8KS three-phase synchronous motors

User's manual

Version: **1.00 (March 2020)**
Order no.: **MAMOT3-ENG**

Translation of the original documentation

Chapter 1 • General information

1 Manual history

Version	Date	Notes
1.00	2020-03-10	First edition

Information:

B&R makes every effort to keep user's manuals as current as possible. New versions are available in electronic form on the B&R website (www.br-automation.com). Check regularly to determine if you have the latest version.

2 Safety

2.1 Intended use

The servo motor is only permitted to be used as intended. In this context, the servo motor is only permitted to be used for the applications specified in the technical documents; all information in these commissioning and maintenance instructions must be observed.

Installation, commissioning and maintenance work, as well as work during operation, is only permitted to be carried out by qualified personnel.

For the purposes of the safety instructions listed here, "qualified personnel" is defined as persons trained and authorized in the field who are authorized to set up, install, commission and operate devices, systems and circuits in accordance with applicable safety standards (DIN EN 50110-1).

Incorrect behavior can cause severe personal injury and damage to property.

2.2 Organization of notices

Safety notices

Contain **only** information that warns of dangerous functions or situations.

Signal word	Description
Danger!	Failure to observe these safety guidelines and notices will result in death, severe injury or substantial damage to property.
Warning!	Failure to observe these safety guidelines and notices can result in death, severe injury or substantial damage to property.
Caution!	Failure to observe these safety guidelines and notices can result in minor injury or damage to property.
Notice!	Failure to observe these safety guidelines and notices can result in damage to property.

General notices

Contain **useful** information for users and instructions for avoiding malfunctions.

Signal word	Description
Information:	Useful information, application tips and instructions for avoiding malfunctions.

2.3 General safety guidelines

B&R servo drives and servo motors have been designed, developed and manufactured for conventional use in industrial environments. They were not designed, developed and manufactured for any use involving serious risks or hazards that could lead to death, injury, serious physical damage or loss of any kind without the implementation of exceptionally stringent safety precautions.

In particular, such risks and hazards include the use of these devices to monitor nuclear reactions in nuclear power plants, their use in flight control or flight safety systems as well as in the control of mass transportation systems, medical life support systems or weapons systems.

This servo motor has been constructed in accordance with the current standards of safety technology and tested for operational safety prior to delivery.

To ensure proper installation and safe operation, be sure to read and observe:

- The installation and maintenance guidelines provided in this manual and any accompanying documentation
- The accompanying safety and installation guidelines
- The technical documentation for the respective product
- The installation and safety guidelines for the B&R ACOPOS drive being used
- The applicable work safety regulations
- National, local and plant-specific regulations for your end product

The following dangers must be taken into account when using this product:

Danger associated with

- Electric current
- Moving, rotating and hot parts
- Lifting and carrying
- EMC disturbances
- Mechanical and thermal overload

Advice:

To prevent damage and injury and minimize any residual risks, observe the provided safety notices at all times.

2.3.1 Unauthorized modifications

Warning!

- **Unauthorized modifications to the servo motor are prohibited for reasons of safety. If necessary, contact B&R.**
- **Removing or disabling the servo motor's safety features is not permitted.**

Warning!

- **Caution: Risk of burns!**
- **Surfaces of motors can reach temperatures over 70°C. Provide protection against contact if necessary!**
- **Temperature-sensitive components, such as standard cables or electronic components, are not permitted to come into contact with or be attached to hot surfaces.**
- **Thermal overload of motors can result in irreparable damage to the winding and bearings as well as demagnetization of rare earth magnets. Use the temperature sensor for temperature control.**

Danger!

Use in Ex zones is not permitted unless explicitly designed for this (observe additional instructions). In addition, flammable gas mixtures and hazardous dust concentrations are not permitted in the vicinity of the electric motor. Live and hot motor parts could ignite and cause severe injury as well as damage to property.

If in special cases – use in non-commercial installations – additional requirements are made (e.g. protection of children's fingers), these requirements must be satisfied during setup on the system side.

2.4 Safety guidelines - Transport and storage

For temperature and humidity specifications during transport and storage, see section "General motor data: Storage and transport conditions".

2.4.1 Ambient conditions

The 8KS servo motor is designed for the following ambient conditions:

- Ambient temperature: 0°C to 40°C
- Installation elevation: ≤1000 m above sea level
- Relative humidity: 5% to 85%

2.5 Safety guidelines - Installation

Installation must be performed as described in this manual using suitable equipment and tools.

Devices are only permitted to be installed by qualified personnel without voltage applied. Before installation, voltage to the control cabinet must be switched off and prevented from being switched on again.

General safety guidelines and national accident prevention regulations for working with high voltage systems must be observed.

Electrical installation must be carried out in accordance with applicable guidelines (e.g. line cross sections, fuses, protective ground connections). Note the specifications provided in the "Technical data" chapter.

2.6 Safety guidelines - Operation

2.6.1 Responsibilities of the operator

Definition of the term "operator"

The operator is the person who uses the motor for commercial purposes, or who provides it for use by a 3rd party while carrying legal product responsibility for the protection of the user, personnel or other 3rd parties.

Obligations of the operator:

- To know and implement the applicable industrial safety regulations.
- To know and implement national, local and plant-specific regulations regarding the end product.
- To identify in a risk assessment hazards that can arise due to on-site working conditions.
- To create a manual for operating the motor.
- To regularly check whether the operating instructions issued correspond to current rules and standards.
- To clearly define and manage responsibilities for installation, operation, fault correction, maintenance and cleaning.
- To ensure that all employees have read and understood this user's manual.
- To regularly train and inform personnel about hazards.
- To provide personnel with necessary protective equipment.

2.6.2 Qualified personnel

All tasks such as the transport, installation, commissioning and servicing of devices are only permitted to be carried out by qualified personnel. Qualified personnel are those familiar with the transport, mounting, installation, commissioning and operation of devices who also have the appropriate qualifications to perform these tasks (e.g. IEC 60364). National accident prevention regulations must be observed.

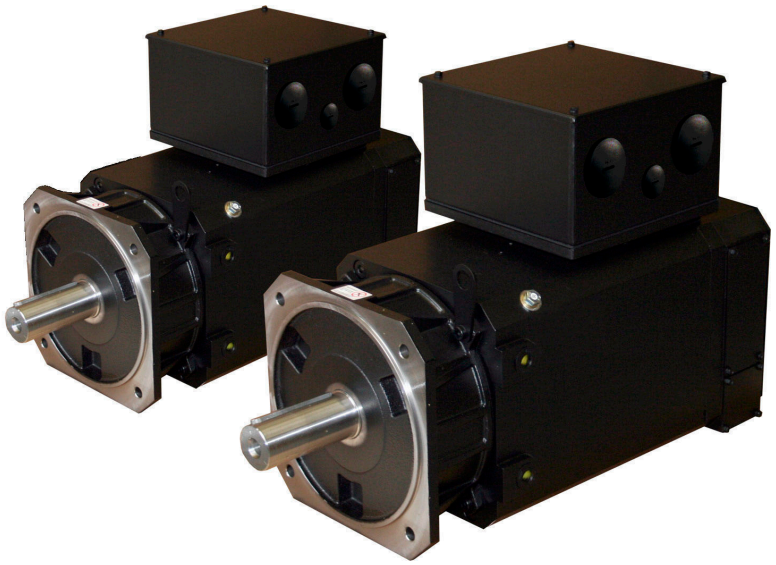
The safety guidelines, information about connection conditions (nameplate and documentation) and limit values specified in the technical data must be read carefully before installation and commissioning and must be strictly observed.

2.6.3 Protective equipment

Always wear suitable safety clothing and equipment for your personal protection.

3 8KS servo motors

8KS servo motors are air-cooled or water-cooled permanent magnet synchronous motors. Designed with a very high power density, very high efficiency and high dynamics, these motors are ideal for the most demanding applications in machine manufacturing. This is further supported by the high overload capacity. These robust and compact motors are also virtually maintenance-free, an additional advantage for achieving highly efficient operation. Using liquid cooling results in a very compact design and significantly reduces noise emissions.



3.1 Nameplate

The nameplate is the identifier for each servo motor. In particular, the respective motor number is unique for each servo motor and absolutely necessary for tracking at our company. The nameplate must therefore be visible at all times and never removed from the motor.

1	Order code
2	Revision
3	Serial number (13-digit)
4	CE marking
5	Protection class
6	Insulation class
7	Cooling specifications
8	Manufacturer
9	Technical data: IN nominal current MN nominal torque nN nominal speed I0 stall current M0 standstill torque UN DC bus voltage

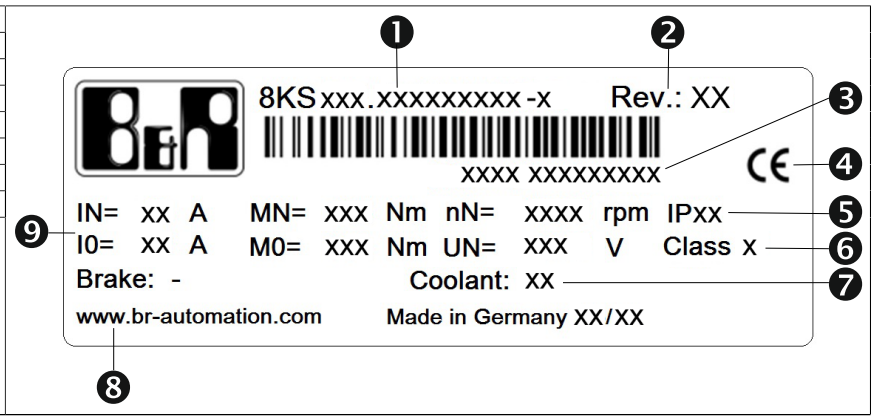


Table 1: Nameplate

Chapter 2 • Technical data

1 General description

Servo motors from the 8KS series are permanent magnet three-phase synchronous motors. Optimized external ventilation provides an effective cooling system that allows for high torque and power density. Due to their high overload capacity and efficient operation (high efficiency), these drives are ideal for demanding applications in general machine manufacturing.

8KS motors are available in air-cooled or water-cooled variants.
The air-cooled variants are optionally available with an installed centrifugal or axial fan.

- Nominal power up to 140 kW
- Fan cooling or optimized water cooling
- Encoders for functional safety available
- High dynamic torque at high speeds
- Power connected using terminal box, encoders connected using speedtec or ITEC circular connectors

2 8KS order key

8KS	b	c	d	.	ee	nnn	ff	gg	-	h

Cooling / Construction type

C ... External cooling by centrifugal fan, flange installation, B-side base mounting
D ... External cooling by centrifugal fan, flange installation, A- and B-side base mounting
J ... External cooling by water jacket, flange installation, B-side base mounting
L ... External cooling by axial fan, flange installation, B-side base mounting
M ... External cooling by axial fan, flange installation, A- and B-side base mounting
see "Cooling / Construction type (b)" on page 11

Size

Valid values: **8, 9** see "Size (c)" on page 12

Length

Valid values: **2, 4, 5, 6** see "Length (d)" on page 12

Motor encoder system

Resolver: **R0**
EnDat encoders: **E6, E7, S0, S1**
see "Motor encoder system (ee)" on page 13

Nominal speed

010 ... 1,000 rpm
011 ... 1,100 rpm
015 ... 1,500 rpm
016 ... 1,600 rpm
020 ... 2,000 rpm
025 ... 2,500 rpm
030 ... 3,000 rpm
see "Nominal speed (nnn)" on page 15

Motor options

Valid values: **A0, A1, A2, A3, B0, B1, B2, B3, C0**, **C1, C2, C3**
see "Motor options (ff)" on page 16

Special motor options

8KS...**00** ... No special motor option
8KS...**04** ... Reinforced A-side bearing (roller bearing)
8KSC...**15** ... Rectangular filter for centrifugal fans
8KSD...**15** ... Rectangular filter for centrifugal fans
see "Special motor options (gg)" on page 19

Motor version

0 ... Motors with EnDat encoder
1 ... Motors with resolver

The value is automatically specified by the configurator and is therefore not freely selectable.

Advice:

Order keys only provide information about possible combinations in exceptional cases.

2.1 ExampleOrder 1

A fan-cooled **8KS** three-phase synchronous motor with size**84** is selected for the application. The motor should be equipped with a mounting base on the A side in addition to the existing mounting base on the B side. The name is therefore 8KS**D**. A single-turn encoder with functional safety was chosen. The required speed is 2500 rpm. The radially-mounted fan should be on the left side of the motor. A brake is not required, the output shaft should be smooth. The fan should be equipped with a filter that is available as a special option.

The code (ee) for the encoder system is **S0**.

The code (nnn) for a nominal speed of 2500 rpm is **025**.

The option code (ff) for fan-cooled 8KS motors with the fan on the left side is always **"A"**. All 8KS motors are equipped with a terminal box (position on the top and cable channel outlet on the right, that corresponds to 270°). The no holding brake and smooth shaft options result in **"0"**, so the option code is **"A0"**

The special option code (gg) for the filter (square filter) is **15**.

The model number for the required motor is **8KSD84.S0025A015-0**

2.2 ExampleOrder 2

A water-cooled **8KSJ** three-phase synchronous motor with size**92** is selected for the application. A multi-turn encoder with functional safety was chosen. The required speed is 2000 rpm. A brake is not required, the output shaft should have a keyway.

The code (ee) for the encoder system is **S1**.

The code (nnn) for a nominal speed of 2000 rpm is **020**.

The option code (ff) for water-cooled 8KSJ motors is always **"B"**. All 8KS motors are equipped with a terminal box (position on the top and cable channel outlet on the right, that corresponds to 270°). The no holding brake and shaft key options result in **"1"**, so the option code is **"B1"**

00 stands for no special option.

The model number for the required motor is **8KSJ92.S1020B100-0**

3 Cooling / Construction type (b)

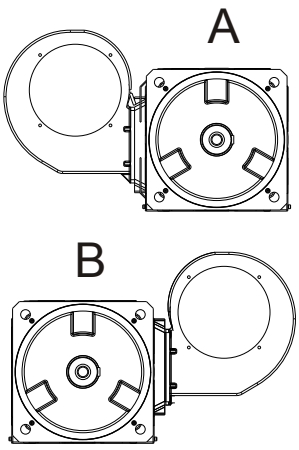
8KS **b** **c** **d** **.** **ee** **nnn** **ff** **gg** **-** **h** see "Order key" on page 9

8KS three-phase synchronous motors are available in cooling types 8KS**C**, 8KS**D**, 8KS**J**, 8KS**L** and 8KS**M**.

Type	Cooling type (b)	Cooling unit installation direction	Available mounting types
8KSC	Fan-cooled	Radial, left or right	Flange, B-side base
8KSD	Fan-cooled	Radial, left or right	Flange, A- and B-side base
8KSJ	Water-cooled	Right	Flange, B-side base
8KSL	Fan-cooled	Axial	Flange, B-side base
8KSM	Fan-cooled	Axial	Flange, A- and B-side base

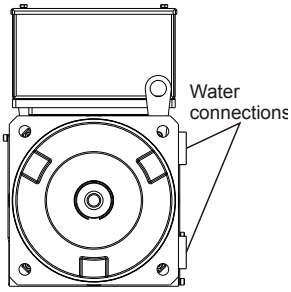
Table 2: Sizes

8KSC / 8KSD



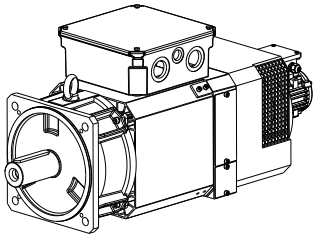
Cooling type 8KSC has external cooling and a centrifugal fan installed on the side (left or right). The motor is installed with the mounting flange, which also serves as a cooling surface, on a mounting base in the B-side bearing area.
Cooling type 8KSD is based on motors of cooling type 8KSC and has an additional mounting base in the A-side bearing area.

8KSJ



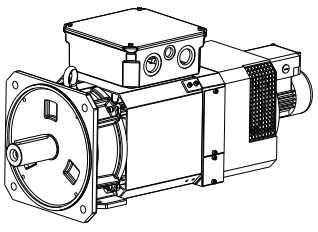
8KSJ cooling type has external cooling and cooling water connections. The motor is installed with the mounting flange, which also serves as a cooling surface, on a mounting base in the B-side bearing area. Due to the design, base mounting on the A-side is not possible with this cooling type!
Size 9 8KSJ motors are equipped with two independent cooling circuits. The connection direction of size 8 8KSJ motors is always on the right. Size 9 must always be connected on both sides.

8KSL



8KSL cooling type has external cooling and an axial fan installed on the back of the motor. The motor is installed with the mounting flange, which also serves as a cooling surface, on a mounting base in the B-side bearing area.

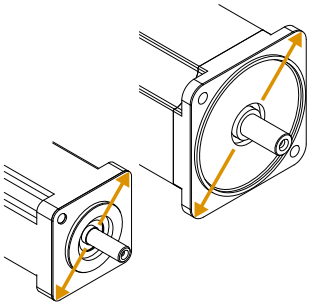
8KSM



Cooling type 8KSM is based on motors of cooling type 8KSL and has an additional mounting base in the A-side bearing area.

4 Size (c)

8KS b c d . ee nnn ff gg - h see "Order key" on page 9



Motors from the 8KS series are available in sizes 8 and 9, depending on the design. These differ in dimensions (especially flange dimensions) and power data.

The various sizes are distinguished by a number (c) in the order number. The larger this number, the larger the flange dimensions and power data of the respective motor.

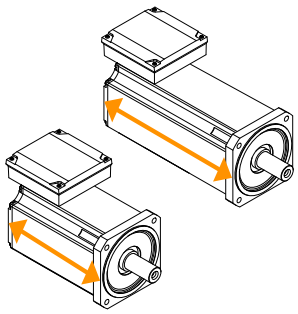
Availability

	Available sizes (c)	
	8KSx8	8KSx9
8KSC	Yes	Yes
8KSD	Yes	---
8KSJ	Yes	Yes
8KSL	Yes	Yes
8KSM	Yes	---

Table 3: Sizes

5 Length (d)

8KS b c d . ee nnn ff gg - h see "Order key" on page 9



8KS three-phase synchronous motors are available in four different lengths. These differ in the power data with identical flange dimensions.

The different lengths are differentiated by a character (d) in the order number. The larger this number, the longer the respective motor.

Availability

Size	Available lengths (d)			
	8KSxx2	8KSxx4	8KSxx5	8KSxx6
8KSx8	Yes	Yes	Yes	Yes
8KSx9	Yes	Yes	Yes	Yes

Table 4: Lengths

6 Motor encoder system (ee)

8KS	b	c	d	.	ee	nnn	ff	gg	-	h

see "Order key" on page 9

8KS three-phase synchronous motors are available with resolvers, EnDat 2.1 encoders or EnDat 2.2 encoders. The encoder system is specified as part of the order number in the form of a 2-digit code (ee).

6.1 Resolver

Technical data

Name	Order code (ee)
	R0
Accuracy	± 6 angular minutes
Vibration during operation 55 < f ≤ 2000 Hz	≤ 500 m/s²
Shock during operation Duration 11 ms	≤ 1000 m/s²

Table 5: Technical data for the resolver

6.2 EnDat 2.1 encoder

General information

EnDat is a standard developed by Johannes Heidenhain GmbH that incorporates the advantages of absolute and incremental position measurement while also offering a read/write parameter memory in the encoder. With absolute position measurement (the absolute position is sampled serially), a homing procedure for referencing is usually not required. Where necessary, a multi-turn encoder should be installed. To reduce costs, a single-turn encoder and a reference switch can also be used. In this case, a homing procedure must be carried out. The incremental process allows the short deceleration periods necessary for position measurement when using drives with highly dynamic characteristics. With the sinusoidal incremental signal and the fine resolution in the EnDat module, a very high positioning resolution is achieved in spite of the moderate signal frequencies used.

Technical data

Different types of EnDat 2.1 encoders can be used depending on requirements:

Name	Order code (ee)	
	E6	E7
Encoder type	EnDat single-turn	EnDat multi-turn
Operating principle	Optical	Optical
EnDat protocol	EnDat 2.1	EnDat 2.1
Resolution	2048-line	2048-line
Recognizable Revolutions	---	4096
Number of lines	2048	2048
Accuracy	±20"	±20"
Cutoff frequency	≥400 kHz (-3 dB)	≥400 kHz (-3 dB)
Vibration during operation 55 < f ≤ 2000 Hz	≤ 300 m/s²	≤ 300 m/s²
Shock during operation Duration 6 ms	≤ 2000 m/s²	≤ 2000 m/s²
Manufacturer's product ID	ECN 1313 EnDat01	EQN 1325 EnDat01

Table 6: Technical data – EnDat 2.1 encoders

6.3 EnDat 2.2 encoder - safety-related position measurement systems

In machine and system manufacturing, the topic of safety is becoming more and more important. This is mirrored in legislation and stricter safety criteria in national and international standards. Most importantly, stricter requirements serve to protect personnel, but they also increasingly serve to protect property and the environment. The goal of functional safety is to minimize or eliminate dangerous situations that can occur in machines and systems either with or without operational errors. This is generally achieved by implementing redundant systems. Moving axes in safety applications require position information in order to be able to carry out their corresponding safety functions. Different system configurations can be implemented to get independent position values. One possibility is using two measuring instruments per axis. To keep costs down, the aim is often to create a solution with only one position measuring instrument. Until now, analog measuring instruments with sine/cosine signals were used for this purpose. The encoder manufacturer Heidenhain – as the first manufacturer with the purely serial EnDat 2.2 protocol for safety position measurement systems – offers a serial single-encoder solution per IEC 61 508 SIL 2. All the advantages of serial data transfer – such as cost optimization, diagnostics possibilities, automatic commissioning and high-speed generation of position values – can now benefit safety applications as well.

100% inspection during production and additional measures during final testing ensure errors have not occurred related to shaft and coupling connections on rotary encoders when using motors with safety encoders (per EN ISO 13849-2).

For information about the area of application and procedure for setting up the various safety functions, please refer to the SafeMOTION user's manual (MAACPMSAFEMC-ENG) in the Downloads section of the B&R website www.br-automation.com.

Technical data

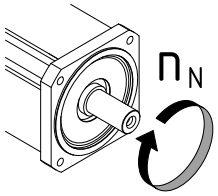
EnDat 2.2 encoders can be used for functional safety in single-turn or multi-turn variants depending on requirements.

Name	Order code (ee)	
	S0	**S1**
Encoder type	EnDat single-turn functional safety	EnDat multi-turn functional safety
Operating principle	Optical	Optical
EnDat protocol	EnDat 2.2	EnDat 2.2
Position values per revolution	33 554 432 (25-bit)	33 554 432 (25-bit)
Distinguishable revolutions	---	4096
Precision	±20"	±20"
Vibration during operation 10 to 2000 Hz	≤300 m/s² (IEC 60068-2-6)	≤300 m/s² (IEC 60068-2-6)
Shock during operation Duration 6 ms	≤2000 m/s² (IEC 60068-2-27)	≤2000 m/s² (IEC 60068-2-27)
Manufacturer's product ID	ECN 1325 FS EnDat22	EQN1337 FS EnDat22

7 Nominal speed (nnn)

8KS	b	c	d	.	ee	nnn	ff	gg	-	h

see "Order key" on page 9



8KS three-phase synchronous motors are available with different nominal speeds.

The nominal speed is specified as part of the order number in the form of a 3-digit code (**nnn**).

	Order code (nnn)						
	010	**011**	**015**	**016**	**020**	**025**	**030**
Nominal speed n_N [rpm]	1000	1100	1500	1600	2000	2500	3000

Availability

Motor size and length	Available nominal speeds n_N [rpm]						
	1000	**1100**	**1500**	**1600**	**2000**	**2500**	**3000**
8KSC8	---	Yes	---	Yes	Yes	Yes	Yes
8KSC92	Yes	---	Yes	---	Yes	Yes	Yes
8KSC94	Yes	---	Yes	---	Yes	Yes	Yes
8KSC95	Yes	---	Yes	---	Yes	Yes	---
8KSC96	Yes	---	Yes	---	Yes	---	---
8KSD8	---	Yes	---	Yes	Yes	Yes	Yes
8KSJ82	Yes	---	Yes	---	Yes	Yes	Yes
8KSJ84	Yes	---	Yes	---	Yes	Yes	Yes
8KSJ85	Yes	---	Yes	---	Yes	Yes	Yes
8KSJ86	Yes	---	Yes	---	Yes	Yes	---
8KSJ92	Yes	---	Yes	---	Yes	Yes	---
8KSJ94	Yes	---	Yes	---	Yes	---	---
8KSJ95	Yes	---	Yes	---	---	---	---
8KSJ96	Yes	---	---	---	---	---	---
8KSM8	---	Yes	---	Yes	Yes	Yes	Yes
8KSL8	---	Yes	---	Yes	Yes	Yes	Yes
8KSL92	Yes	---	Yes	---	Yes	Yes	Yes
8KSL94	Yes	---	Yes	---	Yes	Yes	Yes
8KSL95	Yes	---	Yes	---	Yes	Yes	---
8KSL96	Yes	---	Yes	---	Yes	---	---

Table 7: Available nominal speeds

8 Motor options (ff)

8KS	b	c	d	.	ee	nnn	ff	gg	-	h

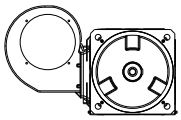
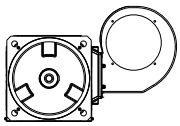
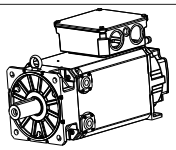
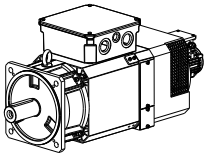
see "Order key" on page 9

8KS three-phase synchronous motors can be delivered with the following options:

- With a smooth or keyed shaft end
- With or without a holding brake
- With two different fan installation directions

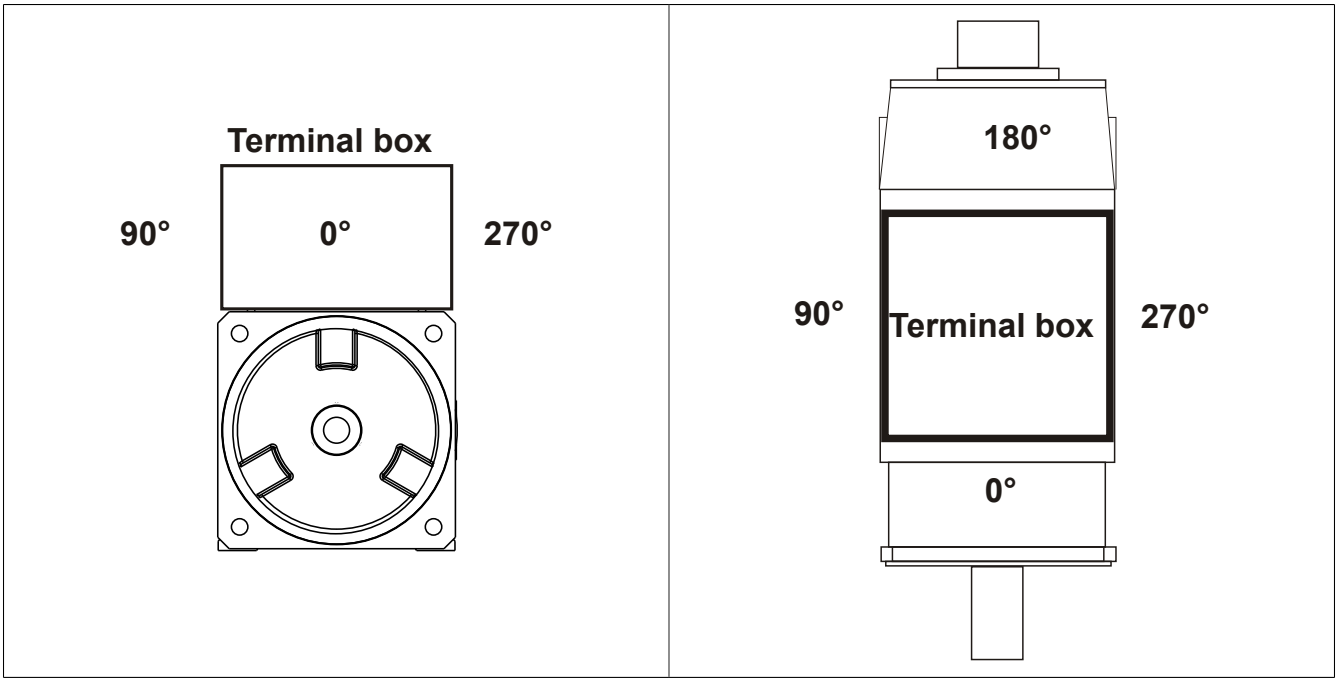
8.1 Determining the order code for motor options (ff)

See the following table for the corresponding code (ff) in the order key.

Cooling / Construction type	Motor option		Order code (ff)
	Holding brake	Shaft end	
 Centrifugal fan - Left	No	Smooth	A0
		With key	A1
	Standard holding brake	Smooth	A2
		With key	A3
 Centrifugal fan - right  Water-cooled	No	Smooth	B0
		With key	B1
	Standard holding brake	Smooth	B2
		With key	B3
 Axial fan	No	Smooth	C0
		With key	C1
	Standard holding brake	Smooth	C2
		With key	C3

8.2 Connection directions

The power connection for 8KS three-phase synchronous motors is generally designed as a terminal box. The position of the terminal box is "top" with cable outlet "right" (corresponds to 270°).



8.3 Holding brake

The holding brake is a permanent magnet brake and can be controlled by the B&R drive system. Based on principle, this type of holding brake exhibits a minimal amount of backlash.

The brake is designed as a holding brake. It not permitted to be used for operational braking! Under these conditions, the brake has a service life of approximately 5,000,000 cycles (opening and closing the brake is one cycle). Loaded braking during an emergency stop is permitted but reduces its service life.

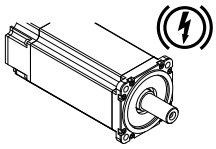
Information:

The required brake holding torque is determined based on the actual load torque. If not enough information is known about the load torque, it is recommended to assume a safety factor of 2.

Warning!

The holding brake is not intended for normal braking. The holding brake does not provide protection for personnel. The maximum motor torque far exceeds the holding torque for the brake.

8.3.1 Standard holding brake (ff)



All 8KS three-phase synchronous motors can be delivered with a holding brake. It is used to hold the motor shaft when the power is switched off to the servo motor.

Standard holding brake - Technical data

Description	Motor size	
	8	9
Holding torque M_{Br} [Nm]	200	320
Connected load P_{On} [W]	170	190
Supply current I_{On} [A]	6.5 (+10% -15%)	7.3 (+10% -15%)
Supply voltage U_{On} [V]	24 (+5% -10%)	24 (+5% -10%)
Moment of inertia J_{Br} [kgcm²]	40	90
Weight m_{Br} [kg]	13	29

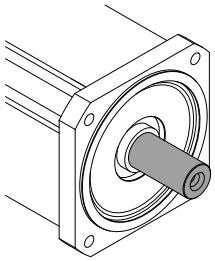
Advice:

External control of the brake is required for operation with B&R drive systems, **see "Brake controller" on page 145.**

8.4 Design of the shaft end

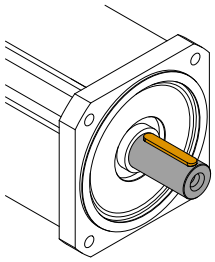
All 8KS three-phase synchronous motor shafts conform to DIN 748, Form E. They are available with a smooth or keyed shaft end.

Variants



Smooth shaft end

A smooth shaft end is used for a force-fit shaft-hub connection and guarantees a back-lash-free connection between the shaft and hub as well as a high degree of operating smoothness. The end of the shaft has a threaded center hole.



Keyed shaft end

A keyed shaft end is used for a form-fit torque transfer with low demands on the shaft-hub connection and for handling torque in a constant direction.
The keyways for 8KS three-phase synchronous motors conform to keyway form N1 per DIN 6885-1. Form A keyed shafts that conform to DIN 6885-1 are used. Balancing motors with keyways is done using the shaft and fitment key convention per DIN ISO 8821.
The end of the shaft has a threaded center hole that can be used to install machine actuators with shaft end cover plates.

Caution!

Shaft breakage due to heavy reverse operation.

The shaft key can become dislodged during heavy reverse operation. In extreme cases, the shaft could brake!

- **Preferably use smooth shaft ends with clamping elements.**

Caution!

Motor damage due to imbalance.

If motors with a keyed shaft end are operated without the shaft key, this can result in imbalances and subsequently motor damage.

- **In these cases, use a smooth shaft end.**

Warning!

Personal injury and damage to property due to ejected elements!

With freely rotating motors, ejected elements can cause personal injury and damage to property.

- **The following safety precautions also apply during short testing and trial operations!**
- **Secure the keys.**
- **Secure or remove mounting screws or other mounting elements.**
- **A shaft protection sleeve for transport and storage must also be removed.**

9 Special motor options (gg)

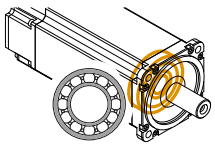
8KS	b	c	d	.	ee	nnn	ff	gg	-	h

see "Order key" on page 9

The respective special motor option is specified as part of the order number in the form of a 2-digit code (gg).

8KS three-phase synchronous motors can be supplied with special motor option "Reinforced A-side bearing". For fan motors 8KSC and 8KSD, a rectangular filter can be selected as a special motor option. For 8KSC and 8KSD, a combination of "Reinforced A-side bearing" and rectangular filter is also possible. Other special motor options must be arranged with B&R.

Reinforced A-side bearing



8KS three-phase synchronous motors with special motor option **"Reinforced A-side bearing"** can handle increased radial and axial forces (F_r , F_a) on the end of the shaft. For specifications for determining the permissible radial and axial forces, see the corresponding motor data.

Information:

Motors with special motor option "reinforced A-side bearing" have increased values for the dimensions of the motor shaft and the total length (in relation to motors with standard bearings).

For the exact dimensions, see the technical data of the respective 8KS three-phase synchronous motors.

9.1 Determining the order code for special options (gg)

See the following table for the corresponding code (gg) in the order key.

Cooling type	Order code (gg)	Special motor option		No special motor option
		Reinforced A-side bearing	Rectangular filter	
8KSC	00	---	---	Yes
	04	Yes	---	---
	15	---	Yes	---
	22	Yes	Yes	---
8KSD	00	---	---	Yes
	04	Yes	---	---
	15	---	Yes	---
	22	Yes	Yes	---
8KSJ	00	---	---	Yes
	04	Yes	---	---
8KSL	00	---	---	Yes
	04	Yes	---	---
8KSM	00	---	---	Yes
	04	Yes	---	---

Table 8: Determining the order code for special options (gg)

10 General motor data

General information	Cooling type C/D	Cooling type J	Cooling type L/M
C-UR-US listed	Yes	Yes	In preparation
UL file number	E480221		E480221

Electrical characteristics			
Mains input voltage on servo drive	3x 400 VAC ... 3x 480 VAC ±10%		
Connection type Power connection Encoder connection	Terminal box speedtec circular connector from Intercontec, size 1		

Thermal characteristics			
Class of the insulation system in accordance with EN 60034-1	F		
Methods of cooling in accordance with EN 60034-6 (IC code)	Externally cooled, with independent centrifugal fan module (IC 416) Direction of air flow: B to A	Liquid-cooled with integrated heat exchanger (IC 3W7)	Externally cooled, with independent axial fan module (IC 416) Direction of air flow: A to B
Incoming coolant temperature		10°C to 25°C, max. 5 K less than the ambient temperature	
Thermal motor protection in accordance with EN 60034-11	KTY84-130 Maximum winding temperature is 155°C (limited by the thermal motor protection in the ACOPOS servo drive or in the ACOPOS-multi drive system to 110°C with EnDat feedback and 130°C with resolver feedback)		

Mechanical characteristics	
Vibration severity per EN 60034-14	Vibration severity A (Vibration severity B upon request)
Eye bolt according to DIN 580	The eye bolts provided are to be used as lifting lugs
Flange	FF flange in accordance with IEC standard
Shaft end	In accordance with DIN 748, centered with inner threads in accordance with DIN 332, Form D
Key and keyway in accordance with DIN 6885-1	Form A shaft keys, form N1 keyway
Balancing the shaft in accordance with DIN ISO 8821	Half-key arrangement
Concentricity in accordance with DIN 42955	Tolerance N, option: R , ball bearings only
Bearing service life	LH10 20,000 h, reference value, permanent lubrication for roller bearing
Coating Color	Water-based coating RAL 9005 flat; shaft end and flange front metallic glossy

Operating conditions	
Rating class, operating mode in accordance with EN 60034-1	S1 - Continuous operation
Environmental conditions during operation	Class 3K3/3Z12 per DIN EN 60721-3-3 at 0°C to 40°C corresponds to -15 to 60°C at 5% to 85% relative humidity and an absolute humidity of 1 g/m3 to 25 g/m.
Maximum installation elevation	1000 m
Maximum flange temperature	No limitations
EN 60034-5 protection (IP code)	IP54
Construction and mounting arrangement type in accordance with EN 60034-7 (IM code)	Horizontal IMB5 or IMB35
Resistance to vibration in accordance with EN 60068-2-6	Radial 3 g, axial 1 g (10 Hz to 55 Hz)

Reduction of I_N, M_N, I_0 and M_0 for ambient temperatures above 40°C or installation elevations higher than 1000 m above sea level (all motors)					
Ambient temperature	40°C	45°C	50°C	55°C	60°C
Correction factor k1	1	1.06	1.13	1.22	1.34
Elevation above sea level	1000 m	2000 m	3000 m	4000 m	5000 m
Correction factor k2	1	1.07	1.16	1.27	1.55

Reduction of continuous power at increased coolant inlet temperatures					
Coolant inlet temperature	25°C	30°C	35°C	40°C	45°C
Percent of nominal torque	100%	97%	95%	92%	89%

Storage and transport conditions	
Storage temperature	-15 to 60°C
Relative humidity during storage	Max. 85%, non-condensing
Transport temperature	-15 to 60°C
Relative humidity during transport	Max. 85%, non-condensing
To avoid frost damage, the cooling water must be drained at ambient temperatures below 3°C!	

10.1 Fan modules

Centrifugal fan - Technical data

Motor size	8KSC8/8KSD8		8KSC9/8KSD9	
General information	400 VAC fan	400 VAC fan	400 VAC fan	400 VAC fan
C-UR-US listed	Yes	Yes	Yes	Yes
Fan type	Centrifugal fan	Centrifugal fan	Centrifugal fan	Centrifugal fan
Rotor bearings	Ball bearings	Ball bearings	Ball bearings	Ball bearings
Degree of protection	IP54	IP54	IP54	IP54
Nominal voltage	Δ/Y 240/420 // 280/480 V	Δ/Y 240/420 // 280/480 V	Δ/Y 240/420 // 280/480 V	Δ/Y 240/420 // 280/480 V
Mains frequency	50 Hz	60Hz	50Hz	60Hz
Nominal current	Δ/Y 0.48/0.28 A	Δ/Y 0.48/0.28 A	Δ/Y 1.8/1.05 A	Δ/Y 1.8/1.05 A
Nominal speed	2820 rpm	3420 rpm	2882 rpm	3460 rpm
Power consumption	0.25 W	0.3 W	0.45 W	0.6 W
Temperature range	0 - 40°C	0 - 40°C	0 - 40°C	0 - 40°C
Operating noise	74 - 78 ±3dB(A)	74 - 78 ±3dB(A)	74 - 78 ±3dB(A)	74 - 78 ±3dB(A)
Service life at 40°C	20,000 h	20,000 h	20,000 h	20,000 h

Axial fan - Technical data

Motor size	8KSL8/8KSM8		8KSL9/8KSM9	
General information	400 VAC fan	400 VAC fan	400 VAC fan	400 VAC fan
C-UR-US listed	Yes	Yes	Yes	Yes
Fan type	Axial fan	Axial fan	Axial fan	Axial fan
Rotor bearings	Ball bearings	Ball bearings	Ball bearings	Ball bearings
Degree of protection	IP54	IP54	IP54	IP54
Nominal voltage	Δ/Y 240/420 // 280/480 V	Δ/Y 240/420 // 280/480 V	Δ/Y 240/420 // 280/480 V	Δ/Y 240/420 // 280/480 V
Mains frequency	50 Hz	60 Hz	50 Hz	60 Hz
Nominal current	Δ/Y 0.48/ 0.28	Δ/Y 0.48/ 0.28	Δ/Y 1.05/ 0.6	Δ/Y 1.05/ 0.6
Nominal speed	2730 rpm	3250 rpm	2820 rpm	3420 rpm
Power consumption	0.08 W	0.12 W	0.25 W	0.3 W
Temperature range	0 - 40°C	0 - 40°C	0 - 40°C	0 - 40°C
Operating noise	74 - 78 ±3dB(A)	74 - 78 ±3dB(A)	74 - 78 ±3dB(A)	74 - 78 ±3dB(A)
Service life at 40°C	20,000 h	20,000 h	20,000 h	20,000 h

11 Definitions and formula symbols

11.1 Formula symbols

Term	Character	Unit	Description
Nominal speed	n_N	rpm	Nominal speed of the motor
Nominal torque	M_N	Nm	The nominal torque is output by the motor ($n = n_N$) when the nominal current is being drawn. This is possible for any length of time if the environmental conditions are correct.
Nominal power	P_N	kW	The nominal power is output by the motor when $n = n_N$. This is possible for any length of time if the environmental conditions are correct.
Nominal current	I_N	A	The nominal current is the effective value for the phase current (current in the motor supply line) when generating the nominal torque at the nominal speed. This is possible for any length of time if the environmental conditions are correct.
Stall torque	M_0	Nm	The stall torque is output by the motor at speed n_0 ($n \geq 1$ rpm) when the stall current is being drawn. This is possible for any length of time if the environmental conditions are correct.
Stall current	I_0	A	The stall current is the effective value of the phase current (current in the motor supply line) for the generation of the stall torque at the speed n_0. This is possible for any length of time if the environmental conditions are correct ($n \geq 1$ rpm).
Peak torque	M_{max}	Nm	The peak torque is briefly output by the motor when the peak current is being drawn.
Peak current	I_{max}	A	The peak current is the effective value of the phase current (current in the motor supply line) for generating the peak torque. This is only possible for a short time. The peak current is determined by the magnetic circuit. Exceeding this value for a short time can cause irreversible damage (demagnetization of the magnet material).
Maximum speed (electrical)	n_{max}	rpm	n rsub{max} = {U rsub{max}*1000} over {nroot{}{2}* k rsub{E0cold} } Maximum electrical speed. Calculated with the following formula: $n_{max} = \frac{U_{max} * 1000}{\sqrt{2} * k_{E0cold}}$
Maximum speed	n_{max}	rpm	Maximum motor speed. This is a mechanical condition (centrifugal force, bearing wear).
Average speed	n_{avg}	rpm	Average speed for one cycle
Torque constant	K_T	Nm/A	The torque constant determines the torque created by the motor with 1 A rms phase current. The torque constant is valid up to approx. 2x M_0.
Voltage constant	K_E	V/1000 rpm	The voltage constant determines the effective value (phase-phase) of the counter EMF induced by the motor at a speed of 1000 rpm.
Stator resistance	R_{2ph}	Ohm	Resistance measured in ohms between two motor leads (phase-phase) at 20°C winding temperature. On B&R motors, the windings use a star connection.
Stator inductance	L_{2ph}	mH	Winding inductance measured between two motor leads.
Electrical time constant	t_{el}	ms	Corresponds to 1/5 of the time needed for the stator current to stabilize with constant operating conditions.
Thermal time constant	t_{therm}	min	Corresponds to 1/5 of the time needed for the motor temperature to stabilize with constant operating conditions.
Moment of inertia without brake	J	kgcm²	Moment of inertia for a motor without a holding brake
Weight without brake	m	kg	Weight of a motor without a holding brake
Moment of inertia of brake	J_{Br}	kgcm²	Moment of inertia for the built-in holding brake
Brake mass	m_{Br}	kg	Weight of the built-in holding brake
Brake holding torque	M_{Br}	Nm	Minimum torque required to hold the rotor when the brake is activated
Installed load	P_{on}	W	Installed load for the built-in holding brake
Installed current	I_{on}	A	Installed current for the built-in holding brake
Connection voltage	U_{on}	V	Operating voltage for the built-in holding brake
Activation delay	t_{on}	ms	Delay time required for the holding torque of the brake to be established after the operating voltage has been removed from the holding brake
Release delay	t_{off}	ms	Delay time required until the holding torque of the holding brake is reduced by 90% (the brake is released) after operating voltage has been returned to the holding brake

12 8KSC - Technical data

12.1 8KSC8 - Technical data

8KSC82

Model number	8KSC82.ee011ff00-h	8KSC82.ee016ff00-h	8KSC82.ee020ff00-h	8KSC82.ee025ff00-h	8KSC82.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1100	1600	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	120	115		110	105
Nominal power P_N [W]	13823	19268	24086	28798	32987
Nominal current I_N [A]	27.3	37.6	46.3	54	58
Stall torque M_0 [Nm]	130				
Stall current I_0 [A]	29.3	41.8	53	65	73
Maximum torque M_{max} [Nm]	305				
Maximum current I_{max} [A]	76	108	138	170	190
Maximum speed n_{max} [rpm]	4300				
Torque constant K_T [Nm/A]	4.63	3.24	2.55	2.08	1.85
Voltage constant K_E [V/1000 rpm]	300	210	165	135	120
Stator resistance R_{2ph} [Ω]	0.64	0.32	0.196	0.132	0.104
Stator inductance L_{2ph} [mH]	19.4	9.6	6	4	3.1
Electrical time constant t_{el} [ms]	31.656	31	30.6	34.167	32.4
Thermal time constant t_{therm} [min]	22.8				
Moment of inertia J [kgcm²]	450				
Weight without brake m [kg]	110				
Holding brake					
Holding torque of brake M_{Br} [Nm]	200				
Mass of brake [kg]	13				
Moment of inertia of brake J_{Br} [kgcm²]	40				
Recommendations					
ACOPOS 8Vxxxx.xx...	1320	1640		128M	
ACOPOSmulti 8BVIxxxx...	0330	0660		0880	
Cross section for B&R motor cables [mm²]	4	10		0	
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

8KSC84

Model number	8KSC84.ee011ff00-h	8KSC84.ee016ff00-h	8KSC84.ee020ff00-h	8KSC84.ee025ff00-h	8KSC84.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1100	1600	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	160	150	145	140	130
Nominal power P_N [W]	18431	25133	30369	36652	40841
Nominal current I_N [A]	35.7	46.5	57	67	74
Stall torque M_0 [Nm]	175				
Stall current I_0 [A]	39	53	68	84	98
Maximum torque M_{max} [Nm]	405				
Maximum current I_{max} [A]	101	138	175	215	250
Maximum speed n_{max} [rpm]	4300				
Torque constant K_T [Nm/A]	4.61	3.38	2.66	2.15	1.84
Voltage constant K_E [V/1000 rpm]	300	220	173	140	120
Stator resistance R_{2ph} [Ω]	0.42	0.22	0.14	0.092	0.068
Stator inductance L_{2ph} [mH]	14.6	7.8	4.8	3.2	2.3
Electrical time constant t_{el} [ms]	35.667	36.636	35.714	32.6	40
Thermal time constant t_{therm} [min]	23.8				
Moment of inertia J [kgcm²]	580				
Weight without brake m [kg]	125				
Holding brake					
Holding torque of brake M_{Br} [Nm]	200				
Mass of brake [kg]	13				
Moment of inertia of brake J_{Br} [kgcm²]	40				
Recommendations					
ACOPOS 8Vxxxx.xx...	1640		128M		
ACOPOSmulti 8BVIxxxx...	0440	0660	0880	1650	
Cross section for B&R motor cables [mm²]	10		0		
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

8KSC85

Model number	8KSC85.ee011ff00-h	8KSC85.ee016ff00-h	8KSC85.ee020ff00-h	8KSC85.ee025ff00-h	8KSC85.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1100	1600	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	195	185	175	165	155
Nominal power P_N [W]	22462	30997	36652	43197	48695
Nominal current I_N [A]	40.4	55	68	79	90
Stall torque M_0 [Nm]	215				
Stall current I_0 [A]	45	65	84	103	125
Maximum torque M_{max} [Nm]	505				
Maximum current I_{max} [A]	117	170	215	265	325
Maximum speed n_{max} [rpm]	4300				
Torque constant K_T [Nm/A]	4.99	3.46	2.69	2.18	1.79
Voltage constant K_E [V/1000 rpm]	325	225	175	141	116
Stator resistance R_{2ph} [Ω]	0.36	0.172	0.104	0.068	0.046
Stator inductance L_{2ph} [mH]	13.6	6.5	4	2.5	1.74
Electrical time constant t_{el} [ms]	38.722	37.111	40.4	44	45
Thermal time constant t_{therm} [min]	25				
Moment of inertia J [kgcm²]	710				
Weight without brake m [kg]	145				
Holding brake					
Holding torque of brake M_{Br} [Nm]	200				
Mass of brake [kg]	13				
Moment of inertia of brake J_{Br} [kgcm²]	40				
Recommendations					
ACOPOS 8Vxxxx.xx...	1640		128M		-
ACOPOSmulti 8BVIxxxx...	0660	0880	1650		
Cross section for B&R motor cables [mm²]	10	0			
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

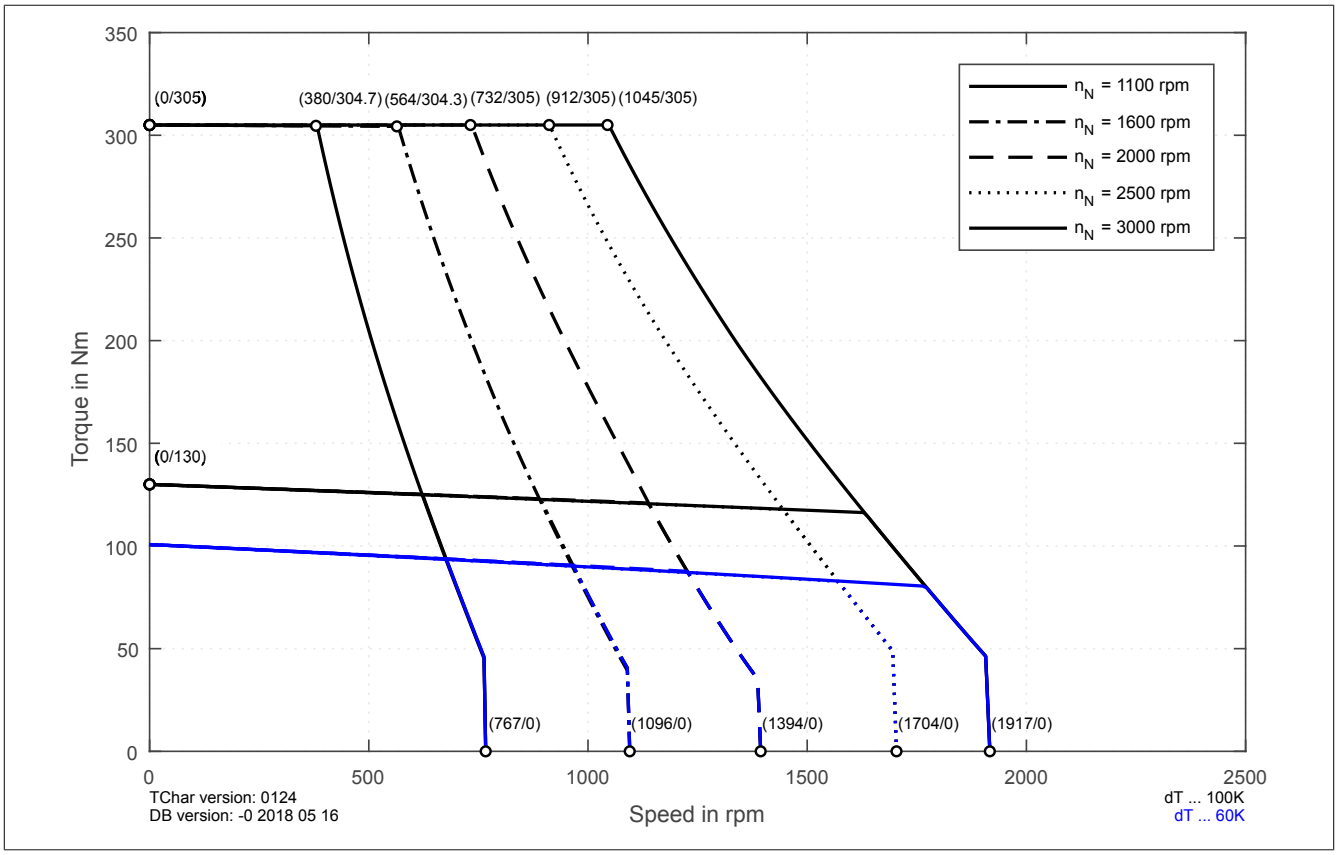
8KSC86

Model number	8KSC86.ee011ff00-h	8KSC86.ee016ff00-h	8KSC86.ee020ff00-h	8KSC86.ee025ff00-h	8KSC86.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1100	1600	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	230	215	205	190	175
Nominal power P_N [W]	26494	36024	42935	49742	54978
Nominal current I_N [A]	52	69	81	91	99
Stall torque M_0 [Nm]	260				
Stall current I_0 [A]	59	84	103	125	146
Maximum torque M_{max} [Nm]	610	605			
Maximum current I_{max} [A]	150	215	265	325	380
Maximum speed n_{max} [rpm]	4300				
Torque constant K_T [Nm/A]	4.61	3.23	2.61	2.15	1.84
Voltage constant K_E [V/1000 rpm]	300	210	170	140	120
Stator resistance R_{2ph} [Ω]	0.24	0.116	0.076	0.052	0.038
Stator inductance L_{2ph} [mH]	9.6	4.6	3.1	2.09	1.53
Electrical time constant t_{el} [ms]	41	40.167	39.5	35.667	39.5
Thermal time constant t_{therm} [min]	26.2				
Moment of inertia J [kgcm²]	840				
Weight without brake m [kg]	165				
Holding brake					
Holding torque of brake M_{Br} [Nm]	200				
Mass of brake [kg]	13				
Moment of inertia of brake J_{Br} [kgcm²]	40				
Recommendations					
ACOPOS 8Vxxxx.xx...	128M			-	
ACOPOSmulti 8BVIxxxx...	0660	1650			
Cross section for B&R motor cables [mm²]	0				
Connector type	Terminal box				

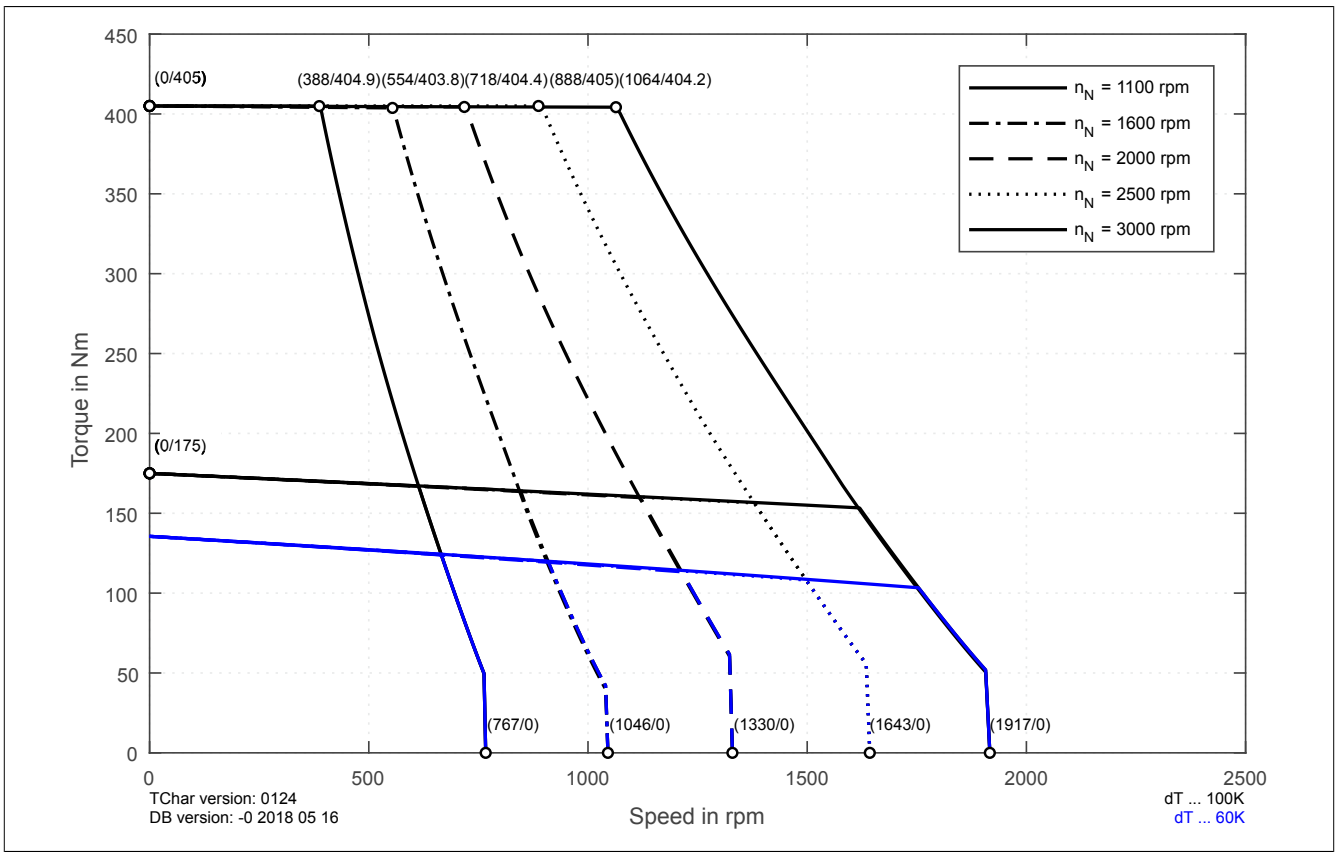
NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

12.1.1 Speed-Torque characteristic curves at 325 VDC DC bus voltage

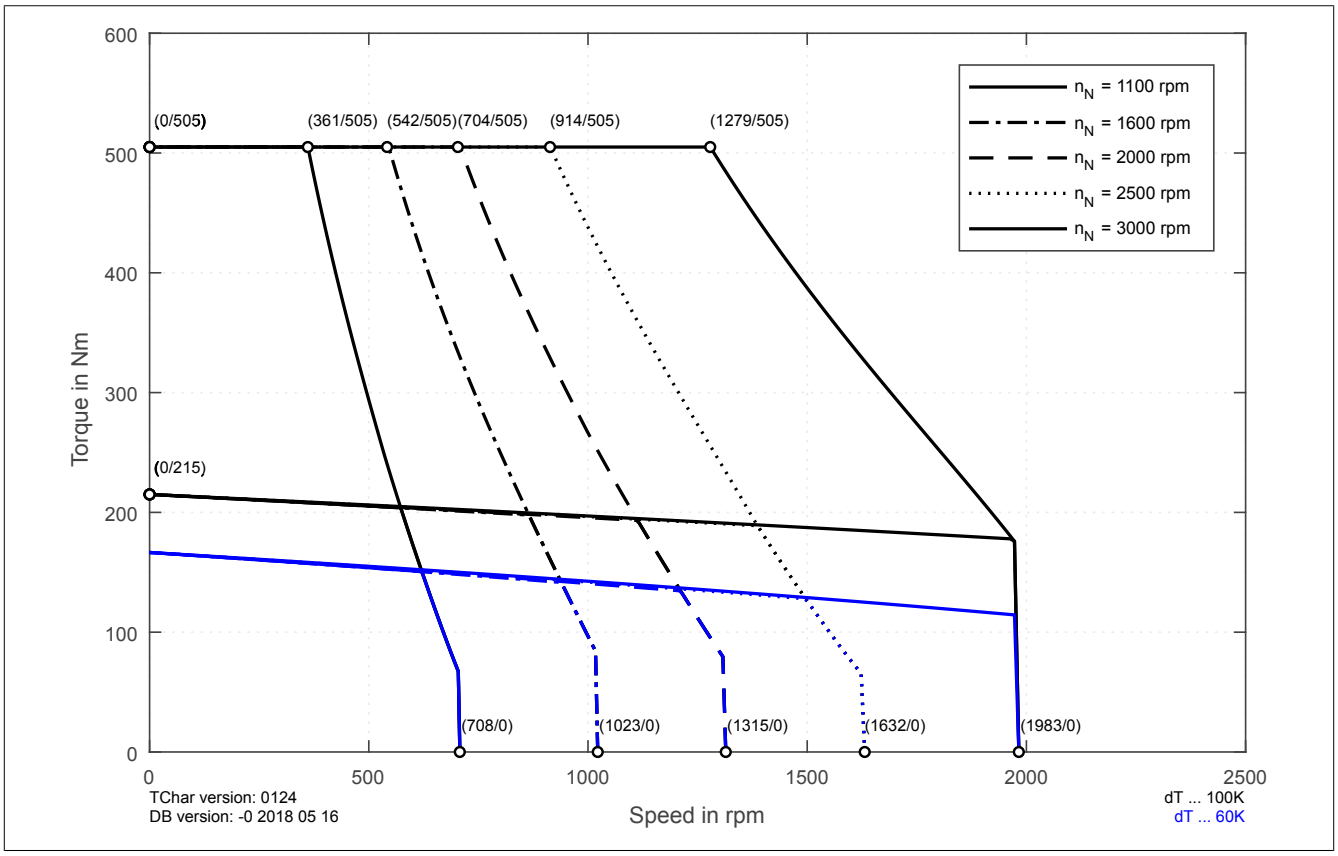
8KSC82.eennnffgg-h and 8KSD82.eennnffgg-h



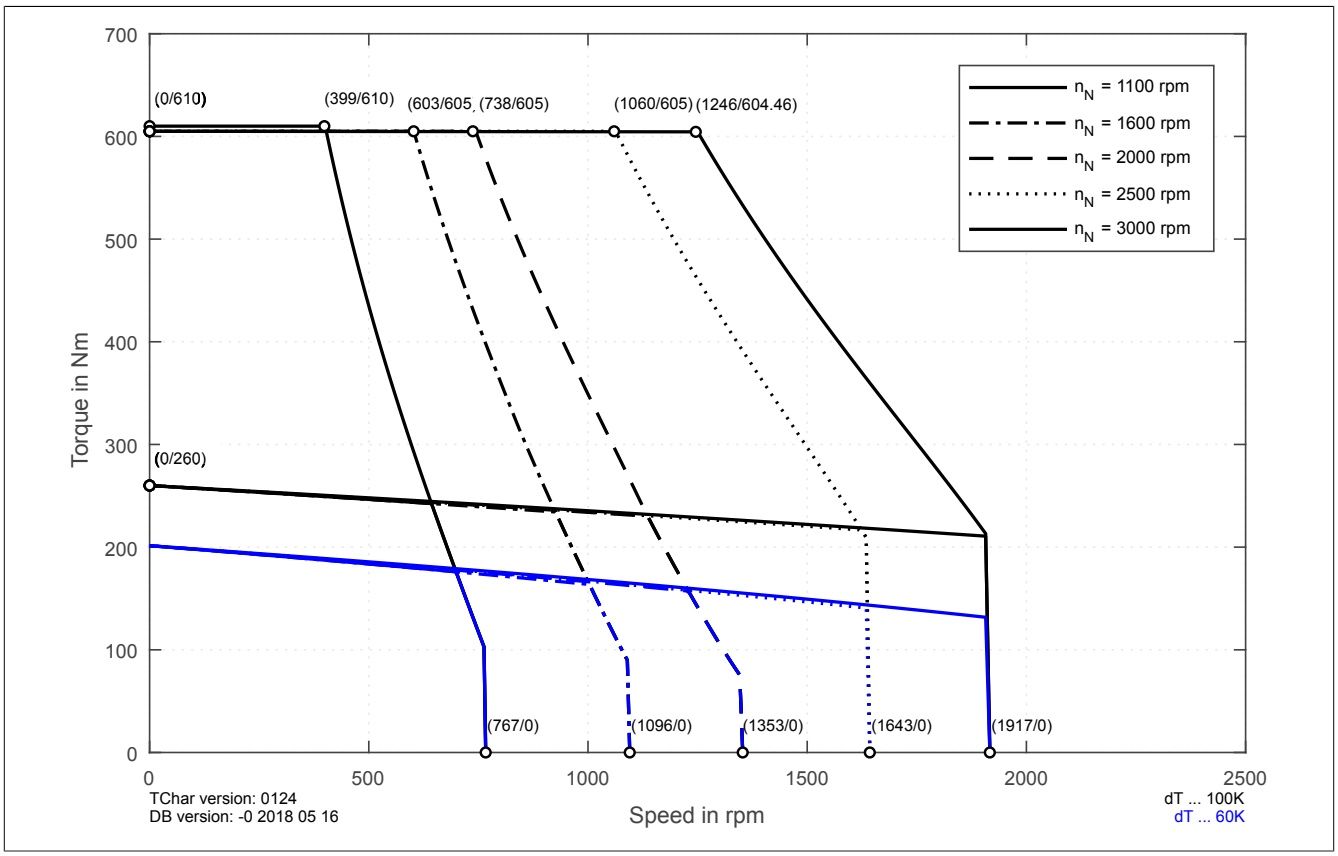
8KSC84.eennnffgg-h and 8KSD84.eennnffgg-h



8KSC85.eennnffgg-h and 8KSD85.eennnffgg-h

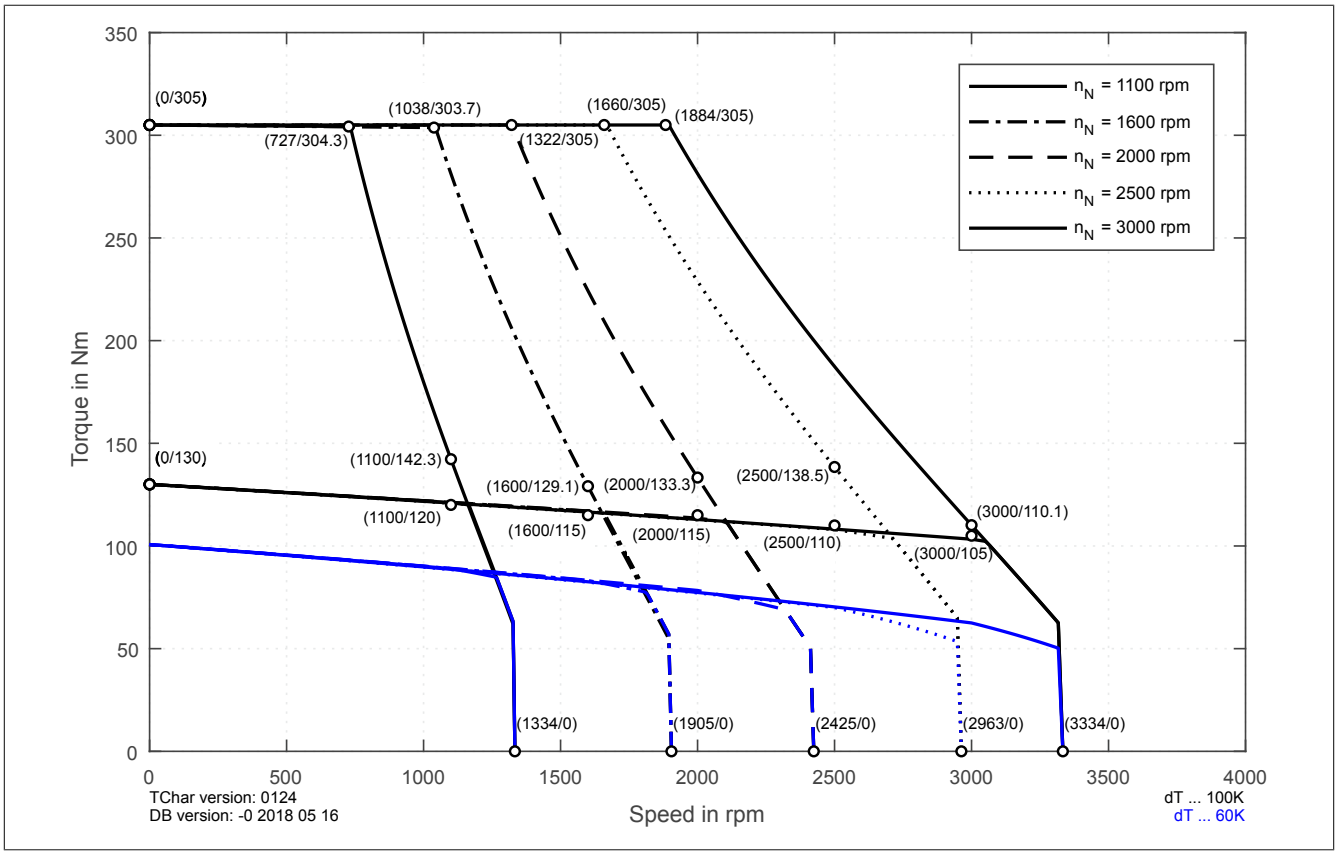


8KSC86.eennnffgg-h and 8KSD86.eennnffgg-h

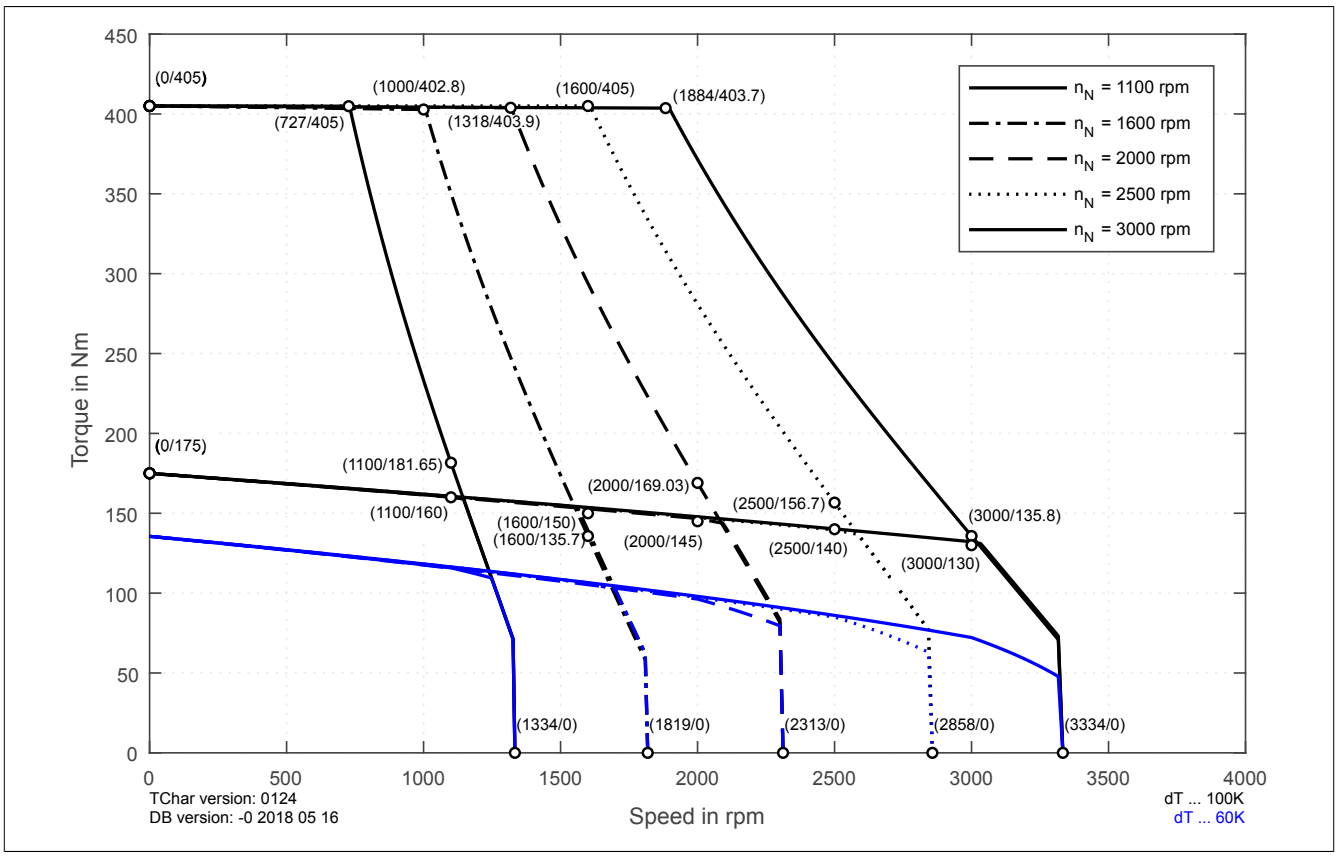


12.1.2 Speed-torque characteristic at 560 DC bus voltage

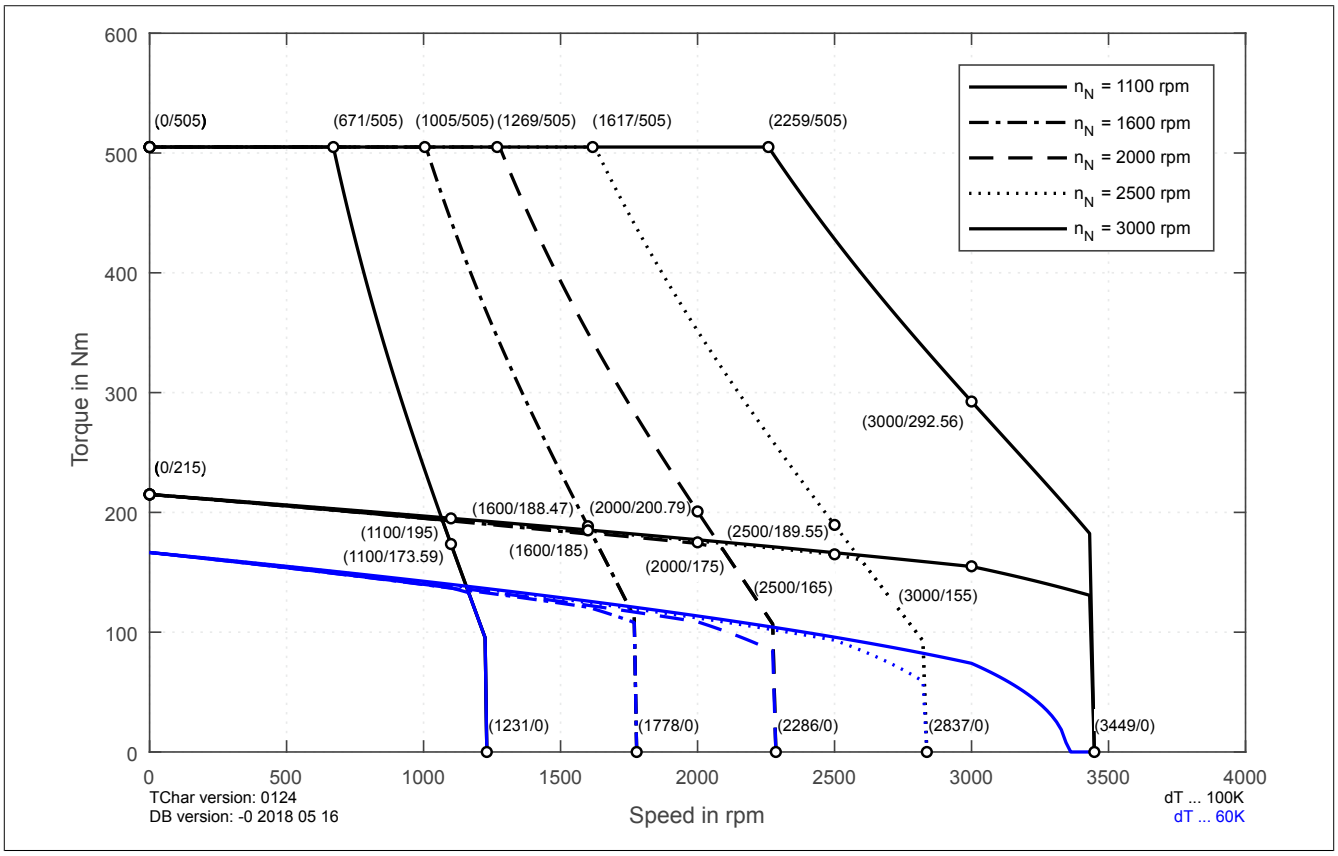
8KSC82.eennnffgg-h and 8KSD82.eennnffgg-h



