8LS...-3 three-phase synchronous motors

User's manual

Version: **2.51 (December 2020)**
Order no.: **MAMOT2-ENG**

Translation of the original documentation

1 General information

1.1 Manual history

Version	Date	Notes
2.51	December 2020	General revision. Updated nameplate figure (see "Nameplate" on page 10). Updated section "Avoiding bearing currents" (see "Avoiding bearing currents [Ring core design]" on page 283). Updated section "Connecting connectors properly" (see "Connecting connectors properly" on page 287).
2.50	December 2018	General revision Updates: Motors (8LSAA, 8LSA5A/B/C, 8LSC5A/B/C, 8LSO9, 8LSP9). 8LSC fan kit (see "replacement parts, connection direction, assembly" on page 268). Mounting type and cooling (see "installation conditions" on page 272). Connecting connectors properly (see "installation and connection"). Connection sequence (see "installation and connection" on page 284)
2.10	July 2017	Updated ring core design (see "Avoiding bearing currents (common-mode currents)" on page 283).
2.00	April 2016	First edition for motor version V3

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.

1.2 About this user's manual

This user's manual describes the product, informs you how to use it and warns of possible dangers.

The personnel responsible for installation, operation, fault rectification, maintenance and cleaning must read and understand this manual before starting any work. The machine documentation must also be taken into account; the product described here is a component of this. This, along with observing all specifications and safety guidelines, will ensure safe functionality and a long service life.

As a component of the machine, this manual must be made freely accessible and stored in the immediate vicinity of the machine.

In addition to the information in this manual, local accident prevention regulations and national industrial safety regulations apply.

This document is not intended for end customers! The safety guidelines required for end customers must be incorporated into the operating instructions for end customers in the respective national language by the machine manufacturer or system provider.

1.3 Safety

This chapter provides you with safety-related information about working with the product.

Safety guidelines relevant to certain phases of the product's service life have been documented in the relevant chapters in this manual.

1.3.1 Organization of safety notices

Safety notices in this manual are organized as follows:

Safety notice	Description
Danger!	Failure to observe these safety guidelines and notices can result in death.
Warning!	Failure to observe these safety guidelines and notices can result in severe injury or substantial damage to property.
Caution!	Failure to observe these safety guidelines and notices can result in injury or damage to property.
Note:	These instructions are important for avoiding malfunctions.

1.3.2 Intended use

B&R motors and gear motors are components designed for installation in electrical systems or machines. They were designed, developed and manufactured for general industrial use. They are intended to be operated in covered rooms and under normal climatic conditions, which is usually the case in modern production halls. When used in residential areas, commercial areas or small businesses, additional filtering measures are required or must be provided by the user. Only operate the motor with B&R drive systems.

Use in accordance with the intended purpose is prohibited until:

- It has been determined that the machine complies with the provisions of EC Directive 2006/42/EC (Machinery Directive) and EMC Directive 2014/30/EU.
- All values specified on the nameplate and in the user's manual (e.g. connection and ambient conditions) have been observed.

1.3.3 Reasonably foreseeable misuse

Use of this product in areas with fatal risks or dangers is prohibited!

Danger!

Severe personal injury and damage to property due to failure!

When used without ensuring exceptionally high safety measures, death, injury, severe physical impairments or other serious losses are possible.

Do not use the product in the following areas, as well as other areas associated with fatal risks or dangers:

- **Explosive areas**
- **Monitoring nuclear reactions in nuclear power plants**
- **Flight control systems and air traffic control**
- **Controlling mass transport systems**
- **Medical life support systems**
- **Controlling weapons systems**

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

1.3.4 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.

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. If a holding brake is available, it must be checked for functionality after machine actuators have been attached and after maintenance and repair work has been carried out!**
- **Keep all covers and control cabinet doors closed during operation and as long as the machine is not disconnected from the mains.**
- **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!**

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!**

1.3.5 Provisions and safety guidelines

To ensure proper commissioning and safe operation, be sure to observe the following:

- General safety regulations
- The applicable work safety regulations
- National accident prevention regulations (e.g. VBG 4) for working with high-voltage systems

- National, local and plant-specific regulations for your end product
- Relevant regulations for electrical installations (e.g. wire cross section, fuses, protective conductor connection). The values provided in chapter "Technical data" must also be taken into account here.

The operator is solely responsible for these and all other regulations applicable at the place of use.

1.3.6 Responsibilities of the 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

- Applicable industrial safety regulations must be observed.
- National, local and plant-specific regulations must be observed.
- A risk assessment must identify hazards that can arise due to on-site working conditions.
- Documentation including safety guidelines must be prepared for operating the finished system (with motors, gearboxes, servo drives, etc.).
- Whether the applicable operating instructions and manuals correspond to current rules and standards must be checked regularly.
- Responsibilities for installation, operation, fault correction, maintenance and cleaning must be clearly regulated and defined.
- It must be ensured that responsible personnel have read and understood this user's manual.
- Personnel must receive training on a regular basis and be informed of hazards.
- Personnel must be provided with the required protective equipment.

1.3.7 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.

1.3.8 Safety notices

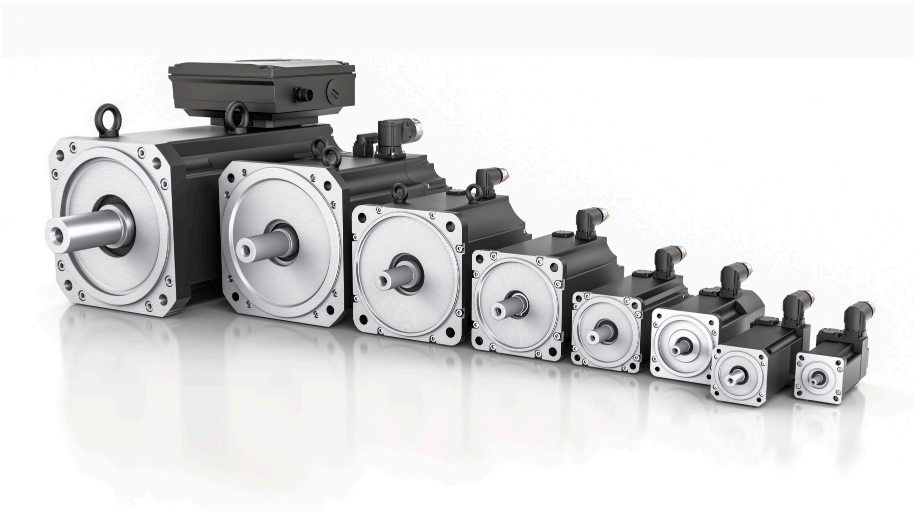
A "hot surface" warning label is provided with the product. Attach it to the assembled product so that it is visible at all times.

"Hot surface" warning label

1.3.9 Protective equipment

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

1.4 8LS three-phase synchronous motors



B&R's 8LS three-phase synchronous motors have been specially developed for use in high-performance applications. Today, they are used to manufacture consumer goods and products in the plastics industry, packaging industry, metalworking industry, beverage and food industry and to palletize these products with handling systems. Complete solutions from a single source requires the right components as well as the right configuration for the application environment. The large selection of available 8LS three-phase synchronous motors makes it possible to easily meet conditions such as reducing the variety of parts, guaranteeing ease of service and maintaining minimum requirements on space.

An optimally adapted drive rounds off a successful design. In order to achieve this, specialists are available to users at B&R subsidiaries around the world who are happy to provide their mechatronic know-how. B&R automation components: the economical combination of mechanics, electronics, technology and innovation.

1.4.1 Standards, guidelines and certifications

The 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, mounting arrangements
EN 60034-11	Rotating electrical machines - Thermal protection
EN 60034-14	Mechanical vibration of certain machines with shaft heights 56 mm and higher
UL 1004-1	Rotating electrical machines, general requirements
UL 1004-6	Servo and stepper motors
C22.2 no. 100-14	Motors and generators

Guidelines

Low Voltage Directive 2014/35/EU	The motors correspond to the low voltage directive (conformity).
EMC Directive 2014/30/EU	To operate the motor in accordance with its intended use, it must comply with the protection requirements 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.
RoHS Directive 2011/65/EU	The motors in this series comply with the RoHS Directive (2011/65/EU) for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

Advice:

National, local and plant-specific regulations must also be taken into account!

Certifications

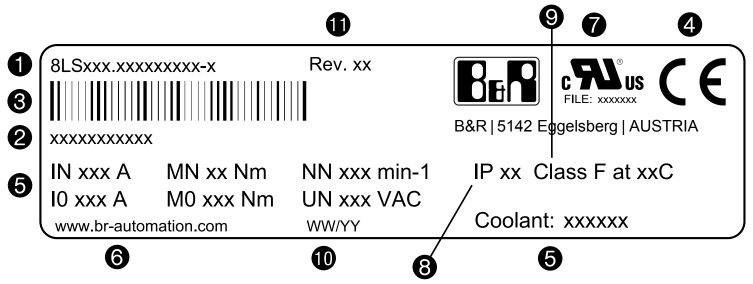
General information	8LSA	8LSC	8LSO	8LSP
C-UR-US listed	Yes			
UL file number	E360421			

1.4.2 Nameplate

The nameplate clearly identifies each motor. The serial number ensures traceability.

The nameplate adhesive label on the motor housing contains the following information:

1	Order code
2	11-digit serial number
3	Serial number as a barcode (Code 128)
4	CE marking
5	Technical data (rated torque M_n, rated current I_n, continuous stall torque M_0, continuous stall current I_0, rated voltage U_N, rated speed n_n, cooling type)
6	Manufacturer
7	UL-recognized component mark
8	Protection class
9	Insulation class
10	Production period (week/year)
11	Revision



Advice:

The nameplate should be visible at all times in installed state.

1.4.2.1 Embedded parameter chip

All relevant mechanical and electrical information and data is stored in the EnDat encoder used for B&R motors. This means that the user does not have to configure settings on the servo drive. As soon as the encoder is connected to the servo drive and the power supply to the electronics is switched on, the motor is automatically identified. The motor sends its nominal parameters and limit parameters to the servo drive. The drive then automatically determines the current limits and current control parameters required for optimal control of the motor. The only things that the user has to optimize are the speed and position controllers. Support for this is provided by the integrated commissioning environment of B&R Automation Studio™.

In addition to assistance during commissioning, routine service work is also simplified, and motors can be replaced without having to take extra time to set parameters.

2 Technical data

2.1 General description

Three-phase synchronous motors from the 8LS series are permanent magnet, electronically commutated synchronous motors for applications that require excellent dynamic characteristics and positioning precision as well as compact size and reduced weight.

- Compact sizes result in low weight and optimal power density
- Single-cable solution (hybrid) available
- Easier construction
- Fast axes thanks to impressive dynamic properties
- Universal application through large overload capability
- Good controllability thanks to optimized torque rippling
- Encoders for functional safety available
- Fan-cooling or self-cooling models
- Extremely easy to service
- Low costs

2.2 8LS order key

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

Cooling / Construction type

A ... Built-in connector, self-cooling
C ... Built-in connector, attached fan module
E [1] ... Built-in connector, liquid cooled A-side flange
O ... Terminal box, self-cooling
P ... Terminal box, built-in fan module
see "Cooling / Construction type (b)" on page 16

Size

Valid values: **2, 3, 4, 5, 6, 7, 8, 9** see "Size (c)" on page 17

Length

Valid values: **2, 3, 4, 5, 6, 7, 8, A, B, C** see "Length (d)" on page 17

Motor encoder system

Resolvers: **R0, R2**
Inductive EnDat encoders: **D8, D9, DA, DB, EA, EB, S8, S9, SA, SB**
Optical EnDat encoders: **D0, D1, D4, D5, E0, E1, E4, E5, S0, S1, S4, S5**
see "Motor encoder system (ee)" on page 18

Nominal speed

011 ... 1,100 rpm
013 ... 1,300 rpm
015 ... 1,500 rpm
020 ... 2,000 rpm
022 ... 2,200 rpm
030 ... 3,000 rpm
040 ... 4,000 rpm
045 ... 4,500 rpm
060 ... 6,000 rpm
see "Nominal speed (nnn)" on page 21

Motor options

Valid values: **A0, B1, C0**, **D1, F7, S7, ...**
see "Motor options (ff) 8LSA / 8LSC" on page 24 and "8LSO / 8LSP" on page 31

Special motor options

8LS**A**...**00** ... No special motor option / cooling type: Self-cooling
8LS**A**...**04** ... Special motor option: Reinforced A-side bearing / cooling type: Self-cooling
8LS**C**...**00** ... Special motor option: 230 VAC fan / cooling type: External cooling
8LS**C**...**05** ... No special motor option / cooling type: External cooling with 24 VDC fan
8LS**C**...**11** ... Special motor option: Reinforced A-side bearing / cooling type: External cooling with 24 VDC fan
8LS**O**...**00** ... No special motor option / cooling type: Self-cooling
8LS**P**...**05** ... No special motor option / cooling type: External cooling with 24 VDC fan
8LS**O**...**44** ... Special motor option: Toothed shaft / Cooling type: Self-cooling
8LS**P**...**44** ... Special motor option: Toothed shaft / Cooling type: External cooling with 24 VDC fan
see "Special motor options (gg) 8LSA / 8LSC" on page 35
see "Special motor options (gg) 8LSO / 8LSP" on page 38

Motor version

3 ... Version 3 (The motor version is specified as code (h) in the model number. Motor version 3 is currently valid.)

1) Cooling type / Construction type E is only available on request and is not further documented in this user's manual. If necessary, contact B&R.

Advice:

Order keys only provide information about possible combinations in exceptional cases. Information about possible combinations is available in the CAD configurator (cad.br-automation.com).

2.2.1 Example order 1

A three-phase synchronous motor of type **8LSA45** with a nominal speed of 3000 rpm was selected for an application. Because of the construction, the cables can only be connected on the top of the motor ("top" connection direction). The motor should also be equipped with a holding brake, a keyed shaft and a 32-line EnDat single-turn encoder.

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

The (nnn) code for a nominal speed of 3000 rpm is **030**.

The code (ff) for the other options (oil seal, holding brake, keyed shaft and connection direction) is **C3**.

The model number for the necessary motor is therefore **8LSA45.EA030C300-3**.

2.2.2 Example order 2

A three-phase synchronous motor of type **8LSA56** with a nominal speed of 4500 rpm was selected for an application. Because of the construction, the cables can only be connected on the back of the motor (swivel connectors), and must be as compact as possible, so the single-cable (hybrid) solution is desired. The motor should also be equipped with a holding brake, a smooth shaft, an oil seal and a 32-line EnDat multi-turn encoder.

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

The code (nnn) for a nominal speed of 4500 rpm is **045**.

The code (ff) for the other options (oil seal, holding brake, smooth shaft end and angled single-cable solution, swivel connector) is **S8**.

The model number for the necessary motor is therefore **8LSA56.DB045S800-3**.

2.3 Cooling / Construction type (b)

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

see "Order key" on page 13

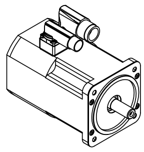
8LS three-phase synchronous motors are available in cooling types 8LS**A**, 8LS**C**, 8LS**O** and 8LS**P**. Cooling type 8LS**E** is only available upon request. All motors are based on cooling type A (elongated, slim) and can deviate in this, the cable connection or mounting type.

The cooling types are distinguished by a character (**c**) in the model number.

Cooling type (b)		Connection type	Available mounting types	
			Mounting flange	Mounting flange and mounting base
8LS**A**	Self-cooling	Connector	Yes	---
8LS**C**	Built-in fan module	Connector	Yes	---
8LS**E** [1)]	Liquid-cooled A-side flange	Connector	Yes	---
8LS**O**	Self-cooling	Terminal box	Yes	Yes
8LS**P**	Built-in fan module	Terminal box	---	Yes

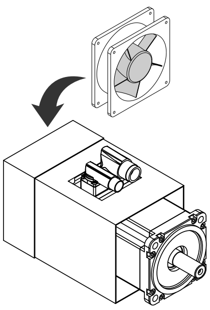
1) Cooling type E is only available upon request for sizes 4, 6 and 8.

8LSA



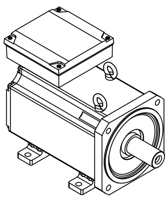
Cooling type 8LSA is self-cooling and has a slim, elongated design.
These motors must be attached to the machine with the mounting flange, which also serves as a cooling surface.

8LSC



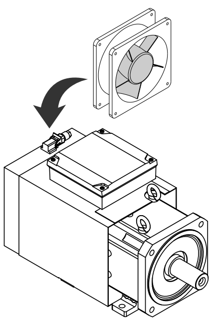
Cooling type 8LSC is based on motors with cooling type 8LSA. These motors are externally cooled and differ only by a fan module mounted in the area of the B-side bearing.
These motors must be attached to the machine with the mounting flange, which also serves as a cooling surface.
Depending on the mounting situation, the attached fan module increases the nominal torque (M_N), nominal current (I_N), stall torque (M_0) and stall current (I_0) by 30% compared to the motors with cooling type 8LSA.

8LSO



Cooling type 8LSO is self-cooling and has a slim, elongated design.
These motors can be mounted to the machine with the mounting flange, which also serves as a cooling surface, or with the mounting base. If the motor is only mounted with the mounting base and not with the mounting flange, the continuous power is reduced in S1 operation.

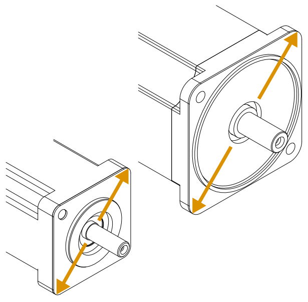
8LSP



Cooling type 8LSP is based on motors with cooling type 8LSO. These motors are externally cooled and differ only by a fan module mounted in the area of the B-side bearing.
These motors can be mounted to the machine with the mounting flange, which also serves as a cooling surface, or with the mounting base. If the motor is only mounted with the mounting base and not with the mounting flange, the continuous power is reduced in S1 operation.
Depending on the mounting situation, the attached fan module increases the nominal torque (M_N), nominal current (I_N), stall torque (M_0) and stall current (I_0) by 30% compared to the motors with cooling type 8LSO.
For transport reasons, this cooling type always has mounting base.

2.4 Size (c)

8LS b **c** d . ee nnn ff gg - h see "Order key" on page 13



8LS three-phase synchronous motors are available in various sizes (2, A, 3 ... 9). These differ in dimensions (especially flange dimensions) and power data.

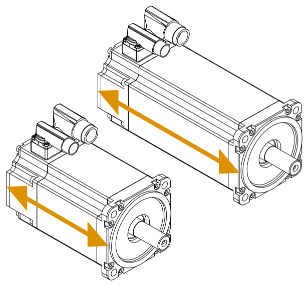
The sizes are distinguished by a character (**c**) in the model number. The larger this number, the larger the flange dimensions and power data of the respective motor.

Availability

	Available sizes (c)								
	8LSx2	8LSxA	8LSx3	8LSx4	8LSx5	8LSx6	8LSx7	8LSx8	8LSx9
8LSA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	---
8LSC	---	---	---	Yes	Yes	Yes	Yes	Yes	---
8LSO	---	---	---	---	---	---	---	---	Yes
8LSP	---	---	---	---	---	---	---	---	Yes

2.5 Length (d)

8LS b c **d** . ee nnn ff gg - h see "Order key" on page 13



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

The lengths are distinguished by a number (**d**) in the model number. The larger this number, the longer the respective motor.

Availability

	Available lengths (d)									
	8LSxx2	8LSxx3	8LSxx4	8LSxx5	8LSxx6	8LSxx7	8LSxx8	8LSxxA	8LSxxB	8LSxxC
8LSA2	---	Yes	Yes	Yes	Yes	---	---	---	---	---
8LSAA	Yes	Yes	Yes	---	---	---	---	---	---	---
8LSA3	---	Yes	Yes	Yes	Yes	Yes	---	---	---	---
8LSA4 / 8LSC4	---	Yes	Yes	Yes	Yes	---	---	---	---	---
8LSA5 / 8LSC5	---	Yes	Yes	Yes	Yes	Yes	---	Yes	Yes	Yes
8LSA6 / 8LSC6	---	Yes	Yes	Yes	Yes	---	---	---	---	---
8LSA7 / 8LSC7	---	Yes	Yes	Yes	Yes	Yes	Yes	---	---	---
8LSA8 / 8LSC8	---	Yes	Yes	Yes	Yes	---	---	---	---	---
8LSO9 / 8LSP9	---	Yes	Yes	Yes	Yes	---	---	---	---	---

2.6 Motor encoder system (ee)

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

see "Order key" on page 13

8LS three-phase synchronous motors are available with EnDat encoders as well as resolvers. The motor encoder system is listed as part of the model number in the form of a 2-character code (**ee**).

Analog and digital transfer

A resolver is an analog encoder system. Resolvers are particularly robust against vibrations and high operating temperatures. Their disadvantage is the low precision of 6-10 arcminutes. There is still no multi-turn variant with resolvers.

Digital encoders use a serial transfer protocol. This protocol is called EnDat. The EnDat protocol is a developed standard that incorporates the advantages of absolute and incremental position measurement and also offers a read/write parameter memory in the encoder. The embedded parameter chip is stored by B&R in this encoder memory. This data and the B&R ACOPOS systems form a plug-and-play drive solution. Absolute positioning can be used within a revolution with the single-turn variants. A homing procedure is not required because of the absolute position measurement. For applications where the motor covers several revolutions for positioning, a multi-turn encoder that can save up to 65535 revolutions can be used. A solution with a single-turn encoder variant with a homing procedure is also possible. In EnDat 2.1 analog/digital sampling, a very fine resolution is achieved by the evaluation modules developed by B&R.

2.6.1 EnDat 2.2

For the advanced, fully digital EnDat 2.2 protocol, the positions are generated directly in the encoder and communicated serially with the drive system. This transfer is very robust in relation to disturbances and is even certified for safety applications.

EnDat 2.2 is therefore to be preferred over the older EnDat 2.1 variant.

2.6.2 General safety 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).

There are also a number of safety functions that are already possible with D encoders.

2.6.3 Information: SafeMOTION

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.

2.6.4 Resolver

Technical data	Order code (ee)	
	R0	R2
Precision [']	10	6
Vibration during operation [m/s²]	10 < f ≤ 500 Hz: ≤196	55 < f ≤ 2000 Hz: <500
Shock during operation [m/s²] (11 ms duration)	≤981	≤1000

Availability	Available resolvers / Order code (ee)	
	R0	R2
8LSA2...-3	Yes	---
8LSAA...-3	Yes	---
8LSA3/4/5/6/7/8...-3	---	Yes
8LSx5**A**/**B**/**C**...-3	---	Yes
8LSC...-3	---	Yes
8LSO...-3 8LSP...-3	---	Yes

2.6.5 Inductive EnDat encoders for sizes 2 and A

Technical data	Encoder type / Order code (ee)			
	D8	D9	S8	S9
Operating principle	Inductive			
EnDat protocol	2.2	2.2	2.2	2.2
Functional safety[1)]	Yes	Yes	Yes	Yes
Single-turn / Multi-turn	S	M	S	M
Revolutions	1	4096	1	4096
Resolution [bits single-turn / bits multi-turn]	19/0	19/12	19/0	19/12
Precision ["]	120			
Switching frequency ≥ [kHz]	Digital pos. in the encoder			
Vibration during operation - Stator Max [m/s2]	400			
Vibration during operation - Rotor Max [m/s2]	600			
Shock during operation max [m/s²]	2000			
Probability of dangerous failure per hour (PFH) SIL 2	≤15 * 10^{-9}			
Manufacturer's product ID	ECI 1119 FS EnDat22	EQI 1131 FS EnDat22	ECI 1119 FS EnDat22	EQI 1131 FS EnDat22

1) See appendix B "Safety level overview for ACOPOS product family safety functions" of the SafeMOTION user's manual (MAACPMSAFEMC-ENG), which is available in the Downloads section of the B&R website ().
There are additional limitations when combining B&R motors with gearboxes, see the SafeMOTION user's manual (MAACPMSAFEMC-ENG), section "1.2.1 ACOPOSmulti SafeMOTION EnDat 2.2 and ACOPOS P3 SafeMOTION", in the Downloads section of the B&R website (www.br-automation.com).

Availability	Available encoders / Order code (ee)			
	D8	D9	S8	S9
8LSx2...-3	Yes	Yes	Yes	Yes
8LSAA...-3	Yes	Yes	---	---

2.6.6 Optical inductive EnDat encoders for sizes 2 and A

Technical data	Encoder type / Order code (ee)			
	E4	E5	D4	D5
Operating principle	Optical			
EnDat protocol	2.1	2.1	2.2	2.2
Functional safety[1)]	---	---	Yes	Yes
Single-turn / Multi-turn	S	M	S	M
Revolutions	1	4096	1	4096
Resolution [bits single-turn / bits multi-turn]	13/0	13/12	23/0	23/12
Precision ["]	60			
Switching frequency ≥ [kHz]	190		Digital pos. in the encoder	
Vibration during operation - Stator Max [m/s2]	200			
Vibration during operation - Rotor Max [m/s2]	200			
Shock during operation max [m/s²]	1000			
Probability of dangerous failure per hour (PFH) SIL 2	---	---	≤15 * 10^{-9}	
Manufacturer's product ID	ECN 1113 EnDat01	EQN 1125 EnDat01	ECN 1123 FS EnDat22	EQN 1135 FS EnDat22

1) See appendix B "Safety level overview for ACOPOS product family safety functions" of the SafeMOTION user's manual (MAACPMSAFEMC-ENG), which is available in the Downloads section of the B&R website (www.br-automation.com).
There are additional limitations when combining B&R motors with gearboxes, see the SafeMOTION user's manual (MAACPMSAFEMC-ENG), section "1.2.1 ACOPOSmulti SafeMOTION EnDat 2.2 and ACOPOS P3 SafeMOTION", in the Downloads section of the B&R website (www.br-automation.com).

Availability	Available encoders / Order code (ee)			
	E4	E5	D4	D5
8LSx2...-3	Yes	Yes	Yes	Yes
8LSAA...-3	Yes	Yes	Yes	Yes

2.6.7 Inductive EnDat encoders for sizes 3 - 9

Technical data	Encoder type / Order code (ee)					
	EA	EB	DA	DB	SA	SB
Operating principle	Inductive					
EnDat protocol	2.1	2.1	2.2	2.2	2.2	2.2
Functional safety[1)]	---	---	Yes	Yes	Yes	Yes
Single-turn / Multi-turn	S	M	S	M	S	M
Revolutions	1	4096	1	4096	1	4096
Resolution [bits single-turn / bits multi-turn]	19/0	19/12	19/0	19/12	19/0	19/12
Precision ["]	180		65			
Switching frequency ≥ [kHz]	6		Digital pos. in the encoder			
Vibration during operation - Stator Max [m/s2]	200		400			
Vibration during operation - Rotor Max [m/s2]	200		600			
Shock during operation max [m/s²]	2000		2000			
Probability of dangerous failure per hour (PFH) SIL 2	---	---	$\leq 15 * 10^{-9}$			
Manufacturer's product ID	ECI 1319 EnDat01	EQI 1331 EnDat01	ECI 1319 FS EnDat22	EQI 1331 FS EnDat22	ECI 1319 FS EnDat22	EQI 1331 FS EnDat22

1) See appendix B "Safety level overview for ACOPOS product family safety functions" of the SafeMOTION user's manual (MAACPMSAFEMC-ENG), which is available in the Downloads section of the B&R website (www.br-automation.com).
There are additional limitations when combining B&R motors with gearboxes, see the SafeMOTION user's manual (MAACPMSAFEMC-ENG), section "1.2.1 ACOPOSmulti SafeMOTION EnDat 2.2 and ACOPOS P3 SafeMOTION", in the Downloads section of the B&R website (www.br-automation.com).

Availability	Available encoders / Order code (ee)					
	EA	EB [3)]	DA	DB	SA	SB
8LSx2...-3	---	---	---	---	---	---
8LSx3/4/5/6/7/8...-3[2)]	Yes	Yes	Yes	Yes	Yes	Yes
8LSx5**A/B/C**...-3	---	---	Yes	Yes	Yes	Yes
8LSO93/94...-3 8LSP93/94...-3	---	---	Yes	Yes	Yes	Yes
8LSO95/96...-3 8LSP95/96...-3	---	---	---	---	---	---

2) Not applicable for 8LSx5**A/B/C**...-3
3) Encoder type **EB** requires at least the following versions (ACP10_SYS version or firmware version) of the ACOPOS operating systems:

- ACOPOS: V2.090 or later
- ACOPOSmulti: V2.031 or later

2.6.8 Optical EnDat encoders for sizes 3 - 9

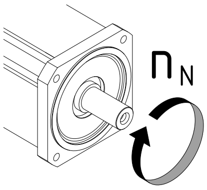
Technical data	Encoder type / Order code (ee)					
	E0	E1	D0	D1	S0	S1
Operating principle	Optical					
EnDat protocol	2.1	2.1	2.2	2.2	2.2	2.2
Functional safety[1)]	---	---	Yes	Yes	Yes	Yes
Single-turn / Multi-turn	S	M	S	M	S	M
Revolutions	1	4096	1	4096	1	4096
Resolution [bits single-turn / bits multi-turn]	13/0	13/12	25/0	25/12	25/0	25/12
Precision ["]	60		20			
Switching frequency ≥ [kHz]	130		Digital pos. in the encoder			
Vibration during operation - Stator Max [m/s2]	300					
Vibration during operation - Rotor Max [m/s2]	300					
Shock during operation max [m/s²]	2000					
Probability of dangerous failure per hour (PFH) SIL 2	---	---	$\leq 10 * 10^{-9}$			
Manufacturer's product ID	ECN 1313 EnDat01	EQN 1325 EnDat01	ECN 1325 FS EnDat22	EQN 1337 FS EnDat22	ECN 1325 FS EnDat22	EQN 1337 FS EnDat22

1) See appendix B "Safety level overview for ACOPOS product family safety functions" of the SafeMOTION user's manual (MAACPMSAFEMC-ENG), which is available in the Downloads section of the B&R website (www.br-automation.com).
There are additional limitations when combining B&R motors with gearboxes, see the SafeMOTION user's manual (MAACPMSAFEMC-ENG), section "1.2.1 ACOPOSmulti SafeMOTION EnDat 2.2 and ACOPOS P3 SafeMOTION", in the Downloads section of the B&R website (www.br-automation.com).

Availability	Available encoders / Order code (ee)					
	E0	E1	D0	D1	S0	S1
8LSx2...-3	---	---	---	---	---	---
8LSx3/4/5/6/7/8...-3 8LSx5**A**/**B**/**C**...-3	Yes	Yes	Yes	Yes	Yes	Yes
8LSO...-3 8LSP...-3	---	---	Yes	Yes	Yes	Yes

2.7 Nominal speed (nnn)

8LS **b** **c** **d** **.** **ee** **nnn** **ff** **gg** **-** **h** see "Order key" on page 13



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

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

	Order code (nnn)								
	011	013	015	020	022	030	040	045	060
Nominal speed n_N [rpm]	1100	1300	1500	2000	2200	3000	4000	4500	6000

2.7.1 Availability - 8LSA...-3

8LSA2

	Available nominal speeds n_N [rpm]								
	1100	1300	1500	2000	2200	3000	4000	4500	6000
8LSA23	---	---	---	---	---	---	---	---	Yes
8LSA24	---	---	---	---	---	---	---	---	Yes
8LSA25	---	---	---	---	---	---	---	Yes	Yes
8LSA26	---	---	---	---	---	---	---	Yes	Yes

8LSAA

	Available nominal speeds n_N [rpm]								
	1100	1300	1500	2000	2200	3000	4000	4500	6000
8LSAA	---	---	---	---	---	Yes	---	Yes	Yes

8LSA3

	Available nominal speeds n_N [rpm]								
	1100	1300	1500	2000	2200	3000	4000	4500	6000
8LSA33	---	---	---	---	---	Yes	---	Yes	Yes
8LSA34	---	---	---	---	Yes	Yes	---	Yes	Yes
8LSA35	---	---	---	---	Yes	Yes	---	Yes	Yes
8LSA36	---	---	---	---	Yes	Yes	---	Yes	Yes
8LSA37	---	---	---	---	Yes	Yes	---	Yes	Yes

8LSA4

	Available nominal speeds n_N [rpm]								
	1100	1300	1500	2000	2200	3000	4000	4500	6000
8LSA43	---	---	---	---	Yes	Yes	---	Yes	Yes
8LSA44	---	---	---	---	Yes	Yes	---	Yes	Yes
8LSA45	---	---	---	---	Yes	Yes	---	Yes	Yes
8LSA46	---	---	---	---	Yes	Yes	---	Yes	Yes

8LSA5

	Available nominal speeds n_N [rpm]								
	1100	1300	1500	2000	2200	3000	4000	4500	6000
8LSA53	---	---	---	---	Yes	Yes	---	Yes	---
8LSA54	---	---	---	---	Yes	Yes	---	Yes	---
8LSA55	---	---	---	---	Yes	Yes	---	Yes	---
8LSA56	---	---	---	---	Yes	Yes	---	Yes	---
8LSA57	---	---	---	---	Yes	Yes	---	Yes	---
8LSA5**A**	---	---	---	---	Yes	Yes	---	Yes	---
8LSA5**B**	---	---	---	---	Yes	Yes	Yes	---	---
8LSA5**C**	---	---	Yes	---	Yes	Yes	---	---	---

8LSA6

	Available nominal speeds n_N [rpm]								
	1100	**1300**	**1500**	**2000**	**2200**	**3000**	**4000**	**4500**	**6000**
8LSA63	---	---	---	---	Yes	Yes	---	Yes	---
8LSA64	---	---	---	---	Yes	Yes	---	Yes	---
8LSA65	---	---	---	---	Yes	Yes	---	Yes	---
8LSA66	---	---	---	---	Yes	Yes	---	Yes	---

8LSA7

	Available nominal speeds n_N [rpm]								
	1100	**1300**	**1500**	**2000**	**2200**	**3000**	**4000**	**4500**	**6000**
8LSA73	---	---	---	---	Yes	Yes	---	Yes	---
8LSA74	---	---	---	---	Yes	Yes	---	Yes	---
8LSA75	Yes	---	---	---	Yes	Yes	---	---	---
8LSA76	---	---	Yes	---	Yes	Yes	---	---	---
8LSA77	---	---	---	---	---	Yes	---	---	---
8LSA78	---	---	---	---	---	Yes	---	---	---

8LSA8

	Available nominal speeds n_N [rpm]								
	1100	**1300**	**1500**	**2000**	**2200**	**3000**	**4000**	**4500**	**6000**
8LSA83	---	---	Yes	---	Yes	Yes	---	---	---
8LSA84	---	---	Yes	---	Yes	Yes	---	---	---
8LSA85	---	---	Yes	Yes	---	---	---	---	---
8LSA86	---	---	Yes	Yes	---	---	---	---	---

2.7.2 Availability - 8LSC...-3

8LSC4

	Available nominal speeds n_N [rpm]								
	1100	**1300**	**1500**	**2000**	**2200**	**3000**	**4000**	**4500**	**6000**
8LSC43	---	---	---	---	Yes	Yes	---	Yes	Yes
8LSC44	---	---	---	---	Yes	Yes	---	Yes	Yes
8LSC45	---	---	---	---	Yes	Yes	---	Yes	Yes
8LSC46	---	---	---	---	Yes	Yes	---	Yes	Yes

8LSC5

	Available nominal speeds n_N [rpm]								
	1100	**1300**	**1500**	**2000**	**2200**	**3000**	**4000**	**4500**	**6000**
8LSC53	---	---	---	---	Yes	Yes	---	Yes	---
8LSC54	Yes	---	---	---	Yes	Yes	---	Yes	---
8LSC55	---	---	---	---	Yes	Yes	---	Yes	---
8LSC56	---	---	---	---	Yes	Yes	---	Yes	---
8LSC57	---	---	---	---	Yes	Yes	---	Yes	---
8LSC5**A**	---	---	---	---	Yes	Yes	---	Yes	---
8LSC5**B**	---	---	---	Yes	Yes	Yes	Yes	---	---
8LSC5**C**	---	---	Yes	---	Yes	Yes	---	---	---

8LSC6

	Available nominal speeds n_N [rpm]								
	1100	**1300**	**1500**	**2000**	**2200**	**3000**	**4000**	**4500**	**6000**
8LSC63	---	---	---	---	Yes	Yes	---	Yes	---
8LSC64	---	---	---	---	Yes	Yes	---	Yes	---
8LSC65	---	---	---	---	Yes	Yes	---	Yes	---
8LSC66	---	---	---	---	Yes	Yes	---	Yes	---

8LSC7

	Available nominal speeds n_N [rpm]								
	1100	**1300**	**1500**	**2000**	**2200**	**3000**	**4000**	**4500**	**6000**
8LSC73	---	---	---	---	Yes	Yes	---	Yes	---
8LSC74	---	---	---	---	Yes	Yes	---	Yes	---
8LSC75	---	---	---	---	Yes	Yes	---	---	---
8LSC76	---	---	Yes	---	---	Yes	---	---	---
8LSC77	---	---	---	---	---	Yes	---	---	---
8LSC78	---	---	---	---	---	Yes	---	---	---

8LSC8

	Available nominal speeds n_N [rpm]								
	1100	1300	1500	2000	2200	3000	4000	4500	6000
8LSC83	---	---	Yes	---	Yes	Yes	---	---	---
8LSC84	---	---	Yes	---	Yes	Yes	---	---	---
8LSC85	---	---	Yes	Yes	---	---	---	---	---
8LSC86	---	---	Yes	Yes	---	---	---	---	---

2.7.3 Availability - 8LSO...-3 / 8LSP...-3

8LSO9

	Available nominal speeds n_N [rpm]		
	1300	1500	2200
8LSO93	Yes	Yes	Yes
8LSO94	Yes	Yes	Yes
8LSO95	Yes	Yes	Yes
8LSO96	Yes	Yes	Yes

8LSP9

	Available nominal speeds n_N [rpm]		
	1300	1500	2200
8LSP93	Yes	Yes	Yes
8LSP94	Yes	Yes	Yes
8LSP95	Yes	Yes	Yes
8LSP96	Yes	Yes	Yes

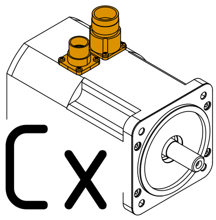
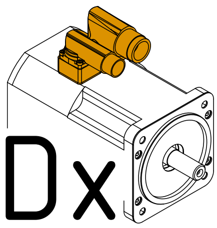
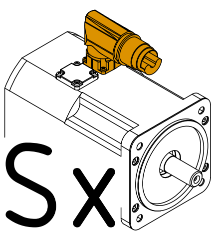
2.8 Motor options (ff) 8LSA / 8LSC

8LS b c d . ee nnn **ff** gg - h see "Order key" on page 13

See the following table for the corresponding code (**ff**) in the order key.
The first position in the code (**ff**) defines the connection direction with options **C**x, **D**x and **S**x. The second position (e.g. x**0**, x**1**, x**2**, x**3** ... x**A**, x**B**, x**C**, etc.) defines all other motor options according to the table.

Advice:

- **The combination "reinforced holding brake" with special motor option "reinforced A-side bearing" is not possible.**
- **Motors with reinforced bearings cannot be combined with gearboxes.**
- **An increased brake is not available for 8LSAA.**
- **A standard brake and reinforced brake are not available for 8LSA5C for technical reasons.**

Motor option				Order code (ff)
Connection direction	**Oil seal**	**Holding brake**	**Shaft end**	
Straight (top connector)  Encoder and power cable: Separated with own connections	---	---	Smooth shaft	**C0**
	---	---	With key	**C1**
	---	Standard holding brake	Smooth shaft	**C2**
	---	Standard holding brake	With key	**C3**
	---	Heavy-duty holding brake	Smooth shaft	**C4**
	---	Heavy-duty holding brake	With key	**C5**
	Yes	---	Smooth shaft	**C6**
	Yes	---	With key	**C7**
	Yes	Standard holding brake	Smooth shaft	**C8**
	Yes	Standard holding brake	With key	**C9**
	Yes	Heavy-duty holding brake	Smooth shaft	**CA**
	Yes	Heavy-duty holding brake	With key	**CB**
	---	Special-purpose holding brake[2]	Smooth shaft	**CC**
	---	Special-purpose holding brake[2]	With key	**CD**
	Yes	Special-purpose holding brake[2]	Smooth shaft	**CE**
	Yes	Special-purpose holding brake[2]	With key	**CF**
Angled (swivel connector)  Encoder and power cable: Separated with own connections	---	---	Smooth shaft	**D0**
	---	---	With key	**D1**
	---	Standard holding brake	Smooth shaft	**D2**
	---	Standard holding brake	With key	**D3**
	---	Heavy-duty holding brake	Smooth shaft	**D4**
	---	Heavy-duty holding brake	With key	**D5**
	Yes	---	Smooth shaft	**D6**
	Yes	---	With key	**D7**
	Yes	Standard holding brake	Smooth shaft	**D8**
	Yes	Standard holding brake	With key	**D9**
	Yes	Heavy-duty holding brake	Smooth shaft	**DA**
	Yes	Heavy-duty holding brake	With key	**DB**
	---	Special-purpose holding brake[2]	Smooth shaft	**DC**
	---	Special-purpose holding brake[2]	With key	**DD**
	Yes	Special-purpose holding brake[2]	Smooth shaft	**DE**
	Yes	Special-purpose holding brake[2]	With key	**DF**
Single-cable solution (hybrid), angled, swivel connector  Encoder and power cable: Combined in one cable	---	---	Smooth shaft	**S0**
	---	---	With key	**S1**
	---	Standard holding brake	Smooth shaft	**S2**
	---	Standard holding brake	With key	**S3**
	---	Heavy-duty holding brake	Smooth shaft	**S4**
	---	Heavy-duty holding brake	With key	**S5**
	Yes	---	Smooth shaft	**S6**
	Yes	---	With key	**S7**
	Yes	Standard holding brake	Smooth shaft	**S8**
	Yes	Standard holding brake	With key	**S9**
	Yes	Heavy-duty holding brake	Smooth shaft	**SA**
	Yes	Heavy-duty holding brake	With key	**SB**
	---	Special-purpose holding brake[2]	Smooth shaft	**SC**
	---	Special-purpose holding brake[2]	With key	**SD**
	Yes	Special-purpose holding brake[2]	Smooth shaft	**SE**
	Yes	Special-purpose holding brake[2]	With key	**SF**

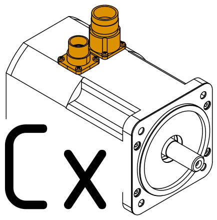
2) The "special-purpose holding brake" is only available in combination with a "reinforced A-side bearing", see "Special motor options (gg) 8LSA / 8LSC".

See page 35.

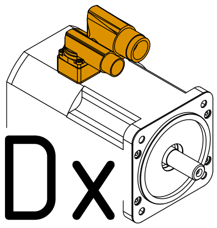
2.8.1 Connection direction (ff) 8LSA / 8LSC

Power connection and encoder connection

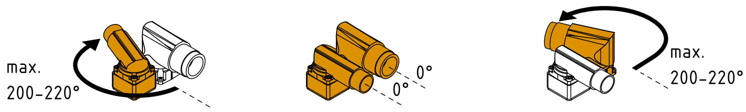
8LSA and **8LSC** three-phase synchronous motors are available with 3 different connection options.



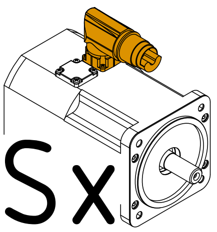
Straight built-in connector
Connection direction: Straight (top)
Encoder and power cable: Separated with own connections



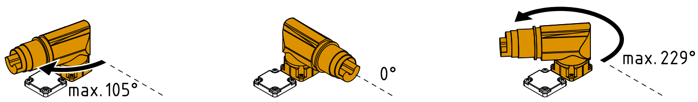
Angled built-in connector
Connection direction: Angled (swivel connector)
Encoder and power cable: Separated with own connections



Check the angle specifications (max. 200-220°) and the feasibility with regard to your requirements using the CAD configurator (cad.br-automation.com).

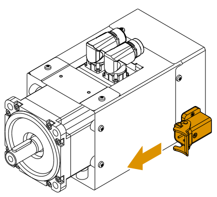


Single-cable solution (hybrid)
Connection direction: Angled, swivel connector
Encoder and power cable: Combined in one cable



Fan connection

8LSC three-phase synchronous motors are only available at the factory with one possible fan connection direction.



Fan connection
Connection direction: Angled

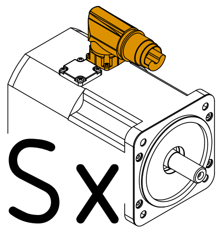
Other connection directions are possible, but must be implemented by the user. The junction box and cover with fan can be rotated in 90° steps; pay attention to possible interference with the motor connections.

Further information:
Changing the fan connection direction (Page 268)

Motor options (ff) - Overview (order code)

see "Motor options (ff) 8LSA / 8LSC" on page 24

2.8.2 Availability - Single-cable solution (hybrid) (ff) 8LSA / 8LSC



The single-cable solution (hybrid) is only **possible for motors with connector size 1.0** (built-in connector on the motor side) and therefore generally **up to size/length 65**.

The following **exceptions** apply to individual motors with **size/length 5A, 5B and 5C**. The listed motors are therefore not available as a single-cable solution (hybrid).

Cooling type A	Speed	Connector size	Single-cable solution (hybrid) available
8LSA5A.ee045ffgg-3	4500	1.5	---
8LSA5B.ee030ffgg-3	3000	1.5	---
8LSA5B.ee040ffgg-3	4000	1.5	---
8LSA5C.ee022ffgg-3	2200	1.5	---
8LSA5C.ee030ffgg-3	3000	1.5	---

Cooling type C	Speed	Connector size	Single-cable solution (hybrid) available
8LSC5A.ee045ffgg-3	4500	1.5	---
8LSC5B.ee030ffgg-3	3000	1.5	---
8LSC5B.ee040ffgg-3	4000	1.5	---
8LSC5C.ee022ffgg-3	2200	1.5	---
8LSC5C.ee030ffgg-3	3000	1.5	---

Availability - 8LSA66 / 8LSC66

Cooling type A	Speed	Connector size	Single-cable solution (hybrid) available
8LSA66.ee015ffgg-3	1500	1	Yes
8LSA66.ee022ffgg-3	2200	1	Yes
8LSA66.ee030ffgg-3	3000	1	Yes
8LSA66.ee045ffgg-3	4500	1.5	---

Cooling type C	Speed	Connector size	Single-cable solution (hybrid) available
8LSC66.ee015ffgg-3	1500	1	Yes
8LSC66.ee022ffgg-3	2200	1	Yes
8LSC66.ee030ffgg-3	3000	1	Yes
8LSC66.ee045ffgg-3	4500	1.5	---

Availability - 8LSA7 / 8LSC7

Cooling type A	Speed	Connector size	Single-cable solution (hybrid) available
8LSA73.ee030ffgg-3	3000	1	Yes
8LSA73.ee045ffgg-3	4500	1.5	---
8LSA74.ee015ffgg-3	1500	1	Yes
8LSA74.ee020ffgg-3	2000	1	Yes
8LSA74.ee022ffgg-3	2200	1	Yes
8LSA74.ee030ffgg-3	3000	1	Yes
8LSA74.ee045ffgg-3	4500	1.5	---
8LSA75.ee015ffgg-3	1500	1	Yes
8LSA75.ee020ffgg-3	2000	1	Yes
8LSA75.ee022ffgg-3	2200	1	Yes
8LSA75.ee030ffgg-3	3000	1	Yes
8LSA76.ee015ffgg-3	1500	1.5	---
8LSA76.ee030ffgg-3	3000	1.5	---

Cooling type C	Speed	Connector size	Single-cable solution (hybrid) available
8LSC73.ee030ffgg-3	3000	1	Yes
8LSC73.ee045ffgg-3	4500	1.5	---
8LSC74.ee020ffgg-3	2000	1	Yes
8LSC74.ee022ffgg-3	2200	1	Yes
8LSC74.ee030ffgg-3	3000	1	Yes
8LSC74.ee045ffgg-3	4500	1.5	---
8LSC75.ee030ffgg-3	3000	1.5	---
8LSC76.ee030ffgg-3	3000	1.5	---

All other lengths for size 7 are equipped with connector size 1.5 and therefore not available for the single-cable solution (hybrid).

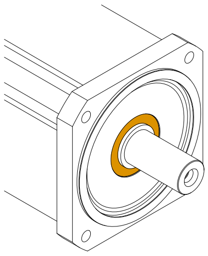
Availability - 8LSA8 / 8LSC8

Size 8 motors (connector size 1.5) are not available for the single-cable solution (hybrid).

Motor options (ff) - Overview (order code)

see "Motor options (ff) 8LSA / 8LSC" on page 24

2.8.3 Oil seal (ff) 8LSA / 8LSC



All 8LS three-phase synchronous motors are available with a form A oil seal per DIN 3760.

When equipped with an oil seal, the motors have IP65 protection per EN 60034-5.

Motor options (ff) - Overview (order code)

see "Motor options (ff) 8LSA / 8LSC" on page 24

Servicing

To maintain functionality of the oil seal, it must be lubricated regularly with oil. An oil seal that is not lubricated will harden due to increased frictional heat and will eventually provide only dust protection.

> ## Advice:
>
> **Proper lubrication of the oil seal must be ensured throughout the entire service life of the motor.**
>
> **For this reason, mounting a gearbox on motors with an oil seal is not permitted!**

2.8.4 Holding brake (ff) 8LSA / 8LSC

Operating principle

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. Voltage (see the technical data) is required to release the brake.

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. It is recommended by the brake manufacturer to take into account a safety factor of 2.

Warning!

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

Personnel protection

Information:

If the holding brake should be used for the purpose of protecting personnel, the user must check via the MTTF values of the respective holding brake whether the performance level per EN ISO 13849 required for the respective application can be achieved with this holding brake. B&R recommends cyclical function testing of the holding brake.

The $\mathbf{B_{10d}}$ value required for calculating the performance level can be calculated as follows:

$$\mathbf{B_{10d}} = MTTF_d \times (0.1 \times n_{op})$$

$\mathbf{B_{10d}}$	Average number of cycles until dangerous failure occurs on 10% of the components.
$\mathbf{MTTF_d}$	Mean time to dangerous failure. $MTTF_d$ = MTTF x 2 For the MTTF value, see the technical data of the holding brakes.
$\mathbf{n_{op}}$	Average number of annual actuations.

Motor options (ff) - Overview (order code)

see "Motor options (ff) 8LSA / 8LSC" on page 24

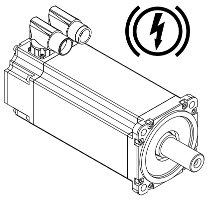
Advice:

In addition to the standard holding brake and the reinforced holding brake, there is also a special holding brake for special option "reinforced A-side bearing".

see "Special motor options (gg) 8LSA / 8LSC" on page 35

see "Special-purpose holding brake for reinforced A-side bearing" on page 37

2.8.4.1 Standard holding brake (ff) 8LSA / 8LSC

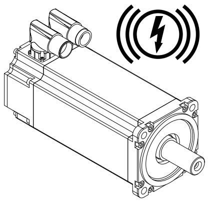


The **8LSA** and **8LSC** three-phase synchronous motors can be supplied with a standard holding brake. It is installed directly behind the A flange on the motor and is used to hold the motor shaft when no power is applied to the servo motor.

Technical data - Standard holding brake

	8LSA2 8LSC2	8LSAA	8LSA3 8LSC3	8LSA4 8LSC4	8LSA5 8LSC5	8LSA6 8LSC6	8LSA7 8LSC7	8LSA8 8LSC8
Holding torque M_{Br} [Nm]	2.2	3.2	4	8	15	32	47	130
Connected load P_{On} [W]	8.2	10.8	13.4	18.0	24.0	26.0	20.4	50.0
Supply current I_{On} [A]	0.35	0.45	0.56	0.75	1.0	1.08	0.85	2.08
Supply voltage U_{On} [VDC]	24 (+10% / -10%)			24 (+6% / -10%)				
Moment of inertia J_{Br} [kgcm²]	0.12	0.38	0.38	0.54	1.66	5.85	32	53.0
Weight m_{Br} [kg]	0.19	0.60	0.29	0.46	0.9	1.6	3.8	5.35
MTTF[h]	39,150,000			9,080,000	12,060,000	48,760,000	39,150,000	5,510,000

2.8.4.2 Reinforced holding brake (ff) 8LSA / 8LSC



8LSA and **8LSC** three-phase synchronous motors in sizes 3 - 7 that have normal A-side bearings can be delivered with a reinforced holding brake.
Combining a "reinforced A-side bearing" with a reinforced holding brake is **not possible**!

Technical data - Reinforced holding brake

	8LSA3 8LSC3	8LSA4 8LSC4	8LSA5 8LSC5	8LSA6 8LSC6	8LSA7 8LSC7
Holding torque M_{Br} [Nm]	9	15	60	60	80
Connected load P_{On} [W]	15	18.0	25.0	25.0	36.5
Supply current I_{On} [A]	0.63	0.75	1.04	1.04	1.52
Supply voltage U_{On} [VDC]	24 (+10% / -10%)	24 (+6% / -10%)			
Moment of inertia J_{Br} [kgcm²]	0.55	1.35	14.7	14.7	27.0
Weight m_{Br} [kg]	0.52	0.98	3.23	3.23	4.4
MTTF[h]	---	39,150,000			

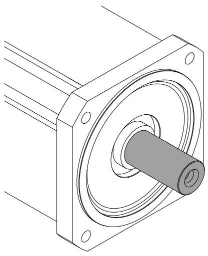
2.8.5 Shaft end (ff) 8LSA / 8LSC

All 8LS three-phase synchronous motors have shaft ends per DIN 748. The shaft end is available in several variants, and availability can be determined in the corresponding table.

Motor options (ff) - Overview (order code)

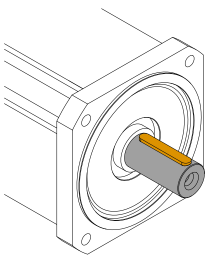
see "Motor options (ff) 8LSA / 8LSC" on page 24

Variants



Smooth shaft end

A smooth shaft end is used for a force-fit shaft-hub connection and guarantees a backlash-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 8LS 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 mount 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.**

2.9 Motor options (ff) 8LSO / 8LSP

8LS	b	c	d	.	ee	nnn	**ff**	gg	-	h

see "Order key" on page 13

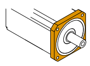
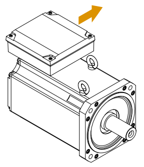
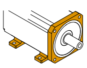
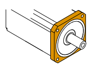
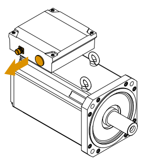
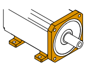
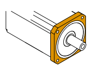
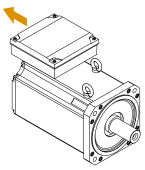
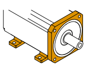
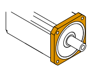
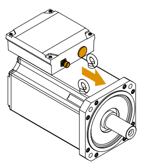
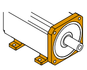
See the following table for the corresponding code (**ff**) in the order key.

Applies to all options:

The **terminal box** is always located **on top**; the cable outlet / connection direction is shown in the options table.

The **encoder connection** is straight and facing the connection direction.

Availability

Motor option					Availability		Order code (ff)
Installation type	**Connection direction**	**Oil seal**	**Holding brake**	**Shaft end**	**8LSO**	**8LSP**	
Flange 	270° (right) 	---	---	Smooth shaft	Yes	---	**A0**
		---	---	With key	Yes	---	**A1**
		Yes	---	Smooth shaft	Yes	---	**A6**
		Yes	---	With key	Yes	---	**A7**
Flange/Foot 		---	---	Smooth shaft	Yes	Yes	**B0**
		---	---	With key	Yes	Yes	**B1**
		Yes	---	Smooth shaft Toothed shaft[1]	Yes	Yes	**B6**
		Yes	---	With key	Yes	Yes	**B7**
Flange 	90° (left) 	---	---	Smooth shaft	Yes	---	**E0**
		---	---	With key	Yes	---	**E1**
		Yes	---	Smooth shaft	Yes	---	**E6**
		Yes	---	With key	Yes	---	**E7**
Flange/Foot 		---	---	Smooth shaft	Yes	Yes	**F0**
		---	---	With key	Yes	Yes	**F1**
		Yes	---	Smooth shaft Toothed shaft[1]	Yes	Yes	**F6**
		Yes	---	With key	Yes	Yes	**F7**
Flange 	180° B-side bearing 	---	---	Smooth shaft	Yes	---	**J0**
		---	---	With key	Yes	---	**J1**
		Yes	---	Smooth shaft	Yes	---	**J6**
		Yes	---	With key	Yes	---	**J7**
Flange/Foot 		---	---	Smooth shaft	Yes	Yes	**K0**
		---	---	With key	Yes	Yes	**K1**
		Yes	---	Smooth shaft Toothed shaft[1]	Yes	Yes	**K6**
		Yes	---	With key	Yes	Yes	**K7**
Flange 	0° (A-side bearing) 	---	---	Smooth shaft	Yes	---	**N0**
		---	---	With key	Yes	---	**N1**
		Yes	---	Smooth shaft	Yes	---	**N6**
		Yes	---	With key	Yes	---	**N7**
Flange/Foot 		---	---	Smooth shaft	Yes	Yes	**P0**
		---	---	With key	Yes	Yes	**P1**
		Yes	---	Smooth shaft Toothed shaft[1]	Yes	Yes	**P6**
		Yes	---	With key	Yes	Yes	**P7**

1) The "toothed shaft" is only available as a special motor option (gg) with code 44.
See "Special motor options (gg) 8LSO / 8LSP".

2.9.1 Mounting type (ff) for 8LSO/8LSP

Cooling type **8LSO** is available with the mounting flange as well as the mounting flange and mounting base.

Cooling type **8LSP** is always equipped with a mounting flange and mounting base.

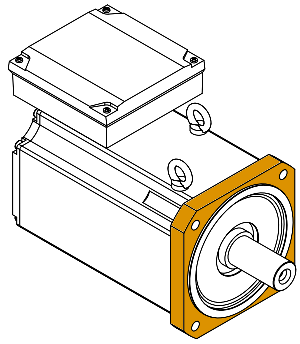
If the motor is equipped with a mounting flange and mounting base, then installation takes place either on the mounting flange or the mounting base.

Motor options (ff) - Overview (order code)

see "Motor options (ff) 8LSO / 8LSP" on page 31

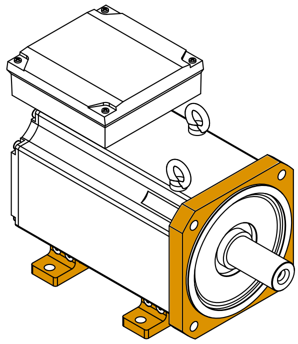
Mounting types

Mounting flange

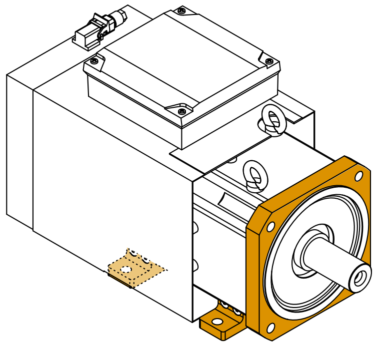


8LS**O**

Mounting flange and mounting base



8LS**O**



8LS**P**

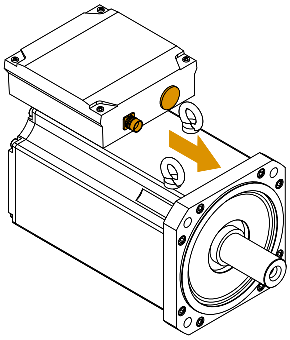
2.9.2 Connection direction (ff) for 8LSO / 8LSP

8LSO and 8LSP three-phase synchronous motors are available with a terminal box and 4 different connection directions

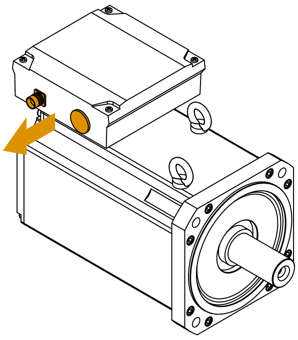
Motor options (ff) - Overview (order code)

see "Motor options (ff) 8LSO / 8LSP" on page 31

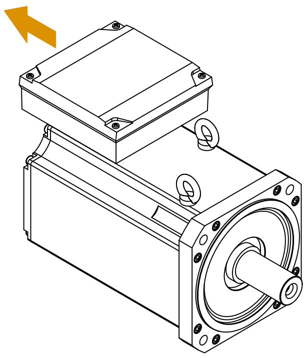
Power connection and encoder connection



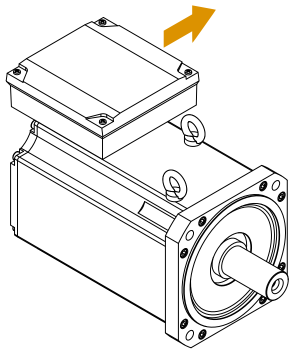
0°



90°

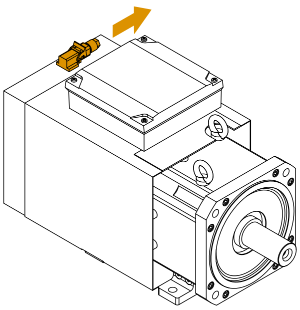


180°



270°

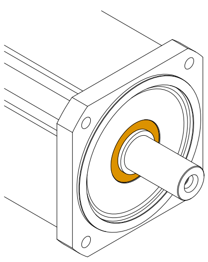
Fan connection



270°

With the **8LSP** three-phase synchronous motor, the **fan connection direction** is always **270°**.

2.9.3 Oil seal (ff) 8LSO / 8LSP



All 8LS three-phase synchronous motors are available with a form A oil seal per DIN 3760.

When equipped with an oil seal, the motors have IP65 protection per EN 60034-5.

Motor options (ff) - Overview (order code)

see "Motor options (ff) 8LSO / 8LSP" on page 31

Servicing

To maintain functionality of the oil seal, it must be lubricated regularly with oil. An oil seal that is not lubricated will harden due to increased frictional heat and will eventually provide only dust protection.

Advice:

Proper lubrication of the oil seal must be ensured throughout the entire service life of the motor.

For this reason, mounting a gearbox on motors with an oil seal is not permitted!

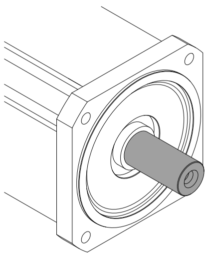
2.9.4 Shaft end (ff) 8LSO / 8LSP

All 8LS three-phase synchronous motors have shaft ends per DIN 748. The shaft end is available in several variants, and availability can be determined in the corresponding table.

Motor options (ff) - Overview (order code)

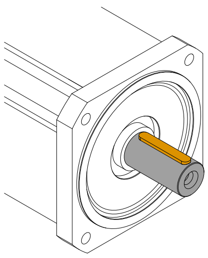
see "Motor options (ff) 8LSO / 8LSP" on page 31

Variants



Smooth shaft end

A smooth shaft end is used for a force-fit shaft-hub connection and guarantees a backlash-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 8LS 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 mount machine actuators with shaft end cover plates.

Caution!

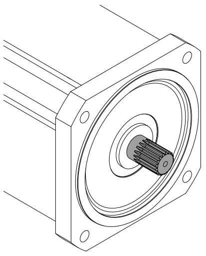
Shaft breakage due to heavy reverse operation.

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.**

Special option

see "Special motor options (gg) 8LSO / 8LSP" on page 38



Toothed shaft

The toothed shaft manufactured per ANSI B 92.1 is only available for 8LSO/8LSP motors as a **special motor option**.

2.10 Special motor options (gg) 8LSA / 8LSC

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

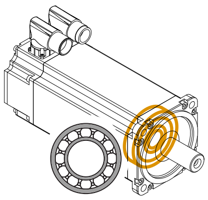
see "Order key" on page 13

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

The code (**ff**) for the motor options is limited by the special motor option (**gg**), or further codes (**ff**) are necessary when using the special-purpose holding brake. For the additional (**ff**) codes when using a special-purpose holding brake, see this section.

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

Reinforced A-side bearing



8LSA and **8LSC** three-phase synchronous motors with sizes 4 - 8 are available with special motor option **"Reinforced A-side bearing"**.
The reinforced A-side bearing allows increased radial and axial forces ($_{Fr}$ and $_{Fa}$) to be absorbed at the shaft end. For specifications for determining the permissible radial and axial forces, see the corresponding motor data.

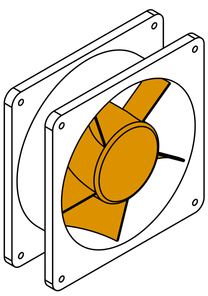
For motors with holding brake, the holding brake must be designed as a **special-purpose holding brake**.
see "Special-purpose holding brake - Technical data" on page 37

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 8LS three-phase synchronous motors.

Fan 230 VAC



Cooling type C (8LSC) can be equipped with the **24 VDC fan (standard fan)** or **230 VAC fan (special motor option)**.

230 VAC / 24 VDC fans - Technical data

see "Fan modules" on page 40

Replacement parts (8LSC)

see "Replacement parts - 8LSC fan kit" on page 268

Availability of special motor options

The **availability** of the special motor options depends on the cooling type (8LSA / 8LSC), size (4 - 8) and motor option (ff). For the availability of special motor options, see the following tables.

Cooling type	Order code (gg)	Special motor option[1)		Standard fan 24 VDC	8LSA...	8LSA... / 8LSC...
		Reinforced A-side bearing	230 VAC fan		...2, ...A, ...3	...4, ...5, ...6, ...7, ...8
8LS**A**	**00**	---	---	---	Yes	Yes
8LS**A**	**04**	Yes	---	---	---	Yes
8LS**C**	**00**	---	Yes	---	---	Yes
8LS**C**	**05**	---	---	Yes	---	Yes
8LS**C**	**11**	Yes	---	Yes	---	Yes

1) Motor options "Standard holding brake" and "Increased holding brake" cannot be ordered in combination with special motor option "Reinforced A-side bearing".

Permissible combinations (without holding brake)

The following combinations are available with special motor option **reinforced A-side bearing** (**gg**).

Order code			Options (ff)			Special motor options (gg)
(ff)	(gg) 8LSA	(gg) 8LSC	Connector direction	Shaft sealing ring	Shaft end	
C0	**04** (Self-cooled)	**11** (Standard fan 24 VDC)	Straight (top connector)	---	Smooth shaft	**Reinforced A-side bearing**
C1				---	Keyed shaft	
C6				Yes	Smooth shaft	
C7				Yes	Keyed shaft	
D0			Angled (swivel connector)	---	Smooth shaft	
D1				---	Keyed shaft	
D6				Yes	Smooth shaft	
D7				Yes	Keyed shaft	
S0			Single-cable solution (hybrid) Angled, swivel connector	---	Smooth shaft	
S1				---	Keyed shaft	
S6				Yes	Smooth shaft	
S7				Yes	Keyed shaft	

Permissible combinations (with special-purpose holding brake for reinforced A-side bearing)

The following combinations are available with special motor option **reinforced A-side bearing** (**gg**).

Order code			Options			Special motor options (gg)
(ff)	(gg) 8LSA	(gg) 8LSC	Connector direction	Shaft sealing ring	Shaft end	
CC	**04** (Self-cooled)	**11** (Standard fan 24 VDC)	Straight (top connector)	---	Smooth shaft	**Reinforced A-side bearing + Special holding brake**
CD				---	Keyed shaft	
CE				Yes	Smooth shaft	
CF				Yes	Keyed shaft	
DC			Angled (swivel connector)	---	Smooth shaft	
DD				---	Keyed shaft	
DE				Yes	Smooth shaft	
DF				Yes	Keyed shaft	
SC			Single-cable solution (hybrid) Angled, swivel connector	---	Smooth shaft	
SD				---	Keyed shaft	
SE				Yes	Smooth shaft	
SF				Yes	Keyed shaft	

Example orders

Motor with reinforced A-side bearing - Without holding brake

For an 8LSA55 with D0 encoder with connection type "Single-cable solution, angled (swivel connector)", the following selection is made: No holding brake, no oil seal, with key. Motor option (ff) = **S1**. A reinforced A-side bearing is also required. Special motor option (gg) for 8LS**A** = **04**.

Order code: **8LSA55.D0030S104-3**

For an 8LSC55 with D0 encoder with connection type "Single-cable solution, angled (swivel connector)", the following selection is made: No holding brake, no oil seal, with key. Motor option (ff) = **D1**. A reinforced A-side bearing is also required. Special motor option (gg) for 8LS**C** = **11**.

The order code is: **8LSC55.D0030S111-3**

Motor with reinforced A-side bearing - With special-purpose holding brake

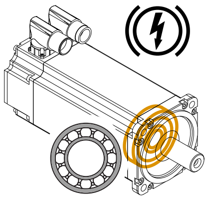
A reinforced A-side bearing is required for an 8LSA55 with E0 encoder and the desired angled (swivel connector) connection direction. Special motor option (gg) for 8LS**A** = **04**. The following selection is also made: Special-purpose holding brake, no oil seal, with key. Motor option (ff) = **DD**

The order code is: **8LSA55.E0030DD04-3**

A reinforced A-side bearing is required for an 8LSC55 with E0 encoder and the desired angled (swivel connector) connection direction. Special motor option (gg) for 8LS**C** = **11**. The following selection is made: No holding brake, no oil seal, with key. Motor option (ff) = **DD .**

The order code is: **8LSC55.E0030DD11-3**

2.10.1 Special-purpose holding brake for reinforced A-side bearing



A special-purpose holding brake is required for special motor option "Reinforced A-side bearing" in conjunction with a holding brake.

Operating principle

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. Voltage (see the technical data) is required to release the brake.

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. It is recommended by the brake manufacturer to take into account a safety factor of 2.

Warning!

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

Information:

If the holding brake should be used for the purpose of protecting personnel, the user must check via the MTTF values of the respective holding brake whether the performance level per EN ISO 13849 required for the respective application can be achieved with this holding brake. B&R recommends cyclical function testing of the holding brake.

see "Motor options (ff) 8LSA / 8LSC" on page 24

Special-purpose holding brake - Technical data

	8LSA4 8LSC4	8LSA5 8LSC5	8LSA6 8LSC6	8LSA7[1)] 8LSC7[1)]	8LSA8 8LSC8
Holding torque M_{Br} [Nm]	8	28	28	---	120
Connected load P_{On} [W]	16	26	26	---	50
Supply current I_{On} [A]	0.67	1.08	1.08	---	1.51
Supply voltage U_{On} [V]	24 (+6% / -10%)				
Moment of inertia J_{Br} [kgcm²]	1.84	10.2	10.2	---	58.9
Weight m_{Br} [kg]	1.55	2.1	2.1	---	6
MTTF[h]	12,060,000	48,760,000			5,510,000

1) If necessary, contact B&R.

2.11 Special motor options (gg) 8LSO / 8LSP

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

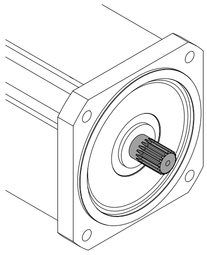
see "Order key" on page 13

The special motor option is specified as part of the model number in the form of a 2-character code (**gg**).

No special motor option

If no special motor option is desired, the two-character code (**gg**) as part of the model number only provides information about the cooling type.

Order code		Standard fan 24 VDC	
Cool-ing type	(gg)		
8LS**O9**	**00**	---	No special motor option
8LS**P9**	**05**	Yes	



Toothed shaft for 8LSO / 8LSP

The toothed shaft manufactured per ANSI B 92.1 is available as special motor option **44** for speeds **1300** and **1500**.

The toothed shaft is only available with special motor options (**ff**). Note that the code (**ff**) in the respective chapter section ("Motor options (ff) 8LSO / 8LSP" on page 31) is specified with a smooth shaft, which becomes a toothed shaft due to special motor option **44**, however.

Order code			Motor option (ff)			Standard fan 24 VDC
Cooling type	(ff)	(gg)	Mounting type	Connection direction	Oil seal	
8LS**O9**	**B6**	**44**	Flange/Foot	270° (right)	Yes	---
	F6			90° (left)	Yes	---
	K6			180° B-side bearing	Yes	---
	P6			0° (A-side bearing)	Yes	---
8LS**P9**	**B6**	**44**	Flange/Foot	270° (right)	Yes	Yes
	F6			90° (left)	Yes	Yes
	K6			180° B-side bearing	Yes	Yes
	P6			0° (A-side bearing)	Yes	Yes

2.12 General motor data

General information	8LSA	8LSC	8LSO	8LSP
C-UR-US listed	Yes			
UL file number	E360421			

Electrical properties	8LSA	8LSC	8LSO	8LSP
Mains input voltage on servo drive	3x 400 VAC ... 3x 480 VAC ±10%			
Connection type - Conventional: Power connection: Encoder connection:	Circular connector speedtec system, sizes 1 and 1.5 speedtec or itec system		Terminal box M10 or M12 speedtec or itec system	
Connection type - Single-cable solution (hybrid)	htec circular connector with speedtec system, size 1		---	

Thermal properties	8LSA	8LSC	8LSO	8LSP
Insulation class of the isolation system per EN 60034-1	F			
Methods of cooling per EN 60034-6 (IC code)	Self-cooling, free circulation surface cooling (IC4A0A0)	External cooling, surface cooling with machine-mounted independent fan component (IC4A0A6)	Self-cooling, free circulation surface cooling (IC4A0A0)	External cooling, surface cooling with machine-mounted independent fan component (IC4A0A6)
Thermal motor protection per EN 60034-11	Maximum winding temperature is 155°C (limited by the thermal motor protection in the ACOPOS servo drive or in the ACOPOSmulti drive system to 110°C with EnDat feedback and 130°C with resolver feedback) KTY83-110 (up to revision C7) / AM-PTC1000 (revision C8/C9)			

Mechanical properties	8LSA	8LSC	8LSO	8LSP
Vibration severity per EN 60034-14	Vibration severity level A[1]			
Bearing service life calculation	DIN ISO 281			
Center hole per DIN 332	Form F			
Eye bolt per DIN 580	Starting with size 8		Yes	
Shaft end per DIN 748[2]	Form E			
Oil seal per DIN 3760	Form A			
Key and keyway per DIN 6885-1	Form A keys, form N1 keyway			
Balancing of shaft per DIN ISO 8821	Shaft and fitment key convention			
Mounting flange per DIN 42948	Form A			
Radial runout, concentricity and axial runout of mounting flange per DIN 42955	Tolerance R			
Coating: Description: Color:	Water-based coating 98160 *IDROLIN/E SM SEMIOPACO NERO RAL 9005-C.452 RAL 9005 flat; shaft end and flange front metallic glossy			

Operating conditions	8LSA	8LSC	8LSO	8LSP
Rating class, operating mode per EN 60034-1	S1 - Continuous operation			
Ambient temperature during operation	-15°C to +40°C			
Reduction of nominal and stall current as well as nominal and stall torque at temperatures above 40°C	10% per 10°C			
Max. ambient temperature during operation	+55°C[3]			
Reduction of nominal and stall current as well as nominal and stall torque at installation elevations starting at 1,000 m above sea level	5% per 1000 m			
Maximum installation elevation	2000 m[4]			
Max. flange temperature	65°C			
EN 60034-5 protection (IP code): Degree of protection with optional oil seal (DIN 3760):	IP64 IP65	IP64, fan IP20 IP65, fan IP20	IP64 IP65	IP64, fan IP20 IP65, fan IP20
Type of construction and mounting arrangement per EN 60034-7 (IM code)	Horizontal (IM3001) Vertical, motor attached to the machine (IM 3011)[5] Vertical, motor stands on the machine (IM3031)			

Storage and transport conditions	8LSA	8LSC	8LSO	8LSP
Storage temperature	-20 to +60°C			
Relative humidity during storage	Max. 90%, non-condensing			
Transport temperature	-20 to +60°C			
Relative humidity during transport	Max. 90%, non-condensing			

1) Valid for all motors with an axis height greater than 56 mm.
2) Except for size 2 regular and reinforced bearing for sizes 5, 7 and 8
3) Continuous operation of the servo motors at an ambient temperature of +40°C to max. +55°C is possible, but this results in premature aging.
4) Requirements that go beyond this must be arranged with B&R.
5) With the IM 3011 type of construction and mounting arrangement (vertical, motor attached to the machine), there is a risk of production fluids or oils penetrating the motor on the flange side. Motors or motor-gearbox combinations that should be used with this mounting arrangement must therefore have at least IP65 protection on the flange side.

2.12.1 Fan modules

Fan 24 VDC (standard)

The fan components used depend on the size.

	8LSx4	8LSx5 / 8LSx6	8LSx7 / 8LSx8	8LSP9
Manufacturer	ebm-papst			
Manufacturer's product ID	4184 NXH	7114 N	6424 M	W1G250-HH37-52
C-UR-US listed	Yes			
Fan type	DC fan with electronically commutated external rotor motor			
Rotor bearings	Ball bearings			
Protection	IP20			
Nominal voltage	24 VDC +16% / -50%	24 VDC +25% / -50%	24 VDC +33% / -50%	24 VDC +17% / -33%
Power consumption	11 W	12 W		105 W
Overload protection	Protected against blocking and overloading by PTC resistor; Partially impedance protected		Reverse polarity and stall protection	
Temperature range	-30 to +70°C	-25 to +72°C	-20 to +55°C	-25 to +60°C
Operating noise	57 dB(A)	53 dB(A)	52 dB(A)	-
Service life At 40°C: At maximum permissible temperature:	 70000 h 35000 h	 80000 h 37500 h		 - -

Fan 230 VAC (special motor option for 8LSC)

The fan components used depend on the size.

	8LSx4	8LSx5 / 8LSx6 / 8LSx7 / 8LSx8
Manufacturer	ebm-papst	
Manufacturer's product ID	3656 ZP	7450 ES
C-UR-US listed	Yes	
Fan type	AC fan with external-rotor shaded-pole motor	
Rotor bearings	Ball bearings	
Degree of protection	IP20	
Nominal voltage	230 VAC	
Power consumption	12 W	47 W
Overload protection	Impedance protected	Thermal switches
Temperature range	-40 to +75°C	-25 to +50°C
Operating noise	37 dB(A)	60 dB(A)
Service life At 40°C: At maximum permissible temperature:	 52500 h 22500 h	 63000 h 50000 h

Special motor options (gg) for 8LSC (fan 230 VAC)

see "Special motor options (gg) 8LSA / 8LSC" on page 35

Replacement parts (8LSC)

see "Replacement parts - 8LSC fan kit" on page 268

2.12.2 Formula symbols

Term	Symbol	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 ambient conditions are correct.
Nominal power	P_N	kW	The nominal power is supplied by the motor when $n = n_N$. This is possible for any length of time if the ambient conditions are correct.
Nominal current	I_N	A	The nominal current is the RMS 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 ambient conditions are correct.
Stall torque	M_0	Nm	The stall torque is output by the motor at the speed n_0 and when the stall current is being applied. This is possible for any length of time if the ambient conditions are correct. Speed n_0 must be high enough for the temperature in all windings to be homogeneous and stationary (for B&R motors, n_0 = 50 rpm). The continuous torque is reduced when the motor is at a complete standstill.
Stall current	I_0	A	The stall current is the RMS value of the phase current (current in the motor supply line) for generating the stall torque at speed n_0. This is possible for any length of time if the ambient conditions are correct. Speed n_0 must be high enough for the temperature in all windings to be homogeneous and stationary (for B&R motors, n_0 = 50 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 RMS value of the phase current (current in the motor supply line) for generating the peak torque. This is only permitted 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	n_{max}	rpm	Maximum motor speed. This is a mechanical condition (centrifugal force, bearing wear).
Average speed	$n_{average}$	rpm	Average speed for one cycle
Torque constant	K_T	Nm/A	The torque constant specifies the torque generated by the motor at 1 Arms phase current. This value applies at a motor temperature of 20°C. If the temperature increases, the torque constant is reduced (typically down to 10%). If the current increases, the torque constant is reduced (typically starting at twice the value of the nominal current).
Voltage constant	K_E	V/1000 rpm	The voltage constant specifies the RMS value (phase-phase) of the reverse voltage induced by the motor at a speed of 1000 rpm (EMF). This value applies at a motor temperature of 20°C. When the temperature increases, the voltage constant is reduced (usually down to 5%). If the current increases, the voltage constant is reduced (typically starting at twice the value of the nominal current).
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. Stator inductance depends on the rotor position.
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	Mass of motor without holding brake
Moment of inertia of brake	J_{Br}	kgcm²	Moment of inertia for the built-in holding brake
Mass of brake	m_{Br}	kg	Mass of 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

2.12.3 Power dissipation

Power from the servo motors is dissipated via the motor flange and the surface of the motor. The following factors are important to ensure optimal heat dissipation:

- Thermally open installation
- Free convection

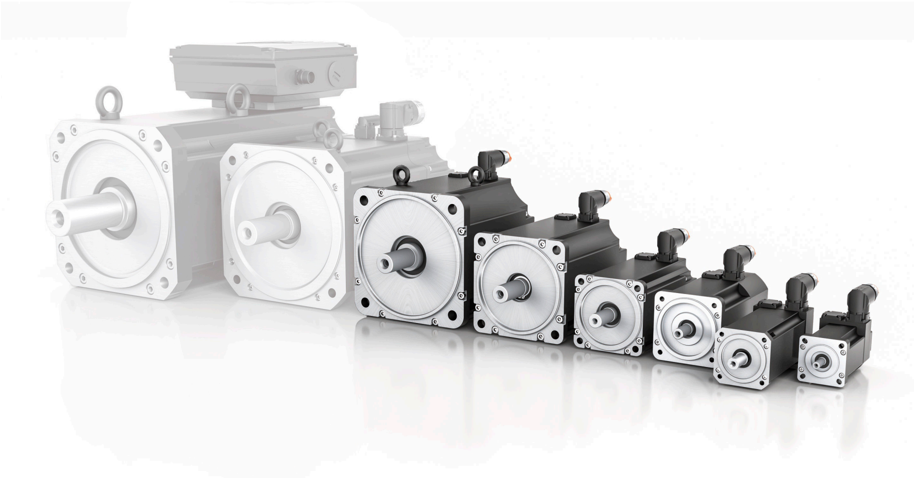
The motor data specified for the nominal operating point apply to a motor installed in a thermally open system. The dimensions of the flange plates used for the measurement are shown in the table below.

Generally speaking, the larger the flange, the better the heat dissipation.

Size	Dimensions [mm]	Material
8LSx2, 8LSAA, 8LSx3	250 x 250 x 6	Aluminum
8LSx4, 8LSx5, 8LSx5A/B/C	350 x 350 x 12	Aluminum
8LSx6, 8LSx7	495 x 495 x 15	Aluminum
8LSx8	ø 450 x 20	Steel
8LSO9, 8LSP9	350 x 395 x 19	Steel

2.13 Standard motors

The most commonly used 8LSA series motors are available as standard motors (preferred motors). If required, these motors are available on short notice using express delivery.



Overview of standard motors

<table>
<tr><th>Cooling type</th><th>Size</th><th>Length</th><th>Nominal speed nN [rpm]</th><th>Motor version</th><th>Availability / Technical data</th></tr>
<tr><td rowspan="11">8LSA</td><td>2</td><td>5</td><td>6000</td><td rowspan="11">-3</td><td>see "8LSA25...-3" on page 44</td></tr>
<tr><td rowspan="2">A</td><td>2</td><td rowspan="2">4500</td><td rowspan="2">see "8LSAAA2...-3 / 8LSAA4...-3" on page 45</td></tr>
<tr><td>4</td></tr>
<tr><td rowspan="2">3</td><td>5</td><td rowspan="4">3000 / 6000</td><td>see "8LSA35...-3" on page 46</td></tr>
<tr><td>7</td><td>see "8LSA37...-3" on page 47</td></tr>
<tr><td rowspan="2">4</td><td>4</td><td>see "8LSA44...-3" on page 48</td></tr>
<tr><td>6</td><td>see "8LSA46...-3" on page 49</td></tr>
<tr><td rowspan="2">5</td><td>5</td><td rowspan="4">3000</td><td rowspan="2">see "8LSA55...-3 / 8LSA57...-3" on page 50</td></tr>
<tr><td>7</td></tr>
<tr><td rowspan="2">7</td><td>3</td><td rowspan="2">see "8LSA73...-3 / 8LSA75...-3" on page 51</td></tr>
<tr><td>5</td></tr>
</table>

2.13.1 8LSA25...-3 - Standard motors

	Nominal speed nN [rpm]	Resolver	EnDat (inductive)	Holding brake	Connection direction	Shaft end
8LSA25.R0060D000-3	6000	R0	---	---	Angled (swivel connector)	Smooth shaft
8LSA25.R0060D200-3			---	Yes		
8LSA25.R0060D100-3			---	---		Keyed shaft
8LSA25.R0060D300-3			---	Yes		
8LSA25.D8060S000-3		---	2.2 single-turn	---	Single-cable solution (hybrid) Angled, swivel connector	Smooth shaft
8LSA25.D8060S200-3		---		Yes		
8LSA25.D9060S000-3		---	2.2 multi-turn	---		
8LSA25.D9060S200-3		---		Yes		
8LSA25.D8060S100-3		---	2.2 single-turn	---		Keyed shaft
8LSA25.D8060S300-3		---		Yes		
8LSA25.D9060S100-3		---	2.2 multi-turn	---		
8LSA25.D9060S300-3		---		Yes		

8LSA25...-3 - Technical data

Model number	8LSA25.ee060ffgg-3
Motor	
Nominal speed n_N [rpm]	6000
Number of pole pairs	4
Nominal torque M_n [Nm]	0.52
Nominal power P_N [W]	327
Nominal current I_N [A]	0.71
Stall torque M_0 [Nm]	0.6
Stall current I_0 [A]	0.82
Maximum torque M_{max} [Nm]	2.4
Maximum current I_{max} [A]	3.7
Maximum speed n_{max} [rpm]	9000
Torque constant K_T [Nm/A]	0.73
Voltage constant K_E [V/1000 rpm]	43.98
Stator resistance R_{2ph} [Ω]	34.63
Stator inductance L_{2ph} [mH]	49.6
Electrical time constant t_{el} [ms]	1.4
Thermal time constant t_{therm} [min]	20
Moment of inertia J [kgcm²]	0.16
Weight without brake m [kg]	1.3
Holding brake	
Holding torque of brake M_{Br} [Nm]	2.2
Mass of brake [kg]	0.45
Moment of inertia of brake J_{Br} [kgcm²]	0.12
Recommendations	
ACOPOS 8Vxxxx.xx...	1010
ACOPOSmulti 8BVIxxxx...	0014
ACOPOS P3 8EIxxxx...	2X2X
Cross section for B&R motor cables [mm²]	0.75
Connector size	1.0

Additional technical data

Speed-torque characteristic curve, permissible shaft load and dimensions

see "8LSA2...-3 - Technical data" on page 52

2.13.2 8LSAA2...-3 / 8LSAA4...-3 - Standard motors

8LSAA2...-3	Nominal speed nN [rpm]	Resolver	EnDat (inductive)	Holding brake	Connection direction	Shaft end
8LSAA2.D8045S000-3	4500	---	2.2 single-turn		Single-cable solution (hybrid) Angled, swivel connector	Smooth shaft
8LSAA2.D8045S200-3		---		Yes		
8LSAA2.D9045S000-3		---	2.2 multi-turn	---		
8LSAA2.D9045S200-3		---		Yes		
8LSAA2.D8045S100-3		---	2.2 single-turn	---		Keyed shaft
8LSAA2.D8045S300-3		---		Yes		
8LSAA2.D9045S100-3		---	2.2 multi-turn	---		
8LSAA2.D9045S300-3		---		Yes		

8LSAA4...-3	Nominal speed nN [rpm]	Resolver	EnDat (inductive)	Holding brake	Connection direction	Shaft end
8LSAA4.D8045S000-3	4500	---	2.2 single-turn	---	Single-cable solution (hybrid) Angled, swivel connector	Smooth shaft
8LSAA4.D8045S200-3		---		Yes		
8LSAA4.D9045S000-3		---	2.2 multi-turn	---		
8LSAA4.D9045S200-3		---		Yes		
8LSAA4.D8045S100-3		---	2.2 single-turn	---		Keyed shaft
8LSAA4.D8045S300-3		---		Yes		
8LSAA4.D9045S100-3		---	2.2 multi-turn	---		
8LSAA4.D9045S300-3		---		Yes		

8LSAA2...-3 / 8LSAA4...-3 - Technical data

Model number	8LSAA2.ee045ffgg-3	8LSAA4.ee045ffgg-3
Motor		
Nominal speed n_N [rpm]	4500	
Number of pole pairs	5	
Nominal torque M_n [Nm]	1.27	2.8
Nominal power P_N [W]	598	1319
Nominal current I_N [A]	1.31	2.89
Stall torque M_0 [Nm]	1.4	3.2
Stall current I_0 [A]	1.42	3.3
Maximum torque M_{max} [Nm]	4.5	11.3
Maximum current I_{max} [A]	6	15
Maximum speed n_{max} [rpm]	7000	
Torque constant K_T [Nm/A]	0.97	
Voltage constant K_E [V/1000 rpm]	58.64	
Stator resistance R_{2ph} [Ω]	13.9	5.3
Stator inductance L_{2ph} [mH]	27	12.4
Electrical time constant t_{el} [ms]	1.94	2.34
Thermal time constant t_{therm} [min]	31	38
Moment of inertia J [kgcm²]	0.38	1.1
Weight without brake m [kg]	2.2	3.8
Holding brake		
Holding torque of brake M_{Br} [Nm]	3.2	
Mass of brake [kg]	0.6	
Moment of inertia of brake J_{Br} [kgcm²]	0.38	
Recommendations		
ACOPOS 8Vxxxx.xx...	1016	1045
ACOPOSmulti 8BVIxxxx...	0014	0028
ACOPOS P3 8EIxxxx...	2X2X	4X5X
Cross section for B&R motor cables [mm²]	0.75	
Connector size	1.0	

Additional technical data

Speed-torque characteristic curve, permissible shaft load and dimensions

see "8LSAA...-3 - Technical data" on page 62

2.13.3 8LSA35...-3 - Standard motors

	Nominal speed nN [rpm]	Resolver	EnDat (inductive)	Holding brake	Connection direction	Shaft end
8LSA35.EA030D000-3	3000	---	2.1 single-turn	---	Angled (swivel connector)	Smooth shaft
8LSA35.EA030D200-3		---		Yes		
8LSA35.EA060D000-3	6000	---		---		
8LSA35.EA060D200-3		---		Yes		
8LSA35.EB030D000-3	3000	---	2.1 multi-turn	---		
8LSA35.EB030D200-3		---		Yes		
8LSA35.EB060D000-3	6000	---		---		
8LSA35.EB060D200-3		---		Yes		
8LSA35.R2030D000-3	3000	R2	---	---		
8LSA35.R2030D200-3			---	Yes		
8LSA35.R2060D000-3	6000		---	---		
8LSA35.R2060D200-3			---	Yes		
8LSA35.R2030D100-3	3000		---	---		Keyed shaft
8LSA35.R2030D300-3			---	Yes		
8LSA35.R2060D100-3	6000		---	---		
8LSA35.R2060D300-3			---	Yes		
8LSA35.DA030S000-3	3000	---	2.2 single-turn	---	Single-cable solution (hybrid), angled, swivel connector	Smooth shaft
8LSA35.DA030S200-3		---		Yes		
8LSA35.DA060S000-3	6000	---		---		
8LSA35.DA060S200-3		---		Yes		
8LSA35.DB030S000-3	3000	---	2.2 multi-turn	---		
8LSA35.DB030S200-3		---		Yes		
8LSA35.DB060S000-3	6000	---		---		
8LSA35.DB060S200-3		---		Yes		
8LSA35.DA030S100-3	3000	---	2.2 single-turn	---		Keyed shaft
8LSA35.DA030S300-3		---		Yes		
8LSA35.DA060S100-3	6000	---		---		
8LSA35.DA060S300-3		---		Yes		
8LSA35.DB030S100-3	3000	---	2.2 multi-turn	---		
8LSA35.DB030S300-3		---		Yes		
8LSA35.DB060S100-3	6000	---		---		
8LSA35.DB060S300-3		---		Yes		

8LSA35...-3 - Technical data

Model number	8LSA35.ee030ffgg-3	8LSA35.ee060ffgg-3
Motor		
Nominal speed n_N [rpm]	3000	6000
Number of pole pairs	4	
Nominal torque M_n [Nm]	2.1	1.6
Nominal power P_N [W]	660	1005
Nominal current I_N [A]	1.4	2.2
Stall torque M_0 [Nm]	2.3	
Stall current I_0 [A]	1.6	3.2
Maximum torque M_{max} [Nm]	9.2	
Maximum current I_{max} [A]	6.8	13.6
Maximum speed n_{max} [rpm]	9000	
Torque constant K_T [Nm/A]	1.45	0.73
Voltage constant K_E [V/1000 rpm]	87.96	43.98
Stator resistance R_{2ph} [Ω]	12.22	3.02
Stator inductance L_{2ph} [mH]	63	15.6
Electrical time constant t_{el} [ms]	5.2	5.1
Thermal time constant t_{therm} [min]	34	
Moment of inertia J [$kgcm^2$]	0.9	
Weight without brake m [kg]	4.4	
Holding brake		
Holding torque of brake M_{Br} [Nm]	4	
Mass of brake [kg]	1.09	
Moment of inertia of brake J_{Br} [$kgcm^2$]	0.38	
Recommendations		
ACOPOS 8Vxxxx.xx...	1022	1045
ACOPOSmulti 8BVIxxxx...	0014	0028
ACOPOS P3 8EIxxxx...	2X2X	4X5X
Cross section for B&R motor cables [mm^2]	0.75	
Connector size	1.0	

Additional technical data

Speed-torque characteristic curve, permissible shaft load and dimensions

see "8LSA3...-3 - Technical data" on page 70

2.13.4 8LSA37...-3 - Standard motors

	Nominal speed nN [rpm]	Resolver	EnDat (inductive)	Holding brake	Connection direction	Shaft end
8LSA37.R2030D000-3	3000	R2	---	---	Angled (swivel connector)	Smooth shaft
8LSA37.R2030D200-3			---	Yes		
8LSA37.R2060D000-3	6000		---	---		
8LSA37.R2060D200-3			---	Yes		
8LSA37.R2030D100-3	3000		---	---		Keyed shaft
8LSA37.R2030D300-3			---	Yes		
8LSA37.R2060D100-3	6000		---	---		
8LSA37.R2060D300-3			---	Yes		
8LSA37.DA030S000-3	3000	---	2.2 single-turn	---	Single-cable solution (hybrid) Angled, swivel connector	Smooth shaft
8LSA37.DA030S200-3		---		Yes		
8LSA37.DA060S000-3	6000	---		---		
8LSA37.DA060S200-3		---		Yes		
8LSA37.DB030S000-3	3000	---	2.2 multi-turn	---		
8LSA37.DB030S200-3		---		Yes		
8LSA37.DB060S000-3	6000	---		---		
8LSA37.DB060S200-3		---		Yes		
8LSA37.DA030S100-3	3000	---	2.2 single-turn	---		Keyed shaft
8LSA37.DA030S300-3		---		Yes		
8LSA37.DA060S100-3	6000	---		---		
8LSA37.DA060S300-3		---		Yes		
8LSA37.DB030S100-3	3000	---	2.2 multi-turn	---		
8LSA37.DB030S300-3		---		Yes		
8LSA37.DB060S100-3	6000	---		---		
8LSA37.DB060S300-3		---		Yes		

8LSA37...-3 - Technical data

Model number	8LSA37.ee030ffgg-3	8LSA37.ee060ffgg-3
Motor		
Nominal speed n_N [rpm]	3000	6000
Number of pole pairs	4	
Nominal torque M_n [Nm]	3.4	2
Nominal power P_N [W]	1068	1257
Nominal current I_N [A]	2.3	2.7
Stall torque M_0 [Nm]	3.6	
Stall current I_0 [A]	2.5	4.9
Maximum torque M_{max} [Nm]	14.4	
Maximum current I_{max} [A]	10.6	21.2
Maximum speed n_{max} [rpm]	9000	
Torque constant K_T [Nm/A]	1.45	0.73
Voltage constant K_E [V/1000 rpm]	87.96	43.98
Stator resistance R_{2ph} [Ω]	6.98	1.76
Stator inductance L_{2ph} [mH]	37.5	9.6
Electrical time constant t_{el} [ms]	5.4	5.5
Thermal time constant t_{therm} [min]	38	
Moment of inertia J [kgcm²]	1.38	
Weight without brake m [kg]	5.6	
Holding brake		
Holding torque of brake M_{Br} [Nm]	4	
Mass of brake [kg]	0.59	
Moment of inertia of brake J_{Br} [kgcm²]	0.38	
Recommendations		
ACOPOS 8Vxxxx.xx...	1045	1090
ACOPOSmulti 8BVIxxxx...	0028	0055
ACOPOS P3 8EIxxxx...	4X5X	8X8X
Cross section for B&R motor cables [mm²]	0.75	
Connector size	1.0	

Additional technical data

Speed-torque characteristic curve, permissible shaft load and dimensions

see "8LSA3...-3 - Technical data" on page 70

2.13.5 8LSA44...-3 - Standard motors

	Nominal speed nN [rpm]	Resolver	EnDat (inductive)	Holding brake	Connection direction	Shaft end
8LSA44.EA030D000-3	3000	---	2.1 single-turn	---	Angled (swivel connector)	Smooth shaft
8LSA44.EA030D200-3		---		Yes		
8LSA44.EA060D000-3	6000	---		---		
8LSA44.EA060D200-3		---		Yes		
8LSA44.EB030D000-3	3000	---	2.1 multi-turn	---		
8LSA44.EB030D200-3		---		Yes		
8LSA44.EB060D000-3	6000	---		---		
8LSA44.EB060D200-3		---		Yes		
8LSA44.R2030D000-3	3000	R2	---	---		
8LSA44.R2030D200-3			---	Yes		
8LSA44.R2060D000-3	6000		---	---		
8LSA44.R2060D200-3			---	Yes		
8LSA44.R2030D100-3	3000		---	---		Keyed shaft
8LSA44.R2030D300-3			---	Yes		
8LSA44.R2060D100-3	6000		---	---		
8LSA44.R2060D300-3			---	Yes		
8LSA44.DA030S000-3	3000	---	2.2 single-turn	---	Single-cable solution (hybrid) Angled, swivel connector	Smooth shaft
8LSA44.DA030S200-3		---		Yes		
8LSA44.DA060S000-3	6000	---		---		
8LSA44.DA060S200-3		---		Yes		
8LSA44.DB030S000-3	3000	---	2.2 multi-turn	---		
8LSA44.DB030S200-3		---		Yes		
8LSA44.DB060S000-3	6000	---		---		
8LSA44.DB060S200-3		---		Yes		
8LSA44.DA030S100-3	3000	---	2.2 single-turn	---		Keyed shaft
8LSA44.DA030S300-3		---		Yes		
8LSA44.DA060S100-3	6000	---		---		
8LSA44.DA060S300-3		---		Yes		
8LSA44.DB030S100-3	3000	---	2.2 multi-turn	---		
8LSA44.DB030S300-3		---		Yes		
8LSA44.DB060S100-3	6000	---		---		
8LSA44.DB060S300-3		---		Yes		

8LSA44...-3 - Technical data

Model number	8LSA44.ee030ffgg-3	8LSA44.ee060ffgg-3
Motor		
Nominal speed n_N [rpm]	3000	6000
Number of pole pairs	5	
Nominal torque M_n [Nm]	4.62	3
Nominal power P_N [W]	1451	1885
Nominal current I_N [A]	2.8	3.7
Stall torque M_0 [Nm]	6	
Stall current I_0 [A]	3.7	7.4
Maximum torque M_{max} [Nm]	22.8	
Maximum current I_{max} [A]	21.9	43.8
Maximum speed n_{max} [rpm]	12000	
Torque constant K_T [Nm/A]	1.63	0.81
Voltage constant K_E [V/1000 rpm]	98.44	49.22
Stator resistance R_{2ph} [Ω]	3.6	0.862
Stator inductance L_{2ph} [mH]	24	6.2
Electrical time constant t_{el} [ms]	6.7	7.2
Thermal time constant t_{therm} [min]	30	
Moment of inertia J [$kgcm^2$]	2.73	
Weight without brake m [kg]	5.4	
Holding brake		
Holding torque of brake M_{Br} [Nm]	8	
Mass of brake [kg]	1	
Moment of inertia of brake J_{Br} [$kgcm^2$]	0.69	
Recommendations		
ACOPOS 8Vxxxx.xx...	1045	1090
ACOPOSmulti 8BVIxxxx...	0055	0110
ACOPOS P3 8EIxxxx...	4X5X	8X8X
Cross section for B&R motor cables [mm^2]	0.75	
Connector size	1.0	

Additional technical data

Speed-torque characteristic curve, permissible shaft load and dimensions

see "8LSA4...-3 - Technical data" on page 83

2.13.6 8LSA46...-3 - Standard motors

	Nominal speed nN [rpm]	Resolver	EnDat (inductive)	Holding brake	Connection direction	Shaft end
8LSA46.R2030D000-3	3000	R2	---	---	Angled (swivel connector)	Smooth shaft
8LSA46.R2030D200-3			---	Yes		
8LSA46.R2060D000-3	6000		---	---		
8LSA46.R2060D200-3			---	Yes		
8LSA46.R2030D100-3	3000		---	---		Keyed shaft
8LSA46.R2030D300-3			---	Yes		
8LSA46.R2060D100-3	6000		---	---		
8LSA46.R2060D300-3			---	Yes		
8LSA46.DA030S000-3	3000	---	2.2 single-turn	---	Single-cable solution (hybrid) Angled, swivel connector	Smooth shaft
8LSA46.DA030S200-3		---		Yes		
8LSA46.DA060S000-3	6000	---		---		
8LSA46.DA060S200-3		---		Yes		
8LSA46.DB030S000-3	3000	---	2.2 multi-turn	---		
8LSA46.DB030S200-3		---		Yes		
8LSA46.DB060S000-3	6000	---		---		
8LSA46.DB060S200-3		---		Yes		
8LSA46.DA030S100-3	3000	---	2.2 single-turn	---		Keyed shaft
8LSA46.DA030S300-3		---		Yes		
8LSA46.DA060S100-3	6000	---		---		
8LSA46.DA060S300-3		---		Yes		
8LSA46.DB030S100-3	3000	---	2.2 multi-turn	---		
8LSA46.DB030S300-3		---		Yes		
8LSA46.DB060S100-3	6000	---		---		
8LSA46.DB060S300-3		---		Yes		

8LSA46...-3 - Technical data

Model number	8LSA46.ee030ffgg-3	8LSA46.ee060ffgg-3
Motor		
Nominal speed n_N [rpm]	3000	6000
Number of pole pairs	5	
Nominal torque M_n [Nm]	7.7	5
Nominal power P_N [W]	2419	3142
Nominal current I_N [A]	4.7	6.1
Stall torque M_0 [Nm]	10	
Stall current I_0 [A]	6.1	12.3
Maximum torque M_{max} [Nm]	38	
Maximum current I_{max} [A]	36.5	72.9
Maximum speed n_{max} [rpm]	12000	
Torque constant K_T [Nm/A]	1.63	0.81
Voltage constant K_E [V/1000 rpm]	98.44	49.22
Stator resistance R_{2ph} [Ω]	1.92	0.48
Stator inductance L_{2ph} [mH]	17.44	4.36
Electrical time constant t_{el} [ms]	9.1	
Thermal time constant t_{therm} [min]	40	
Moment of inertia J [kgcm²]	4.39	
Weight without brake m [kg]	7.3	
Holding brake		
Holding torque of brake M_{Br} [Nm]	8	
Mass of brake [kg]	1	
Moment of inertia of brake J_{Br} [kgcm²]	0.69	
Recommendations		
ACOPOS 8Vxxxx.xx...	1090	1180
ACOPOSmulti 8BVIxxxx...	0055	0110
ACOPOS P3 8EIxxxx...	8X8X	017X
Cross section for B&R motor cables [mm²]	0.75	1.5
Connector size	1.0	

Additional technical data

Speed-torque characteristic curve, permissible shaft load and dimensions

see "8LSA4...-3 - Technical data" on page 83

2.13.7 8LSA55...-3 / 8LSA57...-3 - Standard motors

8LSA55...-3	Nominal speed nN [rpm]	Resolver	EnDat (inductive)	Holding brake	Connection direction	Shaft end
8LSA55.EA030D000-3	3000	---	2.1 single-turn	---	Angled (swivel connector)	Smooth shaft
8LSA55.EA030D200-3		---		Yes		
8LSA55.EB030D000-3		---	2.1 multi-turn	---		
8LSA55.EB030D200-3		---		Yes		
8LSA55.R2030D000-3		R2	---	---		
8LSA55.R2030D200-3			---	Yes		
8LSA55.R2030D100-3			---	---		Keyed shaft
8LSA55.R2030D300-3			---	Yes		
8LSA55.DA030S000-3		---	2.2 single-turn	---	Single-cable solution (hybrid) Angled, swivel connector	Smooth shaft
8LSA55.DA030S200-3		---		Yes		
8LSA55.DB030S000-3		---	2.2 multi-turn	---		
8LSA55.DB030S200-3		---		Yes		
8LSA55.DA030S100-3		---	2.2 single-turn	---		Keyed shaft
8LSA55.DA030S300-3		---		Yes		
8LSA55.DB030S100-3		---	2.2 multi-turn	---		
8LSA55.DB030S300-3		---		Yes		

8LSA57...-3	Nominal speed nN [rpm]	Resolver	EnDat (inductive)	Holding brake	Connection direction	Shaft end
8LSA57.R2030D000-3	3000	R2	---	---	Angled (swivel connector)	Smooth shaft
8LSA57.R2030D200-3			---	Yes		
8LSA57.R2030D100-3			---	---		Keyed shaft
8LSA57.R2030D300-3			---	Yes		
8LSA57.DA030S000-3		---	2.2 single-turn	---	Single-cable solution (hybrid) Angled, swivel connector	Smooth shaft
8LSA57.DA030S200-3		---		Yes		
8LSA57.DB030S000-3		---	2.2 multi-turn	---		
8LSA57.DB030S200-3		---		Yes		
8LSA57.DA030S100-3		---	2.2 single-turn	---		Keyed shaft
8LSA57.DA030S300-3		---		Yes		
8LSA57.DB030S100-3		---	2.2 multi-turn	---		
8LSA57.DB030S300-3		---		Yes		

8LSA55...-3 / 8LSA57...3 - Technical data

Model number	8LSA55.ee030ffgg-3	8LSA57.ee030ffgg-3
Motor		
Nominal speed n_N [rpm]	3000	
Number of pole pairs	4	
Nominal torque M_n [Nm]	11.6	17.5
Nominal power P_N [W]	3644	5498
Nominal current I_N [A]	7.1	10.7
Stall torque M_0 [Nm]	12.5	20
Stall current I_0 [A]	7.7	12.3
Maximum torque M_{max} [Nm]	41.4	69
Maximum current I_{max} [A]	33	52.6
Maximum speed n_{max} [rpm]	9000	
Torque constant K_T [Nm/A]	1.63	
Voltage constant K_E [V/1000 rpm]	98.44	
Stator resistance R_{2ph} [Ω]	1.127	0.62
Stator inductance L_{2ph} [mH]	12.5	7.21
Electrical time constant t_{el} [ms]	11.1	11.6
Thermal time constant t_{therm} [min]	40	46
Moment of inertia J [kgcm²]	8.19	13.13
Weight without brake m [kg]	10.4	14.5
Holding brake		
Holding torque of brake M_{Br} [Nm]	15	
Mass of brake [kg]	1.5	1.3
Moment of inertia of brake J_{Br} [kgcm²]	1.66	
Recommendations		
ACOPOS 8Vxxxx.xx...	1090	1180
ACOPOSmulti 8BVIxxxx...	0110	
ACOPOS P3 8EIxxxx...	8X8X	017X
Cross section for B&R motor cables [mm²]	0.75	1.5
Connector size	1.0	

Additional technical data

Speed-torque characteristic curve, permissible shaft load and dimensions

see "8LSA5...-3 - Technical data" on page 97

2.13.8 8LSA73...-3 / 8LSA75...-3 - Standard motors

8LSA73...-3	Nominal speed nN [rpm]	Resolver	EnDat (inductive)	Holding brake	Connection direction	Shaft end
8LSA73.R2030D000-3	3000	R2	---	---	Angled (swivel connector)	Smooth shaft
8LSA73.R2030D200-3			---	Yes		
8LSA73.R2030D100-3			---	---		Keyed shaft
8LSA73.R2030D300-3			---	Yes		
8LSA73.DA030S000-3		---	2.2 single-turn	---	Single-cable solution (hybrid) Angled, swivel connector	Smooth shaft
8LSA73.DA030S200-3		---		Yes		
8LSA73.DB030S000-3		---	2.2 multi-turn	---		
8LSA73.DB030S200-3		---		Yes		
8LSA73.DA030S100-3		---	2.2 single-turn	---		Keyed shaft
8LSA73.DA030S300-3		---		Yes		
8LSA73.DB030S100-3		---	2.2 multi-turn	---		
8LSA73.DB030S300-3		---		Yes		

8LSA75...-3	Nominal speed nN [rpm]	Resolver	EnDat (inductive)	Holding brake	Connection direction	Shaft end
8LSA75.R2030D000-3	3000	R2	---	---	Angled (swivel connector)	Smooth shaft
8LSA75.R2030D200-3			---	Yes		
8LSA75.R2030D100-3			---	---		Keyed shaft
8LSA75.R2030D300-3			---	Yes		
8LSA75.DA030S000-3		---	2.2 single-turn	---	Single-cable solution (hybrid) Angled, swivel connector	Smooth shaft
8LSA75.DA030S200-3		---		Yes		
8LSA75.DB030S000-3		---	2.2 multi-turn	---		
8LSA75.DB030S200-3		---		Yes		
8LSA75.DA030S100-3		---	2.2 single-turn	---		Keyed shaft
8LSA75.DA030S300-3		---		Yes		
8LSA75.DB030S100-3		---	2.2 multi-turn	---		
8LSA75.DB030S300-3		---		Yes		

8LSA73...-3 / 8LSA75...-3 - Technical data

Model number	8LSA73.ee030ffgg-3	8LSA75.ee030ffgg-3
Motor		
Nominal speed n_N [rpm]	3000	
Number of pole pairs	5	
Nominal torque M_n [Nm]	20.5	30
Nominal power P_N [W]	6440	9425
Nominal current I_N [A]	12.58	18.4
Stall torque M_0 [Nm]	26	43
Stall current I_0 [A]	15.95	26.38
Maximum torque M_{max} [Nm]	107	187
Maximum current I_{max} [A]	96.54	169
Maximum speed n_{max} [rpm]	6000	4500
Torque constant K_T [Nm/A]	1.63	
Voltage constant K_E [V/1000 rpm]	98.44	
Stator resistance R_{2ph} [Ω]	0.395	0.21
Stator inductance L_{2ph} [mH]	6.5	3.9
Electrical time constant t_{el} [ms]	15.48	18.57
Thermal time constant t_{therm} [min]	37	46
Moment of inertia J [kgcm²]	46	74
Weight without brake m [kg]	20	28
Holding brake		
Holding torque of brake M_{Br} [Nm]	47	
Mass of brake [kg]	0	
Moment of inertia of brake J_{Br} [kgcm²]	32	
Recommendations		
ACOPOS 8Vxxxx.xx...	1180	1320
ACOPOSmulti 8BVIxxxx...	0220	0330
ACOPOS P3 8EIxxxx...	024X	034X
Cross section for B&R motor cables [mm²]	1.5	4
Connector size	1.0	

Additional technical data

Speed-torque characteristic curve, permissible shaft load and dimensions

see "8LSA7...-3 - Technical data" on page 136

2.14 8LSA - Technical data

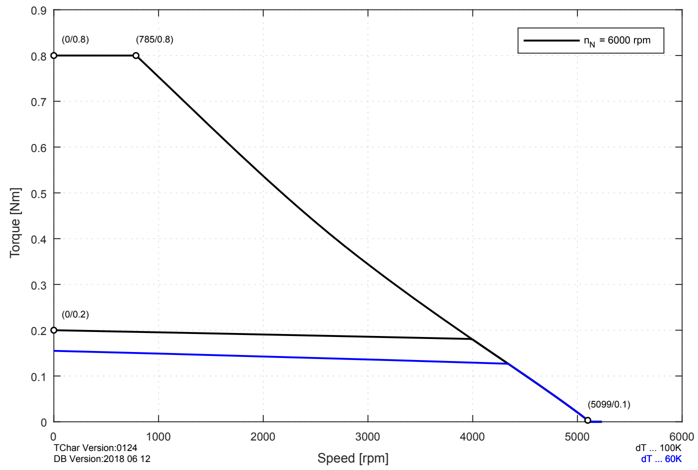
2.14.1 8LSA2...-3 - Technical data

Model number	8LSA23. ee060ffgg-3	8LSA24. ee060ffgg-3	8LSA25. ee045ffgg-3	8LSA25. ee060ffgg-3	8LSA26. ee045ffgg-3	8LSA26. ee060ffgg-3
Motor						
Nominal speed n_N [rpm]	6000		4500	6000	4500	6000
Number of pole pairs	4					
Nominal torque M_n [Nm]	0.17	0.35	0.54	0.52	0.72	0.69
Nominal power P_N [W]	107	220	254	327	339	434
Nominal current I_N [A]	0.23	0.48	0.56	0.71	0.8	0.95
Stall torque M_0 [Nm]	0.2	0.4	0.6		0.8	
Stall current I_0 [A]	0.27	0.55	0.62	0.82	0.89	1.1
Maximum torque M_{max} [Nm]	0.8	1.6	2.4		3.2	
Maximum current I_{max} [A]	1.25	2.5	2.77	3.7	4.05	5
Maximum speed n_{max} [rpm]	9000					
Torque constant K_T [Nm/A]	0.73		0.97	0.73	0.9	0.73
Voltage constant K_E [V/1000 rpm]	43.98		58.64	43.98	54.45	43.98
Stator resistance R_{2ph} [Ω]	159	52.3	63.4	34.63	33.75	22.8
Stator inductance L_{2ph} [mH]	165	67.5	87.8	49.6	52.9	36.6
Electrical time constant t_{el} [ms]	1	1.3	1.4		1.6	
Thermal time constant t_{therm} [min]	13	16	20		23	
Moment of inertia J [kgcm²]	0.07	0.12	0.16		0.2	
Weight without brake m [kg]	0.9	1.1	1.3		1.5	
Holding brake						
Holding torque of brake M_{Br} [Nm]	2.2					
Mass of brake [kg]	0.45					
Moment of inertia of brake J_{Br} [kgcm²]	0.12					
Recommendations						
ACOPOS 8Vxxxx.xx...	1010					1016
ACOPOSmulti 8BVIxxxx...	0014					
ACOPOS P3 8EIxxxx...	2X2X					
Cross section for B&R motor cables [mm²]	0.75					
Connector size	1.0					

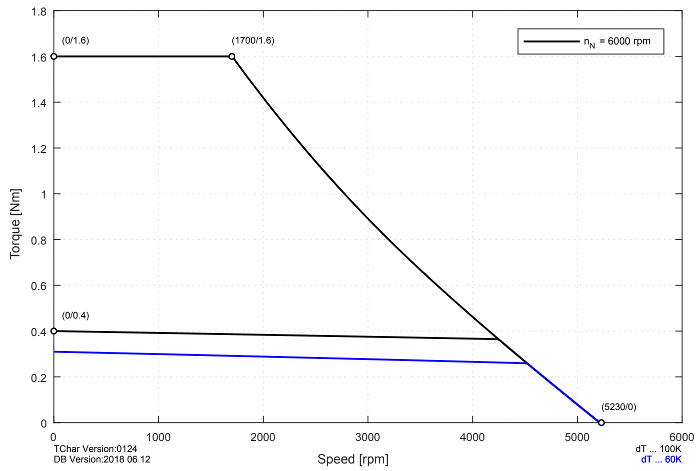
NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guideline; detailed inspection of the corresponding 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.

