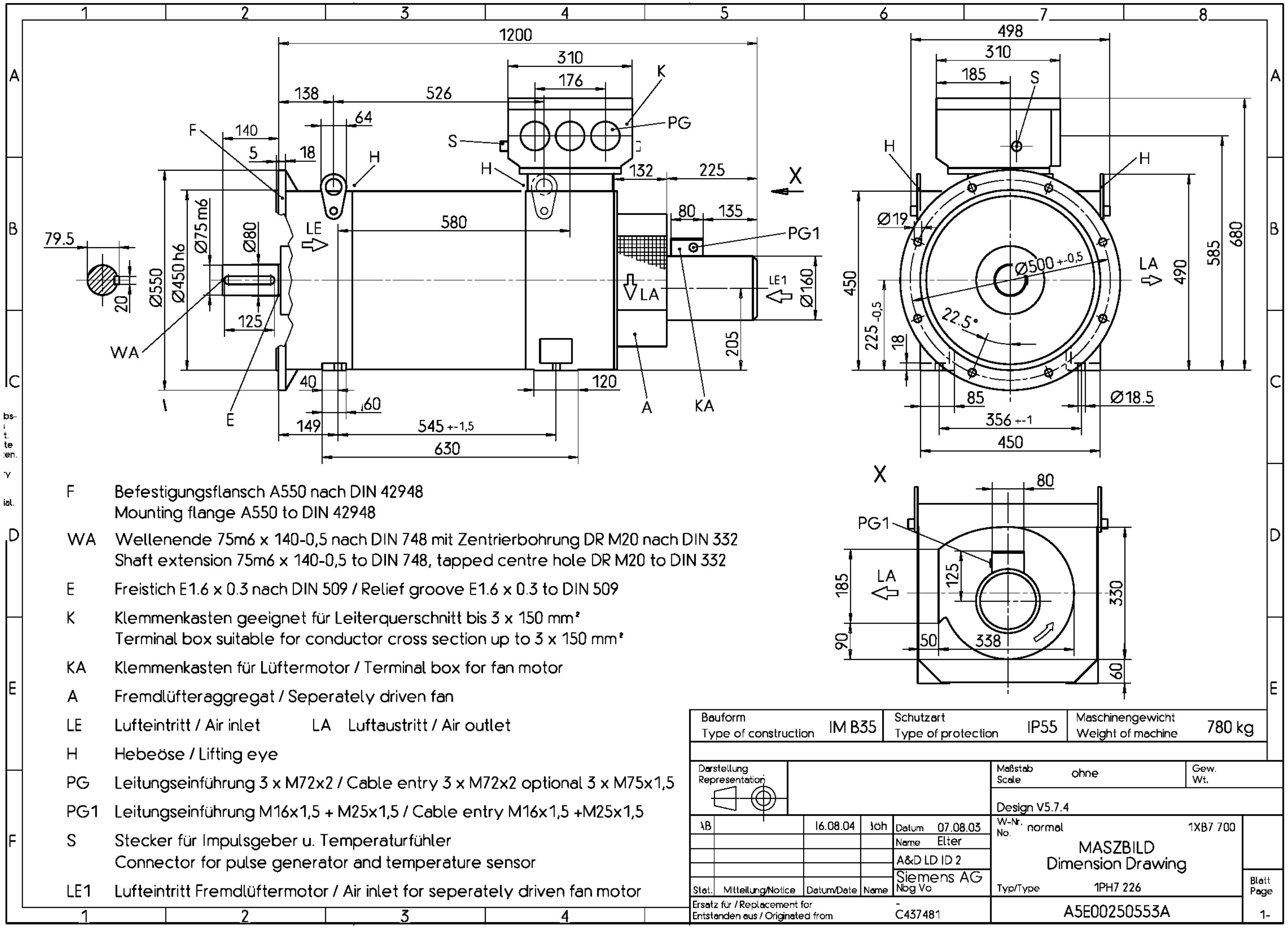


Fig. 9-21 1PH7226–D, IM B35, air flow direction DE – NDE



F Befestigungsflansch A550 nach DIN 42948
Mounting flange A550 to DIN 42948

WA Wellenende 75m6 x 140-0,5 nach DIN 748 mit Zentrierbohrung DR M20 nach DIN 332
Shaft extension 75m6 x 140-0,5 to DIN 748, tapped centre hole DR M20 to DIN 332

E Freistich E1.6 x 0.3 nach DIN 509 / Relief groove E1.6 x 0.3 to DIN 509

K Klemmenkasten geeignet für Leiterquerschnitt bis 3 x 150 mm²
Terminal box suitable for conductor cross section up to 3 x 150 mm²

KA Klemmenkasten für Lüftermotor / Terminal box for fan motor

A Fremdlüfteraggregat / Seperately driven fan

LE Lufteintritt / Air inlet LA Luftaustritt / Air outlet

H Hebeöse / Lifting eye

PG Leitungseinführung 3 x M72x2 / Cable entry 3 x M72x2 optional 3 x M75x1,5

PG1 Leitungseinführung M16x1,5 + M25x1,5 / Cable entry M16x1,5 +M25x1,5

S Stecker für Impulsgeber u. Temperaturfühler
Connector for pulse generator and temperature sensor

