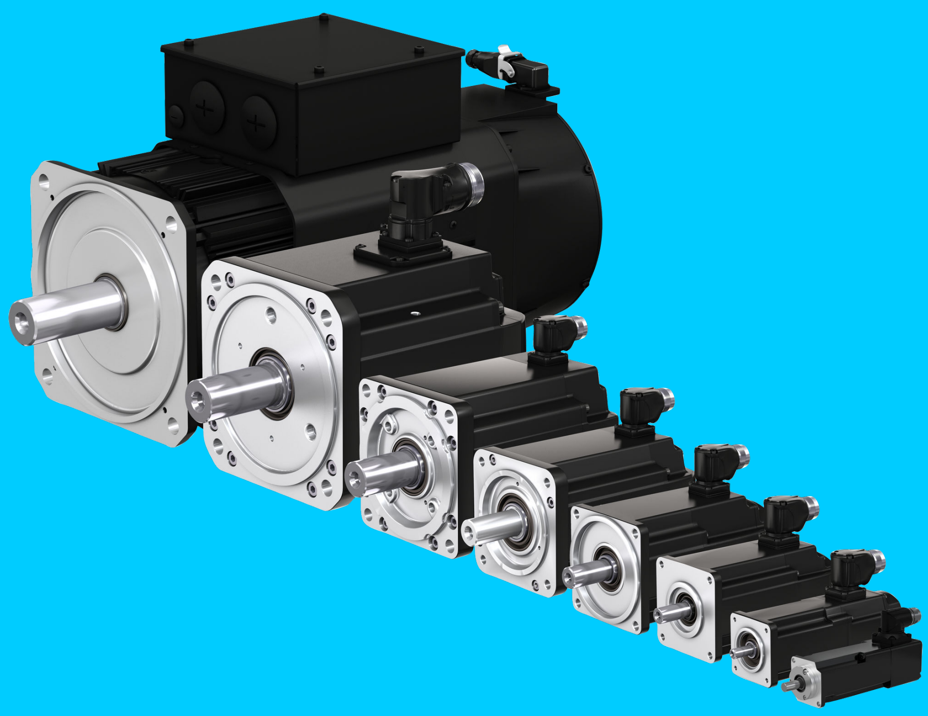
Project Planning Manual
(Original document)

# MS2N
# Synchronous Servo Motors



R911347583 Edition 11

**Disclaimer**

The specified data only serves to describe the product. As our products are constantly being further developed, no statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. Please note that our products are subject to a natural process of wear and aging.

DOK-MOTOR*-MS2N*******-PR11-EN-P DC-AE/PAD31-SI (tk)

60d29a4fceb3109d0a347e82440135b6, 8, en_US

# Table of contents

# 1 About this documentation

## 1.1 Editions of this documentation

This documentation explains the product characteristics, application possibilities, operating conditions and the operational limits of the motors, contains the technical data of the available motors and provides information on product selection, handling and operation.

Table 1: Record of revisions

| Edition | Release date | Notes |
|---|---|---|
| 11 | 03/2026 | Extending product range: Frame size 02<br>Technical data updated<br>Editorial revisions |
| 10 | 07/2024 | Amendment ctrlX SENSE$^{motor}$, Geber JS, JM, MS, MM<br>Type code 03, 04, 05, 06, 07, 10: "Standard - 22-Bit, ctrlX SENSE$^{motor}$" |
| 09 | 10/2023 | UKCA amended<br>Update of specifications, operating areas and characteristic curves |
| 08 | 05/2022 | Extending product range: Frame size 13 |
| 07 | 06/2021 | Chapter motor encoders, corrections |
| 06 | 05/2021 | Extending product range: Frame size 03A<br>Extending product range: Frame size 13<br>Second PT1000 in MS2N13 terminal boxes<br>Information China Energie Level<br>Editorial revision |
| 05 | 12/2020 | Extending product range: Frame size 13<br>Editorial revision |
| 04 | 05/2019 | Extending product range: Terminal boxes size “C”, motor encoder Hx<br>Radial force: Details about motor frame sizes and lengths<br>Replaced holding brake size 1 for frame size -05, -06<br>Editorial revision |
| 03 | 11/2017 | Extending product range |
| 02 | 03/2017 | Water cooling, further motor types |
| 01 | 06/2016 | First edition |

## 1.2 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 Z535.6-2011).

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 symbols

In the documentation, the following internationally standardized safety signs and graphic symbols are used. The meaning of the symbols is described in the table.

Table 2: Meaning of safety signs

| Safety symbols | Meaning |
|---|---|
| | Warning against dangerous electric voltage |
| | Warning against hot surfaces |
| | Warning against rotating machine parts |
| | Warning against overhead load |
| | Electrostatic sensitive devices |
| | Prohibited for persons with active implantable medical devices (AIMD) or passive metallic implants (body aids) as well as for pregnant women |
| | Do not carry along metal parts or clocks. |
| | Hammer scales are forbidden |

### Meaning of symbols

Table 3: Meaning of symbols

| Symbol | Meaning |
|---|---|
| | Reference to additional documentation |
| c UR us | The UL Recognized Component Mark identifies recognized component parts which are components of a bigger product or system. |
| CE | The letters “C” and “E” stand for “Conformité Européenne”. The CE-marking expresses the conformity of a product with relevant EC-regulations. |
| UK CA | UKCA means “UK Conformity Assessed”. The UKCA-marking expresses the conformity of a product with all valid statutory requirements of the United Kingdom. |
| SI | Component prepared for the use in “integrated safety technology” systems. |
| | The symbol indicating "separate collection" for all batteries and accumulators is the crossed-out wheeled bin. |

### Markup

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

Remark

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

**Instruction**

Instruction

➡ Result of one instruction

**Instruction multilevel**

1. Action step one
2. Action step two

➡ Result of an instruction

Please comply with the order of the handling instructions.

**Trademark information**

HIPERFACE® is a registered trademark of Sick AG 79183 Waldkirch, Germany

EnDat® is a registered trademark of Dr. Johannes Heidenhain GmbH 83301 Traunreut, Germany

ACURO®link is a registered trademark of Hengstler GmbH 78554 Aldingen, Germany

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SpeedTec® is a registered trademark of TE Connectivity Industrial GmbH 94559 Niederwinkling, Germany

ctrlX®, ctrlX DRIVE®, ctrlX SENSE® are registered trademarks of Bosch Rexroth AG

## 1.3 Additional documentation

Table 4: Additional documentation

| Title | Documentation type | Document type code[1] and number |
|---|---|---|
| Rexroth Motors Safety Notes | Safety Instructions | DOP-MOTOR*-IDYN*SAFETY-**RS-□□-P<br>➦ R911340694 |
| MS2N<br>Synchronous Servo Motors | Operating Instructions | DOK-MOTOR*-MS2N*******-IT□□-EN-P<br>➦ R911347581 |
| ctrlX<br>Motor Cables and Connectors | Reference | DOK-CONNEC-XDRV*******-RE□□-EN-P<br>➦ R911420100 |
| ctrlX<br>Drive Systems | Project Planning Manual | DOK-XDRV**-X***********-PR□□-EN-P<br>➦ R911386579 |

[1] In the document type code, □□ is a placeholder for the current edition of the documentation (example: IT01 means the first edition of the Operating Instructions).

Remark

All other drive and control related documentation can be found on the ➦ ctrlX AUTOMATION – Product information Content Delivery Portal.

# 2 Safety instructions

## 2.1 Important directions on use

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

| EU Product standard | |
|---|---|
| EN 60034-1:2015 | Rotating electrical machines - Part 1: Rating and performance (IEC 2/1768/CD:2014) |

Valid within EU

| EU Directives | |
|---|---|
| 2014/35/EU | Low voltage directive |
| **EN Standards** | |
| EN IEC 60034-5:2020 | Rotating electrical machines - Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) - Classification (IEC 60034-5:2020) |

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 EN 60204-1:2018 Safety of machinery - Electrical equipment of machines -Part 1: General requirements).

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.

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

### 2.1.2 Unintended use

Any use of 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 unintended 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.

## 2.2 Qualification of personnel

Any work with or on the described product may only done by qualified or skilled personnel. For the purpose of this manual, qualified personnel means persons who are familiar with transporting, installing, mounting, commissioning and operating the components of the electrical drive and control system and the associated hazards and have an appropriate qualification for their job.

All persons working on, with or in the vicinity of an electrical system must be informed of the relevant safety requirements, safety guidelines and internal instructionsEN 50110-1:2013.

## 2.3 General safety instructions

**Important! Please read all instructions before motor installation.**

Do not install or operate motors or components of the electric drive and control system before you have not carefully read all delivered documents.

**Keep this instructions!**
The operating instruction must be stored and transferred in case of sale during the complete product lifetime.

Please observe the particular applicable national, local and system-specific regulations, the safety instructions in the documentation and the warning and informative labels on the motors.

Observe the general safety notes in this chapter and the safety instructions in this documentation. Therewith, you avoid personal danger, damage and errors.

**Improper use of the motors and failure to follow the safety instructions in this document may result in material damage, personal injury, electric shock or, in extreme cases, to death!**

In the case of damage due to non-observance of the safety notes, Bosch Rexroth assumes no liability.

Applications for functional safety are only allowed if the motors have the SI-sign on the type plate.

## 2.4 Product- and technology-dependent safety instructions

### 2.4.1 Protection from electric voltage

**Work required on the electric system may only be carried out by skilled electricians. Tools for electricians (VDE tools) are absolutely necessary.**

Before working:

- Enable.
- Secure against reactivation.
- Ensure de-energization.
- Ground and short-circuit.
- Cover or shield any adjacent live parts.

After completing the job, cancel the measures in reverse order.

**Dangerous voltage occurs during operation! Danger to life, risk of injury by electric shock!**

- Before start-up, connect the protective conductors on all electric components according to the connection plan.
- Operation, even for short measuring purposes is only allowed with fixed connected protective conductor on the specified points of the components.

### 2.4.2 Protection from mechanical danger

**Dangerous movements! Danger to life, risk of injury, heavy injury or material damage.**

- Do not stay within the motion zone of the machine. Avoid unauthorized access into the danger zone.
- 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,
  - providing an external braking / catching / clamping device, or
  - ensure sufficient weight compensation of the axes.

  Only using the serially delivered **motor holding brake** or an external holding brake activated by the drive controller **is not suitable for personal protection!**

**Rotating parts! Danger to life, risk of injury, heavy injury or material damage.**

- Secure key and/or transmission elements against ejection.
- Install covers on dangerous rotating machine parts before start-up.

### 2.4.3 Protection against magnetic and electromagnetic fields

**Health hazard for persons with active body aids or passive metallic implants and for pregnant women.**

Magnetic and electromagnetic fields are created in the direct environment of live conductors or permanent magnets of electro motors and are a serious danger for persons.

Observe the country-specific regulations. For Germany, please observe the specifications of the occupational insurance association BGV B11 and BGR B11 regarding “electromagnetic fields”.

- For persons with active body aids (like heart pacemakers), passive metallic implants (like hip prosthesis) and pregnant women possible hazards exist due to electro magnetic or magnetic fields in direct environment of electric drive and control components and the corresponding live conductors.

  Access into these areas can be dangerous for these persons:
  - Areas, in which components of electrical drive and control systems and corresponding live conductors are mounted, activated or operated.
  - Areas in which motor parts with permanent magnets are stored, repaired or assembled.
- Above mentioned persons must contact their attending physician before entering these areas.
- Please observe the valid industrial safety regulations for plants which are fitted with components of electrical drive and control systems and corresponding live conductors.

**Crushing hazard of fingers and hands due to strong attractive forces of the magnets!**

- Handle only with protective gloves.

**Risk of destruction of sensitive parts! Data loss!**

- Keep watches, credit cards, check cards and identity cards and all ferromagnetic metal parts, such as iron, nickel and cobalt away from permanent magnets.

### 2.4.4 Protection against burns

**Risk of burns due to hot motor surfaces!**

- Avoid contact with hot motor surfaces. **Temperatures may rise over 60 °C**.
- Allow the motors to cool down long enough before touching them.
- Temperature-sensitive components may not come into contact with the motor surface. Ensure appropriate mounting distance of connection cables and other components.

### 2.4.5 Electrostatic sensitive devices (ESD)

The motors contain parts which underlie an electrostatic danger. These components, especially temperature sensors of the motor winding can be destroyed by improper use.

Avoid, e.g. direct contact of open wires or contacts of the connection cable of temperature sensors without being electrostatically discharged or grounded.

Remark

Do suitable ESD protective measures before you handle imperiled components (e.g. ESD protective clothes, wristlets, conductive floor, grounded cabinets and working surfaces).

Safety instructions

## 2.5 Safety instructions on the product

Please note these safety and prohibitive signs on the motor.

| | |
|---|---|
| **⚠ WARNING** | **Hot surfaces with temperatures over 60 °C may cause burns**<br>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.<br>– Wear safety gloves.<br>– Do not work on hot surfaces. |

| | |
|---|---|
| **⚠ WARNING** | **Warning against dangerous electric voltage**<br>Electric connection may only be established by specialized staff. Tools for electricians (VDE tools) are absolutely necessary.<br>– The installation has to be switched de-energized before operation and de-energization must be ensured via a suitable measuring device. De-energize the machine and secure the mains switch again unintended or unauthorized re-energization.<br>– Open the terminal boxes only in switched-off voltage. |

| | |
|---|---|
| **⚠ CAUTION** | **Motor damage due to strikes onto the motor shaft**<br>Do not strike the shaft end and do not exceed the allowed axial and radial forces of the motor. |

# 3 Identification

## 3.1 Type plate

The type plate contains all essential electrical data, the serial number, date of manufacture, mark of conformity as well as the information provided by the manufacturer. For more, see the explanation below.

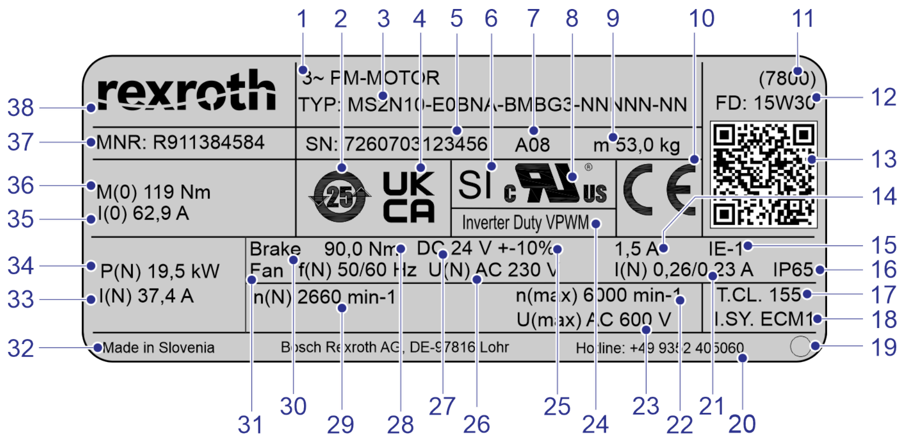



Fig. 1: Type plate MS2N (example)

Table 5: Type plate specification MS2N

| Symbol | Meaning | Symbol | Meaning |
|---|---|---|---|
| 1 | Machine type/product | 20 | Company address |
| 2 | China-RoHs 2 label | 21 | Rated current |
| 3 | Type designation | 22 | Maximum permissible speed |
| 4 | UKCA conformity mark | 23 | Maximum input supply voltage |
| 5 | Serial number | 24 | UL text |
| 6 | Components prepared for the use in “integrated safety technology” systems | 25 | Tolerance range of the rated voltage |
| 7 | Change release | 26 | Rated voltage |
| 8 | UL mark | 27 | Rated voltage - brake (optional) |
| 9 | Mass | 28 | Detent torque - brake (optional) |
| 10 | CE conformity mark | 29 | Rated speed of rotation |
| 11 | Plant | 30 | Holding brake (optional) |
| 12 | Manufacturing date | 31 | Fan (optional) |
| 13 | QR code | 32 | Designation of origin |
| 14 | Rated current - brake (optional) | 33 | Rated current by star connection at mode of operation S1 |
| 15 | Efficiency classification | 34 | Rated power by star connection at mode of operation S1 |
| 16 | Degree of protection IP | 35 | Continuous standstill current at cooling type - natural convection |
| 17 | Thermal class | 36 | Continuous standstill torque at cooling type - natural convection |
| 18 | Isolation system | 37 | Material number |
| 19 | Type plate designation | 38 | Brand mark/logo |

The following marks of conformity are included on the type plate.

Table 6: Meaning of marks of conformity

| Certification mark | Meaning |
|---|---|
| cURus | The UL Recognized Component Mark (UL recognized) identifies recognized component parts which are components of a bigger product or system. The recognition relates on Standards UL 1004-1 „Rotating electrical machines –General requirements“, UL 1004-6 „Servo and stepper motors“, CSA C22.2 No. 100 „Motors and generators“. |
| CE | The CE-marking confirms the conformity of a product according to the declaration of conformity. |
| UK CA | The UKCA-marking confirms the conformity of a product with relevant regulations. |
| 25 | Motors labeled with the symbol EFUP 25 (environmental-friendly use period) can be used for 25 years as intended before substances limited in their concentration according to China RoHS2 may leak and subsequently pose a risk to environment and health. |

Remark

Individual marks of conformity are printed only on the first type plate that is attached to the product - marked with ○. This depends on the requirements of the test and certification body.

## 3.2 Type code

The table below shows all the possible options within the MS2N type code and the available standard frame size combinations.

Table 7: MS2N type code structure

| Example: | M | S | 2 | N | 0 | 6 | - | D | 0 | B | N | N | - | A | S | U | H | 0 | - | N | N | N | N | N | - | N | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Field | ① | | | | ② | | | ③ | ④ | ⑤ | | ⑥ | | ⑦ | ⑧ | ⑨ | ⑩ | ⑪ | | ⑫ | ⑬ | ⑭ | ⑮ | ⑯ | | ⑰ | |

| Field | Options | Available frame size ② | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ① | Product: | | | | | | | | |
| | MS2N | | | | | | | | |
| ② | Frame size: | | | | | | | | |
| | 02 / 03 / 04 / 05 / 06 / 07 / 10 / 13 | | | | | | | | |
| ③ | Frame length: a) | | | | | | | | |
| | A | 02 | 03 | – | – | – | – | – | – |
| | B | – | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| | C | 02 | – | 04 | 05 | 06 | 07 | 10 | 13 |
| | D | – | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| | E | – | – | – | – | 06 | 07 | 10 | 13 |
| | F | – | – | – | – | – | – | 10 | – |
| | R | – | – | – | – | – | – | 10 | – |
| ④ | Rotor inertia: a) | | | | | | | | |
| | 0 = Low inertia | 02 | 03 | 04 | 05 | 06 | 07 | 10 | – |
| | 1 = Mean inertia | – | – | – | – | 06 | 07 | 10 | 13 |
| ⑤ | Winding: a) | | | | | | | | |
| | BD = 1,000 1/min | – | – | – | – | – | 07 | 10 | – |
| | BF = 1,500 1/min | – | – | – | – | – | 07 | 10 | – |
| | BH = 2,000 1/min | – | – | 04 | 05 | 06 | 07 | 10 | 13 |
| | BL = 2,500 1/min | – | – | – | – | – | – | 10 | – |
| | BN = 3,000 1/min | – | – | 04 | 05 | 06 | 07 | 10 | 13 |
| | BQ = 4,000 1/min | – | – | 04 | – | – | 07 | 10 | – |
| | BR = 4,500 1/min | – | – | – | 05 | 06 | 07 | – | – |
| | BT = 6,000 1/min | – | – | 04 | 05 | 06 | – | – | – |
| | BY = 9,000 1/min | 02 | 03 | – | – | – | – | – | – |
| ⑥ | Cooling mode: a) | | | | | | | | |
| | N = Self-cooling | 02 | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| | A = Forced ventilation axial 230 V / 50 Hz | – | – | – | – | – | 07 | 10 | – |
| | B = Forced ventilation axial 115 V / 60 Hz | – | – | – | – | – | 07 | 10 | – |
| | C = Forced ventilation axial 3 x 400 V | – | – | – | – | – | – | – | 13 |
| | L = Water cooling | – | – | – | – | – | 07 | 10 | 13 |
| ⑦ | Encoder performance: a) | | | | | | | | |
| | A = Basic - 16 signal periods, Hiperface® | – | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| | B = Standard - 128 signal periods, Hiperface® (SIL2, PL d) | – | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| | M = Standard - 22-Bit, ctrlX SENSE$^{motor}$ (SIL2, PL d) | 02 | 03 | 04 | 05 | 06 | 07 | 10 | – |
| | J = Standard - 22-Bit, ctrlX SENSE$^{motor}$ (SIL3, PL e) | 02 | 03 | 04 | 05 | 06 | 07 | 10 | – |
| | C = Advanced - 20-Bit, ACURO®Link (SIL2, PLd) | – | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| | D = 24-Bit, ACURO®Link (SIL3, PLe) | – | – | – | – | 06 | 07 | 10 | 13 |
| | H = Advanced - 20-Bit, ACURO®Link (SIL3, PLe) | – | 03 | 04 | 05 | – | – | – | – |

Identification

| Example: | M | S | 2 | N | 0 | 6 | - | D | 0 | B | N | N | - | A | S | U | H | 0 | - | N | N | N | N | N | - | N | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Field | ① | | | | ② | | | ③ | ④ | ⑤ | | ⑥ | | ⑦ | ⑧ | ⑨ | ⑩ | ⑪ | | ⑫ | ⑬ | ⑭ | ⑮ | ⑯ | | ⑰ | |

| Field | Options | Available frame size ② | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ⑧ | **Encoder design:** | | | | | | | | |
| | S = Singleturn - 1 revolution absolute | 02 | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| | M = Multiturn - 4,096 revolutions absolute | 02 | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| ⑨ | **Electrical connection:** [a] | | | | | | | | |
| | H = Single cable connection M17, rotatable | 02 | 03 | 04 | 05 | – | – | – | – |
| | S = Single cable connection M23, rotatable | – | 03 | 04 | 05 | 06 | 07 | – | – |
| | D = Double cable connection 2 x M17, rotatable | – | 03 | 04 | 05 | – | – | – | – |
| | U = Double cable connection M23 / M17, rotatable | – | – | – | – | 06 | 07 | 10 | – |
| | V = Double cable connection M40 / M17, rotatable | – | – | – | – | – | 07 | 10 | – |
| | A = Double cable connection M58, fix, A-side / M17, rotatable | – | – | – | – | – | 07 | 10 | – |
| | B = Double cable connection M58, fix, B-side / M17, rotatable | – | – | – | – | – | 07 | 10 | – |
| | T = Terminal box, A side or B side, size 1 | – | – | – | – | – | – | 10 | – |
| | C = Terminal box, A side or B side, size 2 | – | – | – | – | – | – | 10 | 13 |
| | E = Terminal box, A side or B side, size 3 | – | – | – | – | – | – | – | 13 |
| ⑩ | **Shaft:** [a] | | | | | | | | |
| | H = Plain, without shaft sealing ring | 02 | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| | G = Plain, with shaft sealing ring | 02 | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| | L = Keyway, without shaft sealing ring | – | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| | K = Keyway, without shaft sealing ring | – | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| ⑪ | **Holding brake:** [a] | | | | | | | | |
| | 0 = Without holding brake | 02 | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| | 1 = Size 1, electrically released | 02 | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| | 2 = Size 2, electrically released | – | – | – | – | 06 | 07 | 10 | 13 |
| | 3 = Size 3, electrically released | – | – | – | – | – | – | 10 | – |
| ⑫ | **Flange accuracy:** | | | | | | | | |
| | N = Standard | 02 | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| | R = Increased accuracy | – | – | – | – | 06 | 07 | 10 | 13 |
| ⑬ | **Bearing:** | | | | | | | | |
| | N = Standard bearing | 02 | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| ⑭ | **Type of construction:** [a] | | | | | | | | |
| | N = IM B5 / IM 3001, PT1000 | – | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| | D = IM B5 / IM 3001 | 02 | 03 | 04 | 05 | – | – | – | – |
| | C = IM B35 / IM 2001, PT1000 | – | – | – | – | – | – | – | 13 |
| ⑮ | **Coating:** | | | | | | | | |
| | N = Standard varnish RAL 9005 black | 02 | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| ⑯ | **Other design:** [a] | | | | | | | | |
| | N = None | 02 | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| | E = Additional grounding connection | – | 03 | 04 | 05 | 06 | 07 | 10 | – |
| | P = Air-pressure connector kit | – | 03 | 04 | 05 | 06 | 07 | 10 | – |
| ⑰ | **Special design:** | | | | | | | | |
| | NN = None | 02 | 03 | 04 | 05 | 06 | 07 | 10 | 13 |

[a] See ➦ Remark

– not available

Remark

Not all combinations of field options are available within the selected frame size. For field options where standard combinations are limited, refer to the following chapters.

### 3.2.1 Combinations – frame sizes 03 / 04 / 05

Table 8: Frame length combination for frame size 03

| ③ Frame length | ⑦ Encoder performance | | | | ⑨ Electrical connection |
|---|---|---|---|---|---|
| | M | J | C | H | H |
| A | ● | ● | ● | ● | ● |

Table 9: Frame length combination for frame size 04

| ③ Frame length | ⑤ Winding | | | |
|---|---|---|---|---|
| | BH | BN | BQ | BT |
| B | – | ● | – | ● |
| C | – | ● | – | ● |
| D | ● | – | ● | – |

Table 10: Frame length combination for frame size 05

| ③ Frame length | ⑤ Winding | | | |
|---|---|---|---|---|
| | BH | BN | BR | BT |
| B | – | ● | – | ● |
| C | – | ● | – | ● |
| D | ● | – | ● | – |

Table 11: Encoder performance combination for frame sizes 03 / 04 / 05

<table>
<tr><th rowspan="2">⑦ Encoder performance</th><th colspan="3">⑨ Electrical connection</th><th colspan="2">⑭ Type of construction</th><th colspan="3">⑯ Other design</th></tr>
<tr><th>H</th><th>S</th><th>D</th><th>N</th><th>D</th><th>N</th><th>E</th><th>P</th></tr>
<tr><td>A</td><td rowspan="2">–</td><td rowspan="2">–</td><td rowspan="2">●</td><td rowspan="2">●</td><td rowspan="2">–</td><td rowspan="2">●</td><td rowspan="2">●</td><td rowspan="2">●</td></tr>
<tr><td>B</td></tr>
<tr><td>J</td><td rowspan="2">●</td><td rowspan="2">●</td><td rowspan="2">–</td><td rowspan="2">–</td><td rowspan="2">●</td><td rowspan="2">●</td><td rowspan="2">●</td><td rowspan="2">–</td></tr>
<tr><td>M</td></tr>
<tr><td>C</td><td rowspan="2">●</td><td rowspan="2">●</td><td rowspan="2">●</td><td rowspan="2">●</td><td rowspan="2">–</td><td rowspan="2">●</td><td rowspan="2">●</td><td rowspan="2">●</td></tr>
<tr><td>H</td></tr>
</table>

| ⑯ Other design | ⑨ Electrical connection | | ⑩ Shaft | |
|---|---|---|---|---|
| | H | S | G | K |
| P | ● | ● | ● | ● |

● available – not available

### 3.2.2 Combinations – frame size 06

Table 12: Frame length, encoder performance and other design combination for frame size 06

| ③ Frame length | ④ Rotor inertia | ⑤ Winding | ⑪ Holding brake | | |
|---|---|---|---|---|---|
| | | | 0 | 1 | 2 |
| C | 0 | BN | ● | ● | – |
| | | BT | ● | ● | – |
| D | 0 | BN | ● | – | ● |
| | | BR | ● | – | ● |
| E | 0 | BH | ● | – | ● |
| | | BR | ● | – | ● |
| B | 1 | BN | ● | ● | – |
| D | 1 | BN | ● | – | ● |

| ⑦ Encoder performance | ⑨ Electrical connection | | ⑯ Other design | | |
|---|---|---|---|---|---|
| | S | U | N | E | P |
| A | – | ● | ● | ● | ● |
| B | | | | | |
| J | ● | – | ● | ● | – |
| M | | | | | |

| ⑯ Other design | ⑩ Shaft | |
|---|---|---|
| | G | K |
| P | ● | ● |

● available – not available

### 3.2.3 Combinations – frame size 07

Table 13: Frame length combination for frame size 07 and cooling mode N - self-cooling

| ③ Frame length | ④ Rotor inertia | ⑤ Winding | ⑨ Electrical connection | | | ⑪ Holding brake | | |
|---|---|---|---|---|---|---|---|---|
| | | | S | U | V | 0 | 1 | 2 |
| B | 1 | BN | ● | ● | – | ● | ● | – |
| C | 0 | BN | ● | ● | – | ● | ● | – |
| | | BQ | ● | ● | – | ● | ● | – |
| | 1 | BN | ● | ● | – | ● | ● | – |
| | | BR | ● | ● | – | ● | ● | – |
| D | 0 | BF | ● | ● | – | ● | – | ● |
| | | BH | ● | ● | – | ● | – | ● |
| | | BN | ● | ● | – | ● | – | ● |
| | | BR | – | – | ● | ● | – | ● |
| | 1 | BF | ● | ● | – | ● | – | ● |
| | | BH | ● | ● | – | ● | – | ● |
| | | BN | ● | ● | – | ● | – | ● |
| E | 0 | BD | ● | ● | – | ● | – | ● |
| | | BH | ● | ● | – | ● | – | ● |
| | | BN | – | – | ● | ● | – | ● |
| | | BQ | – | – | ● | ● | – | ● |
| | 1 | BD | ● | ● | – | ● | – | ● |
| | | BH | ● | ● | – | ● | – | ● |
| | | BN | – | – | ● | ● | – | ● |

Table 14: Frame length combination for frame size 07 and cooling mode A / B - forced ventilation

| ③ Frame length | ④ Rotor inertia | ⑤ Winding | ⑨ Electrical connection | ⑪ Holding brake | | |
|---|---|---|---|---|---|---|
| | | | V | 0 | 1 | 2 |
| C | 0 | BN | ● | ● | ● | – |
| | | BQ | ● | ● | ● | – |
| | 1 | BN | ● | ● | ● | – |
| | | BR | ● | ● | ● | – |
| D | 0 | BF | ● | ● | – | ● |
| | | BH | ● | ● | – | ● |
| | | BN | ● | ● | – | ● |
| | | BR | ● | ● | – | ● |
| | 1 | BF | ● | ● | – | ● |
| | | BH | ● | ● | – | ● |
| | | BN | ● | ● | – | ● |
| E | 0 | BD | ● | ● | – | ● |
| | | BH | ● | ● | – | ● |
| | | BN | ● | ● | – | ● |
| | | BQ | ● | ● | – | ● |
| | 1 | BD | ● | ● | – | ● |
| | | BH | ● | ● | – | ● |
| | | BN | ● | ● | – | ● |

● available – not available

Identification

Table 15: Frame length combination for frame size 07 and cooling mode L - water cooling

| ③ Frame length | ④ Rotor inertia | ⑤ Winding | ⑨ Electrical connection | | | ⑪ Holding brake | | |
|---|---|---|---|---|---|---|---|---|
| | | | V | A | B | 0 | 1 | 2 |
| C | 0 | BN | ● | – | – | ● | ● | – |
| | | BQ | ● | – | – | ● | ● | – |
| | 1 | BN | ● | – | – | ● | ● | – |
| | | BR | ● | – | – | ● | ● | – |
| D | 0 | BH | ● | – | – | ● | – | ● |
| | | BN | ● | – | – | ● | – | ● |
| | | BR | – | ● | ● | ● | – | ● |
| | 1 | BH | ● | – | – | ● | – | ● |
| | | BN | ● | – | – | ● | – | ● |
| E | 0 | BH | ● | – | – | ● | – | ● |
| | | BN | – | ● | ● | ● | – | ● |
| | | BQ | – | ● | ● | ● | – | ● |
| | 1 | BH | ● | – | – | ● | – | ● |
| | | BN | – | ● | ● | ● | – | ● |

Table 16: Encoder performance and other design combination for frame size 07

| ⑦ Encoder performance | ⑨ Electrical connection | | | | | ⑯ Other design | | |
|---|---|---|---|---|---|---|---|---|
| | S | U | V | A | B | N | E | P |
| A | – | ● | ● | ● | ● | ● | ● | ● |
| B | | | | | | | | |
| J | ● | – | ● | ● | ● | ● | ● | – |
| M | | | | | | | | |

| ⑯ Other design | ⑥ Cooling mode | | ⑩ Shaft | |
|---|---|---|---|---|
| | N | L | G | K |
| P | ● | ● | ● | ● |

● available – not available

### 3.2.4 Combinations – frame size 10

Table 17: Frame length combination for frame size 10 and cooling mode N - self-cooling

| ③ Frame length | ④ Rotor inertia | ⑤ Winding | ⑨ Electrical connection | | | | ⑪ Holding brake | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | U | V | A | B | 0 | 1 | 2 | 3 |
| B | 1 | BQ | ● | ● | – | – | ● | ● | ● | – |
| C | 0 | BH | – | ● | – | – | ● | – | ● | – |
| | | BN | – | ● | – | – | ● | – | ● | – |
| | 1 | BH | – | ● | – | – | ● | – | ● | – |
| | | BN | – | ● | – | – | ● | – | ● | – |
| D | 0 | BH | – | ● | – | – | ● | – | ● | – |
| | | BN | – | ● | – | – | ● | – | ● | – |
| | 1 | BF | – | ● | – | – | ● | – | ● | – |
| | | BN | – | ● | – | – | ● | – | ● | – |
| E | 0 | BH | – | ● | – | – | ● | – | – | ● |
| | | BN | – | – | ● | ● | ● | – | – | ● |
| | 1 | BF | – | ● | – | – | ● | – | – | ● |
| | | BN | – | – | ● | ● | ● | – | – | ● |
| F | 0 | BD | – | ● | – | – | ● | – | – | ● |
| | | BH | – | – | ● | ● | ● | – | – | ● |
| | 1 | BD | – | ● | – | – | ● | – | – | ● |
| | | BH | – | – | ● | ● | ● | – | – | ● |
| R | 0 | BQ | – | – | ● | ● | ● | – | – | ● |

Table 18: Frame length combination for frame size 10 and cooling mode A / B - forced ventilation

| ③ Frame length | ④ Rotor inertia | ⑤ Winding | ⑨ Electrical connection | | | | ⑪ Holding brake | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | V | A | B | T | 0 | 2 | 3 |
| C | 0 | BH | ● | – | – | ● | ● | ● | – |
| | | BN | ● | – | – | ● | ● | ● | – |
| | 1 | BH | ● | – | – | – | ● | ● | – |
| | | BN | ● | – | – | – | ● | ● | – |
| D | 0 | BH | ● | – | – | ● | ● | ● | – |
| | | BN | – | ● | ● | ● | ● | ● | – |
| | 1 | BF | ● | – | – | – | ● | ● | – |
| | | BN | – | ● | ● | – | ● | ● | – |
| E | 0 | BH | – | ● | ● | ● | ● | – | ● |
| | | BN | – | ● | ● | ● | ● | – | ● |
| | 1 | BF | ● | – | – | – | ● | – | ● |
| | | BN | – | ● | ● | ● | ● | – | ● |
| F | 0 | BD | ● | – | – | – | ● | – | ● |
| | | BH | – | ● | ● | ● | ● | – | ● |
| | 1 | BD | ● | – | – | – | ● | – | ● |
| | | BH | – | ● | ● | ● | ● | – | ● |
| R | 0 | BQ | – | ● | ● | ● | ● | – | ● |

● available – not available

Table 19: Frame length combination for frame size 10 and cooling mode L - water cooling

| ③ Frame length | ④ Rotor inertia | ⑤ Winding | ⑨ Electrical connection | | | | ⑪ Holding brake | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | A | B | T | C | 0 | 2 | 3 |
| C | 0 | BH | ● | ● | ● | – | ● | ● | – |
| | | BN | ● | ● | ● | – | ● | ● | – |
| | 1 | BH | ● | ● | – | – | ● | ● | – |
| | | BN | ● | ● | – | – | ● | ● | – |
| D | 0 | BH | ● | ● | ● | – | ● | ● | – |
| | | BN | ● | ● | ● | – | ● | ● | – |
| | 1 | BF | ● | ● | – | – | ● | ● | – |
| | | BN | ● | ● | – | – | ● | ● | – |
| E | 0 | BH | ● | ● | ● | – | ● | – | ● |
| | | BN | ● | ● | – | ● | ● | – | ● |
| | 1 | BF | ● | ● | – | – | ● | – | ● |
| | | BN | ● | ● | – | – | ● | – | ● |
| F | 0 | BH | ● | ● | – | ● | ● | – | ● |
| | 1 | BD | ● | ● | – | – | ● | – | ● |
| | | BH | ● | ● | – | – | ● | – | ● |
| R | 0 | BL | – | – | – | – | ● | – | ● |
| | | BQ | – | – | – | ● | ● | – | ● |

Table 20: Flange accuracy and other design combination for frame size 10

| ⑫ Flange accuracy | ③ Frame length | | | |
|---|---|---|---|---|
| | C | D | E | F |
| R | ● | ● | ● | ● |

| ⑯ Other design | ⑥ Cooling mode | | ⑩ Shaft | | ⑦ Encoder performance | | | |
|---|---|---|---|---|---|---|---|---|
| | N | L | G | K | A | B | C | D |
| P | ● | ● | ● | ● | ● | ● | ● | ● |

● available – not available

Identification

### 3.2.5 Combinations – frame size 13

Table 21: Frame length combination for frame size 13 and cooling mode N - self-cooling

| ③ Frame length | ④ Rotor inertia | ⑤ Winding | ⑨ Electrical connection | | ⑪ Holding brake | | |
|---|---|---|---|---|---|---|---|
| | | | C | E | 0 | 1 | 2 |
| B | 1 | BH | ● | – | ● | ● | – |
| | | BN | ● | – | ● | ● | – |
| C | 1 | BH | ● | – | ● | – | ● |
| | | BN | ● | – | ● | – | ● |
| D | 1 | BH | – | ● | ● | – | ● |
| | | BN | – | ● | ● | – | ● |
| E | 1 | BH | – | ● | ● | – | ● |
| | | BN | – | ● | ● | – | ● |

Table 22: Frame length combination for frame size 13 and cooling mode A / B - forced ventilation

| ③ Frame length | ④ Rotor inertia | ⑤ Winding | ⑨ Electrical connection | | ⑪ Holding brake | | |
|---|---|---|---|---|---|---|---|
| | | | C | E | 0 | 1 | 2 |
| B | 1 | BH | ● | – | ● | ● | – |
| | | BN | ● | – | ● | ● | – |
| C | 1 | BH | ● | – | ● | – | ● |
| | | BN | ● | – | ● | – | ● |
| D | 1 | BH | – | ● | ● | – | ● |
| | | BN | – | ● | ● | – | ● |
| E | 1 | BH | – | ● | ● | – | ● |
| | | BN | – | ● | ● | – | ● |

Table 23: Frame length combination for frame size 13 and cooling mode L - water cooling

| ③ Frame length | ④ Rotor inertia | ⑤ Winding | ⑨ Electrical connection | | ⑪ Holding brake | | |
|---|---|---|---|---|---|---|---|
| | | | C | E | 0 | 1 | 2 |
| B | 1 | BH | ● | – | ● | ● | – |
| | | BN | ● | – | ● | ● | – |
| C | 1 | BH | ● | – | ● | ● | – |
| | | BN | ● | – | ● | ● | – |
| D | 1 | BH | – | ● | ● | ● | – |
| | | BN | – | ● | ● | ● | – |
| E | 1 | BH | – | ● | ● | ● | – |
| | | BN | – | ● | ● | ● | – |

● available – not available

# 4 Features and functions

## 4.1 Basic data

| Product |
| --- |
| 3~ PM Motor |

| Type |
| --- |
| MS2N |

| Ambient temperature during operation |
| --- |
| 0 ... 40 °C (with derating up to 60 °C) |

| Type of protection (EN IEC 60034-5:2020) |
| --- |
| IP64 without shaft sealing ring<br>IP65 with shaft sealing ring<br>IP67 with sealing air |

| Cooling mode (EN 60034-6:1993) |
| --- |
| IC410, Self-cooling<br>IC416, Forced ventilation<br>IC3W7, Water cooling |

| Motor type of construction (EN 60034-7:1993 + A1:2001) |
| --- |
| IM B5<br>IM B35 (only MS2N13) |

| Coating |
| --- |
| Varnish RAL 9005 |

| Flange |
| --- |
| similar to DIN 42948:1965-11 |

| Shaft end |
| --- |
| Cylindrical (DIN 748-3), centering hole with thread "DS" (DIN 332-2:1983-05), optional with keyway (half key balancing according toISO 21940-32:2012) |

| Concentricity, run-out, alignment (DIN 42955:1981-12) |
| --- |
| Tolerance N (standard)<br>Tolerance R (availability acc. to type code) |

| Oscillating quantity level (EN IEC 60034-14:2018) |
| --- |
| Level A up to rated speed |

| Installation altitude |
| --- |
| 0 ... 1,000 m above sea level (without derating) |

| Sound pressure level |
| --- |
| MS2N02 ... MS2N13: 75 dB(A) +3 dB(A) |

| Thermal class (EN 60034-1:2010 + Cor.:2010) |
| --- |
| 155 (F) |

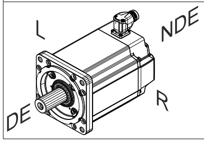
| Encoder system |
| --- |
| BASIC performance HIPERFACE®<br>Capacitive absolute value encoder, sin/cos 1Vss, 16 signal periods as Single- or Multiturn variant |
| STANDARD Performance ctrlX SENSE$^{motor}$<br>Magnetic absolute encoder 22 bit, digital in single or multi-turn version<br>STANDARD performance HIPERFACE®<br>Optical absolute value encoder, sin/cos 1Vss, 128 bit, digital in Single- or Multiturn design |

| |
|---|
| ADVANCED Performance ACURO®link |
| Optical absolute value encoder 20 bit, digital in Single- or Multiturn design |
| HIGH performance ACURO®link |
| Optical absolute value encoder 24 bit, digital in Single- or Multiturn design |

| Electrical connection |
|---|
| **Single cable connection** with<br>● M17 circular connector, rotatable, quick lock Speedtec®<br>● M23 circular connector, rotatable, quick lock SPEEDCON® |
| **Double cable connection** with<br>● Power connectors M17, M23, M40 (rotatable, quick lock SPEEDCON®), M58 or terminal boxes<br>● M17 Encoder connector, rotatable, quick lock SPEEDCON® |

| Motor holding brake |
|---|
| Optional, electrically released $U_N$ 24V DC (± 10 %) |

**Motor ends**



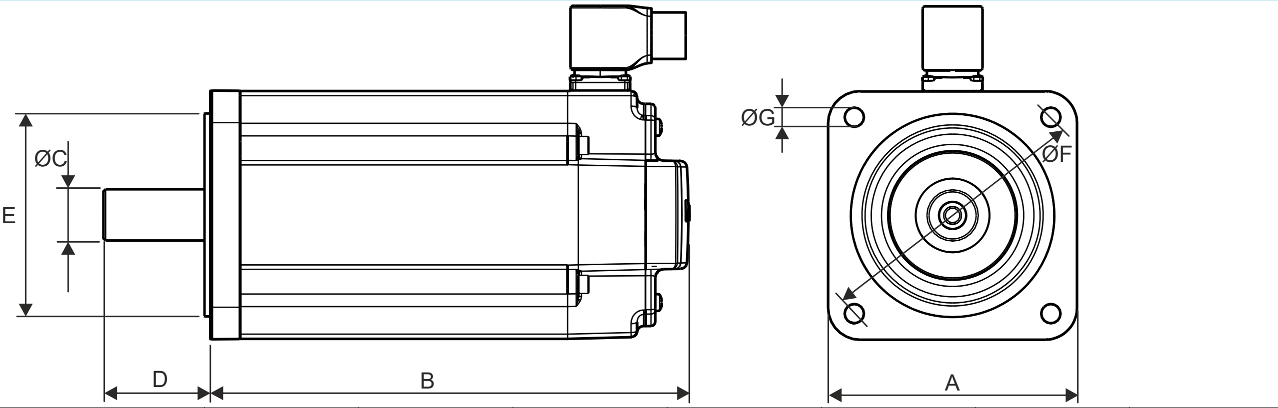

| | |
|---|---|
| DE | Drive End, A-side |
| NDE | Non Drive End, B-side |
| L | Left |
| R | Right |

**Remark**

In the case of special design, details named in the operating instructions can deviate. In this case, order the supplementary documentation.

## 4.2 Mechanical interfaces

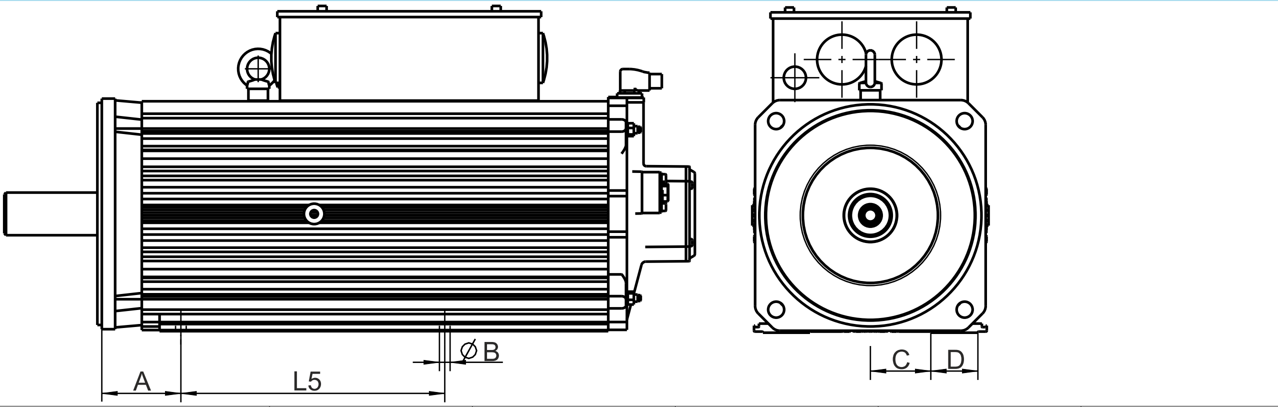
**Dimensions (flange)**




| Type | A<br>☐ Flange [mm] | B<br>Length [mm] | C<br>Shaft Ø [mm] | D<br>Shaft length [mm] | E<br>Centering collar [mm] | F<br>Hole circle [mm] | G<br>Mounting holes [mm] |
|---|---|---|---|---|---|---|---|
| MS2N02 | 40 | 1) | 8 | 18 | 30 | 46 | 4.5 |
| MS2N03-A | 58 | 1) | 9 | 20 | 40 | 63 | 4.5 |
| MS2N03-B | 58 | 1) | 9 | 20 | 40 | 63 | 4.5 |
| MS2N03-D | 58 | 1) | 11 | 23 | 40 | 63 | 4.5 |
| MS2N04 | 82 | 1) | 14 | 30 | 50 | 95 | 6.6 |
| MS2N05 | 98 | 1) | 19 | 40 | 95 | 115 | 9 |
| MS2N06 | 116 | 1) | 24 | 50 | 95 | 130 | 9 |
| MS2N07 | 140 | 1) | 32 | 58 | 130 | 165 | 11 |
| MS2N10 | 196 | 1) | 38 | 80 | 180 | 215 | 14 |
| MS2N13 | 260 | 1) | 48 | 110 | 250 | 300 | 18 |

1) See dimensional drawings under ➡ Technical data

**Dimensions (foot)**




| Type | A<br>[mm] | L5<br>Length [mm] | B<br>Bore Ø [mm] | C<br>Distance [mm] | D<br>Distance [mm] |
|---|---|---|---|---|---|
| MS2N13-B | 89 | 147 | 12 | 68 | 53 |
| MS2N13-C | 89 | 197 | 12 | 68 | 53 |
| MS2N13-D | 89 | 247 | 12 | 68 | 53 |
| MS2N13-E | 89 | 297 | 12 | 68 | 53 |

Use the following screws and washers for flange and foot assembly.

Table 24: Mounting screws tightening torque

| Screw [1] | M4 | M6 | M8 | M10 | M12 | M16 |
|---|---|---|---|---|---|---|
| Mounting holes Ø [mm] | 4.5 | 6.6 | 9 | 11 / 12 | 14 | 18 |
| Tightening torque $M_A$[Nm] at $\mu_K$= 0.12 | 3.0 | 10.1 | 24.6 | 48 | 84 | 206 |
| Washer | - | - | yes | yes | yes | yes |
| [1] Screws according to EN ISO 4762:2004 or EN ISO 4014:2011. Fastening class 8.8. The screw lengths depends on material and installation situation. The specified tightening torque must be ensured. | | | | | | |

## 4.3 Rotor inertia

| Rotor inertia | Type | MS2N□□ | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 02 | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| 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.

## 4.4 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 - 100 K ($M_{S1\ 100\ K}$) on the voltage limit characteristic curve $U_{ZK\ 1}$ is reached (tolerance range ca. ± 250 1/min).

Table 25: Winding code acc. to type code (speed at DC bus voltage UZK 1)

| Winding code | Nominal speed [1/min] |
|---|---|
| BD | 1000 |
| BF | 1,500 |
| BH | 2,000 |
| BL | 2,500 |
| BN | 3,000 |
| BQ | 4,000 |
| BR | 4500 |
| BT | 6,000 |
| BY | 9,000 |

## 4.5 Thermal motor protection

The motor temperature is monitored by two systems that are operated independently of each other. The mounted **temperature sensor** and the drive-internal **temperature model** ensure the best protection of motors against thermal overload.

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 Rexroth controllers. Threshold values for MS2N motors:

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

For motors with an analog encoder **“A / B”**, the temperature signal is output via the TP(+) and TP(-) connections in the power connection.

For motors with a digital encoder **"C / D / H / J / M"**, the temperature signal is transmitted digitally via the encoder interface (cyclical communication).

**Temperature measurement type of construction N**

In motors with type of construction **"N"**, the temperature of the winding is recorded and monitored via PT1000 temperature sensors installed in the motor winding.

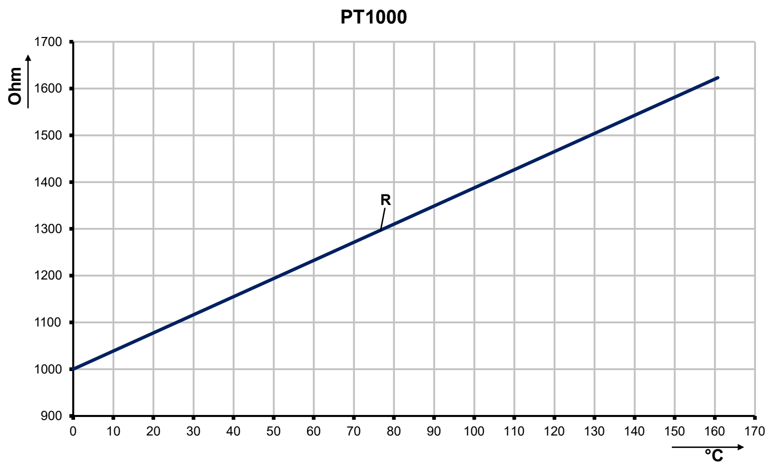



Fig. 2: Characteristic curve PT1000

**Temperature measurement type of construction D**

The temperature of the winding is detected and monitored indirectly for type of construction **"D"** motors via the temperature sensor in the ctrlX SENSE encoder (availability according to type code).

**Temperature evaluation with third-party controllers**

When using third-party devices, please refer to the information on implementing the encoder manufacturer's interface.

Hengstler:
ACURO Encoder AD37 series – Functional Safety Item number: 2572032

For motors with type of construction **"D"** (with ctrlX SENSE encoder), an indirect temperature recording of the winding can only be ensured with the temperature model in drives of Bosch Rexroth.

# 4.6 Cooling mode

## 4.6.1 Overview of cooling types

| Motor cooling (EN 60034-6) | Cooling type 1) | MS2N□□ | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 02 | 03 | 04 | 05 | 06 | 07 | 10 | 13 |
| IC410, Self-cooling | N | ● | ● | ● | ● | ● | ● | ● | - |
| IC416, Forced ventilation 230 V | A | - | - | - | - | - | ● | ● | - |
| IC416, Forced ventilation 115 V | B | - | - | - | - | - | ● | ● | - |
| IC416, Forced ventilation 3 × 400/480 V | C | - | - | - | - | - | - | - | ● |
| IC3W7, Water cooling | L | - | - | - | - | - | ● | ● | ● |
| 1) according to the type code | | | | | | | | | |

### 4.6.2 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. Any usage at increased ambient temperature (0 ... 60 °C) is possible. Please note the details in ➦ Chapter 10.2 Derating in case of deviating ambient conditions on page 430.

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.

### 4.6.3 Forced ventilation (IC416)

MS2N motors of size **07, 10** and **13** are available as forced ventilated designs. The designation is done via the feature cooling mode within the type code:

- **“A”** 230 V (50 / 60 Hz)
- **“B”** 115 V ( 60 Hz)
- **“C”** 3 × 400 / 480 V (50 / 60 Hz)

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.** |
|---|---|
| | Before you get closer to operating fan units, take protective measures. Do not wear jewelry, wear tight-fitting clothes and use personal protective equipment (like a hairnet). Tie your hair back. Otherwise the danger exists that hair will get ripped out. |

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.

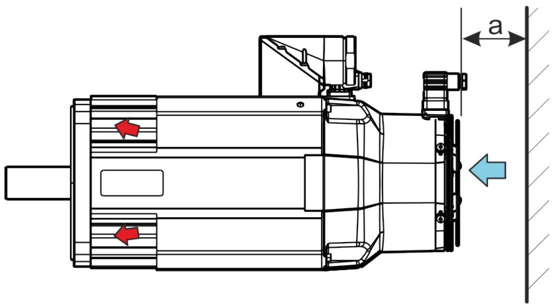



Fig. 3: Minimum distance

a Minimum distance 80 mm

Blowing fans, air flow direction NDE → DE.

Operate fans only in dustfree and dry ambient air. 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.

Fans are not suited to transfer ambient air,

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

## 4.6.4 Water cooling (IC3W7)

MS2N motors of size **07**, **10** and **13** are available as water-cooled designs. The cooling circuit of the motor is designed with stainless steel. The designation is done via the feature cooling mode **"L"** within the motor type code. The nominal data are achieved at ambient temperatures of up to 40 °C.

### Cooling system

The motor power loss $P_V$ transformed to heat is dissipated using the coolant. External cooling units are necessary to operate water-cooled motors. Install systems in the cooling circuit for monitoring flow, pressure and temperature.

Remark

Basically, Bosch Rexroth does not claim any warranty for third-party products.

| Manufacturers of cooling units | |
|---|---|
| Rittal GmbH & Co. KG | ➦http://www.rittal.com |
| KKT Kraus Kälte- und Klimatechnik GmbH | ➦http://www.kkt-chillers.com |
| Glen Dimplex Deutschland GmbH | ➦http://www.riedel-cooling.com |
| BKW Kälte-Wärme-Versorgungstechnik GmbH | ➦ http://www.bkw-kuema.de |
| Hyfra Industriekühlanlagen GmbH | ➦http://www.hyfra.de |

The cooling unit must be able to dissipated heat of the motors at any time. If several motors are operated on one cooling system, this applies to the sum of the individual power losses. The required coolant pressure must also be able to be achieved at maximum volume flow.

The necessary cooling and pump performance is calculated of the sum of connected motors or heat input, the specified minimum flow and pressure loss. The dimensioning of the cooling system is in the responsibility of the machine manufacturer.

Generally, different cooling circuits are used to cool the motors.

- closed cooling circuit (application allowed, no penetration of oxygen possible)
- half-opened cooling circuit (application allowed, penetration of oxygen only possible via surge tank)
- opened cooling circuit (application not allowed, penetration of oxygen unhindered possible)

Remark

Bosch Rexroth recommends to design the cooling circuits as closed system.

The occurring electro-chemical processes within the cooling system must be minimized via selection of the materials. Do not combine different materials, like copper, brass, iron, zinc and halogenated plastics (e.g. tubes and sealing made of PVC).

Fix coolant ducts and check for their tightness in regular intervals.

### Potential equalization

Connect all components within the cooling system (e.g. motor, heat exchanger, pipe system, pump, pressure compensation container, etc.) with a potential equalization. Do the potential equalization with a copper bus bar or copper wire with an appropriate conductor cross-section.

Coolant ducts must not contact live parts. Please observe sufficient insulation according to the regulations valid for the place of installation.

### Cleaning the coolant circuit

Inspect and clean (purge) the cooling system at regular intervals as specified in the machine and cooling system manufacturer's maintenance schedule. Note that the utilization of unsuitable cleaning agents may cause irreversible damage to the motor cooling system. This type of damage does not lie within the responsibility of Bosch Rexroth.

| NOTICE | Damage to the motor cooling system due to unsuitable cleaning agents! |
|---|---|
| | – The only liquids or materials allowed to be used for cleaning and motor cooling are those which do not corrode the motor cooling system or do not react aggressively to the materials used in Bosch Rexroth motors.<br>– Observe the instructions of the manufacturers of the cleaning agent and the cooling system. |

## Coolants

The coolant must comply with certain criteria and treated accordingly (see ➦ Coolant characteristics on page 37). To ensure corrosion protection and chemical stabilization admix an additive to the cooling water. The selected coolant additives (**biocides**, **inhibitors**) must comply with the materials in the cooling system (e.g. copper, brass, stainless steel, etc.) and minimize the micro-biological growth. Pay attention to environmentally friendly materials.

A cooling with floating water from the supply network is not allowed. Floating water can cause sediments (chalk) or corrosion within the cooling system.

Remark

In the case of other used coolants than water (e.g. oil), a performance reduction of the motor can be necessary to dissipate the created power loss. The dimensioning of the cooling system is in the responsibility of the machine manufacturer.

| NOTICE | Motor damage due to missing or incompatible coolant water! |
|---|---|
| | – For this reason, water cooled motors may only be operated as long as coolant supply is ensured.<br>– Do not use any cooling lubricants or cutting materials from machining processes for cooling.<br>– Using aggressive coolant additives or additives can lead to irreparable motor damage. |

### Coolant characteristics

Adjust the required coolant, especially the material compatibility must be specified with the manufacturer of the cooling unit and the manufacturer of the coolant additives. The basic minimum requirements for the coolant are displayed in the following.

| Cooling water quality for motors with internal cooling circuit made of stainless steel. | |
|---|---|
| pH value (bei 20 °C) | 6 ... 9 |
| Total hardness | 1.2 ... 2.5 mmol/l |
| Chloride concentration | < 150 ppm |
| Sulfate concentration | < 200 ppm |
| Nitrate concentration | < 50 ppm |
| Amount solutes | < 350 ppm |
| Particle size of dirt | ≤ 100 µm |
| Conductivity | < 2000 µS/cm |

### Coolant additives

Coolant additives can be purchased from the following manufacturers. Products of other manufacturers can be also be used.

| Manufacturer of chemical additives: | |
|---|---|
| Nalco Deutschland GmbH | ➦ http://www.nalco.com |
| FUCHS PETROLUB AG | ➦ http://www.fuchs-oil.com |
| Clariant Produkte (Deutschland) GmbH | ➦ http://www.antifrogen.de |
| hebro chemie GmbH | ➦ http://www.hebro-chemie.de |
| TYFOROP Chemie GmbH | ➦ http://www.tyfo.de |
| Schweizer-Chemie GmbH | ➦ http://www.schweitzer-chemie.de |

Bosch Rexroth does not make any general statement and does not conduct any surveys regarding the suitability of device-specific cooling media, additives or operating conditions and does not assume any warranty for third-party products.

The performance test for the used cooling media and the design of the liquid cooling system is the responsibility of the machine manufacturer. The selected coolant additives have to comply with the materials within the cooling system.

Comply with the environmental protection and waste disposal instructions at the place of installation when selecting the coolant additives.

The proper chemical treatment of the closed water systems is precondition to prevent corrosion, to maintain thermal transmission, and to minimize the growth of bacteria in all parts of the system.

Coolant additives of NALCO Deutschland GmbH (example):

**Coolant water Nalco CCL100** is a ready-to-use, preserved cooling water for use in closed cooling water systems. Nalco CCL100 contains corrosion inhibitor protecting ferrous metal, copper, copper alloys and aluminum. It is free from nitrite and minimizes the micro-biological growth.

**Coolant additive NALCO TRAC100** is a liquid corrosion and film inhibitor for the use in closed cooling systems. Nalco TRAC100 is a complete inhibitor protecting ferrous metal, copper alloys and aluminum against corrosion. It is free from nitrite and minimizes the micro-biological growth.

**Coolant additive NALCO 7330** is a non-oxidizing broad band biocide and suitable for application in closed cooling circuit systems.

**Coolant additive Nalco 73199** is an organic corrosion inhibitor supporting a fast own protection layer and covering protection layer for non-ferrous metals.

### Coolant temperature

When setting the coolant inlet temperature within a range of 10 ... 40 °C (for derating see ➦ Chapter 10.2 Derating in case of deviating ambient conditions on page 430) observe the ambient temperature and the existing relative air humidity. To avoid condensation, the coolant inlet temperature must be above the dew point temperature . The following figure shows the dependency of dew point temperature of relative air humidity and air temperature.

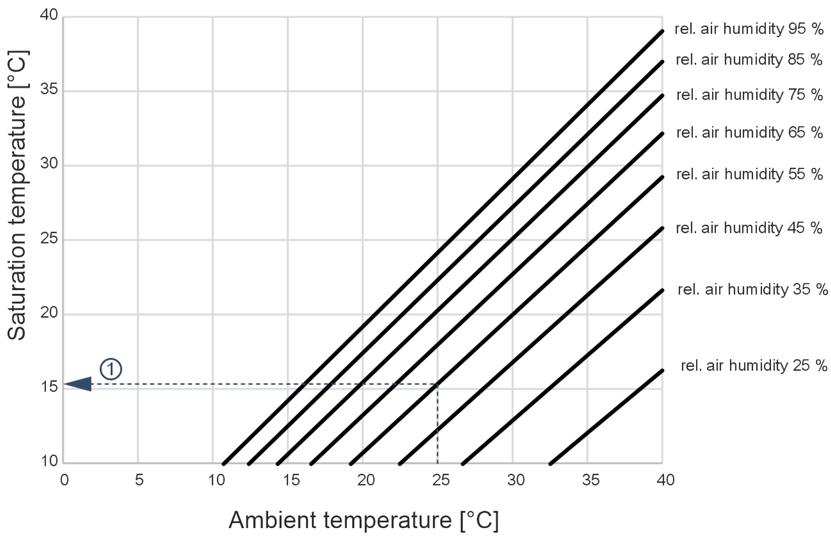



Fig. 4: Dew point temperature depends from ambient temperature and relative air humidity

Example ① Saturation 15.3 °C at ambient temperature of 25 °C and relative air humidity of 55 %

<u>Remark</u>

To avoid condensation of the motors, the coolant inlet temperature must be above the dew point temperature .

# 4.7 Motor encoder

## 4.7.1 Introduction

### Safety Integrity Level (SIL)

MS2N motors are available with encoder systems with different safety integrity levels (SIL). All components of a safety-related system (e. g. motor, control device, software ... ) must be evaluated together in order to execute a safety function and thus achieve and maintain a defined safe state of a system.

**⚠ WARNING**

**The component is part of a safety-related system! Death, serious injury or damage to property if these instructions are not followed.**

Motors with encoder units for functional safety are part of a safety-related system. All components of a safety-related system must be evaluated according to the standards claimed about functional safety.

- Carry out a detailed risk analysis to determine an appropriate Safety Integrity Level (SIL) for your specific application based on all applicable standards.
- Do not exceed any of the SIL rating data when using this product.

For more information about Integrated Safety technology and the requirements to use motors with encoder systems for Safety technology applications, please refer to the documentation about the drive controller.

### Singleturn

The singleturn design “S” allows absolute, indirect position recording within one mechanical motor rotation.

### Multiturn

The multiturn version “M” enables absolute, indirect position detection within:

- 4,096 mechanical motor revolutions (HIPERFACE®, ACURO®link),
- 65,536 mechanical motor revolutions (ctrlX SENSE).

## 4.7.2 HIPERFACE®

### Encoder performance

#### BASIC

BASIC encoders with encoder performance “A□” 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. The motor temperature is not transmitted via encoder interface.

#### STANDARD

STANDARD encoders with encoder performance “B□” use an optical 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. The encoder fulfills the specification for safety technique according to SIL2 and category 3, PL d. The motor temperature is not transmitted via encoder interface.

### Functional details

Table 26: Technical data motor encoder HIPERFACE®

| Designation | | | BASIC | | STANDARD | |
|---|---|---|---|---|---|---|
| Performance | Symbol | Unit | AM | AS | BM | BS |
| Encoder interface | - | - | HIPERFACE® | | | |
| Encoder signal periods | ~/⎍ | - | 16 | | 128 | |
| Distinguishable rotations | $U_{turn}$ | - | 4,096 | 1 | 4,096 | 1 |
| System accuracy typical/maximum [2] | ∢ | " | ± 360 / ± 520 | | ± 90 / ± 120 | |
| Encoder output signal | $V_{out}$ | | 1 Vss | | | |
| Encoder voltage supply | $VCC_{Encoder}$ | V | 7...12 | | | |
| Encoder max. current consumption | $I_{Encoder}$ | mA | 50 | | 60 | |

1) The installation mechanics can sporadically influence the accuracy of the overall system.
2) Reachable overall system accuracy by considering the installation mechanics, typical and maximum value.

### Safety data

Table 27: Technical data motor encoder HIPERFACE®

| Safety characteristics | Symbol | Unit | AM | AS | BM | BS |
|---|---|---|---|---|---|---|
| Safety integrity level | | - | - | | SIL 2 | |
| Performance level | | - | - | | Category 3, PL d | |
| Mission Time | | h | - | | 175,200 (20 years) | |

## 4.7.3 ACURO®link

### Encoder performance

#### ADVANCED

ADVANCED encoder with encoder performance **“C▯”** or **“H▯”** use an optical sampling method. Data output of process and parameter data (electronic type plate) happens digitally via the ACURO®link protocol. The encoder with encoder performance **“C▯”** fulfills the specification for safety technique according to SIL 2 and category 3, PL d. The encoder with encoder performance **“H▯”** fulfills the specification for safety technique according to SIL 3 and category 3, PL e. The motor temperature is transmitted digitally.

#### HIGH

HIGH encoders with encoder performance **“D▯”** use an optical sampling method. Data output of process and parameter data (electronic type plate) happens digitally via the ACURO®link protocol. The encoder with encoder performance **“D”** fulfills the specifications for safety technique according to SIL 3 and Category 3, PL e. The motor temperature is transmitted digitally.

### Functional details

Table 28: Technical data motor encoder ACURO®link

| Designation | | | ADVANCED | | | | HIGH | |
|---|---|---|---|---|---|---|---|---|
| Performance | Symbol | Unit | CM | CS | HM | HS | DM | DS |
| Encoder interface | - | - | ACURO®link | | | | | |
| Functional encoder resolution (single-turn) | | - | 20 bit | | | | 24 bit | |
| Distinguishable rotations | $U_{turn}$ | - | 4,096 | 1 | 4,096 | 1 | 4,096 | 1 |
| System accuracy typical/maximum [2] | ∢ | '' | ± 50 / ± 70 | | | | ± 20 / ± 30 | |
| Encoder voltage supply | $VCC_{Encoder}$ | V | 7...12 | | | | | |
| Encoder max. current consumption | $I_{Encoder}$ | mA | 60 | | | | 130 | |

1) The installation mechanics can sporadically influence the accuracy of the overall system.
2) Reachable overall system accuracy by considering the installation mechanics, typical and maximum value.

### Safety data

Table 29: Technical data motor encoder ACURO®link

| Safety characteristics | Symbol | Unit | CM | CS | HM | HS | DM | DS |
|---|---|---|---|---|---|---|---|---|
| Safety integrity level | | - | SIL 2 | | SIL 3 | | | |
| Performance level | | - | Category 3, PL d | | Category 3, PL e | | | |
| Position resolution for safe position | | - | 9 bit | | | | | |
| Mission Time | | h | 175,200 (20 years) | | | | | |

### 4.7.4 ctrlX SENSE

#### Encoder performance

STANDARD

STANDARD encoders with encoder performance “J” / “M” use a magnetic sampling method. Data output of process and parameter data (electronic type plate) happens digitally via the ctrlX SENSE[motor] protocol. The encoder with encoder performance “J” fulfills the specifications for safety technique according to SIL 3 and Category 4, PL e. The encoder with encoder performance “M” fulfills the specifications for safety technique according to SIL 2 and Category 3, PL e. The motor temperature is transmitted digitally.

#### Functional details

Table 30: Technical data motor encoder ctrlX SENSE

| Designation | | | STANDARD | | | |
|---|---|---|---|---|---|---|
| Performance | Symbol | Unit | MM | MS | JM | JS |
| Resolution per revolution | | | 22 bit | | | |
| System accuracy typical/maximum 1) | ∢ | " | ± 100 / ± 150 | | | |
| Number of recordable revolutions | $U_{turn}$ | - | 65,536 | 1 | 65,536 | 1 |
| Measuring principle | | | magnetic | | | |
| 1) Reachable overall system accuracy by considering the installation mechanics, typical and maximum value. | | | | | | |

| Interfaces | Symbol | Unit | MM | MS | JM | JS |
|---|---|---|---|---|---|---|
| Communication interface | - | - | ctrlX SENSE[motor] | | | |
| Maximum initialization time | | ms | 500 | | | |

| Electrical data | Symbol | Unit | MM | MS | JM | JS |
|---|---|---|---|---|---|---|
| Voltage supply | $VCC_{Encoder}$ | V DC | 8...14 | | | |
| Current consumption | $I_{Encoder}$ | mA | 140 | | | |
| Encoder power maximum | $P_{Encoder}$ | mW | 1,200 | | | |

- For the tolerance of the voltage, pay attention to the voltage drop on the cable.
- The data in the table applies to the connection points on the encoder.
- The supply input ($V_{Ext}$) of the ctrlX SENSE standard is designed for overvoltage up to 60 $V_{DC}$.
- The ctrlX SENSE standard itself does not cause any permanent damage in the voltage range 14 to 60 $V_{DC}$.
- In the 14 to 60 $V_{DC}$ voltage range, the ctrlX SENSE standard sends a corresponding safety-relevant error message. In this case, the evaluation unit must switch off the motor’s power.
- At voltages above 60 $V_{DC}$, irreparable damage to the ctrlX SENSE standard can occur. The source of the power supply must be a power unit with SELV protection in accordance with IEC 60950-1 or PELV in accordance with IEC 60204-1.
- In addition to buffering (17 µF) of the $V_{Ext}$ supply voltage, there is no other surge protection in the ctrlX SENSE. There is no soft start for the charge of the buffering.

| Mechanical data | Symbol | Unit | MM | MS | JM | JS |
|---|---|---|---|---|---|---|
| Moment of inertia of rotor | | $kg*mm^2$ | 0.91 | | | |

## Safety data

### Safe absolute singleturn position

The safe position of a ctrlX SENSE - STANDARD can reflect a mechanical revolution. The multiturn position is not safe.

Table 31: Technical data motor encoder ctrlX SENSE

| Safety characteristics | Symbol | Unit | MM | MS | JM | JS |
|---|---|---|---|---|---|---|
| Safety integrity level (IEC 61508) | | - | SIL 2 | | SIL 3 | |
| Category (EN ISO 13849) | | - | 3 | | 4 | |
| Performance level | | - | PL d | | PL e | |
| Safety-related resolution | | - | 19 bit | | | |
| Safe illustratable position area | - | rev. | 1 | | | |
| PFH: Probability of hazardous loss / h | PFH | 1/h | 1E-09 | | | |
| Mission Time | | h | 175,200 (20 years) | | | |
| Available safe memory area | | kByte | 4 | | | |
| Maximum cable length 1) | | m | 75 | | | |
| Accuracy of safe position (mechanical) | | | ± 1.5° | | | |
| Accuracy of safe velocity | | | ± 6 % | | | |
| Maximum encoder speed 1) | | 1/min | 12,000 | | | |
| Angular acceleration 1) | | rad/s² | ≤ 250,000 | | | |
| **Available safety functions according to EN 61800-5-2 and EN 61800-5-3** | | | Refer to:<br>➦ctrlX SENSE CE Declaration DCTC-30139-001<br>➦ctrlX SENSE Operating Instructions | | | |
| | | | **Safe parameter**<br>ctrlX SENSE can read and write safe parameters via the non-safety-oriented parameter channel | | | |
| 1) specified data can be limited due to the design of the motor or drive controller. **Please observe the information provided in the documentation specified above.** | | | | | | |

**⚠ WARNING**

**Death, serious injury or material damage due to non-compliance with the ambient conditions**

The safety-related data of the encoder are only valid if the specified ambient conditions of the motor are complied with. Failure to observe these conditions can lead to malfunction of the encoder, resulting in serious injury or damage to property. Please observe the manufacturer's instructions and ensure compliance with the ambient conditions to ensure safe use of the encoder.

➦ Chapter 10.1 Ambient conditions during operation on page 429

### Notes on maintenance and service measures

Maintenance work on ctrlX SENSE encoders is possible for motors of size frame 02 ... 10, e.g. to replace the battery on multiturn encoders or to replace the encoder completely. For this, the motor cover must be removed.

| ⚠ WARNING | **Improper battery change can lead to loss of the safety functions!**<br>The battery may only be replaced by specialists or qualified electricians.<br>For motors of frame sizes **03 … 10** with multiturn encoders, it is possible to replace the battery by opening the motor cover without changing the encoder calibration.<br>It is important to ensure that the mechanical connections of the encoder board are not changed when replacing the battery in order to maintain the alignment of the position sensor. |
|---|---|

| ⚠ WARNING | **Frame size 02**<br>For motors of frame size **02** with multiturn encoders it is not possible to replace the battery with opening the motor cover without changing the encoder calibration. |
|---|---|

| ⚠ WARNING | **Loss of safety functions due to opening the shielding box (encoder)!**<br>Opening the shielding box (for encoder exchange, for example) can lead to loss of the safety functions.<br>The encoder may only be replaced by Rexroth Service or an authorized workshop.<br>The encoder must be recalibrated after loosening the screws of the shielding box.<br>The encoder must be recalibrated after it has been replaced. |
|---|---|

Table 32: CE Declaration of Conformity - ctrlX SENSE

| CE | Standard | Declaration of conformity *) |
|---|---|---|
| Machinery Directive 2006/42/EC | EN ISO 13849-1<br>EN 62061<br>EN 61800-5-1<br>EN 61800-5-2<br>EN 61508-1 ... 7 | DCTC-30139-001 |
| *) ctrlX SENSE Declaration of Conformity is available in Bosch Rexroth media directory: ➦DCTC-30139-001 | | |

**Further documentation**

Safety Manuals:
➦Safety Manual ctrlX SENSE parameter
➦Safety Manual ctrlX SENSE communication

The power supply source must be a power supply unit with SELV protection in accordance with IEC 60950-1 or PELV in accordance with IEC 60204-1. ➦Table 30 Technical data motor encoder ctrlX SENSE on page 43

## 4.8 Degree of protection

The protection type according to EN 60034-5 is determined by the abbreviation IP (International Protection) and two code 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 code number 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
- **IP67** with shaft sealing ring and sealing air connection

Additional specifications (not on type plate)

- Motors with fan
  - **IP65** fan motor
  - **IP2X** safety fence fan propeller

## 4.9 Output shaft, balancing and extension elements

### 4.9.1 Shaft end

#### Options according to type code

| Shaft | Type |
|---|---|
| Plain, without shaft sealing ring | H |
| Plain, with shaft sealing ring | G |
| Keyway, without shaft sealing ring | L |
| Keyway, with shaft sealing ring | K |

#### Plain 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 | 5 × 5 × 22 | DS M5 |
| MS2N05 | 6 × 6 × 32 | DS M6 |
| MS2N06 | 8 × 7 × 40 | DS M8 |
| MS2N07 | 10 × 8 × 45 | DS M10 |
| MS2N10 | 10 × 8 × 70 | DS M12 |
| MS2N13 | 14 × 9 × 80 | DS M16 |

**Remark**

Keys are not included in the scope of delivery.

The design with shaft sealing ring is optional. The shaft sealing ring affects the degree of protection ➦ Chapter 4.8 Degree of protection on page 46. We recommend regular visual inspections on shaft sealing rings. Depending on operating conditions, signs of wear may appear after 5,000 operating hours. If necessary, replace the shaft sealing rings.

**Remark**

Bosch Rexroth recommends to have these repairs made by Bosch Rexroth Service.

### 4.9.2 Balancing

MS2N motors with keyway are balanced with “half key” (half key balancing acc. to DIN ISO 21940-32).

The type of balancing is specified at the shaft front end or the base of the recess with **“H”** for half key balancing.

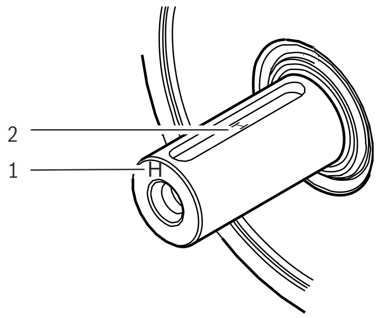



Fig. 5: Identification balancing
1 Identification of balancing at the end face of the shaft
2 Identification of balancing in the base of the recess

### 4.9.3 Attachment of drive elements

The mode of balancing of drive elements must be adjusted to the motor. Observe the notes about mounting drive elements.

| ⚠ CAUTION | **Ingressing fluid may damage the motor!**<br>Fluids (e.g., cooling lubricants, gear oil, etc.) may not be present at the output shaft.<br>When attaching gearboxes, only use gearboxes with a closed (oil-tight) lubrication system. 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 and GTM are intended for installation at MS2N motors. Refer to the notes regarding the motor and gearbox configuration in ➦ Chapter 5.6 Characteristic curve in gearbox mounting on page 66.

Observe the instructions in the corresponding manufacturer´s documentation.

### Overdetermined bearing

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

Remark

If an overdetermined arrangement of bearings cannot be avoided, please 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.

Remark

When extremely stiff couplings are attached, the revolving radial force 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 directly attached to the output shaft are used, this change in the lengths 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.

Remark

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

## 4.10 Direction of rotation

The direction of rotation of Bosch Rexroth motors is defined according to EN 60034-8 for **clockwise rotation**. When looking at the shaft end (DE) and in the direction of view (NDE), the direction of rotation is clockwise (clockwise sense of rotation) when L1 - U, L2 - V, L3 - W are connected in phase according to the connection diagram.

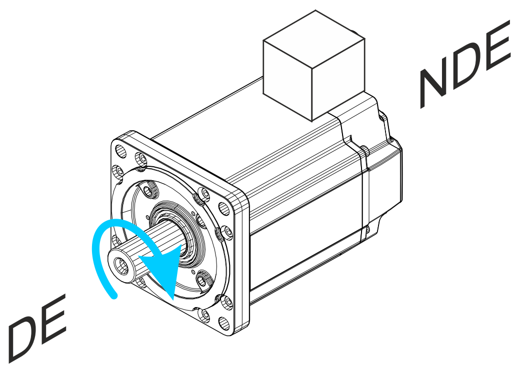



Fig. 6: Direction of rotation

## 4.11 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 allowed 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 4.11.1 Technical data holding brakes on page 50

| ⚠ CAUTION | **Malfunctions due to wear**<br>Impermissibly high wear due to breaking from speed by exceeding the specified emergency stop properties.<br>Avoid deceleration from speed during setup mode. |
|---|---|

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 DC ±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:

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

Fig. 7: Voltage drop of brake supply for Cu (copper) conductor

$\Delta U$ Voltage drop [V]
$\rho_{Cu}$ Specific resistance of copper [$\Omega$*mm²/m]
$l$ Cable length [m]
$q$ Wire cross section [mm²]
$I_N$ Rated current [A]

| ⚠ CAUTION | **Malfunction in case of exceeded tolerance of the rated voltage (switching voltage)**<br>For safe switching of the holding brake, a rated voltage of **24 V DC ±10%** is required at the motor.<br>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 4.11.3 Energy saving function for holding brakes on page 52.

The holding brakes are intended for direct connection to the Bosch Rexroth controllers. A protective circuit to switch inductive loads of holding brakes is integrated in controllers. Please observe when operating of third-party converters that MS2N motors do not have an integrated protective circuit.

### 4.11.1 Technical data holding brakes

| Holding brakes - Technical data | | | | | | | |
|---|---|---|---|---|---|---|---|
| Type | Holding torque | Rated voltage[1)] | Rated current | Maximum connection time | Maximum disconnec-tion time | Moment of inertia of the holding brake | Maximum switched energy |
| | $M_4$ | $U_N$ | $I_N$ | $t_1$ | $t_2$ | $J_{br}$ | $W_{max}$ |
| | Nm | V | A | ms | ms | kg*m² | J |
| MS2N02-A□□□□-□□□□1 | 0.45 | 24 | 0.28 | 15 | 35 | 0.0000002 | 50 |
| MS2N02-C□□□□-□□□□1 | 0.45 | 24 | 0.28 | 15 | 35 | 0.0000002 | 50 |
| MS2N03-A□□□□-□□□□1 | 1.80 | 24 | 0.46 | 8 | 35 | 0.0000074 | 300 |
| MS2N03-B□□□□-□□□□1 | 1.80 | 24 | 0.46 | 8 | 35 | 0.0000074 | 300 |
| MS2N03-D□□□□-□□□□1 | 1.80 | 24 | 0.46 | 8 | 35 | 0.0000074 | 300 |
| MS2N04-B□□□□-□□□□1 | 5.00 | 24 | 0.63 | 30 | 45 | 0.0000451 | 400 |
| MS2N04-C□□□□-□□□□1 | 5.00 | 24 | 0.63 | 30 | 45 | 0.0000451 | 400 |
| MS2N04-D□□□□-□□□□1 | 5.00 | 24 | 0.63 | 30 | 45 | 0.0000451 | 400 |
| MS2N05-B□□□□-□□□□1 | 10.00 | 24 | 0.73 | 30 | 80 | 0.0001070 | 400 |
| MS2N05-C□□□□-□□□□1 | 10.00 | 24 | 0.73 | 30 | 80 | 0.0001070 | 400 |
| MS2N05-D□□□□-□□□□1 | 10.00 | 24 | 0.73 | 30 | 80 | 0.0001070 | 400 |
| MS2N06-B□□□□-□□□□1 | 10.00 | 24 | 0.73 | 30 | 80 | 0.0001070 | 400 |
| MS2N06-C□□□□-□□□□1 | 10.00 | 24 | 0.73 | 30 | 80 | 0.0001070 | 400 |
| MS2N06-D□□□□-□□□□2 | 15.00 | 24 | 0.75 | 50 | 135 | 0.0001400 | 888 |
| MS2N06-E□□□□-□□□□2 | 15.00 | 24 | 0.75 | 50 | 135 | 0.0001400 | 888 |
| MS2N07-C□□□□-□□□□1 | 20.00 | 24 | 0.78 | 40 | 100 | 0.0002550 | 340 |
| MS2N07-D□□□□-□□□□2 | 36.00 | 24 | 0.94 | 60 | 200 | 0.0004100 | 850 |
| MS2N07-E□□□□-□□□□2 | 36.00 | 24 | 0.94 | 60 | 200 | 0.0004100 | 850 |
| MS2N10-B□□□□-□□□□1 | 33.00 | 24 | 0.94 | 60 | 200 | 0.0004100 | 850 |
| MS2N10-C□□□□-□□□□2 | 53.00 | 24 | 1.00 | 70 | 220 | 0.0014700 | 850 |
| MS2N10-D□□□□-□□□□2 | 53.00 | 24 | 1.00 | 70 | 220 | 0.0014700 | 850 |
| MS2N10-E□□□□-□□□□3 | 90.00 | 24 | 1.50 | 65 | 250 | 0.0027000 | 1470 |
| MS2N10-F□□□□-□□□□3 | 90.00 | 24 | 1.50 | 65 | 250 | 0.0027000 | 1470 |
| MS2N13-B□□□□-□□□□1 | 115.00 | 24 | 2.10 | 100 | 240 | 0.005670 | 4,900 |
| MS2N13-C□□□□-□□□□1 | 115.00 | 24 | 2.10 | 100 | 240 | 0.005670 | 4,900 |
| MS2N13-D□□□□-□□□□1 | 115.00 | 24 | 2.10 | 100 | 240 | 0.005670 | 4,900 |
| MS2N13-E□□□□-□□□□1 | 115.00 | 24 | 2.10 | 100 | 240 | 0.005670 | 4,900 |
| MS2N13-C□□□□-□□□□2 | 280.00 | 24 | 1.70 | 300 | 350 | 0.020000 | 2,000 |
| MS2N13-D□□□□-□□□□2 | 280.00 | 24 | 1.70 | 300 | 350 | 0.020000 | 2,000 |
| MS2N13-E□□□□-□□□□2 | 280.00 | 24 | 1.70 | 300 | 350 | 0.020000 | 2,000 |

1) Tolerance ± 10 %

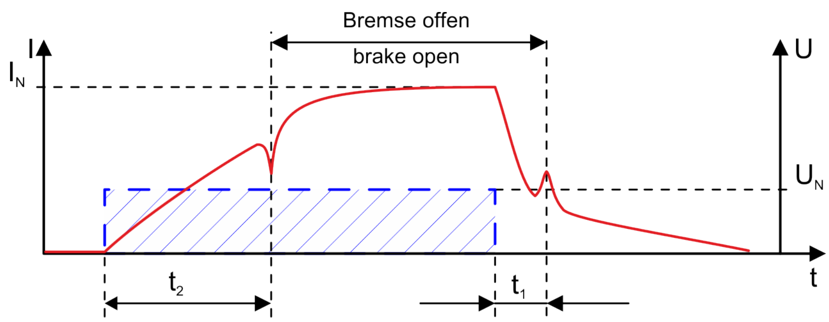



Fig. 8: Switching times of static hold mode
$t_1$ Connection time (close)
$t_2$ Disconnection time (open)

## 4.11.2 Sizing holding brakes

### Static sizing

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

$$M_4 \geq S \cdot M_6$$

Fig. 9: Static load torque
$M_4$ Brake torque [Nm]
$M_6$ Load torque [Nm]
S Safety factor

### 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.

$$M_1 \geq S \cdot M_6$$

Fig. 10: Dynamic load torque
$M_1$ Dynamic torque [Nm]
$M_6$ Load torque [Nm]
S Safety factor

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 ($J_{tot}$) has to be taken into consideration.

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

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

Fig. 11: Shutdown time
$t_{Br}$ 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 [$kgm^2$]

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).

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

Fig. 12: Maximum switched energy

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

$$P_{\max} > W \cdot z$$

Fig. 13: Maximum switching power

$P_{max}$ Maximum switched energy [J]
W Switching energy [J]
z Switching operations

## 4.11.3 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. 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 $U_N \geq 17\ V_{DC}$
- 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

<u>Remark</u>

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.

## 4.11.4 Holding brakes safety instructions

The permanent magnet brake of a MS2N motor is no safety brake. This means, a torque reduction by non- influenceable disturbance factors can occur. Especially for use in vertical axes.

| ⚠ WARNING | Grievous bodily harm due to dangerous movements from falling or dropping axes! |
|---|---|
| | Secure vertical axes against dropping or sinking after switching off by e.g.:<br>– Mechanical locking of the vertical axis<br>– External brake, arrestor, clamping device.<br>– Weight compensation of the axes |

The holding brake itself is not suitable for personal protection. Ensure protection of individuals by superordinate protective measures such as cordoning off of danger zones using protective fences or grids.

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

- EN 954; ISO 13849-1 and ISO 13849-2 Safety-related parts of control units
- 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 safety requirements valid for the case of application and observe the safety requirements during plant design. Comply with national regulations at the installation site of the system.

### 4.11.5 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 (torque wrench) or automatically by means of the software function.

**Manually check holding torque (M4)**

1. Disconnect the motor from the power supply and secure it against being switched on again.
2. Measure the transferable holding torque (M4) of the holding brake with a torque wrench.

**Check holding torque (M4) using the software function**

For Bosch Rexroth drive controller

- Start the P-0-0541, C2100 Command Holding system check in drive controller. 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. If you have any questions about grind in parameters, contact Bosch Rexroth service.

## 4.12 Flange accuracy

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 4.9 Output shaft, balancing and extension elements on page 46.

### 4.12.1 Concentricity tolerance of the shaft end

Table 33: Concentricity tolerance regarding the shaft diameter for MS2N motors

| Diameter shaft end, d [mm] | Concentricity tolerance [mm] | |
|---|---|---|
| | N | R |
| 8 / 9 | 0.03 | 0.015 |
| 11 / 14 | 0.035 | 0.018 |
| 19 / 24 | 0.04 | 0.021 |
| 32 / 38 / 48 | 0.05 | 0.025 |

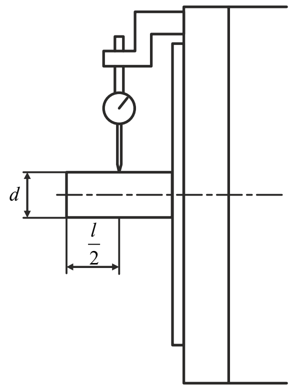



Fig. 14: Measuring system of concentricity tolerance

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

### 4.12.2 Concentricity and alignment

Table 34: Coaxiality and alignment tolerance related to the centering diameter in MS2N motors

| Centering diameter [mm] | Concentricity and alignment tolerance [mm] | |
|---|---|---|
| | N | R |
| 30 / 40 / 50 / 95 | 0.08 | 0.04 |
| 130 / 180 | 0.1 | 0.05 |
| 250 | 0.125 | 0.063 |

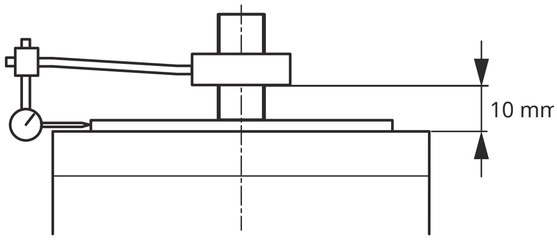



Fig. 15: Measuring system of coaxiality

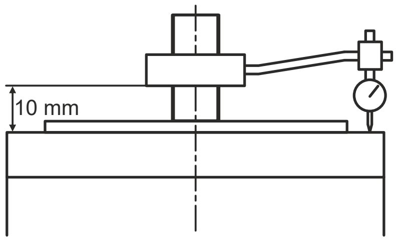



Fig. 16: Measuring system of alignment

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

## 4.13 Vibration behavior

The oscillation behavior corresponds to oscillating quantity level A according to EN IEC 60034-14:2018 up to the rated speed.

## 4.14 Bearing

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

Table 35: Bearing size MS2N

| Type | Bearing size DE | Bearing size NDE | Floating bearing | Fixed bearing |
|---|---|---|---|---|
| MS2N02 | 608 | 607 | DE | NDE |
| 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 | 6309 | 6306 | DE | NDE |
| MS2N13 | 6212 | 6211 | DE | NDE |

### 4.14.1 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, and so on).
- 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 36 Mean speed - basis of calculated grease service life on page 55:

Table 36: Mean speed - basis of calculated grease service life

| Type MS2N□□ | Mean speed |
|---|---|
| □□ = 02 / 03 / 04 / 05 / 06 | ≤ 3,500 1/min |
| □□ = 07 | ≤ 3,000 1/min |

| Type MS2N□□ | Mean speed |
|---|---|
| □□ = 10 | ≤ 2,000 1/min |
| □□ = 13 | ≤ 1,800 1/min |

The following standard values apply under the specified preconditions for the 60K and 100K 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.

Remark

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

## 4.14.2 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.

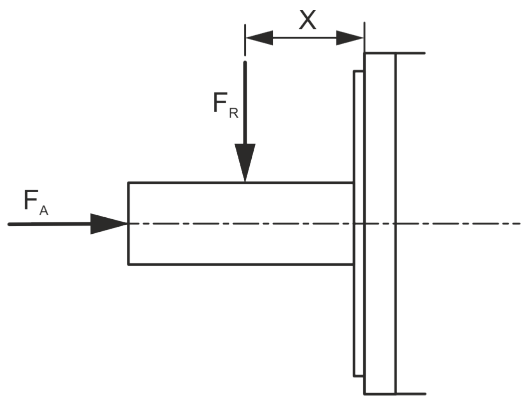



Fig. 17: Point of action of radial force $F_R$ and axial force $F_A$

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:

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

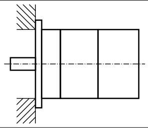
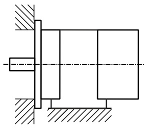
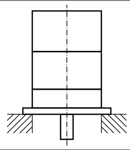
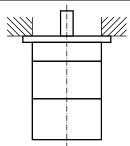
**For radial force diagrams, refer to the technical data**

MS2N02 ➦ Chapter 6.1.4 MS2N02 radial force on page 73
MS2N03 ➦ Chapter 6.2.5 MS2N03 radial force on page 84
MS2N04 ➦ Chapter 6.3.4 MS2N04 radial force on page 100
MS2N05 ➦ Chapter 6.4.4 MS2N05 radial force on page 116
MS2N06 ➦ Chapter 6.5.4 MS2N06 radial force on page 135
MS2N07 ➦ Chapter 6.6.8 MS2N07 radial force on page 237
MS2N10 ➦ Chapter 6.7.10 MS2N10 radial force on page 344

MS2N13 ➦ Chapter 6.8.8 MS2N13 radial force on page 399

## 4.15 Type of construction, installation type

The motors can be installed horizontally and vertically with the shaft end pointing to the top or bottom. The mounting variants comply with the IM code according to EN 60034-7:1993 + A1:2001 for type of construction and installation type.

| Code I / Code II (EN 60034-7) | | |
|---|---|---|
| IM B5 / IM 3001 |  | Flange attachment on the drive side of the flange |
| IM B35 / IM 2001 (only MS2N13) |  | Foot installation, feet below, with additional flange mounting on 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 4.8 Degree of protection on page 46.

## 4.16 Coating

One-layer standard varnish (1K), water-based, in conductive form, RAL9005 jet black

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

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

## 4.17 Air-pressure connection

A defined over pressure can be conducted into the motor with an air-pressure connector kit. Therewith, penetration of damaging liquids can be prevented. The areas of application for sealing air are all installation locations in which humid air or coolant can come into direct contact with the motors, especially in wet processing rooms.

| **NOTICE** | **Damage due to permanent existing liquid on the shaft sealing ring!** |
|---|---|
| | The use of sealing air does **not** prevent the penetration of continuously existing liquid on the shaft sealing ring (e.g. for open gearboxes). Due to capillary action, gearbox oil can penetrate into the motor and damage it, despite using sealing air. |

The pressure air must be free from oil and dry, according to DIN ISO 8573-1 Class 3 (usually in pressure air nets).

Table 37: Specification pressure air for sealing air application

| Designation | Value |
|---|---|
| Operating pressure | 0.1 ± 0.05 bar |
| Max. relative humidity | 20...30 % |
| Air | dry, free from dust and oil (DIN ISO 8573-1 Class 3) |
| Necessary compressed air hose | 4 × 0.75 (not included in the scope of delivery) |

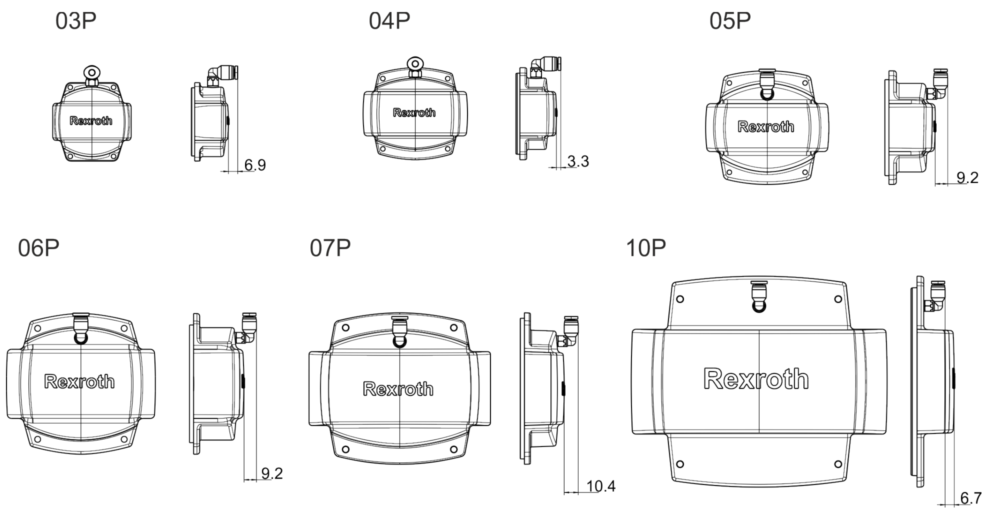



Fig. 18: Sealing air connection variants

Table 38: Total length of motor with sealing air connection

| Motor | Connection, rotatable | Total length [mm] 1) | S [mm] |
|---|---|---|---|
| MS2N03 | 03P | L + 15 + S | 6.9 |
| MS2N04 | 04P | L + 15 + S | 3.3 |
| MS2N05 | 05P | L + 18 + S | 9.2 |
| MS2N06 | 06P | L + 18 + S | 9.2 |
| MS2N07 | 07P | L + 16 + S | 10.4 |
| MS2N10 | 10P | L + 16 | - |

1) For “L” see dimensional drawings under ➦ Technical data

| NOTICE | **Damage due to ingress of dirt!** The compressed air gland is not closed upon delivery. Always operate motors with compressed air connection with connected compressed air supply. |
|---|---|

Further information ➦ Chapter 9 Sealing air connection on page 428.

## 4.18 Additional ground connection

For MS2N motors, an additional grounding connection is provided. The availability is specified in the product type code under the entry Other design **“E”**.

Preassembled motor connection cable (with PE conductor) can be used for the grounding concept at the machine as the requirements of the machine grounding according to DIN EN 60204-1 have to be met. The machine manufacturer is responsible for system safety and for compliance with the installation instructions. The superordinate protection devices such as the switch off characteristics of safety devices and loop impedences have to be taken into consideration. Due to an insufficient machine grounding, the option additional grounding connection can be used to directly attach a ground connection at the motor.

## 4.19 Noise emission

The typical sound pressure level Lp(A) is specified for the speed range 0 rpm up to the rated speed. The installation situation affects the noise emission.

Noise reduction by switching the PWM frequency

MS2N synchronous servo motors are equipped with windings in toothed coil technology for a compact motor design; typical of toothed coil technology are undershoots and harmonics in the magnetic air gap field. The high number of harmonics and undershaft in connection with the 4 kHz frequency of the converters can lead to magnetic noise stimulation in certain speed ranges, especially if a mechanic motor-self frequency is stimulated velocity-dependent. If this noise is found to be disturbing, a switchover of the PWM clock frequency from 4 kHz to 8 kHz optimized for the motor type can be used. Therewith, the stimulation of motor-self frequencies caused by the 4 kHz frequency can be avoided.

If necessary, use the setting options on the control unit.

**IndraDrive:** Parameter P-0-0062 "Switching speed for speed-dependent PWM switching" is available from firmware versions MPx-20V17. The default value of the parameter is 0.

**ctrlX:** CAN-Parameter inverter power section: Velocity-dependent PWM switching 0x2120:04 P-0-0062

The PWM switch (4 kHz / 8 kHz) can be selected and observed during **drive sizing with IndraSize**.

# 5 Operating areas and characteristic curves

## 5.1 Operating area

The permissible operating ranges for MS2N motors are defined for ambient temperatures of 0 ... 40 °C and installation altitudes up to 1,000 m above MSL. The operating areas are characterized by characteristic curve fields:

- Limit curves (intermitted operation, voltage limit without/with field weakening)
- S1-100 K continuous operation curve (overtemperature 100 K at the winding)
- S1-60 K continuous operation curves (overtemperature 60 K at the housing)

The individual characteristic curves are described in the following figure.

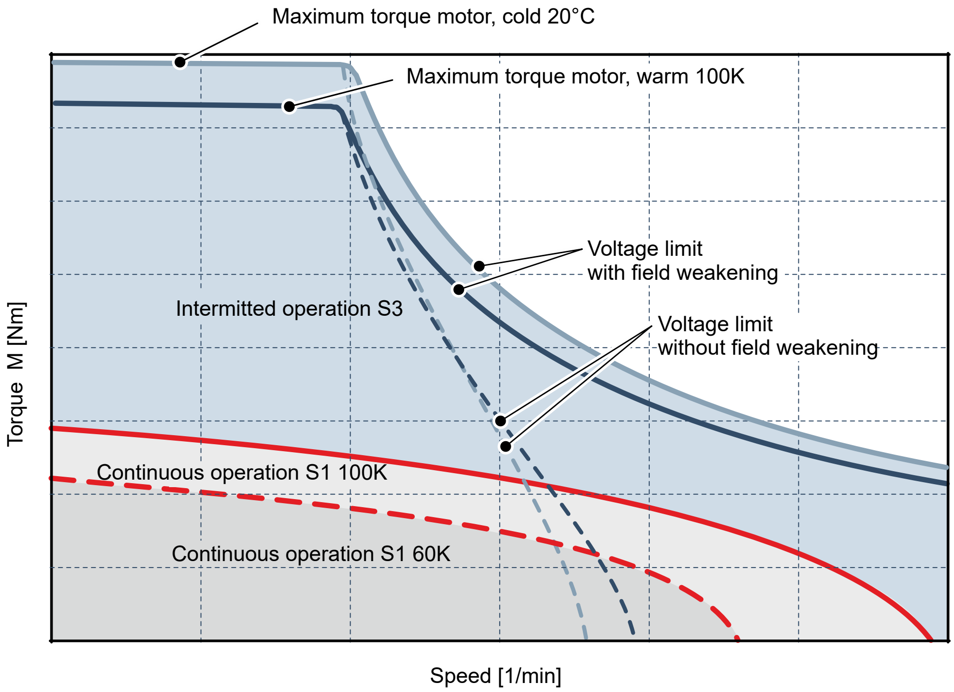



Fig. 19: Operating area of MS2N motors

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:

Table 39: Installation conditions for utilization according to the specified characteristic curves

| Type MS2N□□ | 100 K data (not thermally insulated) | 60 K data (thermally insulated) 1) |
|---|---|---|
| | Steel plate L x W x H [mm] | Aluminum plate L x W x H [mm] |
| □□ = 02 / 03 / 04 | 100 x 220 x 40 | 140 × 210 × 10 |
| □□ = 05 / 06 | 350 x 350 x 30 | 300 × 240 × 15 |
| □□ = 07 / 10 | 450 x 370 x 30 | 300 × 270 × 15 |
| □□ = 13 | 450 x 370 x 30 | – |

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

**Remark**

In case of ambient temperatures above 40 °C and installation altitudes of 1,000 m above MSL, the high performance data have to be reduced .

### 5.1.1 Continuous operation S1

The S1-100 K 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**<br>Motors in continuous operation application must not be operated above the specified characteristic curve limits S1-60 K or S1-100 K. |
|---|---|

### 5.1.2 Periodic intermitted operation S3

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

### 5.1.3 Operation in field weakening

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

## 5.1.4 Motor torque during operation at standstill

In applications such as joining or press machines, where motors have to produce torque continuously asymmetrical currents when the motor is in standstill (close angular range) 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 that can be output at standstill $M_0$* can be calculated by multiplying the data sheet values with the subsequent reduction factors $F_0$.

$M_0^* = F_0 \cdot M_0$

### Reduction factor F0

Table 40: Reduction factor $F_0$

<table>
<tr><th rowspan="2">Type<br>MS2N□□</th><th rowspan="2">Cooling type</th><th colspan="7">Frame length</th></tr>
<tr><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>F</th><th>R</th></tr>
<tr><td rowspan="2">□□ = 02</td><td>Self-cooling 60K</td><td>0.95</td><td>–</td><td>0.95</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>Self-cooling 100K</td><td>0.85</td><td>–</td><td>0.85</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td rowspan="2">□□ = 03</td><td>Self-cooling 60K</td><td>0.87</td><td colspan="3">0.95</td><td rowspan="2">–</td><td rowspan="2">–</td><td rowspan="2">–</td></tr>
<tr><td>Self-cooling 100K</td><td>0.84</td><td colspan="3">0.85</td></tr>
<tr><td rowspan="2">□□ = 04 / 05</td><td>Self-cooling 60K</td><td rowspan="16">–</td><td colspan="3">0.95</td><td rowspan="2">–</td><td rowspan="8">–</td><td rowspan="8">–</td></tr>
<tr><td>Self-cooling 100K</td><td colspan="3">0.85</td></tr>
<tr><td rowspan="2">□□ = 06</td><td>Self-cooling 60K</td><td>0.88</td><td colspan="3">0.95</td></tr>
<tr><td>Self-cooling 100K</td><td>0.85</td><td colspan="3">0.85</td></tr>
<tr><td rowspan="4">□□ = 07</td><td>Self-cooling 60K</td><td>0.88</td><td colspan="3">0.95</td></tr>
<tr><td>Self-cooling 100K</td><td>0.85</td><td colspan="3">0.85</td></tr>
<tr><td>Forced ventilation</td><td rowspan="2">-</td><td colspan="3">0.80</td></tr>
<tr><td>Water cooling</td><td colspan="3">0.72</td></tr>
<tr><td rowspan="4">□□ = 10</td><td>Self-cooling 60K</td><td>0.82</td><td>0.88</td><td colspan="3">0.95</td><td>0.92</td></tr>
<tr><td>Self-cooling 100K</td><td>0.80</td><td>0.82</td><td colspan="3">0.85</td><td>0.85</td></tr>
<tr><td>Forced ventilation</td><td rowspan="2">-</td><td colspan="5">0.80</td></tr>
<tr><td>Water cooling</td><td colspan="5">0.72</td></tr>
<tr><td rowspan="4">□□ = 13</td><td>Self-cooling 60K</td><td>0.88</td><td>0.90</td><td colspan="2">0.92</td><td>–</td><td>–</td></tr>
<tr><td>Self-cooling 100K</td><td>0.82</td><td>0.83</td><td colspan="2">0.85</td><td>–</td><td>–</td></tr>
<tr><td>Forced ventilation</td><td colspan="2">0.78</td><td colspan="2">0.80</td><td rowspan="2">–</td><td rowspan="2">–</td></tr>
<tr><td>Water cooling</td><td colspan="4">0.72</td></tr>
</table>

## 5.2 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 result.

**Remark**

S1 continuous operation curves depend on the DC bus voltage. The rated data specified on the type plate are defined for operating with $U_{ZK2}$ (cf. Fig. 20 and Fig. 21).

The characteristic curve apply to:

Table 41: DC bus voltages

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

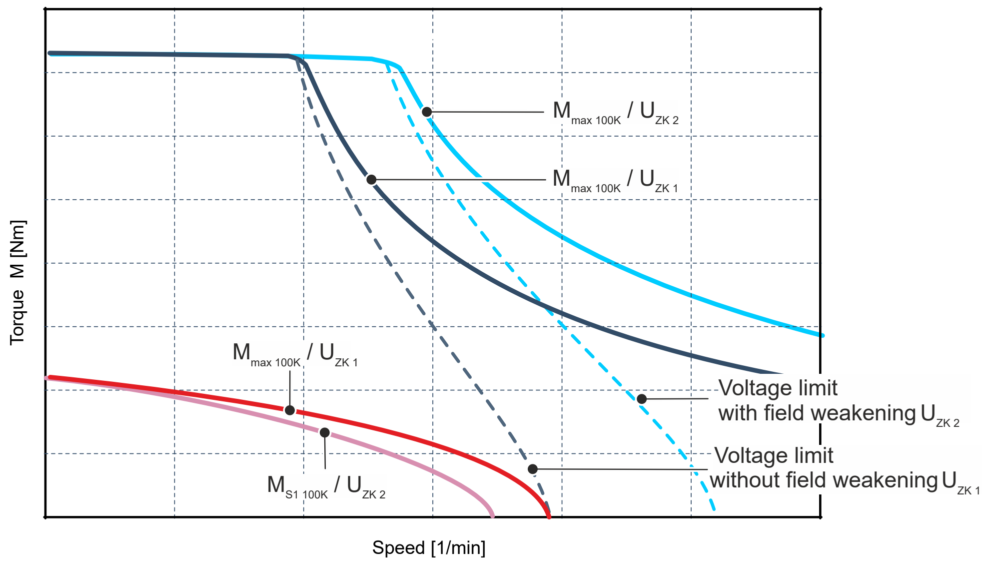



Fig. 20: Characteristic curve specifications

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

Depending on the motor variants, the S1 continuous operating characteristics can also extend into the field weakening range (see ➦ Chapter 5.3) even here, the DC bus voltage influences the characteristic curve due to additional inverter losses and the UZK-dependent magnetization current (field weakening). The corresponding S1 characteristic curves are shown in the torque-speed characteristic curves (e.g. technical data section) and taken into account in the drive design (e.g. IndraSize).

The torque-speed curves in the technical data section are marked for the valid DC bus voltage.

- $U_{ZK\,1}$ (uncontrolled supply 3 × AC 400 V)
- $U_{ZK\,2}$ (controlled supply 3 × AC 400 ... 480 V)

## 5.3 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 S1 continuous operation characteristics at $M_{S1\ 100K}$ / $U_{ZK\ 2}$

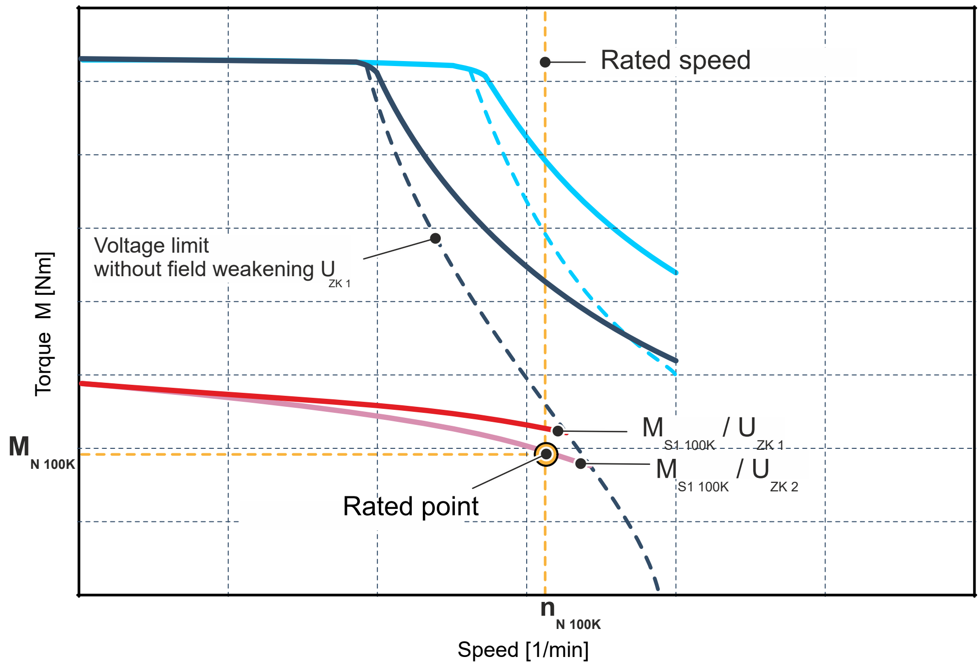



Fig. 21: Rated point

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.

## 5.4 Tolerances

The values specified in the technical data are subject to a natural dispersion. Observe the tolerance specifications for the following parameters.

Table 42: Tolerance specifications of the motor data

| Designation | Symbol | Tolerance value |
|---|---|---|
| Standstill torque - 60 K | $M_{0\ 60K}$ | ± 5 % |
| Standstill torque - 100 K | $M_{0\ 100K}$ | ± 5 % |
| Rotor inertia | $J_{rot}$ | ± 10 % |
| Rated torque - 100 K | $M_{N\ 100K}$ | ± 5 % |
| Rated power - 100 K | $P_{N\ 100K}$ | ± 5 % |
| Maximum torque 20 °C (cold) | $M_{max\ 20°C}$ | ± 5 % |
| Maximum torque - 100 K (warm) | $M_{max\ 100K}$ | ± 5 % |
| Torque constant at 20 °C | $K_m$ | ± 5 % |
| Voltage constant at 20 °C | $K_E$ | ± 5 % |

## 5.5 Temperature influence and tolerance

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

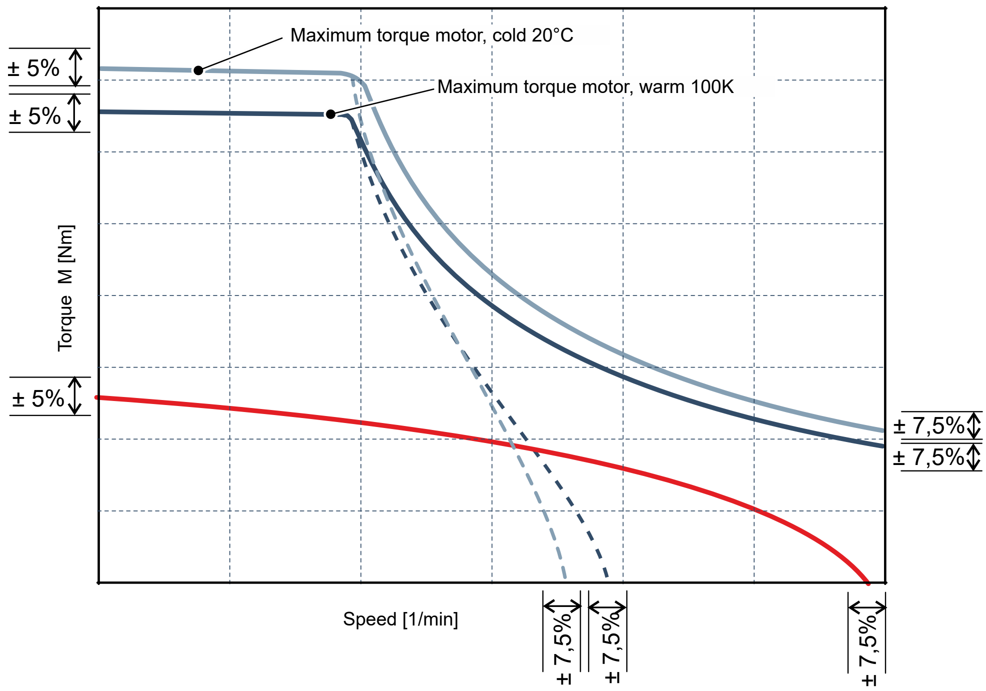



Fig. 22: Temperature influence and tolerances

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

## 5.6 Characteristic curve in gearbox mounting

Due to the speed-dependent self-heating of the gearbox, the cooling effect in the flange mounting area is limited. A speed-dependent reduction of the specified performance data is necessary to not overload motors when using gearboxes.

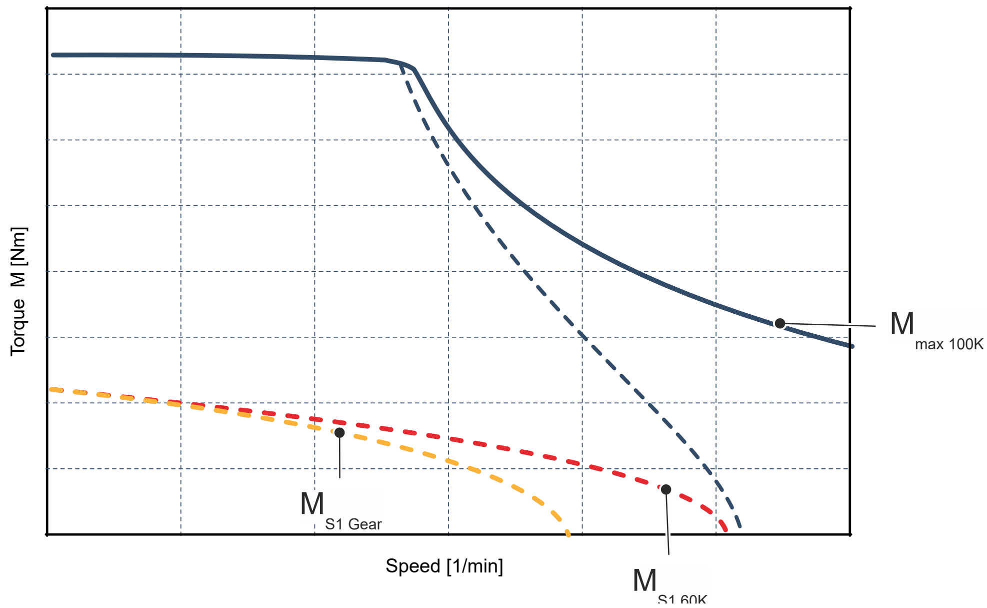



Fig. 23: S1 characteristic curve in gearbox

<u>Remark</u>

The standard value of reduction of the **S1 60 K 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.

## 5.7 IndraSize

By using the IndraSize software, drive controllers, motors and mechanic gearboxes can be easily sized. The engineering tool covers the entire range of Rexroth drives and motors. Calculate the characteristic curves for your application with IndraSize: ➦www.boschrexroth.com/indraSize

# 6 Technical data

## 6.1 MS2N02 technical data

### 6.1.1 Self-cooling

MS2N02-A0BYN

| Description | Symbol | Unit | MS2N02-A0BYN-□□□□0-□N | MS2N02-A0BYN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1)] | $M_{0\ 60K}$ | Nm | 0.18 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 0.42 | |
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 0.23 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 0.52 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | kg*m² | 0.0000016 | 0.0000019 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 8,000 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 0.19 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 0.45 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 0.16 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 0.78 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 0.73 | |
| Maximum current | $I_{max}$ | A | 1.8 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 9,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 9,000 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 0.50 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 min-1 | 30.0 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 95.0 | |
| Winding inductance | $L_{12\_min}$ | mH | 67.5 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 0.35 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 20 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 3.5 | |
| Mass | $m_{mot}$ | kg | 0.6 | 0.8 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0.00 | 0.45 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0.00 | 0.28 |
| Maximum connection time | $t_1$ | ms | 0 | 15 |
| Maximum disconnection time | $t_2$ | ms | 0 | 35 |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

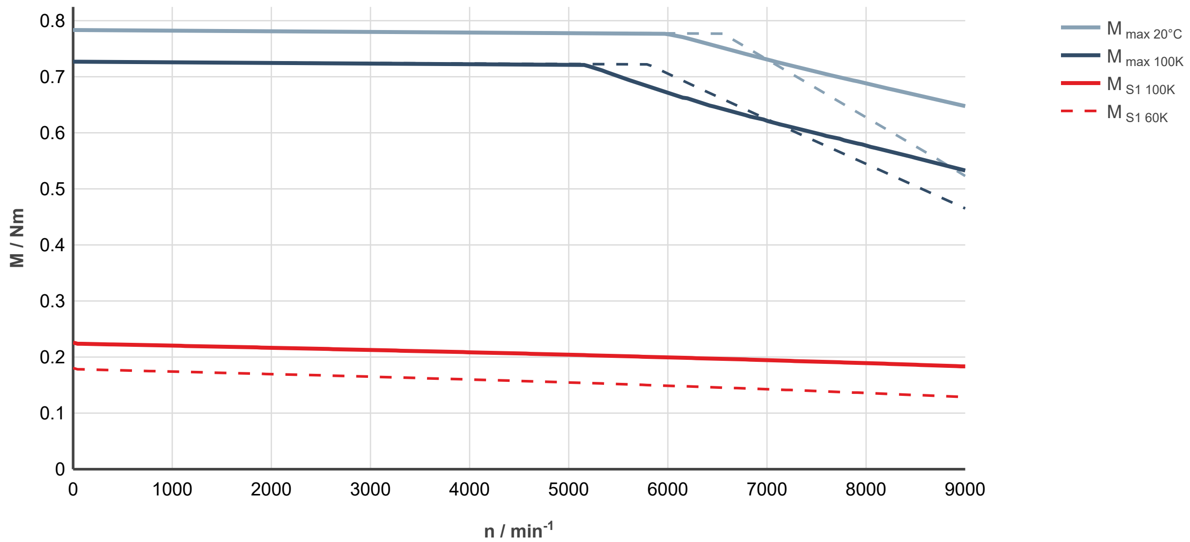



Fig. 24: MS2N02-A0BYN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

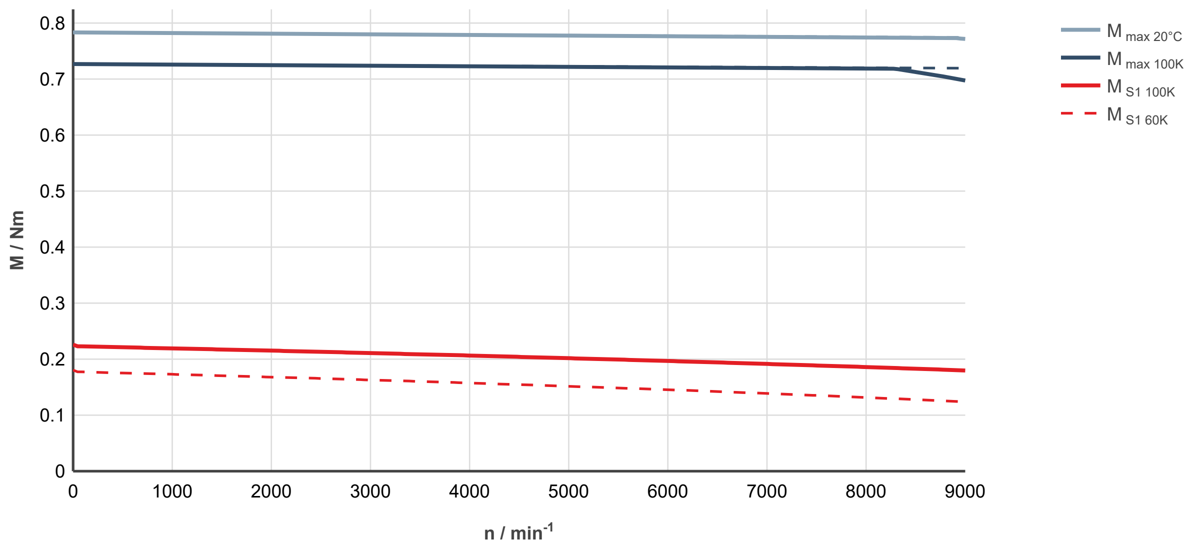



Fig. 25: MS2N02-A0BYN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 x AC 400... 480 V

## MS2N02-C0BYN

| Description | Symbol | Unit | MS2N02-C0BYN-□□□□0-□N | MS2N02-C0BYN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 0.42 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 0.68 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 0.54 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 0.88 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0000040 | 0.0000043 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 8,000 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 0.33 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 0.6 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 0.27 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 2.39 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 2.20 | |
| Maximum current | $I_{max}$ | A | 3.8 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 9,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 9,000 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C | $K_m$ | Nm/A | 0.64 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 min-1 | 41.92 | |
| Winding resistance at 20 °C [1] | $R_{12}$ | Ohm | 43.1 | |
| Winding inductance | $L_{12\_min}$ | mH | 45.5 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.0 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 12 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 4 | |
| Mass | $m_{mot}$ | kg | 0.9 | 1.1 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0.00 | 0.45 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0.00 | 0.28 |
| Maximum connection time | $t_1$ | ms | 0 | 15 |
| Maximum disconnection time | $t_2$ | ms | 0 | 35 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

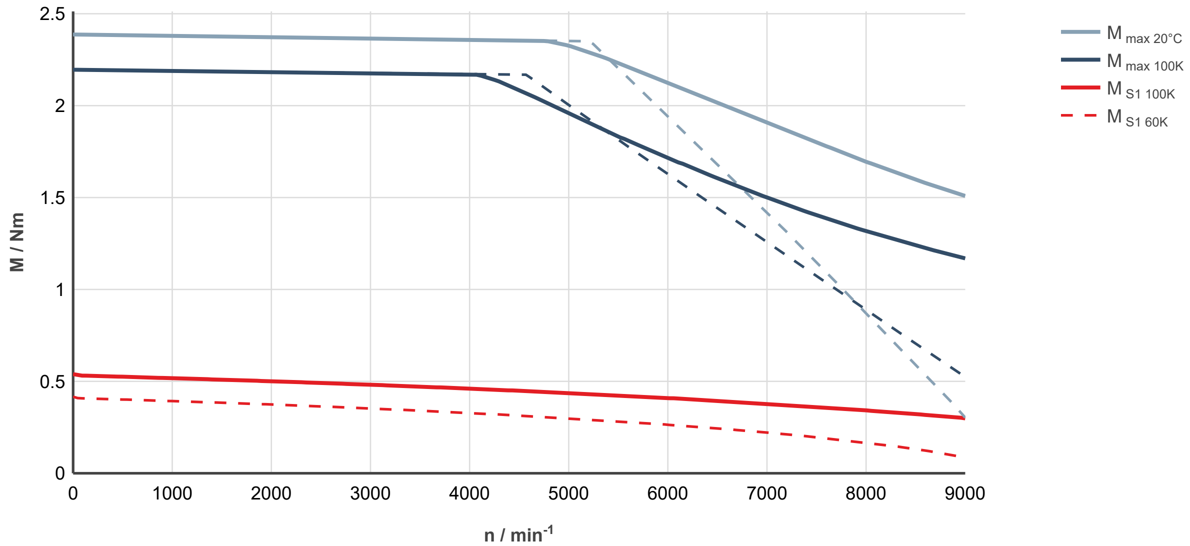



Fig. 26: MS2N02-C0BYN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

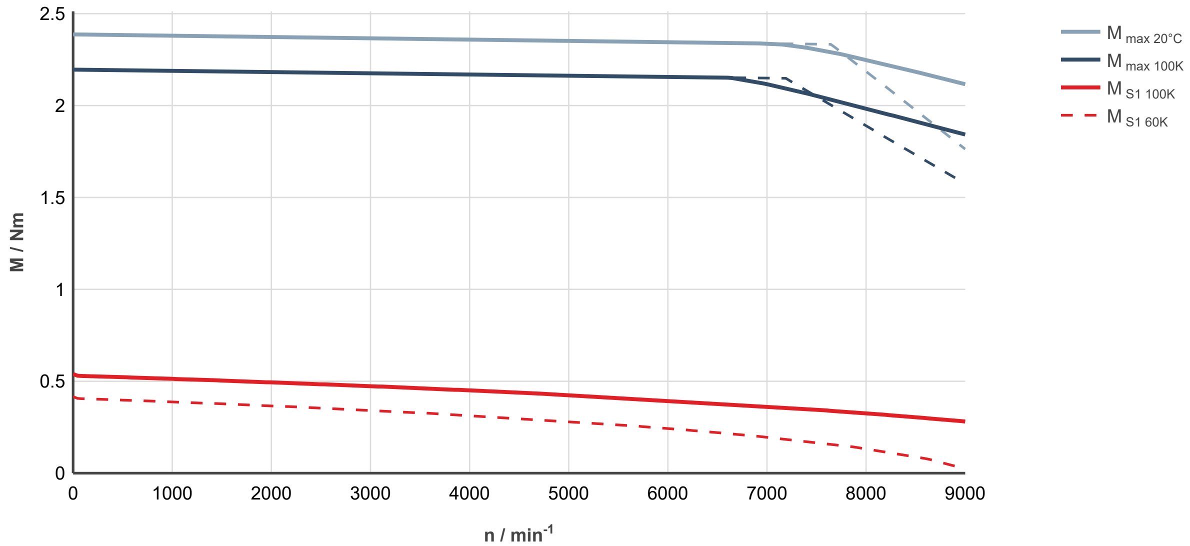



Fig. 27: MS2N02-C0BYN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 x AC 400... 480 V

## 6.1.2 MS2N02 self-cooling – dimensional drawing

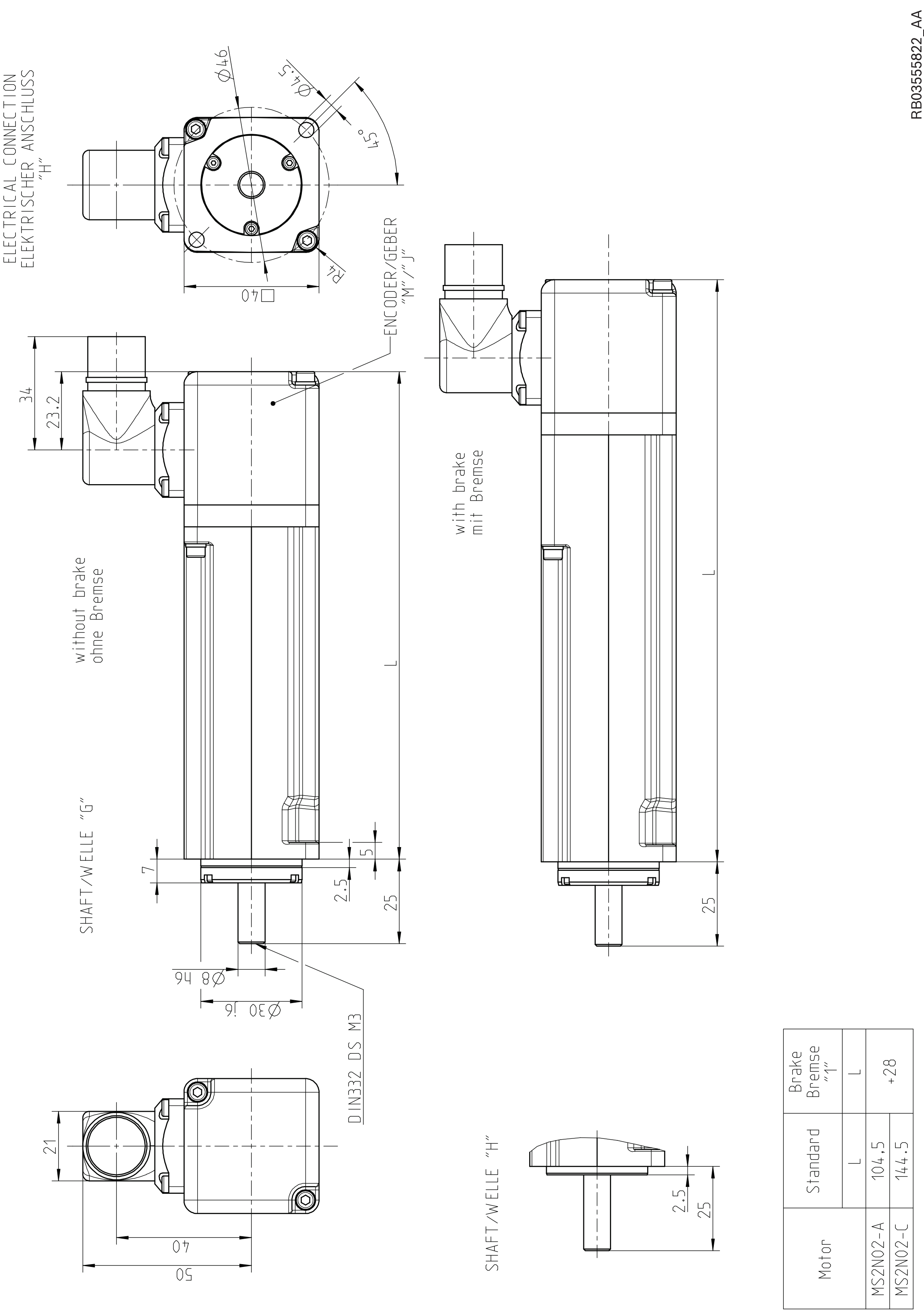
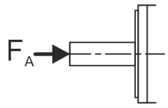



Fig. 28: MS2N02-□□□□N

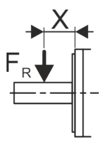
## 6.1.3 MS2N02 axial force




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)
- Mean speed

## 6.1.4 MS2N02 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.

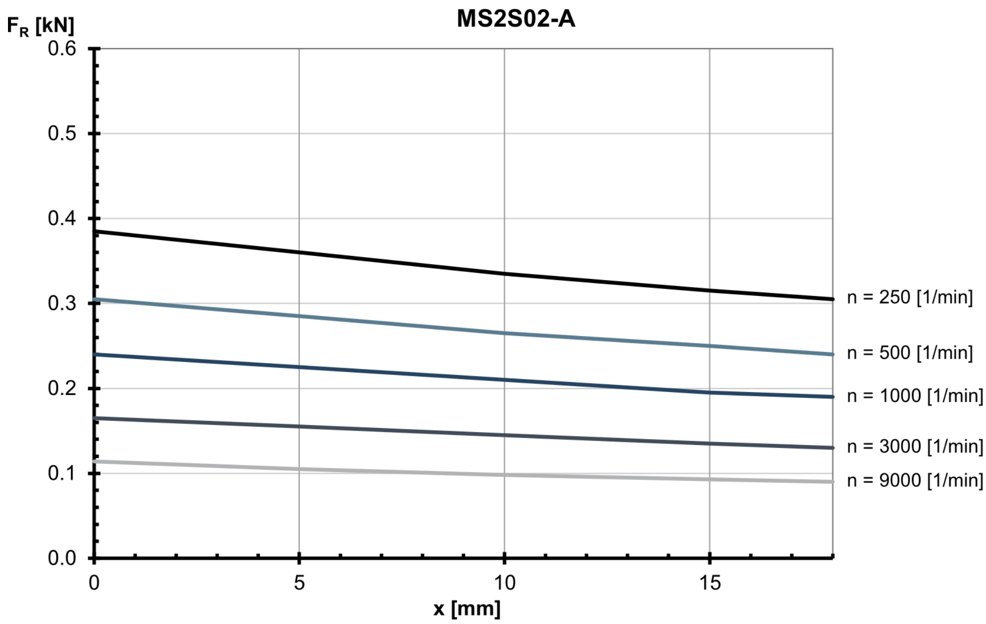



Fig. 29: MS2N02-A: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h



Technical data

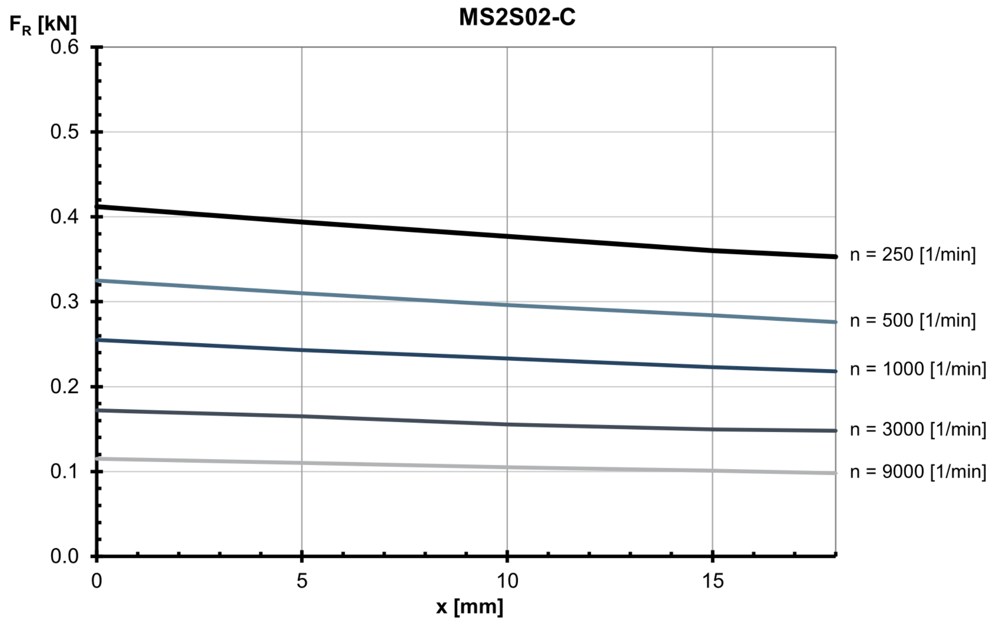



Fig. 30: MS2N02-C: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

# 6.2 MS2N03 technical data

## 6.2.1 Self-cooling

### MS2N03-A0BYN

| Designation | Symbol | Unit | MS2N03-A0BYN-□□□□0-□N | MS2N03-A0BYN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 0.45 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 1.59 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 0.53 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 1.85 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.00002 | 0.000027 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 9,000 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 0.26 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 1.06 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 0.25 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 1.85 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 1.71 | |
| Maximum current | $I_{max(eff)}$ | A | 7.25 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 9,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 9,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 0.31 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 19.0 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 8.96 | |
| Winding inductance | $L_{12\_min}$ | mH | 12.37 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 0.39 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 11.5 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 11.0 | |
| Mass | $m_{mot}$ | kg | 1.10 | 1.35 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 1.80 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.46 |
| Maximum connection time | $t_1$ | ms | 0 | 8 |
| Maximum disconnection time | $t_2$ | ms | 0 | 35 |
| 1) For tolerance details refer to ➡ Chapter 5.4 Tolerances | | | | |

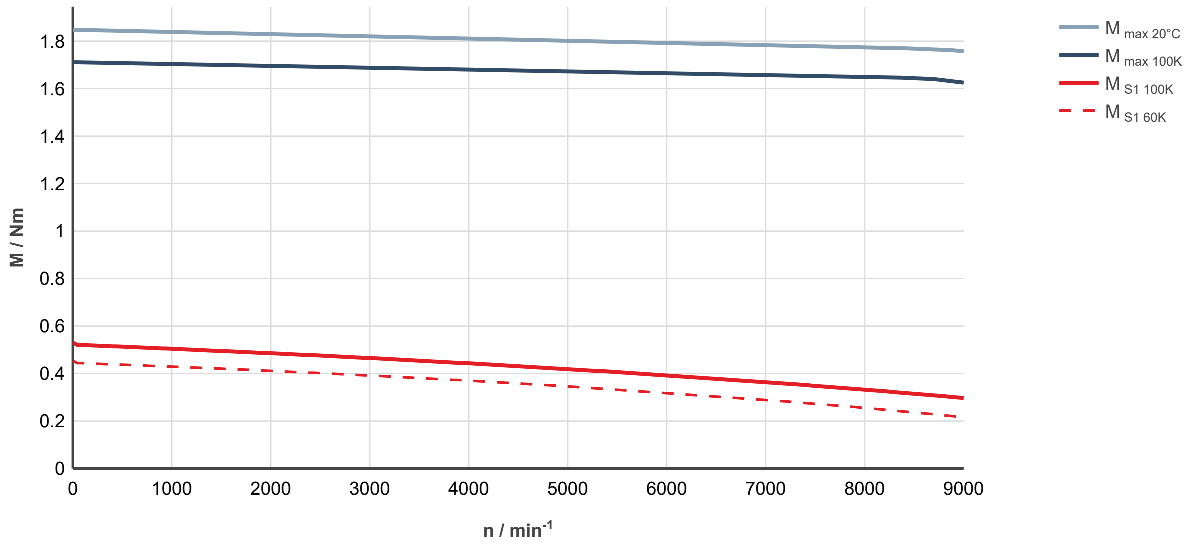



Fig. 31: MS2N03-A0BYN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

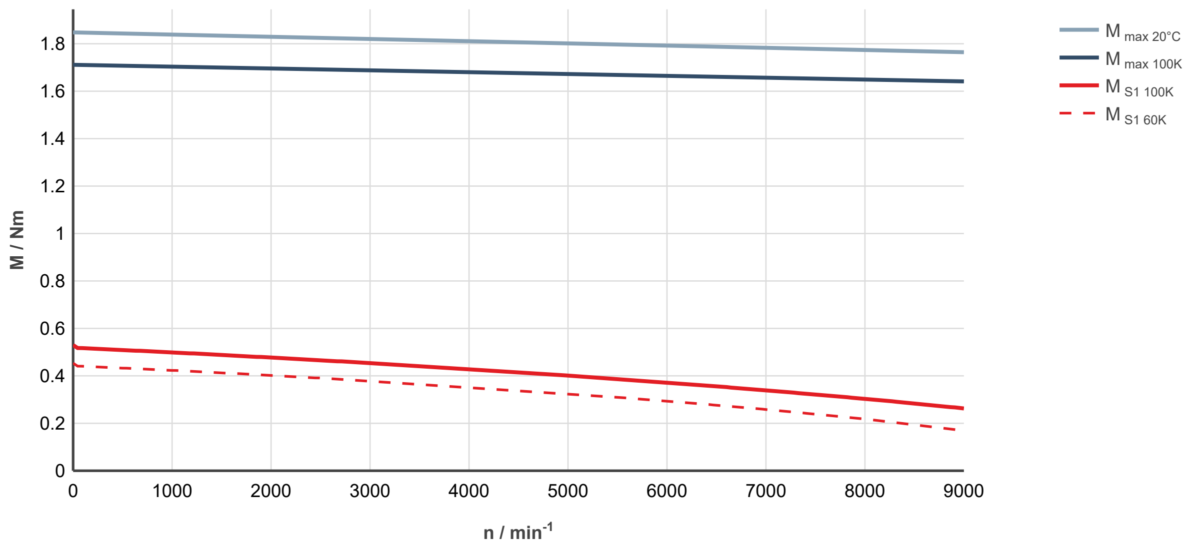



Fig. 32: MS2N03-A0BYN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V

## MS2N03-B0BYN

| Designation | Symbol | Unit | MS2N03-B0BYN-□□□□0-□N | MS2N03-B0BYN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1)] | $M_{0\ 60K}$ | Nm | 0.73 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 1.31 | |
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 0.9 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 1.61 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | kg*m² | 0.000023 | 0.000030 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 6,470 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 0.54 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 1.08 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 0.37 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 3.75 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 3.46 | |
| Maximum current | $I_{max(rms)}$ | A | 7.25 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 9,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 9,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 0.61 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 36.9 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 14.3 | |
| Winding inductance | $L_{12\_min}$ | mH | 20.22 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 1.4 | 1.8 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 1.80 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.46 |
| Maximum connection time | $t_1$ | ms | 0 | 8 |
| Maximum disconnection time | $t_2$ | ms | 0 | 35 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