2.14.1.1 Speed-torque characteristic curves at 325 VDC DC bus voltage

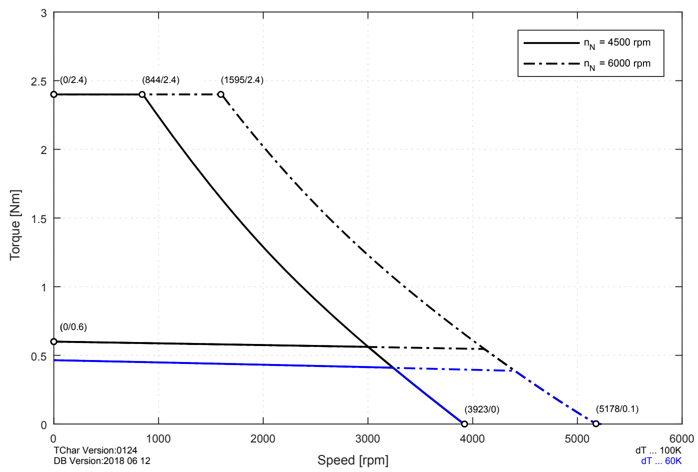
8LSA23.eennnffgg-3



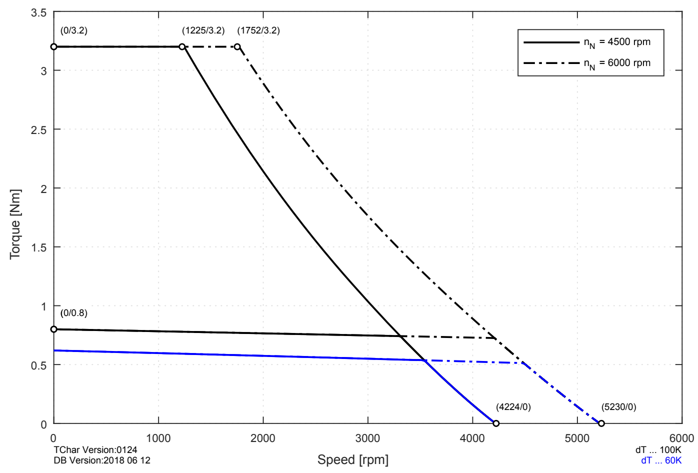
8LSA24.eennnffgg-3



8LSA25.eennnffgg-3

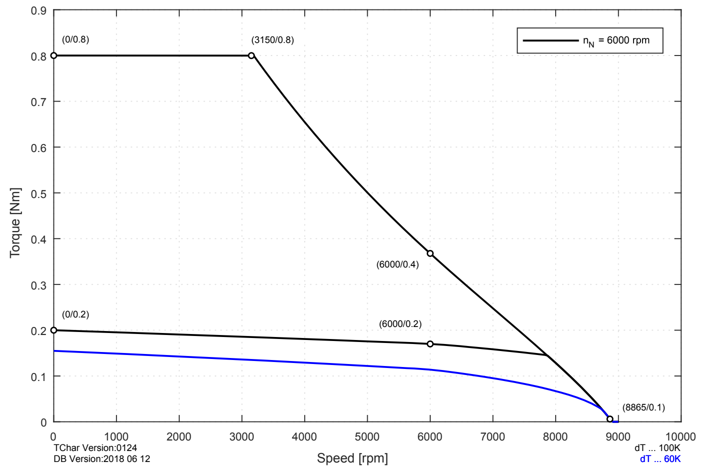


8LSA26.eennnffgg-3

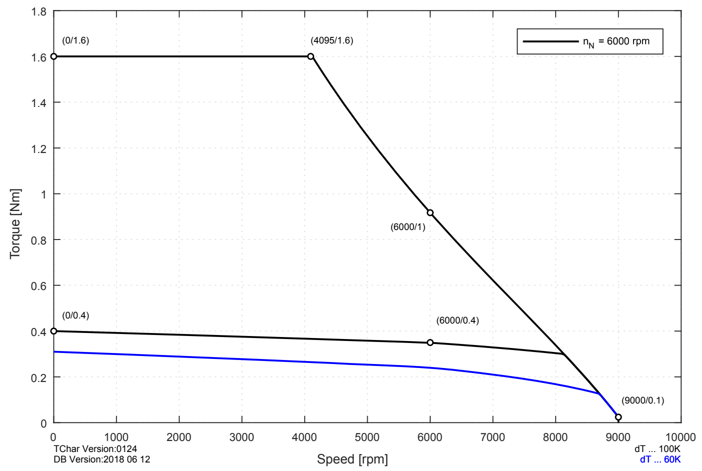


2.14.1.2 Speed-torque characteristic curves at 560 VDC DC bus voltage

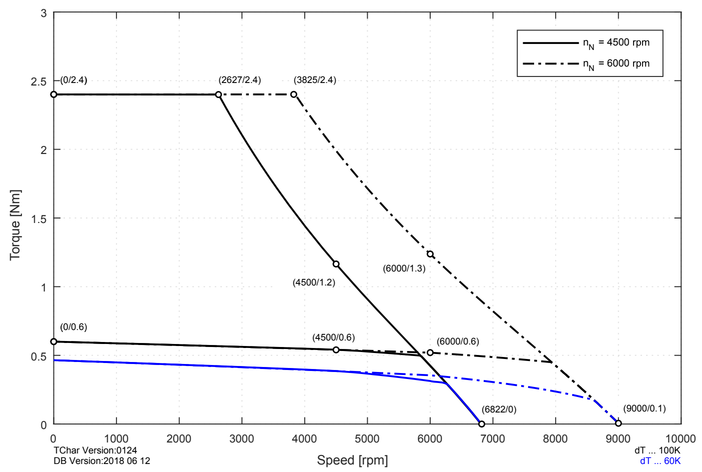
8LSA23.eennnffgg-3



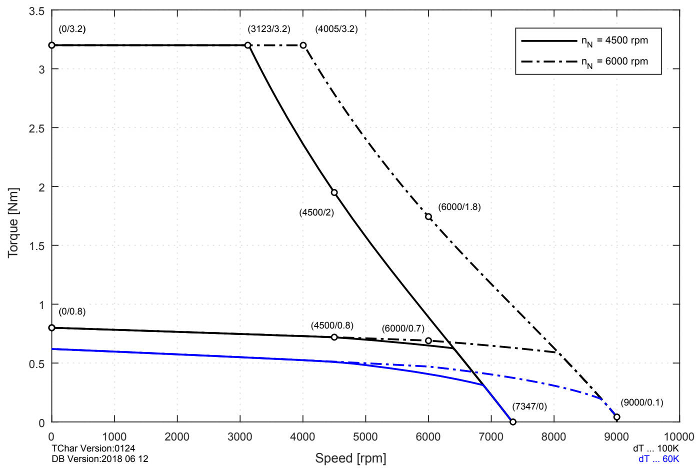
8LSA24.eennnffgg-3



8LSA25.eennnffgg-3

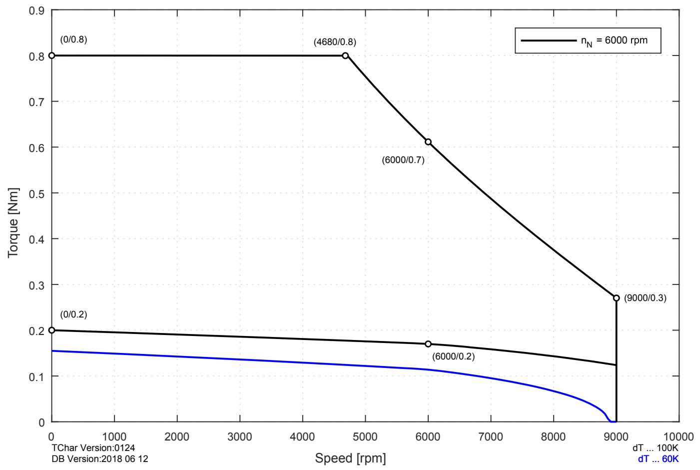


8LSA26.eennnffgg-3

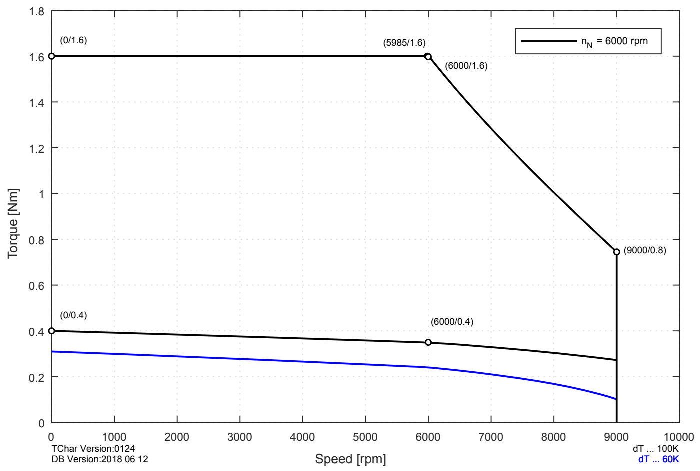


2.14.1.3 Speed-torque characteristic curves at 750 VDC DC bus voltage

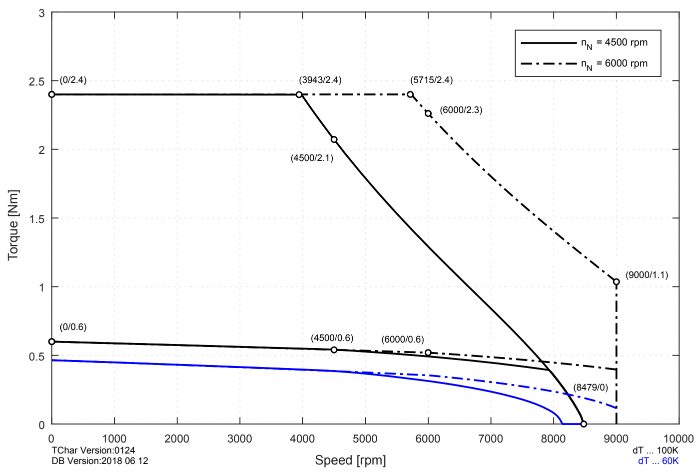
8LSA23.eennnffgg-3



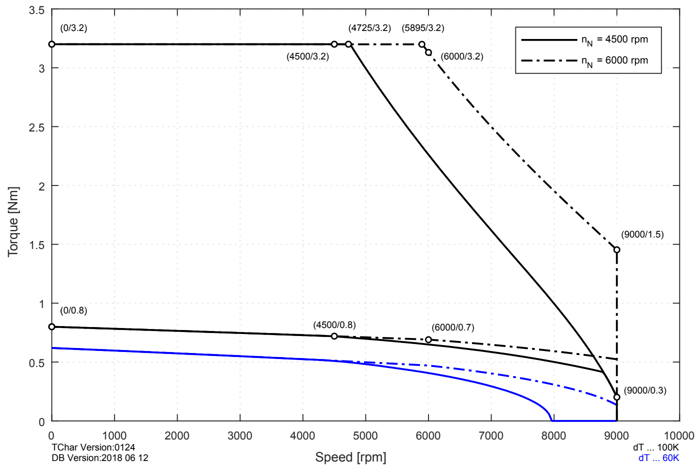
8LSA24.eennnffgg-3



8LSA25.eennnffgg-3



8LSA26.eennnffgg-3

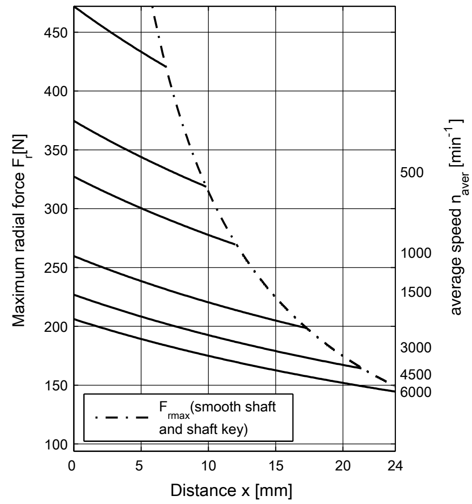


2.14.1.4 Maximum shaft load

Note the information in section "Load capacity of the shaft end and bearing" on page 273 of chapter "Installation conditions".

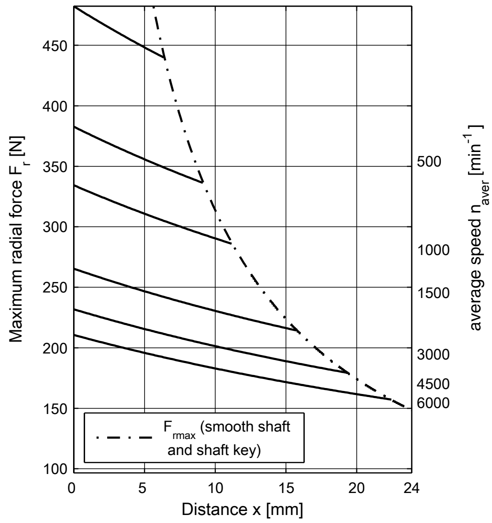
2.14.1.4.1 8LSA2...-3 - Standard bearing

8LSA23 (standard bearing)



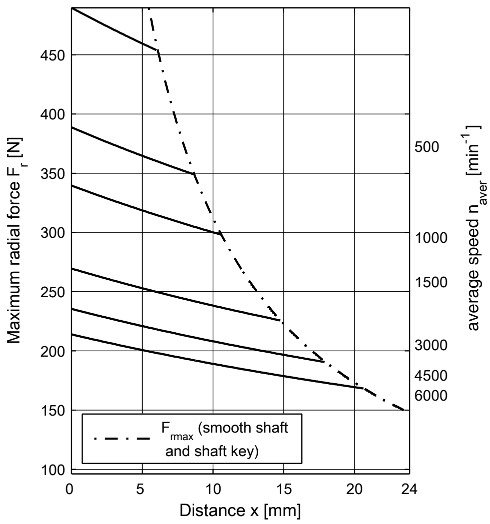
maximum allowed axial force: F_{amax} = 41 N

8LSA24 (standard bearing)



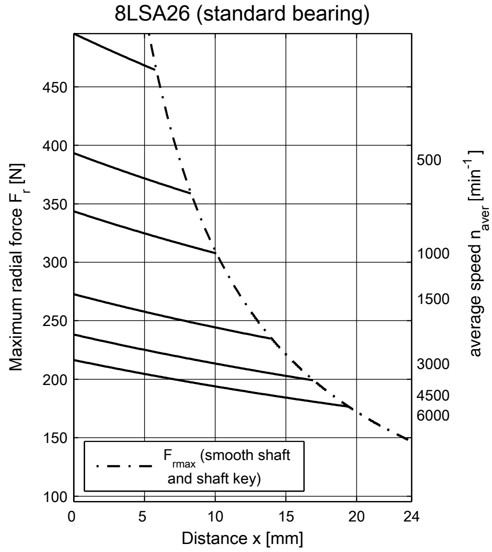
maximum allowed axial force: F_{amax} = 43 N

8LSA25 (standard bearing)



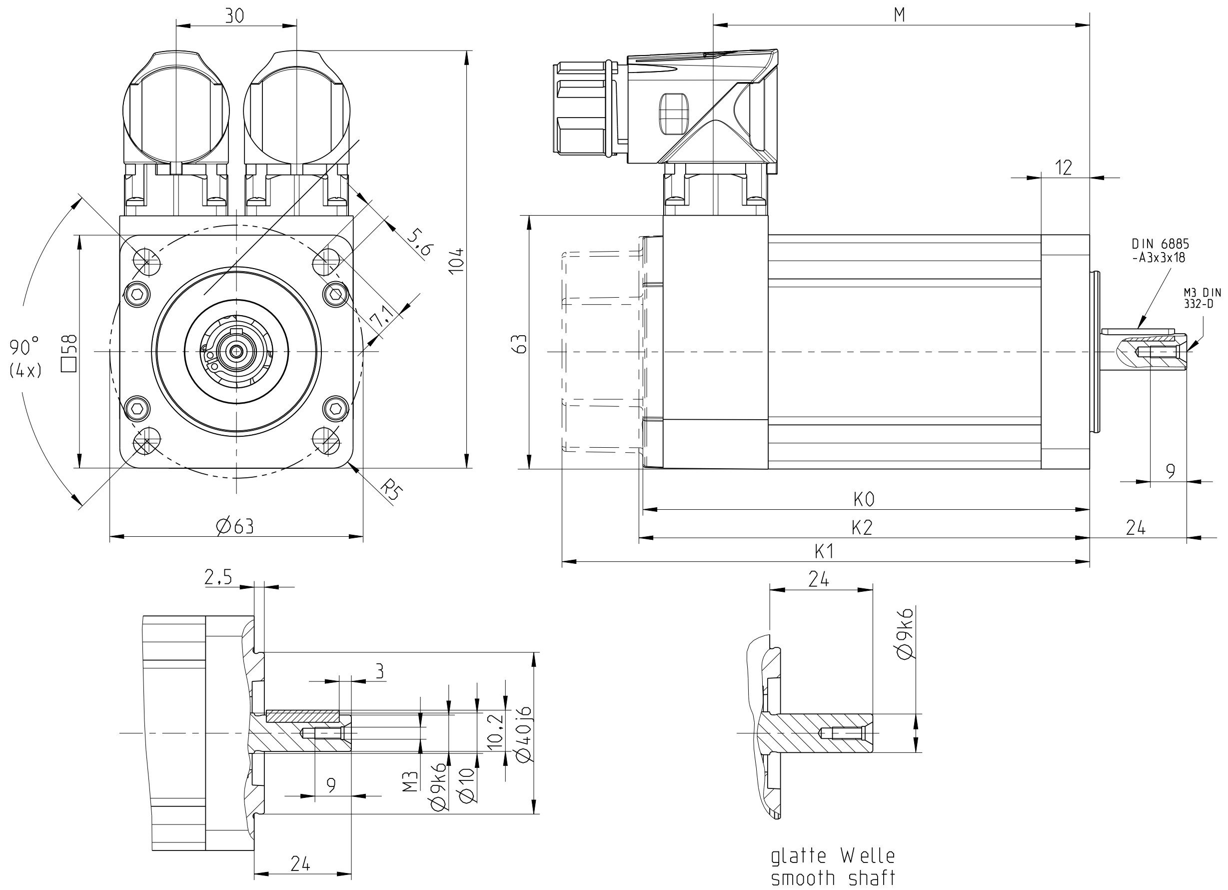
maximum allowed axial force: F_{amax} = 44 N

8LSA26 (standard bearing)



maximum allowed axial force: F_{amax} = 46 N

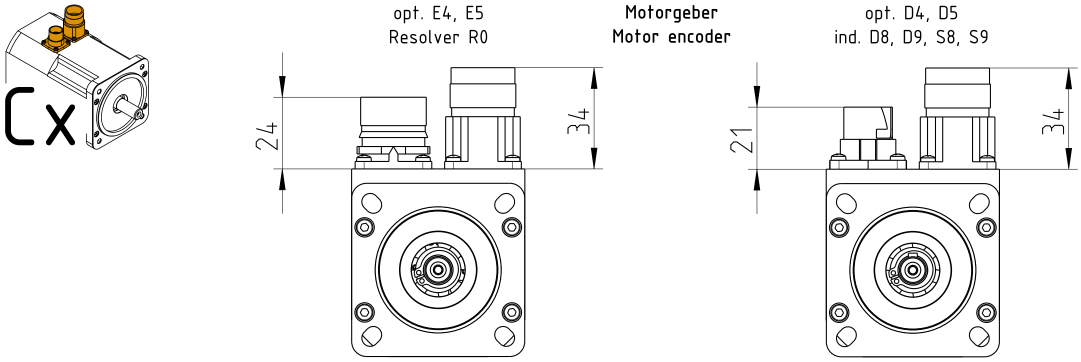
2.14.1.5 8LSA2...-3 - Dimensions

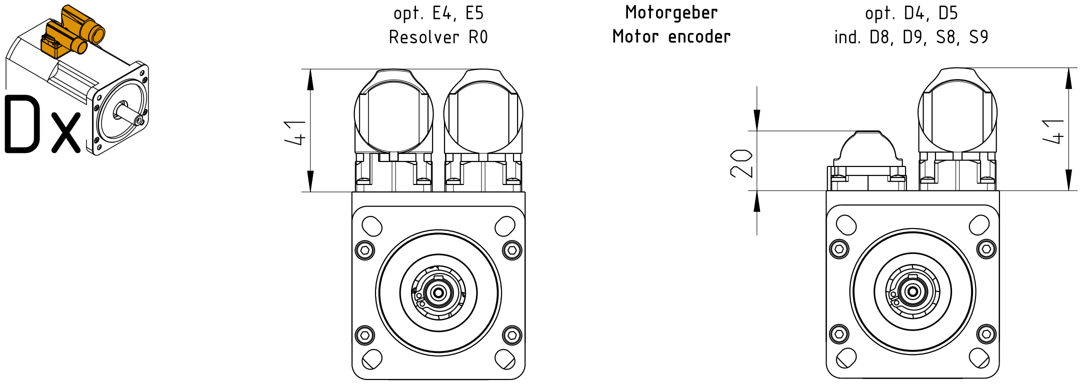


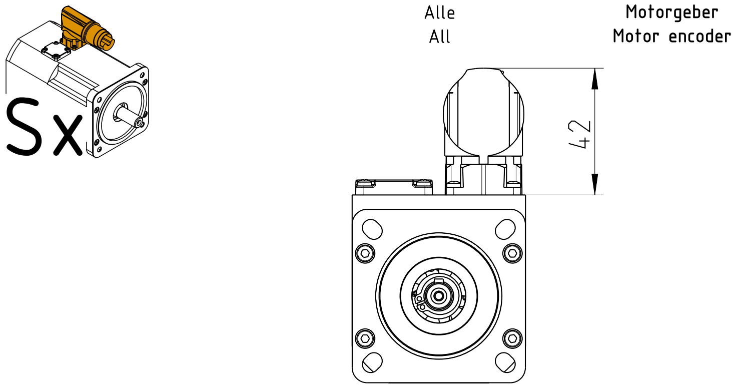
EnDat/Resolver feedback					Extension of K_0, K_1, K_2 and M depending on motor option [mm]	
Model number	**K_0**	**K_1**	**K_2**	**M**	**Holding brake**	**Oil seal**
Encoder assignments	**R0**	**E4, E5, D4, D5, D8, D9, S4, S5, S8, S9**	**E8,E9**			
8LSA23.eennnffgg-3	91	111	111	73	24	7
8LSA24.eennnffgg-3	101	121	121	83	24	7
8LSA25.eennnffgg-3	111	131	131	93	24	7
8LSA26.eennnffgg-3	121	141	141	103	24	7

IMPORTANT: Extension of encoder cover for certain encoders, see dimension "K_2"

2.14.1.6 8LSA2...-3 - Connection dimensions







2.14.2 8LSAA...-3 - Technical data

Model number	8LSAA2. ee030ffgg-3	8LSAA2. ee045ffgg-3	8LSAA2. ee060ffgg-3	8LSAA3. ee030ffgg-3	8LSAA3. ee045ffgg-3	8LSAA3. ee060ffgg-3
Motor						
Nominal speed n_N [rpm]	3000	4500	6000	3000	4500	6000
Number of pole pairs	5					
Nominal torque M_n [Nm]	1.3	1.27	1.23	2.11	2.05	1.97
Nominal power P_N [W]	408	598	773	663	966	1238
Nominal current I_N [A]	0.9	1.31	1.69	1.46	2.11	2.7
Stall torque M_0 [Nm]	1.4			2.24		
Stall current I_0 [A]	0.95	1.42	1.89	1.54	2.31	3.1
Maximum torque M_{max} [Nm]	4.5			7.5		
Maximum current I_{max} [A]	4	6	8	6.5	9.8	13
Maximum speed n_{max} [rpm]	7000					
Torque constant K_T [Nm/A]	1.45	0.97	0.73	1.45	0.97	0.73
Voltage constant K_E [V/1000 rpm]	87.96	58.64	43.98	87.96	58.64	43.98
Stator resistance R_{2ph} [Ω]	30.3	13.9	7.6	18.6	7.8	4.7
Stator inductance L_{2ph} [mH]	59.2	27	14.8	40.5	17.5	10.1
Electrical time constant t_{el} [ms]	1.95	1.94	1.95	2.18	2.24	2.15
Thermal time constant t_{therm} [min]	31			34		
Moment of inertia J [kgcm²]	0.38			0.6		
Weight without brake m [kg]	2.2			2.9		
Holding brake						
Holding torque of brake M_{Br} [Nm]	3.2					
Mass of brake [kg]	0.6					
Moment of inertia of brake J_{Br} [kgcm²]	0.38					
Recommendations						
ACOPOS 8Vxxxx.xx...	1016		1022		1045	
ACOPOSmulti 8BVIxxxx...	0014		0028	0014	0028	
ACOPOS P3 8EIxxxx...	2X2X				4X5X	
Cross section for B&R motor cables [mm²]	0.75					
Connector size	1.0					

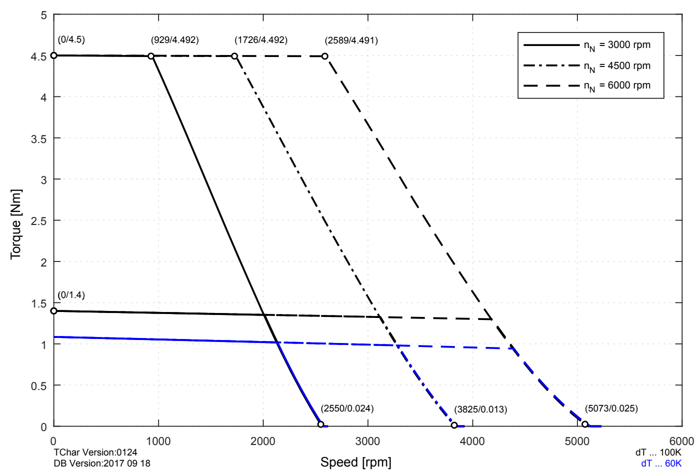
NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guideline; detailed inspection of the corresponding 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.

Model number	8LSAA4.ee030ffgg-3	8LSAA4.ee045ffgg-3	8LSAA4.ee060ffgg-3
Motor			
Nominal speed n_N [rpm]	3000	4500	6000
Number of pole pairs		5	
Nominal torque M_n [Nm]	2.96	2.8	2.7
Nominal power P_N [W]	930	1319	1696
Nominal current I_N [A]	2.05	2.89	3.7
Stall torque M_0 [Nm]		3.2	
Stall current I_0 [A]	2.21	3.3	4.38
Maximum torque M_{max} [Nm]		11.3	
Maximum current I_{max} [A]	10	15	20.1
Maximum speed n_{max} [rpm]		7000	
Torque constant K_T [Nm/A]	1.45	0.97	0.73
Voltage constant K_E [V/1000 rpm]	87.96	58.64	43.98
Stator resistance R_{2ph} [Ω]	10.6	5.3	2.7
Stator inductance L_{2ph} [mH]	26.1	12.4	6.5
Electrical time constant t_{el} [ms]	2.46	2.34	2.41
Thermal time constant t_{therm} [min]		38	
Moment of inertia J [kgcm²]		1.1	
Weight without brake m [kg]		3.8	
Holding brake			
Holding torque of brake M_{Br} [Nm]		3.2	
Mass of brake [kg]		0.6	
Moment of inertia of brake J_{Br} [kgcm²]		0.38	
Recommendations			
ACOPOS 8Vxxxx.xx...	1045		1090
ACOPOSmulti 8BVIxxxx...	0028		0055
ACOPOS P3 8EIxxxx...	4X5X		8X8X
Cross section for B&R motor cables [mm²]		0.75	
Connector size		1.0	

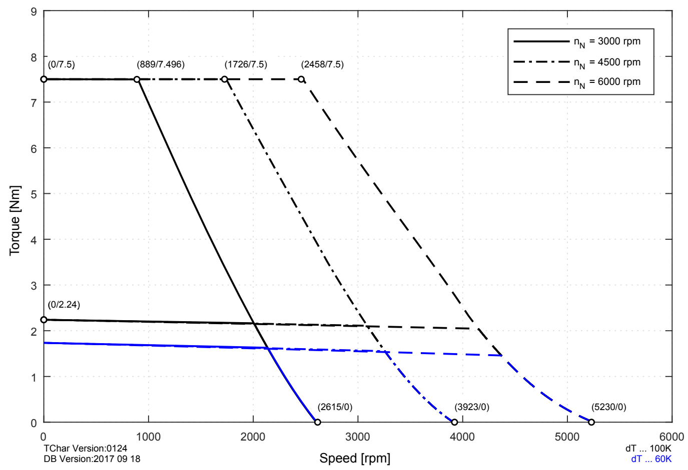
NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guideline; detailed inspection of the corresponding 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.

2.14.2.1 Speed-torque characteristic curves at 325 VDC DC bus voltage

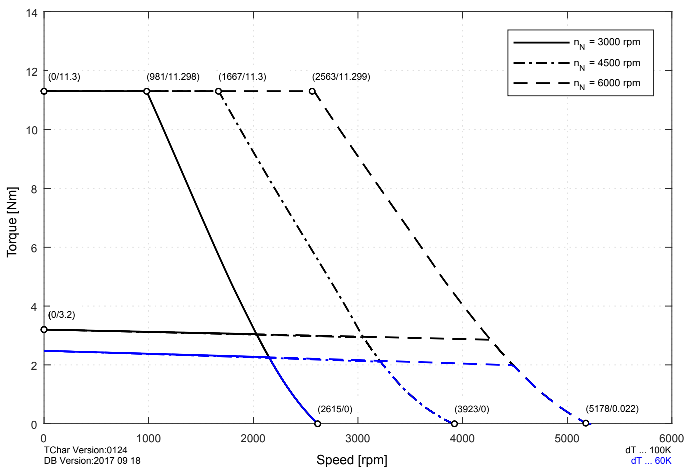
8LSAA2.eennnffgg-3



8LSAA3.eennnffgg-3

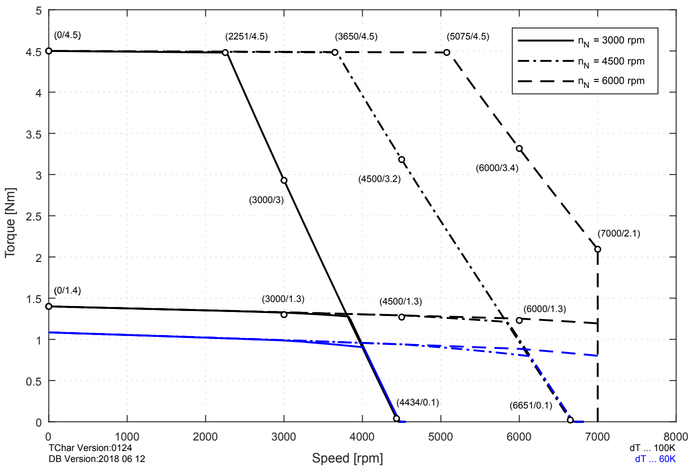


8LSAA4.eennnffgg-3

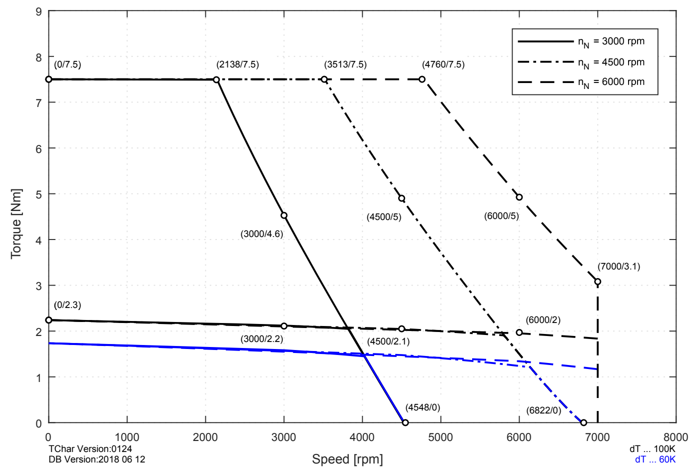


2.14.2.2 Speed-torque characteristic curves at 560 VDC DC bus voltage

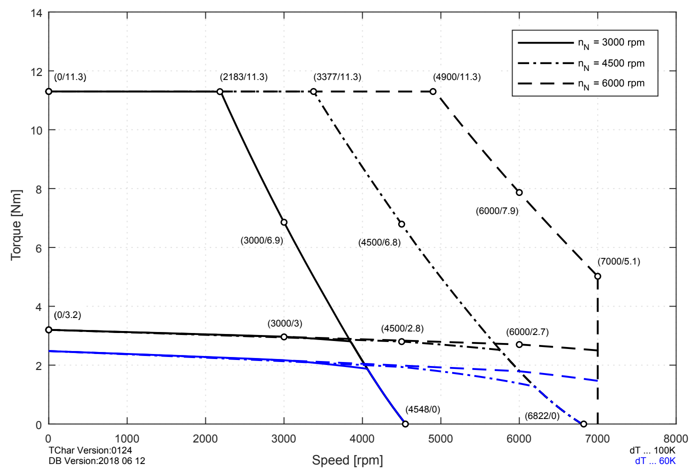
8LSAA2.eennnffgg-3



8LSAA3.eennnffgg-3

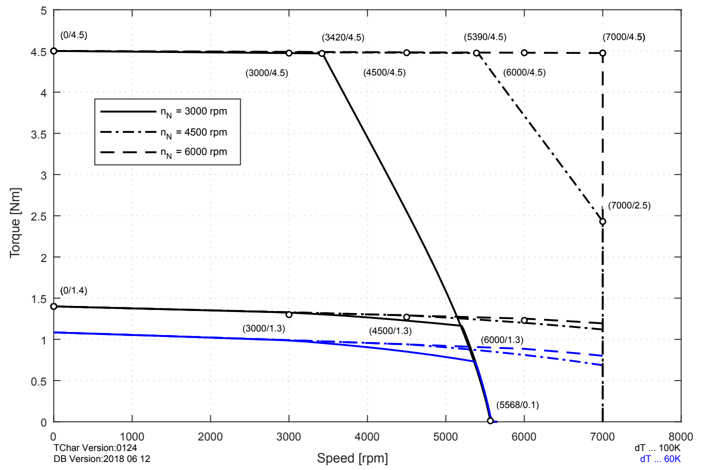


8LSAA4.eennnffgg-3

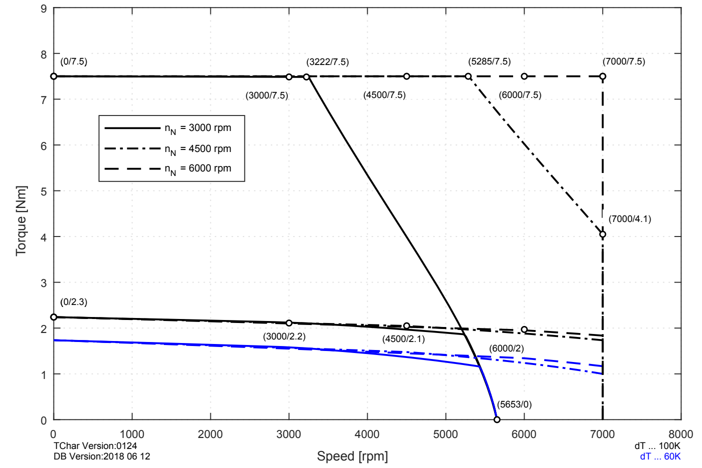


2.14.2.3 Speed-torque characteristic curves at 750 VDC DC bus voltage

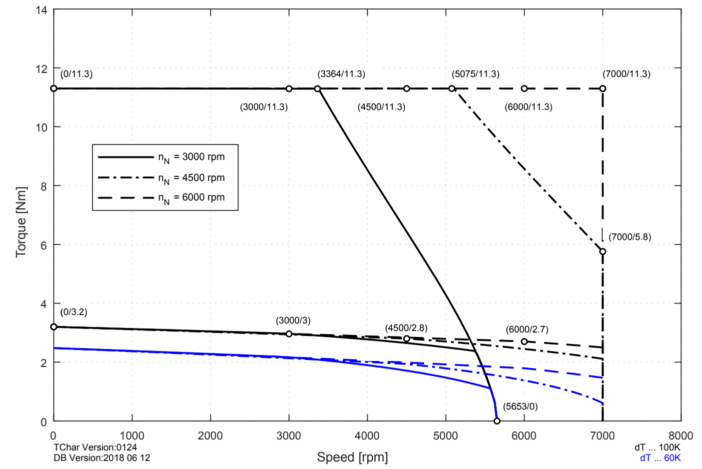
8LSAA2.eennnffgg-3



8LSAA3.eennnffgg-3



8LSAA4.eennnffgg-3

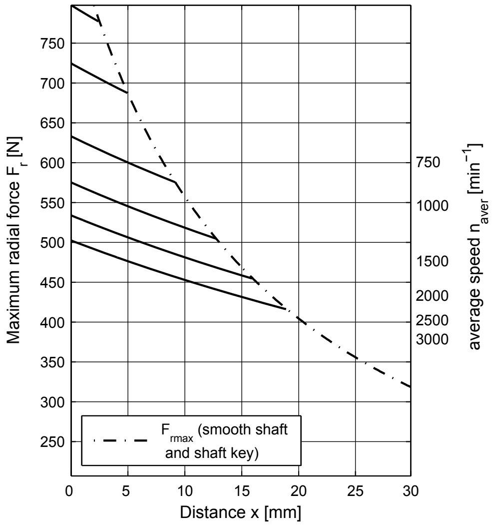


2.14.2.4 Maximum shaft load

Note the information in section "Load capacity of the shaft end and bearing" on page 273 of chapter "Installation conditions".

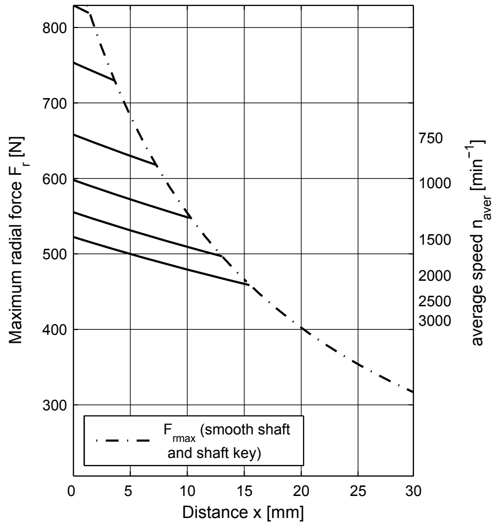
2.14.2.4.1 8LSAA...-3 - Standard bearing

8LSAA2 (standard bearing)



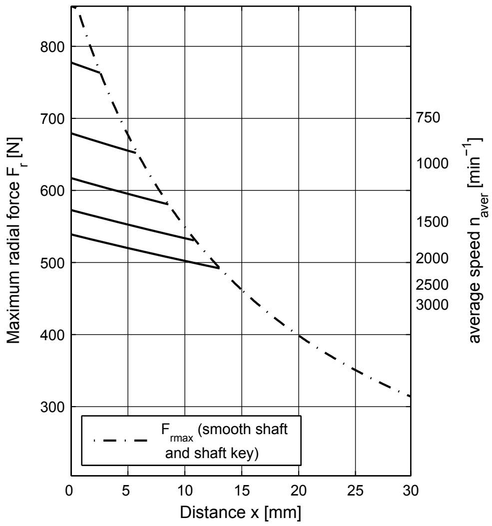
maximum allowed axial force: F_{amax} = 94 N

8LSAA3 (standard bearing)



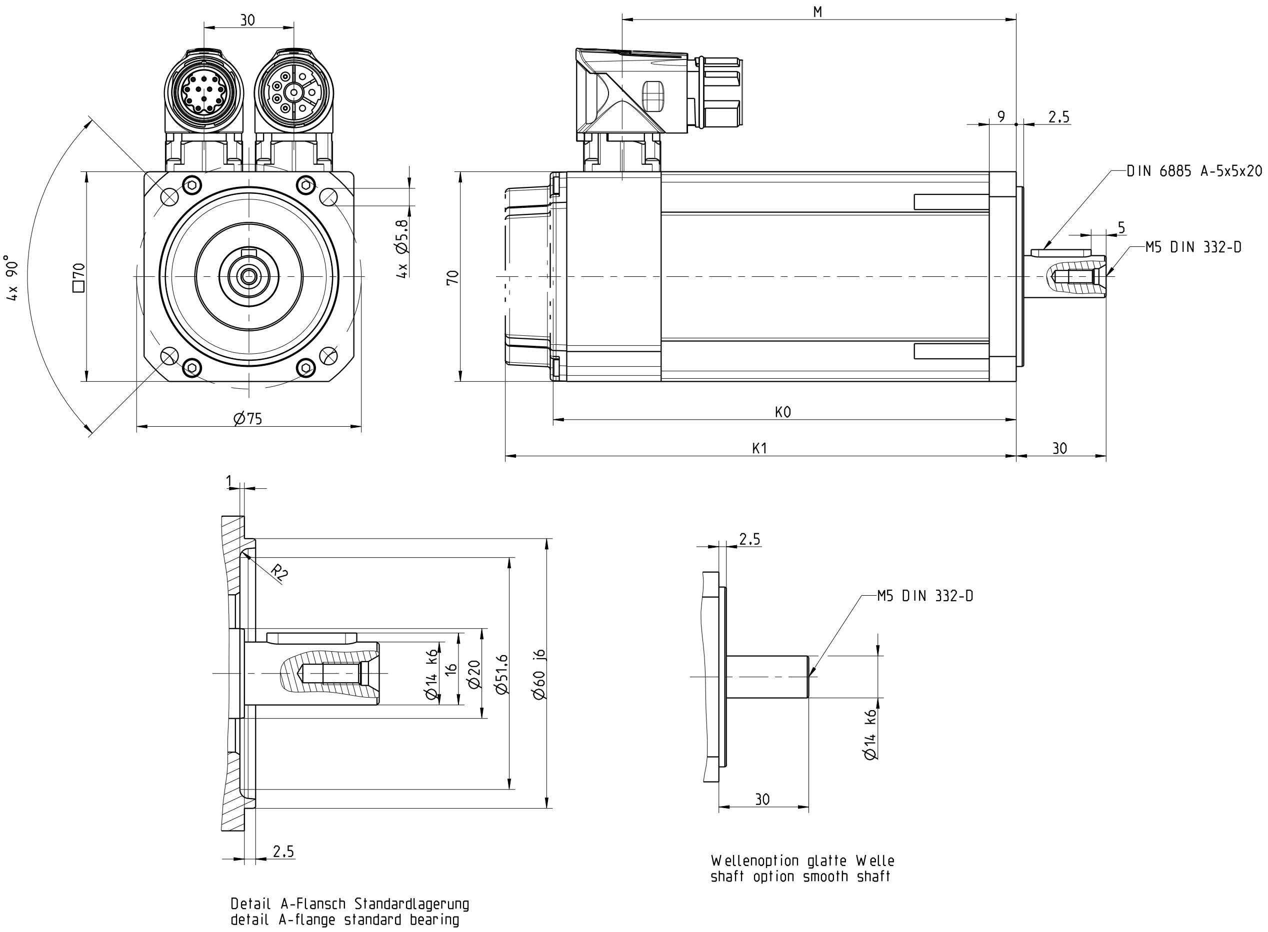
maximum allowed axial force: F_{amax} = 100 N

8LSAA4 (standard bearing)



maximum allowed axial force: F_{amax} = 106 N

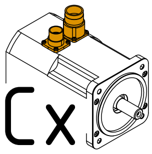
2.14.2.5 8LSAA...-3 - Dimensions

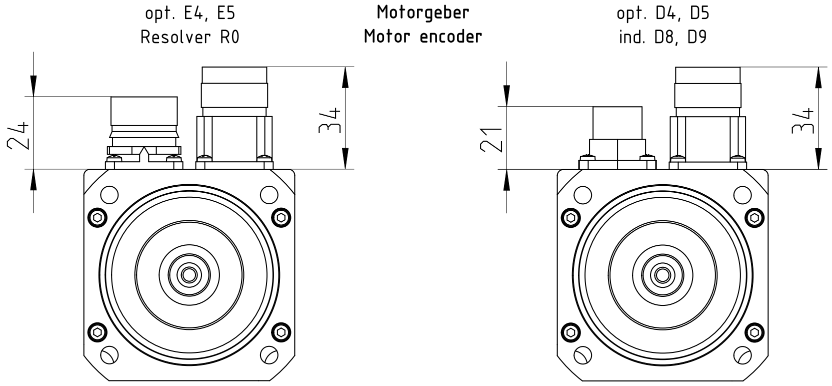


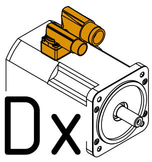
EnDat/Resolver feedback				Extension of K_0 and M depending on motor option [mm]
	K_0	K_1	M	Holding brake
Encoder assignments	**R0, D8, D9**	**E4, E5, D4, D5**		
8LSAA2...-3	135	150.5	111.5	31
8LSAA3...-3	155	170.5	131.5	31
8LSAA4...-3	180	195.5	156.5	31

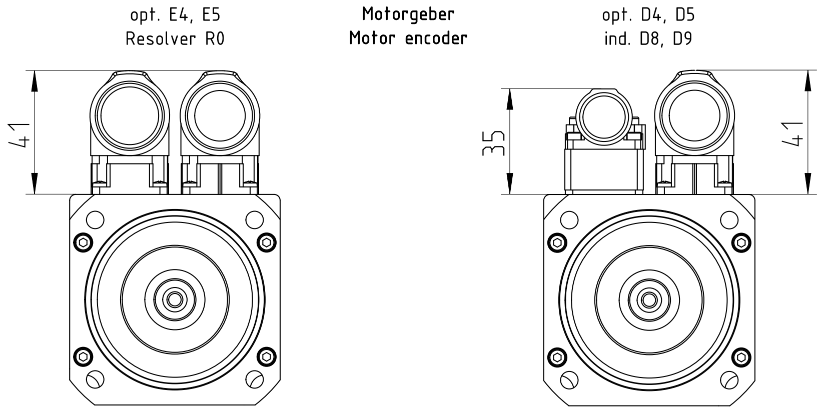
IMPORTANT: Dimensions K_0 and K_1 depend on the length of the encoder cover.

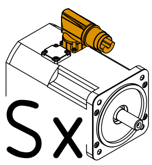
2.14.2.6 8LSAA...-3 - Connection dimensions

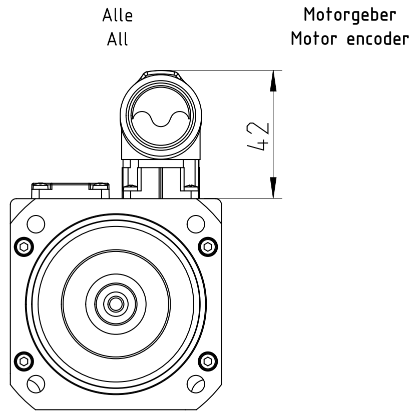












2.14.3 8LSA3...-3 - Technical data

Model number	8LSA33. ee030ffgg-3	8LSA33. ee045ffgg-3	8LSA33. ee060ffgg-3	8LSA34. ee022ffgg-3	8LSA34. ee030ffgg-3	8LSA34. ee045ffgg-3
Motor						
Nominal speed n_N [rpm]	3000	4500	6000	2200	3000	4500
Number of pole pairs	4					
Nominal torque M_n [Nm]	0.7	0.67	0.6	1.44	1.4	1.3
Nominal power P_N [W]	220	316	377	332	440	613
Nominal current I_N [A]	0.48	0.69	0.82	0.72	0.96	1.34
Stall torque M_0 [Nm]	0.75			1.5		
Stall current I_0 [A]	0.52	0.77	1.03	0.75	1.03	1.55
Maximum torque M_{max} [Nm]	3			6		
Maximum current I_{max} [A]	2.2	3.3	4.4	3.2	4.4	6.6
Maximum speed n_{max} [rpm]	9000					
Torque constant K_T [Nm/A]	1.45	0.97	0.73	1.99	1.45	0.97
Voltage constant K_E [V/1000 rpm]	87.96	58.64	43.98	120.43	87.96	58.64
Stator resistance R_{2ph} [Ω]	56.5	27.56	15.98	40.62	22.83	9.35
Stator inductance L_{2ph} [mH]	214	98.4	58.2	184.2	102.3	43.7
Electrical time constant t_{el} [ms]	3.8	3.6		4.5		4.7
Thermal time constant t_{therm} [min]	30			32		
Moment of inertia J [kgcm²]	0.4			0.65		
Weight without brake m [kg]	3.2			3.8		
Holding brake						
Holding torque of brake M_{Br} [Nm]	4					
Mass of brake [kg]	1.07					
Moment of inertia of brake J_{Br} [kgcm²]	0.38					
Recommendations						
ACOPOS 8Vxxxx.xx...	1010		1016	1010	1016	1022
ACOPOSmulti 8BVIxxxx...	0014					
ACOPOS P3 8EIxxxx...	2X2X					
Cross section for B&R motor cables [mm²]	0.75					
Connector size	1.0					

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 guideline; 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.

Model number	8LSA34.ee060ffgg-3	8LSA35.ee022ffgg-3	8LSA35.ee030ffgg-3	8LSA35.ee045ffgg-3	8LSA35.ee060ffgg-3	8LSA36.ee022ffgg-3
Motor						
Nominal speed n_N [rpm]	6000	2200	3000	4500	6000	2200
Number of pole pairs	4					
Nominal torque M_n [Nm]	1	2.1		1.8	1.6	2.7
Nominal power P_N [W]	628	484	660	848	1005	622
Nominal current I_N [A]	1.37	1.1	1.4	1.9	2.2	1.4
Stall torque M_0 [Nm]	1.5	2.3				3
Stall current I_0 [A]	2.06	1.2	1.6	2.4	3.2	1.5
Maximum torque M_{max} [Nm]	6	9.2				12
Maximum current I_{max} [A]	8.9	5	6.8	10.2	13.6	6.5
Maximum speed n_{max} [rpm]	9000					
Torque constant K_T [Nm/A]	0.73	1.99	1.45	0.97	0.73	1.99
Voltage constant K_E [V/1000 rpm]	43.98	120.43	87.96	58.64	43.98	120.43
Stator resistance R_{2ph} [Ω]	5.08	24.26	12.22	6.16	3.02	15.18
Stator inductance L_{2ph} [mH]	23.86	119.9	63	29.7	15.6	83.4
Electrical time constant t_{el} [ms]	4.7	4.9	5.2	4.8	5.1	5.5
Thermal time constant t_{therm} [min]	32	34				36
Moment of inertia J [kgcm²]	0.65	0.9				1.15
Weight without brake m [kg]	3.8	4.4				5
Holding brake						
Holding torque of brake M_{Br} [Nm]	4					
Mass of brake [kg]	1.07	1.09				1.07
Moment of inertia of brake J_{Br} [kgcm²]	0.38					
Recommendations						
ACOPOS 8Vxxxx.xx...	1045	1016	1022	1045		1022
ACOPOSmulti 8BVIxxxx...	0028	0014		0028		0014
ACOPOS P3 8EIxxxx...	4X5X	2X2X		4X5X		2X2X
Cross section for B&R motor cables [mm²]	0.75					
Connector size	1.0					

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 guideline; 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.

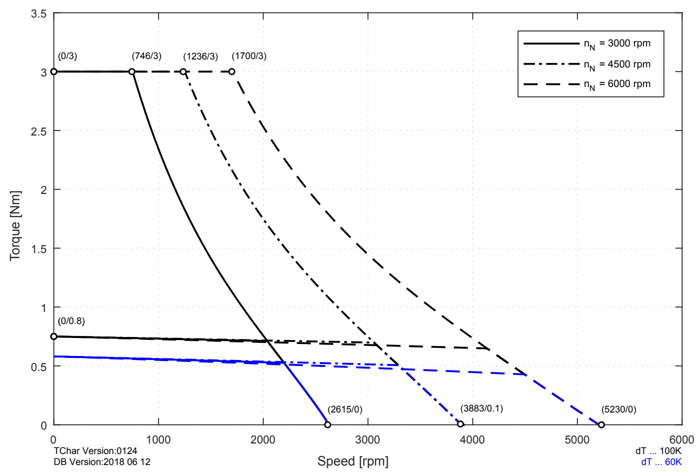
<table>
<tr><th>Model number</th><th>8LSA36.
ee030ffgg-3</th><th>8LSA36.
ee045ffgg-3</th><th>8LSA36.
ee060ffgg-3</th><th>8LSA37.
ee022ffgg-3</th><th>8LSA37.
ee030ffgg-3</th><th>8LSA37.
ee045ffgg-3</th><th>8LSA37.
ee060ffgg-3</th></tr>
<tr><td colspan="8">Motor</td></tr>
<tr><td>Nominal speed n_N [rpm]</td><td>3000</td><td>4500</td><td>6000</td><td>2200</td><td>3000</td><td>4500</td><td>6000</td></tr>
<tr><td>Number of pole pairs</td><td colspan="7">4</td></tr>
<tr><td>Nominal torque M_n [Nm]</td><td>2.7</td><td>2.2</td><td>1.8</td><td colspan="2">3.4</td><td>2.7</td><td>2</td></tr>
<tr><td>Nominal power P_N [W]</td><td>848</td><td>1037</td><td>1131</td><td>783</td><td>1068</td><td>1272</td><td>1257</td></tr>
<tr><td>Nominal current I_N [A]</td><td>1.9</td><td>2.3</td><td>2.5</td><td>1.7</td><td>2.3</td><td>2.8</td><td>2.7</td></tr>
<tr><td>Stall torque M_0 [Nm]</td><td colspan="3">3</td><td colspan="4">3.6</td></tr>
<tr><td>Stall current I_0 [A]</td><td>2.1</td><td>3.1</td><td>4.1</td><td>1.8</td><td>2.5</td><td>3.7</td><td>4.9</td></tr>
<tr><td>Maximum torque M_{max} [Nm]</td><td colspan="3">12</td><td colspan="4">14.4</td></tr>
<tr><td>Maximum current I_{max} [A]</td><td>8.9</td><td>13.3</td><td>17.7</td><td>7.8</td><td>10.6</td><td>16</td><td>21.2</td></tr>
<tr><td>Maximum speed n_{max} [rpm]</td><td colspan="7">9000</td></tr>
<tr><td>Torque constant K_T [Nm/A]</td><td>1.45</td><td>0.97</td><td>0.73</td><td>1.99</td><td>1.45</td><td>0.97</td><td>0.73</td></tr>
<tr><td>Voltage constant K_E [V/1000 rpm]</td><td>87.96</td><td>58.64</td><td>43.98</td><td>120.43</td><td>87.96</td><td>58.64</td><td>43.98</td></tr>
<tr><td>Stator resistance R_{2ph} [Ω]</td><td>8.18</td><td>3.73</td><td>1.95</td><td>12.59</td><td>6.98</td><td>2.93</td><td>1.76</td></tr>
<tr><td>Stator inductance L_{2ph} [mH]</td><td>44.91</td><td>20.3</td><td>10.6</td><td>68.9</td><td>37.5</td><td>16.2</td><td>9.6</td></tr>
<tr><td>Electrical time constant t_{el} [ms]</td><td>5.5</td><td>5.4</td><td colspan="2">5.5</td><td>5.4</td><td colspan="2">5.5</td></tr>
<tr><td>Thermal time constant t_{therm} [min]</td><td colspan="3">36</td><td colspan="4">38</td></tr>
<tr><td>Moment of inertia J [kgcm²]</td><td colspan="3">1.15</td><td colspan="4">1.38</td></tr>
<tr><td>Weight without brake m [kg]</td><td colspan="3">5</td><td colspan="4">5.6</td></tr>
<tr><td colspan="8">Holding brake</td></tr>
<tr><td>Holding torque of brake M_{Br} [Nm]</td><td colspan="7">4</td></tr>
<tr><td>Mass of brake [kg]</td><td colspan="3">1.07</td><td colspan="4">0.59</td></tr>
<tr><td>Moment of inertia of brake J_{Br} [kgcm²]</td><td colspan="7">0.38</td></tr>
<tr><td colspan="8">Recommendations</td></tr>
<tr><td>ACOPOS 8Vxxxx.xx...</td><td colspan="2">1045</td><td>1090</td><td>1022</td><td colspan="2">1045</td><td>1090</td></tr>
<tr><td>ACOPOSmulti 8BVIxxxx...</td><td colspan="2">0028</td><td>0055</td><td colspan="2">0028</td><td colspan="2">0055</td></tr>
<tr><td>ACOPOS P3 8EIxxxx...</td><td colspan="2">4X5X</td><td>8X8X</td><td>2X2X</td><td colspan="2">4X5X</td><td>8X8X</td></tr>
<tr><td>Cross section for B&R motor cables [mm²]</td><td colspan="7">0.75</td></tr>
<tr><td>Connector size</td><td colspan="7">1.0</td></tr>
</table>

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 guideline; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).

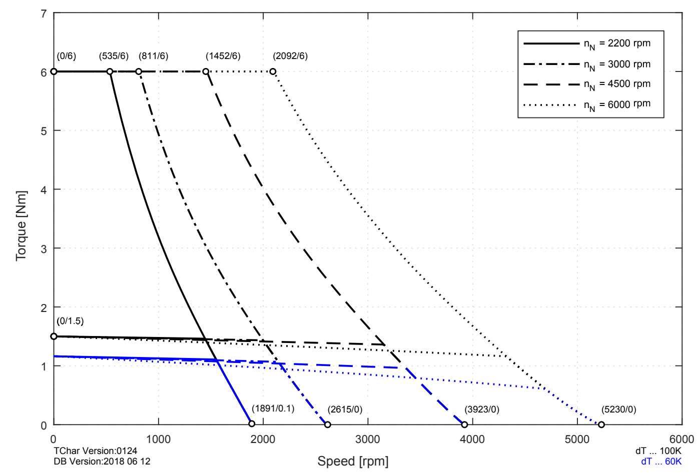
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

2.14.3.1 Speed-torque characteristic curves at 325 VDC DC bus voltage

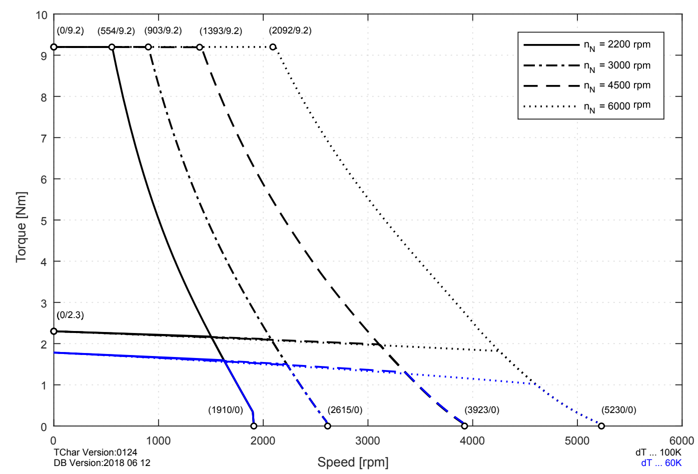
8LSA33.eennnffgg-3



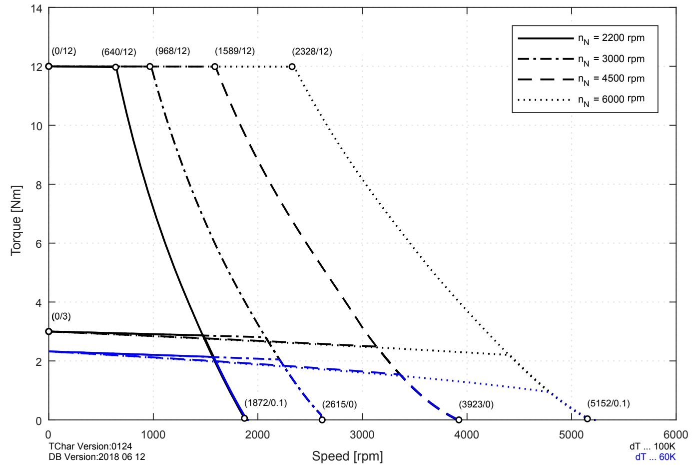
8LSA34.eennnffgg-3



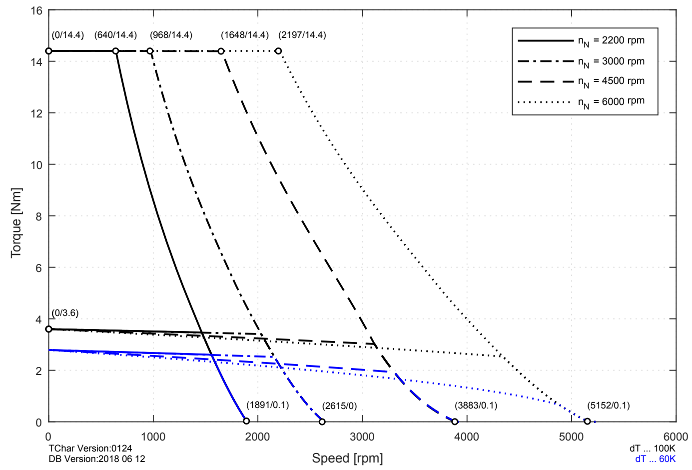
8LSA35.eennnffgg-3



8LSA36.eennnffgg-3

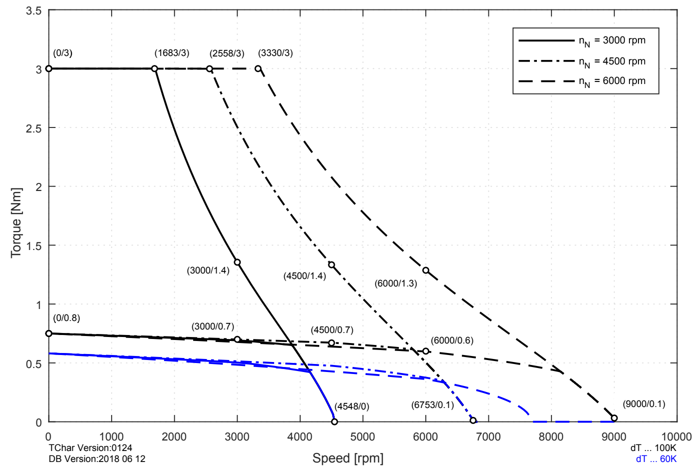


8LSA37.eennnffgg-3

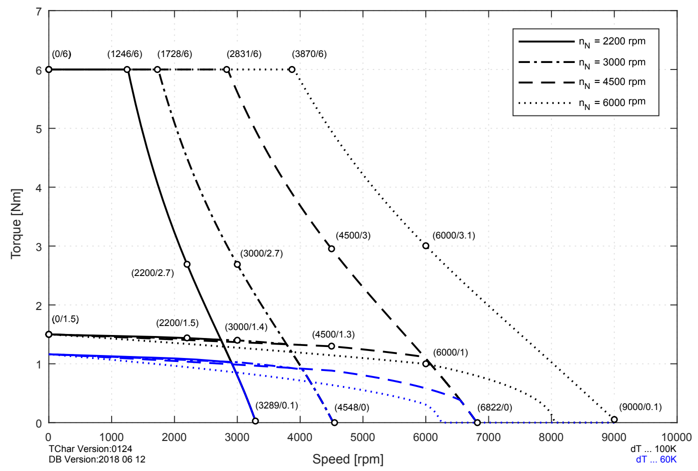


2.14.3.2 Speed-torque characteristic curves at 560 VDC DC bus voltage

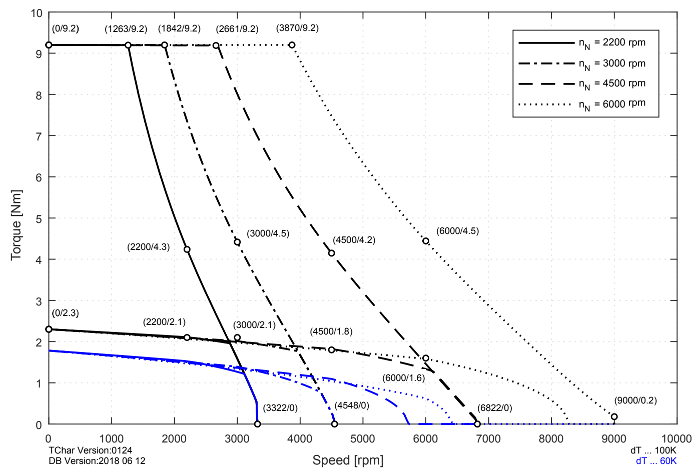
8LSA33.eennnffgg-3



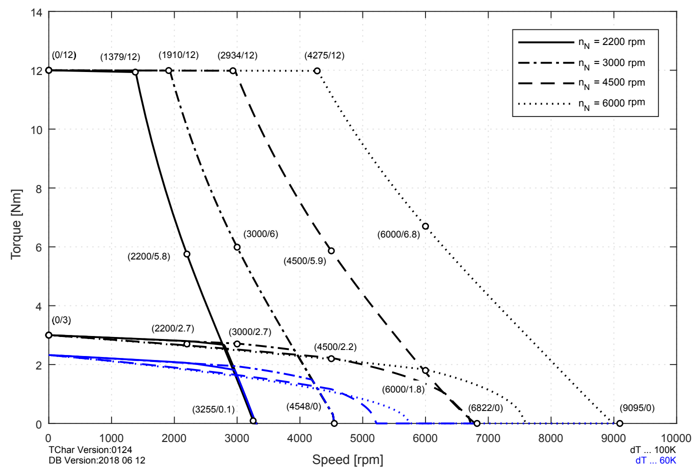
8LSA34.eennnffgg-3



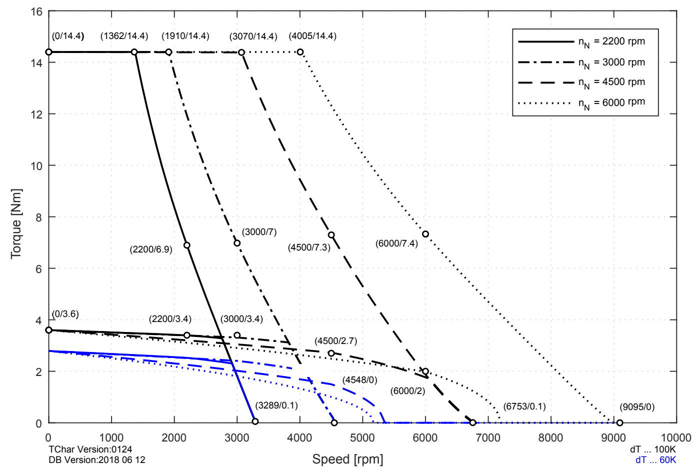
8LSA35.eennnffgg-3



8LSA36.eennnffgg-3

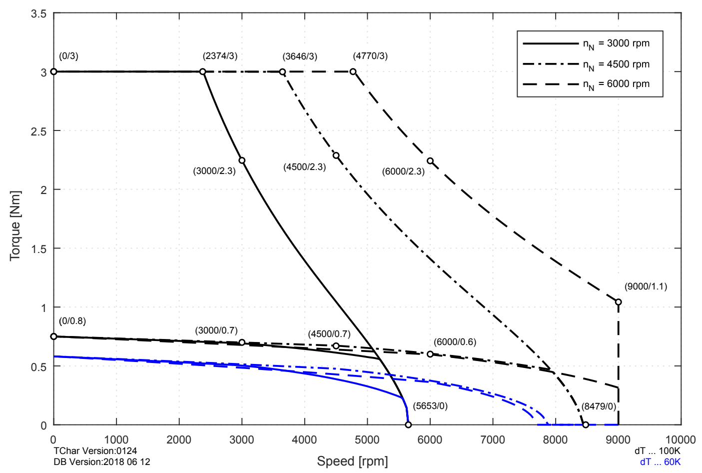


8LSA37.eennnffgg-3

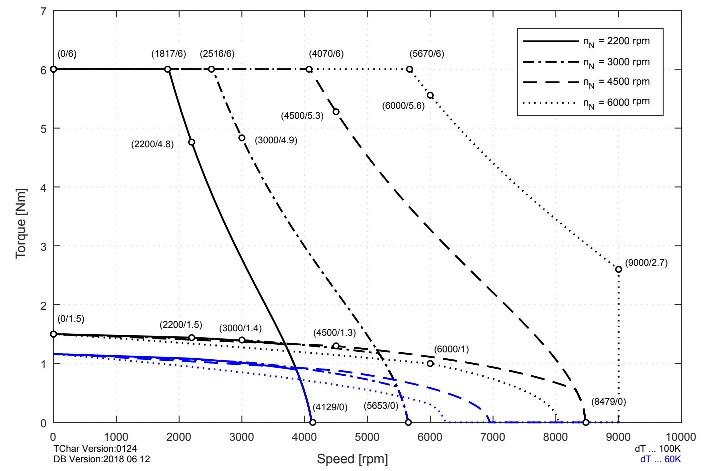


2.14.3.3 Speed-torque characteristic curves at 750 VDC DC bus voltage

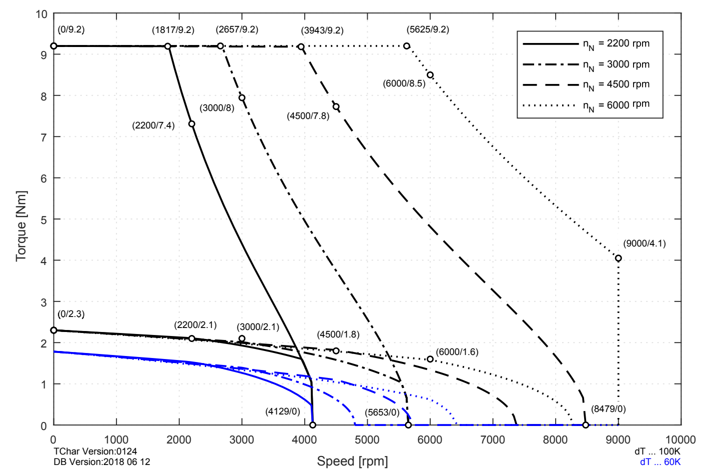
8LSA33.eennnffgg-3



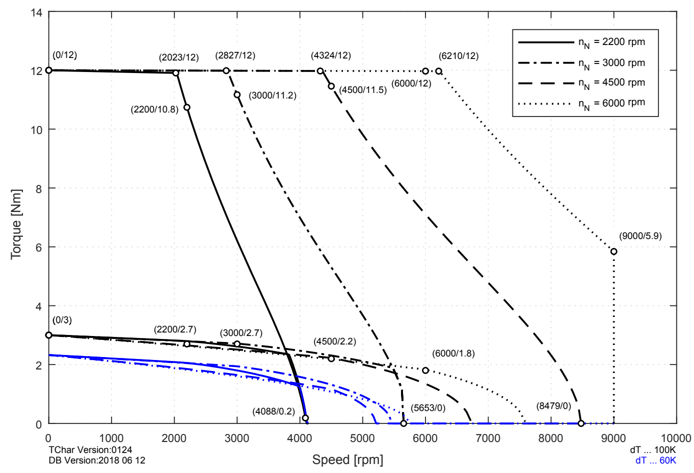
8LSA34.eennnffgg-3



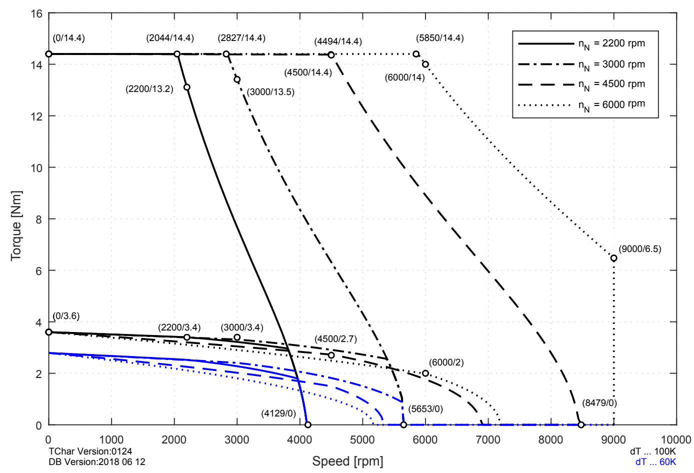
8LSA35.eennnffgg-3



8LSA36.eennnffgg-3



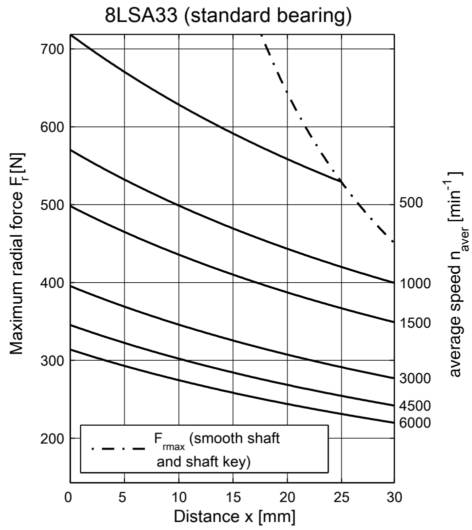
8LSA37.eennnffgg-3



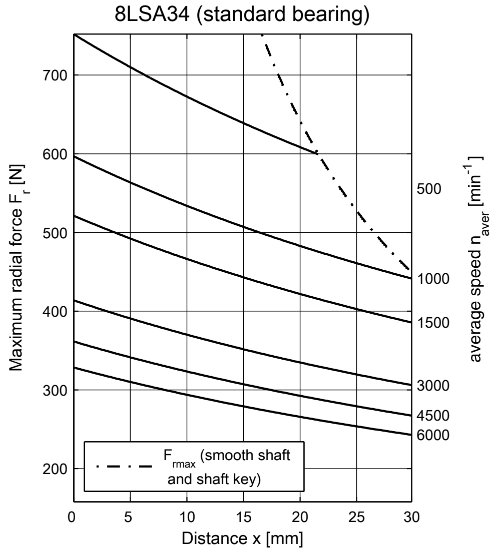
2.14.3.4 Maximum shaft load

Note the information in section "Load capacity of the shaft end and bearing" on page 273 of chapter "Installation conditions".

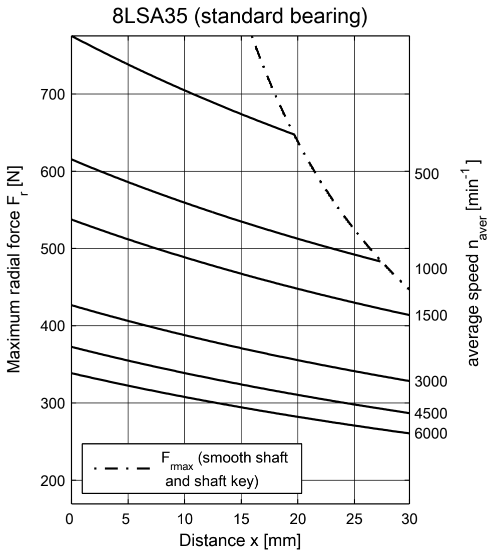
2.14.3.4.1 8LSA3...-3 - Standard bearing



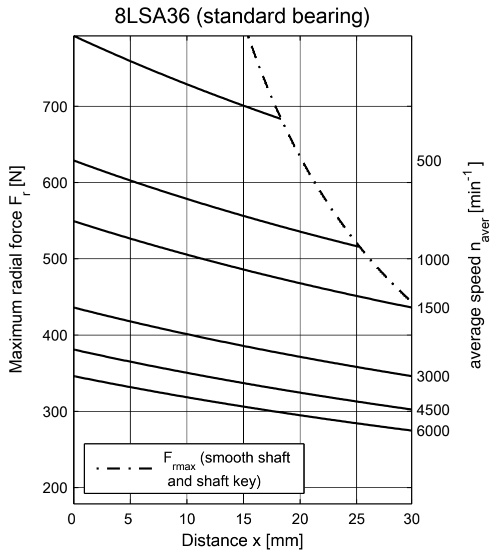
maximum allowed axial force: F_{amax} = 62 N



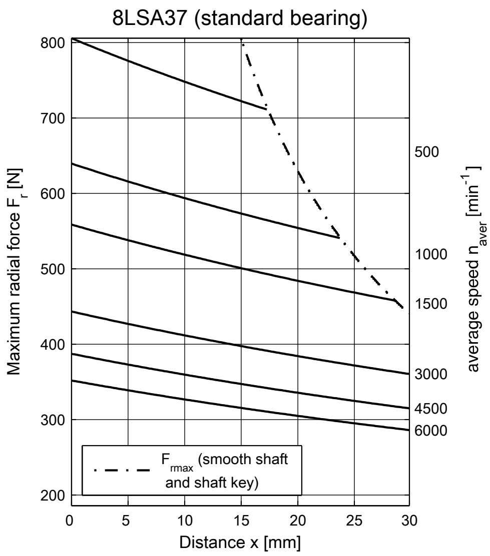
maximum allowed axial force: F_{amax} = 67 N



maximum allowed axial force: F_{amax} = 71 N

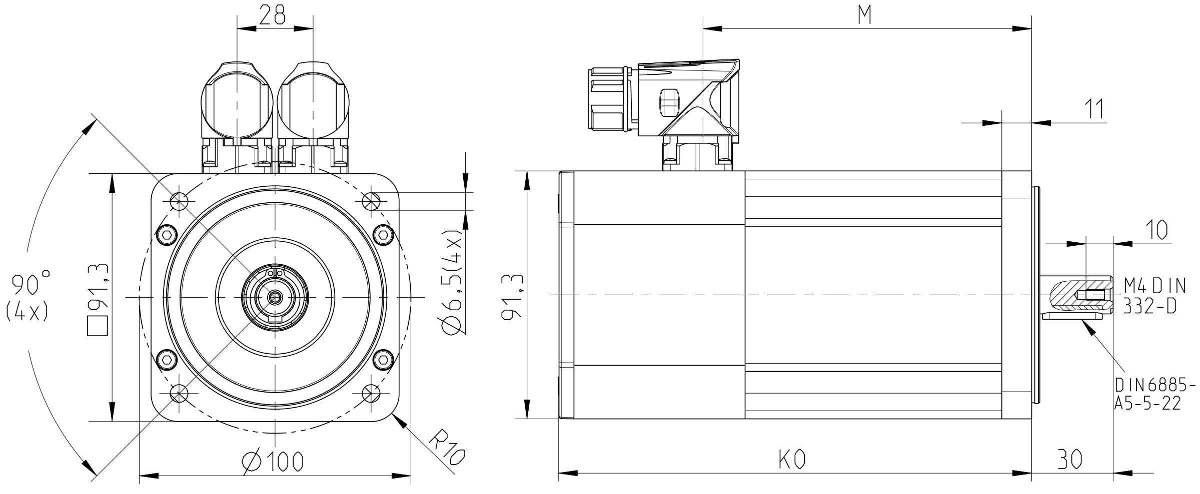


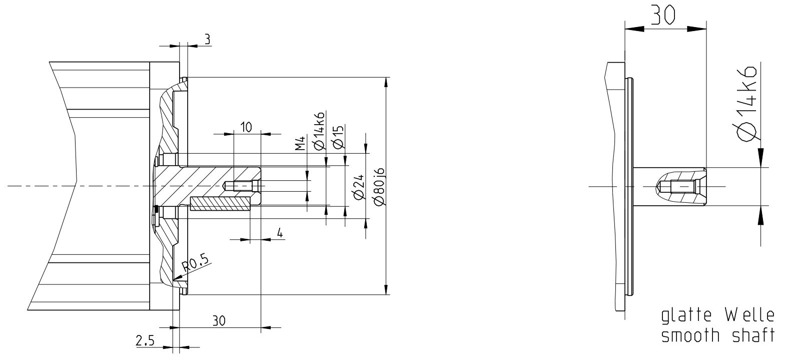
maximum allowed axial force: F_{amax} = 73 N



maximum allowed axial force: F_{amax} = 76 N

2.14.3.5 8LSA3...-3 - Dimensions

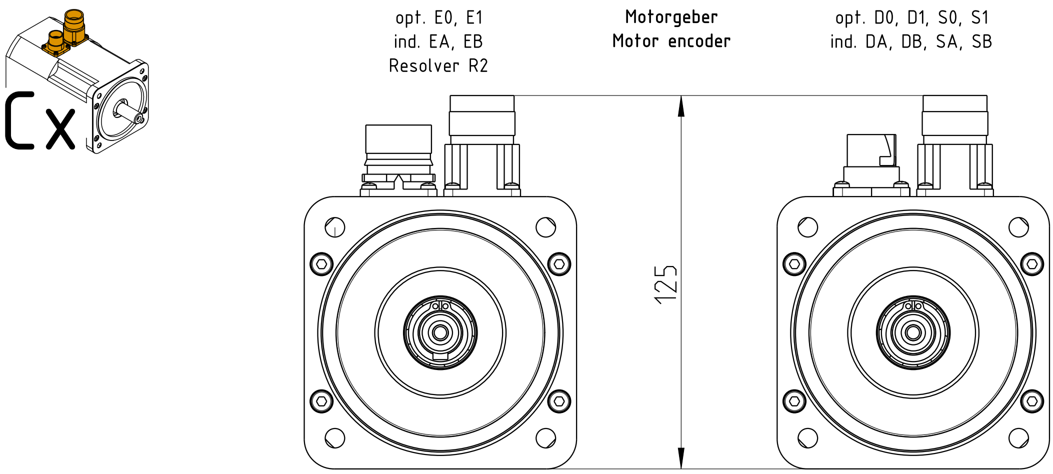


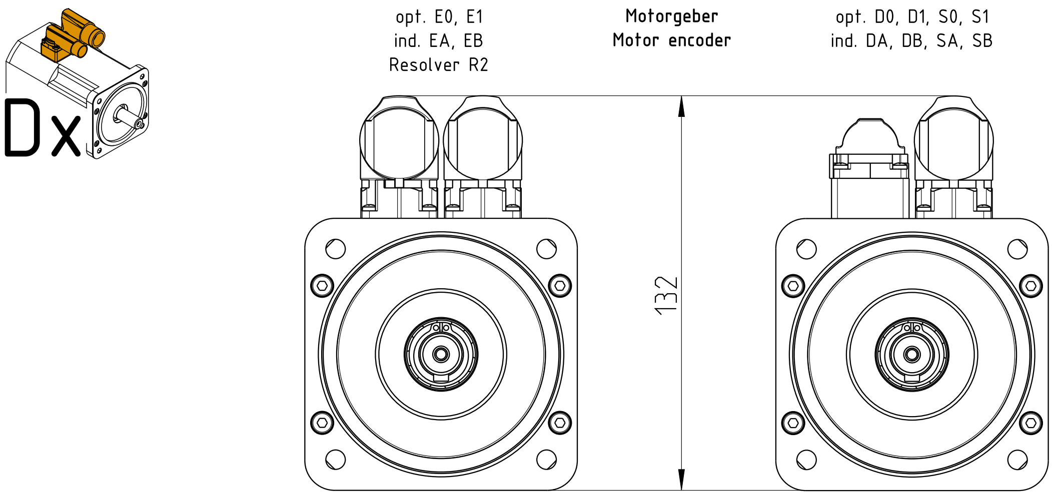


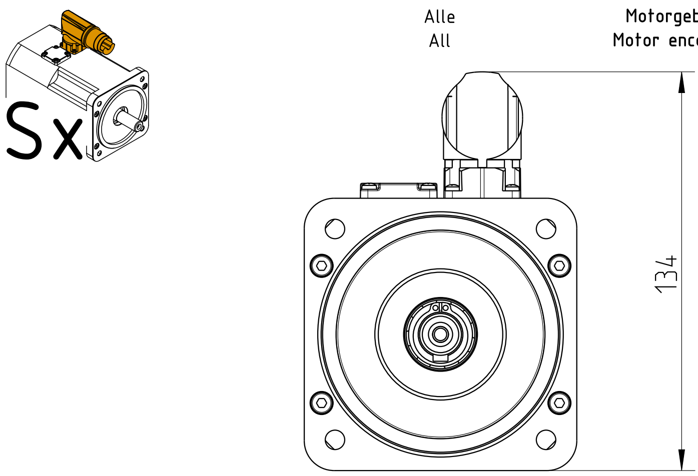
EnDat/Resolver feedback			Extension of K_0 and M depending on the motor option [mm]	
Model number	K_0	M	Holding brake	Reinforced A-side bearing
8LSA33.eennnffgg-3	144	93	35	---
8LSA34.eennnffgg-3	159	108	35	---
8LSA35.eennnffgg-3	174	123	35	---
8LSA36.eennnffgg-3	189	138	35	---
8LSA37.eennnffgg-3	204	153	35	---

IMPORTANT: Motor option "oil seal" has no effect on the motor length.

2.14.3.6 8LSA3...-3 - Connector options dimensions







2.14.4 8LSA4...-3 - Technical data

Model number	8LSA43.ee022ffgg-3	8LSA43.ee030ffgg-3	8LSA43.ee045ffgg-3	8LSA43.ee060ffgg-3
Motor				
Nominal speed n_N [rpm]	2200	3000	4500	6000
Number of pole pairs	5			
Nominal torque M_n [Nm]	3.5	3.1	2.7	2
Nominal power P_N [W]	806	974	1272	1257
Nominal current I_N [A]	1.6	1.9	2.5	
Stall torque M_0 [Nm]	4			
Stall current I_0 [A]	1.8	2.5	3.7	4.9
Maximum torque M_{max} [Nm]	15.2			
Maximum current I_{max} [A]	10.7	14.6	21.9	29.2
Maximum speed n_{max} [rpm]	12000			
Torque constant K_T [Nm/A]	2.22	1.63	1.08	0.81
Voltage constant K_E [V/1000 rpm]	134.04	98.44	64.93	49.22
Stator resistance R_{2ph} [Ω]	11.53	5.94	2.64	1.42
Stator inductance L_{2ph} [mH]	81.1	36.5	16.5	9.2
Electrical time constant t_{el} [ms]	7	6.1	6.3	6.5
Thermal time constant t_{therm} [min]	25			
Moment of inertia J [kgcm²]	1.87			
Weight without brake m [kg]	4.5			
Holding brake				
Holding torque of brake M_{Br} [Nm]	8			
Mass of brake [kg]	1			
Moment of inertia of brake J_{Br} [kgcm²]	0.69			
Recommendations				
ACOPOS 8Vxxxx.xx...	1022	1045		1090
ACOPOSmulti 8BVIxxxx...	0028		0055	
ACOPOS P3 8EIxxxx...	2X2X	4X5X		8X8X
Cross section for B&R motor cables [mm²]	0.75			
Connector size	1.0			

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 guideline; 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.