LE1 Lufteintritt Fremdlüftermotor / Air inlet for seperately driven fan motor

Fig. 9-22 1PH7226–F–L, IM B35, air flow direction DE – NDE

9.2 Type of construction IM B35 with separately–driven fan

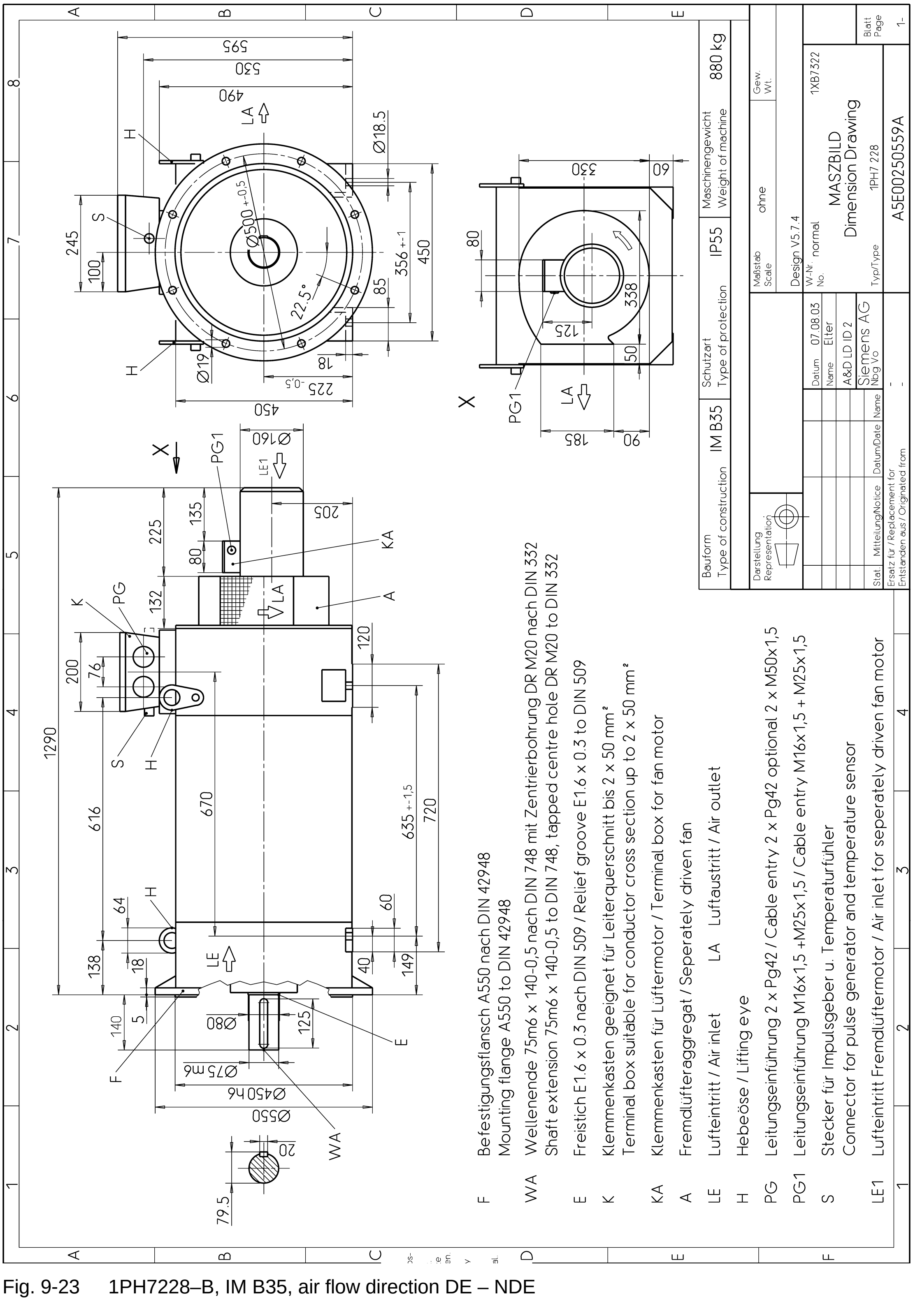


Fig. 9-23 1PH7228–B, IM B35, air flow direction DE – NDE

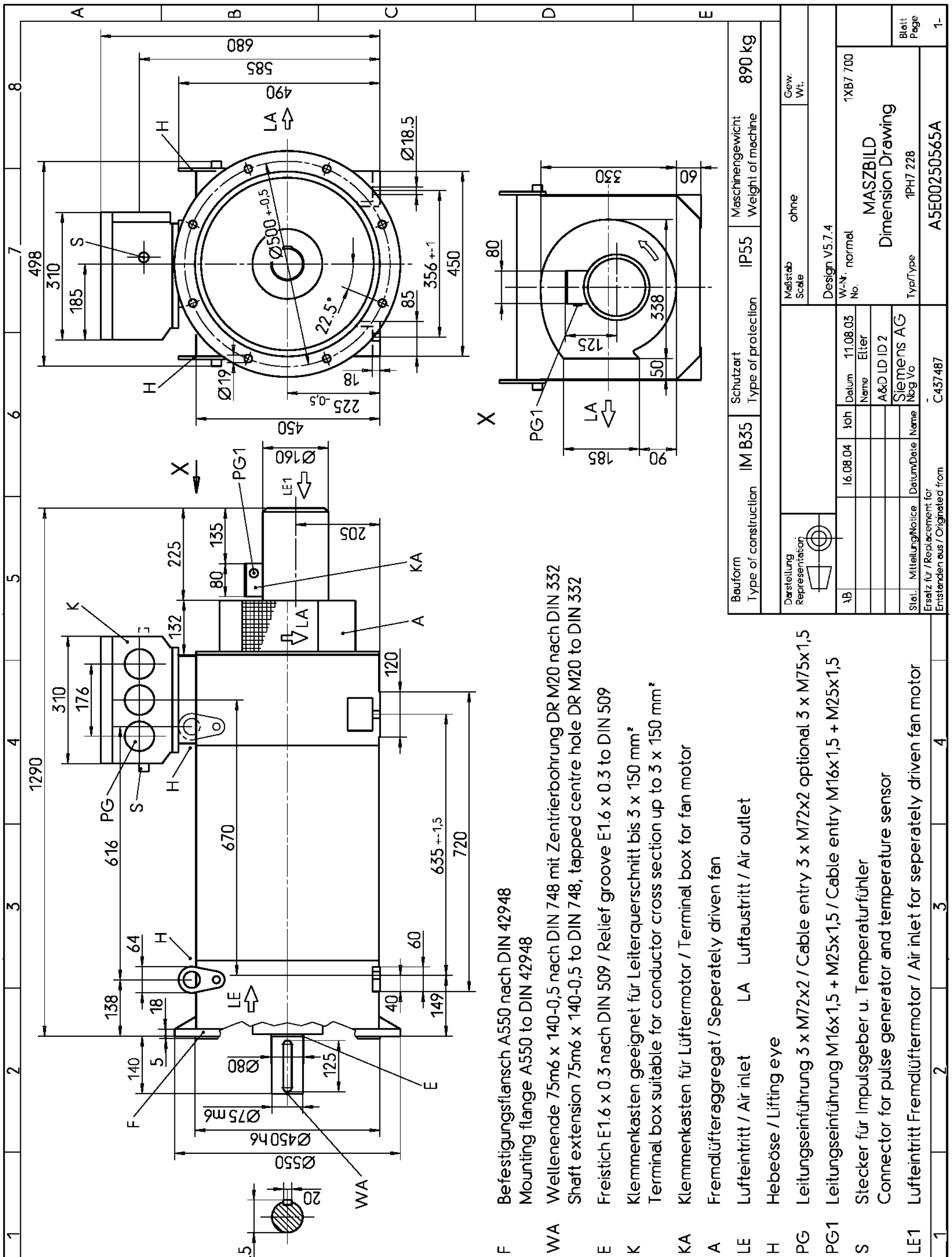


Fig. 9-24 1PH7228–D–L, IM B35, air flow direction DE – NDE

9.2.3 Air flow direction NDE – DE

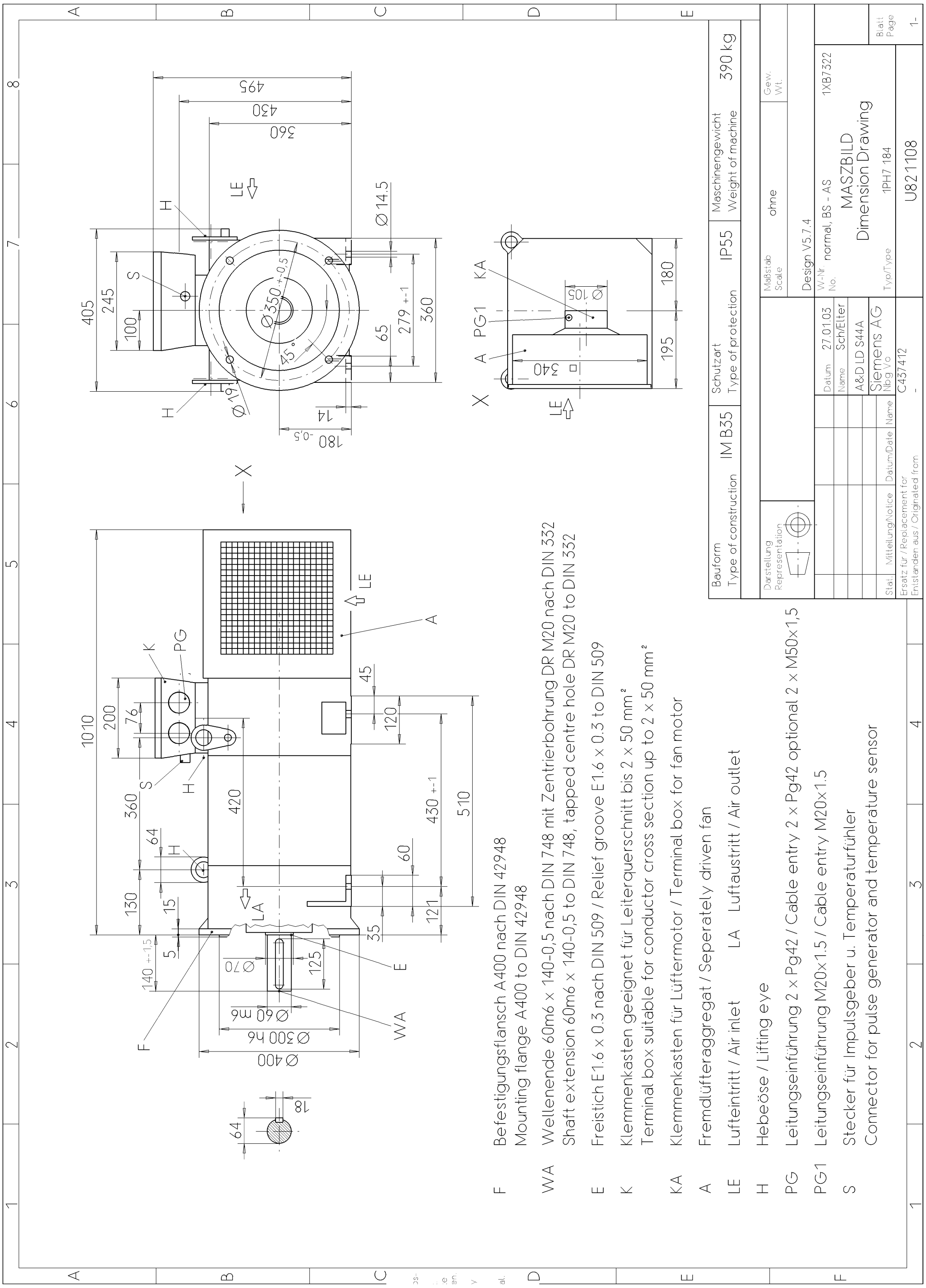


Fig. 9-25 1PH7184, IM B35, air flow direction NDE – DE, A400

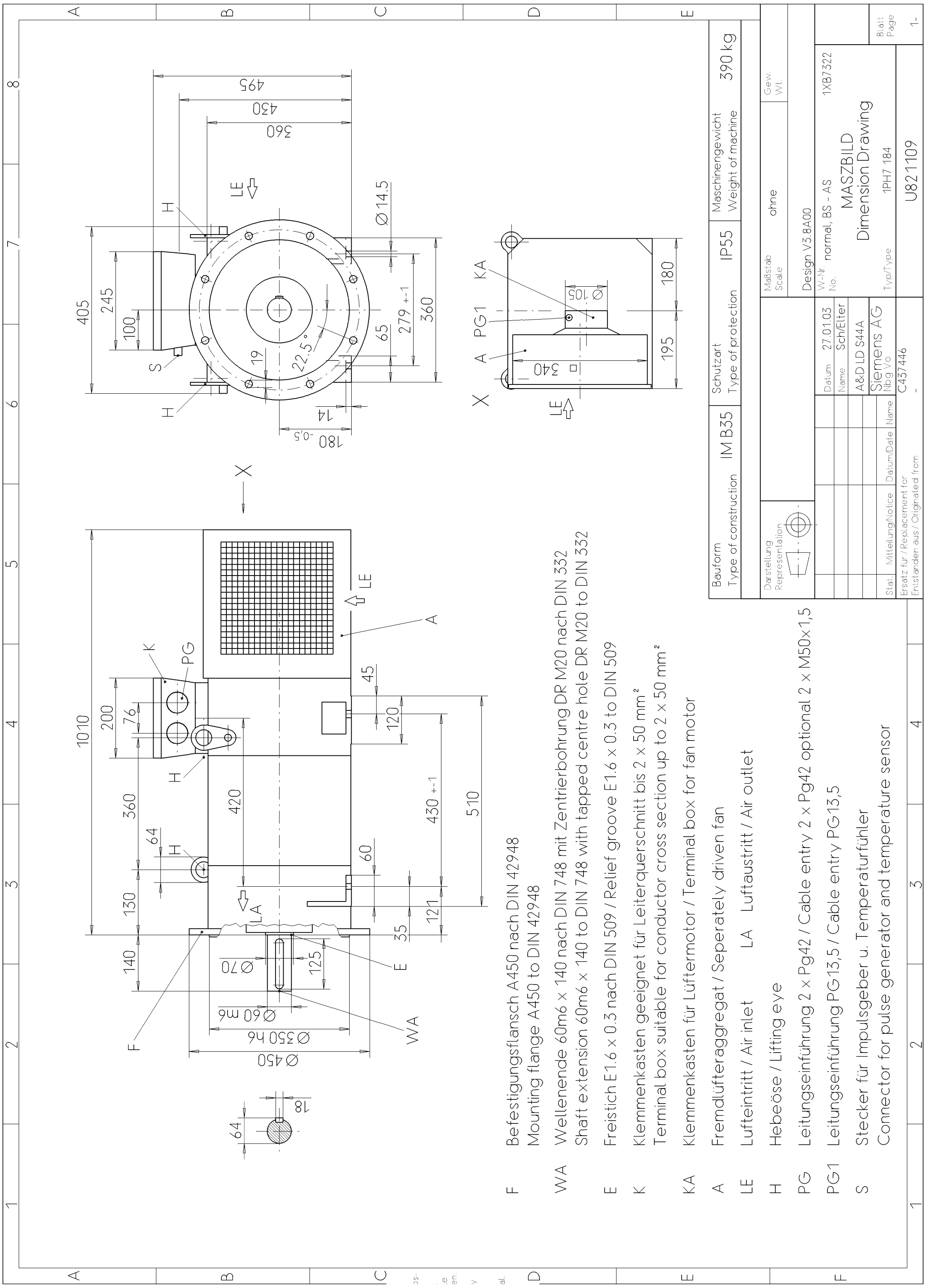
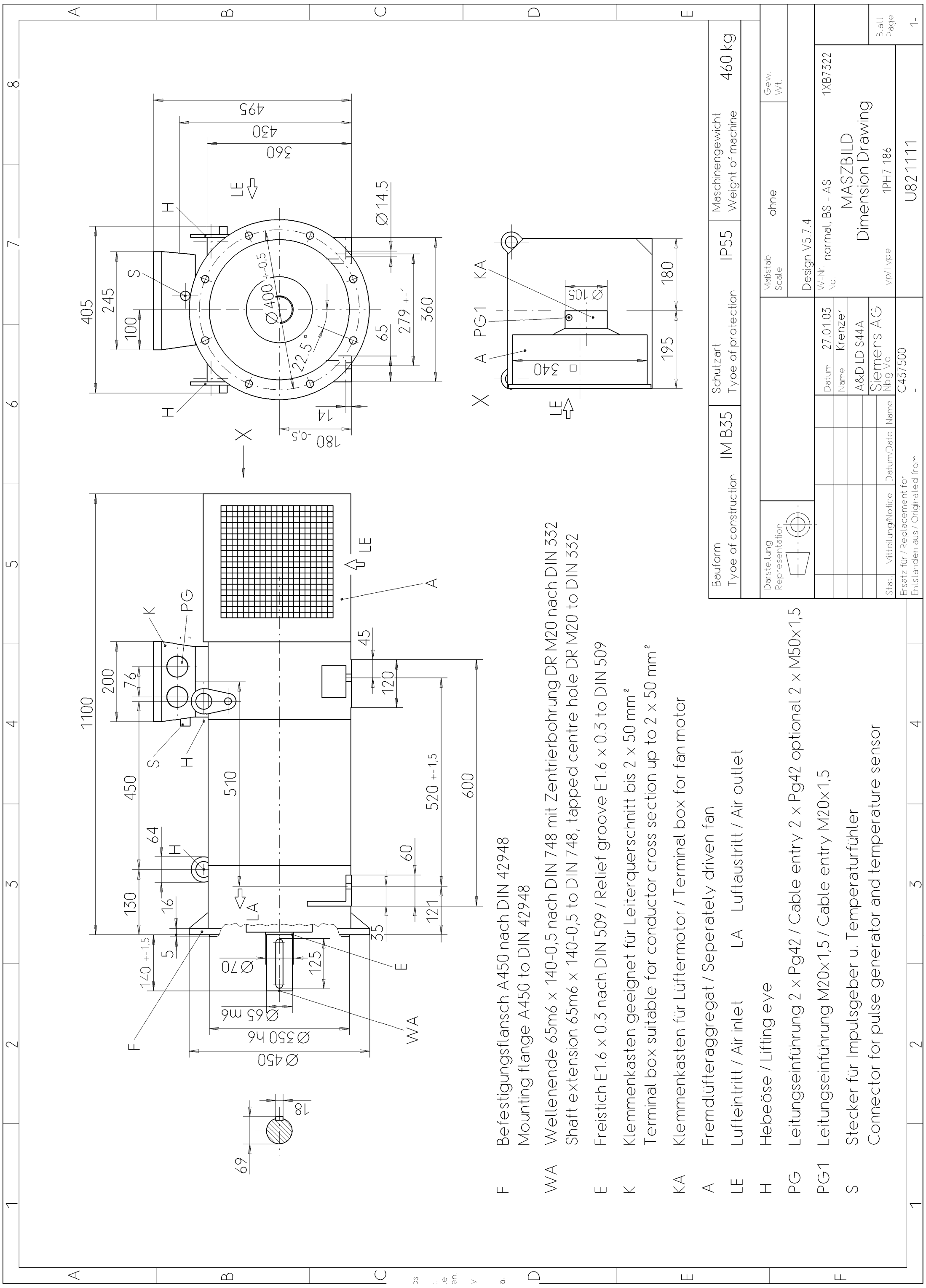


Fig. 9-26 1PH7184, IM B35, air flow direction NDE – DE, A450

9.2 Type of construction IM B35 with separately–driven fan



F Befestigungsflansch A450 nach DIN 42948
Mounting flange A450 to DIN 42948

WA Wellenende 65m6 x 140-0,5 nach DIN 748 mit Zentrierbohrung DR M20 nach DIN 332
Shaft extension 65m6 x 140-0,5 to DIN 748, tapped centre hole DR M20 to DIN 332

E Freistich E1.6 x 0.3 nach DIN 509 / Relief groove E1.6 x 0.3 to DIN 509

K Klemmenkasten geeignet für Leiterquerschnitt bis 2 x 50 mm²
Terminal box suitable for conductor cross section up to 2 x 50 mm²

KA Klemmenkasten für Lüftermotor / Terminal box for fan motor

A Fremdlüfteraggregat / Seperately driven fan

LE Lufteintritt / Air inlet LA Luftaustritt / Air outlet

H Hebeöse / Lifting eye

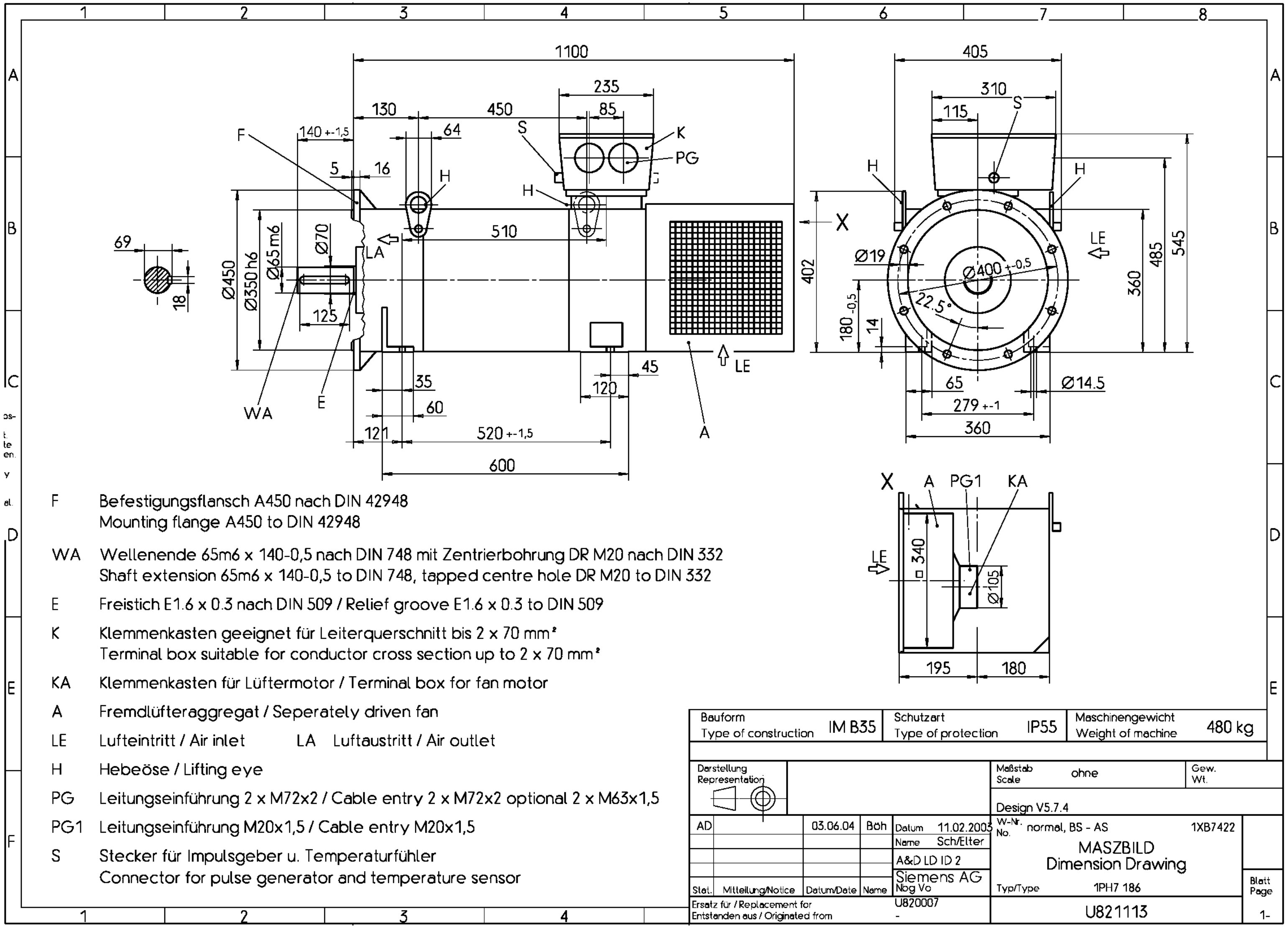
PG Leitungseinführung 2 x Pg42 / Cable entry 2 x Pg42 optional 2 x M50x1,5

PG1 Leitungseinführung M20x1,5 / Cable entry M20x1,5

S Stecker für Impulsgeber u. Temperaturfühler
Connector for pulse generator and temperature sensor

Bauform / Type of construction IM B35
Schutzart / Type of protection IP55
Maschinengewicht / Weight of machine 460 kg
Gew. / Wt.
Darstellung / Representation
Maßstab / Scale ohne
Design V5.7.4
W-Nr / No. normal, BS - AS
MASZBILD
Dimension Drawing
1XB7322
Typ/Type 1PH7 186
U821111
Datum 27.01.03
Name Krenzer
A&D LD S44A
Siemens AG
Nbg Vo
C437500
Stat | Mitteilung/Notice | Datum/Date | Name
Ersatz für / Replacement for
Entstanden aus / Originated from
Blatt / Page 1-

Fig. 9-27 1PH7186, IM B35, air flow direction NDE – DE



F Befestigungsflansch A450 nach DIN 42948
Mounting flange A450 to DIN 42948

WA Wellenende 65m6 x 140-0,5 nach DIN 748 mit Zentrierbohrung DR M20 nach DIN 332
Shaft extension 65m6 x 140-0,5 to DIN 748, tapped centre hole DR M20 to DIN 332

E Freistich E1.6 x 0.3 nach DIN 509 / Relief groove E1.6 x 0.3 to DIN 509

K Klemmenkasten geeignet für Leiterquerschnitt bis 2 x 70 mm²
Terminal box suitable for conductor cross section up to 2 x 70 mm²

KA Klemmenkasten für Lüftermotor / Terminal box for fan motor

A Fremdlüfteraggregat / Seperately driven fan

LE Lufteintritt / Air inlet LA Luftaustritt / Air outlet

H Hebeöse / Lifting eye

PG Leitungseinführung 2 x M72x2 / Cable entry 2 x M72x2 optional 2 x M63x1,5

PG1 Leitungseinführung M20x1,5 / Cable entry M20x1,5

S Stecker für Impulsgeber u. Temperaturfühler
Connector for pulse generator and temperature sensor

Bauform / Type of construction IM B35
Schutzart / Type of protection IP55
Maschinengewicht / Weight of machine 480 kg

Darstellung / Representation
Maßstab / Scale ohne
Gew. / Wt.
Design V5.7.4
AD 03.06.04 Böh
Datum 11.02.2003
Name Sch/Elter
A&D LD ID 2
Siemens AG
Nbg Vo
W-Nr. / No. normal, BS - AS 1XB7422
MASZBILD
Dimension Drawing
Typ/Type 1PH7 186
Stat. Mitteilung/Notice Datum/Date Name
Ersatz für / Replacement for
Entstanden aus / Originated from U820007 -
U821113
Blatt / Page 1-

