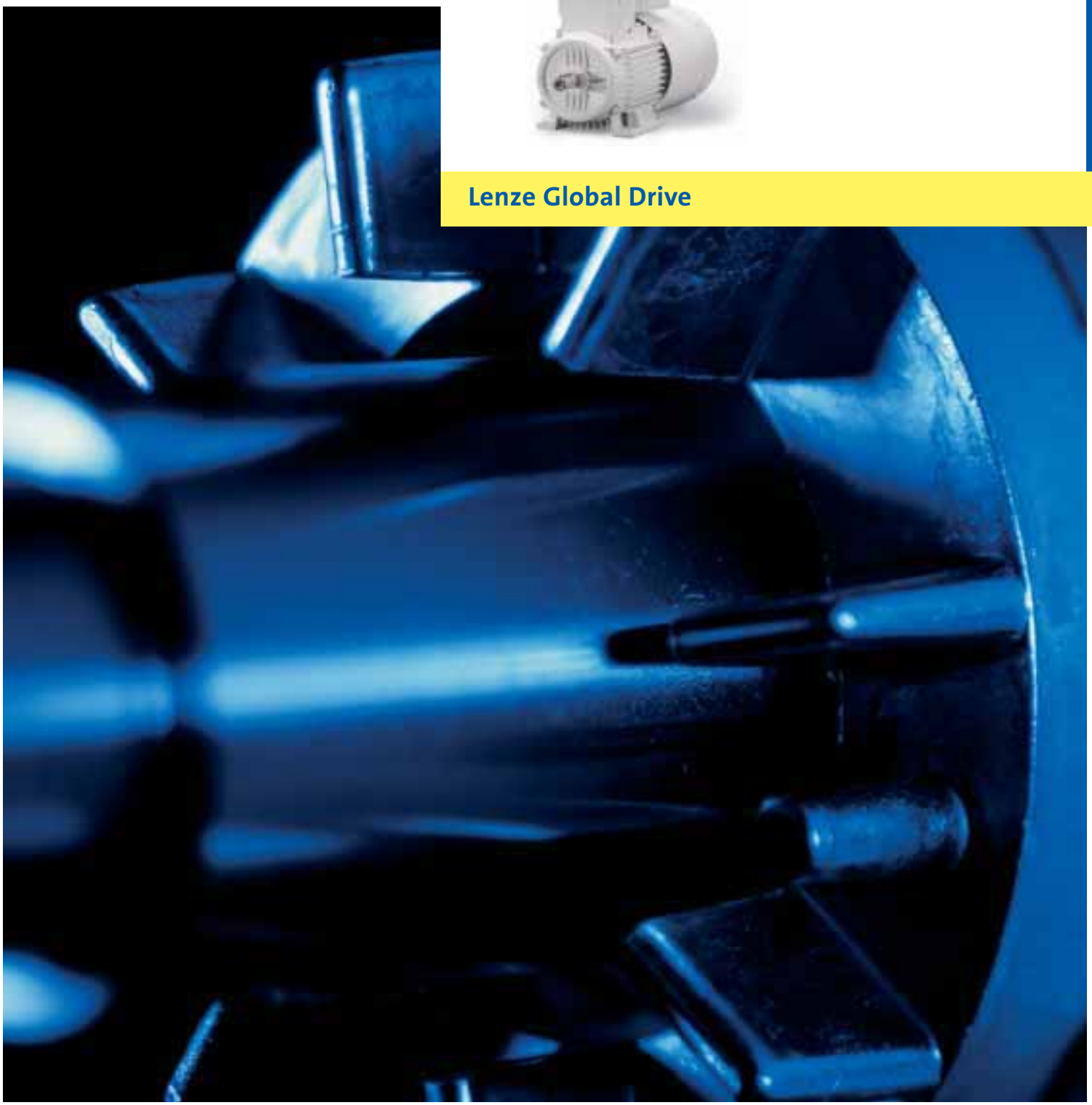
Three-phase AC motors

Lenze Global Drive



Lenze

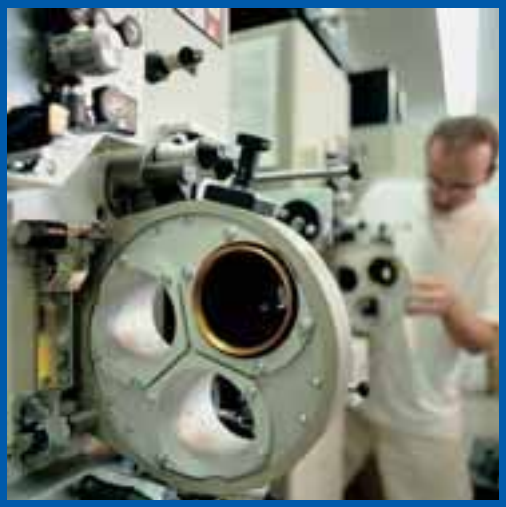
No matter which drive solution you imagine, we make your dreams come true.

True to our slogan (one stop shopping) we offer you a complete program of electronic and mechanical drive systems which is distinguished by reliability and efficiency.

The scope of our program includes frequency inverters, servo controllers, variable-speed drives, speed reduction gearboxes, motors, brakes, clutches, decentralised I/O and operator and display units.











Many well-known companies use Lenze products in various applications.

Product code

Three-phase AC motors

M D □ □ □ □□ □□□ - □ □

Product group
M = Motor

Type of current
D = Three-phase current

Cooling method/Ventilation
F = Forced-ventilated
E = Self-ventilated

Version
M = Modular motor

Type of machine
A = Asynchronous machine

Options
BI = Brake and incremental encoder
BR = Brake
BS = Brake and resolver
IG = Incremental encoder
XX = No brake, no encoder
RS = Resolver

Size

Length

Number of pairs of poles

E82MV □ □ □ - □ B

2	= 230 V
4	= 400 V

2	5	1	= 0.25 kW
3	7	1	= 0.37 kW
5	5	1	= 0.55 kW
7	5	1	= 0.75 kW
1	5	2	= 1.5 kW
2	2	2	= 2.2 kW
3	0	2	= 3.0 kW
4	0	2	= 4.0 kW
5	5	2	= 5.5 kW
7	5	2	= 7.5 kW

System overview | Three-phase AC motors

Robust three-phase AC motors are used in many sectors of industry. Their extremely compact design and universal application options mean that these motors can be found in almost all types of machine. Lenze three-phase AC motors are characterised in particular by a very well-designed modular system which is built on the basis of a universal terminal box and incremental encoder and resolver options which can be added easily.

The addition of BFK458 spring-operated brakes also ensures that the motors can be used in a wide variety of applications.

This range of motors is completed by complementary frequency inverters and gearboxes.

A complete drive package from a single supplier!

Lenze | An introduction

Lenze is the competent partner for your application. Lenze is not only a supplier for single components but also offers solutions for complete drive systems including planning, execution and commissioning.

Furthermore, a worldwide service and distribution network lets you engage a qualified customer advisory service and an after sales service that is fast and extensive.

Our quality assurance system for design, production, sales and service is certified according to DIN ISO 9001 : 2000. Our environmental management system is also certified to DIN EN ISO 14001.
Our customers set the standards for measuring the quality of our products. Our task is to meet your requirements, since customer orientation is a Lenze principle demanding the best quality.

See for yourself.






A worldwide service –
Our team of experts provides reliable and professional assistance.

A true system

Drive and automation technology

Products which are setting the pace in terms of technology and complete drive solutions for machine and system production - just what Lenze is all about. We provide our customers with frequency and servo inverters with powers up to 400 kW. We support both central control cabinet solutions and decentralised drive concepts, e.g. with motor inverters with IP65 type of protection.

Both standard three-phase AC motors and synchronous and asynchronous servo motors are available to complement the various controllers, all of which can be combined with various types of gearboxes. Human Machine Interfaces, decentralised I/O systems and modules for fieldbus interfacing are also available for exchanging information.

Lenze boasts extensive application know-how in all manner of industries. This knowledge has been applied in the design of the controller and PC software, providing an efficient means of implementing numerous standard applications using simple parameter settings.

An all-round service comprising component selection advice, training, commissioning support and even a helpline which can be accessed all over the world and independent system engineering completes the offer.

9300 servo inverter

ECS servo system for multi-axis application

9300 vector frequency inverter

8200 vector frequency inverter

8200 motec motor inverter

starttec motor starter

Communication modules

Engineering Software

Runtime Software

Servo motors

Small drives

Brakes and clutches

Contents | Three-phase AC motors

Abbreviations used in this catalogue

h	[mm]	Shaft height
n_r	[rpm]	Rated speed
M_r	[Nm]	Rated torque
P_r	[kW]	Rated power
I_r	[A]	Rated current
I_0	[A]	Continuous standstill current
f_r	[Hz]	Rated frequency
M_{max}	[Nm]	Maximum torque
I_{max}	[A]	Maximum current
n_{max}	[rpm]	Maximum speed
J_{load}	[kgcm²]	Mass moment of inertia, load machine
M_{load}	[Nm]	Torque, load machine
M_0	[Nm]	Continuous standstill torque
M_{cont}	[Nm]	Continuous torque
M_{perm}	[Nm]	Permissible torque
η_{gear}		Gearbox efficiency
J_{mot}	[kgcm²]	Mass moment of inertia of the motor
m	[kg]	Mass
$\cos\varphi_N$		Power factor for asynchronous motors
U_r	[V]	Rated voltage
F_a	[N]	Permissible axial force
F_{r1}	[N]	Permissible radial force in centre of shaft
F_{r2}	[N]	Permissible radial force at shaft end
i		Transmission ratio
M_B	[Nm]	Holding torque of brake
J_B	[kgcm²]	Mass moment of inertia, brake

MD□MA	Asynchronous three-phase AC motor, self-ventilated or forced ventilated (MDEMA/MDFMA)
AC	Alternating current/voltage
DC	Direct current/voltage
DIN	Deutsches Institut für Normung
EMC	Electromagnetic compatibility
EN	European standard
IEC	International Electrotechnical Commission
IP	International Protection Code
NEMA	National Electrical Manufacturers Association
VDE	Verband deutscher Elektrotechniker
CE	Communauté Européene
IM	International Mounting Code

Robust three-phase asynchronous motors are used in almost all sectors of industry. Their extremely compact design and high protection have already enabled them to win over a large share of the DC drive market.

Lenze Drive Technology is able to offer complete solutions for this area of application. In addition to asynchronous motors, our product range also features matched frequency inverters and numerous types of gearbox. The three-phase AC motor with motec is a new integrated solution.

Our three-phase AC motors are particularly suitable for inverter operation. Modern inverters switch output stages at clock frequencies between 4 and 16 kHz, which can give rise to high rates of voltage rise and overvoltages in the motor windings. The windings and insulation system have been designed specifically to ensure reliable continuous operation.

The motors are fitted as standard with temperature sensors which can be used for temperature monitoring and are set to motor thermal class F (155°C).

The motors are supplied as standard with IP54 protection although the drives can also be supplied with IP55 protection as an option.

Lenze has built an extremely high-quality and cost-effective system. Two different non-drive end shaft ends along with a universal non-drive end bearing cover and the modular design enable various feedback systems and brakes to be added as options.

Resolvers or incremental encoders as well as variants featuring the well-known BFK458 spring-operated brakes can also be added.

This system is also characterised by a universal terminal box. All possible connections can be housed in a single compact application terminal box. On drives with built-in inverters, the connections are wired in the inverter.

A well-designed concept and complete solution for users from a single supplier.

Module versions

Module 1		Module 2	
MDFMARS	*Blower* *RES*	*MDFMABS*	*Blower* *Brake + RES*
MDFMAIG	*Blower* *ITD21*	*MDFMABI*	*Blower* *Brake + ITD21*
MDFMAXX	*Blower*	*MDFMABR*	*Blower* *Brake*
MDEMAXX	*Integral fan*	*MDEMABR*	*Integral fan* *Brake*
MDEMARS	*Integral fan* *RES* *Frame size 90, 100, 112*	*MDEMARS*	*Integral fan* *RES* *Frame size 71, 80, 132, 160, 180*
MDEMAIG	*Integral fan* *ITD21* *Frame size 90, 100, 112*	*MDEMAIG*	*Integral fan* *ITD 21* *Frame size 71, 80, 132, 160, 180*

RES = Resolver
ITD21 = Incremental encoder

Three-phase AC motors can be supplied in a variety of designs. Both foot and flange mounting versions are available.

Machines with bearing covers
horizontal orientation (selection)
DIN IEC 34 Part 7, Table 1

Design		Description				
Abbrev- Italian	Figure	Bearing	Stand (housing)	Shaft	General design	Fastening or installation
B3		2 bearing covers	With feet	Free shaft end	–	Installation on base
B5		2 bearing covers	No feet	Free shaft end	Mounting flange in vicinity of bearing, accessed from housing side	Flange mounting
B14		2 bearing covers	No feet	Free shaft end	Mounting flange in vicinity of bearing on drive end; no access	Flange mounting

The three-phase AC motors are suitable for mounting in any mounting position and are compatible for vertical orientations to DIN IEC 34 Part 7.

Indoor installation only (no weather shield)

Drive flange and shaft ends
(to DIN 42673/DIN 42677)

Motor frame size	71	80	90	100	112	132	160	180
Design/flange	B3	B3	B3	B3	B3	B3	B3	B3
	B5 A160	B5 A200	B5 A200	B5 A250	B5 A250	B5 A300	B5 A350	B5 A350
	B14 C105*	B14 C120*	B14 C160*	B14 C160*	B14 C160*	–	–	–
	–	B14 C160**	–	–	–	–	–	–
Shaft end	14 x 30	19 x 40	24 x 50	28 x 60	28 x 60	38 x 80	42 x 110	48 x 110

* Standard
**Option

Overview of available options

Options	Motor frame size							
	71	80	90	100	112	132	160	180
Fans								
Integral fan [1]	●	●	●	●	●	●	●	●
Blower 230 V	●	●	●	●	●	●	●	●
Blower 400 V	●	●	●	●	●	●	●	●
Speed/position encoder								
Without	●	●	●	●	●	●	●	●
Resolver	●	●	●	●	●	●	●	●
ITD21 TTL, 2048 pul.	●	●	●	●	●	●	●	●
ITD21 HTL, 2048 pul.	●	●	●	●	●	●	●	●
ITD21 TTL, 512 pul.	●	●	●	●	●	●	●	●
ITD21 HTL, 512 pul.	●	●	●	●	●	●	●	●
BFK458 spring-operated brake								
Brake 24 V	●	●	●	●	●	●	●	●
Brake 205 V	●	●	●	●	●	●	●	●
Brake 230 V	●	●	●	●	●	●	●	●
Brake 24 V (higher-torque)	●		●	●	●	●	●	●
Brake 205 V (higher-torque)	●		●	●	●	●	●	●
Brake 230 V (higher-torque)	●		●	●	●	●	●	●
motec E82MV	●	●	●	●	●	●		

[1] Brake and encoder and integral fan not available

Three-phase AC motor/motec assignment

Three-phase AC motor	Integrated motec
MD□MA□□ **071-12**	E82MV**251**_□B
MD□MA□□ **071-32**	E82MV**371**_□B
MD□MA□□ **080-12**	E82MV**551**_□B
MD□MA□□ **080-32**	E82MV**751**_□B
MD□MA□□ **090-12**	E82MV**152**_□B
MD□MA□□ **090-32**	E82MV**152**_□B
MD□MA□□ **100-12**	E82MV**222**_□B
MD□MA□□ **100-32** *	E82MV**302**_□B
MD□MA□□ **112-22** *	E82MV**402**_□B
MD□MA□□ **132-12** *	E82MV**552**_□B
MD□MA□□ **132-22** *	E82MV**752**_□B

* In the power range from 3 ... 7.5 kW, on self-ventilated motors, please note the current derating of the 8200 motec.

Control modes

The following conditions must be met in order for rated data to be achieved:

- Ambient temperature up to 40°C
- Installation up to 1000 m above sea level
- Unobstructed airflow
- No intake of warm outlet air

The control mode is important when selecting a motor. For example, the temperature rise on a motor subject to short-term load will be lower than that on a motor subject to long-term load and can therefore be set to a lower value. Control modes S1 to S8 to VDE 0530 apply.

In **continuous operation S1**, the operating time at rated power is long enough for the machine to reach steady-state temperature. These motors are suitable for continuous operation, i.e. their rated load may be applied continuously.

In **short-term operation S2**, in comparison with the subsequent pause, the operating time is too short for the machine to reach steady-state temperature. During the subsequent lengthy pause, the motor cools down to the initial temperature.

In **intermittent operation S3, S4, S5**, cycles of the same type combine to form a sequence. The cycle time is usually 10 minutes. The pause is sufficient to cool down the machine.

S3 operation occurs if the start-up current for the temperature rise is insignificant, S4 if it is significant, S5 if the braking current of the machine increases the temperature rise.

In **continuous operation with intermittent loading S6**, the motor can cool down during the no-load phases .

In **uninterrupted operation with acceleration and braking S7**, there are almost no pauses. The machine is constantly under voltage.

In **uninterrupted operation S8 with pole-changing** the machine runs constantly under load but with frequent speed variation.

Alternative rated data

Rated power conversions for different control modes
According to operating time, power ratings other than those listed in the technical data are permissible for control modes S2, S3 and S6. The table below contains guide values for converting power ratings:

Control mode S2		Control mode S3			Control mode S6	
Operating time in minutes	Conversion factor k_1	Operating time in %	Conversion factor k_3 with integral fan	Conversion factor k_3 with blower	Operating time in %	Conversion factor k_6
10	1.40 to 1.50	15	1.40 to 1.5	1.50 to 1.65	15	1.50 to 1.6
30	1.15 to 1.20	25	1.30 to 1.4	1.40 to 1.55	25	1.40 to 1.5
60	1.07 to 1.10	40	1.15 to 1.2	1.30 to 1.45	40	1.30 to 1.4
90	1.00 to 1.05	60	1.05 to 1.1	1.15 to 1.25	60	1.15 to 1.2

Table 1: Increased power for control modes S2, S3 and S6

The power ratings, which are determined by operating time, can be calculated using the conversion factors k_ϑ (k_1, k_3, k_6) in Table 1 and the motor rated powers Pr:

$$P_{perm} = ki \; P_r$$

Alternative ambient conditions
In the event of alternative ambient conditions, the power must be derated using the factors in Tables 2 and 3. The permissible continuous power is calculated as follows:

$$P_{perm} = k_\vartheta \; k_h \; P_r$$

Cooling air temperature °C	40	45	50	55	60
Power derating k_ϑ	1.0	0.95	0.9	0.83	0.7

Table 2: Power derating for alternative ambient/cooling air temperatures

Site altitude above sea level in m	1000	2000	3000	4000	5000
Power derating k_h	1.0	0.92	0.83	0.77	0.67

Table 3: Power derating for alternative site altitude

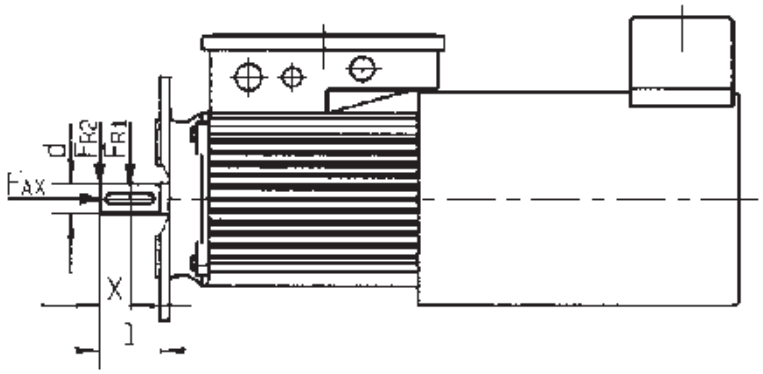
Radial and axial loads applied to the shaft

250% rated torque and a service life of 20,000 hours for the ball bearing are assumed as limiting conditions for the permissible shaft load.

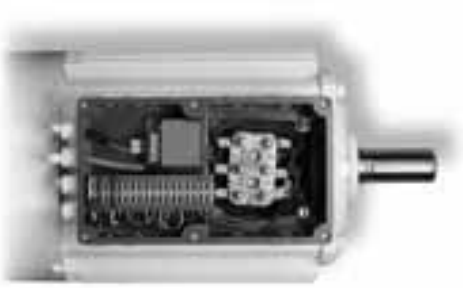
Motor type	Shaft dimensions d x l mm	Distance X mm	Permissible axial force F_{ax} N	Permissible radial force at X F_{r1} N	Permissible radial force on shaft end F_{r2} N
MD□MA□□ 071-□□	14 x 30	15	260	470	200
MD□MA□□ 080-□□	19 x 40	20	230	560	510
MD□MA□□ 090-□□	24 x 50	25	330	780	650
MD□MA□□ 100-□□	28 x 60	30	310	1060	850
MD□MA□□ 112-□□	28 x 60	30	310	1450	1250
MD□MA□□ 132-□□	38 x 80	40	350	2100	1800
MD□MA□□ 160-□□	42 x 110	55	950	2400	2100
MD□MA□□ 180-□□	48 x 110	55	2240	3600	2800

Linear interpolation may take place between F_{r1} and F_{r2}.

Axial and radial shaft loads



Terminal box
Lenze's three-phase AC motor features a larger terminal box in which all connections are clearly arranged. The terminal box is located at the top of IM B3 design motors.



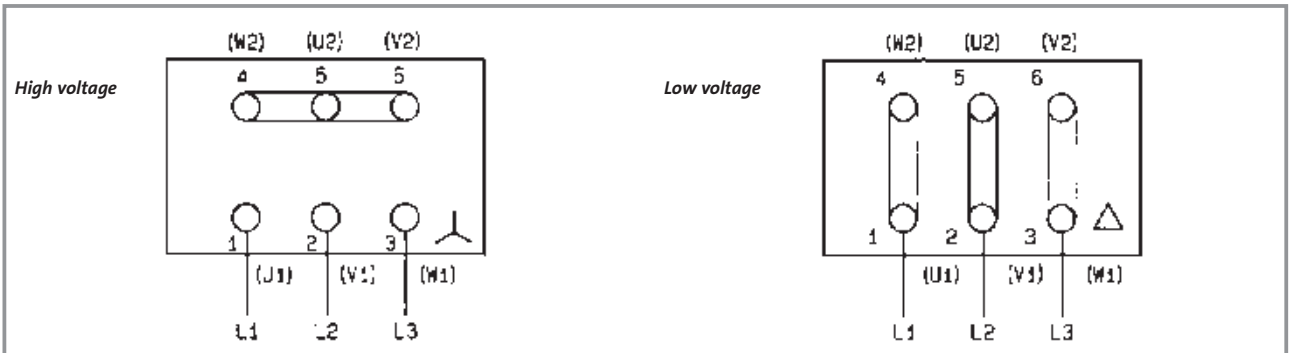
Application terminal box

Motor connection
The three-phase AC motors are designed for operation on a constant mains and for inverter operation.

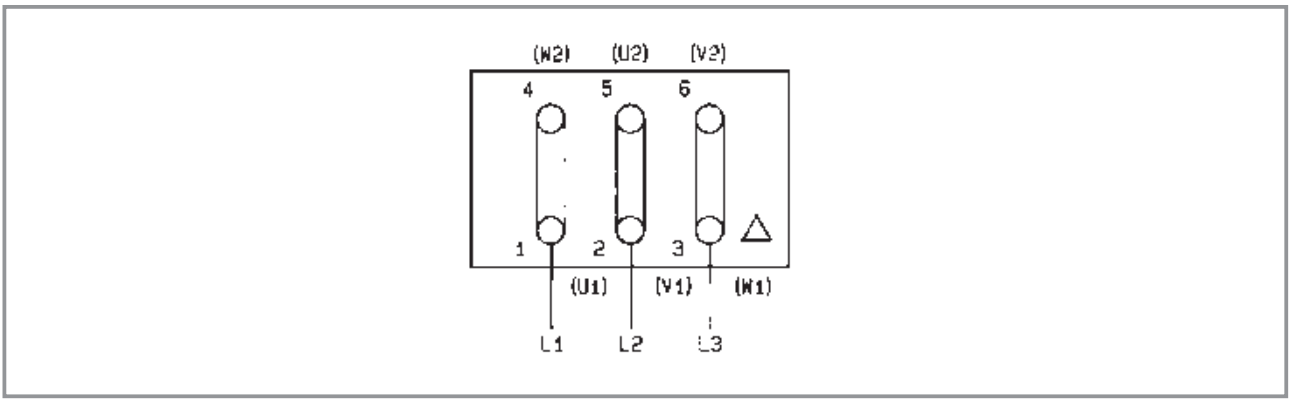
For operation at 50 Hz, the motors should be operated in a Δ-connection at 230 V or in a Y-connection at 400 V.

