The Drive & Control Company

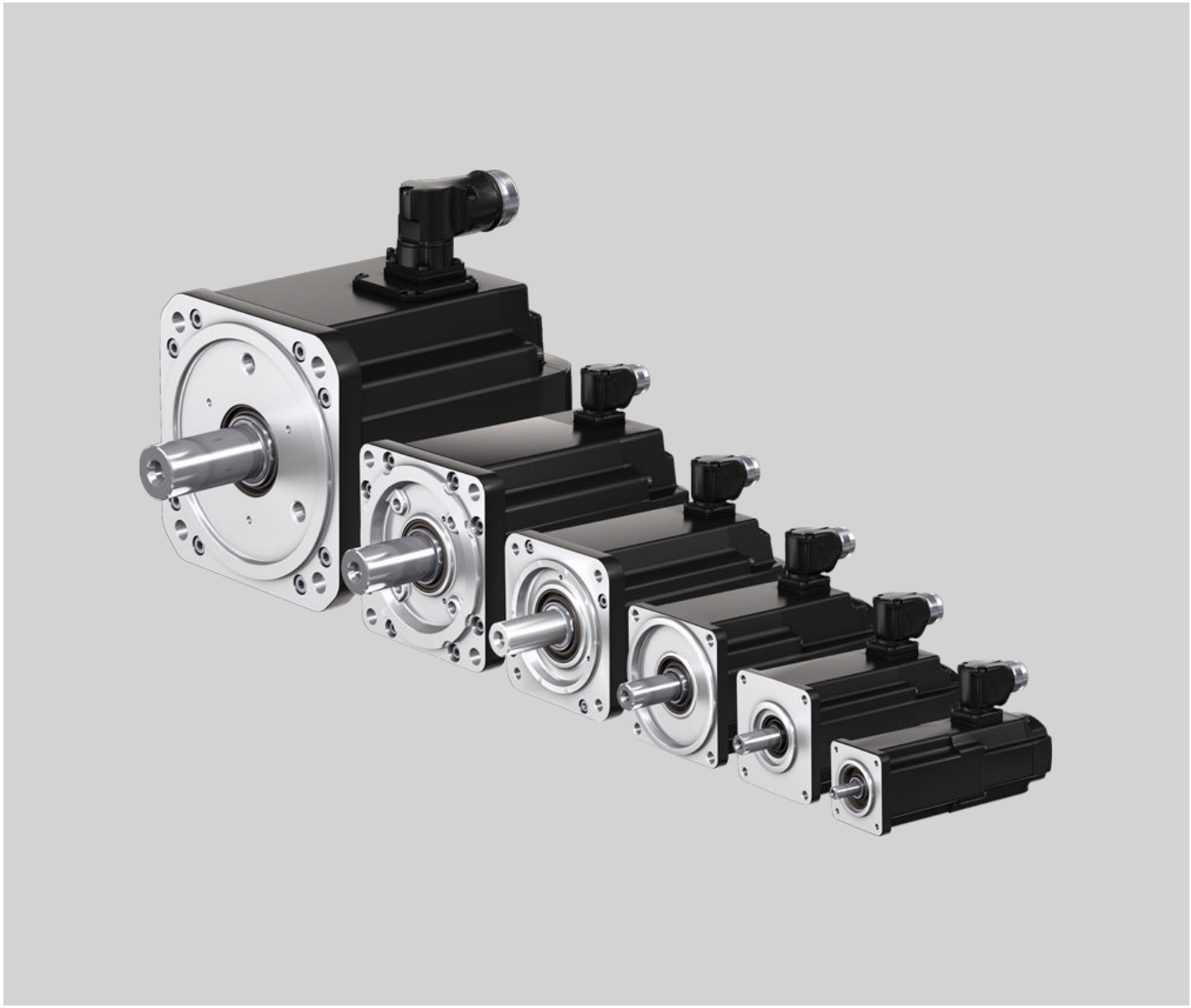
Rexroth
Bosch Group

IndraDyn S

Synchronous Servo Motors MS2N

Project planning
R911347583

Edition 01



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Purpose of Documentation
This documentation ...

- explains the features of the product, possibilities for use, operating conditions and operational limits
- contains technical data regarding the motors that can be supplied
- provides information regarding product selection, handling and operation

Record of Revision

Edition	Release Date	Notes
DOK-MOTOR*-MS2N*******-PR01-EN-P	06/2016	First edition

About this documentation

Presentation of information

Safety instructions

The safety instructions in this documentation include signal words (danger, warning, caution, note) and a signal symbol (acc. to ANSI Z535.6-2006).

The signal word is intended to draw your attention to the safety instructions and describes the seriousness of the danger. The warning triangle with exclamation mark indicates the danger for persons.

⚠ DANGER

Non-compliance with this safety instructions **will** result in death or severe personal injury.

⚠ WARNING

Non-compliance with this safety instructions **can** result in death or severe personal injury.

⚠ CAUTION

Non-compliance with this safety instructions can result in moderate or minor personal injury.

NOTICE

Non-compliance with this safety instructions can result in material damage.

Safety sign

In the documentation, the following internationally standardized safety signs and graphic symbols are used. The table contains the significance of the signs.

Safety sign	Significance
	Warning against dangerous electric voltage
	Warning against hot surfaces
	Warning against rotating machine parts
	Warnung vor schwebender Last
	Electrostatic sensitive devices
	Prohibition for persons with cardiac pacemaker

Safety sign	Significance
	Do not carry along metal parts or clocks
	Hammer scales are forbidden

Meaning of safety signs

Markup

The following markups are used for a user-friendly text information representation.

📖 Reference to supplementary documentation

☞ This note gives important information, which must be observed.

- Listings on the first level contain a bullet point
  - Listings on the second level contain a dash

1. Handling instructions are specified in numbered lists. Please comply with the order of the handling instructions.

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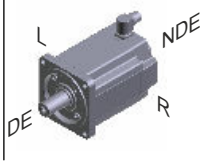
1 Product information

The MS2N series in the IndraDyn S product group consists of permanent-magnet-excited synchronous servo motors in 6 frame sizes with numerous optional variants. The motors have been designed for industrial applications and have been optimized for operation at Rexroth controllers of the IndraDrive series.

For more information refer to www.boschrexroth.com/ms2n

1.1 Basic features

Product	3~ PM motor
Type	MS2N
Ambient temperature during operation	0 … 40 °C
Protection class (EN 60034-5)	IP64 without shaft sealing ring IP65 with shaft sealing ring
Cooling mode (EN 60034-6)	IC410, Self-cooling
	IC416, Forced ventilation 230 V / 115 V, Air flow direction NDE ⇒DE, thermal protection, no circuit with external motor protection necessary)
Motor design EN 60034-7)	IM B5
Coating	Varnish RAL 9005
Flange	similar to DIN 42948
Shaft end	Cylindrical (DIN 748 part 3), centering hole with thread "DS" (DIN 332 part 2), optionally with keyway (half key balancing according to DIN ISO 21940-32)
Concentricity, run-out, alignment	Standard tolerance N (DIN 42955) Optional tolerance R (DIN 42955)
Oscillating quantity level	Level A (EN 60034-14) up to the rated speed
Installation altitude	0 ... 1000 m above MSL (without derating)
Sound pressure level	MS2N03 ... MS2N10: 75 dB(A) +3 dB(A)
Thermal class	155 (F) (EN 60034-1)
Encoder system	**Basic Performance HIPERFACE®** Capacitive absolute value encoder, sin/cos 1Vss, 16 signal periods as single or multi-turn variant
	Advanced performance ACURO®link Optical absolute value encoder 20 bit, digital in single or multi turn variant
Electrical connection[1)]	**Single cable connection** with circular connector, rotatable, quick lock SPEEDCON®
	Double cable connection with Power connectors M17, M23, M40 (rotatable, quick lock SPEEDCON®), M58 or terminal boxes Encoder connector M17, rotatable, quick lock SPEEDCON®
Holding brake (option)	electrically released U_N 24V DC (±10%)
Motor ends	 DE Drive End, A-Seite NDE Non Drive End, B-Seite L Left, links R Right, rechts

1) *Available options, see chapter 3 "Type code " on page 29*

Product information

1.2 Important instructions on use

1.2.1 Intended use

Prerequisites for proper and safe use of the motors are proper transport, appropriate storage, proper assembly and connection, careful maintenance, operation and overhaul.

The motors have been designed for installation in industrial machinery. The motors have been designed and manufactured in compliance with the EU directives and harmonized standards specified in the following.

The observance of and compliance with the specifications of the operating instructions (DOK-MOTOR*-MS2N*******-ITRS-**-P) are part of the intended use.

Standards

EN 60034-1	Rating and performance
EN 60034-5	Degree of protection

Directives

2014/35/EU	Low voltage directive

The machine manufacturer must evaluate the electric and mechanic safety as well as environmental influences in the assembled state of the machine according to the Machine Directive 2006/42/EC and DIN EN 60204-1 (safety of machines).

The electrical installation must comply with the protection requirements of EMC Directive 2014/30/EU. The plant manufacturer is responsible for appropriate installation (for example: physical separation of signal and power cables, using shielded cables, ...). The EMC instructions of the converter manufacturer must be observed.

The machine may not be commissioned before conformity with these directives has been confirmed.

1.2.2 Unintended use

Any use of the MS2N motors outside of the specified fields of application or under operating conditions and technical data other than those specified in this documentation is considered to be "inappropriate use".

Unless explicitly provided for this purpose, the motors may not be used in explosion-hazardous areas.

Direct operation on the three-phase network is forbidden.

1.3 Labeling on the product

1.3.1 Type plate

The type plate contains all relevant product data.

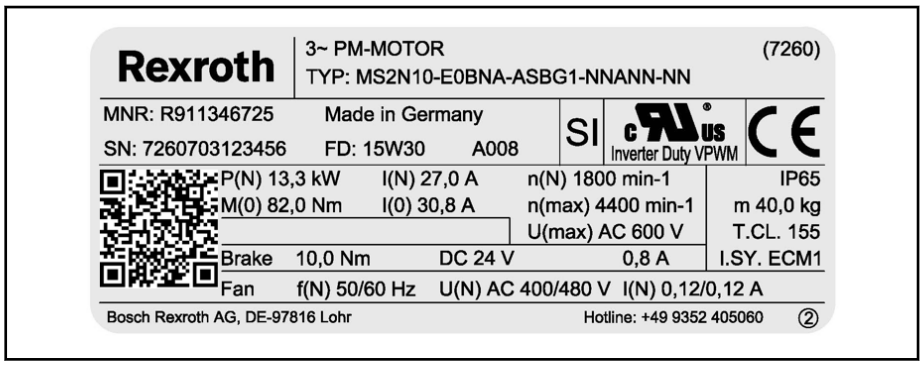


Fig. 1-1: Type plate MS2N (example)

TYPE	Product type code	n(max)	Maximum speed
SN	Serial number	U(max)	Maximum voltage UL
FD	Manufacturing date	IP65	Degree of protection IPxx
P(N)	Rated power - 100K	m	Mass
I(N)	Rated current - 100K	T.CL.	Thermal class
n(N)	Rated speed (100K)	I.SY.	Insulation system identification
M(0)	Standstill torque - 100 K	SI	Use in systems for “integrated safety technique” prepared.
I(0)	Standstill current - 100 K		
Brake	Holding brake data (optional)	Fan	Data motor fan (optional)

Tab. 1-1: Type plate specification MS2N

The following marks of conformity are used.

Mark of conformity	Significance
CE	Conformity with applicable EC Directives For MS2N motors, conformity according to low-voltage directive 2014/35/EU , EN 60034-1, EN 60034-5.
c UL us	The UL Recognized Component Mark identifies recognized component parts which are components of a bigger product or system

Tab. 1-2: Meaning of marks of conformity

Product information

1.3.2 Safety instructions on the product

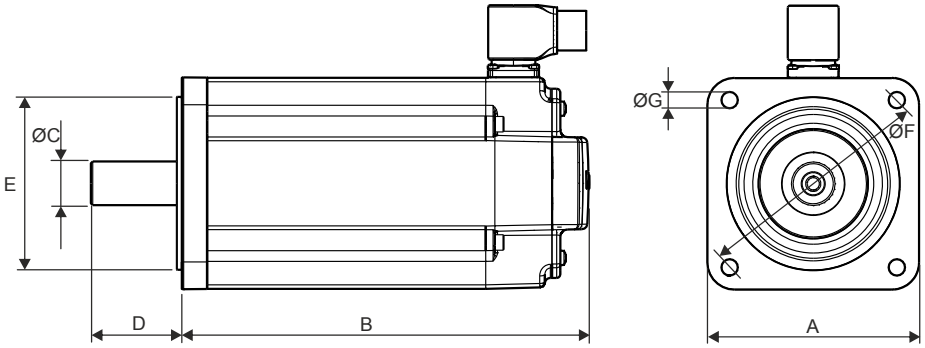
Please note the safety and prohibitive sign on the motor. The sign significance is explained in the following warnings.

Safety sign	Significance
	**Hot surfaces with temperatures over 60 °C may cause burns** Let the motors cool down before working on the motors or in close proximity to the motors. The thermal time constant stated in the technical data is a measure for the cooling time. Cooling down can require up to 140 minutes. - Wear safety gloves - Do not work on hot surfaces.
	**Motor damage due to strikes onto the motor shaft** Do not strike the shaft end and do not exceed the allowed axial and radial forces of the motor.

Tab. 1-3: Safety sign on the product

2 Features and functions

2.1 Mechanical interfaces



Type	A □ Flange [mm]	B Length [mm]	C Shaft Ø [mm]	D Shaft length [mm]	E Centering collar [mm]	F Hole circle [mm]	G Mounting hole [mm]
MS2N03-B	58	See specifications	9	20	40	63	4.5
MS2N03-D			11	23			
MS2N04	82		14	30	50	95	6.6
MS2N05	98		19	40	95	115	9
MS2N06	116		24	50	95	130	9
MS2N07	140		32	58	130	165	11
MS2N10	196		38	80	180	215	14

Tab. 2-1: Mechanical interface flange, shaft

Use the following screws and washers for flange assembly.

Hole ⌀ [mm]	Screw 8.8 DIN EN ISO 4762 DIN EN ISO 4014	Tightening torque M_A[Nm] at μ_K= 0.12	Washer DIN EN ISO 28738
4.5	M4 × 20	3.0	-
6.6	M6 × 20	10.1	-
9	M8 × 20	24.6	yes
11	M10 × 30	48	yes
14	M12 × 40	84	yes
18	M16 × 35	206	yes

Tab. 2-2: Tightening torque of mounting screws

2.2 Rotor inertia

	Type	MS2N...					
		03	04	05	06	07	10
Low inertia	0	•	•	•	•	•	•
Mean inertia	1	-	-	-	•	•	•

In the "low inertia" design, the motor is optimized for dynamic applications with maximum acceleration capacity.

In the "mean inertia" design, the motor is optimized for applications with increased requirements on controllability and synchronous operation.

2.3 Winding code

The speed to the corresponding winding designations are standard values. The specified rated speed can deviate from the specified in the technical data sheet. The speed is determined to define the winding designation on which the standstill torque - 100K ($M_{S1\ 100K}$) on the voltage limit characteristic curve $U_{ZK\ 1}$ is reached (tolerance range ca. ± 250 1/min).

Labeling	Nominal speed [1/min]
BD	1000
BF	1500
BH	2000
BN	3000
BQ	4000
BR	4500
BT	6000
BY	9000

Tab. 2-3: Winding code according to type code (speed at DC bus voltage $U_{ZK\ 1}$)

2.4 Thermal motor protection

The motor temperature is monitored by two systems that are operated independently of each other.

- Temperature sensor
- Temperature model

and ensures thus the best protection of motors against irreversible damage by thermal overload.

In case of motors with an analog encoder (AS/AM), the temperature signal is output via the TP(+) und TP(-) ports in the power connection.

In case of motors with digital encoder (CS/CM), the temperature signals are transmitted digitally via the encoder interface (cyclic communication).

The threshold values for motor temperature monitoring are contained in the encoder data memory and are read in and monitored automatically during the operation with IndraDrive controllers.

Monitoring of motor temperature is done via mounted temperature sensors KTY84-130.

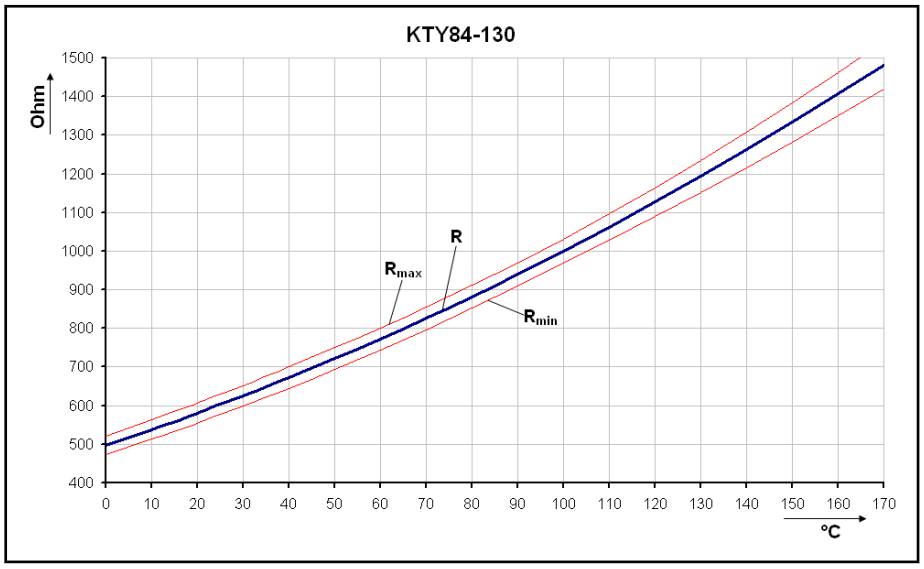


Fig. 2-1: Characteristic curve KTY84-130

Threshold values for MS2N motors:

- Motor-warning temperature (140°C)
- Motor-disconnection temperature (145°C)

The IndraDrive control devices monitor the functionality of the temperature sensors. For further information, please refer to the functional description of IndraDrive control devices.

2.5 Cooling type

EN 60034-6	Type	MS2N...					
		03	04	05	06	07	10
Self-cooling (IC410)	N	•	•	•	•	•	•
Forced ventilation 230 V (IC416)	A	-	-	-	-	•	•
Forced ventilation 115 V (IC416)	B	-	-	-	-	•	•

2.5.1 Self-cooling (IC410)

In case of self-cooling motors, the heat dissipation is realized via natural convection and radiation to the ambient air as well as by heat conduction to the machine construction.

The specified nominal data is reached at ambient temperatures of up to 40 °C. Unhindered vertical convection has to be ensured by a sufficient distance of 100 mm to adjacent components.

Pollution of the surface of the motor reduces heat dissipation and can result in thermal overload. The availability of the system can be increased by regular checks and cleaning of the motors. Please ensure access to the motors for maintenance purposes.

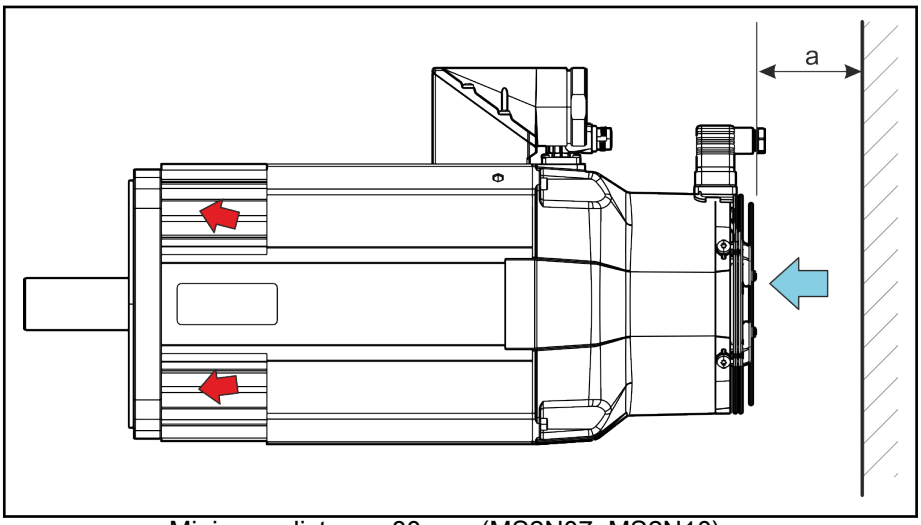
2.5.2 Forced ventilation (IC416)

In case of force-ventilated motors, the energy dissipation is additionally realized via a fan that is not connected to the motor.

⚠ WARNING **Damage to persons and machines due to drawing in of hairs, clothes or loose objects.**

Do not come close to running fan units with clothes or open hair that can be drawn in. Remove ties and use hair nets. Avoid drawing in of loose objects.

The specified nominal data is reached at ambient temperatures of up to 40 °C. Unhindered drawing in of cooling air and heat dissipation has to be ensured by minimum distances to the machine environment.



a Minimum distance 80 mm (MS2N07, MS2N10)

Fig. 2-2: Minimum distance

Blowing fans, air flow direction NDE → DE.

Operate fan with ambient air (dry, dust-free,...). Heated air may not be sucked in again.

Dirt and contaminants can reduce the flow rate of the fans and result in a thermal overload of the motors. The availability of the system can be increased by regular checks and cleaning of the fans and motors. Please ensure access to the motors for maintenance purposes.

The use of fans is not intended for air supply

- containing abrasive particles
- having a corroding effect, e.g., salt mist
- containing a high dust concentration (e.g. sawdust)
- with inflammable gas/dust

Features and functions

2.6 Encoder

BASIC The BASIC encoders Ax use a capacitive sampling method. Data output of process data happens analog via SinCos track. Data output of parameter data (electronic type plate) happens digitally via Hiperface®-Protocol. Temperature signals are not transmitted via the encoder interface.

ADVANCED The ADVANCED encoders Cx use a photoelectric sampling method. Data output of process and parameter data (electronic type plate) happens digitally via ACURO®link-Protocol. The encoder meets the requirements on safety engineering according to standard SIL 2 under EN IEC 61508 and PL d under EN ISO 13849. The temperature signals are transmitted digitally via the encoder interface.

Singleturn The singleturn design allows absolute, indirect position recording within one mechanical motor rotation.

Multiturn The multiturn design allows absolute, indirect position recording within 4096 mechanical motor rotations.

2.6.1 Technical data of encoder

	BASIC		ADVANCED	
	AS - Singleturn	**AM - Multiturn**	**CS - Singleturn**	**CM - Multiturn**
Protocol	Hiperface	Hiperface	ACURO®link	ACURO®link
Signal periods	16	16	-	-
Resolution	-	-	20 bit	20 bit
Distinguishable revolutions	1	4096	1	4096
System accuracy typical/maximum	±360´´ / ±520´´	±360´´ / ±520´´	±50´´ / ±70´´	±50´´ / ±70´´
Data transmission	analog 1 Vss	analog 1 Vss	digital	digital
Supply voltage	7 ... 12 V	7 ... 12 V	7 ... 12 V	7 ... 12 V
Current consumption	<50 mA	<50 mA	<130 mA	<130 mA
Functional safety EN IEC 61508	-	-	SIL2	SIL2
Functional safety EN ISO 13849	-	-	PL d	PL d
Single cable connection	-	-	•	•
Double cable connection	•	•	•	•

• available

- Not available

Tab. 2-4: Technical data of encoder

2.7 Degree of protection

The protection mode acc. to EN 60034-5 is specified by the abbreviation IP (International Protection) and two numbers for the degree of protection. The first code number stands for the degree of protection against contact and ingress of foreign bodies, the second one stands for the degree of protection against ingress of water.

Standard motors (specification according to type plate)

- **IP64** without shaft sealing ring
- **IP65** with radial shaft sealing ring

Additional specifications (not on type plate)

- Motors with fan
  - **IP65** fan motor
  - **IP2X** safety fence fan propeller
- Connection technique
  - **IP67** connectors plugged in
  - **IP65** terminal boxes in correct connection

2.8 Drive shaft balancing and extension elements

2.8.1 Shaft end

Smooth shaft

Cylindrical shaft end according to DIN 748-3 with frontal centering hole with "DS" thread according to DIN 332-2.

The standard design for a non-positive shaft-hub connection without play and excellent smooth running. Use clamping sets, pressure sleeves or clamping elements for coupling the machine elements to be driven.

Shaft with keyway

Cylindrical shaft end according to DIN 748-3 with frontal centering hole with "DS" thread according to DIN 332-2 and keyway.

The keyway design allows form-locking transmission of torques with constant direction and low requirements on the shaft-hub connection.

The machine elements to be driven have to be secured in axial direction via the centering hole.

Type	Key DIN 6885-A	Centering hole DIN 332 Part 2
MS2N03-B	3×3×14	DS M3
MS2N03-D	4×4×16	DS M4
MS2N04	5x5x20	DS M5
MS2N05	6x6x32	DS M6
MS2N06	8x7x40	DS M8
MS2N07	10×8×45	DS M10
MS2N10	10×8×70	DS M12

Tab. 2-5: Keyway and centering holes for MS2N motors

Keys are not included in the scope of delivery.

Shaft	Type
Smooth, without shaft sealing ring	H
Smooth, with shaft sealing ring	G
Keyway, without shaft sealing ring	L
Keyway, with shaft sealing ring	K

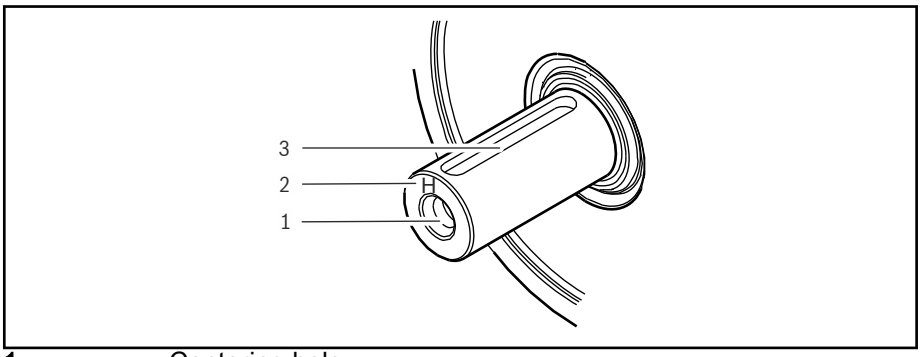
Tab. 2-6: Options according to type code

Design with shaft sealing ring is optional. The shaft sealing ring affects the degree of protection chapter 2.7 "Degree of protection" on page 17.

2.8.2 Winding

MS2N motors with keyway are balanced with "half key ". Half key balancing according to DIN ISO 21940-32.

The balancing type is specified at the shaft front end with "**H**" for half key balancing.



1 Centering hole
2 Labeling balancing
3 Keyway

Fig. 2-3: Shaft end

2.8.3 Attachment of drive elements

Refer to the notes regarding the installation of drive elements.

⚠ CAUTION **Motor damage by intrusion of liquid!**

Pending liquids (e.g. cooling lubricants, gearbox oil, etc.) at the drive shaft are inadmissible.

When installing gearboxes please use gearboxes with closed (oil-proof) lubrication system only. Gearbox oil should not be in permanent contact with the shaft sealing ring of the motors.

Gearbox mounting on motors

The Rexroth gearbox series GTE, GTM are intended for installation at MS2N motors. Refer to the notes regarding the motor and gearbox configuration in chapter 4.1.5 "Characteristic curve in gearbox mounting" on page 45.

Overdetermined bearing

When installing drive elements, avoid overdetermined bearing as impermissibly high bearing forces can be generated due to unfavorable tolerance ratios.

☞ If redundant storage cannot be avoided, it is required to contact Bosch Rexroth.

Couplings

The machine construction and the drive elements used must be carefully adapted to the motor type so as to make sure that the load limits of the shaft and the bearing are not exceeded.

☞ When extremely stiff couplings are attached, the revolving radial forces may cause an impermissibly high load on the shaft and bearing.

Bevel gear pinion or helical drive pinion

Due to thermal expansion, the DE side of the drive shaft can be displaced by up to 0.6 mm in relation to the motor housing. If helical drive pinions or bevel gear pinions are directly mounted to the drive shaft, this change in position will lead to

- a shift in the position of the axis, if the driving pinions are not axially fixed on the machine side,
- a thermally dependent component of the axial force, if the driving pinions are axially fixed on the machine side. This causes the risk of exceeding the maximum permissible axial force or of the gear backlash increasing to an impermissible degree.
- Damage of the NDE bearing by exceeding the maximum permissible axial force.

☞ It is recommended to use drive elements with integrated bearings and mount them on the motor shaft via axially compensating couplings.

2.9 Holding brake

MS2N motors can optionally be provided with permanent magnet brakes. The backlash-free holding brakes are operated according to the "electrically-released" principle (closed-circuit principle) and open upon applying the switching voltage.

- Number of operating cycles ≥ 5.000.000
- The holding brakes with emergency stop function are intended to secure motor shafts at standstill. **The holding brakes are no operation brakes to decelerate motors in operation from speed**.
- In case of an emergency stop or voltage drop, the brake operation is only permitted to a limited extend. Up to 500 breaking cycles from speed 3000 1/min can be performed, whereas the maximum switched energy per emergency stop of the brake must not be exceeded. The number of brake applications per hour is 20, whereas a uniform scheduling is a precondition. For specifications about the max. switched energy per emergency stop, see chapter 2.9.1 "Technical data of holding brakes" on page 21

⚠ CAUTION **Malfunctions due to wear**

Impermissibly high wear due to breaking from speed by exceeding the specified emergency stop properties.

Impermissibly high number of braking applications during setup mode.

Rated voltage

The rated voltage to apply the brakes is 24 V DC (±10%).

The voltage supply of the holding brake has to be designed so as to guarantee under the worst installation and operation conditions that a sufficient voltage **24 V ±10%** is available at the motor in order to release the holding brake.

The voltage drop ΔU on the brake supply can approximately be calculated for copper conductors using the following formula:

$$\Delta U = \rho_{Cu} \cdot \left(\frac{2 \cdot l}{q} \right) \cdot I_N$$

ΔU	Voltage drop [V]
ρ_{Cu}	specific resistance of copper 0.0178 [Ω*mm²/m]
l	Cable length [m]
q	Wire cross section [mm²]
I_N	Rated current [A]

Fig. 2-4: Voltage drop of brake supply for Cu (copper) conductor

⚠ CAUTION **Malfunction in case of exceeded tolerance of the rated voltage (switching voltage)**

For safe switching of the holding brake, a rated voltage of **24 V DC ±10%** is required at the motor.

Ensure correct dimensioning of the supply wires (wire length and cross-section) for the holding brake.

The control voltage can be reduced using the energy saving function after safely releasing the brake, see chapter 2.9.3 "Energy saving function for holding brakes" on page 22.

IndraDrive connection

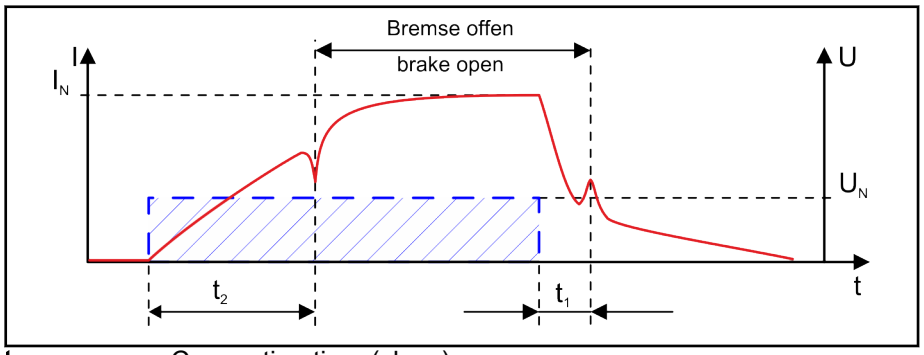
The holding brake in the motor is intended for direct connection to the IndraDrive controller. As a protective separation is ensured for the brake cable in the motor and as the power cable is equipped with reinforced insulation, no other protective circuits are required.

The protective circuit to switch inductive loads of holding brakes is not integrated in MS2N motors. It is integrated in IndraDrive controllers of Bosch Rexroth drive systems.

2.9.1 Technical data of holding brakes

MS2N		03	04	05	06		07		10		
Brake		1	1	1	1	2	1	2	1	2	3
Static holding torque	M4 [Nm]	1.8	5.0	10	10	15	20	36	33	53	90
Dynamic braking torque	M_1 [Nm]	1.3	4.5	4.5	4.5	11	12.5	16.5	16.5	23	33
Rated voltage	U_N [V]	24									
Rated current	I_N [A]	0.46	0.63	0.73	0.73	0.65	0.78	0.89	0.89	1.0	1.5
Connection time	t_1 [ms]	8	30	30	30	29	40	60	60	50	65
Disconnection time	t_2 [ms]	35	45	80	80	130	100	200	200	220	250
Maximum switched energy	W_{max} [J]	300	400	400	400	888	340	850	850	850	1470

Tab. 2-7: Technical data of holding brake



t_1 Connection time (close)
t_2 Disconnection time (open)

Fig. 2-5: Switching times of static hold mode

2.9.2 Sizing of holding brakes

Static sizing

Check the load torque (M_6) with the available holding torque (M_4). The load torque has to be smaller than the holding torque. In case of unsafe assumed load, use a sufficient safety factor.

$$M_4 \geq S \cdot M_6$$

M_4 Brake torque [Nm]
M_6 Load torque [Nm]
S Safety factor

Fig. 2-6: Static load torque

Dynamic sizing if emergency stop

In case of an emergency stop, the load torque (M_6) has to be smaller than the minimum dynamic torque (M_1) of the brake. Otherwise the dynamic brake torque is not sufficient to set the axis to standstill.

$$M_1 \geq S \cdot M_6$$

M_1 Dynamic torque [Nm]
M_6 Load torque [Nm]
S Safety factor
Fig. 2-7: Dynamic load torque

If a mass has to be decelerated within a specified time or after a certain distance, the additional mass moment of inertia of the complete system (J_{total}) has to be taken into consideration.

$$t_{Br} = \frac{J_{ges} \cdot n}{9{,}55 \cdot (M_1 \pm M_6)}$$

$$J_{ges} = J_{rot} + J_{fremd}$$

t_{Br} Deceleration time [s]
n Nominal speed [1/min]
M_1 Dynamic torque [Nm]
M_6 Load torque [Nm]
J_{total} Moment of inertia of complete system [kgm^2]
J_{rot} Moment of inertia of motor [kgm^2]
J_{for} External inertia [kgm^2]
Fig. 2-8: Shutdown time

The specified formula refers to idealized, linear correlations and can thus only be used for estimation purposes. A load torque M_6 inhibiting the brake application is displayed with "-", a brake application supporting the load torque M_6 is displayed with "+".

Thermal dimensioning

The brake can be thermally overexerted due to multiple repetitive brake applications (breaking capacity).

$$W_{\max} > \frac{M_1}{M_1 - M_6} \cdot \frac{J_{ges} \cdot n^2}{182{,}5}$$

W_{max} Maximum switching work [J]
n Nominal speed [1/min]
M_1 Dynamic torque [Nm]
M_6 Load torque [Nm]
J_{total} Moment of inertia of complete system [kgm^2]
Fig. 2-9: Maximum switched energy

2.9.3 Energy saving function for holding brakes

Decrease brake voltage

The control voltage of the holding brake in MS2N holding brakes can be reduced after executing the switching operation "Open brake" by using control modules (e.g. IndraDrive brake control module HAT02.1-003). By decreasing the control voltage, energy can be saved of up to 50% and the self-heating of the motor can be reduced.

To decrease the control voltage of MS2N holding brakes, the following conditions apply:

- Maximum decrease of control voltage to U_N ≥17 V DC

- Waiting time after releasing the holding brake is at least 200 ms
- Decreasing the control voltage by voltage control or pulse width modulation with a PWM cycle frequency ≥ 4 kHz

Refer to the instructions in the control module documentation.

Refer to the notes for dimensioning of the cable length and cable cross-section of brake cables.

2.9.4 Safety instructions holding brake

The permanent magnetic brake is no safety brake. This means, a torque reduction by non-influenceable disturbance factors can occur. Especially for use in vertical axes.

⚠ DANGER **Grievous bodily harm due to dangerous movements from falling or dropping axes!**

Additionally secure vertical axes to prevent them from sinking or descending after having shutdown the motor, for instance as follows:

- Mechanically lock the vertical axis.
- External brake, arrestor, clamping device.
- Weight compensation of the axes

The holding brake itself is not suitable for personal protection. Ensure protection of persons by superordinate fail-safe measures, like block danger zones via safety fences.

For European countries, additionally comply with the following standards and guidelines, e.g.

- EN 954 and ISO 13849-1 and ISO 13849-2 Safety-related components of controls
- Information sheet no. 005 "Gravity-loaded axes (vertical axes)" published by: DGUV Fachbereich Holz und Metall (German Employer's Liability Insurance Association Wood and Metal)

Determine the complete safety requirements, valid for special case of application and observe it during plant design. Comply with all applicable national regulations!

2.9.5 Holding brake – Commissioning and maintenance instructions

That is why the function and the holding brakes have to be checked in regular intervals and malfunctions must be removed in an appropriate period.

The braking effect can be reduced by

- corrosion on friction surfaces, vapor and sediment
- Over voltages and too high temperatures
- wear (increasing the air gap between armature and pole)

The holding brake functionality can be checked "mechanically by hand" or "automatically by means of the software function".

Manually check holding torque (M4)

1. De-energize the motor and ensure it cannot be restarted.
2. Measure the transferable holding torque of the holding brake with a torque wrench.

Check holding torque (M4) using the software function

1. Start the "P-0-0541, C2100 Command Holding system check" The efficiency of the holding brake and the opened state are checked by starting the routine.

   If the holding torque (M4) **is not achieved**, the resurfacing routine can be used to reconstitute the holding torque. Contact the Rexroth service department.

2.10 Flange exactness

The properties concentricity, run-out and alignment are defined in the flange accuracy (N, R). By default, MS2N motors are equipped with tolerance N, from frame size 06, the optional design tolerance R is available. The labeling is done in the motor type designation. (See also chapter 2.8 "Drive shaft balancing and extension elements" on page 17).

2.10.1 Concentricity tolerance of the shaft end

Diameter shaft end [d]	Concentricity tolerance in [mm]	
	N (normal)	R (reduced)
9	0.03	0.015
11, 14	0.035	0.018
19, 24	0.04	0.021
32, 38	0.05	0.025

Tab. 2-8: Concentricity tolerance regarding the shaft diameter for MS2N motors

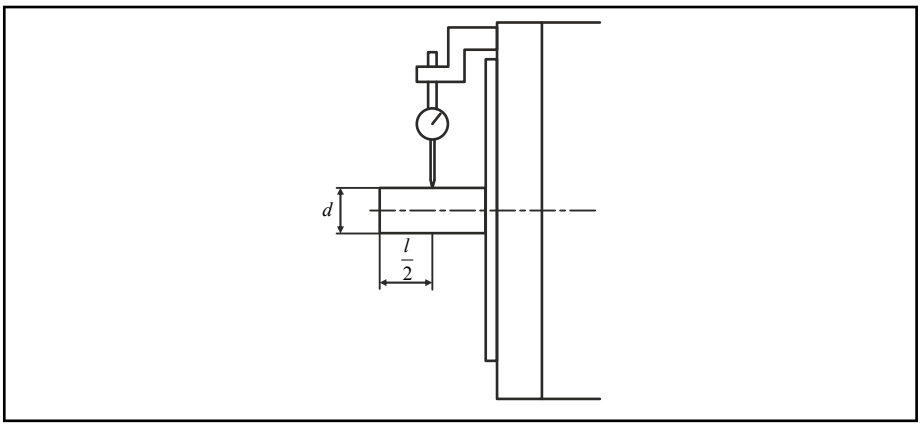


Fig. 2-10: Measuring system of concentricity tolerance

Measurement takes place in distance *l/2* (Shaft end center), rectangular to the motor flange.

2.10.2 Concentricity and alignment

Centering diameter [mm]	Concentricity and alignment tolerance in [mm]	
	N (normal)	R (reduced)
40, 50, 95	0.08	0.04
130, 180	0.1	0.05

Tab. 2-9: Coaxiality and alignment tolerance related to the centering diameter in MS2N motors

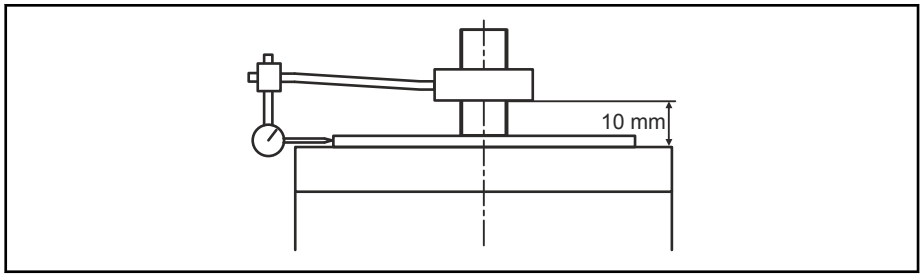


Fig. 2-11: Measuring system of coaxiality

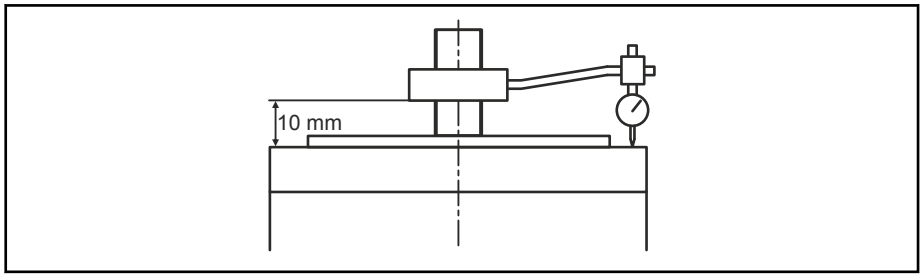


Fig. 2-12: Measuring system of alignment

The coaxiality and the alignment are measured in vertical motor position to exclude the influence of gravitational forces.

2.11 Vibration behavior

The oscillation behavior corresponds to oscillating quantity level A according to DIN EN 60034-14 up to the rated speed.

2.12 Bearing

The motors are equipped with a deep-groove ball bearing with high-temperature grease for prelubrication.

Bearing size MS2N

Type	Bearing size DE	Bearing size NDE	Floating bearing	Fixed bearing
MS2N03	6001	6000	DE	NDE
MS2N04	6003	6001	DE	NDE
MS2N05	6204	6303	DE	NDE
MS2N06	6206	6303	DE	NDE
MS2N07	6207	6205	DE	NDE
MS2N10	6308	6306	DE	NDE

Tab. 2-10: MS2N bearing size

2.12.1 Bearing service life

The bearing lifetime is an important criterion for the availability of motors. The operating conditions influence the bearing service life L_{10h} considerably.

The following boundary conditions apply to the bearing service life L_{10h}:

- Operation within the specified permissible loads (radial and axial force)
- Operation within the permissible ambient conditions (temperature range 0 … 40 °C, vibration, ...)
- Operation within the thermally permissible operating characteristic curve

The bearing lifetime also depends on the service life of the grease. A calculated grease service life was used for the mentioned specifications, taking into consideration the following boundary conditions.

- Horizontal installation
- Low vibration and impact loads
- No oscillating bearing movement < 180°
- Mean speed according to Table 2-11:

Type	Mean speed
MS2N03, -04, -05, -06	≤ 3500 1/min
MS2N07	≤ 3000 1/min
MS2N10	≤ 2000 1/min

Tab. 2-11: Mean speed - basis of calculated grease service life

The following standard values apply under the specified preconditions for the 60K and 100 K operation modes:

L_{10h} in case of operation after S1-60K

L_{10h} = 30.000 h, in case of utilization after S1-60K and max. load factor 95% during the runtime.

L_{10h} in case of operation after S1-100K

L_{10h} = 20.000 h, in case of utilization after S1-100K and max. load factor 90% during the runtime.

☞ When exceeding or not complying with these conditions, a reduced service life is to be expected.

2.12.2 Explanation of radial and axial force

During operation, both radial and axial forces act upon the motor shaft and the motor bearing. The permissible radial force F_R in distance x from the shaft shoulder and the mean speed is specified in the radial force diagrams.

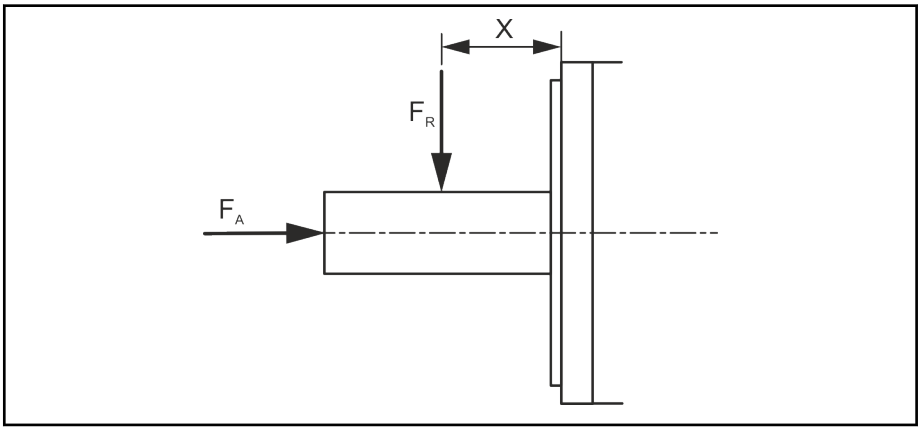


Fig. 2-13: Point of action of radial force F_R and axial force F_A

The axial force values are the minimum permissible axial forces F_A without limitations. A detailed dimensioning is only possible if more boundary conditions are known:

- Axial and radial force with force application point
- Installation position (horizontal, vertical with the shaft end pointing to the top or bottom)
- Mean speed

For radial force diagrams, refer to the technical data

MS2N03 chapter 4.2.3 "Radial and axial force" on page 51

MS2N05 chapter 4.3.3 "Radial and axial force" on page 65

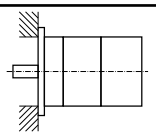
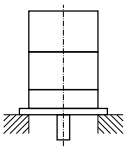
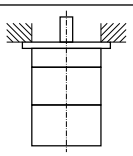
MS2N06 chapter 4.4.3 "Radial and axial force" on page 83

MS2N07 chapter 4.5.5 "Radial and axial force" on page 114
MS2N10 chapter 4.6.6 "Radial and axial force" on page 151

2.13 Frame size, installation type

The motors can be installed horizontally and vertically with the shaft end pointing to the top or bottom. The installation variants correspond to IM-code according to EN 60034-7 for frame size and installation type.

Code I / Code II (EN 60034-7)

IM B5 / IM 3001		Flange attachment on the drive side of the flange
IM V1 / IM 3011		Flange attachment on the drive side of the flange, drive side facing down
IM V3 / IM 3031		Flange attachment on the drive side of the flange, drive side facing up

Avoid liquid at the drive shaft or the shaft sealing ring in case of vertical installation according to IM V3. For further information regarding the protection class, see chapter 2.7 "Degree of protection" on page 17.

2.14 Coating

1K-standard varnish, water-based, RAL 9005 black

An additional varnish with a coat thickness of max. 40 µm is permitted.

Protect all safety notes, type plates and open connectors with a painting protection when painting additionally.

2.15 Noise emission

The typical sound pressure level Lp(A) is specified for the speed range 0 rpm up to the rated speed, see chapter 1.1 "Basic features" on page 7. The installation situation affects the noise emission.

MS2N03: 75 dB(A) +3 dB(A)

MS2N05: 75 dB(A) +3 dB(A)

MS2N06: 75 dB(A) +3 dB(A)

MS2N07: 75 dB(A) +3 dB(A)

MS2N10: 75 dB(A) +3 dB(A)

3 Type code

Not all combination possibilities of individual type code characteristics is also available. Available combinations are listed under "Available options". Please note the following identification: "●" available; "-" not available

Before ordering, please check the availability of the separate options with your Bosch Rexroth Service representative.

Type code

3.1 MS2N03 type code

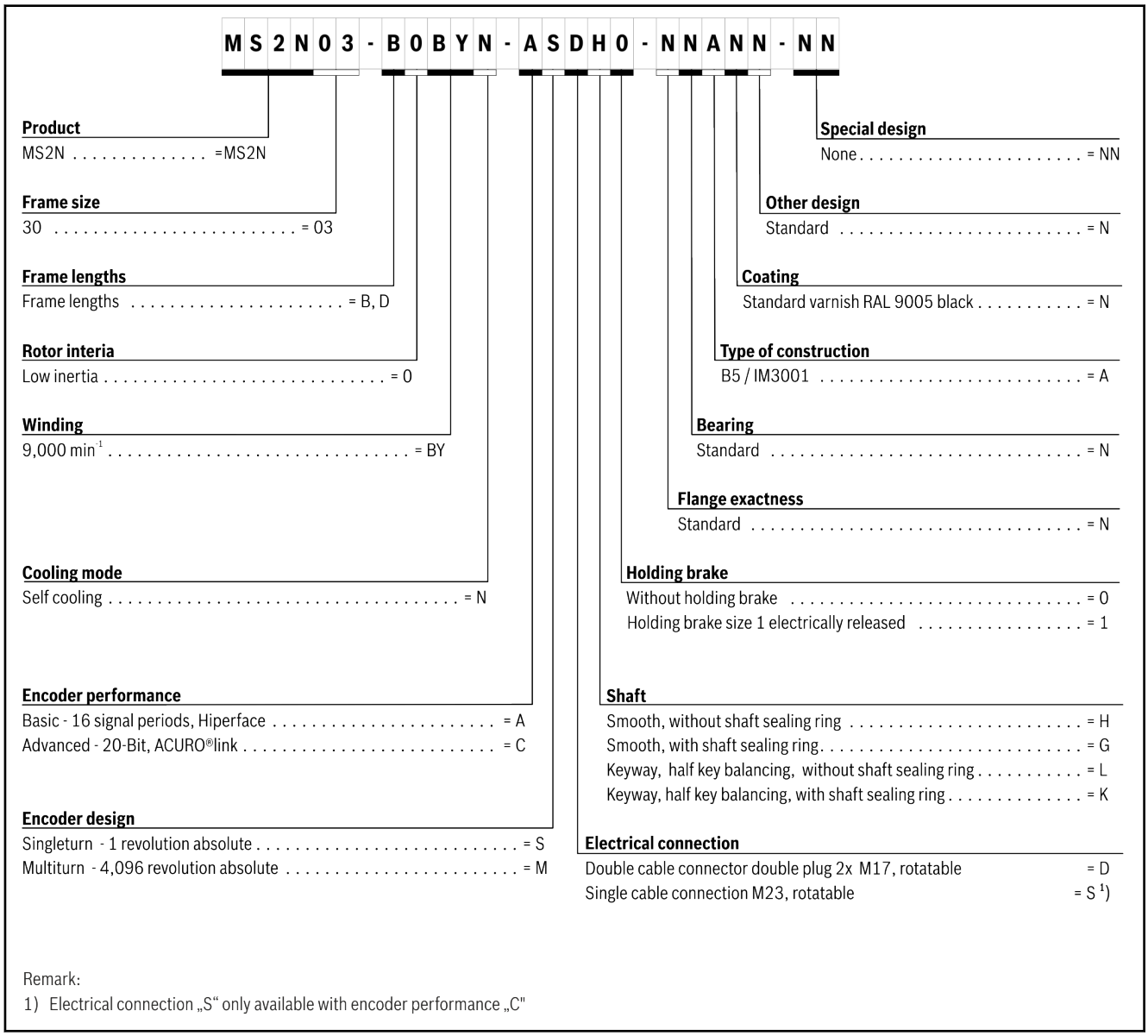
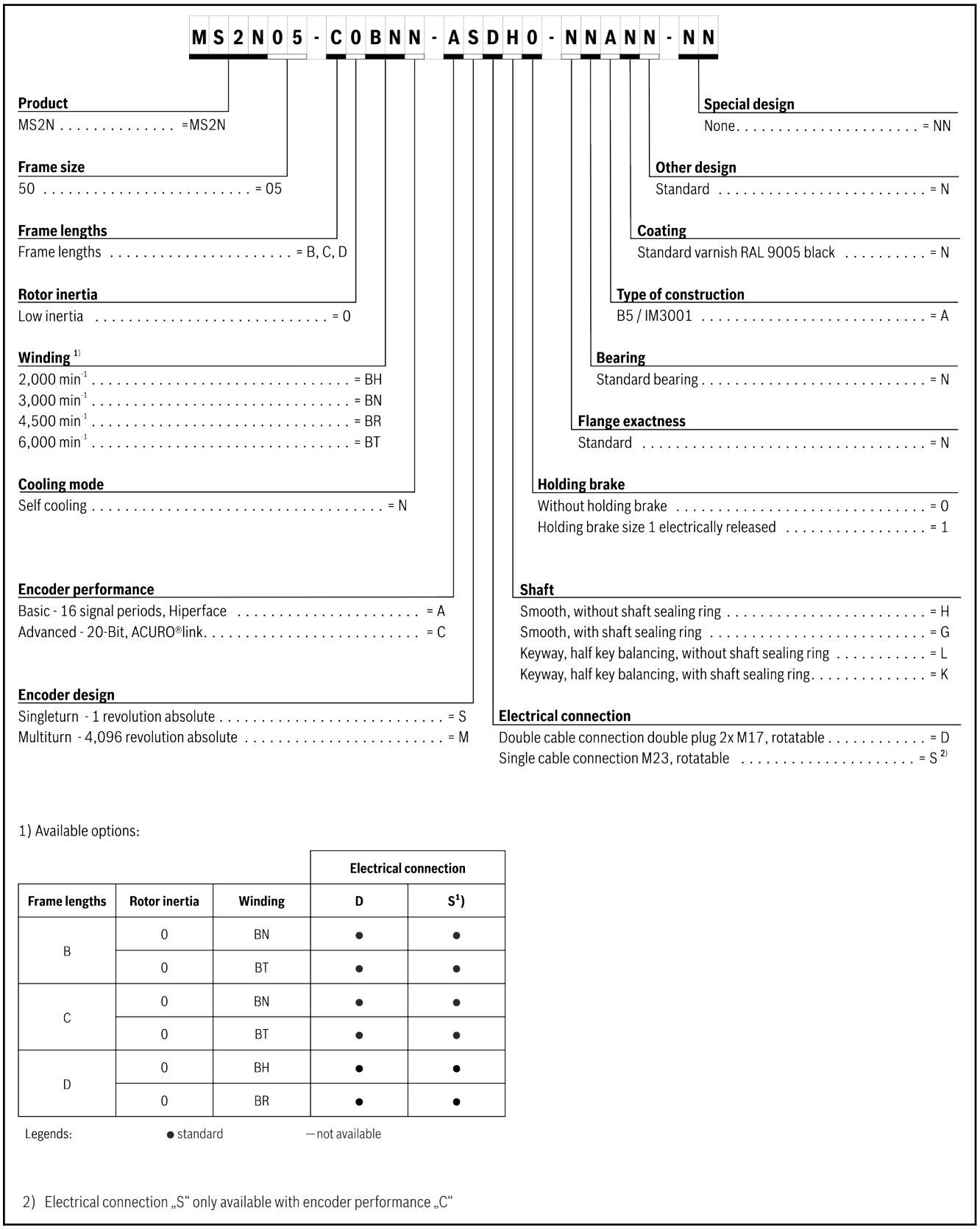


Fig. 3-1: MS2N03 type code

3.2 MS2N05 type code



1) Available options:

			Electrical connection	
Frame lengths	**Rotor inertia**	**Winding**	**D**	**S[1])**
B	0	BN	●	●
	0	BT	●	●
C	0	BN	●	●
	0	BT	●	●
D	0	BH	●	●
	0	BR	●	●

Legends: ● standard — not available

2) Electrical connection „S“ only available with encoder performance „C“

Fig. 3-2: MS2N05 type code

Type code

3.3 MS2N06 type code

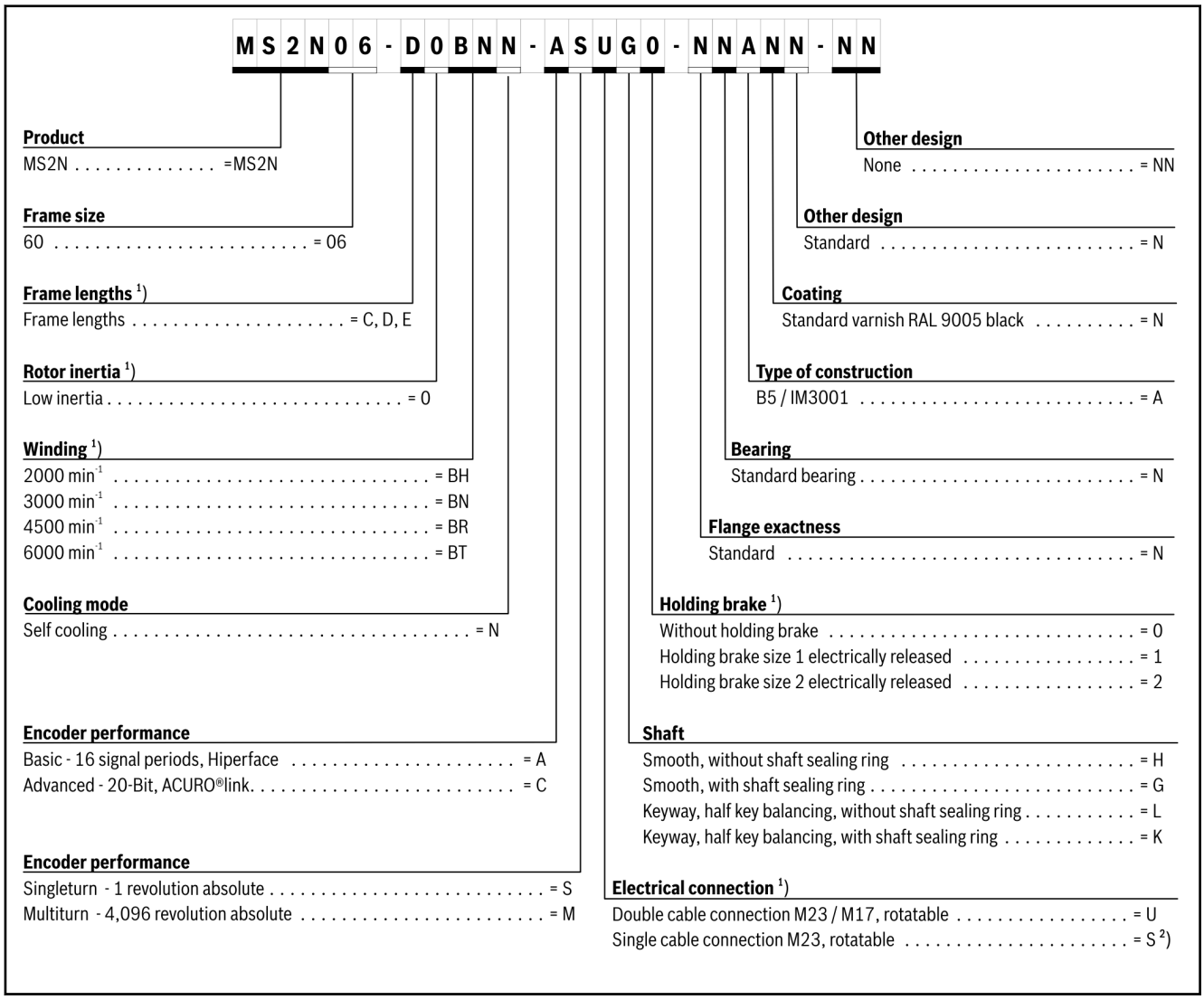


Fig. 3-3: MS2N06 (1) type code

1) Available options:

Cooling mode N - Self cooling

			Electrical connection		Holding brake		
Frame length	**Rotor inertia**	**Winding**	**U**	**S²)**	**0**	**1**	**2**
C	0	BN	●	●	●	●	–
	0	BT	●	●	●	●	–
D	0	BN	●	●	●	–	●
	0	BR	●	●	●	–	●
E	0	BH	●	●	●	–	●
	0	BR	●	●	●	–	●
B	1	BN	●	●	●	●	–
D	1	BN	●	●	●	–	●