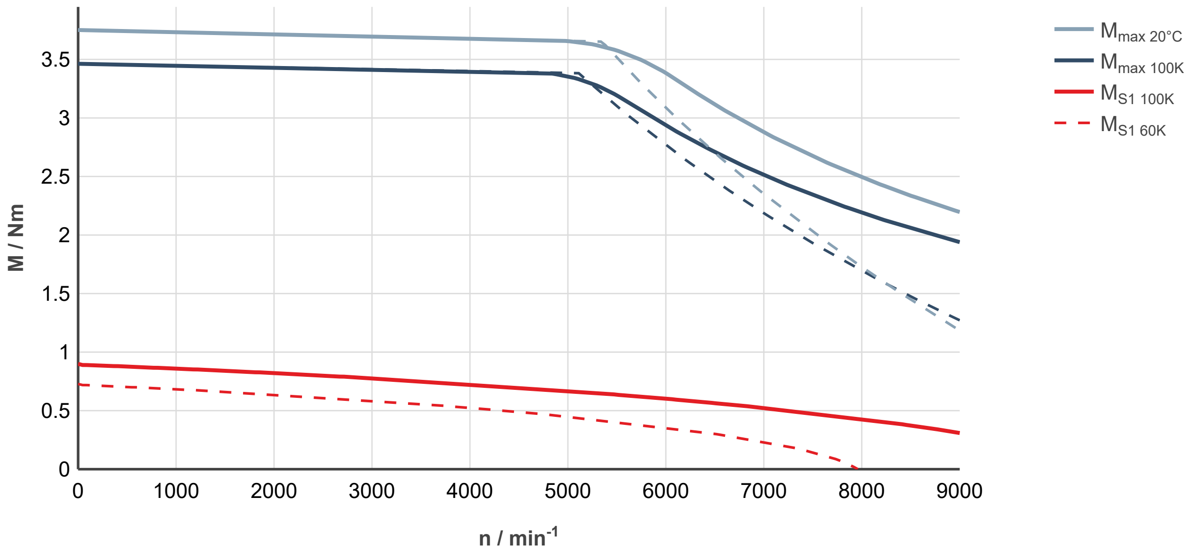



Fig. 33: MS2N03-B0BYN-▯▯▯▯▯0, ctrlX DRIVE,uncontrolled supply 3 × AC 400 V

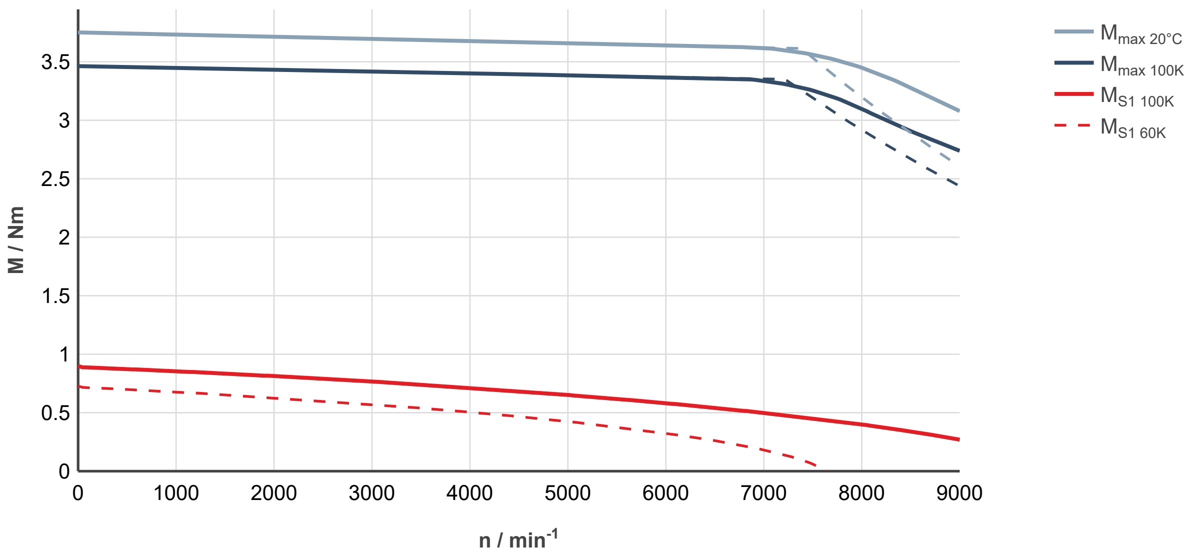



Fig. 34: MS2N03-B0BYN-▯▯▯▯▯0, ctrlX DRIVE,controlled supply 3 × AC 400 ... 480 V

## MS2N03-D0BYN

| Designation | Symbol | Unit | MS2N03-D0BYN-□□□□0-□N | MS2N03-D0BYN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1)] | $M_{0\ 60K}$ | Nm | 1.15 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 2.07 | |
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 1.45 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 2.6 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | $kg*m^2$ | 0.000037 | 0.000044 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 5,700 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 0.68 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 1.39 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 0.4 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 7.4 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 6.8 | |
| Maximum current | $I_{max(rms)}$ | A | 14.5 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 9,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 9,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 0.6 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 36.2 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 6.29 | |
| Winding inductance | $L_{12\_min}$ | mH | 9.56 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 2.0 | 2.4 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 1.80 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.46 |
| Maximum connection time | $t_1$ | ms | 0 | 8 |
| Maximum disconnection time | $t_2$ | ms | 0 | 35 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

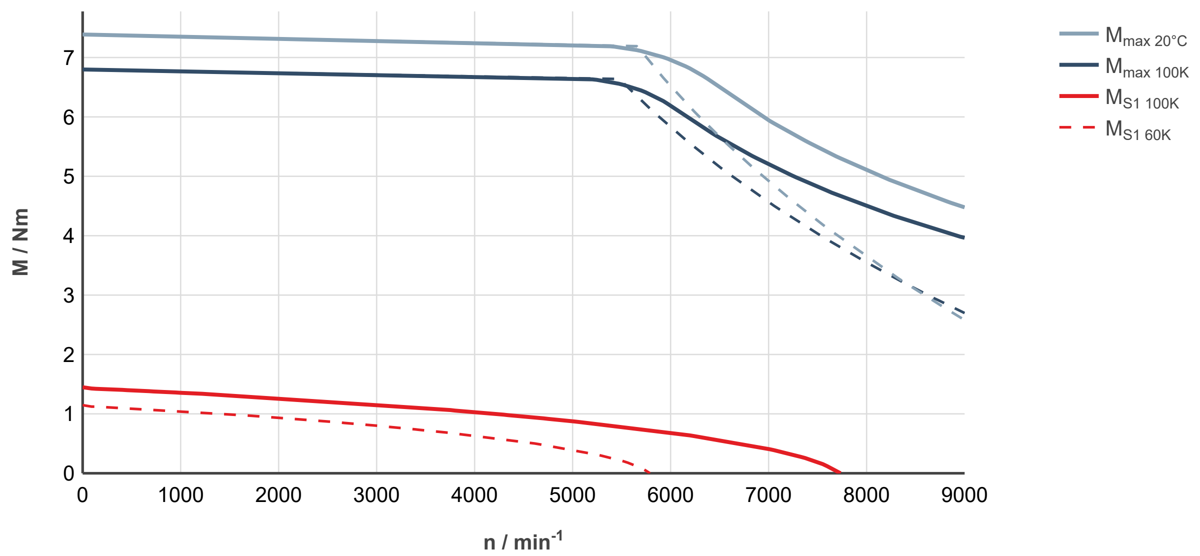



Fig. 35: MS2N03-D0BYN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

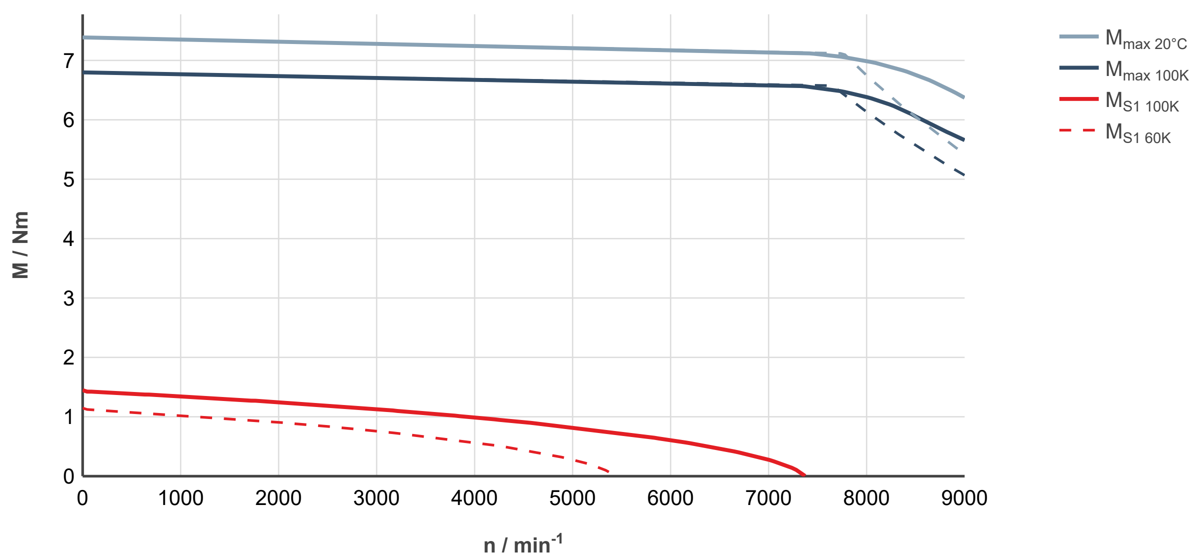
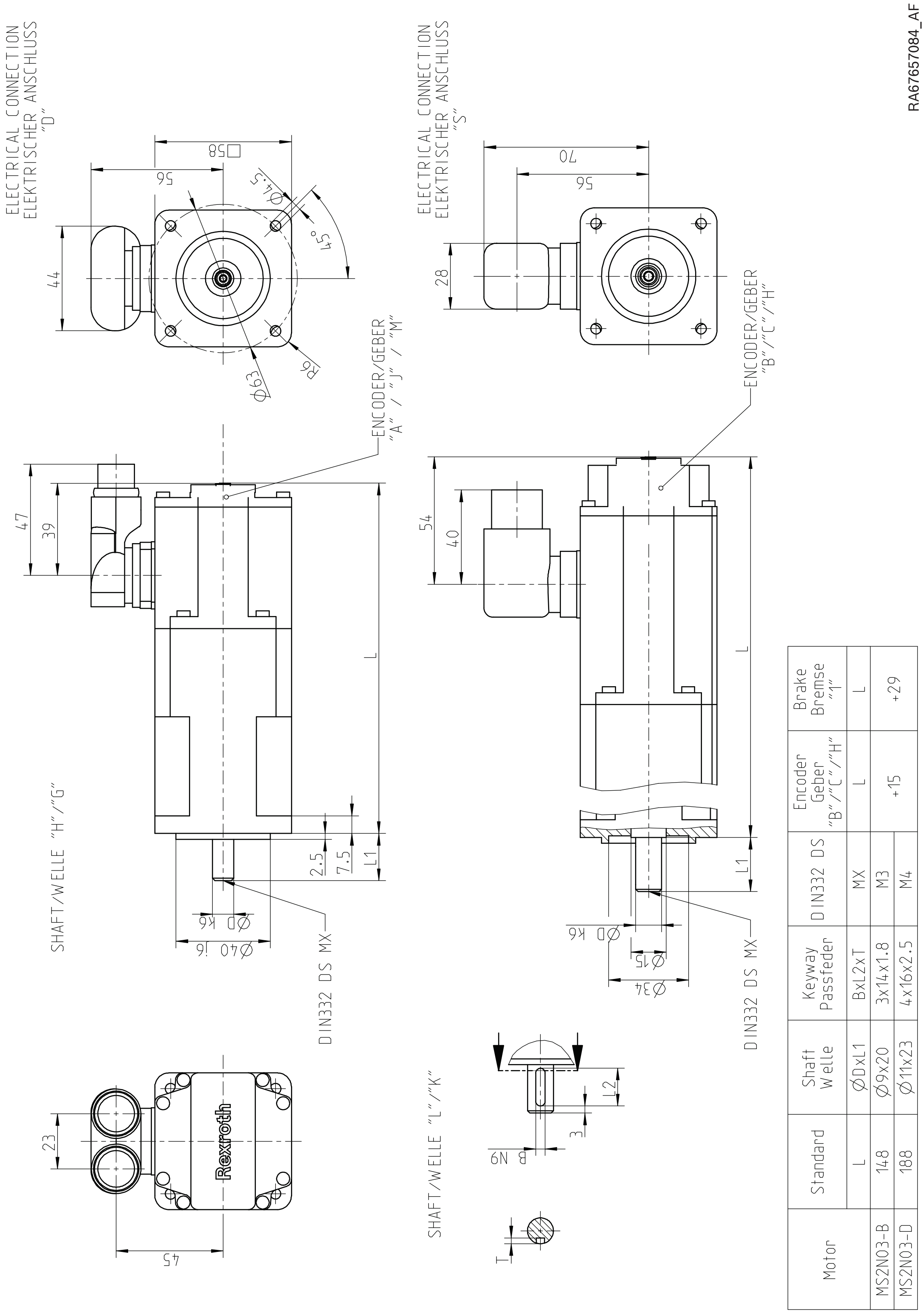



Fig. 36: MS2N03-D0BYN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

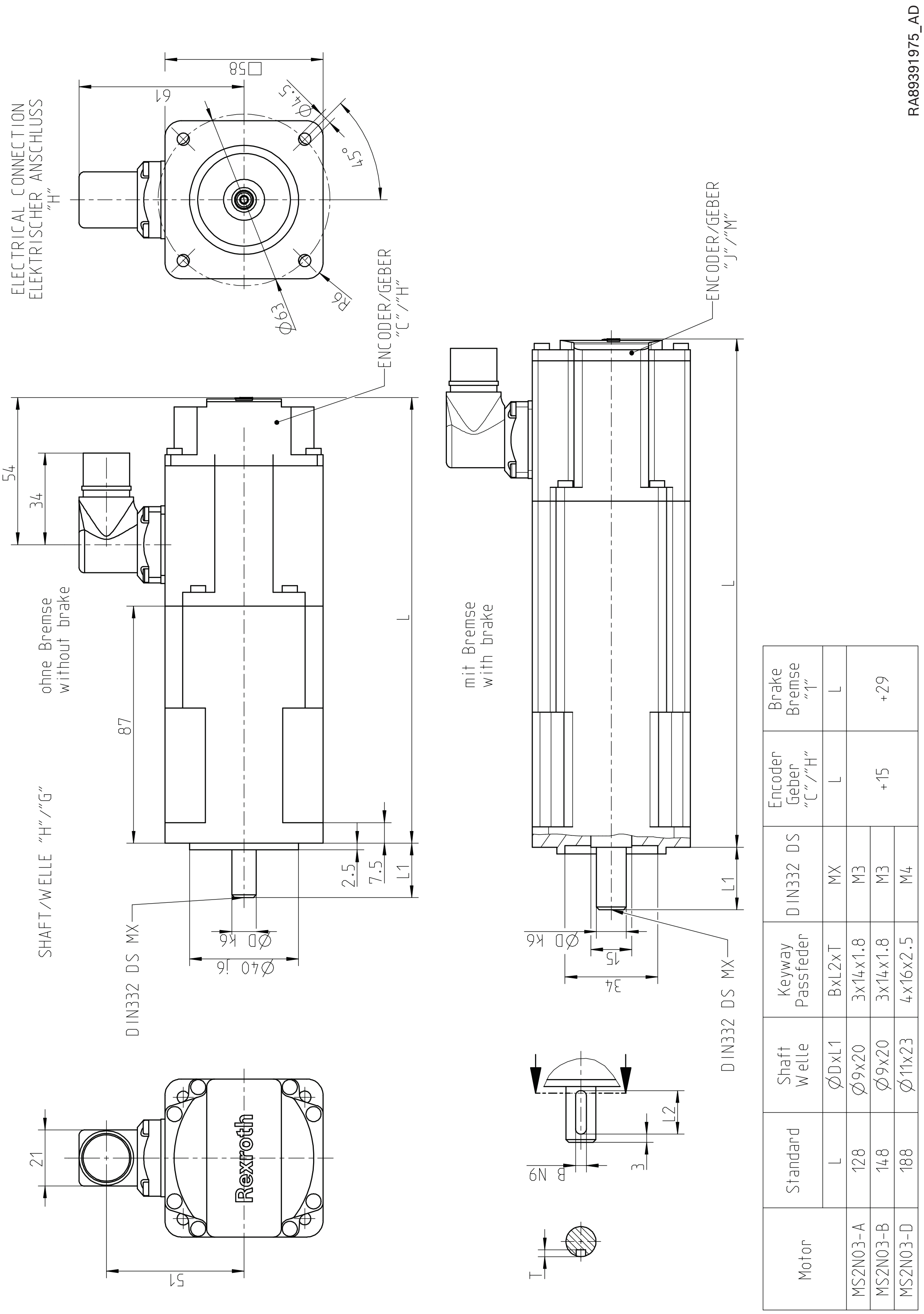
## 6.2.2 MS2N03 self-cooling with M17 double plug / M23 single cable connector – dimensional drawing




| Motor | Standard L | Shaft Welle ØDxL1 | Keyway Passfeder BxL2xT | DIN332 DS MX | Encoder Geber "B"/"C"/"H" L | Brake Bremse "1" L |
|---|---|---|---|---|---|---|
| MS2N03-B | 148 | Ø9x20 | 3x14x1.8 | M3 | +15 | +29 |
| MS2N03-D | 188 | Ø11x23 | 4x16x2.5 | M4 | | |

Fig. 37: MS2N03-□□□□□N

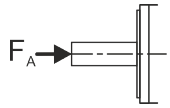
### 6.2.3 MS2N03 self-cooling with M17 single cable connector – dimensional drawing




| Motor | Standard | Shaft Welle | Keyway Passfeder | DIN332 DS | Encoder Geber "C"/"H" | Brake Bremse "1" |
|---|---|---|---|---|---|---|
| | L | ØDxL1 | BxL2xT | MX | L | L |
| MS2N03-A | 128 | Ø9x20 | 3x14x1.8 | M3 | +15 | +29 |
| MS2N03-B | 148 | Ø9x20 | 3x14x1.8 | M3 | | |
| MS2N03-D | 188 | Ø11x23 | 4x16x2.5 | M4 | | |

Fig. 38: MS2N03-□□□□N-□□H□□

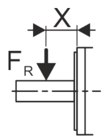
## 6.2.4 MS2N03 axial force




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)
- Mean speed

## 6.2.5 MS2N03 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.

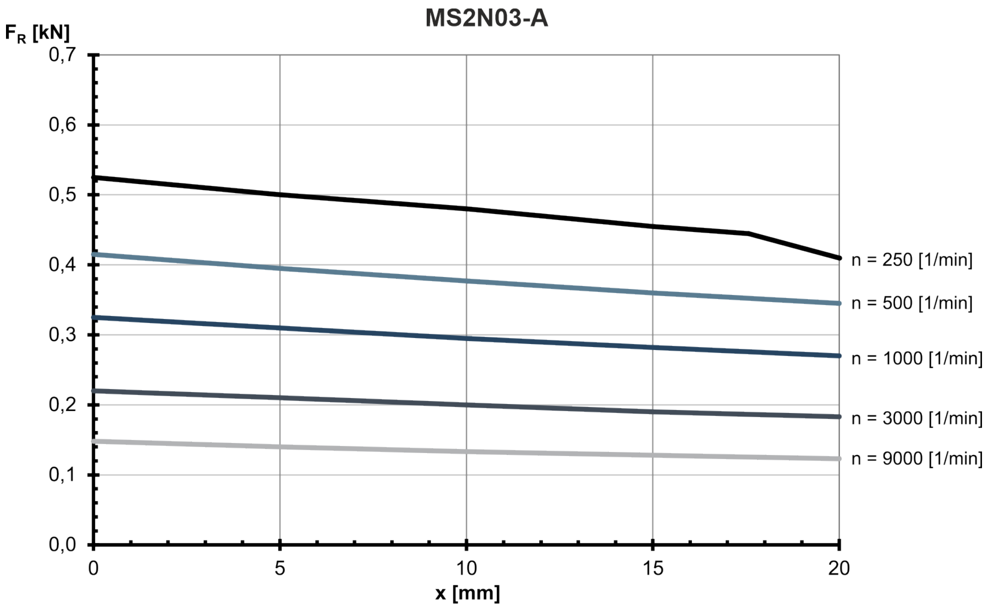



Fig. 39: MS2N03-A: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

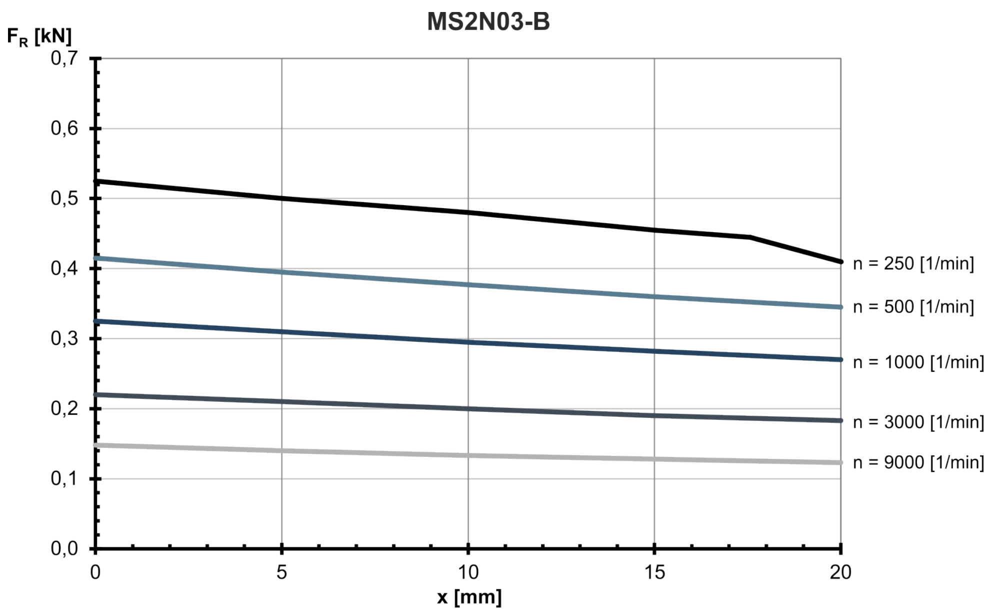



Fig. 40: MS2N03-B: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

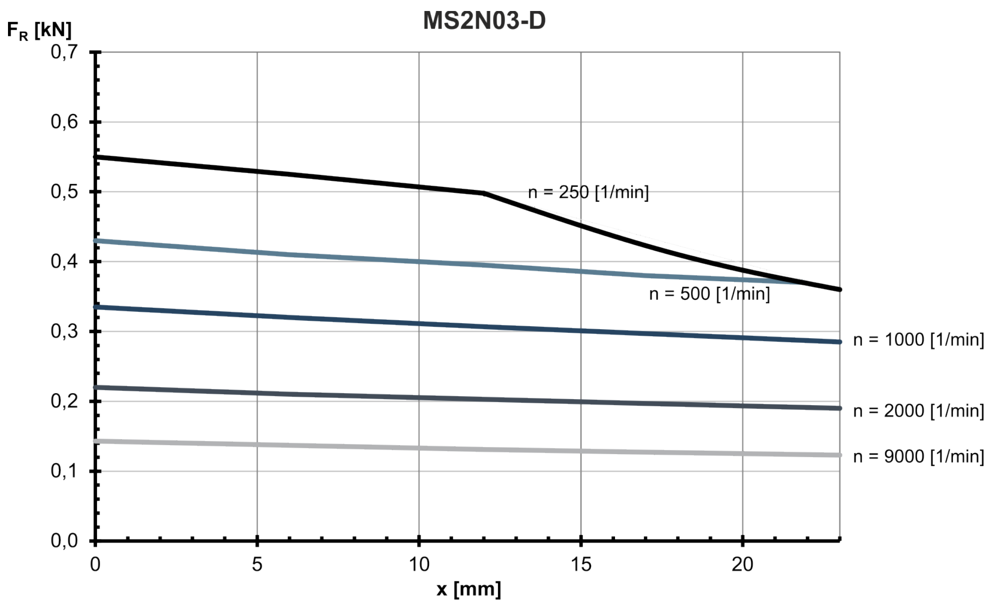



Fig. 41: MS2N03-D: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

# 6.3 MS2N04 technical data

## 6.3.1 Self-cooling

### MS2N04-B0BNN

| Designation | Symbol | Unit | MS2N04-B0BNN-□□□□0-□N | MS2N04-B0BNN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 1.75 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 1.11 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 2.15 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 1.36 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.00007 | 0.00011 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,000 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 1.67 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 1.11 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 0.53 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 6.4 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 5.9 | |
| Maximum current | $I_{max(rms)}$ | A | 4.9 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.73 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 104.9 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 26.2 | |
| Winding inductance | $L_{12\_min}$ | mH | 110.09 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.1 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 18.9 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 12.7 | |
| Mass | $m_{mot}$ | kg | 2.7 | 3.4 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 5.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.63 |
| Maximum connection time | $t_1$ | ms | 0 | 30 |
| Maximum disconnection time | $t_2$ | ms | 0 | 45 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

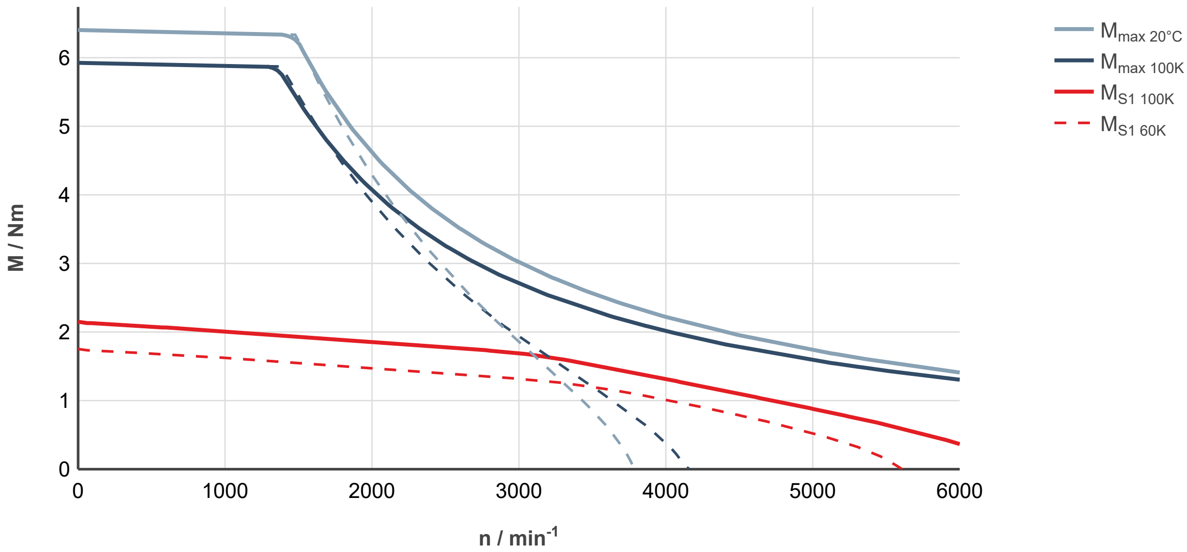



Fig. 42: MS2N04-B0BNN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

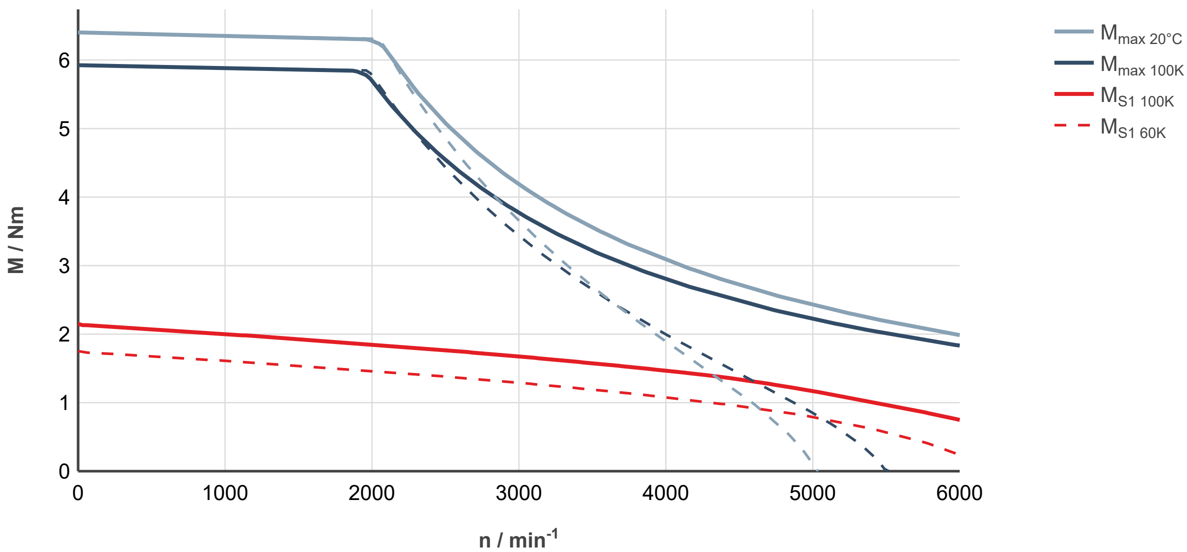



Fig. 43: MS2N04-B0BNN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N04-B0BTN

| Designation | Symbol | Unit | MS2N04-B0BTN-□□□□0-□N | MS2N04-B0BTN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1)] | $M_{0\ 60K}$ | Nm | 1.75 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 2.2 | |
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 2.15 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 2.7 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | kg*m² | 0.00007 | 0.00011 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 4,980 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 1.09 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 1.51 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 0.57 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 6.4 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 5.9 | |
| Maximum current | $I_{max(rms)}$ | A | 9.8 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 0.87 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 52.7 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 6.55 | |
| Winding inductance | $L_{12\_min}$ | mH | 27.52 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.1 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 18.9 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 12.7 | |
| Mass | $m_{mot}$ | kg | 2.7 | 3.4 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 5.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.63 |
| Maximum connection time | $t_1$ | ms | 0 | 30 |
| Maximum disconnection time | $t_2$ | ms | 0 | 45 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

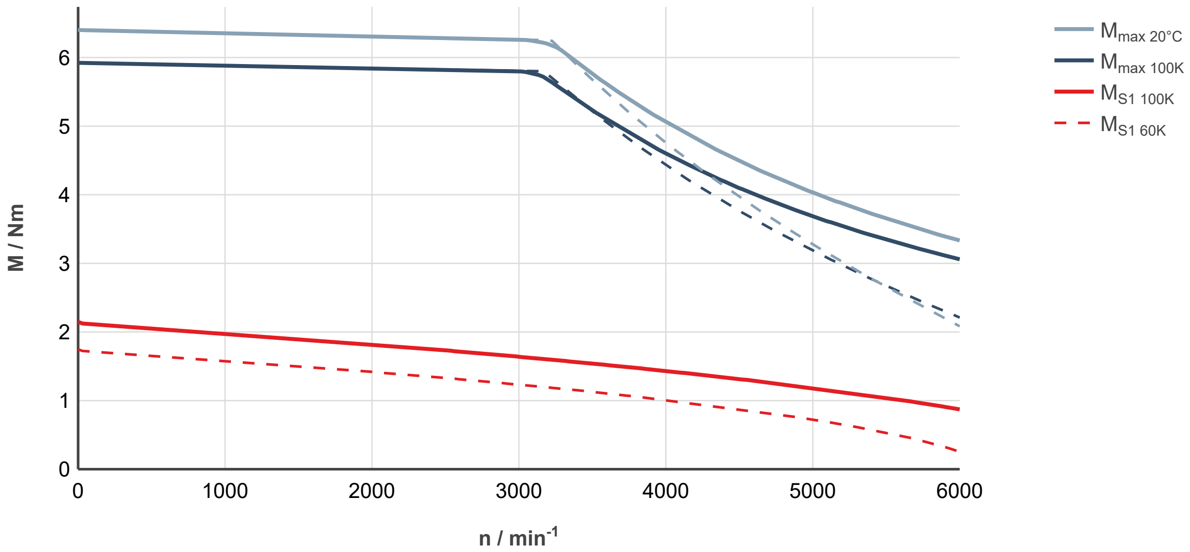



Fig. 44: MS2N04-B0BTN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

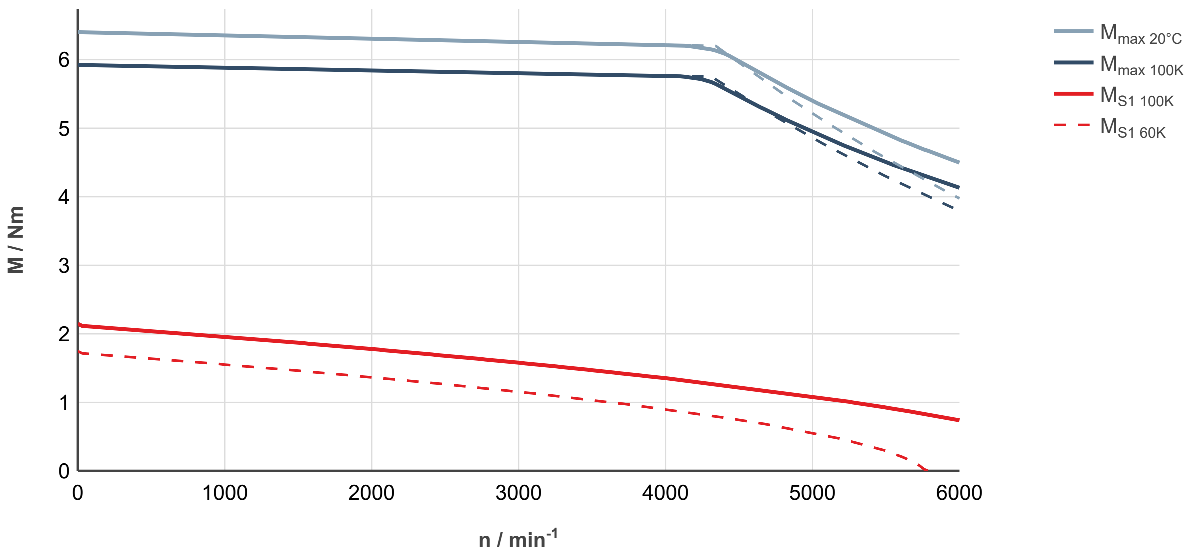



Fig. 45: MS2N04-B0BTN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N04-C0BNN

| Designation | Symbol | Unit | MS2N04-C0BNN-□□□□0-□N | MS2N04-C0BNN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 2.8 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 1.78 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 3.5 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 2.24 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.00011 | 0.00016 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,230 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 2.39 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 1.61 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 0.81 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 13.05 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 12.00 | |
| Maximum current | $I_{max(rms)}$ | A | 9.7 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.74 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 105.7 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 10.9 | |
| Winding inductance | $L_{12\_min}$ | mH | 52.4 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 2.2 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 35.3 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 16.0 | |
| Mass | $m_{mot}$ | kg | 3.7 | 4.4 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 5.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.63 |
| Maximum connection time | $t_1$ | ms | 0 | 30 |
| Maximum disconnection time | $t_2$ | ms | 0 | 45 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

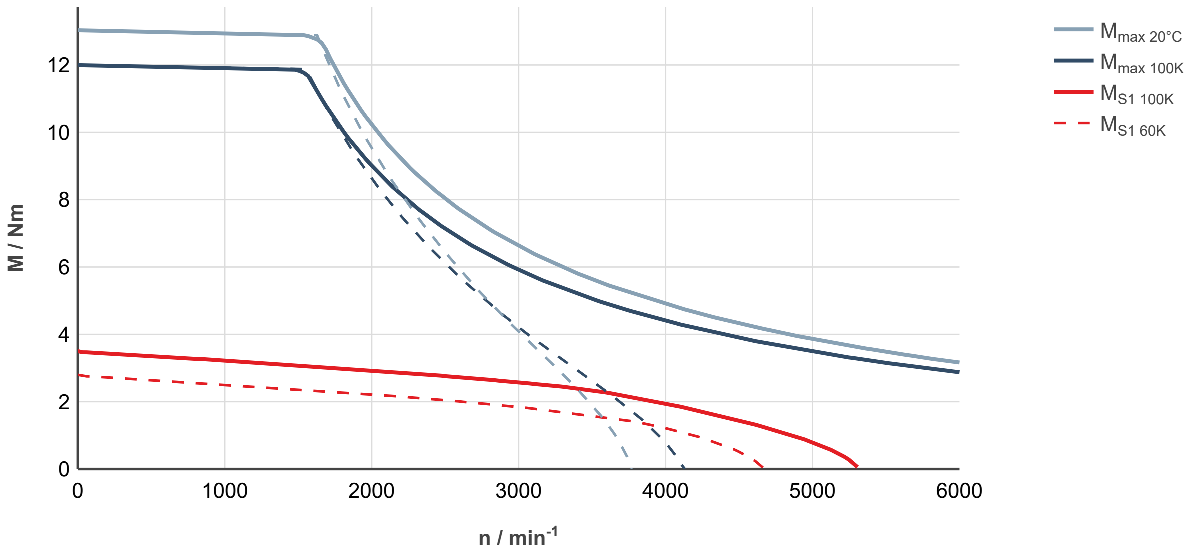



Fig. 46: MS2N04-C0BNN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

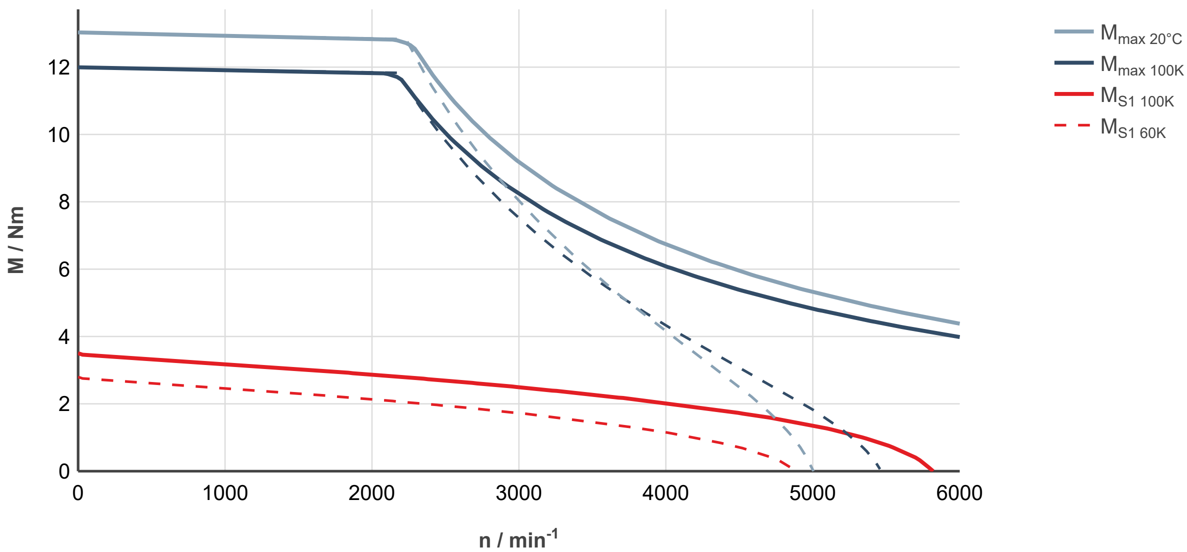



Fig. 47: MS2N04-C0BNN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N04-C0BTN

| Designation | Symbol | Unit | MS2N04-C0BTN-□□□□0-□N | MS2N04-C0BTN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 2.80 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 3.11 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 3.50 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 3.9 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.00011 | 0.00016 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,900 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 1.66 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 2.01 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 0.68 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 13.05 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 12.00 | |
| Maximum current | $I_{max(rms)}$ | A | 17.3 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 0.98 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 59.8 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 3.5 | |
| Winding inductance | $L_{12\_min}$ | mH | 17.86 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.8 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 35.3 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 16.0 | |
| Mass | $m_{mot}$ | kg | 3.7 | 4.4 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 5.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.63 |
| Maximum connection time | $t_1$ | ms | 0 | 30 |
| Maximum disconnection time | $t_2$ | ms | 0 | 45 |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

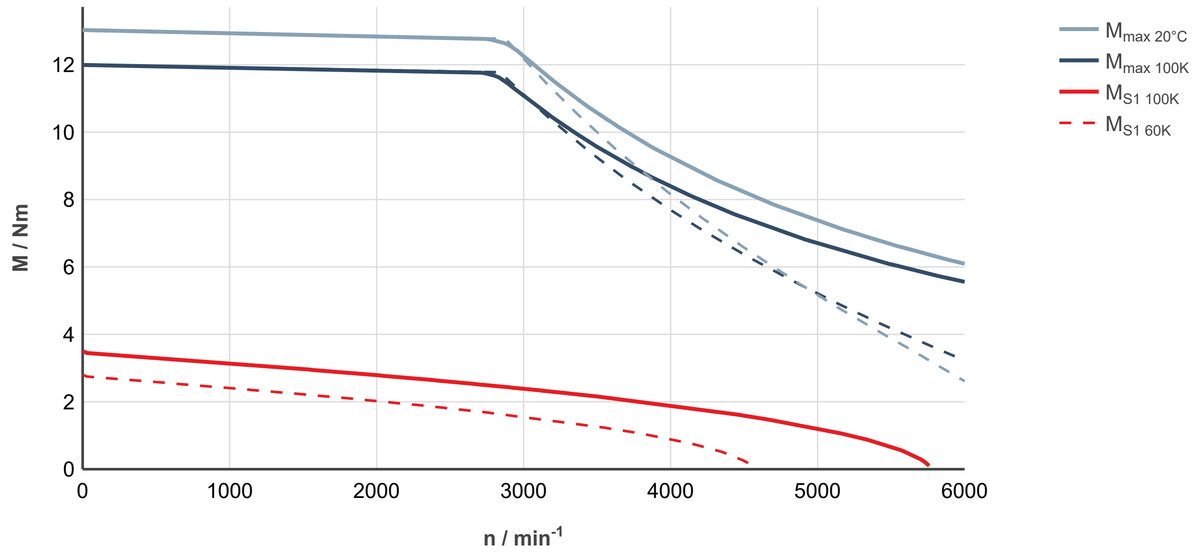



Fig. 48: MS2N04-C0BTN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

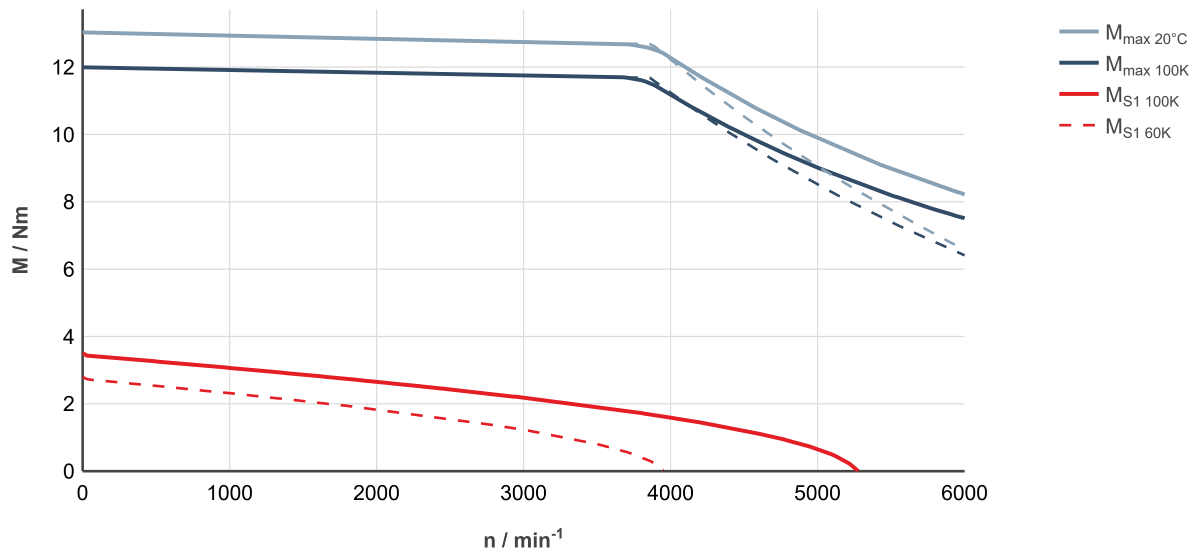



Fig. 49: MS2N04-C0BTN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N04-D0BHN

| Designation | Symbol | Unit | MS2N04-D0BHN-□□□□0-□N | MS2N04-D0BHN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 3.85 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 1.61 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 4.65 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 1.96 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.00016 | 0.00020 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,040 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 3.75 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 1.63 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 0.8 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 19.7 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 18.1 | |
| Maximum current | $I_{max(rms)}$ | A | 9.7 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.62 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 159.1 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 15.8 | |
| Winding inductance | $L_{12\_min}$ | mH | 77.27 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 2.95 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 44.0 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 18.5 | |
| Mass | $m_{mot}$ | kg | 4.7 | 5.4 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 5.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.63 |
| Maximum connection time | $t_1$ | ms | 0 | 30 |
| Maximum disconnection time | $t_2$ | ms | 0 | 45 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

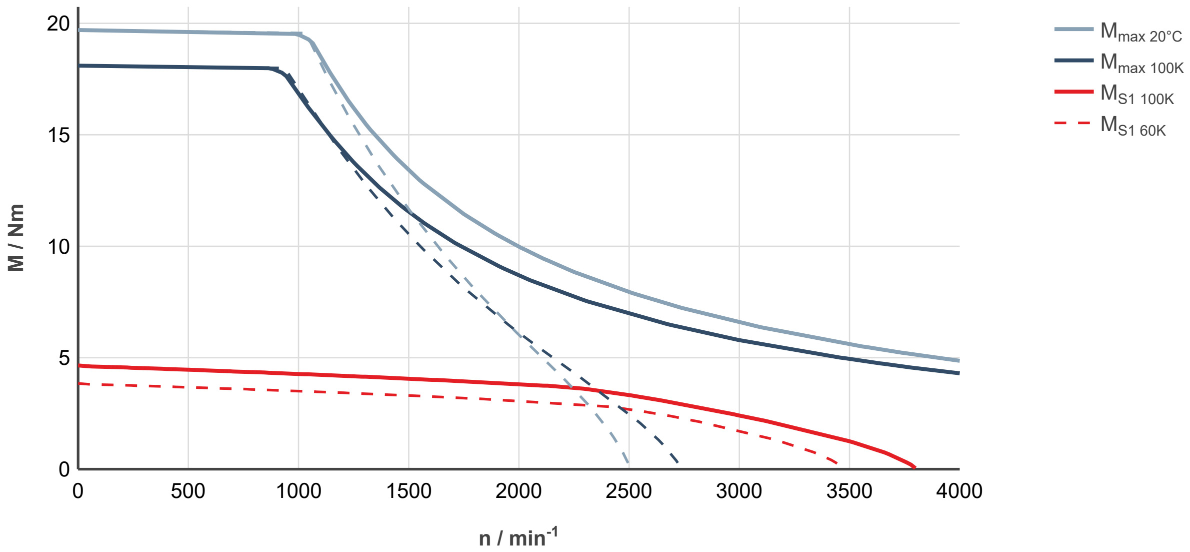



Fig. 50: MS2N04-D0BHN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

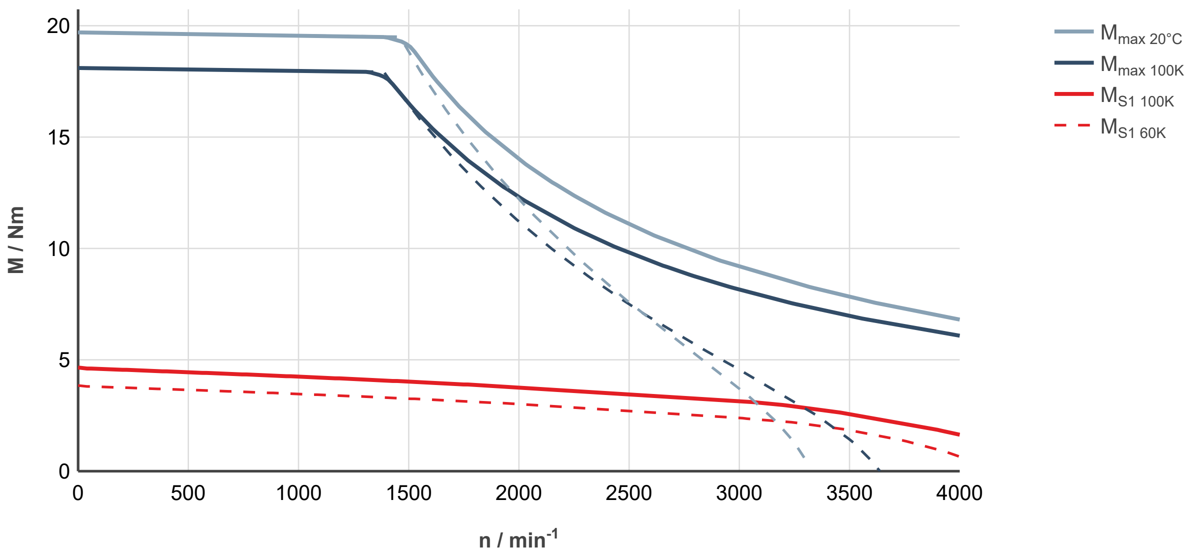



Fig. 51: MS2N04-D0BHN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N04-D0BQN

| Designation | Symbol | Unit | MS2N04-D0BQN-□□□□0-□N | MS2N04-D0BQN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1)] | $M_{0\ 60K}$ | Nm | 3.85 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 2.86 | |
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 4.65 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 3.48 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | kg*m² | 0.00016 | 0.00020 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,320 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 2.65 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 2.12 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 0.92 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 19.7 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 18.1 | |
| Maximum current | $I_{max(rms)}$ | A | 17.3 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 1.48 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 89.9 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 4.87 | |
| Winding inductance | $L_{12\_min}$ | mH | 24.5 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 3.24 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 44.0 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 18.5 | |
| Mass | $m_{mot}$ | kg | 4.7 | 5.4 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 5.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.63 |
| Maximum connection time | $t_1$ | ms | 0 | 30 |
| Maximum disconnection time | $t_2$ | ms | 0 | 45 |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

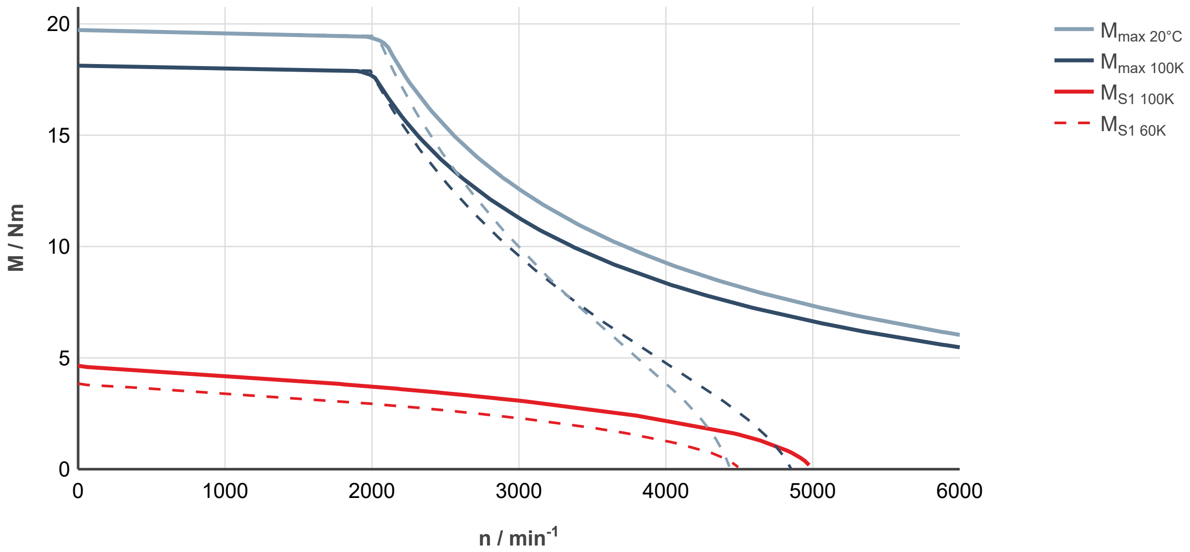



Fig. 52: MS2N04-D0BQN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

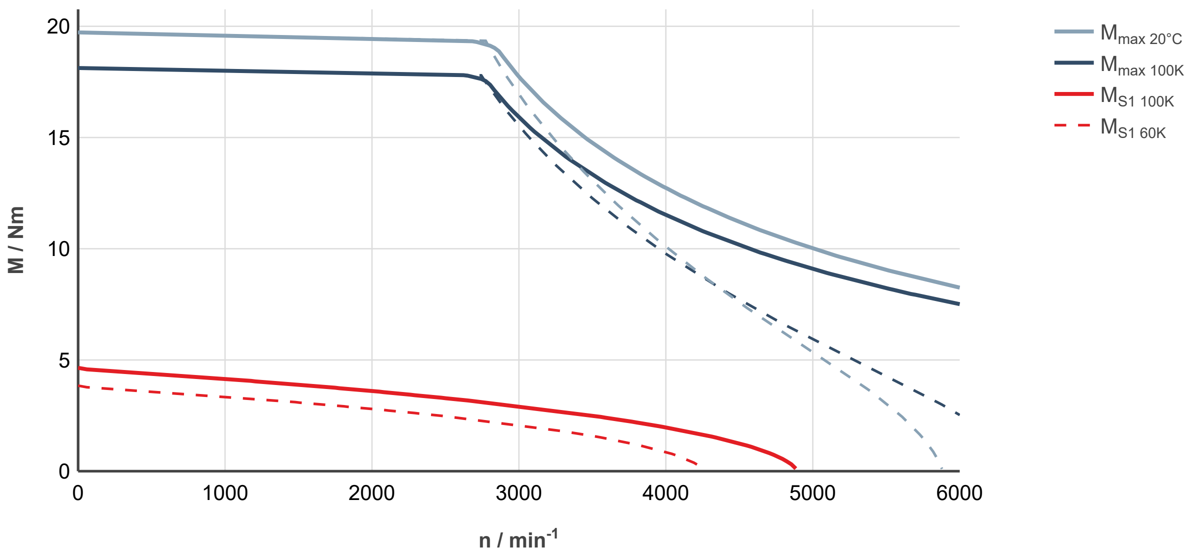
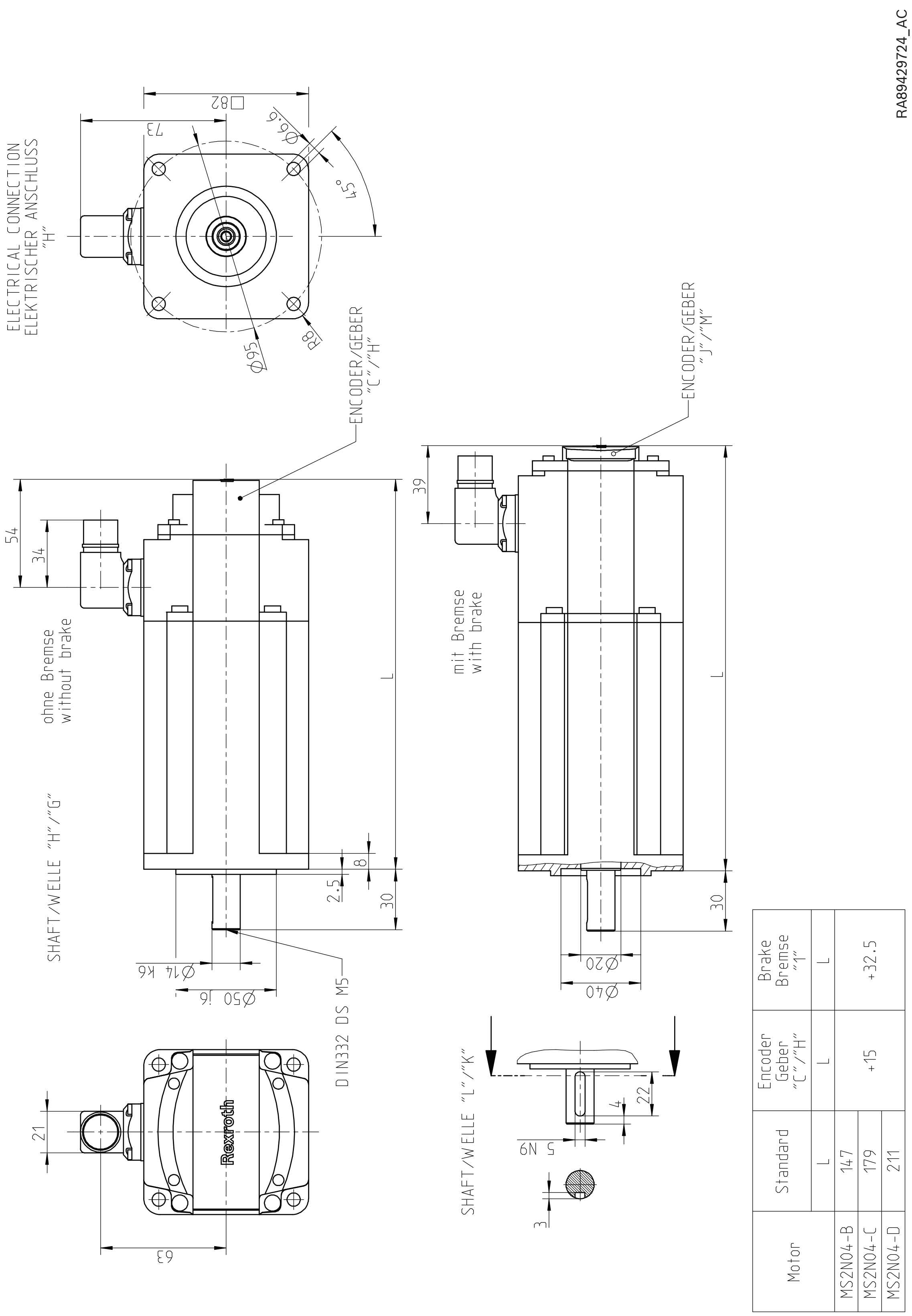


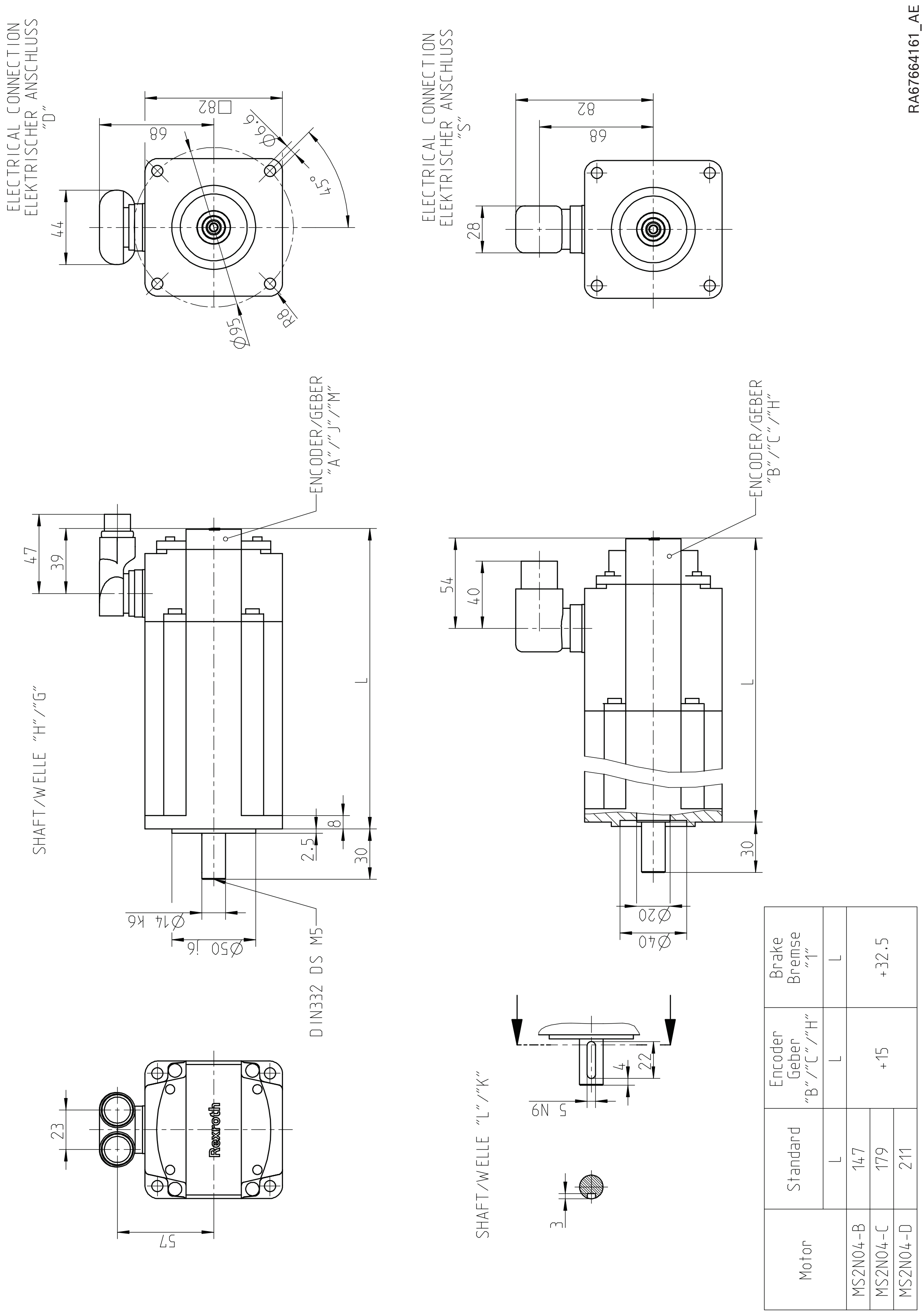

Fig. 53: MS2N04-D0BQN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## 6.3.2 MS2N04 self-cooling – dimensional drawing




| Motor | Standard L | Encoder Geber "C"/"H" L | Brake Bremse "1" L |
|---|---|---|---|
| MS2N04-B | 147 | +15 | +32.5 |
| MS2N04-C | 179 | | |
| MS2N04-D | 211 | | |

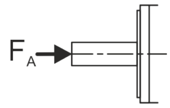
Fig. 54: MS2N04-□□□□N-□□H




| Motor | Standard L | Encoder Geber "B"/"C"/"H" L | Brake Bremse "1" L |
|---|---|---|---|
| MS2N04-B | 147 | +15 | +32.5 |
| MS2N04-C | 179 | | |
| MS2N04-D | 211 | | |

Fig. 55: MS2N04-□□□□N

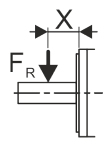
## 6.3.3 MS2N04 axial force




Axial forces $F_A$ are permissible without limitation up to 30 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

## 6.3.4 MS2N04 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.

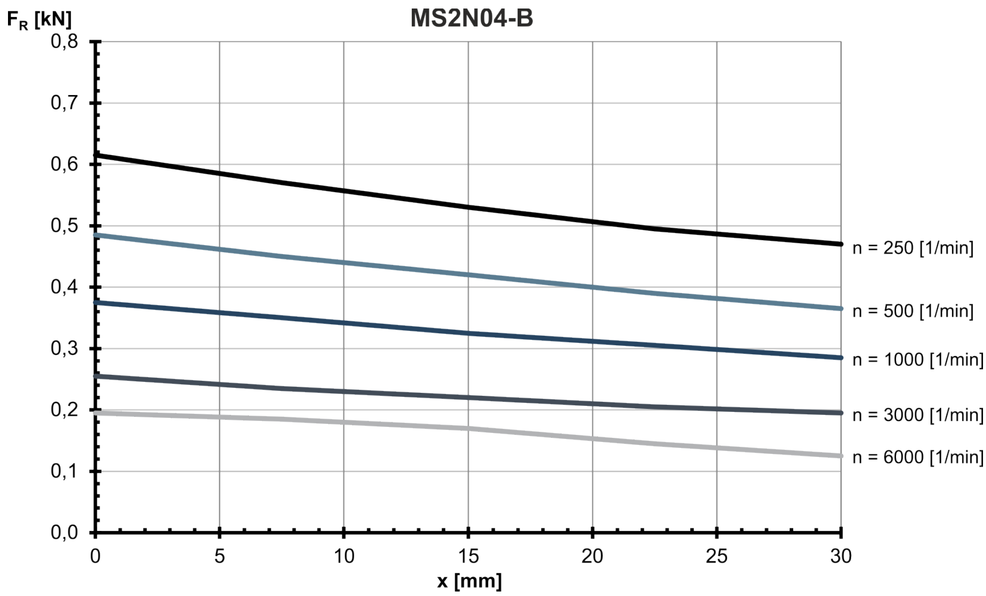



Fig. 56: MS2N04-B: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

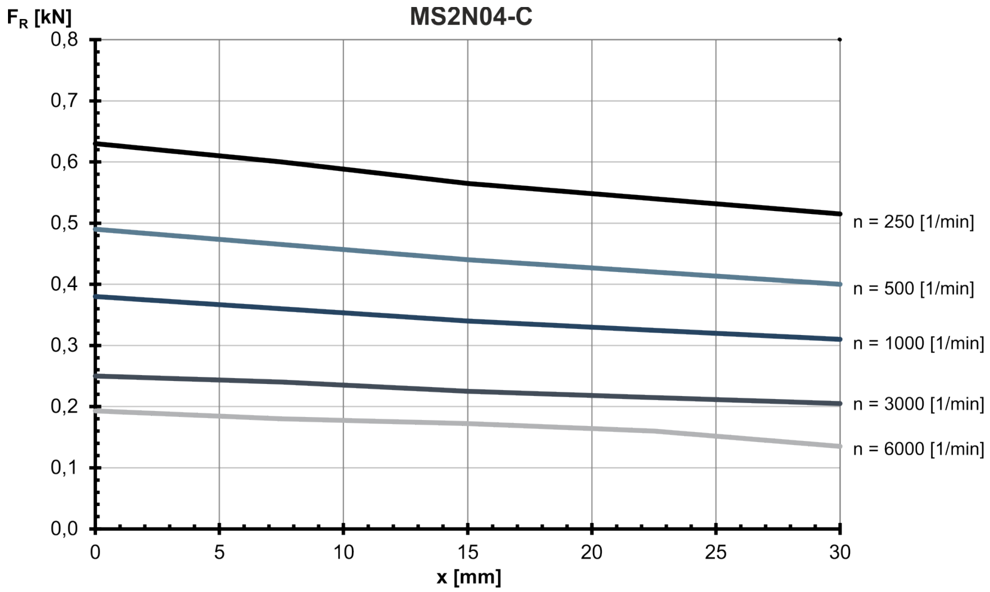



Fig. 57: MS2N04-C: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

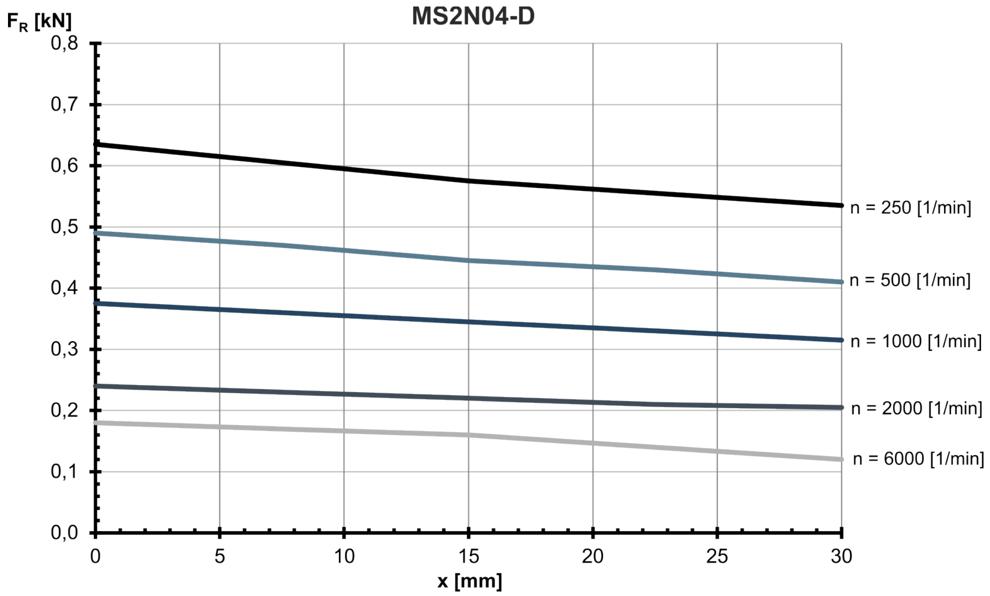



Fig. 58: MS2N04-D: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

# 6.4 MS2N05 technical data

## 6.4.1 Self-cooling

### MS2N05-B0BNN

| Designation | Symbol | Unit | MS2N05-B0BNN-□□□□0-□N | MS2N05-B0BNN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 3.75 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 2.29 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 4.45 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 2.75 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.00017 | 0.00028 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,850 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 3.72 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 2.36 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 1.11 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 11.5 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 10.6 | |
| Maximum current | $I_{max(rms)}$ | A | 8.4 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.78 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 108.4 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 10.6 | |
| Winding inductance | $L_{12\_min}$ | mH | 56.4 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 4.0 | 5.1 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 10.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.73 |
| Maximum connection time | $t_1$ | ms | 0 | 30 |
| Maximum disconnection time | $t_2$ | ms | 0 | 80 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

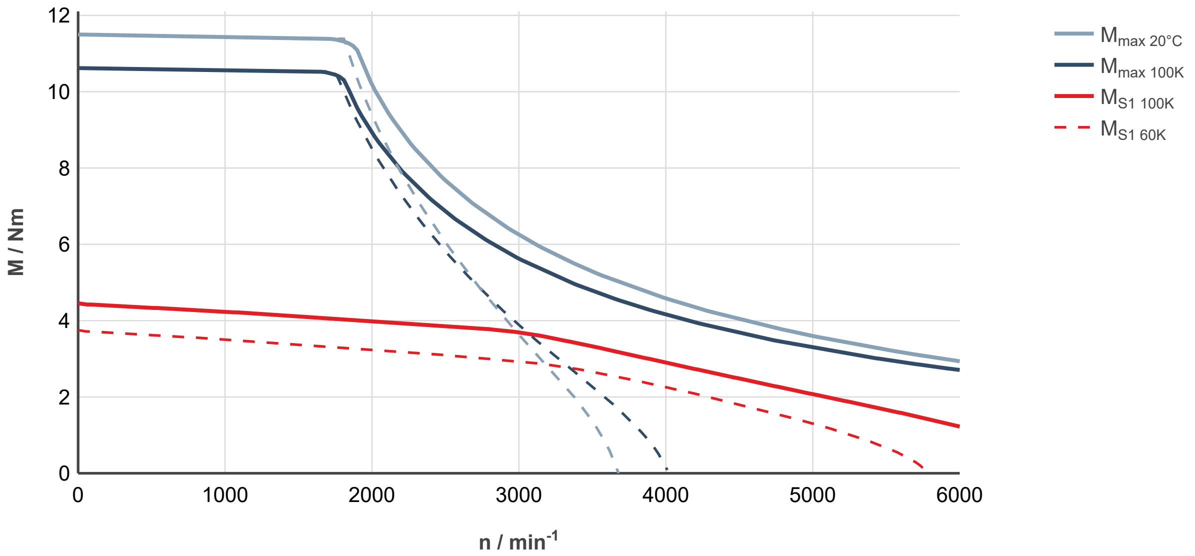



Fig. 59: MS2N05-B0BNN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

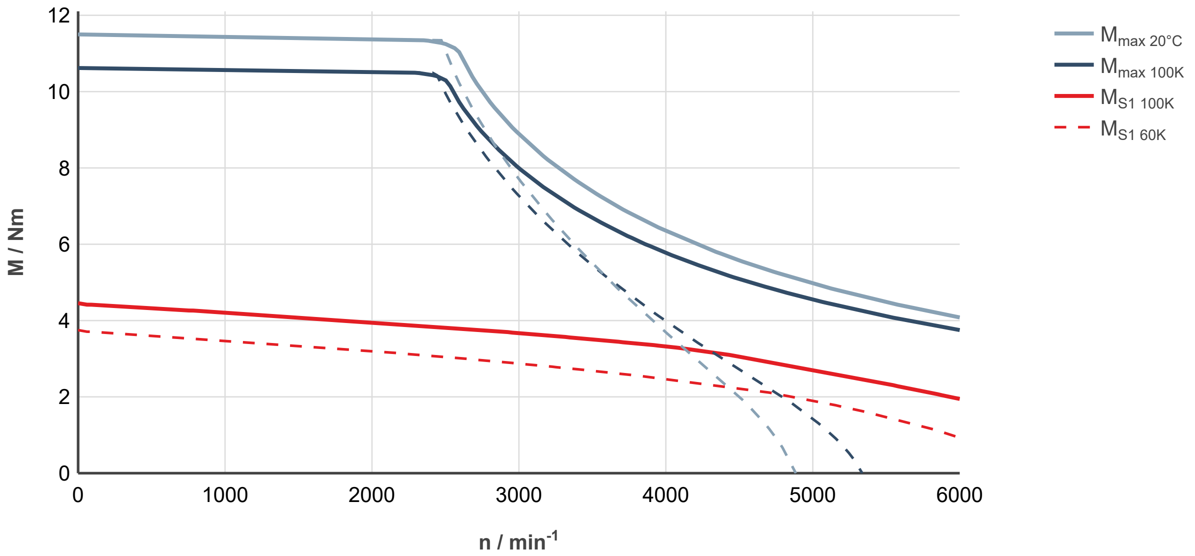



Fig. 60: MS2N05-B0BNN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N05-B0BTN

| Designation | Symbol | Unit | MS2N05-B0BTN-□□□□0-□N | MS2N05-B0BTN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1)] | $M_{0\ 60K}$ | Nm | 3.75 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 4.55 | |
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 4.45 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 5.45 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | kg*m² | 0.00017 | 0.00028 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 5,410 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 2.37 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 3.12 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 1.34 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 11.5 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 10.6 | |
| Maximum current | $I_{max(rms)}$ | A | 16.8 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 0.89 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 54.2 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 2.7 | |
| Winding inductance | $L_{12\_min}$ | mH | 14.09 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 4.0 | 5.1 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 10.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.73 |
| Maximum connection time | $t_1$ | ms | 0 | 30 |
| Maximum disconnection time | $t_2$ | ms | 0 | 80 |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

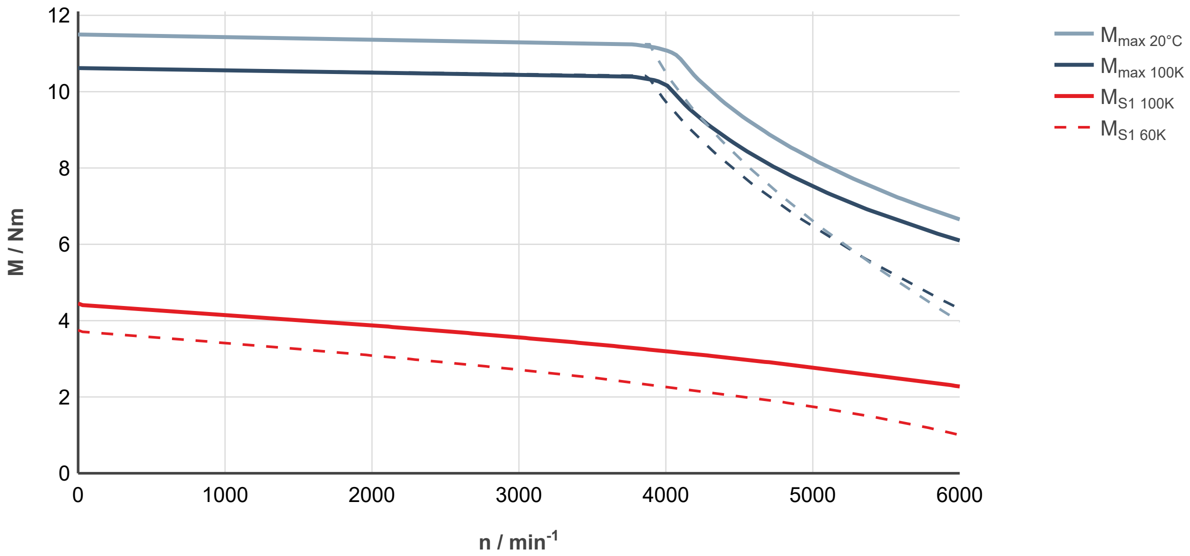



Fig. 61: MS2N05-B0BTN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

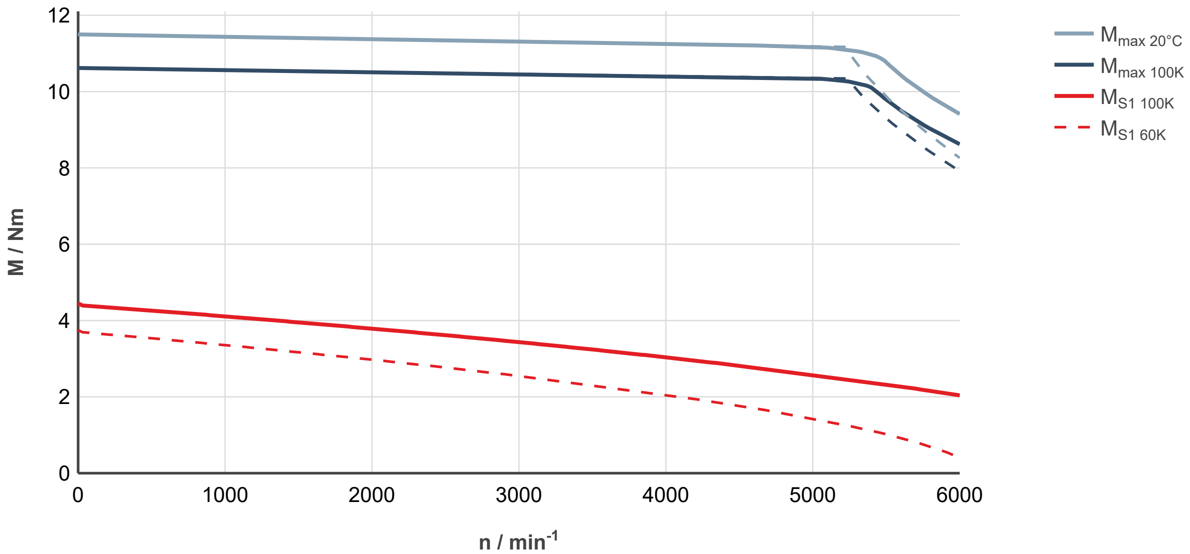



Fig. 62: MS2N05-B0BTN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N05-C0BNN

| Designation | Symbol | Unit | MS2N05-C0BNN-□□□□0-□N | MS2N05-C0BNN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 6.1 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 3.53 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 7.15 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 4.16 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.00029 | 0.00040 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,990 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 5.45 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 3.3 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 1.71 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 22.6 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 20.8 | |
| Maximum current | $I_{max(rms)}$ | A | 15.1 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 1.85 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 112.7 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 5.0 | |
| Winding inductance | $L_{12\_min}$ | mH | 30.3 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.77 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 36.2 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 16.0 | |
| Mass | $m_{mot}$ | kg | 5.9 | 7.0 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 10.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.73 |
| Maximum connection time | $t_1$ | ms | 0 | 30 |
| Maximum disconnection time | $t_2$ | ms | 0 | 80 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

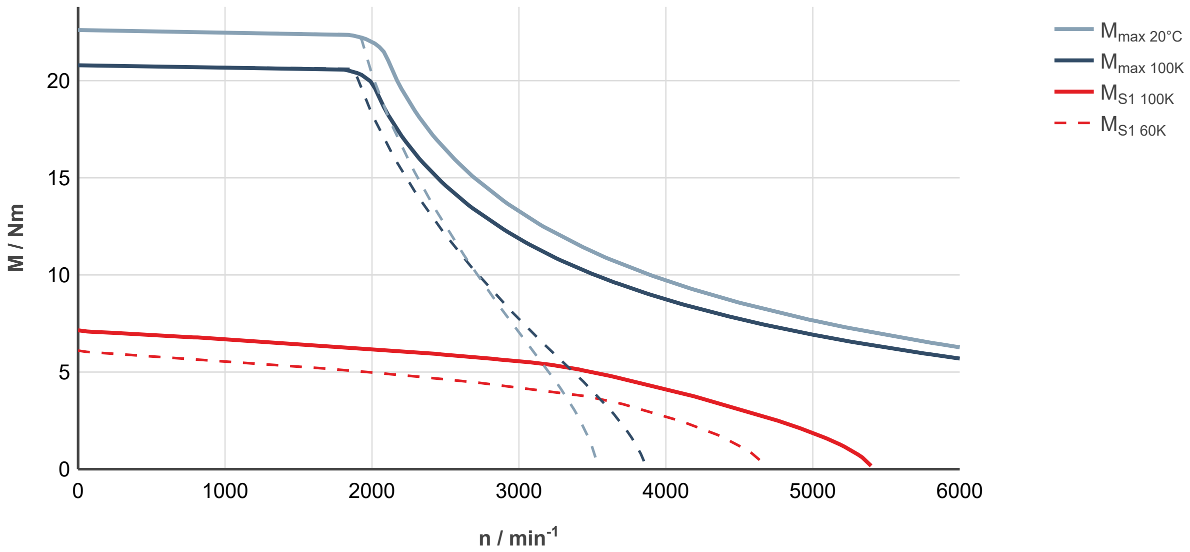



Fig. 63: MS2N05-C0BNN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

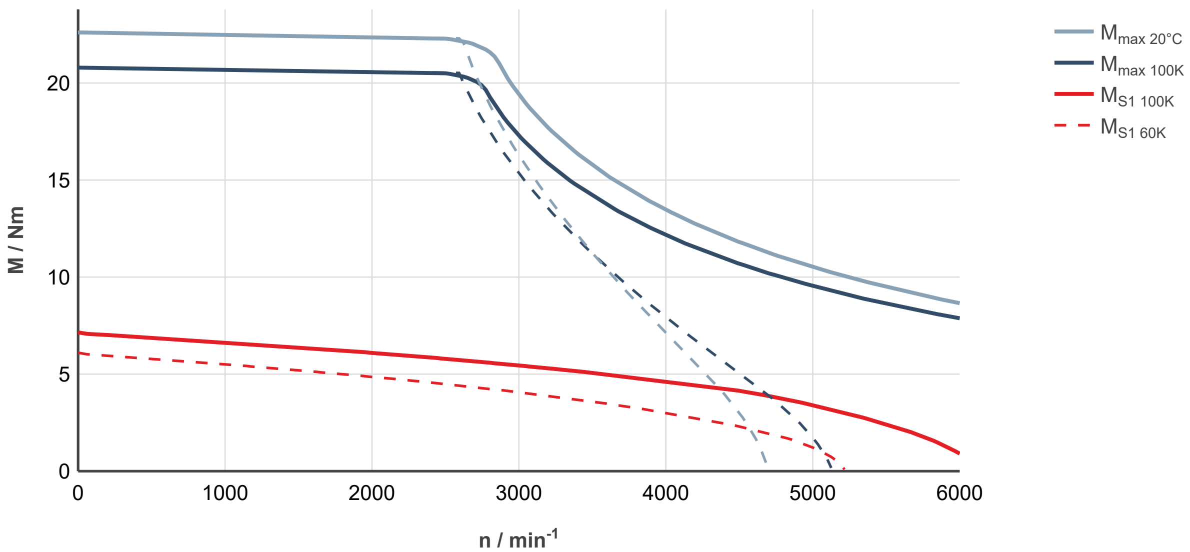



Fig. 64: MS2N05-C0BNN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N05-C0BTN

| Designation | Symbol | Unit | MS2N05-C0BTN-□□□□0-□N | MS2N05-C0BTN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1)] | $M_{0\ 60K}$ | Nm | 6.10 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 7.1 | |
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 7.15 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 8.35 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | $kg{*}m^2$ | 0.00029 | 0.00040 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 4,090 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 3.52 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 4.43 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 1.51 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 22.6 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 20.8 | |
| Maximum current | $I_{max(rms)}$ | A | 30.2 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 0.93 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 56.3 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 1.26 | |
| Winding inductance | $L_{12\_min}$ | mH | 7.6 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.5 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 36.2 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 16.0 | |
| Mass | $m_{mot}$ | kg | 5.9 | 7.0 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 10.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.73 |
| Maximum connection time | $t_1$ | ms | 0 | 30 |
| Maximum disconnection time | $t_2$ | ms | 0 | 80 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

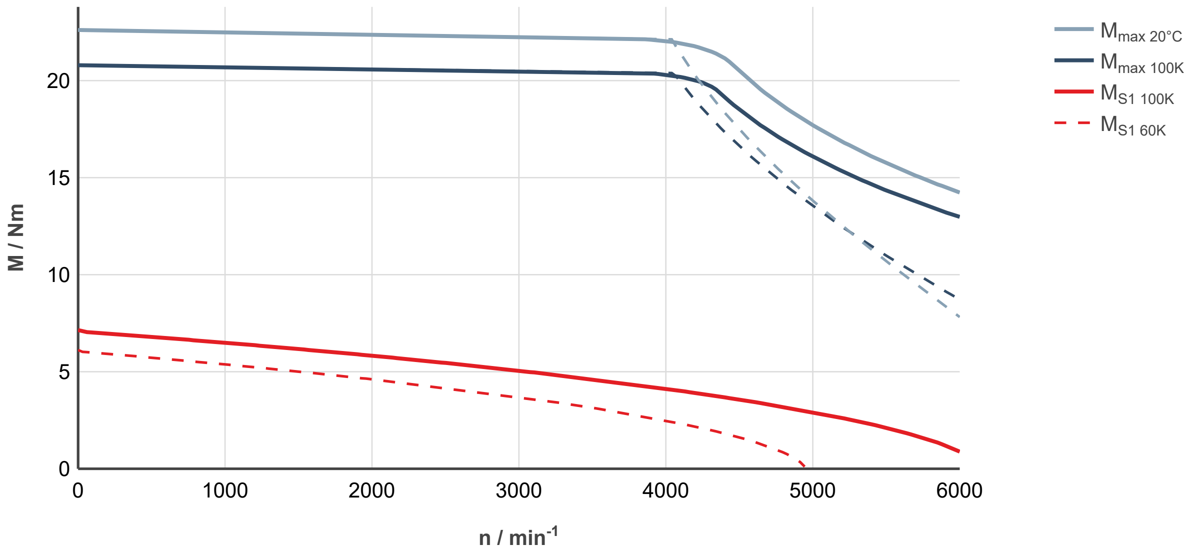



Fig. 65: MS2N05-C0BTN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

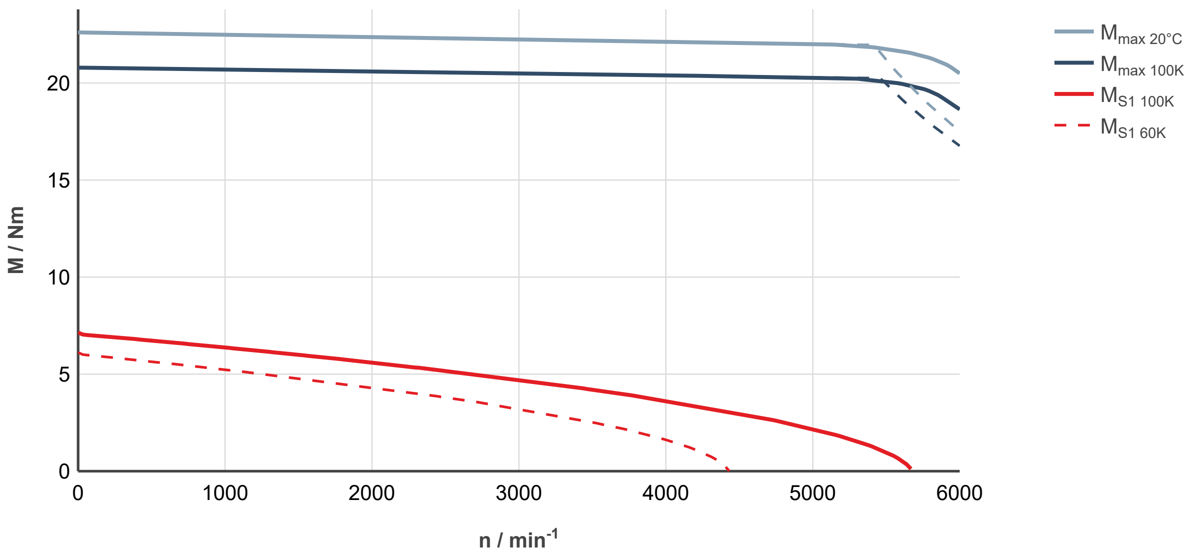



Fig. 66: MS2N05-C0BTN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N05-D0BHN

| Designation | Symbol | Unit | MS2N05-D0BHN-□□□□0-□N | MS2N05-D0BHN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 7.9 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 3.05 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 9.35 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 3.63 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.00040 | 0.00051 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 7.55 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 3.03 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 1.58 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 34.0 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 31.3 | |
| Maximum current | $I_{max(rms)}$ | A | 15.15 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.79 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 169.6 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 6.87 | |
| Winding inductance | $L_{12\_min}$ | mH | 46.74 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | 8.4 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 10.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.73 |
| Maximum connection time | $t_1$ | ms | 0 | 30 |
| Maximum disconnection time | $t_2$ | ms | 0 | 80 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

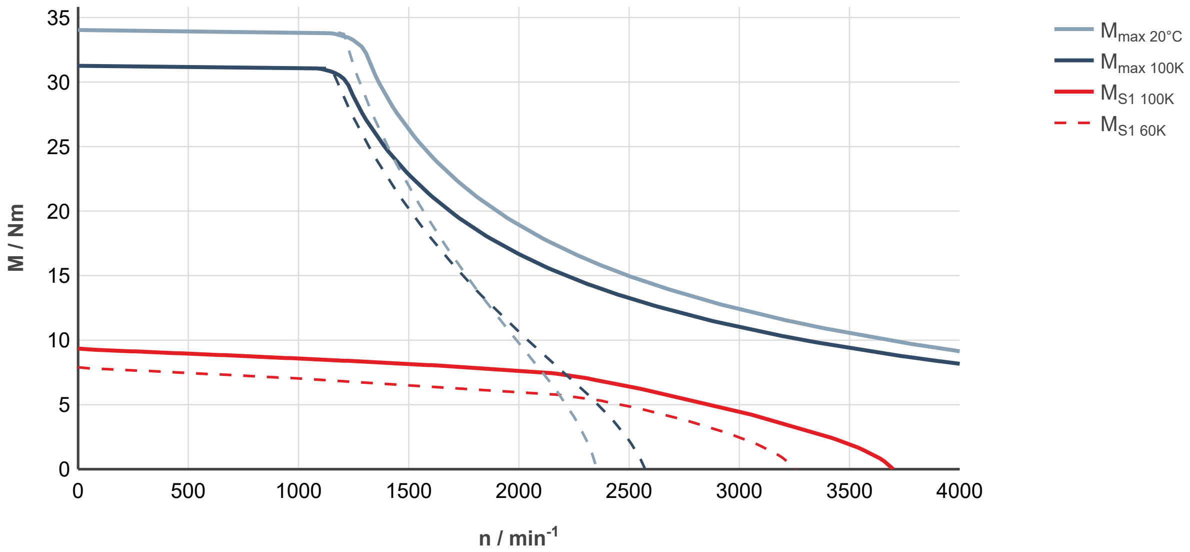



Fig. 67: MS2N05-D0BHN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

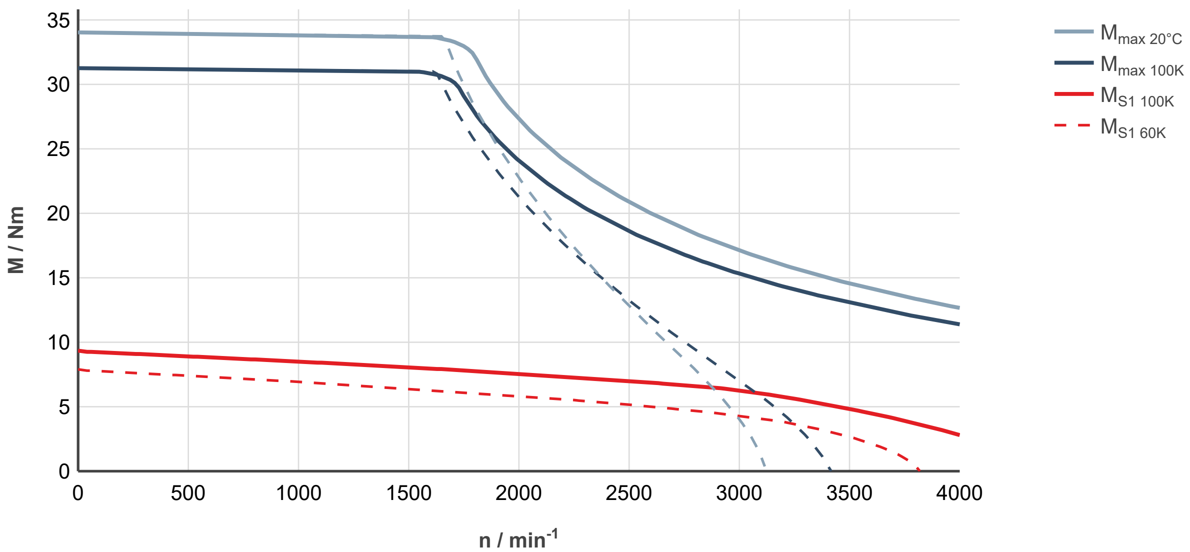



Fig. 68: MS2N05-D0BHN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N05-D0BRN

<table>
<tr><th>Designation</th><th>Symbol</th><th>Unit</th><th>MS2N05-D0BRN-□□□□0-□N</th><th>MS2N05-D0BRN-□□□□1-□N</th></tr>
<tr><td>Standstill torque - 60K [1)]</td><td>$M_{0\ 60K}$</td><td>Nm</td><td colspan="2">7.9</td></tr>
<tr><td>Standstill current - 60K</td><td>$I_{0\ 60K}$</td><td>A</td><td colspan="2">6.05</td></tr>
<tr><td>Standstill torque - 100K [1)]</td><td>$M_{0\ 100K}$</td><td>Nm</td><td colspan="2">9.35</td></tr>
<tr><td>Standstill current - 100K</td><td>$I_{0\ 100K}$</td><td>A</td><td colspan="2">7.2</td></tr>
<tr><td>Moment of inertia of rotor [1)]</td><td>$J_{rot}$</td><td>$kg*m^2$</td><td>0.00040</td><td>0.00051</td></tr>
<tr><td>Rated speed - 100K</td><td>$n_{N\ 100K}$</td><td>1/min</td><td colspan="2">3,510</td></tr>
<tr><td>Rated torque - 100K [1)]</td><td>$M_{N\ 100K}$</td><td>Nm</td><td colspan="2">4.74</td></tr>
<tr><td>Rated current - 100K</td><td>$I_{N\ 100K}$</td><td>A</td><td colspan="2">3.95</td></tr>
<tr><td>Rated power - 100K [1)]</td><td>$P_{N\ 100K}$</td><td>kW</td><td colspan="2">1.74</td></tr>
<tr><td>Maximum torque 20 °C (cold) [1)]</td><td>$M_{max\ 20°C}$</td><td>Nm</td><td colspan="2">34.0</td></tr>
<tr><td>Maximum torque 100K (warm) [1)]</td><td>$M_{max\ 100K}$</td><td>Nm</td><td colspan="2">31.3</td></tr>
<tr><td>Maximum current</td><td>$I_{max(rms)}$</td><td>A</td><td colspan="2">30.3</td></tr>
<tr><td>Maximum speed (electrical)</td><td>$n_{max\ el}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Maximum speed (mechanical)</td><td>$n_{max\ mech}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Number of pole pairs</td><td>p</td><td>–</td><td colspan="2">5</td></tr>
<tr><td>Torque constant at 20 °C [1)]</td><td>$K_m$</td><td>Nm/A</td><td colspan="2">1.4</td></tr>
<tr><td>Voltage constant at 20 °C [1)]</td><td>$K_E$</td><td>V/1000 $min^{-1}$</td><td colspan="2">84.8</td></tr>
<tr><td>Winding resistance at 20 °C</td><td>$R_{12}$</td><td>Ohm</td><td colspan="2">1.76</td></tr>
<tr><td>Winding inductance</td><td>$L_{12\_min}$</td><td>mH</td><td colspan="2">11.18</td></tr>
<tr><td>Leakage capacitance of the component</td><td>$C_{ab}$</td><td>nF</td><td colspan="2">3.29</td></tr>
<tr><td>Thermal time constant of winding</td><td>$T_{th\_W}$</td><td>s</td><td colspan="2">45.8</td></tr>
<tr><td>Thermal time constant of motor</td><td>$T_{th\_M}$</td><td>min</td><td colspan="2">18.5</td></tr>
<tr><td>Mass</td><td>$m_{mot}$</td><td>kg</td><td>7.3</td><td>8.4</td></tr>
<tr><td colspan="5"><u>Holding brake</u></td></tr>
<tr><td>Holding torque</td><td>$M_4$</td><td>Nm</td><td>0</td><td>10.00</td></tr>
<tr><td>Rated voltage</td><td>$U_N$</td><td>V</td><td>0</td><td>24</td></tr>
<tr><td>Rated current</td><td>$I_N$</td><td>A</td><td>0</td><td>0.73</td></tr>
<tr><td>Maximum connection time</td><td>$t_1$</td><td>ms</td><td>0</td><td>30</td></tr>
<tr><td>Maximum disconnection time</td><td>$t_2$</td><td>ms</td><td>0</td><td>80</td></tr>
<tr><td colspan="5">1) For tolerance details refer to ➦ Chapter 5.4 Tolerances</td></tr>
</table>

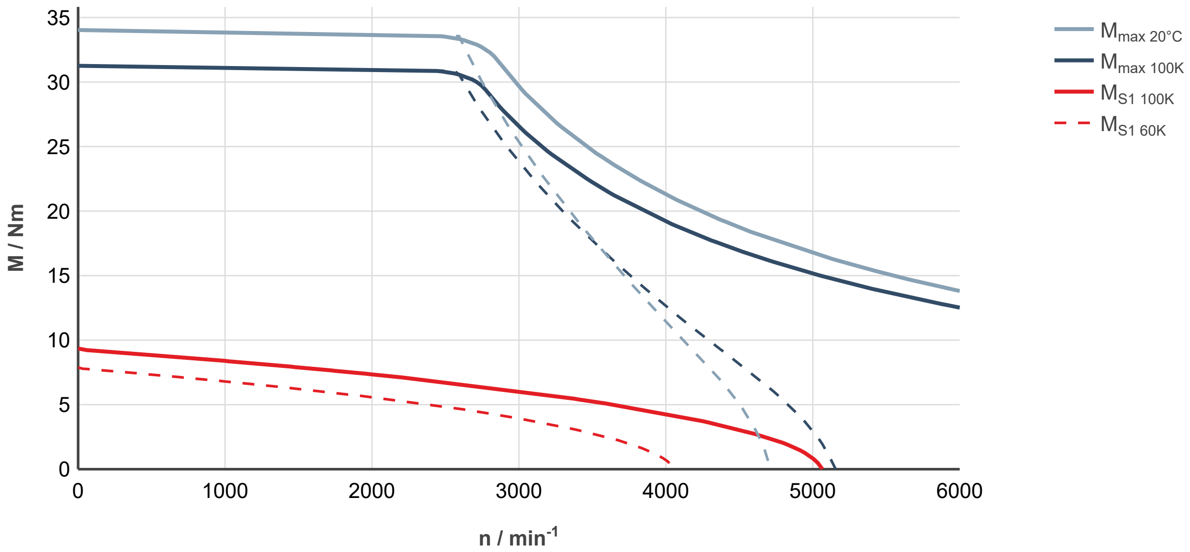



Fig. 69: MS2N05-D0BRN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

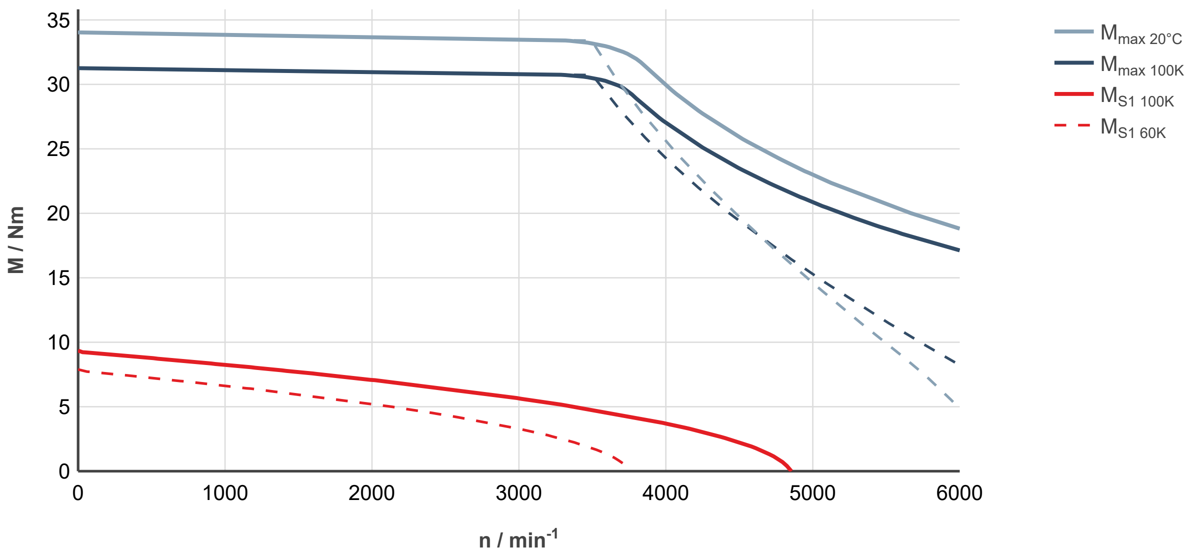
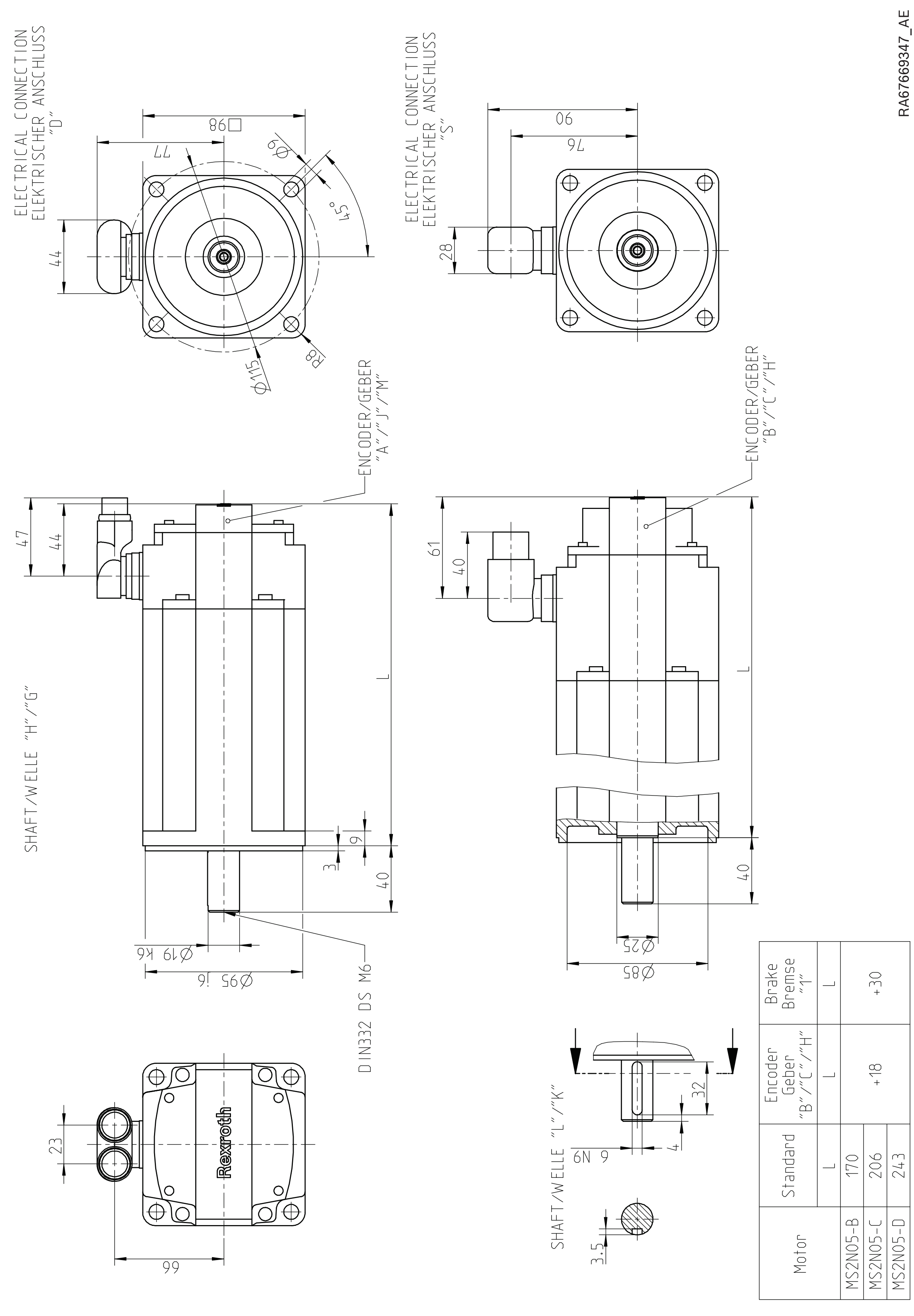


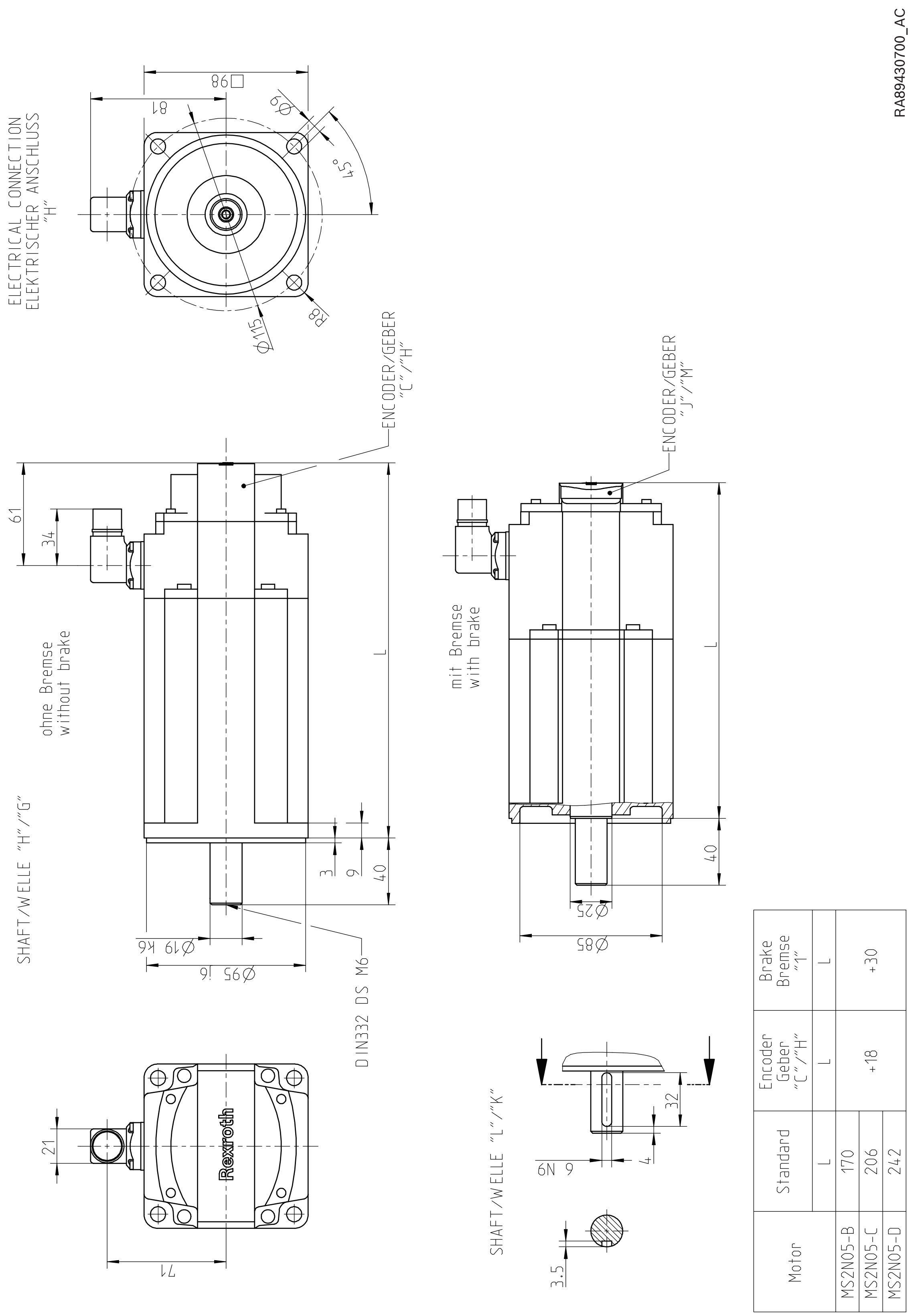

Fig. 70: MS2N05-D0BRN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## 6.4.2 MS2N05 self-cooling – dimensional drawing




| Motor | Standard L | Encoder Geber "B"/"C"/"H" L | Brake Bremse "1" L |
|---|---|---|---|
| MS2N05-B | 170 | +18 | +30 |
| MS2N05-C | 206 | | |
| MS2N05-D | 243 | | |

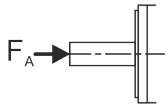
Fig. 71: MS2N05-□□□□N




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

Fig. 72: MS2N05-□□□□N-□□H

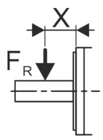
## 6.4.3 MS2N05 axial force




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

## 6.4.4 MS2N05 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.

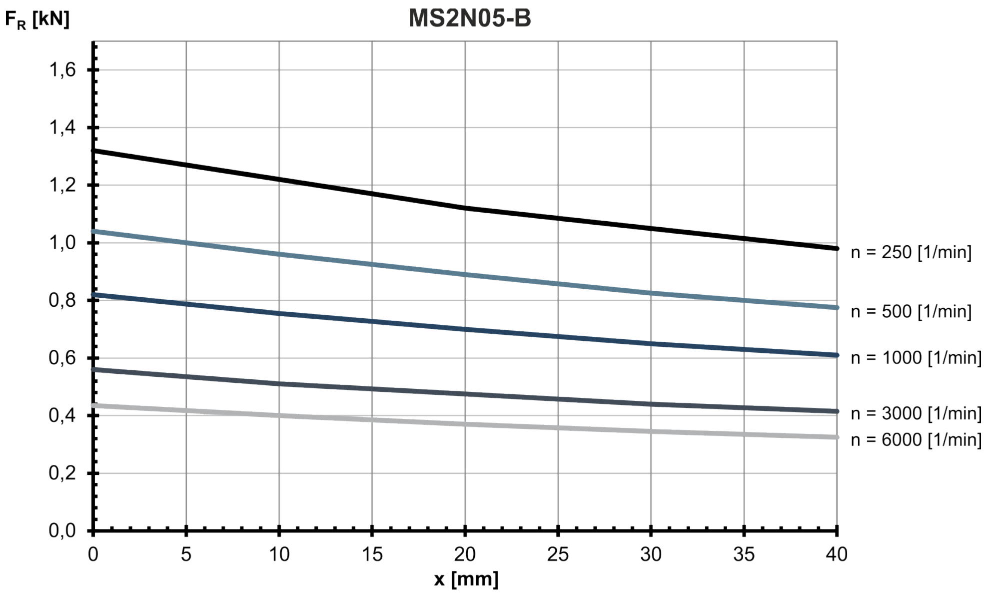



Fig. 73: MS2N05-B: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

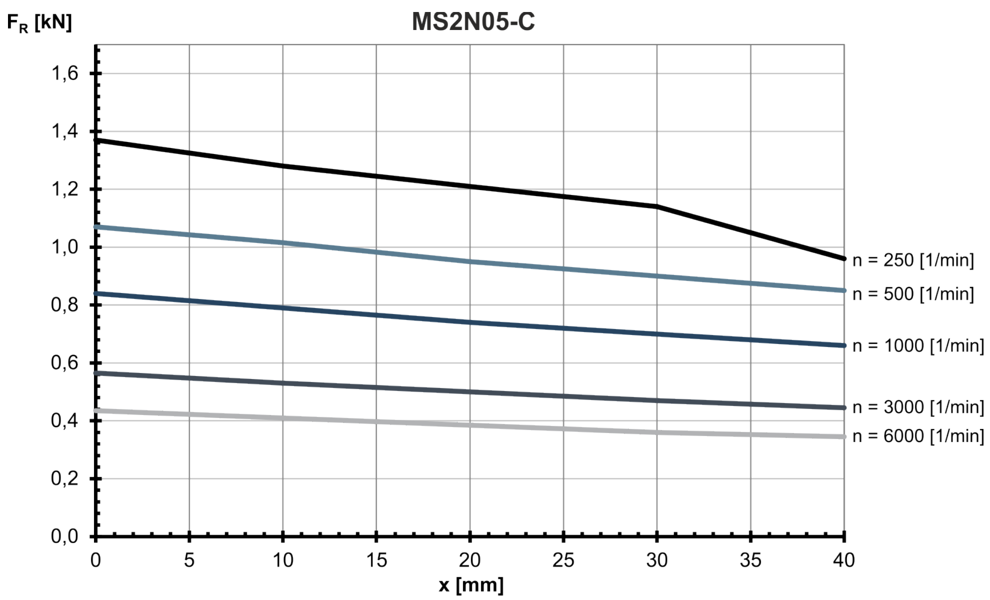



Fig. 74: MS2N05-C: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

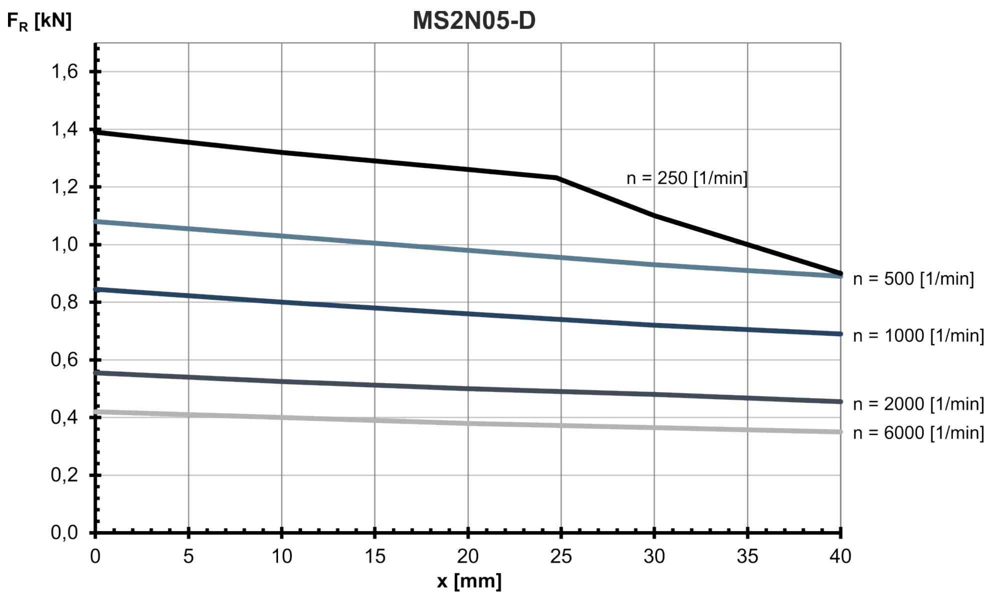



Fig. 75: MS2N05-D: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

# 6.5 MS2N06 technical data

## 6.5.1 Self-cooling

### MS2N06-B1BNN

| Designation | Symbol | Unit | MS2N06-B1BNN-□□□□0-□N | MS2N06-B1BNN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1)] | $M_{0\ 60K}$ | Nm | 3.25 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 2.22 | |
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 3.60 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 2.47 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | kg*m² | 0.00048 | 0.00059 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,000 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 2.71 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 1.93 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 0.85 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 10.2 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 9.45 | |
| Maximum current | $I_{max(rms)}$ | A | 7.8 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 1.62 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 98.2 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 12.2 | |
| Winding inductance | $L_{12\_min}$ | mH | 52.4 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 0.6 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 15.7 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 12.2 | |
| Mass | $m_{mot}$ | kg | 5.1 | 6.2 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 10.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.73 |
| Maximum connection time | $t_1$ | ms | 0 | 30 |
| Maximum disconnection time | $t_2$ | ms | 0 | 80 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

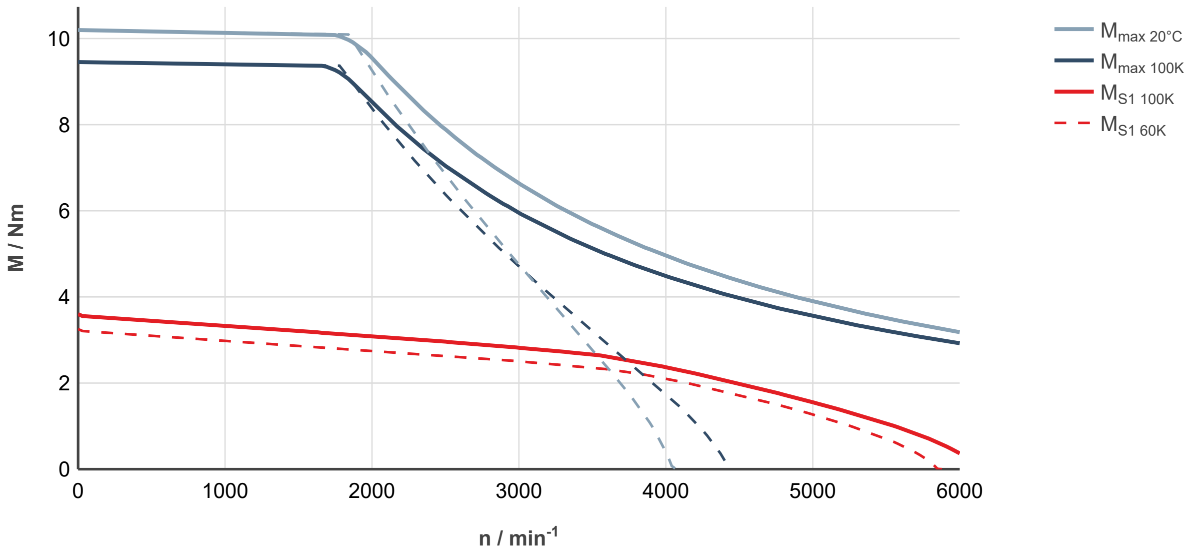



Fig. 76: MS2N06-B1BNN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

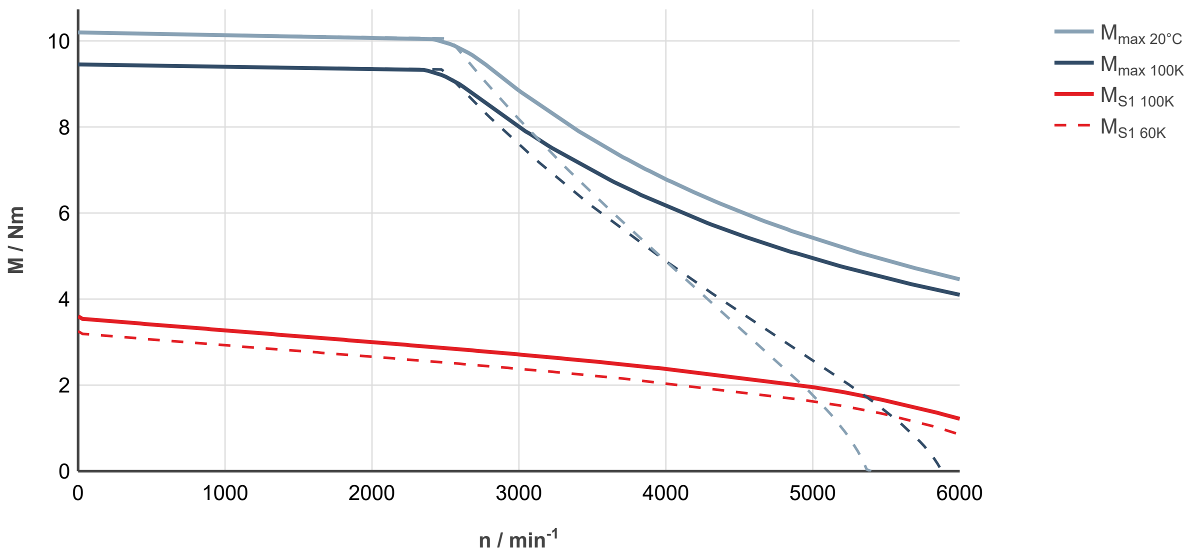



Fig. 77: MS2N06-B1BNN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N06-C0BNN

| Designation | Symbol | Unit | MS2N06-C0BNN-□□□□0-□N | MS2N06-C0BNN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 6.0 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 3.75 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 7.1 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 4.5 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.00039 | 0.00050 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,000 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 5.4 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 3.51 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 1.69 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 17.3 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 16.0 | |
| Maximum current | $I_{max(rms)}$ | A | 12.75 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.73 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 105.4 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 4.48 | |
| Winding inductance | $L_{12\_min}$ | mH | 39.5 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 6.4 | 7.4 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 10.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.73 |
| Maximum connection time | $t_1$ | ms | 0 | 30 |
| Maximum disconnection time | $t_2$ | ms | 0 | 80 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

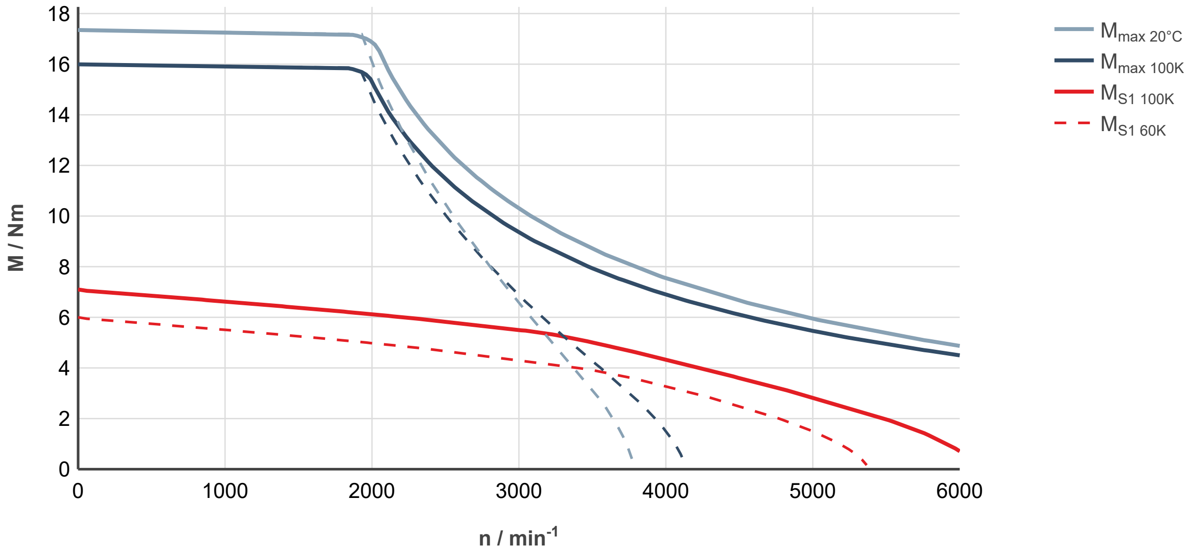



Fig. 78: MS2N06-C0BNN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

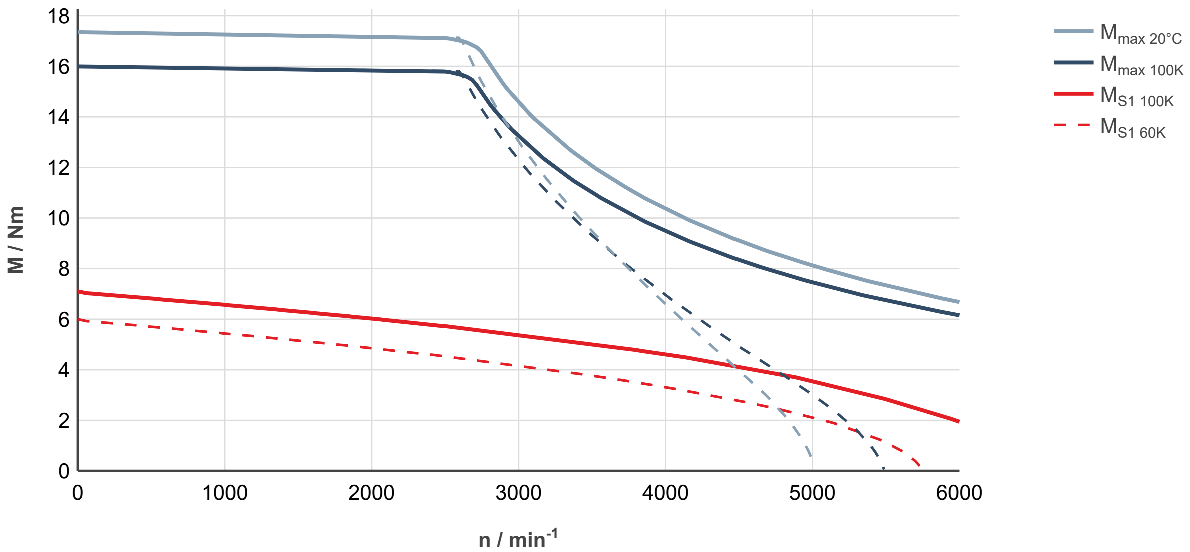



Fig. 79: MS2N06-C0BNN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N06-C0BTN

| Designation | Symbol | Unit | MS2N06-C0BTN-□□□□0-□N | MS2N06-C0BTN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 6.0 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 7.5 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 7.1 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 9.0 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.00039 | 0.00050 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 4,020 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 3.35 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 4.52 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 1.41 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 17.3 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 16.0 | |
| Maximum current | $I_{max(rms)}$ | A | 25.5 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 0.87 | |
| Voltage constant at 20 °C [1] | $K_E$ | $V/1000\ min^{-1}$ | 52.7 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 1.12 | |
| Winding inductance | $L_{12\_min}$ | mH | 9.17 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 6.4 | 7.4 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 10.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.73 |
| Maximum connection time | $t_1$ | ms | 0 | 30 |
| Maximum disconnection time | $t_2$ | ms | 0 | 80 |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

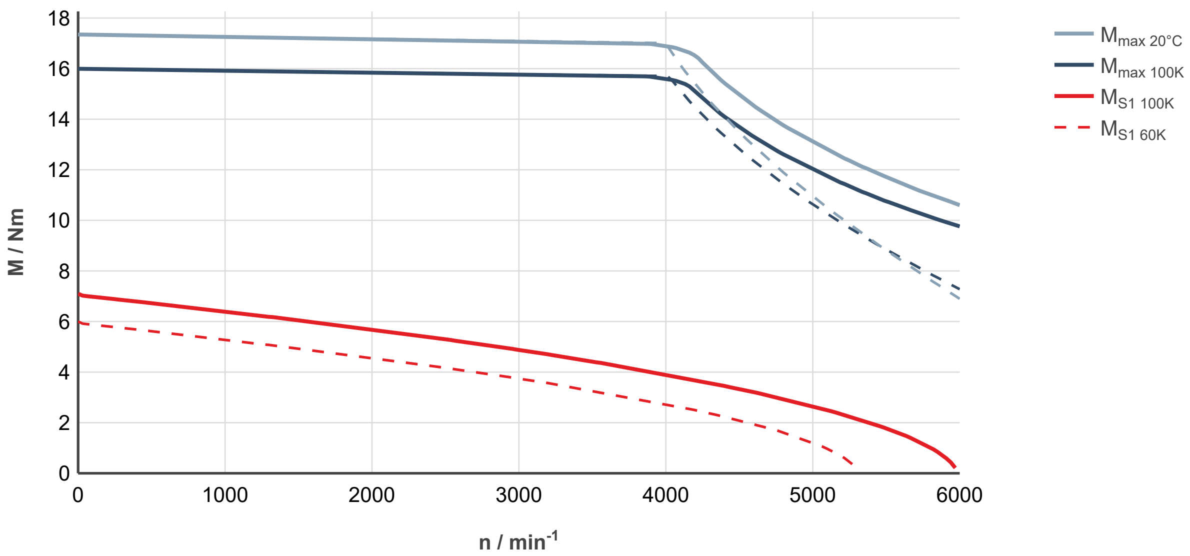



Fig. 80: MS2N06-C0BTN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

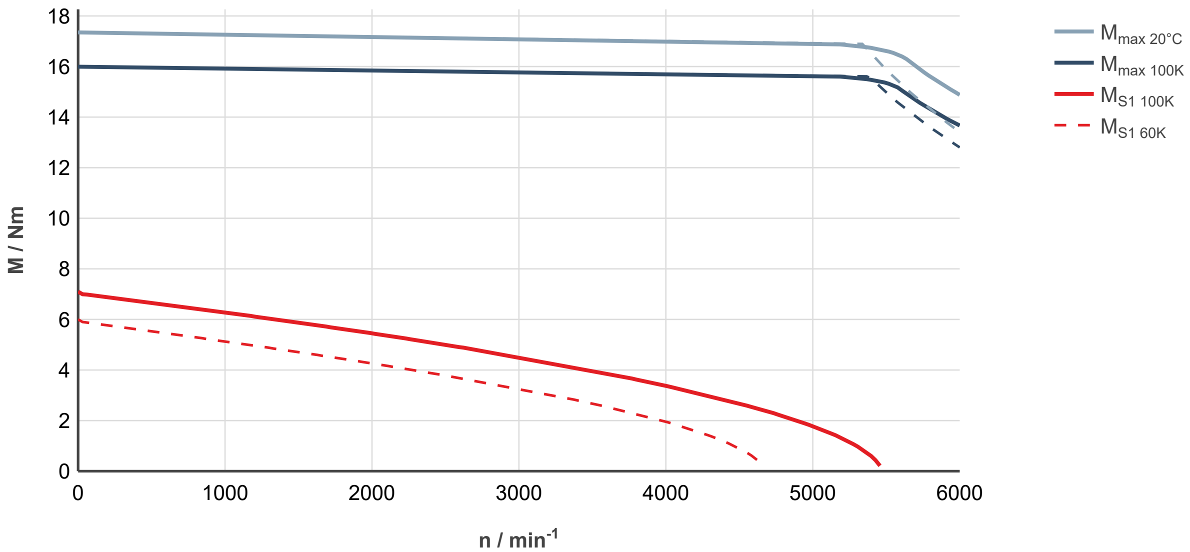



Fig. 81: MS2N06-C0BTN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N06-D0BNN

| Designation | Symbol | Unit | MS2N06-D0BNN-□□□□0-□N | MS2N06-D0BNN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 9.7 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 6.1 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 11.9 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 7.55 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | $kg{*}m^2$ | 0.00065 | 0.00079 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,960 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 8.5 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 5.6 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 2.63 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 34.8 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 32.0 | |
| Maximum current | $I_{max(rms)}$ | A | 25.4 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 1.70 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 103.5 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 1.85 | |
| Winding inductance | $L_{12\_min}$ | mH | 18 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 9.0 | 10.5 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 15.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.75 |
| Maximum connection time | $t_1$ | ms | 0 | 50 |
| Maximum disconnection time | $t_2$ | ms | 0 | 135 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

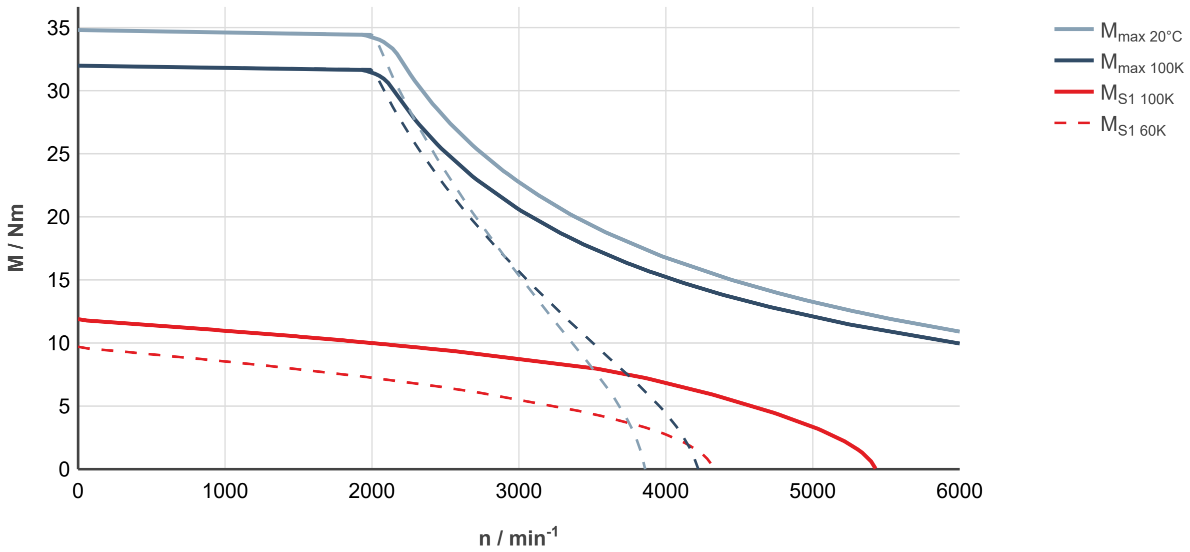



Fig. 82: MS2N06-D0BNN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

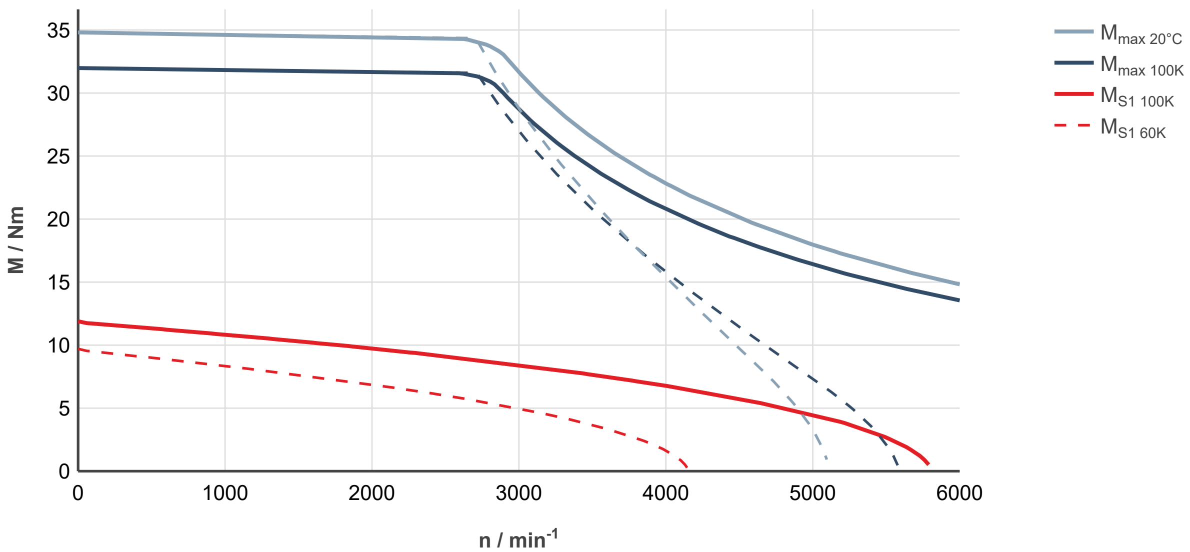



Fig. 83: MS2N06-D0BNN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N06-D0BRN

| Designation | Symbol | Unit | MS2N06-D0BRN-□□□□0-□N | MS2N06-D0BRN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1)] | $M_{0\ 60K}$ | Nm | 9.70 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 7.85 | |
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 11.9 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 9.75 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | kg*m² | 0.00065 | 0.00079 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,800 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 6.20 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 5.40 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 2.48 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 34.8 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 32.0 | |
| Maximum current | $I_{max(rms)}$ | A | 32.7 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 1.33 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 80.5 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 1.13 | |
| Winding inductance | $L_{12\_min}$ | mH | 11.06 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 9.0 | 10.5 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 15.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.75 |
| Maximum connection time | $t_1$ | ms | 0 | 50 |
| Maximum disconnection time | $t_2$ | ms | 0 | 135 |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