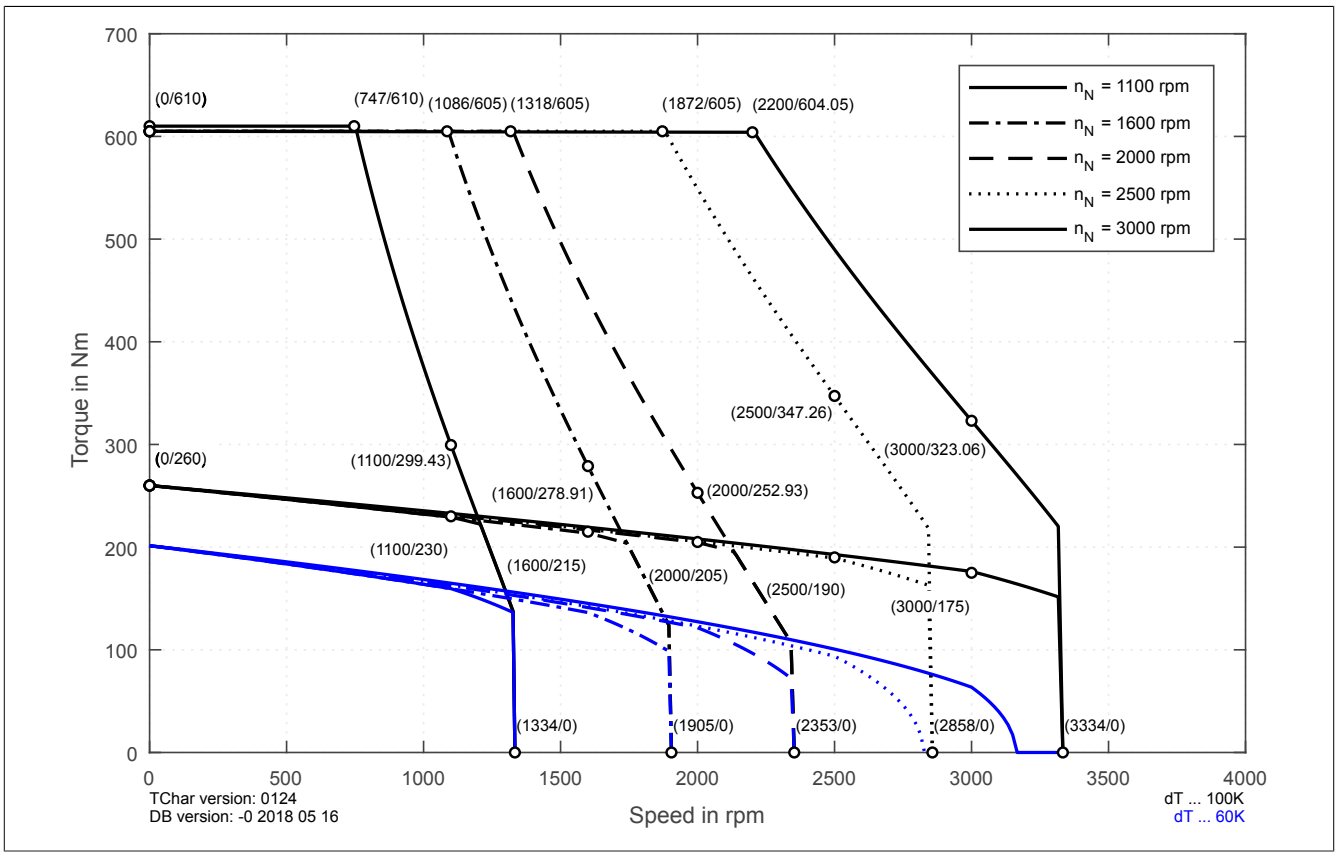
8KSC84.eennnffgg-h and 8KSD84.eennnffgg-h



8KSC85.eennnffgg-h and 8KSD85.eennnffgg-h

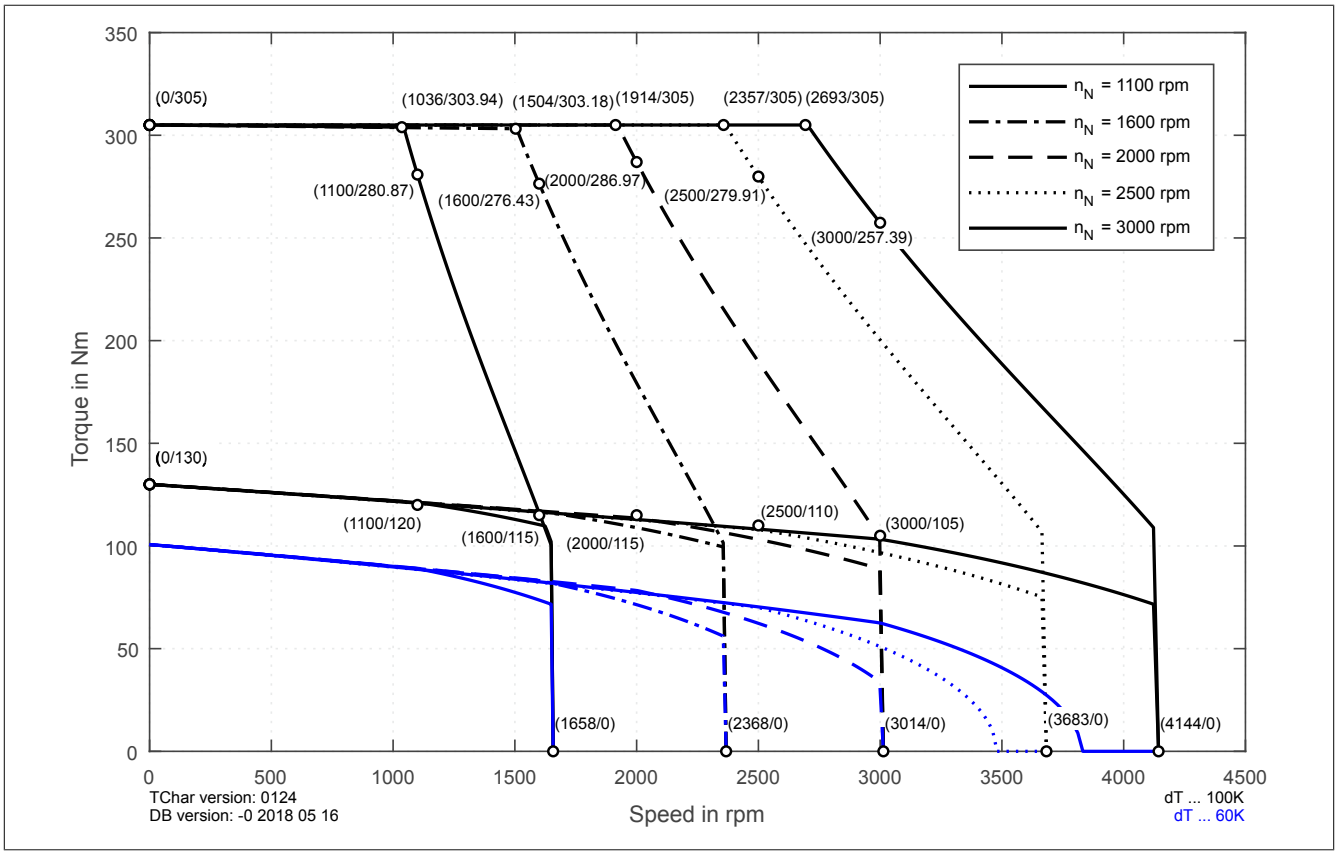


8KSC86.eennnffgg-h and 8KSD86.eennnffgg-h

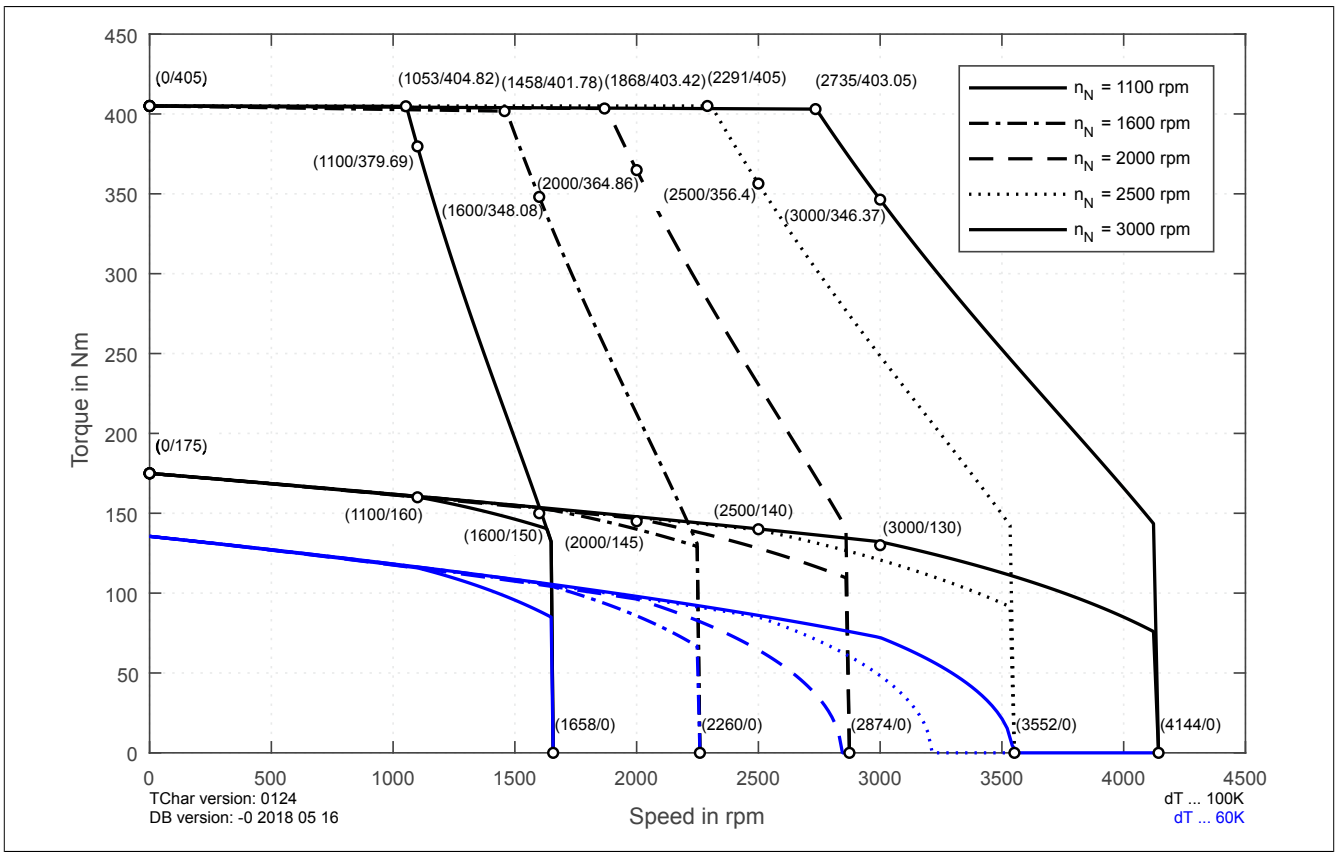


12.1.3 Speed-torque characteristic 750 DC bus voltage

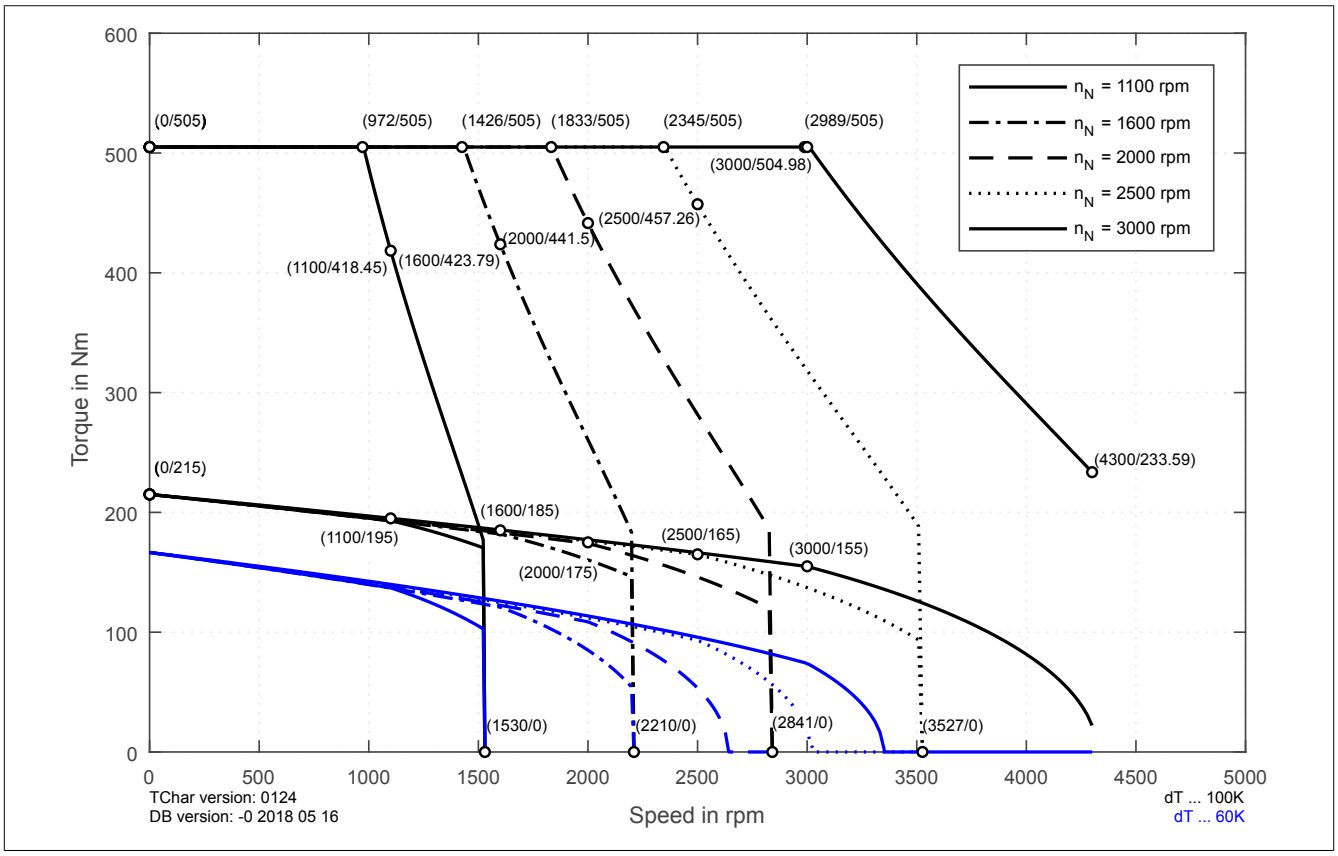
8KSC82.eennnffgg-h and 8KSD82.eennnffgg-h



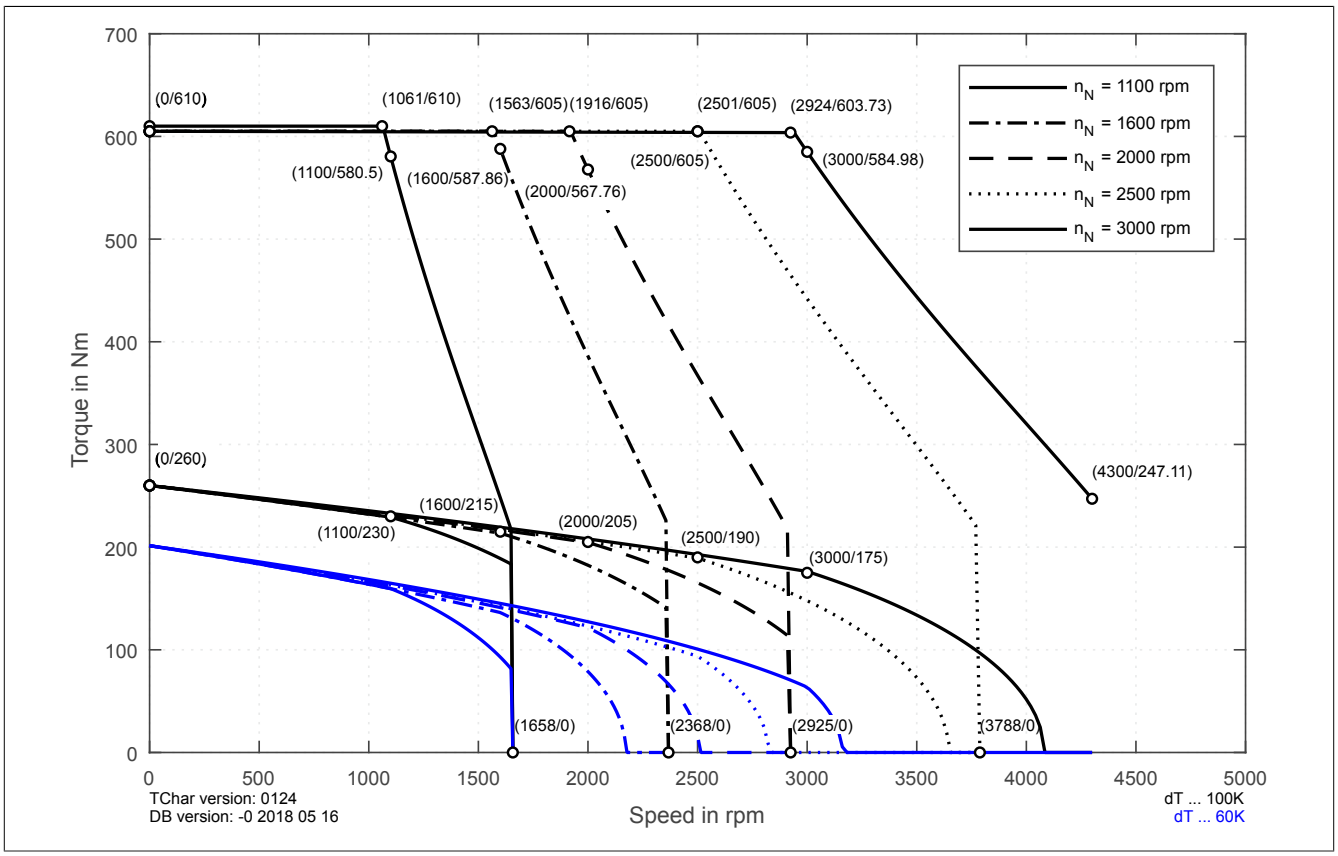
8KSC84.eennnffgg-h and 8KSD84.eennnffgg-h



8KSC85.eennnffgg-h and 8KSD85.eennnffgg-h



8KSC86.eennnffgg-h and 8KSD86.eennnffgg-h



12.1.4 Dimensions 8KSC8

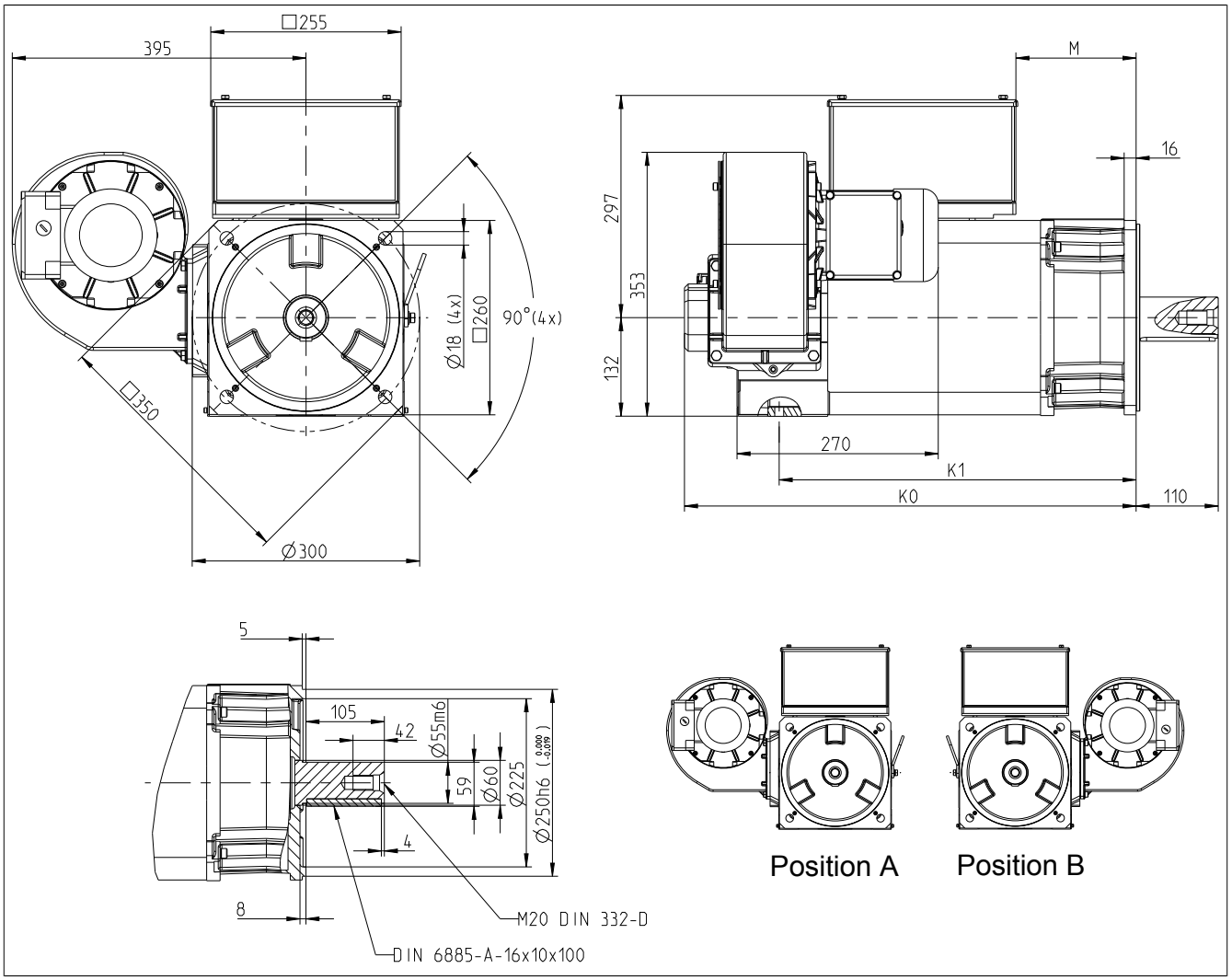


Figure 1: 8KSC8 - Dimensions

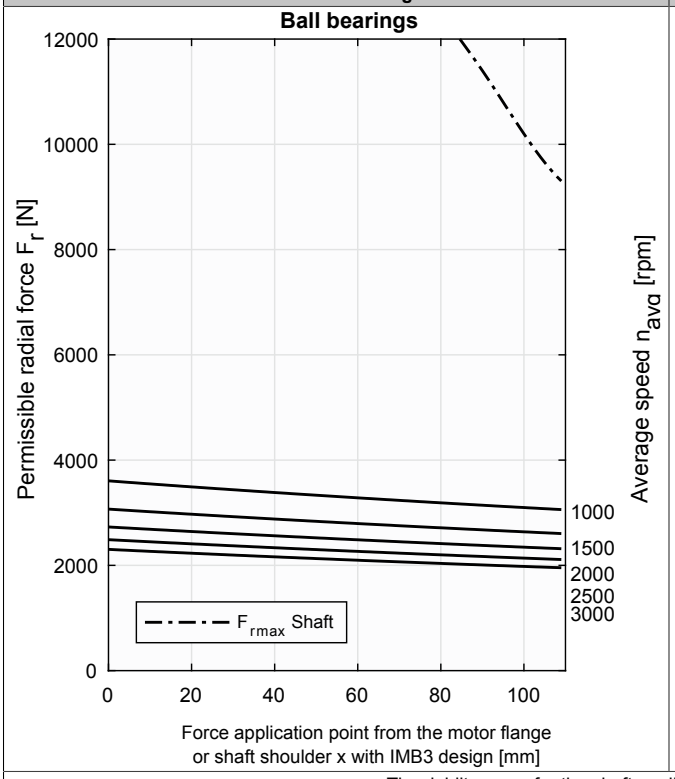
Dimensions of fan postion right (Position B) are equal to the dimensions to the left (Position A).

Order code	K_0	K1	M	Extension K0/ K1 with brake option
8KSC82.eennnffgg-h	556	428	134	108
8KSC84.eennnffgg-h	606	478	184	108
8KSC85.eennnffgg-h	656	528	234	108
8KSC86.eennnffgg-h	706	578	284	108

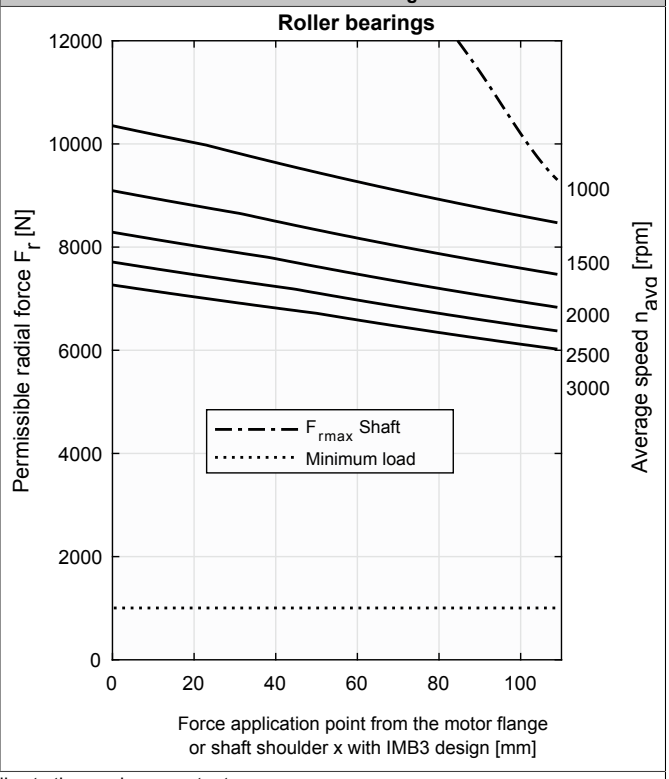
12.1.5 Maximum shaft load

The values in the diagram below are based on a mechanical service life of the bearings of 20,000 operating hours.

Standard bearing



Reinforced bearing



The rigidity curve for the shaft applies to the maximum motor torque.

12.2 8KSC9 - Technical data

8KSC92

Model number	8KSC92.ee010ff00-h	8KSC92.ee015ff00-h	8KSC92.ee020ff00-h	8KSC92.ee025ff00-h	8KSC92.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1000	1500	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	285	265	245	225	205
Nominal power P_N [W]	29845	41626	51313	58905	64403
Nominal current I_N [A]	59	82	100	115	122
Stall torque M_0 [Nm]	325				
Stall current I_0 [A]	68	103	134	170	195
Maximum torque M_{max} [Nm]	700				
Maximum current I_{max} [A]	160	245	320	400	455
Maximum speed n_{max} [rpm]	3600				
Torque constant K_T [Nm/A]	4.92	3.27	2.51	2	1.75
Voltage constant K_E [V/1000 rpm]	337	224	172	137	119
Stator resistance R_{2ph} [Ω]	0.24	0.108	0.064	0.04	0.03
Stator inductance L_{2ph} [mH]	10.6	4.7	2.8	1.74	1.33
Electrical time constant t_{el} [ms]	42.358	42.593	42.313	43.05	43.733
Thermal time constant t_{therm} [min]	48.8				
Moment of inertia J [kgcm²]	1500				
Weight without brake m [kg]	230				
Holding brake					
Holding torque of brake M_{Br} [Nm]	320				
Mass of brake [kg]	29				
Moment of inertia of brake J_{Br} [kgcm²]	90				
Recommendations					
ACOPOS 8Vxxxx.xx...	128M		-		
ACOPOSmulti 8BVIxxxx...	0880	1650		-	
Cross section for B&R motor cables [mm²]	0				
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

8KSC94

Model number	8KSC94.ee010ff00-h	8KSC94.ee015ff00-h	8KSC94.ee020ff00-h	8KSC94.ee025ff00-h	8KSC94.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1000	1500	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	355	330	305	285	260
Nominal power P_N [W]	37176	51836	63879	74613	81681
Nominal current I_N [A]	75	104	127	145	160
Stall torque M_0 [Nm]	405				
Stall current I_0 [A]	85	127	165	205	245
Maximum torque M_{max} [Nm]	875				
Maximum current I_{max} [A]	205	305	400	490	585
Maximum speed n_{max} [rpm]	3600				
Torque constant K_T [Nm/A]	4.87	3.28	2.49	2.02	1.7
Voltage constant K_E [V/1000 rpm]	334	225	171	139	117
Stator resistance R_{2ph} [Ω]	0.174	0.08	0.046	0.03	0.022
Stator inductance L_{2ph} [mH]	8.3	3.7	2.2	1.42	1.01
Electrical time constant t_{el} [ms]	46.621	46.25	46.261	46.467	45.091
Thermal time constant t_{therm} [min]	43.9				
Moment of inertia J [kgcm²]	1800				
Weight without brake m [kg]	255				
Holding brake					
Holding torque of brake M_{Br} [Nm]	320				
Mass of brake [kg]	29				
Moment of inertia of brake J_{Br} [kgcm²]	90				
Recommendations					
ACOPOS 8Vxxxx.xx...	128M	-			
ACOPOSmulti 8BVIxxxx...	1650		-		
Cross section for B&R motor cables [mm²]	0				
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

8KSC95

Model number	8KSC95.ee010ff00-h	8KSC95.ee015ff00-h	8KSC95.ee020ff00-h	8KSC95.ee025ff00-h
Motor				
Nominal speed n_N [rpm]	1000	1500	2000	2500
Number of pole pairs	3			
Nominal torque M_n [Nm]	430	400	375	345
Nominal power P_N [W]	45029	62832	78540	90321
Nominal current I_N [A]	90	130	147	175
Stall torque M_0 [Nm]	480			
Stall current I_0 [A]	101	155	190	240
Maximum torque M_{max} [Nm]	1050			
Maximum current I_{max} [A]	245	375	455	585
Maximum speed n_{max} [rpm]	3600			
Torque constant K_T [Nm/A]	4.89	3.18	2.61	2.04
Voltage constant K_E [V/1000 rpm]	336	218	179	140
Stator resistance R_{2ph} [Ω]	0.136	0.058	0.038	0.024
Stator inductance L_{2ph} [mH]	6.9	2.9	1.96	1.2
Electrical time constant t_{el} [ms]	49.824	49.448	48.3	49.167
Thermal time constant t_{therm} [min]	39			
Moment of inertia J [kgcm²]	2200			
Weight without brake m [kg]	285			
Holding brake				
Holding torque of brake M_{Br} [Nm]	320			
Mass of brake [kg]	29			
Moment of inertia of brake J_{Br} [kgcm²]	90			
Recommendations				
ACOPOS 8Vxxxx.xx...	128M	-		
ACOPOSmulti 8BVIxxxx...	1650	-		
Cross section for B&R motor cables [mm²]	0			
Connector type	Terminal box			

Table 15: 8KSC95.ee010ff00-h, 8KSC95.ee015ff00-h, 8KSC95.ee020ff00-h, 8KSC95.ee025ff00-h - Technical data

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

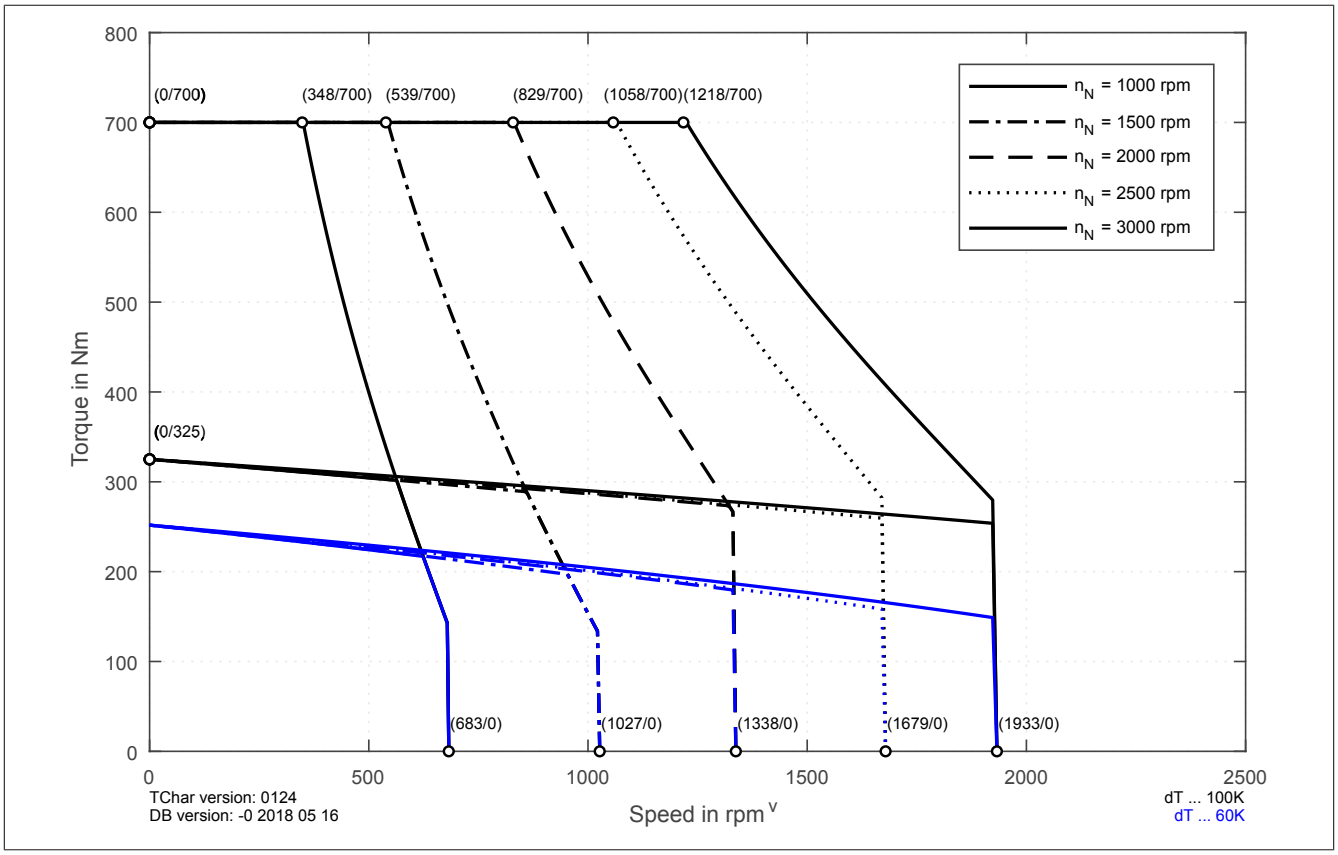
8KSC96

Model number	8KSC96.ee010ff00-h	8KSC96.ee015ff00-h	8KSC96.ee020ff00-h
Motor			
Nominal speed n_N [rpm]	1000	1500	2000
Number of pole pairs		3	
Nominal torque M_n [Nm]	500	470	440
Nominal power P_N [W]	52360	73827	92153
Nominal current I_N [A]	107	139	175
Stall torque M_0 [Nm]		555	
Stall current I_0 [A]	118	165	220
Maximum torque M_{max} [Nm]		1110	
Maximum current I_{max} [A]	255	355	475
Maximum speed n_{max} [rpm]		3600	
Torque constant K_T [Nm/A]	4.8	3.48	2.6
Voltage constant K_E [V/1000 rpm]	331	240	179
Stator resistance R_{2ph} [Ω]	0.108	0.056	0.032
Stator inductance L_{2ph} [mH]	5.7	3	1.66
Electrical time constant t_{el} [ms]	51.852	52.5	51.188
Thermal time constant t_{therm} [min]		34.2	
Moment of inertia J [kgcm²]		2500	
Weight without brake m [kg]		310	
Holding brake			
Holding torque of brake M_{Br} [Nm]		320	
Mass of brake [kg]		29	
Moment of inertia of brake J_{Br} [kgcm²]		90	
Recommendations			
ACOPOSmulti 8BVIxxxx...	1650	-	
Cross section for B&R motor cables [mm²]		0	
Connector type		Terminal box	

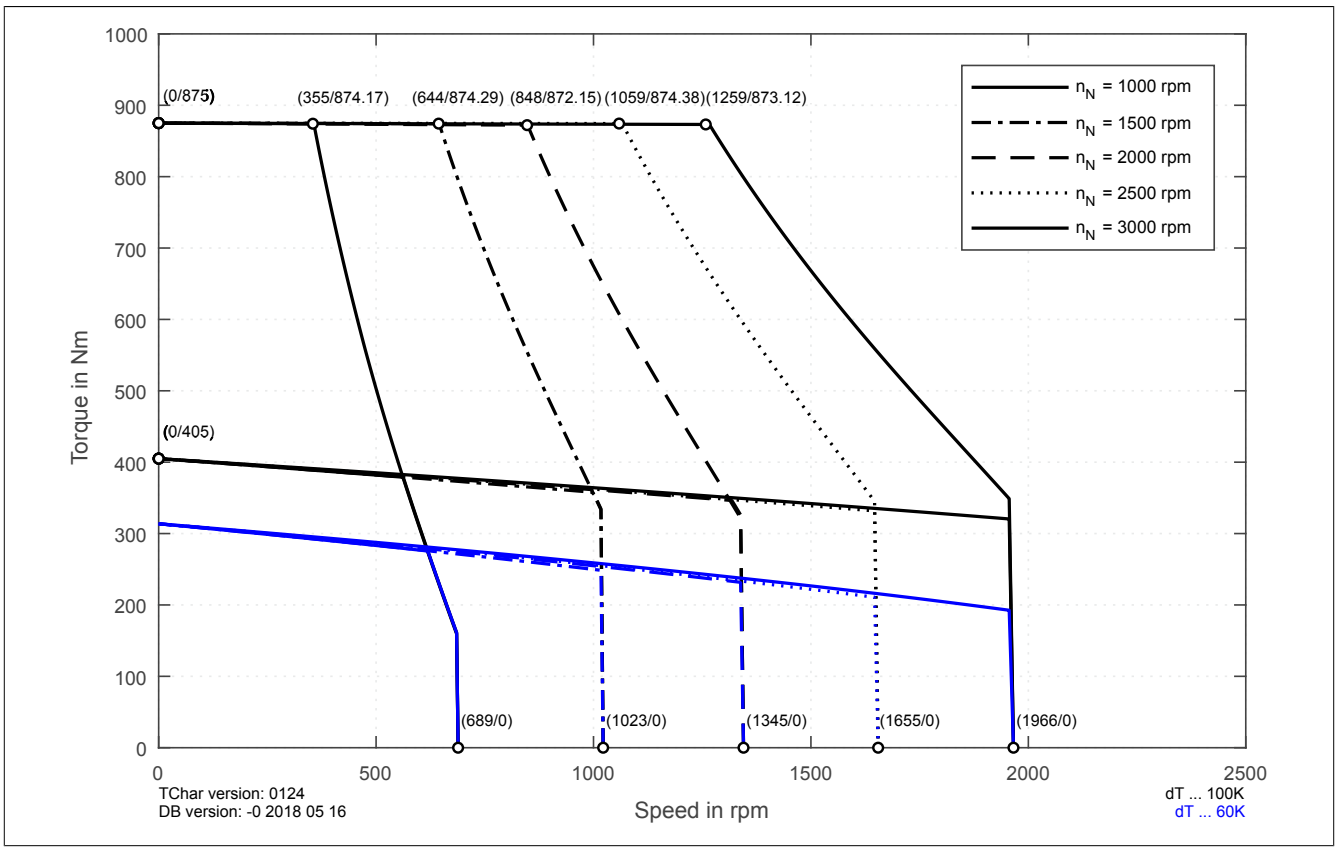
NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