Legend: ● available – not available

2) Electrical connection „S“ only available with encoder performance „C“

Fig. 3-4: MS2N06 (1) type code

Type code

3.4 MS2N07 type code

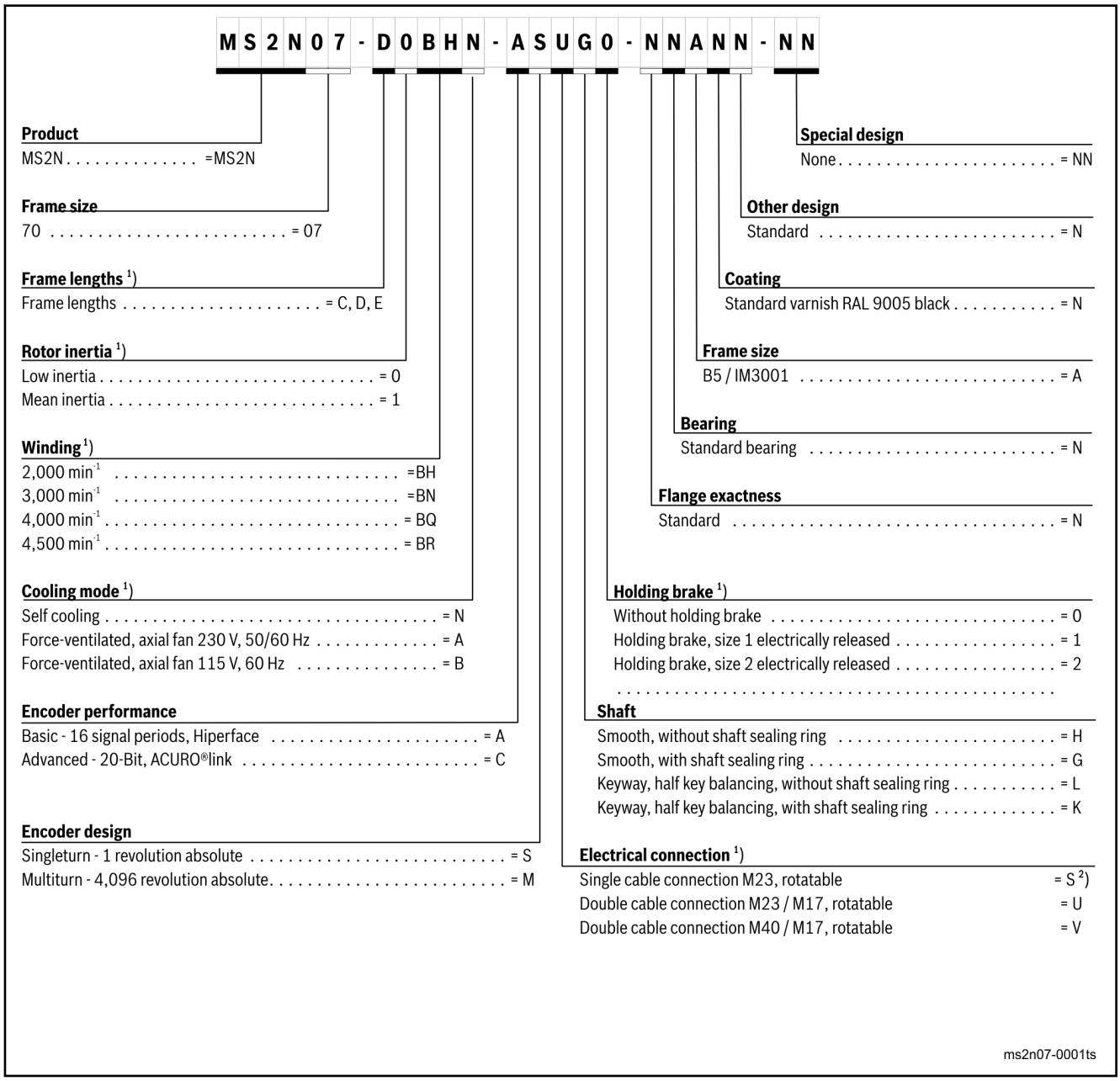


Fig. 3-5: MS2N07 (1) type code

1) Available options:

Cooling mode N - self cooling

			Electrical connection			Holding brake		
Frame lengths	**Rotor interia**	**Winding**	**S²)**	**U**	**V**	**0**	**1**	**2**
C	0	BQ	●	●	–	●	●	–
D	0	BH	●	●	–	●	–	●
	0	BR	–	–	●	●	–	●
E	0	BH	●	●	–	●	–	●
	0	BN	–	–	●	●	–	●
	0	BQ	–	–	●	●	–	●
C	1	BN	●	●	–	●	●	–
D	1	BH	●	●	–	●	–	●
	1	BN	●	●	–	●	–	●
E	1	BN	–	–	●	●	–	●

Legend: ● available – not available

Cooling mode A or B - force-ventilated

			Electrical connection	Holding brake		
Frame lengths	**Rotor interia**	**Winding**	**V**	**0**	**1**	**2**
E	0	BH	●	●	–	●
	0	BN	●	●	–	●
	0	BQ	●	●	–	●
D	1	BH	●	●	–	●
	1	BN	●	●	–	●

Legend: ● available – not available

2) Electrical connection „S“ only available with encoder performace „C“

Fig. 3-6: MS2N07 (2) type code

Type code

3.5 MS2N10 type code

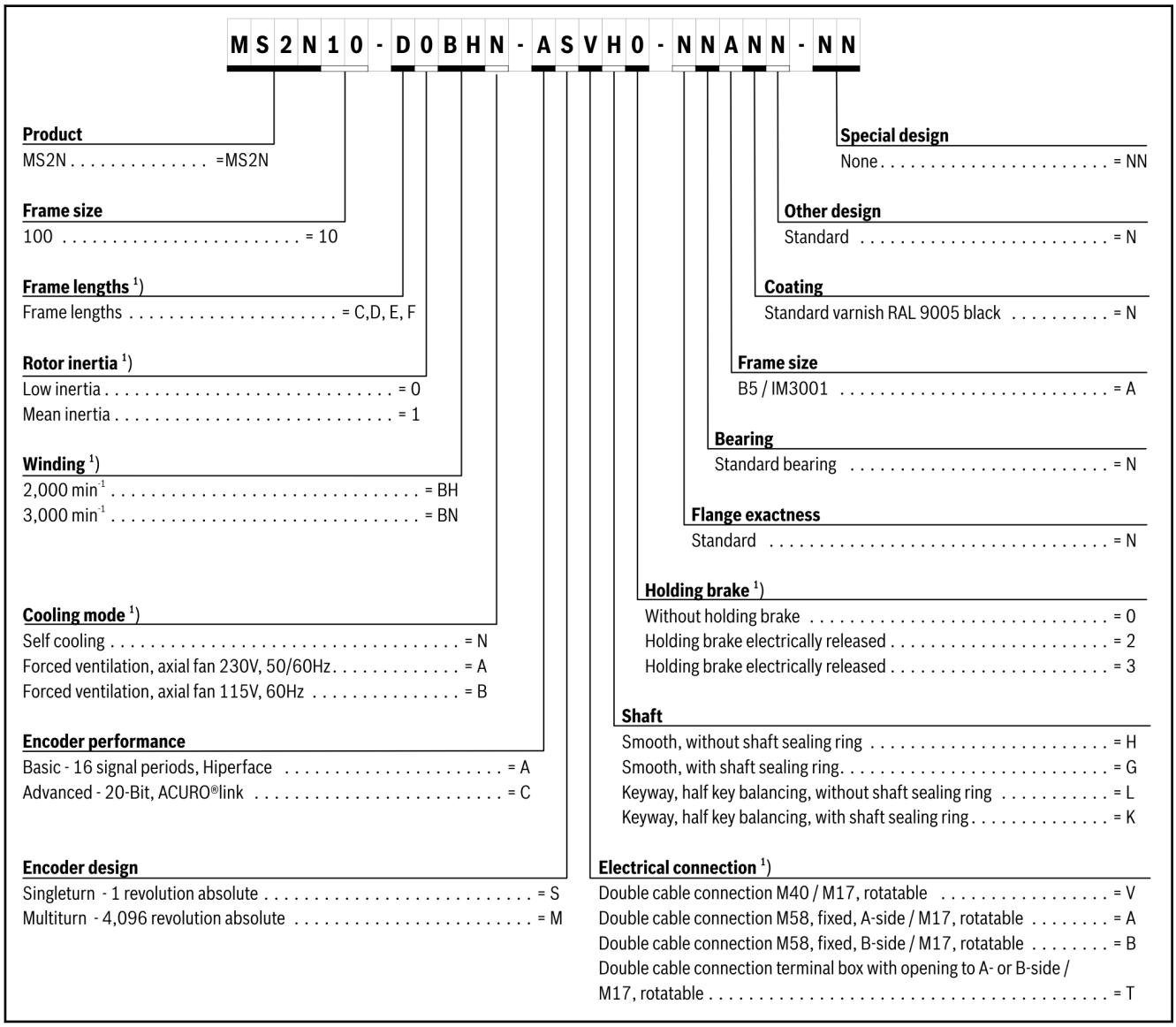


Fig. 3-7: MS2N10 (1) type code

1) Available options:

Cooling mode N - self cooling

			Electrical connection		Holding brake			
Frame lengths	**Rotor inertia**	**Winding**	**V**	**A / B**	**0**	**1**	**2**	**3**
C	0	BH	●	–	●	–	●	–
		BN	●	–	●	–	●	–
D	0	BH	●	–	●	–	●	–
	0	BN	●	–	●	–	●	–
E	0	BN	–	●	●	–	–	●
	1	BN	–	●	●	–	–	●
F	0	BH	–	●	●	–	–	●

Legend: ● available – not available

Cooling mode A or B - forced ventilation

			Electrical connection			Holding brake		
Frame lengths	**Rotor inertia**	**Winding**	**V**	**A / B**	**T**	**0**	**2**	**3**
C	0	BN	●	–	●	●	●	–
D	0	BH	●	–	●	●	●	–
		BN	–	●	●	●	●	–
	1	BN	–	●	–	●	●	–
E	0	BH	–	●	●	●	–	●
		BN	–	●	●	●	–	●
	1	BN	–	●	–	●	–	●
F	0	BH	–	●	●	●	–	●
	1	BH	–	●	–	●	–	●

Legende: ● available – not available

Fig. 3-8: MS2N10 (2) type code

4 Technical data

4.1 Operating areas and characteristic curves

4.1.1 Operating area

The permissible operating ranges for MS2N motors are defined for ambient temperatures of 0 … 40 °C and installation altitudes up to 1000 m above MSL. The operating areas are characterized by characteristic curve fields according to Fig.4-1.

The individual characteristic curves are described in the following figure.

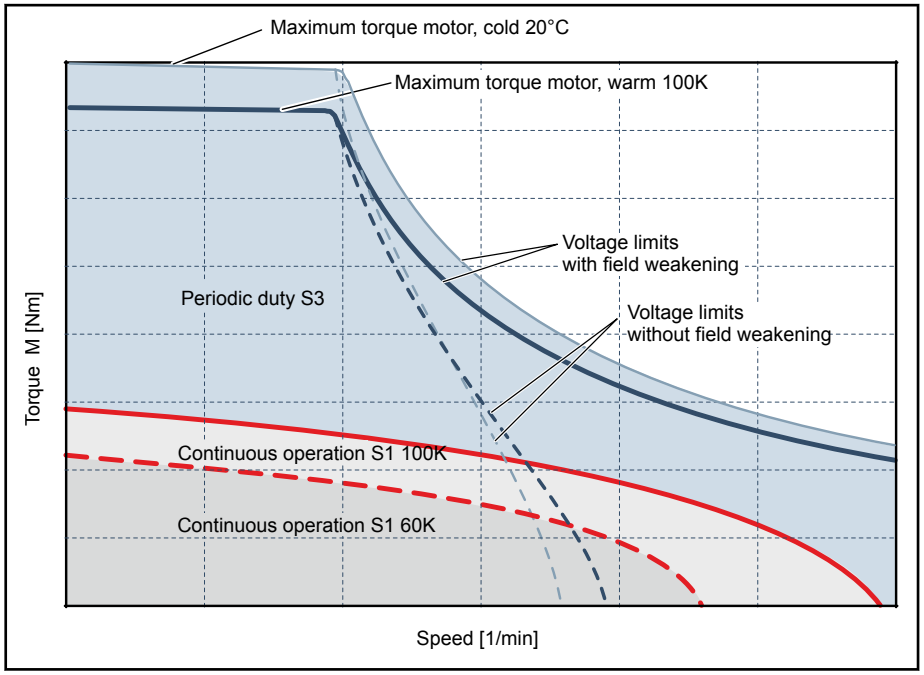


Fig. 4-1: Operating area of MS2N motors

The thermal motor installation determines the degree of power loss, discharged via the flange. The rated data for 100K and 60K specified in the technical data apply to the following installation conditions:

Type	100K data (not thermally insulated,)	60K data (thermally insulated)[1]
	Steel plate L x W x H [mm]	Aluminum plate L x W x H [mm]
MS2N03, -04	100 x 220 x 40	140 × 210 × 10
MS2N05, -06	350 x 350 x 30	300 × 240 × 15
MS2N07, -10	450 x 370 x 30	300 × 270 × 15

1) insulated with laminated paper FR-2, material thickness 2 mm

Tab. 4-1: Installation conditions for utilization according to the specified characteristic curves

☞ In case of ambient temperatures above 40 °C and installation altitudes of 1000 m above MSL, the high performance data have to be reduced (see chapter 6.2 "Ambient temperature und installation altitude in operation" on page 163).

Technical data

Continuous operation S1

The S1-100K characteristic curve represents the permissible limits of motor winding during continuous operation. For a lower thermal utilization, e.g.

- in case of unfavorable harnessing of heat of the flange mounting
- in order to limit the housing temperature to 100 °C
- in order to avoid unfavorable heating of the machine by the motor
- in order to increase the motor (e.g. motor/encoder bearing) reliability

Bosch Rexroth recommends to select the S1-60K characteristic curve. The characteristic curves are specified for S1-100K and S1-60K. The motor utilization is predominantly influenced by the installation situation.

NOTICE **Property damage due to thermal overload**

Motors in continuous operation application must not be operated above the specified characteristic curve limits S1-60K or S1-100K.

Periodic intermitted operation S3

During periodic intermittent operation, the motor can tolerate a higher load depending on the ON time.

Operation in field weakening

Field weakening operation of MS2N motors is possible with IndraDrive controllers.

Motor torque during operation at standstill

In applications such as joining or press machines, where motors have to produce torque continuously, asymmetrical currents will flow in the motor windings. This can result in motor overload during continuous operation. The values specified in the data sheet have to be reduced according to the following table. The continuous torque available at standstill M_0* can be calculated by multiplying the data sheet values with the subsequent reduction factors F_0.

$M_0* = F_0 \cdot M_0$

Type	Cooling type	Frame lengths				
		B	C	D	E	F
MS2N03, -04, -05	Self-cooling 60K	0.95				
	Self-cooling 100K	0.85				
MS2N06	Self-cooling 60K	0.88	0.95			
	Self-cooling 100K	0.85	0.85			
MS2N07	Self-cooling 60K	0.88	0.95			
	Self-cooling 100K	0.85	0.85			
	Forced ventilation		0.80			
MS2N10	Self-cooling 60K	0.82	0.88	0.95		
	Self-cooling 100K	0.80	0.82	0.85		
	Forced ventilation		0.80			

Tab. 4-2: Reduction factor F_0

4.1.2 Characteristic curves for DC bus voltage

The technical data sheets contain characteristic curves for two typical DC bus voltages. Depending on the DC bus voltage, the characteristic curves are offset.

S1 continuous operation curves depend on the DC bus voltage. The rated data on the type plate are defined with U_{ZK2} for the worst case scenario (cf. chapter 4.1.3 "Rated data" on page 43).

The characteristic curves apply to:

Controller	Line voltage	DC bus
IndraDrive	3 × 400 V ($U_{ZK\,1}$)	uncontrolled
	3 × 400 ... 480 V ($U_{ZK\,2}$)	controlled

Tab. 4-3: DC bus voltages

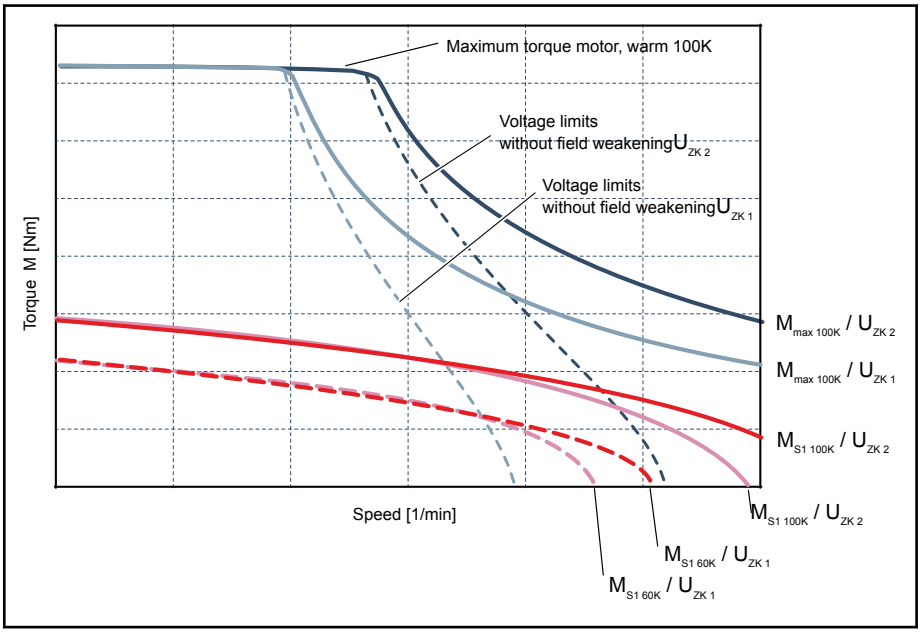


Fig. 4-2: Characteristic curve specifications

The specified characteristic curves are typical standard values. The actual performance data of a drive axis are subject to manufacturing-related tolerances.

4.1.3 Rated data

Rated data are defined for the following conditions:

- Rated speed is determined by the DC bus voltage $U_{ZK\ 1}$. The voltage limit or the point of optimal performance are relevant variables to specify the rated speed.
- Rated data are applied to the rated speed and to the continuous operation characteristics at $U_{ZK\ 2}$

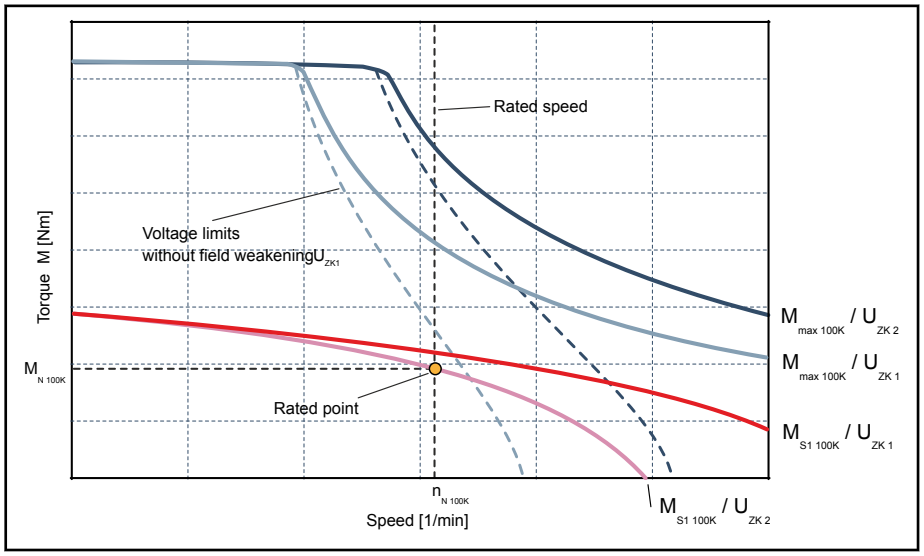


Fig. 4-3: Rated point

In case of motors with high speeds, the rated point of the characteristic voltage limit curve $U_{ZK\ 1}$ can be displayed in the direction of the point of origin.

The rated data are specified on type place of the motors as well as in the technical data sheet.

Technical data

4.1.4 Temperature influence and tolerances

The torque-speed characteristic curves are specified for cold motors ($M_{max\ 20°C}$) as well as for motors at rated-load operating temperature ($M_{max\ 100K}$). Following figure shows the influence of motor temperature and material variation caused by manufacturing tolerances.

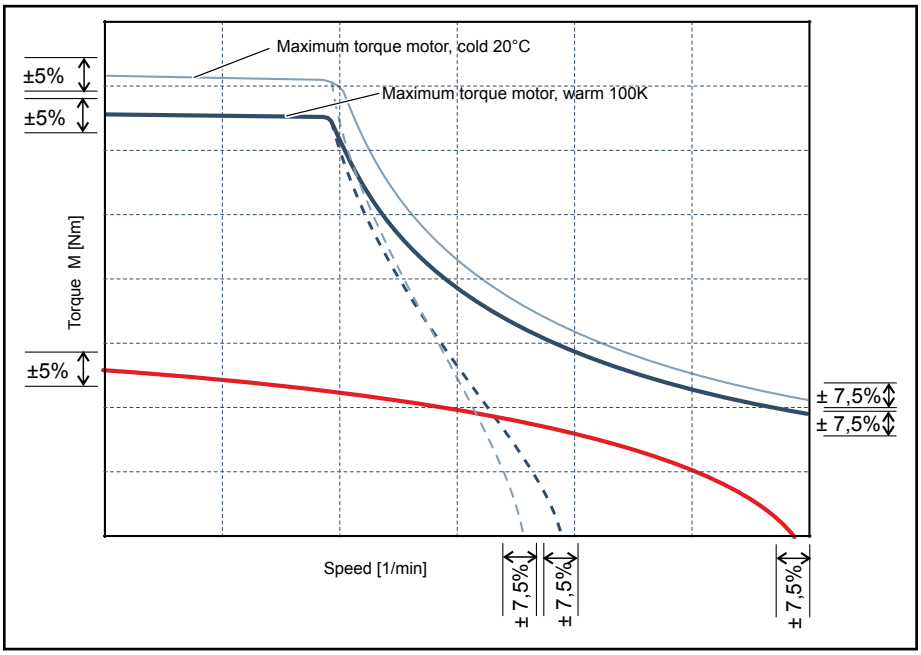


Fig. 4-4: Temperature influence and tolerances

The specified tolerances apply to MS2N motors with controlled and uncontrolled infeed.

4.1.5 Characteristic curve in gearbox mounting

Due to the self-heating of the gearboxes depending on the speed, the cooling effect in the flange mounting area is limited. A speed-dependent reduction of the specified performance data is required to avoid thermally overload of motors when using gearboxes.

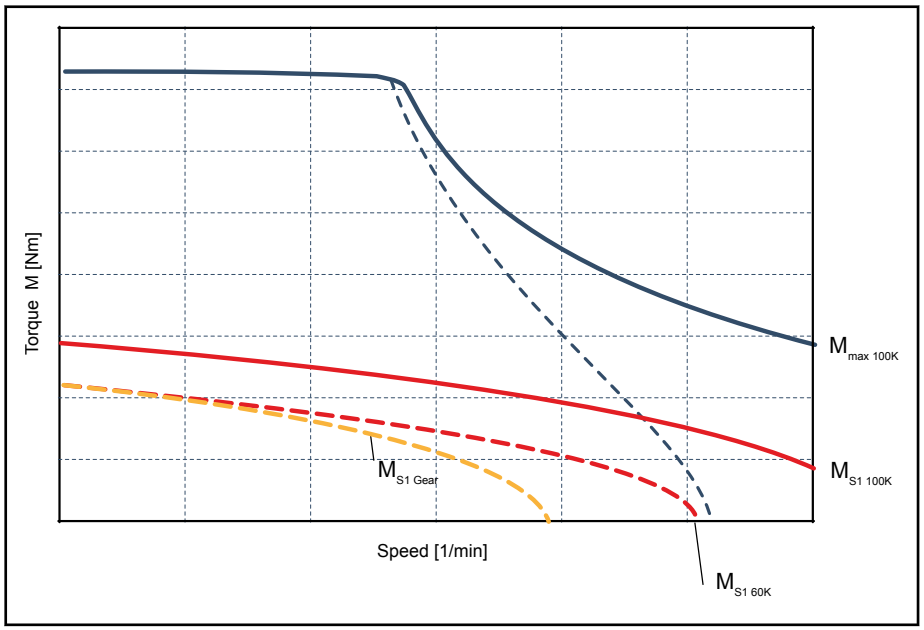


Fig. 4-5: S1 characteristic curve in gearbox

☞ The standard value of reduction of the **S1 60K characteristic curve** in gearbox mounting is **20 - 30 %** . In case of thermally critical applications (e.g. flange temperatures > 80 °C), Bosch Rexroth recommends to check the temperature load at the gearbox and the motor.

4.1.6 IndraSize

By using the IndraSize software, drive controllers, motors and mechanic gearboxes can be easily sized. The engineering tool covers the entire product family of IndraDrives and IndraDyn motors. Calculate the characteristic curves for your application by using the sizing tool IndraSize: www.boschrexroth.com/.../IndraSize

Technical data

4.2 MS2N03

4.2.1 Technical data of self-cooling

MS2N03-B0BYN

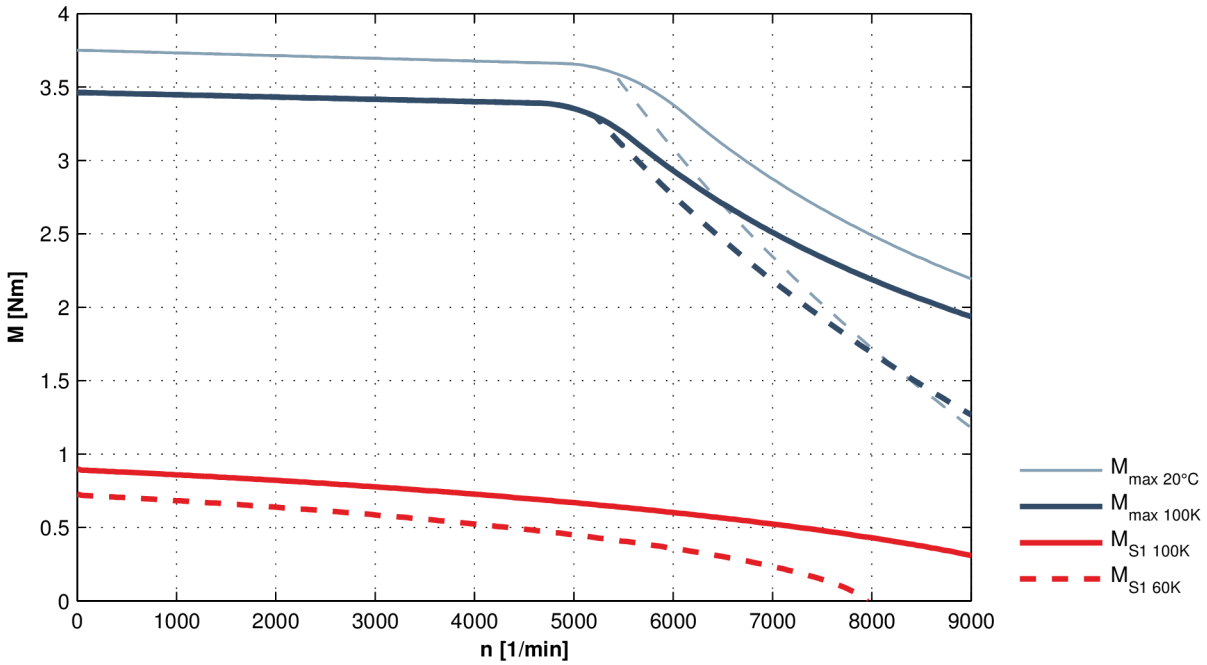
Designation	Symbol	Unit	Tolerance	MS2N03-B0BYN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	0.73
Standstill current (60 K)	$I_{0\ 60K}$	A		1.31
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	0.9
Standstill current (100 K)	$I_{0\ 100K}$	A		1.61
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.000023
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.000030
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		6470
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	0.54
Rated current (100K)	$I_{N\ 100K}$	A		1.08
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	0.37
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	3.75
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	3.46
Maximum current	$I_{max(eff)}$	A		7.25
Max. speed (electrical)	$n_{max\ el}$	1/rpm		9000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		9000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	0.61
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	36.9
Winding resistance at 20 °C	R_{12}	Ohm		14.308
Winding inductivity	L_{12_min}	mH		20.22
Discharge capacity of the component	C_{dis}	nF		0.83
Thermal time constant of winding	T_{th_W}	s		12.1
Thermal time constant of motor	T_{th_M}	min		11.3
Mass without brake	m_{mot}	kg		1.4
Mass with brake	m_{mot}	kg		1.8
Holding brake data				Size 1
Holding torque	M_4	Nm		1.8
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.46
Maximum connection time	t_1	ms		8
Maximum disconnection time	t_2	ms		25

Latest amendment: 2016-06-09

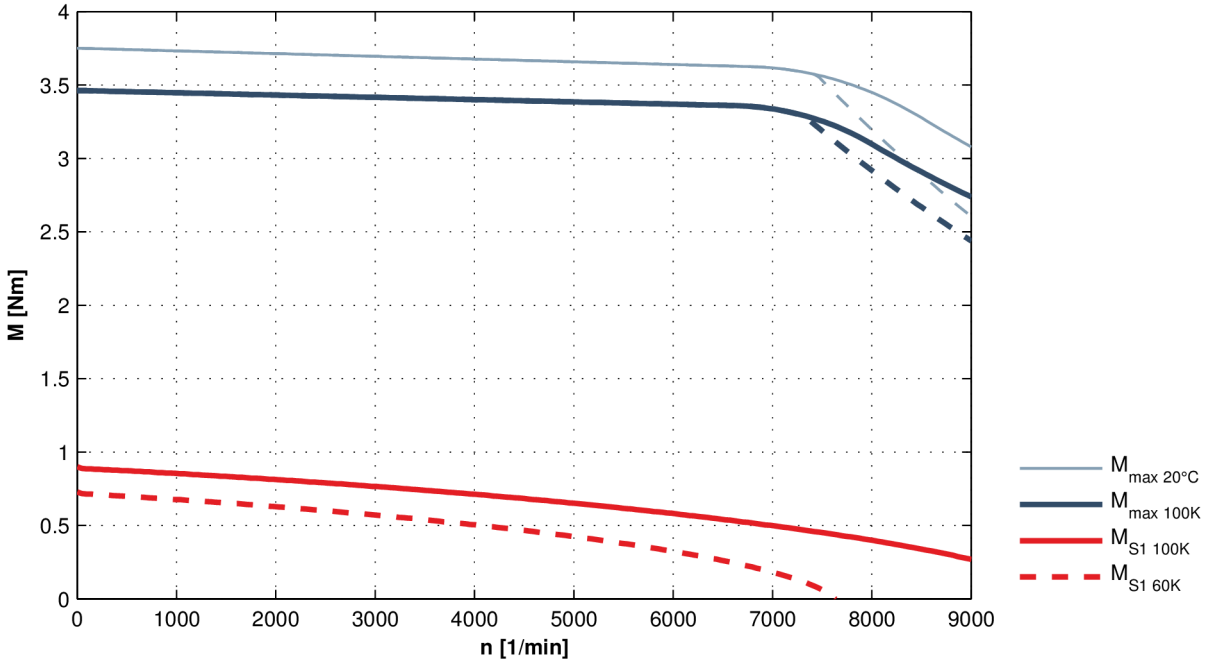
Tab. 4-4: Technical data MS2N03-B0BYN

Speed-torque characteristic curve MS2N03-B0BYN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-5: Speed-torque characteristic curve MS2N03-B0BYN

Technical data

MS2N03-D0BYN

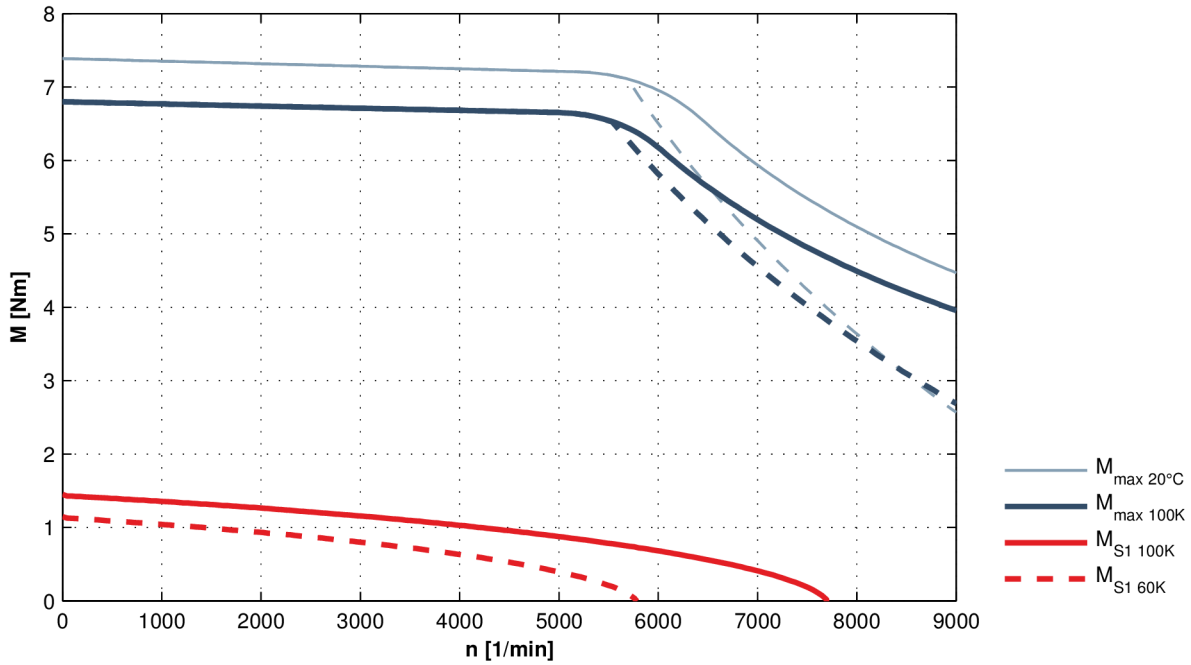
Designation	Symbol	Unit	Tolerance	MS2N03-D0BYN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	1.15
Standstill current (60 K)	$I_{0\ 60K}$	A		2.07
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	1.45
Standstill current (100 K)	$I_{0\ 100K}$	A		2.6
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.000037
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.000044
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		5700
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	0.68
Rated current (100K)	$I_{N\ 100K}$	A		1.39
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	0.4
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	7.4
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	6.8
Maximum current	$I_{max(eff)}$	A		14.5
Max. speed (electrical)	$n_{max\ el}$	1/rpm		9000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		9000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	0.6
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	36.2
Winding resistance at 20 °C	R_{12}	Ohm		6.294
Winding inductivity	L_{12_min}	mH		9.56
Discharge capacity of the component	C_{dis}	nF		1.6
Thermal time constant of winding	T_{th_W}	s		14.5
Thermal time constant of motor	T_{th_M}	min		12.1
Mass without brake	m_{mot}	kg		2.0
Mass with brake	m_{mot}	kg		2.4
Holding brake data				Size 1
Holding torque	M_4	Nm		1.8
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.46
Maximum connection time	t_1	ms		8
Maximum disconnection time	t_2	ms		25

Latest amendment: 2016-06-09

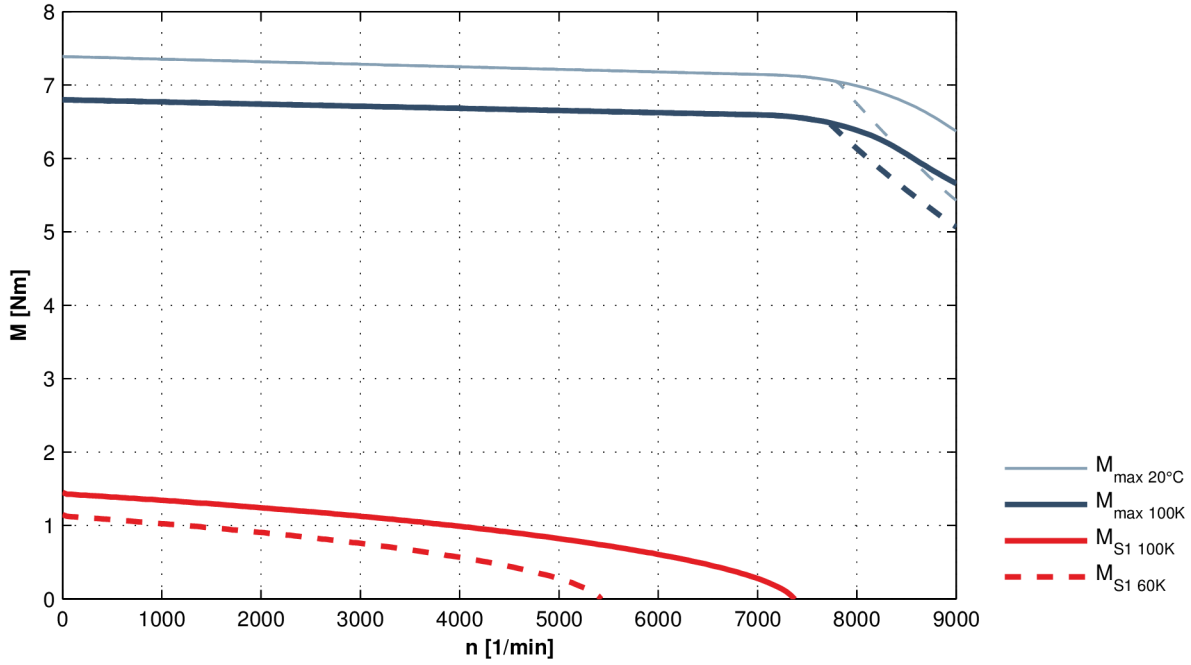
Tab. 4-6: Technical data MS2N03-D0BYN

Speed-torque characteristic curve MS2N03-D0BYN

IndraDrive, uncontrolled feed 3 × AC 400 V



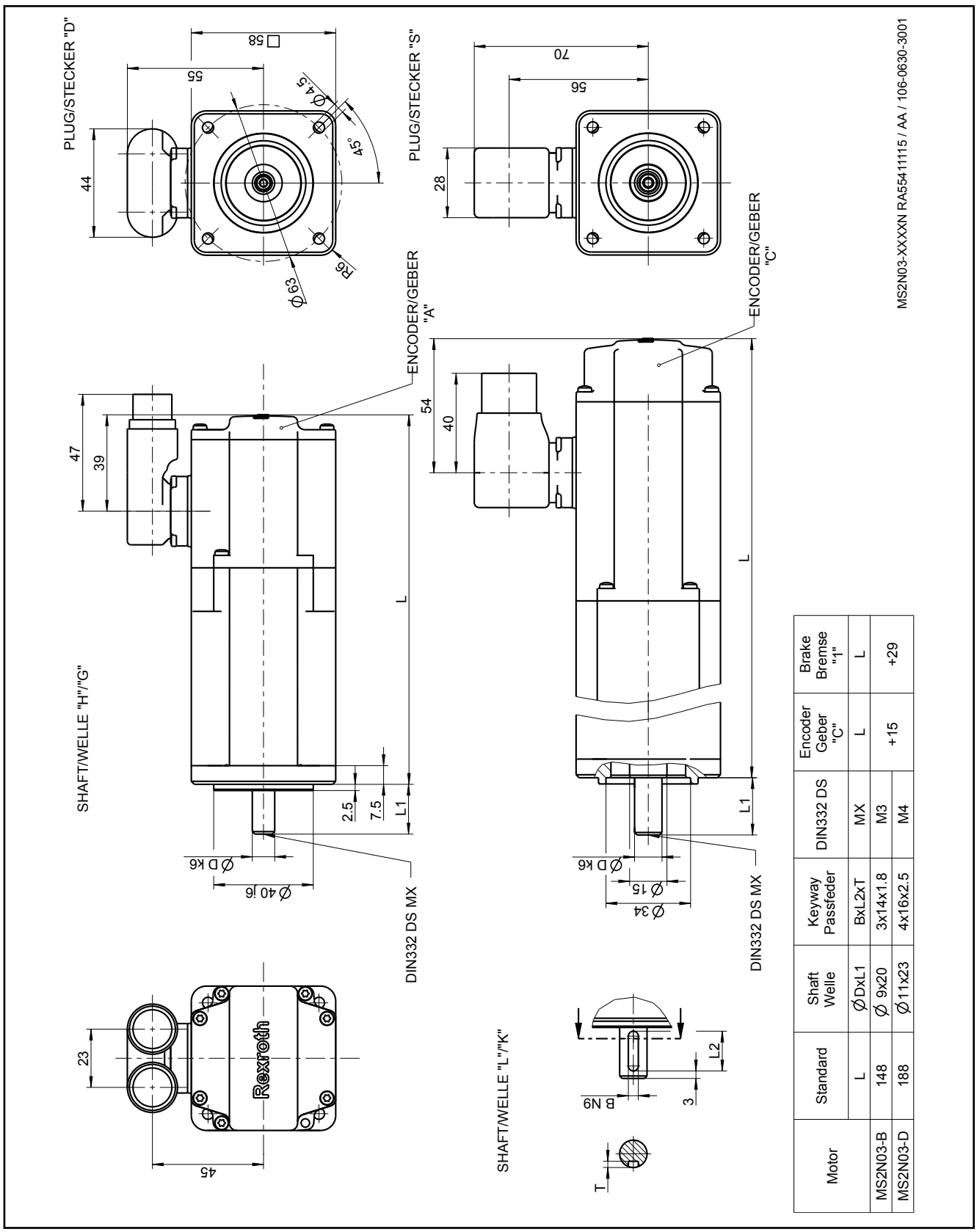
IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-7: Speed-torque characteristic curve MS2N03-D0BYN

Technical data

4.2.2 Self-cooling dimension



Motor	Standard	Shaft Welle	Keyway Passfeder	DIN332 DS	Encoder Geber "C"	Brake Bremse "1"
	L	ØDxL1	BxL2xT	MX	L	L
MS2N03-B	148	Ø 9x20	3x14x1.8	M3	+15	+29
MS2N03-D	188	Ø11x23	4x16x2.5	M4		

Fig. 4-6: MS2N03-xxxxD/S

4.2.3 Radial and axial force

Radial force

The permissible radial force F_R is specified in distance x from the shaft shoulder, depending on the mean speed in the following diagram.

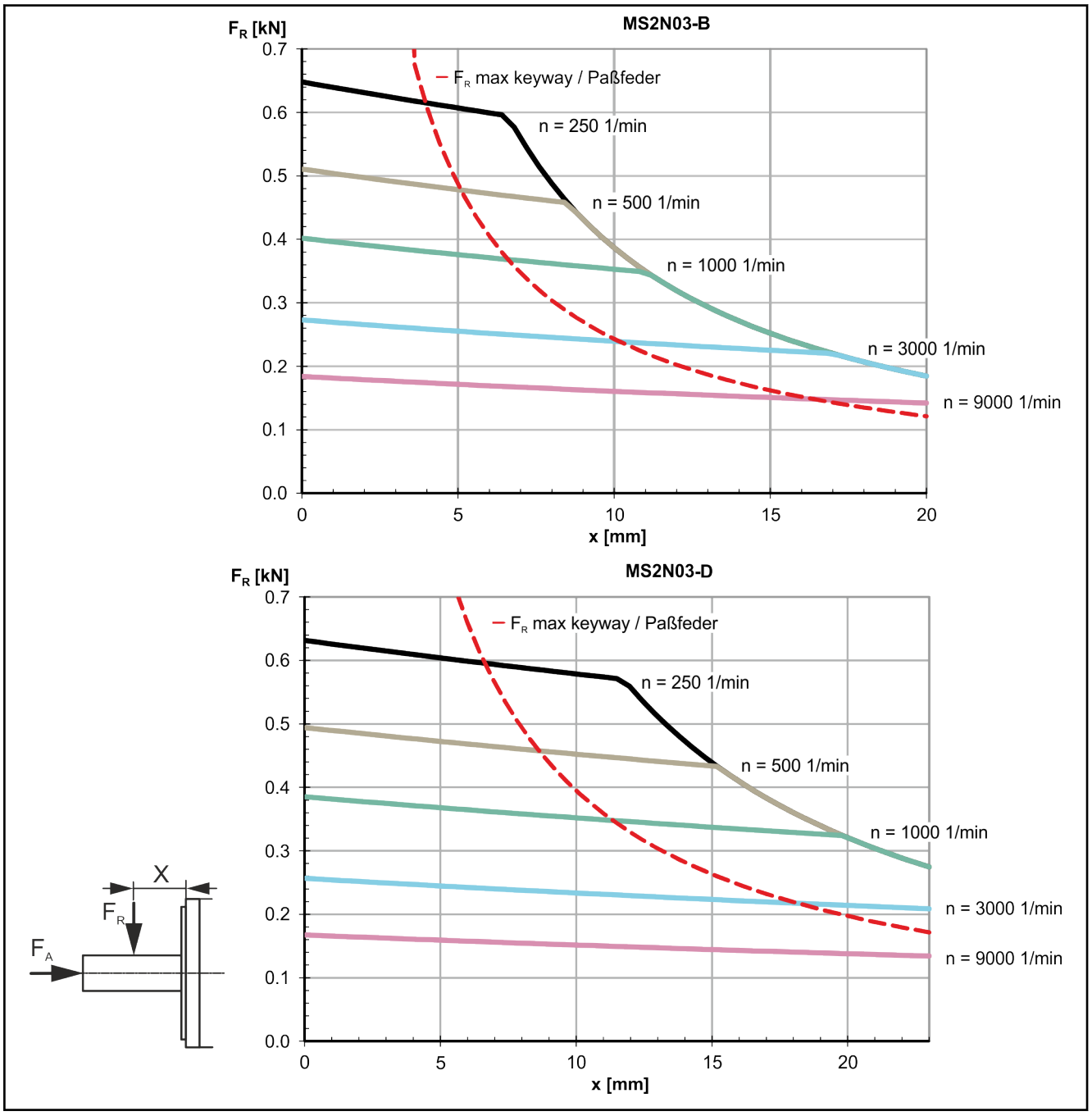


Fig. 4-7: MS2N03: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30000 h

Axial force

Axial forces F_A only allowed after a detailed dimensioning by your distribution partner at Bosch Rexroth. For evaluation purposes, please specify the following information:

- Axial and radial force with force application point
- Installation position (horizontal/vertical with the shaft end pointing to the top or bottom)

Technical data

- Mean speed

4.3 MS2N05

4.3.1 Technical data of self-cooling

MS2N05-B0BNN

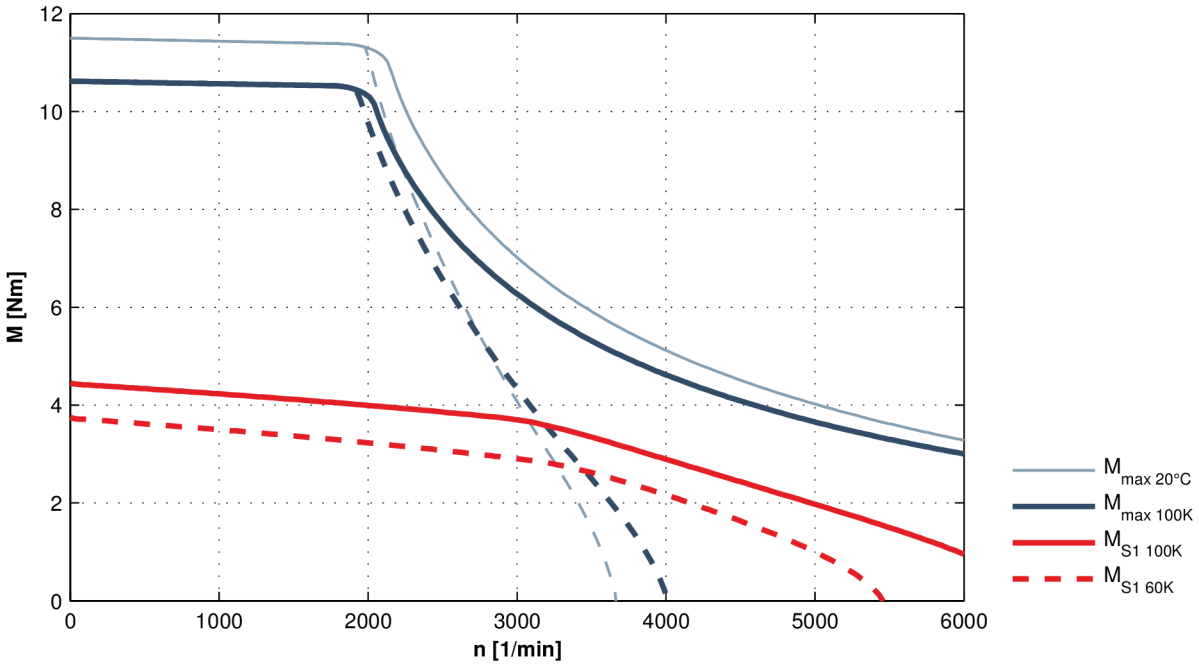
Designation	Symbol	Unit	Tolerance	MS2N05-B0BNN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	3.75
Standstill current (60 K)	$I_{0\ 60K}$	A		2.27
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	4.45
Standstill current (100 K)	$I_{0\ 100K}$	A		2.72
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00017
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00028
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2950
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	3.68
Rated current (100K)	$I_{N\ 100K}$	A		2.32
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	1.14
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	11.5
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	10.6
Maximum current	$I_{max(eff)}$	A		8.4
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.78
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	108.4
Winding resistance at 20 °C	R_{12}	Ohm		10.8
Winding inductivity	L_{12_min}	mH		56.4
Discharge capacity of the component	C_{dis}	nF		1.3
Thermal time constant of winding	T_{th_W}	s		21.2
Thermal time constant of motor	T_{th_M}	min		12.7
Mass without brake	m_{mot}	kg		4.0
Mass with brake	m_{mot}	kg		5.1
Holding brake data				
Holding torque	M_4	Nm		10
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.73
Maximum connection time	t_1	ms		30
Maximum disconnection time	t_2	ms		80

Latest amendment: 2016-06-09

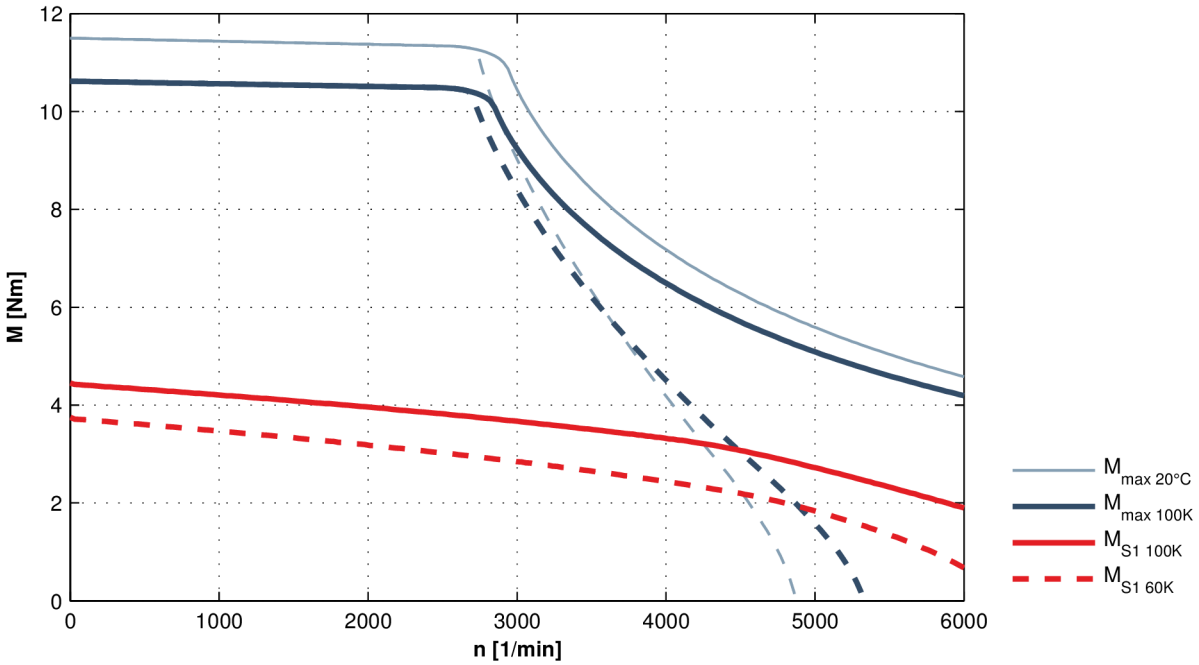
Tab. 4-8: Technical data MS2N05-B0BNN

Speed-torque characteristic curve MS2N05-B0BNN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-9: Speed-torque characteristic curve MS2N05-B0BNN

Technical data

MS2N05-B0BTN

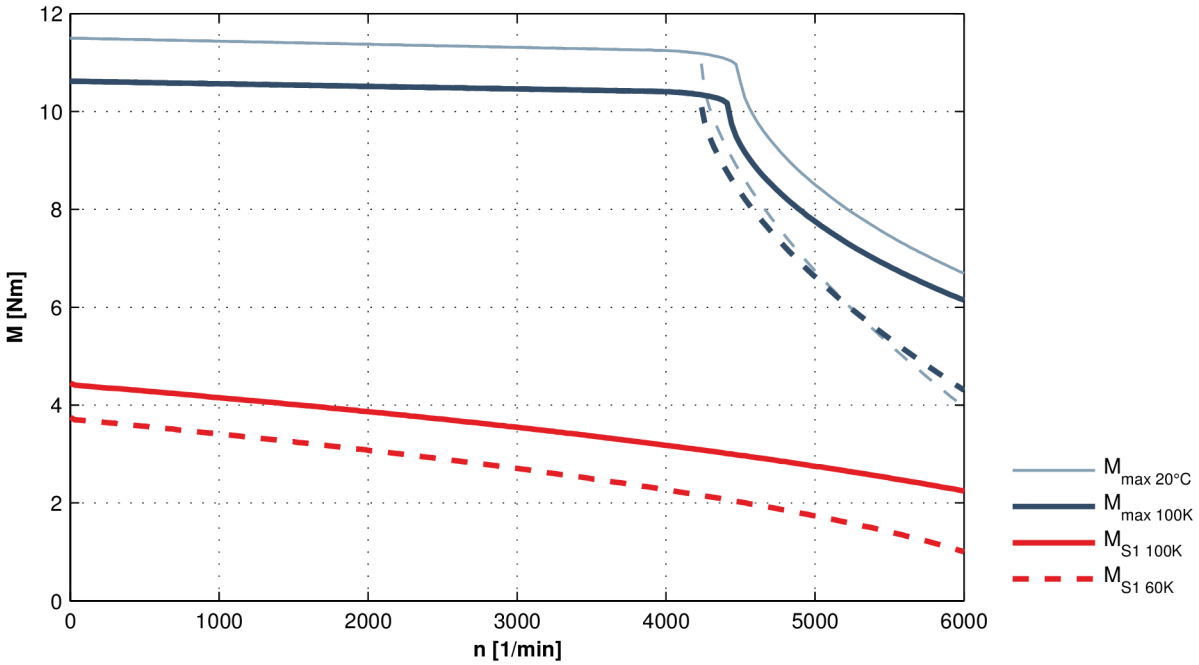
Designation	Symbol	Unit	Tolerance	MS2N05-B0BTN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	3.75
Standstill current (60 K)	$I_{0\ 60K}$	A		4.55
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	4.45
Standstill current (100 K)	$I_{0\ 100K}$	A		5.45
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00017
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00028
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		5410
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	2.34
Rated current (100K)	$I_{N\ 100K}$	A		3.09
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	1.33
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	11.5
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	10.6
Maximum current	$I_{max(eff)}$	A		16.8
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	0.89
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	54.2
Winding resistance at 20 °C	R_{12}	Ohm		2.704
Winding inductivity	L_{12_min}	mH		14.09
Discharge capacity of the component	C_{dis}	nF		1.21
Thermal time constant of winding	T_{th_W}	s		21.2
Thermal time constant of motor	T_{th_M}	min		12.7
Mass without brake	m_{mot}	kg		4.0
Mass with brake	m_{mot}	kg		5.1
Holding brake data				Size 1
Holding torque	M_4	Nm		10
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.73
Maximum connection time	t_1	ms		30
Maximum disconnection time	t_2	ms		80

Latest amendment: 2016-06-09

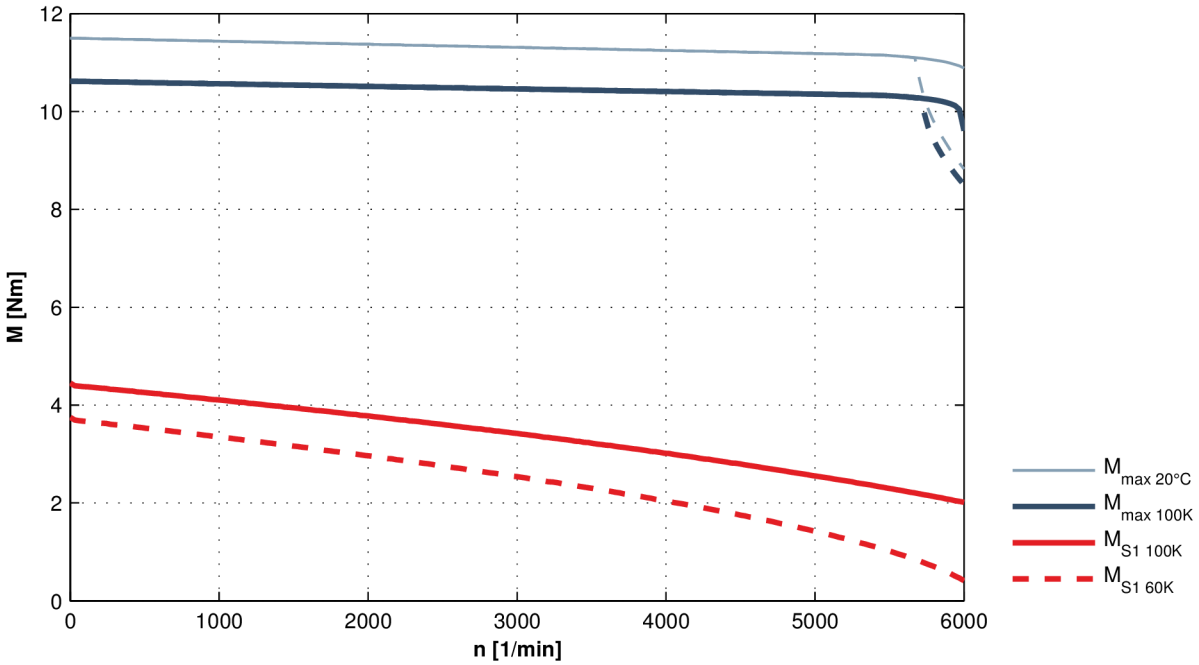
Tab. 4-10: Technical data MS2N05-B0BTN

Speed-torque characteristic curve MS2N05-B0BTN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-11: Speed-torque characteristic curve MS2N05-B0BTN