For inverter operation, the base frequency has been set at 87 Hz at a rated voltage of 400 V in a Δ-connection. For this purpose, the motors should be connected in a Δ-connection.

Connection diagram for operation at 50 Hz



Connection diagram for operation at 87 Hz



Connection of options
The size of the terminal box has been increased significantly for the connection of options. It can house all necessary connections along with the rectifier required for the brakes. The terminal box has a built-in DIN rail for up to 18 possible connections.

The following terminals are available:

Meaning	Terminal designation	Addition
PE Earthing	⏚	Green/yellow
Blower single-phase Blower single-phase	U1 U2	Connection to L1 mains Connection to N mains
Blower 3-phase Blower 3-phase Blower 3-phase	U1 V1 W1	Connection to L1 mains Connection to L2 mains Connection to L3 mains
Temperature contact (NC contact) Temperature contact (NC contact) Temperature detector Temperature detector	S1 S2 T1 T2	Warning 1S1 Warning 1S2 + KTY – KTY
Incremental encoder supply + Incremental encoder supply – Incremental encoder output channel A	B1 B2 B3	Power supply GND (ground)
Incremental encoder output channel $\overline{A}$ Incremental encoder output channel B Incremental encoder output channel $\overline{B}$	B4 B5 B6	Inverse Inverse
Incremental encoder output channel C Incremental encoder output channel $\overline{C}$	B7 B8	Zero track Inverse
Screen	B10	
Resolver Ref + Resolver Ref – Resolver cos + Resolver cos – Resolver sin + Resolver sin –	B1 B2 B4 B5 B6 B7	
DC brake + DC brake –	Y1 Y2	
Brake rectifier Brake rectifier Brake rectifier Brake rectifier	1 4 2+ 3-	Connection to L1 mains Connection to N mains Connection to brake 2F1 (+) Connection to brake 2F2 (–)

See page 23 for encoder data

Cable connectors

Motor type	Motor terminal box						Fan terminal box
	M50X1.5	M32X1.5	M25X1.5	M20X1.5	M16X1.5	M12X1.5	M16X1.5
MD□MA□□ 071-□2	–	–	2X	4X	2X	4X	1X
MD□MA□□ 080-□2	–	–	2X	4X	2X	4X	1X
MD□MA□□ 090-□2	–	–	2X	4X	2X	4X	1X
MD□MA□□ 100-□2	–	–	2X	4X	2X	4X	1X
MD□MA□□ 112-□2	–	2X	–	2X	4X	4X	1X
MD□MA□□ 132-□2	2X	–	–	2X	4X	4X	1X
MD□MA□□ 160-□2	2X	–	–	2X	4X	4X	1X
MD□MA□□ 180-□2	2X	–	–	2X	4X	4X	1X

Technical data, motors

Rated data for operation at 50 Hz

Lenze three-phase AC motors are designed for operation on 230/400 V three-phase mains and with Lenze 8200, 8210, 9300 vector control and motec inverters.

Please refer to the table for the rated data for operation at 50 Hz.

In the power range from 3 ... 7.5 kW, on self-ventilated motors, please note the current derating of the 8200 motec.

The motors can be operated on 60 Hz mains. The table below shows how the rated data is affected by the operating frequency.

Rated data for operation at 50 Hz

Type of protection: IP54, insulation class F

Motor type	Shaft height h [mm]	Speed n_r [rpm]	Torque M_r [Nm]	Power P_r [kW]	Current I [A]	Supply voltage U [V]	Frequency [Hz]	Power-factor cos φ	Efficiency η	Stalling torque M_K [Nm]	Starting torque M_A [Nm]	Starting current I_A/I_r	Moment of inertia J [kgm²]	Weight m [kg]
MD□MA□□071-12	71	1370	1.8	0.25	1.1/1.8	400/230	50	0.60	0.62	3.4	3.4	3.8	0.0006	5.9
MD□MA□□071-32	71	1310	2.7	0.37	1.15/2.0	400/230	50	0.74	0.63	5.2	5.2	3.7	0.0008	6.6
MD□MA□□080-12	80	1370	3.9	0.55	1.6/2.8	400/230	50	0.78	0.65	6.8	6.5	3.8	0.0016	8.6
MD□MA□□080-32	80	1390	5.2	0.75	1.9/3.3	400/230	50	0.80	0.71	9.7	9.2	4.5	0.0019	9.88
MD□MA□□090-12	90	1405	7.5	1.1	2.6/4.5	400/230	50	0.80	0.77	21.0	16.5	4.9	0.0026	14.0
MD□MA□□090-32	90	1410	10.2	1.5	3.5/6.1	400/230	50	0.78	0.79	28.6	25.5	5.3	0.0034	17.2
MD□MA□□100-12	100	1425	14.7	2.2	4.8/8.3	400/230	50	0.80	0.82	37.8	35.0	6.1	0.0057	25.0
MD□MA□□100-32	100	1415	20.2	3.0	6.5/11.4	400/230	50	0.81	0.82	48.5	46.5	6.1	0.0065	26.0
MD□MA□□112-22	112	1435	26.6	4.0	8.3/14.3	400/230	50	0.82	0.85	73.4	66.5	6.3	0.0118	34.0
MD□MA□□132-12	132	1450	36.2	5.5	11.0/19.1	400/230	50	0.84	0.86	103.0	72.5	6.9	0.0290	62.0
MD□MA□□132-22	132	1450	49.4	7.5	14.6/25.4	400/230	50	0.85	0.87	140.0	107.0	6.7	0.0350	73.0
MD□MA□□160-22	160	1460	71.9	11.0	21.0/36.5	400/230	50	0.85	0.89	204.0	150.0	7.0	0.0610	110.0
MD□MA□□160-32	160	1460	98.1	15.0	27.8/48.4	400/230	50	0.87	0.90	288.0	214.0	7.1	0.0750	130.0
MD□MA□□180-12	180	1470	120.2	18.5	32.8/57.8	400/230	50	0.90	0.905	313.0	260.0	6.8	0.1350	165.0
MD□MA□□180-22	180	1456	144.3	22.0	38.8/67.4	400/230	50	0.90	0.91	360.0	330.0	7.3	0.1550	175.0

* The motors can be operated at their rated torque in the voltage range between 360 and 440 V without thermally overloading the motor.

How operating frequency affects rated data

Frequency f in Hz	Voltage $\frac{U}{U_n}$ in %	Power $\frac{P}{P_n}$ in %	Speed $\frac{n}{n_n}$ in %	Torque $\frac{M}{M_n}$ in %	Motor starting torque $\frac{M_A}{M_{AN}}$ in %
50	100	100	100	100	100
60	100	100	120	83	70
60	120	120	120	100	100

Setting the motor reference point (inverter parameter setting) to 87 Hz at a rated voltage of 400 V in a Δ-connection makes it possible to operate the motors at up to 87 Hz rated speed with the rated torque. Above the rated speed, the motors can be operated at up to the maximum speed of 4500 rpm with constant power.

Please refer to the table below for the rated data for operation at 87 Hz.

Rated data for operation at 60 Hz
Type of protection: IP54, insulation class F

Motor type	Shaft height h [mm]	Speed n_r [rpm]	Torque M_r [Nm]	Power P_r [kW]	Current I [A]	Supply voltage U [V]	Frequency [Hz]	Power factor cosφ	Efficiency η	Stalling torque M_K [Nm]	Starting torque M_A [Nm]	Starting current I_A/I_N	Moment of inertia J [kgm²]	Weight m [kg]
MD□MA□□071-12	71	1670	1.8	0.31	1.1/1.8	480/277	60	0.60	0.62	3.4	3.4	3.8	0.0006	5.9
MD□MA□□071-32	71	1610	2.7	0.45	1.15/2.0	480/277	60	0.74	0.63	5.2	5.2	3.7	0.0008	6.6
MD□MA□□080-12	80	1670	3.9	0.68	1.6/2.8	480/277	60	0.78	0.65	6.8	6.5	3.8	0.0016	8.6
MD□MA□□080-32	80	1690	5.2	0.92	1.9/3.3	480/277	60	0.80	0.71	9.7	9.2	4.5	0.0019	9.8
MD□MA□□090-12	90	1705	7.5	1.3	2.6/4.5	480/277	60	0.80	0.77	21.0	16.5	4.9	0.0026	14.0
MD□MA□□090-32	90	1710	10.2	1.8	3.5/6.1	480/277	60	0.78	0.79	28.6	25.5	5.3	0.0034	17.2
MD□MA□□100-12	100	1725	14.7	2.6	4.8/8.3	480/277	60	0.80	0.82	37.8	35.0	6.1	0.0057	25.0
MD□MA□□100-32	100	1715	20.2	3.6	6.5/11.4	480/277	60	0.81	0.82	48.5	46.5	6.1	0.0065	26.0
MD□MA□□112-22	112	1735	26.6	4.8	8.3/14.3	480/277	60	0.82	0.85	73.4	66.5	6.3	0.0118	34.0
MD□MA□□132-12	132	1750	36.2	6.6	11.0/19.1	480/277	60	0.84	0.86	103.0	72.5	6.9	0.0290	62.0
MD□MA□□132-22	132	1750	49.4	9.0	14.6/25.4	480/277	60	0.85	0.87	140.0	107.0	6.7	0.0350	73.0
MD□MA□□160-22	160	1760	71.9	13.2	21.0/36.5	480/277	60	0.85	0.89	204.0	150.0	7.0	0.0610	110.0
MD□MA□□160-32	160	1760	98.1	18.0	27.8/48.4	480/277	60	0.87	0.90	288.0	214.0	7.1	0.0750	130.0
MD□MA□□180-12	180	1770	120.2	22.2	32.8/57.8	480/277	60	0.90	0.905	313.0	260.0	6.8	0.1350	165.0
MD□MA□□180-22	180	1756	144.3	26.4	38.8/67.4	480/277	60	0.90	0.91	360.0	330.0	7.3	0.1550	175.0

Rated data for operation at 87 Hz
Type of protection: IP54, insulation class F

Motor type	Shaft height h [mm]	Speed n_r [rpm]	Torque M_r [Nm]	Power P_r [kW]	Current I [A]	Supply voltage U [V]	Frequency [Hz]	Power factor cos φ	Efficiency η	Stalling torque M_K [Nm]	Moment of inertia J [kgm²]	Weight m [kg]
MD□MA□□071-12	71	2480	1.8	0.47	1.8	400	87	0.59	0.71	3.8	0.0006	5.9
MD□MA□□071-32	71	2420	2.7	0.67	2.0	400	87	0.73	0.75	6.0	0.0008	6.6
MD□MA□□080-12	80	2480	3.9	1.0	2.8	400	87	0.73	0.78	8.3	0.0016	8.6
MD□MA□□080-32	80	2510	5.2	1.35	3.3	400	87	0.77	0.83	12.0	0.0019	9.8
MD□MA□□090-12	90	2520	7.6	2.0	4.5	400	87	0.77	0.83	25.0	0.0026	14.0
MD□MA□□090-32	90	2525	10.2	2.7	6.1	400	87	0.76	0.84	36.0	0.0034	17.2
MD□MA□□100-12	100	2535	14.7	3.9	8.3	400	87	0.76	0.84	47.2	0.0057	25.0
MD□MA□□100-32	100	2530	20.2	5.4	11.4	400	87	0.78	0.84	68.7	0.0065	26.0
MD□MA□□112-22	112	2545	26.6	7.1	14.3	400	87	0.83	0.84	82.5	0.0118	34.0
MD□MA□□132-12	132	2555	36.2	9.7	19.1	400	87	0.83	0.88	115.0	0.0290	62.0
MD□MA□□132-22	132	2555	49.4	13.2	25.4	400	87	0.84	0.89	148.0	0.0350	73.0
MD□MA□□160-22	160	2565	71.9	19.3	36.5	400	87	0.85	0.90	216.0	0.0610	110.0
MD□MA□□160-32	160	2565	98.1	26.4	48.4	400	87	0.86	0.92	294.0	0.0750	130.0
MD□MA□□180-12	180	2575	120.2	32.4	57.8	400	87	0.89	0.920	330.0	0.1350	165.0
MD□MA□□180-22	180	2560	144.3	38.7	67.4	400	87	0.89	0.920	378.0	0.1550	175.0

Blower

Motor frame size	Version	Connection	50 Hz Power [W]	50 Hz Voltage [V]	50 Hz Current [A]	60 Hz Power [W]	60 Hz Voltage [V]	60 Hz Current [A]	Weight m [kg]
071	1 ~		58	230-240	0.19	70	230-277	0.20	2.4
	3 ~	Y	30	380-500	0.05	33	380-575	0.06	
080	1 ~		61	230-240	0.20	73	230-277	0.22	2.3
	3 ~	Y	31	380-500	0.05	34	380-575	0.06	
090	1 ~		71	230-277	0.25	88	230-277	0.25	3.1
	3 ~	Y	85	380-500	0.16	90	380-575	0.15	
	3 ~	Δ	85	220-290	0.28	90	220-332	0.26	
100	1 ~		72	230-277	0.25	88	230-277	0.28	3.5
	3 ~	Y	86	380-500	0.16	93	380-575	0.16	
	3 ~	Δ	86	220-290	0.28	93	220-332	0.28	
112	1 ~		73	230-277	0.26	107	230-277	0.31	3.9
	3 ~	Y	85	380-500	0.15	94	380-575	0.16	
	3 ~	Δ	85	220-290	0.27	94	220-332	0.28	
132	1 ~		115	230-277	0.40	185	230-277	0.59	5.3
	3 ~	Y	138	380-500	0.24	148	380-575	0.16	
	3 ~	Δ	138	220-290	0.45	148	220-332	0.24	
160	1 ~		225	230-277	0.93				7
	3 ~	Y	220	380-500	0.40	280	380-575	0.51	
	3 ~	Δ	220	220-290	0.71	280	220-332	0.85	
180	1 ~		225	230-277	0.93				8.8
	3 ~	Y	220	380-500	0.40	280	380-575	0.51	
	3 ~	Δ	220	220-290	0.71	280	220-332	0.85	

Brake BFK458 - __ E

Frame size	Rated torque [Nm]	P [W] (at 20°C)	Assignment of motor frame size	Weight [kg]
06	4.0	20	71	1.0
08	8.0	25	71/80/90	1.5
10	16.0	30	90/100	2.5
12	32.0	40	100/112	4.0
14	60.0	50	112/132	6.6
16	80.0	55	132	9.5
18	150.0	85	160/180	16.0
20	260.0	100	160/180	24.0

Incremental encoder

Type ITD 21 A4 TTL	
Voltage level	TTL
No. of pulses	2048 (512) pulses/revolution
Tracks	2 tracks and index pulse
Supply voltage	5 V DC ±5%
Limit frequency	300 kHz
Operating temperature range	-20°C ... +100°C
Type of protection	IP54
Maximum speed	8000 rpm
Weight	300 g
Design	A4

Type ITD 21 A4 HTL	
Voltage level	HTL
No. of pulses	2048 (512) pulses/revolution
Tracks	2 tracks and index pulse
Supply voltage	8 V DC 30%
Limit frequency	160 kHz
Operating temperature range	-20°C ... +100°C
Type of protection	IP54
Maximum speed	8000 rpm
Weight	300 g
Design	A4

Resolver

Type TS 2651 N141 E78	
Input voltage	7 V rms
Input frequency	4 kHz
Max. electrical error	± 10 angular minutes
Operating temperature range	-10°C ... +150°C
Type of protection	IP53
Maximum speed	8000 rpm
Weight	305 g
Design	A4

Limit values for operation with IGBT inverters

The insulation system of Lenze three-phase AC motors has been dimensioned for thermal class F (ϑmax. = 155°C). Dielectric and thermal stress has a major effect on the ageing/weakening of windings. Operation with high-speed IGBT inverters actually increases dielectric stress. The following limit values have been set for the motor winding based on current data without assuming a significant reduction in service life:

$$du/dt < 5\ kV/\mu s$$
$$U < 1500\ V$$

These values are not exceeded in motive mode on IGBTs currently used on Lenze products and at cable lengths of less than 50 m.

In operation in generator mode, these values may be exceeded. In applications in which an external brake resistor is required to convert the generator power fed into the DC bus, a motor choke must be provided to reduce insulation stresses.

Operation at 50/60 Hz

Three-phase AC standard motors are designed for operation at 50 Hz. The motors can be connected to a 230 V power supply in a Δ-connection or a 400 V power supply in a Y-connection.

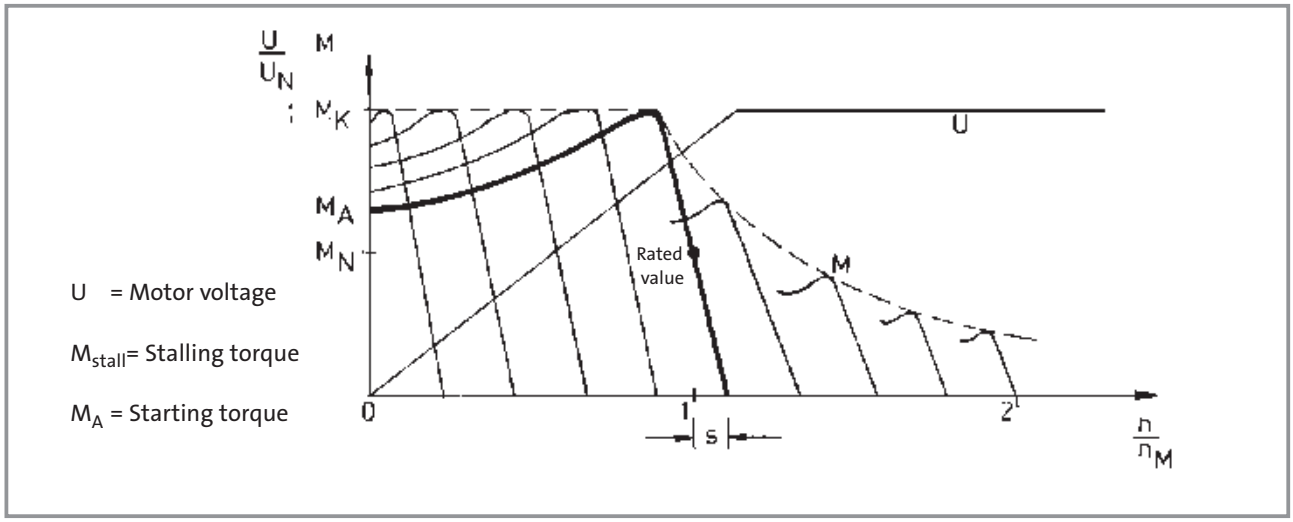
Frequency inverters can be used to vary the rotating field frequency and therefore the speed of the motor.

In the inverter output frequency range up to 50 Hz (known as the armature speed range), the inverter keeps the voltage/frequency (V/f) range constant. This creates constant magnetic flux in the machine, i.e. the torque remains constant up to 50 Hz. In contrast, the power increases in a linear fashion until it reaches the rated power.

At 50 Hz and above (known as the base frequency), the field weakening range begins. Although the voltage cannot be increased any further due to the preset mains voltage, the output frequency continues to increase. The torque decreases in proportion with the reduction in the magnetic flux. As the speed increases in proportion with the frequency, operation with constant power is possible above the base frequency. The diagram below illustrates the resulting speed/torque characteristic.

The data provided for operation at 50 Hz can be applied to operation at 60 Hz by taking into account the affect of the operating frequency on the rated data as shown in the table at the bottom of page 22.

Speed/torque characteristic for inverter operation



Operation at 87 Hz

Setting the V/f break point to 87 Hz and 400 V in a Δ-connection for inverter operation enables the motor to be operated at up to 87 Hz with its rated torque without exceeding the thermal limit values of the motor.

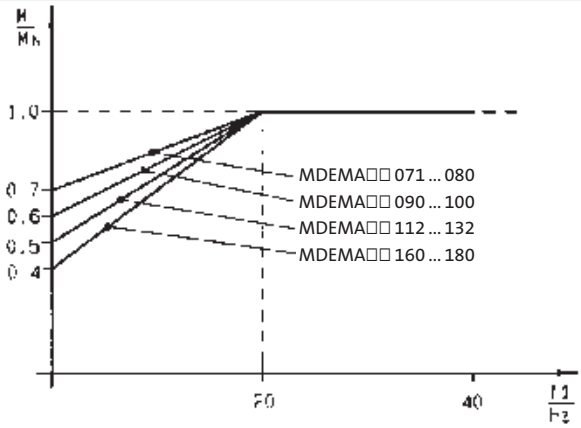
In comparison with operation at 50 Hz, this type of operation enables the permanent power of the motor to be increased by approximately 73%.

However, throughout the range, the motor runs with the delta current increased by a factor of 400/230 = √3. Do not forget to dimension the inverter for the corresponding current.

Thermal protection

The motor's self-ventilation is not always sufficient for operation on a frequency inverter. For operation with inverter output frequencies below 20 Hz, the air flow rate of the integral fan is generally not sufficient. A blower would be required here for continuous operation at rated torque. If a blower is not used, the torque must be reduced in the lower frequency range. Depending on the frame size of the motor, the continuous standstill torques and the operating torques must be reduced up to the inverter output frequency of 20 Hz as shown in the diagram below.

Torque reduction based on motor frame size with self-ventilation



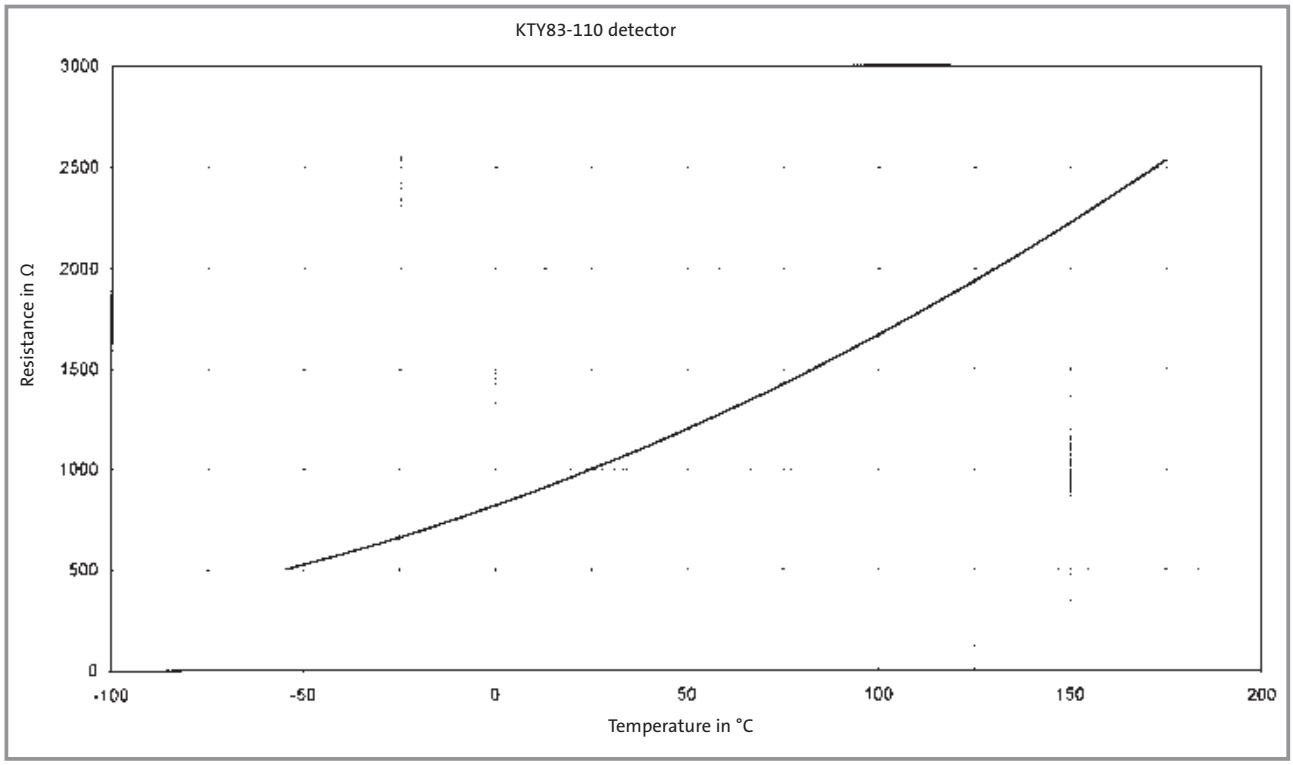
Inverter output frequency f_1

A motor protection relay is no longer sufficient to protect the motor as at operation at f<20 Hz, the rated current will often cause irreparable thermal damage to the motor.