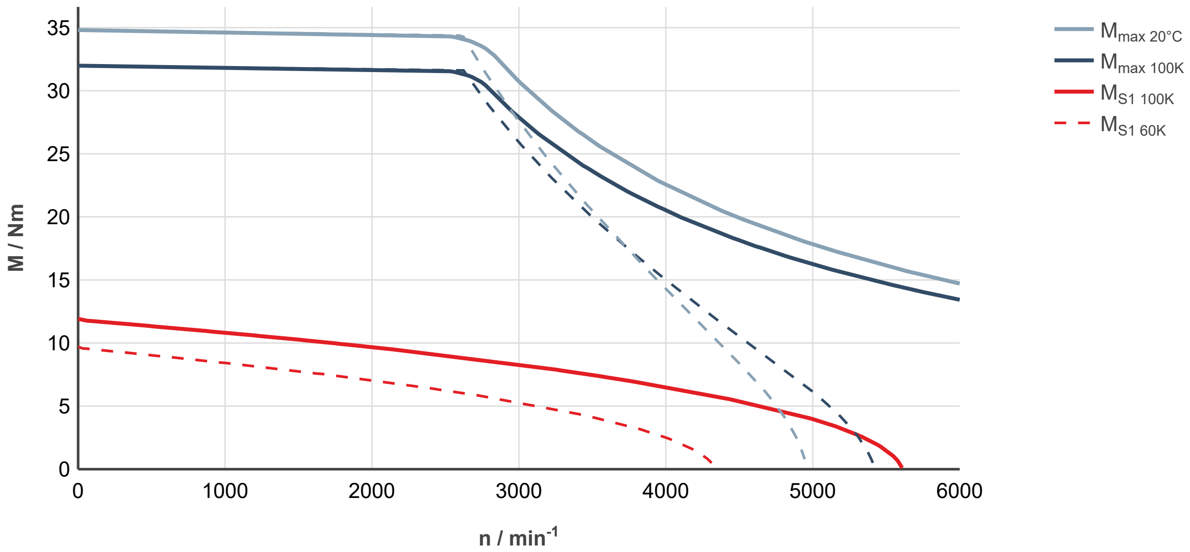



Fig. 84: MS2N06-D0BRN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

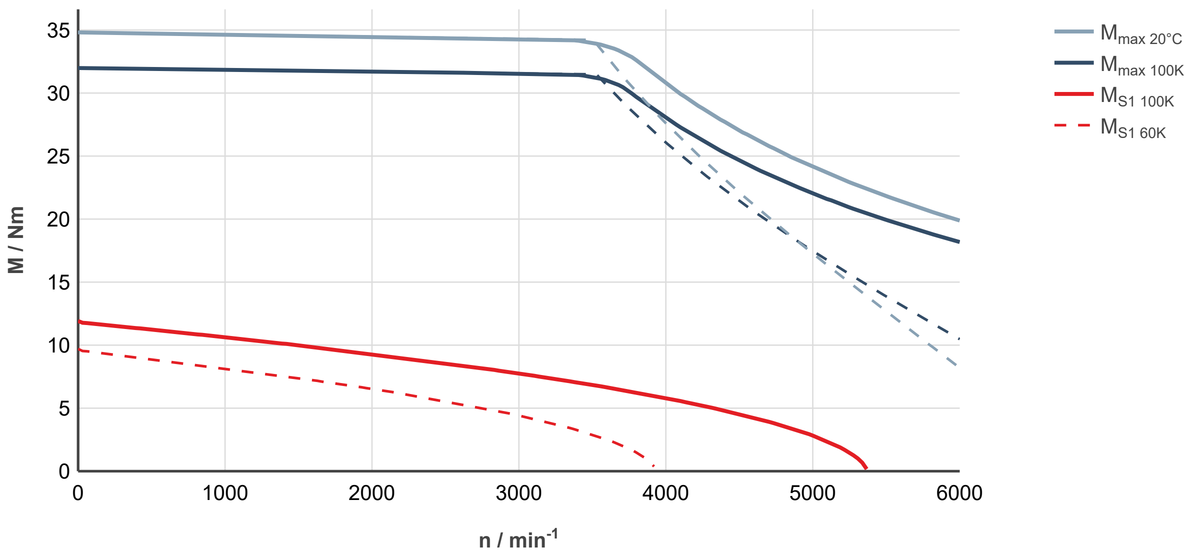



Fig. 85: MS2N06-D0BRN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N06-D1BNN

| Designation | Symbol | Unit | MS2N06-D1BNN-□□□□0-□N | MS2N06-D1BNN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 9.0 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 5.05 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 11.1 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 6.25 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0014 | 0.00154 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,000 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 6.40 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 3.82 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 2.01 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 41.8 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 38.4 | |
| Maximum current | $I_{max(rms)}$ | A | 25.5 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 1.93 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 117.3 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 2.75 | |
| Winding inductance | $L_{12\_min}$ | mH | 18.0 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.84 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 32.5 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 17.4 | |
| Mass | $m_{mot}$ | kg | 9.0 | 10.5 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 15.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.75 |
| Maximum connection time | $t_1$ | ms | 0 | 50 |
| Maximum disconnection time | $t_2$ | ms | 0 | 135 |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

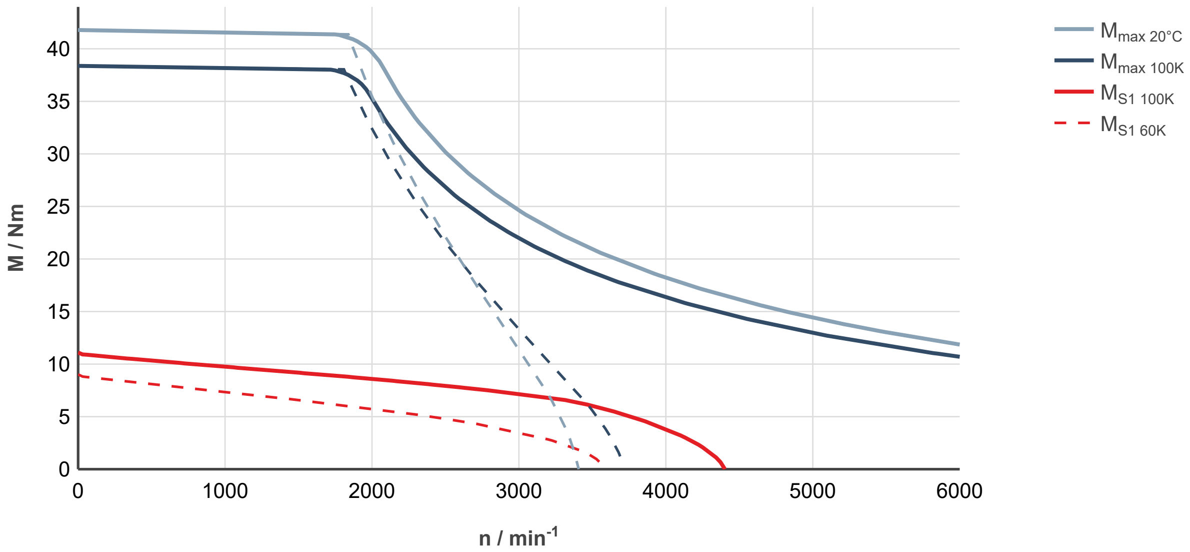



Fig. 86: MS2N06-D1BNN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

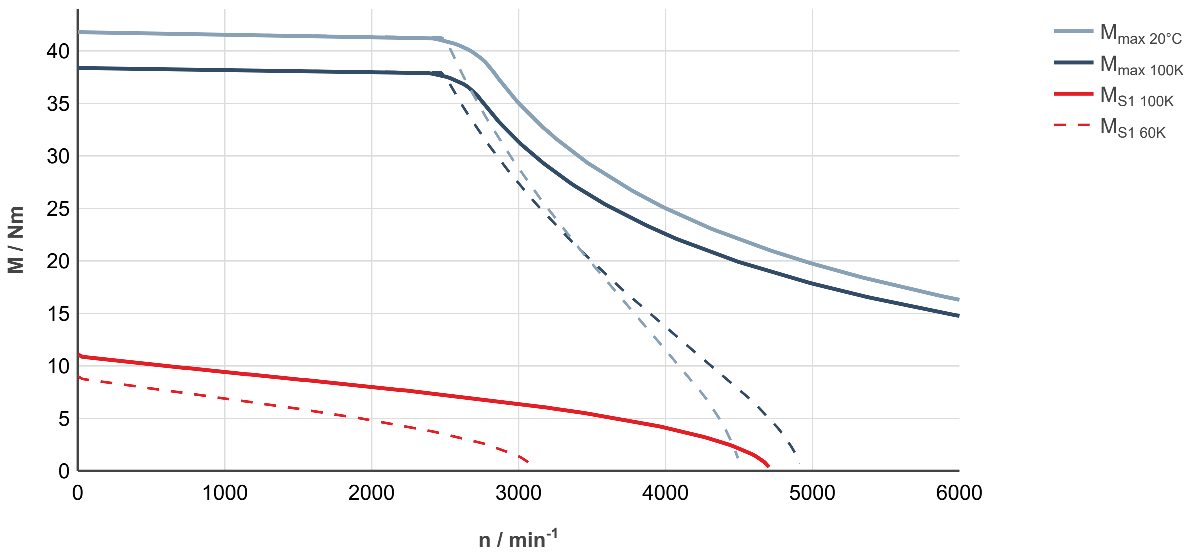



Fig. 87: MS2N06-D1BNN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N06-E0BHN

<table>
<tr><th>Designation</th><th>Symbol</th><th>Unit</th><th>MS2N06-E0BHN-□□□□0-□N</th><th>MS2N06-E0BHN-□□□□2-□N</th></tr>
<tr><td>Standstill torque - 60K [1)]</td><td>$M_{0\ 60K}$</td><td>Nm</td><td colspan="2">13.0</td></tr>
<tr><td>Standstill current - 60K</td><td>$I_{0\ 60K}$</td><td>A</td><td colspan="2">5.4</td></tr>
<tr><td>Standstill torque - 100K [1)]</td><td>$M_{0\ 100K}$</td><td>Nm</td><td colspan="2">16.3</td></tr>
<tr><td>Standstill current - 100K</td><td>$I_{0\ 100K}$</td><td>A</td><td colspan="2">6.8</td></tr>
<tr><td>Moment of inertia of rotor [1)]</td><td>$J_{rot}$</td><td>kg*m²</td><td>0.00089</td><td>0.00103</td></tr>
<tr><td>Rated speed - 100K</td><td>$n_{N\ 100K}$</td><td>1/min</td><td colspan="2">2,000</td></tr>
<tr><td>Rated torque - 100K [1)]</td><td>$M_{N\ 100K}$</td><td>Nm</td><td colspan="2">13.15</td></tr>
<tr><td>Rated current - 100K</td><td>$I_{N\ 100K}$</td><td>A</td><td colspan="2">5.65</td></tr>
<tr><td>Rated power - 100K [1)]</td><td>$P_{N\ 100K}$</td><td>kW</td><td colspan="2">2.75</td></tr>
<tr><td>Maximum torque 20 °C (cold) [1)]</td><td>$M_{max\ 20°C}$</td><td>Nm</td><td colspan="2">53.4</td></tr>
<tr><td>Maximum torque 100K (warm) [1)]</td><td>$M_{max\ 100K}$</td><td>Nm</td><td colspan="2">49.0</td></tr>
<tr><td>Maximum current</td><td>$I_{max(rms)}$</td><td>A</td><td colspan="2">25.4</td></tr>
<tr><td>Maximum speed (electrical)</td><td>$n_{max\ el}$</td><td>1/min</td><td colspan="2">4,000</td></tr>
<tr><td>Maximum speed (mechanical)</td><td>$n_{max\ mech}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Number of pole pairs</td><td>p</td><td>–</td><td colspan="2">5</td></tr>
<tr><td>Torque constant at 20 °C [1)]</td><td>$K_m$</td><td>Nm/A</td><td colspan="2">2.58</td></tr>
<tr><td>Voltage constant at 20 °C [1)]</td><td>$K_E$</td><td>V/1000 $min^{-1}$</td><td colspan="2">157</td></tr>
<tr><td>Winding resistance at 20 °C</td><td>$R_{12}$</td><td>Ohm</td><td colspan="2">2.54</td></tr>
<tr><td>Winding inductance</td><td>$L_{12\_min}$</td><td>mH</td><td colspan="2">27.6</td></tr>
<tr><td>Leakage capacitance of the component</td><td>$C_{ab}$</td><td>nF</td><td colspan="2">3.03</td></tr>
<tr><td>Thermal time constant of winding</td><td>$T_{th\_W}$</td><td>s</td><td colspan="2">48.6</td></tr>
<tr><td>Thermal time constant of motor</td><td>$T_{th\_M}$</td><td>min</td><td colspan="2">20.0</td></tr>
<tr><td>Mass</td><td>$m_{mot}$</td><td>kg</td><td>11.5</td><td>13.0</td></tr>
<tr><td colspan="5"><u>Holding brake</u></td></tr>
<tr><td>Holding torque</td><td>$M_4$</td><td>Nm</td><td>0</td><td>15.00</td></tr>
<tr><td>Rated voltage</td><td>$U_N$</td><td>V</td><td>0</td><td>24</td></tr>
<tr><td>Rated current</td><td>$I_N$</td><td>A</td><td>0</td><td>0.75</td></tr>
<tr><td>Maximum connection time</td><td>$t_1$</td><td>ms</td><td>0</td><td>50</td></tr>
<tr><td>Maximum disconnection time</td><td>$t_2$</td><td>ms</td><td>0</td><td>135</td></tr>
<tr><td colspan="5">1) For tolerance details refer to ➦Chapter 5.4 Tolerances</td></tr>
</table>

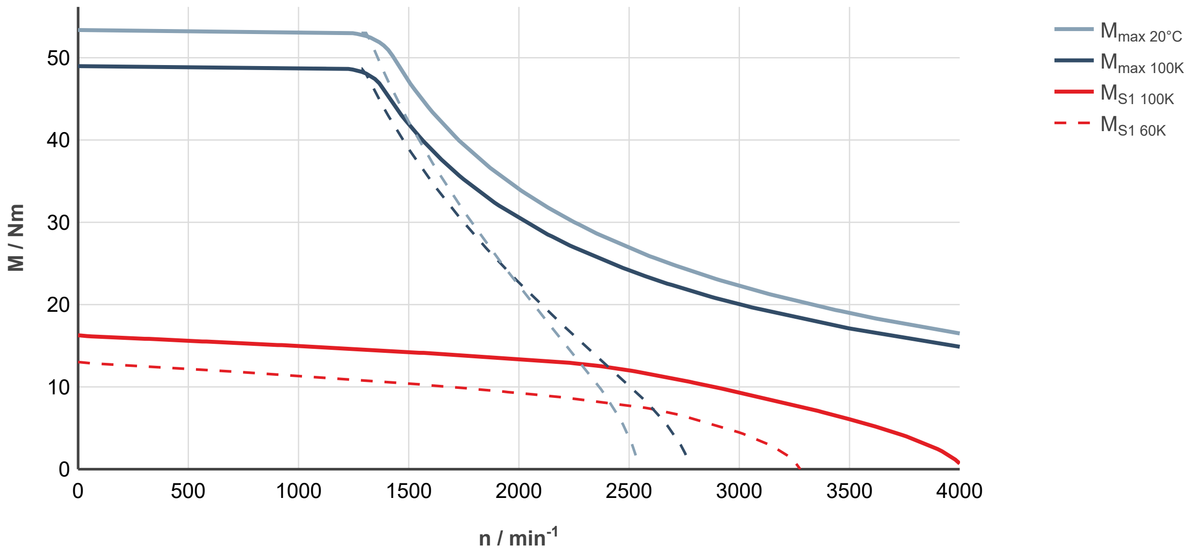



Fig. 88: MS2N06-E0BHN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

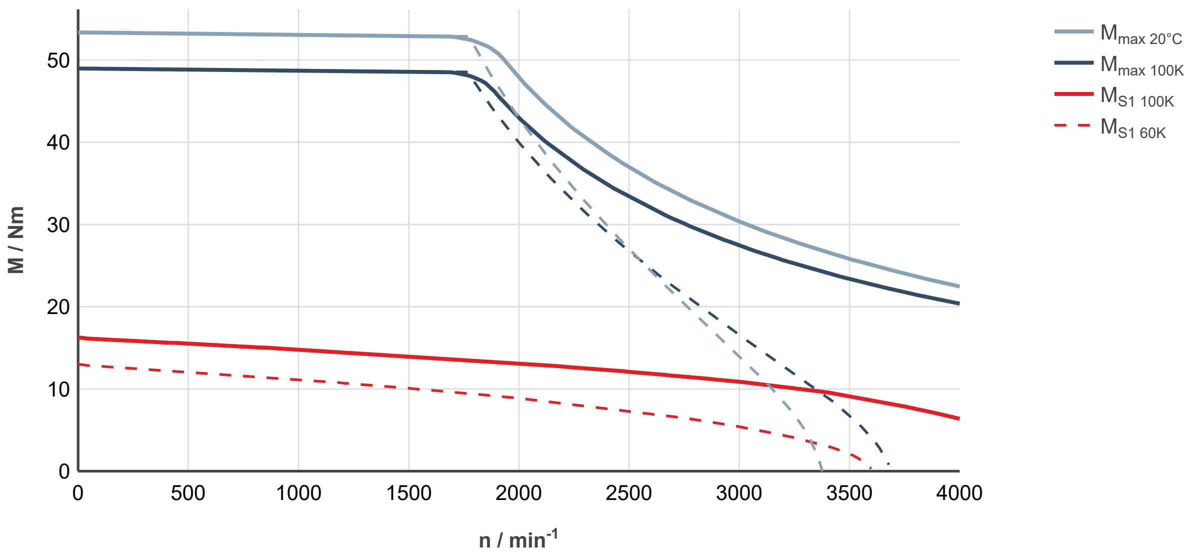



Fig. 89: MS2N06-E0BHN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N06-E0BRN

| Designation | Symbol | Unit | MS2N06-E0BRN-□□□□0-□N | MS2N06-E0BRN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 13.0 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 10.85 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 16.3 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 13.7 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | $kg*m^2$ | 0.00089 | 0.00103 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,120 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 8.05 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 7.2 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 2.63 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 53.4 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 49.0 | |
| Maximum current | $I_{max(rms)}$ | A | 50.8 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.29 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 78.4 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.638 | |
| Winding inductance | $L_{12\_min}$ | mH | 6.895 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 3.87 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 48.6 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 20.0 | |
| Mass | $m_{mot}$ | kg | 11.5 | 13.0 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 15.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.75 |
| Maximum connection time | $t_1$ | ms | 0 | 50 |
| Maximum disconnection time | $t_2$ | ms | 0 | 135 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

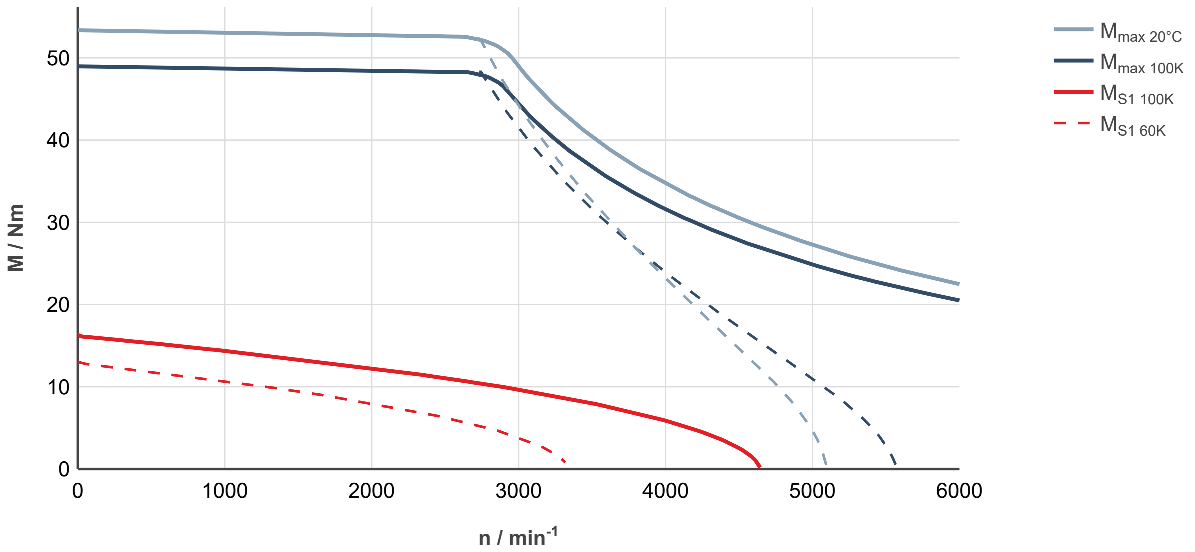



Fig. 90: MS2N06-E0BRN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

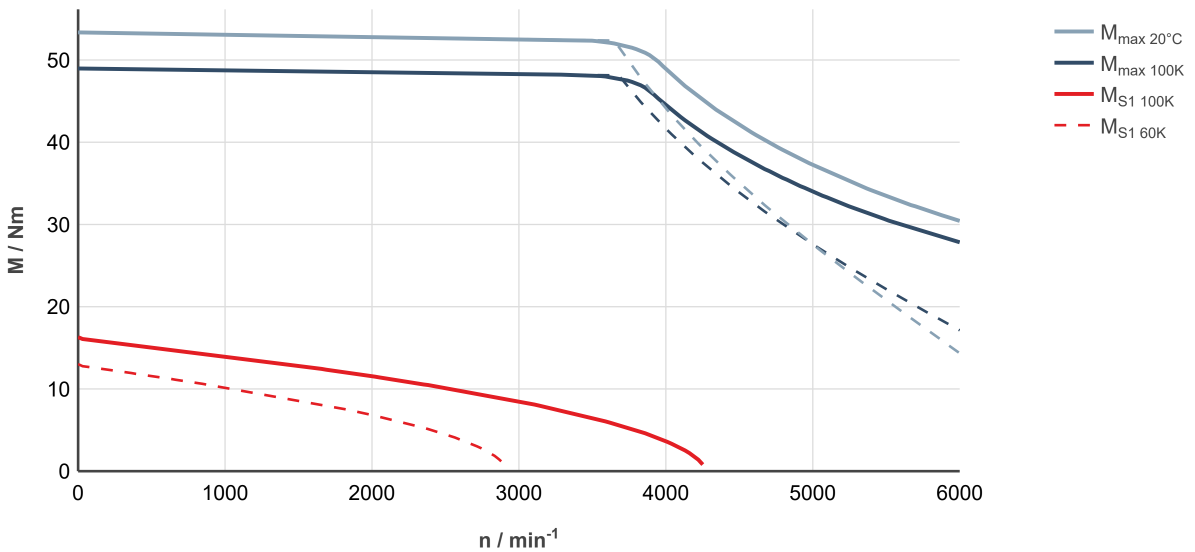
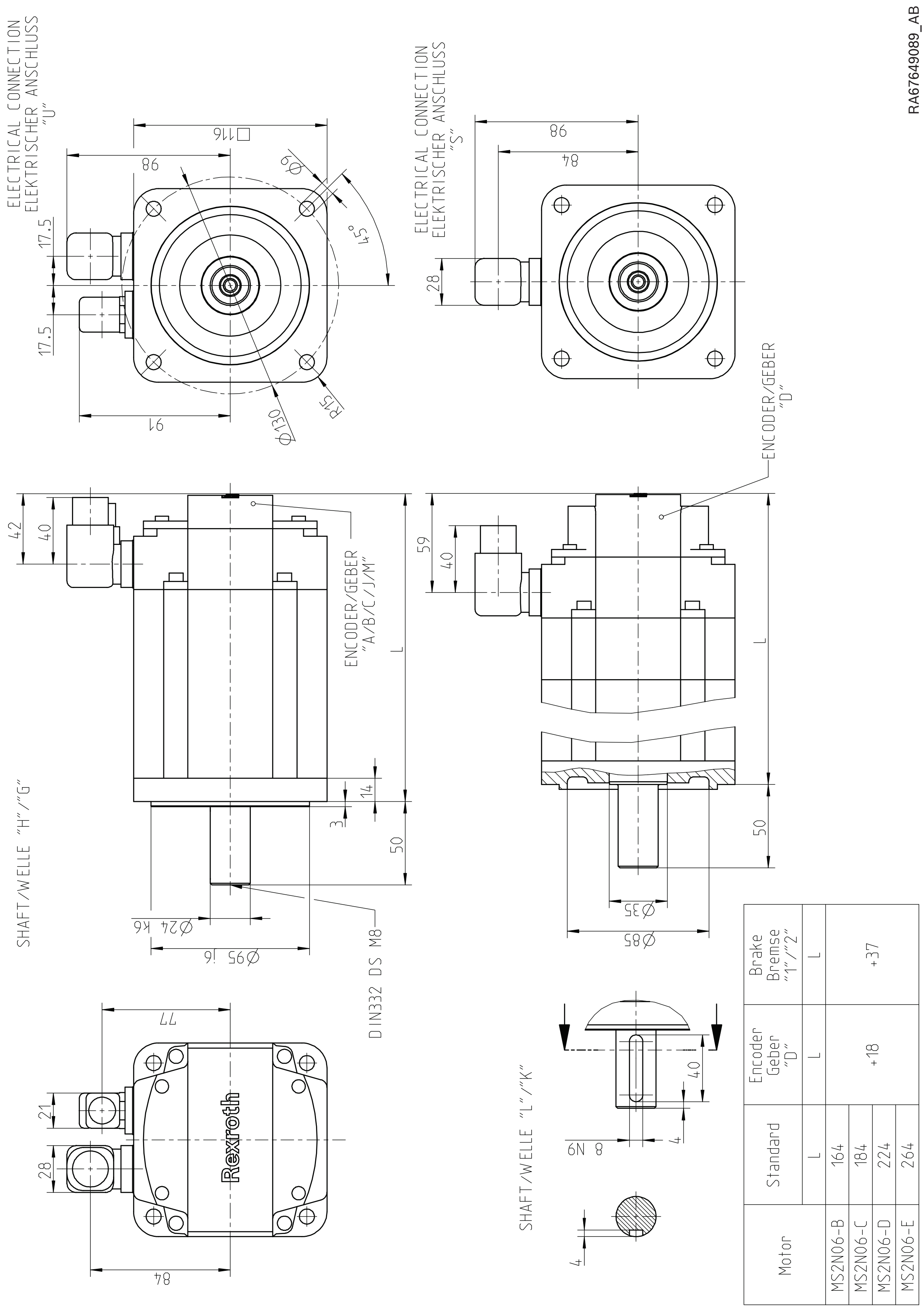



Fig. 91: MS2N06-E0BRN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

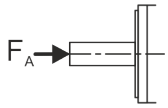
## 6.5.2 MS2N06 self-cooling – dimensional drawing




| 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. 92: MS2N06-□□□□N

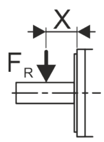
## 6.5.3 MS2N06 axial force




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

## 6.5.4 MS2N06 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.

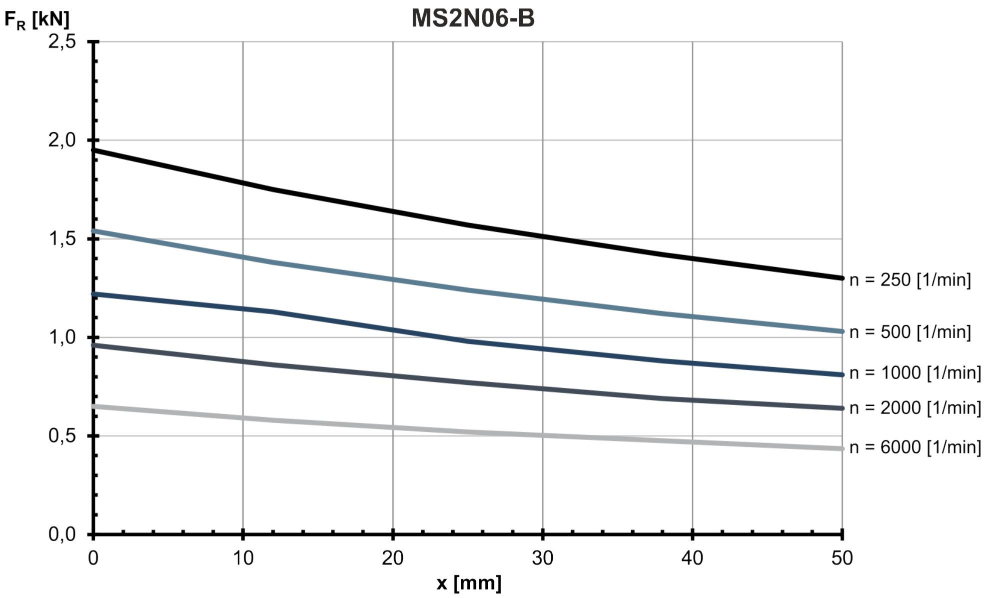



Fig. 93: MS2N06-B: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

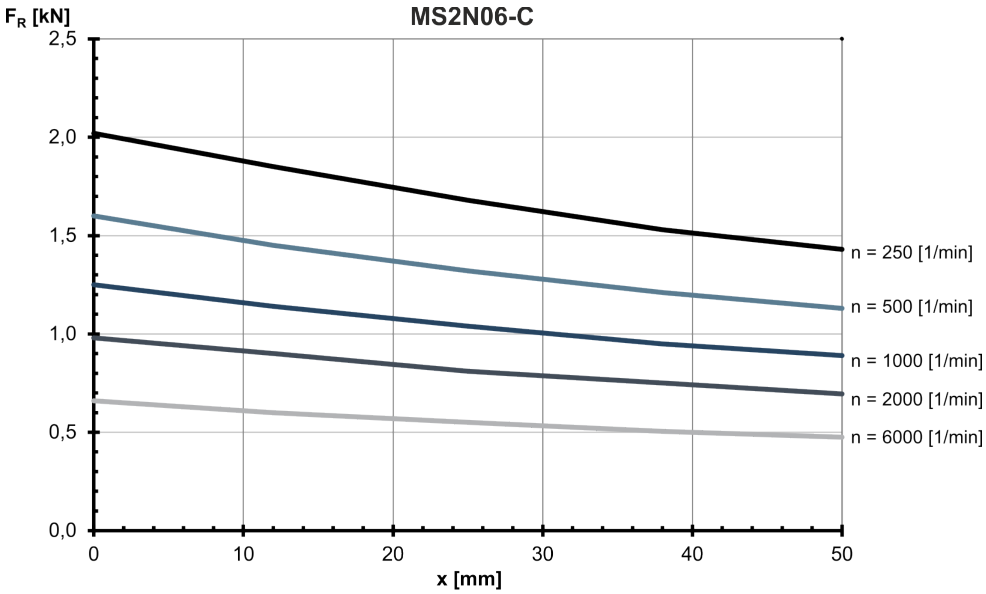



Fig. 94: MS2N06-C: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

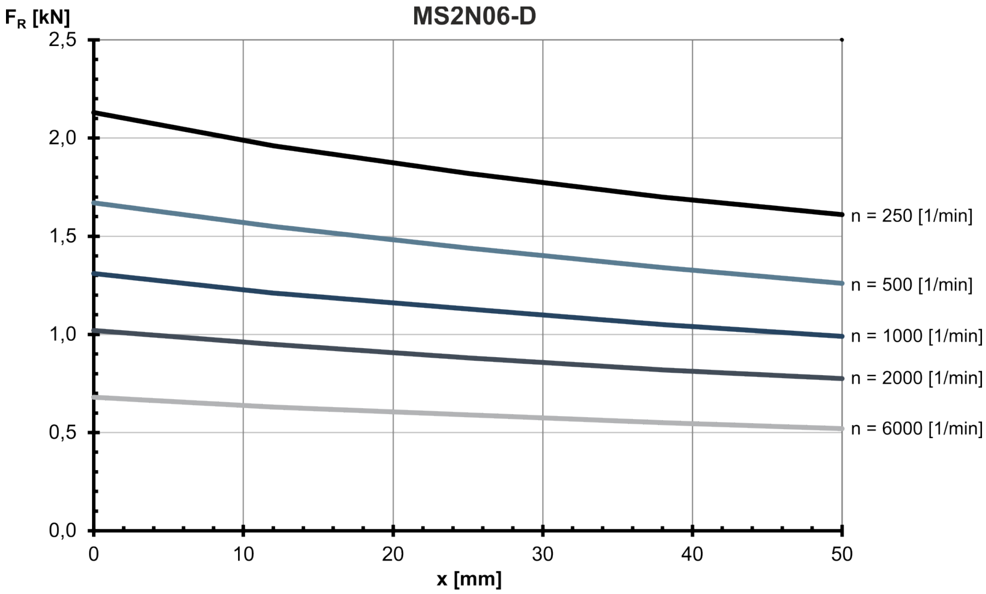



Fig. 95: MS2N06-D: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

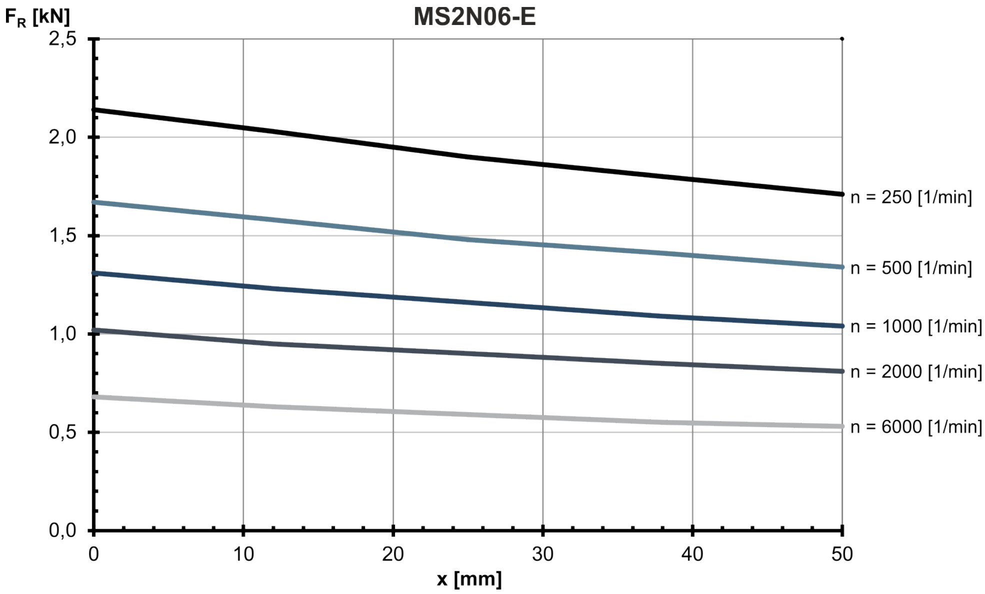



Fig. 96: MS2N06-E: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

# 6.6 MS2N07 technical data

## 6.6.1 Self-cooling

### MS2N07-B1BNN

| Designation | Symbol | Unit | MS2N07-B1BNN-□□□□0-□N | MS2N07-B1BNN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 7.4 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 4.25 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 8.2 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 4.74 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | $kg*m^2$ | 0.00197 | 0.00223 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,920 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 6.8 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 4.04 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 2.08 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 22.8 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 21.0 | |
| Maximum current | $I_{max(rms)}$ | A | 14.8 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.89 | |
| Voltage constant at 20 °C 1) | $K_E$ | $V/1000\ min^{-1}$ | 114.5 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 4.62 | |
| Winding inductance | $L_{12\_min}$ | mH | 31.29 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 0.9 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 34.9 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 13.0 | |
| Mass | $m_{mot}$ | kg | 9.5 | 11.5 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 20.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.78 |
| Maximum connection time | $t_1$ | ms | 0 | 40 |
| Maximum disconnection time | $t_2$ | ms | 0 | 100 |
| 1) For tolerance details refer to ➡Chapter 5.4 Tolerances | | | | |

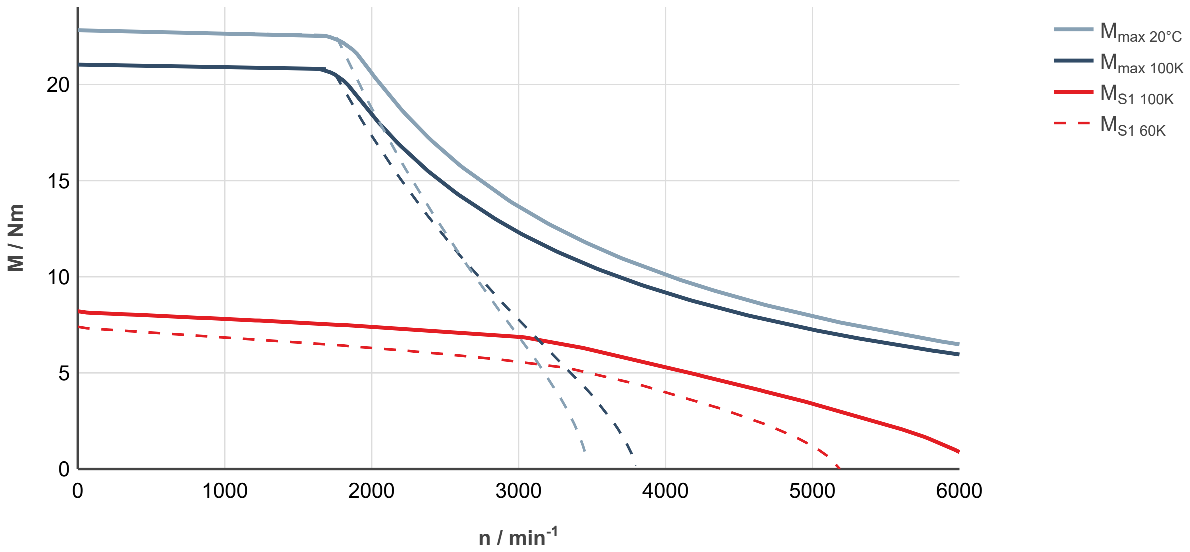



Fig. 97: MS2N07-B1BNN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

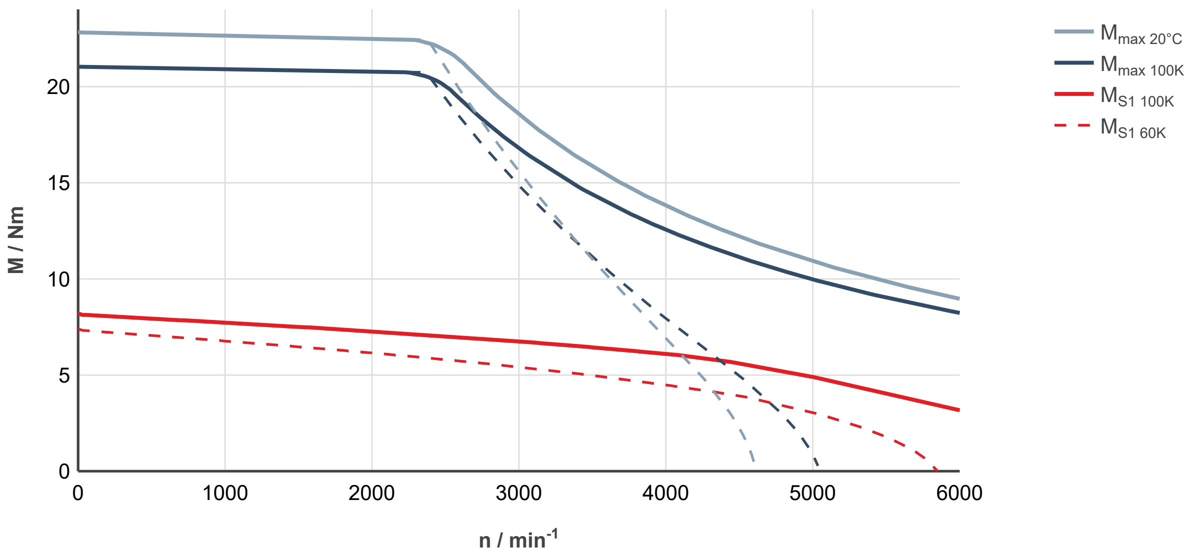



Fig. 98: MS2N07-B1BNN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-C0BNN

| Designation | Symbol | Unit | MS2N07-C0BNN-□□□□0-□N | MS2N07-C0BNN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 12.8 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 6.9 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 16.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 8.8 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0012 | 0.00146 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,650 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 12.65 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 7.05 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 3.5 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 38.8 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 35.7 | |
| Maximum current | $I_{max(rms)}$ | A | 24.8 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.01 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 122.0 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 1.58 | |
| Winding inductance | $L_{12\_min}$ | mH | 23.2 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 2.42 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 46.4 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 14.8 | |
| Mass | $m_{mot}$ | kg | 12.0 | 14.0 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 20.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.78 |
| Maximum connection time | $t_1$ | ms | 0 | 40 |
| Maximum disconnection time | $t_2$ | ms | 0 | 100 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

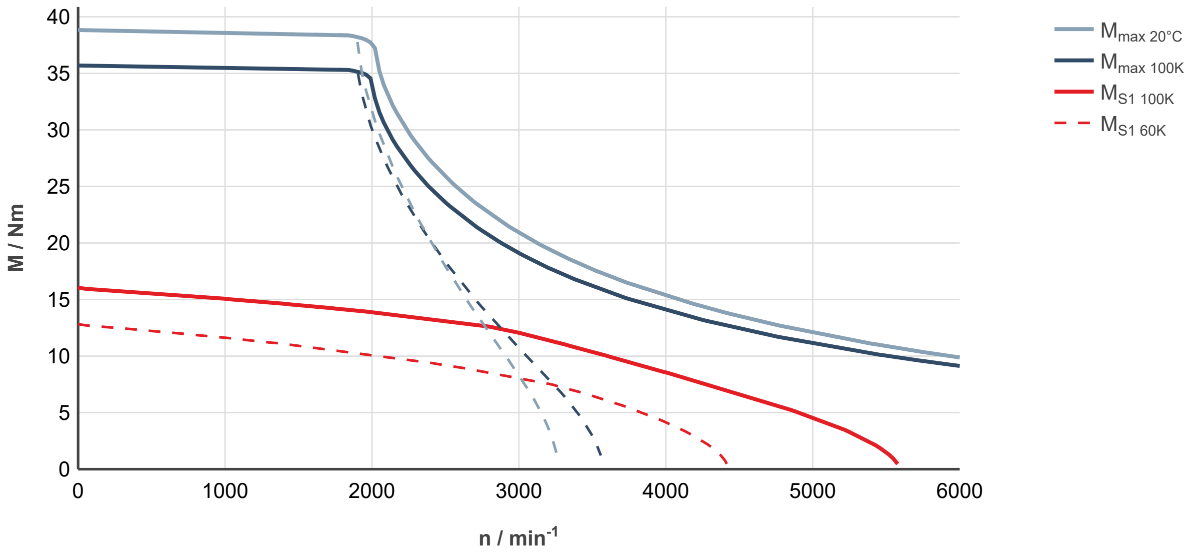



Fig. 99: MS2N07-C0BNN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

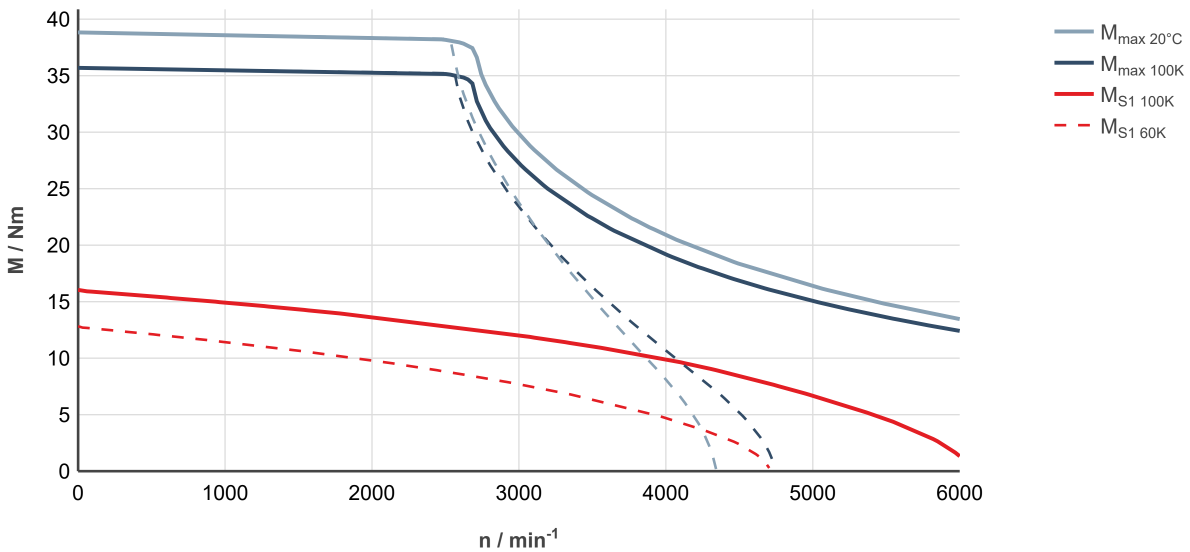



Fig. 100: MS2N07-C0BNN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-C0BQN

| Designation | Symbol | Unit | MS2N07-C0BQN-□□□□0-□N | MS2N07-C0BQN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 12.8 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 10.1 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 16.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 12.9 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0012 | 0.00146 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 4,070 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 9.0 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 7.5 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 3.84 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 38.8 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 35.7 | |
| Maximum current | $I_{max(rms)}$ | A | 36.4 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.37 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 83.1 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.776 | |
| Winding inductance | $L_{12\_min}$ | mH | 10.5 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 12.0 | 14.0 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 20.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.78 |
| Maximum connection time | $t_1$ | ms | 0 | 40 |
| Maximum disconnection time | $t_2$ | ms | 0 | 100 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

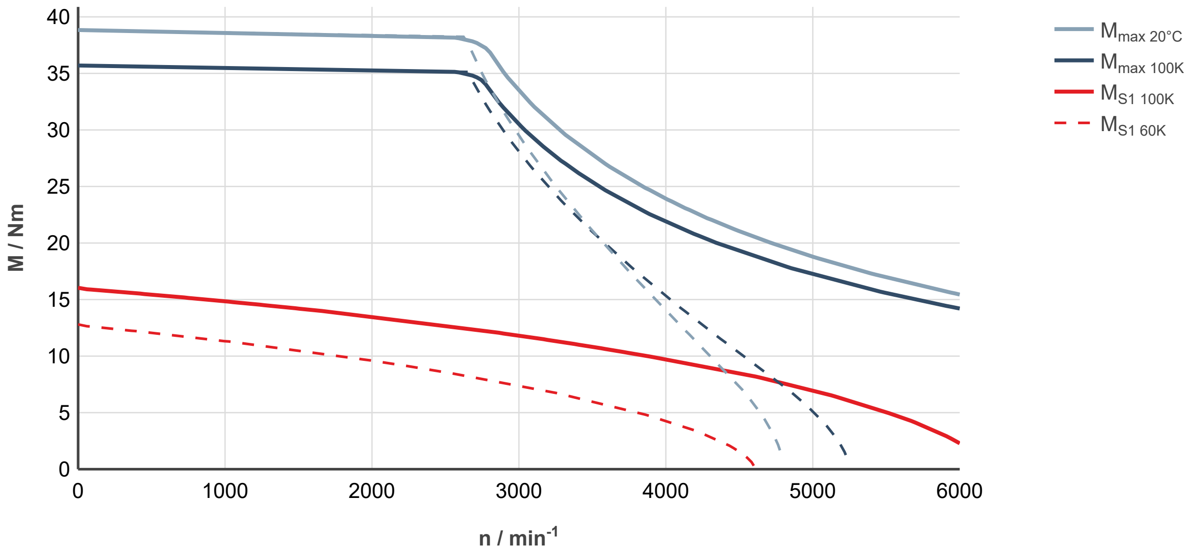



Fig. 101: MS2N07-C0BQN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

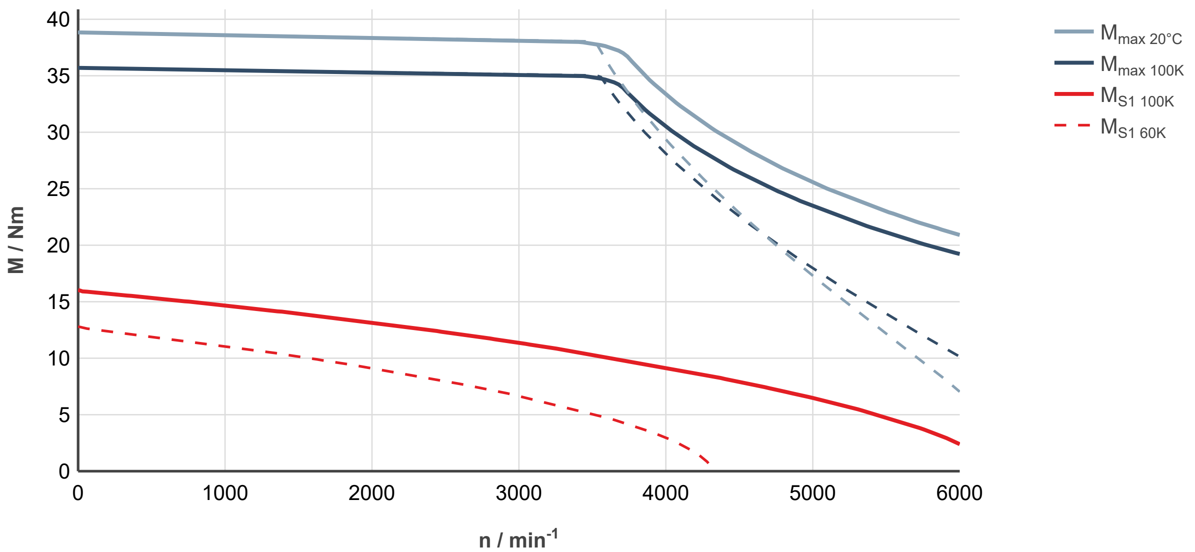



Fig. 102: MS2N07-C0BQN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-C1BNN

| Designation | Symbol | Unit | MS2N07-C1BNN-□□□□0-□N | MS2N07-C1BNN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 11.5 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 6.6 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 14.5 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 8.35 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.00305 | 0.00331 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,020 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 9.60 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 5.80 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 3.04 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 46.0 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 42.2 | |
| Maximum current | $I_{max(rms)}$ | A | 29.5 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 1.88 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 114.0 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 1.8 | |
| Winding inductance | $L_{12\_min}$ | mH | 15.2 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 12.0 | 14.0 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 20.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.78 |
| Maximum connection time | $t_1$ | ms | 0 | 40 |
| Maximum disconnection time | $t_2$ | ms | 0 | 100 |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

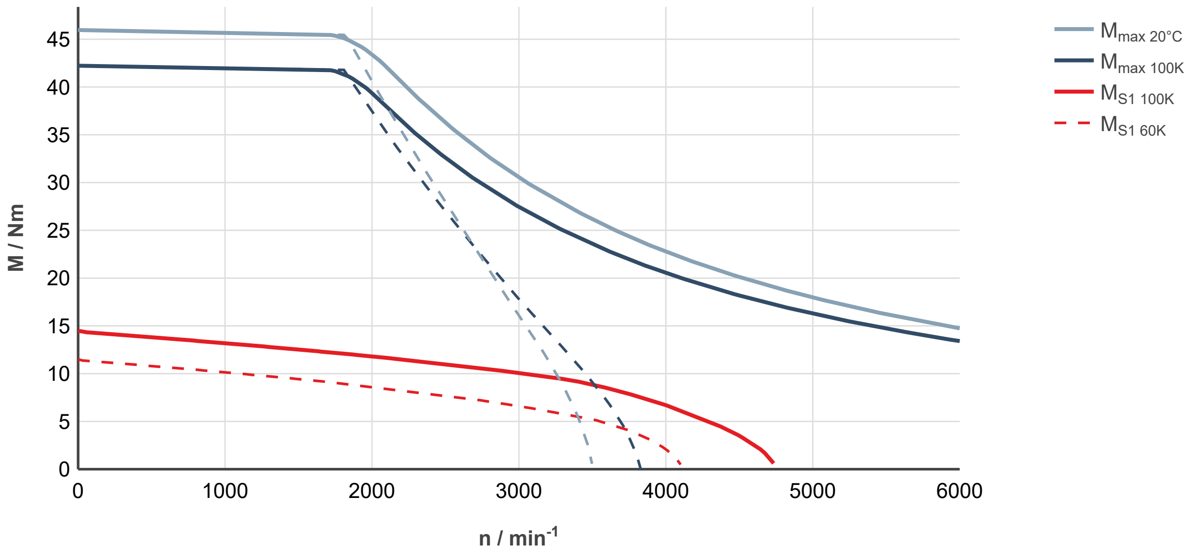



Fig. 103: MS2N07-C1BNN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

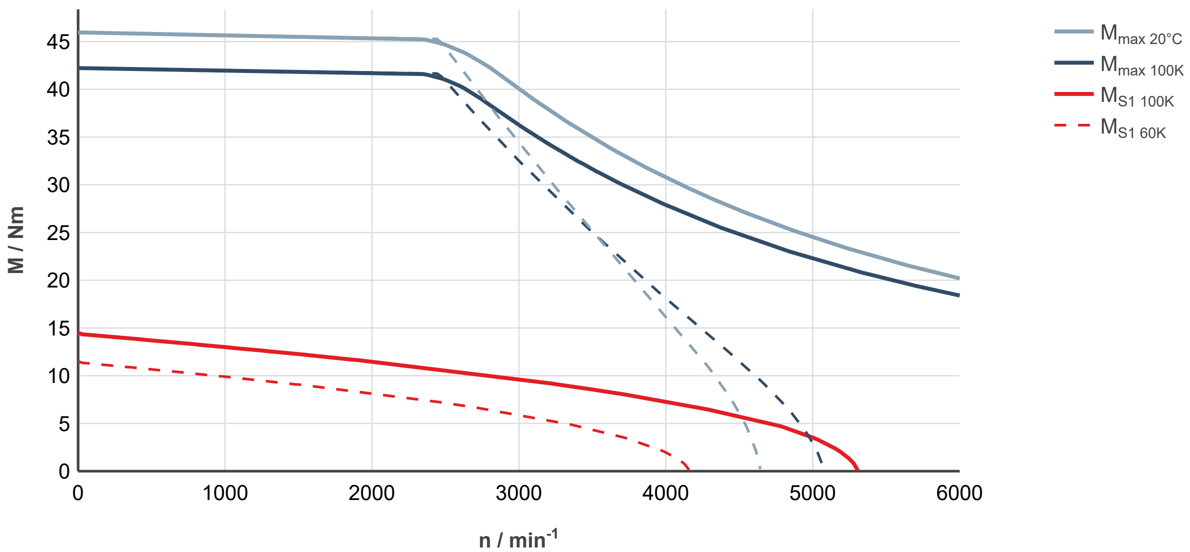



Fig. 104: MS2N07-C1BNN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-C1BRN

| Designation | Symbol | Unit | MS2N07-C1BRN-□□□□0-□N | MS2N07-C1BRN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 11.5 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 9.55 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 14.5 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 12.1 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.00305 | 0.00331 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,610 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 7.05 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 6.3 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 2.66 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 46.0 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 42.2 | |
| Maximum current | $I_{max(rms)}$ | A | 42.7 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.3 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 78.7 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.895 | |
| Winding inductance | $L_{12\_min}$ | mH | 7.28 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.65 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 37.8 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 14.8 | |
| Mass | $m_{mot}$ | kg | 12.0 | 14.0 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 20.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.78 |
| Maximum connection time | $t_1$ | ms | 0 | 40 |
| Maximum disconnection time | $t_2$ | ms | 0 | 100 |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

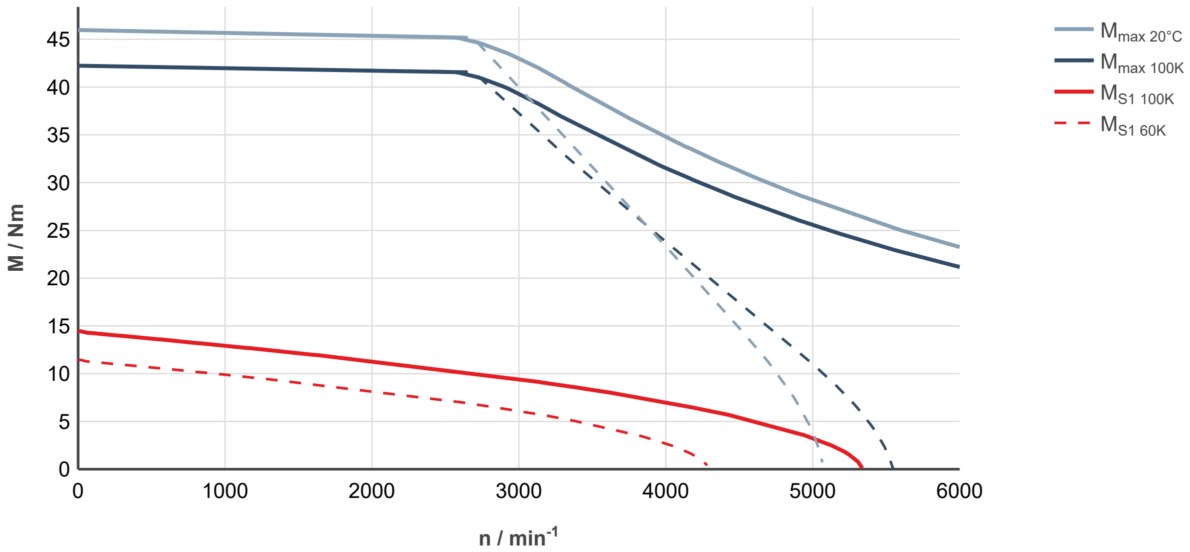



Fig. 105: MS2N07-C1BRN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

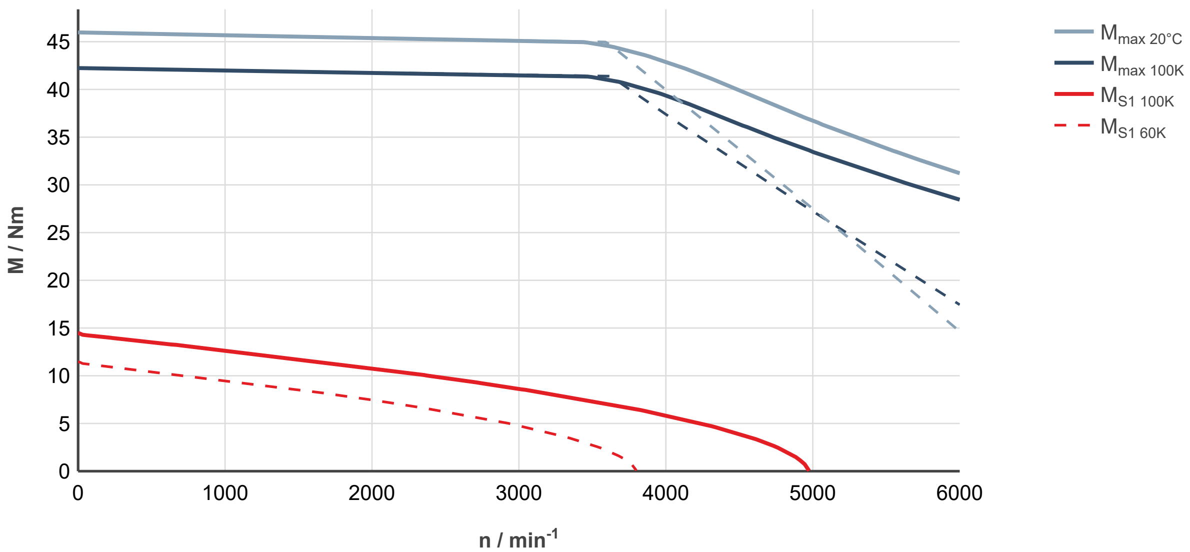



Fig. 106: MS2N07-C1BRN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D0BFN

| Designation | Symbol | Unit | MS2N07-D0BFN-□□□□0-□N | MS2N07-D0BFN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 22.0 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 5.8 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 28.2 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 7.55 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0021 | 0.00251 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,340 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 24.9 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 6.75 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 3.49 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 79.7 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 73.2 | |
| Maximum current | $I_{max(rms)}$ | A | 24.8 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 4.09 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 248 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 2.71 | |
| Winding inductance | $L_{12\_min}$ | mH | 45.67 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 4.71 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 54 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 18.7 | |
| Mass | $m_{mot}$ | kg | 17.5 | 20 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

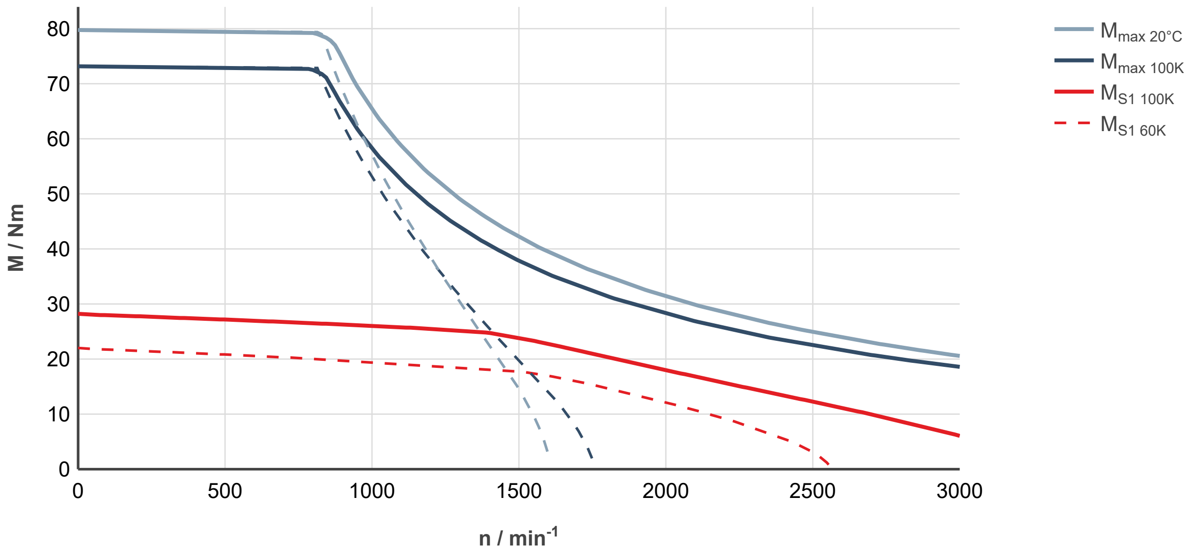



Fig. 107: MS2N07-D0BFN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

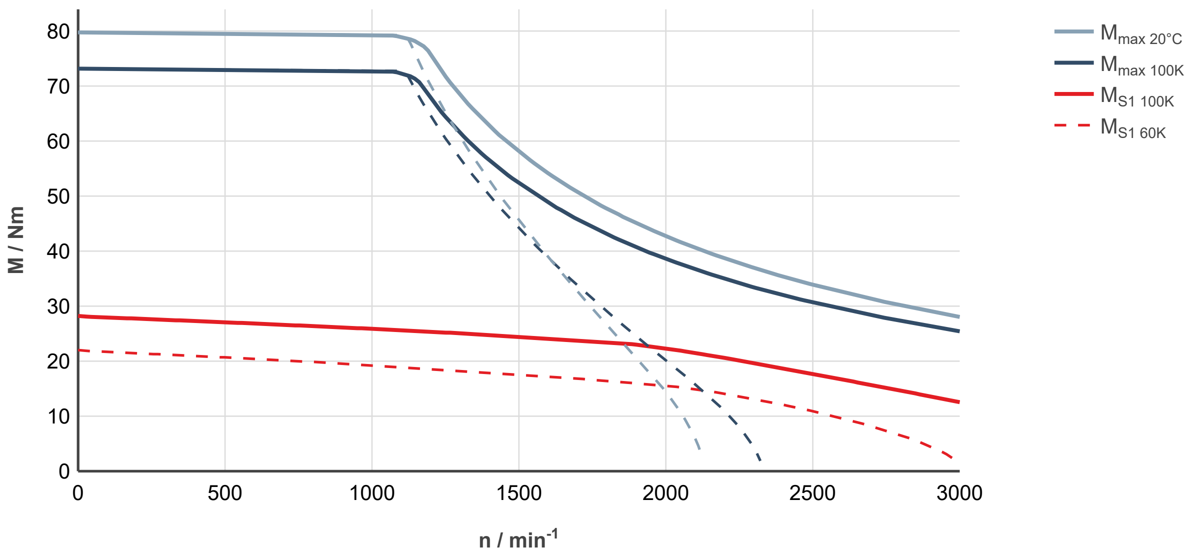



Fig. 108: MS2N07-D0BFN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D0BHN

| Designation | Symbol | Unit | MS2N07-D0BHN-□□□□0-□N | MS2N07-D0BHN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 22.0 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 8.55 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 28.2 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 11.1 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0021 | 0.00251 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 22.0 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 8.85 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 4.6 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 79.7 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 73.2 | |
| Maximum current | $I_{max(rms)}$ | A | 36.4 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.76 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 167.5 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 1.30 | |
| Winding inductance | $L_{12\_min}$ | mH | 20.2 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 4.1 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 54.0 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 18.7 | |
| Mass | $m_{mot}$ | kg | 17.5 | 20 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

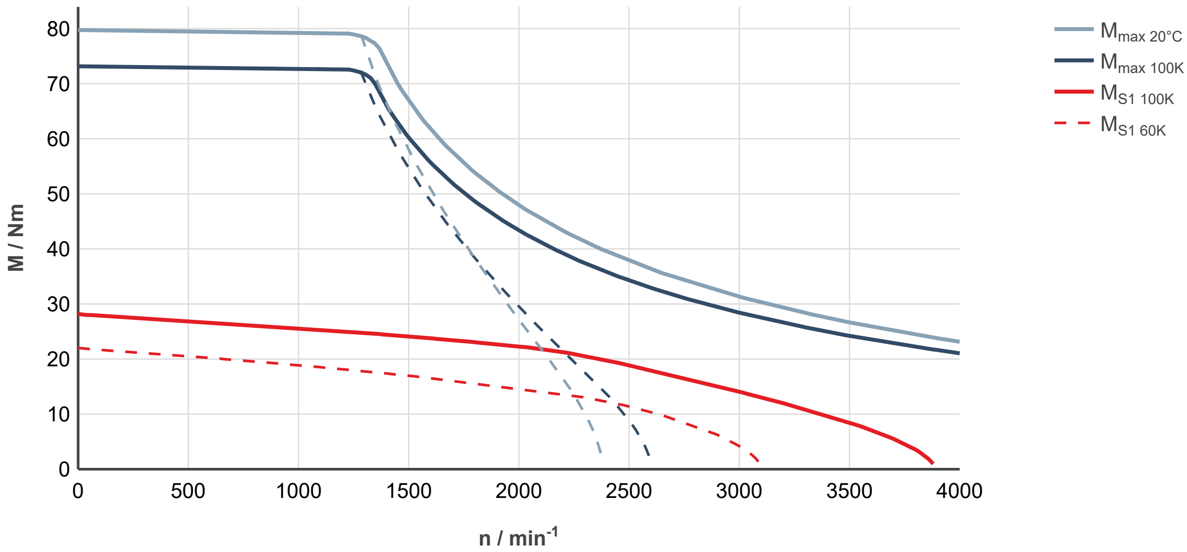



Fig. 109: MS2N07-D0BHN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

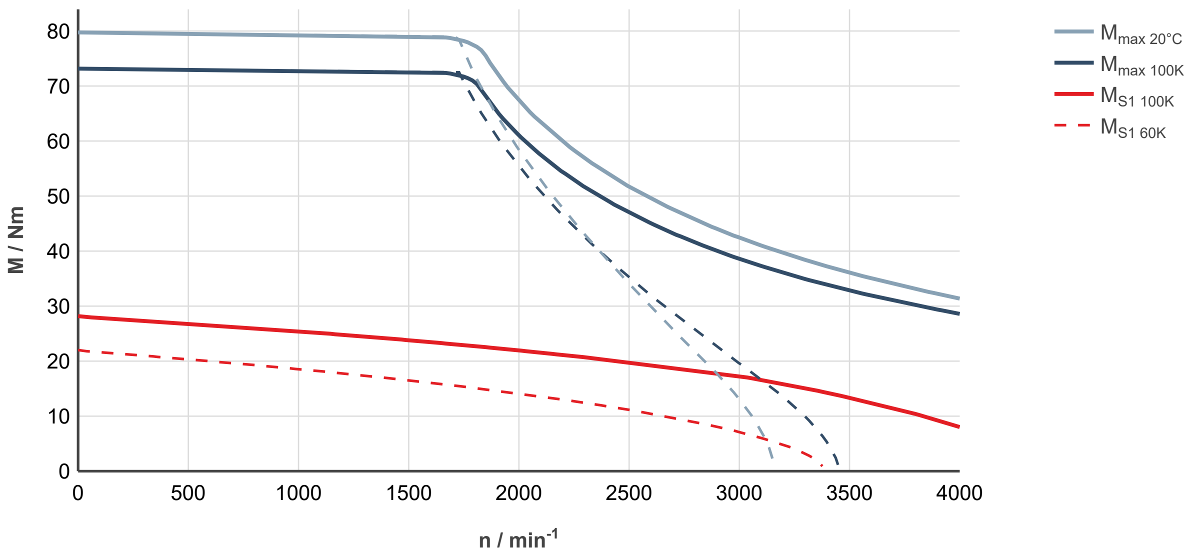



Fig. 110: MS2N07-D0BHN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D0BNN

| Designation | Symbol | Unit | MS2N07-D0BNN-□□□□0-□N | MS2N07-D0BNN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 22.0 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 11.55 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 28.2 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 15.0 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0021 | 0.00251 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,940 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 16.9 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 9.35 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 5.2 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 79.7 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 73.2 | |
| Maximum current | $I_{max(rms)}$ | A | 49.5 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.04 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 124.1 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.671 | |
| Winding inductance | $L_{12\_min}$ | mH | 10.0 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 4.0 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 54.0 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 18.7 | |
| Mass | $m_{mot}$ | kg | 17.5 | 20 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

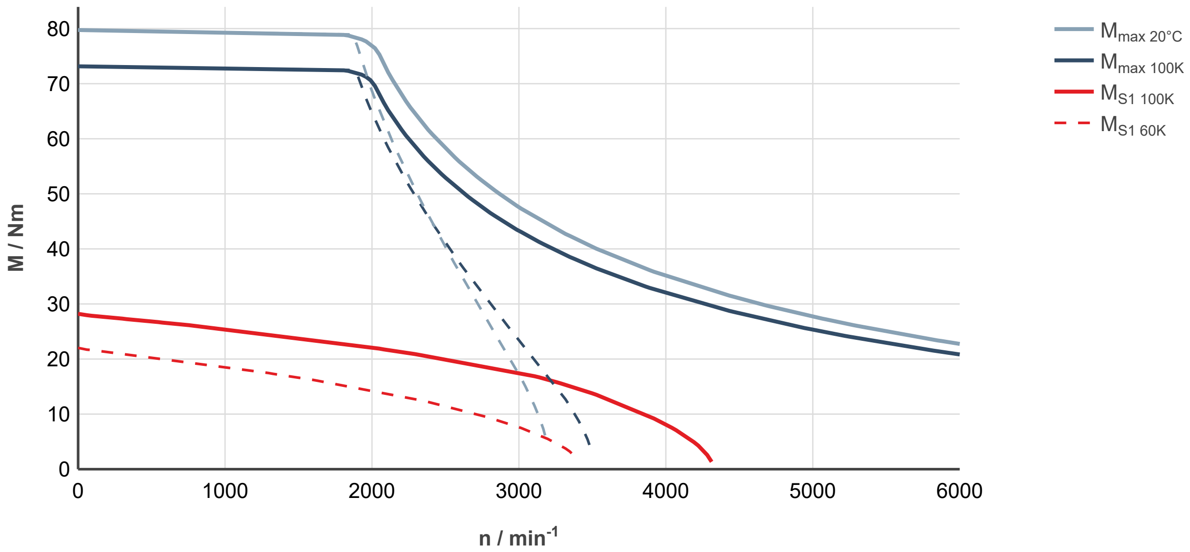



Fig. 111: MS2N07-D0BNN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

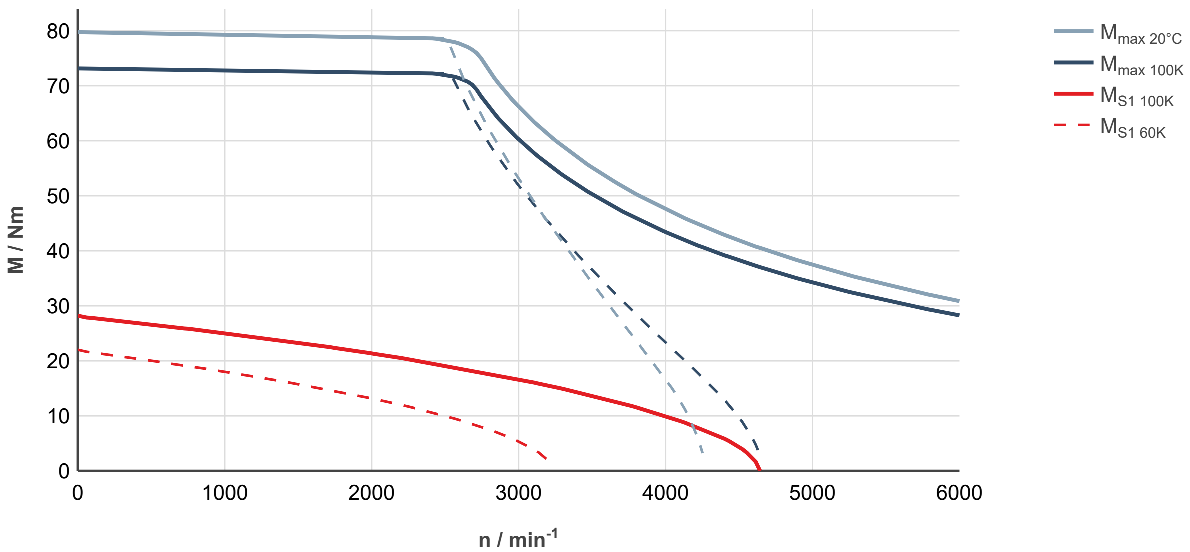



Fig. 112: MS2N07-D0BNN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D0BRN

| Designation | Symbol | Unit | MS2N07-D0BRN-□□□□0-□N | MS2N07-D0BRN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 22.0 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 17.1 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 28.2 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 22.3 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0021 | 0.00251 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,020 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 14.7 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 12.15 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 4.64 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 79.7 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 73.2 | |
| Maximum current | $I_{max(rms)}$ | A | 72.7 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.38 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 83.9 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.327 | |
| Winding inductance | $L_{12\_min}$ | mH | 5.06 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 17.5 | 20 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

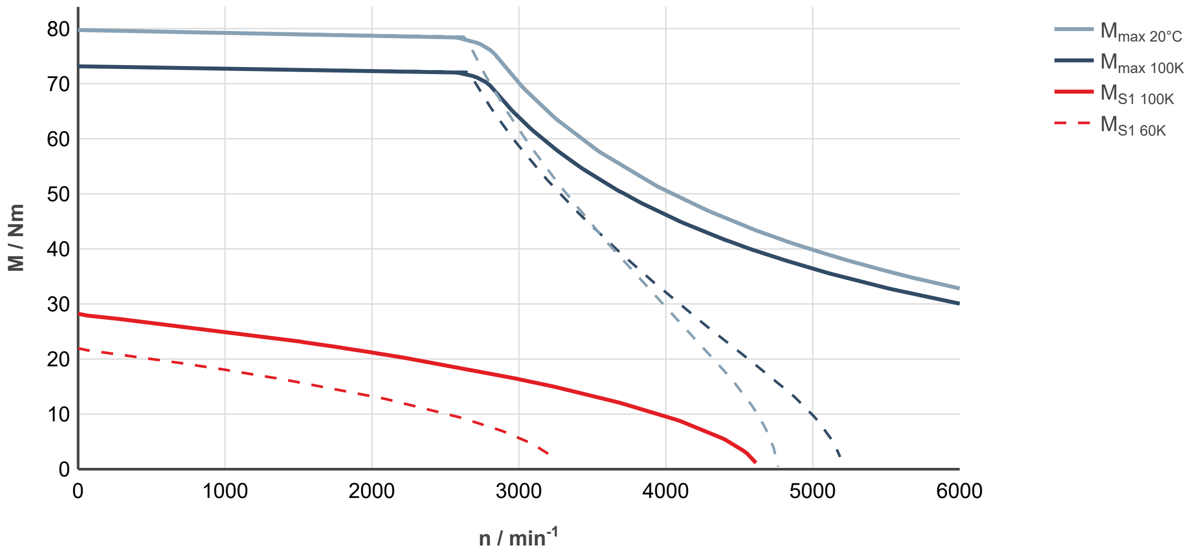



Fig. 113: MS2N07-D0BRN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

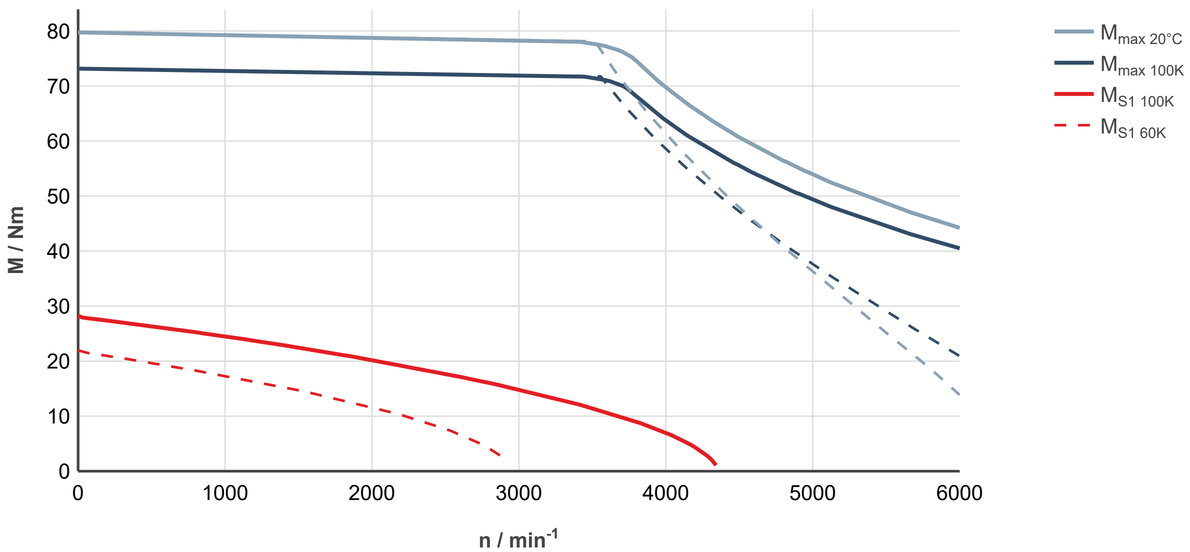



Fig. 114: MS2N07-D0BRN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D1BFN

| Designation | Symbol | Unit | MS2N07-D1BFN-□□□□0-□N | MS2N07-D1BFN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 18.9 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 5.45 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 23.8 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 6.9 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.00529 | 0.00570 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,500 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 20.9 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 6.15 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 3.28 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 92.5 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 84.8 | |
| Maximum current | $I_{max(rms)}$ | A | 29.5 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 3.73 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 226.5 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 2.93 | |
| Winding inductance | $L_{12\_min}$ | mH | 28.7 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 3.65 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 43.8 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 18.7 | |
| Mass | $m_{mot}$ | kg | 17.5 | 20.0 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

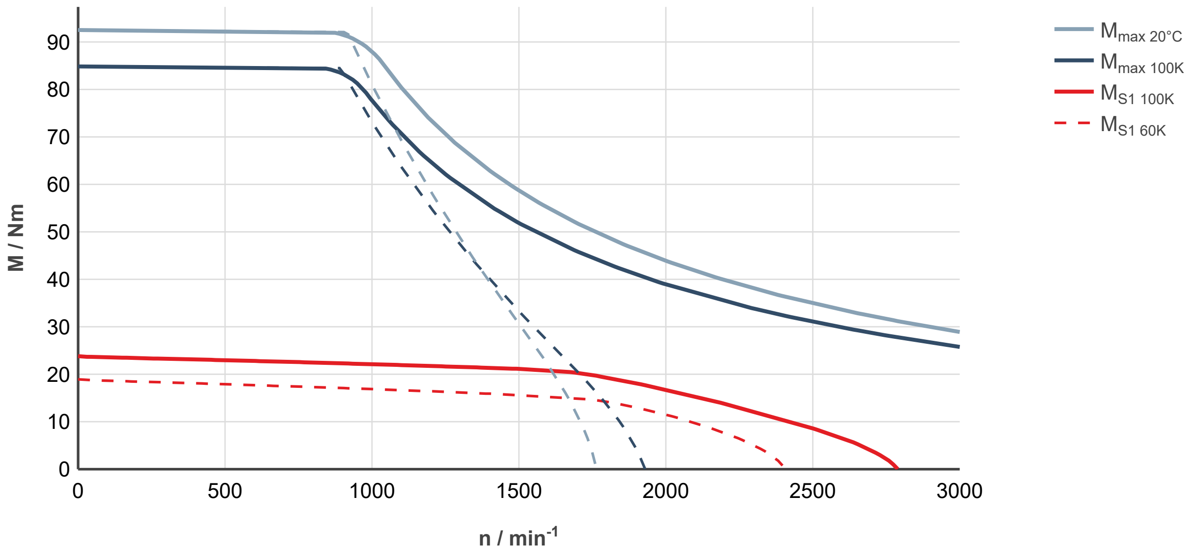



Fig. 115: MS2N07-D1BFN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

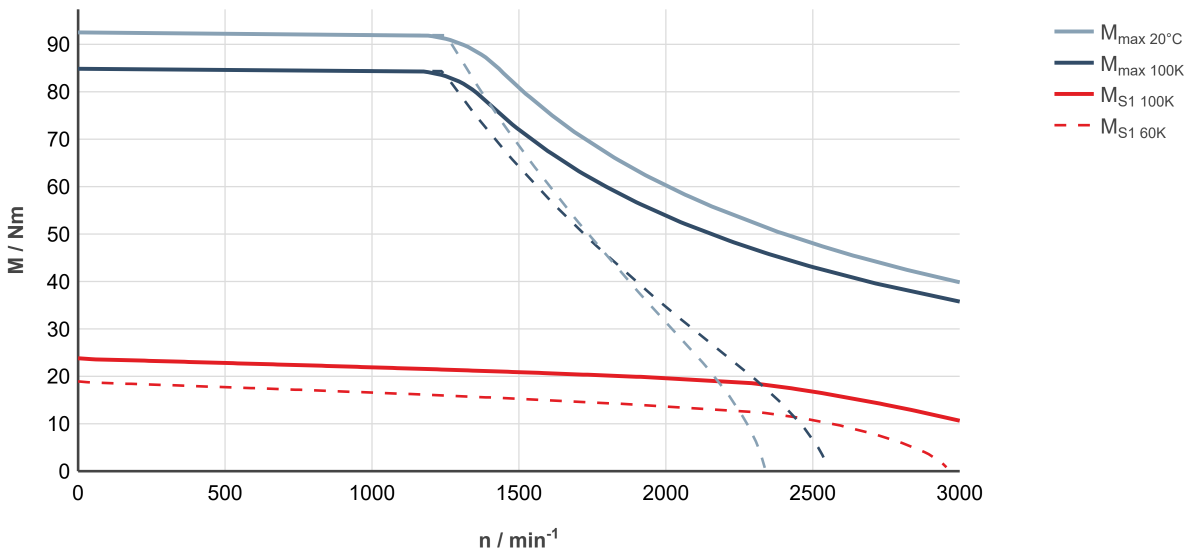



Fig. 116: MS2N07-D1BFN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D1BHN

| Designation | Symbol | Unit | MS2N07-D1BHN-□□□□0-□N | MS2N07-D1BHN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 18.9 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 7.8 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 23.8 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 9.9 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.00529 | 0.00570 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 18.5 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 7.95 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 3.87 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 92.5 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 84.8 | |
| Maximum current | $I_{max(rms)}$ | A | 42.7 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.59 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 157.5 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 1.56 | |
| Winding inductance | $L_{12\_min}$ | mH | 12.8 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 17.5 | 20.0 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

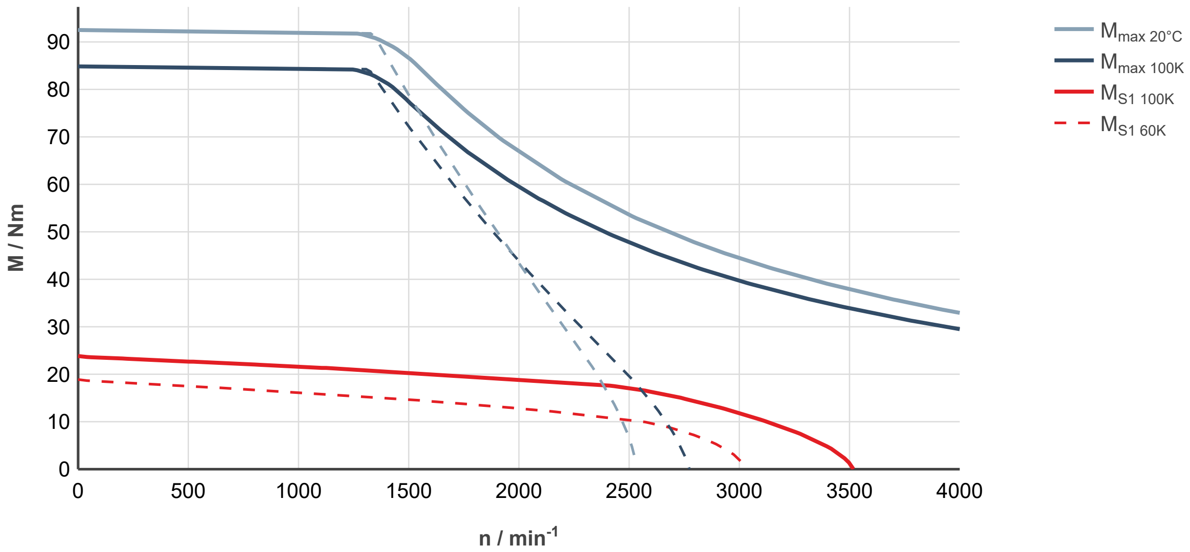



Fig. 117: MS2N07-D1BHN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

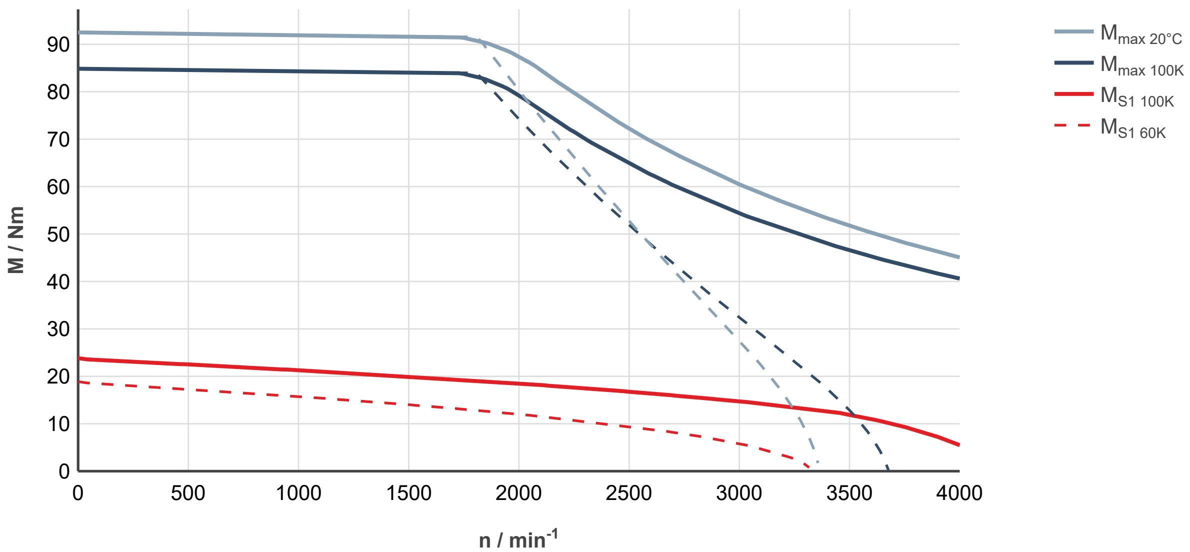



Fig. 118: MS2N07-D1BHN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D1BNN

<table>
<tr><th>Designation</th><th>Symbol</th><th>Unit</th><th>MS2N07-D1BNN-□□□□0-□N</th><th>MS2N07-D1BNN-□□□□2-□N</th></tr>
<tr><td>Standstill torque - 60K [1)]</td><td>$M_{0\ 60K}$</td><td>Nm</td><td colspan="2">18.9</td></tr>
<tr><td>Standstill current - 60K</td><td>$I_{0\ 60K}$</td><td>A</td><td colspan="2">9.9</td></tr>
<tr><td>Standstill torque - 100K [1)]</td><td>$M_{0\ 100K}$</td><td>Nm</td><td colspan="2">23.8</td></tr>
<tr><td>Standstill current - 100K</td><td>$I_{0\ 100K}$</td><td>A</td><td colspan="2">12.5</td></tr>
<tr><td>Moment of inertia of rotor [1)]</td><td>$J_{rot}$</td><td>kg*m²</td><td>0.00529</td><td>0.00570</td></tr>
<tr><td>Rated speed - 100K</td><td>$n_{N\ 100K}$</td><td>1/min</td><td colspan="2">3,000</td></tr>
<tr><td>Rated torque - 100K [1)]</td><td>$M_{N\ 100K}$</td><td>Nm</td><td colspan="2">13.6</td></tr>
<tr><td>Rated current - 100K</td><td>$I_{N\ 100K}$</td><td>A</td><td colspan="2">7.6</td></tr>
<tr><td>Rated power - 100K [1)]</td><td>$P_{N\ 100K}$</td><td>kW</td><td colspan="2">4.28</td></tr>
<tr><td>Maximum torque 20 °C (cold) [1)]</td><td>$M_{max\ 20°C}$</td><td>Nm</td><td colspan="2">92.5</td></tr>
<tr><td>Maximum torque 100K (warm) [1)]</td><td>$M_{max\ 100K}$</td><td>Nm</td><td colspan="2">84.8</td></tr>
<tr><td>Maximum current</td><td>$I_{max(rms)}$</td><td>A</td><td colspan="2">54.1</td></tr>
<tr><td>Maximum speed (electrical)</td><td>$n_{max\ el}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Maximum speed (mechanical)</td><td>$n_{max\ mech}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Number of pole pairs</td><td>p</td><td>–</td><td colspan="2">5</td></tr>
<tr><td>Torque constant at 20 °C [1)]</td><td>$K_m$</td><td>Nm/A</td><td colspan="2">2.05</td></tr>
<tr><td>Voltage constant at 20 °C [1)]</td><td>$K_E$</td><td>V/1000 $min^{-1}$</td><td colspan="2">124.3</td></tr>
<tr><td>Winding resistance at 20 °C</td><td>$R_{12}$</td><td>Ohm</td><td colspan="2">0.942</td></tr>
<tr><td>Winding inductance</td><td>$L_{12\_min}$</td><td>mH</td><td colspan="2">7.9</td></tr>
<tr><td>Leakage capacitance of the component</td><td>$C_{ab}$</td><td>nF</td><td colspan="2">3.0</td></tr>
<tr><td>Thermal time constant of winding</td><td>$T_{th\_W}$</td><td>s</td><td colspan="2">43.8</td></tr>
<tr><td>Thermal time constant of motor</td><td>$T_{th\_M}$</td><td>min</td><td colspan="2">18.7</td></tr>
<tr><td>Mass</td><td>$m_{mot}$</td><td>kg</td><td>17.5</td><td>20.0</td></tr>
<tr><td colspan="5"><u>Holding brake</u></td></tr>
<tr><td>Holding torque</td><td>$M_4$</td><td>Nm</td><td>0</td><td>36.00</td></tr>
<tr><td>Rated voltage</td><td>$U_N$</td><td>V</td><td>0</td><td>24</td></tr>
<tr><td>Rated current</td><td>$I_N$</td><td>A</td><td>0</td><td>0.94</td></tr>
<tr><td>Maximum connection time</td><td>$t_1$</td><td>ms</td><td>0</td><td>60</td></tr>
<tr><td>Maximum disconnection time</td><td>$t_2$</td><td>ms</td><td>0</td><td>200</td></tr>
<tr><td colspan="5">1) For tolerance details refer to ➦Chapter 5.4 Tolerances</td></tr>
</table>

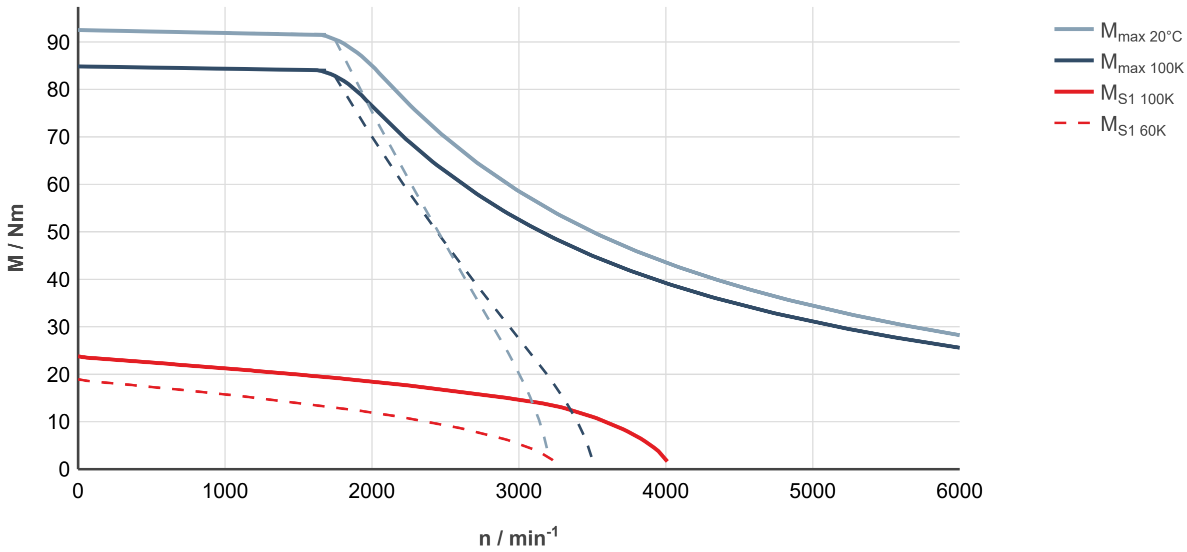



Fig. 119: MS2N07-D1BNN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

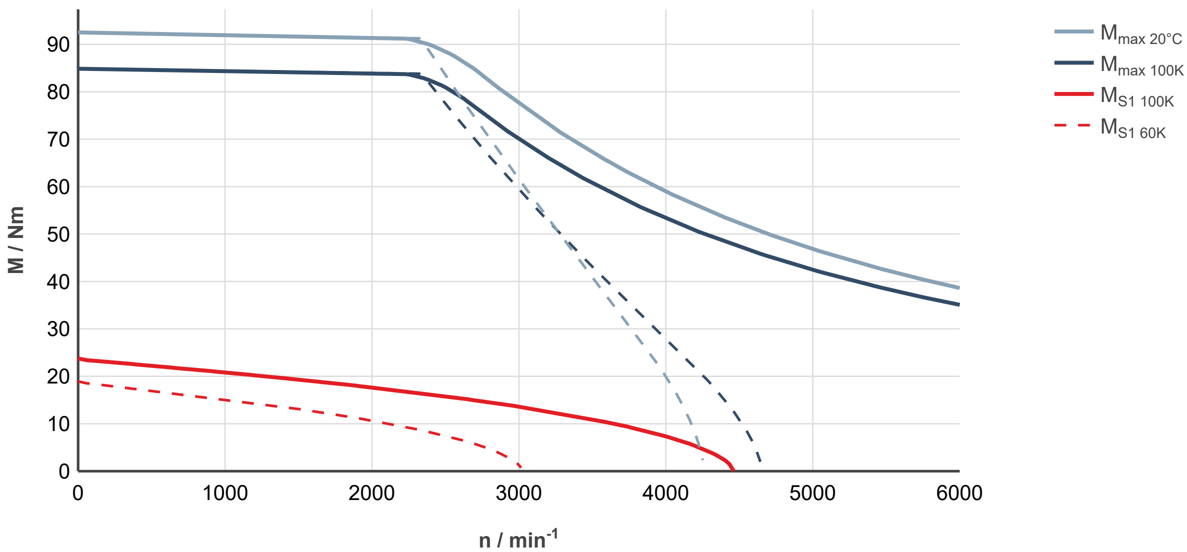



Fig. 120: MS2N07-D1BNN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-E0BDN

| Designation | Symbol | Unit | MS2N07-E0BDN-□□□□0-□N | MS2N07-E0BDN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 29.2 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 5.15 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 38.2 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 6.8 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.003 | 0.00341 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 900 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 34.6 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 6.2 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 3.26 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 119.5 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 109.5 | |
| Maximum current | $I_{max(eff)}$ | A | 24.8 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 2,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 6.09 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 370 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 3.72 | |
| Winding inductance | $L_{12\_min}$ | mH | 65.9 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 6.95 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 60.8 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 21.7 | |
| Mass | $m_{mot}$ | kg | 23 | 26 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

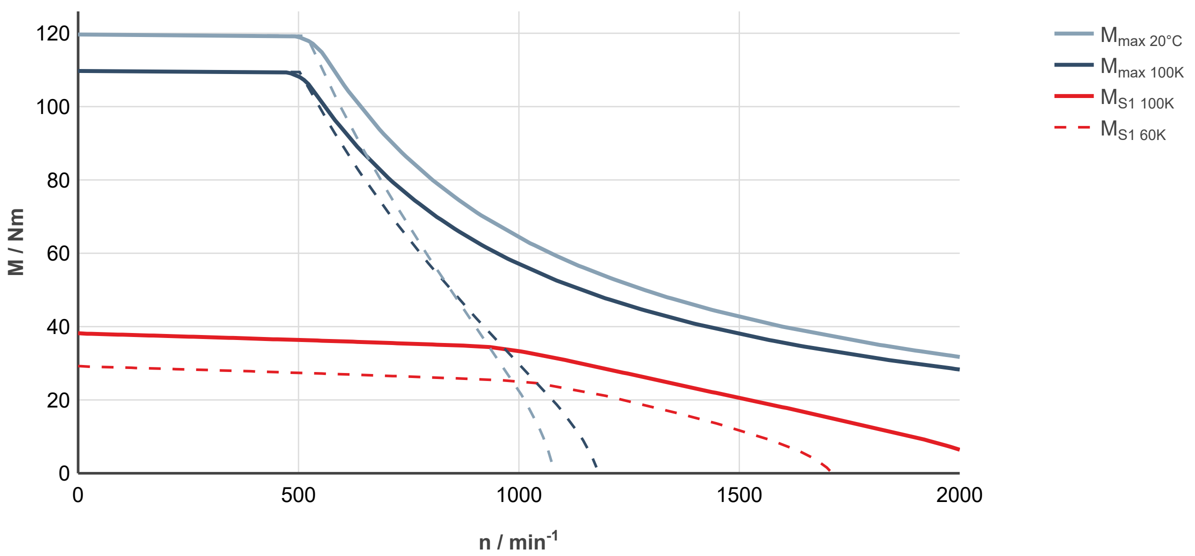



Fig. 121: MS2N07-E0BDN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

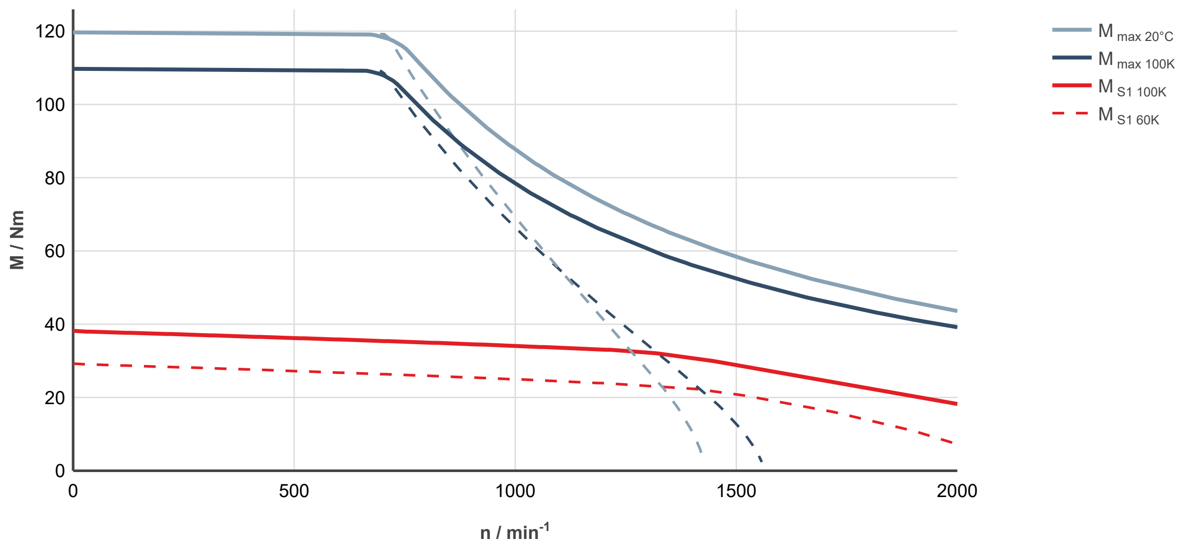



Fig. 122: MS2N07-E0BDN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-E0BHN

| Designation | Symbol | Unit | MS2N07-E0BHN-□□□□0-□N | MS2N07-E0BHN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 29.2 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 10.35 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 38.2 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 13.7 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.003 | 0.00341 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,940 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 27.7 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 10.25 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 5.65 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 119.5 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 109.5 | |
| Maximum current | $I_{max(eff)}$ | A | 49.5 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 3.03 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 184.3 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.95 | |
| Winding inductance | $L_{12\_min}$ | mH | 14.8 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 23 | 26 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

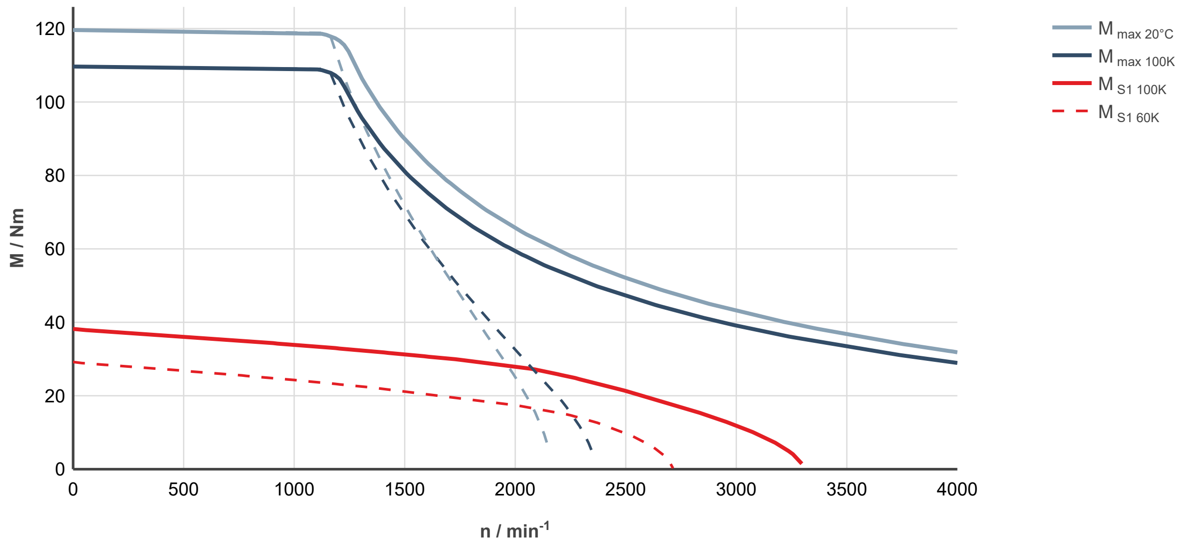



Fig. 123: MS2N07-E0BHN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

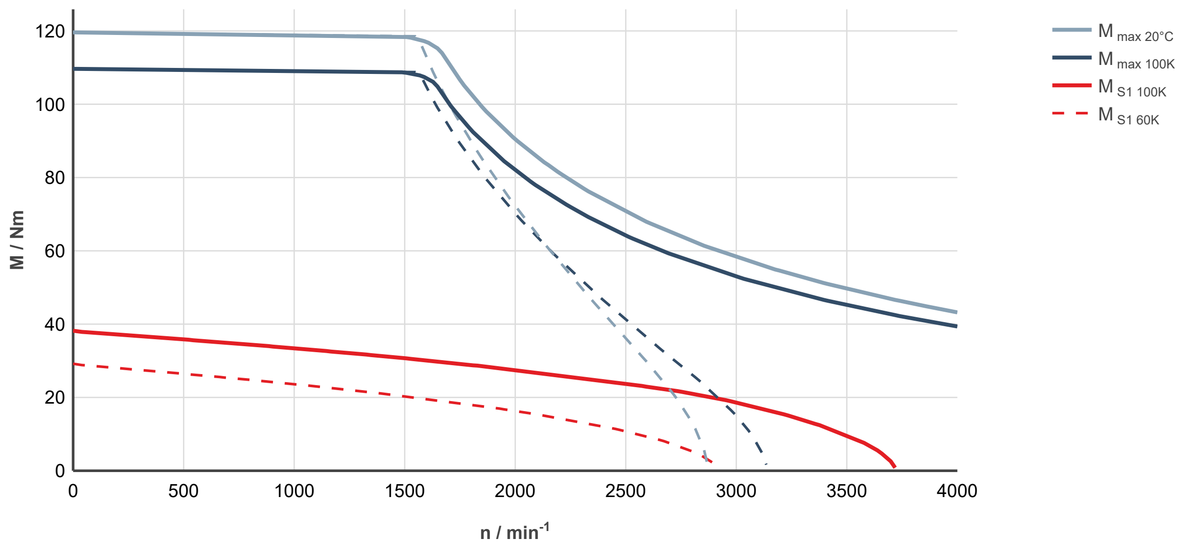



Fig. 124: MS2N07-E0BHN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-E0BNN

<table>
<tr><th>Designation</th><th>Symbol</th><th>Unit</th><th>MS2N07-E0BNN-□□□□0-□N</th><th>MS2N07-E0BNN-□□□□2-□N</th></tr>
<tr><td>Standstill torque - 60K [1)]</td><td>$M_{0\ 60K}$</td><td>Nm</td><td colspan="2">29.2</td></tr>
<tr><td>Standstill current - 60K</td><td>$I_{0\ 60K}$</td><td>A</td><td colspan="2">15.1</td></tr>
<tr><td>Standstill torque - 100K [1)]</td><td>$M_{0\ 100K}$</td><td>Nm</td><td colspan="2">38.2</td></tr>
<tr><td>Standstill current - 100K</td><td>$I_{0\ 100K}$</td><td>A</td><td colspan="2">20.0</td></tr>
<tr><td>Moment of inertia of rotor [1)]</td><td>$J_{rot}$</td><td>kg*m²</td><td>0.003</td><td>0.00341</td></tr>
<tr><td>Rated speed - 100K</td><td>$n_{N\ 100K}$</td><td>1/min</td><td colspan="2">2,600</td></tr>
<tr><td>Rated torque - 100K [1)]</td><td>$M_{N\ 100K}$</td><td>Nm</td><td colspan="2">21.5</td></tr>
<tr><td>Rated current - 100K</td><td>$I_{N\ 100K}$</td><td>A</td><td colspan="2">11.75</td></tr>
<tr><td>Rated power - 100K [1)]</td><td>$P_{N\ 100K}$</td><td>kW</td><td colspan="2">5.85</td></tr>
<tr><td>Maximum torque 20 °C (cold) [1)]</td><td>$M_{max\ 20°C}$</td><td>Nm</td><td colspan="2">119.5</td></tr>
<tr><td>Maximum torque 100K (warm) [1)]</td><td>$M_{max\ 100K}$</td><td>Nm</td><td colspan="2">109.5</td></tr>
<tr><td>Maximum current</td><td>$I_{max(rms)}$</td><td>A</td><td colspan="2">72.7</td></tr>
<tr><td>Maximum speed (electrical)</td><td>$n_{max\ el}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Maximum speed (mechanical)</td><td>$n_{max\ mech}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Number of pole pairs</td><td>p</td><td>–</td><td colspan="2">5</td></tr>
<tr><td>Torque constant at 20 °C [1)]</td><td>$K_m$</td><td>Nm/A</td><td colspan="2">2.08</td></tr>
<tr><td>Voltage constant at 20 °C [1)]</td><td>$K_E$</td><td>V/1000 $min^{-1}$</td><td colspan="2">126.2</td></tr>
<tr><td>Winding resistance at 20 °C</td><td>$R_{12}$</td><td>Ohm</td><td colspan="2">0.455</td></tr>
<tr><td>Winding inductance</td><td>$L_{12\_min}$</td><td>mH</td><td colspan="2">7.50</td></tr>
<tr><td>Leakage capacitance of the component</td><td>$C_{ab}$</td><td>nF</td><td colspan="2">6.11</td></tr>
<tr><td>Thermal time constant of winding</td><td>$T_{th\_W}$</td><td>s</td><td colspan="2">60.8</td></tr>
<tr><td>Thermal time constant of motor</td><td>$T_{th\_M}$</td><td>min</td><td colspan="2">21.7</td></tr>
<tr><td>Mass</td><td>$m_{mot}$</td><td>kg</td><td>23</td><td>26</td></tr>
<tr><td colspan="5"><u>Holding brake</u></td></tr>
<tr><td>Holding torque</td><td>$M_4$</td><td>Nm</td><td>0</td><td>36.00</td></tr>
<tr><td>Rated voltage</td><td>$U_N$</td><td>V</td><td>0</td><td>24</td></tr>
<tr><td>Rated current</td><td>$I_N$</td><td>A</td><td>0</td><td>0.94</td></tr>
<tr><td>Maximum connection time</td><td>$t_1$</td><td>ms</td><td>0</td><td>60</td></tr>
<tr><td>Maximum disconnection time</td><td>$t_2$</td><td>ms</td><td>0</td><td>200</td></tr>
<tr><td colspan="5">1) For tolerance details refer to ➦Chapter 5.4 Tolerances</td></tr>
</table>

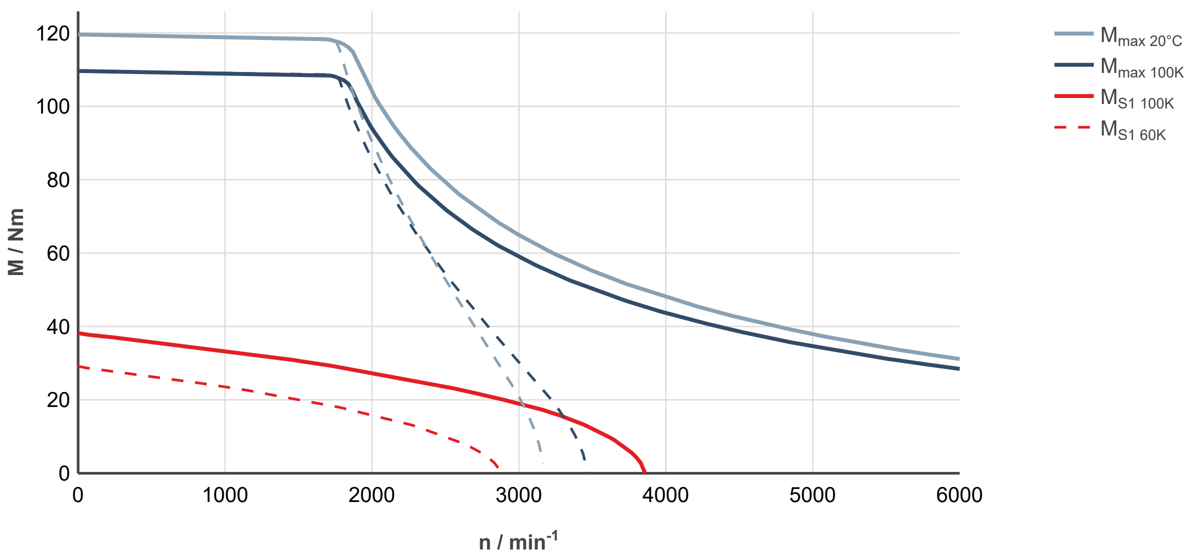



Fig. 125: MS2N07-E0BNN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

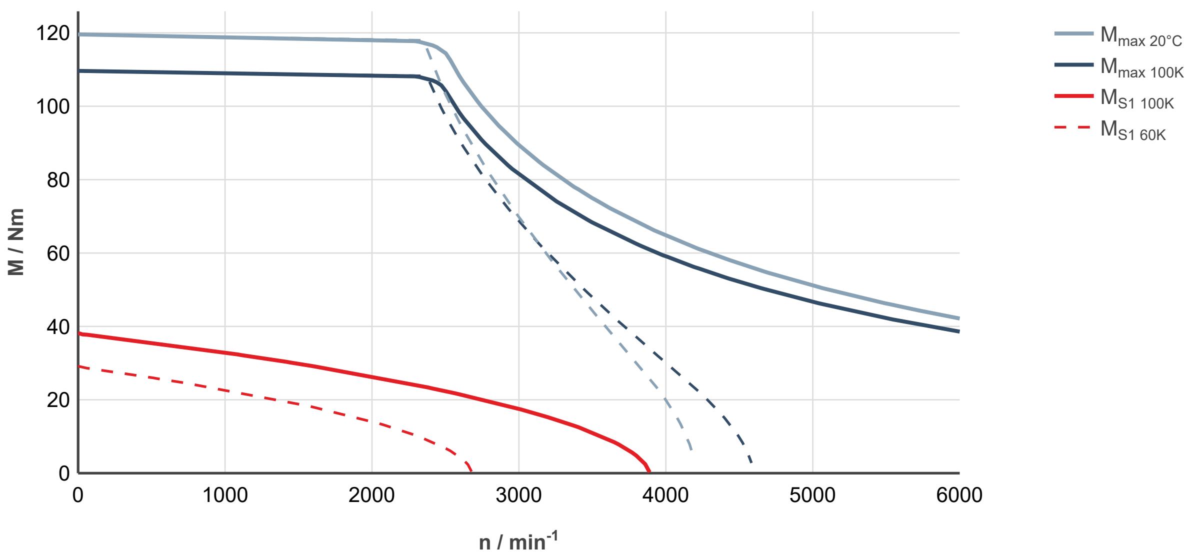



Fig. 126: MS2N07-E0BNN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-E0BQN

| Designation | Symbol | Unit | MS2N07-E0BQN-□□□□0-□N | MS2N07-E0BQN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1)] | $M_{0\ 60K}$ | Nm | 29.2 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 19.1 | |
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 38.2 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 25.3 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | kg*m² | 0.003 | 0.00341 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,570 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 19.0 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 13.25 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 5.1 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 119.5 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 109.5 | |
| Maximum current | $I_{max(rms)}$ | A | 92.3 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 1.64 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 99.3 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.282 | |
| Winding inductance | $L_{12\_min}$ | mH | 4.64 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 23 | 26 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

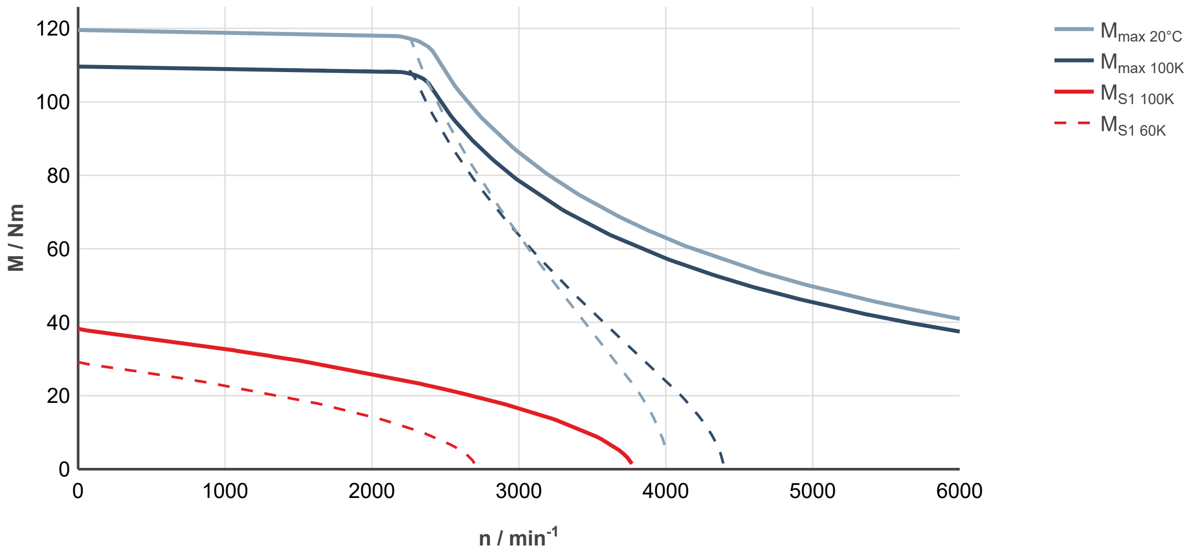



Fig. 127: MS2N07-E0BQN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

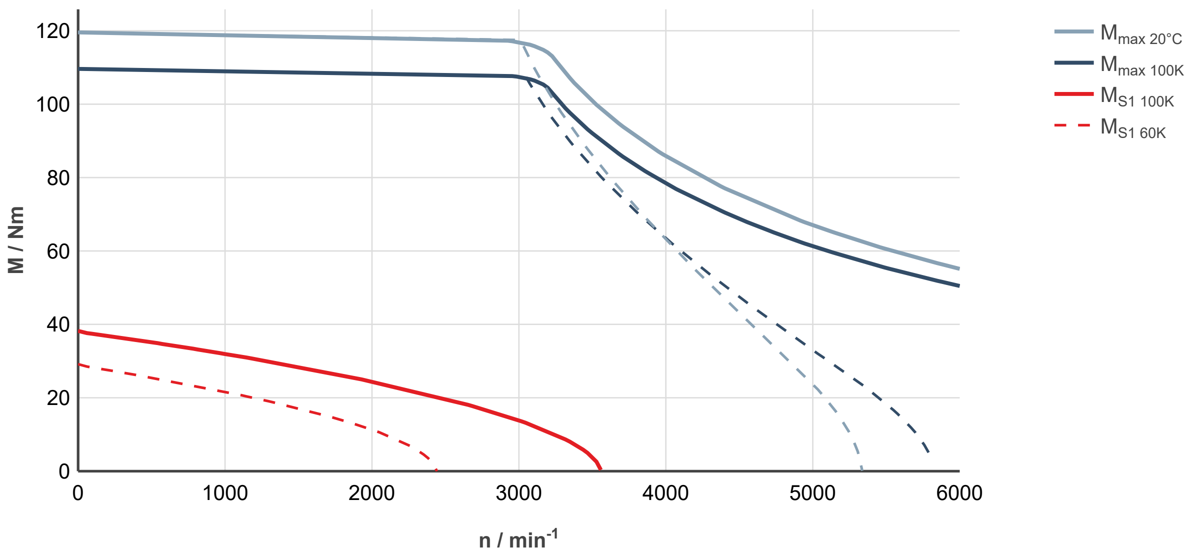



Fig. 128: MS2N07-E0BQN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-E1BDN

<table>
<tr><th>Designation</th><th>Symbol</th><th>Unit</th><th>MS2N07-E1BDN-□□□□0-□N</th><th>MS2N07-E1BDN-□□□□2-□N</th></tr>
<tr><td>Standstill torque - 60K [1)]</td><td>$M_{0\ 60K}$</td><td>Nm</td><td colspan="2">25.8</td></tr>
<tr><td>Standstill current - 60K</td><td>$I_{0\ 60K}$</td><td>A</td><td colspan="2">4.93</td></tr>
<tr><td>Standstill torque - 100K [1)]</td><td>$M_{0\ 100K}$</td><td>Nm</td><td colspan="2">32.2</td></tr>
<tr><td>Standstill current - 100K</td><td>$I_{0\ 100K}$</td><td>A</td><td colspan="2">6.2</td></tr>
<tr><td>Moment of inertia of rotor [1)]</td><td>$J_{rot}$</td><td>kg*m²</td><td>0.00752</td><td>0.00793</td></tr>
<tr><td>Rated speed - 100K</td><td>$n_{N\ 100K}$</td><td>1/min</td><td colspan="2">1,000</td></tr>
<tr><td>Rated torque - 100K [1)]</td><td>$M_{N\ 100K}$</td><td>Nm</td><td colspan="2">29.2</td></tr>
<tr><td>Rated current - 100K</td><td>$I_{N\ 100K}$</td><td>A</td><td colspan="2">5.7</td></tr>
<tr><td>Rated power - 100K [1)]</td><td>$P_{N\ 100K}$</td><td>kW</td><td colspan="2">3.05</td></tr>
<tr><td>Maximum torque 20 °C (cold) [1)]</td><td>$M_{max\ 20°C}$</td><td>Nm</td><td colspan="2">140</td></tr>
<tr><td>Maximum torque 100K (warm) [1)]</td><td>$M_{max\ 100K}$</td><td>Nm</td><td colspan="2">128.5</td></tr>
<tr><td>Maximum current</td><td>$I_{max(rms)}$</td><td>A</td><td colspan="2">29.5</td></tr>
<tr><td>Maximum speed (electrical)</td><td>$n_{max\ el}$</td><td>1/min</td><td colspan="2">2,000</td></tr>
<tr><td>Maximum speed (mechanical)</td><td>$n_{max\ mech}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Number of pole pairs</td><td>p</td><td>–</td><td colspan="2">5</td></tr>
<tr><td>Torque constant at 20 °C [1)]</td><td>$K_m$</td><td>Nm/A</td><td colspan="2">5.63</td></tr>
<tr><td>Voltage constant at 20 °C [1)]</td><td>$K_E$</td><td>V/1000 $min^{-1}$</td><td colspan="2">341.8</td></tr>
<tr><td>Winding resistance at 20 °C</td><td>$R_{12}$</td><td>Ohm</td><td colspan="2">4.2</td></tr>
<tr><td>Winding inductance</td><td>$L_{12\_min}$</td><td>mH</td><td colspan="2">42.9</td></tr>
<tr><td>Leakage capacitance of the component</td><td>$C_{ab}$</td><td>nF</td><td colspan="2">5.7</td></tr>
<tr><td>Thermal time constant of winding</td><td>$T_{th\_W}$</td><td>s</td><td colspan="2">47.5</td></tr>
<tr><td>Thermal time constant of motor</td><td>$T_{th\_M}$</td><td>min</td><td colspan="2">21.7</td></tr>
<tr><td>Mass</td><td>$m_{mot}$</td><td>kg</td><td>23</td><td>26</td></tr>
<tr><td colspan="5"><u>Holding brake</u></td></tr>
<tr><td>Holding torque</td><td>$M_4$</td><td>Nm</td><td>0</td><td>36.00</td></tr>
<tr><td>Rated voltage</td><td>$U_N$</td><td>V</td><td>0</td><td>24</td></tr>
<tr><td>Rated current</td><td>$I_N$</td><td>A</td><td>0</td><td>0.94</td></tr>
<tr><td>Maximum connection time</td><td>$t_1$</td><td>ms</td><td>0</td><td>60</td></tr>
<tr><td>Maximum disconnection time</td><td>$t_2$</td><td>ms</td><td>0</td><td>200</td></tr>
<tr><td colspan="5">1) For tolerance details refer to ➦Chapter 5.4 Tolerances</td></tr>
</table>

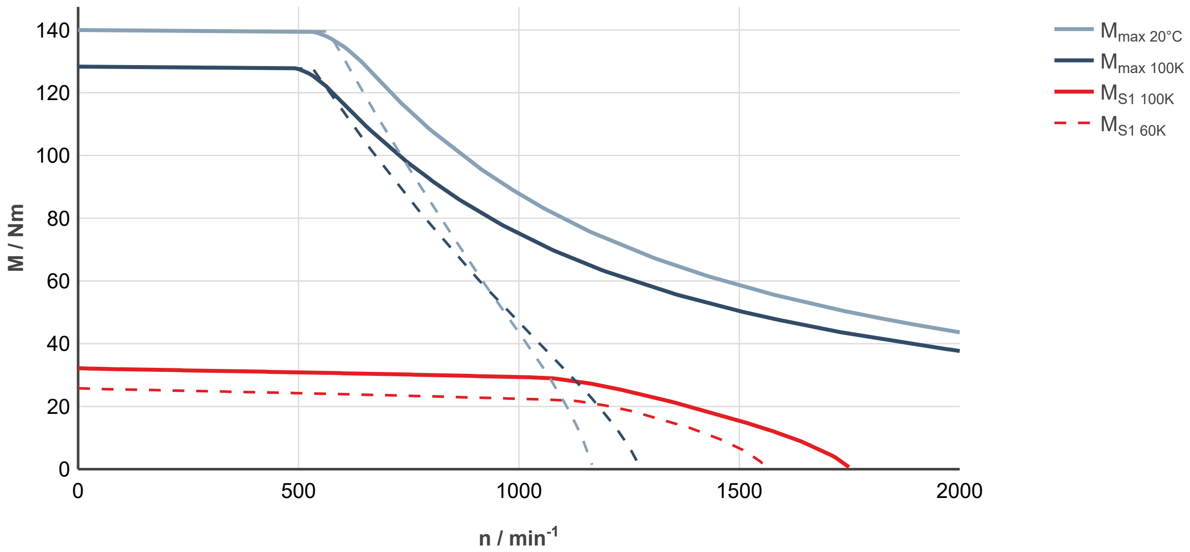



Fig. 129: MS2N07-E1BDN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

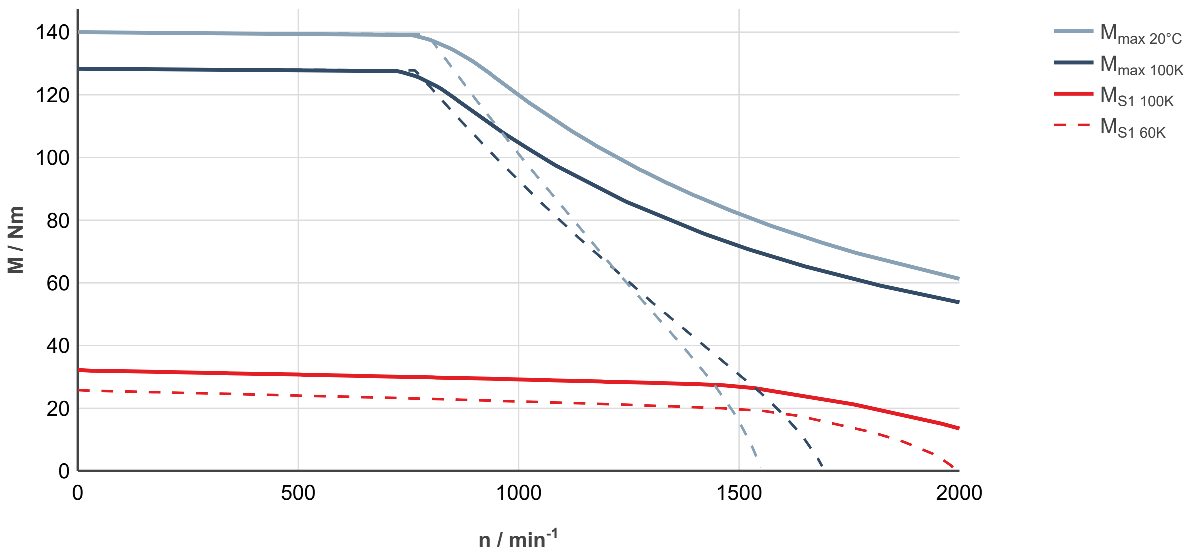



Fig. 130: MS2N07-E1BDN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-E1BHN

<table>
<tr><th>Designation</th><th>Symbol</th><th>Unit</th><th>MS2N07-E1BHN-□□□□0-□N</th><th>MS2N07-E1BHN-□□□□2-□N</th></tr>
<tr><td>Standstill torque - 60K [1)]</td><td>$M_{0\ 60K}$</td><td>Nm</td><td colspan="2">25.8</td></tr>
<tr><td>Standstill current - 60K</td><td>$I_{0\ 60K}$</td><td>A</td><td colspan="2">9</td></tr>
<tr><td>Standstill torque - 100K [1)]</td><td>$M_{0\ 100K}$</td><td>Nm</td><td colspan="2">32.2</td></tr>
<tr><td>Standstill current - 100K</td><td>$I_{0\ 100K}$</td><td>A</td><td colspan="2">11.3</td></tr>
<tr><td>Moment of inertia of rotor [1)]</td><td>$J_{rot}$</td><td>kg*m²</td><td>0.00752</td><td>0.00793</td></tr>
<tr><td>Rated speed - 100K</td><td>$n_{N\ 100K}$</td><td>1/min</td><td colspan="2">2,000</td></tr>
<tr><td>Rated torque - 100K [1)]</td><td>$M_{N\ 100K}$</td><td>Nm</td><td colspan="2">23.5</td></tr>
<tr><td>Rated current - 100K</td><td>$I_{N\ 100K}$</td><td>A</td><td colspan="2">8.55</td></tr>
<tr><td>Rated power - 100K [1)]</td><td>$P_{N\ 100K}$</td><td>kW</td><td colspan="2">4.93</td></tr>
<tr><td>Maximum torque 20 °C (cold) [1)]</td><td>$M_{max\ 20°C}$</td><td>Nm</td><td colspan="2">140</td></tr>
<tr><td>Maximum torque 100K (warm) [1)]</td><td>$M_{max\ 100K}$</td><td>Nm</td><td colspan="2">128.5</td></tr>
<tr><td>Maximum current</td><td>$I_{max(rms)}$</td><td>A</td><td colspan="2">54.1</td></tr>
<tr><td>Maximum speed (electrical)</td><td>$n_{max\ el}$</td><td>1/min</td><td colspan="2">4,000</td></tr>
<tr><td>Maximum speed (mechanical)</td><td>$n_{max\ mech}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Number of pole pairs</td><td>p</td><td>–</td><td colspan="2">5</td></tr>
<tr><td>Torque constant at 20 °C [1)]</td><td>$K_m$</td><td>Nm/A</td><td colspan="2">3.08</td></tr>
<tr><td>Voltage constant at 20 °C [1)]</td><td>$K_E$</td><td>V/1000 $min^{-1}$</td><td colspan="2">187</td></tr>
<tr><td>Winding resistance at 20 °C</td><td>$R_{12}$</td><td>Ohm</td><td colspan="2">1.31</td></tr>
<tr><td>Winding inductance</td><td>$L_{12\_min}$</td><td>mH</td><td colspan="2">12.1</td></tr>
<tr><td>Leakage capacitance of the component</td><td>$C_{ab}$</td><td>nF</td><td colspan="2">4.77</td></tr>
<tr><td>Thermal time constant of winding</td><td>$T_{th\_W}$</td><td>s</td><td colspan="2">47.5</td></tr>
<tr><td>Thermal time constant of motor</td><td>$T_{th\_M}$</td><td>min</td><td colspan="2">21.7</td></tr>
<tr><td>Mass</td><td>$m_{mot}$</td><td>kg</td><td>23</td><td>26</td></tr>
<tr><td colspan="5"><u>Holding brake</u></td></tr>
<tr><td>Holding torque</td><td>$M_4$</td><td>Nm</td><td>0</td><td>36.00</td></tr>
<tr><td>Rated voltage</td><td>$U_N$</td><td>V</td><td>0</td><td>24</td></tr>
<tr><td>Rated current</td><td>$I_N$</td><td>A</td><td>0</td><td>0.94</td></tr>
<tr><td>Maximum connection time</td><td>$t_1$</td><td>ms</td><td>0</td><td>60</td></tr>
<tr><td>Maximum disconnection time</td><td>$t_2$</td><td>ms</td><td>0</td><td>200</td></tr>
<tr><td colspan="5">1) For tolerance details refer to ➦ Chapter 5.4 Tolerances</td></tr>
</table>

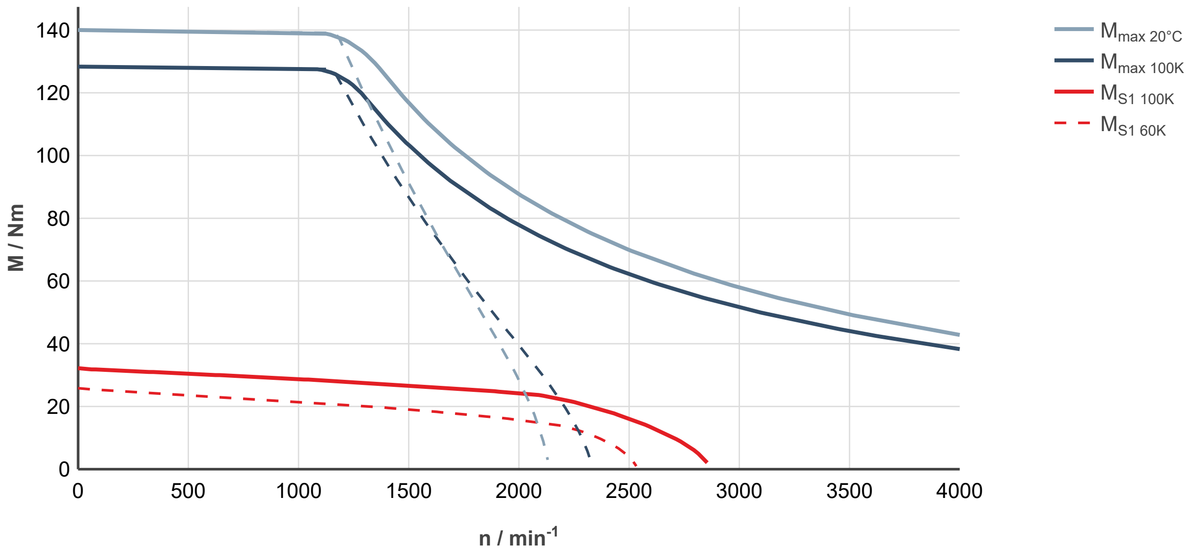



Fig. 131: MS2N07-E1BHN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

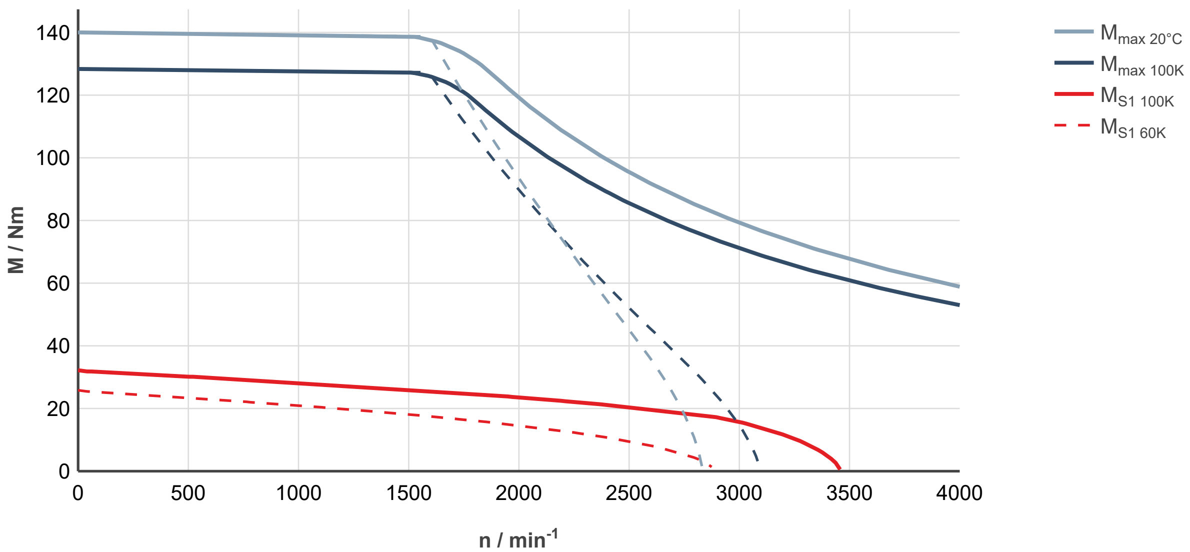



Fig. 132: MS2N07-E1BHN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-E1BNN

| Designation | Symbol | Unit | MS2N07-E1BNN-□□□□0-□N | MS2N07-E1BNN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 25.8 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 14.1 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 32.2 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 17.7 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | $kg*m^2$ | 0.00752 | 0.00793 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,500 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 15.6 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 9.15 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 4.08 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 140 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 128.5 | |
| Maximum current | $I_{max(rms)}$ | A | 85.4 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 1.96 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 119.0 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.532 | |
| Winding inductance | $L_{12\_min}$ | mH | 5.12 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 23 | 26 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

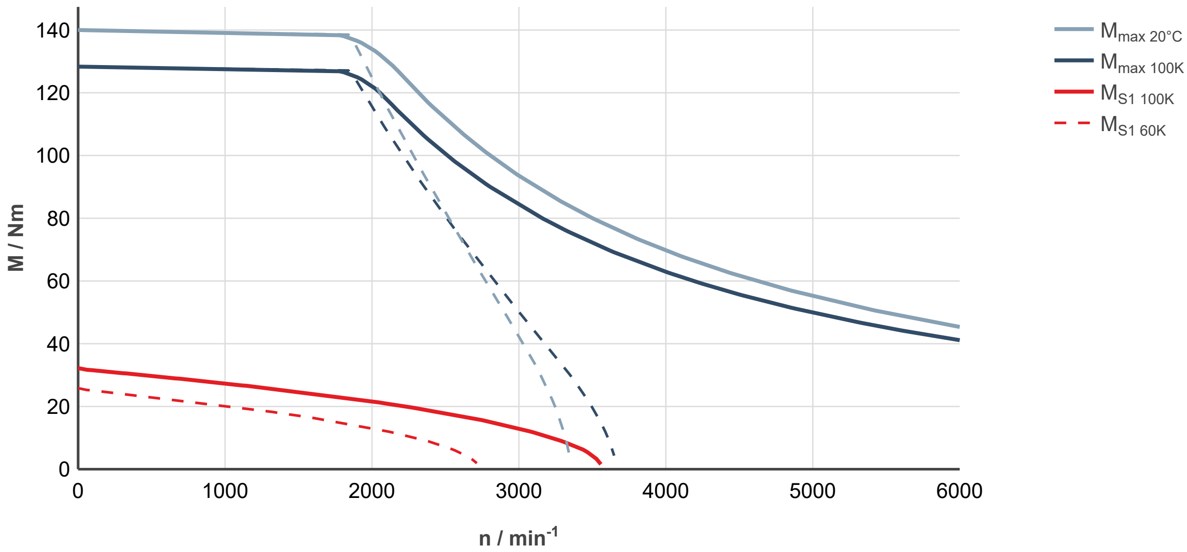



Fig. 133: MS2N07-E1BNN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

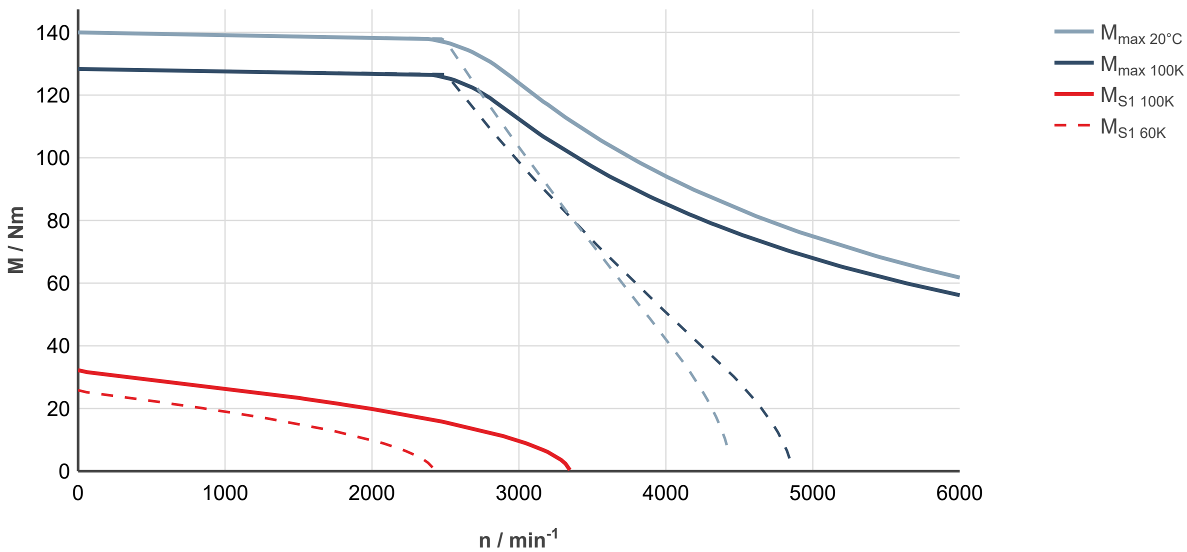



Fig. 134: MS2N07-E1BNN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## 6.6.2 Forced ventilation

### MS2N07-C0BNA / MS2M07-C0BNB

| Designation | Symbol | Unit | MS2N07-C0BNA-□□□□□0-□N | MS2N07-C0BNA-□□□□□1-□N | MS2N07-C0BNB-□□□□□0-□N | MS2N07-C0BNB-□□□□□1-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 19.8 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 11 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0012 | 0.00146 | 0.0012 | 0.00146 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,490 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 16.3 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 9.15 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 4.25 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 38.8 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 35.7 | | | |
| Maximum current | $I_{max(rms)}$ | A | 24.8 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.01 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 122.0 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 1.58 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 23.2 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 2.42 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 39.4 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 9.0 | | | |
| Mass | $m_{mot}$ | kg | 14.5 | 16.5 | 14.5 | 16.5 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 20.00 | 0 | 20.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.78 | 0 | 0.78 |
| Maximum connection time | $t_1$ | ms | 0 | 40 | 0 | 40 |
| Maximum disconnection time | $t_2$ | ms | 0 | 100 | 0 | 100 |
| **Fan data** | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | | | |

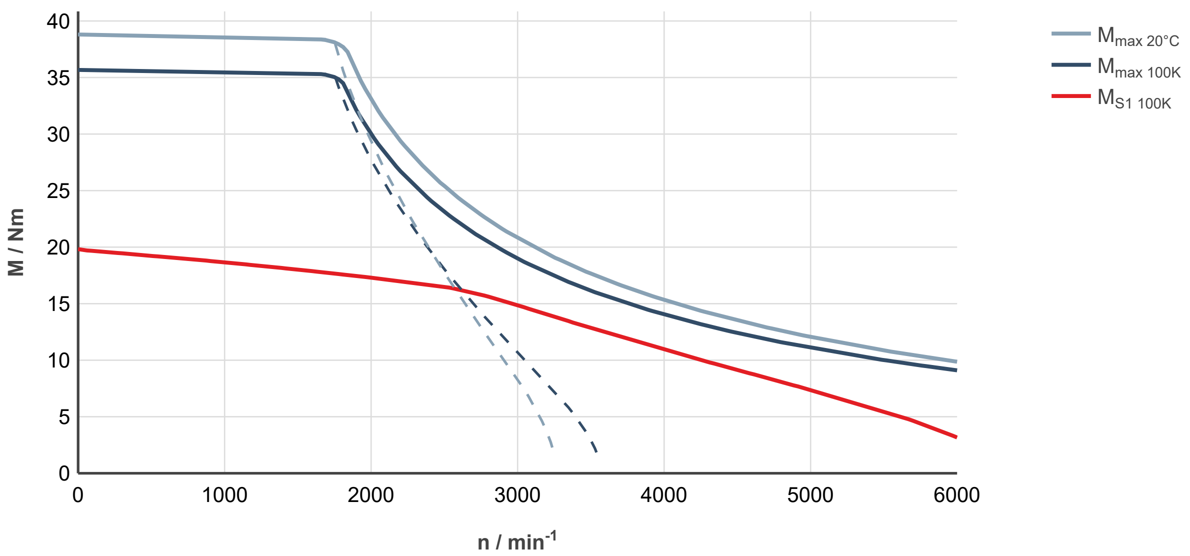



Fig. 135: MS2N07-C0BNA-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

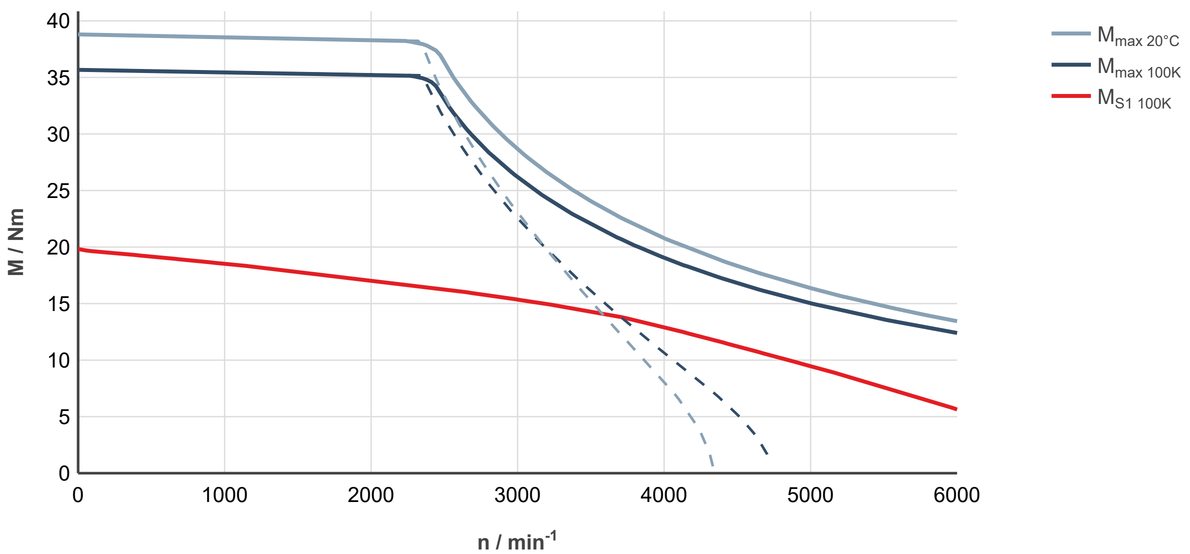



Fig. 136: MS2N07-C0BNA-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-C0BQA / MS2N07-C0BQB

| Designation | Symbol | Unit | MS2N07-C0BQA-□□□□0-□N | MS2N07-C0BQA-□□□□1-□N | MS2N07-C0BQB-□□□□0-□N | MS2N07-C0BQB-□□□□1-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 19.8 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 15.8 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0012 | 0.00146 | 0.0012 | 0.00146 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,900 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 12.45 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 10.2 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 5.1 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 38.8 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 35.7 | | | |
| Maximum current | $I_{max(rms)}$ | A | 36.4 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.37 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 min⁻¹ | 83.1 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.776 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 10.5 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 2.2 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 39.4 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 9.0 | | | |
| Mass | $m_{mot}$ | kg | 14.5 | 16.5 | 14.5 | 16.5 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 20.00 | 0 | 20.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.78 | 0 | 0.78 |
| Maximum connection time | $t_1$ | ms | 0 | 40 | 0 | 40 |
| Maximum disconnection time | $t_2$ | ms | 0 | 100 | 0 | 100 |
| **Fan data** | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |
| 1) For tolerance details refer to ➡Chapter 5.4 Tolerances | | | | | | |

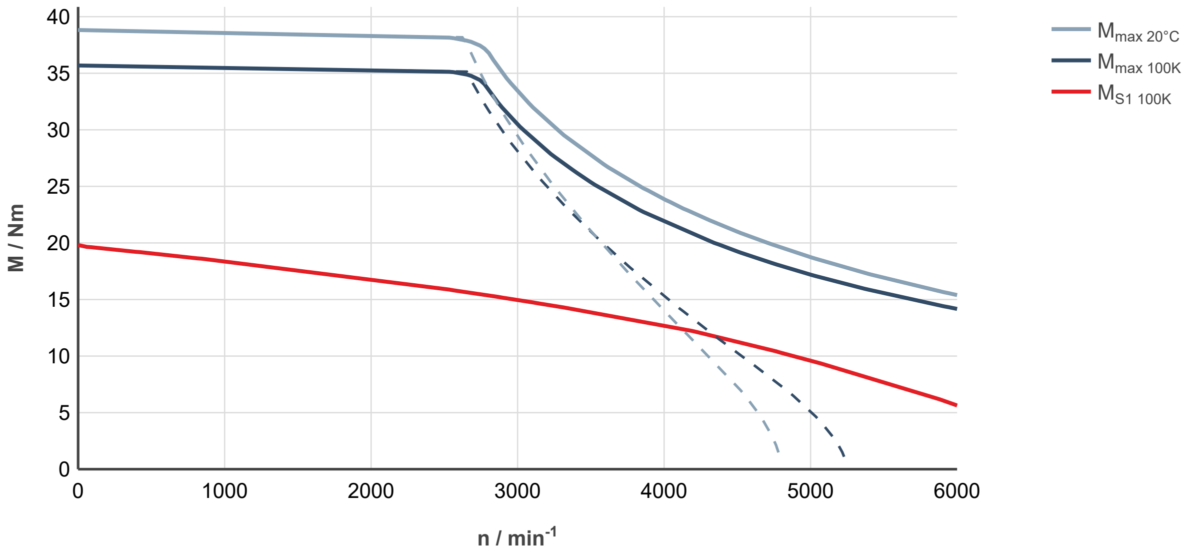



Fig. 137: MS2N07-C0BQA-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

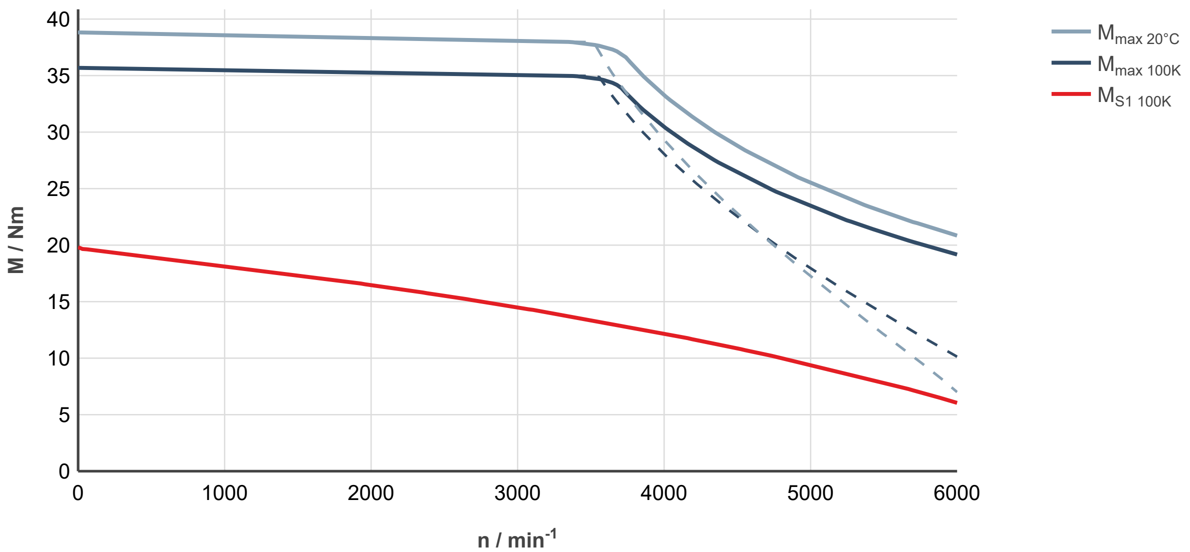



Fig. 138: MS2N07-C0BQA-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-C1BNA / MS2N07-C1BNB

| Designation | Symbol | Unit | MS2N07-C1BNA-□□□□0-□N | MS2N07-C1BNA-□□□□1-□N | MS2N07-C1BNB-□□□□0-□N | MS2N07-C1BNB-□□□□1-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 18.0 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 10.4 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.00305 | 0.00331 | 0.00305 | 0.00331 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,000 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 13.65 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 8.15 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 4.29 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 46.0 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 42.2 | | | |
| Maximum current | $I_{max(rms)}$ | A | 29.5 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.88 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 114.0 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 1.8 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 15.2 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.85 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 34.5 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 9.0 | | | |
| Mass | $m_{mot}$ | kg | 14.5 | 16.5 | 14.5 | 16.5 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 20.00 | 0 | 20.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.78 | 0 | 0.78 |
| Maximum connection time | $t_1$ | ms | 0 | 40 | 0 | 40 |
| Maximum disconnection time | $t_2$ | ms | 0 | 100 | 0 | 100 |
| **Fan data** | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | | | |

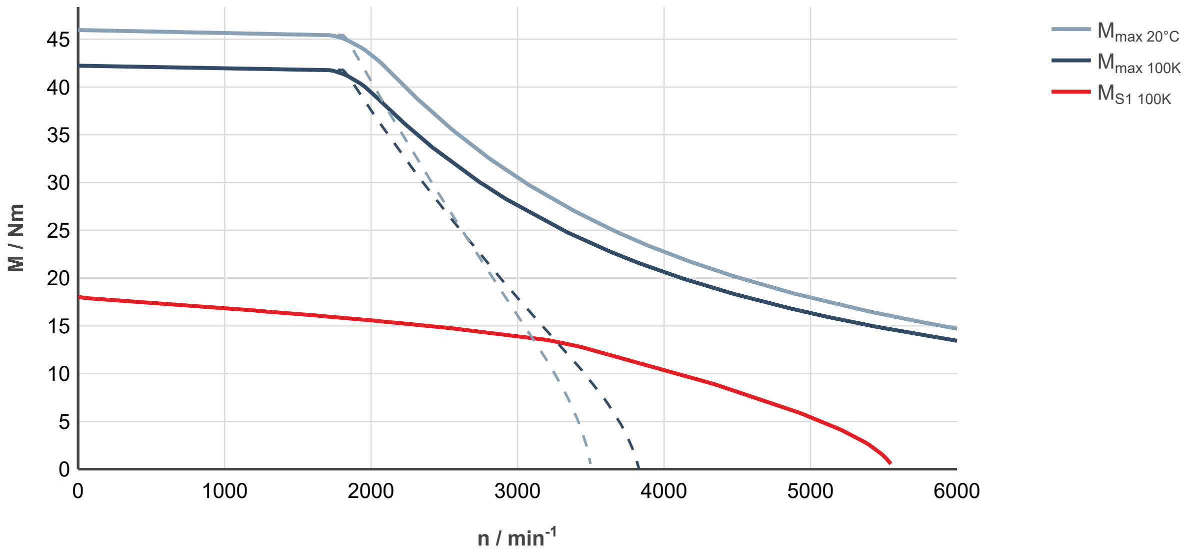



Fig. 139: MS2N07-C1BNA-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

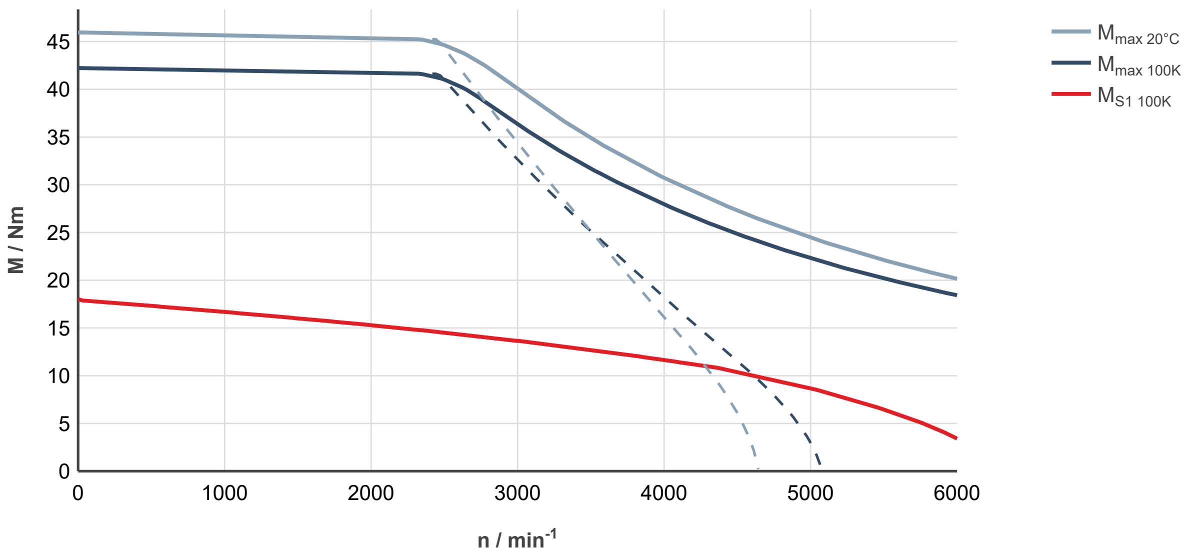



Fig. 140: MS2N07-C1BNA-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-C1BRA / MS2N07-C1BRB

| Designation | Symbol | Unit | MS2N07-C1BRA-□□□□0-□N | MS2N07-C1BRA-□□□□1-□N | MS2N07-C1BRB-□□□□0-□N | MS2N07-C1BRB-□□□□1-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 18.0 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 14.9 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.00305 | 0.00331 | 0.00305 | 0.00331 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 4,100 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 9.65 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 8.55 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 4.14 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 46.0 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 42.2 | | | |
| Maximum current | $I_{max(rms)}$ | A | 42.7 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.3 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 78.7 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.895 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 7.28 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.65 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 34.5 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 9.0 | | | |
| Mass | $m_{mot}$ | kg | 14.5 | 16.5 | 14.5 | 16.5 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 20.00 | 0 | 20.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.78 | 0 | 0.78 |
| Maximum connection time | $t_1$ | ms | 0 | 40 | 0 | 40 |
| Maximum disconnection time | $t_2$ | ms | 0 | 100 | 0 | 100 |
| **Fan data** | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

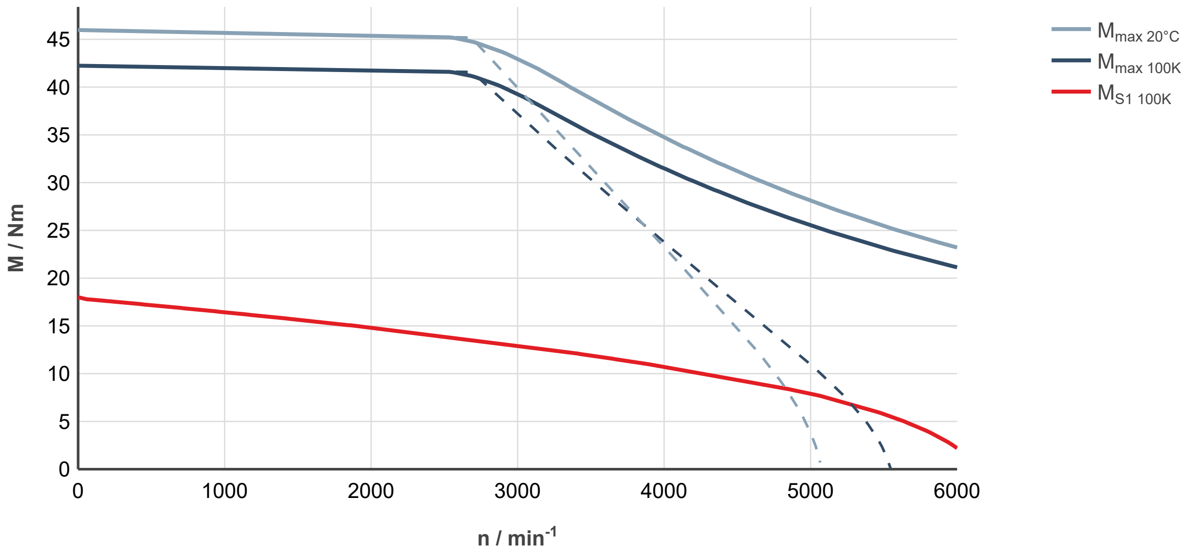



Fig. 141: MS2N07-C1BRA-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

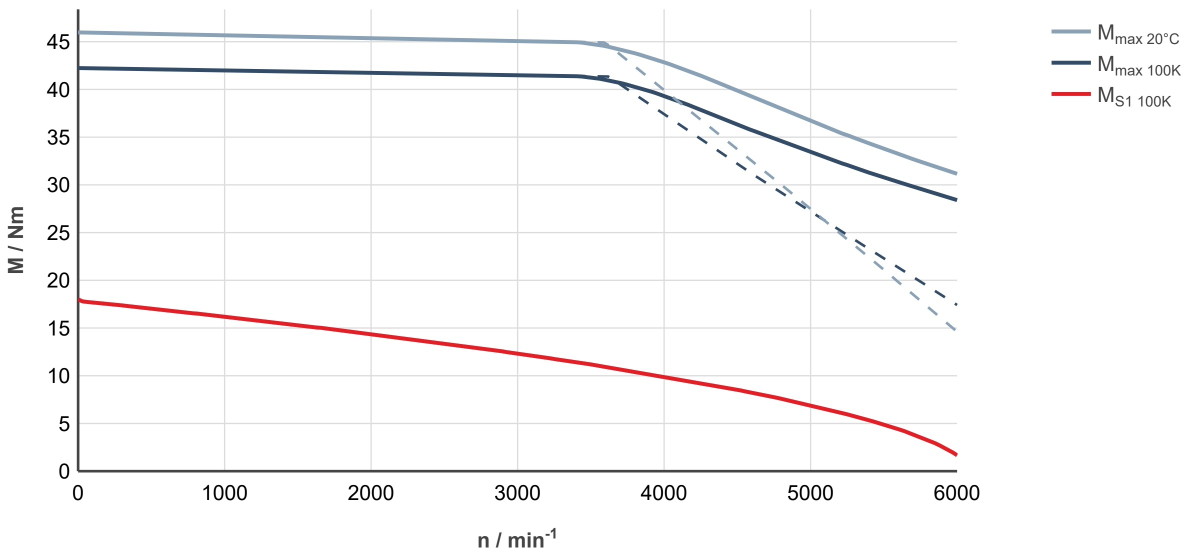



Fig. 142: MS2N07-C1BRA-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D0BFA / MS2N07-D0BFB

| Designation | Symbol | Unit | MS2N07-D0BFA-□□□□0-□N | MS2N07-D0BFA-□□□□2-□N | MS2N07-D0BFB-□□□□0-□N | MS2N07-D0BFB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 35.5 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 9.55 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0021 | 0.00251 | 0.0021 | 0.00251 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,215 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 33.1 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 8.95 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 4.21 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 79.7 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 73.2 | | | |
| Maximum current | $I_{max(rms)}$ | A | 24.8 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 4.09 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 248 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 2.71 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 45.67 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 4.71 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 45.8 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 10.7 | | | |
| Mass | $m_{mot}$ | kg | 20 | 22.5 | 20 | 22.5 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 | 0 | 200 |
| **Fan data** | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | | | |

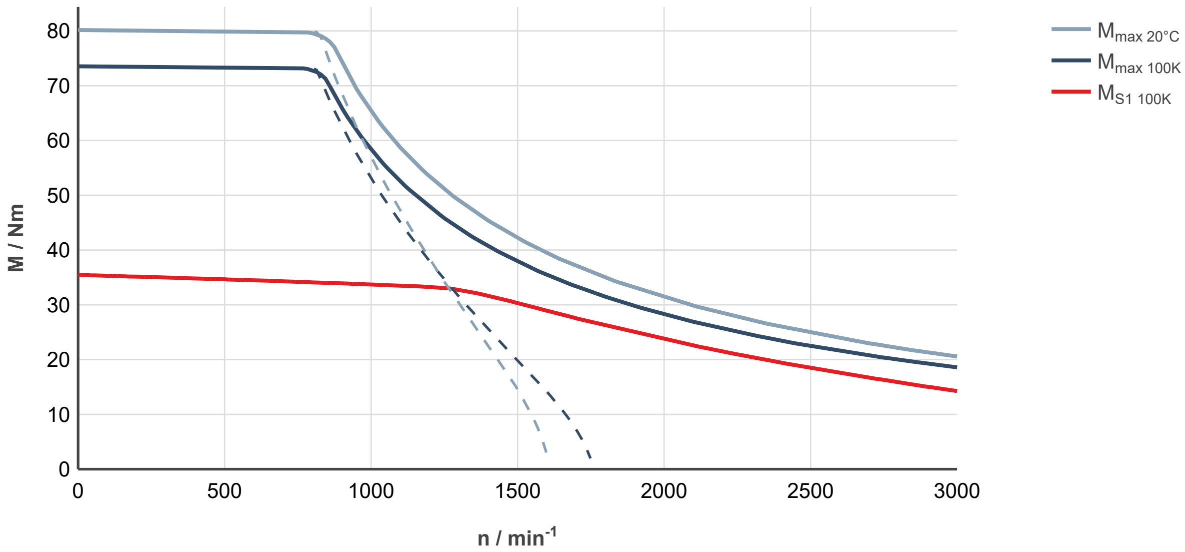



Fig. 143: MS2N07-D0BFA-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

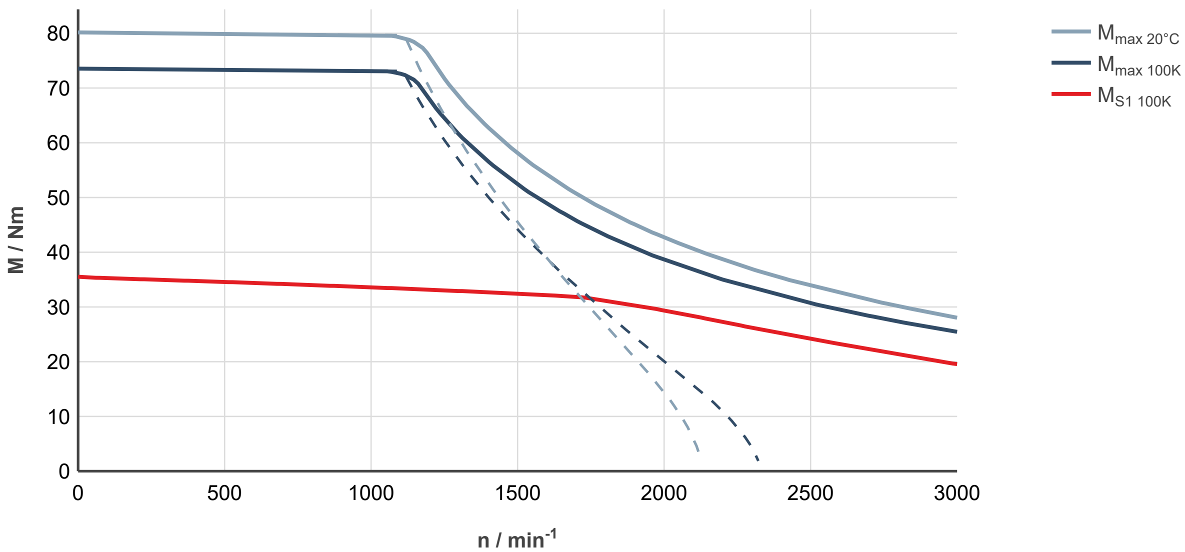



Fig. 144: MS2N07-D0BFA-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D0BHA / MS2N07-D0BHB

| Designation | Symbol | Unit | MS2N07-D0BHA-□□□□0-□N | MS2N07-D0BHA-□□□□2-□N | MS2N07-D0BHB-□□□□_0-□N | MS2N07-D0BHB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 35.5 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 14.1 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m$^2$ | 0.0021 | 0.00251 | 0.0021 | 0.00251 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,870 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 30.1 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 12.1 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 5.9 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 79.7 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 73.2 | | | |
| Maximum current | $I_{max(rms)}$ | A | 36.4 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.76 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 min$^{-1}$ | 167.5 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 1.30 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 20.2 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 4.1 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 45.8 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 10.7 | | | |
| Mass | $m_{mot}$ | kg | 20 | 22.5 | 20 | 22.5 |
| Holding brake | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 | 0 | 200 |
| Fan data | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

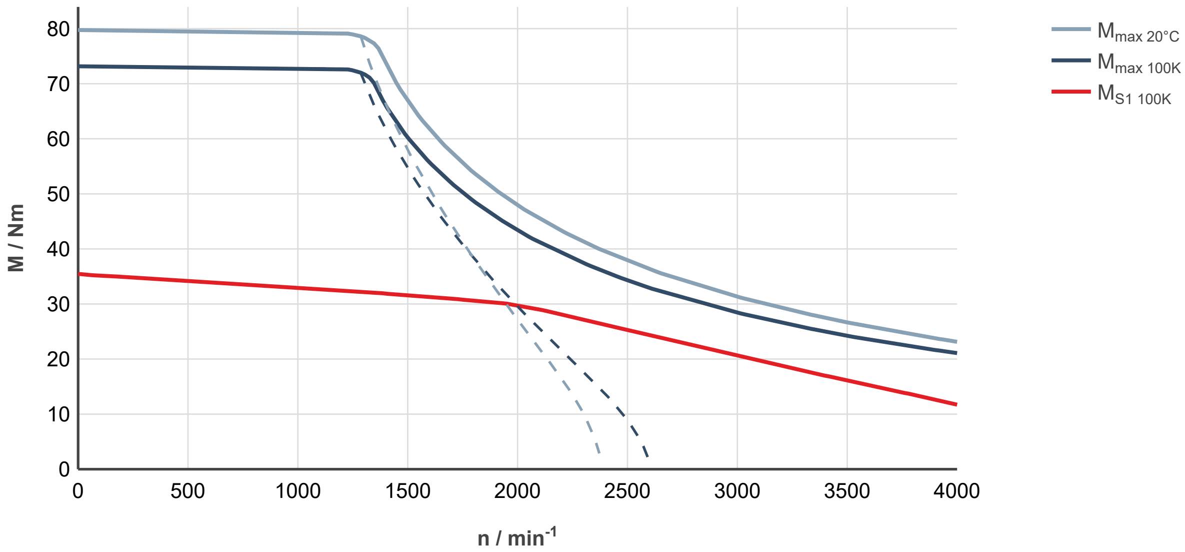



Fig. 145: MS2N07-D0BHA-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

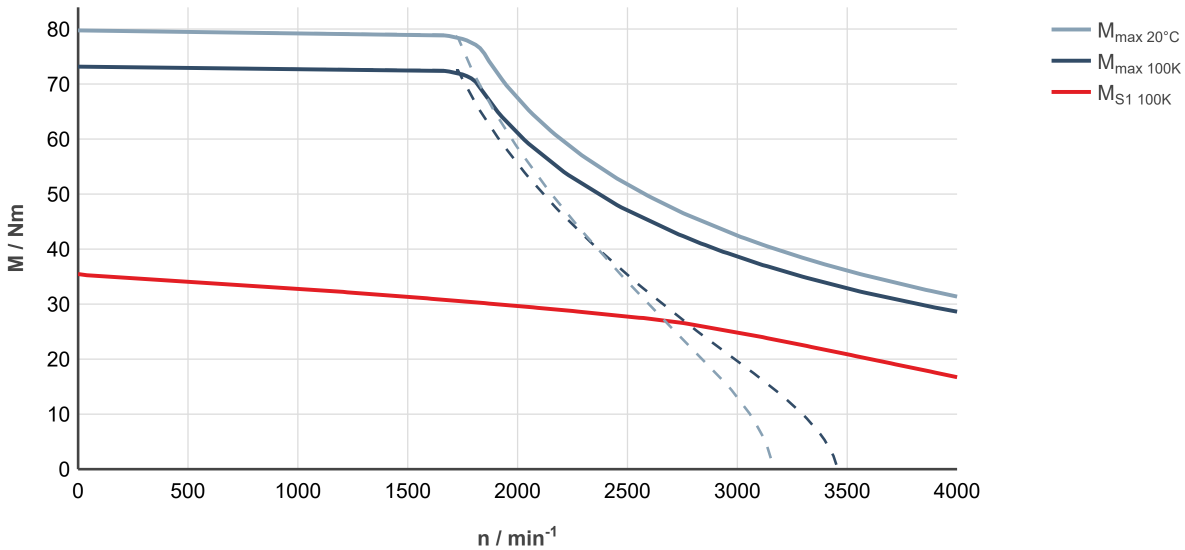



Fig. 146: MS2N07-D0BHA-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D0BNA / MS2N07-D0BNB

| Designation | Symbol | Unit | MS2N07-D0BNA-□□□□0-□N | MS2N07-D0BNA-□□□□2-□N | MS2N07-D0BNB-□□□□0-□N | MS2N07-D0BNB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 35.5 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 19.1 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0021 | 0.00251 | 0.0021 | 0.00251 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,660 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 26.5 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 14.5 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 7.4 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 79.7 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 73.2 | | | |
| Maximum current | $I_{max(rms)}$ | A | 49.5 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.04 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 124.1 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.671 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 10.0 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 4.0 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 45.8 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 10.7 | | | |
| Mass | $m_{mot}$ | kg | 20 | 22.5 | 20 | 22.5 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 | 0 | 200 |
| **Fan data** | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

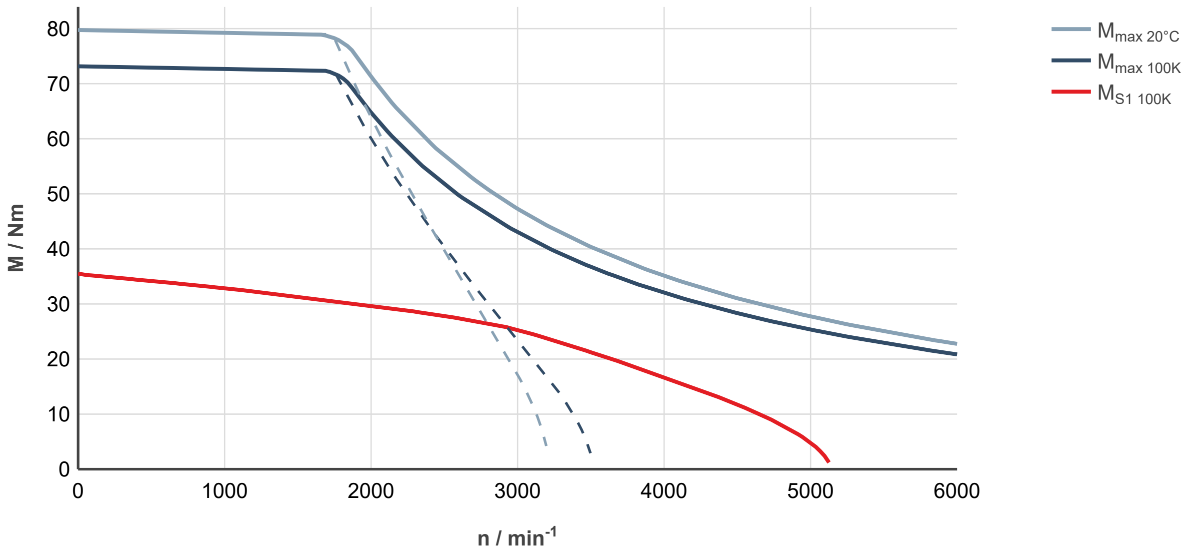



Fig. 147: MS2N07-D0BNA-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

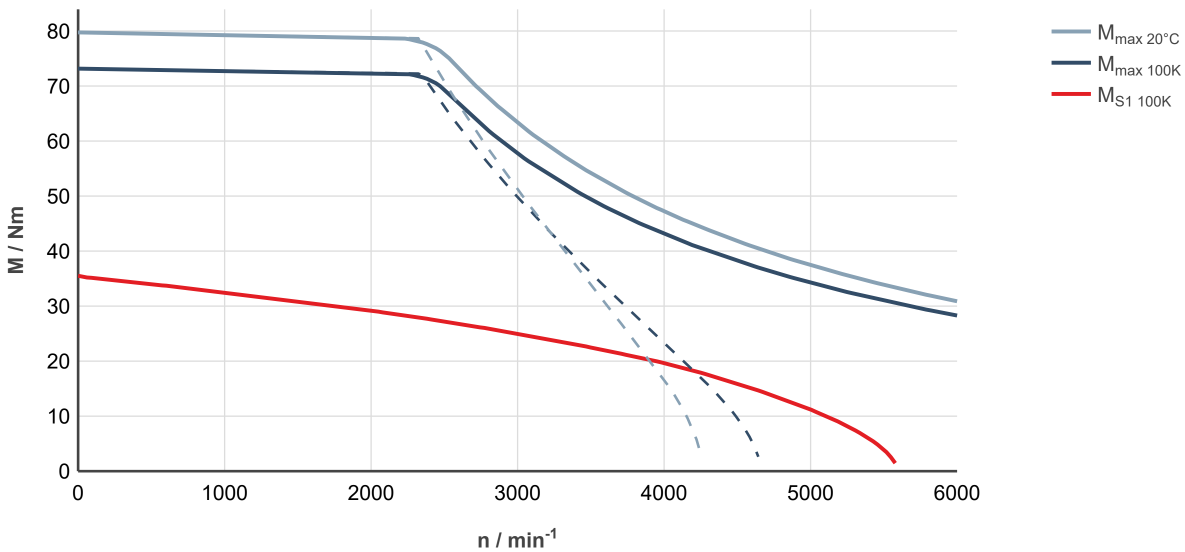



Fig. 148: MS2N07-D0BNA-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D0BRA / MS2N07-D0BRB

| Designation | Symbol | Unit | MS2N07-D0BRA-□□□□0-□N | MS2N07-D0BRA-□□□□2-□N | MS2N07-D0BRB-□□□□0-□N | MS2N07-D0BRB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 35.5 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 28.2 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | $kg{*}m^2$ | 0.0021 | 0.00251 | 0.0021 | 0.00251 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,650 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 18.7 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 15.4 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 7.15 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 79.7 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 73.2 | | | |
| Maximum current | $I_{max(rms)}$ | A | 72.7 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.38 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 83.9 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.327 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 5.06 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 3.95 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 45.8 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 10.7 | | | |
| Mass | $m_{mot}$ | kg | 20 | 22.5 | 20 | 22.5 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 | 0 | 200 |
| **Fan data** | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

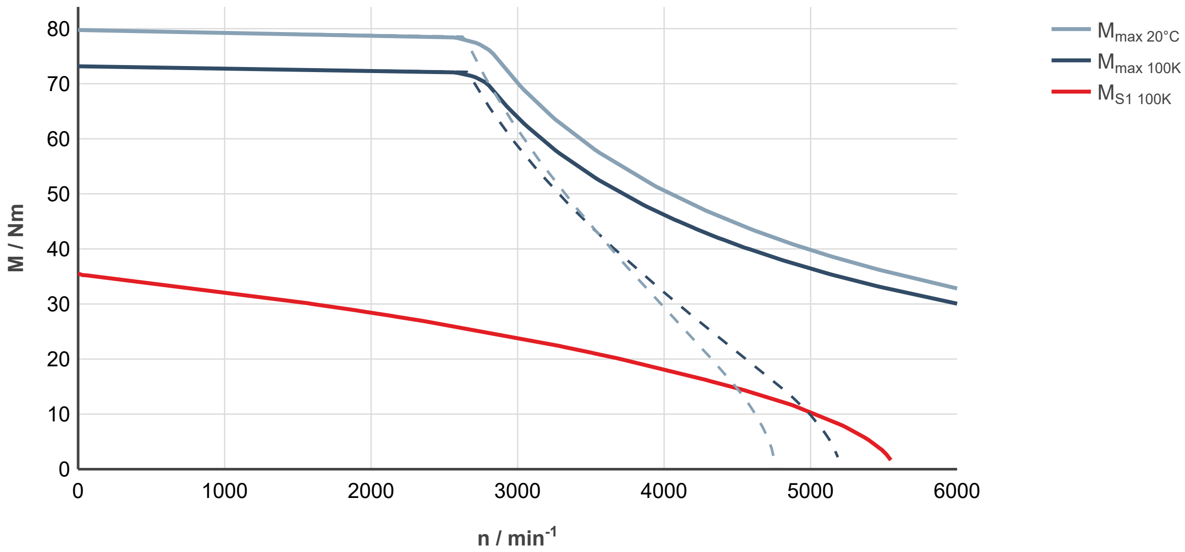



Fig. 149: MS2N07-D0BRA-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

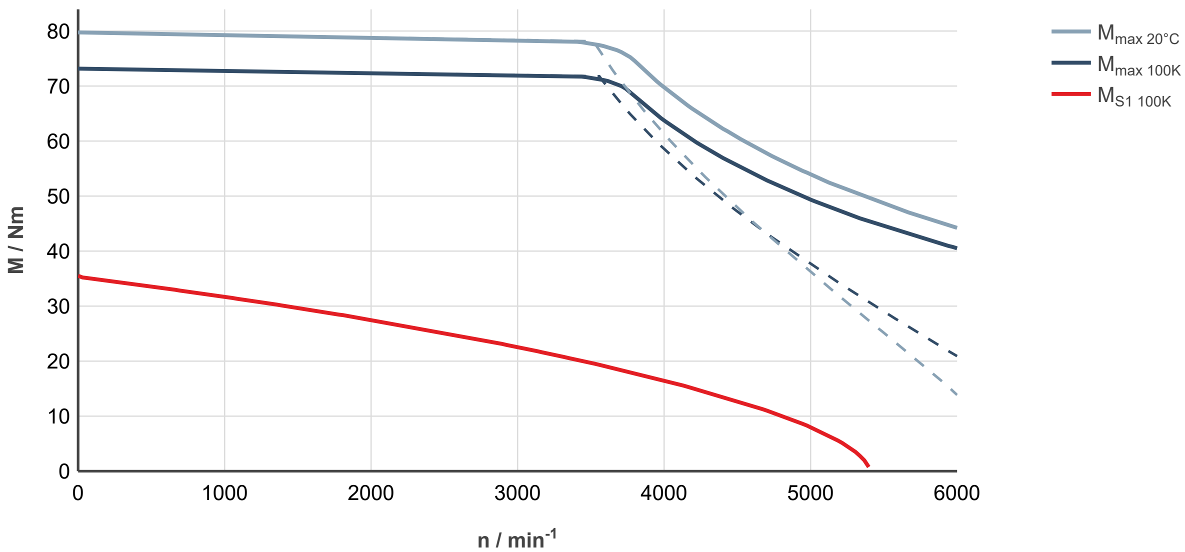



Fig. 150: MS2N07-D0BRA-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D1BFA / MS2N07-D1BFB

| Designation | Symbol | Unit | MS2N07-D1BFA-□□□□0-□N | MS2N07-D1BFA-□□□□2-□N | MS2N07-D1BFB-□□□□0-□N | MS2N07-D1BFB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 31.0 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 9.0 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.00529 | 0.00570 | 0.00529 | 0.00570 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,480 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 28.5 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 8.4 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 4.42 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 92.5 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 84.8 | | | |
| Maximum current | $I_{max(rms)}$ | A | 29.5 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 3.73 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 226.5 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 2.93 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 28.7 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 3.65 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 38.9 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 10.7 | | | |
| Mass | $m_{mot}$ | kg | 21.0 | 24.0 | 21.0 | 24.0 |
| <u>Holding brake</u> | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 | 0 | 200 |
| <u>Fan data</u> | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

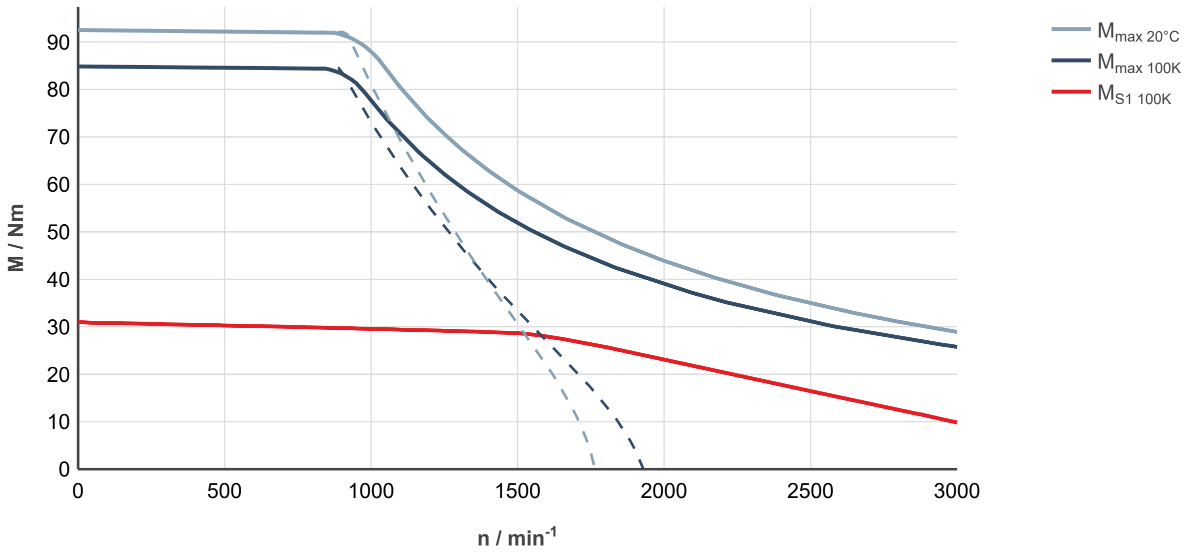



Fig. 151: MS2N07-D1BFA-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

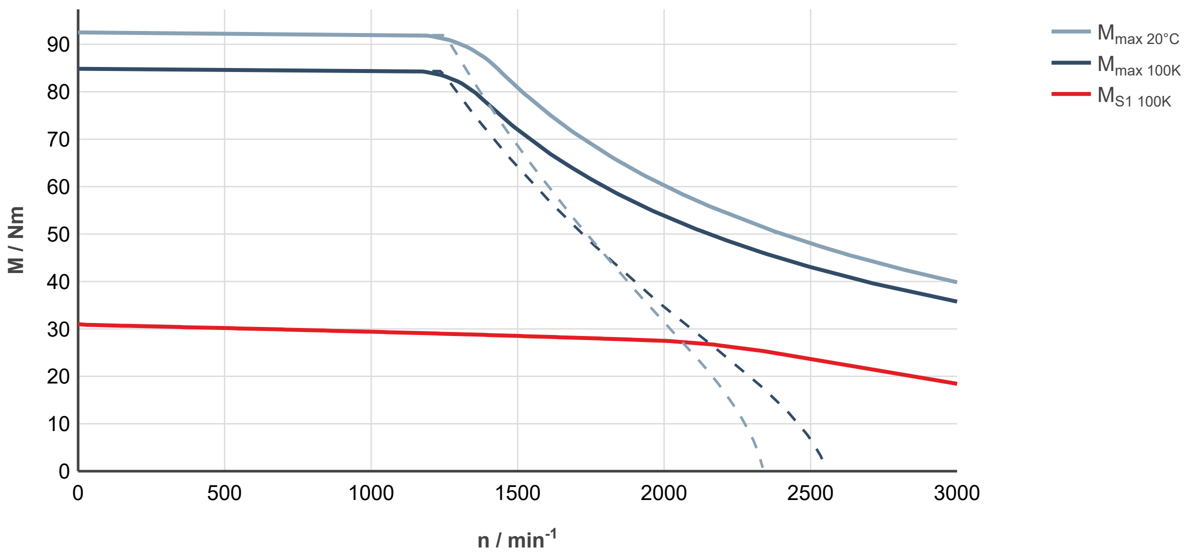



Fig. 152: MS2N07-D1BFA-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D1BHA / MS2N07-D1BHB

| Designation | Symbol | Unit | MS2N07-D1BHA-□□□□0-□N | MS2N07-D1BHA-□□□□2-□N | MS2N07-D1BHB-□□□□0-□N | MS2N07-D1BHB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 31.0 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 12.9 | | | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.00529 | 0.00570 | 0.00529 | 0.00570 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | | | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 26.4 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 11.25 | | | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 5.50 | | | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 92.5 | | | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 84.8 | | | |
| Maximum current | $I_{max(rms)}$ | A | 42.7 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.59 | | | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 min$^{-1}$ | 157.5 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 1.56 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 12.8 | | | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 21.0 | 24.0 | 21.0 | 24.0 |
| <u>Holding brake</u> | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 | 0 | 200 |
| <u>Fan data</u> | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | | | |

Technical data

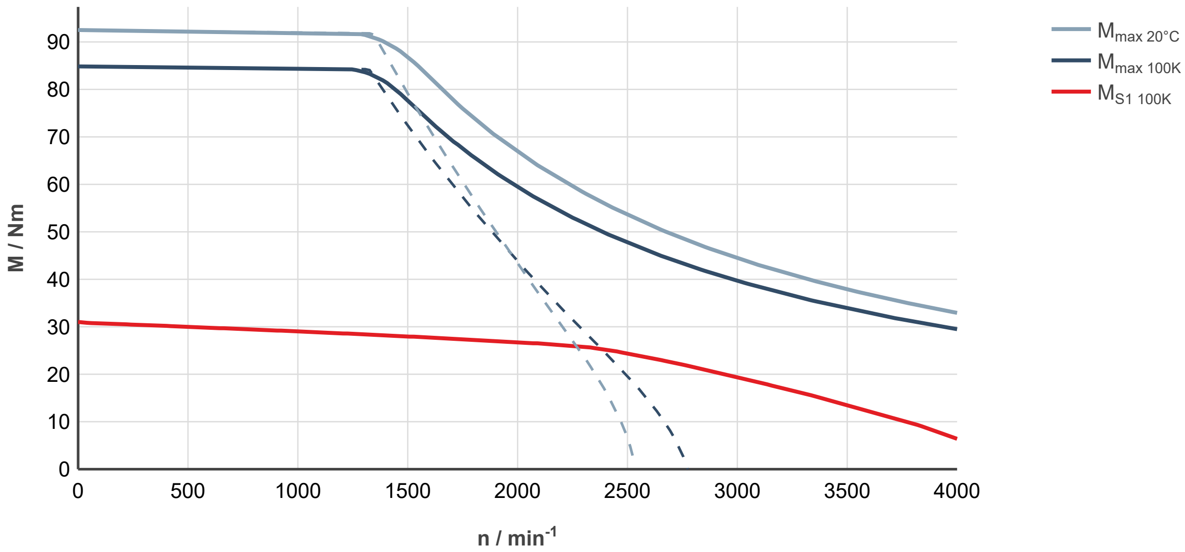



Fig. 153: MS2N07-D1BHA-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

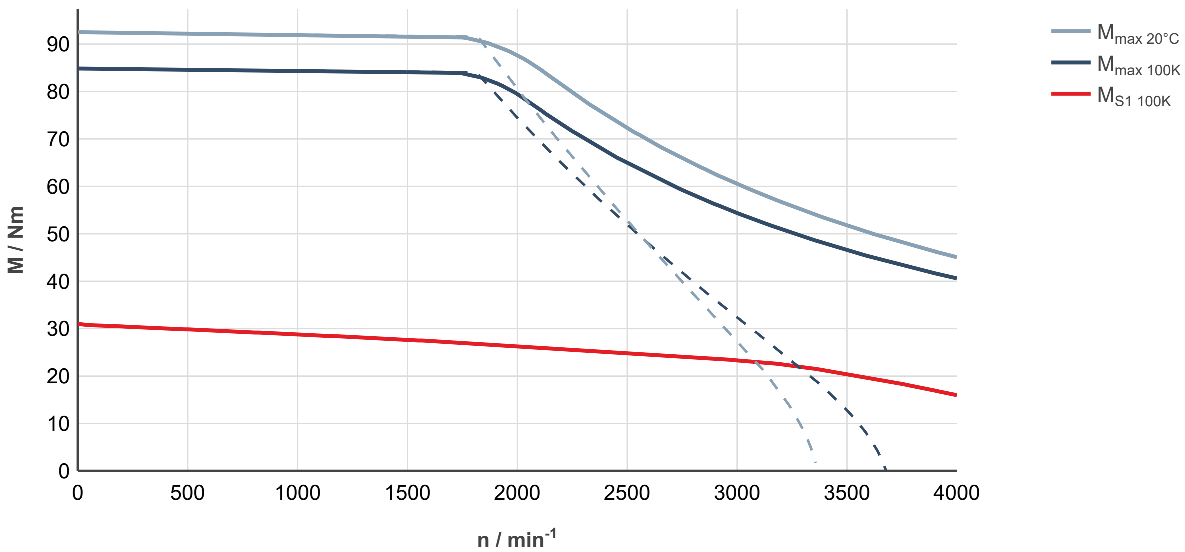



Fig. 154: MS2N07-D1BHA-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D1BNA / MS2N07-D1BNB

| Designation | Symbol | Unit | MS2N07-D1BNA-□□□□0-□N | MS2N07-D1BNA-□□□□2-□N | MS2N07-D1BNB-□□□□0-□N | MS2N07-D1BNB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 31.0 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 16.3 | | | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.00529 | 0.00570 | 0.00529 | 0.00570 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,870 | | | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 23.0 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 12.55 | | | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 6.9 | | | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 92.5 | | | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 84.8 | | | |
| Maximum current | $I_{max(rms)}$ | A | 54.1 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.05 | | | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 124.3 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.942 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 7.9 | | | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 21.0 | 24.0 | 21.0 | 24.0 |
| <u>Holding brake</u> | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 | 0 | 200 |
| <u>Fan data</u> | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

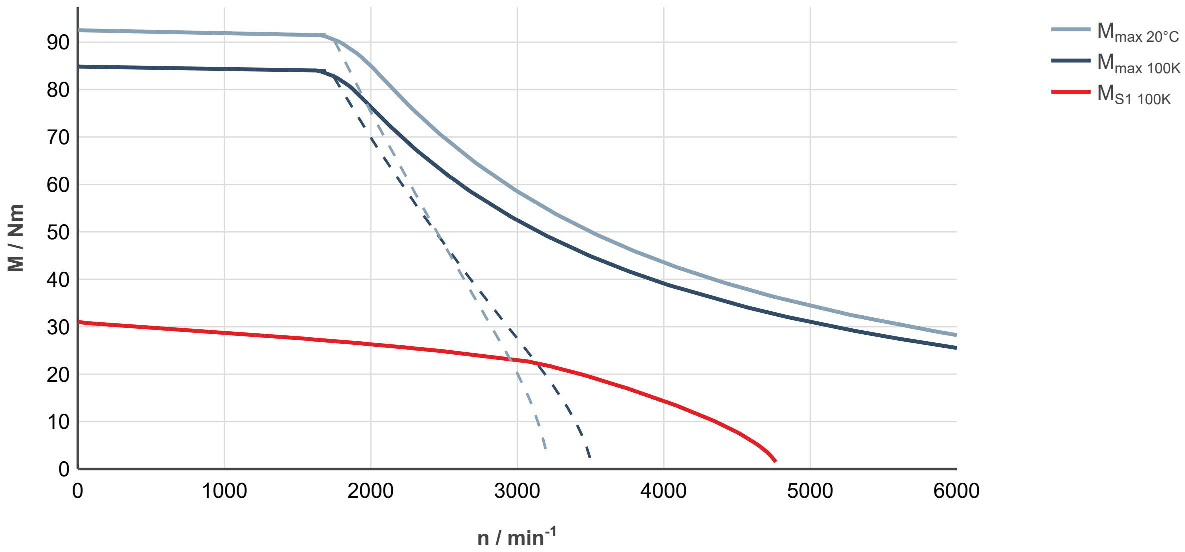



Fig. 155: MS2N07-D1BNA-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

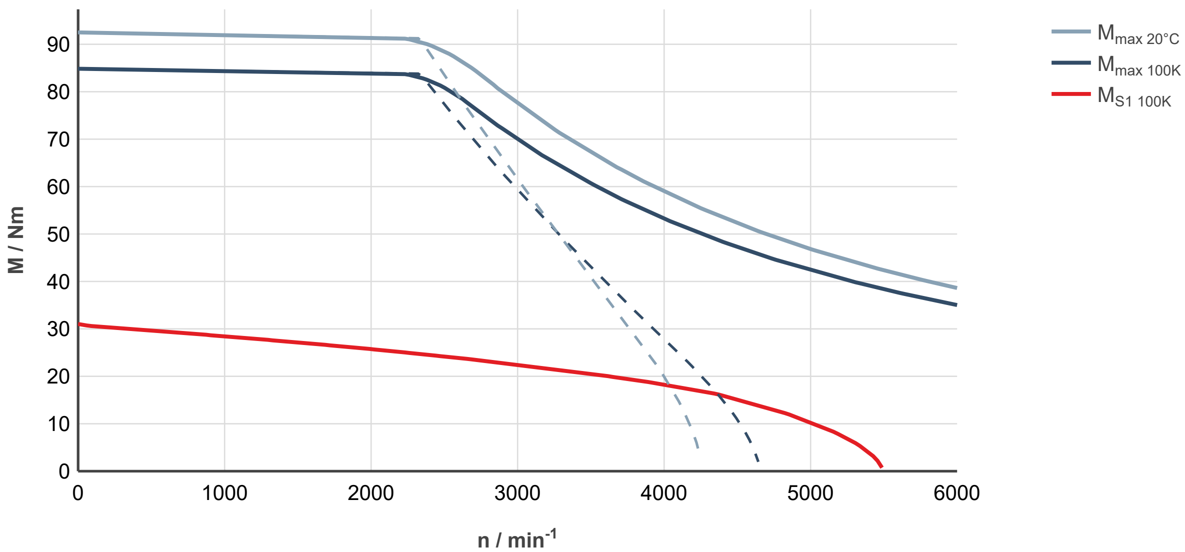



Fig. 156: MS2N07-D1BNA-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-E0BDA / MS2N07-E0BDB

| Designation | Symbol | Unit | MS2N07-E0BDA-□□□□0-□N | MS2N07-E0BDA-□□□□2-□N | MS2N07-E0BDB-□□□□0-□N | MS2N07-E0BDB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 49.5 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 8.9 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.003 | 0.00341 | 0.003 | 0.00341 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 815 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 47.3 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 8.55 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 4.04 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 119.5 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 109.5 | | | |
| Maximum current | $I_{max(rms)}$ | A | 24.8 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 2,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 6.09 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 370 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 3.72 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 65.9 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 6.95 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 51.5 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 12.5 | | | |
| Mass | $m_{mot}$ | kg | 26 | 29 | 26 | 29 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 | 0 | 200 |
| **Fan data** | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | | | |

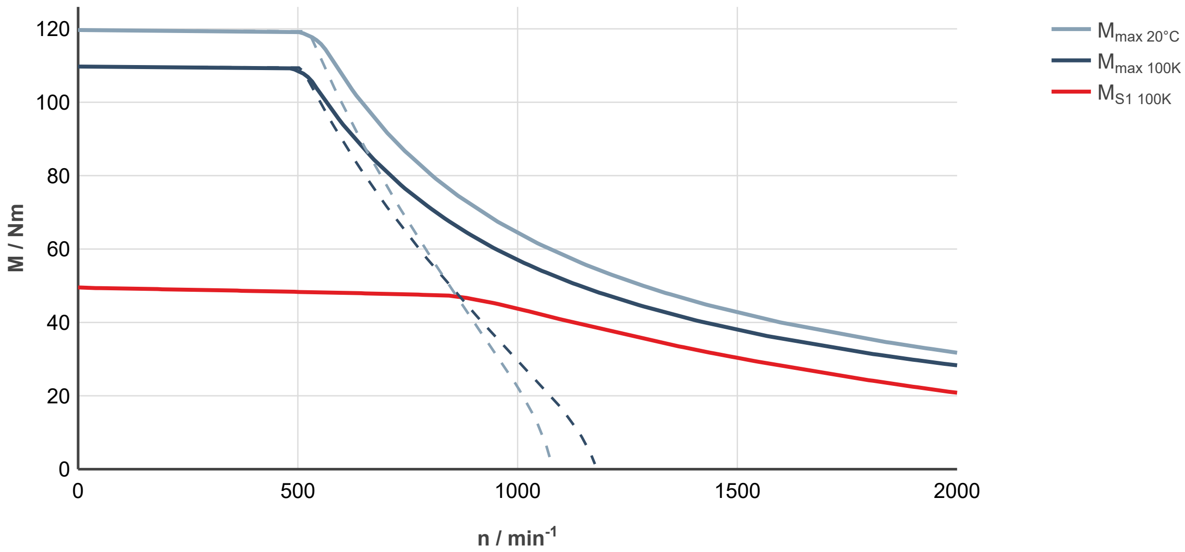



Fig. 157: MS2N07-E0BDA-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

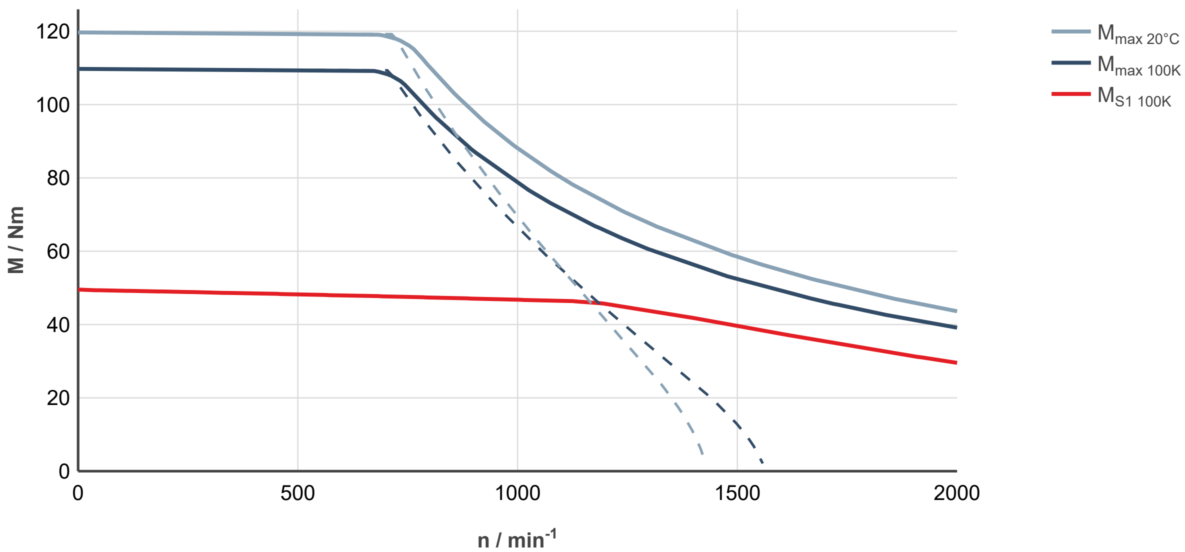



Fig. 158: MS2N07-E0BDA-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-E0BHA / MS2N07-E0BHB

| Designation | Symbol | Unit | MS2N07-E0BHA-□□□□0-□N | MS2N07-E0BHA-□□□□2-□N | MS2N07-E0BHB-□□□□0-□N | MS2N07-E0BHB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 49.5 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 17.9 | | | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | kg*m² | 0.003 | 0.00341 | 0.003 | 0.00341 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,760 | | | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 42.4 | | 42.3 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 15.5 | | 15.4 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 7.8 | | | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 119.5 | | | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 109.5 | | | |
| Maximum current | $I_{max(rms)}$ | A | 49.5 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 3.03 | | | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 184.3 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.95 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 14.8 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 7.1 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 51.5 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 12.5 | | | |
| Mass | $m_{mot}$ | kg | 26 | 29 | 26 | 29 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 | 0 | 200 |
| **Fan data** | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | | | |

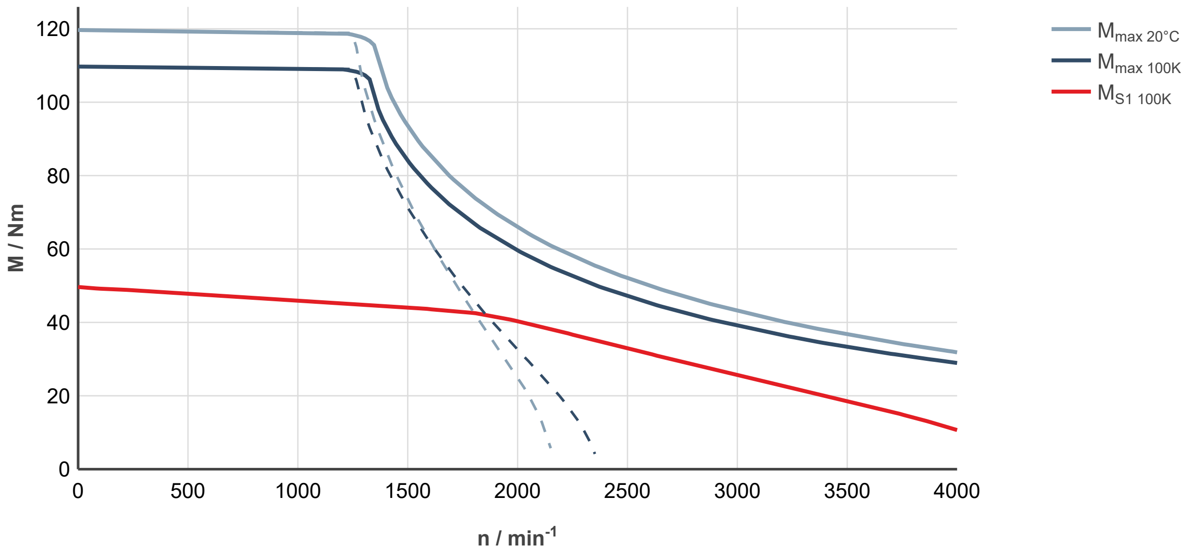



Fig. 159: MS2N07-E0BHA-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

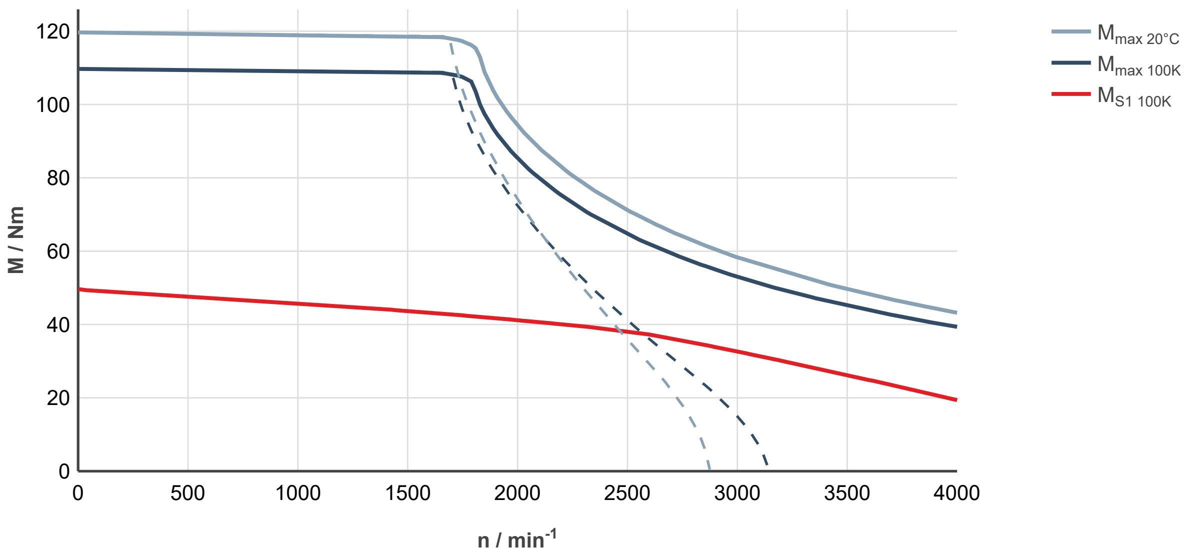



Fig. 160: MS2N07-E0BHA-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-E0BNA / MS2N07-E0BNB

| Designation | Symbol | Unit | MS2N07-E0BNA-□□□□0-□N | MS2N07-E0BNA-□□□□2-□N | MS2N07-E0BNB-□□□□0-□N | MS2N07-E0BNB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 49.5 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 26.2 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.003 | 0.00341 | 0.003 | 0.00341 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,730 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 34.4 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 18.6 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 9.85 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 119.5 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 109.5 | | | |
| Maximum current | $I_{max(rms)}$ | A | 72.7 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.08 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 126.2 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.455 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 7.50 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 6.11 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 51.5 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 12.5 | | | |
| Mass | $m_{mot}$ | kg | 26 | 29 | 26 | 29 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 | 0 | 200 |
| **Fan data** | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

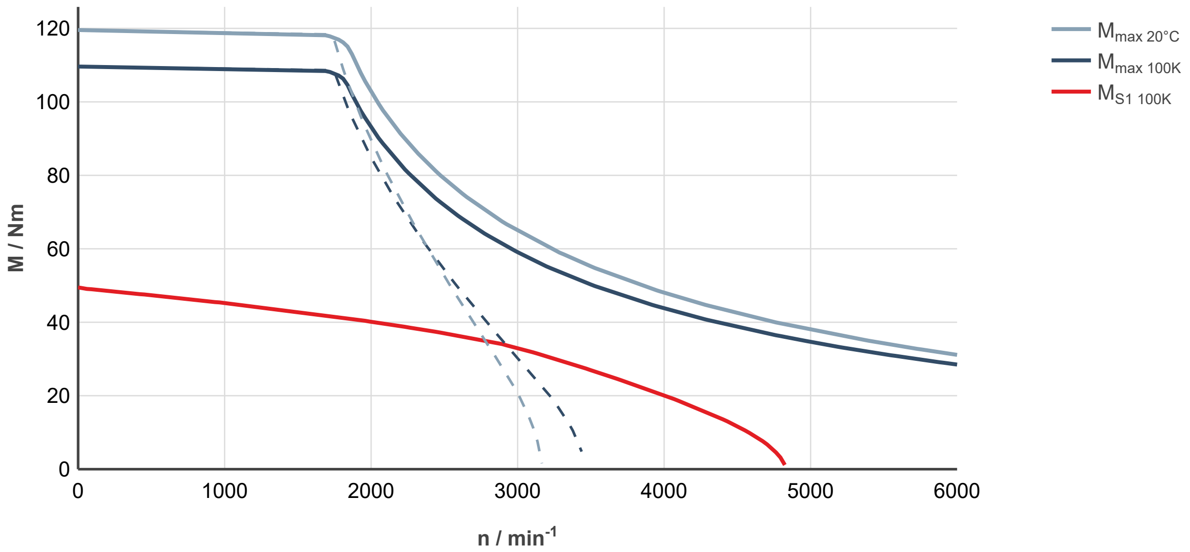



Fig. 161: MS2N07-E0BNA-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

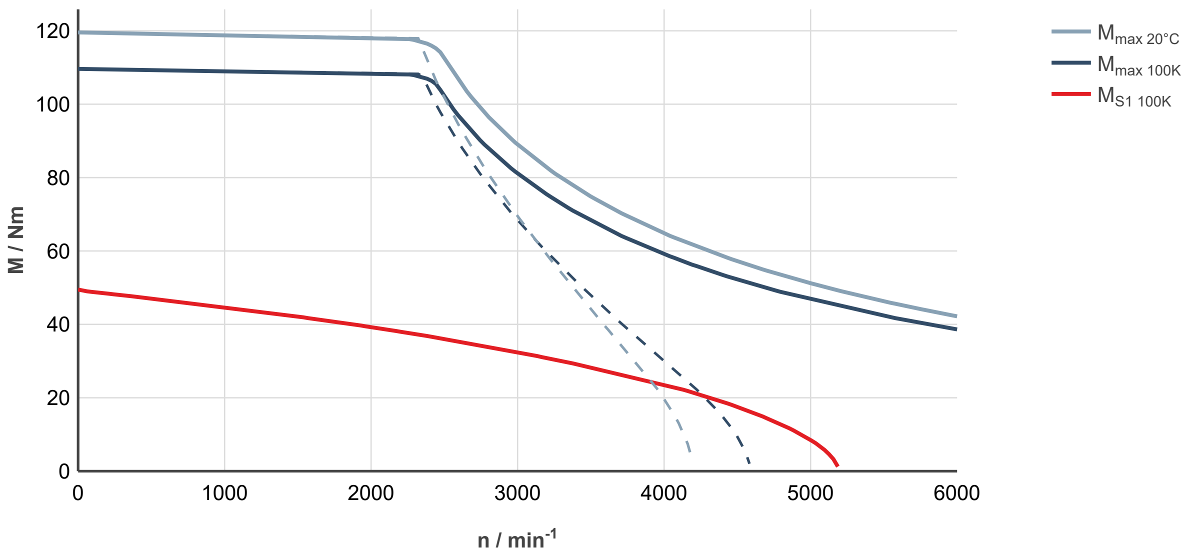



Fig. 162: MS2N07-E0BNA-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-E0BQA / MSN207-E0BQB

| Designation | Symbol | Unit | MS2N07-E0BQA-□□□□0-□N | MS2N07-E0BQA-□□□□2-□N | MS2N07-E0BQB-□□□□0-□N | MS2N07-E0BQB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 49.5 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 33.3 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | $kg*m^2$ | 0.003 | 0.00341 | 0.003 | 0.00341 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,300 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 27.3 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 19.0 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 9.45 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 119.5 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 109.5 | | | |
| Maximum current | $I_{max(rms)}$ | A | 92.3 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.64 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 99.3 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.282 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 4.64 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 6.21 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 51.5 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 12.5 | | | |
| Mass | $m_{mot}$ | kg | 26 | 29 | 26 | 29 |
| Holding brake | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 | 0 | 200 |
| Fan data | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | | | |

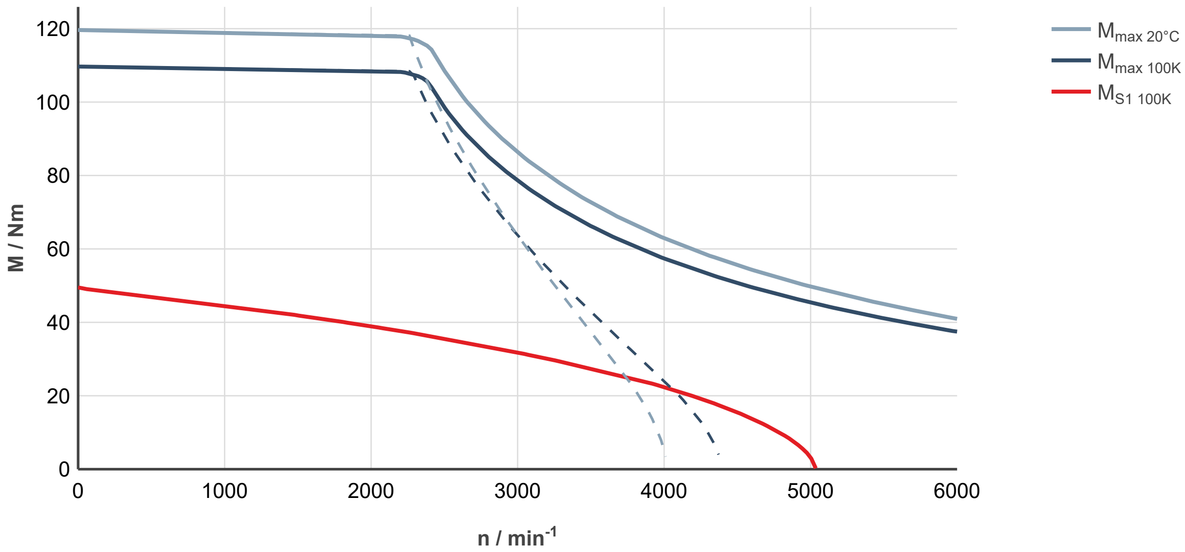



Fig. 163: MS2N07-E0BQA-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

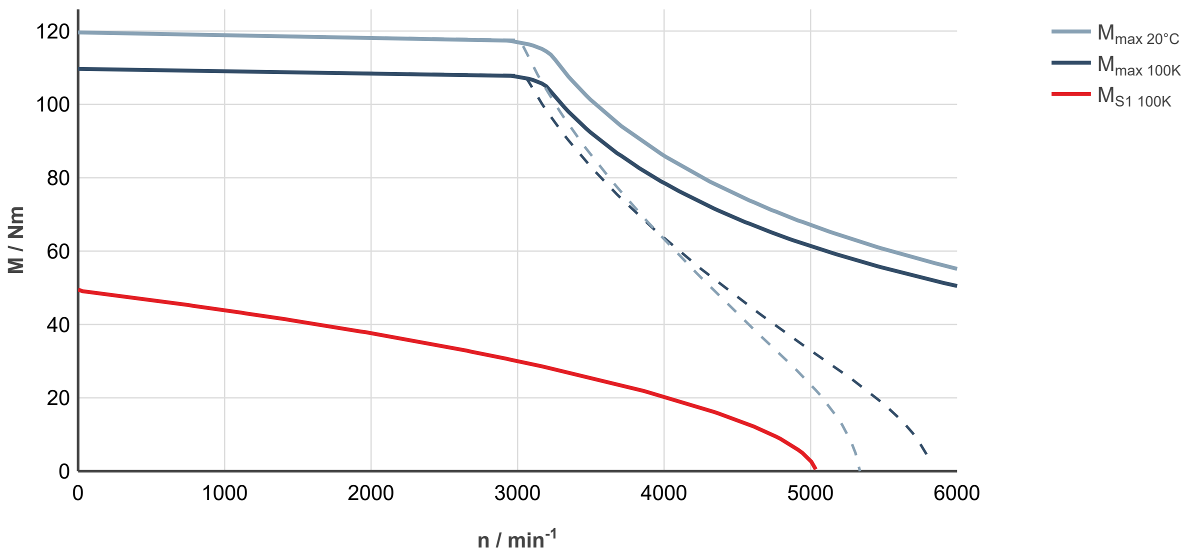



Fig. 164: MS2N07-E0BQA-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-E1BDA / MS2N07-E1BDB

| Designation | Symbol | Unit | MS2N07-E1BDA-□□□□0-□N | MS2N07-E1BDA-□□□□2-□N | MS2N07-E1BDB-□□□□0-□N | MS2N07-E1BDB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 43.5 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 8.35 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.00752 | 0.00793 | 0.00752 | 0.00793 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 960 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 41.5 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 8.05 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 4.17 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 140 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 128.5 | | | |
| Maximum current | $I_{max(rms)}$ | A | 29.5 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 2,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 5.63 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 341.8 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 4.2 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 42.9 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 5.7 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 43.0 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 12.5 | | | |
| Mass | $m_{mot}$ | kg | 26 | 29 | 26 | 29 |
| <u>Holding brake</u> | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 | 0 | 200 |
| <u>Fan data</u> | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | | | |

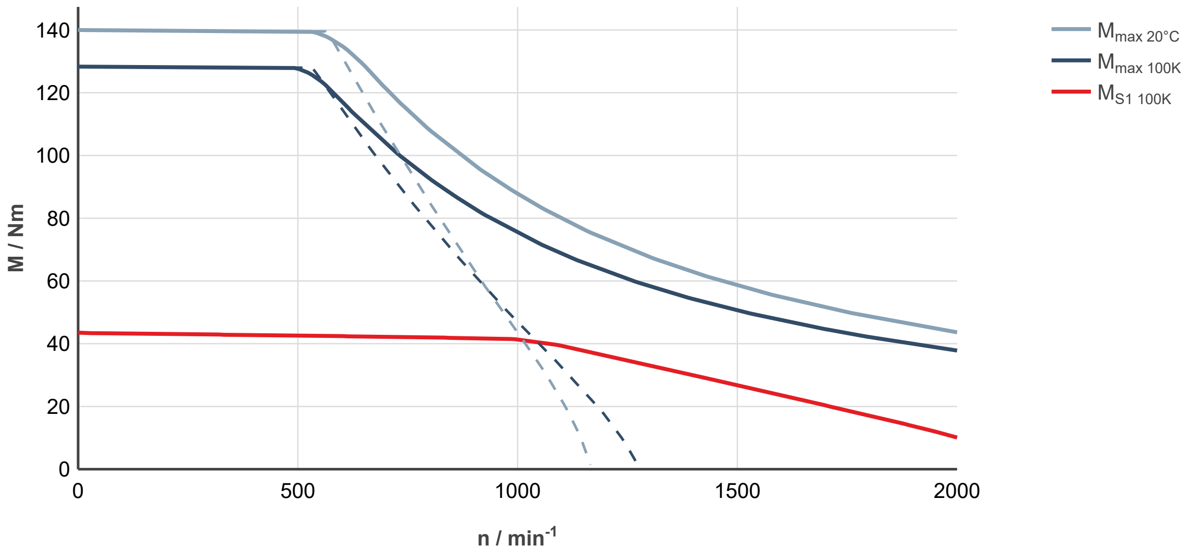



Fig. 165: MS2N07-E1BDA-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

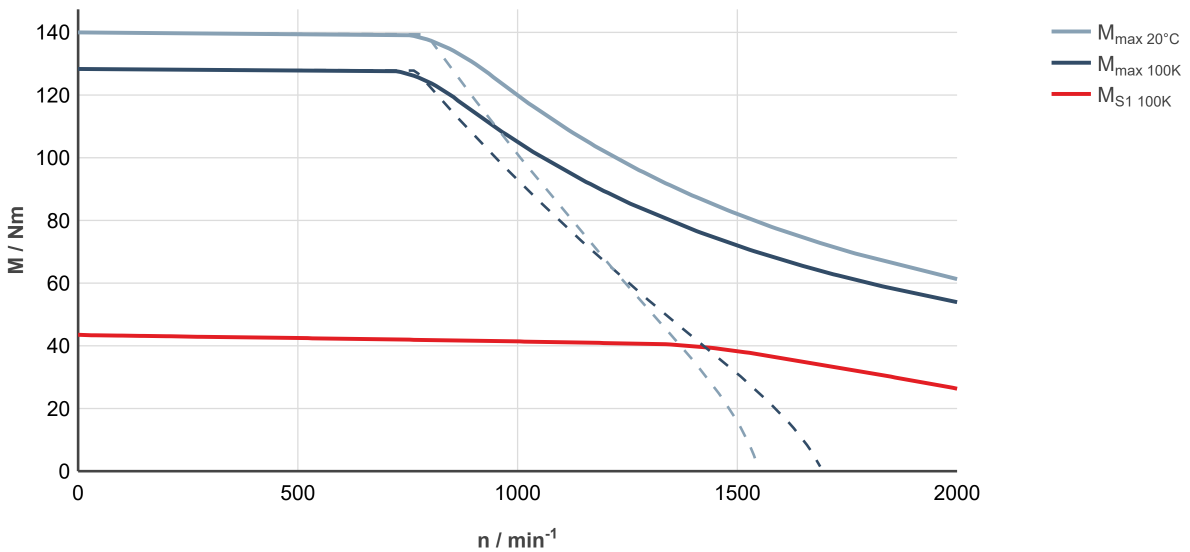



Fig. 166: MS2N07-E1BDA-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-E1BHA / MS2N07-E1BHB

| Designation | Symbol | Unit | MS2N07-E1BHA-□□□□0-□N | MS2N07-E1BHA-□□□□2-□N | MS2N07-E1BHB-□□□□0-□N | MS2N07-E1BHB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 43.5 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 15.2 | | | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.00752 | 0.00793 | 0.00752 | 0.00793 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,900 | | | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 36.4 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 13.2 | | | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 7.3 | | | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 140 | | | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 128.5 | | | |
| Maximum current | $I_{max(rms)}$ | A | 54.1 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 3.08 | | | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 187 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 1.31 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 12.1 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 4.77 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 43.0 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 12.5 | | | |
| Mass | $m_{mot}$ | kg | 26 | 29 | 26 | 29 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 | 0 | 200 |
| **Fan data** | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

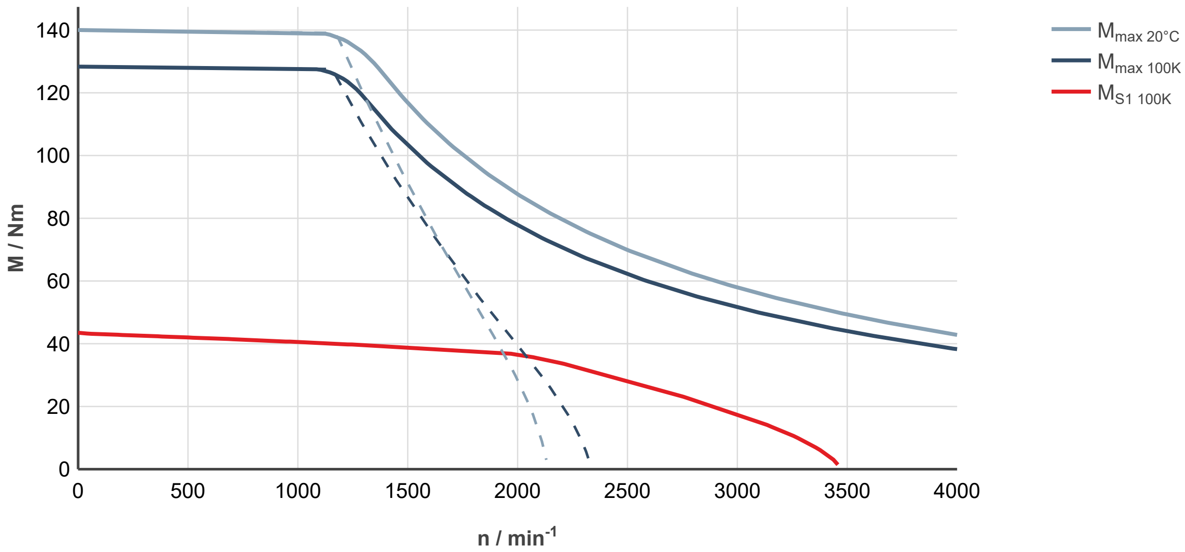



Fig. 167: MS2N07-E1BHA-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

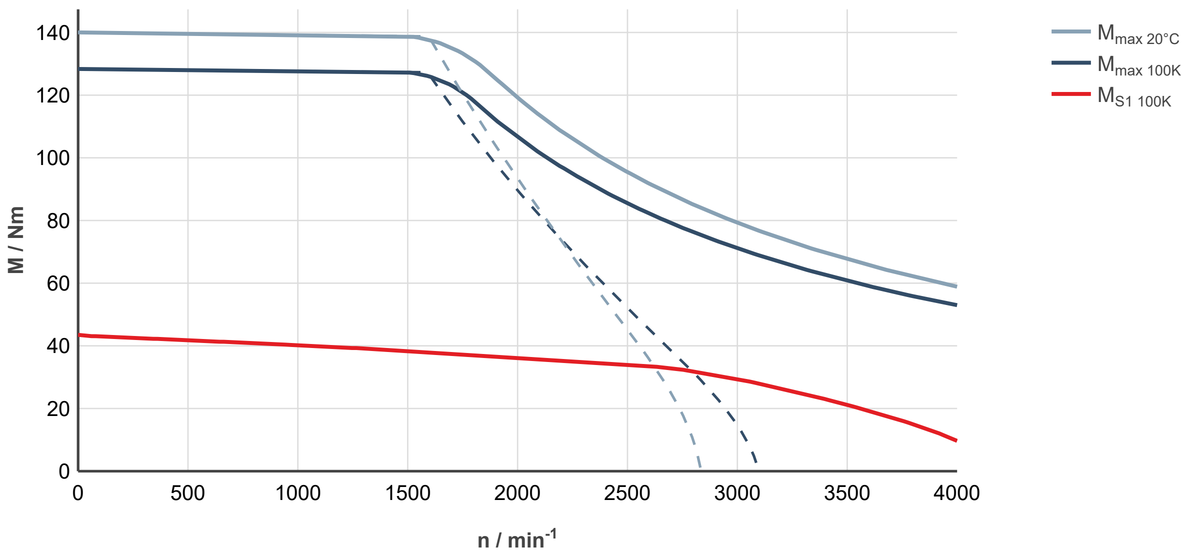



Fig. 168: MS2N07-E1BHA-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V



Technical data

## MS2N07-E1BNA / MS2N07-E1BNB

| Designation | Symbol | Unit | MS2N07-E1BNA-□□□□0-□N | MS2N07-E1BNA-□□□□2-□N | MS2N07-E1BNB-□□□□0-□N | MS2N07-E1BNB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 43.5 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 23.9 | | | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.00752 | 0.00793 | 0.00752 | 0.00793 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,100 | | | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 26.9 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 15.6 | | | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 8.75 | | | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 140 | | | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 128.5 | | | |
| Maximum current | $I_{max(rms)}$ | A | 85.4 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 1.96 | | | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 119.0 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.532 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 5.12 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 4.65 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 43.0 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 12.5 | | | |
| Mass | $m_{mot}$ | kg | 26 | 29 | 26 | 29 |
| <u>Holding brake</u> | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 | 0 | 200 |
| <u>Fan data</u> | | | | | | |
| Rated voltage | $U_N$ | V | 230 | | 115 | |
| Rated current | $I_N$ | A | 0.17/0.15 | | 0.31 | |
| Frequency | $f_N$ | Hz | 50/60 | | 60 | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

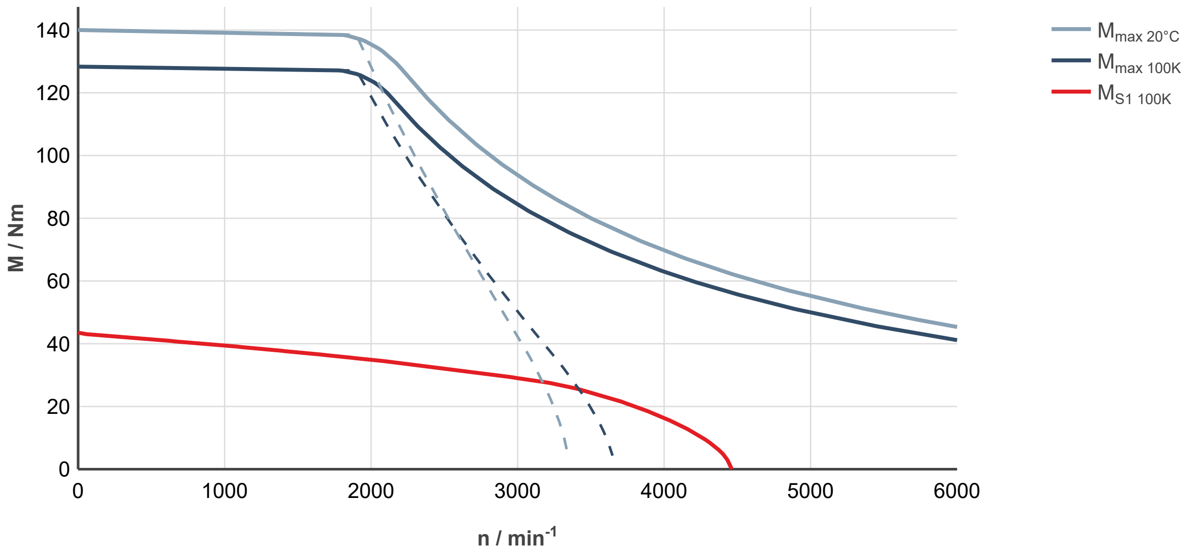



Fig. 169: MS2N07-E1BNA-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

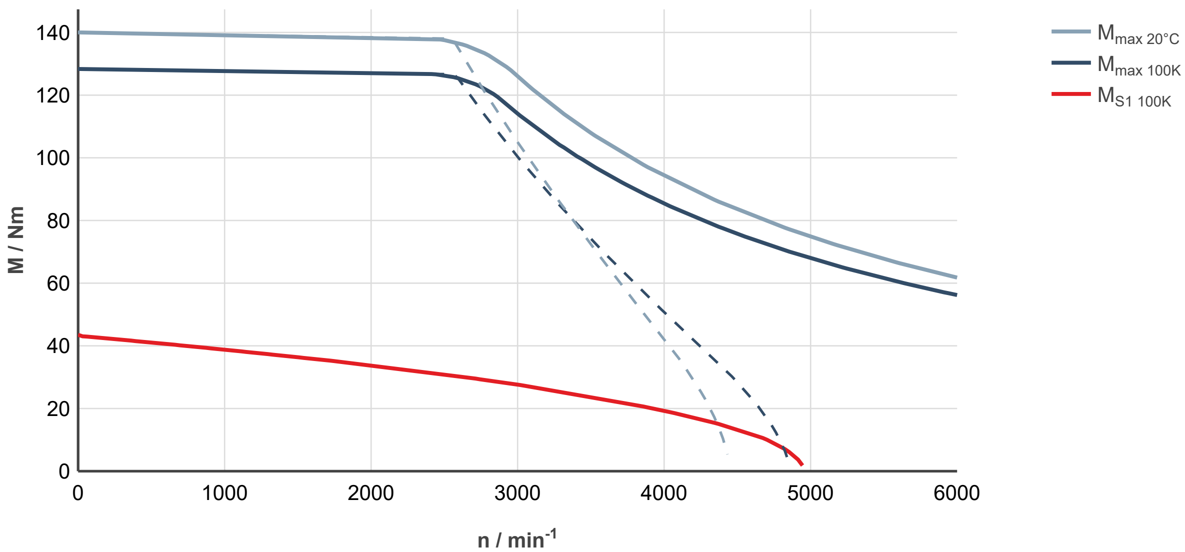



Fig. 170: MS2N07-E1BNA-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## 6.6.3 Water cooling

### MS2N07-C0BNL

| Designation | Symbol | Unit | MS2N07-C0BNL-□□□□0-□N | MS2N07-C0BNL-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 26.6 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 15.3 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | kg*m² | 0.0012 | 0.00146 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,100 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 23.4 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 13.55 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 5.15 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 38.8 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 35.7 | |
| Maximum current | $I_{max(eff)}$ | A | 24.8 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 2.01 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 122.0 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 1.58 | |
| Winding inductance | $L_{12\_min}$ | mH | 23.2 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 2.42 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 39.4 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 4.0 | |
| Mass | $m_{mot}$ | kg | 14.0 | 16.0 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 20.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.78 |
| Maximum connection time | $t_1$ | ms | 0 | 40 |
| Maximum disconnection time | $t_2$ | ms | 0 | 100 |
| Water cooling | | | | |
| Power loss | $P_V$ | kW | 0.8 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 1.45 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.10 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.10 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

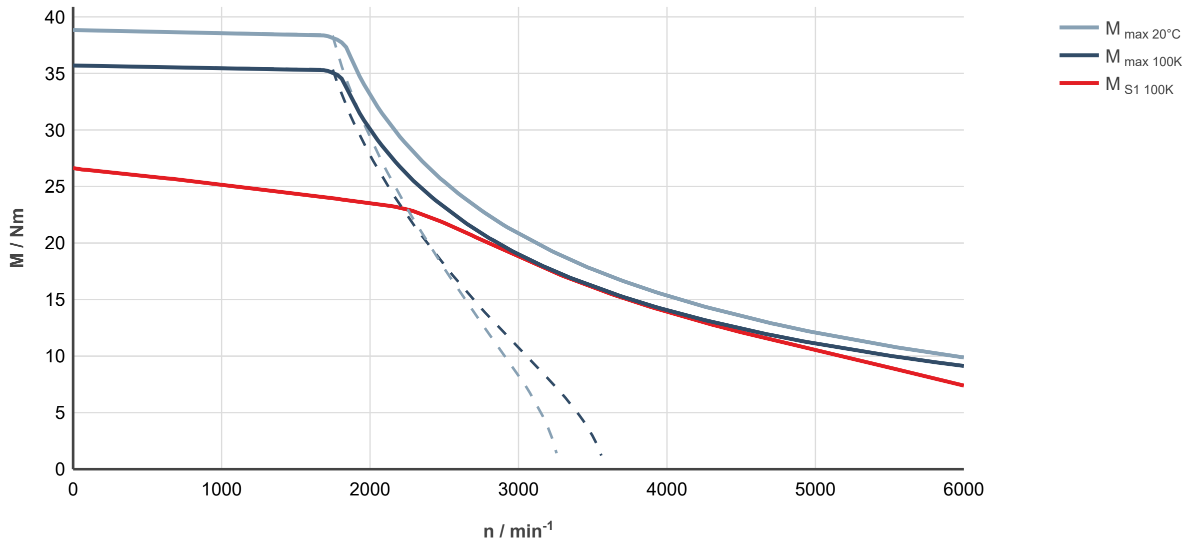



Fig. 171: MS2N07-C0BNL-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

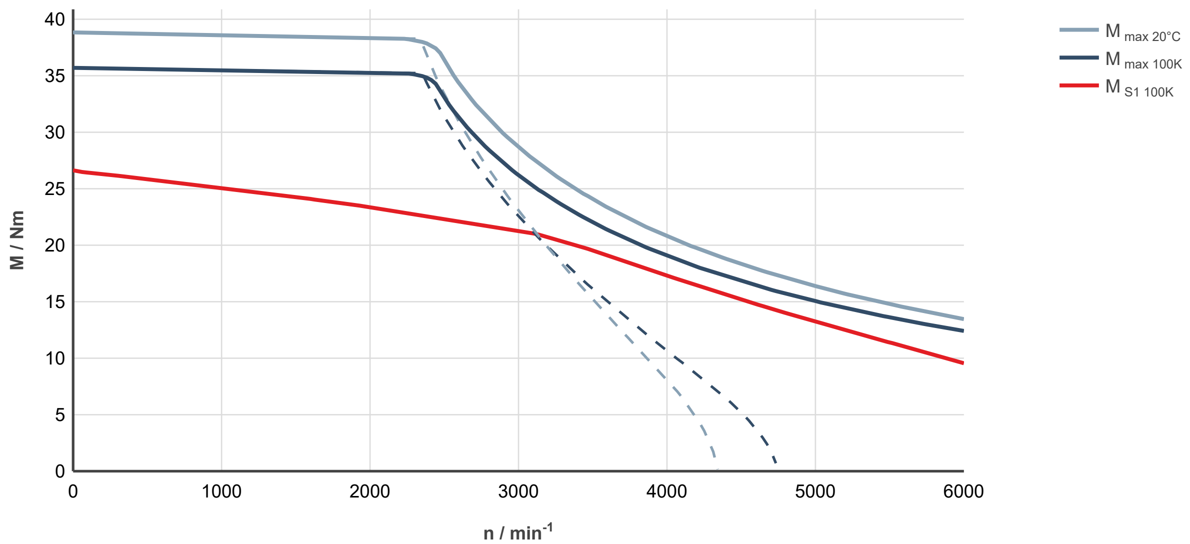



Fig. 172: MS2N07-C0BNL-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V

## MS2N07-C0BQL

| Designation | Symbol | Unit | MS2N07-C0BQL-□□□□0-□N | MS2N07-C0BQL-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 26.6 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 22.3 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0012 | 0.00146 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,360 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 19.9 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 16.8 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 7.0 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 38.8 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 35.7 | |
| Maximum current | $I_{max(eff)}$ | A | 36.4 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 1.37 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 83.1 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.776 | |
| Winding inductance | $L_{12\_min}$ | mH | 10.5 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 2.2 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 39.4 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 4.0 | |
| Mass | $m_{mot}$ | kg | 14.0 | 16.0 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 20.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.78 |
| Maximum connection time | $t_1$ | ms | 0 | 40 |
| Maximum disconnection time | $t_2$ | ms | 0 | 100 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 0.8 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 1.45 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.10 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.10 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

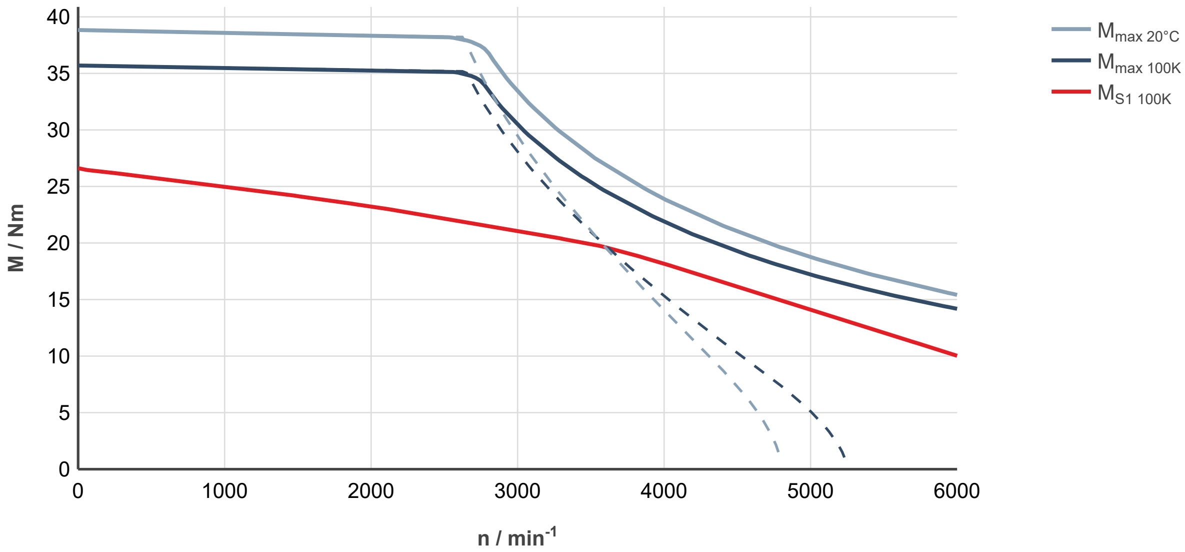



Fig. 173: MS2N07-C0BQL-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

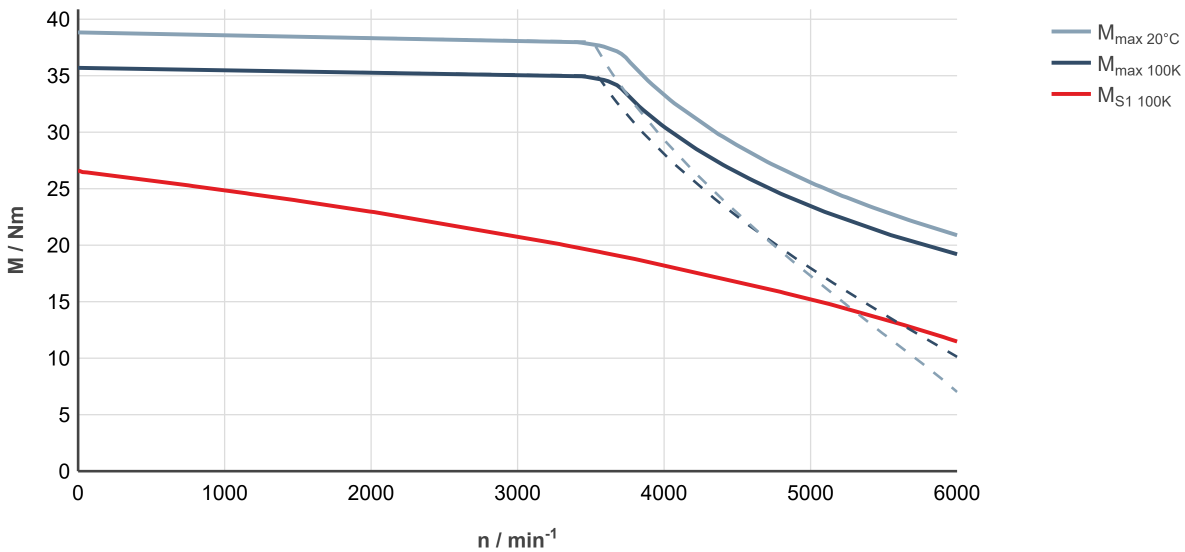



Fig. 174: MS2N07-C0BQL-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-C1BRL

<table>
<tr><th>Designation</th><th>Symbol</th><th>Unit</th><th>MS2N07-C1BRL-□□□□□0-□N</th><th>MS2N07-C1BRL-□□□□□1-□N</th></tr>
<tr><td>Standstill torque - 100K [1]</td><td>$M_{0\ 100K}$</td><td>Nm</td><td colspan="2">25.0</td></tr>
<tr><td>Standstill current - 100K</td><td>$I_{0\ 100K}$</td><td>A</td><td colspan="2">20.8</td></tr>
<tr><td>Moment of inertia of rotor [1]</td><td>$J_{rot}$</td><td>kg*m²</td><td>0.00305</td><td>0.00331</td></tr>
<tr><td>Rated speed - 100K</td><td>$n_{N\ 100K}$</td><td>1/min</td><td colspan="2">4,090</td></tr>
<tr><td>Rated torque - 100K [1]</td><td>$M_{N\ 100K}$</td><td>Nm</td><td colspan="2">17.4</td></tr>
<tr><td>Rated current - 100K</td><td>$I_{N\ 100K}$</td><td>A</td><td colspan="2">15.1</td></tr>
<tr><td>Rated power - 100K [1]</td><td>$P_{N\ 100K}$</td><td>kW</td><td colspan="2">7.45</td></tr>
<tr><td>Maximum torque 20 °C (cold) [1]</td><td>$M_{max\ 20°C}$</td><td>Nm</td><td colspan="2">46.0</td></tr>
<tr><td>Maximum torque 100K (warm) [1]</td><td>$M_{max\ 100K}$</td><td>Nm</td><td colspan="2">42.2</td></tr>
<tr><td>Maximum current</td><td>$I_{max(rms)}$</td><td>A</td><td colspan="2">42.7</td></tr>
<tr><td>Maximum speed (electrical)</td><td>$n_{max\ el}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Maximum speed (mechanical)</td><td>$n_{max\ mech}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Number of pole pairs</td><td>p</td><td>-</td><td colspan="2">5</td></tr>
<tr><td>Torque constant at 20 °C [1]</td><td>$K_m$</td><td>Nm/A</td><td colspan="2">1.3</td></tr>
<tr><td>Voltage constant at 20 °C [1]</td><td>$K_E$</td><td>V/1000 $min^{-1}$</td><td colspan="2">78.7</td></tr>
<tr><td>Winding resistance at 20 °C</td><td>$R_{12}$</td><td>Ohm</td><td colspan="2">0.895</td></tr>
<tr><td>Winding inductance</td><td>$L_{12\_min}$</td><td>mH</td><td colspan="2">7.28</td></tr>
<tr><td>Leakage capacitance of the component</td><td>$C_{ab}$</td><td>nF</td><td colspan="2">1.65</td></tr>
<tr><td>Thermal time constant of winding</td><td>$T_{th\_W}$</td><td>s</td><td colspan="2">34.5</td></tr>
<tr><td>Thermal time constant of motor</td><td>$T_{th\_M}$</td><td>min</td><td colspan="2">4.0</td></tr>
<tr><td>Mass</td><td>$m_{mot}$</td><td>kg</td><td>13.5</td><td>15.5</td></tr>
<tr><td colspan="5"><u>Holding brake</u></td></tr>
<tr><td>Holding torque</td><td>$M_4$</td><td>Nm</td><td>0</td><td>20.00</td></tr>
<tr><td>Rated voltage</td><td>$U_N$</td><td>V</td><td>0</td><td>24</td></tr>
<tr><td>Rated current</td><td>$I_N$</td><td>A</td><td>0</td><td>0.78</td></tr>
<tr><td>Maximum connection time</td><td>$t_1$</td><td>ms</td><td>0</td><td>40</td></tr>
<tr><td>Maximum disconnection time</td><td>$t_2$</td><td>ms</td><td>0</td><td>100</td></tr>
<tr><td colspan="5"><u>Water cooling</u></td></tr>
<tr><td>Power loss</td><td>$P_V$</td><td>kW</td><td colspan="2">0.8</td></tr>
<tr><td>Coolant inlet temperature</td><td>$T_{in}$</td><td>°C</td><td colspan="2">10 ... 40</td></tr>
<tr><td>Permissible coolant temperature increase for $P_V$</td><td>$\Delta T_{max}$</td><td>K</td><td colspan="2">8.0</td></tr>
<tr><td>Required coolant flow for $P_V$</td><td>$Q_{min}$</td><td>l/min</td><td colspan="2">1.45</td></tr>
<tr><td>Pressure drop at $Q_{min}$</td><td>$\Delta p$</td><td>bar</td><td colspan="2">0.10</td></tr>
<tr><td>Maximum permissible inlet pressure</td><td>$p_{max}$</td><td>bar</td><td colspan="2">6.0</td></tr>
<tr><td>Volume of coolant duct</td><td>$V_{cool}$</td><td>l</td><td colspan="2">0.10</td></tr>
<tr><td>Material of coolant duct</td><td>-</td><td>-</td><td colspan="2">Stainless steel</td></tr>
<tr><td colspan="3">1) For tolerance details refer to ➦Chapter 5.4 Tolerances</td><td colspan="2"></td></tr>
</table>

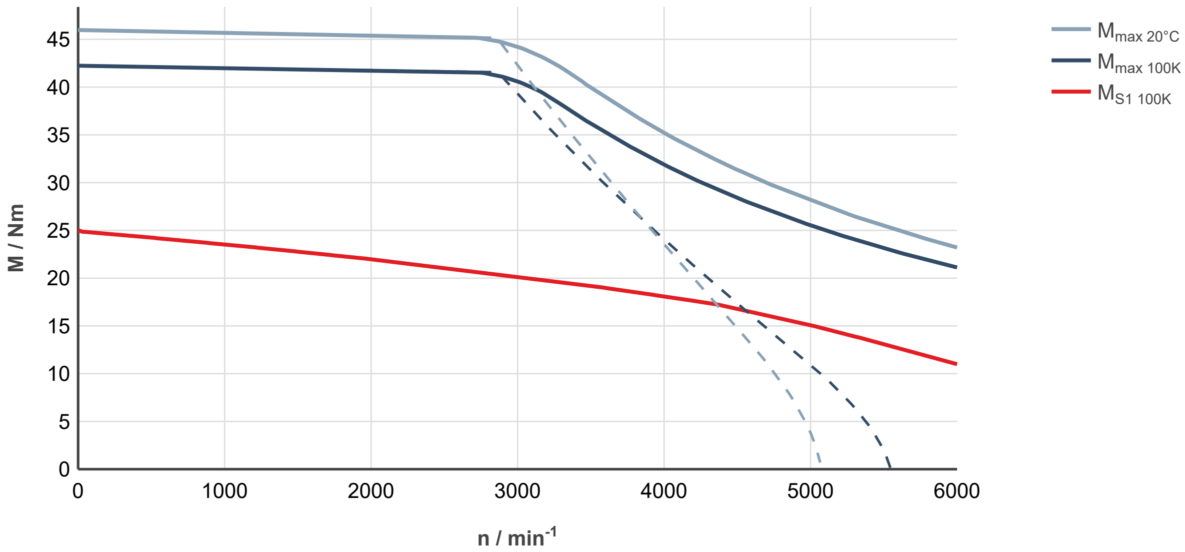



Fig. 175: MS2N07-C1BRL-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

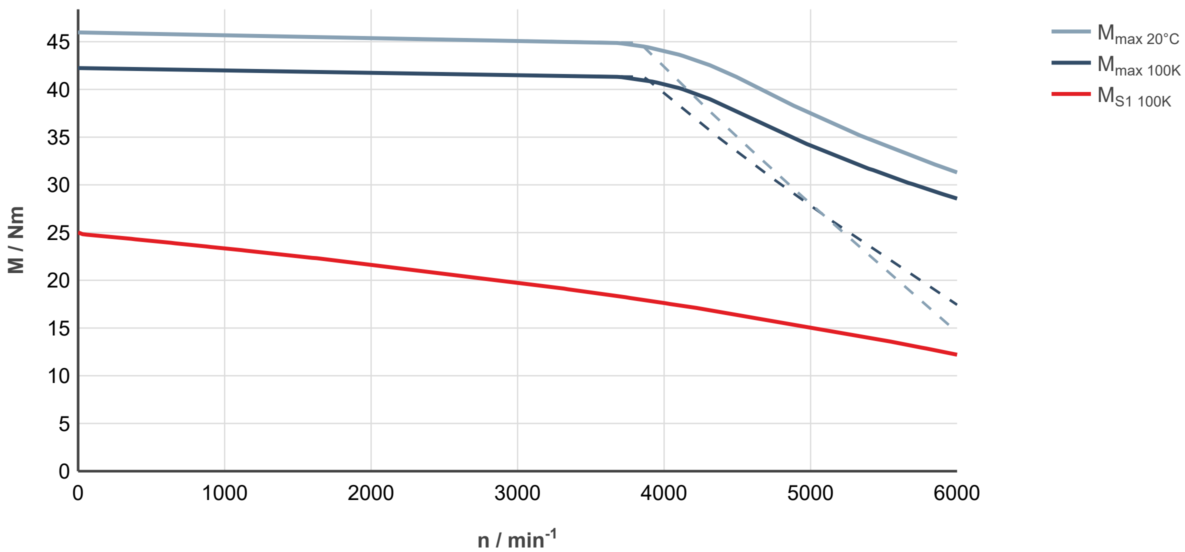



Fig. 176: MS2N07-C1BRL-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D0BHL

| Designation | Symbol | Unit | MS2N07-D0BHL-□□□□0-□N | MS2N07-D0BHL-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 55.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 22.8 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0021 | 0.00251 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,550 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 48.4 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 20.2 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 7.85 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 79.7 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 73.2 | |
| Maximum current | $I_{max(rms)}$ | A | 36.4 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.76 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 167.5 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 1.30 | |
| Winding inductance | $L_{12\_min}$ | mH | 20.2 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 4.1 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 45.8 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 4.2 | |
| Mass | $m_{mot}$ | kg | 19.5 | 22.0 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 1.4 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 2.51 | |
| Pressure drop at $Q_{min}$ | Δp | bar | 0.16 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.20 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

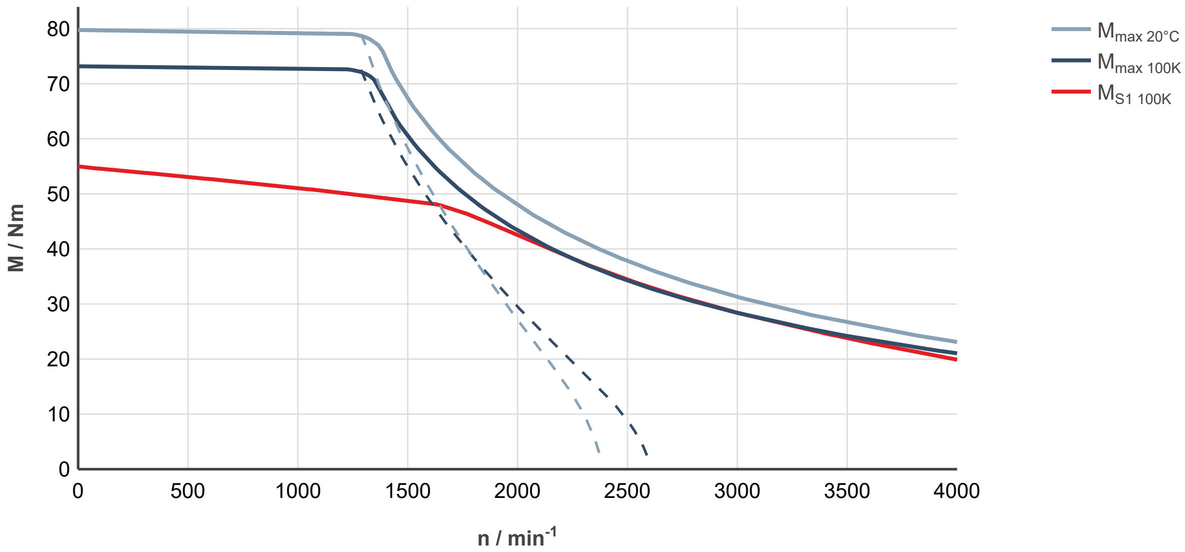



Fig. 177: MS2N07-D0BHL-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

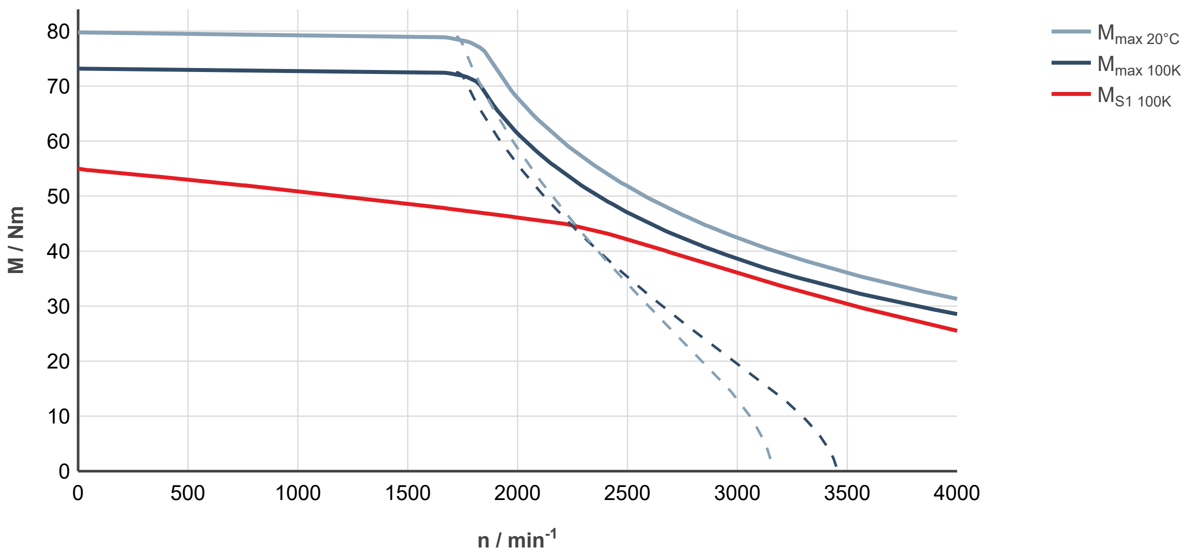



Fig. 178: MS2N07-D0BHL-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D0BNL

| Designation | Symbol | Unit | MS2N07-D0BNL-□□□□0-□N | MS2N07-D0BNL-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 55.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 31.0 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | $kg*m^2$ | 0.0021 | 0.00251 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,100 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 45.0 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 25.5 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 9.9 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 79.7 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 73.2 | |
| Maximum current | $I_{max(rms)}$ | A | 49.5 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.04 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 124.1 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.671 | |
| Winding inductance | $L_{12\_min}$ | mH | 10.0 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 4.0 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 45.8 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 4.2 | |
| Mass | $m_{mot}$ | kg | 19.5 | 22.0 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 1.4 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 2.51 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.16 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.20 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➡ Chapter 5.4 Tolerances | | | | |

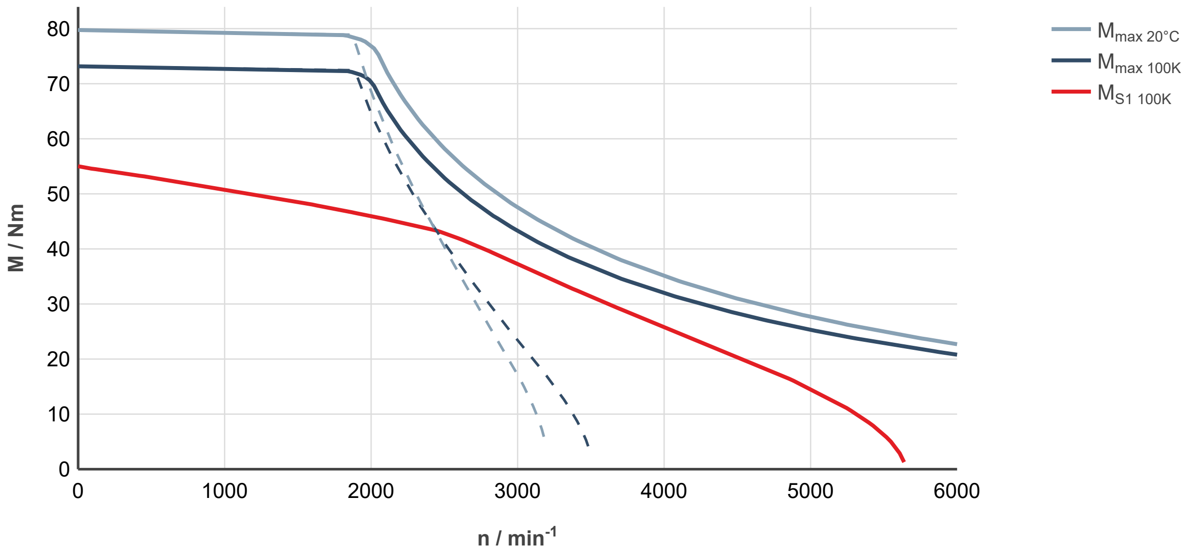



Fig. 179: MS2N07-D0BNL-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

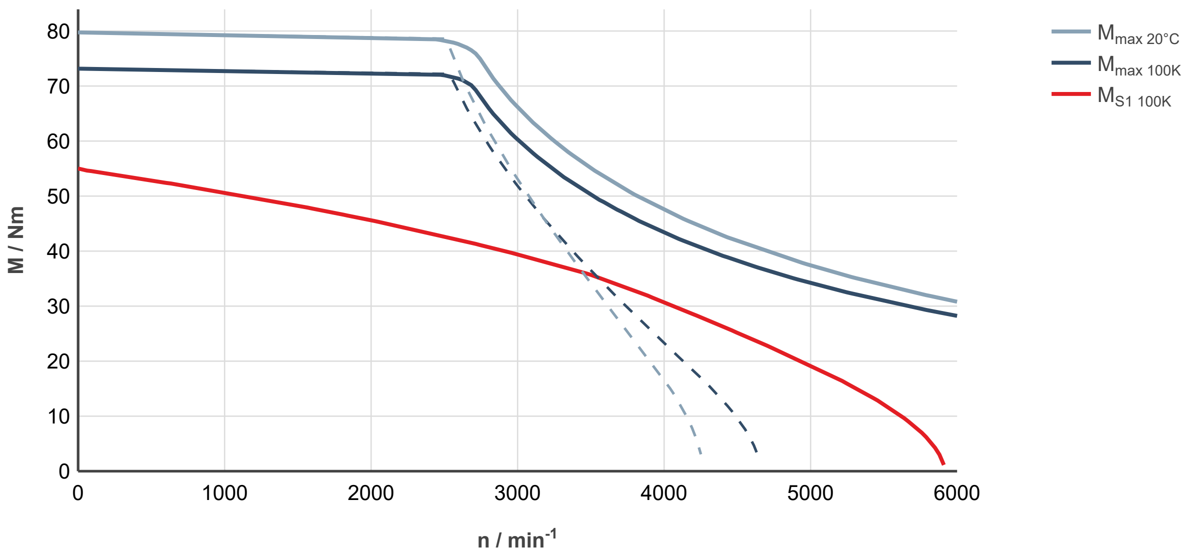



Fig. 180: MS2N07-D0BNL-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D0BRL

| Designation | Symbol | Unit | MS2N07-D0BRL-□□□□□0-□N | MS2N07-D0BRL-□□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 55.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 45.8 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | kg*m² | 0.0021 | 0.00251 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,650 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 33.2 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 27.7 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 12.7 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 79.7 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 73.2 | |
| Maximum current | $I_{max(rms)}$ | A | 72.7 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 1.38 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 83.9 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.327 | |
| Winding inductance | $L_{12\_min}$ | mH | 5.06 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 3.95 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 45.8 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 4.2 | |
| Mass | $m_{mot}$ | kg | 19.5 | 22.0 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 1.4 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 2.51 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.16 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.20 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

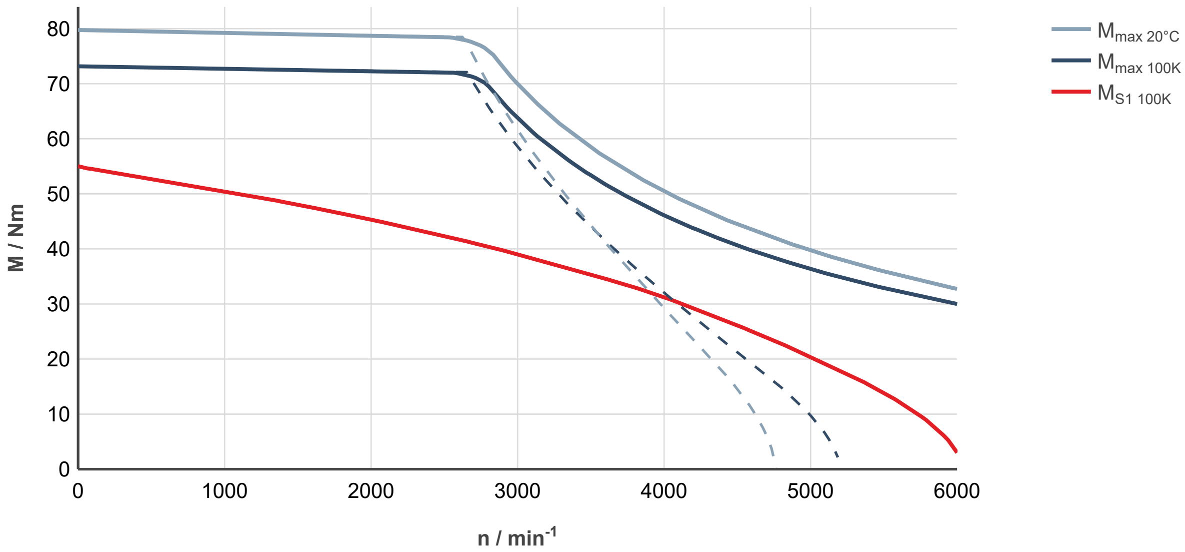



Fig. 181: MS2N07-D0BRL-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

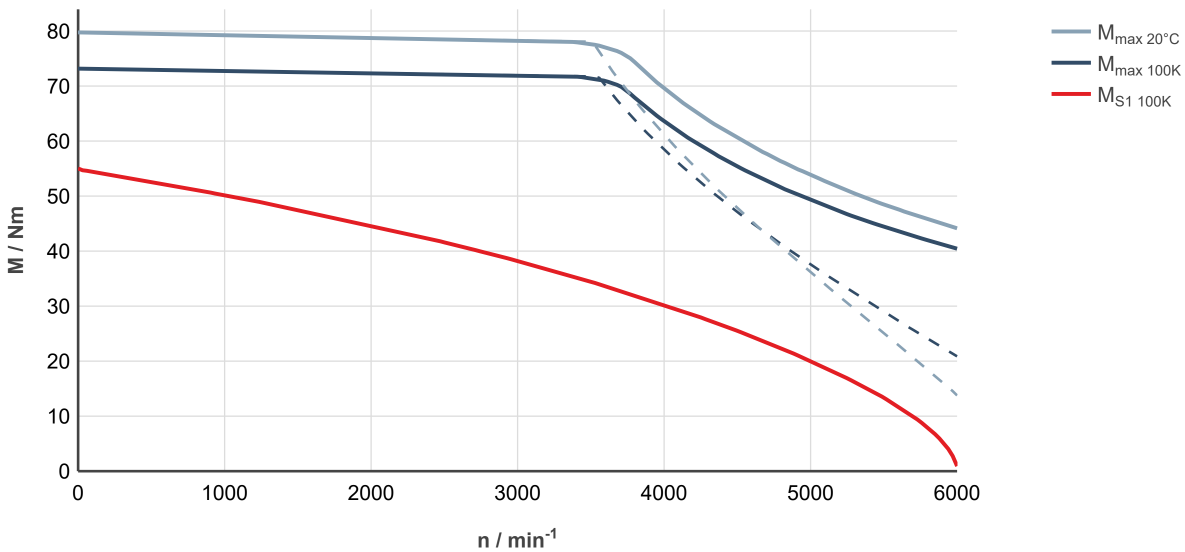



Fig. 182: MS2N07-D0BRL-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-D1BNL

| Designation | Symbol | Unit | MS2N07-D1BNL-□□□□0-□N | MS2N07-D1BNL-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 50.5 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 26.7 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.00529 | 0.00570 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,450 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 41.7 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 22.6 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 10.7 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 92.5 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 84.8 | |
| Maximum current | $I_{max(rms)}$ | A | 54.1 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.05 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 124.3 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.942 | |
| Winding inductance | $L_{12\_min}$ | mH | 7.9 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 3.0 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 38.9 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 4.2 | |
| Mass | $m_{mot}$ | kg | 20.0 | 23 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 1.4 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 2.51 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.16 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.20 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

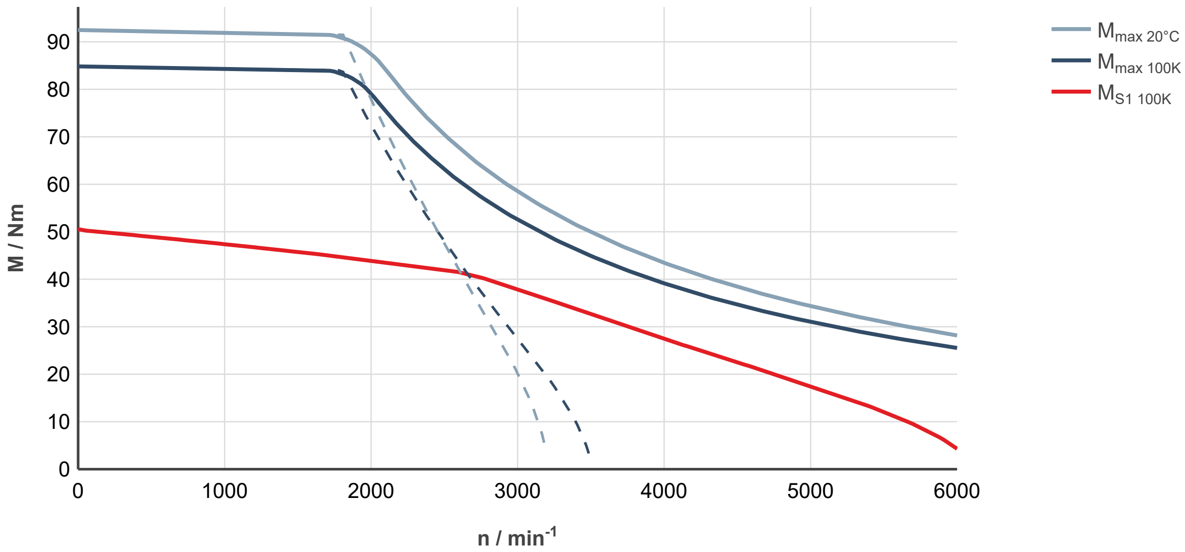



Fig. 183: MS2N07-D1BNL-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

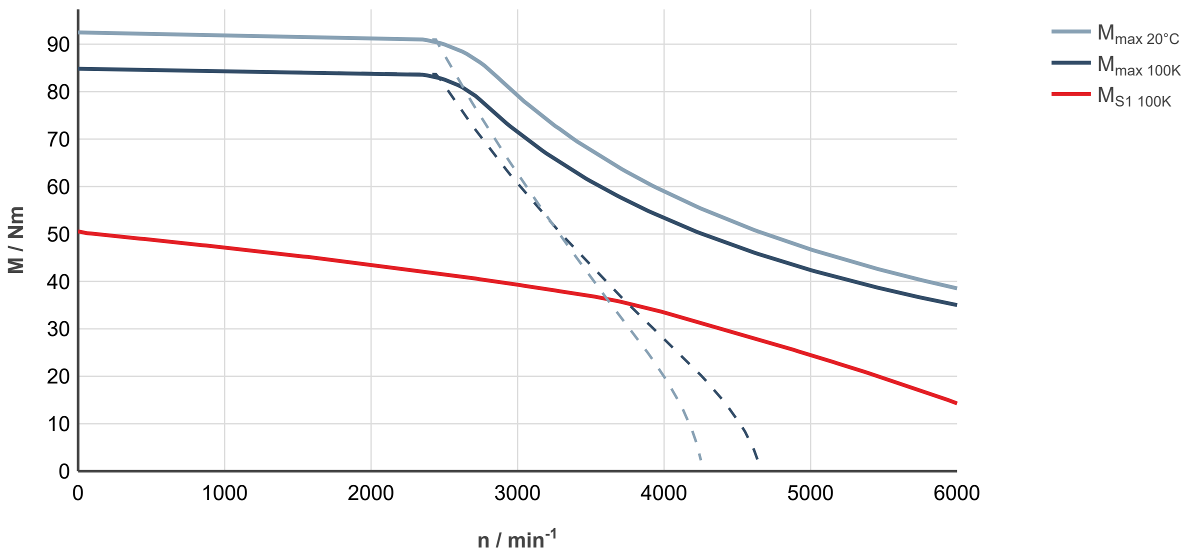



Fig. 184: MS2N07-D1BNL-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-E0BHL

| Designation | Symbol | Unit | MS2N07-E0BHL-□□□□0-□N | MS2N07-E0BHL-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 83.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 31.5 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.003 | 0.00341 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,400 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 73.9 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 28.2 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 10.85 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 119.5 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 109.5 | |
| Maximum current | $I_{max(rms)}$ | A | 49.5 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 3.03 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 184.3 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.95 | |
| Winding inductance | $L_{12\_min}$ | mH | 14.8 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 7.1 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 51.5 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 4.4 | |
| Mass | $m_{mot}$ | kg | 26 | 29 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 2.0 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 3.59 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.30 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.25 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

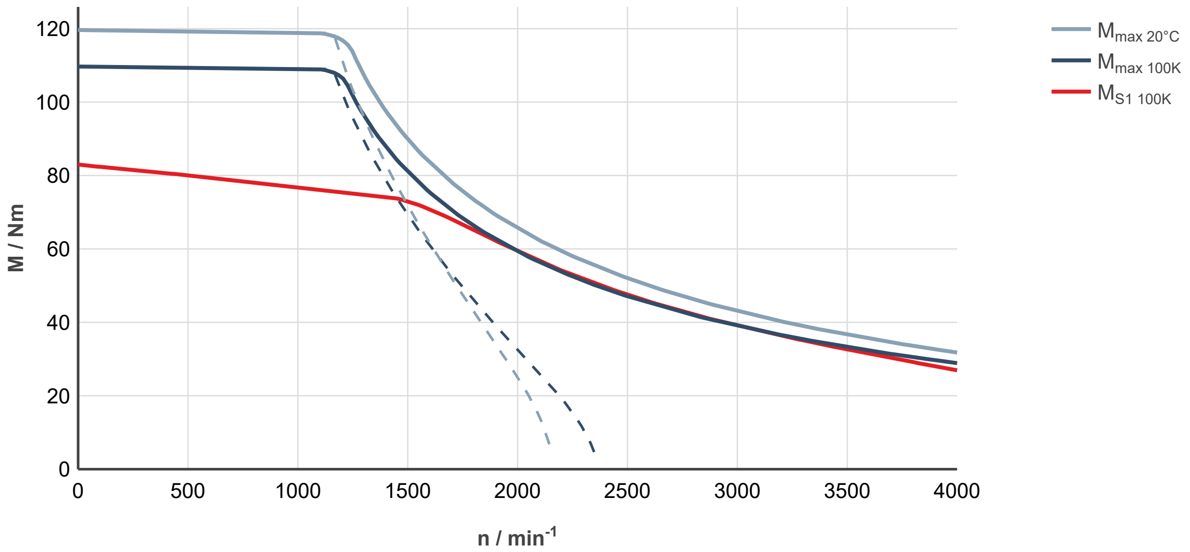



Fig. 185: MS2N07-E0BHL-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

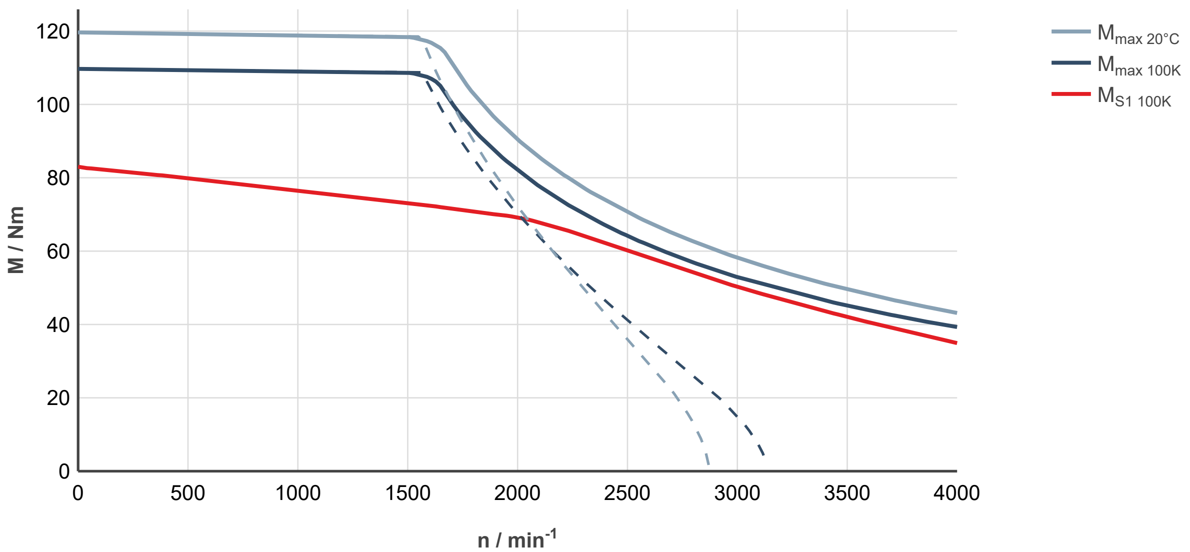



Fig. 186: MS2N07-E0BHL-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-E0BNL

| Designation | Symbol | Unit | MS2N07-E0BNL-□□□□0-□N | MS2N07-E0BNL-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 83.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 46.0 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.003 | 0.00341 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,200 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 67.0 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 37.3 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 15.4 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 119.5 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 109.5 | |
| Maximum current | $I_{max(rms)}$ | A | 72.7 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.08 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 126.2 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.455 | |
| Winding inductance | $L_{12\_min}$ | mH | 7.50 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 6.11 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 51.5 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 4.4 | |
| Mass | $m_{mot}$ | kg | 26 | 29 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 2.0 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 3.59 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.30 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.25 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

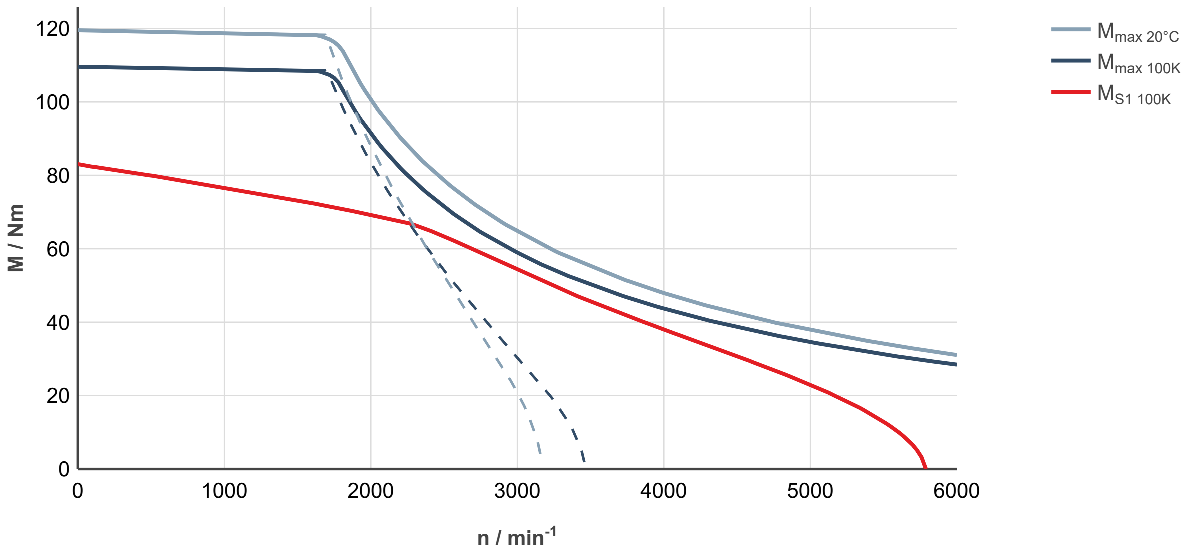



Fig. 187: MS2N07-E0BNL-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

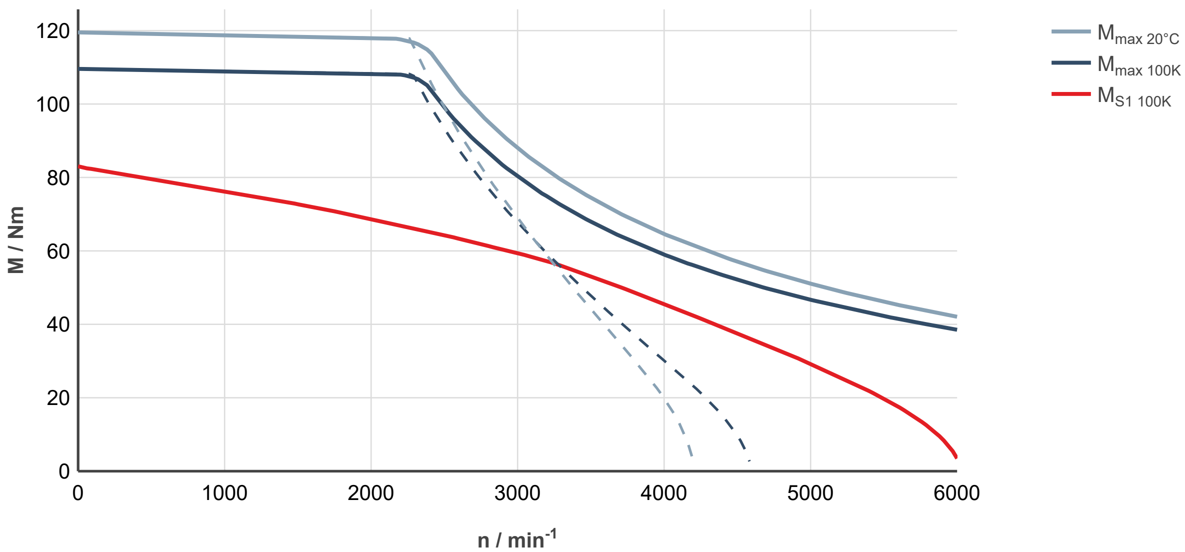



Fig. 188: MS2N07-E0BNL-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-E0BQL

| Designation | Symbol | Unit | MS2N07-E0BQL-□□□□0-□N | MS2N07-E0BQL-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 83.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 58.3 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.003 | 0.00341 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,000 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 55.7 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 39.1 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 17.5 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 119.5 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 109.5 | |
| Maximum current | $I_{max(rms)}$ | A | 92.3 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.64 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 99.3 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.282 | |
| Winding inductance | $L_{12\_min}$ | mH | 4.64 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 6.21 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 51.5 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 4.4 | |
| Mass | $m_{mot}$ | kg | 26 | 29 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 36.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 2.0 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 3.59 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.30 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.25 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