Model number	**8LSA44.ee022ffgg-3**	**8LSA44.ee030ffgg-3**	**8LSA44.ee045ffgg-3**	**8LSA44.ee060ffgg-3**
Motor				
Nominal speed n_N [rpm]	2200	3000	4500	6000
Number of pole pairs	5			
Nominal torque M_n [Nm]	5.2	4.62	3.6	3
Nominal power P_N [W]	1198	1451	1696	1885
Nominal current I_N [A]	2.3	2.8	3.3	3.7
Stall torque M_0 [Nm]	6			
Stall current I_0 [A]	2.7	3.7	5.5	7.4
Maximum torque M_{max} [Nm]	22.8			
Maximum current I_{max} [A]	16.1	21.9	32.9	43.8
Maximum speed n_{max} [rpm]	12000			
Torque constant K_T [Nm/A]	2.22	1.63	1.08	0.81
Voltage constant K_E [V/1000 rpm]	134.04	98.44	64.93	49.22
Stator resistance R_{2ph} [Ω]	6.24	3.6	1.6	0.862
Stator inductance L_{2ph} [mH]	44.8	24	10.8	6.2
Electrical time constant t_{el} [ms]	7.2	6.7	6.8	7.2
Thermal time constant t_{therm} [min]	30			
Moment of inertia J [kgcm²]	2.73			
Weight without brake m [kg]	5.4			
Holding brake				
Holding torque of brake M_{Br} [Nm]	8			
Mass of brake [kg]	1			
Moment of inertia of brake J_{Br} [kgcm²]	0.69			
Recommendations				
ACOPOS 8Vxxxx.xx...	1045		1090	
ACOPOSmulti 8BVIxxxx...	0028	0055		0110
ACOPOS P3 8EIxxxx...	4X5X		8X8X	
Cross section for B&R motor cables [mm²]	0.75			
Connector size	1.0			

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 guideline; 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.

Model number	8LSA45.ee022ffgg-3	8LSA45.ee030ffgg-3	8LSA45.ee045ffgg-3	8LSA45.ee060ffgg-3
Motor				
Nominal speed n_N [rpm]	2200	3000	4500	6000
Number of pole pairs	5			
Nominal torque M_n [Nm]	7	6.16	4.8	4
Nominal power P_N [W]	1613	1935	2262	2513
Nominal current I_N [A]	3.2	3.8	4.4	4.9
Stall torque M_0 [Nm]	8			
Stall current I_0 [A]	3.6	4.9	7.4	9.8
Maximum torque M_{max} [Nm]	30.4			
Maximum current I_{max} [A]	21.4	29.2	43.9	58.3
Maximum speed n_{max} [rpm]	12000			
Torque constant K_T [Nm/A]	2.22	1.63	1.08	0.81
Voltage constant K_E [V/1000 rpm]	134.04	98.44	64.93	49.22
Stator resistance R_{2ph} [Ω]	4.32	2.489	1.106	0.6
Stator inductance L_{2ph} [mH]	41	21.8	9.69	5.4
Electrical time constant t_{el} [ms]	9.5	8.8		9
Thermal time constant t_{therm} [min]	35			
Moment of inertia J [kgcm²]	3.58			
Weight without brake m [kg]	6.5			
Holding brake				
Holding torque of brake M_{Br} [Nm]	8			
Mass of brake [kg]	0.9			
Moment of inertia of brake J_{Br} [kgcm²]	0.69			
Recommendations				
ACOPOS 8Vxxxx.xx...	1045	1090		1180
ACOPOSmulti 8BVIxxxx...	0055		0110	
ACOPOS P3 8EIxxxx...	4X5X	8X8X		013X
Cross section for B&R motor cables [mm²]	0.75			
Connector size	1.0			

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 guideline; 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.

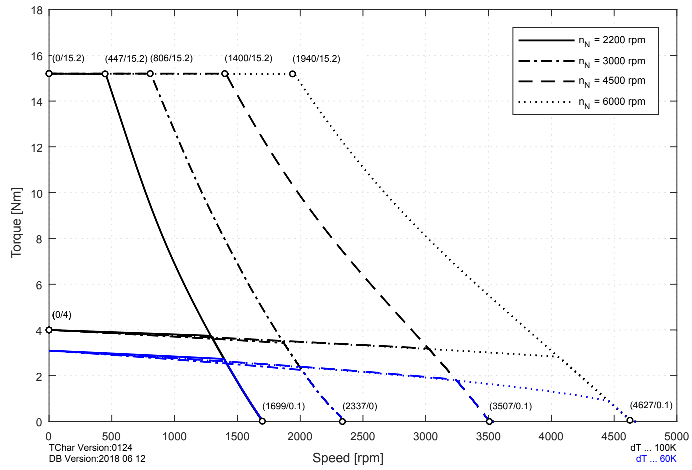
Model number	8LSA46.ee022ffgg-3	8LSA46.ee030ffgg-3	8LSA46.ee045ffgg-3	8LSA46.ee060ffgg-3
Motor				
Nominal speed n_N [rpm]	2200	3000	4500	6000
Number of pole pairs	5			
Nominal torque M_n [Nm]	8.7	7.7	6	5
Nominal power P_N [W]	2004	2419	2827	3142
Nominal current I_N [A]	3.9	4.7	5.5	6.1
Stall torque M_0 [Nm]	10			
Stall current I_0 [A]	4.5	6.1	9.2	12.3
Maximum torque M_{max} [Nm]	38			
Maximum current I_{max} [A]	26.8	36.5	54.8	72.9
Maximum speed n_{max} [rpm]	12000			
Torque constant K_T [Nm/A]	2.22	1.63	1.08	0.81
Voltage constant K_E [V/1000 rpm]	134.04	98.44	64.93	49.22
Stator resistance R_{2ph} [Ω]	3.61	1.92	0.8	0.48
Stator inductance L_{2ph} [mH]	32	17.44	7.75	4.36
Electrical time constant t_{el} [ms]	8.9	9.1	9.7	9.1
Thermal time constant t_{therm} [min]	40			
Moment of inertia J [kgcm²]	4.39			
Weight without brake m [kg]	7.3			
Holding brake				
Holding torque of brake M_{Br} [Nm]	8			
Mass of brake [kg]	1			
Moment of inertia of brake J_{Br} [kgcm²]	0.69			
Recommendations				
ACOPOS 8Vxxxx.xx...	1090		1180	
ACOPOSmulti 8BVIxxxx...	0055		0110	
ACOPOS P3 8EIxxxx...	8X8X		013X	017X
Cross section for B&R motor cables [mm²]	0.75			1.5
Connector size	1.0			

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 guideline; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).

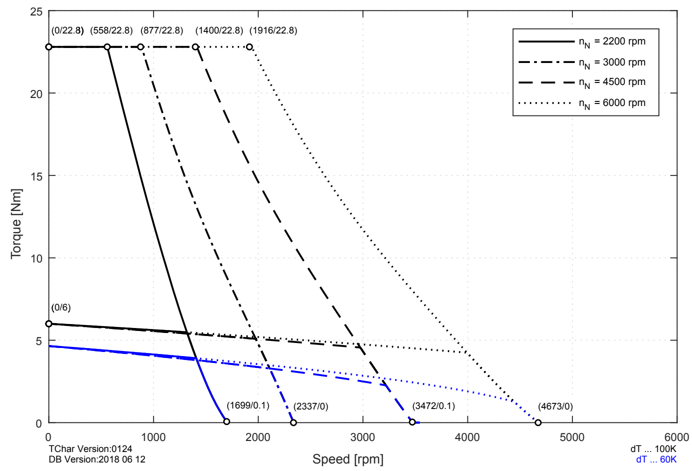
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

2.14.4.1 Speed-torque characteristic curves at 325 VDC DC bus voltage

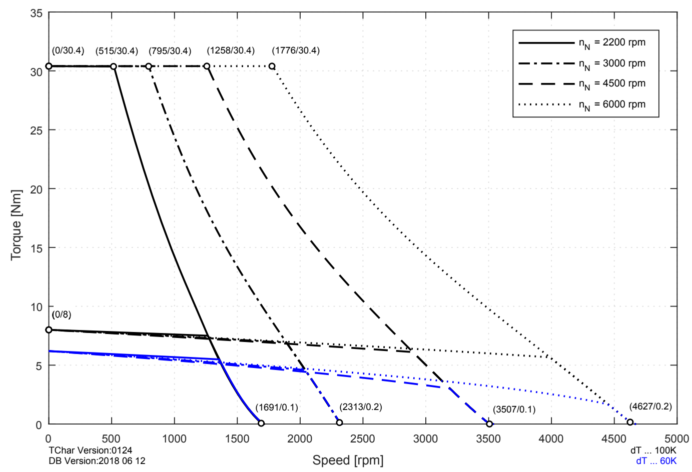
8LSA43.eennnffgg-3



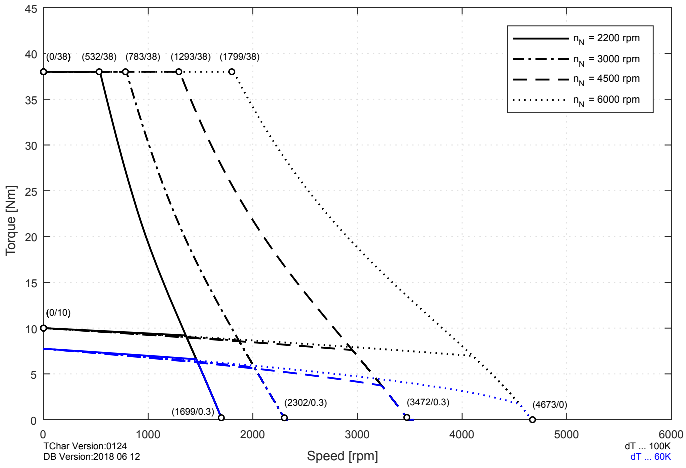
8LSA44.eennnffgg-3



8LSA45.eennnffgg-3

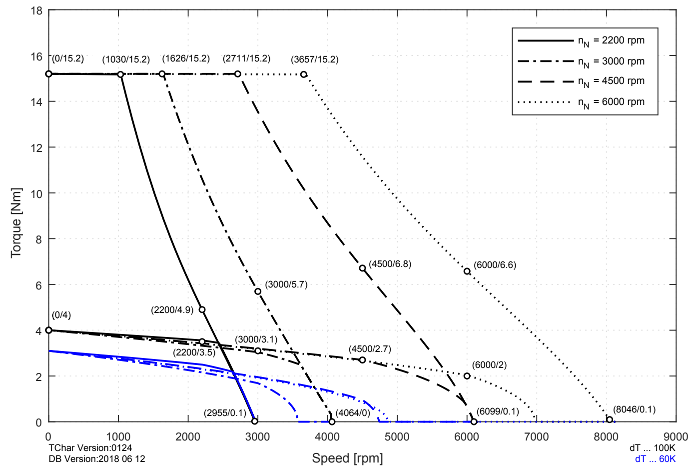


8LSA46.eennnffgg-3

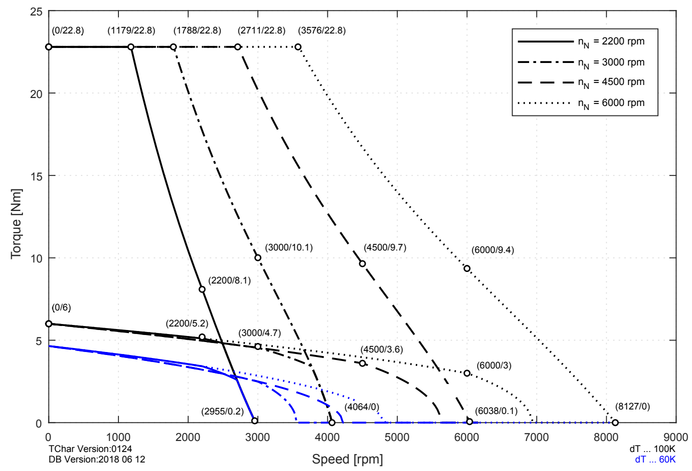


2.14.4.2 Speed-torque characteristic curves at 560 VDC DC bus voltage

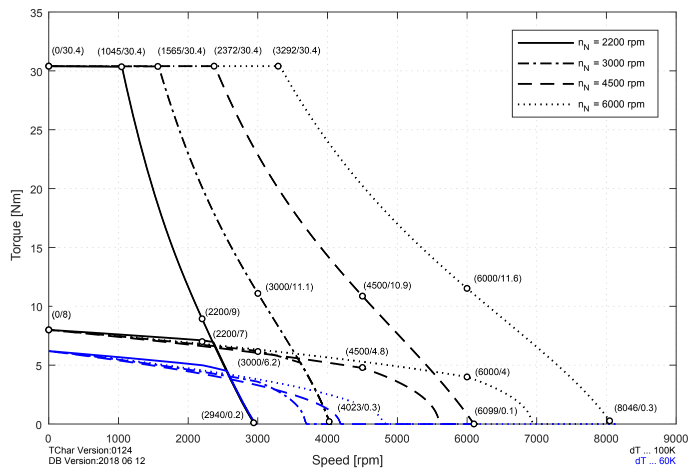
8LSA43.eennnffgg-3



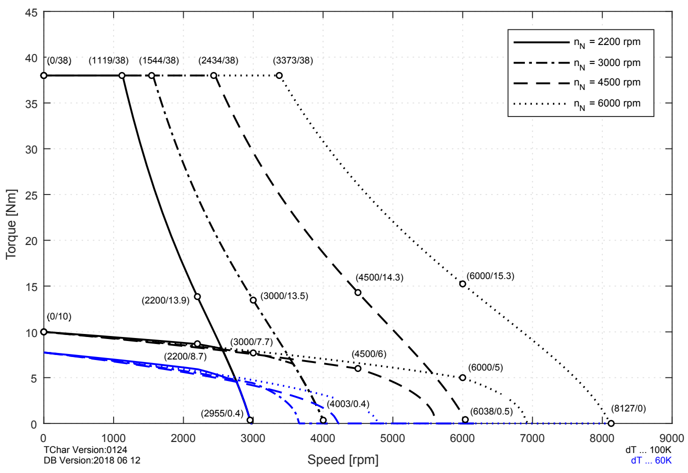
8LSA44.eennnffgg-3



8LSA45.eennnffgg-3

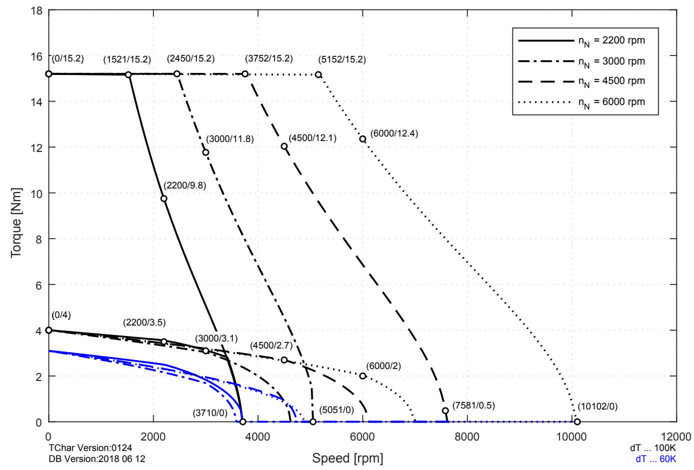


8LSA46.eennnffgg-3

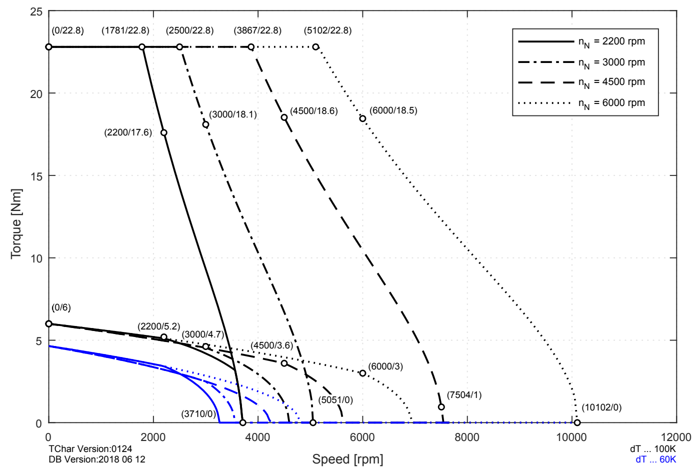


2.14.4.3 Speed-torque characteristic curves at 750 VDC DC bus voltage

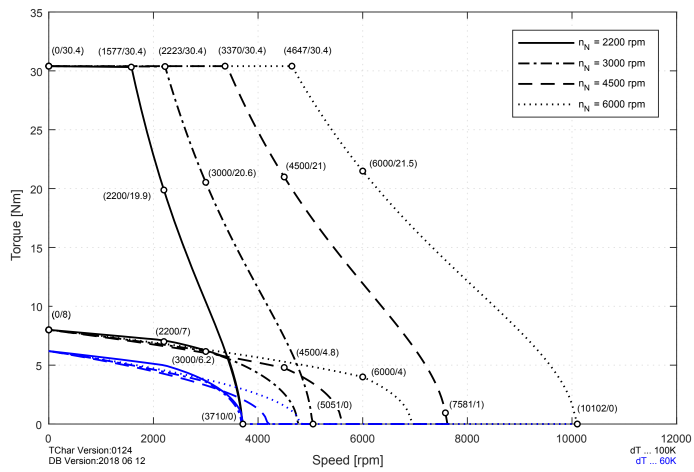
8LSA43.eennnffgg-3



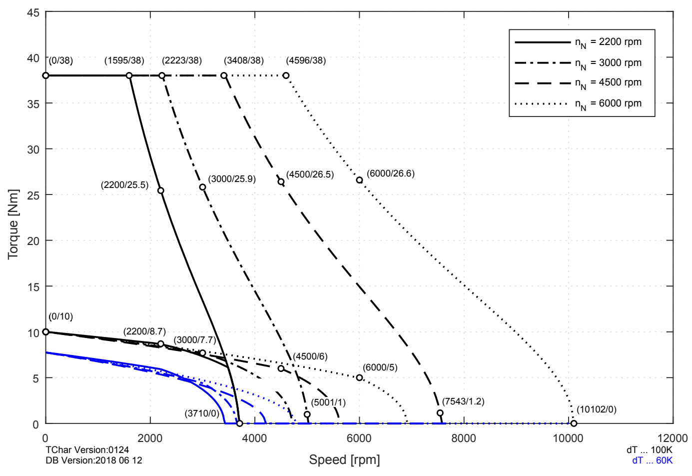
8LSA44.eennnffgg-3



8LSA45.eennnffgg-3



8LSA46.eennnffgg-3

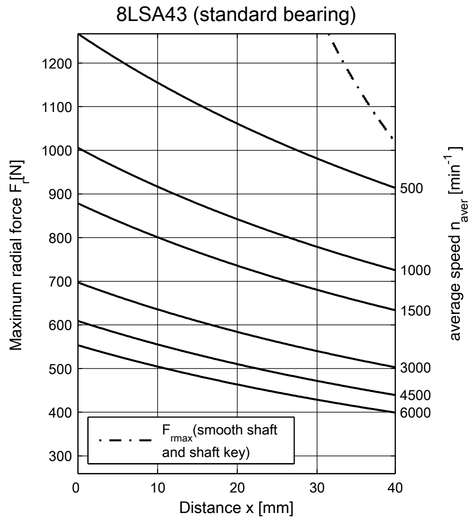


2.14.4.4 Maximum shaft load

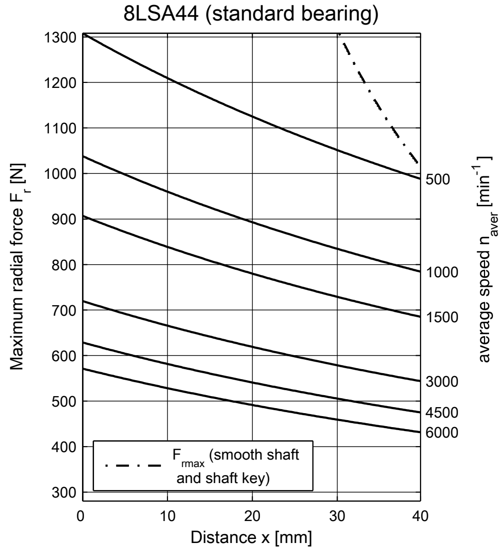
Note the information in section "Load capacity of the shaft end and bearing" on page 273 of chapter "Installation conditions".

2.14.4.4.1 8LSA4...3 / 8LSC4...-3 - Standard bearing

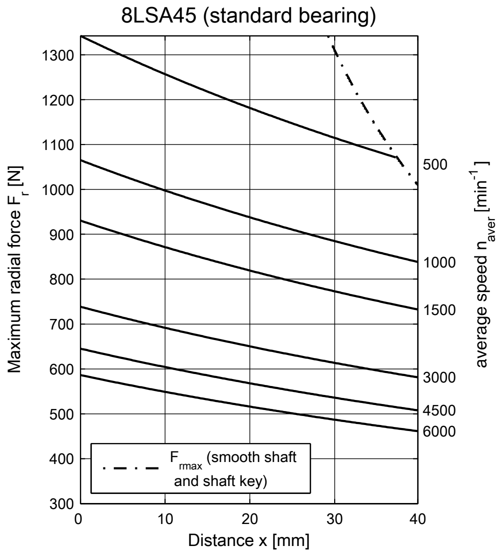
Shaft load values apply to both 8LSA and 8LSC!



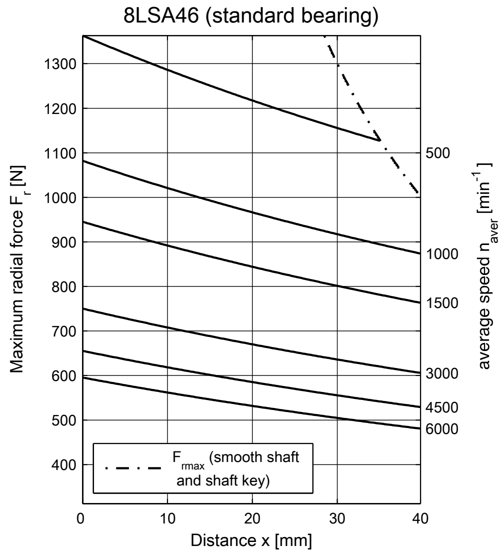
maximum allowed axial force: F_{amax} = 111 N



maximum allowed axial force: F_{amax} = 118 N



maximum allowed axial force: F_{amax} = 124 N

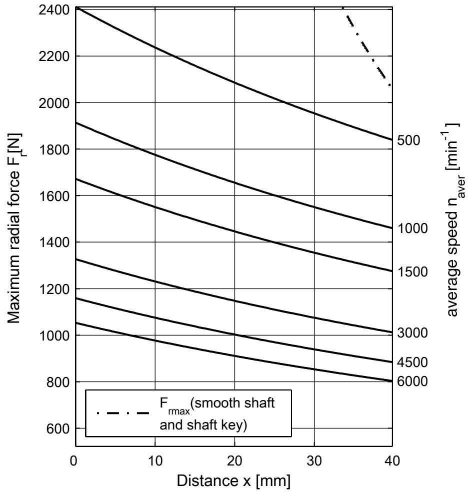


maximum allowed axial force: F_{amax} = 127 N

2.14.4.4.2 8LSA4...-3 / 8LSC4...-3 - Reinforced bearing

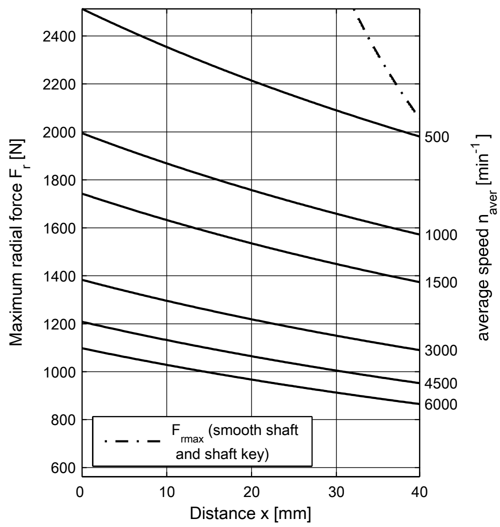
Shaft load values apply to both 8LSA and 8LSC!

8LSA43 (special option "reinforced A side bearing")



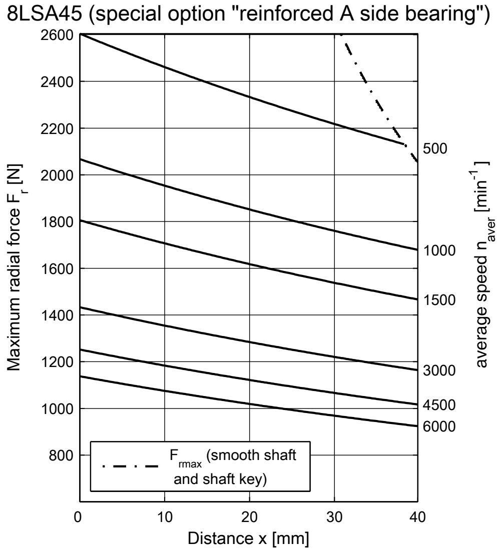
maximum allowed axial force: F_{amax} = 218 N

8LSA44 (special option "reinforced A side bearing")



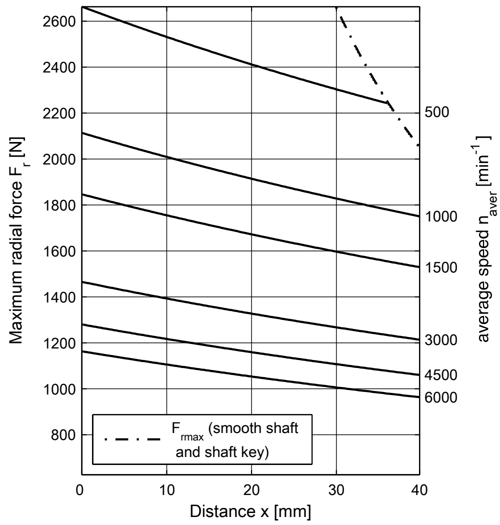
maximum allowed axial force: F_{amax} = 232 N

8LSA45 (special option "reinforced A side bearing")



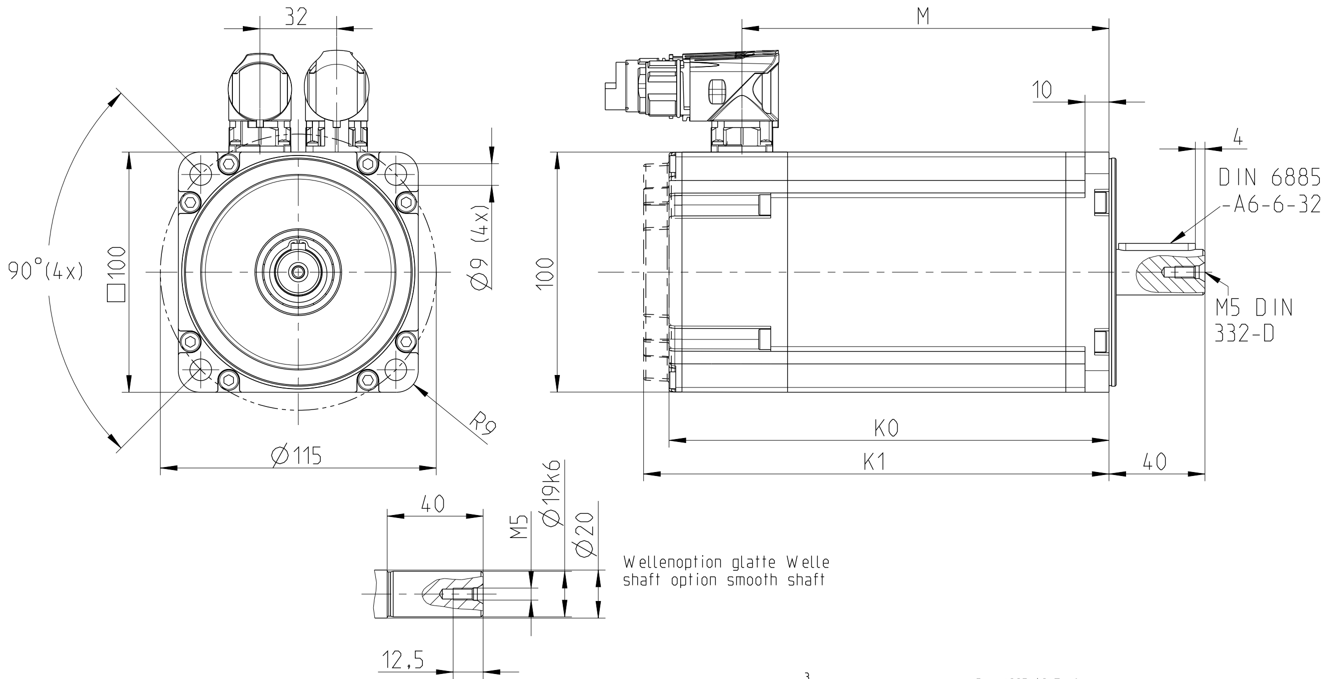
maximum allowed axial force: F_{amax} = 244 N

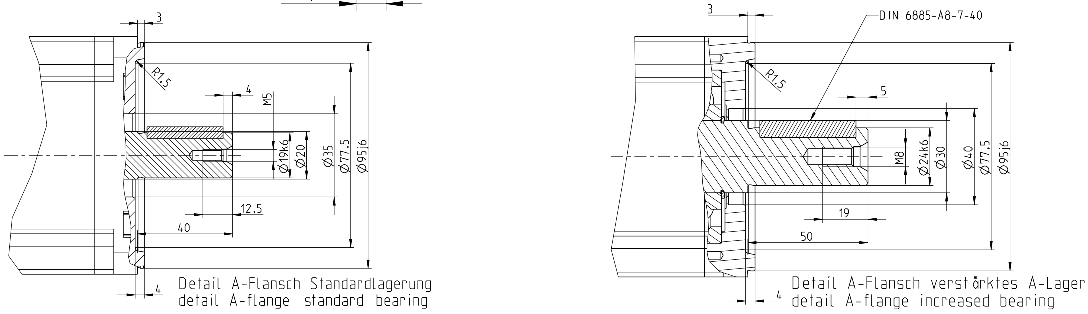
8LSA46 (special option "reinforced A side bearing")



maximum allowed axial force: F_{amax} = 252 N

2.14.4.5 8LSA4...-3 - Dimensions

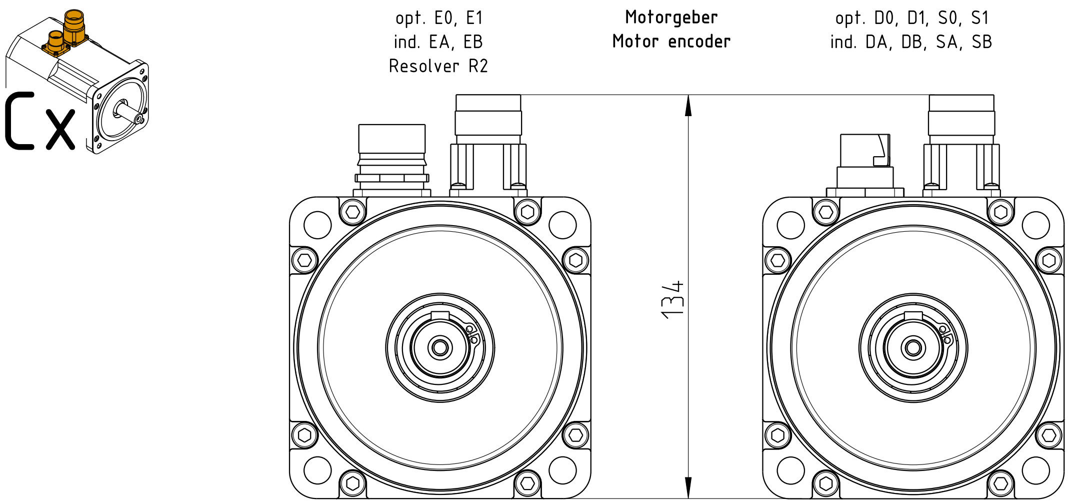


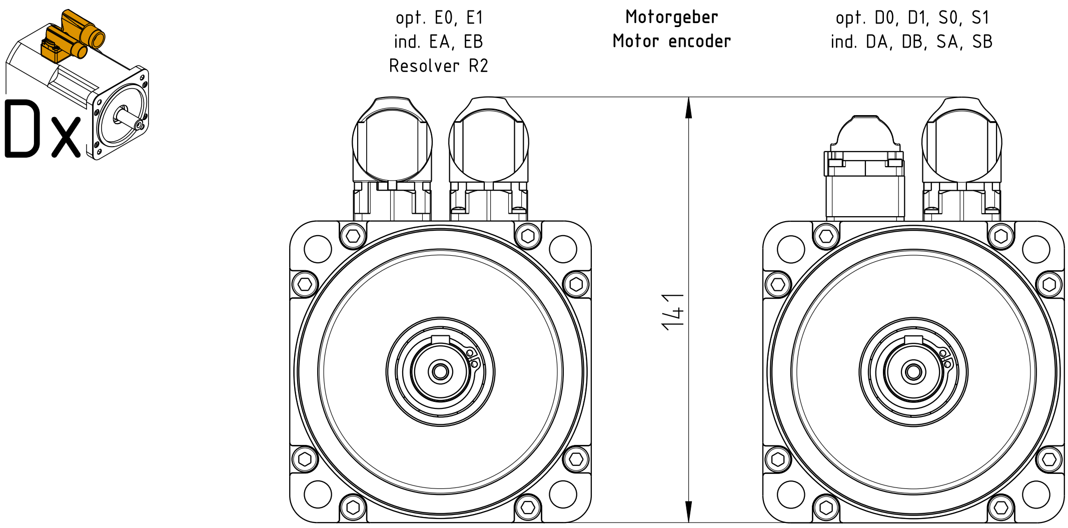


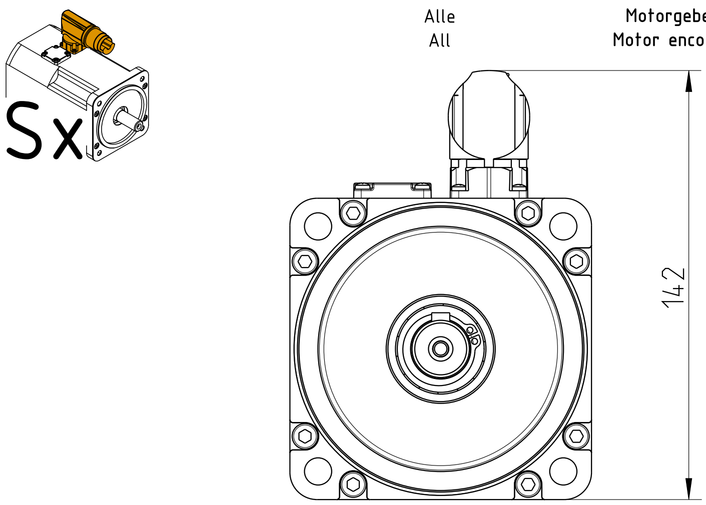
EnDat/Resolver feedback				Extension of K_0, K_1 and M depending on motor option [mm]		
Encoder assignments	**DA,DB,EA,EB,SA,SB,R2**	**D0,D1,E0,E1,S0,S1**				
Model number	**K_0**	**K_1**	**M**	**Holding brake**	**Heavy-duty holding brake**	**Reinforced A-side bearing**
8LSA43.eennnffgg-3	163	174	133	32	37	15
8LSA44.eennnffgg-3	183	194	153	32	37	15
8LSA45.eennnffgg-3	207	218	177	32	37	15
8LSA46.eennnffgg-3	227	238	197	32	37	15

IMPORTANT: Motor option "oil seal" has no effect on the motor length.

2.14.4.6 8LSA4...-3 - Connection dimensions







2.14.5 8LSA5...-3 - Technical data

Model number	8LSA53.ee022ffgg-3	8LSA53.ee030ffgg-3	8LSA53.ee045ffgg-3
Motor			
Nominal speed n_N [rpm]	2200	3000	4500
Number of pole pairs	4		
Nominal torque M_n [Nm]	4.2	4	3.9
Nominal power P_N [W]	968	1257	1838
Nominal current I_N [A]	1.9	2.5	3.6
Stall torque M_0 [Nm]	4.5		
Stall current I_0 [A]	2	2.8	4.1
Maximum torque M_{max} [Nm]	13.8		
Maximum current I_{max} [A]	8	10.5	16.5
Maximum speed n_{max} [rpm]	9000		
Torque constant K_T [Nm/A]	2.22	1.63	1.09
Voltage constant K_E [V/1000 rpm]	134.04	98.44	65.97
Stator resistance R_{2ph} [Ω]	10.9	5.13	2.56
Stator inductance L_{2ph} [mH]	95.92	40.33	19.33
Electrical time constant t_{el} [ms]	8.8	7.9	8.7
Thermal time constant t_{therm} [min]	33		
Moment of inertia J [kgcm²]	3.62		
Weight without brake m [kg]	6.2		
Holding brake			
Holding torque of brake M_{Br} [Nm]	15		
Mass of brake [kg]	1.5		
Moment of inertia of brake J_{Br} [kgcm²]	1.66		
Recommendations			
ACOPOS 8Vxxxx.xx...	1022	1045	1090
ACOPOSmulti 8BVIxxxx...	0028		0055
ACOPOS P3 8EIxxxx...	2X2X	4X5X	8X8X
Cross section for B&R motor cables [mm²]	0.75		
Connector size	1.0		

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 guideline; 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.

Model number	8LSA54.ee022ffgg-3	8LSA54.ee030ffgg-3	8LSA54.ee045ffgg-3
Motor			
Nominal speed n_N [rpm]	2200	3000	4500
Number of pole pairs	4		
Nominal torque M_n [Nm]	7.8	7.7	7.3
Nominal power P_N [W]	1797	2419	3440
Nominal current I_N [A]	3.5	4.7	6.7
Stall torque M_0 [Nm]	9		
Stall current I_0 [A]	4.1	5.5	8.2
Maximum torque M_{max} [Nm]	27.6		
Maximum current I_{max} [A]	15.4	20.9	33
Maximum speed n_{max} [rpm]	9000		
Torque constant K_T [Nm/A]	2.22	1.63	1.09
Voltage constant K_E [V/1000 rpm]	134.04	98.44	65.97
Stator resistance R_{2ph} [Ω]	3.44	2.16	0.926
Stator inductance L_{2ph} [mH]	34.5	21.52	8.67
Electrical time constant t_{el} [ms]	10	10.6	10.9
Thermal time constant t_{therm} [min]	37		
Moment of inertia J [kgcm²]	6.04		
Weight without brake m [kg]	8.5		
Holding brake			
Holding torque of brake M_{Br} [Nm]	15		
Mass of brake [kg]	1.4		
Moment of inertia of brake J_{Br} [kgcm²]	1.66		
Recommendations			
ACOPOS 8Vxxxx.xx...	1090		1180
ACOPOSmulti 8BVIxxxx...	0055		0110
ACOPOS P3 8EIxxxx...	8X8X		013X
Cross section for B&R motor cables [mm²]	0.75		
Connector size	1.0		

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 guideline; 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.

<table>
<tr><th>Model number</th><th>8LSA55.ee022ffgg-3</th><th>8LSA55.ee030ffgg-3</th><th>8LSA55.ee045ffgg-3</th><th>8LSA56.ee022ffgg-3</th></tr>
<tr><td colspan="5">Motor</td></tr>
<tr><td>Nominal speed n_N [rpm]</td><td>2200</td><td>3000</td><td>4500</td><td>2200</td></tr>
<tr><td>Number of pole pairs</td><td colspan="4">4</td></tr>
<tr><td>Nominal torque M_n [Nm]</td><td>11.8</td><td>11.6</td><td>9.5</td><td>14.4</td></tr>
<tr><td>Nominal power P_N [W]</td><td>2719</td><td>3644</td><td>4477</td><td>3318</td></tr>
<tr><td>Nominal current I_N [A]</td><td>5.3</td><td>7.1</td><td>8.7</td><td>6.5</td></tr>
<tr><td>Stall torque M_0 [Nm]</td><td colspan="3">12.5</td><td>16</td></tr>
<tr><td>Stall current I_0 [A]</td><td>5.6</td><td>7.7</td><td>11.5</td><td>7.2</td></tr>
<tr><td>Maximum torque M_{max} [Nm]</td><td colspan="3">41.4</td><td>55.2</td></tr>
<tr><td>Maximum current I_{max} [A]</td><td>23.6</td><td>33</td><td>47.3</td><td>30.8</td></tr>
<tr><td>Maximum speed n_{max} [rpm]</td><td colspan="4">9000</td></tr>
<tr><td>Torque constant K_T [Nm/A]</td><td>2.22</td><td>1.63</td><td>1.09</td><td>2.22</td></tr>
<tr><td>Voltage constant K_E [V/1000 rpm]</td><td>134.04</td><td>98.44</td><td>65.97</td><td>134.04</td></tr>
<tr><td>Stator resistance R_{2ph} [Ω]</td><td>2.265</td><td>1.127</td><td>0.51</td><td>1.51</td></tr>
<tr><td>Stator inductance L_{2ph} [mH]</td><td>24.29</td><td>12.5</td><td>4.96</td><td>17.6</td></tr>
<tr><td>Electrical time constant t_{el} [ms]</td><td>10.7</td><td>11.1</td><td>9.7</td><td>11.6</td></tr>
<tr><td>Thermal time constant t_{therm} [min]</td><td colspan="3">40</td><td>43</td></tr>
<tr><td>Moment of inertia J [kgcm²]</td><td colspan="3">8.19</td><td>10.66</td></tr>
<tr><td>Weight without brake m [kg]</td><td colspan="3">10.4</td><td>13</td></tr>
<tr><td colspan="5">Holding brake</td></tr>
<tr><td>Holding torque of brake M_{Br} [Nm]</td><td colspan="4">15</td></tr>
<tr><td>Mass of brake [kg]</td><td colspan="3">1.5</td><td>1.4</td></tr>
<tr><td>Moment of inertia of brake J_{Br} [kgcm²]</td><td colspan="4">1.66</td></tr>
<tr><td colspan="5">Recommendations</td></tr>
<tr><td>ACOPOS 8Vxxxx.xx...</td><td colspan="2">1090</td><td>1180</td><td>1090</td></tr>
<tr><td>ACOPOSmulti 8BVIxxxx...</td><td>0055</td><td colspan="3">0110</td></tr>
<tr><td>ACOPOS P3 8EIxxxx...</td><td colspan="2">8X8X</td><td>013X</td><td>8X8X</td></tr>
<tr><td>Cross section for B&R motor cables [mm²]</td><td colspan="4">0.75</td></tr>
<tr><td>Connector size</td><td colspan="4">1.0</td></tr>
</table>

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 guideline; 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.

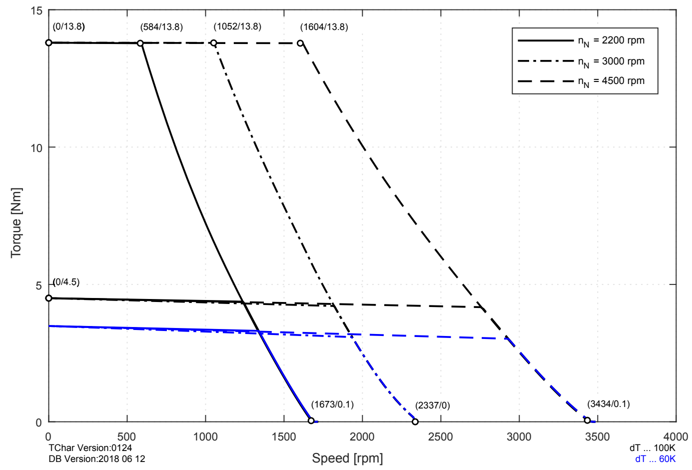
Model number	8LSA56.ee030ffgg-3	8LSA56.ee045ffgg-3	8LSA57.ee022ffgg-3	8LSA57.ee030ffgg-3	8LSA57.ee045ffgg-3
Motor					
Nominal speed n_N [rpm]	3000	4500	2200	3000	4500
Number of pole pairs	4				
Nominal torque M_n [Nm]	13.9	12.7	18	17.5	15
Nominal power P_N [W]	4367	5985	4147	5498	7069
Nominal current I_N [A]	8.5	11.6	8.1	10.7	13.7
Stall torque M_0 [Nm]	16		20		
Stall current I_0 [A]	9.8	14.7	9	12.3	18.3
Maximum torque M_{max} [Nm]	55.2		69		
Maximum current I_{max} [A]	41.8	65.9	38.4	52.6	82.6
Maximum speed n_{max} [rpm]	9000				
Torque constant K_T [Nm/A]	1.63	1.09	2.22	1.63	1.09
Voltage constant K_E [V/1000 rpm]	98.44	65.97	134.04	98.44	65.97
Stator resistance R_{2ph} [Ω]	0.75	0.341	1.13	0.62	0.29
Stator inductance L_{2ph} [mH]	8.16	4.08	13.17	7.21	3.2
Electrical time constant t_{el} [ms]	10.9	12	11.7	11.6	11
Thermal time constant t_{therm} [min]	43		46		
Moment of inertia J [kgcm²]	10.66		13.13		
Weight without brake m [kg]	13		14.5		
Holding brake					
Holding torque of brake M_{Br} [Nm]	15				
Mass of brake [kg]	1.4		1.3		
Moment of inertia of brake J_{Br} [kgcm²]	1.66				
Recommendations					
ACOPOS 8Vxxxx.xx...	1180				1320
ACOPOSmulti 8BVIxxxx...	0110	0220	0110		0220
ACOPOS P3 8EIxxxx...	013X	017X	013X	017X	024X
Cross section for B&R motor cables [mm²]	0.75	1.5	0.75	1.5	4
Connector size	1.0				

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 guideline; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).

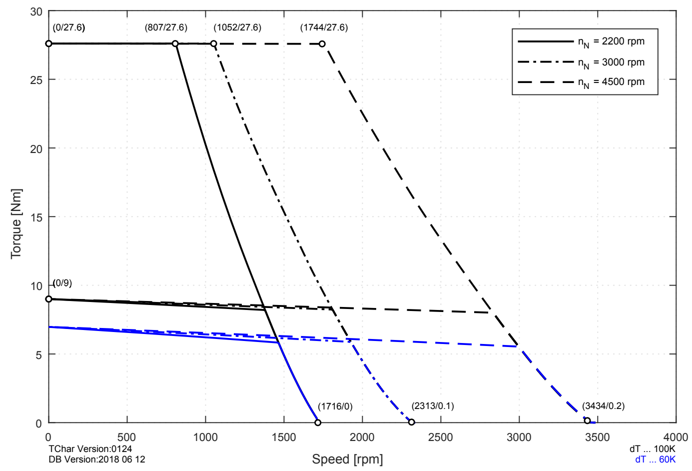
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

2.14.5.1 Speed-torque characteristic curves at 325 VDC DC bus voltage

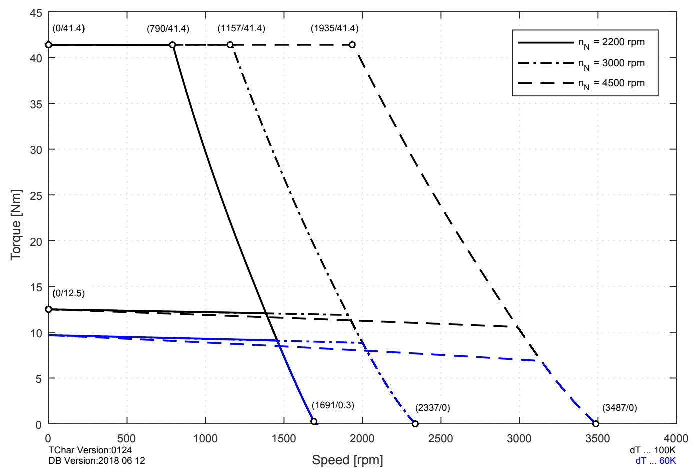
8LSA53.eennnffgg-3



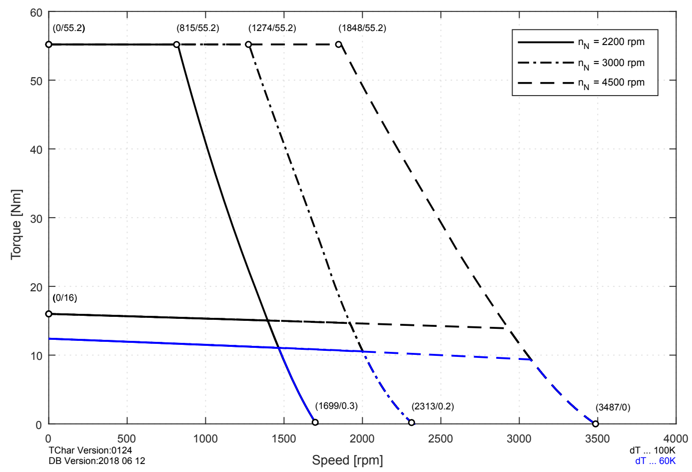
8LSA54.eennnffgg-3



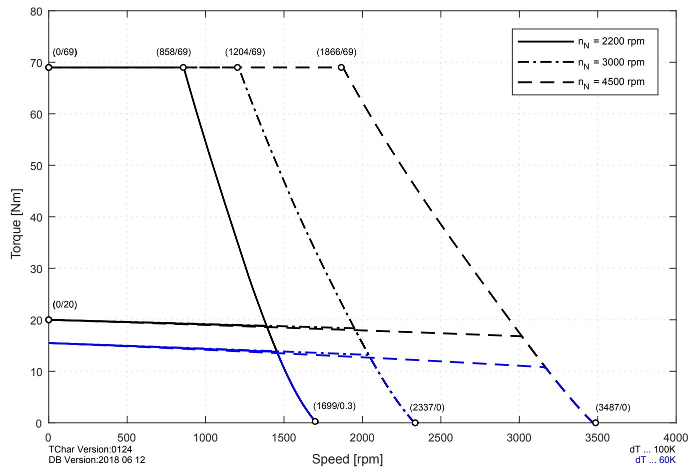
8LSA55.eennnffgg-3



8LSA56.eennnffgg-3

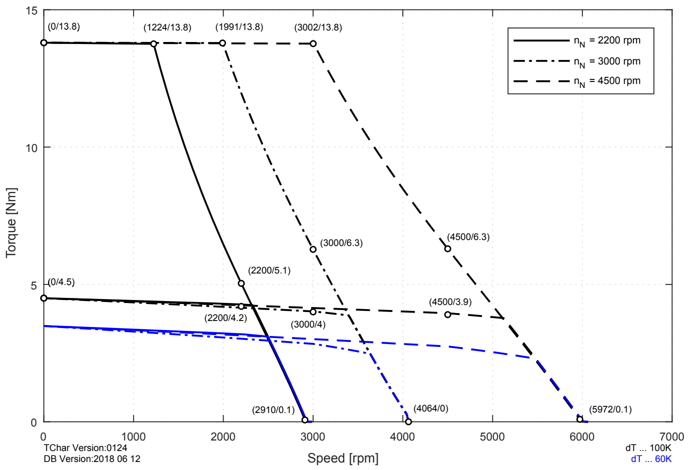


8LSA57.eennnffgg-3

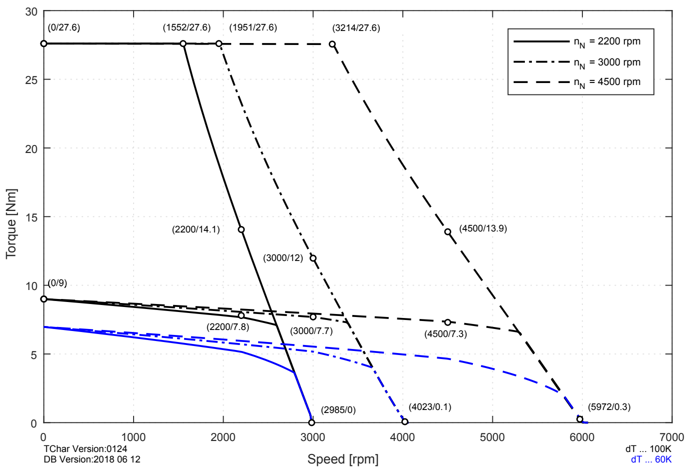


2.14.5.2 Speed-torque characteristic curves at 560 VDC DC bus voltage

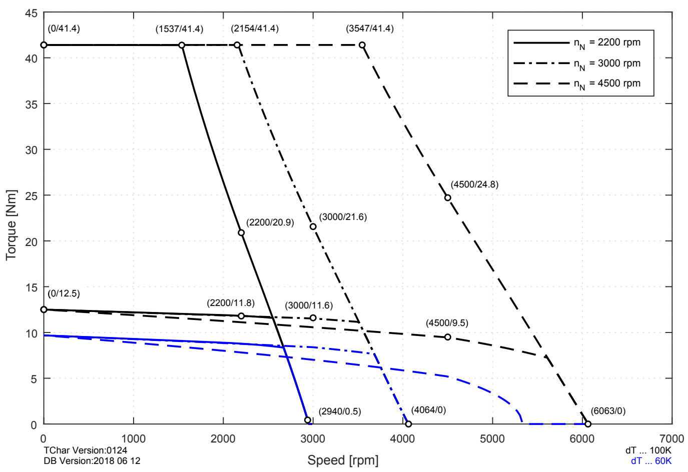
8LSA53.eennnffgg-3



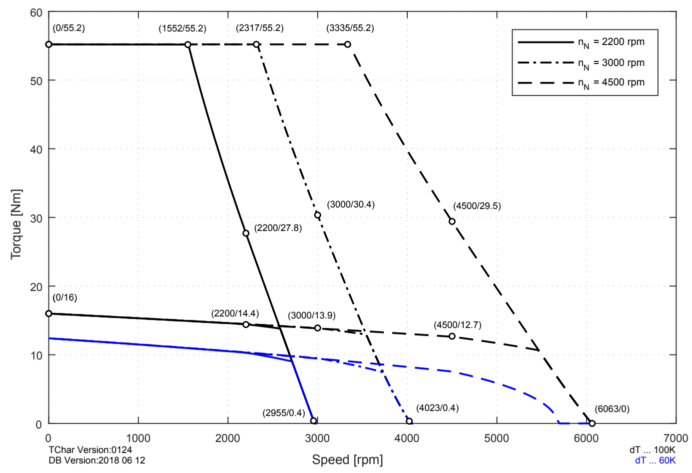
8LSA54.eennnffgg-3



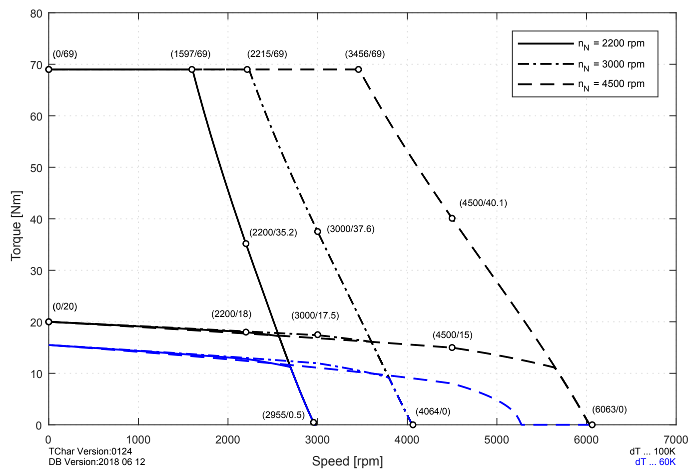
8LSA55.eennnffgg-3



8LSA56.eennnffgg-3

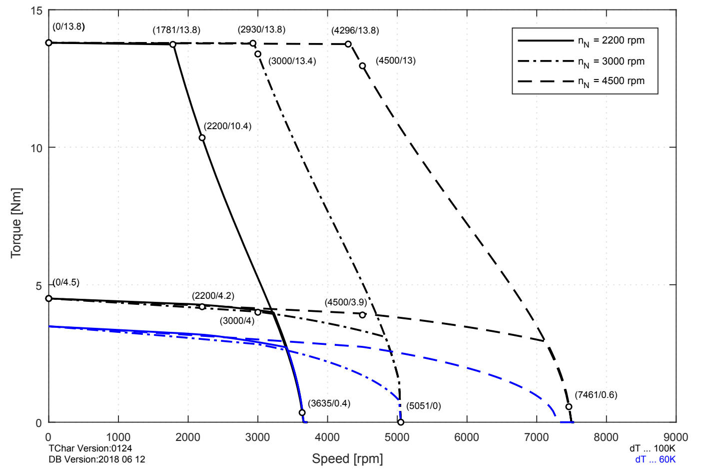


8LSA57.eennnffgg-3

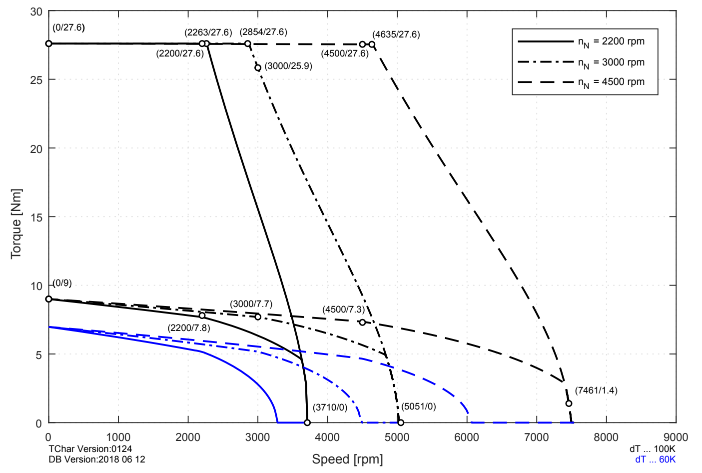


2.14.5.3 Speed-torque characteristic curves at 750 VDC DC bus voltage

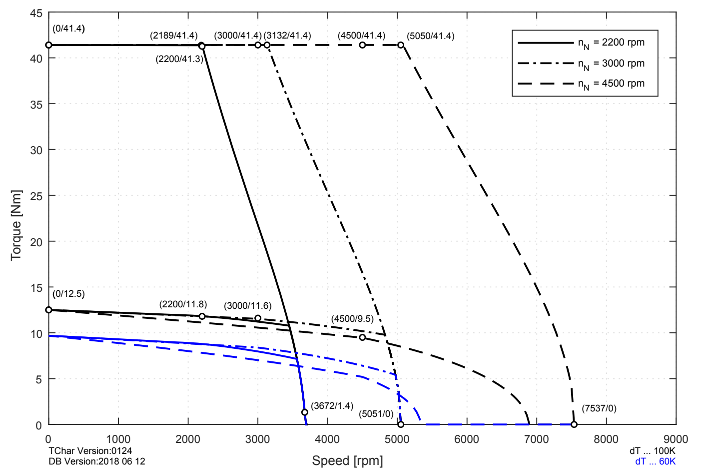
8LSA53.eennnffgg-3



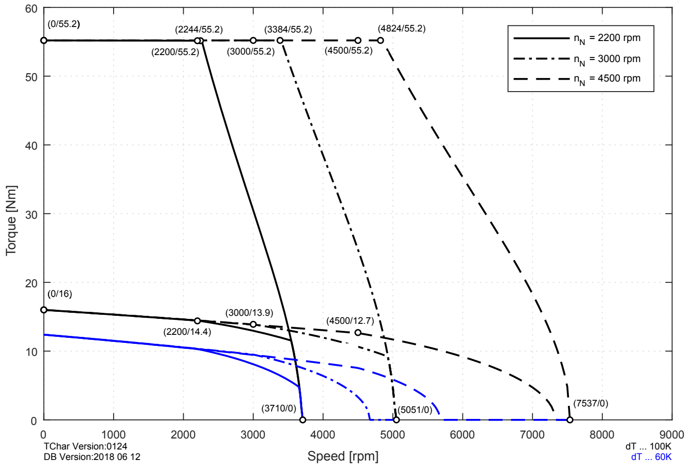
8LSA54.eennnffgg-3



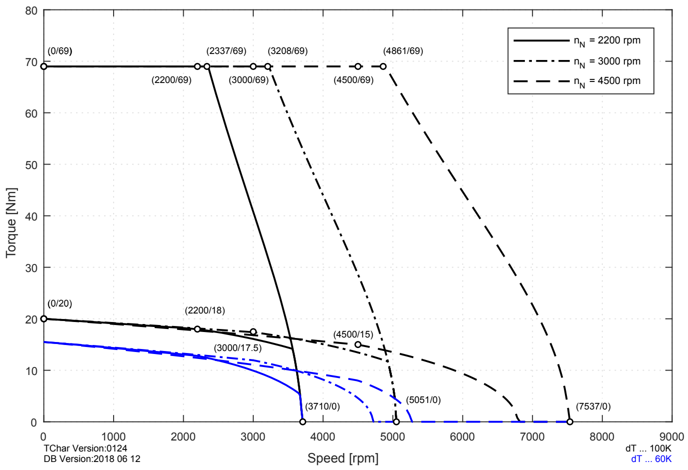
8LSA55.eennnffgg-3



8LSA56.eennnffgg-3



8LSA57.eennnffgg-3



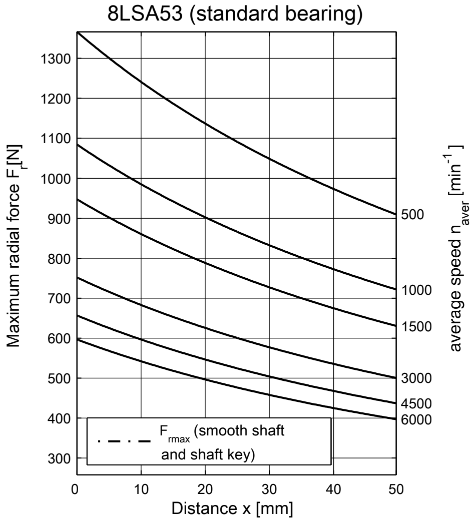
2.14.5.4 Maximum shaft load

Note the information in section "Load capacity of the shaft end and bearing" on page 273 of chapter "Installation conditions".

2.14.5.4.1 8LSA5...-3 / 8LSC5...-3 - Standard bearing

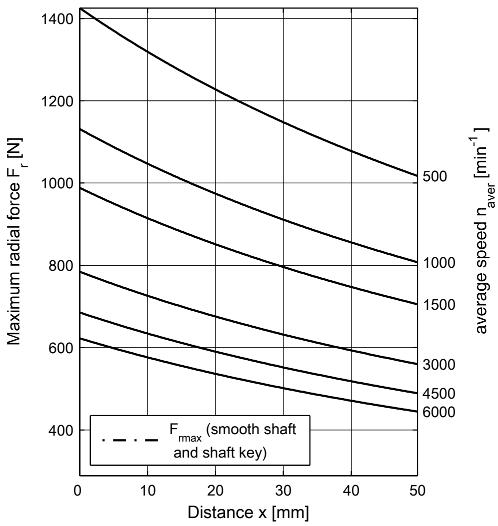
Shaft load values apply to both 8LSA and 8LSC!

8LSA53 (standard bearing)



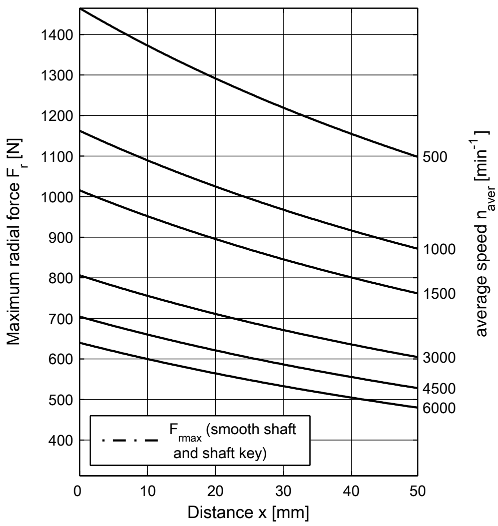
maximum allowed axial force: F_{amax} = 114 N

8LSA54 (standard bearing)



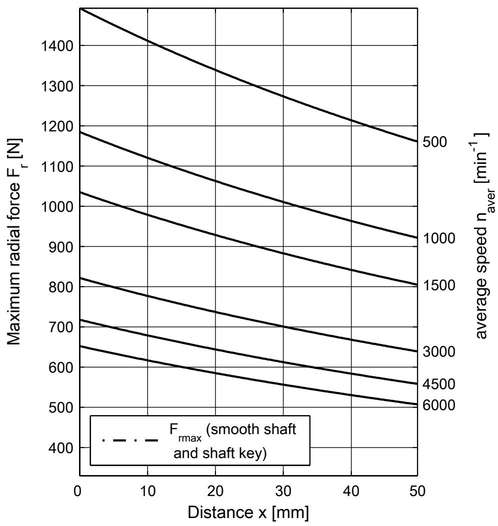
maximum allowed axial force: F_{amax} = 124 N

8LSA55 (standard bearing)



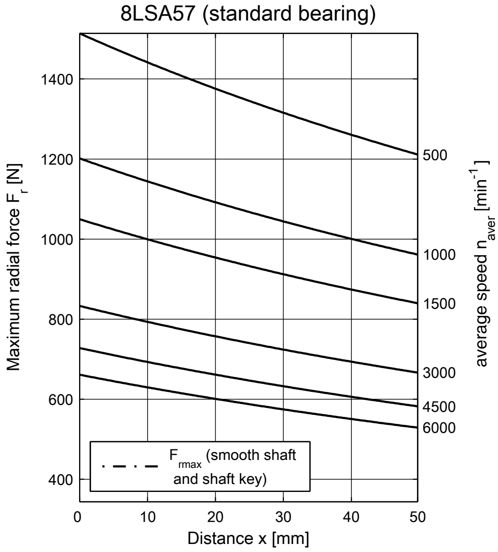
maximum allowed axial force: F_{amax} = 131 N

8LSA56 (standard bearing)



maximum allowed axial force: F_{amax} = 137 N

8LSA57 (standard bearing)

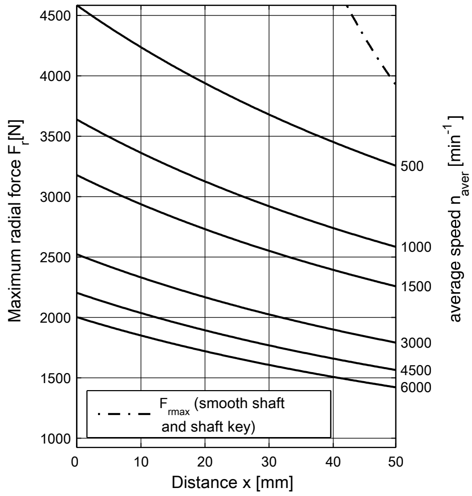


maximum allowed axial force: F_{amax} = 141 N

2.14.5.4.2 8LSA5...-3 / 8LSC5...-3 - Reinforced bearing

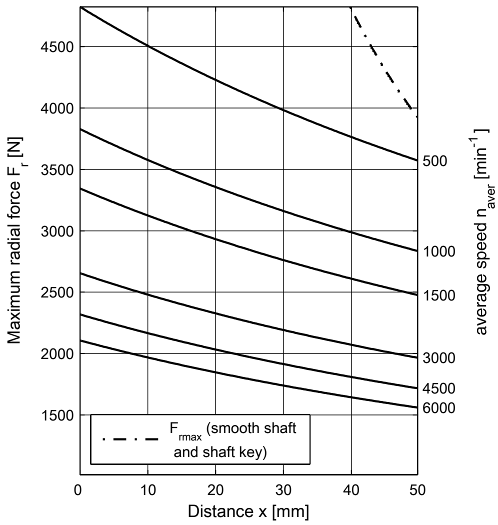
Shaft load values apply to both 8LSA and 8LSC!

8LSA53 (special option "reinforced A side bearing")



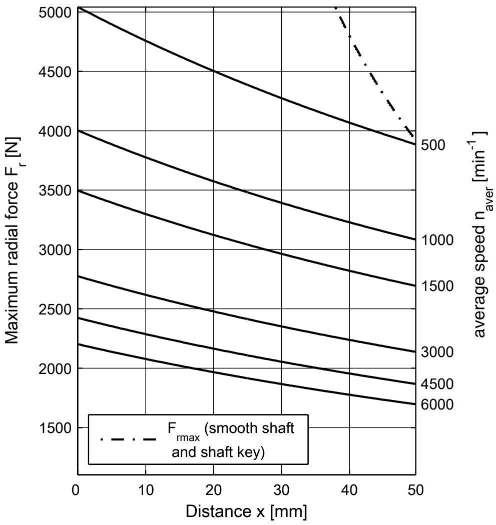
maximum allowed axial force: F_{amax} = 398 N

8LSA54 (special option "reinforced A side bearing")



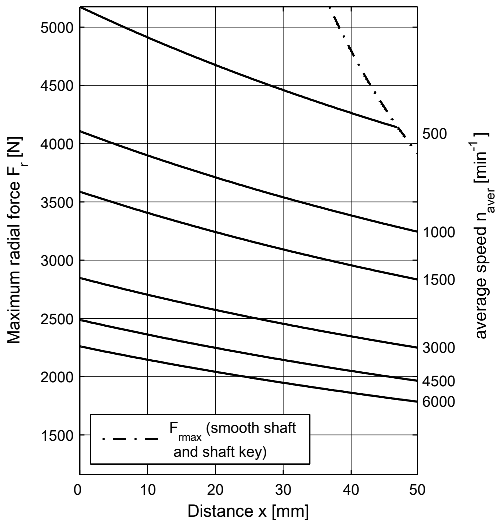
maximum allowed axial force: F_{amax} = 429 N

8LSA55 (special option "reinforced A side bearing")



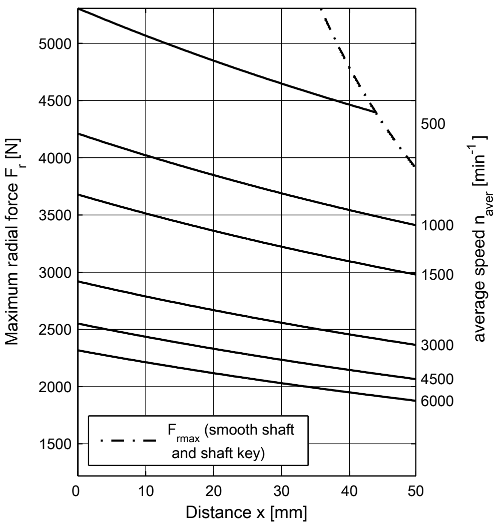
maximum allowed axial force: F_{amax} = 459 N

8LSA56 (special option "reinforced A side bearing")



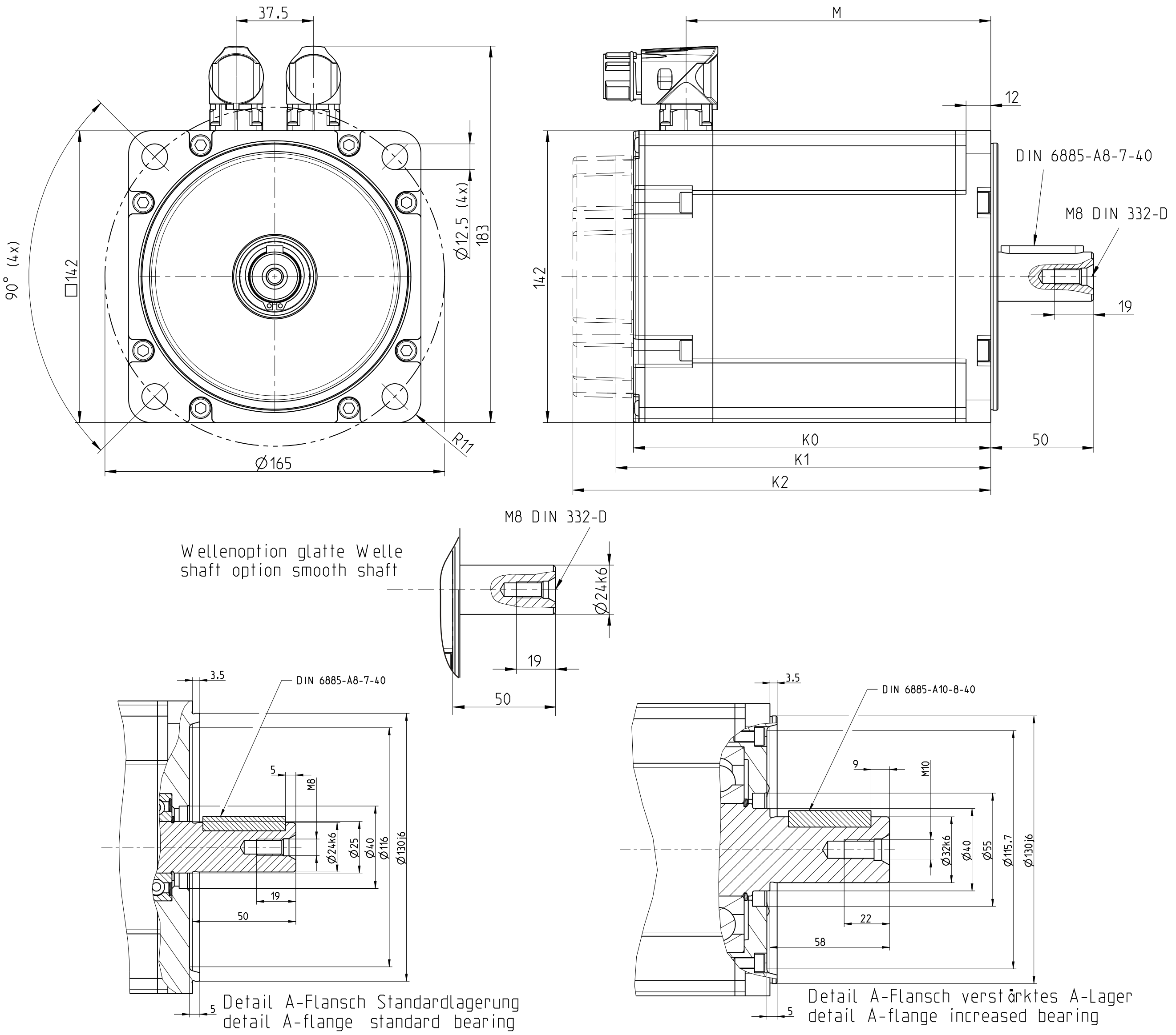
maximum allowed axial force: F_{amax} = 478 N

8LSA57 (special option "reinforced A side bearing")



maximum allowed axial force: F_{amax} = 497 N

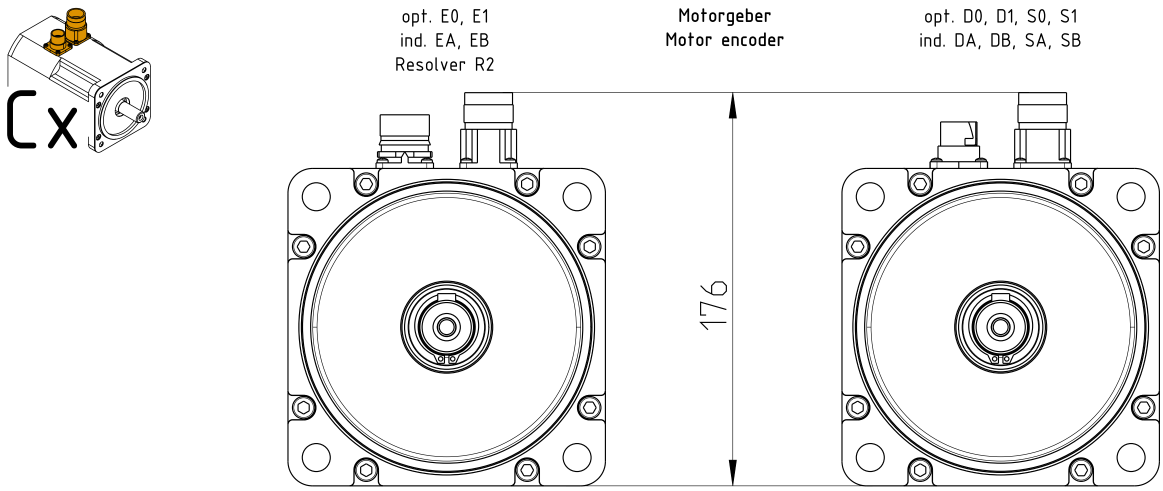
2.14.5.5 8LSA5...-3 - Dimensions

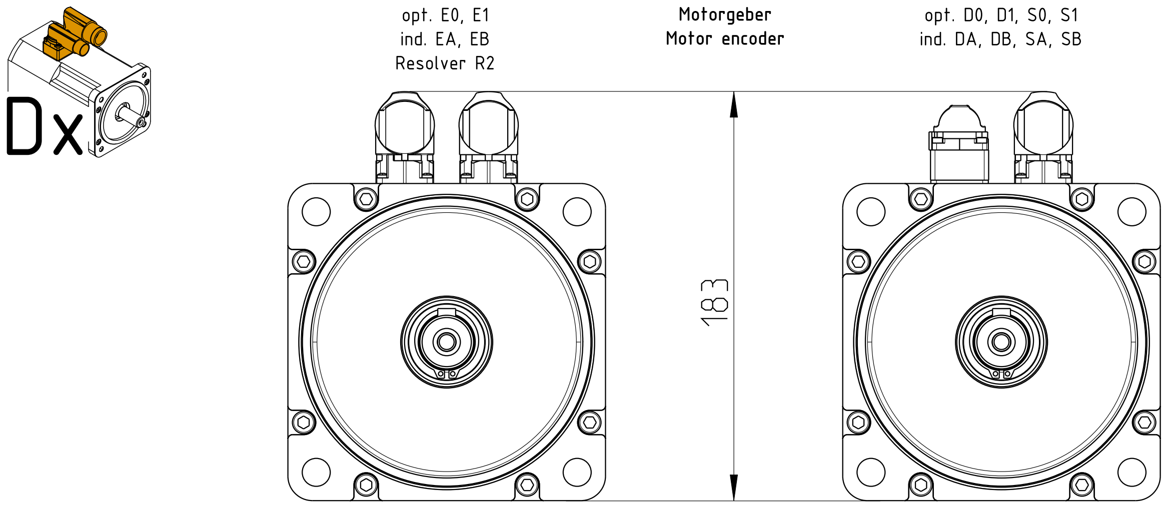


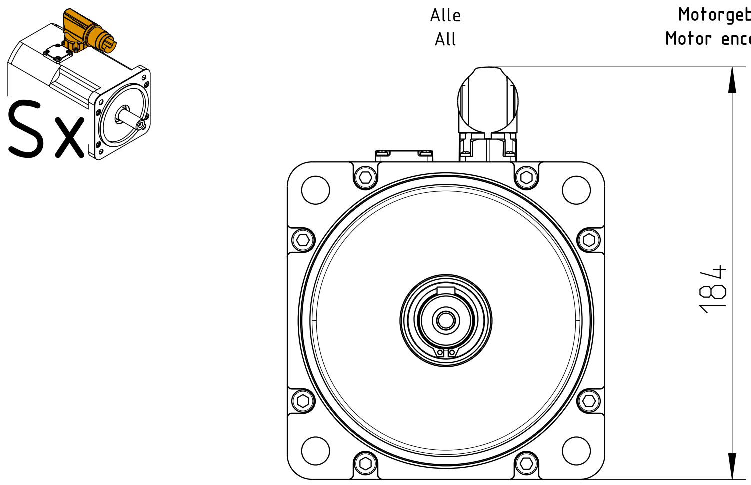
EnDat/Resolver feedback					Extension of K_0, K_1, K_2 and M depending on the motor option [mm]		
Encoder assignments	**DA,DB,SA,SB,R2**	**EA,EB**	**D0,D1,E0,E1,S0,S1**				
Model number	**K_0**	**K_1**	**K_2**	**M**	**Holding brake**	**Reinforced holding brake**	**Reinforced A-side bearing**
8LSA53.eennnffgg-3	148	159	178	123	35	50	15
8LSA54.eennnffgg-3	173	184	203	148	35	50	10
8LSA55.eennnffgg-3	198	209	228	173	30	45	10
8LSA56.eennnffgg-3	223	234	253	198	30	45	5
8LSA57.eennnffgg-3	248	259	278	223	25	40	5

IMPORTANT: Motor option "oil seal" has no effect on the motor length.

2.14.5.6 8LSA5...-3 - Connection dimensions







2.14.6 8LSA5A/B/C...-3 - Technical data

Model number	8LSA5A. ee022ffgg-3	8LSA5A. ee030ffgg-3	8LSA5A. ee045ffgg-3	8LSA5B. ee022ffgg-3	8LSA5B. ee030ffgg-3	8LSA5B. ee040ffgg-3
Motor						
Nominal speed n_N [rpm]	2200	3000	4500	2200	3000	4000
Number of pole pairs	5					
Nominal torque M_n [Nm]	18	14	8	26	21	14
Nominal power P_N [W]	4147	4398	3770	5990	6597	5864
Nominal current I_N [A]	8.1	8.6	7.4	11.7	12.9	11.4
Stall torque M_0 [Nm]	24			36		
Stall current I_0 [A]	10.8	14.7	22	16.2	22.1	29.3
Maximum torque M_{max} [Nm]	84			131		
Maximum current I_{max} [A]	50	69	103	78	107	141
Maximum speed n_{max} [rpm]	6000					
Torque constant K_T [Nm/A]	2.22	1.63	1.09	2.22	1.63	1.23
Voltage constant K_E [V/1000 rpm]	134.04	98.44	65.97	134.04	98.44	74.35
Stator resistance R_{2ph} [Ω]	0.83	0.45	0.19	0.5	0.27	0.15
Stator inductance L_{2ph} [mH]	11	5.9	2.47	7	3.8	2.2
Electrical time constant t_{el} [ms]	13.25	13.11	13	14	14.07	14.67
Thermal time constant t_{therm} [min]	45			51		
Moment of inertia J [kgcm²]	16			24.7		
Weight without brake m [kg]	18.5			25		
Holding brake						
Holding torque of brake M_{Br} [Nm]	17			60		
Mass of brake [kg]	0					
Moment of inertia of brake J_{Br} [kgcm²]	3.6			14.7		
Recommendations						
ACOPOS 8Vxxxx.xx...	1180		1320	1180	1320	
ACOPOSmulti 8BVIxxxx...	0110	0220	0330	0220	0330	
ACOPOS P3 8EIxxxx...	013X	017X	034X	024X	034X	
Cross section for B&R motor cables [mm²]	0.75	1.5	4	1.5	4	
Connector size	1.0		1.5	1.0	1.5	

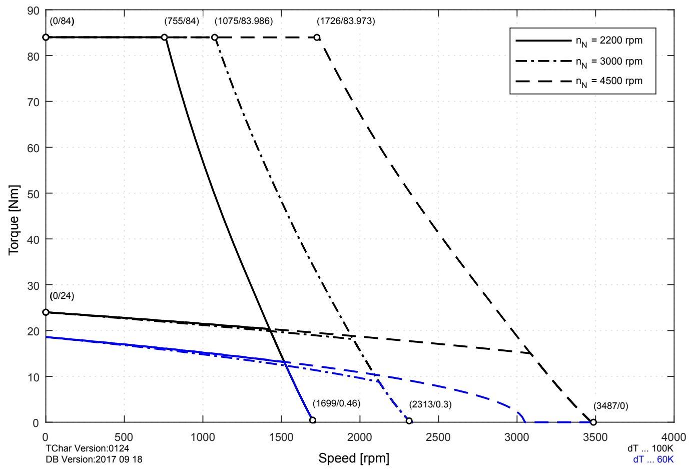
NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guideline; detailed inspection of the corresponding 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.

Model number	8LSA5C.ee015ffgg-3	8LSA5C.ee022ffgg-3	8LSA5C.ee030ffgg-3
Motor			
Nominal speed n_N [rpm]	1500	2200	3000
Number of pole pairs	5		
Nominal torque M_n [Nm]	40	34	27
Nominal power P_N [W]	6283	7833	8482
Nominal current I_N [A]	12.3	15.3	16.6
Stall torque M_0 [Nm]	48		
Stall current I_0 [A]	14.7	21.6	29.5
Maximum torque M_{max} [Nm]	177		
Maximum current I_{max} [A]	72	106	145
Maximum speed n_{max} [rpm]	6000		
Torque constant K_T [Nm/A]	3.26	2.22	1.63
Voltage constant K_E [V/1000 rpm]	196.87	134.04	98.44
Stator resistance R_{2ph} [Ω]	0.771	0.359	0.19
Stator inductance L_{2ph} [mH]	11.35	5.15	2.9
Electrical time constant t_{el} [ms]	14.3	14.35	15.26
Thermal time constant t_{therm} [min]	57		
Moment of inertia J [kgcm²]	33		
Weight without brake m [kg]	28		
Holding brake			
Holding torque of brake M_{Br} [Nm]	60		
Mass of brake [kg]	0		
Moment of inertia of brake J_{Br} [kgcm²]	14.7		
Recommendations			
ACOPOS 8Vxxxx.xx...	1180	1320	
ACOPOSmulti 8BVIxxxx...	0220	0330	
ACOPOS P3 8EIxxxx...	017X	024X	034X
Cross section for B&R motor cables [mm²]	1.5	4	
Connector size	1.0	1.5	

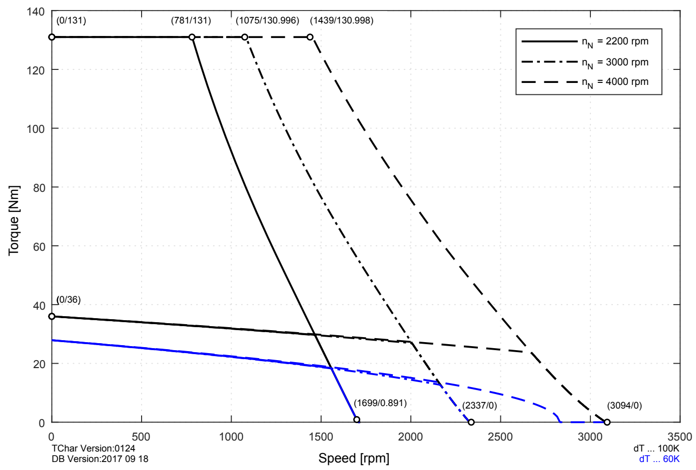
NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guideline; detailed inspection of the corresponding 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.

2.14.6.1 Speed-torque characteristic curves at 325 VDC DC bus voltage

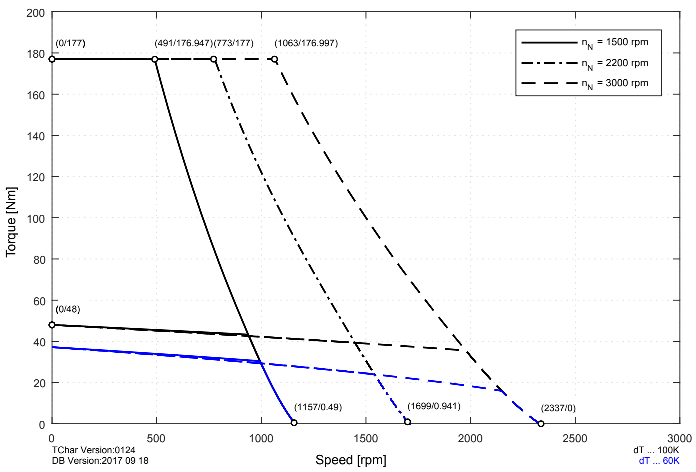
8LSA5A.eennnffgg-3



8LSA5B.eennnffgg-3

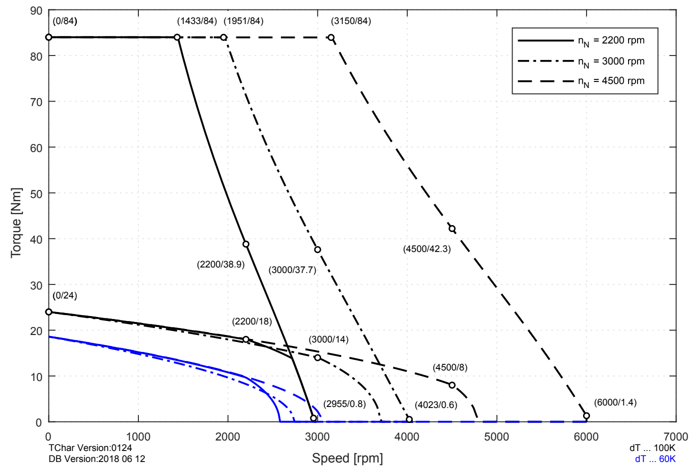


8LSA5C.eennnffgg-3

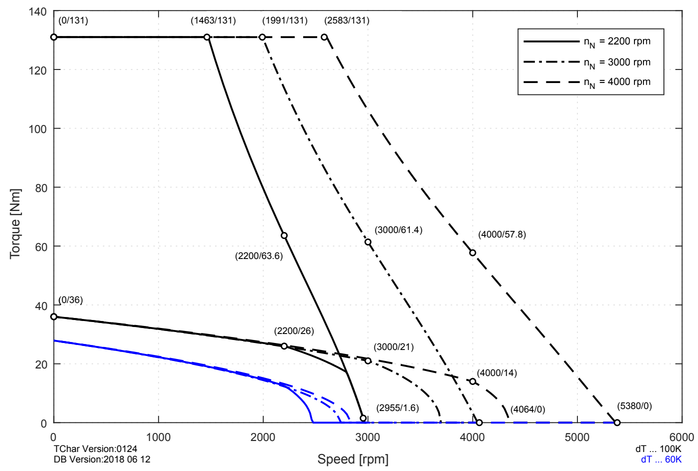


2.14.6.2 Speed-torque characteristic curves at 560 VDC DC bus voltage

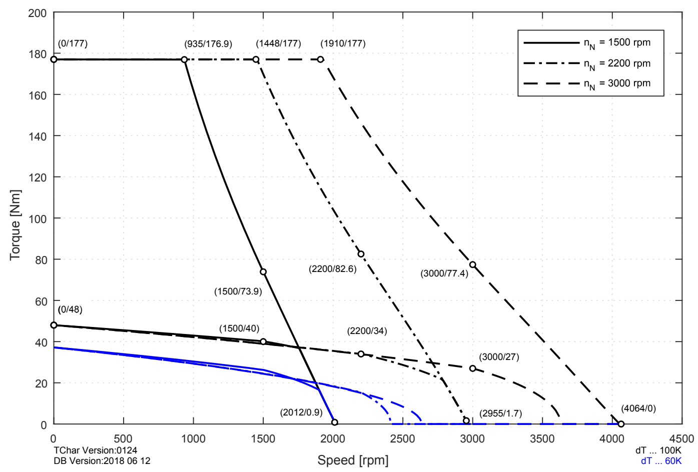
8LSA5A.eennnffgg-3



8LSA5B.eennnffgg-3

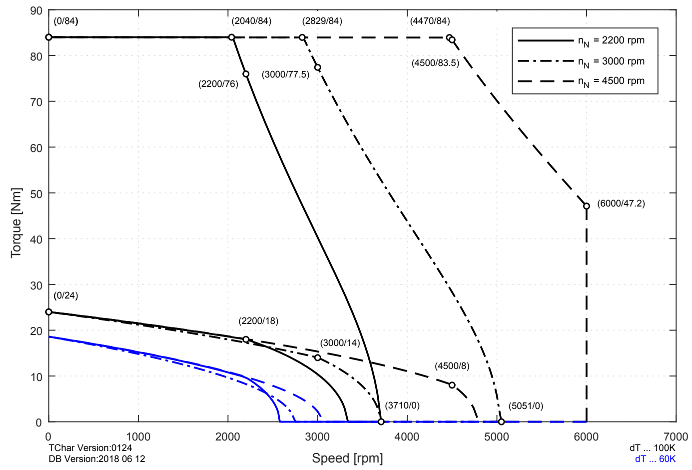


8LSA5C.eennnffgg-3

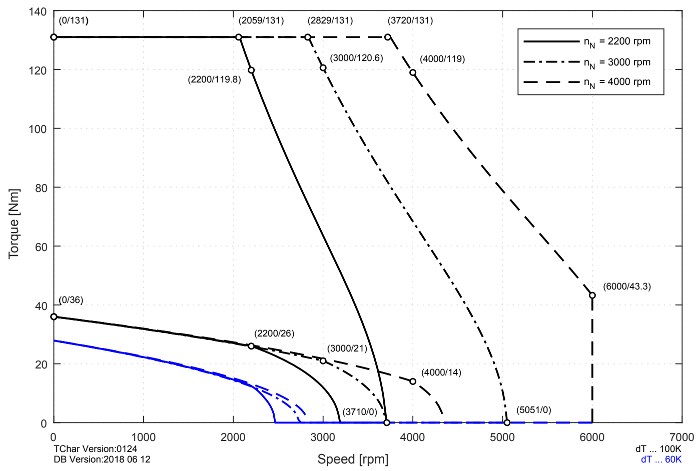


2.14.6.3 Speed-torque characteristic curves at 750 VDC DC bus voltage

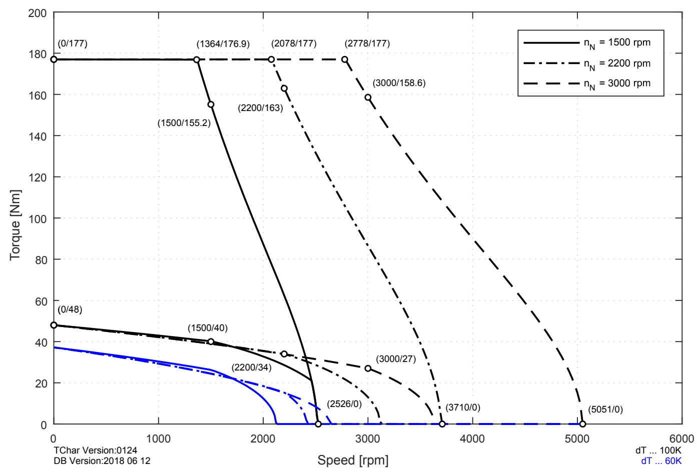
8LSA5A.eennnffgg-3



8LSA5B.eennnffgg-3



8LSA5C.eennnffgg-3

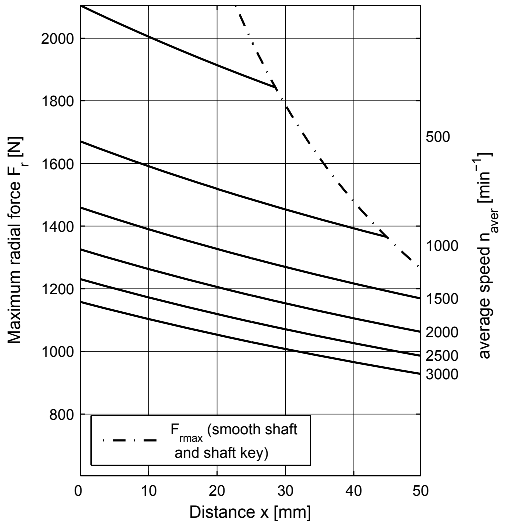


2.14.6.4 Maximum shaft load

Note the information in section "Load capacity of the shaft end and bearing" on page 273 of chapter "Installation conditions".

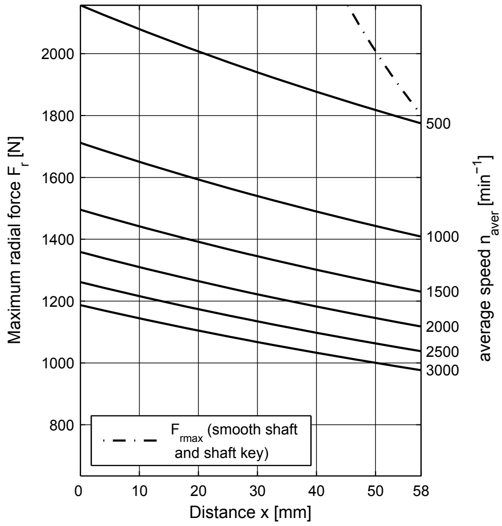
2.14.6.4.1 8LSA5A/B/C...-3 - Standard bearing

8LSA5A (standard bearing)



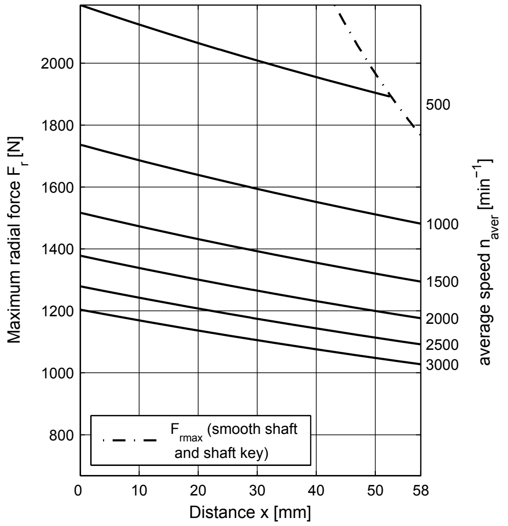
maximum allowed axial force: F_{amax} = 224 N

8LSA5B (standard bearing)



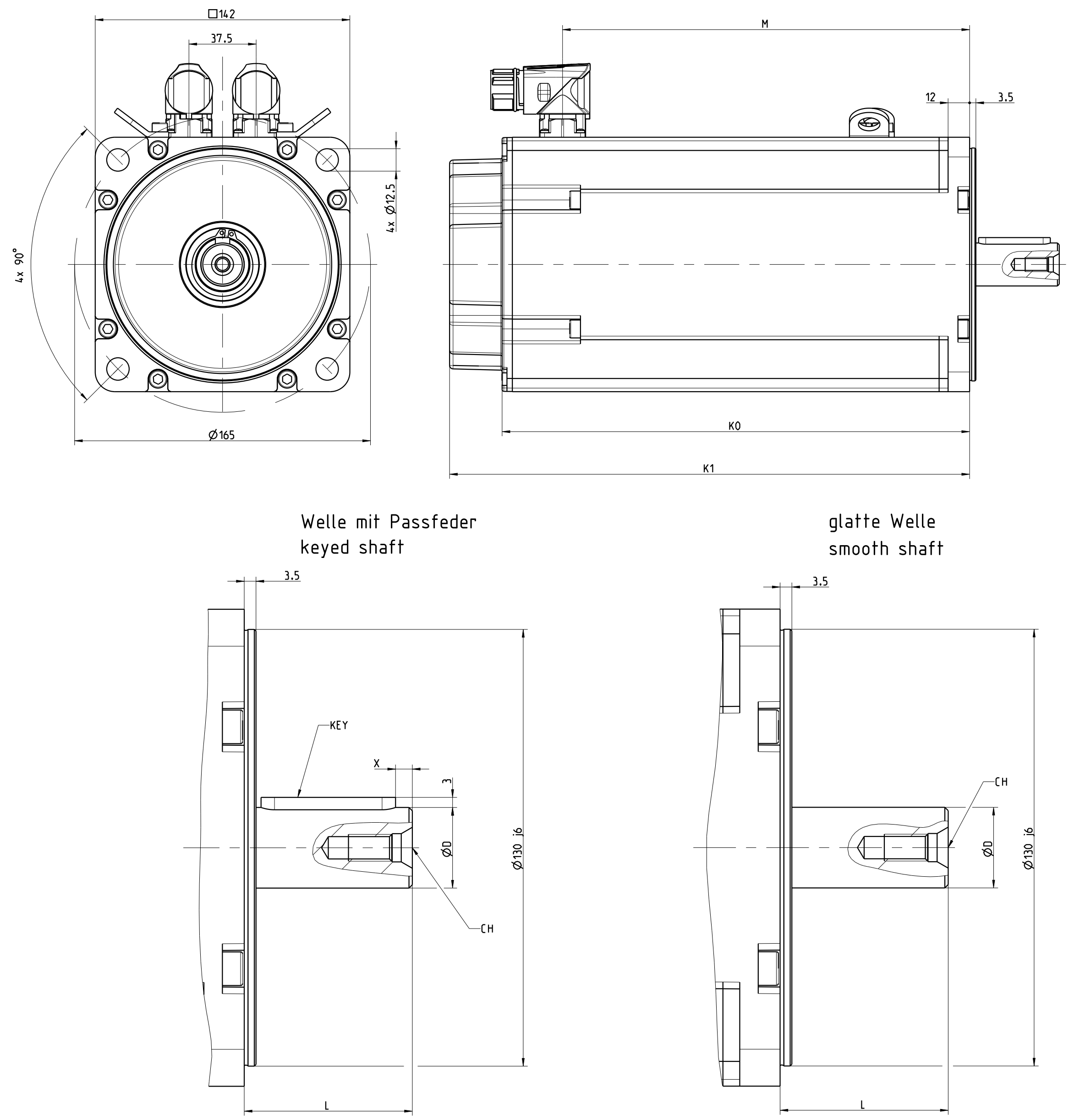
maximum allowed axial force: F_{amax} = 233 N

8LSA5C (standard bearing)



maximum allowed axial force: F_{amax} = 241 N

2.14.6.5 8LSA5A/B/C...-3 - Dimensions



Motor

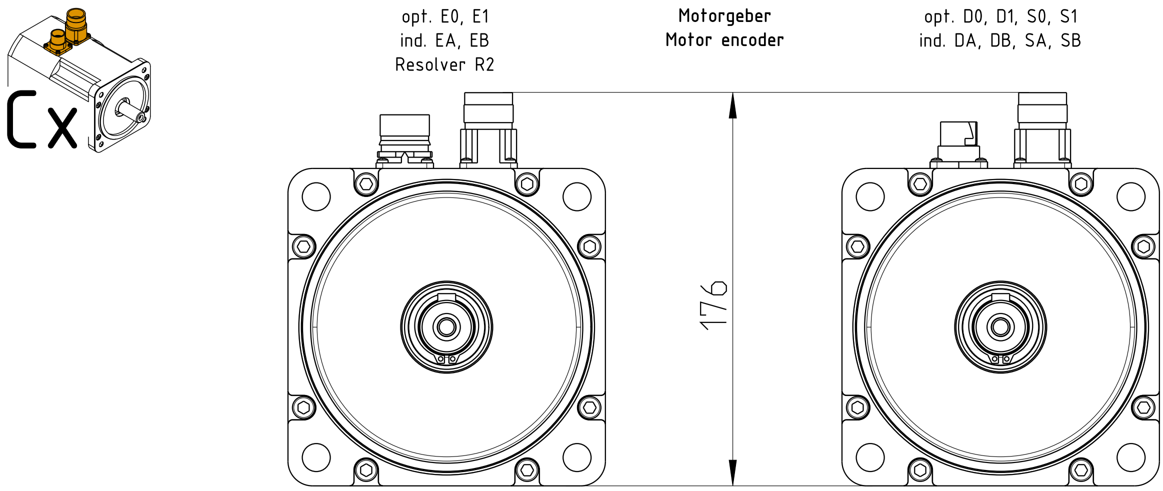
EnDat/Resolver feedback					Extension of K_0, K_1 and M depending on motor option [mm]		
	K_0	K_1	M		Holding brake	Increased brake	Reinforced bearing
Encoder assignments	R2, DA, DB, SA, SB	E0, E1, D0, D1, S0, S1	All encoders				
Connector size			1	1.5			
8LSA5A...-3	260	290	227	229.5	38	60	17
8LSA5B...-3	327.5	357.5	294.5	297	---	60	17
8LSA5C...-3	395	425	362	364.5	---	60	17

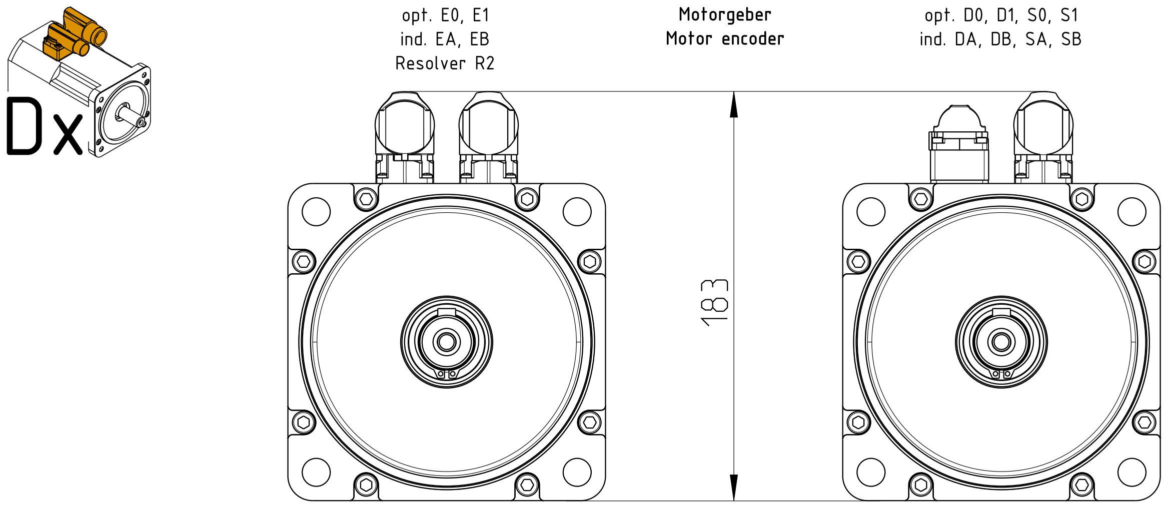
IMPORTANT: Dimensions K_0 and K_1 depend on the length of the encoder cover.