The only reliable means of protection is provided by temperature monitoring in the windings. For this purpose, Lenze three-phase AC motors are fitted with thermal contacts.

KTY 83-110 detector
(built-in temperature detector)
The KTY temperature detector permanently monitors the motor temperature. The feedback system cable is used for feedback to the 9300 servo inverter.

If the detector is supplied with a measured current of 1 mA, the temperature and the resistance are related as follows:



Thermostat – NC contact
A temperature contact can be used to monitor the winding as an alternative to the KTY permanent detector. The contact can be used on motors with terminal boxes.

Both temperature monitoring devices are fitted as standard on MDFMA range asynchronous motors.

Technical data

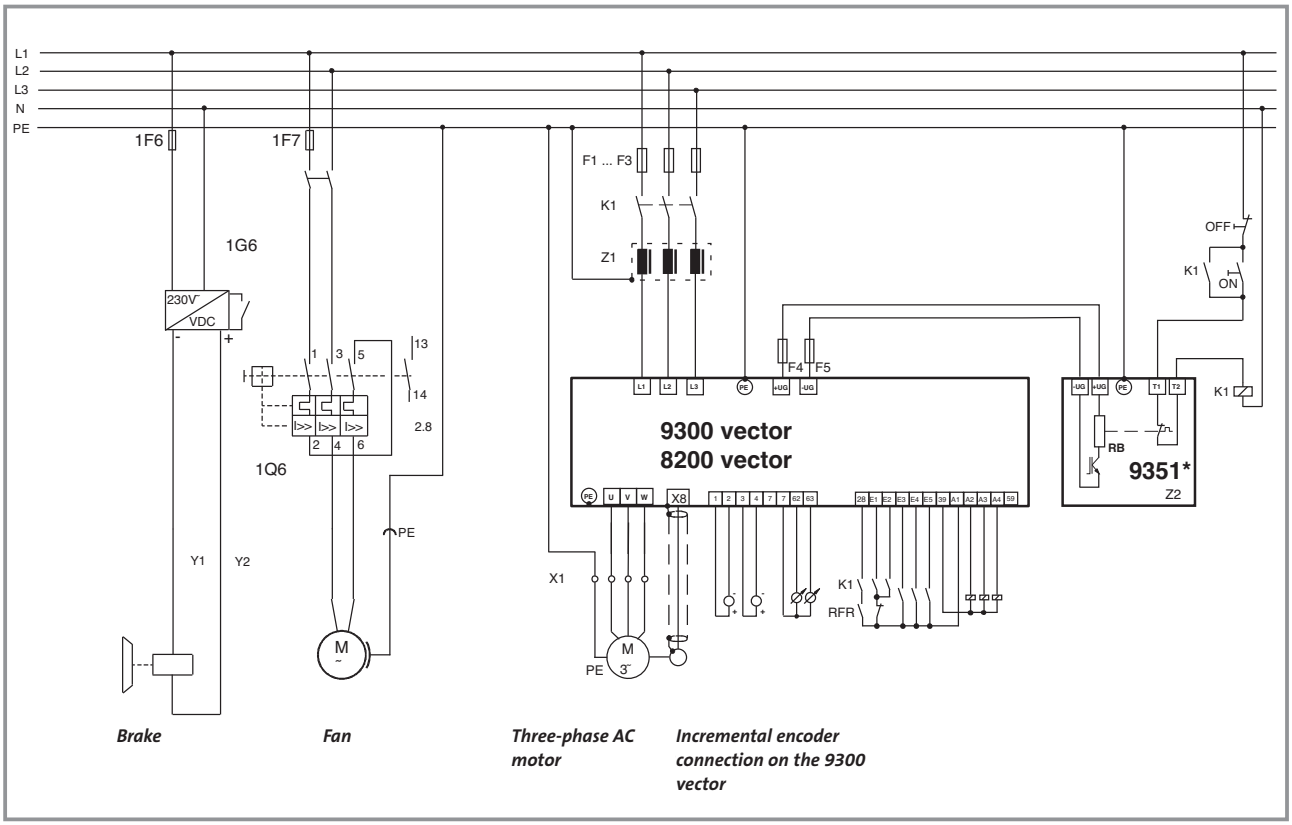
	AC connection	DC connection		
Operating temperature	150°C ± 5°C			
Reset temperature	90 ... 135°C			
Supply voltage	250 V ≈	60 V	48 V	24 V
Rated current [A]	2.5 A	1.0 A	1.25 A	1.6 A

Limit values for inverter operation

The data provided on page 24 for frequency inverter operation can be used as limit values for dielectric stress on the motor winding.

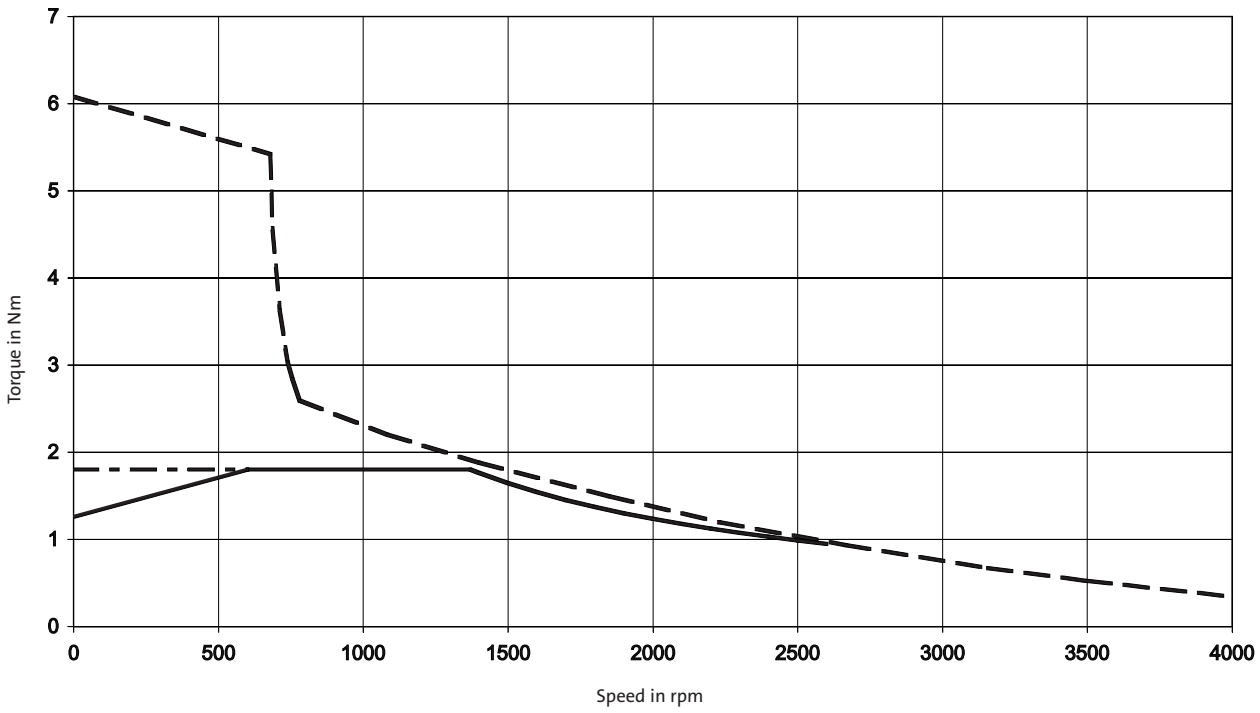
Wiring diagram, mains supply and power supply for the motor

An example wiring diagram for a three-phase AC motor with a 9300 range controller appears below. It shows the mains supply and power supply for the motor.



* Optional on the 9300 vector

Maximum torques MD□MA□□ 071-12, 50 Hz, star connection, with 9300 controller



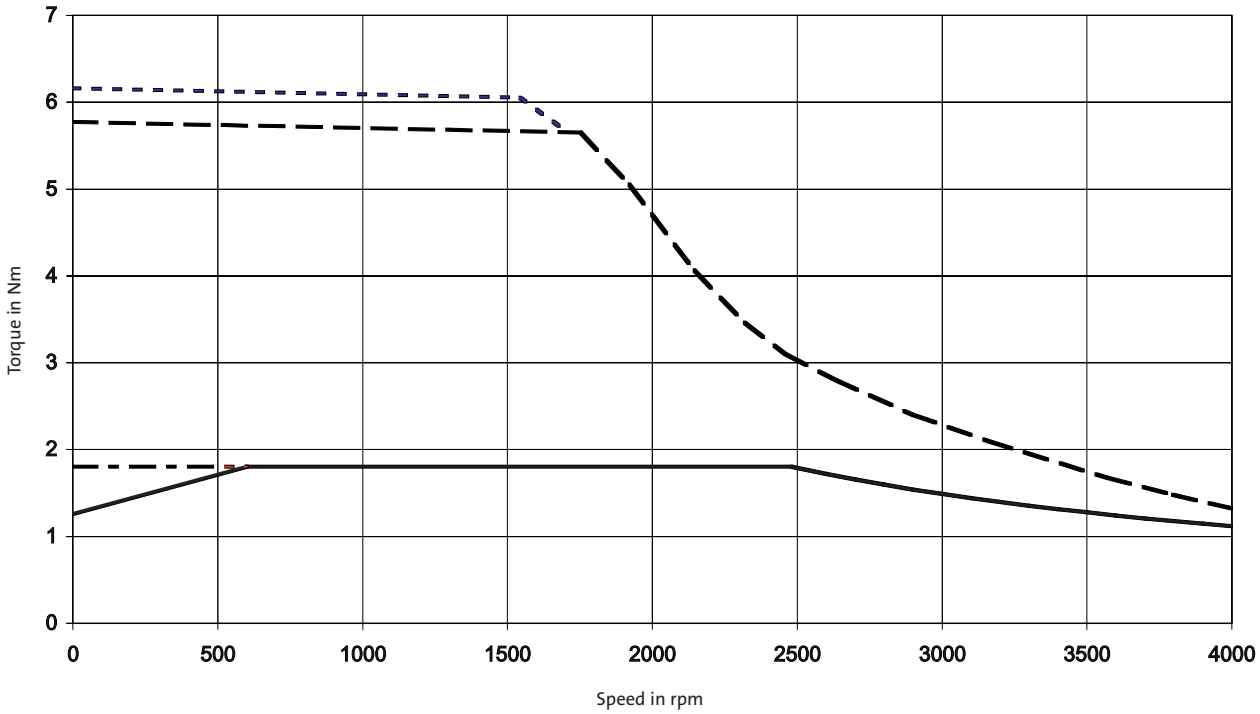
Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

9321, Imax = 2.25 A

Continuous operation S1, forced-ventilated

Continuous operation S1, self-ventilated

Maximum torques MD□MA□□ 071-12, 87 Hz, delta connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

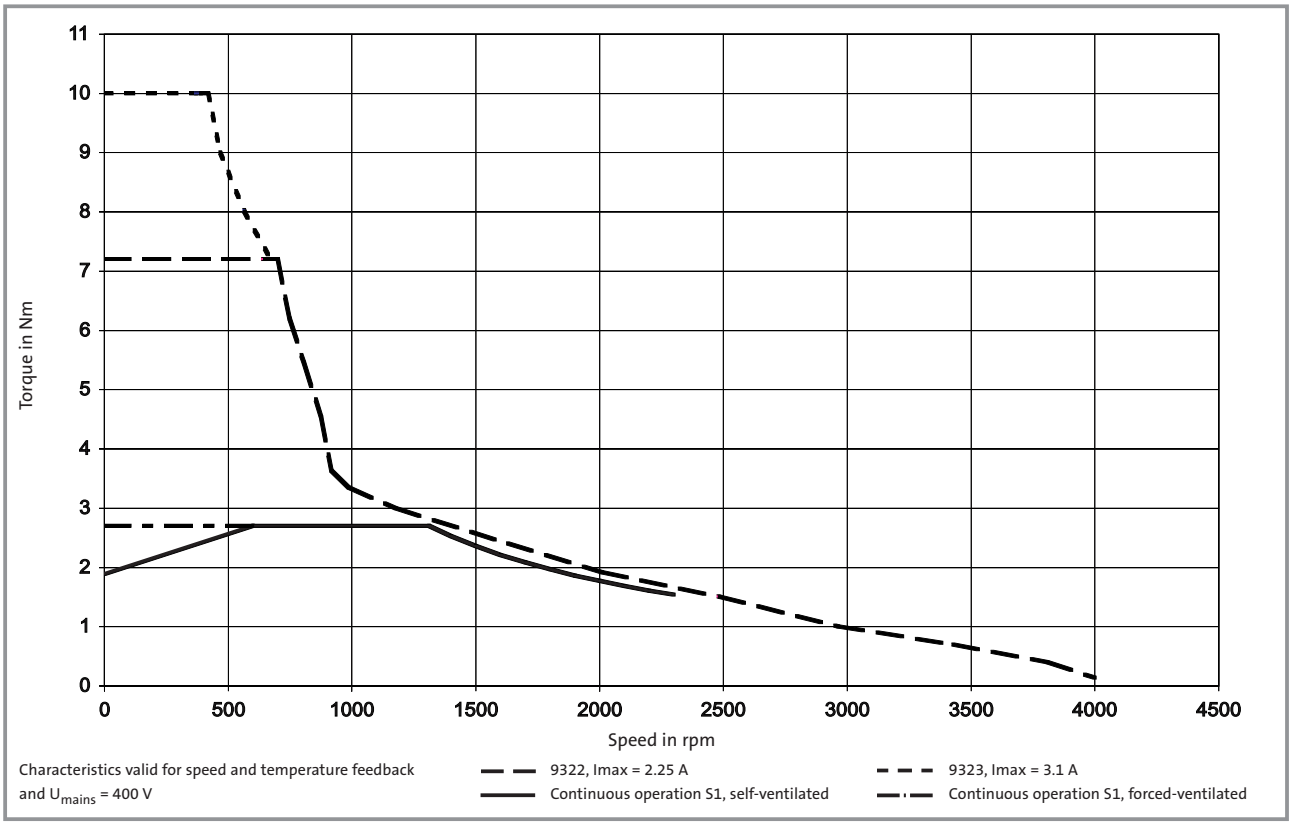
9322, Imax = 3.75 A

Continuous operation S1, self-ventilated

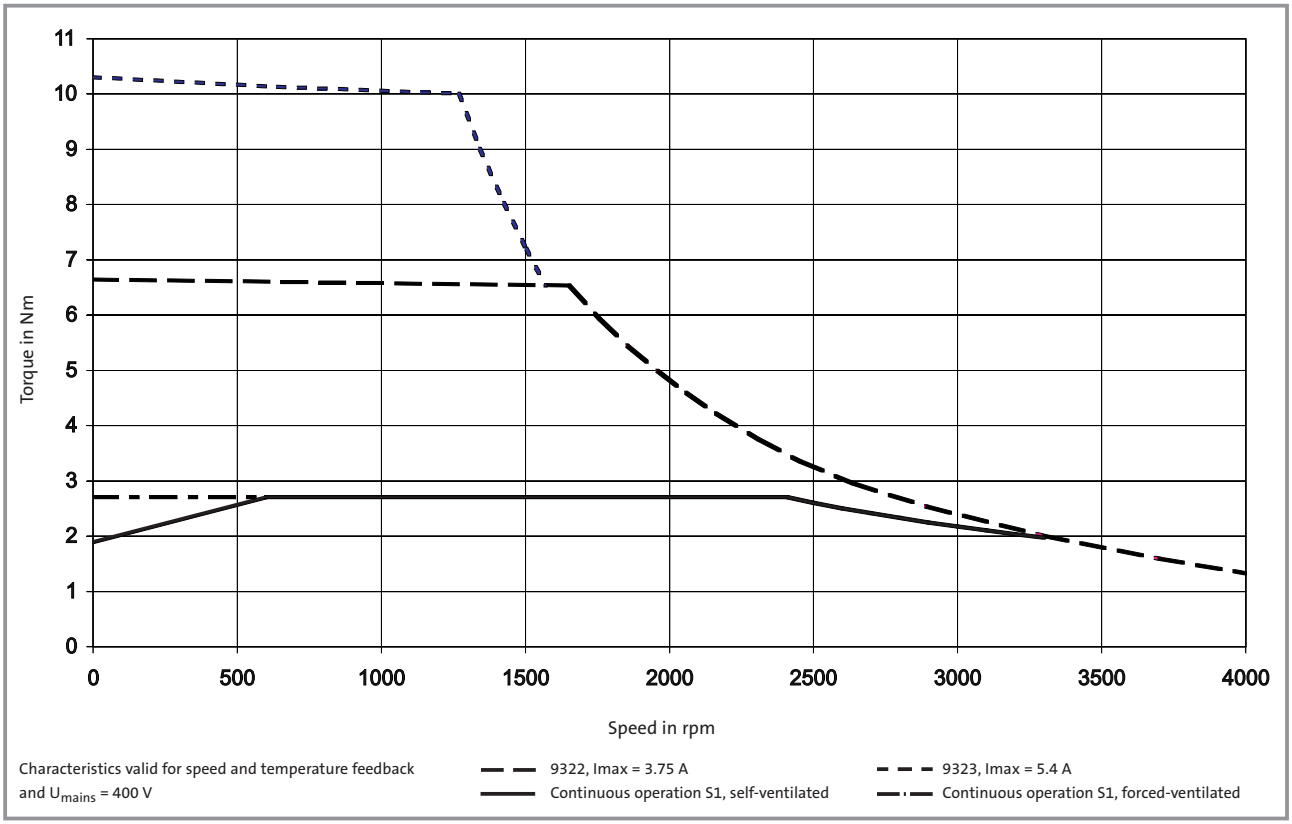
9323, Imax = 4.05 A

Continuous operation S1, forced-ventilated

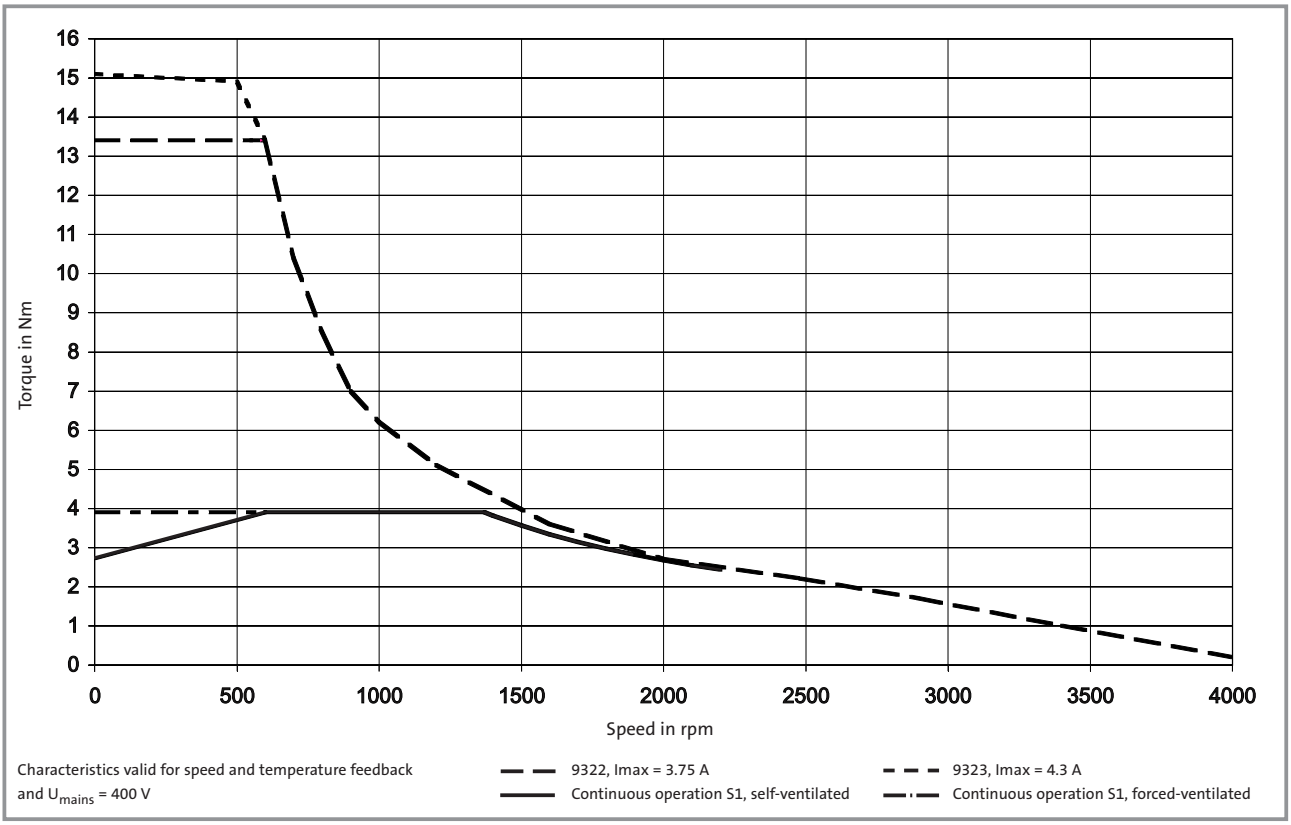
Maximum torques MD□MA□□ 071-32, 50 Hz, star connection, with 9300 controller