12.2.1 Speed-Torque characteristic curves at 325 VDC DC bus voltage

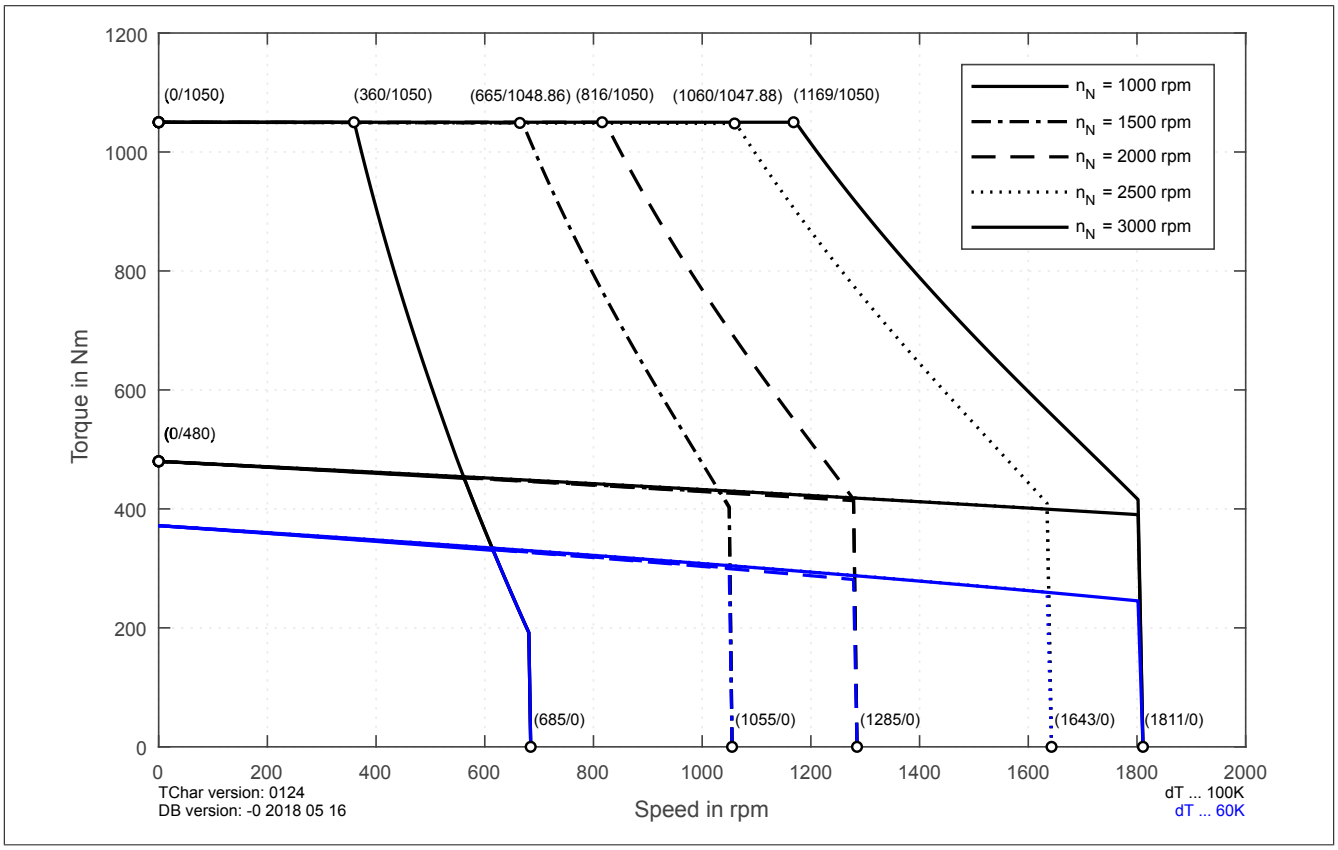
8KSC92.eennnffgg-h



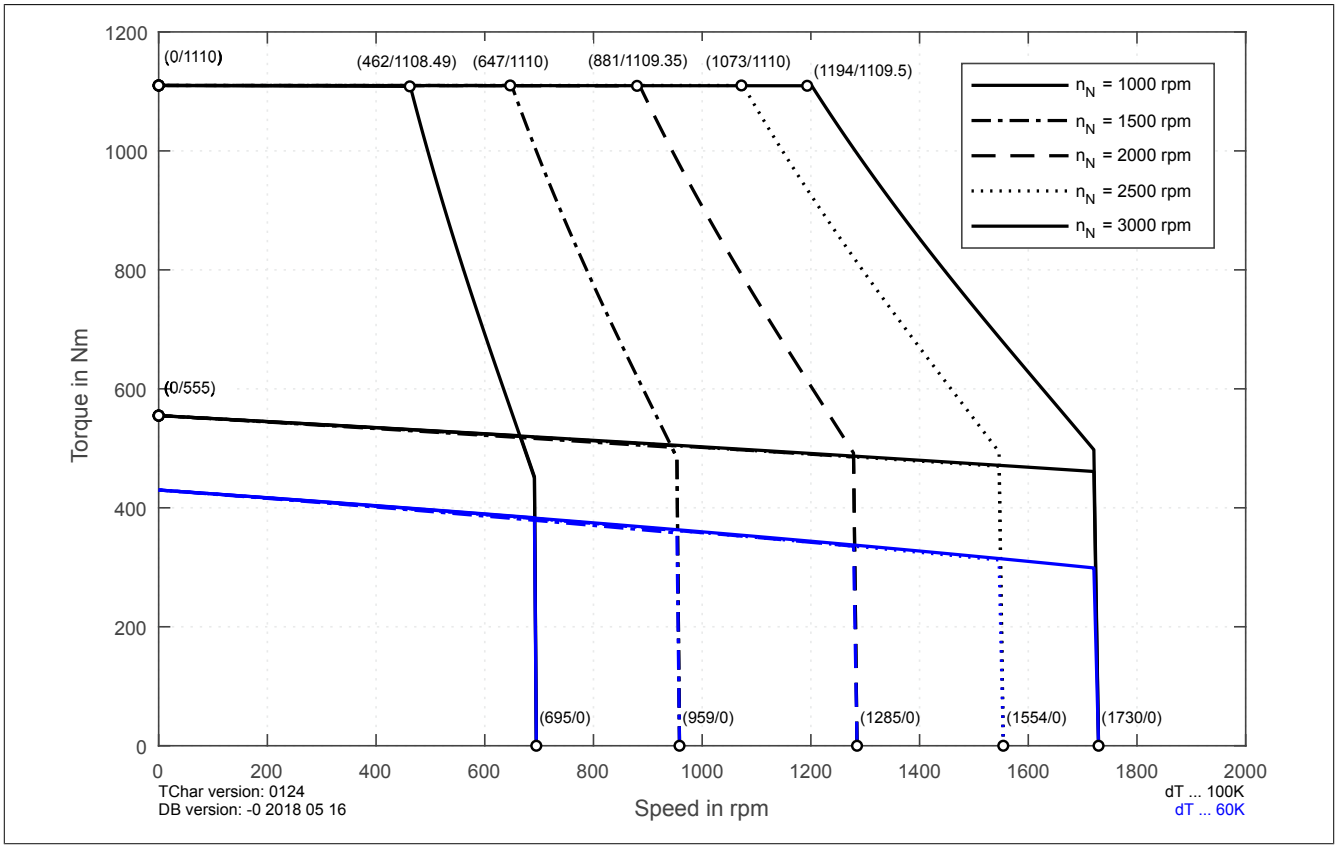
8KSC94.eennnffgg-h



8KSC95.eennnffgg-h

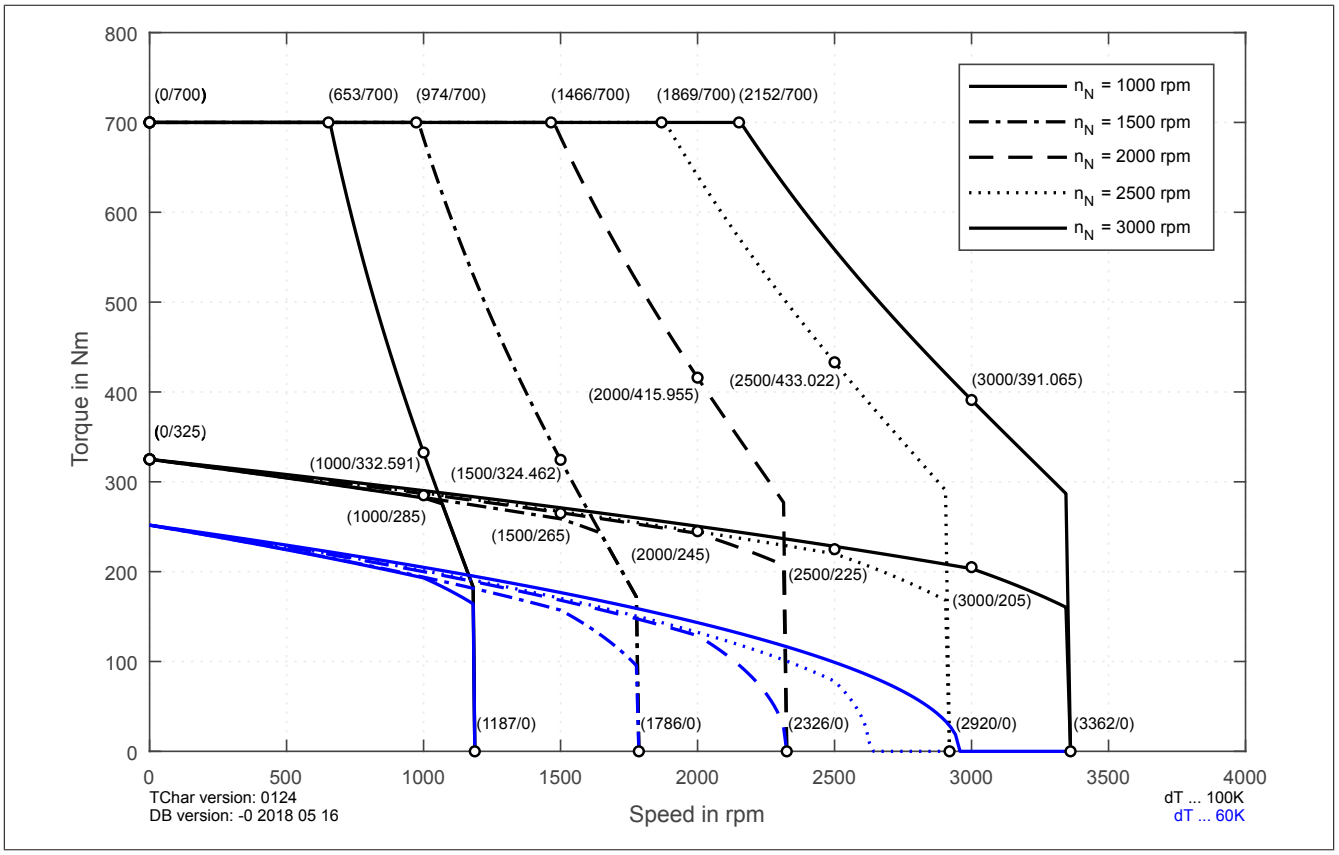


8KSC96.eennnffgg-h

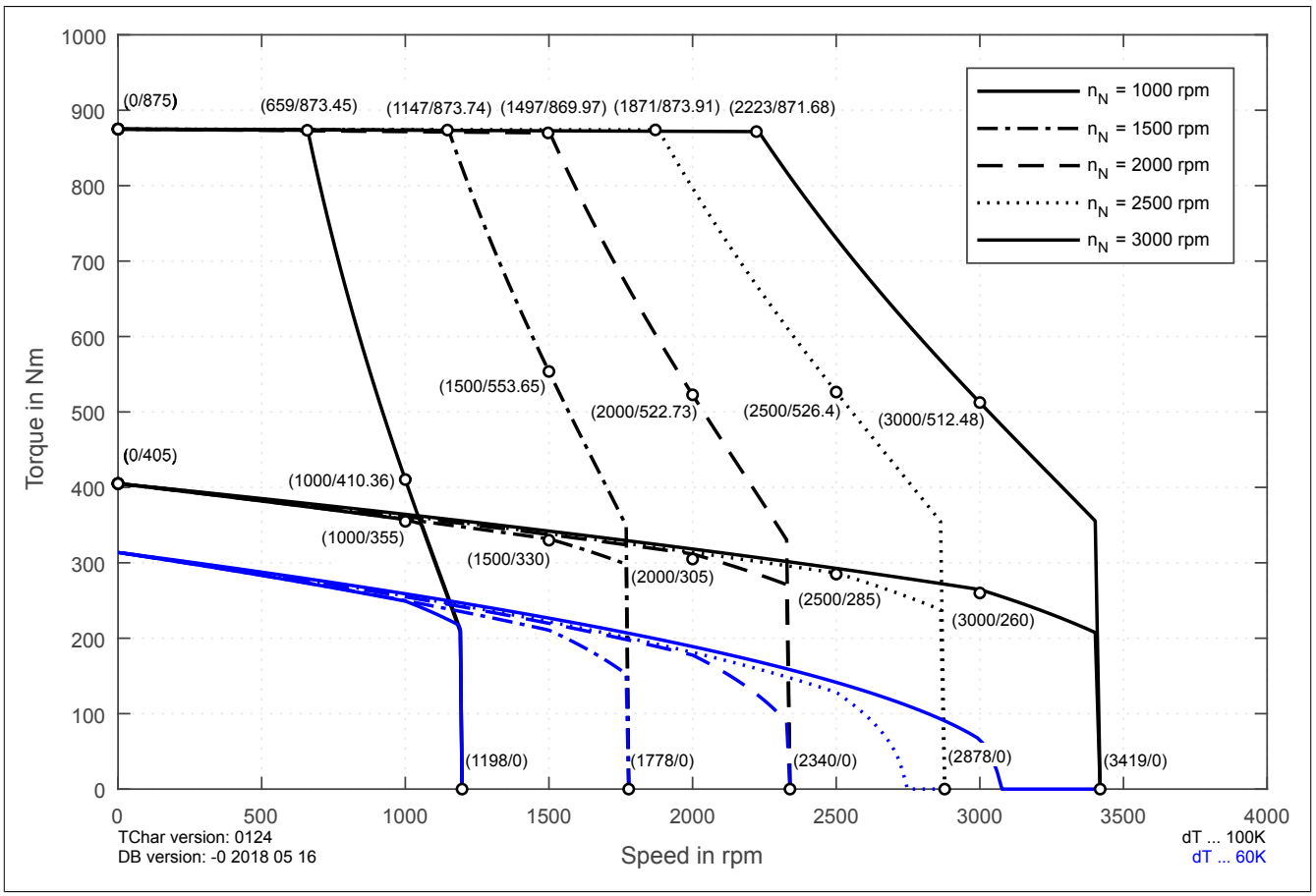


12.2.2 Speed-Torque characteristic curves at 560 VDC DC bus voltage

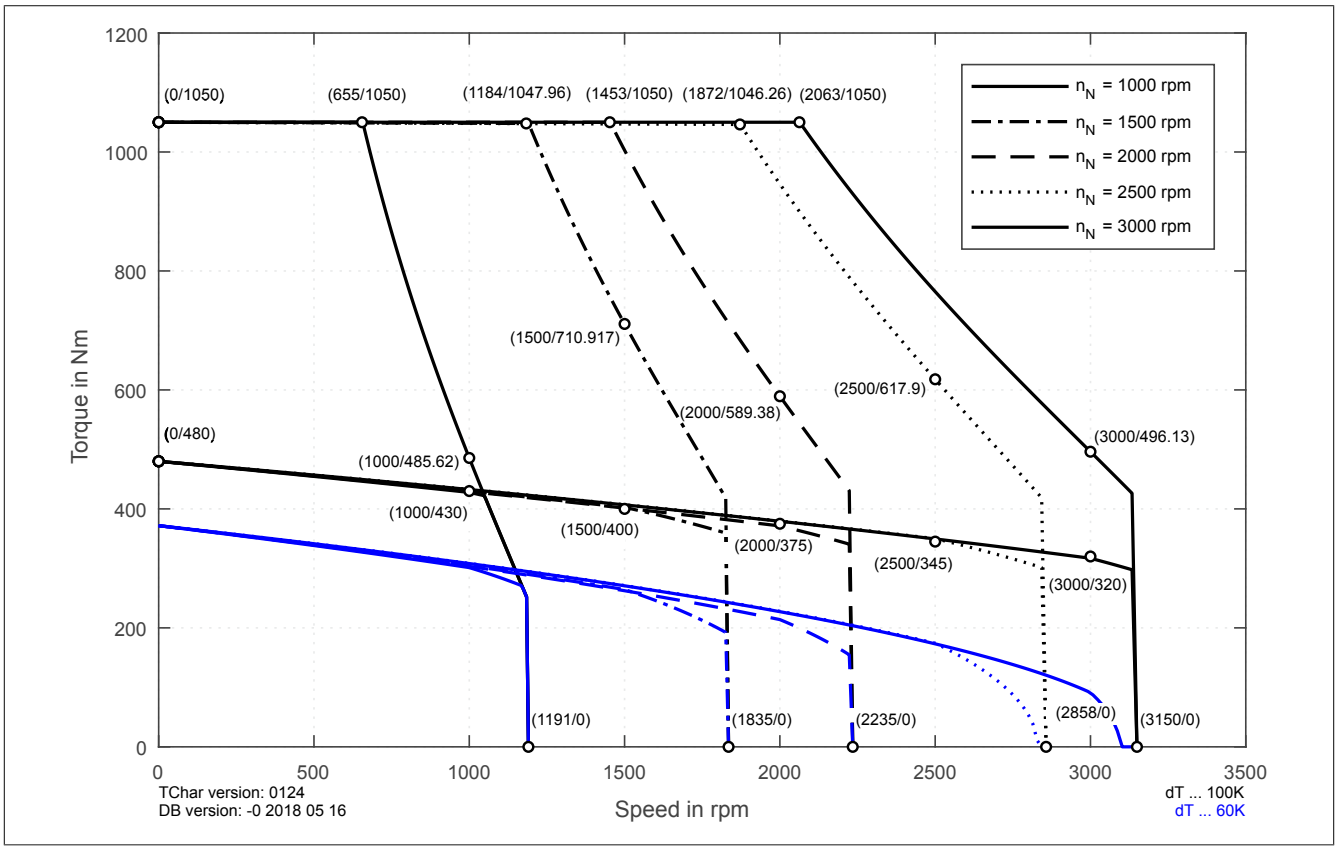
8KSC92.eennnffgg-h



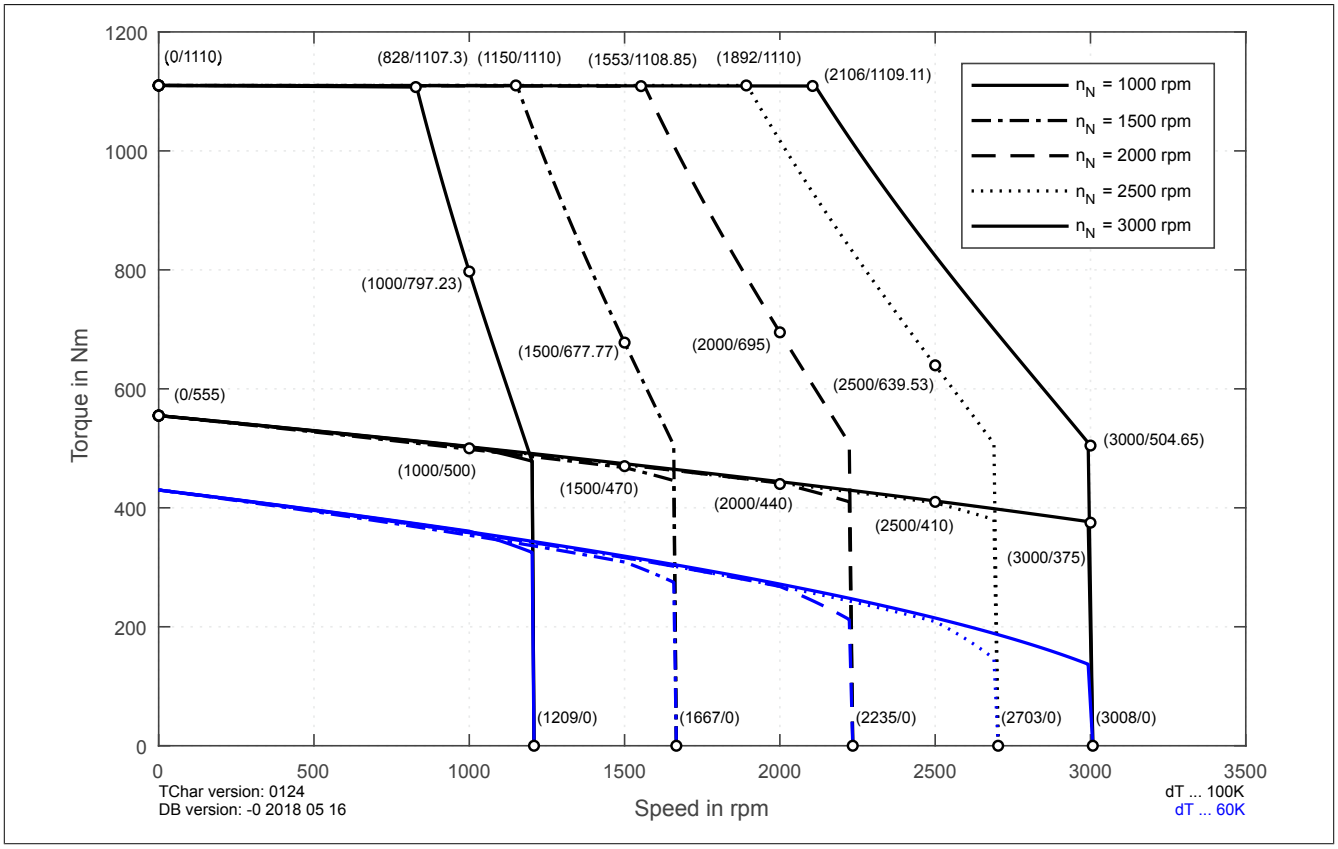
8KSC94.eennnffgg-h



8KSC95.eennnffgg-h

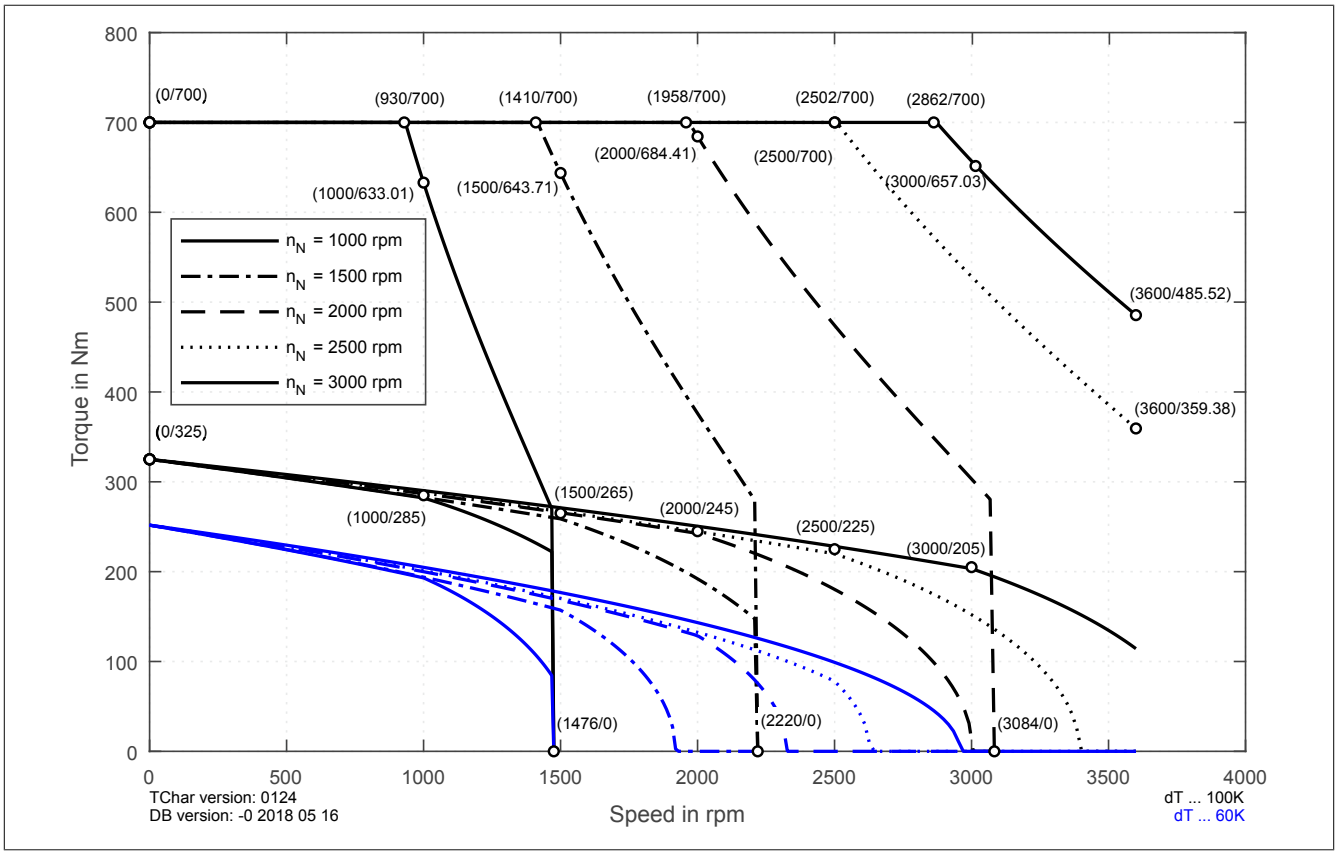


8KSC96.eennnffgg-h

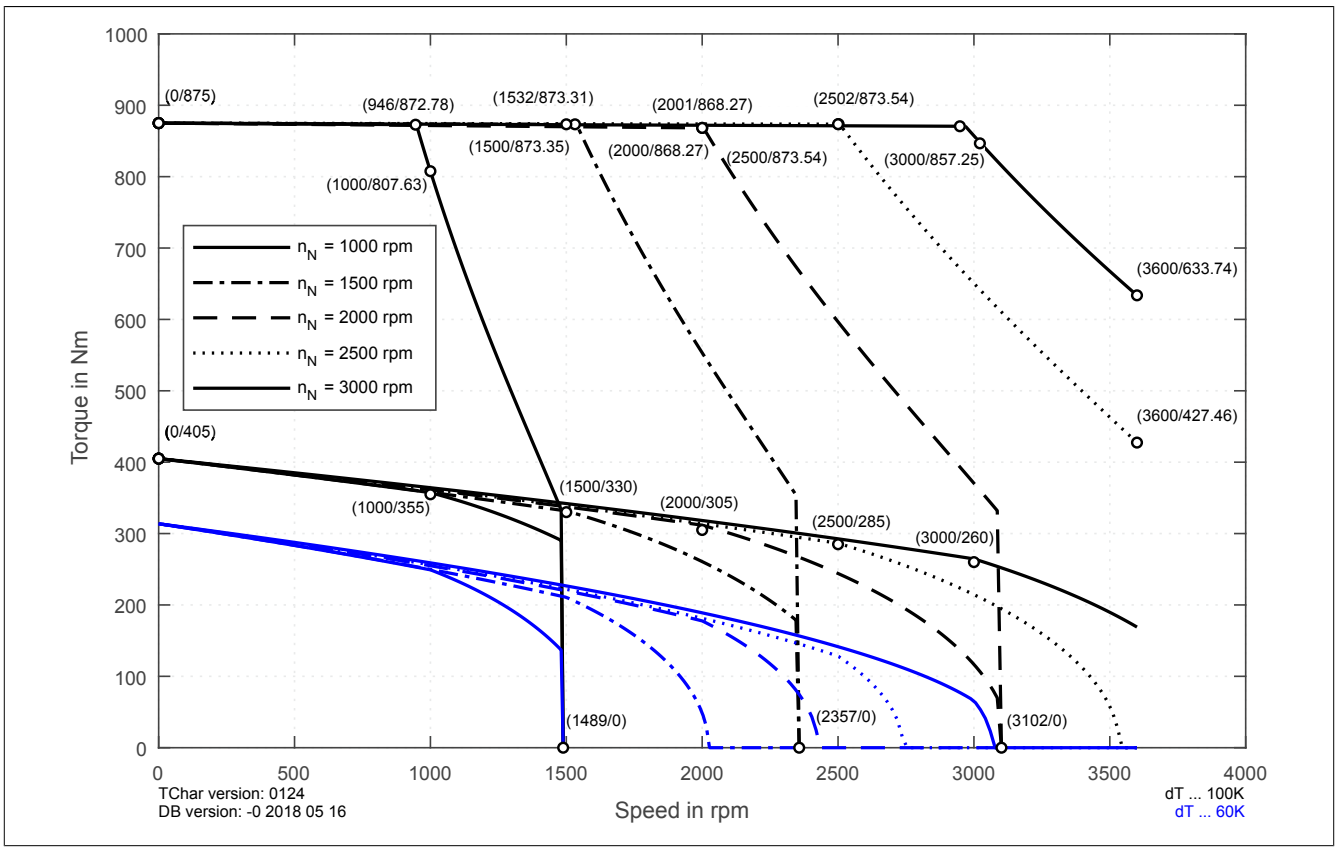


12.2.3 Speed-Torque characteristic curve at 750 VDC DC bus voltage

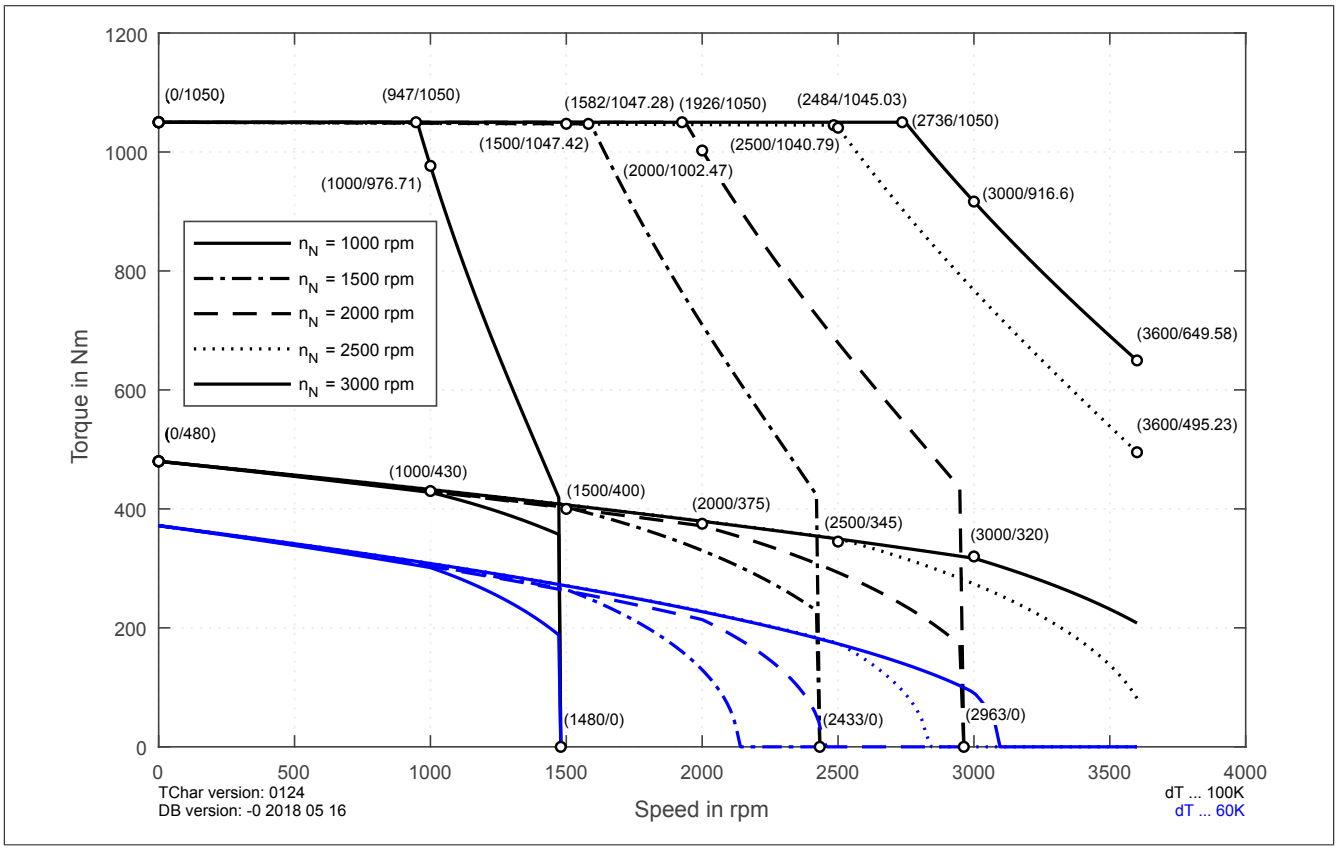
8KSC92.eennnffgg-h



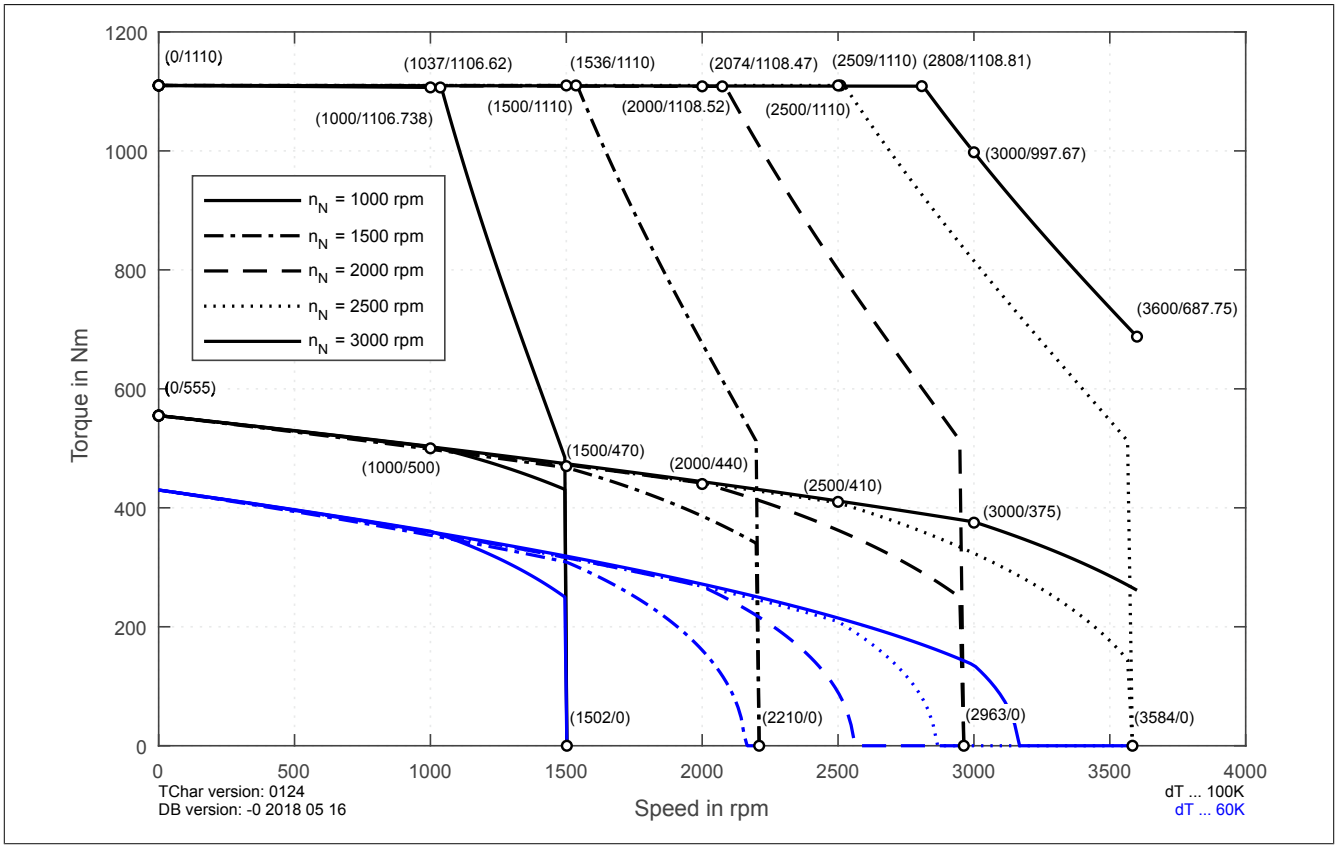
8KSC94.eennnffgg-h



8KSC95.eennnffgg-h



8KSC96.eennnffgg-h



12.2.4 8KSC9 - Dimensions

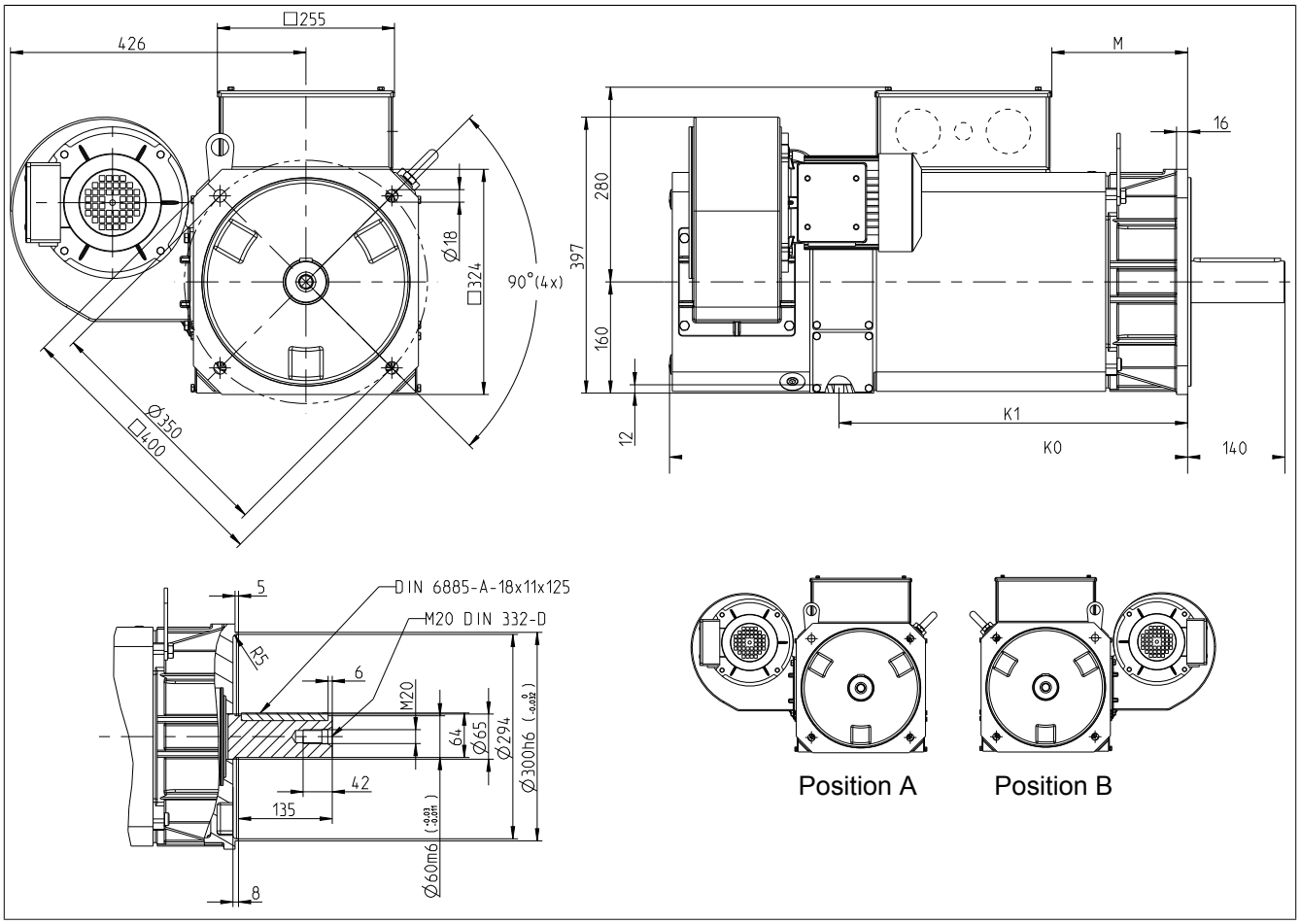


Figure 2: 8KSC9 - Dimensions

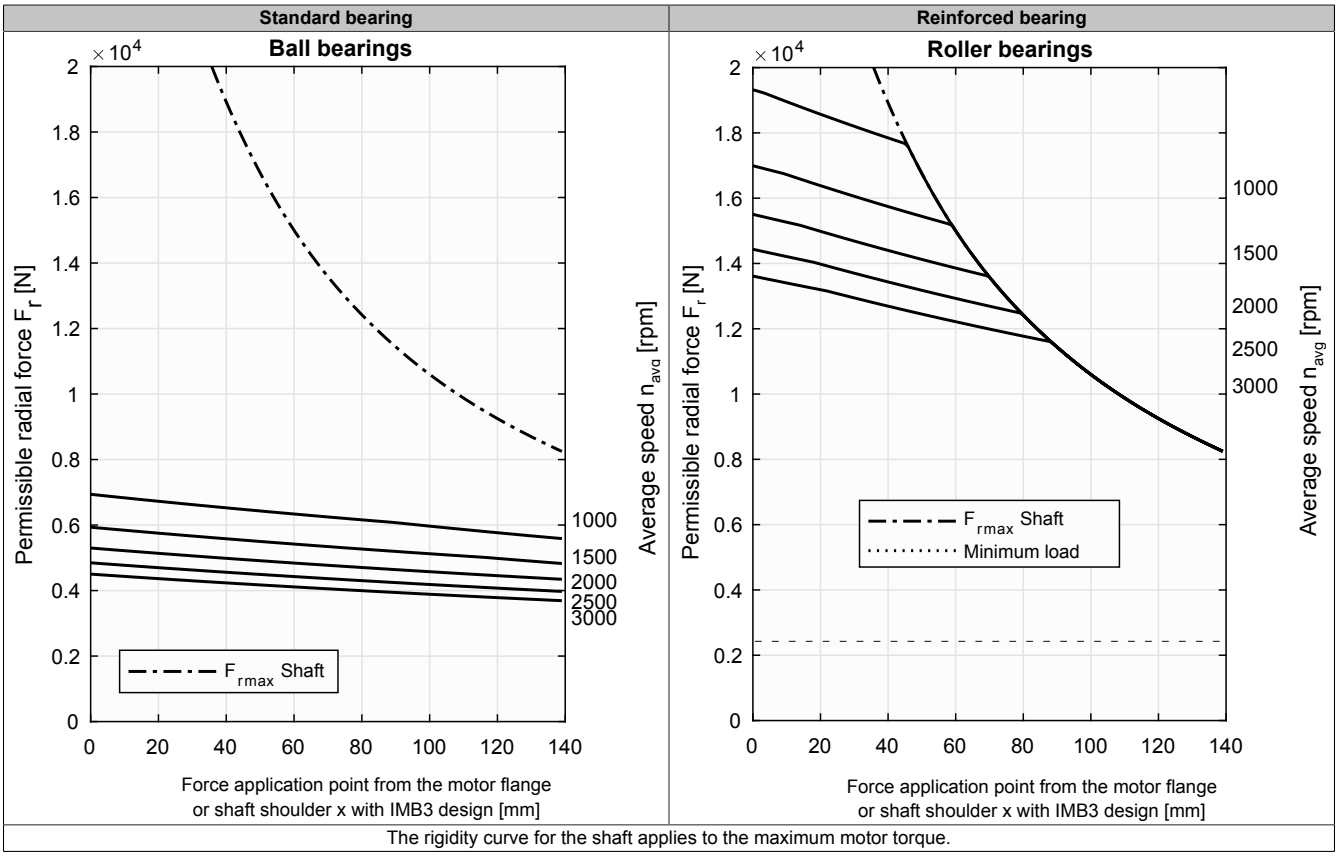
Dimensions for the fan on the right (position B) are the same as for the fan on the left (position A).

Order number	K_0	K1	M	Extension of K0 or K1 with brake
8KSC92.eennnffgg-h	696	452	Depends on the terminal box [1]	On request
8KSC94.eennnffgg-h	746	502	Depends on the terminal box [1]	On request
8KSC95.eennnffgg-h	796	552	Depends on the terminal box [1]	On request
8KSC96.eennnffgg-h	846	602	Depends on the terminal box [1]	On request

1) Different terminal boxes are used depending on the nominal speed; please request step file.

12.2.5 Maximum shaft load

The values in the diagram below are based on a mechanical service life of the bearings of 20,000 operating hours.



The rigidity curve for the shaft applies to the maximum motor torque.

13 8KSD - Technical data

13.1 8KSD8 - Technical data

8KSD82

Model number	8KSD82.ee011ff00-h	8KSD82.ee016ff00-h	8KSD82.ee020ff00-h	8KSD82.ee025ff00-h
Motor				
Nominal speed n_N [rpm]	1100	1600	2000	2500
Number of pole pairs	3			
Nominal torque M_n [Nm]	120	115		110
Nominal power P_N [W]	13823	19268	24086	28798
Nominal current I_N [A]	27.3	37.6	46.3	54
Stall torque M_0 [Nm]	130			
Stall current I_0 [A]	29.3	41.8	53	65
Maximum torque M_{max} [Nm]	305			
Maximum current I_{max} [A]	76	108	138	170
Maximum speed n_{max} [rpm]	4300			
Torque constant K_T [Nm/A]	4.63	3.24	2.55	2.08
Voltage constant K_E [V/1000 rpm]	300	210	165	135
Stator resistance R_{2ph} [Ω]	0.64	0.32	0.196	0.132
Stator inductance L_{2ph} [mH]	19.4	9.6	6	4
Electrical time constant t_{el} [ms]	31.656	31	30.6	34.167
Thermal time constant t_{therm} [min]	22.8			
Moment of inertia J [kgcm²]	450			
Weight without brake m [kg]	110			
Holding brake				
Holding torque of brake M_{Br} [Nm]	200			
Mass of brake [kg]	13			
Moment of inertia of brake J_{Br} [kgcm²]	40			
Recommendations				
ACOPOS 8Vxxxx.xx...	1320	1640		128M
ACOPOSmulti 8BVIxxxx...	0330	0660		0880
Cross section for B&R motor cables [mm²]	4	10		0
Connector type	Terminal box			

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

8KSD84

Model number	8KSD84.ee011ff00-h	8KSD84.ee016ff00-h	8KSD84.ee020ff00-h	8KSD84.ee025ff00-h	8KSD84.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1100	1600	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	160	150	145	140	130
Nominal power P_N [W]	18431	25133	30369	36652	40841
Nominal current I_N [A]	35.7	46.5	57	67	74
Stall torque M_0 [Nm]	175				
Stall current I_0 [A]	39	53	68	84	98
Maximum torque M_{max} [Nm]	405				
Maximum current I_{max} [A]	101	138	175	215	250
Maximum speed n_{max} [rpm]	4300				
Torque constant K_T [Nm/A]	4.61	3.38	2.66	2.15	1.84
Voltage constant K_E [V/1000 rpm]	300	220	173	140	120
Stator resistance R_{2ph} [Ω]	0.42	0.22	0.14	0.092	0.068
Stator inductance L_{2ph} [mH]	14.6	7.8	4.8	3.2	2.3
Electrical time constant t_{el} [ms]	35.667	36.636	35.714	32.6	40
Thermal time constant t_{therm} [min]	23.8				
Moment of inertia J [kgcm²]	580				
Weight without brake m [kg]	125				
Holding brake					
Holding torque of brake M_{Br} [Nm]	200				
Mass of brake [kg]	13				
Moment of inertia of brake J_{Br} [kgcm²]	40				
Recommendations					
ACOPOS 8Vxxxx.xx...	1640		128M		
ACOPOSmulti 8BVIxxxx...	0440	0660	0880	1650	
Cross section for B&R motor cables [mm²]	10		0		
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

8KSD85

Model number	8KSD85.ee011ff00-h	8KSD85.ee016ff00-h	8KSD85.ee020ff00-h	8KSD85.ee025ff00-h	8KSD85.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1100	1600	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	195	185	175	165	155
Nominal power P_N [W]	22462	30997	36652	43197	48695
Nominal current I_N [A]	40.4	55	68	79	90
Stall torque M_0 [Nm]	215				
Stall current I_0 [A]	45	65	84	103	125
Maximum torque M_{max} [Nm]	505				
Maximum current I_{max} [A]	117	170	215	265	325
Maximum speed n_{max} [rpm]	4300				
Torque constant K_T [Nm/A]	4.99	3.46	2.69	2.18	1.79
Voltage constant K_E [V/1000 rpm]	325	225	175	141	116
Stator resistance R_{2ph} [Ω]	0.36	0.172	0.104	0.068	0.046
Stator inductance L_{2ph} [mH]	13.6	6.5	4	2.5	1.74
Electrical time constant t_{el} [ms]	38.722	37.111	40.4	44	45
Thermal time constant t_{therm} [min]	25				
Moment of inertia J [kgcm²]	710				
Weight without brake m [kg]	145				
Holding brake					
Holding torque of brake M_{Br} [Nm]	200				
Mass of brake [kg]	13				
Moment of inertia of brake J_{Br} [kgcm²]	40				
Recommendations					
ACOPOS 8Vxxxx.xx...	1640		128M		-
ACOPOSmulti 8BVIxxxx...	0660	0880	1650		
Cross section for B&R motor cables [mm²]	10	0			
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

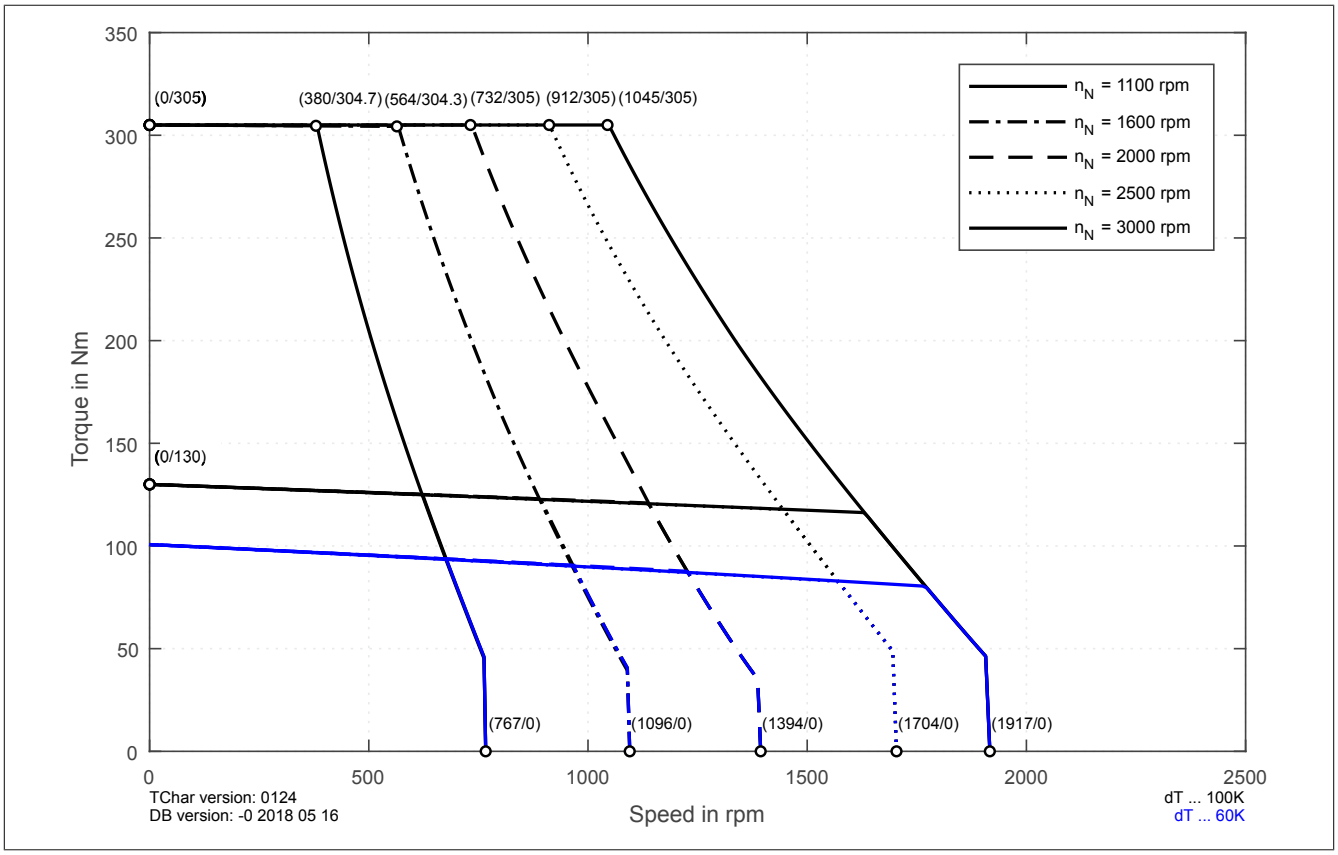
8KSD86

Model number	8KSD86.ee011ff00-h	8KSD86.ee016ff00-h	8KSD86.ee020ff00-h	8KSD86.ee025ff00-h
Motor				
Nominal speed n_N [rpm]	1100	1600	2000	2500
Number of pole pairs	3			
Nominal torque M_n [Nm]	230	215	205	190
Nominal power P_N [W]	26494	36024	42935	49742
Nominal current I_N [A]	52	69	81	91
Stall torque M_0 [Nm]	260			
Stall current I_0 [A]	59	84	103	125
Maximum torque M_{max} [Nm]	610	605		
Maximum current I_{max} [A]	150	215	265	325
Maximum speed n_{max} [rpm]	4300			
Torque constant K_T [Nm/A]	4.61	3.23	2.61	2.15
Voltage constant K_E [V/1000 rpm]	300	210	170	140
Stator resistance R_{2ph} [Ω]	0.24	0.116	0.076	0.052
Stator inductance L_{2ph} [mH]	9.6	4.6	3.1	2.09
Electrical time constant t_{el} [ms]	41	40.167	39.5	35.667
Thermal time constant t_{therm} [min]	26.2			
Moment of inertia J [kgcm²]	840			
Weight without brake m [kg]	165			
Holding brake				
Holding torque of brake M_{Br} [Nm]	200			
Mass of brake [kg]	13			
Moment of inertia of brake J_{Br} [kgcm²]	40			
Recommendations				
ACOPOS 8Vxxxx.xx...	128M			-
ACOPOSmulti 8BVIxxxx...	0660	1650		
Cross section for B&R motor cables [mm²]	0			
Connector type	Terminal box			

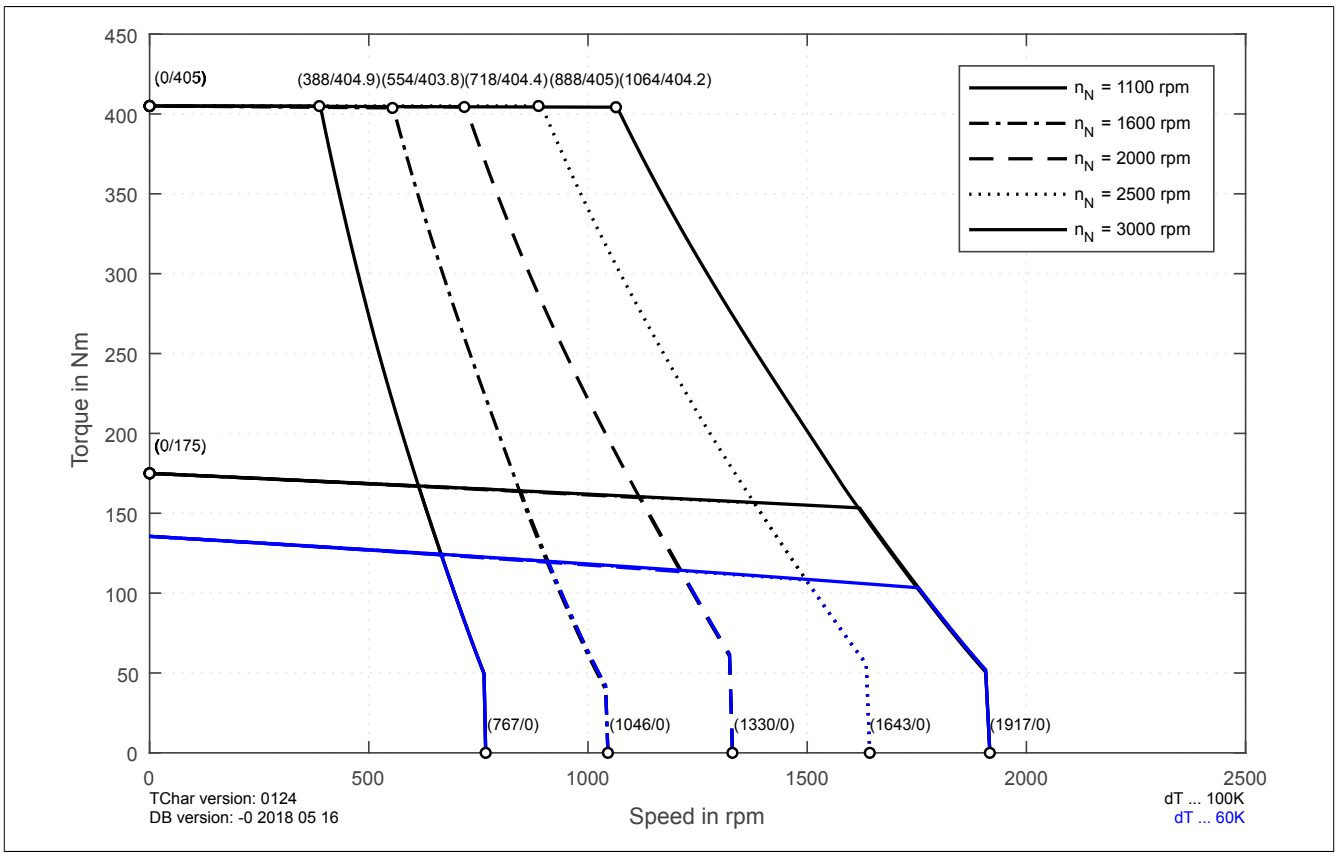
NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

13.1.1 Speed-Torque characteristic curves at 325 VDC DC bus voltage

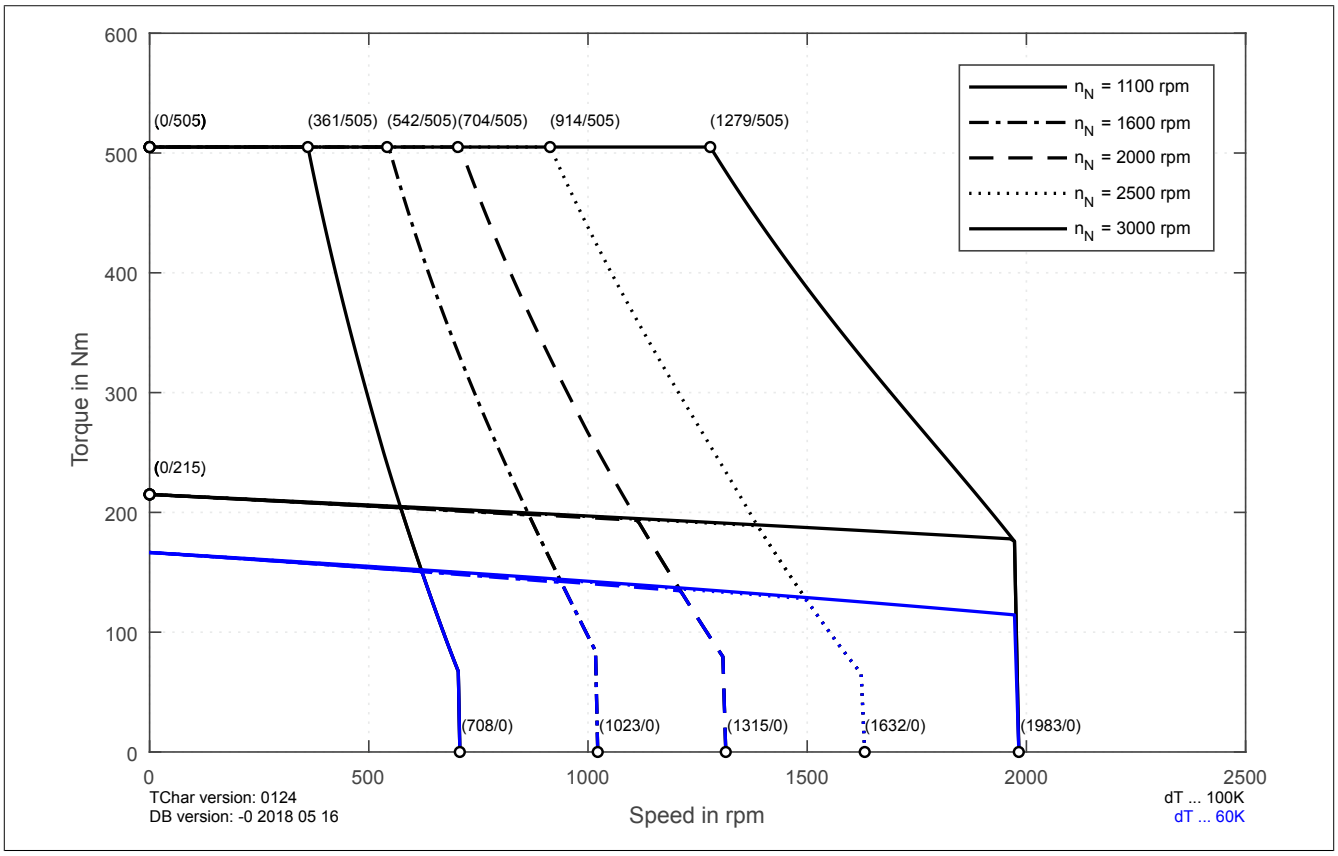
8KSC82.eennnffgg-h and 8KSD82.eennnffgg-h



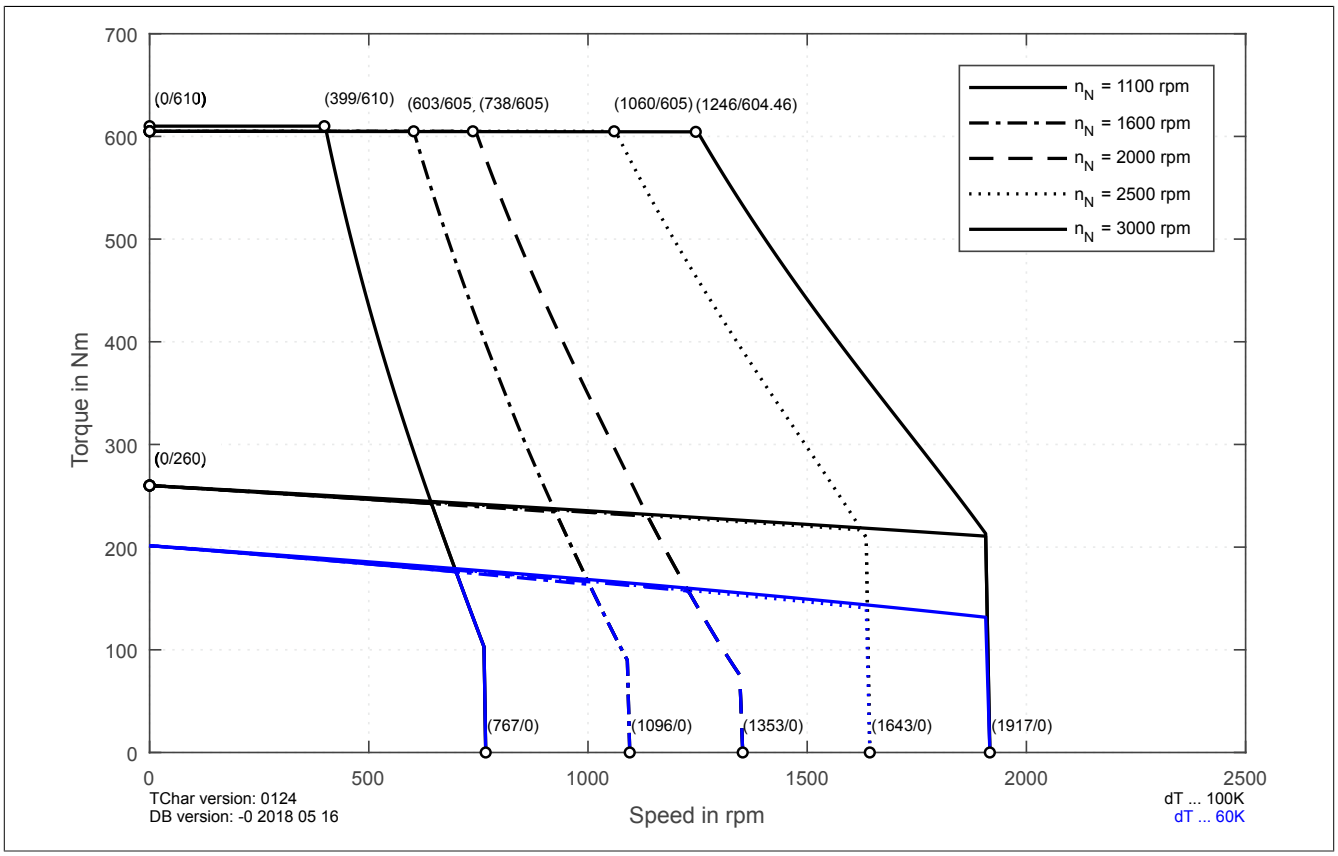
8KSC84.eennnffgg-h and 8KSD84.eennnffgg-h



8KSC85.eennnffgg-h and 8KSD85.eennnffgg-h

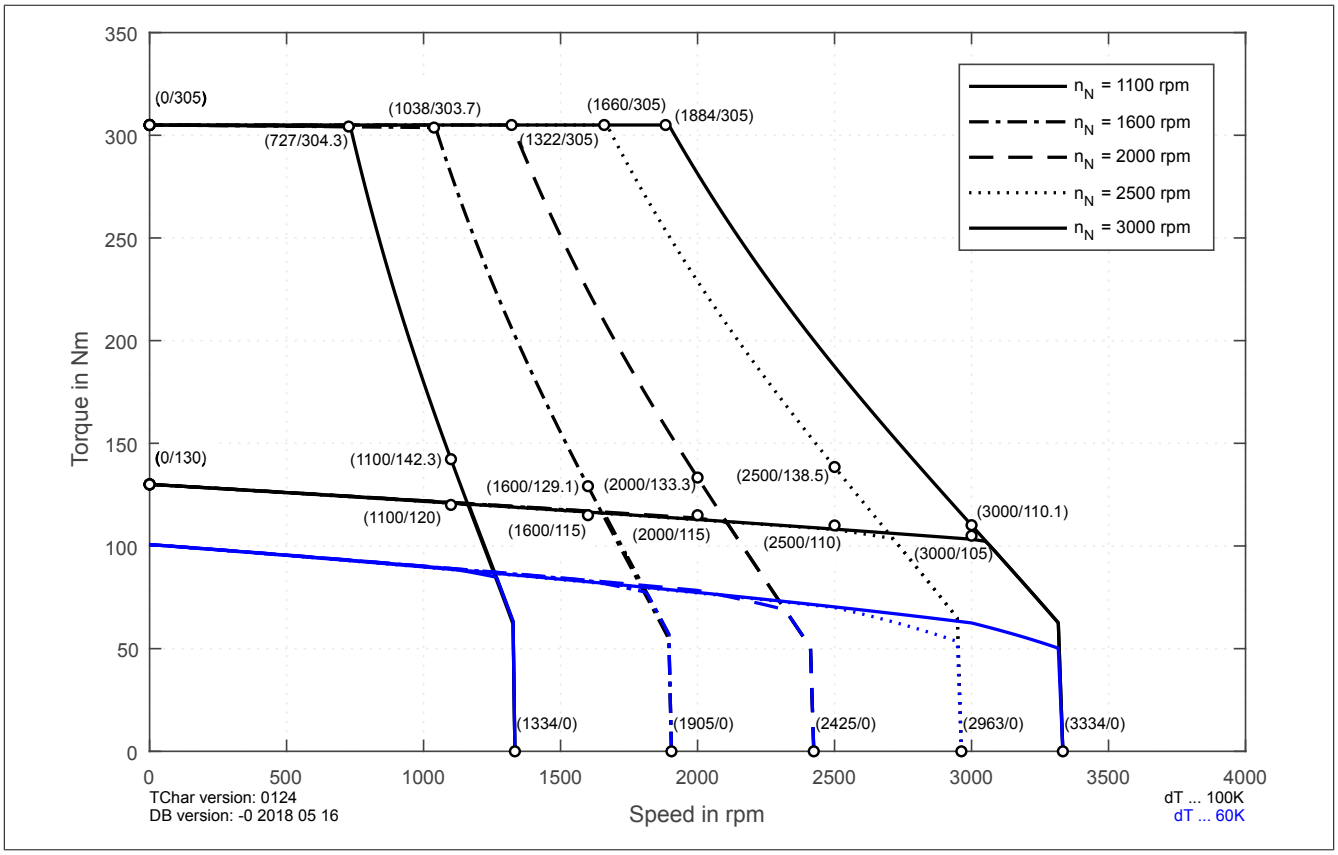


8KSC86.eennnffgg-h and 8KSD86.eennnffgg-h

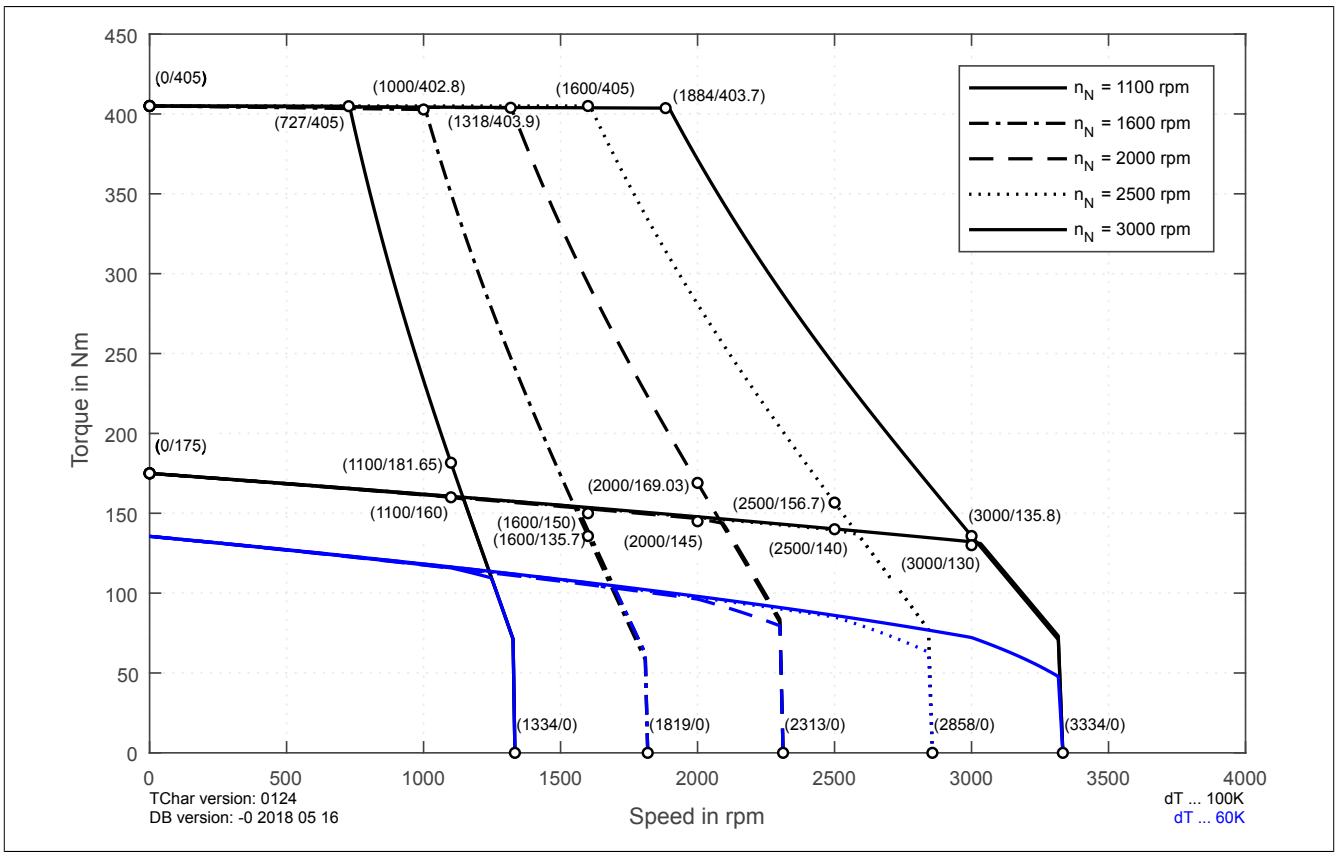


13.1.2 Speed-torque characteristic at 560 DC bus voltage

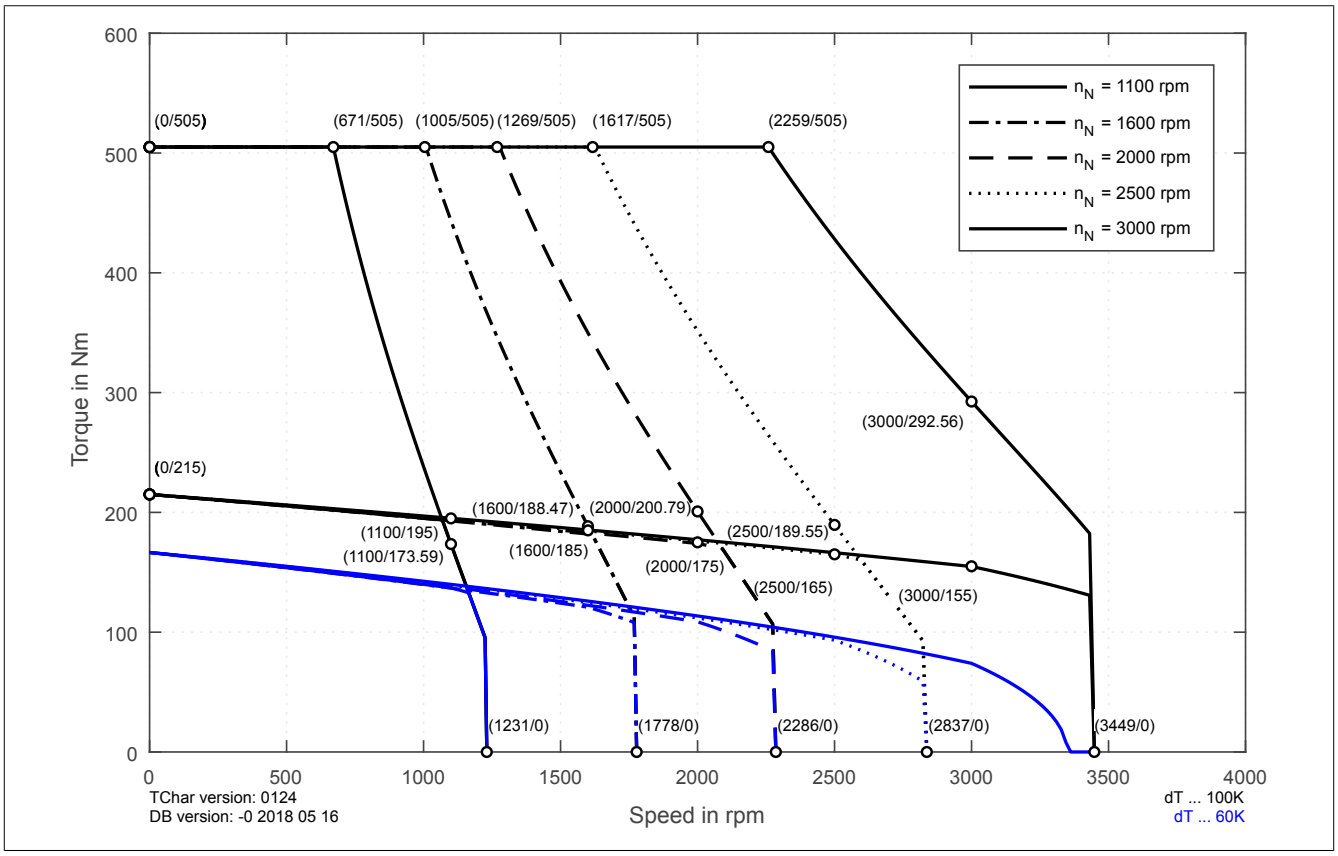
8KSC82.eennnffgg-h and 8KSD82.eennnffgg-h



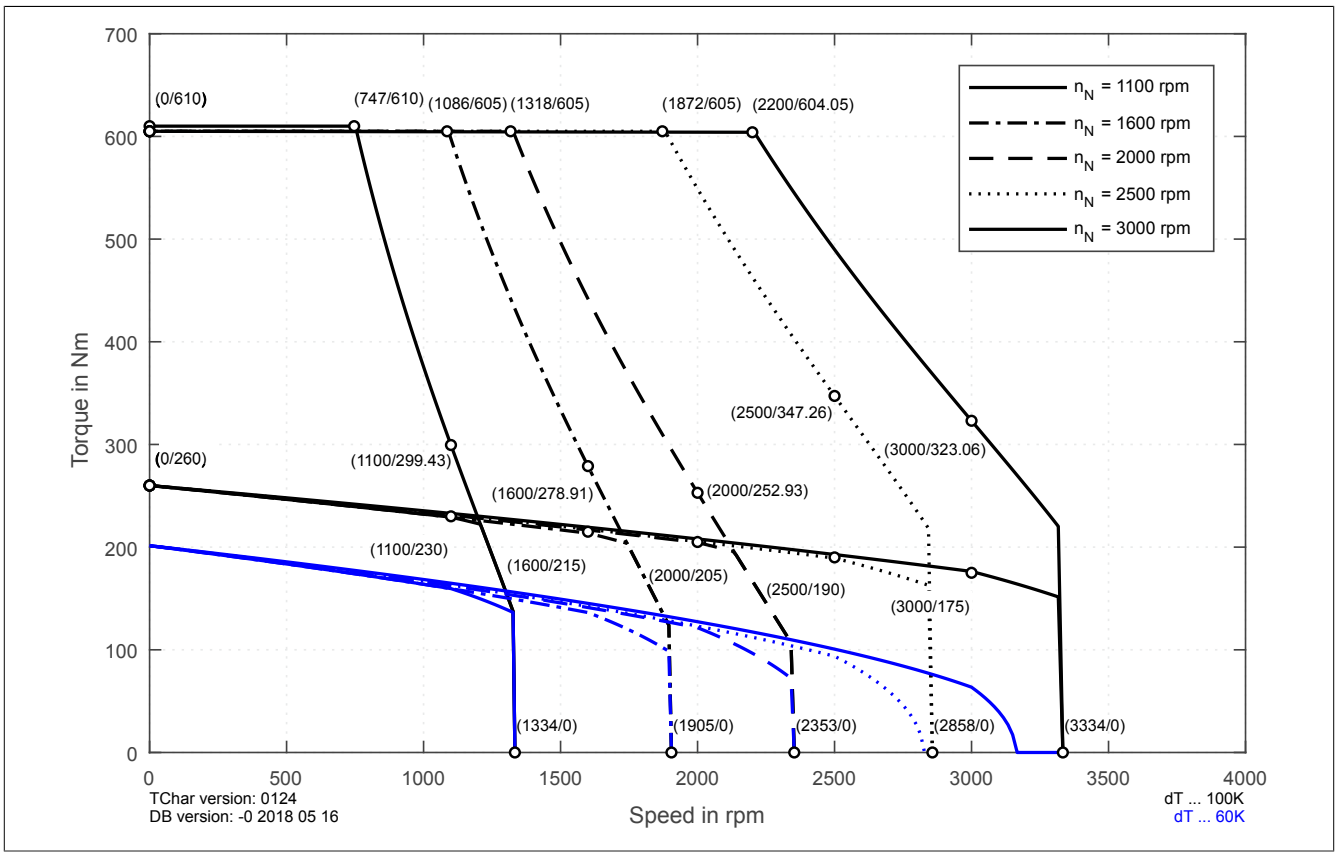
8KSC84.eennnffgg-h and 8KSD84.eennnffgg-h



8KSC85.eennnffgg-h and 8KSD85.eennnffgg-h

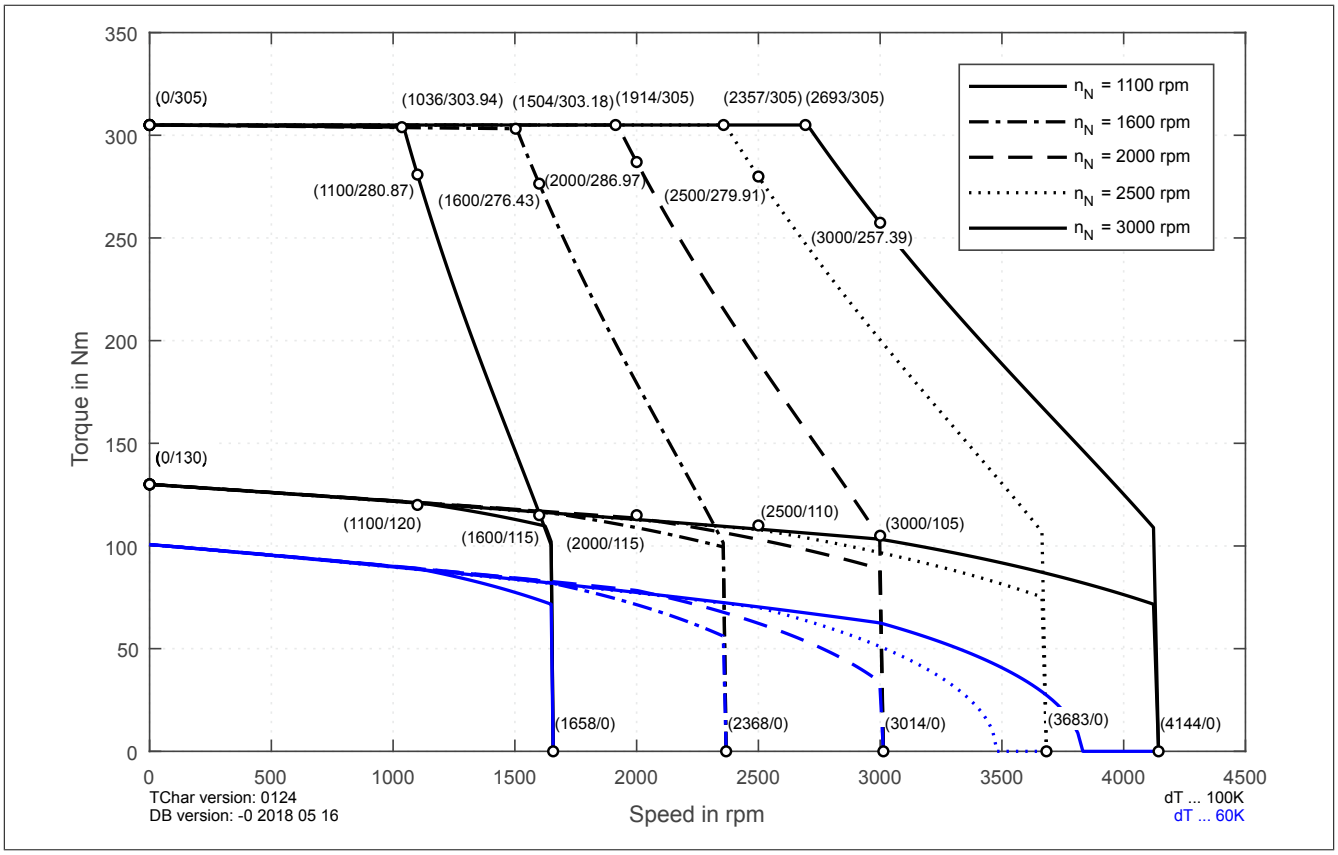


8KSC86.eennnffgg-h and 8KSD86.eennnffgg-h

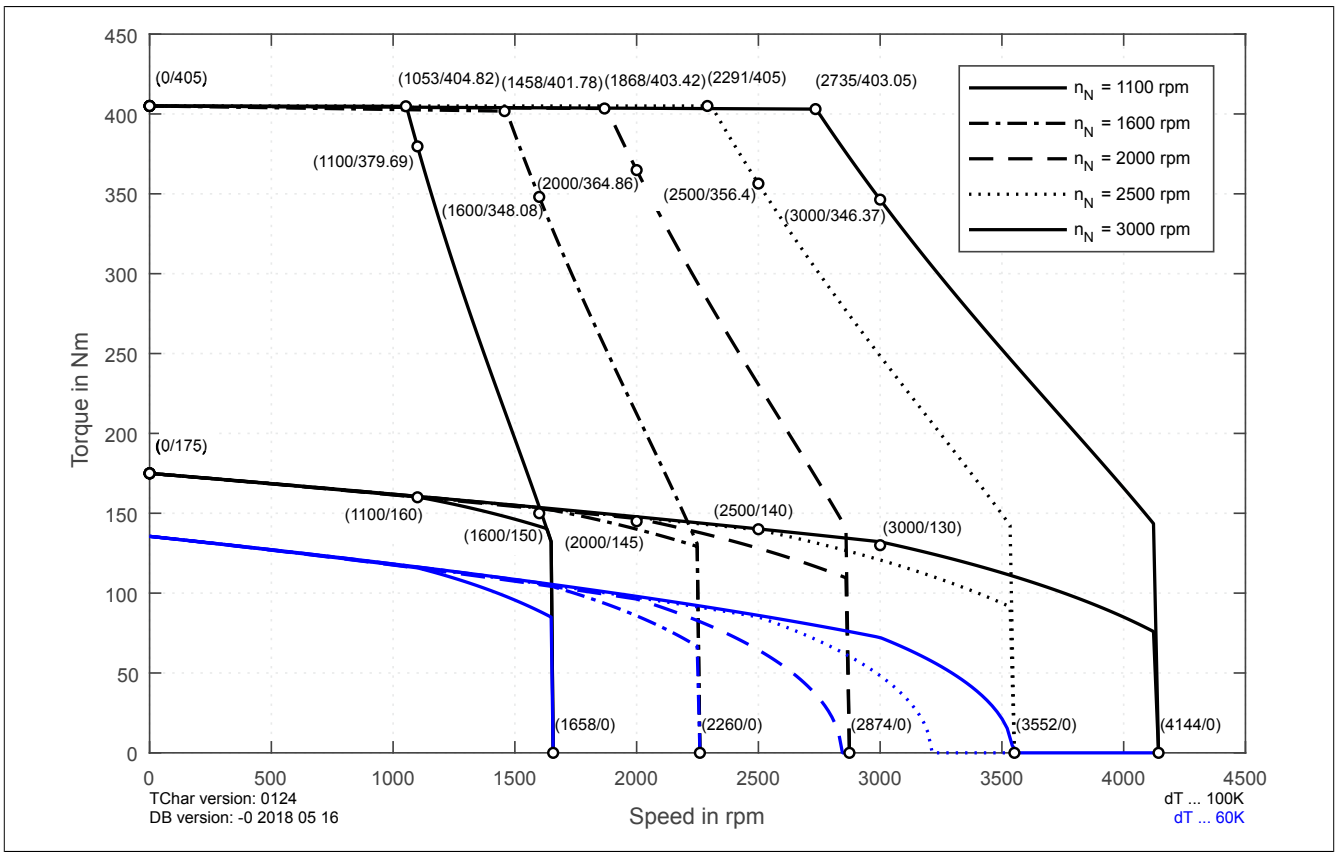


13.1.3 Speed-torque characteristic 750 DC bus voltage

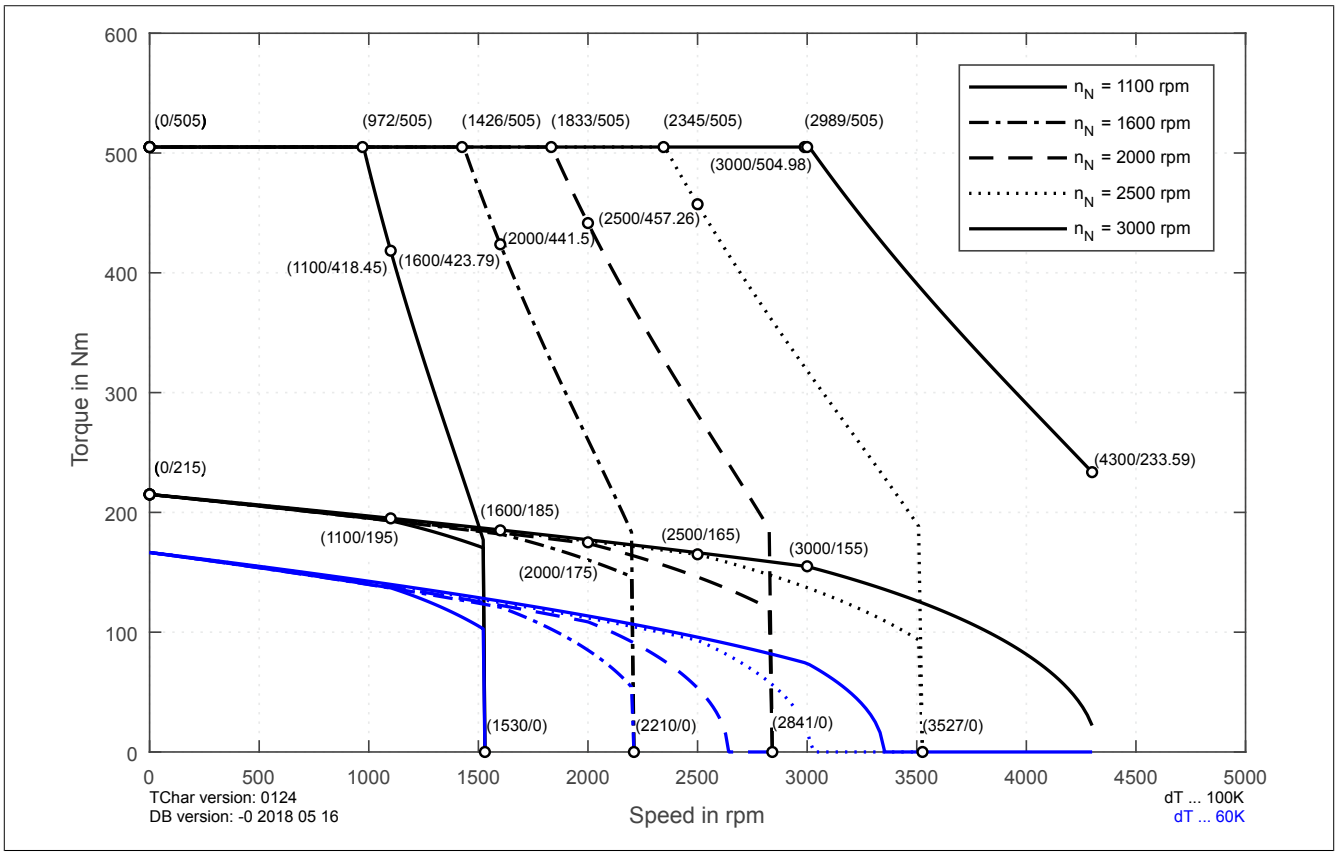
8KSC82.eennnffgg-h and 8KSD82.eennnffgg-h



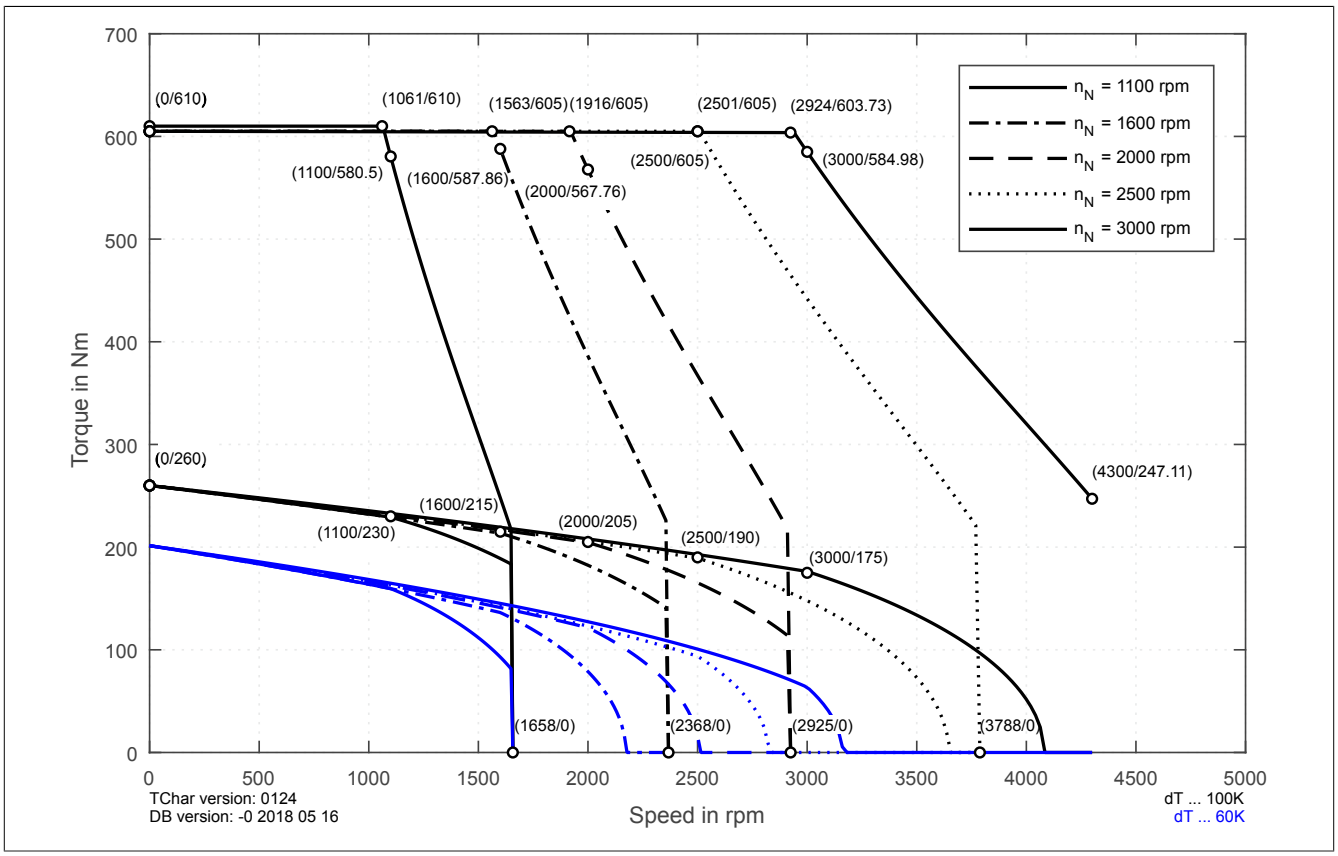
8KSC84.eennnffgg-h and 8KSD84.eennnffgg-h



8KSC85.eennnffgg-h and 8KSD85.eennnffgg-h



8KSC86.eennnffgg-h and 8KSD86.eennnffgg-h



13.1.4 Dimensions 8KSD8

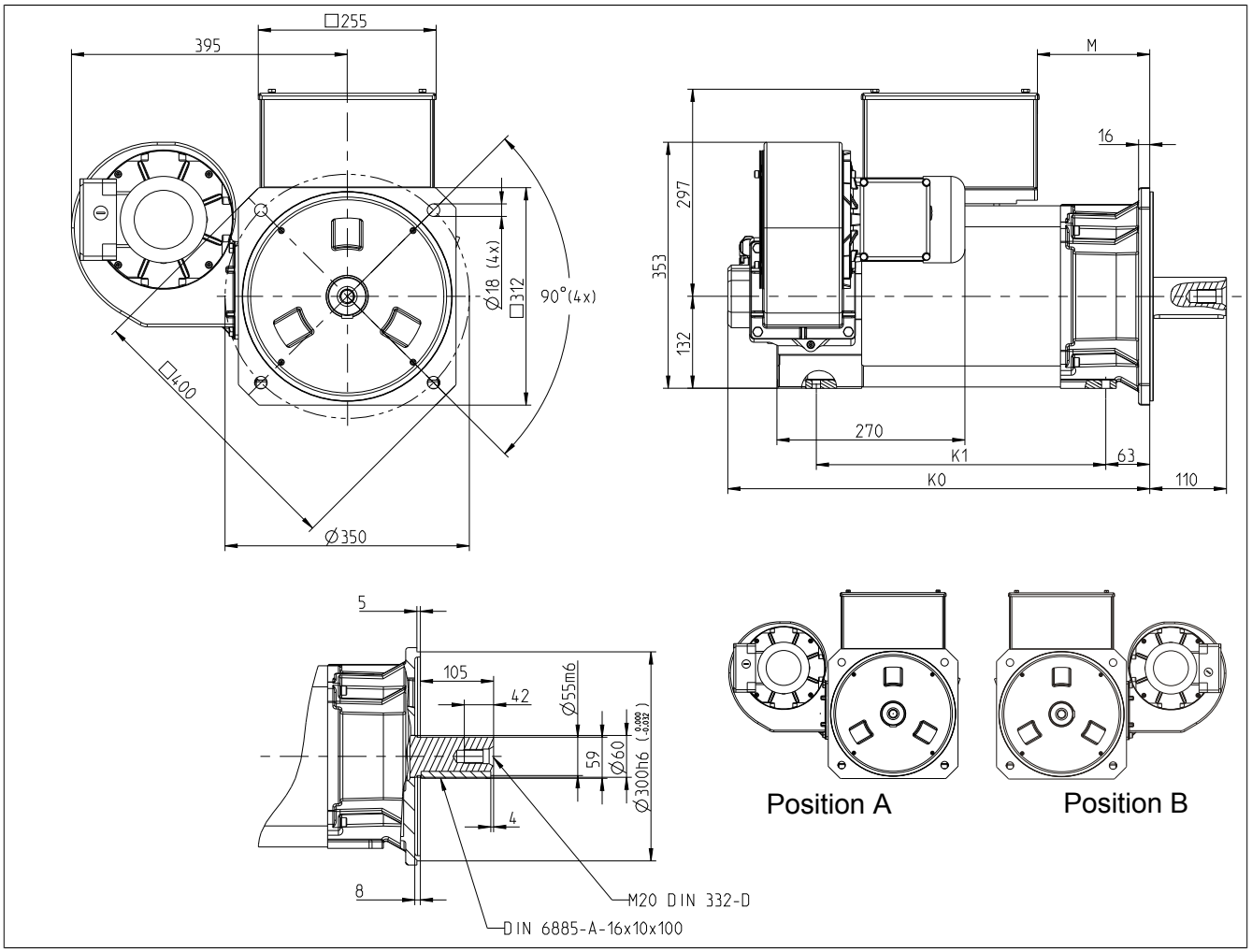


Figure 3: 8KSD8 - Dimensions

Dimensions of fan postion right (Position B) are equal to the dimensions to the left (Position A).

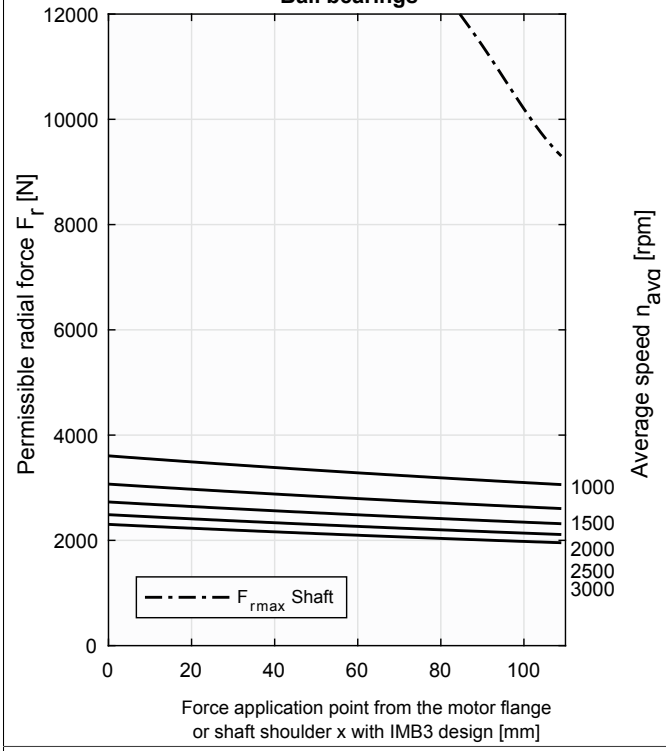
Order code	K_0	K1	M	Extension K0/ K1 with brake option
8KSD82.eennnffgg-h	556	365	109	108
8KSD84.eennnffgg-h	606	415	159	108
8KSD85.eennnffgg-h	656	465	209	108
8KSD86.eennnffgg-h	706	515	259	108

13.1.5 Maximum shaft load

The values in the diagram below are based on a mechanical service life of the bearings of 20,000 operating hours.

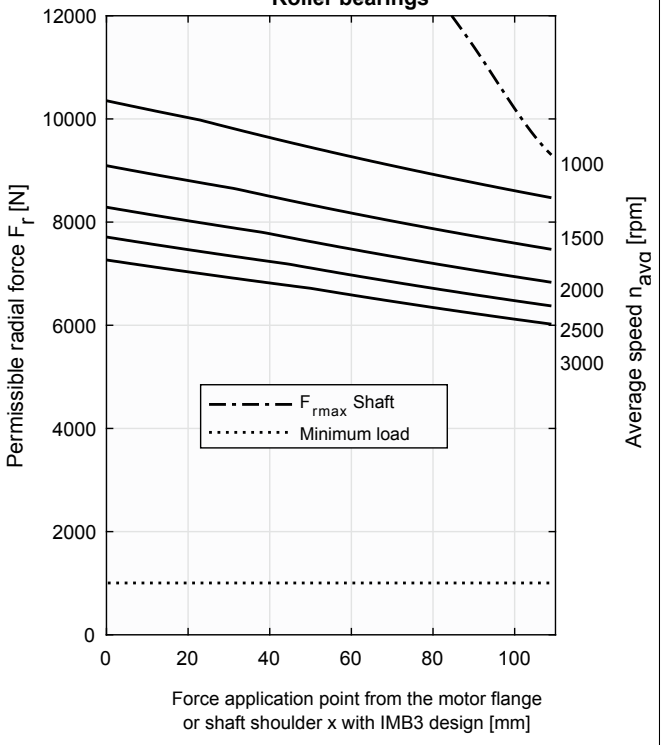
Standard bearing

Ball bearings



Reinforced bearing

Roller bearings



The rigidity curve for the shaft applies to the maximum motor torque.