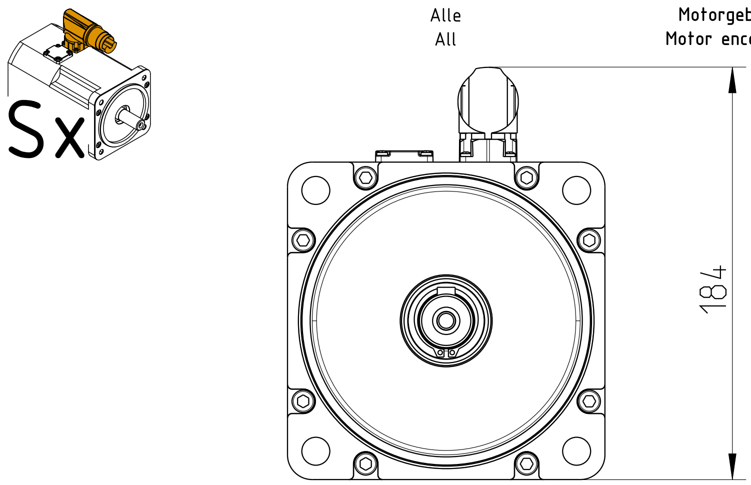
Shaft end

		D	L	KEY	CH	X
8LSA5A...-3	Without special motor option Reinforced bearing	24 k6 38 k6	50 80	DIN 6885 A8x7x40 DIN 6885 A10x8x70	M8 DIN 332-D M12 DIN 332-D	5 5
8LSA5B...-3	Without special motor option Reinforced bearing	28 k6 38 k6	58 80	DIN 6885 A8x7x40 DIN 6885 A10x8x70	M10 DIN 332-D M12 DIN 332-D	9 5
8LSA5C...-3	Without special motor option Reinforced bearing	28 k6 38 k6	58 80	DIN 6885 A8x7x40 DIN 6885 A10x8x70	M10 DIN 332-D M12 DIN 332-D	9 5

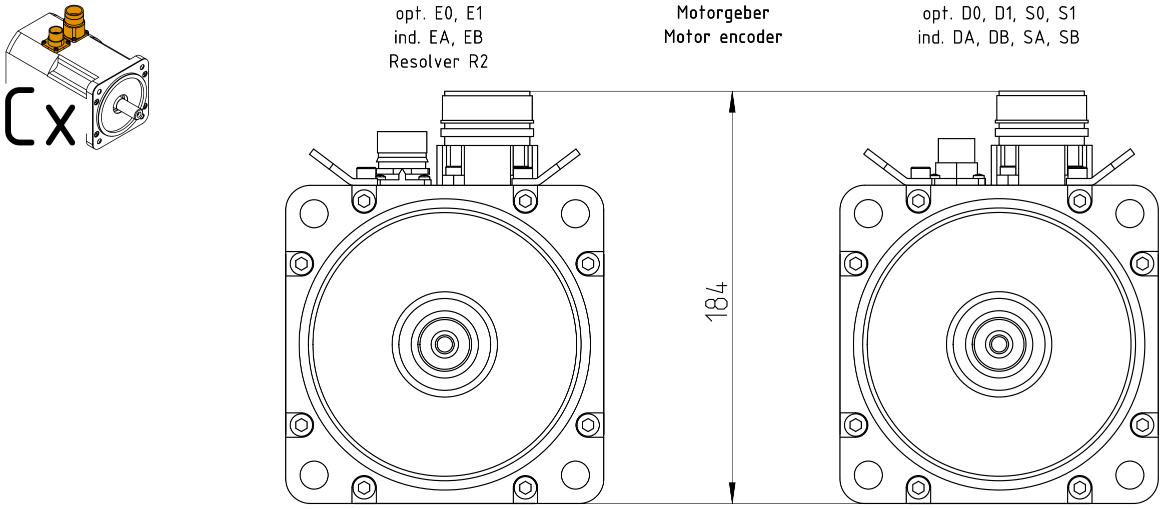
2.14.6.6 8LSA5A/B/C...-3 (connector size 1) - Connection dimensions

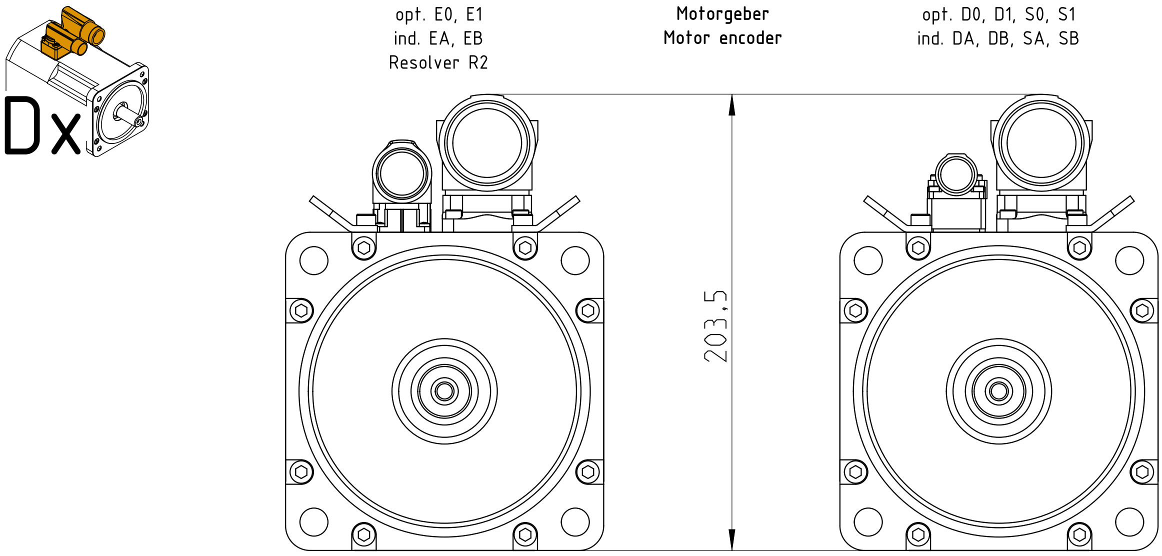






2.14.6.7 8LSA5A/B/C...-3 (connector size 1.5) - Connection dimensions





2.14.7 8LSA6...-3 - Technical data

Model number	8LSA63.ee022ffgg-3	8LSA63.ee030ffgg-3	8LSA63.ee045ffgg-3	8LSA64.ee022ffgg-3
Motor				
Nominal speed n_N [rpm]	2200	3000	4500	2200
Number of pole pairs	4			
Nominal torque M_n [Nm]	11.8	11.6	9.5	18
Nominal power P_N [W]	2719	3644	4477	4147
Nominal current I_N [A]	5.3	7.1	8.7	8.1
Stall torque M_0 [Nm]	12.5			20
Stall current I_0 [A]	5.6	7.7	11.5	9
Maximum torque M_{max} [Nm]	46.92			78.2
Maximum current I_{max} [A]	30.5	42.5	61	49.5
Maximum speed n_{max} [rpm]	9000			
Torque constant K_T [Nm/A]	2.22	1.63	1.09	2.22
Voltage constant K_E [V/1000 rpm]	134.04	98.44	65.97	134.04
Stator resistance R_{2ph} [Ω]	2.265	1.127	0.51	1.13
Stator inductance L_{2ph} [mH]	24.29	12.5	5	13.17
Electrical time constant t_{el} [ms]	10.7	11.1	9.7	11.7
Thermal time constant t_{therm} [min]	42			45
Moment of inertia J [kgcm²]	8.19			13.13
Weight without brake m [kg]	12.8			16.7
Holding brake				
Holding torque of brake M_{Br} [Nm]	32			
Mass of brake [kg]	1.5			
Moment of inertia of brake J_{Br} [kgcm²]	5.85			
Recommendations				
ACOPOS 8Vxxxx.xx...	1090		1180	
ACOPOSmulti 8BVIxxxx...	0055	0110		
ACOPOS P3 8EIxxxx...	8X8X		013X	
Cross section for B&R motor cables [mm²]	0.75			
Connector size	1.0			

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 guideline; 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.

Model number	8LSA64.ee030ffgg-3	8LSA64.ee045ffgg-3	8LSA65.ee022ffgg-3	8LSA65.ee030ffgg-3	8LSA65.ee045ffgg-3
Motor					
Nominal speed n_N [rpm]	3000	4500	2200	3000	4500
Number of pole pairs	4				
Nominal torque M_n [Nm]	17.5	15.1	22	21	12.2
Nominal power P_N [W]	5498	7116	5068	6597	5749
Nominal current I_N [A]	10.7	13.8	9.9	12.9	11.2
Stall torque M_0 [Nm]	20		24		
Stall current I_0 [A]	12.3	18.3	10.8	14.7	22
Maximum torque M_{max} [Nm]	78.2		97.92		
Maximum current I_{max} [A]	67.8	106.5	64.3	90.9	130.5
Maximum speed n_{max} [rpm]	9000				
Torque constant K_T [Nm/A]	1.63	1.09	2.22	1.63	1.09
Voltage constant K_E [V/1000 rpm]	98.44	65.97	134.04	98.44	65.97
Stator resistance R_{2ph} [Ω]	0.62	0.285	0.94	0.484	0.2
Stator inductance L_{2ph} [mH]	7.21	3.21	10.9	6	2.48
Electrical time constant t_{el} [ms]	11.6	11.03	11.6	12.4	
Thermal time constant t_{therm} [min]	45		48		
Moment of inertia J [kgcm²]	13.13		15.6		
Weight without brake m [kg]	16.7		18.1		
Holding brake					
Holding torque of brake M_{Br} [Nm]	32				
Mass of brake [kg]	1.5				
Moment of inertia of brake J_{Br} [kgcm²]	5.85				
Recommendations					
ACOPOS 8Vxxxx.xx...	1180	1320	1180		1320
ACOPOSmulti 8BVIxxxx...	0110	0220	0110	0220	0330
ACOPOS P3 8EIxxxx...	017X	024X	013X	017X	034X
Cross section for B&R motor cables [mm²]	1.5	4	0.75	1.5	4
Connector size	1.0				

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 guideline; 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.

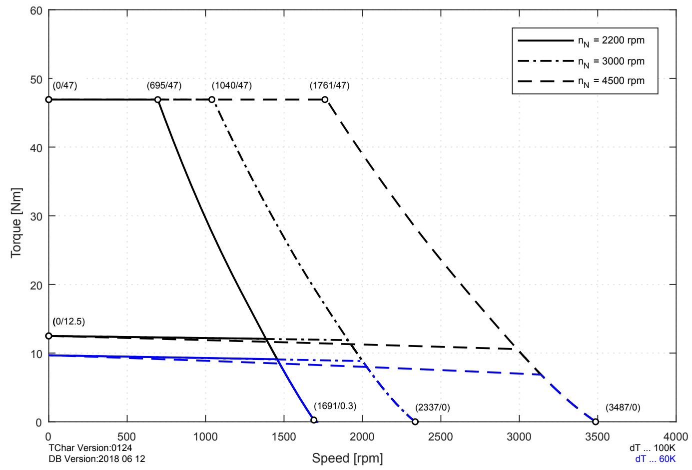
Model number	8LSA66.ee022ffgg-3	8LSA66.ee030ffgg-3	8LSA66.ee045ffgg-3
Motor			
Nominal speed n_N [rpm]	2200	3000	4500
Number of pole pairs	4		
Nominal torque M_n [Nm]	24.5	23.5	15
Nominal power P_N [W]	5644	7383	7069
Nominal current I_N [A]	11.1	14.4	13.7
Stall torque M_0 [Nm]	28		
Stall current I_0 [A]	12.6	17.2	25.7
Maximum torque M_{max} [Nm]	114.24		
Maximum current I_{max} [A]	74.4	103.5	152.6
Maximum speed n_{max} [rpm]	9000		
Torque constant K_T [Nm/A]	2.22	1.63	1.09
Voltage constant K_E [V/1000 rpm]	134.04	98.44	65.97
Stator resistance R_{2ph} [Ω]	0.72	0.382	0.19
Stator inductance L_{2ph} [mH]	10.4	4.87	2.1
Electrical time constant t_{el} [ms]	14.4	12.7	11.1
Thermal time constant t_{therm} [min]	52		
Moment of inertia J [kgcm²]	18.06		
Weight without brake m [kg]	20.6		
Holding brake			
Holding torque of brake M_{Br} [Nm]	32		
Mass of brake [kg]	1.5		
Moment of inertia of brake J_{Br} [kgcm²]	5.85		
Recommendations			
ACOPOS 8Vxxxx.xx...	1180		1320
ACOPOSmulti 8BVIxxxx...	0110	0220	0330
ACOPOS P3 8EIxxxx...	017X	024X	034X
Cross section for B&R motor cables [mm²]	1.5		4
Connector size	1.0		1.5

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 guideline; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).

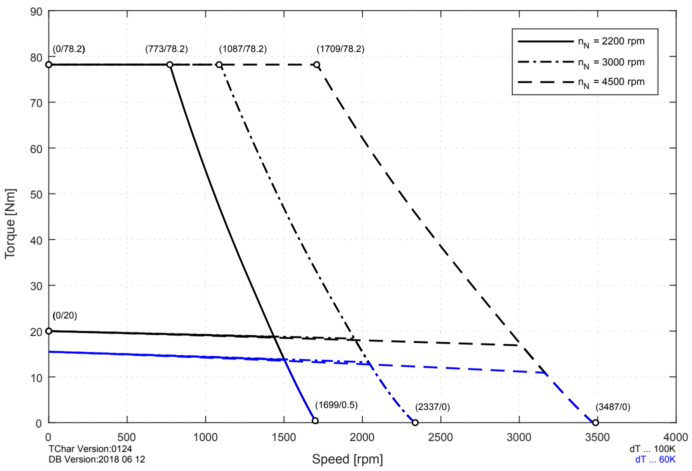
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

2.14.7.1 Speed-torque characteristic curves at 325 VDC DC bus voltage

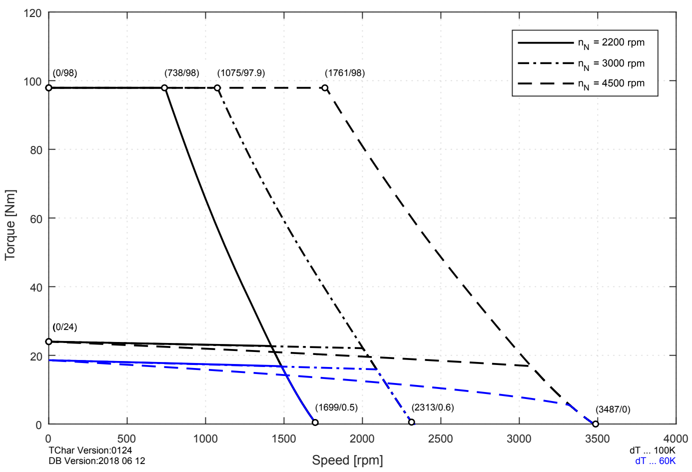
8LSA63.eennnffgg-3



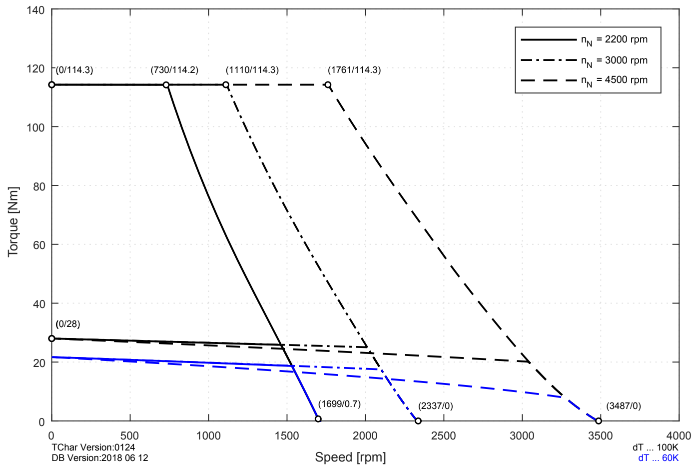
8LSA64.eennnffgg-3



8LSA65.eennnffgg-3

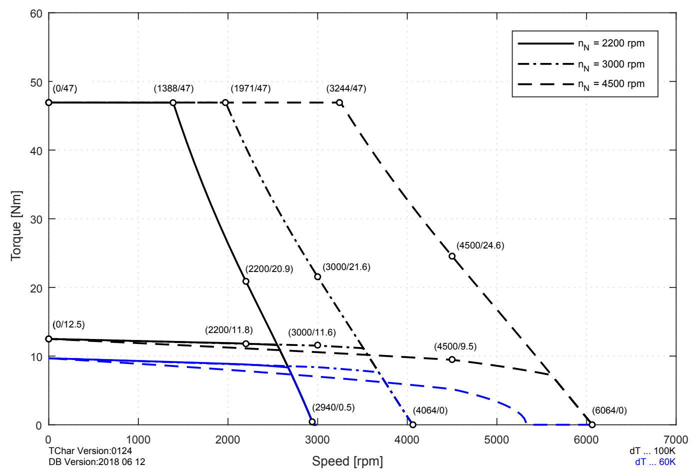


8LSA66.eennnffgg-3

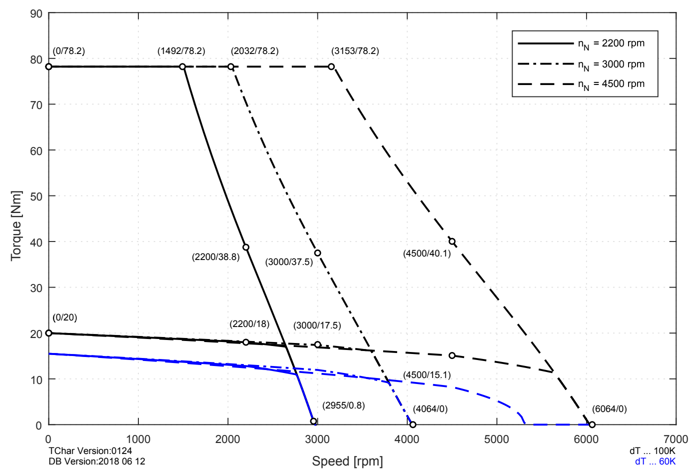


2.14.7.2 Speed-torque characteristic curves at 560 VDC DC bus voltage

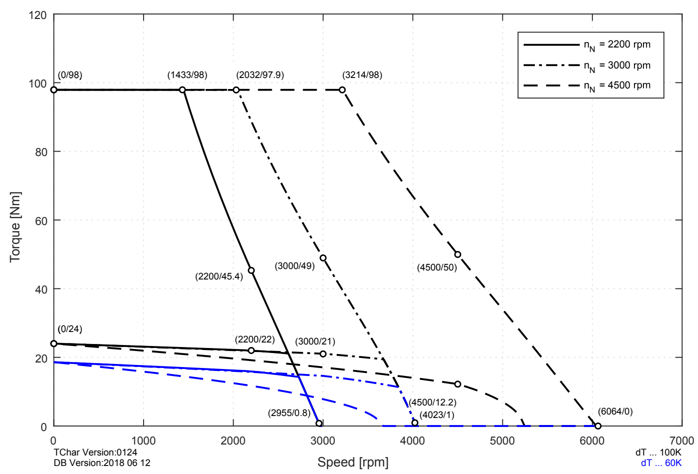
8LSA63.eennnffgg-3



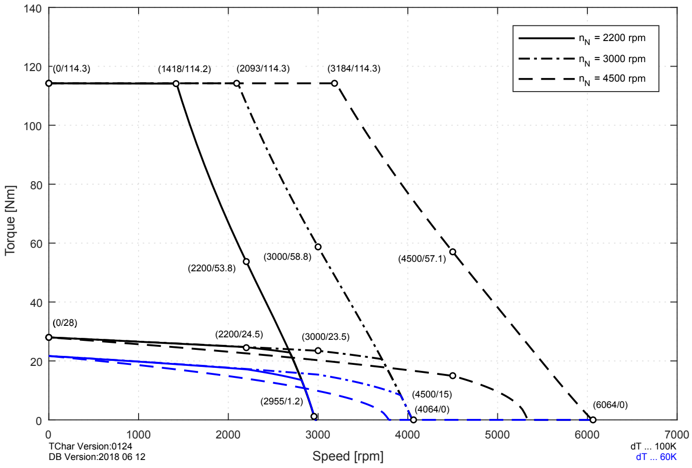
8LSA64.eennnffgg-3



8LSA65.eennnffgg-3

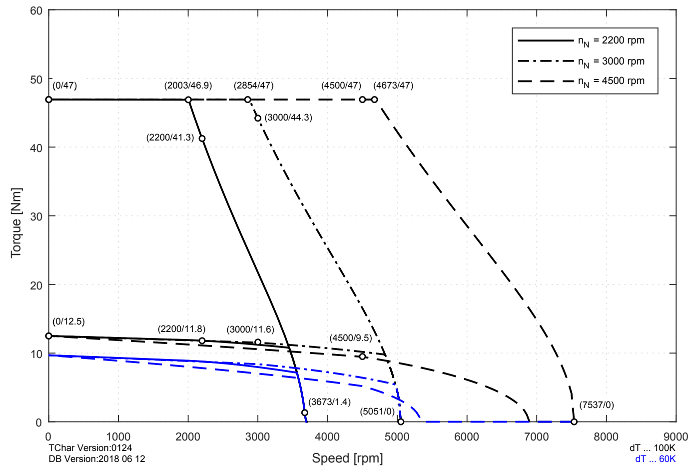


8LSA66.eennnffgg-3

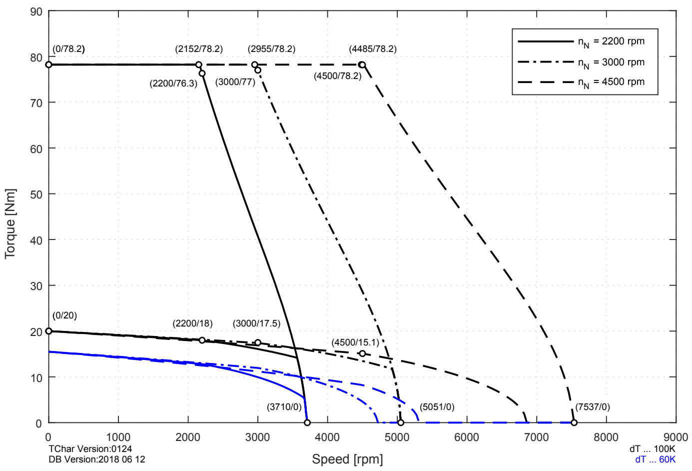


2.14.7.3 Speed-torque characteristic curves at 750 VDC DC bus voltage

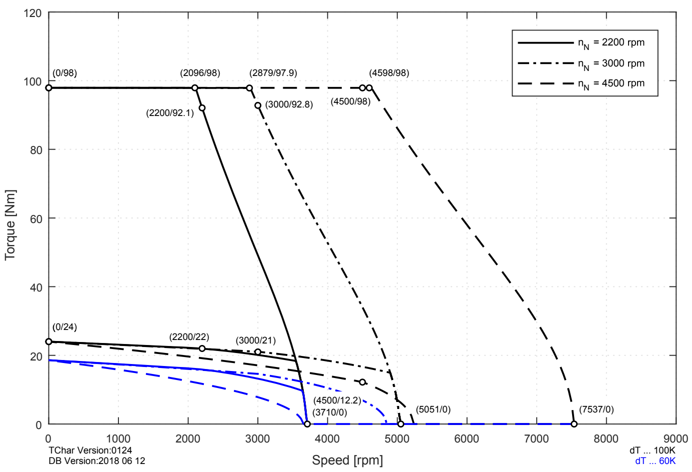
8LSA63.eennnffgg-3



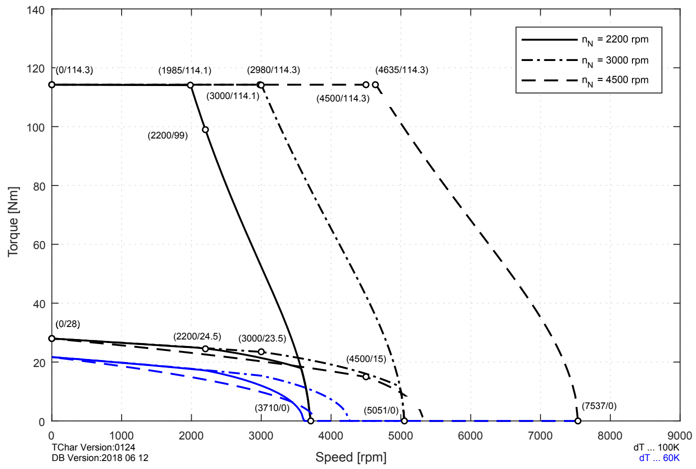
8LSA64.eennnffgg-3



8LSA65.eennnffgg-3



8LSA66.eennnffgg-3



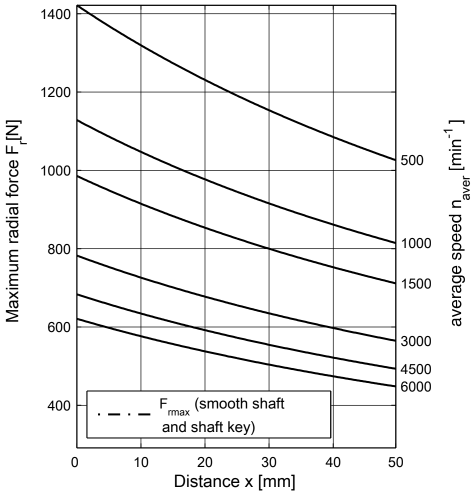
2.14.7.4 Maximum shaft load

Note the information in section "Load capacity of the shaft end and bearing" on page 273 of chapter "Installation conditions".

2.14.7.4.1 8LSA6...-3 / 8LSC6...-3 - Standard bearing

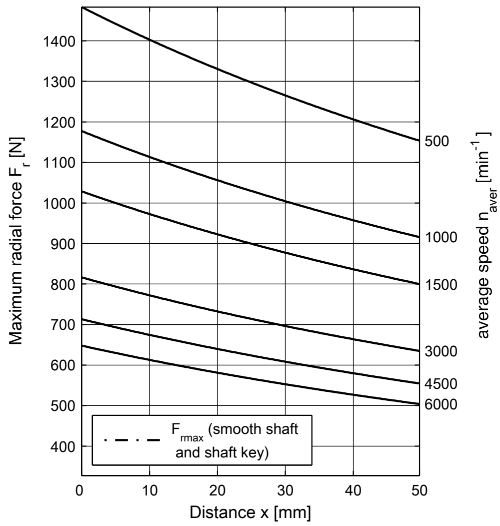
Shaft load values apply to both 8LSA and 8LSC!

8LSA63 (standard bearing)



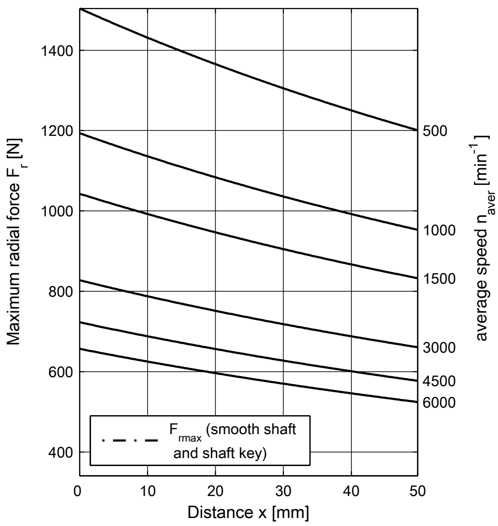
maximum allowed axial force: F_{amax} = 125 N

8LSA64 (standard bearing)



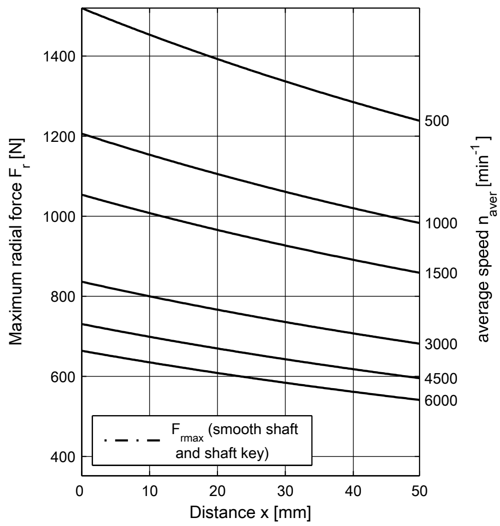
maximum allowed axial force: F_{amax} = 136 N

8LSA65 (standard bearing)



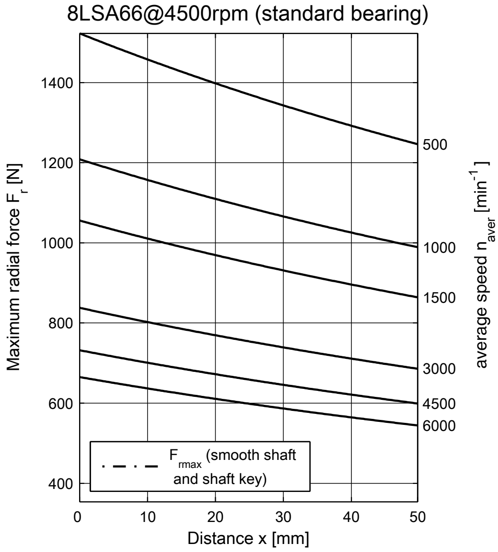
maximum allowed axial force: F_{amax} = 140 N

8LSA66 (standard bearing)



maximum allowed axial force: F_{amax} = 143 N

8LSA66@4500rpm (standard bearing)

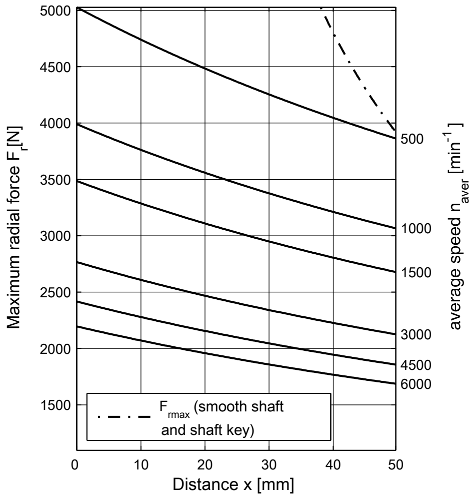


maximum allowed axial force: F_{amax} = 143 N

2.14.7.4.2 8LSA6...-3 / 8LSC6...-3 - Reinforced bearing

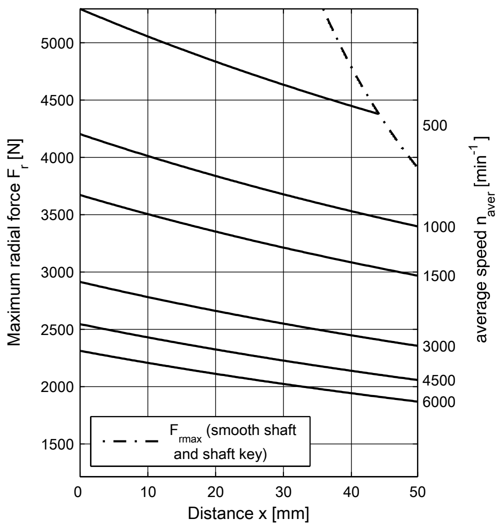
Shaft load values apply to both 8LSA and 8LSC!

8LSA63 (special option "reinforced A side bearing")



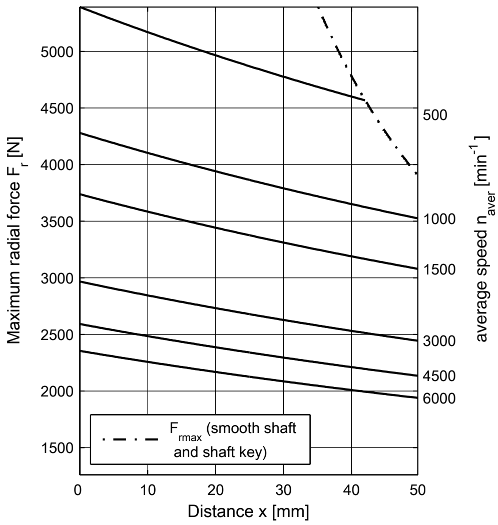
maximum allowed axial force: F_{amax} = 457 N

8LSA64 (special option "reinforced A side bearing")



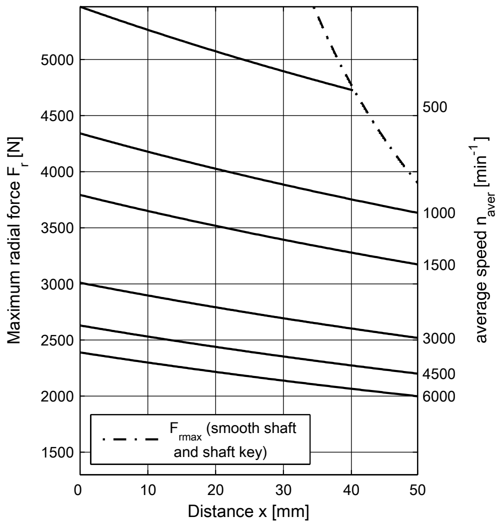
maximum allowed axial force: F_{amax} = 495 N

8LSA65 (special option "reinforced A side bearing")



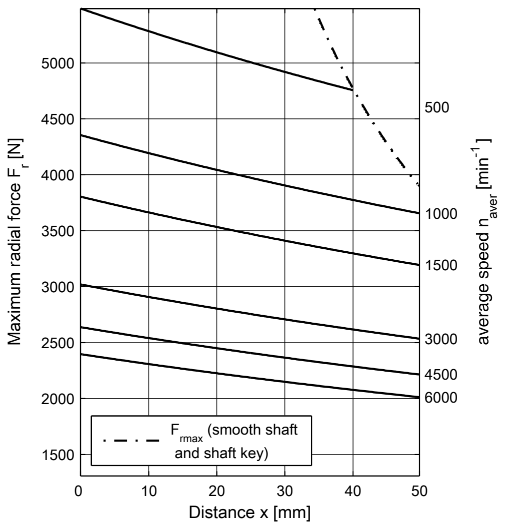
maximum allowed axial force: F_{amax} = 510 N

8LSA66 (special option "reinforced A side bearing")



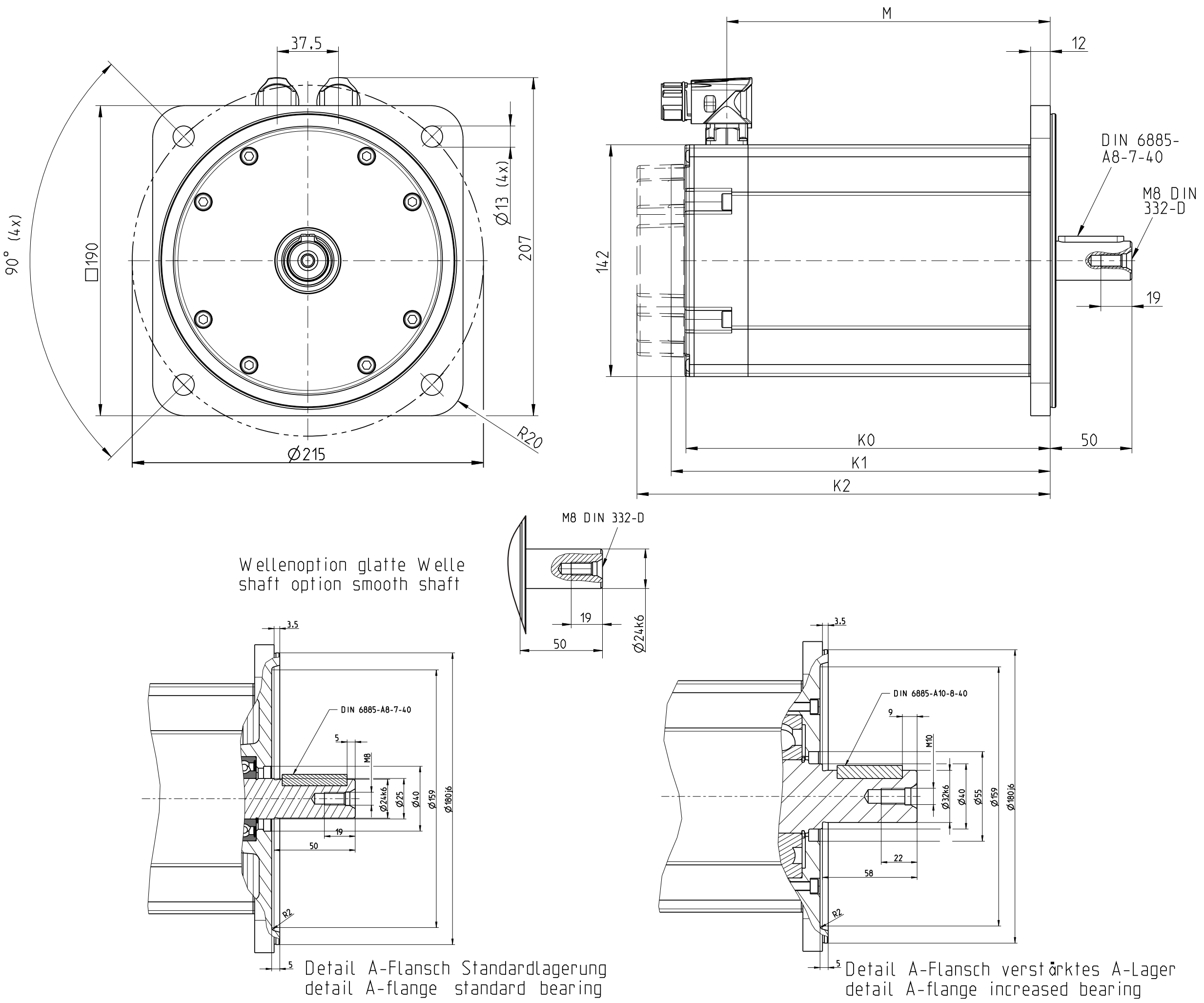
maximum allowed axial force: F_{amax} = 521 N

A66@4500rpm (special option "reinforced A side bearing")



maximum allowed axial force: F_{amax} = 524 N

2.14.7.5 8LSA6...-3 - Dimensions

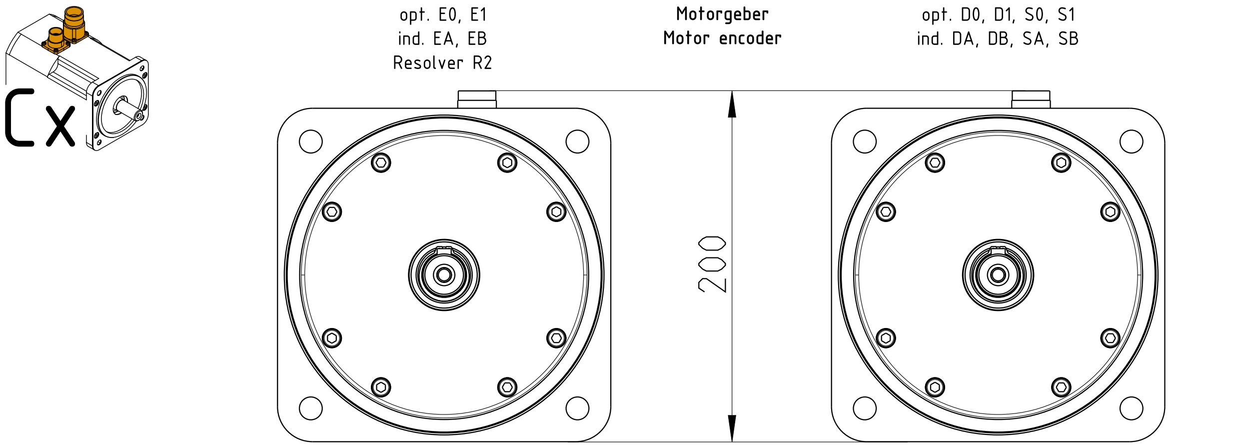


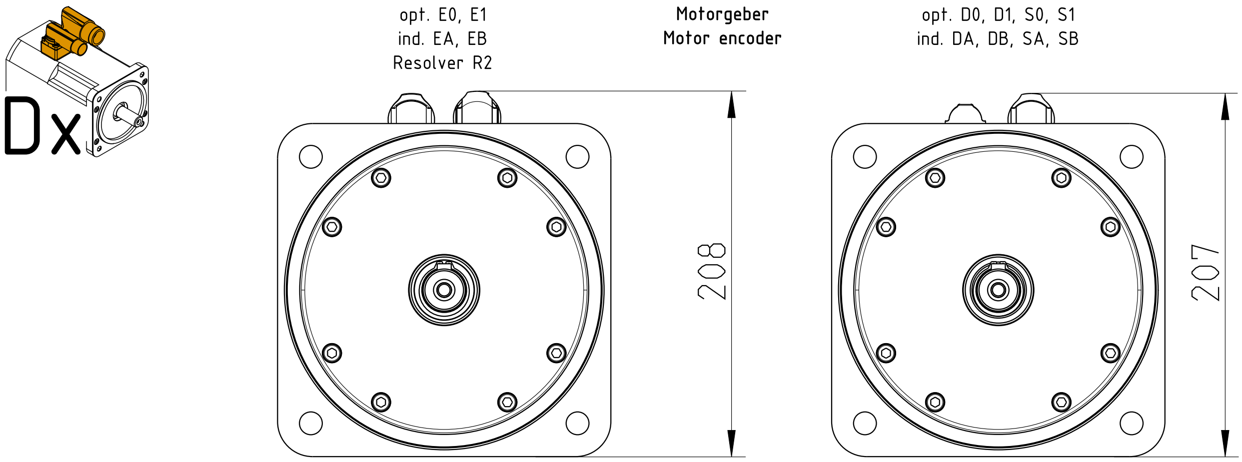
EnDat/Resolver feedback					Extension of K_0, K_1, K_2 and M depending on the motor option [mm]		
Encoder assignments	**DA,D-B,SA,SB,R2**	**EA,EB**	**D0,D1,E0,E1,S0,S1**				
Model number	**K_0**	**K_1**	**K_2**	**M**	**Holding brake**	**Heavy-duty holding brake**	**Reinforced A-side bearing**
8LSA63.eennnffgg-3	178	189	208	153	60	70	28
8LSA64.eennnffgg-3	223	234	253	198	60	70	28
8LSA65.eennnffgg-3	246	257	276	221	60	70	28
8LSA66.eennnffgg-3	268	279	298	243	60	70	28
8LSA66.ee045ffgg-3, power connector size 1.5	283	294	313	250	60	70	28

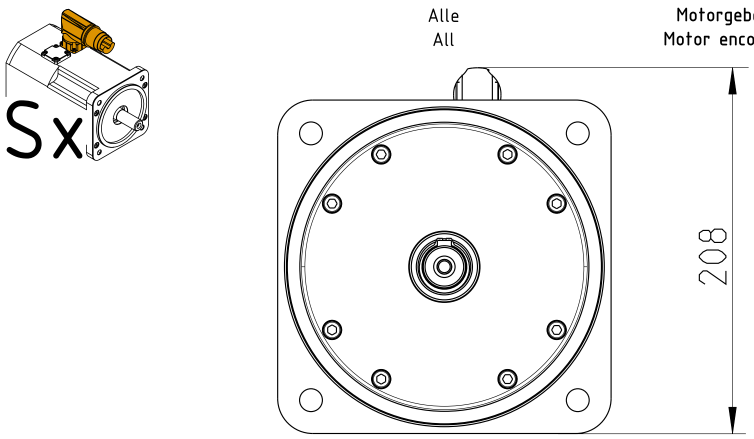
IMPORTANT: Motor option "oil seal" has no effect on the motor length.

2.14.7.6 8LSA6...-3 (connector size 1) - Connection dimensions

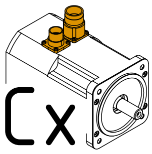
These dimensions are valid **up to 8LSA65...-3** or **up to 8LSA66...-3 with nominal speed 3000**.
Starting with **8LSA66...-3 with nominal speed 4500**, the dimensions of connector size 1.5 on page 135 apply.

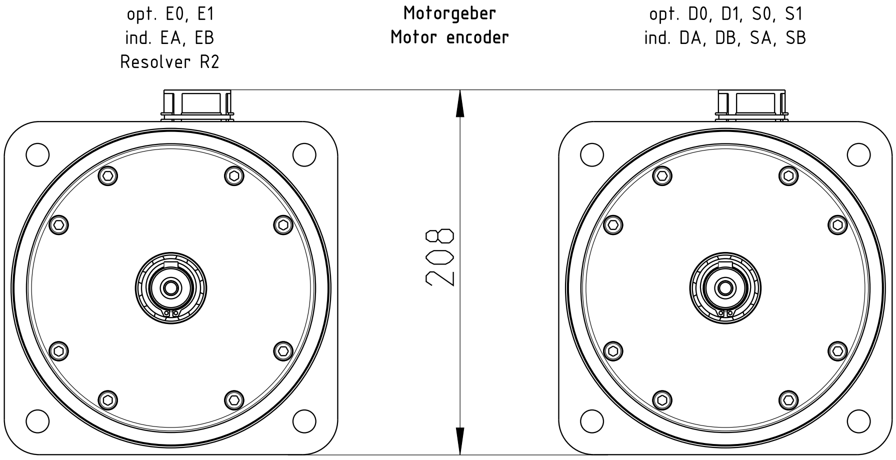


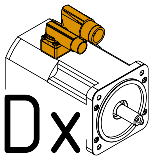


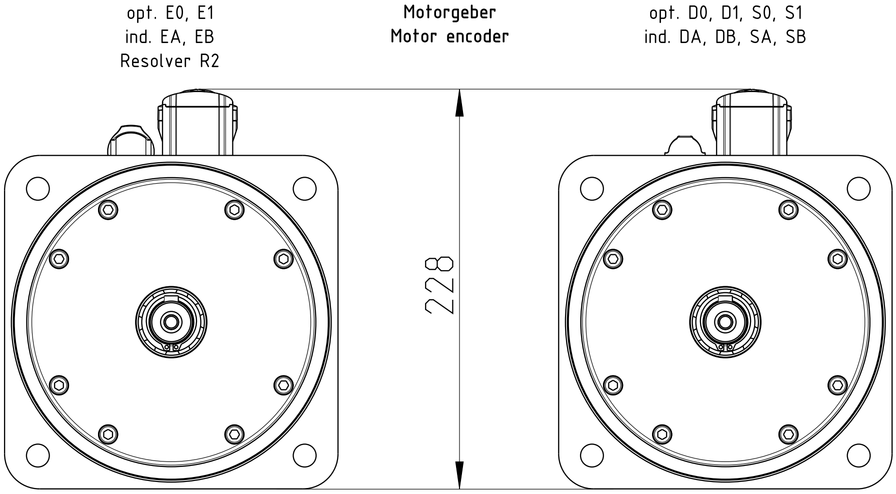


2.14.7.7 8LSA6...-3 (connector size 1.5) - Connection dimensions









2.14.8 8LSA7...-3 - Technical data

Model number	8LSA73.ee022ffgg-3	8LSA73.ee030ffgg-3	8LSA73.ee045ffgg-3
Motor			
Nominal speed n_N [rpm]	2200	3000	4500
Number of pole pairs		5	
Nominal torque M_n [Nm]	21.9	20.5	16
Nominal power P_N [W]	5045	6440	7540
Nominal current I_N [A]	9.86	12.58	14.68
Stall torque M_0 [Nm]		26	
Stall current I_0 [A]	11.71	15.95	23.85
Maximum torque M_{max} [Nm]		107	
Maximum current I_{max} [A]	71	96.54	144
Maximum speed n_{max} [rpm]		6000	
Torque constant K_T [Nm/A]	2.22	1.63	1.09
Voltage constant K_E [V/1000 rpm]	134.04	98.44	65.97
Stator resistance R_{2ph} [Ω]	0.72	0.395	0.19
Stator inductance L_{2ph} [mH]	12.3	6.5	2.9
Electrical time constant t_{el} [ms]	17.08	15.48	15.26
Thermal time constant t_{therm} [min]		37	
Moment of inertia J [kgcm²]		46	
Weight without brake m [kg]		20	
Holding brake			
Holding torque of brake M_{Br} [Nm]		47	
Mass of brake [kg]		0	
Moment of inertia of brake J_{Br} [kgcm²]		32	
Recommendations			
ACOPOS 8Vxxxx.xx...	1180		1320
ACOPOSmulti 8BVIxxxx...	0110	0220	0330
ACOPOS P3 8EIxxxx...	013X	024X	034X
Cross section for B&R motor cables [mm²]	1.5		4
Connector size	1.0		1.5

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 guideline; 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.

Model number	8LSA74.ee022ffgg-3	8LSA74.ee030ffgg-3	8LSA74.ee045ffgg-3
Motor			
Nominal speed n_N [rpm]	2200	3000	4500
Number of pole pairs	5		
Nominal torque M_n [Nm]	27.5	25	18
Nominal power P_N [W]	6336	7854	8482
Nominal current I_N [A]	12.39	15.34	16.51
Stall torque M_0 [Nm]	33		
Stall current I_0 [A]	14.86	20.25	30
Maximum torque M_{max} [Nm]	150		
Maximum current I_{max} [A]	99	135.33	202
Maximum speed n_{max} [rpm]	6000		
Torque constant K_T [Nm/A]	2.22	1.63	1.09
Voltage constant K_E [V/1000 rpm]	134.04	98.44	65.97
Stator resistance R_{2ph} [Ω]	0.51	0.28	0.13
Stator inductance L_{2ph} [mH]	9	4.9	2.2
Electrical time constant t_{el} [ms]	16.67	17.5	16.92
Thermal time constant t_{therm} [min]	41		
Moment of inertia J [kgcm²]	60		
Weight without brake m [kg]	24		
Holding brake			
Holding torque of brake M_{Br} [Nm]	47		
Mass of brake [kg]	0		
Moment of inertia of brake J_{Br} [kgcm²]	32		
Recommendations			
ACOPOS 8Vxxxx.xx...	1180	1320	
ACOPOSmulti 8BVIxxxx...	0220	0330	
ACOPOS P3 8EIxxxx...	017X	024X	034X
Cross section for B&R motor cables [mm²]	1.5	4	
Connector size	1.0		1.5

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 guideline; 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.

Model number	8LSA75.ee022ffgg-3	8LSA75.ee030ffgg-3
Motor		
Nominal speed n_N [rpm]	2200	3000
Number of pole pairs	5	
Nominal torque M_n [Nm]	34	30
Nominal power P_N [W]	7833	9425
Nominal current I_N [A]	15.32	18.4
Stall torque M_0 [Nm]	43	
Stall current I_0 [A]	19.37	26.38
Maximum torque M_{max} [Nm]	187	
Maximum current I_{max} [A]	124	169
Maximum speed n_{max} [rpm]	4500	
Torque constant K_T [Nm/A]	2.22	1.63
Voltage constant K_E [V/1000 rpm]	134.04	98.44
Stator resistance R_{2ph} [Ω]	0.39	0.21
Stator inductance L_{2ph} [mH]	7.1	3.9
Electrical time constant t_{el} [ms]	17.5	18.57
Thermal time constant t_{therm} [min]	46	
Moment of inertia J [$kgcm^2$]	74	
Weight without brake m [kg]	28	
Holding brake		
Holding torque of brake M_{Br} [Nm]	47	
Mass of brake [kg]	0	
Moment of inertia of brake J_{Br} [$kgcm^2$]	32	
Recommendations		
ACOPOS 8Vxxxx.xx...	1320	
ACOPOSmulti 8BVIxxxx...	0220	0330
ACOPOS P3 8EIxxxx...	024X	034X
Cross section for B&R motor cables [mm^2]	4	
Connector size	1.0	

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 guideline; 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.

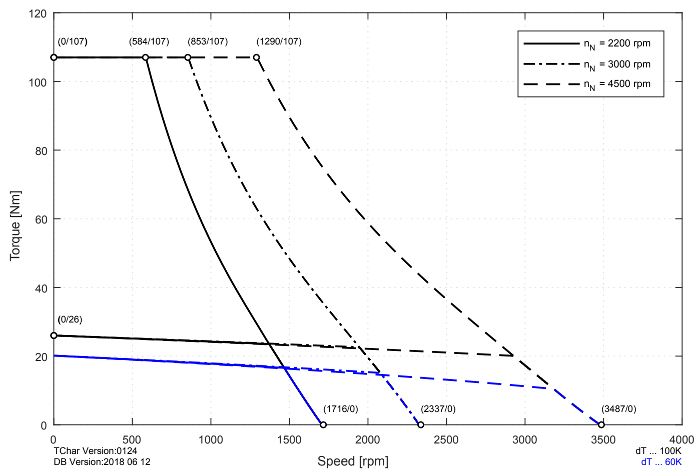
Model number	8LSA76.ee015ffgg-3	8LSA76.ee022ffgg-3	8LSA76.ee030ffgg-3	8LSA77.ee030ffgg-3	8LSA78.ee030ffgg-3
Motor					
Nominal speed n_N [rpm]	1500	2200	3000		
Number of pole pairs	5				
Nominal torque M_n [Nm]	48.5	42.5	35	40	44
Nominal power P_N [W]	7618	9791	10996	12566	13823
Nominal current I_N [A]	14.88	19.2	21.47	24.5	27
Stall torque M_0 [Nm]	60			73	85
Stall current I_0 [A]	18.4	27	36.81	44.8	52.1
Maximum torque M_{max} [Nm]	230			270	330
Maximum current I_{max} [A]	92.5	136	185	212	260
Maximum speed n_{max} [rpm]	4500				
Torque constant K_T [Nm/A]	3.26	2.22	1.63		
Voltage constant K_E [V/1000 rpm]	196.87	134.04	98.44		
Stator resistance R_{2ph} [Ω]	0.57	0.26	0.15	0.109	0.08
Stator inductance L_{2ph} [mH]	11.5	5.1	2.7	2.2	1.8
Electrical time constant t_{el} [ms]	17.85	19.6	18	18.2	22.5
Thermal time constant t_{therm} [min]	56			65	74
Moment of inertia J [kgcm²]	102			130	158
Weight without brake m [kg]	36			44	52
Holding brake					
Holding torque of brake M_{Br} [Nm]	47				
Mass of brake [kg]	0				
Moment of inertia of brake J_{Br} [kgcm²]	32				
Recommendations					
ACOPOS 8Vxxxx.xx...	1320		1640		
ACOPOSmulti 8BVIxxxx...	0220	0330	0440	0660	
ACOPOS P3 8EIxxxx...	024X	034X	044X	-	
Cross section for B&R motor cables [mm²]	4		10		
Connector size	1.5				1.5/16

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 guideline; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).

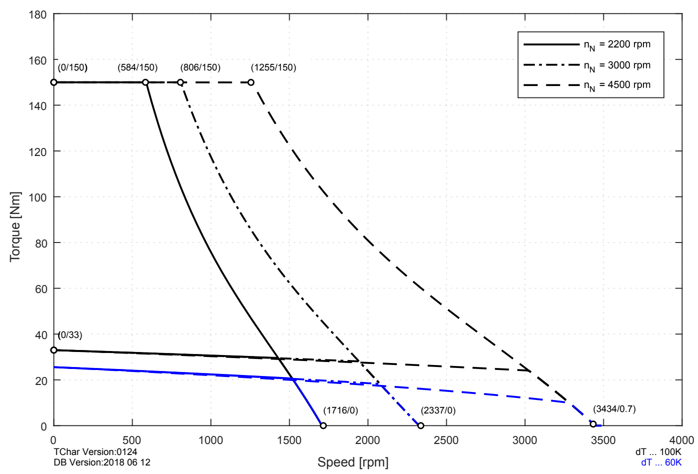
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

2.14.8.1 Speed-torque characteristic curves at 325 VDC DC bus voltage

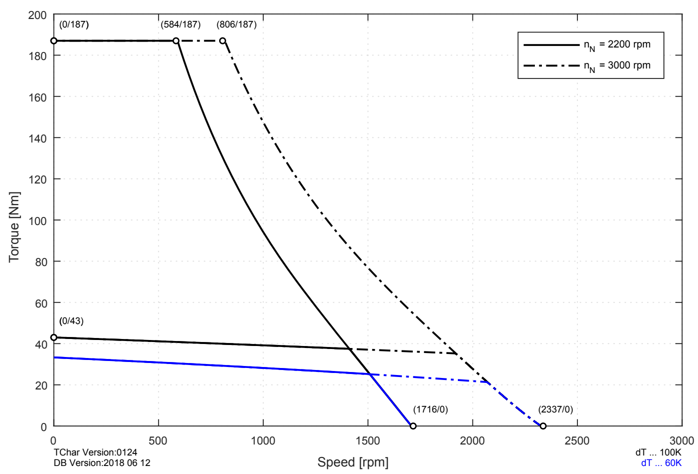
8LSA73.eennnffgg-3



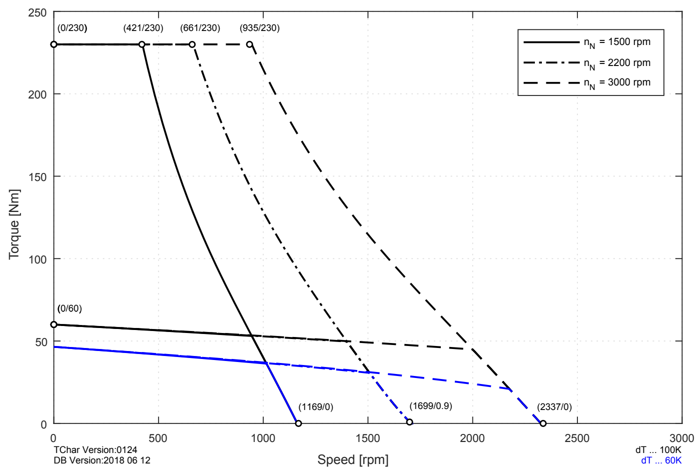
8LSA74.eennnffgg-3



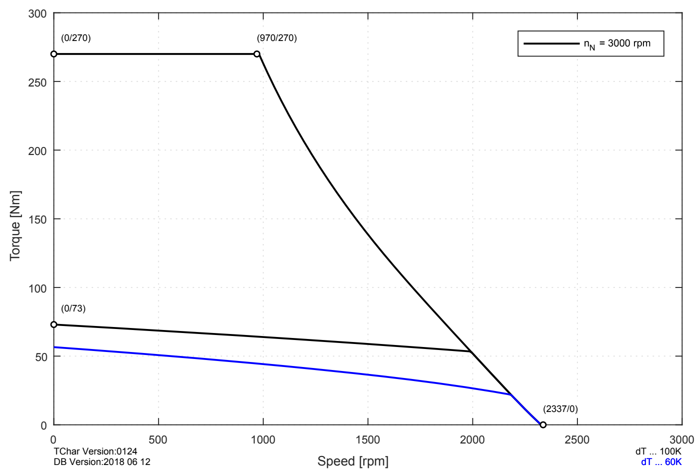
8LSA75.eennnffgg-3



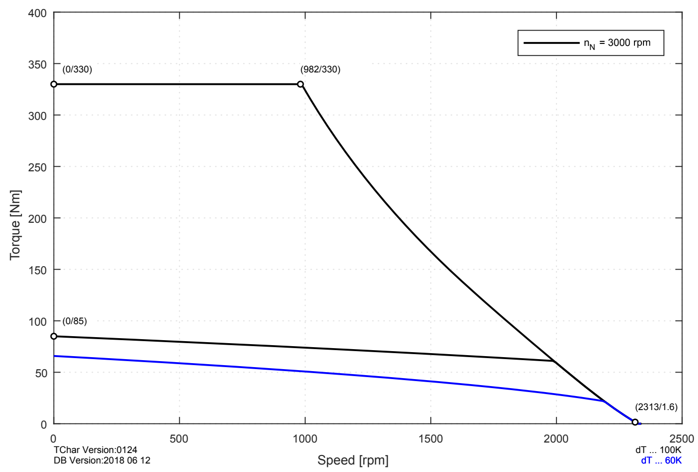
8LSA76.eennnffgg-3



8LSA77.eennnffgg-3

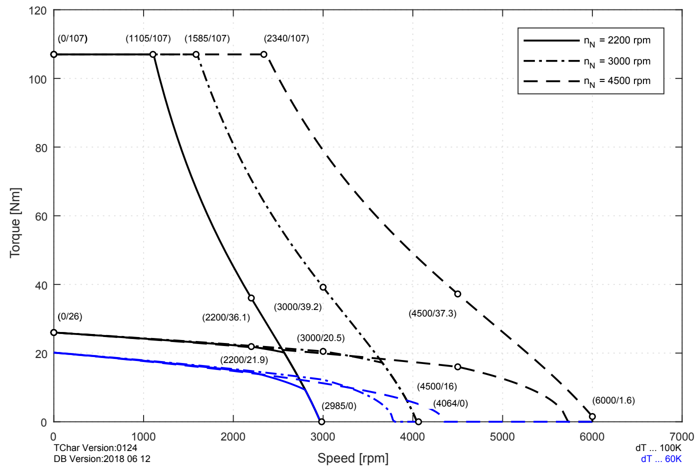


8LSA78.eennnffgg-3

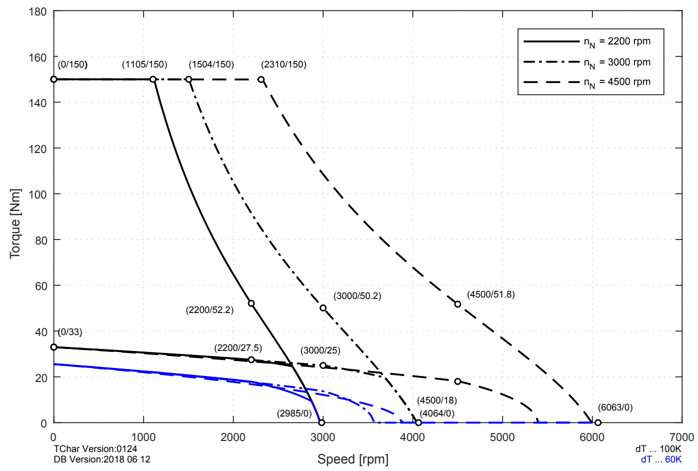


2.14.8.2 Speed-torque characteristic curves at 560 VDC DC bus voltage

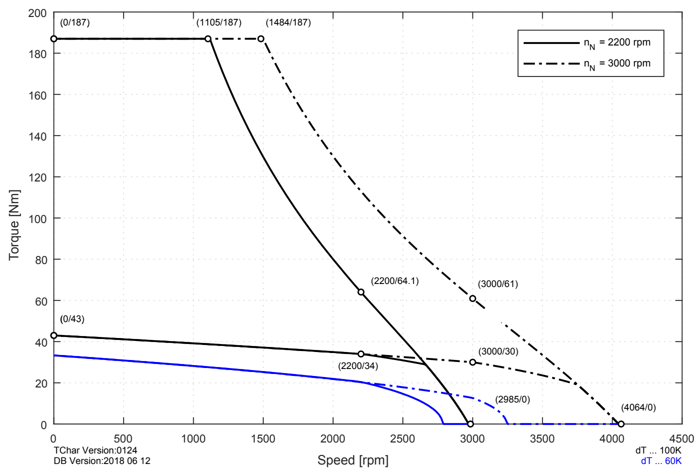
8LSA73.eennnffgg-3



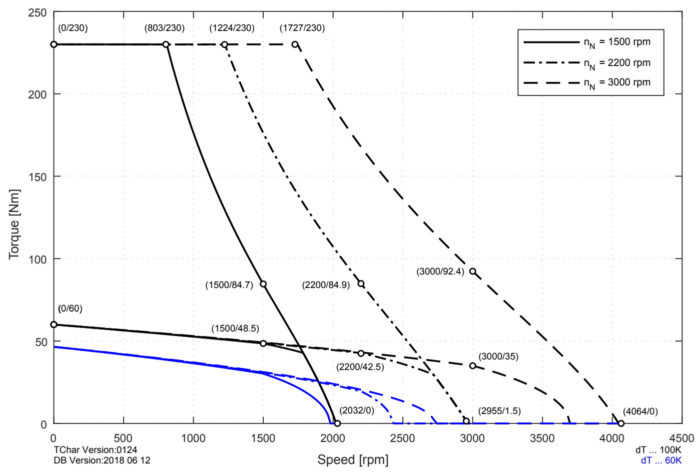
8LSA74.eennnffgg-3



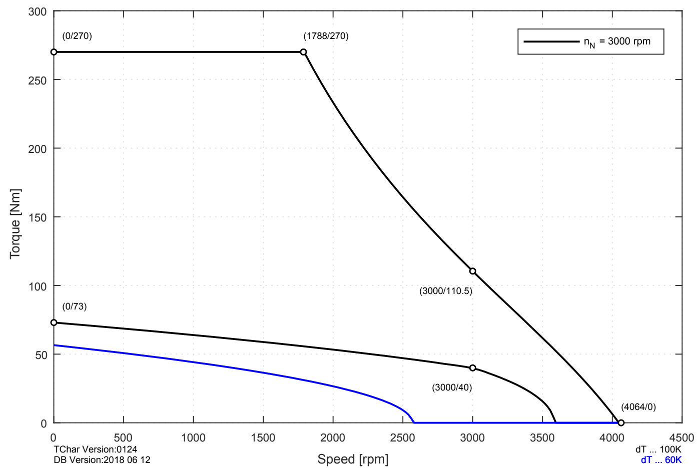
8LSA75.eennnffgg-3



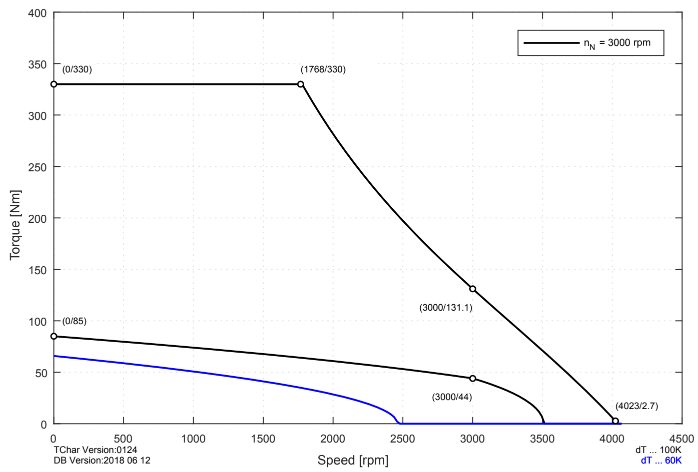
8LSA76.eennnffgg-3



8LSA77.eennnffgg-3

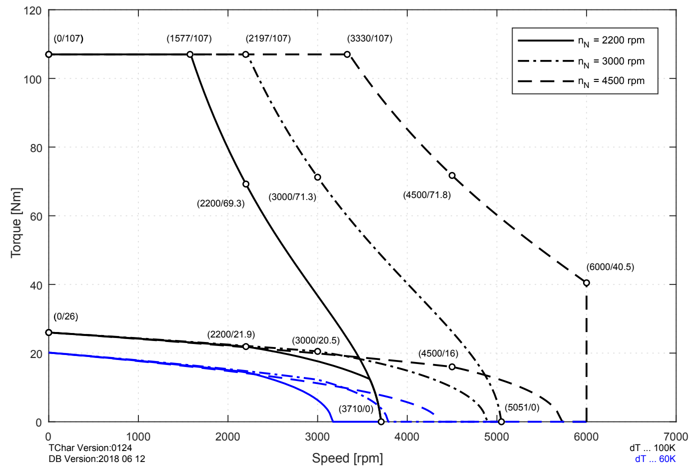


8LSA78.eennnffgg-3

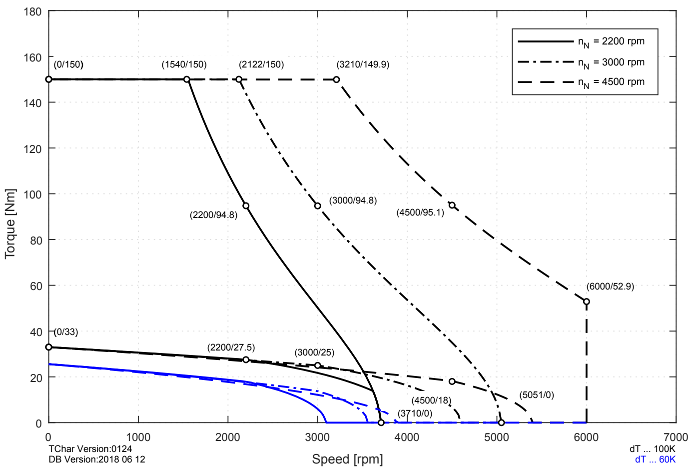


2.14.8.3 Speed-torque characteristic curves at 750 VDC DC bus voltage

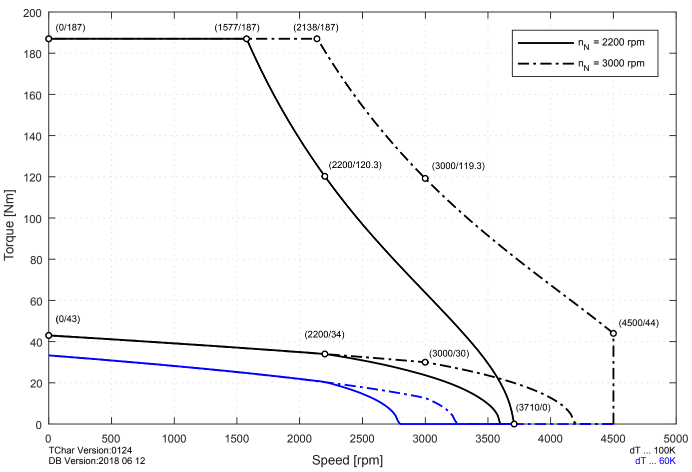
8LSA73.eennnffgg-3



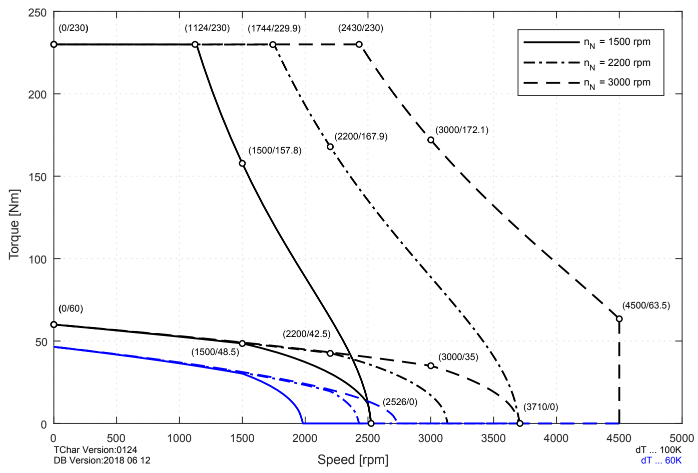
8LSA74.eennnffgg-3



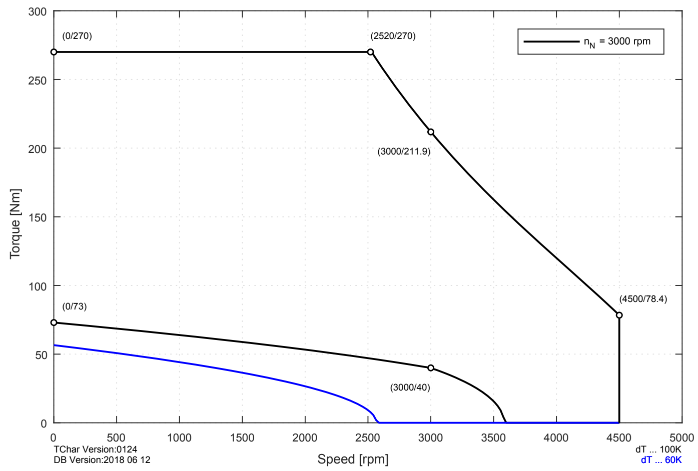
8LSA75.eennnffgg-3



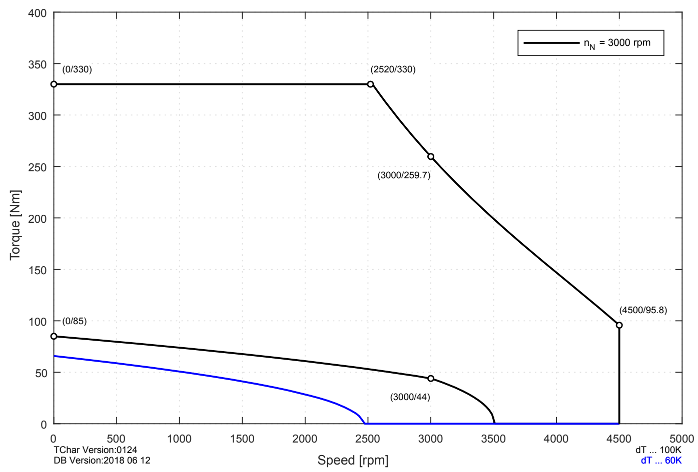
8LSA76.eennnffgg-3



8LSA77eennnffgg-3



8LSA78.eennnffgg-3



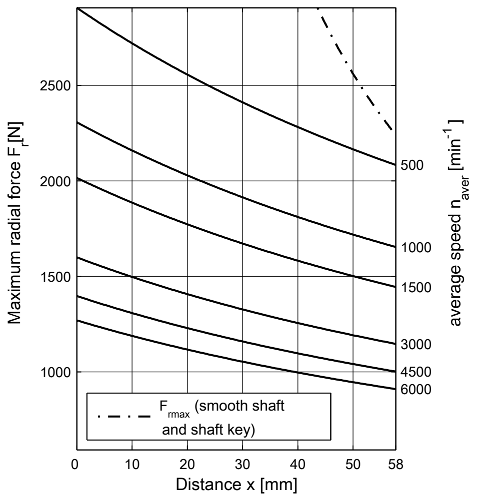
2.14.8.4 Maximum shaft load

Note the information in section "Load capacity of the shaft end and bearing" on page 273 of chapter "Installation conditions".

2.14.8.4.1 8LSA7...-3 / 8LSC7...-3 - Standard bearing

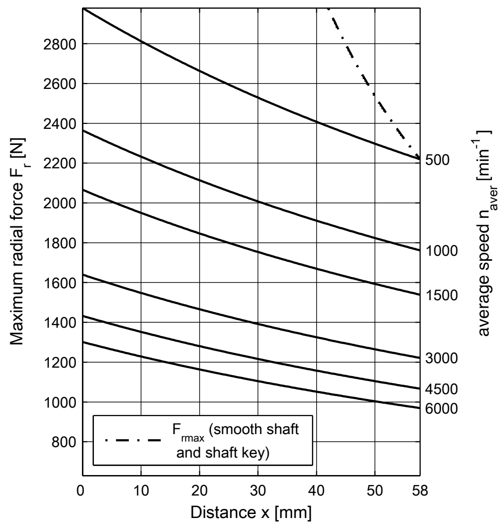
Shaft load values apply to both 8LSA and 8LSC!

8LSA73 (standard bearing)



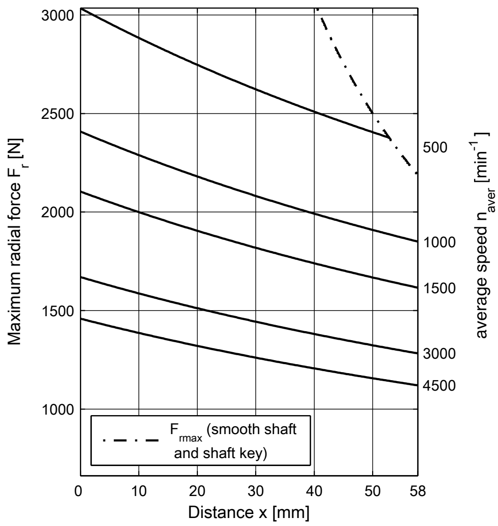
maximum allowed axial force: F_{amax} = 254 N

8LSA74 (standard bearing)



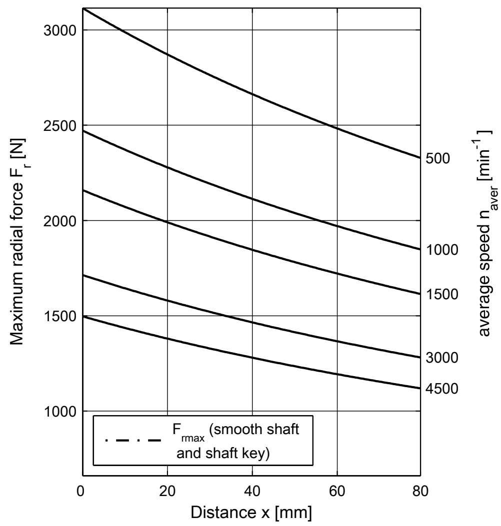
maximum allowed axial force: F_{amax} = 266 N

8LSA75 (standard bearing)



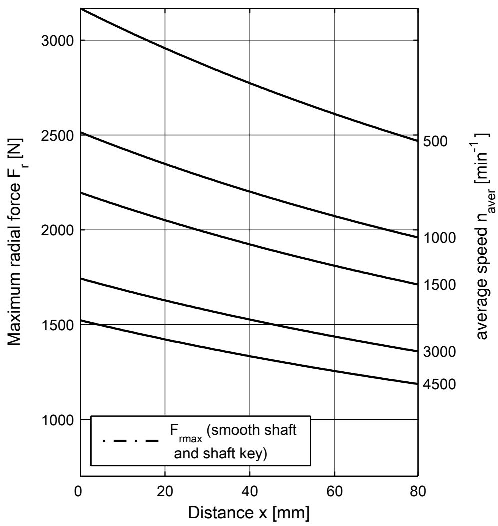
maximum allowed axial force: F_{amax} = 276 N

8LSA76 (standard bearing)



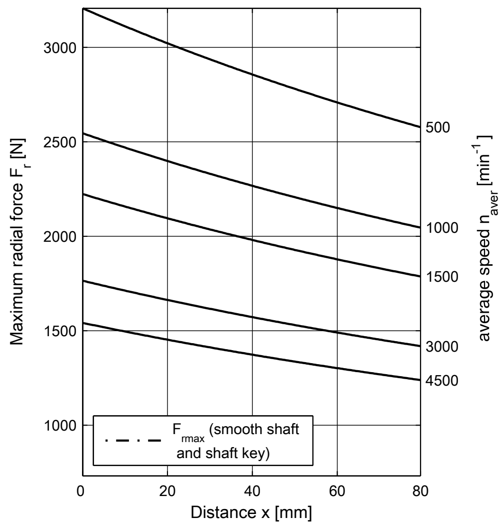
maximum allowed axial force: F_{amax} = 279 N

8LSA77 (standard bearing)



maximum allowed axial force: F_{amax} = 290 N

8LSA78 (standard bearing)

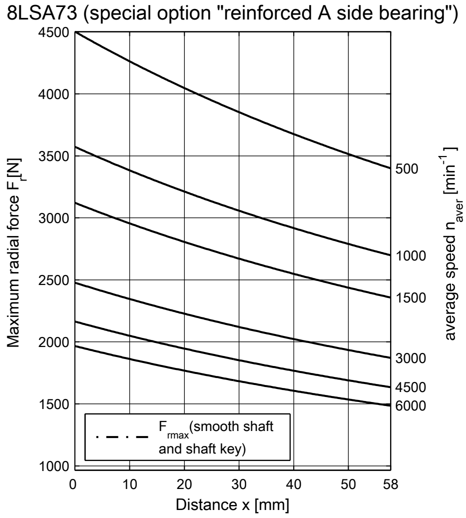


maximum allowed axial force: F_{amax} = 299 N

2.14.8.4.2 8LSA7...-3 / 8LSC7...-3 - Reinforced bearing

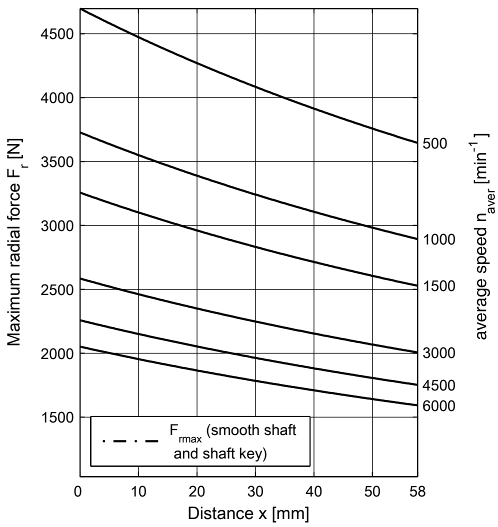
Shaft load values apply to both 8LSA and 8LSC!

8LSA73 (special option "reinforced A side bearing")



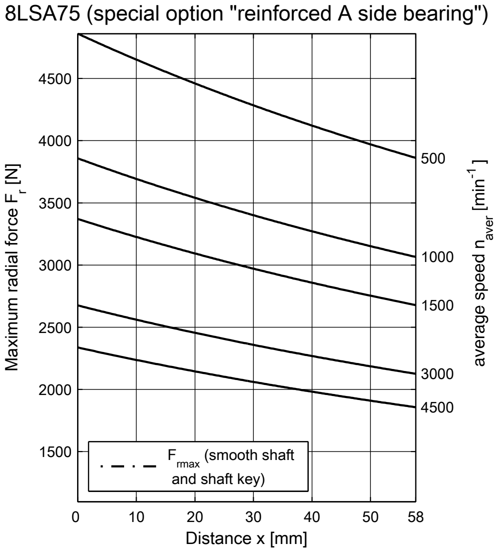
maximum allowed axial force: F_{amax} = 405 N

8LSA74 (special option "reinforced A side bearing")



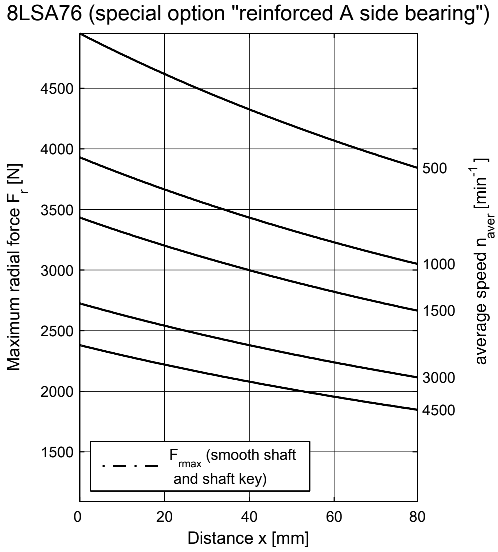
maximum allowed axial force: F_{amax} = 429 N

8LSA75 (special option "reinforced A side bearing")



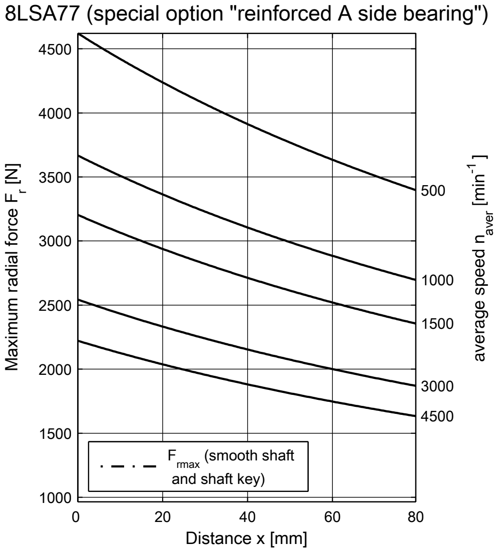
maximum allowed axial force: F_{amax} = 450 N

8LSA76 (special option "reinforced A side bearing")



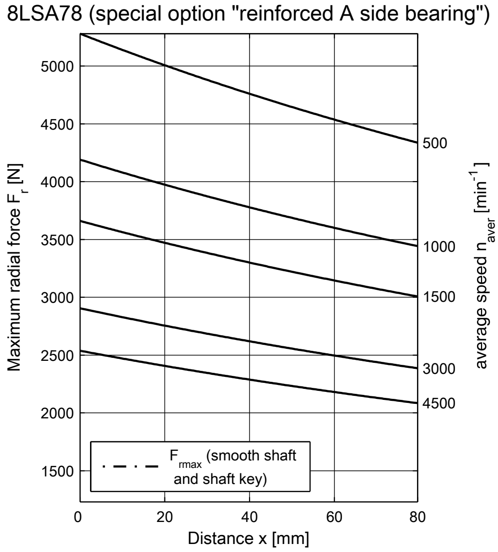
maximum allowed axial force: F_{amax} = 453 N

8LSA77 (special option "reinforced A side bearing")



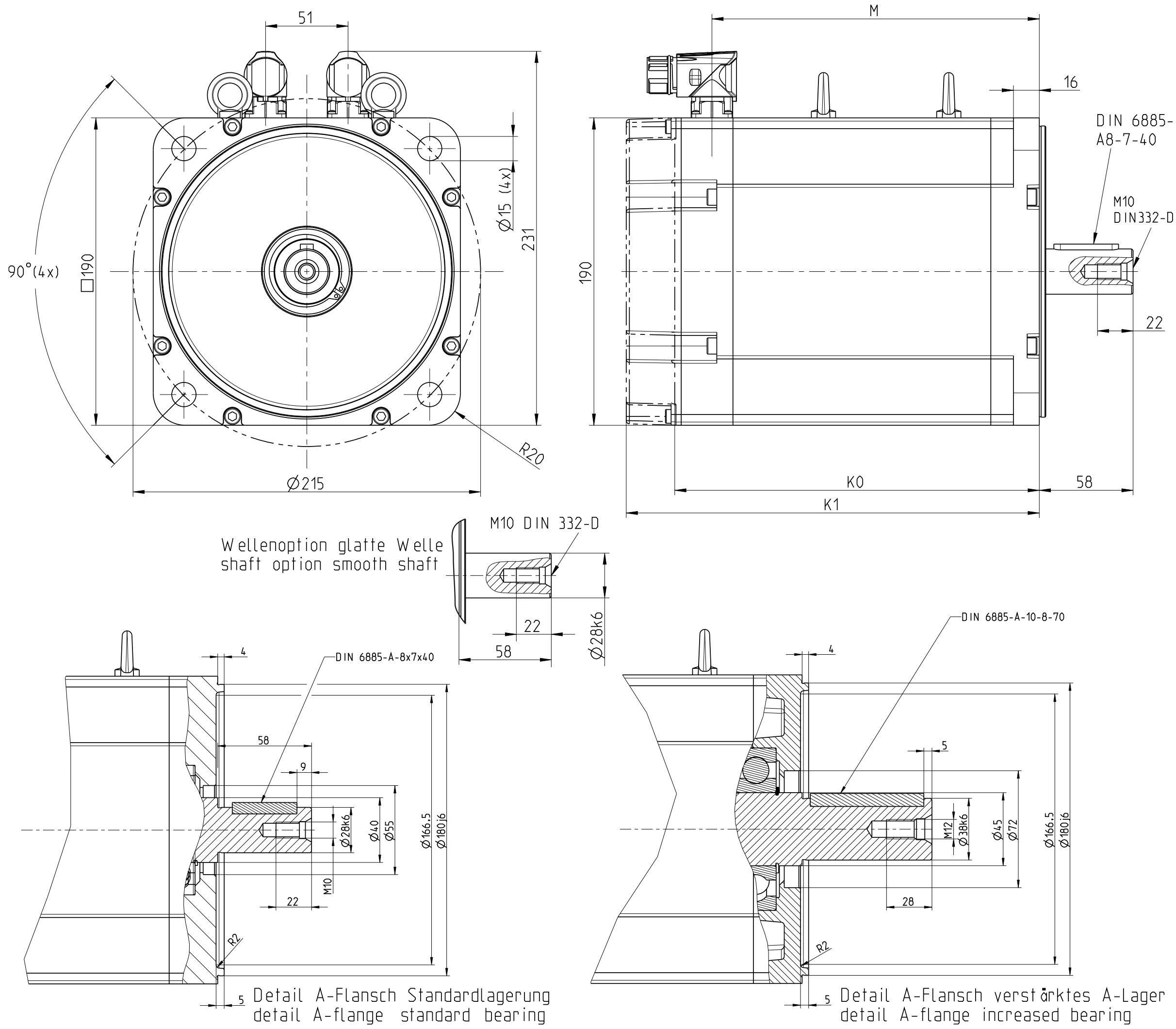
maximum allowed axial force: F_{amax} = 410 N

8LSA78 (special option "reinforced A side bearing")



maximum allowed axial force: F_{amax} = 498 N

2.14.8.5 8LSA73/74/75...-3 - Dimensions

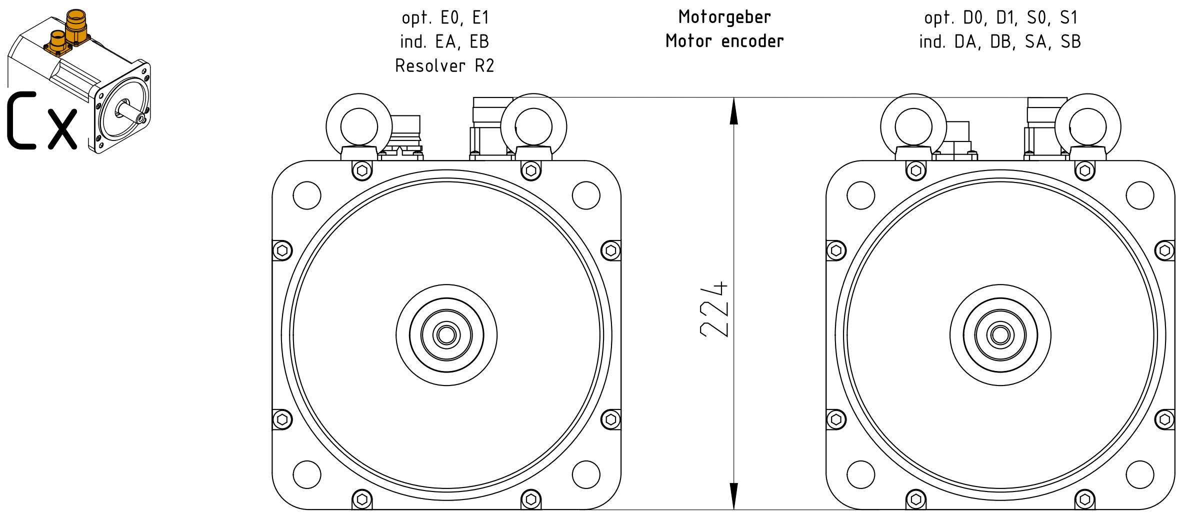


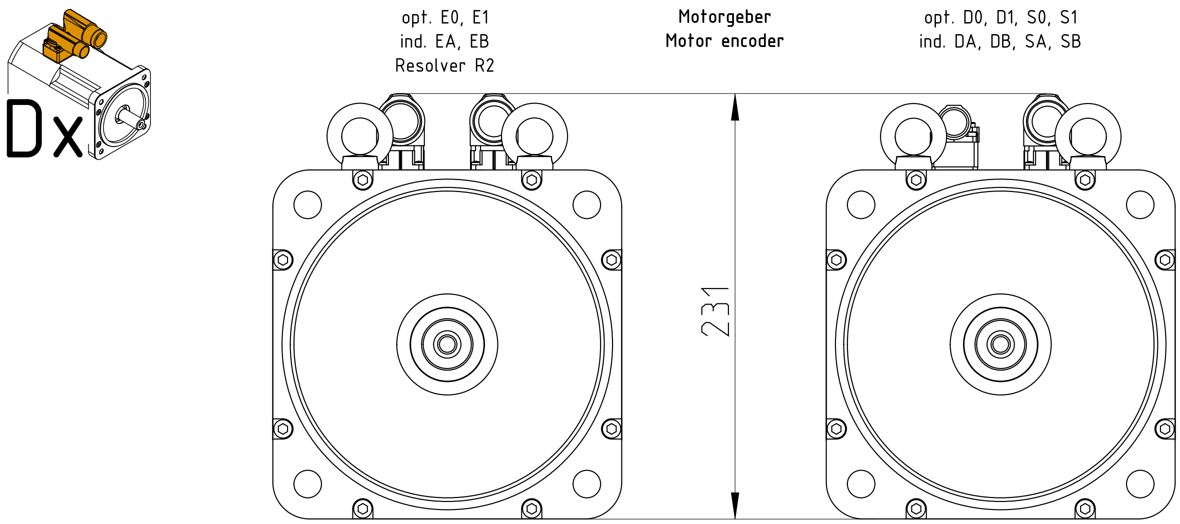
EnDat/Resolver feedback				Extension of K_0 and K_1 depending on the motor option [mm]		
Encoder assignments	**DA,DB,EA,EB,R2, SA,SB**	**D0,D1,E0,E1,S0,S1**				
Model number	**K_0**	**K_1**	**M**	**Holding brake**	**Heavy-duty holding brake**	**Reinforced A-side bearing**
8LSA73.eennnffgg-3	205	233	180	37	54	10
8LSA73.ee045ffgg-3, power connector size 1.5	**On request**					
8LSA74.eennnffgg-3	228	256	203	37	54	10
8LSA74.ee045ffgg-3, power connector size 1.5	243.5	243.5	212	37	54	10
8LSA75.eennnffgg-3	250	278	225	37	54	10

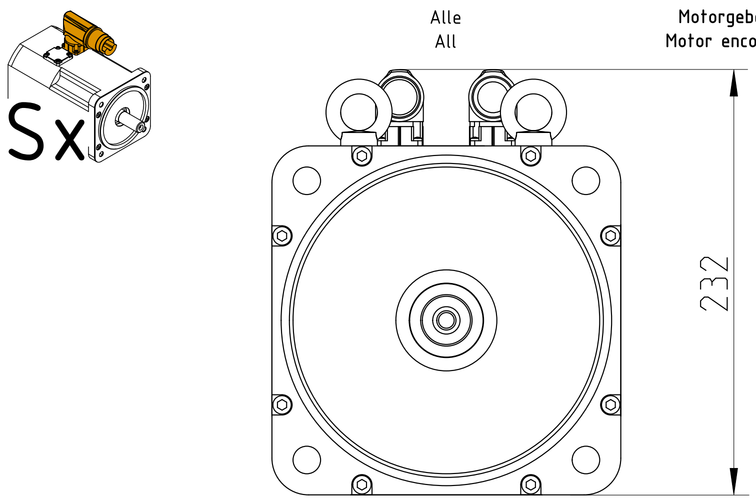
IMPORTANT: Motor option "oil seal" has no effect on the motor length.

2.14.8.6 8LSA73/74/75...-3 (connector size 1) - Connection dimensions

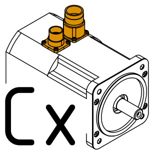
For **8LSA73...-3 with nominal speed 4500** and **8LSA74...-3 with nominal speed 4500**, the dimensions of connector size 1.5 on page 151 apply.