Fig. 9-28 1PH7186–F–L, IM B35, air flow direction NDE – DE, A450

9.2 Type of construction IM B35 with separately–driven fan

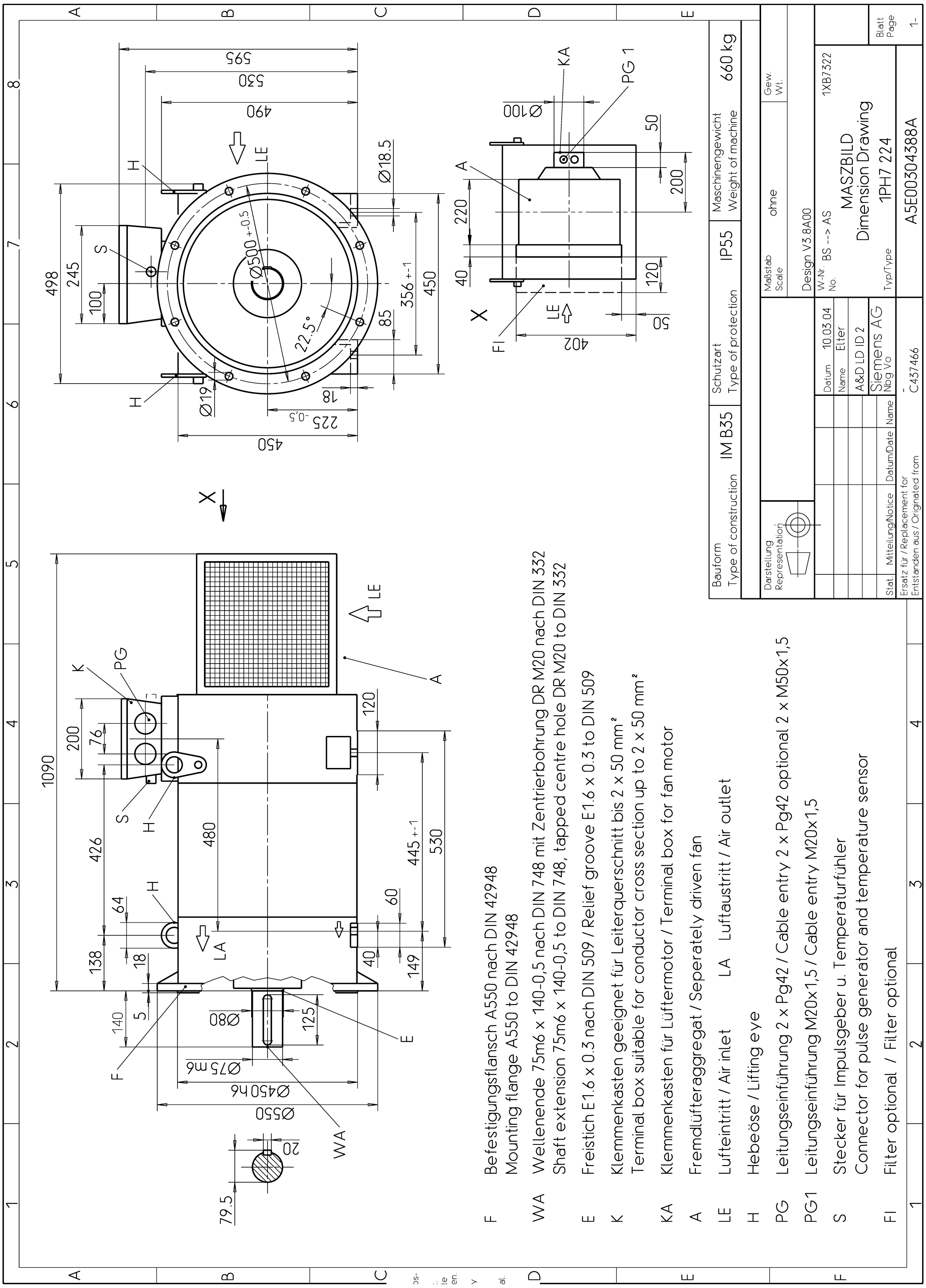


Fig. 9-29 1PH7224–B–F, IM B35, air flow direction NDE – DE

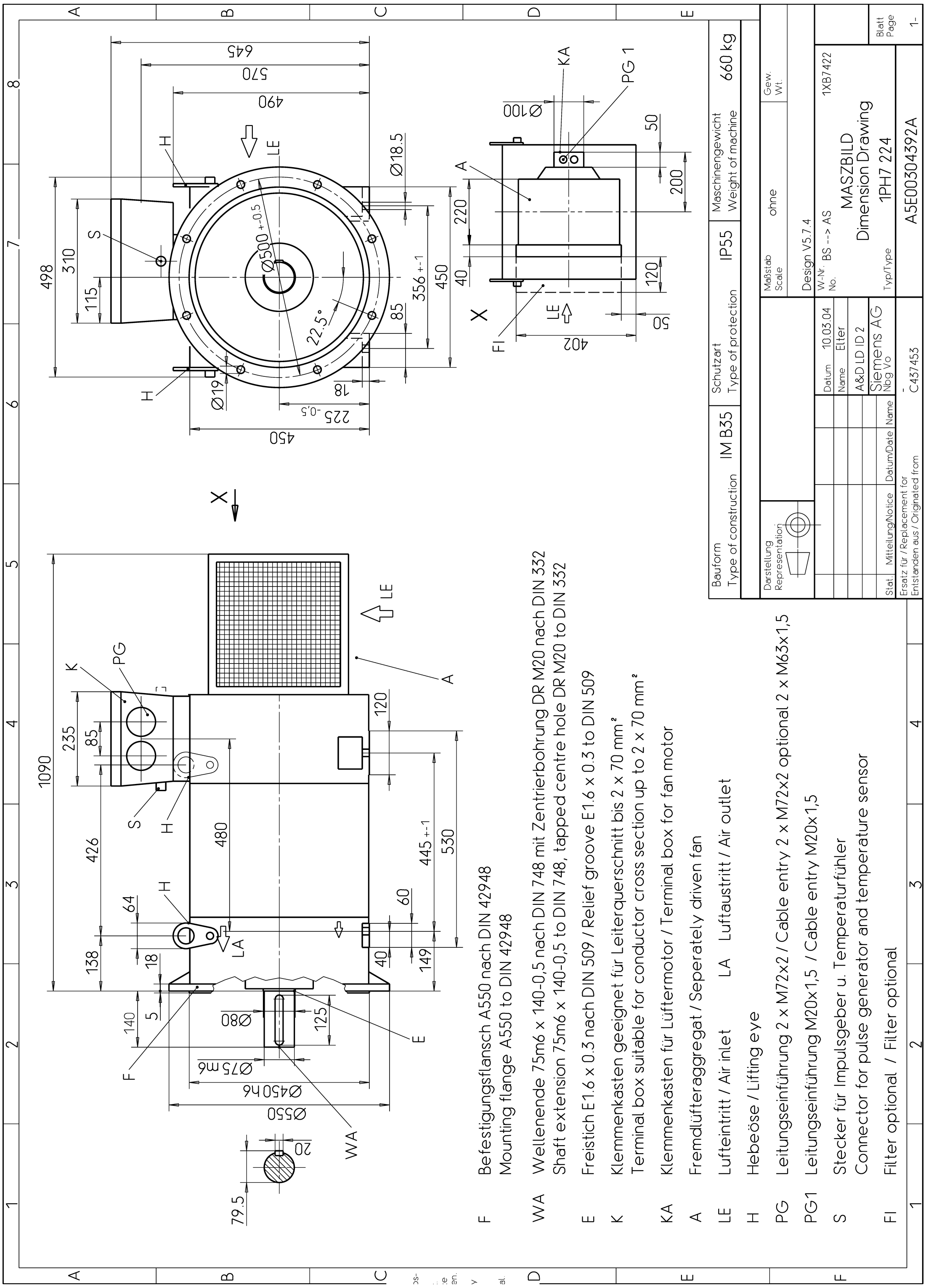


Fig. 9-30 1PH7224–U, IM B35, air flow direction NDE – DE

9.2 Type of construction IM B35 with separately–driven fan

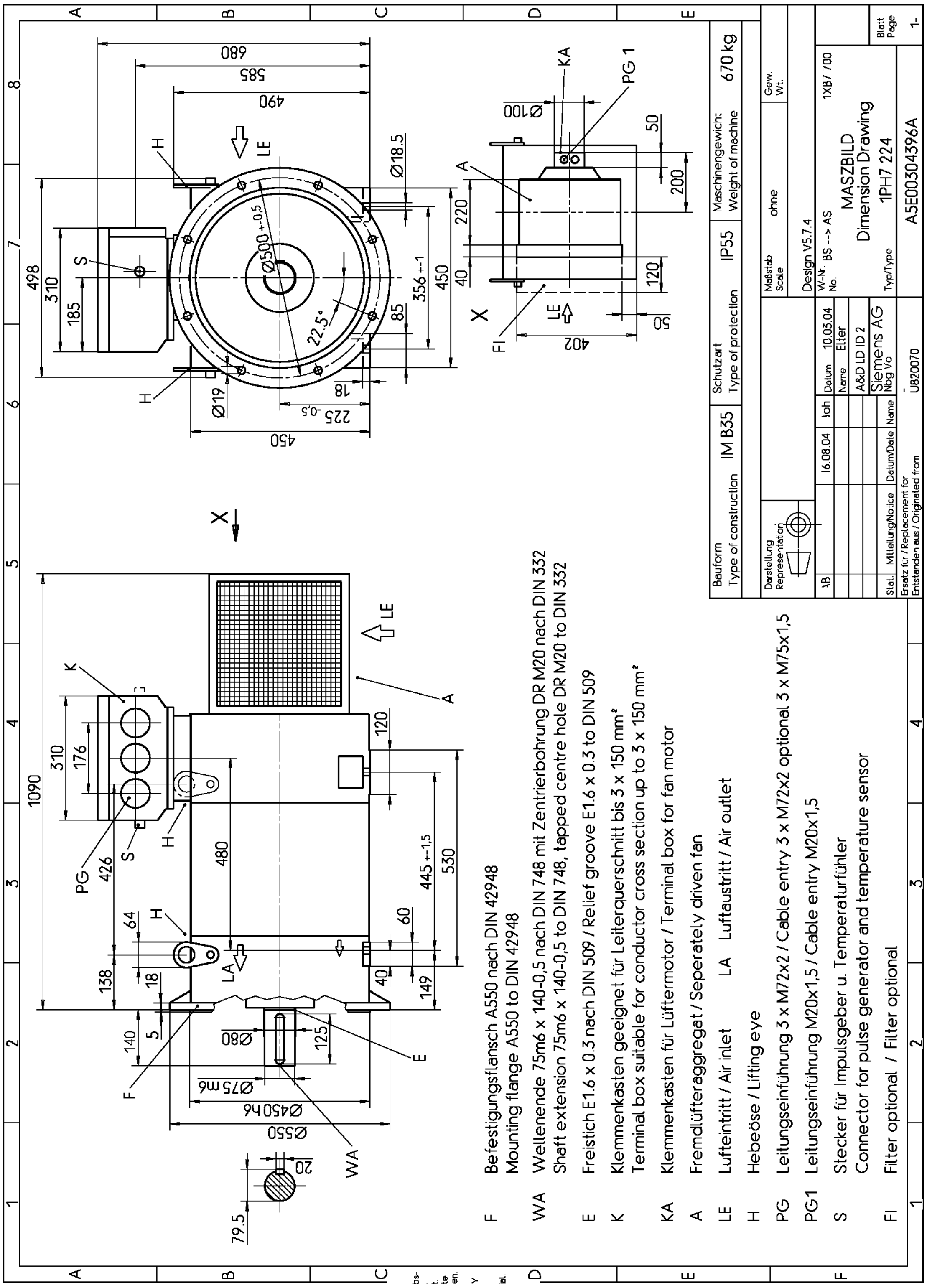


Fig. 9-31 1PH7224–L, IM B35, air flow direction NDE – DE

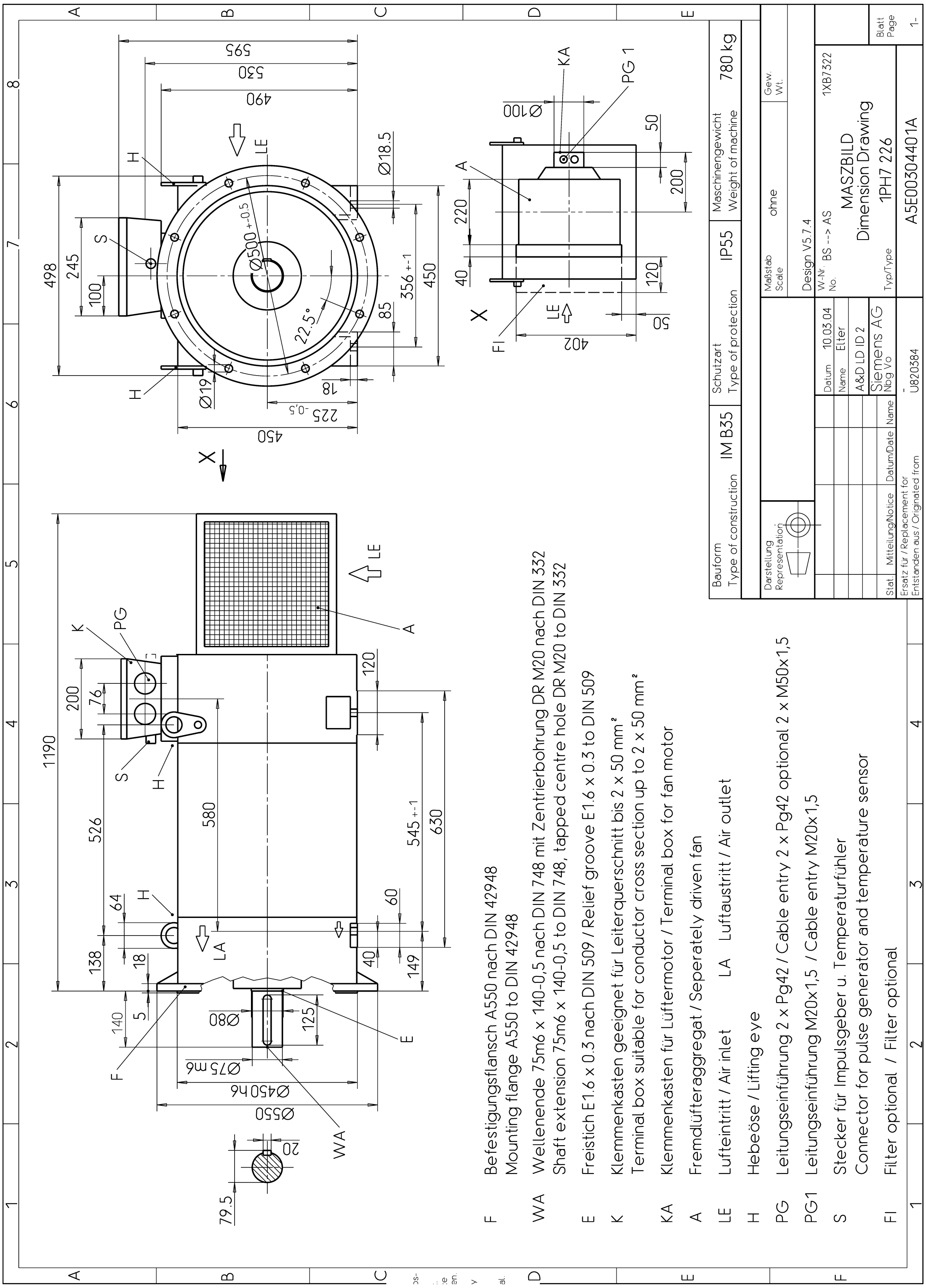


Fig. 9-32 1PH7226–B, IM B35, air flow direction NDE – DE