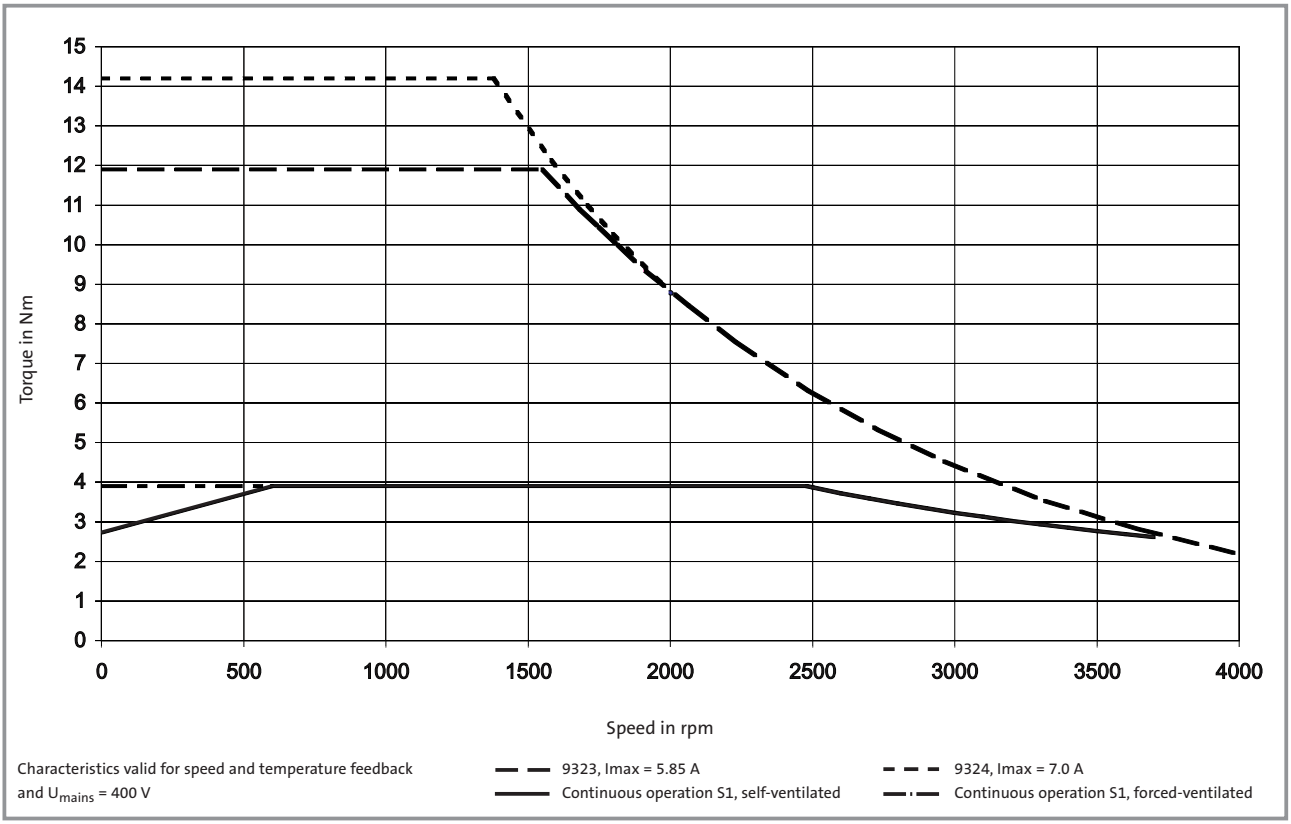
Maximum torques MD□MA□□ 071-32, 87 Hz, delta connection, with 9300 controller



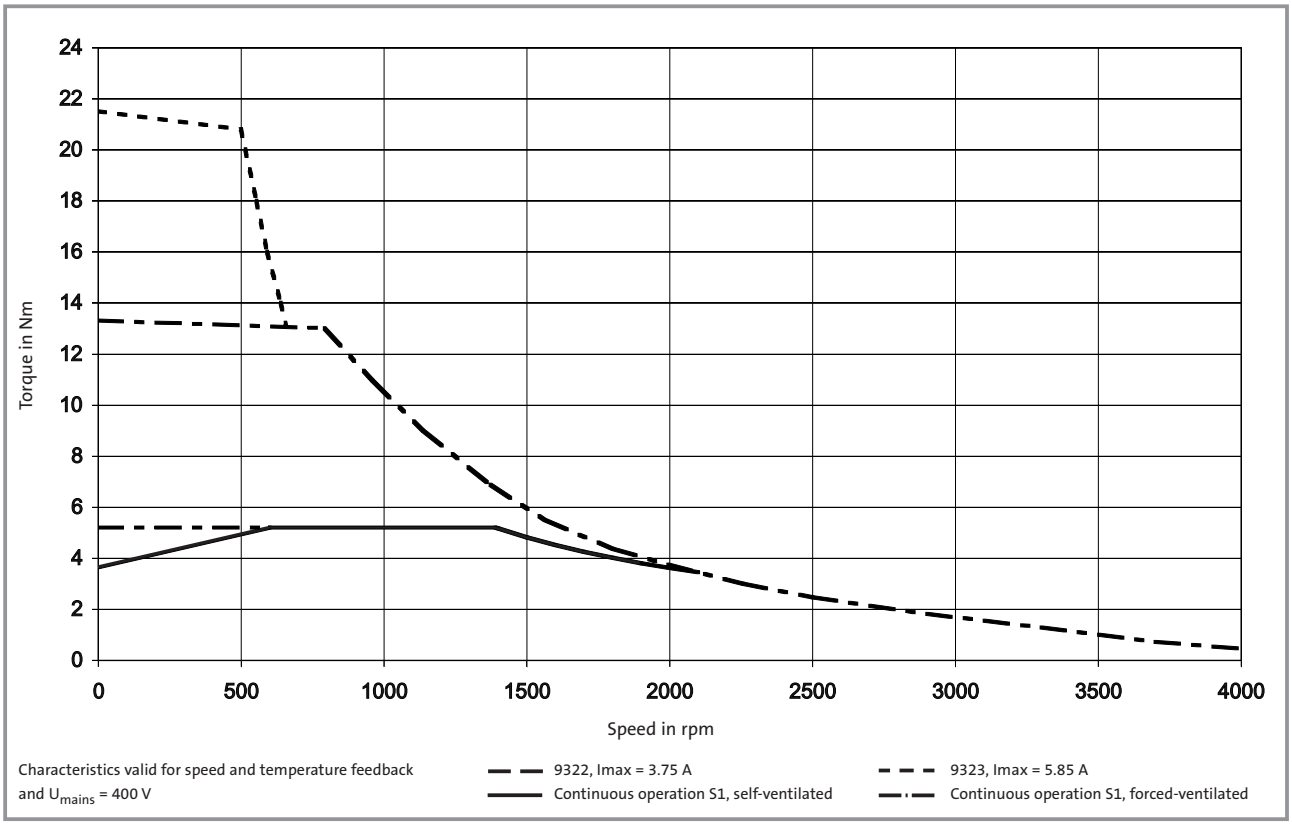
Maximum torques MD□MA□□ 080-12, 50 Hz, star connection, with 9300 controller



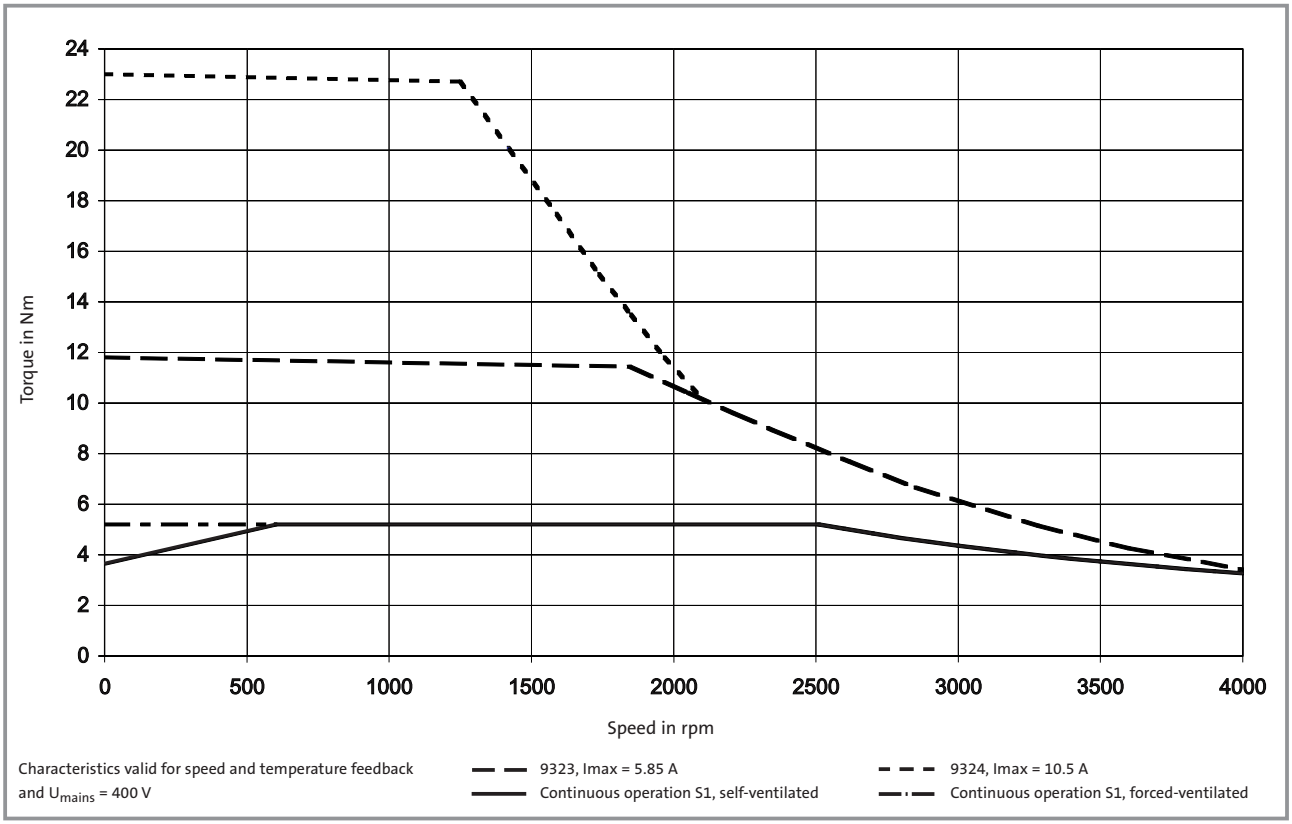
Maximum torques MD□MA□□ 080-12, 87 Hz, delta connection, with 9300 controller



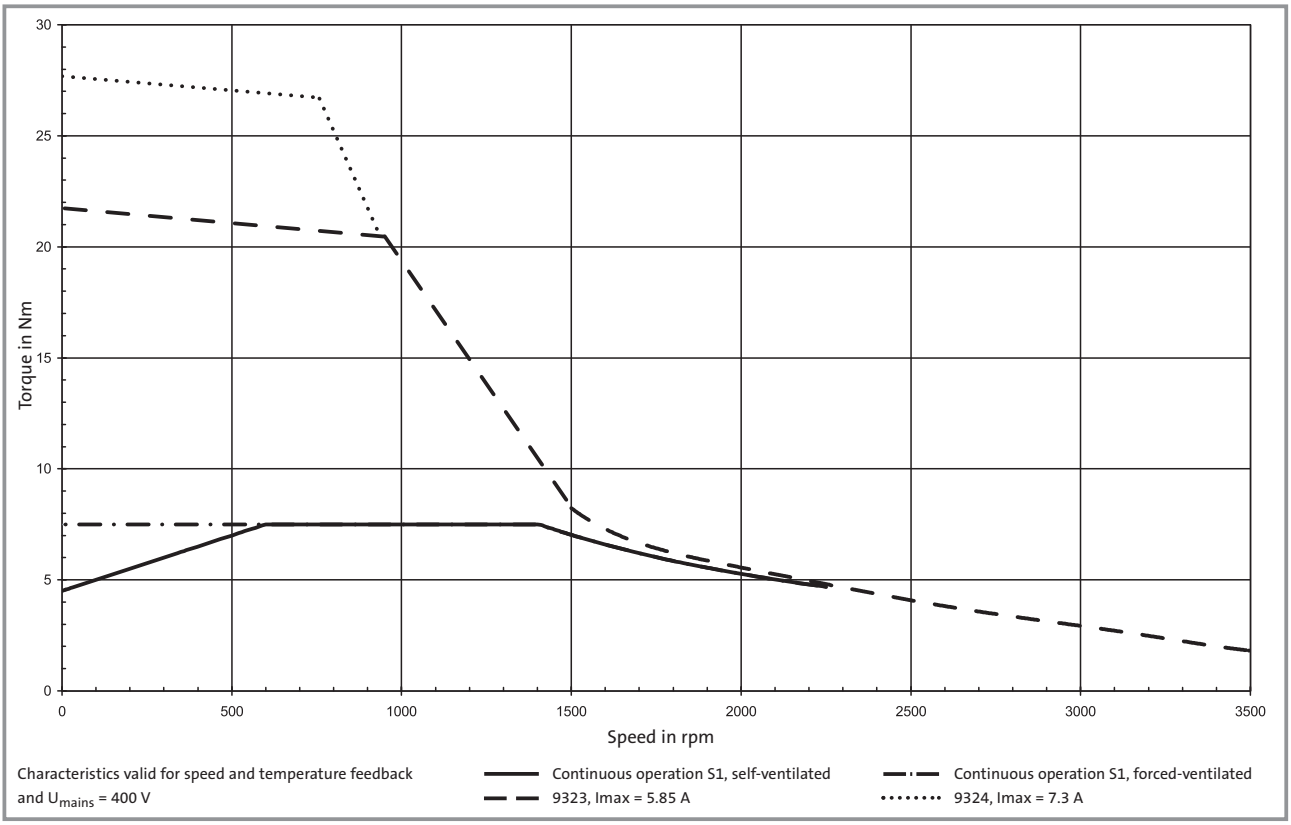
Maximum torques MD□MA□□ 080-32, 50 Hz, star connection, with 9300 controller



Maximum torques MD□MA□□ 080-32, 87 Hz, delta connection, with 9300 controller



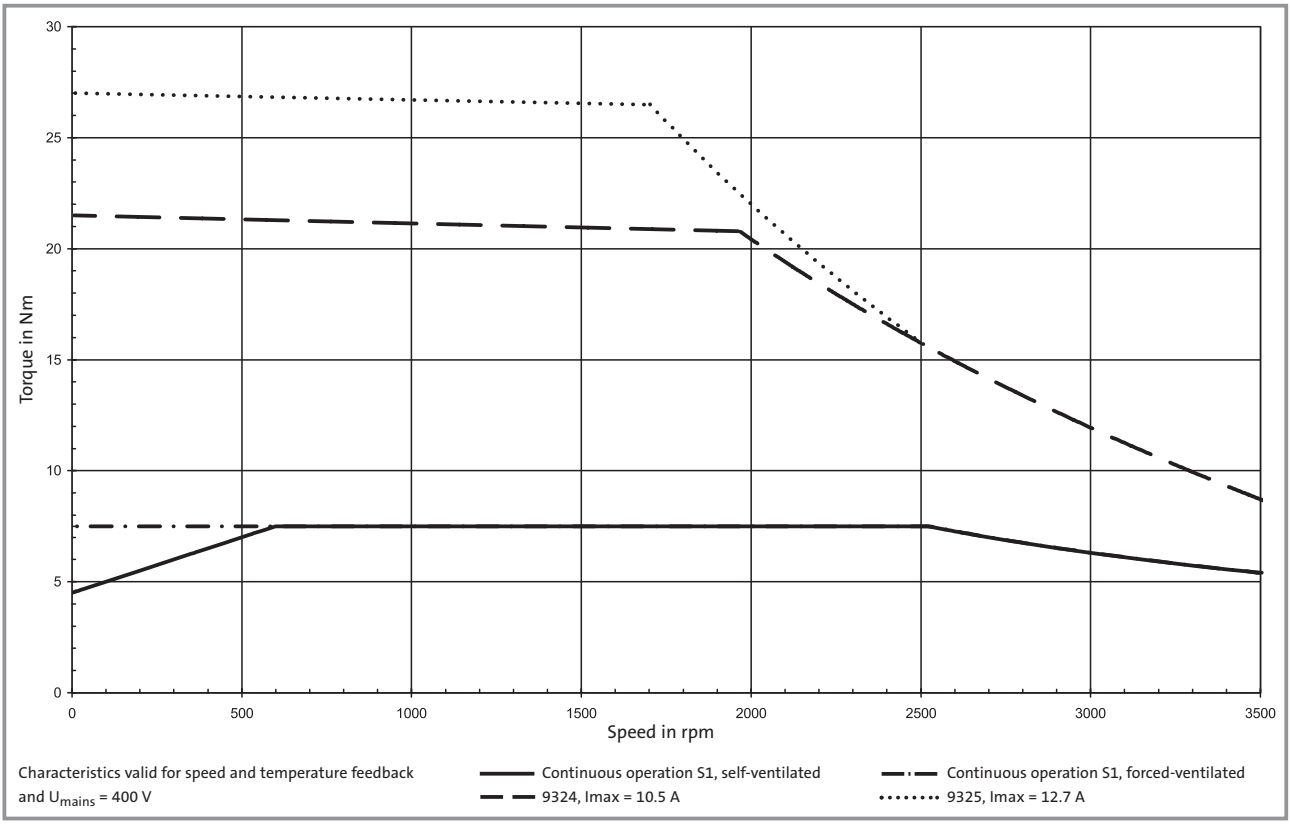
Maximum torques MD□MA□□ 090-12, 50 Hz, star connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

Continuous operation S1, self-ventilated
9323, Imax = 5.85 A
Continuous operation S1, forced-ventilated
9324, Imax = 7.3 A

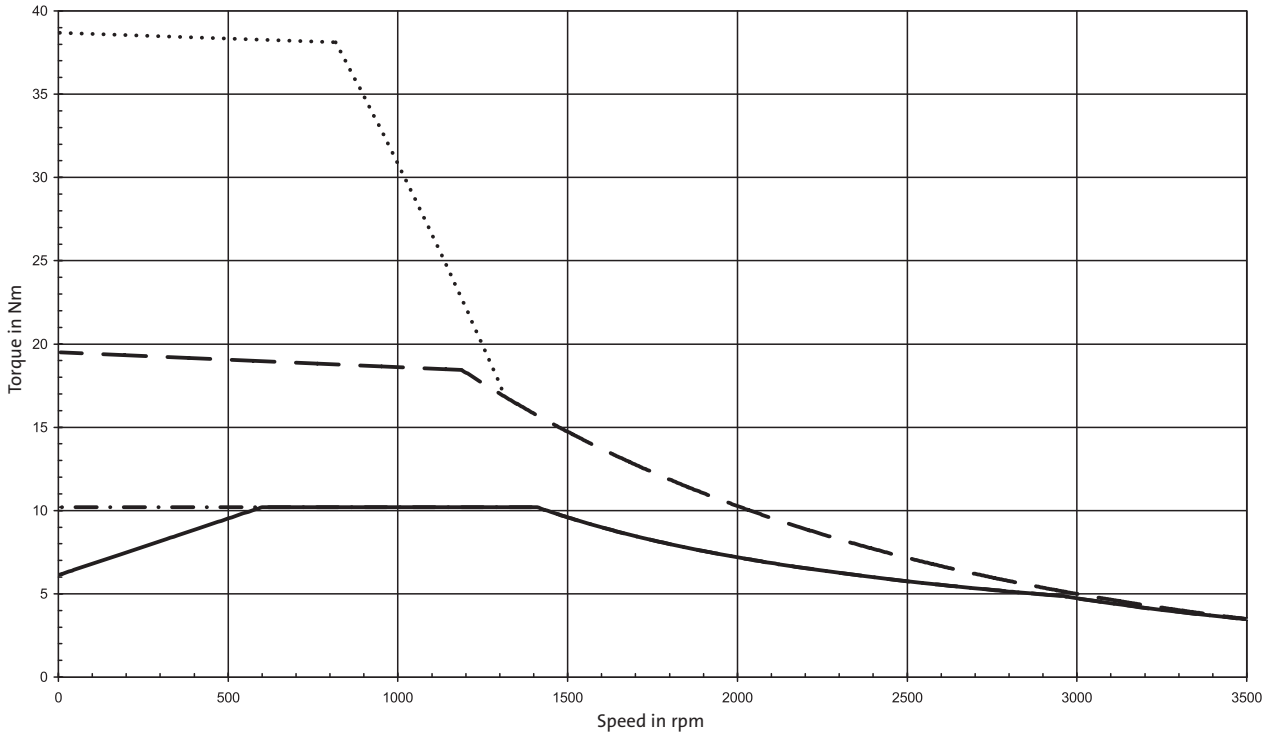
Maximum torques MD□MA□□ 090-12, 87 Hz, delta connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

Continuous operation S1, self-ventilated
9324, Imax = 10.5 A
Continuous operation S1, forced-ventilated
9325, Imax = 12.7 A

Maximum torques MD□MA□□ 090-32, 50 Hz, star connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

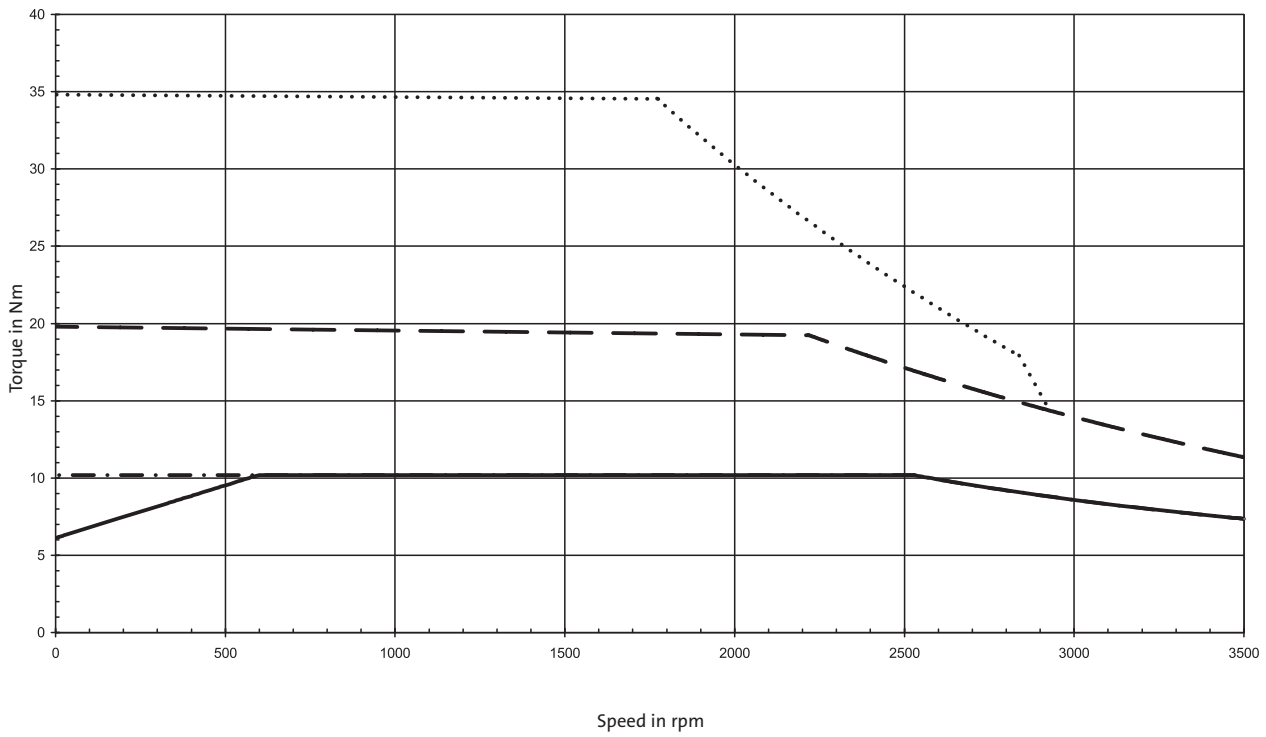
Continuous operation S1, self-ventilated

9323, Imax = 5.85 A

Continuous operation S1, forced-ventilated

9324, Imax = 10.5 A

Maximum torques MD□MA□□ 090-32, 87 Hz, delta connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