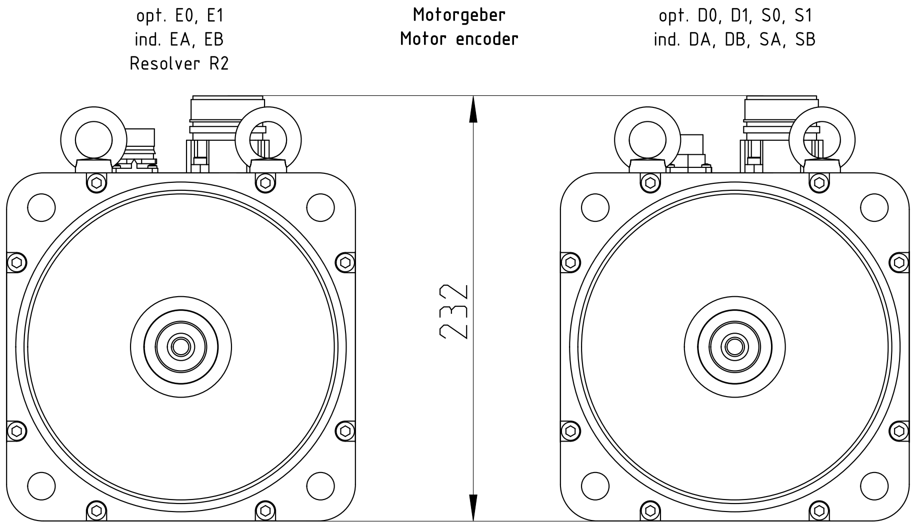


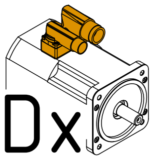


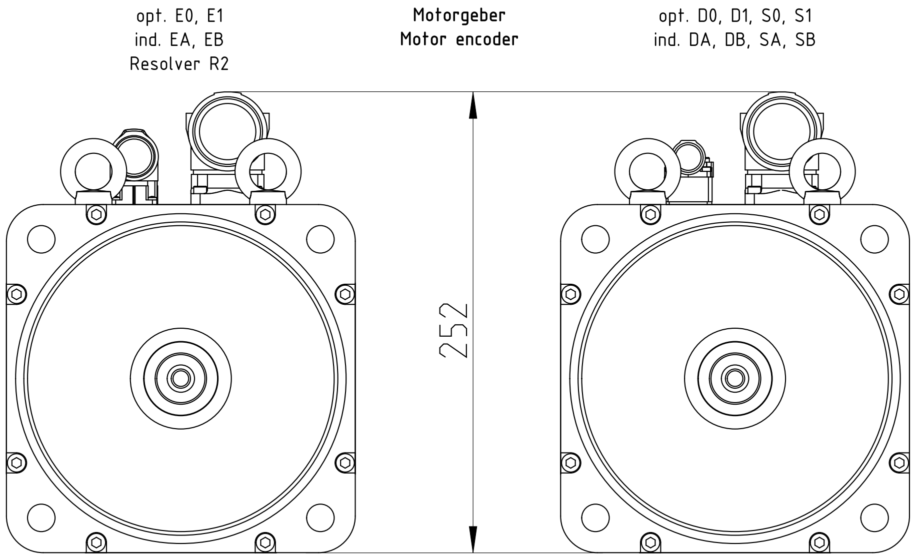


2.14.8.7 8LSA73/74/75...-3 (connector size 1.5) - Connection dimensions

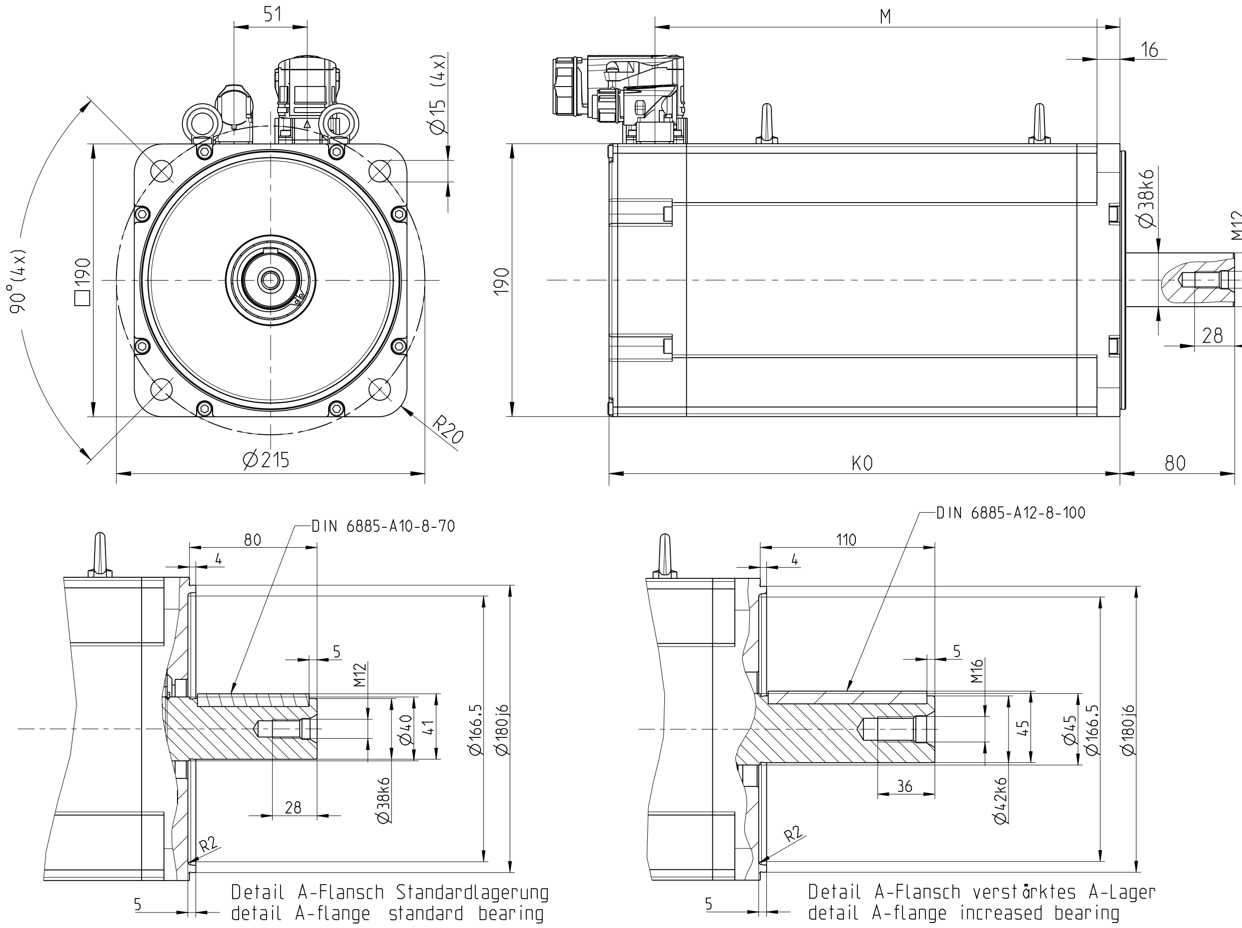








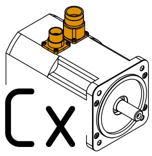
2.14.8.8 8LSA76/77/78...-3 - Dimensions

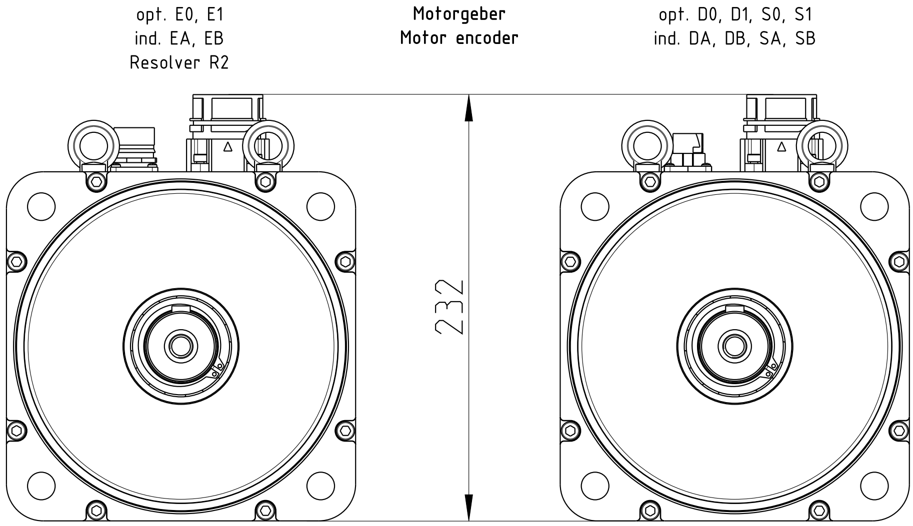


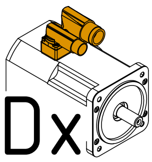
EnDat/Resolver feedback			Extension of K_0 depending on motor option [mm]			
Model number	**K_0**	**M**	**Holding brake**	**Heavy-duty holding brake**	**Special brake**	**Reinforced A-side bearing**
8LSA76.eennnffgg-3	311	279	37	54	50	10
8LSA77.eennnffgg-3	356	324	37	54	50	10
8LSA78.eennnffgg-3	401	369	37	54	50	10

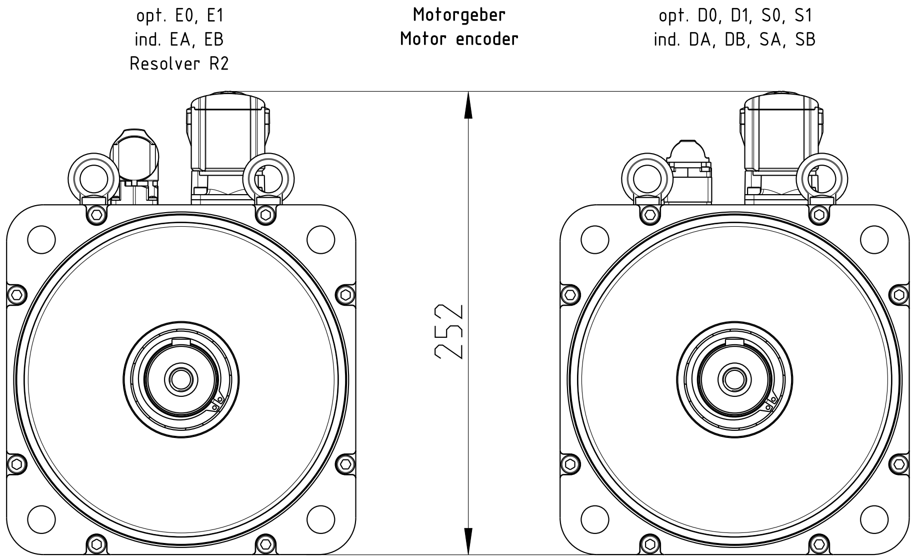
IMPORTANT: Motor option "oil seal" has no effect on the motor length.

2.14.8.9 8LSA76/77/78...-3 - Connection dimensions









2.14.9 8LSA8...-3 - Technical data

<table>
<tr><th>Model number</th><th>8LSA83.ee015ffgg-3</th><th>8LSA83.ee022ffgg-3</th><th>8LSA83.ee030ffgg-3</th><th>8LSA84.ee015ffgg-3</th></tr>
<tr><td colspan="5">Motor</td></tr>
<tr><td>Nominal speed n_N [rpm]</td><td>1500</td><td>2200</td><td>3000</td><td>1500</td></tr>
<tr><td>Number of pole pairs</td><td colspan="4">3</td></tr>
<tr><td>Nominal torque M_n [Nm]</td><td>35</td><td>31</td><td>27</td><td>58</td></tr>
<tr><td>Nominal power P_N [W]</td><td>5498</td><td>7142</td><td>8482</td><td>9111</td></tr>
<tr><td>Nominal current I_N [A]</td><td>10.7</td><td>14</td><td>16.6</td><td>17.8</td></tr>
<tr><td>Stall torque M_0 [Nm]</td><td colspan="3">40</td><td>69</td></tr>
<tr><td>Stall current I_0 [A]</td><td>12.3</td><td>18</td><td>24.5</td><td>21.2</td></tr>
<tr><td>Maximum torque M_{max} [Nm]</td><td colspan="3">120</td><td>204</td></tr>
<tr><td>Maximum current I_{max} [A]</td><td>50</td><td>73</td><td>102</td><td>79</td></tr>
<tr><td>Maximum speed n_{max} [rpm]</td><td colspan="4">3600</td></tr>
<tr><td>Torque constant K_T [Nm/A]</td><td>3.26</td><td>2.22</td><td>1.63</td><td>3.26</td></tr>
<tr><td>Voltage constant K_E [V/1000 rpm]</td><td>196.87</td><td>134.04</td><td>98.44</td><td>196.87</td></tr>
<tr><td>Stator resistance R_{2ph} [Ω]</td><td>0.896</td><td>0.41</td><td>0.23</td><td>0.34</td></tr>
<tr><td>Stator inductance L_{2ph} [mH]</td><td>16.86</td><td>9.6</td><td>5.4</td><td>10.3</td></tr>
<tr><td>Electrical time constant t_{el} [ms]</td><td>18.8</td><td>23.4</td><td>23.5</td><td>30.3</td></tr>
<tr><td>Thermal time constant t_{therm} [min]</td><td colspan="3">50</td><td>65</td></tr>
<tr><td>Moment of inertia J [kgcm²]</td><td colspan="3">65</td><td>114</td></tr>
<tr><td>Weight without brake m [kg]</td><td colspan="3">43</td><td>61</td></tr>
<tr><td colspan="5">Holding brake</td></tr>
<tr><td>Holding torque of brake M_{Br} [Nm]</td><td colspan="4">130</td></tr>
<tr><td>Mass of brake [kg]</td><td colspan="4">9</td></tr>
<tr><td>Moment of inertia of brake J_{Br} [kgcm²]</td><td colspan="4">53</td></tr>
<tr><td colspan="5">Recommendations</td></tr>
<tr><td>ACOPOS 8Vxxxx.xx...</td><td>1180</td><td colspan="3">1320</td></tr>
<tr><td>ACOPOSmulti 8BVIxxxx...</td><td>0110</td><td>0220</td><td colspan="2">0330</td></tr>
<tr><td>ACOPOS P3 8EIxxxx...</td><td>017X</td><td>024X</td><td>034X</td><td>024X</td></tr>
<tr><td>Cross section for B&R motor cables [mm²]</td><td colspan="4">4</td></tr>
<tr><td>Connector size</td><td colspan="4">1.5</td></tr>
</table>

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 guideline; 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.

Model number	8LSA84.ee022ffgg-3	8LSA84.ee030ffgg-3	8LSA85.ee015ffgg-3	8LSA85.ee020ffgg-3
Motor				
Nominal speed n_N [rpm]	2200	3000	1500	2000
Number of pole pairs	3			
Nominal torque M_n [Nm]	51.5	48.4	77	72
Nominal power P_N [W]	11865	15205	12095	15080
Nominal current I_N [A]	23.2	29.7	23.6	29.4
Stall torque M_0 [Nm]	69		94	
Stall current I_0 [A]	31.1	42.3	28.9	38.4
Maximum torque M_{max} [Nm]	204		280	
Maximum current I_{max} [A]	115	171	113	151
Maximum speed n_{max} [rpm]	3600			
Torque constant K_T [Nm/A]	2.22	1.63	3.26	2.45
Voltage constant K_E [V/1000 rpm]	134.04	98.44	196.87	147.65
Stator resistance R_{2ph} [Ω]	0.16	0.09	0.29	0.17
Stator inductance L_{2ph} [mH]	4.9	2.6	8.9	5.3
Electrical time constant t_{el} [ms]	30.6	28.9	30.7	31.2
Thermal time constant t_{therm} [min]	65		80	
Moment of inertia J [kgcm²]	114		150	
Weight without brake m [kg]	61		75.5	
Holding brake				
Holding torque of brake M_{Br} [Nm]	130			
Mass of brake [kg]	9			
Moment of inertia of brake J_{Br} [kgcm²]	53			
Recommendations				
ACOPOS 8Vxxxx.xx...	1640		1320	1640
ACOPOSmulti 8BVIxxxx...	0440	0660	0330	0440
ACOPOS P3 8EIxxxx...	044X	-	034X	044X
Cross section for B&R motor cables [mm²]	4	10	4	10
Connector size	1.5	1.5/16	1.5	1.5/16

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 guideline; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).

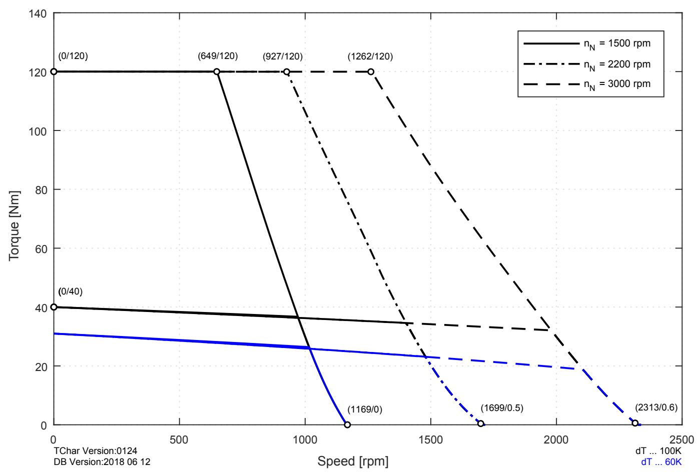
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

Model number	8LSA86.ee015ffgg-3	8LSA86.ee020ffgg-3
Motor		
Nominal speed n_N [rpm]	1500	2000
Number of pole pairs	3	
Nominal torque M_n [Nm]	97	85
Nominal power P_N [W]	15237	17802
Nominal current I_N [A]	29.8	32.9
Stall torque M_0 [Nm]	115	
Stall current I_0 [A]	35.3	44.6
Maximum torque M_{max} [Nm]	345	
Maximum current I_{max} [A]	137	182
Maximum speed n_{max} [rpm]	3600	
Torque constant K_T [Nm/A]	3.26	2.58
Voltage constant K_E [V/1000 rpm]	196.87	156.03
Stator resistance R_{2ph} [Ω]	0.208	0.15
Stator inductance L_{2ph} [mH]	6.1	4.9
Electrical time constant t_{el} [ms]	30.5	32.6
Thermal time constant t_{therm} [min]	90	
Moment of inertia J [kgcm²]	192	
Weight without brake m [kg]	89	
Holding brake		
Holding torque of brake M_{Br} [Nm]	130	
Mass of brake [kg]	9	
Moment of inertia of brake J_{Br} [kgcm²]	53	
Recommendations		
ACOPOS 8Vxxxx.xx...	1640	
ACOPOSmulti 8BVIxxxx...	0440	0660
ACOPOS P3 8EIxxxx...	044X	-
Cross section for B&R motor cables [mm²]	10	
Connector size	1.5	1.5/16

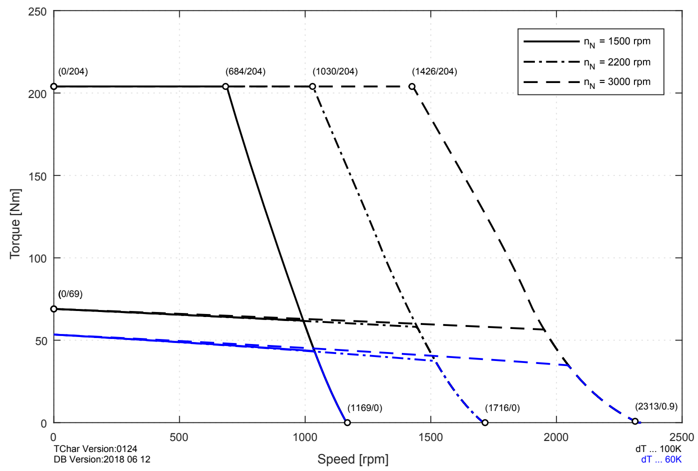
NOTE about servo drives: The recommended servo drive / inverter module is designed for 1.1x the stall current. If more than double the amount is needed during the acceleration phase, the next larger servo drive should be selected. This recommendation is only a guideline; detailed inspection of the corresponding 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.

2.14.9.1 Speed-torque characteristic curves at 325 VDC DC bus voltage

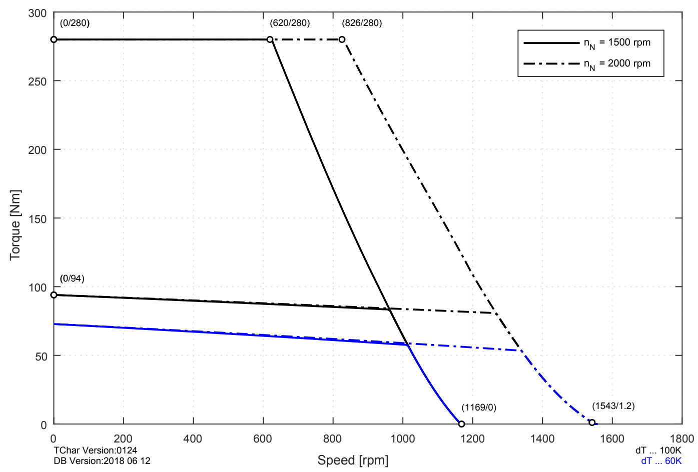
8LSA83.eennnffgg-3



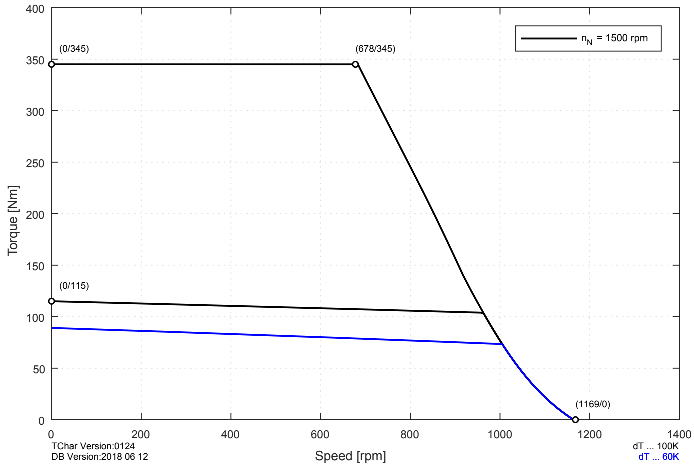
8LSA84.eennnffgg-3



8LSA85.eennnffgg-3

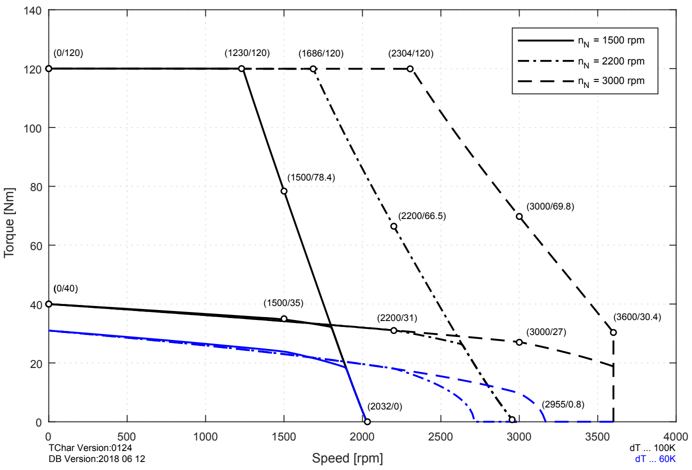


8LSA86.eennnffgg-3

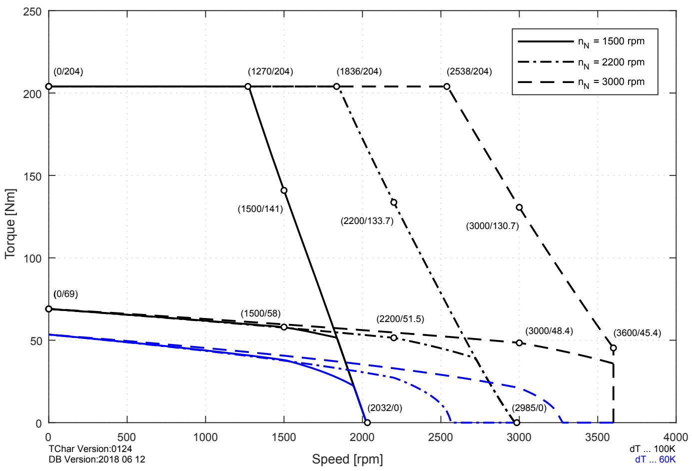


2.14.9.2 Speed-torque characteristic curves at 560 VDC DC bus voltage

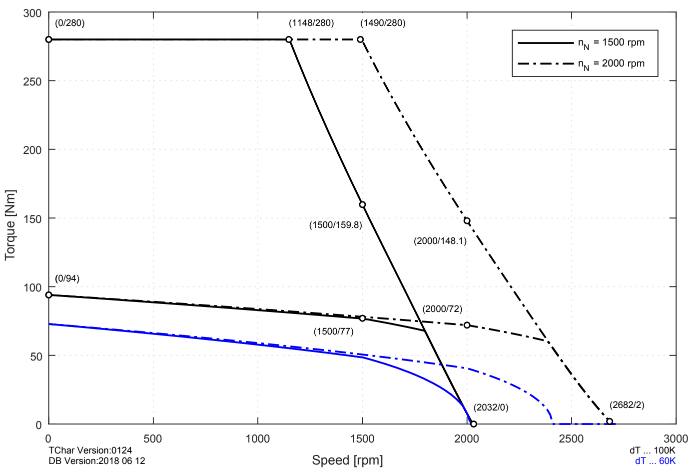
8LSA83.eennnffgg-3



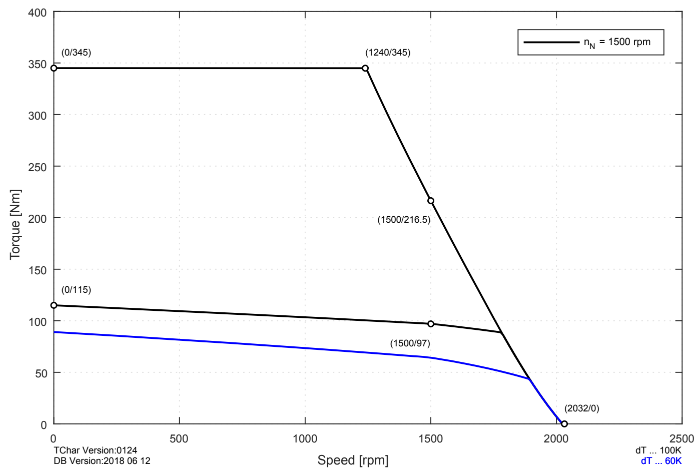
8LSA84.eennnffgg-3



8LSA85.eennnffgg-3

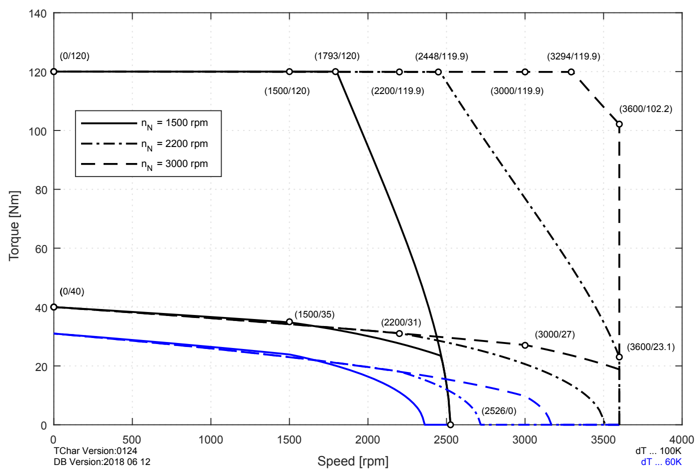


8LSA86.eennnffgg-3

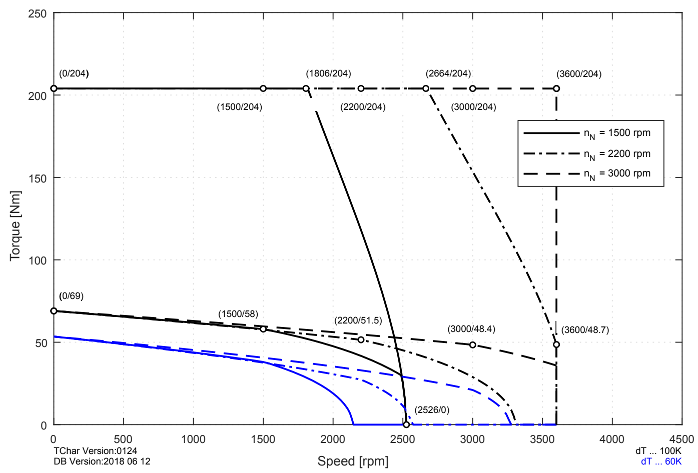


2.14.9.3 Speed-torque characteristic curves at 750 VDC DC bus voltage

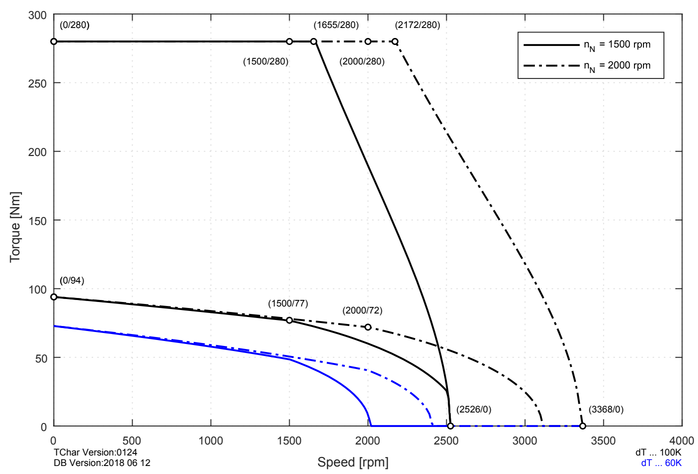
8LSA83.eennnffgg-3



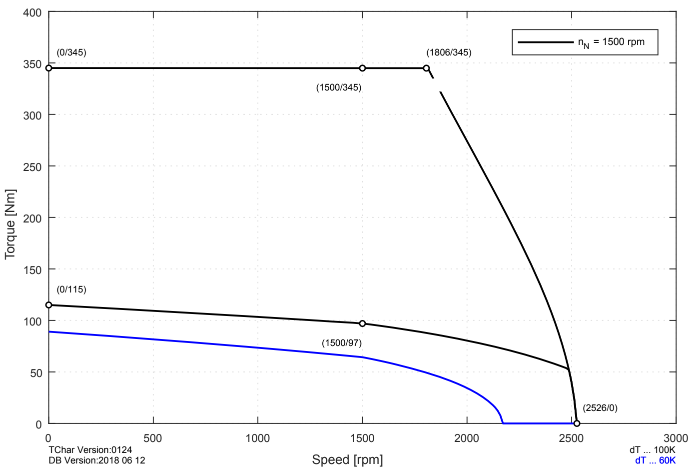
8LSA84.eennnffgg-3



8LSA85.eennnffgg-3



8LSA86.eennnffgg-3

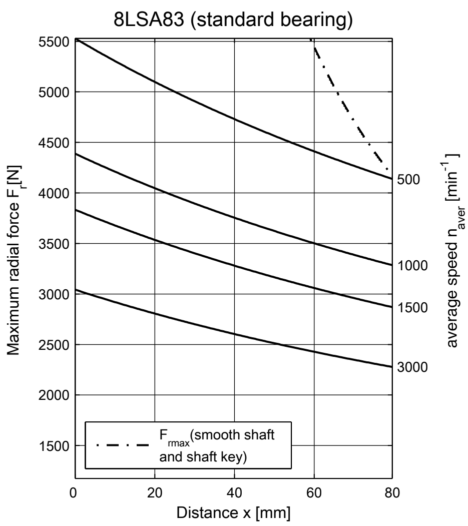


2.14.9.4 Maximum shaft load

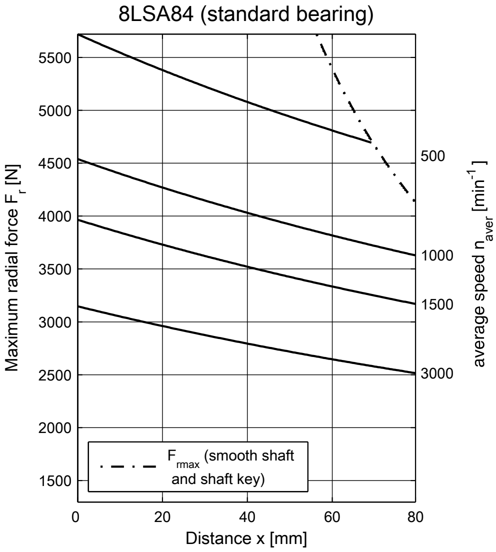
Note the information in section "Load capacity of the shaft end and bearing" on page 273 of chapter "Installation conditions".

2.14.9.4.1 8LSA8...-3 / 8LSC8...-3 - Standard bearing

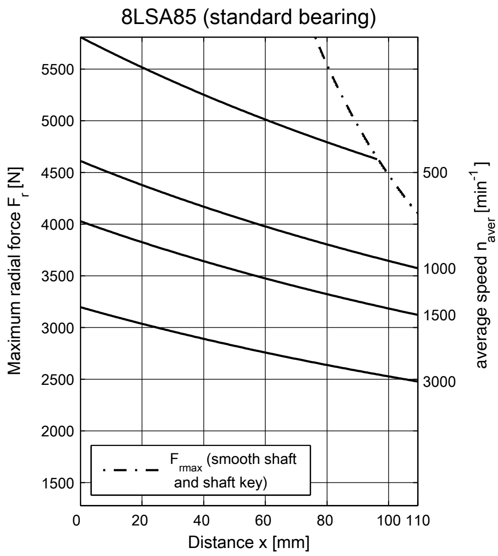
Shaft load values apply to both 8LSA and 8LSC!



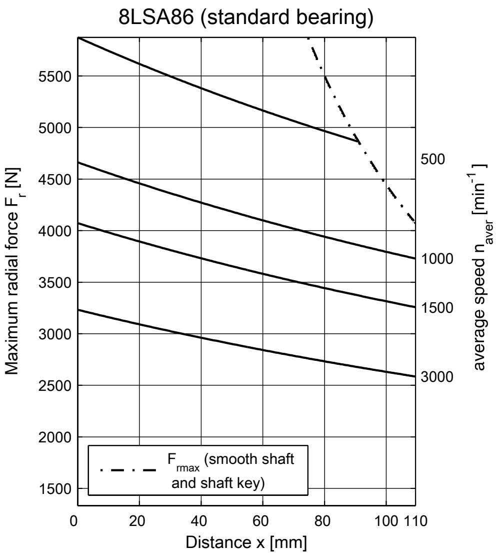
maximum allowed axial force: F_{amax} = 495 N



maximum allowed axial force: F_{amax} = 532 N



maximum allowed axial force: F_{amax} = 531 N

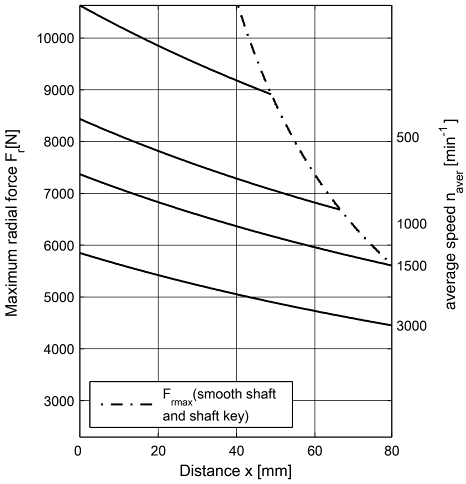


maximum allowed axial force: F_{amax} = 546 N

2.14.9.4.2 8LSA8...-3 / 8LSC8...-3 - Reinforced bearing

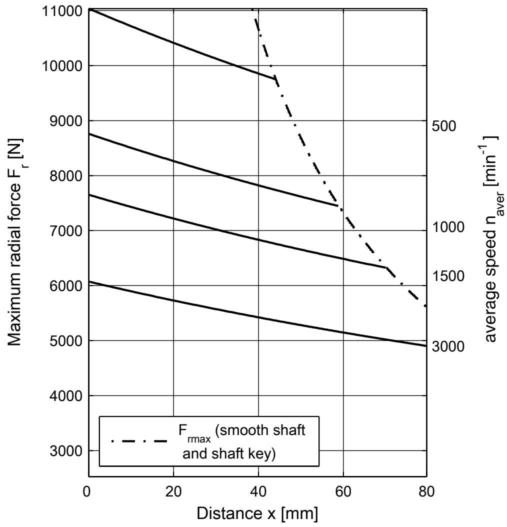
Shaft load values apply to both 8LSA and 8LSC!

8LSA83 (special option "reinforced A side bearing")



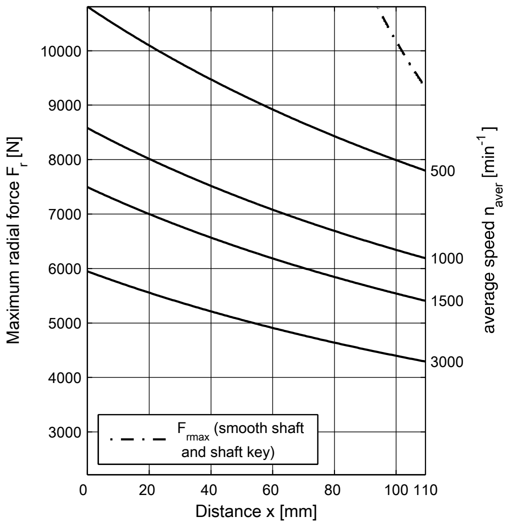
maximum allowed axial force: F_{amax} = 961 N

8LSA84 (special option "reinforced A side bearing")



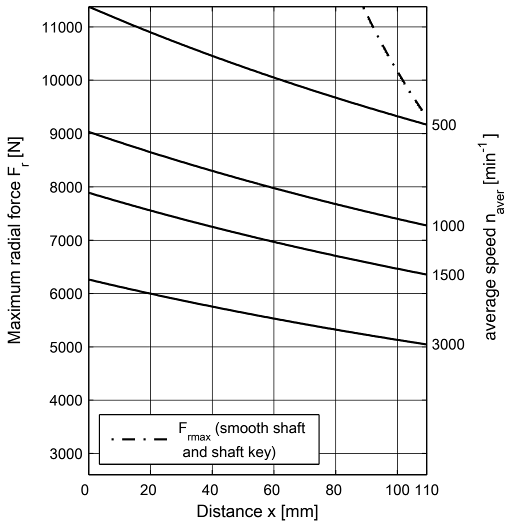
maximum allowed axial force: F_{amax} = 1032 N

8LSA85 (special option "reinforced A side bearing")



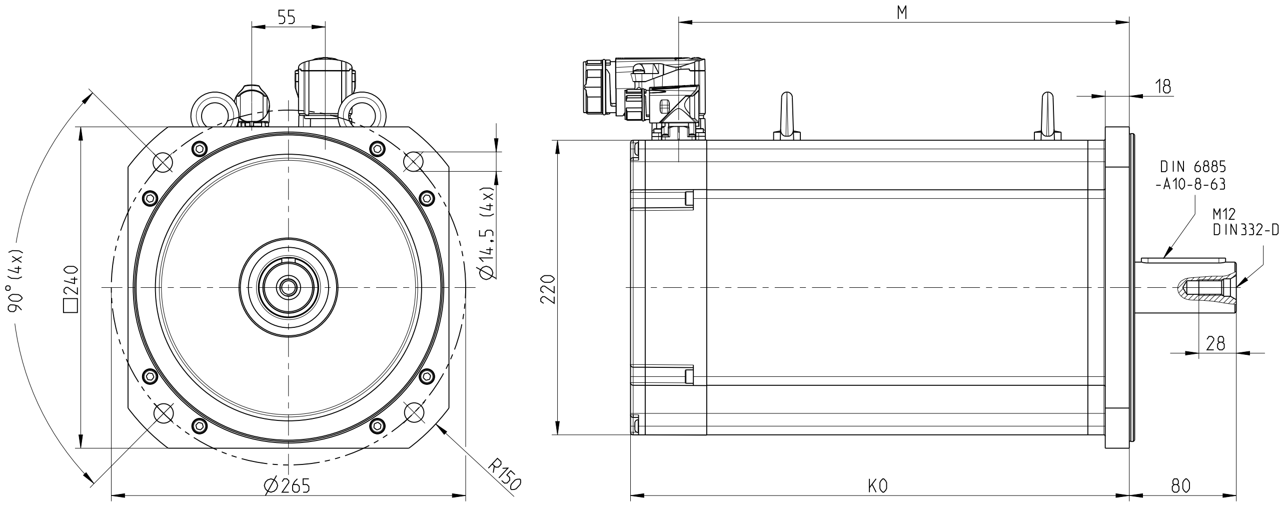
maximum allowed axial force: F_{amax} = 948 N

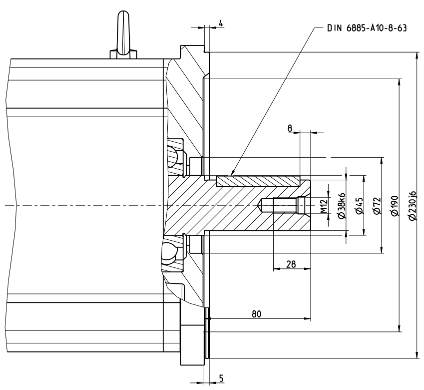
8LSA86 (special option "reinforced A side bearing")

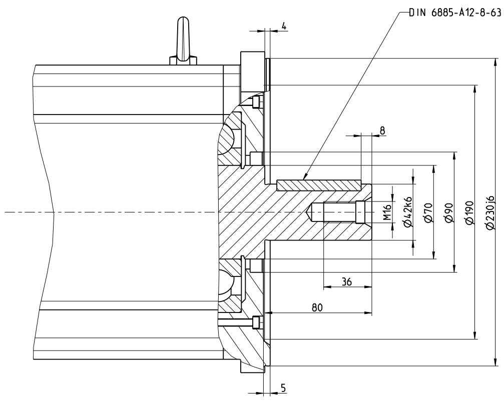


maximum allowed axial force: F_{amax} = 1062 N

2.14.9.5 8LSA8...-3 - Dimensions







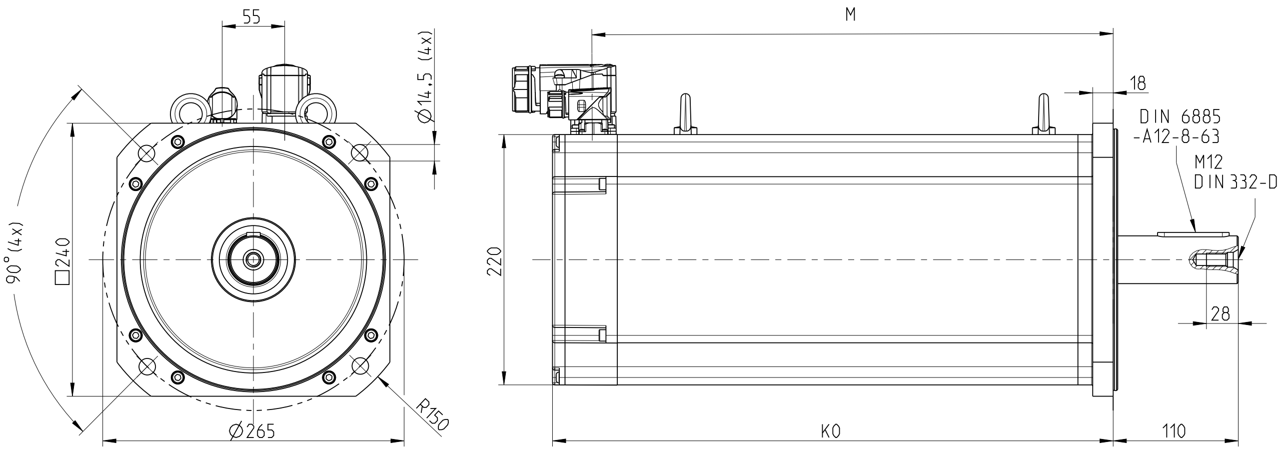
Detail A-Flansch Standardlagerung
detail A-flange standard bearing

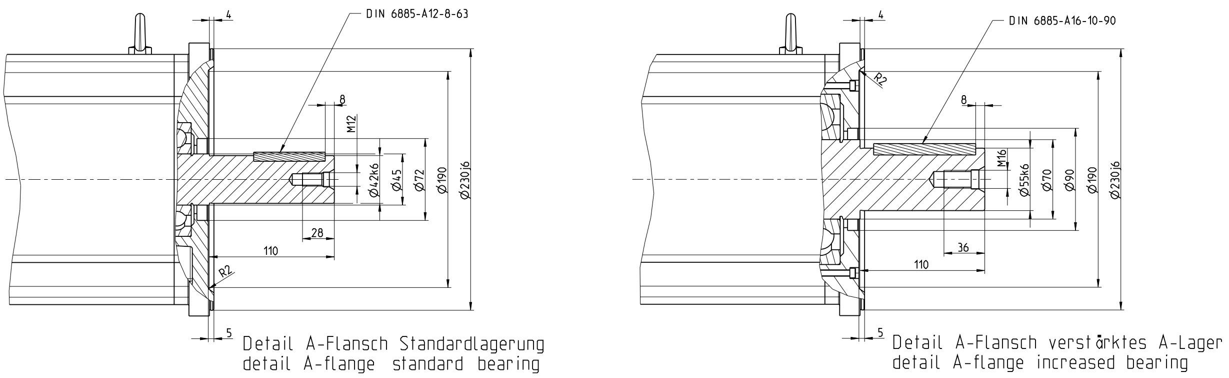
Detail A-Flansch verstärktes A-Lager
detail A-flange increased bearing

Optical EnDat feedback			Extension of K_0 depending on motor option [mm]		
Model number	**K_0**	**M**	**Holding brake[1)]**	**Oil seal**	**Reinforced A-side bearing**
8LSA83.eennnffgg-3	321	259	50	---	16.5
8LSA84.eennnffgg-3	401	339	50	---	16.5

Inductive EnDat/resolver feedback			Extension of K_0 depending on motor option [mm]		
Model number	**K_0**	**M**	**Holding brake[1)]**	**Oil seal**	**Reinforced A-side bearing**
8LSA83.eennnffgg-3	293	259	50	---	16.5
8LSA84.eennnffgg-3	373	339	50	---	16.5

1) Motor option "Holding brake" cannot be ordered in combination with special motor option "Reinforced A-side bearing".



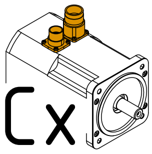


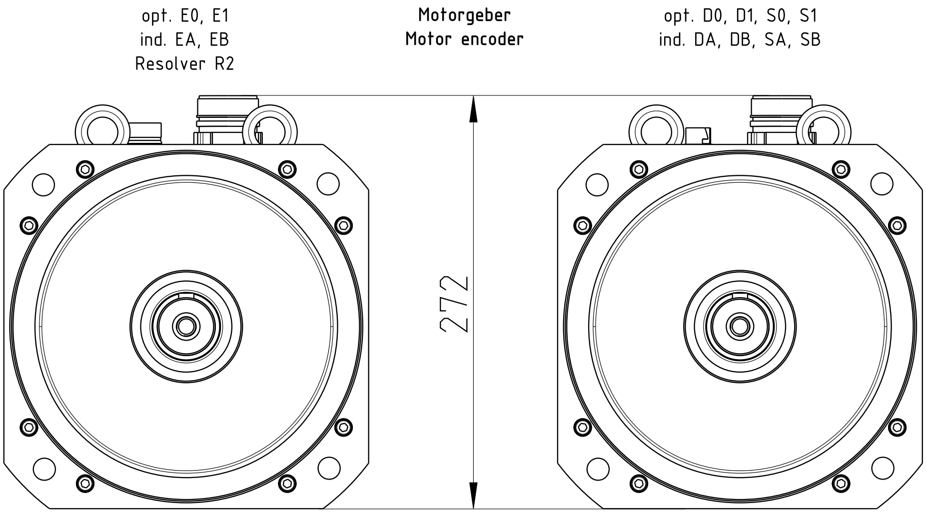
Optical EnDat feedback			Extension of K_0 depending on motor option [mm]		
Model number	**K_0**	**M**	**Holding brake[1)]**	**Oil seal**	**Reinforced A-side bearing**
8LSA85.eennnffgg-3	461	399	50	---	16.5
8LSA86.eennnffgg-3	521	459	50	---	16.5

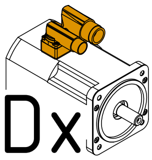
Inductive EnDat/resolver feedback			Extension of K_0 depending on motor option [mm]		
Model number	**K_0**	**M**	**Holding brake[1)]**	**Oil seal**	**Reinforced A-side bearing**
8LSA85.eennnffgg-3	433	399	50	---	16.5
8LSA86.eennnffgg-3	493	459	50	---	16.5

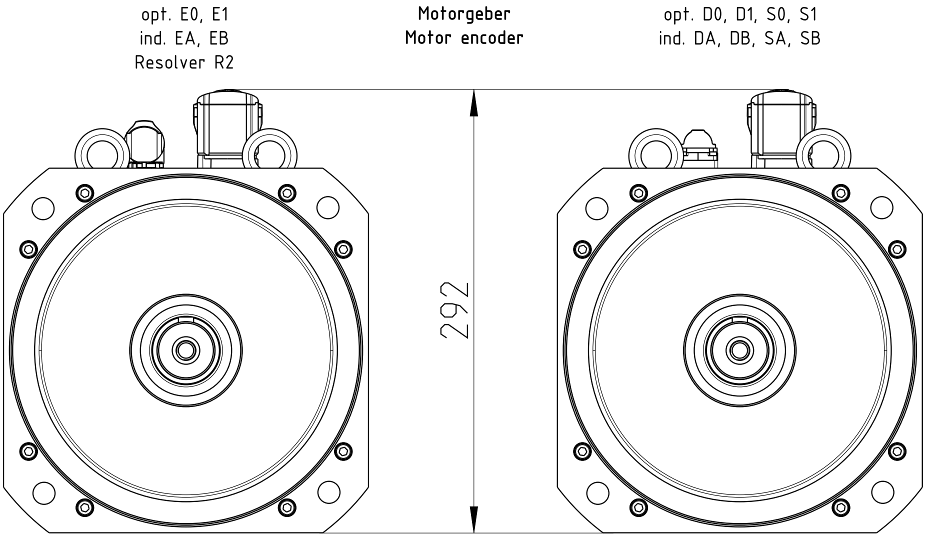
1) Motor option "Holding brake" cannot be ordered in combination with special motor option "Reinforced A-side bearing".

2.14.9.6 8LSA8...-3 - Connection dimensions









2.15 8LSC - Technical data

2.15.1 8LSC4...-3 - Technical data

Model number	8LSC43. ee022ffgg-3	8LSC43. ee030ffgg-3	8LSC43. ee045ffgg-3	8LSC43. ee060ffgg-3	8LSC44. ee022ffgg-3	8LSC44. ee030ffgg-3
Motor						
Nominal speed n_N [rpm]	2200	3000	4500	6000	2200	3000
Number of pole pairs	5					
Nominal torque M_n [Nm]	4.55	4.03	3.51	2.6	6.76	6.01
Nominal power P_N [W]	1048	1266	1654	1634	1557	1888
Nominal current I_N [A]	2.1	2.5	3.2		3	3.7
Stall torque M_0 [Nm]	5.2				7.8	
Stall current I_0 [A]	2.3	3.2	4.8	6.4	3.5	4.8
Maximum torque M_{max} [Nm]	15.2				22.8	
Maximum current I_{max} [A]	10.7	14.6	21.9	29.2	16.1	21.9
Maximum speed n_{max} [rpm]	12000					
Torque constant K_T [Nm/A]	2.22	1.63	1.08	0.81	2.22	1.63
Voltage constant K_E [V/1000 rpm]	134.04	98.44	64.93	49.22	134.04	98.44
Stator resistance R_{2ph} [Ω]	11.53	5.94	2.64	1.42	6.24	3.6
Stator inductance L_{2ph} [mH]	81.1	36.5	16.5	9.2	44.8	24
Electrical time constant t_{el} [ms]	7	6.1	6.3	6.5	7.2	6.7
Thermal time constant t_{therm} [min]	25				30	
Moment of inertia J [kgcm²]	1.87				2.73	
Weight without brake m [kg]	6.1				7	
Holding brake						
Holding torque of brake M_{Br} [Nm]	8					
Mass of brake [kg]	1					
Moment of inertia of brake J_{Br} [kgcm²]	0.69					
Recommendations						
ACOPOS 8Vxxxx.xx...	1045		1090		1045	1090
ACOPOSmulti 8BVIxxxx...	0028		0055			
ACOPOS P3 8EIxxxx...	4X5X		8X8X		4X5X	8X8X
Cross section for B&R motor cables [mm²]	0.75					
Connector size	1.0					

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 guideline; 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.

Model number	8LSC44.ee045ffgg-3	8LSC44.ee060ffgg-3	8LSC45.ee022ffgg-3	8LSC45.ee030ffgg-3	8LSC45.ee045ffgg-3	8LSC45.ee060ffgg-3
Motor						
Nominal speed n_N [rpm]	4500	6000	2200	3000	4500	6000
Number of pole pairs	5					
Nominal torque M_n [Nm]	4.68	3.9	9.1	8.01	6.24	5.2
Nominal power P_N [W]	2205	2450	2096	2516	2941	3267
Nominal current I_N [A]	4.3	4.8	4.1	4.9	5.8	6.4
Stall torque M_0 [Nm]	7.8		10.4			
Stall current I_0 [A]	7.2	9.6	4.7	6.4	9.6	12.8
Maximum torque M_{max} [Nm]	22.8		30.4			
Maximum current I_{max} [A]	32.9	43.8	21.4	29.2	43.9	58.3
Maximum speed n_{max} [rpm]	12000					
Torque constant K_T [Nm/A]	1.08	0.81	2.22	1.63	1.08	0.81
Voltage constant K_E [V/1000 rpm]	64.93	49.22	134.04	98.44	64.93	49.22
Stator resistance R_{2ph} [Ω]	1.6	0.862	4.32	2.489	1.106	0.6
Stator inductance L_{2ph} [mH]	10.8	6.2	41	21.8	9.69	5.4
Electrical time constant t_{el} [ms]	6.8	7.2	9.5	8.8		9
Thermal time constant t_{therm} [min]	30		35			
Moment of inertia J [kgcm²]	2.73		3.58			
Weight without brake m [kg]	7		8.1			
Holding brake						
Holding torque of brake M_{Br} [Nm]	8					
Mass of brake [kg]	1		0.9			
Moment of inertia of brake J_{Br} [kgcm²]	0.69					
Recommendations						
ACOPOS 8Vxxxx.xx...	1090	1180	1090		1180	
ACOPOSmulti 8BVIxxxx...	0110		0055		0110	
ACOPOS P3 8EIxxxx...	8X8X	013X	8X8X		013X	017X
Cross section for B&R motor cables [mm²]	0.75					1.5
Connector size	1.0					

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 guideline; 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.

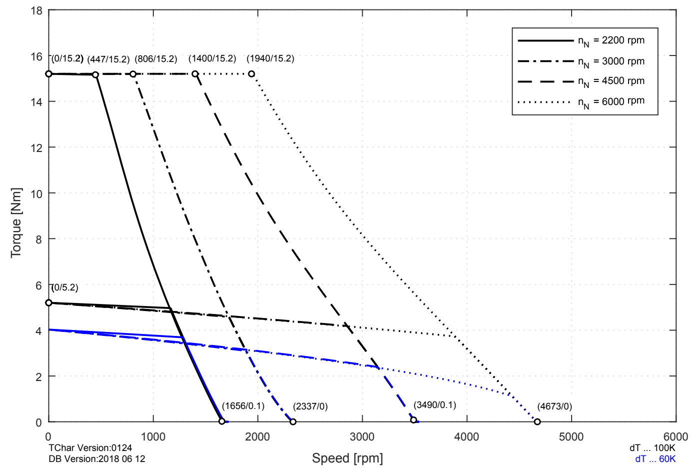
Model number	8LSC46.ee022ffgg-3	8LSC46.ee030ffgg-3	8LSC46.ee045ffgg-3	8LSC46.ee060ffgg-3
Motor				
Nominal speed n_N [rpm]	2200	3000	4500	6000
Number of pole pairs	5			
Nominal torque M_n [Nm]	11.31	10.01	7.8	6.5
Nominal power P_N [W]	2606	3145	3676	4084
Nominal current I_N [A]	5.1	6.1	7.2	8
Stall torque M_0 [Nm]	13			
Stall current I_0 [A]	5.9	8	12	16
Maximum torque M_{max} [Nm]	38			
Maximum current I_{max} [A]	26.8	36.5	54.8	72.9
Maximum speed n_{max} [rpm]	12000			
Torque constant K_T [Nm/A]	2.22	1.63	1.08	0.81
Voltage constant K_E [V/1000 rpm]	134.04	98.44	64.93	49.22
Stator resistance R_{2ph} [Ω]	3.61	1.92	0.8	0.48
Stator inductance L_{2ph} [mH]	32	17.44	7.75	4.36
Electrical time constant t_{el} [ms]	8.9	9.1	9.7	9.1
Thermal time constant t_{therm} [min]	40			
Moment of inertia J [kgcm²]	4.39			
Weight without brake m [kg]	8.9			
Holding brake				
Holding torque of brake M_{Br} [Nm]	8			
Mass of brake [kg]	1			
Moment of inertia of brake J_{Br} [kgcm²]	0.69			
Recommendations				
ACOPOS 8Vxxxx.xx...	1090		1180	
ACOPOSmulti 8BVIxxxx...	0055	0110		0220
ACOPOS P3 8EIxxxx...	8X8X		017X	024X
Cross section for B&R motor cables [mm²]	0.75		1.5	
Connector size	1.0			

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 guideline; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).

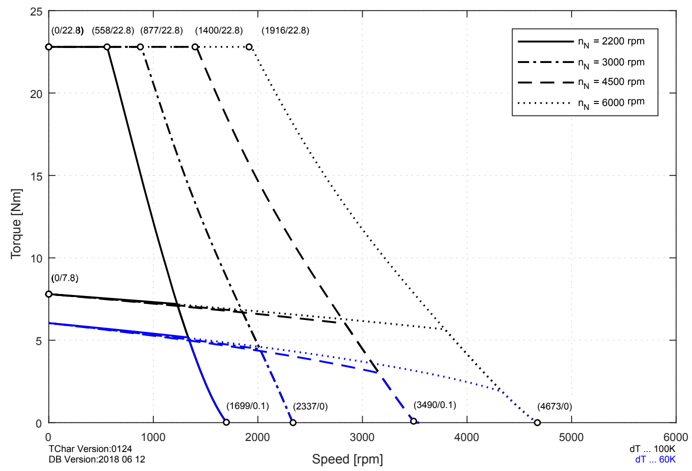
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

2.15.1.1 Speed-torque characteristic curves at 325 VDC DC bus voltage

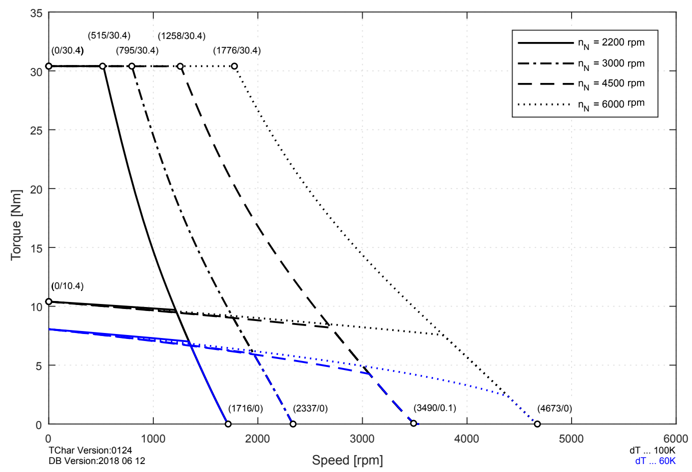
8LSC43.eennnffgg-3



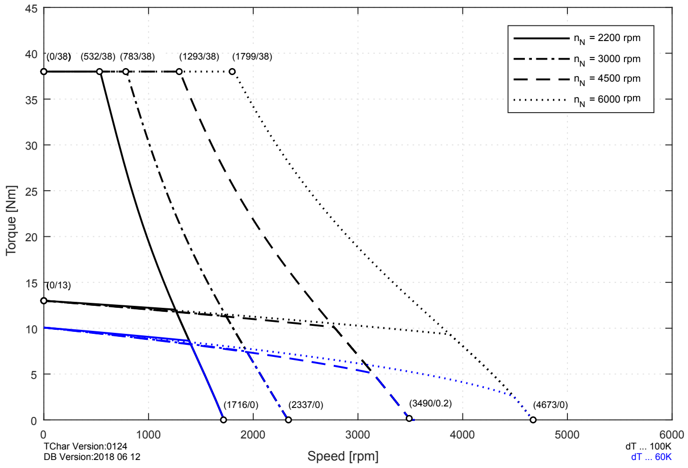
8LSC44.eennnffgg-3



8LSC45.eennnffgg-3

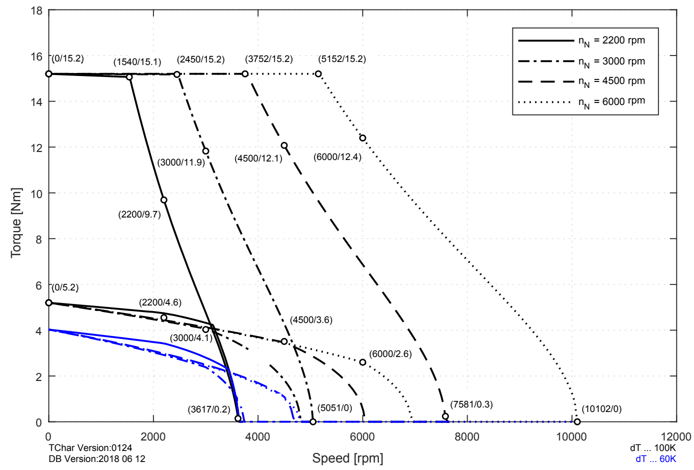


8LSC46.eennnffgg-3

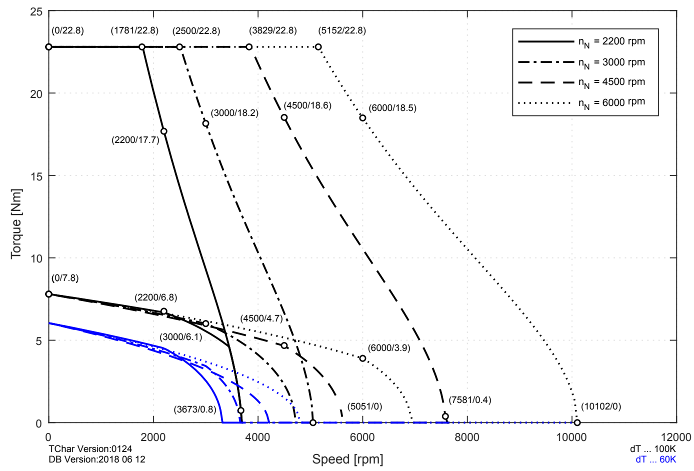


2.15.1.2 Speed-torque characteristic curves at 750 VDC DC bus voltage

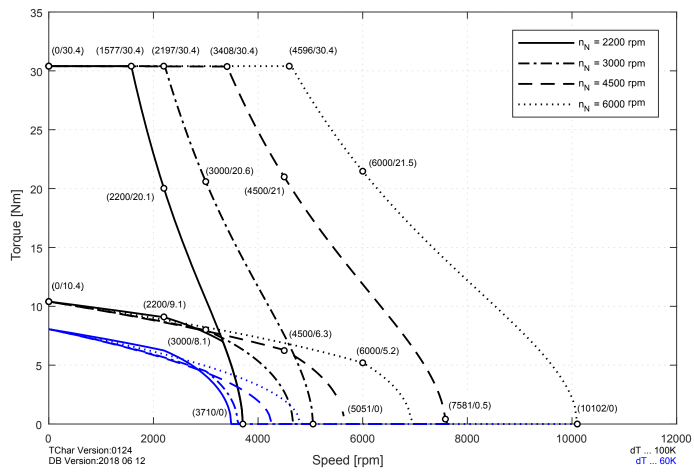
8LSC43.eennnffgg-3



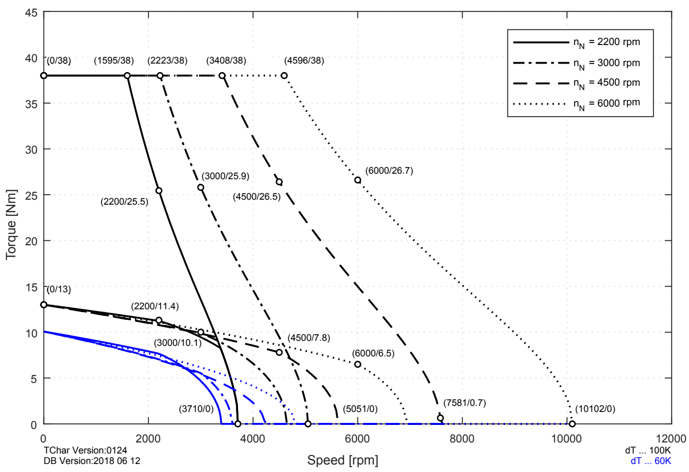
8LSC44.eennnffgg-3



8LSC45.eennnffgg-3

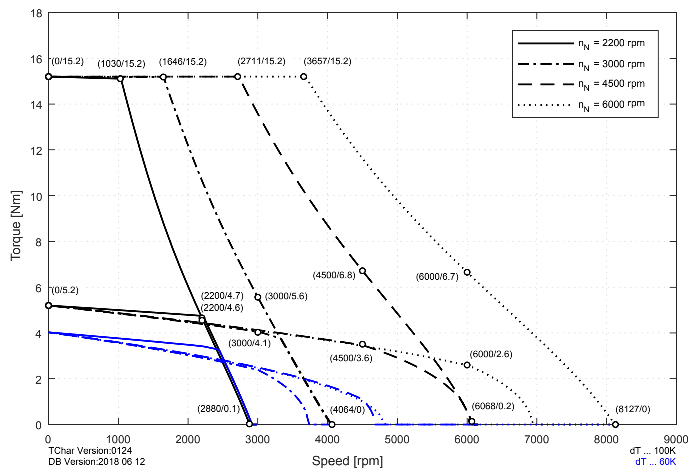


8LSC46.eennnffgg-3

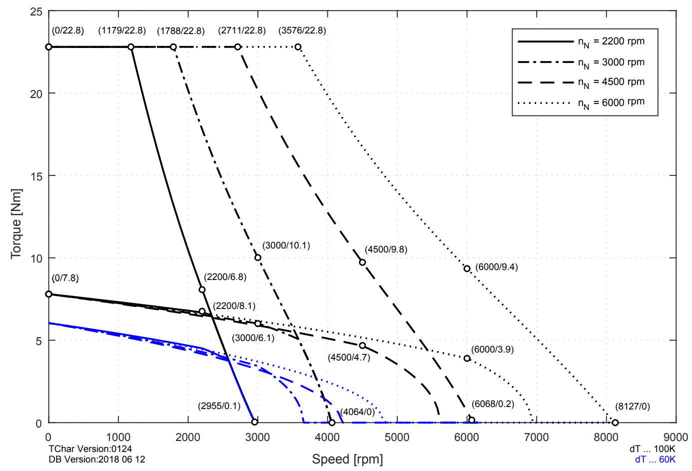


2.15.1.3 Speed-torque characteristic curves at 560 VDC DC bus voltage

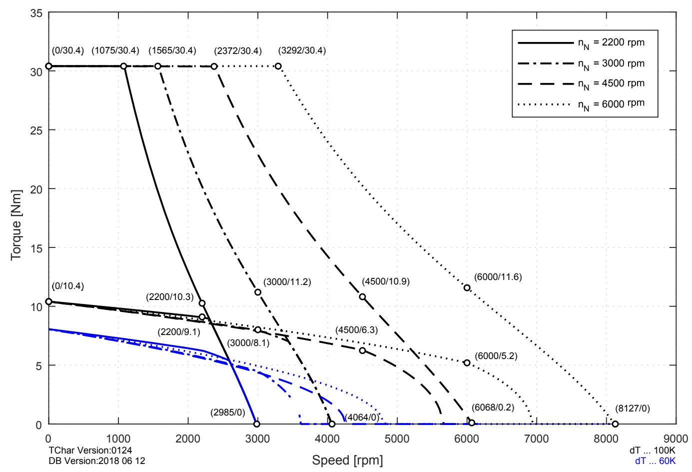
8LSC43.eennnffgg-3



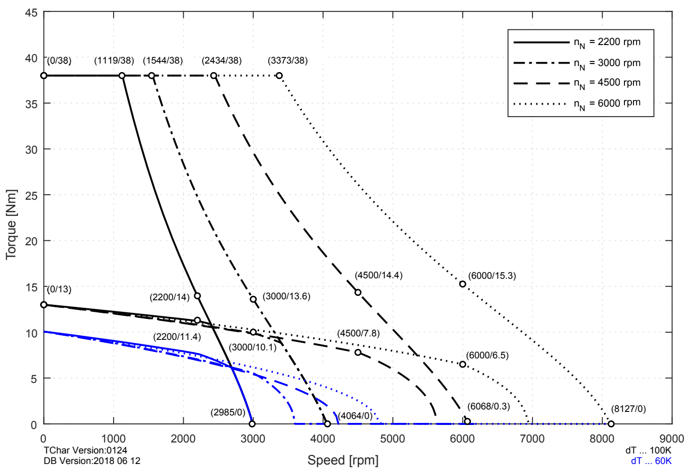
8LSC44.eennnffgg-3



8LSC45.eennnffgg-3



8LSC46.eennnffgg-3

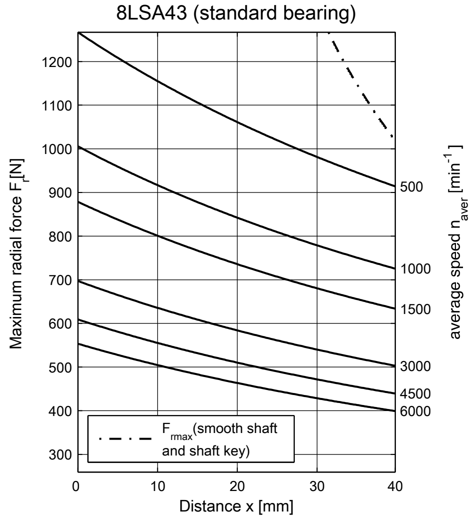


2.15.1.4 Maximum shaft load

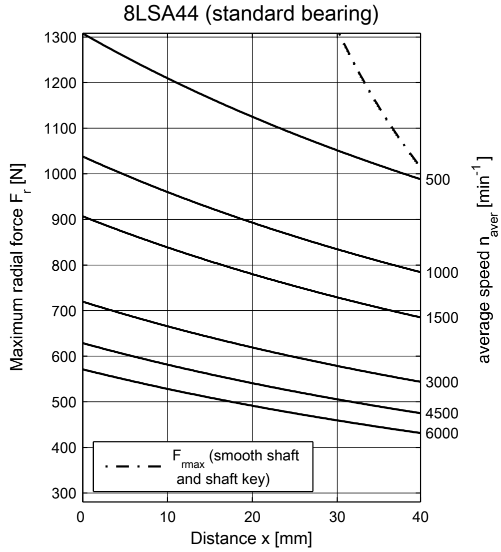
Note the information in section "Load capacity of the shaft end and bearing" on page 273 of chapter "Installation conditions".

2.15.1.4.1 8LSA4...3 / 8LSC4...-3 - Standard bearing

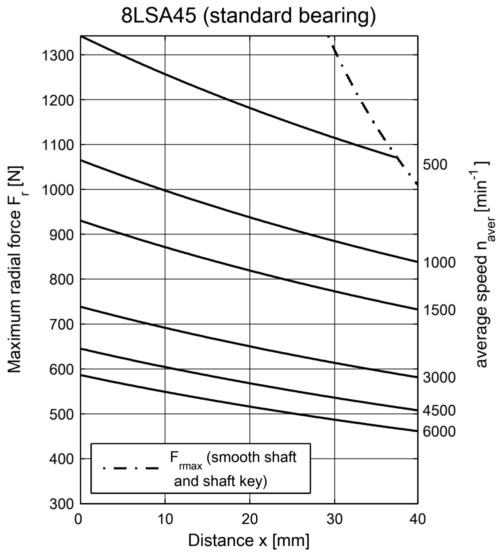
Shaft load values apply to both 8LSA and 8LSC!



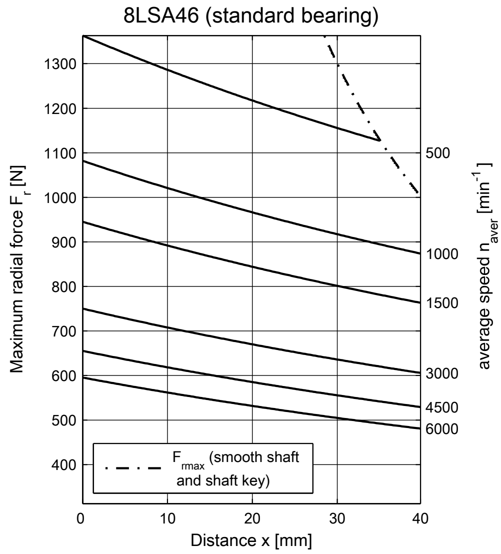
maximum allowed axial force: F_{amax} = 111 N



maximum allowed axial force: F_{amax} = 118 N



maximum allowed axial force: F_{amax} = 124 N

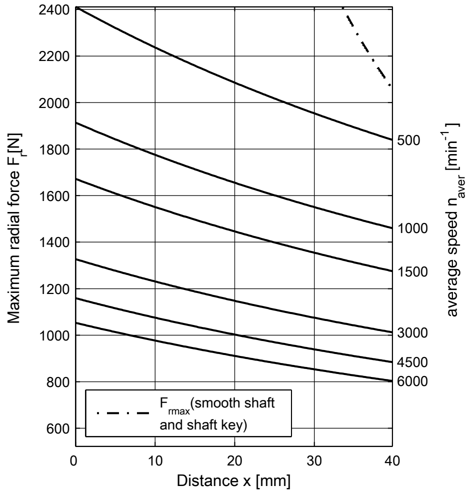


maximum allowed axial force: F_{amax} = 127 N

2.15.1.4.2 8LSA4...-3 / 8LSC4...-3 - Reinforced bearing

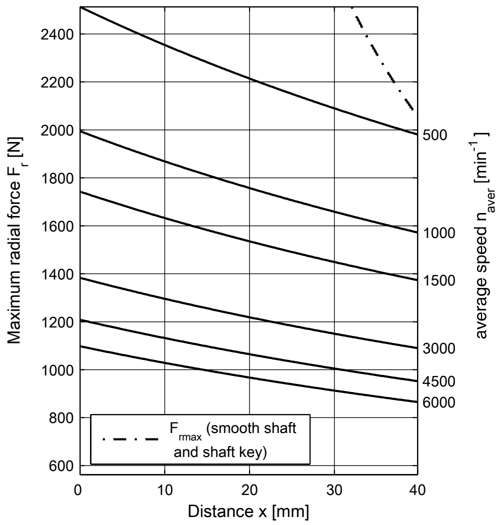
Shaft load values apply to both 8LSA and 8LSC!

8LSA43 (special option "reinforced A side bearing")



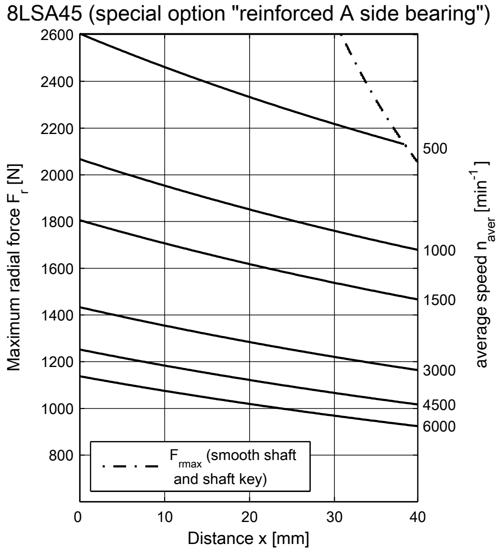
maximum allowed axial force: F_{amax}= 218 N

8LSA44 (special option "reinforced A side bearing")



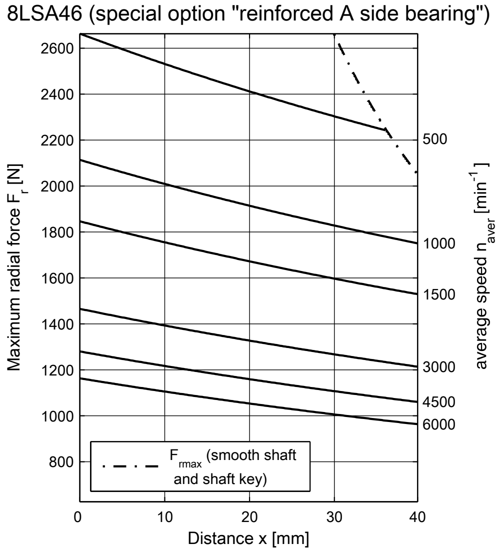
maximum allowed axial force: F_{amax} = 232 N

8LSA45 (special option "reinforced A side bearing")



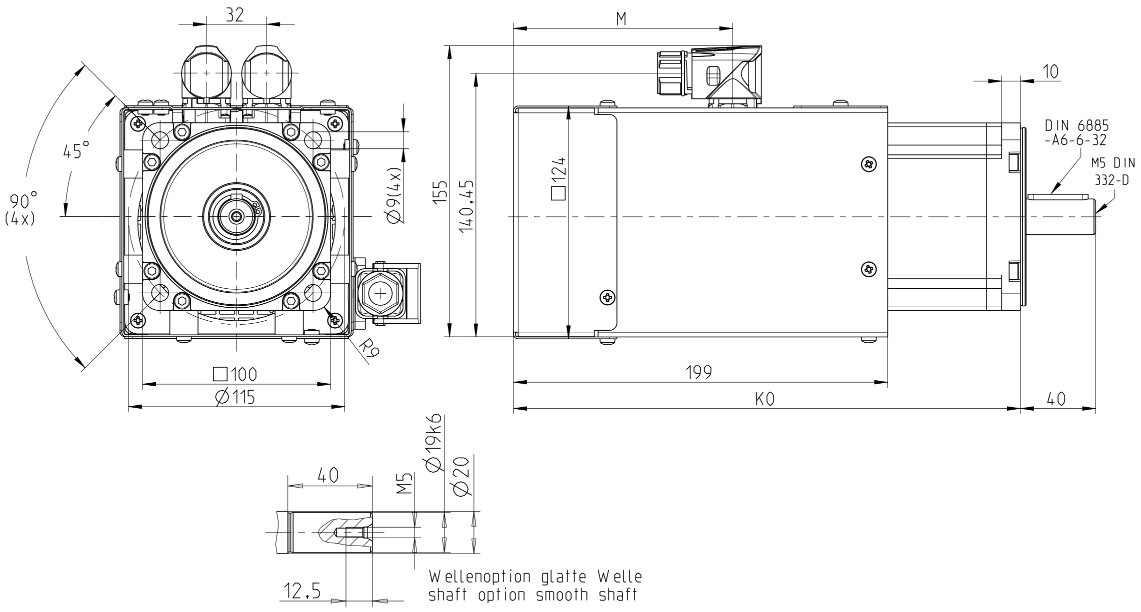
maximum allowed axial force: F_{amax} = 244 N

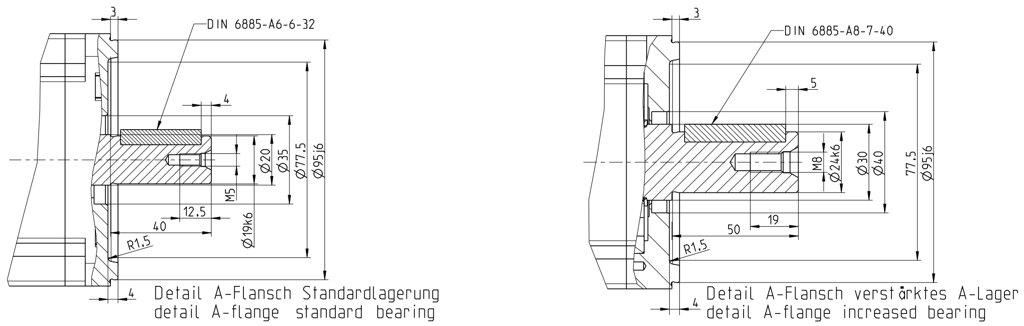
8LSA46 (special option "reinforced A side bearing")



maximum allowed axial force: F_{amax} = 252 N

2.15.1.5 8LSC4...-3 - Dimensions

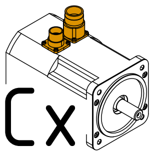


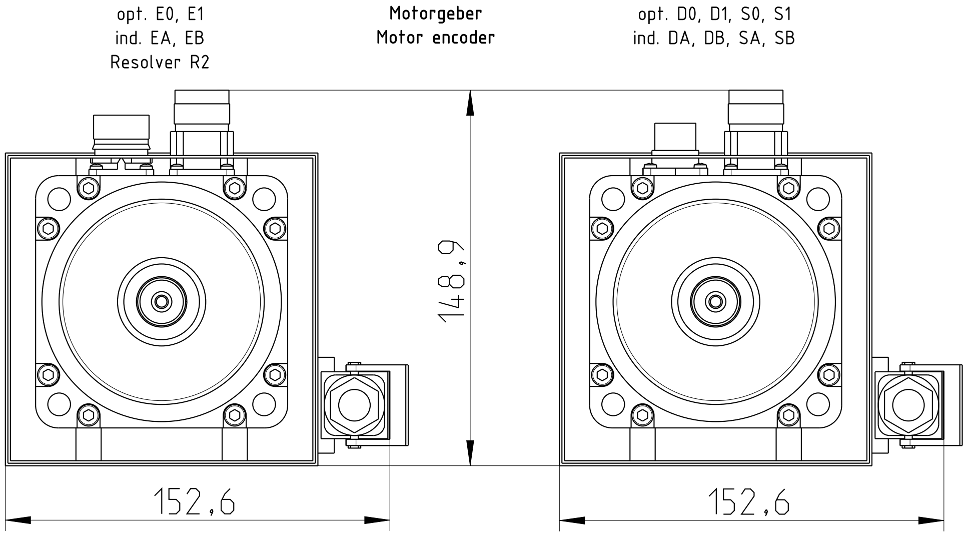


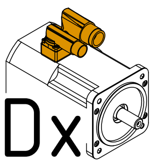
EnDat/Resolver feedback			Extension of K_0, K_1 and M depending on the motor option [mm]		
Model number	**K**	**M**	**Holding brake**	**Heavy-duty holding brake**	**Reinforced A-side bearing**
8LSC43.eennnffgg-3	250	117	32	37	15
8LSC44.eennnffgg-3	270	117	32	37	15
8LSC45.eennnffgg-3	294	117	32	37	15
8LSC46.eennnffgg-3	314	117	32	37	15

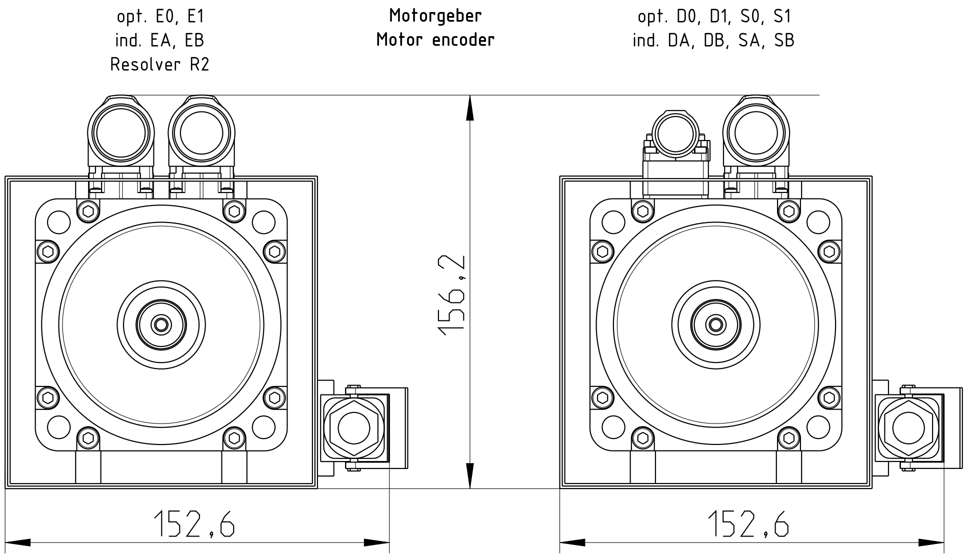
IMPORTANT: Motor option "oil seal" has no effect on the motor length.

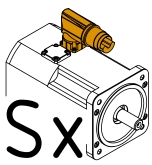
2.15.1.6 8LSC4...-3 - Connection dimensions

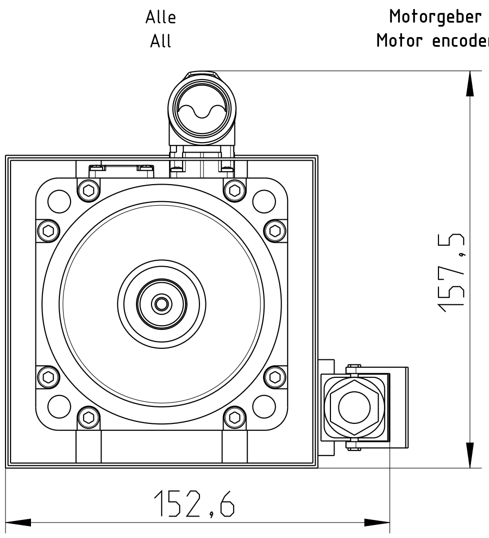












2.15.2 8LSC5...-3 - Technical data

Model number	8LSC53. ee022ffgg-3	8LSC53. ee030ffgg-3	8LSC53. ee045ffgg-3	8LSC54. ee022ffgg-3	8LSC54. ee030ffgg-3	8LSC54. ee045ffgg-3
Motor						
Nominal speed n_N [rpm]	2200	3000	4500	2200	3000	4500
Number of pole pairs	4					
Nominal torque M_n [Nm]	5.46	5.2	5.07	10.14	10.01	9.49
Nominal power P_N [W]	1258	1634	2389	2336	3145	4472
Nominal current I_N [A]	2.5	3.2	4.6		6.1	8.7
Stall torque M_0 [Nm]	5.85			11.7		
Stall current I_0 [A]	2.6	3.6	5.4	5.3	7.2	10.7
Maximum torque M_{max} [Nm]	13.8			27.6		
Maximum current I_{max} [A]	8	10.5	16.5	15.4	20.9	33
Maximum speed n_{max} [rpm]	9000					
Torque constant K_T [Nm/A]	2.22	1.63	1.09	2.22	1.63	1.09
Voltage constant K_E [V/1000 rpm]	134.04	98.44	65.97	134.04	98.44	65.97
Stator resistance R_{2ph} [Ω]	10.9	5.13	2.222	3.44	2.16	0.926
Stator inductance L_{2ph} [mH]	95.92	40.33	19.33	34.5	21.52	8.67
Electrical time constant t_{el} [ms]	8.8	7.9	8.7	10	10.6	10.9
Thermal time constant t_{therm} [min]	33			37		
Moment of inertia J [kgcm²]	3.62			6.04		
Weight without brake m [kg]	8.5			10.8		
Holding brake						
Holding torque of brake M_{Br} [Nm]	15					
Mass of brake [kg]	1.49		1.5	1.4		
Moment of inertia of brake J_{Br} [kgcm²]	1.66					
Recommendations						
ACOPOS 8Vxxxx.xx...	1045		1090			1180
ACOPOSmulti 8BVIxxxx...	0028	0055			0110	
ACOPOS P3 8EIxxxx...	4X5X		8X8X			013X
Cross section for B&R motor cables [mm²]	0.75					
Connector size	1.0					

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 guideline; 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.

Model number	8LSC55. ee022ffgg-3	8LSC55. ee030ffgg-3	8LSC55. ee045ffgg-3	8LSC56. ee022ffgg-3	8LSC56. ee030ffgg-3	8LSC56. ee045ffgg-3
Motor						
Nominal speed n_N [rpm]	2200	3000	4500	2200	3000	4500
Number of pole pairs	4					
Nominal torque M_n [Nm]	15.34	15.08	12.35	18.72	18.07	16.51
Nominal power P_N [W]	3534	4738	5820	4313	5677	7780
Nominal current I_N [A]	6.9	9.3	11.3	8.4	11.1	15.1
Stall torque M_0 [Nm]	16.25			20.8		
Stall current I_0 [A]	7.3	10	14.9	9.4	12.8	19.1
Maximum torque M_{max} [Nm]	41.4			55.2		
Maximum current I_{max} [A]	23.6	33	47.3	30.8	41.8	65.9
Maximum speed n_{max} [rpm]	9000					
Torque constant K_T [Nm/A]	2.22	1.63	1.09	2.22	1.63	1.09
Voltage constant K_E [V/1000 rpm]	134.04	98.44	65.97	134.04	98.44	65.97
Stator resistance R_{2ph} [Ω]	2.265	1.127	0.51	1.51	0.75	0.341
Stator inductance L_{2ph} [mH]	24.29	12.5	4.96	17.6	8.16	4.08
Electrical time constant t_{el} [ms]	10.7	11.1	9.7	11.6	10.9	12
Thermal time constant t_{therm} [min]	40			43		
Moment of inertia J [$kgcm^2$]	8.19			10.66		
Weight without brake m [kg]	12.7			15.3		
Holding brake						
Holding torque of brake M_{Br} [Nm]	15					
Mass of brake [kg]	1.5			1.4		
Moment of inertia of brake J_{Br} [$kgcm^2$]	1.66					
Recommendations						
ACOPOS 8Vxxxx.xx...	1090	1180				1320
ACOPOSmulti 8BVIxxxx...	0110		0220	0110		0220
ACOPOS P3 8EIxxxx...	8X8X	013X	017X	013X	017X	024X
Cross section for B&R motor cables [mm^2]	0.75		1.5	0.75	1.5	4
Connector size	1.0					

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 guideline; 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.

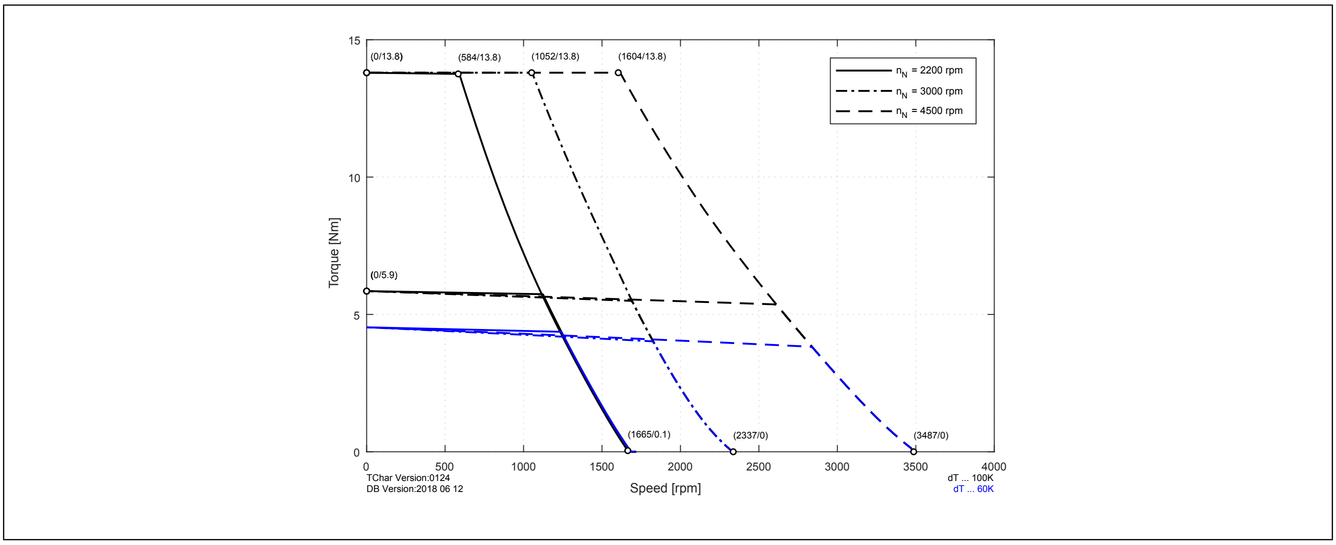
Model number	8LSC57.ee022ffgg-3	8LSC57.ee030ffgg-3	8LSC57.ee045ffgg-3
Motor			
Nominal speed n_N [rpm]	2200	3000	4500
Number of pole pairs	4		
Nominal torque M_n [Nm]	23.4	22.75	19.5
Nominal power P_N [W]	5391	7147	9189
Nominal current I_N [A]	10.6	14	17.9
Stall torque M_0 [Nm]	26		
Stall current I_0 [A]	11.7	16	23.8
Maximum torque M_{max} [Nm]	69		
Maximum current I_{max} [A]	38.4	52.6	82.6
Maximum speed n_{max} [rpm]	9000		
Torque constant K_T [Nm/A]	2.22	1.63	1.09
Voltage constant K_E [V/1000 rpm]	134.04	98.44	65.97
Stator resistance R_{2ph} [Ω]	1.13	0.62	0.29
Stator inductance L_{2ph} [mH]	13.17	7.21	3.2
Electrical time constant t_{el} [ms]	11.7	11.6	11
Thermal time constant t_{therm} [min]	46		
Moment of inertia J [kgcm²]	13.13		
Weight without brake m [kg]	16.8		
Holding brake			
Holding torque of brake M_{Br} [Nm]	15		
Mass of brake [kg]	1.3		
Moment of inertia of brake J_{Br} [kgcm²]	1.66		
Recommendations			
ACOPOS 8Vxxxx.xx...	1180		1320
ACOPOSmulti 8BVIxxxx...	0110	0220	0330
ACOPOS P3 8EIxxxx...	013X	024X	034X
Cross section for B&R motor cables [mm²]	1.5		4
Connector size	1.0		

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 guideline; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).