Technical data

MS2N05-C0BNN

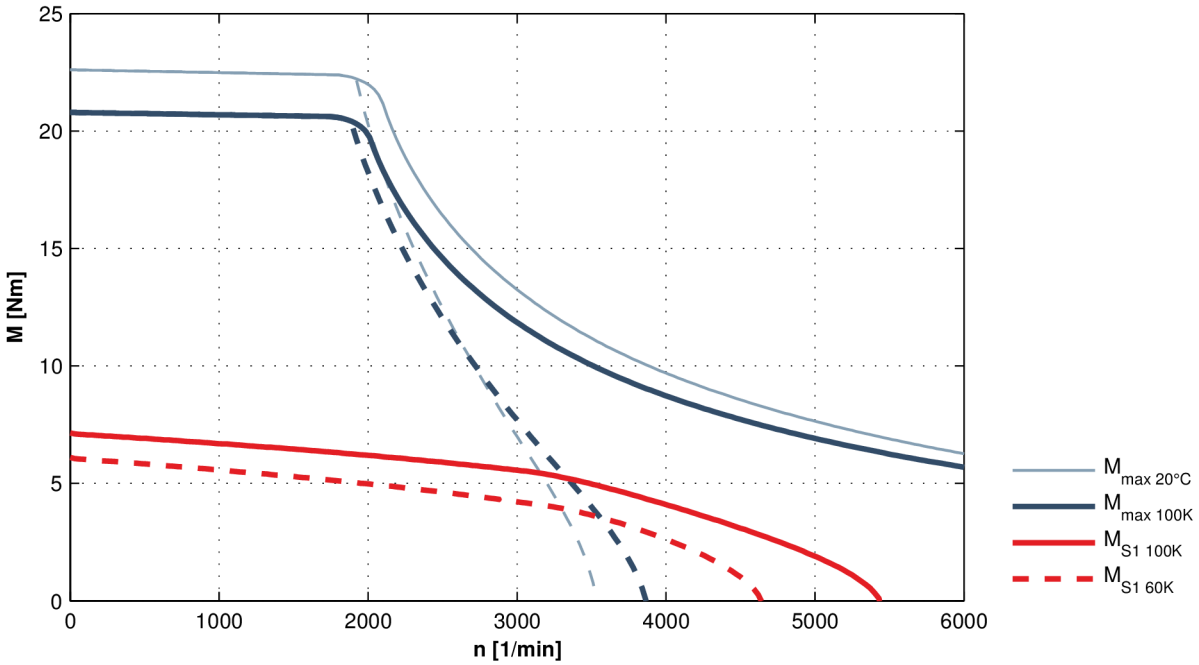
Designation	Symbol	Unit	Tolerance	MS2N05-C0BNN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	6.1
Standstill current (60 K)	$I_{0\ 60K}$	A		3.53
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	7.15
Standstill current (100 K)	$I_{0\ 100K}$	A		4.16
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00029
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00040
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2990
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	5.45
Rated current (100K)	$I_{N\ 100K}$	A		3.3
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	1.71
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	22.6
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	20.8
Maximum current	$I_{max(eff)}$	A		15.1
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.85
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	112.7
Winding resistance at 20 °C	R_{12}	Ohm		5.021
Winding inductivity	L_{12_min}	mH		30.3
Discharge capacity of the component	C_{dis}	nF		1.77
Thermal time constant of winding	T_{th_W}	s		36.2
Thermal time constant of motor	T_{th_M}	min		16
Mass without brake	m_{mot}	kg		5.9
Mass with brake	m_{mot}	kg		7.0
Holding brake data				Size 1
Holding torque	M_4	Nm		10
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.73
Maximum connection time	t_1	ms		30
Maximum disconnection time	t_2	ms		80

Latest amendment: 2016-06-09

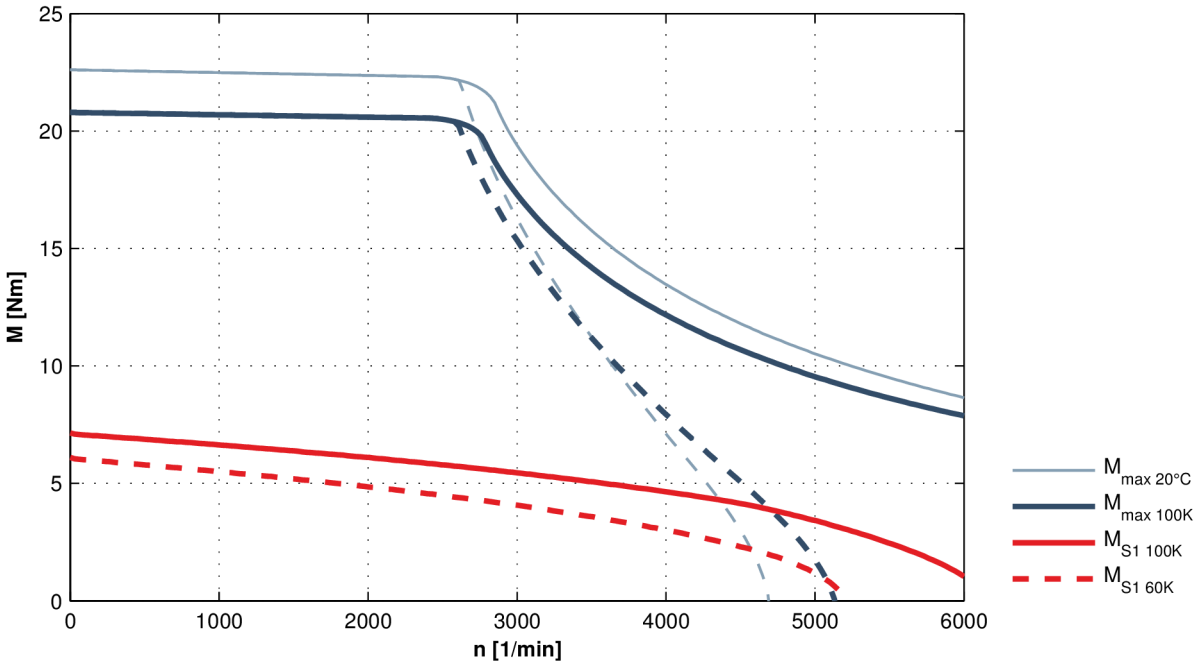
Tab. 4-12: Technical data MS2N05-C0BNN

Speed-torque characteristic curve MS2N05-C0BNN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-13: Speed-torque characteristic curve MS2N05-C0BNN

Technical data

MS2N05-C0BTN

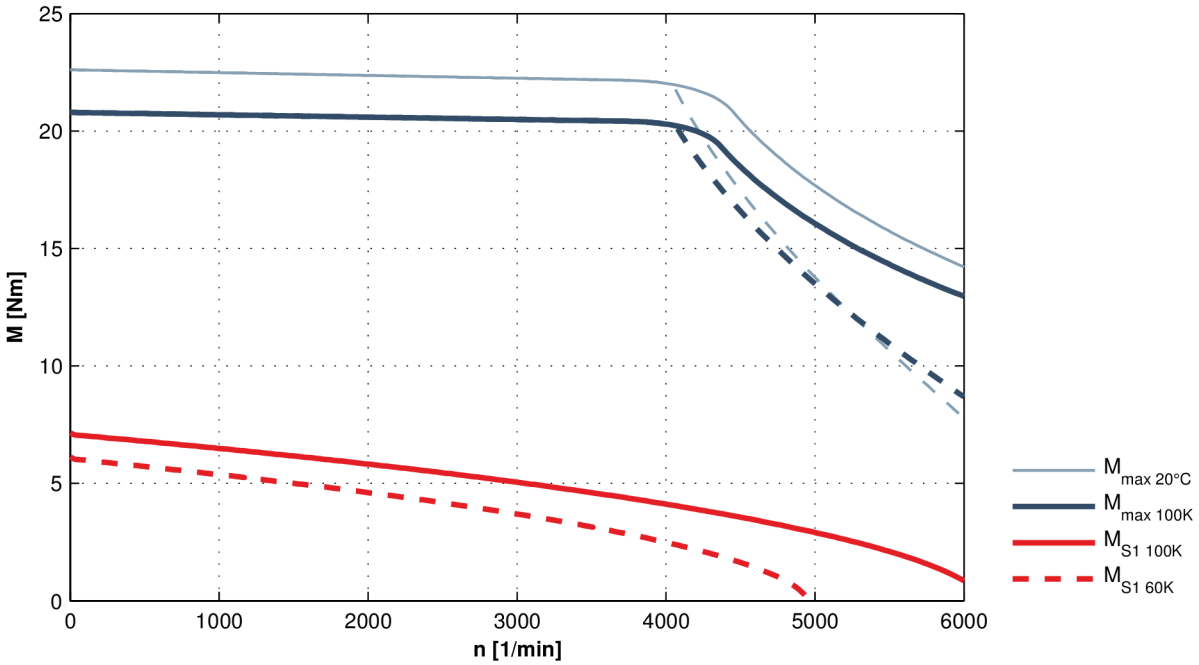
Designation	Symbol	Unit	Tolerance	MS2N05-C0BTN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	6.1
Standstill current (60 K)	$I_{0\ 60K}$	A		7.1
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	7.15
Standstill current (100 K)	$I_{0\ 100K}$	A		8.35
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00029
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00040
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		4090
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	3.52
Rated current (100K)	$I_{N\ 100K}$	A		4.43
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	1.51
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	22.6
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	20.8
Maximum current	$I_{max(eff)}$	A		30.2
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	0.93
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	56.3
Winding resistance at 20 °C	R_{12}	Ohm		1.255
Winding inductivity	L_{12_min}	mH		7.6
Discharge capacity of the component	C_{dis}	nF		1.5
Thermal time constant of winding	T_{th_W}	s		36.2
Thermal time constant of motor	T_{th_M}	min		16
Mass without brake	m_{mot}	kg		5.9
Mass with brake	m_{mot}	kg		7.0
Holding brake data				Size 1
Holding torque	M_4	Nm		10
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.73
Maximum connection time	t_1	ms		30
Maximum disconnection time	t_2	ms		80

Latest amendment: 2016-06-09

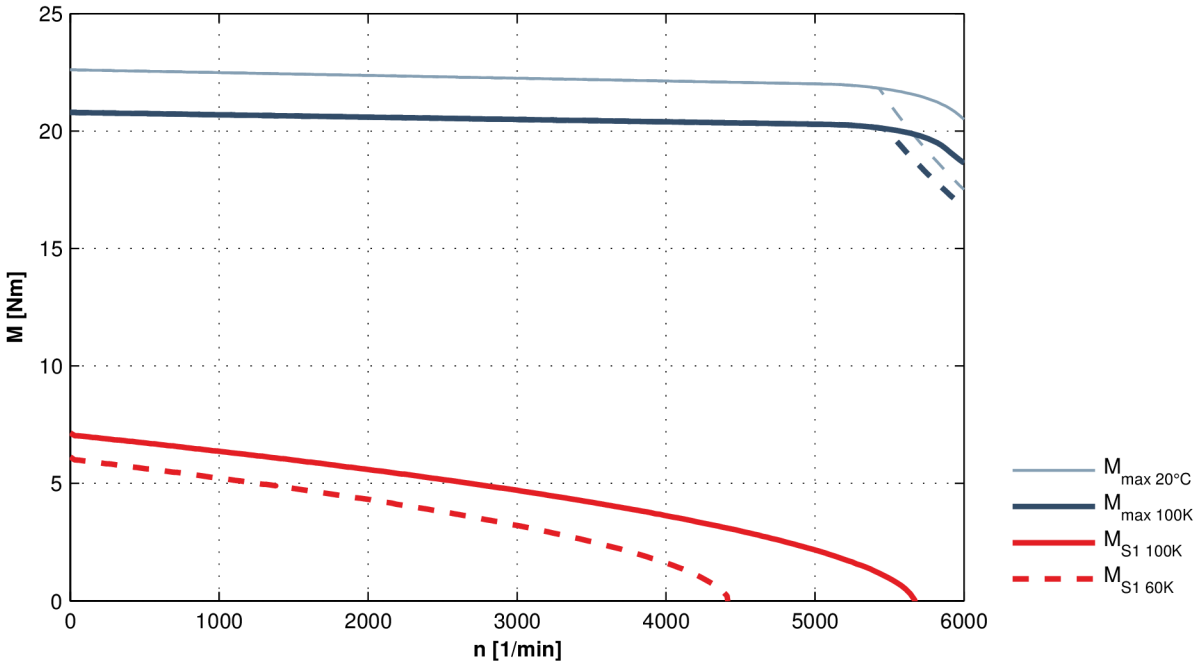
Tab. 4-14: Technical data MS2N05-C0BTN

Speed-torque characteristic curve MS2N05-C0BTN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-15: Speed-torque characteristic curve MS2N05-C0BTN

Technical data

MS2N05-D0BHN

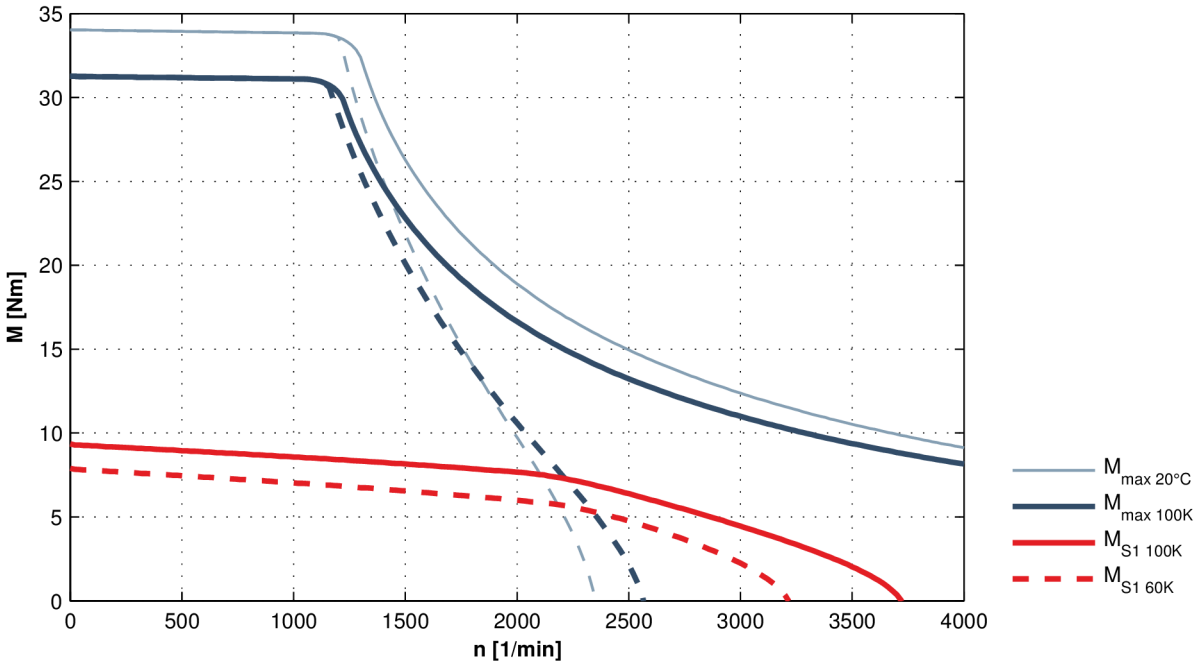
Designation	Symbol	Unit	Tolerance	MS2N05-D0BHN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	7.9
Standstill current (60 K)	$I_{0\ 60K}$	A		3.05
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	9.35
Standstill current (100 K)	$I_{0\ 100K}$	A		3.63
Moment of inertia of the rotor	J_{red}	kg*m^2	± 10%	0.00040
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00051
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2000
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	7.55
Rated current (100K)	$I_{N\ 100K}$	A		3.04
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	1.59
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	34.0
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	31.3
Maximum current	$I_{max(eff)}$	A		15.15
Max. speed (electrical)	$n_{max\ el}$	1/rpm		4000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	2.79
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	169.6
Winding resistance at 20 °C	R_{12}	Ohm		6.865
Winding inductivity	L_{12_min}	mH		46.7
Discharge capacity of the component	C_{dis}	nF		3.27
Thermal time constant of winding	T_{th_W}	s		45.8
Thermal time constant of motor	T_{th_M}	min		18.5
Mass	m_{mot}	kg		7.3
Mass with brake	m_{mot}	kg		8.4
Holding brake data				Size 1
Holding torque	M_4	Nm		10
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.73
Maximum connection time	t_1	ms		30
Maximum disconnection time	t_2	ms		80

Latest amendment: 2016-06-09

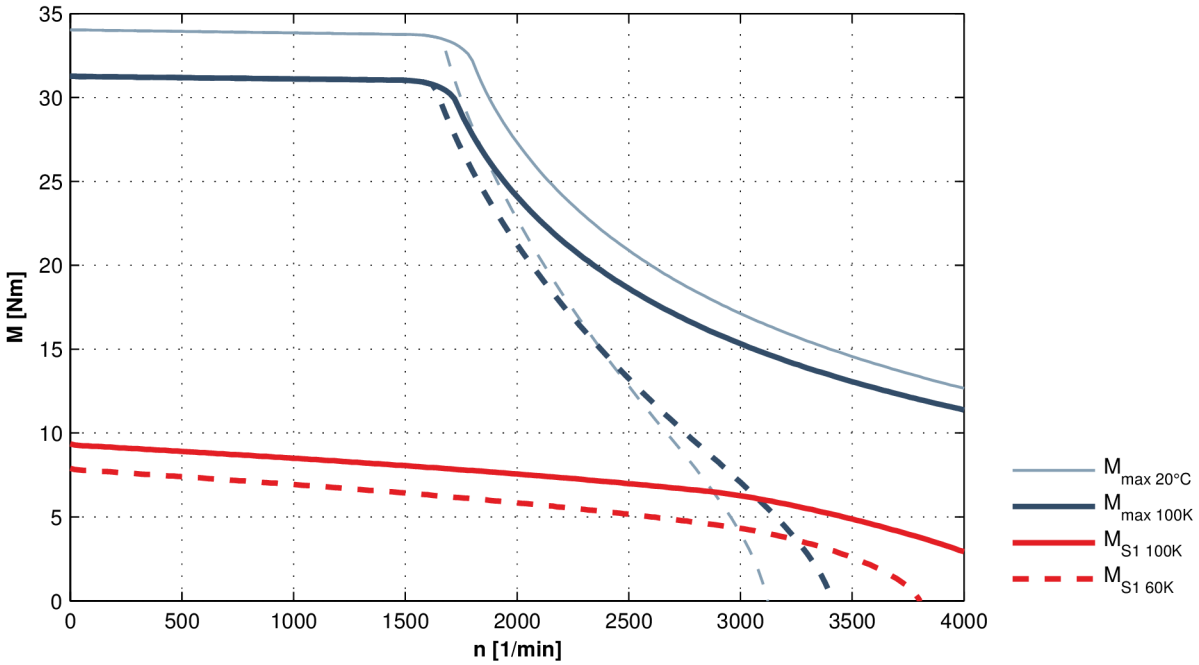
Tab. 4-16: Technical data MS2N05-D0BHN

Speed-torque characteristic curve MS2N05-D0BHN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-17: Speed-torque characteristic curve MS2N05-D0BHN

Technical data

MS2N05-D0BRN

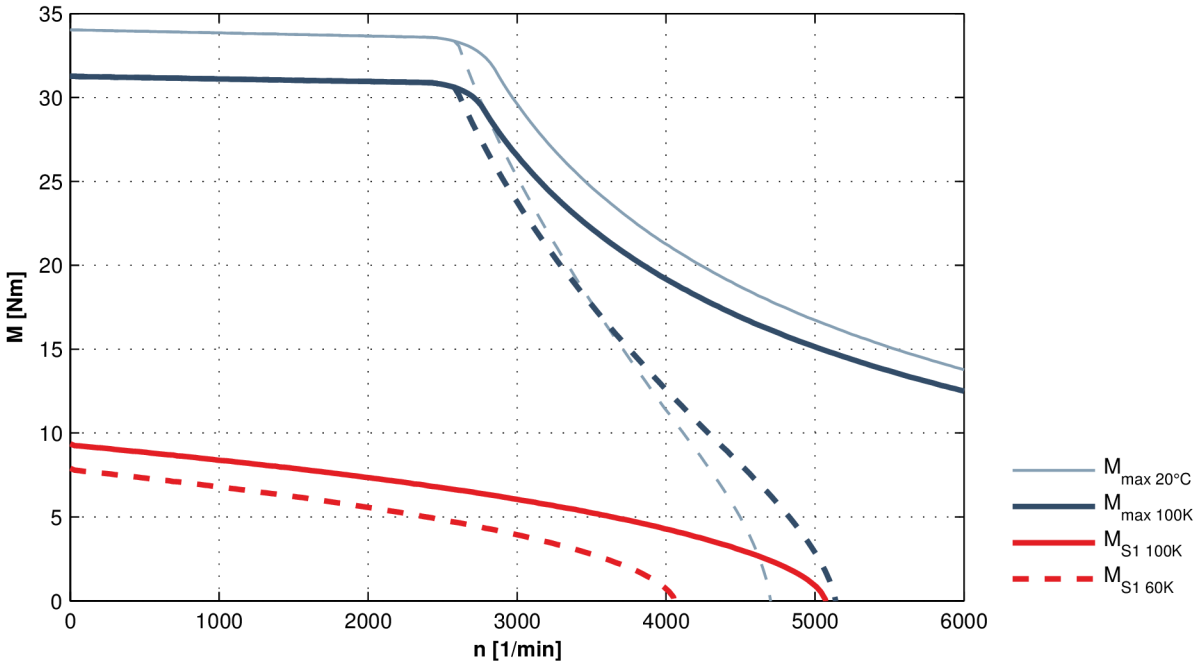
Designation	Symbol	Unit	Tolerance	MS2N05-D0BRN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	7.9
Standstill current (60 K)	$I_{0\ 60K}$	A		6.05
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	9.35
Standstill current (100 K)	$I_{0\ 100K}$	A		7.2
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00040
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00051
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		3510
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	4.74
Rated current (100K)	$I_{N\ 100K}$	A		3.95
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	1.74
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	34
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	31.3
Maximum current	$I_{max(eff)}$	A		30.3
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.4
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	84.8
Winding resistance at 20 °C	R_{12}	Ohm		1.764
Winding inductivity	L_{12_min}	mH		11.18
Discharge capacity of the component	C_{dis}	nF		3.29
Thermal time constant of winding	T_{th_W}	s		45.8
Thermal time constant of motor	T_{th_M}	min		18.5
Mass without brake	m_{mot}	kg		7.3
Mass with brake	m_{mot}	kg		8.4
Holding brake data				Size 1
Holding torque	M_4	Nm		10
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.73
Maximum connection time	t_1	ms		30
Maximum disconnection time	t_2	ms		80

Latest amendment: 2016-06-09

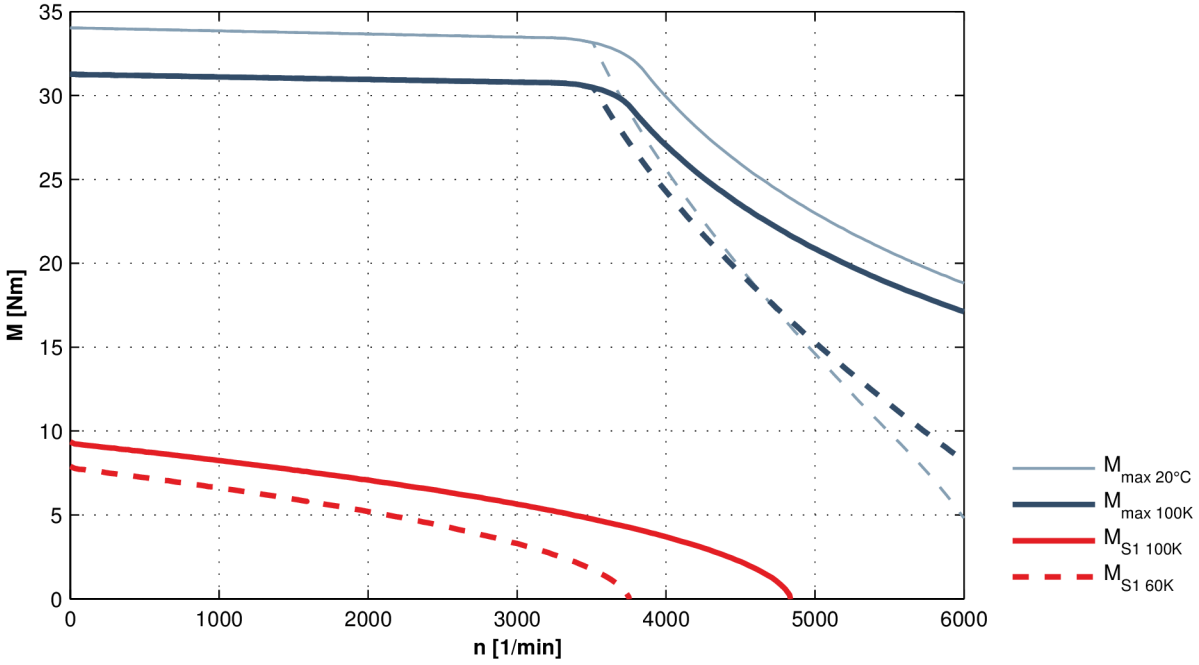
Tab. 4-18: Technical data MS2N05-D0BRN

Speed-torque characteristic curve MS2N05-D0BRN

IndraDrive, uncontrolled feed 3 × AC 400 V



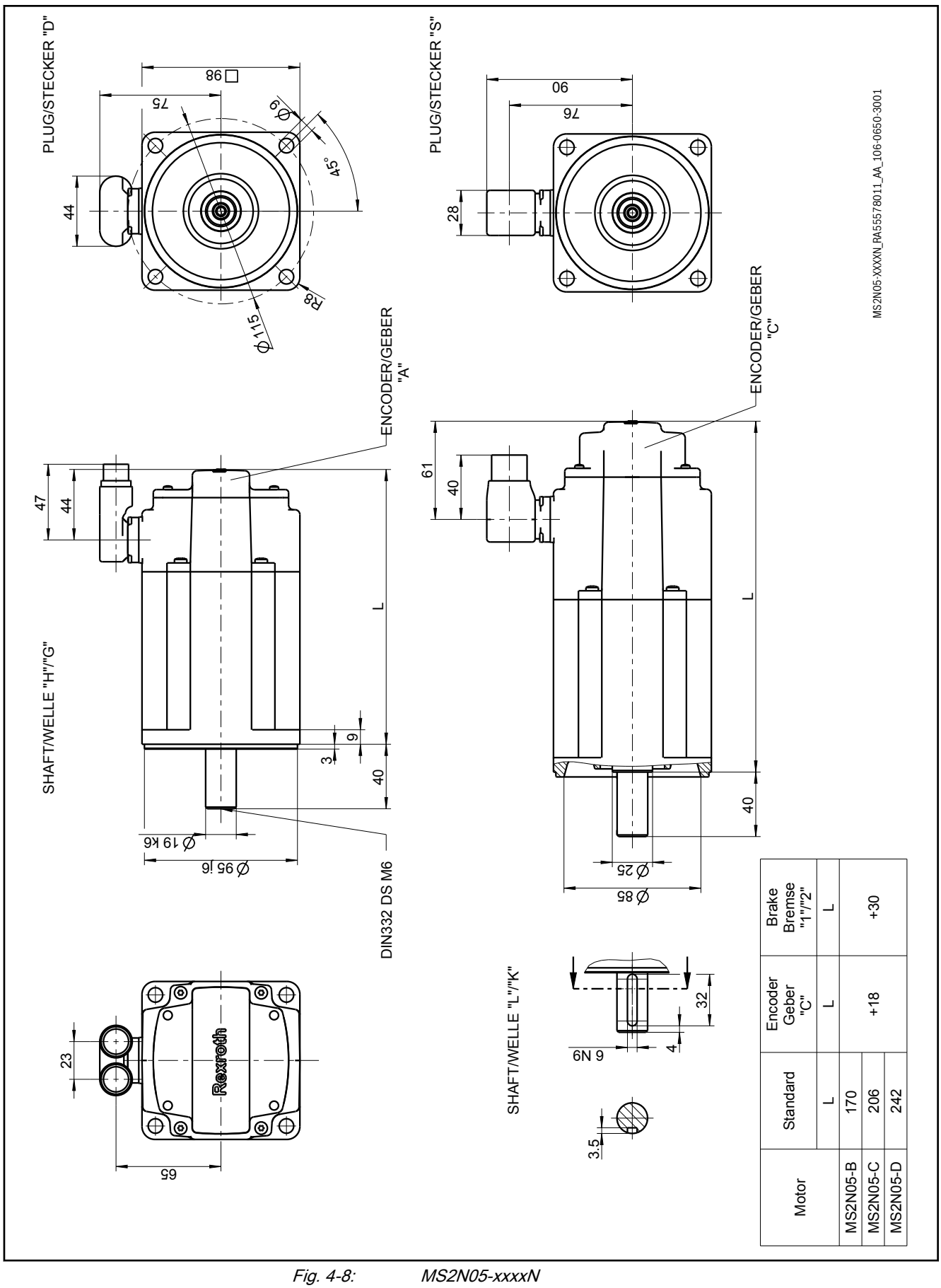
IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-19: Speed-torque characteristic curve MS2N05-D0BRN

Technical data

4.3.2 Self-cooling dimensions



Motor		Standard L	Encoder Geber "C" L	Brake Bremse "1"/"2" L
MS2N05-B		170	+18	+30
MS2N05-C		206		
MS2N05-D		242		

Fig. 4-8: MS2N05-xxxxN

4.3.3 Radial and axial force

Radial force

The permissible radial force F_R is specified in distance x from the shaft shoulder, depending on the mean speed in the following diagram.

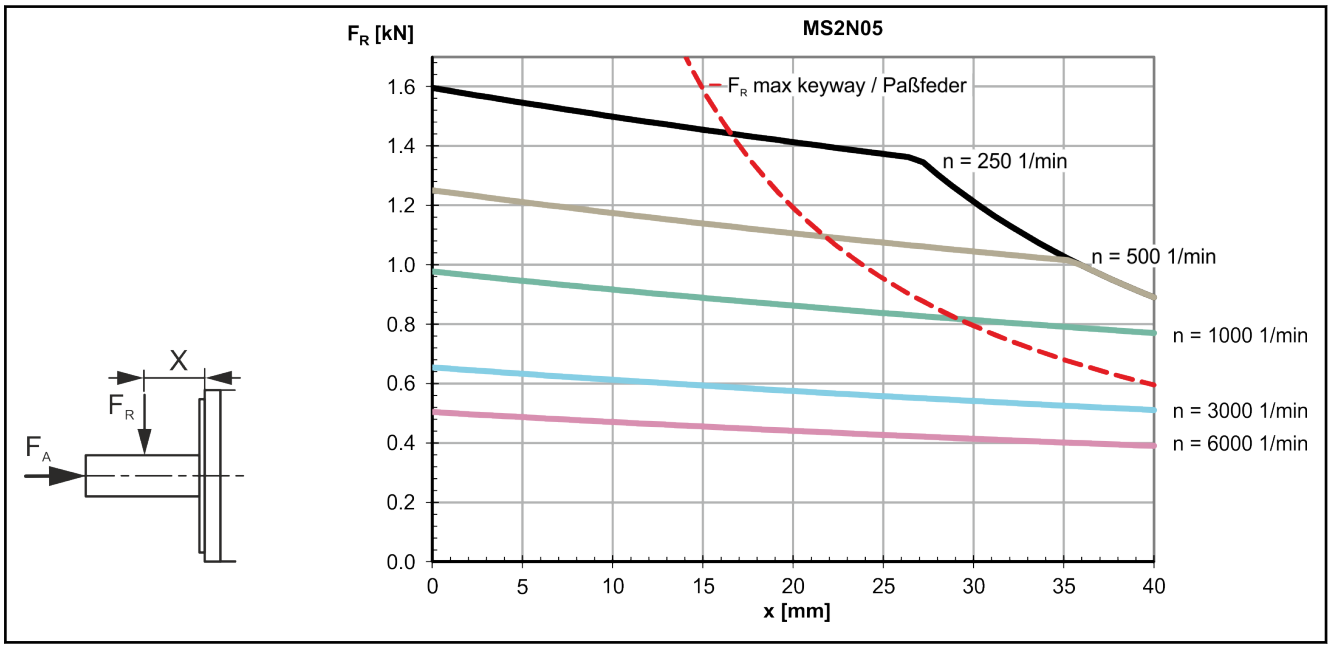


Fig. 4-9: MS2N05: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30000 h

Axial force

Axial forces F_A are permissible without limitation up to 40 N. Higher axial forces only after a detailed dimensioning by your distribution partner at Bosch Rexroth. For evaluation purposes, please specify the following information:

- Axial and radial force with force application point
- Installation position (horizontal, vertical with the shaft end pointing to the top or bottom)
- Mean speed

Technical data

4.4 MS2N06

4.4.1 Technical data of self-cooling

MS2N06-B1BNN

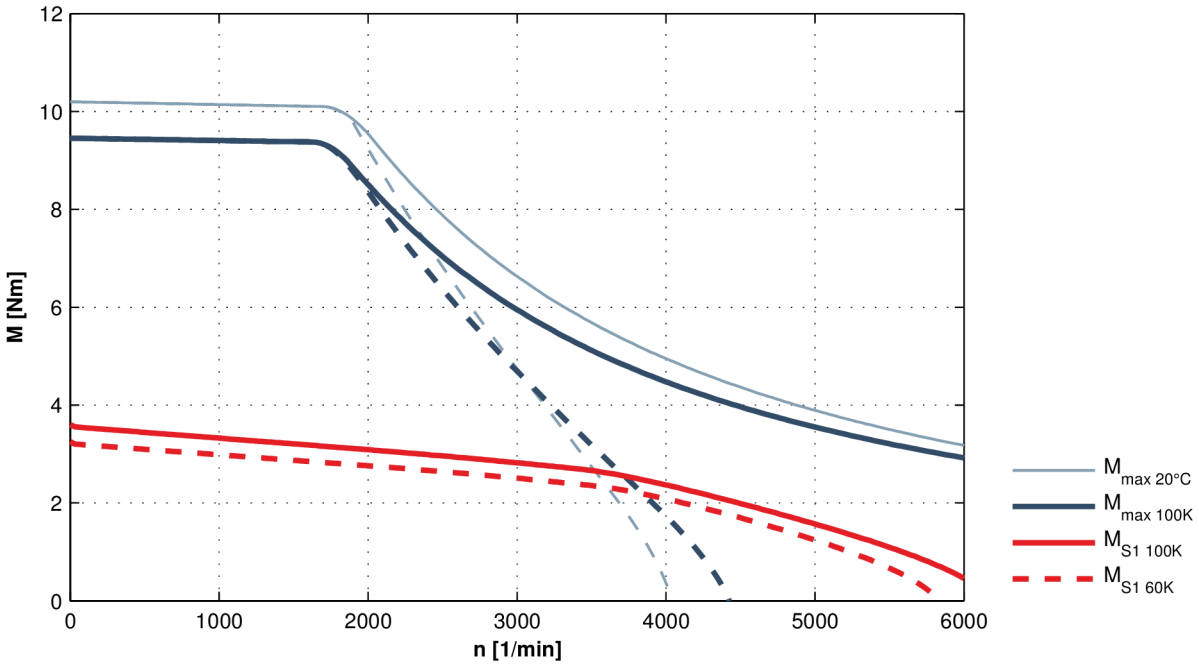
Designation	Symbol	Unit	Tolerance	MS2N06-B1BNN (preliminary)
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	3.25
Standstill current (60 K)	$I_{0\ 60K}$	A		2.22
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	3.60
Standstill current (100 K)	$I_{0\ 100K}$	A		2.47
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00048
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00059
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		3000
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	2.71
Rated current (100K)	$I_{N\ 100K}$	A		1.93
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	0.85
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	10.2
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	9.45
Maximum current	$I_{max(eff)}$	A		7.8
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.62
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	98.2
Winding resistance at 20 °C	R_{12}	Ohm		12.2
Winding inductivity	L_{12_min}	mH		52.4
Discharge capacity of the component	C_{dis}	nF		0.6
Thermal time constant of winding	T_{th_W}	s		90
Thermal time constant of motor	T_{th_M}	min		11.7
Mass without brake	m_{mot}	kg		5.1
Mass with brake	m_{mot}	kg		6.1
Holding brake data				Size 1
Holding torque	M_4	Nm		10
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.73
Maximum connection time	t_1	ms		30
Maximum disconnection time	t_2	ms		80

Latest amendment: 2016-05-24

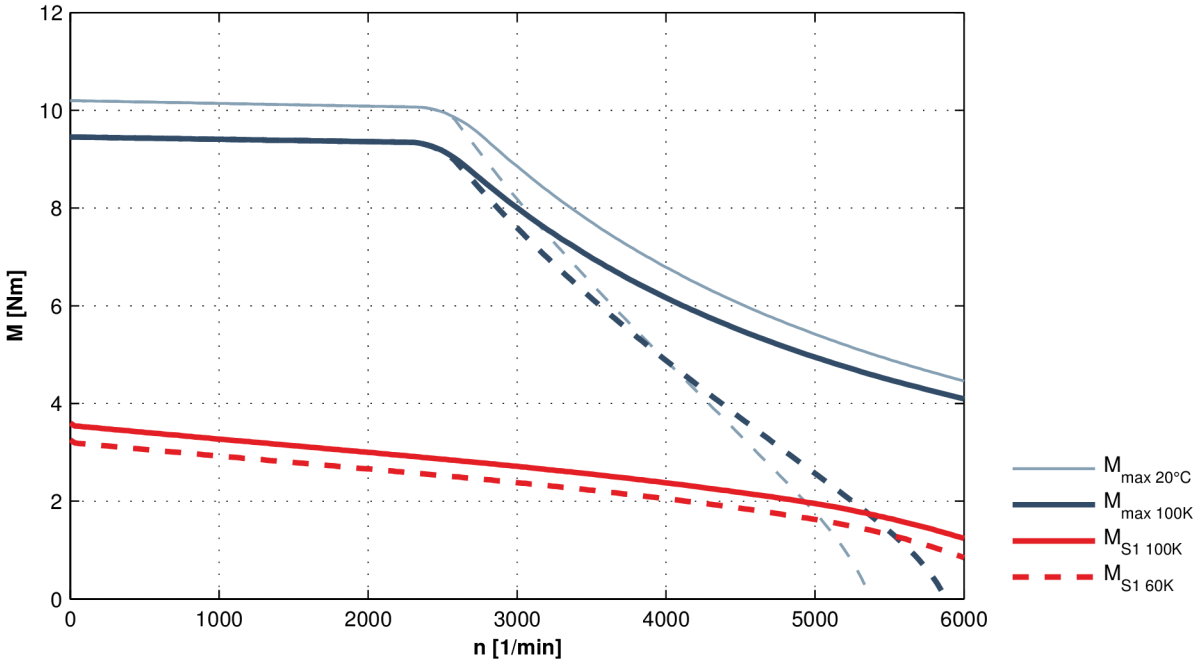
Tab. 4-20: Technical data MS2N06-B1BNN

Speed-torque characteristic curve MS2N06-B1BNN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-21: Speed-torque characteristic curve MS2N06-B1BNN

Technical data

MS2N06-C0BNN

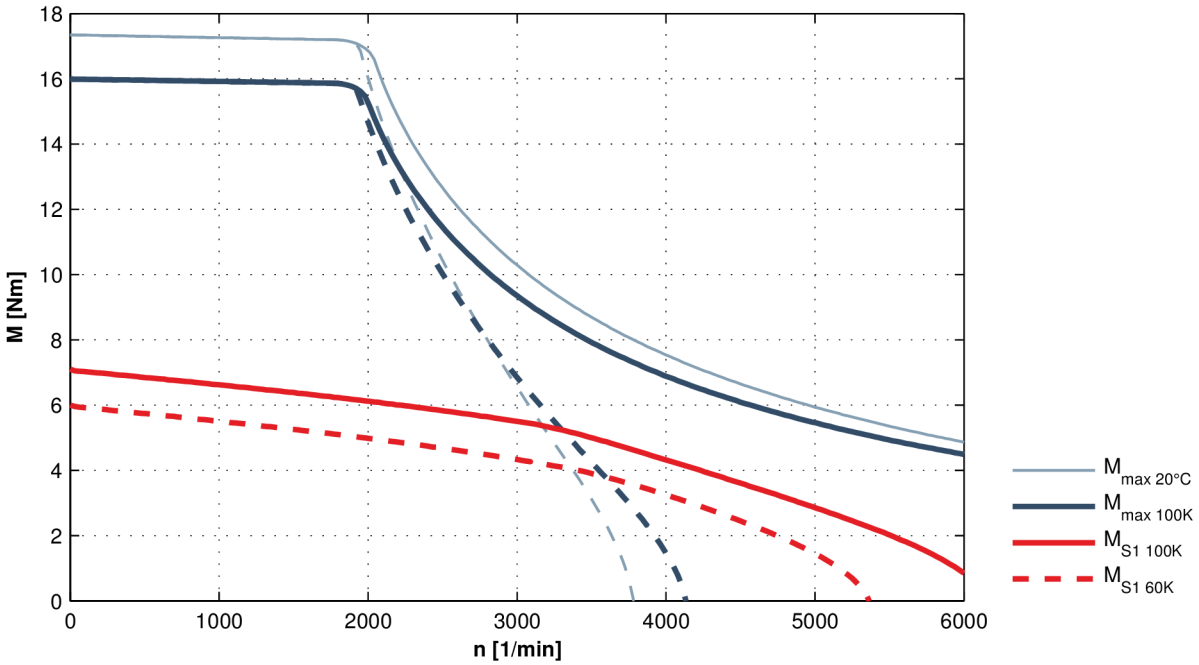
Designation	Symbol	Unit	Tolerance	MS2N06-C0BNN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	6.0
Standstill current (60 K)	$I_{0\ 60K}$	A		3.75
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	7.1
Standstill current (100 K)	$I_{0\ 100K}$	A		4.5
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00039
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00050
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		3000
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	5.4
Rated current (100K)	$I_{N\ 100K}$	A		3.51
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	1.69
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	17.3
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	16.0
Maximum current	$I_{max(eff)}$	A		12.75
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.73
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	105.4
Winding resistance at 20 °C	R_{12}	Ohm		4.477
Winding inductivity	L_{12_min}	mH		39.5
Discharge capacity of the component	C_{dis}	nF		1.24
Thermal time constant of winding	T_{th_W}	s		27.3
Thermal time constant of motor	T_{th_M}	min		14.1
Mass without brake	m_{mot}	kg		6.4
Mass with brake	m_{mot}	kg		7.4
Holding brake data				Size 1
Holding torque	M_4	Nm		10
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.73
Maximum connection time	t_1	ms		30
Maximum disconnection time	t_2	ms		80

Latest amendment: 2016-06-09

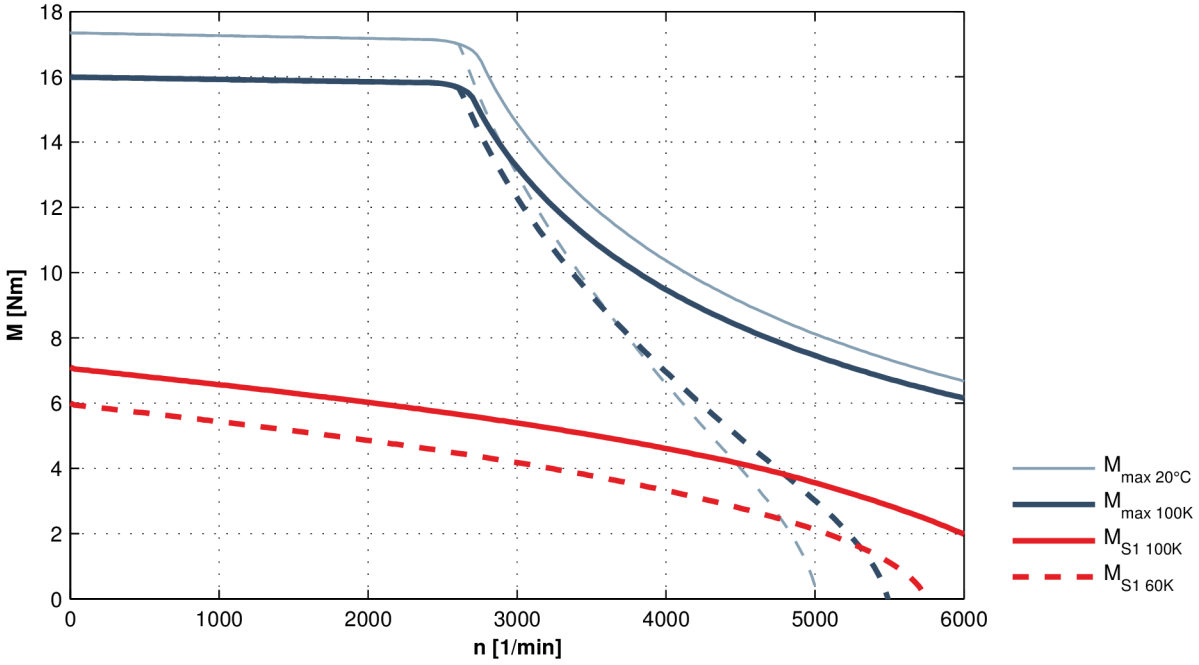
Tab. 4-22: Technical data MS2N06-C0BNN

Speed-torque characteristic curve MS2N06-C0BNN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-23: Speed-torque characteristic curve MS2N06-C0BNN

Technical data

MS2N06-C0BTN

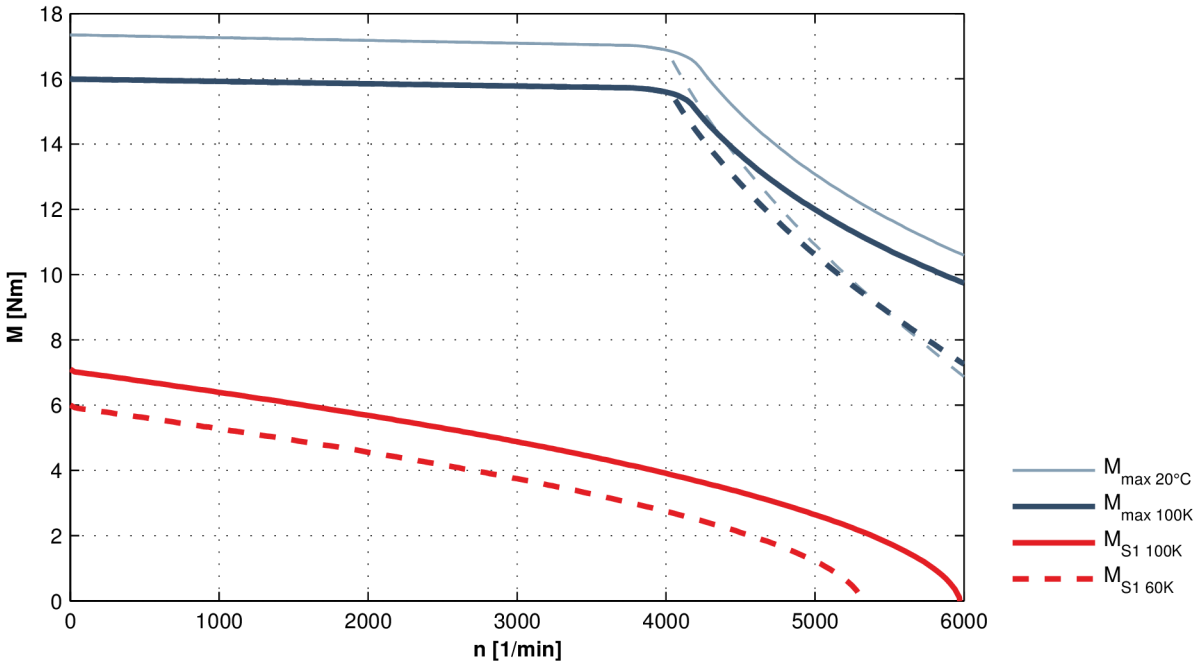
Designation	Symbol	Unit	Tolerance	MS2N06-C0BTN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	6.0
Standstill current (60 K)	$I_{0\ 60K}$	A		7.5
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	7.1
Standstill current (100 K)	$I_{0\ 100K}$	A		9.0
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00039
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00050
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		4020
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	3.34
Rated current (100K)	$I_{N\ 100K}$	A		4.51
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	1.41
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	17.3
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	16.0
Maximum current	$I_{max(eff)}$	A		25.5
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	0.87
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	52.7
Winding resistance at 20 °C	R_{12}	Ohm		1.119
Winding inductivity	L_{12_min}	mH		9.17
Discharge capacity of the component	C_{dis}	nF		1.2
Thermal time constant of winding	T_{th_W}	s		27.3
Thermal time constant of motor	T_{th_M}	min		14.1
Mass without brake	m_{mot}	kg		6.4
Mass with brake	m_{mot}	kg		7.4
Holding brake data				Size 1
Holding torque	M_4	Nm		10
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.73
Maximum connection time	t_1	ms		30
Maximum disconnection time	t_2	ms		80

Latest amendment: 2016-06-09

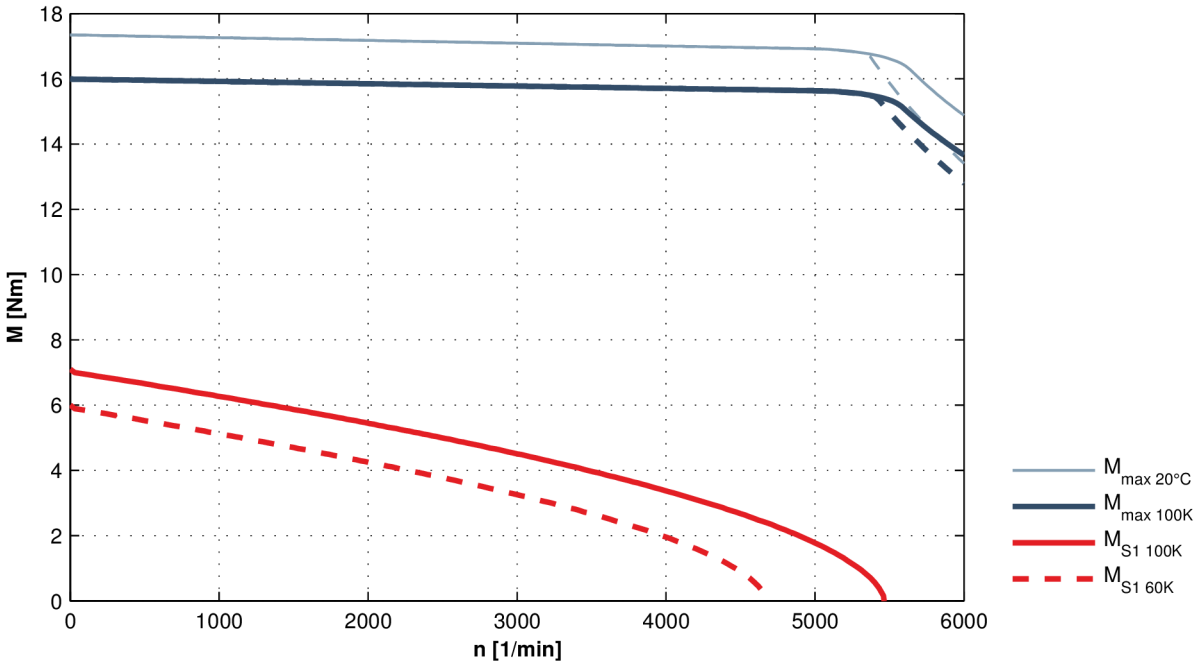
Tab. 4-24: Technical data MS2N06-C0BTN

Speed-torque characteristic curve MS2N06-C0BTN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-25: Speed-torque characteristic curve MS2N06-C0BTN

Technical data

MS2N06-D0BNN

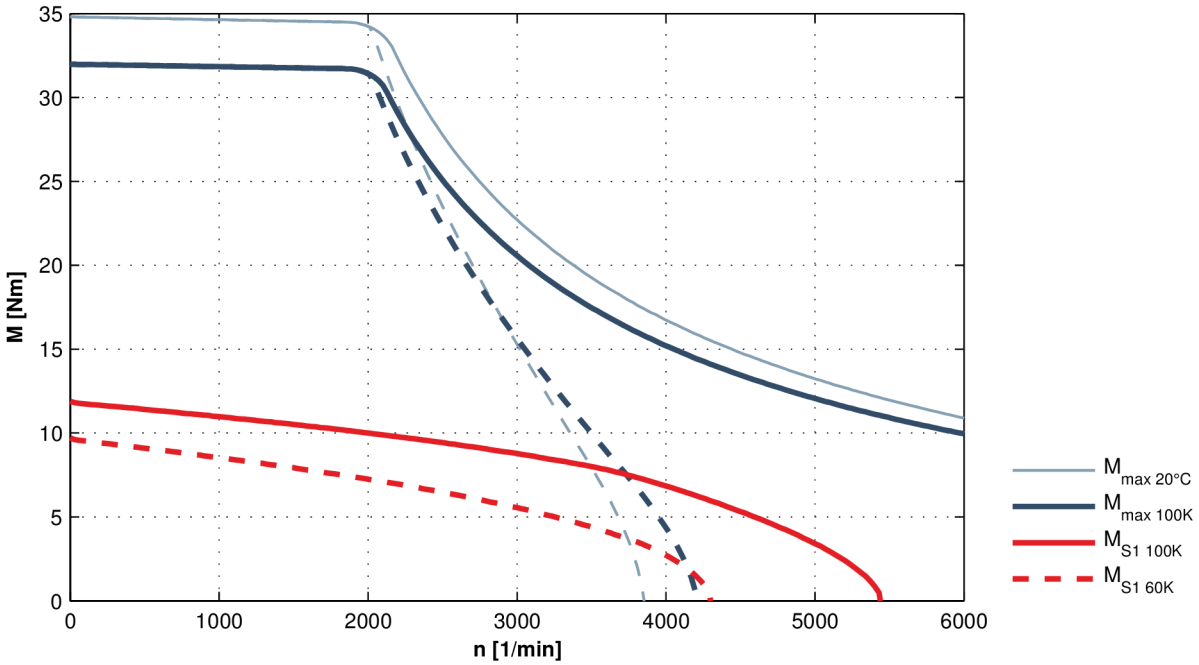
Designation	Symbol	Unit	Tolerance	MS2N06-D0BNN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	9.7
Standstill current (60 K)	$I_{0\ 60K}$	A		6.1
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	11.9
Standstill current (100 K)	$I_{0\ 100K}$	A		7.55
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00065
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00079
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2960
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	8.5
Rated current (100K)	$I_{N\ 100K}$	A		5.6
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	2.63
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	34.8
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	32.0
Maximum current	$I_{max(eff)}$	A		25.4
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.70
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	103.5
Winding resistance at 20 °C	R_{12}	Ohm		1.855
Winding inductivity	L_{12_min}	mH		18
Discharge capacity of the component	C_{dis}	nF		5
Thermal time constant of winding	T_{th_W}	s		38.6
Thermal time constant of motor	T_{th_M}	min		17.4
Mass without brake	m_{mot}	kg		9.0
Mass with brake	m_{mot}	kg		10.5
Holding brake data				Size 2
Holding torque	M_4	Nm		15
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.65
Maximum connection time	t_1	ms		29
Maximum disconnection time	t_2	ms		130

Latest amendment: 2016-06-09

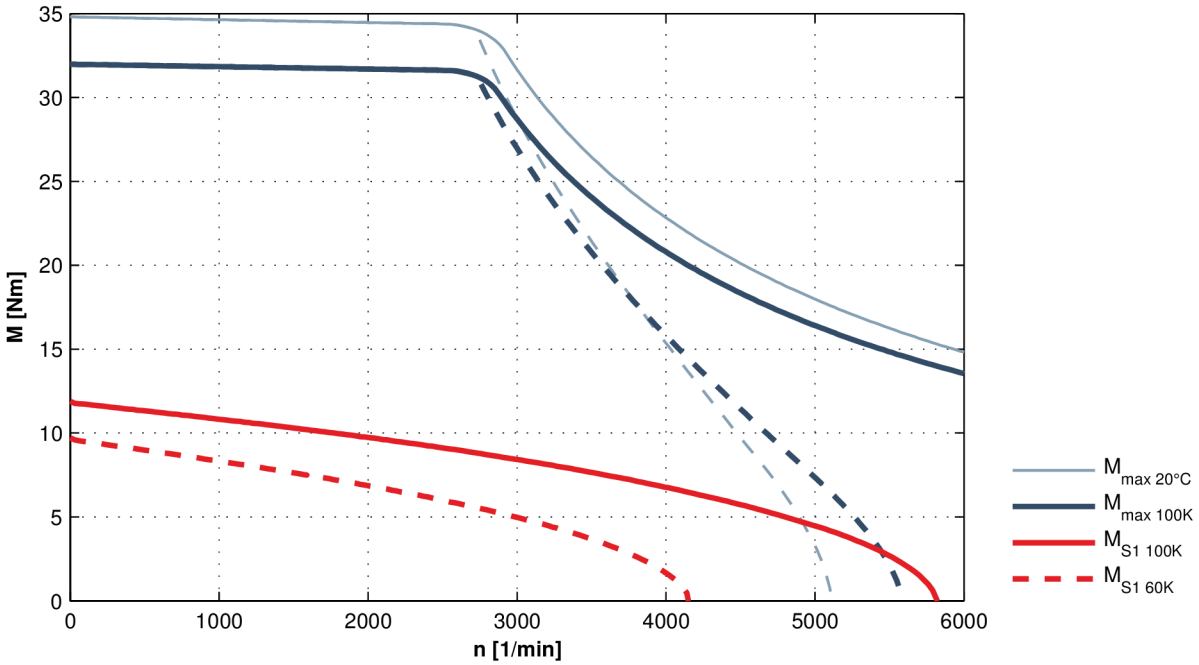
Tab. 4-26: Technical data MS2N06-D0BNN

Speed-torque characteristic curve MS2N06-D0BNN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-27: Speed-torque characteristic curve MS2N06-D0BNN

Technical data

MS2N06-D1BNN

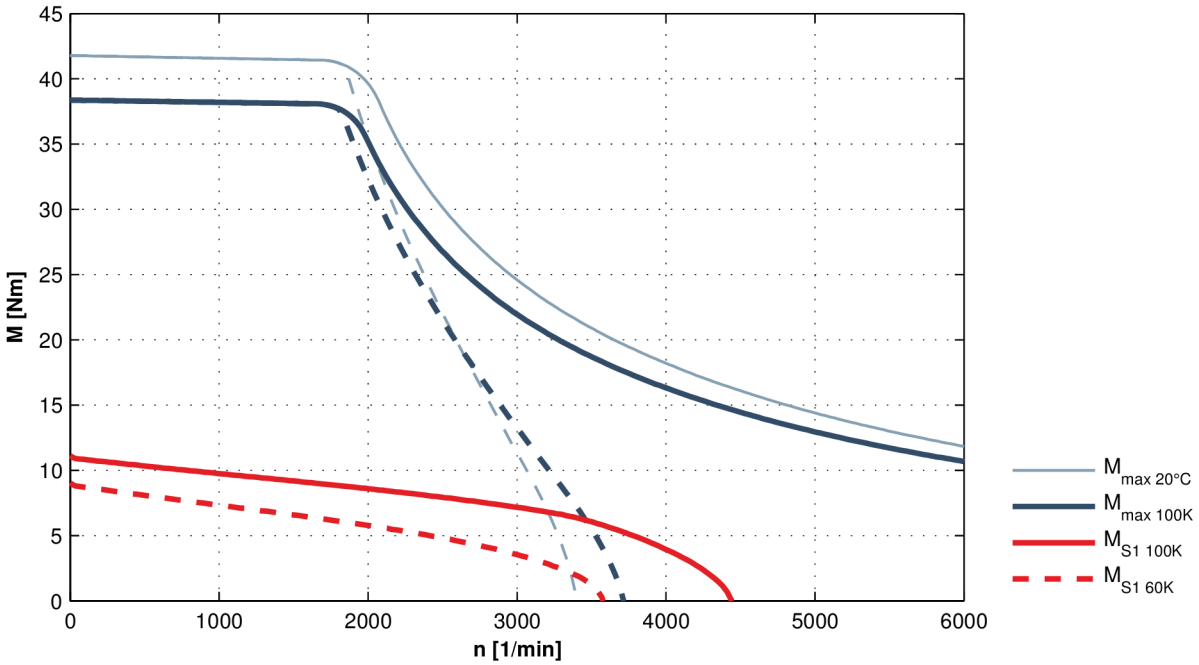
Designation	Symbol	Unit	Tolerance	MS2N06-D1BNN (preliminary)
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	9.0
Standstill current (60 K)	$I_{0\ 60K}$	A		5.05
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	11.1
Standstill current (100 K)	$I_{0\ 100K}$	A		6.25
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00140
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00154
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		3000
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	6.40
Rated current (100K)	$I_{N\ 100K}$	A		3.82
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	2.01
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	41.8
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	38.4
Maximum current	$I_{max(eff)}$	A		25.5
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.93
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	117.3
Winding resistance at 20 °C	R_{12}	Ohm		2.75
Winding inductivity	L_{12_min}	mH		18.0
Discharge capacity of the component	C_{dis}	nF		1.84
Thermal time constant of winding	T_{th_W}	s		75
Thermal time constant of motor	T_{th_M}	min		14.4
Mass without brake	m_{mot}	kg		9.1
Mass with brake	m_{mot}	kg		10.6
Holding brake data				Size 1
Holding torque	M_4	Nm		10
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.73
Maximum connection time	t_1	ms		30
Maximum disconnection time	t_2	ms		80