14 8KSJ - Technical data

14.1 8KSJ8 - Technical data

8KSJ82

Model number	8KSJ82.ee010ff00-h	8KSJ82.ee015ff00-h	8KSJ82.ee020ff00-h	8KSJ82.ee025ff00-h	8KSJ82.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1000	1500	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	175	170	165	160	150
Nominal power P_N [W]	18326	26704	34558	41888	47124
Nominal current I_N [A]	39.1	55	67	79	86
Stall torque M_0 [Nm]	180				
Stall current I_0 [A]	40.4	58	73	90	101
Maximum torque M_{max} [Nm]	340				
Maximum current I_{max} [A]	85	121	155	190	210
Maximum speed n_{max} [rpm]	4300				
Torque constant K_T [Nm/A]	4.65	3.26	2.56	2.09	1.86
Voltage constant K_E [V/1000 rpm]	296	207	163	133	118
Stator resistance R_{2ph} [Ω]	0.64	0.32	0.196	0.132	0.104
Stator inductance L_{2ph} [mH]	19.4	9.6	6	4	3.1
Electrical time constant t_{el} [ms]	31.656	31	30.6	34.167	32.4
Thermal time constant t_{therm} [min]	16.1				
Moment of inertia J [kgcm²]	450				
Weight without brake m [kg]	110				
Holding brake					
Holding torque of brake M_{Br} [Nm]	200				
Mass of brake [kg]	13				
Moment of inertia of brake J_{Br} [kgcm²]	40				
Recommendations					
ACOPOS 8Vxxxx.xx...	1640		128M		
ACOPOSmulti 8BVIxxxx...	0660		0880	1650	
Cross section for B&R motor cables [mm²]	10	0			
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

8KSJ84

Model number	8KSJ84.ee010ff00-h	8KSJ84.ee015ff00-h	8KSJ84.ee020ff00-h	8KSJ84.ee025ff00-h	8KSJ84.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1000	1500	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	230	225	215	210	200
Nominal power P_N [W]	24086	35343	45029	54978	62832
Nominal current I_N [A]	52	70	86	102	115
Stall torque M_0 [Nm]	240				
Stall current I_0 [A]	54	74	93	116	135
Maximum torque M_{max} [Nm]	450				
Maximum current I_{max} [A]	113	155	195	240	280
Maximum speed n_{max} [rpm]	4300				
Torque constant K_T [Nm/A]	4.63	3.39	2.67	2.16	1.85
Voltage constant K_E [V/1000 rpm]	296	217	171	138	118
Stator resistance R_{2ph} [Ω]	0.42	0.22	0.14	0.092	0.068
Stator inductance L_{2ph} [mH]	14.6	7.8	4.8	3.2	2.3
Electrical time constant t_{el} [ms]	35.667	36.636	35.714	32.6	40
Thermal time constant t_{therm} [min]	15				
Moment of inertia J [kgcm²]	580				
Weight without brake m [kg]	120				
Holding brake					
Holding torque of brake M_{Br} [Nm]	200				
Mass of brake [kg]	13				
Moment of inertia of brake J_{Br} [kgcm²]	40				
Recommendations					
ACOPOS 8Vxxxx.xx...	1640		128M		-
ACOPOSmulti 8BVIxxxx...	0660	0880	1650		
Cross section for B&R motor cables [mm²]	10	0			
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

8KSJ85

Model number	8KSJ85.ee010ff00-h	8KSJ85.ee015ff00-h	8KSJ85.ee020ff00-h	8KSJ85.ee025ff00-h	8KSJ85.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1000	1500	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	290	285	275	265	255
Nominal power P_N [W]	30369	44768	57596	69377	80111
Nominal current I_N [A]	62	87	109	130	150
Stall torque M_0 [Nm]	305				
Stall current I_0 [A]	64	92	119	147	180
Maximum torque M_{max} [Nm]	555				
Maximum current I_{max} [A]	130	190	240	300	365
Maximum speed n_{max} [rpm]	4300				
Torque constant K_T [Nm/A]	4.96	3.43	2.67	2.16	1.78
Voltage constant K_E [V/1000 rpm]	321	222	173	140	115
Stator resistance R_{2ph} [Ω]	0.36	0.172	0.104	0.068	0.046
Stator inductance L_{2ph} [mH]	13.6	6.5	4	2.5	1.74
Electrical time constant t_{el} [ms]	38.722	37.111	40.4	44	45
Thermal time constant t_{therm} [min]	14				
Moment of inertia J [kgcm²]	710				
Weight without brake m [kg]	130				
Holding brake					
Holding torque of brake M_{Br} [Nm]	200				
Mass of brake [kg]	13				
Moment of inertia of brake J_{Br} [kgcm²]	40				
Recommendations					
ACOPOS 8Vxxxx.xx...	128M			-	
ACOPOSmulti 8BVIxxxx...	0880	1650			-
Cross section for B&R motor cables [mm²]	0				
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

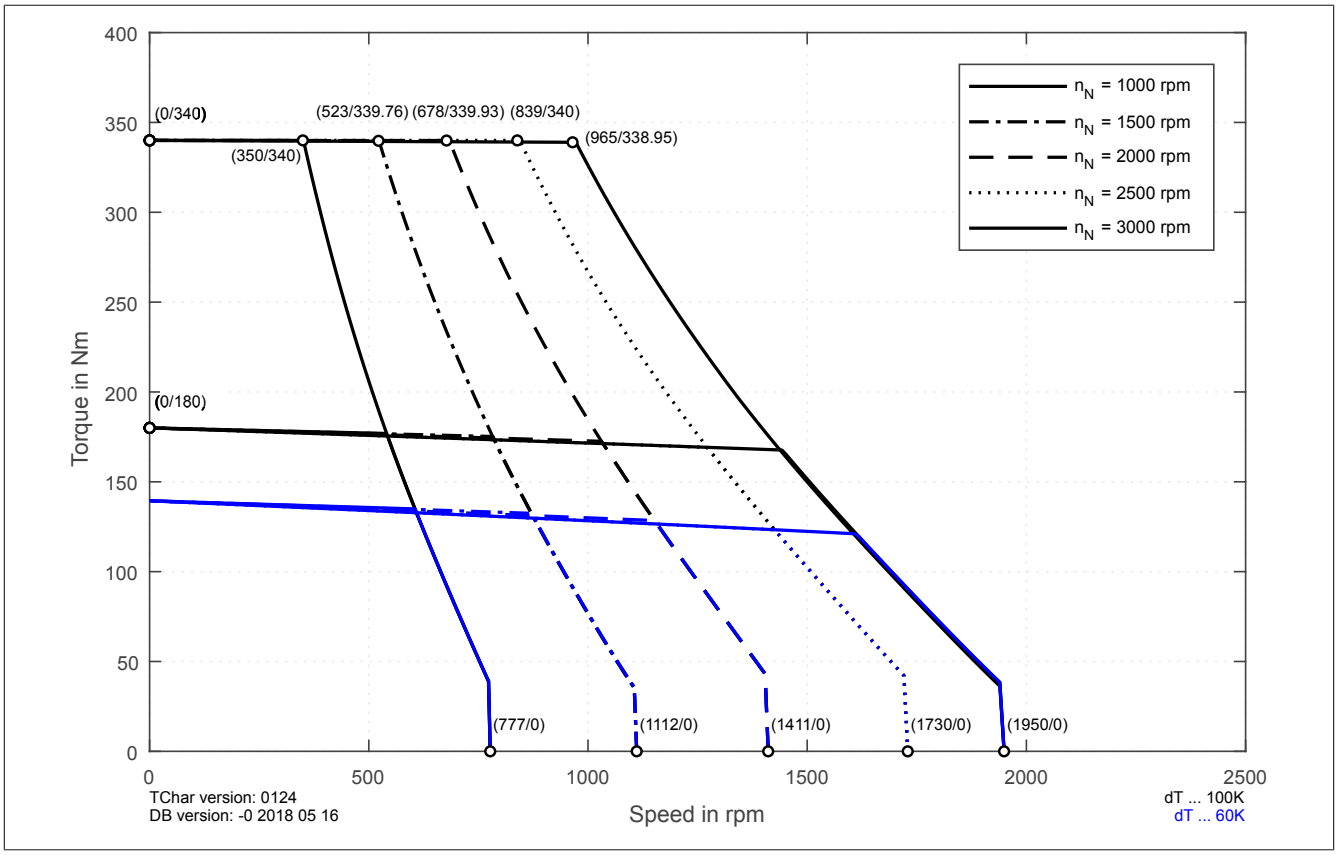
8KSJ86

Model number	8KSJ86.ee010ff00-h	8KSJ86.ee015ff00-h	8KSJ86.ee020ff00-h	8KSJ86.ee025ff00-h
Motor				
Nominal speed n_N [rpm]	1000	1500	2000	2500
Number of pole pairs	3			
Nominal torque M_n [Nm]	350	345	330	320
Nominal power P_N [W]	36652	54192	69115	83776
Nominal current I_N [A]	80	112	135	160
Stall torque M_0 [Nm]	360			
Stall current I_0 [A]	83	118	146	180
Maximum torque M_{max} [Nm]	665			
Maximum current I_{max} [A]	170	240	300	365
Maximum speed n_{max} [rpm]	4300			
Torque constant K_T [Nm/A]	4.57	3.2	2.59	2.13
Voltage constant K_E [V/1000 rpm]	296	207	168	138
Stator resistance R_{2ph} [Ω]	0.24	0.116	0.076	0.052
Stator inductance L_{2ph} [mH]	9.6	4.6	3.1	2.09
Electrical time constant t_{el} [ms]	41	40.167	39.5	35.667
Thermal time constant t_{therm} [min]	13			
Moment of inertia J [kgcm²]	840			
Weight without brake m [kg]	140			
Holding brake				
Holding torque of brake M_{Br} [Nm]	200			
Mass of brake [kg]	13			
Moment of inertia of brake J_{Br} [kgcm²]	40			
Recommendations				
ACOPOS 8Vxxxx.xx...	128M		-	
ACOPOSmulti 8BVIxxxx...		1650		-
Cross section for B&R motor cables [mm²]	0			
Connector type	Terminal box			

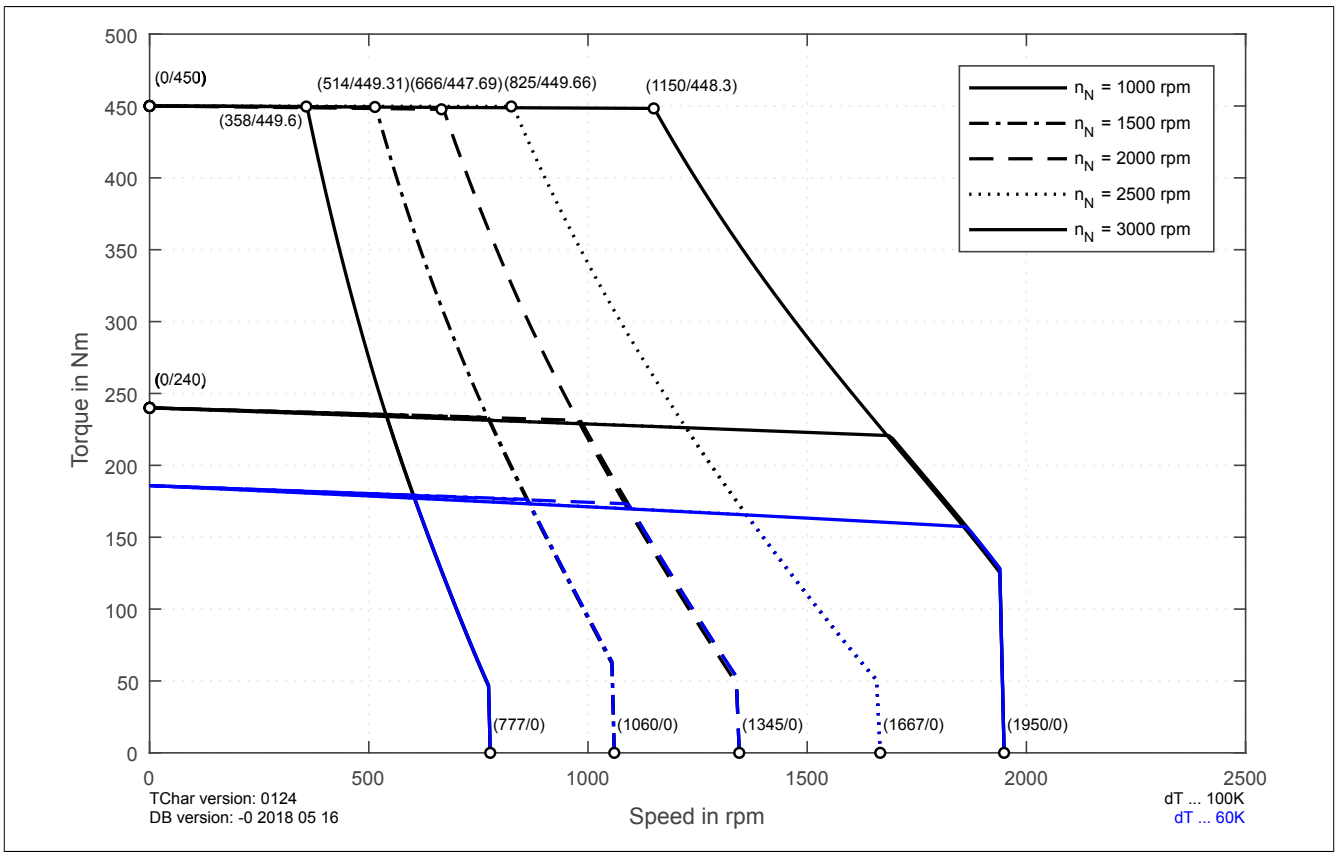
NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

14.1.1 Speed-Torque characteristic curves at 325 VDC DC bus voltage

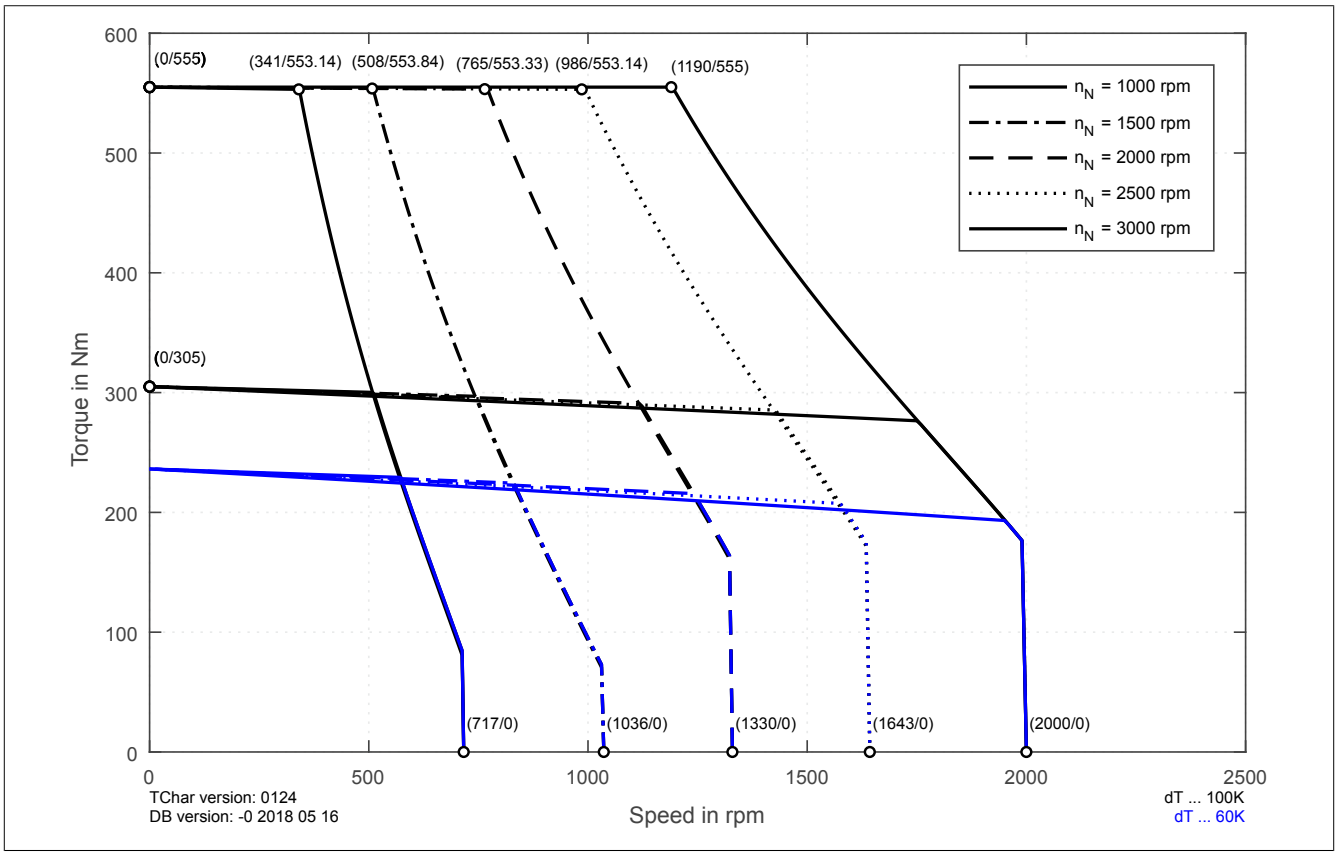
8KSJ82.eennnffgg-h



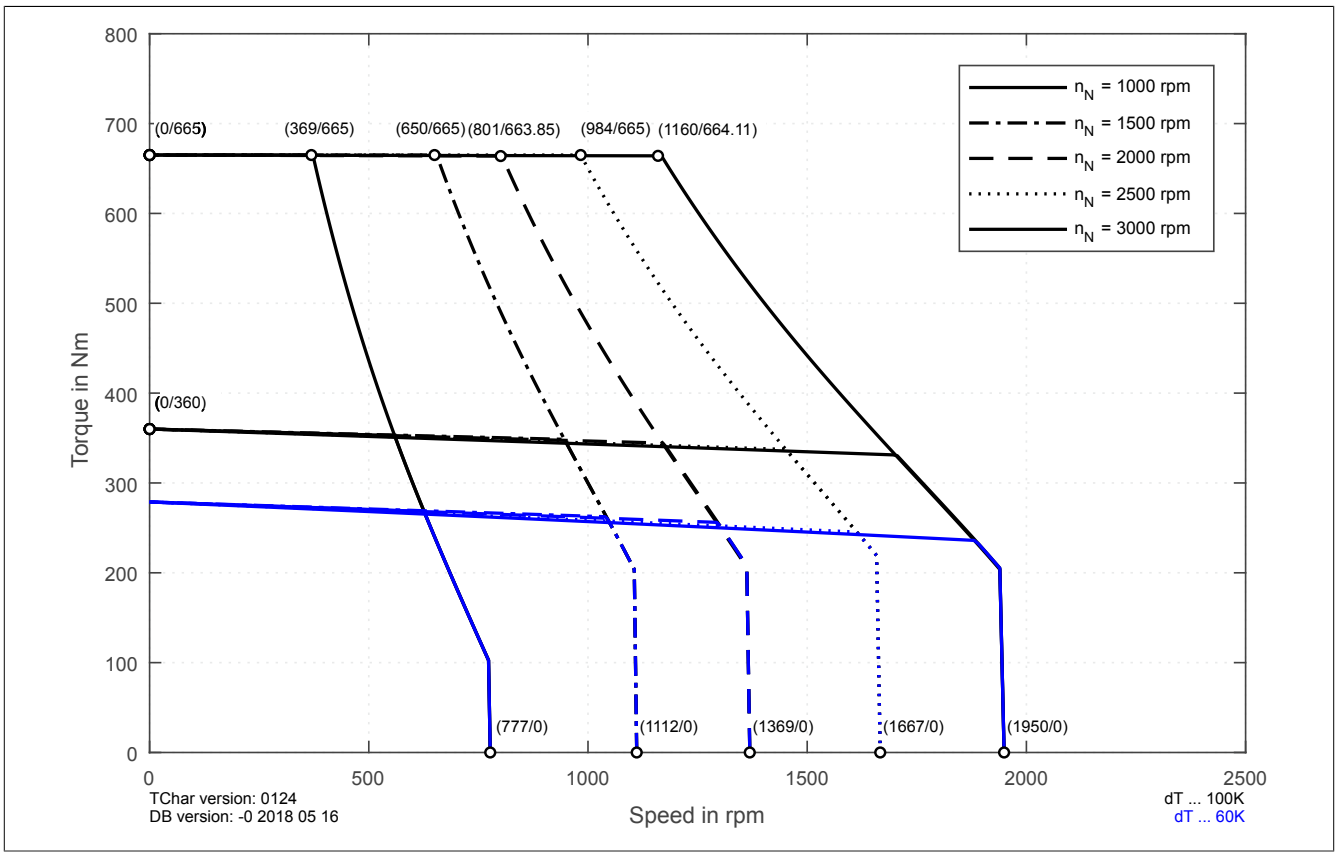
8KSJ84.eennnffgg-h



8KSJ85.eennnffgg-h

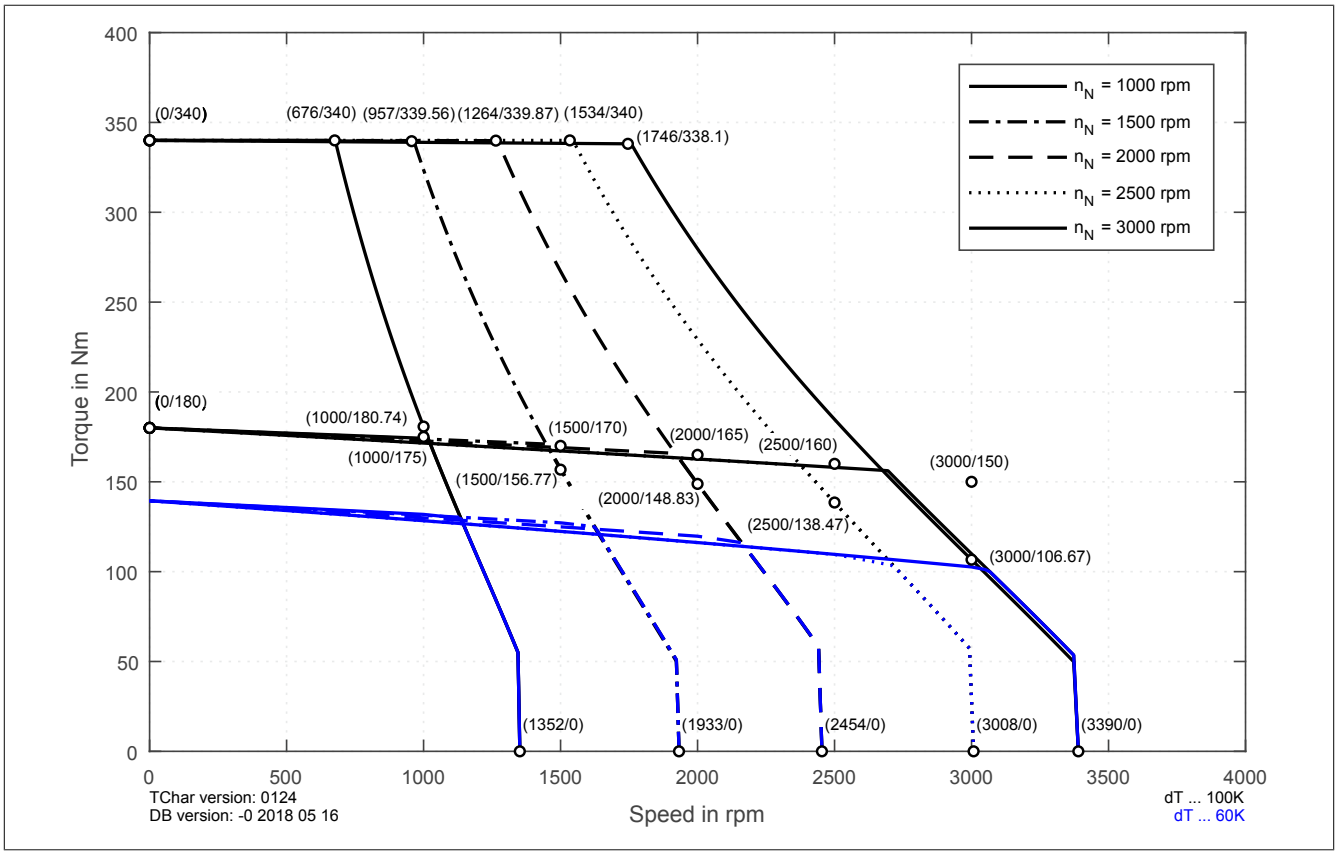


8KSJ86.eennnffgg-h

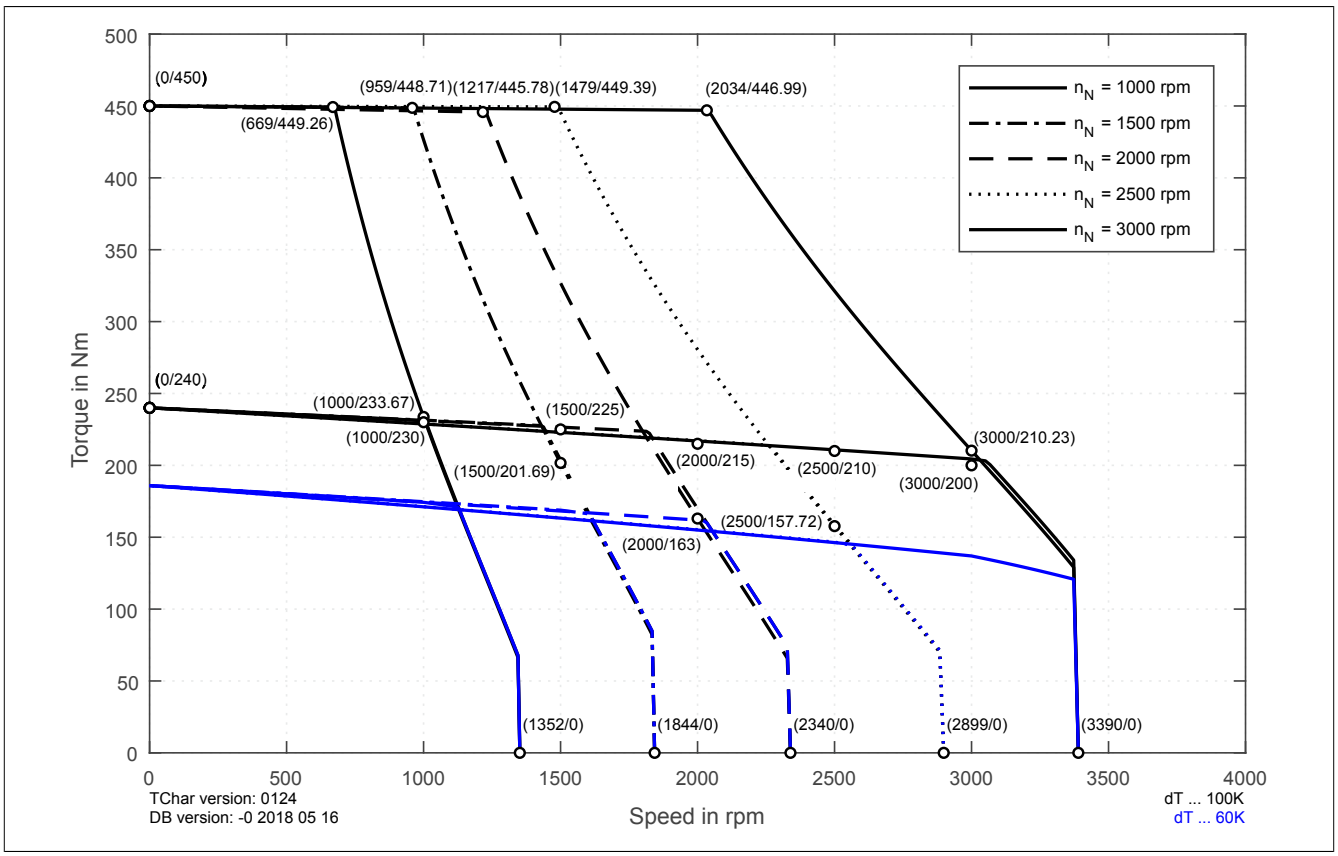


14.1.2 Speed-torque characteristic 560 DC bus voltage

8KSJ82.eennnffgg-h



8KSJ84.eennnffgg-h



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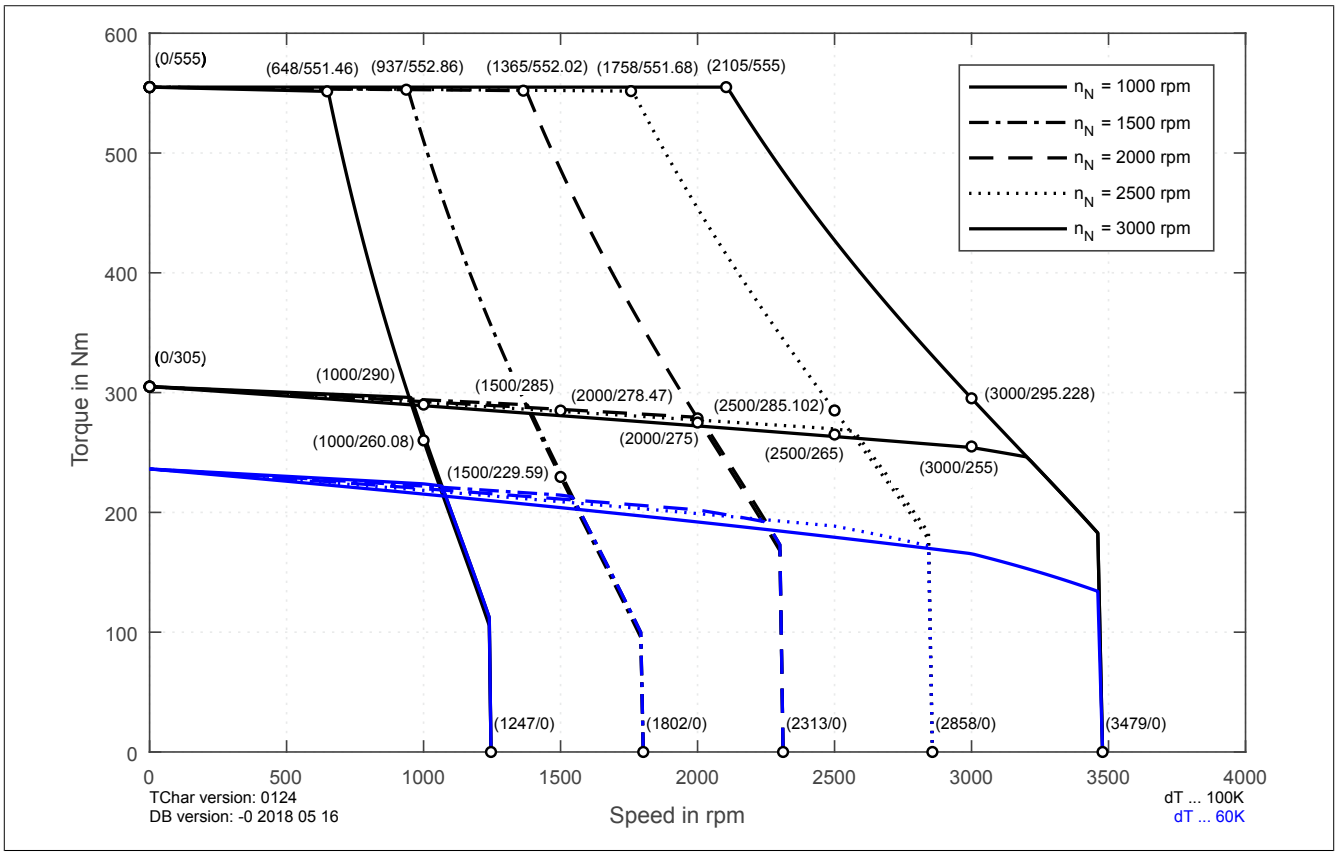
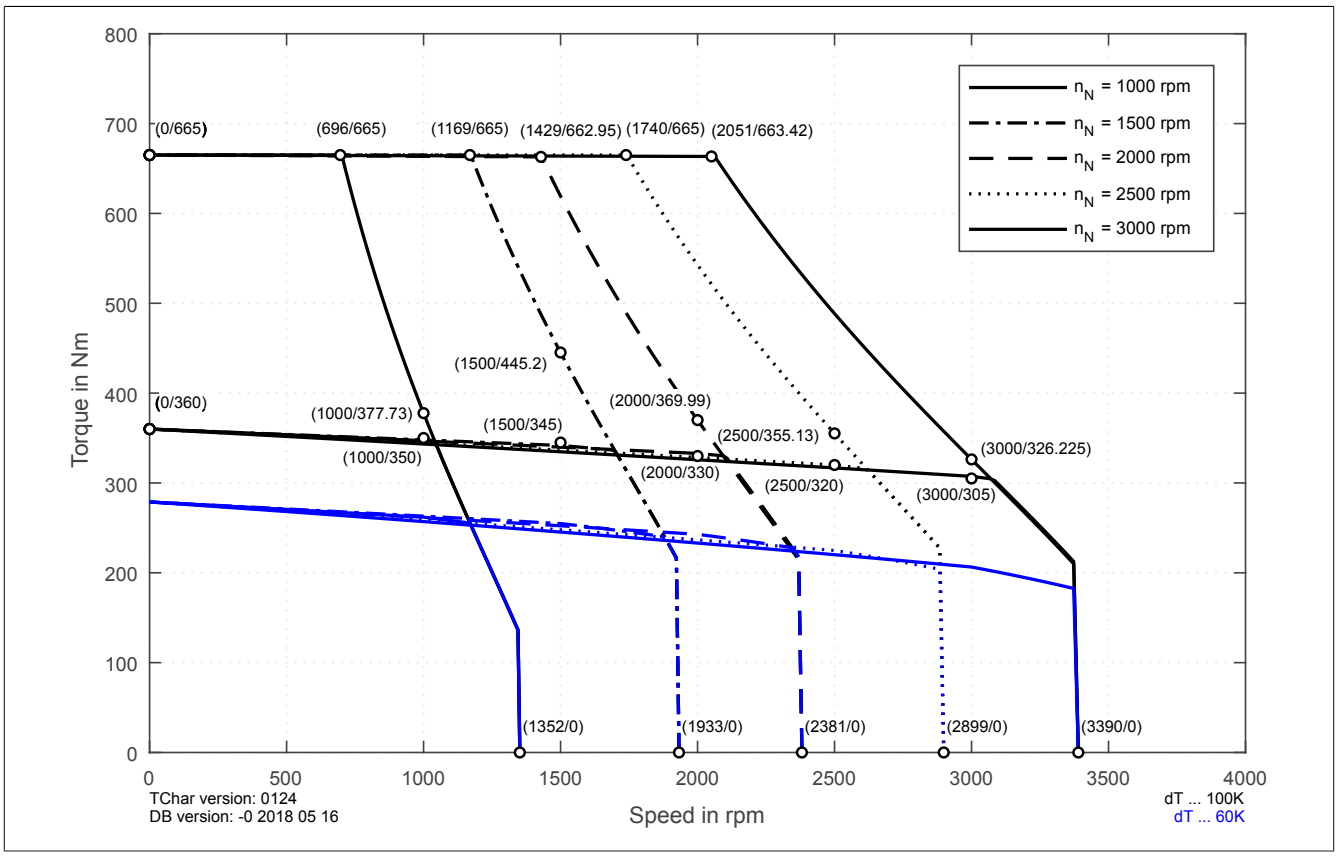
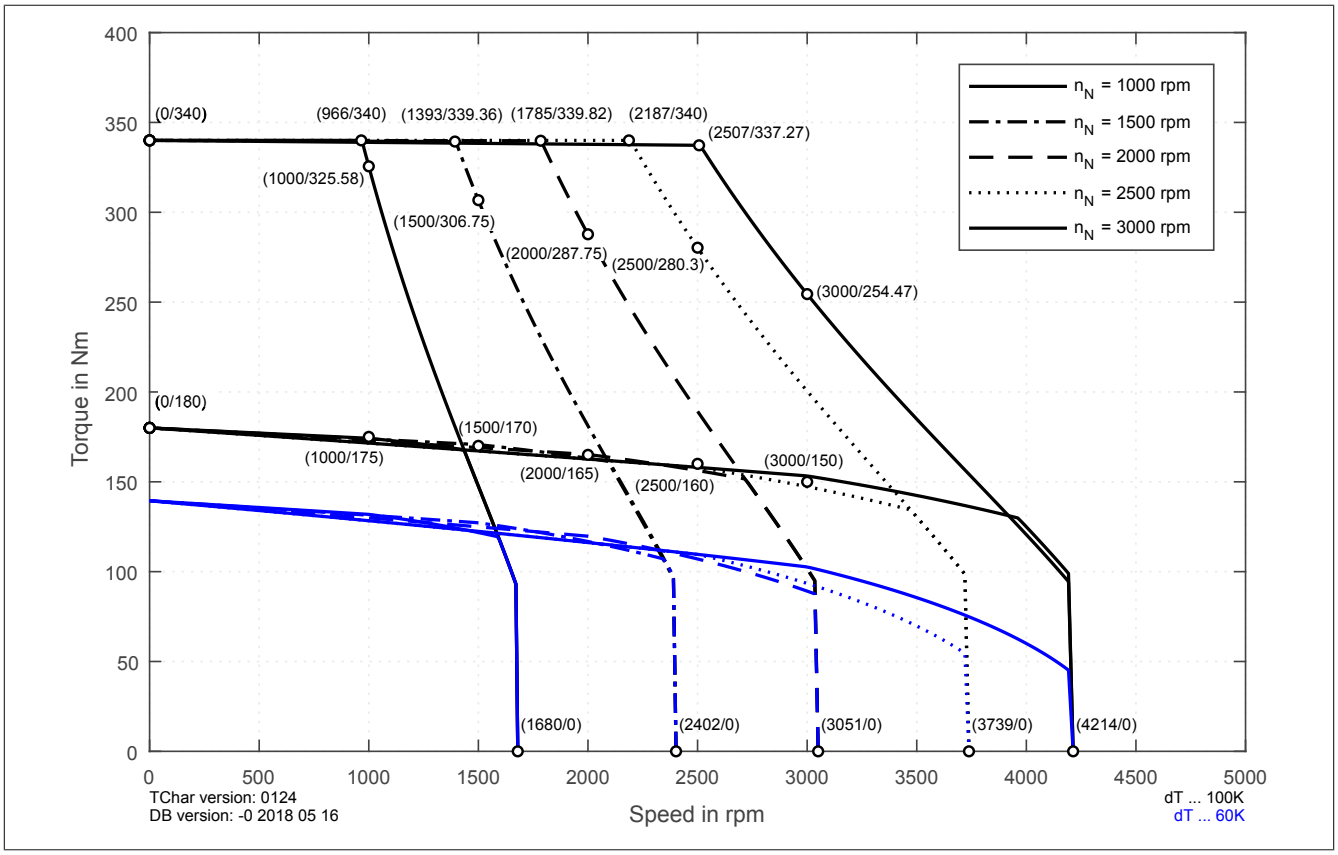


8KSJ86.eennnffgg-h

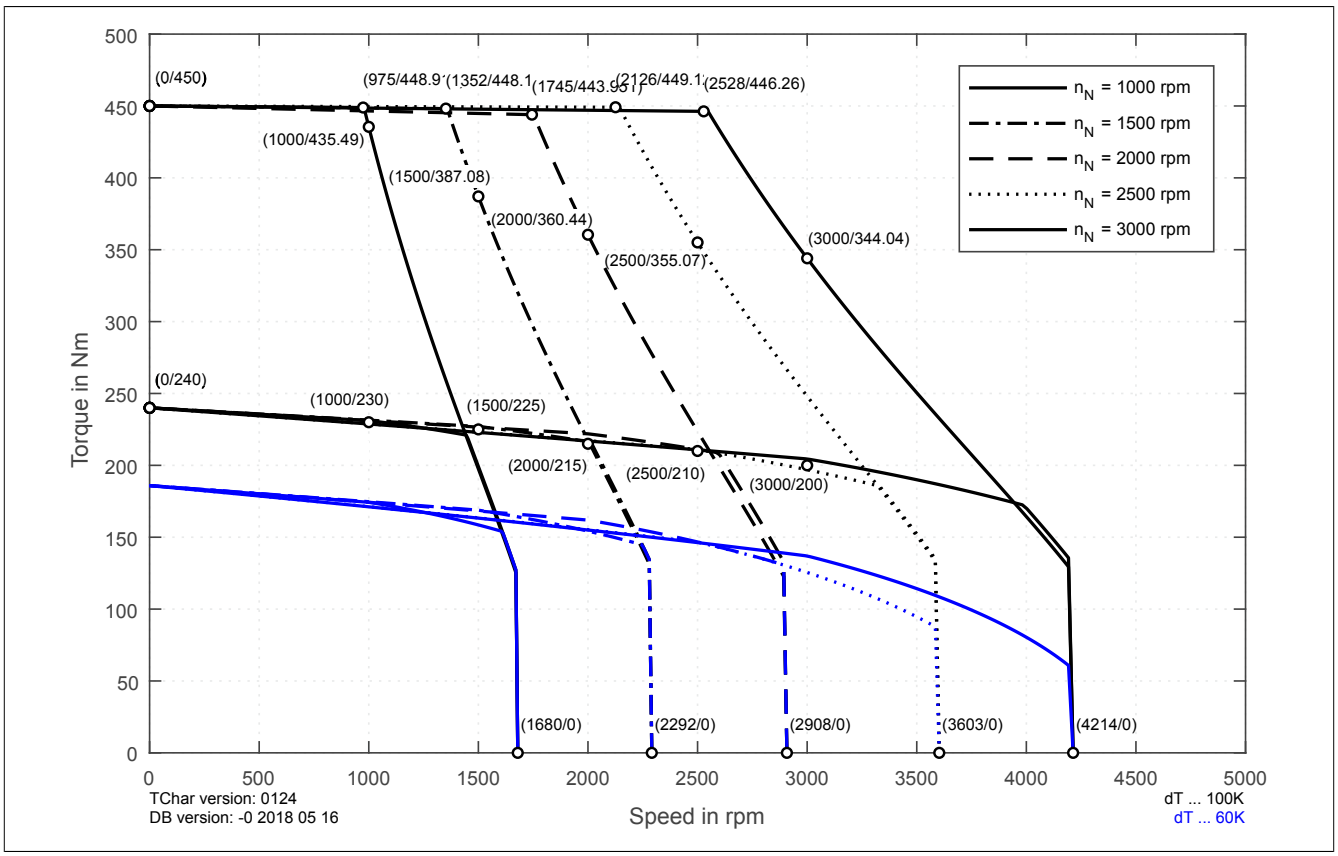


14.1.3 Speed-torque characteristic 750 DC bus voltage

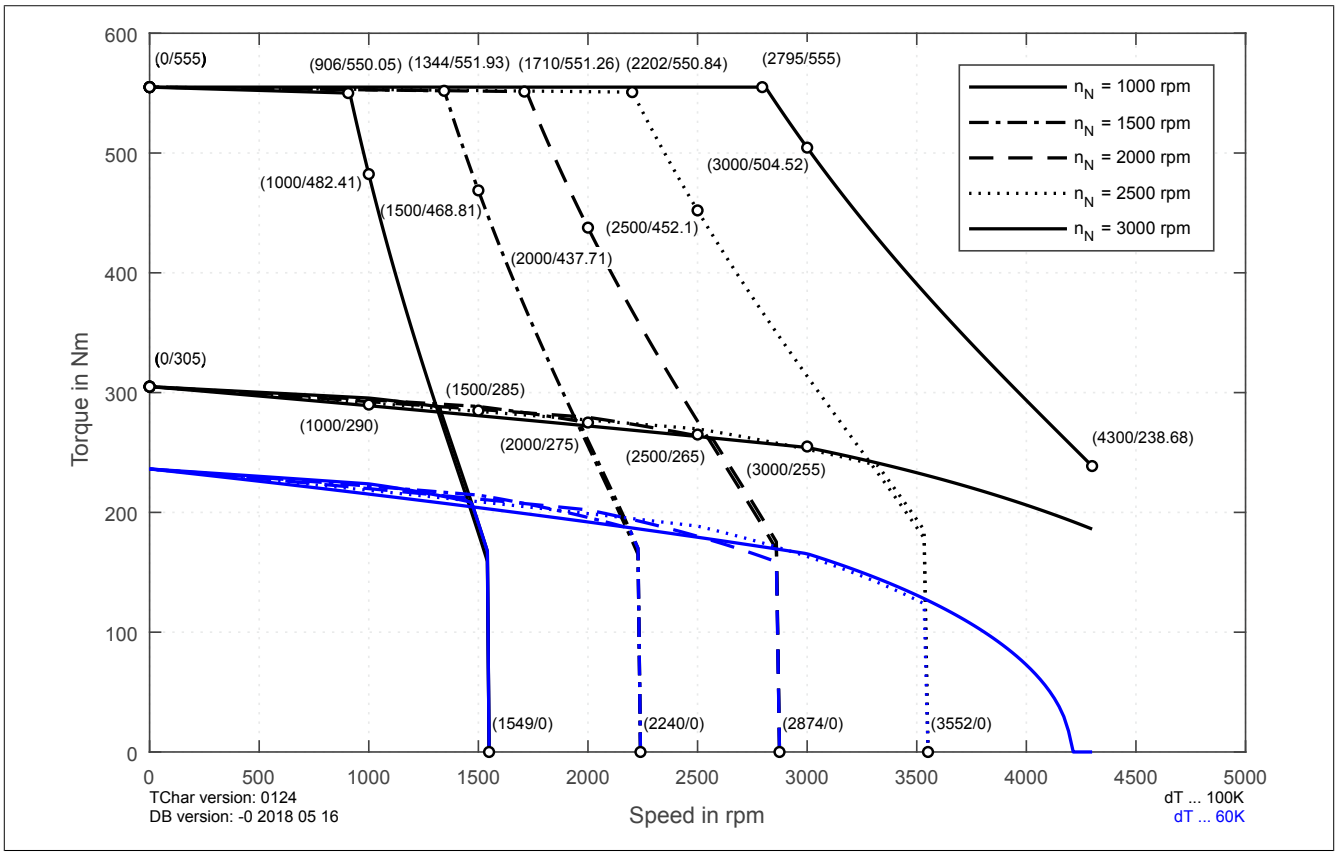
8KSJ82.eennnffgg-h



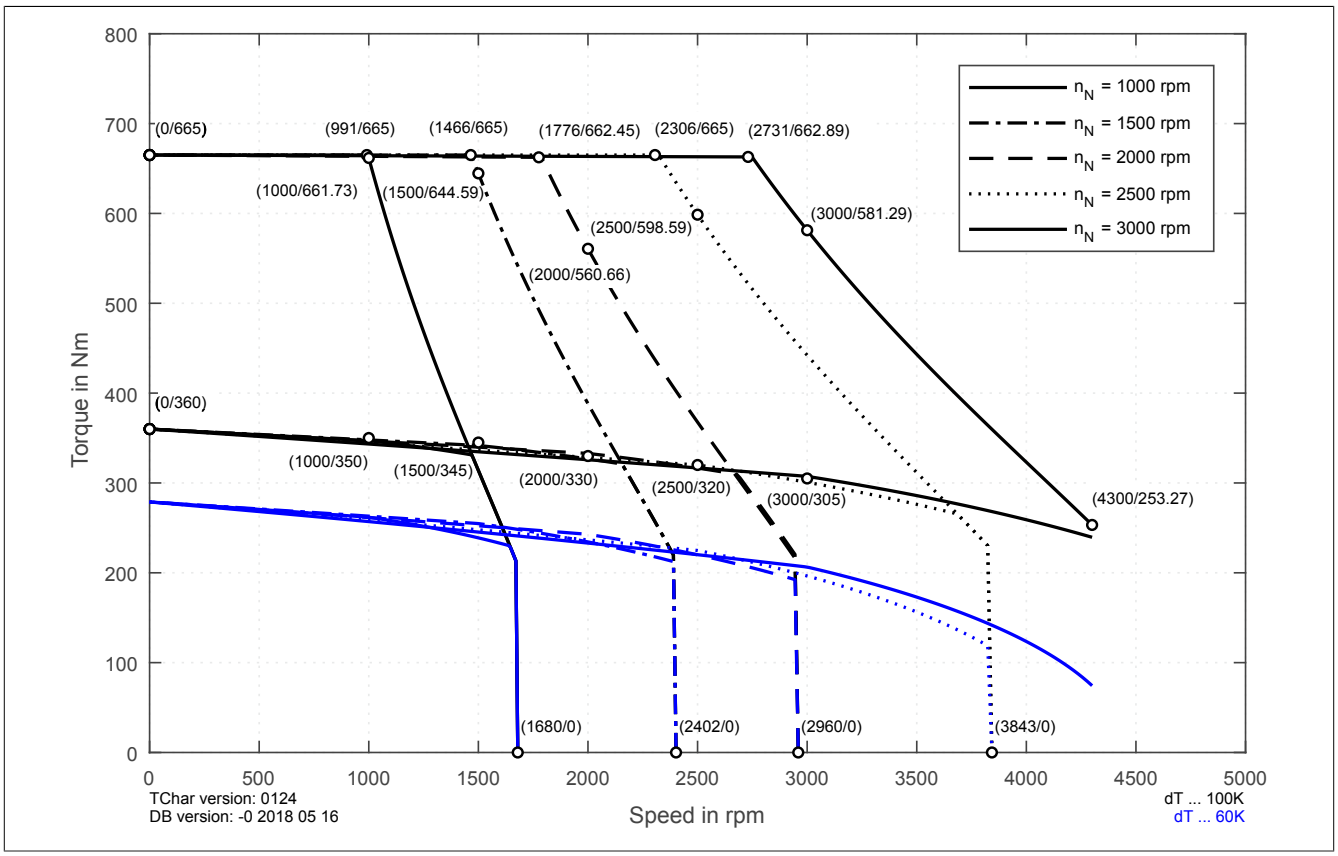
8KSJ84.eennnffgg-h



8KSJ85.eennnffgg-h



8KSJ86.eennnffgg-h



14.1.4 Dimensions 8KSJ8

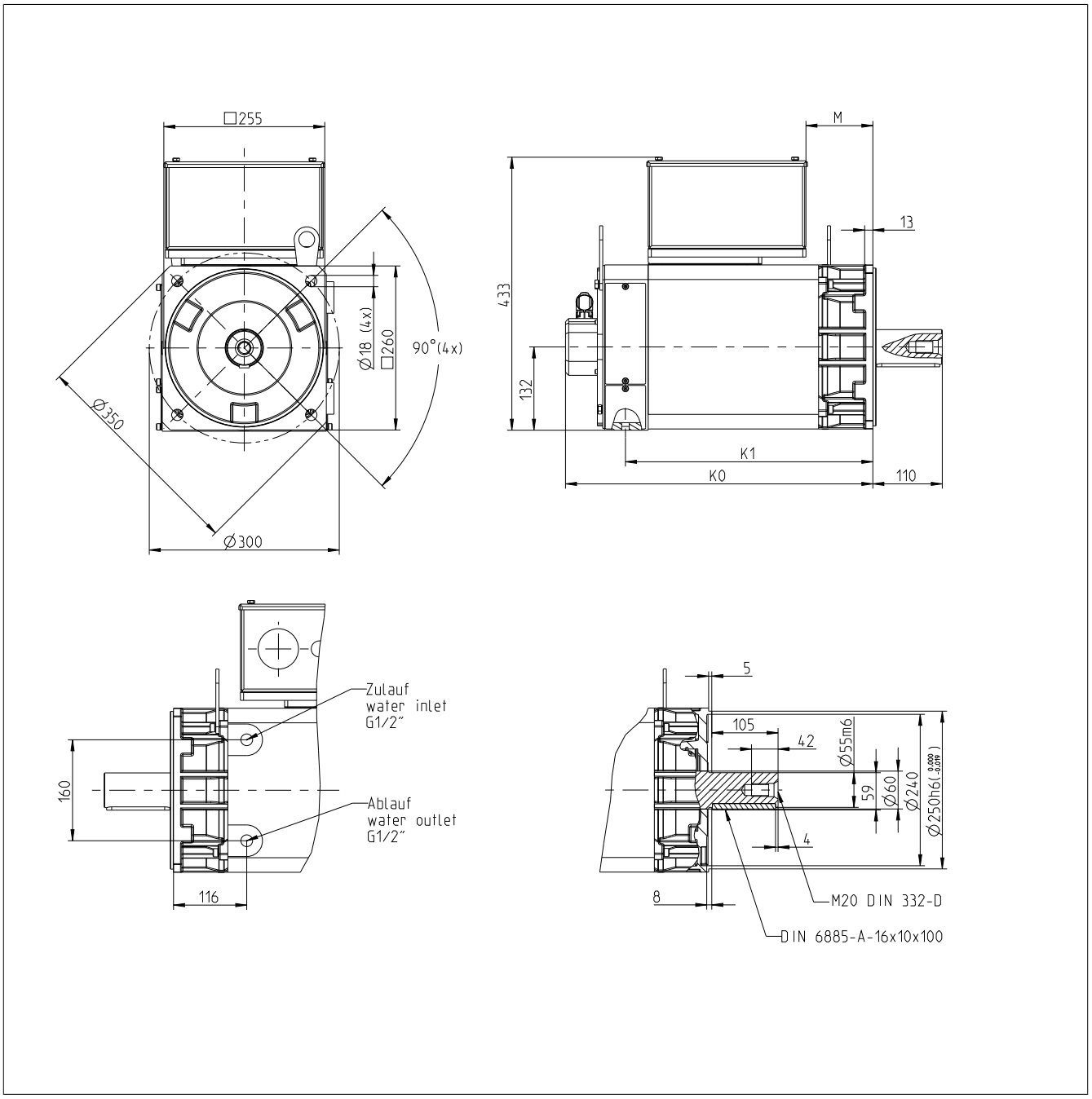


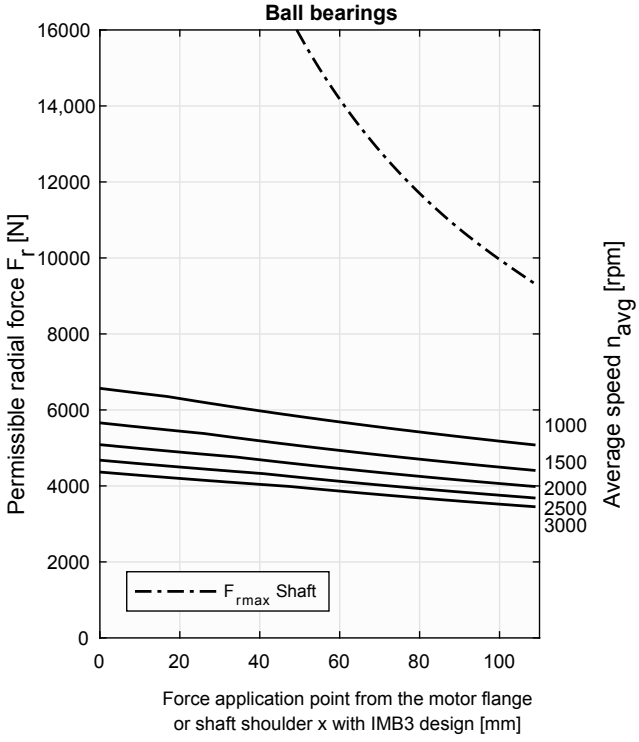
Figure 4: 8KSJ8 - Dimensions

Order code	K_0	K1	M	Extension K0/ K1 with brake option
8KSJ82.eennnffgg-h	442	342	86	140
8KSJ84.eennnffgg-h	492	392	136	140
8KSJ85.eennnffgg-h	542	442	186	140
8KSJ86.eennnffgg-h	592	492	236	140

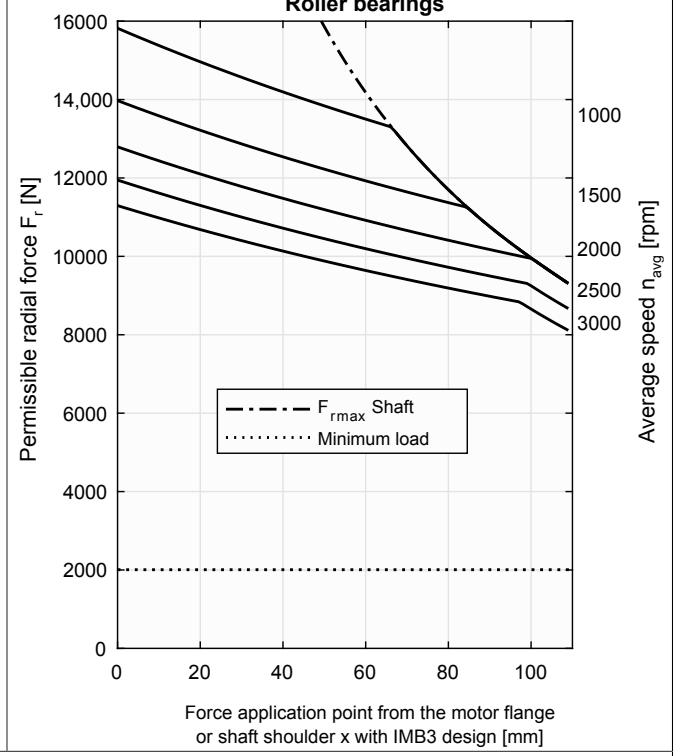
14.1.5 Maximum shaft load

The values in the diagram below are based on a mechanical service life of the bearings of 20,000 operating hours.

Standard bearing



Reinforced bearing



The rigidity curve for the shaft applies to the maximum motor torque.

14.2 8KSJ9 - Technical data

8KSJ92

Model number	8KSJ92.ee010ff00-h	8KSJ92.ee015ff00-h	8KSJ92.ee020ff00-h	8KSJ92.ee025ff00-h
Motor				
Nominal speed n_N [rpm]	1000	1500	2000	2500
Number of pole pairs	3			
Nominal torque M_n [Nm]	305	295	285	275
Nominal power P_N [W]	31940	46338	59690	71995
Nominal current I_N [A]	59	86	109	132
Stall torque M_0 [Nm]	320			
Stall current I_0 [A]	62	93	122	150
Maximum torque M_{max} [Nm]	695			
Maximum current I_{max} [A]	146	220	285	360
Maximum speed n_{max} [rpm]	3600			
Torque constant K_T [Nm/A]	5.29	3.52	2.7	2.15
Voltage constant K_E [V/1000 rpm]	337	224	172	137
Stator resistance R_{2ph} [Ω]	0.24	0.108	0.064	0.04
Stator inductance L_{2ph} [mH]	10.6	4.7	2.8	1.74
Electrical time constant t_{el} [ms]	42.358	42.593	42.313	43.05
Thermal time constant t_{therm} [min]	22.8			
Moment of inertia J [kgcm²]	1500			
Weight without brake m [kg]	225			
Holding brake				
Holding torque of brake M_{Br} [Nm]	320			
Mass of brake [kg]	29			
Moment of inertia of brake J_{Br} [kgcm²]	90			
Recommendations				
ACOPOS 8Vxxxx.xx...	128M		-	
ACOPOSmulti 8BVIxxxx...	0880	1650		
Cross section for B&R motor cables [mm²]	0			
Connector type	Terminal box			

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

8KSJ94

Model number	8KSJ94.ee010ff00-h	8KSJ94.ee015ff00-h	8KSJ94.ee020ff00-h
Motor			
Nominal speed n_N [rpm]	1000	1500	2000
Number of pole pairs		3	
Nominal torque M_n [Nm]	390	380	375
Nominal power P_N [W]	40841	59690	78540
Nominal current I_N [A]	76	111	143
Stall torque M_0 [Nm]		400	
Stall current I_0 [A]	78	116	150
Maximum torque M_{max} [Nm]		870	
Maximum current I_{max} [A]	185	270	360
Maximum speed n_{max} [rpm]		3600	
Torque constant K_T [Nm/A]	5.25	3.54	2.69
Voltage constant K_E [V/1000 rpm]	334	225	171
Stator resistance R_{2ph} [Ω]	0.174	0.08	0.046
Stator inductance L_{2ph} [mH]	8.3	3.7	2.2
Electrical time constant t_{el} [ms]	46.621	46.25	46.261
Thermal time constant t_{therm} [min]		24	
Moment of inertia J [kgcm²]		1800	
Weight without brake m [kg]		260	
Holding brake			
Holding torque of brake M_{Br} [Nm]		320	
Mass of brake [kg]		29	
Moment of inertia of brake J_{Br} [kgcm²]		90	
Recommendations			
ACOPOS 8Vxxxx.xx...	128M		-
ACOPOSmulti 8BVIxxxx...	0880	1650	
Cross section for B&R motor cables [mm²]		0	
Connector type		Terminal box	

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

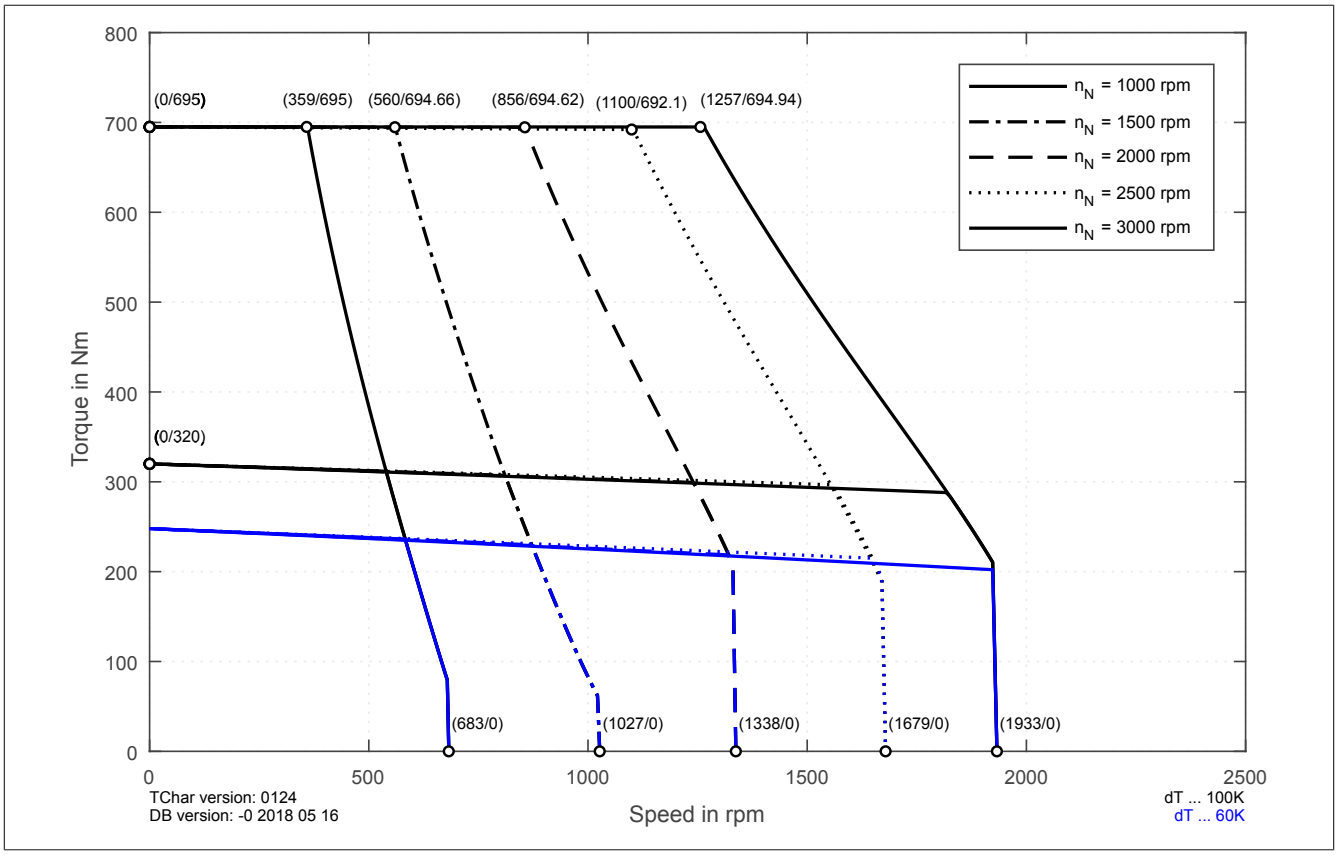
8KSJ95, 8KSJ96

Model number	8KSJ95.ee010ff00-h	8KSJ95.ee015ff00-h	8KSJ96.ee010ff00-h
Motor			
Nominal speed n_N [rpm]	1000	1500	1000
Number of pole pairs		3	
Nominal torque M_n [Nm]	465	460	555
Nominal power P_N [W]	48695	72257	58119
Nominal current I_N [A]	91	137	110
Stall torque M_0 [Nm]	480		575
Stall current I_0 [A]	94	144	114
Maximum torque M_{max} [Nm]	1030		1210
Maximum current I_{max} [A]	215	335	255
Maximum speed n_{max} [rpm]		3600	
Torque constant K_T [Nm/A]	5.27	3.43	5.2
Voltage constant K_E [V/1000 rpm]	336	218	331
Stator resistance R_{2ph} [Ω]	0.136	0.058	0.108
Stator inductance L_{2ph} [mH]	6.9	2.9	5.7
Electrical time constant t_{el} [ms]	49.824	49.448	51.852
Thermal time constant t_{therm} [min]	25.2		26.3
Moment of inertia J [kgcm²]	2200		2500
Weight without brake m [kg]	295		330
Holding brake			
Holding torque of brake M_{Br} [Nm]		320	
Mass of brake [kg]		29	
Moment of inertia of brake J_{Br} [kgcm²]		90	
Recommendations			
ACOPOS 8Vxxxx.xx...	128M	-	128M
ACOPOSmulti 8BVIxxxx...		1650	
Cross section for B&R motor cables [mm²]		0	
Connector type		Terminal box	

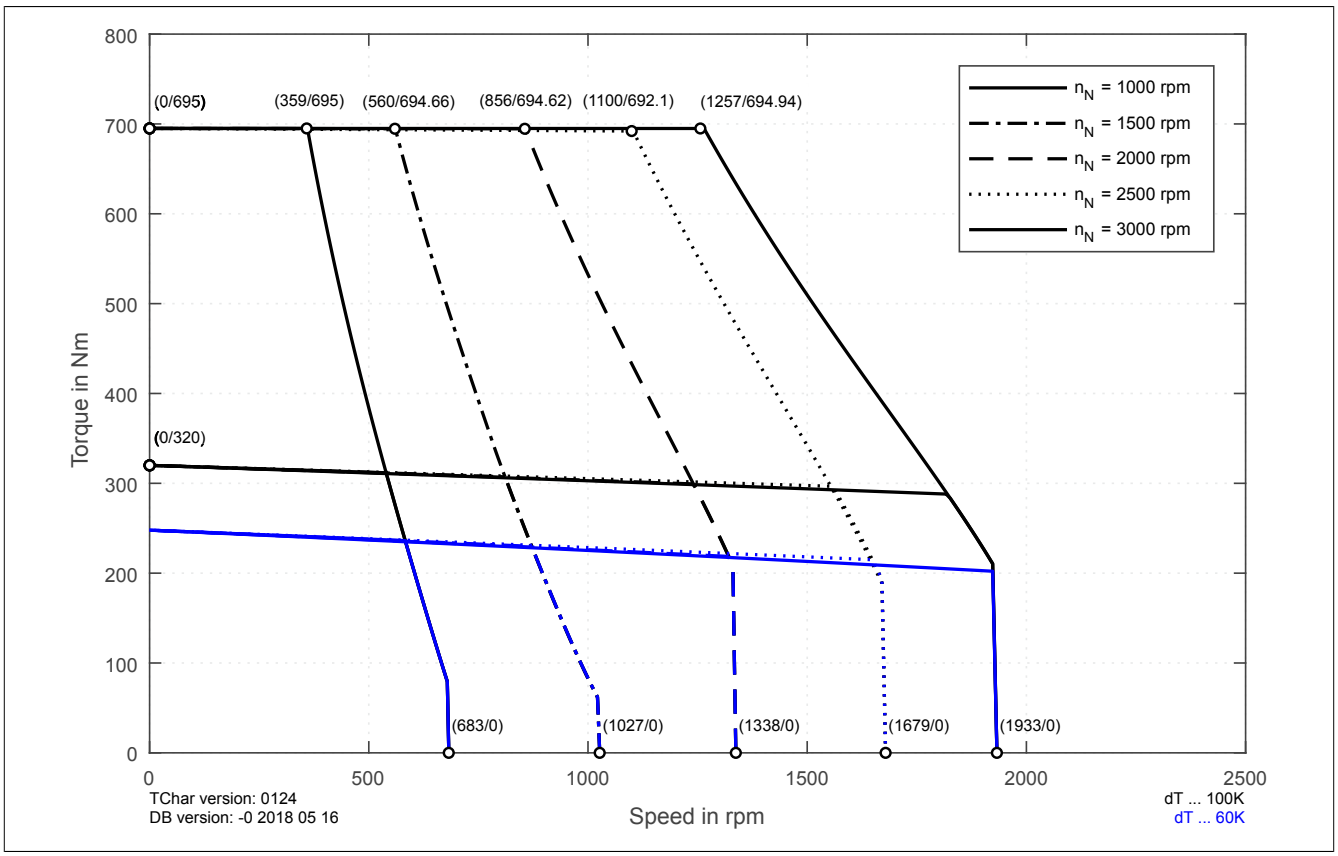
NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