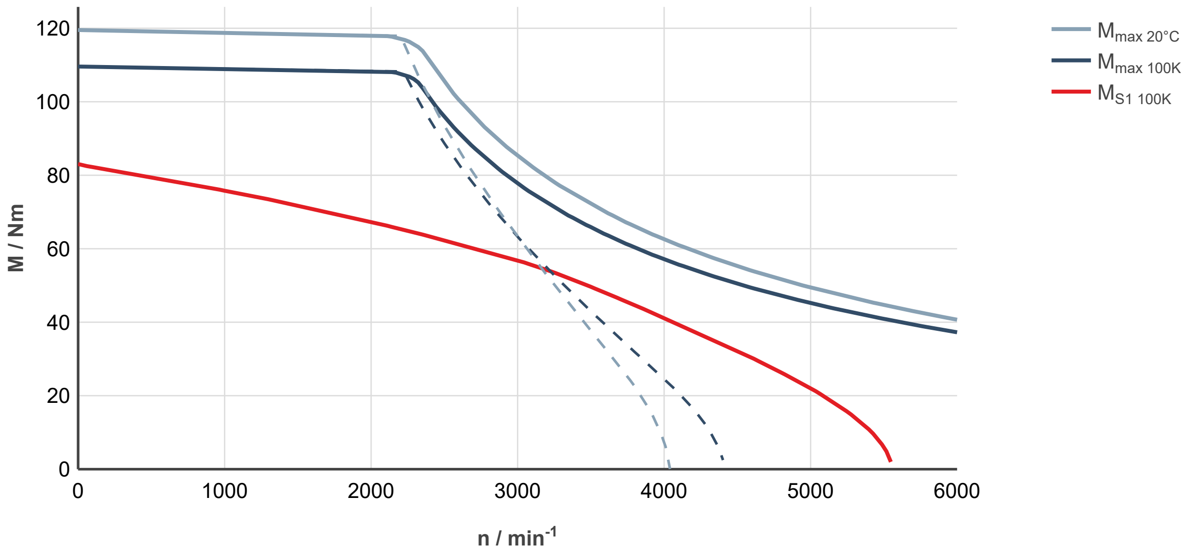



Fig. 189: MS2N07-E0BQL-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

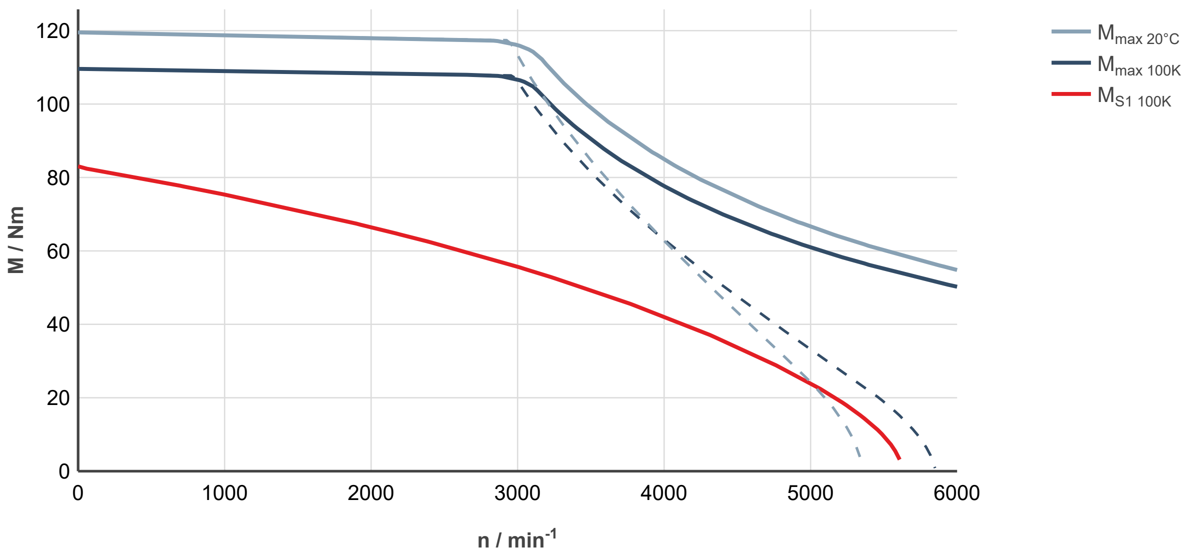



Fig. 190: MS2N07-E0BQL-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N07-E1BNL

<table>
<tr><th>Designation</th><th>Symbol</th><th>Unit</th><th>MS2N07-E1BNL-□□□□0-□N</th><th>MS2N07-E1BNL-□□□□2-□N</th></tr>
<tr><td>Standstill torque - 100K 1)</td><td>$M_{0\ 100K}$</td><td>Nm</td><td colspan="2">76.5</td></tr>
<tr><td>Standstill current - 100K</td><td>$I_{0\ 100K}$</td><td>A</td><td colspan="2">42.1</td></tr>
<tr><td>Moment of inertia of rotor 1)</td><td>$J_{rot}$</td><td>kg*m²</td><td>0.00752</td><td>0.00793</td></tr>
<tr><td>Rated speed - 100K</td><td>$n_{N\ 100K}$</td><td>1/min</td><td colspan="2">2,700</td></tr>
<tr><td>Rated torque - 100K 1)</td><td>$M_{N\ 100K}$</td><td>Nm</td><td colspan="2">55.6</td></tr>
<tr><td>Rated current - 100K</td><td>$I_{N\ 100K}$</td><td>A</td><td colspan="2">31.6</td></tr>
<tr><td>Rated power - 100K 1)</td><td>$P_{N\ 100K}$</td><td>kW</td><td colspan="2">15.7</td></tr>
<tr><td>Maximum torque 20 °C (cold) 1)</td><td>$M_{max\ 20°C}$</td><td>Nm</td><td colspan="2">140</td></tr>
<tr><td>Maximum torque 100K (warm) 1)</td><td>$M_{max\ 100K}$</td><td>Nm</td><td colspan="2">128.5</td></tr>
<tr><td>Maximum current</td><td>$I_{max(rms)}$</td><td>A</td><td colspan="2">85.4</td></tr>
<tr><td>Maximum speed (electrical)</td><td>$n_{max\ el}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Maximum speed (mechanical)</td><td>$n_{max\ mech}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Number of pole pairs</td><td>p</td><td>–</td><td colspan="2">5</td></tr>
<tr><td>Torque constant at 20 °C 1)</td><td>$K_m$</td><td>Nm/A</td><td colspan="2">1.96</td></tr>
<tr><td>Voltage constant at 20 °C 1)</td><td>$K_E$</td><td>V/1000 $min^{-1}$</td><td colspan="2">119.0</td></tr>
<tr><td>Winding resistance at 20 °C</td><td>$R_{12}$</td><td>Ohm</td><td colspan="2">0.532</td></tr>
<tr><td>Winding inductance</td><td>$L_{12\_min}$</td><td>mH</td><td colspan="2">5.12</td></tr>
<tr><td>Leakage capacitance of the component</td><td>$C_{ab}$</td><td>nF</td><td colspan="2">4.65</td></tr>
<tr><td>Thermal time constant of winding</td><td>$T_{th\_W}$</td><td>s</td><td colspan="2">43.0</td></tr>
<tr><td>Thermal time constant of motor</td><td>$T_{th\_M}$</td><td>min</td><td colspan="2">4.4</td></tr>
<tr><td>Mass</td><td>$m_{mot}$</td><td>kg</td><td>26.5</td><td>29.5</td></tr>
<tr><td colspan="5"><u>Holding brake</u></td></tr>
<tr><td>Holding torque</td><td>$M_4$</td><td>Nm</td><td>0</td><td>36.00</td></tr>
<tr><td>Rated voltage</td><td>$U_N$</td><td>V</td><td>0</td><td>24</td></tr>
<tr><td>Rated current</td><td>$I_N$</td><td>A</td><td>0</td><td>0.94</td></tr>
<tr><td>Maximum connection time</td><td>$t_1$</td><td>ms</td><td>0</td><td>60</td></tr>
<tr><td>Maximum disconnection time</td><td>$t_2$</td><td>ms</td><td>0</td><td>200</td></tr>
<tr><td colspan="5"><u>Water cooling</u></td></tr>
<tr><td>Power loss</td><td>$P_V$</td><td>kW</td><td colspan="2">2.0</td></tr>
<tr><td>Coolant inlet temperature</td><td>$T_{in}$</td><td>°C</td><td colspan="2">10 ... 40</td></tr>
<tr><td>Permissible coolant temperature increase for $P_V$</td><td>$\Delta T_{max}$</td><td>K</td><td colspan="2">8.0</td></tr>
<tr><td>Required coolant flow for $P_V$</td><td>$Q_{min}$</td><td>l/min</td><td colspan="2">3.59</td></tr>
<tr><td>Pressure drop at $Q_{min}$</td><td>$\Delta p$</td><td>bar</td><td colspan="2">0.30</td></tr>
<tr><td>Maximum permissible inlet pressure</td><td>$p_{max}$</td><td>bar</td><td colspan="2">6.0</td></tr>
<tr><td>Volume of coolant duct</td><td>$V_{cool}$</td><td>l</td><td colspan="2">0.25</td></tr>
<tr><td>Material of coolant duct</td><td>–</td><td>–</td><td colspan="2">Stainless steel</td></tr>
<tr><td colspan="3">1) For tolerance details refer to ➦Chapter 5.4 Tolerances</td><td colspan="2"></td></tr>
</table>

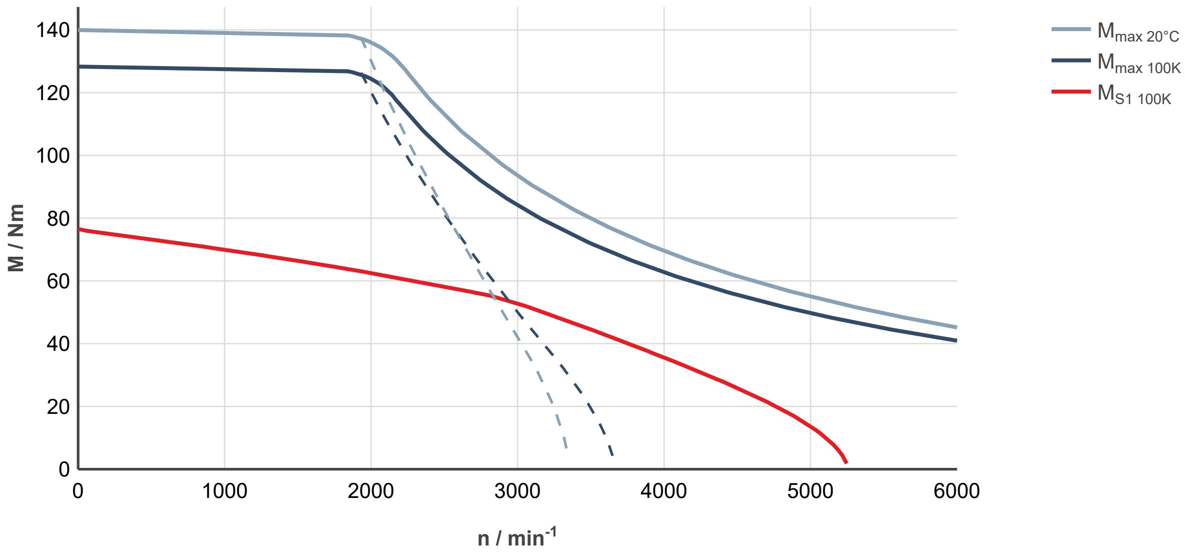



Fig. 191: MS2N07-E1BNL-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

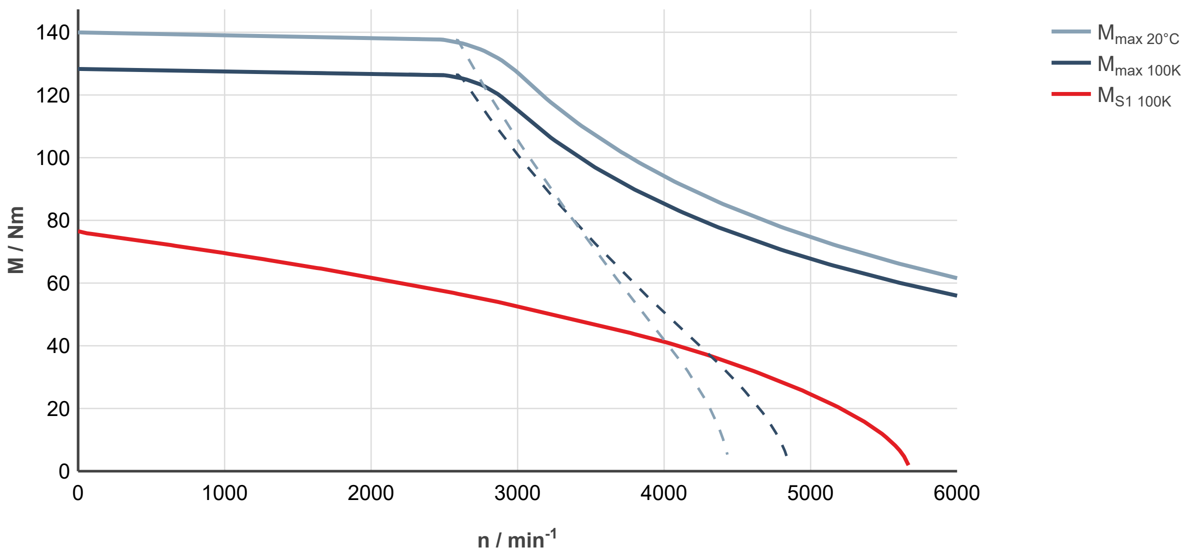
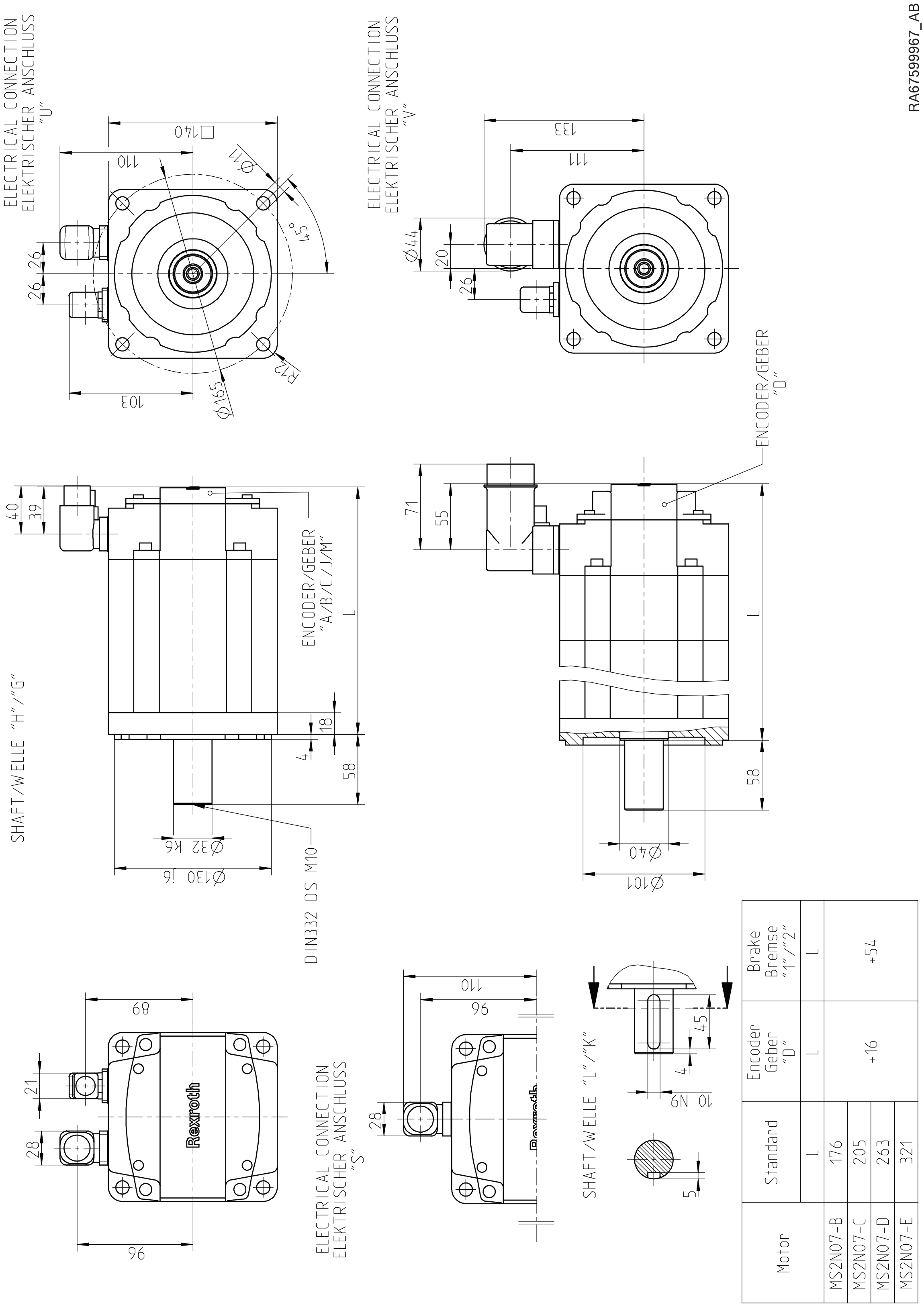



Fig. 192: MS2N07-E1BNL-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

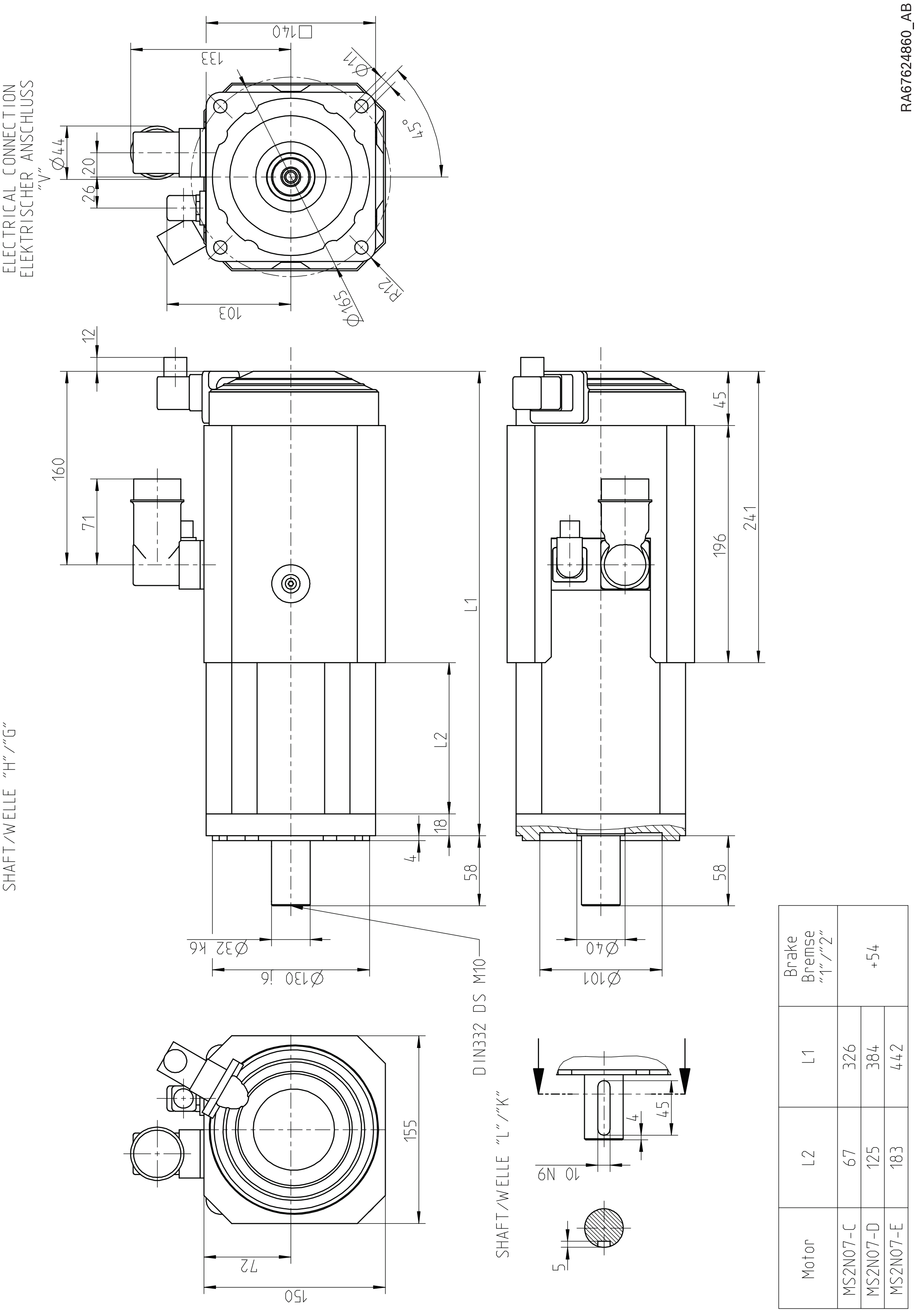
## 6.6.4 MS2N07 self-cooling – dimensional drawing




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

Fig. 193: MS2N07-□□□□N

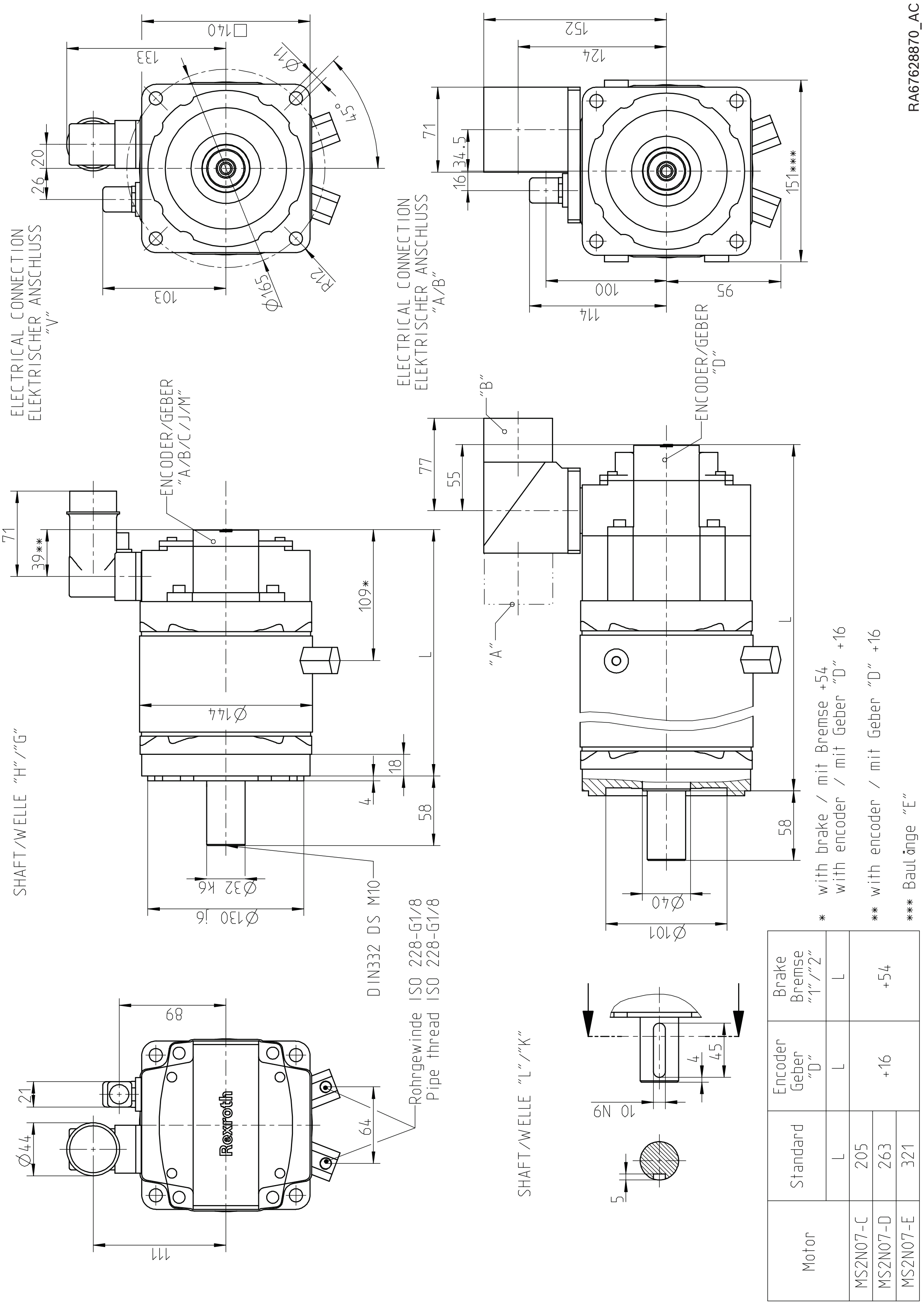
## 6.6.5 MS2N07 forced ventilation – dimensional drawing




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

Fig. 194: MS2N07-□□□□A / MS2N07-□□□□B

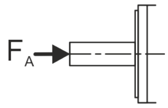
## 6.6.6 MS2N07 water cooling – dimensional drawing




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

Fig. 195: MS2N07-▯▯▯▯L

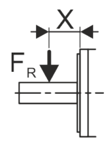
## 6.6.7 MS2N07 axial force




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

## 6.6.8 MS2N07 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.

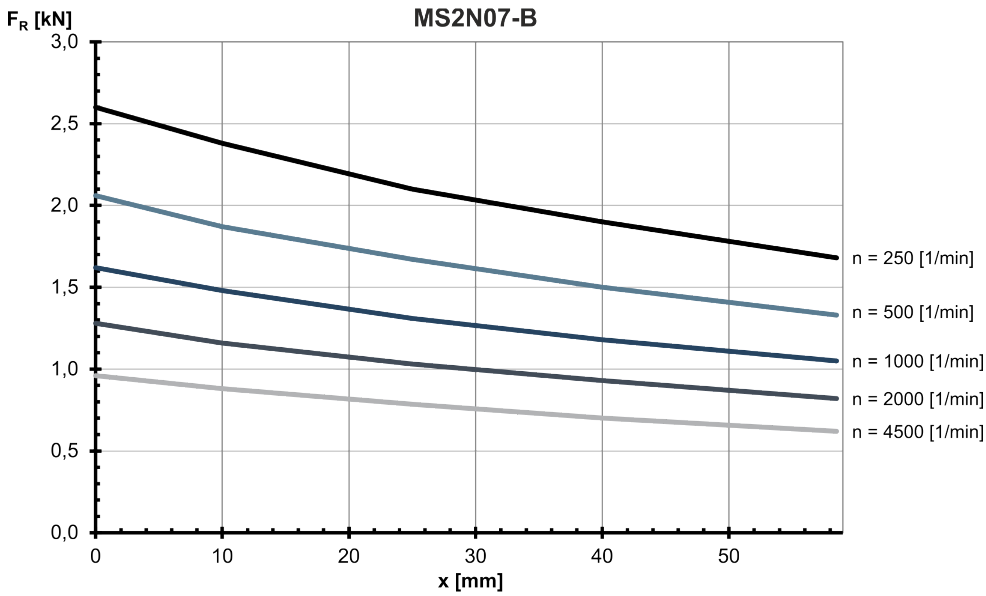



Fig. 196: MS2N07-B: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

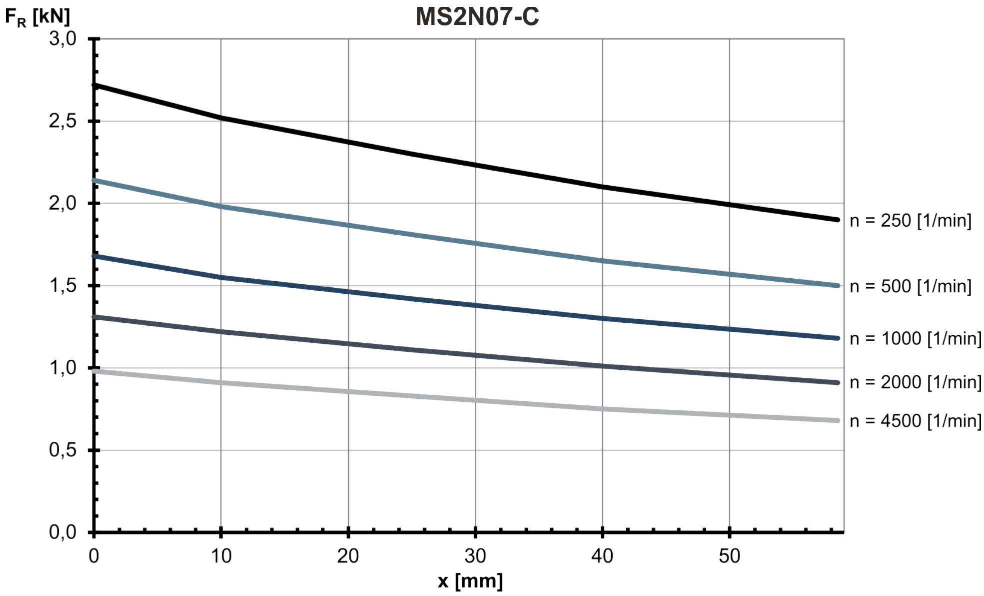



Fig. 197: MS2N07-C: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

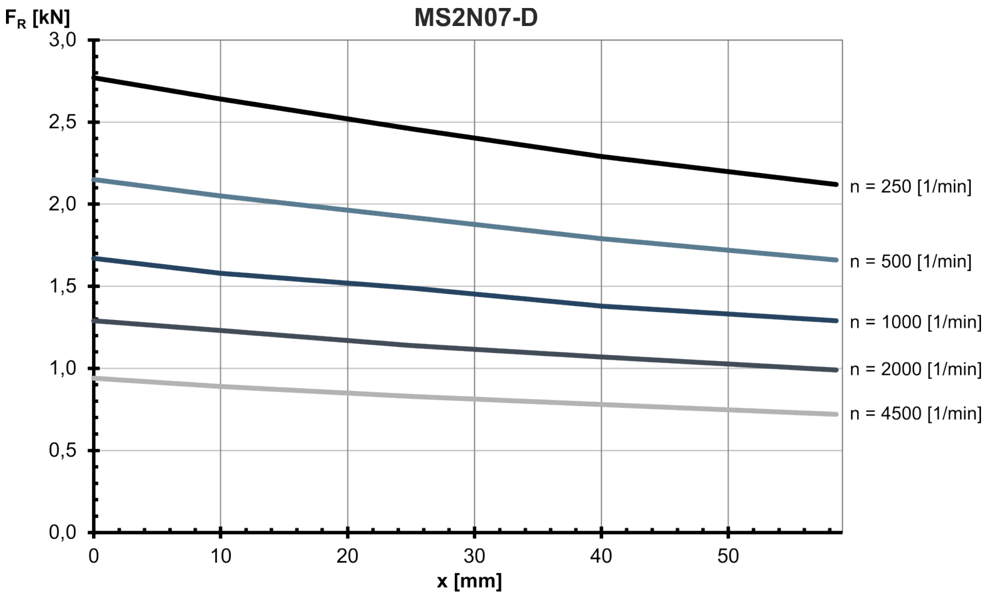



Fig. 198: MS2N07-D: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

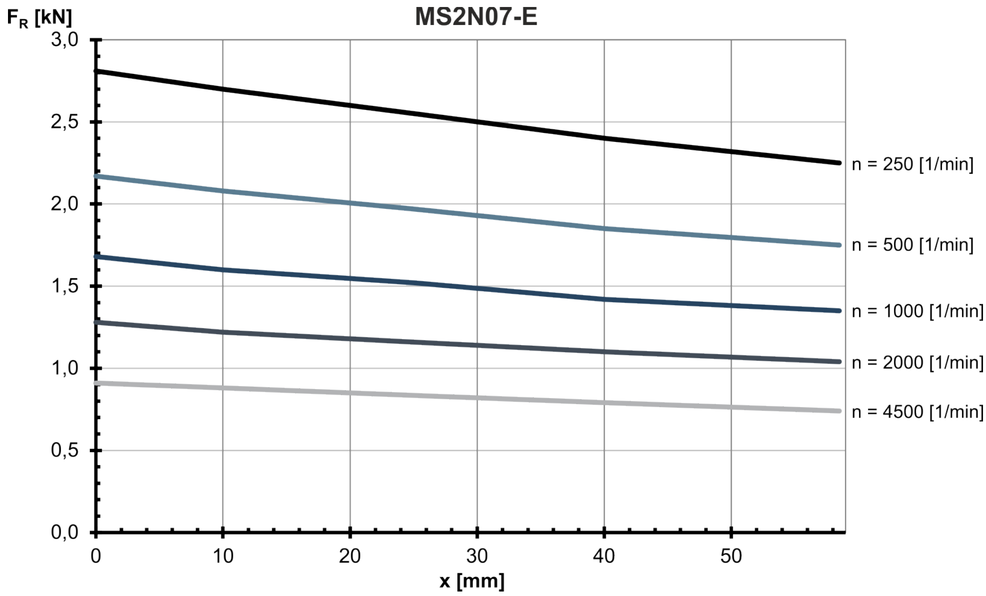



Fig. 199: MS2N07-E: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

# 6.7 MS2N10 technical data

## 6.7.1 Self-cooling

### MS2N10-B1BQN

| Designation | Symbol | Unit | MS2N10-B1BQN-□□□□0-□N | MS2N10-B1BQN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 15.6 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 13.1 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 16.7 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 14.2 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.00520 | 0.00561 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,520 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 8.3 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 7.35 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 3.06 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 41.3 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 38 | |
| Maximum current | $I_{max(rms)}$ | A | 42 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 1.31 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 79.6 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.642 | |
| Winding inductance | $L_{12\_min}$ | mH | 7.9 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.0 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 81.3 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 30.6 | |
| Mass | $m_{mot}$ | kg | 17.5 | 21 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 33.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 0.94 |
| Maximum connection time | $t_1$ | ms | 0 | 60 |
| Maximum disconnection time | $t_2$ | ms | 0 | 200 |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

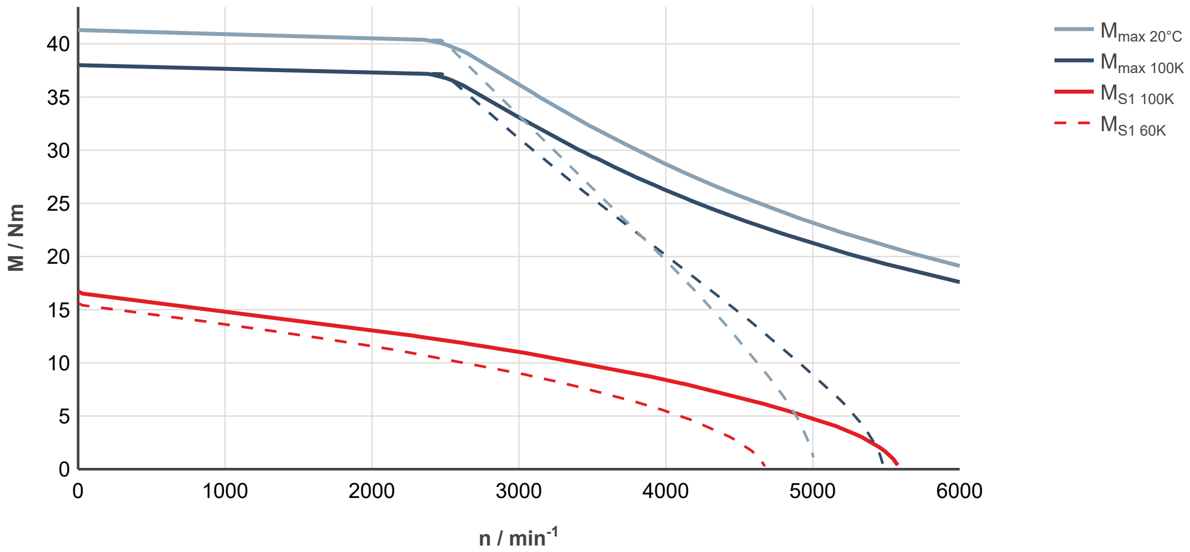



Fig. 200: MS2N10-B1BQN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

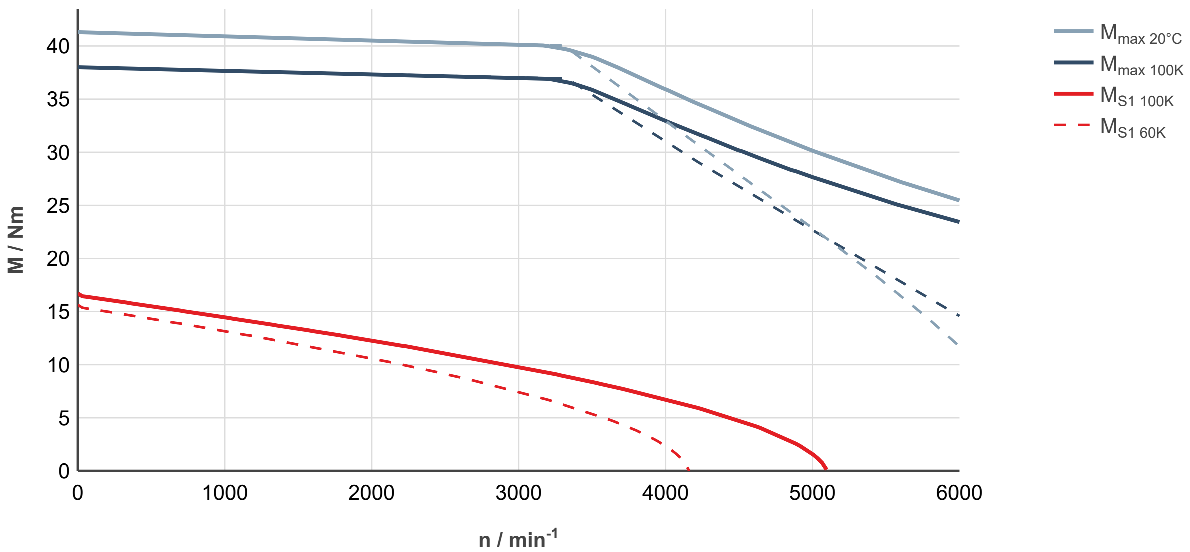



Fig. 201: MS2N10-B1BQN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-C0BHN

| Designation | Symbol | Unit | MS2N10-C0BHN-□□□□0-□N | MS2N10-C0BHN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 30.2 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 12.6 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 34.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 14.5 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0048 | 0.00627 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 27.2 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 11.7 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 5.7 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 76.8 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 70.5 | |
| Maximum current | $I_{max(rms)}$ | A | 38.5 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.60 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 157.8 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.74 | |
| Winding inductance | $L_{12\_min}$ | mH | 18.7 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.9 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 99.3 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 33.0 | |
| Mass | $m_{mot}$ | kg | 23.5 | 28.5 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

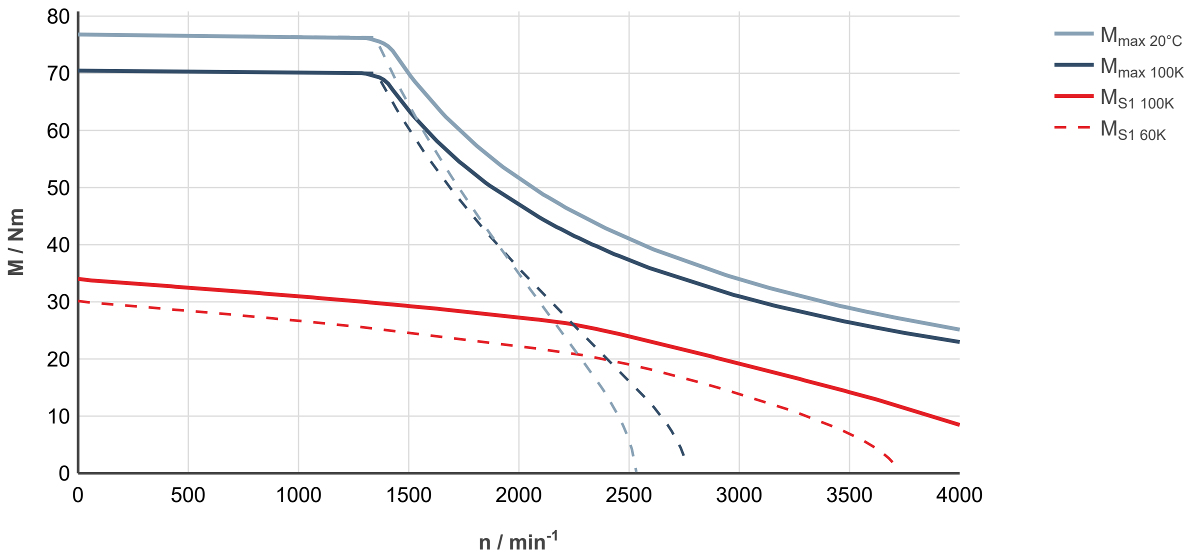



Fig. 202: MS2N10-C0BHN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

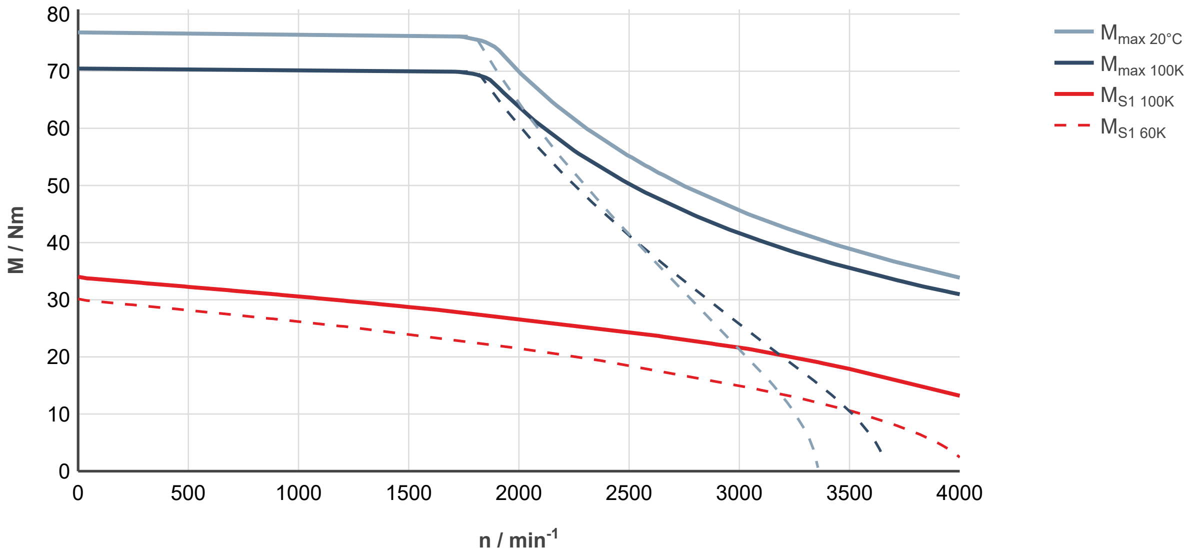



Fig. 203: MS2N10-C0BHN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-C0BNN

| Designation | Symbol | Unit | MS2N10-C0BNN-□□□□0-□N | MS2N10-C0BNN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 30.2 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 16.8 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 34.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 19.3 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0048 | 0.00627 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,880 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 21.4 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 12.35 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 6.45 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 76.8 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 70.5 | |
| Maximum current | $I_{max(rms)}$ | A | 51.3 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 1.95 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 118.4 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.441 | |
| Winding inductance | $L_{12\_min}$ | mH | 10.67 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.97 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 99.3 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 33.0 | |
| Mass | $m_{mot}$ | kg | 23.5 | 28.5 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

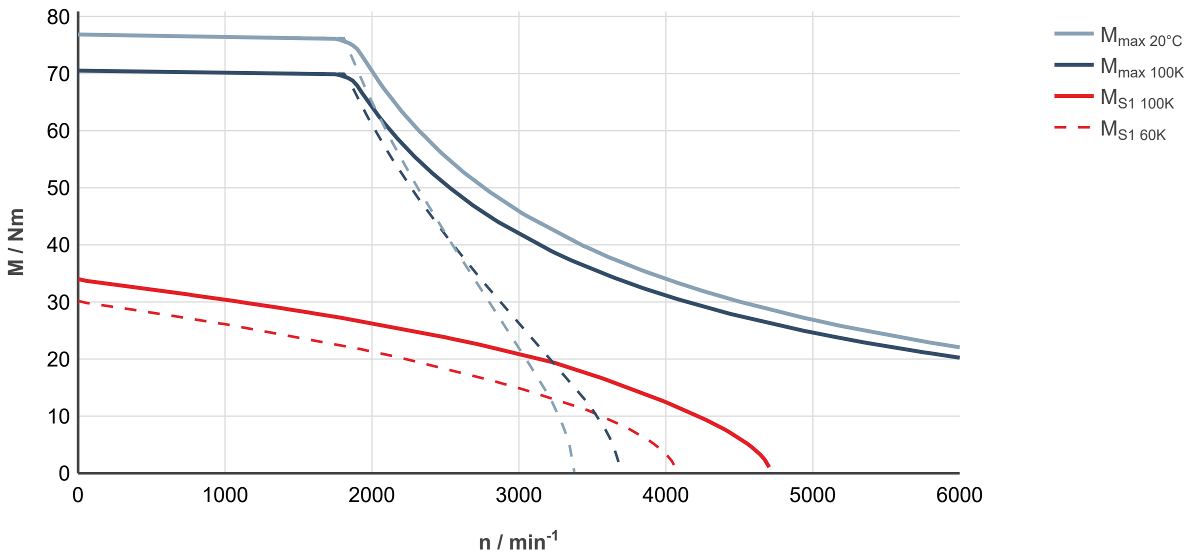



Fig. 204: MS2N10-C0BNN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

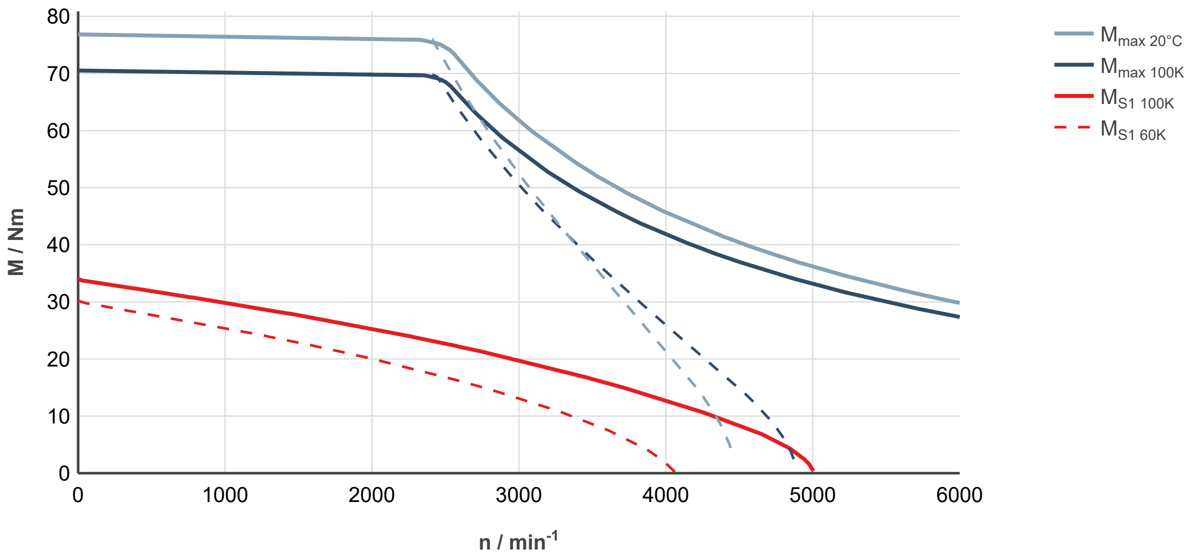



Fig. 205: MS2N10-C0BNN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-C1BHN

<table>
<tr><th>Designation</th><th>Symbol</th><th>Unit</th><th>MS2N10-C1BHN-□□□□0-□N</th><th>MS2N10-C1BHN-□□□□2-□N</th></tr>
<tr><td>Standstill torque - 60K [1)]</td><td>$M_{0\ 60K}$</td><td>Nm</td><td colspan="2">27.3</td></tr>
<tr><td>Standstill current - 60K</td><td>$I_{0\ 60K}$</td><td>A</td><td colspan="2">11.1</td></tr>
<tr><td>Standstill torque - 100K [1)]</td><td>$M_{0\ 100K}$</td><td>Nm</td><td colspan="2">31.0</td></tr>
<tr><td>Standstill current - 100K</td><td>$I_{0\ 100K}$</td><td>A</td><td colspan="2">12.75</td></tr>
<tr><td>Moment of inertia of rotor [1)]</td><td>$J_{rot}$</td><td>kg*m²</td><td>0.0092</td><td>0.01067</td></tr>
<tr><td>Rated speed - 100K</td><td>$n_{N\ 100K}$</td><td>1/min</td><td colspan="2">2,000</td></tr>
<tr><td>Rated torque - 100K [1)]</td><td>$M_{N\ 100K}$</td><td>Nm</td><td colspan="2">22.9</td></tr>
<tr><td>Rated current - 100K</td><td>$I_{N\ 100K}$</td><td>A</td><td colspan="2">9.7</td></tr>
<tr><td>Rated power - 100K [1)]</td><td>$P_{N\ 100K}$</td><td>kW</td><td colspan="2">4.80</td></tr>
<tr><td>Maximum torque 20 °C (cold) [1)]</td><td>$M_{max\ 20°C}$</td><td>Nm</td><td colspan="2">86.5</td></tr>
<tr><td>Maximum torque 100K (warm) [1)]</td><td>$M_{max\ 100K}$</td><td>Nm</td><td colspan="2">79.4</td></tr>
<tr><td>Maximum current</td><td>$I_{max(eff)}$</td><td>A</td><td colspan="2">40.9</td></tr>
<tr><td>Maximum speed (electrical)</td><td>$n_{max\ el}$</td><td>1/min</td><td colspan="2">4,000</td></tr>
<tr><td>Maximum speed (mechanical)</td><td>$n_{max\ mech}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Number of pole pairs</td><td>p</td><td>–</td><td colspan="2">5</td></tr>
<tr><td>Torque constant at 20 °C [1)]</td><td>$K_m$</td><td>Nm/A</td><td colspan="2">2.63</td></tr>
<tr><td>Voltage constant at 20 °C [1)]</td><td>$K_E$</td><td>V/1000 $min^{-1}$</td><td colspan="2">160</td></tr>
<tr><td>Winding resistance at 20 °C</td><td>$R_{12}$</td><td>Ohm</td><td colspan="2">0.96</td></tr>
<tr><td>Winding inductance</td><td>$L_{12\_min}$</td><td>mH</td><td colspan="2">15.23</td></tr>
<tr><td>Leakage capacitance of the component</td><td>$C_{ab}$</td><td>nF</td><td colspan="2">1.8</td></tr>
<tr><td>Thermal time constant of winding</td><td>$T_{th\_W}$</td><td>s</td><td colspan="2">85.0</td></tr>
<tr><td>Thermal time constant of motor</td><td>$T_{th\_M}$</td><td>min</td><td colspan="2">33.0</td></tr>
<tr><td>Mass</td><td>$m_{mot}$</td><td>kg</td><td>24</td><td>29</td></tr>
<tr><td colspan="5"><u>Holding brake</u></td></tr>
<tr><td>Holding torque</td><td>$M_4$</td><td>Nm</td><td>0</td><td>53.00</td></tr>
<tr><td>Rated voltage</td><td>$U_N$</td><td>V</td><td>0</td><td>24</td></tr>
<tr><td>Rated current</td><td>$I_N$</td><td>A</td><td>0</td><td>1.00</td></tr>
<tr><td>Maximum connection time</td><td>$t_1$</td><td>ms</td><td>0</td><td>70</td></tr>
<tr><td>Maximum disconnection time</td><td>$t_2$</td><td>ms</td><td>0</td><td>220</td></tr>
<tr><td colspan="5">1) For tolerance details refer to ➦Chapter 5.4 Tolerances</td></tr>
</table>

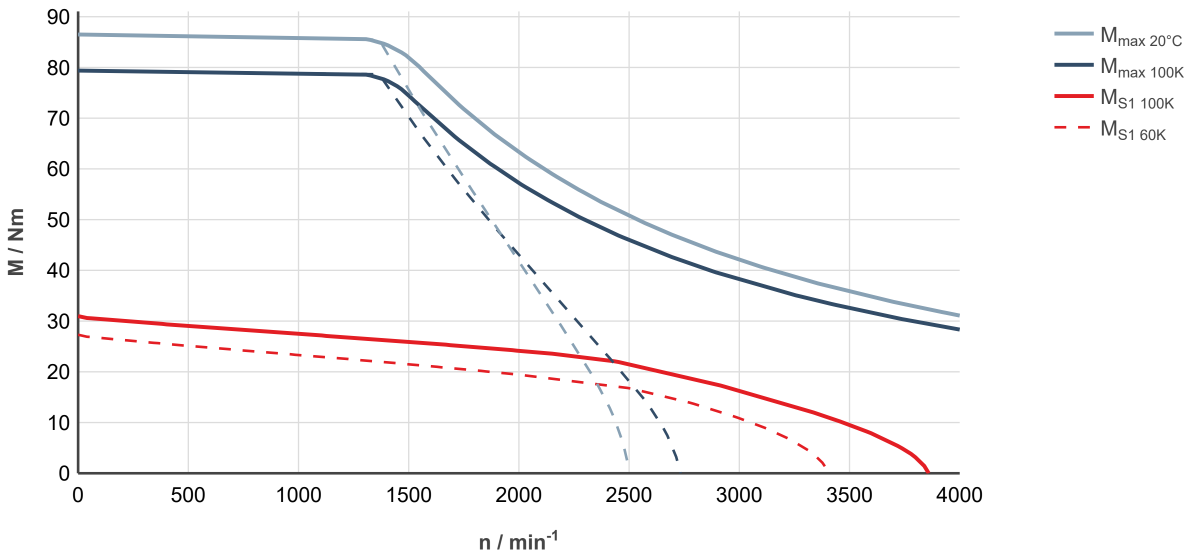



Fig. 206: MS2N10-C1BHN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

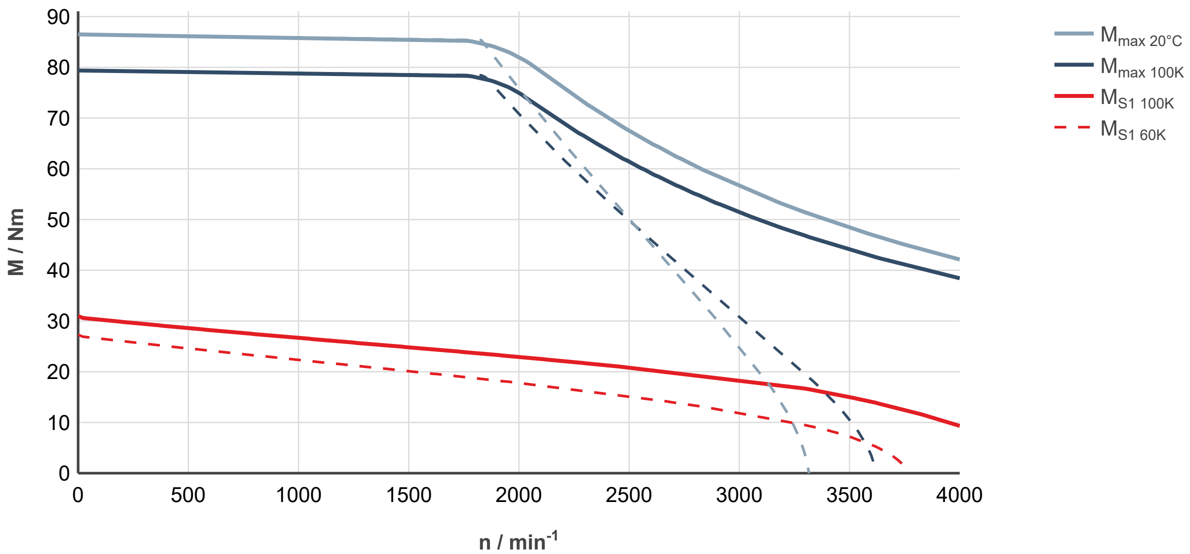



Fig. 207: MS2N10-C1BHN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-C1BNN

<table>
<tr><th>Designation</th><th>Symbol</th><th>Unit</th><th>MS2N10-C1BNN-□□□□0-□N</th><th>MS2N10-C1BNN-□□□□2-□N</th></tr>
<tr><td>Standstill torque - 60K [1)]</td><td>$M_{0\ 60K}$</td><td>Nm</td><td colspan="2">27.3</td></tr>
<tr><td>Standstill current - 60K</td><td>$I_{0\ 60K}$</td><td>A</td><td colspan="2">16.5</td></tr>
<tr><td>Standstill torque - 100K [1)]</td><td>$M_{0\ 100K}$</td><td>Nm</td><td colspan="2">31.0</td></tr>
<tr><td>Standstill current - 100K</td><td>$I_{0\ 100K}$</td><td>A</td><td colspan="2">19</td></tr>
<tr><td>Moment of inertia of rotor [1)]</td><td>$J_{rot}$</td><td>kg*m²</td><td>0.0092</td><td>0.01067</td></tr>
<tr><td>Rated speed - 100K</td><td>$n_{N\ 100K}$</td><td>1/min</td><td colspan="2">3,090</td></tr>
<tr><td>Rated torque - 100K [1)]</td><td>$M_{N\ 100K}$</td><td>Nm</td><td colspan="2">13.75</td></tr>
<tr><td>Rated current - 100K</td><td>$I_{N\ 100K}$</td><td>A</td><td colspan="2">8.90</td></tr>
<tr><td>Rated power - 100K [1)]</td><td>$P_{N\ 100K}$</td><td>kW</td><td colspan="2">4.44</td></tr>
<tr><td>Maximum torque 20 °C (cold) [1)]</td><td>$M_{max\ 20°C}$</td><td>Nm</td><td colspan="2">86.5</td></tr>
<tr><td>Maximum torque 100K (warm) [1)]</td><td>$M_{max\ 100K}$</td><td>Nm</td><td colspan="2">79.4</td></tr>
<tr><td>Maximum current</td><td>$I_{max(rms)}$</td><td>A</td><td colspan="2">60.8</td></tr>
<tr><td>Maximum speed (electrical)</td><td>$n_{max\ el}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Maximum speed (mechanical)</td><td>$n_{max\ mech}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Number of pole pairs</td><td>p</td><td>–</td><td colspan="2">5</td></tr>
<tr><td>Torque constant at 20 °C [1)]</td><td>$K_m$</td><td>Nm/A</td><td colspan="2">1.78</td></tr>
<tr><td>Voltage constant at 20 °C [1)]</td><td>$K_E$</td><td>V/1000 $min^{-1}$</td><td colspan="2">107.9</td></tr>
<tr><td>Winding resistance at 20 °C</td><td>$R_{12}$</td><td>Ohm</td><td colspan="2">0.439</td></tr>
<tr><td>Winding inductance</td><td>$L_{12\_min}$</td><td>mH</td><td colspan="2">6.6</td></tr>
<tr><td>Leakage capacitance of the component</td><td>$C_{ab}$</td><td>nF</td><td colspan="2">1.52</td></tr>
<tr><td>Thermal time constant of winding</td><td>$T_{th\_W}$</td><td>s</td><td colspan="2">85.0</td></tr>
<tr><td>Thermal time constant of motor</td><td>$T_{th\_M}$</td><td>min</td><td colspan="2">33.0</td></tr>
<tr><td>Mass</td><td>$m_{mot}$</td><td>kg</td><td>24</td><td>29</td></tr>
<tr><td colspan="5"><u>Holding brake</u></td></tr>
<tr><td>Holding torque</td><td>$M_4$</td><td>Nm</td><td>0</td><td>53.00</td></tr>
<tr><td>Rated voltage</td><td>$U_N$</td><td>V</td><td>0</td><td>24</td></tr>
<tr><td>Rated current</td><td>$I_N$</td><td>A</td><td>0</td><td>1.00</td></tr>
<tr><td>Maximum connection time</td><td>$t_1$</td><td>ms</td><td>0</td><td>70</td></tr>
<tr><td>Maximum disconnection time</td><td>$t_2$</td><td>ms</td><td>0</td><td>220</td></tr>
<tr><td colspan="5">1) For tolerance details refer to ➦Chapter 5.4 Tolerances</td></tr>
</table>

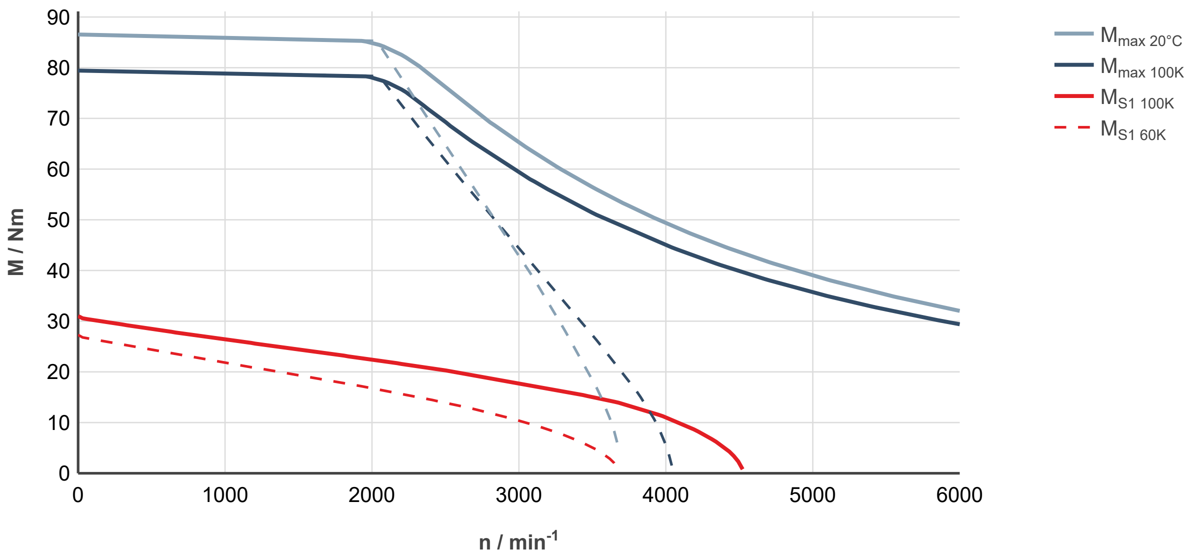



Fig. 208: MS2N10-C1BNN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

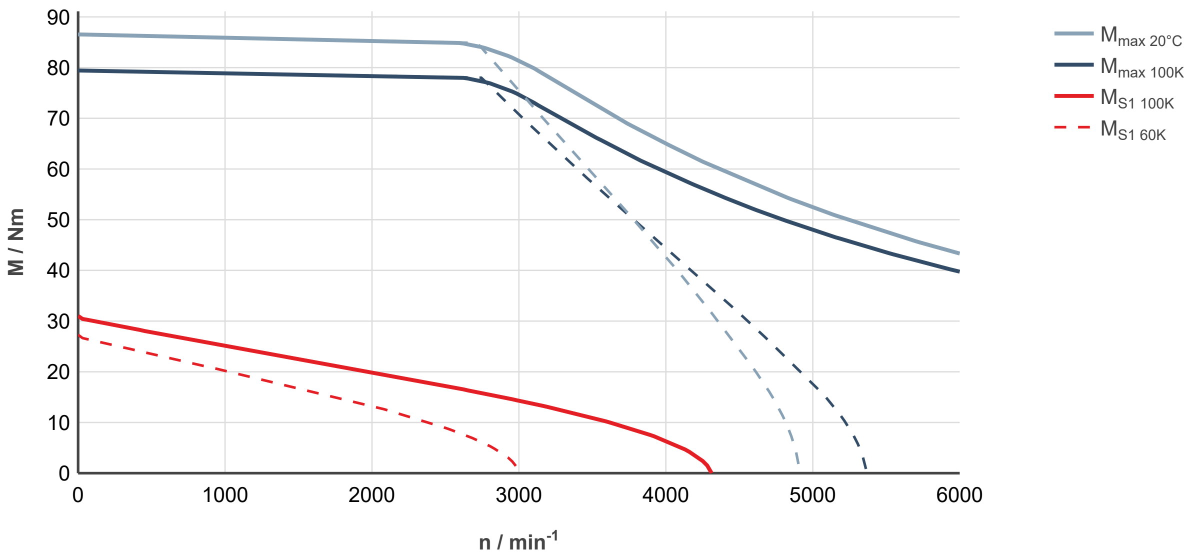



Fig. 209: MS2N10-C1BNN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-D0BHN

<table>
<tr><th>Designation</th><th>Symbol</th><th>Unit</th><th>MS2N10-D0BHN-□□□□0-□N</th><th>MS2N10-D0BHN-□□□□2-□N</th></tr>
<tr><td>Standstill torque - 60K [1)]</td><td>$M_{0\ 60K}$</td><td>Nm</td><td colspan="2">51</td></tr>
<tr><td>Standstill current - 60K</td><td>$I_{0\ 60K}$</td><td>A</td><td colspan="2">19.1</td></tr>
<tr><td>Standstill torque - 100K [1)]</td><td>$M_{0\ 100K}$</td><td>Nm</td><td colspan="2">60.5</td></tr>
<tr><td>Standstill current - 100K</td><td>$I_{0\ 100K}$</td><td>A</td><td colspan="2">23.1</td></tr>
<tr><td>Moment of inertia of rotor [1)]</td><td>$J_{rot}$</td><td>kg*m²</td><td>0.0081</td><td>0.00957</td></tr>
<tr><td>Rated speed - 100K</td><td>$n_{N\ 100K}$</td><td>1/min</td><td colspan="2">2,000</td></tr>
<tr><td>Rated torque - 100K [1)]</td><td>$M_{N\ 100K}$</td><td>Nm</td><td colspan="2">44.6</td></tr>
<tr><td>Rated current - 100K</td><td>$I_{N\ 100K}$</td><td>A</td><td colspan="2">17.3</td></tr>
<tr><td>Rated power - 100K [1)]</td><td>$P_{N\ 100K}$</td><td>kW</td><td colspan="2">9.35</td></tr>
<tr><td>Maximum torque 20 °C (cold) [1)]</td><td>$M_{max\ 20°C}$</td><td>Nm</td><td colspan="2">155</td></tr>
<tr><td>Maximum torque 100K (warm) [1)]</td><td>$M_{max\ 100K}$</td><td>Nm</td><td colspan="2">142</td></tr>
<tr><td>Maximum current</td><td>$I_{max(rms)}$</td><td>A</td><td colspan="2">70</td></tr>
<tr><td>Maximum speed (electrical)</td><td>$n_{max\ el}$</td><td>1/min</td><td colspan="2">4,000</td></tr>
<tr><td>Maximum speed (mechanical)</td><td>$n_{max\ mech}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Number of pole pairs</td><td>p</td><td>–</td><td colspan="2">5</td></tr>
<tr><td>Torque constant at 20 °C [1)]</td><td>$K_m$</td><td>Nm/A</td><td colspan="2">2.86</td></tr>
<tr><td>Voltage constant at 20 °C [1)]</td><td>$K_E$</td><td>V/1000 $min^{-1}$</td><td colspan="2">173.5</td></tr>
<tr><td>Winding resistance at 20 °C</td><td>$R_{12}$</td><td>Ohm</td><td colspan="2">0.386</td></tr>
<tr><td>Winding inductance</td><td>$L_{12\_min}$</td><td>mH</td><td colspan="2">10.3</td></tr>
<tr><td>Leakage capacitance of the component</td><td>$C_{ab}$</td><td>nF</td><td colspan="2">3.15</td></tr>
<tr><td>Thermal time constant of winding</td><td>$T_{th\_W}$</td><td>s</td><td colspan="2">113.6</td></tr>
<tr><td>Thermal time constant of motor</td><td>$T_{th\_M}$</td><td>min</td><td colspan="2">38.8</td></tr>
<tr><td>Mass</td><td>$m_{mot}$</td><td>kg</td><td>34</td><td>39</td></tr>
<tr><td colspan="5"><u>Holding brake</u></td></tr>
<tr><td>Holding torque</td><td>$M_4$</td><td>Nm</td><td>0</td><td>53.00</td></tr>
<tr><td>Rated voltage</td><td>$U_N$</td><td>V</td><td>0</td><td>24</td></tr>
<tr><td>Rated current</td><td>$I_N$</td><td>A</td><td>0</td><td>1.00</td></tr>
<tr><td>Maximum connection time</td><td>$t_1$</td><td>ms</td><td>0</td><td>70</td></tr>
<tr><td>Maximum disconnection time</td><td>$t_2$</td><td>ms</td><td>0</td><td>220</td></tr>
<tr><td colspan="5">1) For tolerance details refer to ➦Chapter 5.4 Tolerances</td></tr>
</table>

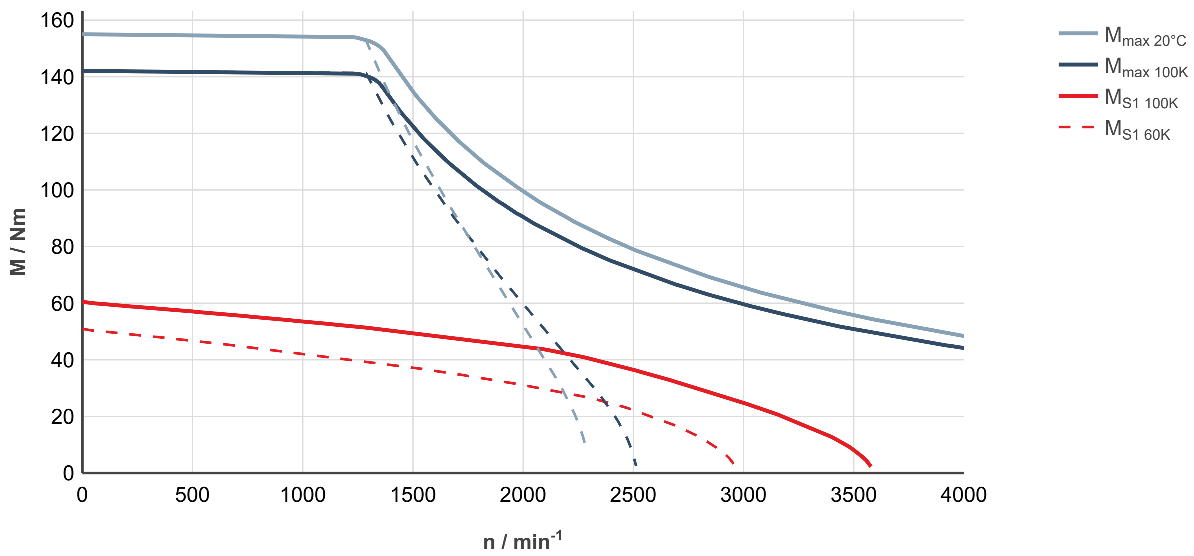



Fig. 210: MS2N10-D0BHN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

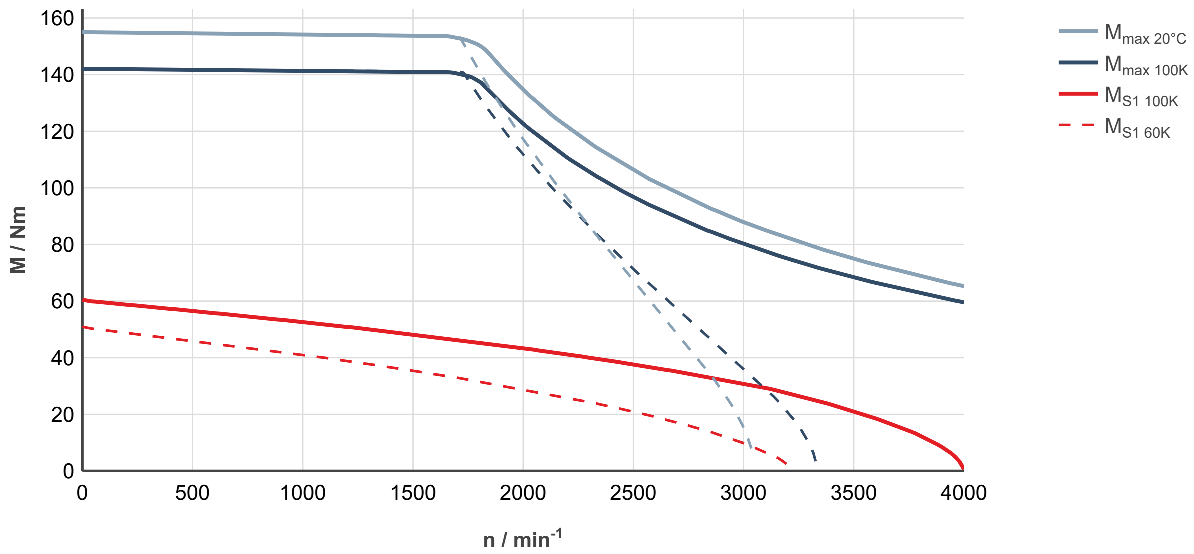



Fig. 211: MS2N10-D0BHN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-D0BNN

<table>
<tr><th>Designation</th><th>Symbol</th><th>Unit</th><th>MS2N10-D0BNN-□□□□0-□N</th><th>MS2N10-D0BNN-□□□□2-□N</th></tr>
<tr><td>Standstill torque - 60K 1)</td><td>$M_{0\ 60K}$</td><td>Nm</td><td colspan="2">51.0</td></tr>
<tr><td>Standstill current - 60K</td><td>$I_{0\ 60K}$</td><td>A</td><td colspan="2">28.2</td></tr>
<tr><td>Standstill torque - 100K 1)</td><td>$M_{0\ 100K}$</td><td>Nm</td><td colspan="2">60.5</td></tr>
<tr><td>Standstill current - 100K</td><td>$I_{0\ 100K}$</td><td>A</td><td colspan="2">34.1</td></tr>
<tr><td>Moment of inertia of rotor 1)</td><td>$J_{rot}$</td><td>kg*m²</td><td>0.0081</td><td>0.00957</td></tr>
<tr><td>Rated speed - 100K</td><td>$n_{N\ 100K}$</td><td>1/min</td><td colspan="2">2,600</td></tr>
<tr><td>Rated torque - 100K 1)</td><td>$M_{N\ 100K}$</td><td>Nm</td><td colspan="2">31.0</td></tr>
<tr><td>Rated current - 100K</td><td>$I_{N\ 100K}$</td><td>A</td><td colspan="2">18.0</td></tr>
<tr><td>Rated power - 100K 1)</td><td>$P_{N\ 100K}$</td><td>kW</td><td colspan="2">8.45</td></tr>
<tr><td>Maximum torque 20 °C (cold) 1)</td><td>$M_{max\ 20°C}$</td><td>Nm</td><td colspan="2">155</td></tr>
<tr><td>Maximum torque 100K (warm) 1)</td><td>$M_{max\ 100K}$</td><td>Nm</td><td colspan="2">142</td></tr>
<tr><td>Maximum current</td><td>$I_{max(rms)}$</td><td>A</td><td colspan="2">102.5</td></tr>
<tr><td>Maximum speed (electrical)</td><td>$n_{max\ el}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Maximum speed (mechanical)</td><td>$n_{max\ mech}$</td><td>1/min</td><td colspan="2">6,000</td></tr>
<tr><td>Number of pole pairs</td><td>p</td><td>–</td><td colspan="2">5</td></tr>
<tr><td>Torque constant at 20 °C 1)</td><td>$K_m$</td><td>Nm/A</td><td colspan="2">1.95</td></tr>
<tr><td>Voltage constant at 20 °C 1)</td><td>$K_E$</td><td>V/1000 $min^{-1}$</td><td colspan="2">118.5</td></tr>
<tr><td>Winding resistance at 20 °C</td><td>$R_{12}$</td><td>Ohm</td><td colspan="2">0.18</td></tr>
<tr><td>Winding inductance</td><td>$L_{12\_min}$</td><td>mH</td><td colspan="2">5.05</td></tr>
<tr><td>Leakage capacitance of the component</td><td>$C_{ab}$</td><td>nF</td><td colspan="2">4.1</td></tr>
<tr><td>Thermal time constant of winding</td><td>$T_{th\_W}$</td><td>s</td><td colspan="2">113.6</td></tr>
<tr><td>Thermal time constant of motor</td><td>$T_{th\_M}$</td><td>min</td><td colspan="2">38.8</td></tr>
<tr><td>Mass</td><td>$m_{mot}$</td><td>kg</td><td>34</td><td>39</td></tr>
<tr><td colspan="5"><u>Holding brake</u></td></tr>
<tr><td>Holding torque</td><td>$M_4$</td><td>Nm</td><td>0</td><td>53.00</td></tr>
<tr><td>Rated voltage</td><td>$U_N$</td><td>V</td><td>0</td><td>24</td></tr>
<tr><td>Rated current</td><td>$I_N$</td><td>A</td><td>0</td><td>1.00</td></tr>
<tr><td>Maximum connection time</td><td>$t_1$</td><td>ms</td><td>0</td><td>70</td></tr>
<tr><td>Maximum disconnection time</td><td>$t_2$</td><td>ms</td><td>0</td><td>220</td></tr>
<tr><td colspan="5">1) For tolerance details refer to ➦Chapter 5.4 Tolerances</td></tr>
</table>

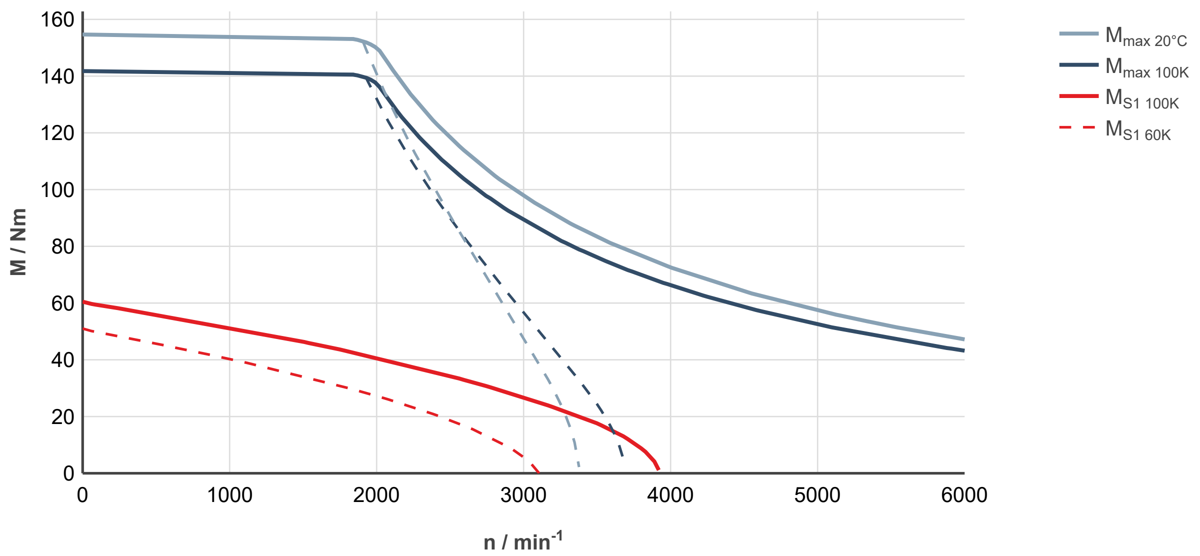



Fig. 212: MS2N10-D0BNN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

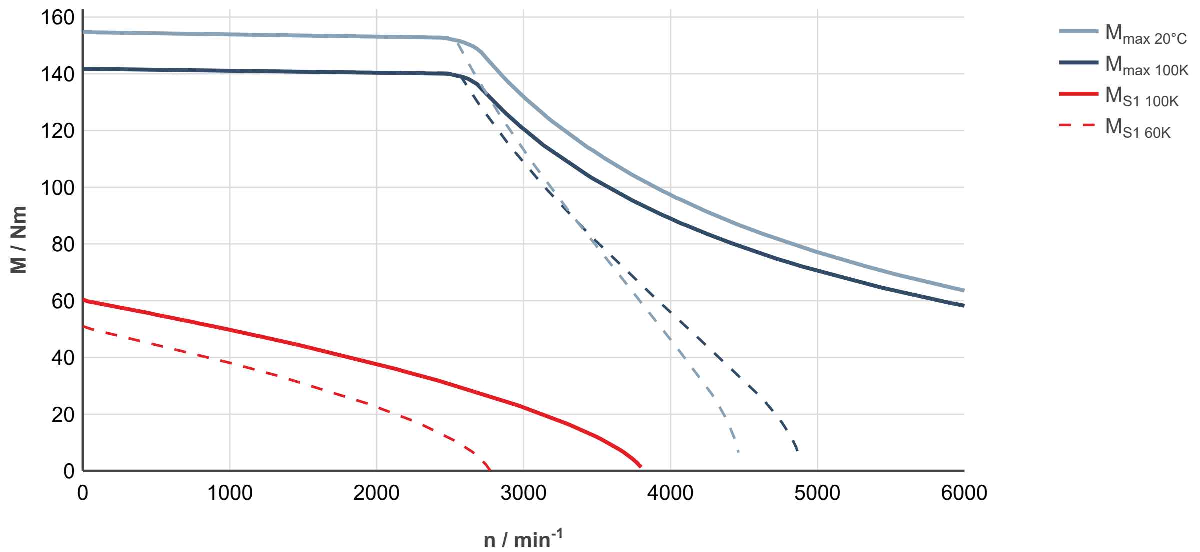



Fig. 213: MS2N10-D0BNN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-D1BFN

| Designation | Symbol | Unit | MS2N10-D1BFN-□□□□0-□N | MS2N10-D1BFN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 47.2 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 14.3 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 56.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 17.2 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0171 | 0.01857 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,600 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 43.8 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 13.75 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 7.35 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 174 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 160 | |
| Maximum current | $I_{max(rms)}$ | A | 60.7 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 3.53 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 214.5 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.70 | |
| Winding inductance | $L_{12\_min}$ | mH | 12.2 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 3.3 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 93.3 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 38.8 | |
| Mass | $m_{mot}$ | kg | 36 | 41 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

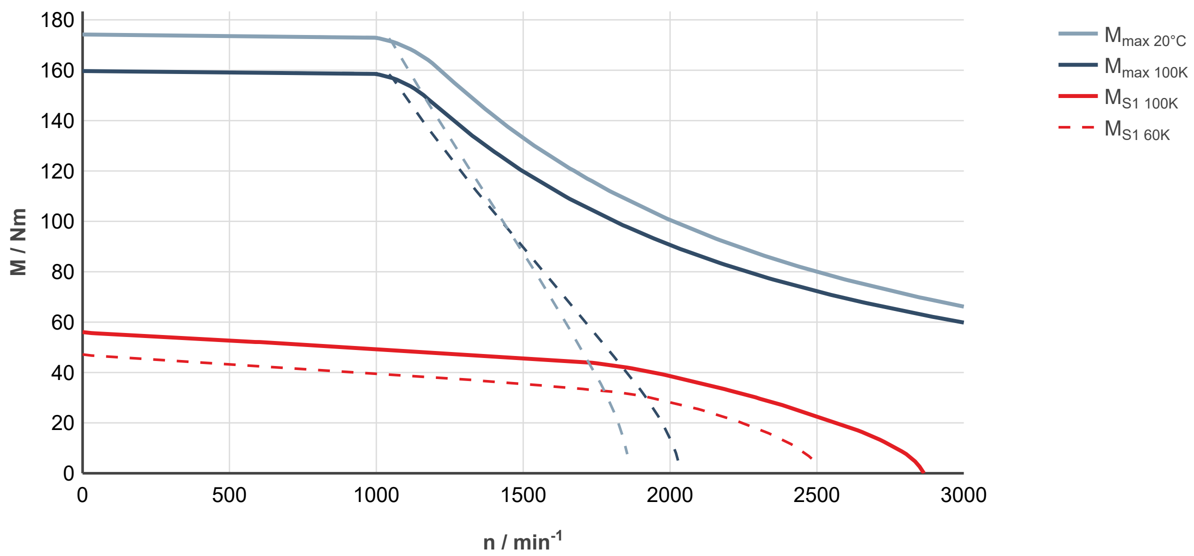



Fig. 214: MS2N10-D1BFN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

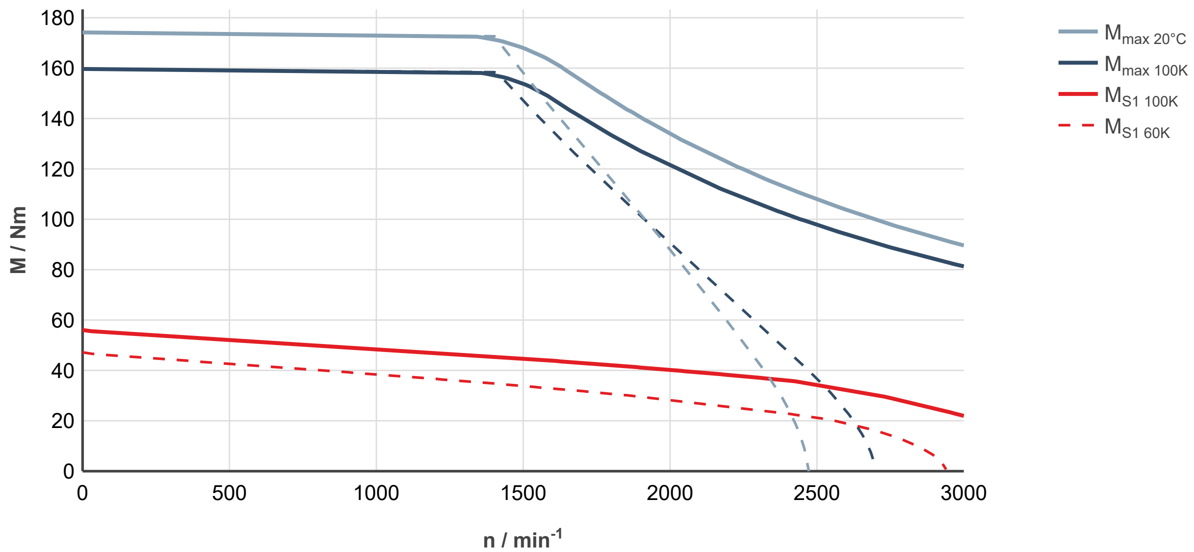



Fig. 215: MS2N10-D1BFN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-D1BNN

| Designation | Symbol | Unit | MS2N10-D1BNN-□□□□0-□N | MS2N10-D1BNN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 47.2 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 28.6 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 56.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 34.3 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0171 | 0.01857 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,460 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 24.7 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 16.0 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 6.35 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 174 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 160 | |
| Maximum current | $I_{max(rms)}$ | A | 121.5 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 1.76 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 107.6 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.178 | |
| Winding inductance | $L_{12\_min}$ | mH | 3.23 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 3.33 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 93.3 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 38.8 | |
| Mass | $m_{mot}$ | kg | 36 | 41 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

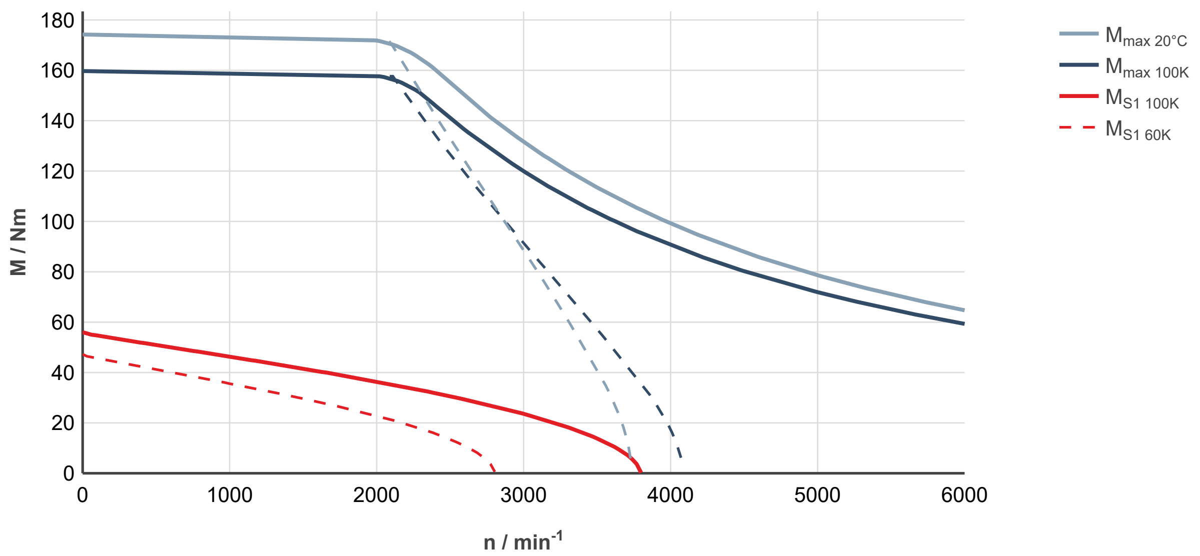



Fig. 216: MS2N10-D1BNN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

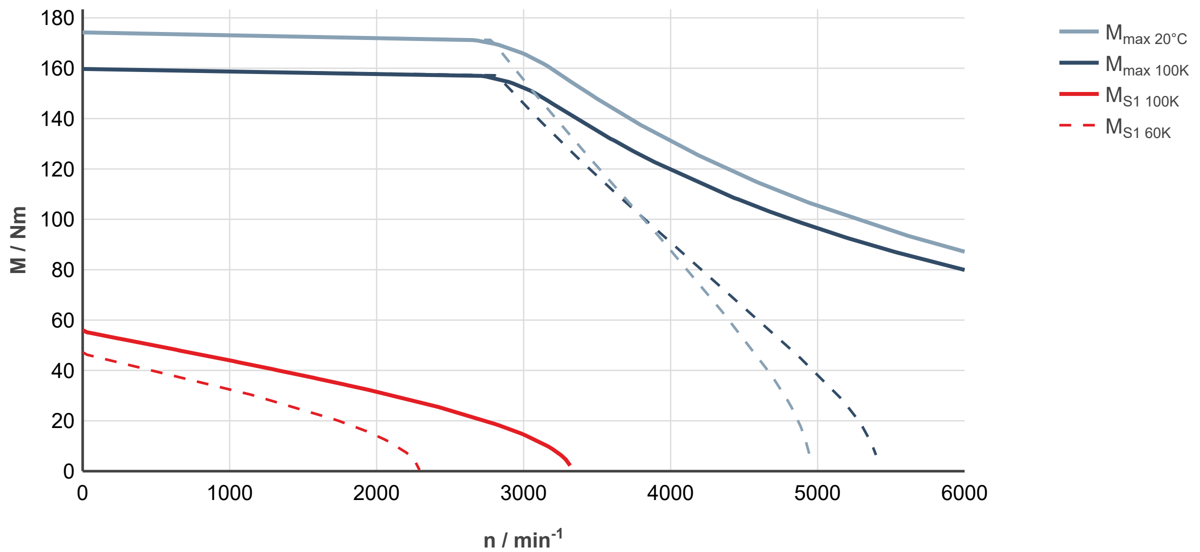



Fig. 217: MS2N10-D1BNN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-E0BHN

| Designation | Symbol | Unit | MS2N10-E0BHN-□□□□0-□N | MS2N10-E0BHN-□□□□3-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 67.7 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 25.0 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 82.5 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 31.0 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0114 | 0.0141 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 53.2 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 20.5 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 11.15 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 234 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 214 | |
| Maximum current | $I_{max(rms)}$ | A | 102.5 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.9 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 176.4 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.244 | |
| Winding inductance | $L_{12\_min}$ | mH | 7.43 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 45 | 52 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

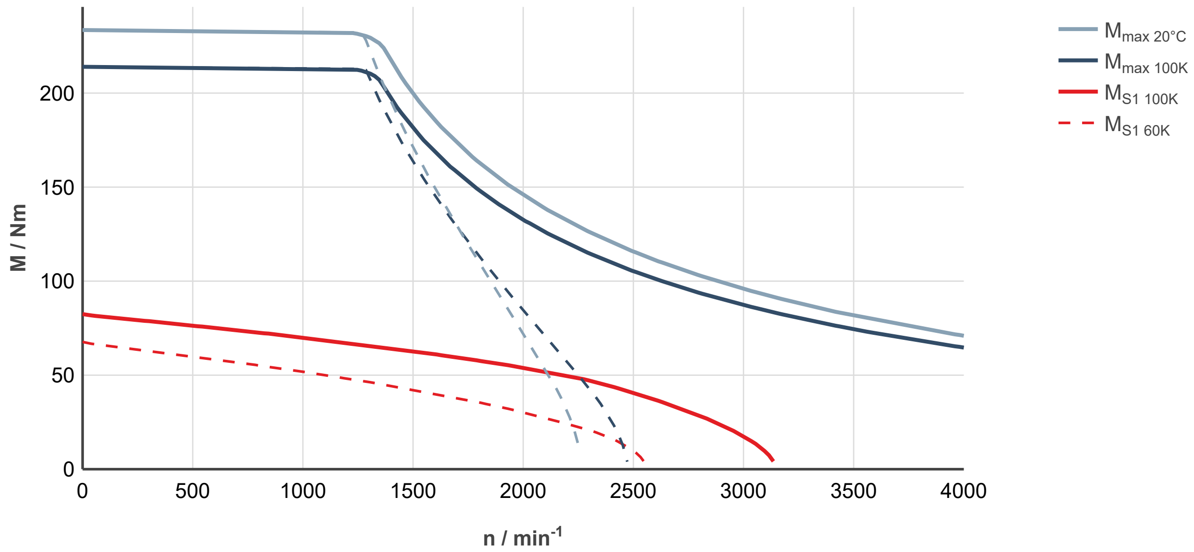



Fig. 218: MS2N10-E0BHN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

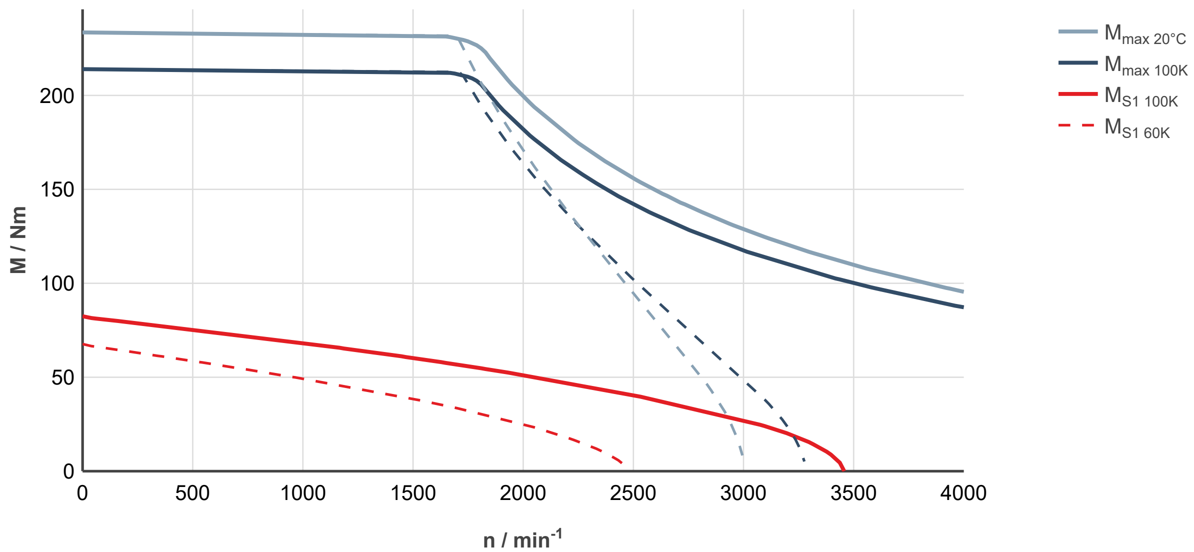



Fig. 219: MS2N10-E0BHN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-E0BNN

| Designation | Symbol | Unit | MS2N10-E0BNN-□□□□0-□N | MS2N10-E0BNN-□□□□3-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1)] | $M_{0\ 60K}$ | Nm | 67.7 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 34.5 | |
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 82.5 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 42.8 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | kg*m² | 0.0114 | 0.0141 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,120 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 41.2 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 22.2 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 9.15 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 234 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 214 | |
| Maximum current | $I_{max(rms)}$ | A | 140 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 2.1 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 128.5 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.133 | |
| Winding inductance | $L_{12\_min}$ | mH | 4.00 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 45 | 52 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

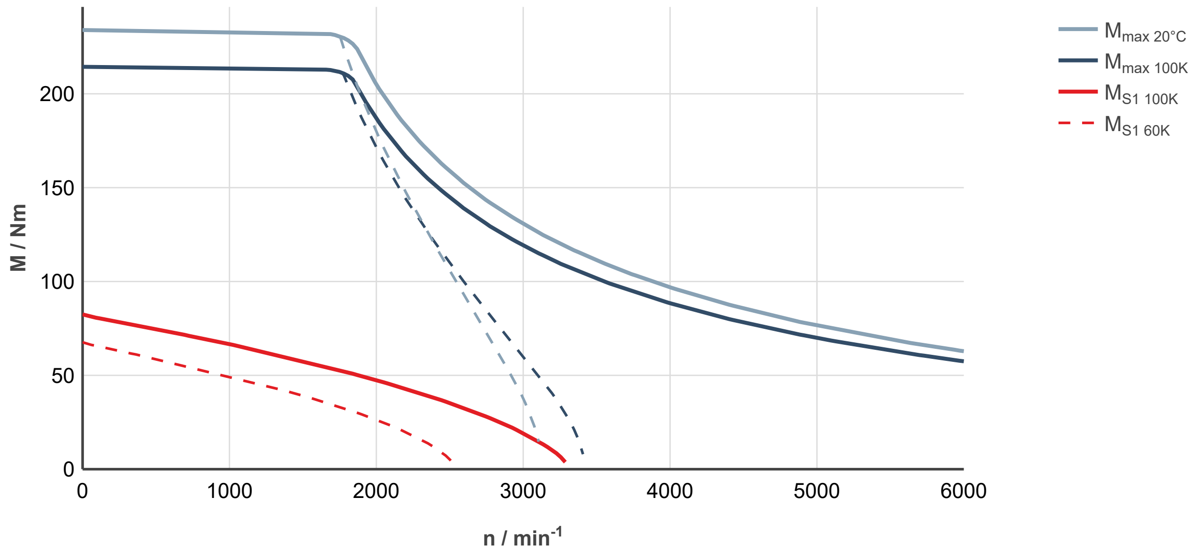



Fig. 220: MS2N10-E0BNN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

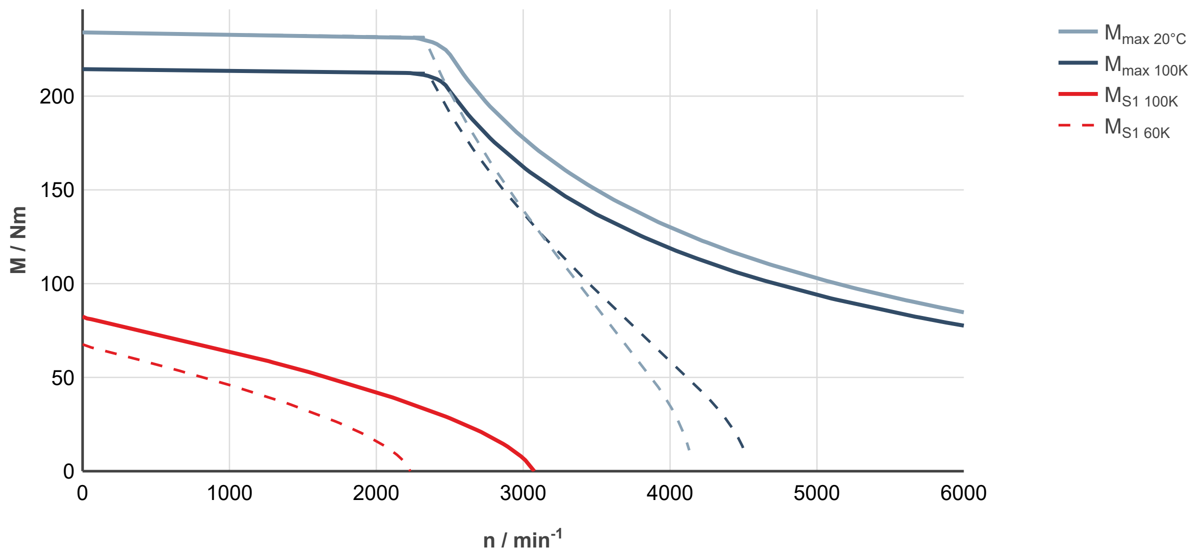



Fig. 221: MS2N10-E0BNN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-E1BFN

| Designation | Symbol | Unit | MS2N10-E1BFN-□□□□0-□N | MS2N10-E1BFN-□□□□3-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 64.0 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 17.1 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 76.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 20.5 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | $kg*m^2$ | 0.025 | 0.0277 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,500 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 57.4 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 15.9 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 9.0 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 266 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 244 | |
| Maximum current | $I_{max(rms)}$ | A | 81 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 4.0 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 243 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.53 | |
| Winding inductance | $L_{12\_min}$ | mH | 10.0 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 5.12 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 100.5 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 44.6 | |
| Mass | $m_{mot}$ | kg | 47 | 54 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

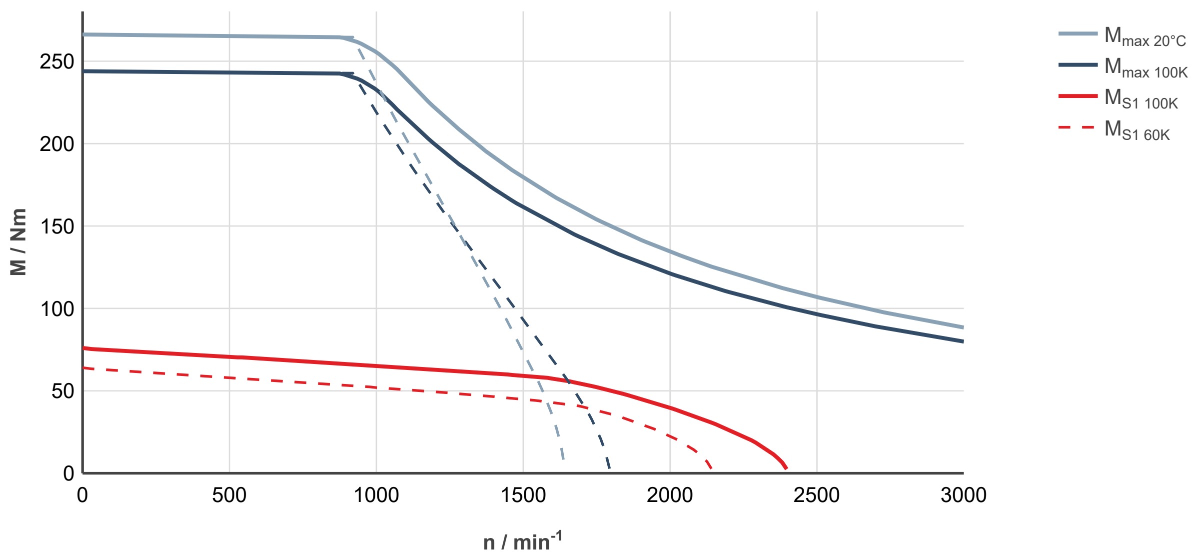



Fig. 222: MS2N10-E1BFN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

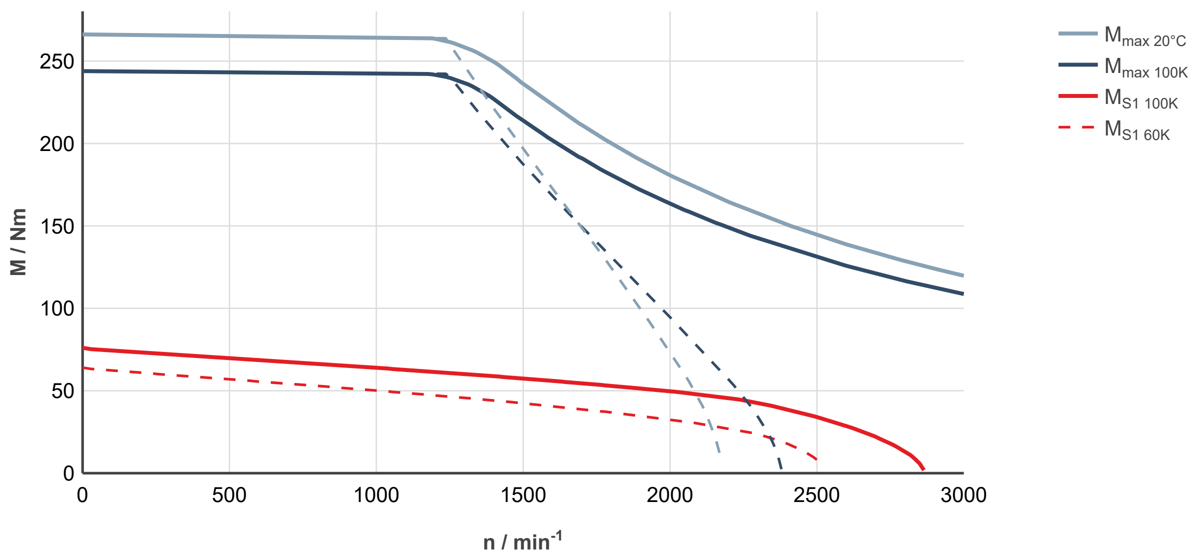



Fig. 223: MS2N10-E1BFN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-E1BNN

| Designation | Symbol | Unit | MS2N10-E1BNN-□□□□0-□N | MS2N10-E1BNN-□□□□3-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 64.0 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 34.2 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 76.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 41 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.025 | 0.0277 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,970 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 32.2 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 18.3 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 6.65 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 266 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 244 | |
| Maximum current | $I_{max(rms)}$ | A | 162 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.0 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 121.6 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.137 | |
| Winding inductance | $L_{12\_min}$ | mH | 2.87 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 5.0 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 100.5 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 44.6 | |
| Mass | $m_{mot}$ | kg | 47 | 54 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

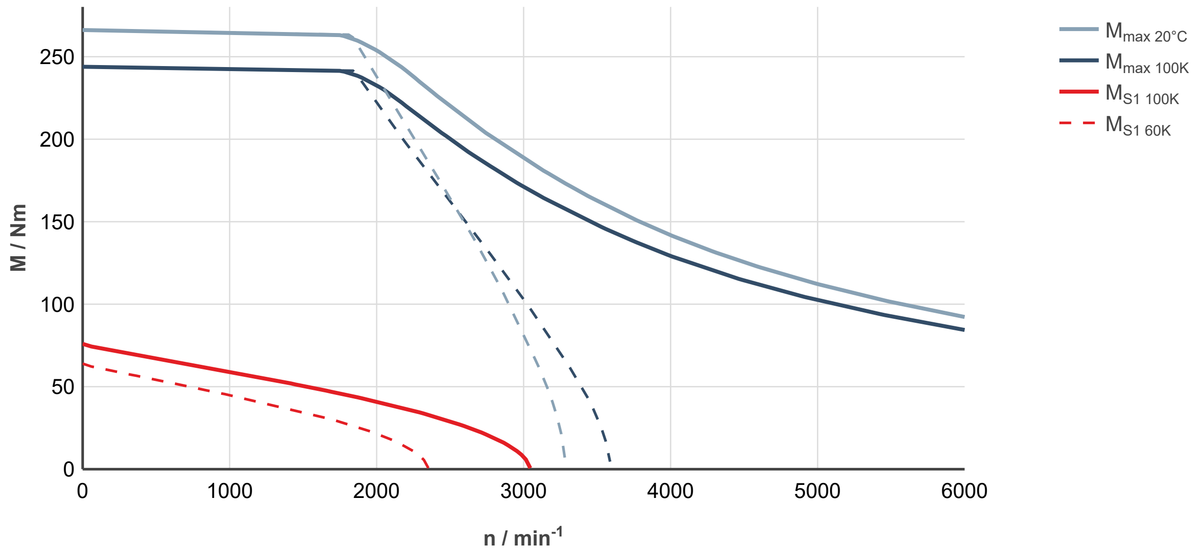



Fig. 224: MS2N10-E1BNN-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

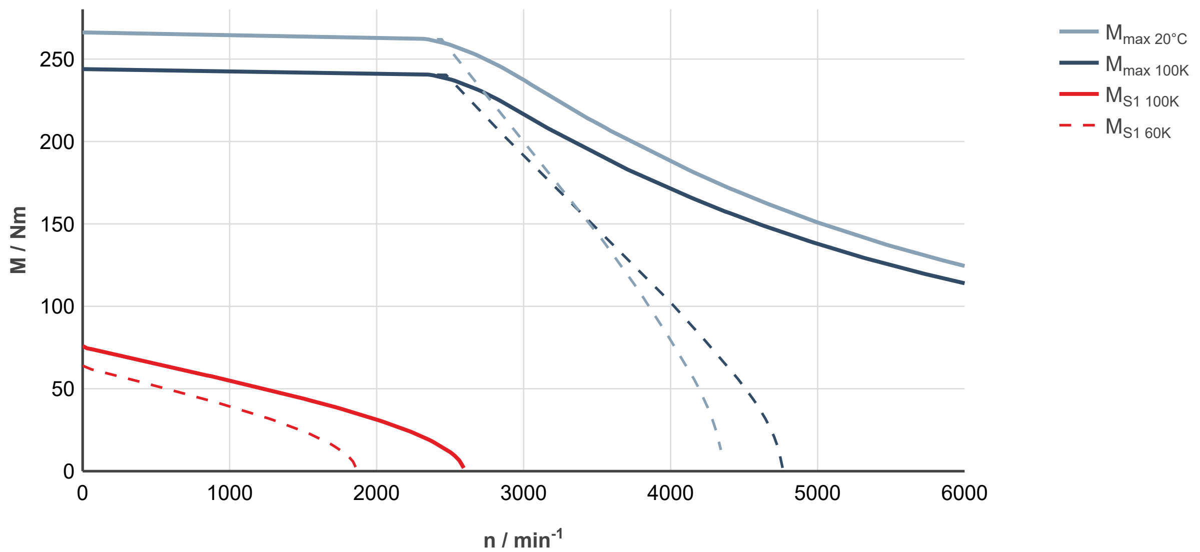



Fig. 225: MS2N10-E1BNN-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-F0BDN

| Designation | Symbol | Unit | MS2N10-F0BDN-□□□□0-□N | MS2N10-F0BDN-□□□□3-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1)] | $M_{0\ 60K}$ | Nm | 85.0 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 15.8 | |
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 103 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 19.5 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | $kg{*}m^2$ | 0.0147 | 0.0174 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,000 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 89.6 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 17.1 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 9.4 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 313 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 287 | |
| Maximum current | $I_{max(rms)}$ | A | 70 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 2,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 5.76 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 350 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.667 | |
| Winding inductance | $L_{12\_min}$ | mH | 20.05 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 7.75 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 128.6 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 49.5 | |
| Mass | $m_{mot}$ | kg | 55 | 62 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

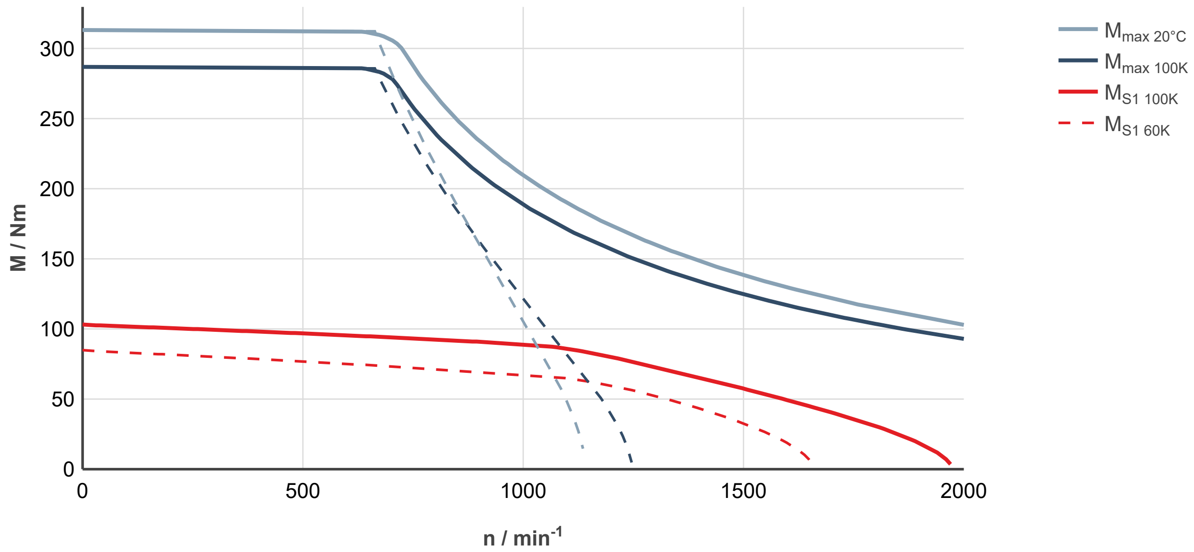



Fig. 226: MS2N10-F0BDN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

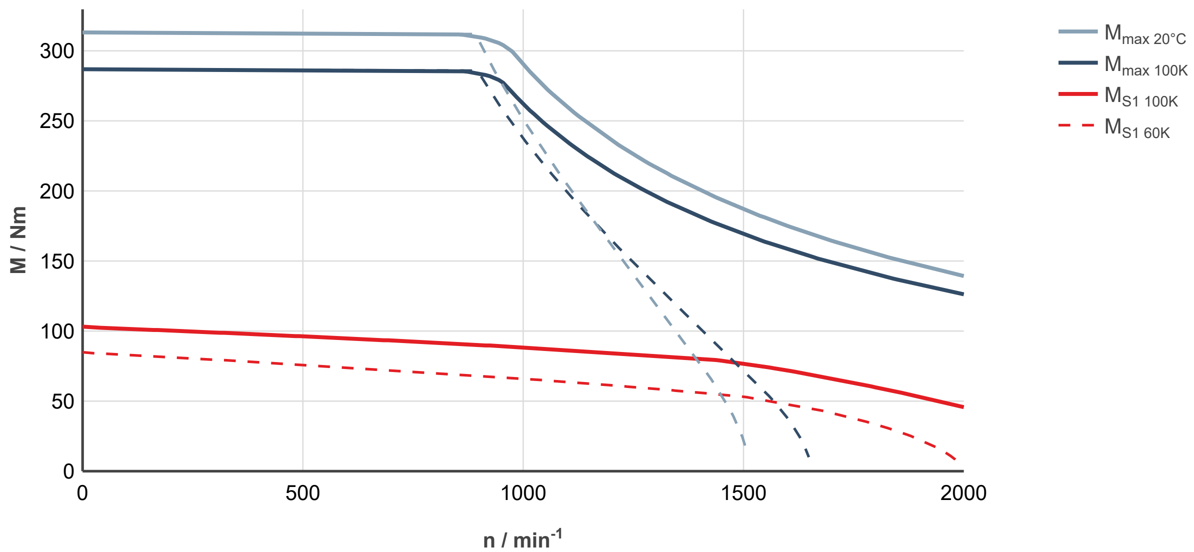



Fig. 227: MS2N10-F0BDN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-F0BHN

| Designation | Symbol | Unit | MS2N10-F0BHN-□□□□0-□N | MS2N10-F0BHN-□□□□3-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 85 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 32.0 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 103 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 39.4 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0147 | 0.0174 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 56.7 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 22.4 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 11.85 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 313 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 287 | |
| Maximum current | $I_{max(rms)}$ | A | 140 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.84 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 172.5 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.169 | |
| Winding inductance | $L_{12\_min}$ | mH | 5.01 | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 55 | 62 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

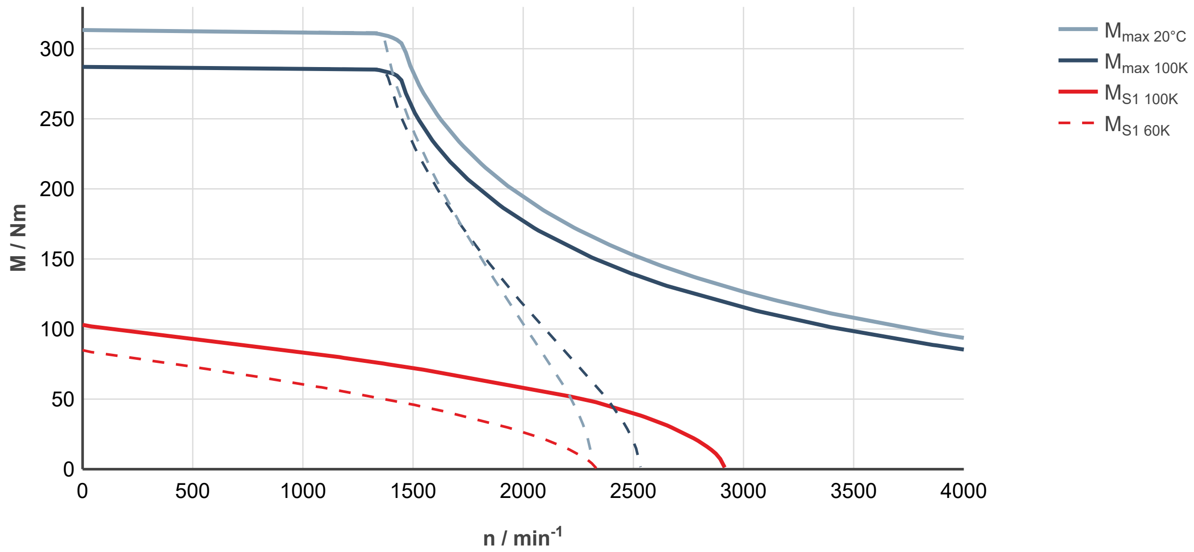



Fig. 228: MS2N10-F0BHN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

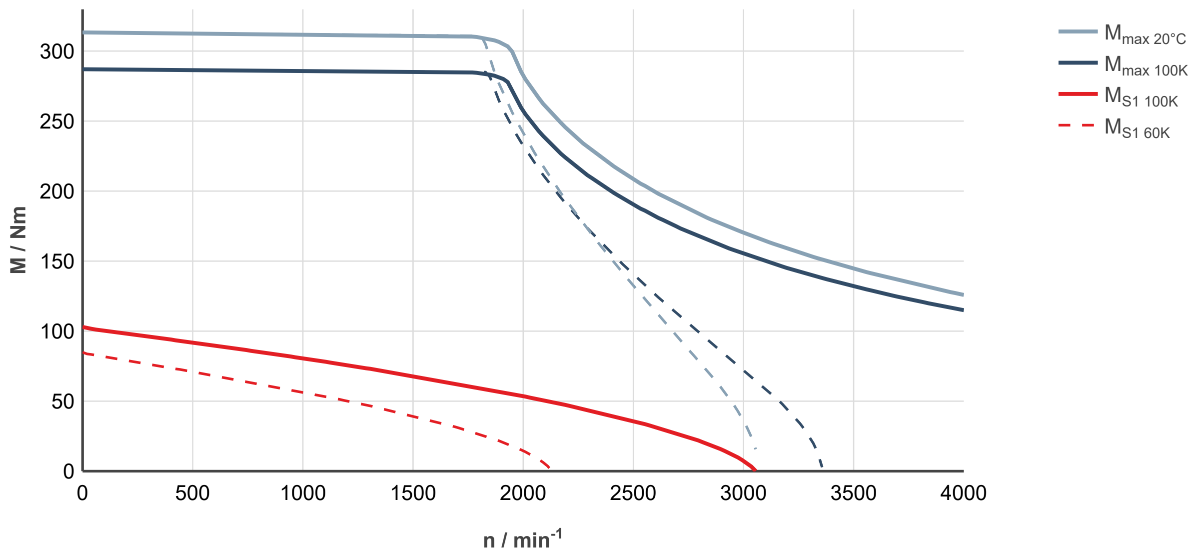



Fig. 229: MS2N10-F0BHN-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-F1BDN

| Designation | Symbol | Unit | MS2N10-F1BDN-□□□□0-□N | MS2N10-F1BDN-□□□□3-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1)] | $M_{0\ 60K}$ | Nm | 79.5 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 15.9 | |
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 96.5 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 19.5 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | kg*m² | 0.0329 | 0.0356 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,000 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 81.9 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 16.8 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 8.6 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 360 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 330 | |
| Maximum current | $I_{max(rms)}$ | A | 81.0 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 2,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 5.36 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 325.5 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.678 | |
| Winding inductance | $L_{12\_min}$ | mH | 14.6 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 6.8 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 102 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 49.5 | |
| Mass | $m_{mot}$ | kg | 59.0 | 66 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

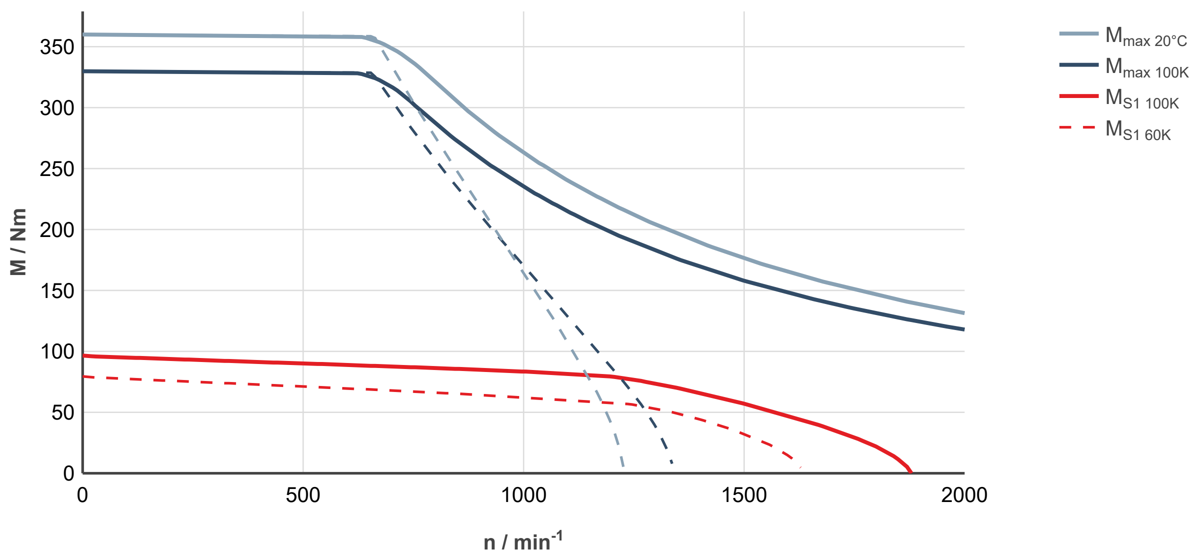



Fig. 230: MS2N10-F1BDN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

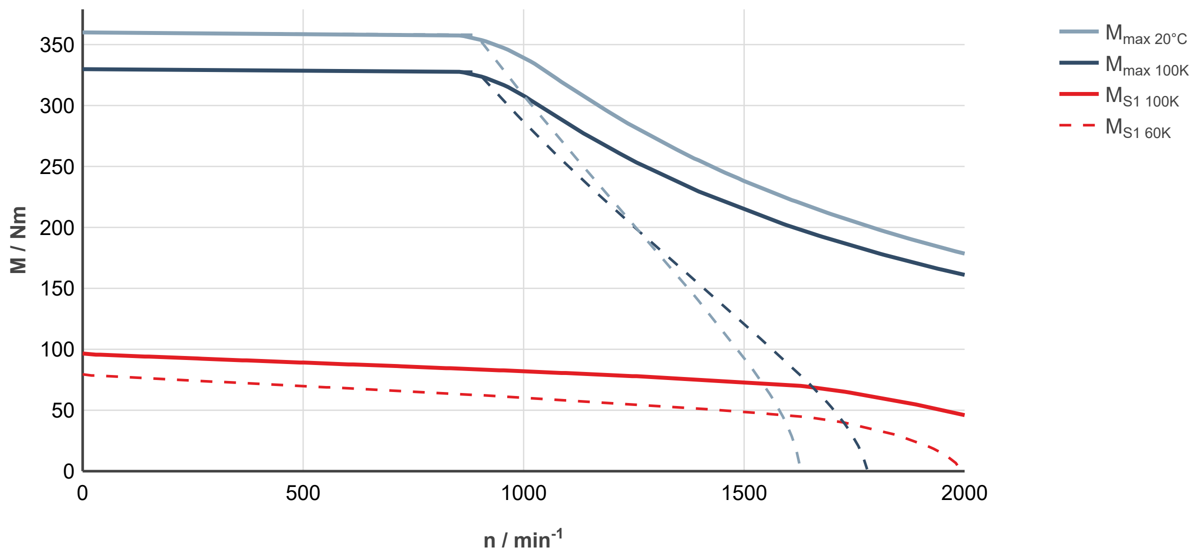



Fig. 231: MS2N10-F1BDN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-F1BHN

| Designation | Symbol | Unit | MS2N10-F1BHN-□□□□0-□N | MS2N10-F1BHN-□□□□3-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 79.5 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 31.8 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 96.5 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 38.9 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | $kg*m^2$ | 0.0329 | 0.0356 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 44.4 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 18.9 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 9.3 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 360 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 330 | |
| Maximum current | $I_{max(rms)}$ | A | 162 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.7 | |
| Voltage constant at 20 °C 1) | $K_E$ | $V/1000\ min^{-1}$ | 163.9 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.174 | |
| Winding inductance | $L_{12\_min}$ | mH | 3.61 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 6.70 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 102 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 49.5 | |
| Mass | $m_{mot}$ | kg | 59.0 | 66 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

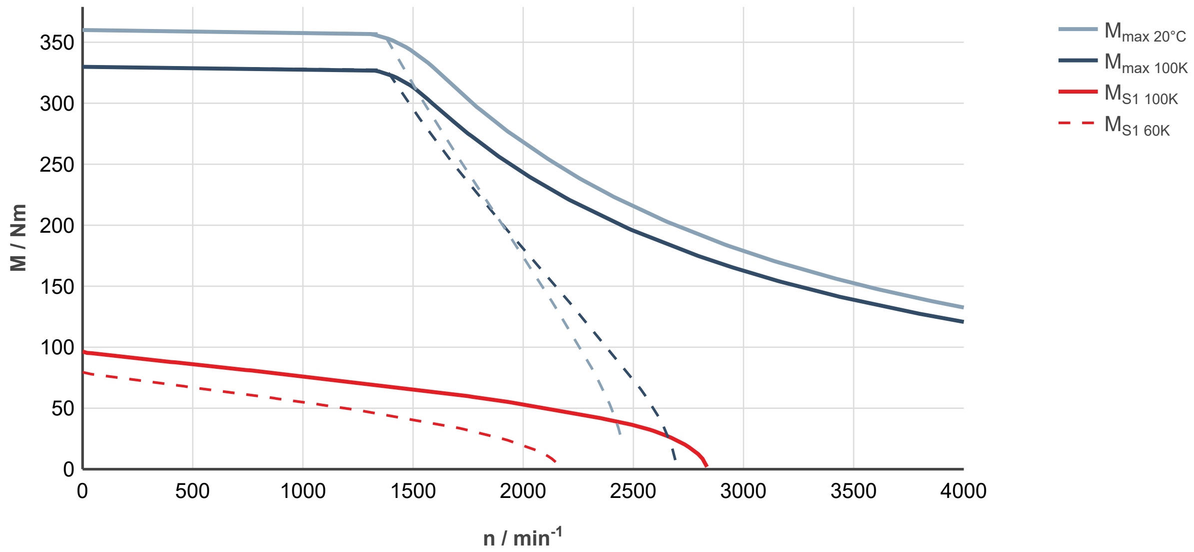



Fig. 232: MS2N10-F1BHN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

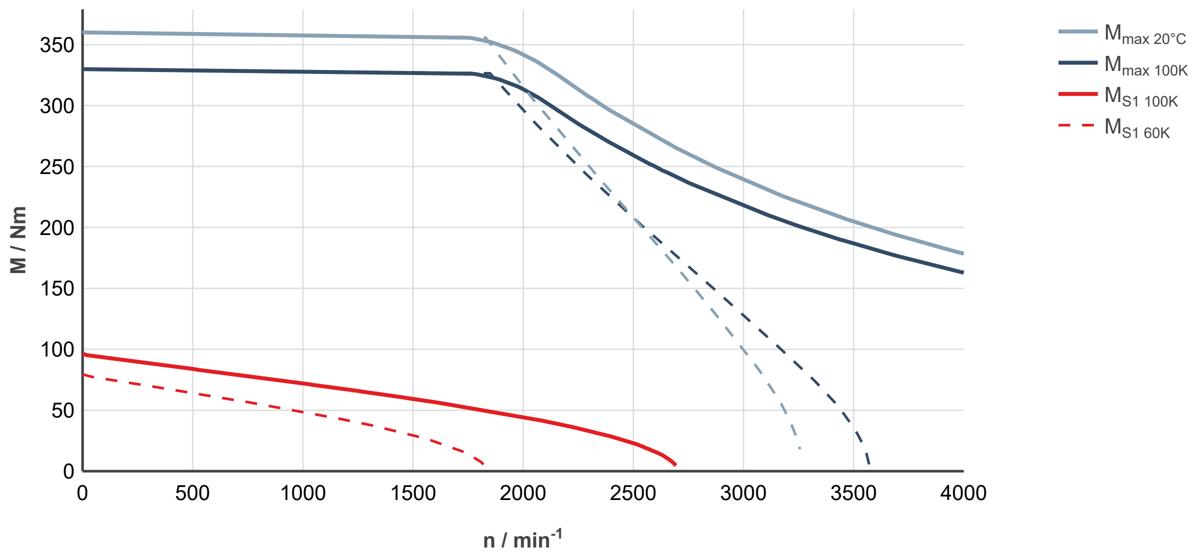



Fig. 233: MS2N10-F1BHN-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-R0BQN

| Designation | Symbol | Unit | MS2N10-R0BQN-□□□□0-□N | MS2N10-R0BQN-□□□□3-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 74.5 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 58.7 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 88.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 69.8 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0147 | 0.0174 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,300 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 40.8 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 34.2 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 5.55 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 355 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 325 | |
| Maximum current | $I_{max(eff)}$ | A | 330 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 1.37 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 81.8 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.05 | |
| Winding inductance | $L_{12\_min}$ | mH | 0.765 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 13.5 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 128.6 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 49.5 | |
| Mass | $m_{mot}$ | kg | 56.0 | 63.0 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

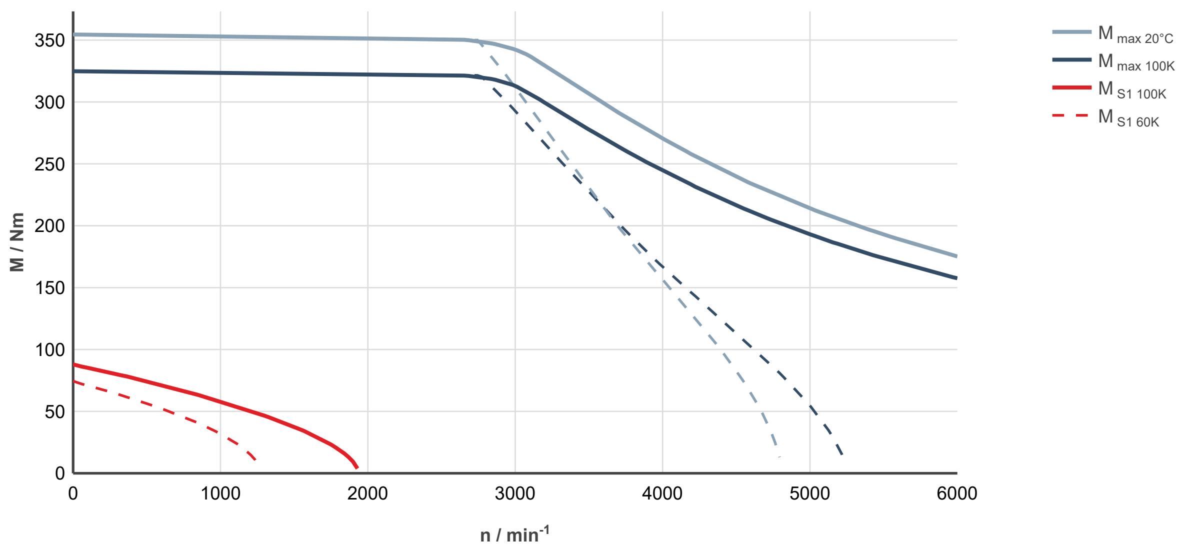



Fig. 234: MS2N10-R0BQN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

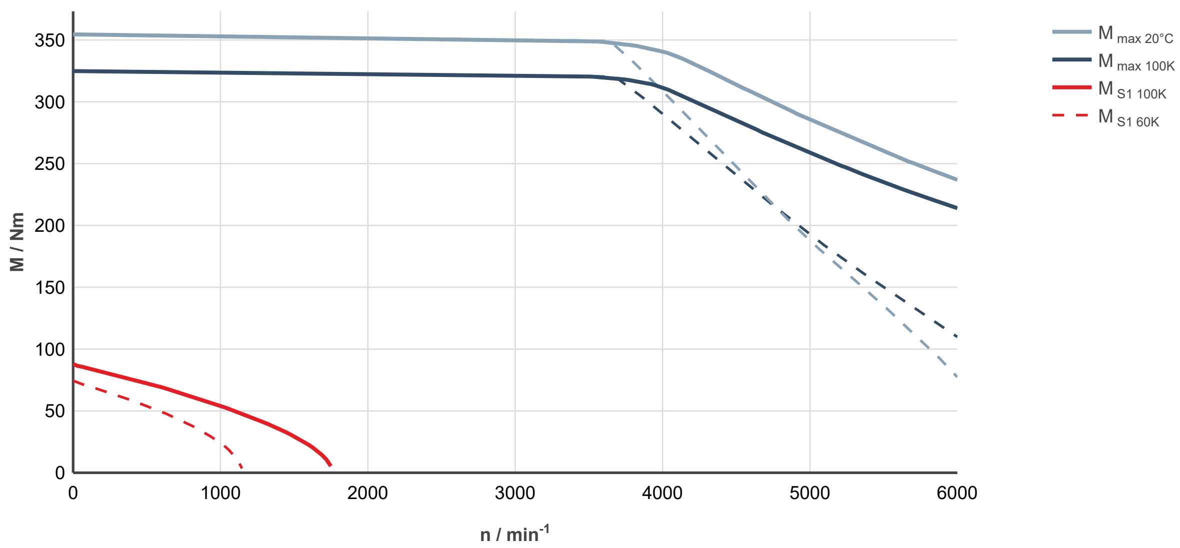



Fig. 235: MS2N10-R0BQN-□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V

## 6.7.2 Forced ventilation

### MS2N10-C0BHA / MS2N10-C0BHB

| Designation | Symbol | Unit | MS2N10-C0BHA-□□□□0-□N | MS2N10-C0BHA-□□□□2-□N | MS2N10-C0BHB-□□□□0-□N | MS2N10-C0BHB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 43.2 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 18.8 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0048 | 0.00627 | 0.0048 | 0.00627 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,820 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 36.3 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 15.9 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 6.9 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 76.8 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 70.5 | | | |
| Maximum current | $I_{max(rms)}$ | A | 38.5 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.60 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 157.8 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.74 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 18.7 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.9 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 81.2 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 10.4 | | | |
| Mass | $m_{mot}$ | kg | 24.5 | 29.5 | 24.5 | 29.5 |
| <u>Holding brake</u> | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 | 0 | 220 |
| <u>Fan data</u> | | | | | | |
| 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 | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | | | |

Technical data

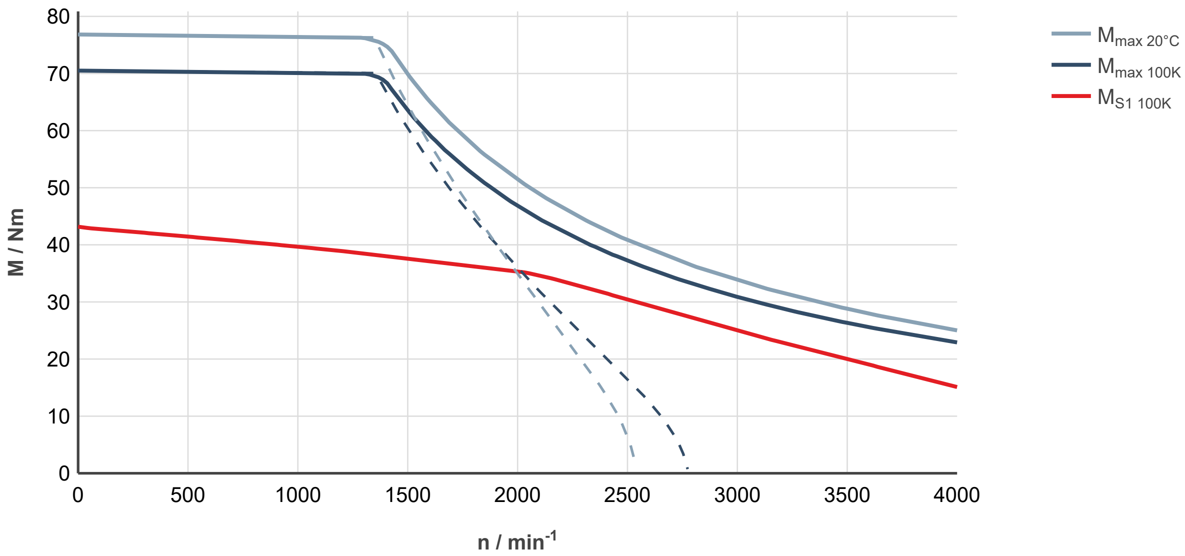



Fig. 236: MS2N10-C0BHA-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

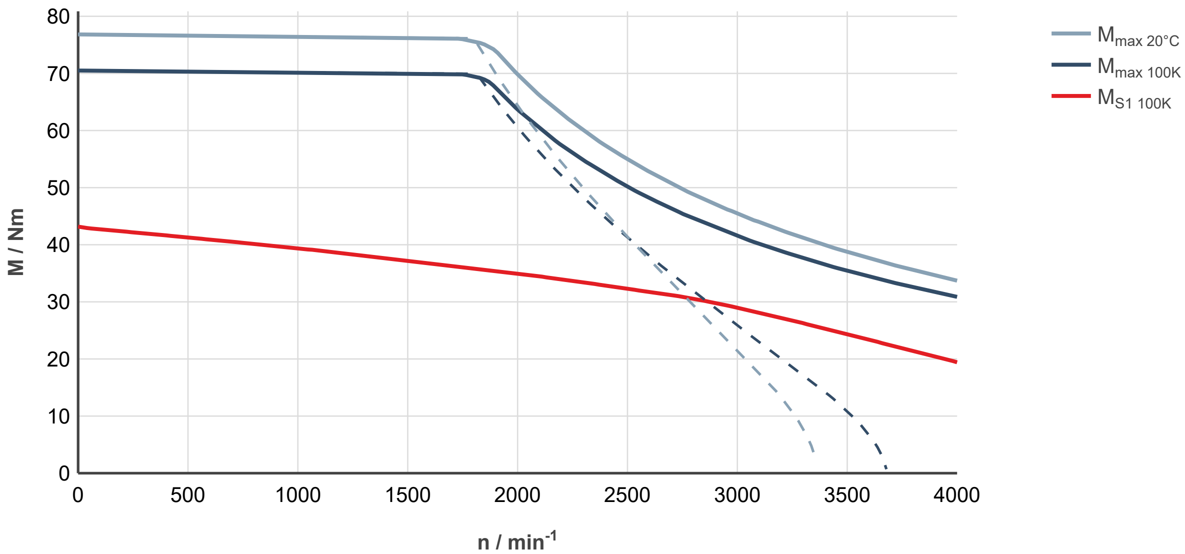



Fig. 237: MS2N10-C0BHA-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-C0BNA / MS2N10-C0BNB

| Designation | Symbol | Unit | MS2N10-C0BNA-□□□□0-□N | MS2N10-C0BNA-□□□□2-□N | MS2N10-C0BNB-□□□□0-□N | MS2N10-C0BNB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 43.2 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 25.1 | | | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0048 | 0.00627 | 0.0048 | 0.00627 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,610 | | | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 31.7 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 18.5 | | | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 8.65 | | | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 76.8 | | | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 70.5 | | | |
| Maximum current | $I_{max(rms)}$ | A | 51.3 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 1.95 | | | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 min⁻¹ | 118.4 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.441 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 10.67 | | | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 24.5 | 29.5 | 24.5 | 29.5 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 | 0 | 220 |
| **Fan data** | | | | | | |
| 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 | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | | | |

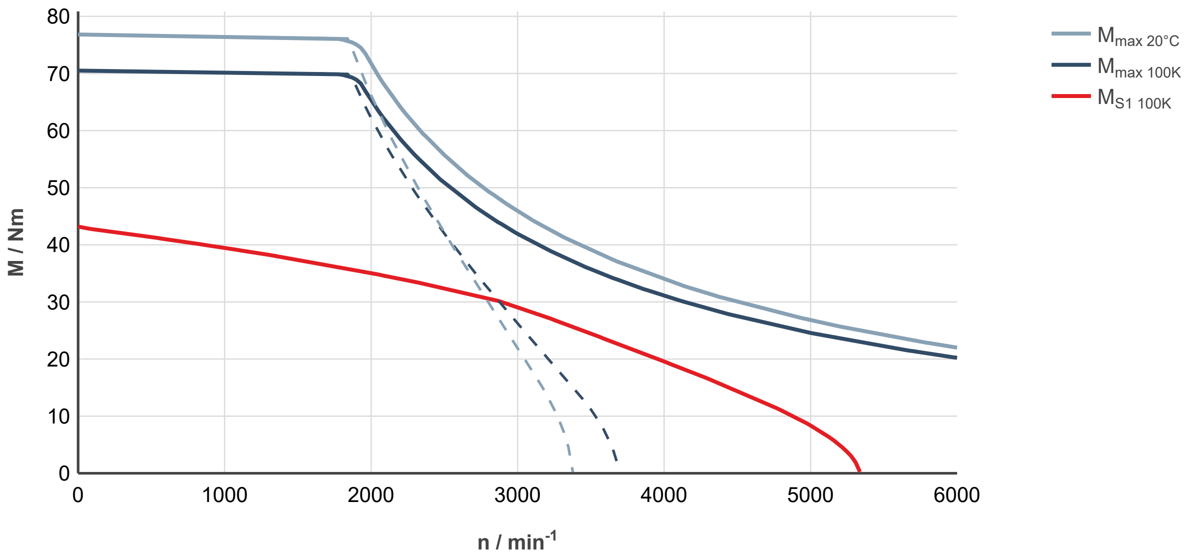



Fig. 238: MS2N10-C0BNA-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

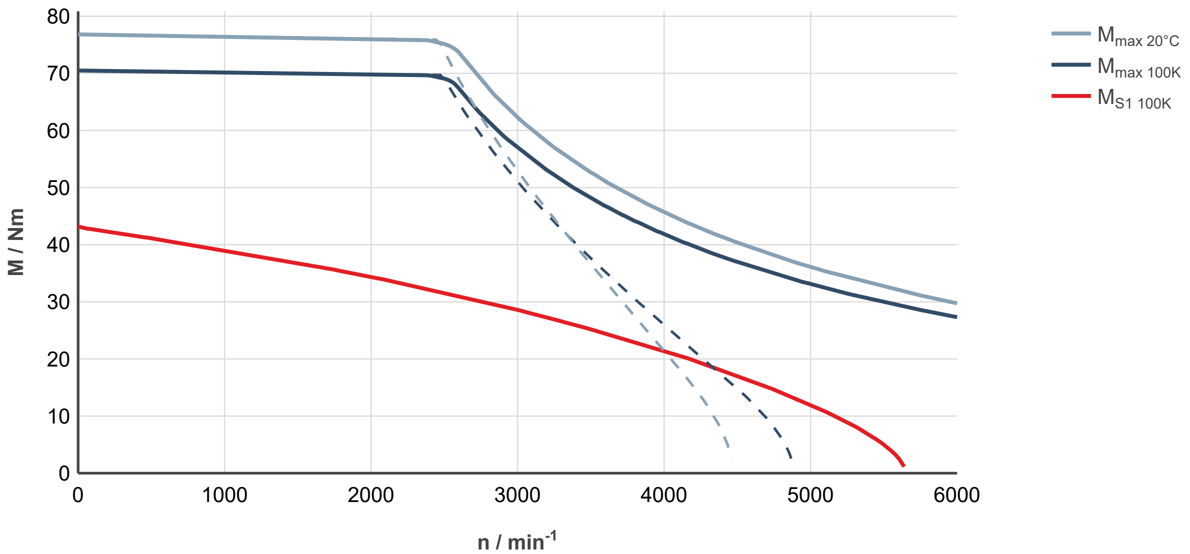



Fig. 239: MS2N10-C0BNA-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-C1BHA / MS2N10-C1BHB

| Designation | Symbol | Unit | MS2N10-C1BHA-□□□□0-□N | MS2N10-C1BHA-□□□□2-□N | MS2N10-C1BHB-□□□□0-□N | MS2N10-C1BHB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 40.0 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 16.7 | | | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0092 | 0.01067 | 0.0092 | 0.01067 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | | | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 33.3 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 14.1 | | | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 6.95 | | | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 86.5 | | | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 79.4 | | | |
| Maximum current | $I_{max(rms)}$ | A | 40.9 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.63 | | | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 160 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.96 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 15.23 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.8 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 68.5 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 10.4 | | | |
| Mass | $m_{mot}$ | kg | 25 | 30 | 25 | 30 |
| Holding brake | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 | 0 | 220 |
| Fan data | | | | | | |
| 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 | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | | | |

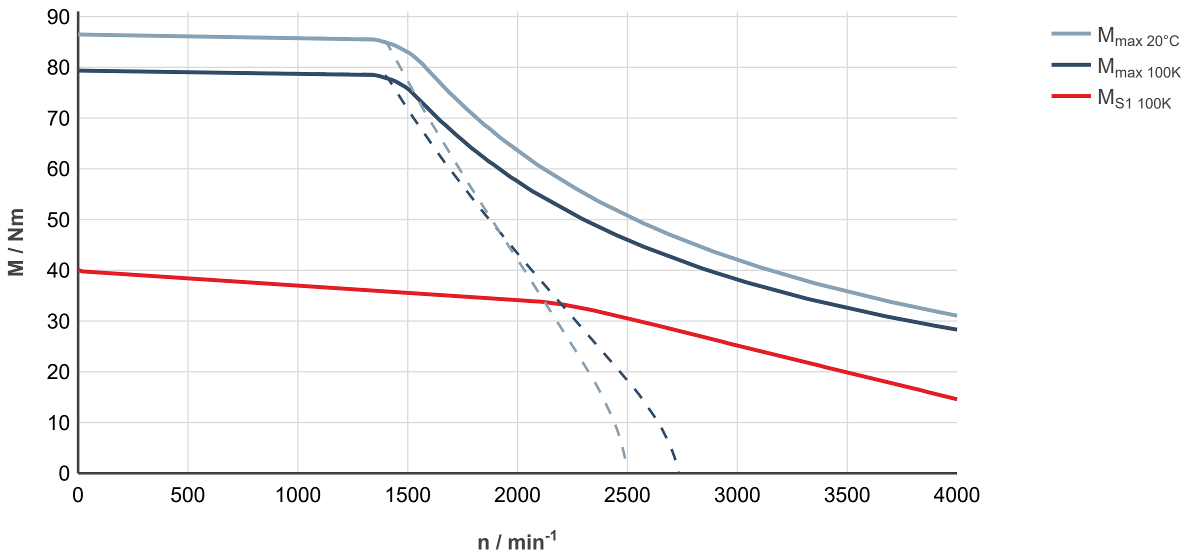



Fig. 240: MS2N10-C1BHA-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

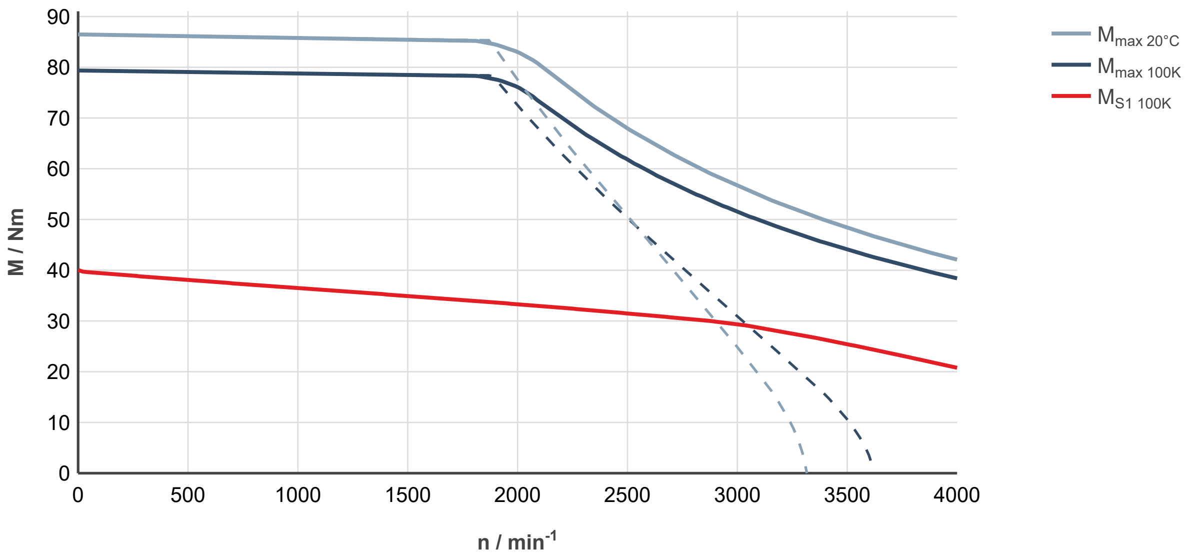



Fig. 241: MS2N10-C1BHA-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-C1BNA / MS2N10-C1BNB

| Designation | Symbol | Unit | MS2N10-C1BNA-□□□□0-□N | MS2N10-C1BNA-□□□□2-□N | MS2N10-C1BNB-□□□□0-□N | MS2N10-C1BNB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K [1) | $M_{0\ 100K}$ | Nm | 40.0 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 24.7 | | | |
| Moment of inertia of rotor [1) | $J_{rot}$ | kg*m² | 0.0092 | 0.01067 | 0.0092 | 0.01067 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,000 | | | |
| Rated torque - 100K [1) | $M_{N\ 100K}$ | Nm | 25.8 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 16.3 | | | |
| Rated power - 100K [1) | $P_{N\ 100K}$ | kW | 8.1 | | | |
| Maximum torque 20 °C (cold) [1) | $M_{max\ 20°C}$ | Nm | 86.5 | | | |
| Maximum torque 100K (warm) [1) | $M_{max\ 100K}$ | Nm | 79.4 | | | |
| Maximum current | $I_{max(rms)}$ | A | 60.8 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C [1) | $K_m$ | Nm/A | 1.78 | | | |
| Voltage constant at 20 °C [1) | $K_E$ | V/1000 $min^{-1}$ | 107.9 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.439 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 6.6 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.52 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 68.5 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 10.4 | | | |
| Mass | $m_{mot}$ | kg | 25 | 30 | 25 | 30 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 | 0 | 220 |
| **Fan data** | | | | | | |
| 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 | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | | | |

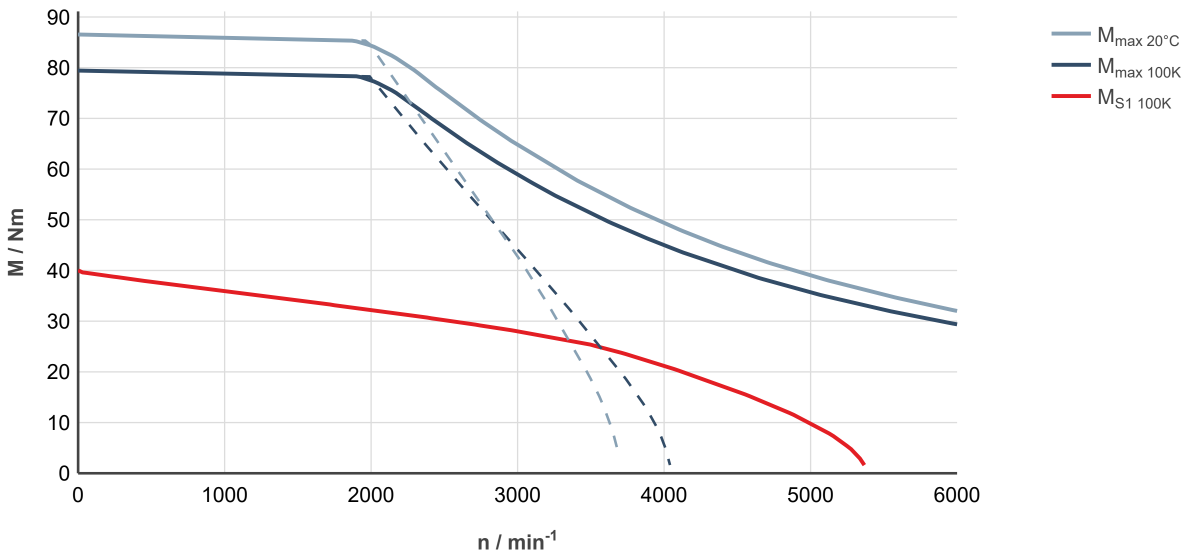



Fig. 242: MS2N10-C1BNA-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

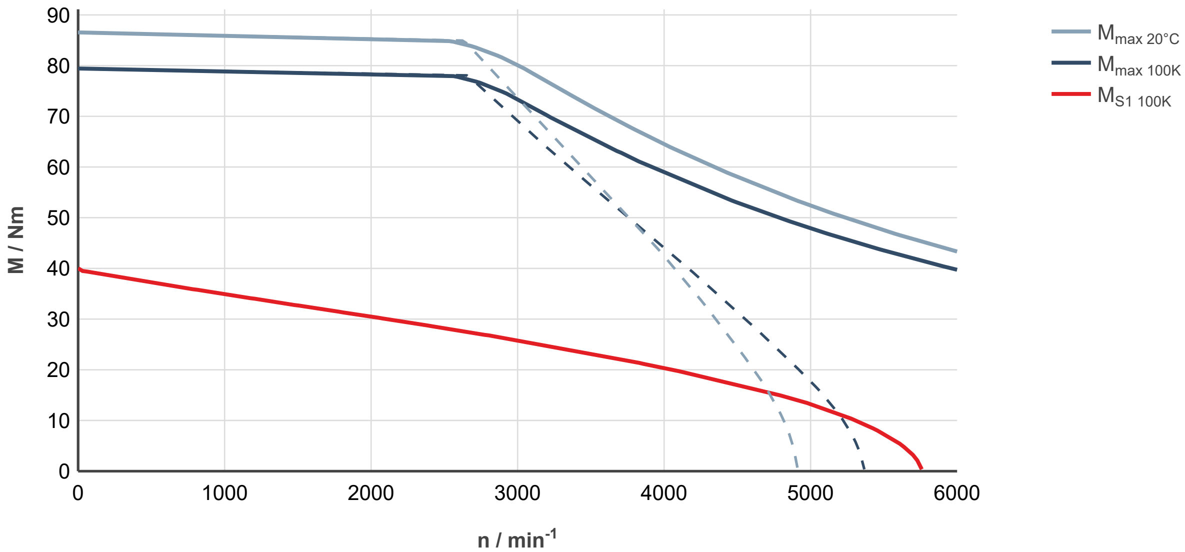



Fig. 243: MS2N10-C1BNA-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-D0BHA / MS2N10-D0BHB

| Designation | Symbol | Unit | MS2N10-D0BHA-□□□□0-□N | MS2N10-D0BHA-□□□□2-□N | MS2N10-D0BHB-□□□□0-□N | MS2N10-D0BHB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K [1)] | $M_{0\,100K}$ | Nm | 82.4 | | | |
| Standstill current - 100K | $I_{0\,100K}$ | A | 32.4 | | | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | $kg*m^2$ | 0.0081 | 0.00957 | 0.0081 | 0.00957 |
| Rated speed - 100K | $n_{N\,100K}$ | 1/min | 1,800 | | | |
| Rated torque - 100K [1)] | $M_{N\,100K}$ | Nm | 67.4 | | | |
| Rated current - 100K | $I_{N\,100K}$ | A | 26.6 | | | |
| Rated power - 100K [1)] | $P_{N\,100K}$ | kW | 12.7 | | | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\,20°C}$ | Nm | 155 | | | |
| Maximum torque 100K (warm) [1)] | $M_{max\,100K}$ | Nm | 142 | | | |
| Maximum current | $I_{max(rms)}$ | A | 70 | | | |
| Maximum speed (electrical) | $n_{max\,el}$ | 1/min | 4,000 | | | |
| Maximum speed (mechanical) | $n_{max\,mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 2.86 | | | |
| Voltage constant at 20 °C [1)] | $K_E$ | $V/1000\ min^{-1}$ | 173.5 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.386 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 10.3 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 3.15 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 90.0 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 11.6 | | | |
| Mass | $m_{mot}$ | kg | 35 | 40 | 35 | 40 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 | 0 | 220 |
| **Fan data** | | | | | | |
| 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 | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | | | |

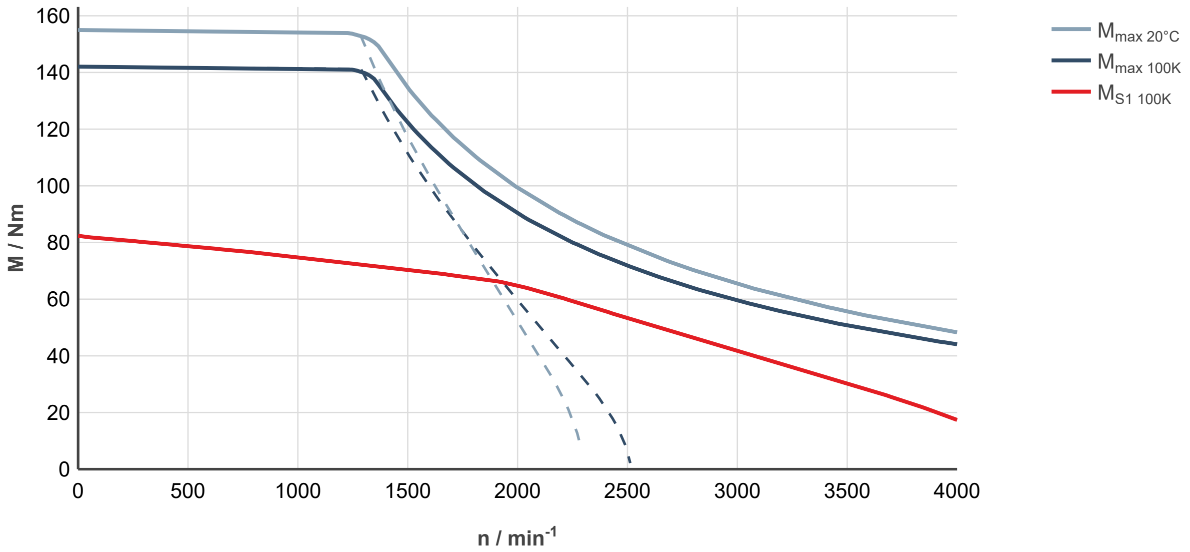



Fig. 244: MS2N10-D0BHA-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

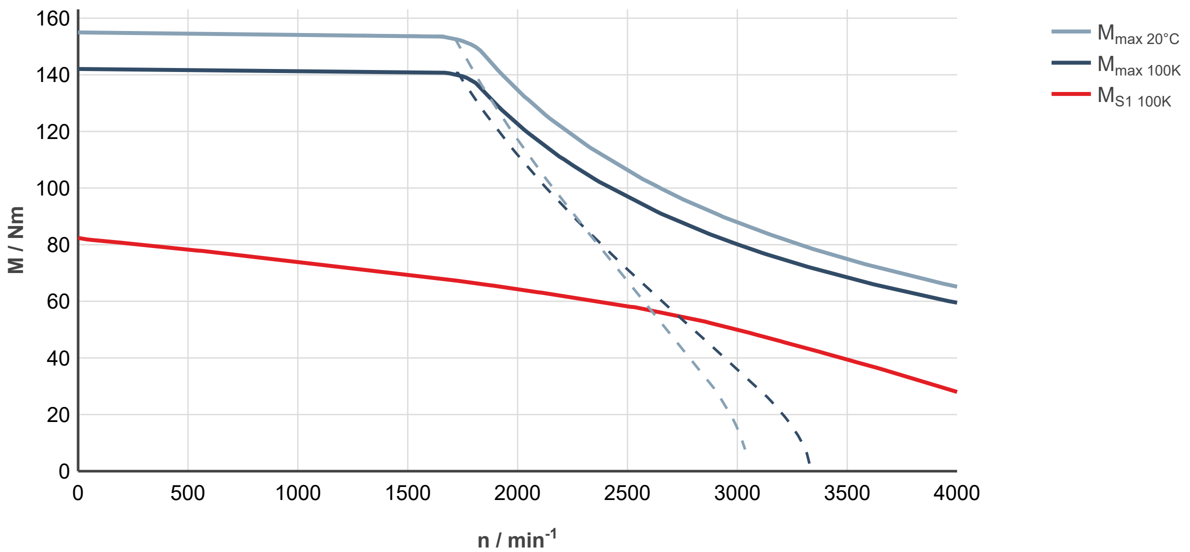



Fig. 245: MS2N10-D0BHA-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-D0BNA / MS2N10-D0BNB

| Designation | Symbol | Unit | MS2N10-D0BNA-□□□□0-□N | MS2N10-D0BNA-□□□□2-□N | MS2N10-D0BNB-□□□□0-□N | MS2N10-D0BNB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 82.4 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 48 | | | |
| Moment of inertia of rotor [1] | $J_{rot}$ | $kg*m^2$ | 0.0081 | 0.00957 | 0.0081 | 0.00957 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,870 | | | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 48.7 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 28.5 | | | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 14.65 | | | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 155 | | | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 142 | | | |
| Maximum current | $I_{max(rms)}$ | A | 102.5 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 1.95 | | | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 118.5 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.18 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 5.05 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 4.1 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 90.0 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 11.6 | | | |
| Mass | $m_{mot}$ | kg | 35 | 40 | 35 | 40 |
| <u>Holding brake</u> | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 | 0 | 220 |
| <u>Fan data</u> | | | | | | |
| 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 | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | | | |

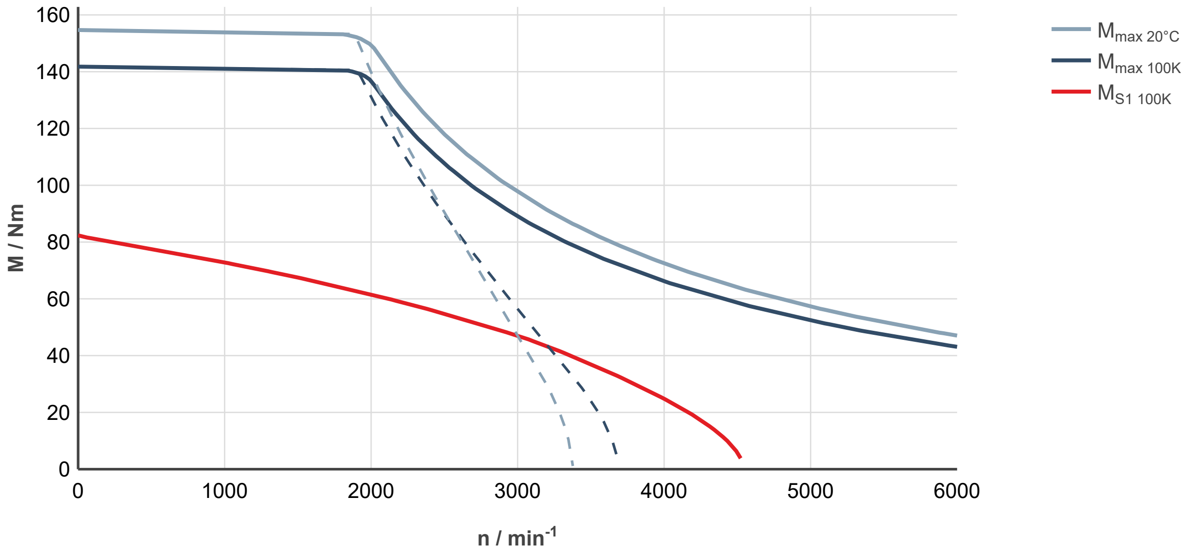



Fig. 246: MS2N10-D0BNA-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

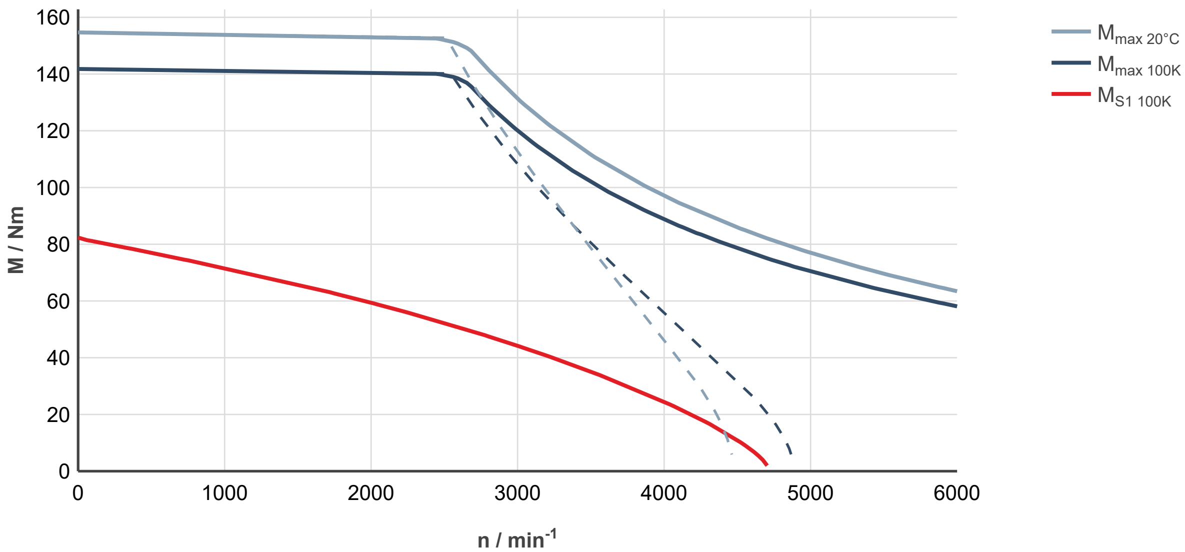



Fig. 247: MS2N10-D0BNA-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-D1BFA / MS2N10-D1BFB

| Designation | Symbol | Unit | MS2N10-D1BFA-□□□□0-□N | MS2N10-D1BFA-□□□□2-□N | MS2N10-D1BFB-□□□□0-□N | MS2N10-D1BFB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 78.0 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 24.2 | | | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0171 | 0.01857 | 0.0171 | 0.01857 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,500 | | | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 66.1 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 20.8 | | | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 10.4 | | | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 174 | | | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 160 | | | |
| Maximum current | $I_{max(rms)}$ | A | 60.7 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 3.53 | | | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 214.5 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.70 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 12.2 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 3.3 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 74.2 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 11.6 | | | |
| Mass | $m_{mot}$ | kg | 37 | 42 | 37 | 42 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 | 0 | 220 |
| **Fan data** | | | | | | |
| 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 | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

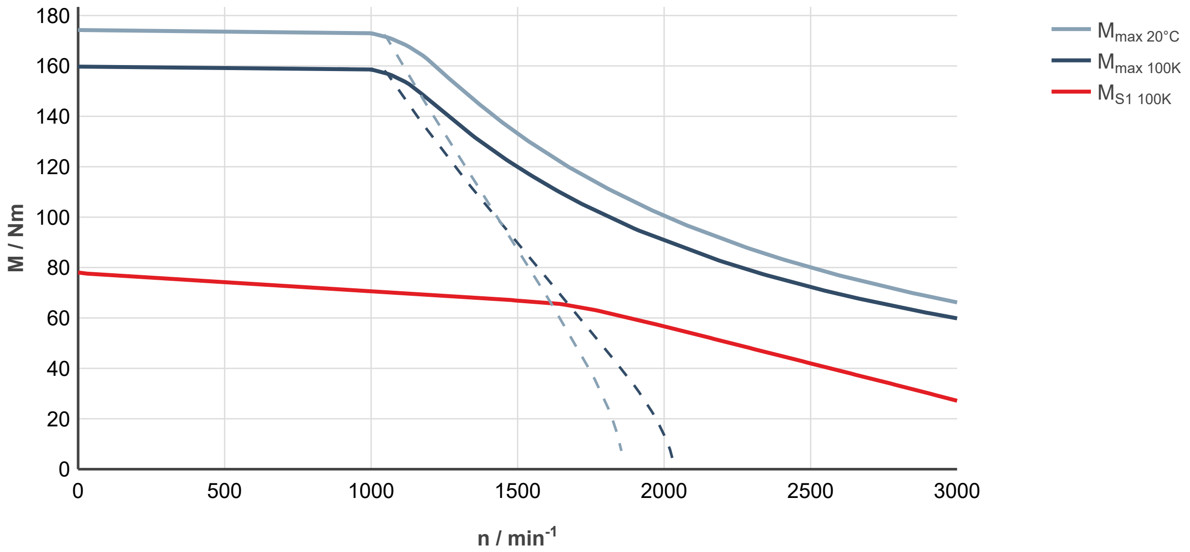



Fig. 248: MS2N10-D1BFA-▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

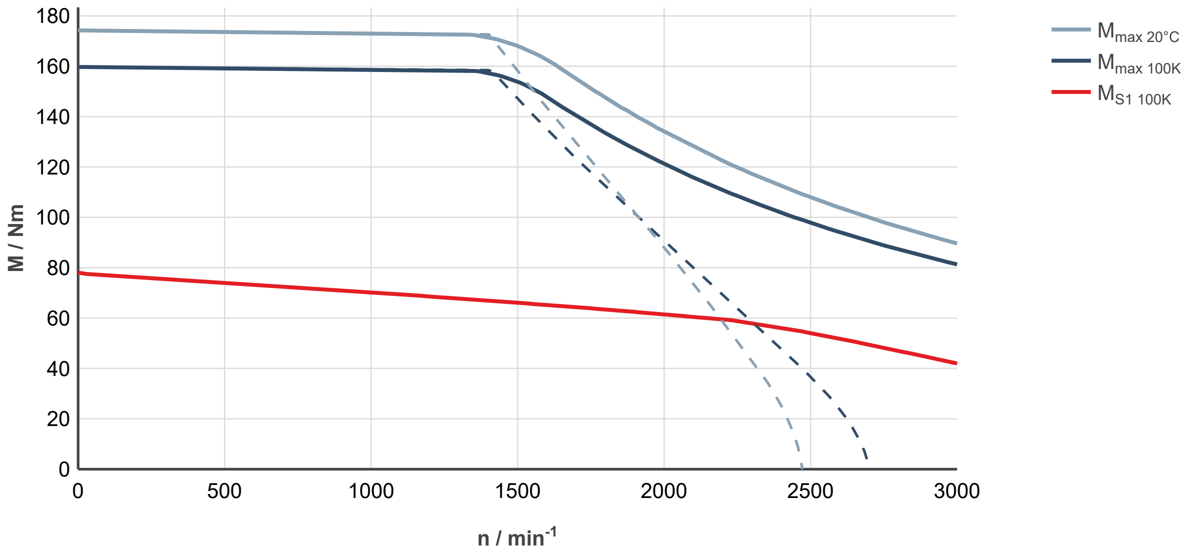



Fig. 249: MS2N10-D1BFA-▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-D1BNA / MS2N10-D1BNB

| Designation | Symbol | Unit | MS2N10-D1BNA-□□□□0-□N | MS2N10-D1BNA-□□□□2-□N | MS2N10-D1BNB-□□□□0-□N | MS2N10-D1BNB-□□□□2-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 78.0 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 48.5 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0171 | 0.01857 | 0.0171 | 0.01857 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,000 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 42.1 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 27.0 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 13.2 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 174 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 160 | | | |
| Maximum current | $I_{max(rms)}$ | A | 121.5 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.76 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 107.6 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.178 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 3.23 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 3.33 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 74.2 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 11.6 | | | |
| Mass | $m_{mot}$ | kg | 37 | 42 | 37 | 42 |
| <u>Holding brake</u> | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 | 0 | 220 |
| <u>Fan data</u> | | | | | | |
| 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 | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | | | |

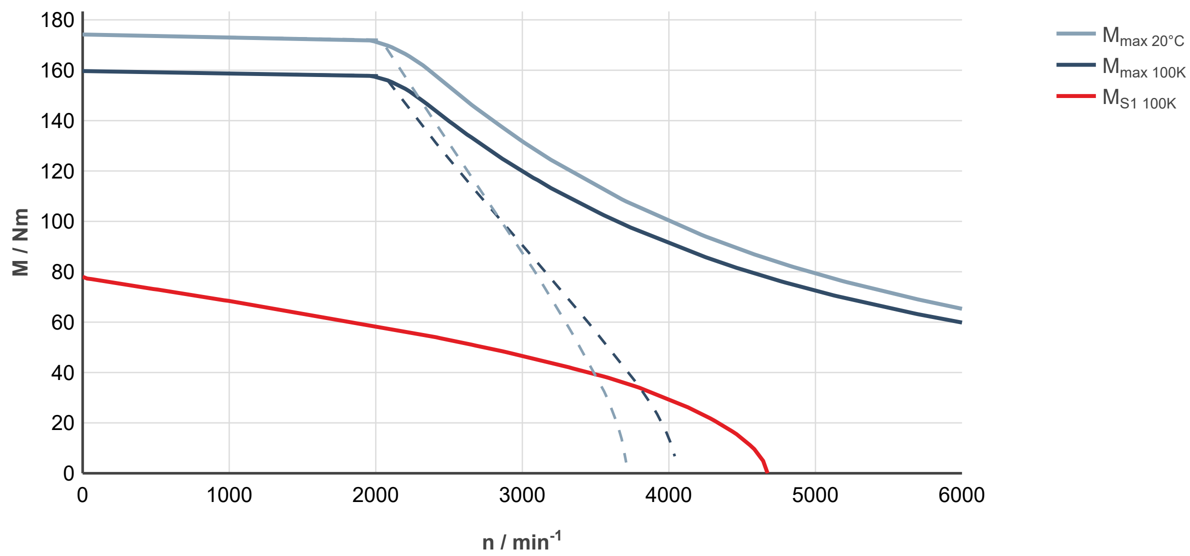



Fig. 250: MS2N10-D1BNA-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

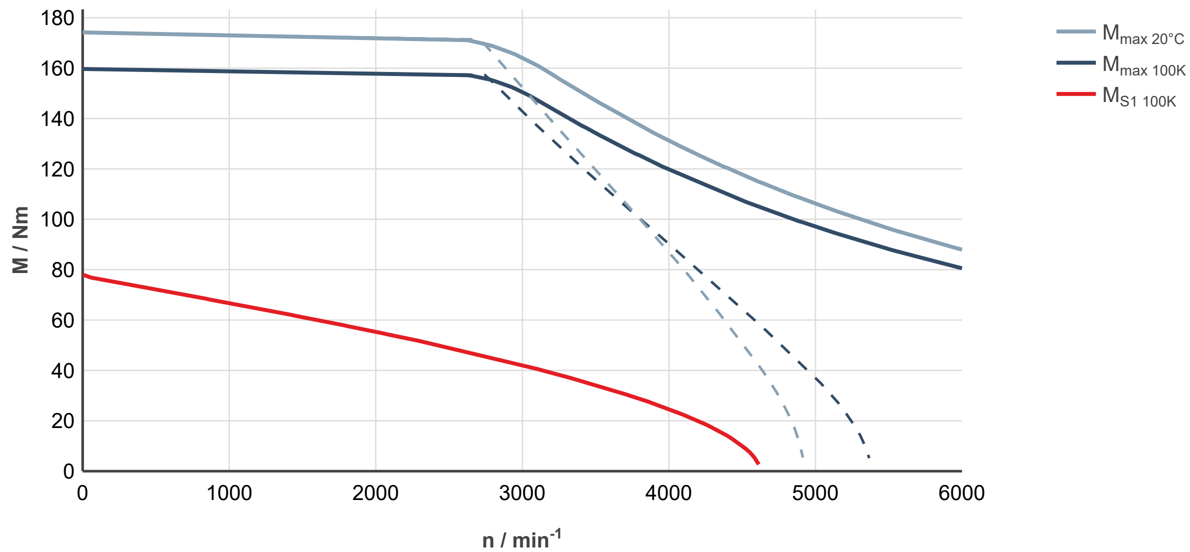



Fig. 251: MS2N10-D1BNA-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-E0BHA / MS2N10-E0BHB

| Designation | Symbol | Unit | MS2N10-E0BHA-□□□□0-□N | MS2N10-E0BHA-□□□□3-□N | MS2N10-E0BHB-□□□□0-□N | MS2N10-E0BHB-□□□□3-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 119 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 46.1 | | | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0114 | 0.0141 | 0.0114 | 0.0141 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,800 | | | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 96 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 37.4 | | | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 18.1 | | | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 234 | | | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 214 | | | |
| Maximum current | $I_{max(rms)}$ | A | 102.5 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.9 | | | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 176.4 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.244 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 7.43 | | | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 46 | 53 | 46 | 53 |
| <u>Holding brake</u> | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 | 0 | 250 |
| <u>Fan data</u> | | | | | | |
| 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 | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | | | |

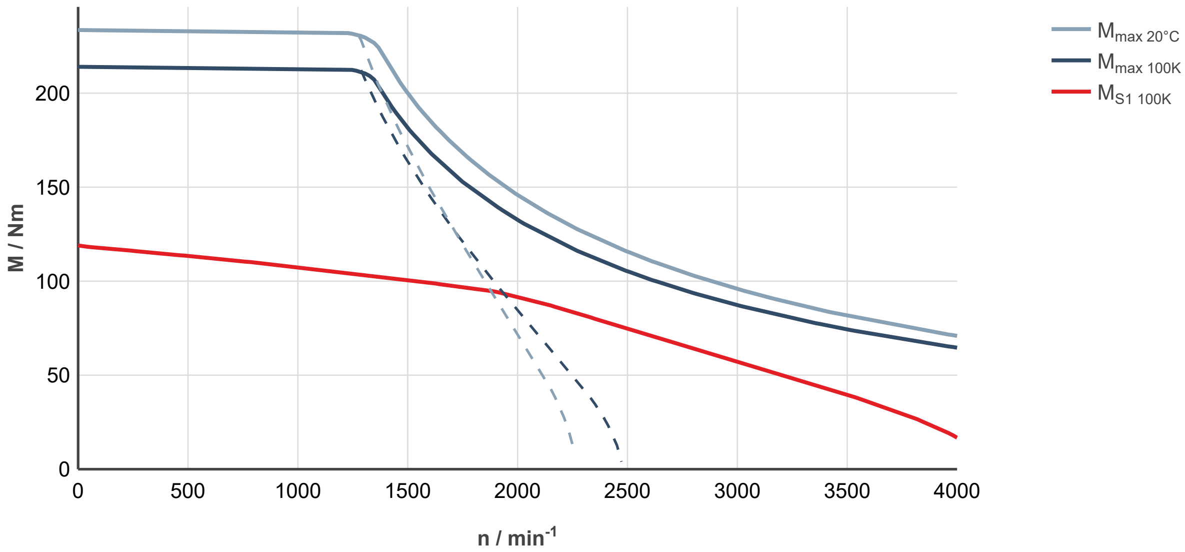



Fig. 252: MS2N10-E0BHA-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

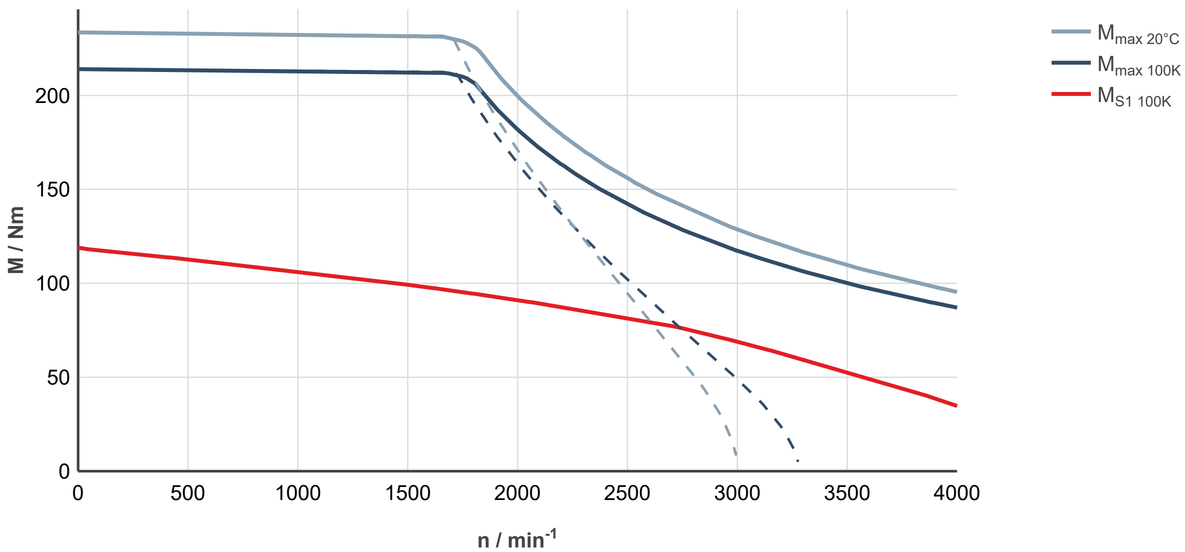



Fig. 253: MS2N10-E0BHA-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-E0BNA / MS2N10-E0BNB

| Designation | Symbol | Unit | MS2N10-E0BNA-□□□□0-□N | MS2N10-E0BNA-□□□□3-□N | MS2N10-E0BNB-□□□□0-□N | MS2N10-E0BNB-□□□□3-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 119 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 62.9 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m$^2$ | 0.0114 | 0.0141 | 0.0114 | 0.0141 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,660 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 69.9 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 37.4 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 19.5 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 234 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 214 | | | |
| Maximum current | $I_{max(rms)}$ | A | 140 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.1 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 min$^{-1}$ | 128.5 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.133 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 4.00 | | | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 46 | 53 | 46 | 53 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 | 0 | 250 |
| **Fan data** | | | | | | |
| 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 | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

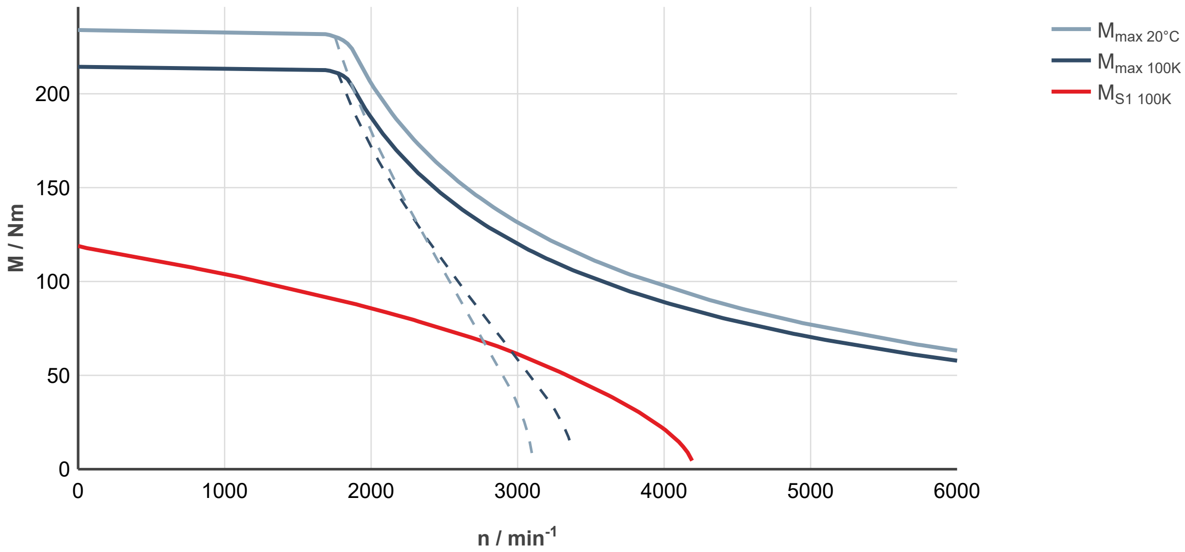



Fig. 254: MS2N10-E0BNA-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

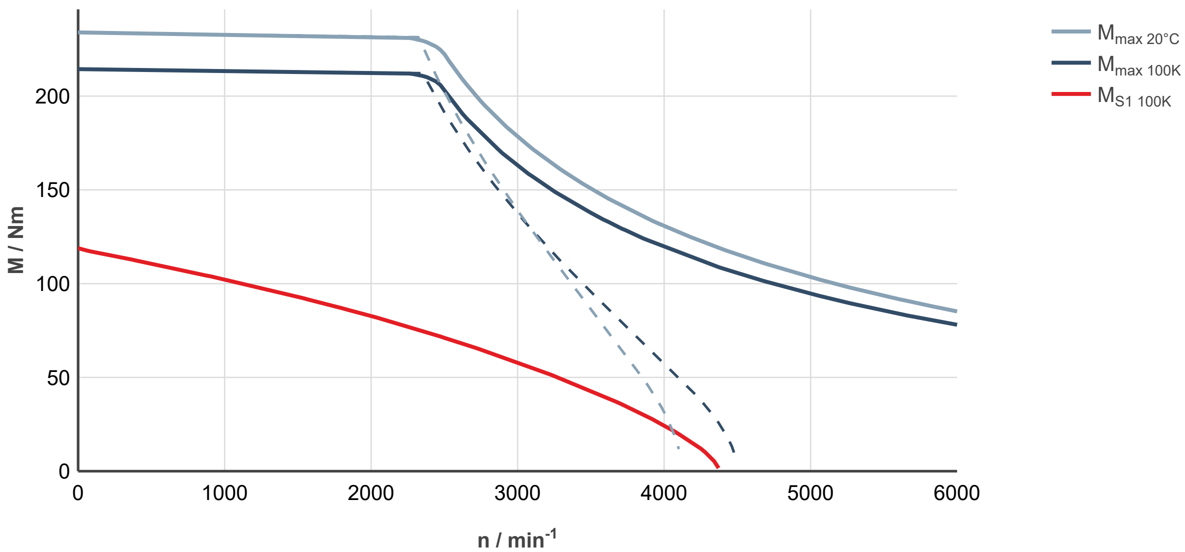



Fig. 255: MS2N10-E0BNA-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-E1BFA / MS2N10-E1BFB

| Designation | Symbol | Unit | MS2N10-E1BFA-□□□□0-□N | MS2N10-E1BFA-□□□□3-□N | MS2N10-E1BFB-□□□□0-□N | MS2N10-E1BFB-□□□□3-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 113.0 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 30.8 | | | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.025 | 0.0277 | 0.025 | 0.0277 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,350 | | | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 96.9 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 26.8 | | | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 13.7 | | | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 266 | | | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 244 | | | |
| Maximum current | $I_{max(rms)}$ | A | 81 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 4.0 | | | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 243 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.53 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 10.0 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 5.12 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 79.5 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 12.5 | | | |
| Mass | $m_{mot}$ | kg | 48 | 55 | 48 | 55 |
| <u>Holding brake</u> | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 | 0 | 250 |
| <u>Fan data</u> | | | | | | |
| 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 | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

Technical data

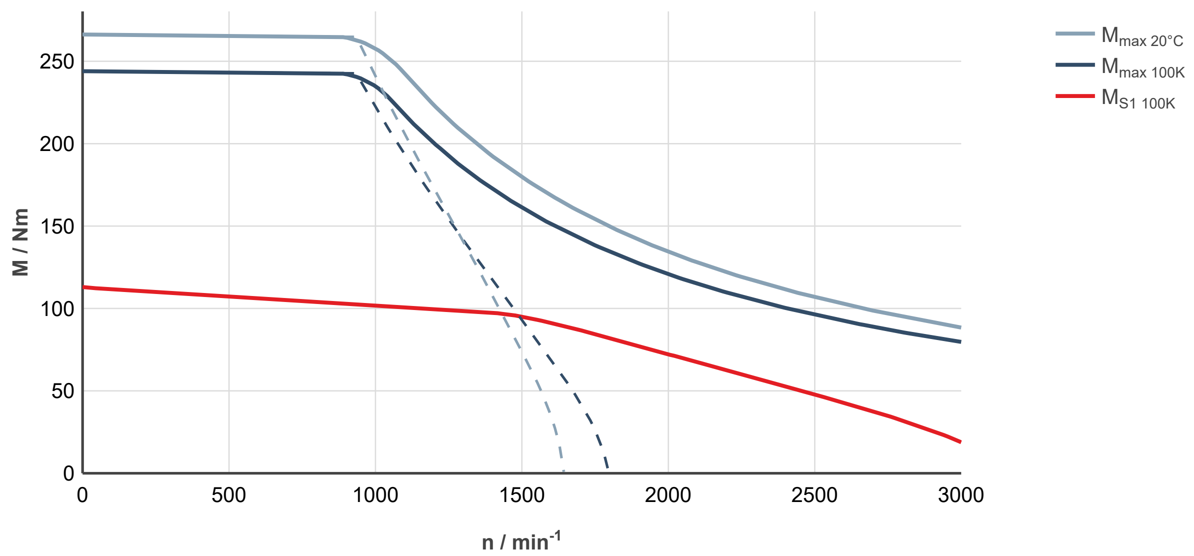



Fig. 256: MS2N10-E1BFA-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

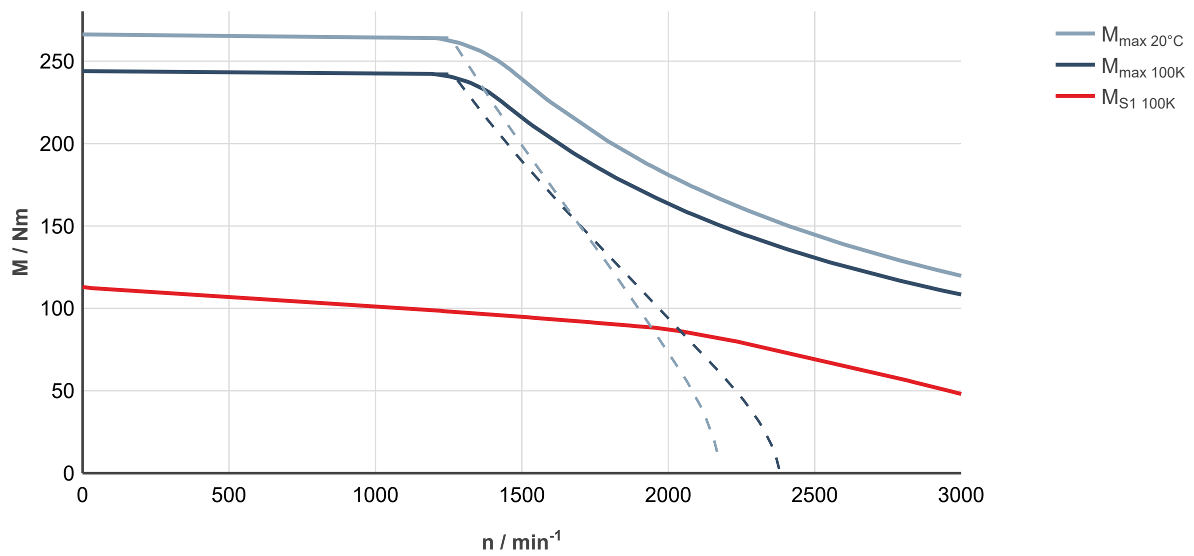



Fig. 257: MS2N10-E1BFA-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 … 480 V

## MS2N10-E1BNA / MS2N10-E1BNB

| Designation | Symbol | Unit | MS2N10-E1BNA-□□□□0-□N | MS2N10-E1BNA-□□□□3-□N | MS2N10-E1BNB-□□□□0-□N | MS2N10-E1BNB-□□□□3-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 113 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 61.7 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.025 | 0.0277 | 0.025 | 0.0277 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,950 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 59.7 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 33.9 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 18.5 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 266 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 244 | | | |
| Maximum current | $I_{max(rms)}$ | A | 162 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.0 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 121.6 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.137 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 2.87 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 5.0 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 79.5 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 12.5 | | | |
| Mass | $m_{mot}$ | kg | 48 | 55 | 48 | 55 |
| Holding brake | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 | 0 | 250 |
| Fan data | | | | | | |
| 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 | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

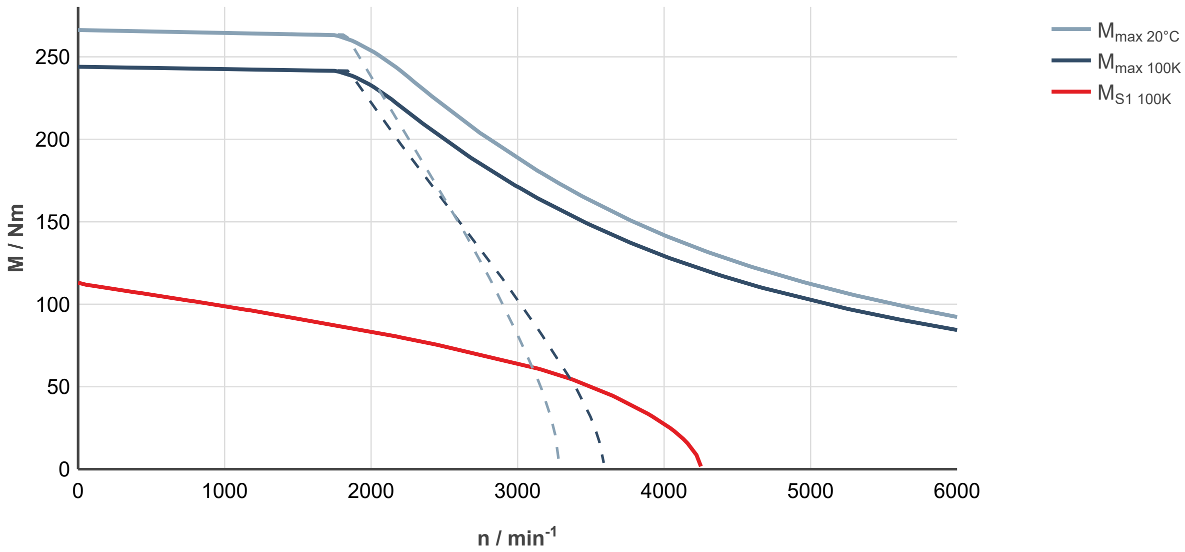



Fig. 258: MS2N10-E1BNA-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

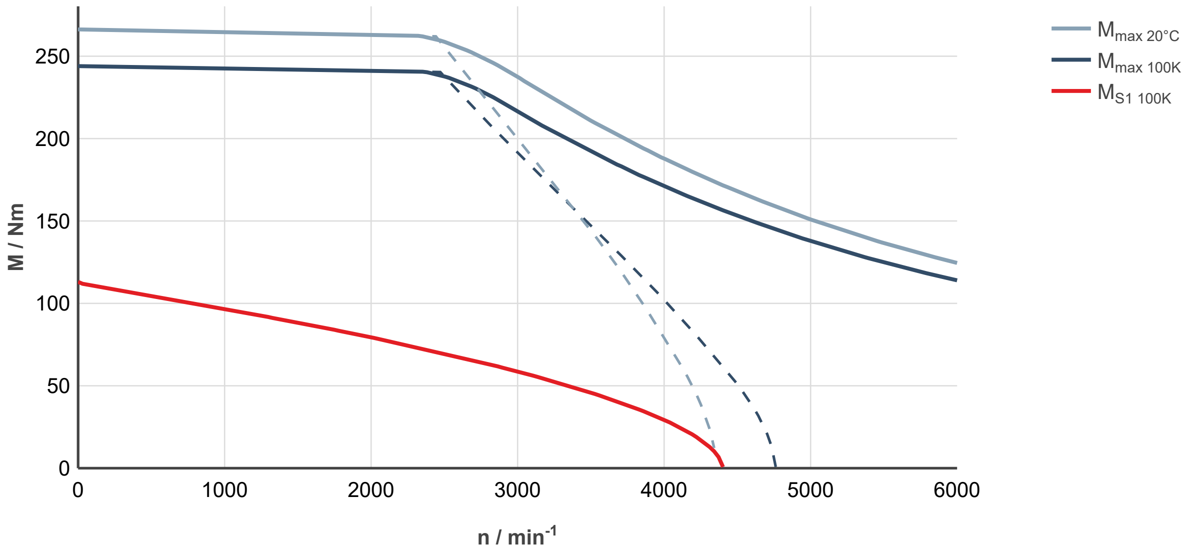



Fig. 259: MS2N10-E1BNA-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-F0BDA / MS2N10-F0BDB

| Designation | Symbol | Unit | MS2N10-F0BDA-□□□□0-□N | MS2N10-F0BDA-□□□□3-□N | MS2N10-F0BDB-□□□□0-□N | MS2N10-F0BDB-□□□□3-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 148.5 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 28.8 | | | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | $kg*m^2$ | 0.0147 | 0.0174 | 0.0147 | 0.0174 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 900 | | | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 138 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 26.9 | | | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 13.0 | | | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 313 | | | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 287 | | | |
| Maximum current | $I_{max(rms)}$ | A | 70 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 2,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 5.76 | | | |
| Voltage constant at 20 °C [1)] | $K_E$ | $V/1000\ min^{-1}$ | 350 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.667 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 20.05 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 7.75 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 101.2 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 13.2 | | | |
| Mass | $m_{mot}$ | kg | 56 | 63 | 56 | 63 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 | 0 | 250 |
| **Fan data** | | | | | | |
| 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 | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | | | |

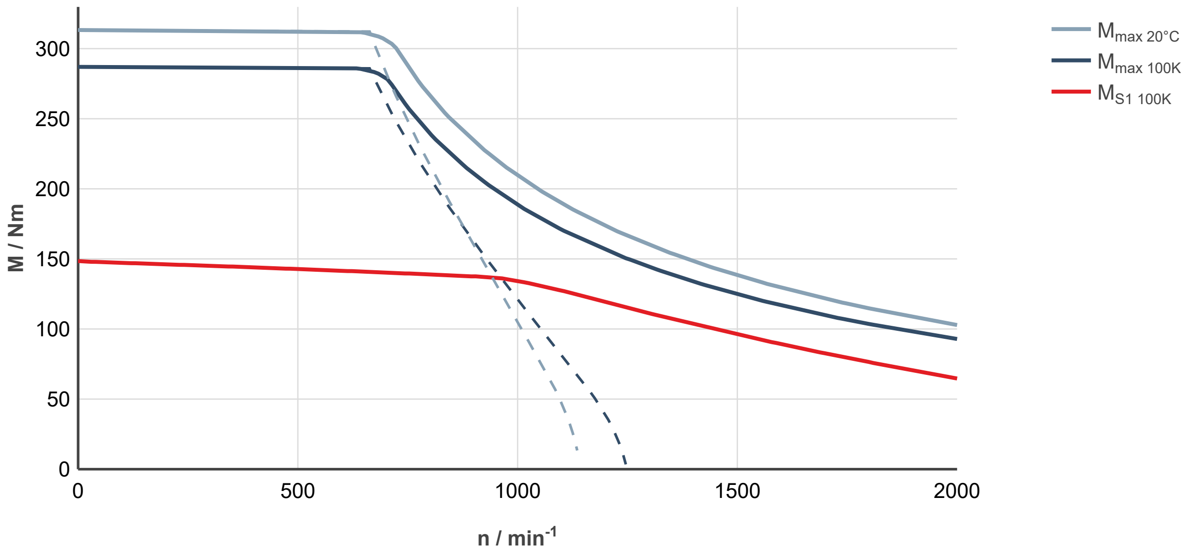



Fig. 260: MS2N10-F0BDA-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

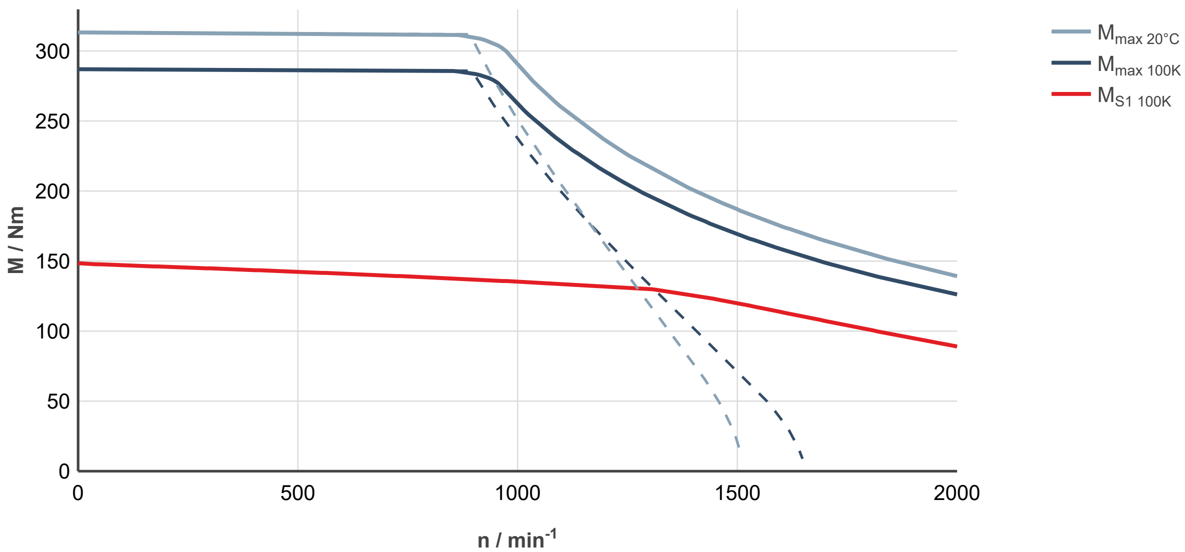



Fig. 261: MS2N10-F0BDA-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-F0BHA / MS2N10-F0BHB

| Designation | Symbol | Unit | MS2N10-F0BHA-□□□□0-□N | MS2N10-F0BHA-□□□□3-□N | MS2N10-F0BHB-□□□□0-□N | MS2N10-F0BHB-□□□□3-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 148.5 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 58.6 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0147 | 0.0174 | 0.0147 | 0.0174 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,950 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 109.5 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 43.6 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 22.4 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 313 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 287 | | | |
| Maximum current | $I_{max(rms)}$ | A | 140 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.84 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 172.5 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.169 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 5.01 | | | |
| Leakage capacitance of the component | $C_{ab}$ | 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 | $m_{mot}$ | kg | 56 | 63 | 56 | 63 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 | 0 | 250 |
| **Fan data** | | | | | | |
| 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 | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

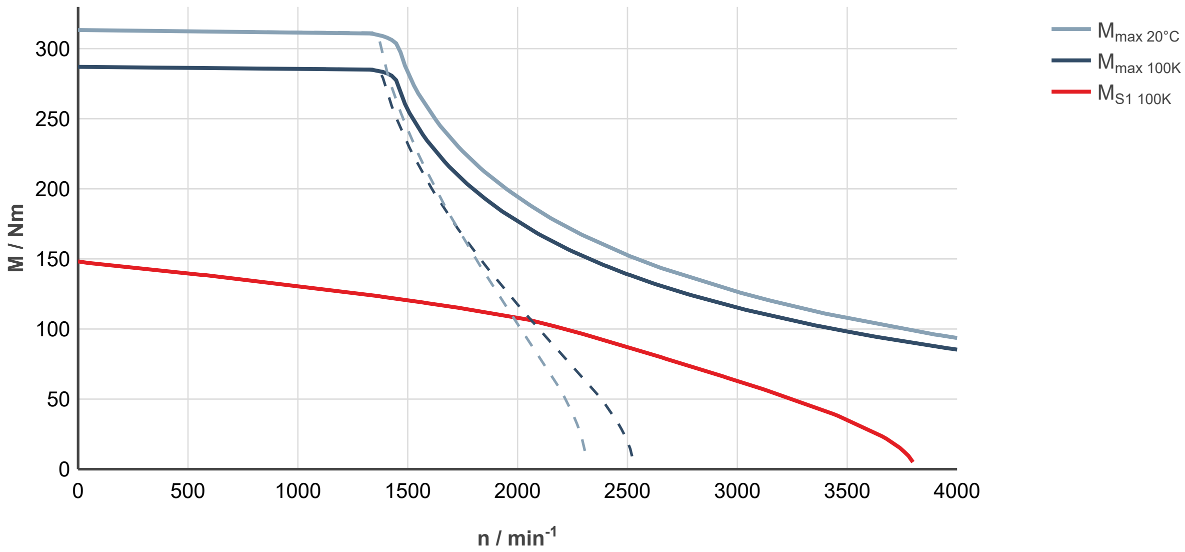



Fig. 262: MS2N10-F0BHA-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

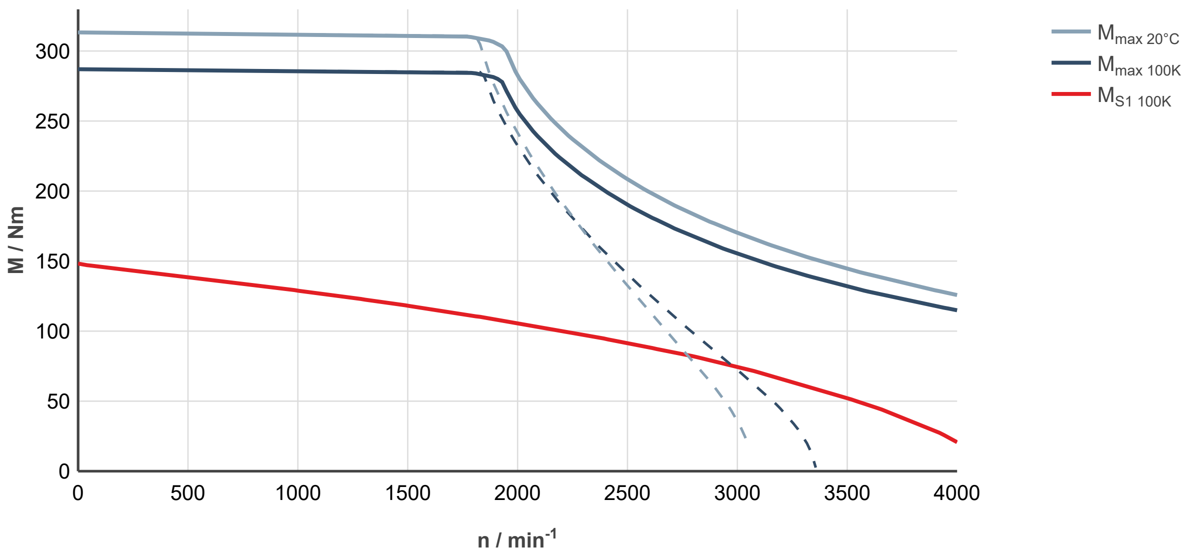



Fig. 263: MS2N10-F0BHA-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 … 480 V

## MS2N10-F1BDA / MS2N10-F1BDB

| Designation | Symbol | Unit | MS2N10-F1BDA-□□□□0-□N | MS2N10-F1BDA-□□□□3-□N | MS2N10-F1BDB-□□□□0-□N | MS2N10-F1BDB-□□□□3-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 145 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 29.5 | | | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0329 | 0.0356 | 0.0329 | 0.0356 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,000 | | | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 131 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 26.9 | | | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 13.7 | | | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 360 | | | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 330 | | | |
| Maximum current | $I_{max(rms)}$ | A | 81.0 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 2,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 5.36 | | | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 325.5 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.678 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 14.6 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 6.8 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 83.0 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 13.2 | | | |
| Mass | $m_{mot}$ | kg | 60 | 67 | 60 | 67 |
| <u>Holding brake</u> | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 | 0 | 250 |
| <u>Fan data</u> | | | | | | |
| 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 | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | | | |

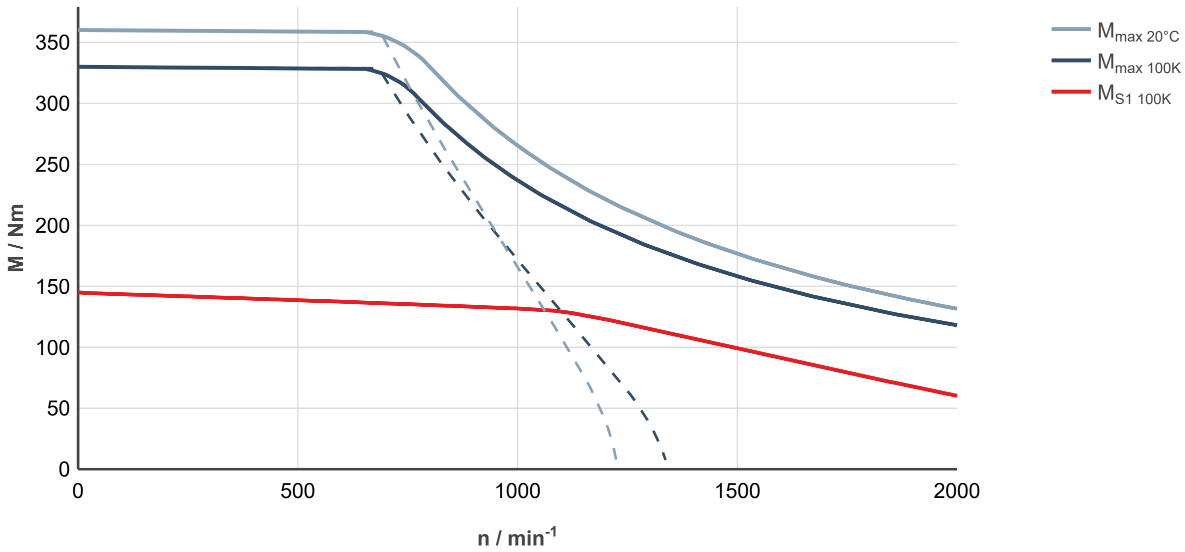



Fig. 264: MS2N10-F1BDA-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

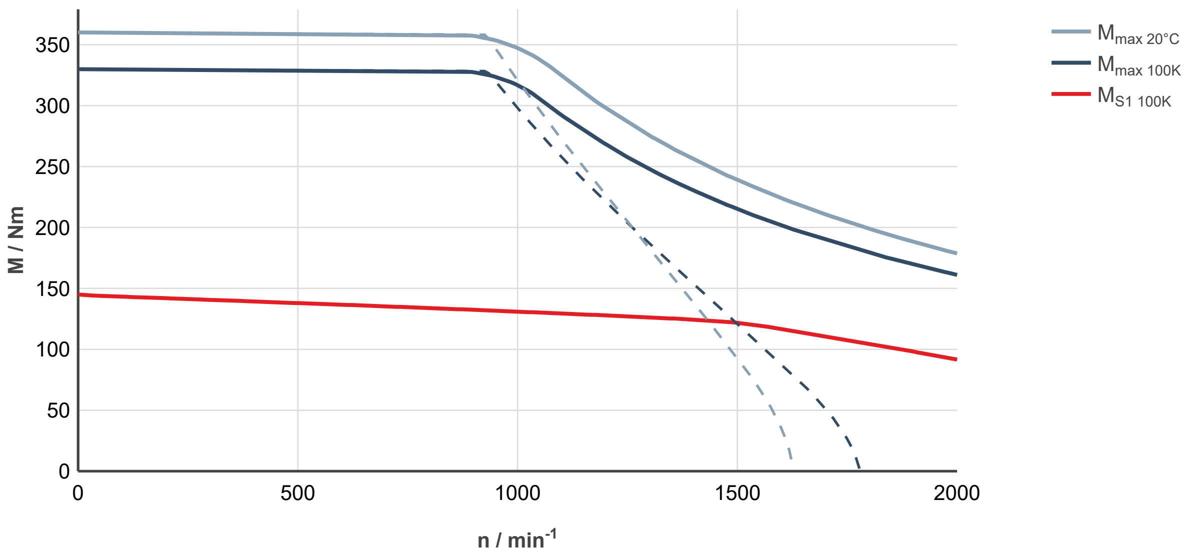



Fig. 265: MS2N10-F1BDA-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-F1BHA / MS2N10-F1BHB

| Designation | Symbol | Unit | MS2N10-F1BHA-□□□□0-□N | MS2N10-F1BHA-□□□□3-□N | MS2N10-F1BHB-□□□□0-□N | MS2N10-F1BHB-□□□□3-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 145 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 58.6 | | | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0329 | 0.0356 | 0.0329 | 0.0356 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | | | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 105.5 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 43.7 | | | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 22.1 | | | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 360 | | | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 330 | | | |
| Maximum current | $I_{max(rms)}$ | A | 162 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.7 | | | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 163.9 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.174 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 3.61 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 6.70 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 83.0 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 13.2 | | | |
| Mass | $m_{mot}$ | kg | 60 | 67 | 60 | 67 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 | 0 | 250 |
| **Fan data** | | | | | | |
| 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 | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | | | |

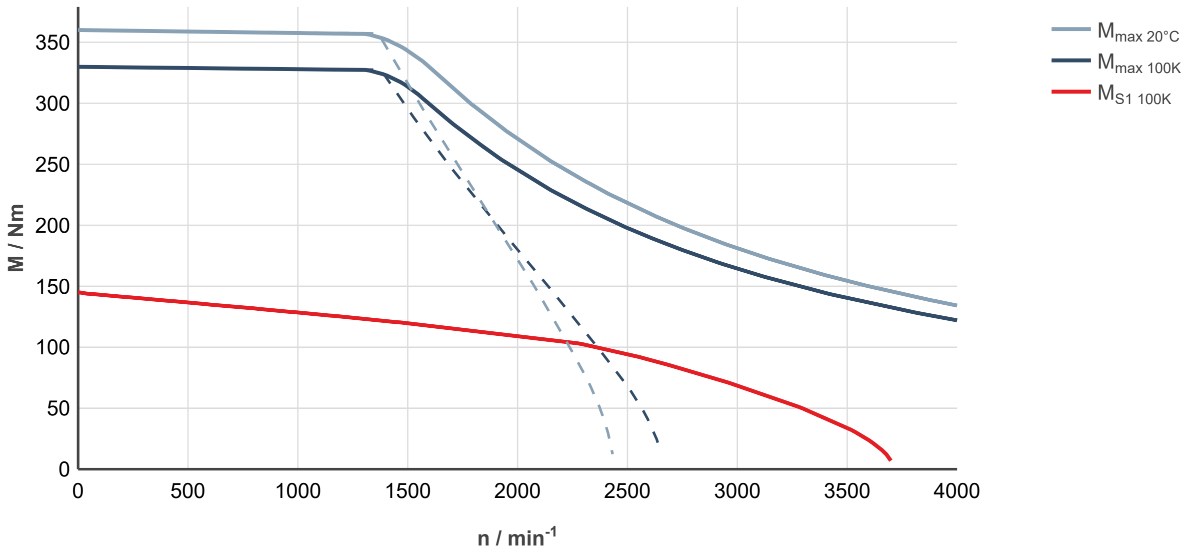



Fig. 266: MS2N10-F1BHA-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

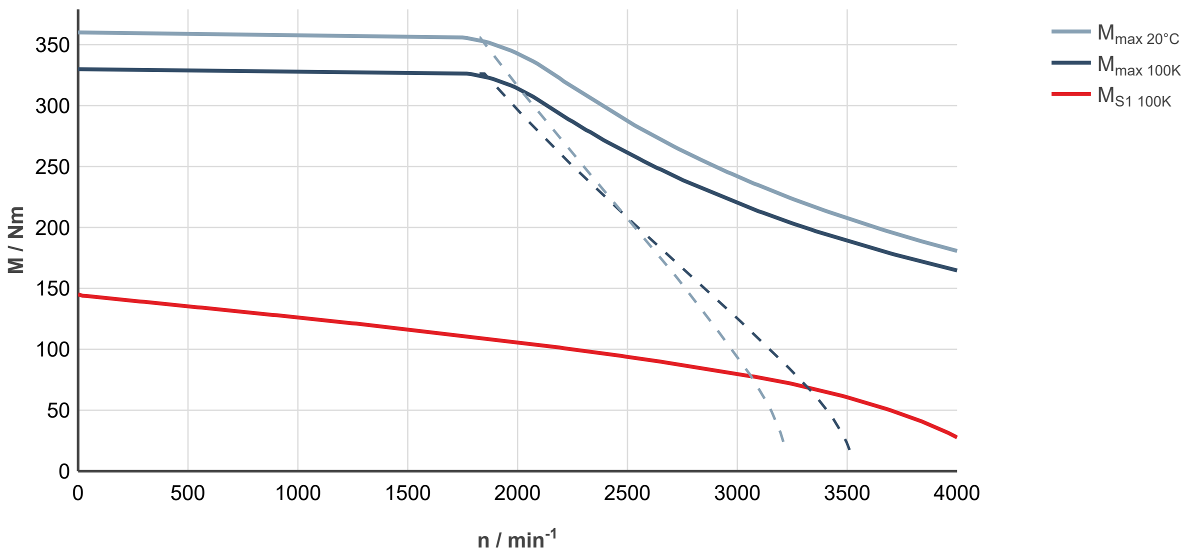



Fig. 267: MS2N10-F1BHA-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-R0BLA / MS2N10-R0BLB

| Designation | Symbol | Unit | MS2N10-R0BLA-□□□□0-□N | MS2N10-R0BLA-□□□□3-□N | MS2N10-R0BLB-□□□□0-□N | MS2N10-R0BLB-□□□□3-□N |
|---|---|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 138 | | | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 72.4 | | | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0147 | 0.0174 | 0.0147 | 0.0174 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,500 | | | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 79.9 | | | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 43.6 | | | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 20.9 | | | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 355 | | | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 325 | | | |
| Maximum current | $I_{max(eff)}$ | A | 220 | | | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 5,000 | | | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | | | |
| Number of pole pairs | p | – | 5 | | | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.0 | | | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 122.7 | | | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.113 | | | |
| Winding inductance | $L_{12\_min}$ | mH | 2.30 | | | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 13.5 | | | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 97.5 | | | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 13.2 | | | |
| Mass | $m_{mot}$ | kg | 55.0 | 62.0 | 55.0 | 62.0 |
| **Holding brake** | | | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 | 0 | 250 |
| **Fan data** | | | | | | |
| 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 | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | | | |

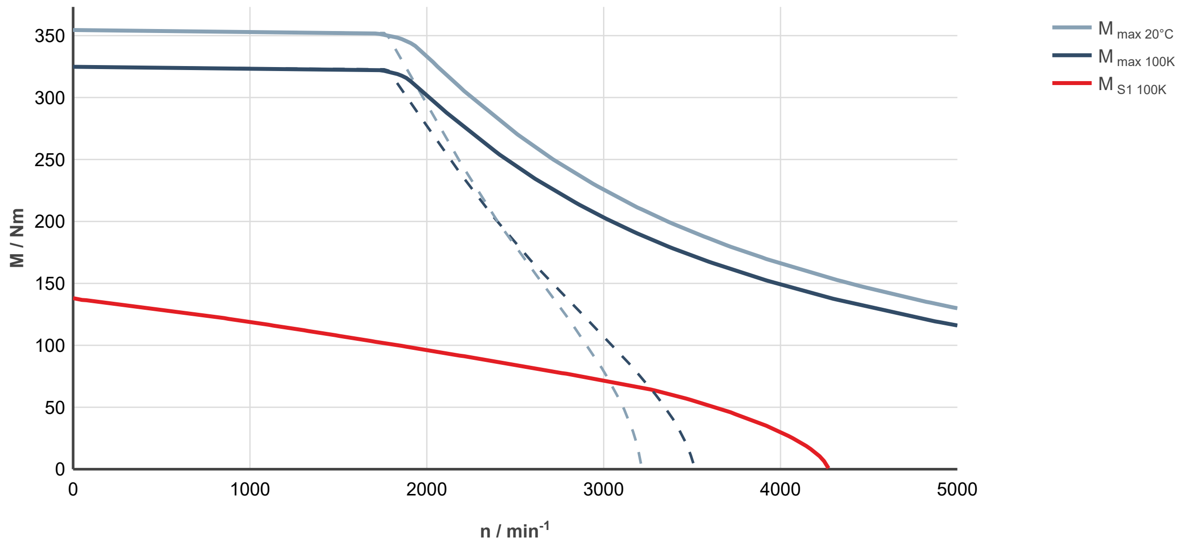



Fig. 268: MS2N10-R0BLA-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

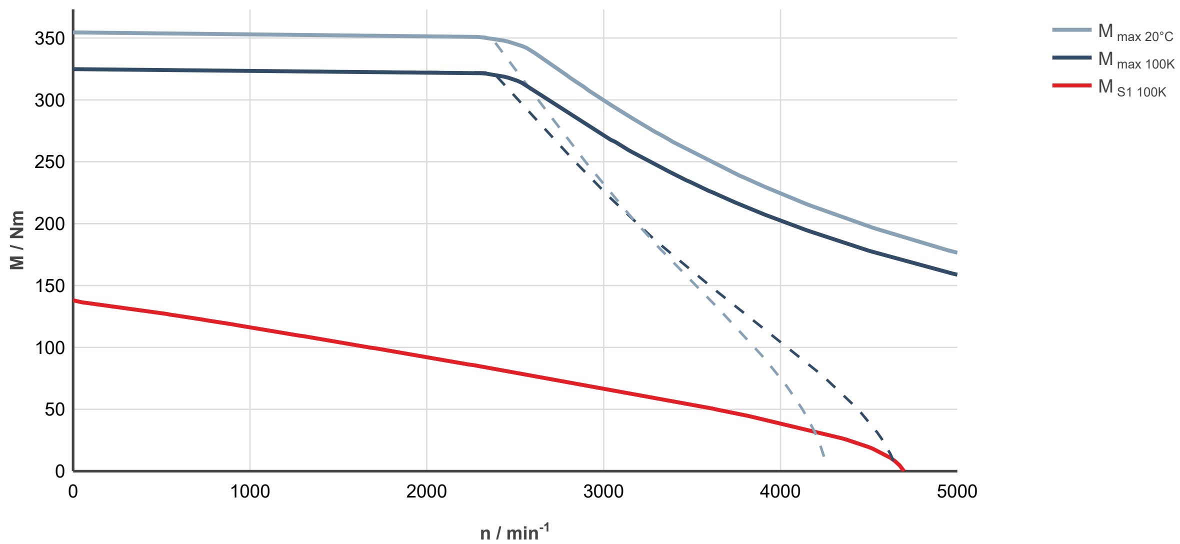



Fig. 269: MS2N10-R0BLA-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V

## 6.7.3 Water cooling

### MS2N10-C0BHL

| Designation | Symbol | Unit | MS2N10-C0BHL-□□□□0-□N | MS2N10-C0BHL-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 51.7 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 23.1 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0048 | 0.00627 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,720 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 44.7 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 20 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 8.05 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 76.8 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 70.5 | |
| Maximum current | $I_{max(eff)}$ | A | 38.5 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.60 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 157.8 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.74 | |
| Winding inductance | $L_{12\_min}$ | mH | 18.7 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.9 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 81.2 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 5.0 | |
| Mass | $m_{mot}$ | kg | 29 | 34 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 0.87 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 1.56 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.10 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.15 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

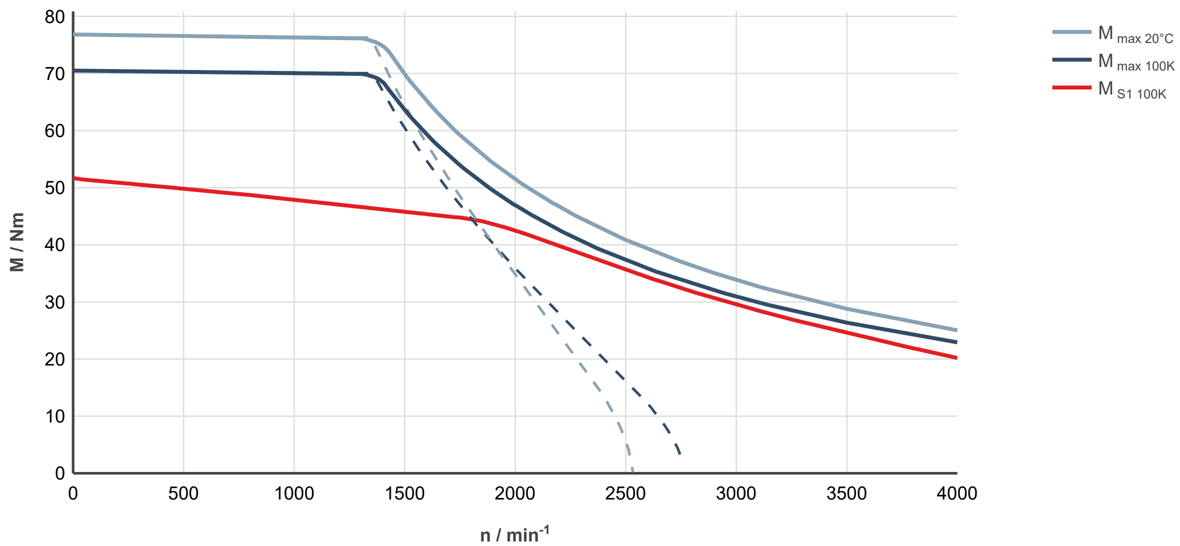



Fig. 270: MS2N10-C0BHL-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

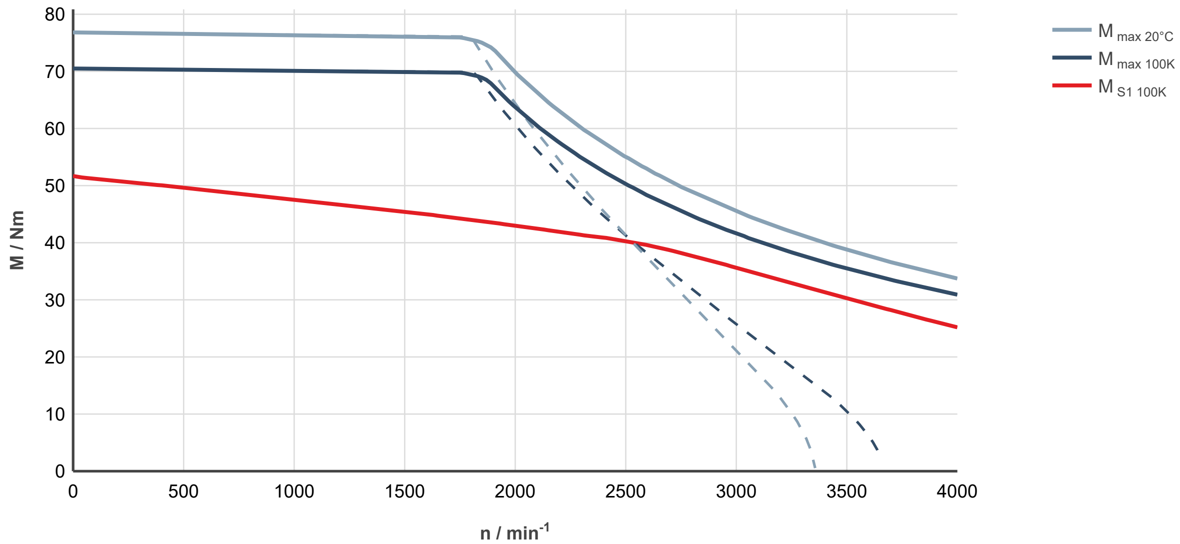



Fig. 271: MS2N10-C0BHL-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V

## MS2N10-C0BNL

| Designation | Symbol | Unit | MS2N10-C0BNL-□□□□□0-□N | MS2N10-C0BNL-□□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 51.7 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 30.8 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0048 | 0.00627 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,310 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 40.4 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 24.1 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 9.8 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 76.8 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 70.4 | |
| Maximum current | $I_{max(rms)}$ | A | 51.3 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.95 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 118.4 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.441 | |
| Winding inductance | $L_{12\_min}$ | mH | 10.67 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.97 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 81.2 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 5.0 | |
| Mass | $m_{mot}$ | kg | 29 | 34 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 0.87 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 1.56 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.10 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.15 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

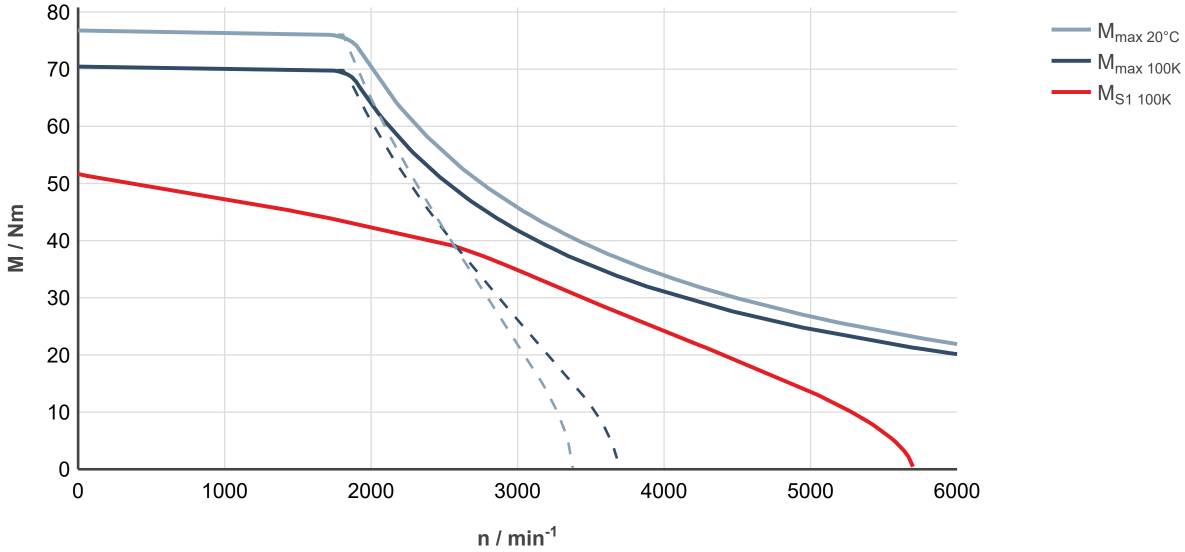



Fig. 272: MS2N10-C0BNL-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

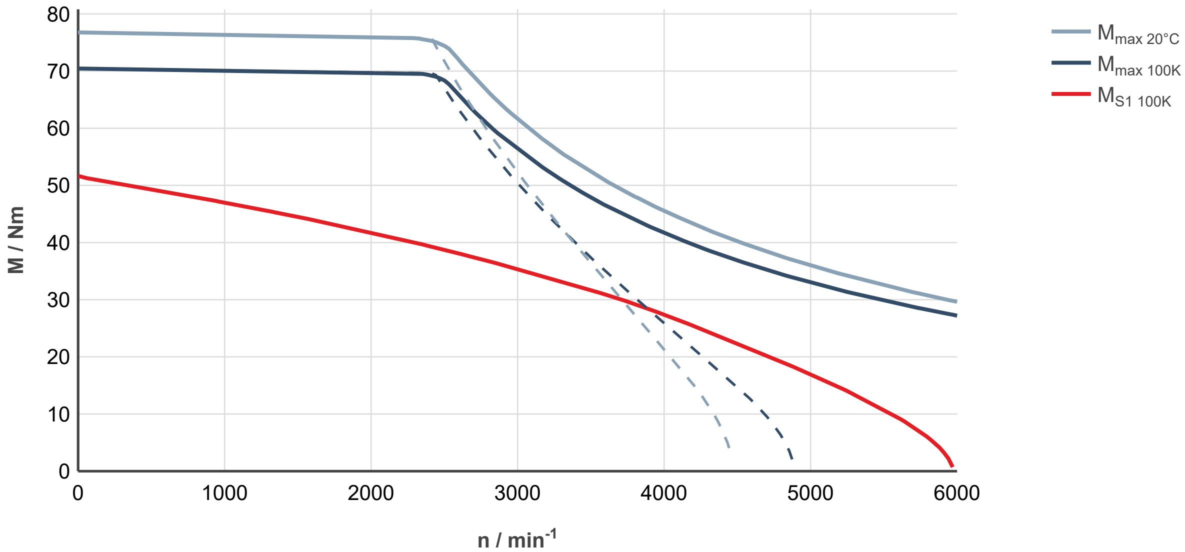



Fig. 273: MS2N10-C0BNL-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-C1BNL

| Designation | Symbol | Unit | MS2N10-C1BNL-□□□□0-□N | MS2N10-C1BNL-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 48.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 29.9 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0092 | 0.01067 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,900 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 33.4 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 21.2 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 10.15 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 86.5 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 79.4 | |
| Maximum current | $I_{max(rms)}$ | A | 60.8 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.78 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 107.9 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.439 | |
| Winding inductance | $L_{12\_min}$ | mH | 6.6 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 1.52 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 68.5 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 5.0 | |
| Mass | $m_{mot}$ | kg | 28.0 | 33 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 0.82 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 1.47 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.10 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.15 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

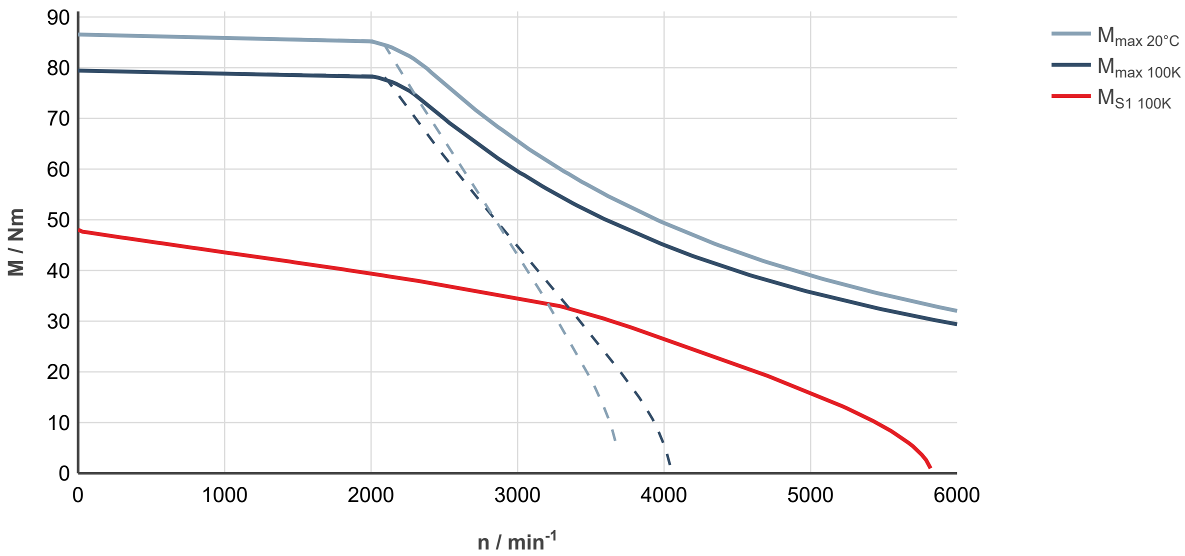



Fig. 274: MS2N10-C1BNL-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

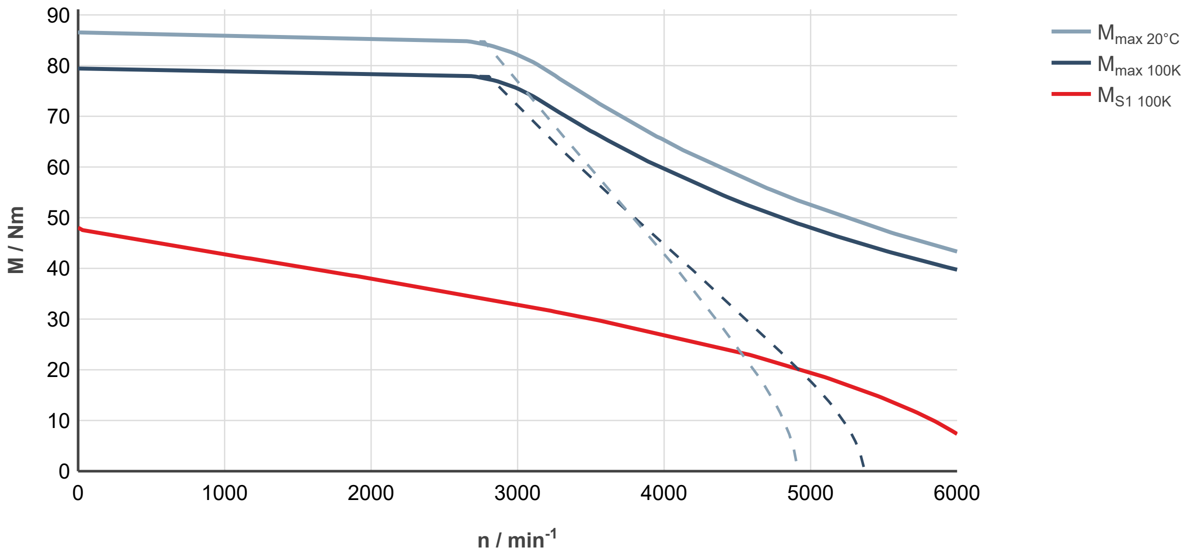



Fig. 275: MS2N10-C1BNL-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-D0BHL

| Designation | Symbol | Unit | MS2N10-D0BHL-□□□□□0-□N | MS2N10-D0BHL-□□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 107.5 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 43.7 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0081 | 0.00957 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,550 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 93.5 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 38.0 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 15.2 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 155 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 142 | |
| Maximum current | $I_{max(rms)}$ | A | 70 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.86 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 173.5 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.386 | |
| Winding inductance | $L_{12\_min}$ | mH | 10.3 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 3.15 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 90.0 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 5.1 | |
| Mass | $m_{mot}$ | kg | 39 | 44 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 1.55 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 2.78 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.185 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.25 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

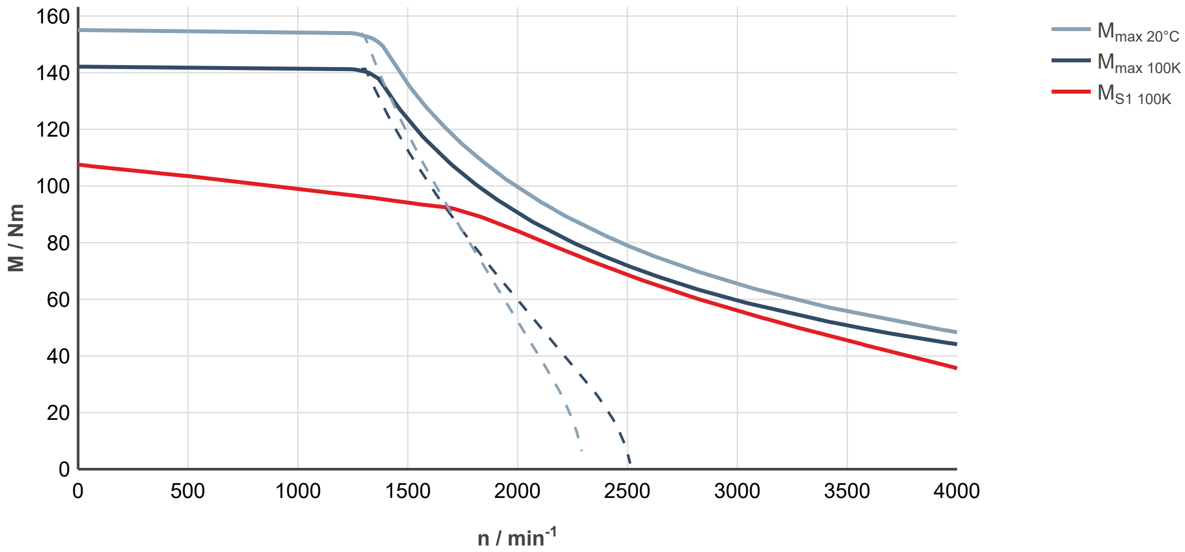



Fig. 276: MS2N10-D0BHL-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

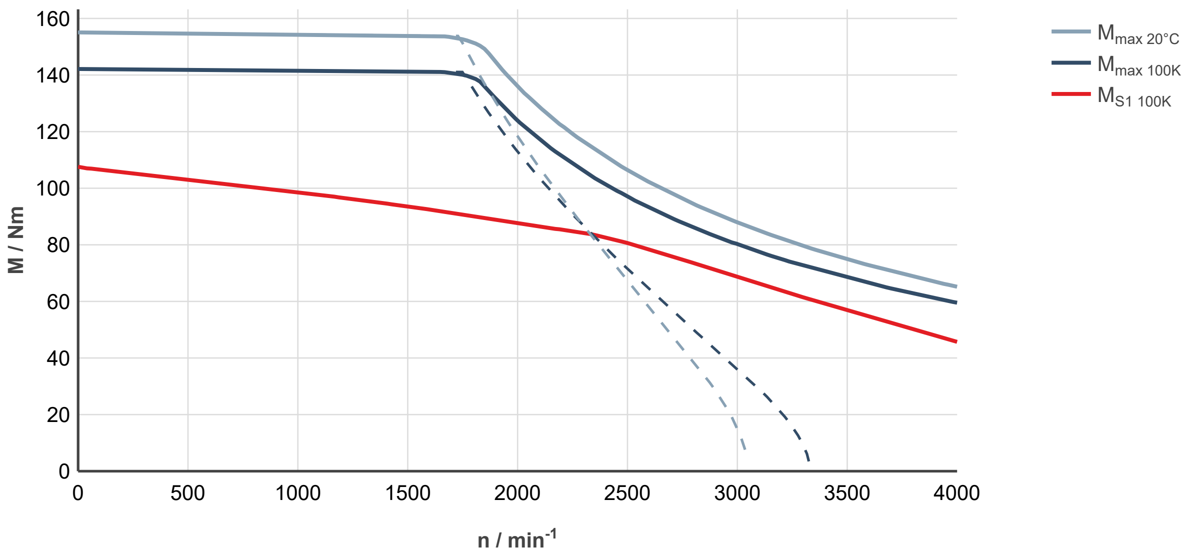



Fig. 277: MS2N10-D0BHL-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-D0BNL

| Designation | Symbol | Unit | MS2N10-D0BNL-□□□□0-□N | MS2N10-D0BNL-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 107.5 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 64.7 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0081 | 0.00957 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,420 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 79.6 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 47.6 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 20.2 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 155 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 142 | |
| Maximum current | $I_{max(rms)}$ | A | 102.5 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.95 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 118.5 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.18 | |
| Winding inductance | $L_{12\_min}$ | mH | 5.05 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 4.1 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 90.0 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 5.1 | |
| Mass | $m_{mot}$ | kg | 39 | 44 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 1.55 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 2.78 | |
| Pressure drop at $Q_{min}$ | Δp | bar | 0.185 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.25 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

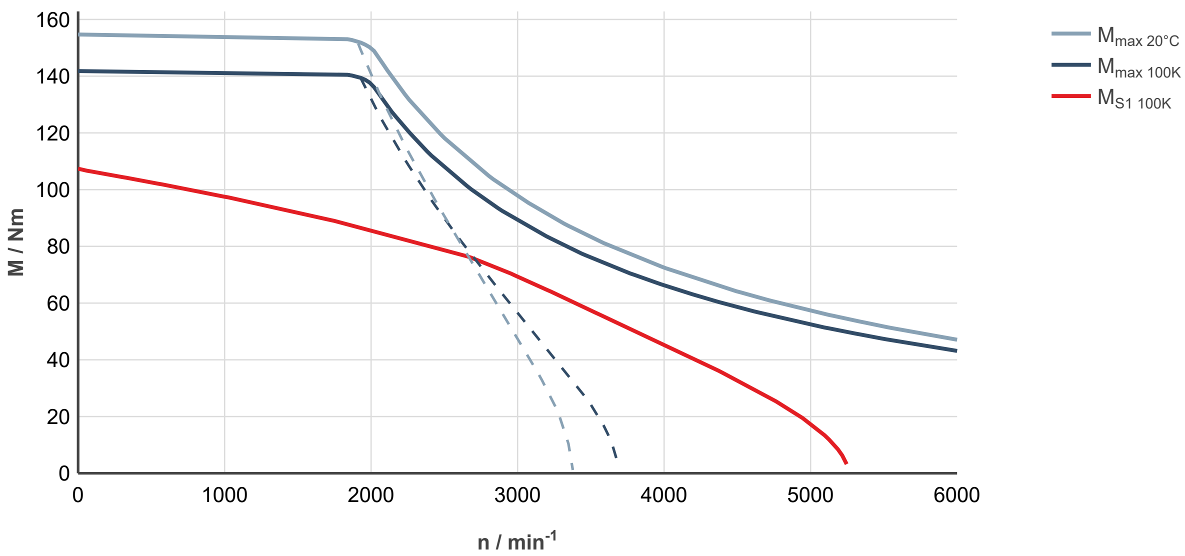



Fig. 278: MS2N10-D0BNL-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

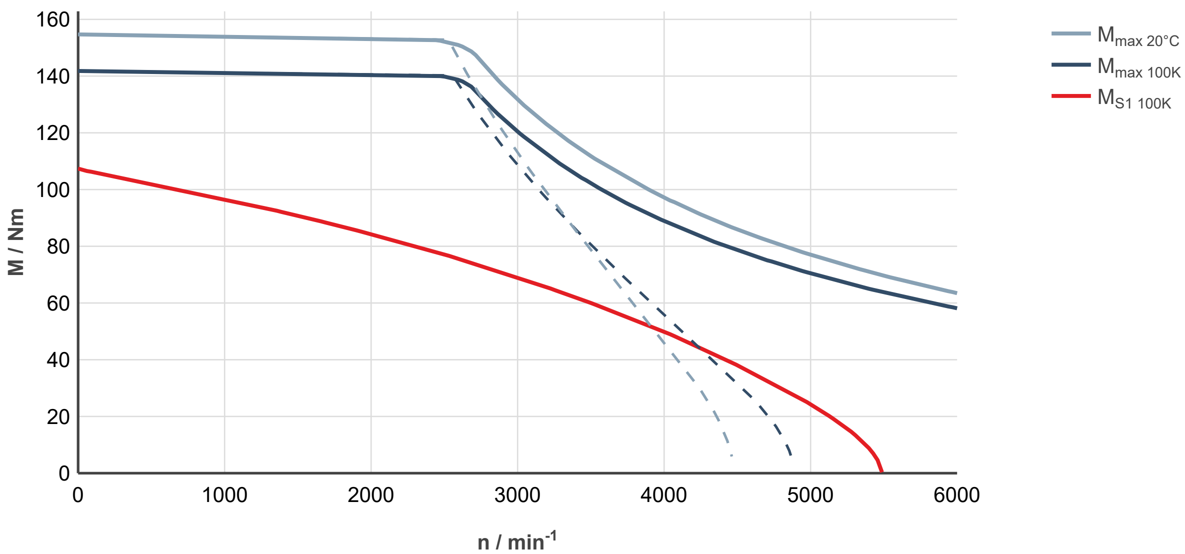



Fig. 279: MS2N10-D0BNL-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-D1BNL

| Designation | Symbol | Unit | MS2N10-D1BNL-□□□□0-□N | MS2N10-D1BNL-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 101.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 63.3 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0171 | 0.01857 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,000 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 61.9 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 39.6 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 19.4 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 174.0 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 160.0 | |
| Maximum current | $I_{max(rms)}$ | A | 121.5 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.76 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 107.6 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.178 | |
| Winding inductance | $L_{12\_min}$ | mH | 3.23 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 3.33 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 74.2 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 5.1 | |
| Mass | $m_{mot}$ | kg | 39 | 44 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 53.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.00 |
| Maximum connection time | $t_1$ | ms | 0 | 70 |
| Maximum disconnection time | $t_2$ | ms | 0 | 220 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 1.47 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 2.64 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.17 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.25 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

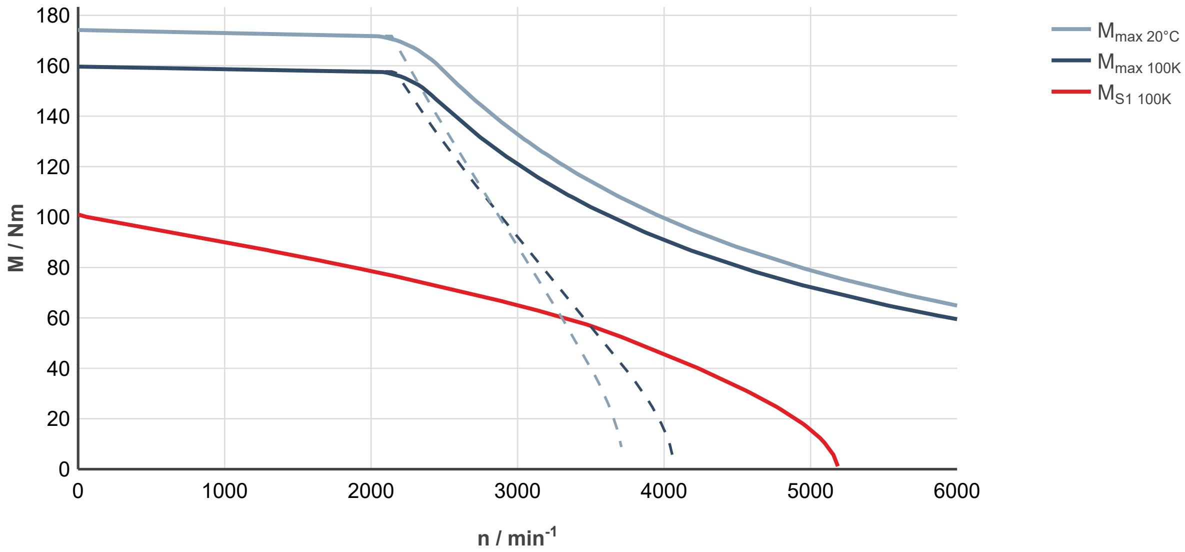



Fig. 280: MS2N10-D1BNL-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

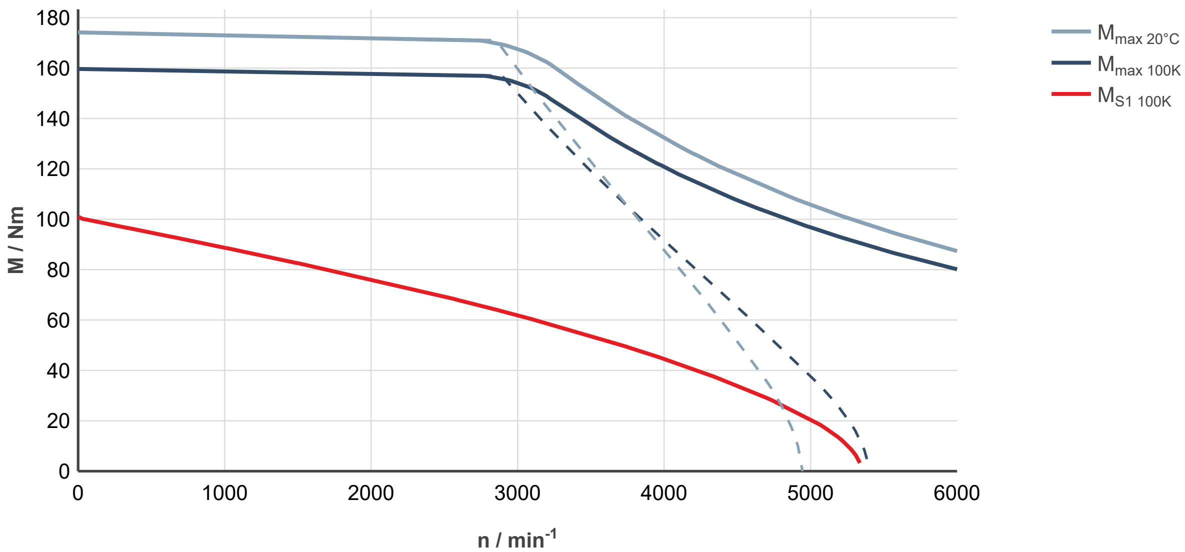



Fig. 281: MS2N10-D1BNL-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-E0BHL

| Designation | Symbol | Unit | MS2N10-E0BHL-□□□□0-□N | MS2N10-E0BHL-□□□□3-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 162 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 65.4 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0114 | 0.0141 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,540 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 137 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 55.2 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 22.1 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 234 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 214 | |
| Maximum current | $I_{max(rms)}$ | A | 102.5 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.9 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 176.4 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.244 | |
| Winding inductance | $L_{12\_min}$ | mH | 7.43 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 6.2 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 97.5 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 5.2 | |
| Mass | $m_{mot}$ | kg | 49 | 56 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 2.22 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 3.98 | |
| Pressure drop at $Q_{min}$ | Δp | bar | 0.36 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.35 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

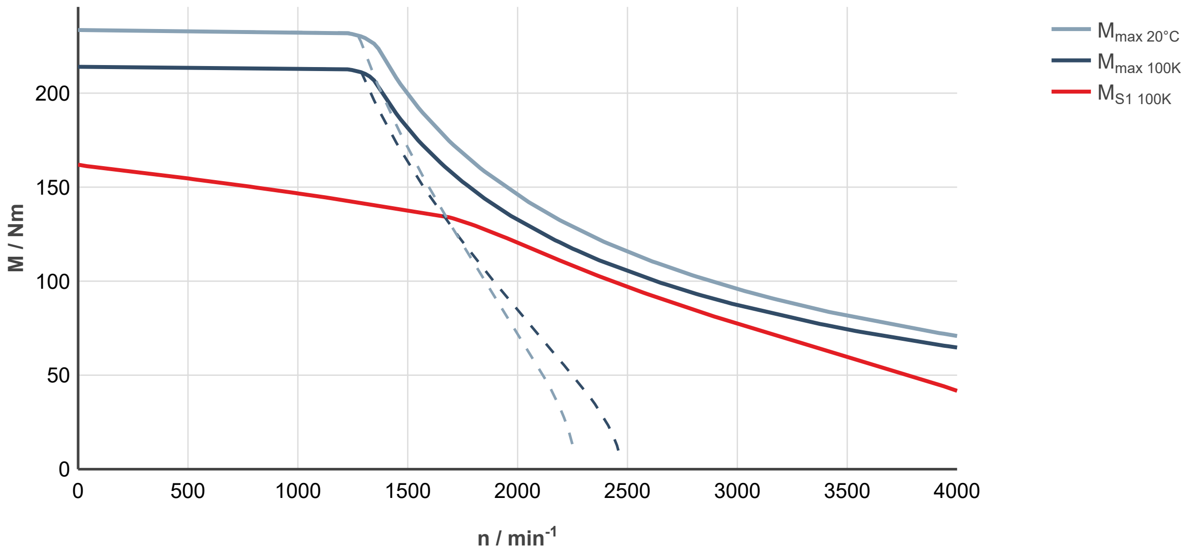



Fig. 282: MS2N10-E0BHL-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

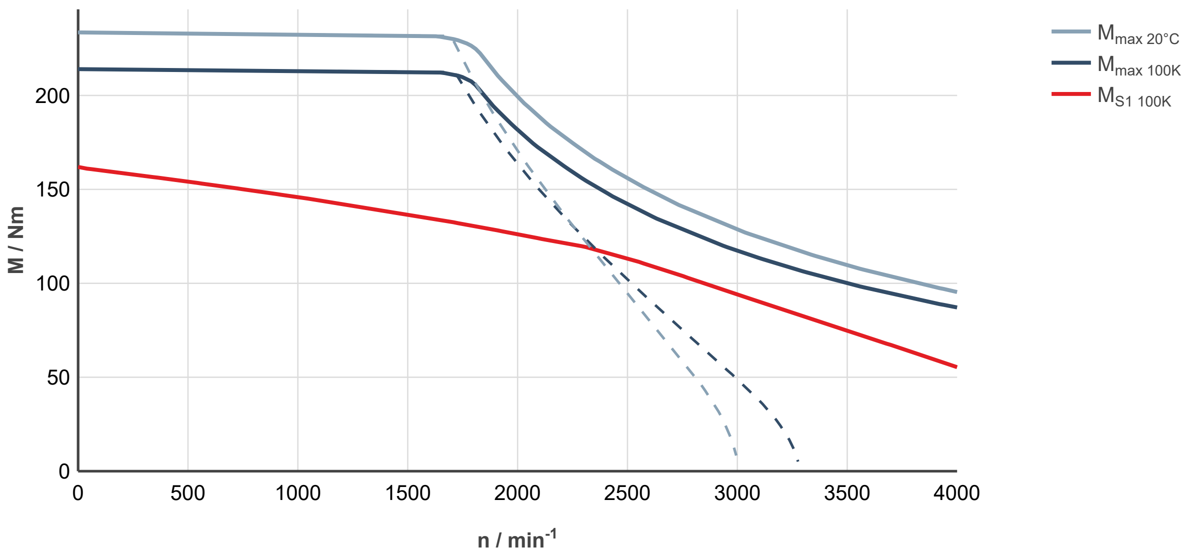



Fig. 283: MS2N10-E0BHL-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-E0BNL

| Designation | Symbol | Unit | MS2N10-E0BNL-□□□□0-□N | MS2N10-E0BNL-□□□□3-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 162 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 90 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0114 | 0.0141 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,220 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 118.5 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 65.6 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 27.5 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 234 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 214 | |
| Maximum current | $I_{max(rms)}$ | A | 140 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.1 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 128.5 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.133 | |
| Winding inductance | $L_{12\_min}$ | mH | 4.00 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 6.2 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 97.5 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 5.2 | |
| Mass | $m_{mot}$ | kg | 49 | 56 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 2.22 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 3.98 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.36 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.35 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➡ Chapter 5.4 Tolerances | | | | |

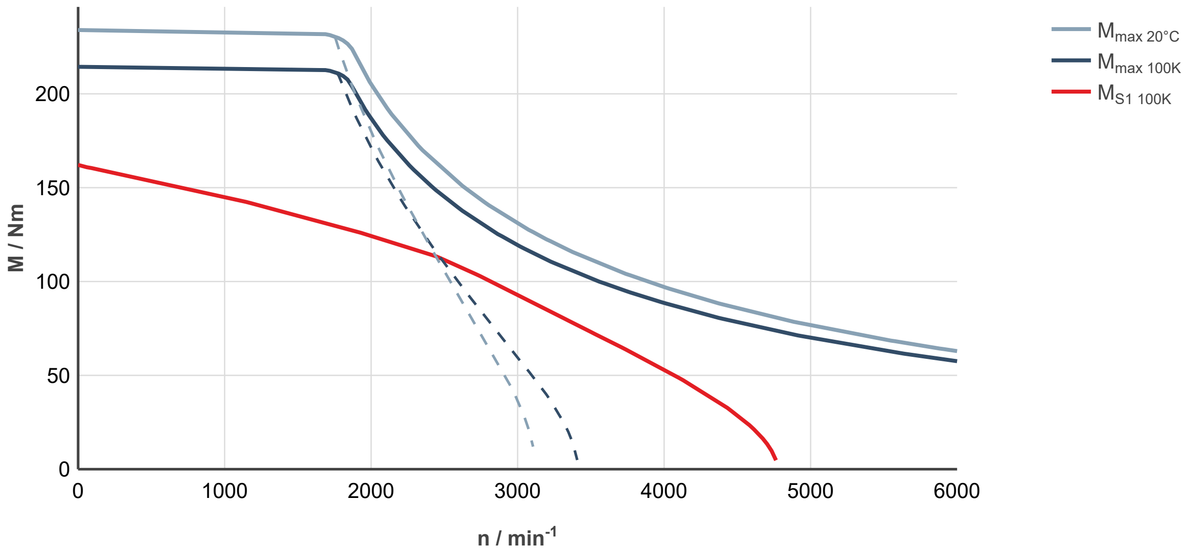



Fig. 284: MS2N10-E0BNL-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

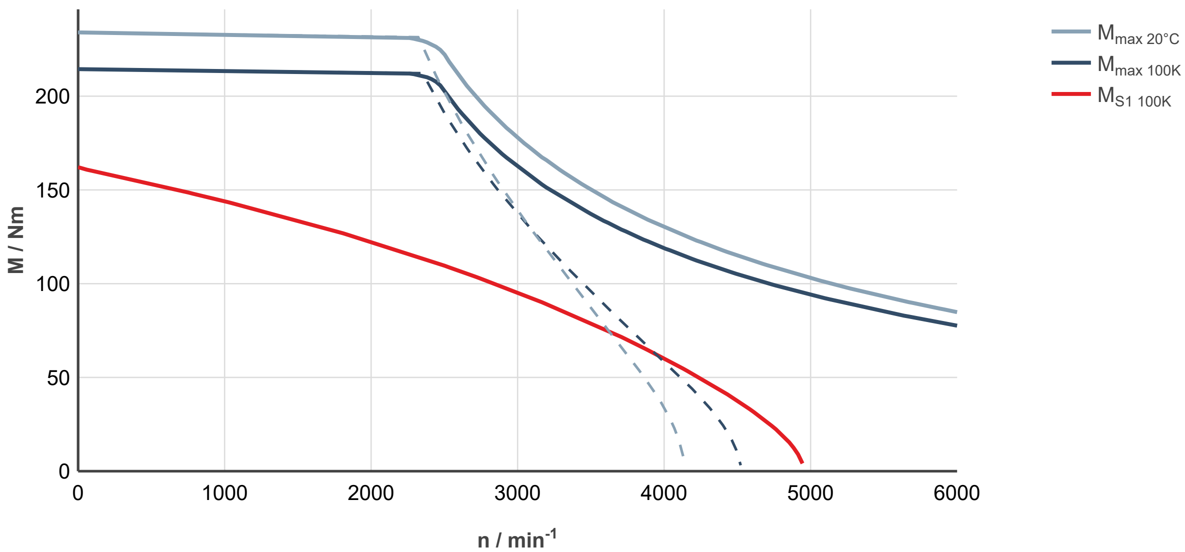



Fig. 285: MS2N10-E0BNL-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-E1BNL

| Designation | Symbol | Unit | MS2N10-E1BNL-□□□□0-□N | MS2N10-E1BNL-□□□□3-□N |
|---|---|---|---|---|
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 159 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 88.0 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | kg*m² | 0.025 | 0.0277 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,750 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 91.4 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 51.5 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 26.3 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 266 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 244 | |
| Maximum current | $I_{max(rms)}$ | A | 162 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 2.0 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 121.6 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.137 | |
| Winding inductance | $L_{12\_min}$ | mH | 2.87 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 5.0 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 79.5 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 5.2 | |
| Mass | $m_{mot}$ | kg | 51 | 58 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 2.15 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 3.86 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.34 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.35 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

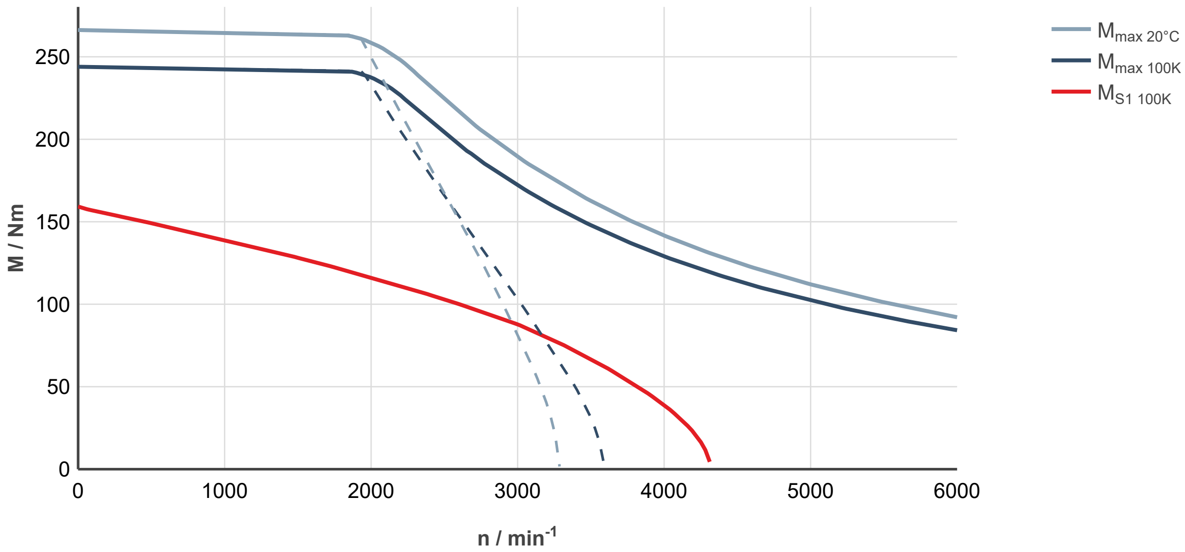



Fig. 286: MS2N10-E1BNL-▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

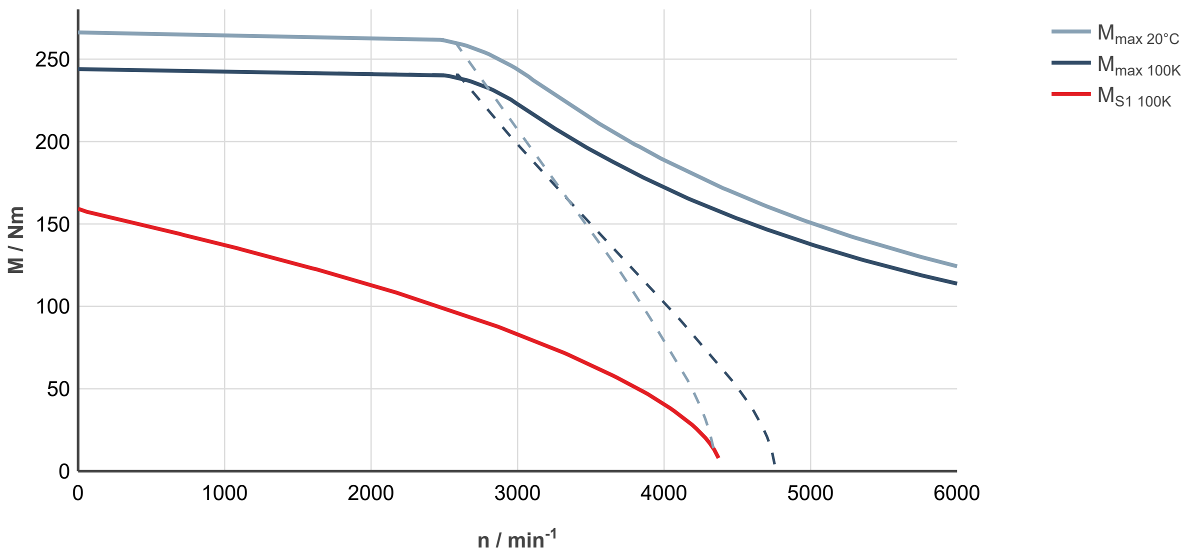



Fig. 287: MS2N10-E1BNL-▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

Technical data

## MS2N10-F0BHL

| Designation | Symbol | Unit | MS2N10-F0BHL-□□□□0-□N | MS2N10-F0BHL-□□□□3-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 214 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 87.5 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0147 | 0.0174 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,650 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 173 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 70.5 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 29.8 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 313 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 287 | |
| Maximum current | $I_{max(rms)}$ | A | 140 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.84 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 172.5 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.169 | |
| Winding inductance | $L_{12\_min}$ | mH | 5.01 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 8.7 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 101.2 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 5.3 | |
| Mass | $m_{mot}$ | kg | 59 | 66 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 2.65 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 4.8 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.51 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.45 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

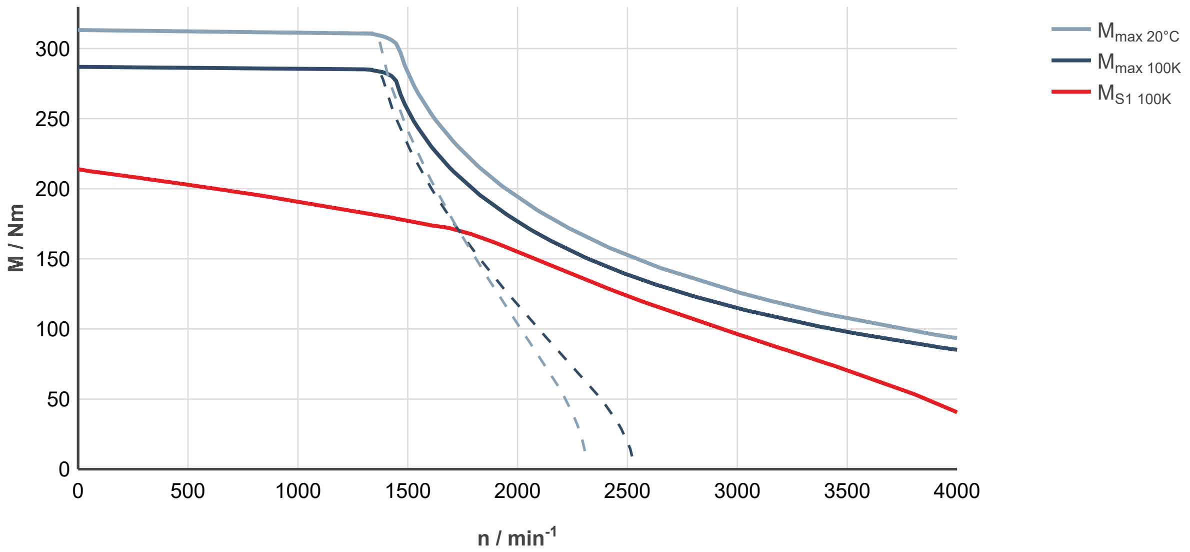



Fig. 288: MS2N10-F0BHL-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

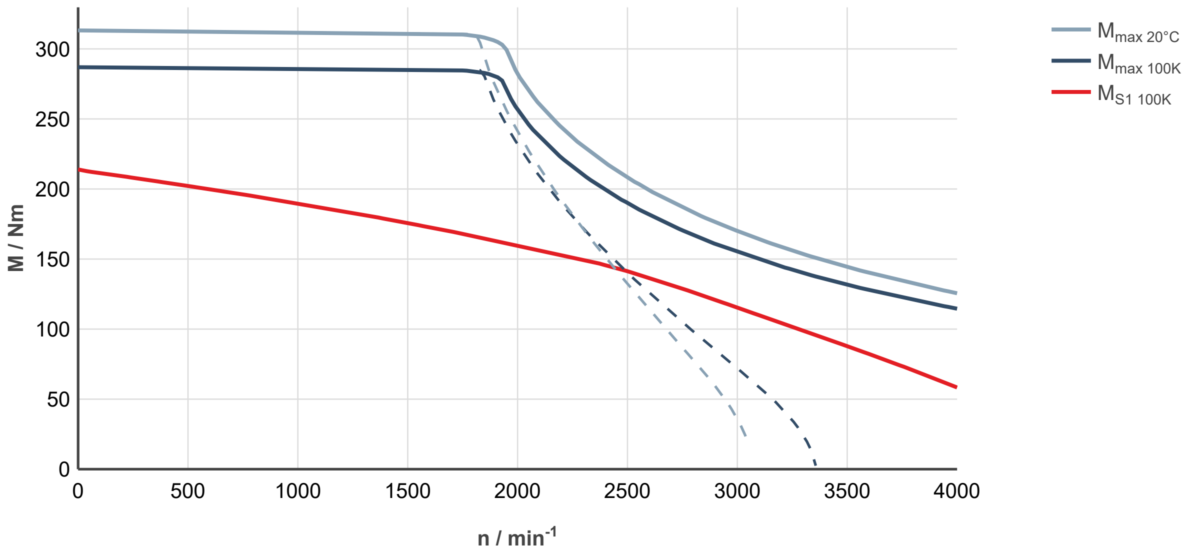



Fig. 289: MS2N10-F0BHL-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-F1BDL

| Designation | Symbol | Unit | MS2N10-F1BDL-□□□□0-□N | MS2N10-F1BDL-□□□□3-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 209 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 42.8 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0329 | 0.0356 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 925 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 190 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 39.2 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 18.4 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 360 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 330 | |
| Maximum current | $I_{max(rms)}$ | A | 81.0 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 2,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 5.36 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 325.5 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.678 | |
| Winding inductance | $L_{12\_min}$ | mH | 14.6 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 6.8 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 83.0 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 5.3 | |
| Mass | $m_{mot}$ | kg | 63.0 | 70 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 2.65 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 4.8 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.51 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.45 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

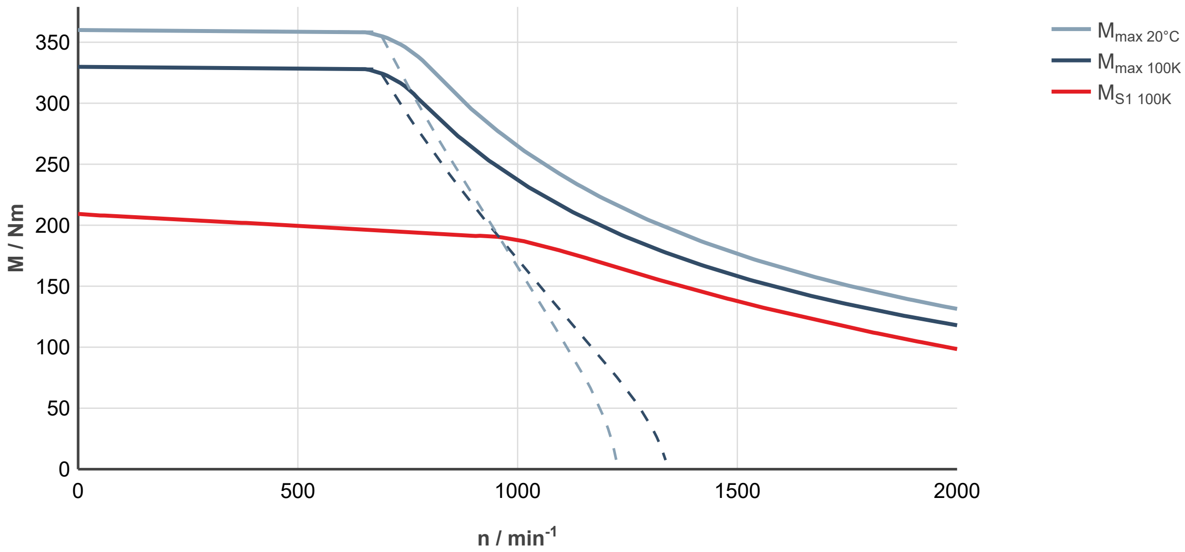



Fig. 290: MS2N10-F1BDL-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

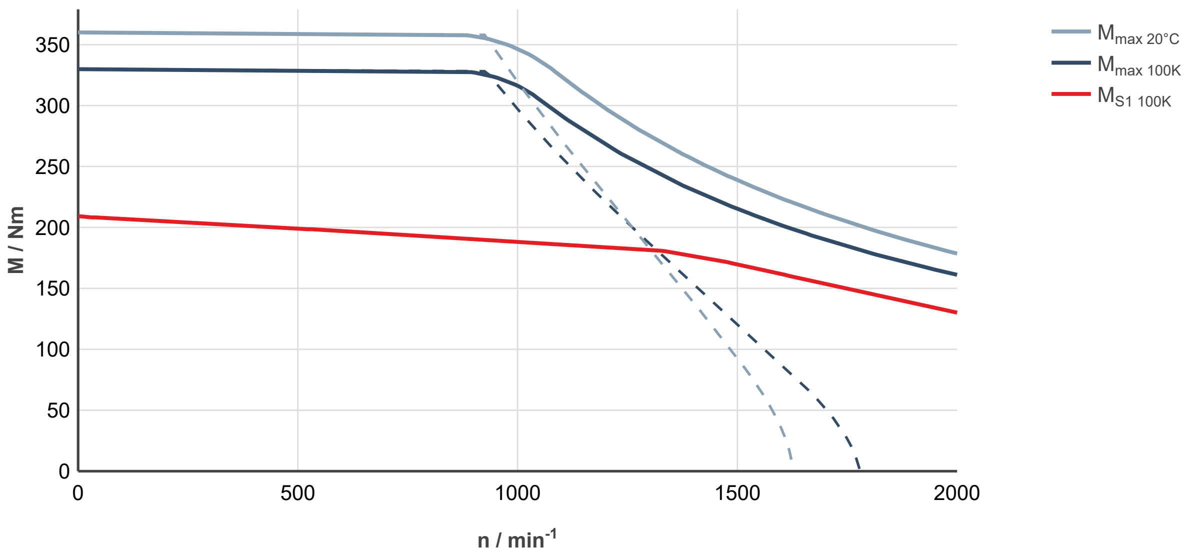



Fig. 291: MS2N10-F1BDL-□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-F1BHL

| Designation | Symbol | Unit | MS2N10-F1BHL-□□□□0-□N | MS2N10-F1BHL-□□□□3-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 209 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 86.0 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0329 | 0.0356 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,930 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 157 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 65.7 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 31.7 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 360 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 330 | |
| Maximum current | $I_{max(rms)}$ | A | 162 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 4,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.7 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 163.9 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.174 | |
| Winding inductance | $L_{12\_min}$ | mH | 3.61 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 6.70 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 83.0 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 5.3 | |
| Mass | $m_{mot}$ | kg | 63.0 | 70 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 2.65 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 4.8 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.51 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.45 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

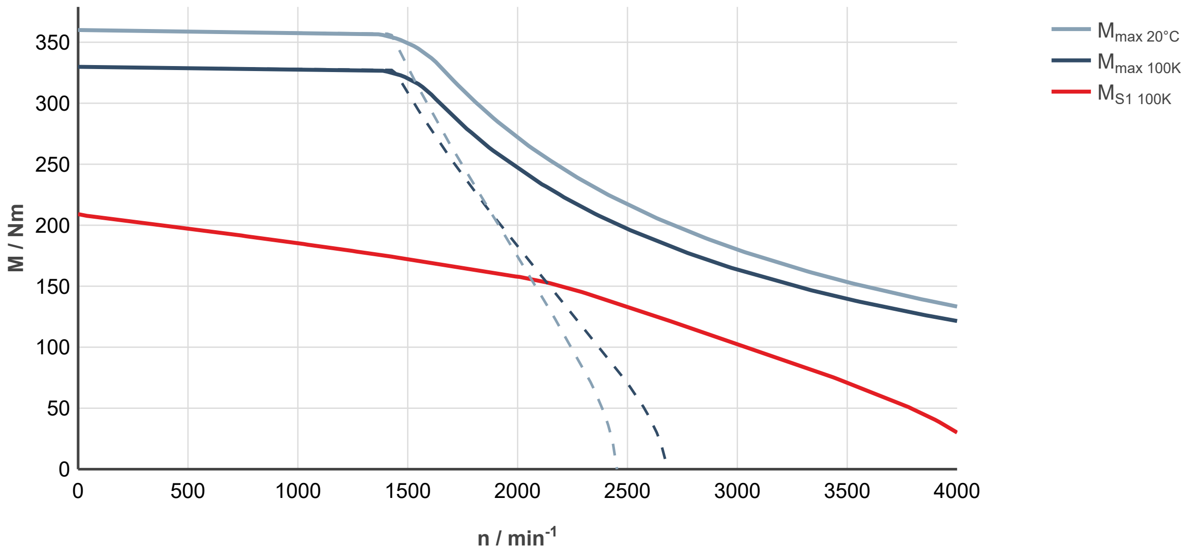



Fig. 292: MS2N10-F1BHL-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

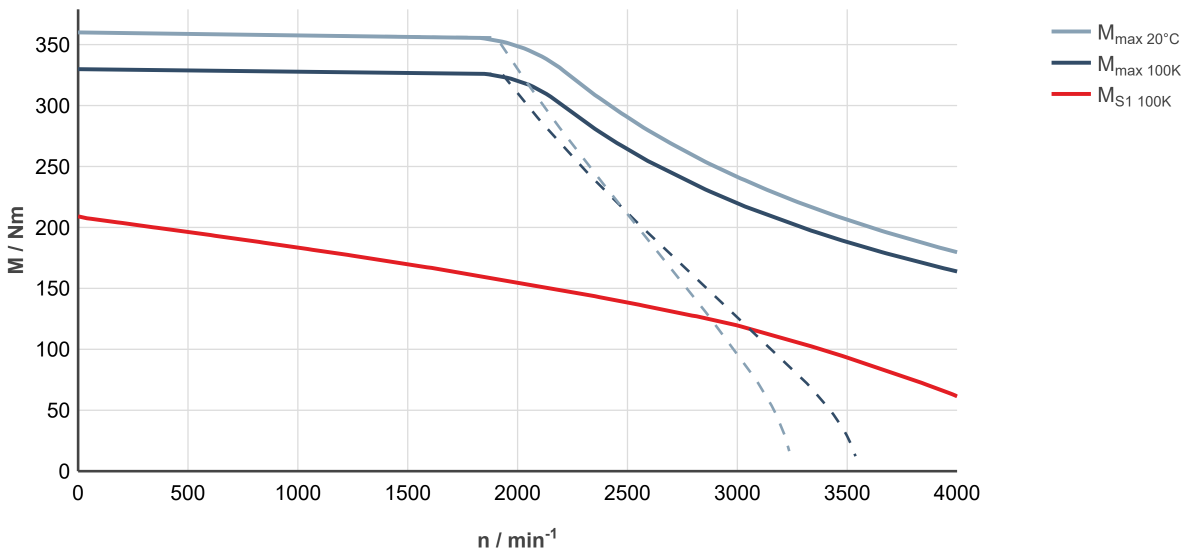



Fig. 293: MS2N10-F1BHL-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V

## MS2N10-R0BLL

| Designation | Symbol | Unit | MS2N10-R0BLL-□□□□0-□N | MS2N10-R0BLL-□□□□3-□N |
|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 186 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 96.2 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0147 | 0.0174 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,500 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 134 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 71.4 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 35.1 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 355 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 325 | |
| Maximum current | $I_{max(eff)}$ | A | 220 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 5,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.0 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 122.7 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.113 | |
| Winding inductance | $L_{12\_min}$ | mH | 2.30 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 13.5 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 97.5 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 5.2 | |
| Mass | $m_{mot}$ | kg | 58.0 | 68.8 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 3.30 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 6.0 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.80 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.45 | |
| Material of coolant duct | – | – | Stainless steel | |