9.2 Type of construction IM B35 with separately–driven fan

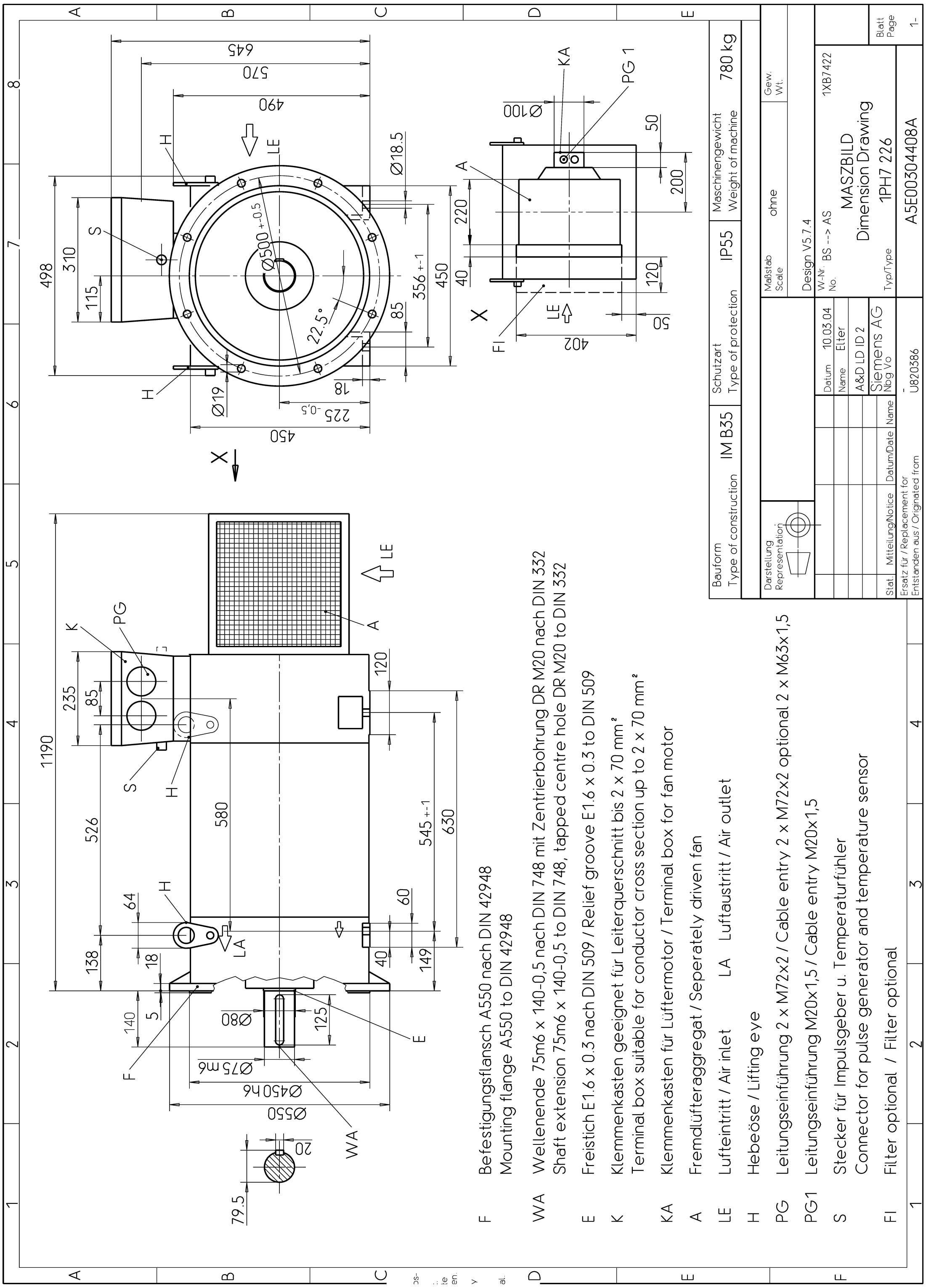


Fig. 9-33 1PH7226–D, IM B35, air flow direction NDE – DE

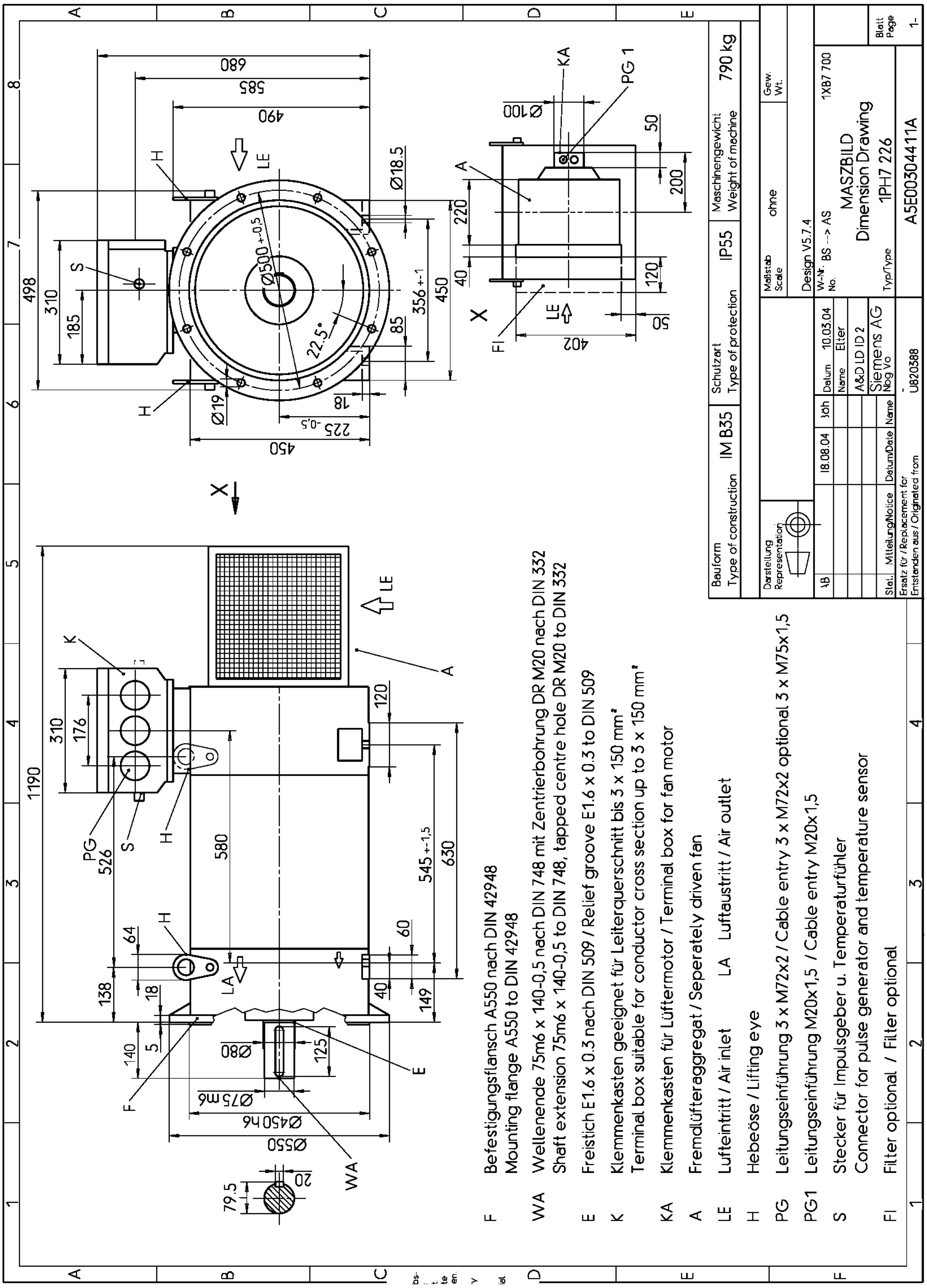


Fig. 9-34 1PH7226–F–L, IM B35, air flow direction NDE – DE

9.2 Type of construction IM B35 with separately–driven fan

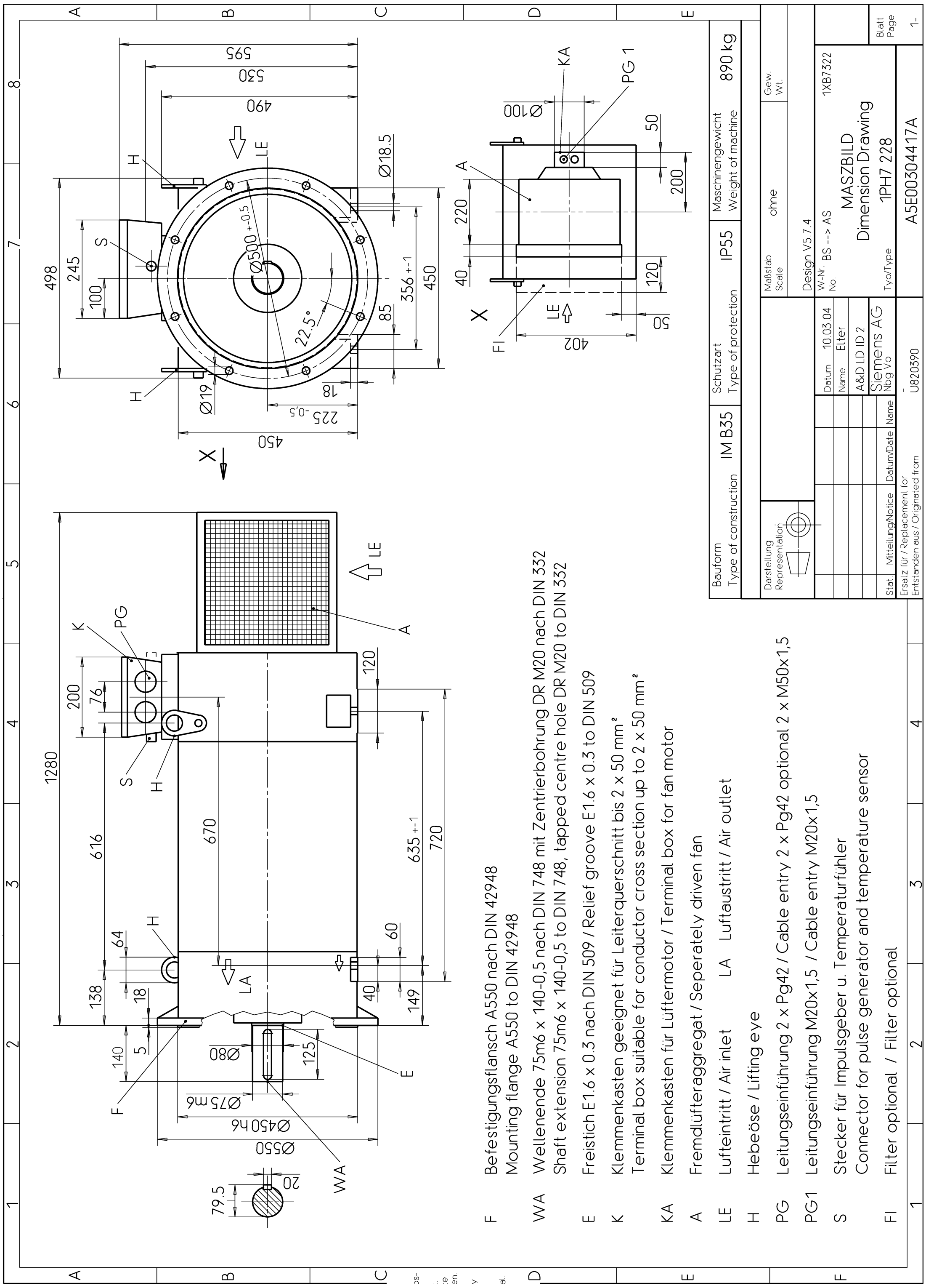


Fig. 9-35 1PH7228–B, IM B35, air flow direction NDE – DE

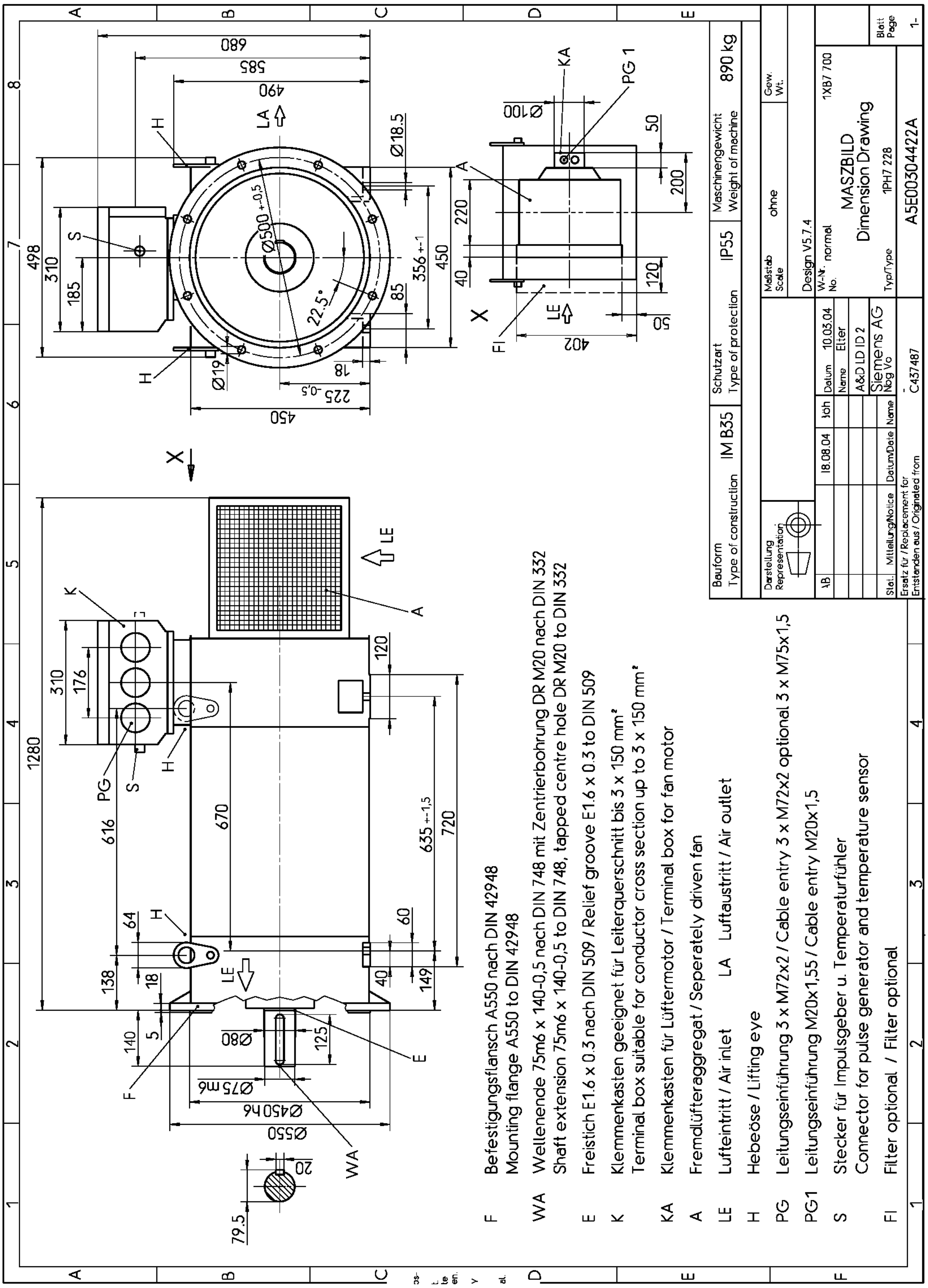


Fig. 9-36 1PH7228–D–L, IM B35, air flow direction NDE – DE

9.2 Type of construction IM B35 with separately–driven fan