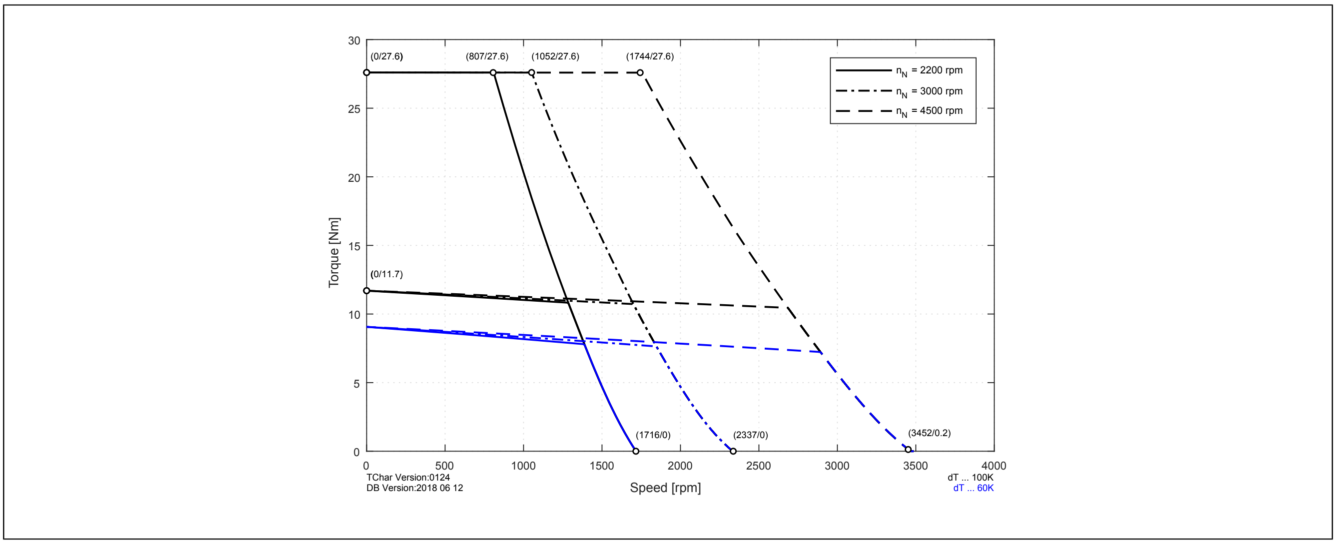
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

2.15.2.1 Speed-torque characteristic curves at 325 VDC DC bus voltage

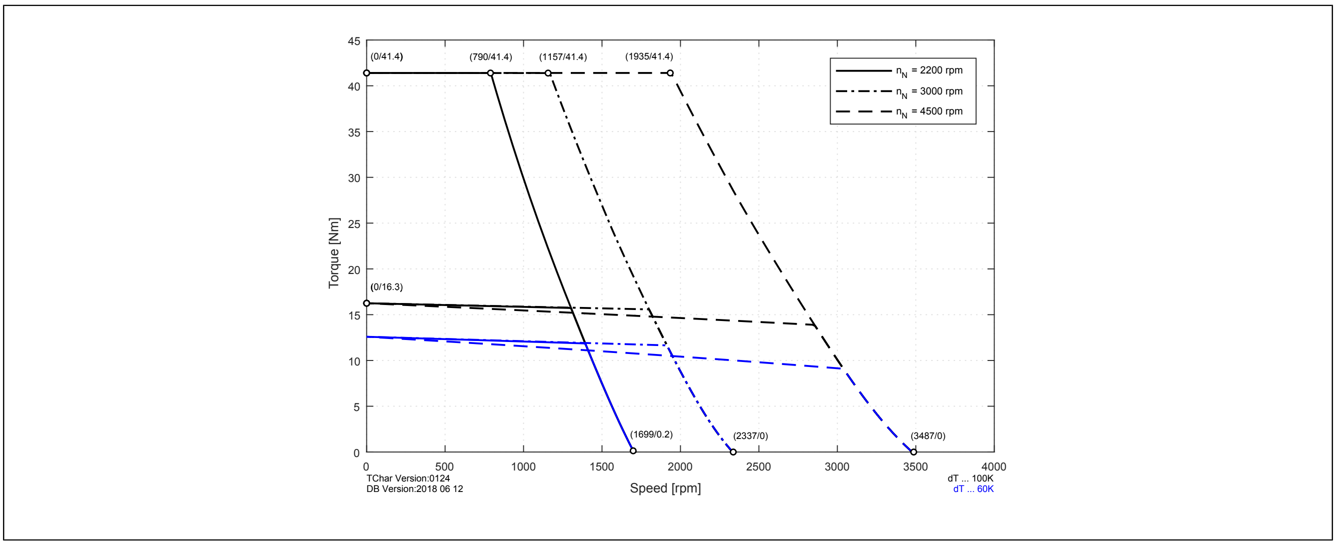
8LSC53.eennnffgg-3



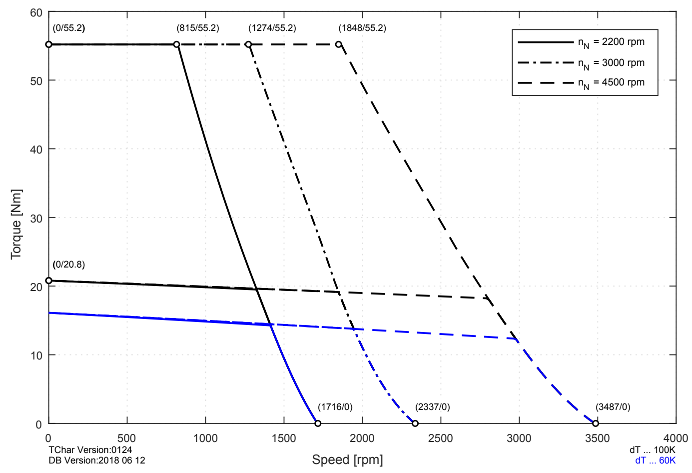
8LSC54.eennnffgg-3



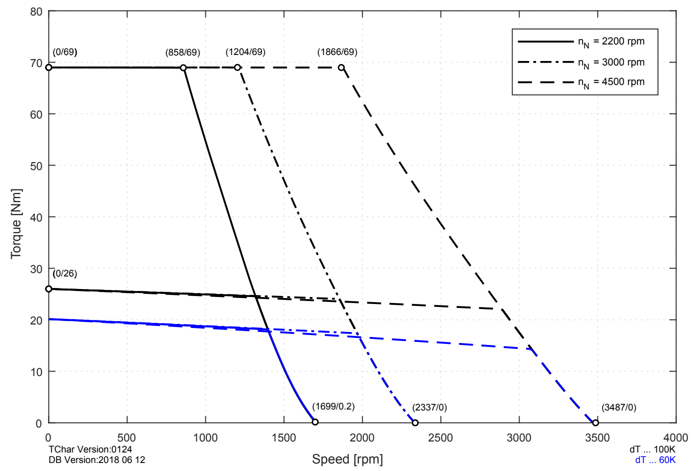
8LSC55.eennnffgg-3



8LSC56.eennnffgg-3

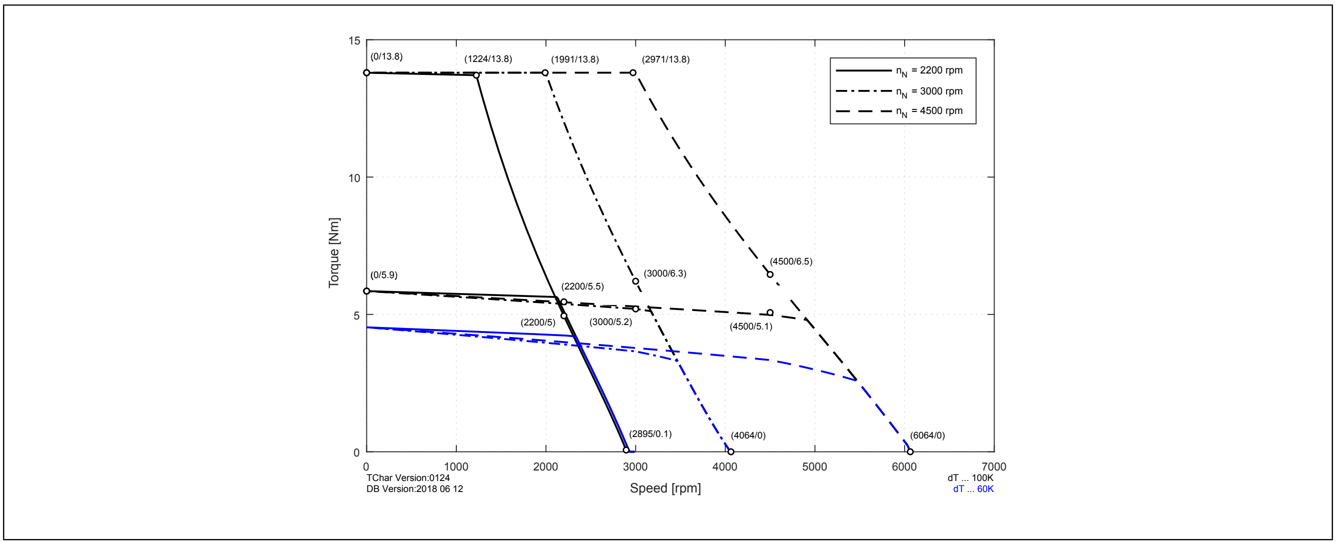


8LSC57.eennnffgg-3

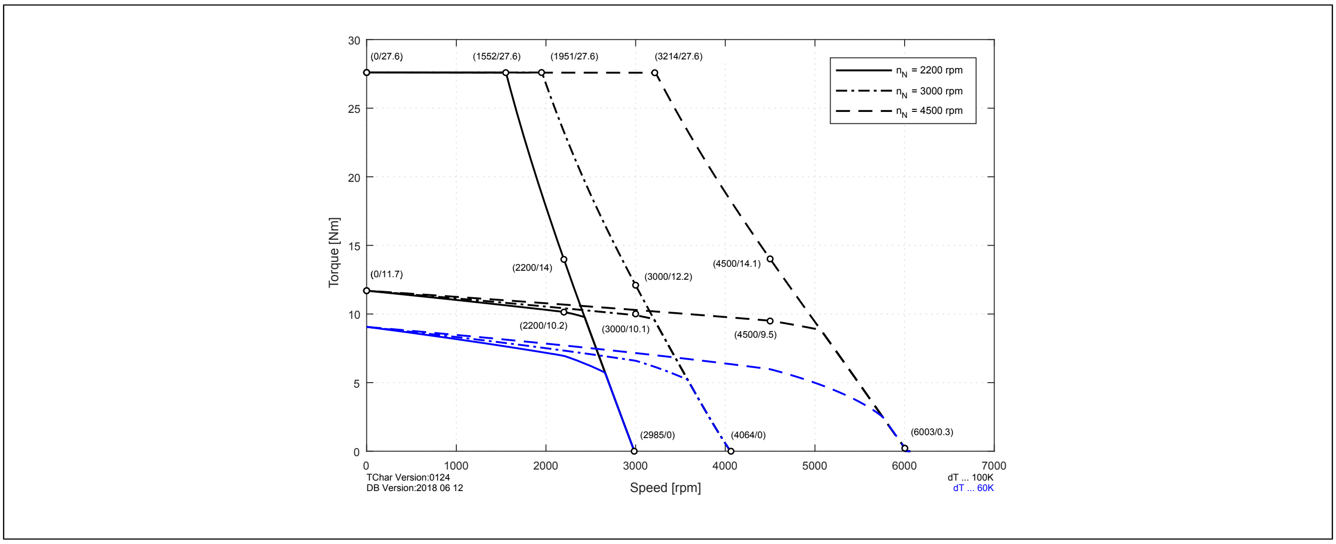


2.15.2.2 Speed-torque characteristic curves at 560 VDC DC bus voltage

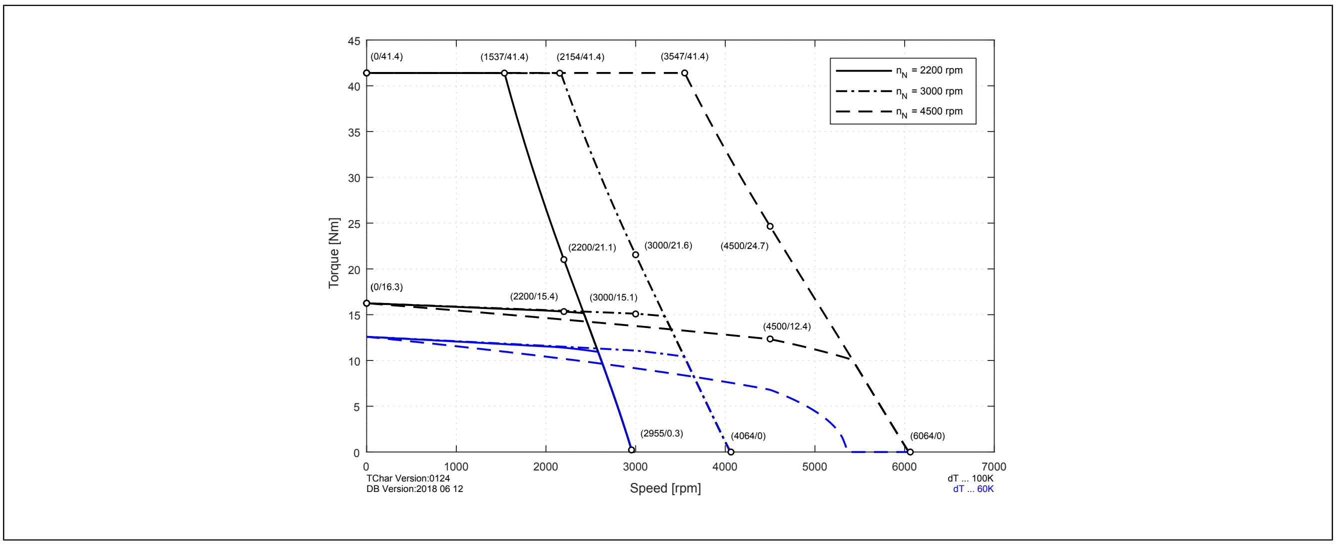
8LSC53.eennnffgg-3



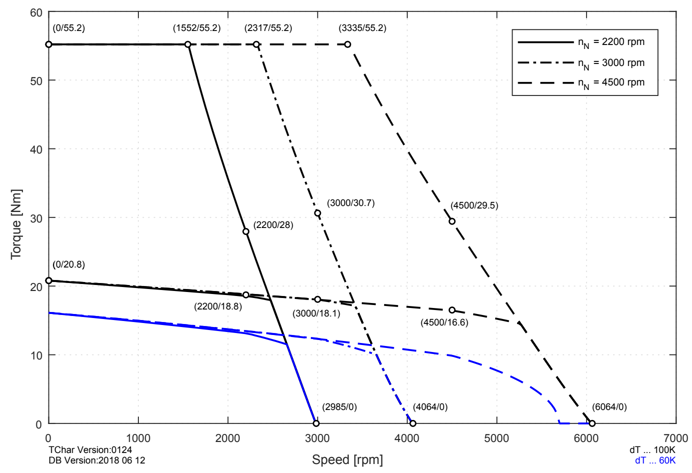
8LSC54.eennnffgg-3



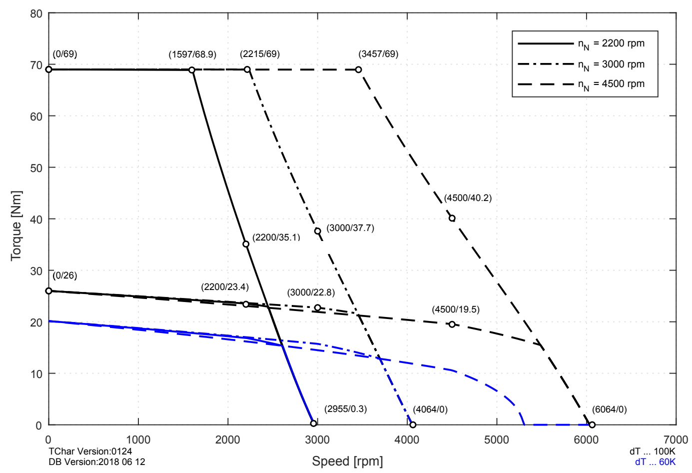
8LSC55.eennnffgg-3



8LSC56.eennnffgg-3

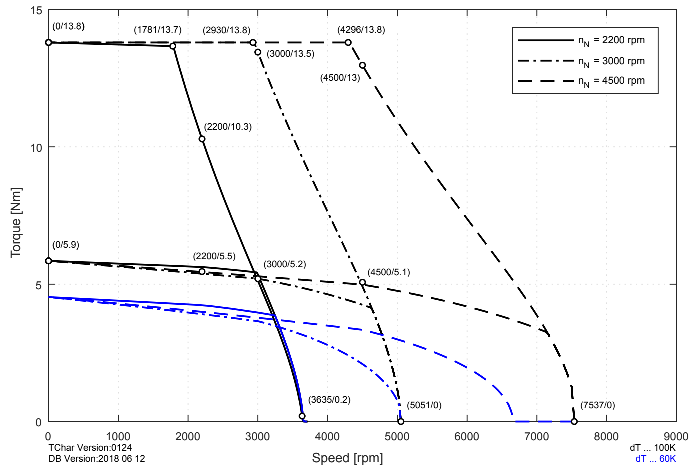


8LSC57.eennnffgg-3

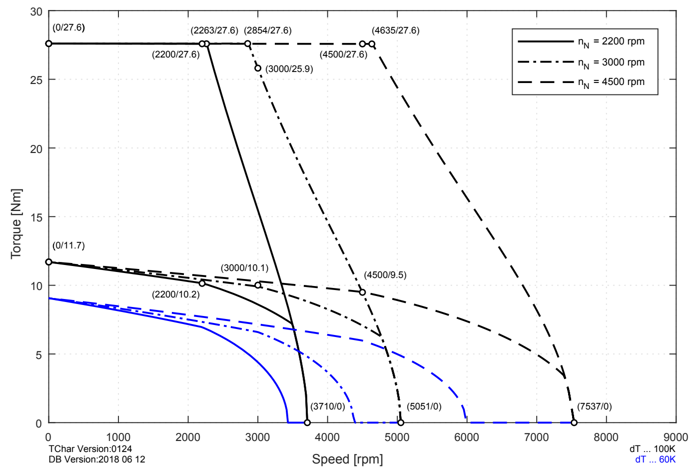


2.15.2.3 Speed-torque characteristic curves at 750 VDC DC bus voltage

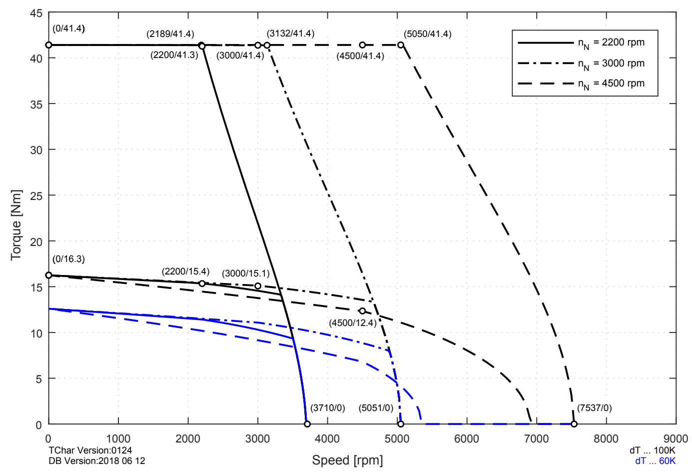
8LSC53.eennnffgg-3



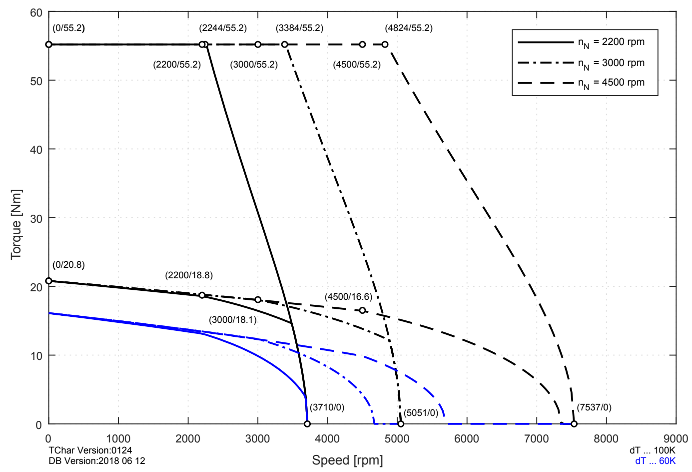
8LSC54.eennnffgg-3



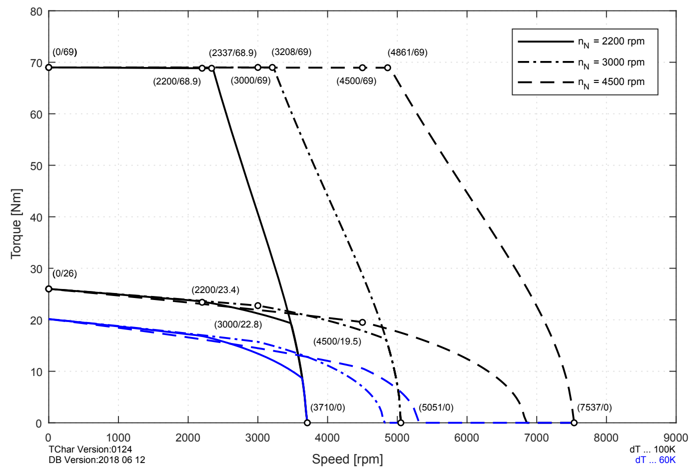
8LSC55.eennnffgg-3



8LSC56.eennnffgg-3



8LSC57.eennnffgg-3



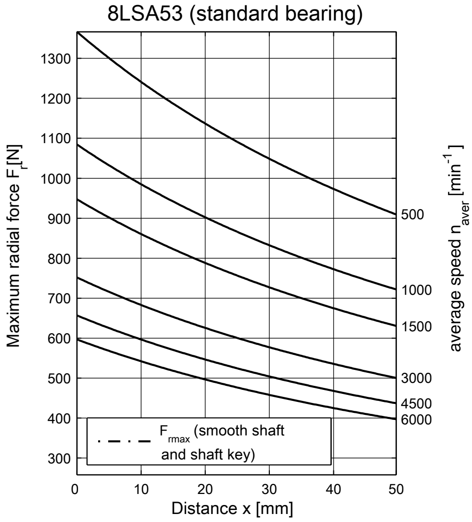
2.15.2.4 Maximum shaft load

Note the information in section "Load capacity of the shaft end and bearing" on page 273 of chapter "Installation conditions".

2.15.2.4.1 8LSA5...-3 / 8LSC5...-3 - Standard bearing

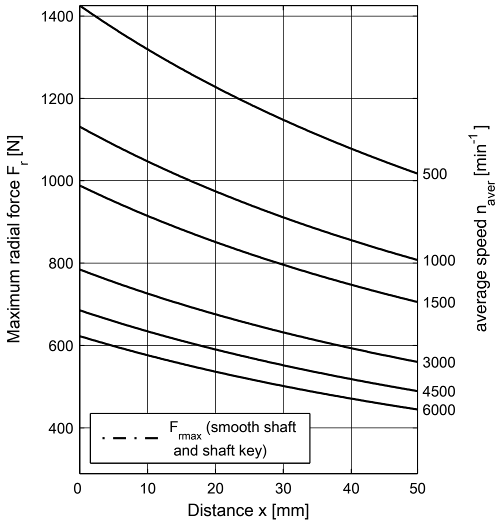
Shaft load values apply to both 8LSA and 8LSC!

8LSA53 (standard bearing)



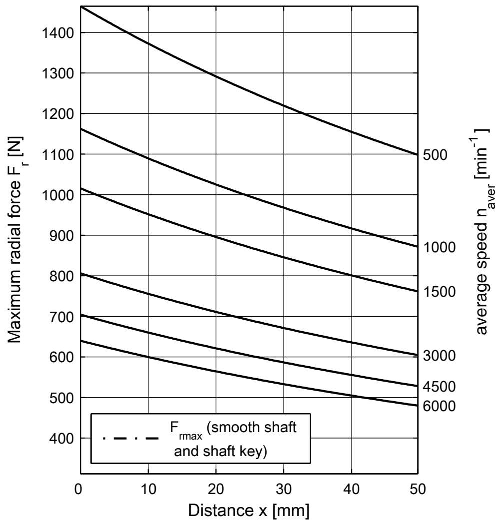
maximum allowed axial force: F_{amax} = 114 N

8LSA54 (standard bearing)



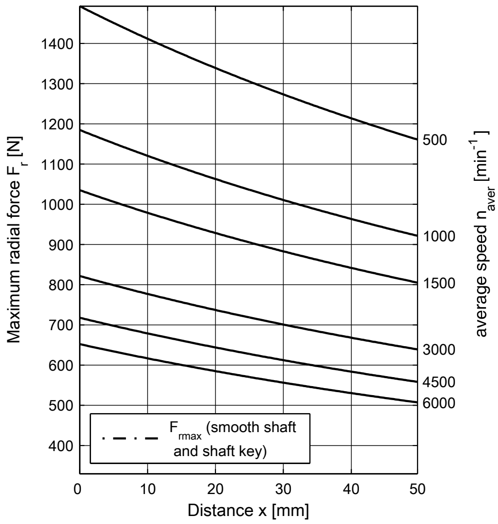
maximum allowed axial force: F_{amax} = 124 N

8LSA55 (standard bearing)



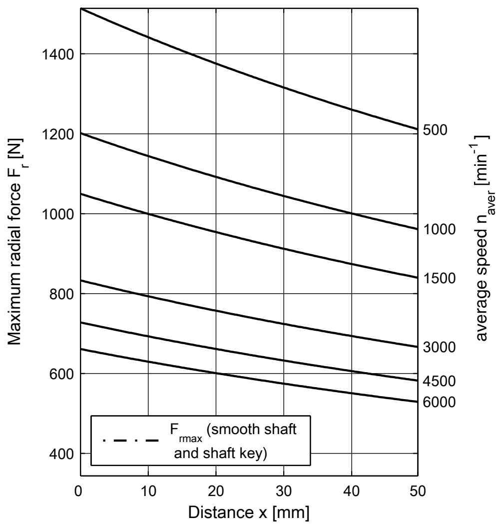
maximum allowed axial force: F_{amax} = 131 N

8LSA56 (standard bearing)



maximum allowed axial force: F_{amax} = 137 N

8LSA57 (standard bearing)

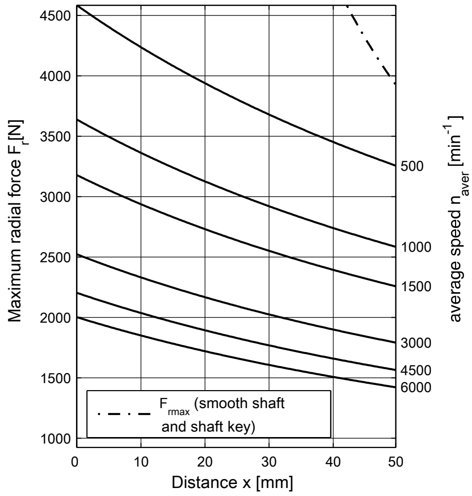


maximum allowed axial force: F_{amax} = 141 N

2.15.2.4.2 8LSA5...-3 / 8LSC5...-3 - Reinforced bearing

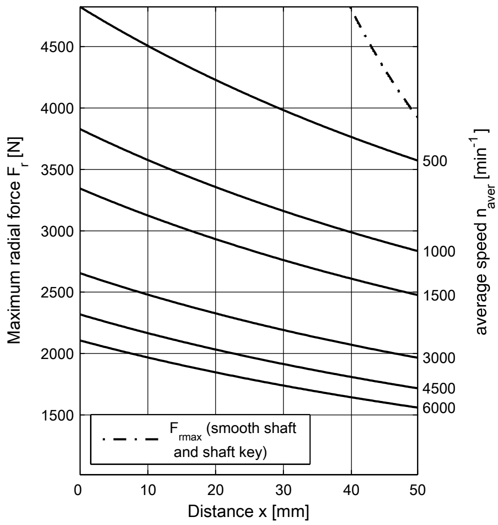
Shaft load values apply to both 8LSA and 8LSC!

8LSA53 (special option "reinforced A side bearing")



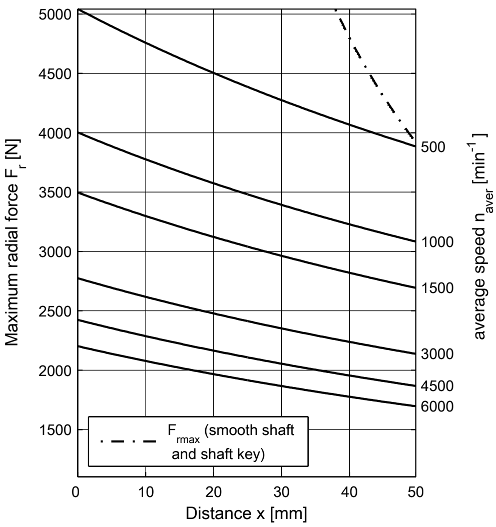
maximum allowed axial force: F_{amax} = 398 N

8LSA54 (special option "reinforced A side bearing")



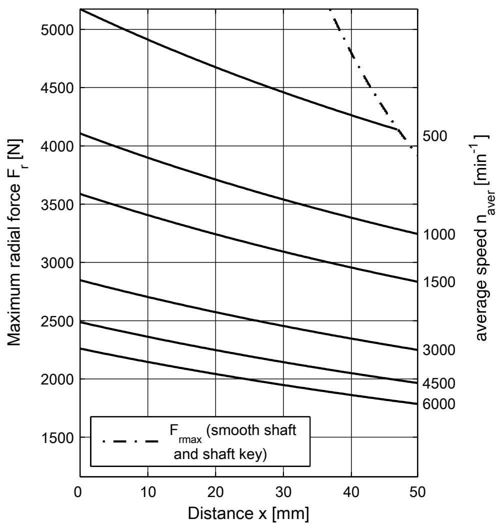
maximum allowed axial force: F_{amax} = 429 N

8LSA55 (special option "reinforced A side bearing")



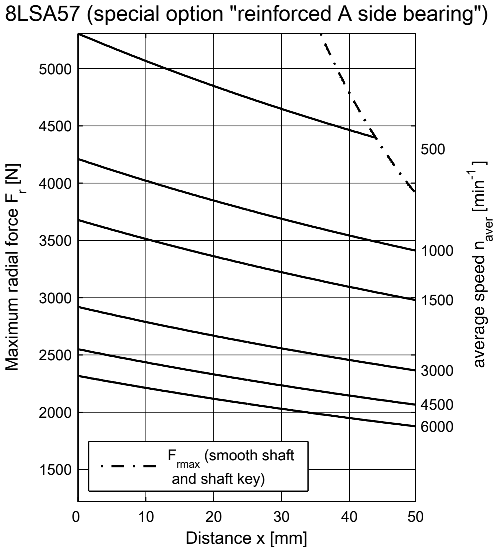
maximum allowed axial force: F_{amax} = 459 N

8LSA56 (special option "reinforced A side bearing")



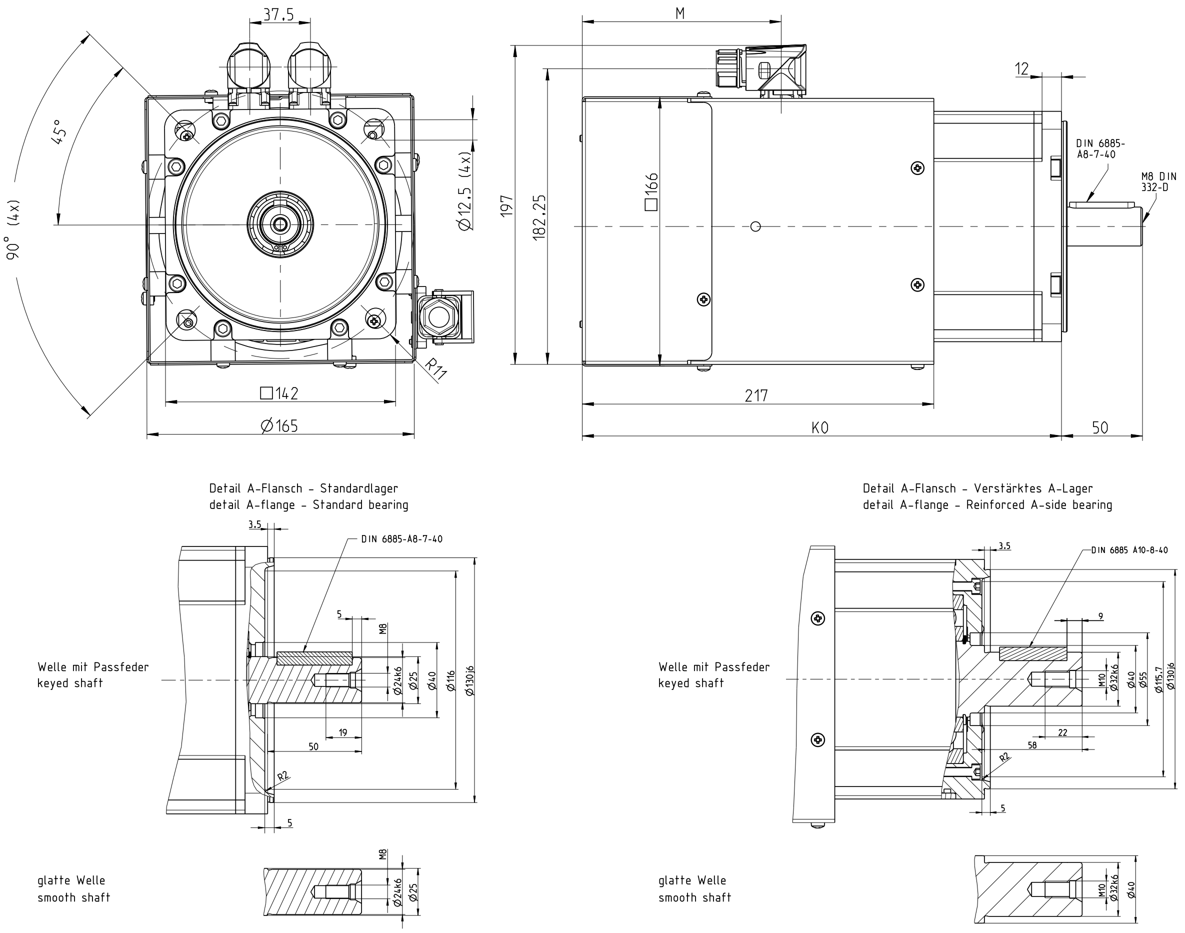
maximum allowed axial force: F_{amax} = 478 N

8LSA57 (special option "reinforced A side bearing")



maximum allowed axial force: F_{amax} = 497 N

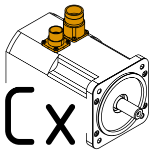
2.15.2.5 8LSC5...-3 - Dimensions

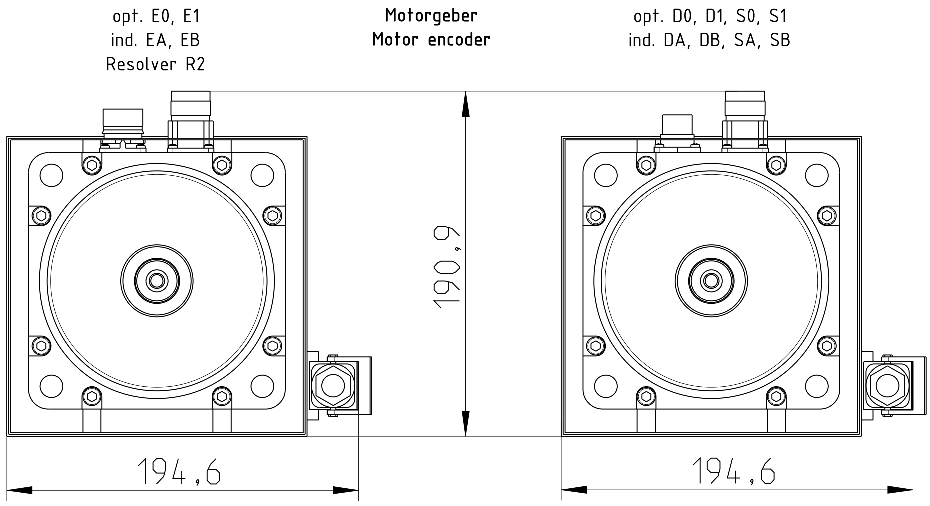


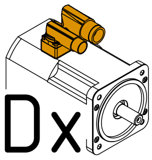
EnDat/Resolver feedback			Extension of K_0 and M depending on the motor option [mm]		
Model number	**K_0**	**M**	**Holding brake**	**Heavy-duty holding brake**	**Reinforced A-side bearing**
8LSC53.eennnffgg-3	246	123	35	50	15
8LSC54.eennnffgg-3	271	123	35	50	10
8LSC55.eennnffgg-3	296	123	30	45	10
8LSC56.eennnffgg-3	321	123	30	45	5
8LSC57.eennnffgg-3	346	123	25	40	5

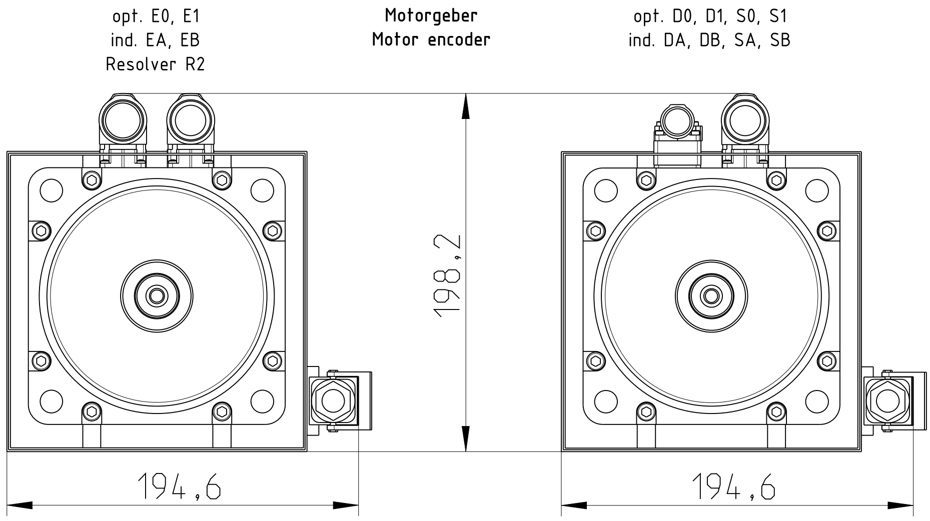
IMPORTANT: Motor option "oil seal" has no effect on the motor length.

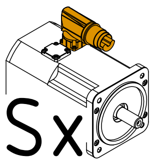
2.15.2.6 8LSC5...-3 - Connection dimensions

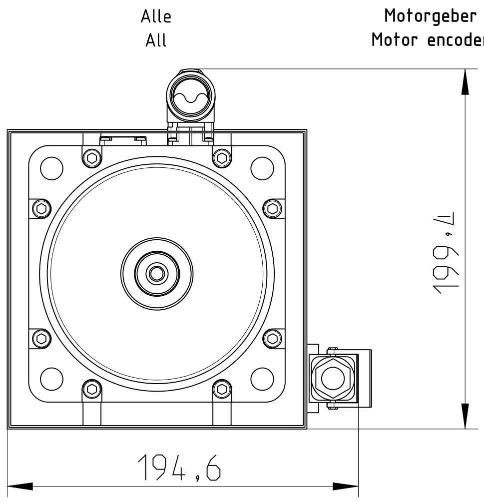












2.15.3 8LSC5A/B/C...-3 - Technical data

Model number	8LSC5A.ee022ffgg-3	8LSC5A.ee030ffgg-3	8LSC5A.ee045ffgg-3	8LSC5B.ee020ffgg-3	8LSC5B.ee022ffgg-3
Motor					
Nominal speed n_N [rpm]	2200	3000	4500	2000	2200
Number of pole pairs	5				
Nominal torque M_n [Nm]	27.5	26.4	20	47	45.5
Nominal power P_N [W]	6336	8294	9425	9844	10482
Nominal current I_N [A]	12.4	16.2	18.4	19.3	20.5
Stall torque M_0 [Nm]	31			50	
Stall current I_0 [A]	14	19	28.5	20.5	22.5
Maximum torque M_{max} [Nm]	84			131	
Maximum current I_{max} [A]	50	69	103	71	78
Maximum speed n_{max} [rpm]	6000				
Torque constant K_T [Nm/A]	2.22	1.63	1.09	2.44	2.22
Voltage constant K_E [V/1000 rpm]	134.04	98.44	65.97	147.65	134.04
Stator resistance R_{2ph} [Ω]	0.83	0.45	0.19	0.595	0.5
Stator inductance L_{2ph} [mH]	11	5.9	2.47	7.97	7
Electrical time constant t_{el} [ms]	13.25	13.11	13	13.4	14
Thermal time constant t_{therm} [min]	45			51	
Moment of inertia J [kgcm²]	16			24.7	
Weight without brake m [kg]	20.5			27	
Holding brake					
Holding torque of brake M_{Br} [Nm]	17			60	
Mass of brake [kg]	0				
Moment of inertia of brake J_{Br} [kgcm²]	3.6			14.7	
Recommendations					
ACOPOS 8Vxxxx.xx...	1180	1320			
ACOPOSmulti 8BVIxxxx...	0220		0330		
ACOPOS P3 8EIxxxx...	017X	024X	034X	024X	034X
Cross section for B&R motor cables [mm²]	1.5	4			
Connector size	1.0		1.5	1.0	

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 guideline; 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.

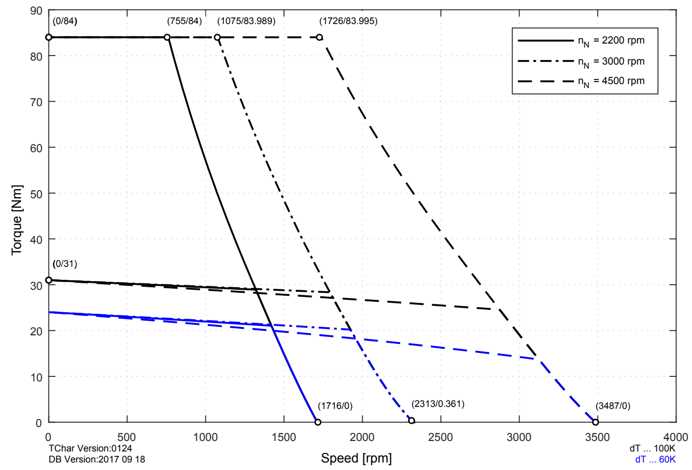
Model number	8LSC5B.ee030ffgg-3	8LSC5B.ee040ffgg-3	8LSC5C.ee015ffgg-3	8LSC5C.ee022ffgg-3	8LSC5C.ee030ffgg-3
Motor					
Nominal speed n_N [rpm]	3000	4000	1500	2200	3000
Number of pole pairs	5				
Nominal torque M_n [Nm]	42	36	67	65	58
Nominal power P_N [W]	13195	15080	10524	14975	18221
Nominal current I_N [A]	25.8	29.3	20.6	29.3	35.6
Stall torque M_0 [Nm]	50		70		
Stall current I_0 [A]	30.7	40.7	21.5	31.6	43
Maximum torque M_{max} [Nm]	131		177		
Maximum current I_{max} [A]	107	141	72	106	145
Maximum speed n_{max} [rpm]	6000				
Torque constant K_T [Nm/A]	1.63	1.23	3.26	2.22	1.63
Voltage constant K_E [V/1000 rpm]	98.44	74.35	196.87	134.04	98.44
Stator resistance R_{2ph} [Ω]	0.27	0.15	0.771	0.359	0.19
Stator inductance L_{2ph} [mH]	3.8	2.2	11.35	5.15	2.9
Electrical time constant t_{el} [ms]	14.07	14.67	14.3		15.26
Thermal time constant t_{therm} [min]	51		57		
Moment of inertia J [kgcm²]	24.7		33		
Weight without brake m [kg]	27		33		
Holding brake					
Holding torque of brake M_{Br} [Nm]	60				
Mass of brake [kg]	0				
Moment of inertia of brake J_{Br} [kgcm²]	14.7				
Recommendations					
ACOPOS 8Vxxxx.xx...	1320	1640	1320	1640	
ACOPOSmulti 8BVIxxxx...	0440	0660	0330	0440	0660
ACOPOS P3 8EIxxxx...	034X	-	024X	044X	-
Cross section for B&R motor cables [mm²]	4	10	4		10
Connector size	1.5		1.0	1.5	

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 guideline; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).

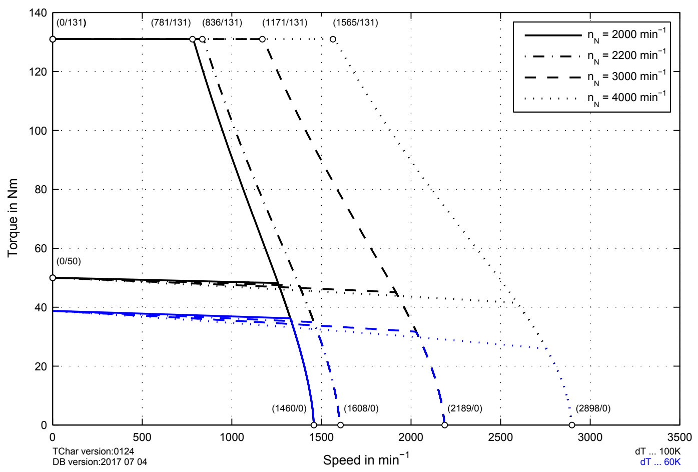
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

2.15.3.1 Speed-torque characteristic curves at 325 VDC DC bus voltage

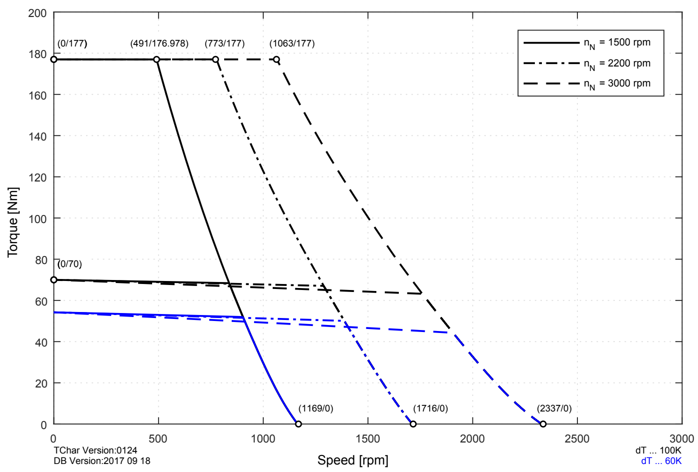
8LSC5A.eennnffgg-3



8LSC5B.eennnffgg-3

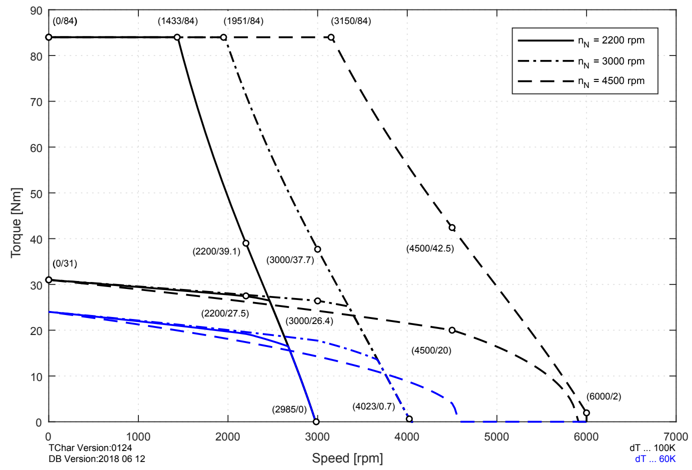


8LSC5C.eennnffgg-3

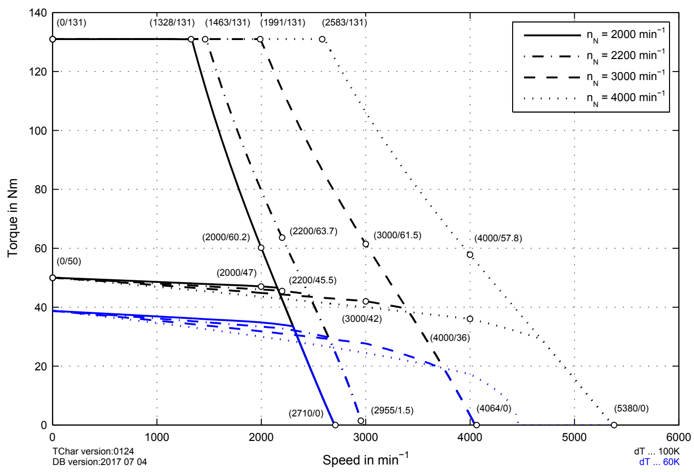


2.15.3.2 Speed-torque characteristic curves at 560 VDC DC bus voltage

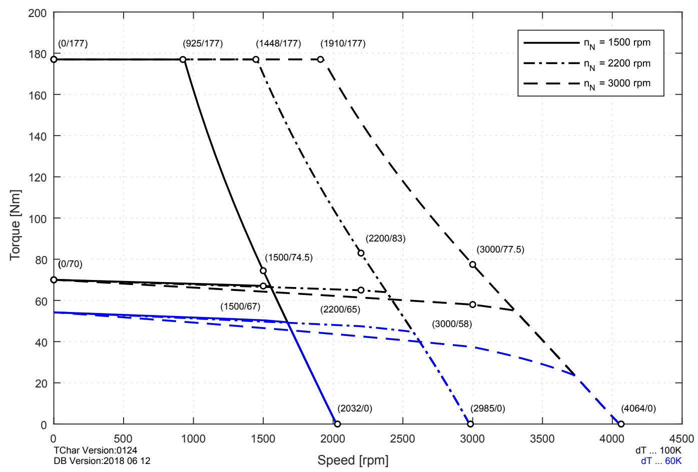
8LSC5A.eennnffgg-3



8LSC5B.eennnffgg-3

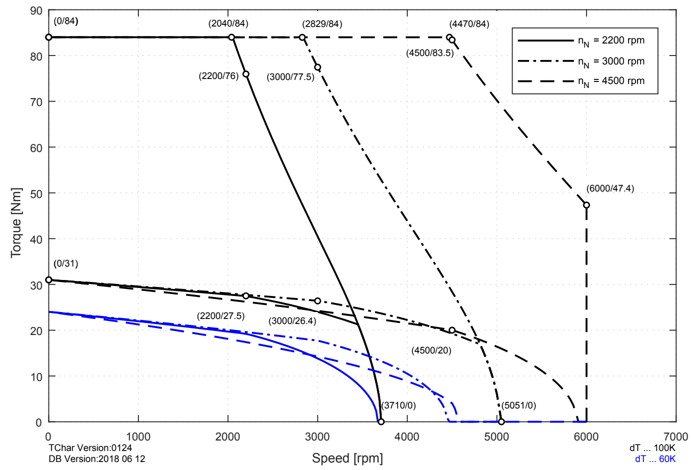


8LSC5C.eennnffgg-3

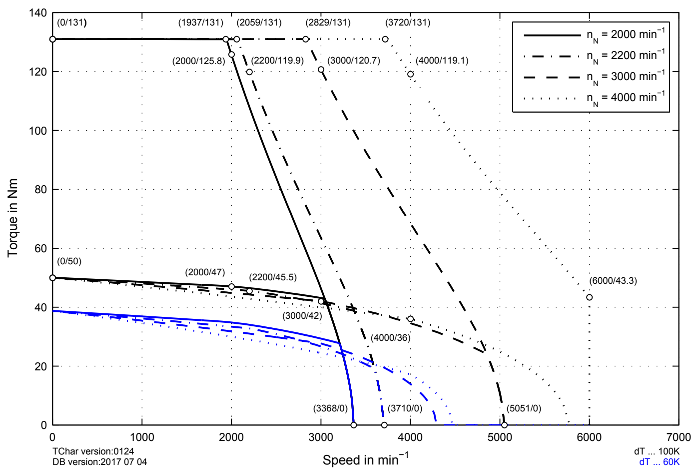


2.15.3.3 Speed-torque characteristic curves at 750 VDC DC bus voltage

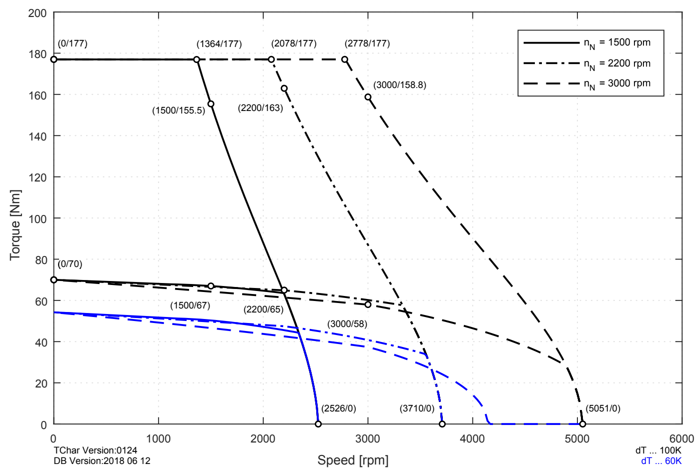
8LSC5A.eennnffgg-3



8LSC5B.eennnffgg-3



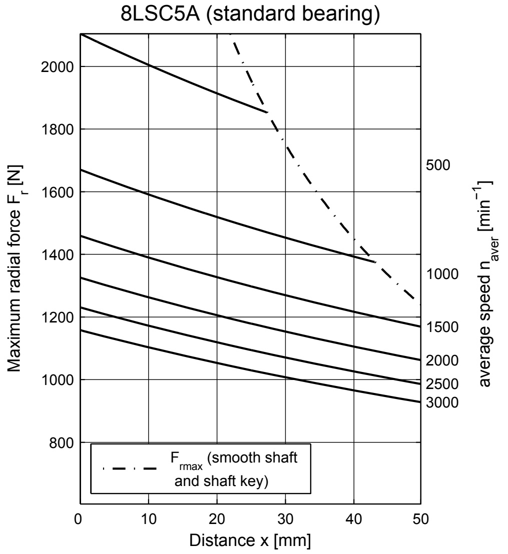
8LSC5C.eennnffgg-3



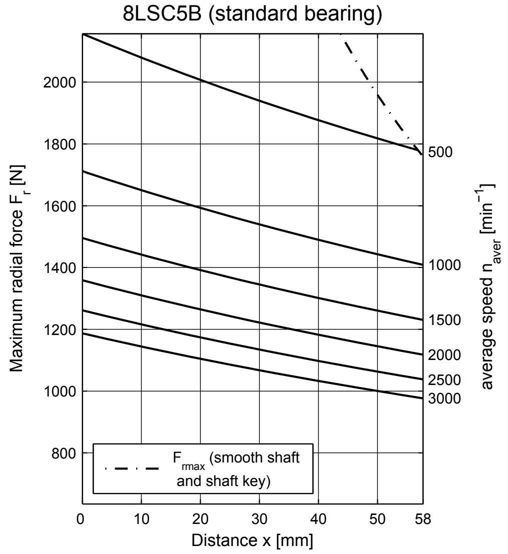
2.15.3.4 Maximum shaft load

Note the information in section "Load capacity of the shaft end and bearing" on page 273 of chapter "Installation conditions".

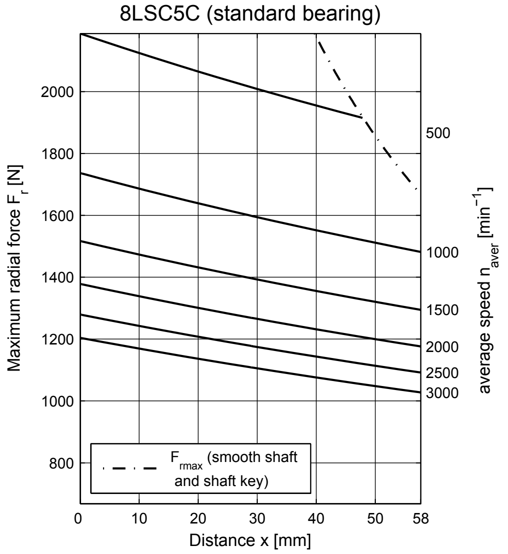
2.15.3.4.1 8LSC5A/B/C...-3 - Standard bearing



maximum allowed axial force: F_{amax} = 224 N

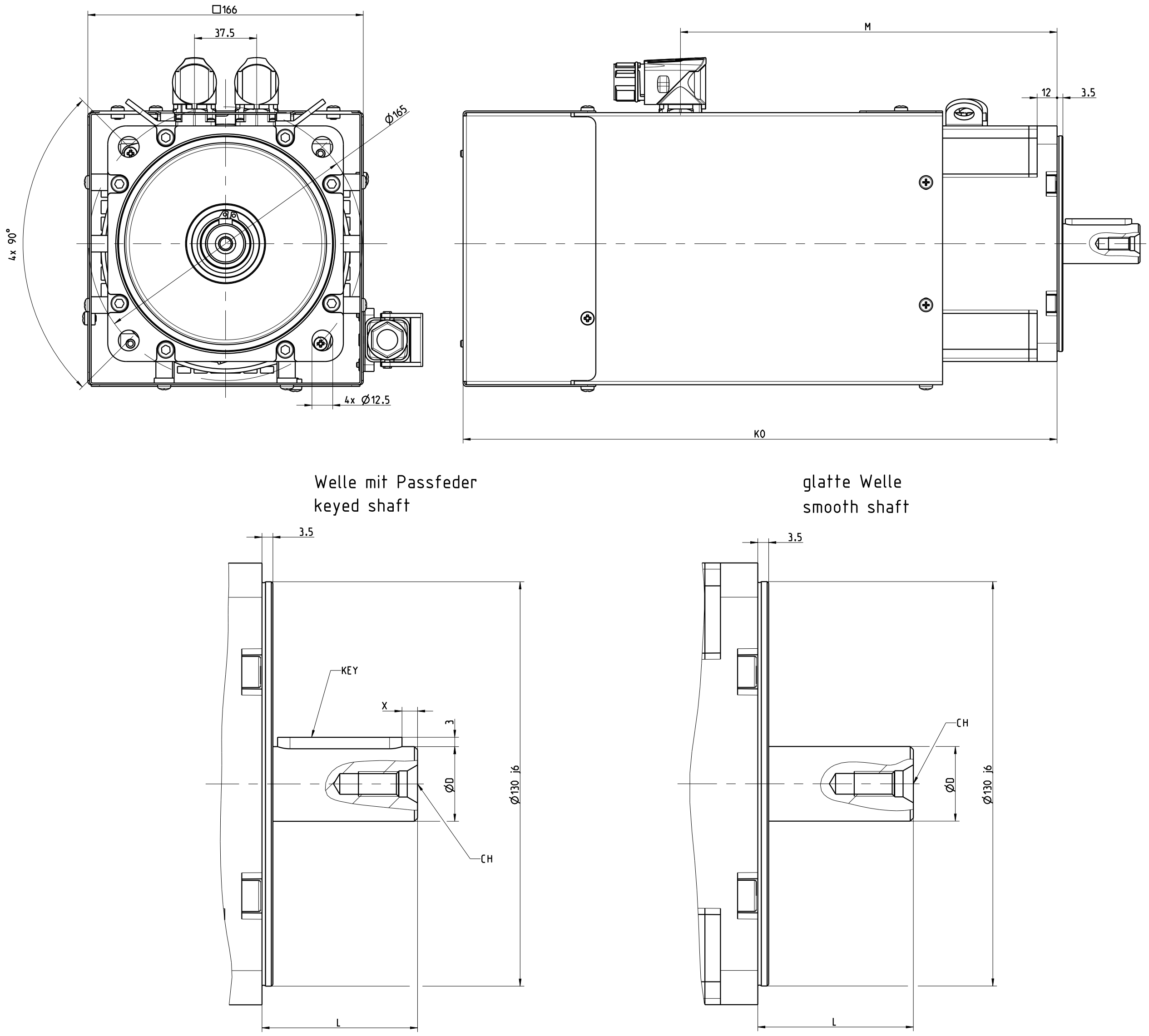


maximum allowed axial force: F_{amax} = 233 N



maximum allowed axial force: F_{amax} = 241 N

2.15.3.5 8LSC5A/B/C...-3 - Dimensions



Motor

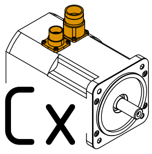
EnDat/Resolver feedback				Extension of K_0 and M depending on motor option [mm]		
	K_0	M		Holding brake	Increased brake	Reinforced bearing
Encoder assignments	**All encoders**	**All encoders**				
Connector size		**1**	**1.5**			
8LSC5A...-3	358	227	229.5	38	60	17
8LSC5B...-3	425.5	294.5	297	---	60	17
8LSC5C...-3	493	362	364.5	---	60	17

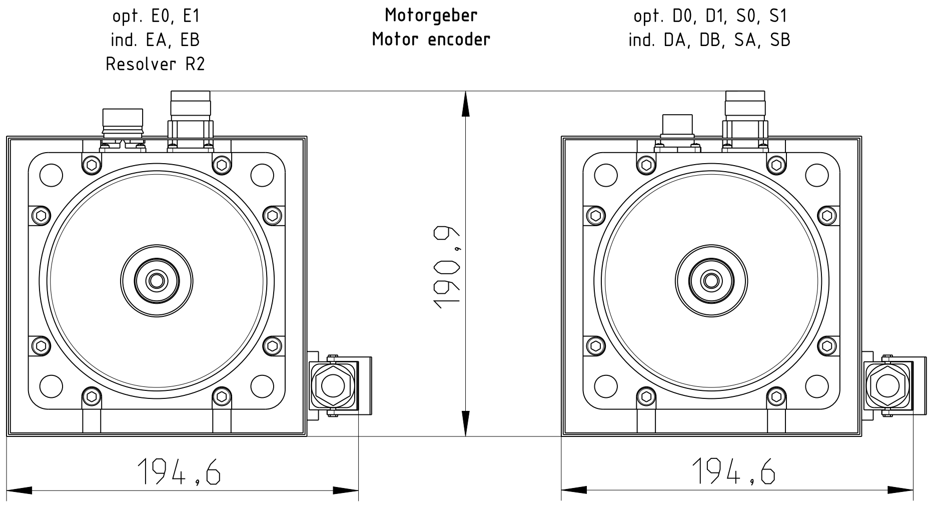
IMPORTANT: Dimension K_0 depends on the length of the encoder cover.

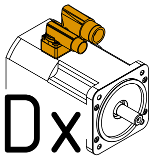
Shaft end

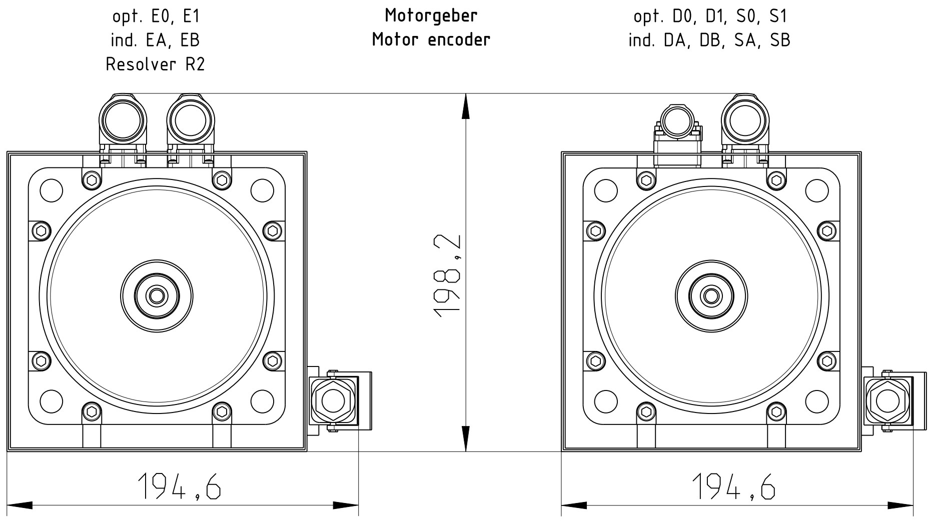
		D	L	Key	CH	X
8LSC5A...-3	Without special motor option Reinforced bearing	24 k6 38 k6	50 80	DIN 6885 A8x7x40 DIN 6885 A10x8x70	M8 DIN 332-D M12 DIN 332-D	5 5
8LSC5B...-3	Without special motor option Reinforced bearing	28 k6 38 k6	58 80	DIN 6885 A8x7x40 DIN 6885 A10x8x70	M10 DIN 332-D M12 DIN 332-D	9 5
8LSC5C...-3	Without special motor option Reinforced bearing	28 k6 38 k6	58 80	DIN 6885 A8x7x40 DIN 6885 A10x8x70	M10 DIN 332-D M12 DIN 332-D	9 5

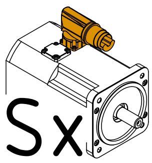
2.15.3.6 8LSC5A/B/C...-3 (connector size 1) - Connection dimensions

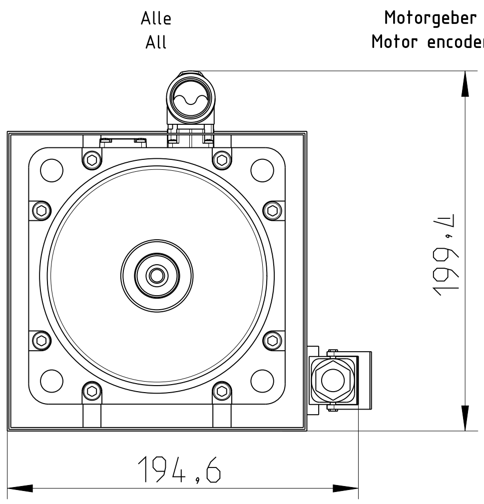




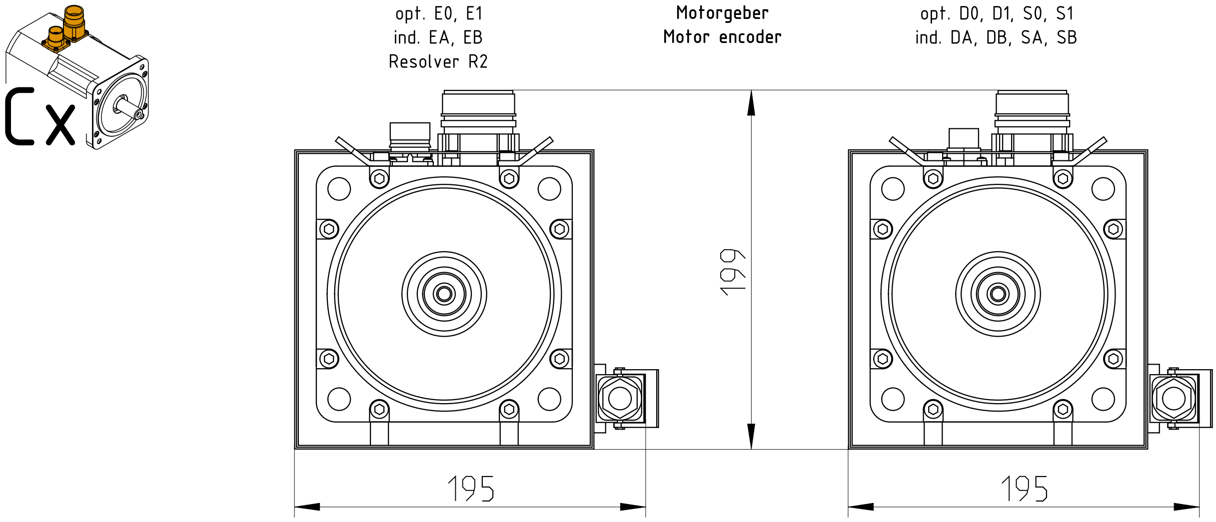


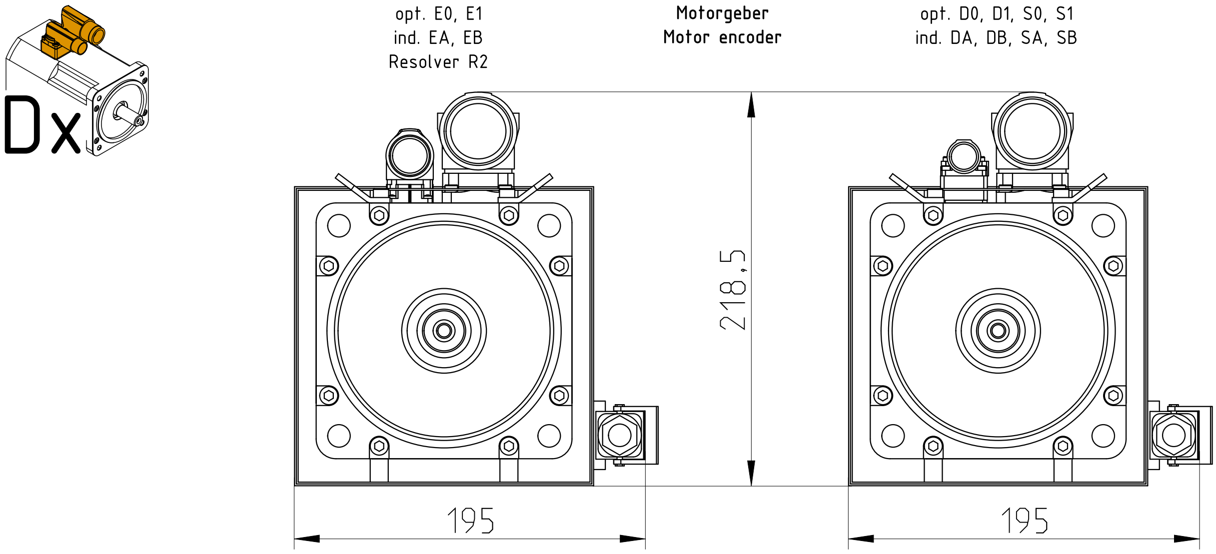






2.15.3.7 8LSC5A/B/C...-3 (connector size 1.5) - Connection dimensions





2.15.4 8LSC6...-3 - Technical data

<table>
<tr><th>Model number</th><th>8LSC63.
ee022ffgg-3</th><th>8LSC63.
ee030ffgg-3</th><th>8LSC63.
ee045ffgg-3</th><th>8LSC64.
ee022ffgg-3</th><th>8LSC64.
ee030ffgg-3</th><th>8LSC64.
ee045ffgg-3</th></tr>
<tr><td colspan="7">Motor</td></tr>
<tr><td>Nominal speed n_N [rpm]</td><td>2200</td><td>3000</td><td>4500</td><td>2200</td><td>3000</td><td>4500</td></tr>
<tr><td>Number of pole pairs</td><td colspan="6">4</td></tr>
<tr><td>Nominal torque M_n [Nm]</td><td>15.34</td><td>15.08</td><td>12.35</td><td>23.4</td><td>22.75</td><td>19.63</td></tr>
<tr><td>Nominal power P_N [W]</td><td>3534</td><td>4738</td><td>5820</td><td>5391</td><td>7147</td><td>9250</td></tr>
<tr><td>Nominal current I_N [A]</td><td>6.9</td><td>9.3</td><td>11.3</td><td>10.6</td><td>14</td><td>18</td></tr>
<tr><td>Stall torque M_0 [Nm]</td><td colspan="3">16.25</td><td colspan="3">26</td></tr>
<tr><td>Stall current I_0 [A]</td><td>7.3</td><td>10</td><td>14.9</td><td>11.7</td><td>16</td><td>23.8</td></tr>
<tr><td>Maximum torque M_{max} [Nm]</td><td colspan="3">46.92</td><td colspan="3">78.2</td></tr>
<tr><td>Maximum current I_{max} [A]</td><td>30.5</td><td>42.5</td><td>61</td><td>49.5</td><td>67.8</td><td>106.5</td></tr>
<tr><td>Maximum speed n_{max} [rpm]</td><td colspan="6">9000</td></tr>
<tr><td>Torque constant K_T [Nm/A]</td><td>2.22</td><td>1.63</td><td>1.09</td><td>2.22</td><td>1.63</td><td>1.09</td></tr>
<tr><td>Voltage constant K_E [V/1000 rpm]</td><td>134.04</td><td>98.44</td><td>65.97</td><td>134.04</td><td>98.44</td><td>65.97</td></tr>
<tr><td>Stator resistance R_{2ph} [Ω]</td><td>2.265</td><td>1.127</td><td>0.51</td><td>1.13</td><td>0.62</td><td>0.285</td></tr>
<tr><td>Stator inductance L_{2ph} [mH]</td><td>24.29</td><td>12.5</td><td>5</td><td>13.17</td><td>7.21</td><td>3.21</td></tr>
<tr><td>Electrical time constant t_{el} [ms]</td><td>10.7</td><td>11.1</td><td>9.7</td><td>11.7</td><td>11.6</td><td>11.03</td></tr>
<tr><td>Thermal time constant t_{therm} [min]</td><td colspan="3">42</td><td colspan="3">45</td></tr>
<tr><td>Moment of inertia J [kgcm²]</td><td colspan="3">8.19</td><td colspan="3">13.13</td></tr>
<tr><td>Weight without brake m [kg]</td><td colspan="3">15.1</td><td colspan="3">19</td></tr>
<tr><td colspan="7">Holding brake</td></tr>
<tr><td>Holding torque of brake M_{Br} [Nm]</td><td colspan="6">32</td></tr>
<tr><td>Mass of brake [kg]</td><td colspan="6">1.5</td></tr>
<tr><td>Moment of inertia of brake J_{Br} [kgcm²]</td><td colspan="6">5.85</td></tr>
<tr><td colspan="7">Recommendations</td></tr>
<tr><td>ACOPOS 8Vxxxx.xx...</td><td>1090</td><td colspan="4">1180</td><td>1320</td></tr>
<tr><td>ACOPOSmulti 8BVIxxxx...</td><td colspan="2">0110</td><td>0220</td><td>0110</td><td>0220</td><td>0330</td></tr>
<tr><td>ACOPOS P3 8EIxxxx...</td><td>8X8X</td><td>013X</td><td>017X</td><td>013X</td><td>024X</td><td>034X</td></tr>
<tr><td>Cross section for B&R motor cables [mm²]</td><td colspan="2">0.75</td><td colspan="3">1.5</td><td>4</td></tr>
<tr><td>Connector size</td><td colspan="6">1.0</td></tr>
</table>

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 guideline; 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.

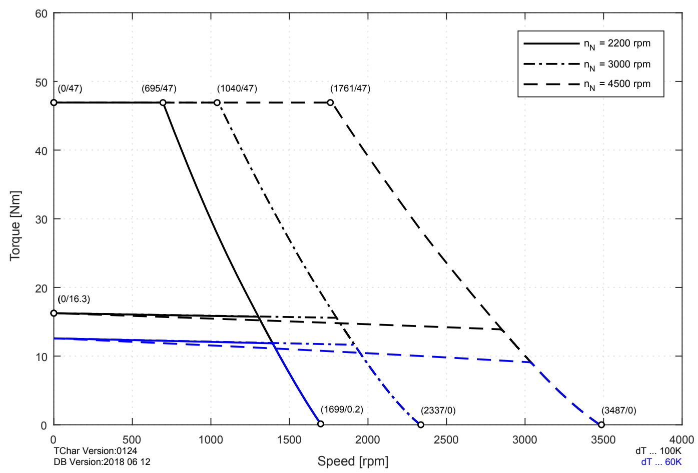
Model number	8LSC65. ee022ffgg-3	8LSC65. ee030ffgg-3	8LSC65. ee045ffgg-3	8LSC66. ee022ffgg-3	8LSC66. ee030ffgg-3	8LSC66. ee045ffgg-3
Motor						
Nominal speed n_N [rpm]	2200	3000	4500	2200	3000	4500
Number of pole pairs	4					
Nominal torque M_n [Nm]	28.6	27.3	15.86	31.85	30.55	19.5
Nominal power P_N [W]	6589	8577	7474	7338	9598	9189
Nominal current I_N [A]	12.9	16.8	14.5	14.4	18.8	17.9
Stall torque M_0 [Nm]	31.2			36.4		
Stall current I_0 [A]	14.1	19.2	28.6	16.4	22.4	33.4
Maximum torque M_{max} [Nm]	97.92			114.24		
Maximum current I_{max} [A]	64.3	90.9	130.5	74.4	103.5	152.6
Maximum speed n_{max} [rpm]	9000					
Torque constant K_T [Nm/A]	2.22	1.63	1.09	2.22	1.63	1.09
Voltage constant K_E [V/1000 rpm]	134.04	98.44	65.97	134.04	98.44	65.97
Stator resistance R_{2ph} [Ω]	0.94	0.484	0.2	0.72	0.382	0.19
Stator inductance L_{2ph} [mH]	10.9	6	2.48	10.4	4.87	2.1
Electrical time constant t_{el} [ms]	11.6	12.4		14.4	12.7	11.1
Thermal time constant t_{therm} [min]	48			52		
Moment of inertia J [kgcm²]	15.6			18.06		
Weight without brake m [kg]	20.4			23		
Holding brake						
Holding torque of brake M_{Br} [Nm]	32					
Mass of brake [kg]	1.5			1.4		
Moment of inertia of brake J_{Br} [kgcm²]	5.85					
Recommendations						
ACOPOS 8Vxxxx.xx...	1180	1320		1180	1320	1640
ACOPOSmulti 8BVIxxxx...	0220		0330	0220	0330	0440
ACOPOS P3 8EIxxxx...	017X	024X	034X	024X	034X	044X
Cross section for B&R motor cables [mm²]	1.5	4		1.5	4	10
Connector size	1.0					1.5

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 guideline; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).

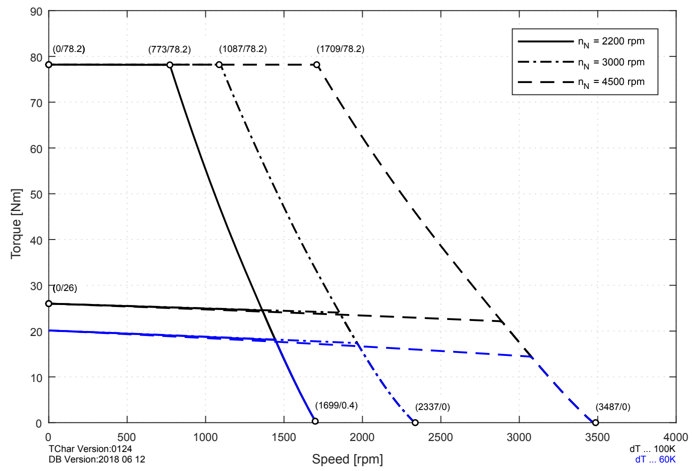
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

2.15.4.1 Speed-torque characteristic curves at 325 VDC DC bus voltage

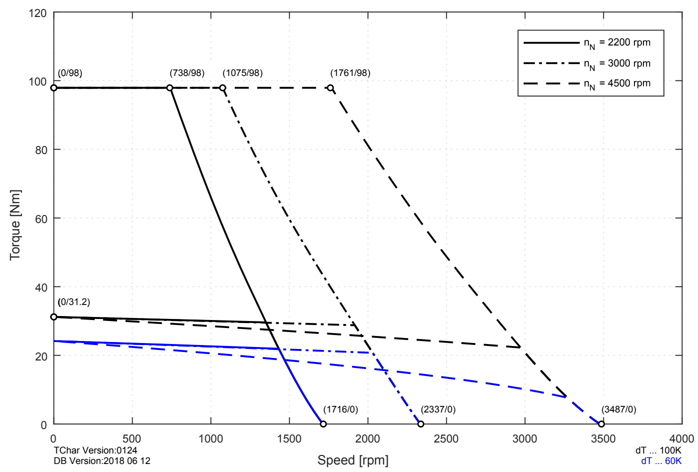
8LSC63.eennnffgg-3



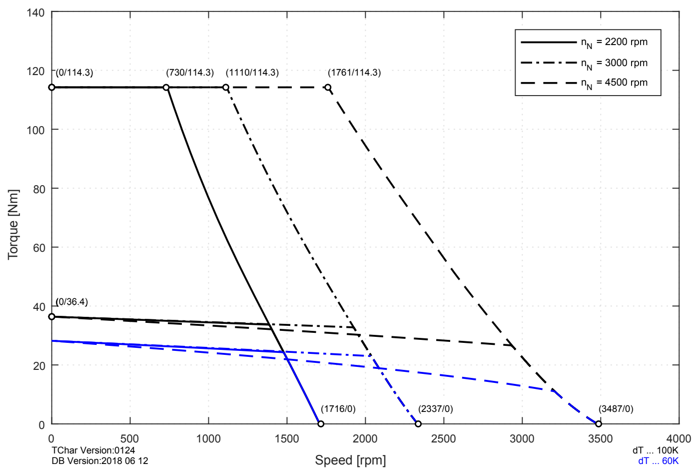
8LSC64.eennnffgg-3



8LSC65.eennnffgg-3

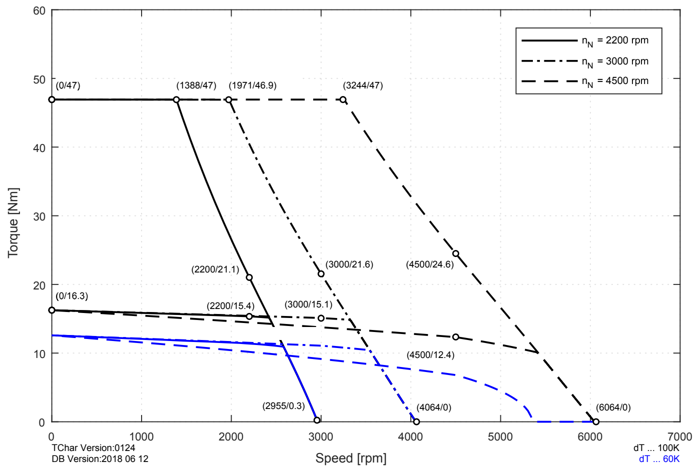


8LSC66.eennnffgg-3

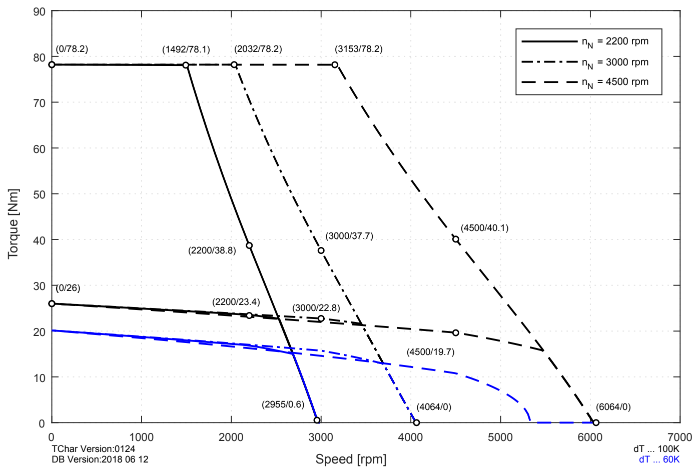


2.15.4.2 Speed-torque characteristic curves at 560 VDC DC bus voltage

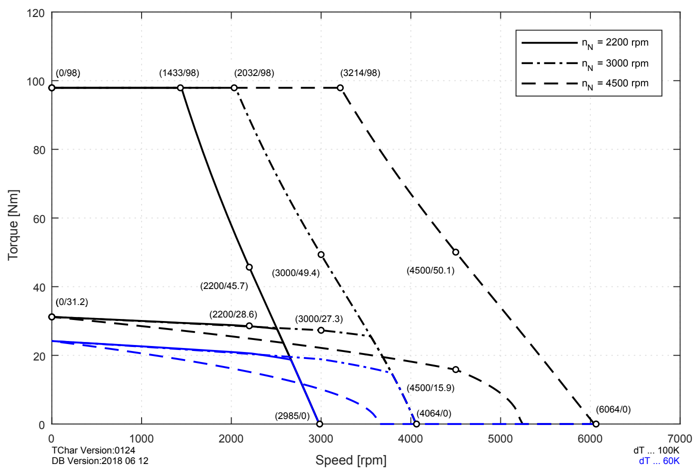
8LSC63.eennnffgg-3



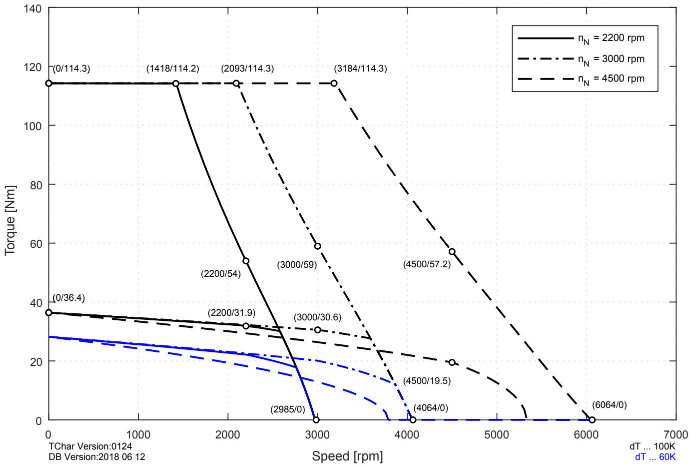
8LSC64.eennnffgg-3



8LSC65.eennnffgg-3

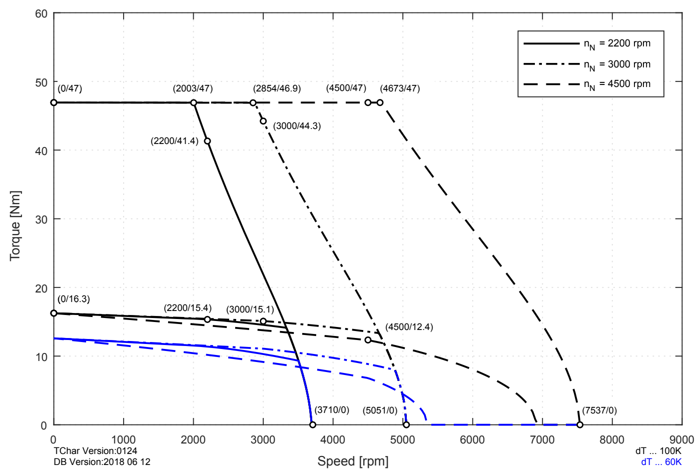


8LSC66.eennnffgg-3

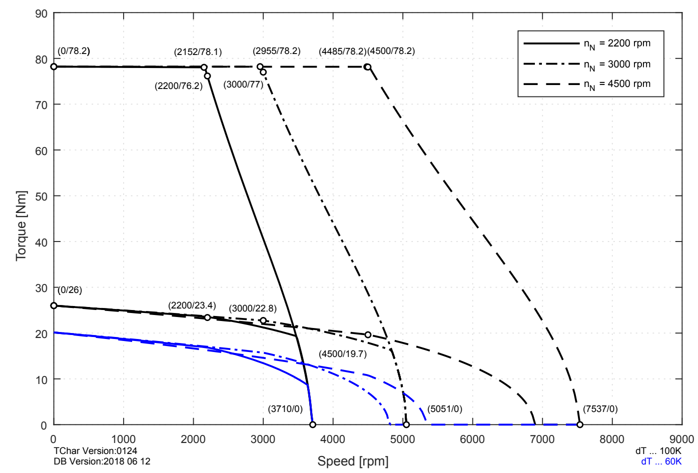


2.15.4.3 Speed-torque characteristic curves at 750 VDC DC bus voltage

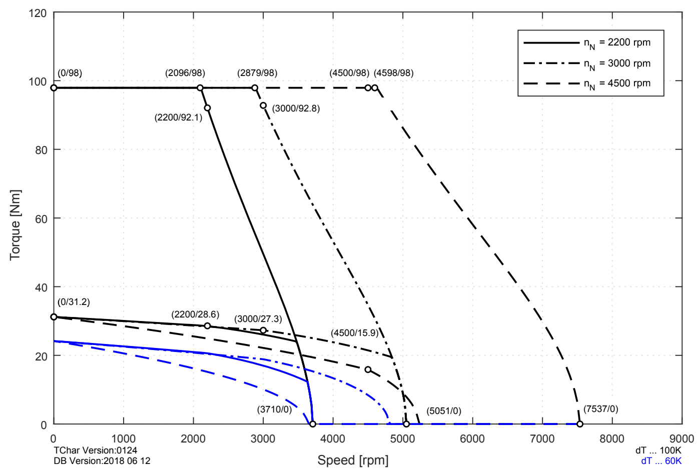
8LSC63.eennnffgg-3



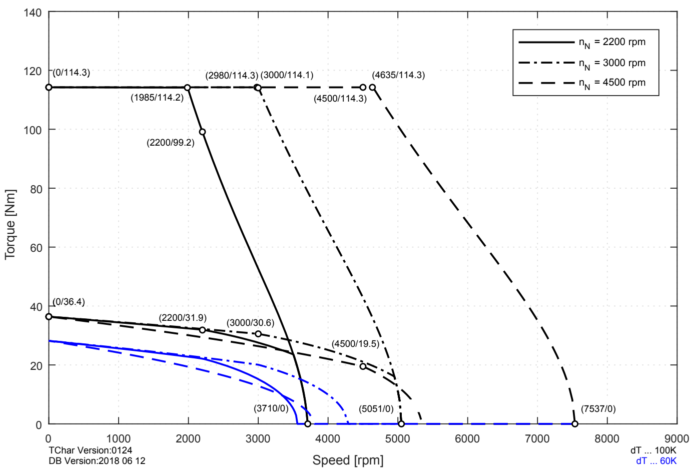
8LSC64.eennnffgg-3



8LSC65.eennnffgg-3



8LSC66.eennnffgg-3



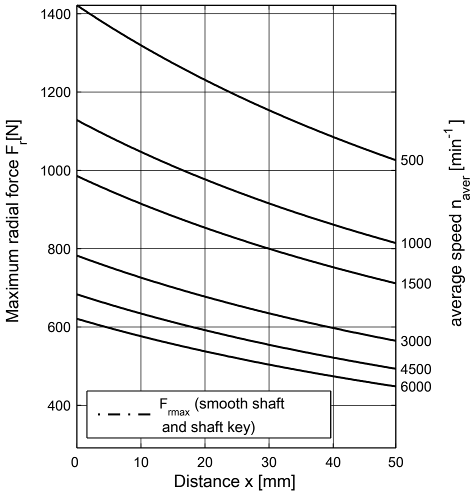
2.15.4.4 Maximum shaft load

Note the information in section "Load capacity of the shaft end and bearing" on page 273 of chapter "Installation conditions".

2.15.4.4.1 8LSA6...-3 / 8LSC6...-3 - Standard bearing

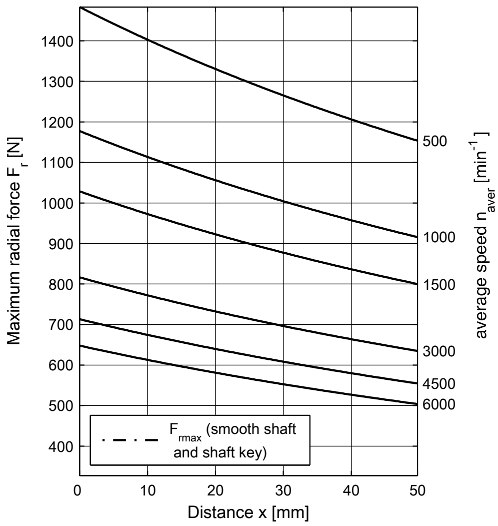
Shaft load values apply to both 8LSA and 8LSC!

8LSA63 (standard bearing)



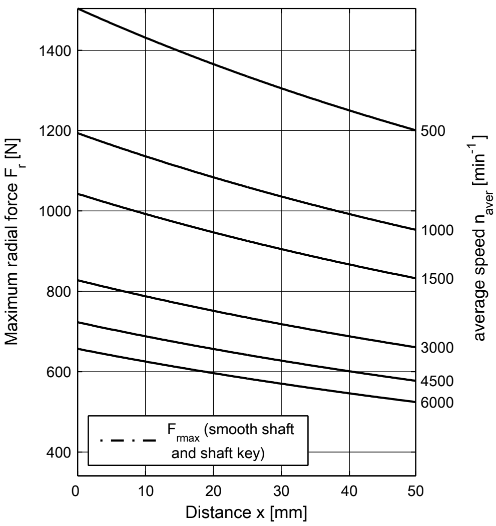
maximum allowed axial force: F_{amax} = 125 N

8LSA64 (standard bearing)



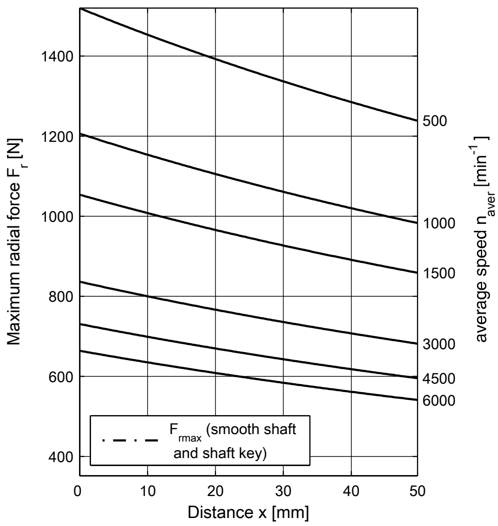
maximum allowed axial force: F_{amax} = 136 N

8LSA65 (standard bearing)



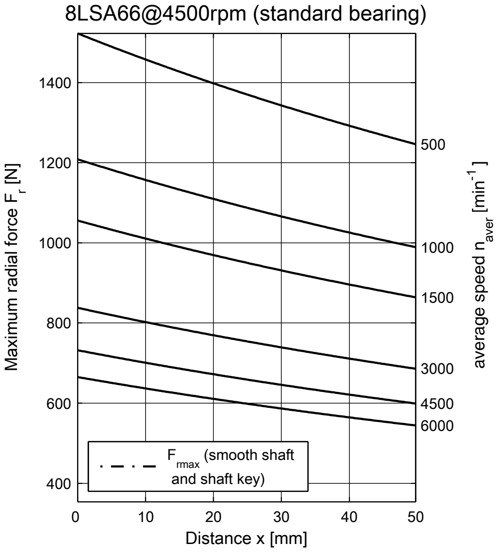
maximum allowed axial force: F_{amax} = 140 N

8LSA66 (standard bearing)



maximum allowed axial force: F_{amax} = 143 N

8LSA66@4500rpm (standard bearing)

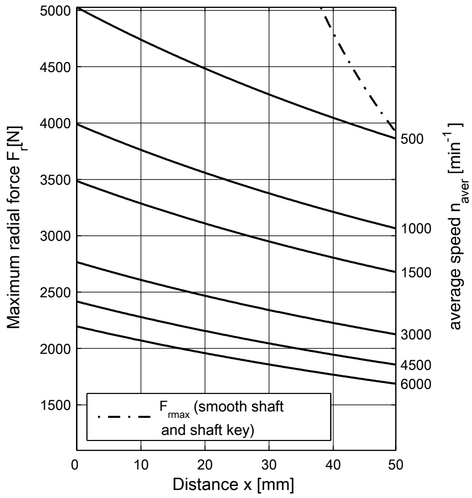


maximum allowed axial force: F_{amax} = 143 N

2.15.4.4.2 8LSA6...-3 / 8LSC6...-3 - Reinforced bearing

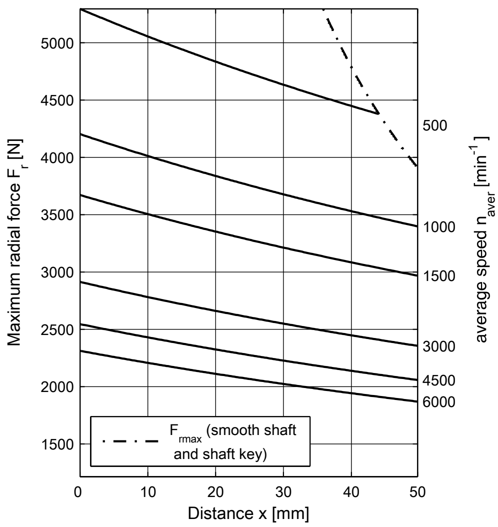
Shaft load values apply to both 8LSA and 8LSC!

8LSA63 (special option "reinforced A side bearing")



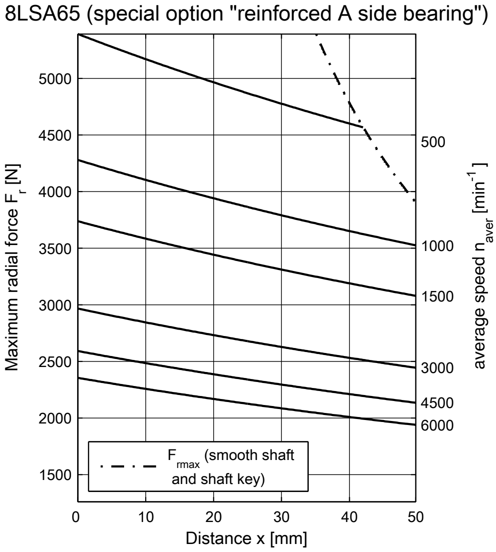
maximum allowed axial force: F_{amax} = 457 N

8LSA64 (special option "reinforced A side bearing")



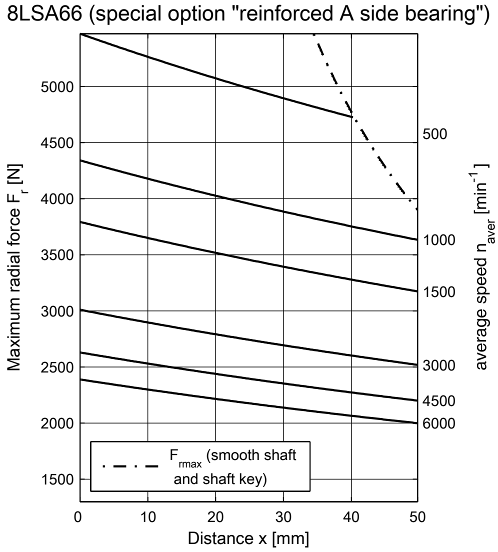
maximum allowed axial force: F_{amax} = 495 N

8LSA65 (special option "reinforced A side bearing")



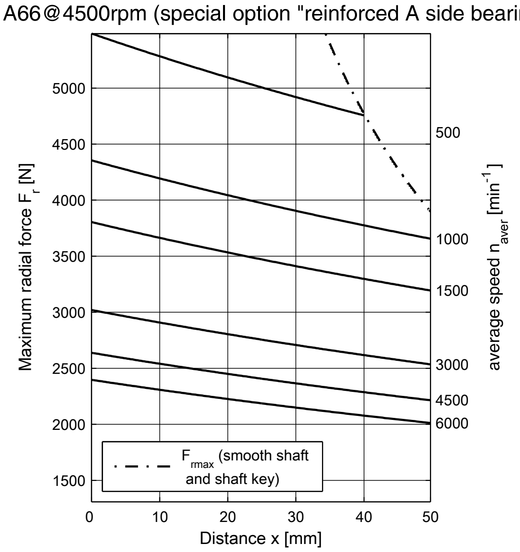
maximum allowed axial force: F_{amax} = 510 N

8LSA66 (special option "reinforced A side bearing")



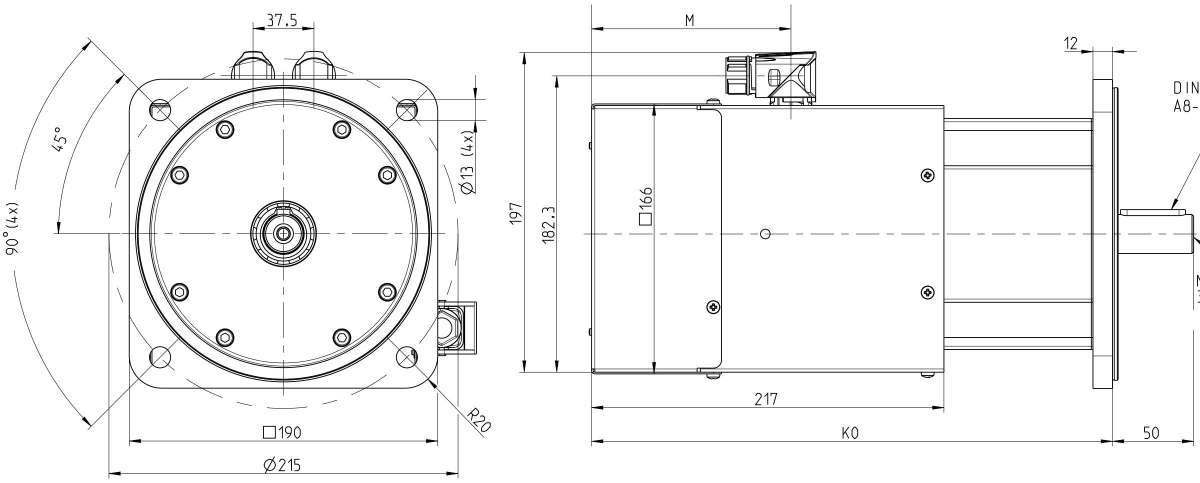
maximum allowed axial force: F_{amax} = 521 N

A66@4500rpm (special option "reinforced A side bearing")

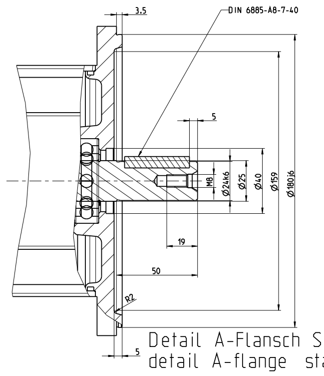


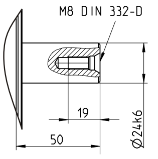
maximum allowed axial force: F_{amax} = 524 N

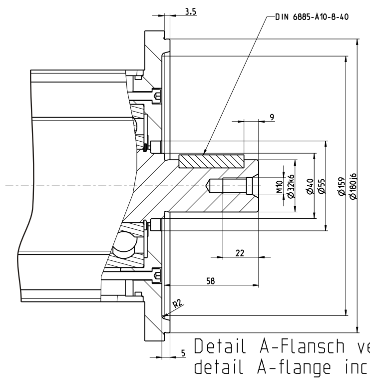
2.15.4.5 8LSC6...-3 - Dimensions



Wellenoption glatte Welle
shaft option smooth shaft







Detail A-Flansch Standardlagerung
detail A-flange standard bearing

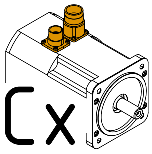
Detail A-Flansch verstärktes A-Lager
detail A-flange increased bearing

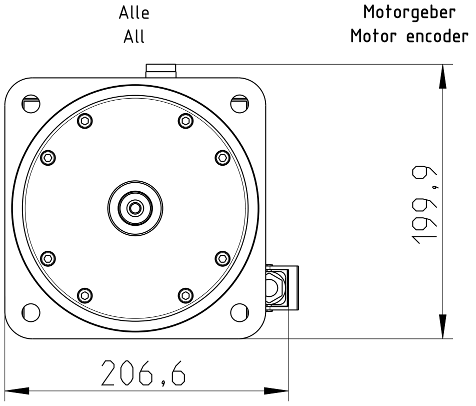
EnDat/Resolver feedback			Extension of K_0 and M depending on the motor option [mm]		
Model number	**K_0**	**M**	**Holding brake**	**Heavy-duty holding brake**	**Reinforced A-side bearing**
8LSC63.eennnffgg-3	276	123	60	70	28
8LSC64.eennnffgg-3	321	123	60	70	28
8LSC65.eennnffgg-3	344	123	60	70	28
8LSC66.eennnffgg-3	366	123	60	70	28
8LSC66.ee045ffgg-3, power connector size 1.5!	381	131	60	70	28

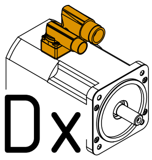
IMPORTANT: Motor option "oil seal" has no effect on the motor length.

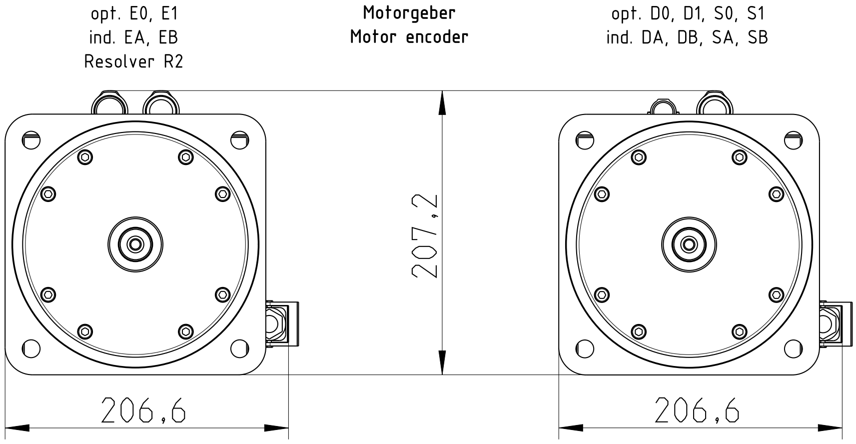
2.15.4.6 8LSC6...-3 (connector size 1) - Connection dimensions

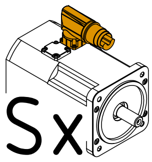
These dimensions are valid **up to 8LSC65...-3** or **up to 8LSC66...-3 with nominal speed 3000**. **Starting with 8LSC66...-3 with nominal speed 4500**, the dimensions of connector size 1.5 on page 217 apply.

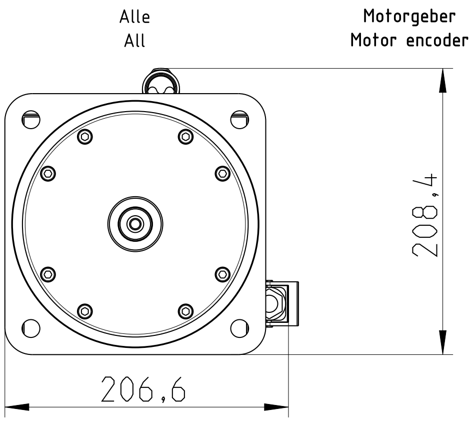




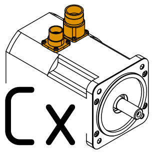


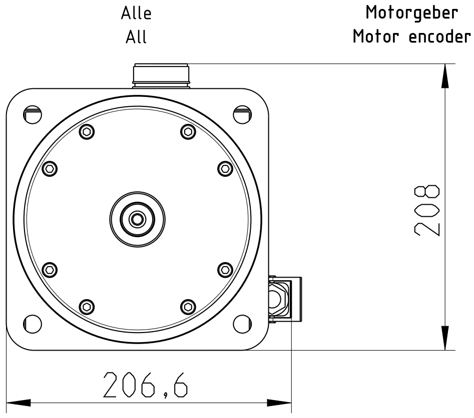


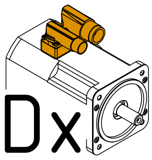


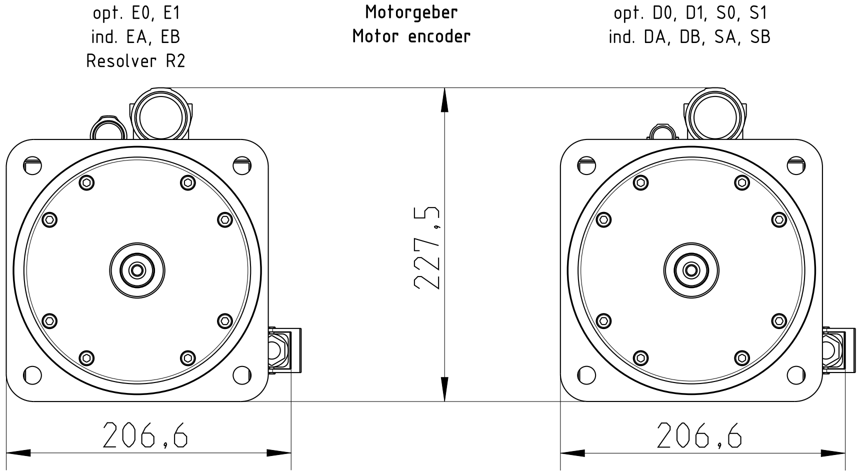


2.15.4.7 8LSC6...-3 (connector size 1.5) - Dimensions









2.15.5 8LSC7...-3 - Technical data

Model number	8LSC73.ee022ffgg-3	8LSC73.ee030ffgg-3	8LSC73.ee045ffgg-3	8LSC74.ee022ffgg-3
Motor				
Nominal speed n_N [rpm]	2200	3000	4500	2200
Number of pole pairs	5			
Nominal torque M_n [Nm]	28.5	26.8	21.5	36.8
Nominal power P_N [W]	6566	8419	10132	8478
Nominal current I_N [A]	12.84	16.44	19.72	16.58
Stall torque M_0 [Nm]	33.8		33	43
Stall current I_0 [A]	15.23	20.74	30	19.37
Maximum torque M_{max} [Nm]	107			150
Maximum current I_{max} [A]	71	96.54	144	99
Maximum speed n_{max} [rpm]	6000			
Torque constant K_T [Nm/A]	2.22	1.63	1.09	2.22
Voltage constant K_E [V/1000 rpm]	134.04	98.44	65.97	134.04
Stator resistance R_{2ph} [Ω]	0.72	0.395	0.19	0.51
Stator inductance L_{2ph} [mH]	12.3	6.5	2.9	9
Electrical time constant t_{el} [ms]	17.08	15.48	15.26	16.67
Thermal time constant t_{therm} [min]	37			41
Moment of inertia J [kgcm²]	46			60
Weight without brake m [kg]	20			24
Holding brake				
Holding torque of brake M_{Br} [Nm]	47			
Mass of brake [kg]	0			
Moment of inertia of brake J_{Br} [kgcm²]	32			
Recommendations				
ACOPOS 8Vxxxx.xx...	1180	1320		
ACOPOSmulti 8BVIxxxx...	0220	0330		0220
ACOPOS P3 8EIxxxx...	017X	024X	034X	024X
Cross section for B&R motor cables [mm²]	1.5	4		
Connector size	1.0		1.5	1.0

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 guideline; 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.