Latest amendment: 2016-05-24

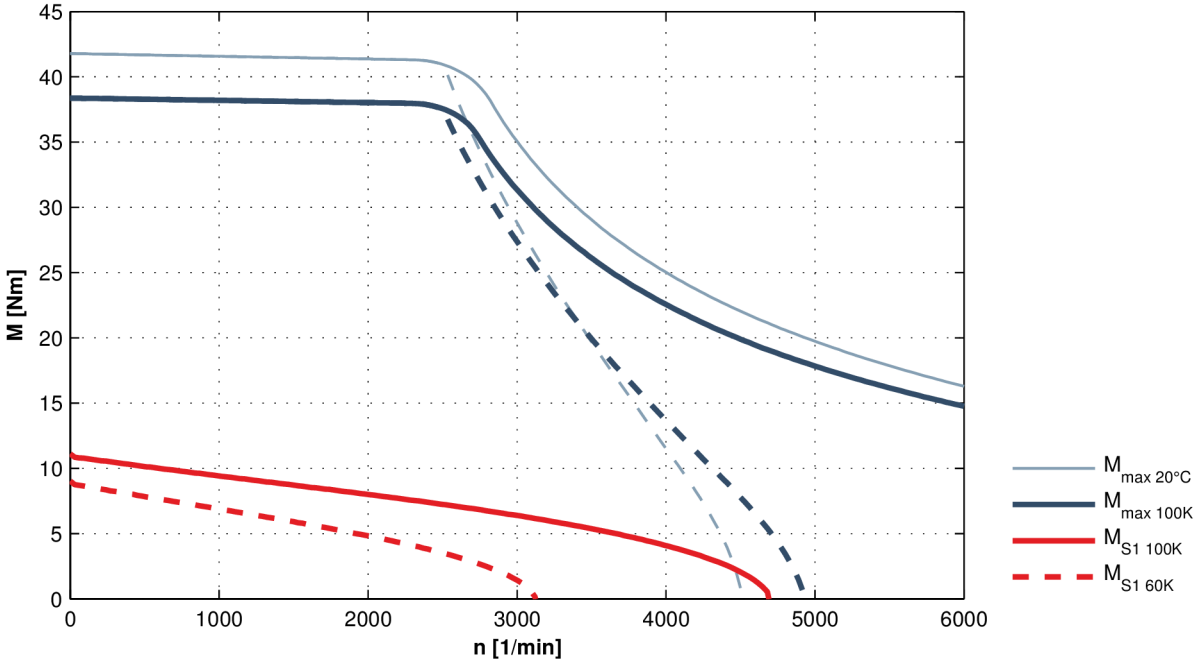
Tab. 4-28: Technical data MS2N06-D1BNN

Speed-torque characteristic curve MS2N06-D1BNN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-29: Speed-torque characteristic curve MS2N06-D1BNN

Technical data

MS2N06-D0BRN

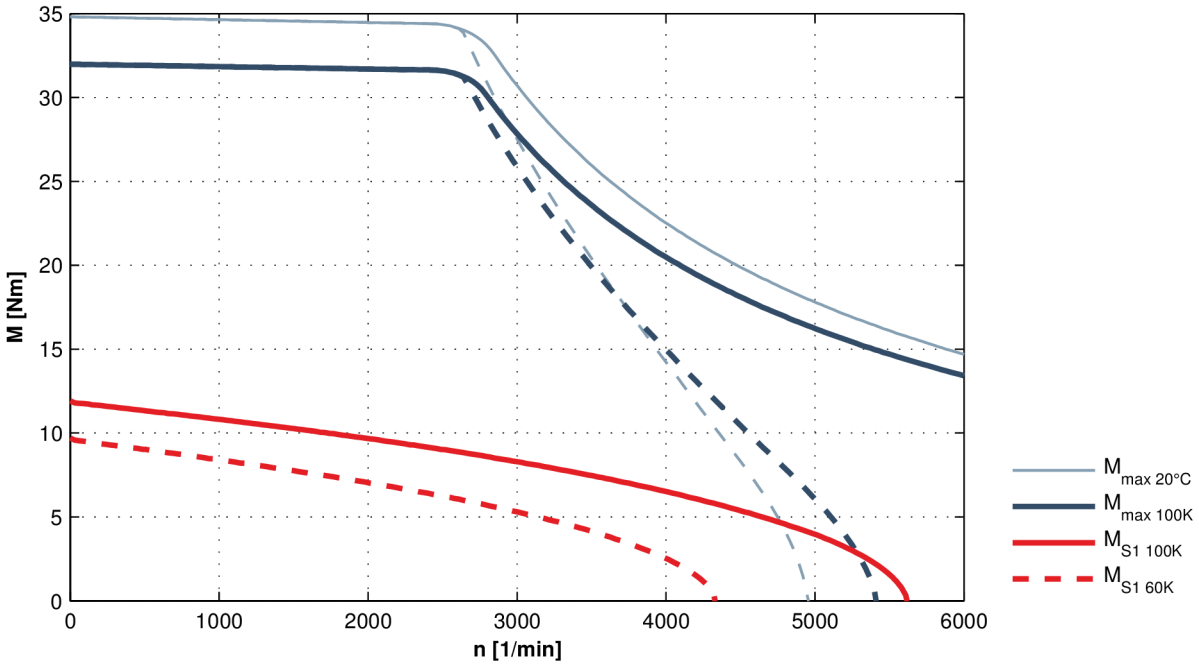
Designation	Symbol	Unit	Tolerance	MS2N06-D0BRN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	9.7
Standstill current (60 K)	$I_{0\ 60K}$	A		7.85
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	11.9
Standstill current (100 K)	$I_{0\ 100K}$	A		9.75
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00065
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00079
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		3800
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	6.2
Rated current (100K)	$I_{N\ 100K}$	A		5.4
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	2.48
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	34.8
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	32.0
Maximum current	$I_{max(eff)}$	A		32.7
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.33
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	80.5
Winding resistance at 20 °C	R_{12}	Ohm		1.134
Winding inductivity	L_{12_min}	mH		11.06
Discharge capacity of the component	C_{dis}	nF		2.55
Thermal time constant of winding	T_{th_W}	s		38.6
Thermal time constant of motor	T_{th_M}	min		17.4
Mass without brake	m_{mot}			9.0
Mass with brake	m_{mot}			10.5
Holding brake data				Size 2
Holding torque	M_4			15
Rated voltage	U_N		± 10%	24
Rated current	I_N			0.65
Maximum connection time	t_1			29
Maximum disconnection time	t_2			130

Latest amendment: 2016-06-09

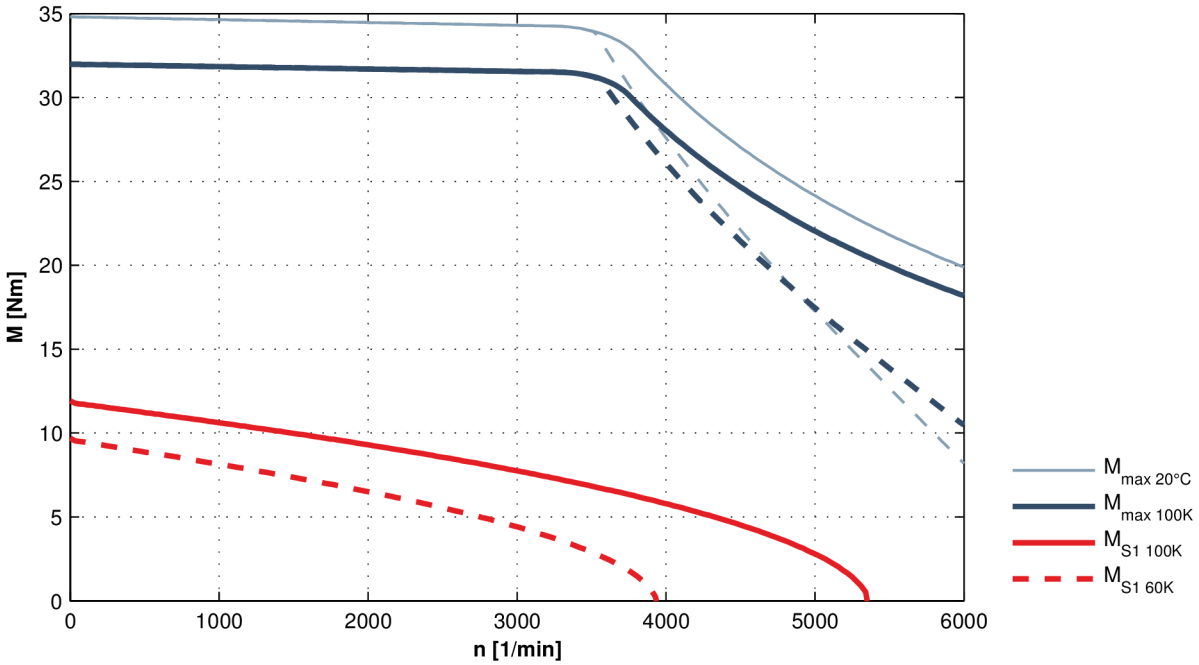
Tab. 4-30: Technical data MS2N06-D0BRN

Speed-torque characteristic curve MS2N06-D0BRN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-31: Speed-torque characteristic curve MS2N06-D0BRN

Technical data

MS2N06-E0BHN

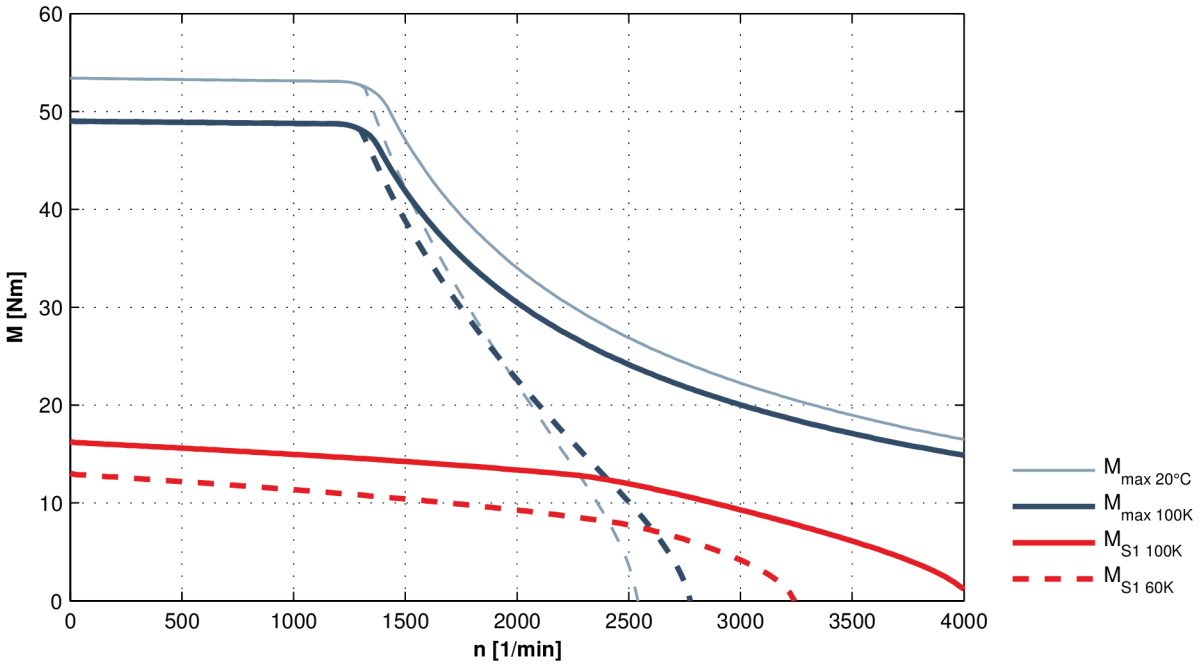
Designation	Symbol	Unit	Tolerance	MS2N06-E0BHN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	13.0
Standstill current (60 K)	$I_{0\ 60K}$	A		5.4
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	16.3
Standstill current (100 K)	$I_{0\ 100K}$	A		6.8
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00089
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00103
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2000
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	13.15
Rated current (100K)	$I_{N\ 100K}$	A		5.65
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	2.75
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	53.4
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	49.0
Maximum current	$I_{max(eff)}$	A		25.4
Max. speed (electrical)	$n_{max\ el}$	1/rpm		4000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	2.58
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	157
Winding resistance at 20 °C	R_{12}	Ohm		2.54
Winding inductivity	L_{12_min}	mH		27.6
Discharge capacity of the component	C_{dis}	nF		3.03
Thermal time constant of winding	T_{th_W}	s		48.6
Thermal time constant of motor	T_{th_M}	min		20
Mass without brake	m_{mot}			11.5
Mass with brake	m_{mot}			13.0
Holding brake data				Size 2
Holding torque	M_4			15
Rated voltage	U_N		± 10%	24
Rated current	I_N			0.65
Maximum connection time	t_1			29
Maximum disconnection time	t_2			130

Latest amendment: 2016-06-09

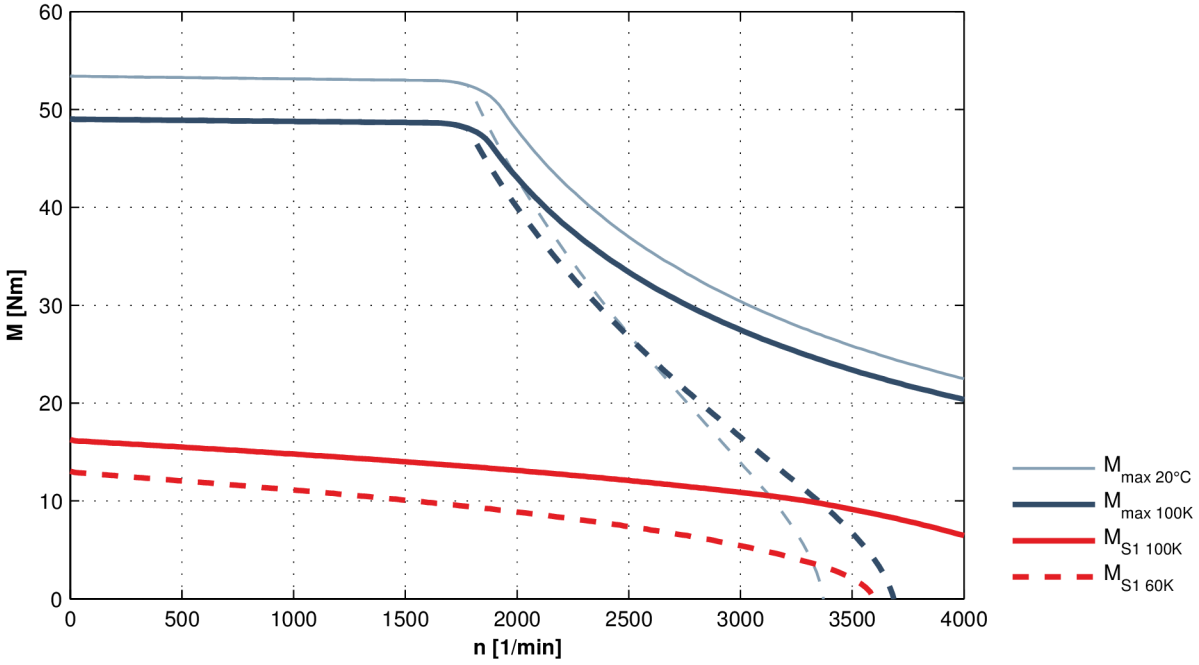
Tab. 4-32: Technical data MS2N06-E0BHN

Speed-torque characteristic curve MS2N06-E0BHN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-33: Speed-torque characteristic curve MS2N06-E0BHN

Technical data

MS2N06-E0BRN

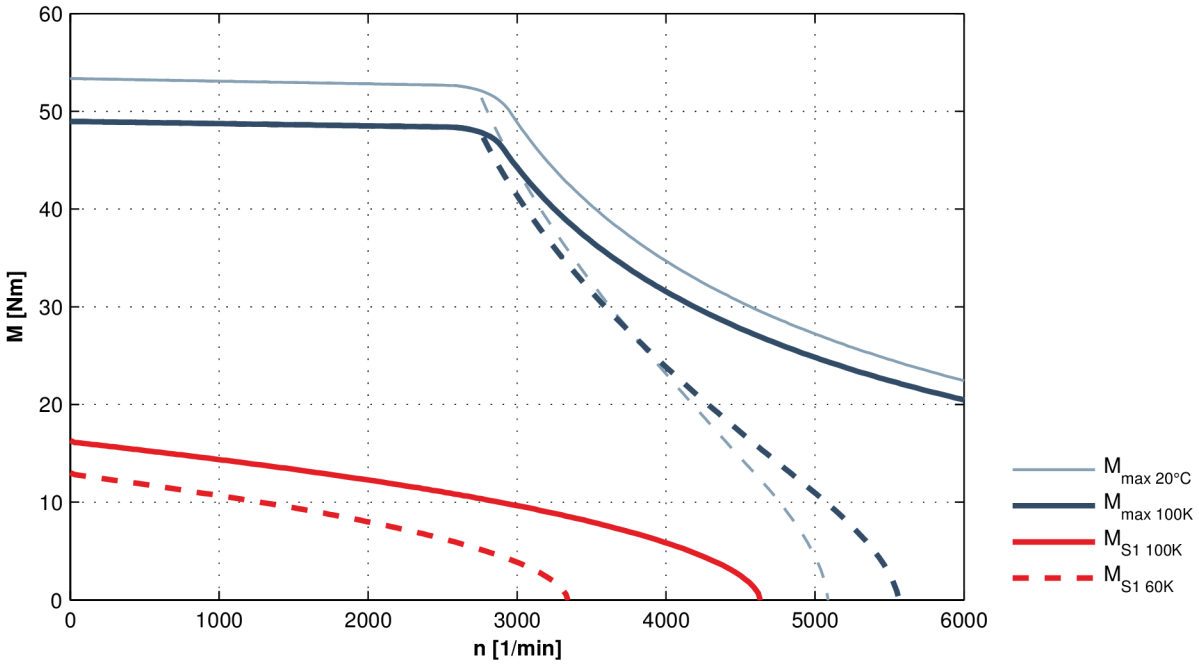
Designation	Symbol	Unit	Tolerance	MS2N06-E0BRN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	13.0
Standstill current (60 K)	$I_{0\ 60K}$	A		10.85
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	16.3
Standstill current (100 K)	$I_{0\ 100K}$	A		13.7
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00089
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00103
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		3120
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	8.05
Rated current (100K)	$I_{N\ 100K}$	A		7.2
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	2.63
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	53.4
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	49.0
Maximum current	$I_{max(eff)}$	A		50.8
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.29
Voltage constant at 20 °C	K_E	V/1000 min^{-1}	± 5%	78.4
Winding resistance at 20 °C	R_{12}	Ohm		0.638
Winding inductivity	L_{12_min}	mH		6.895
Discharge capacity of the component	C_{dis}	nF		3.87
Thermal time constant of winding	T_{th_W}	s		48.6
Thermal time constant of motor	T_{th_M}	min		20
Mass without brake	m_{mot}	kg		11.5
Mass with brake	m_{mot}	kg		13.0
Holding brake data				Size 2
Holding torque	M_4	Nm		15
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.65
Maximum connection time	t_1	ms		29
Maximum disconnection time	t_2	ms		130

Latest amendment: 2016-06-09

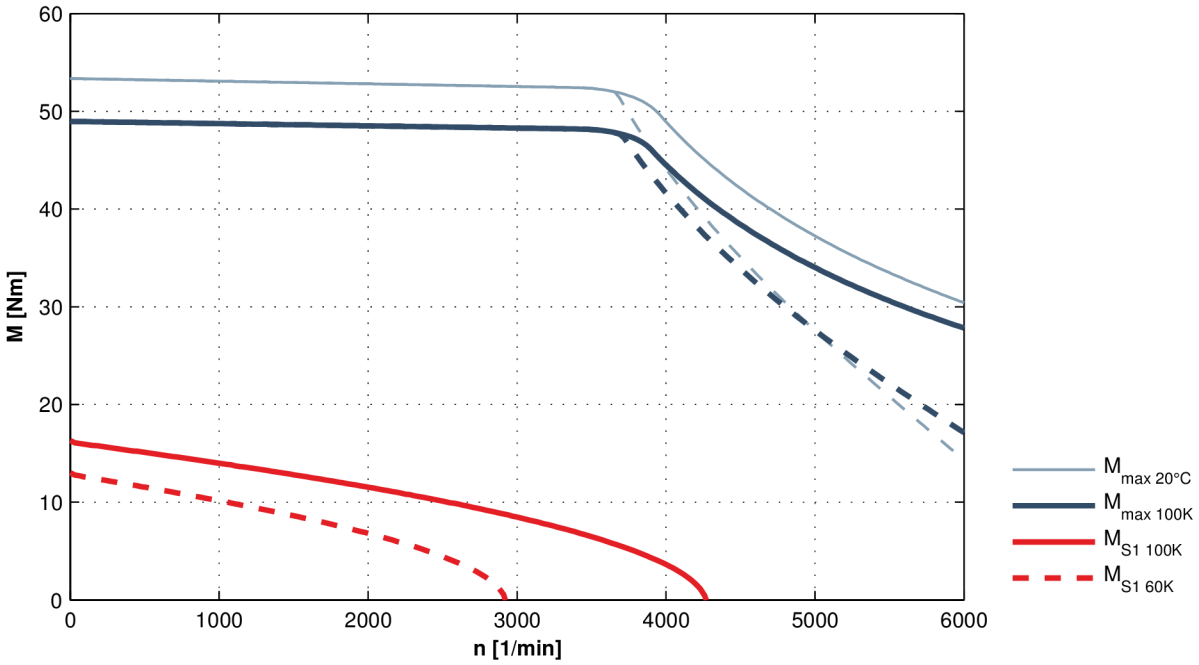
Tab. 4-34: Technical data MS2N06-E0BRN

Speed-torque characteristic curve MS2N06-E0BRN

IndraDrive, uncontrolled feed 3 × AC 400 V



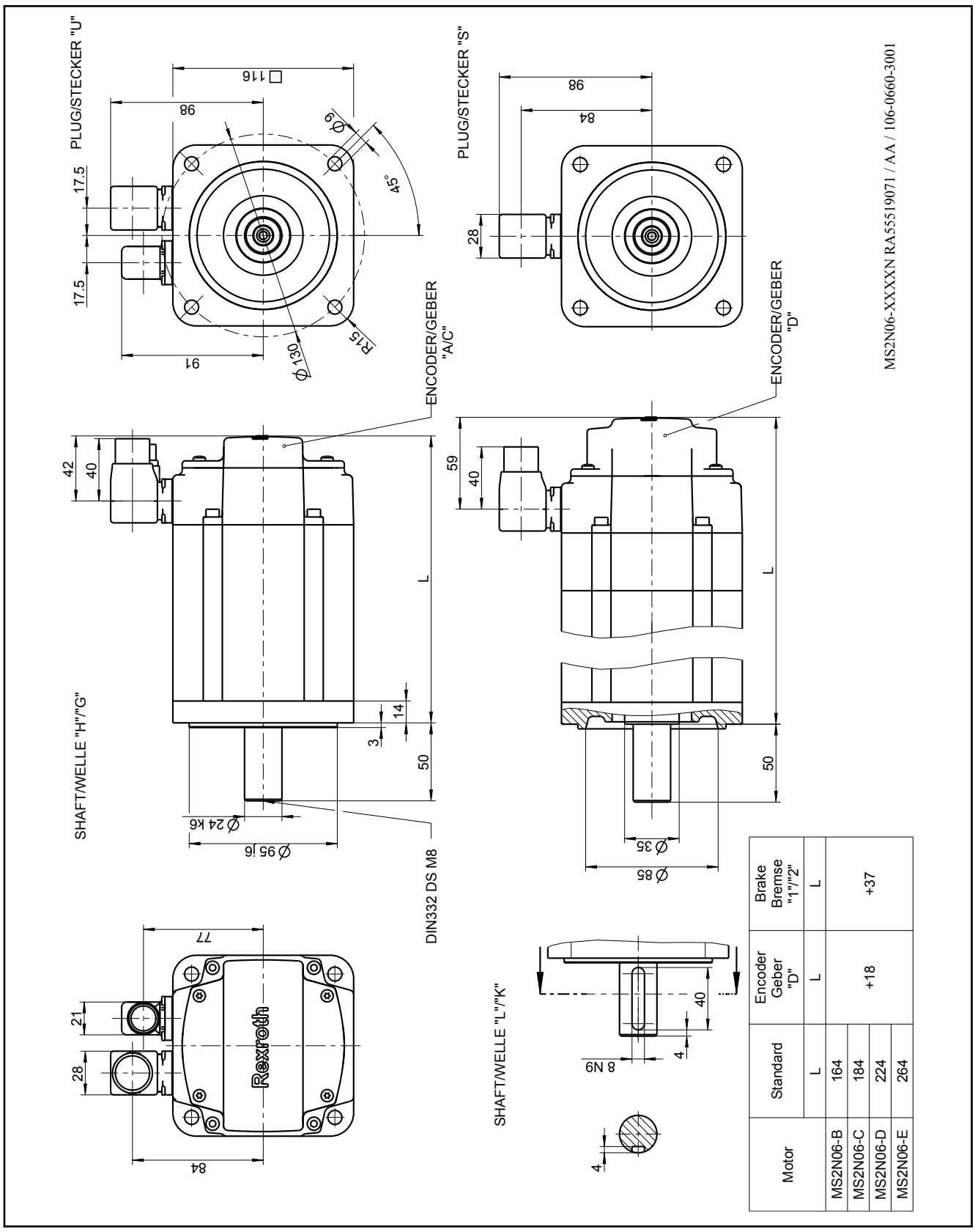
IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-35: Speed-torque characteristic curve MS2N06-E0BRN

Technical data

4.4.2 Self-cooling dimensions



Motor	Standard L	Encoder Geber "D" L	Brake Bremse "1"/"2" L
MS2N06-B	164	+18	+37
MS2N06-C	184		
MS2N06-D	224		
MS2N06-E	264		

Fig. 4-10: MS2N06-xxxxN

4.4.3 Radial and axial force

Radial force

The permissible radial force F_R is specified in distance x from the shaft shoulder, depending on the mean speed in the following diagram.

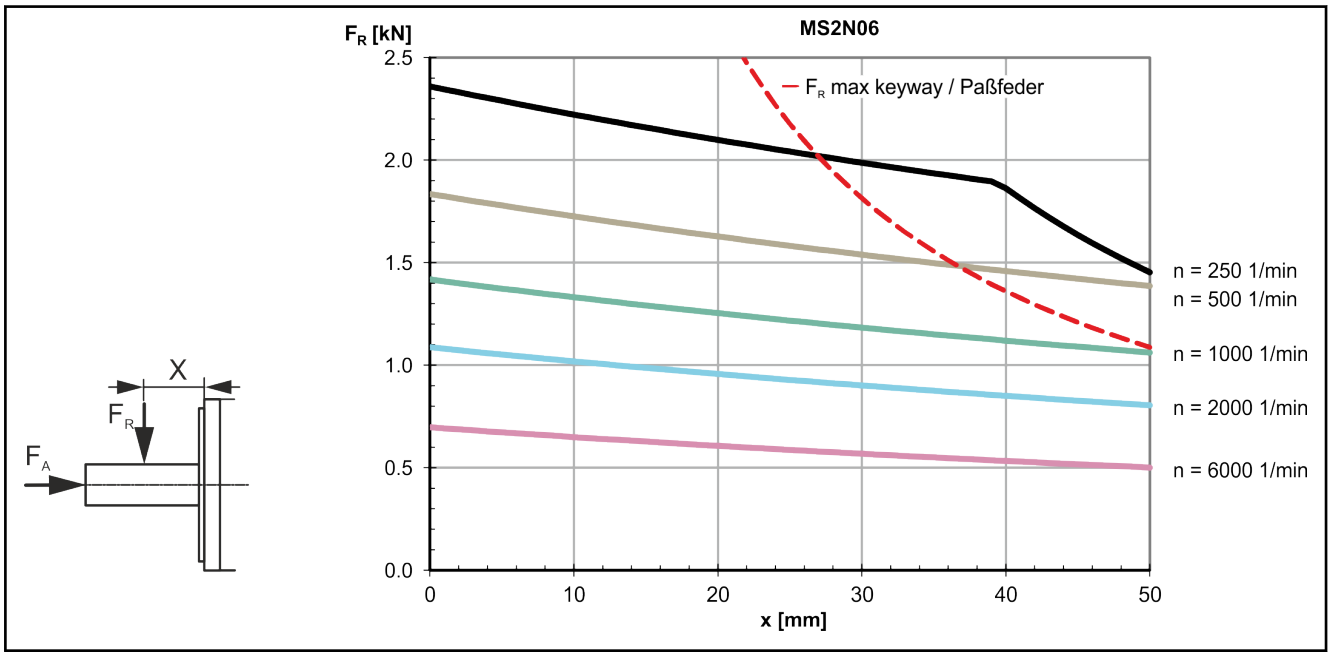


Fig. 4-11: MS2N06: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30000 h

Axial force

Axial forces F_A are permissible without limitation up to 40 N. Higher axial forces only after a detailed dimensioning by your distribution partner at Bosch Rexroth. For evaluation purposes, please specify the following information:

- Axial and radial force with force application point
- Installation position (horizontal, vertical with the shaft end pointing to the top or bottom)
- Mean speed

Technical data

4.5 MS2N07

4.5.1 Technical data of self-cooling

MS2N07-C0BQN

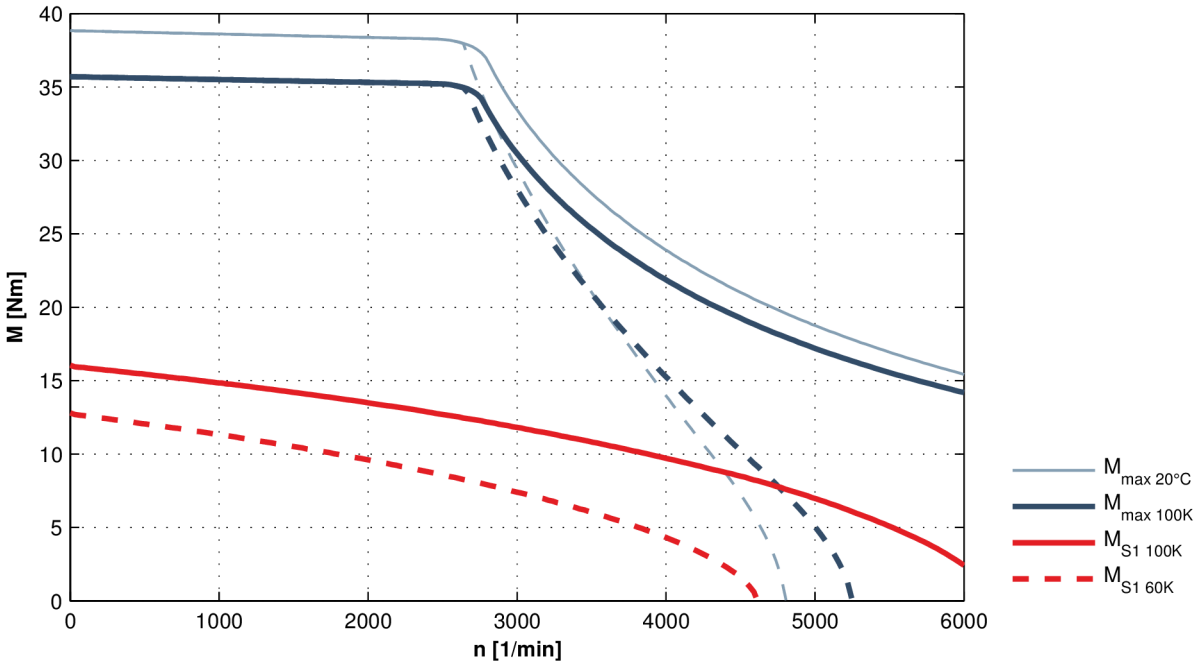
Designation	Symbol	Unit	Tolerance	MS2N07-C0BQN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	12.8
Standstill current (60 K)	$I_{0\ 60K}$	A		10.1
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	16.0
Standstill current (100 K)	$I_{0\ 100K}$	A		12.9
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.0012
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00146
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		4070
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	9.0
Rated current (100K)	$I_{N\ 100K}$	A		7.5
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	3.84
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	38.8
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	35.7
Maximum current	$I_{max(eff)}$	A		36.4
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.37
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	83.1
Winding resistance at 20 °C	R_{12}	Ohm		0.776
Winding inductivity	L_{12_min}	mH		10.5
Discharge capacity of the component	C_{dis}	nF		2.2
Thermal time constant of winding	T_{th_W}	s		46.4
Thermal time constant of motor	T_{th_M}	min		14.8
Mass without brake	m_{mot}	kg		12.0
Mass with brake	m_{mot}	kg		14.0
Holding brake data				Size 1
Holding torque	M_4	Nm		22
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.78
Maximum connection time	t_1	ms		40
Maximum disconnection time	t_2	ms		100

Latest amendment: 2016-06-09

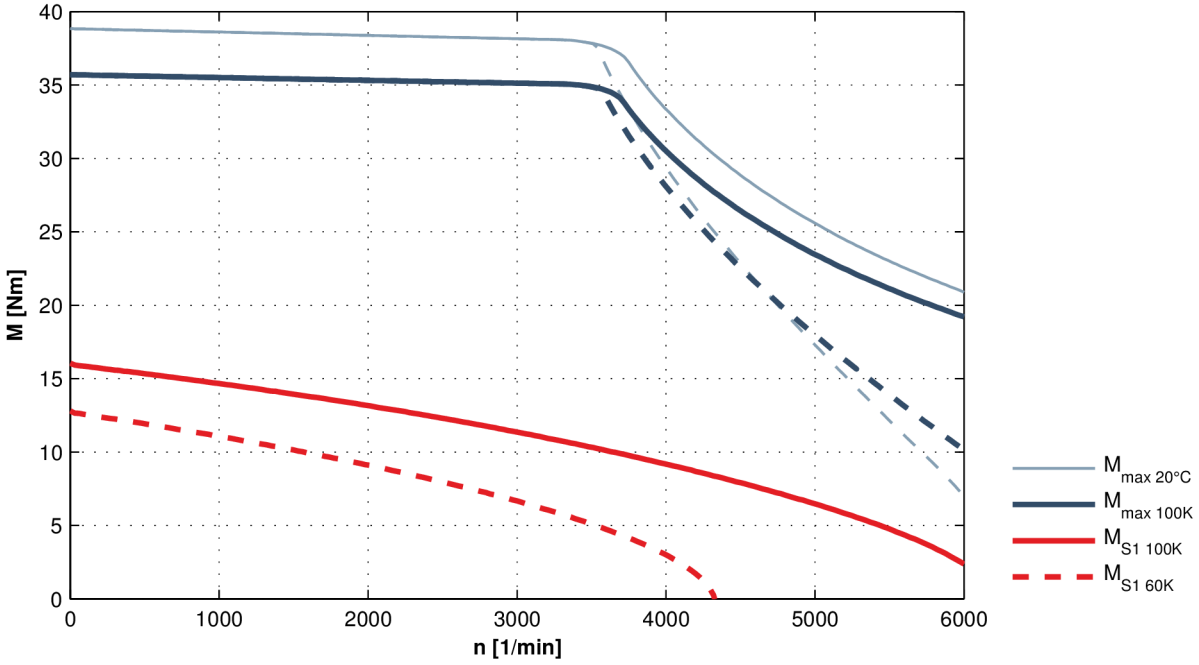
Tab. 4-36: Technical data MS2N07-C0BQN

Speed-torque characteristic curve MS2N07-C0BQN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-37: Speed-torque characteristic curve MS2N07-C0BQN

Technical data

MS2N07-C1BNN

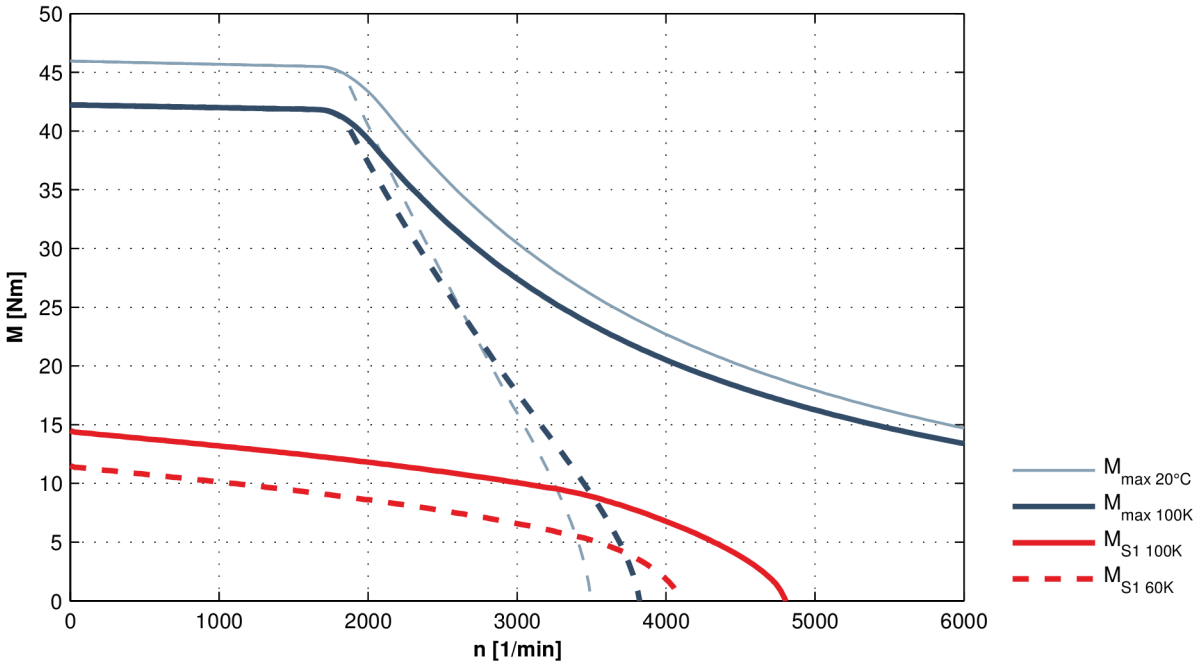
Designation	Symbol	Unit	Tolerance	MS2N07-C1BNN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	11.5
Standstill current (60 K)	$I_{0\ 60K}$	A		6.6
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	14.5
Standstill current (100 K)	$I_{0\ 100K}$	A		8.35
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00305
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00331
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		3020
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	9.60
Rated current (100K)	$I_{N\ 100K}$	A		5.80
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	3.04
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	46
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	42.2
Maximum current	$I_{max(eff)}$	A		29.5
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.88
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	114.0
Winding resistance at 20 °C	R_{12}	Ohm		1.83
Winding inductivity	L_{12_min}	mH		15.2
Discharge capacity of the component	C_{dis}	nF		1.85
Thermal time constant of winding	T_{th_W}	s		37.8
Thermal time constant of motor	T_{th_M}	min		14.8
Mass without brake	m_{mot}	kg		12
Mass with brake	m_{mot}	kg		14
Holding brake data				Size 1
Holding torque	M_4	Nm		20
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.78
Maximum connection time	t_1	ms		40
Maximum disconnection time	t_2	ms		100

Latest amendment: 2016-06-13

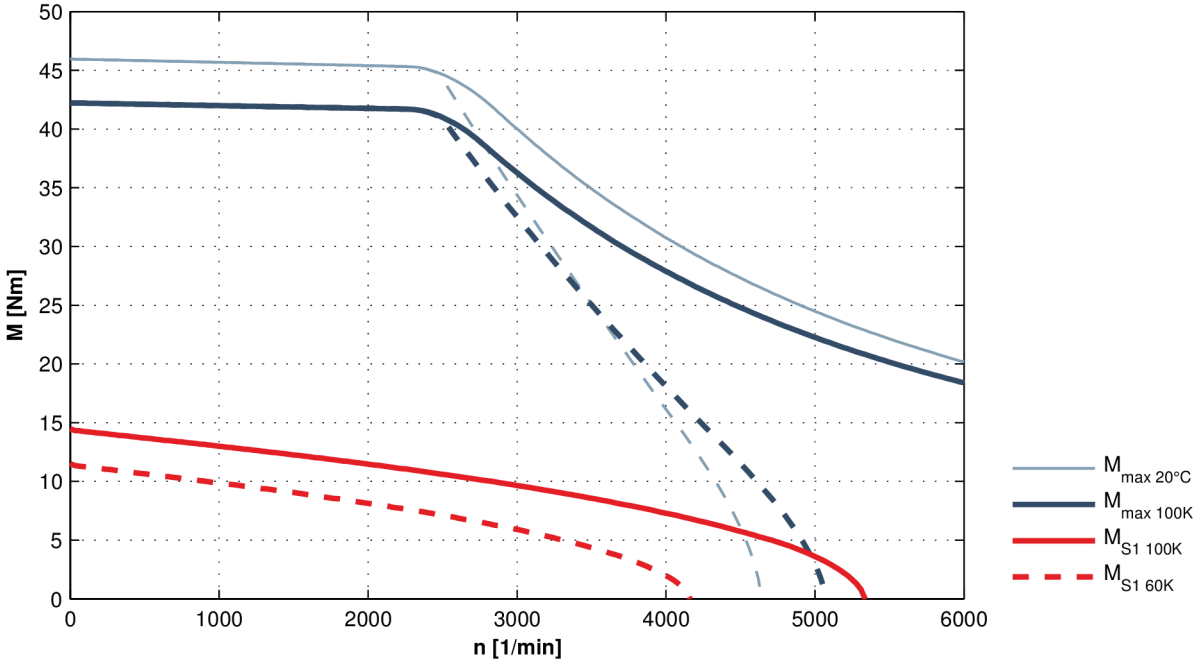
Tab. 4-38: Technical data MS2N07-C1BNN

Speed-torque characteristic curve MS2N07-C1BNN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-39: Speed-torque characteristic curve MS2N07-C1BNN

Technical data

MS2N07-D0BHN

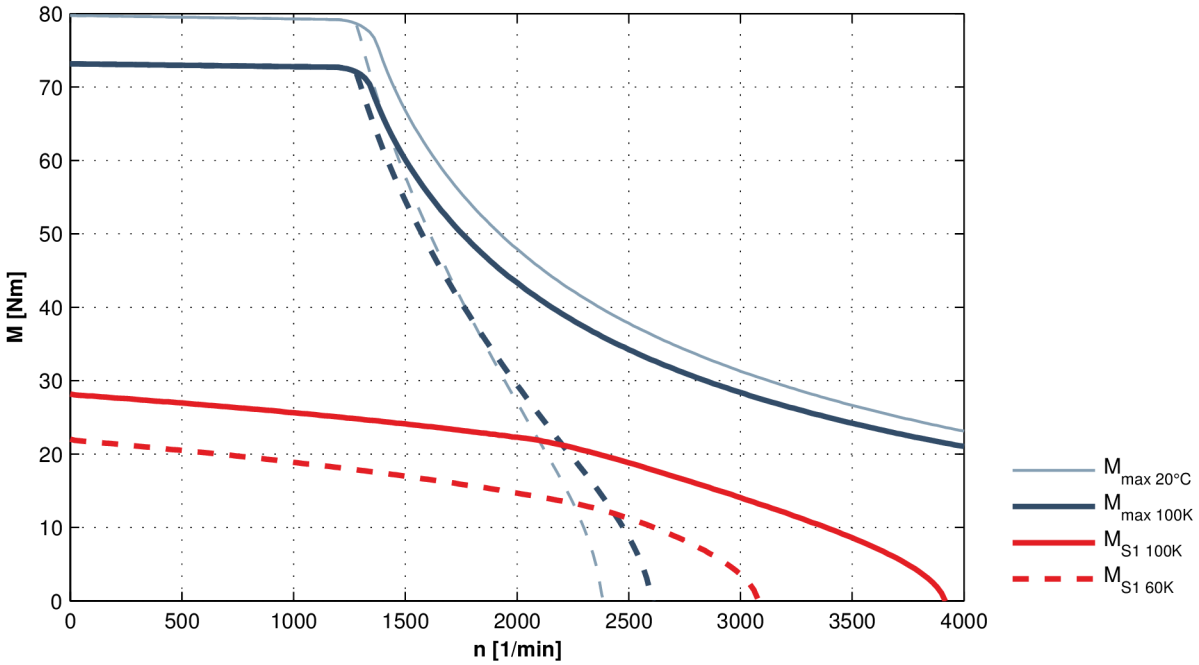
Designation	Symbol	Unit	Tolerance	MS2N07-D0BHN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	22.0
Standstill current (60 K)	$I_{0\ 60K}$	A		8.55
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	28.2
Standstill current (100 K)	$I_{0\ 100K}$	A		11.1
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.0021
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00251
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2000
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	22.0
Rated current (100K)	$I_{N\ 100K}$	A		8.85
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	4.6
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	79.7
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	73.2
Maximum current	$I_{max(eff)}$	A		36.4
Max. speed (electrical)	$n_{max\ el}$	1/rpm		4000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	2.76
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	167.5
Winding resistance at 20 °C	R_{12}	Ohm		1.297
Winding inductivity	L_{12_min}	mH		20.2
Discharge capacity of the component	C_{dis}	nF		4.1
Thermal time constant of winding	T_{th_W}	s		54
Thermal time constant of motor	T_{th_M}	min		18.7
Mass without brake	m_{mot}	kg		17.5
Mass with brake	m_{mot}	kg		20
Holding brake data				Size 2
Holding torque	M_4	Nm		36
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.94
Maximum connection time	t_1	ms		60
Maximum disconnection time	t_2	ms		200

Latest amendment: 2016-06-13

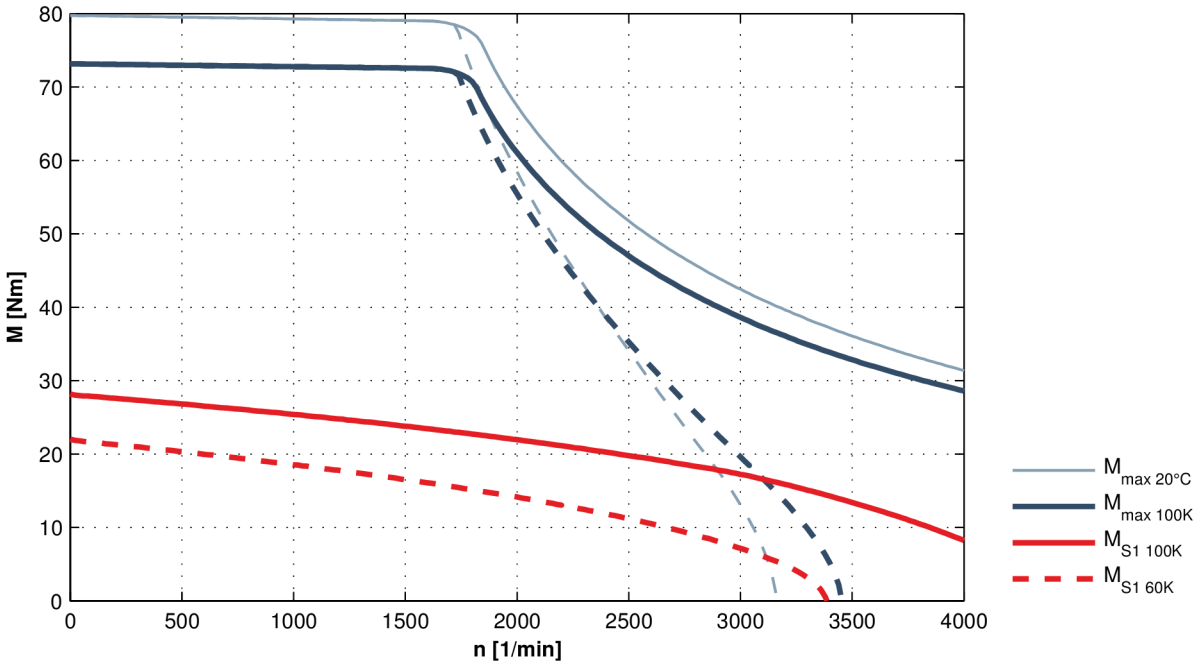
Tab. 4-40: Technical data MS2N07-D0BHN

Speed-torque characteristic curve MS2N07-D0BHN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-41: Speed-torque characteristic curve MS2N07-D0BHN

Technical data

MS2N07-D1BHN

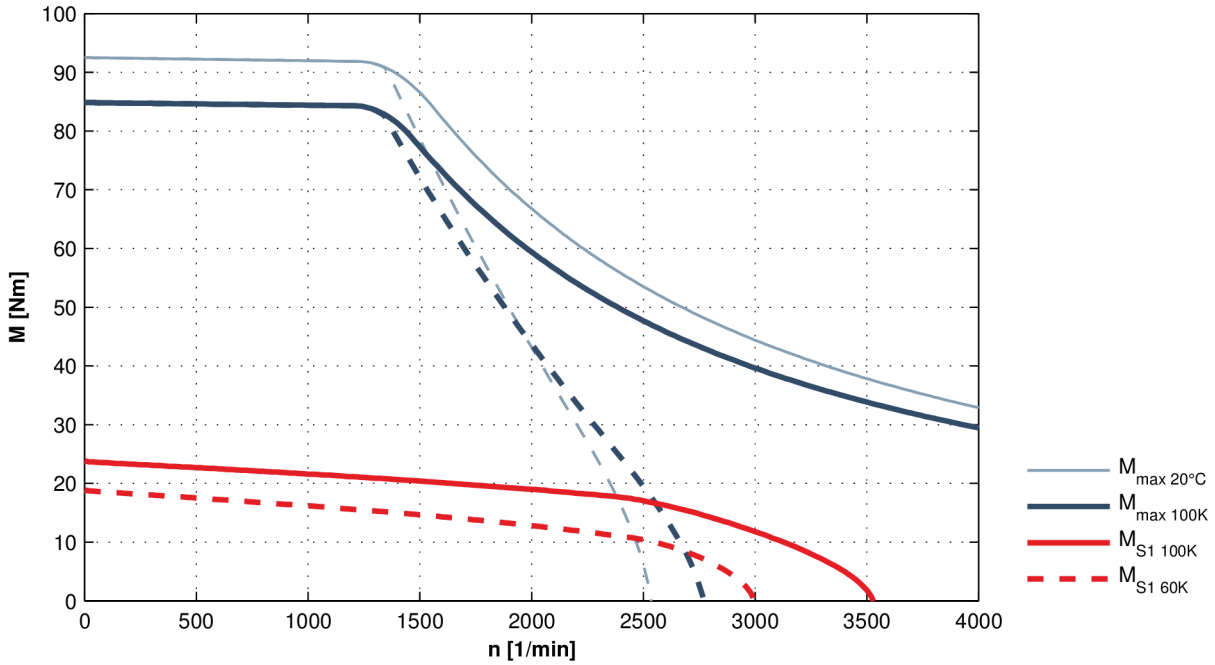
Designation	Symbol	Unit	Tolerance	MS2N07-D1BHN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	18.9
Standstill current (60 K)	$I_{0\ 60K}$	A		7.8
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	23.8
Standstill current (100 K)	$I_{0\ 100K}$	A		9.9
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00529
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00570
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2000
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	18.5
Rated current (100K)	$I_{N\ 100K}$	A		7.95
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	3.87
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	92.5
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	84.8
Maximum current	$I_{max(eff)}$	A		42.7
Max. speed (electrical)	$n_{max\ el}$	1/rpm		4000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	2.59
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	157.5
Winding resistance at 20 °C	R_{12}	Ohm		1.56
Winding inductivity	L_{12_min}	mH		12.8
Discharge capacity of the component	C_{dis}	nF		3.1
Thermal time constant of winding	T_{th_W}	s		43.8
Thermal time constant of motor	T_{th_M}	min		18.7
Mass without brake	m_{mot}	kg		17.5
Mass with brake	m_{mot}	kg		20.0
Holding brake data				Size 2
Holding torque	M_4	Nm		36
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.94
Maximum connection time	t_1	ms		60
Maximum disconnection time	t_2	ms		200

Latest amendment: 2016-06-13

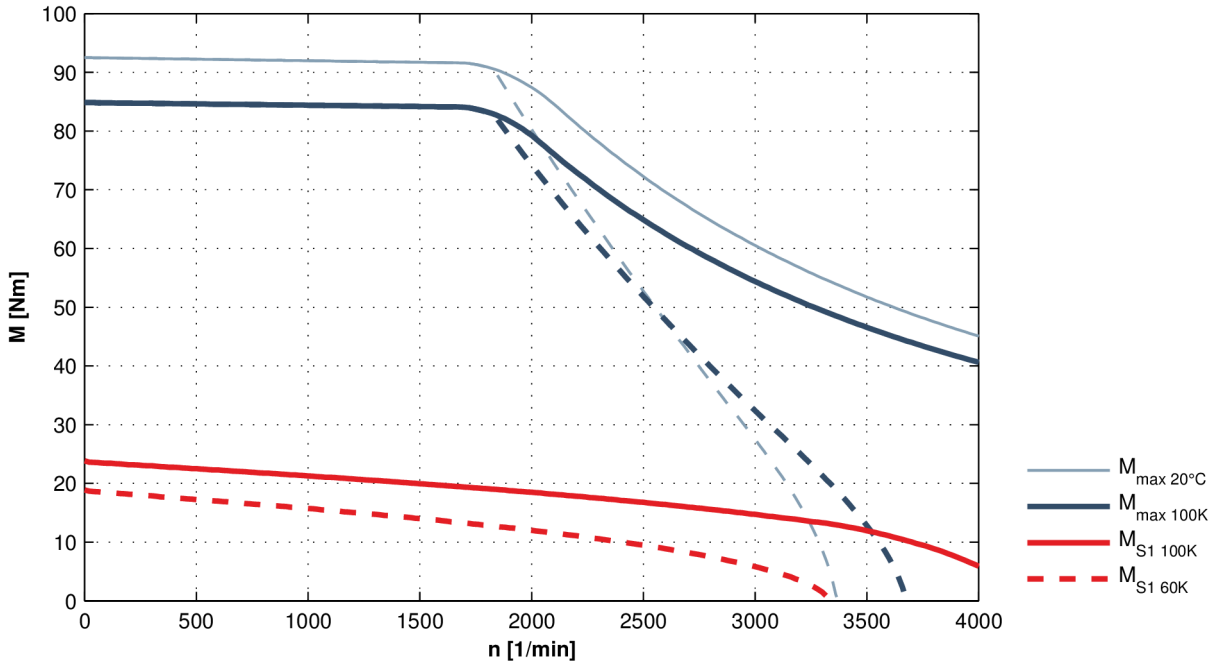
Tab. 4-42: Technical data MS2N07-D1BHN

Speed-torque characteristic curve MS2N07-D1BHN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-43: Speed-torque characteristic curve MS2N07-D1BHN

Technical data

MS2N07-D0BRN

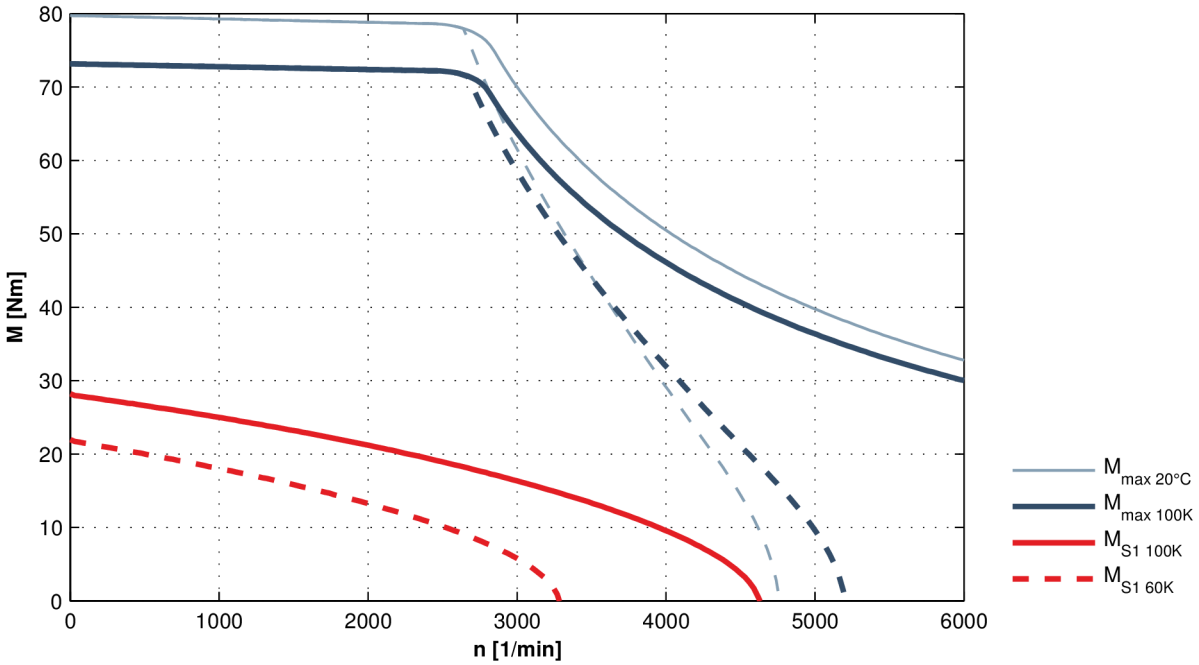
Designation	Symbol	Unit	Tolerance	MS2N07-D0BRN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	22
Standstill current (60 K)	$I_{0\ 60K}$	A		17.1
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	28.2
Standstill current (100 K)	$I_{0\ 100K}$	A		22.3
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.0021
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00251
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		3020
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	14.7
Rated current (100K)	$I_{N\ 100K}$	A		12.15
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	4.64
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	79.7
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	73.2
Maximum current	$I_{max(eff)}$	A		72.7
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.38
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	83.9
Winding resistance at 20 °C	R_{12}	Ohm		0.327
Winding inductivity	L_{12_min}	mH		5.06
Discharge capacity of the component	C_{dis}	nF		3.95
Thermal time constant of winding	T_{th_W}	s		54.0
Thermal time constant of motor	T_{th_M}	min		18.7
Mass without brake	m_{mot}	kg		17.5
Mass with brake	m_{mot}	kg		20
Holding brake data				Size 2
Holding torque	M_4	Nm		36
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.94
Maximum connection time	t_1	ms		60
Maximum disconnection time	t_2	ms		200

Latest amendment: 2016-06-13

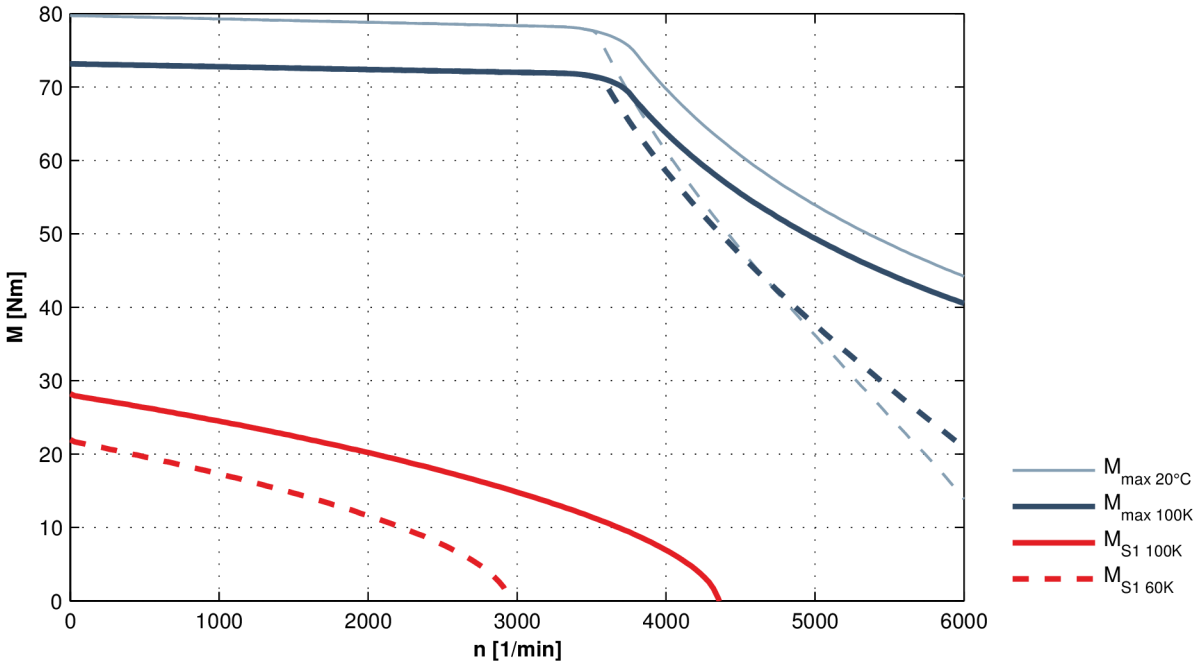
Tab. 4-44: Technical data MS2N07-D0BRN

Speed-torque characteristic curve MS2N07-D0BRN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-45: Speed-torque characteristic curve MS2N07-D0BRN