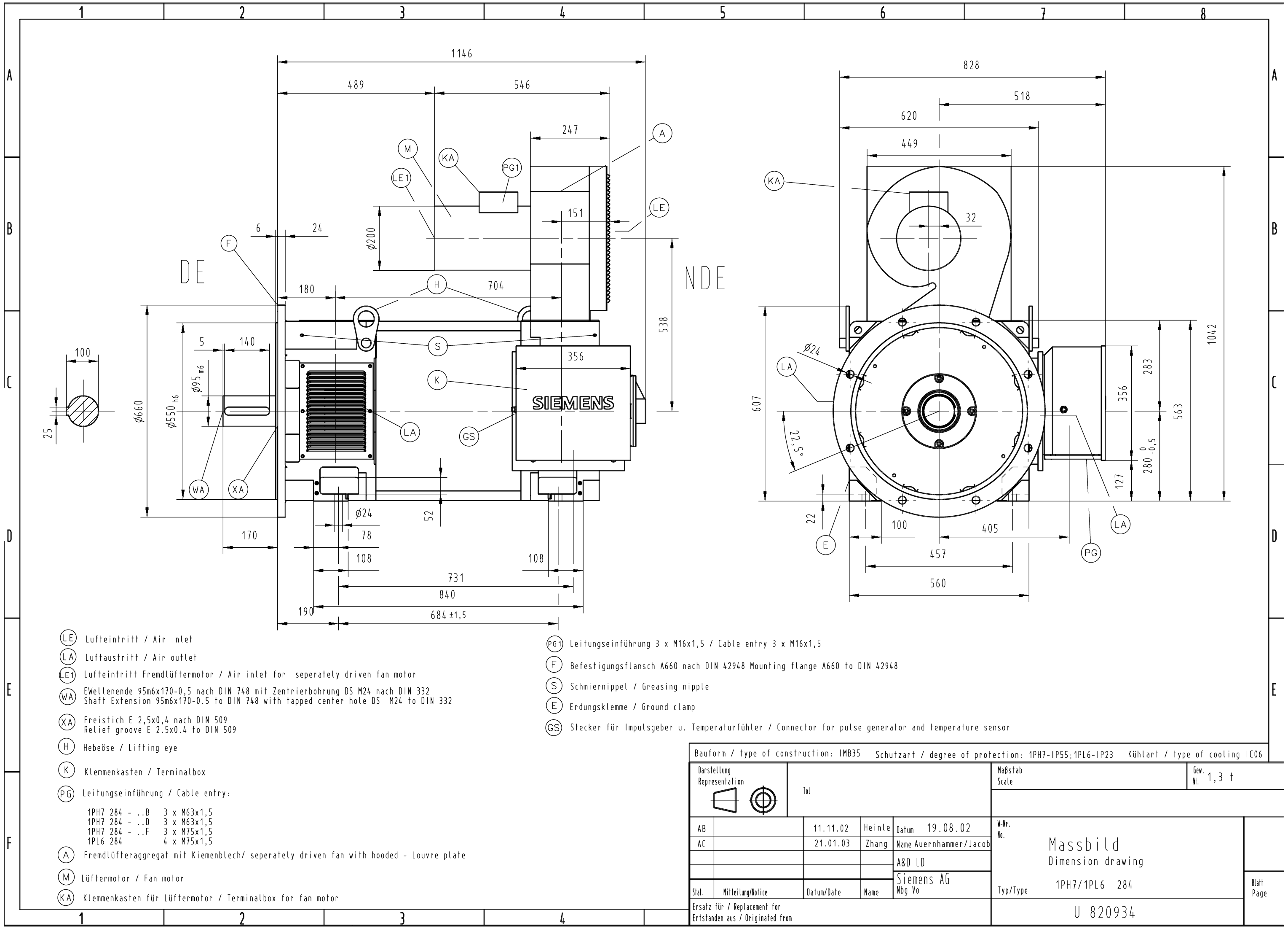


Fig. 9-37 1PH7284, IM B35, air flow direction NDE – DE

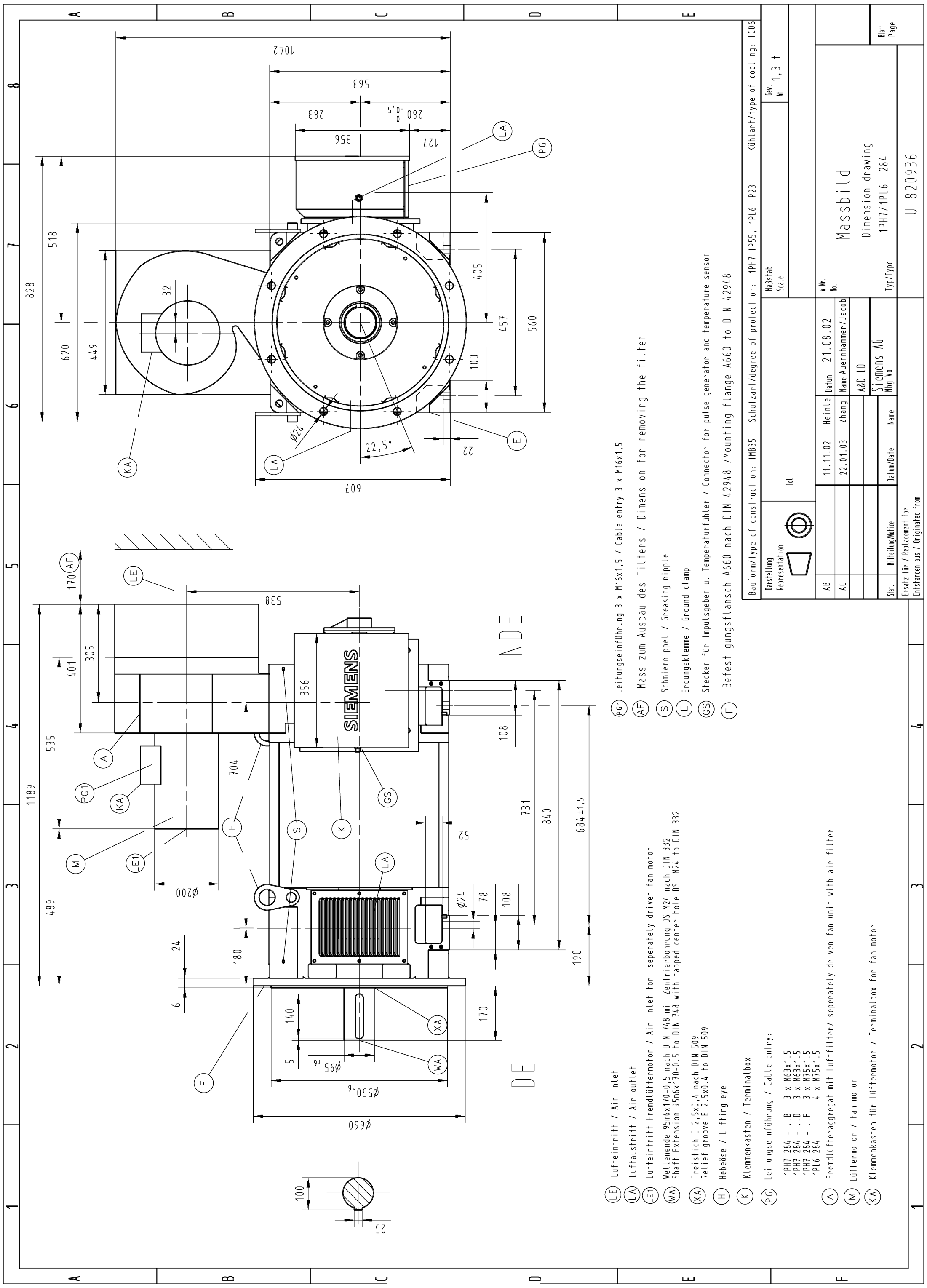


Fig. 9-38 1PH7284 with filter, IM B35, air flow direction NDE – DE

9.2 Type of construction IM B35 with separately–driven fan

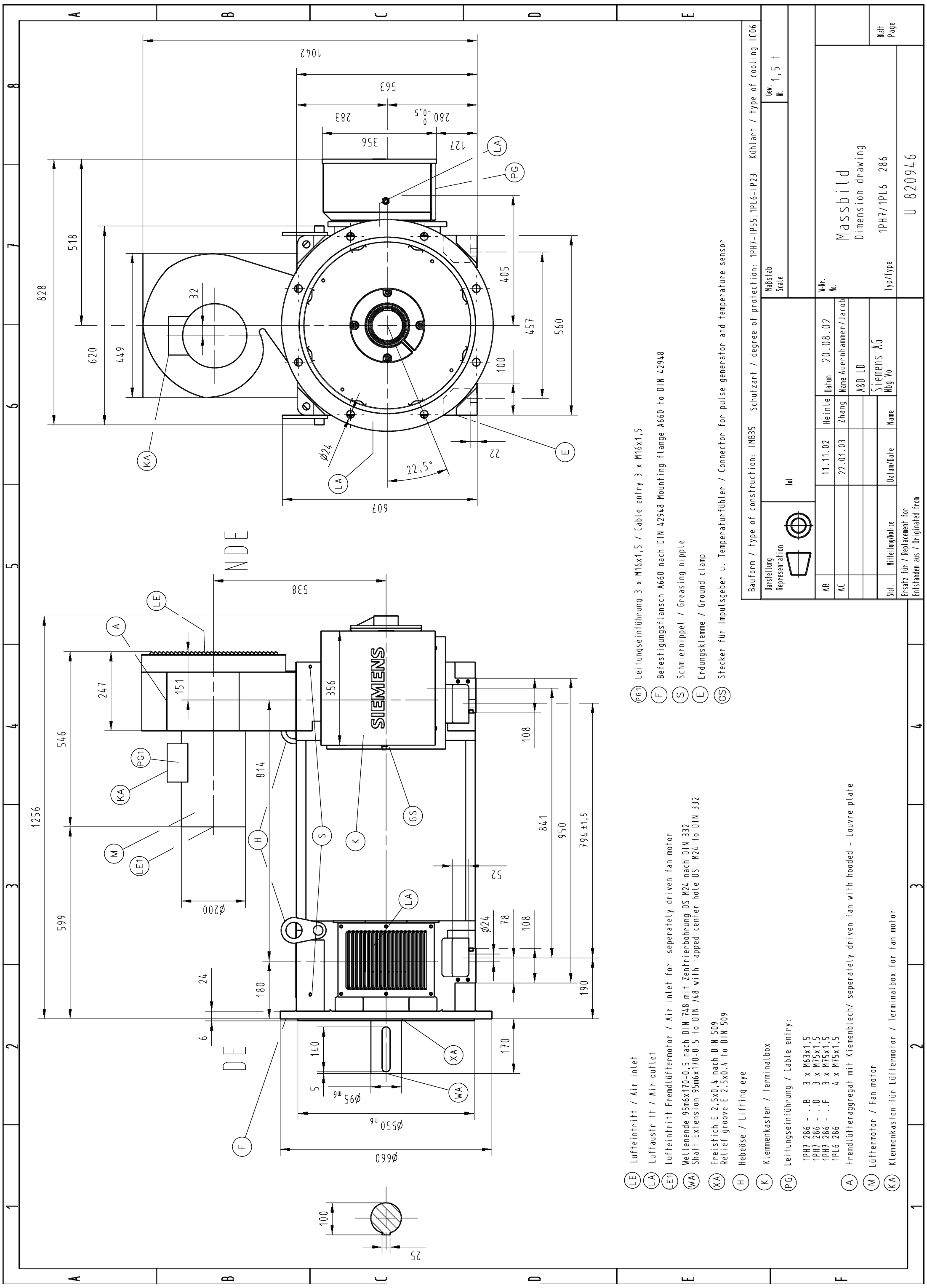


Fig. 9-39 1PH7286, IM B35, air flow direction NDE – DE

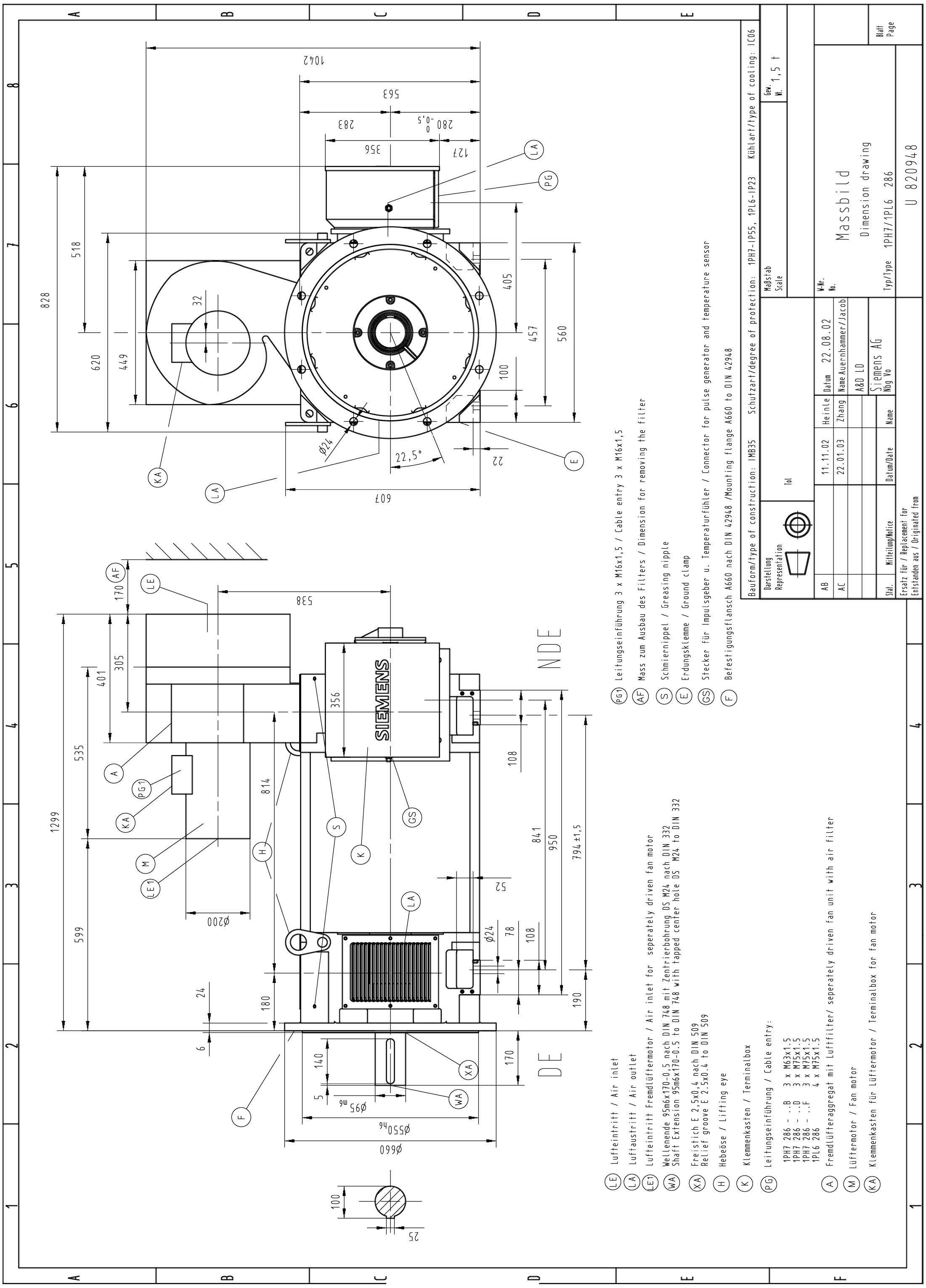


Fig. 9-40 1PH7286 with filter, IM B35, air flow direction NDE – DE

9.2 Type of construction IM B35 with separately–driven fan

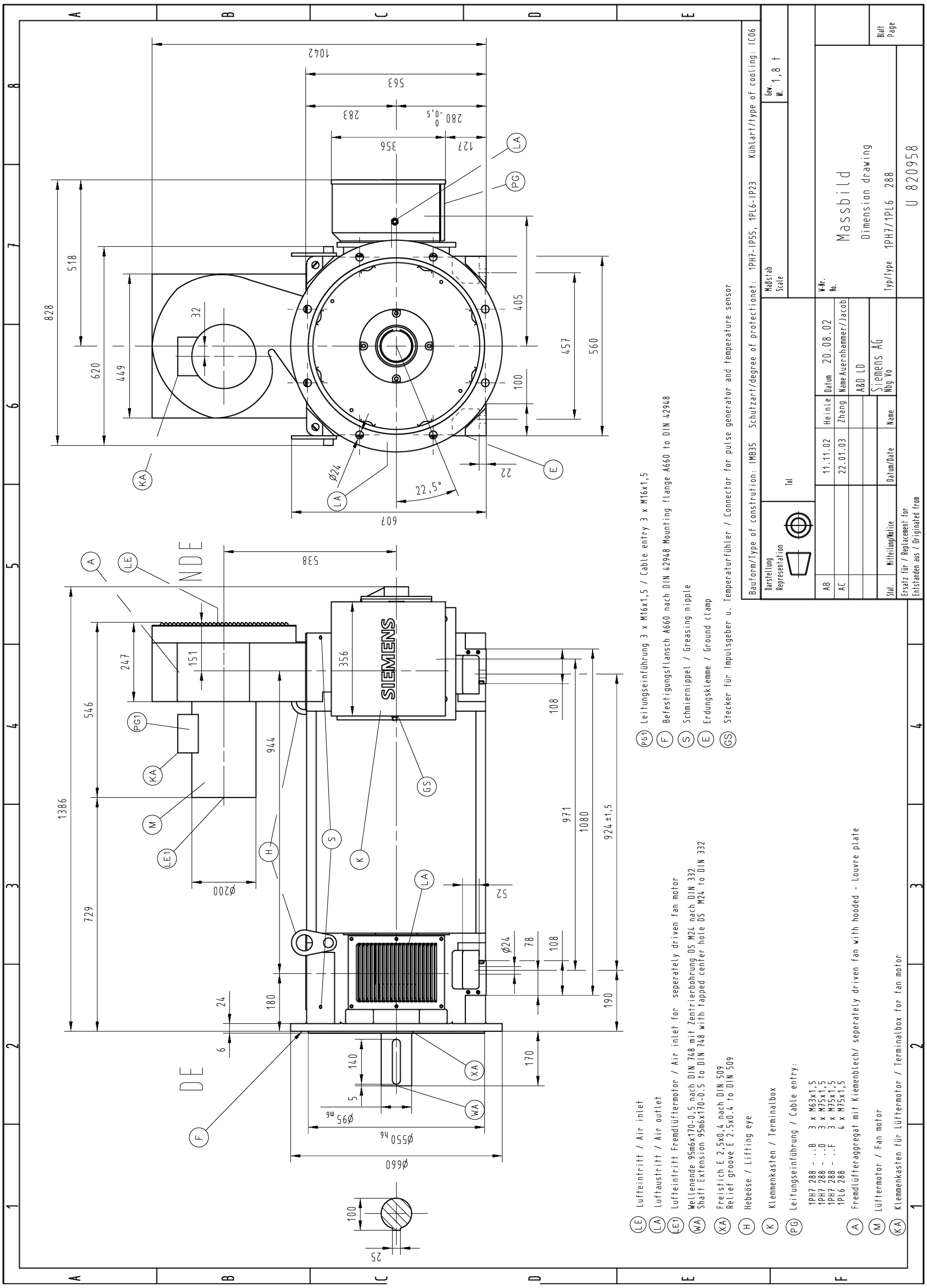


Fig. 9-41 1PH7288, IM B35, air flow direction NDE – DE