Model number	8LSC74.ee030ffgg-3	8LSC74.ee045ffgg-3	8LSC75.ee022ffgg-3	8LSC75.ee030ffgg-3
Motor				
Nominal speed n_N [rpm]	3000	4500	2200	3000
Number of pole pairs	5			
Nominal torque M_n [Nm]	34	24.6	45.5	41
Nominal power P_N [W]	10681	11592	10482	12881
Nominal current I_N [A]	20.86	22.57	20.5	25.15
Stall torque M_0 [Nm]	43		56	48.9
Stall current I_0 [A]	26.38	39.45	25.2	30
Maximum torque M_{max} [Nm]	150		187	
Maximum current I_{max} [A]	135.33	202	124	169
Maximum speed n_{max} [rpm]	6000		4500	
Torque constant K_T [Nm/A]	1.63	1.09	2.22	1.63
Voltage constant K_E [V/1000 rpm]	98.44	65.97	134.04	98.44
Stator resistance R_{2ph} [Ω]	0.28	0.13	0.39	0.21
Stator inductance L_{2ph} [mH]	4.9	2.2	7.1	3.9
Electrical time constant t_{el} [ms]	17.5	16.92	17.5	18.57
Thermal time constant t_{therm} [min]	41		46	
Moment of inertia J [kgcm²]	60		74	
Weight without brake m [kg]	24		28	
Holding brake				
Holding torque of brake M_{Br} [Nm]	47			
Mass of brake [kg]	0			
Moment of inertia of brake J_{Br} [kgcm²]	32			
Recommendations				
ACOPOS 8Vxxxx.xx...	1320	1640	1320	
ACOPOSmulti 8BVIxxxx...	0330	0440	0330	
ACOPOS P3 8EIxxxx...	034X	044X	034X	
Cross section for B&R motor cables [mm²]	4	10	4	
Connector size	1.0	1.5	1.0	1.5

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 guideline; 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.

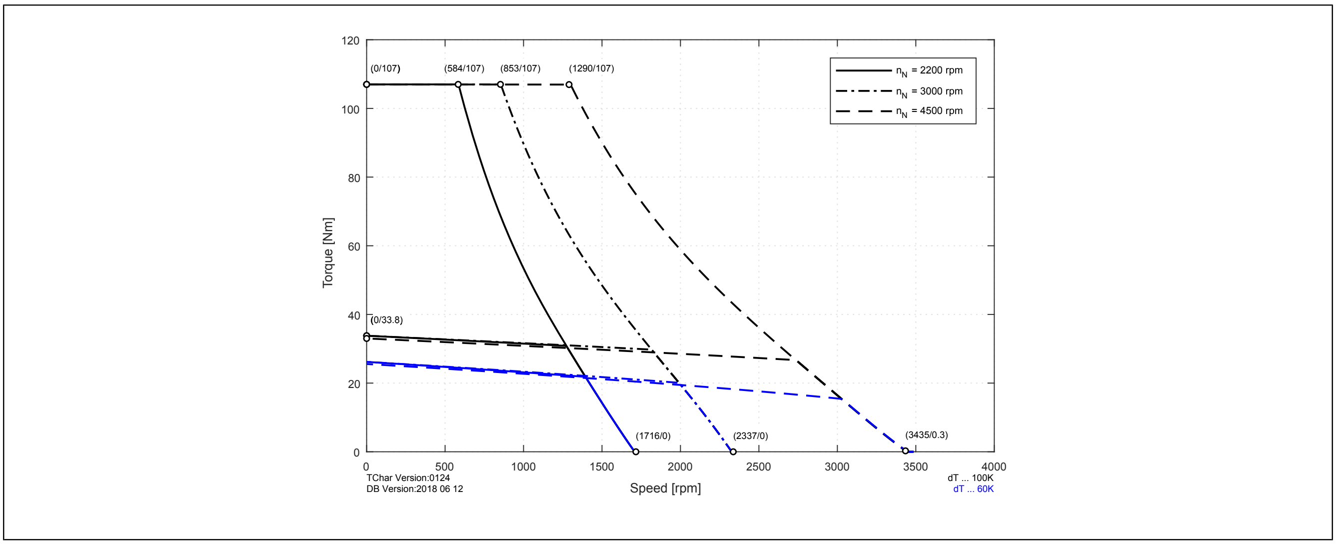
Model number	8LSC76.ee015ffgg-3	8LSC76.ee030ffgg-3	8LSC77.ee030ffgg-3	8LSC78.ee030ffgg-3
Motor				
Nominal speed n_N [rpm]	1500	3000		
Number of pole pairs	5			
Nominal torque M_n [Nm]	66	47.3	53.6	59
Nominal power P_N [W]	10367	14860	16839	18535
Nominal current I_N [A]	20.25	29	32.9	36.2
Stall torque M_0 [Nm]	75		91.2	104
Stall current I_0 [A]	23.01	46	56	63.8
Maximum torque M_{max} [Nm]	230		270	330
Maximum current I_{max} [A]	92.5	185	212	260
Maximum speed n_{max} [rpm]	4500			
Torque constant K_T [Nm/A]	3.26	1.63		
Voltage constant K_E [V/1000 rpm]	196.87	98.44		
Stator resistance R_{2ph} [Ω]	0.57	0.15	0.11	0.08
Stator inductance L_{2ph} [mH]	11.5	2.7	2.2	1.8
Electrical time constant t_{el} [ms]	17.85	18	18.2	22.5
Thermal time constant t_{therm} [min]	56		65	74
Moment of inertia J [kgcm²]	102		130	158
Weight without brake m [kg]	36		44	52
Holding brake				
Holding torque of brake M_{Br} [Nm]	47			
Mass of brake [kg]	0			
Moment of inertia of brake J_{Br} [kgcm²]	32			
Recommendations				
ACOPOS 8Vxxxx.xx...	1320	1640		128M
ACOPOSmulti 8BVIxxxx...	0330	0660		0880
ACOPOS P3 8EIxxxx...	034X	-		
Cross section for B&R motor cables [mm²]	4	10	16	
Connector size	1.5		1.5/16	

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 guideline; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).

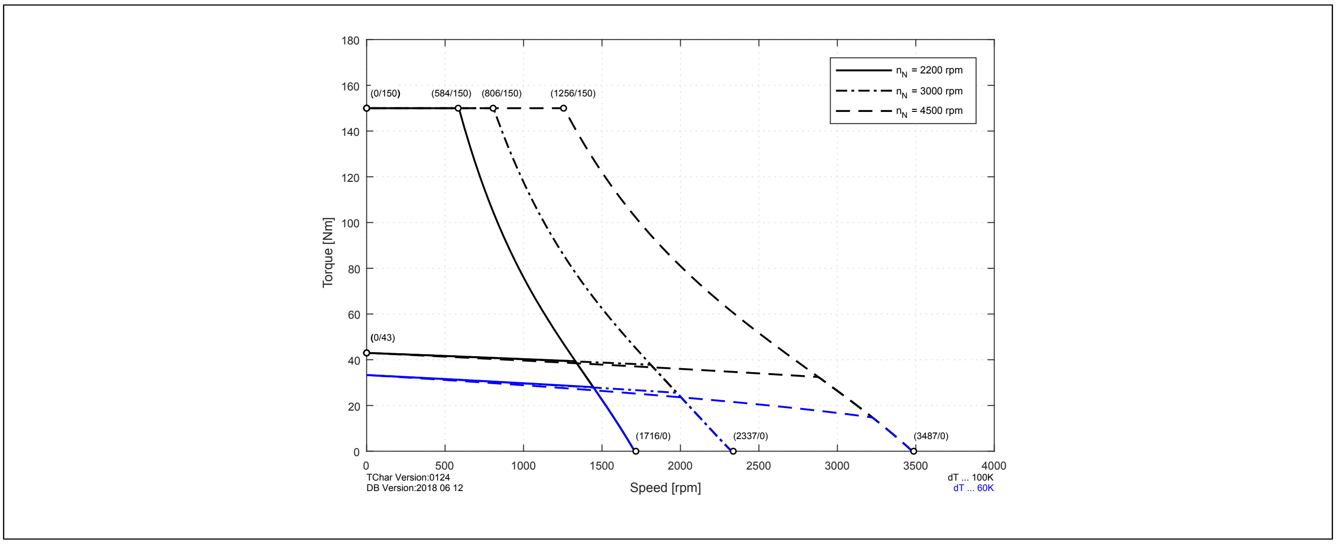
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

2.15.5.1 Speed-torque characteristic curves at 325 VDC DC bus voltage

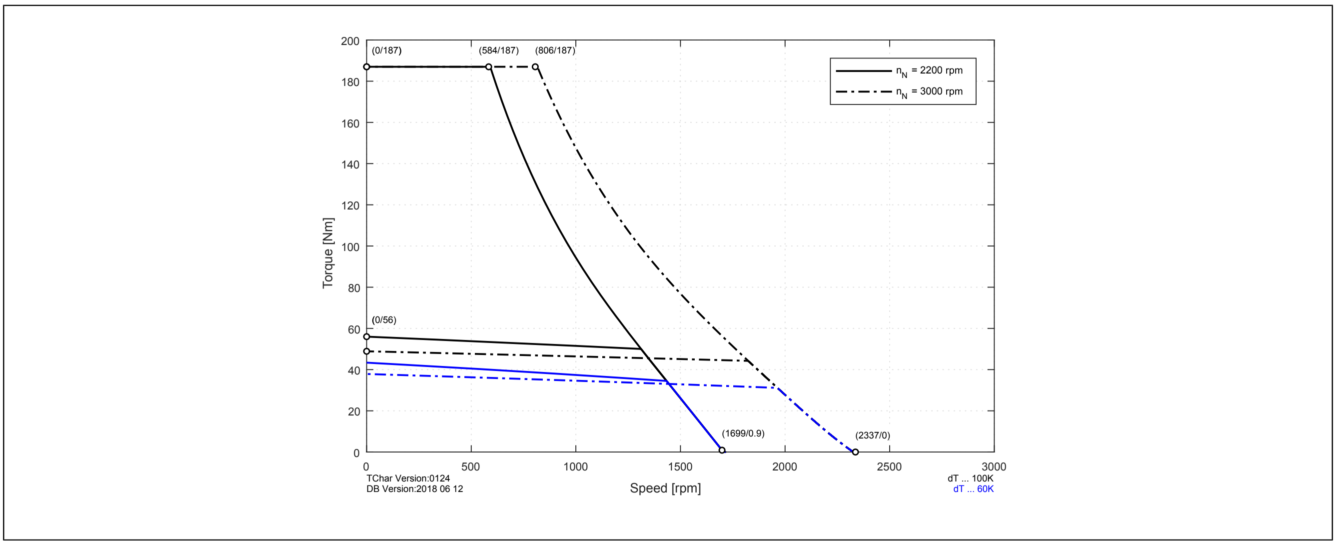
8LSC73.eennnffgg-3



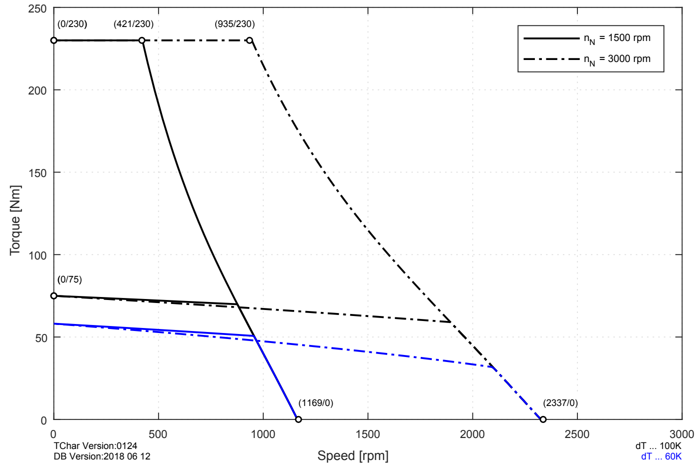
8LSC74.eennnffgg-3



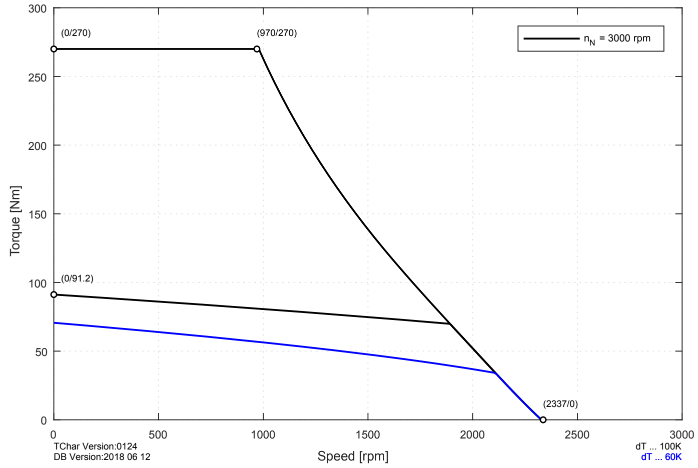
8LSC75.eennnffgg-3



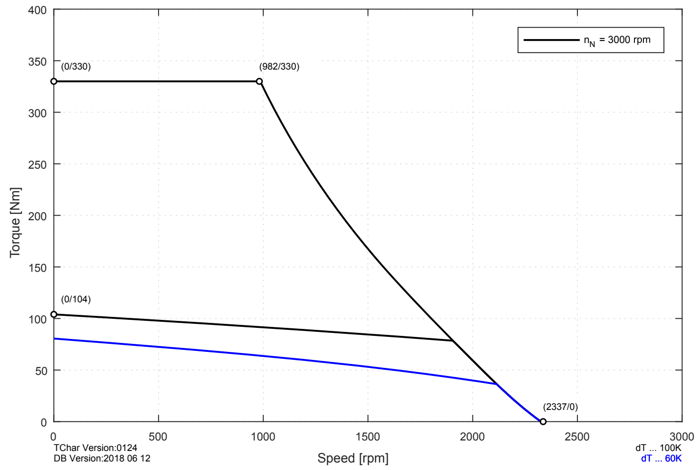
8LSC76.eennnffgg-3



8LSC77.eennnffgg-3

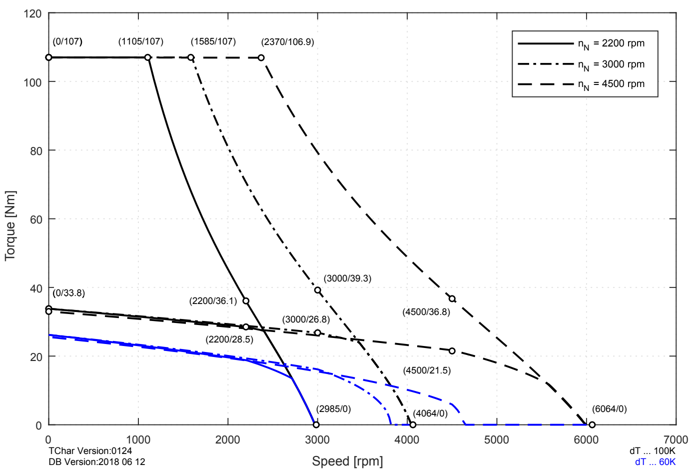


8LSC78.eennnffgg-3

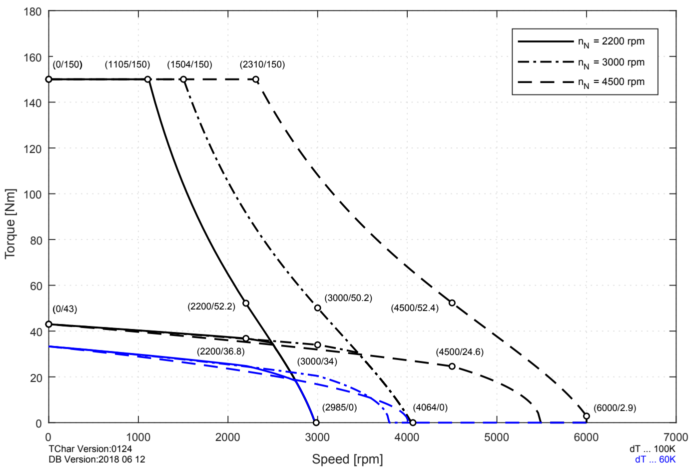


2.15.5.2 Speed-torque characteristic curves at 560 VDC DC bus voltage

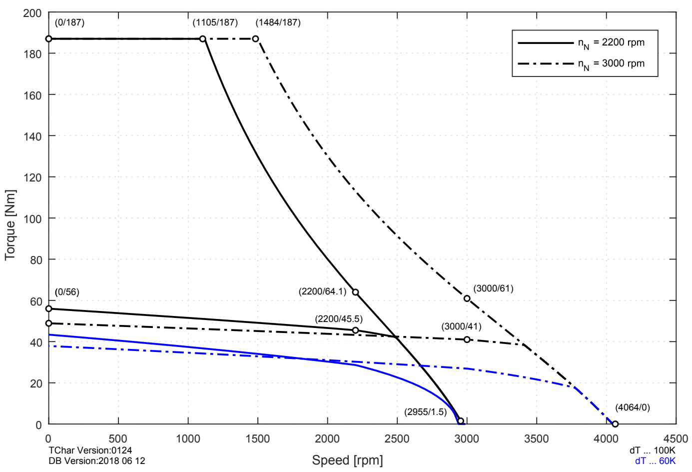
8LSC73.eennnffgg-3



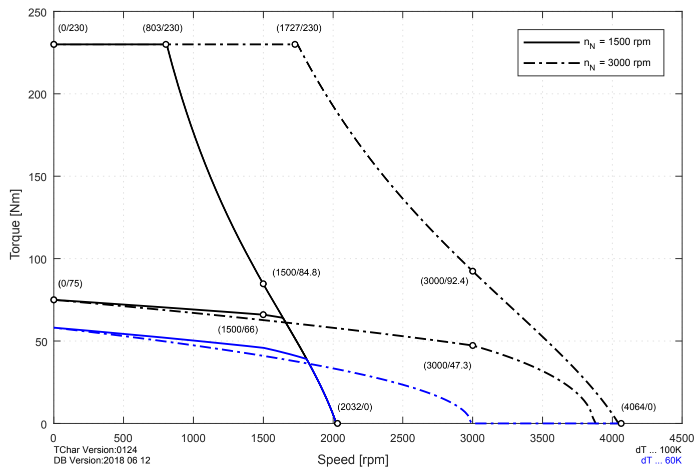
8LSC74.eennnffgg-3



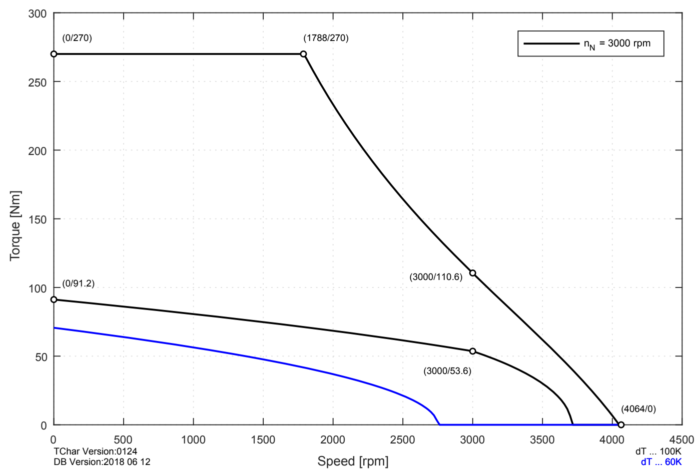
8LSC75.eennnffgg-3



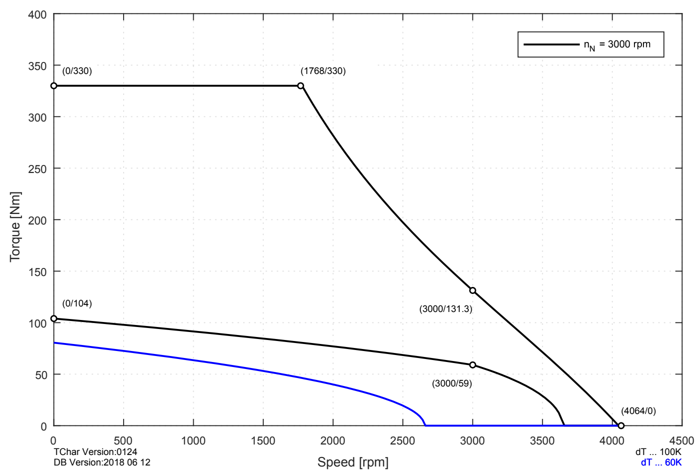
8LSC76.eennnffgg-3



8LSC77.eennnffgg-3

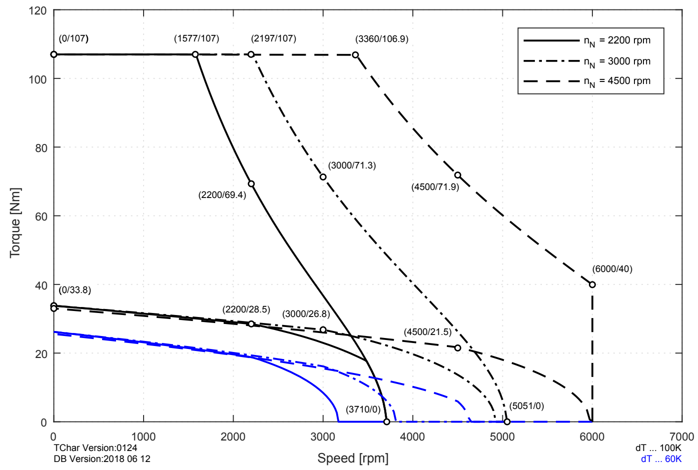


8LSC78.eennnffgg-3

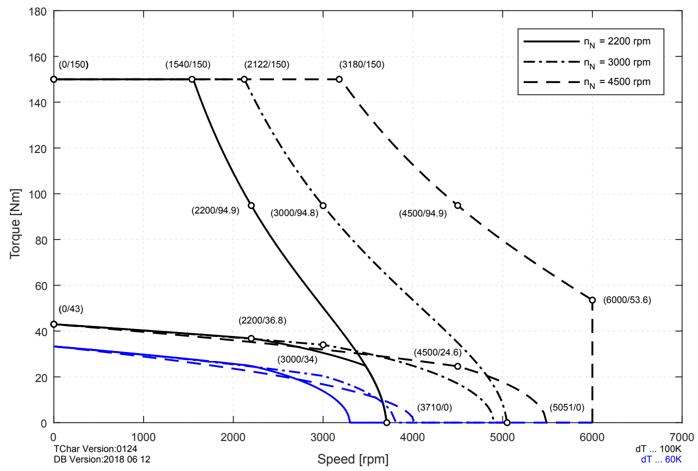


2.15.5.3 Speed-torque characteristic curves at 750 VDC DC bus voltage

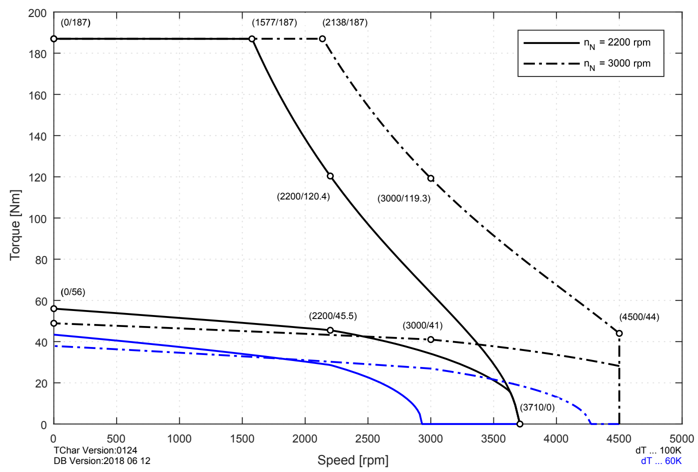
8LSC73.eennnffgg-3



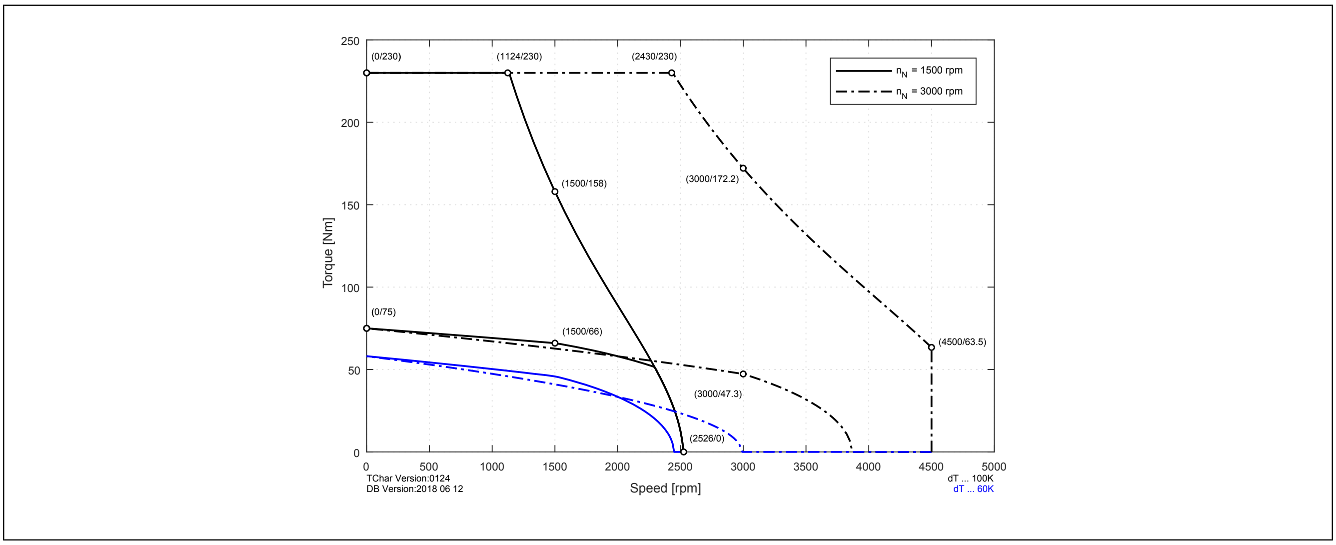
8LSC74.eennnffgg-3



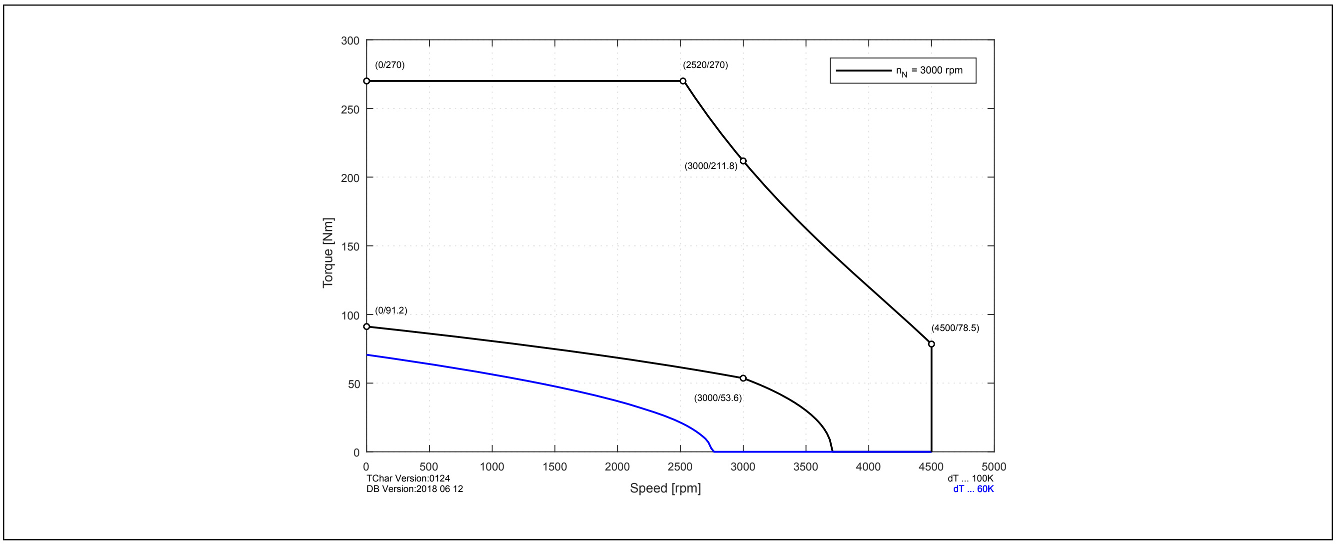
8LSC75.eennnffgg-3



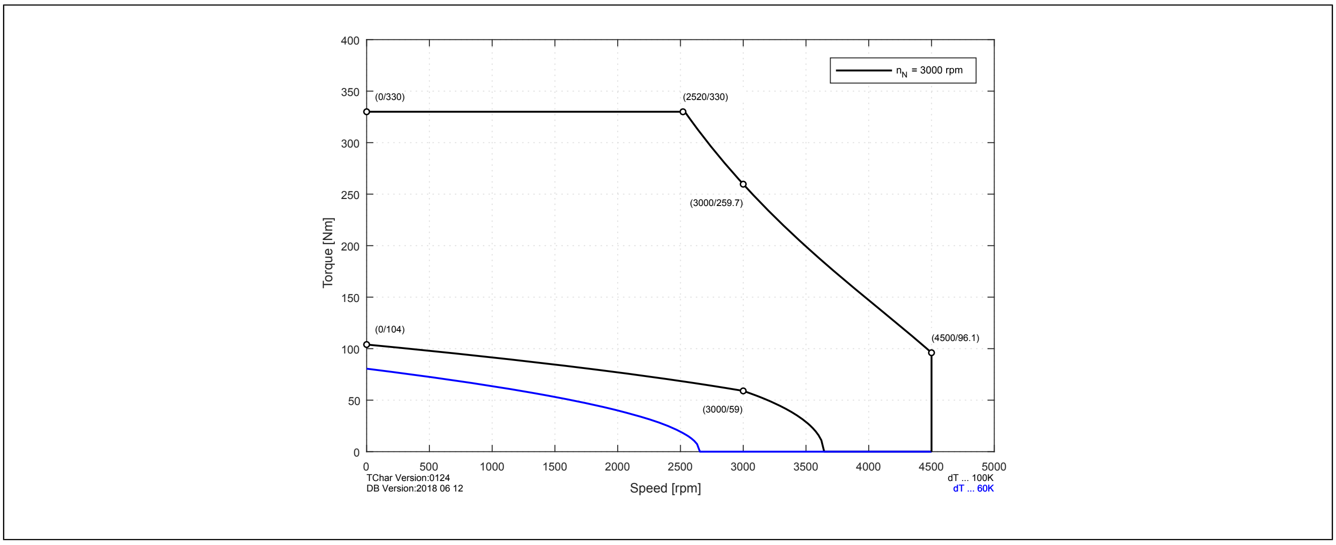
8LSC76.eennnffgg-3



8LSC77.eennnffgg-3



8LSC78.eennnffgg-3



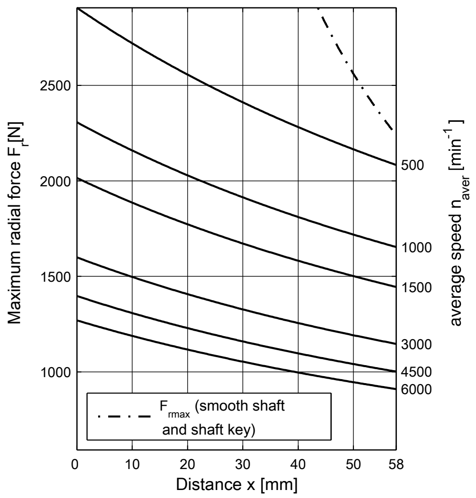
2.15.5.4 Maximum shaft load

Note the information in section "Load capacity of the shaft end and bearing" on page 273 of chapter "Installation conditions".

2.15.5.4.1 8LSA7...-3 / 8LSC7...-3 - Standard bearing

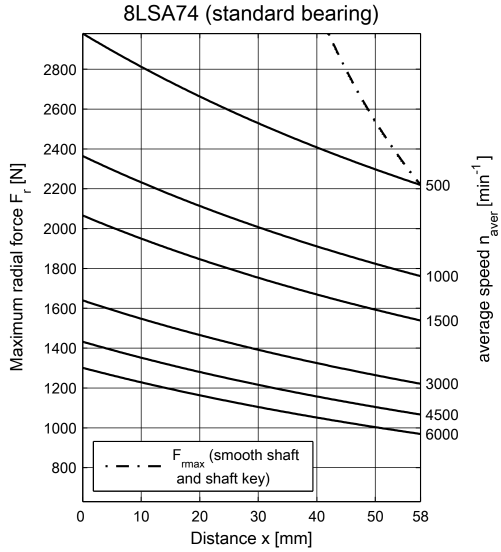
Shaft load values apply to both 8LSA and 8LSC!

8LSA73 (standard bearing)



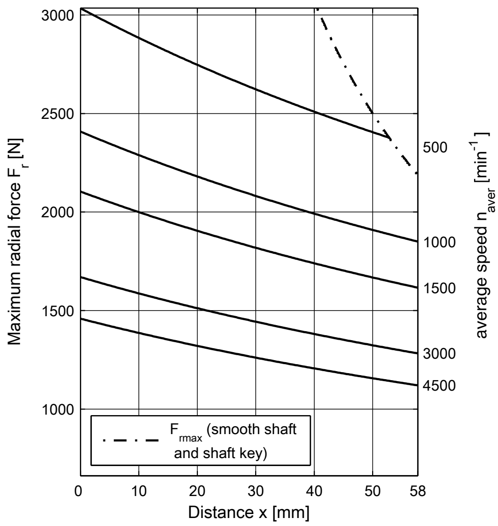
maximum allowed axial force: F_{amax} = 254 N

8LSA74 (standard bearing)



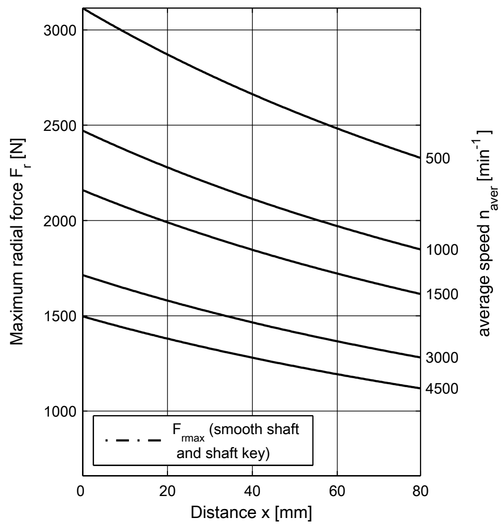
maximum allowed axial force: F_{amax} = 266 N

8LSA75 (standard bearing)



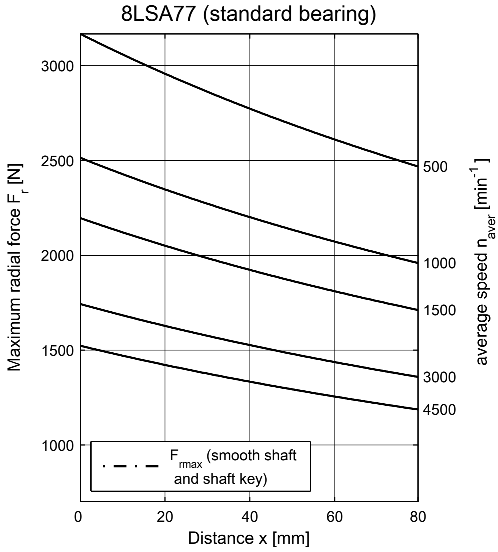
maximum allowed axial force: F_{amax} = 276 N

8LSA76 (standard bearing)



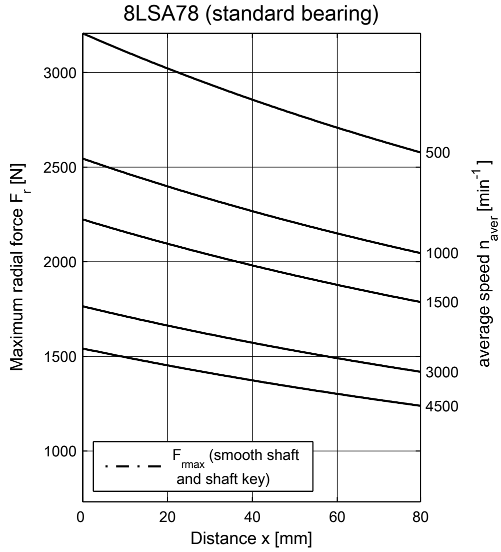
maximum allowed axial force: F_{amax} = 279 N

8LSA77 (standard bearing)



maximum allowed axial force: F_{amax} = 290 N

8LSA78 (standard bearing)

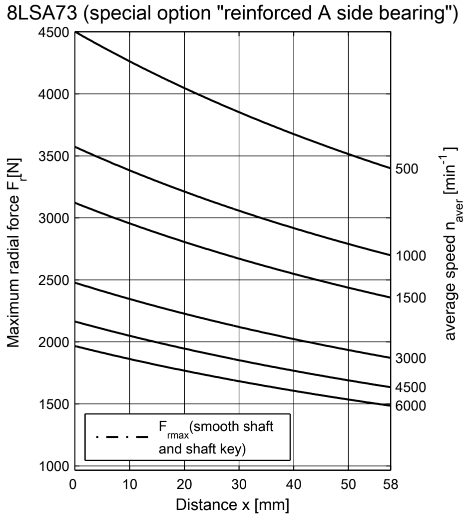


maximum allowed axial force: F_{amax} = 299 N

2.15.5.4.2 8LSA7...-3 / 8LSC7...-3 - Reinforced bearing

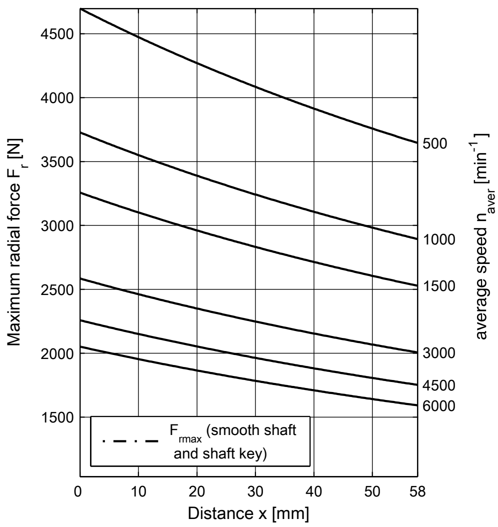
Shaft load values apply to both 8LSA and 8LSC!

8LSA73 (special option "reinforced A side bearing")



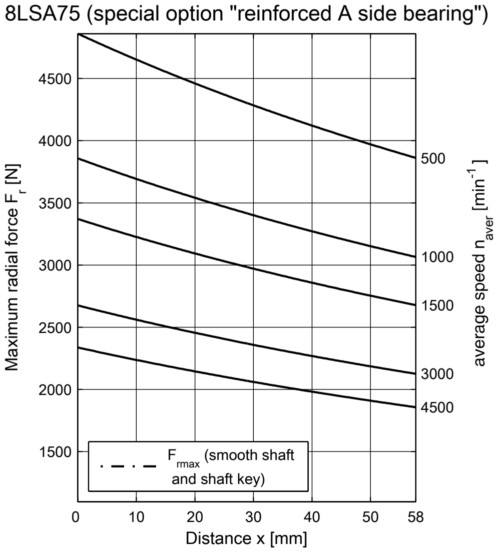
maximum allowed axial force: F_{amax} = 405 N

8LSA74 (special option "reinforced A side bearing")



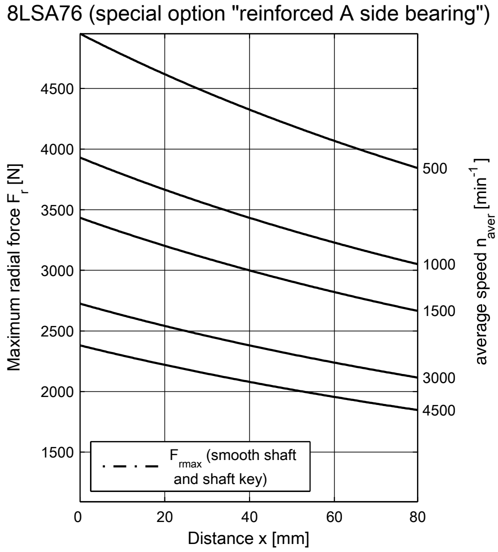
maximum allowed axial force: F_{amax} = 429 N

8LSA75 (special option "reinforced A side bearing")



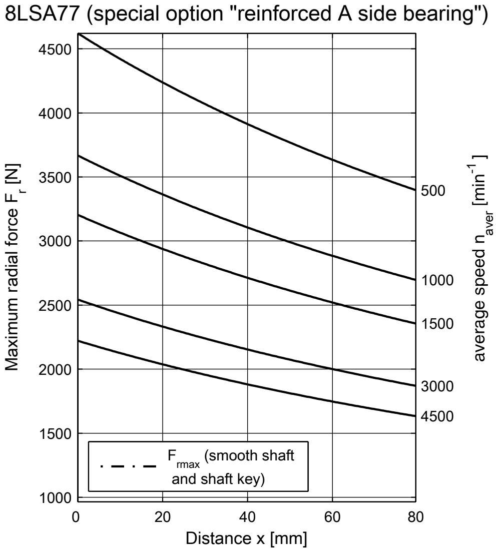
maximum allowed axial force: F_{amax} = 450 N

8LSA76 (special option "reinforced A side bearing")



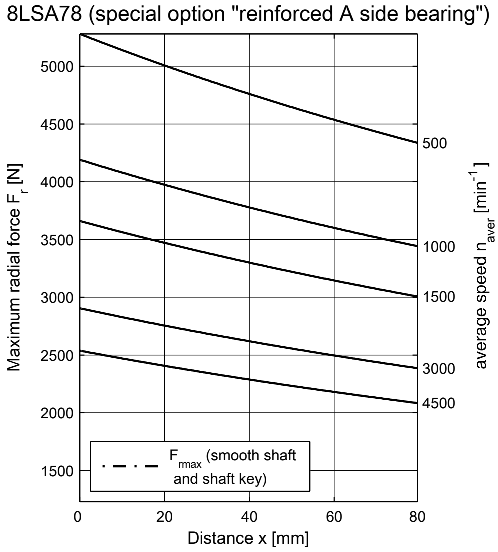
maximum allowed axial force: F_{amax} = 453 N

8LSA77 (special option "reinforced A side bearing")



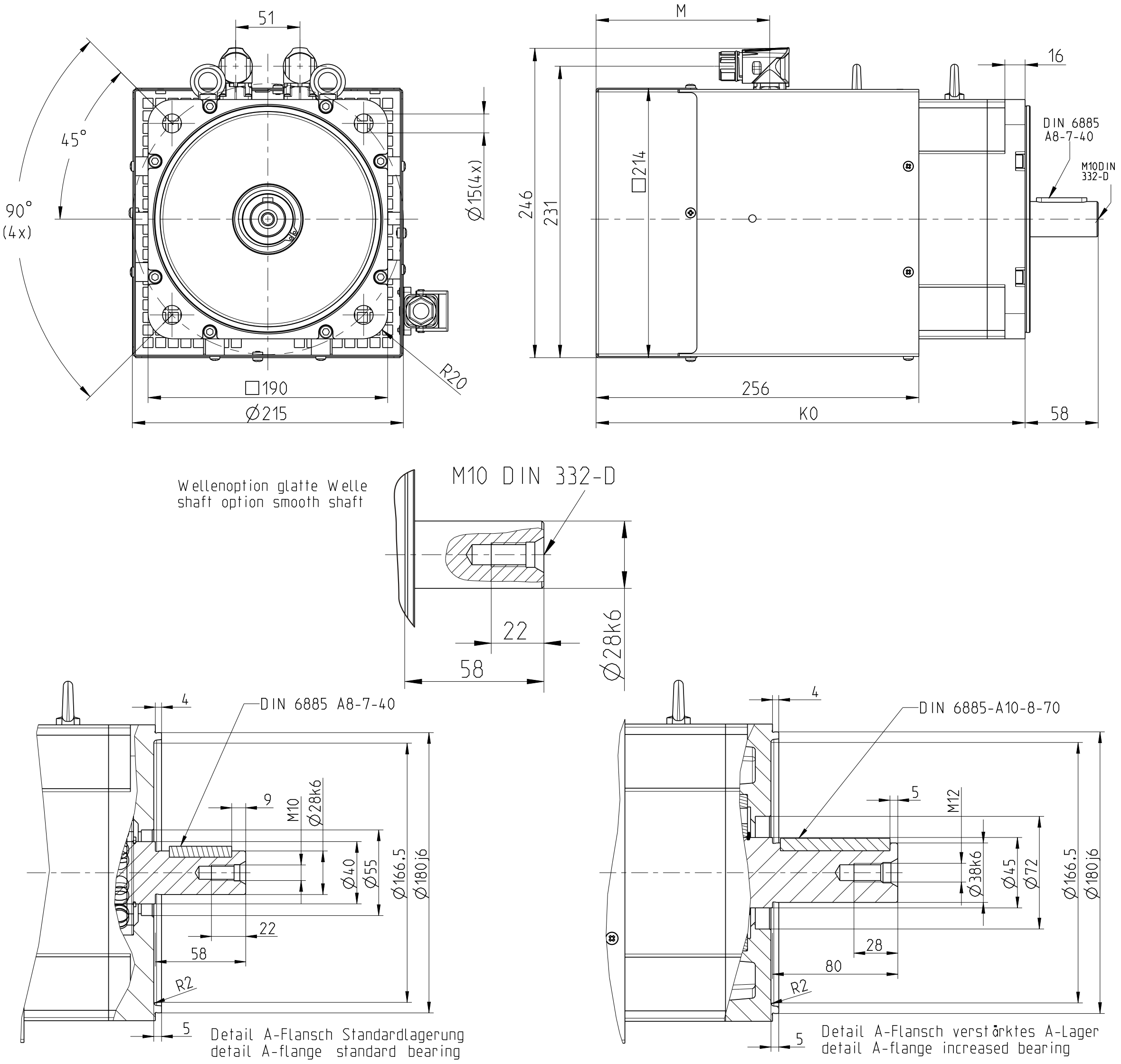
maximum allowed axial force: F_{amax} = 410 N

8LSA78 (special option "reinforced A side bearing")



maximum allowed axial force: F_{amax} = 498 N

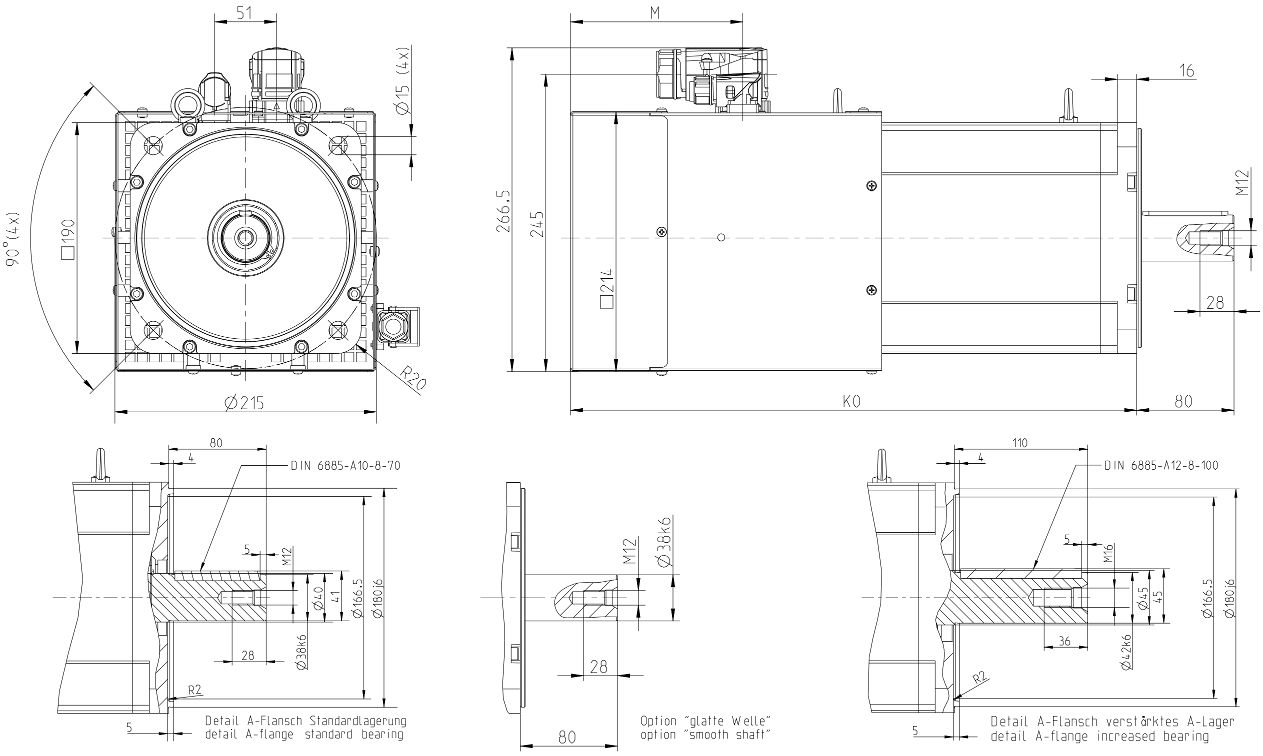
2.15.5.5 8LSC73/74/75...-3 - Dimensions



EnDat/Resolver feedback			Extension of K_0 and M depending on the motor option [mm]		
Model number	**K_0**	**M**	**Holding brake**	**Heavy-duty holding brake**	**Reinforced A-side bearing**
8LSC73.eennnffgg-3	318	137.8	37	54	10
8LSC73.ee045ffgg-3, power connector size 1.5	**On request**				
8LSC74.eennnffgg-3	340.5	137.8	37	54	10
8LSC74.ee045ffgg-3, power connector size 1.5	353.5	141.8	37	54	10
8LSC75.eennnffgg-3	363.0	137.8	37	54	10
8LSC75.ee045ffgg-3, power connector size 1.5	**On request**				

IMPORTANT: Motor option "oil seal" has no effect on the motor length.

2.15.5.6 8LSC76/77/78...-3 - Dimensions

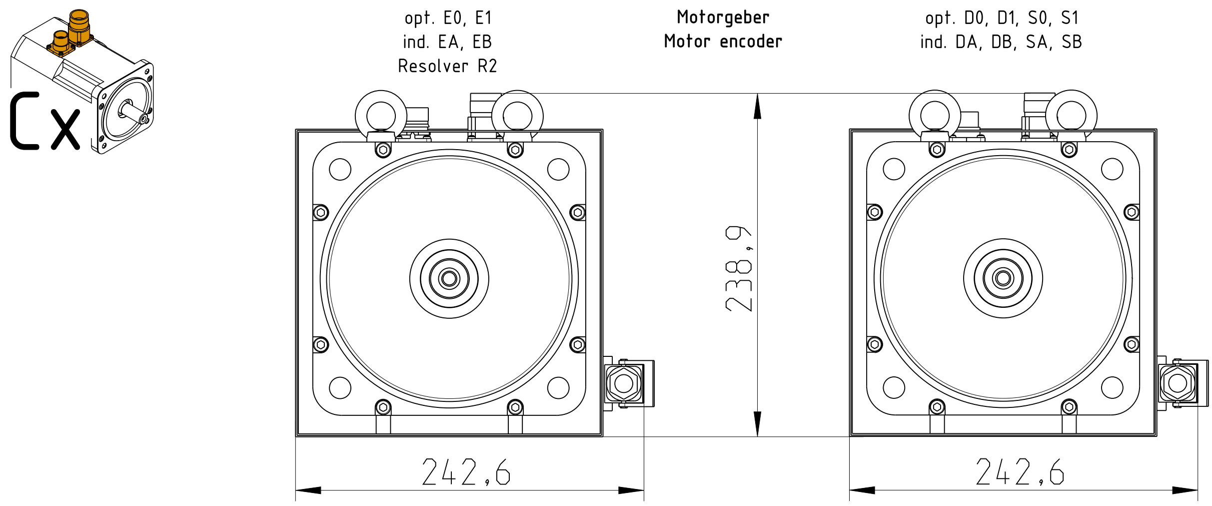


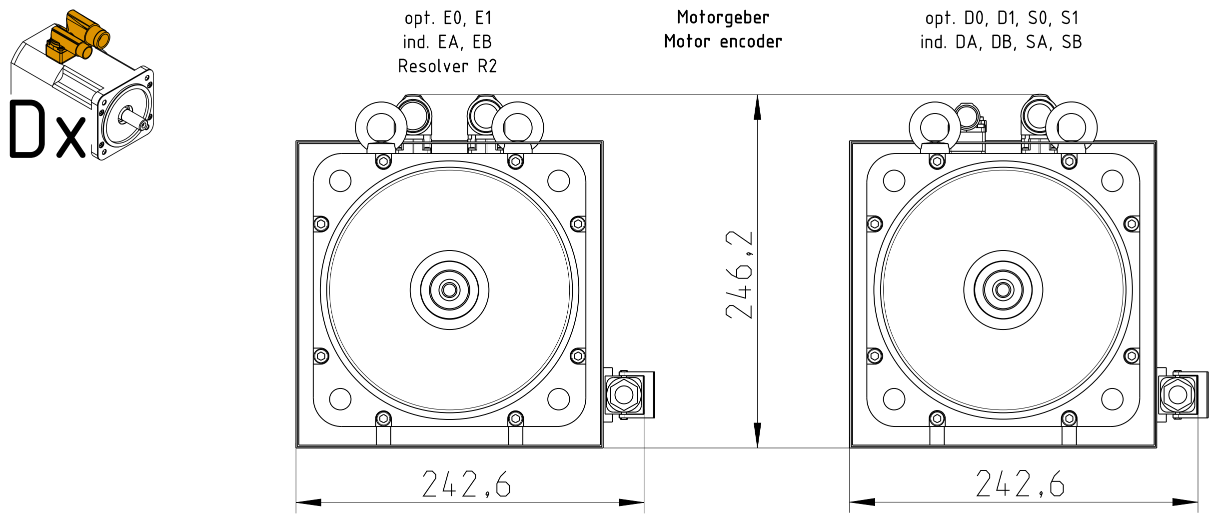
EnDat/Resolver feedback			Extension of K_0 and M depending on the motor option [mm]		
Model number	**K_0**	**M**	**Holding brake**	**Heavy-duty holding brake**	**Reinforced A-side bearing**
8LSC76.eennnffgg-3	421	142	37	54	10
8LSC77.eennnffgg-3	466	142	37	54	10
8LSC78.eennnffgg-3	511	142	37	54	10

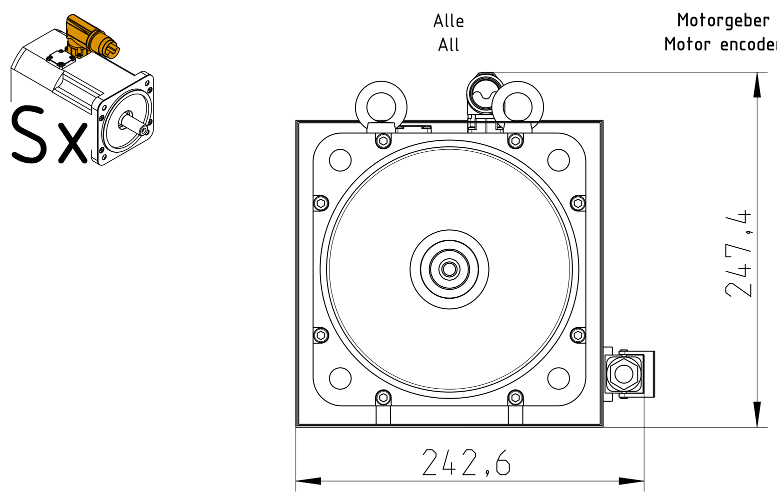
IMPORTANT: Motor option "oil seal" has no effect on the motor length.

2.15.5.7 8LSC7...-3 (connector size 1) - Connection dimensions

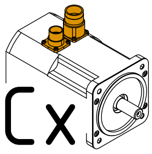
Starting with 8LSC76...3 and also for **8LSC73...-3 with nominal speed 4500** and **8LSC74...-3 with nominal speed 4500**, the dimensions of connector size 1.5 on page 233 apply.

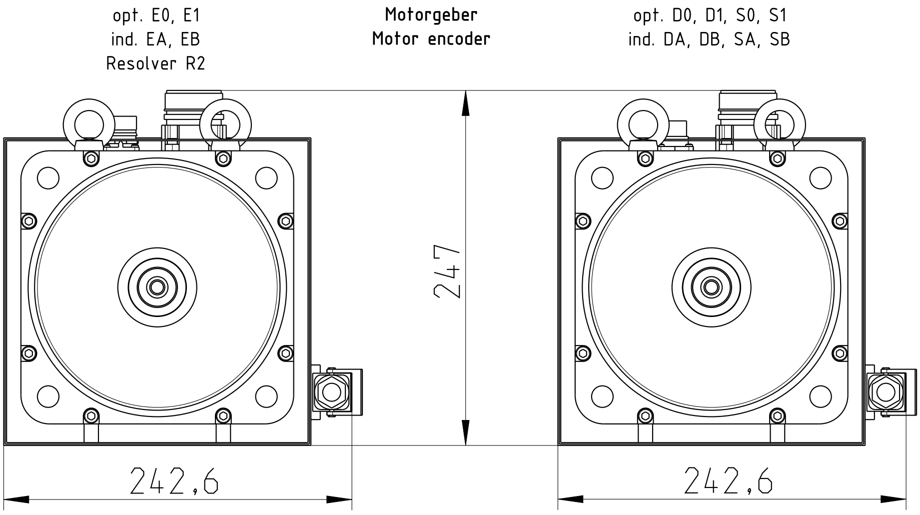


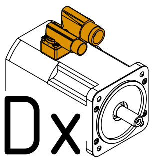


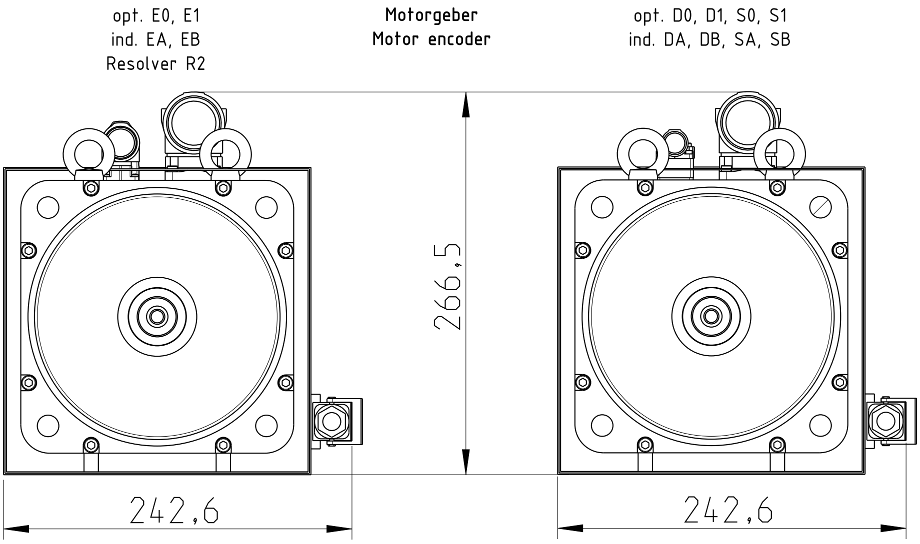


2.15.5.8 8LSC7...-3 (connector size 1.5) - Connection dimensions









2.15.6 8LSC8...-3 - Technical data

Model number	8LSC83.ee015ffgg-3	8LSC83.ee022ffgg-3	8LSC83.ee030ffgg-3	8LSC84.ee015ffgg-3
Motor				
Nominal speed n_N [rpm]	1500	2200	3000	1500
Number of pole pairs	3			
Nominal torque M_n [Nm]	45.5	40.3	35.1	75.4
Nominal power P_N [W]	7147	9284	11027	11844
Nominal current I_N [A]	14	18.2	21.5	23.1
Stall torque M_0 [Nm]	52			89.7
Stall current I_0 [A]	16	23.5	31.9	27.5
Maximum torque M_{max} [Nm]	120			204
Maximum current I_{max} [A]	50	73	102	79
Maximum speed n_{max} [rpm]	3600			
Torque constant K_T [Nm/A]	3.26	2.22	1.63	3.26
Voltage constant K_E [V/1000 rpm]	196.87	134.04	98.44	196.87
Stator resistance R_{2ph} [Ω]	0.896	0.41	0.23	0.34
Stator inductance L_{2ph} [mH]	16.86	9.6	5.4	10.3
Electrical time constant t_{el} [ms]	18.8	23.4	23.5	30.3
Thermal time constant t_{therm} [min]	50			65
Moment of inertia J [kgcm²]	65			114
Weight without brake m [kg]	47.7			65.7
Holding brake				
Holding torque of brake M_{Br} [Nm]	130			
Mass of brake [kg]	9			
Moment of inertia of brake J_{Br} [kgcm²]	53			
Recommendations				
ACOPOS 8Vxxxx.xx...	1180	1320	1640	1320
ACOPOSmulti 8BVIxxxx...	0220	0330	0440	0330
ACOPOS P3 8EIxxxx...	024X	034X	044X	034X
Cross section for B&R motor cables [mm²]	4			
Connector size	1.5			

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 guideline; 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.

Model number	8LSC84.ee022ffgg-3	8LSC84.ee030ffgg-3	8LSC85.ee015ffgg-3	8LSC85.ee020ffgg-3
Motor				
Nominal speed n_N [rpm]	2200	3000	1500	2000
Number of pole pairs	3			
Nominal torque M_n [Nm]	66.95	62.92	100.1	93.6
Nominal power P_N [W]	15424	19767	15724	19604
Nominal current I_N [A]	30.2	38.6	30.7	38.2
Stall torque M_0 [Nm]	89.7		122.2	
Stall current I_0 [A]	40.5	55	37.5	49.9
Maximum torque M_{max} [Nm]	204		280	
Maximum current I_{max} [A]	115	171	113	151
Maximum speed n_{max} [rpm]	3600			
Torque constant K_T [Nm/A]	2.22	1.63	3.26	2.45
Voltage constant K_E [V/1000 rpm]	134.04	98.44	196.87	147.65
Stator resistance R_{2ph} [Ω]	0.16	0.09	0.29	0.17
Stator inductance L_{2ph} [mH]	4.9	2.6	8.9	5.3
Electrical time constant t_{el} [ms]	30.6	28.9	30.7	31.2
Thermal time constant t_{therm} [min]	65		80	
Moment of inertia J [kgcm²]	114		150	
Weight without brake m [kg]	65.7		80.2	
Holding brake				
Holding torque of brake M_{Br} [Nm]	130			
Mass of brake [kg]	9			
Moment of inertia of brake J_{Br} [kgcm²]	53			
Recommendations				
ACOPOS 8Vxxxx.xx...	1640			
ACOPOSmulti 8BVIxxxx...	0660		0440	0660
ACOPOS P3 8EIxxxx...	-		044X	-
Cross section for B&R motor cables [mm²]	10	16	10	
Connector size	1.5	1.5/16	1.5	1.5/16

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 guideline; 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.

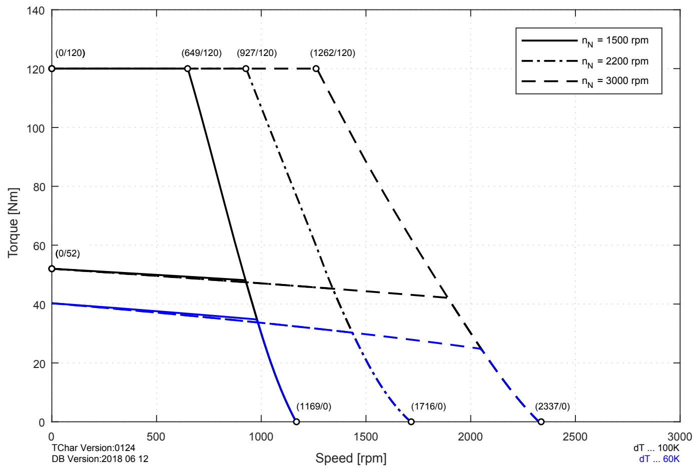
Model number	8LSC86.ee015ffgg-3	8LSC86.ee020ffgg-3
Motor		
Nominal speed n_N [rpm]	1500	2000
Number of pole pairs	3	
Nominal torque M_n [Nm]	126.1	110.5
Nominal power P_N [W]	19808	23143
Nominal current I_N [A]	38.7	42.8
Stall torque M_0 [Nm]	149.5	
Stall current I_0 [A]	45.9	57.9
Maximum torque M_{max} [Nm]	345	
Maximum current I_{max} [A]	137	182
Maximum speed n_{max} [rpm]	3600	
Torque constant K_T [Nm/A]	3.26	2.58
Voltage constant K_E [V/1000 rpm]	196.87	156.03
Stator resistance R_{2ph} [Ω]	0.208	0.15
Stator inductance L_{2ph} [mH]	6.1	4.9
Electrical time constant t_{el} [ms]	30.5	32.6
Thermal time constant t_{therm} [min]	90	
Moment of inertia J [kgcm²]	192	
Weight without brake m [kg]	93.7	
Holding brake		
Holding torque of brake M_{Br} [Nm]	130	
Mass of brake [kg]	9	
Moment of inertia of brake J_{Br} [kgcm²]	53	
Recommendations		
ACOPOS 8Vxxxx.xx...	1640	
ACOPOSmulti 8BVIxxxx...	0660	
Cross section for B&R motor cables [mm²]	10	16
Connector size	1.5	1.5/16

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 guideline; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).

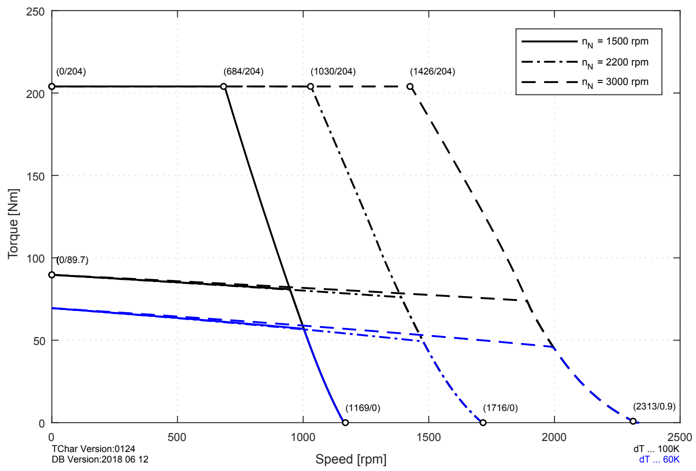
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

2.15.6.1 Speed-torque characteristic curves at 325 VDC DC bus voltage

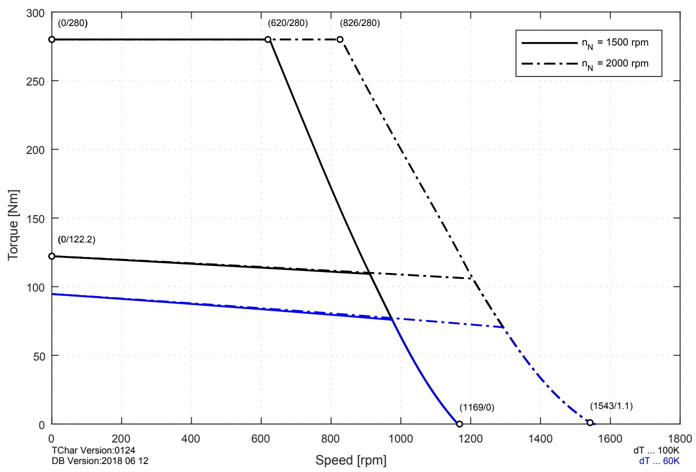
8LSC83.eennnffgg-3



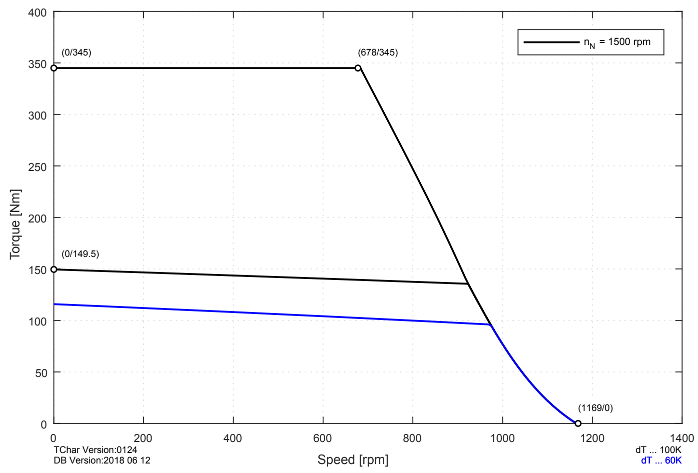
8LSC84.eennnffgg-3



8LSC85.eennnffgg-3

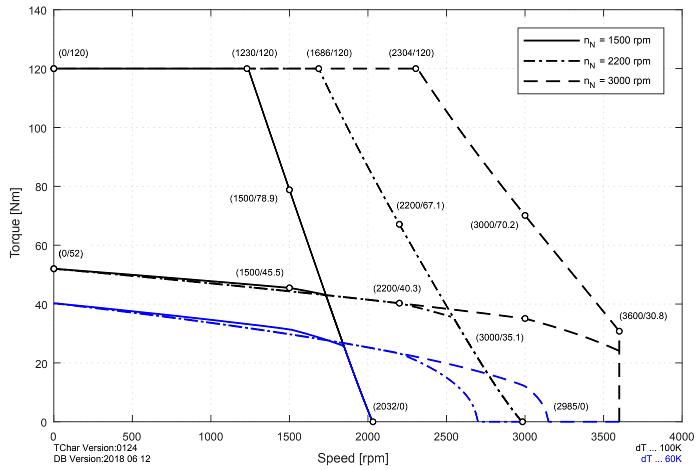


8LSC86.eennnffgg-3

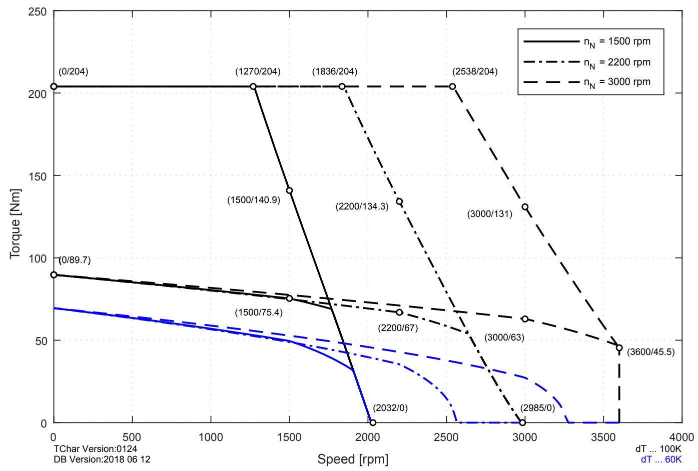


2.15.6.2 Speed-torque characteristic curves at 560 VDC DC bus voltage

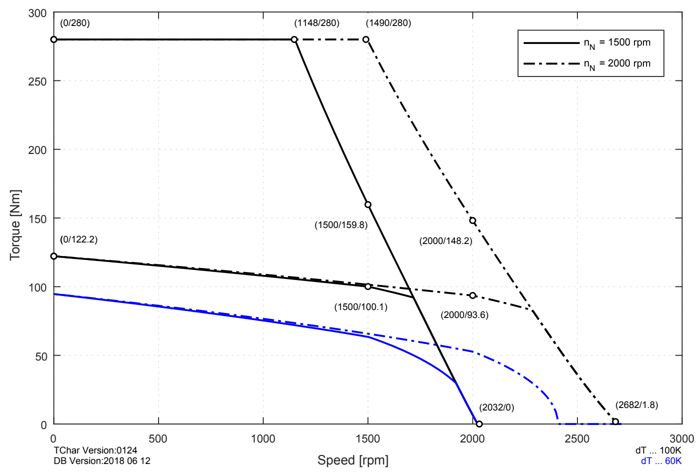
8LSC83.eennnffgg-3



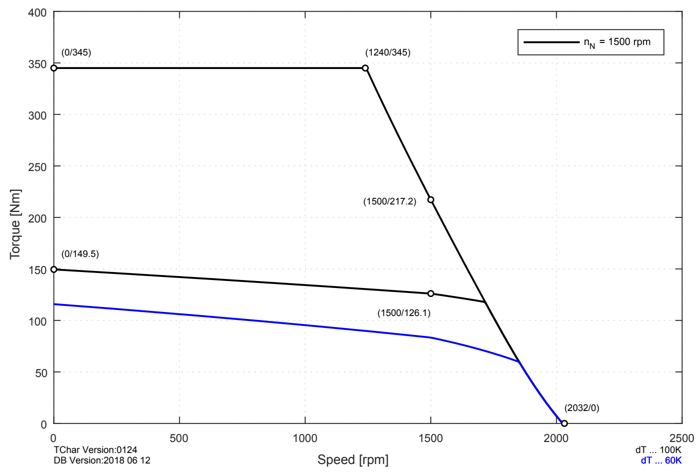
8LSC84.eennnffgg-3



8LSC85.eennnffgg-3

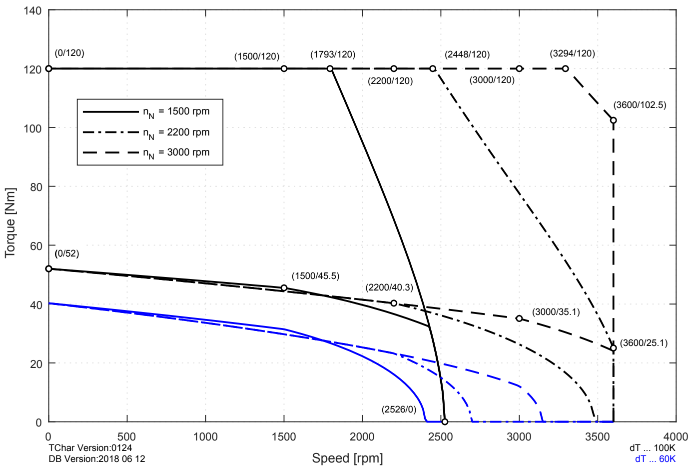


8LSC86.eennnffgg-3

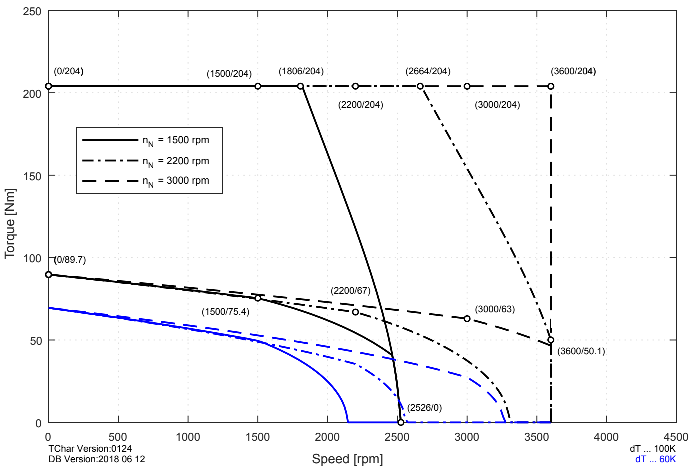


2.15.6.3 Speed-torque characteristic curves at 750 VDC DC bus voltage

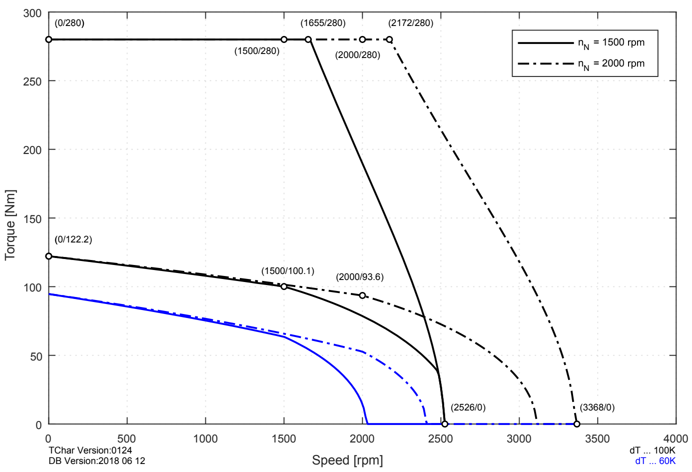
8LSC83.eennnffgg-3



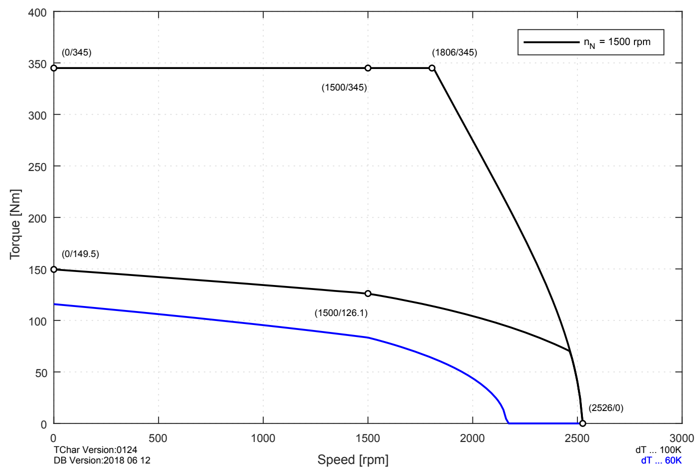
8LSC84.eennnffgg-3



8LSC85.eennnffgg-3



8LSC86.eennnffgg-3

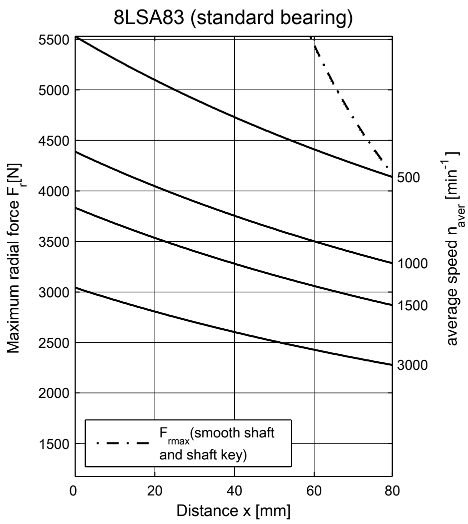


2.15.6.4 Maximum shaft load

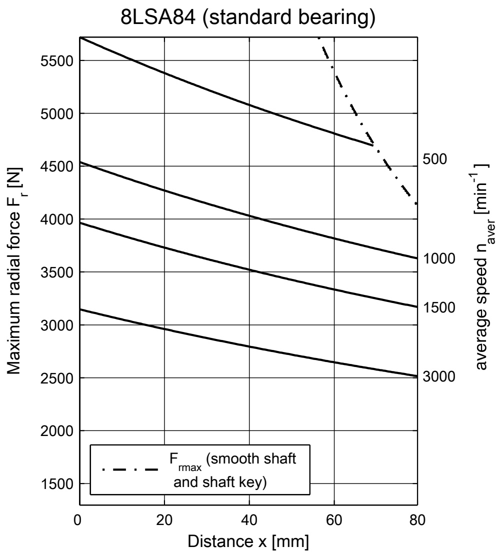
Note the information in section "Load capacity of the shaft end and bearing" on page 273 of chapter "Installation conditions".

2.15.6.4.1 8LSA8...-3 / 8LSC8...-3 - Standard bearing

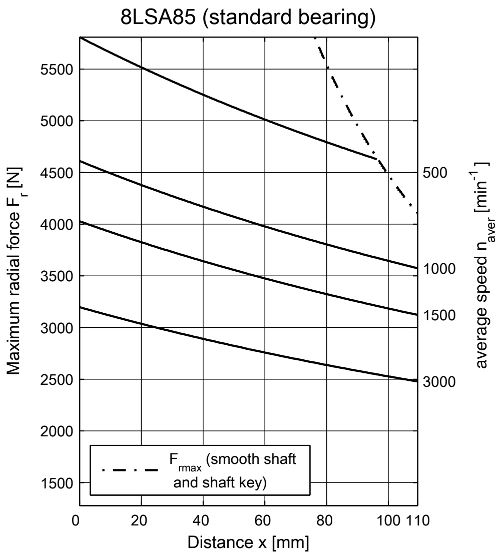
Shaft load values apply to both 8LSA and 8LSC!



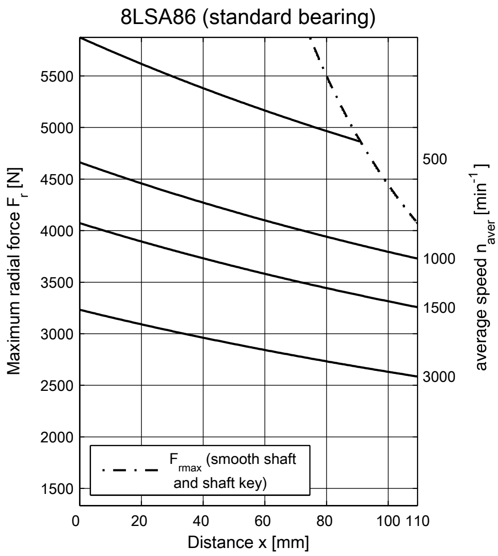
maximum allowed axial force: F_{amax} = 495 N



maximum allowed axial force: F_{amax} = 532 N



maximum allowed axial force: F_{amax} = 531 N

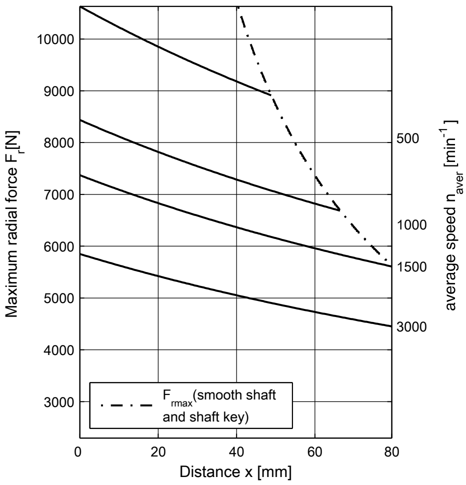


maximum allowed axial force: F_{amax} = 546 N

2.15.6.4.2 8LSA8...-3 / 8LSC8...-3 - Reinforced bearing

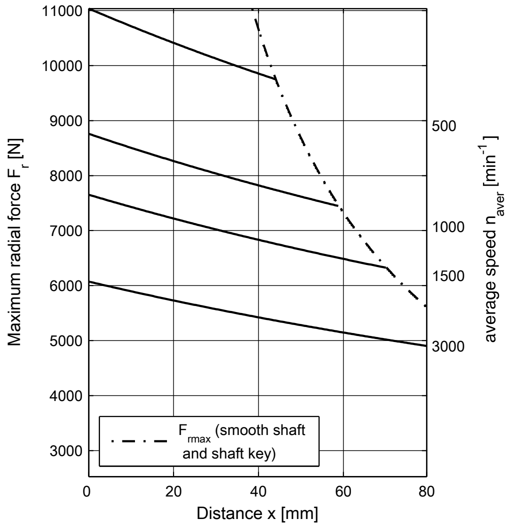
Shaft load values apply to both 8LSA and 8LSC!

8LSA83 (special option "reinforced A side bearing")



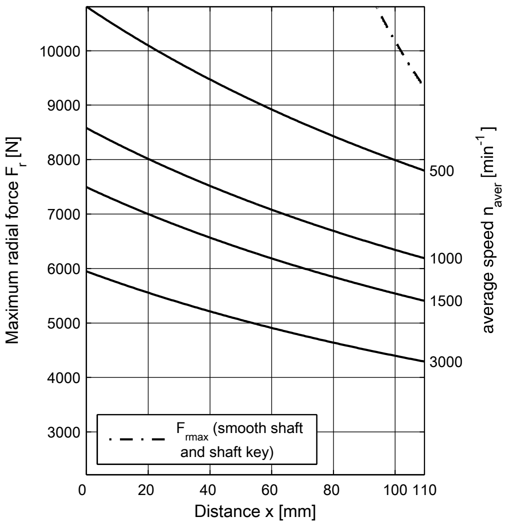
maximum allowed axial force: F_{amax} = 961 N

8LSA84 (special option "reinforced A side bearing")



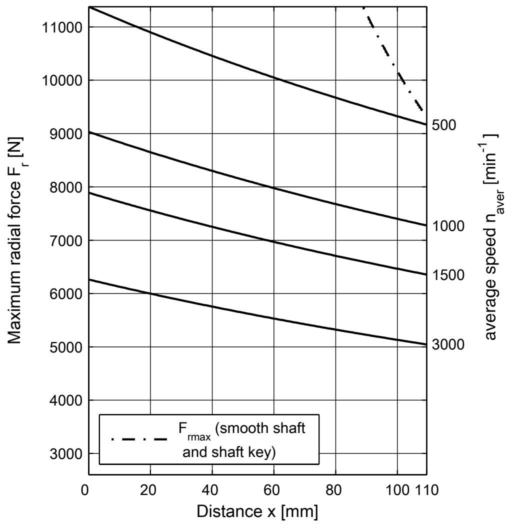
maximum allowed axial force: F_{amax} = 1032 N

8LSA85 (special option "reinforced A side bearing")



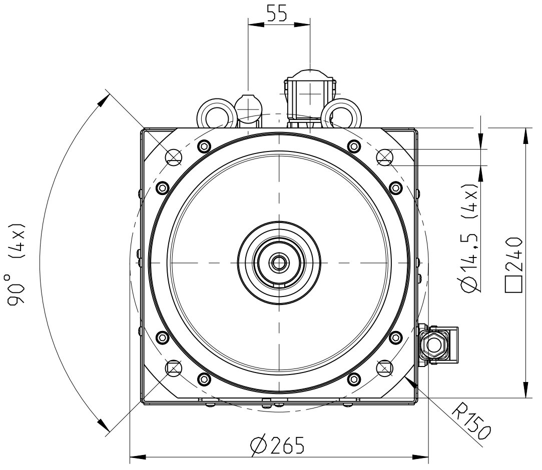
maximum allowed axial force: F_{amax} = 948 N

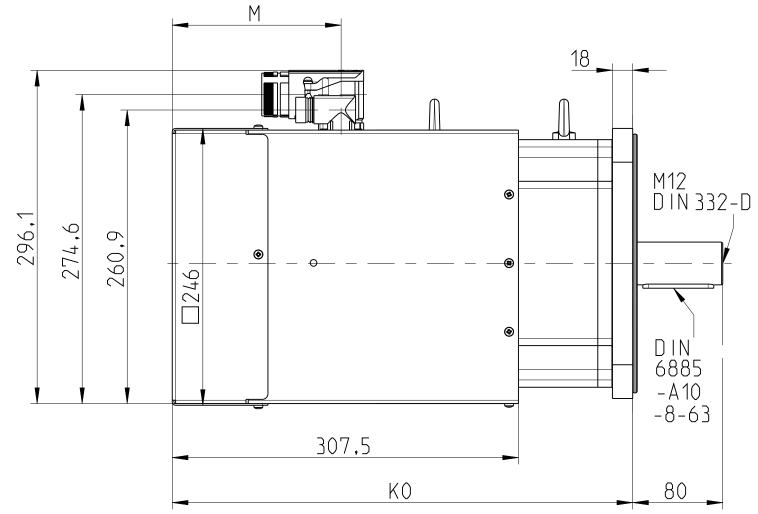
8LSA86 (special option "reinforced A side bearing")

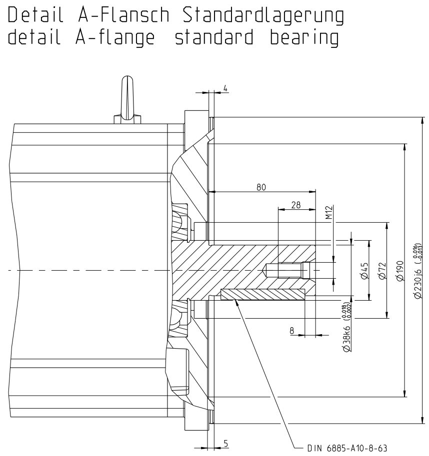


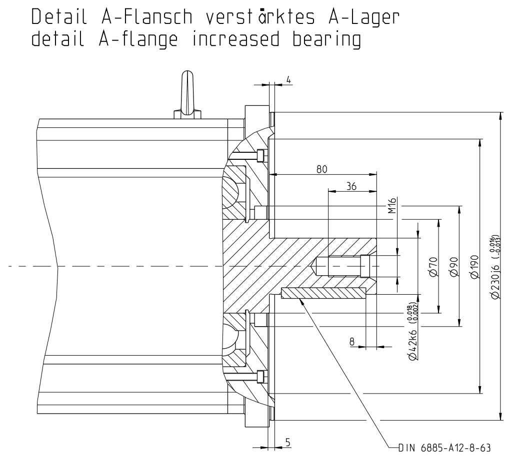
maximum allowed axial force: F_{amax} = 1062 N

2.15.6.5 8LSC8...-3 - Dimensions



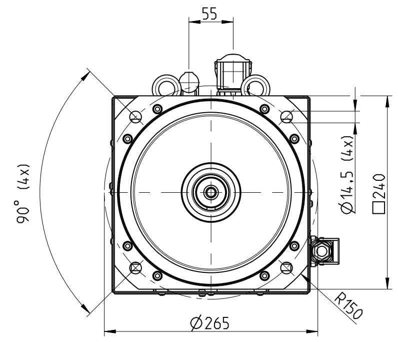


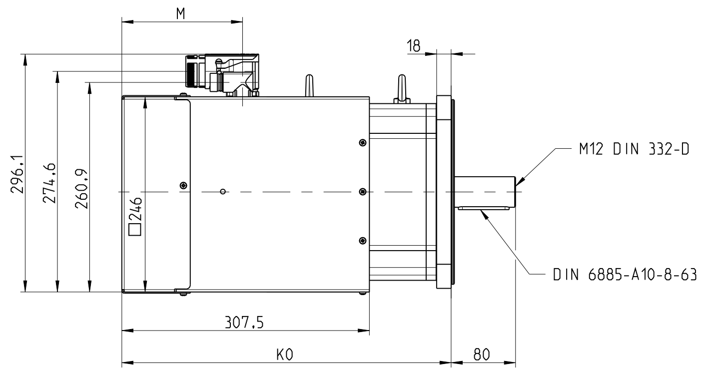


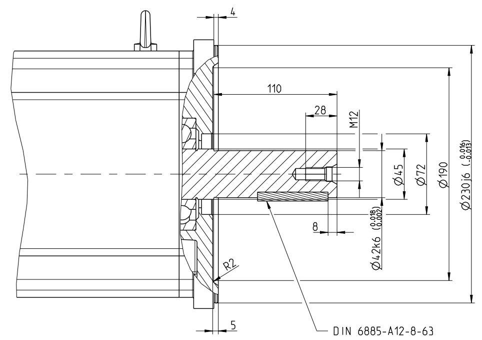


EnDat feedback / Resolver feedback			Extension of K_0 depending on motor option [mm]		
Model number	**K_0**	**M**	**Holding brake[1)]**	**Oil seal**	**Reinforced A-side bearing**
8LSC83.eennnffgg-3	409	150	50	---	16.5
8LSC84.eennnffgg-3	489	150	50	---	16.5

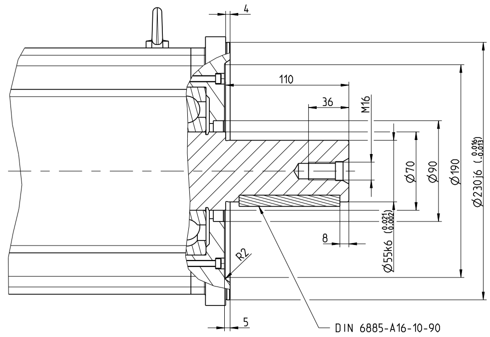
1) Motor option "Holding brake" cannot be ordered in combination with special motor option "Reinforced A-side bearing".







Detail A-Flansch Standardlagerung
detail A-flange standard bearing

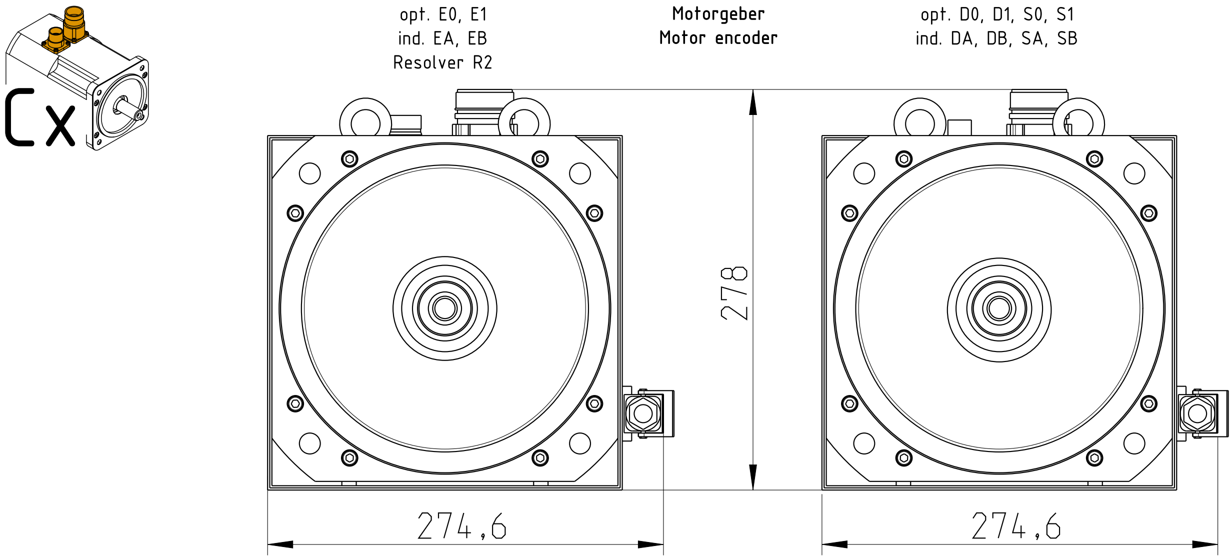


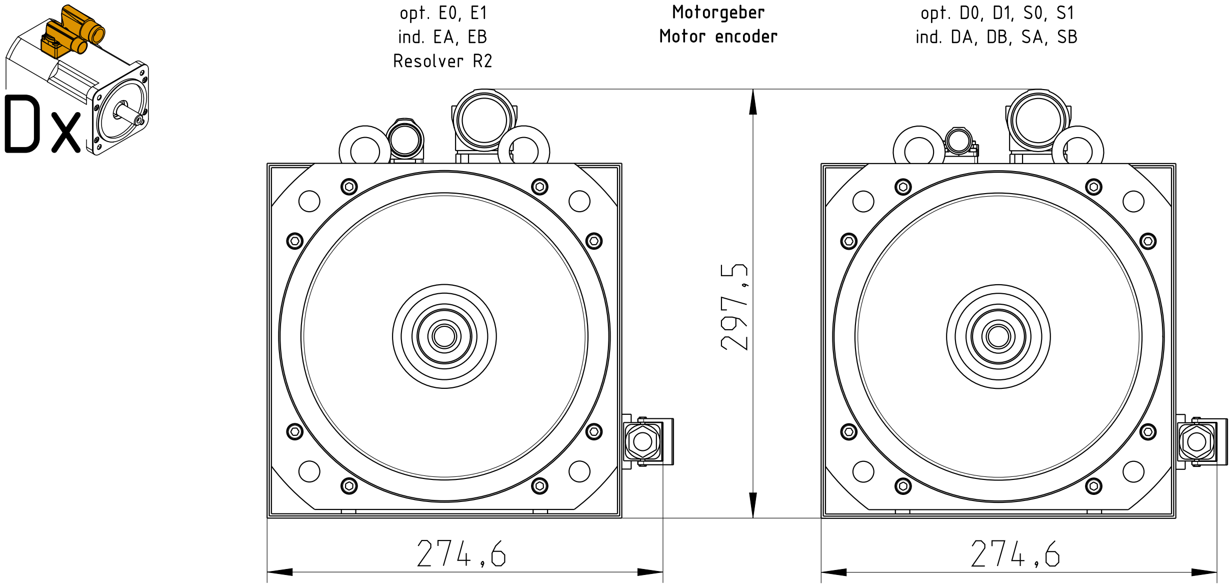
Detail A-Flansch verstärktes A-Lager
detail A-flange increased bearing

EnDat feedback / Resolver feedback			Extension of K_0 depending on motor option [mm]		
Model number	**K_0**	**M**	**Holding brake[1)]**	**Oil seal**	**Reinforced A-side bearing**
8LSC85.eennnffgg-3	549	150	50	---	16.5
8LSC86.eennnffgg-3	609	150	50	---	16.5

1) Motor option "Holding brake" cannot be ordered in combination with special motor option "Reinforced A-side bearing".

2.15.6.6 8LSC8...-3 - Connection dimensions





2.16 8LSO - Technical data

2.16.1 8LSO9...-3 - Technical data

Model number	8LSO93.ee013ffgg-3	8LSO93.ee015ffgg-3	8LSO93.ee022ffgg-3	8LSO94.ee013ffgg-3	8LSO94.ee015ffgg-3	8LSO94.ee022ffgg-3
Motor						
Nominal speed n_N [rpm]	1300	1500	2200	1300	1500	2200
Number of pole pairs	4					
Nominal torque M_n [Nm]	110		67	140		96
Nominal power P_N [W]	14975	17279	15436	19059	21991	22117
Nominal current I_N [A]	30	38	30.3	38	43	43.4
Stall torque M_0 [Nm]	140			180		
Stall current I_0 [A]	38	43	63.3	49	55	81.5
Maximum torque M_{max} [Nm]	407			556		
Maximum current I_{max} [A]	138	146	216	177	200	295
Maximum speed n_{max} [rpm]	3000					
Torque constant K_T [Nm/A]	3.64	3.26	2.21	3.64	3.26	2.21
Voltage constant K_E [V/1000 rpm]	219.91	196.87	134.04	219.91	196.87	134.04
Stator resistance R_{2ph} [Ω]	0.194	0.158	0.076	0.115	0.103	0.049
Stator inductance L_{2ph} [mH]	5.39	4.7	2.23	3.75	3.1	1.35
Electrical time constant t_{el} [ms]	28	29.8	29	33		
Thermal time constant t_{therm} [min]	63			65		
Moment of inertia J [kgcm²]	290			373		
Weight without brake m [kg]	118		128	140		150
Holding brake						
Holding torque of brake M_{Br} [Nm]	0					
Mass of brake [kg]	0					
Moment of inertia of brake J_{Br} [kgcm²]	0					
Recommendations						
ACOPOS 8Vxxxx.xx...	1640		128M	1640		128M
ACOPOSmulti 8BVIxxxx...	0440	0660	0880	0660		1650
Cross section for B&R motor cables [mm²]	10		16	10	16	25

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 guideline; 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.

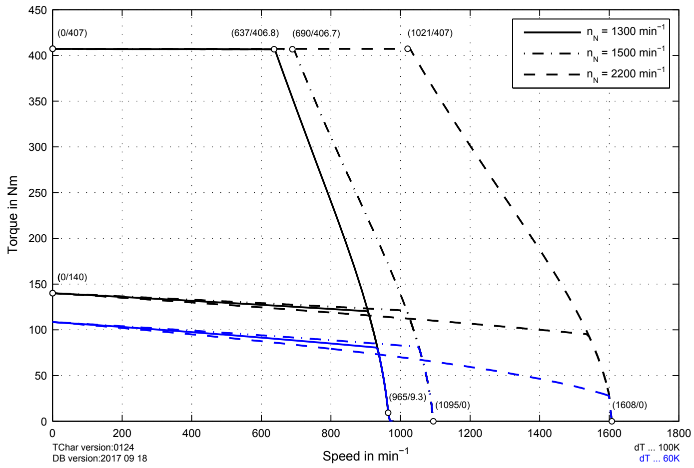
Model number	8LSO95.ee013ffgg-3	8LSO95.ee015ffgg-3	8LSO95.ee022ffgg-3	8LSO96.ee013ffgg-3	8LSO96.ee015ffgg-3	8LSO96.ee022ffgg-3
Motor						
Nominal speed n_N [rpm]	1300	1500	2200	1300	1500	2200
Number of pole pairs	4					
Nominal torque M_n [Nm]	183		123	229		165
Nominal power P_N [W]	24913	28746	28337	31175	35971	38013
Nominal current I_N [A]	50	56	55.7	62	70	74.7
Stall torque M_0 [Nm]	240			300		
Stall current I_0 [A]	65	74	108.6	82	92	135.7
Maximum torque M_{max} [Nm]	778			1000		
Maximum current I_{max} [A]	249	280	412	320	359	530
Maximum speed n_{max} [rpm]	3000					
Torque constant K_T [Nm/A]	3.64	3.26	2.21	3.64	3.26	2.21
Voltage constant K_E [V/1000 rpm]	219.91	196.87	134.04	219.91	196.87	134.04
Stator resistance R_{2ph} [Ω]	0.083	0.062	0.03	0.066	0.045	0.022
Stator inductance L_{2ph} [mH]	2.95	2.22	1.06	2.4	1.7	0.83
Electrical time constant t_{el} [ms]	35	36	35	36	37.8	37
Thermal time constant t_{therm} [min]	67			69		
Moment of inertia J [kgcm²]	497			622		
Weight without brake m [kg]	171		183	204		216
Holding brake						
Holding torque of brake M_{Br} [Nm]	0					
Mass of brake [kg]	0					
Moment of inertia of brake J_{Br} [kgcm²]	0					
Recommendations						
ACOPOS 8Vxxxx.xx...	128M					-
ACOPOSmulti 8BVIxxxx...	0880		1650			
Cross section for B&R motor cables [mm²]	16	25	50	25	35	70

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 guideline; detailed inspection of the corresponding speed/torque characteristic curve can result in deviations of the servo drive size (larger or smaller).