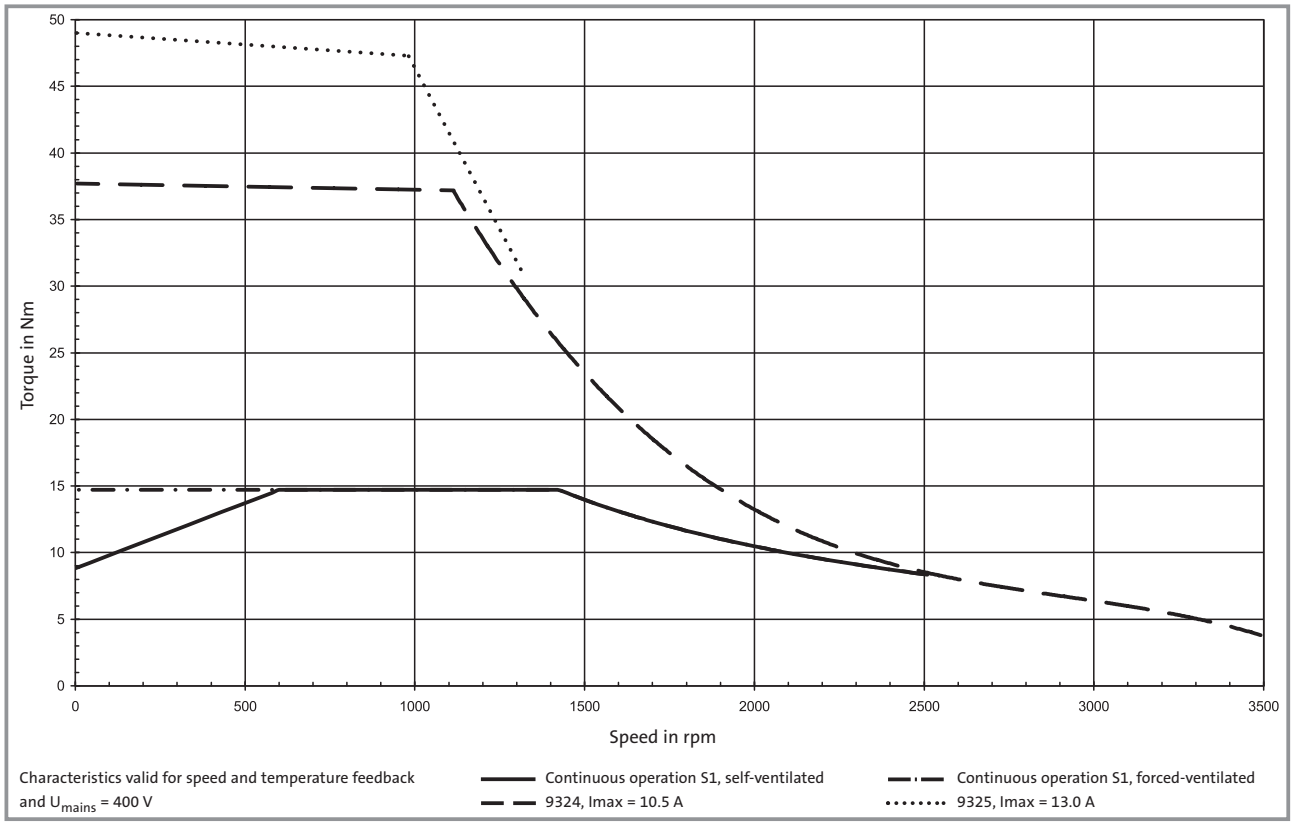
Continuous operation S1, self-ventilated

9324, Imax = 10.5 A

Continuous operation S1, forced-ventilated

9325, Imax = 16.7 A

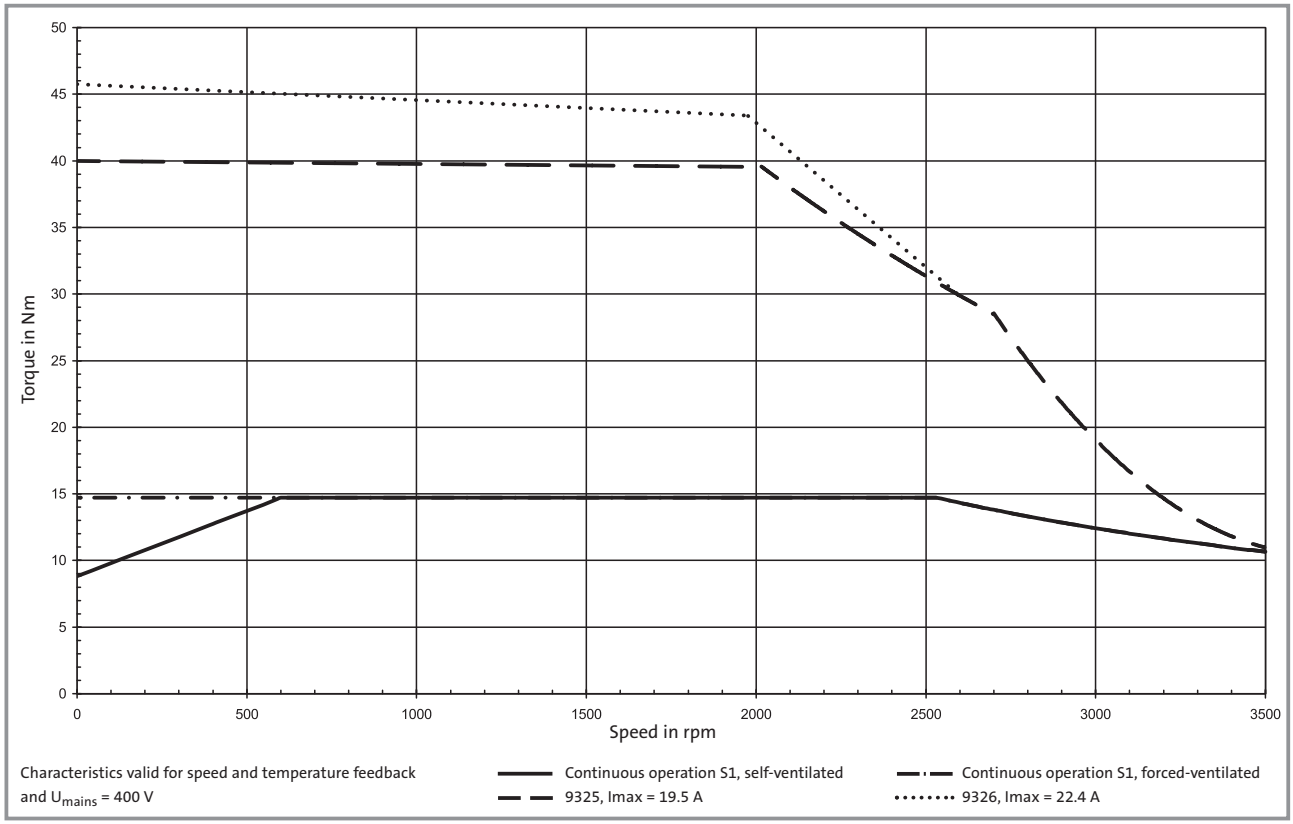
Maximum torques MD□MA□□ 100-12, 50 Hz, star connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

Continuous operation S1, self-ventilated
9324, Imax = 10.5 A
Continuous operation S1, forced-ventilated
9325, Imax = 13.0 A

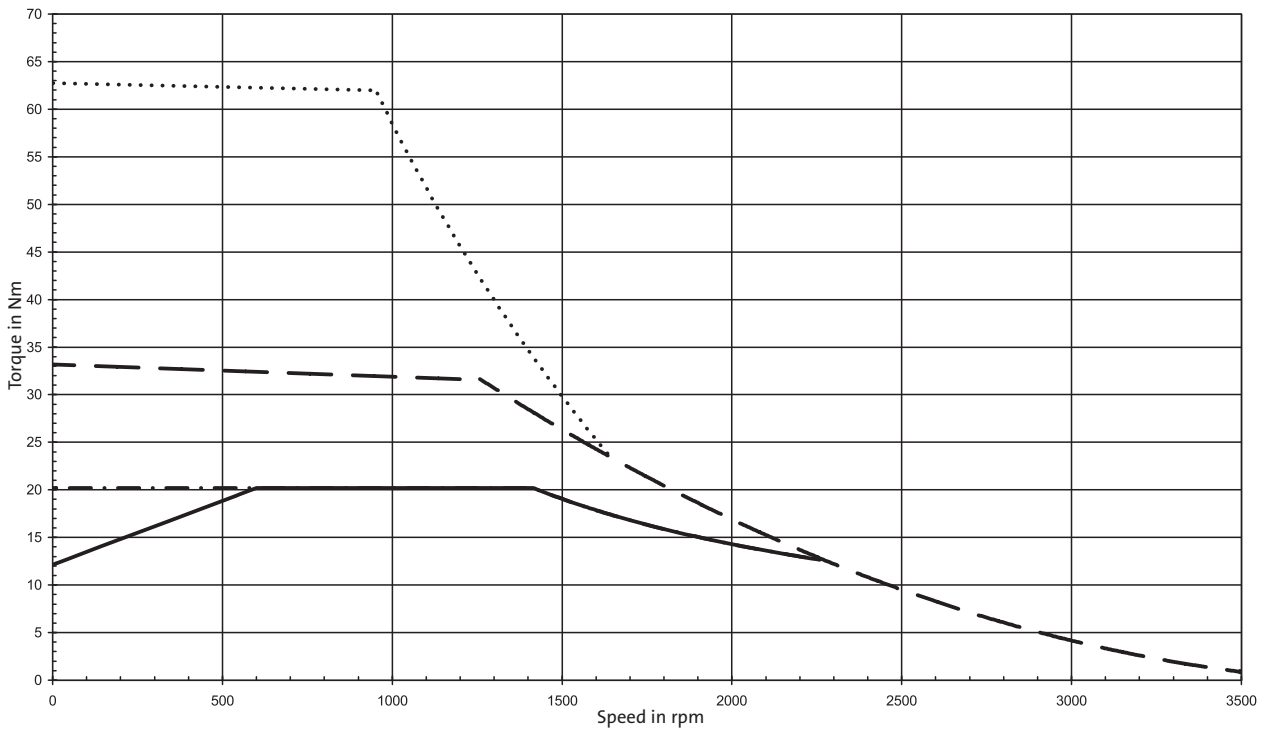
Maximum torques MD□MA□□ 100-12, 87 Hz, delta connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

Continuous operation S1, self-ventilated
9325, Imax = 19.5 A
Continuous operation S1, forced-ventilated
9326, Imax = 22.4 A

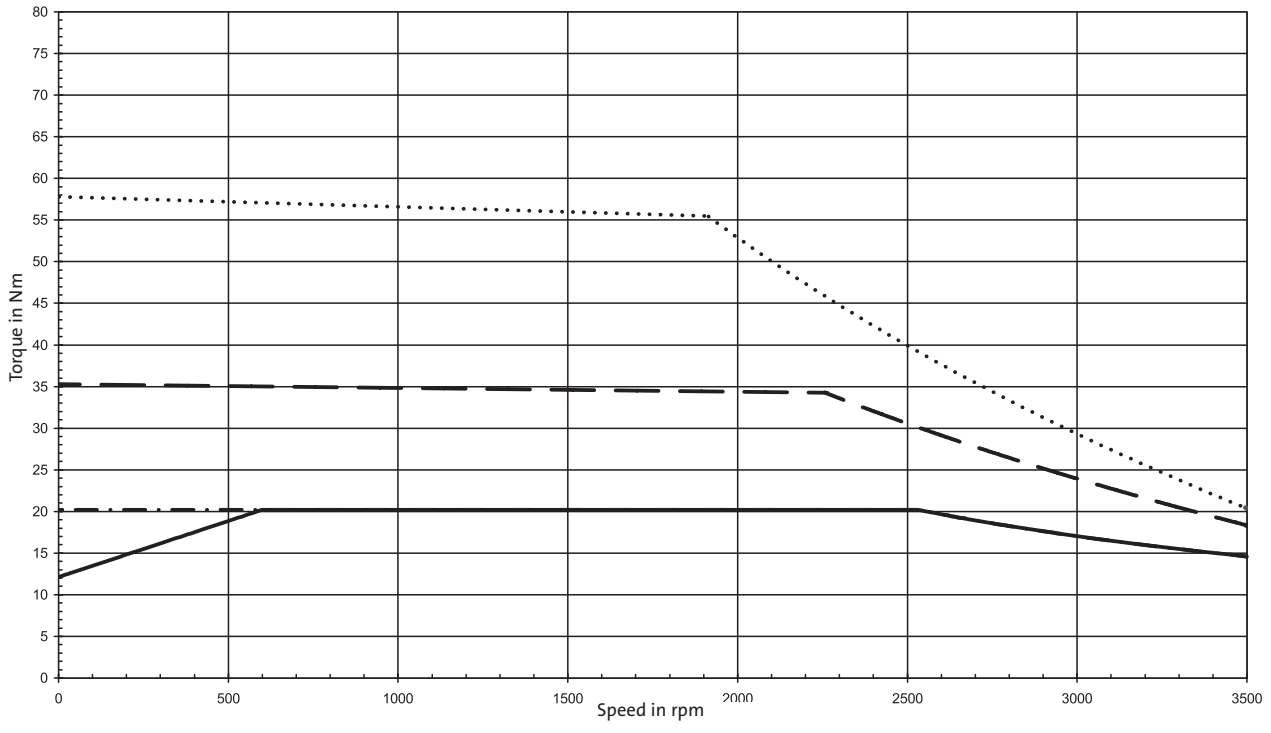
Maximum torques MD□MA□□ 100-32, 50 Hz, star connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

Continuous operation S1, self-ventilated
9324, Imax = 10.5 A
Continuous operation S1, forced-ventilated
9325, Imax = 17.8 A

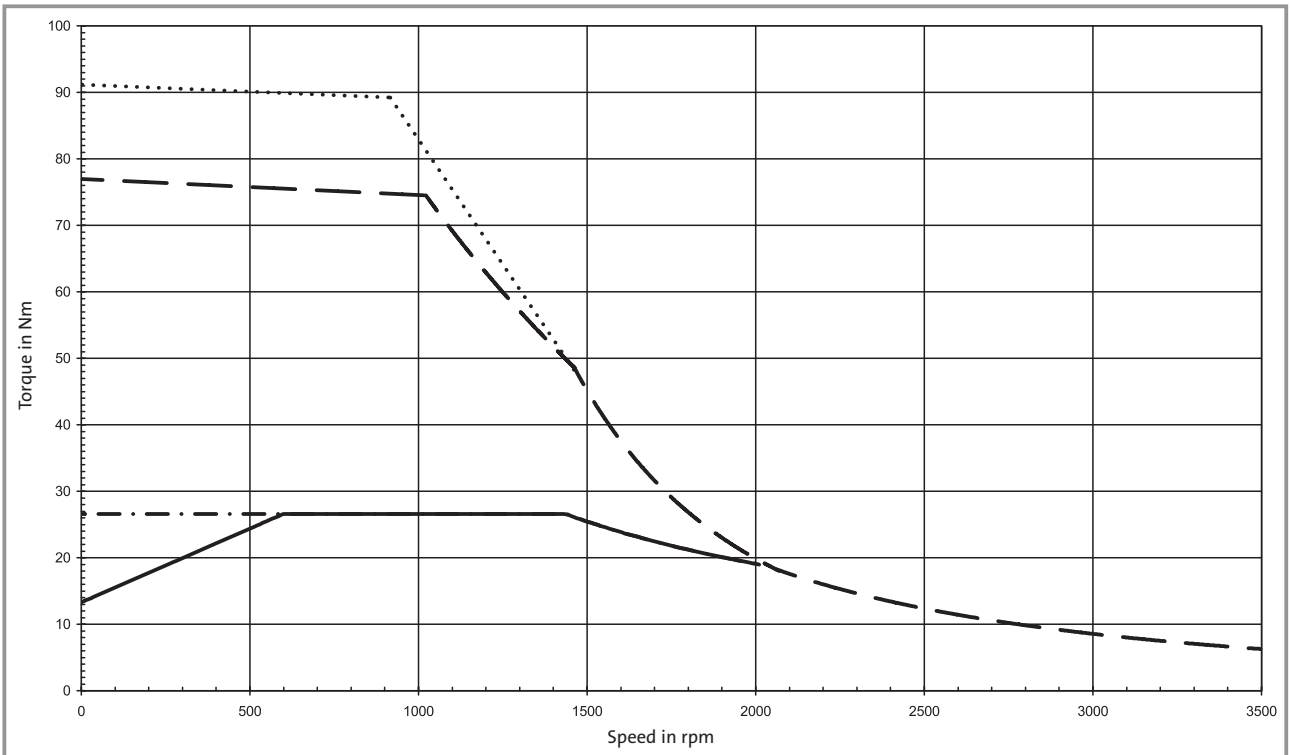
Maximum torques MD□MA□□ 100-32, 87 Hz, delta connection, with 9300 controller



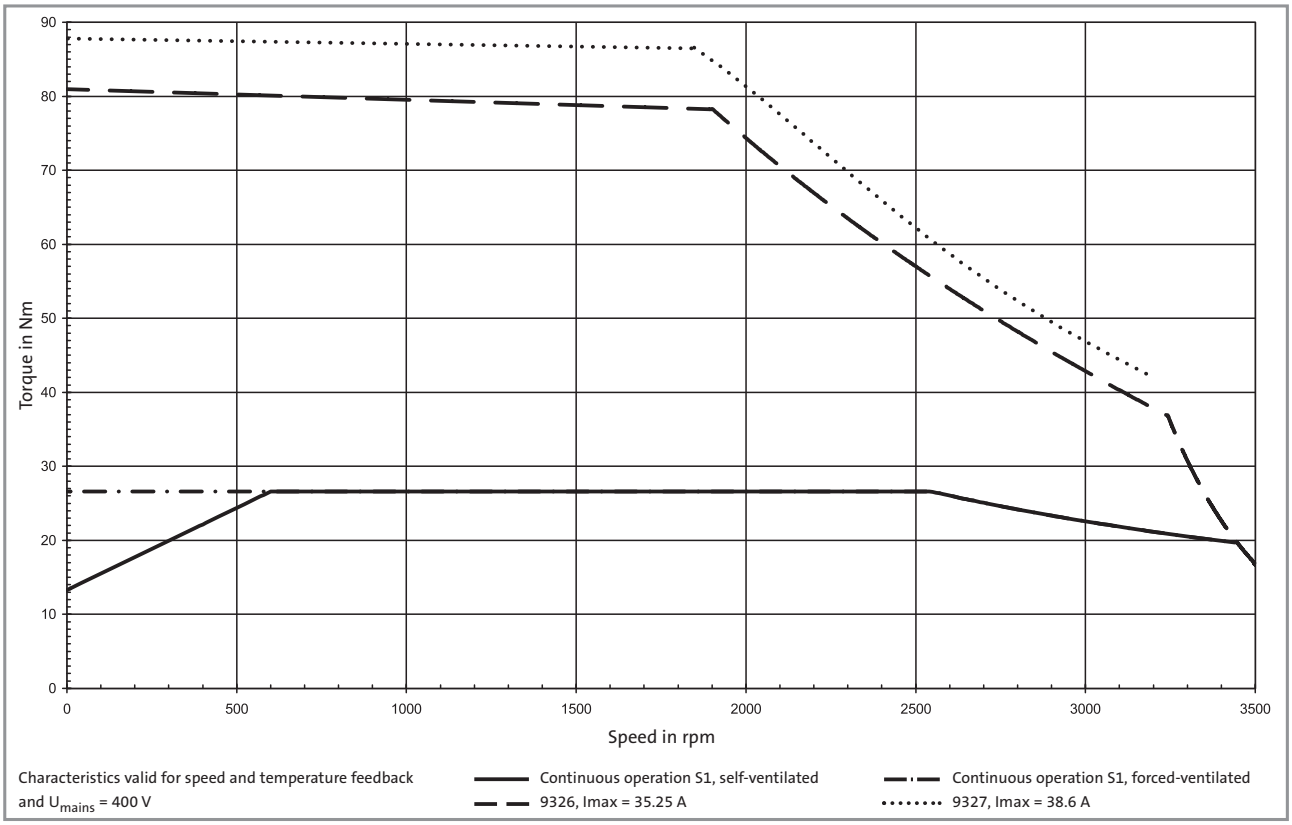
Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

Continuous operation S1, self-ventilated
9325, Imax = 19.5 A
Continuous operation S1, forced-ventilated
9326, Imax = 28.5 A

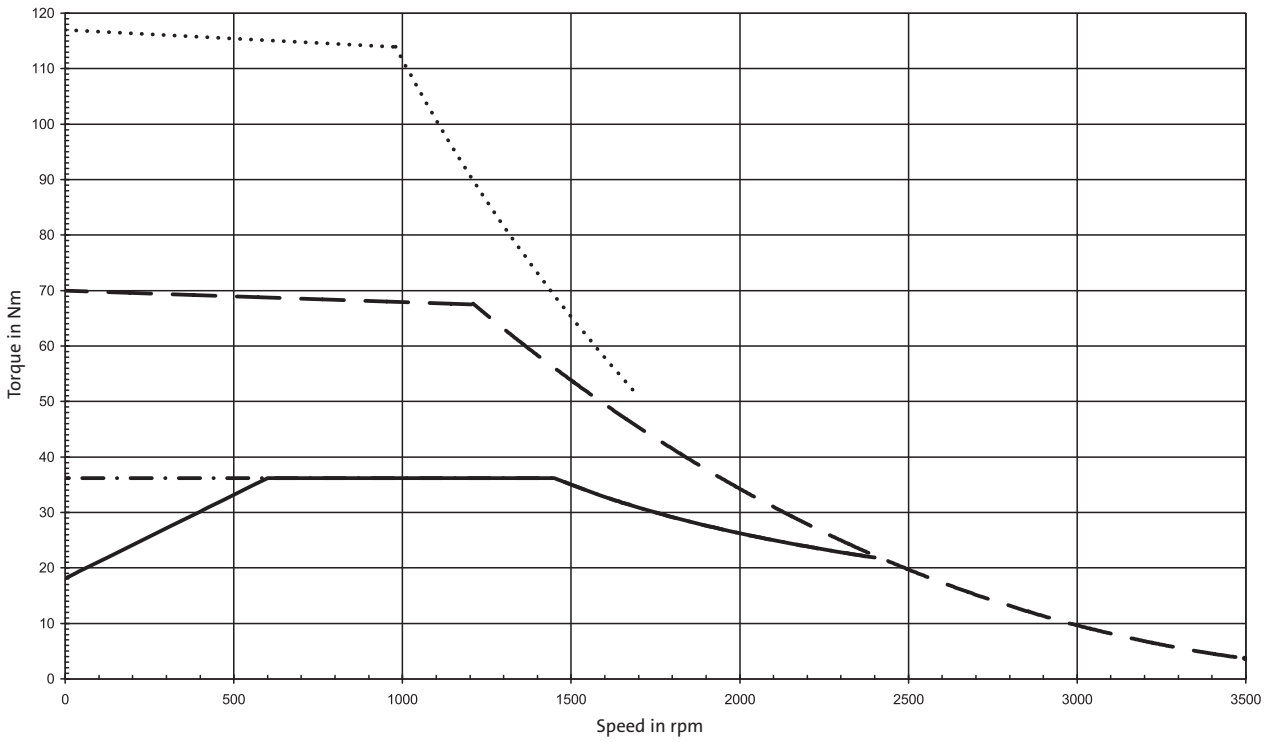
Maximum torques MD□MA□□ 112-22, 50 Hz, star connection, with 9300 controller



Maximum torques MD□MA□□ 112-22, 87 Hz, delta connection, with 9300 controller



Maximum torques MD□MA□□ 132-12, 50 Hz, star connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

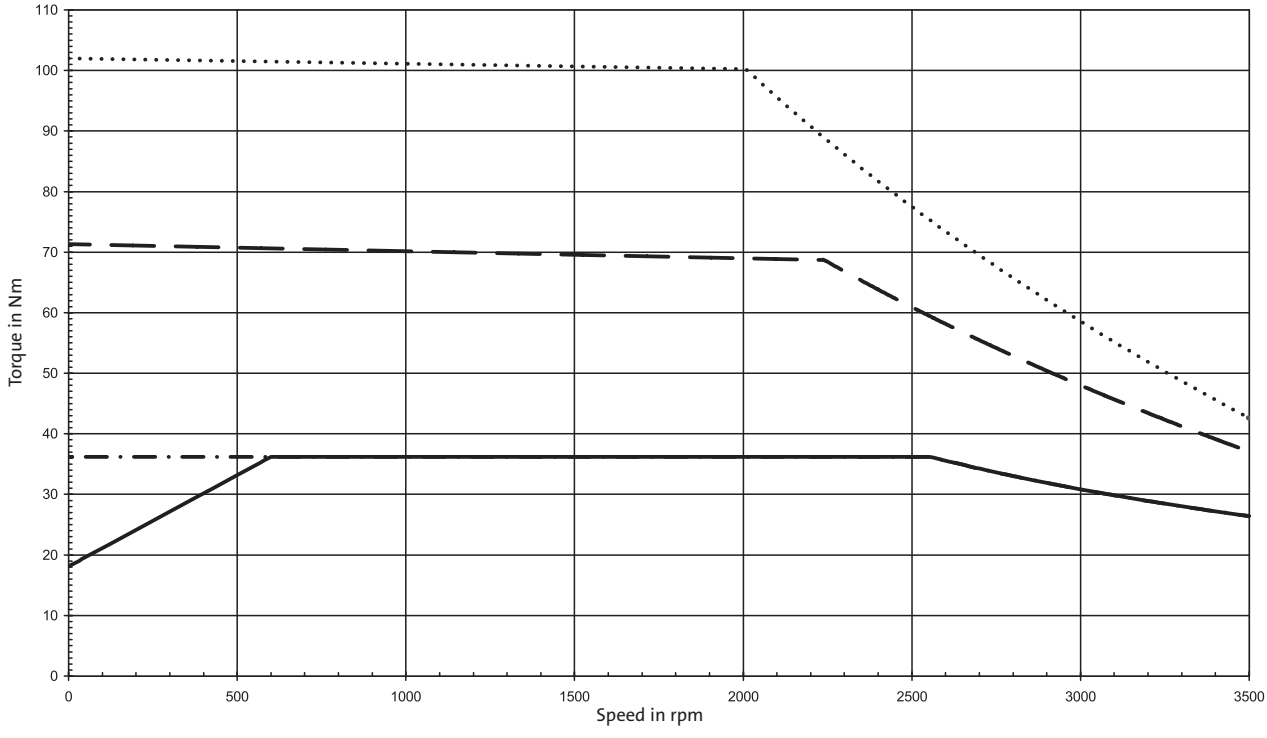
Continuous operation S1, self-ventilated