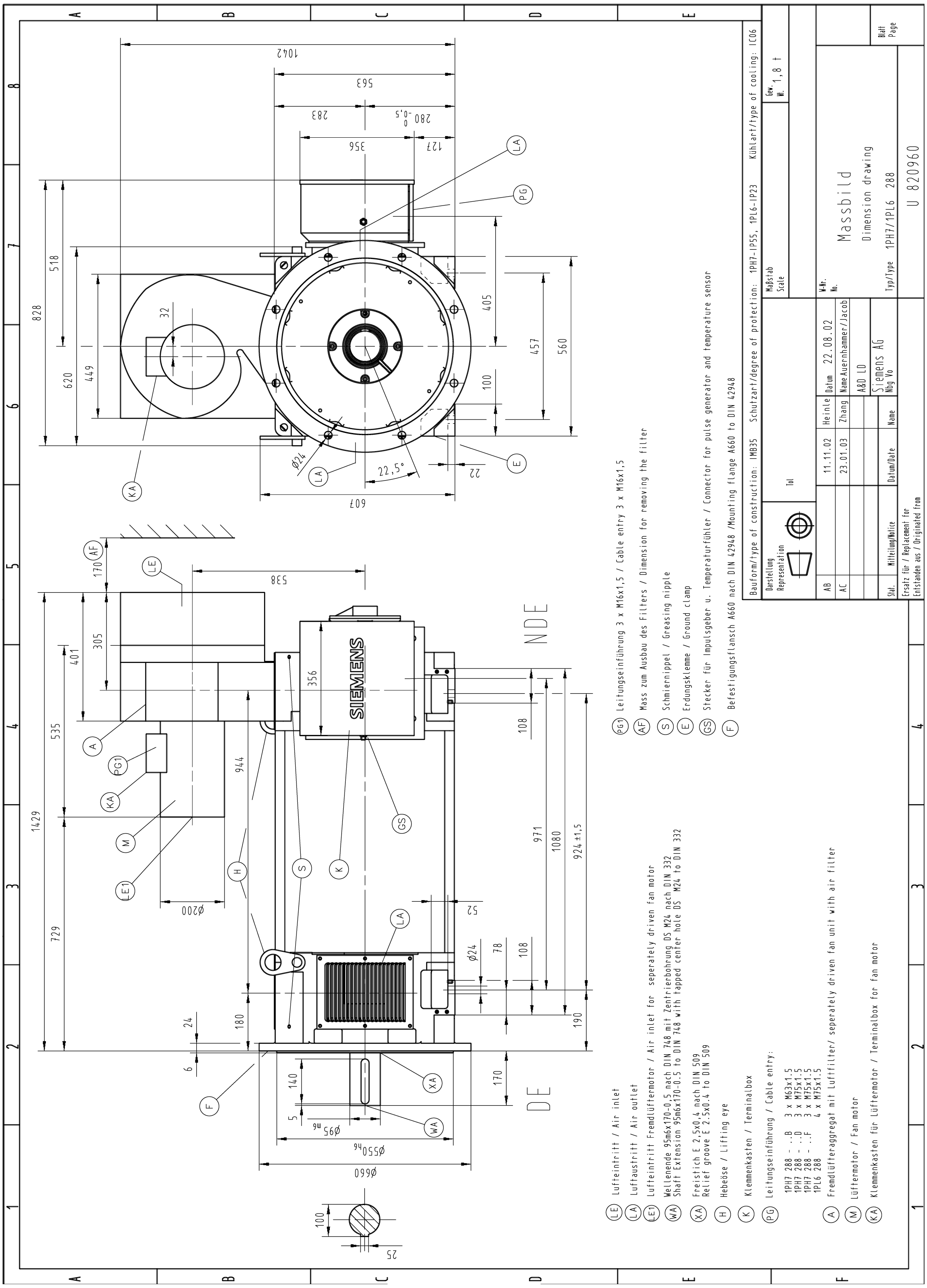


Fig. 9-42 1PH7288 with filter, IM B35, air flow direction NDE – DE

9.3 Type of construction IM B35 with pipe connection

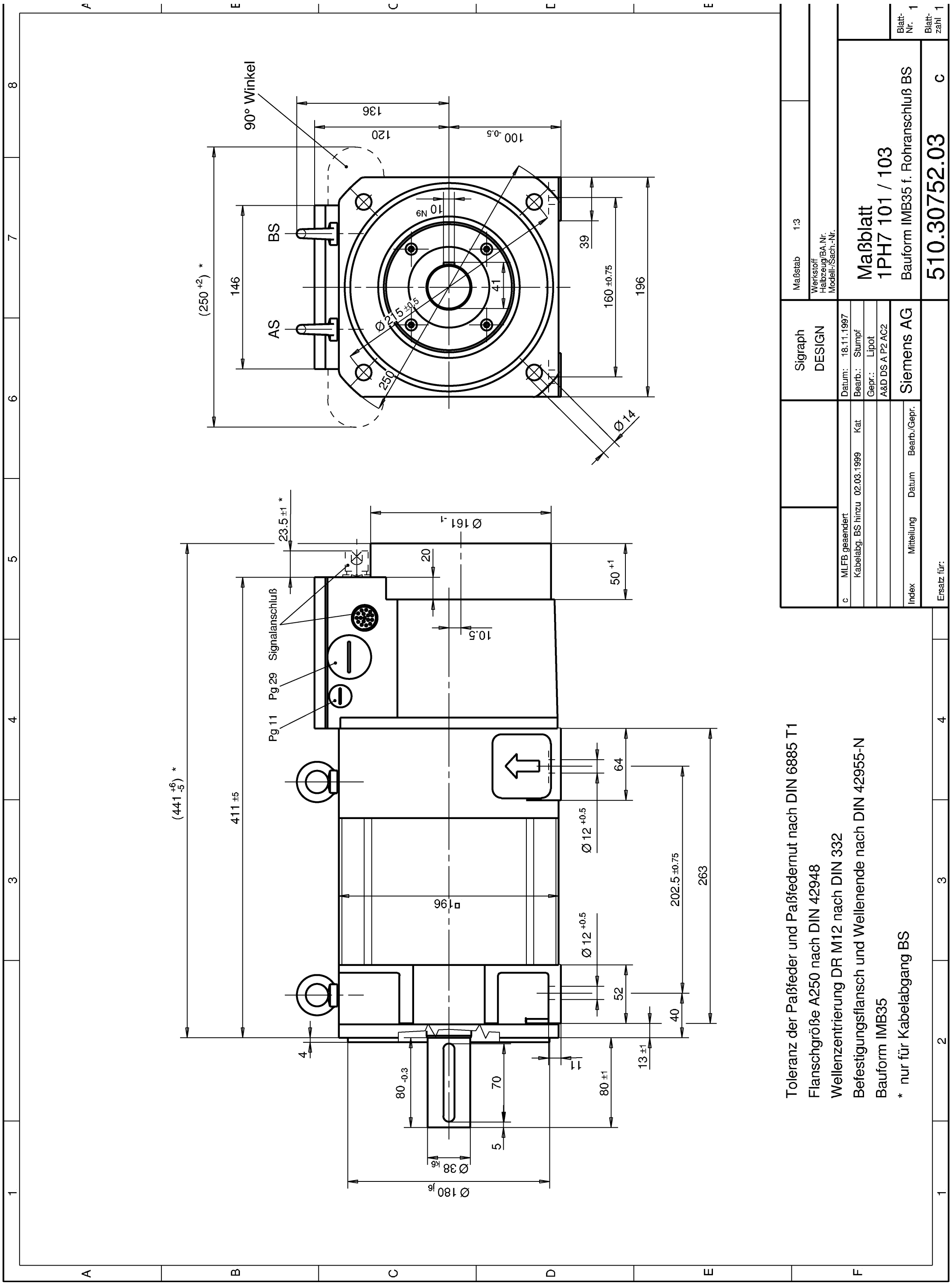


Fig. 9-43 1PH7101 to 1PH7103, IM B35 with pipe connection

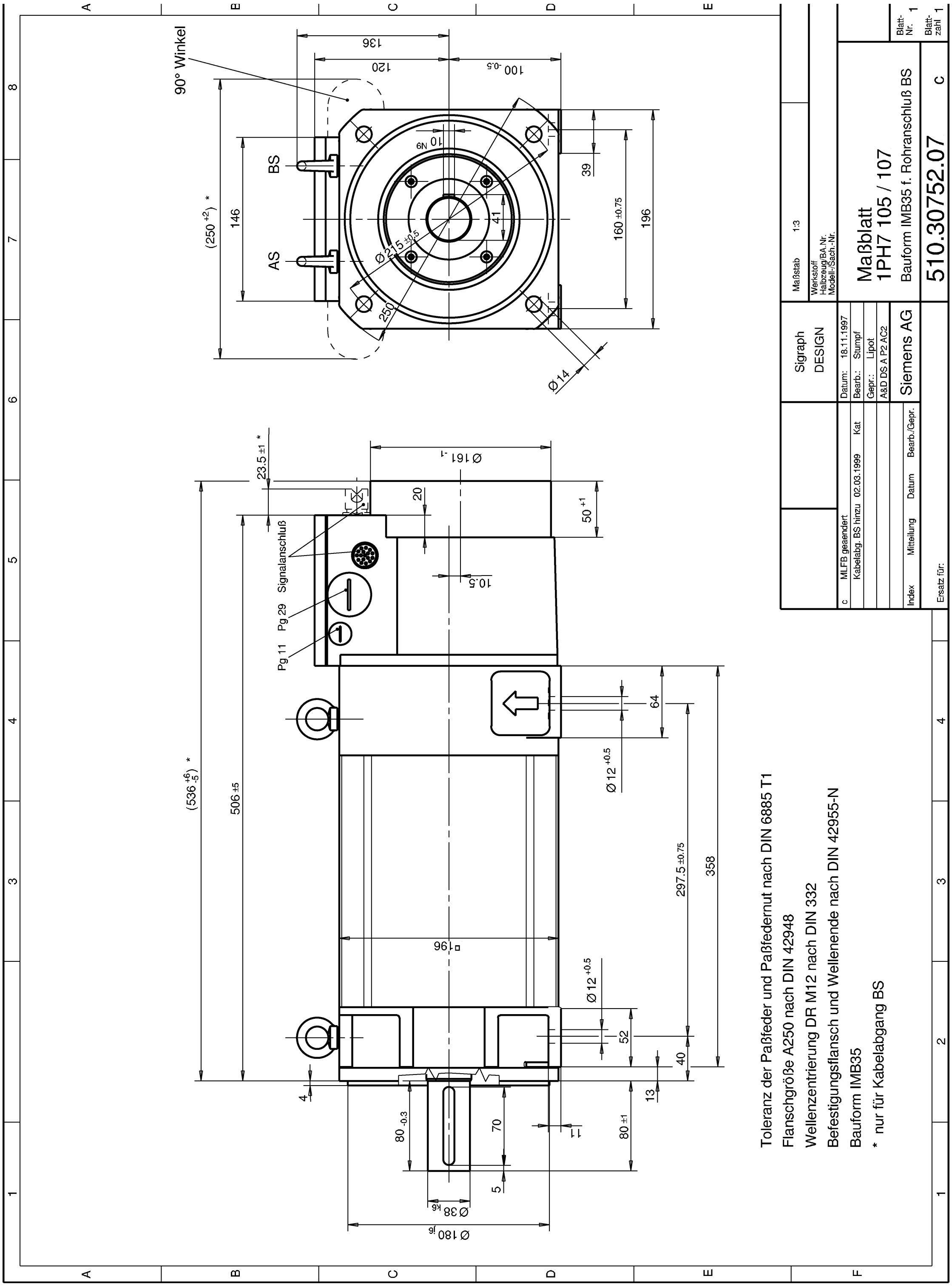


Fig. 9-44 1PH7105 to 1PH7107, IM B35 with pipe connection

9.3 Type of construction IM B35 with pipe connection

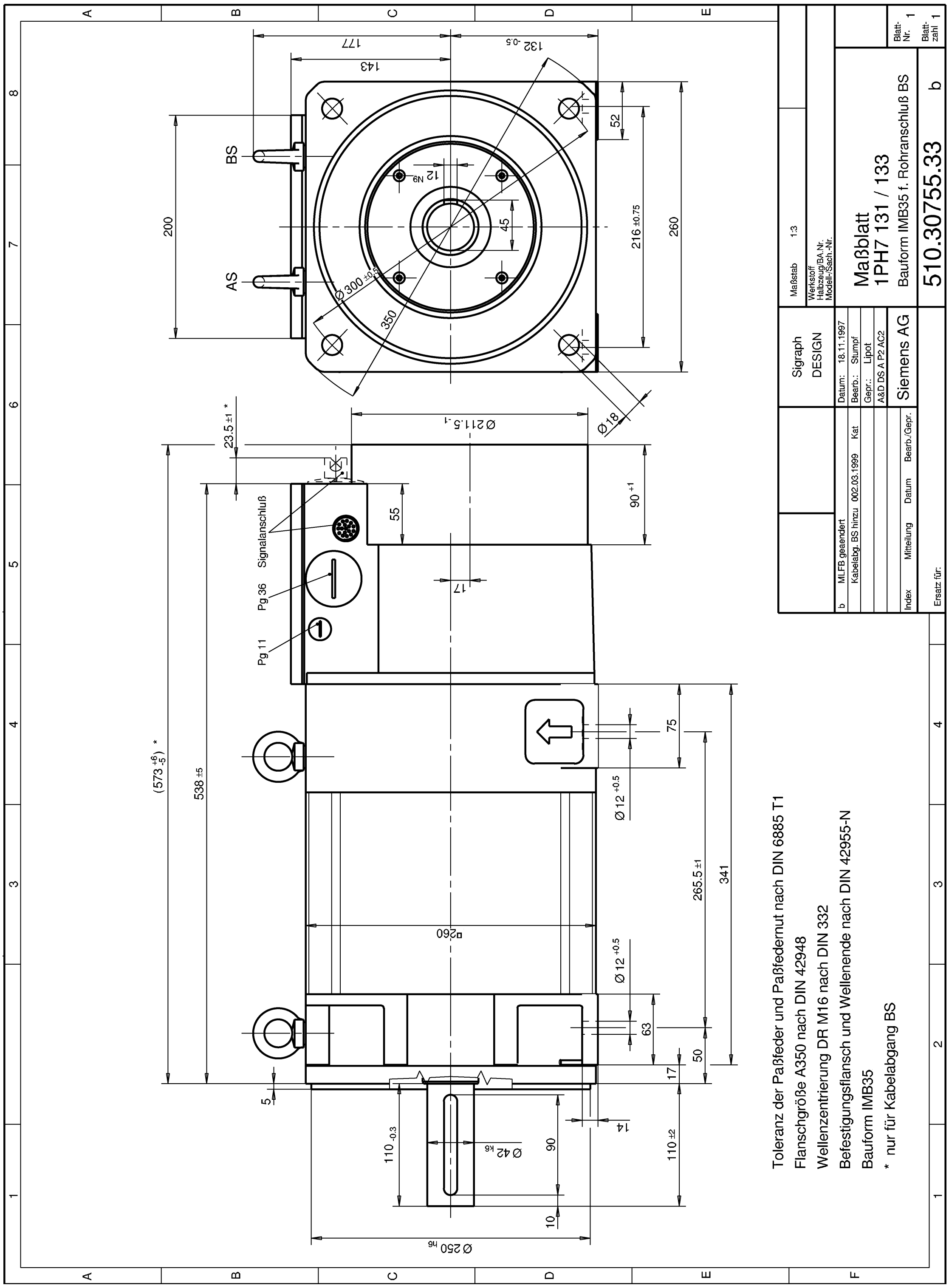


Fig. 9-45 1PH7131 to 1PH7133, IM B35 with pipe connection

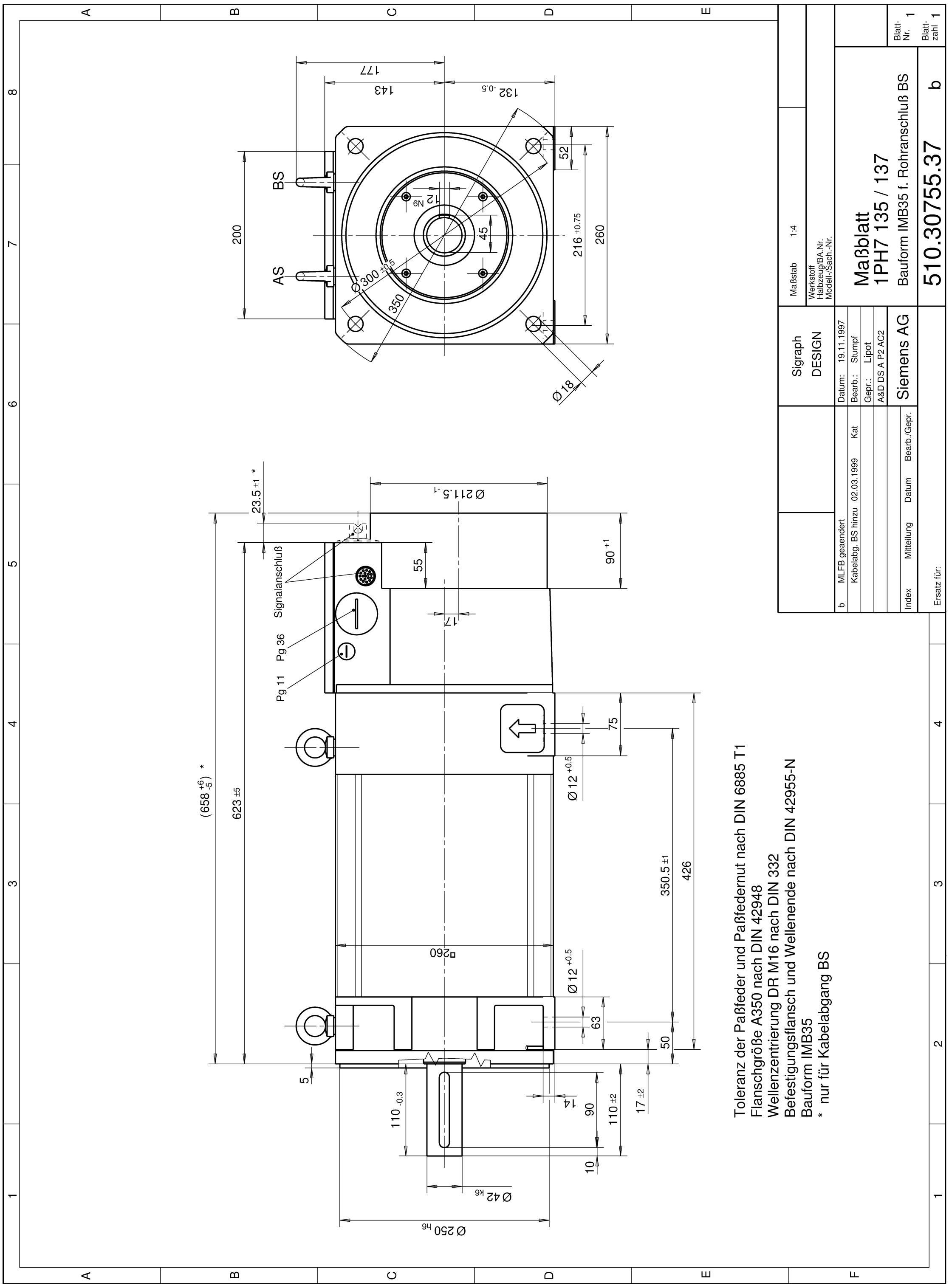