14.2.1 Speed-Torque characteristic curves at 325 VDC DC bus voltage

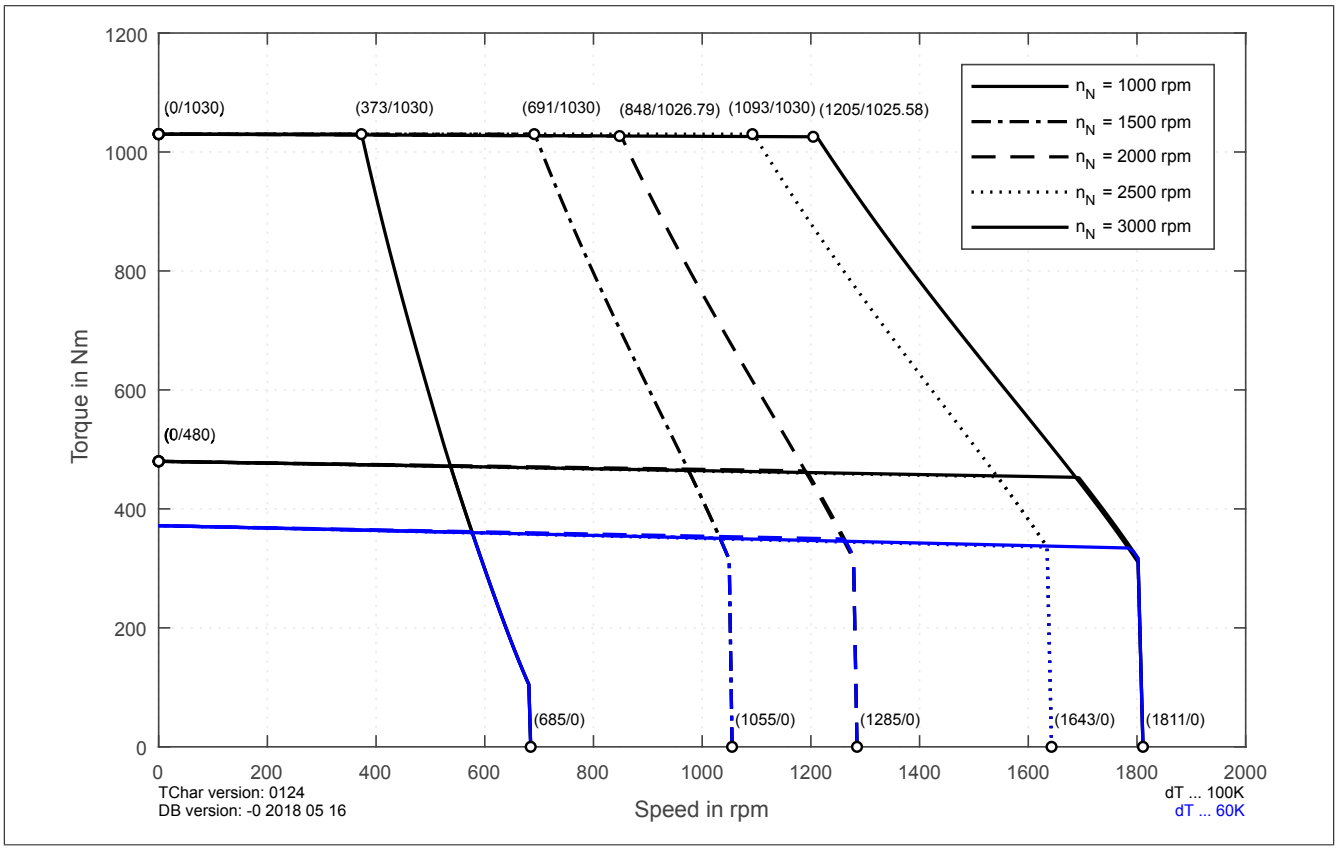
8KSJ92.eennnffgg-h



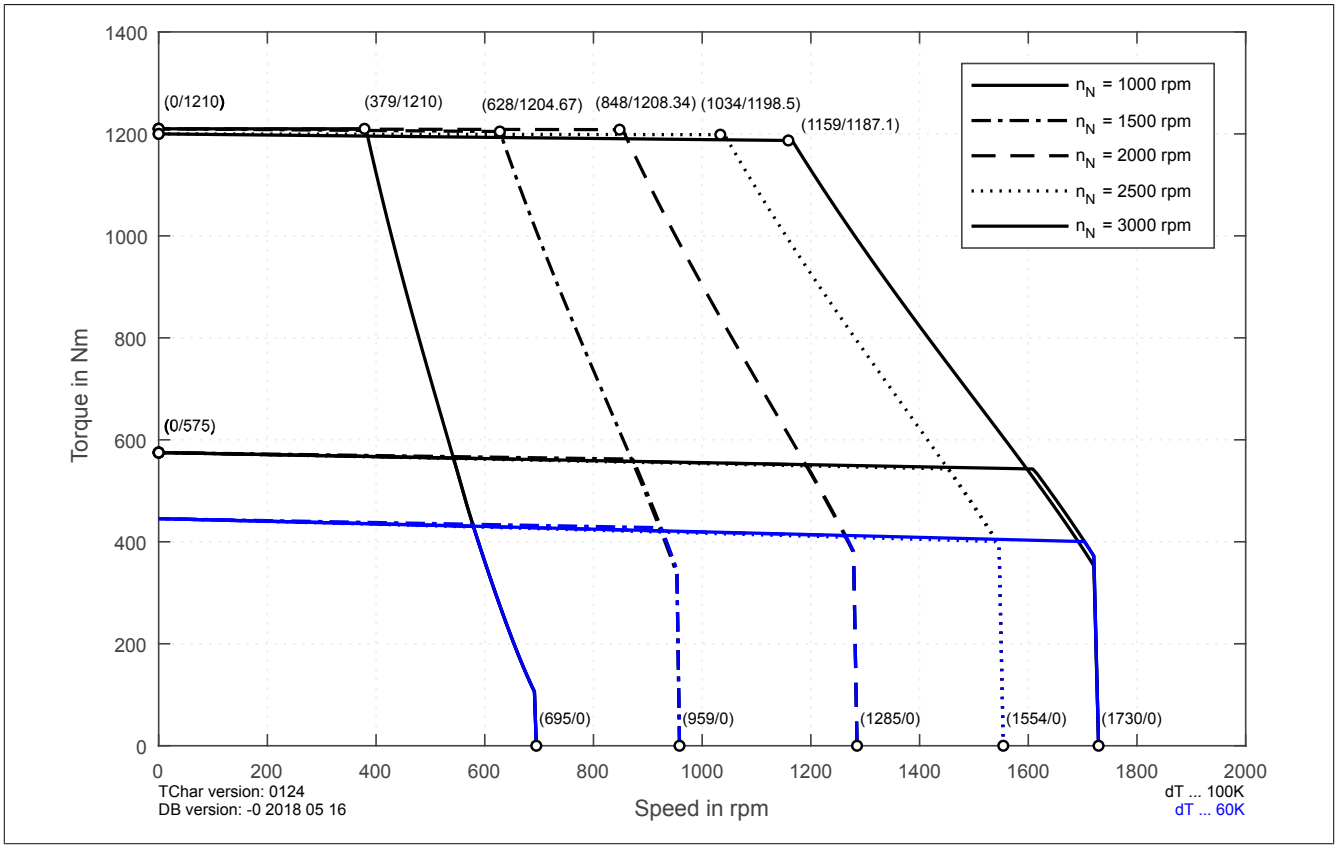
8KSJ94.eennnffgg-h



8KSJ95.eennnffgg-h

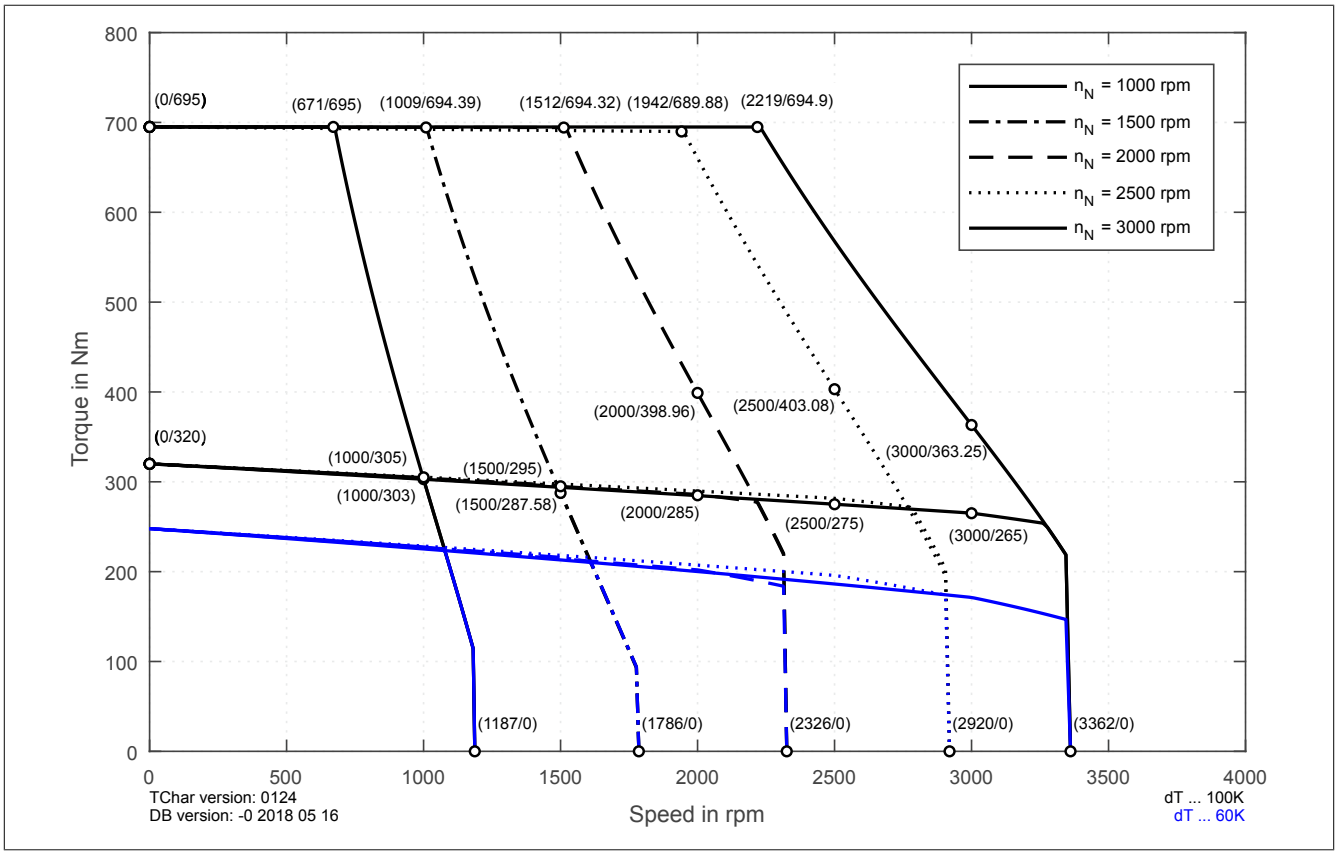


8KSJ96.eennnffgg-h

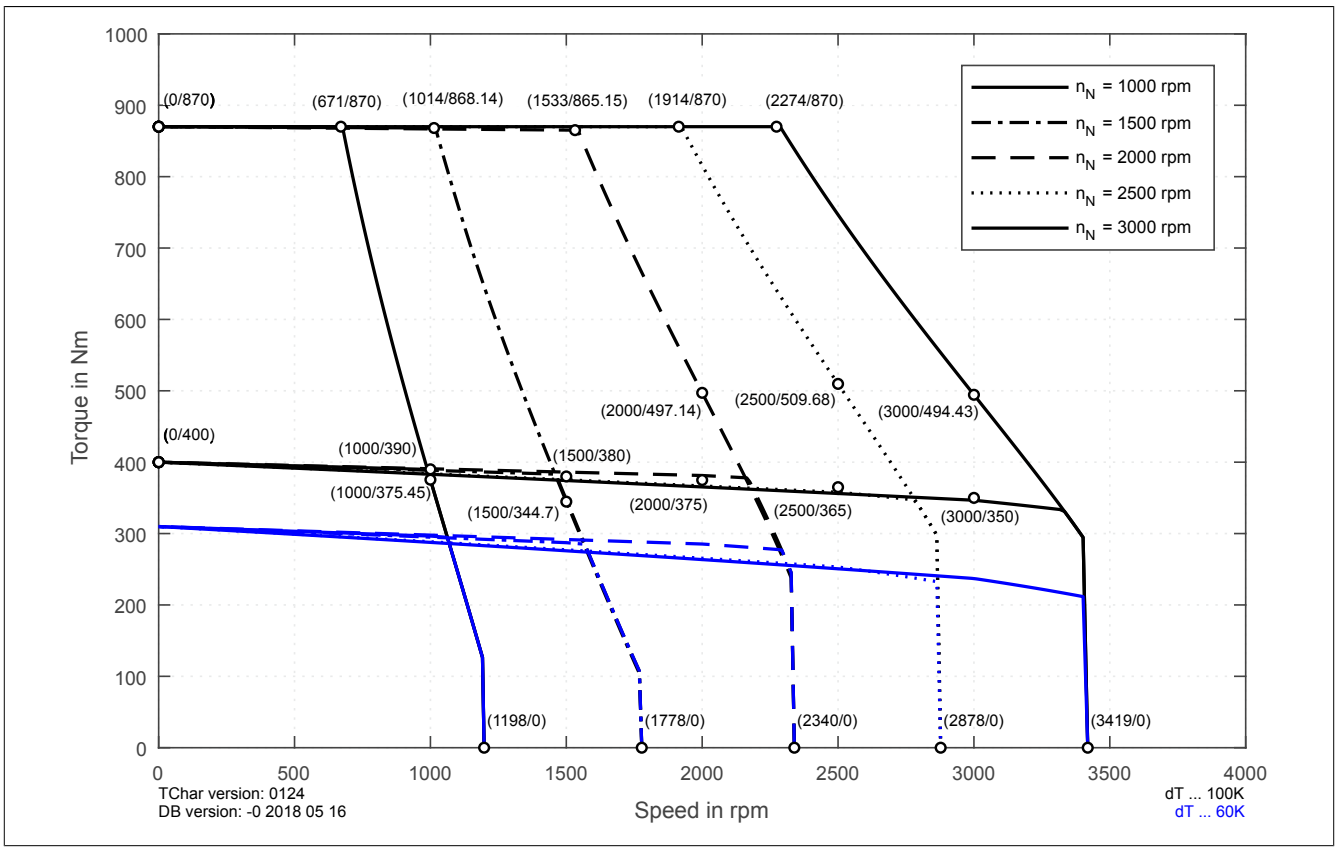


14.2.2 Speed-torque characteristic 560 DC bus voltage

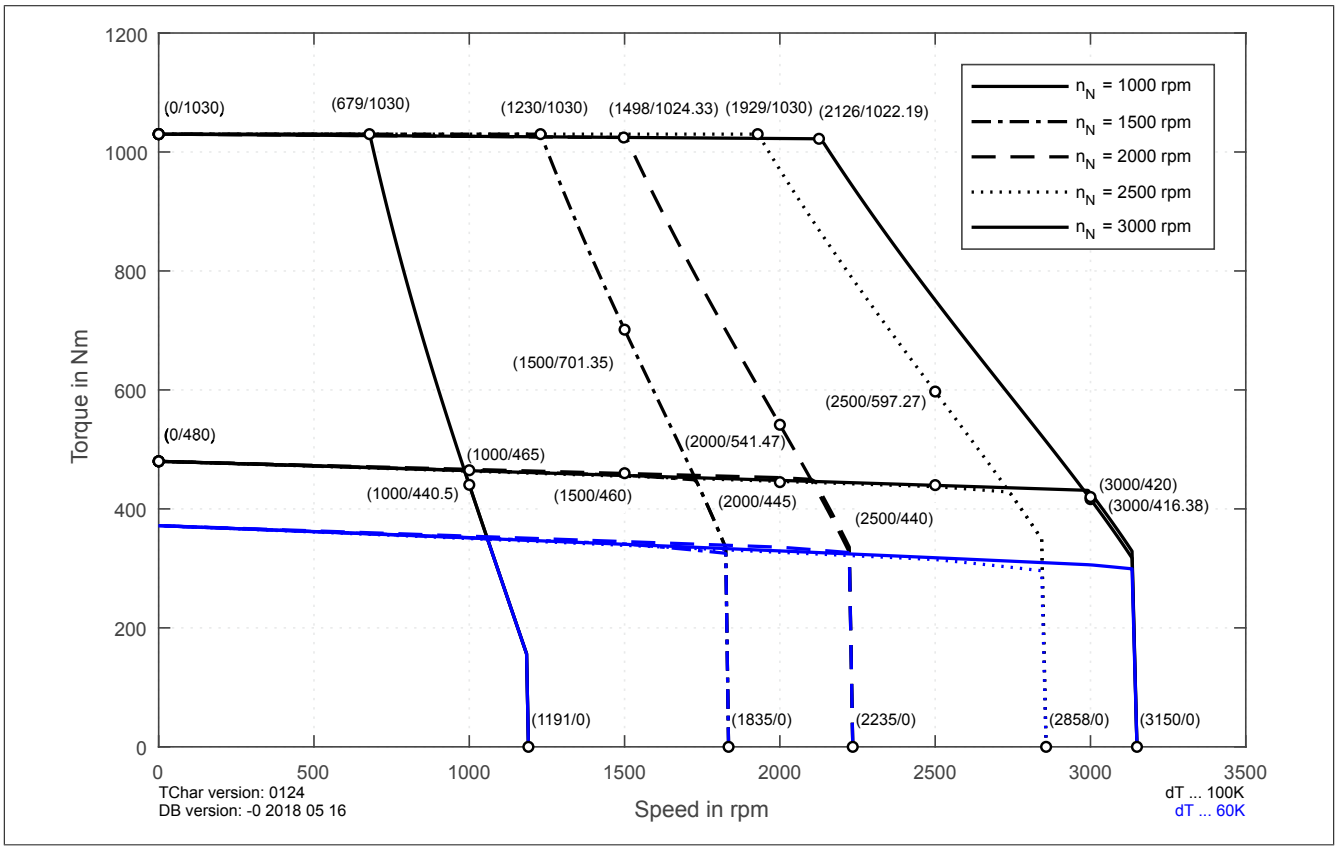
8KSJ92.eennnffgg-h



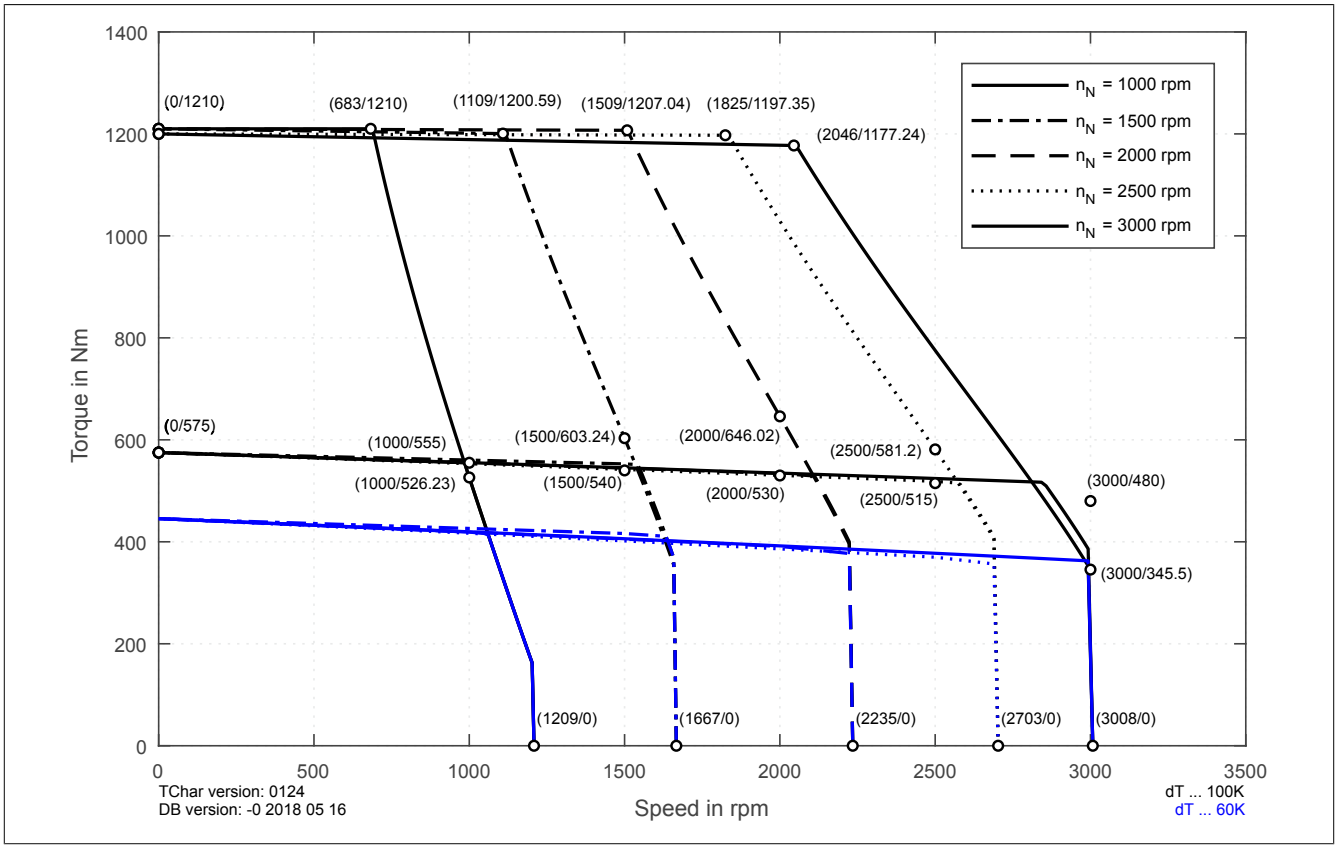
8KSJ94.eennnffgg-h



8KSJ95.eennnffgg-h

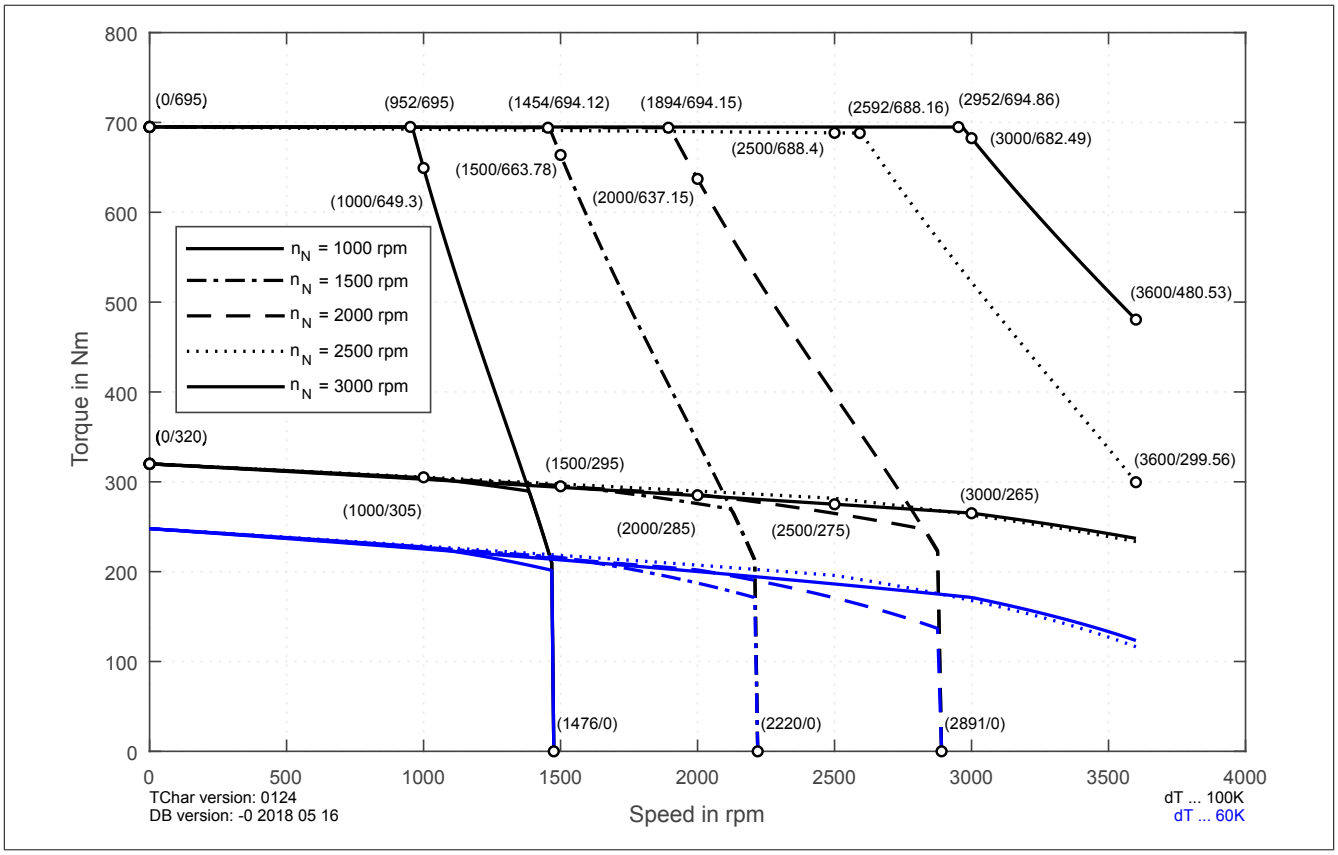


8KSJ96.eennnffgg-h

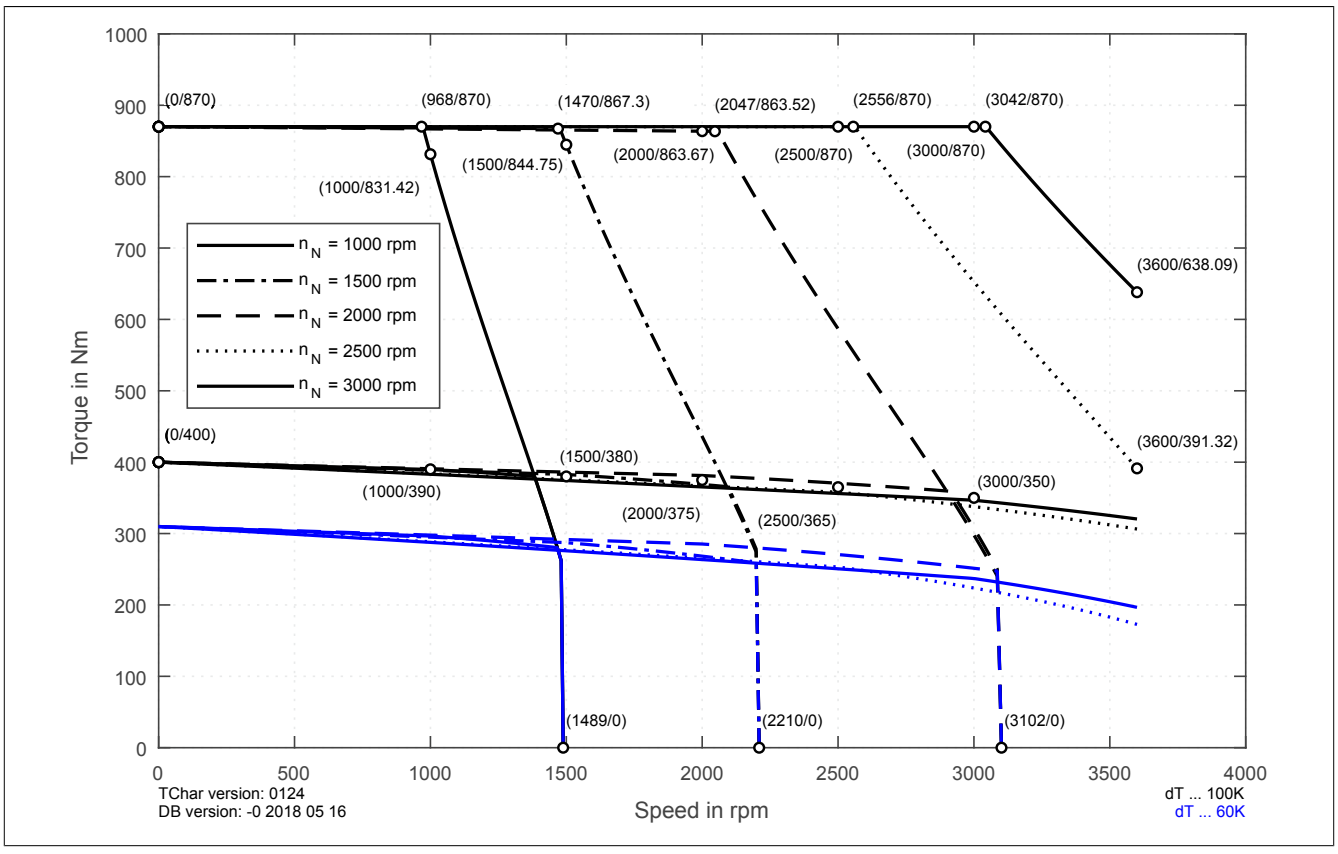


14.2.3 Speed-torque characteristic 750 DC bus voltage

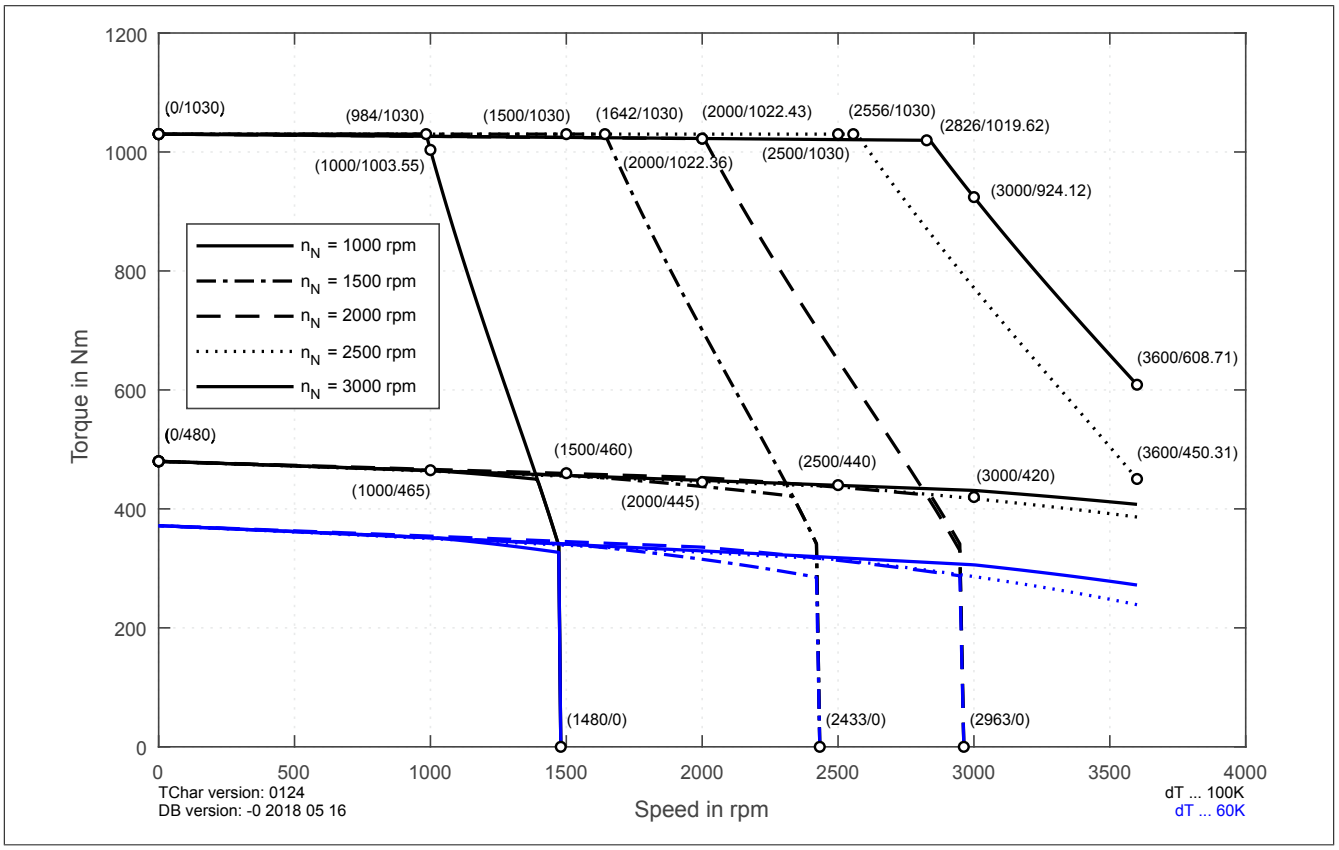
8KSJ92.eennnffgg-h



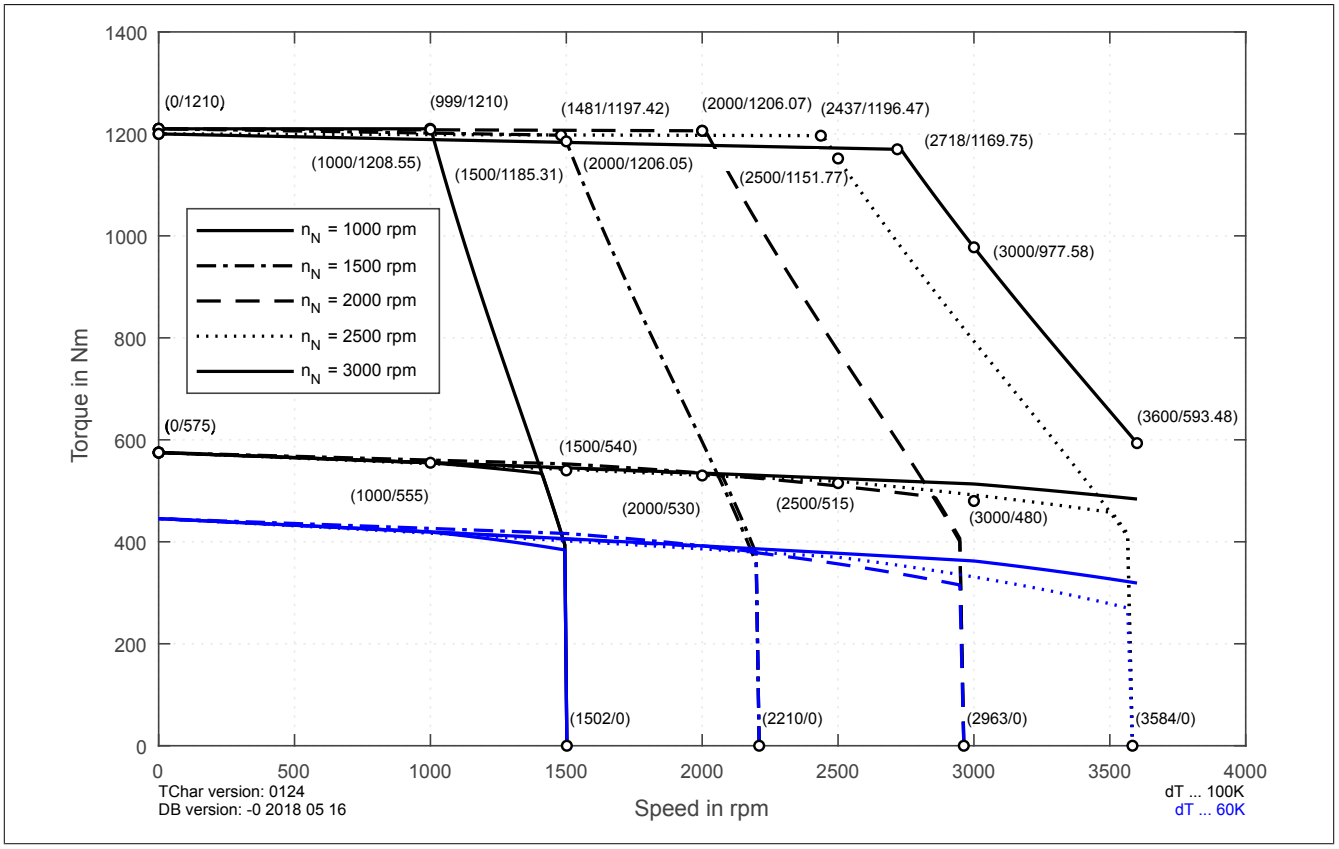
8KSJ94.eennnffgg-h



8KSJ95.eennnffgg-h



8KSJ96.eennnffgg-h



14.2.4 Dimensions 8KSJ9

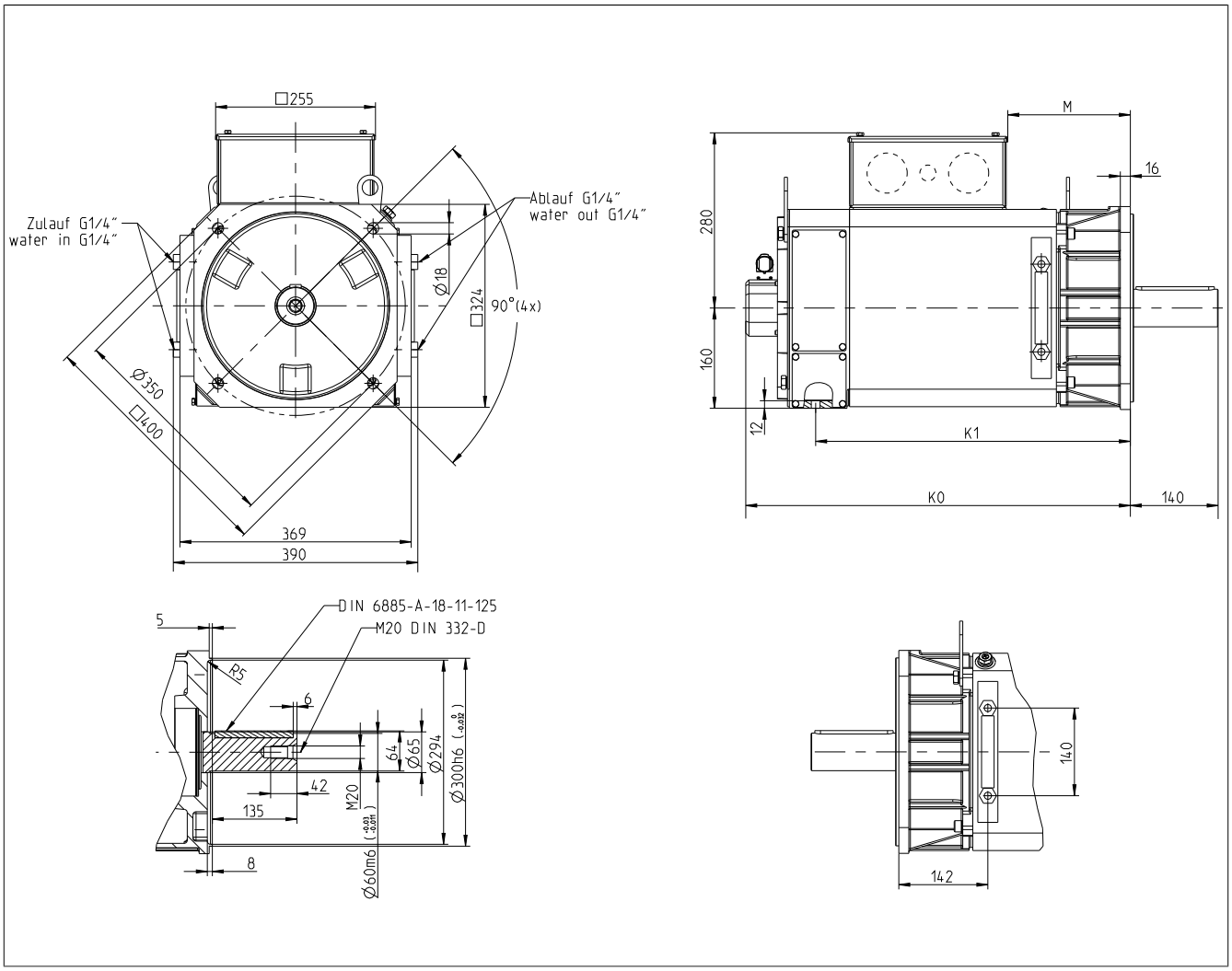
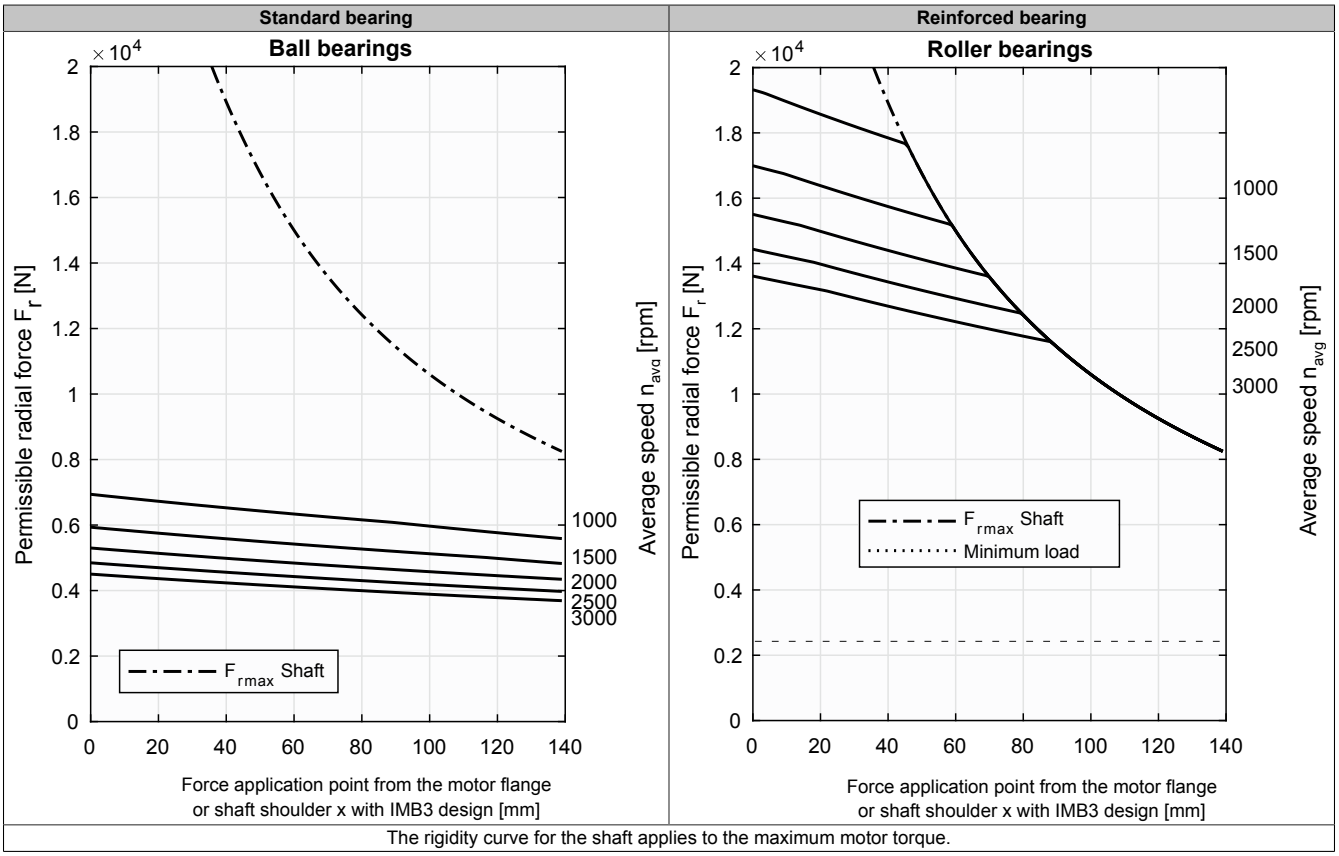


Figure 5: 8KSJ9 - Dimensions

Order code	K_0	K1	M	Extension K0/ K1 with brake option
8KSJ92.eennnffgg-h	564	452	106	150
8KSJ94.eennnffgg-h	614	502	156	150
8KSJ95.eennnffgg-h	664	552	216	150
8KSJ96.eennnffgg-h	714	602	266	150

14.2.5 Maximum shaft load

The values in the diagram below are based on a mechanical service life of the bearings of 20,000 operating hours.



The rigidity curve for the shaft applies to the maximum motor torque.

15 8KSL - Technical data

15.1 8KSL8 - Technical data

8KSL82

Model number	8KSL82.ee011ff00-h	8KSL82.ee016ff00-h	8KSL82.ee020ff00-h	8KSL82.ee025ff00-h	8KSL82.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1100	1600	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	120	115		110	105
Nominal power P_N [W]	13823	19268	24086	28798	32987
Nominal current I_N [A]	27.3	37.6	46.3	54	58
Stall torque M_0 [Nm]	130				
Stall current I_0 [A]	29.3	41.8	53	65	73
Maximum torque M_{max} [Nm]	305				
Maximum current I_{max} [A]	76	108	138	170	190
Maximum speed n_{max} [rpm]	4300				
Torque constant K_T [Nm/A]	4.63	3.24	2.55	2.08	1.85
Voltage constant K_E [V/1000 rpm]	300	210	165	135	120
Stator resistance R_{2ph} [Ω]	0.64	0.32	0.196	0.132	0.104
Stator inductance L_{2ph} [mH]	19.4	9.6	6	4	3.1
Electrical time constant t_{el} [ms]	31.656	31	30.6	34.167	32.4
Thermal time constant t_{therm} [min]	22.8				
Moment of inertia J [kgcm²]	450				
Weight without brake m [kg]	110				
Holding brake					
Holding torque of brake M_{Br} [Nm]	200				
Mass of brake [kg]	13				
Moment of inertia of brake J_{Br} [kgcm²]	40				
Recommendations					
ACOPOS 8Vxxxx.xx...	1320	1640		128M	
ACOPOSmulti 8BVIxxxx...	0330	0660		0880	
Cross section for B&R motor cables [mm²]	4	10		0	
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

8KSL84

Model number	8KSL84.ee011ff00-h	8KSL84.ee016ff00-h	8KSL84.ee020ff00-h	8KSL84.ee025ff00-h	8KSL84.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1100	1600	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	160	150	145	140	130
Nominal power P_N [W]	18431	25133	30369	36652	40841
Nominal current I_N [A]	35.7	46.5	57	67	74
Stall torque M_0 [Nm]	175				
Stall current I_0 [A]	39	53	68	84	98
Maximum torque M_{max} [Nm]	405				
Maximum current I_{max} [A]	101	138	175	215	250
Maximum speed n_{max} [rpm]	4300				
Torque constant K_T [Nm/A]	4.61	3.38	2.66	2.15	1.84
Voltage constant K_E [V/1000 rpm]	300	220	173	140	120
Stator resistance R_{2ph} [Ω]	0.42	0.22	0.14	0.092	0.068
Stator inductance L_{2ph} [mH]	14.6	7.8	4.8	3.2	2.3
Electrical time constant t_{el} [ms]	35.667	36.636	35.714	32.6	40
Thermal time constant t_{therm} [min]	23.8				
Moment of inertia J [kgcm²]	580				
Weight without brake m [kg]	125				
Holding brake					
Holding torque of brake M_{Br} [Nm]	200				
Mass of brake [kg]	13				
Moment of inertia of brake J_{Br} [kgcm²]	40				
Recommendations					
ACOPOS 8Vxxxx.xx...	1640		128M		
ACOPOSmulti 8BVIxxxx...	0440	0660	0880	1650	
Cross section for B&R motor cables [mm²]	10		0		
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

8KSL85

Model number	8KSL85.ee011ff00-h	8KSL85.ee016ff00-h	8KSL85.ee020ff00-h	8KSL85.ee025ff00-h	8KSL85.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1100	1600	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	195	185	175	165	155
Nominal power P_N [W]	22462	30997	36652	43197	48695
Nominal current I_N [A]	40.4	55	68	79	90
Stall torque M_0 [Nm]	215				
Stall current I_0 [A]	45	65	84	103	125
Maximum torque M_{max} [Nm]	505				
Maximum current I_{max} [A]	117	170	215	265	325
Maximum speed n_{max} [rpm]	4300				
Torque constant K_T [Nm/A]	4.99	3.46	2.69	2.18	1.79
Voltage constant K_E [V/1000 rpm]	325	225	175	141	116
Stator resistance R_{2ph} [Ω]	0.36	0.172	0.104	0.068	0.046
Stator inductance L_{2ph} [mH]	13.6	6.5	4	2.5	1.74
Electrical time constant t_{el} [ms]	38.722	37.111	40.4	44	45
Thermal time constant t_{therm} [min]	25				
Moment of inertia J [kgcm²]	710				
Weight without brake m [kg]	145				
Holding brake					
Holding torque of brake M_{Br} [Nm]	200				
Mass of brake [kg]	13				
Moment of inertia of brake J_{Br} [kgcm²]	40				
Recommendations					
ACOPOS 8Vxxxx.xx...	1640		128M		-
ACOPOSmulti 8BVIxxxx...	0660	0880	1650		
Cross section for B&R motor cables [mm²]	10	0			
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

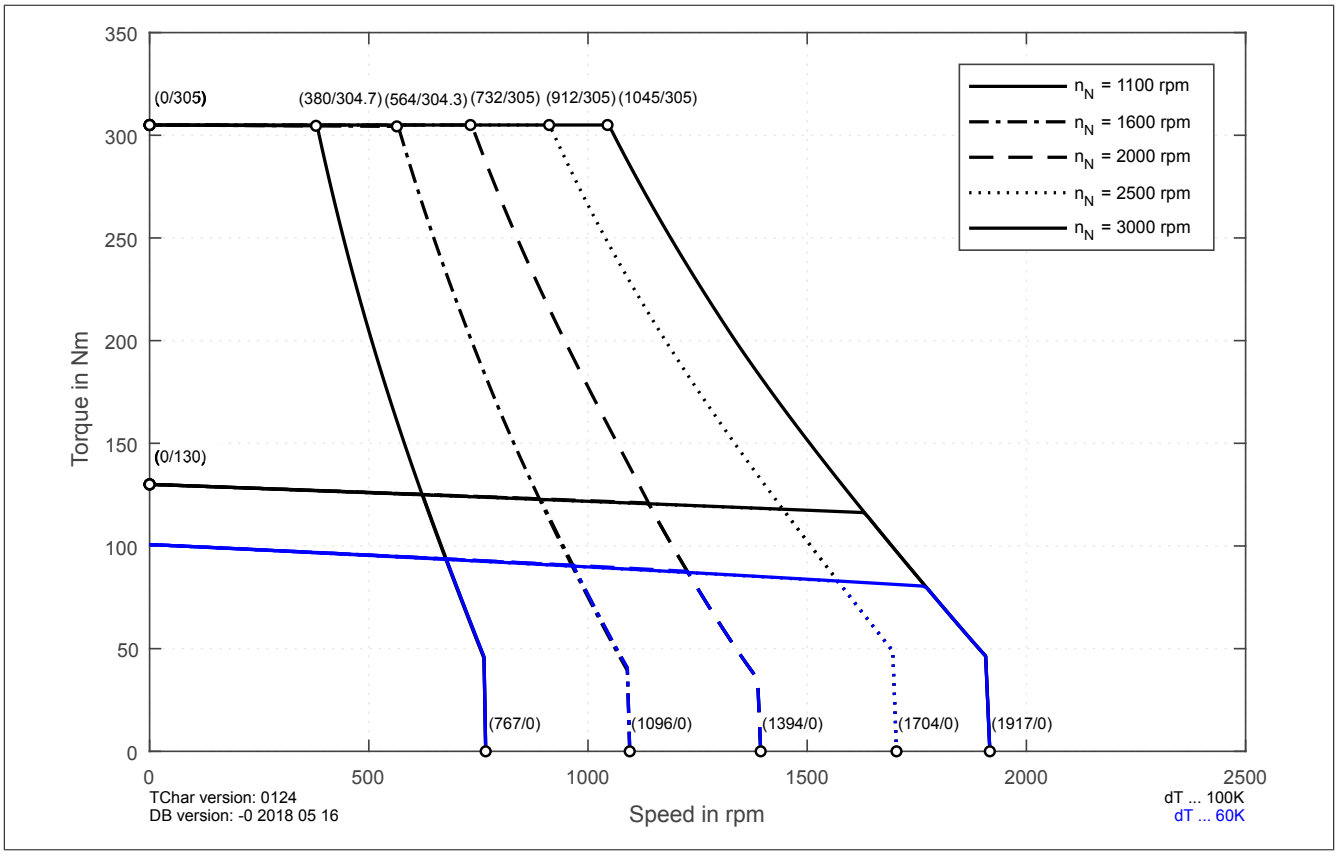
8KSL86

Model number	8KSL86.ee011ff00-h	8KSL86.ee016ff00-h	8KSL86.ee020ff00-h	8KSL86.ee025ff00-h	8KSL86.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1100	1600	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	230	215	205	190	175
Nominal power P_N [W]	26494	36024	42935	49742	54978
Nominal current I_N [A]	52	69	81	91	99
Stall torque M_0 [Nm]	260				
Stall current I_0 [A]	59	84	103	125	146
Maximum torque M_{max} [Nm]	610	605			
Maximum current I_{max} [A]	150	215	265	325	380
Maximum speed n_{max} [rpm]	4300				
Torque constant K_T [Nm/A]	4.61	3.23	2.61	2.15	1.84
Voltage constant K_E [V/1000 rpm]	300	210	170	140	120
Stator resistance R_{2ph} [Ω]	0.24	0.116	0.076	0.052	0.038
Stator inductance L_{2ph} [mH]	9.6	4.6	3.1	2.09	1.53
Electrical time constant t_{el} [ms]	41	40.167	39.5	35.667	39.5
Thermal time constant t_{therm} [min]	26.2				
Moment of inertia J [kgcm²]	840				
Weight without brake m [kg]	165				
Holding brake					
Holding torque of brake M_{Br} [Nm]	200				
Mass of brake [kg]	13				
Moment of inertia of brake J_{Br} [kgcm²]	40				
Recommendations					
ACOPOS 8Vxxxx.xx...	128M			-	
ACOPOSmulti 8BVIxxxx...	0660	1650			
Cross section for B&R motor cables [mm²]	0				
Connector type	Terminal box				

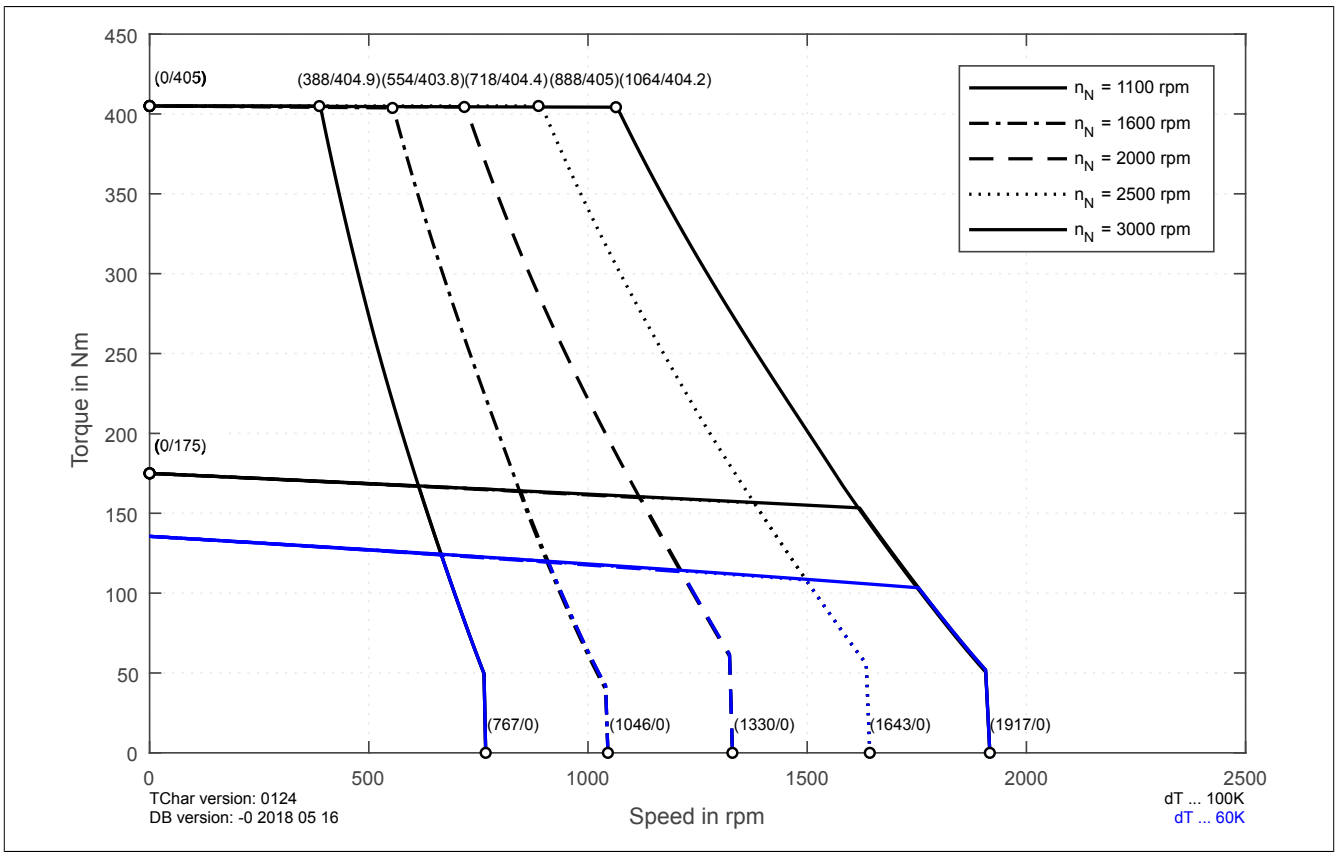
NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

15.1.1 Speed-Torque characteristic curves at 325 VDC DC bus voltage

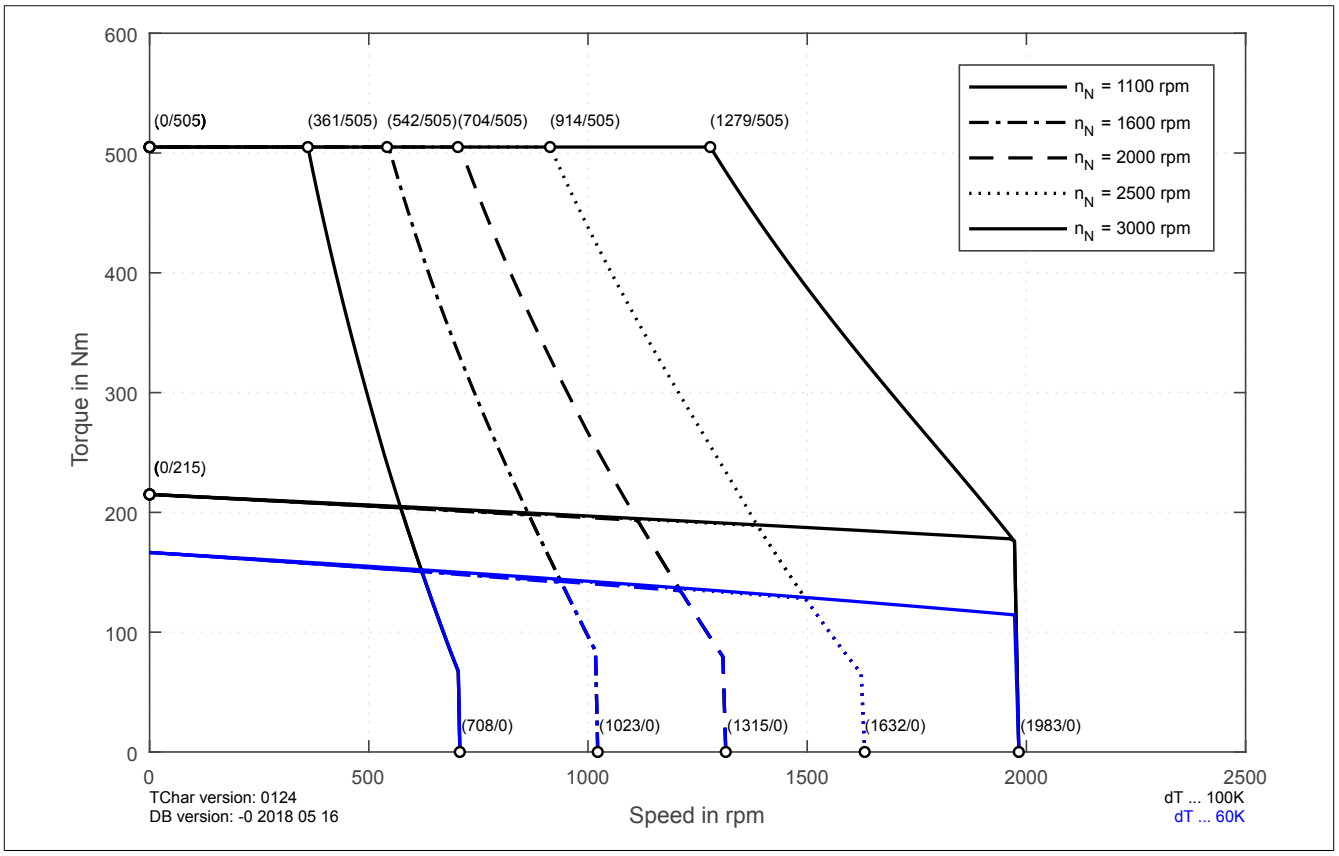
8KSL82.eennnffgg-h and 8KSM82.eennnffgg-h



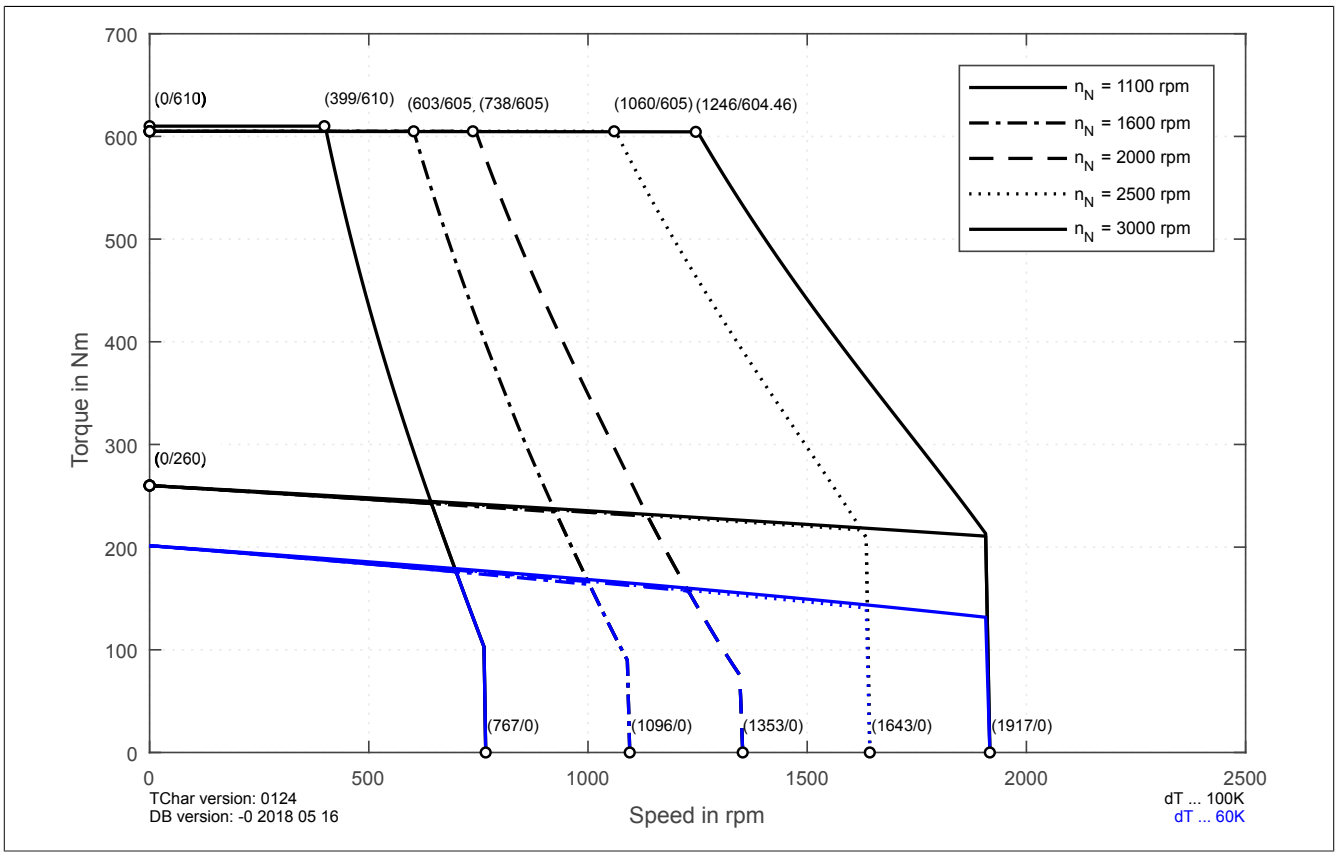
8KSL84.eennnffgg-h and 8KSM84.eennnffgg-h



8KSL85.eennnffgg-h and 8KSM85.eennnffgg-h

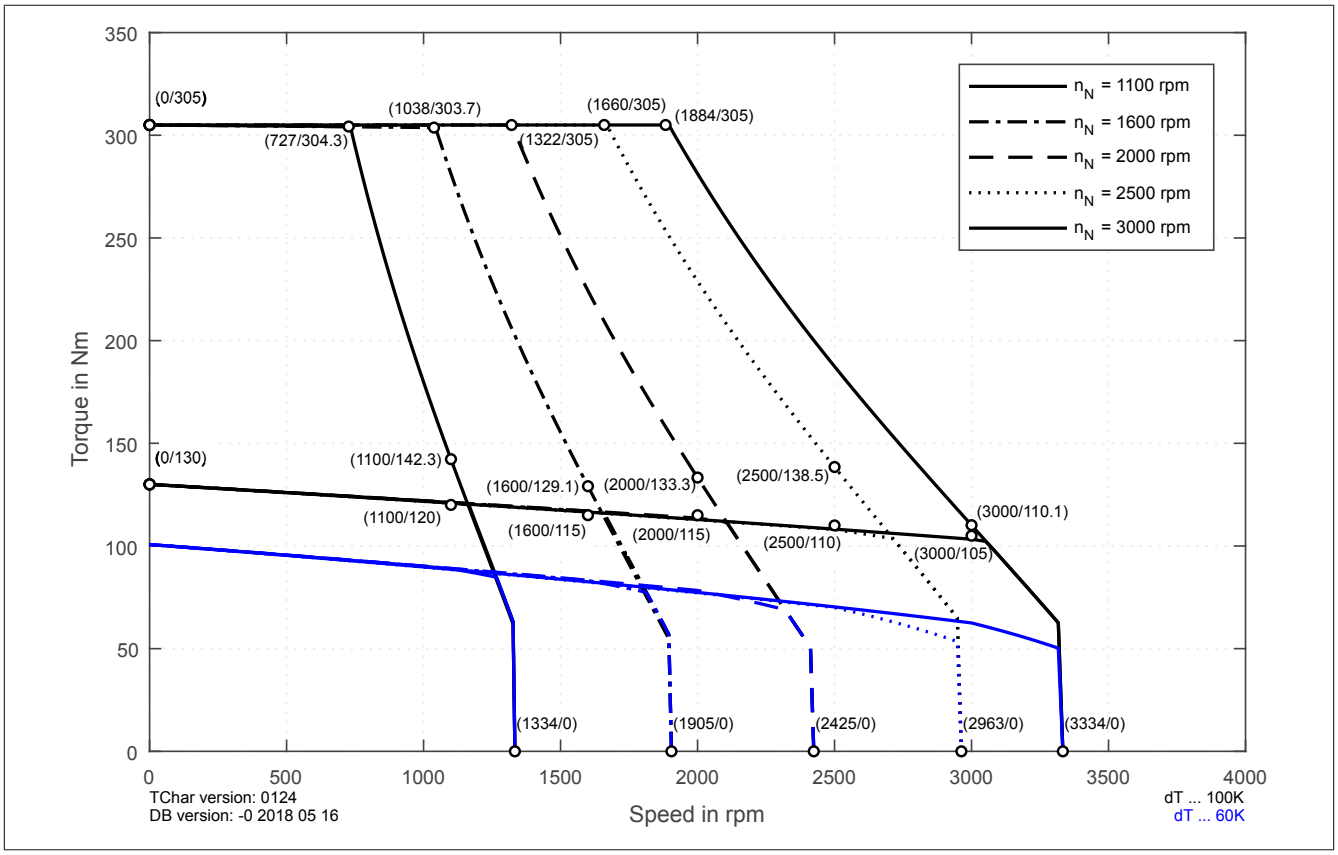


8KSL86.eennnffgg-h and 8KSM86.eennnffgg-h

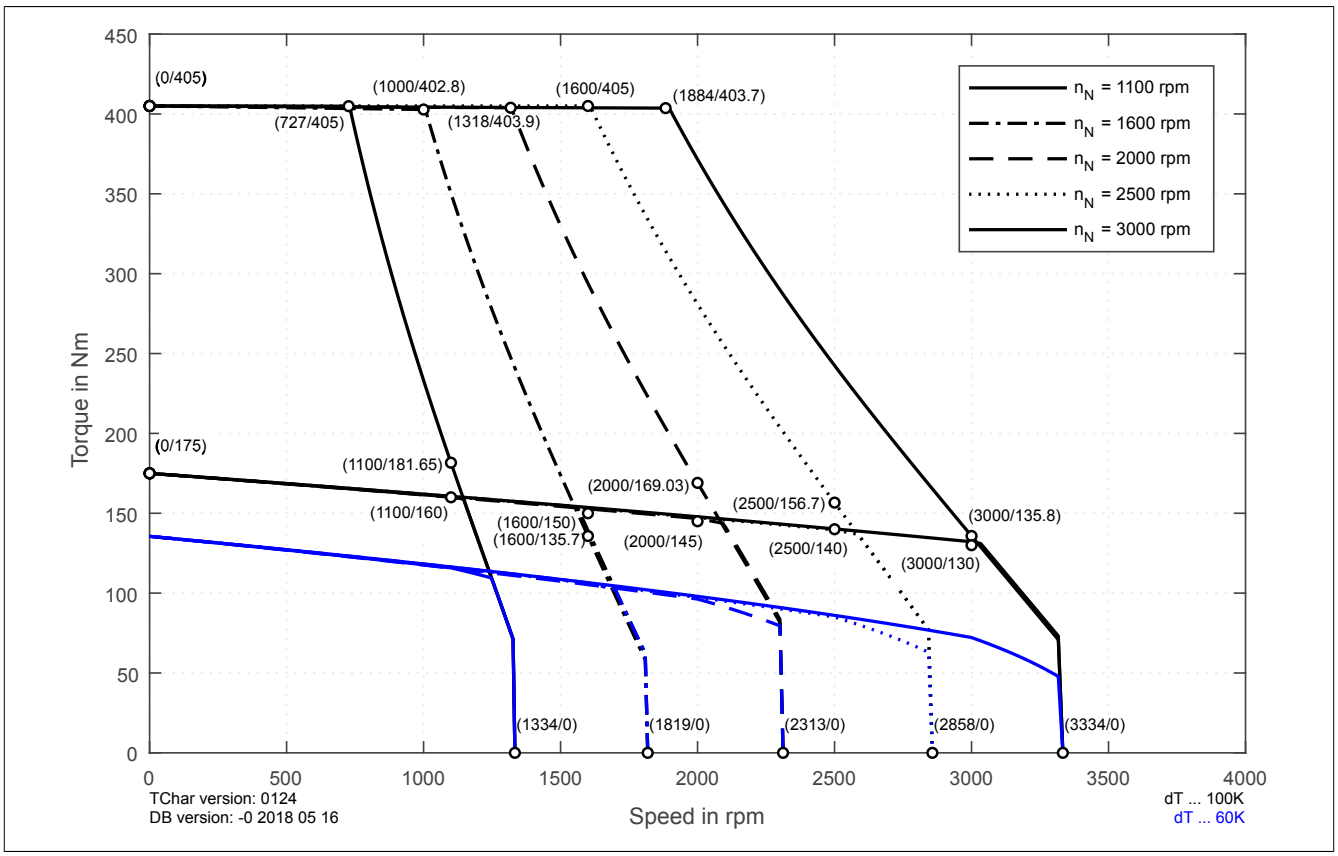


15.1.2 Speed-Torque characteristic curves at 560 VDC DC bus voltage

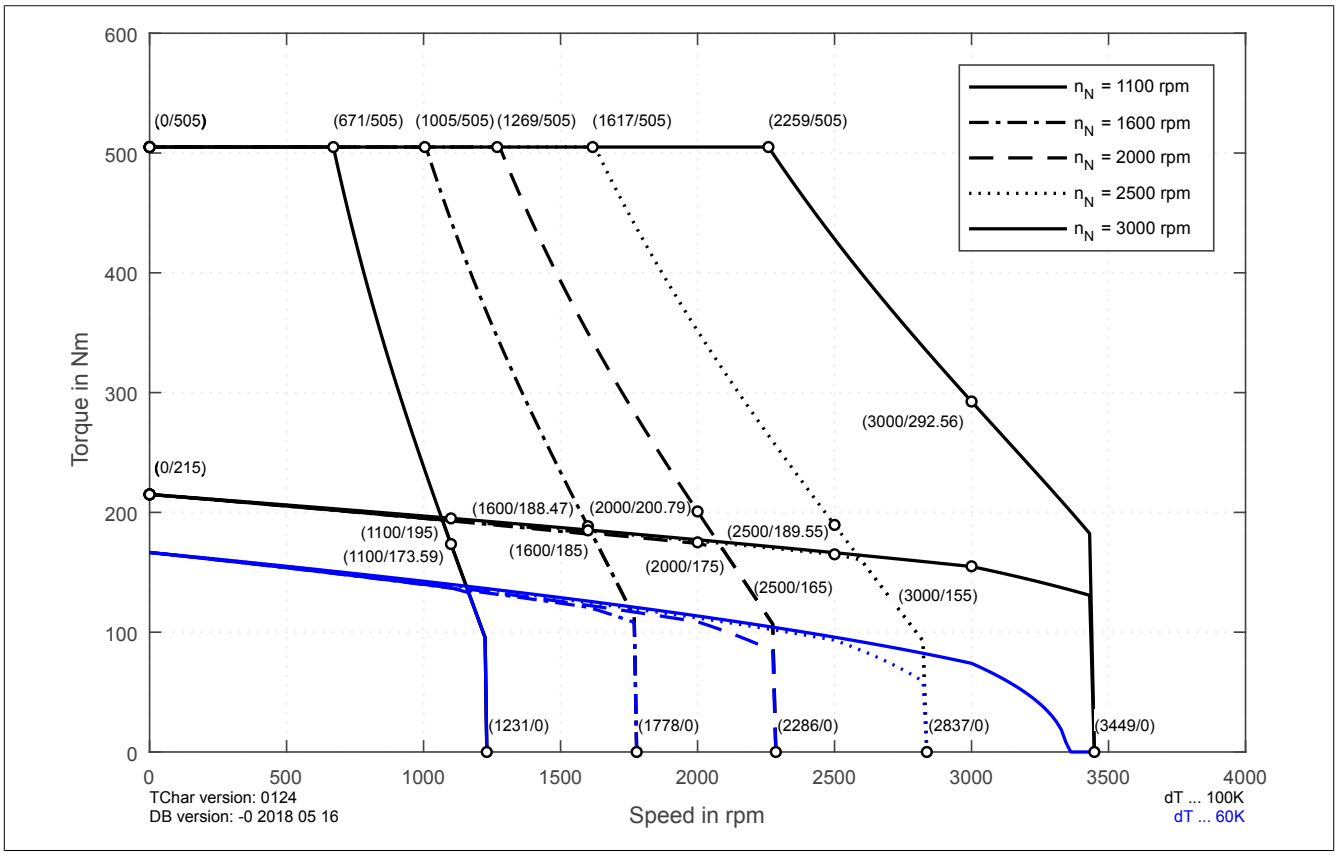
8KSL82.eennnffgg-h and 8KSM82.eennnffgg-h



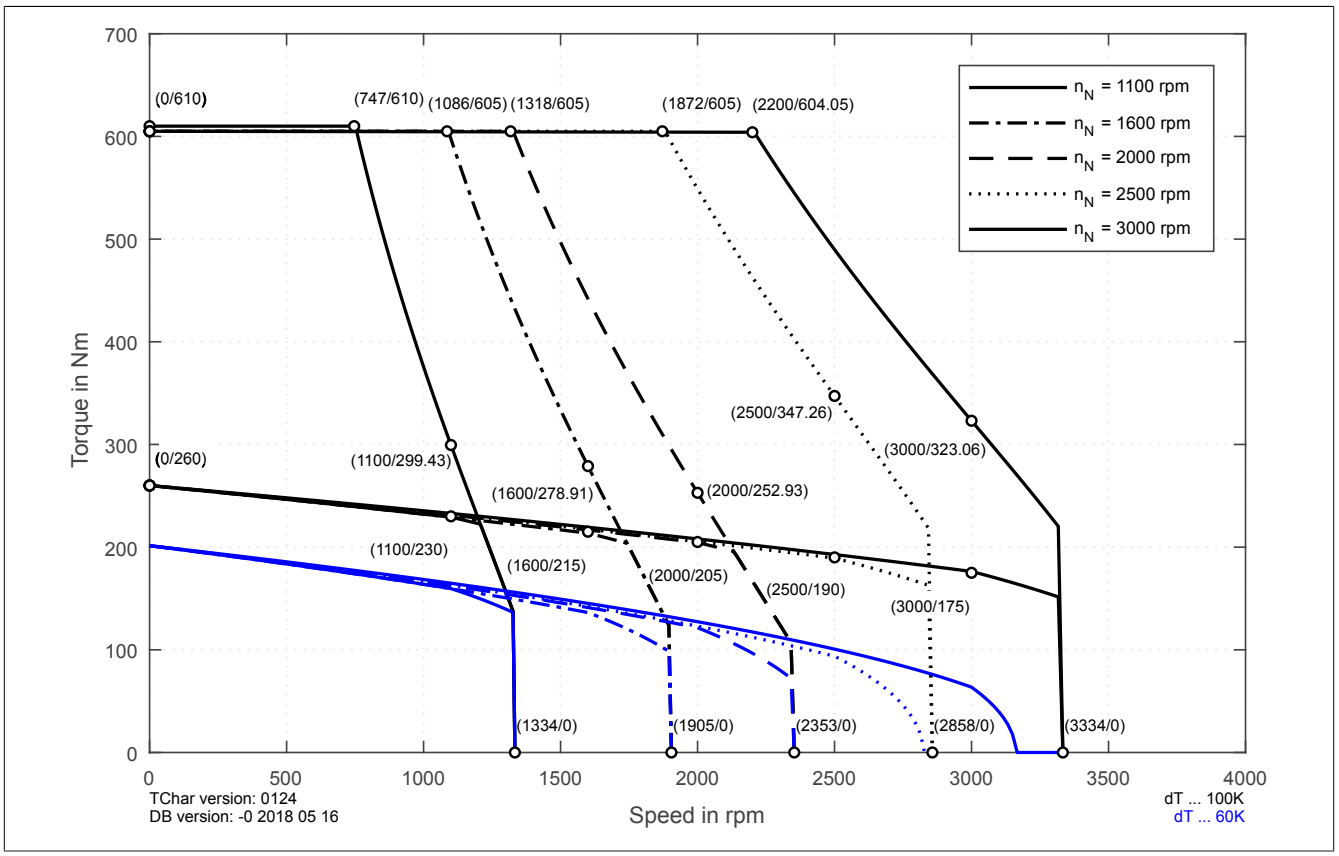
8KSL84.eennnffgg-h and 8KSM84.eennnffgg-h