1) For tolerance details refer to ➦ Chapter 5.4 Tolerances

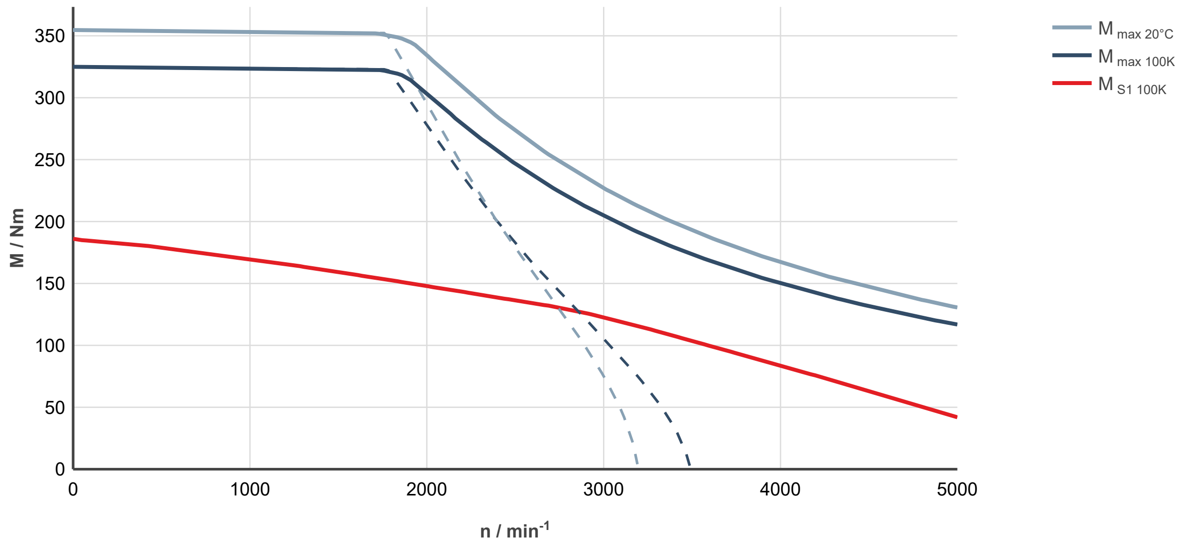



Fig. 294: MS2N10-R0BLL-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

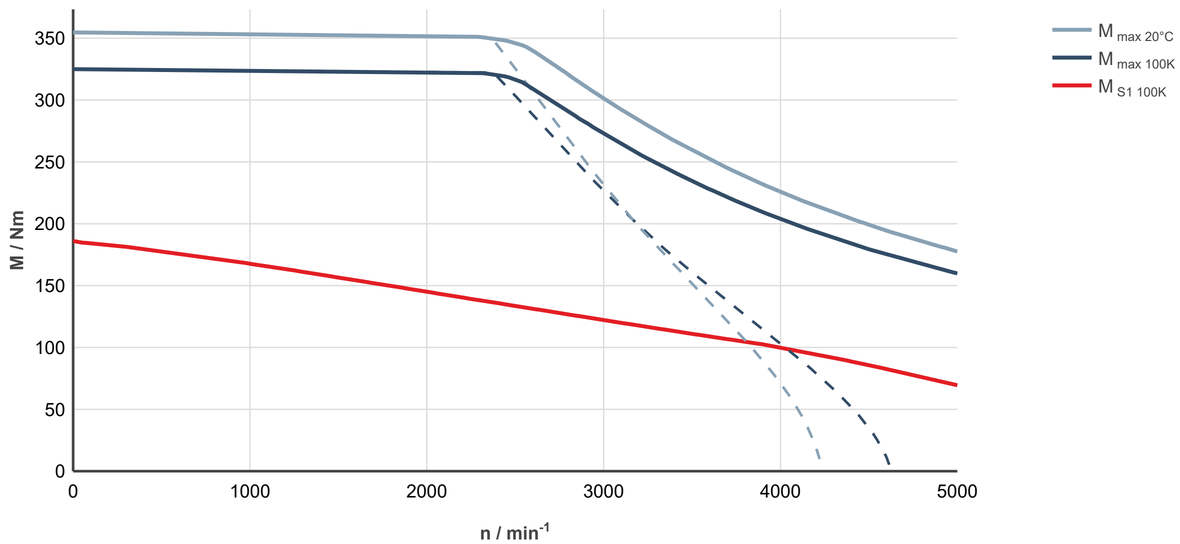



Fig. 295: MS2N10-R0BLL-□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V

## MS2N10-R0BQL

| Designation | Symbol | Unit | MS2N10-R0BQL-□□□□0-□N | MS2N10-R0BQL-□□□□3-□N |
|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 186.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 143 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0147 | 0.0174 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 4,000 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 89.3 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 73.4 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 37.4 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 355 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 325 | |
| Maximum current | $I_{max(eff)}$ | A | 330 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 6,000 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 6,000 | |
| Number of pole pairs | p | – | 5 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 1.37 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 81.8 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.05 | |
| Winding inductance | $L_{12\_min}$ | mH | 0.765 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 13.5 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 97.5 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 5.2 | |
| Mass | $m_{mot}$ | kg | 58.0 | 68.8 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 90.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.50 |
| Maximum connection time | $t_1$ | ms | 0 | 65 |
| Maximum disconnection time | $t_2$ | ms | 0 | 250 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 2.90 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10 ... 40 | |
| Permissible coolant temperature increase for $P_V$ | $\Delta T_{max}$ | K | 8.0 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 5.3 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | 0.65 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.45 | |
| Material of coolant duct | – | – | Stainless steel | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

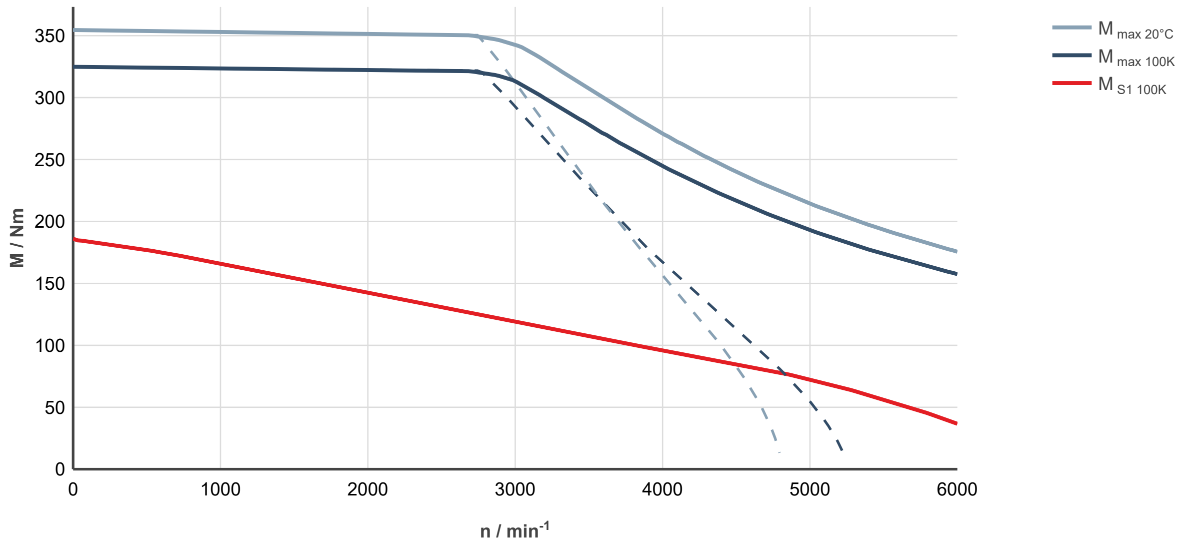



Fig. 296: MS2N10-R0BQL-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V

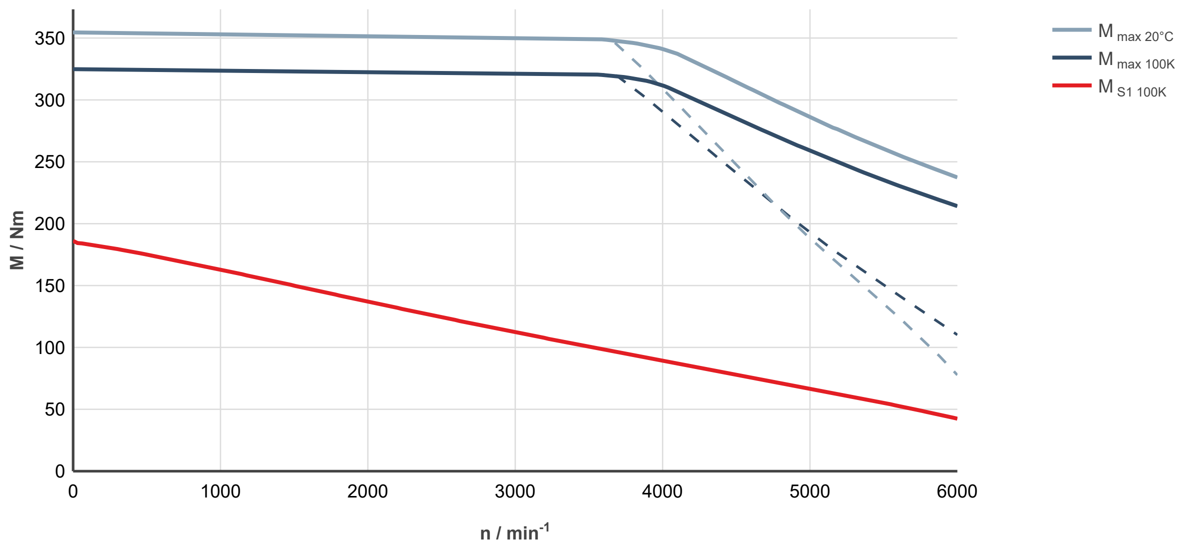



Fig. 297: MS2N10-R0BQL-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V

## 6.7.4 MS2N10 self-cooling with connector – dimensional drawing

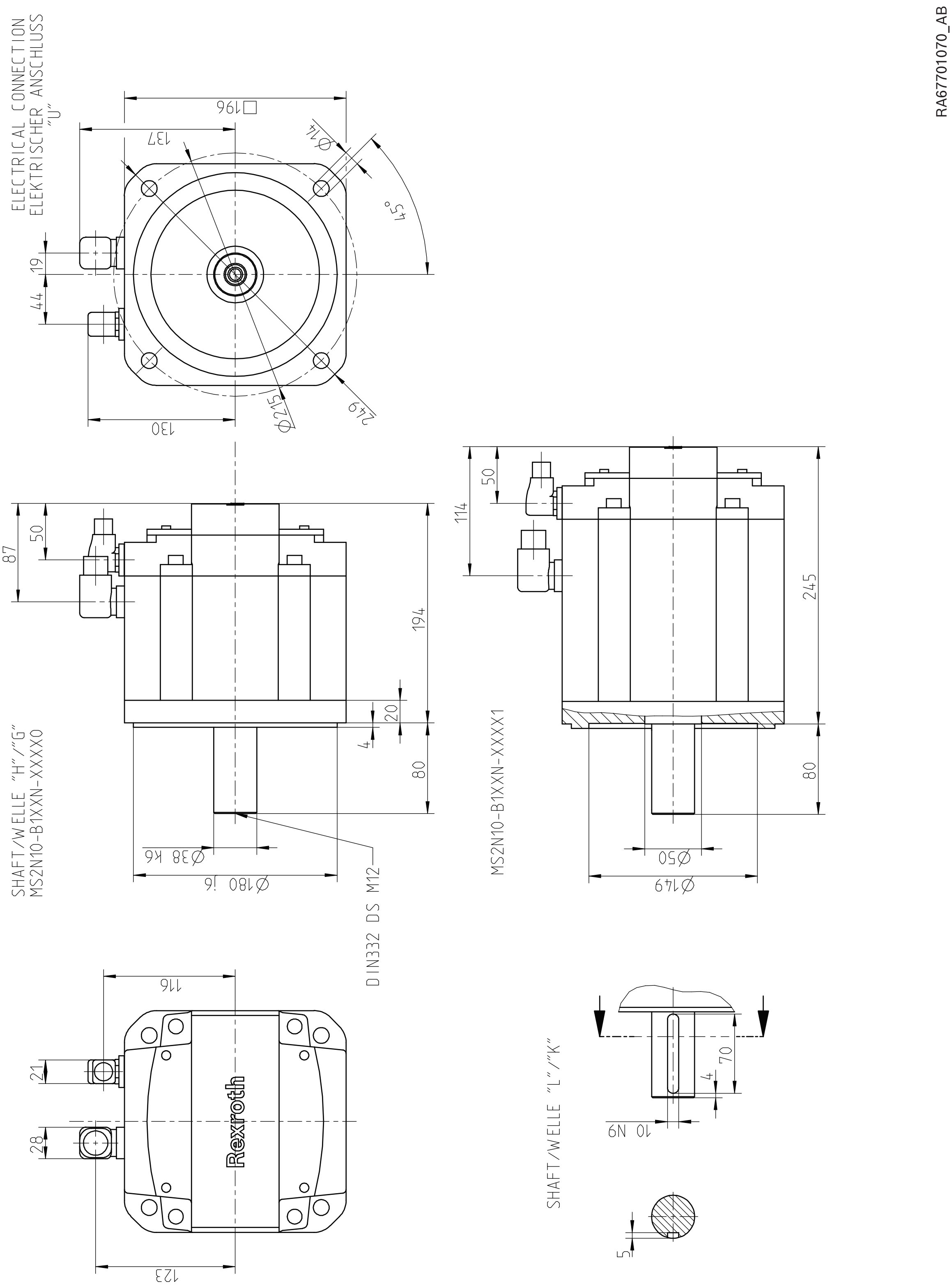
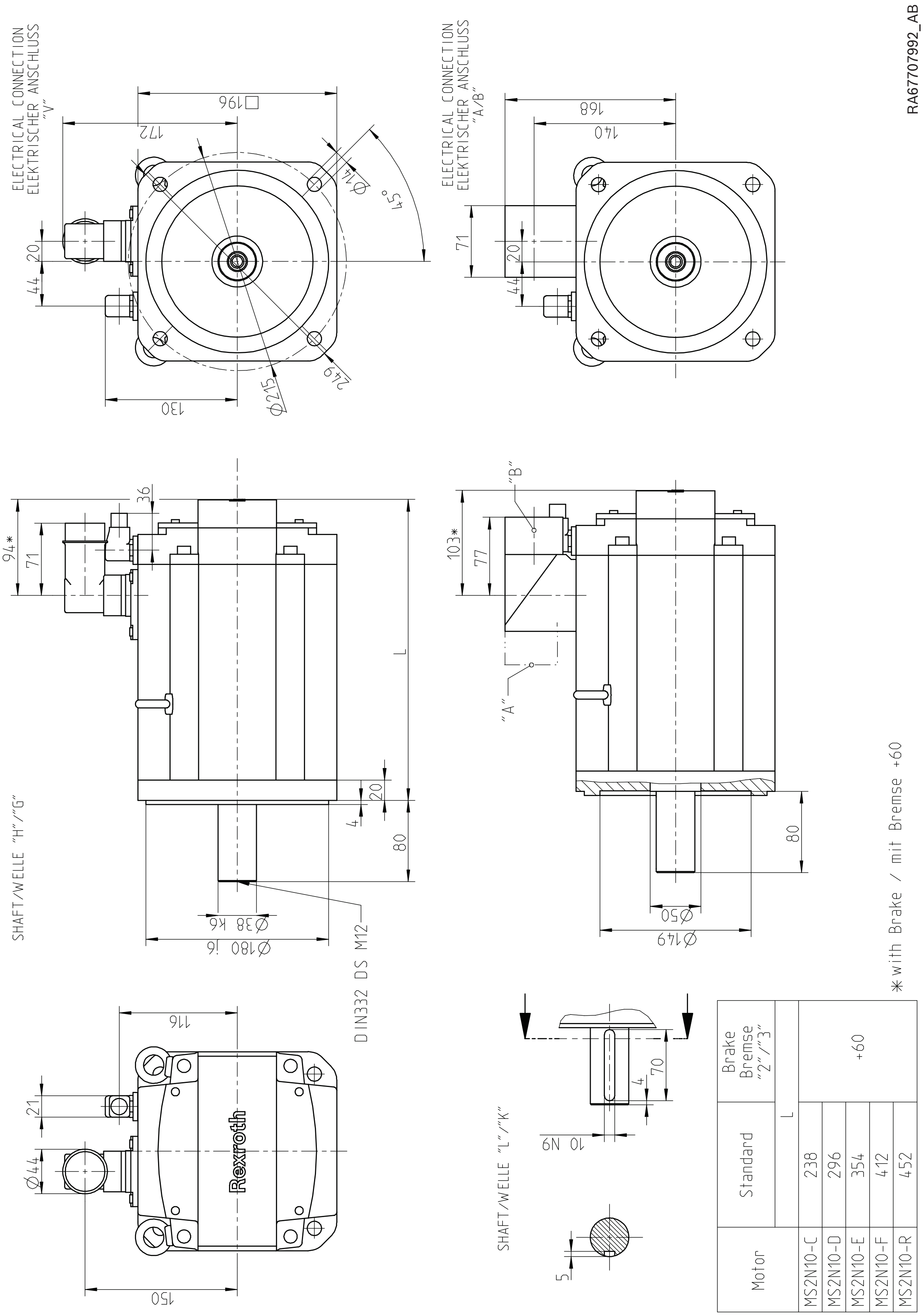



Fig. 298: MS2N10-B1□□N




| Motor | L Standard | L Brake Bremse "2"/"3" |
|---|---|---|
| MS2N10-C | 238 | +60 |
| MS2N10-D | 296 | |
| MS2N10-E | 354 | |
| MS2N10-F | 412 | |
| MS2N10-R | 452 | |

Fig. 299: MS2N10-□□□□□N

## 6.7.5 MS2N10 forced ventilation with terminal box – dimensional drawing

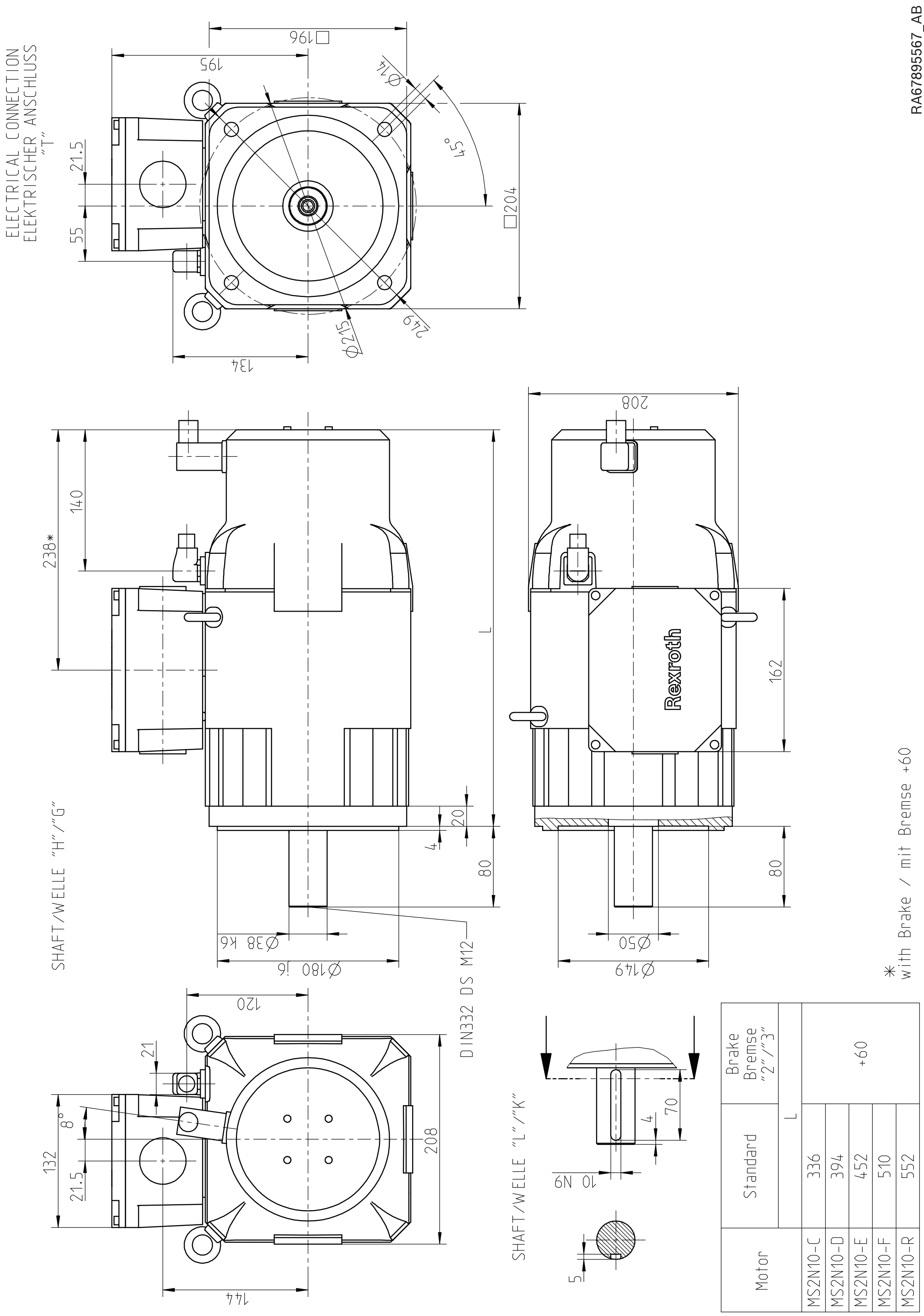



Fig. 300: MS2N10-□□□□A-□□T / MS2N10-□□□□B-□□T

## 6.7.6 MS2N10 forced ventilation with connector – dimensional drawing

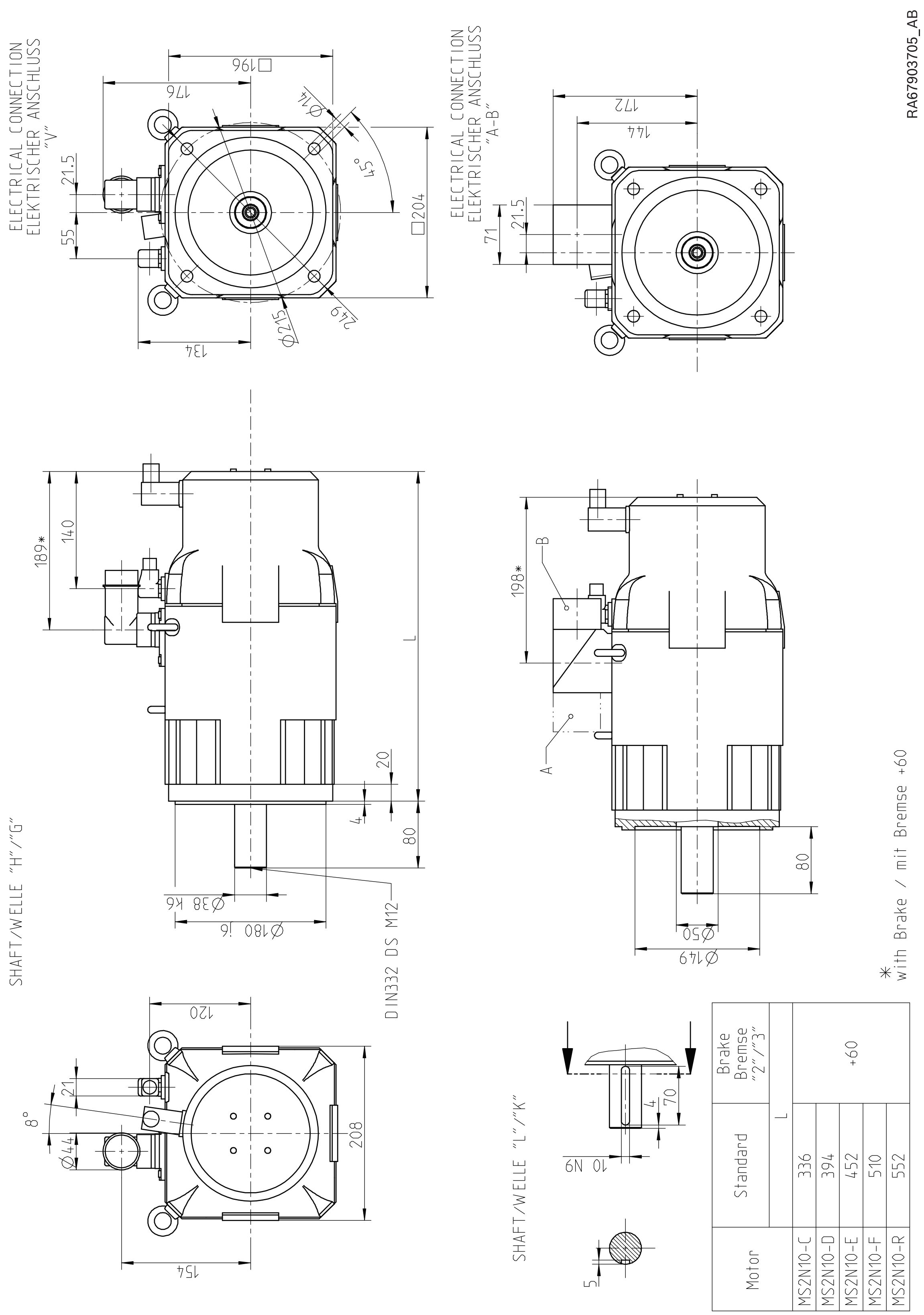



Fig. 301: MS2N10-□□□□A / MS2N10-□□□□B

## 6.7.7 MS2N10 water cooling with terminal box “C” – dimensional drawing

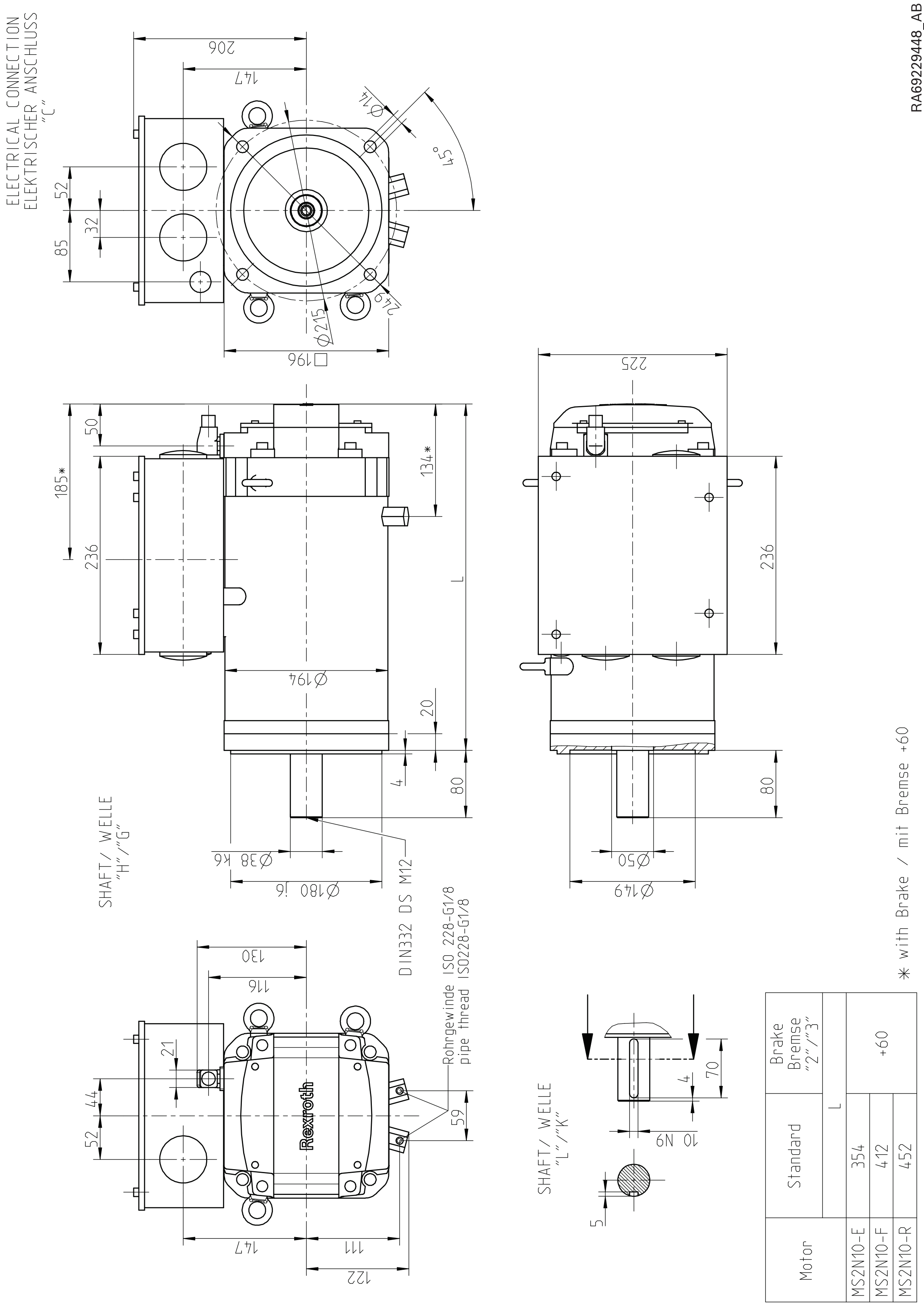
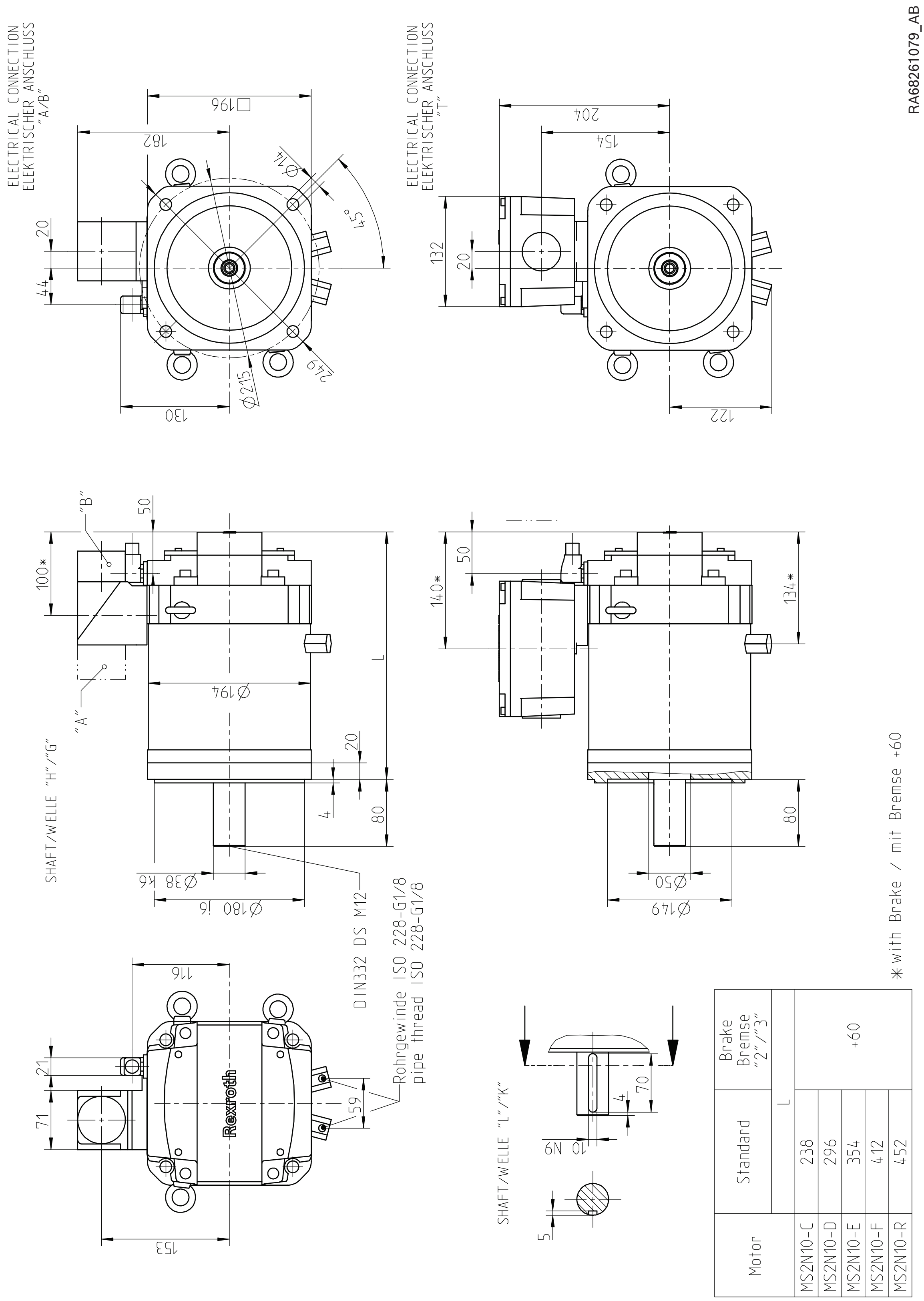



Fig. 302: MS2N10-□□□□L-□□C

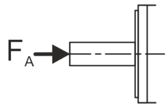
## 6.7.8 MS2N10 water cooling with connectors “A / B” or terminal box “T” – dimensional drawing




| Motor | Standard L | Brake / Bremse "2"/"3" L |
|---|---|---|
| MS2N10-C | 238 | +60 |
| MS2N10-D | 296 | |
| MS2N10-E | 354 | |
| MS2N10-F | 412 | |
| MS2N10-R | 452 | |

Fig. 303: MS2N10-□□□□L

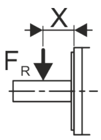
## 6.7.9 MS2N10 axial force




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

## 6.7.10 MS2N10 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.

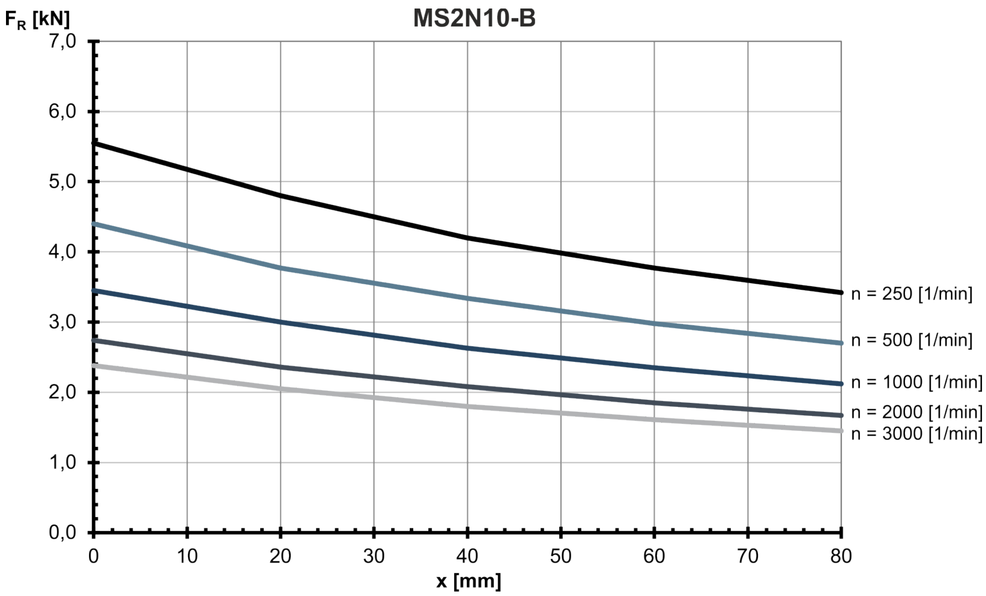



Fig. 304: MS2N10-B: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

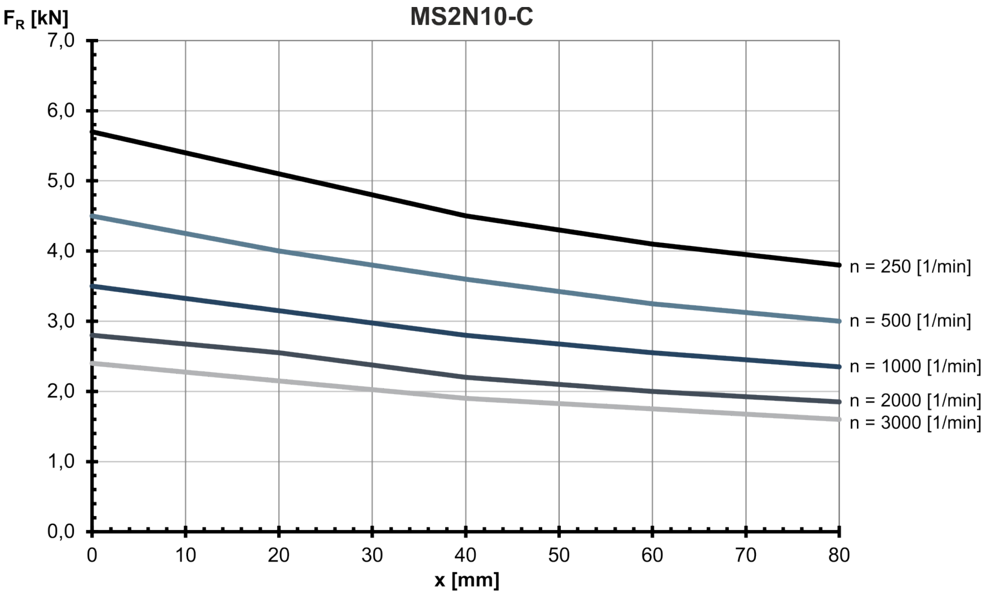



Fig. 305: MS2N10-C: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

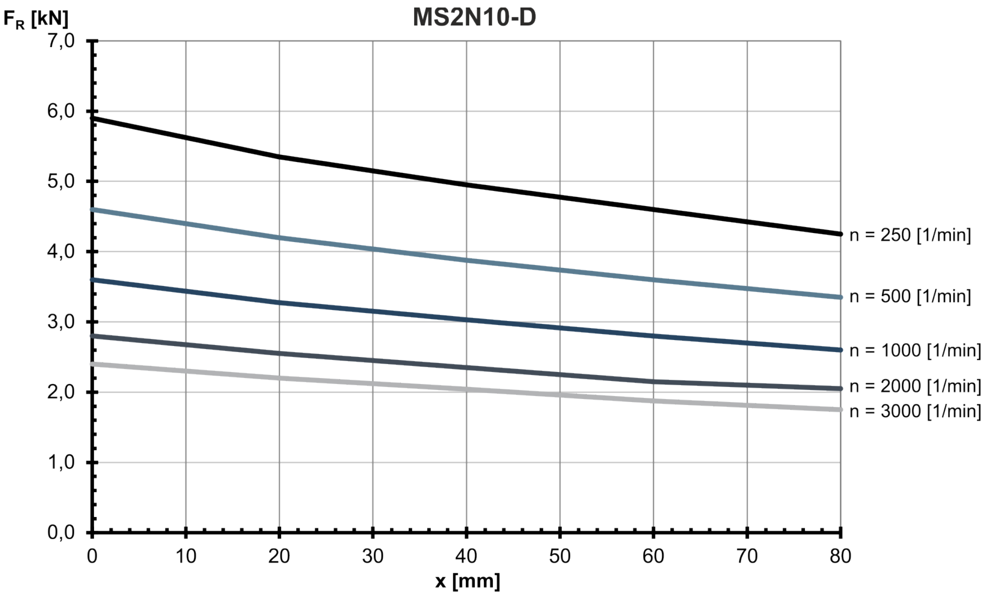



Fig. 306: MS2N10-D: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

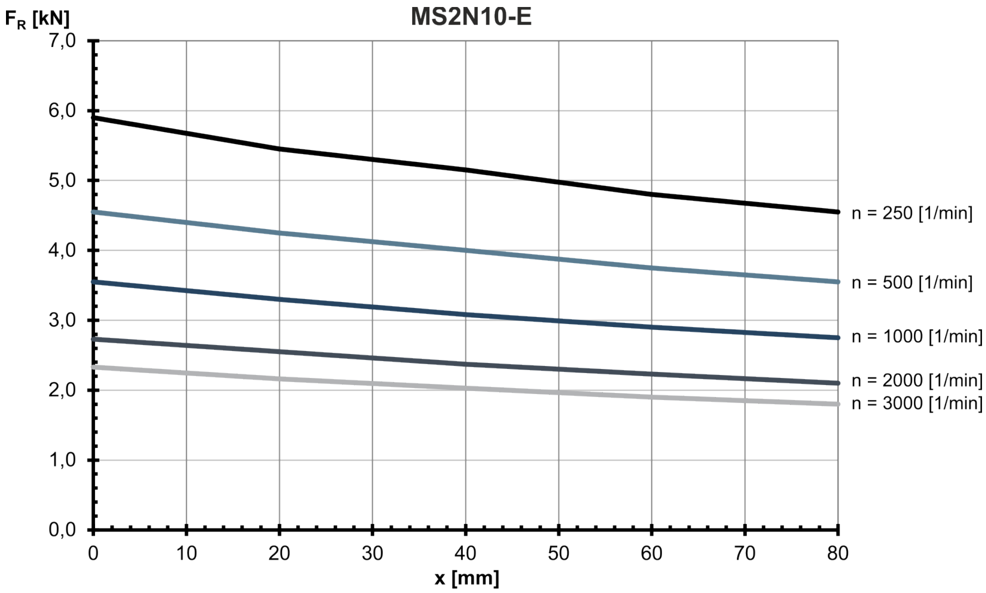



Fig. 307: MS2N10-E: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

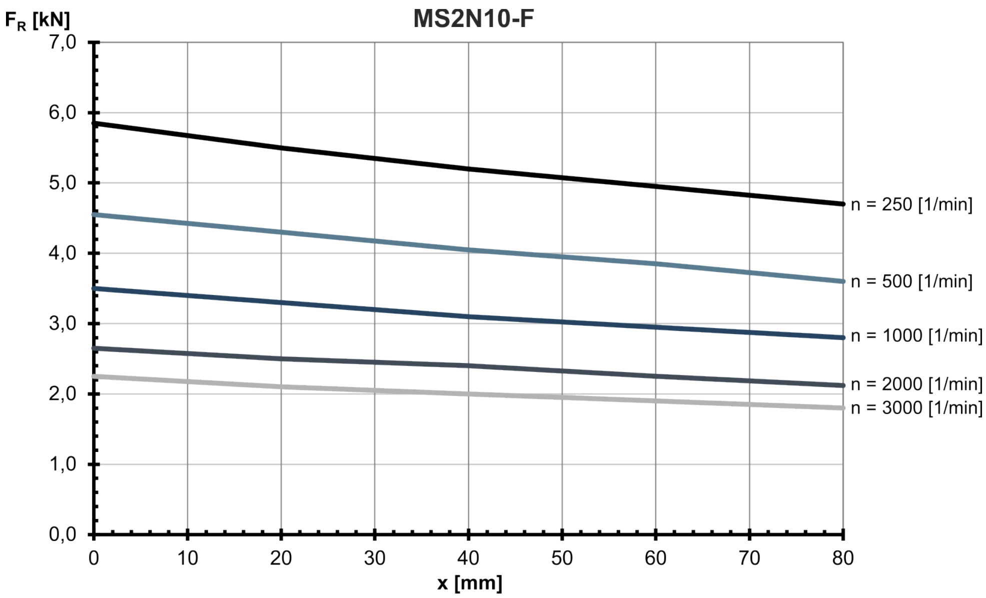



Fig. 308: MS2N10-F: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

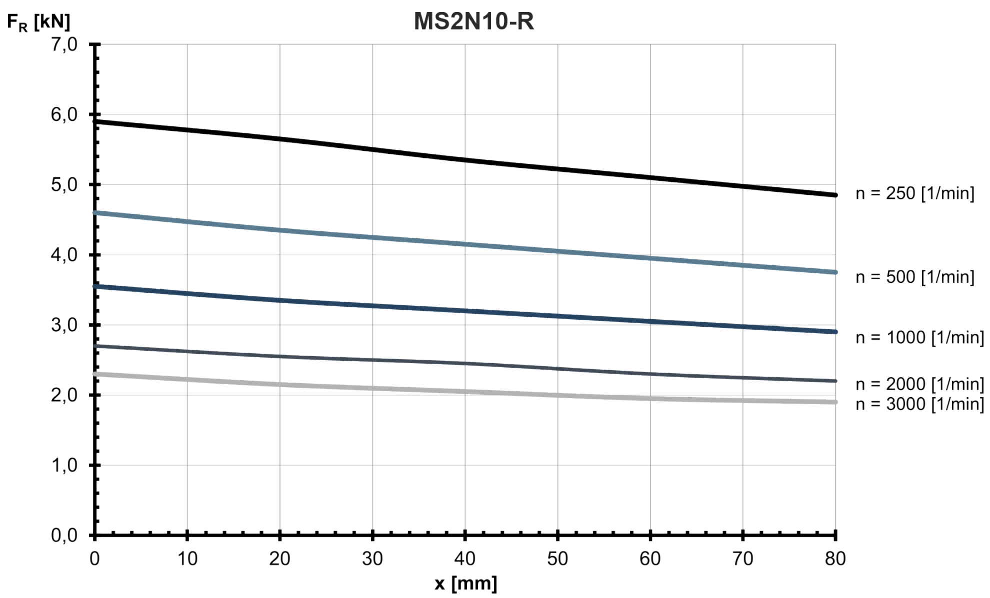



Fig. 309: MS2N10-R: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

# 6.8 MS2N13 technical data

## 6.8.1 Self-cooling

### MS2N13-B1BHN

| Designation | Symbol | Unit | MS2N13-B1BHN-□□□□0-□N | MS2N13-B1BHN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1)] | $M_{0\ 60K}$ | Nm | 92.5 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 36.5 | |
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 98.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 38.7 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | kg*m² | 0.0476 | 0.055 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 50.5 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 20.8 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 10.6 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 345 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 328 | |
| Maximum current | $I_{max(eff)}$ | A | 160 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 2.52 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 154 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.145 | |
| Winding inductance | $L_{12\_min}$ | mH | 5.6 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 11.3 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 350 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 60 | |
| Mass | $m_{mot}$ | kg | 89 | 95 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 115.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 2.10 |
| Maximum connection time | $t_1$ | ms | 0 | 100 |
| Maximum disconnection time | $t_2$ | ms | 0 | 240 |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

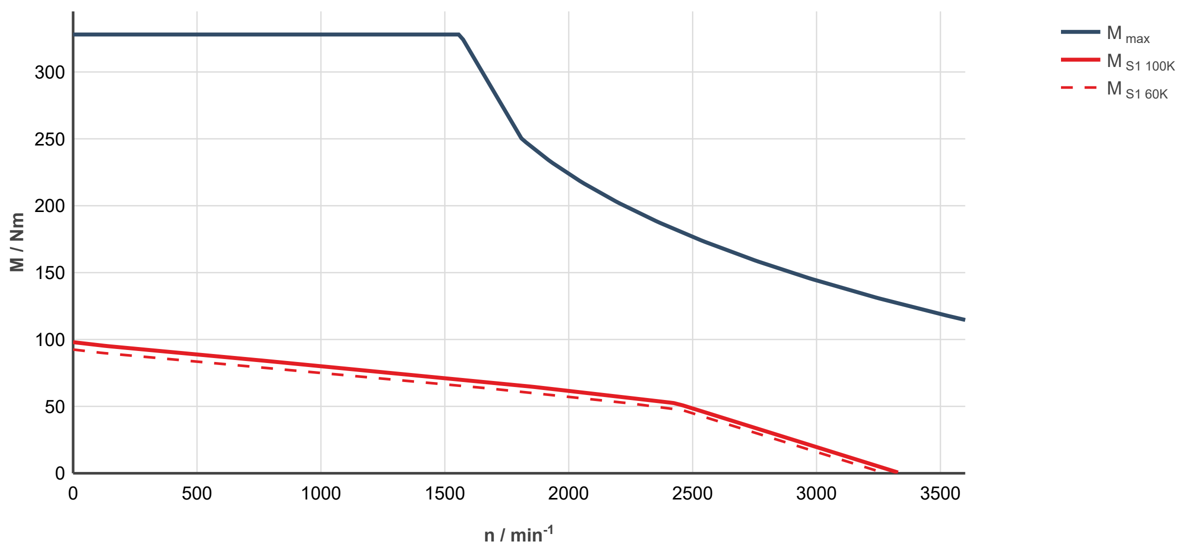



Fig. 310: MS2N13-B1BHN-□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

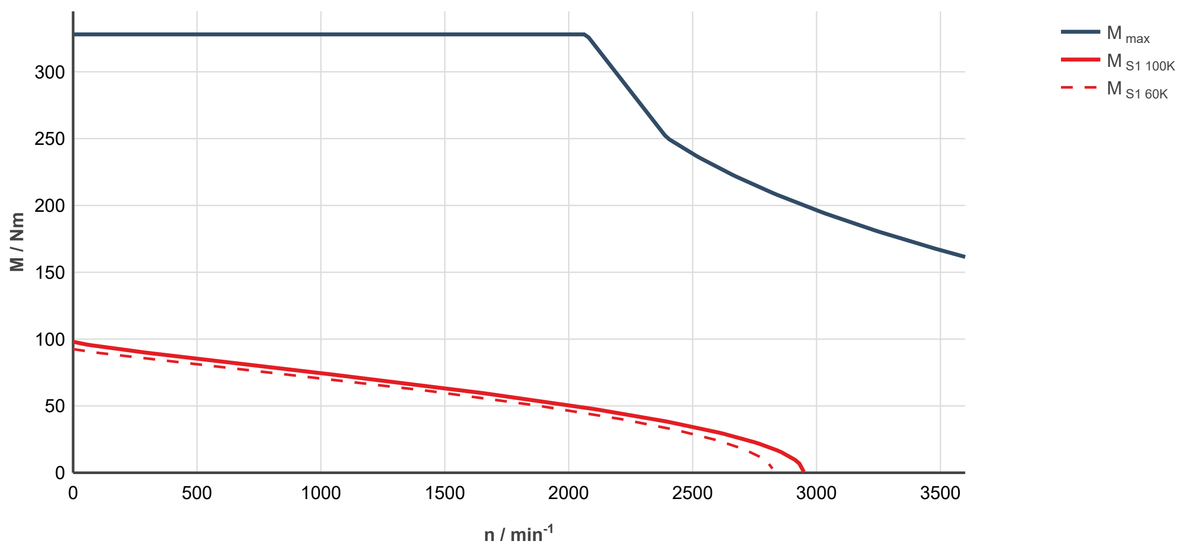



Fig. 311: MS2N13-B1BHN-□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 br ... 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-B1BNN

| Designation | Symbol | Unit | MS2N13-B1BNN-□□□□0-□N | MS2N13-B1BNN-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 92.5 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 50.7 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 98.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 53.6 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0476 | 0.055 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 33.6 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 19.7 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 7.0 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 345 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 328 | |
| Maximum current | $I_{max(eff)}$ | A | 220 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | - | 3 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 1.81 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 112 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.08 | |
| Winding inductance | $L_{12\_min}$ | mH | 3.0 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 10.1 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 350 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 60 | |
| Mass | $m_{mot}$ | kg | 89 | 95 |
| Holding brake | | | | |
| Holding torque | $M_4$ | Nm | 0 | 115.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 2.10 |
| Maximum connection time | $t_1$ | ms | 0 | 100 |
| Maximum disconnection time | $t_2$ | ms | 0 | 240 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

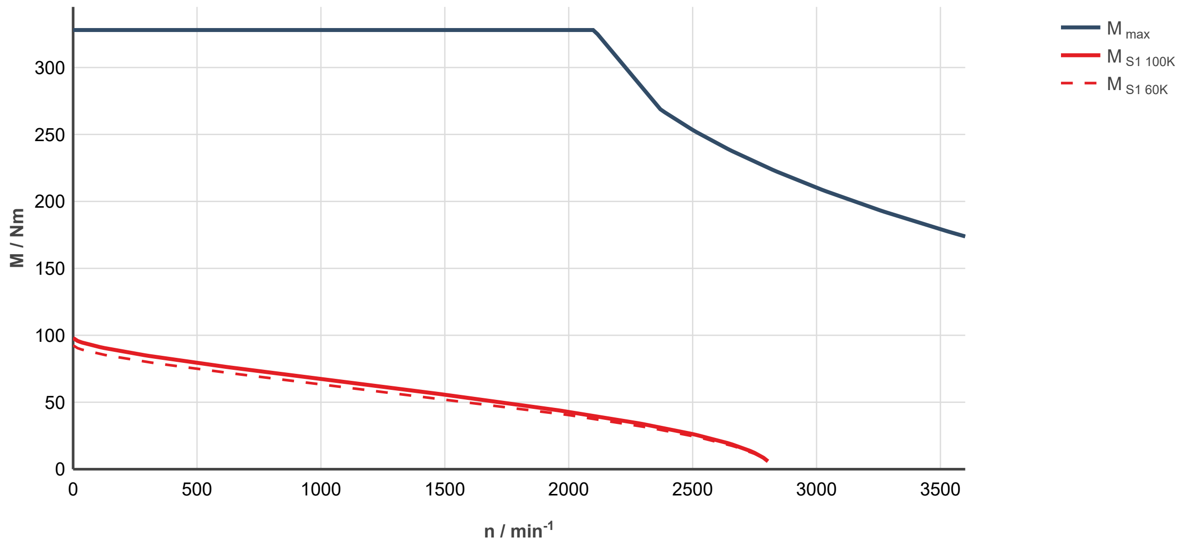



Fig. 312: MS2N13-B1BNN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

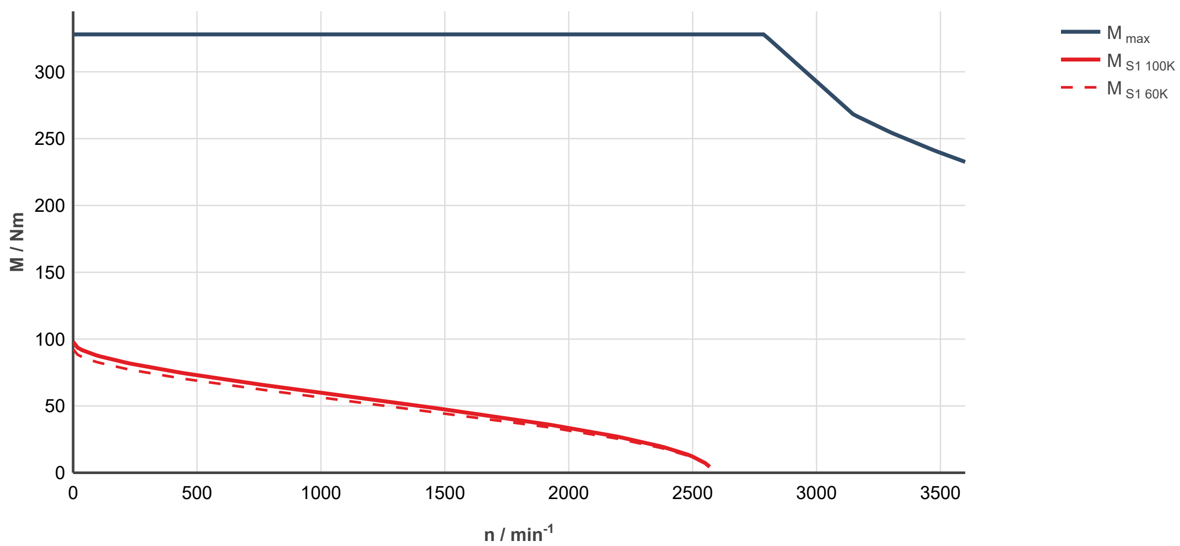



Fig. 313: MS2N13-B1BNN-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-C1BHN

| Designation | Symbol | Unit | MS2N13-C1BHN-□□□□0-□N | MS2N13-C1BHN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 122 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 48.4 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 132 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 52.3 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0618 | 0.0835 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 50.1 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 21.1 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 10.5 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 455 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 430 | |
| Maximum current | $I_{max(eff)}$ | A | 205 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.54 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 155.3 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.097 | |
| Winding inductance | $L_{12\_min}$ | mH | 3.8 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 13 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 310 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 63 | |
| Mass | $m_{mot}$ | kg | 105 | 123 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 280.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.70 |
| Maximum connection time | $t_1$ | ms | 0 | 300 |
| Maximum disconnection time | $t_2$ | ms | 0 | 350 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

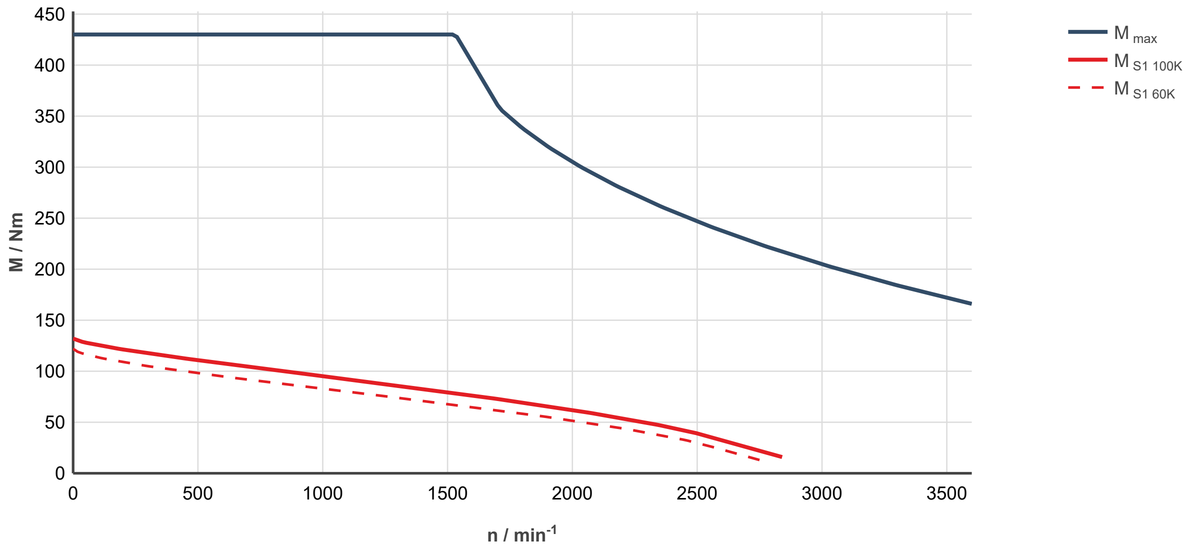



Fig. 314: MS2N13-C1BHN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

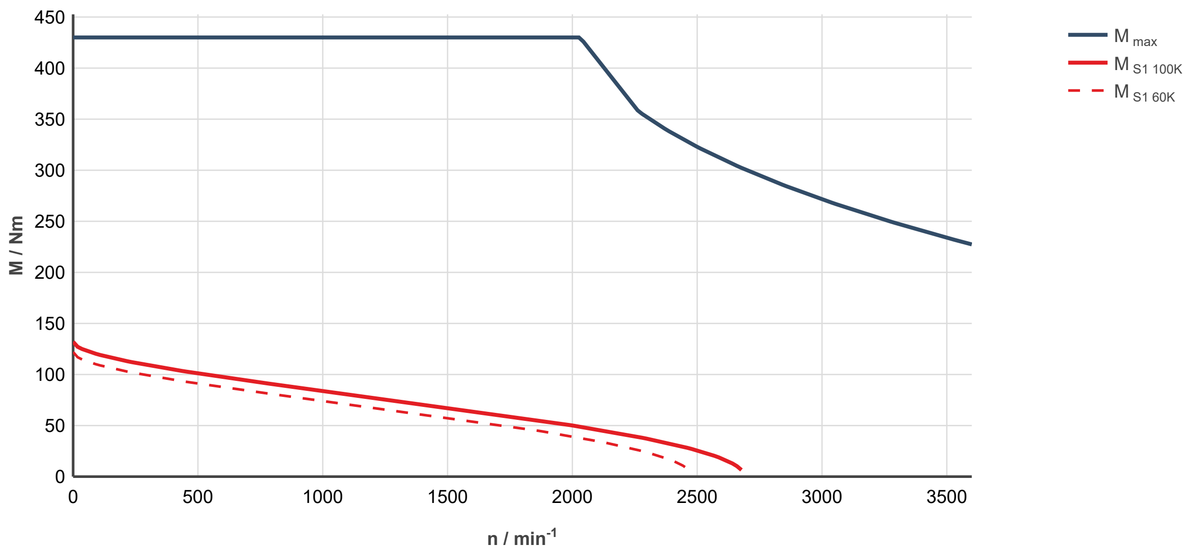



Fig. 315: MS2N13-C1BHN-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-C1BNN

| Designation | Symbol | Unit | MS2N13-C1BNN-□□□□0-□N | MS2N13-C1BNN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1)] | $M_{0\ 60K}$ | Nm | 122 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 63.5 | |
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 132 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 69 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | kg*m² | 0.0618 | 0.0835 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,500 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 59.3 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 32.3 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 9.3 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 455 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 430 | |
| Maximum current | $I_{max(eff)}$ | A | 270 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 1.93 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 119 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.059 | |
| Winding inductance | $L_{12\_min}$ | mH | 2.5 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 13 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 310 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 63 | |
| Mass | $m_{mot}$ | kg | 105 | 123 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 280.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.70 |
| Maximum connection time | $t_1$ | ms | 0 | 300 |
| Maximum disconnection time | $t_2$ | ms | 0 | 350 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

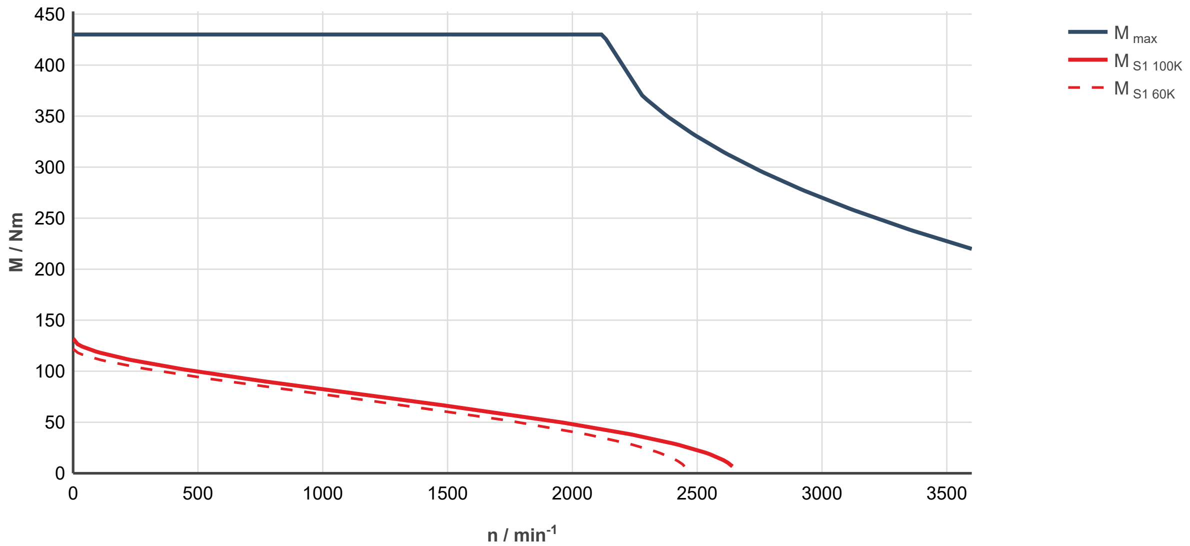



Fig. 316: MS2N13-C1BNN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

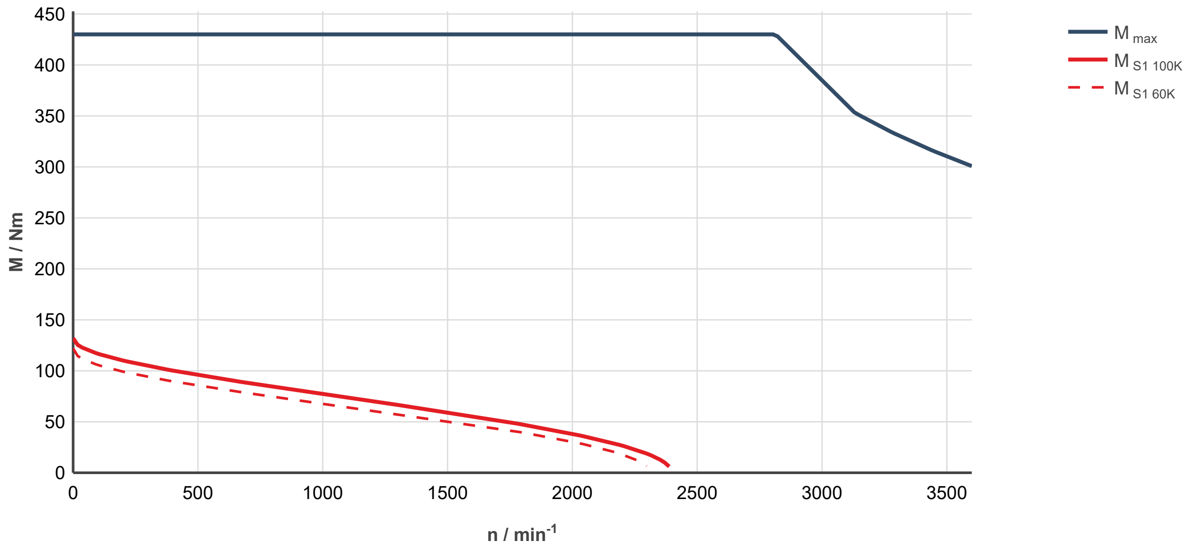



Fig. 317: MS2N13-C1BNN-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-D1BHN

| Designation | Symbol | Unit | MS2N13-D1BHN-□□□□0-□N | MS2N13-D1BHN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 142 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 56.5 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 158 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 62.5 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | $kg*m^2$ | 0.078 | 0.0976 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,500 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 67 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 27.8 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 10.5 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 578 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 546 | |
| Maximum current | $I_{max(eff)}$ | A | 265 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.56 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 156 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.072 | |
| Winding inductance | $L_{12\_min}$ | mH | 3.4 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 16.35 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 280 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 70 | |
| Mass | $m_{mot}$ | kg | 124 | 142 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 280.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.70 |
| Maximum connection time | $t_1$ | ms | 0 | 300 |
| Maximum disconnection time | $t_2$ | ms | 0 | 350 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

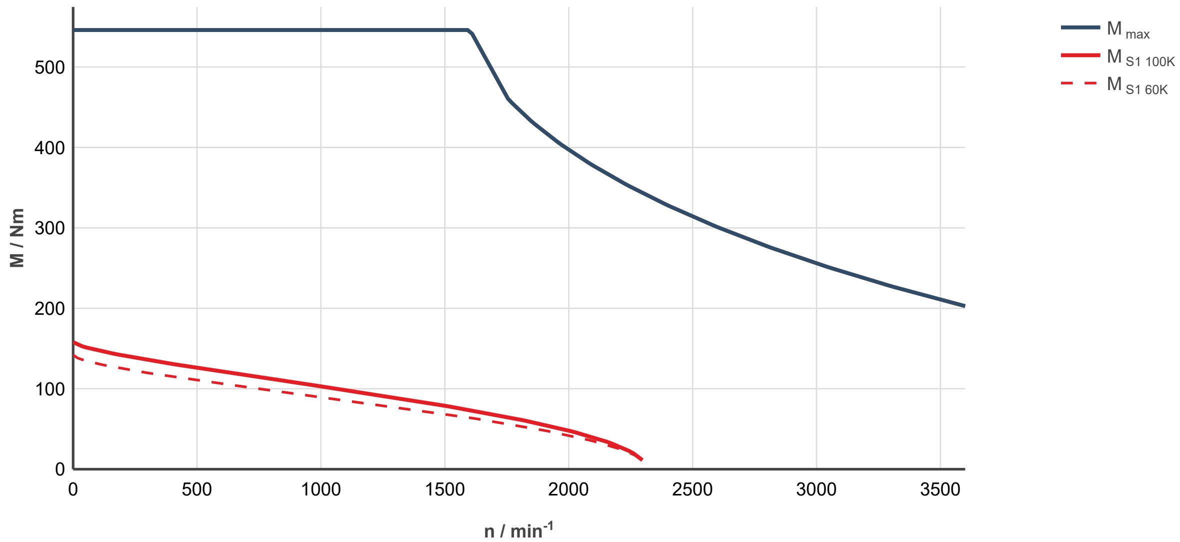



Fig. 318: MS2N13-D1BHN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

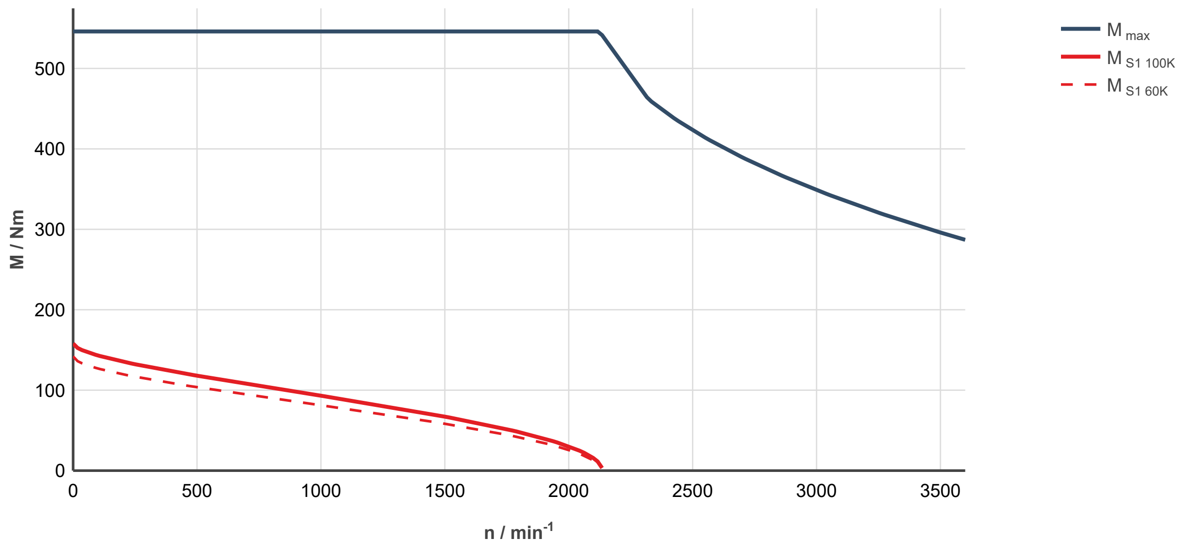



Fig. 319: MS2N13-D1BHN-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 … 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-D1BNN

| Designation | Symbol | Unit | MS2N13-D1BNN-□□□□0-□N | MS2N13-D1BNN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K [1] | $M_{0\ 60K}$ | Nm | 142 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 74.3 | |
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 158 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 83 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.078 | 0.0976 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,500 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 57.2 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 31.9 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 9.0 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 578 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 546 | |
| Maximum current | $I_{max(eff)}$ | A | 354 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 1.91 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 116.9 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.046 | |
| Winding inductance | $L_{12\_min}$ | mH | 1.9 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 19.5 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 280 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 70 | |
| Mass | $m_{mot}$ | kg | 124 | 142 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 280.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.70 |
| Maximum connection time | $t_1$ | ms | 0 | 300 |
| Maximum disconnection time | $t_2$ | ms | 0 | 350 |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

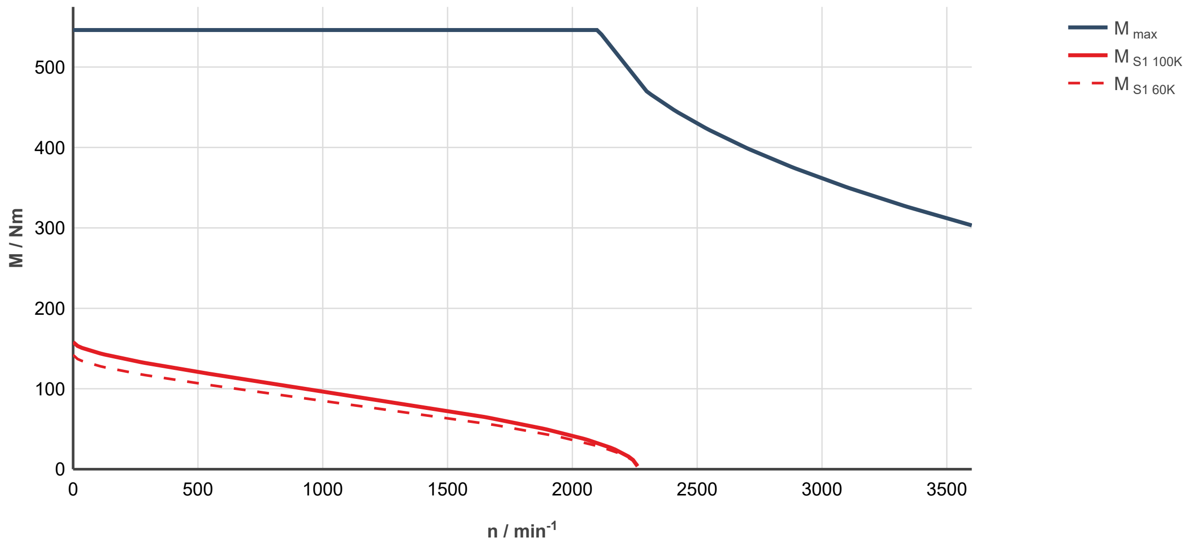



Fig. 320: MS2N13-D1BNN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

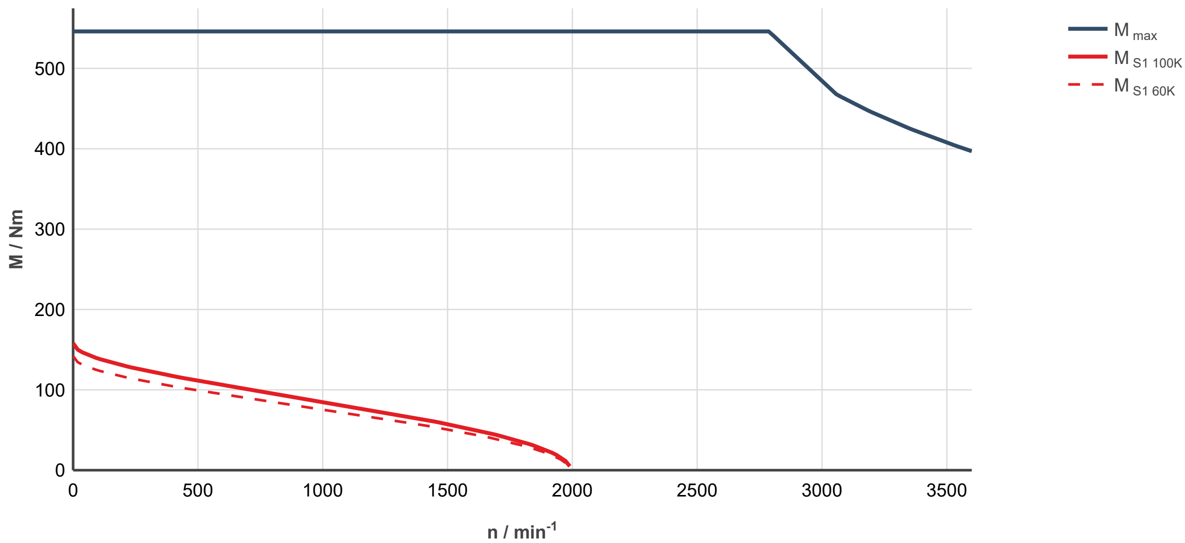



Fig. 321: MS2N13-D1BNN-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-E1BHN

| Designation | Symbol | Unit | MS2N13-E1BHN-□□□□0-□N | MS2N13-E1BHN-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 60K 1) | $M_{0\ 60K}$ | Nm | 166.0 | |
| Standstill current - 60K | $I_{0\ 60K}$ | A | 64.7 | |
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 188.0 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 73.2 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.09 | 0.1117 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 1,200 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 85.9 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 34.4 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 10.8 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 692 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 657 | |
| Maximum current | $I_{max(eff)}$ | A | 305 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.60 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 159.8 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.058 | |
| Winding inductance | $L_{12\_min}$ | mH | 2.6 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 24.3 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 250 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 80 | |
| Mass | $m_{mot}$ | kg | 143 | 161 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 280.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.70 |
| Maximum connection time | $t_1$ | ms | 0 | 300 |
| Maximum disconnection time | $t_2$ | ms | 0 | 350 |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

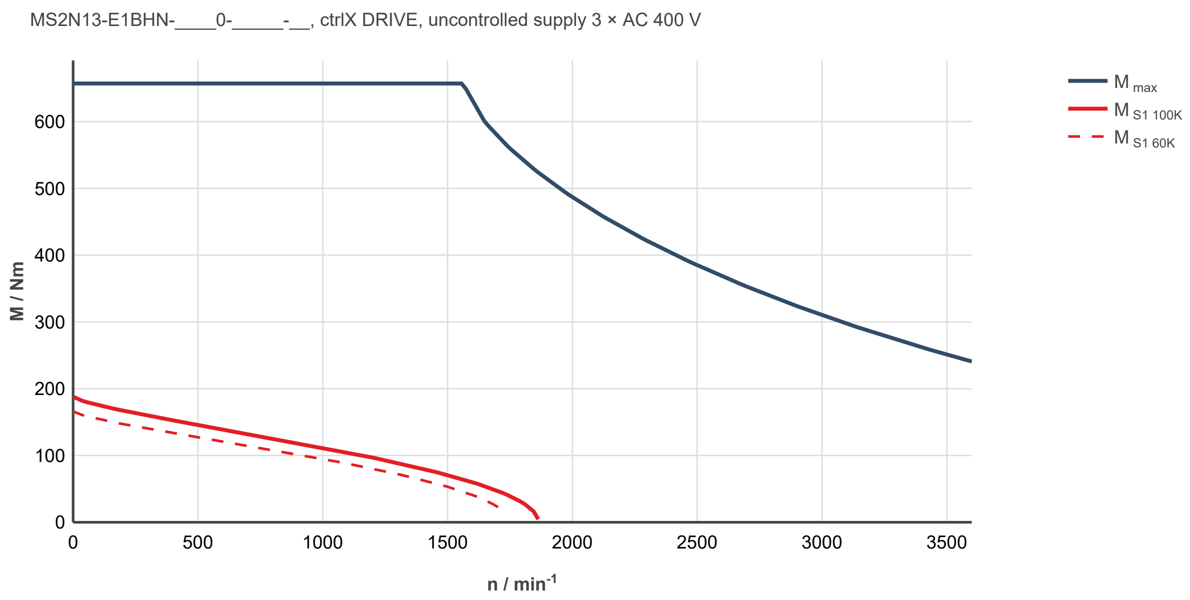



Fig. 322: MS2N13-E1BHN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

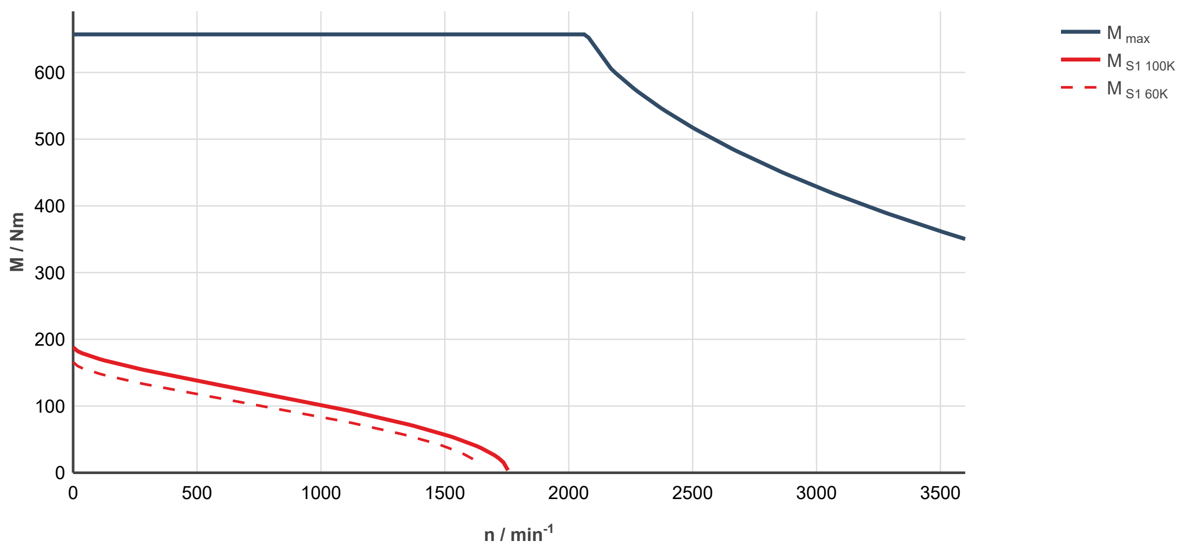



Fig. 323: MS2N13-E1BHN-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-E1BNN

<table>
<tr><th>Designation</th><th>Symbol</th><th>Unit</th><th>MS2N13-E1BNN-□□□□0-□N</th><th>MS2N13-E1BNN-□□□□2-□N</th></tr>
<tr><td>Standstill torque - 60K [1)]</td><td>$M_{0\ 60K}$</td><td>Nm</td><td colspan="2">166.0</td></tr>
<tr><td>Standstill current - 60K</td><td>$I_{0\ 60K}$</td><td>A</td><td colspan="2">83.8</td></tr>
<tr><td>Standstill torque - 100K [1)]</td><td>$M_{0\ 100K}$</td><td>Nm</td><td colspan="2">188.0</td></tr>
<tr><td>Standstill current - 100K</td><td>$I_{0\ 100K}$</td><td>A</td><td colspan="2">94.8</td></tr>
<tr><td>Moment of inertia of rotor [1)]</td><td>$J_{rot}$</td><td>kg*m²</td><td>0.09</td><td>0.1117</td></tr>
<tr><td>Rated speed - 100K</td><td>$n_{N\ 100K}$</td><td>1/min</td><td colspan="2">900</td></tr>
<tr><td>Rated torque - 100K [1)]</td><td>$M_{N\ 100K}$</td><td>Nm</td><td colspan="2">93.7</td></tr>
<tr><td>Rated current - 100K</td><td>$I_{N\ 100K}$</td><td>A</td><td colspan="2">48.9</td></tr>
<tr><td>Rated power - 100K [1)]</td><td>$P_{N\ 100K}$</td><td>kW</td><td colspan="2">8.8</td></tr>
<tr><td>Maximum torque 20 °C (cold) [1)]</td><td>$M_{max\ 20°C}$</td><td>Nm</td><td colspan="2">692</td></tr>
<tr><td>Maximum torque 100K (warm) [1)]</td><td>$M_{max\ 100K}$</td><td>Nm</td><td colspan="2">657</td></tr>
<tr><td>Maximum current</td><td>$I_{max(eff)}$</td><td>A</td><td colspan="2">400</td></tr>
<tr><td>Maximum speed (electrical)</td><td>$n_{max\ el}$</td><td>1/min</td><td colspan="2">3,600</td></tr>
<tr><td>Maximum speed (mechanical)</td><td>$n_{max\ mech}$</td><td>1/min</td><td colspan="2">3,600</td></tr>
<tr><td>Number of pole pairs</td><td>p</td><td>–</td><td colspan="2">3</td></tr>
<tr><td>Torque constant at 20 °C [1)]</td><td>$K_m$</td><td>Nm/A</td><td colspan="2">1.83</td></tr>
<tr><td>Voltage constant at 20 °C [1)]</td><td>$K_E$</td><td>V/1000 $min^{-1}$</td><td colspan="2">122.4</td></tr>
<tr><td>Winding resistance at 20 °C</td><td>$R_{12}$</td><td>Ohm</td><td colspan="2">0.033</td></tr>
<tr><td>Winding inductance</td><td>$L_{12\_min}$</td><td>mH</td><td colspan="2">1.5</td></tr>
<tr><td>Leakage capacitance of the component</td><td>$C_{ab}$</td><td>nF</td><td colspan="2">21.8</td></tr>
<tr><td>Thermal time constant of winding</td><td>$T_{th\_W}$</td><td>s</td><td colspan="2">250</td></tr>
<tr><td>Thermal time constant of motor</td><td>$T_{th\_M}$</td><td>min</td><td colspan="2">80</td></tr>
<tr><td>Mass</td><td>$m_{mot}$</td><td>kg</td><td>143</td><td>161</td></tr>
<tr><td colspan="5"><u>Holding brake</u></td></tr>
<tr><td>Holding torque</td><td>$M_4$</td><td>Nm</td><td>0</td><td>280.00</td></tr>
<tr><td>Rated voltage</td><td>$U_N$</td><td>V</td><td>0</td><td>24</td></tr>
<tr><td>Rated current</td><td>$I_N$</td><td>A</td><td>0</td><td>1.70</td></tr>
<tr><td>Maximum connection time</td><td>$t_1$</td><td>ms</td><td>0</td><td>300</td></tr>
<tr><td>Maximum disconnection time</td><td>$t_2$</td><td>ms</td><td>0</td><td>350</td></tr>
<tr><td colspan="5">1) For tolerance details refer to ➦Chapter 5.4 Tolerances</td></tr>
</table>

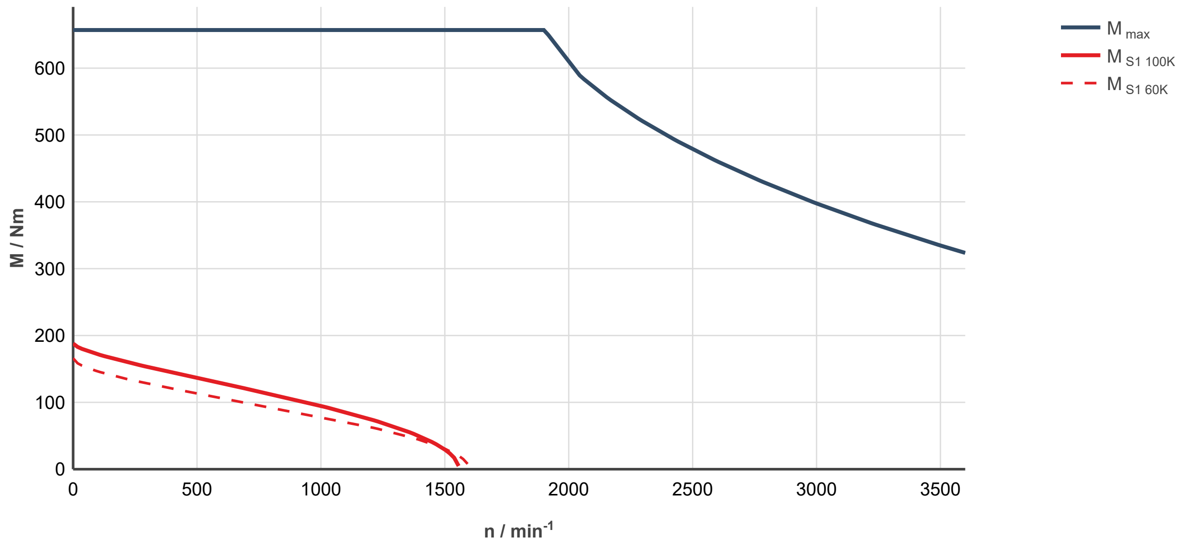



Fig. 324: MS2N13-E1BNN-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

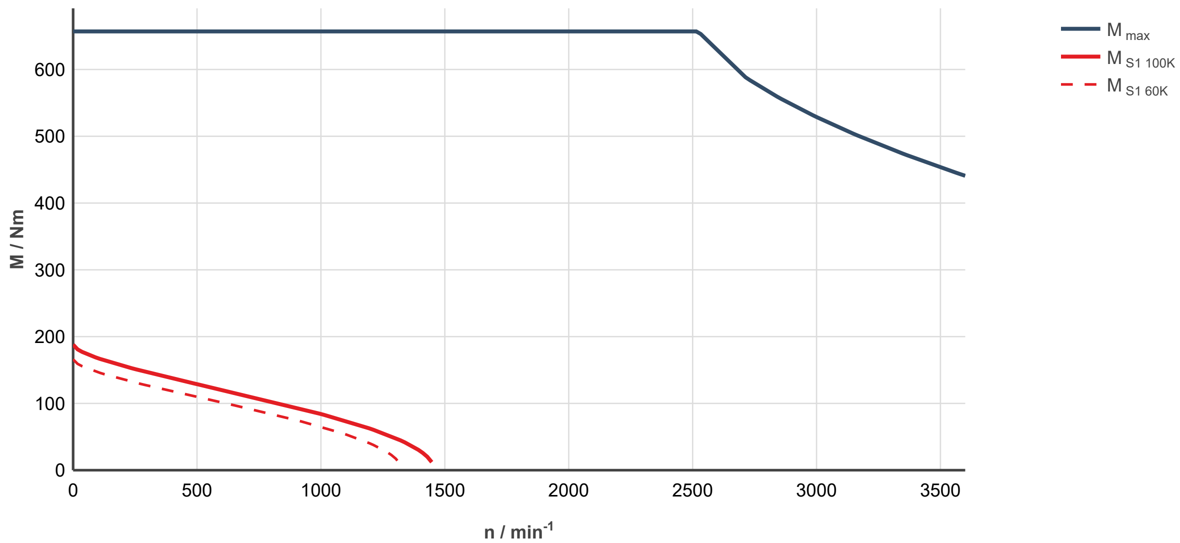



Fig. 325: MS2N13-E1BNN-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

## 6.8.2 Forced ventilation

### MS2N13-B1BHC

| Designation | Symbol | Unit | MS2N13-B1BHC-□□□□0-□N | MS2N13-B1BHC-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 160 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 63 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m$^2$ | 0.0476 | 0.055 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 139 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 56 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 29 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 345 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 328 | |
| Maximum current | $I_{max(eff)}$ | A | 160 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.52 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 min$^{-1}$ | 154 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.145 | |
| Winding inductance | $L_{12\_min}$ | mH | 5.6 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 11.3 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 300 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 14.8 | |
| Mass | $m_{mot}$ | kg | 92 | 98 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 115.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 2.10 |
| Maximum connection time | $t_1$ | ms | 0 | 100 |
| Maximum disconnection time | $t_2$ | ms | 0 | 240 |
| **Fan data** | | | | |
| Rated voltage | $U_N$ | V | 400/460 | |
| Rated current | $I_N$ | A | 0.19/0.21 | |
| Frequency | $f_N$ | Hz | 50/60 | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

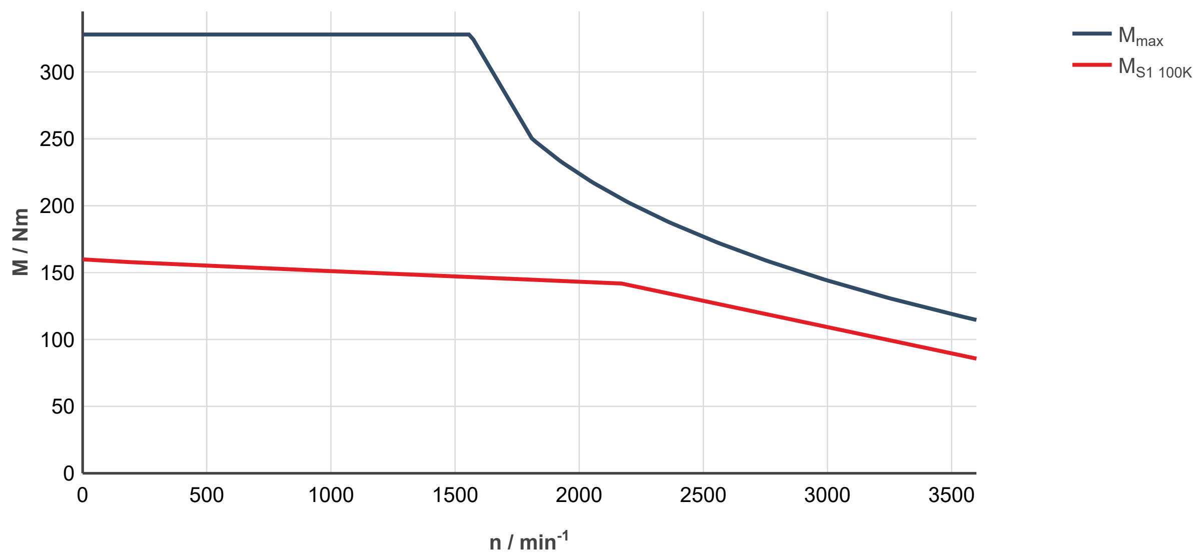



Fig. 326: MS2N13-B1BHC-□□□□0, ctrlX DRIVE,uncontrolled supply 3 × AC 400 V
$M_{max}$ Characteristic curve applies to maximum torque 20 °C (cold)

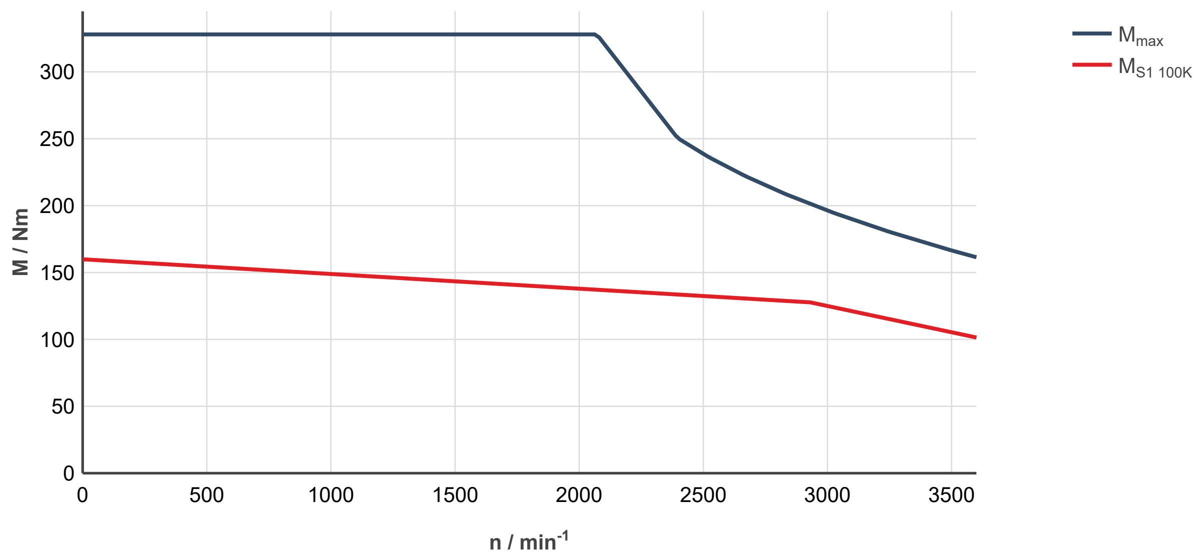



Fig. 327: MS2N13-B1BHC-□□□□0, ctrlX DRIVE,controlled supply 3 × AC 400 ... 480 V
$M_{max}$ Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-B1BNC

| Designation | Symbol | Unit | MS2N13-B1BNC-□□□□0-□N | MS2N13-B1BNC-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 160 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 87.3 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0476 | 0.055 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,860 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 100.2 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 56.5 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 30.0 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 345 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 328 | |
| Maximum current | $I_{max(eff)}$ | A | 220 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.81 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 112 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.08 | |
| Winding inductance | $L_{12\_min}$ | mH | 3.0 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 10.1 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 300 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 18 | |
| Mass | $m_{mot}$ | kg | 92 | 98 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 115.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 2.10 |
| Maximum connection time | $t_1$ | ms | 0 | 100 |
| Maximum disconnection time | $t_2$ | ms | 0 | 240 |
| **Fan data** | | | | |
| Rated voltage | $U_N$ | V | 400/460 | |
| Rated current | $I_N$ | A | 0.19/0.21 | |
| Frequency | $f_N$ | Hz | 50/60 | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

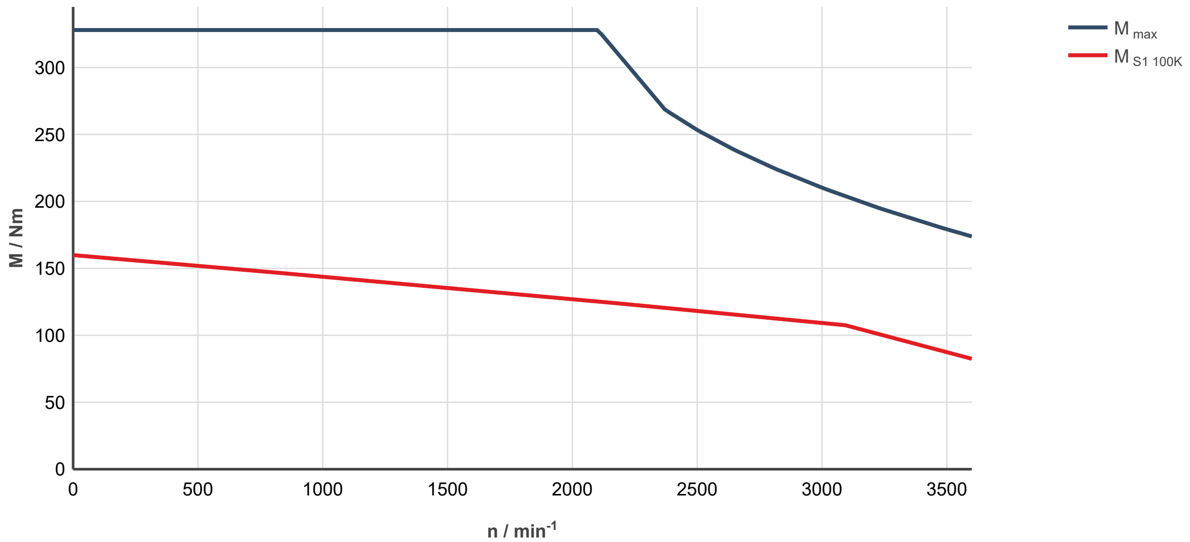



Fig. 328: MS2N13-B1BNC-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

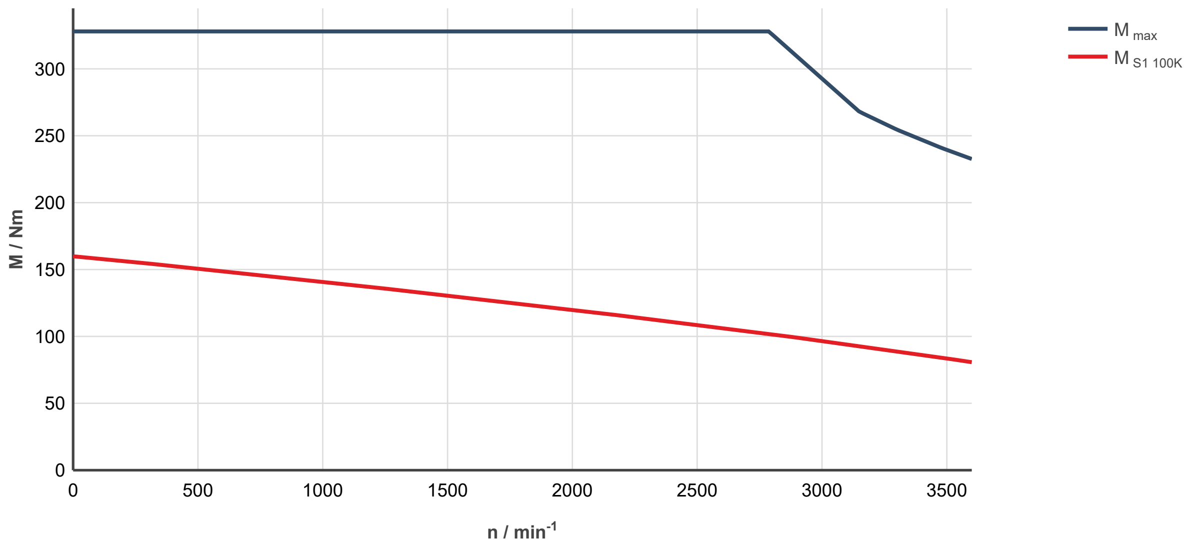



Fig. 329: MS2N13-B1BNC-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-C1BHC

| Designation | Symbol | Unit | MS2N13-C1BHC-□□□□0-□N | MS2N13-C1BHC-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 216 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 85 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0618 | 0.0835 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 183 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 73.3 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 38.3 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 455 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 430 | |
| Maximum current | $I_{max(eff)}$ | A | 205 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.54 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 155.3 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.097 | |
| Winding inductance | $L_{12\_min}$ | mH | 3.8 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 13 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 230 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 14.8 | |
| Mass | $m_{mot}$ | kg | 108 | 126 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 280.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.70 |
| Maximum connection time | $t_1$ | ms | 0 | 300 |
| Maximum disconnection time | $t_2$ | ms | 0 | 350 |
| **Fan data** | | | | |
| Rated voltage | $U_N$ | V | 400/460 | |
| Rated current | $I_N$ | A | 0.19/0.21 | |
| Frequency | $f_N$ | Hz | 50/60 | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

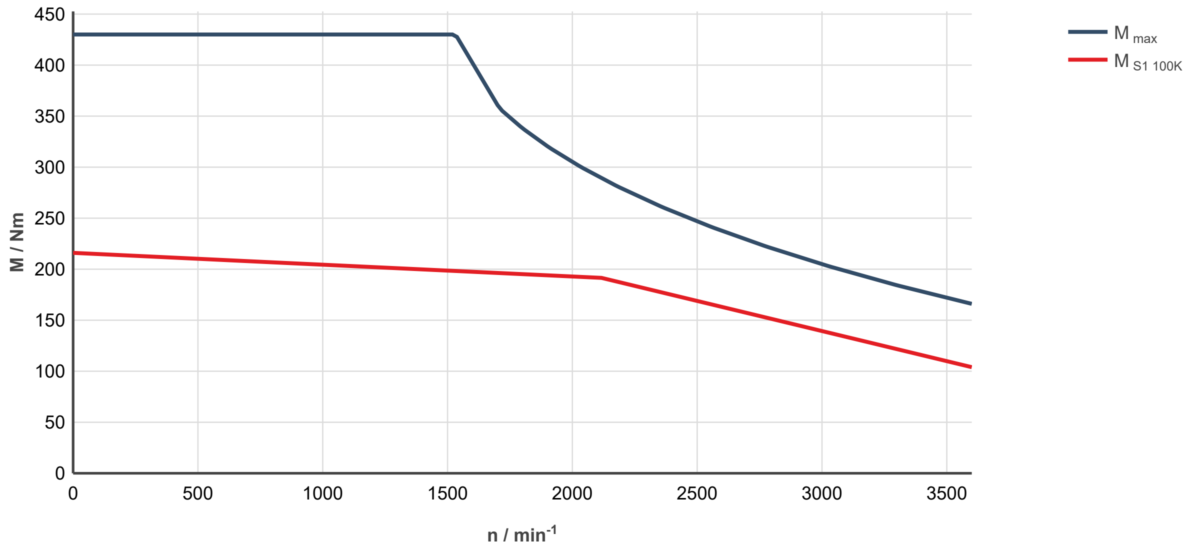



Fig. 330: MS2N13-C1BHC-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$ Characteristic curve applies to maximum torque 20 °C (cold)

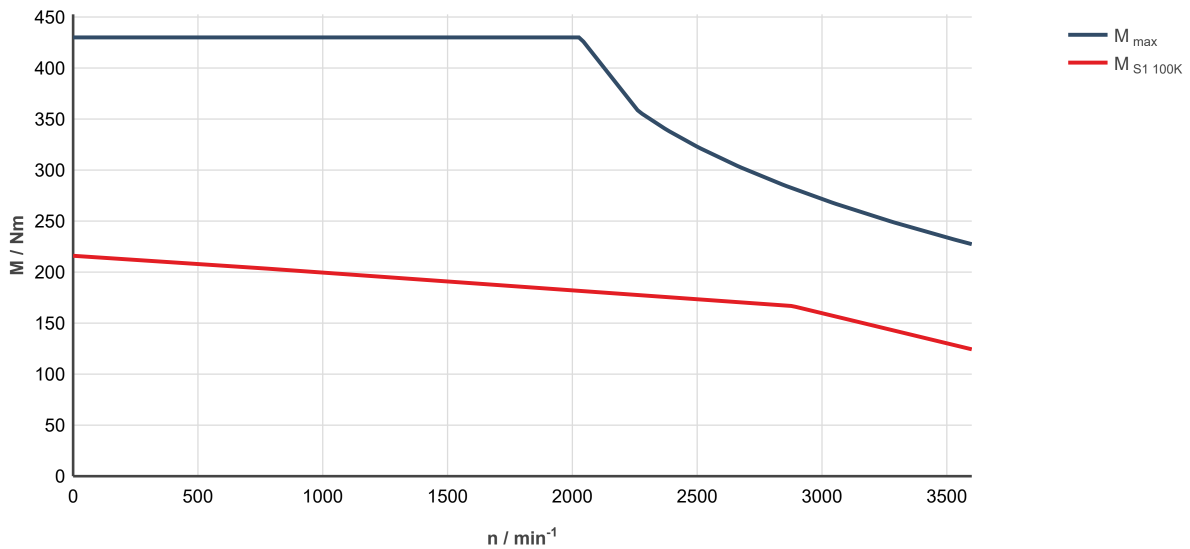



Fig. 331: MS2N13-C1BHC-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V
$M_{max}$ Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-C1BNC

| Designation | Symbol | Unit | MS2N13-C1BNC-□□□□0-□N | MS2N13-C1BNC-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 216 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 111.5 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0618 | 0.0835 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,860 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 136.8 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 73.5 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 41.0 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 457 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 430 | |
| Maximum current | $I_{max(eff)}$ | A | 270 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.93 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 119 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.059 | |
| Winding inductance | $L_{12\_min}$ | mH | 2.5 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 13 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 240 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 14.8 | |
| Mass | $m_{mot}$ | kg | 108 | 126 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 280.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.70 |
| Maximum connection time | $t_1$ | ms | 0 | 300 |
| Maximum disconnection time | $t_2$ | ms | 0 | 350 |
| <u>Fan data</u> | | | | |
| Rated voltage | $U_N$ | V | 400/460 | |
| Rated current | $I_N$ | A | 0.19/0.21 | |
| Frequency | $f_N$ | Hz | 50/60 | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

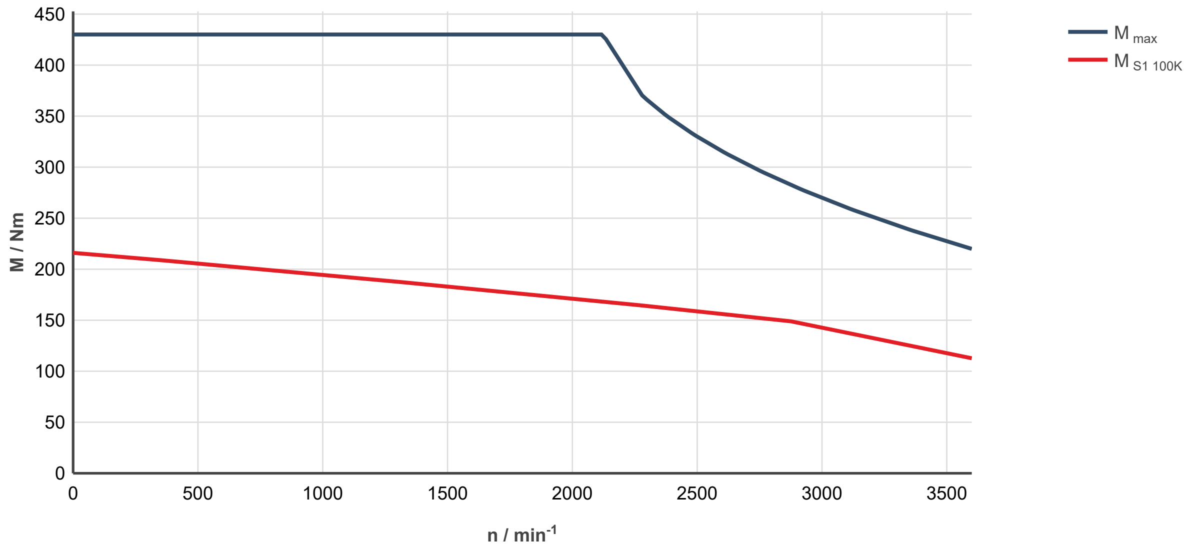



Fig. 332: MS2N13-C1BNC-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

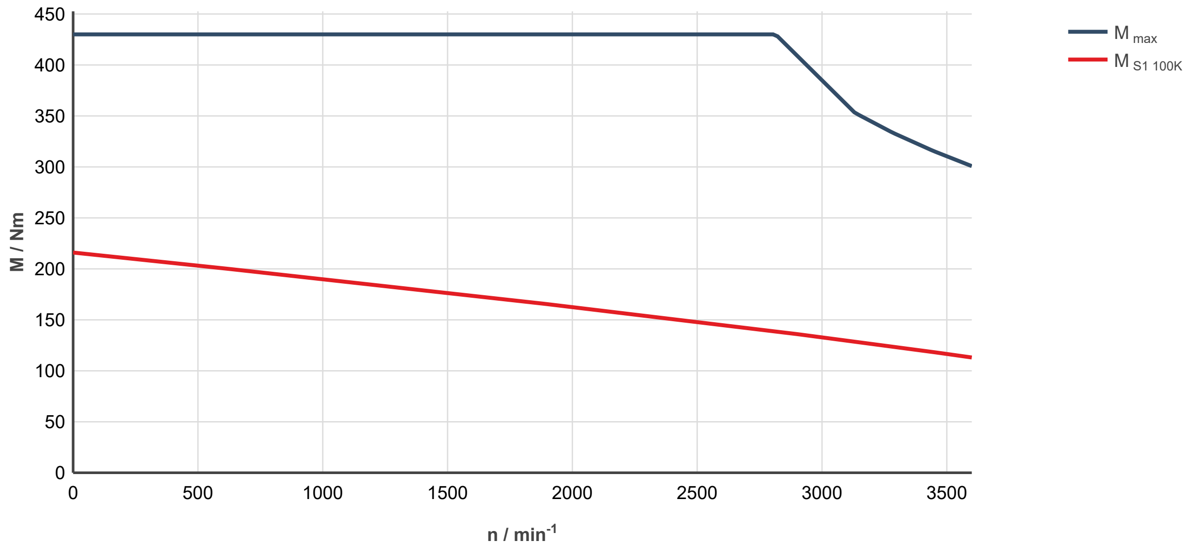



Fig. 333: MS2N13-C1BNC-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-D1BHC

| Designation | Symbol | Unit | MS2N13-D1BHC-□□□□0-□N | MS2N13-D1BHC-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K [1)] | $M_{0\ 100K}$ | Nm | 258 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 101.5 | |
| Moment of inertia of rotor [1)] | $J_{rot}$ | kg*m² | 0.078 | 0.0976 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K [1)] | $M_{N\ 100K}$ | Nm | 205 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 82.5 | |
| Rated power - 100K [1)] | $P_{N\ 100K}$ | kW | 42.9 | |
| Maximum torque 20 °C (cold) [1)] | $M_{max\ 20°C}$ | Nm | 578 | |
| Maximum torque 100K (warm) [1)] | $M_{max\ 100K}$ | Nm | 546 | |
| Maximum current | $I_{max(eff)}$ | A | 265 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C [1)] | $K_m$ | Nm/A | 2.56 | |
| Voltage constant at 20 °C [1)] | $K_E$ | V/1000 $min^{-1}$ | 156 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.072 | |
| Winding inductance | $L_{12\_min}$ | mH | 3.4 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 16.35 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 240 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 18 | |
| Mass | $m_{mot}$ | kg | 127 | 144 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 280.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.70 |
| Maximum connection time | $t_1$ | ms | 0 | 300 |
| Maximum disconnection time | $t_2$ | ms | 0 | 350 |
| <u>Fan data</u> | | | | |
| Rated voltage | $U_N$ | V | 400/460 | |
| Rated current | $I_N$ | A | 0.19/0.21 | |
| Frequency | $f_N$ | Hz | 50/60 | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

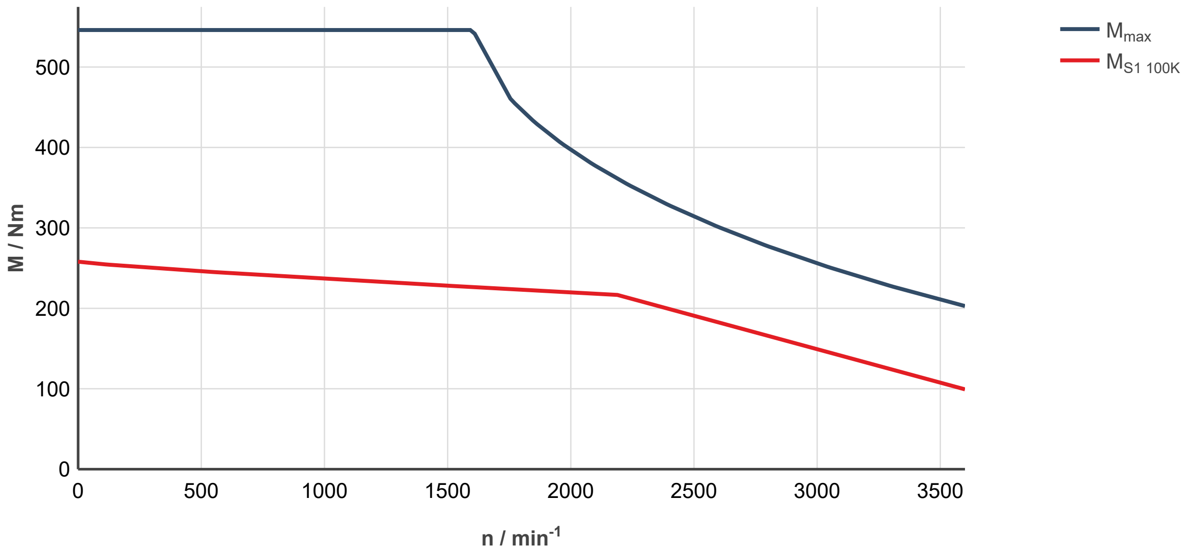



Fig. 334: MS2N13-D1BHC-▯▯▯▯▯0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V(1)
$M_{max}$ Characteristic curve applies to maximum torque 20 °C (cold)

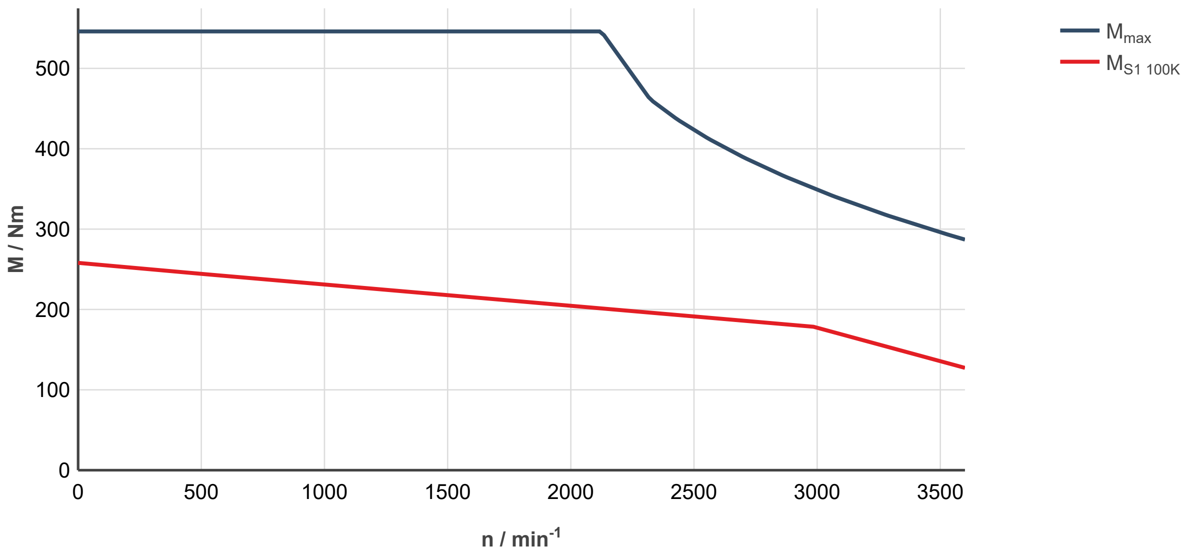



Fig. 335: MS2N13-D1BHC-▯▯▯▯▯0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V
$M_{max}$ Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-D1BNC

| Designation | Symbol | Unit | MS2N13-D1BNC-□□□□0-□N | MS2N13-D1BNC-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 258 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 134.5 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.078 | 0.0976 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,000 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 133 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 72 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 41.8 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 578 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 546 | |
| Maximum current | $I_{max(eff)}$ | A | 354 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 1.91 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 116.9 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.046 | |
| Winding inductance | $L_{12\_min}$ | mH | 1.9 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 19.5 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 240 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 13.5 | |
| Mass | $m_{mot}$ | kg | 127 | 144 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 280.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.70 |
| Maximum connection time | $t_1$ | ms | 0 | 300 |
| Maximum disconnection time | $t_2$ | ms | 0 | 350 |
| **Fan data** | | | | |
| Rated voltage | $U_N$ | V | 400/460 | |
| Rated current | $I_N$ | A | 0.19/0.21 | |
| Frequency | $f_N$ | Hz | 50/60 | |
| 1) For tolerance details refer to ➡Chapter 5.4 Tolerances | | | | |

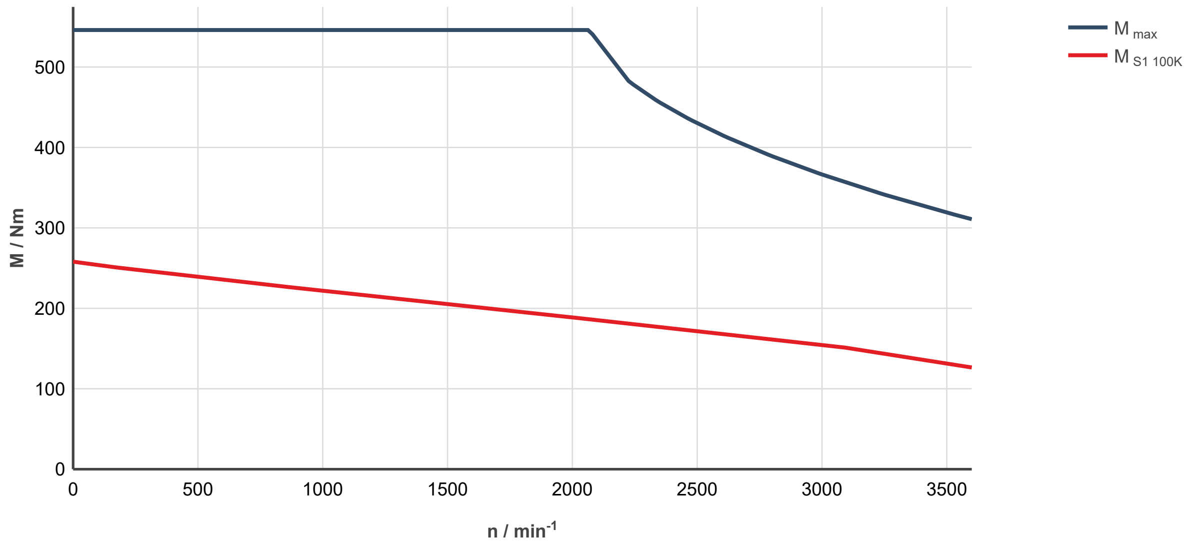



Fig. 336: MS2N13-D1BNC-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

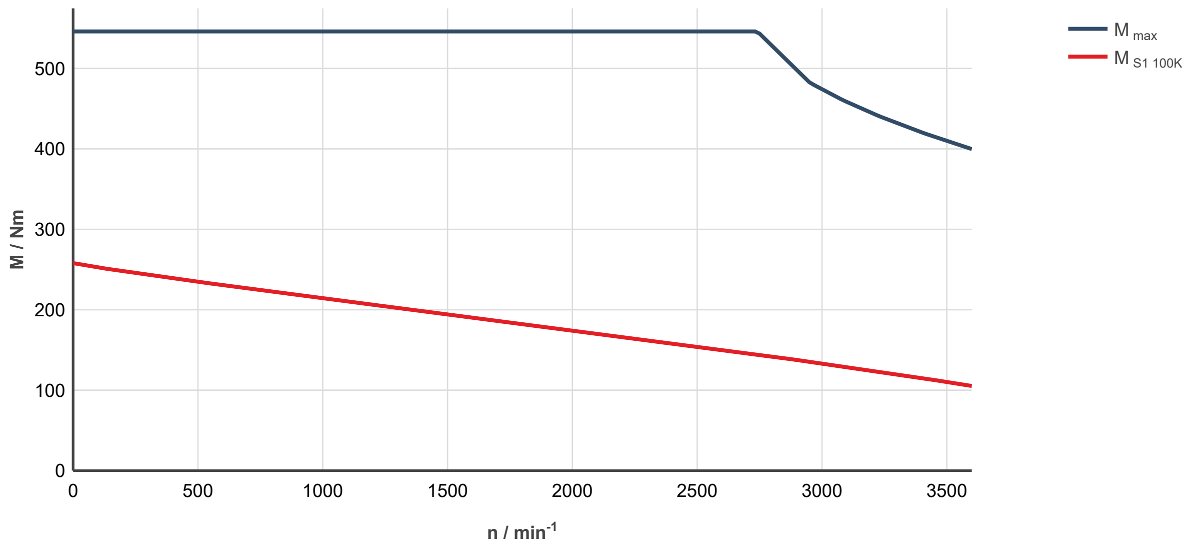



Fig. 337: MS2N13-D1BNC-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-E1BHC

| Designation | Symbol | Unit | MS2N13-E1BHC-□□□□0-□N | MS2N13-E1BHC-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 300 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 116 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.09 | 0.1117 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 228 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 90 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 47.8 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 692 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 657 | |
| Maximum current | $I_{max(eff)}$ | A | 305 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.60 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 159.8 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.058 | |
| Winding inductance | $L_{12\_min}$ | mH | 2.6 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 24.3 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 210 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 14.8 | |
| Mass | $m_{mot}$ | kg | 146 | 164 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 280.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.70 |
| Maximum connection time | $t_1$ | ms | 0 | 300 |
| Maximum disconnection time | $t_2$ | ms | 0 | 350 |
| **Fan data** | | | | |
| Rated voltage | $U_N$ | V | 400/460 | |
| Rated current | $I_N$ | A | 0.19/0.21 | |
| Frequency | $f_N$ | Hz | 50/60 | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

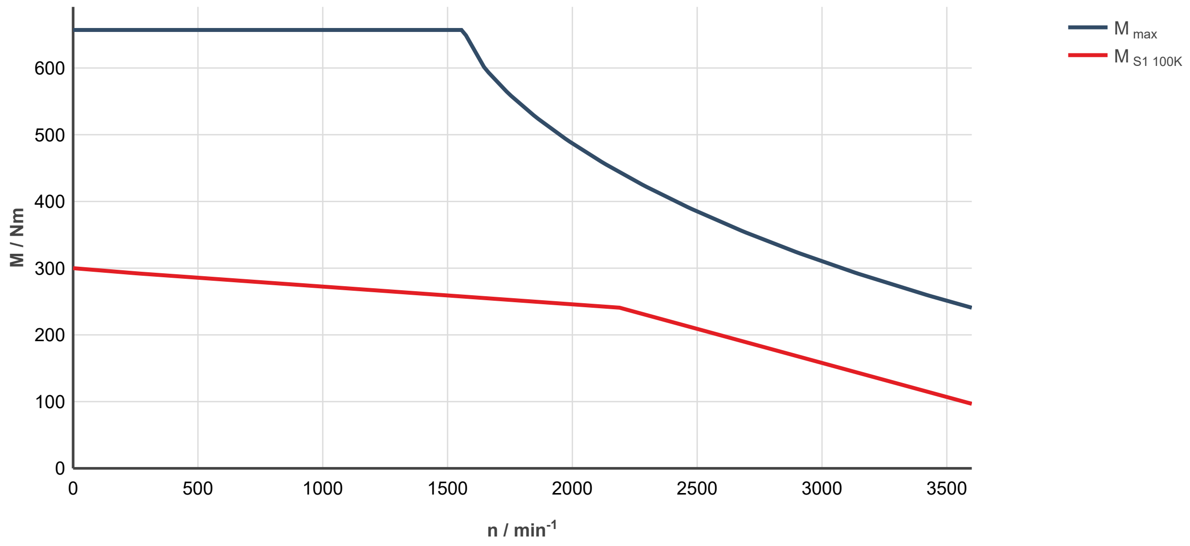



Fig. 338: MS2N13-E1BHC-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$ Characteristic curve applies to maximum torque 20 °C (cold)

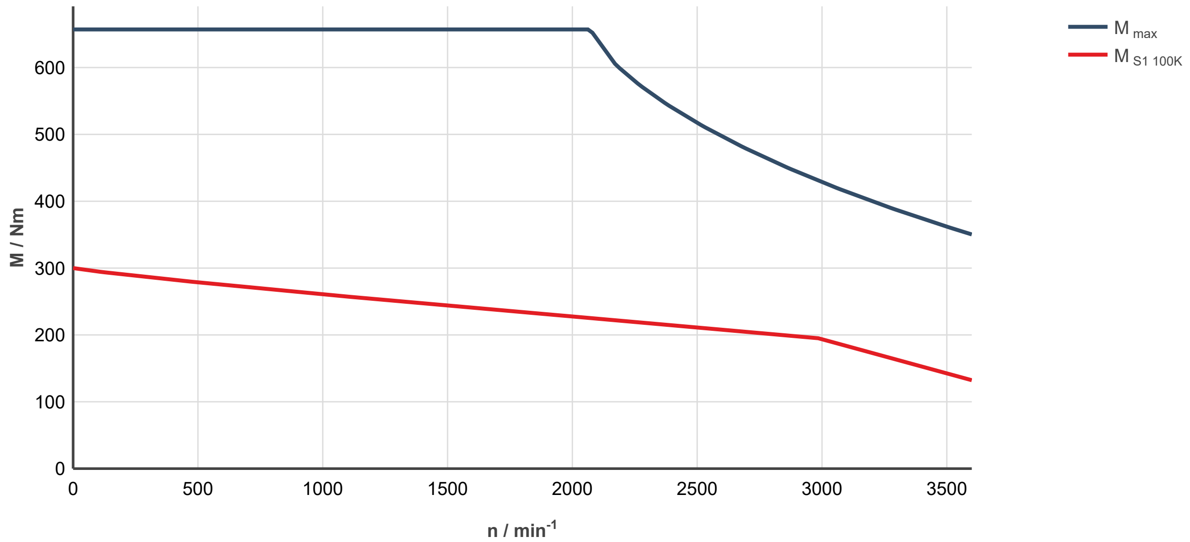



Fig. 339: MS2N13-E1BHC-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V
$M_{max}$ Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-E1BNC

| Designation | Symbol | Unit | MS2N13-E1BNC-□□□□0-□N | MS2N13-E1BNC-□□□□2-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 300 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 152 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.09 | 0.1117 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 3,000 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 130 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 69.5 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 40.8 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 692 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 657 | |
| Maximum current | $I_{max(eff)}$ | A | 400 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.83 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 122.4 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.033 | |
| Winding inductance | $L_{12\_min}$ | mH | 1.5 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 21.8 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 210 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 14.8 | |
| Mass | $m_{mot}$ | kg | 146 | 164 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 280.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 1.70 |
| Maximum connection time | $t_1$ | ms | 0 | 300 |
| Maximum disconnection time | $t_2$ | ms | 0 | 350 |
| **Fan data** | | | | |
| Rated voltage | $U_N$ | V | 400/460 | |
| Rated current | $I_N$ | A | 0.19/0.21 | |
| Frequency | $f_N$ | Hz | 50/60 | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

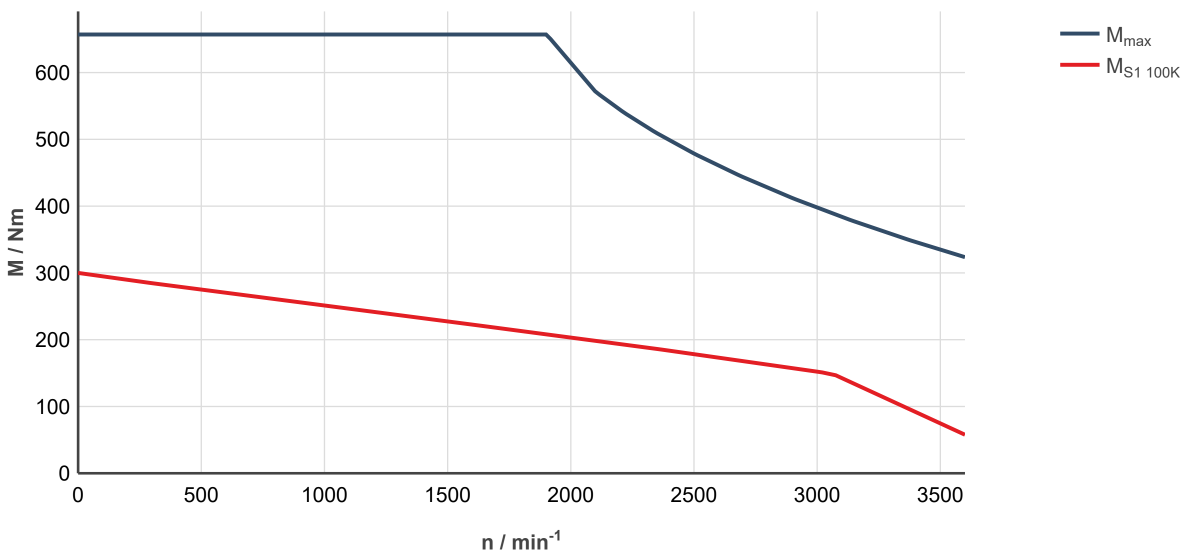



Fig. 340: MS2N13-E1BNC-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$ Characteristic curve applies to maximum torque 20 °C (cold)

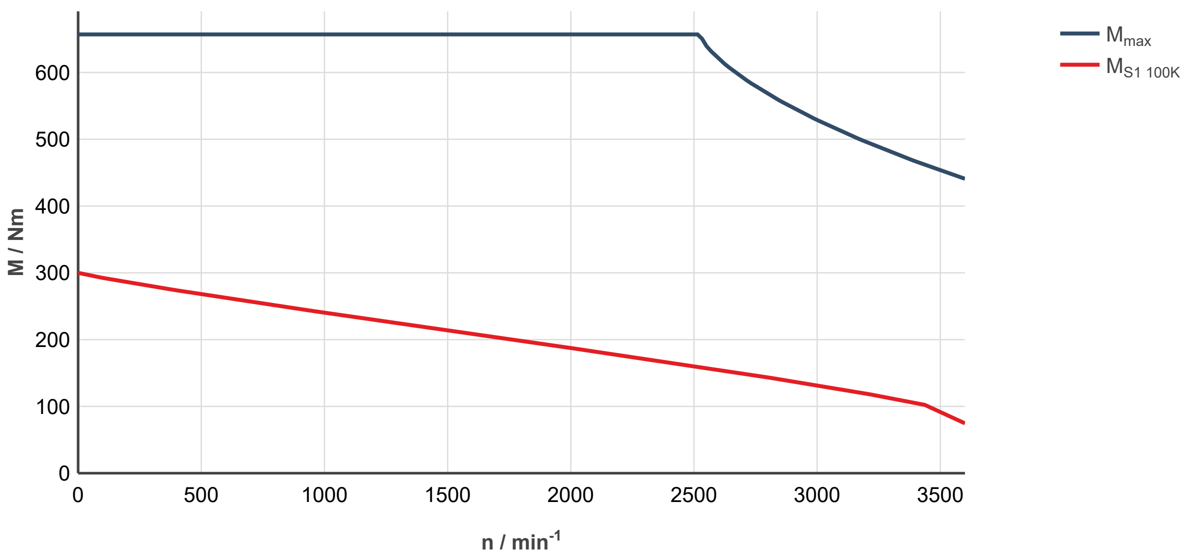



Fig. 341: MS2N13-E1BNC-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V
$M_{max}$ Characteristic curve applies to maximum torque 20 °C (cold)

## 6.8.3 Water cooling

### MS2N13-B1BHL

| Designation | Symbol | Unit | MS2N13-B1BHL-□□□□0-□N | MS2N13-B1BHL-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 100K [1] | $M_{0\ 100K}$ | Nm | 176 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 72.5 | |
| Moment of inertia of rotor [1] | $J_{rot}$ | kg*m² | 0.0476 | 0.055 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K [1] | $M_{N\ 100K}$ | Nm | 158.5 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 66.8 | |
| Rated power - 100K [1] | $P_{N\ 100K}$ | kW | 33.2 | |
| Maximum torque 20 °C (cold) [1] | $M_{max\ 20°C}$ | Nm | 322 | |
| Maximum torque 100K (warm) [1] | $M_{max\ 100K}$ | Nm | 306 | |
| Maximum current | $I_{max(eff)}$ | A | 160 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C [1] | $K_m$ | Nm/A | 2.52 | |
| Voltage constant at 20 °C [1] | $K_E$ | V/1000 $min^{-1}$ | 154 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.145 | |
| Winding inductance | $L_{12\_min}$ | mH | 5.6 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 11.3 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 260 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 9 | |
| Mass | $m_{mot}$ | kg | 88 | 94 |
| <u>Holding brake</u> | | | | |
| Holding torque | $M_4$ | Nm | 0 | 115.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 2.10 |
| Maximum connection time | $t_1$ | ms | 0 | 100 |
| Maximum disconnection time | $t_2$ | ms | 0 | 240 |
| <u>Water cooling</u> | | | | |
| Power loss | $P_V$ | kW | 2.1 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10...40 | |
| Allowed coolant-temperature for $P_V$ | $\Delta T_{max}$ | K | 8 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 4.0 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | < 0.6 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.148 | |
| Material of coolant duct | – | – | Stainless steel | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

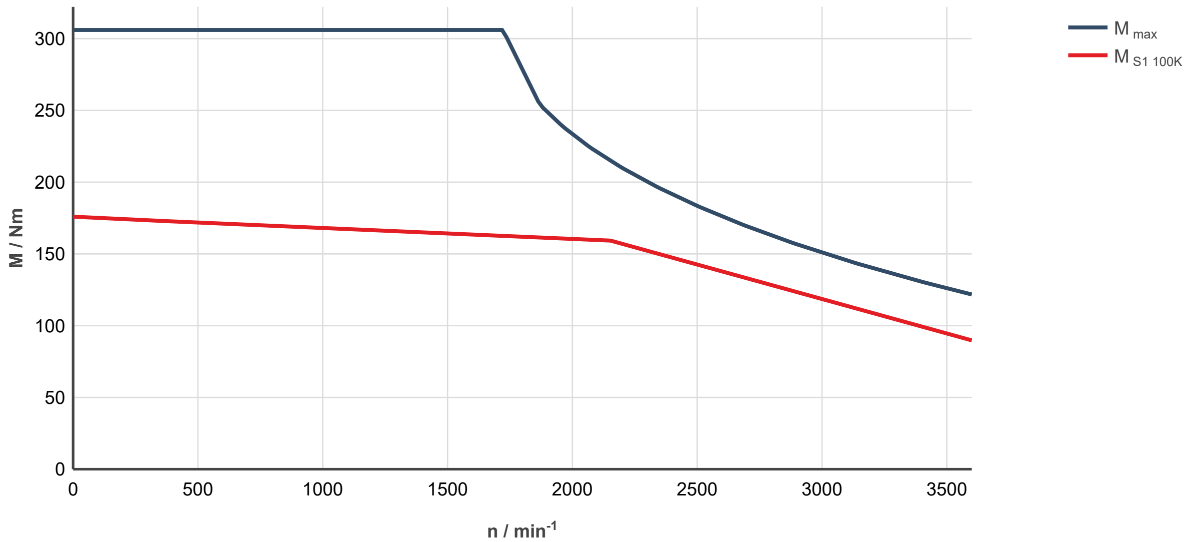



Fig. 342: MS2N13-B1BHL-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

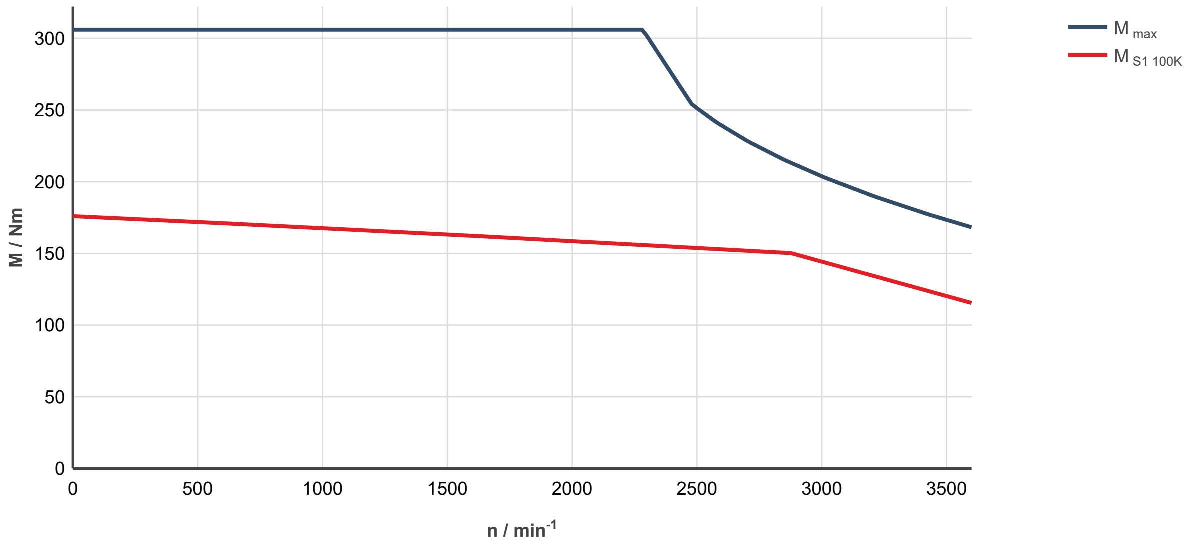



Fig. 343: MS2N13-B1BHL-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-B1BNL

| Designation | Symbol | Unit | MS2N13-B1BNL-□□□□0-□N | MS2N13-B1BNL-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 176 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 100 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0476 | 0.055 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,750 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 129.9 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 76.8 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 37.4 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 322 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 306 | |
| Maximum current | $I_{max(eff)}$ | A | 220 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.81 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 112 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.08 | |
| Winding inductance | $L_{12\_min}$ | mH | 3.0 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 10.1 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 260 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 9 | |
| Mass | $m_{mot}$ | kg | 88 | 94 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 115.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 2.10 |
| Maximum connection time | $t_1$ | ms | 0 | 100 |
| Maximum disconnection time | $t_2$ | ms | 0 | 240 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 2.1 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10...40 | |
| Allowed coolant-temperature for $P_V$ | $\Delta T_{max}$ | K | 8 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 4.0 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | < 0.6 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.148 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