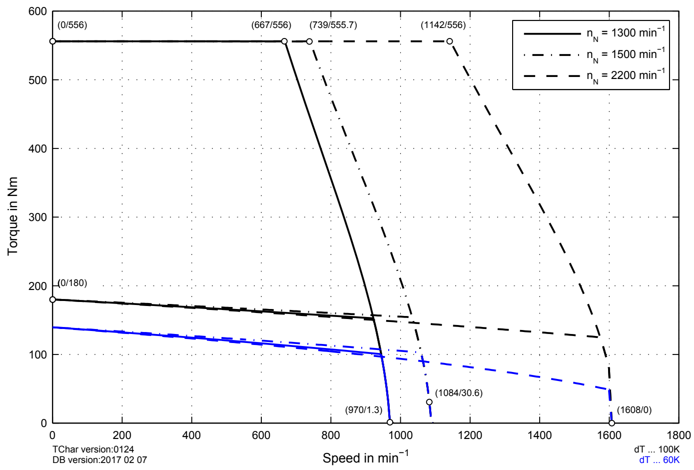
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

2.16.1.1 Speed-torque characteristic curves at 325 VDC DC bus voltage

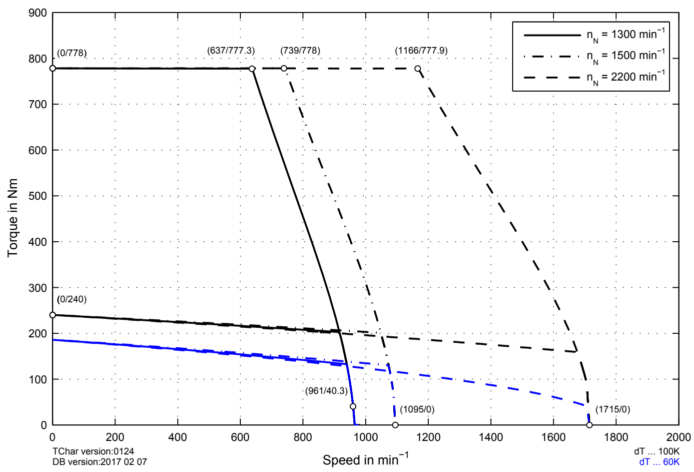
8LSO93.eennnffgg-3



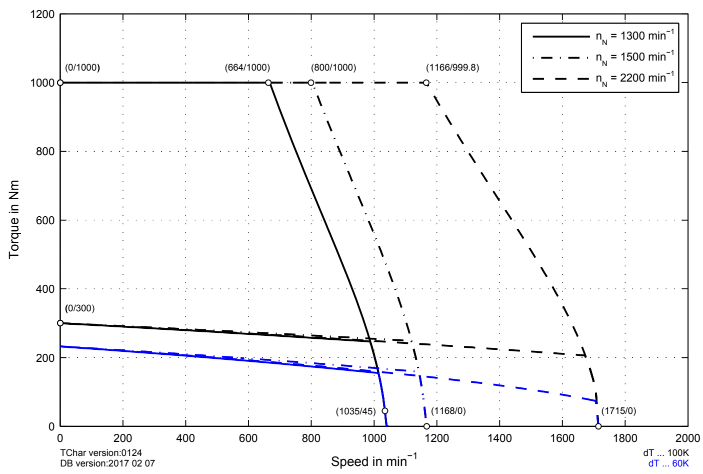
8LSO94.eennnffgg-3



8LSO95.eennnffgg-3

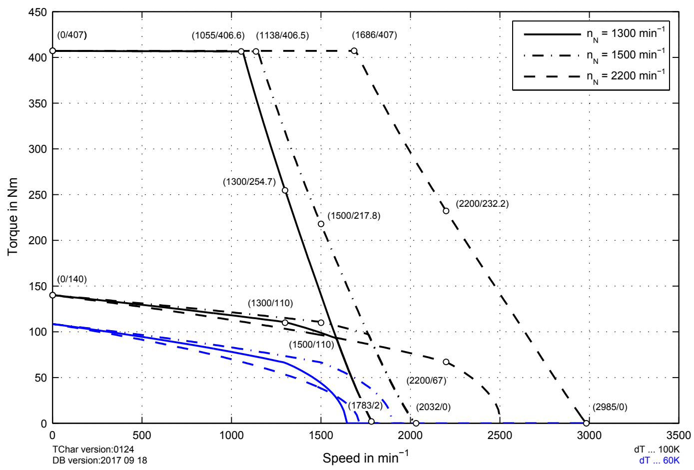


8LSO96.eennnffgg-3

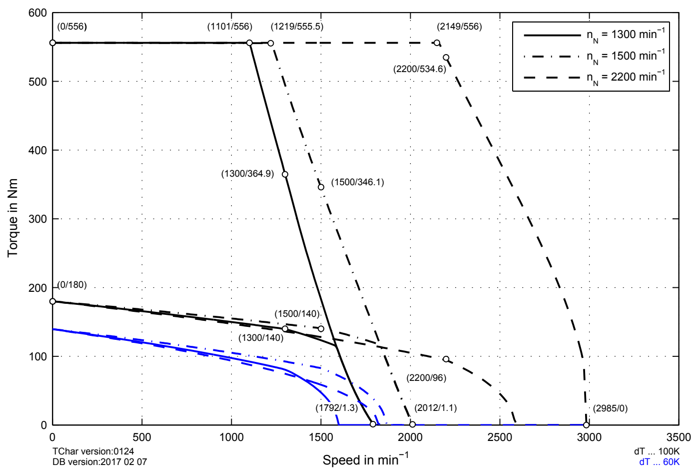


2.16.1.2 Speed-torque characteristic curves at 560 VDC DC bus voltage

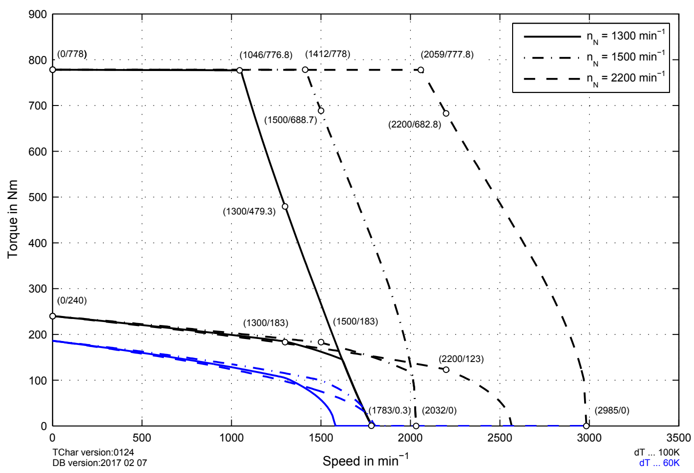
8LSO93.eennnffgg-3



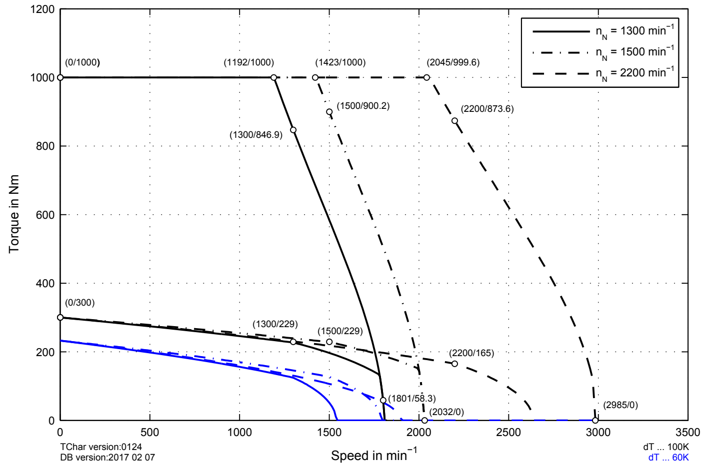
8LSO94.eennnffgg-3



8LSO95.eennnffgg-3

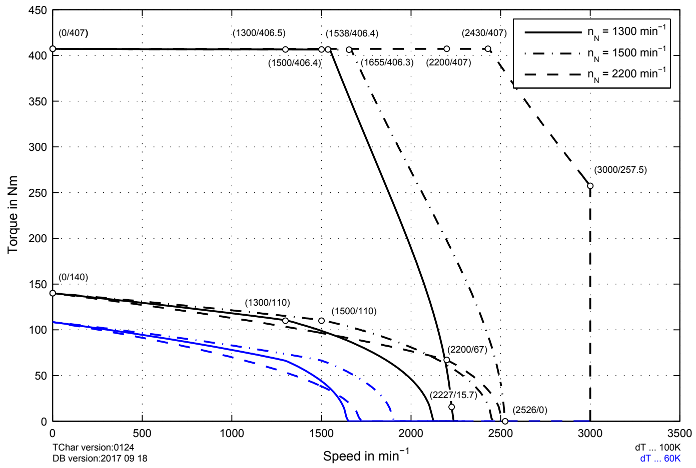


8LSO96.eennnffgg-3

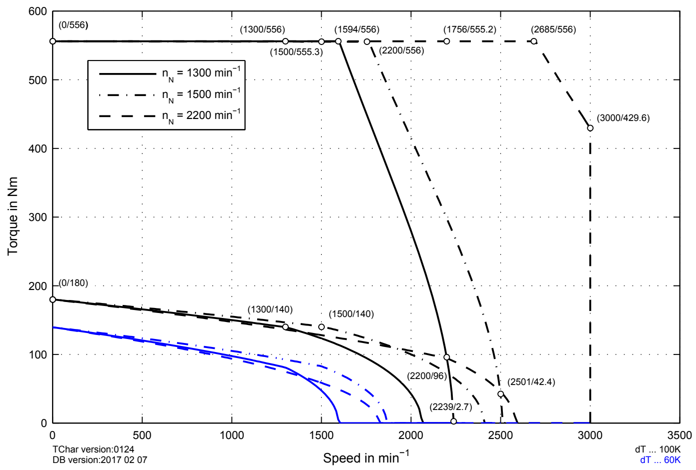


2.16.1.3 Speed-torque characteristic curves at 750 VDC DC bus voltage

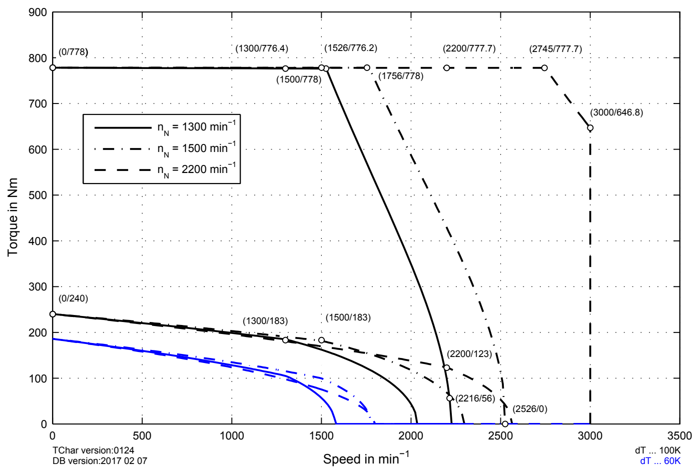
8LSO93.eennnffgg-3



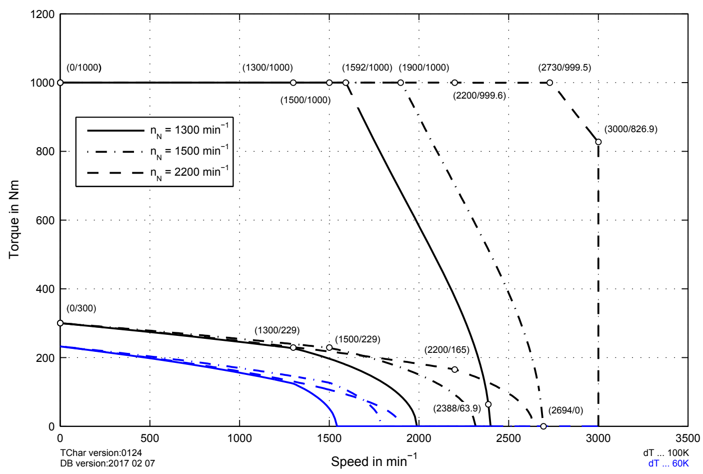
8LSO94.eennnffgg-3



8LSO95.eennnffgg-3



8LSO96.eennnffgg-3

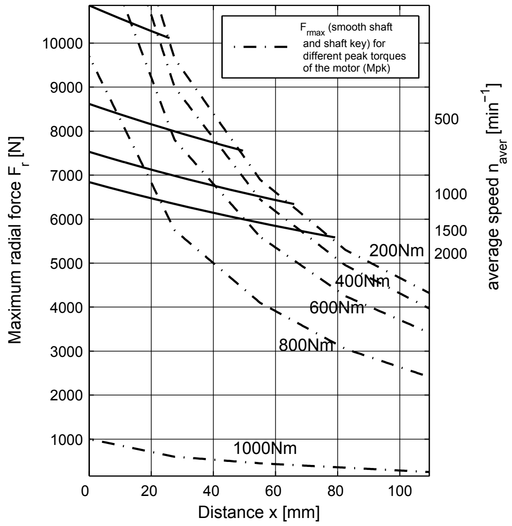


2.16.1.4 Maximum shaft load

Note the information in section "Load capacity of the shaft end and bearing" on page 273 of chapter "Installation conditions".

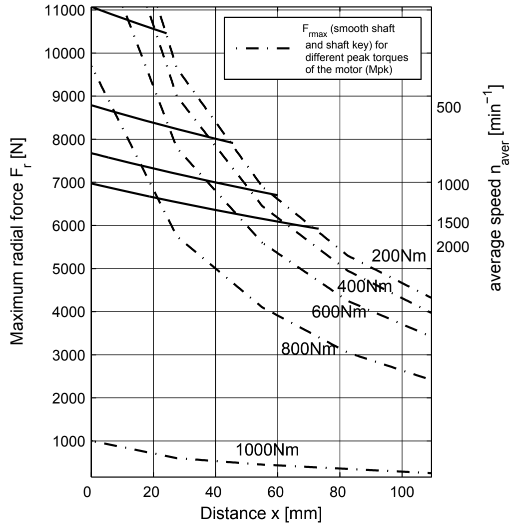
2.16.1.4.1 8LSO9...-3 - Standard bearing

8LSO93 (standard bearing)



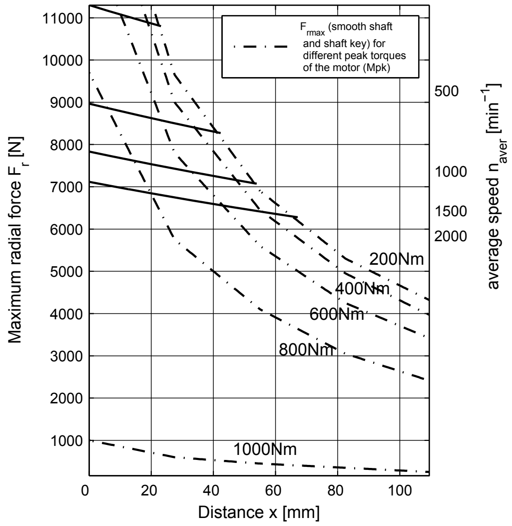
maximum allowed axial force: F_{amax} = 1126 N

8LSO94 (standard bearing)



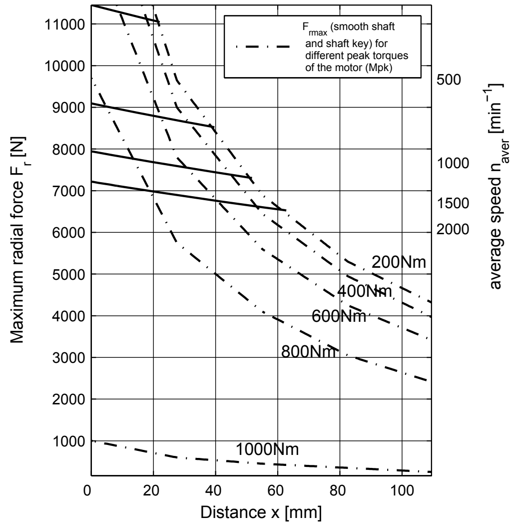
maximum allowed axial force: F_{amax} = 1171 N

8LSO95 (standard bearing)



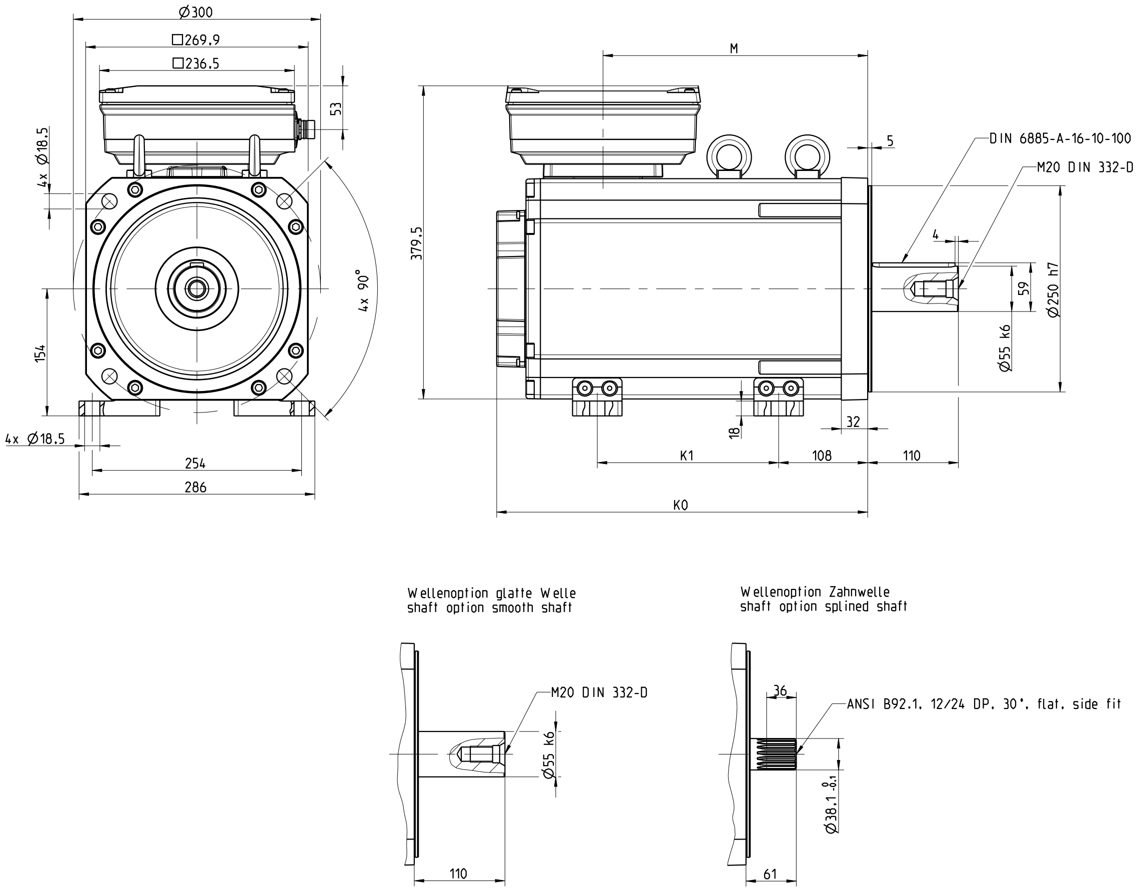
maximum allowed axial force: F_{amax} = 1220 N

8LSO96 (standard bearing)



maximum allowed axial force: F_{amax} = 1256 N

2.16.1.5 8LSO9...-3 - Dimensions



EnDat/Resolver feedback					Extension of K_0 and M depending on motor option [mm]
	K_0		K_1	M	Oil seal
Encoder assign-ments	R2, DA, DB	D0, D1	All encoders	All encoders	
8LSO93...-3	422	450	220	321	0
8LSO94...-3	482	510	280	381	0
8LSO95...-3	572	600	370	471	0
8LSO96...-3	662	690	460	561	0

IMPORTANT: Dimension K_0 depends on the length of the encoder cover.

2.17 8LSP - Technical data

2.17.1 8LSP9...-3 - Technical data

Model number	8LSP93. ee013ffgg-3	8LSP93. ee015ffgg-3	8LSP93. ee022ffgg-3	8LSP94. ee013ffgg-3	8LSP94. ee015ffgg-3	8LSP94. ee022ffgg-3
Motor						
Nominal speed n_N [rpm]	1300	1500	2200	1300	1500	2200
Number of pole pairs	4					
Nominal torque M_n [Nm]	160		148	208		195
Nominal power P_N [W]	21782	25133	34097	28316	32673	44925
Nominal current I_N [A]	43	49	67	57	63.8	88
Stall torque M_0 [Nm]	180			234		
Stall current I_0 [A]	49	55	81	64	71.8	106
Maximum torque M_{max} [Nm]	407			556		
Maximum current I_{max} [A]	138	146	216	177	200	295
Maximum speed n_{max} [rpm]	3000					
Torque constant K_T [Nm/A]	3.64	3.26	2.21	3.64	3.26	2.21
Voltage constant K_E [V/1000 rpm]	219.91	196.87	134.04	219.91	196.87	134.04
Stator resistance R_{2ph} [Ω]	0.194	0.158	0.076	0.115	0.103	0.049
Stator inductance L_{2ph} [mH]	5.39	4.7	2.23	3.75	3.1	1.35
Electrical time constant t_{el} [ms]	28	29.8	29	33		
Thermal time constant t_{therm} [min]	63			65		
Moment of inertia J [kgcm²]	290			373		
Weight without brake m [kg]	128	118	128	150	140	150
Holding brake						
Holding torque of brake M_{Br} [Nm]	0					
Mass of brake [kg]	0					
Moment of inertia of brake J_{Br} [kgcm²]	0					
Recommendations						
ACOPOS 8Vxxxx.xx...	1640		128M			
ACOPOSmulti 8BVIxxxx...	0660		1650	0880		1650
Cross section for B&R motor cables [mm²]	10	16	25	16	25	50

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 guideline; 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.

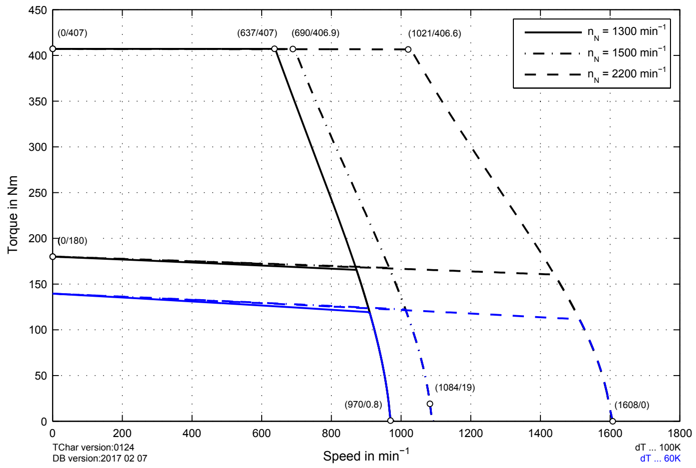
<table>
<tr><th>Model number</th><th>8LSP95.
ee013ffgg-3</th><th>8LSP95.
ee015ffgg-3</th><th>8LSP95.
ee022ffgg-3</th><th>8LSP96.
ee013ffgg-3</th><th>8LSP96.
ee015ffgg-3</th><th>8LSP96.
ee022ffgg-3</th></tr>
<tr><td colspan="7">Motor</td></tr>
<tr><td>Nominal speed n_N [rpm]</td><td>1300</td><td>1500</td><td>2200</td><td>1300</td><td>1500</td><td>2200</td></tr>
<tr><td>Number of pole pairs</td><td colspan="6">4</td></tr>
<tr><td>Nominal torque M_n [Nm]</td><td colspan="2">280</td><td>263</td><td colspan="2">350</td><td>325</td></tr>
<tr><td>Nominal power P_N [W]</td><td>38118</td><td>43982</td><td>60591</td><td>47647</td><td>54978</td><td>74875</td></tr>
<tr><td>Nominal current I_N [A]</td><td>76</td><td>86</td><td>119</td><td>96</td><td>107.3</td><td>147</td></tr>
<tr><td>Stall torque M_0 [Nm]</td><td colspan="3">312</td><td colspan="3">390</td></tr>
<tr><td>Stall current I_0 [A]</td><td>85</td><td>96</td><td>141</td><td>107</td><td>119.6</td><td>175</td></tr>
<tr><td>Maximum torque M_{max} [Nm]</td><td colspan="3">778</td><td colspan="3">1000</td></tr>
<tr><td>Maximum current I_{max} [A]</td><td>249</td><td>280</td><td>412</td><td>320</td><td>359</td><td>530</td></tr>
<tr><td>Maximum speed n_{max} [rpm]</td><td colspan="6">3000</td></tr>
<tr><td>Torque constant K_T [Nm/A]</td><td>3.64</td><td>3.26</td><td>2.21</td><td>3.64</td><td>3.26</td><td>2.21</td></tr>
<tr><td>Voltage constant K_E [V/1000 rpm]</td><td>219.91</td><td>196.87</td><td>134.04</td><td>219.91</td><td>196.87</td><td>134.04</td></tr>
<tr><td>Stator resistance R_{2ph} [Ω]</td><td>0.083</td><td>0.062</td><td>0.03</td><td>0.066</td><td>0.045</td><td>0.022</td></tr>
<tr><td>Stator inductance L_{2ph} [mH]</td><td>2.95</td><td>2.22</td><td>1.06</td><td>2.4</td><td>1.7</td><td>0.83</td></tr>
<tr><td>Electrical time constant t_{el} [ms]</td><td>35</td><td>36</td><td>35</td><td>36</td><td>37.8</td><td>37</td></tr>
<tr><td>Thermal time constant t_{therm} [min]</td><td colspan="3">67</td><td colspan="3">69</td></tr>
<tr><td>Moment of inertia J [kgcm²]</td><td colspan="3">497</td><td colspan="3">622</td></tr>
<tr><td>Weight without brake m [kg]</td><td>183</td><td>171</td><td>183</td><td>216</td><td>204</td><td>216</td></tr>
<tr><td colspan="7">Holding brake</td></tr>
<tr><td>Holding torque of brake M_{Br} [Nm]</td><td colspan="6">0</td></tr>
<tr><td>Mass of brake [kg]</td><td colspan="6">0</td></tr>
<tr><td>Moment of inertia of brake J_{Br} [kgcm²]</td><td colspan="6">0</td></tr>
<tr><td colspan="7">Recommendations</td></tr>
<tr><td>ACOPOS 8Vxxxx.xx...</td><td colspan="2">128M</td><td>-</td><td>128M</td><td colspan="2">-</td></tr>
<tr><td>ACOPOSmulti 8BVIxxxx...</td><td colspan="5">1650</td><td>-</td></tr>
<tr><td>Cross section for B&R motor cables [mm²]</td><td>25</td><td>35</td><td>70</td><td colspan="2">50</td><td>70</td></tr>
</table>

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 guideline; detailed inspection of the corresponding speed/ torque characteristic curve can result in deviations of the servo drive size (larger or smaller).

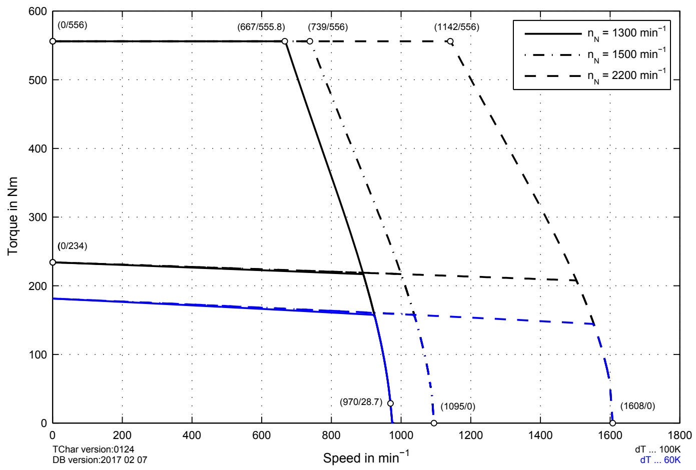
NOTE about cable cross section: The B&R motor cables with this cable cross section are produced optimally (cables stripped to the correct length) for the ACOPOS servo drive or the recommended ACOPOS inverter module. B&R motor cables with other cable cross sections can also be used (within the specified terminal cross section range) and can be obtained from B&R in the desired design on request. Note the type of wiring.

2.17.1.1 Speed-torque characteristic curves at 325 VDC DC bus voltage

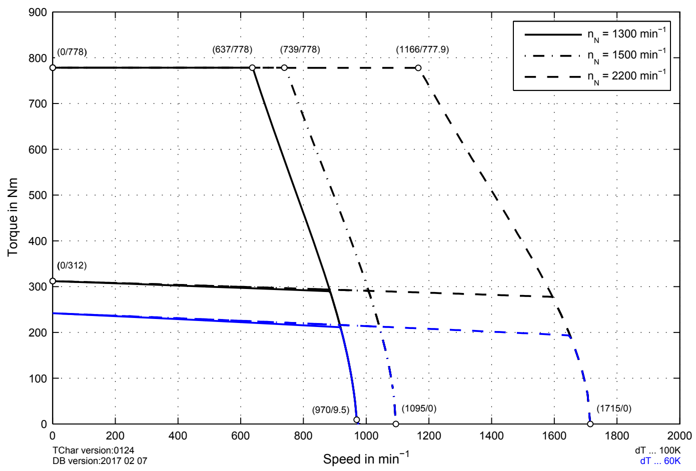
8LSP93.eennnffgg-3



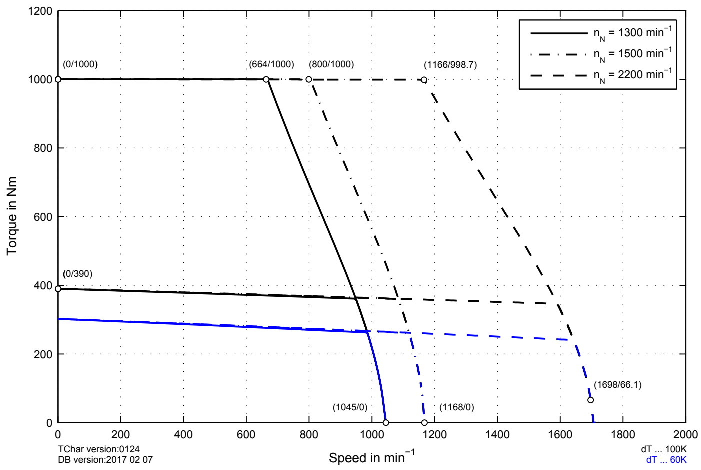
8LSP94.eennnffgg-3



8LSP95.eennnffgg-3

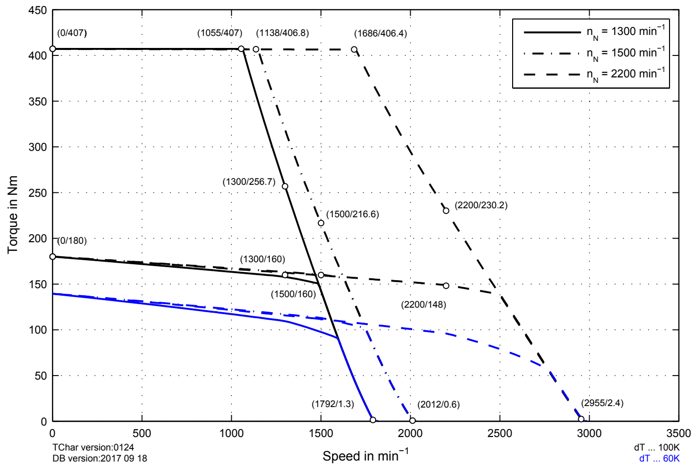


8LSP96.eennnffgg-3

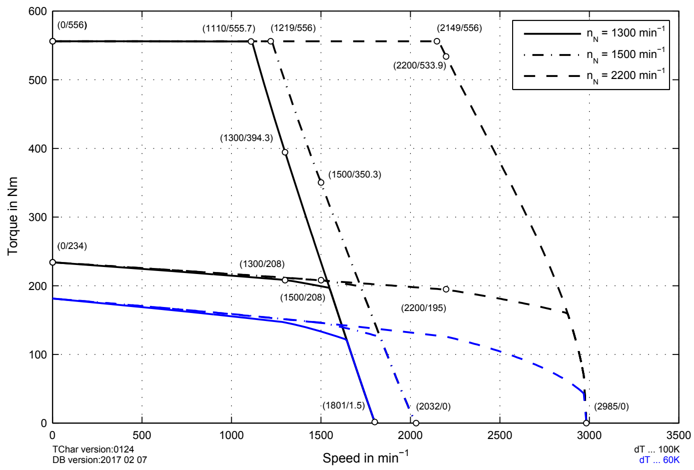


2.17.1.2 Speed-torque characteristic curves at 560 VDC DC bus voltage

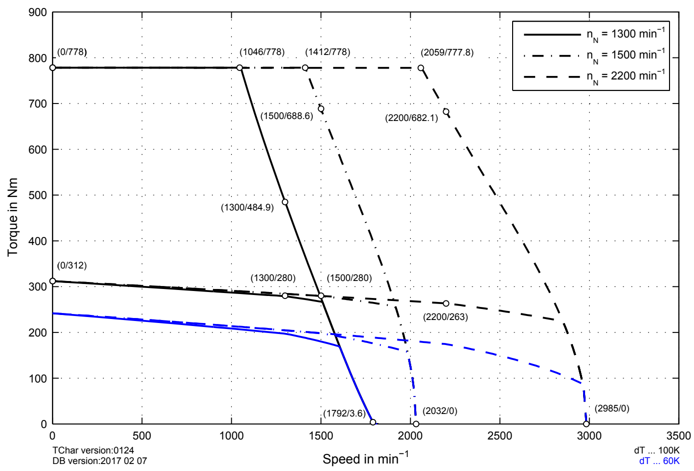
8LSP93.eennnffgg-3



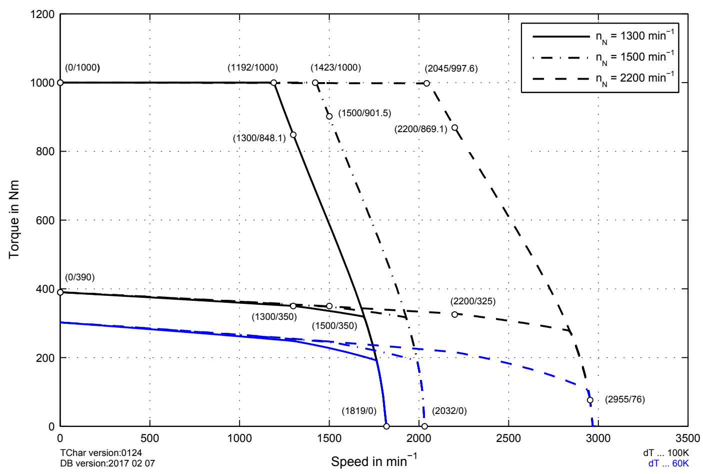
8LSP94.eennnffgg-3



8LSP95.eennnffgg-3

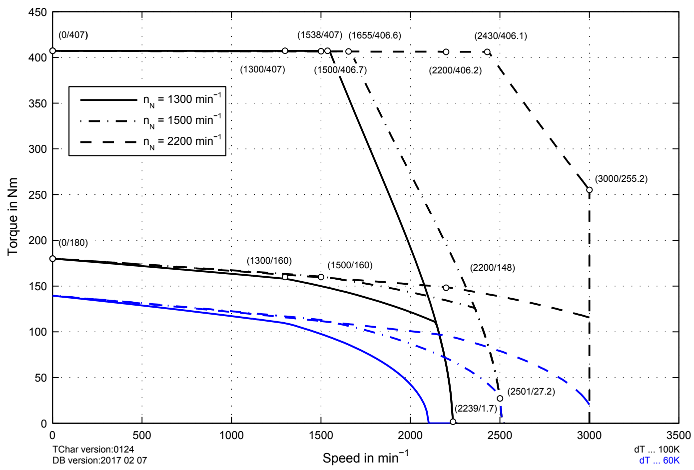


8LSP96.eennnffgg-3

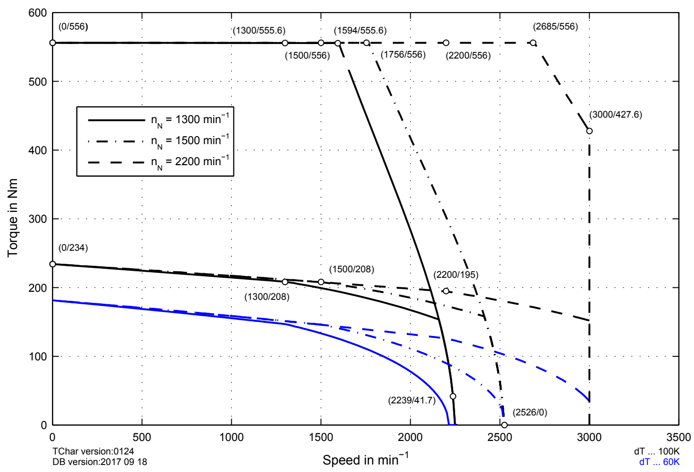


2.17.1.3 Speed-torque characteristic curves at 750 VDC DC bus voltage

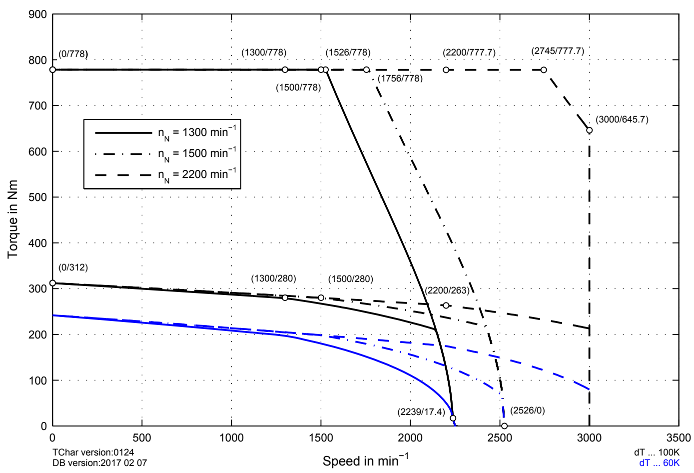
8LSP93.eennnffgg-3



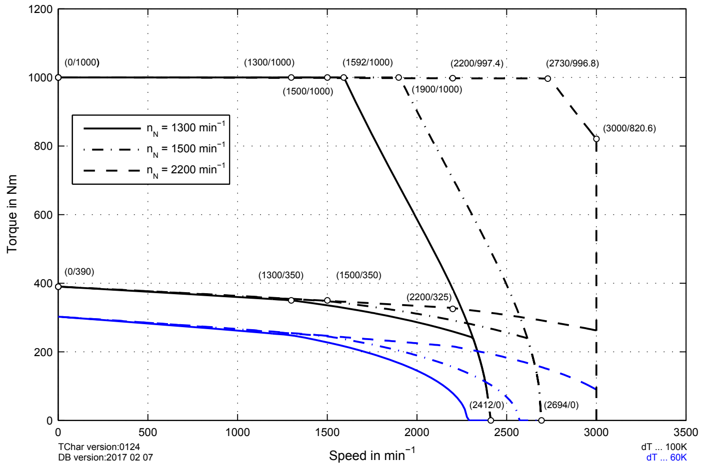
8LSP94.eennnffgg-3



8LSP95.eennnffgg-3



8LSP96.eennnffgg-3

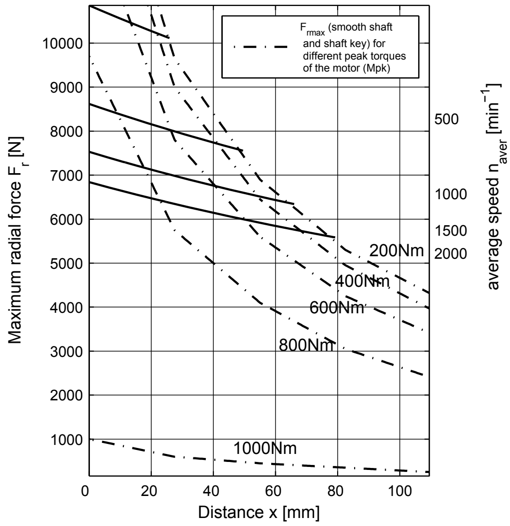


2.17.1.4 Maximum shaft load

Note the information in section "Load capacity of the shaft end and bearing" on page 273 of chapter "Installation conditions".

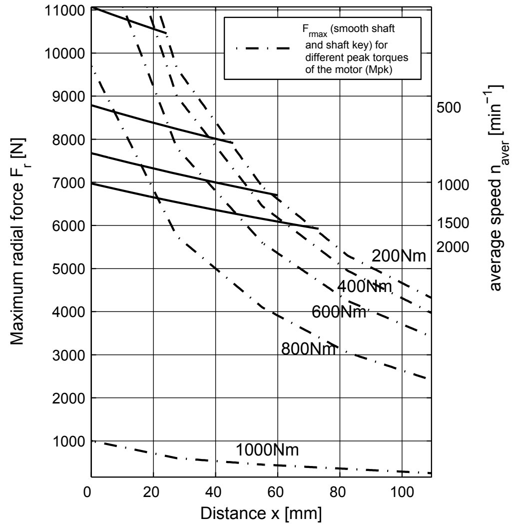
2.17.1.4.1 8LSP9...-3 - Standard bearing

8LSP93 (standard bearing)



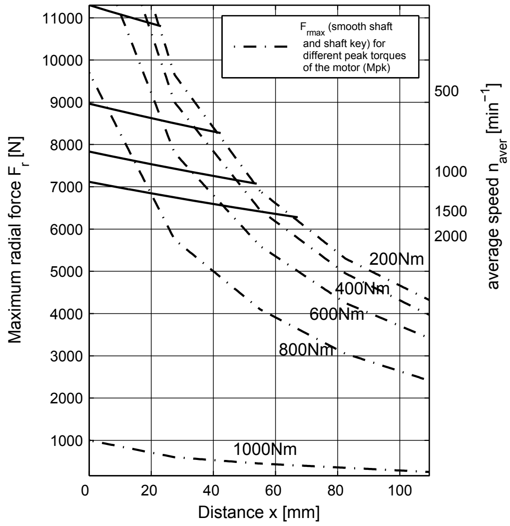
maximum allowed axial force: F_{amax} = 1126 N

8LSP94 (standard bearing)



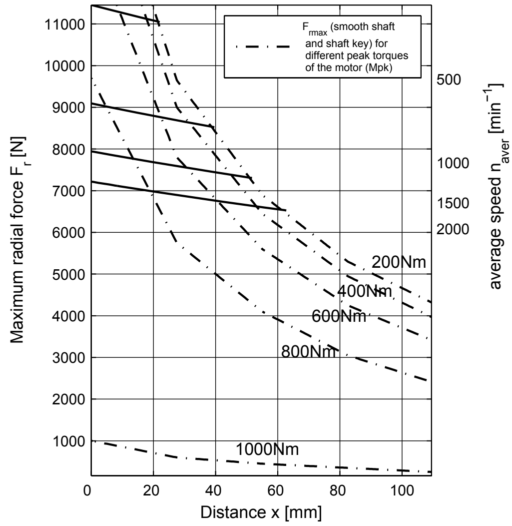
maximum allowed axial force: F_{amax} = 1171 N

8LSP95 (standard bearing)



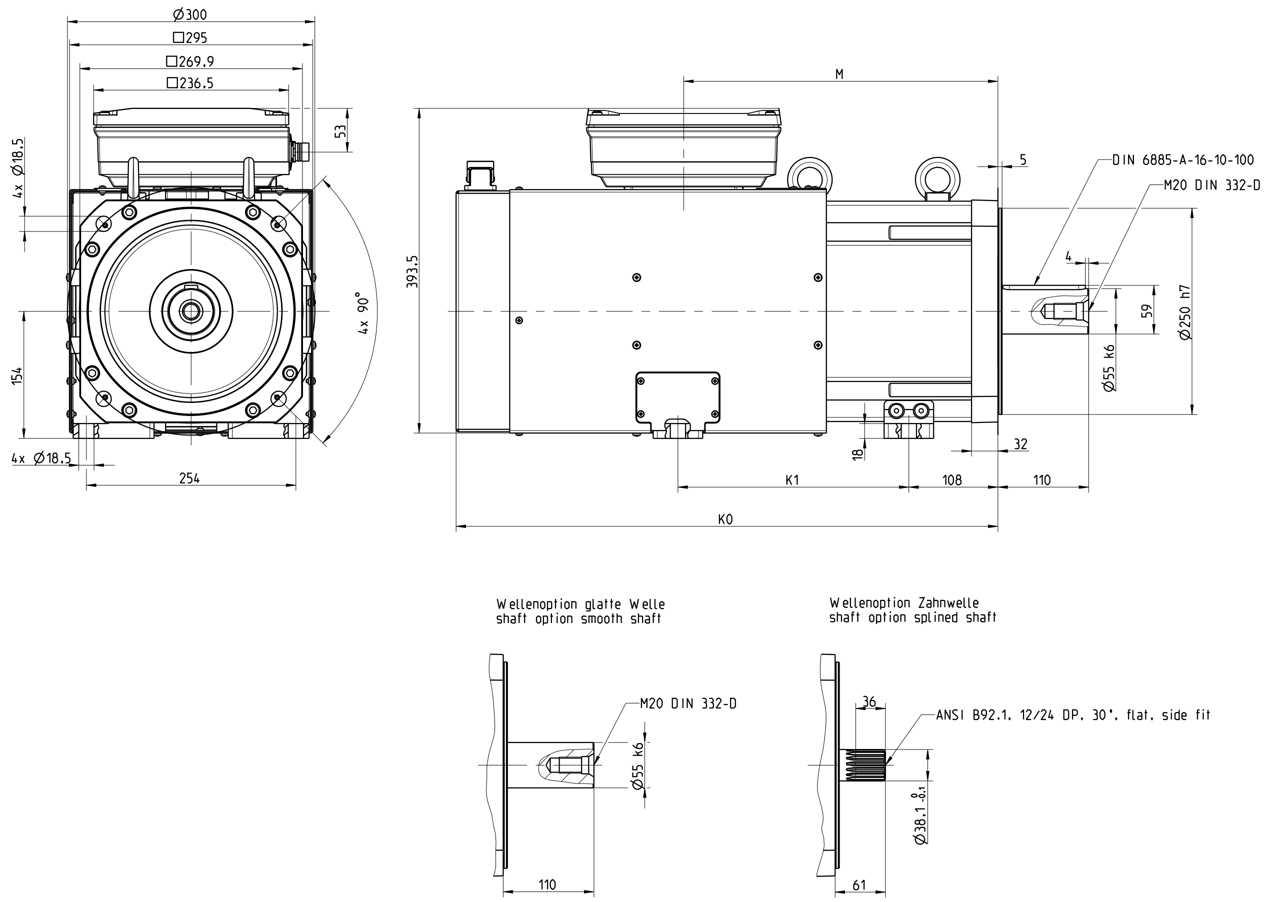
maximum allowed axial force: F_{amax} = 1220 N

8LSP96 (standard bearing)



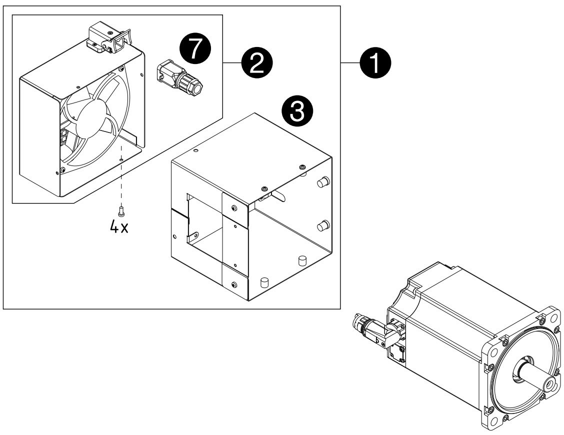
maximum allowed axial force: F_{amax} = 1256 N

2.17.1.5 8LSP9...-3 - Dimensions



EnDat/Resolver feedback				Extension of K_0 and M depending on motor option [mm]
	K_0	**K_1**	**M**	**Oil seal**
Encoder assign-ments	**All encoders**	**All encoders**	**All encoders**	
8LSP93...-3	597	220	321	0
8LSP94...-3	657	280	381	0
8LSP95...-3	747	370	471	0
8LSP96...-3	837	460	561	0

2.18 Replacement parts - 8LSC fan kit



Replacement parts for the fan assembly are available for motors with cooling type 8LSC.

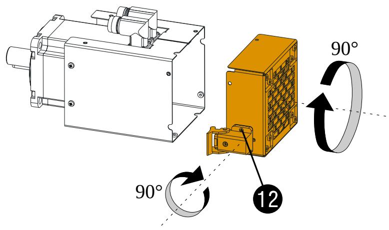
Overview of replacement parts

	1 Fan kit		2 Cover with fan		3 Side panel for fan	7 Fan connector	
	24 VDC	230 VAC	24 VDC	230 VAC		Metal	Plastic
8LSC**4**...-3	8XMFL4.00-1	8XMFL4.10-1	8XMFL4.02-1	8XMFL4.12-1	8XMFL4.01-1	8XMFLC.02-1	8XMFLC.01-1
8LSC**5**...-3 8LSC**6**...-3	8XMFL5.00-1	8XMFL5.10-1	8XMFL5.02-1	8XMFL5.12-1	8XMFL5.01-1		
8LSC**5A/B/C**...-3	8XMFL5.C0-1	8XMFL5.C2-1			8XMFL5.C3-1		
8LSC**7**...-3	8XMFL7.00-1	8XMFL7.10-1	8XMFL7.02-1	8XMFL7.12-1	8XMFL7.01-1		
8LSC**8**...-3	8XMFL8.00-1	8XMFL8.10-1	8XMFL8.02-1	8XMFL8.12-1	8XMFL8.01-1		

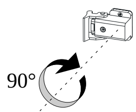
230 VAC / 24 VDC fans - Technical data

see "Fan modules" on page 40

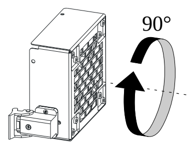
Connection direction



8LSC three-phase synchronous motors are only available at the factory with the fan connection direction shown.
Other connection directions are possible, but must be implemented by the user.
The junction box and cover with fan can be rotated in 90° steps; pay attention to possible interference with the motor connections.



Built-in connector: Loosen the two mounting screws (12) and carefully lift the built-in connector. Turn the built-in connector to the desired position (possible in 90° steps). Make sure that the built-in connector seal is not damaged and that no cables are crushed. Tighten the mounting screws (12) again.



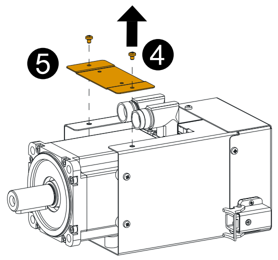
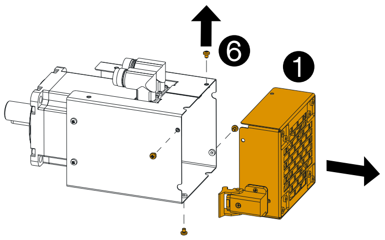
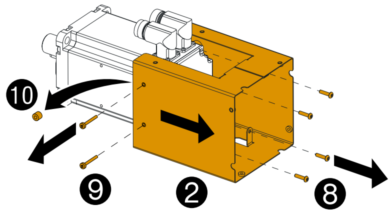
Cover with fan: After disassembly, the cover with fan can be easily mounted in the desired position; see the following disassembly and assembly instructions.

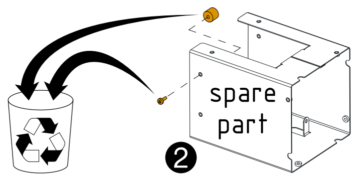
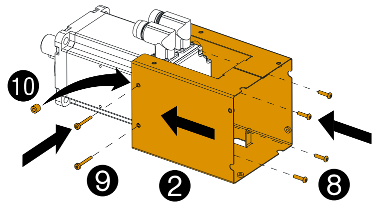
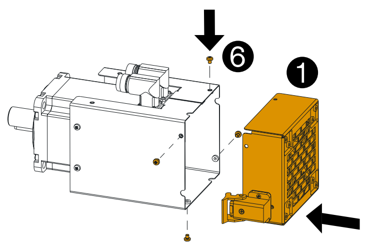
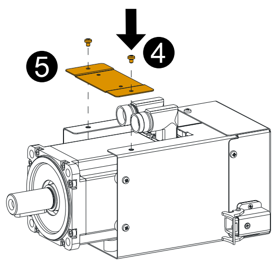
Disassembly / Assembly

Caution!

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.

[2] see "Qualified personnel" on page 9

8LSC disassembly	
	Remove the screws (4) and the stabilization plate (5).
	Remove the screws (6) and the cover with fan (1). **Note:** Keep the screws (6) in a safe place, they are needed to mount the new cover with fan (if a complete fan kit is used as a replacement, these screws are included).
	Remove the screws on three sides (8) and (9) and the spacers (10). Remove the side panel (2) from the motor. **Note:** Keep fasteners (8) and (9) and (10) in a safe place because they are required to secure the new side panel.

8LSC mounting	
	Remove the screws and rubber buffers from the side panel (2), the replacement part. Dispose of the removed parts properly. **Note:** Mounting using these rubber buffers is not intended for 8LSC motors!
	Slide the new side panel (2) onto the motor and fasten it with the screws (8). With the screws (9), also install the spacers (10) on all three sides. **Note:** The fasteners (8) and (9) and (10) are reused and are not part of the replacement part. **Tightening torque** for screw (8): Up to 8LSC6, M4x10, 1.8 Nm and screw locking; 8LSC7 and 8LSC8, M5x16, 3.7 Nm and screw locking
	Slide the new cover with fan (1) onto the side panel and fasten it with the new screws (6). **Note:** You can mount the cover with fan (1) rotated in 90° steps as well as change the direction of the built-in connector. See Connection direction (Page 268). **Note:** The screws (6) are reused and are not part of the replacement part (if a complete fan kit is used as a replacement, these screws are included).
	Mount the stabilization plate (5) with the new screws (4).

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	8LSA	8LSC	8LSO	8LSP
Storage temperature	-20 to +60°C			
Relative humidity during storage	Max. 90%, non-condensing			
Transport temperature	-20 to +60°C			
Relative humidity during transport	Max. 90%, 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.**

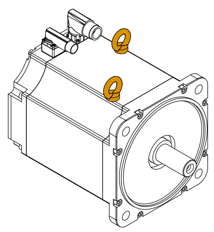
3.1 Lifting eye bolts

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.

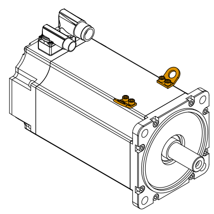
> ## Caution!
>
> **The eye bolts included in delivery are intended exclusively for lifting the motor without any additional components installed!**

Types of eye bolts

8LSA / 8LSC / 8LSO / 8LSP



8LSA5A/B/C / 8LSC5A/B/C



8LSA...-3 / 8LSC...-3

8LSA	8LSC	Availability of eye bolts
8LSA5A/B/C...-3	8LSC5A/B/C...-3	Yes
8LSA73...-3	8LSC73...-3	Yes
8LSA74...-3	8LSC74...-3	Yes
8LSA75...-3	8LSC75...-3	Yes
8LSA76...-3	8LSC76...-3	Yes
8LSA77...-3	8LSC77...-3	Yes
8LSA78...-3	8LSC78...-3	Yes
8LSA83...-3	8LSC83...-3	Yes
8LSA84...-3	8LSC84...-3	Yes
8LSA85...-3	8LSC85...-3	Yes
8LSA86...-3	8LSC86...-3	Yes

8LSO...-3 / 8LSP...-3

8LSO	8LSP	Availability of eye bolts
8LSO9...-3	8LSP9...-3	Yes

4 Installation conditions

Before every commissioning procedure, the motor must be checked by qualified personnel. The check must include the proper condition in terms of mounting and installation, the installation conditions and safe operation.

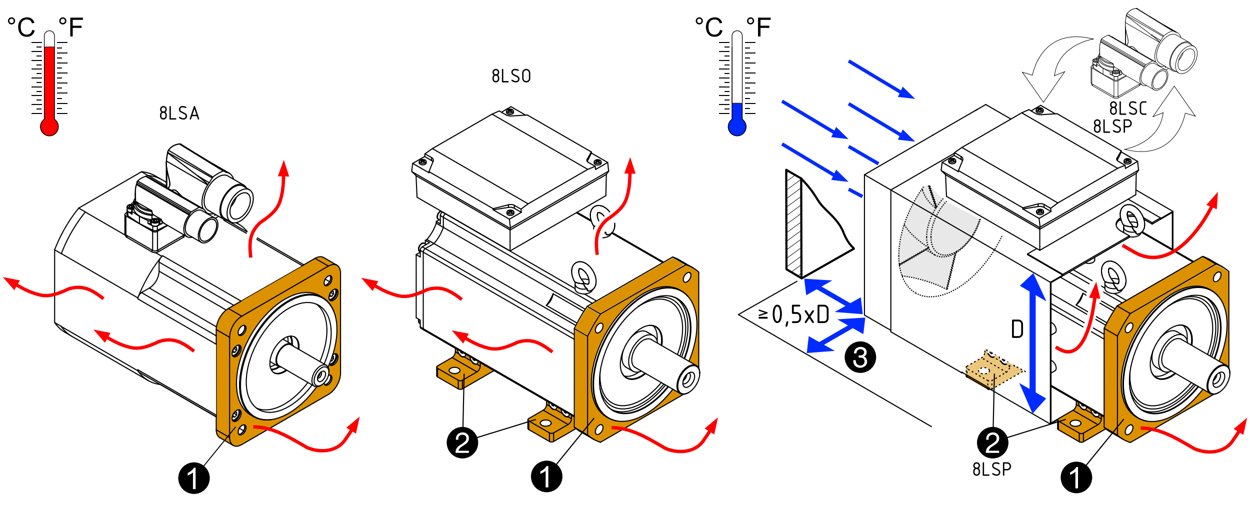
Operating conditions	8LSA	8LSC	8LSO	8LSP
Rating class, operating mode per EN 60034-1	S1 - Continuous operation			
Ambient temperature during operation	-15°C to +40°C			
Reduction of nominal and stall current as well as nominal and stall torque at temperatures above 40°C	10% per 10°C			
Max. ambient temperature during operation	+55°C[3]			
Reduction of nominal and stall current as well as nominal and stall torque at installation elevations starting at 1,000 m above sea level	5% per 1000 m			
Maximum installation elevation	2000 m[4]			
Max. flange temperature	65°C			
EN 60034-5 protection (IP code): Degree of protection with optional oil seal (DIN 3760):	IP64 IP65	IP64, fan IP20 IP65, fan IP20	IP64 IP65	IP64, fan IP20 IP65, fan IP20
Type of construction and mounting arrangement per EN 60034-7 (IM code)	Horizontal (IM3001) Vertical, motor attached to the machine (IM 3011)[5] Vertical, motor stands on the machine (IM3031)			

4.1 Mounting type and cooling

Ensure unobstructed air circulation and cooling so that no heat accumulation can build up on the motor.

Preferably attach the motor with the **motor flange** (1), which also serves as a **cooling surface**, directly on the machine.
If the motor (8LSO / 8LSP) is only mounted with the **mounting base** (2) and not with the mounting flange, the continuous power is reduced in S1 operation.

Externally cooled motors (8LSC / 8LSP) pull in cool air at the B-side flange and that air flows between the motor housing and the fan side panel and leaves the motor at the A-side flange.
For externally cooled motors, keep a **minimum distance** (3) of ≥0.5xD to other components on all sides (D corresponds to a height of the side panel). A sufficient **ventilation cross section** (DxD) for cool air must be ensured; an intake of already heated air or recirculation is not permitted.



[3] Continuous operation of the servo motors at an ambient temperature of +40°C to max. +55°C is possible, but this results in premature aging.
[4] Requirements that go beyond this must be arranged with B&R.
[5] With the IM 3011 type of construction and mounting arrangement (vertical, motor attached to the machine), there is a risk of production fluids or oils penetrating the motor on the flange side. Motors or motor-gearbox combinations that should be used with this mounting arrangement must therefore have at least IP65 protection on the flange side.

The following points must be observed:

- The opposite side of the mounting flange is not permitted to be thermally insulated. Heat from the motor must be allowed to dissipate sufficiently.
- Air circulation must not be impeded. There must be sufficient cooling air on the motor housing.
- Exceeding the specified maximum values for motor temperature is not permitted.

It is important to note the following:

- Power or heat from the motors is dissipated via the mounting flange and surface of the motor housing.
- The motor can heat up due to external heat sources.

Caution!

Personal injury and damage to property due to failure or overheating of the drive.

If the maximum permissible operating temperature is exceeded, a drive defect with consequential damage is very probable.

The cause of a defect could insufficient lubrication due to overheating, for example.

- **For safety reasons, switch off the machine if the maximum permissible temperature is exceeded.**
- **Ensure unobstructed air circulation and cooling so that no heat accumulation can build up in the drive or machine.**

4.2 Load capacity of the shaft end and bearing

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

Radial force

The 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 type, bearing type, average speed, the position where the radial force is applied and the desired service life of the bearings.

Axial force, shift in shaft position caused by axial force

The 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 all motors with inductive encoder systems. As a result, no axial force in excess of the calculated values is permitted in the direction of the B-side flange when using these motors. (See "Determining permissible values for F_r and F_a".)

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!

Determining permissible values of F_r and F_a

For information about determining permissible values of$_{Fr}$ and$_{Fa}$, see th diagrams in chapter Technical data (section "Maximum shaft load" for the respective motor).

The permissible values in the diagram are based on a mechanical bearing lifespan of 20,000 h (bearing lifespan calculation based on DIN ISO 281).

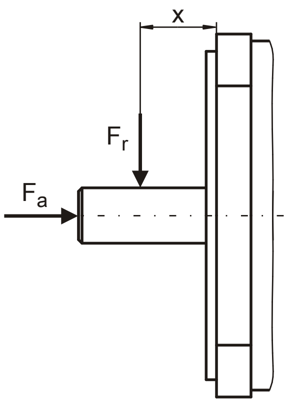
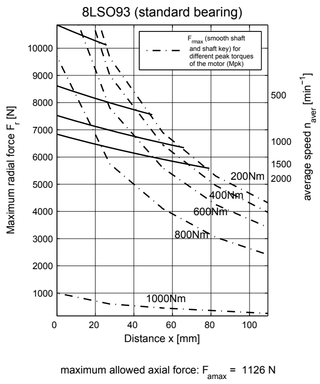


Figure 1: Definition of shaft load

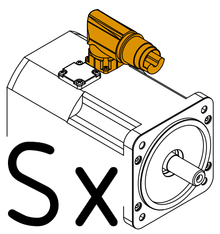
F_r.......... Radial force
F_a......... Axial force
x............ Distance between the motor flange and the point where radial force F_r is applied.

8LSO / 8LSP



With 8LSO/8LSP motors, the peak torque must be taken into account since the shaft is additionally loaded with high torsion.

4.3 Single-cable solution (hybrid)



Advice:

In the case of motors with the single-cable solution (hybrid), the temperature signal is not transmitted via two separate lines in the motor cable as before. Instead, it is transmitted digitally via the encoder interface.

The following conditions must be met by the drives in order to operate a motor with a single-cable solution (hybrid).

- **For ACOPOSmulti: The cable cover must be designed for operation with a hybrid cable (cable cutout present, delivered 2015 or later)**
- **For ACOPOSmulti with SafeMOTION: The configured operating system version (NC version) must be set to V2.48.0 or later; the Safety Release must be V1.9 or later.**
- **For all drives: The configured operating system version (NC version) must be set to V2.42.2 or later.**

If the conditions listed above are not met, temperature evaluation on the drive will not work.

5 Installation and connection

5.1 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.

5.2 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!**

5.2.1 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 9

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. If a holding brake is available, it must be checked for functionality after machine actuators have been attached and after maintenance and repair work has been carried out!**
- **Keep all covers and control cabinet doors closed during operation and as long as the machine is not disconnected from the mains.**
- **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!**

5.2.2 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.**

5.3 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.

5.4 Installing in the 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.

Inspection

Before installation, inspect the components to determine whether they are suitable and undamaged.

> ## 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.**

Cleaning

Clean anti-corrosive agents and dirt off the output shaft and flange of the motor as well as the opposite side of the shaft and flange on the machine.

> ## Caution!
>
> **Damage to property caused by improper cleaning.**
>
> **Contact with cleaning agents can damage oil seals, sealing lips and gaskets.**
>
> - **Only use suitable and material-friendly cleaning agents.**
> - **Ensure that oil seals, sealing lips and gaskets do not come into contact with cleaning agents.**

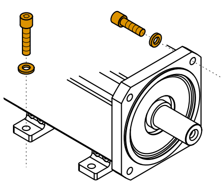
Installation with the mounting flange

Attach the motor with the mounting flange, which also serves as a cooling surface, directly to the machine.

For this, the motor must be screwed to the machine via the flange.

Apply tightening torque in accordance with the standard when tightening the screws and use a screw locking mechanism.

5.4.1 Fasteners and tightening torques



Use socket head cap screws (ISO 4762 - Property class min. 8.8) and flat washers.

Tighten the screws evenly in diagonally opposite sequence and with the correct tightening torque to avoid distorting the flange and excessively straining screws.

The values given for screws are calculated values and are based on the following requirements:

- Coefficient of friction μ = 0.14
- Screwing into steel

If the motor is screwed onto other materials or if there are different surface roughnesses, the user must determine the correct tightening torque.

	Screw	Flat washer [mm]	Tightening torque [Nm]
8LSA2	M5	5.3 x 9	6
8LSAA	M5	--- 1)	6
8LSA3	M6	6.4 x 11	10
8LSA4 / 8LSC4	M8	8.4 x 14	23

	Screw	Flat washer [mm]	Tightening torque [Nm]
8LSA5 / 8LSC5	M10	10.5 x 18	43
8LSA6 / 8LSC6	M12	13 x 20	54
8LSA7 / 8LSC7	M12	13 x 20	70
8LSA8 / 8LSC8	M12	13 x 20	70
8LSO9 / 8LSP9	M16	17 x 28	145

1) Motor size 8LSAA does not have a flat washer.

5.5 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!**

5.5.1 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).

5.5.1.1 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.**

5.5.1.2 Connectors from other manufacturers

Advice:

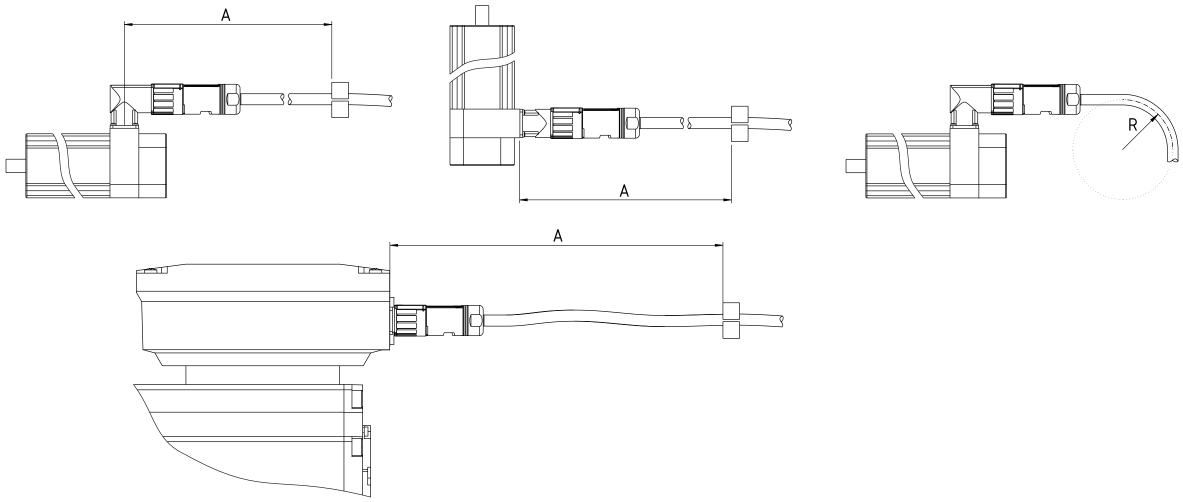
Disturbances caused by electrical or electromagnetic effects!

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.**

5.5.1.3 Cable clamp and bend radius

To ensure that cables and connectors are not exposed to harmful loads, the cable clamp **(A)** and minimum bend radius **(R)** must be observed during installation.



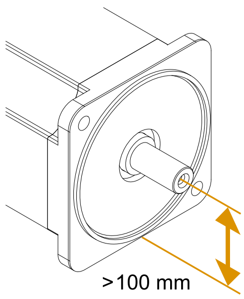
Cable clamp (A)

- A = Max. 300 mm along longitudinal axis of connector
- The connection must be free of force and torque.
- Movement relative to the connector is not permitted!
- Tensile stress on cables and connectors is not permitted!

Bend radius (R)

- The minimum radius values can be taken from the current technical data sheet for the cable

5.5.1.4 Avoiding bearing currents (common-mode currents)



When operating servo motors with an axis height greater than 100 mm, bearing currents (common-mode currents) can cause damage to the surface of the motor bearings. This damage results in loud operating noises, typically occur after an operating period of one to two years and can result in irreparable damage to the motor bearings.
To reduce the bearing currents to a permissible minimum, B&R recommends the use of 8BXC ring cores when wiring the motors. The required number of 8BXC ring cores depends on the axis height of the respective motor.

Motor axis height	Ring core 8BXC006.0000-00	Ring core 8BXC008.0000-00
100 - 131 mm	1 piece	1 piece (for each phase)
132 - 159 mm	2 pieces	1 piece (for each phase)
>160 mm	3 pieces	2 pieces (for each phase)

Table 55: Dimensioning the ring cores

Information:

Table 1 contains typical values. If the 8BXC ring cores show temperatures greater than 80°C during operation for a certain axis height, the bearing currents are so high that the number of 8BXC ring cores must be increased by 1.

Order data

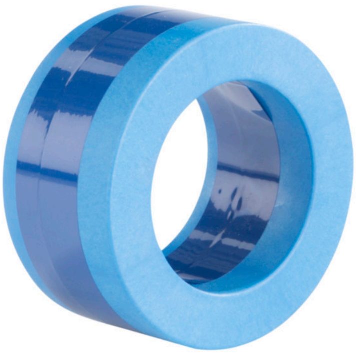
Model number	Short description	Figure
	Accessory sets	
8BXC006.0000-00	ACOPOSmulti accessory set: 16x ring core 68 x 43 x 36 mm, 23.3 to 46.6 µH [10 kHz]	

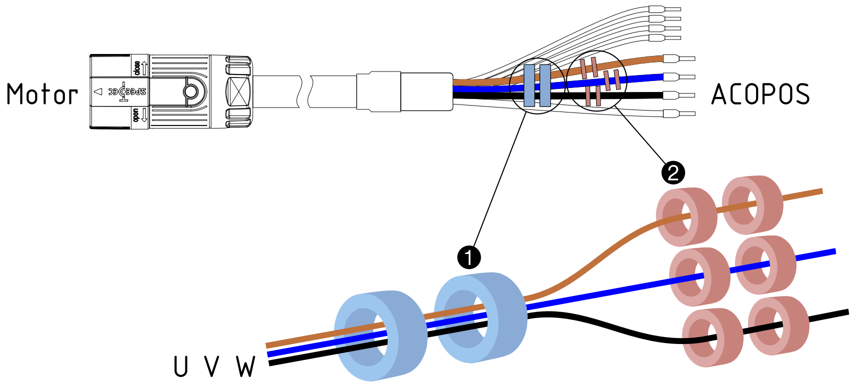
Table 56: 8BXC006.0000-00 - Order data

Model number	Short description	Figure
	Accessory sets	
8BXC008.0000-00	ACOPOSmulti accessory set: 120x ring core 40 x 32 x 15 mm, 33 to 99 µH [10 kHz] 8.4 to 15.6 [100 kHz]	

Table 57: 8BXC008.0000-00 - Order data

Installing 8BXC ring cores

Thread the 3 motor phases U, V and W together through the 8BXC006.0000-00 ring cores **(1)** and the individual phases U, V and W each through the 8BXC008.0000-00 ring cores **(2)**.



5.5.2 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!**

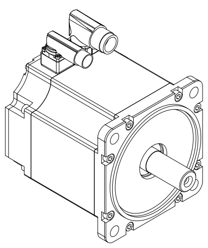
Danger!

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.

Separate connections for motor and encoder



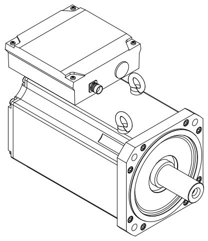
Connecting

1. Disconnect the machine from the power system and secure it against being switched on again.
2. Connect the cable to the drive system (ACOPOS).
3. Connect the power connector to the motor.
4. Connect the encoder connector to the motor.

Disconnecting

1. Disconnect the machine from the power system and secure it against being switched on again.
2. Disconnect the encoder connector from the motor.
3. Disconnect the power connector from the motor.
4. Disconnect the cable from the drive system (ACOPOS).

Separate connections for motor (terminal box) and encoder



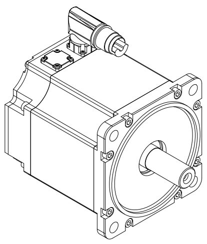
Connecting

1. Disconnect the machine from the power system and secure it against being switched on again.
2. Connect the cable to the drive system (ACOPOS).
3. Connect the temperature sensor to the motor.
4. Install the power supply on the motor.
5. Connect the encoder connector to the motor.

Disconnecting

1. Disconnect the machine from the power system and secure it against being switched on again.
2. Disconnect the encoder connector from the motor.
3. Remove the power supply from the motor.
4. Disconnect the temperature sensor from the motor.
5. Disconnect the cable from the drive system (ACOPOS).

Single-cable solution (hybrid)



Connecting

1. Disconnect the machine from the power system and secure it against being switched on again.
2. Connect the cable to the drive system (ACOPOS).
3. Connect the connector (hybrid) to the motor.

Disconnecting

1. Disconnect the machine from the power system and secure it against being switched on again.
2. Disconnect the connector (hybrid) from the motor.
3. Disconnect the cable from the drive system (ACOPOS).

5.5.3 Connecting connectors properly

The connectors for the power and encoder connection of B&R motors are available as speedtec system[1] and itec system. The systems differ in the type of locking mechanism.

1) The speedtec system on the motor side is backward compatible with wiring with a screw terminal. Existing wiring with screw terminals can therefore continue to be used when replacing motors. For the proper connection, see "Screw terminal (for motors with speedtec connection)" on page 290.

Caution!

Damage due to improperly connected connectors!

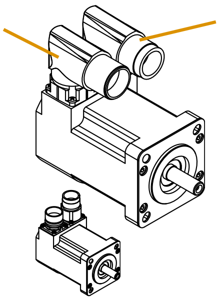
Incorrectly connected connectors can result in disturbances and damage to the motor and encoder!

- **Always connect or disconnect the connector straight in/out, without force and without tools.**
- **It is important to ensure that connectors are fully connected and locked.**

5.5.3.1 System overview

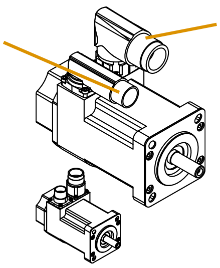
8LSA / 8LSC

speedtec system
Encoder connection
- Resolver
- EnDat 2.1



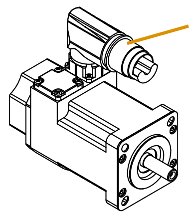
speedtec system
Power connection

itec system
Encoder connection
- EnDat 2.2



speedtec system
Power connection

8LSA/8LSC (htec circular connector for single-cable solution)

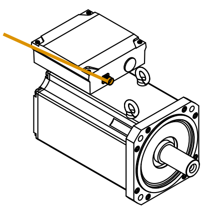


speedtec system
Power and encoder connection

8LSO / 8LSP

speedtec system
Encoder connection
- Resolver

itec system
Encoder connection
- EnDat 2.2

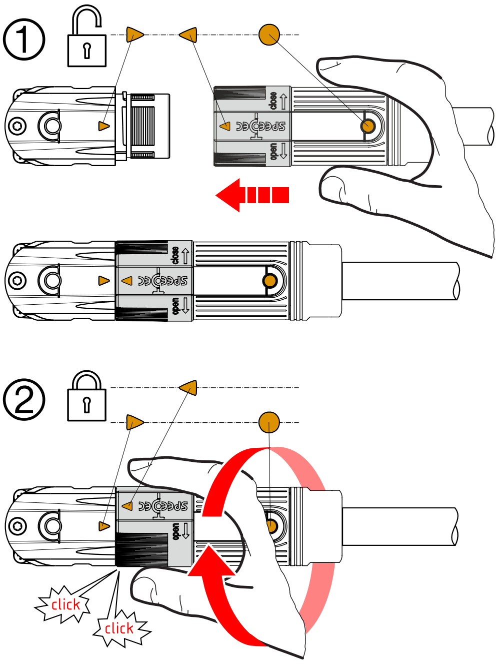


For additional information about the terminal box, see see "Motors with terminal box (8LSO9 / 8LSP9)" on page 292.

5.5.3.2 speedtec system

The speedtec system is equipped with a tool-free quick-release fastener and an internal thread, making it compatible with built-in connectors that use a screw terminal.

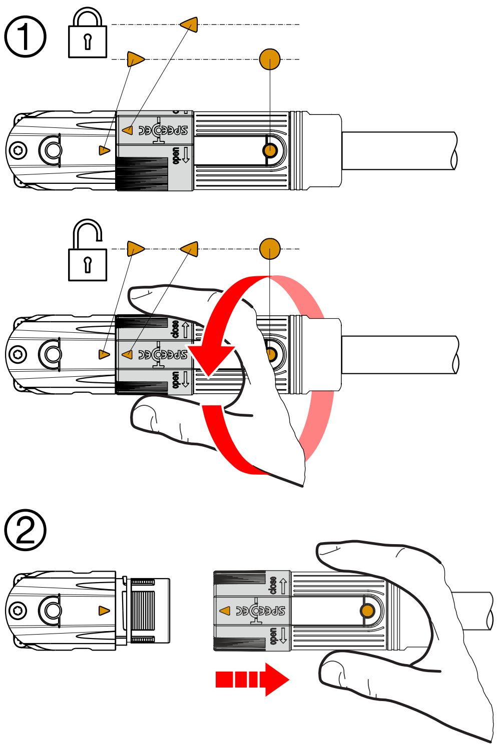
Connecting and locking



1. Align the ►◄• markings with each other.
   Push the connector straight and tightly onto the built-in connector.

2. Tighten the locking ring clockwise (direction of arrow "close").
   The interlocking device must be turned until at least **2** "**click**" sounds can be heard. To ensure correct locking, the ►◄• markings must also be **offset** from each other (see step 2 in the figure on the left).

Unlocking and disconnecting the connector



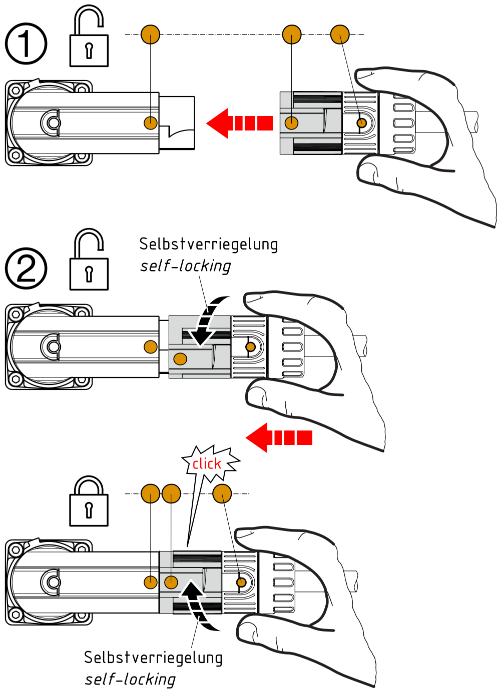
1. Turn the locking ring counterclockwise (direction of arrow "open") until the ►◄• markings are aligned with each other.

2. Disconnect the connector straight out and without force from the built-in connector.
   It is only permitted to pull the connector during removal, not the cable.

5.5.3.3 itec system

The tool-free self-locking itec system twists the frontmost ring of the connector during connection and returns it to the middle position after it has been locked.

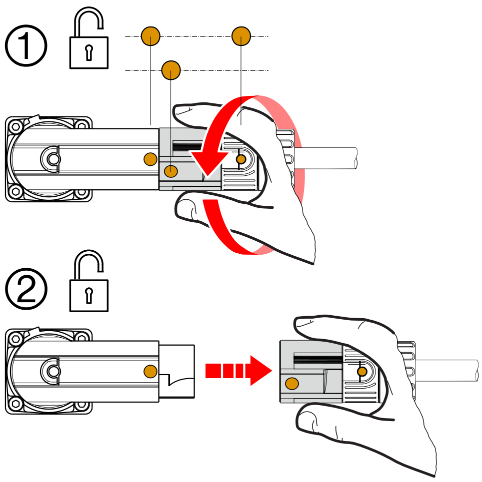
Connecting and locking



1. Align the • • • markings with each other.
   Push the connector straight and without gaps.

2. While pushing, the front ring of the connector turns counter-clockwise and jumps back to the middle position after locking. Correct locking is indicated by the middle position of the front ring and a "**click**" sound.

Unlocking and disconnecting the connector



1. Turn the front ring of the connector one eighth of a turn counterclockwise and hold it in this position.
2. Disconnect the connector straight out and without force.
   It is only permitted to pull the connector during removal, not the cable.

5.5.3.4 Screw terminal (for motors with speedtec connection)

The screw terminal is used when an existing motor with a screw terminal is replaced by a new motor (of the same series with a backward compatible speedtec connection). The existing wiring with screw terminals can therefore continue to be used.

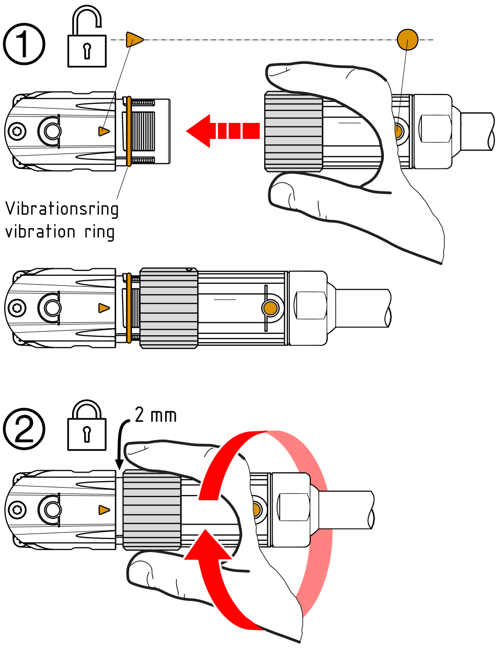
The connection is made without tools; it is important to ensure installation without tilting.

Vibration ring

If strong vibrations (>4-6 g) are expected during operation, the screw terminal must be secured with a vibration ring. This prevents the screw connection from coming loose. The vibration ring does not provide a sealing function. **Installation** is performed without tools by sliding onto the built-in connector on the motor side. The corresponding nut for the vibration ring is located just after the fine thread.

Order number for the vibration ring:	Content of delivery:	
8PX000.00-1	Vibration ring, size 1, 50 pieces	(for motors with speedtec connection)
8PX001.00-1	Vibration ring, size 1.5, 10 pieces	(for motors with speedtec connection)

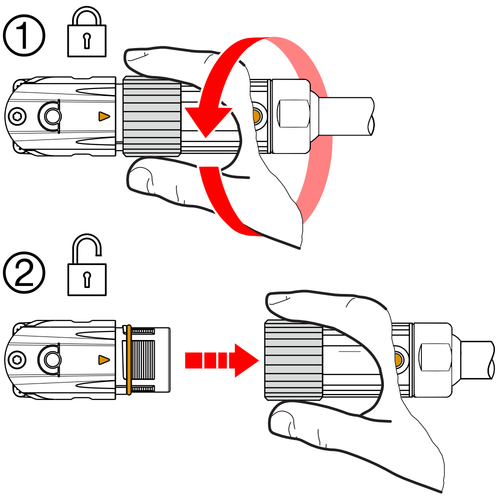
Connecting and locking



1. Fit a vibration ring if necessary.
   Align the ►• markings with each other.
   Push the connector straight onto the built-in connector.

2. Turn the locking ring clockwise and tighten it until the end stop.
   The gap between the connector and the built-in connector should be approx. 2 mm.

Unlocking and disconnecting the connector



1. Turn the locking ring counterclockwise until it is completely detached from the thread of the built-in connector.

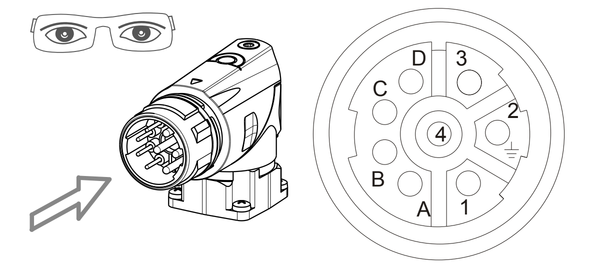
2. Disconnect the connector straight out and without force from the built-in connector.
   It is only permitted to pull the connector during removal, not the cable.

5.5.4 Connection type

5.5.4.1 Power connection

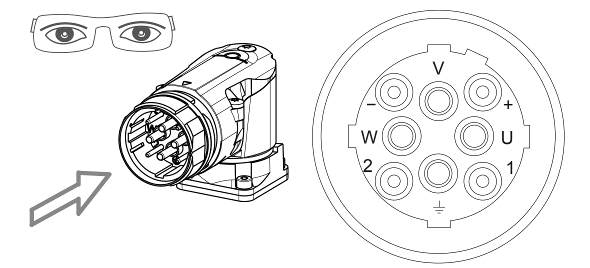
5.5.4.1.1 Pinout power connection.

Built-in connector, size 1 (speedtec system / screw terminal)



	Pin	Description	Function
	1	U	Motor connection U
	4	V	Motor connection V
	3	W	Motor connection W
	2	PE	Grounding
	A	T+	Temperature +
	B	T-	Temperature -
	C	B+	Brake +
	D	B-	Brake -

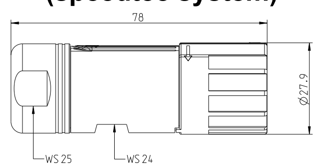
Built-in connector, size 1.5 (speedtec system / screw terminal)



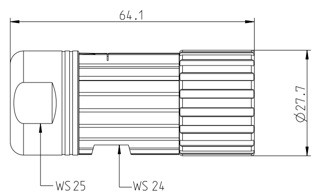
	Pin	Description	Function
	U	U	Motor connection U
	V	V	Motor connection V
	W	W	Motor connection W
	Ground symbol	PE	Grounding
	1	T+	Temperature +
	2	T-	Temperature -
	+	B+	Brake +
	-	B-	Brake -

5.5.4.1.2 Power connector dimensions

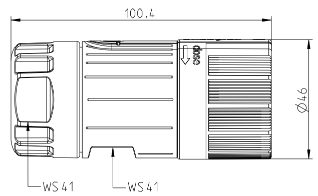
Connector size 1 (speedtec system)



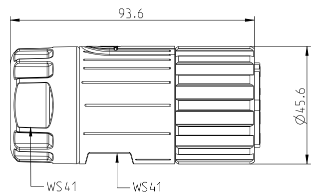
Connector size 1 (screw terminal [1])



Connector size 1.5 (speedtec system)

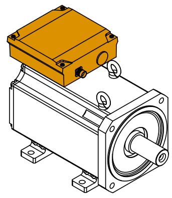


Connector size 1.5 (screw terminal [1])



1) The speedtec system on the motor side is backward compatible with wiring with a screw terminal. The existing wiring with screw terminals can therefore continue to be used. This connector is a component of cables that are not yet equipped with the speedtec system.

5.5.4.2 Motors with terminal box (8LSO9 / 8LSP9)



The **encoder connection** is straight and facing the connection direction.
speedtec is used for resolvers and the itec system is used for EnDat 2.2.
The size of the **power connections** depends on the motor power. The motor phases U V W are connected to M10 (M12 for 8LSO96.ee022ffgg-h and 8LSP96.ee022ffgg-h) and secured with threaded nuts. The required nuts and washers are included in delivery.

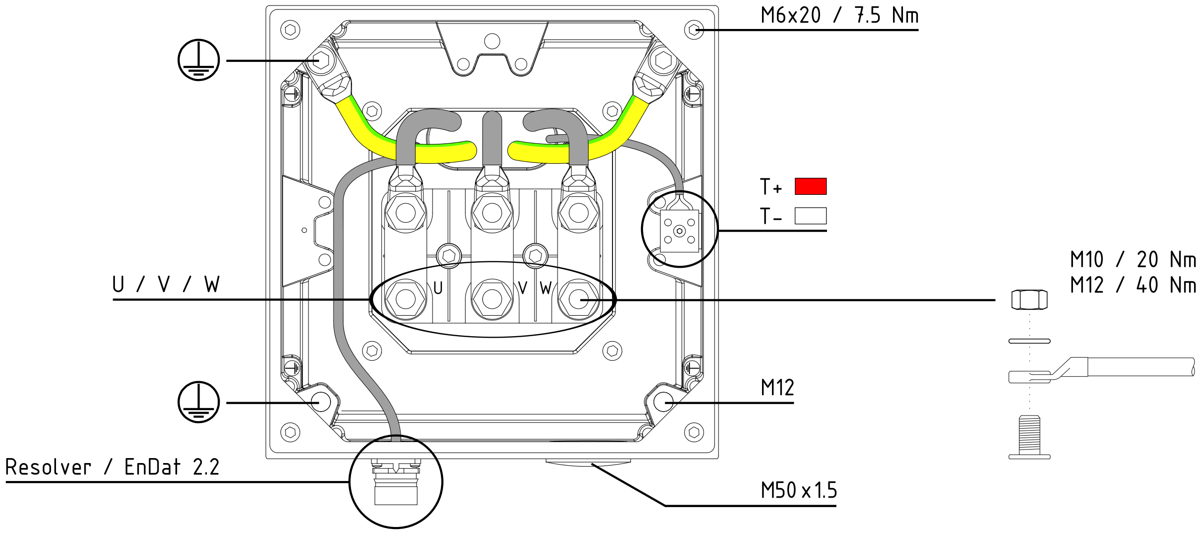
The **terminal box opening** (power connection) is designed with an M50x1.5 internal thread and closed with a dummy plug when delivered.

Advice:

For the terminal box opening, use an EMC cable gland where the cable gland or the cable braided shield ground connection covers the full 360°.
The required M50x1.5 EMC cable gland is not included in delivery.

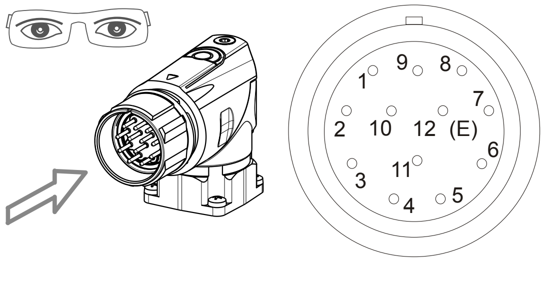
The **temperature sensor** must be connected accordingly with a red cable for T+ and a white cable for T-.

Two free M12 threaded holes are available for the **ground connection** .



5.5.4.3 Encoder connection

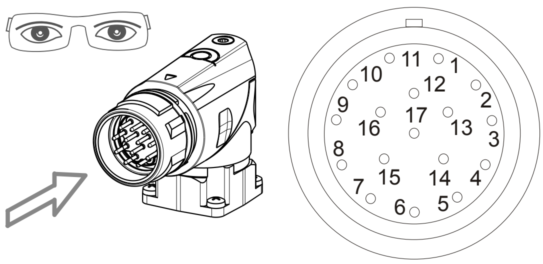
5.5.4.3.1 Resolver (speedtec system / screw terminal) - Pinout



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	---	---

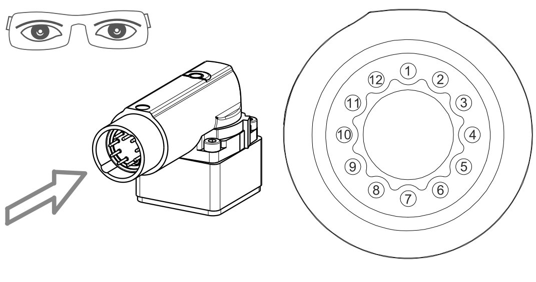
5.5.4.3.2 EnDat connection - Pinout

EnDat 2.1 (speedtec system / screw terminal)



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 (itec system)



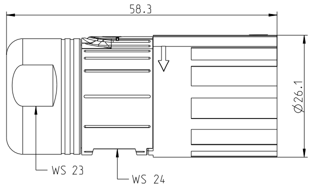
Pin	Color	Description	Function
1	Brown/Green	+5 V output / 0.25 A	Encoder power supply +5 V
2	Gray	D	Data output
3	Pink	D\	Data output inverted
4	Purple	T	Clock input
5	Yellow	T\	Clock input inverted
6	White	Sense COM	Sense 0 V
7	White/Green	COM (1, 3-9, 11, 13-15)	Sense +5 V
8	---	---	---
9	---	---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

1) Only relevant if an encoder with battery-backed multi-turn functionality is installed on the motor. The battery backup can be implemented using 8BXB000.0000-00 backup batteries installed on ACOPOSmulti 8BVI inverter modules or ACOPOS 8AC126.60-1 plug-in modules with battery module 8AXB000.0000-00. No backup battery is installed in the encoder itself.

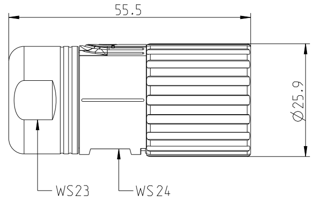
[1)] 1)

5.5.4.3.3 Encoder connector dimensions

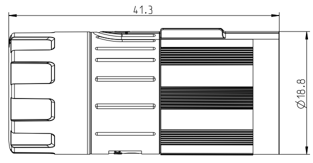
EnDat 2.1 / Resolver (speedtec system)



EnDat 2.1 / Resolver (screw terminal[1])

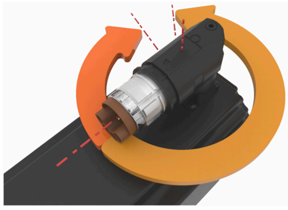


EnDat 2.2 (itec system)



1) The speedtec system on the motor side is backward compatible with wiring with a screw terminal. The existing wiring with screw terminals can therefore continue to be used. This connector is a component of cables that are not yet equipped with the speedtec system.

5.5.4.4 Single-cable solution (hybrid) - (speedtec system)



- 300° swivel speedtec connection
- Encoder and power cable: Combined in one cable
- Quick-release self-locking connector system
- Robust industrial connectors with optimal EMC shielding
- Robust metal housing

Advice:

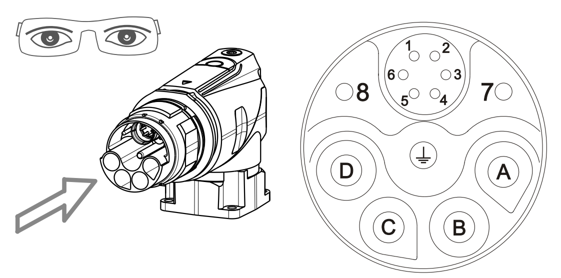
In the case of motors with the single-cable solution (hybrid), the temperature signal is not transmitted via two separate lines in the motor cable as before. Instead, it is transmitted digitally via the encoder interface.

The following conditions must be met by the drives in order to operate a motor with a single-cable solution (hybrid).

- **For ACOPOSmulti: The cable cover must be designed for operation with a hybrid cable (cable cutout present, delivered 2015 or later)**
- **For ACOPOSmulti with SafeMOTION: The configured operating system version (NC version) must be set to V2.48.0 or later; the Safety Release must be V1.9 or later.**
- **For all drives: The configured operating system version (NC version) must be set to V2.42.2 or later.**

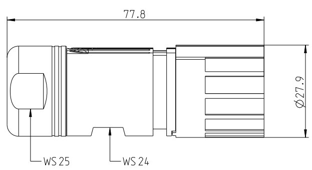
If the conditions listed above are not met, temperature evaluation on the drive will not work.

5.5.4.4.1 Single-cable solution (hybrid) - (speedtec system) - Pinout



Pin	Function
A	Motor connection U
B	Motor connection V
C	Motor connection W
D	---
7	Brake -
8	Brake +
PE	Grounding
1	Encoder connection
2	Ground
3	Data
4	Data inverted
5	Clock input
6	Clock input inverted

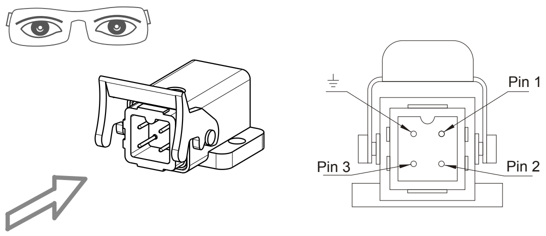
5.5.4.4.2 Single-cable solution (hybrid) - (speedtec system) - Dimensions



5.5.4.5 Fan connection

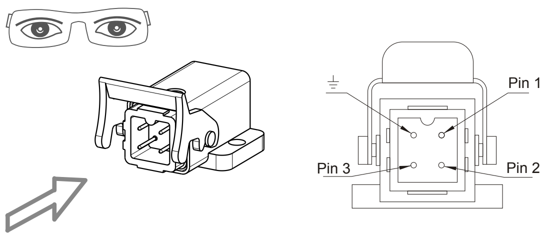
5.5.4.5.1 Fan connector pinout

24 V



Pin	Description	Function
1	Fan connector -	Ground
2	--	--
3	Fan connector +	24VDC
4	--	--

230 V



Pin	Description	Function
1	N	230 VAC
2	L1	230 VAC
3	--	--
Ground symbol	PE	Grounding

Cable-side connector - Order data

The 4-pole connector is available in plastic and aluminum variants.

Plastic housing

- Model number: 8XMFLC.01-1
- 4x 0.75-1.5 mm²
- Union nut tightening torque: 3 Nm
- Ambient temperature (operation) -25°C to 80°C

Die-cast aluminum housing

- Model number: 8XMFLC.02-1
- Push-in connection
- 4x 0.14-1.5 mm²
- Union nut tightening torque: 5.5 Nm
- Ambient temperature (operation) -40°C to 125°C

6 Commissioning and operation

6.1 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.

6.2 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.**

6.2.1 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 9

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. If a holding brake is available, it must be checked for functionality after machine actuators have been attached and after maintenance and repair work has been carried out!**
- **Keep all covers and control cabinet doors closed during operation and as long as the machine is not disconnected from the mains.**
- **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!**

6.2.2 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.**

6.2.3 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.**

6.2.4 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 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".

6.3 Verification

6.3.1 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.
- A holding brake must be functional if available.
- 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.**

6.3.2 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.

6.3.3 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.

6.4 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)

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.

7.1 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.**

7.1.1 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 9

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.**
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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

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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.

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

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- **Before working on the machine, secure it against unwanted movements. If a holding brake is available, it must be checked for functionality after machine actuators have been attached and after maintenance and repair work has been carried out!**
- **Keep all covers and control cabinet doors closed during operation and as long as the machine is not disconnected from the mains.**
- **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!**

7.2 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 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.

7.3 Oil seal

Motors can optionally be equipped with an oil seal (form A per DIN 3760). The motors thus satisfy the requirements for IP65 protection per EN 60034-5.

Advice:

Gearbox mounting is not permitted as a result, however, since maintenance of the oil seal is impeded by the gearbox.

- **Ensure sufficient lubrication of the oil seal throughout the entire service life of the motor.**

7.4 Cleaning

Clean the motors regularly to ensure good heat dissipation.

Information:

- **During cleaning work, hold the drive cable/connector in place.**
- **Remove fibers and foreign matter from the motor housing by hand without damaging the motor surface or shaft end.**
- **Use a cloth moistened with water to remove dust and dirt from the motor housing (excluding the shaft end).**

Caution!

- **Cleaning is only permitted to be carried out by qualified personnel.**
- **Before starting cleaning work, make sure that the motor is switched off, disconnected from power, stopped and cooled down.**
- **Compressed air tools, high-pressure cleaners, wire brushes, scrapers, etc. are not suitable for cleaning the motor and cables.**

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	

8.1 Safety

8.1.1 Protective equipment

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

8.1.2 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.**

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