8KSL85.eennnffgg-h and 8KSM85.eennnffgg-h

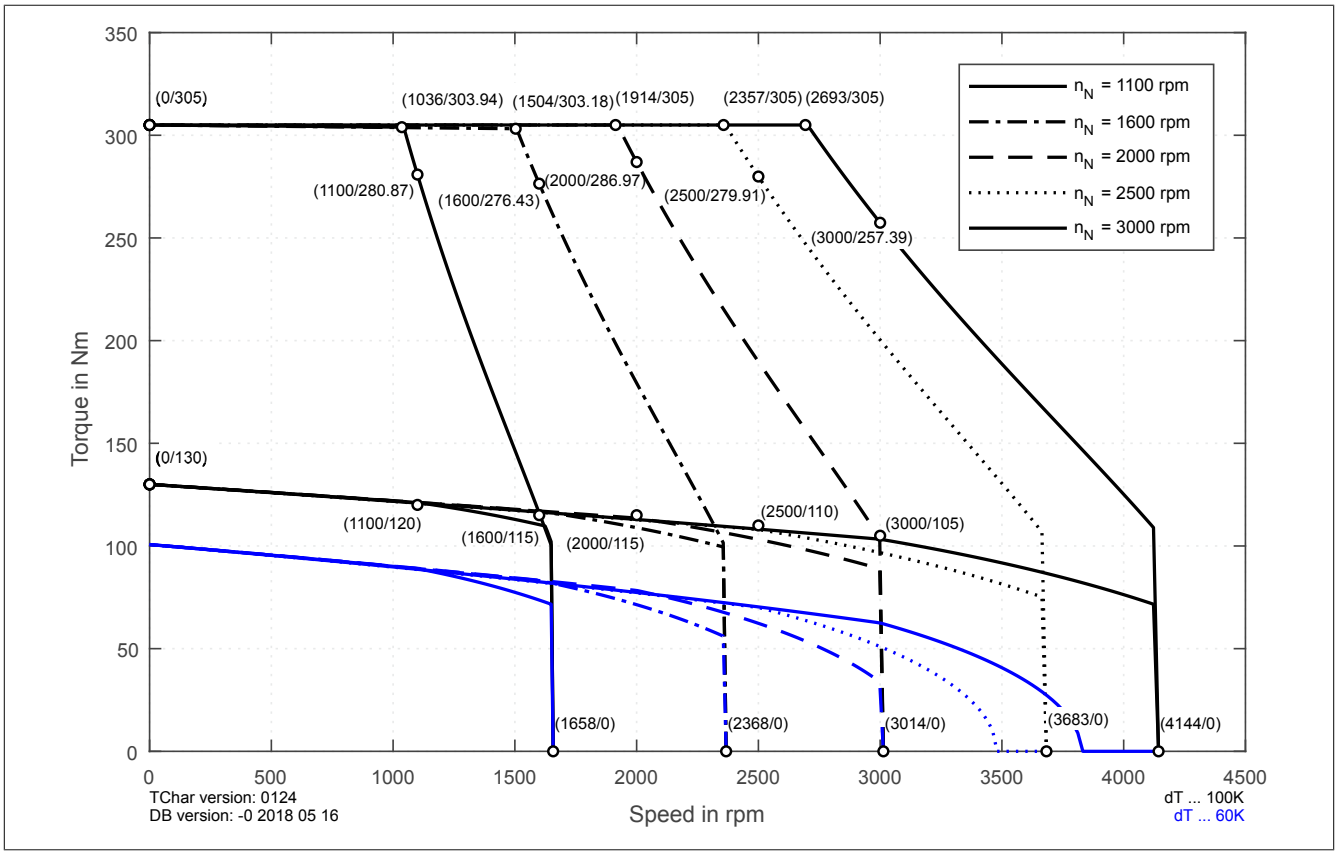


8KSL86.eennnffgg-h and 8KSM86.eennnffgg-h

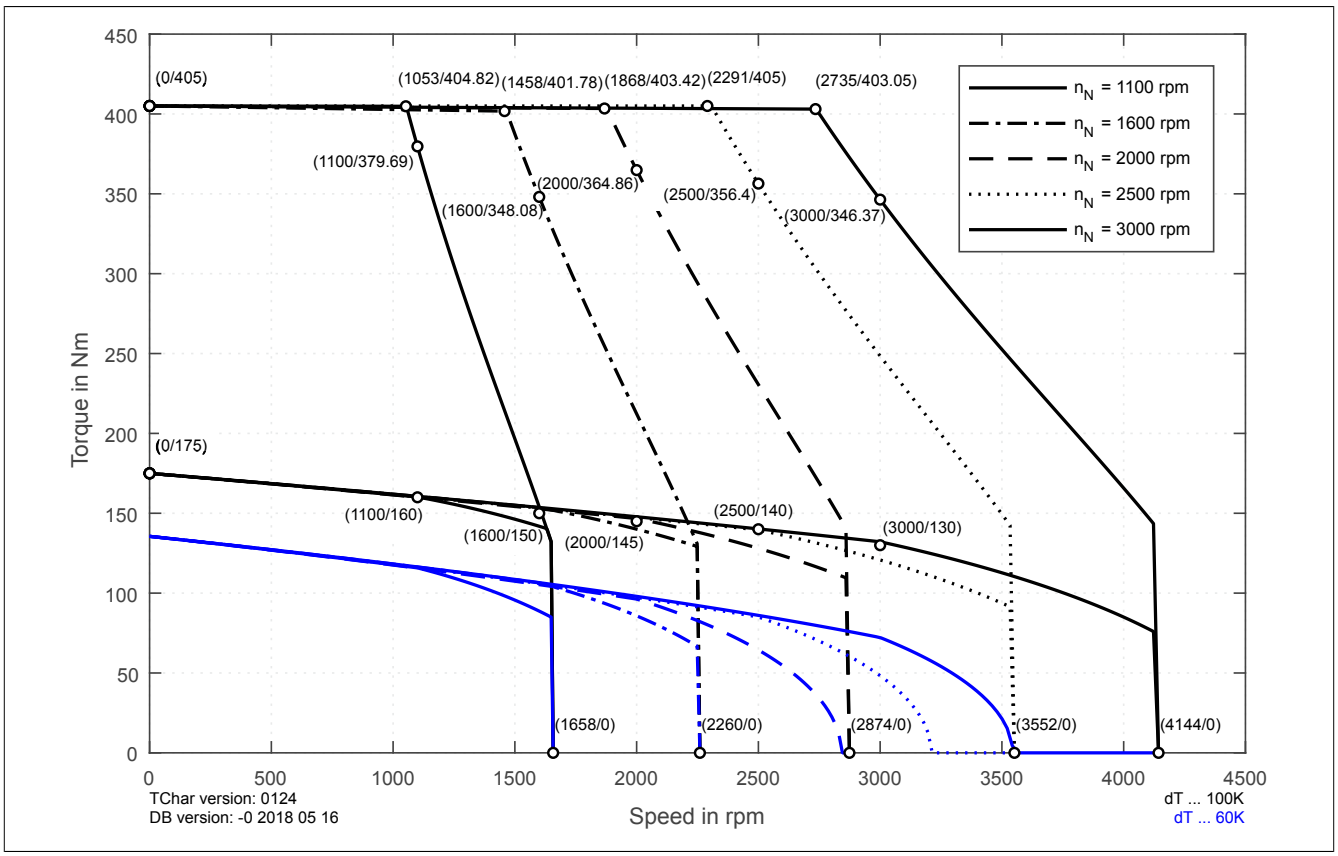


15.1.3 Speed-Torque characteristic curves at 750 VDC DC bus voltage

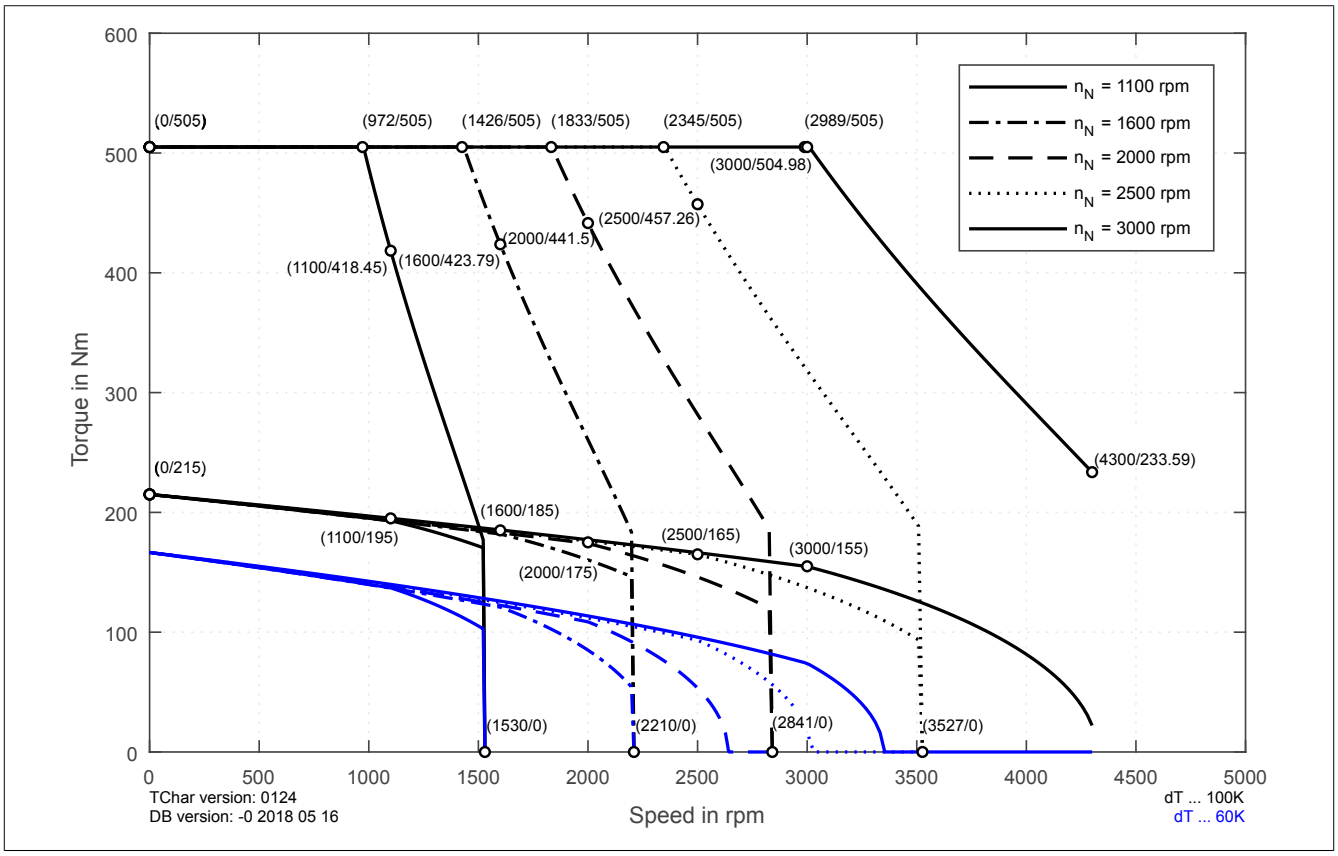
8KSL82.eennnffgg-h and 8KSM82.eennnffgg-h



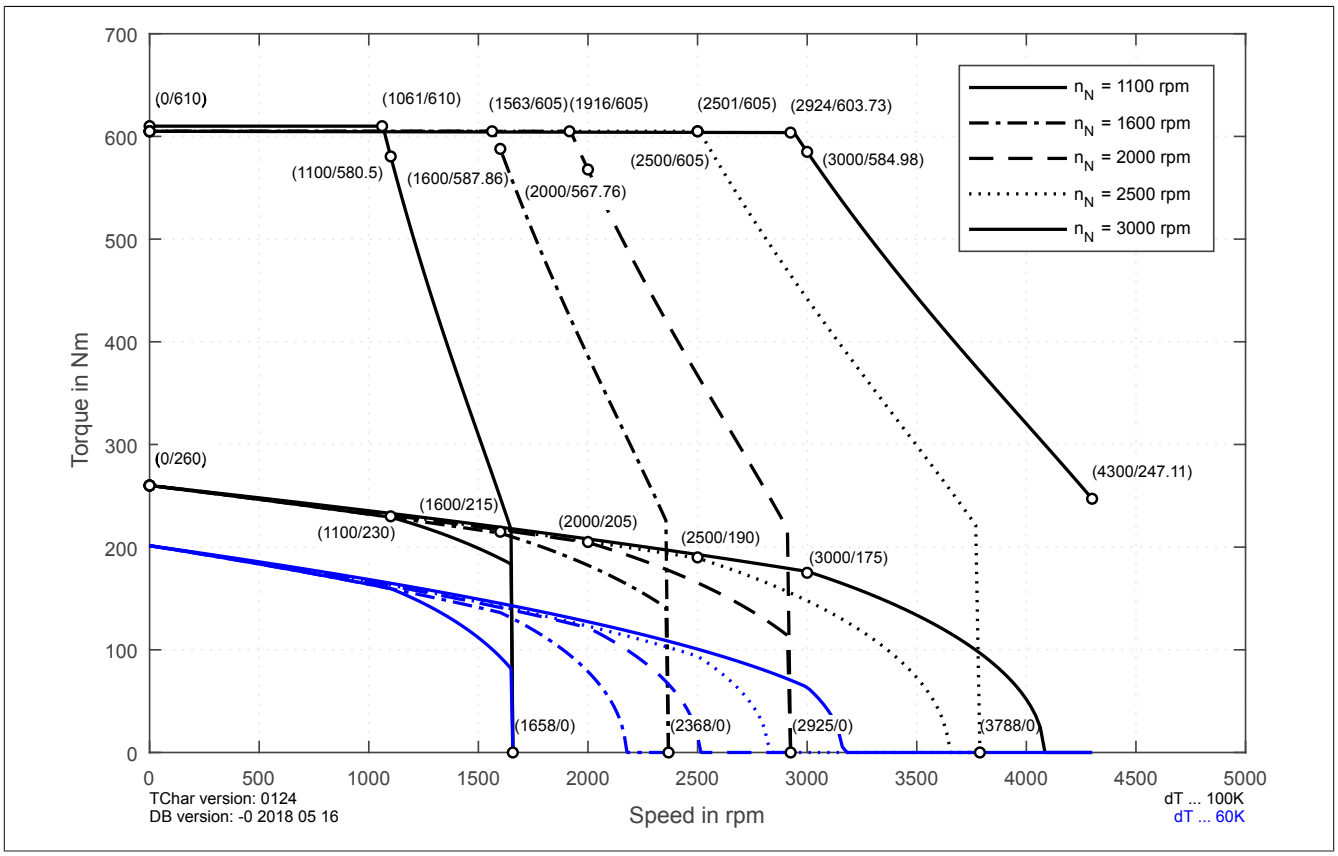
8KSL84.eennnffgg-h and 8KSM84.eennnffgg-h



8KSL85.eennnffgg-h and 8KSM85.eennnffgg-h



8KSL86.eennnffgg-h and 8KSM86.eennnffgg-h



15.1.4 8KSL8 - Dimensions

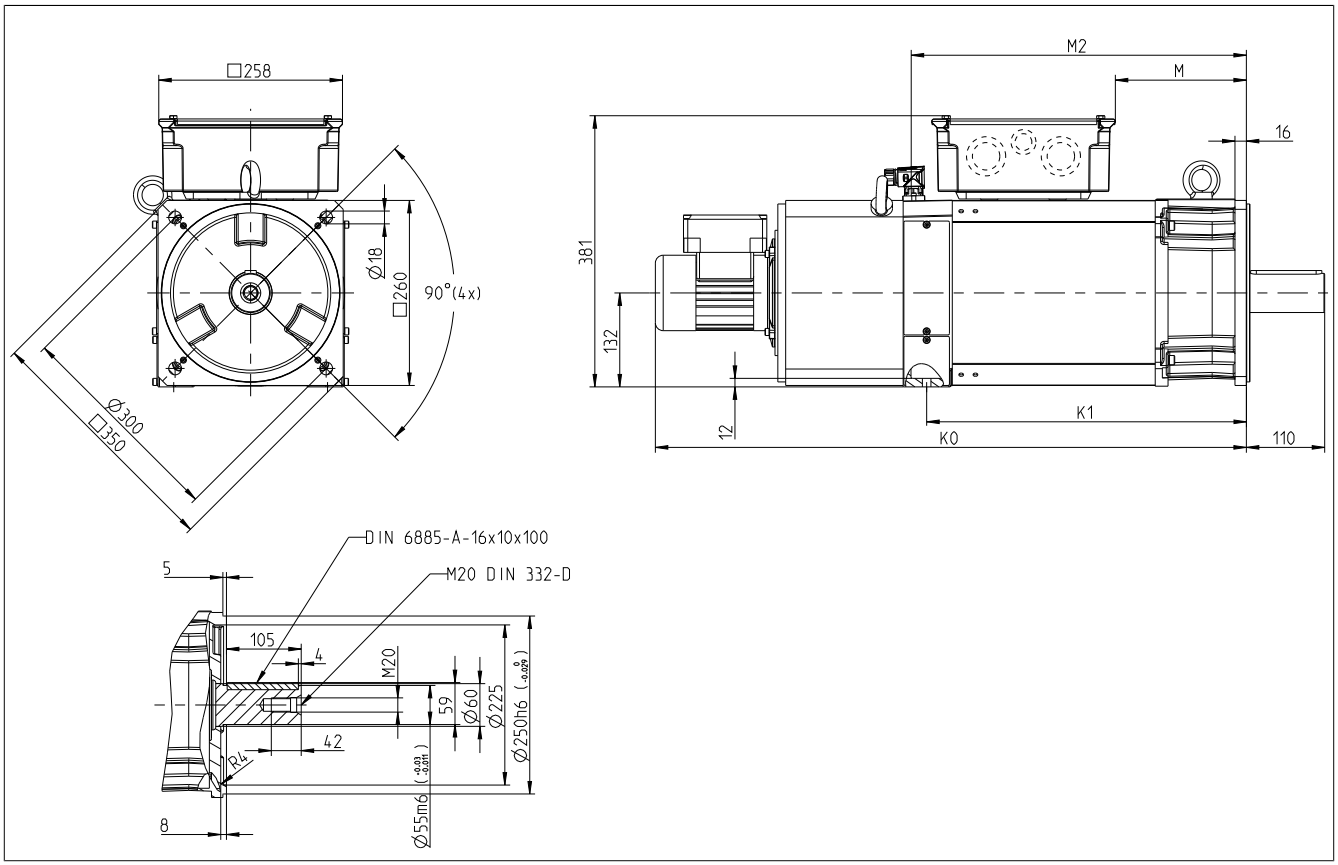
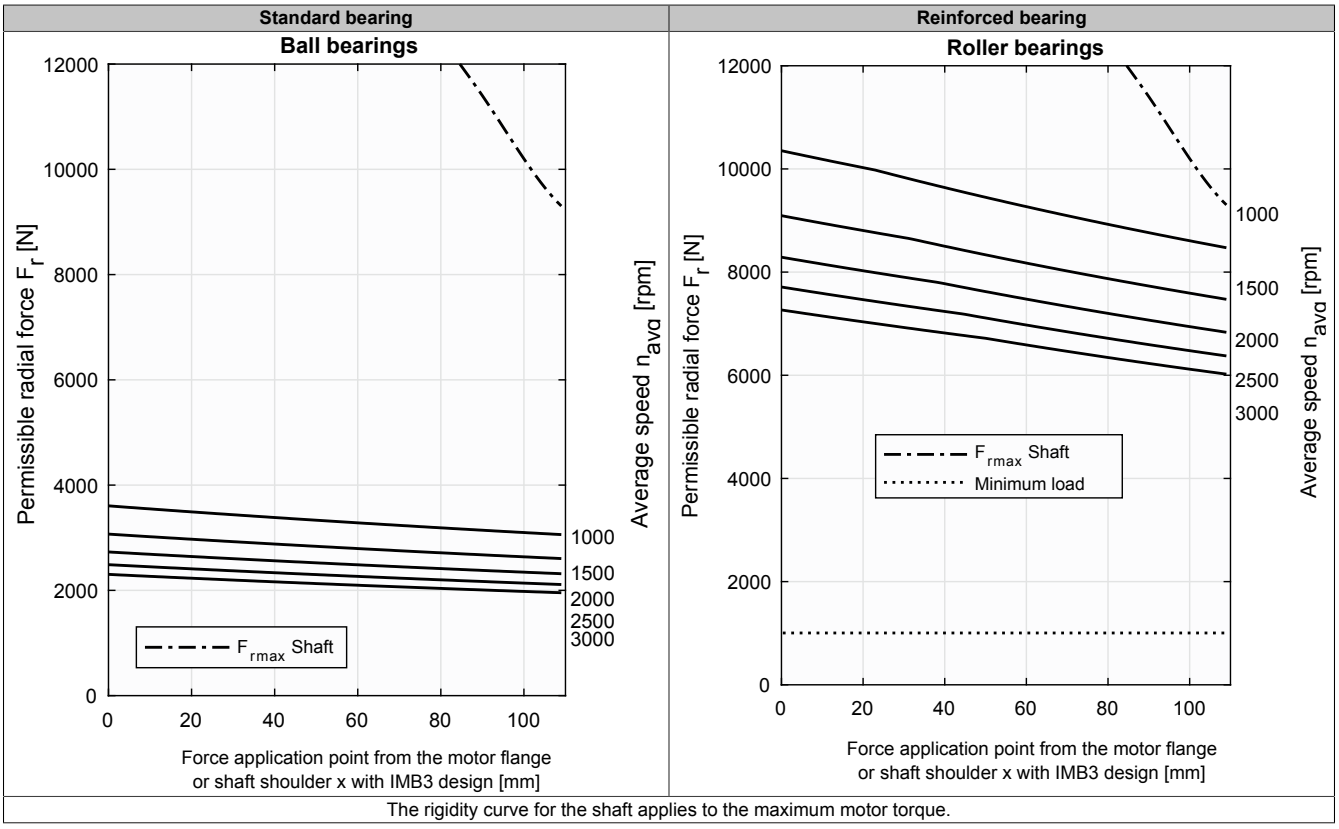


Figure 6: 8KSL8 - Dimensions

Order number	K_0	K1	M	M2	Extension of K0 or K1 and M2 with brake
8KSL82.eennnffgg-h	780	399	134	417	On request
8KSL84.eennnffgg-h	830	449	184	467	On request
8KSL85.eennnffgg-h	880	499	234	517	On request
8KSL86.eennnffgg-h	930	549	284	567	On request

15.1.5 Maximum shaft load

The values in the diagram below are based on a mechanical service life of the bearings of 20,000 operating hours.



The rigidity curve for the shaft applies to the maximum motor torque.

15.2 8KSL9 - Technical data

8KSL92

Model number	8KSL92.ee010ff00-h	8KSL92.ee015ff00-h	8KSL92.ee020ff00-h	8KSL92.ee025ff00-h	8KSL92.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1000	1500	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	285	265	245	225	205
Nominal power P_N [W]	29845	41626	51313	58905	64403
Nominal current I_N [A]	59	82	100	115	122
Stall torque M_0 [Nm]	325				
Stall current I_0 [A]	68	103	134	170	195
Maximum torque M_{max} [Nm]	700				
Maximum current I_{max} [A]	160	245	320	400	455
Maximum speed n_{max} [rpm]	3600				
Torque constant K_T [Nm/A]	4.92	3.27	2.51	2	1.75
Voltage constant K_E [V/1000 rpm]	337	224	172	137	119
Stator resistance R_{2ph} [Ω]	0.24	0.108	0.064	0.04	0.03
Stator inductance L_{2ph} [mH]	10.6	4.7	2.8	1.74	1.33
Electrical time constant t_{el} [ms]	42.358	42.593	42.313	43.05	43.733
Thermal time constant t_{therm} [min]	48.8				
Moment of inertia J [kgcm²]	1500				
Weight without brake m [kg]	230				
Holding brake					
Holding torque of brake M_{Br} [Nm]	320				
Mass of brake [kg]	29				
Moment of inertia of brake J_{Br} [kgcm²]	90				
Recommendations					
ACOPOS 8Vxxxx.xx...	128M		-		
ACOPOSmulti 8BVIxxxx...	0880	1650		-	
Cross section for B&R motor cables [mm²]	0				
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

8KSL94

Model number	8KSL94.ee010ff00-h	8KSL94.ee015ff00-h	8KSL94.ee020ff00-h	8KSL94.ee025ff00-h	8KSL94.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1000	1500	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	355	330	305	285	260
Nominal power P_N [W]	37176	51836	63879	74613	81681
Nominal current I_N [A]	75	104	127	145	160
Stall torque M_0 [Nm]	405				
Stall current I_0 [A]	85	127	165	205	245
Maximum torque M_{max} [Nm]	875				
Maximum current I_{max} [A]	205	305	400	490	585
Maximum speed n_{max} [rpm]	3600				
Torque constant K_T [Nm/A]	4.87	3.28	2.49	2.02	1.7
Voltage constant K_E [V/1000 rpm]	334	225	171	139	117
Stator resistance R_{2ph} [Ω]	0.174	0.08	0.046	0.03	0.022
Stator inductance L_{2ph} [mH]	8.3	3.7	2.2	1.42	1.01
Electrical time constant t_{el} [ms]	46.621	46.25	46.261	46.467	45.091
Thermal time constant t_{therm} [min]	43.9				
Moment of inertia J [kgcm²]	1800				
Weight without brake m [kg]	255				
Holding brake					
Holding torque of brake M_{Br} [Nm]	320				
Mass of brake [kg]	29				
Moment of inertia of brake J_{Br} [kgcm²]	90				
Recommendations					
ACOPOS 8Vxxxx.xx...	128M	-			
ACOPOSmulti 8BVIxxxx...	1650		-		
Cross section for B&R motor cables [mm²]	0				
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

8KSL95

Model number	8KSL95.ee010ff00-h	8KSL95.ee015ff00-h	8KSL95.ee020ff00-h	8KSL95.ee025ff00-h
Motor				
Nominal speed n_N [rpm]	1000	1500	2000	2500
Number of pole pairs	3			
Nominal torque M_n [Nm]	430	400	375	345
Nominal power P_N [W]	45029	62832	78540	90321
Nominal current I_N [A]	90	130	147	175
Stall torque M_0 [Nm]	480			
Stall current I_0 [A]	101	155	190	240
Maximum torque M_{max} [Nm]	1050			
Maximum current I_{max} [A]	245	375	455	585
Maximum speed n_{max} [rpm]	3600			
Torque constant K_T [Nm/A]	4.89	3.18	2.61	2.04
Voltage constant K_E [V/1000 rpm]	336	218	179	140
Stator resistance R_{2ph} [Ω]	0.136	0.058	0.038	0.024
Stator inductance L_{2ph} [mH]	6.9	2.9	1.96	1.2
Electrical time constant t_{el} [ms]	49.824	49.448	48.3	49.167
Thermal time constant t_{therm} [min]	39			
Moment of inertia J [kgcm²]	2200			
Weight without brake m [kg]	285			
Holding brake				
Holding torque of brake M_{Br} [Nm]	320			
Mass of brake [kg]	29			
Moment of inertia of brake J_{Br} [kgcm²]	90			
Recommendations				
ACOPOS 8Vxxxx.xx...	128M	-		
ACOPOSmulti 8BVIxxxx...	1650	-		
Cross section for B&R motor cables [mm²]	0			
Connector type	Terminal box			

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

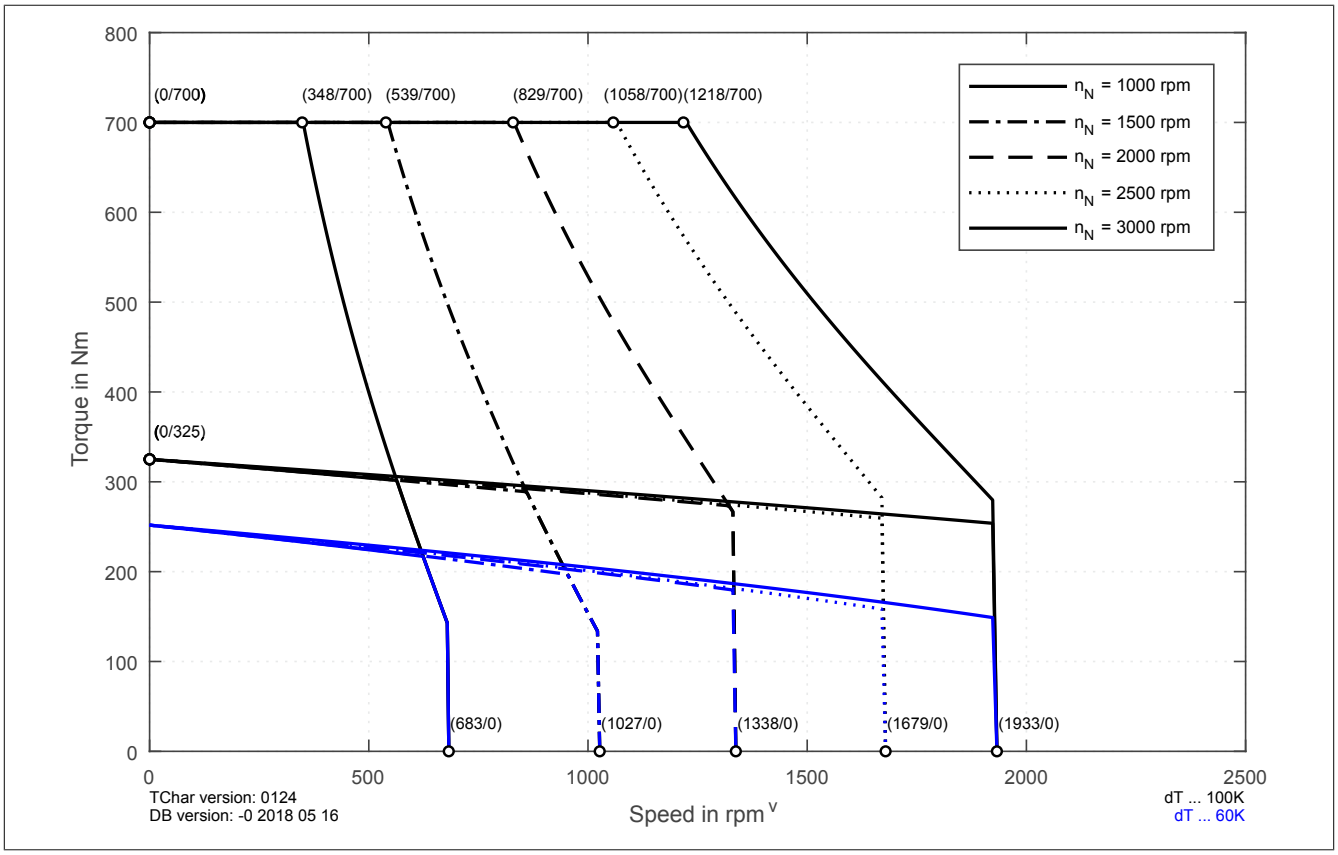
8KSL96

Model number	8KSL96.ee010ff00-h	8KSL96.ee015ff00-h	8KSL96.ee020ff00-h
Motor			
Nominal speed n_N [rpm]	1000	1500	2000
Number of pole pairs		3	
Nominal torque M_n [Nm]	500	470	440
Nominal power P_N [W]	52360	73827	92153
Nominal current I_N [A]	107	139	175
Stall torque M_0 [Nm]		555	
Stall current I_0 [A]	118	165	220
Maximum torque M_{max} [Nm]		1110	
Maximum current I_{max} [A]	255	355	475
Maximum speed n_{max} [rpm]		3600	
Torque constant K_T [Nm/A]	4.8	3.48	2.6
Voltage constant K_E [V/1000 rpm]	331	240	179
Stator resistance R_{2ph} [Ω]	0.108	0.056	0.032
Stator inductance L_{2ph} [mH]	5.7	3	1.66
Electrical time constant t_{el} [ms]	51.852	52.5	51.188
Thermal time constant t_{therm} [min]		34.2	
Moment of inertia J [kgcm²]		2500	
Weight without brake m [kg]		310	
Holding brake			
Holding torque of brake M_{Br} [Nm]		320	
Mass of brake [kg]		29	
Moment of inertia of brake J_{Br} [kgcm²]		90	
Recommendations			
ACOPOSmulti 8BVIxxxx...	1650	-	
Cross section for B&R motor cables [mm²]		0	
Connector type		Terminal box	

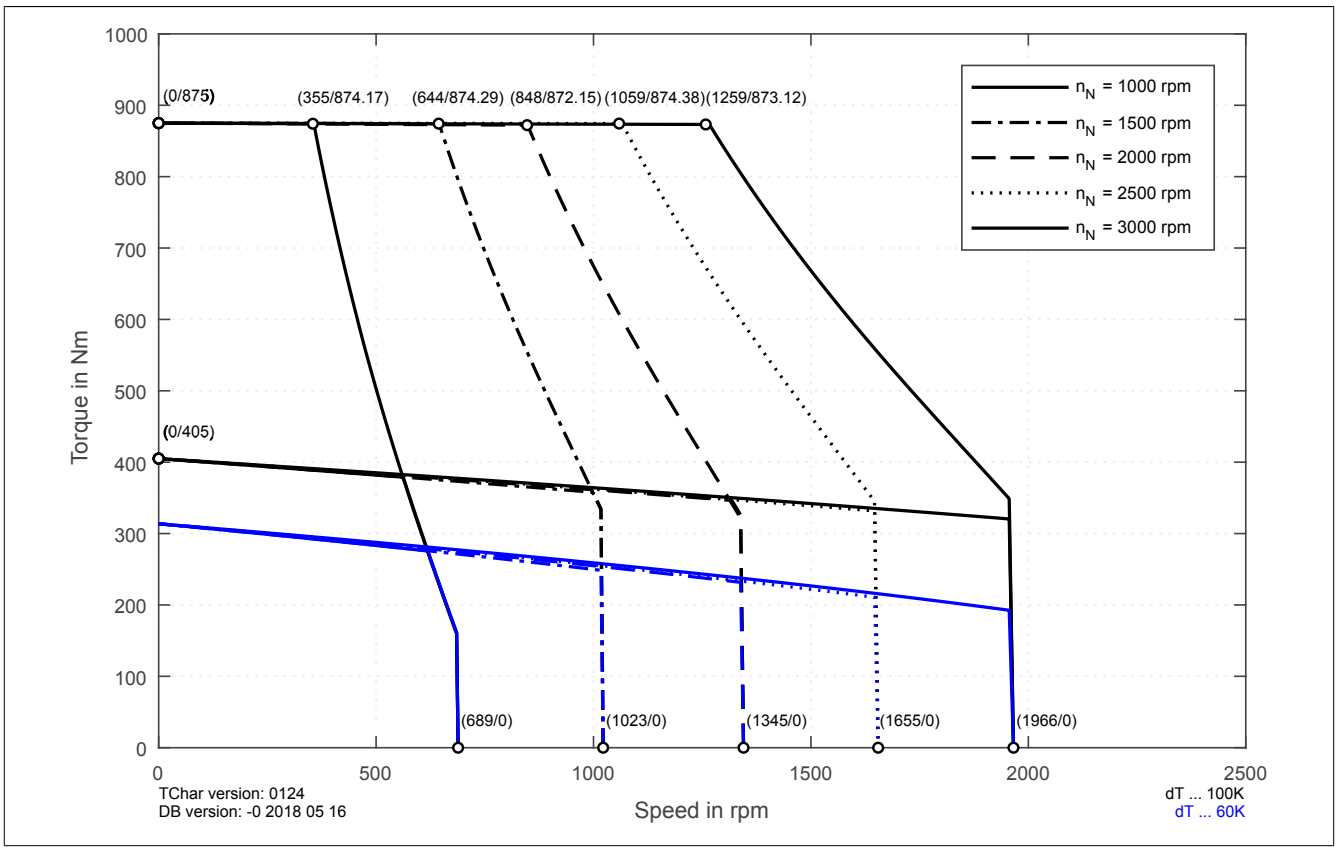
NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

15.2.1 Speed-Torque characteristic curves at 325 VDC DC bus voltage

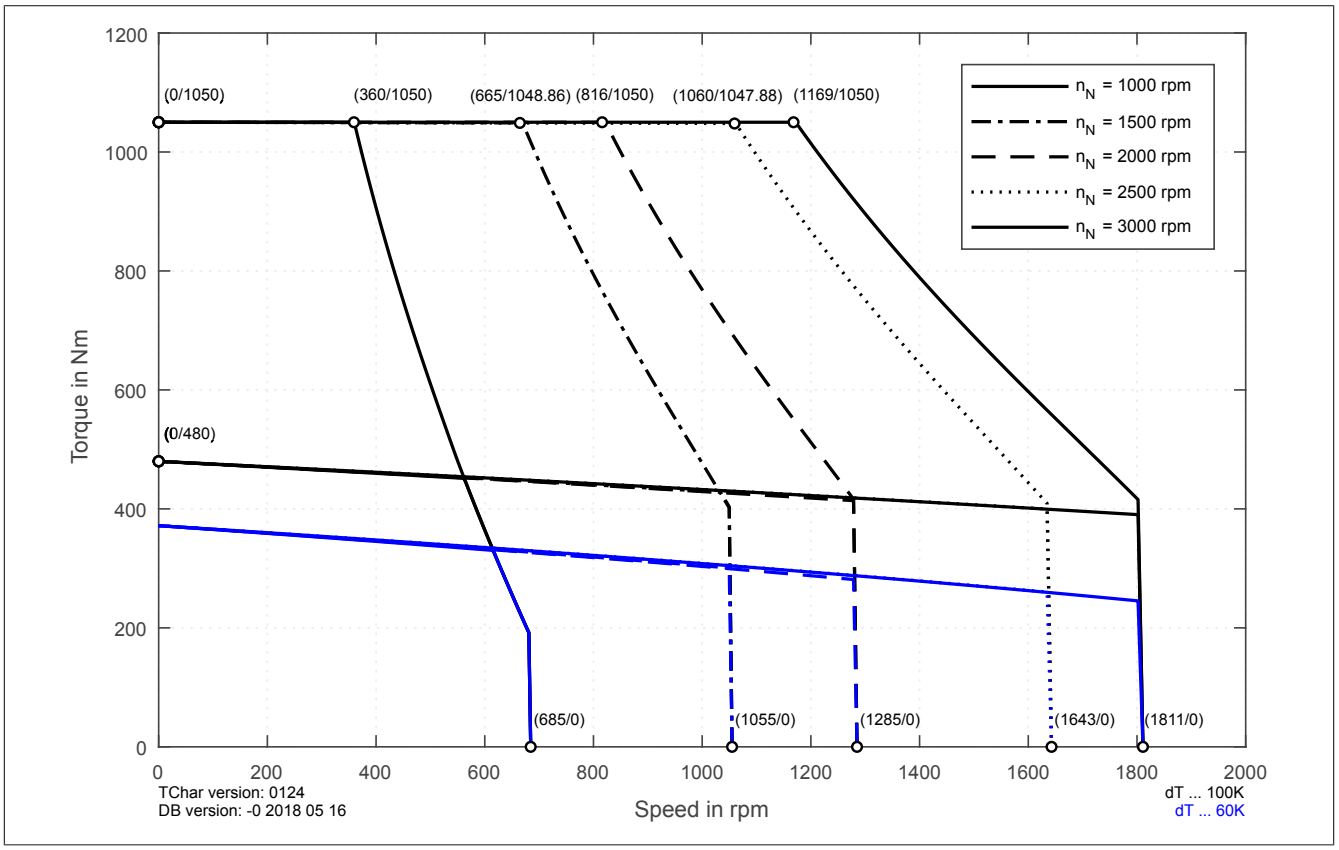
8KSL92.eennnffgg-h



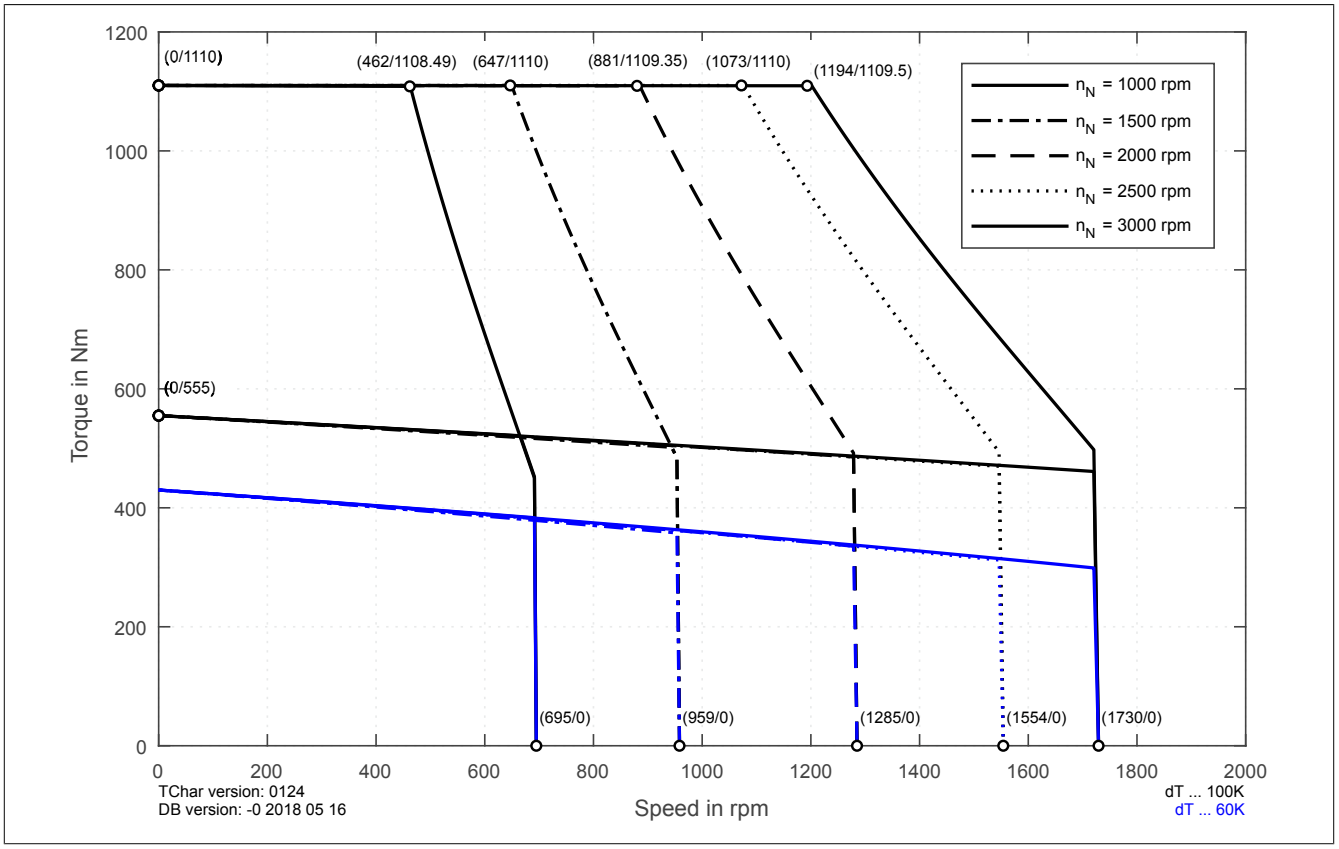
8KSL94.eennnffgg-h



8KSL95.eennnffgg-h

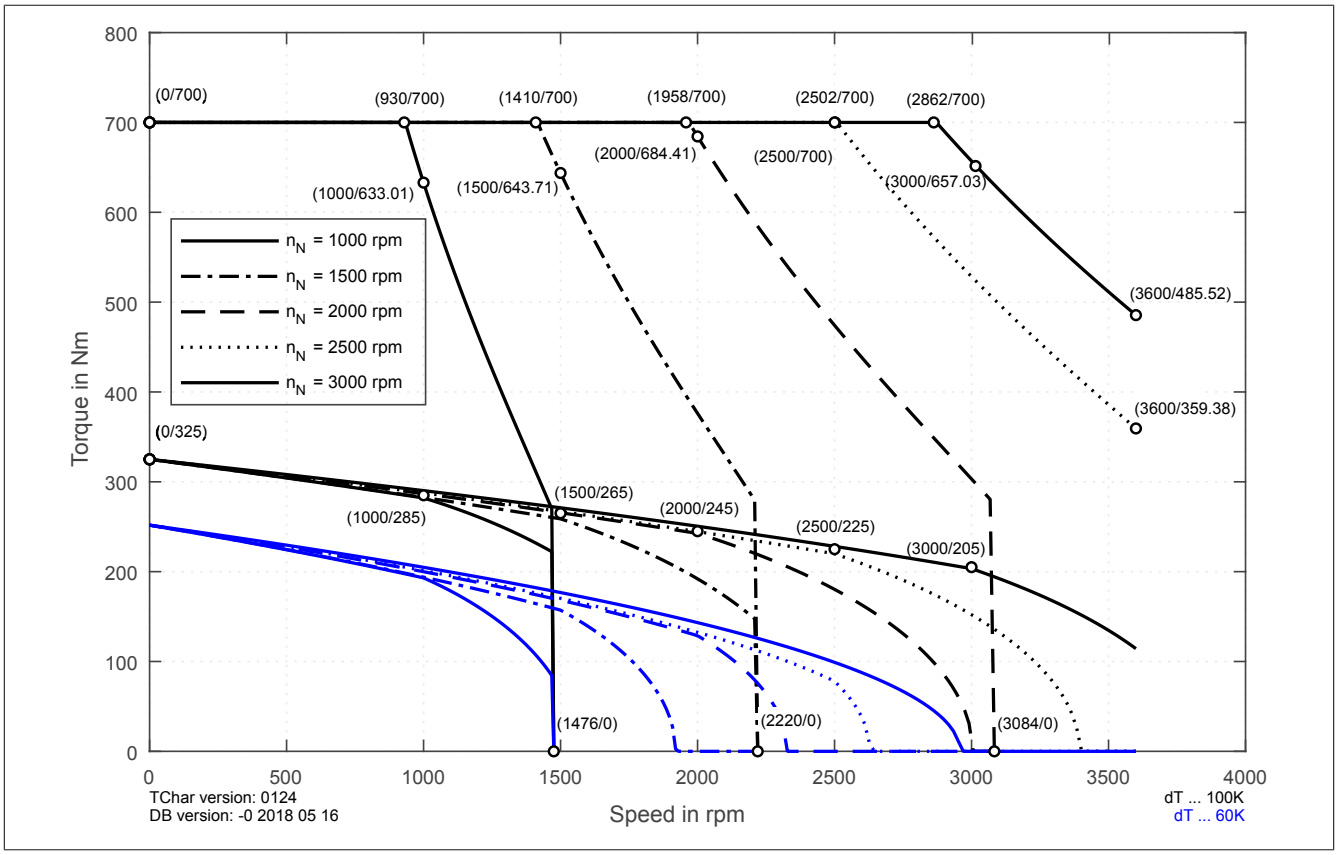


8KSL96.eennnffgg-h

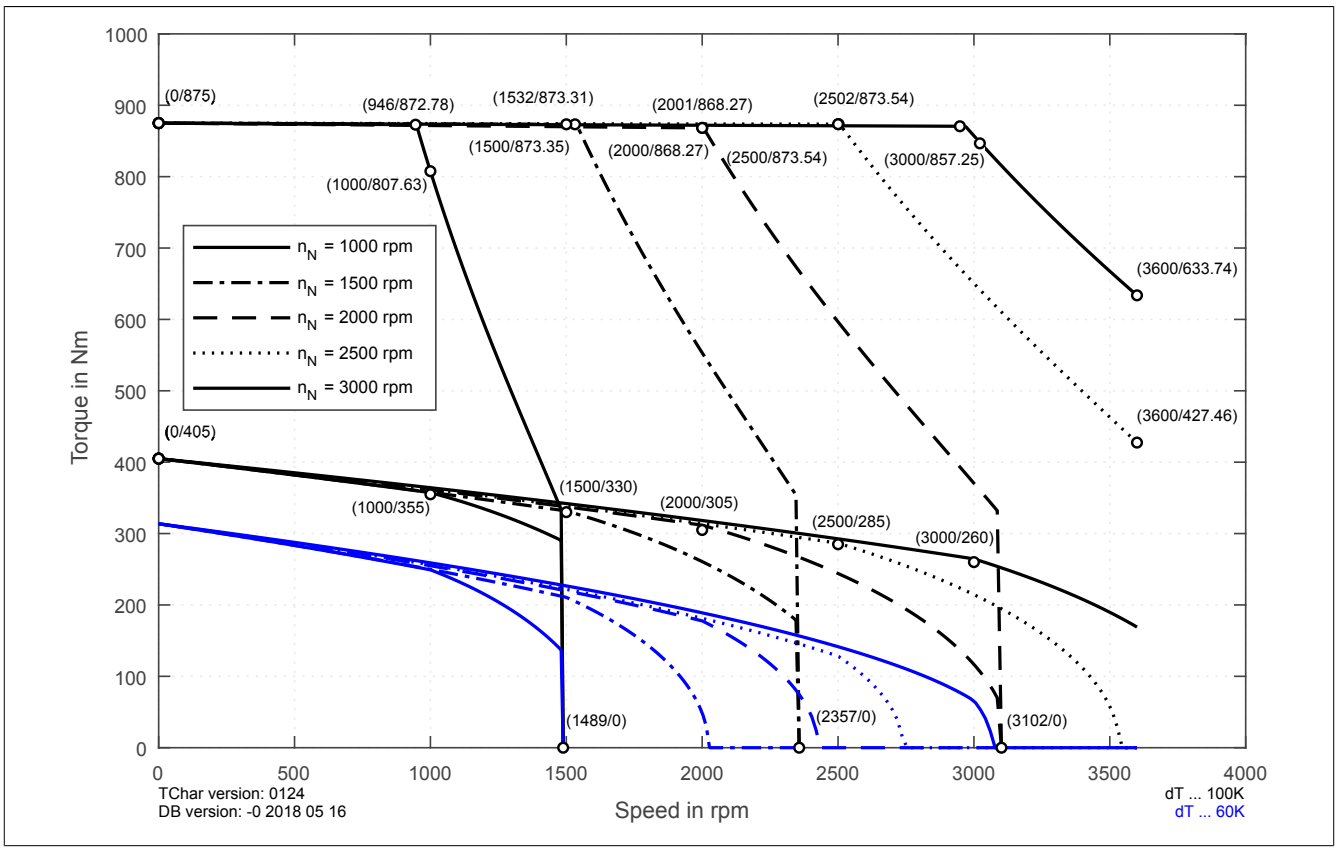


15.2.2 Speed-Torque characteristic curve at 750 VDC DC bus voltage

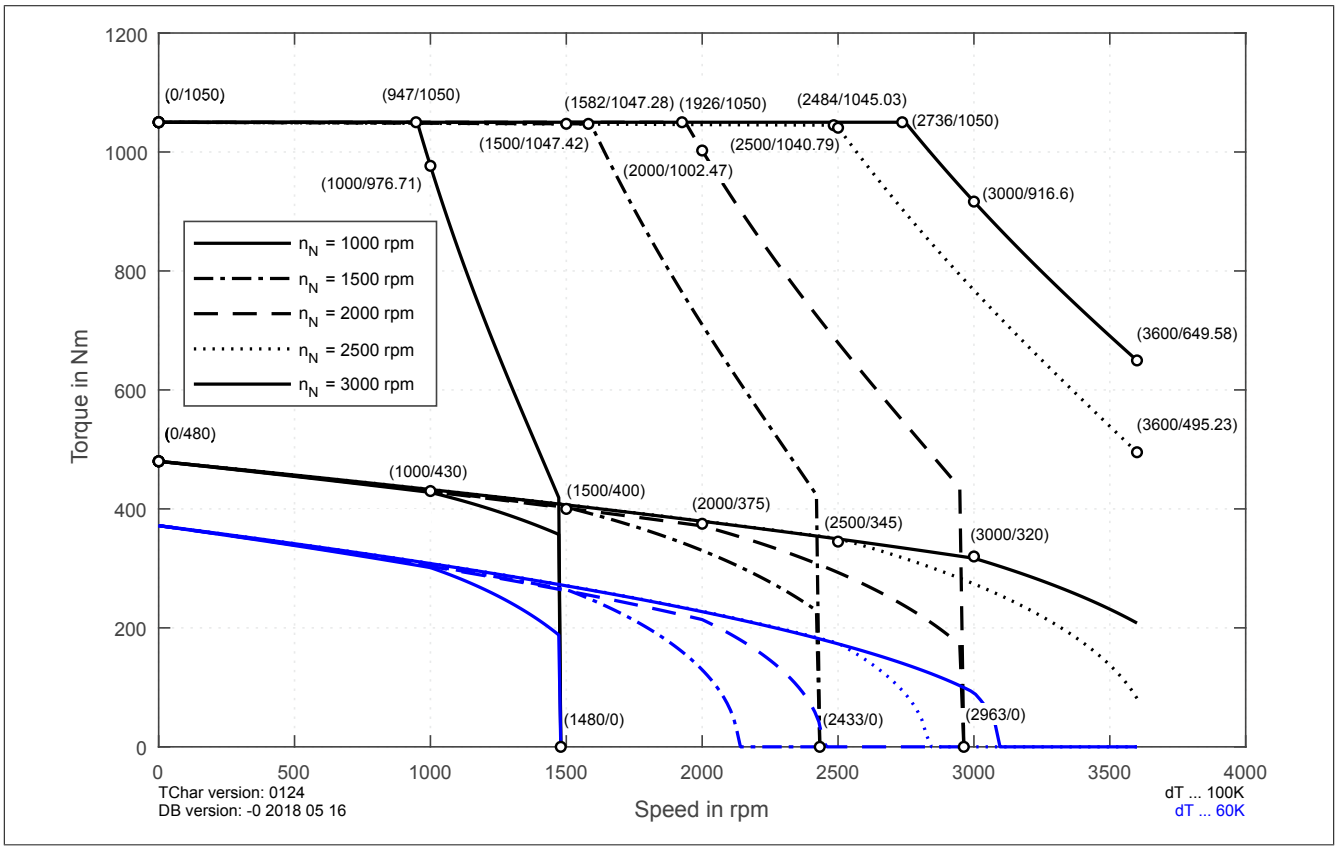
8KSL92.eennnffgg-h



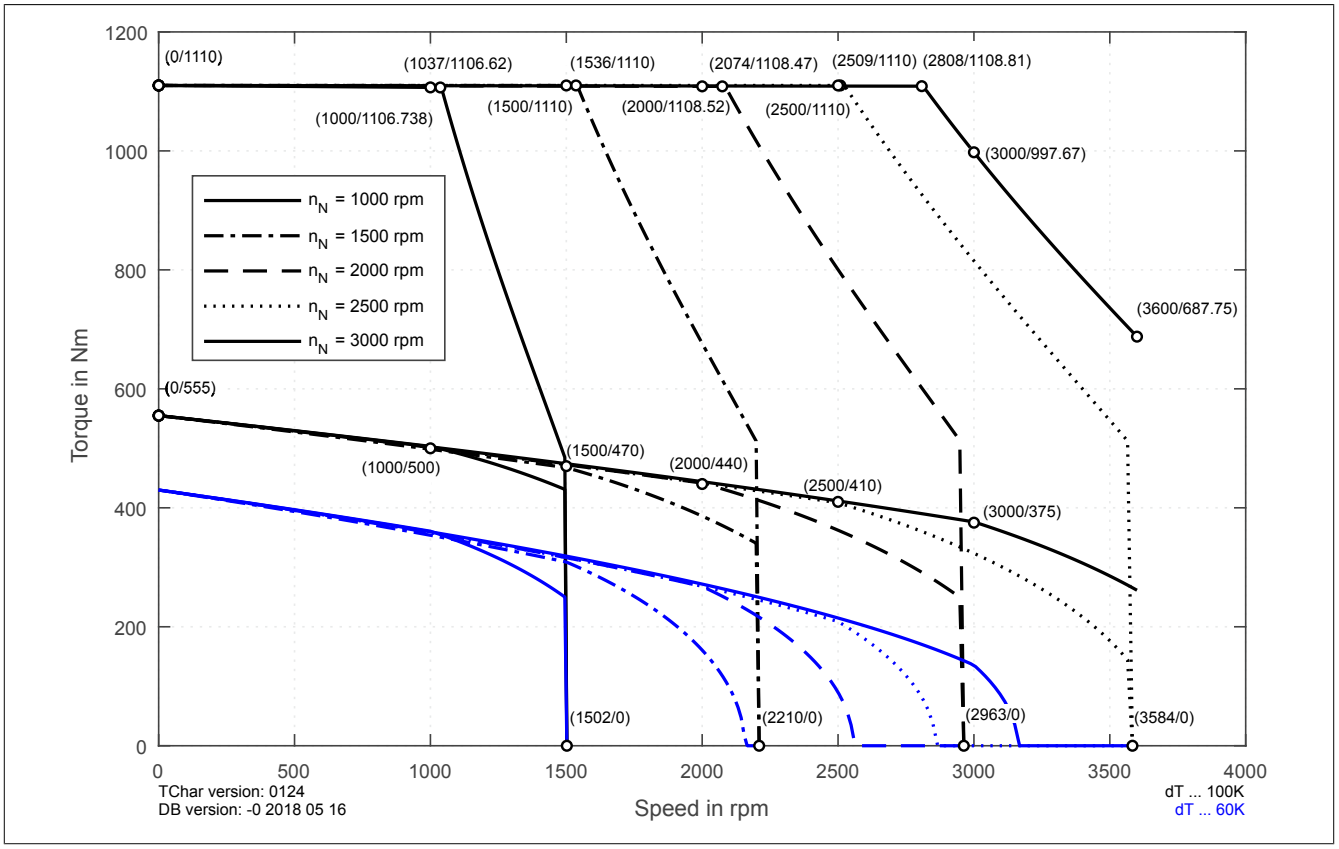
8KSL94.eennnffgg-h



8KSL95.eennnffgg-h

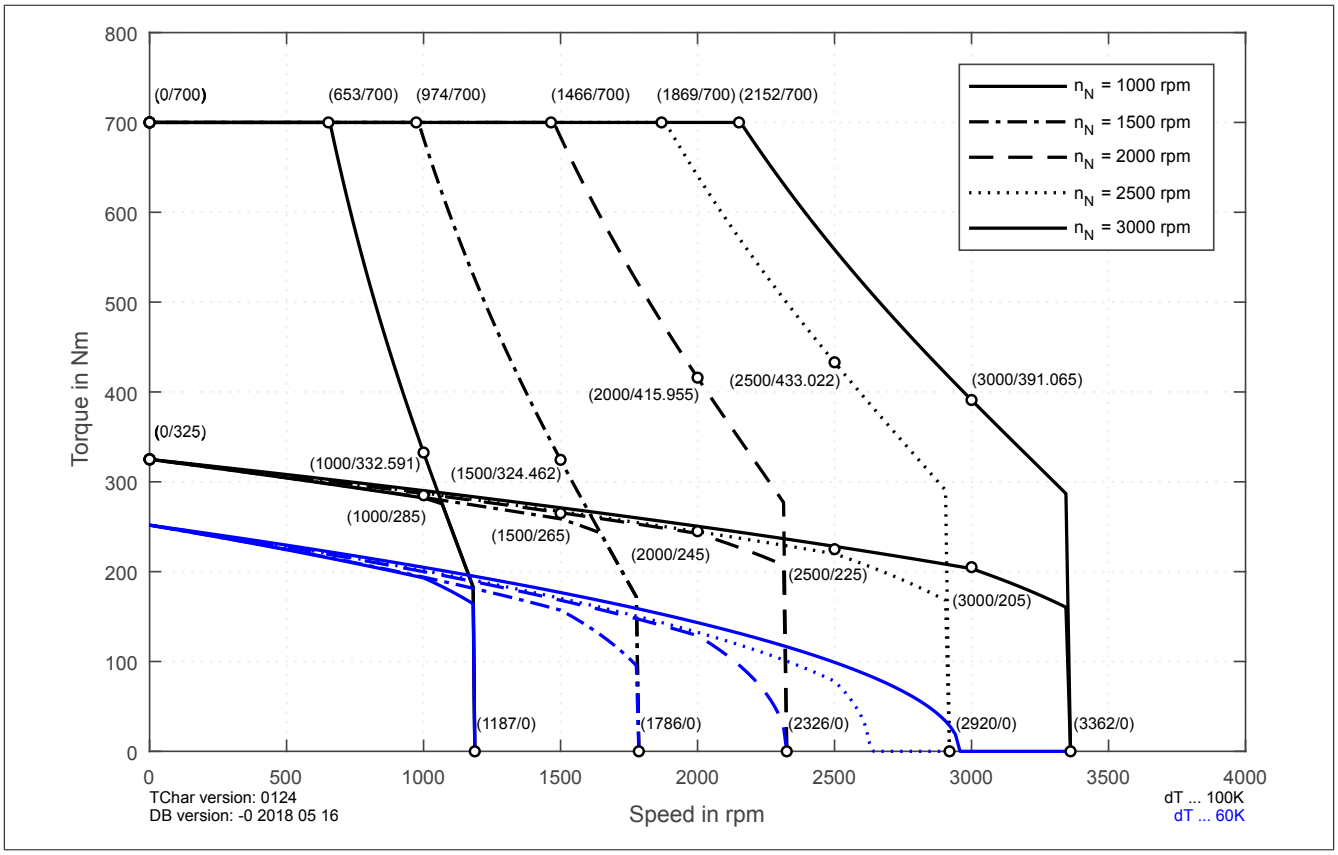


8KSL96.eennnffgg-h

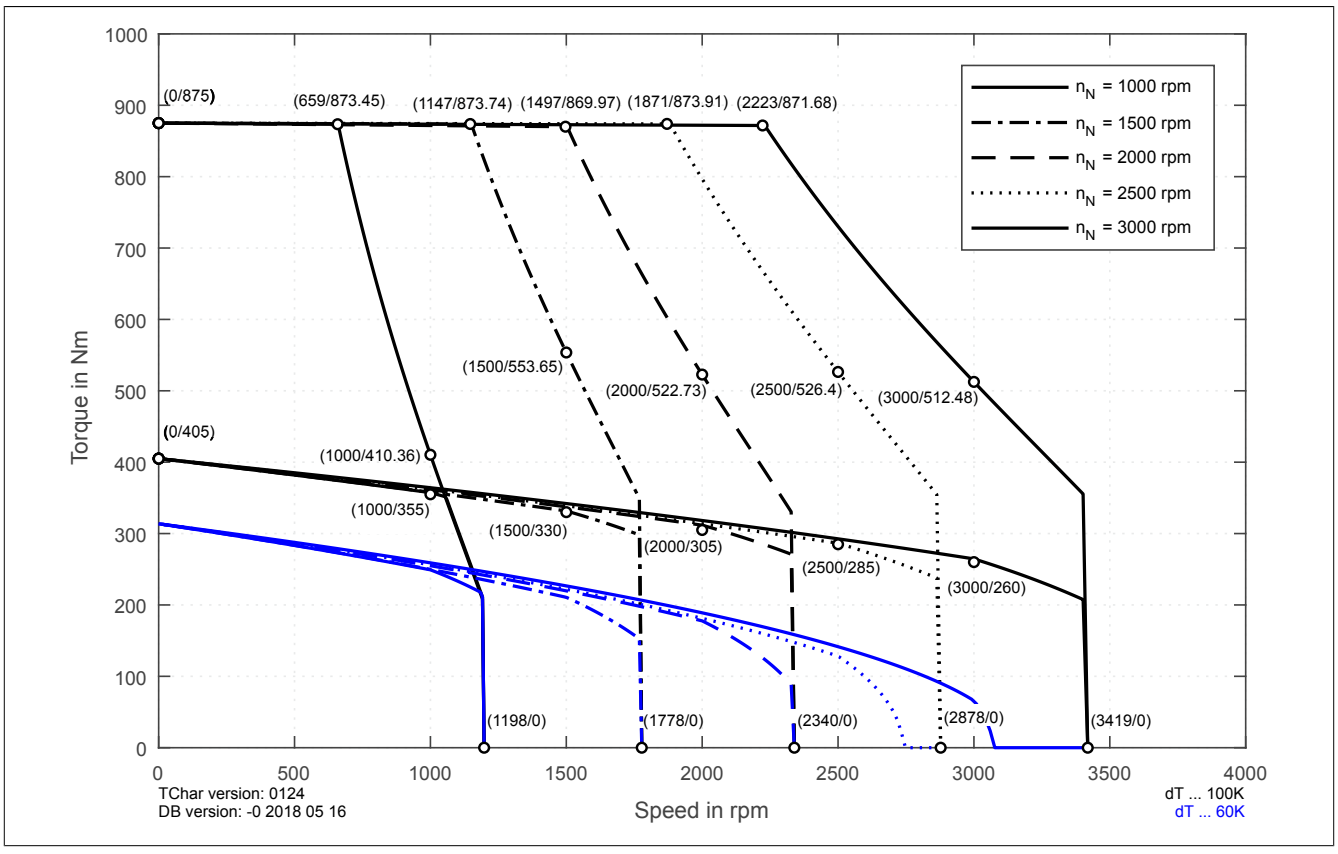


15.2.3 Speed-Torque characteristic curves at 560 VDC DC bus voltage

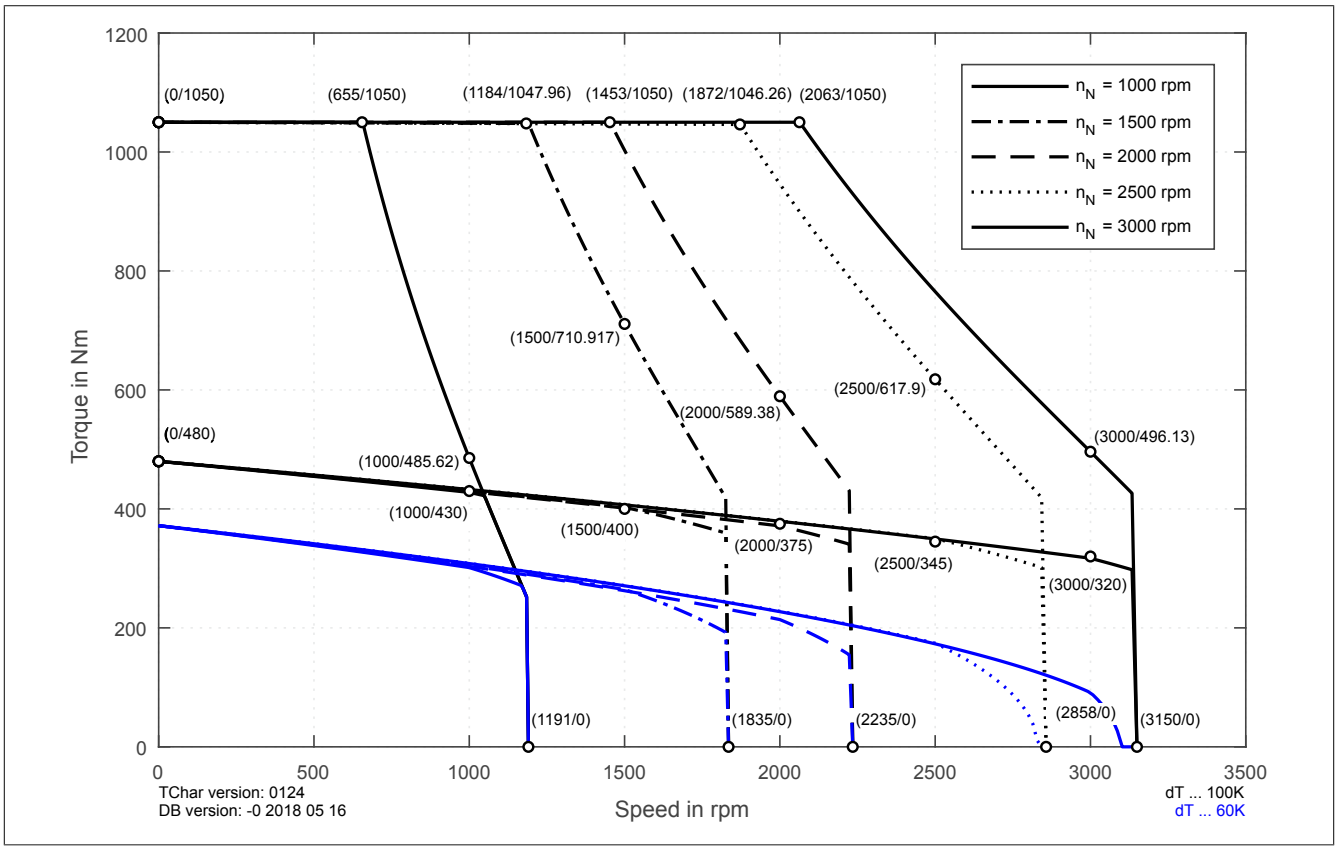
8KSL92.eennnffgg-h



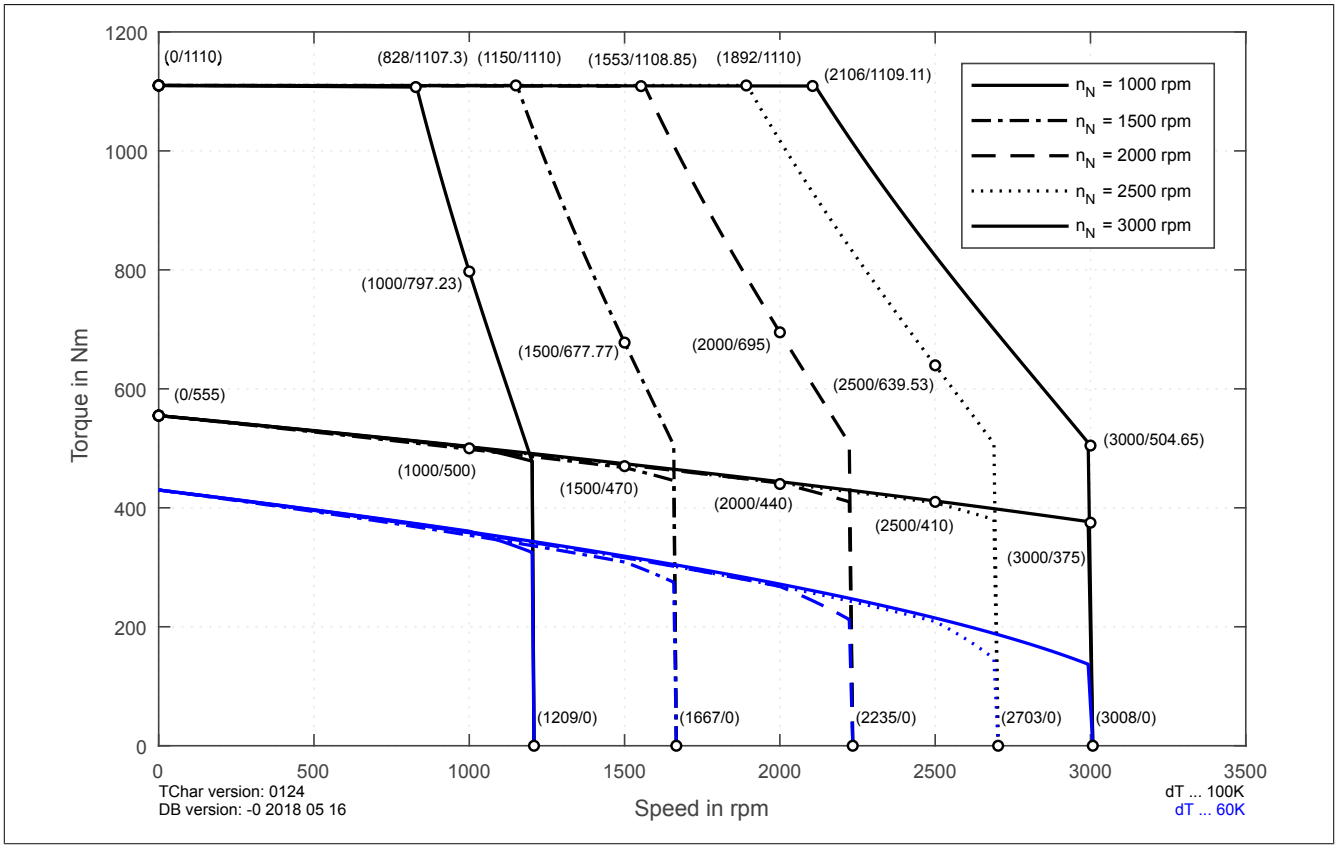
8KSL94.eennnffgg-h



8KSL95.eennnffgg-h



8KSL96.eennnffgg-h



15.2.4 8KSL9 - Dimensions

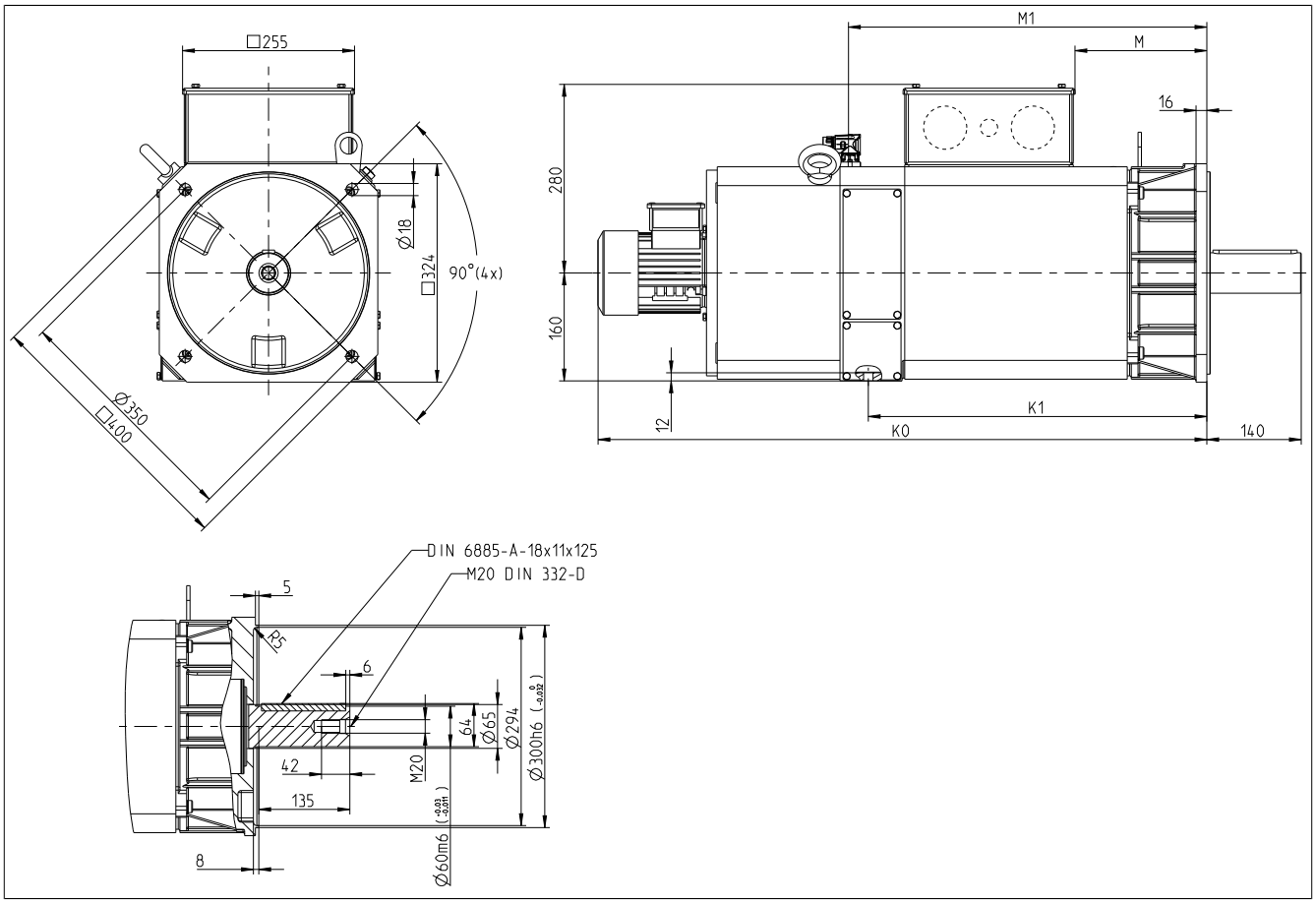


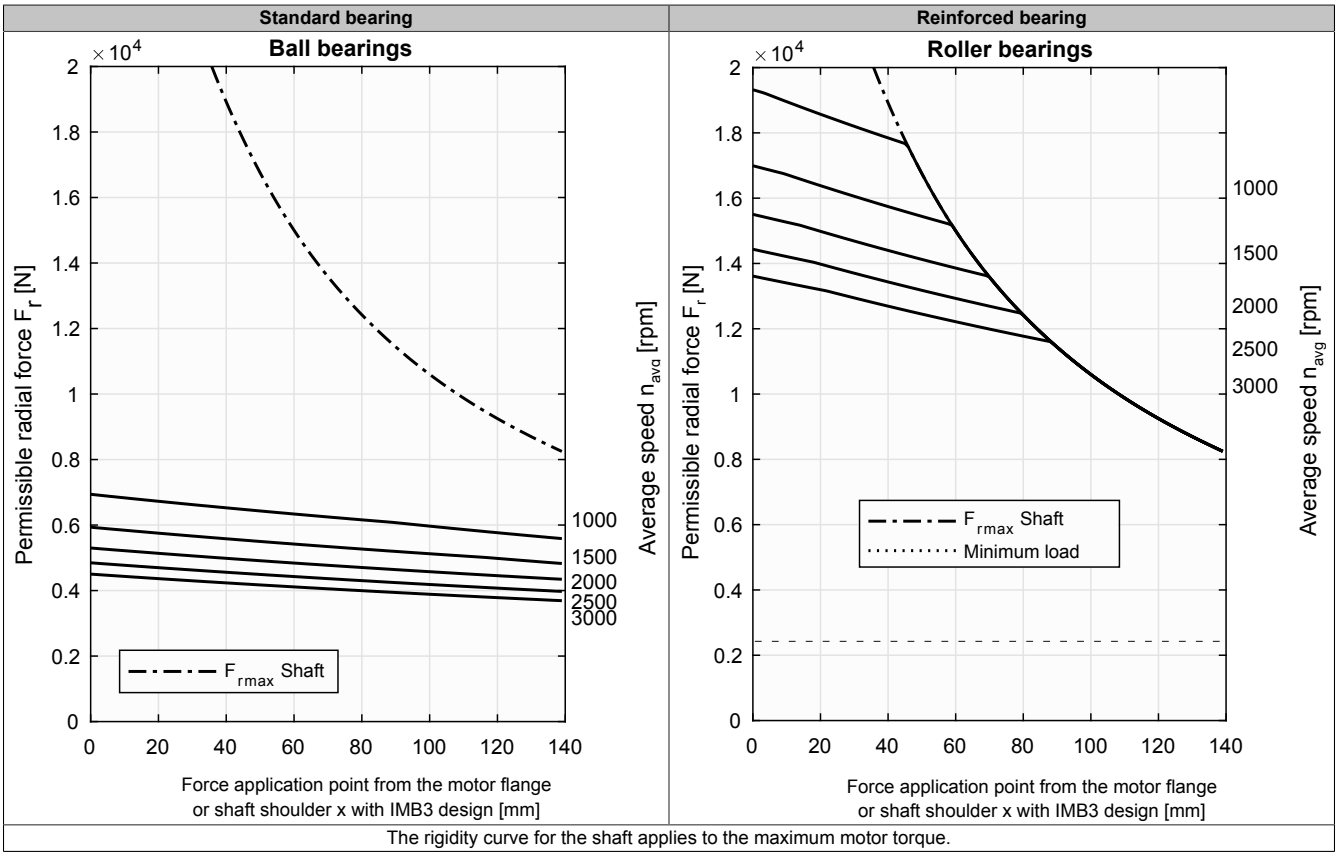
Figure 7: 8KSL9 - Dimensions

Order number	K_0	K1	M	M1	Extension of K0 or K1 and M1 with brake
8KSL92.eennnffgg-h	853	452	Depends on the terminal box 1)	Upon request	175
8KSL94.eennnffgg-h	903	502	Depends on the terminal box 1)	Upon request	175
8KSL95.eennnffgg-h	953	552	Depends on the terminal box 1)	Upon request	175
8KSL96.eennnffgg-h	1003	602	Depends on the terminal box 1)	Upon request	175

1) Different terminal boxes are used depending on the nominal speed; please request step file.