Continuous operation S1, forced-ventilated

9325, Imax = 19.5 A

9326, Imax = 29.7 A

Maximum torques MD□MA□□ 132-12, 87 Hz, delta connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

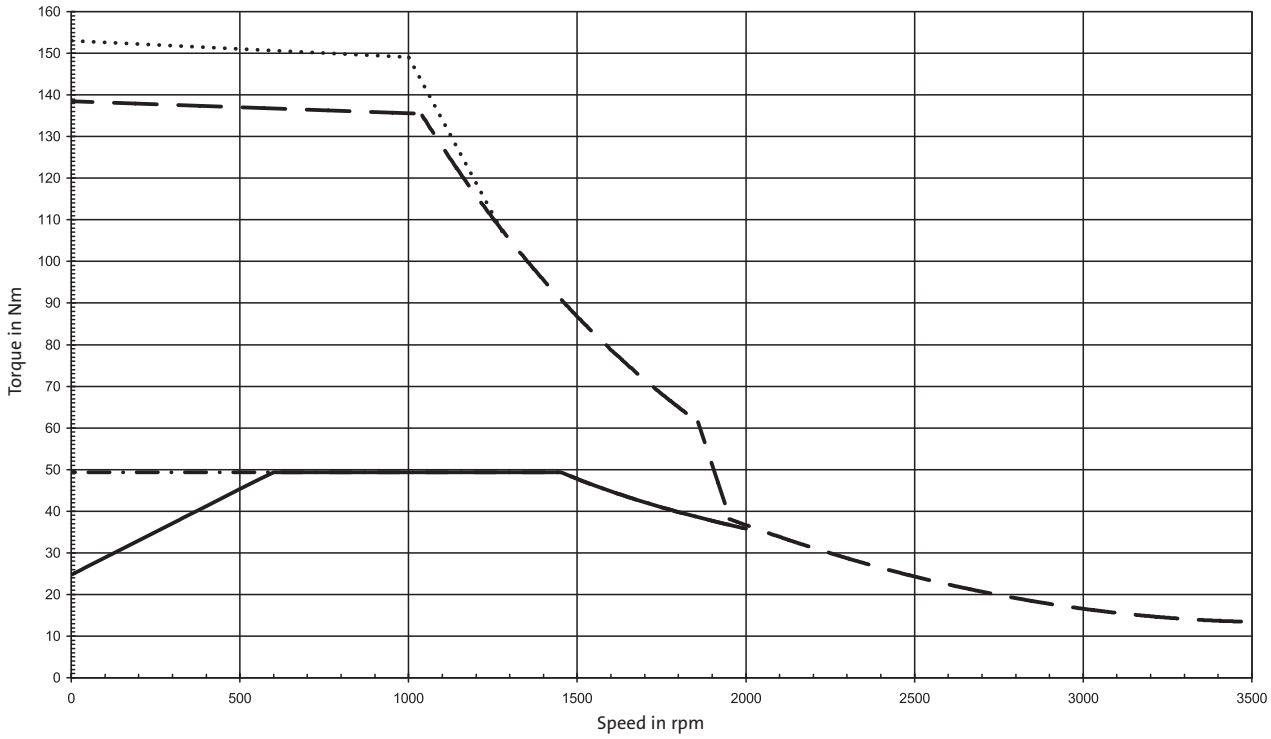
Continuous operation S1, self-ventilated

Continuous operation S1, forced-ventilated

9326, Imax = 32.25 A

9327, Imax = 48 A

Maximum torques MD□MA□□ 132-22, 50 Hz, star connection, with 9300 controller

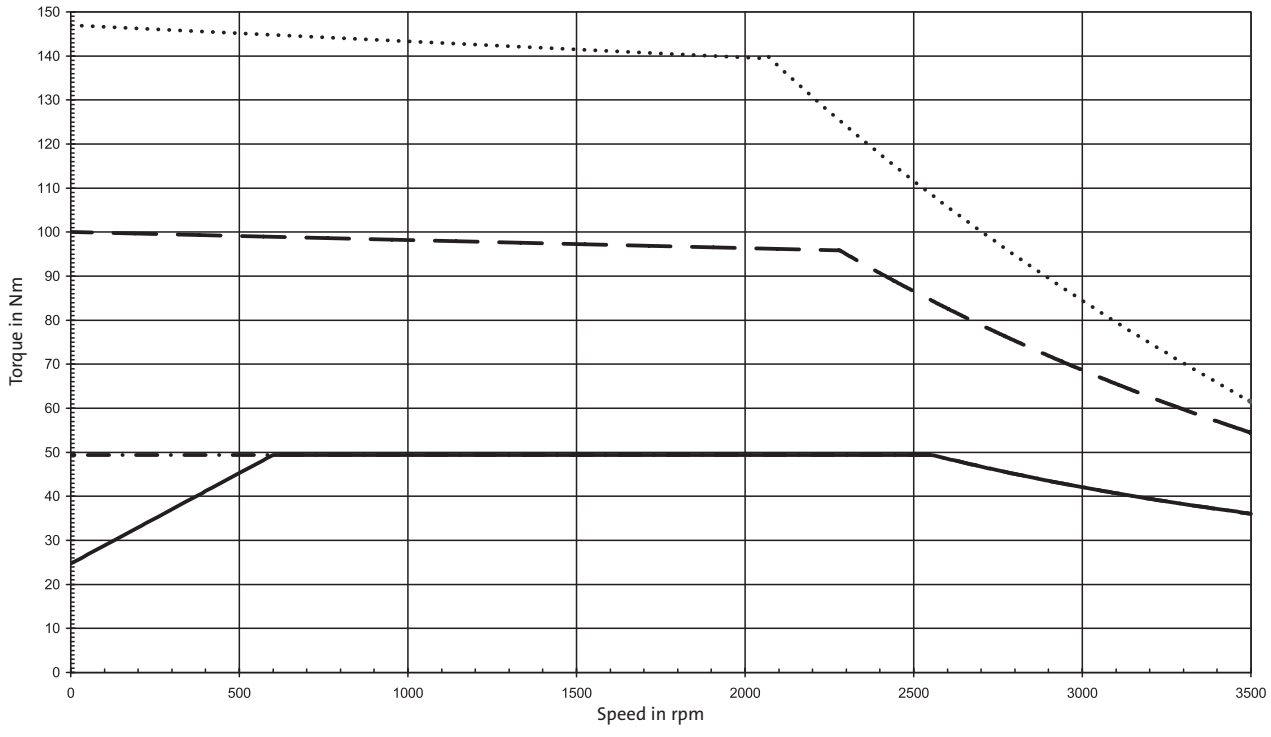


Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

Continuous operation S1, self-ventilated
9326, Imax = 35.25 A

Continuous operation S1, forced-ventilated
9327, Imax = 39.4 A

Maximum torques MD□MA□□ 132-22, 87 Hz, delta connection, with 9300 controller

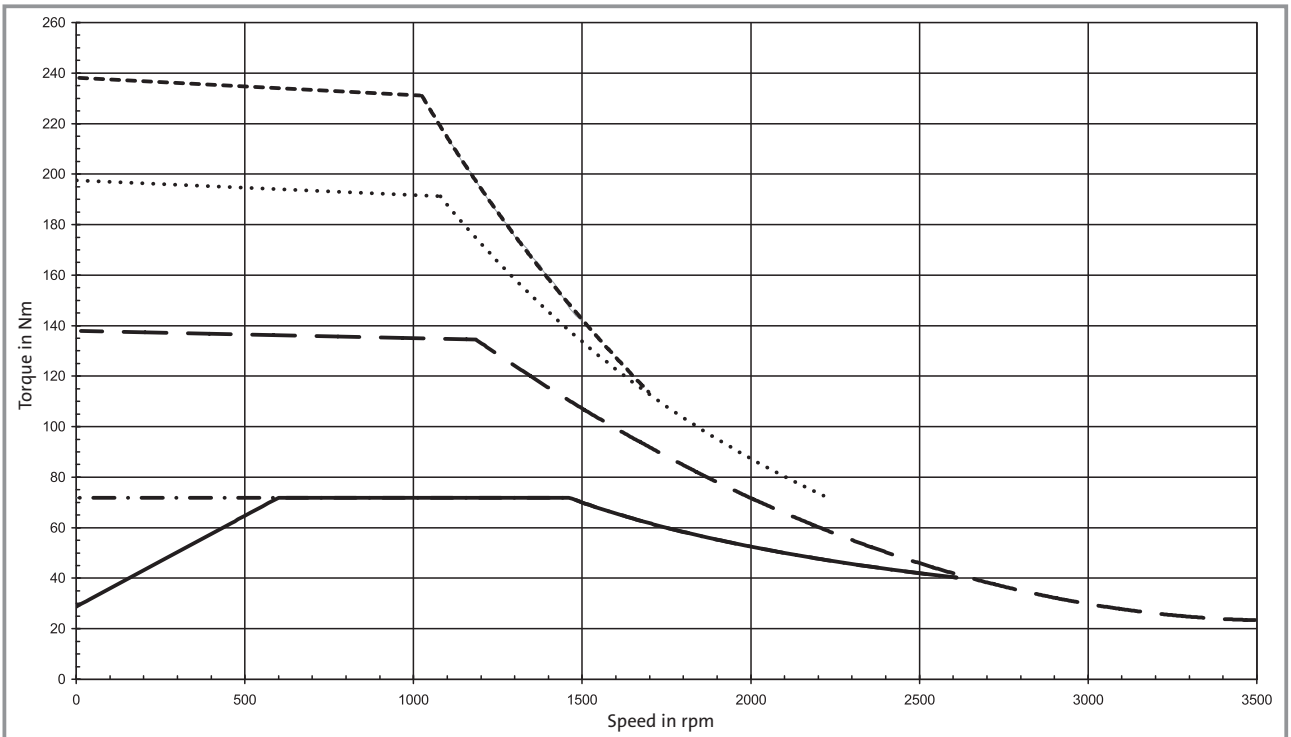


Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

Continuous operation S1, self-ventilated
9327, Imax = 48 A

Continuous operation S1, forced-ventilated
9328, Imax = 68.6 A

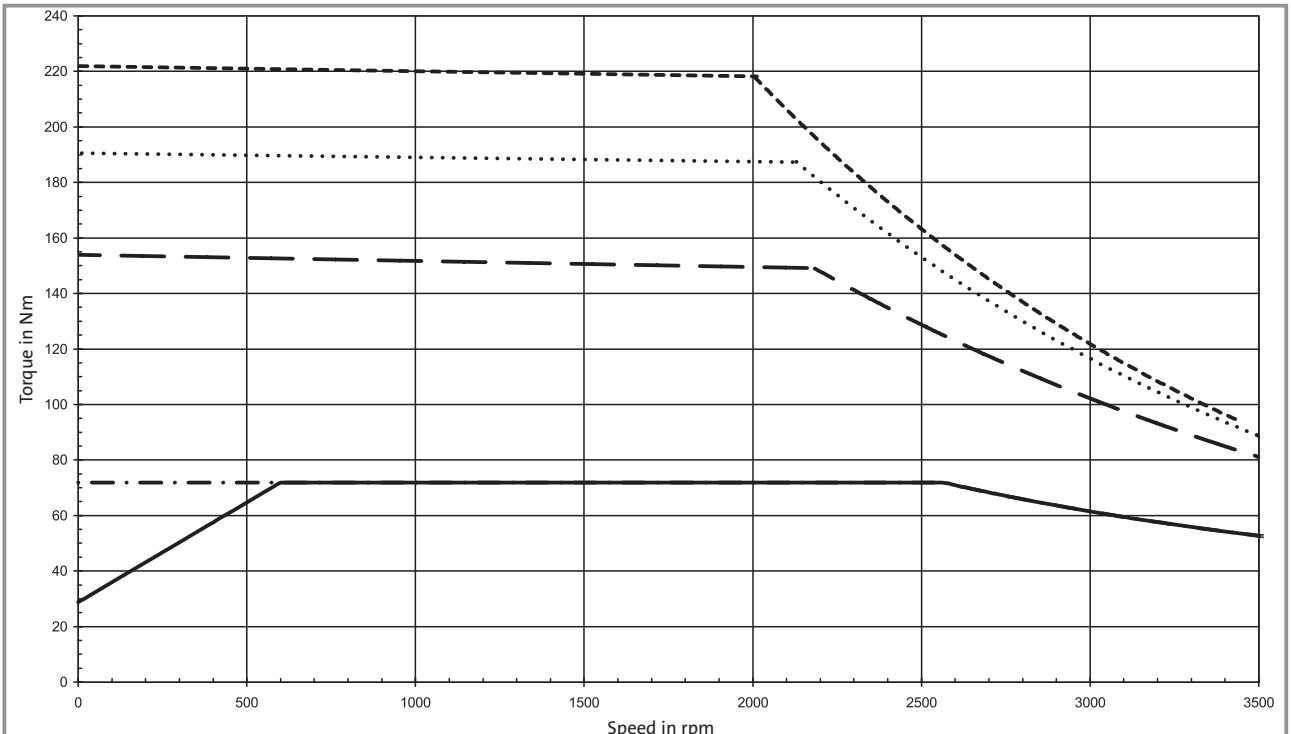
Maximum torques MD□MA□□ 160-22, 50 Hz, star connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

- Continuous operation S1, self-ventilated
- Continuous operation S1, forced-ventilated
- 9326, Imax = 35.25 A
- 9327, Imax = 48 A
- 9328, Imax = 56.7 A

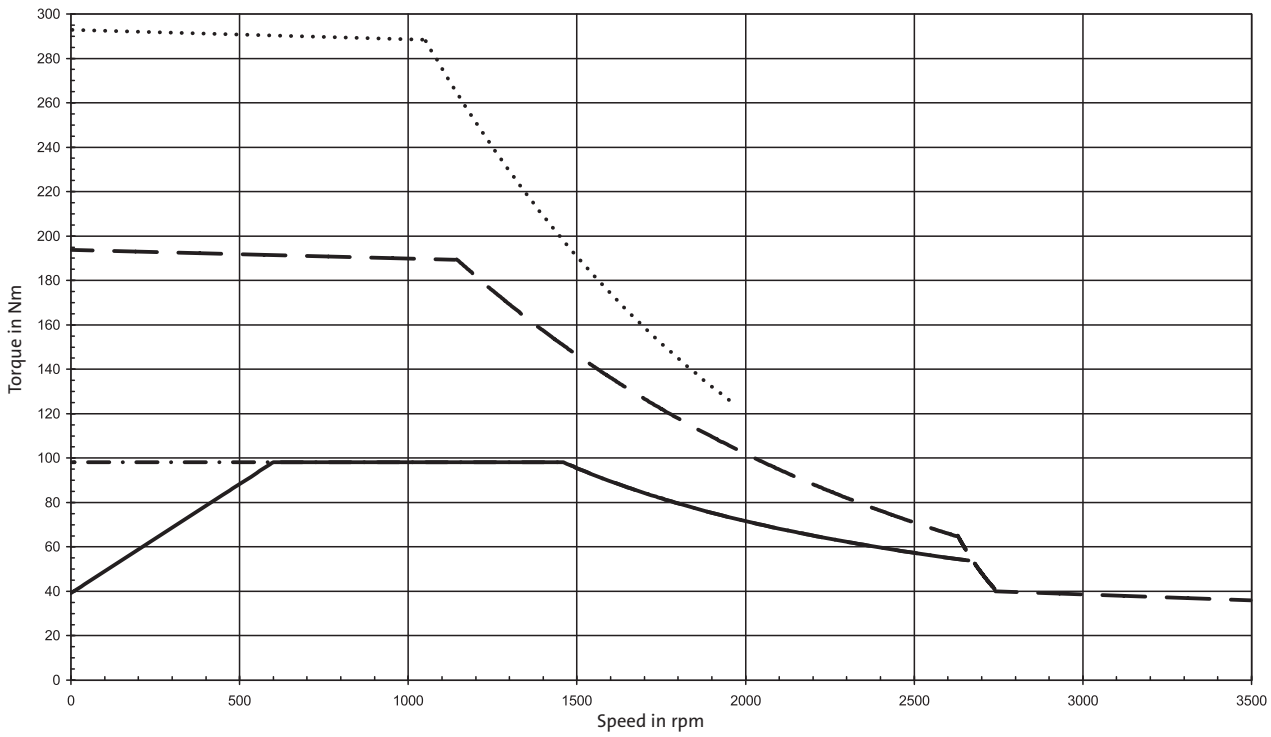
Maximum torques MD□MA□□ 160-22, 87 Hz, delta connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

- Continuous operation S1, self-ventilated
- Continuous operation S1, forced-ventilated
- 9328, Imax = 70.5 A
- 9329, Imax = 88.5 A
- 9330, Imax = 98.6 A

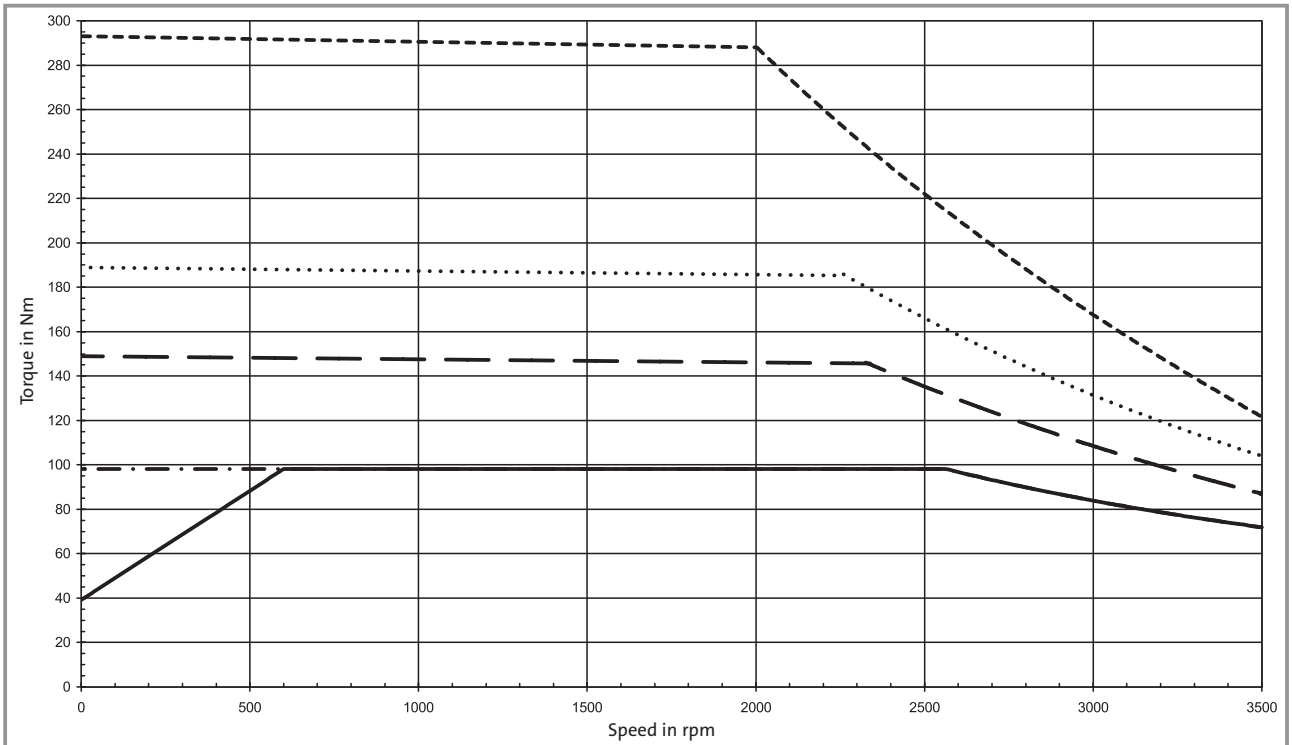
Maximum torques MD□MA□□ 160-32, 50 Hz, star connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

- Continuous operation S1, self-ventilated
- 9327, Imax = 48 A
- Continuous operation S1, forced-ventilated
- 9328, Imax = 70.5 A

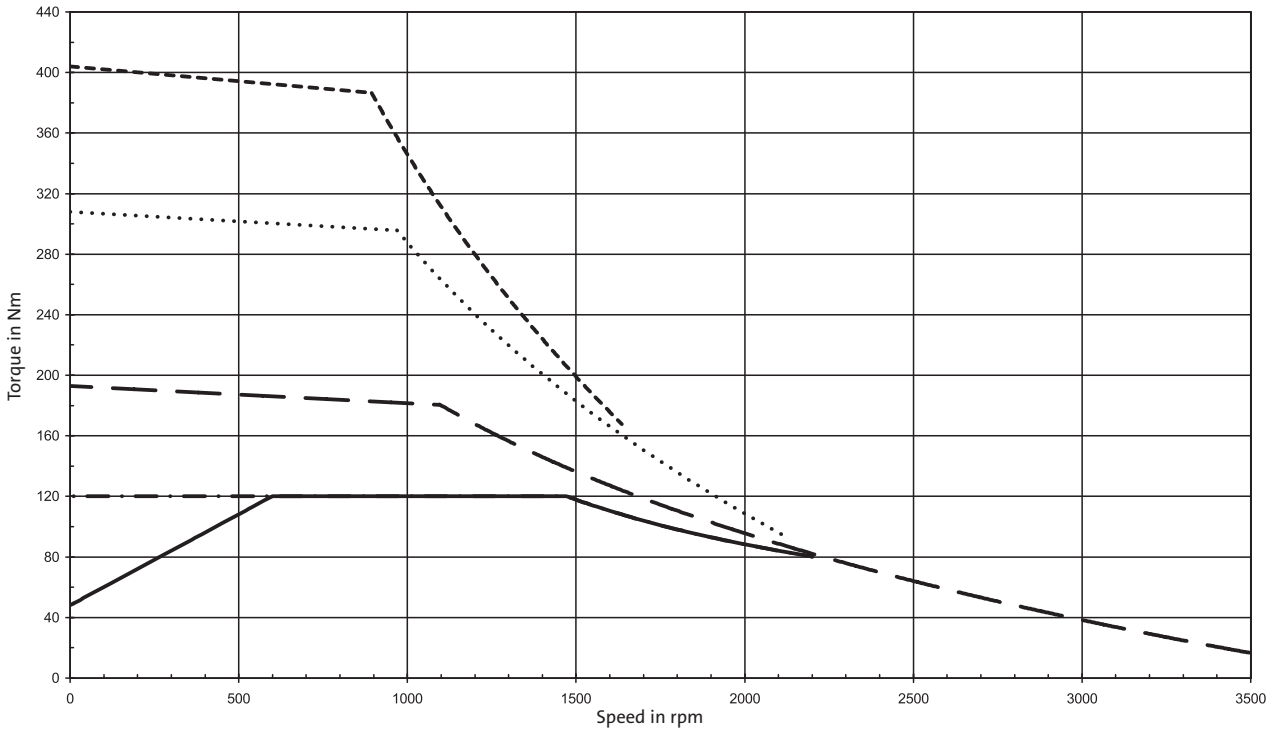
Maximum torques MD□MA□□ 160-32, 87 Hz, delta connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