Technical data

MS2N07-D1BNN

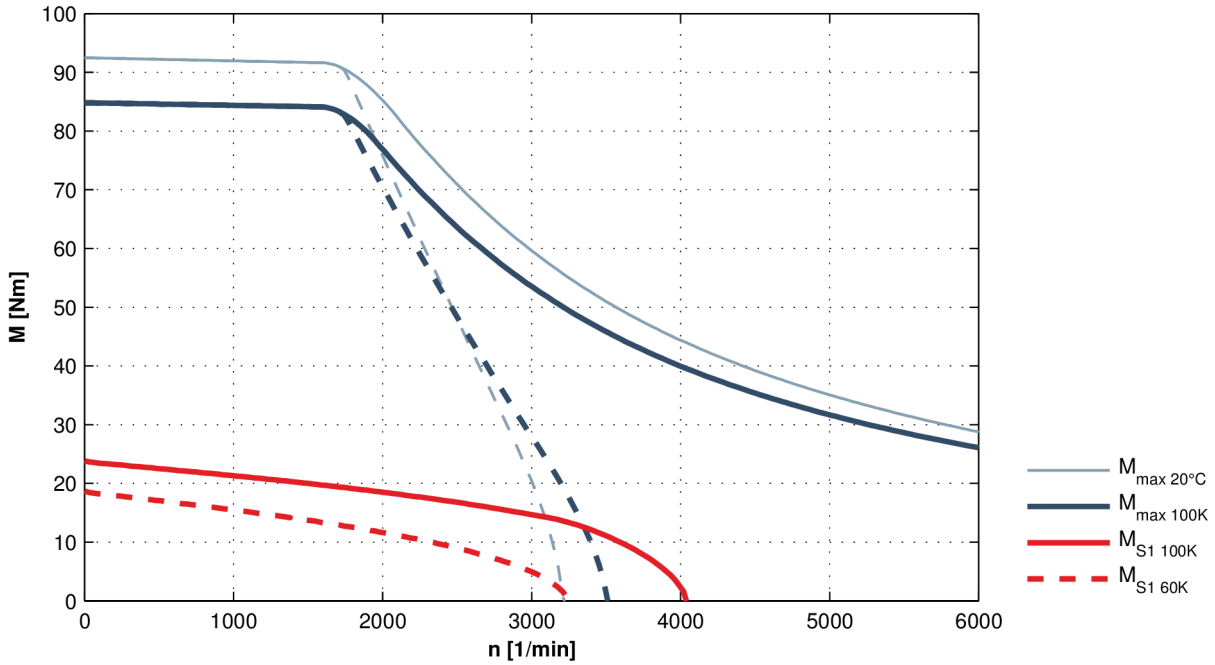
Designation	Symbol	Unit	Tolerance	MS2N07-D1BNN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	18.9
Standstill current (60 K)	$I_{0\ 60K}$	A		9.9
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	23.8
Standstill current (100 K)	$I_{0\ 100K}$	A		12.5
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00529
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00570
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		3000
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	13.6
Rated current (100K)	$I_{N\ 100K}$	A		7.6
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	4.28
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	92.5
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	84.8
Maximum current	$I_{max(eff)}$	A		54.1
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	2.05
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	124.3
Winding resistance at 20 °C	R_{12}	Ohm		0.95
Winding inductivity	L_{12_min}	mH		7.9
Discharge capacity of the component	C_{dis}	nF		3.0
Thermal time constant of winding	T_{th_W}	s		43.8
Thermal time constant of motor	T_{th_M}	min		18.7
Mass without brake	m_{mot}	kg		17.5
Mass with brake	m_{mot}	kg		20.0
Holding brake data				Size 2
Holding torque	M_4	Nm		36
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.94
Maximum connection time	t_1	ms		60
Maximum disconnection time	t_2	ms		200

Latest amendment: 2016-06-13

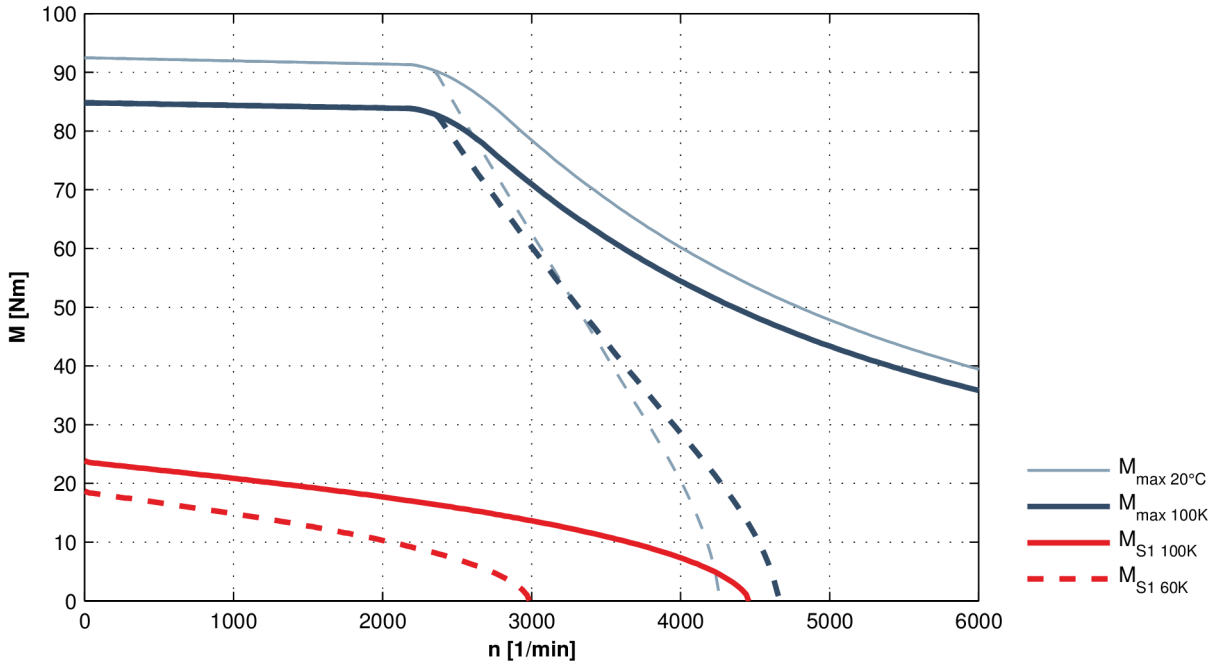
Tab. 4-46: Technical data MS2N07-D1BNN

Speed-torque characteristic curve MS2N07-D1BNN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-47: Speed-torque characteristic curve MS2N07-D1BNN

Technical data

MS2N07-E0BHN

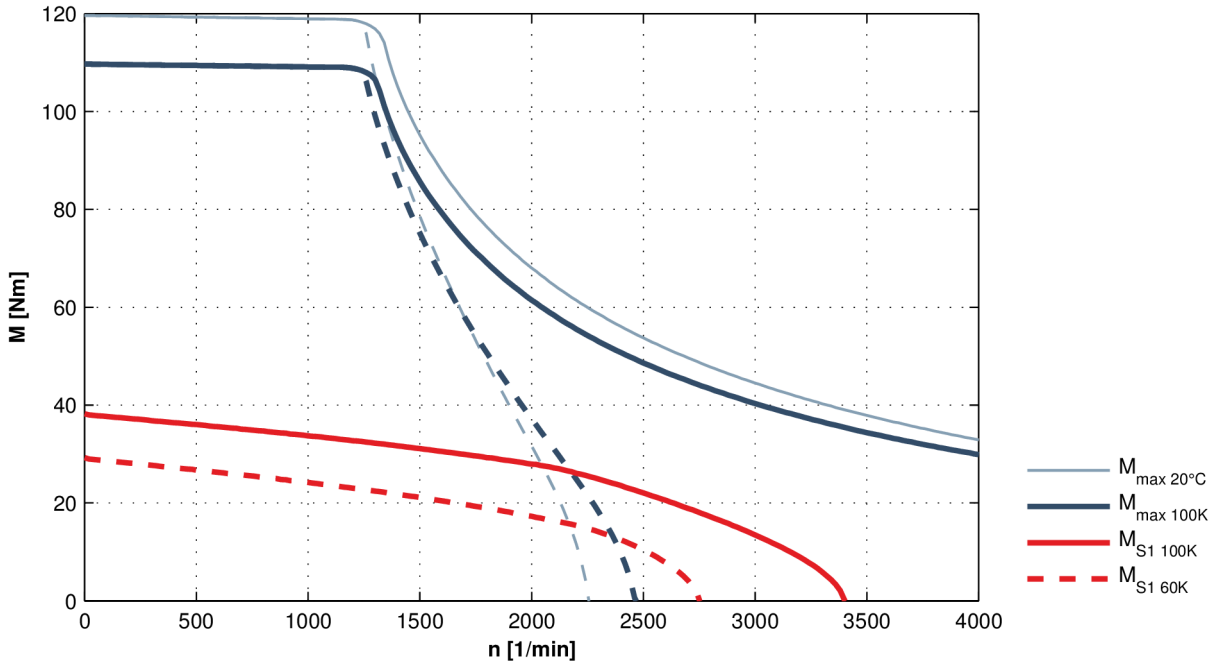
Designation	Symbol	Unit	Tolerance	MS2N07-E0BHN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	29.2
Standstill current (60 K)	$I_{0\ 60K}$	A		10.75
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	38.2
Standstill current (100 K)	$I_{0\ 100K}$	A		14.2
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.003
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00341
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2000
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	27.3
Rated current (100K)	$I_{N\ 100K}$	A		10.45
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	5.70
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	119.5
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	109.5
Maximum current	$I_{max(eff)}$	A		51.8
Max. speed (electrical)	$n_{max\ el}$	1/rpm		4000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	2.92
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	177.2
Winding resistance at 20 °C	R_{12}	Ohm		0.91
Winding inductivity	L_{12_min}	mH		14.8
Discharge capacity of the component	C_{dis}	nF		7.1
Thermal time constant of winding	T_{th_W}	s		60.8
Thermal time constant of motor	T_{th_M}	min		21.7
Mass without brake	m_{mot}	kg		23
Mass with brake	m_{mot}	kg		26
Holding brake data				Size 2
Holding torque	M_4	Nm		36
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.94
Maximum connection time	t_1	ms		60
Maximum disconnection time	t_2	ms		200

Latest amendment: 2016-06-13

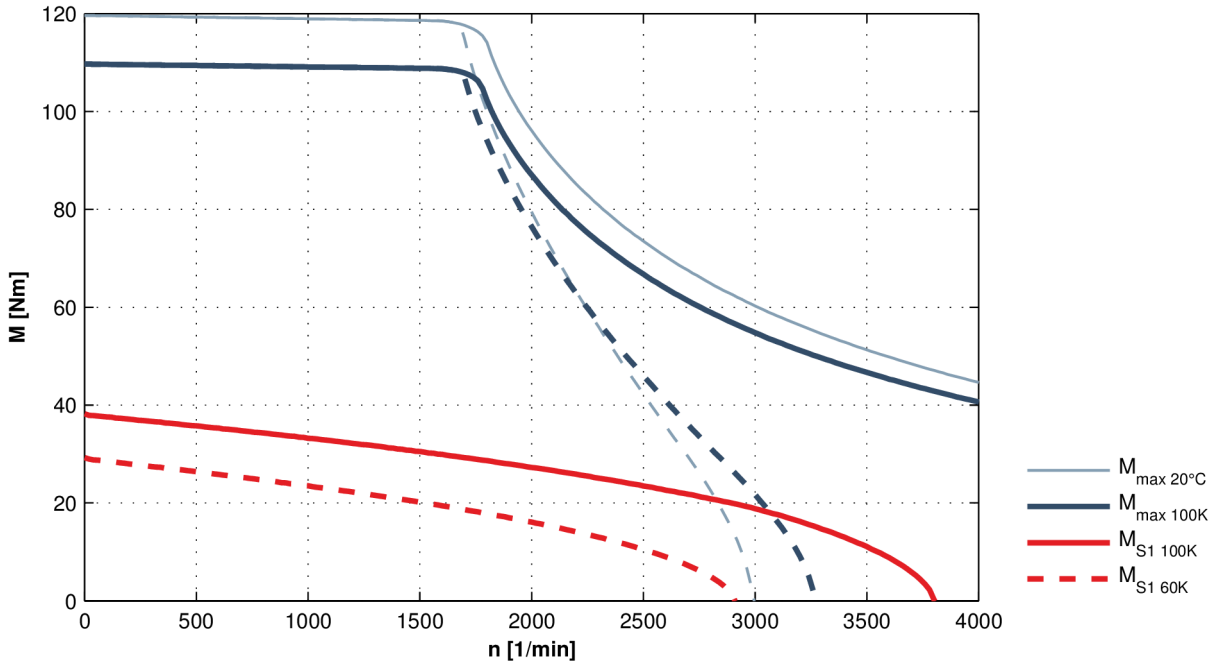
Tab. 4-48: Technical data MS2N07-E0BHN

Speed-torque characteristic curve MS2N07-E0BHN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-49: Speed-torque characteristic curve MS2N07-E0BHN

Technical data

MS2N07-E0BNN

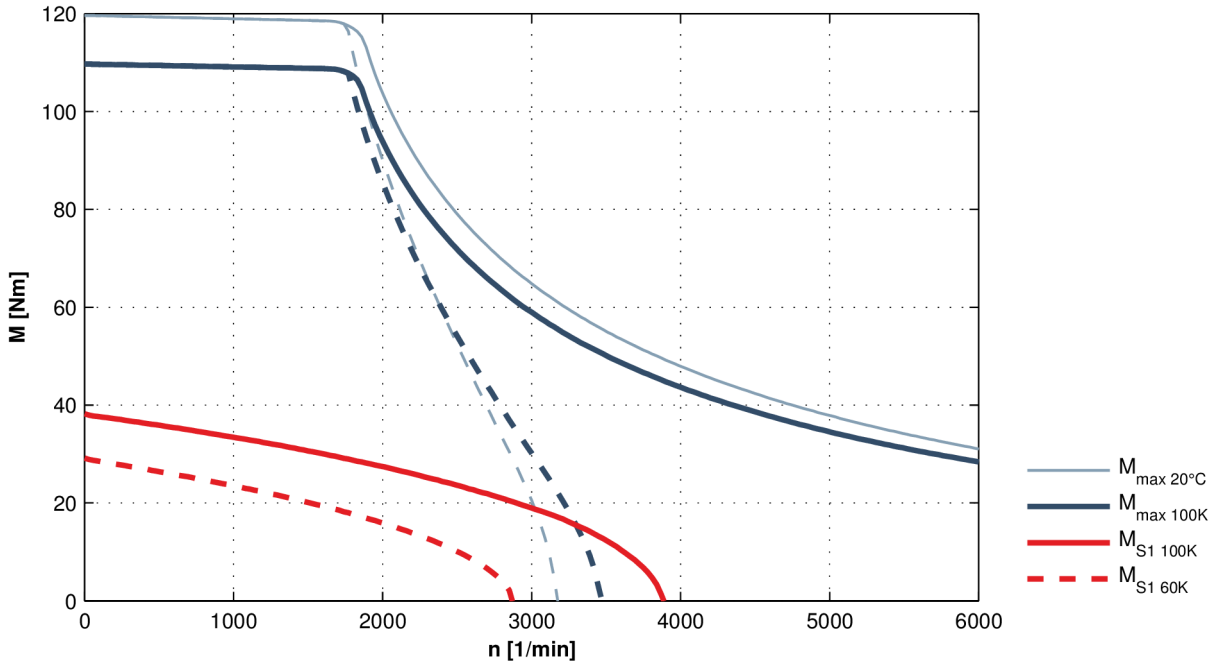
Designation	Symbol	Unit	Tolerance	MS2N07-E0BNN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	29.2
Standstill current (60 K)	$I_{0\ 60K}$	A		15.1
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	38.2
Standstill current (100 K)	$I_{0\ 100K}$	A		20.0
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.0030
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00341
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2600
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	21.5
Rated current (100K)	$I_{N\ 100K}$	A		11.75
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	5.85
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	119.5
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	109.5
Maximum current	$I_{max(eff)}$	A		72.7
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	2.07
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	126.0
Winding resistance at 20 °C	R_{12}	Ohm		0.461
Winding inductivity	L_{12_min}	mH		7.50
Discharge capacity of the component	C_{dis}	nF		6.11
Thermal time constant of winding	T_{th_W}	s		60.8
Thermal time constant of motor	T_{th_M}	min		21.7
Mass without brake	m_{mot}	kg		23
Mass with brake	m_{mot}	kg		26
Holding brake data				Size 2
Holding torque	M_4	Nm		36
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.94
Maximum connection time	t_1	ms		60
Maximum disconnection time	t_2	ms		200

Latest amendment: 2016-06-13

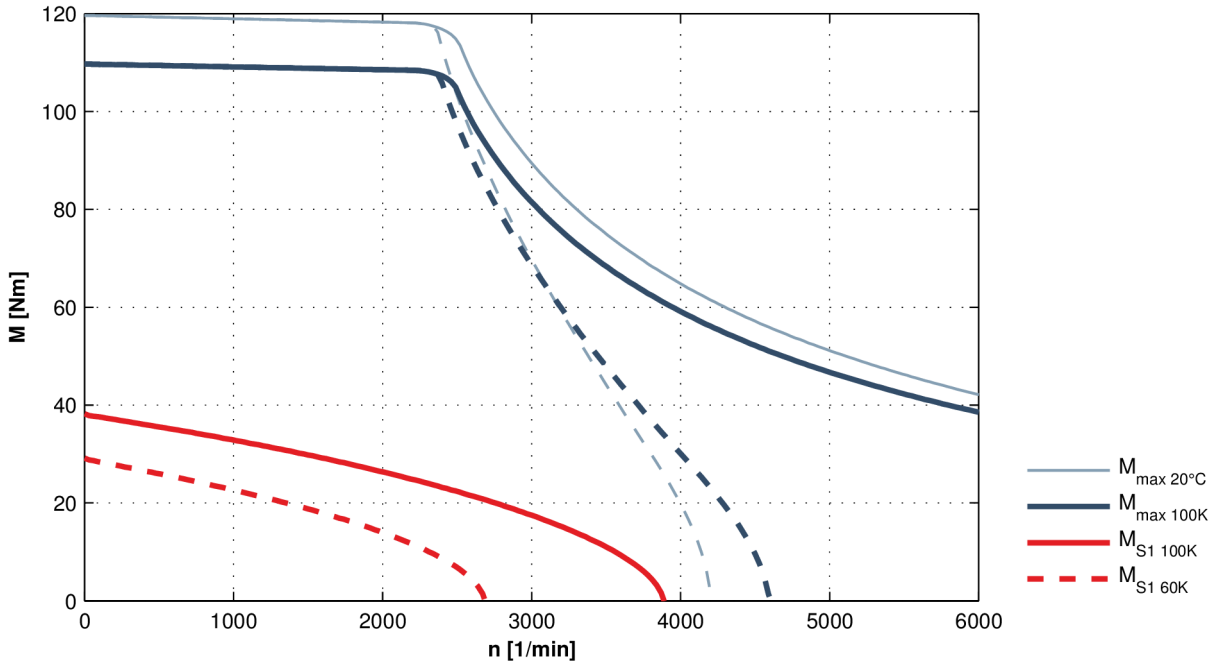
Tab. 4-50: Technical data MS2N07-E0BNN

Speed-torque characteristic curve MS2N07-E0BNN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-51: Speed-torque characteristic curve MS2N07-E0BNN

Technical data

MS2N07-E0BQN

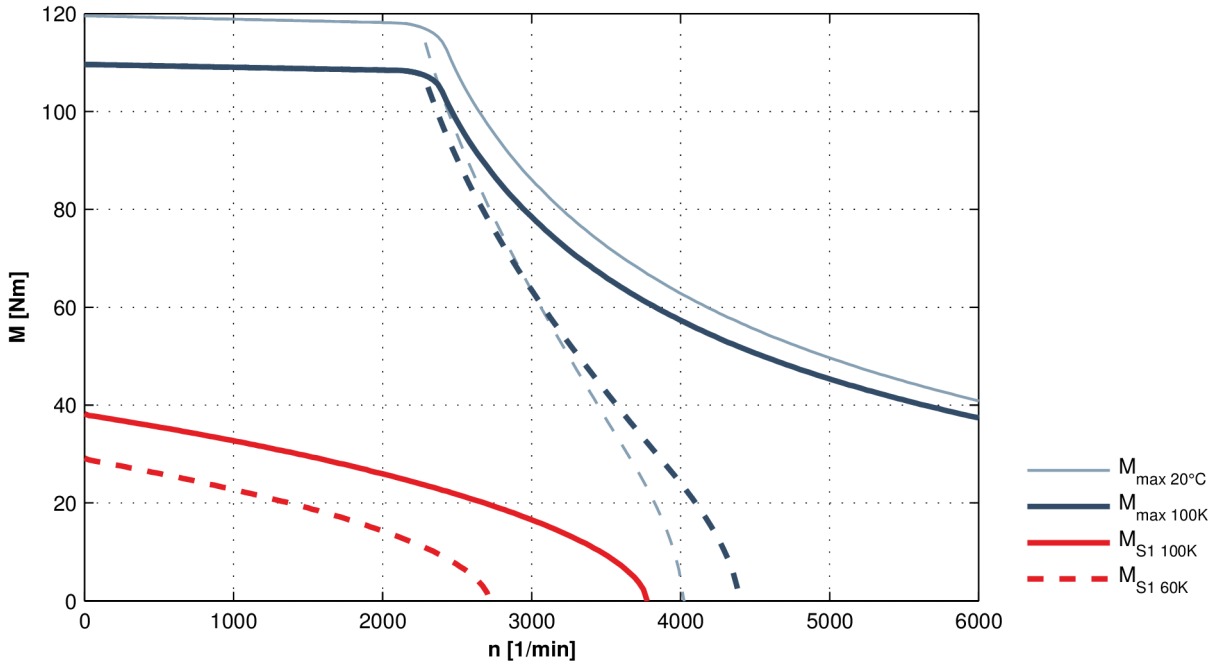
Designation	Symbol	Unit	Tolerance	MS2N07-E0BQN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	29.2
Standstill current (60 K)	$I_{0\ 60K}$	A		19.1
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	38.2
Standstill current (100 K)	$I_{0\ 100K}$	A		25.3
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.0030
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00341
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2570
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	19.0
Rated current (100K)	$I_{N\ 100K}$	A		13.25
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	5.1
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	119.5
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	109.5
Maximum current	$I_{max(eff)}$	A		92.3
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant	K_m	Nm/A	± 5%	1.64
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	99.3
Winding resistance at 20 °C	R_{12}	Ohm		0.282
Winding inductivity	L_{12_min}	mH		4.64
Discharge capacity of the component	C_{dis}	nF		6.21
Thermal time constant of winding	T_{th_W}	s		60.8
Thermal time constant of motor	T_{th_M}	min		21.7
Mass without brake	m_{mot}	kg		23
Mass with brake	m_{mot}	kg		26
Holding brake data				Size 2
Holding torque	M_4	Nm		36
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.94
Maximum connection time	t_1	ms		60
Maximum disconnection time	t_2	ms		200

Latest amendment: 2016-06-13

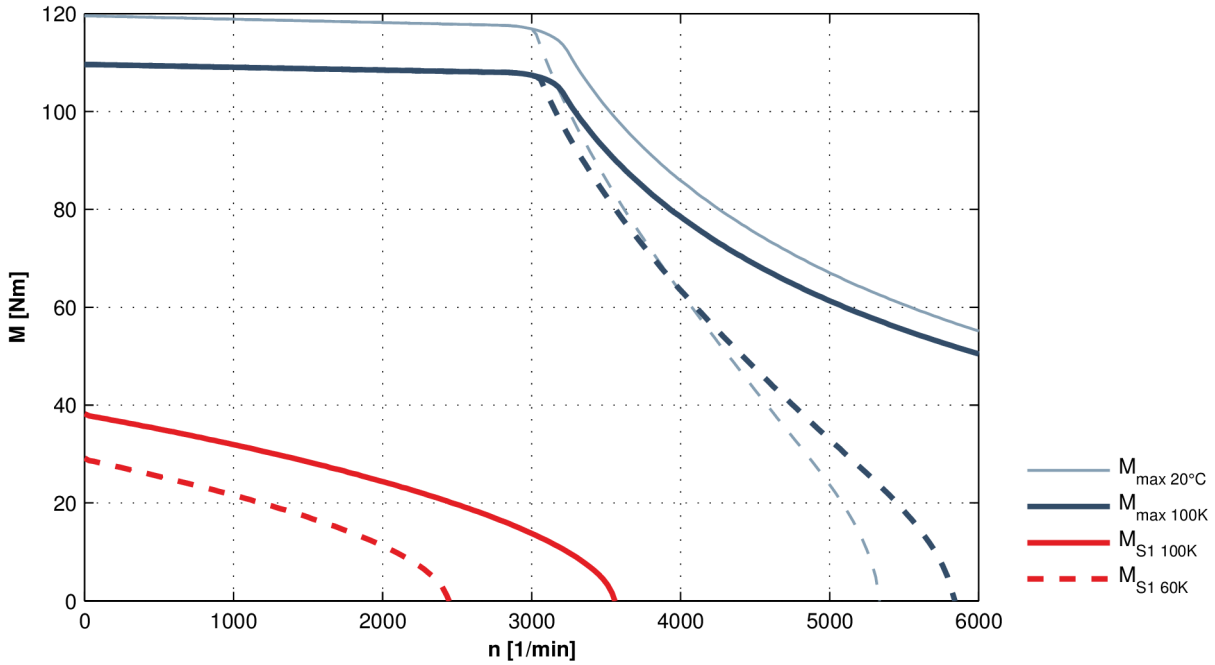
Tab. 4-52: Technical data MS2N07-E0BQN

Speed-torque characteristic curve MS2N07-E0BQN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-53: Speed-torque characteristic curve MS2N07-E0BQN

Technical data

MS2N07-E1BNN

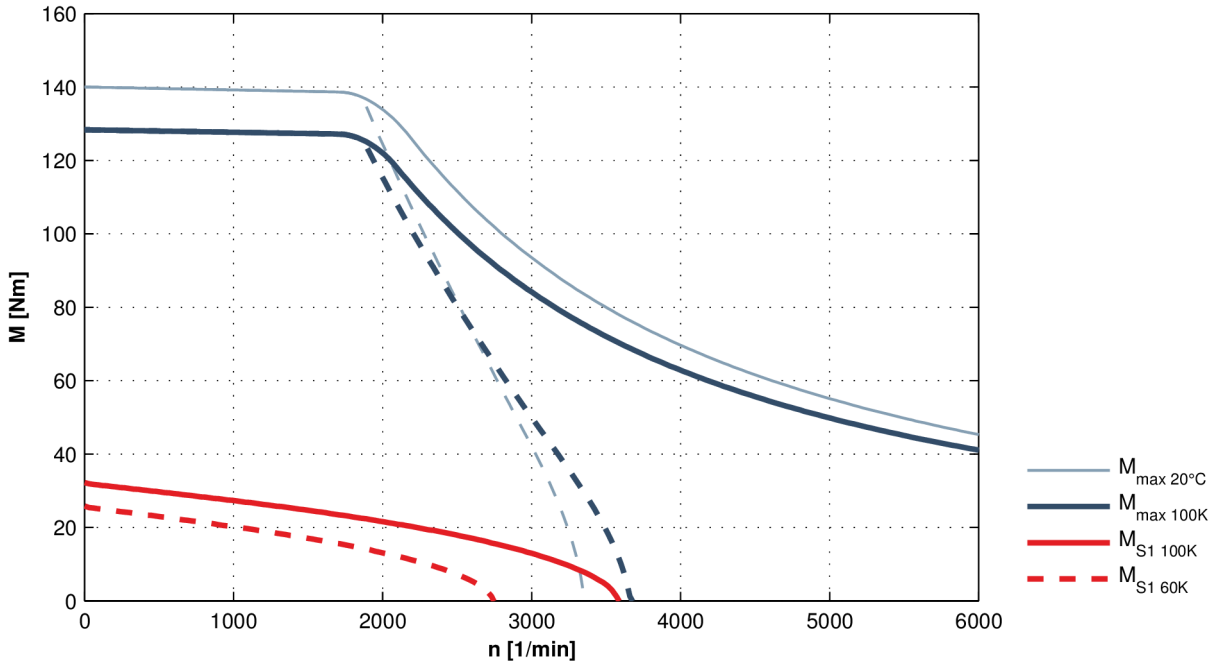
Designation	Symbol	Unit	Tolerance	MS2N07-E1BNN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	25.8
Standstill current (60 K)	$I_{0\ 60K}$	A		14.1
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	32.2
Standstill current (100 K)	$I_{0\ 100K}$	A		17.7
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00752
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00793
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2500
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	15.6
Rated current (100K)	$I_{N\ 100K}$	A		9.15
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	4.08
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	140
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	128.5
Maximum current	$I_{max(eff)}$	A		85.4
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.96
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	119.0
Winding resistance at 20 °C	R_{12}	Ohm		0.532
Winding inductivity	L_{12_min}	mH		5.12
Discharge capacity of the component	C_{dis}	nF		4.65
Thermal time constant of winding	T_{th_W}	s		47.5
Thermal time constant of motor	T_{th_M}	min		21.7
Mass without brake	m_{mot}	kg		23
Mass with brake	m_{mot}	kg		26
Holding brake data				Size 2
Holding torque	M_4	Nm		36
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		0.94
Maximum connection time	t_1	ms		60
Maximum disconnection time	t_2	ms		200

Latest amendment: 2016-06-13

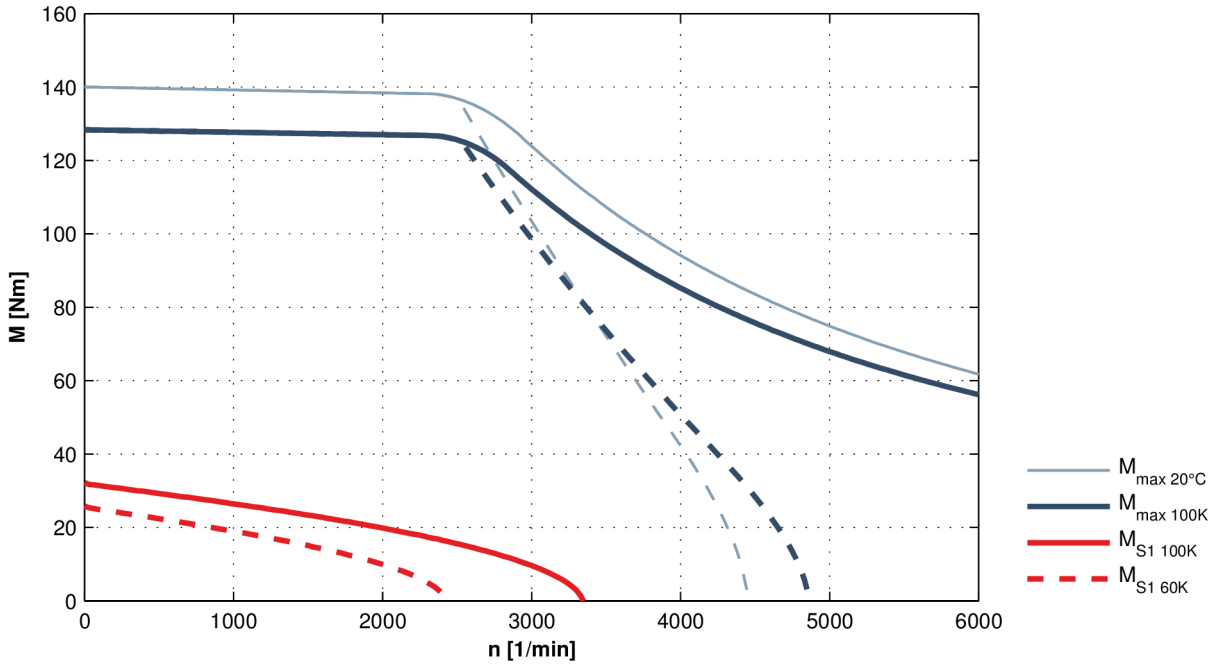
Tab. 4-54: Technical data MS2N07-E1BNN

Speed-torque characteristic curve MS2N07-E1BNN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-55: Speed-torque characteristic curve MS2N07-E1BNN

Technical data

4.5.2 Technical data forced ventilation

MS2N07-D1BHA/B

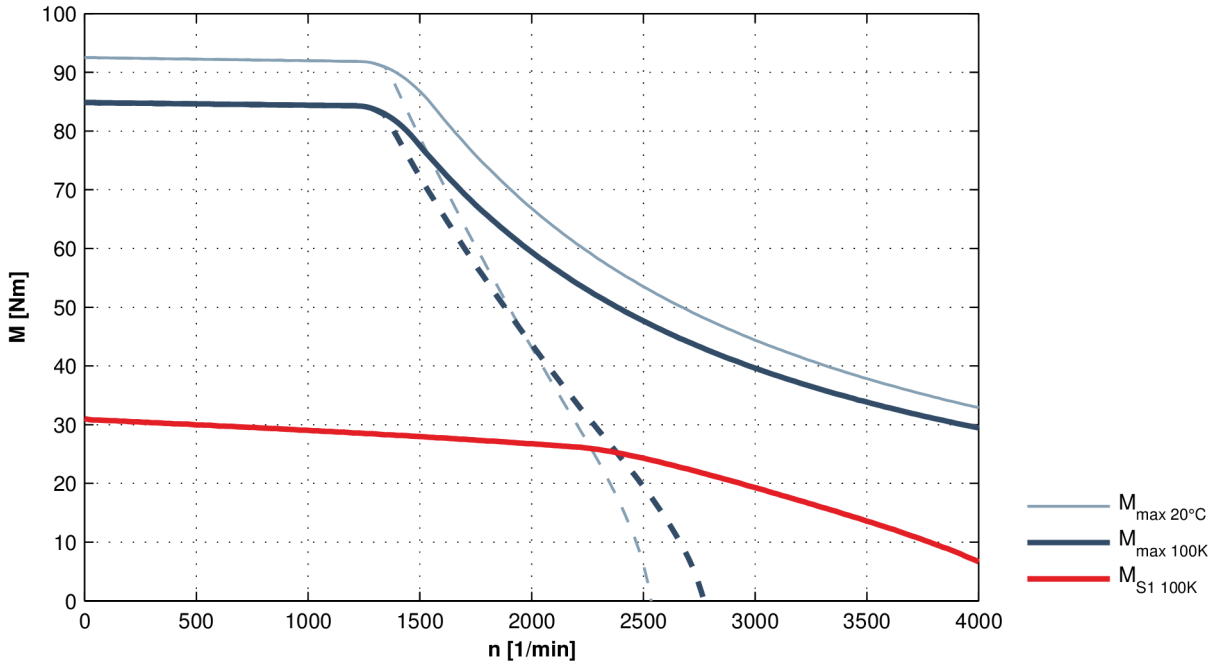
Designation	Symbol	Unit	Tolerance	MS2N07-D1BHA	MS2N07-D1BHB
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	31.0	
Standstill current (100 K)	$I_{0\ 100K}$	A		12.9	
Moment of inertia of rotor without brake	J_{red}	kg*m²	± 10%	0.00529	
Moment of inertia of rotor with brake	J_{red}	kg*m²	± 10%	0.00570	
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2000	
Rated speed (100K)	$M_{N\ 100K}$		± 5%	26.4	
Rated current (100K)	$I_{N\ 100K}$	A		11.25	
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	5.50	
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	92.5	
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	84.8	
Maximum current	$I_{max(eff)}$	A		42.7	
Max. speed (electrical)	$n_{max\ el}$	1/rpm		4000	
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000	
Number of pole pairs	p			5	
Torque constant at 20 °C	K_m	Nm/A	± 5%	2.59	
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	157.5	
Winding resistance at 20 °C	R_{12}	Ohm		1.56	
Winding inductivity	L_{12_min}	mH		12.8	
Discharge capacity of the component	C_{dis}	nF		3.1	
Thermal time constant of winding	T_{th_W}	s		38.9	
Thermal time constant of motor	T_{th_M}	min		10.7	
Mass without brake	m_{mot}			20.5	
Mass with brake	m_{mot}			23.0	
Holding brake data				Size 2	
Holding torque	M_4			36	
Rated voltage	U_N		± 10%	24	
Rated current	I_N			0.94	
Maximum connection time	t_1			60	
Maximum disconnection time	t_2			200	
Fan data				A	B
Rated voltage	U_N	V		230	115
Rated current	I_N	A		0.20/0.18	0.45
Frequency	f_N	Hz		50/60	60

Latest amendment: 2016-06-13

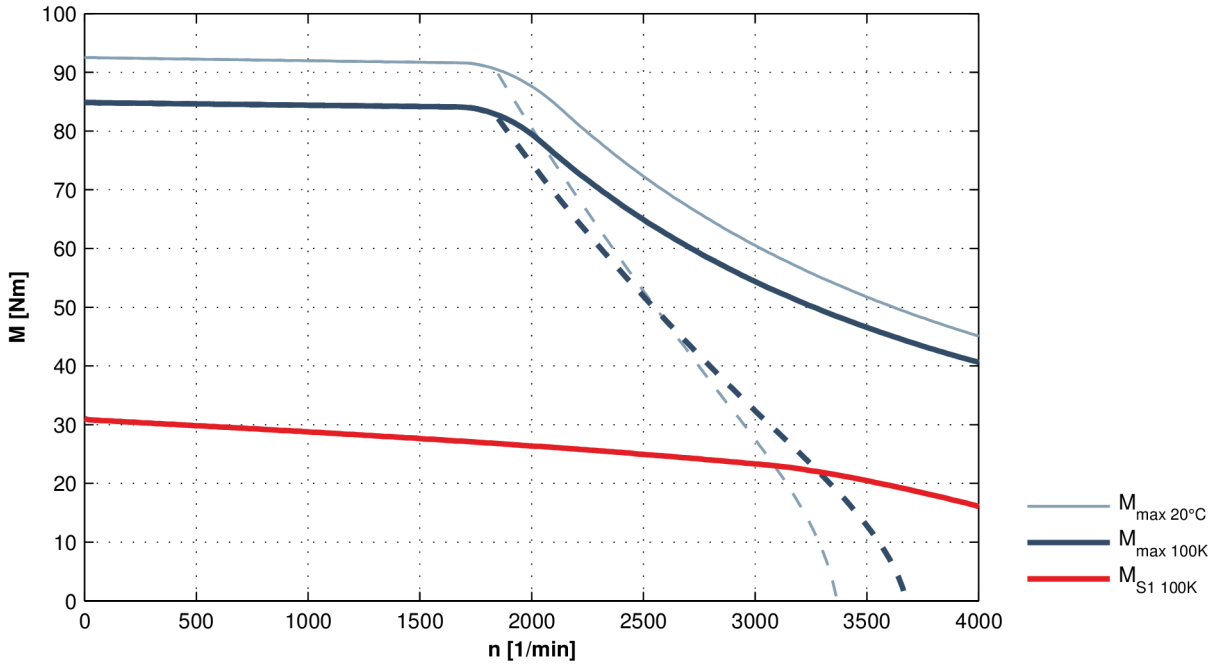
Tab. 4-56: Technical data MS2N07-D1BHA/B

Speed-torque characteristic curve MS2N07-D1BHA/B

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-57: Speed-torque characteristic curve MS2N07-D1BHA/B

Technical data

MS2N07-D1BNA/B

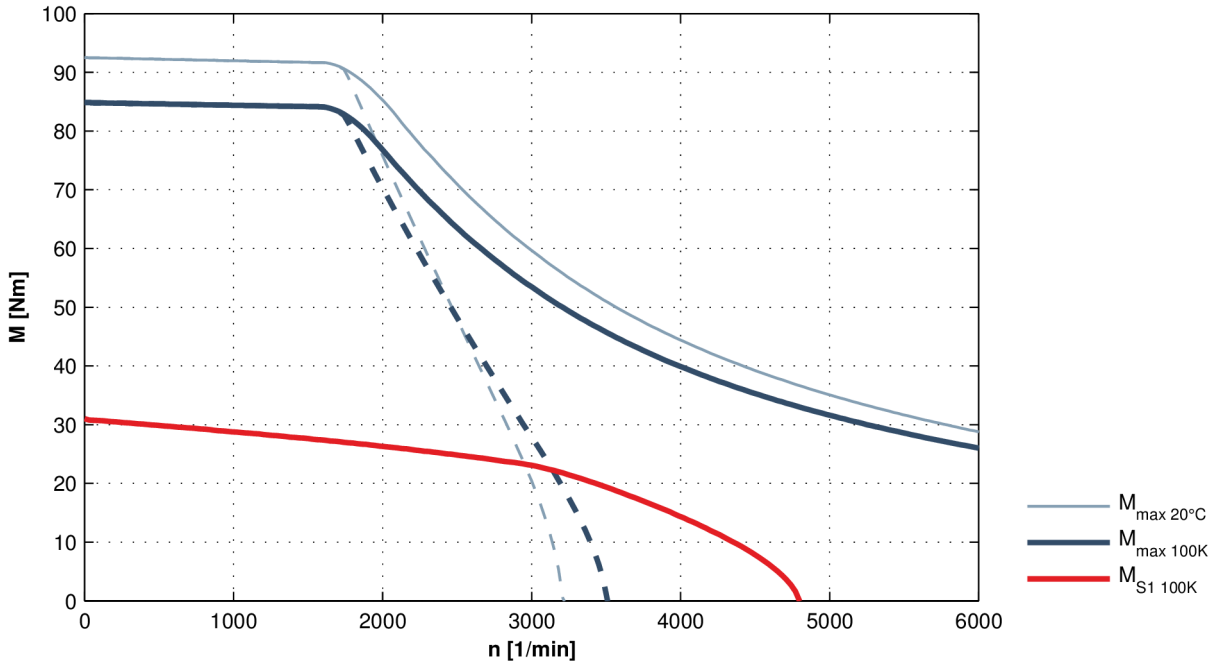
Designation	Symbol	Unit	Tolerance	MS2N07-D1BNA	MS2N07-D1BNB
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	31	
Standstill current (100 K)	$I_{0\ 100K}$	A		16.3	
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00529	
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00570	
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2870	
Rated speed (100K)	$M_{N\ 100K}$		± 5%	23	
Rated current (100K)	$I_{N\ 100K}$	A		12.55	
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	6.9	
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	92.5	
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	84.8	
Maximum current	$I_{max(eff)}$	A		54.1	
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000	
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000	
Number of pole pairs	p			5	
Torque constant at 20 °C	K_m	Nm/A	± 5%	2.05	
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	124.3	
Winding resistance at 20 °C	R_{12}	Ohm		0.952	
Winding inductivity	L_{12_min}	mH		7.9	
Discharge capacity of the component	C_{dis}	nF		3.0	
Thermal time constant of winding	T_{th_W}	s		38.9	
Thermal time constant of motor	T_{th_M}	min		10.7	
Mass without brake	m_{mot}			20.5	
Mass with brake	m_{mot}			23	
Holding brake data				Size 2	
Holding torque	M_4			36	
Rated voltage	U_N		± 10%	24	
Rated current	I_N			0.94	
Maximum connection time	t_1			60	
Maximum disconnection time	t_2			200	
Fan data				A	B
Rated voltage	U_N	V		230	115
Rated current	I_N	A		0.20/0.18	0.45
Frequency	f_N	Hz		50/60	60

Latest amendment: 2016-06-13

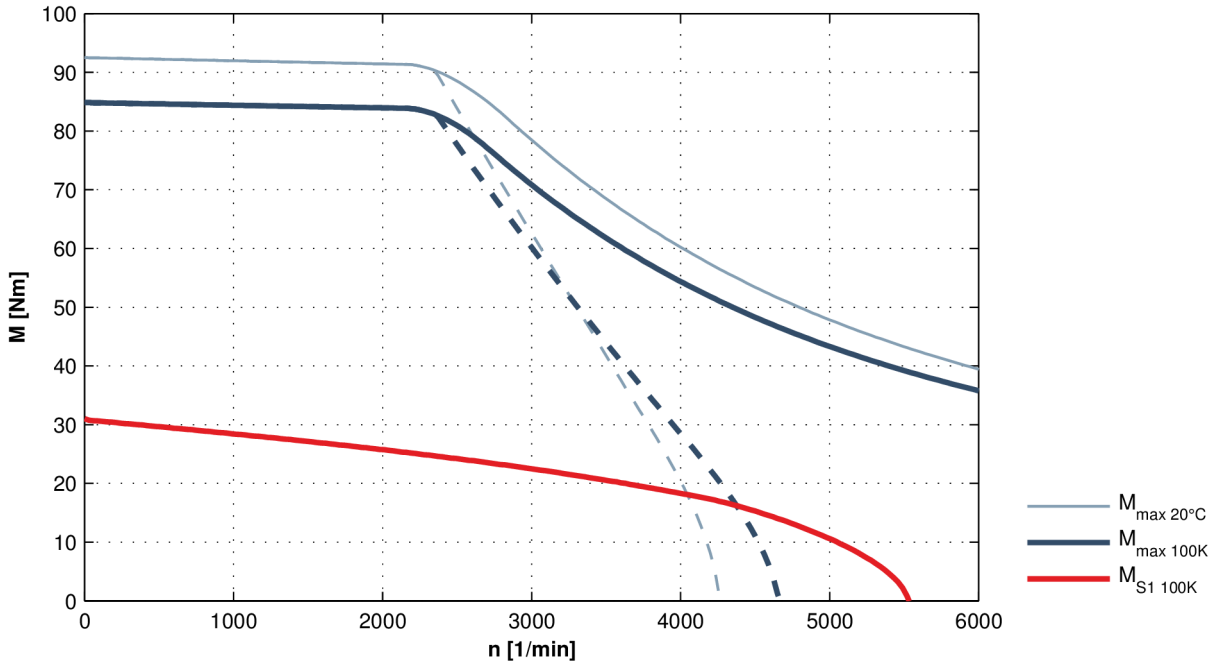
Tab. 4-58: Technical data MS2N07-D1BNA/B

Speed-torque characteristic curves MS2N07-D1BNA/B

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-59: Speed-torque characteristic curves MS2N07-D1BNA/B

Technical data

MS2N07-E0BNA/B

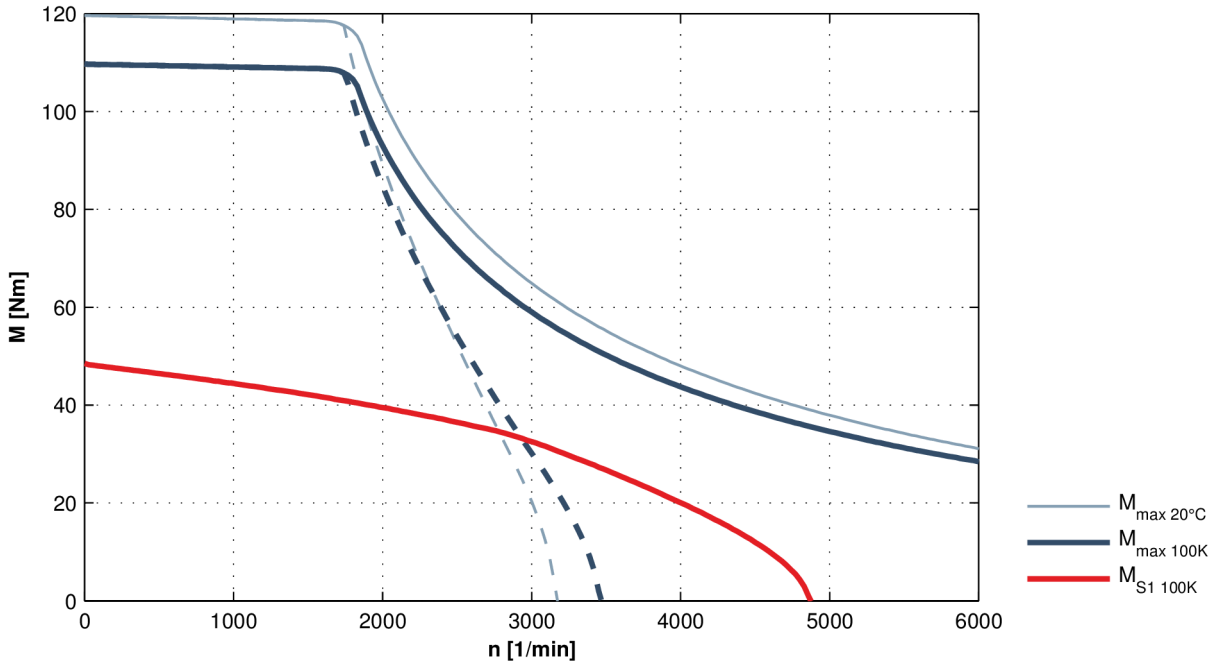
Designation	Symbol	Unit	Tolerance	MS2N07-E0BNA	MS2N07-E0BNB
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	48.5	
Standstill current (100 K)	$I_{0\ 100K}$	A		25.6	
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.003	
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00341	
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2750	
Rated torque (100K)	$M_{N\ 100K}$		± 5%	33.8	
Rated current (100K)	$I_{N\ 100K}$	A		18.2	
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	9.75	
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	119.5	
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	109.5	
Maximum current	$I_{max(eff)}$	A		72.7	
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000	
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000	
Number of pole pairs	p			5	
Torque constant at 20 °C	K_m	Nm/A	± 5%	2.08	
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	126.2	
Winding resistance at 20 °C	R_{12}	Ohm		0.455	
Winding inductivity	L_{12_min}	mH		7.50	
Discharge capacity of the component	C_{dis}	nF		6.11	
Thermal time constant of winding	T_{th_W}	s		52.9	
Thermal time constant of motor	T_{th_M}	min		12.1	
Mass without brake	m_{mot}			26	
Mass with brake	m_{mot}			29	
Holding brake data				Size 2	
Holding torque	M_4			36	
Rated voltage	U_N		± 10%	24	
Rated current	I_N			0.94	
Maximum connection time	t_1			60	
Maximum disconnection time	t_2			200	
Fan data				A	B
Rated voltage	U_N	V		230	115
Rated current	I_N	A		0.20/0.18	0.45
Frequency	f_N	Hz		50/60	60

Latest amendment: 2016-06-09

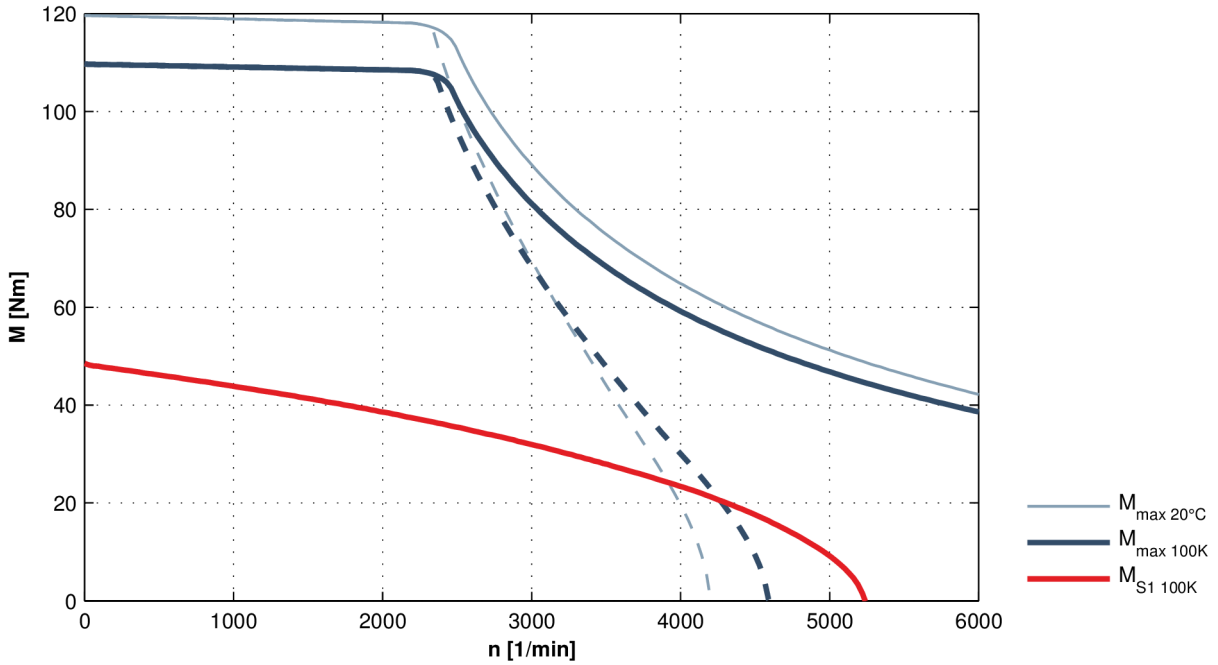
Tab. 4-60: Technical data MS2N07-E0BNA/B

Speed-torque characteristic curve MS2N07-E0BNA/B

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-61: Speed-torque characteristic curve MS2N07-E0BNA/B

Technical data

MS2N07-E0BQA/B

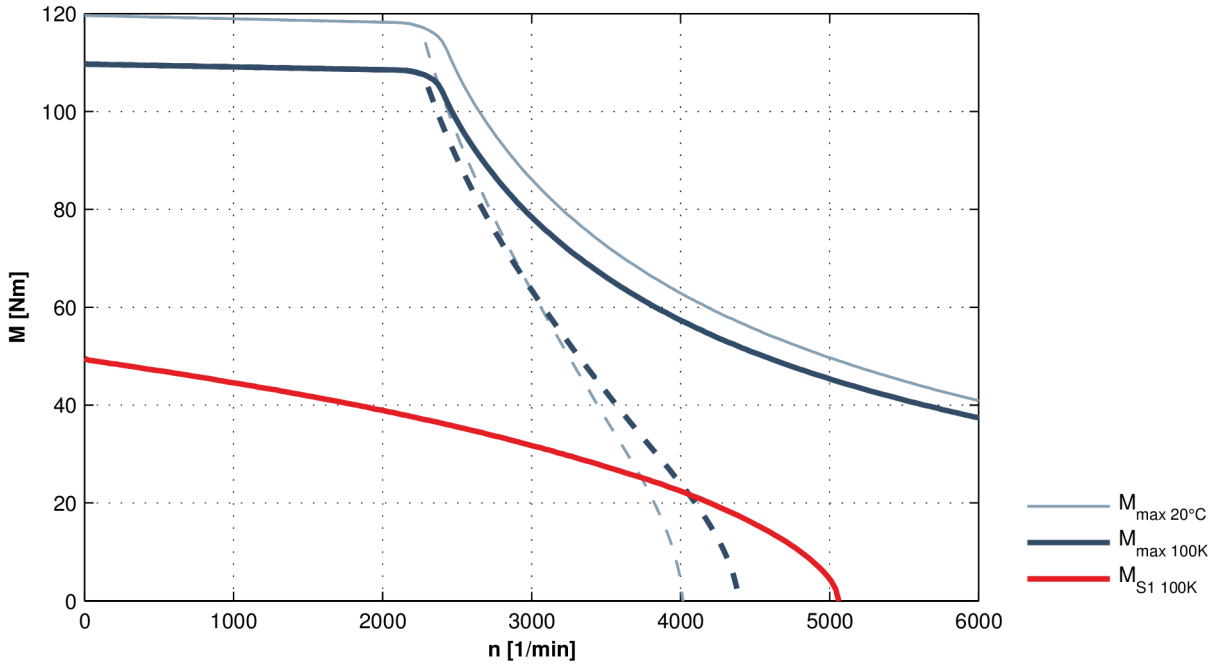
Designation	Symbol	Unit	Tolerance	MS2N07-E0BQA	MS2N07-E0BQB
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	49.5	
Standstill current (100 K)	$I_{0\ 100K}$	A		33.3	
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00300	
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00341	
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		3300	
Rated speed (100K)	$M_{N\ 100K}$		± 5%	27.3	
Rated current (100K)	$I_{N\ 100K}$	A		19.0	
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	9.45	
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	119.5	
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	109.5	
Maximum current	$I_{max(eff)}$	A		92.3	
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000	
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000	
Number of pole pairs	p			5	
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.64	
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	99.37	
Winding resistance at 20 °C	R_{12}	Ohm		0.282	
Winding inductivity	L_{12_min}	mH		4.64	
Discharge capacity of the component	C_{dis}	nF		6.21	
Thermal time constant of winding	T_{th_W}	s		52.9	
Thermal time constant of motor	T_{th_M}	min		12.1	
Mass without brake	m_{mot}			26	
Mass with brake	m_{mot}			29	
Holding brake data				Size 2	
Holding torque	M_4			36	
Rated voltage	U_N		± 10%	24	
Rated current	I_N			0.94	
Maximum connection time	t_1			60	
Maximum disconnection time	t_2			200	
Fan data				A	B
Rated voltage	U_N	V		230	115
Rated current	I_N	A		0.20/0.18	0.45
Frequency	f_N	Hz		50/60	60

Latest amendment: 2016-06-09

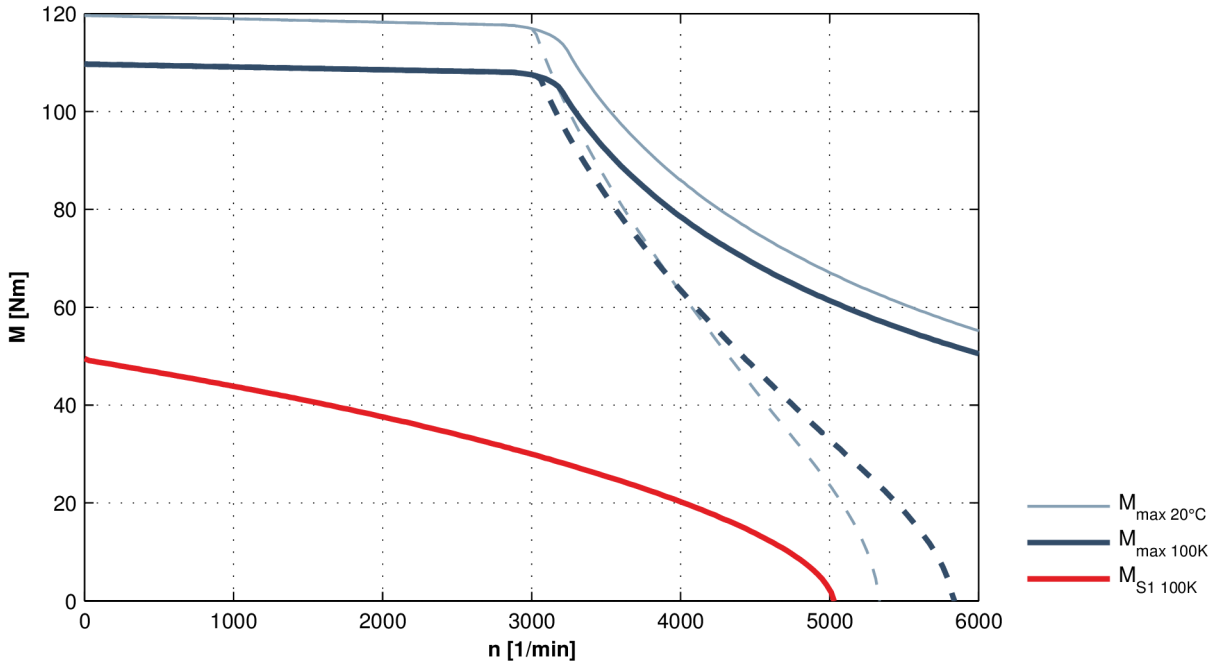
Tab. 4-62: Technical data MS2N07-E0BQA/B

Speed-torque characteristic curve MS2N07-E0BQA/B

IndraDrive, uncontrolled feed 3 × AC 400 V



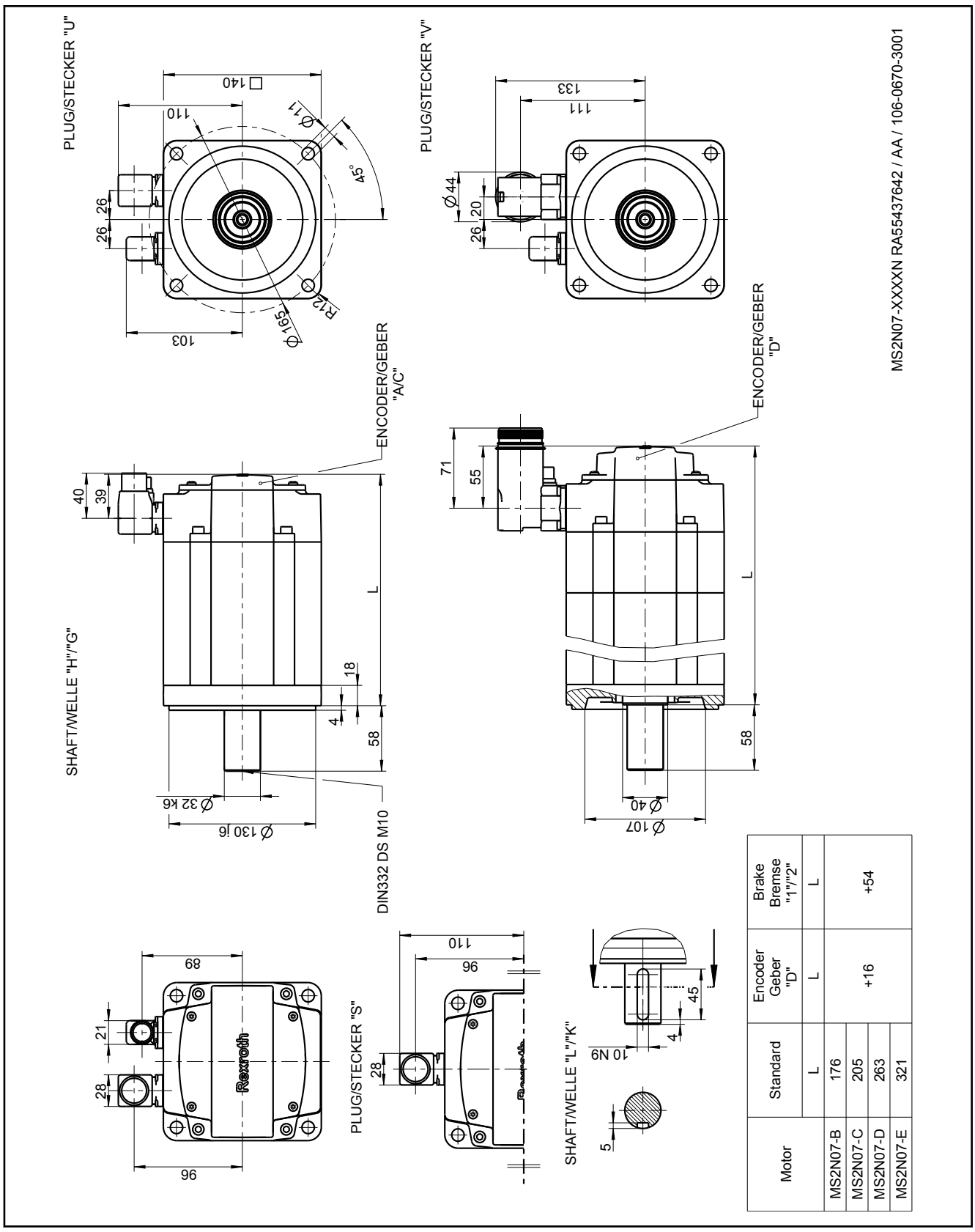
IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-63: Speed-torque characteristic curve MS2N07-E0BQA/B

Technical data

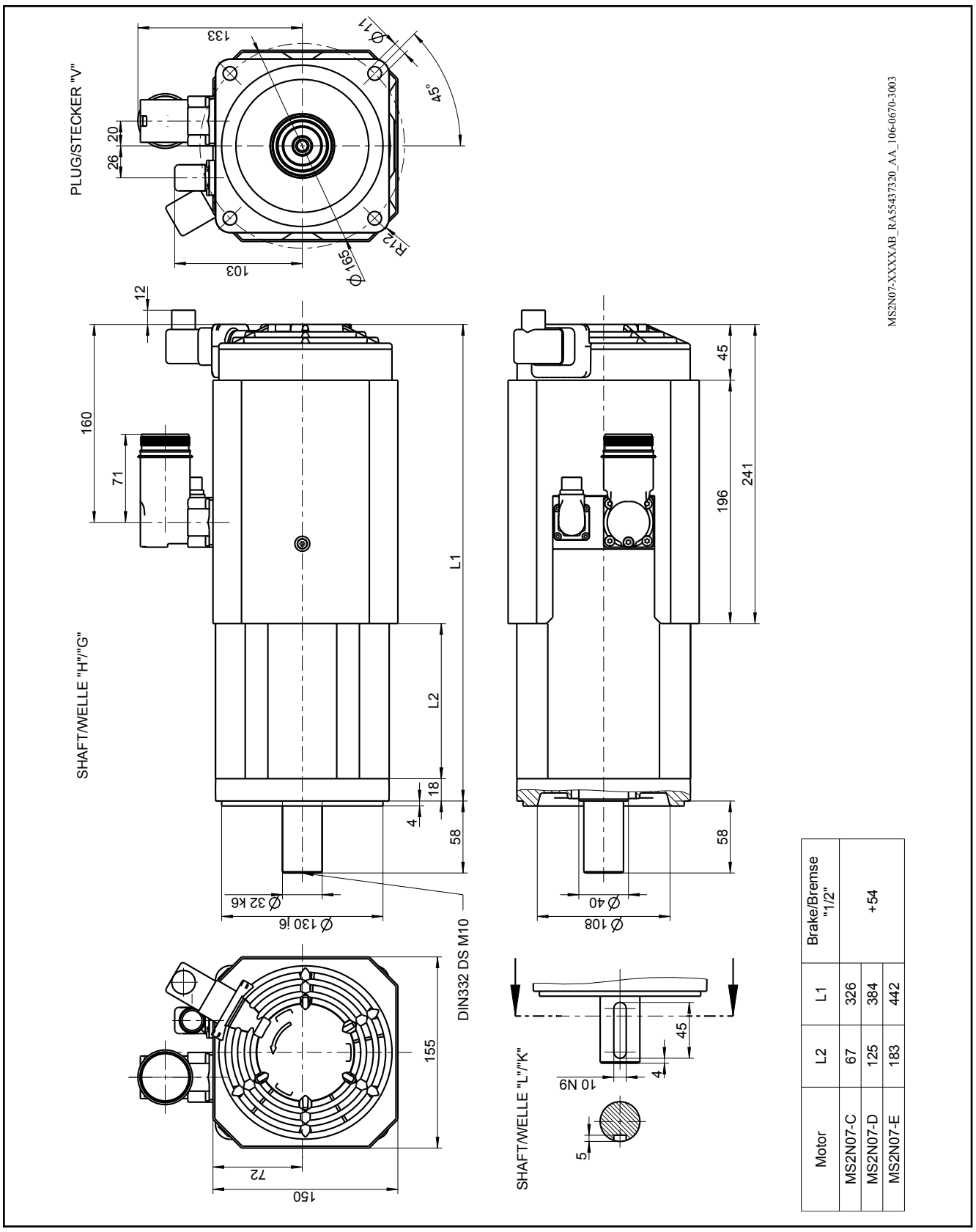
4.5.3 Self-cooling dimensions



Motor	Standard	Encoder Geber "D"	Brake Bremse "1"/"2"
	L	L	L
MS2N07-B	176	+16	+54
MS2N07-C	205		
MS2N07-D	263		
MS2N07-E	321		

Fig. 4-12: MS2N07-xxxxN

4.5.4 Forced ventilation dimensions



Motor	L2	L1	Brake/Bremse "1/2"
MS2N07-C	67	326	+54
MS2N07-D	125	384	
MS2N07-E	183	442	

Fig. 4-13: MS2N07-xxxxA/B

Technical data

4.5.5 Radial and axial force

Radial force

The permissible radial force F_R is specified in distance x from the shaft shoulder, depending on the mean speed in the following diagram.