15.2.5 Maximum shaft load

The values in the diagram below are based on a mechanical service life of the bearings of 20,000 operating hours.



The rigidity curve for the shaft applies to the maximum motor torque.

16 8KSM - Technical data

16.1 8KSM8 - Technical data

8KSM82

Model number	8KSM82.ee011ff00-h	8KSM82.ee016ff00-h	8KSM82.ee020ff00-h	8KSM82.ee025ff00-h	8KSM82.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1100	1600	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	120	115		110	105
Nominal power P_N [W]	13823	19268	24086	28798	32987
Nominal current I_N [A]	27.3	37.6	46.3	54	58
Stall torque M_0 [Nm]	130				
Stall current I_0 [A]	29.3	41.8	53	65	73
Maximum torque M_{max} [Nm]	305				
Maximum current I_{max} [A]	76	108	138	170	190
Maximum speed n_{max} [rpm]	4300				
Torque constant K_T [Nm/A]	4.63	3.24	2.55	2.08	1.85
Voltage constant K_E [V/1000 rpm]	300	210	165	135	120
Stator resistance R_{2ph} [Ω]	0.64	0.32	0.196	0.132	0.104
Stator inductance L_{2ph} [mH]	19.4	9.6	6	4	3.1
Electrical time constant t_{el} [ms]	31.656	31	30.6	34.167	32.4
Thermal time constant t_{therm} [min]	22.8				
Moment of inertia J [kgcm²]	450				
Weight without brake m [kg]	110				
Holding brake					
Holding torque of brake M_{Br} [Nm]	200				
Mass of brake [kg]	13				
Moment of inertia of brake J_{Br} [kgcm²]	40				
Recommendations					
ACOPOS 8Vxxxx.xx...	1320	1640		128M	
ACOPOSmulti 8BVIxxxx...	0330	0660		0880	
Cross section for B&R motor cables [mm²]	4	10		0	
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

8KSM84

Model number	8KSM84.ee011ff00-h	8KSM84.ee016ff00-h	8KSM84.ee020ff00-h	8KSM84.ee025ff00-h	8KSM84.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1100	1600	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	160	150	145	140	130
Nominal power P_N [W]	18431	25133	30369	36652	40841
Nominal current I_N [A]	35.7	46.5	57	67	74
Stall torque M_0 [Nm]	175				
Stall current I_0 [A]	39	53	68	84	98
Maximum torque M_{max} [Nm]	405				
Maximum current I_{max} [A]	101	138	175	215	250
Maximum speed n_{max} [rpm]	4300				
Torque constant K_T [Nm/A]	4.61	3.38	2.66	2.15	1.84
Voltage constant K_E [V/1000 rpm]	300	220	173	140	120
Stator resistance R_{2ph} [Ω]	0.42	0.22	0.14	0.092	0.068
Stator inductance L_{2ph} [mH]	14.6	7.8	4.8	3.2	2.3
Electrical time constant t_{el} [ms]	35.667	36.636	35.714	32.6	40
Thermal time constant t_{therm} [min]	23.8				
Moment of inertia J [kgcm²]	580				
Weight without brake m [kg]	125				
Holding brake					
Holding torque of brake M_{Br} [Nm]	200				
Mass of brake [kg]	13				
Moment of inertia of brake J_{Br} [kgcm²]	40				
Recommendations					
ACOPOS 8Vxxxx.xx...	1640		128M		
ACOPOSmulti 8BVIxxxx...	0440	0660	0880	1650	
Cross section for B&R motor cables [mm²]	10		0		
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

8KSM85

Model number	8KSM85.ee011ff00-h	8KSM85.ee016ff00-h	8KSM85.ee020ff00-h	8KSM85.ee025ff00-h	8KSM85.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1100	1600	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	195	185	175	165	155
Nominal power P_N [W]	22462	30997	36652	43197	48695
Nominal current I_N [A]	40.4	55	68	79	90
Stall torque M_0 [Nm]	215				
Stall current I_0 [A]	45	65	84	103	125
Maximum torque M_{max} [Nm]	505				
Maximum current I_{max} [A]	117	170	215	265	325
Maximum speed n_{max} [rpm]	4300				
Torque constant K_T [Nm/A]	4.99	3.46	2.69	2.18	1.79
Voltage constant K_E [V/1000 rpm]	325	225	175	141	116
Stator resistance R_{2ph} [Ω]	0.36	0.172	0.104	0.068	0.046
Stator inductance L_{2ph} [mH]	13.6	6.5	4	2.5	1.74
Electrical time constant t_{el} [ms]	38.722	37.111	40.4	44	45
Thermal time constant t_{therm} [min]	25				
Moment of inertia J [kgcm²]	710				
Weight without brake m [kg]	145				
Holding brake					
Holding torque of brake M_{Br} [Nm]	200				
Mass of brake [kg]	13				
Moment of inertia of brake J_{Br} [kgcm²]	40				
Recommendations					
ACOPOS 8Vxxxx.xx...	1640		128M		-
ACOPOSmulti 8BVIxxxx...	0660	0880	1650		
Cross section for B&R motor cables [mm²]	10	0			
Connector type	Terminal box				

NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

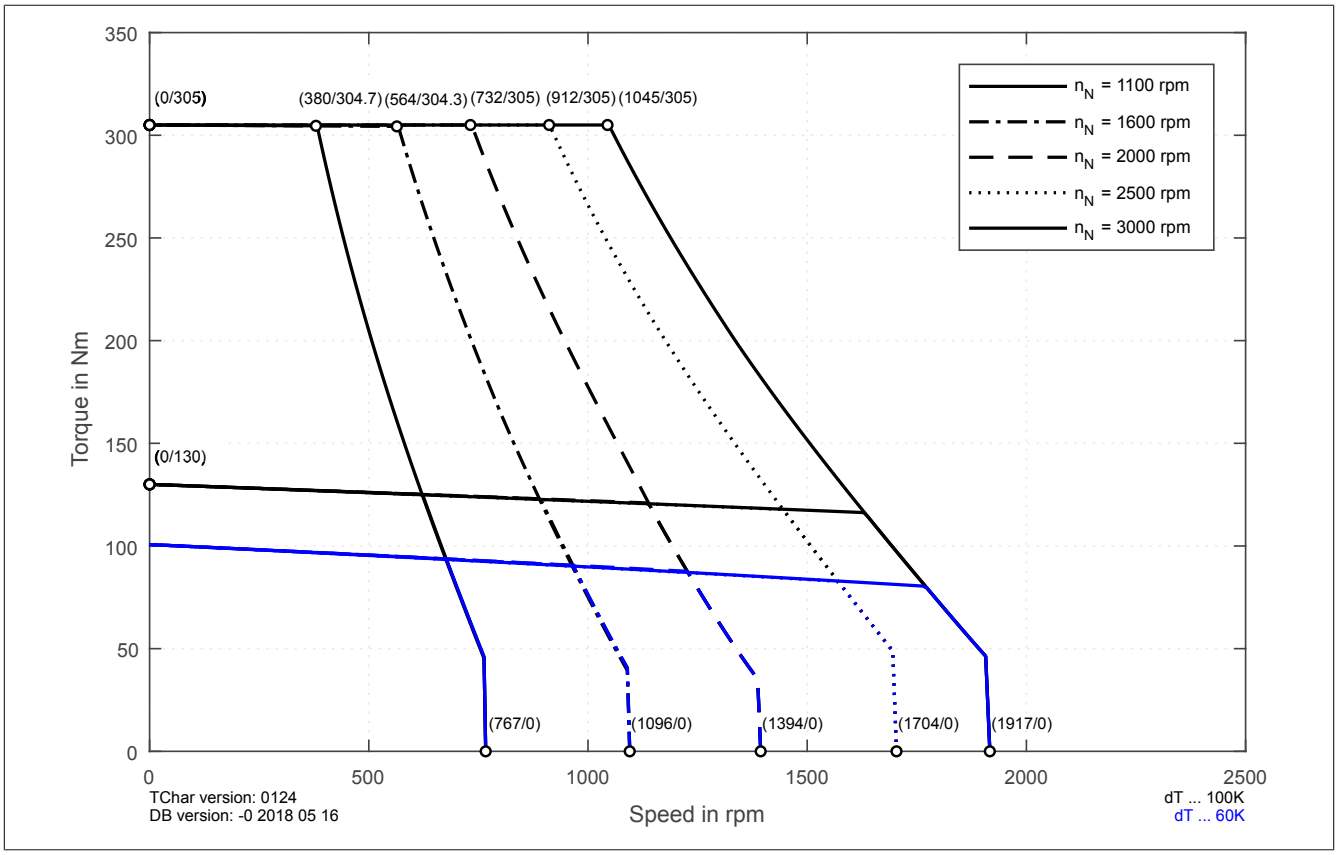
8KSM86

Model number	8KSM86.ee011ff00-h	8KSM86.ee016ff00-h	8KSM86.ee020ff00-h	8KSM86.ee025ff00-h	8KSM86.ee030ff00-h
Motor					
Nominal speed n_N [rpm]	1100	1600	2000	2500	3000
Number of pole pairs	3				
Nominal torque M_n [Nm]	230	215	205	190	175
Nominal power P_N [W]	26494	36024	42935	49742	54978
Nominal current I_N [A]	52	69	81	91	99
Stall torque M_0 [Nm]	260				
Stall current I_0 [A]	59	84	103	125	146
Maximum torque M_{max} [Nm]	610	605			
Maximum current I_{max} [A]	150	215	265	325	380
Maximum speed n_{max} [rpm]	4300				
Torque constant K_T [Nm/A]	4.61	3.23	2.61	2.15	1.84
Voltage constant K_E [V/1000 rpm]	300	210	170	140	120
Stator resistance R_{2ph} [Ω]	0.24	0.116	0.076	0.052	0.038
Stator inductance L_{2ph} [mH]	9.6	4.6	3.1	2.09	1.53
Electrical time constant t_{el} [ms]	41	40.167	39.5	35.667	39.5
Thermal time constant t_{therm} [min]	26.2				
Moment of inertia J [kgcm²]	840				
Weight without brake m [kg]	165				
Holding brake					
Holding torque of brake M_{Br} [Nm]	200				
Mass of brake [kg]	13				
Moment of inertia of brake J_{Br} [kgcm²]	40				
Recommendations					
ACOPOS 8Vxxxx.xx...	128M			-	
ACOPOSmulti 8BVIxxxx...	0660	1650			
Cross section for B&R motor cables [mm²]	0				
Connector type	Terminal box				

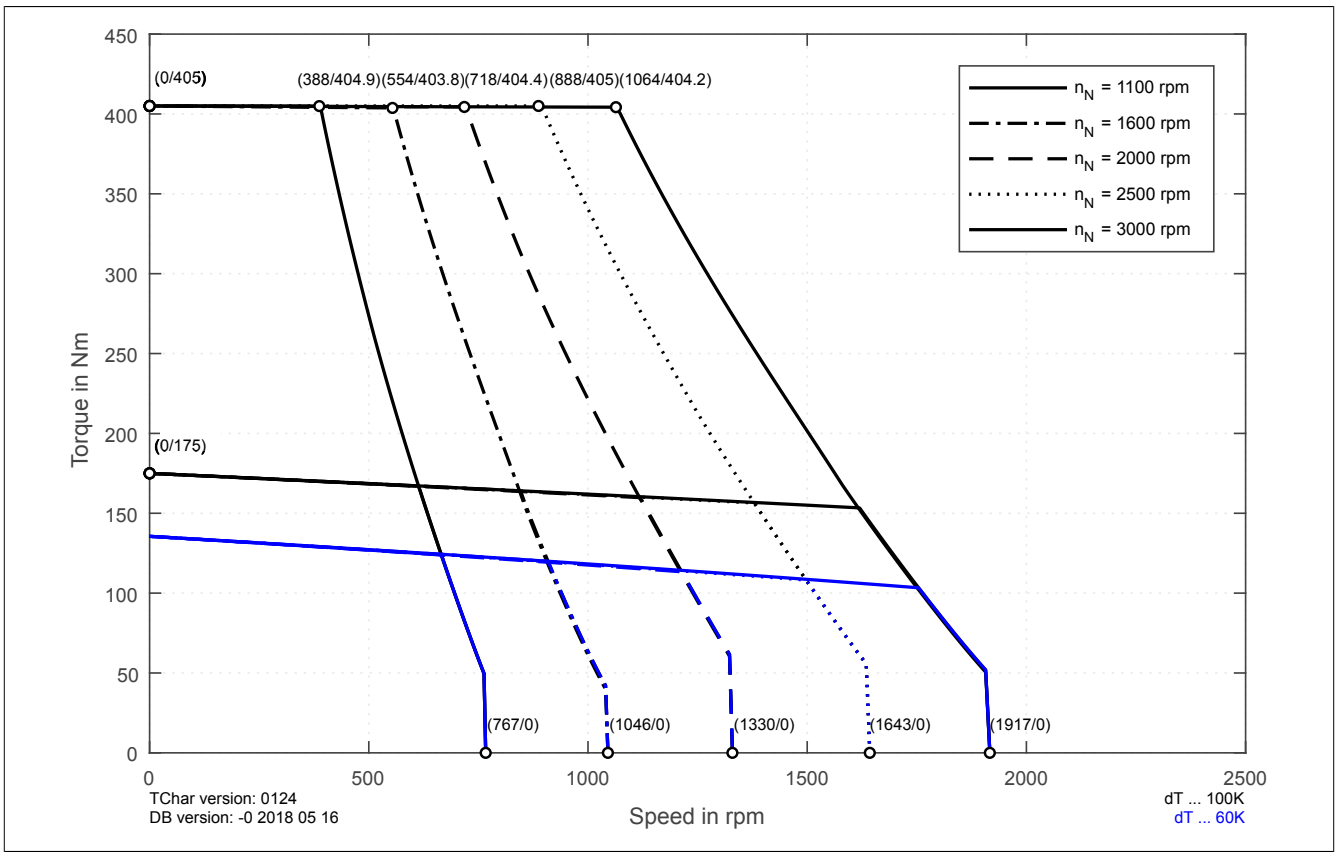
NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guide value; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

16.1.1 Speed-Torque characteristic curves at 325 VDC DC bus voltage

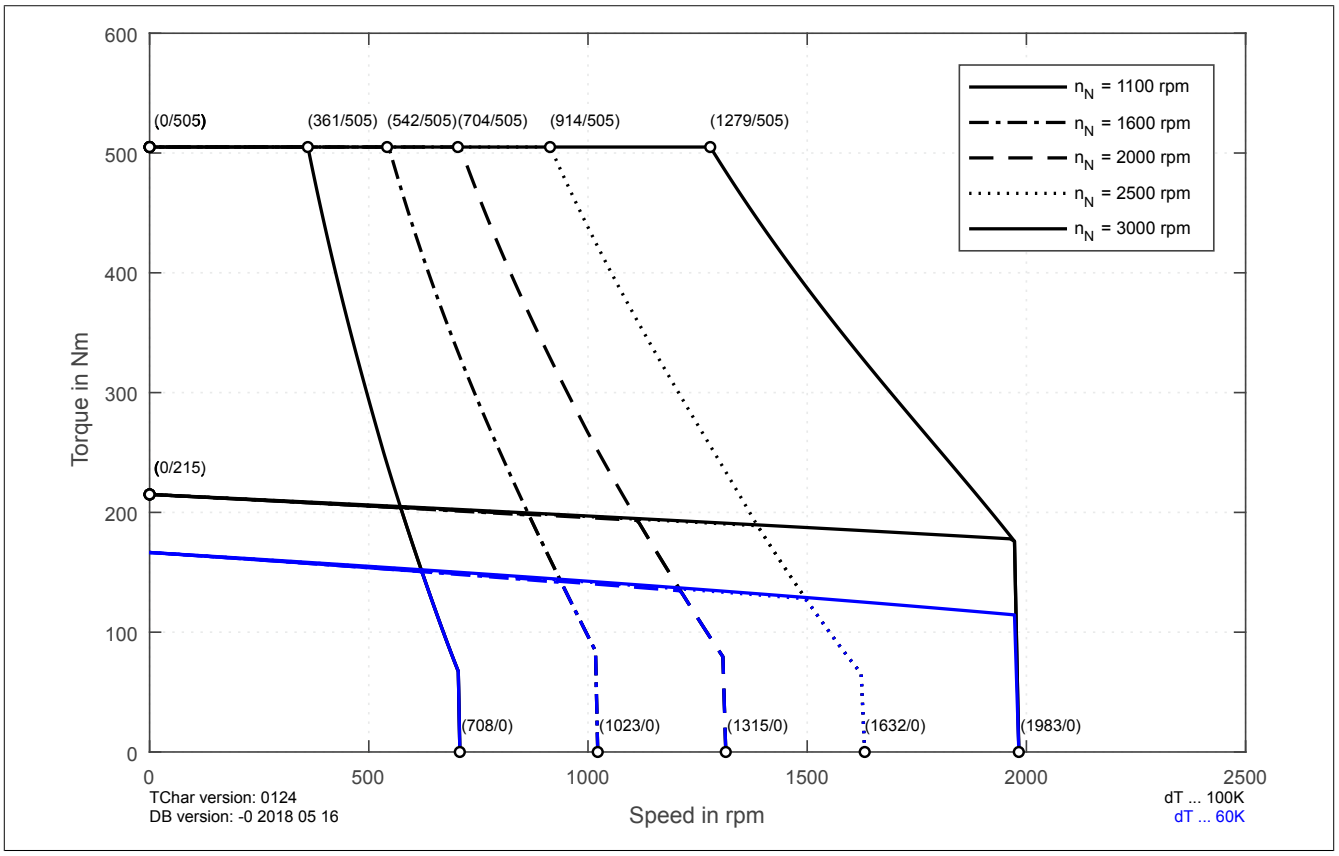
8KSL82.eennnffgg-h and 8KSM82.eennnffgg-h



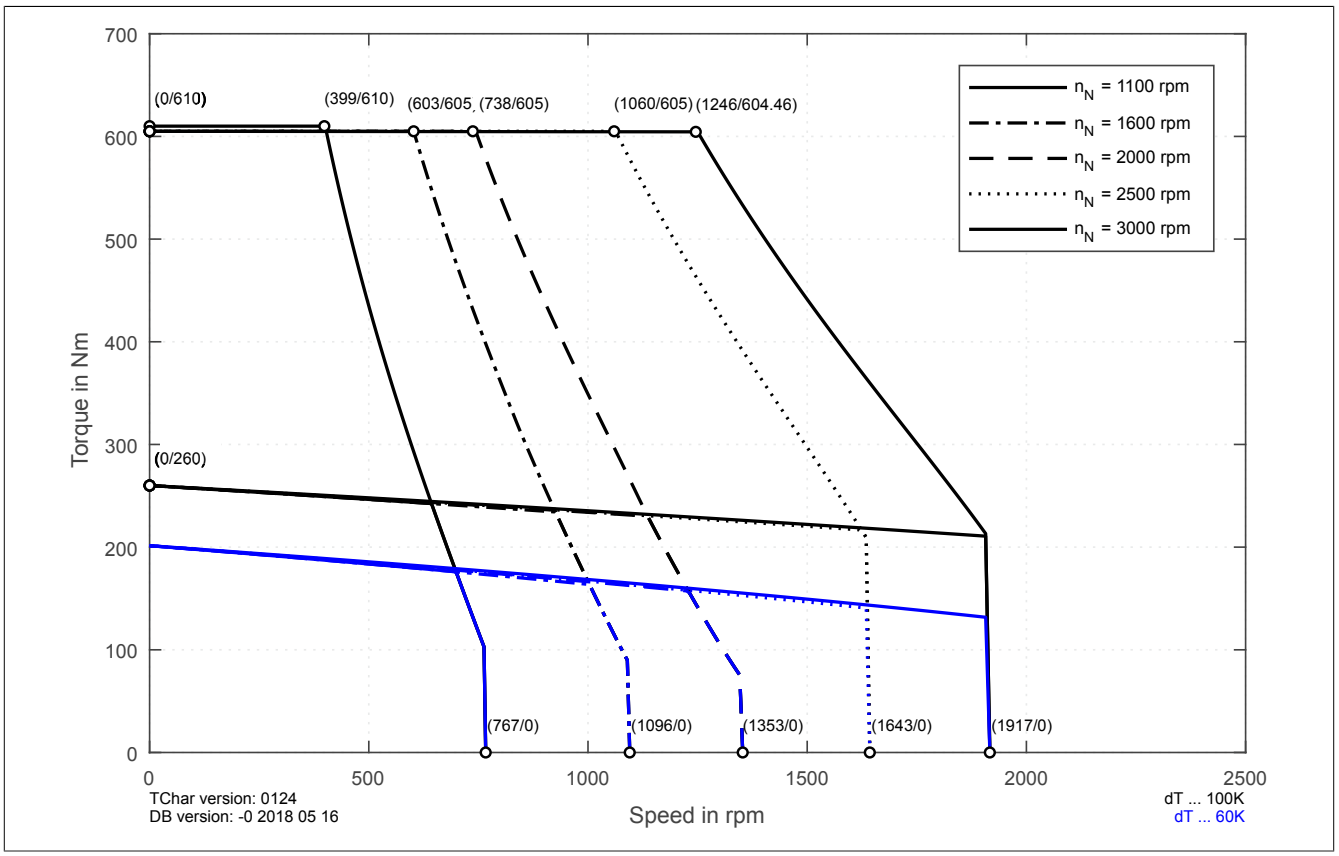
8KSL84.eennnffgg-h and 8KSM84.eennnffgg-h



8KSL85.eennnffgg-h and 8KSM85.eennnffgg-h

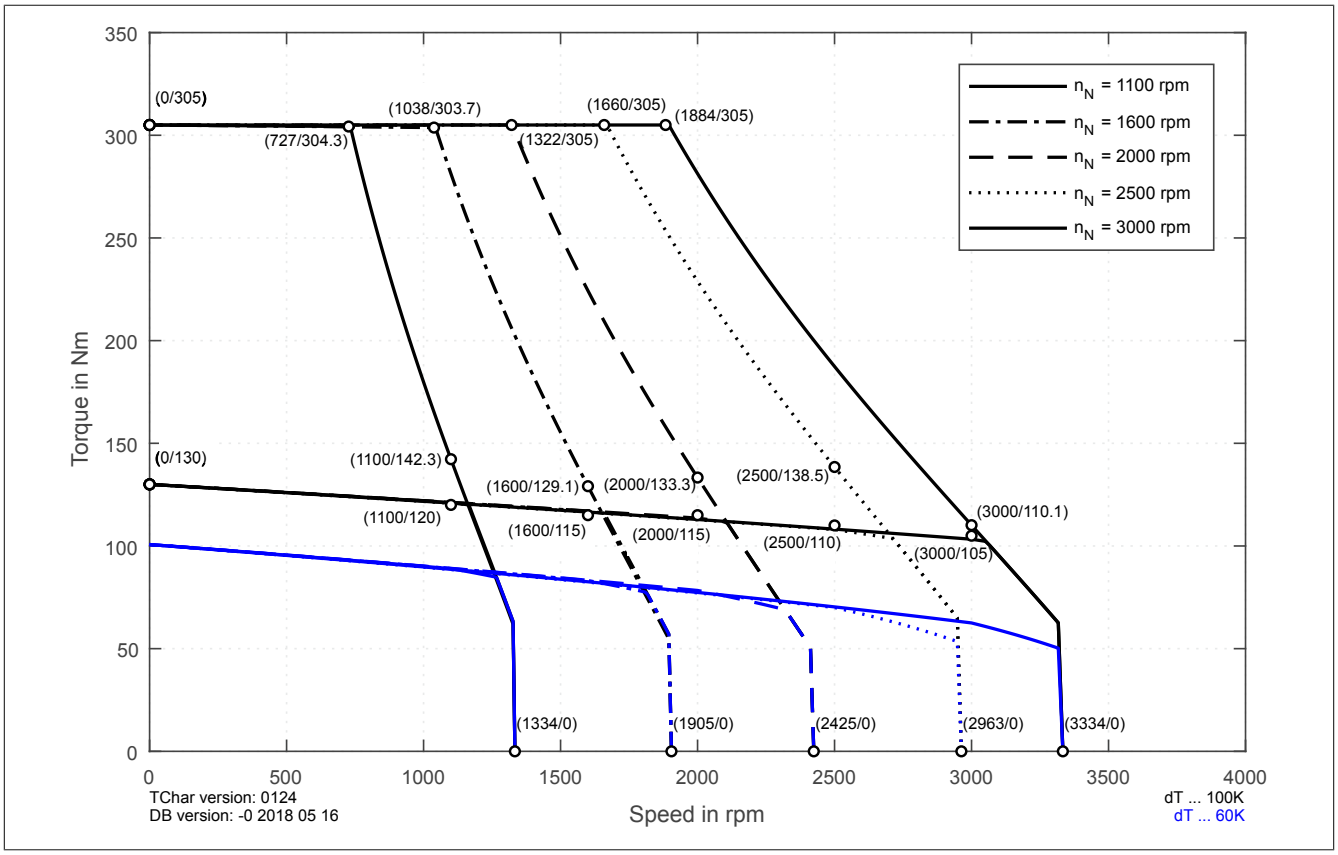


8KSL86.eennnffgg-h and 8KSM86.eennnffgg-h

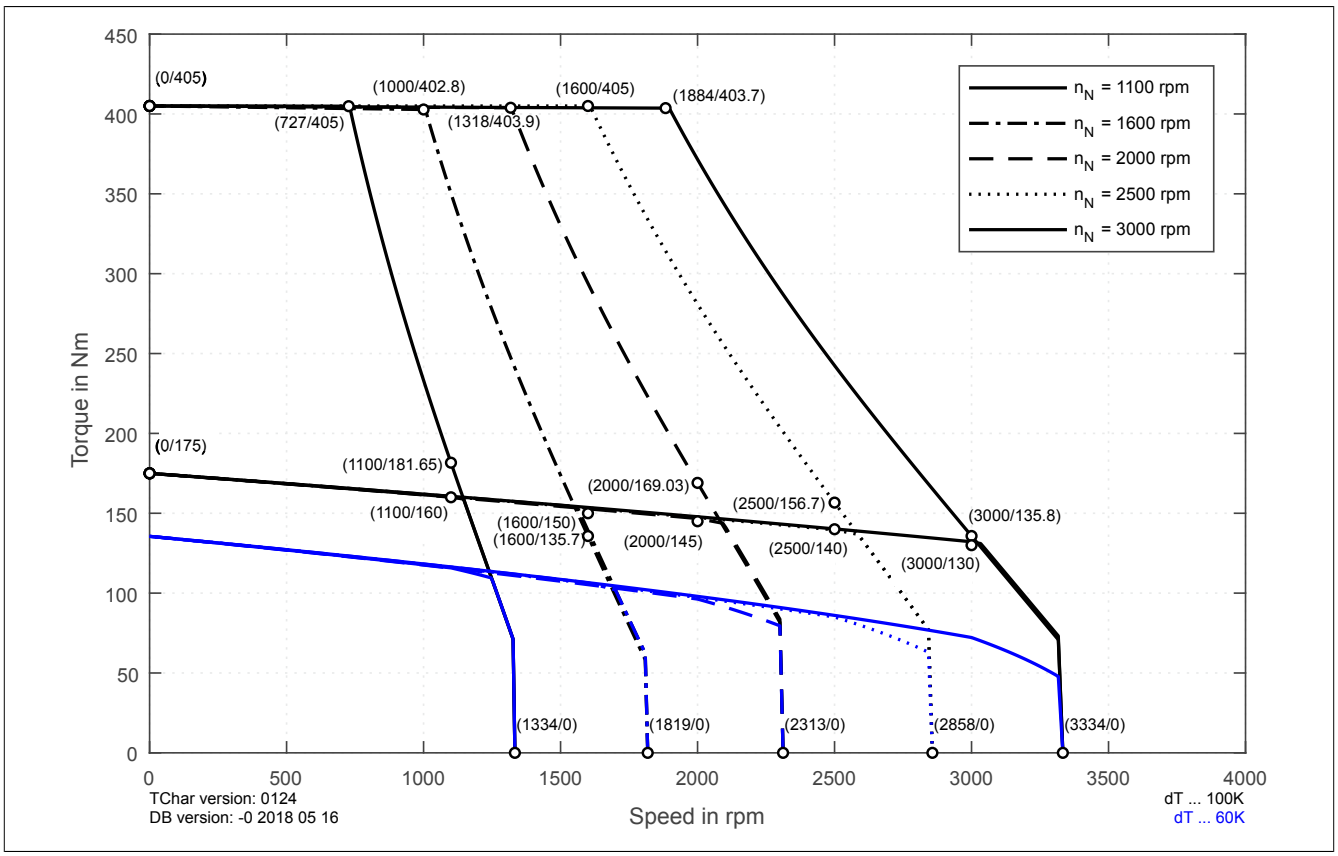


16.1.2 Speed-Torque characteristic curves at 560 VDC DC bus voltage

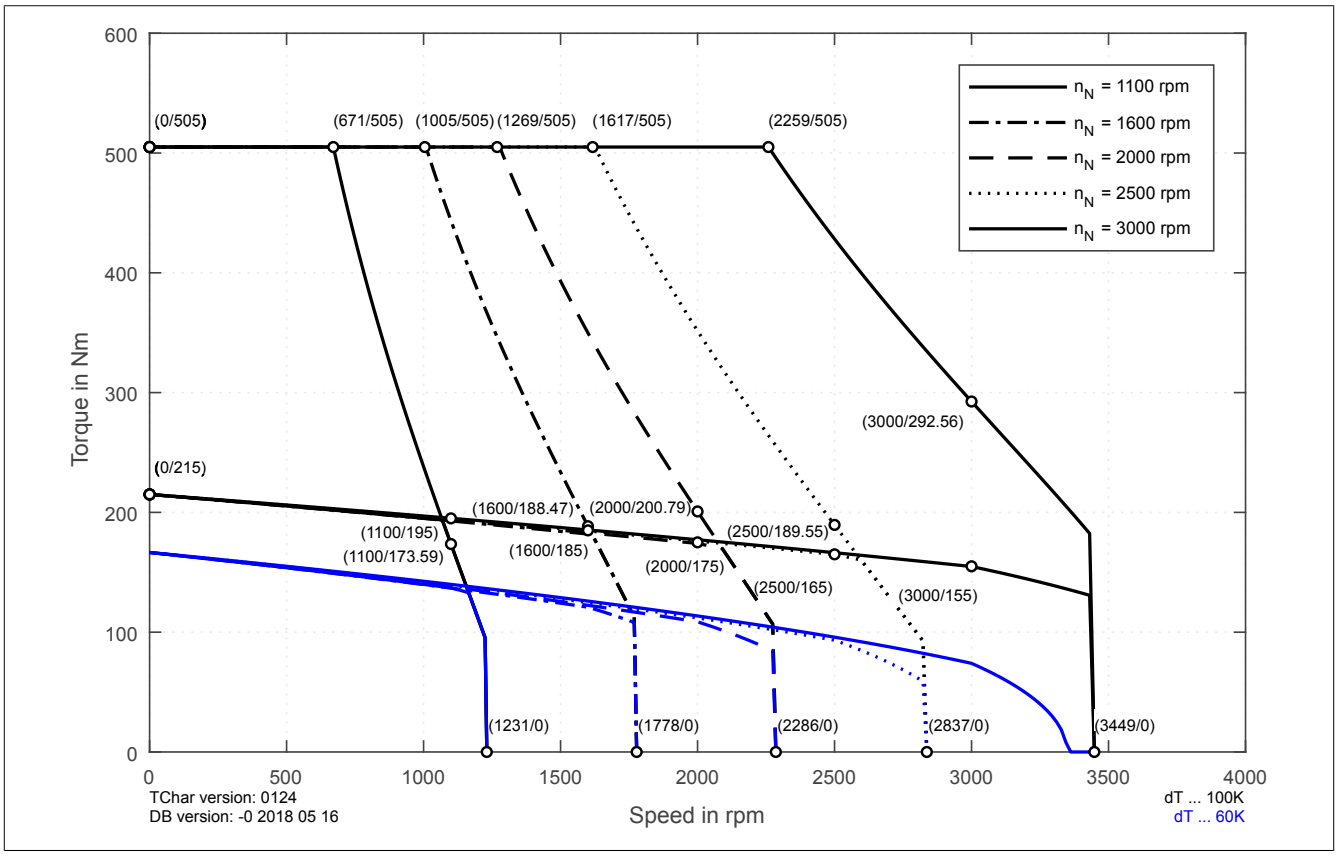
8KSL82.eennnffgg-h and 8KSM82.eennnffgg-h



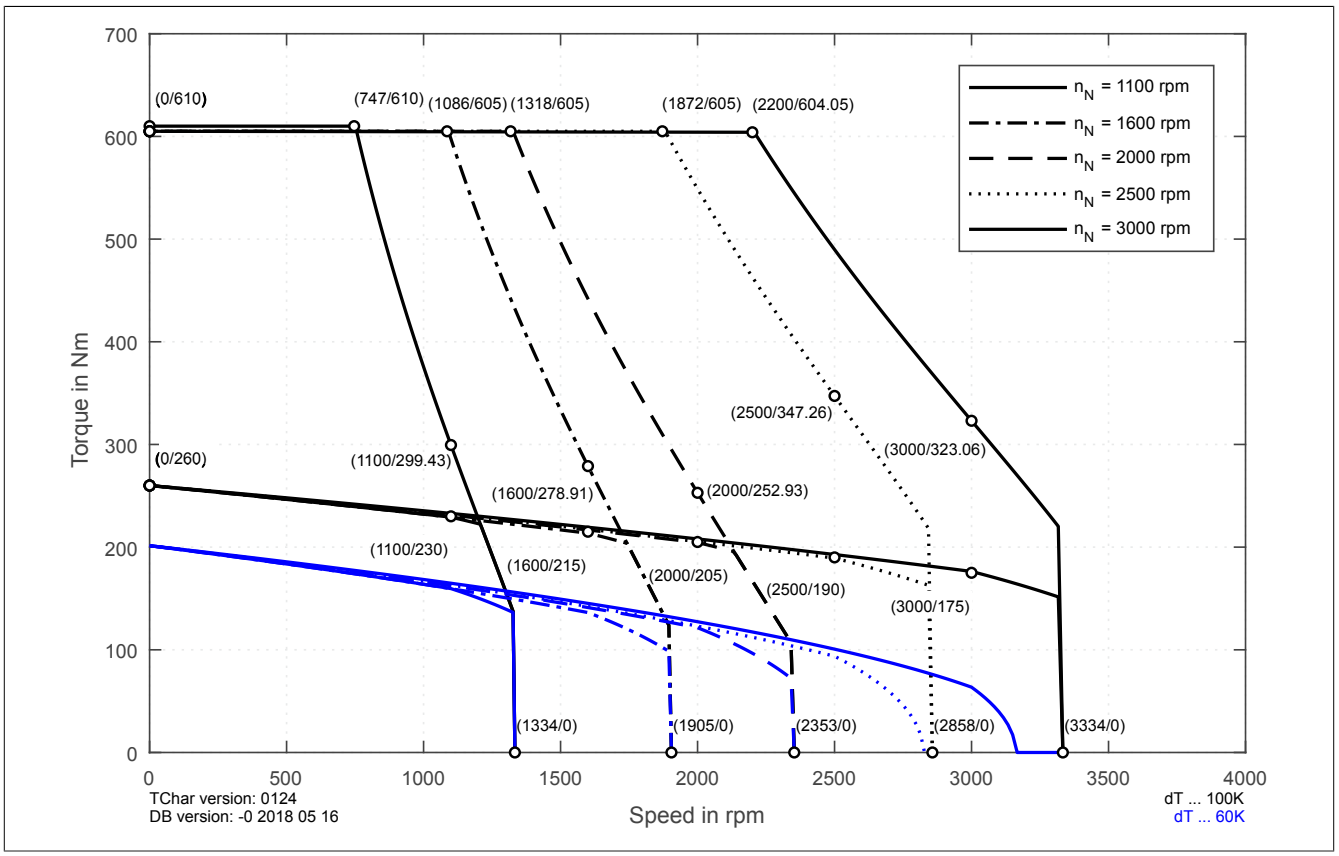
8KSL84.eennnffgg-h and 8KSM84.eennnffgg-h



8KSL85.eennnffgg-h and 8KSM85.eennnffgg-h

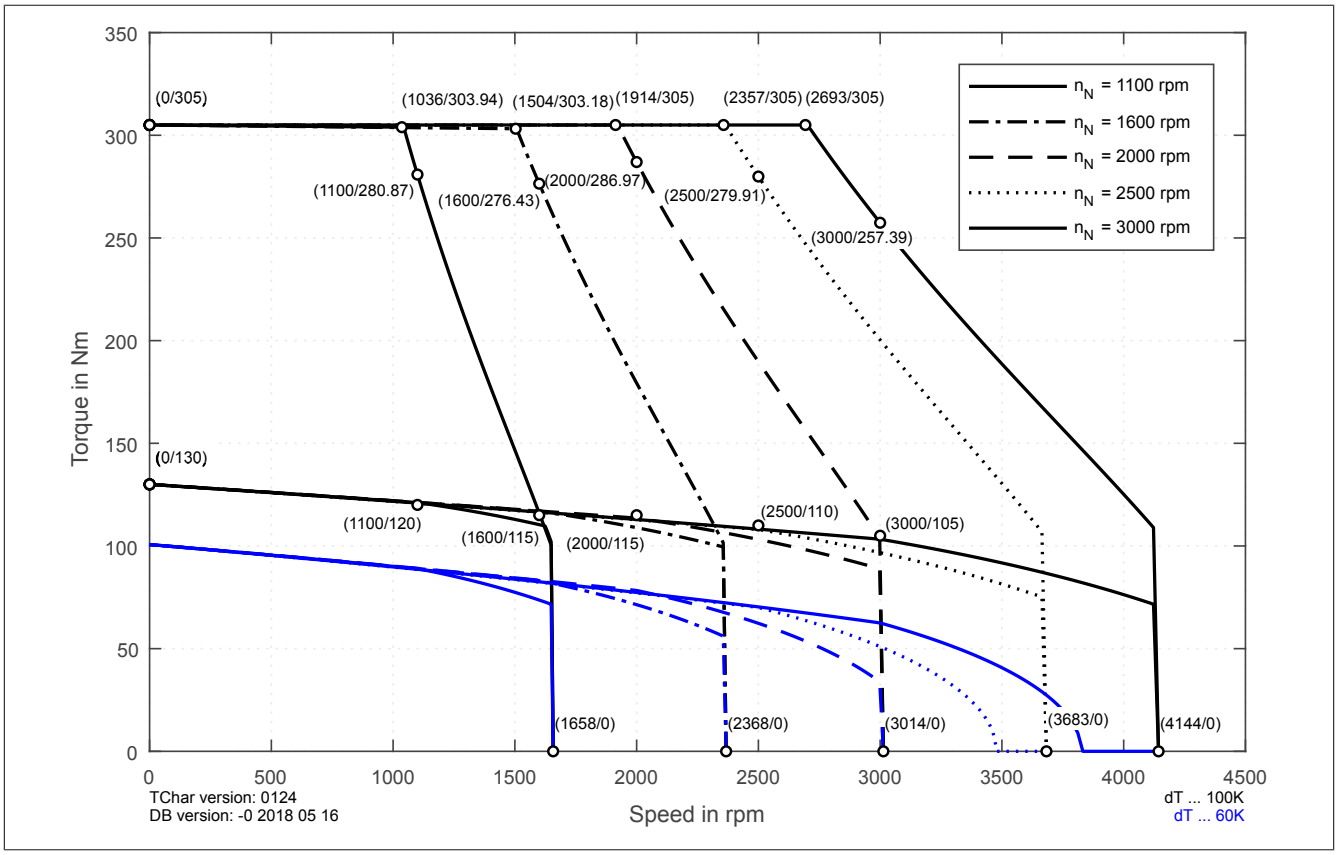


8KSL86.eennnffgg-h and 8KSM86.eennnffgg-h

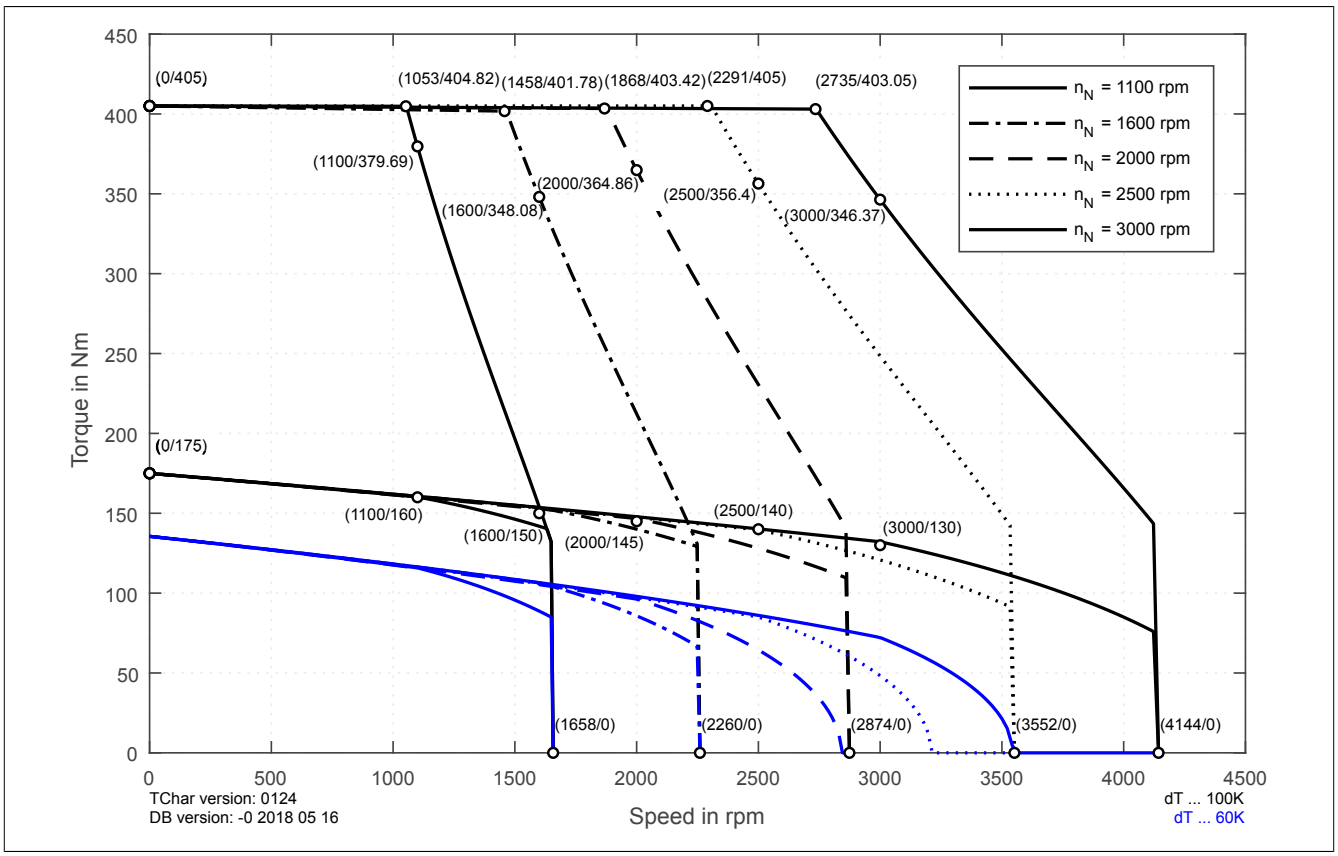


16.1.3 Speed-Torque characteristic curves at 750 VDC DC bus voltage

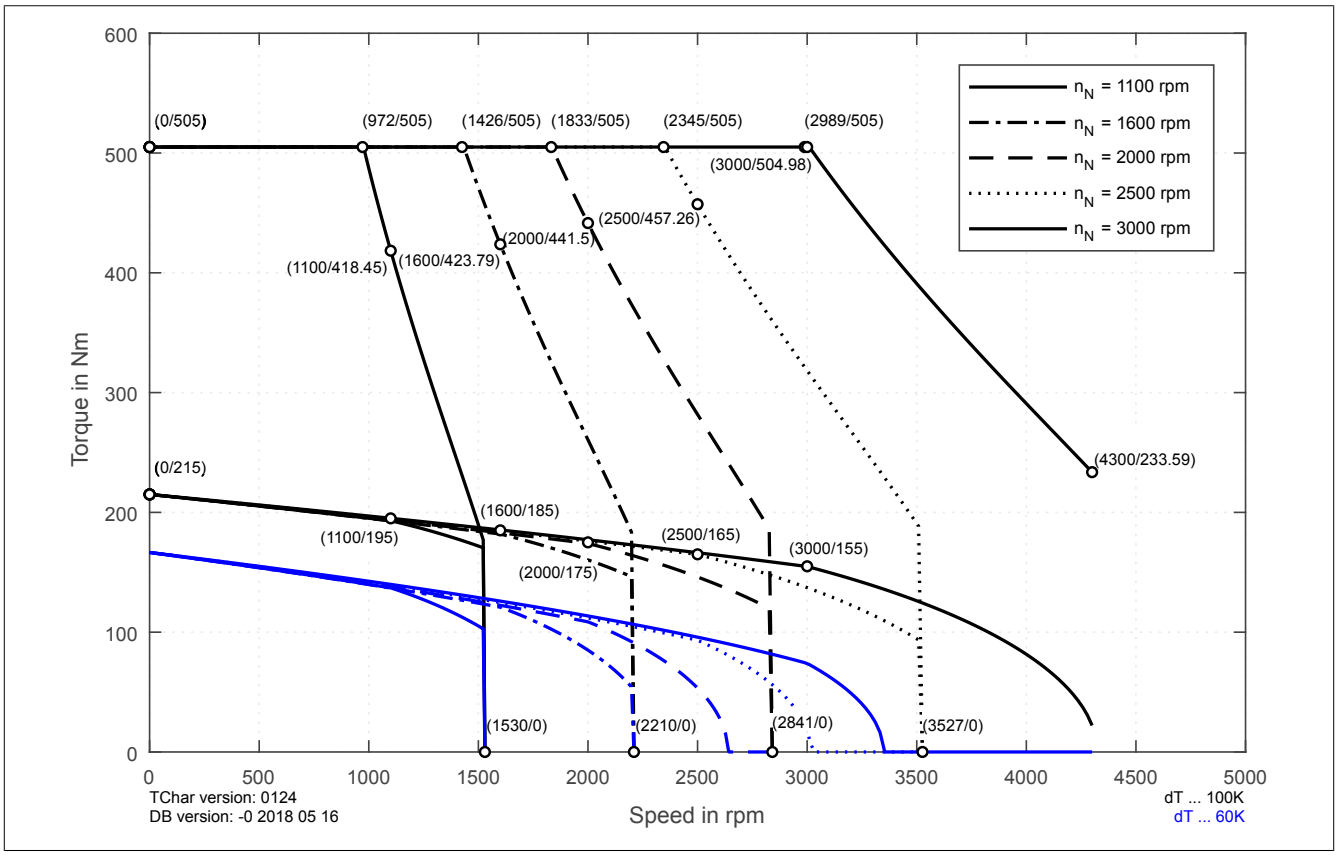
8KSL82.eennnffgg-h and 8KSM82.eennnffgg-h



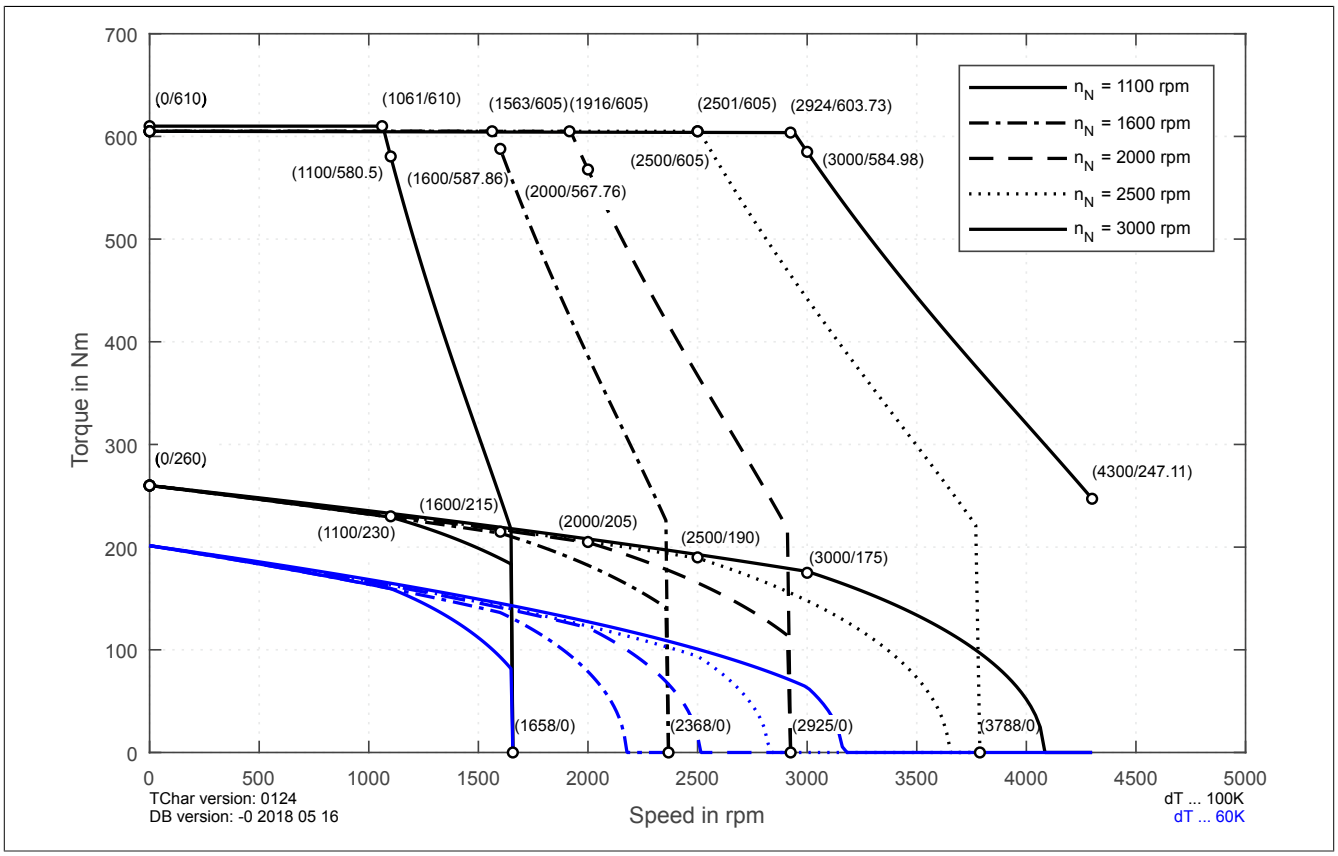
8KSL84.eennnffgg-h and 8KSM84.eennnffgg-h



8KSL85.eennnffgg-h and 8KSM85.eennnffgg-h



8KSL86.eennnffgg-h and 8KSM86.eennnffgg-h



16.1.4 8KSM8 - Dimensions

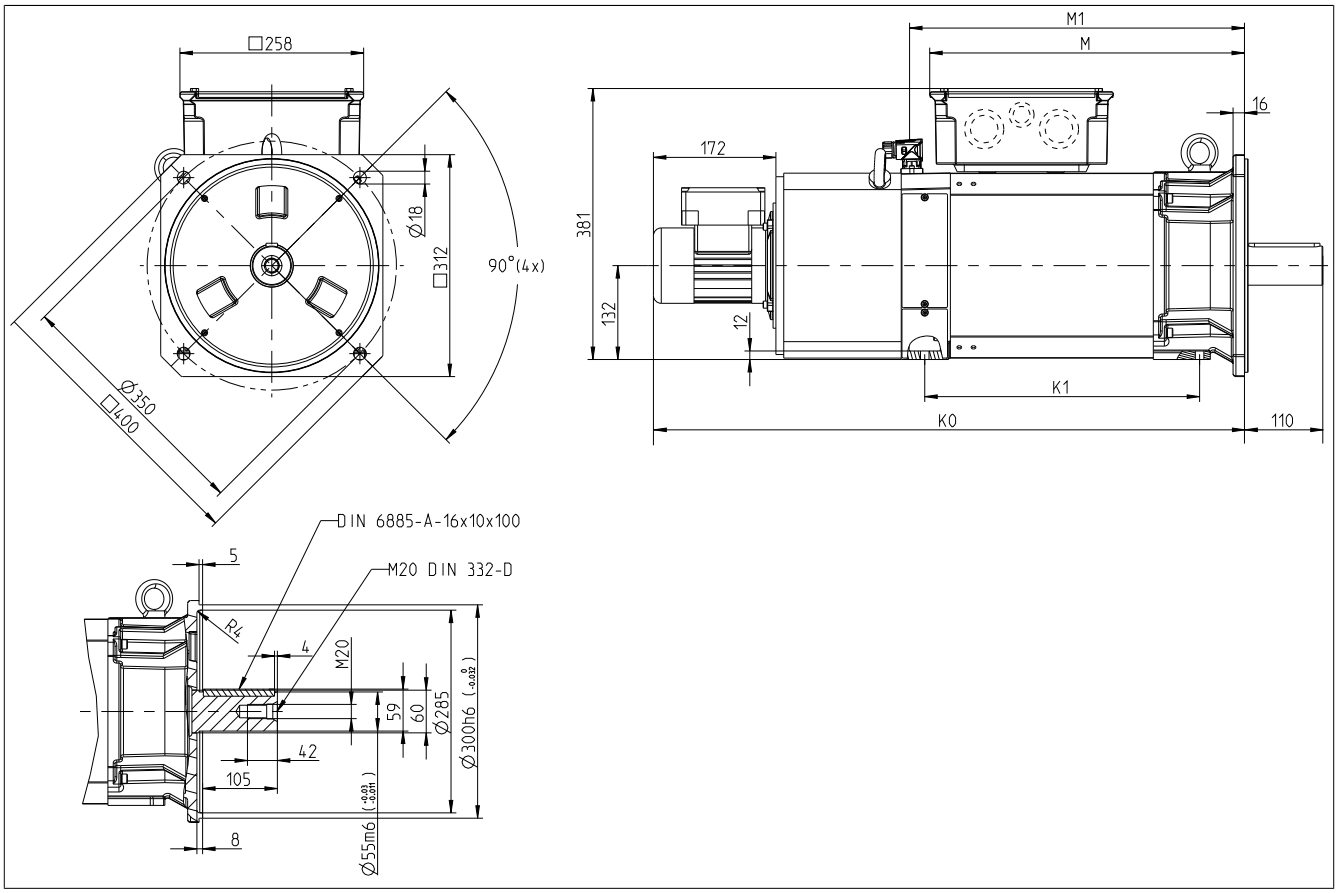


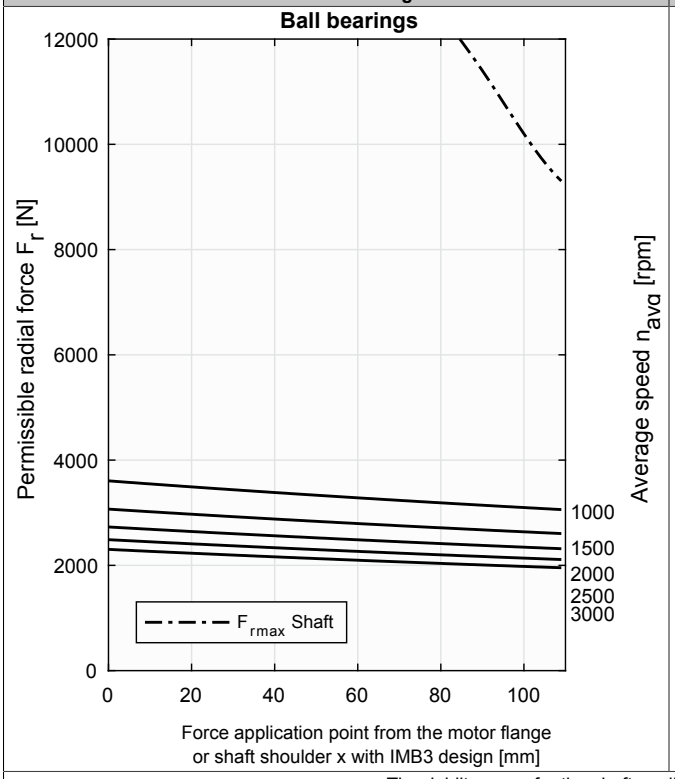
Figure 8: 8KSM8 - Dimensions

Order number	K_0	K1	M	M1	Extension of K0 or K1 and M1 with brake
8KSM82.eennnffgg-h	780	336	134	417	On request
8KSM84.eennnffgg-h	830	386	184	467	On request
8KSM85.eennnffgg-h	880	436	234	517	On request
8KSM86.eennnffgg-h	930	486	284	567	On request

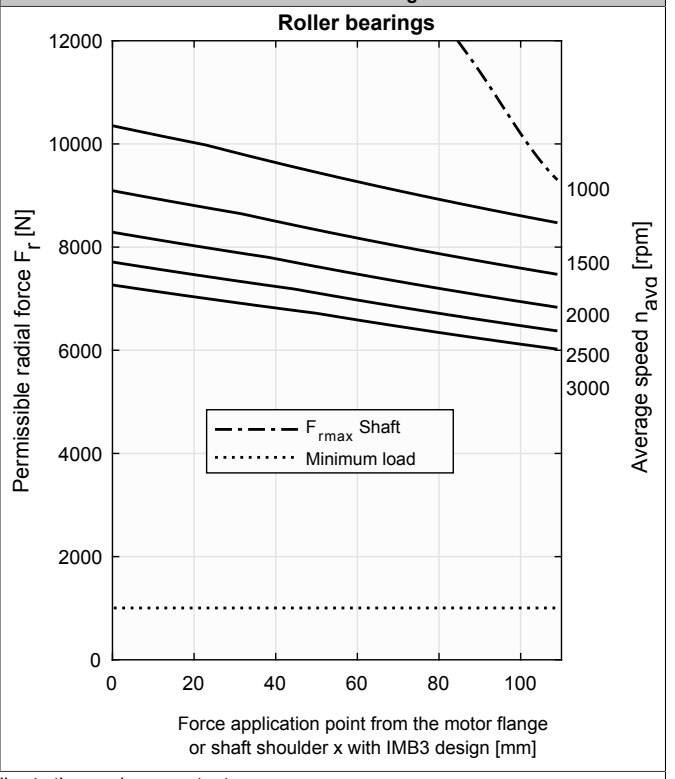
16.1.5 Maximum shaft load

The values in the diagram below are based on a mechanical service life of the bearings of 20,000 operating hours.

Standard bearing



Reinforced bearing



The rigidity curve for the shaft applies to the maximum motor torque.

Chapter 3 • Transport and storage

During transport and storage, the product must be protected against undue stress (mechanical loads, temperature, moisture, corrosive atmospheres, etc.).

If necessary, also protect existing electrostatically sensitive components such as the encoders in motors against electrostatic discharge (ESD).

Never use attachment parts (cable connection, terminal boxes, fans, etc.) for securing during transport or as supporting surfaces.

Transport and storage conditions

- The room must be dry, dust-free and free of vibrations.
- The room must be well ventilated and free from drafts.
- The air in the room is not permitted to contain aggressive or hazardous gases.

Storage and transport conditions	8KSC / 8KSD / 8KSJ / 8KSL / 8KSM
Storage temperature	-15 to 60°C
Relative humidity during storage	Max. 85%, non-condensing
Transport temperature	-15 to 60°C
Relative humidity during transport	Max. 85%, non-condensing

Radial or axial forces on the shaft

Caution!

Damage to property due to excessive radial or axial forces on the shaft.

Excessive radial or axial forces on the shaft can damage the bearing and impair the effect of any holding brake present to such an extent that the braking effect is non-existent or reduced. Similarly, encoder errors or damage to the gearbox can occur as a result.

- **Transport and store the product only in its original packaging and lying on the housing.**
- **Avoid pressure and impact on the shaft end and housing.**
- **Do not use the shaft for securing during transport.**
- **Transport and lift heavy output shaft components separately and not installed on the shaft end.**

Transport

Check product deliveries immediately for transport damage and report any damage immediately to the carrier. In the event of damage, discontinue use where applicable.

Danger!

Danger of injury due to loads!

Suspended loads can lead to personal injury or death if they fall down. Heavy loads can tilt and trap people or severely injure them.

Failure to comply with instructions, guidelines and regulations or use of unsuitable or damaged tools and devices can result in serious injury and/or damage to property.

- **Motors should only be lifted without any additional load from other products (e.g. gears, pulleys, couplings, etc.).**
- **If motors have eye bolts, only lift the motors using the eye bolts.**
- **Only use permitted lifting, transport and aids with sufficient lifting capacity.**
- **Never stand in the danger zone or under suspended loads.**
- **Secure the product against dropping and tilting.**
- **Wear safety shoes, protective clothing and a safety helmet.**
- **Comply with the national and local regulations.**

Storage

Caution!

Damage caused by degraded material properties.

Storage for long periods of time or storage under improper conditions can cause certain materials to age prematurely, to have degraded properties and to become damaged. Damaged components can then result in further damage to property.

Recommendations to avoid damage during storage:

- **Reduce the storage time to a minimum and do not exceed the maximum storage time of 2 years.**
- **Rotate the motor shaft a few turns at least every 6 months either by hand or at a low speed (max. 50 rpm). Bearing noise can occur during the run-in phase, which is perfectly normal and is not a sign of bearing damage.**
- **Apply a preservative coating to unprotected components such as the shaft end.**
- **Avoid contact corrosion.**
- **Use the original packaging.**
- **Use covers to protect against dust.**
- **Check the seals for damage when the item is issued or prior to use.**

1 Eye bolts

If motors have eye bolts, only lift the motors using the eye bolts. The position of the eye bolts depends on the overall length of the motor.

Caution!

The eye bolts are intended exclusively for lifting the motor without any additional components installed!

Availability

	Availability of eye bolts
8KSC	Yes
8KSD	Yes
8KSJ	Yes
8KSL	Yes
8KSM	Yes

Chapter 4 • Installation conditions

1 Installation conditions and cooling

General conditions

The motor can be installed in covered rooms according to its degree of protection (see nameplate) in dusty or humid environments and normal climatic conditions. If dust-containing air is used as cooling air for the air-cooled motors, dust filters with fine filter mats must be installed upstream. It is generally necessary to keep aggressive, corrosive, abrasive and plastic-dissolving media away from the motor.

Advice:

Unless special agreements have been made, the drive is designed for the following climatic operating conditions by default:

- **Ambient temperature 0°C to 40°C**
- **Installation elevation ≤1000 m above sea level**
- **Relative humidity 5% to 85%**

For all other permissible operating conditions, see DIN EN 60721-3-3 (class 3K3/3Z12).

These climatic conditions must be observed during installation!

2 Transport and temporary storage

Transport

B&R servo motors from the 8KS series have a mass of up to approx. 350 kg. See the technical documentation of the product for the exact weight. The motor shaft and connecting surfaces must be protected against corrosion. The motor is only permitted to be transported with the shaft protection cover; damage to the motor shaft must be avoided. To prevent foreign bodies from entering the fan during transport; the air inlet and air outlet openings must be covered.

Warning!

- **For the ambient conditions that are permitted to affect the motor during transport, see DIN EN 60721-3-2 (class 2K2/2M1). Contrary to the DIN standard, the permissible temperature range is reduced to -15°C to 60°C.**
- **Suitable load-handling equipment such as belt or loop lifting straps must be used.**
- **If provided, the lifting lugs on the motor can be used for lifting.**
- **The terminal boxes, shaft end, fan (if applicable) and motor connectors are not permitted to be used as transport locks or lifting lugs.**
- **Observe all applicable local regulations during transport. Equipment used to lift, transport or suspend loads must comply with applicable regulations.**

For the weight specifications of individual servo motors, see chapter "Technical data".

Appropriate load bearing equipment must be used during transport and installation. Observe all applicable local regulations. Lifting devices, ground conveyors and load suspension equipment must comply with the applicable regulations. Do not exceed the maximum capacity of lifting equipment. Use suitable cable guidance or spreading equipment, particularly if the motor is equipped with built-on assemblies. For the weight of the motor, see chapter "Technical data".

Danger!

Failure to comply with instructions, guidelines and regulations or use of unsuitable or damaged tools and devices can result in serious injury and/or damage to property.

Temporary storage

If a motor is not put into operation promptly after delivery, it must be stored in a dry, dust- and vibration-free indoor environment (V_{eff} ≤ 0.2 mm/s). 8KS servo motors should not be stored longer than 2 years. They should be stored at a temperature as uniform as possible, but not outside the temperature range of -15 to 60°C. Higher storage temperatures within the range of the operating temperature accelerate the aging process of the gaskets and bearing greases and thus have a negative effect on the service life even before commissioning. Direct sunlight, UV light and ozone also contribute to aging of the sealing elements and must therefore also be avoided! It is important to note that the warranty periods are guaranteed from the date of delivery. We therefore recommend keeping the storage time to a minimum. If longer storage cannot be avoided, however, the ambient conditions (class 1K2/1M1) listed in DIN EN 60721-3-1 must be observed. Contrary to the DIN standard, the temperature range is permitted to be extended to -15°C to 60°C.

Caution!

To avoid frost damage, it must be ensured that there is no coolant in the motor during transport or temporary storage at ambient temperatures <3°C.

2.1 Securing the bearing

Caution!

- **In order to avoid transport damage, the rotor of motors with cylindrical roller bearings (option "reinforced bearing") is blocked by a transport lock on the shaft end.**
- **This transport lock must be used again for other transports.**
- **If this transport lock can no longer be used because another output element is installed, other suitable measures for axially locking the rotor in place must be taken during transport.**

3 Delivery

Deliveries are assembled by order. Immediately report any transport damage directly to the shipping company. As soon as you receive your order, compare the power data and variants of the delivered motor with the order data.

Contact the responsible B&R technical office there are any missing or noticeably defective items.

3.1 Deviations

Caution!

There could be technical deviations from this manual if the servo motor supplied does not correspond to the standard variant according to the technical documentation, or if special contractual agreements have been made. In this case, request the corresponding technical supplements.

Warning!

Commissioning the motor is prohibited until the fault has been professionally corrected.

4 Vibrations

The system's vibration behavior at the place of use can result in an increase in the vibration values on the motor. This can be caused by output elements, installation conditions, alignment and installation as well as by the influence of external vibrations.

Caution!

- **The permissible vibration values per EN 60034-14 are not permitted to be exceeded; otherwise, this could impair the motor function motor and bearing service life. Under certain circumstances, complete balancing of the rotor with the machine actuator might be necessary (per ISO 1940).**
- **The vibrations emitted after installation are not permitted to exceed the permissible accelerations (see the technical data in chapter "General motor data").**
- **If there are changes from normal operation – e.g. increased temperatures, noises or vibrations – if in doubt, switch off the motor, determine the cause and consult the manufacturer if necessary.**

5 Water cooling

5.1 Water cooling specifications

Required connections

Size	8KSJ8	8KSJ9
Forward flow connections Return flow connections	1 1	2 2
Position of the connections	A-side, right	A-side, both sides
Connection threads	2 x G1/2"	4 x G 1/4"
Flow direction	Any	
Coolant inlet temperature	10 to 25°C (max. 5 K lower than ambient temperature)	

Table 40: Water cooling

Required cooling volumetric flow rates

Motor type	Volumetric flow rate [l/min]	Pressure drop ±15% [bar]	Heating [K]	Max. coolant pressure [bar]
8KSJ82	9	0.25	4	6
8KSJ84			5	
8KSJ85			6	
8KSJ86			7	
8KSJ92	10	0.45	5	6
8KSJ94		0.5	6	
8KSJ95		0.55	7	
8KSJ96		0.6	8	

Table 41: Cooling volumetric flow rates

Materials in the motor that come into contact with fluids

The following materials that come in contact with fluids are used in the motor:

	8KSJ8	8KSJ9
Cooling system	EPD-coated aluminum	Stainless steel
Connections	Steel galvanized	Brass
Gaskets	NBR	Vulcanized fiber

Table 42: Materials that come into contact with fluids

Cooling water quality

Clear water, free of suspended matter and dirt must used as coolant. The water must meet the following requirements:

Conditions	Value
Maximum permissible system pressure [bar]	6
Motor coolant temperature [°C]	10 to 25
pH value (at 20°C)	6.5 to 7.5
Total hardness [mmol/l]	1.43 to 2.5
Chloride - Cl [mg/l]	<200
Sulphate - SO_4^2 [mg/l]	<200
Oil [mg/ l]	<1
Permissible particle size of solid foreign bodies and particles (e.g. sand) [mm]	<0.1

Table 43: Cooling water quality

Corrosion and germ protection additives

Adding corrosion and germ protection additives are permitted in the coolant in closed cooling circuits. The type and quantity of these additives depend on the respective recommendations of the manufacturers and the prevailing ambient conditions.