- Continuous operation S1, self-ventilated
- 9328, Imax = 70.5 A
- 9330, Imax = 130.7 A
- Continuous operation S1, forced-ventilated
- 9329, Imax = 88.5 A

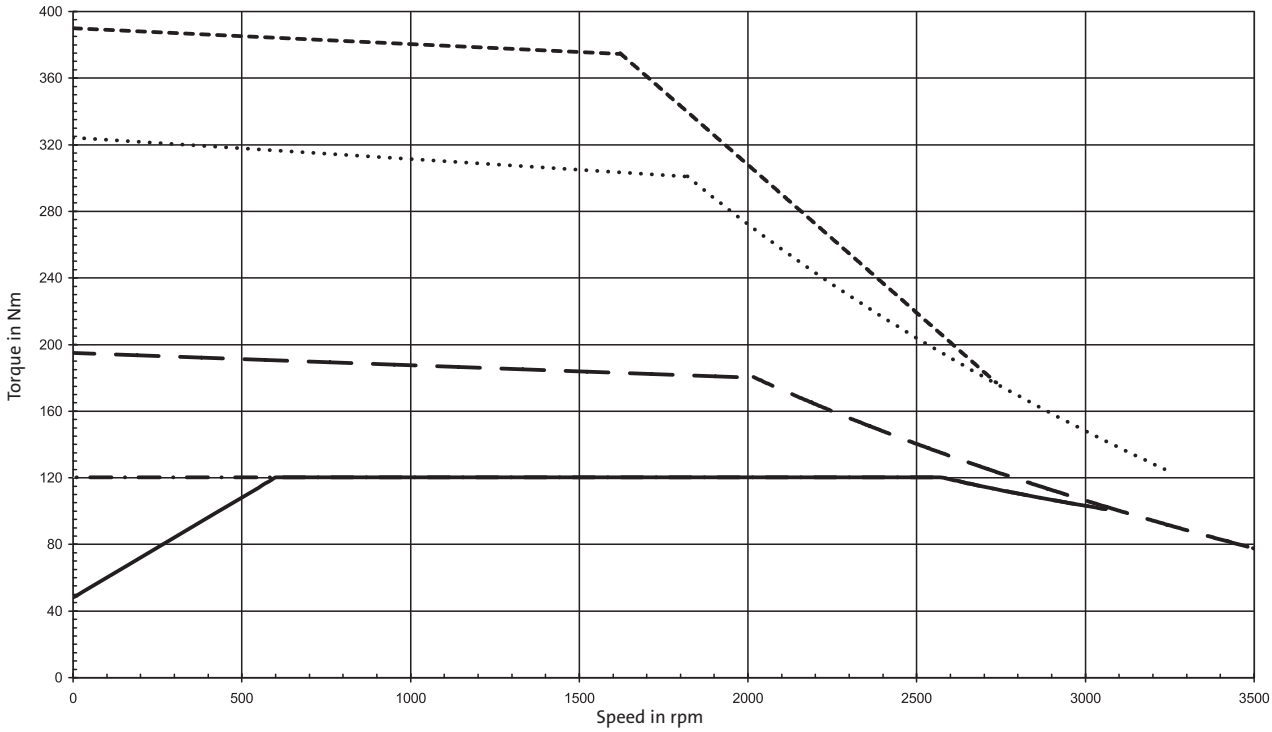
Maximum torques MD□MA□□ 180-12, 50 Hz, star connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

Continuous operation S1, self-ventilated
Continuous operation S1, forced-ventilated
9327, Imax = 48 A
9328, Imax = 48 A
9329, Imax = 88.5 A

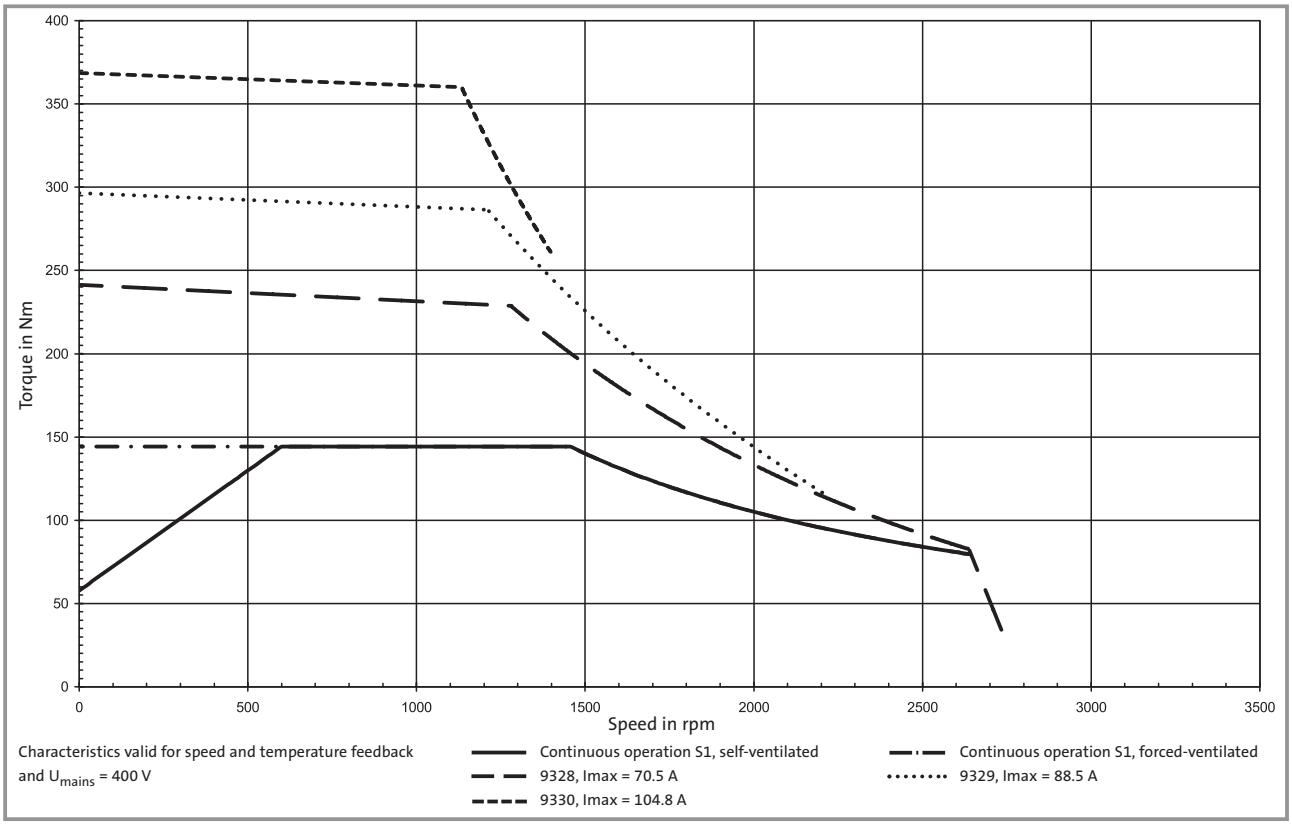
Maximum torques MD□MA□□ 180-12, 87 Hz, delta connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

Continuous operation S1, self-ventilated
Continuous operation S1, forced-ventilated
9329, Imax = 88.5 A
9330, Imax = 133.5 A
9331, Imax = 156.1 A

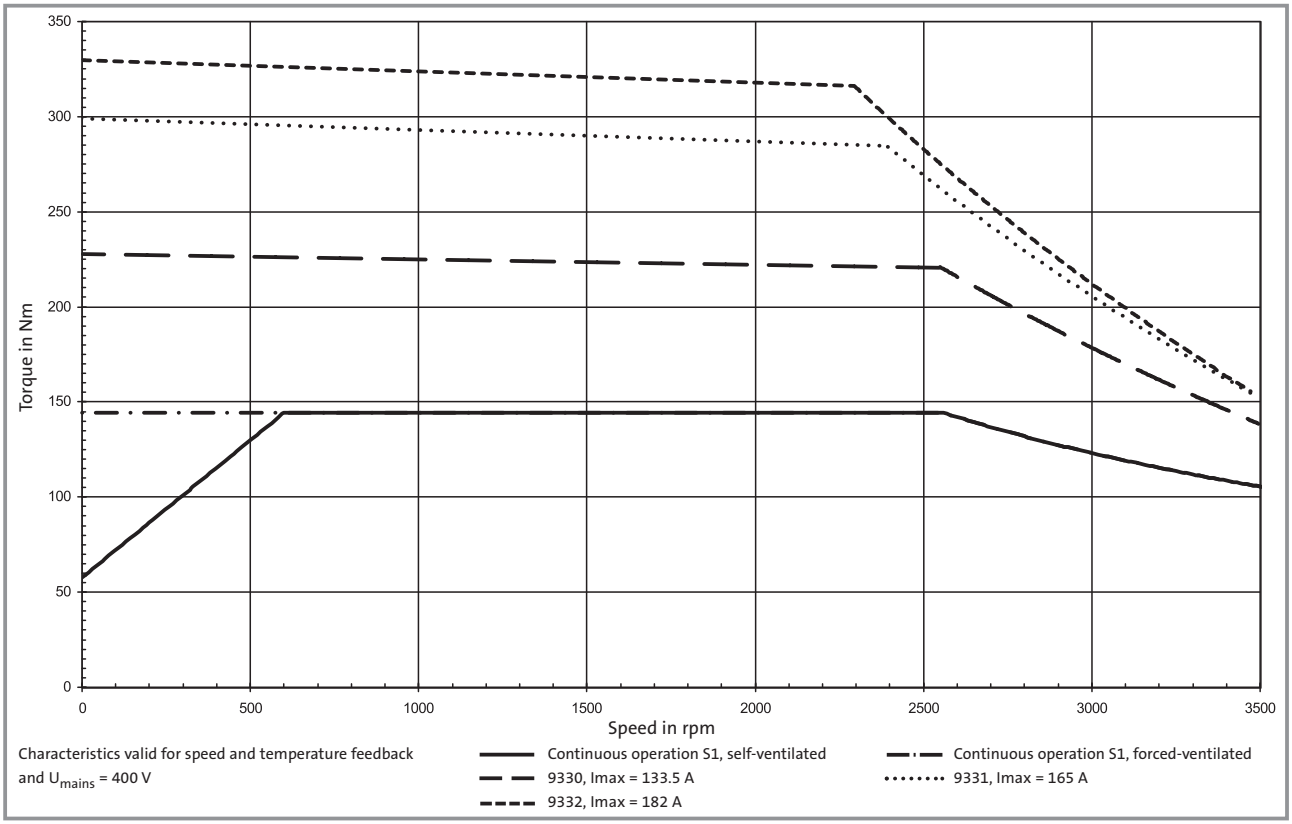
Maximum torques MD□MA□□ 180-22, 50 Hz, star connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

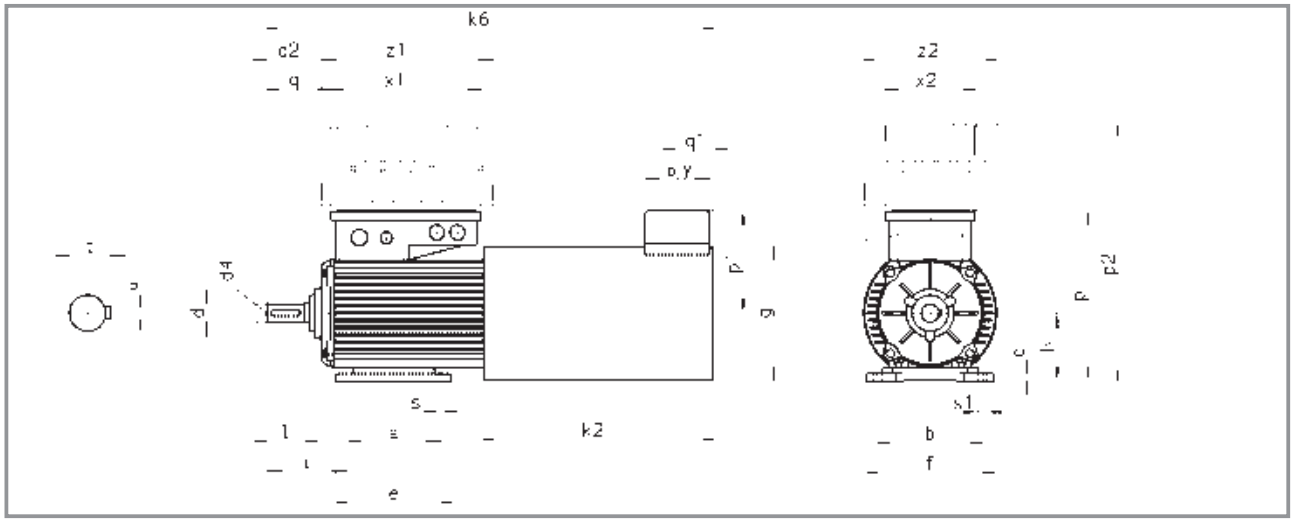
- Continuous operation S1, self-ventilated
- Continuous operation S1, forced-ventilated
- 9328, Imax = 70.5 A
- 9329, Imax = 88.5 A
- 9330, Imax = 104.8 A

Maximum torques MD□MA□□ 180-22, 87 Hz, delta connection, with 9300 controller



Characteristics valid for speed and temperature feedback and U_{mains} = 400 V

- Continuous operation S1, self-ventilated
- Continuous operation S1, forced-ventilated
- 9330, Imax = 133.5 A
- 9331, Imax = 165 A
- 9332, Imax = 182 A

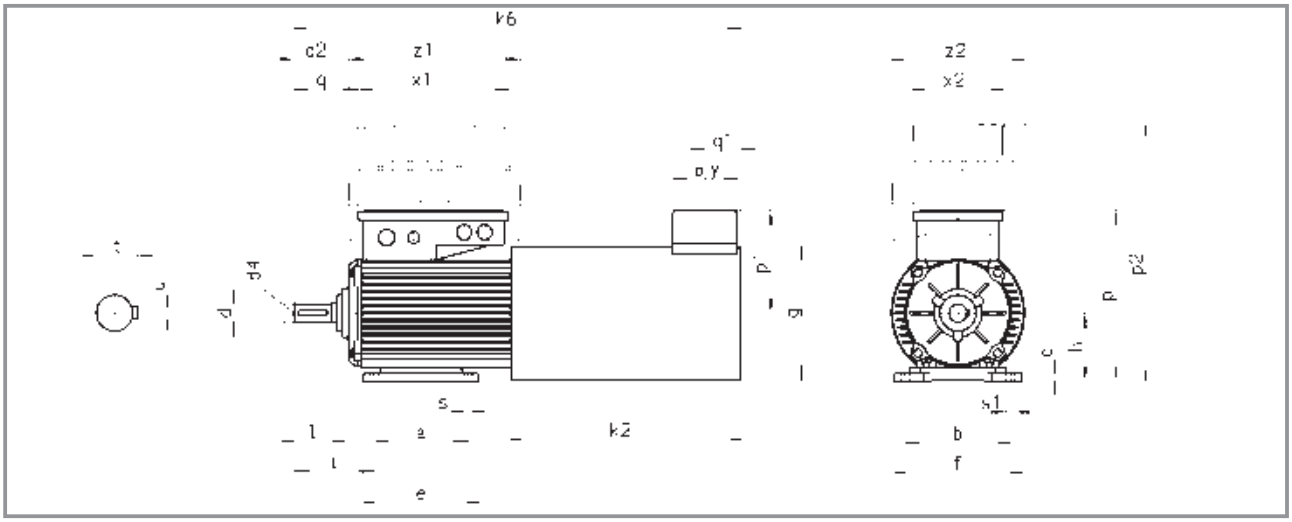


Motor dimensions
Design IM B3 (with terminal box/integrated motec)

Motor type	Three-phase AC motor																				motec			
	d x l	a	b	c	d4	e	f	g	h	i	p	p1	q	q1	s	s1	t	u	x1	x2	y	q2	p2	z1	z2
	IEC 72 letter symbol																								
	D x E	B	A	HA		BB	AB	AC	H						K		GA	F							
MD□MA□□ 071-12	14x30	90	112	8	M5	105	142	143	71	75	214	–	52	–	7	10	16	5	200	120	–	43	281	202	156
MD□MA□□ 071-32	14x30	90	112	8	M5	105	142	143	71	75	214	–	52	–	7	10	16	5	200	120	–	43	281	202	156
MD□MA□□ 080-12	19x40	100	125	9	M6	120	160	156	80	90	231	–	65	–	10	13	21.5	6	200	120	–	59	315	230	176
MD□MA□□ 080-32	19x40	100	125	9	M6	120	160	156	80	90	231	–	65	–	10	13	21.5	6	200	120	–	59	315	230	176
MD□MA□□ 090-12	24x50	100	140	10	M8	153	170	176	90	106	232	150	85	47.5	10	12	27	8	200	120	85	72	315	230	176
MD□MA□□ 090-32	24x50	125	140	10	M8	153	170	176	90	106	232	150	85	47.5	10	12	27	8	200	120	85	72	315	230	176
MD□MA□□ 100-12	28x60	140	160	14	M10	172	200	194	100	123	251	159	99	47.5	12	14	31	8	200	120	85	86	335	230	176
MD□MA□□ 100-32	28x60	140	160	14	M10	172	200	194	100	123	251	159	99	47.5	12	14	31	8	200	120	85	74	344	327	213

		Options with integral fan			Options with blower			
Motor type		No resolver or. ITD21	Resolver or. ITD21	Brake	No Resolver or. ITD21	Resolver or ITD21	Brake	Brake and resolver or. ITD21
MD□MA□□ 071-12	k6	241	291	291	352	352	399	399
	k2	63	121	121	177	177	231	231
MD□MA□□ 071-32	k6	241	291	291	352	352	399	399
	k2	63	121	121	177	177	231	231
MD□MA□□ 080-12	k6	281	335	335	389	389	442	442
	k2	70	130	130	181	181	239	239
MD□MA□□ 080-32	k6	281	335	335	389	389	442	442
	k2	70	130	130	181	181	239	239
MD□MA□□ 090-12	k6	313	377	385	436	436	495	495
	k2	75	139	153	198	198	263	263
MD□MA□□ 090-32	k6	338	402	410	461	461	520	520
	k2	75	139	153	198	198	263	263
MD□MA□□ 100-□2	k6	392	454	454	506	506	566	566
	k2	80	158	158	194	194	270	270

Dimensions in [mm]

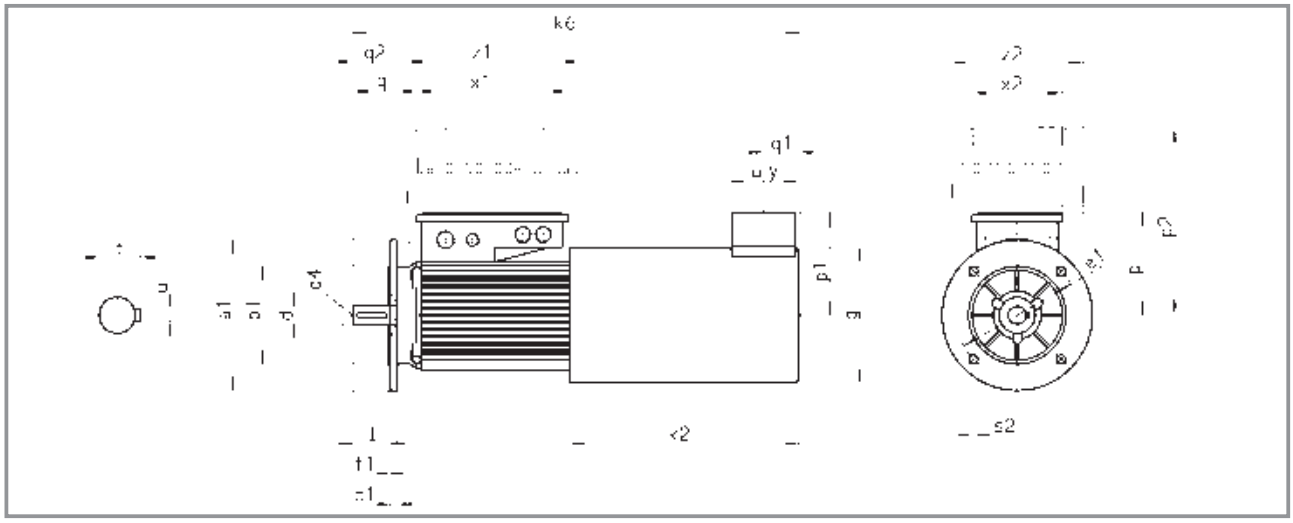


Motor dimensions
Design IM B3 (with terminal box/integrated motec)

Motor type	Three-phase AC motor																					motec			
	d x l	a	b	c	d4	e	f	g	h	i	p	p1	q	q1	s	s1	t	u	x1	x2	y	q2	p2	z1	z2
	IEC 72 letter symbol																								
	D x E	B	A	HA		BB	AB	AC	H						K		GA	F							
MD□MA□□112-22	28x60	140	190	16	M10	174	230	219	112	130	286	172	102	47.5	12	12	31	8	226	127	85	80	385	327	213
MD□MA□□132-12	38x80	140	216	16	M12	182	278	258	132	169	320	191	129	47.5	12	12	41	10	226	127	85	112	420	327	213
MD□MA□□132-22	38x80	178	216	16	M12	220	278	258	132	169	320	191	129	47.5	12	12	41	10	226	127	85	112	420	327	213
MD□MA□□160-22	42x110	210	254	20	M16	256	300	310	160	218	380	217	175	47.5	15	15	45	12	226	127	85	–	–	–	–
MD□MA□□ 160-32	42x110	254	254	20	M16	300	300	310	160	218	380	217	175	47.5	15	15	45	12	226	127	85	–	–	–	–
MD□MA□□180-12	48x110	241	279	23	M16	320	350	348	180	231	405	217	186	47.5	15	15	51.5	14	226	127	85	–	–	–	–
MD□MA□□180-22	48x110	279	279	23	M16	320	350	348	180	231	405	217	186	47.5	15	15	51.5	14	226	127	85	–	–	–	–

		Options with integral fan			Options with blower			
Motor type		No resolver or. ITD21	Resolver or. ITD21	Brake	No Resolver or. ITD21	Resolver or ITD21	Brake	Brake and resolver or. ITD21
MD□MA□□112-22	k6	420	475	492	522	522	597	597
	k2	88	143	160	190	190	265	265
MD□MA□□132-12	k6	470	572	550	592	592	668	668
	k2	120	222	210	252	252	328	328
MD□MA□□132-22	k6	508	610	588	630	630	706	706
	k2	120	222	210	252	252	328	328
MD□MA□□160-22	k6	598	703	711	738	738	850	850
	k2	147	252	260	287	287	399	399
MD□MA□□160-32	k6	642	747	755	782	782	894	894
	k2	147	252	260	287	287	399	399
MD□MA□□180-12	k6	671	780	784	812	812	926	926
	k2	147	256	260	288	288	402	402
MD□MA□□180-22	k6	671	780	784	812	812	926	926
	k2	147	256	260	288	288	402	402

Dimensions in [mm]