Fig. 9-46 1PH7135 to 1PH7137, IM B35 with pipe connection

9.3 Type of construction IM B35 with pipe connection

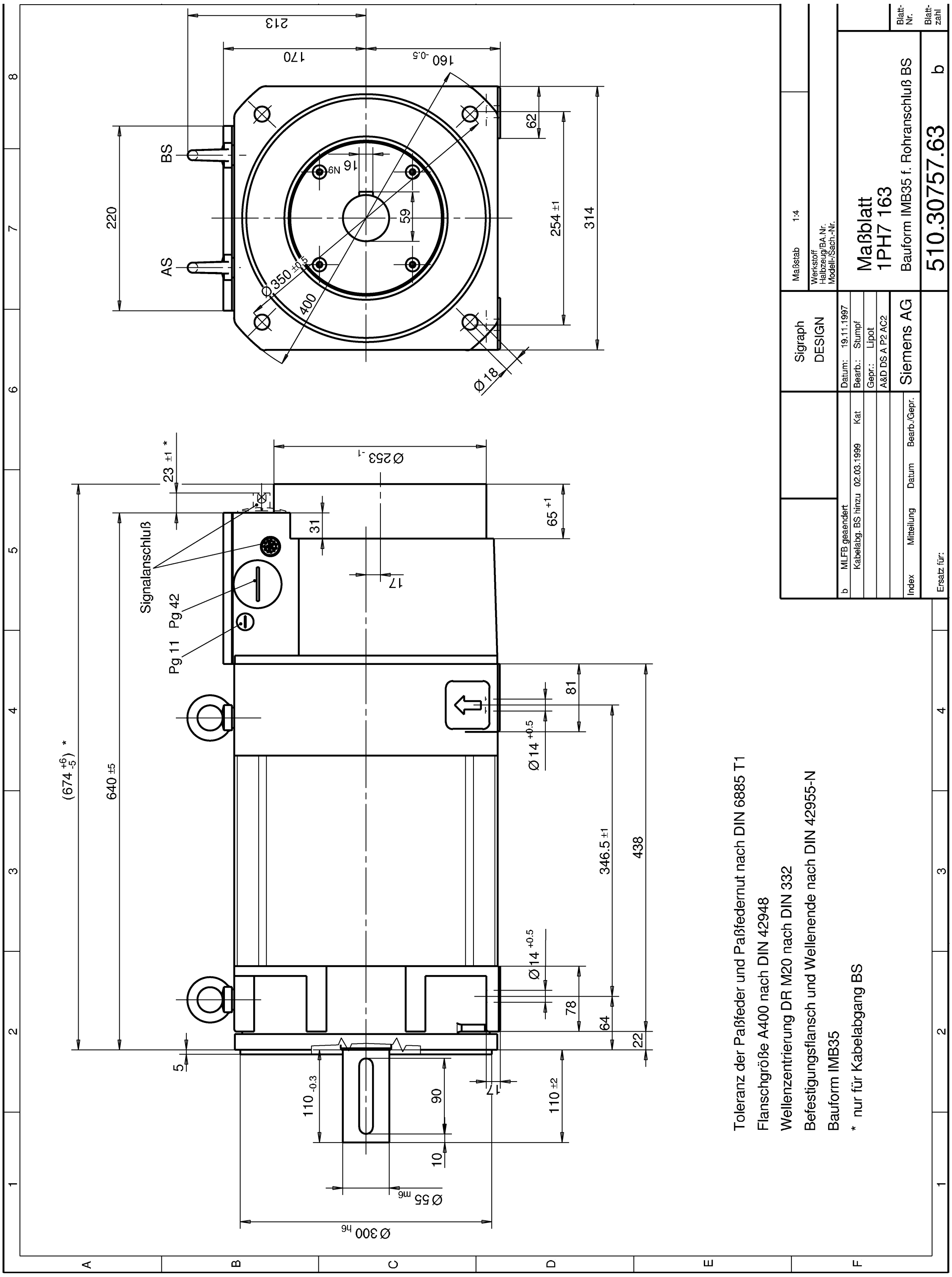


Fig. 9-47 1PH7163, IM B35 with pipe connection

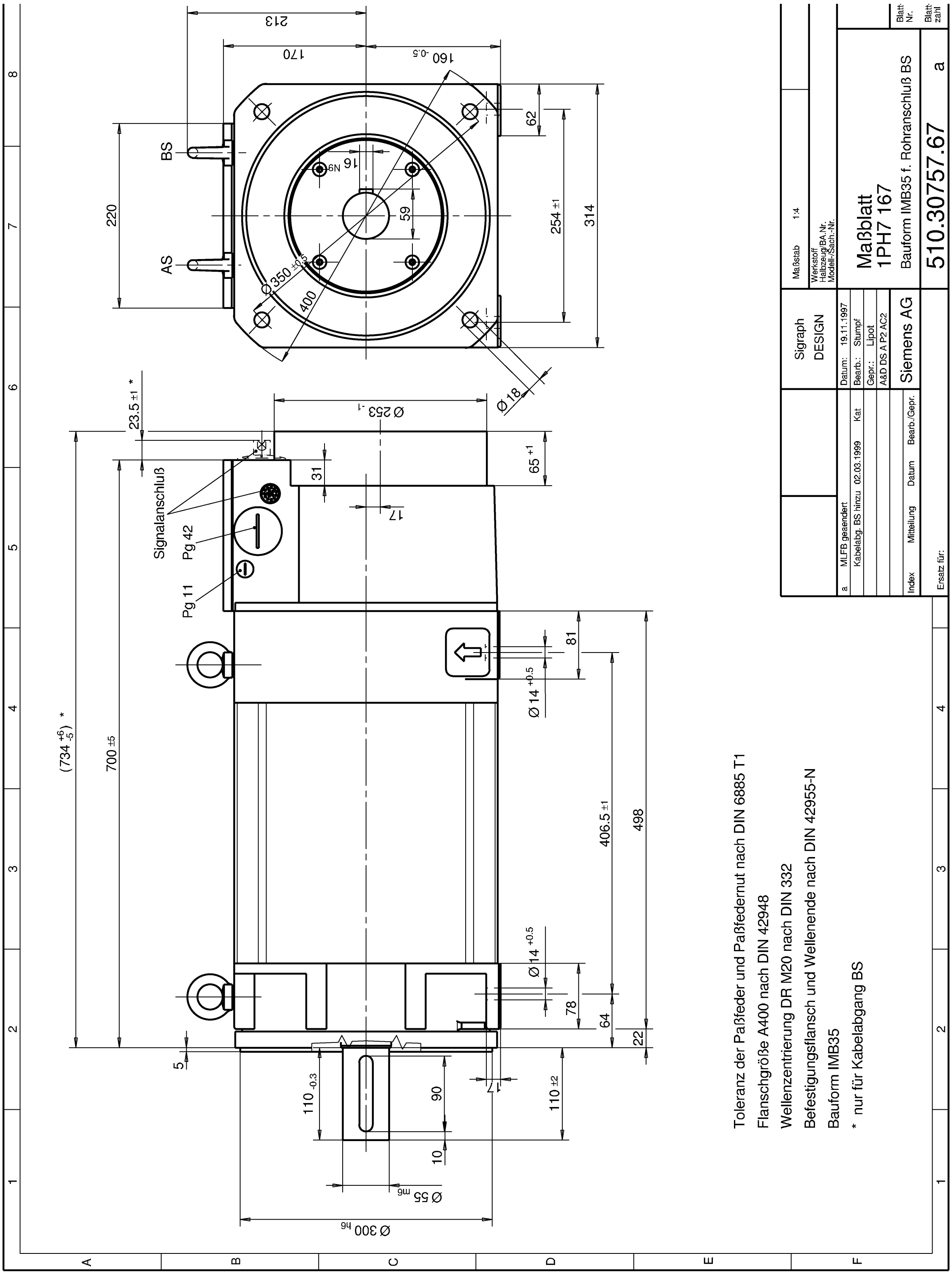


Fig. 9-48 1PH7167, IM B35 with pipe connection

9.4 Type of construction IM B35 with second shaft end

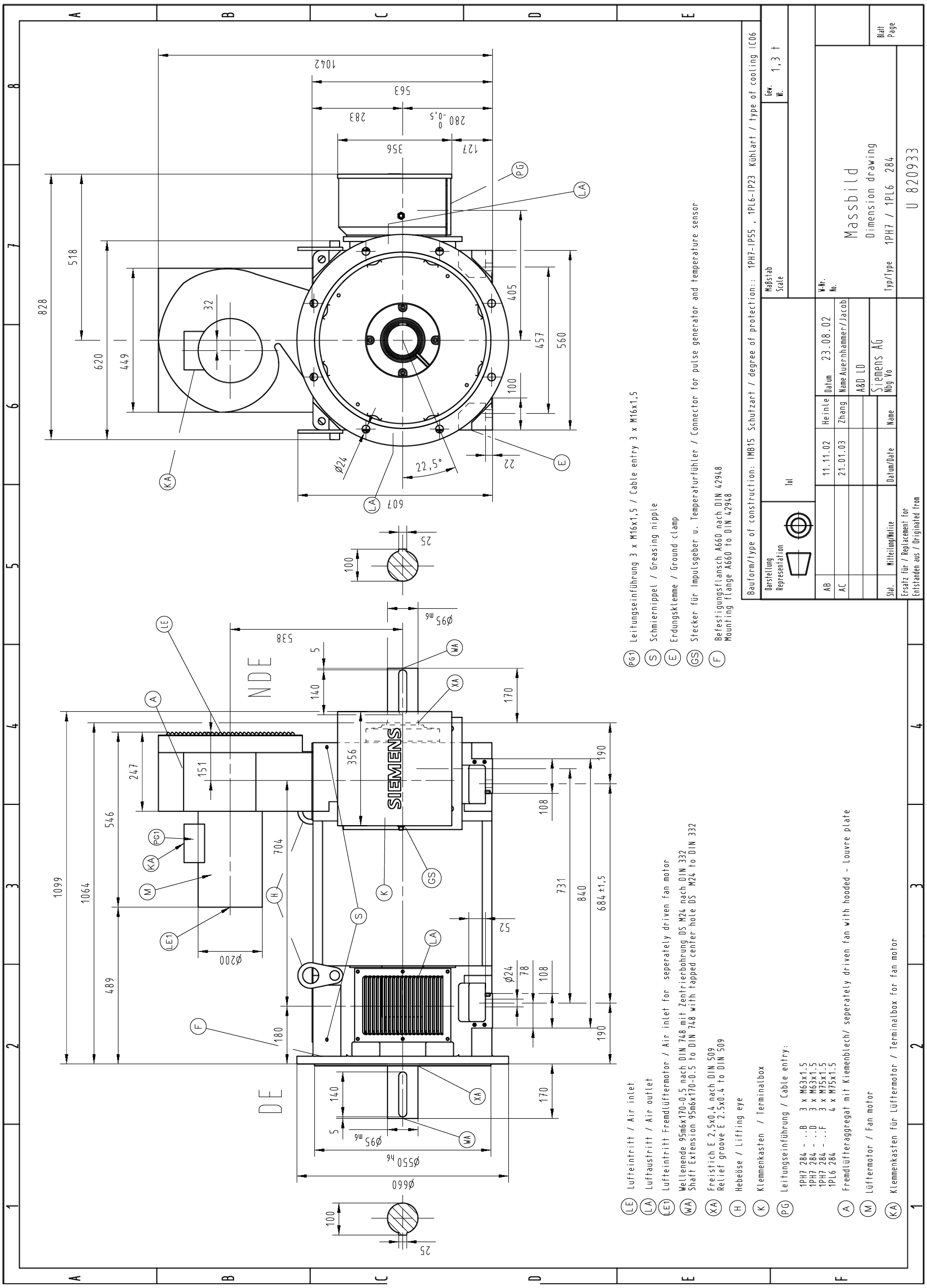


Fig. 9-49 1PH7284, IM B35 with second shaft end, K16, air flow direction NDE – DE

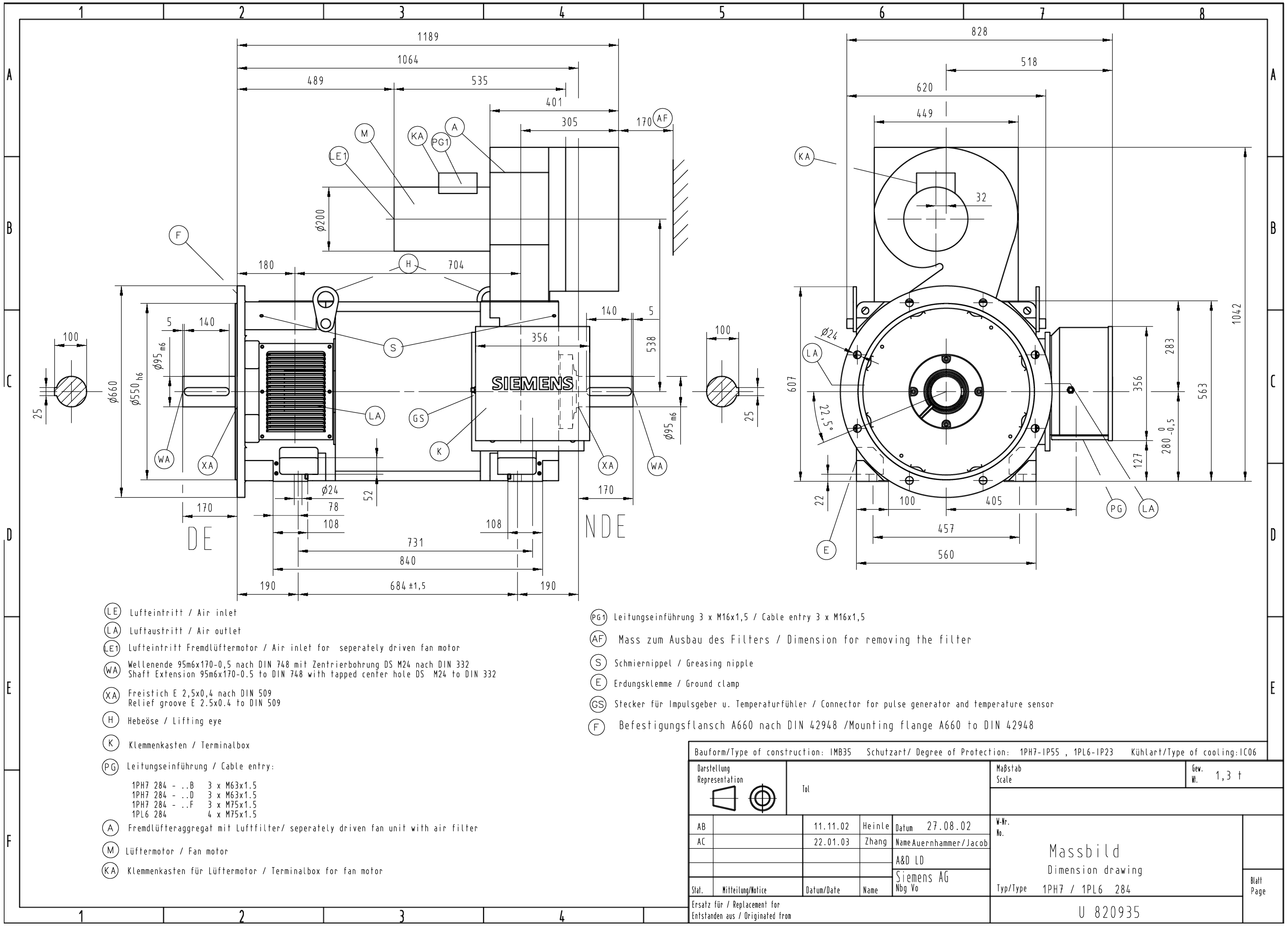


Fig. 9-50 1PH7284, with filter, IM B35 with second shaft end, K16, air flow direction NDE – DE