Caution!

- **The safety regulations of the corresponding corrosion and germicide manufacturers for the product must be observed.**
- **Cooling lubricants from machining processes are not permitted to be used to cool the motor!**
- **A closed cooling circuit should always be filled using filtering (filter fineness: < 0.1 mm) in view of harmful deposits in the cooling channels or lines. A filter must always be provided for an open cooling circuit.**

Advice:

The plant engineer is responsible for the configuration of the entire cooling system. Condensation must always be avoided.

5.2 Connecting the cooling circuit

Caution!

- **No tensile, compressive or torsional loads from coolant lines are permitted to be applied to the motor connections.**
- **The connection is only permitted to be carried out by qualified personnel. The motor must be disconnected from the power supply.**
- **When connecting or disconnecting cooling lines, it is important to ensure that no coolant gets into the motor terminal box.**

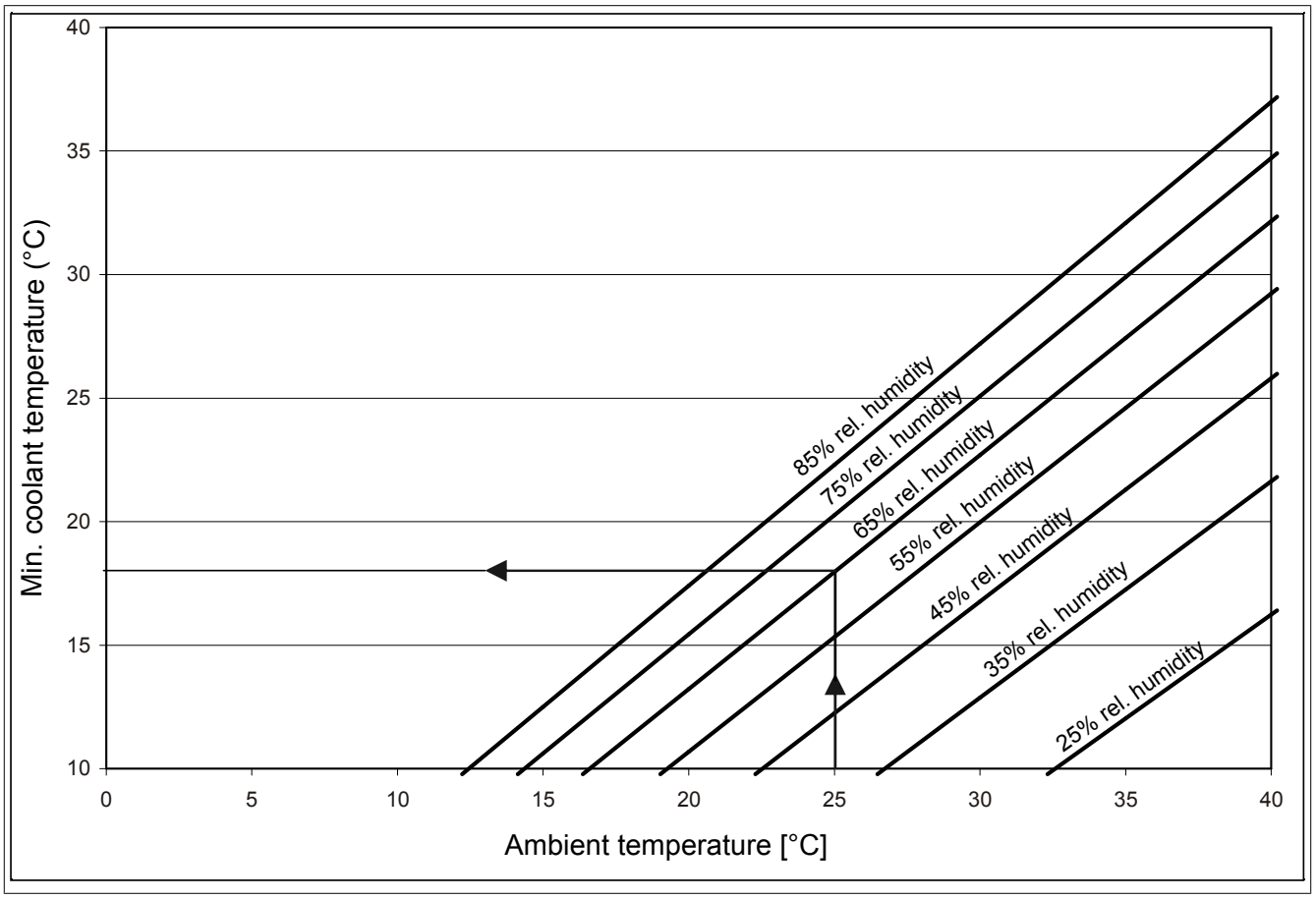
Caution!

The leak tightness of the cooling system must be checked before commissioning by performing pressure-testing with the coolant (water) (per VDE 0160 (05/88). The test pressure must be twice the operating pressure (minimum test pressure: 1 bar). It is not necessary to bring the coolant used to the operating temperature. The pressure must be maintained until the leak tightness has been tested at each point (minimum test time: 10 minutes).

5.3 Determining the coolant temperature

Minimum coolant temperature depending on the ambient conditions

The permissible temperature of the coolant depends on the relative humidity during operation and the ambient temperature. At an ambient temperature of 25°C and a relative humidity of 65%, for example, a minimum coolant inlet temperature of 18°C is permissible. The characteristic curves shown in the diagram are limiting curves. A coolant inlet temperature greater than 18°C should therefore be selected in the example.



Advice:

- **If the motor at a standstill for a longer period of time, the coolant supply must be interrupted (to avoid condensation).**
- **If ambient temperatures <3°C can occur while the motor is at a standstill for a longer period of time, the coolant must be drained as a precautionary measure (to prevent frost damage).**

5.4 Cooling system - Faults during operation

Fault	Cause of error	Correction
Overtemperature in the motor Motor temperature monitoring responds	Water cooling not active	Check and switch on, if necessary
	Insufficient coolant supply • Deposits in the cooling channels • Faults in the external cooling system	Check the water circuit. • Check and clean if necessary. • Information from plant engineers
Overload pressure in the cooling system	Highly contaminated coolant	Filter the coolant.
	Cooling ducts clogged	Check and clean if necessary.
	Faults in the external cooling system	Information from plant engineers

Table 44: Water cooling - Faults during operation

6 Air cooling specifications

Required cooling quantities

Size	8KSC/D8	8KSC/D9
Air volume [m^3/min]	≥5.8	≥9.5
Pressure head [Pa]	≥370	≥640
Air direction for centrifugal fan	From B to A	
Air direction for axial fan	From A to B	

Table 45: Required cooling quantities

Notice!

- **Thermal convection and thermal radiation are not permitted to be affected by the installation conditions.**
- **During forced air cooling, cooling air must be able to flow in unhindered and the warm air must be able to flow out freely.**
- **The motor must be installed so that heated exhaust air cannot be drawn in again. This applies to exhaust air from the device itself as well as other nearby devices.**
- **The distance to adjacent machine parts should not be less than 100 mm.**
- **In case of heavy dirt accumulation, the housing surface and airways must be cleaned regularly.**

7 Load capacity of the shaft end and bearing

8KS three-phase synchronous motors are equipped with grooved ball bearings that are sealed on both sides and lubricated.

Caution!

To ensure proper lubrication of the grooved ball bearings after long storage times, the motor shaft must be turned a few revolutions manually at least every 2 years.

Radial and axial forces (F_r, F_a) applied to the shaft end during operation and installation must be within the specifications listed below. Bearing elements are not permitted to be subjected to shocks or impacts! Incorrect handling will reduce the service life and result in damage to the bearings.

Installation

The permissible axial forces F_a during the installation of pinion gears, couplings, etc. depend on the motor size and are listed in the following table:

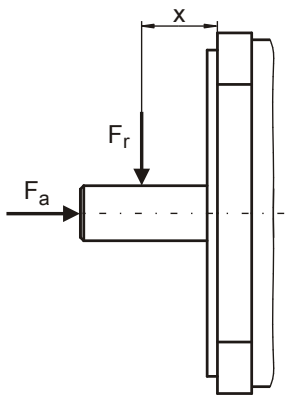
Motor size	Permissible axial force F_a [N]	
	Standard bearing	Special motor option "Reinforced A-side bearing"
2	850	---
3	1400	---
4	2300	5050
5	2500	9500
6	2500	9500
7	5500	9500
8	9500	18700
F_r ... Radial force F_a... Axial force x ... Distance between the motor flange (or shaft shoulder for IMB3 construction types) and the point where radial force F_r is applied.	 Figure 9: Definition of shaft load	

Table 46: Permissible axial force Fa during installation

Warning!

Excessive axial forces on the motor shaft during installation can damage the bearings and weaken the motor holding brake until the breaking effect is reduced or nonexistent. Encoder errors can also occur.

Therefore, excessive pressure or shocks to the front shaft end or the rear housing cover should be avoided under all circumstances.

Loads caused by a hammer definitely exceed the permissible values!

Operation

Radial force

Radial force F_r on the shaft end is a function of the loads during installation (e.g. belt tension on pulleys) and operation (e.g. load torque on the pinion). The maximum radial force F_r depends on the shaft end variant, bearing type, average speed, the position where the radial force is applied and the desired service life of the bearings.

Warning!

Excessive radial forces can result in premature wear of the bearings or, in extreme cases, can cause the shaft end to break.

Caution!

When using add-on drive elements on the drive shaft, overdetermined bearings must be avoided. The necessarily occurring tolerances cause additional forces on the motor shaft bearings. This can damage or significantly reduce the service life of the bearings!

Axial force, shift in shaft position caused by axial force

Axial force F_a on the shaft end is a function of the loads during installation (e.g. stress caused by mounting) and operation (e.g. thrust caused by slanted tooth pinions). The maximum axial force F_a depends on the bearing type and the desired service life of the bearings. The fixed bearing is secured on the B-side flange with a retaining ring. The floating bearing on the B-side flange is preloaded with a spring in the direction of the A-side flange. Axial

forces in the direction of the B-side flange can cause the spring bias to be overcome, which shifts the shaft by the amount of axial backlash in the bearing (approx. 0.1 - 0.2 mm). This shift can cause problems on motors with holding brakes or motors with EnDat encoders (EA and EB). As a result, **no** axial force is permitted in the direction of the B-side flange when using these motors.

Warning!

Axial loads are not permitted on shaft ends of motors with holding brakes. It is especially important to prevent axial forces in the direction of the B flange since these forces can cause the brake to fail!

Information:

Axial loads are not permitted on shaft ends of motors with EnDat encoders. It is especially important to prevent axial forces in the direction of the B flange since these forces can cause encoder errors!

Determining permissible values for F_r and F_a

For information about determining permissible values of F_r and F_a, see the motor data for the respective three-phase synchronous motor. Permissible values are based on a bearing service life of 20,000 h (bearing service life calculation based on DIN ISO 281).

Warning!

Simultaneously loading the shaft end with the maximum values of F_r and F_a is not permitted! Contact B&R if this occurs.

Chapter 5 • Installation and connection

1 Before installation

Read this user's manual completely before performing any work activities.

In addition, take into account the technical documentation for all other machine components as well as the finished machine.

2 Safety

Work on motors and their wiring is only permitted to be carried out by qualified personnel [2)] without voltage applied. The control cabinet must first be disconnected from the power supply and secured against being switched on again.

Only use appropriate equipment and tools. Protect yourself with safety equipment.

Warning!

Personal injury and damage to property due to unauthorized modifications!

As a result of unauthorized modifications to the product, the performance and limit values can be negatively affected and dangers can arise. Due to this, severe damage to property and injuries cannot be excluded.

Unauthorized modifications are therefore prohibited!

- **Do not carry out any unauthorized modifications or alterations to the product.**
- **If necessary, contact B&R.**

Caution!

The eye bolts included in delivery are intended exclusively for lifting the motor without any additional components installed!

2.1 General sources of danger

Tampering of protection or safety devices

Protective and/or safety devices protect you and other persons from dangerous voltage, rotating or moving elements and hot surfaces.

Danger!

Personal injury and damage to property due to tampering of protective equipment!

If protective or safety devices are removed or put out of operation, there is no longer any personal protection and serious personal injury and damage to property can occur.

- **Do not remove any safety devices.**
- **Do not put any safety devices out of operation.**
- **Always use all safety devices during short-term test and trial operations!**

Dangerous voltage

To operate the motors, dangerous voltage must be applied to certain parts.

[2)] see "Qualified personnel" on page 6

Danger!

Risk of injury due to electric shock!

If live parts are touched, there is immediate danger of fatal electric shock.

If connections are connected or disconnected in the incorrect order or when the power is switched on, electric arcs can occur and persons and contacts can be damaged.

Even if the motor is not rotating or is running as a generator driven externally, the control and power connections can still carry voltage!

- **Never touch connections when the power is switched on.**
- **Never disconnect or connect electrical connections to the motor and servo drive when the power is switched on!**
- **Do not stay in the danger zone during operation and secure it against access by unauthorized persons.**
- **Always operate the motor with all safety equipment. Do this even during short testing and trial operations!**
- **Keep all covers and control cabinet doors closed during operation and as long as the machine is not disconnected from the power system.**
- **Before working on motors, gearboxes or servo drives or in the danger zone of your machine, disconnect them completely from the power system and secure them against being switched on again by other persons or automatic systems.**
- **Note the discharge time of any existing DC bus.**
- **Only connect measuring instruments when the power is switched off!**

Danger due to electromagnetic fields

Electromagnetic fields are generated by the operation of electrical power engineering equipment such as transformers, drives and motors.

Danger!

Danger to health due to electromagnetic fields!

The functionality of a heart pacemaker can be impaired by electromagnetic fields to such an extent that the wearer experiences harm to his or her health, possibly with a fatal outcome.

- **Observe relevant national health and safety regulations.**
- **Persons with pacemakers are not allowed to be in endangered areas.**
- **Warn staff by providing information, warnings and safety identification.**
- **Secure the danger zone by means of barriers.**
- **Reduce electromagnetic fields at their source (using shielding, for example).**

Dangerous motion

By rotating and positioning motions of the motors, machine elements are moved or driven and loads conveyed.

After switching on the machine, movements of the motor shaft must always be expected! For this reason, higher-level protective measures must be put in place to ensure that personnel and machines are protected. This type of protection can be achieved, for example, by using stable mechanical protective equipment such as protective covers, protective fences, protective gates or photoelectric sensors.

In the immediate vicinity of the machine, provide sufficient and easily accessible emergency switching-off devices to stop the machine as quickly as possible in the event of an accident.

Danger!

Danger of injury due to rotating or moving elements and loads!

By rotating or moving elements, body parts can be drawn in or severed or subjected to impacts.

- **Do not stay in the danger zone during operation and secure it against access by unauthorized persons.**
- **Before working on the machine, secure it against unwanted movements. A holding brake is not suitable for this!**
- **Keep all covers and control cabinet doors closed during operation and as long as the machine is not disconnected from the power system.**
- **Always operate the motor with all safety equipment. Do this even during short testing and trial operations!**
- **Motors can be started automatically via remote control! If appropriate, a corresponding warning symbol must be applied, and protective measures must be implemented to prevent entry into the high-risk area.**

Danger!

Danger of injury due to loads!

Suspended loads can lead to personal injury or death if they fall down. Heavy loads can tilt and trap people or severely injure them.

Failure to comply with instructions, guidelines and regulations or use of unsuitable or damaged tools and devices can result in serious injury and/or damage to property.

- **Motors should only be lifted without any additional load from other products (e.g. connection elements).**
- **Only use permitted lifting, transport and aids with sufficient lifting capacity.**
- **Never stand in the danger zone or under suspended loads.**
- **Secure the product against dropping and tilting.**
- **Wear safety shoes, protective clothing and a safety helmet.**
- **Comply with the national and local regulations.**

Warning!

Danger of injury due to incorrect control or a defect.

Improper control of motors or a defect can result in injuries and unintended and hazardous movements of motors.

Such incorrect behavior can be triggered by:

- **Incorrect installation or faults when handling components**
- **Improper or incomplete wiring**
- **Defective devices (servo drive, motor, position encoder, cables, brake)**
- **Incorrect control (e.g. caused by software error)**

Risk due to hot surfaces

Due to the power dissipation from the motor and friction in the gearbox, these components as well as their environment can reach a temperature of more than 100°C.

The resulting heat is released to the environment via the housing and the flange.

Warning!

Risk of burns due to hot surfaces!

Touching hot surfaces (e.g. motor and gearbox housings, as well as connected components), can lead to very severe burns due to the very high temperature of these parts.

- **Do not stay in the danger zone during operation and secure it against access by unauthorized persons.**
- **Never touch the motor or gearbox housing as well as adjacent surfaces during nominal load operation.**
- **Be aware of hot surfaces also during standstill.**
- **Allow the motor and gearbox to cool down sufficiently before working on them; there remains the risk of burns for a long period of time after they are switched off.**
- **Always operate the motor or gearbox with all safety devices. Do this even during short testing and trial operations!**

2.2 Noise emissions

Take into account the health of personnel in proximity to the machine.

Warning!

Hearing damage due to noise levels.

During operation, the motor can exceed the permissible workplace noise level and also cause hearing damage.

- **Implement suitable noise reduction measures (e.g. housings, covers or other sound-insulating measures).**
- **Take into account applicable industrial safety regulations.**

3 Shaft end and bearing

The motor shaft is supported on both sides with grease-lubricated grooved ball bearings. Protect the motor from damage due to excessive radial and axial forces!

Under all circumstances, avoid the following loads on the front shaft end or the rear motor housing cover:

- Excessive pressure
- Impacts
- Hammer blows

Warning!

Damage due to excessive axial forces!

The motor bearings can be damaged or the service life reduced by excessive axial forces (e.g. by impacting or pressing) on the shaft. Damage to the encoder or any installed options (holding brake, gearbox) is also possible.

- **Do not hit the motor or output shaft with a hammer. The impact of a hammer certainly exceeds the permissible values.**
- **In addition, avoid impact and excessive pressure on the motor and output shaft.**

Overdetermined bearing

Avoid an overdetermined bearing when attaching drive elements onto the output shaft! The necessarily occurring tolerances cause additional forces on the output shaft bearing. This can damage or significantly reduce the service life of the bearings!

Lifting and transporting

The weight of attachment elements (toothed gears, pulleys, couplings, etc.) can have a harmful effect on the bearing during lifting and transportation from the motor. Take into account these radial and axial loads during these operations!

Installing and removing attachment elements

Always install and remove the attachment elements (toothed gears, pulleys, couplings, etc.) at the shaft end without any axial load on the motor bearings and all other parts installed in the motor. For this, use suitable clamping sets, pressure sleeves, other clamping elements, retractors, etc. The centering hole on the face side of the shaft end can be used for this work.

Pay attention to balanced connection elements or corresponding assembly.

Secure the attachments against unintended loosening after installation and before operation.

4 Installation and securing

Check the following before and during installation:

- The motor is not damaged.
- The motor is not installed in the danger zone of other equipment.
- The intended use is observed (see chapter "General information and technical data"). The nameplate data, warning and informational signs are observed.
- The anti-corrosion agent has been removed from the shaft end without leaving behind any residue.
- The motor is appropriately designed for the ambient conditions and environmental influences on site (see chapter "Operating conditions").
- The installation space in the machine is suitable for the cooling type of the servo motor. The motor must be installed in such a way that cooling lines can be connected or air intake/outtake from the fan is ensured.
- Sufficient space is provided in the machine for connecting the motor and for inspection and maintenance work. For the installation dimensions of the motor with tolerance specifications, see the technical documentation or the dimensions image provided.
- The motor can be installed and operated with the available connection data and installation options. When installing the motor flange, ensure that the flange surface is well and evenly supported. The housing and contact surfaces must be undamaged and clean. They should be in exact positional accuracy to the connecting shafts in order to avoid damaging loads in the complete system due to misalignment of bearings, shafts and housing. When tightening the flange mounting screws (at least property class 8.8), tension on the flange connection must be avoided.
- The permissible radial forces are not exceeded according to the operating characteristic curves in the technical documentation for the product (if necessary, contact the B&R subsidiary). For axial forces, clarification with the motor manufacturer is always necessary.
- The brake (optional) can be released after applying the operating voltage (audible switching noise).
- The rotor can be rotated evenly and without scraping noise. For a motor with an integrated brake, release the brake beforehand.
- The design of the motor and encoder cable corresponds to the specifications in the product's technical documentation.
- The output elements and machine actuators are secured.
- The complete cooling system is leak-proof and functional, and protected against possible foreign bodies falling in.

4.1 Balancing output elements

Warning!

- **Do not apply shock loads to the shaft and bearing.**
- **Axial forces are not permitted on the motor when installing or uninstalling output elements.**
- **Generally required measures for protection against contacting output elements must be observed.**
- **If a motor is commissioned without an output element, the shaft key must be secured against being ejected.**

Balancing

In the standard variant, rotors are dynamically balanced with half-keys (per EN 60034-14 / ISO 8821 / ISO 1940)

Information:

Observe the balancing type marking on the shaft end face:

H = Balancing with half-keys Standard variant

Output elements

When installing the output element, it is important to ensure that the appropriate balancing method is being used. The output elements must be balanced per ISO 1940.

Information:

Suitable devices must always be used when installing or uninstalling output elements (e.g. coupling disks, toothed gears, pulleys).

- **Use tapping in the shaft end.**
- **Use spacers to mechanically protect the shaft when pulling off.**
- **If necessary, heat up the output elements before installing (max. permissible temperature at shaft end: 150°C for a short time).**

Caution!

- **For shaft variants without a key, the machine actuators must be secured to the output shaft using suitable clamping sets.**
- **For shaft variants with a key, it is important to ensure that the output elements are in contact with the shaft shoulder. Chamferor radius on the output element and shaft radius to the shoulder (per DIN 748-1) must match.**
- **If the tapping hole in the shaft end is used for the axial securing of output elements (e.g. pulleys), the tightening torques listed in the table are not permitted to be exceeded.**

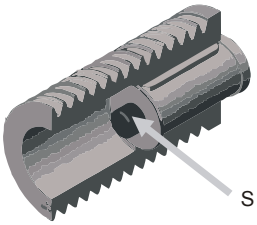
	Screw thread	Tightening torque [Nm]
	M10	19
	M12	33
	M16	80
	M20	160

Table 47: Tightening torques using locking screw S of a pulley as an example

Warning!

Suitable screw locking measures must be implemented.

5 Connecting and disconnecting the motor

Observe the following safety guidelines and instructions when connecting and disconnecting the motor:

The protective ground conductor must be connected via the power connection or motor connector.

Danger!

Personal injury and damage to property due to missing ground potential!

If there is no proper ground potential on the motor housing or servo drive, fault currents can lead to serious personal injury and damage to property.

- **Properly (also during short-term test and trial operation!) connect the motor housing and the servo drive to the ground potential (PE rail).**

Danger!

Personal injury and damage to property due to direct mains connection!

Connecting the motor directly to the mains results in severe personal injury and damage to property.

- **Only operate the motor with B&R drive systems.**

Danger!

Risk of injury due to electric shock!

If live parts are touched, there is immediate danger of fatal electric shock.

If connections are connected or disconnected in the incorrect order or when the power is switched on, electric arcs can occur and persons and contacts can be damaged.

Even if the motor is not rotating or is running as a generator driven externally, the control and power connections can still carry voltage!

- **Never touch connections when the power is switched on.**
- **Never disconnect or connect electrical connections to the motor and servo drive when the power is switched on!**
- **Do not stay in the danger zone during operation and secure it against access by unauthorized persons.**
- **Always operate the motor with all safety equipment. Do this even during short testing and trial operations!**
- **Keep all covers and control cabinet doors closed during operation and as long as the machine is not disconnected from the power system.**
- **Before working on motors, gearboxes or servo drives or in the danger zone of your machine, disconnect them completely from the power system and secure them against being switched on again by other persons or automatic systems.**
- **Note the discharge time of any existing DC bus.**
- **Only connect measuring instruments when the power is switched off!**

Warning!

Risk of burns due to hot surfaces!

Touching hot surfaces (e.g. motor and gearbox housings, as well as connected components), can lead to very severe burns due to the very high temperature of these parts.

- **Do not stay in the danger zone during operation and secure it against access by unauthorized persons.**
- **Never touch the motor or gearbox housing as well as adjacent surfaces during nominal load operation.**
- **Be aware of hot surfaces also during standstill.**
- **Allow the motor and gearbox to cool down sufficiently before working on them; there remains the risk of burns for a long period of time after they are switched off.**
- **Always operate the motor or gearbox with all safety devices. Do this even during short testing and trial operations!**

5.1 Cables and connectors

Information:

To find the technical data and order data for the cables, see the current user's manual for the B&R drive system being used.
They are available in the Downloads section of the B&R website (www.br-automation.com).

5.1.1 Cables from other manufacturers

Caution!

Damage caused by voltage rise!

Cables from other manufacturers can have a negative effect on voltage rise on the winding. The winding can become damaged as a result of voltage rise.

- **If non-B&R cables are used, you must provide documented evidence of conformity with voltage class A per EN 60034-25.**
- **If this evidence has not been provided, there is no claim to warranty due to winding damage that can be attributed to a rise in voltage on the winding.**

5.1.2 Connectors from other manufacturers

Advice:

Disturbances caused by electrical or electromagnetic effects!

When using connectors from other manufacturers, EMC faults cannot be excluded.

- **Use B&R connectors to ensure compliance with the EMC limit values of the connection.**
- **Ensure proper assembly and that cable shields are connected correctly.**

5.1.3 Ring core design

Motors with shaft heights greater than 100 mm can already produce bearing currents that slowly damage the bearing over a longer period of time. Bearing currents damage the bearing surfaces and are evident by a loud running noise. This generally lasts 1-2 years. To ensure a long service life, B&R recommends analyzing for bearing currents after the bearings have been in operation for a year. If necessary, contact B&R.

Dimensioning the ring core to avoid bearing currents

Different ferrite cores are necessary depending on the motor size and cable.

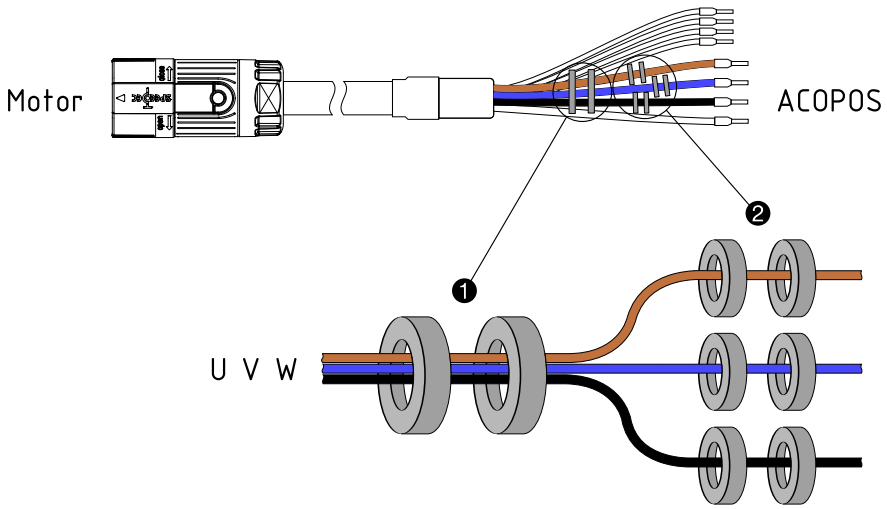
Since common-mode currents are heavily dependent on conditions, the following recommendations for ring core dimensioning are only suggestions. In most cases, this dimensioning is sufficient.

The temperature of the ring cores can be measured to check whether the dimensioning is sufficient. If the temperature is above 80°C, then one additional ferrite core of each respective type must be used.

Motor axis height (mm)	M-112 ring core Pieces	M-381 ring core Pieces (for each phase)
100	1	1
132	2	1
160	3	2

Installation of the ring cores

Thread the 3 motor phases U, V and W together through the M-112 ring cores **(1)** and the individual phases U, V and W each through the M-381 ring cores **(2)**.



Ring core order data

M-112 ring core (16 pieces)
Model number: 8BXC006.0000-00

M-381 ring core (120 pieces)
Model number: 8BXC008.0000-00

5.2 Order of connection

When connecting or disconnecting the servo motor, the following safety guidelines and orders must be observed.

Danger!

Risk of injury due to electric shock!

If live parts are touched, there is immediate danger of fatal electric shock.

If connections are connected or disconnected in the incorrect order or when the power is switched on, electric arcs can occur and persons and contacts can be damaged.

Even if the motor is not rotating or is running as a generator driven externally, the control and power connections can still carry voltage!

- **Never touch connections when the power is switched on.**
- **Never disconnect or connect electrical connections to the motor and servo drive when the power is switched on!**
- **Do not stay in the danger zone during operation and secure it against access by unauthorized persons.**
- **Always operate the motor with all safety equipment. Do this even during short testing and trial operations!**
- **Keep all covers and control cabinet doors closed during operation and as long as the machine is not disconnected from the power system.**
- **Before working on motors, gearboxes or servo drives or in the danger zone of your machine, disconnect them completely from the power system and secure them against being switched on again by other persons or automatic systems.**
- **Note the discharge time of any existing DC bus.**
- **Only connect measuring instruments when the power is switched off!**

Danger!

Risk of injury due to electric shock!

If live parts are touched, there is immediate danger of fatal electric shock.

If connections are connected or disconnected in the incorrect order or when the power is switched on, electric arcs can occur and persons and contacts can be damaged.

Even if the motor is not rotating or is running as a generator driven externally, the control and power connections can still carry voltage!

- **Never touch connections when the power is switched on.**
- **Never disconnect or connect electrical connections to the motor and servo drive when the power is switched on!**
- **Do not stay in the danger zone during operation and secure it against access by unauthorized persons.**
- **Always operate the motor with all safety equipment. Do this even during short testing and trial operations!**
- **Keep all covers and control cabinet doors closed during operation and as long as the machine is not disconnected from the power system.**
- **Before working on motors, gearboxes or servo drives or in the danger zone of your machine, disconnect them completely from the power system and secure them against being switched on again by other persons or automatic systems.**
- **Note the discharge time of any existing DC bus.**
- **Only connect measuring instruments when the power is switched off!**

Danger!

After switching off the servo drive, wait for the DC bus to discharge for at least five minutes. To avoid a hazard, the current voltage on the DC bus must be measured between -DC1 and +DC1 and less than 42 VDC before starting work with a suitable measuring instrument. An unlit operating LED does not indicate that the device is de-energized!

Caution!

The temperature sensor on the motor is sensitive to electrostatic discharge (ESD). For this reason, the attachment cables on the drive system side (ACOPOS) must first be completely assembled and connected. Only then are the connectors permitted to be connected to the motor in the order described.

5.3 Connecting connectors properly

The power and encoder connectors are available in different variants.

Caution!

Damage due to improper connector installation!

Incorrectly attached connectors can lead to malfunctions and damage to the motor and encoder!

- **Always attach the connectors without excessive force or the use of tools.**
- **Make sure that the connectors are fully attached and locked if necessary.**

5.4 Electrical installation

- The person installing the system is responsible for correct installation.
- The motor data on the nameplate must be observed.
- Connecting cables and connectors must be correctly dimensioned for the voltages and currents that occur and suitable for the type of installation.
- The motor and its assemblies (brake, encoder, etc.) must be connected according to the circuit diagrams (see chapter "Installation").
- Shielded power and encoder cables must be used in order to avoid electromagnetic EMC interference from motor supply lines and its consequences on encoders and control systems. Observe the EMC instructions from the inverter manufacturer.
- Before connecting, check the built-in connectors, male connectors and terminal boxes for possible damage, corrosion, dirt and moisture.
- To ensure the degree of protection, it is important to ensure that the screws, gaskets and sealing surfaces of the connectors and terminal box are correctly placed and tight.

  ## Advice:

  Also to maintain the protection class, rotatable connection boxes should not be changed by rotating them more than 5 times in total.

- Connectors and terminal box connectors are not permitted to be subjected to any mechanical stress; if necessary, provide torsion, tension and shear relief as well as anti-kink protection.

For the main connection via a terminal box, it is also important to ensure the following:

- The cable ends are only stripped until the insulation reaches close to the cable lugs or terminals. Protruding wire ends must be avoided.
- The cable lugs used are adapted to the dimensions and cross sections of the terminals and cables.
- The screw connections of the electrical connectors are tightened with the specified tightening torque (see chapter "Installation").
- The degree of protection is maintained.

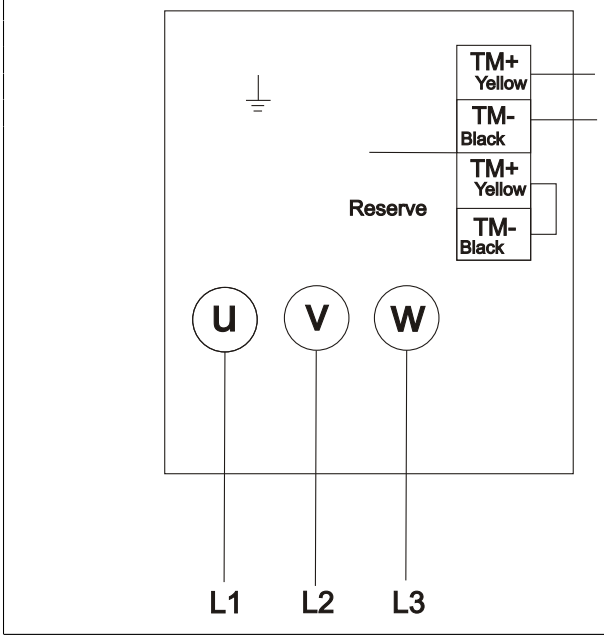
Advice:

All unnecessary entries must be closed off with metallic closing elements. The sealing elements must be functional and undamaged when sealing the terminal box.

5.4.1 8KS power connection

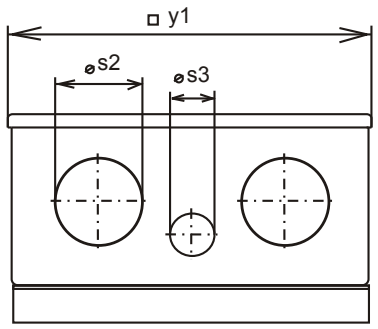
The power connection for 8KS three-phase synchronous motors is generally designed as a terminal box. The position of the terminal box is "top" with cable outlet "right" (corresponds to 270°).

8KSx8/8KSx9 power connection



Pin	Function
U	Motor connection U
V	Motor connection V
W	Motor connection W
PE	Grounding
T+	Temperature +
T-	Temperature -
T+	Temperature + (reserved)
T-	Temperature - (reserved)

Table 48: Connection diagram



Terminal box number	Dimensions [mm]			Number and size of the terminal blocks	Tightening torque [Nm]
		Cable outlet			
	y1	s2	s3		
20	258	2xM25x1.5	1xM25x1.5	3xM8	12
22	258	2xM40x1.5	1xM25x1.5	3xM8	12
24	258	2xM63x1.5	1xM25x1.5	3xM8	12
26	258	2xM63x1.5	1xM25x1.5	3xM10	20
30	215	2xø40.5	1xø25.5	3xM6	6
32	255	2xø64	1xø25.5	3xM10	20

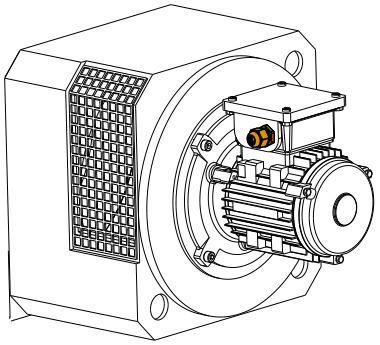
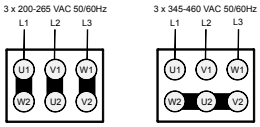
Table 49: Cable connections - Dimensions

Cooling / Construction type	Size	Length	Nominal speed						
			1000	1100	1500	1600	2000	2500	3000
8KSC 8KSD 8KSL 8KSM	8	2		20		20	22	22	22
		4		20		22	22	22	22
		5		20		22	22	22	24
		6		22		22	22	24	24
8KSC 8KSL	9	2	30		30		32	32	32
		4	30		32		32	32	32
		5	30		32		32	32	--
		6	32		32		32	--	--
8KSJ	8	2	20		22		22	22	22
		4	22		22		22	24	24
		5	22		22		24	24	26
		6	22		24		24	26	--
8KSJ	9	2	30		32		32		
		4	30		32		32		
		5	32		32		--		
		6	32		--		--		

Table 50: Assigning the terminal box numbers according to nominal speed

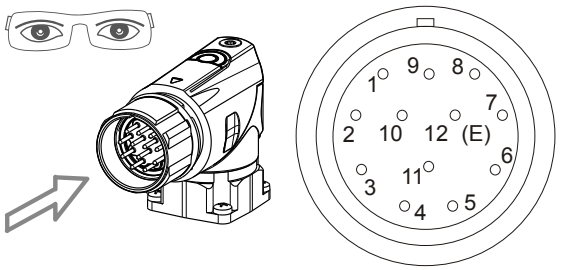
5.4.2 Fan connector 400 VAC

The fan connector for 8KS three-phase synchronous motors is generally designed as a terminal box. The position of the terminal box is "top" with cable outlet "right" (corresponds to 270°).

Fan connector position	Fan connector		8KSC/8KSD8	
		Nominal voltage	Δ/Y 240/420 // 280/480 V	
		Rated frequency	50	60
		Nominal current Δ/Y	1.05/ 0.6	1.05/ 0.6
		Nominal speed	2820	3420
		Nominal power	0.25	0.3
		Connection	Terminal box	
		Degree of protection	IP54	
		CSA and UL listed	Sheet number E123665	
		Rotor bearing	Ball bearings	
		Operating noise	74-78 ±3 dB(A)	
		Service life at 40°C	20,000 h	
		Temperature range	0 - 40°C	

5.4.3 Encoder connection

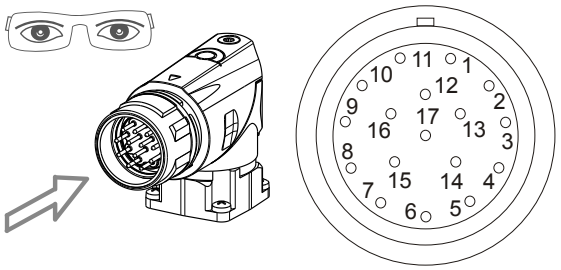
5.4.3.1 Resolver pinout



Pin	Color (LTN)	Description
1	---	---
2	---	---
3	Blue	S4
4	Red	S1
5	Black/White	R2
6	---	---
7	Yellow	S2
8	Black	S3
9	Red/White	R1
10	---	---
11	---	---
12	---	---

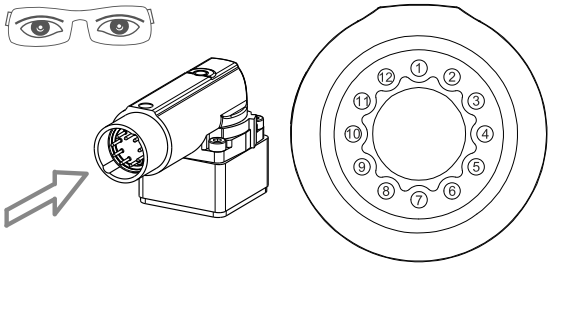
5.4.3.2 EnDat connection - Pinout

EnDat 2.1



Pin	Color	Description	Function
1	Blue	Sense +5 V	Sense output +5 V
2	---	---	---
3	---	---	---
4	White	Sense COM	Sense output 0 V
5	---	---	---
6	---	---	---
7	Brown/Green	+5 V output / 0.25A	Encoder power supply +5 V
8	Violet	T	Clock input
9	Yellow	T\	Clock input inverted
10	White/Green	COM (1, 3-9, 11, 13-15)	0 V encoder power supply
11	---	---	---
12	Blue/Black	B	Channel B
13	Red/Black	B\	Channel B inverted
14	Gray	D	Data output
15	Green/Black	A	Channel A
16	Yellow/Black	A\	Channel A inverted
17	Pink	D\	Data inverted

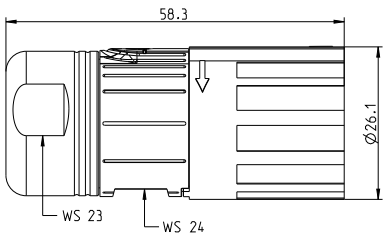
EnDat 2.2



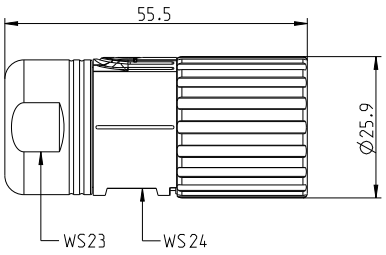
Pin	Color	Description	Function
1	Brown/Green	+5 V output / 0.25 A	Encoder power supply +5 V
2	Gray	D	Data output
3	Pink	D\	Data output inverted
4	Purple	T	Clock input
5	Yellow	T\	Clock input inverted
6	White	Sense COM	Sense 0 V
7	White/Green	COM (1, 3-9, 11, 13-15)	Sense +5 V
8	---	---	---
9	---	---	---
10	---	---	---
11	---	---	---
12	Blue	Sense +5 V	Battery +5 V

5.4.3.3 Encoder connector dimensions

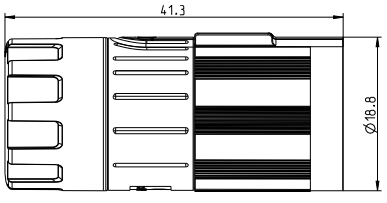
EnDat 2.1 / Resolver (speedtec)



EnDat 2.1 / Resolver (screw connection)



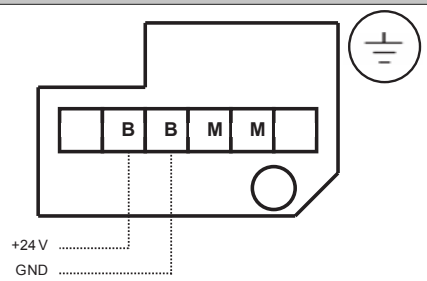
EnDat 2.2 (springtec)



5.4.4 Brake connection

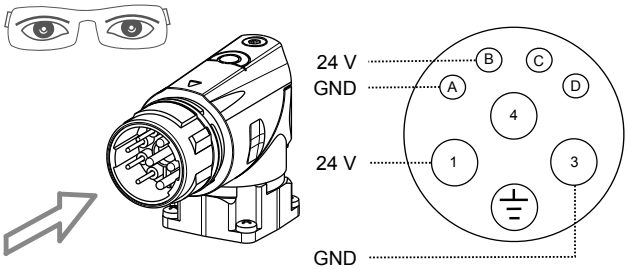
Brake connection for 8KSC/D/J

The brake connection for 8KS three-phase synchronous motors with radial external ventilation or water cooling is designed as a terminal box. The position of the terminal box is "top" with cable outlet "right" (corresponds to 270°).

Terminal	Description	Function
	B	Brake
	M	Micro-switch (normally open contact)

Brake connection for 8KSL/M

The brake connection for 8KS three-phase synchronous motors with axial external ventilation is designed as a built-in connector.

Built-in connector	Pin	Description	Function
	1	B	Brake
	2	---	---
	3	B	Brake
	4	---	---
	A	M	Micro-switch (normally open contact)
	B	M	Micro-switch (normally open contact)
	C	---	---
	D	---	---

5.4.4.1 Brake controller

Depending on the motor size, 6.5 A or 7.3 A are required for controlling the 8KS brake. ACOPOS drive and ACOPOSmulti only provide 3 A and 4.2 A respectively, however.

Control with solid-state relays is therefore recommended as a solution. There are two variants:

- Solid-state relay without feedback
- Solid-state relay with feedback

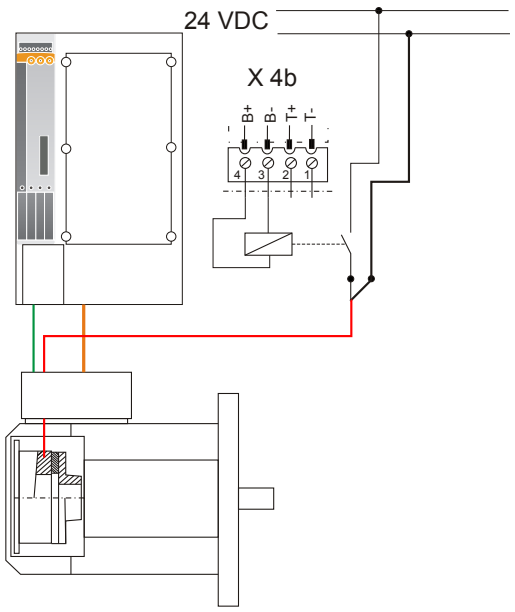
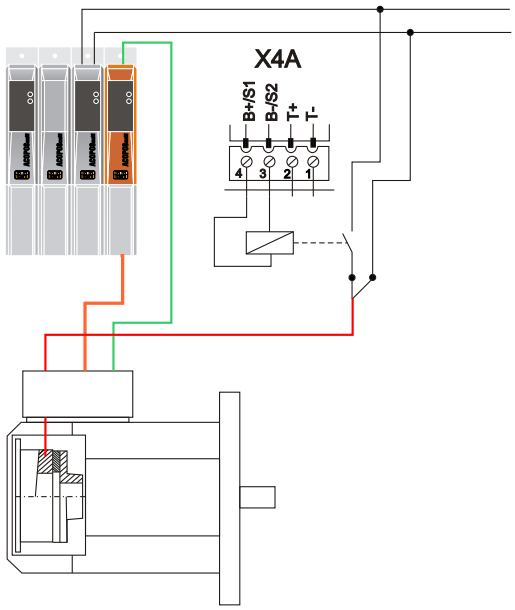
Advice:

Parameter "BRAKE MODE": Bit 2: Control monitoring OFF!

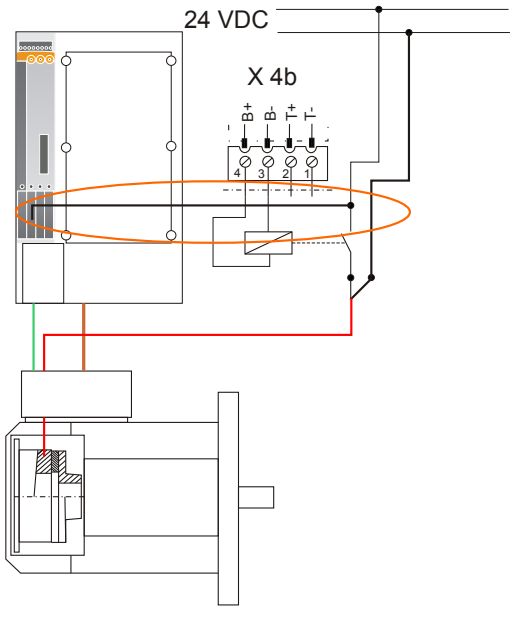
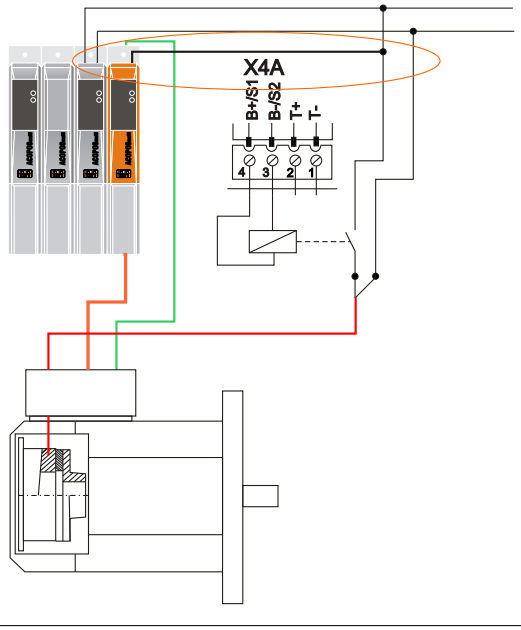
Caution!

Only connect holding brakes of 8KS motors to B&R drive systems via external dry contacts!

Brake controller without feedback

ACOPOS	ACOPOSmulti
	

Brake controller with feedback

ACOPOS	ACOPOSmulti
	

Chapter 6 • Commissioning and operation

1 Before commissioning and operation

Read this user's manual completely before starting any commissioning activities or operation.

In addition, take into account the technical documentation for all other machine components (e.g. the B&R drive system) as well as the finished machine.

2 Safety

Commissioning is only permitted to be carried out by qualified personnel[2)].

Only use appropriate equipment and tools. Protect yourself with safety equipment.

Caution!

Severe personal injury and damage to property due to failure of the servo drive!

If the servo drive fails, an uncontrolled motor can cause damage.

Electronic devices are generally not failsafe!

- **Ensure that the motor is brought into a safe state if the servo drive fails.**

2.1 General sources of danger

Tampering of protection or safety devices

Protective and/or safety devices protect you and other persons from dangerous voltage, rotating or moving elements and hot surfaces.

Danger!

Personal injury and damage to property due to tampering of protective equipment!

If protective or safety devices are removed or put out of operation, there is no longer any personal protection and serious personal injury and damage to property can occur.

- **Do not remove any safety devices.**
- **Do not put any safety devices out of operation.**
- **Always use all safety devices during short-term test and trial operations!**

Dangerous voltage

To operate the motors, dangerous voltage must be applied to certain parts.

2) see "Qualified personnel" on page 6

Danger!

Risk of injury due to electric shock!

If live parts are touched, there is immediate danger of fatal electric shock.

If connections are connected or disconnected in the incorrect order or when the power is switched on, electric arcs can occur and persons and contacts can be damaged.

Even if the motor is not rotating or is running as a generator driven externally, the control and power connections can still carry voltage!

- **Never touch connections when the power is switched on.**
- **Never disconnect or connect electrical connections to the motor and servo drive when the power is switched on!**
- **Do not stay in the danger zone during operation and secure it against access by unauthorized persons.**
- **Always operate the motor with all safety equipment. Do this even during short testing and trial operations!**
- **Keep all covers and control cabinet doors closed during operation and as long as the machine is not disconnected from the power system.**
- **Before working on motors, gearboxes or servo drives or in the danger zone of your machine, disconnect them completely from the power system and secure them against being switched on again by other persons or automatic systems.**
- **Note the discharge time of any existing DC bus.**
- **Only connect measuring instruments when the power is switched off!**

Danger due to electromagnetic fields

Electromagnetic fields are generated by the operation of electrical power engineering equipment such as transformers, drives and motors.

Danger!

Danger to health due to electromagnetic fields!

The functionality of a heart pacemaker can be impaired by electromagnetic fields to such an extent that the wearer experiences harm to his or her health, possibly with a fatal outcome.

- **Observe relevant national health and safety regulations.**
- **Persons with pacemakers are not allowed to be in endangered areas.**
- **Warn staff by providing information, warnings and safety identification.**
- **Secure the danger zone by means of barriers.**
- **Reduce electromagnetic fields at their source (using shielding, for example).**

Dangerous motion

By rotating and positioning motions of the motors, machine elements are moved or driven and loads conveyed.

After switching on the machine, movements of the motor shaft must always be expected! For this reason, higher-level protective measures must be put in place to ensure that personnel and machines are protected. This type of protection can be achieved, for example, by using stable mechanical protective equipment such as protective covers, protective fences, protective gates or photoelectric sensors.

In the immediate vicinity of the machine, provide sufficient and easily accessible emergency switching-off devices to stop the machine as quickly as possible in the event of an accident.

Danger!

Danger of injury due to rotating or moving elements and loads!

By rotating or moving elements, body parts can be drawn in or severed or subjected to impacts.

- **Do not stay in the danger zone during operation and secure it against access by unauthorized persons.**
- **Before working on the machine, secure it against unwanted movements. A holding brake is not suitable for this!**
- **Keep all covers and control cabinet doors closed during operation and as long as the machine is not disconnected from the power system.**
- **Always operate the motor with all safety equipment. Do this even during short testing and trial operations!**
- **Motors can be started automatically via remote control! If appropriate, a corresponding warning symbol must be applied, and protective measures must be implemented to prevent entry into the high-risk area.**

Danger!

Danger of injury due to loads!

Suspended loads can lead to personal injury or death if they fall down. Heavy loads can tilt and trap people or severely injure them.

Failure to comply with instructions, guidelines and regulations or use of unsuitable or damaged tools and devices can result in serious injury and/or damage to property.

- **Motors should only be lifted without any additional load from other products (e.g. connection elements).**
- **Only use permitted lifting, transport and aids with sufficient lifting capacity.**
- **Never stand in the danger zone or under suspended loads.**
- **Secure the product against dropping and tilting.**
- **Wear safety shoes, protective clothing and a safety helmet.**
- **Comply with the national and local regulations.**

Warning!

Danger of injury due to incorrect control or a defect.

Improper control of motors or a defect can result in injuries and unintended and hazardous movements of motors.

Such incorrect behavior can be triggered by:

- **Incorrect installation or faults when handling components**
- **Improper or incomplete wiring**
- **Defective devices (servo drive, motor, position encoder, cables, brake)**
- **Incorrect control (e.g. caused by software error)**

Risk due to hot surfaces

Due to the power dissipation from the motor and friction in the gearbox, these components as well as their environment can reach a temperature of more than 100°C.

The resulting heat is released to the environment via the housing and the flange.

Warning!

Risk of burns due to hot surfaces!

Touching hot surfaces (e.g. motor and gearbox housings, as well as connected components), can lead to very severe burns due to the very high temperature of these parts.

- **Do not stay in the danger zone during operation and secure it against access by unauthorized persons.**
- **Never touch the motor or gearbox housing as well as adjacent surfaces during nominal load operation.**
- **Be aware of hot surfaces also during standstill.**
- **Allow the motor and gearbox to cool down sufficiently before working on them; there remains the risk of burns for a long period of time after they are switched off.**
- **Always operate the motor or gearbox with all safety devices. Do this even during short testing and trial operations!**

2.2 Reversing operation

Warning!

Personal injury and damage to property due to shaft breakage!

The shaft key can become dislodged during heavy reverse operation. In extreme cases, this can cause the shaft end to break, which can lead to severe damage!

- **It is therefore preferable to use a smooth shaft during heavy reversing operation.**

2.3 Freely rotating motors

With freely rotating motors, measures must be taken to prevent the key (if present) from being ejected. Measures must be taken to prevent mounting screws or other mounting elements from being ejected or removed prior to operation. A shaft protection sleeve for transport and storage is not appropriate protection and must also be removed.

Warning!

Personal injury and damage to property due to ejected elements!

With freely rotating motors, ejected elements can cause personal injury and damage to property.

- **The following safety precautions also apply during short testing and trial operations!**
- **Secure the keys.**
- **Secure or remove mounting screws or other mounting elements.**
- **A shaft protection sleeve for transport and storage must also be removed.**

2.4 Holding brake

The motors can be equipped with an optional holding brake. It is only used to hold the motor shaft in place when no power is applied to the motor.

The maximum motor torque far exceeds the holding torque of the brake.

Danger!

Personal injury and damage to property due to non-intended use of the holding brake!

If the holding brake is used differently than intended, functional failures and accidents involving personal injury or damage to property are possible.

- **Do not use the holding brake for braking under normal operating conditions! It is not intended for normal braking.**
- **Do not use the holding brake to protect personnel! The holding brake does not provide protection for personnel!**
- **Do not use the holding brake to hold loads! They do not ensure a securing function (e.g. against lowering in the case of lifted loads).**
- **Do not load motors with holding brakes axially either during assembly or during operation. It is especially important to prevent axial forces in the direction of the B flange since these forces can cause the brake to fail!**

Advice:

Loaded braking during an emergency stop is permitted but reduces its service life.

For additional information about the holding brake, see chapter "Technical data".

3 Verification

3.1 To verify before commissioning

The following must be ensured before commissioning:

- The drive is not permitted to be damaged.
- The motor must be properly aligned and secured and is not permitted to be within the danger zone of other equipment.
- The screw connections must be tightened correctly.
- Any unused connection threads on the flanged end shield must be sealed.
- All components attached to the output shaft must be secured against unintentional release.
- Motors that have a keyed shaft end are not permitted be operated without a key. The resulting imbalance can result in motor damage.
- For freely rotating motors, keys must be secured against ejection and mounting screws; other mounting elements must be secured or removed.
- All the necessary protective equipment (mechanical, thermal, electrical) must be installed.
- All motor connections must be properly made.
- The protective ground conductor must be installed properly and verified.
- The wires are not permitted to touch the motor surface.
- The drive must be free (release brake).
- The emergency switch-off functions must be checked.
- If a fan is present, it must be properly connected and functional.
- If a liquid cooling system is present, it must be properly connected, functional and leak-proof.

Warning!

Personal injury and damage to property due to damaged or unsuitable machine components!

Operating a machine with damaged or unsuitable components is a safety risk and can lead to failures. Severe damage to property and injuries cannot be excluded.

- **Never operate a machine with a damaged motor or gearbox or any other damaged component.**
- **Never install a damaged component in a machine.**
- **Do not use motors or gearboxes that have already been overloaded during operation.**
- **Before installation, ensure that the motor or gearbox is suitable for the machine.**
- **It is better not to carry out short-term test and trial operations with damaged or inappropriate machine components.**
- **Label damaged or non-operational components in a readily visible location and clearly.**

3.2 To verify during commissioning

The following must be ensured during commissioning:

- The functionality of all the motor's components and assemblies (protective equipment, encoder, brake, cooling, gearbox, etc.) must have been verified.
- The operating conditions (see chapter "Installation conditions") must be observed.
- A holding brake, if present, must be released when the motor is rotating.
- If a liquid cooling system is present, it must be functional and leak-proof.
- All electrical attachments and connections must be properly designed and secured.
- All protective measures must have been implemented in order to prevent contact with voltage-carrying components, hot surfaces and rotating or moving parts and assemblies. Also check whether these protective measures are working properly.
- All output elements must be installed and set up in accordance with the manufacturer's specifications.
- The max. permissible speed n_{max} of the motor must be limited and is not permitted to be exceeded. The maximum permissible speed n_q is the maximum speed that is permissible for short-time duty.

3.3 During operation

During operation, be aware of the following signs that can indicate a malfunction:

- Unusual noises
- Unusual vibrations
- Unusual odors
- Smoke generation
- Unusual temperature development
- Increased power consumption
- Lubricant outlet
- The monitoring or safety device responds

If possible, switch off the machine as soon as possible in order to avoid damage or accidents. Always ensure the safety of other persons as well as your own safety during shutdowns and causal investigation!

In the case of shutdowns, please inform the responsible qualified personnel immediately.

4 Faults during operation

In the following table, you can find possible causes of error broken down by malfunction as well as information about how to fix them.

Fault	Possible cause	Fix
Motor will not start	Controller enable missing	Activate controller enable
	Controller error, encoder error	Read error listing on inverter/controller, correct error Check the connector to ensure it is connected correctly (see chapter "Installation and connection", section "Ensure proper connections")
	Power supply not present	Check connection and power supply Check the connector to ensure it is connected correctly (see chapter "Installation and connection", section "Ensure proper connections")
	Rotating field	Check phase sequence, replace connection line if necessary
	Brake will not release (optional equipment may be available)	Check triggering, connections and power supply
	Brake defective (optional equipment may be available)	If necessary, contact B&R.
Runs noisily	Insufficient shielding in connection lines	Check shielding connection and grounding
	Controller parameters too high	Optimize controller parameters
Vibrations	Coupling element or machine not properly balanced	Adjust balance
	Power transmission system misaligned	Realign power transmission system
	Mounting screws loose	Check and tighten screw connections
Noise during operation	Foreign bodies in the motor	If necessary, contact B&R.
	Bearing damage	If necessary, contact B&R.
The motor becomes too warm - the temperature monitoring responds	Power transmission system overloaded	Check motor load and compare with data on nameplate
	Insufficient heat dissipation	Ensure sufficient heat dissipation.
	Brake will not release sufficiently - Grinding brake (optional equipment may be available)	If necessary, contact B&R.
Current consumption too high - motor torque too low	Rest angle is incorrect	Check rest angle and adjust as needed

If necessary, contact B&R.

For this, the following information should be provided:

- Order description and serial number (see nameplate)
- Type and extent of fault
- Circumstances under which the fault occurred
- Application data (cycle of torque, speed and forces over time, ambient conditions)

Chapter 7 • Inspection and maintenance

Various operating conditions (e.g. operating mode, temperature, speed, load, mounting orientation), can have a significant impact on the service life of lubricants, seals and bearings.

Depending on the pollution degree, clean regularly on site to ensure heat is being dissipated properly, for example.

The following tasks are the responsibility of the operator:

- A maintenance plan and the documentation of inspections and maintenance work is created.
- Motors and cooling air-supplying construction are checked for dirt, moisture and leaks.
- Motors and cooling air-supplying construction are cleaned.
- Checking cables and connectors for damage.
- All safety devices are tested for safe operation.

1 Safety

Work on motors and their wiring is only permitted to be carried out by qualified personnel [2)] without voltage applied. The control cabinet must first be disconnected from the power supply and secured against being switched on again.

Only use appropriate equipment and tools. Protect yourself with safety equipment.

Warning!

Personal injury and damage to property due to unauthorized modifications!

As a result of unauthorized modifications to the product, the performance and limit values can be negatively affected and dangers can arise. Due to this, severe damage to property and injuries cannot be excluded.

Unauthorized modifications are therefore prohibited!

- **Do not carry out any unauthorized modifications or alterations to the product.**
- **If necessary, contact B&R.**

1.1 General sources of danger

Tampering of protection or safety devices

Protective and/or safety devices protect you and other persons from dangerous voltage, rotating or moving elements and hot surfaces.

Danger!

Personal injury and damage to property due to tampering of protective equipment!

If protective or safety devices are removed or put out of operation, there is no longer any personal protection and serious personal injury and damage to property can occur.

- **Do not remove any safety devices.**
- **Do not put any safety devices out of operation.**
- **Always use all safety devices during short-term test and trial operations!**

Dangerous voltage

To operate the motors, dangerous voltage must be applied to certain parts.

2) see "Qualified personnel" on page 6

Danger!

Risk of injury due to electric shock!

If live parts are touched, there is immediate danger of fatal electric shock.

If connections are connected or disconnected in the incorrect order or when the power is switched on, electric arcs can occur and persons and contacts can be damaged.

Even if the motor is not rotating or is running as a generator driven externally, the control and power connections can still carry voltage!

- **Never touch connections when the power is switched on.**
- **Never disconnect or connect electrical connections to the motor and servo drive when the power is switched on!**
- **Do not stay in the danger zone during operation and secure it against access by unauthorized persons.**
- **Always operate the motor with all safety equipment. Do this even during short testing and trial operations!**
- **Keep all covers and control cabinet doors closed during operation and as long as the machine is not disconnected from the power system.**
- **Before working on motors, gearboxes or servo drives or in the danger zone of your machine, disconnect them completely from the power system and secure them against being switched on again by other persons or automatic systems.**
- **Note the discharge time of any existing DC bus.**
- **Only connect measuring instruments when the power is switched off!**

Danger due to electromagnetic fields

Electromagnetic fields are generated by the operation of electrical power engineering equipment such as transformers, drives and motors.

Danger!

Danger to health due to electromagnetic fields!

The functionality of a heart pacemaker can be impaired by electromagnetic fields to such an extent that the wearer experiences harm to his or her health, possibly with a fatal outcome.

- **Observe relevant national health and safety regulations.**
- **Persons with pacemakers are not allowed to be in endangered areas.**
- **Warn staff by providing information, warnings and safety identification.**
- **Secure the danger zone by means of barriers.**
- **Reduce electromagnetic fields at their source (using shielding, for example).**

Dangerous motion

By rotating and positioning motions of the motors, machine elements are moved or driven and loads conveyed.

After switching on the machine, movements of the motor shaft must always be expected! For this reason, higher-level protective measures must be put in place to ensure that personnel and machines are protected. This type of protection can be achieved, for example, by using stable mechanical protective equipment such as protective covers, protective fences, protective gates or photoelectric sensors.

In the immediate vicinity of the machine, provide sufficient and easily accessible emergency switching-off devices to stop the machine as quickly as possible in the event of an accident.

Danger!

Danger of injury due to rotating or moving elements and loads!

By rotating or moving elements, body parts can be drawn in or severed or subjected to impacts.

- **Do not stay in the danger zone during operation and secure it against access by unauthorized persons.**
- **Before working on the machine, secure it against unwanted movements. A holding brake is not suitable for this!**
- **Keep all covers and control cabinet doors closed during operation and as long as the machine is not disconnected from the power system.**
- **Always operate the motor with all safety equipment. Do this even during short testing and trial operations!**
- **Motors can be started automatically via remote control! If appropriate, a corresponding warning symbol must be applied, and protective measures must be implemented to prevent entry into the high-risk area.**

Danger!

Danger of injury due to loads!

Suspended loads can lead to personal injury or death if they fall down. Heavy loads can tilt and trap people or severely injure them.

Failure to comply with instructions, guidelines and regulations or use of unsuitable or damaged tools and devices can result in serious injury and/or damage to property.

- **Motors should only be lifted without any additional load from other products (e.g. connection elements).**
- **Only use permitted lifting, transport and aids with sufficient lifting capacity.**
- **Never stand in the danger zone or under suspended loads.**
- **Secure the product against dropping and tilting.**
- **Wear safety shoes, protective clothing and a safety helmet.**
- **Comply with the national and local regulations.**

Warning!

Danger of injury due to incorrect control or a defect.

Improper control of motors or a defect can result in injuries and unintended and hazardous movements of motors.

Such incorrect behavior can be triggered by:

- **Incorrect installation or faults when handling components**
- **Improper or incomplete wiring**
- **Defective devices (servo drive, motor, position encoder, cables, brake)**
- **Incorrect control (e.g. caused by software error)**

Risk due to hot surfaces

Due to the power dissipation from the motor and friction in the gearbox, these components as well as their environment can reach a temperature of more than 100°C.

The resulting heat is released to the environment via the housing and the flange.

Warning!

Risk of burns due to hot surfaces!

Touching hot surfaces (e.g. motor and gearbox housings, as well as connected components), can lead to very severe burns due to the very high temperature of these parts.

- **Do not stay in the danger zone during operation and secure it against access by unauthorized persons.**
- **Never touch the motor or gearbox housing as well as adjacent surfaces during nominal load operation.**
- **Be aware of hot surfaces also during standstill.**
- **Allow the motor and gearbox to cool down sufficiently before working on them; there remains the risk of burns for a long period of time after they are switched off.**
- **Always operate the motor or gearbox with all safety devices. Do this even during short testing and trial operations!**

2 Motor bearing and holding brake

Motor bearing

In the case of trouble-free operation, we recommend changing the motor bearing after approx. 20,000 operating hours as a general maintenance guideline (calculated bearing mission time L_{h10}: 20,000 operating hours).

Holding brake

Over time, exposure to moisture and contamination can reduce the braking torque. The application should therefore check the braking torque from time to time using the brake test function with the safety factor required for the application.

If the brake is no longer achieving the necessary torque, a refresh cycle can help it achieve the necessary torque again.

- The brake test function in the ACOPOS servo drive used must be enabled.
- During a refresh cycle, the motor is allowed to turn one revolution at a speed of 50 rpm with the brake engaged. This cleans the brake pads and generally helps the brake to once again achieve the torque it needs.
- After the refresh cycle, the brake should be tested again.
- If the brake is still not achieving the necessary torque after 5 refresh cycles, the motor must be replaced.

Replace the motor when the brake no longer reaches its required torque.

If necessary, contact B&R. Repairs to the motor and brake are only permitted to be carried out by B&R!

Advice:

The motors can be equipped with an optional holding brake. It is used to hold the motor shaft when no power is applied to the motor. The maximum motor torque far exceeds the holding torque of the brake.

Danger!

Personal injury and damage to property due to non-intended use of the holding brake!

If the holding brake is used differently than intended, functional failures and accidents involving personal injury or damage to property are possible.

- **Do not use the holding brake for braking under normal operating conditions! It is not intended for normal braking.**
- **Do not use the holding brake to protect personnel! The holding brake does not provide protection for personnel!**
- **Do not use the holding brake to hold loads! They do not ensure a securing function (e.g. against lowering in the case of lifted loads).**
- **Do not load motors with holding brakes axially either during assembly or during operation. It is especially important to prevent axial forces in the direction of the B flange since these forces can cause the brake to fail!**

Advice:

Loaded braking during an emergency stop is permitted but reduces its service life.

3 Cleaning

The following maintenance tasks are the responsibility of the operator:

- Cleaning motor surfaces and air ducts.
- Changing or cleaning the filter mats when using dust filters:
  Dust filters should generally be cleaned or replaced after 100 hours of operation. If there is a high level of contamination, the maintenance intervals must be shortened accordingly. Filters with dry contaminants can be cleaned using suction, blowing or tapping of the filter. Filters with wet contaminations can be rinsed in lukewarm water with a commercial detergent and then dried.

Advice:

When replacing the filter mats, only original replacement filters from the motor manufacturer should be used. They can be obtained from B&R by specifying the motor or item number (see nameplate).

Chapter 8 • Disposal

Separation of materials

To ensure that devices can be recycled in an environmentally friendly manner, it is necessary to separate out the different materials. Disposal must be carried out in accordance with applicable legal regulations.

Component	Disposal	Note
Motors	Electronic recycling	A magnetized rotor is not permitted to be transported or delivered outside the stator under any circumstances!
Gearbox (without oil)	Metal waste	
Waste oil (gearbox)	Special waste	
Coolant	Special waste	For liquid-cooled motors only. Consists of water / oil with additives.
Modules, cables	Electronic recycling	
Batteries	Special waste	Danger of fire: Do not store batteries together with conductive materials during disposal.
Cardboard/Paper packaging	Paper/Cardboard recycling	

1 Safety

1.1 Protective equipment

Always wear suitable safety clothing and equipment for your personal protection.

1.2 Rotor with rare earth magnets

In B&R motors, rotors are installed with rare earth magnets with high magnetic energy densities.

Warning!

Personal injury and damage to property due to rare earth magnets!

The motors are not permitted to be disassembled into individual parts.

A magnetized rotor is not permitted to be transported or delivered outside the stator under any circumstances!

- **Due to the surrounding magnetic fields, the functionality of a pacemaker can be impaired in such a way that it can lead to bodily harm or even death of the carrier.**
- **The surrounding magnetic fields can affect or destroy electronic and mechanical measuring instruments.**
- **The strong magnetic attractive force can lead to uncontrolled movements of the magnet or the attraction of other objects. Personal injury due to impacts or trapping is possible. If magnets are splintered during collision, personal injury cannot be ruled out.**
- **In potentially explosive atmospheres, a spark generated by magnets can lead to serious explosions and cause personal injury and damage to property.**

Chapter 9 • Standards, guidelines and certifications

8KS servo motors are intended for use in commercial plants and subject to the following standards and guidelines:

Standards

EN 60034-1	Rotating electrical machines - Rating and performance
EN 60034-5	Degrees of protection provided by integral design of rotating electrical machines
EN 60034-6	Rotating electrical machines - Cooling types
EN 60034-7	Rotating electrical machines - Classification of types of construction, installation arrangements
EN 60034-9	Rotating electrical machines - Noise limits
EN 60034-11	Rotating electrical machines - Thermal protection
EN 60034-14	Mechanical vibration of certain machines with shaft heights 56 mm and higher
EN 60204-1	Safety of machinery - Electrical equipment of machines: General requirements

Table 51: Standards

Guidelines

Low Voltage Directive	8KS servo motors meet the requirements of the Low Voltage Directive (conformity).
EMC Directive	To operate an 8KS servo motor in accordance with its intended use, it must comply with the specifications of the EMC Directive. Proper installation (e.g. spatial separation of signal lines and power cables, shielded lines and cables) is the responsibility of the plant installer and system provider. If operating with a power converter, then the EMC guidelines of the power converter, encoder and brake manufacturers must be observed.

Table 52: Guidelines

Advice:

Also observe the relevant national, local and plant-specific regulations.

Appendix A • Cable assignments to servo drives

Power connection

Connector	Motor cable			Suitable cable extension
	Order number [1]	Cross section Power lines [2]	Assembled specifically for [3]	
(---) Terminal box	8CMxxx.10-5	10 mm²	---	---
	8CMxxx.12-8	35 mm²		

1) xxx/xxxx - Cable length (005/0005 corresponds to 5 m, 020/0020 to 20 m, etc.). For available cable lengths, see the B&R website.
2) The stall current of the respective motor and method used to install the respective cable must be taken into account for the cross section of power lines.
3) The customer must adapt the cable to the design of the servo drive.

Encoder connection

Connector	Type	Encoder cable		Suitable cable extension [1]
		Order number [1]	Assembled specifically for	
speedtec size 1.0	EnDat 2.1	8CExxx.12-1	All ACOPOS servo drives	8BCExxxx.11120-0
springtec	EnDat 2.2	8BCFxxxx.1221B-0		8BCFxxxx.12230-0
speedtec size 1.0	Resolver	8CRxxx.12-1		8BCRxxxx.11120-0

1) xxx/xxxx - Cable length (005/0005 corresponds to 5 m, 020/0020 to 20 m, etc.). For available cable lengths, see the B&R website.

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