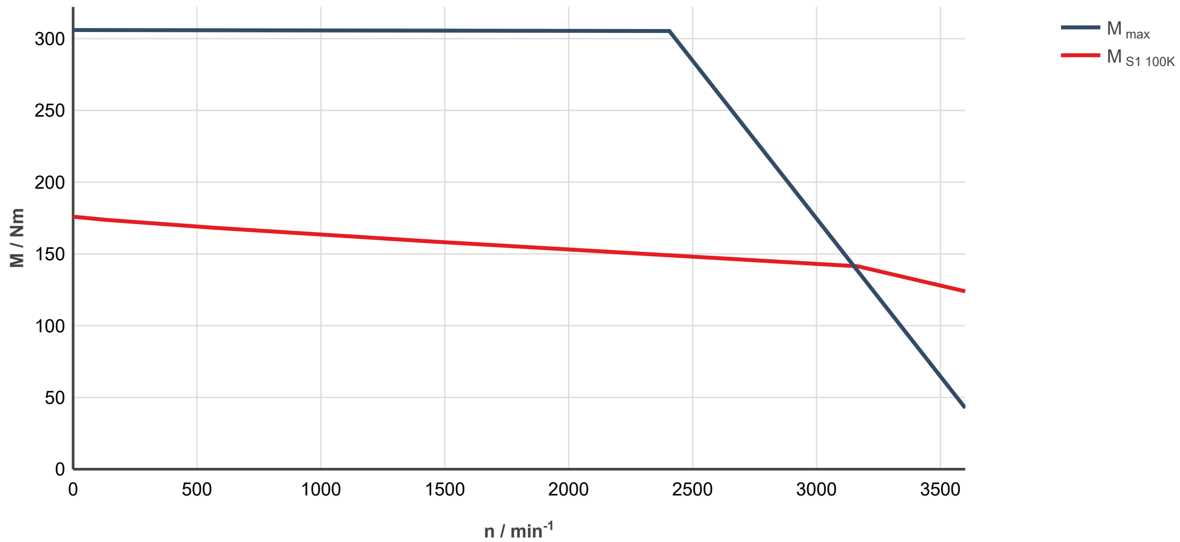



Fig. 344: MS2N13-B1BNL-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

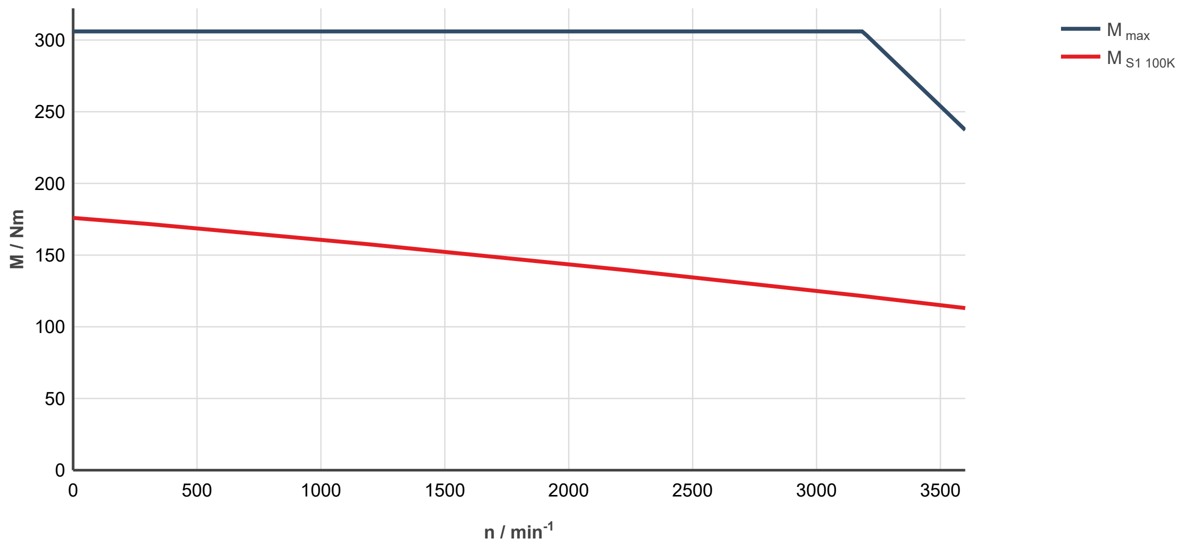



Fig. 345: MS2N13-B1BNL-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-C1BHL

| Designation | Symbol | Unit | MS2N13-C1BHL-□□□□□0-□N | MS2N13-C1BHL-□□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 238 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 98 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.0618 | 0.0692 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 212 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 89 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 44.4 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 420 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 400 | |
| Maximum current | $I_{max(eff)}$ | A | 205 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.54 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 155.3 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.097 | |
| Winding inductance | $L_{12\_min}$ | mH | 3.8 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 13 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 220 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 10 | |
| Mass | $m_{mot}$ | kg | 102 | 108 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 115.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 2.10 |
| Maximum connection time | $t_1$ | ms | 0 | 100 |
| Maximum disconnection time | $t_2$ | ms | 0 | 240 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 2.6 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10...40 | |
| Allowed coolant-temperature for $P_V$ | $\Delta T_{max}$ | K | 8 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 5.0 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | < 0.75 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.178 | |
| Material of coolant duct | – | – | Stainless steel | |

1) For tolerance details refer to ➦ Chapter 5.4 Tolerances

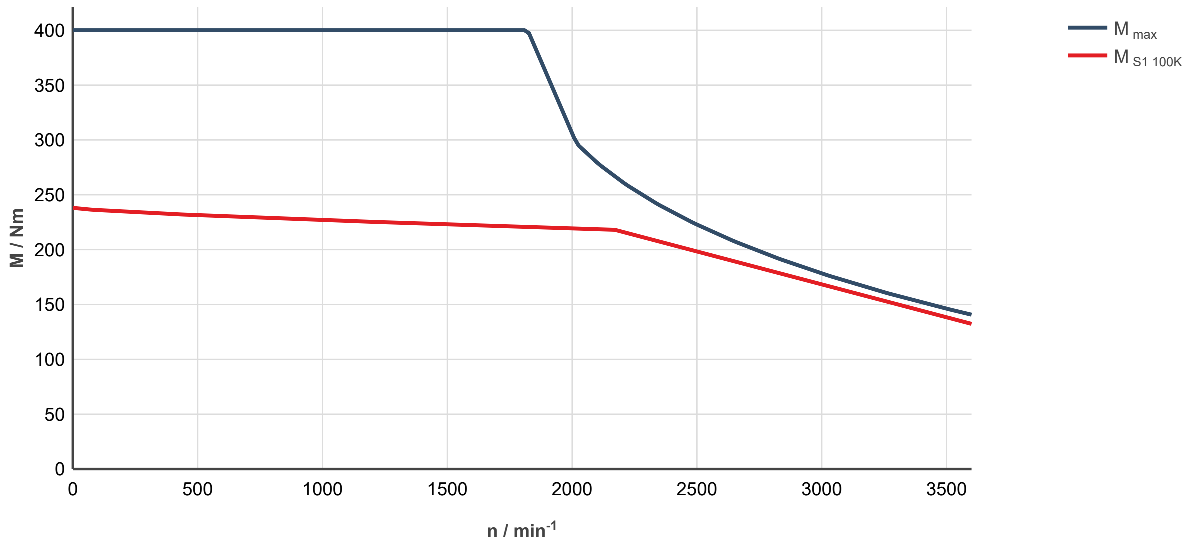



Fig. 346: MS2N13-C1BHL-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$ Characteristic curve applies to maximum torque 20 °C (cold)

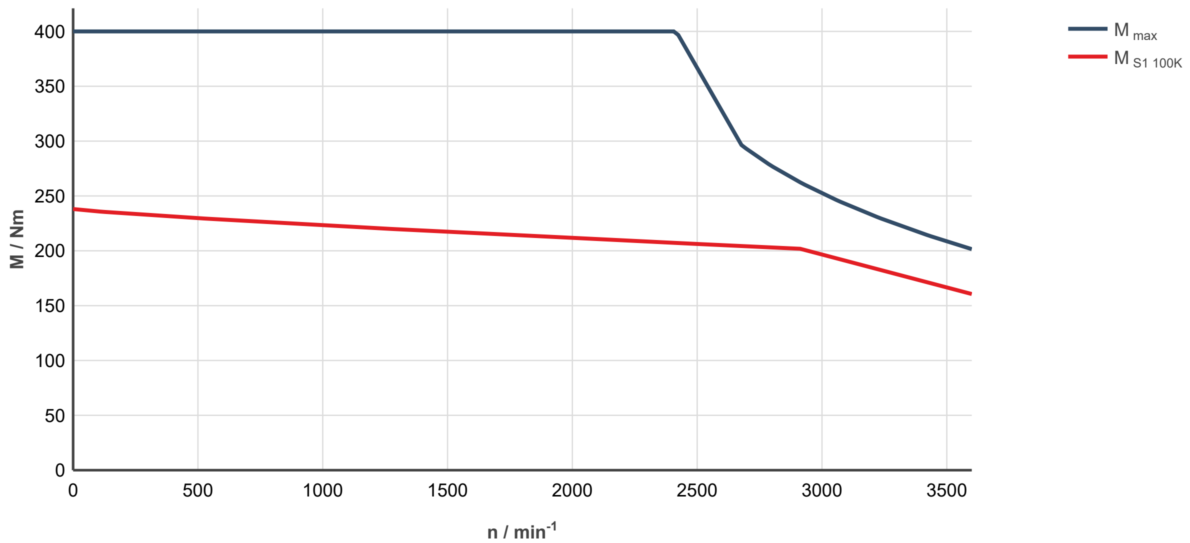



Fig. 347: MS2N13-C1BHL-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V
$M_{max}$ Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-C1BNL

| Designation | Symbol | Unit | MS2N13-C1BNL-□□□□0-□N | MS2N13-C1BNL-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 238 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 127.5 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | $kg*m^2$ | 0.0618 | 0.0692 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,750 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 175 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 99 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 51.8 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 421 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 400 | |
| Maximum current | $I_{max(eff)}$ | A | 270 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.93 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 119 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.059 | |
| Winding inductance | $L_{12\_min}$ | mH | 2.5 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 13 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 220 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 10 | |
| Mass | $m_{mot}$ | kg | 102 | 108 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 115.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 2.10 |
| Maximum connection time | $t_1$ | ms | 0 | 100 |
| Maximum disconnection time | $t_2$ | ms | 0 | 240 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 2.6 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10...40 | |
| Allowed coolant-temperature for $P_V$ | $\Delta T_{max}$ | K | 8 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 5.0 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | < 0.75 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.178 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

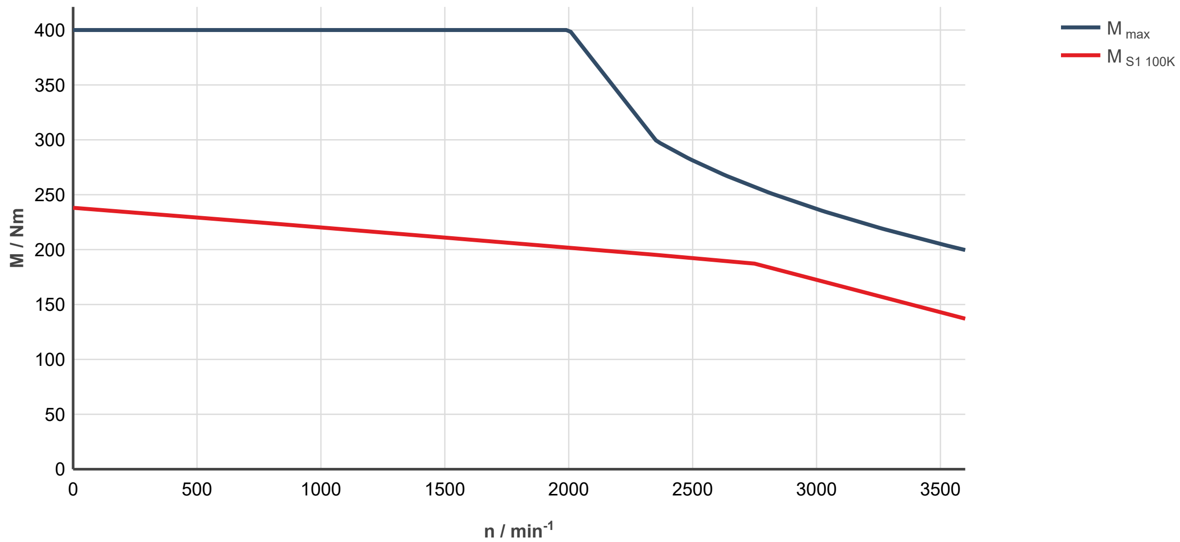



Fig. 348: MS2N13-C1BNL-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

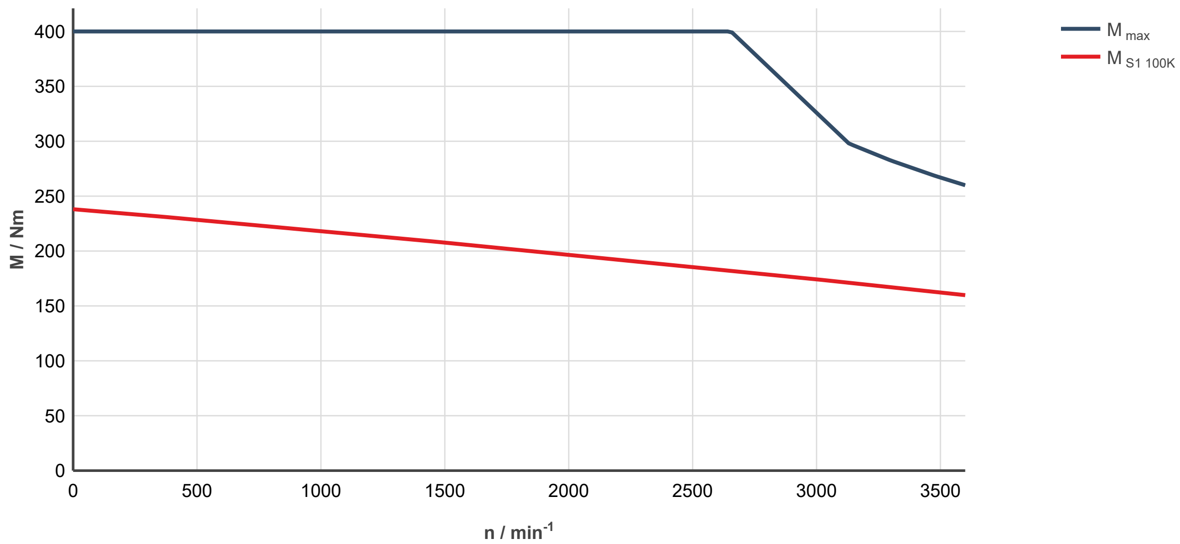



Fig. 349: MS2N13-C1BNL-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-D1BHL

| Designation | Symbol | Unit | MS2N13-D1BHL-□□□□□0-□N | MS2N13-D1BHL-□□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 295 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 122 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | $kg*m^2$ | 0.078 | 0.0833 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 262 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 110 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 54.9 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 540 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 512 | |
| Maximum current | $I_{max(eff)}$ | A | 265 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.56 | |
| Voltage constant at 20 °C 1) | $K_E$ | $V/1000\ min^{-1}$ | 156 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.072 | |
| Winding inductance | $L_{12\_min}$ | mH | 3.4 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 16.35 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 240 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 9 | |
| Mass | $m_{mot}$ | kg | 121 | 127 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 115.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 2.10 |
| Maximum connection time | $t_1$ | ms | 0 | 100 |
| Maximum disconnection time | $t_2$ | ms | 0 | 240 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 3.1 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10...40 | |
| Allowed coolant-temperature for $P_V$ | $\Delta T_{max}$ | K | 8 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 6 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | < 0.9 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.208 | |
| Material of coolant duct | – | – | Stainless steel | |

1) For tolerance details refer to ➦Chapter 5.4 Tolerances

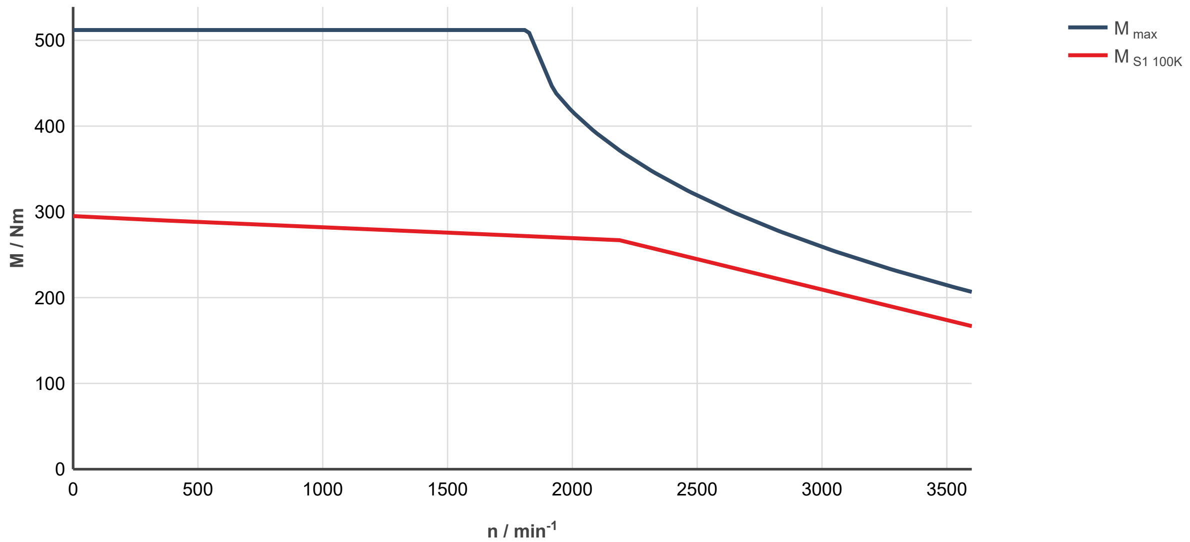



Fig. 350: MS2N13-D1BHL-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

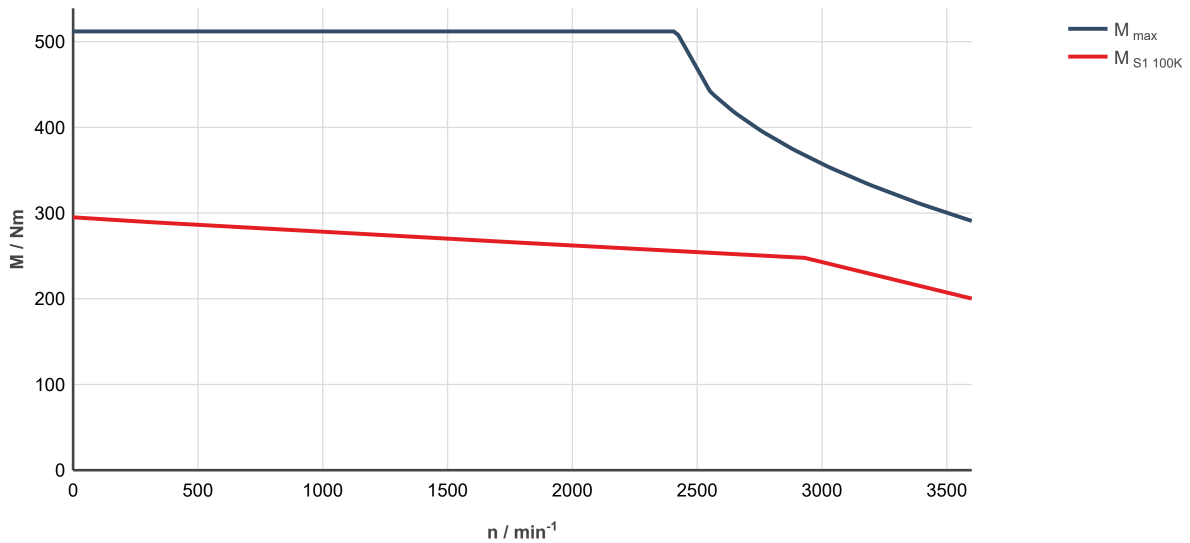



Fig. 351: MS2N13-D1BHL-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-D1BNL

| Designation | Symbol | Unit | MS2N13-D1BNL-□□□□0-□N | MS2N13-D1BNL-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 295 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 162 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.078 | 0.0833 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,750 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 227.6 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 126.5 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 65.5 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 540 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 512 | |
| Maximum current | $I_{max(eff)}$ | A | 354 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.91 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 116.9 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.046 | |
| Winding inductance | $L_{12\_min}$ | mH | 1.9 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 19.5 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 240.0 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 9.0 | |
| Mass | $m_{mot}$ | kg | 121 | 127 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 115.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 2.10 |
| Maximum connection time | $t_1$ | ms | 0 | 100 |
| Maximum disconnection time | $t_2$ | ms | 0 | 240 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 3.15 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10...40 | |
| Allowed coolant-temperature for $P_V$ | $\Delta T_{max}$ | K | 8 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 6 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | < 0.9 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.208 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

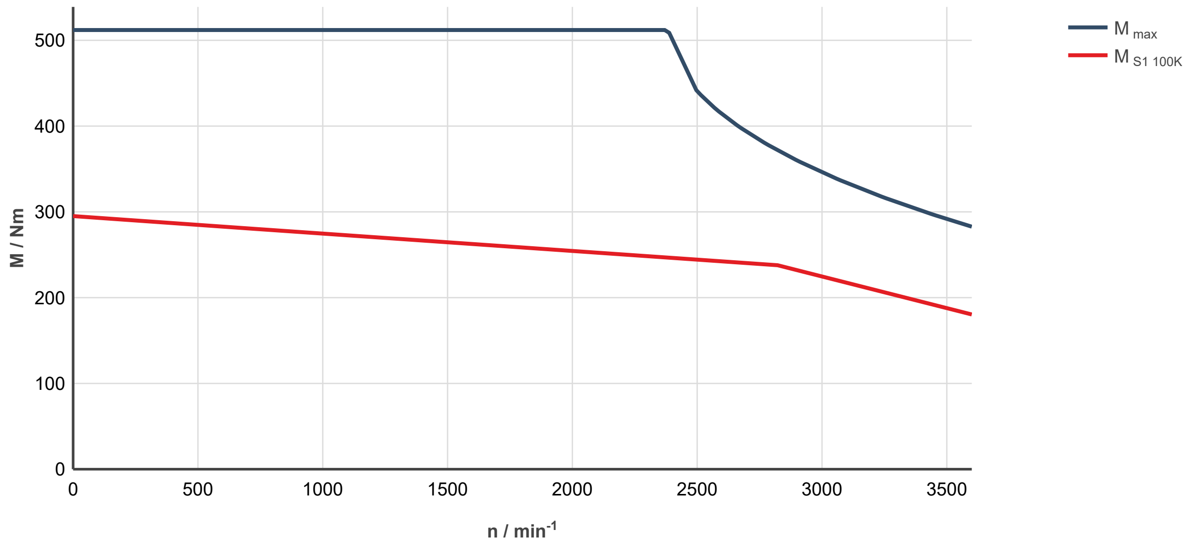



Fig. 352: MS2N13-D1BNL-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

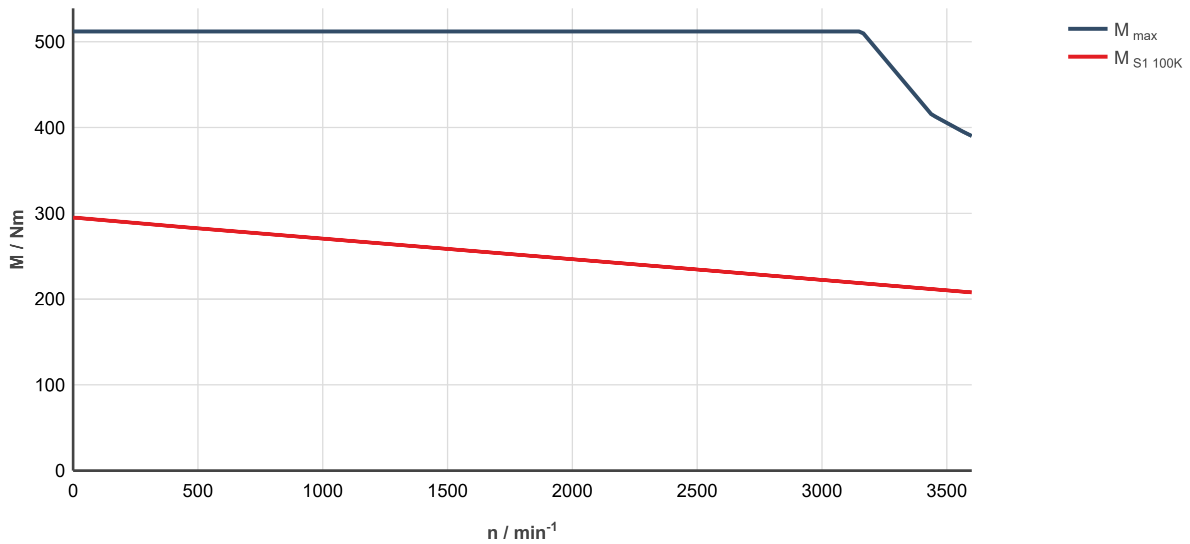



Fig. 353: MS2N13-D1BNL-□□□□□0, ctrlX DRIVE, controlled supply 3 x AC 400 ... 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-E1BHL

| Designation | Symbol | Unit | MS2N13-E1BHL-□□□□0-□N | MS2N13-E1BHL-□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 345 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 138 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.09 | 0.0974 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,000 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 297 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 121 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 62.2 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 642 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 610 | |
| Maximum current | $I_{max(eff)}$ | A | 305 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 2.60 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 159.8 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.058 | |
| Winding inductance | $L_{12\_min}$ | mH | 2.6 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 24.3 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 270 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 9 | |
| Mass | $m_{mot}$ | kg | 146 | 152 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 115.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 2.10 |
| Maximum connection time | $t_1$ | ms | 0 | 100 |
| Maximum disconnection time | $t_2$ | ms | 0 | 240 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 3.2 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10...40 | |
| Allowed coolant-temperature for $P_V$ | $\Delta T_{max}$ | K | 8 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 6 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | < 1.0 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.238 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦Chapter 5.4 Tolerances | | | | |

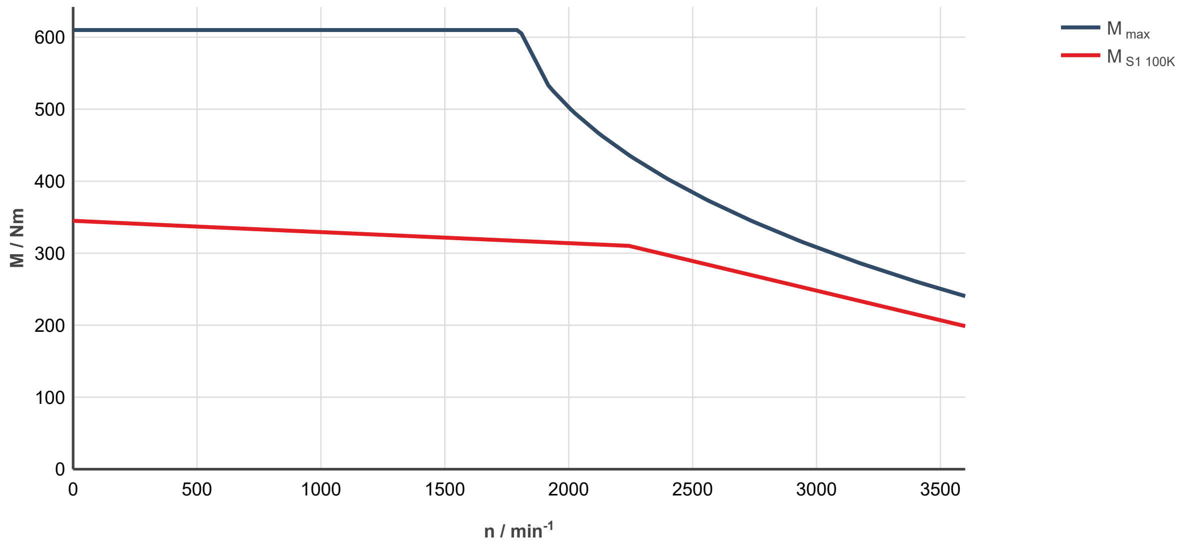



Fig. 354: MS2N13-E1BHL-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

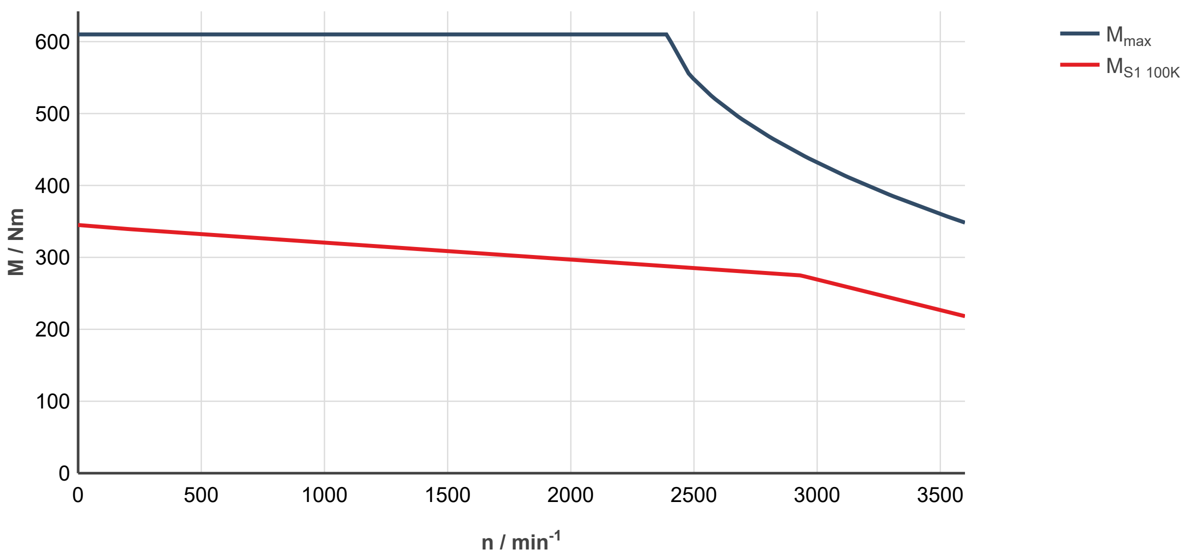



Fig. 355: MS2N13-E1BHL-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

## MS2N13-E1BNL

| Designation | Symbol | Unit | MS2N13-E1BNL-□□□□□0-□N | MS2N13-E1BNL-□□□□□1-□N |
|---|---|---|---|---|
| Standstill torque - 100K 1) | $M_{0\ 100K}$ | Nm | 345 | |
| Standstill current - 100K | $I_{0\ 100K}$ | A | 183 | |
| Moment of inertia of rotor 1) | $J_{rot}$ | kg*m² | 0.09 | 0.0974 |
| Rated speed - 100K | $n_{N\ 100K}$ | 1/min | 2,860 | |
| Rated torque - 100K 1) | $M_{N\ 100K}$ | Nm | 270 | |
| Rated current - 100K | $I_{N\ 100K}$ | A | 146 | |
| Rated power - 100K 1) | $P_{N\ 100K}$ | kW | 80.9 | |
| Maximum torque 20 °C (cold) 1) | $M_{max\ 20°C}$ | Nm | 642 | |
| Maximum torque 100K (warm) 1) | $M_{max\ 100K}$ | Nm | 610 | |
| Maximum current | $I_{max(eff)}$ | A | 400 | |
| Maximum speed (electrical) | $n_{max\ el}$ | 1/min | 3,600 | |
| Maximum speed (mechanical) | $n_{max\ mech}$ | 1/min | 3,600 | |
| Number of pole pairs | p | – | 3 | |
| Torque constant at 20 °C 1) | $K_m$ | Nm/A | 1.83 | |
| Voltage constant at 20 °C 1) | $K_E$ | V/1000 $min^{-1}$ | 122.4 | |
| Winding resistance at 20 °C | $R_{12}$ | Ohm | 0.033 | |
| Winding inductance | $L_{12\_min}$ | mH | 1.5 | |
| Leakage capacitance of the component | $C_{ab}$ | nF | 21.8 | |
| Thermal time constant of winding | $T_{th\_W}$ | s | 270 | |
| Thermal time constant of motor | $T_{th\_M}$ | min | 9 | |
| Mass | $m_{mot}$ | kg | 146 | 152 |
| **Holding brake** | | | | |
| Holding torque | $M_4$ | Nm | 0 | 115.00 |
| Rated voltage | $U_N$ | V | 0 | 24 |
| Rated current | $I_N$ | A | 0 | 2.10 |
| Maximum connection time | $t_1$ | ms | 0 | 100 |
| Maximum disconnection time | $t_2$ | ms | 0 | 240 |
| **Water cooling** | | | | |
| Power loss | $P_V$ | kW | 3.35 | |
| Coolant inlet temperature | $T_{in}$ | °C | 10...40 | |
| Allowed coolant-temperature for $P_V$ | $\Delta T_{max}$ | K | 8 | |
| Required coolant flow for $P_V$ | $Q_{min}$ | l/min | 6 | |
| Pressure drop at $Q_{min}$ | $\Delta p$ | bar | <1,0 | |
| Maximum permissible inlet pressure | $p_{max}$ | bar | 6.0 | |
| Volume of coolant duct | $V_{cool}$ | l | 0.238 | |
| Material of coolant duct | – | – | Stainless steel | |
| 1) For tolerance details refer to ➦ Chapter 5.4 Tolerances | | | | |

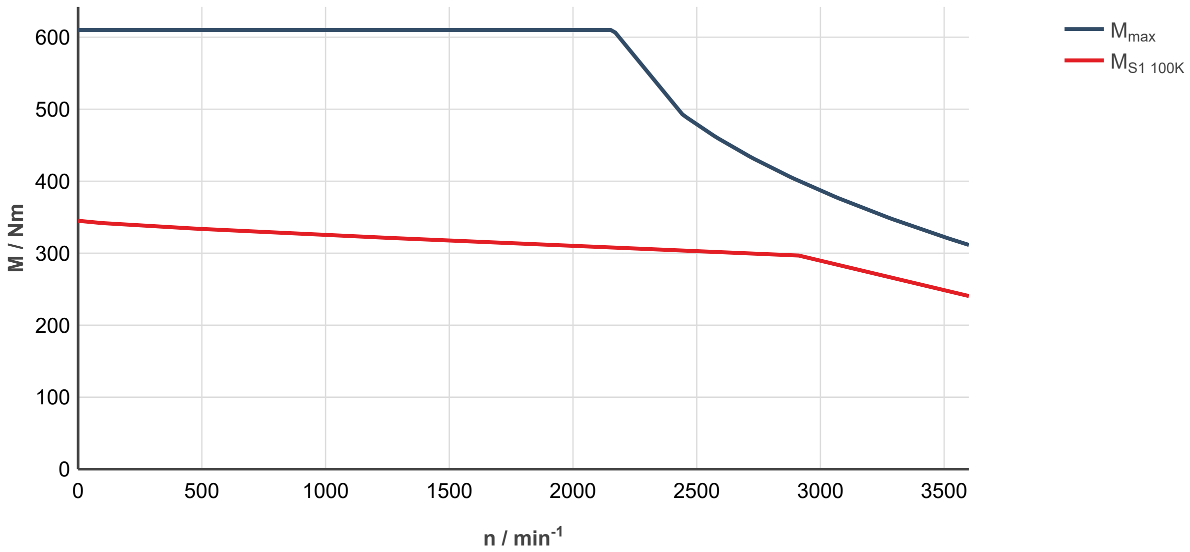



Fig. 356: MS2N13-E1BNL-□□□□□0, ctrlX DRIVE, uncontrolled supply 3 × AC 400 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

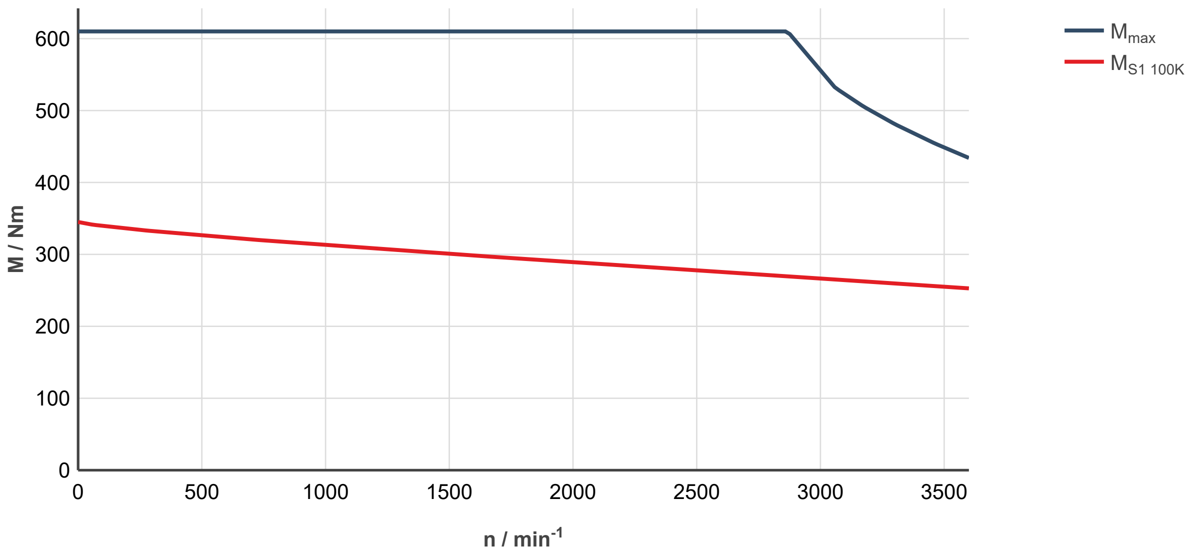
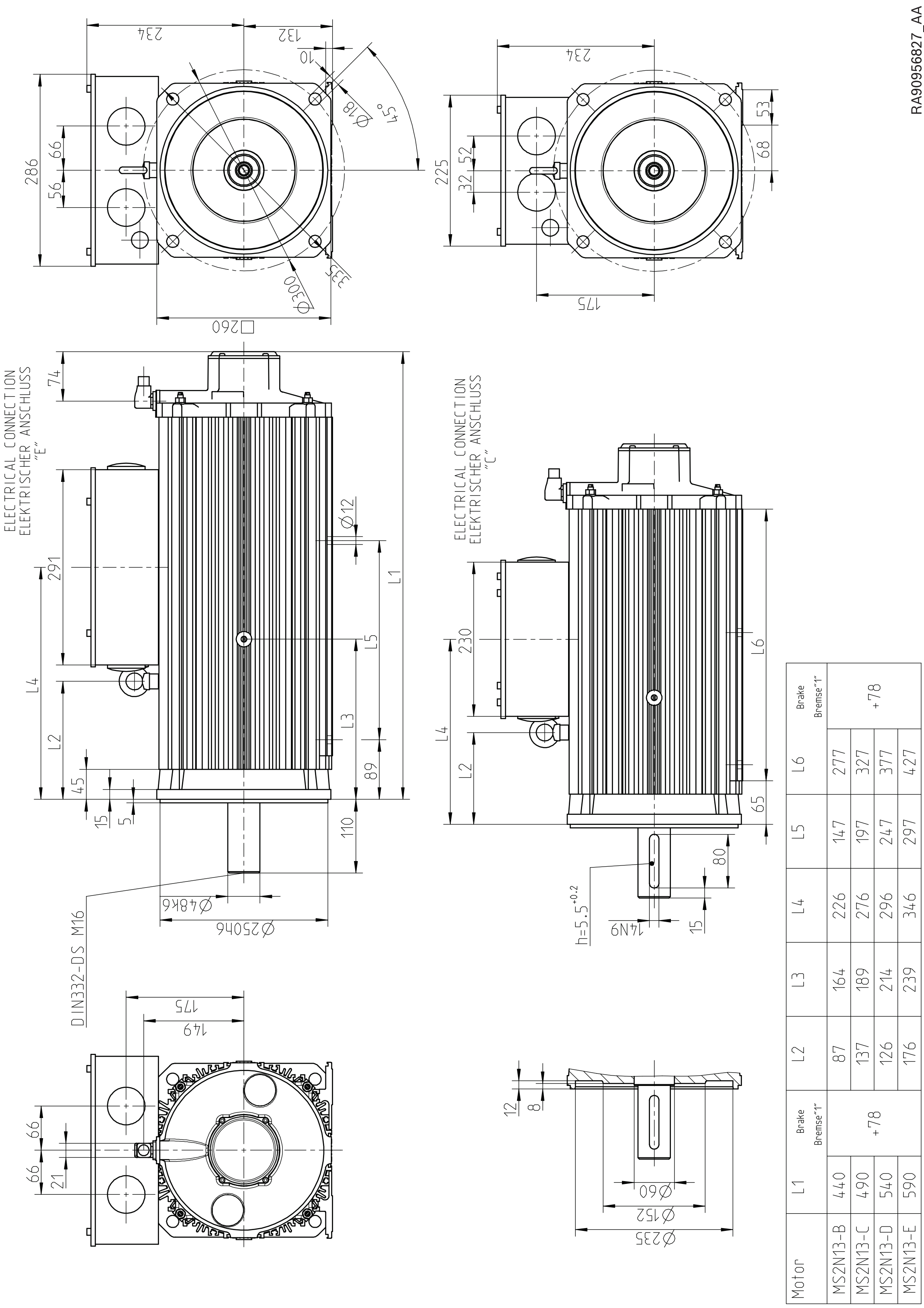



Fig. 357: MS2N13-E1BNL-□□□□□0, ctrlX DRIVE, controlled supply 3 × AC 400 ... 480 V
$M_{max}$: Characteristic curve applies to maximum torque 20 °C (cold)

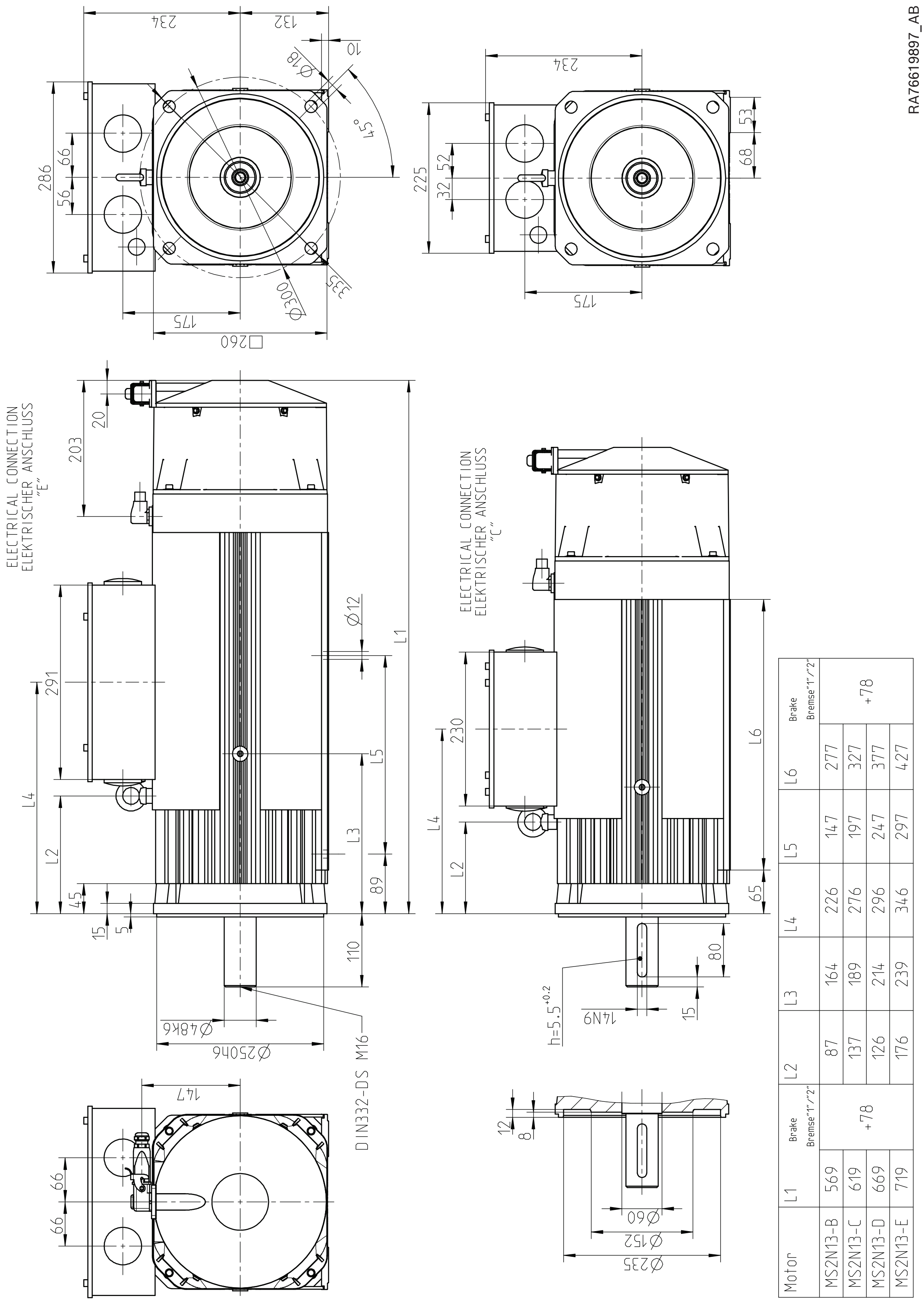
### 6.8.4 MS2N13 self-cooling with terminal box "C / E" – dimensional drawing




| Motor | L1 | Brake Bremse "1" | L2 | L3 | L4 | L5 | L6 | Brake Bremse "1" |
|---|---|---|---|---|---|---|---|---|
| MS2N13-B | 440 | +78 | 87 | 164 | 226 | 147 | 277 | +78 |
| MS2N13-C | 490 | | 137 | 189 | 276 | 197 | 327 | |
| MS2N13-D | 540 | | 126 | 214 | 296 | 247 | 377 | |
| MS2N13-E | 590 | | 176 | 239 | 346 | 297 | 427 | |

Fig. 358: MS2N13-□1□□N

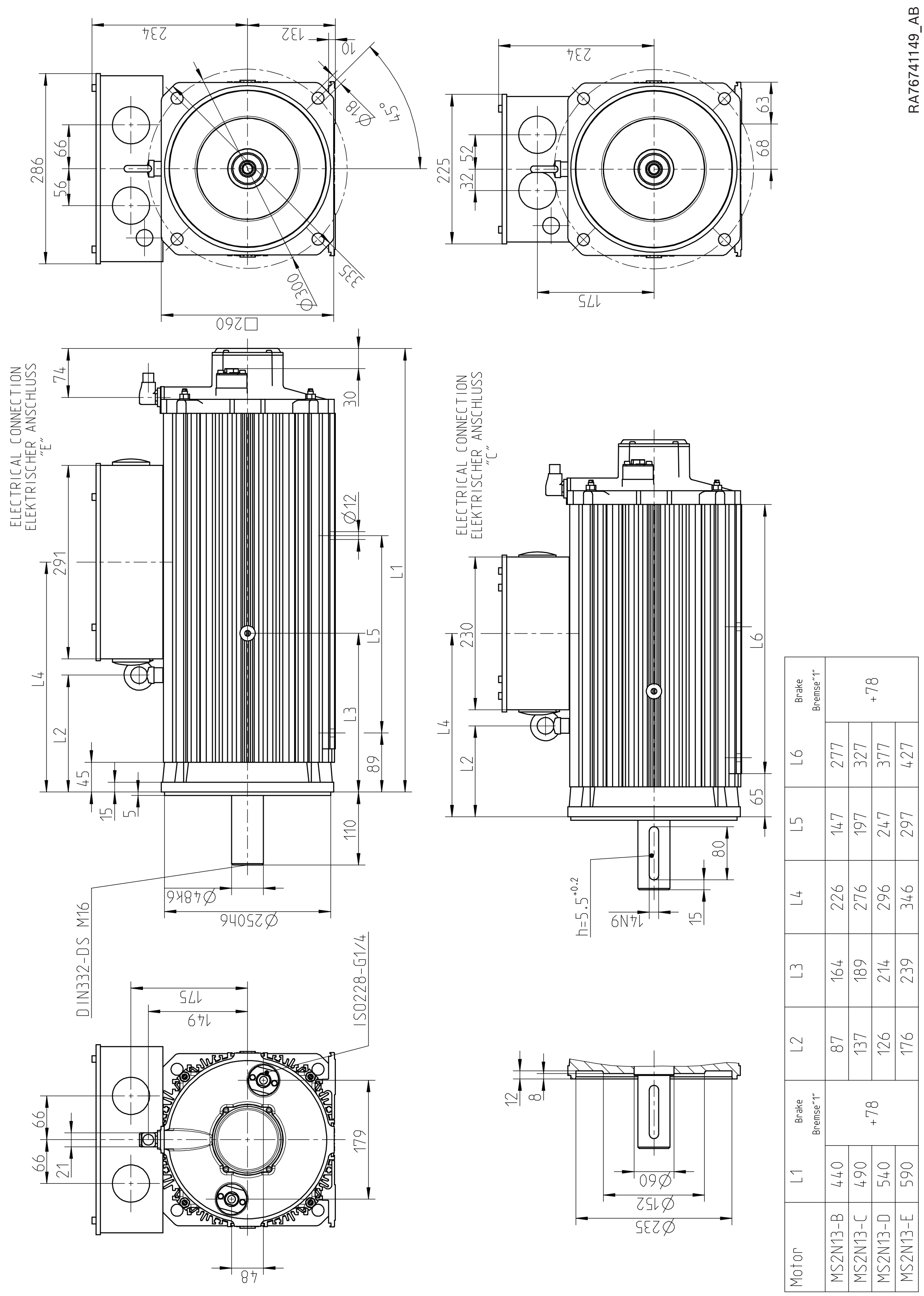
### 6.8.5 MS2N13 forced ventilation with terminal box “C / E” – dimensional drawing




| Motor | L1 | Brake Bremse "1"/"2" | L2 | L3 | L4 | L5 | L6 | Brake Bremse "1"/"2" |
|---|---|---|---|---|---|---|---|---|
| MS2N13-B | 569 | +78 | 87 | 164 | 226 | 147 | 277 | +78 |
| MS2N13-C | 619 | | 137 | 189 | 276 | 197 | 327 | |
| MS2N13-D | 669 | | 126 | 214 | 296 | 247 | 377 | |
| MS2N13-E | 719 | | 176 | 239 | 346 | 297 | 427 | |

Fig. 359: MS2N13-□1□□C

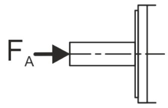
### 6.8.6 MS2N13 water cooling with terminal box “C / E” – dimensional drawing




| Motor | L1 | Brake Bremse "1" | L2 | L3 | L4 | L5 | L6 | Brake Bremse "1" |
|---|---|---|---|---|---|---|---|---|
| MS2N13-B | 440 | +78 | 87 | 164 | 226 | 147 | 277 | +78 |
| MS2N13-C | 490 | | 137 | 189 | 276 | 197 | 327 | |
| MS2N13-D | 540 | | 126 | 214 | 296 | 247 | 377 | |
| MS2N13-E | 590 | | 176 | 239 | 346 | 297 | 427 | |

Fig. 360: MS2N13-▯1▯▯L

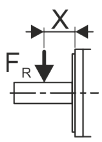
## 6.8.7 MS2N13 axial force




Axial forces $F_A$ are permissible without limitation up to 50 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

## 6.8.8 MS2N13 radial force




| NOTICE | Direction of radial force<br>For foot mounting, the information in the operating instructions on the force direction must be taken into account. |
|---|---|

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

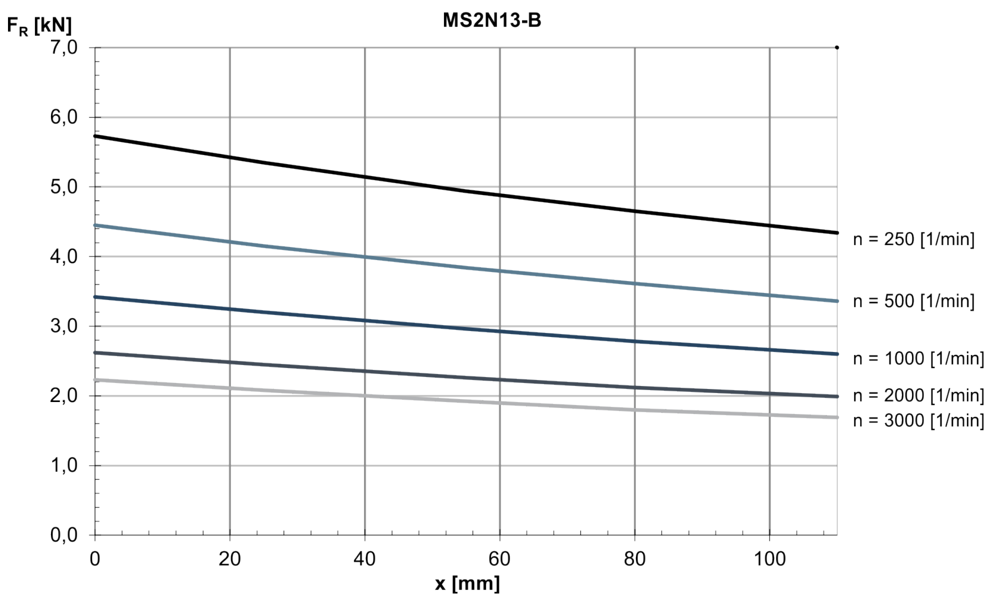



Fig. 361: MS2N13-B: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h



Technical data

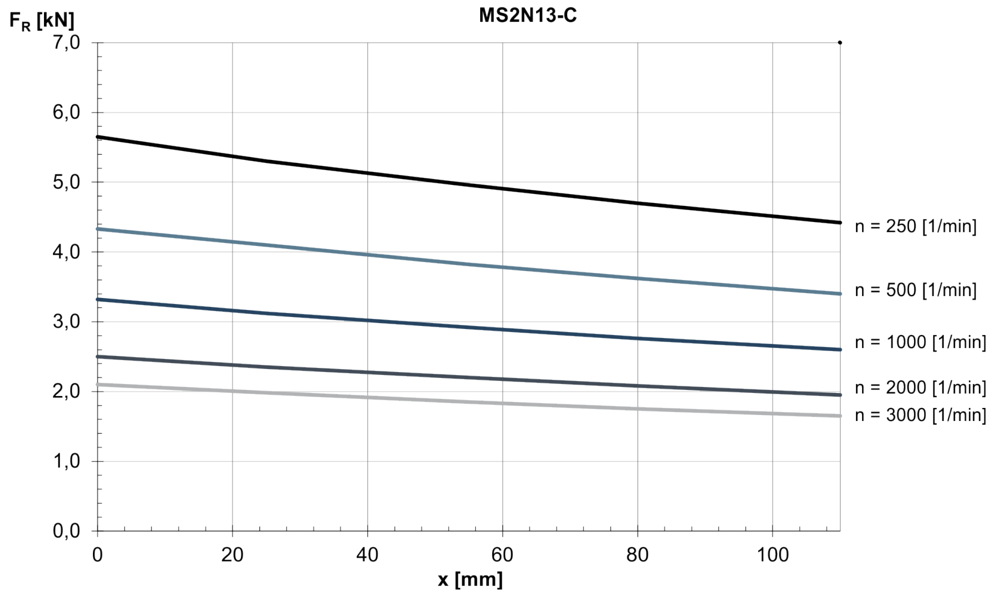



Fig. 362: MS2N13-C: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

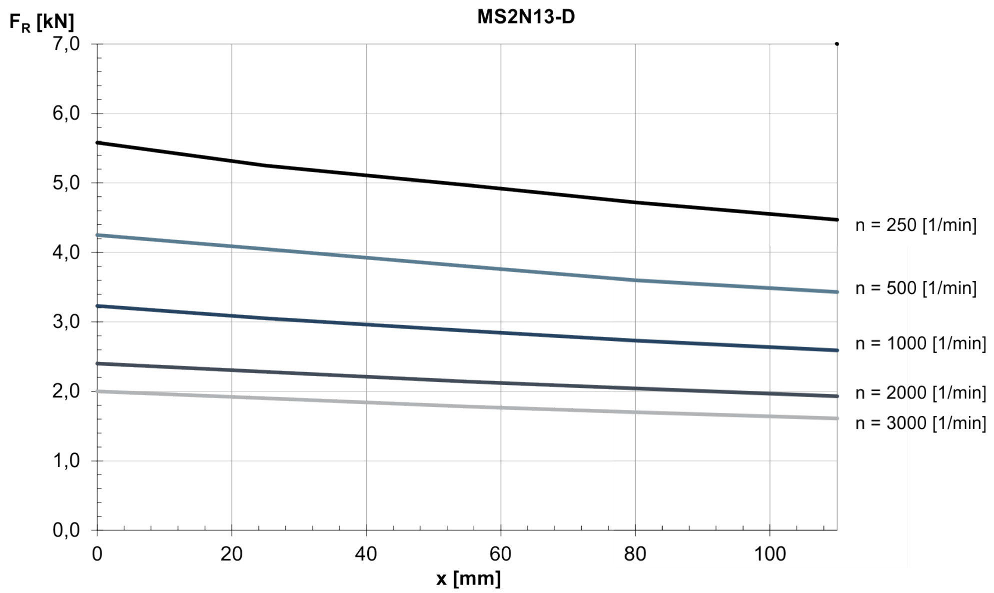



Fig. 363: MS2N13-D: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

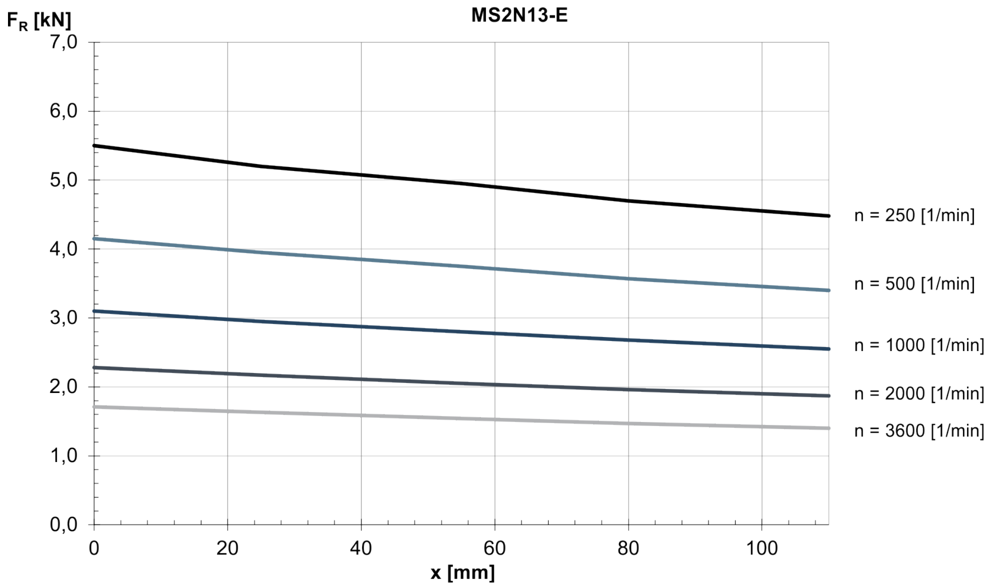


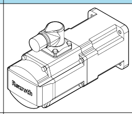
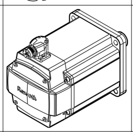
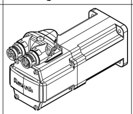
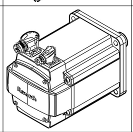
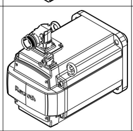
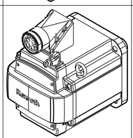
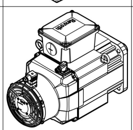
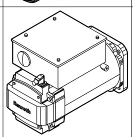
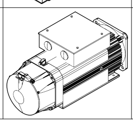

Fig. 364: MS2N13-E: Radial force in distance x from the shaft shoulder at a nominal bearing service life of Lh10 = 30,000 h

# 7 Electrical connection

## 7.1 Overview of connection variants

The electrical connection of MS2N motors is made via plug connectors or terminal boxes. Depending on the selected options, the following connection variants are available.

Table 43: MS2N Connection system overview

| Type | Connection mode | | Type of connection/size | Locking | Output direction |
|---|---|---|---|---|---|
| MS2N□□-□□□□□-□□H |  | Single cable | M17 | Speedtec | rotatable |
| MS2N□□-□□□□□-□□S |  | Single cable | M23 | SpeedCon | rotatable |
| MS2N□□-□□□□□-□□D |  | Double cable | M17 Power | SpeedCon | rotatable |
| | | | M17 Encoder | SpeedCon | rotatable |
| MS2N□□-□□□□□-□□U |  | Double cable | M23 Power | SpeedCon | rotatable |
| | | | M17 Encoder | SpeedCon | rotatable |
| MS2N□□-□□□□□-□□V |  | Double cable | M40 Power | SpeedCon | rotatable |
| | | | M17 Encoder | SpeedCon | rotatable |
| MS2N□□-□□□□□-□□A<br>MS2N□□-□□□□□-□□B |  | Double cable | M58 Power | Thread | fixed |
| | | | M17 Encoder | SpeedCon | rotatable |
| MS2N□□-□□□□□-□□T |  | Double cable | Terminal boxes “T”, power | Terminal board | fixed |
| | | | M17 Encoder | SpeedCon | rotatable |
| MS2N□□-□□□□□-□□C |  | Double cable | Terminal boxes “C”, power | Terminal board | fixed |
| | | | M17 Encoder | SpeedCon | rotatable |
| MS2N13-□□□□□-□□E |  | Double cable | Terminal boxes “E”, power | Terminal board | fixed |
| | | | M17 Encoder | SpeedCon | rotatable |

The device connectors can be rotated.

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 quick locks.

In case of force-ventilated motors, connect the fan unit according to the connection diagram.

# 7.2 Circuit diagram

## 7.2.1 M17 single-cable connection for MS2N with digital encoder “C / D / H / J / M” and optional brake

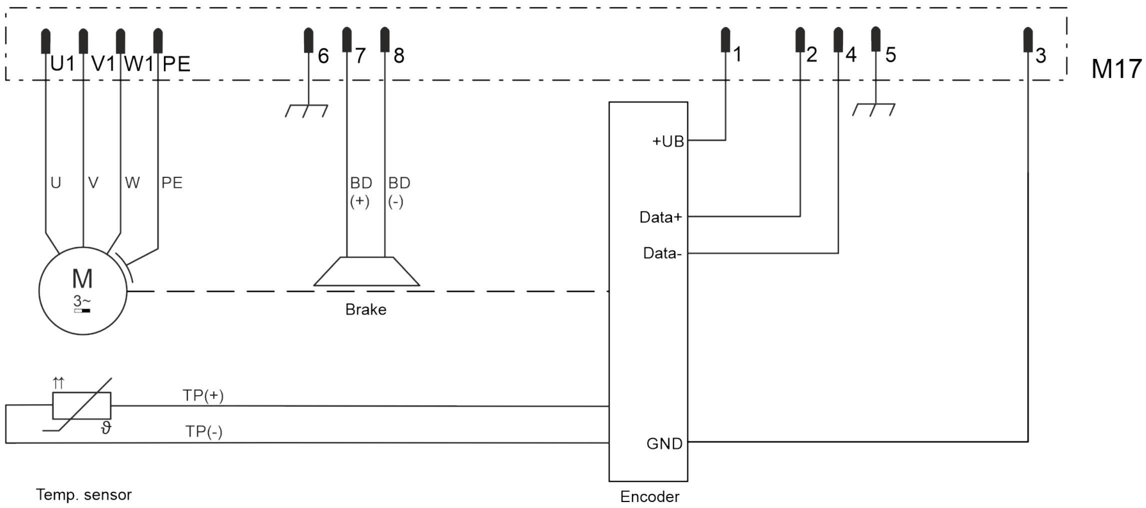



Fig. 365: M17 Single cable connection, digital encoder “C / D / H / J / M”, optional brake

The minimum cross-section in the motor cable is AWG24. The voltage drop on the cable must be taken into account when making the selection.

## 7.2.2 M23 single-cable connection for MS2N with digital encoder “C / D / H / J / M” and optional brake

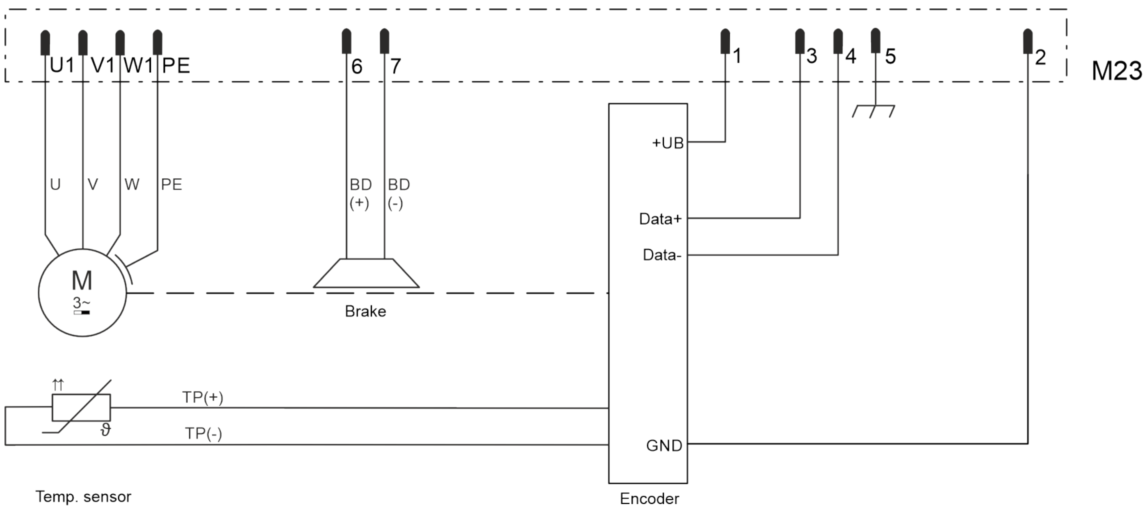



Fig. 366: M23 Single cable connection, digital encoder “C / D / H / J / M”, optional brake

The minimum cross-section in the motor cable is AWG24. The voltage drop on the cable must be taken into account when making the selection.

### 7.2.3 Double cable connection for MS2N with analog encoder "A / B" and optional brake

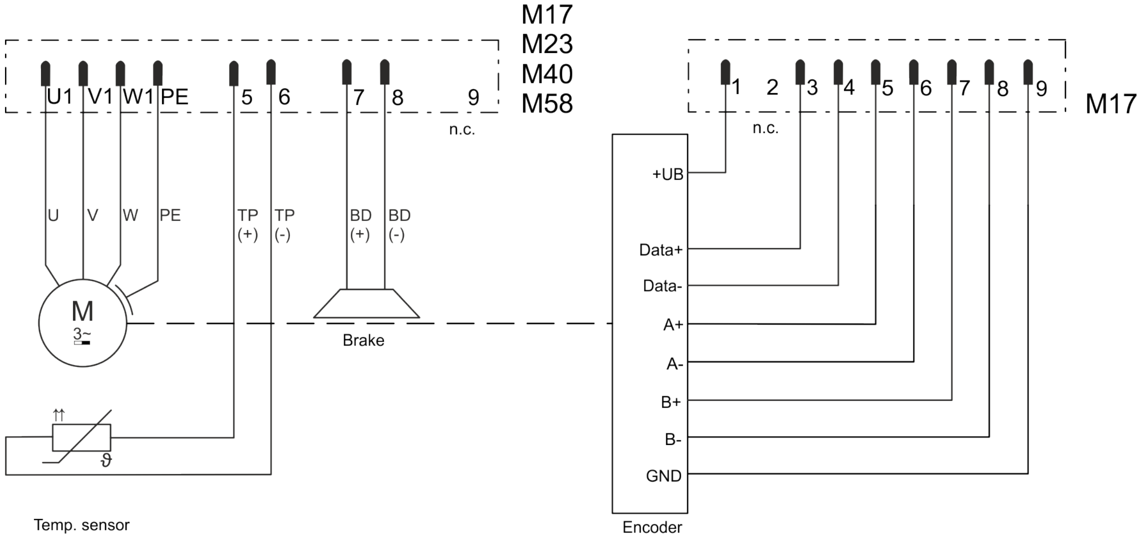



Fig. 367: Double cable connection, analog encoder "A / B", optional brake

### 7.2.4 Double cable connection for MS2N with digital encoder "C / D / H / J / M" and optional brake

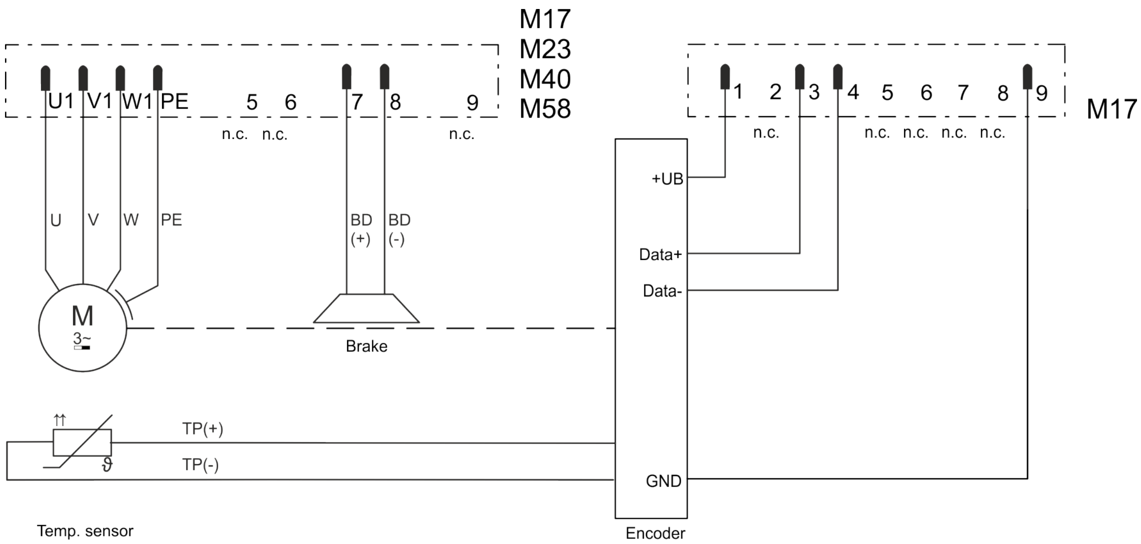



Fig. 368: Double cable connection, digital encoder "C / D / H / J / M", optional brake

### 7.2.5 Double cable connection terminal box for MS2N with analog encoder “A / B” and optional brake

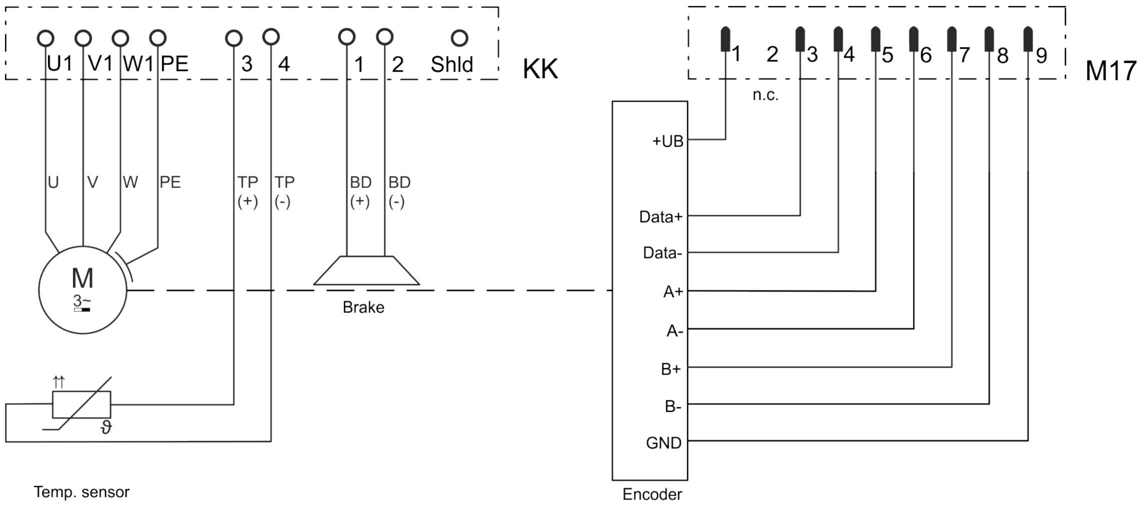



Fig. 369: Double cable connection terminal boxes, analog encoder “A / B”, optional brake

### 7.2.6 Double cable connection for terminal boxes for MS2N with digital encoder “C / D / H / J / M” and optional brake

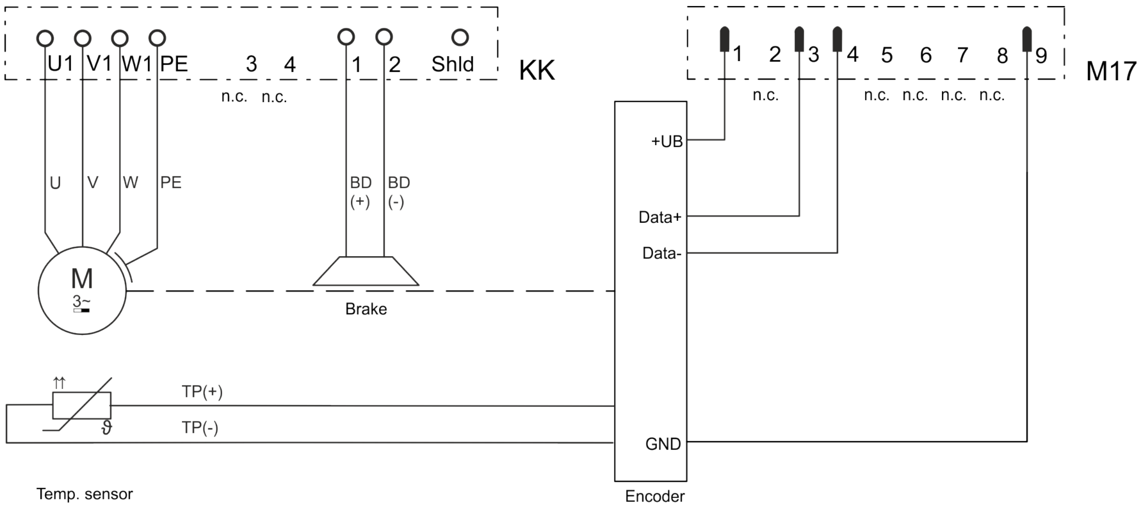



Fig. 370: Double cable connection terminal boxes, digital encoder “C / D / H / J / M”, optional brake

## 7.2.7 Fan 1-phase 115 V

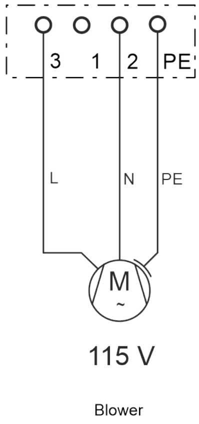



Fig. 371: MS2N Fan connection 115 V

## 7.2.8 Fan 1-phase 230 V

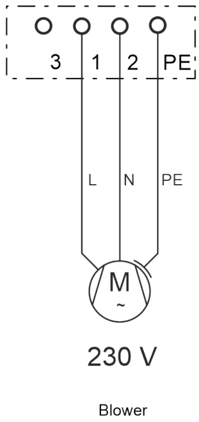



Fig. 372: MS2N Fan connection 230 V

## 7.2.9 Fan 3-phase 400 / 480 V

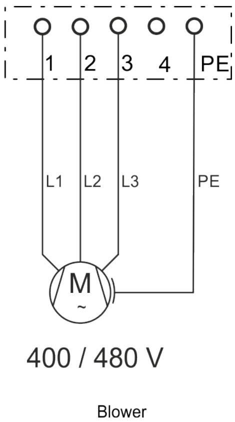



Fig. 373: MS2N Fan connection 400 / 480 V

## 7.3 M17 Encoder connector

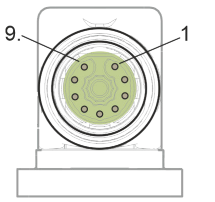



Fig. 374: Connector view of M17 encoder connector

Table 44: Pin assignment of double cable connection encoder

| Connector pin | Encoder performance | |
|---|---|---|
| | “A / B” | “C / D / H / J / M” |
| 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 |

### Adjustment ranges

The output direction of the encoder connector M17 is adjustable. The device connectors can be manually rotated of a plug connector has been installed. Do not use any tools (e.g. pliers or screwdrivers) to turn the device connector 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 MS2N□□-□□□□□-□□U

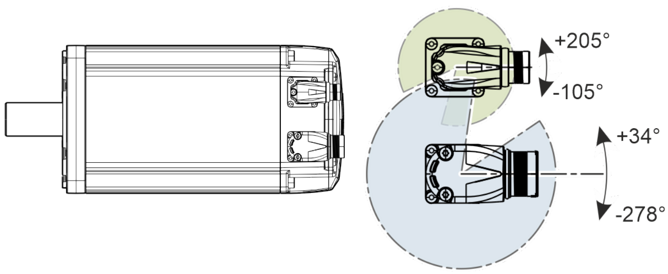



Fig. 375: Rotating area electrical connection “U”

### Adjustment range/angle of rotation MS2N□□-□□□□□-□□V

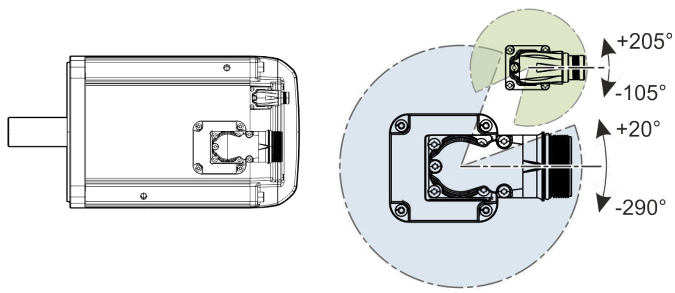



Fig. 376: Rotating area electrical connection “V”

### Adjustment range/angle of rotation MS2N□□-□□□□□-□□□, □ = A / B

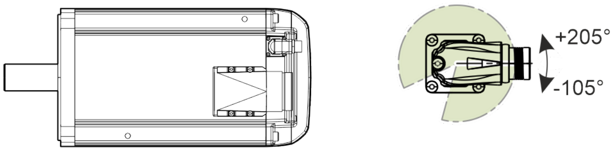



Fig. 377: Rotating area electrical connection “A / B”

### Adjustment range/angle of rotation MS2N□□-□□□□□-□□T

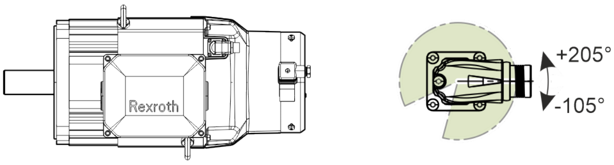



Fig. 378: Rotating area electrical connection “T”

### Adjustment range/angle of rotation MS2N□□-□□□□□-□□C

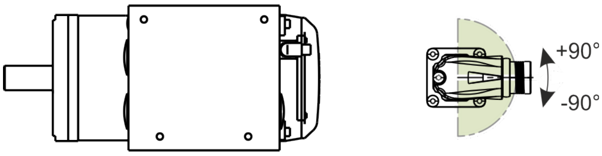



Fig. 379: Rotating area electrical connection “C”

### Adjustment range/angle of rotation MS2N□□-□□□□□-□□E

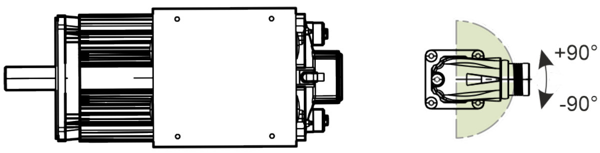



Fig. 380: Rotating area electrical connection “E”

Table 45: Adjustment torque plug connector encoder / M17

| Connector/size | Adjustment torque |
|---|---|
| Encoder / M17 | 2 ... 6 Nm |

## 7.4 M17 Double plug

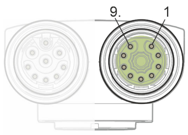



Fig. 381: Connector view double plug M17 encoder

Table 46: Pin assignment of double cable connection encoder

| Connector pin | Encoder performance | |
|---|---|---|
| | “A / B” | “C / D / H / J / M” |
| 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 |

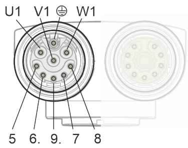



Fig. 382: Connector view double plug M17 power

Table 47: Pin assignment of double cable connection power

| Designation | Encoder performance | | | |
|---|---|---|---|---|
| | “A / B” | “C / D / H / J / M” | “A / B” | “C / D / H / J / M” |
| | with brake | | without brake | |
| 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. |

### Adjustment range

The output direction of the double plug M17 is adjustable. The device connectors can be manually rotated of a plug connector has been installed. Do not use any tools (e.g. pliers or screwdrivers) to turn the device connector 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.

The theoretical setting range is shown below.

### Adjustment range/angle of rotation MS2N□□-□□□□□-□□D

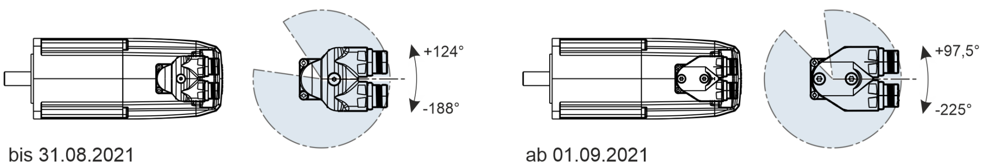



Fig. 383: Rotating area electrical connection “D”

Table 48: Adjustment torque double plug / M17

| Connector/size | Adjustment torque |
|---|---|
| Double plug / M17 | 2 ... 10 Nm |

## 7.5 M17 single cable connector, rotatable (SpeedTec)

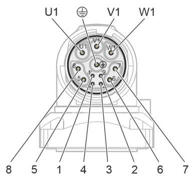



Fig. 384: Connector view of M17 single cable connector

Table 49: Pin assignment of single cable connection

| Connector pin | Encoder performance | |
|---|---|---|
| | “C / D / H / J / M” | “C / D / H / J / M” |
| | with brake | without brake |
| U1 | A1 | A1 |
| V1 | A2 | A2 |
| W1 | A3 | A3 |
| ⏚ | PE | PE |
| 1 | +UB | +UB |
| 2 | Data+ | Data+ |
| 3 | GND | GND |
| 4 | Data- | Data- |
| 5 | Shld_Enc | Shld_Enc |
| 6 | Shld_BD | Shld_BD |
| 7 | BD(+) | n.c. |
| 8 | BD(-) | n.c. |

### Adjustment range

The output direction of the single cable connector M17 is adjustable. The device connectors can be manually rotated of a plug connector has been installed. Do not use any tools (e.g. pliers or screwdrivers) to turn the device connector 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.

The theoretical setting range is shown below.

### Adjustment range/angle of rotation MS2N□□-□□□□□-□□H

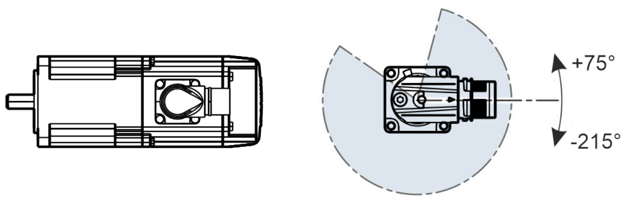



Fig. 385: Rotating area electrical connection “H”

Table 50: .Adjustment torque single cable connector / M17

| Connector/size | Adjustment torque |
|---|---|
| Single cable connector / M17 (SpeedTec) | 4 ... 9 Nm |

## 7.6 M23 single cable connector, rotatable (SpeedCon)

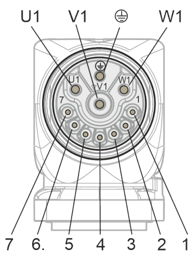



Fig. 386: Connector view of M23 single cable connector

Table 51: Pin assignment of single cable connection

| Connector pin | Encoder performance | |
|---|---|---|
| | “C / D / H / J / M” | “C / D / H / J / M” |
| | 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. |

### Adjustment range

The output direction of the single cable connector M23 is adjustable. The device connectors can be manually rotated of a plug connector has been installed. Do not use any tools (e.g. pliers or screwdrivers) to turn the device connector 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.

The theoretical setting range is shown below.

### Adjustment range/angle of rotation MS2N□□-□□□□□-□□S

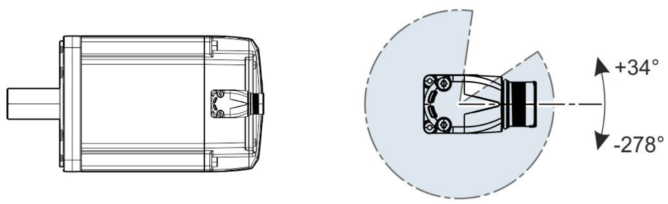



Fig. 387: Rotating area electrical connection “S”

Table 52: Adjustment torque single cable connector / M23

| Connector/size | Adjustment torque |
|---|---|
| Single cable connector / M23 | 4 ... 10 Nm |

## 7.7 M23 cable connector, rotatable (SpeedCon)

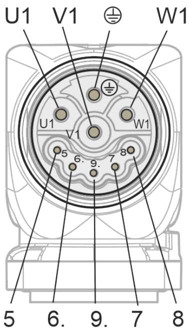



Fig. 388: Connector view of M23 performance connector

Table 53: Pin assignment of double cable connection power

| Connector pin | Encoder performance | | | |
|---|---|---|---|---|
| | “A / B” | “C / D / H / J / M” | “A / B” | “C / D / H / J / M” |
| | with brake | | without brake | |
| 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. |

The output direction of the power connector and the encoder connector can be adjusted. The device connectors can be manually rotated of a plug connector has been installed. Do not use any tools (e.g. pliers or screwdrivers) to turn the device connector 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 MS2N□□-□□□□□-□□U

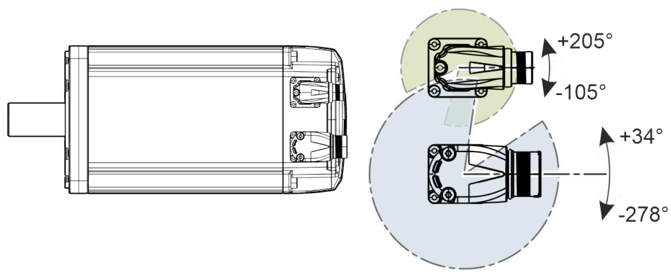



Fig. 389: : Rotating area electrical connection “U”

Table 54: Adjustment torque plug connector power / M23

| Connector/size | Adjustment torque |
|---|---|
| Power / M23 | 4 ... 10 Nm |

## 7.8 M40 cable connector, rotatable (SpeedCon)

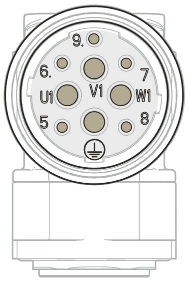



Fig. 390: Connector view of M40 performance connector

Table 55: Pin assignment of double cable connection power

| | Encoder performance | | | |
|---|---|---|---|---|
| | "A / B" | "C / D / H / J / M" | "A / B" | "C / D / H / J / M" |
| Connector pin | with brake | | without brake | |
| 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. |

The output direction of the power connector and the encoder connector can be adjusted. The device connectors can be manually rotated of a plug connector has been installed. Do not use any tools (e.g. pliers or screwdrivers) to turn the device connector 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 MS2N□□-□□□□□-□□V**

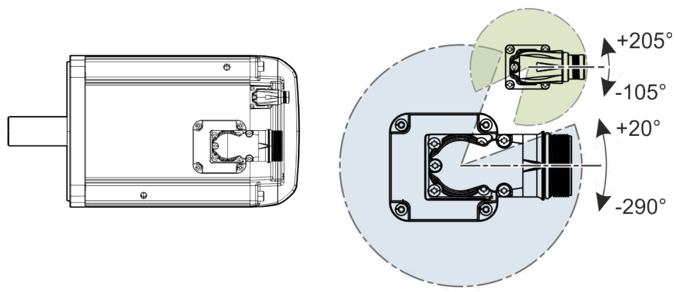



Fig. 391: : Rotating area electrical connection "V"

Table 56: Adjustment torque plug connector power / M40

| Connector/size | Adjustment torque |
|---|---|
| Power / M40 | 12 ... 18 Nm |

# 7.9 M58 cable connector, fixed (thread)

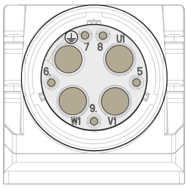



Fig. 392: Connector view of M58 performance connector

Table 57: Pin assignment of double cable connection power

| | Encoder performance | | | |
|---|---|---|---|---|
| | “A / B” | “C / D / H / J / M” | “A / B” | “C / D / H / J / M” |
| Connector pin | with brake | | without brake | |
| 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. |

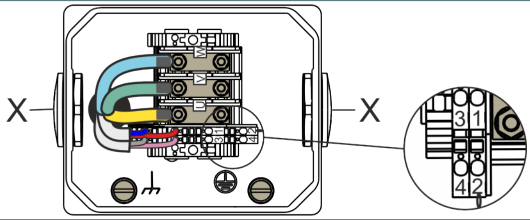
### Connector output direction

The output direction of the power connector and the encoder connector is selectable when ordering.

## 7.10 Terminal box size “T”

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 are not included in the scope of delivery. Ready-made connection cables are supplied with cable entries.

**Terminal box “T”, power**




**Pin assignment, terminal box “T”, power**

| MS2N | Encoder “A / B” | Encoder “C / D / H / J / M” | Cable**) |
|---|---|---|---|
| U | A1 | A1 | 1 |
| V | A2 | A2 | 2 |
| W | A3 | A3 | 3 |
| 1 | BD(+) *) | BD(+) *) | 7 |
| 2 | BD(-) *) | BD(-) *) | 8 |
| 3 | TP1(+) | n.c. | 5 |
| 4 | TP2(-) | n.c. | 6 |
| ⏚ | PE | PE | GNYE |
| ⏧ | Shld | Shld | Shld |

*) n.c. without brake

**) Bosch Rexroth types REL, RL2, RLB2

**Remark**

- Not connected (n.c.) wires must be fixed securely within the terminal box.
- For motors with encoders “C / D / H / J / M”, the temperature signals are transmitted 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.

**Technical data, connection points terminal box “T”, power**

| | |
|---|---|
| U, V, W | Bolts M5, $M_A$ = 2 ... 3 Nm<br>Rated cross section: 16 mm$^2$<br>Rated current: 65 A |
| 1-4 | Tension spring connection 0.5 ... 2.5 mm$^2$ with wire end ferrule |
| ⏚, ⏧ | Screwed connection M8, $M_A$ = 3.8 Nm |

The cable entries “X” are closed with a dummy plugs, at delivery. For bolted threads refer to the following table.

**Cable entries “X”, terminal box “T”, power**

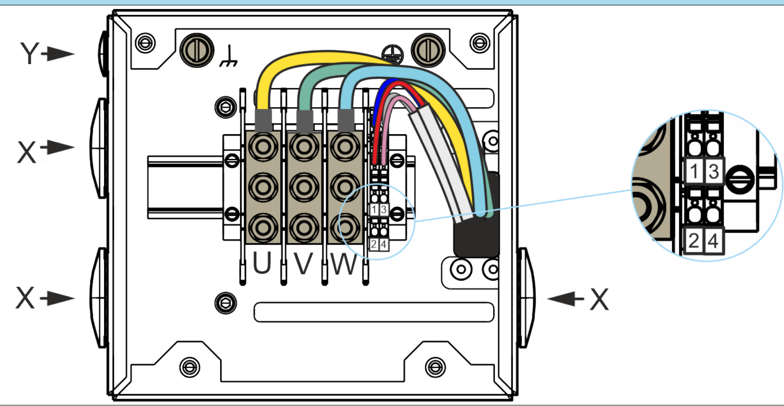
| Motor | Size "X" |
|---|---|
| MS2N10-C0BHA-□□T | 2 x M32 |
| MS2N10-C0BHB-□□T | |
| MS2N10-C0BNA-□□T | |
| MS2N10-C0BNB-□□T | |
| MS2N10-C0BHL-□□T | |
| MS2N10-C0BNL-□□T | |

| Cable entries “X”, terminal box “T”, power | |
|---|---|
| **Motor** | **Size "X"** |
| MS2N10-D0BHA-□□T | 2 x M40 |
| MS2N10-D0BHB-□□T | |
| MS2N10-D0BNA-□□T | |
| MS2N10-D0BNB-□□T | |
| MS2N10-E0BHA-□□T | |
| MS2N10-E0BHB-□□T | |
| MS2N10-E0BNA-□□T | |
| MS2N10-E0BNB-□□T | |
| MS2N10-F0BDA-□□T | |
| MS2N10-F0BDB-□□T | |
| MS2N10-F0BHA-□□T | |
| MS2N10-F0BHB-□□T | |
| MS2N10-E1BNA-□□T | |
| MS2N10-E1BNB-□□T | |
| MS2N10-F1BHA-□□T | |
| MS2N10-F1BHB-□□T | |
| MS2N10-D0BHL-□□T | |
| MS2N10-D0BNL-□□T | |
| MS2N10-E0BHL-□□T | |

## 7.11 Terminal box size “C” (MS2N10)

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 are not included in the scope of delivery. Ready-made connection cables are supplied with cable entries.

Terminal box “C (MS2N10)”, power




| Pin assignment, terminal boxes “C (MS2N10)”, power | | | |
|---|---|---|---|
| **MS2N** | **Encoder “A / B”** | **Encoder “C / D / H / J / M”** | **Cable**)** |
| U | A1 | A1 | 1 |
| V | A2 | A2 | 2 |
| W | A3 | A3 | 3 |
| 1 | BD(+) *) | BD(+) *) | 7 |
| 2 | BD(-) *) | BD(-) *) | 8 |
| 3 | TP1(+) | n.c. | 5 |

| Pin assignment, terminal boxes “C (MS2N10)”, power | | | |
|---|---|---|---|
| MS2N | Encoder “A / B” | Encoder “C / D / H / J / M” | Cable**) |
| 4 | TP2(-) | n.c. | 6 |
| ⏚ | PE | PE | GNYE |
| ⊥ | Shld | Shld | Shld |

*) n.c. without brake

**) Bosch Rexroth types REL, RL2, RLB2

## Remark

– Not connected (n.c.) wires must be fixed securely within the terminal box.
– For motors with encoders **“C / D / H / J / M”**, the temperature signals are transmitted 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.

| Technica data, connection points terminal boxes “C (MS2N10)”, power | |
|---|---|
| U, V, W | Bolts M8, $M_A$ = 6 ... 12 Nm<br>Rated cross section: 50 mm $^2$<br>Rated current: 150 A |
| 1-4 | Tension spring connection 0.5 ... 2.5 mm $^2$ with wire end ferrules |
| ⏚, ⊥ | Screwed connection M8, $M_A$ = 3.5 Nm |

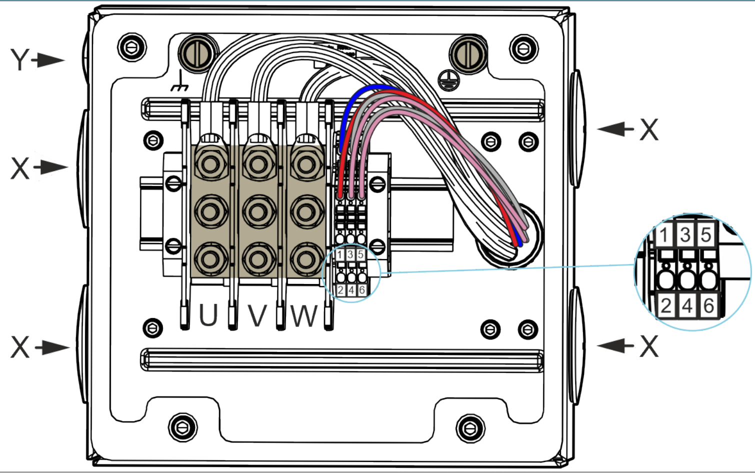
The cable entries “X” and “Y” are closed with dummy plugs, at delivery. For bolted threads refer to the following table.

| Cable entries “X” and “Y”, terminal box “C (MS2N10)”, power | | |
|---|---|---|
| **Motor** | **Size “X”** | **Size “Y”** |
| MS2N10-E0BNL-□□C<br>MS2N10-F0BHL-□□C<br>MS2N10-R0BQL-□□C | 3 x M50 | 1 x M20 |

## 7.12 Terminal box size “C” (MS2N13)

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 are not included in the scope of delivery. Ready-made connection cables are supplied with cable entries.

Terminal box “C (MS2N13)”, power




Pin assignment, terminal box “C (MS2N13)”, power

| MS2N | Encoder “A / B” | Encoder “C / D / H / J / M” | Cable**) |
|---|---|---|---|
| U | A1 | A1 | 1 |
| V | A2 | A2 | 2 |
| W | A3 | A3 | 3 |
| 1 | BD(+) *) | BD(+) *) | 7 |
| 2 | BD(-) *) | BD(-) *) | 8 |
| 3 | TP1(+) | n.c. | 5 |
| 4 | TP2(-) | n.c. | 6 |
| ⏚ (PE) | PE | PE | GNYE |
| ⏛ (shield) | Shld | Shld | Shld |

*) n.c. without brake

**) Bosch Rexroth types REL, RL2, RLB2

**Remark**

- Not connected (n.c.) wires must be fixed securely within the terminal box.
- For motors with encoders **“C / D / H / J / M”**, the temperature signals are transmitted 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.

| Technical data, connection points terminal boxes “C (MS2N13)”, power | |
|---|---|
| U, V, W | Bolts M8, $M_A$ 6 ... 12 Nm<br>Rated cross section: 50 mm $^2$<br>Rated current: 150 A |
| 1-4 | Tension spring connection 0.5 ... 2.5 mm $^2$ with wire end ferrules |
| ⏚, ⏛ | Screwed connection M8, $M_A$ = 3.5 Nm |

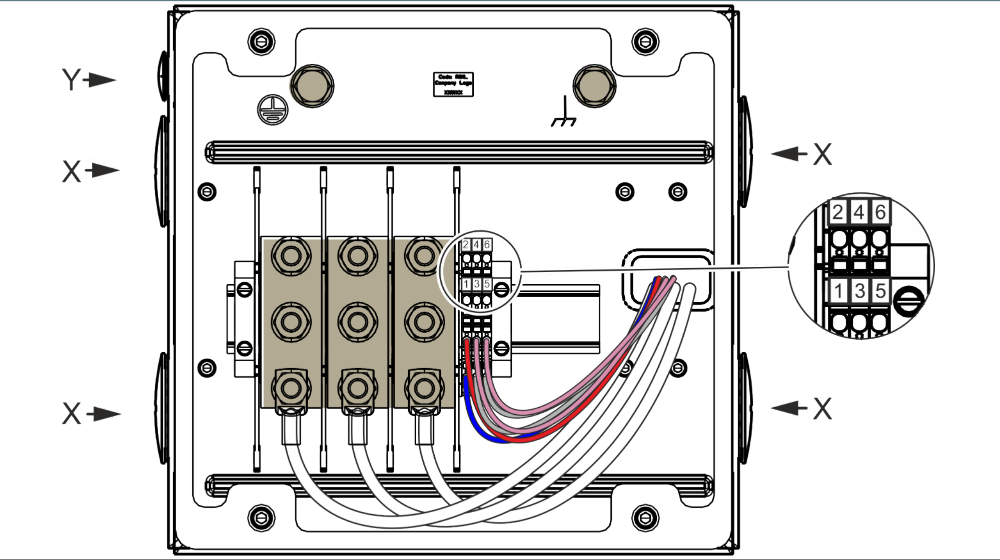
The cable entries “X” and “Y” are closed with dummy plugs, at delivery. For bolted threads refer to the following table.

| Cable entries “X” and “Y”, terminal box “C (MS2N13)”, power | | |
|---|---|---|
| **Motor** | **Size “X”** | **Size “Y”** |
| MS2N13-B1BHN-□□C<br>MS2N13-B1BNN-□□C<br>MS2N13-C1BHN-□□C<br>MS2N13-C1BNN-□□C<br>MS2N13-B1BHC-□□C<br>MS2N13-B1BNC-□□C<br>MS2N13-C1BHC-□□C<br>MS2N13-C1BNC-□□C<br>MS2N13-B1BHL-□□C<br>MS2N13-B1BNL-□□C<br>MS2N13-C1BHL-□□C<br>MS2N13-C1BNL-□□C | 4 x M50 | 1 x M20 |

## 7.13 Terminal box size “E”

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 are not included in the scope of delivery. Ready-made connection cables are supplied with cable entries.

**Terminal box “E” power**




**Pin assignment, terminal box “E”, power**

| MS2N | Encoder “A / B” | Encoder “C / D / H / J / M” | Cable**) |
|---|---|---|---|
| U | A1 | A1 | 1 |
| V | A2 | A2 | 2 |
| W | A3 | A3 | 3 |
| 1 | BD(+) *) | BD(+) *) | 7 |
| 2 | BD(-) *) | BD(-) *) | 8 |
| 3 | TP1(+) | n.c. | 5 |
| 4 | TP2(-) | n.c. | 6 |
| ⏚ | PE | PE | GNYE |
| ⊥ | Shld | Shld | Shld |

*) n.c. without brake

**) Bosch Rexroth types REL, RL2, RLB2

**Remark**

- Not connected (n.c.) wires must be fixed securely within the terminal box.
- The terminal block can be moved on the top-hat rail in order to be able to wire cable outlet directions optimally. The terminal box is suited for double cabling

**Technical data, connection points terminal boxes "E", power**

| | |
|---|---|
| U, V, W | Bolts M10, $M_A$ = 10 ... 20 Nm<br>Rated cross section 6 ... 120 mm²<br>Rated current: 269 A |
| 1-4 | Tension spring connection 0.5 ... 2.5 mm² with wire end ferrules |
| ⏚, ⊥ | Screwed connection M10, $M_A$ = 10 Nm |

The cable entries “X” and “Y” are closed with dummy plugs, at delivery. For bolted threads refer to the following table.

| Cable entries “X” and “Y”, terminal box “T”, power | | |
|---|---|---|
| **Motor** | **Size “X”** | **Size “Y”** |
| MS2N13-D1BHN-□□E | 4 x M50 | 1 x M20 |
| MS2N13-D1BNN-□□E | | |
| MS2N13-E1BHN-□□E | | |
| MS2N13-E1BNN-□□E | | |
| MS2N13-D1BHC-□□E | | |
| MS2N13-D1BNC-□□E | | |
| MS2N13-E1BNC-□□E | | |
| MS2N13-E1BHC-□□E | | |
| MS2N13-D1BHL-□□E | | |
| MS2N13-D1BNL-□□E | | |
| MS2N13-E1BHL-□□E | | |
| MS2N13-E1BNL-□□E | | |

### Notes on cabling

The terminal block can be moved on the DIN rail. This may be necessary in order to be able to wire cable outlet directions optimally. The terminal box is suited for double cabling

# 7.14 Fan 1-phase 115 / 230 V

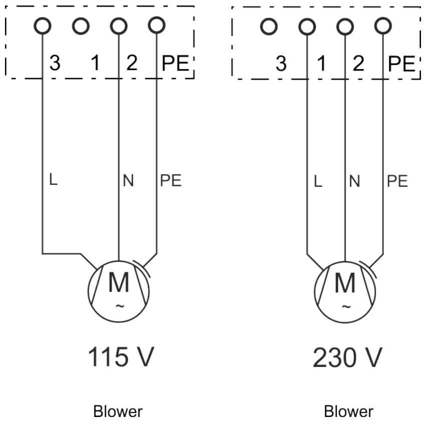



Fig. 393: MS2N Fan connection 115 / 230 V

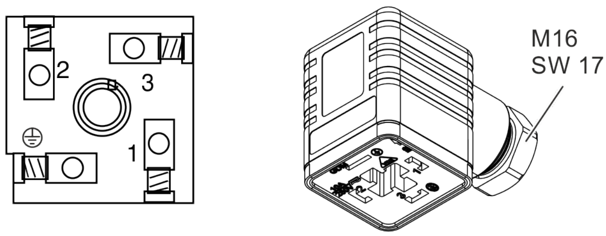



Fig. 394: RLS□□□□ fan connector individual components

Table 58: Connector fan unit for MS2N□□-□□□□A ($U_N$ = 230 V ) and MS2N□□-□□□□B ($U_N$ = 115 V)

| Assignment | | Connection |
|---|---|---|
| 1 | L1, 230 V | Screwed connection 0.5 ... 1.5 mm² |
| 2 | N | |
| 3 | L1, 115 V | |
| ⏚ | PE | |

**Remark**

The plug insert can be mounted in any position into the connector housing. Therewith, the cable output direction can be done in steps of 90 degrees.

### Protection by integrated thermal protection

MS2N fan 115 / 230 V with integrated thermal protection does not need an external motor protective switch.

## 7.15 Fan 3-phase 400 / 480 V

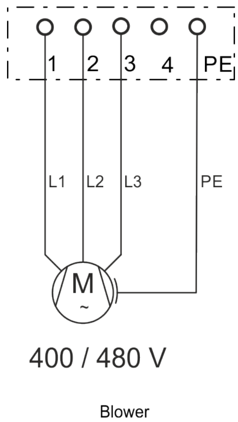



Fig. 395: MS2N fan connection 400 / 480 V

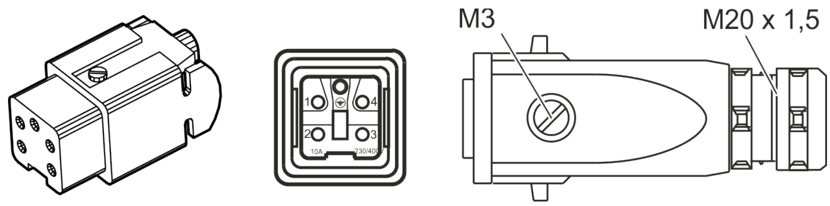



Fig. 396: RLS0782 fan connector individual components

Table 59: Connector fan unit for MS2N□□-□□□□C ($U_N$ = 400 / 480 V )

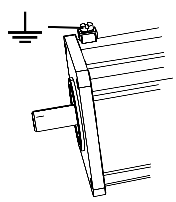
| Assignment | | Connection |
|---|---|---|
| 1 | L1 | 0.5 ... 2.5 mm² <br> 22 ... 12 AWG <br> Clamping screws M3; tightening torque 0.5 ... 0.7 Nm |
| 2 | L2 | |
| 3 | L3 | |
| 4 | n. c. | |
| ⏚ | PE | |

### Protection by motor protection switch

The fan units are connected via adjustable motor protection devices. The motor protection switch must be set to the rated current of the fan unit. When selecting the motor protection switches, make sure that the setting range matches the rated current of the fan unit.

## 7.16 Additional ground connection

For MS2N motors, an additional grounding connection is provided. Refer to the following data to provide an additional grounding connection (see also ➦Chapter 4.18 Additional ground connection on page 58).



| Ground connection | Screw M5 |
|---|---|
| Clamping range | 4 mm² (fine-wired); 6 mm² (single stranded) |
| Tightening torque | maximum 2 Nm |
| Mounting notes | The screw terminal block with clamping bracket has to be assigned in a correct way according to EN 60999-1: 2000. |

## 7.17 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.

For more information about Electromagnetic compatibility (EMC), refer to the project planning manual of the respective drive system.

## 7.18 Ready-made connecting cable

Preassembled power cables, encoder cables and hybrid cables can be provided for the motors. Motors with double cable technology are connected with a power and an encoder cable each. Motors with single cable technology are connected using a hybrid cable. The hybrid cable combines the functionality of power and encoder cable.

The maximum cable length is 75 meters. The maximum cable length can be limited in case of certain motor control unit combinations. Please refer to the documentation about the control unit.

Please contact your sales partner in case of questions about available connection cables.

# 8 Connection water cooling

Any installation material, like tubes or mounting clamps are not in the scope of delivery. Choose a supply hose with correct inner diameter.

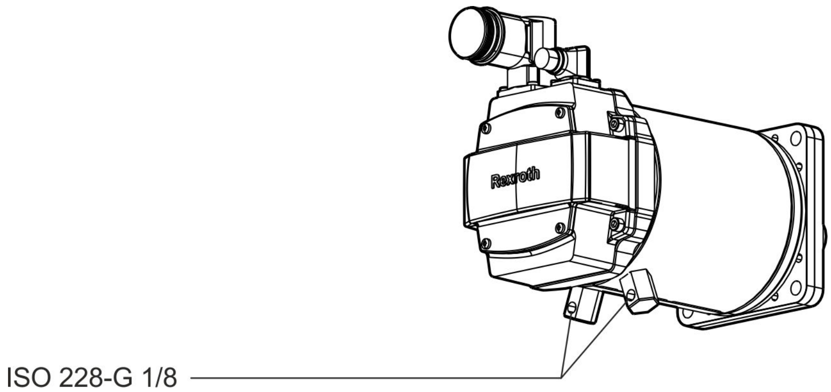



Fig. 397: Coolant connection MS2N07

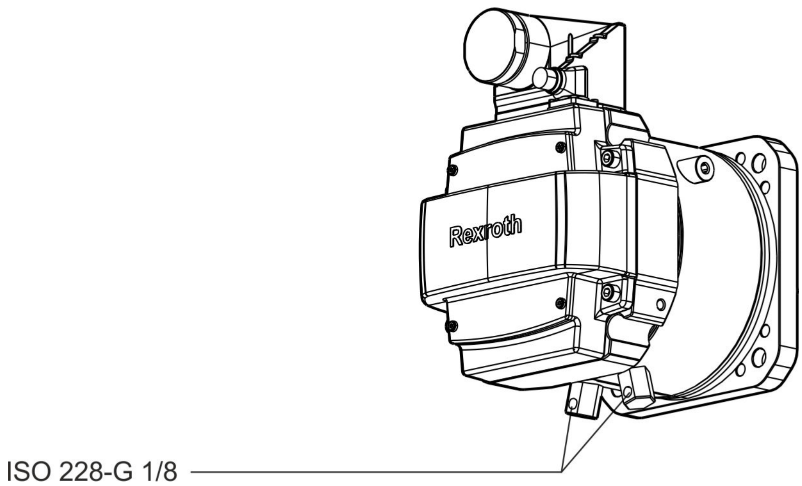



Fig. 398: Coolant connection MS2N10-□□□□L-□□B

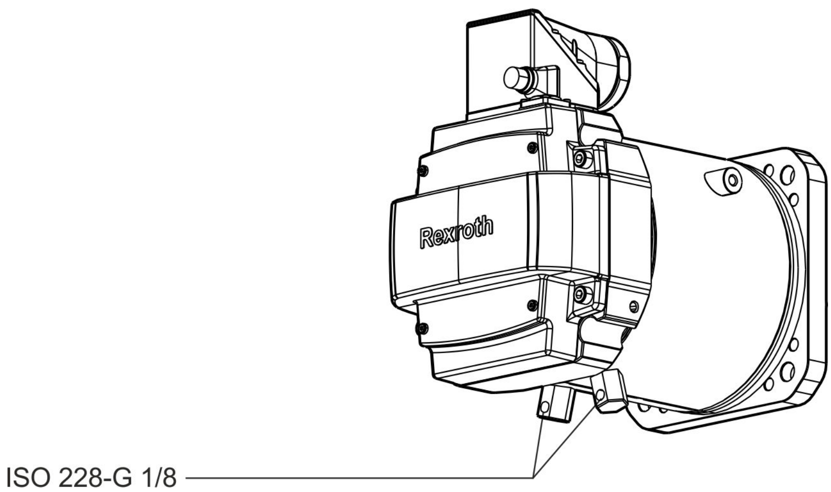



Fig. 399: Coolant connection MS2N10-□□□□L-□□A

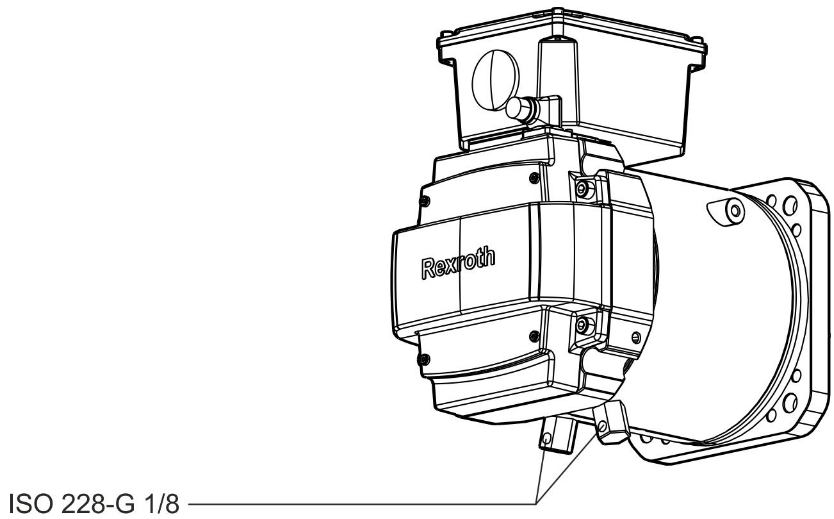



Fig. 400: Coolant connection MS2N10-□□□□L-□□T

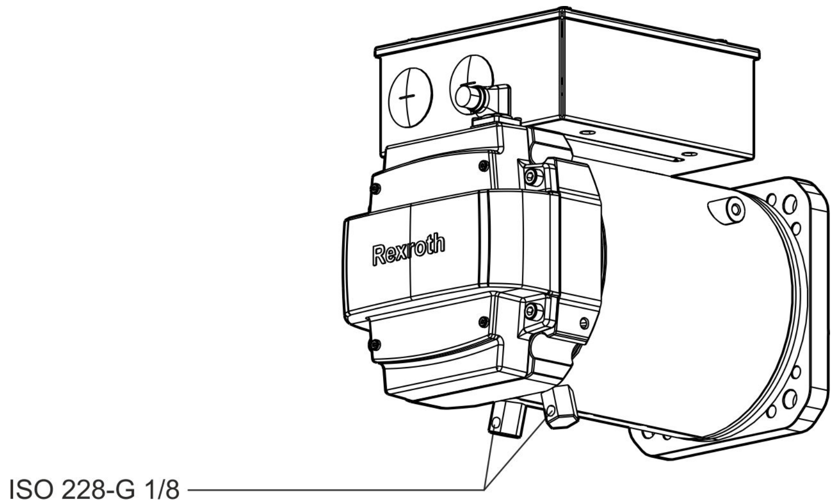



Fig. 401: Coolant connection MS2N10-□□□□L-□□C

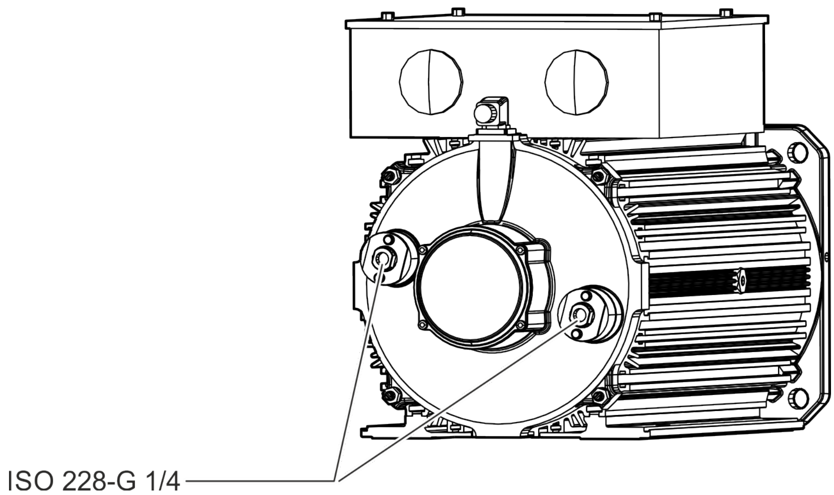



Fig. 402: Coolant connection MS2N13-□□□□L-□□E

Remark

The allocation of intake (IN) and outtake (OUT) can be arbitrarily done. It does not influence the power data of the motor in any way.

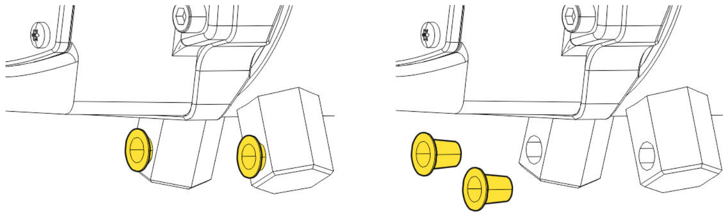


Fig. 403: Protective plug MS2N07, MS2N10 water cooling

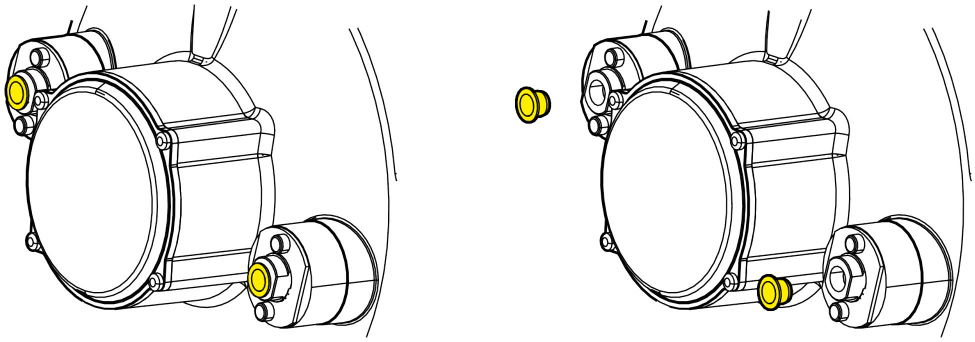


Fig. 404: Protective plug MS2N13 water cooling

The connecting threads on the motor are covered with factory-attached protective caps. These protective caps may only be removed immediately before screwing in the coolant ducts to prevent dirt from entering into the cooling system.

Table 60: Coolant connection thread, allowed tightening torques and screw-in depths

| Motor | Connection | Screw-in depth [mm] | Tightening torque [Nm] |
|---|---|---|---|
| MS2N07 | Pipe thread ISO228-G 1/8 | 10 | 14 ... 15 |
| MS2N10 | Pipe thread ISO228-G 1/8 | 10 | 14 ... 15 |
| MS2N13 | Pipe thread ISO228-G 1/4 | 14 | 18 ... 20 |

***NOTICE***

**The coolant port threads on the motors may be damaged by incorrect tightening torques!**

The allowed motor connection tightening torque may not be exceeded! If the tightening torque or screw-in depth is exceeded, the motor may be damaged irreversibly.

The coolant connections are designed for screw connections with axial sealing.

Bosch Rexroth therefore recommends to use screw connections which contain an O-ring for sealing the screw connection in axial direction.

Seals consisting of hemp, teflon tape or cone-shaped screw connections are not considered to be suitable, as these seals may stress the connection thread at the motor and damage it permanently.

Remark

The machine manufacturer is responsible for ensuring that the coolant connection is tight and for verifying and accepting the tightness after the motor has been installed.

Additionally, record regular monitoring of the proper state of the coolant connection in the maintenance plan of the machine.

# 9 Sealing air connection

The sealing air connection is rotatable. The compressed air hose 4 × 0.75 is not included in the scope of delivery.

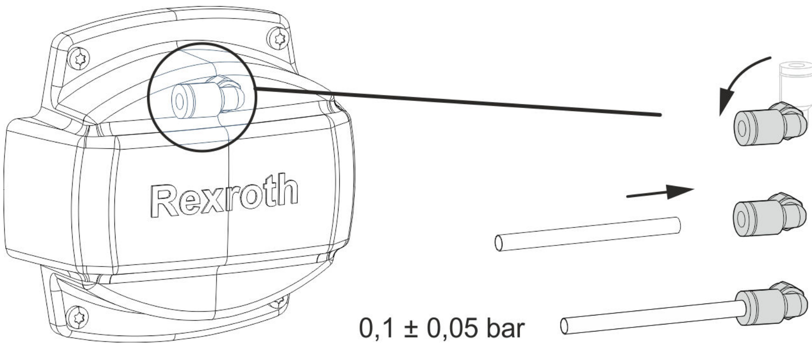



Fig. 405: Connection compressed air hose for using sealing air.

| | |
|---|---|
| **NOTICE** | **Damage due to permanent existing liquid on the shaft sealing ring!**<br>The use of sealing air does **not** prevent the penetration of continuously existing liquid on the shaft sealing ring (e.g. for open gearboxes). Due to capillary action, gearbox oil can penetrate into the motor and damage it, despite using sealing air. |

| | |
|---|---|
| **NOTICE** | **Damage due to ingress of dirt!**<br>The compressed air gland is not closed upon delivery. Always operate motors with compressed air connection with connected compressed air supply. |

# 10 Ambient conditions

## 10.1 Ambient conditions during operation

Climatic conditions are defined in classes according to EN IEC 60721. The classes are differentiated in the areas storage, transport and operation. They are based on long-term experiences and take all influencing variables into account, e.g., air temperature and air humidity.

A permanent use of the motors is possible when the specified class 3K22 according to EN IEC 60721-3-3:2019 is observed. Deviations and enhancements according to the follwing table must be observed.

Table 61: Ambient conditions

| Operation | |
|---|---|
| Installation altitude | 0 ... 1,000 m above MSL |
| Ambient temperature | 0 ... +40 °C |
| Relative humidity | 5 ... 95 % |
| Absolute humidity | 1 ... 29 g/m $^3$ |

### 10.1.1 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 ... 2000 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:

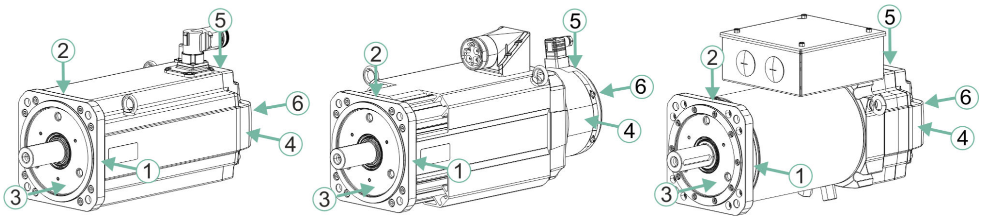



Fig. 406: Vibration load on measuring points

Table 62: Permissible vibration load for MS2N motors

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

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

## 10.2 Derating in case of deviating ambient conditions

**Reduce high performance data:**

1. Reduce the standstill torque $M_{0\ 60K}$ or $M_{0\ 100K}$ specified in the data sheet, with the following factors.

   We have:

   $M_{0\ red} = M_{0\ 60K} \times f_{TH\ 60K}$

   $M_{0\ red} = M_{0\ 100K} \times f_{TH\ 100K}$

   $M_{0\ red} = M_{0\ 100K} \times f_{TH\ W}$

2. Pan the S1-characteristic curve $M_{S1}$ parallel to the speed axis to the junction of the S1-characteristic curve and to the calculated point $M_{0\ red}$ on the torque axis.

   ➡ The determined characteristic curve $M_{S1\ red}$ shows approximately the S1-characteristic curve with appropriate derating.

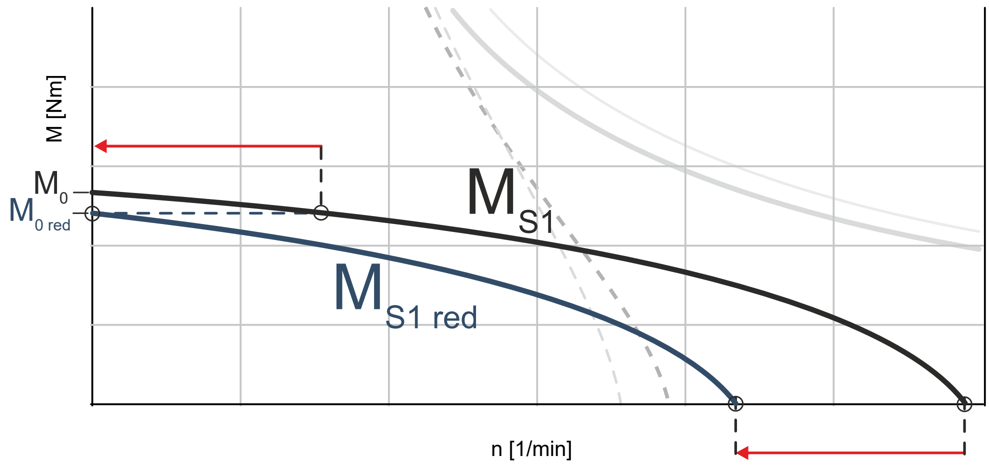



Fig. 407: Determine S1-characteristic curve $M_{S1\ red}$ with derating factor $f_{TH}$

Table 63: Derating factors for self-cooling 60K

| Height [m] | 40 °C | 45 °C | 50°C | 55 °C | 60 °C |
|---|---|---|---|---|---|
| 1,000 | 1.00 | 0.94 | 0.88 | 0.83 | 0.78 |
| 1,500 | 0.97 | 0.91 | 0.85 | 0.81 | 0.76 |
| 2,000 | 0.94 | 0.88 | 0.83 | 0.78 | 0.73 |
| 2,500 | 0.90 | 0.85 | 0.79 | 0.75 | 0.70 |
| 3,000 | 0.86 | 0.81 | 0.76 | 0.71 | 0.67 |

Table 64: Derating factors for self-cooling 100K and forced ventilation

| Height [m] | 40 °C | 45 °C | 50°C | 55 °C | 60 °C |
|---|---|---|---|---|---|
| 1,000 | 1.00 | 0.96 | 0.92 | 0.88 | 0.85 |
| 1,500 | 0.97 | 0.93 | 0.89 | 0.85 | 0.82 |
| 2,000 | 0.94 | 0.90 | 0.86 | 0.83 | 0.80 |
| 2,500 | 0.90 | 0.86 | 0.83 | 0.79 | 0.77 |
| 3,000 | 0.86 | 0.83 | 0.79 | 0.76 | 0.73 |

Table 65: Derating factors for water cooling

| Height [m] | 40 °C | 45 °C | 50°C | 55 °C | 60 °C |
|---|---|---|---|---|---|
| 1,000 | 1.00 | 0.96 | 0.92 | 0.88 | 0.85 |
| 1,500 | 0.99 | 0.95 | 0.91 | 0.87 | 0.84 |
| 2,000 | 0.97 | 0.93 | 0.89 | 0.85 | 0.82 |
| 2,500 | 0.96 | 0.92 | 0.88 | 0.84 | 0.81 |
| 3,000 | 0.95 | 0.91 | 0.87 | 0.83 | 0.80 |

To avoid condensation of the motors, the coolant supply temperature must be above the dew point temperature Fig. 4.

## 10.3 Operation on foreign converters

Principally, operating MS2N motors on foreign converters is possible. In the following, the designs and possible adjustment ranges are represented.

| ⚠ WARNING | **Danger of explosion or material damage due to overload!**<br>Observe the following requirements for safe motor operation on foreign converters. Connection of all necessary sensors and additional devices for a safe operation and their evaluation lies in the sole responsibility of the plant manufacturer or operator. |
|---|---|

**Requirements on the power output stage**

- Converter with pulse width modulation
- Pulse frequency 4 kHz ...16 kHz

**Voltage load of the motor**

During converter operation, the motor underlies a higher voltage load (insulation system, bearing) than on a sinusoidal source voltage only.

*Standard values for peak voltage and rate of rise of voltage:*

- Peak voltage $U_{pk}$ on motor clamps ≤ 1.56 kV
- Rate of rise of voltage du/dt ≤ 5 kV/µs

*Maximum allowed limit load:*

In the case of critical rate of rise of off-state voltage du/dt ≥ 5 kV/µs, the limit values (peak voltage, voltage rise time) according to limit curves A according to **DIN VDE 0530-25 (VDE 0530-25):2009-08 (Figure 14 Limit curve A)** must be kept. Therefore, observe the limit values for voltage rise time and critical rate of rise of off-state voltage.

*Limit values for voltage rise time and critical rate of rise of off-state voltage:*

- Voltage rise time > 0.17 µs
- Rate of rise of off-state voltage du/dt < 8 kV/µs

**Monitoring functions**

- Speed monitoring of maximum permissible speed
- The motor load must not exceed the allowed continuous operation characteristic curve. The converter setting data for controlling and monitoring must comply with the type code data.
- Temperature control to protect from thermal overload
  - The temperature sensor of the motor winding must be connected and evaluated on the converter (ensure monitoring function, observe polarity of temperature sensor, limit switch-off temperature according to ➡Chapter 4.5 Thermal motor protection on page 33).
  - Temperature model or $I^2t$-monitoring within converter. Due to the coupling time of the temperature sensor, an additional suitable temperature model or an $I^2t$-monitoring must be used.

**Requirements for motor operation with holding brake**

- Ensure the brake functionality during normal operation due to voltage control, current monitoring, cyclic control of the brake holding torque, for example.
- Provide an external or an integrated protective circuit within the foreign converter to switch the holding brake (inductive load).
- Never use the holding brake of the motor as an operating brake.
- Idle time after an emergency stop before restarting ≥ 3 minutes.

## 10.4 Transport

The motors must be transported in their original package taking classes 2K11, 2B1, 2C1, 2S5, 2M4 specified acc. to DIN EN 60721-3-2 into account.

Deviations and enhancements according to the following table must be observed.

Table 66: Deviations and enhancements of classification (DIN EN IEC 60721-3-2)

| Transport | |
|---|---|
| Ambient temperature | -25 ... +70 °C |
| Relative humidity | 5 ... 75 % |
| Shock load | ➦Chapter 10.6 Shock load during transport und storage on page 434 |

Remark

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

**Instructions on transport by air**

If motor components with permanent magnets are shipped by air, the DGR (Dangerous Goods Regulations) of the IATA (International Air Transport Association) for hazardous materials of class 9 which also include magnetized substances and objects has to be complied with. This involves, for example:

- Secondary parts of synchronous linear motors
- Rotors of synchronous kit motors
- Rotors of synchronous housing motors (if these are dispatched as motor component, i.e. separate from the stator or motor housing, in service cases)

For details on the maximum allowed magnetic field strengths as well as information on measurement methods for these magnetic field strengths, please refer to the current IATA DGR (see chapter 3.9.2.2).

Further information on air freight:

Integrated battery for ctrlX SENSE (classification UN 3091) is exempted from dangerous goods regulations. MS2N with ctrlX SENSE encoder can therefore be transported via air freight without declaration.

### 10.4.1 Instructions on machine transport

| NOTICE | **Never touch the connection points of electrostatic sensitive devices!**<br>– Mounted components (e.g. temperature sensors, encoder) can contain parts susceptible to electrical discharge.<br>Observe the ESD safety measures. |
|---|---|

| ⚠ WARNING | Risk of injury and material damage due to improper handling during transport! |
|---|---|
| | – Only use hoisting gear suited for the weight of the motors. Use lifting sling belts or lifting eye bolts. Secure the lifting eye bolts before use.<br>– Never walk under hanging loads.<br>– Do not lift the motor at the shaft or on the optional fan housing.<br>– Use suitable protective equipment and protective clothing during transport, and wear safety shoes. |

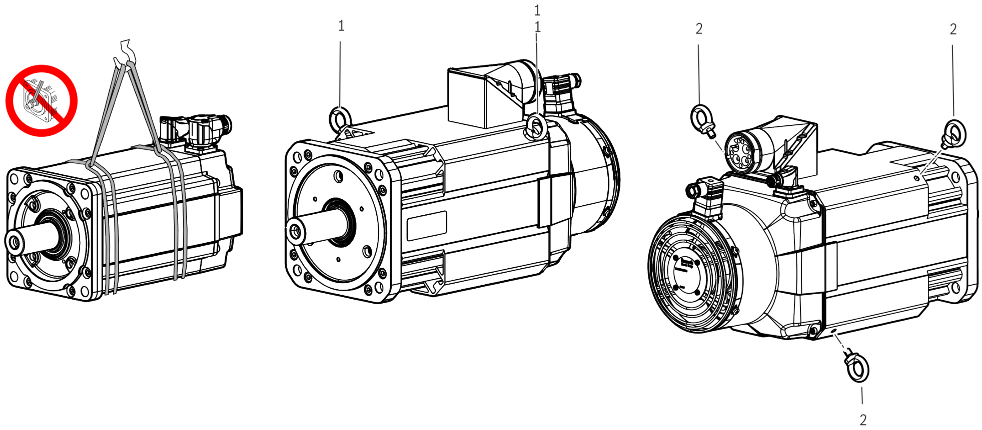



Fig. 408: Lifting and transporting motors
1 Eye bolts (check firm seating before use)
2 Eye bolts alternative position (check firm seat before use)

- 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.

## 10.5 Storage

### General storage conditions

Store the motors in their original packaging in a dry, dust-free, vibration-free and light-protected place without direct solar radiation. Please observe classes 1K21, 1B1, 1C1, 1S10, 1M11 specified for storage acc. to DIN EN 60721-3-1.

Deviations and enhancements according to the follwing table must be observed.

Table 67: Deviations and enhancements of classification (DIN EN IEC 60721-3-1)

| Bearing | |
|---|---|
| Ambient temperature | -25 ... +55 °C |
| Relative air humidity | 5 ... 75 % |
| Absolute air humidity | 1 ... 29 g/m³ |
| Direct solar radiation | Not permitted |

Ambient conditions

| Bearing | |
|---|---|
| Shock load | ➦ Chapter 10.6 Shock load during transport und storage on page 434 |

### Storage time

The maximum storage duration is 2 years.

Storage durations of more than 6 months require conservation measures by the customer. Treat untreated surfaces, e. g. shaft, flange, with preserving agents.

Irrespective of the storage period, which may also extend beyond the warranty period, the function of the products is maintained if additional measures are observed and implemented during commissioning. Warranty extension is not a consequence.

Table 68: Measures before commissioning motors that have been stored over a prolonged period of time

| Storage time / months | | | | Measures for commissioning |
|---|---|---|---|---|
| > 1 | > 6 | > 12 | > 24 | |
| ● | ● | ● | ● | Visual inspection of all parts to be damage-free |
| ● | ● | ● | ● | Resurface the holding brake [1] |
| | ● | ● | ● | Check conservation measures. Renew corrision protection if necessary. Remove the preserving agent before commissioning |
| | | ● | ● | 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 1/min |
| | | ● | ● | Measure insulation resistance. Dry the winding at a value of < 1 kΩ per volt rated voltage. |
| | | | ● | Function test and product revision if necessary by Bosch Rexroth Service |
| [1] Only for motors with holding brake | | | | |

## 10.6 Shock load during transport und storage

Function-impairing effects are avoided as long as the specified limits are complied with.

Table 69: Permissible shock load for MS2N motors

| Type MS2N□□ | Maximum allowed shock load (11 ms) | |
|---|---|---|
| | Axial | radial |
| □□ = 02 / 03 / 04 / 05 | 100 m/s² | 1000 m/s² |
| □□ = 06 | | 500 m/s² |
| □□ = 07 | | 300 m/s² |
| □□ = 10 / 13 | | 200 m/s² |

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

Remark

The specifications do **not apply to motor operation**. Applications with continuous shock load make a case-by-case review necessary.

# 11 Service repair, maintenance and spare parts

Service repairs and the replacement of wearable parts are carried out reliably and professionally to meet factory standards by Bosch Rexroth Service.

| NOTICE | **Product damage possible, loss of warranty claims!**<br>Please note that any repairs or modifications may only be carried out by Bosch Rexroth Service or an authorized specialist workshop.<br>Improper modifications can lead to damage to the engine and are therefore prohibited. In addition, improper modifications will result in the loss of warranty claims. For modification requests, conversions or repairs, please always contact our service department. |
|---|---|

For example, the following repairs can be done:

- Replace motor encoder or battery
- Replace shaft sealing ring
- ...

The service lives of motor components, such as seals and bearings, may vary depending on the operating conditions, such as operation mode, speed, vibration and shock load, and frequent reverse mode. We recommend to change the bearing after 30,000 operating hours. Shorter replacement intervals may be necessary; cf. checks during operation. We recommend regular visual inspections on shaft sealing rings. Depending on operating conditions, signs of wear may appear after 5,000 operating hours. If necessary, replace the shaft sealing rings.

The Bosch Rexroth service helpdesk at our headquarters in Lohr, Germany and our worldwide service provide You can contact us **24/7**.

| | |
|---|---|
| Telephone: | +49 (0) 9352 40 50 60 |
| Fax: | +49 (0) 9352 18 49 41 |
| Email: | service.svc@boschrexroth.de |
| Internet: | ➦https://www.boschrexroth.com |

### Preparing information

For quick and efficient help, please have the following information ready:

- Detailed description of the fault and the circumstances
- Information on the rating plate of the products in question, particularly type codes and serial numbers
- Your contact data (phone number, fax number, email address)

# 12 Environmental protection and disposal

Disposal of the motor components can be done according to the applicable legal process in normal recycling process.

### 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.

### Basic components

Basically, our motors consist of the following components:

- Steel, stainless steel, aluminum, copper, brass
- Plastic parts, insulation and composite material
- Electronic components
- Permanent magnets

Plastic parts of the products may contain flame retardants. These plastic parts are labeled according to EN ISO 1043-1:2011 + A1:2016. They have to be recycled separately or disposed of according to the applicable legal provisions.

### Magnets

| ⚠ WARNING | Danger due to permanent magnets!<br>– Health hazard for persons with heart pacemakers, metallic implants and hearing aids in direct environment of permanent magnets.<br>– Crushing hazard of fingers and hand due to heavy attractive forces of the magnets.<br>– Risk of destruction of sensitive parts like watches, credit cards, ... |
|---|---|

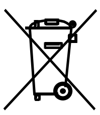
Remark

The permanent magnets must be demagnetized before disposal to avoid injuries or damage. The demagnetization is reached via thermal treatment. The duration of the treatment depends on the size (guide value: 300 °C, 30 min).

### Packaging

Our packaging materials do not contain any problematic materials and can therefor be easily disposed. Packaging materials are: wood, cardboard and polystyrene.

### Batteries and accumulators



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 and accumulators. Outside the scope of the EU Directive 2006/66/EC, the applicable regulations must be followed. Batteries and accumulators can contain hazardous substances which can harm the environment or people's health when improperly stored or disposed of. The batteries or accumulators must be returned to the country-specific collection systems for proper disposal.

### Disposal by the manufacturer

Our products can be returned to us for disposal. However, this requires that the products are free from oil, grease or other dirt. The motor components must be returned in a suitable packaging (origin package if possible). In the case of a transport by air freight, please observe the dangerous goods regulations (IATA) for the secondary part.
Send the products to the following address, carriage free:

Bosch Rexroth AG
Bgm.-Dr.-Nebel-Str. 2
97816 Lohr a.Main, Germany

# 13 Appendix

## 13.1 EU Declaration of Conformity

The CE mark is attached to the type label of the motors.

Declarations of conformity confirming the design and compliance with the valid EN standards and directives are available for MS2N motors.

You will find the full text of the current version of the EU Declaration of Conformity and available translations in Bosch Rexroth Download Center:

➦ "Declaration of Conformity DCTC-30318-002".

## 13.2 UK Declaration of Conformity

You will find the full text of the current version of the UK Declaration of Conformity and available translations in Bosch Rexroth Download Center:

➦ "Declaration of Conformity DCTC-30318-032".

## 13.3 UL / CSA

The UL/CSA conformity of MS2N motors can be found on the type plate of the motors.

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

## 13.4 China RoHS 2

The China RoHS 2 conformity can be found on the type plate of the motors.
Information about listing: ➦ https://www.boschrexroth.com.cn/zh/cn/certificates/china-rohs2/

## 13.5 China Energy Label (CEL)

The **China Energy Label (CEL)** contains details about energy efficiency class and energy usage. Affected permanent magnet synchronous motors exported to China are classified according to GB 30253-2024.


Fig. 409: China Energy Label, example MS2N

### Registered Bosch Rexroth products

Registered Bosch Rexroth motors are provided with the CEL label and can be verified via the QR code on the product-specific web pages (➦ CEL Registered products).

Affected products may only be placed on the market in China after a CEL classification of the product has been passed. **In case of unlisted motor types, please contact Bosch Rexroth.**

### Permanent magnet synchronous motors affected by CEL

- PM synchronous motors up to 1,140 V
- Operation with (frequency-) converter
- Rated power range: 0.55 ... 1,250 kW
- Rated speed range: 45 ... 6,000 1/min

### Permanent magnet synchronous (exceptions) not affected by CEL

- Motors outside of rated power and rated speed range
- Motors with integrated gearbox

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