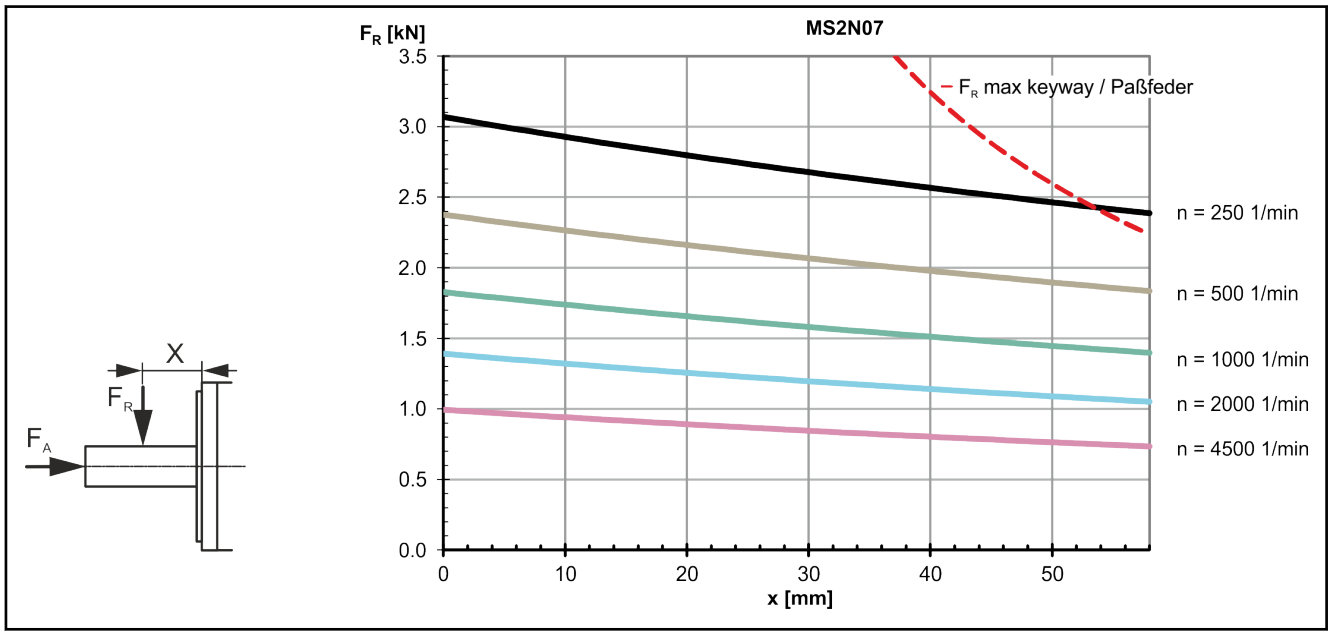


Fig. 4-14: MS2N07: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30000 h

Axial force

Axial forces F_A are permissible without limitation up to 60 N. Higher axial forces only after a detailed dimensioning by your distribution partner at Bosch Rexroth. For evaluation purposes, please specify the following information:

- Axial and radial force with force application point
- Installation position (horizontal, vertical with the shaft end pointing to the top or bottom)
- Mean speed

Technical data

4.6 MS2N10

4.6.1 Technical data of self-cooling

MS2N10-C0BHN

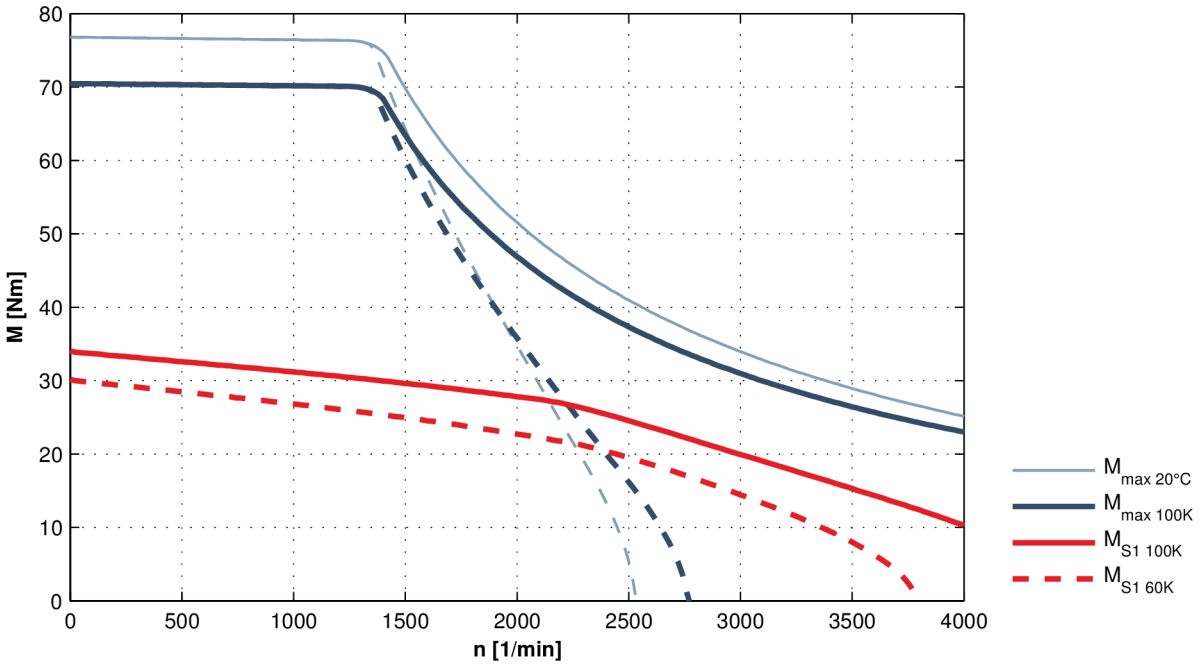
Designation	Symbol	Unit	Tolerance	MS2N10-C0BHN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	30.2
Standstill current (60 K)	$I_{0\ 60K}$	A		12.6
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	34.0
Standstill current (100 K)	$I_{0\ 100K}$	A		14.5
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.0048
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00627
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2000
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	27.2
Rated current (100K)	$I_{N\ 100K}$	A		11.7
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	5.7
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	76.8
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	70.5
Maximum current	$I_{max(eff)}$	A		38.5
Max. speed (electrical)	$n_{max\ el}$	1/rpm		4000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	2.60
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	157.8
Winding resistance at 20 °C	R_{12}	Ohm		0.77
Winding inductivity	L_{12_min}	mH		18.7
Discharge capacity of the component	C_{dis}	nF		1.9
Thermal time constant of winding	T_{th_W}	s		99.3
Thermal time constant of motor	T_{th_M}	min		33
Mass without brake	m_{mot}	kg		23.5
Mass with brake	m_{mot}	kg		28.5
Holding brake data				Size 2
Holding torque	M_4	Nm		53
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		1.0
Maximum connection time	t_1	ms		50
Maximum disconnection time	t_2	ms		220

Latest amendment: 2016-06-09

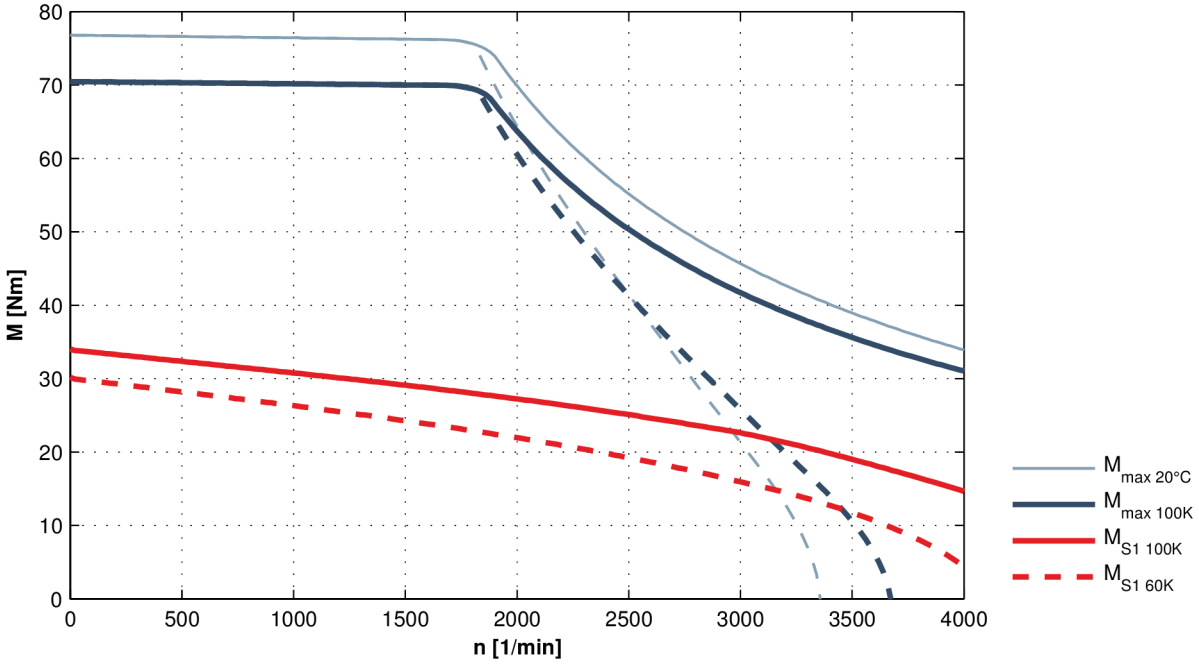
Tab. 4-64: Technical data MS2N10-C0BHN

Speed-torque characteristic curve MS2N10-C0BHN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-65: Speed-torque characteristic curve MS2N10-C0BHN

Technical data

MS2N10-C0BNN

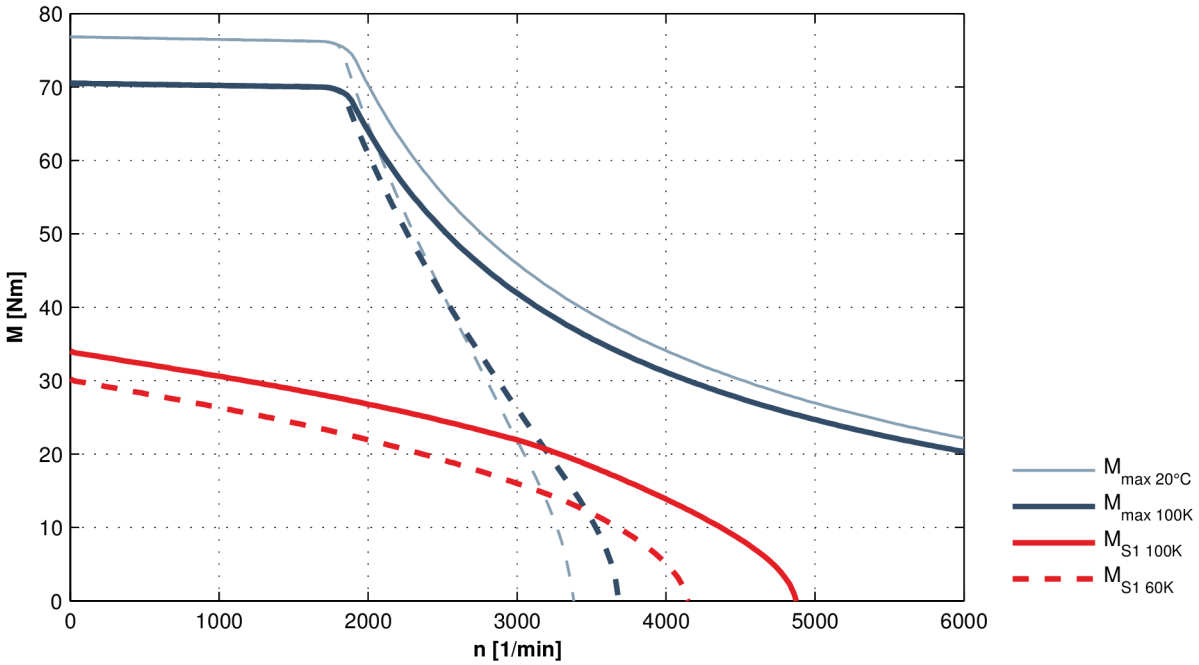
Designation	Symbol	Unit	Tolerance	MS2N10-C0BNN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	30.2
Standstill current (60 K)	$I_{0\ 60K}$	A		16.8
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	34.0
Standstill current (100 K)	$I_{0\ 100K}$	A		19.3
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.0048
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00627
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2880
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	21.2
Rated current (100K)	$I_{N\ 100K}$	A		12.35
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	6.45
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	76.8
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	70.5
Maximum current	$I_{max(eff)}$	A		51.3
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.95
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	118.4
Winding resistance at 20 °C	R_{12}	Ohm		0.441
Winding inductivity	L_{12_min}	mH		10.67
Discharge capacity of the component	C_{dis}	nF		1.97
Thermal time constant of winding	T_{th_W}	s		99.3
Thermal time constant of motor	T_{th_M}	min		33
Mass without brake	m_{mot}	kg		23.5
Mass with brake	m_{mot}	kg		28.5
Holding brake data				Size 2
Holding torque	M_4	Nm		53
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		1.0
Maximum connection time	t_1	ms		50
Maximum disconnection time	t_2	ms		220

Latest amendment: 2016-06-09

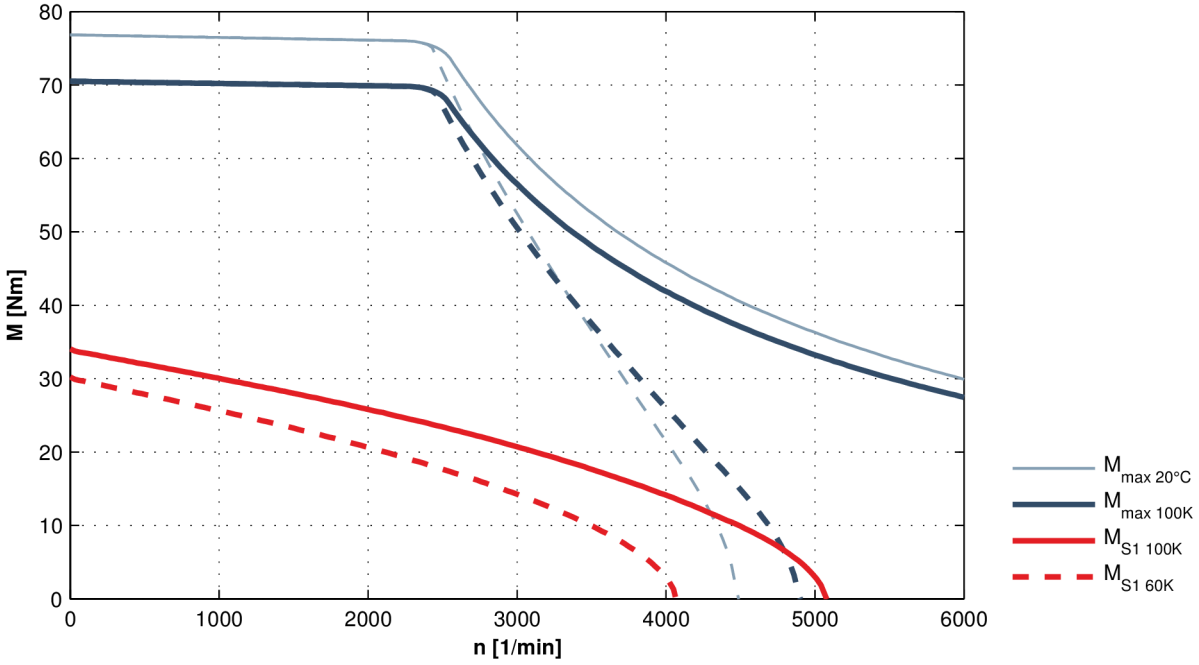
Tab. 4-66: Technical data MS2N10-C0BNN

Speed-torque characteristic curve MS2N10-C0BNN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-67: Speed-torque characteristic curve MS2N10-C0BNN

Technical data

MS2N10-D0BHN

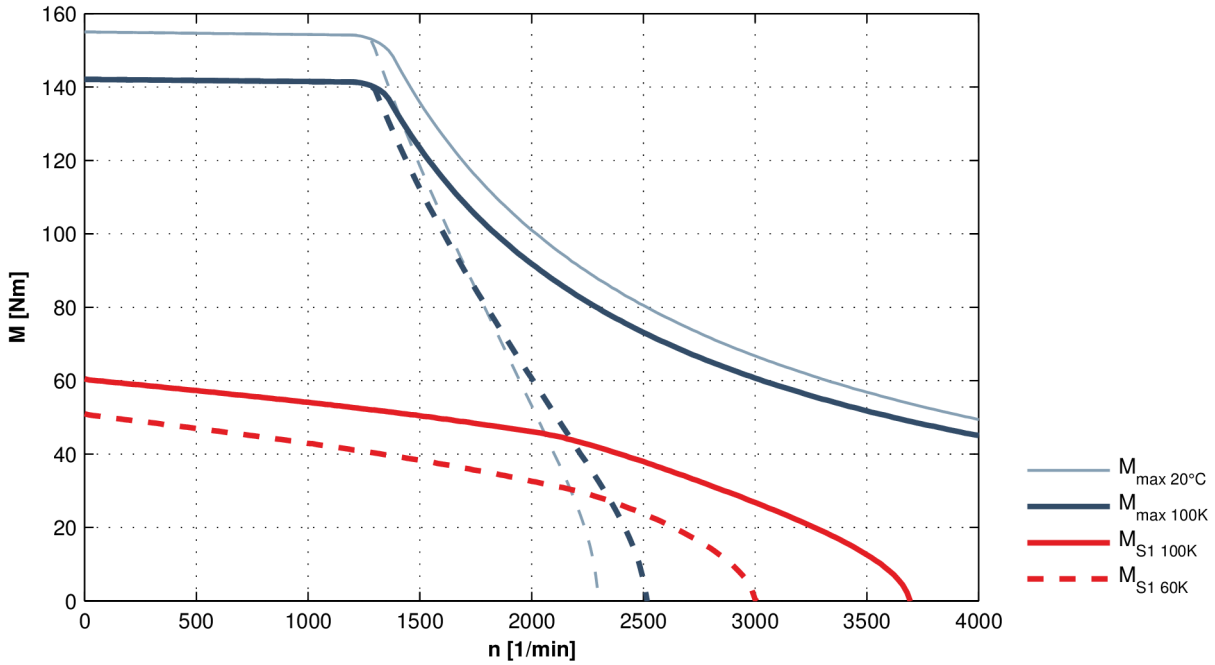
Designation	Symbol	Unit	Tolerance	MS2N10-D0BHN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	51
Standstill current (60 K)	$I_{0\ 60K}$	A		19.1
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	60.5
Standstill current (100 K)	$I_{0\ 100K}$	A		23.1
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.0081
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00957
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2000
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	44.6
Rated current (100K)	$I_{N\ 100K}$	A		17.3
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	9.35
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	155
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	142
Maximum current	$I_{max(eff)}$	A		70
Max. speed (electrical)	$n_{max\ el}$	1/rpm		4000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant	K_m	Nm/A	± 5%	2.86
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	173.5
Winding resistance at 20 °C	R_{12}	Ohm		0.386
Winding inductivity	L_{12_min}	mH		10.86
Discharge capacity of the component	C_{dis}	nF		3.15
Thermal time constant of winding	T_{th_W}	s		113.6
Thermal time constant of motor	T_{th_M}	min		37.8
Mass without brake	m_{mot}	kg		34
Mass with brake	m_{mot}	kg		39
Holding brake data				Size 2
Holding torque	M_4	Nm		53
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		1.0
Maximum connection time	t_1	ms		50
Maximum disconnection time	t_2	ms		220

Latest amendment: 2016-06-09

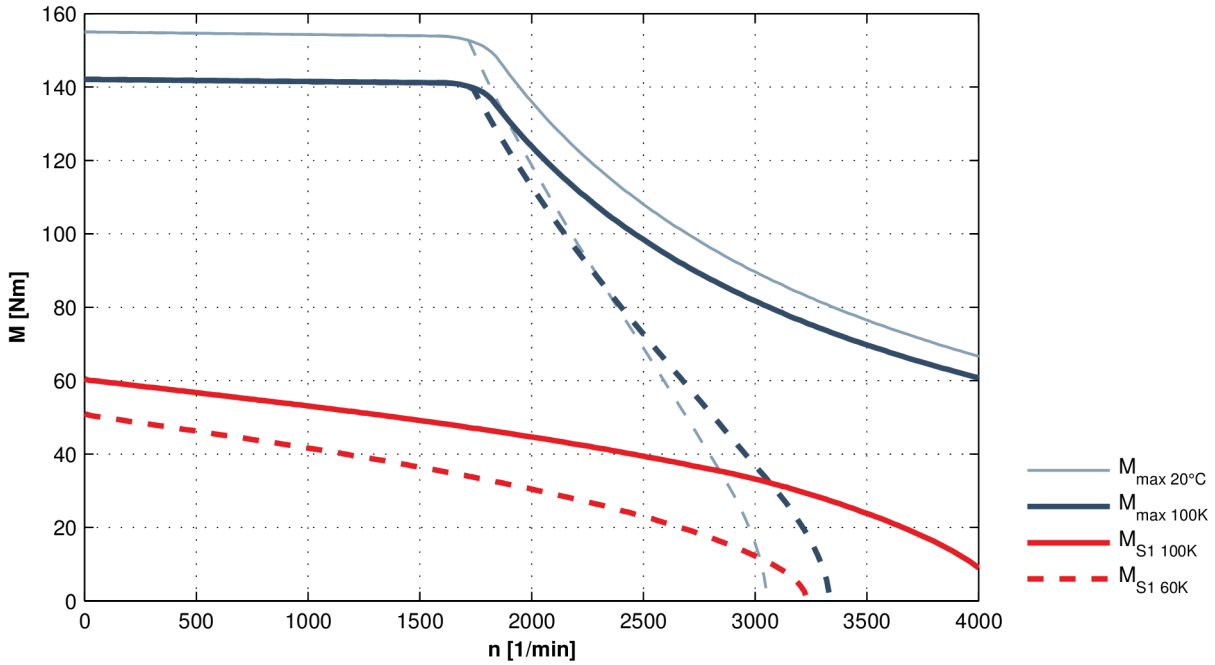
Tab. 4-68: Technical data MS2N10-D0BHN

Speed-torque characteristic curve MS2N10-D0BHN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-69: Speed-torque characteristic curve MS2N10-D0BHN

Technical data

MS2N10-D0BNN

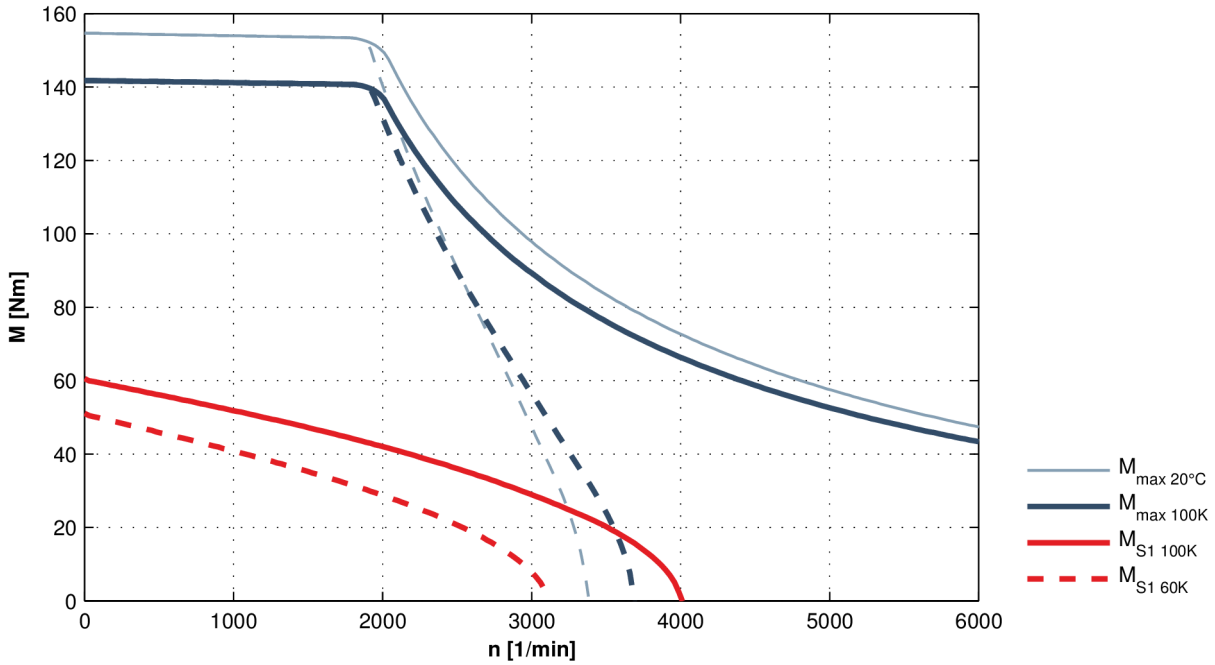
Designation	Symbol	Unit	Tolerance	MS2N10-D0BNN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	51
Standstill current (60 K)	$I_{0\ 60K}$	A		28.2
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	60.5
Standstill current (100 K)	$I_{0\ 100K}$	A		34.1
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.0081
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00957
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2600
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	31.0
Rated current (100K)	$I_{N\ 100K}$	A		18.0
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	8.45
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	155
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	142
Maximum current	$I_{max(eff)}$	A		102.5
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.95
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	118.5
Winding resistance at 20 °C	R_{12}	Ohm		0.18
Winding inductivity	L_{12_min}	mH		5.05
Discharge capacity of the component	C_{dis}	nF		4.1
Thermal time constant of winding	T_{th_W}	s		113.6
Thermal time constant of motor	T_{th_M}	min		37.8
Mass without brake	m_{mot}	kg		34
Mass with brake	m_{mot}	kg		39
Holding brake data				Size 2
Holding torque	M_4	Nm		53
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		1.0
Maximum connection time	t_1	ms		50
Maximum disconnection time	t_2	ms		220

Latest amendment: 2016-06-09

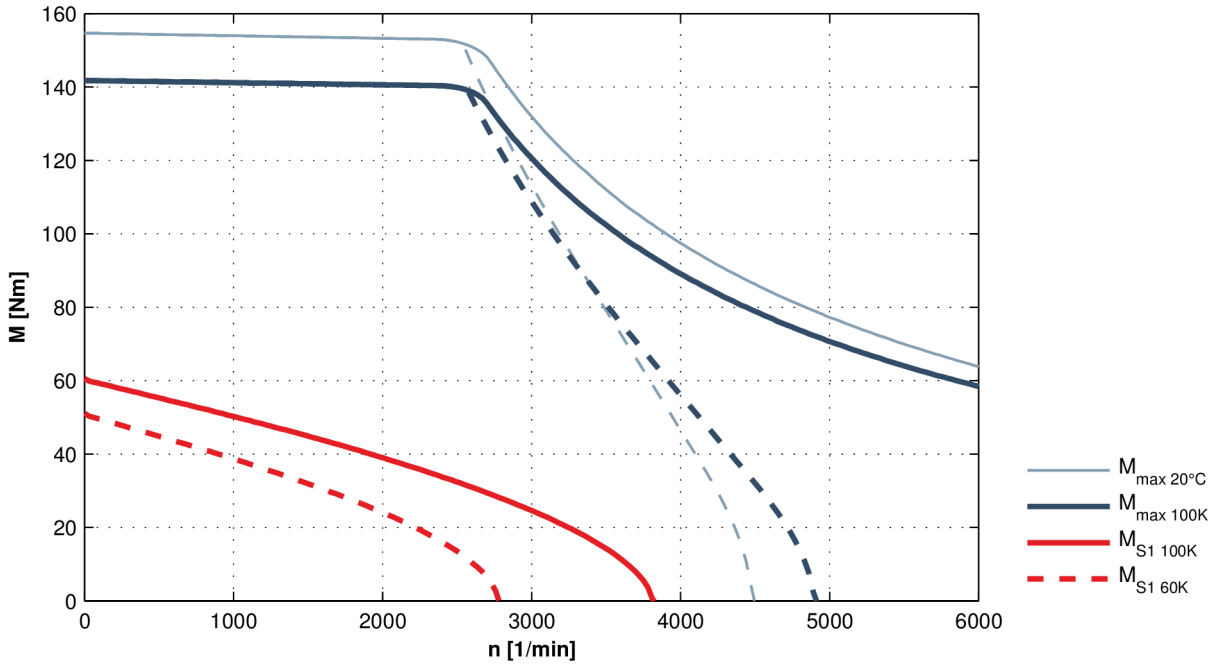
Tab. 4-70: Technical data MS2N10-D0BNN

Speed-torque characteristic curve MS2N10-D0BNN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-71: Speed-torque characteristic curve MS2N10-D0BNN

Technical data

MS2N10-E0BNN

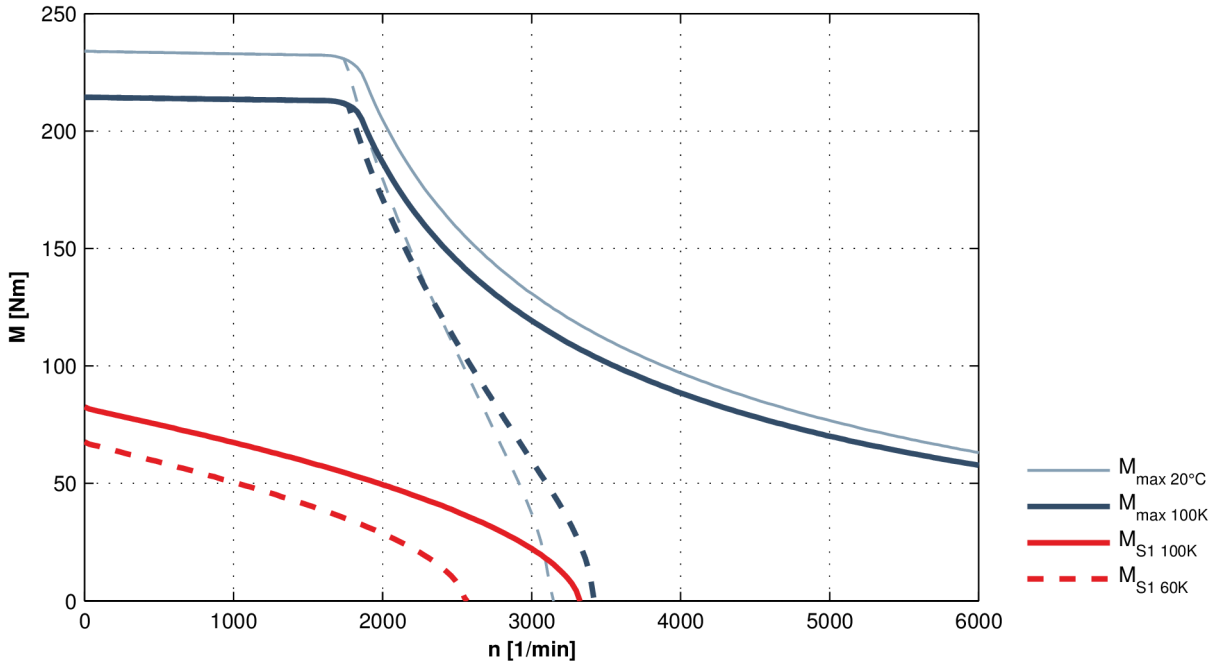
Designation	Symbol	Unit	Tolerance	MS2N10-E0BNN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	67.7
Standstill current (60 K)	$I_{0\ 60K}$	A		34.5
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	82.5
Standstill current (100 K)	$I_{0\ 100K}$	A		42.8
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.0114
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.0141
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2120
Rated torque (100K)	$M_{N\ 100K}$	Nm	± 5%	41.2
Rated current (100K)	$I_{N\ 100K}$	A		22.2
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	9.15
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	234
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	214
Maximum current	$I_{max(eff)}$	A		140
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	2.1
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	128.5
Winding resistance at 20 °C	R_{12}	Ohm		0.133
Winding inductivity	L_{12_min}	mH		4.00
Discharge capacity of the component	C_{dis}	nF		6.2
Thermal time constant of winding	T_{th_W}	s		122.5
Thermal time constant of motor	T_{th_M}	min		44.6
Mass without brake	m_{mot}	kg		45
Mass with brake	m_{mot}	kg		52
Holding brake data				Size 3
Holding torque	M_4	Nm		90
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		1.5
Maximum connection time	t_1	ms		65
Maximum disconnection time	t_2	ms		250

Latest amendment: 2016-06-09

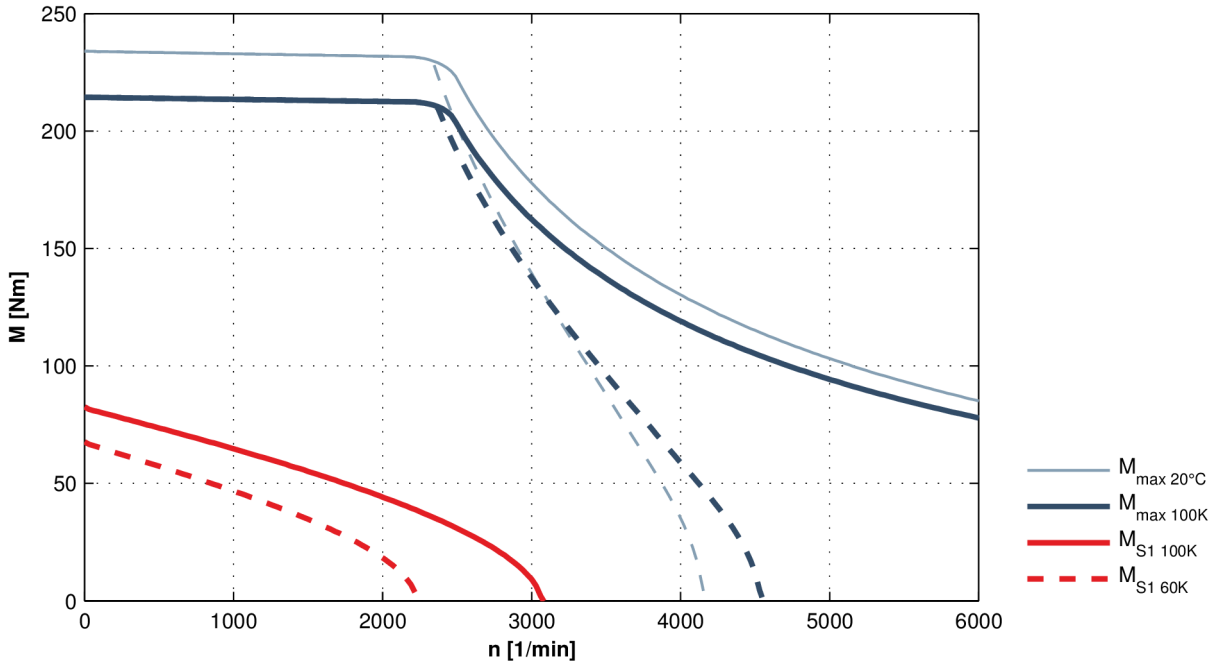
Tab. 4-72: Technical data MS2N10-E0BNN

Speed-torque characteristic curve MS2N10-E0BNN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-73: Speed-torque characteristic curve MS2N10-E0BNN

Technical data

MS2N10-E1BNN

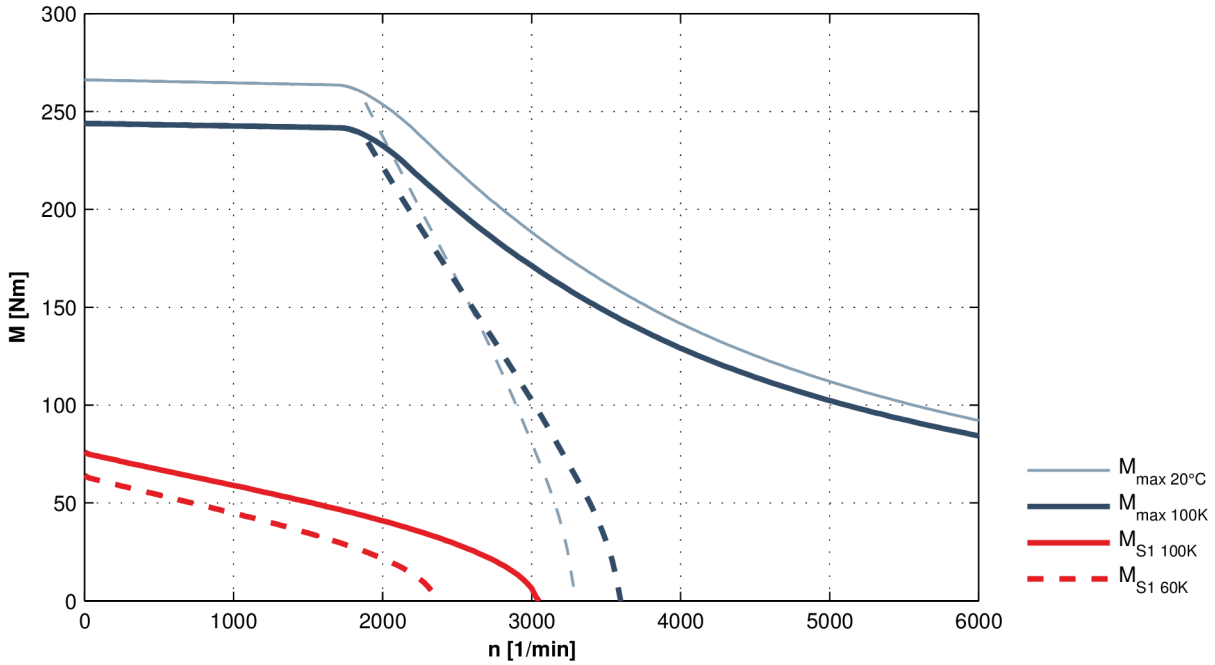
Designation	Symbol	Unit	Tolerance	MS2N10-E1BNN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	64.0
Standstill current (60 K)	$I_{0\ 60K}$	A		34.2
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	76.0
Standstill current (100 K)	$I_{0\ 100K}$	A		41
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.025
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.0277
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		1970
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	32.2
Rated current (100K)	$I_{N\ 100K}$	A		18.3
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	6.65
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	266
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	244
Maximum current	$I_{max(eff)}$	A		162
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	2.0
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	121.6
Winding resistance at 20 °C	R_{12}	Ohm		0.137
Winding inductivity	L_{12_min}	mH		2.57
Discharge capacity of the component	C_{dis}	nF		5.0
Thermal time constant of winding	T_{th_W}	s		97.4
Thermal time constant of motor	T_{th_M}	min		44.6
Mass without brake	m_{mot}	kg		47
Mass with brake	m_{mot}	kg		54
Holding brake data				Size 3
Holding torque	M_4	Nm		90
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		1.5
Maximum connection time	t_1	ms		65
Maximum disconnection time	t_2	ms		250

Latest amendment: 2016-06-13

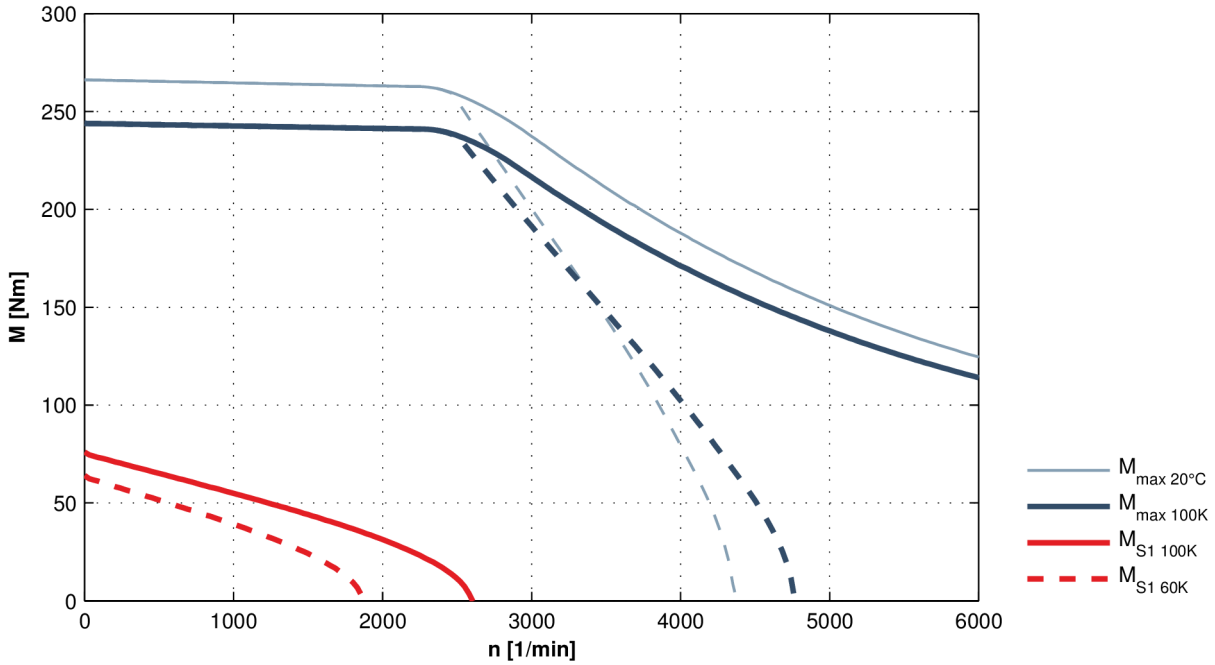
Tab. 4-74: Technical data MS2N10-E1BNN

Speed-torque characteristic curve MS2N10-E1BNN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-75: Speed-torque characteristic curve MS2N10-E1BNN

Technical data

MS2N10-F0BHN

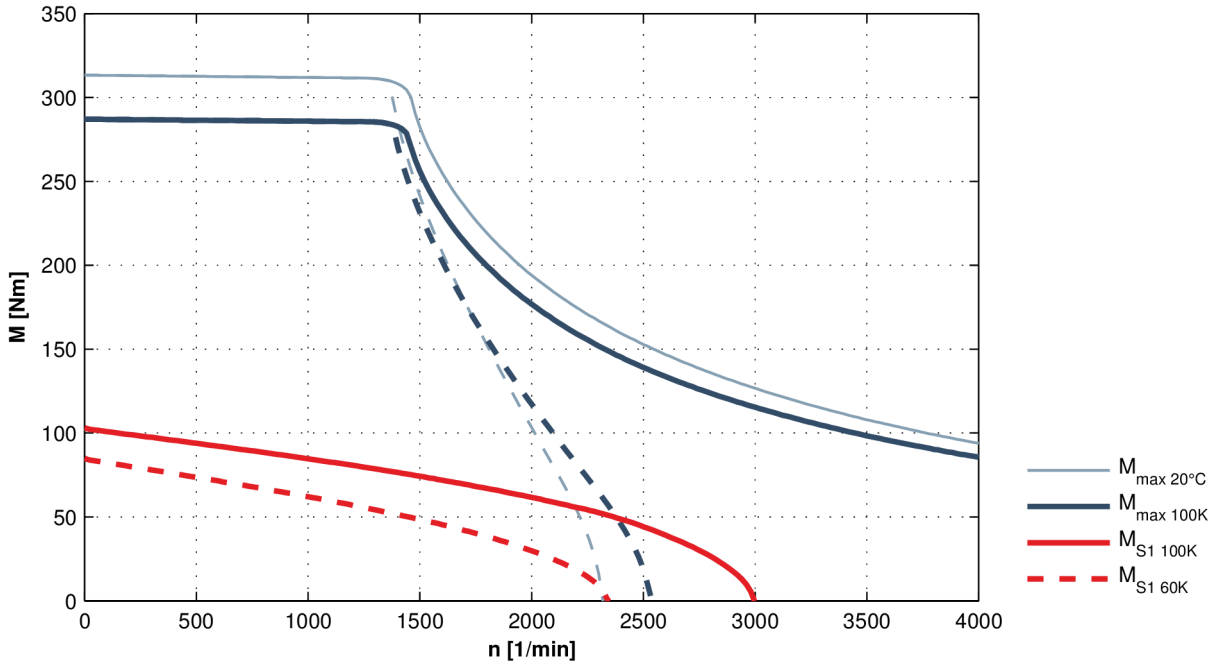
Designation	Symbol	Unit	Tolerance	MS2N10-F0BHN
Standstill torque (60 K)	$M_{0\ 60K}$	Nm	± 5%	85
Standstill current (60 K)	$I_{0\ 60K}$	A		32.0
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	103
Standstill current (100 K)	$I_{0\ 100K}$	A		39.4
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.0147
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.0174
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2000
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	56.7
Rated current (100K)	$I_{N\ 100K}$	A		22.4
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	11.85
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	313
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	287
Maximum current	$I_{max(eff)}$	A		140
Max. speed (electrical)	$n_{max\ el}$	1/rpm		4000
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000
Number of pole pairs	p			5
Torque constant at 20 °C	K_m	Nm/A	± 5%	2.84
Voltage constant at 20 °C[1)]	K_{EMK_1000}	V/1000 min^{-1}	± 5%	172.5
Winding resistance at 20 °C	R_{12}	Ohm		0.169
Winding inductivity	L_{12_min}	mH		5.01
Discharge capacity of the component	C_{dis}	nF		8.7
Thermal time constant of winding	T_{th_W}	s		128.6
Thermal time constant of motor	T_{th_M}	min		49.5
Mass without brake	m_{mot}	kg		55
Mass with brake	m_{mot}	kg		62
Holding brake data				Size 3
Holding torque	M_4	Nm		90
Rated voltage	U_N	V	± 10%	24
Rated current	I_N	A		1.5
Maximum connection time	t_1	ms		65
Maximum disconnection time	t_2	ms		250

Latest amendment: 2016-06-09

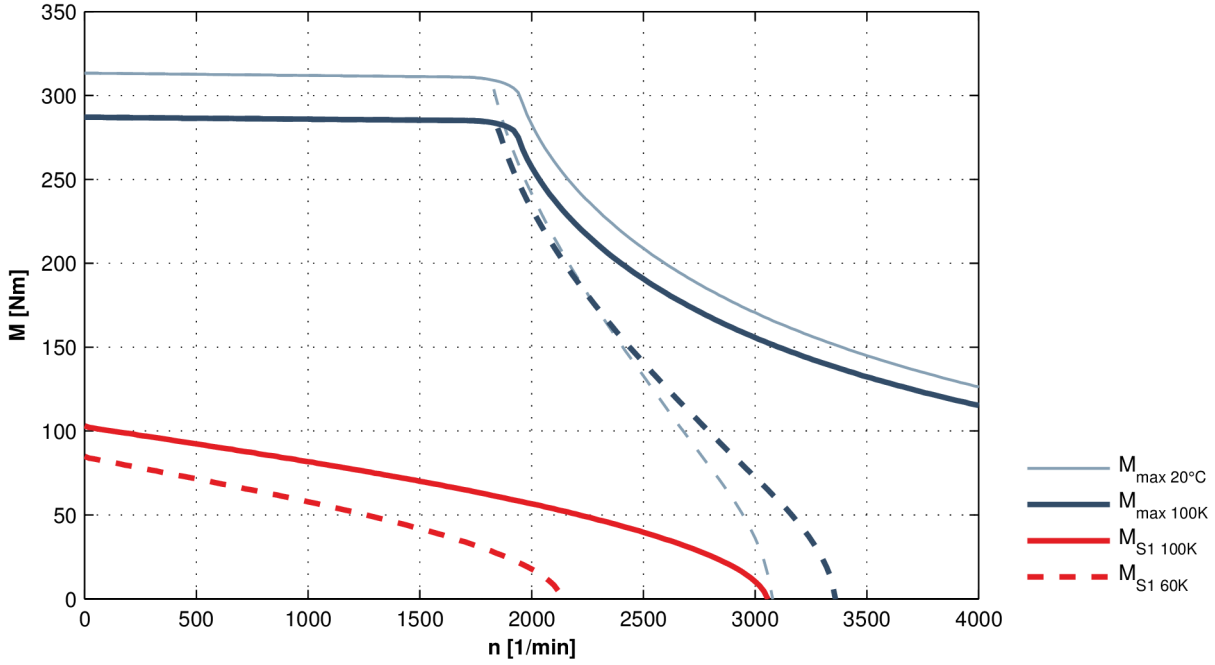
Tab. 4-76: Technical data MS2N10-F0BHN

Speed-torque characteristic curve MS2N10-F0BHN

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-77: Speed-torque characteristic curve MS2N10-F0BHN

Technical data

4.6.2 Technical data forced ventilation

MS2N10-C0BNA/B

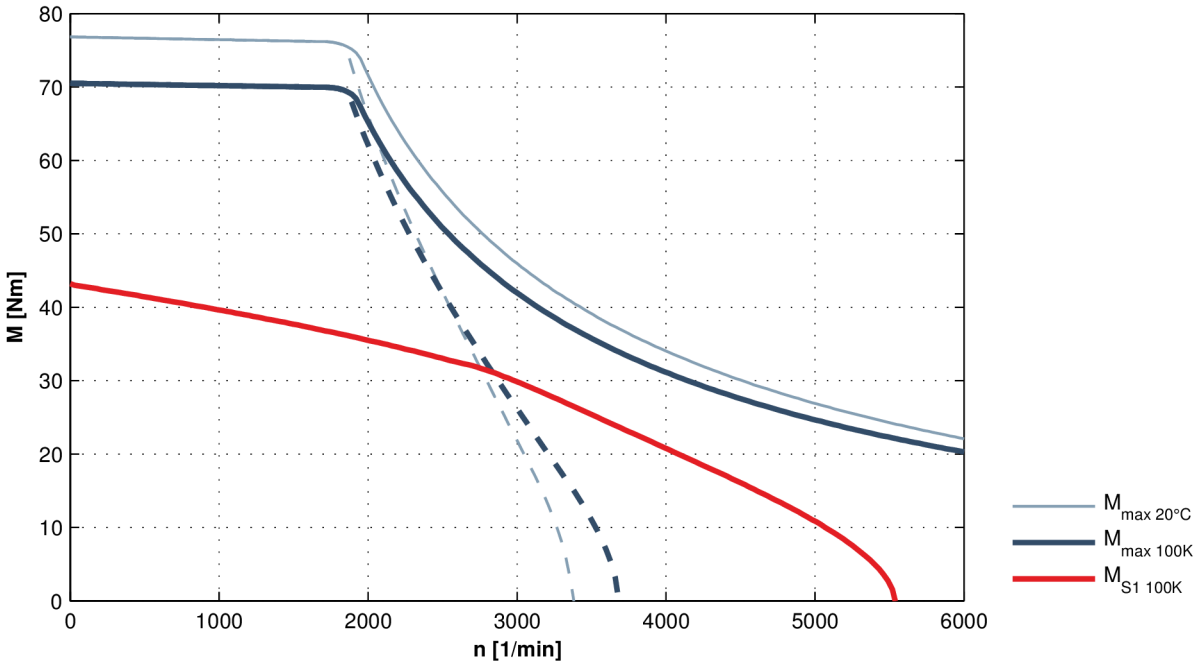
Designation	Symbol	Unit	Tolerance	MS2N10-C0BNA	MS2N10-C0BNB
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	43.3	
Standstill current (100 K)	$I_{0\ 100K}$	A		25.1	
Moment of inertia of rotor without brake	J_{red}	kg*m²	± 10%	0.00480	
Moment of inertia of rotor with brake	J_{red}	kg*m²	± 10%	0.00627	
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2610	
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	31.7	
Rated current (100K)	$I_{N\ 100K}$	A		18.5	
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	8.65	
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	76.8	
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	70.5	
Maximum current	$I_{max(eff)}$	A		51.3	
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000	
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000	
Number of pole pairs	p			5	
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.95	
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	118.5	
Winding resistance at 20 °C	R_{12}	Ohm		0.441	
Winding inductivity	L_{12_min}	mH		10.67	
Discharge capacity of the component	C_{dis}	nF		1.97	
Thermal time constant of winding	T_{th_W}	s		81.2	
Thermal time constant of motor	T_{th_M}	min		10.4	
Mass without brake	m_{mot}	kg		24.5	
Mass with brake	m_{mot}	kg		29.5	
Holding brake data				Size 2	
Holding torque	M_4	Nm		53	
Rated voltage	U_N	V	± 10%	24	
Rated current	I_N	A		1.0	
Maximum connection time	t_1	ms		50	
Maximum disconnection time	t_2	ms		220	
Fan data				A	B
Rated voltage	U_N	V		230	115
Rated current	I_N	A		0.26/0.23	0.46
Frequency	f_N	Hz		50/60	60