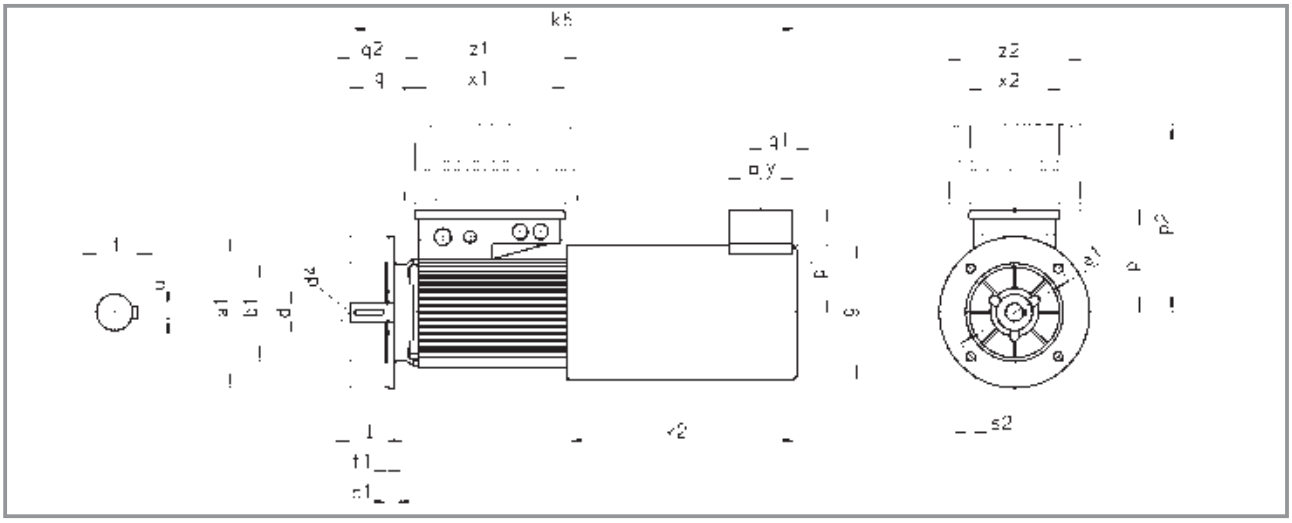


Motor dimensions
Design IM B5 (with terminal box/integrated motec)

Motor type	Three-phase AC motor																		motec			
	Flange to DIN 42948	d x l	a1	b1	c1	d4	e1	f1	g	p	p1	q	q1	s2	t	u	x1	x2	y	q2	p2	z1	z2
		IEC 72 letter symbol																					
		D x E	P	N	LA		M	T	AC					S	GA	F							
MD□MA□□ 071-12	A160	14x30	160	110	10	M5	130	3.5	143	143	–	52	–	10	16	5	200	120	–	43	210	202	156
MD□MA□□ 071-32	A160	14x30	160	110	10	M5	130	3.5	143	143	–	52	–	10	16	5	200	120	–	43	210	202	156
MD□MA□□ 080-12	A200	19x40	200	130	10	M6	165	3.5	156	151	–	65	–	12	21.5	6	200	120	–	59	234	230	176
MD□MA□□ 080-32	A200	19x40	200	130	10	M6	165	3.5	156	151	–	65	–	12	21.5	6	200	120	–	59	234	230	176
MD□MA□□ 090-12	A200	24x50	200	130	10	M8	165	3.5	176	142	150	85	47.5	12	27	8	200	120	85	72	225	230	176
MD□MA□□ 090-32	A200	24x50	200	130	10	M8	165	3.5	176	142	150	85	47.5	12	27	8	200	120	85	72	235	230	176
MD□MA□□ 100-12	A250	28x60	250	180	11	M10	215	4	194	151	159	99	47.5	15	31	8	200	120	85	86	235	230	176
MD□MA□□ 100-32	A250	28x60	250	180	11	M10	215	4	194	151	159	99	47.5	15	31	8	200	120	85	74	244	327	213

	Options with integral fan			Options with blower			
Motor type	No resolver or. ITD21	Resolver or. ITD21	Brake	No Resolver or. ITD21	Resolver or ITD21	Brake	Brake and resolver or. ITD21
MD□MA□□ 071-12 k6	241	291	291	352	352	399	399
k2	63	121	121	177	177	231	231
MD□MA□□ 071-32 k6	241	291	291	352	352	399	399
k2	63	121	121	177	177	231	231
MD□MA□□ 080-12 k6	281	335	335	389	389	442	442
k2	70	130	130	181	181	239	239
MD□MA□□ 080-32 k6	281	335	335	389	389	442	442
k2	70	130	130	181	181	239	239
MD□MA□□ 090-12 k6	313	377	385	436	436	495	495
k2	75	139	153	198	198	263	263
MD□MA□□ 090-32 k6	338	402	410	461	461	520	520
k2	75	139	153	198	198	263	263
MD□MA□□ 100-□2 k6	392	454	454	506	506	566	566
k2	80	158	158	194	194	270	270

Dimensions in [mm]

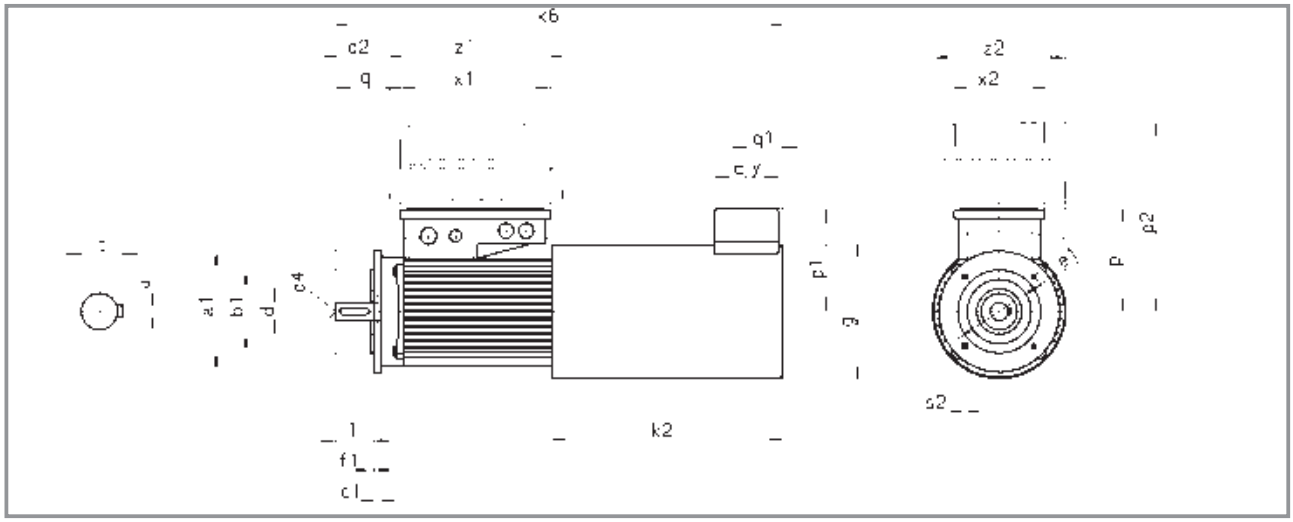


Motor dimensions
Design IM B5 (with terminal box/integrated motec)

Motor type	Three-phase AC motor																			motec			
	Flange d x l to DIN 42948	a1	b1	c1	d4	e1	f1	g	p	p1	q	q1	s2	t	u	x1	x2	y	q2	p2	z1	z2	
		IEC 72 letter symbol																					
		D x E	P	N	LA		M	T	AC					S	GA	F							
MD□MA□□ 112-22	A250	28x60	250	180	12	M10	215	4	219	174	172	102	47.5	15	31	8	226	127	85	80	273	327	213
MD□MA□□ 132-12	A300	38x80	300	230	12	M12	265	4	258	188	191	129	47.5	15	41	10	226	127	85	112	288	327	213
MD□MA□□ 132-22	A300	38x80	300	230	12	M12	265	4	258	188	191	129	47.5	15	41	10	226	127	85	112	288	327	213
MD□MA□□ 160-22	A350	42x110	350	250	13	M16	300	5	310	220	217	175	47.5	19	45	12	226	127	85	–	–	–	–
MD□MA□□ 160-32	A350	42x110	350	250	13	M16	300	5	310	220	217	175	47.5	19	45	12	226	127	85	–	–	–	–
MD□MA□□ 180-12	A350	48x110	350	250	13	M16	300	5	348	238	217	186	47.5	19	51.5	14	226	127	85	–	–	–	–
MD□MA□□ 180-22	A350	48x110	350	250	13	M16	300	5	348	238	217	186	47.5	19	51.5	14	226	127	85	–	–	–	–

Motor type		Options with integral fan			Options with blower			
		No resolver or. ITD21	Resolver or. ITD21	Brake	No Resolver or. ITD21	Resolver or ITD21	Brake	Brake and resolver or. ITD21
MD□MA□□ 112-22	k6	420	475	492	522	522	597	597
	k2	88	143	160	190	190	265	265
MD□MA□□ 132-12	k6	470	572	550	592	592	668	668
	k2	120	222	210	252	252	328	328
MD□MA□□ 132-22	k6	508	610	588	630	630	706	706
	k2	120	222	210	252	252	328	328
MD□MA□□ 160-22	k6	598	703	711	738	738	850	850
	k2	147	252	260	287	287	399	399
MD□MA□□ 160-32	k6	642	747	755	782	782	894	894
	k2	147	252	260	287	287	399	399
MD□MA□□ 180-12	k6	671	780	784	812	812	926	926
	k2	147	256	260	288	288	402	402
MD□MA□□ 180-22	k6	671	780	784	812	812	926	926
	k2	147	256	260	288	288	402	402

Dimensions in [mm]



Motor dimensions
Design IM B14 (with terminal box/integrated motec)

Motor type	Three-phase AC motor																			motec			
	Flange d x l to DIN 42948	a1	b1	c1	d4	e1	f1	g	p	p1	q	q1	s2	t	u	x1	x2	y	q2	p2	z1	z2	
		IEC 72 letter symbol																					
		D x E	P	N	LA		M	T	AC					S	GA	F							
MD□MA□□ 071-X2	C105	14x30	105	70	10	M5	85	2.5	143	143	–	52	–	M6	16	5	200	120	–	43	210	202	156
MD□MA□□ 080-X2	C120	19x40	120	80	10	M6	100	3	156	151	–	65	–	M6	21.5	6	200	120	–	59	234	230	176
	C160	19x40	160	110	10	M6	130	3.5	156	151	–	65	–	M8	21.5	6	200	120	–	59	234	230	176
MD□MA□□ 090-12	C160	24x50	160	110	10	M8	130	3.5	176	142	150	85	47.5	M8	27	8	200	120	85	72	225	230	176
MD□MA□□ 100-12	C160	28x60	160	110	11	M10	130	3.5	194	151	159	99	47.5	M8	31	8	200	120	85	86	235	230	176
MD□MA□□ 100-32	C160	28x60	160	110	11	M10	130	3.5	194	151	159	99	47.5	M8	31	8	200	120	85	74	244	327	213
MD□MA□□ 112-22	C160	28x60	160	110	12	M10	130	3.5	219	174	172	102	47.5	M8	31	8	226	127	85	80	273	327	213

Motor type		Options with integral fan			Options with blower			
		No resolver or. ITD21	Resolver or. ITD21	Brake	No Resolver or. ITD21	Resolver or ITD21	Brake	Brake and resolver or. ITD21
MD□MA□□ 071-12	k6	241	291	291	352	352	399	399
	k2	63	121	121	177	177	231	231
MD□MA□□ 071-32	k6	241	291	291	352	352	399	399
	k2	63	121	121	177	177	231	231
MD□MA□□ 080-12	k6	281	335	335	389	389	442	442
	k2	70	130	130	181	181	239	239
MD□MA□□ 080-32	k6	281	335	335	389	389	442	442
	k2	70	130	130	181	181	239	239
MD□MA□□ 090-12	k6	313	377	385	436	436	495	495
	k2	75	139	153	198	198	263	263
MD□MA□□ 090-32	k6	338	402	410	461	461	520	520
	k2	75	139	153	198	198	263	263
MD□MA□□ 100-□02	k6	392	454	454	506	506	566	566
	k2	80	158	158	194	194	270	270
MD□MA□□ 112-22	k6	420	475	492	522	522	597	597
	k2	88	143	160	190	190	265	265

Dimensions in [mm]

To the Lenze sales office

Page __ of __

☐ **Order**

☐ **Quotation**

Fax no. _____

From

_____
Company

_____
Street/Postcode

_____
Town/Postcode

_____
Date Signature

Customer no.

_____
Order no.

_____
Name

_____
Department

_____
Tel. no.

Delivery address (if different)

_____
Street

_____
Town/Postcode

Invoice to (if different)

_____
Street/Postcode

_____
Town/Postcode

Requested delivery date _____

Despatch information _____

_____

Fax order form

Preferred motors MDEMA/MDFMA (071-100) motors

Customer no.

Order no.

_____ items

☐ **MDEMA self-ventilated**

☐ **MDFMA forced ventilated**

☐ **With built-in motec E82MV□□□_□B**
Complete the fax order form for the 8200 motec

Frame size	Operation at 50 Hz	Operation at 60 Hz	Operation at 87 Hz
071-12	☐ 0.25 KW/1355 RPM/50 Hz (400/230 V)	☐ 0.31 KW/1655 RPM/60 Hz (480/277 V)	☐ 0.47 KW/2475 RPM/87 Hz (400 V)
071-32	☐ 0.37 KW/1345 RPM/50 Hz (400/230 V)	☐ 0.45 KW/1645 RPM/60 Hz (480/277 V)	☐ 0.67 KW/2470 RPM/87 Hz (400 V)
080-12	☐ 0.55 KW/1370 RPM/50 Hz (400/230 V)	☐ 0.68 KW/1670 RPM/60 Hz (480/277 V)	☐ 1.0 KW/2480 RPM/87 Hz (400 V)
080-32	☐ 0.75 KW/1390 RPM/50 Hz (400/230 V)	☐ 0.92 KW/1690 RPM/60 Hz (480/277 V)	☐ 1.35 KW/2510 RPM/87 Hz (400 V)
090-12	☐ 1.1 KW/1405 RPM/50 Hz (400/230 V)	☐ 1.3 KW/1705 RPM/60 Hz (480/277 V)	☐ 2.0 KW/2520 RPM/87 Hz (400 V)
090-32	☐ 1.5 KW/1410 RPM/50 Hz (400/230 V)	☐ 1.8 KW/1710 RPM/60 Hz (480/277 V)	☐ 2.7 KW/2525 RPM/87 Hz (400 V)
100-12	☐ 2.2 KW/1425 RPM/50 Hz (400/230 V)	☐ 2.6 KW/1725 RPM/60 Hz (480/277 V)	☐ 3.9 KW/2535 RPM/87 Hz (400 V)
100-32	☐ 3.0 KW/1415 RPM/50 Hz (400/230 V)	☐ 3.6 KW/1715 RPM/60 Hz (480/277 V)	☐ 5.4 KW/2530 RPM/87 Hz (400 V)

Control mode

☒ S1

Design

☐ B3 ☐ B5-A___ ☐ B14-C___

Drive end

☒ **Standard oil seal**

Non-drive end

☐ Encoder motor (module 1) ☐ Brake motor (module 2)

Temperature monitoring

☒ **Tk NC contact + KTY**

Type of protection

☒ **IP54 or IP55 depending on options**

Brakes

☐ No brake
Brake voltage
☐ BFK458-_____E
☐ DC 24 V
☐ Low noise version
☐ DC 205 V
☐ AC 230 V incl. rectifier

Encoders

☐ No encoder
☐ Resolver
☐ ITD21 2048 IMP TTL
☐ ITD21 2048 IMP HTL
☐ ITD21 512 IMP TTL
☐ ITD21 512 IMP HTL

Cooling

☐ Integral fan
☐ Blower 1 x 220-240 V
☐ Blower 1 x 400 V
☐ No fan
☐ Blower 3 x 400 V (FS 090 upwards)

Attention! Motors without fans are not available

Colour

☐ **Primed** [1]
☐ **RAL 9005** [2] **Black (matt)**
☐ RAL 6011 Reseda green
☐ RAL 2000 Yellow orange
☐ RAL 9018 Papyrus white

Preferential types appear in bold print.

[1] Motor only
[2] Only on motor with motec

Customer no.

Page __ of __

Order no. _____

_____ items

☐ **MDEMA self-ventilated**

☐ **MDFMA forced ventilated**

☐ **With built-in motec E82MV□□□_□B**
Complete the fax order form for the 8200 motec

Frame size	Operation at 50 Hz	Operation at 60 Hz	Operation at 87 Hz
112-22	☐ 4.0 KW/1435 UPM/50 Hz (400/230 V)	☐ 4.8 KW/1735 UPM/60 Hz (480/277 V)	☐ 7.1 KW/2545 UPM/87 Hz (400 V)
132-12	☐ 5.5 KW/1450 UPM/50 Hz (400/230 V)	☐ 6.6 KW/1750 UPM/60 Hz (480/277 V)	☐ 9.7 KW/2555 UPM/87 Hz (400 V)
132-22	☐ 7.5 KW/1450 RPM/50 Hz (400/230 V)	☐ 9.0 KW/1750 RPM/60 Hz (480/277 V)	☐ 13.2 KW/2555 RPM/87 Hz (400 V)
160-22	☐ 11.0 KW/1460 UPM/50 Hz (400/230 V)	☐ 13.2 KW/1760 RPM/60 Hz (480/277 V)	☐ 19.3 KW/2565 RPM/87 Hz (400 V)
160-32	☐ 15.0 KW/1460 RPM/50 Hz (400/230 V)	☐ 18.0 KW/1760 RPM/60 Hz (480/277 V)	☐ 26.4 KW/2565 RPM/87 Hz (400 V)
180-12	☐ 18.5 KW/1470 RPM/50 Hz (400/230 V)	☐ 22.2 KW/1770 RPM/60 Hz (480/277 V)	☐ 32.4 KW/2575 RPM/87 Hz (400 V)
180-22	☐ 22.0 KW/1456 RPM/50 Hz (400/230 V)	☐ 26.4 KW/1756 RPM/60 Hz (480/277 V)	☐ 38.7 KW/2560 RPM/87 Hz (400 V)

Control mode

☒ S1

Design

☐ B3 ☐ B5-A___ ☐ B14-C___(112 only)

Drive end

☒ **Standard oil seal**

Non-drive end

☐ Encoder motor (module 1) ☐ Brake motor (module 2)

Temperature monitoring

☒ **Tk NC contact + KTY**

Type of protection

☒ **IP54 or IP55 depending on options**

Brakes

☐ No brake ☐ BFK458-_____E ☐ Low noise version

Brake voltage ☐ DC 24 V ☐ DC 205 V ☐ AC 230 V incl. rectifier

Encoders

☐ No encoder ☐ Resolver ☐ ITD21 2048 IMP TTL ☐ ITD21 512 IMP TTL ☐ ITD21 2048 IMP HTL ☐ ITD21 512 IMP HTL

Cooling

☐ Integral fan ☐ Blower 1 x 220-240 V ☐ Blower 3 x 400 V ☐ No fan

Attention! Motors without fans are not available

Colour

☐ **Primed** [1] ☐ **RAL 9005** [2] **Black (matt)** ☐ RAL 6011 Reseda green ☐ RAL 2000 Yellow orange ☐ RAL 9018 Papyrus white

Preferential types appear in bold print.

[1] Motor only
[2] Only on motor with motec

Fax order form

8200 motec frequency inverters

Customer no.

Order no. _____

8200 motec frequency inverters

E82MV ☐ ☐ ☐-☐B

2 **230 V**
4 **400 V**

Power				
2	5	1	= 0.25 kW	E82MV251_2B
3	7	1	= 0.37 kW	E82MV371_2B
5	5	1	= 0.55 kW	E82MV551_4B
7	5	1	= 0.75 kW	E82MV751_4B
1	5	2	= 1.5 kW	E82MV152_4B
2	2	2	= 2.2 kW	E82MV222_4B
3	0	2	= 3.0 kW	E82MV302_4B
4	0	2	= 4.0 kW	E82MV402_4B
5	5	2	= 5.5 kW	E82MV552_4B
7	5	2	= 7.5 kW	E82MV752_4B

Function modules

Quantity	I/O function modules	
_____	Standard I/O	E82ZAFSC001
_____	Application I/O	E82ZAFAC001
_____	Bus I/O for motec 0.55 ... 2.2 kW 400 V	E82ZAFB001: (order bus module separately!)
_____	Bus I/O for motec 0.25/0.37 kW 230 V	E82ZMFB001 (order bus function module separately!)
_____	Bus I/O for motec 3.0 ... 7.5 kW 400 V	E82ZAFB201 (order bus function module separately!)

Quantity	Bus function modules	
_____	LECOM-B (RS485)	E82ZAFLC001
_____	INTERBUS	E82ZAFIC001
_____	PROFIBUS-DP	E82ZAFPC001
_____	CAN (system bus)	E82ZAFCC001
_____	DeviceNet	E82ZAFVC001**
_____	CANopen	E82ZAFUC001**
_____	AS-Interface	E82ZAFFC001
_____	CAN-I/O (system bus)	E82ZAFCC201

Communication modules

Quantity		
_____	Diagnosis terminal* (Keypad XT + hand-held)	E82ZBBXC
_____	Diagnosis terminal* (Keypad + hand-held)	E82ZBB

Quantity	PC interface RS232	
_____	Hand-held with PC interface*	E82ZBL-C
_____	PC system cable RS232, **0.5 m**	EWL0048
_____	PC system cable RS232, **5 m**	EWL0020
_____	PC system cable RS232, **10 m**	EWL0021
_____	PC parameterisation software	
_____	Global Drive Control GDC easy	ESP-GDC2-E

Quantity	Connecting cable for diagnosis terminal/hand-held with PC interface	
_____	Connecting cable for diagnosis terminal **2.5 m**	E82ZWL025
_____	Connecting cable for diagnosis terminal **5 m**	E82ZWL050
_____	Connecting cable for diagnosis terminal **10 m**	E82ZWL100

* Additional connecting cable E82ZWLxx required
(PC system cable EWL00xx also required for PC interface)
** In preparation

Customer no.

Page __ of __

Order no.

Accessories

Quantity Wiring terminals

_____	Fan terminal* (for separate motor blower) 2 x 2.5 mm²	E82ZWKL
_____	System terminals 10 x 1.5 mm² for motec 0.25/0.37 kW 230 V	E82ZMKS
_____	System terminals 12 x 1.5 mm² for motec 0.55 ... 2.2 kW 400 V	E82ZWKS
_____	Mains bus connector for motec 0.25/0.37 kW 230 V	E82ZWKN2
_____	Mains bus connector for motec 0.55 ... 2.2 kW 400 V	E82ZWKN4

Quantity Switches/Potentiometers

_____	Switch/potentiometer unit	E82ZBU

Quantity Current limiting module

_____	for motec 0.25/0.37 kW 230 V	E82ZJ004
_____	for motec 0.55 ... 2.2 kW 400 V	EZN3A0150H024

Quantity Braking operation

_____	Brake rectifier for motec 0.55 ... 2.2 kW 400 V (bridge rectifier) max. 270 V AC	E82ZWBR1
_____	Brake rectifier for motec 0.25/0.37 kW 230 V (bridge rectifier) max. 270 V AC	E82ZMBR1
_____	Brake rectifier* (half-wave rectifier) max. 480 V AC	E82ZWBR3
_____	Brake switch	E82ZWBRU

Quantity Brake resistor for motec

_____	1.5/2.2 kW (IP55)	ERBM240R220W
_____	0.25 ... 0.75 kW (IP55)	ERBM470R110W
_____	E82MV302_4B 3.0 kW (IP65)	ERBS180R350W
_____	E82MV402_4B 4.0 kW (IP65)	ERBS100R625W
_____	E82MV552_4B 5.5 kW (IP65)	ERBS100R625W
_____	E82MV752_4B 7.5 kW (IP65)	ERBS082R780W

Cable protection

Circuit-breakers

Quantity Designation

_____ _____

Fuses

Quantity Designation

_____ _____

Fuse holder for fuses

Quantity Designation

_____ _____

_____ _____

Quantity Related documentation

_____	8200 motec operating instructions	EDB82MV 752
_____	Communication manual LECOM	EDSLECOM
_____	Communication manual CAN	EDSCAN
_____	Communication manual PROFIBUS	EDSPBUS
_____	Communication manual INTERBUS	EDSINTERBUS

Documentation in ☐ German ☐ English ☐ French

Miscellaneous

Quantity	Designation	Quantity	Designation
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

* Not for motec 0.25/0.37 kW 230 V

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