9.4 Type of construction IM B35 with second shaft end

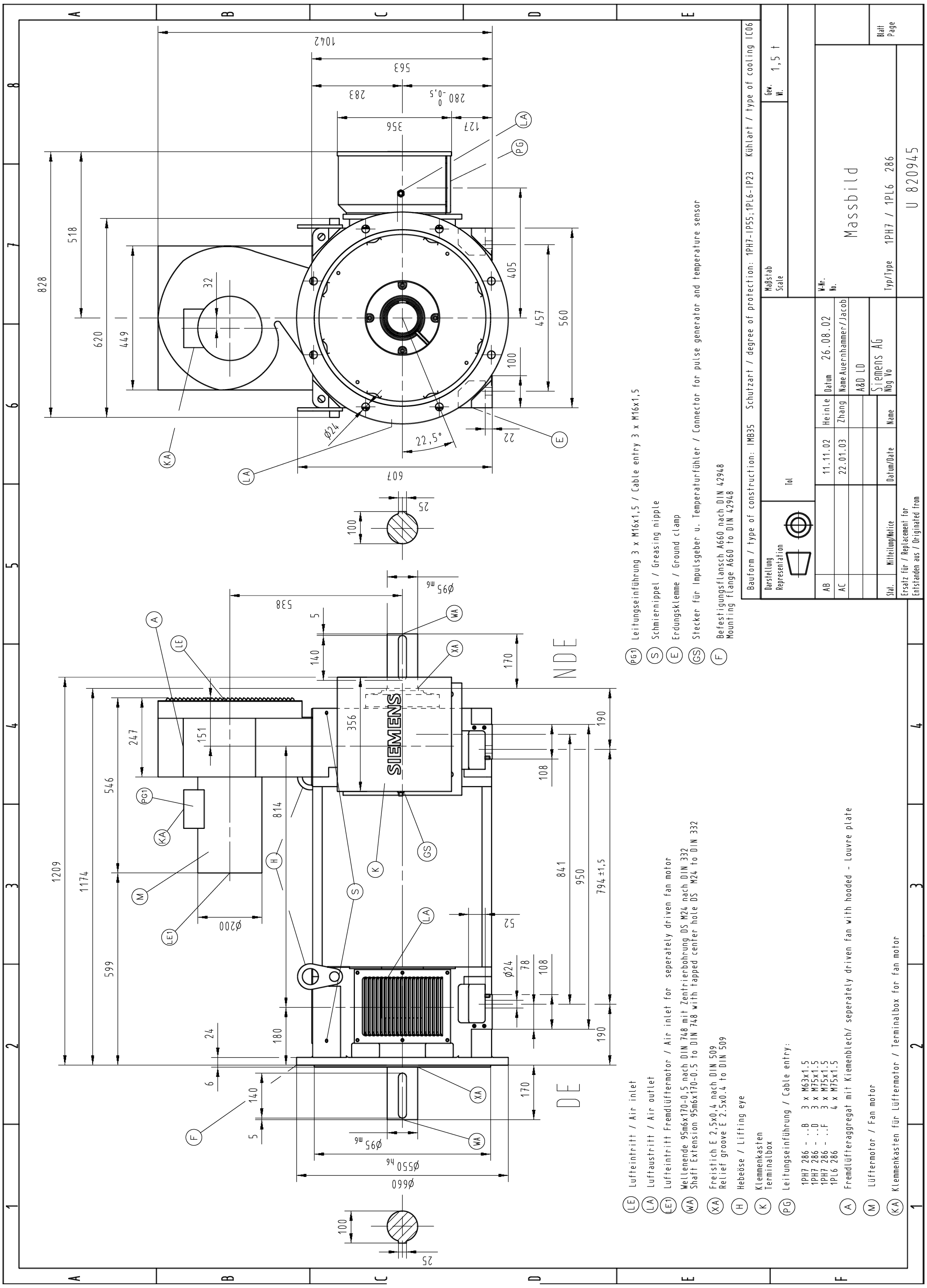


Fig. 9-51 1PH7286, IM B35 with second shaft end, K16, air flow direction NDE – DE

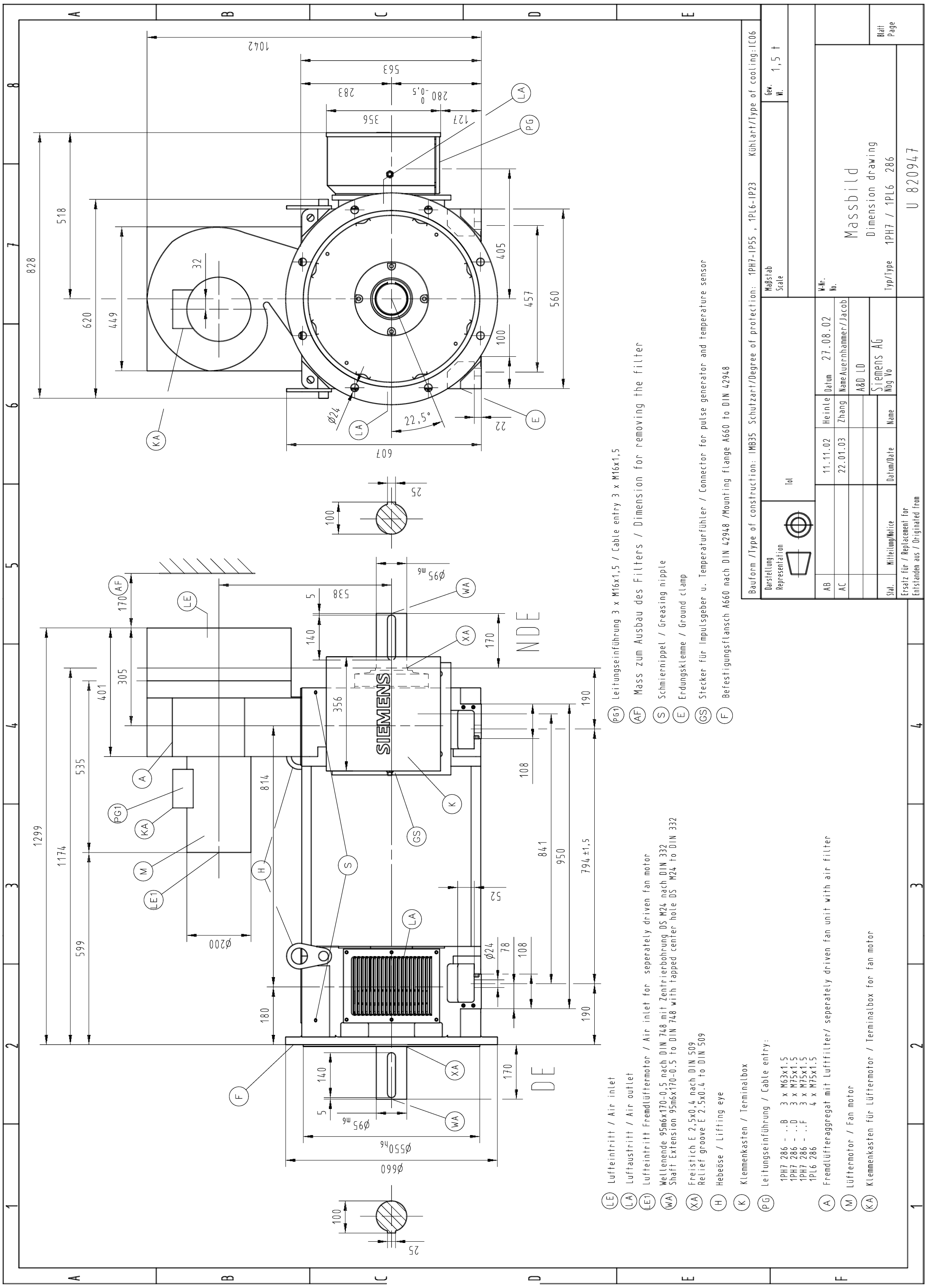


Fig. 9-52 1PH7286, with filter, IM B35 with second shaft end, K16, air flow direction NDE – DE

9.4 Type of construction IM B35 with second shaft end

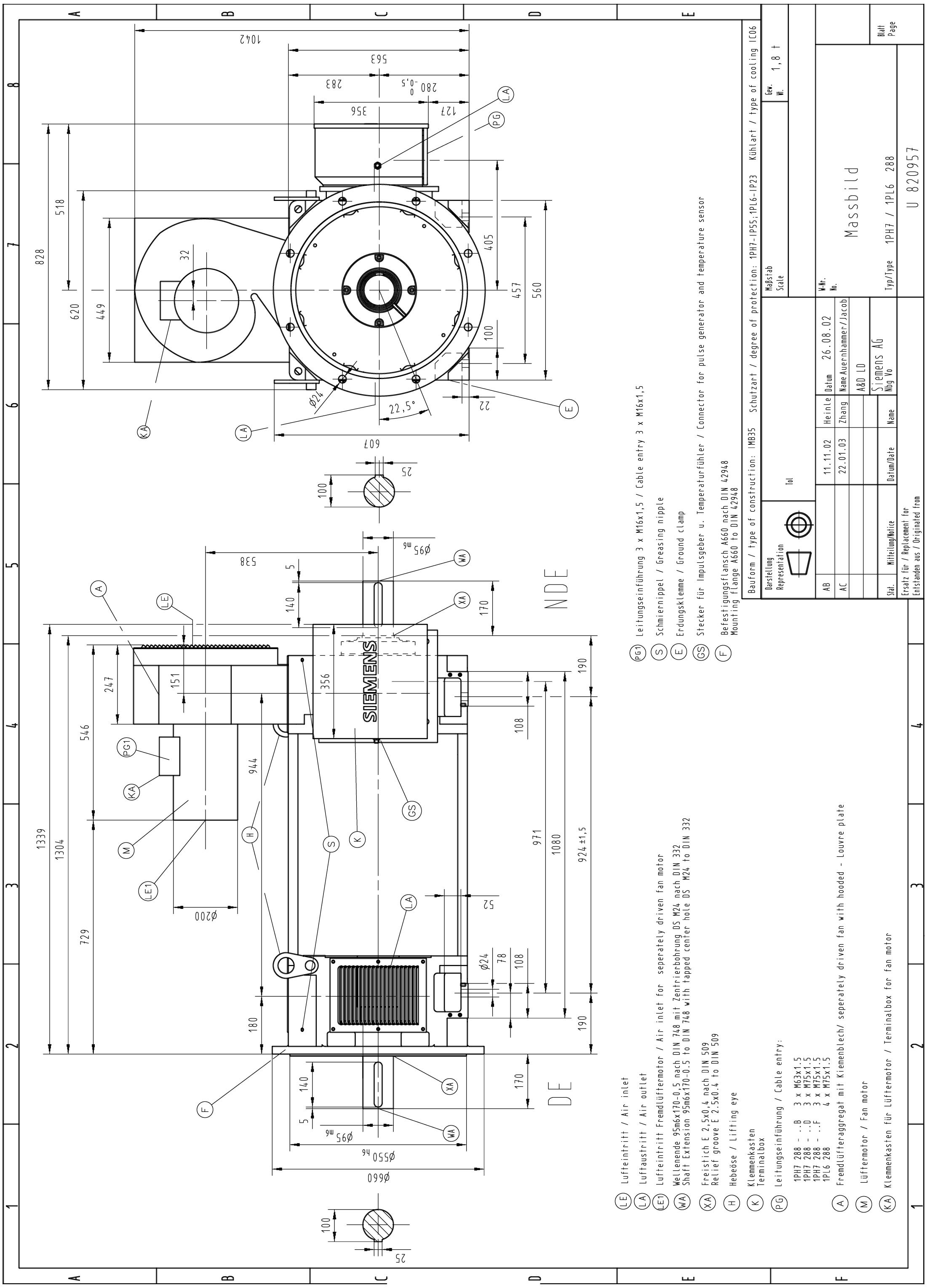


Fig. 9-53 1PH7288, IM B35 with second shaft end, K16, air flow direction NDE – DE

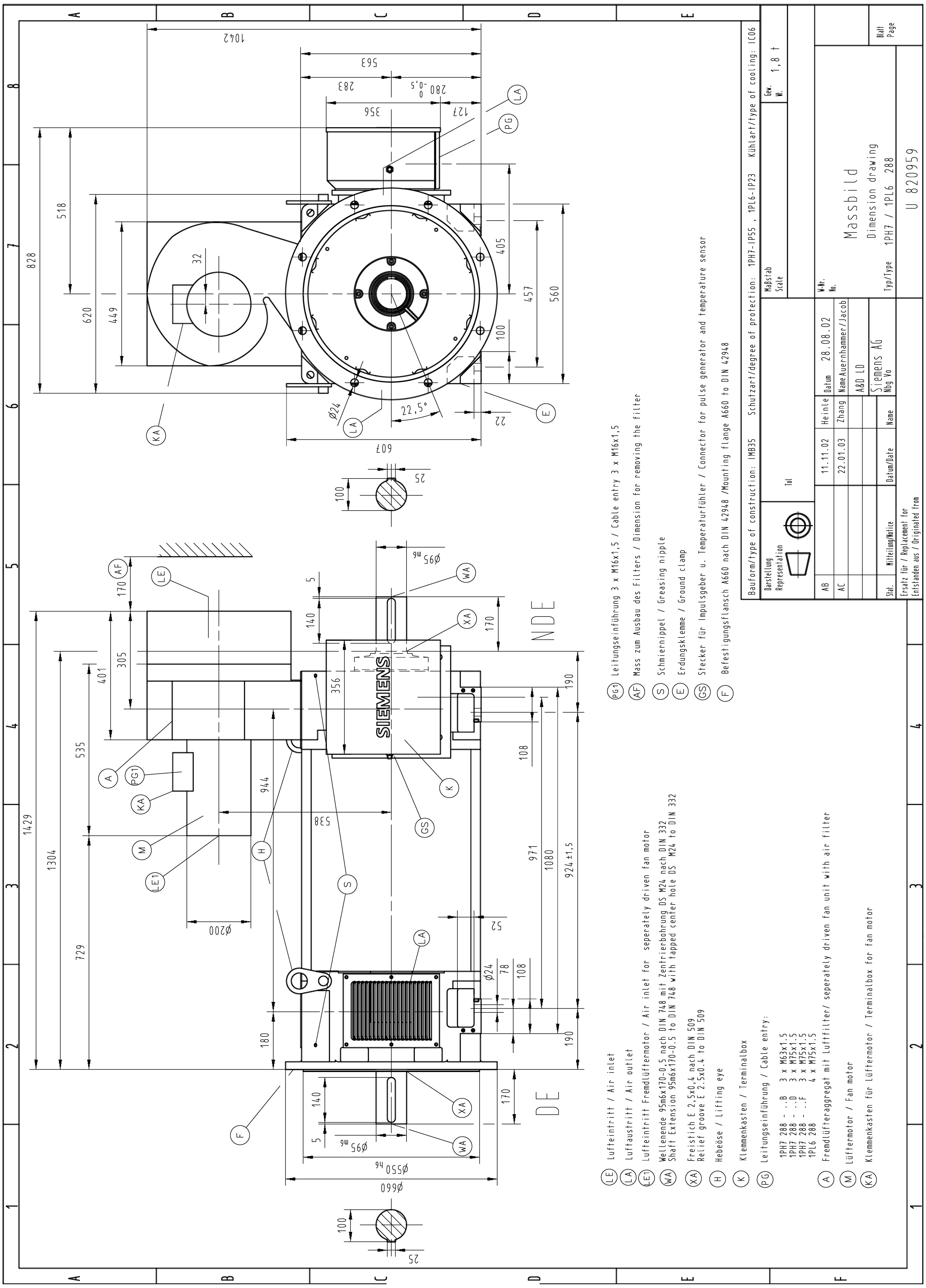


Fig. 9-54 1PH7288, with filter, IM B35 with second shaft end, K16, air flow direction NDE – DE

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