Latest amendment: 2016-06-09

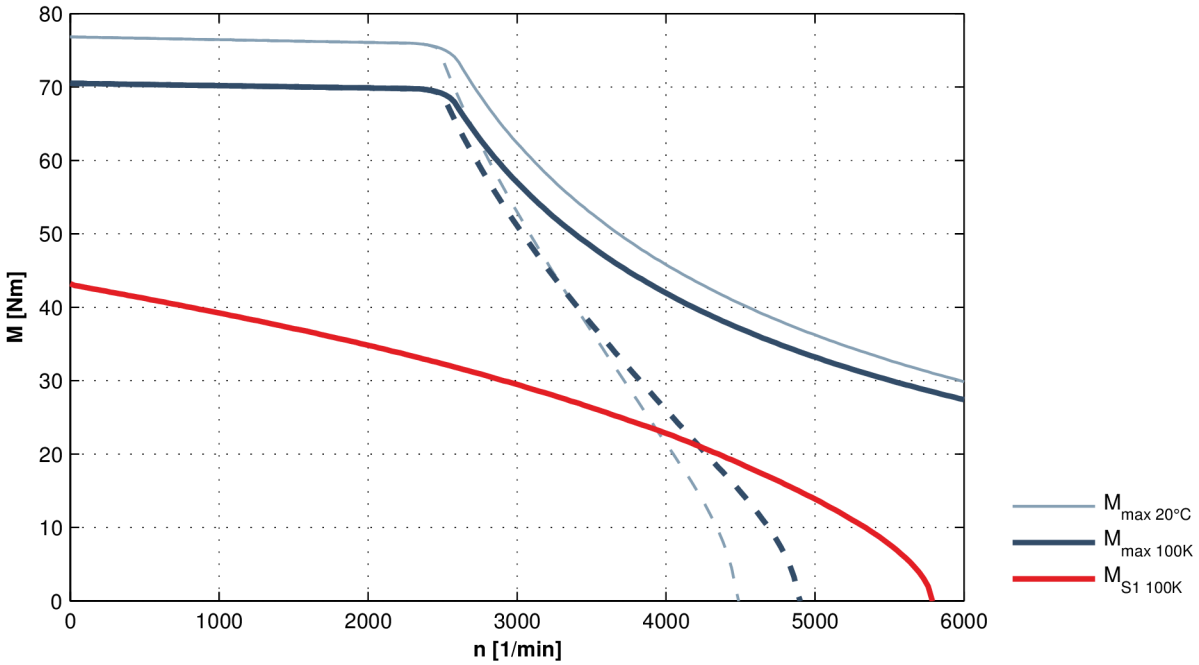
Tab. 4-78: Technical data MS2N10-C0BNA/B

Speed-torque characteristic curves MS2N10-C0BNA/B

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-79: Speed-torque characteristic curves MS2N10-C0BNA/B

Technical data

MS2N10-D0BHA/B

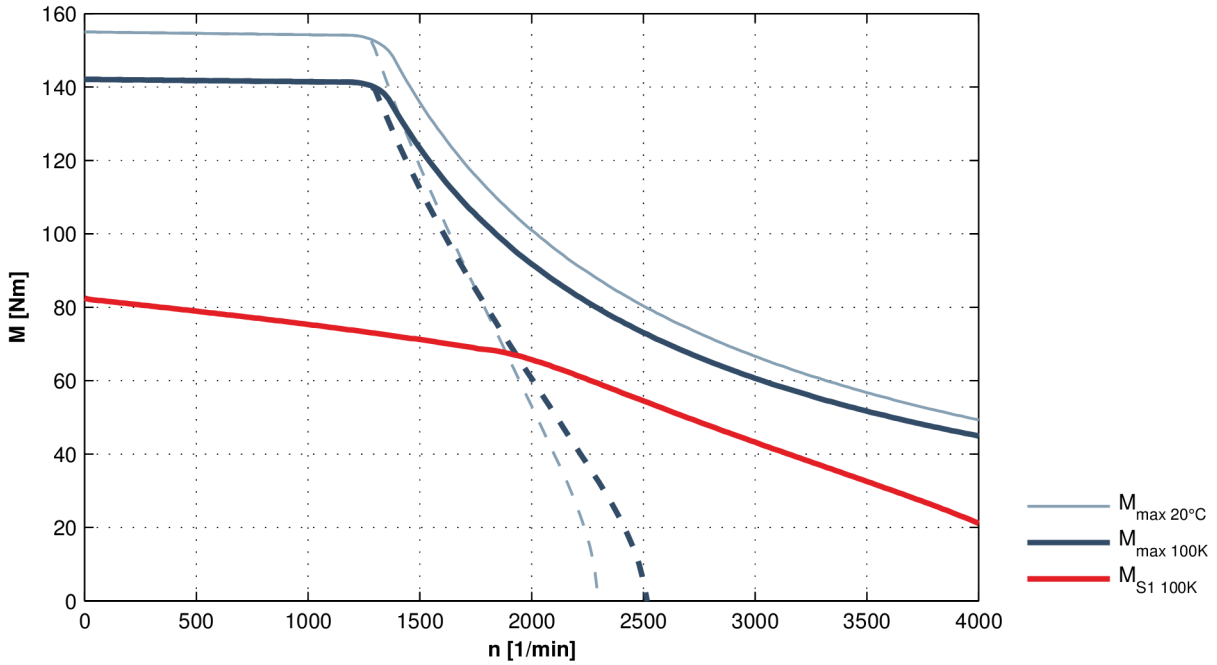
Designation	Symbol	Unit	Tolerance	MS2N10-D0BHA	MS2N10-D0BHB
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	82.4	
Standstill current (100 K)	$I_{0\ 100K}$	A		32.7	
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.00810	
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00957	
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		1800	
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	67.4	
Rated current (100K)	$I_{N\ 100K}$	A		26.6	
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	12.7	
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	155	
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	142	
Maximum current	$I_{max(eff)}$	A		70	
Max. speed (electrical)	$n_{max\ el}$	1/rpm		4000	
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000	
Number of pole pairs	p			5	
Torque constant at 20 °C	K_m	Nm/A	± 5%	2.86	
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	173.5	
Winding resistance at 20 °C	R_{12}	Ohm		0.386	
Winding inductivity	L_{12_min}	mH		10.86	
Discharge capacity of the component	C_{dis}	nF		3.15	
Thermal time constant of winding	T_{th_W}	s		90	
Thermal time constant of motor	T_{th_M}	min		11.6	
Mass without brake	m_{mot}	kg		35	
Mass with brake	m_{mot}	kg		40	
Holding brake data				Size 2	
Holding torque	M_4	Nm		53	
Rated voltage	U_N	V	± 10%	24	
Rated current	I_N	A		1.0	
Maximum connection time	t_1	ms		50	
Maximum disconnection time	t_2	ms		220	
Fan data				A	B
Rated voltage	U_N	V		230	115
Rated current	I_N	A		0.26/0.23	0.46
Frequency	f_N	Hz		50/60	60

Latest amendment: 2016-06-13

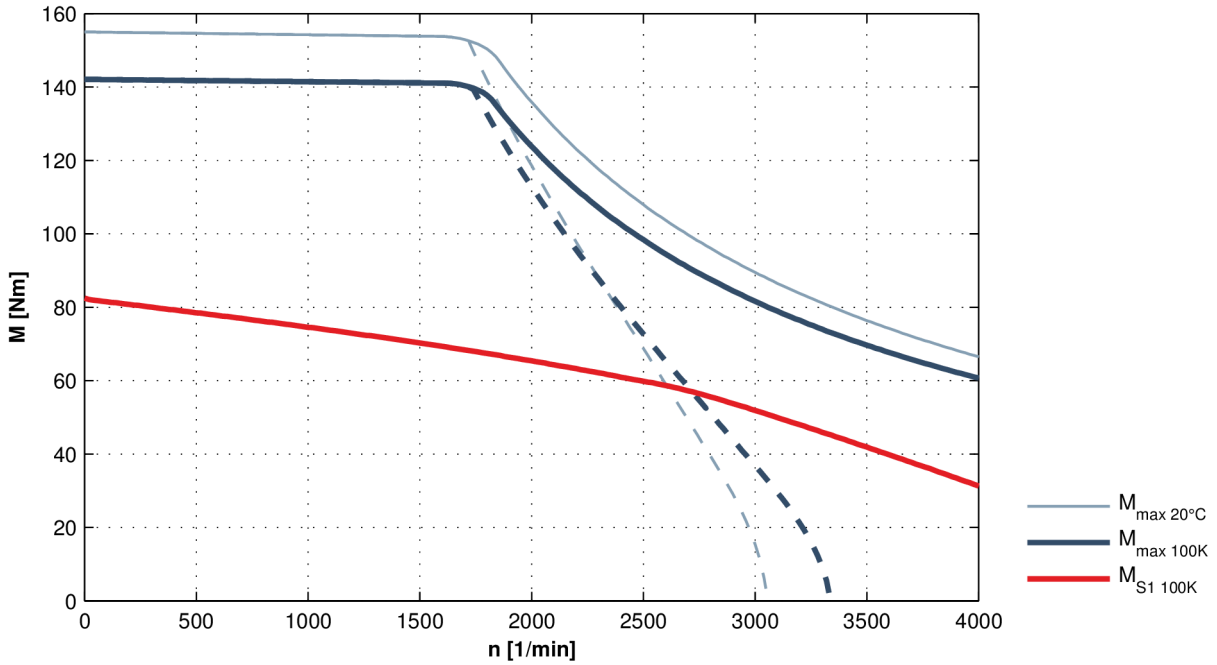
Tab. 4-80: Technical data MS2N10-D0BHA/B

Speed-torque characteristic curves MS2N10-D0BHA/B

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-81: Speed-torque characteristic curves MS2N10-D0BHA/B

Technical data

MS2N10-D0BNA/B

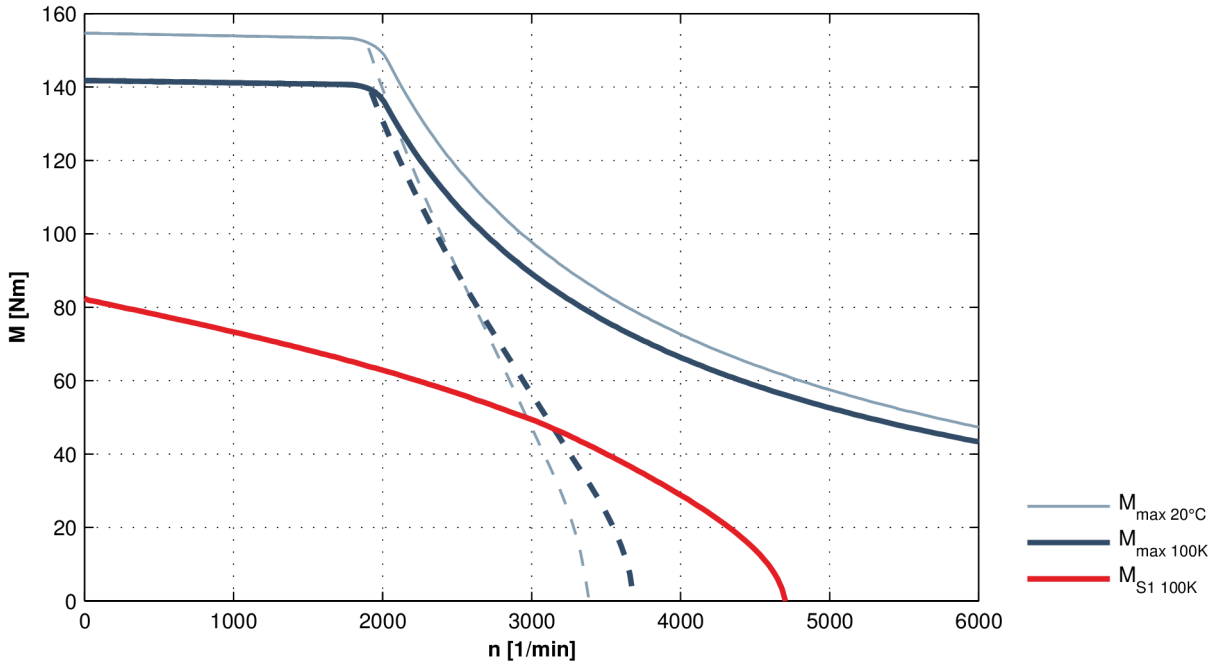
Designation	Symbol	Unit	Tolerance	MS2N10-D0BNA	MS2N10-D0BNB
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	82.4	
Standstill current (100 K)	$I_{0\ 100K}$	A		48	
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.0081	
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.00957	
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2870	
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	48.7	
Rated current (100K)	$I_{N\ 100K}$	A		28.5	
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	14.65	
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	155	
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	142	
Maximum current	$I_{max(eff)}$	A		102.5	
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000	
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000	
Number of pole pairs	p			5	
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.95	
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	118.5	
Winding resistance at 20 °C	R_{12}	Ohm		0.18	
Winding inductivity	L_{12_min}	mH		5.05	
Discharge capacity of the component	C_{dis}	nF		4.1	
Thermal time constant of winding	T_{th_W}	s		90	
Thermal time constant of motor	T_{th_M}	min		11.6	
Mass without brake	m_{mot}	kg		35	
Mass with brake	m_{mot}	kg		40	
Holding brake data				Size 2	
Holding torque	M_4	Nm		53	
Rated voltage	U_N	V	± 10%	24	
Rated current	I_N	A		1.0	
Maximum connection time	t_1	ms		50	
Maximum disconnection time	t_2	ms		220	
Fan data				A	B
Rated voltage	U_N	V		230	115
Rated current	I_N	A		0.26/0.23	0.46
Frequency	f_N	Hz		50/60	60

Latest amendment: 2016-06-13

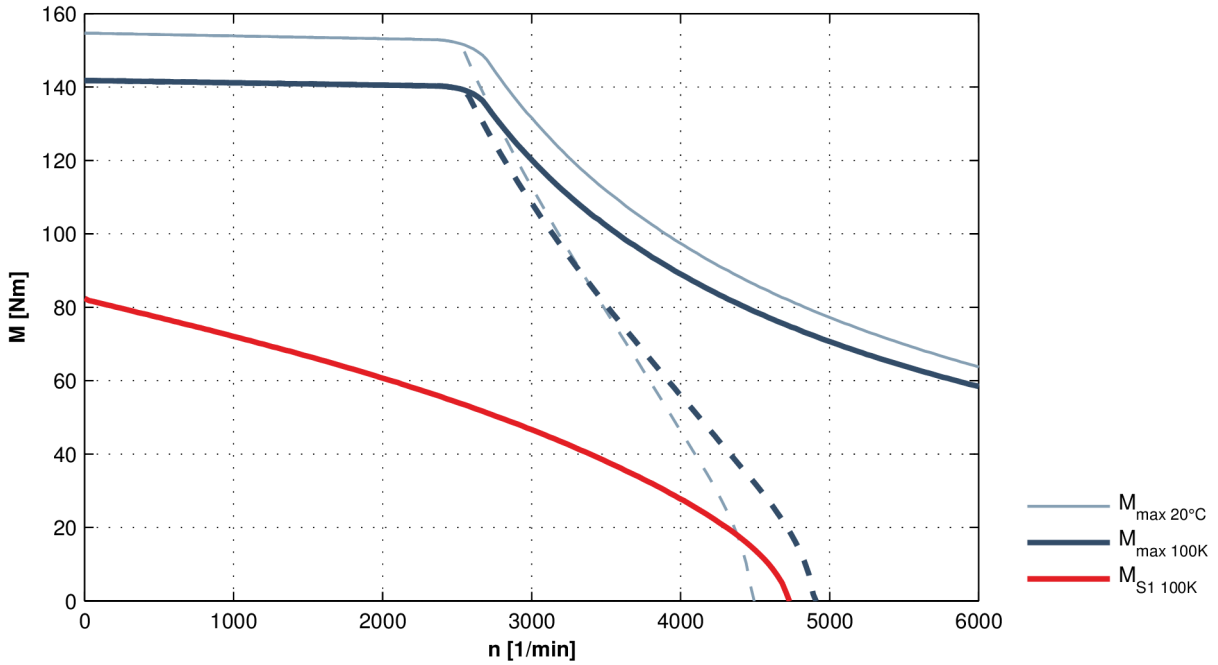
Tab. 4-82: Technical data MS2N10-D0BNA/B

Speed-torque characteristic curves MS2N10-D0BNA/B

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-83: Speed-torque characteristic curves MS2N10-D0BNA/B

Technical data

MS2N10-D1BNA/B

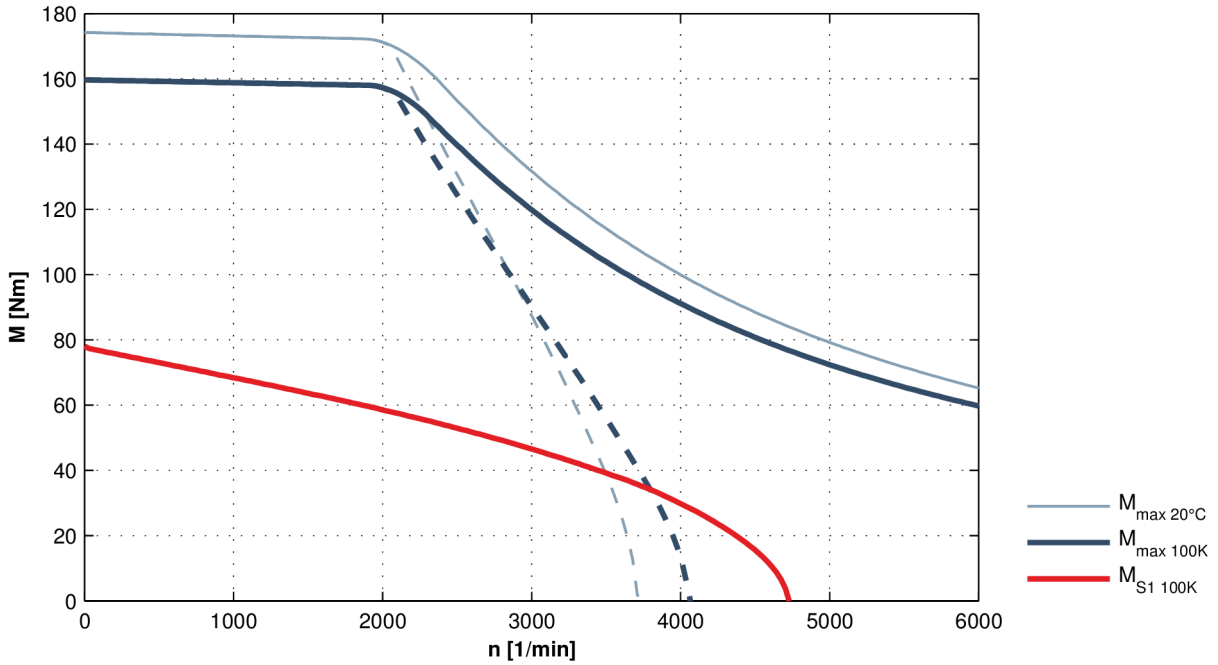
Designation	Symbol	Unit	Tolerance	MS2N10-D1BNA	MS2N10-D1BNB
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	78.0	
Standstill current (100 K)	$I_{0\ 100K}$	A		48.5	
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.01710	
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.01857	
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		3000	
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	42.1	
Rated current (100K)	$I_{N\ 100K}$	A		27.0	
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	13.2	
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	174	
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	160	
Maximum current	$I_{max(eff)}$	A		121.5	
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000	
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000	
Number of pole pairs	p			5	
Torque constant at 20 °C	K_m	Nm/A	± 5%	1.77	
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	107.6	
Winding resistance at 20 °C	R_{12}	Ohm		0.178	
Winding inductivity	L_{12_min}	mH		3.23	
Discharge capacity of the component	C_{dis}	nF		3.33	
Thermal time constant of winding	T_{th_W}	s		60.7	
Thermal time constant of motor	T_{th_M}	min		11.6	
Mass without brake	m_{mot}	kg		37	
Mass with brake	m_{mot}	kg		42	
Holding brake data				Size 2	
Holding torque	M_4	Nm		53	
Rated voltage	U_N	V	± 10%	24	
Rated current	I_N	A		1.0	
Maximum connection time	t_1	ms		50	
Maximum disconnection time	t_2	ms		220	
Fan data				A	B
Rated voltage	U_N	V		230	115
Rated current	I_N	A		0.26/0.23	0.46
Frequency	f_N	Hz		50/60	60

Latest amendment: 2016-06-13

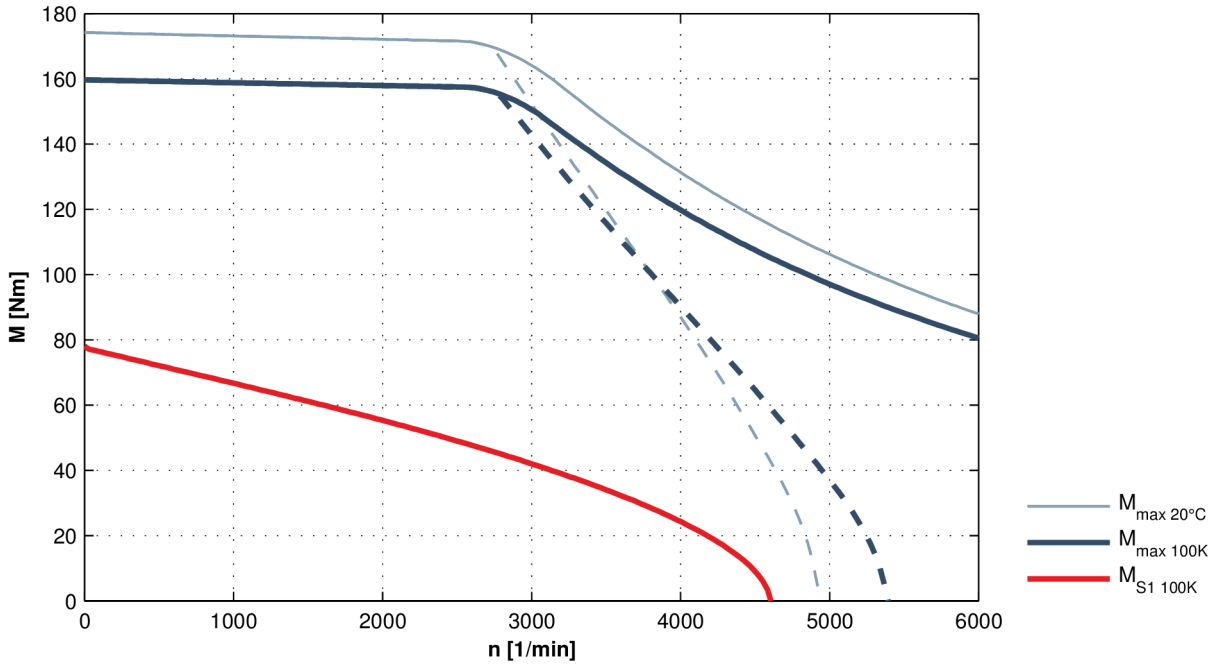
Tab. 4-84: Technical data MS2N10-D1BNA/B

Speed-torque characteristic curves MS2N10-D1BNA/B

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-85: Speed-torque characteristic curves MS2N10-D1BNA/B

Technical data

MS2N10-E0BHA/B

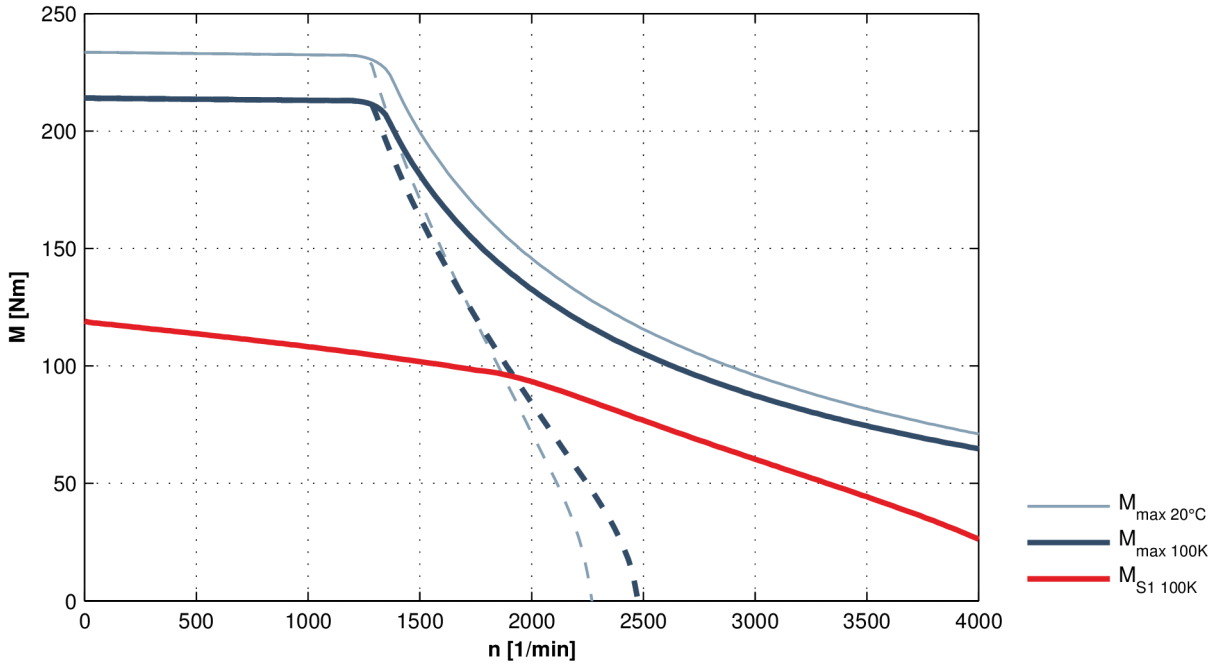
Designation	Symbol	Unit	Tolerance	MS2N10-E0BHA	MS2N10-E0BHB
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	119	
Standstill current (100 K)	$I_{0\ 100K}$	A		46.1	
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.0114	
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.0141	
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		1800	
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	96.0	
Rated current (100K)	$I_{N\ 100K}$	A		37.4	
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	18.1	
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	234	
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	214	
Maximum current	$I_{max(eff)}$	A		102.5	
Max. speed (electrical)	$n_{max\ el}$	1/rpm		4000	
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		4000	
Number of pole pairs	p			5	
Torque constant	K_m	Nm/A	± 5%	2.88	
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	176.4	
Winding resistance at 20 °C	R_{12}	Ohm		0.244	
Winding inductivity	L_{12_min}	mH		7.43	
Discharge capacity of the component	C_{dis}	nF		6.2	
Thermal time constant of winding	T_{th_W}	s		97.5	
Thermal time constant of motor	T_{th_M}	min		12.5	
Mass without brake	m_{mot}	kg		46	
Mass with brake	m_{mot}	kg		53	
Holding brake data				Size 3	
Holding torque	M_4	Nm		90	
Rated voltage	U_N	V	± 10%	24	
Rated current	I_N	A		1.5	
Maximum connection time	t_1	ms		65	
Maximum disconnection time	t_2	ms		250	
Fan data				A	B
Rated voltage	U_N	V		230	115
Rated current	I_N	A		0.26/0.23	0.46
Frequency	f_N	Hz		50/60	60

Latest amendment: 2016-06-13

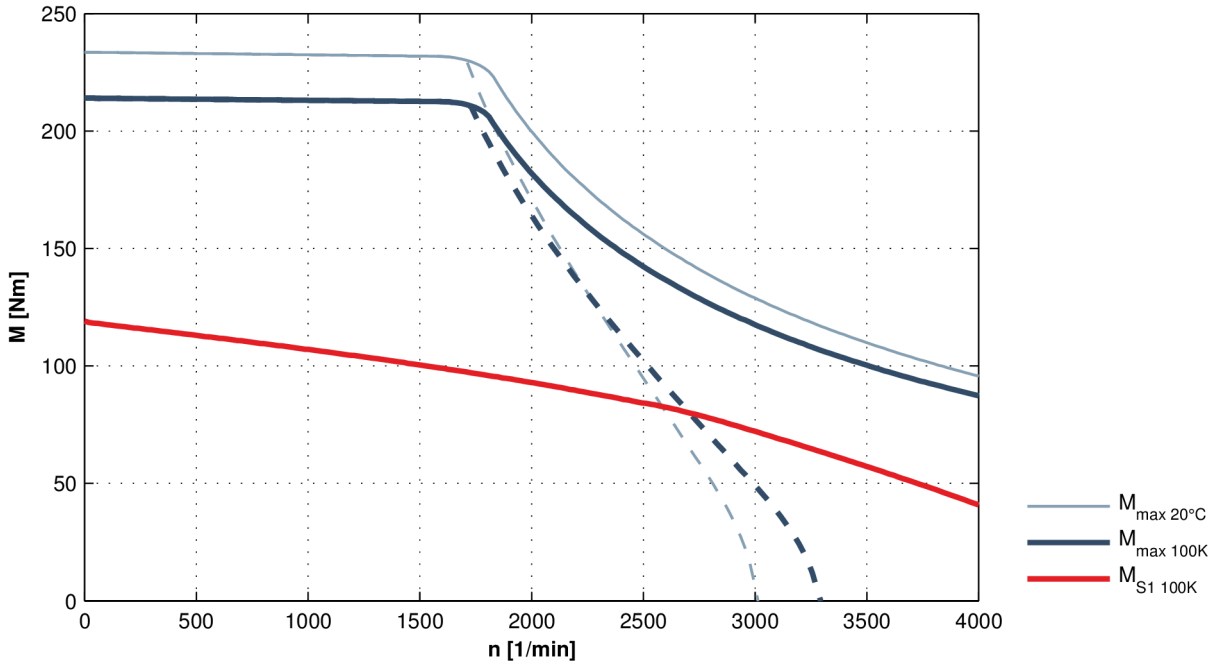
Tab. 4-86: Technical data MS2N10-E0BHA/B

Speed-torque characteristic curves MS2N10-E0BHA/B

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-87: Speed-torque characteristic curves MS2N10-E0BHA/B

Technical data

MS2N10-E0BNA/B

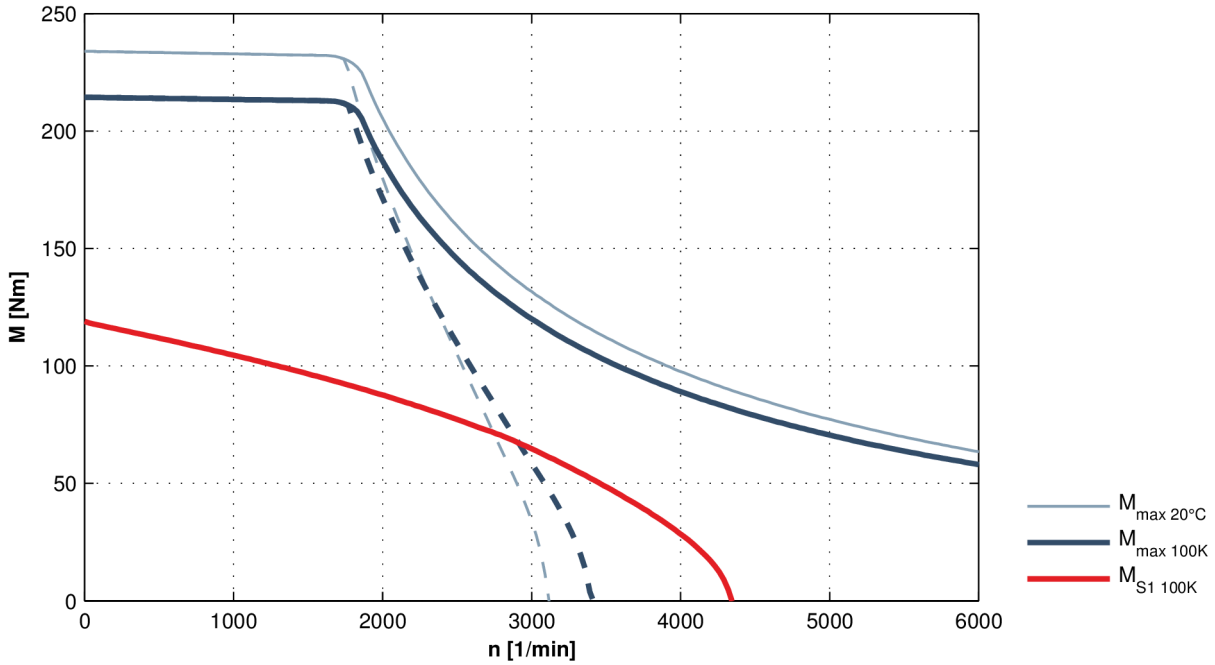
Designation	Symbol	Unit	Tolerance	MS2N10-E0BNA	MS2N10-E0BNB
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	119	
Standstill current (100 K)	$I_{0\ 100K}$	A		62.9	
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.0114	
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.0141	
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2660	
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	69.9	
Rated current (100K)	$I_{N\ 100K}$	A		37.4	
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	19.5	
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	234	
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	214	
Maximum current	$I_{max(eff)}$	A		140	
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000	
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000	
Number of pole pairs	p			5	
Torque constant	K_m	Nm/A	± 5%	2.12	
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	128.5	
Winding resistance at 20 °C	R_{12}	Ohm		0.131	
Winding inductivity	L_{12_min}	mH		4.00	
Discharge capacity of the component	C_{dis}	nF		6.2	
Thermal time constant of winding	T_{th_W}	s		97.5	
Thermal time constant of motor	T_{th_M}	min		12.5	
Mass without brake	m_{mot}	kg		46	
Mass with brake	m_{mot}	kg		53	
Holding brake data				Size 3	
Holding torque	M_4	Nm		90	
Rated voltage	U_N	V	± 10%	24	
Rated current	I_N	A		1.5	
Maximum connection time	t_1	ms		65	
Maximum disconnection time	t_2	ms		250	
Fan data				A	B
Rated voltage	U_N	V		230	115
Rated current	I_N	A		0.26/0.23	0.46
Frequency	f_N	Hz		50/60	60

Latest amendment: 2016-06-13

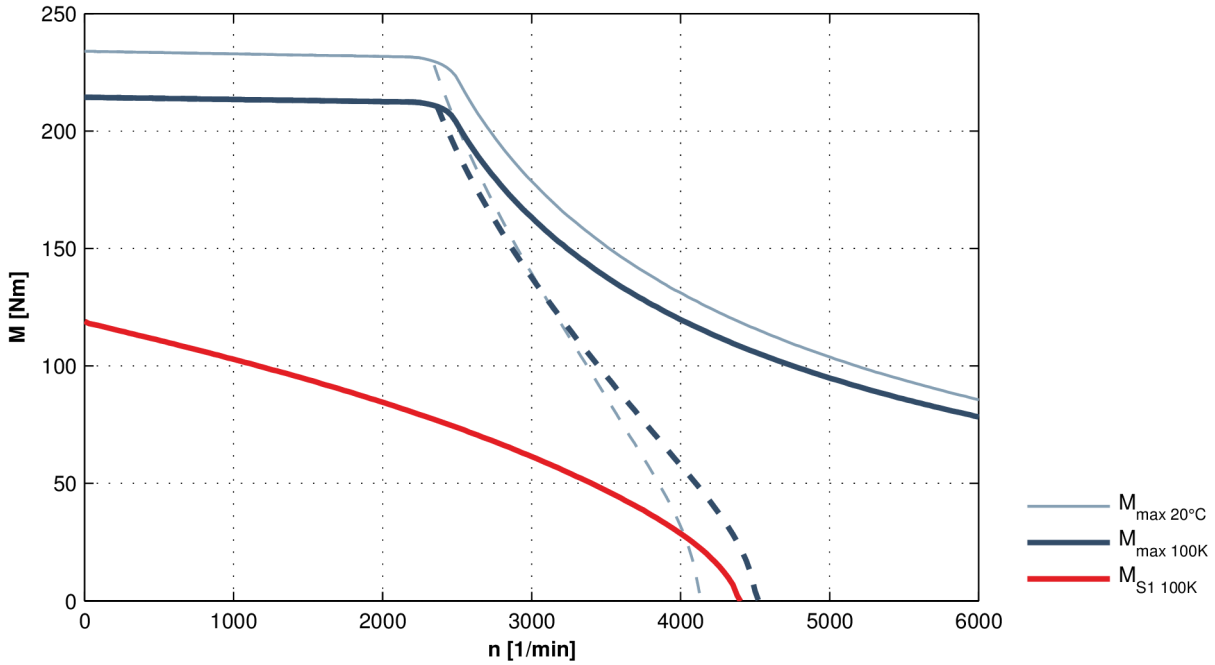
Tab. 4-88: Technical data MS2N10-E0BNA/B

Speed-torque characteristic curves MS2N10-E0BNA/B

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-89: Speed-torque characteristic curves MS2N10-E0BNA/B

Technical data

MS2N10-E1BNA/B

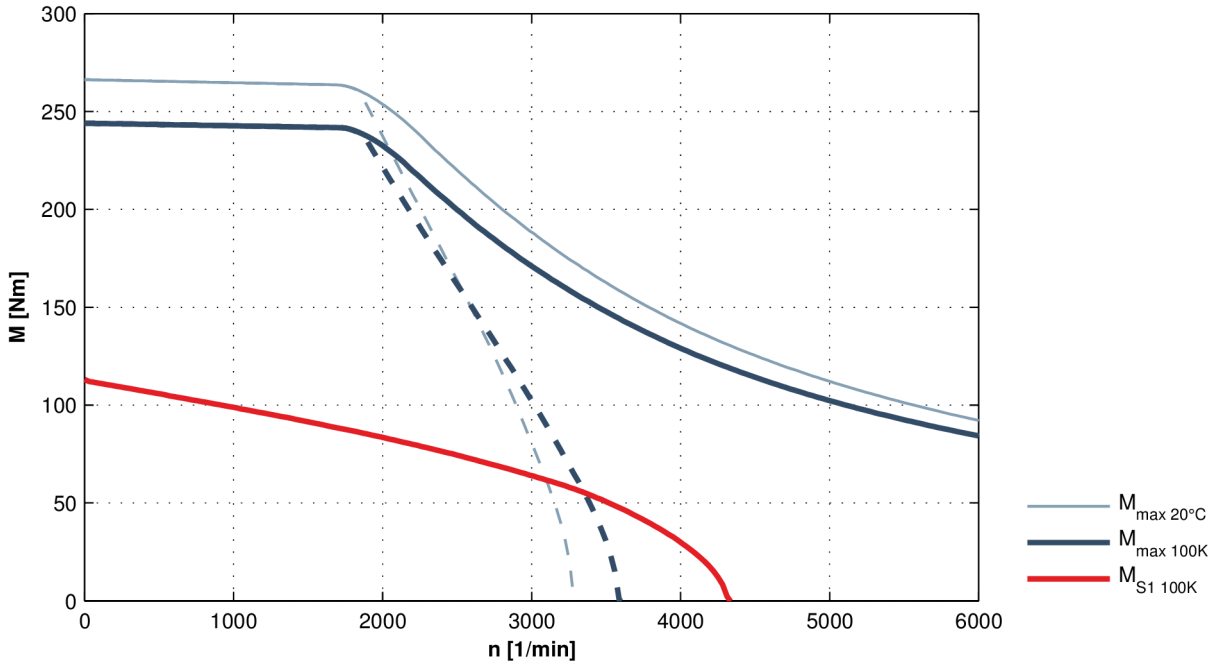
Designation	Symbol	Unit	Tolerance	MS2N10-E1BNA	MS2N10-E1BNB
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	113	
Standstill current (100 K)	$I_{0\ 100K}$	A		61.7	
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.025	
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.0277	
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2950	
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	59.7	
Rated current (100K)	$I_{N\ 100K}$	A		33.9	
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	18.5	
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	266	
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	244	
Maximum current	$I_{max(eff)}$	A		162	
Max. speed (electrical)	$n_{max\ el}$	1/rpm		6,000	
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000	
Number of pole pairs	p			5	
Torque constant	K_m	Nm/A	± 5%	2.0	
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	121.6	
Winding resistance at 20 °C	R_{12}	Ohm		0.137	
Winding inductivity	L_{12_min}	mH		2.57	
Discharge capacity of the component	C_{dis}	nF		5.0	
Thermal time constant of winding	T_{th_W}	s		66.0	
Thermal time constant of motor	T_{th_M}	min		12.5	
Mass without brake	m_{mot}	kg		46	
Mass with brake	m_{mot}	kg		53	
Holding brake data				Size 3	
Holding torque	M_4	Nm		90	
Rated voltage	U_N	V	± 10%	24	
Rated current	I_N	A		1.5	
Maximum connection time	t_1	ms		65	
Maximum disconnection time	t_2	ms		250	
Fan data				A	B
Rated voltage	U_N	V		230	115
Rated current	I_N	A		0.26/0.23	0.46
Frequency	f_N	Hz		50/60	60

Latest amendment: 2016-06-13

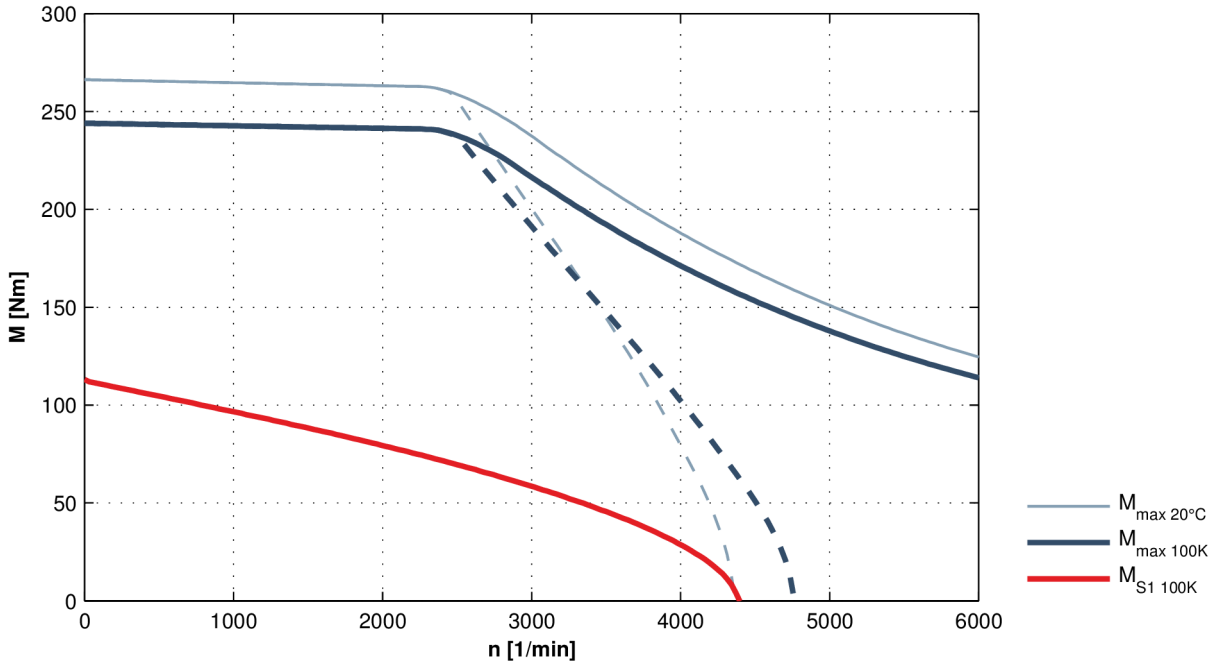
Tab. 4-90: Technical data MS2N10-E1BNA/B

Speed-torque characteristic curves MS2N10-E1BNA/B

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-91: Speed-torque characteristic curves MS2N10-E1BNA/B

Technical data

MS2N10-F0BHA/B

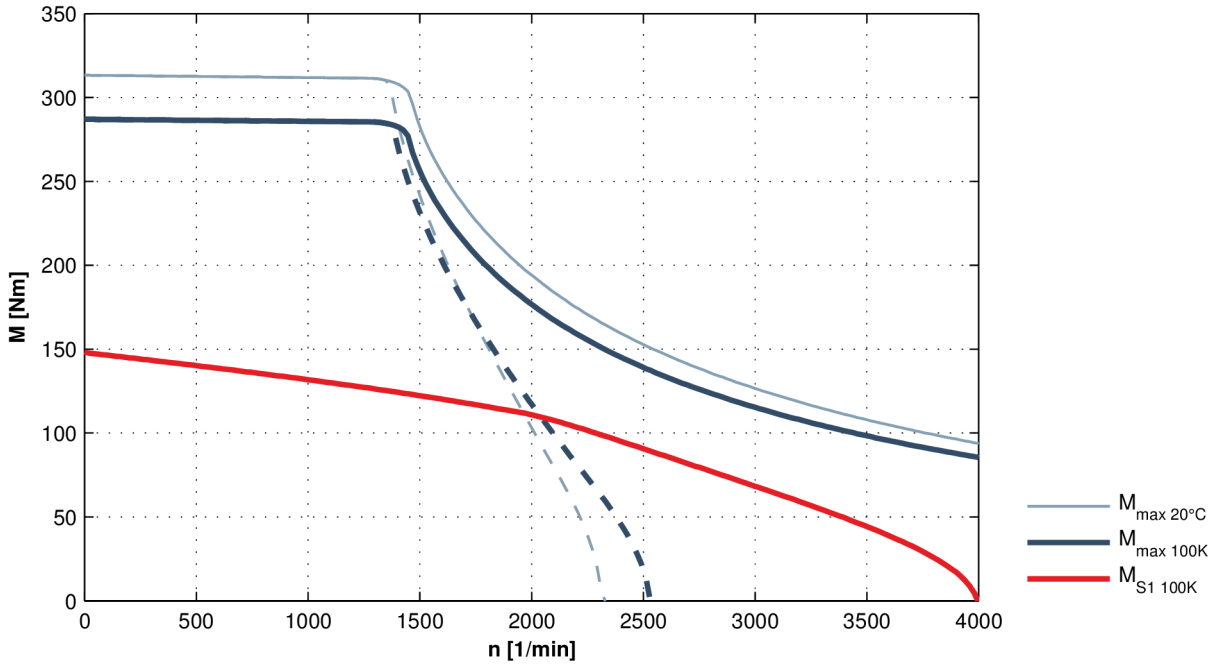
Designation	Symbol	Unit	Tolerance	MS2N10-F0BHA	MS2N10-F0BHB
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	145.5	
Standstill current (100 K)	$I_{0\ 100K}$	A		58.6	
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.0147	
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.0174	
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		1,950	
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	109.5	
Rated current (100K)	$I_{N\ 100K}$	A		43.6	
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	22.4	
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	313	
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	287	
Maximum current	$I_{max(eff)}$	A		140	
Max. speed (electrical)	$n_{max\ el}$	1/rpm		4000	
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000	
Number of pole pairs	p			5	
Torque constant at 20 °C	K_m	Nm/A	± 5%	2.84	
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	172.5	
Winding resistance at 20 °C	R_{12}	Ohm		0.169	
Winding inductivity	L_{12_min}	mH		5.01	
Discharge capacity of the component	C_{dis}	nF		8.7	
Thermal time constant of winding	T_{th_W}	s		101.2	
Thermal time constant of motor	T_{th_M}	min		13.2	
Mass without brake	m_{mot}	kg		56	
Mass with brake	m_{mot}	kg		63	
Holding brake data				Size 3	
Holding torque	M_4	Nm		90	
Rated voltage	U_N	V	± 10%	24	
Rated current	I_N	A		1.5	
Maximum connection time	t_1	ms		65	
Maximum disconnection time	t_2	ms		250	
Fan data				A	B
Rated voltage	U_N	V		230	115
Rated current	I_N	A		0.26/0.23	0.46
Frequency	f_N	Hz		50/60	60

Latest amendment: 2016-06-13

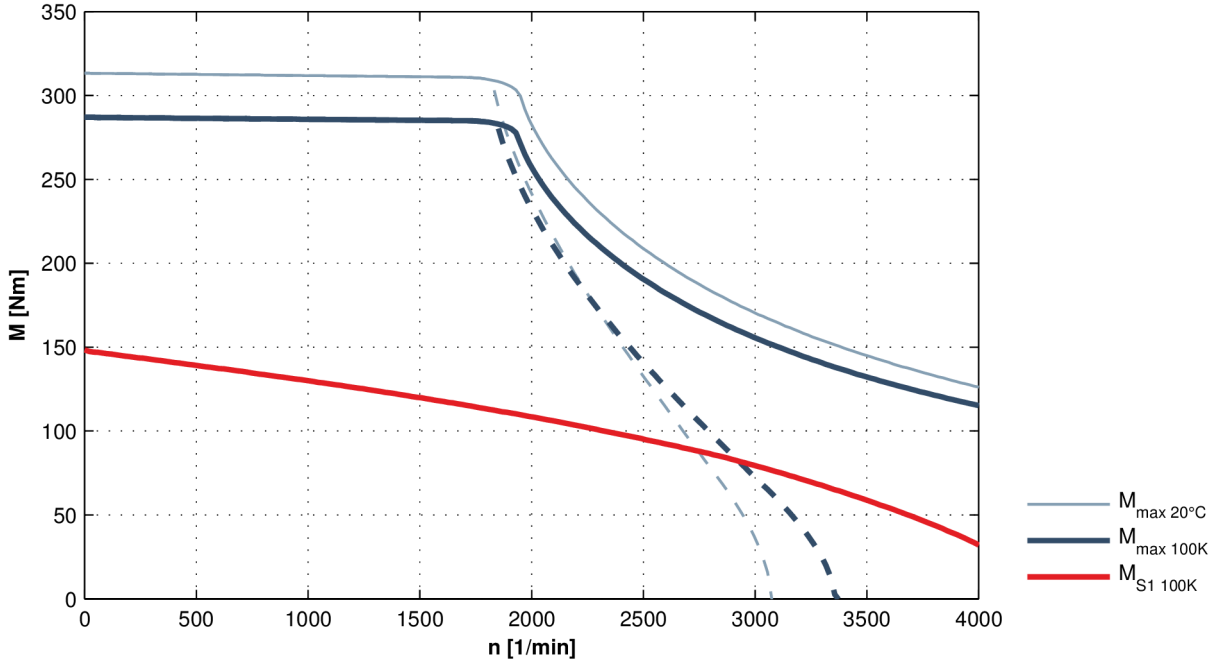
Tab. 4-92: Technical data MS2N10-F0BHA/B

Speed-torque characteristic curves MS2N10-F0BHA/B

IndraDrive, uncontrolled feed 3 × AC 400 V



IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-93: Speed-torque characteristic curves MS2N10-F0BHA/B

Technical data

MS2N10-F1BHA/B

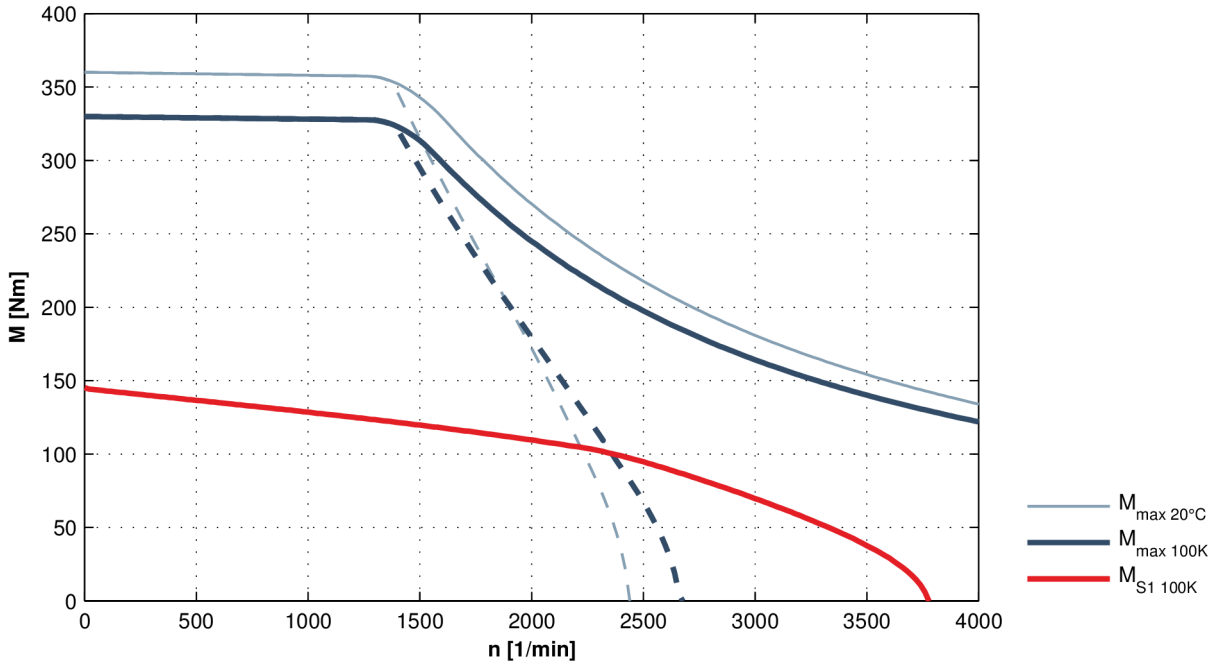
Designation	Symbol	Unit	Tolerance	MS2N10-F1BHA	MS2N10-F1BHB
Standstill torque (100 K)	$M_{0\ 100K}$	Nm	± 5%	145	
Standstill current (100 K)	$I_{0\ 100K}$	A		58.6	
Moment of inertia of rotor without brake	J_{red}	kg*m^2	± 10%	0.0329	
Moment of inertia of rotor with brake	J_{red}	kg*m^2	± 10%	0.0356	
Rated speed (100K)	$n_{N\ 100K}$	1/rpm		2000	
Rated speed (100K)	$M_{N\ 100K}$	Nm	± 5%	105.5	
Rated current (100K)	$I_{N\ 100K}$	A		43.7	
Rated power (100K)	$P_{N\ 100K}$	kW	± 5%	22.1	
Maximum torque 20 °C (cold)	$M_{max\ 20°C}$	Nm	± 5%	360	
Maximum torque 100K (warm)	$M_{max\ 100K}$	Nm	± 5%	330	
Maximum current	$I_{max(eff)}$	A		162	
Max. speed (electrical)	$n_{max\ el}$	1/rpm		4000	
Maximum speed (mechanical)	$n_{max\ mech}$	1/rpm		6,000	
Number of pole pairs	p			5	
Torque constant at 20 °C	K_m	Nm/A	± 5%	2.7	
Voltage constant at 20 °C	K_{EMK_1000}	V/1000 min^{-1}	± 5%	163.9	
Winding resistance at 20 °C	R_{12}	Ohm		0.174	
Winding inductivity	L_{12_min}	mH		3.61	
Discharge capacity of the component	C_{dis}	nF		6.70	
Thermal time constant of winding	T_{th_W}	s		68.3	
Thermal time constant of motor	T_{th_M}	min		13.2	
Mass without brake	m_{mot}	kg		56	
Mass with brake	m_{mot}	kg		63	
Holding brake data				Size 3	
Holding torque	M_4	Nm		90	
Rated voltage	U_N	V	± 10%	24	
Rated current	I_N	A		1.5	
Maximum connection time	t_1	ms		65	
Maximum disconnection time	t_2	ms		250	
Fan data				A	B
Rated voltage	U_N	V		230	115
Rated current	I_N	A		0.26/0.23	0.46
Frequency	f_N	Hz		50/60	60

Latest amendment: 2016-06-13

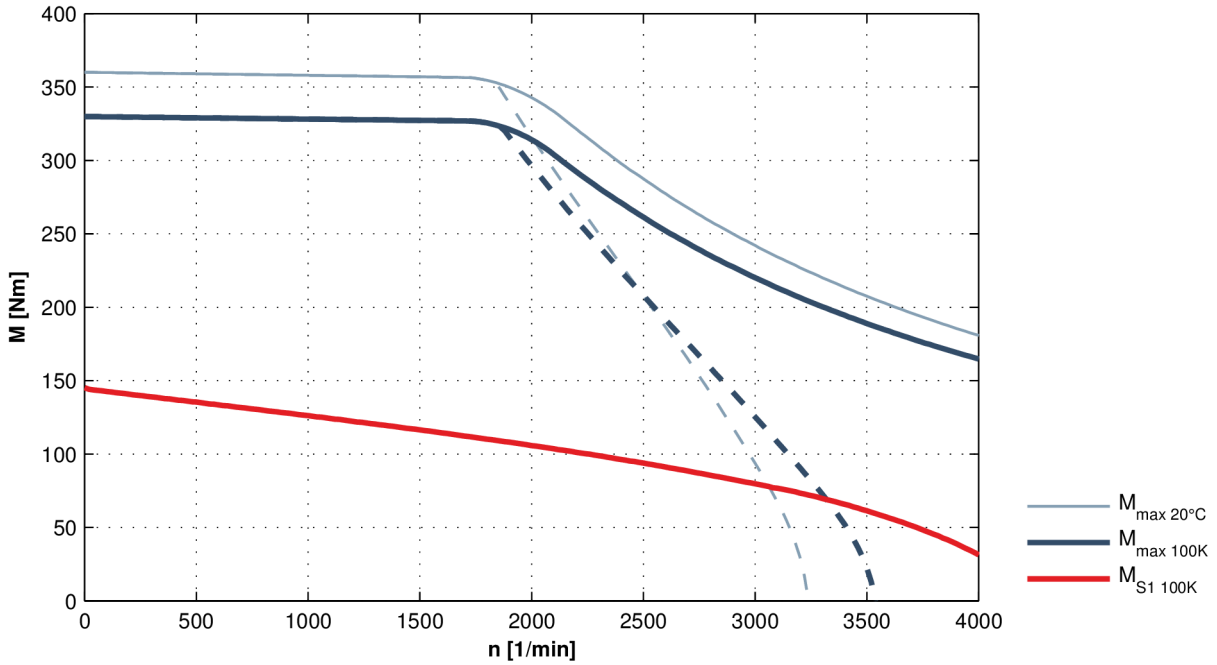
Tab. 4-94: Technical data MS2N10-F1BHA/B

Speed-torque characteristic curve MS2N10-F1BHA/B

IndraDrive, uncontrolled feed 3 × AC 400 V



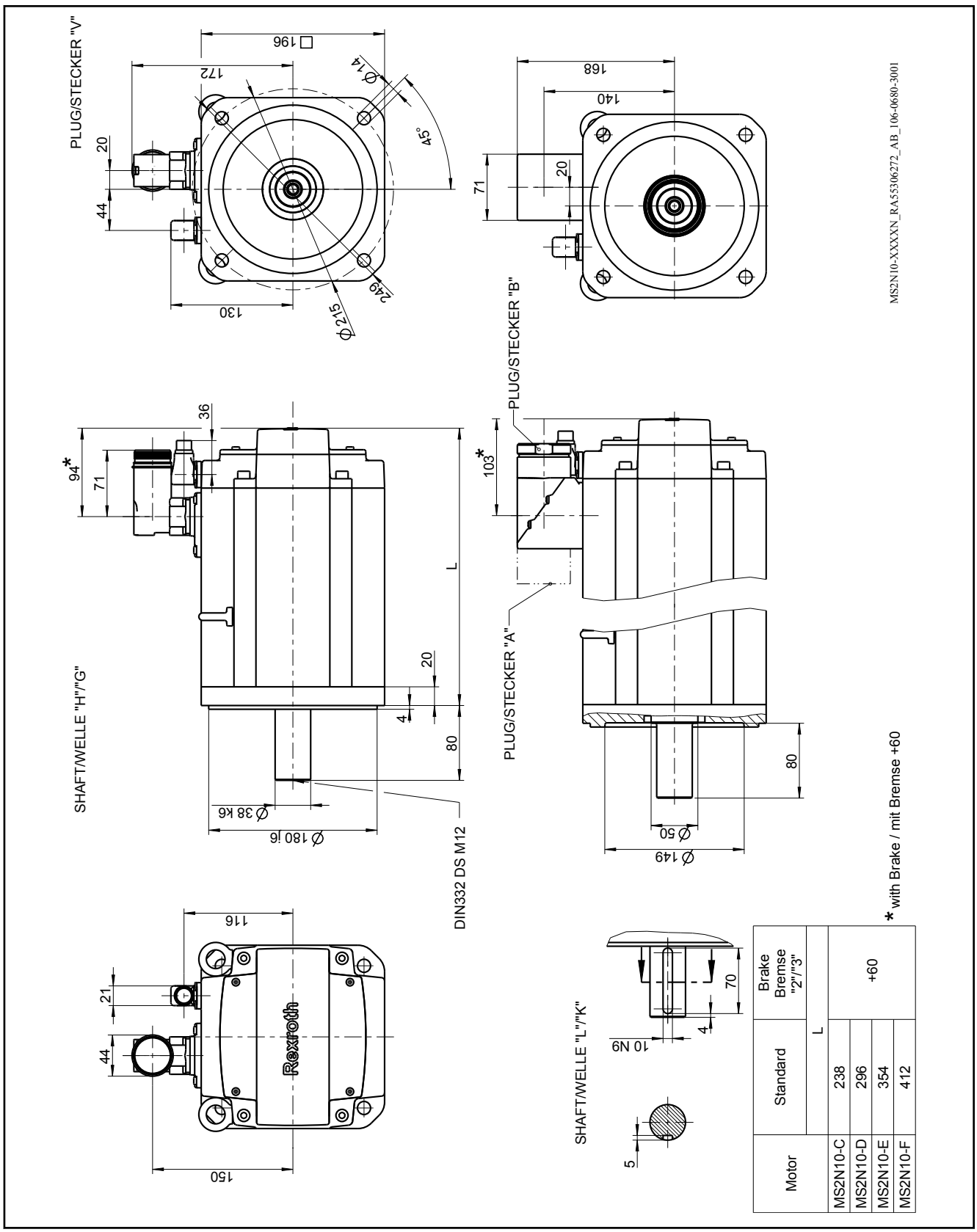
IndraDrive, controlled feed 3 × AC 400 … 480 V



Tab. 4-95: Speed-torque characteristic curve MS2N10-F1BHA/B

Technical data

4.6.3 Self-cooling dimensions with connector



Motor	L		
	Standard		Brake Bremse "2"/"3"
MS2N10-C	238		+60
MS2N10-D	296		
MS2N10-E	354		
MS2N10-F	412		

Fig. 4-15: MS2N10-xxxxN

4.6.4 Forced ventilation dimensions with connector

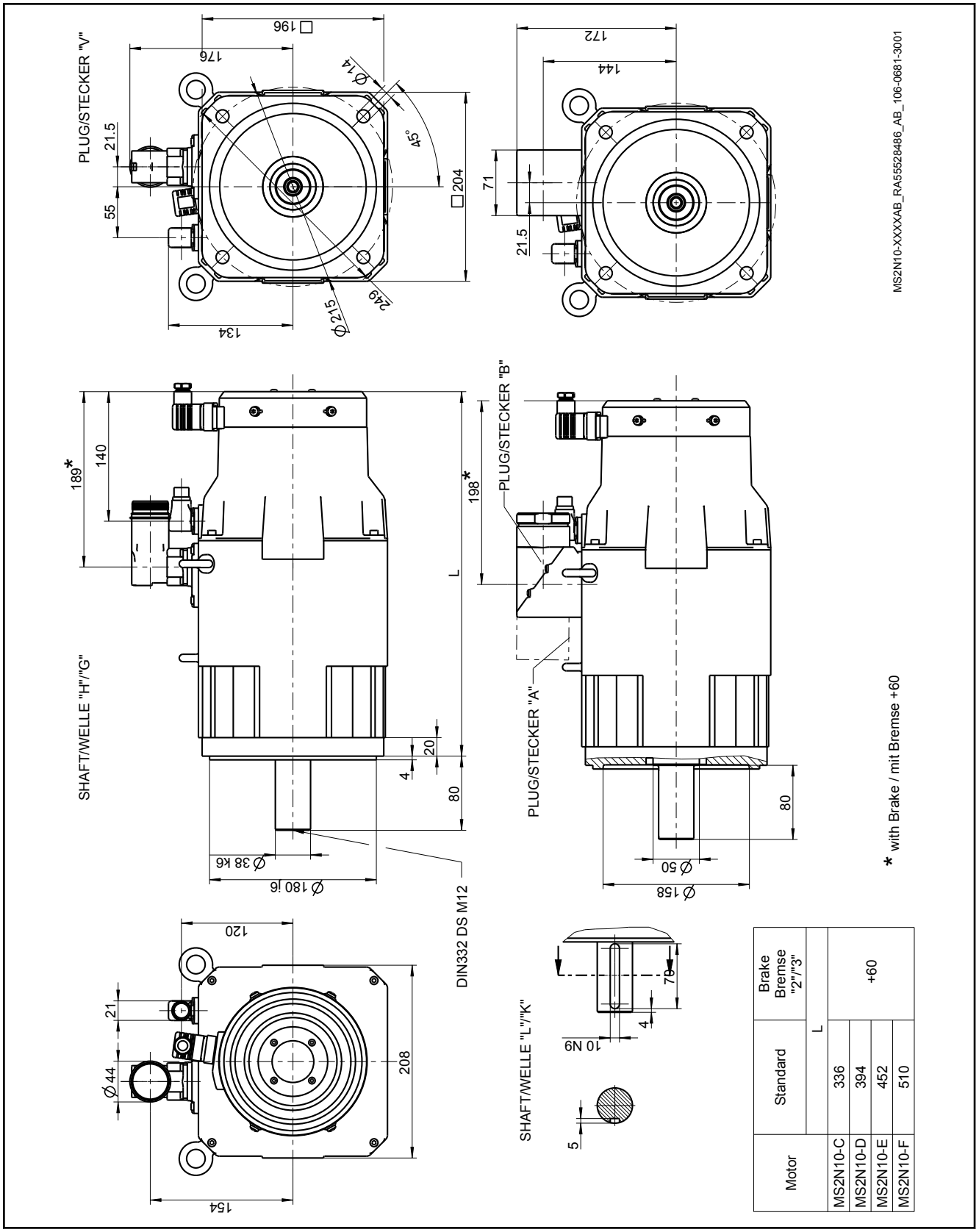
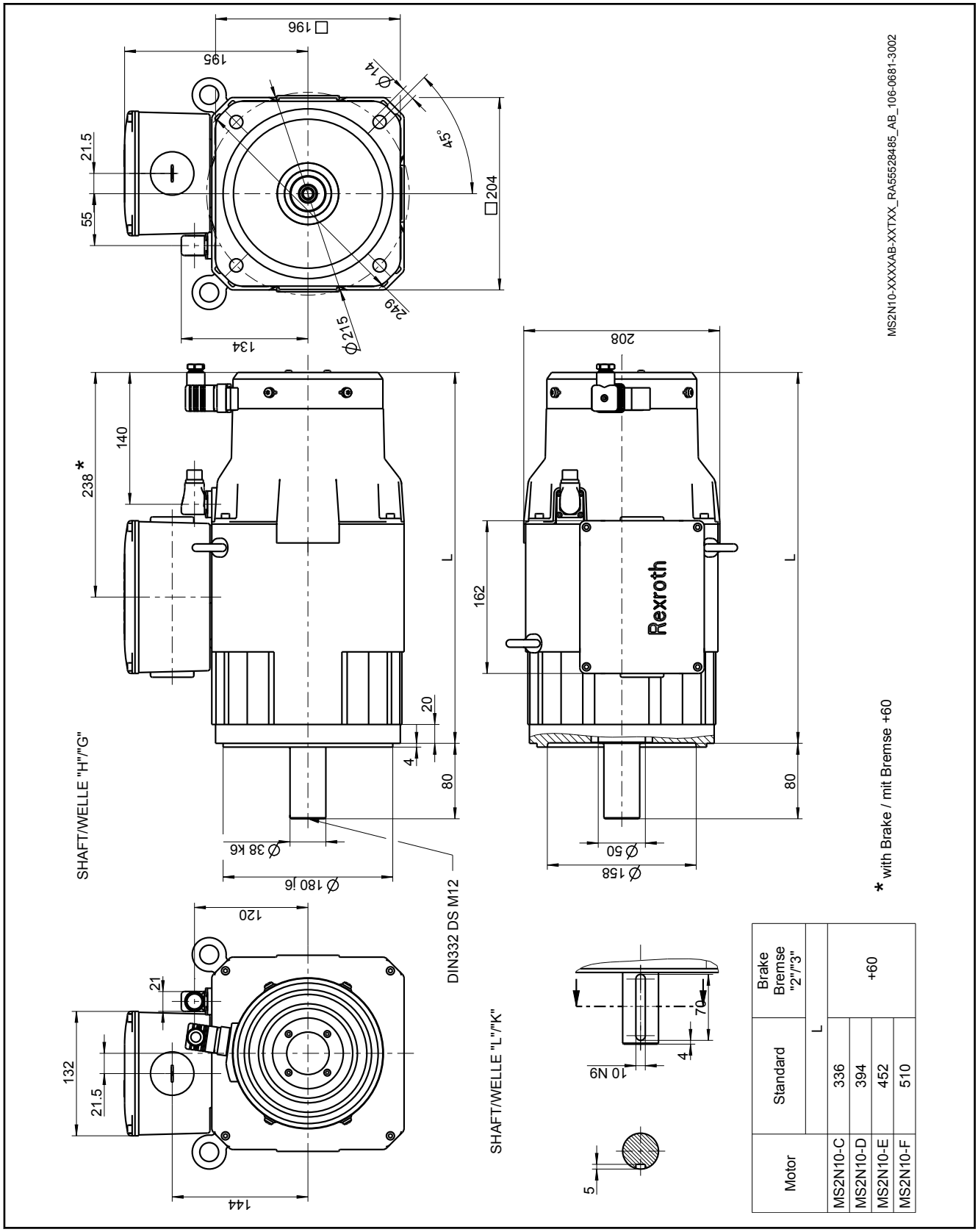


Fig. 4-16: MS2N-xxxxA/B

Technical data

4.6.5 Forced ventilation dimensions with terminal boxes



Motor	L Standard	L Brake Bremse "2"/"3" +60
MS2N10-C	336	
MS2N10-D	394	
MS2N10-E	452	
MS2N10-F	510	

Fig. 4-17: MS2N-xxxxA/B-xxTxx

4.6.6 Radial and axial force

Radial force

The permissible radial force F_R is specified in distance x from the shaft shoulder, depending on the mean speed in the following diagram.

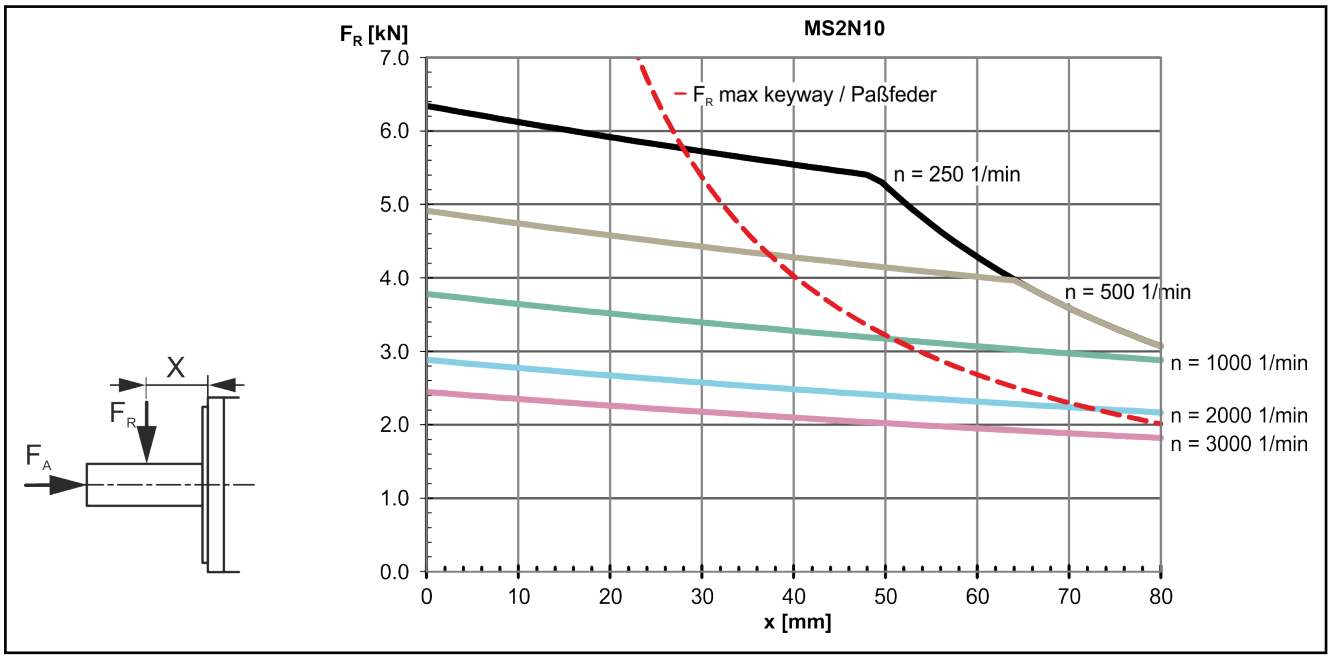


Fig. 4-18: MS2N10: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30000 h

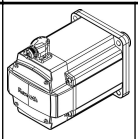
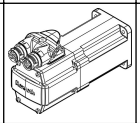
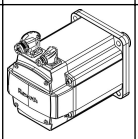
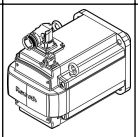
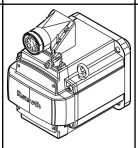
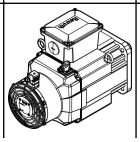
Axial force

Axial forces F_A are permissible without limitation up to 80 N. Higher axial forces only after a detailed dimensioning by your distribution partner at Bosch Rexroth. For evaluation purposes, please specify the following information:

- Axial and radial force with force application point
- Installation position (horizontal, vertical with the shaft end pointing to the top or bottom)
- Mean speed

5 Connection

MS2N motors are connected via connectors or terminal boxes. Depending on the selected options, the following connection variants are available.

Type	Connection mode		Type of connection/size	Locking	Output direction
MS2Nxx-xxxxx-xxS		Single cable	M23	SpeedCon	rotatable
MS2Nxx-xxxxx-xxD		Double cable	M17 Power M17 Encoder	SpeedCon SpeedCon	rotatable rotatable
MS2Nxx-xxxxx-xxU		Double cable	M23 Power M17 Encoder	SpeedCon SpeedCon	rotatable rotatable
MS2Nxx-xxxxx-xxV		Double cable	M40 Power M17 Encoder	SpeedCon SpeedCon	rotatable rotatable
MS2Nxx-xxxxx-xxA MS2Nxx-xxxxx-xxB		Double cable	M58 Power M17 Encoder	Thread SpeedCon	fixed rotatable
MS2Nxx-xxxxx-xxT		Double cable	Terminal box power M17 Encoder	Terminal board SpeedCon	fixed rotatable

Tab. 5-1: MS2N connection system overview

In case of force-ventilated motors, connect the fan unit according to chapter 5.5 "Fan unit " on page 161. The flange sockets can be rotated. The adjustment options are described in chapter 5.2 "Turn connector" on page 157.

Ready-made connection cables are available for user-friendly connection. Use these cables for a simple, quick and reliable installation. The plug connectors are equipped with SpeedCon quick locks (see chapter 5.3 "Attaching the connectors" on page 158.

Connection

5.1 Connectors

5.1.1 Single cable connection

M23 connector

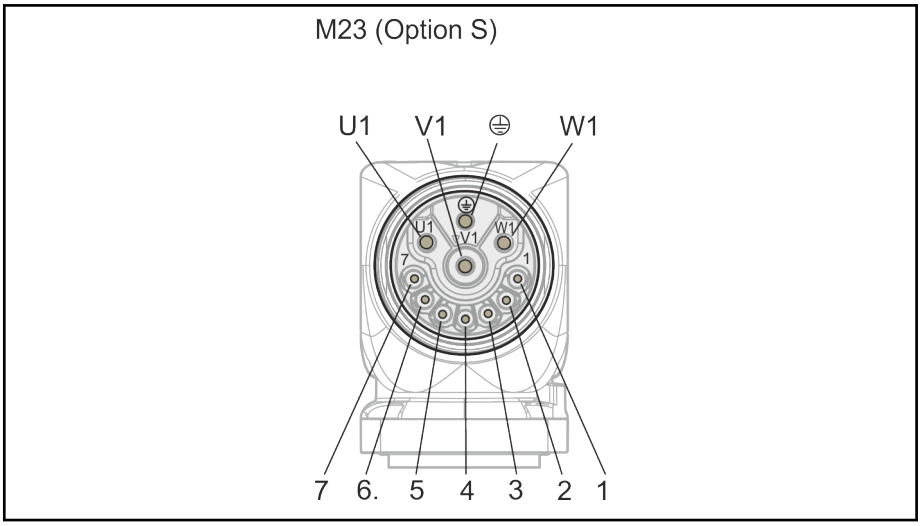


Fig. 5-1: Cable view of single cable connection M23

Designation	Function	
	with brake	without brake
U1	A1	A1
V1	A2	A2
W1	A3	A3
⏚	PE	PE
1	+UB	+UB
2	GND	GND
3	Data+	Data+
4	Data-	Data-
5	Shld	Shld
6	BD(+)	n.c.
7	BD(-)	n.c.

Tab. 5-2: Pin assignment of single cable connection

5.1.2 Double cable connection

Encoder connector M17

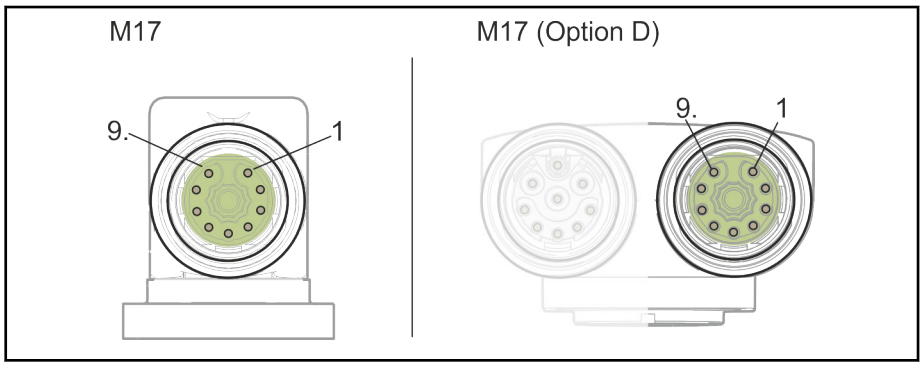


Fig. 5-2: Connector view of encoder M17

Designation	Function	
	Encoder A	Encoder C, D
1	+UB	+UB
2	n.c.	n.c.
3	Data+	Data+
4	Data-	Data-
5	A+	n.c.
6	A -	n.c.
7	B+	n.c.
8	B -	n.c.
9	GND	GND

Tab. 5-3: Pin assignment of double cable connection encoder

Connection

Power connector M17, M23, M40, M58

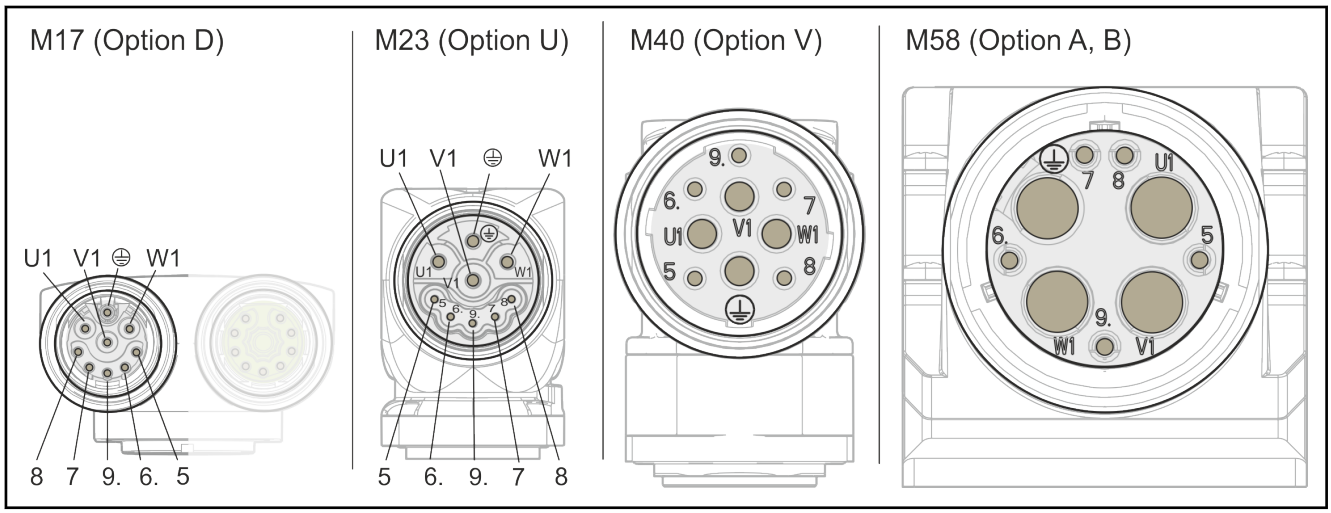


Fig. 5-3: Plug view power M17, M23, M40, M58

Designation	Function			
	with brake		without brake	
	Encoder A	Encoder C, D	Encoder A	Encoder C, D
U1	A1	A1	A1	A1
V1	A2	A2	A2	A2
W1	A3	A3	A3	A3
⏚	PE	PE	PE	PE
5	TP(+)	n.c.	TP(+)	n.c.
6	TP(-)	n.c.	TP(-)	n.c.
7	BD(+)	BD(+)	n.c.	n.c.
8	BD(-)	BD(-)	n.c.	n.c.
9	n.c.	n.c.	n.c.	n.c.

Tab. 5-4: Pin assignment of double cable connection power

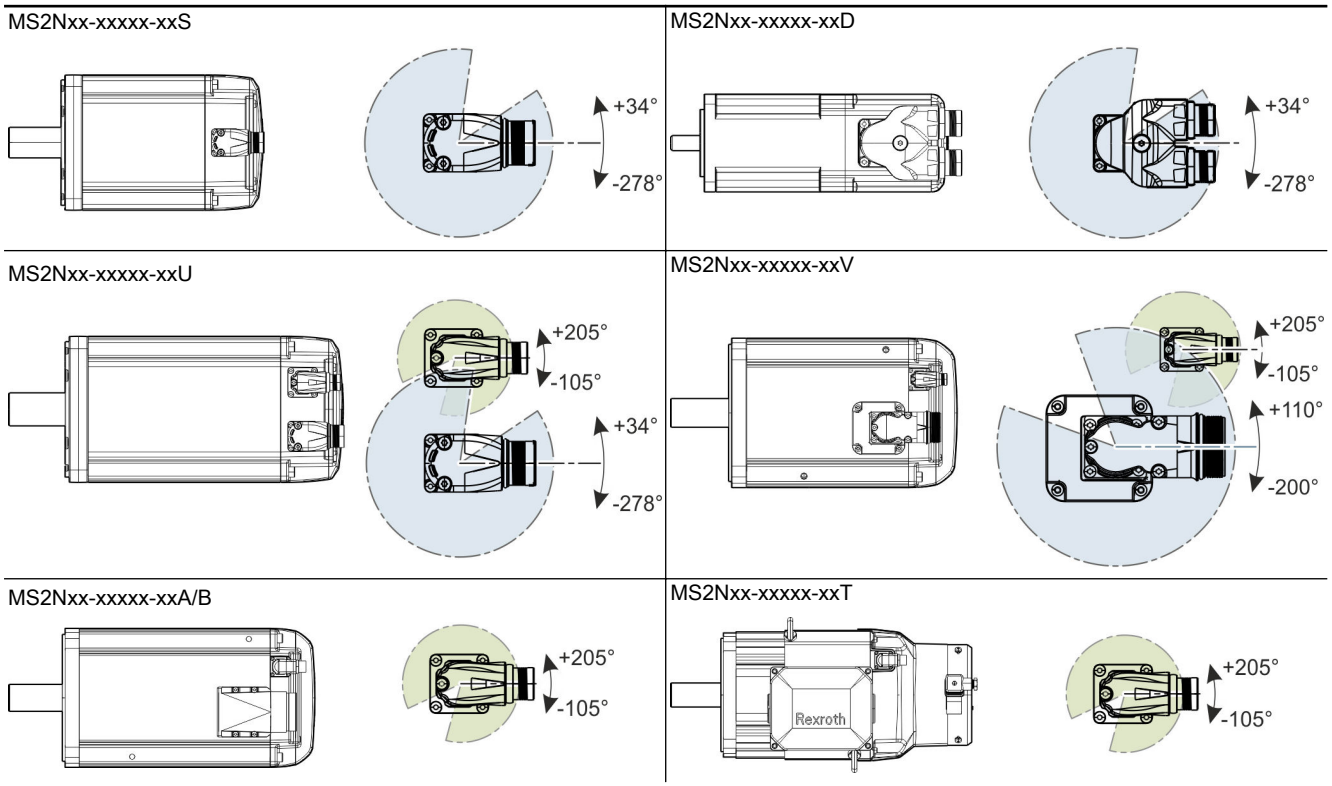
5.2 Turn connector

The output direction of the power connector and the encoder connector can be adjusted. The flange sockets can be manually rotated of a plug connector has been installed. Do not use any tools (e.g. pliers or screwdrivers) to turn the flange socket to avoid damage.

Change the output direction a maximum of ten times and do not exceed the specified adjustment torques and the angle of rotation.

Adjustment ranges can be limited by adjacent plug connectors. In the following, the designs and possible adjustment ranges are represented.

Adjustment range/angle of rotation



Tab. 5-5: Adjustment range/angle of rotation of plug connector

Connector/size	Adjustment torque
Encoder/M17	2 … 6 Nm
Double plug / M17	2 … 10 Nm
Single cable connector Power / M23	4 … 10 Nm
Power / M40	12 … 18 Nm

Tab. 5-6: Adjustment torque of rotatable connector

Connection

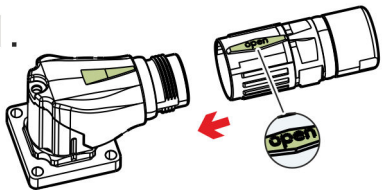
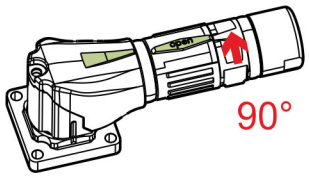
5.3 Attaching the connectors

Observe when connecting the flange socket:

- Use ready-made, shielded connection cables of Bosch Rexroth.
- Connect or disconnect plug connections only in de-energized, dry and clean state.
- Protect the flange sockets from external force effect.

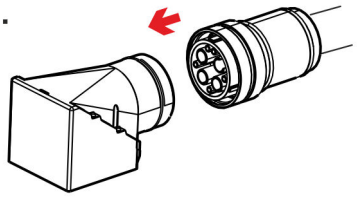
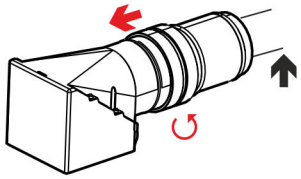
5.3.1 M17, M23, M40 SpeedCon quick lock

The SpeedCon quick lock shows the frame size M17. Frame sizes M23 and M40 have the same functions.

SpeedCon quick lock	
1. 	2. 
Insert power connector in position “open”.	"Manually" tighten the power connector with a rotation by approx. 90°.

Tab. 5-7: Connect SpeedCon connectors

5.3.2 M58 screw thread

Threaded connection	
1. 	2. 
Position power connector at thread	Tighten knurled nut "securely", retrace cable

Tab. 5-8: Connect connector with threaded connection

5.4 Terminal boxes

The terminal boxes of the motors are optimized for the respective motor current. Upon delivery, the terminal box openings are closed with dummy plugs, cable entries[1)] are not included in the scope of delivery.

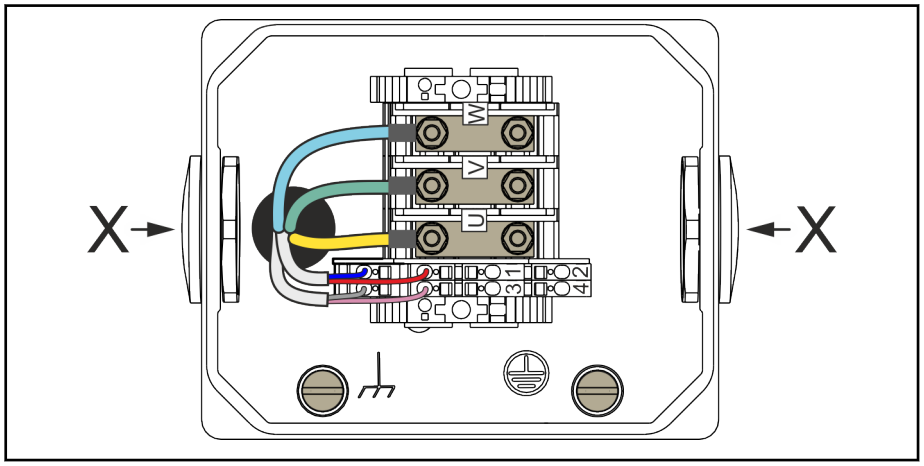


Fig. 5-4: MS2N terminal box

Motor		Rexroth	
Designation	**Clamp / data**	**IndraDrive**	**RL2 cable**
U	Bolt clamps M5, tightening torque 2 ...3 Nm	A1	1
V	Rated cross section 16 mm²	A2	2
W	Rated current 76 A (rated current according to UL 65 A)	A3	3
1	Tension spring connection 0.5 ... 2.5 mm² with wire end ferrule	BD(+)	7
2		BD(-)	8
3		TP(+)	5
4		TP(-)	6
⏚	M8 screw, tightening torque 3,8 Nm	⏚	GNYE
⏚		Shld ⏚	⏚

Tab. 5-9: MS2N Pin assignment terminal boxes

For motors with encoder C, the temperature signals are transmitted digitally via the encoder interface. In this case, the temperature wires of ready-made power cables do not have any function, but must be connected according to the pin assignment in the terminal boxes.

1) Ready-made connection cables are supplied with cable entries.

Connection

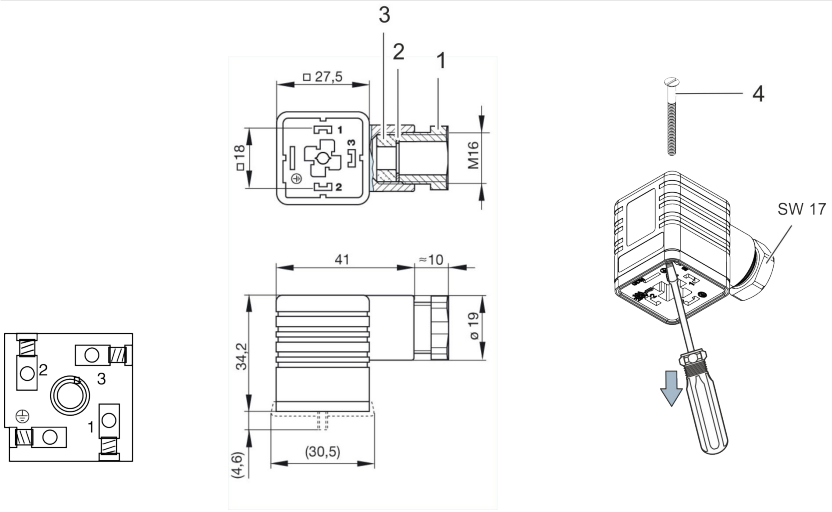
Motor	Opening for cable insert "X"
MS2N10-C0BHA-xxTxx-xxxxx-xx	2x M32
MS2N10-C0BHB-xxTxx-xxxxx-xx	
MS2N10-C0BNA-xxTxx-xxxxx-xx	
MS2N10-C0BNB-xxTxx-xxxxx-xx	
MS2N10-D0BHA-xxTxx-xxxxx-xx	2x M40
MS2N10-D0BHB-xxTxx-xxxxx-xx	
MS2N10-D0BNA-xxTxx-xxxxx-xx	
MS2N10-D0BNB-xxTxx-xxxxx-xx	
MS2N10-E0BHA-xxTxx-xxxxx-xx	
MS2N10-E0BHB-xxTxx-xxxxx-xx	
MS2N10-E0BNA-xxTxx-xxxxx-xx	
MS2N10-E0BNB-xxTxx-xxxxx-xx	
MS2N10-F0BDA-xxTxx-xxxxx-xx	
MS2N10-F0BDB-xxTxx-xxxxx-xx	
MS2N10-F0BHA-xxTxx-xxxxx-xx	
MS2N10-F0BHB-xxTxx-xxxxx-xx	

Tab. 5-10: Cable entry at MS2N terminal box

5.5 Fan unit

To connect the fan unit, use a connection cable 3 x 0.75 mm^2.

MS2Nxx-xxxxA (U_N 230 V)
MS2Nxx-xxxxB (U_N 115 V)



Assignment		Connection
1	L1 230 V	Screwed connection 0.5 ... 1.5 mm^2
2	N	
3	L1 115 V	
⏚	PE	

Tab. 5-11: Assignment of connector fan unit MS2N

5.6 Shielding concept

Converter-fed drives can generate high-frequency discharge currents in motor cables and motors. By using shielded cables and a large-area, low-impedance connection of the shield connections at motor and controller, impedances can be minimized and the discharge currents can be lead from the motor to the controller. Ready-made cables of Bosch Rexroth are designed and tested according to the requirements of installed motor components. This can no longer be ensured when using cables from other manufacturers.

 For more information about "Electromagnetic compatibility (EMC)EMV", refer to the "Rexroth IndraDrive Drive Systems with HMV01/02 HMS01/02, HMD01, HCS02/03" documentation.

6 Operating conditions and handling

6.1 Ambient conditions in operation, at transport and storage

Ambient climatic conditions are defined in classes according to DIN EN 60721. The conditions are based on observations made over long periods of time worldwide and take into account all influencing variables, such as the air temperature and humidity.

The permanent use of motors according to class 3K4 by complying with the deviations according the following table is possible. Comply with the specified conditions for transport and storage.

	Operation	Transport	Storage
Ambient temperature	0 … +40 °C	-25 … +70 °C	-25 … +55 °C
Relative humidity	5 … 95 %	5 … 95 %	5 … 75 %
Absolute humidity	1 … 29 g/m^3	1 … 60 g/m^3	1 … 29 g/m^3
Condensation	Not allowed	Not allowed	Not allowed
Climatic class	corresponding to 3K4 according to EN 60721-3-3	corresponding to 2K3 according to EN 60721-3-2	corresponding to 1K3 according to EN 60721-3-1
Mechanical strength	see Chapter 6.3 "Vibration load during operation"	see Chapter 6.4 "Shock load during transport und storage"	

Tab. 6-1: Ambient conditions

6.2 Ambient temperature und installation altitude in operation

According to DIN EN 60034-1, the motor performance data specified below are valid for:

- Ambient temperature 0 ... +40 °C
- Installation altitude 0 … 1,000 m above sea level

When exceeding the given limits, the performance data of the motors has to be reduced. In case of deviating ambient conditions, contact your distribution partner for an application-specific design.

Operating conditions and handling

6.3 Vibration load during operation

Vibrations are sine-wave oscillations in stationary use, which vary in their effect on the resistance of the motors depending on their intensity.

The specified limit values are valid for frequencies of 10-2,000 Hz during stimulation on the motor flange. Limitations can be necessary for occurring resonances depending on the application and installation situation.

The following limit values apply according to EN 60068-2-6 for MS2N motors:

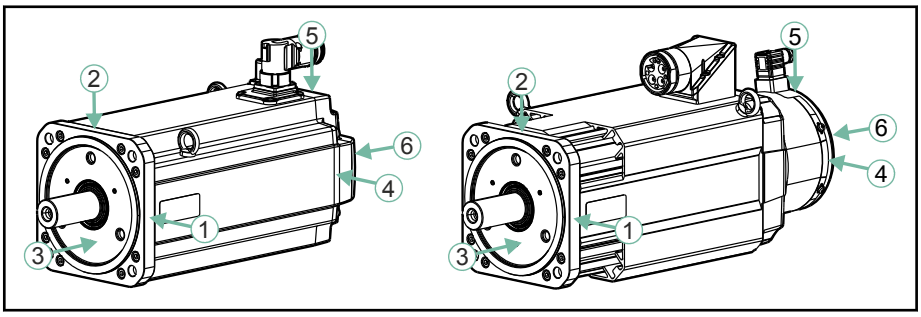


Fig. 6-1: Vibration load on measuring points

Direction	Measuring point	Limit value (10-2000 Hz)	
		Motors Self-cooling	Motors Forced ventilation
Radial	1, 2 (radial motor flange)	30 m/s²	10 m/s²
	4, 5 (radial bearing shield / fan)	50 m/s²	25 m/s²
Axial	3 (axial motor flange)	10 m/s²	10 m/s²
	6 (axial bearing shield / fan)	25 m/s²	25 m/s²

Tab. 6-2: Permissible vibration load for MS2N motors

Check the vibration load on the fan housing in case of forced ventilation. The specified values must not be exceeded.

6.4 Shock load during transport und storage

MS2N motors comply with the transport condition requirements of class 2M1 (shock during transport) acc. to EN 60721-3-2 compare with chapter 6.5 "Transport (shipping)" on page 165. Function-impairing effects are avoided as long as the specified limits are complied with.

Frame size	Maximum allowed shock load (11 ms)	
	Axial	Radial
MS2N03, -04, -05	100 m/s²	1000 m/s²
MS2N06		500 m/s²
MS2N07		300 m/s²
MS2N10		200 m/s²

Tab. 6-3: Permissible shock load for MS2N motors

The specified limit values do not apply to half-sine-shaped single shock load acc. to EN 60068-2-27. The specifications do not apply to **motor operation**.

Applications with continuous shock load require a case-by-case review.

6.5 Transport (shipping)

The motors have to be transported in their original packaging, complying with 2K2, 2B1, 2C2, 2S2, 2M1 acc. to DIN EN 60721-3-2.

Please observe the following classification limitations:

- chapter 6.1 "Ambient conditions in operation, at transport and storage" on page 163
- No occurrence of salt mist

☞ Before transport, discharge the liquid coolant from liquid-cooled motors to avoid frost damage.

Transport by air

If motor components with permanent magnets are shipped by air, the DGR (**D**angerous **G**oods **R**egulations) of the IATA (International Air Transport Association) for hazardous materials of class 9 which also include magnetized substances and objects must be observed. For example, these regulations are applicable for

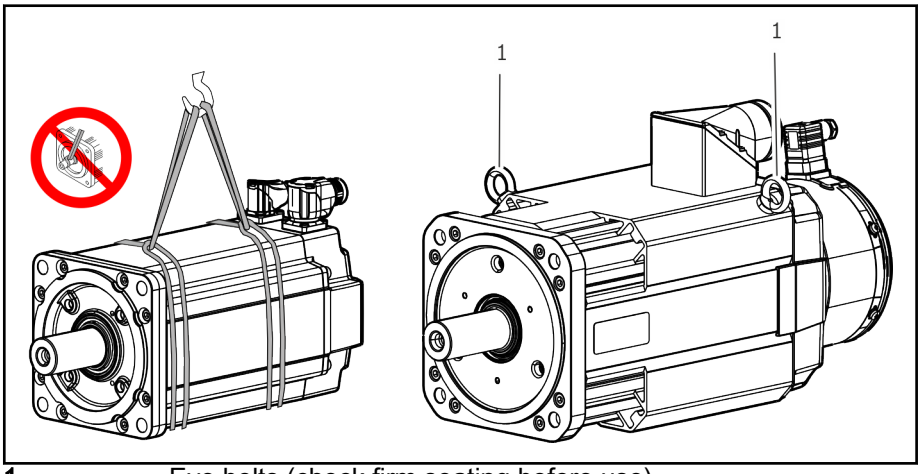
- Secondary parts of synchronous linear motors
- Rotors of synchronous kit motors
- Rotors of synchronous housing motors (if shipped as motor components, i.e., separated from the stator or motor housing in case service work is required)

For information on the maximum allowed magnetic strenghts and methods of measuring such magnetic field strengths, please refer to the current IATA DGR (chapter 3.9.2.2).

6.6 Transport with lifting devices

⚠ WARNING **Risk of injury and material damage due to improper handling during transport!**

- Only use lifting devices suited for the weight of the motors. Use lifting sling belts or lifting eye bolts. Secure the lifting eye bolts before use.
- Never walk under hanging loads.
- Do not lift the motor at the shaft or on the optional fan housing.
- Use suitable protective equipment and protective clothing during transport, and wear safety shoes.



1 Eye bolts (check firm seating before use)

Fig. 6-2: Lifting and transporting motors

- Before transporting the motor, determine the weight of the motor. For more details about motor weight, please refer to the type plate or the Project Planning Manual (Technical Data).
- Adjust the carrying capacity of the lifting device to the motor weight.
- If provided by the manufacturer, all lifting eye bolts must be used and tightened before use.
- Avoid increased transport vibrations.
- Remove any existing transport locks prior to commissioning and keep them.

NOTICE **Never touch the connection points of electrostatic sensitive devices!**

Installed components (e.g., KTY84, encoder) may contain electrostatic sensitive devices (ESD).

- Observe the ESD safety measures.

6.7 Storage

Store the motors in their original packaging in a dry, dust-free, vibration-free and light-protected place without direct solar radiation. Comply with the

classes 1K2, 1B1, 1C1,1S1,1M2 specified for storage acc. to DIN EN 60721-3-2.

Please observe the following classification limitations:

- chapter 6.1 "Ambient conditions in operation, at transport and storage" on page 163
- No occurrence of salt mist

NOTICE **Damage due to moisture and humidity!**

- Protect the products from dampness and corrosion.
- Store them only in rainproof and dry rooms.

☞ Before storage, discharge the liquid coolant from liquid-cooled motors to avoid frost damage.

Additional measures have to taken upon commissioning to ensure smooth functioning – irrespective of the storage time which may be longer than the warranty period of our products. Warranty extension is not a consequence.

Motors

Storage time/months			Measures for commissioning
> 1	> 12	> 60	
•	•	•	Visual inspection of all parts to be damage-free
•	•	•	Resurface the holding brake
	•	•	Check the electric contacts to verify that they are free from corrosion
	•	•	Let the motor run in without load for one hour at 800 ... 1000 rpm.
	•	•	Measure insulation resistance. Dry the winding at a value of < 1kOhm per volt rated voltage.
		•	Exchange bearings
		•	Exchange encoders

Tab. 6-4: Measures before commissioning motors that have been stored over a prolonged period of time

Cables and connectors

Storage time/months			Measures for commissioning
> 1	> 12	> 60	
•	•	•	Visual inspection of all parts to be damage-free
	•	•	Check the electric contacts to verify that they are free from corrosion
		•	Visually inspect the cable jacket. Do not use the cable if you detect any abnormalities (squeezed or kinked spots, color deviations, ...).

Tab. 6-5: Measures before commissioning cables and connectors that have been stored over a prolonged period of time

7 Environmental protection and disposal

Production method

The products are manufactured in energy- and resource-optimized production processes which allow re-using and recycling the resulting waste. We regularly try to replace pollutant-loaded raw materials and supplies by more environment-friendly alternatives.

No release of hazardous substances

Our products do not contain any hazardous substances which may be released in case of appropriate use. Normally, our products will not have any negative influences on the environment.

Basic components

Basically, our motors consist of the following components: Steel, aluminum, copper, brass, permanent magnets (rare earth metal), electrotechnical components.

Return of products

Our products can be returned to us for disposal free of charge. However, this requires that the products be free from oil, grease or other dirt.

Furthermore, the products returned for disposal may not contain any undue foreign material or foreign components.

Deliver the products "free domicile" to the following address:

Bosch Rexroth AG
Electric Drives and Controls
Buergermeister-Dr.-Nebel-Straße 2
97816 Lohr am Main, Germany

Permanent magnets

⚠ WARNING **Danger due to permanent magnets!**

▸ Health hazard for persons with heart pacemakers, metallic implants and hearing aids in direct environment of permanent magnets.

▸ Crushing hazard of fingers and hand due to heavy attractive forces of the magnets.

▸ Risk of destruction of sensitive parts such as watches, credit cards, ...

Permanent magnets present a serious danger during disposal. Prior to disposal, permanent magnets attached to the motor components (e.g. synchronous motor rotors, secondary parts of linear motors) have to be demagnetized using thermal treatment. The disposal of demagnetized permanent magnets is prohibited.

Demagnetize magnets

The demagnetization of the permanent magnets is reached via special thermal treatment. The handling duration is influenced by the frame of the motor component. The motor component has to remain in the oven for a minimum of 30 minutes, starting at the time, the magnetic surface has reached 300 °C.

Please also refer to the safety instructions regarding protection from magnetic fields, handling and assembly in the chapter “Safety Notes for Electric Drives and Controls” when using permanent magnets.

Packaging

Packaging materials consist of cardboard, wood and polystyrene. They can be recycled anywhere without any problem.

For ecological reasons, please refrain from returning the empty packages to us.

Batteries and accumulators

Batteries and accumulators can be labeled with this symbol.

Environmental protection and disposal

The symbol indicating "separate collection" for all batteries and accumulators is the crossed-out wheeled bin.

End users in the EU are legally bound to return used batteries. Outside the validity of the EU Directive 2006/66/EC, the particularly applicable regulations must be followed.

Used batteries can contain hazardous substances which can harm the environment or people's health when improperly stored or disposed of.

After use, the batteries or accumulators contained in Rexroth products must be properly disposed of according to the country-specific collection systems.

Recycling

Most of the products can be recycled due to their high content of metal. In order to recycle the metal in the best possible way, the products must be disassembled into individual assemblies.

Metals contained in electric and electronic assemblies can also be recycled by means of special separation processes.

Plastic parts of the products may contain flame retardants. These plastic parts are labeled according to EN ISO 1043. They have to be recycled separately or disposed of according to the applicable legal provisions.

8 Service and support

Our worldwide service network provides an optimized and efficient support. Our experts offer you advice and assistance should you have any queries. You can contact us **24/7**.

Service Germany

Our technology-oriented Competence Center in Lohr, Germany, is responsible for all your service-related queries for electric drive and controls.

Contact the **Service Hotline** and **Service Helpdesk** under:

Phone:	**+49 9352 40 5060**
Fax:	**+49 9352 18 4941**
E-mail:	service.svc@boschrexroth.de
Internet:	http://www.boschrexroth.com/

Additional information on service, repair (e.g. delivery addresses) and training can be found on our internet sites.

Service worldwide

Outside Germany, please contact your local service office first. For hotline numbers, refer to the sales office addresses on the internet.

Preparing information

To be able to help you more quickly and efficiently, please have the following information ready:

- Detailed description of malfunction and circumstances
- Type plate specifications of the affected products, in particular type codes and serial numbers
- Your contact data (phone and fax number as well as your e-mail address)

9 Appendix

9.1 EU-Declaration of conformity

According to **Low voltage directive 2014/35/EU**, the vendor

Bosch Rexroth AG

Buergermeister-Dr.-Nebel-Straße 2

97816 Lohr am Main, Germany

hereby declares that the product below

3~ PM motor

MS2N03...	MS2N04...	MS2N05...
MS2N06...	MS2N07...	MS2N10...

From the date of manufacture 2016-04-20 were developed, designed and manufactured in compliance with the above-mentioned EU directive.

Harmonized standards applied:

Standard	Title	Edition
EN 60034-1 (IEC 60034-1)	Rotating electrical machines - Part 1: Rating and performance	2010 + Cor.:2010 (2010, modified)
EN 60034-5 (IEC 60034-5)	Rotating electrical machines - Part 5: Degrees of protection provided by integral design of rotating electrical machines (IP-Code) - Classification	2001 + A1:2007 (2000 + Corrigendum 2001 + A1:2006

Further explanations: None

Appendix

Rexroth
Bosch Group

EU-Konformitätserklärung - *Original*

Dok.-Nr.: DCTC-30318-002
Datum: 2016-04-20

- ☐ nach Maschinenrichtlinie 2006/42/EG
- ☒ nach Niederspannungsrichtlinie 2014/35/EU
- ☐ nach EMV-Richtlinie 2014/30/EU
- ☐ nach ATEX-Richtlinie 2014/34/EU

Hiermit erklärt der Hersteller,
Bosch Rexroth AG
Bürgermeister-Dr.-Nebel-Straße 2
97816 Lohr am Main / Germany,

dass die nachstehenden Produkte

Bezeichnung: 3~ PM-MOTOR

Baureihen: MS2N03... MS2N04... MS2N05...
MS2N06... MS2N07... MS2N10...

Ab Herstelldatum: 2016-04-20

in Übereinstimmung mit den oben genannten EU-Richtlinien entwickelt, konstruiert und gefertigt wurden.

Angewandte harmonisierte Normen:

Norm	Titel	Ausgabe
EN 60034-1 *(IEC 60034-1)*	Drehende elektrische Maschinen – Teil 1: Bemessung und Betriebsverhalten	2010 + Cor.:2010 *(2010, modifiziert)*
EN 60034-5 *(IEC 60034-5)*	Drehende elektrische Maschinen – Teil 5: Schutzarten aufgrund der Gesamtkonstruktion von drehenden elektrischen Maschinen (IP-Code) –Einteilung	2001 + A1:2007 *(2000 + Corrigendum 2001 + A1:2006)*

Lohr am Main , den 2016-04-20 ppa. i.V.
Ort Datum Joachim Hennig, Werkleitung LoP2 Eberhard Schemm, Entwicklungsbereichsleiter Antriebe

Änderungen im Inhalt der EU-Konformitätserklärung sind vorbehalten. Derzeit gültige Ausgabe auf Anfrage.

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DCTC-30318-002_KOE_N_DE_2016-04-20.docx

Fig. 9-1: EU-Declaration of conformity - origin, German

Appendix

Rexroth
Bosch Group

EU declaration of conformity - *original*

Doc. No.: DCTC-30318-002
Date: 2016-04-20

- ☐ in accordance with Machinery Directive 2006/42/EC
- ☒ in accordance with Low Voltage Directive 2014/35/EU
- ☐ in accordance with EMC Directive 2014/30/EU
- ☐ in accordance with ATEX Directive 2014/34/EU

The manufacturer,
Bosch Rexroth AG
Bürgermeister-Dr.-Nebel-Straße 2
97816 Lohr am Main / Germany

hereby declares that the products below

Name: 3~ PM-MOTOR

Series: MS2N03... MS2N04... MS2N05...
MS2N06... MS2N07... MS2N10...

From the date of manufacture: 2016-04-20

were developed, designed and manufactured in compliance with the above-mentioned EU directives.

Harmonized Standards applied:

Standard	Title	Edition
EN 60034-1 *(IEC 60034-1)*	Rotating electrical machines – Part 1: Rating and performance	2010 + Cor.:2010 *(2010, modified)*
EN 60034-5 *(IEC 60034-5)*	Rotating electrical machines – Part 5: Degrees of protection provided by integral design of rotating electrical machines (IP code) - Classification	2001 + A1:2007 *(2000 + Corrigendum 2001 + A1:2006)*

Lohr am Main , dated 2016-04-20
Place Date

Joachim Hennig
Plant Manager LoP2

Eberhard Schemm
Head of Development Drives Solutions

We reserve the right to make changes to the content of the EU Declaration of Conformity. Current issue on request.

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DCTC-30318-002_KOE_N_EN_2016-04-20.docx

Fig. 9-2: EU-Declaration of conformity - origin, English

Appendix

9.2 UL / CSA

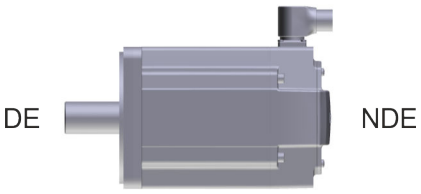
The UL/CSA conformity of MS2N motors can be found on the type plate of the motors. The following symbol is used for identification purposes:

The MS2N motor listing with the UL file number E335445 can be found under www.ul.com

Definition of used terms

DE (Drive End)

Side of the output shaft of the motor (side A)



Discharge capacity

Symbol: C_{ab}

Unit: **nF** (nanofarrad)

Discharge capacity of short-circuited power connections U, V, W against the motor housing.

Fixed bearing

The fixed bearing is used for radial support and simultaneously for axial guidance in both directions. Thus, it is both specified at the shaft as well as at the housing (end shield).

Floating bearing

The floating bearing is only used for radial support. Additionally, axis offsets have to be allowed by the floating bearing to prevent cross-location, e.g. in case of changes in the shaft length due to thermal expansion.

Holding brake, dynamic braking torque

Symbol: M_1

Unit: **Nm** (Newton meter)

The dynamic braking torque of MS2N holding brakes is available at rated-load operating temperature of the motor (120° C, internal motor temperature) to decelerate the drive axis from reference speed 3000 1/min in case of an emergency stop.

Holding brake, rated current

Symbol: I_N

Unit: **A** (Ampere)

The rated current of MS2N holding brakes is specified relating to 20° C.

Holding brake connection time

Symbol: t_1

Unit: **ms** (milliseconds)

Definition of used terms

Duration until the holding brake applies.

Holding brake disconnection time

Symbol: t_2

Unit: **ms** (milliseconds)

Duration until the holding brake releases.

Holding brake holding torque

Symbol: M_4

Unit: **Nm** (Newton meter)

The static holding torque of MS2N holding brakes is available at rated-load operating temperature of the motor (120° C, internal motor temperature) to hold the drive axis in idle state.

Holding brake input voltage

Symbol: U_{Br}

Unit: **V** (Volt)

Input voltage of the holding brake.

Holding brake static holding torque

Symbol: M_4

Unit: **Nm** (Newton meter)

The static holding torque of MS2N holding brakes is specified relating to 120° C. It is available at rated-load operating temperature of the motor to hold the drive axis.

Max. speed (electrical)

Symbol: $n_{max\ el}$

Unit: **1/min** (rotations per minute)

Winder-dependent limit speed of the motor, always below the mechanical maximum speed.

Maximum current

Symbol: I_{max}

Unit: **I** (Ampere)

Maximum, temporarily permissible motor phase current of the motor winding without adverse affect on the permanent magnet circuit of the motor.

Maximum speed (mechanical)

Symbol: $n_{max\ mech}$

Unit: **1/min** (rotations per minute)

Mechanically maximum permissible speed of the motor. Limiting factors, e.g. centrifugal force and friction.

Maximum torque 100 K

Symbol: M_{max_100K}

Unit: **Nm** (Newton meter)

Temporary maximum torque that can be released at rated-load operating temperature. The maximum torque depends on the drive control unit.

Maximum torque 20 °C

Symbol: $M_{max\_20°C}$

Unit: **Nm** (Newton meter)

Temporary maximum torque that can be released at a motor housing temperature of 20 °C (cold motor). The maximum torque depends on the drive control unit.

Moment of inertia of the rotor

Symbol: J_{red}

Unit: $kg*m^2$

Moment of inertia of all rotating motor parts. In case of MS2N motors with holding brake, the moment of inertia, including the moment of inertia of the holding brake, and if required, the prolonged motor shaft is specified.

NDE (Non Drive End)

Side of end shield of the motor (side B)

Number of pole pairs

Symbol: **p**

Unit: **without**

The number of pole pairs is the number of pairs (north pole, south pole) of magnetic poles on the rotor of a motor. The pole number of the motor results from 2 · p.

Operating modes

The operating modes of electric motors are divided into different load groups according to VDE 0530 "Rules for electrical machines". The motors have to be designed as to prevent an exceedance of the permissible winder temperatures in the respective work procedures. Operation is the motor load specification including the duration, order and if applicable the start-up, electrical braking, idle state and interrupts.

S1 (continuous operation): Operation under constant load whose duration is sufficient to reach the thermal steady state. The specified operating characteristic curves differ between S1 60K operation and S1 100K operation.

S3 (periodic intermitted operation: The periodic intermittent operation is a sequence of cycles of the same kind at constant nominal load and standstill time. The startup current does not measurably influence the rise in temperature. Relative duty cycle is equal to the load time divided by (load time plus standstill time) multiplied by 100%.

Rated current - 100K

Symbol: I_{N_100K}

Definition of used terms

Unit: **A** (Ampere)

Required phase current of the motor at the point of the rated speed to generate the rated torque.

Rated power - 100K

Symbol: P_{N_100K}

Einheit: **kW** (kilowatt)

Electric power input of the motor at the operating point of the rated speed and the rated torque.

Rated speed - 100K

Symbol: M_{N_100K}

Unit: **Nm** (Newton meter)

S1 continuous torque that can be released at 100K operation at the point of the rated speed.

Rated speed - 100K

Symbol: n_N

Unit: **1/min** (rotations per minute)

Speed specified by the manufacturer to specify the nominal data on the rating plate. The speed is reached at DC bus voltage Uzk1.

Sound pressure level

Symbol: L_P

Unit: **dB(A)**

Specified values for 1 m distance from motor to measuring point during operating in a speed range of 0 to the rated speed.

Standstill current - 100 K

Symbol: I_{0_100}

Unit: **A** (Ampere)

Phase current (crest value) of the motor M_{0_100} required for the continuous torque at standstill at a speed of n > 0.1 Hz.

Standstill current - 60 K

Symbol: I_{0_60}

Unit: **A** (Ampere)

Phase current (crest value) of the motor M_{0_60} required for the continuous torque at standstill at a speed of n > 0.1 Hz.

Standstill torque - 100 K

Symbol: M_{0_100}

Unit: **Nm** (Newton meter)

Continuous torque that can be released at the motor output shaft at a winding temperature curve of ΔT = 100K.

Standstill torque - 60 K

Symbol: M_{0_60}

Unit: **Nm** (Newton meter)

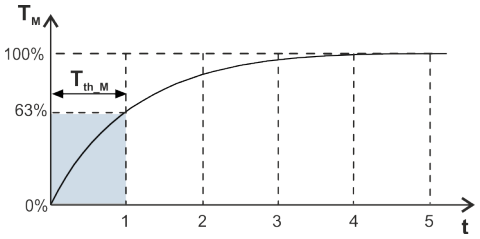
Continuous torque that can be released at the motor output shaft , at a housing temperature rise of ΔT = 60K.

Thermal time constant of motor

Symbol: T_{th_M}

Unit: **min** (minute)

Time of the temperature increase to 63 % of the final temperature of the motor housing with the motor loaded with the permissible S1-100K continuous torque.



T_M: Temperature (motor housing)

Thermal time constant of winding

Symbol: T_{th_W}

Unit: **s** (second)

Thermal time constant of winding at S1-100K continuous torque.

Torque constant

Symbol: K_m

Unit: **Nm/A** (Newton meter per Ampere)

Ratio of the generated torque to the motor phase current at a motor temperature of 20°C. Applicable up to approx. i = 2x I_{0_60} .

Utilization factor

The load factor defines the maximum motor load referring to the thermally permissible operating characteristic curve that is assumed to determine the bearing service life under the defined boundary conditions.

For a service life of L_{10h} **= 30.000 h**, it is assumed that the motor is utilized to full advantage thermally with a maximum of 95% motor load over the course of the service life, relating to the thermally permissible operating characteristic curve S1-100K.

For a service life of L_{10h} **= 20.000 h**, it is assumed that the motor is utilized to full advantage thermally with a maximum of 90% motor load over the course of the service life, relating to the thermally permissible operating characteristic curve S1-100K.

Voltage constant

Symbol: $K_{EMK1000}$

Definition of used terms

Unit: **V/1000min^{-1}**

Effective value of the induced motor voltage at a rotor speed of 1000 rpm and a motor temperature of 20 °C.

Winding inductivity

Symbol: **L_{12_min}**

Unit: **mH** (millihenry)

Minimum inductivity measured between two strands.

Winding resistance

Symbol: **R_{12}**

Unit: **Ω** (Ohm)

Measured winding resistance among two strands at 20 °C.

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Notes

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